Riverstone Retirement Community
HUNT CLUB ROAD DEVELOPMENT

SITE SERVICING AND STORMWATER MANAGEMENT REPORT

Prepared by:

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May 25th, 2017
Revised September 7, 2017

Novatech File: 117036
Ref: 2017-058

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September 7, 2017

City of Ottawa
Planning Infrastructure and Economic Development
Planning and Infrastructure Approvals
City of Ottawa
110 Laurier Ave. West, 4th Floor
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Attention: **Sean Moore, Planner III**

Reference: **Riverstone Retirement Community - Hunt Club Road Development**
Site Servicing and Stormwater Management Report
Novatech File No.: 117036

Please find enclosed six (6) copies of the Site Servicing and Stormwater Management Report for the proposed hotel and retirement home located on the corner of West Hunt Club Road and Airport Parkway. This report is submitted in support of the site plan and zoning application and demonstrates how the proposed site will be serviced with storm, sanitary, watermain, and stormwater management.

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

Sincerely,

NOVATECH

Greg MacDonald, P.Eng.
Director | Land Development and Public Sector Infrastructure

c.c. Jim Burghout, Claridge Homes

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1.0 INTRODUCTION

Novatech has been retained by Claridge Homes to prepare the site servicing and stormwater management report in support of the site plan and zoning application for the proposed hotel and retirement home, located on the corner of West Hunt Club Road and Airport Parkway. The site location is shown in **Figure 1 – Key Plan.**

This report will outline how the proposed development will be serviced with sanitary, water, and stormwater management.

The proposed development will include an 8 storey retirement home building comprising of 145 units (100 - 1 bedroom, 5 - 2 bedroom and 40 assisted) and an 8 storey hotel comprising of 150 units. The site plan for this development is shown in **Figure 2 – Site Plan**.

The site will be developed in phasing. The construction of the retirement home and the underground parking for the retirement residence will be completed as Phase 1. The hotel and future underground parking for the hotel will be constructed in Phase 2. A phasing plan for this site is shown in **Figure 3 – Phasing Plan**.

1.1 Existing Conditions

The site is located at the southwest corner of the Airport Parking and West Hunt Club Road. There is an existing church located on the west side of the property. The site has two residential houses on it, a commercial building vacated by Roofmaster Ottawa Inc. and a utility garage. The ground slopes northeast to the on-ramp of the Airport Parking. Drainage is collected at the existing dual inlet catch basins located at the north corner of the site within the right of way.

1.2 Relevant Reports

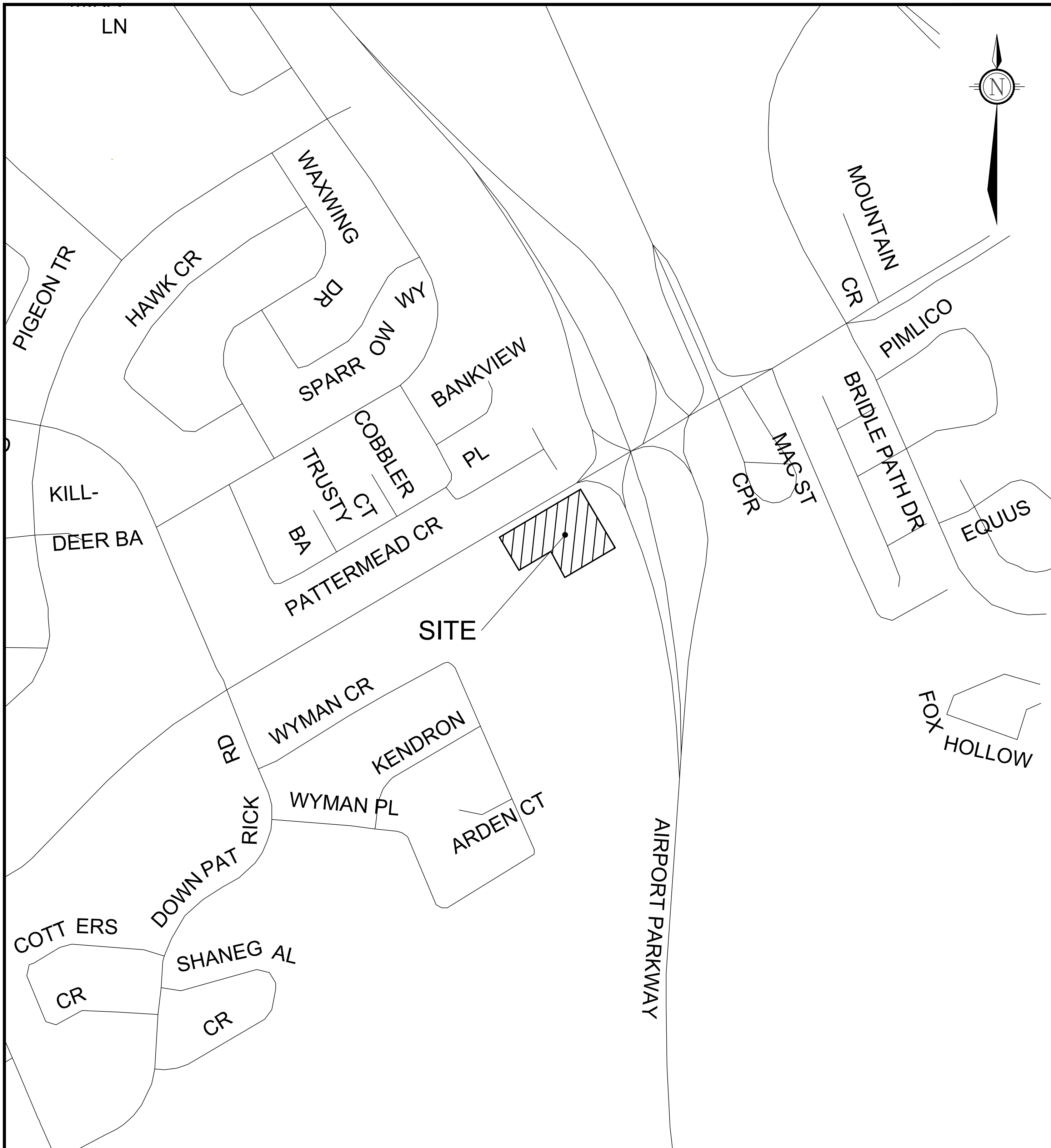
The following reports were referenced when preparing this document:

- *Sawmill Creek Sub Watershed Study Update, (CH2M HILL, 2003)*
- *Geotechnical Investigation – Proposed Multi-Storey Buildings – 1026-1054 Hunt Club Road, Ottawa, Ontario (Patterson Group, September 2016, Report Number: PG4091-1)*

1.3 Geotechnical Investigation

Patterson Group conducted a geotechnical investigation which assessed the general soil, bedrock, and groundwater conditions at the site by analyzing the information gathered at test holes (7 boreholes). The principal findings of the geotechnical investigation are:

- Fill was encountered at all test holes. The fill varies from 0.46m to 2.13m in thickness and varies in composition from stone dust, to silty sand, to crushed stone, to river stone, to gravel, to sand, to organics.
- A mixture of silty sand, silt, clayey sand, and sand are found below the ground surface (BH1 to BH4, BH6 to BH7). The sands vary in depth from 0.46m to 9.75m.
- Glacial till was observed at BH 5. The depth of glacial till ranges from 1.22m to 5.49m. It consists of brown silty sand with gravel, cobbles and boulders.
- Practical refusals were encountered at BH 3 and BH 7 at a depth of 15.8m and 21.1m, respectively.
- The long-term groundwater table can be expected between 3m and 4m depth below the existing ground surface.



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KEY PLAN
1026-1054
WEST HUNT CLUB ROAD

HUNT CLUB DEVELOPMENT

DATE	JOB	FIGURE
AUG 2017	117036	FIG-1

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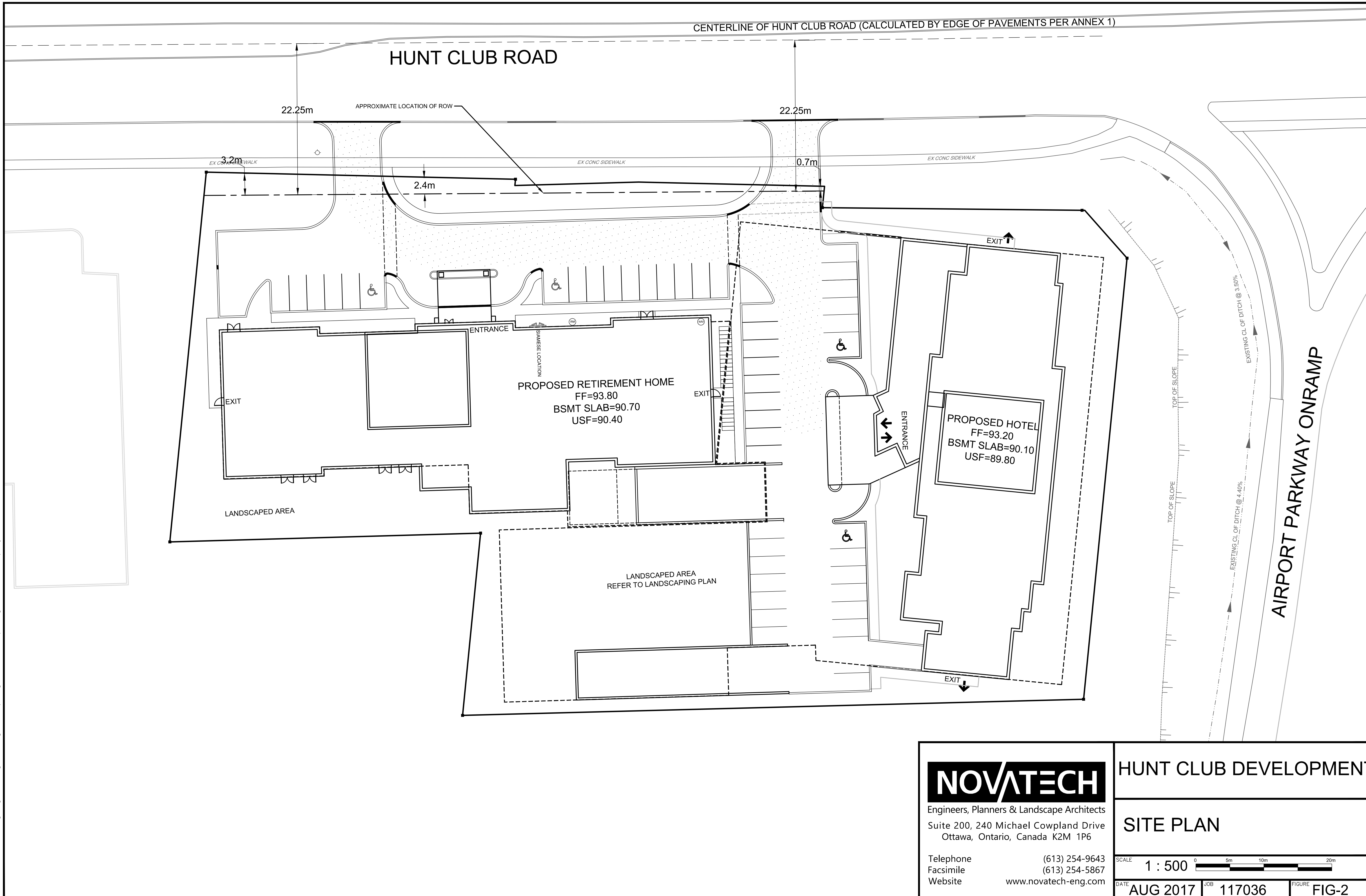

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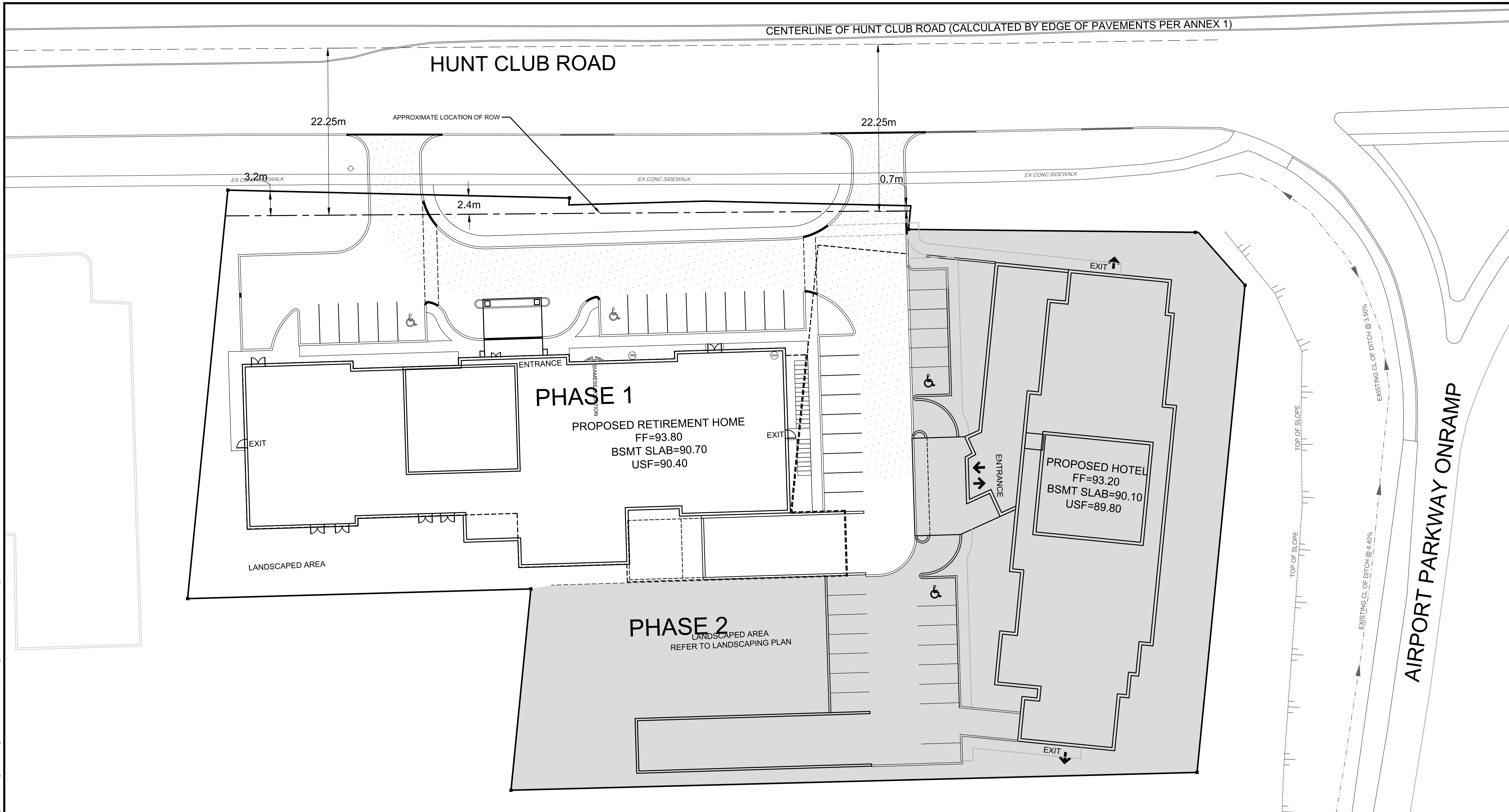

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HUNT CLUB DEVELOPMENT

PHASING PLAN

SCALE 1 : 500 (0 5m 10m 20m)

DATE AUG 2017 | JOB 117036 | FIGURE FIG-3

SHT11X17.DWG - 279mmX432mm

This report provides engineering guidelines based on Patterson Group's interpretation of the test hole information and project requirements. Refer to the *Geotechnical Investigation – Proposed Multi-Storey Buildings – 1026-1054 Hunt Club Road, Ottawa, Ontario (Patterson Group, September 2016), Report Number: PG4091-1)*.

2.0 SANITARY SERVICING

Sanitary flows from the site will be directed by gravity sewer into the existing 225mm sanitary sewer along the south side of Hunt Club Road which then discharges to a 450mm sanitary sewer within the median. The sanitary sewer travels east along Hunt Club Road which then connects to the existing 525mm sanitary trunk sewer on Bank Street. The extent of the sanitary sewer location is shown in the 2016 Sewer Collection System drawing in **Appendix D**.

The sanitary design flows were calculated for the proposed retirement residence using estimated populations based on the architectural design plans. The design criteria used to determine the sanitary flows are based on the *City of Ottawa Sewer Design Guidelines (October, 2012)* and are as follows:

- Residential Average Flow = 350 L/capita/day
- Residential Peaking Factor = Harmon Equation (max peaking factor = 4.0)
- Commercial Peaking Factor = 1.5
- Institutional Peaking Factor = 1.5
- Peak Extraneous Flows (Infiltration) = 0.28 L/s/ha
- Retirement Residential Dwelling (1 Bedroom) = 1.4 people/unit (average)
- Retirement Residential Dwelling (2 Bedroom) = 2.1 people/unit (average)
- Doctor and Medical Staff = 275 L/cap/day
- Hotel Room (1 Bedroom) = 225 L/bed/day
- Hotel Room (2 Bedroom) = 225 L/bed/day
- Hotel Staff = 40 L/cap/day
- Beauty Salon = 650 L/day/station
- Dining Area = 115 L/seat/day
- Convenience Store = 5 L/m^2/day
- Laundry = 1200 L/machine/day
- Bar/Lounge Area = 70 L/cap/day
- Hotel Staff = 40 L/cap/day

Based on the above design criteria, the peak sanitary design flows are shown below in **Table 1** and **Table 2**.

Table 1: Sanitary Design Flows – Retirement Home

Type	Design Criteria[1]	No. of Units	Population	Peaking Factor[2]	Peak Sanitary Flow
Retirement Res. Dwelling (1 bedroom)	1.4 people / unit (450 L/bed/day)	75	105	1.5	0.83 L/s
Retirement Res. Studio Dwelling (1 bedroom)	1.4 people / unit (450 L/bed/day)	25	35	1.5	0.27 L/s
Retirement Res. Dwelling (2 bedroom)	2.1 people / unit (450 L/bed/day)	5	11	1.5	0.09 L/s
Retirement Assisted Care (1 bedroom)	(450 L/bed/day)	40	56	1.5 (Institutional)	0.44 L/s
Doctor/Medical Staff	(275 L/cap/day)	20	20	4.0	0.25 L/s
Beauty Salon	650 L/day/station	4 stations	-	1.5	0.05 L/s
Convenience Store	5 L/m^2 per day	50 m^2	-	1.5	0.004 L/s
Laundry[3]	1200 L/day / machine	4 machines	-	1.5	0.08 L/s
Dining[3]	115 L/seat/day	212 seats (50 tables)	-	1.5	0.42 L/s
Total (Building)		**Ha**			**2.43 L/s**
Extraneous Flows	0.28 L/s/ha	0.926 ha	-	-	0.26 L/s
Total (Site)					**2.69 L/s**

[1]As per the City of Ottawa Sewer Design Guidelines (October 2012) – Appendix 4-A
[2]As per the City of Ottawa Sewer Design Guidelines (October 2012) – Institutional Peaking Factor = 1.5
[3]Dining and laundry facilities are currently unknown and have been assumed.

Table 2: Sanitary Design Flows – Hotel

Type	Design Criteria[1]	No. of Units	Population	Peaking Factor[2]	Peak Sanitary Flow
Hotel Room[3] (1 bedroom)	1.4 people / unit (225 L/bed/day)	75	105	1.5	0.41 L/s
Hotel Room[3] (2 bedroom)	2.1 people / unit (225 L/bed/day)	75	158	1.5	0.62 L/s
Dining Area[3]	(115 L/seat/day)	30	30	1.5	0.06 L/s
Bar/Lounge Area[3]	(70 L/cap/day)	25	25	1.5 (Commercial)	0.03 L/s
Hotel Staff[3]	(40 L/cap/day)	10	10	4.0	0.02 L/s
Laundry[3]	1200 L/machine/day	4	-	1.5	0.08 L/s
Total (Building)		**Ha**			**1.22 L/s**
Extraneous Flows	0.28 L/s/ha	0.926 ha	-	-	0.27 L/s
Total (Site)					**1.49 L/s**

[1]As per the City of Ottawa Sewer Design Guidelines (October 2012) – Appendix 4-A
[2]As per the City of Ottawa Sewer Design Guidelines (October 2012) – Institutional Peaking Factor = 1.5
[3]Units are currently unknown and have been assumed.

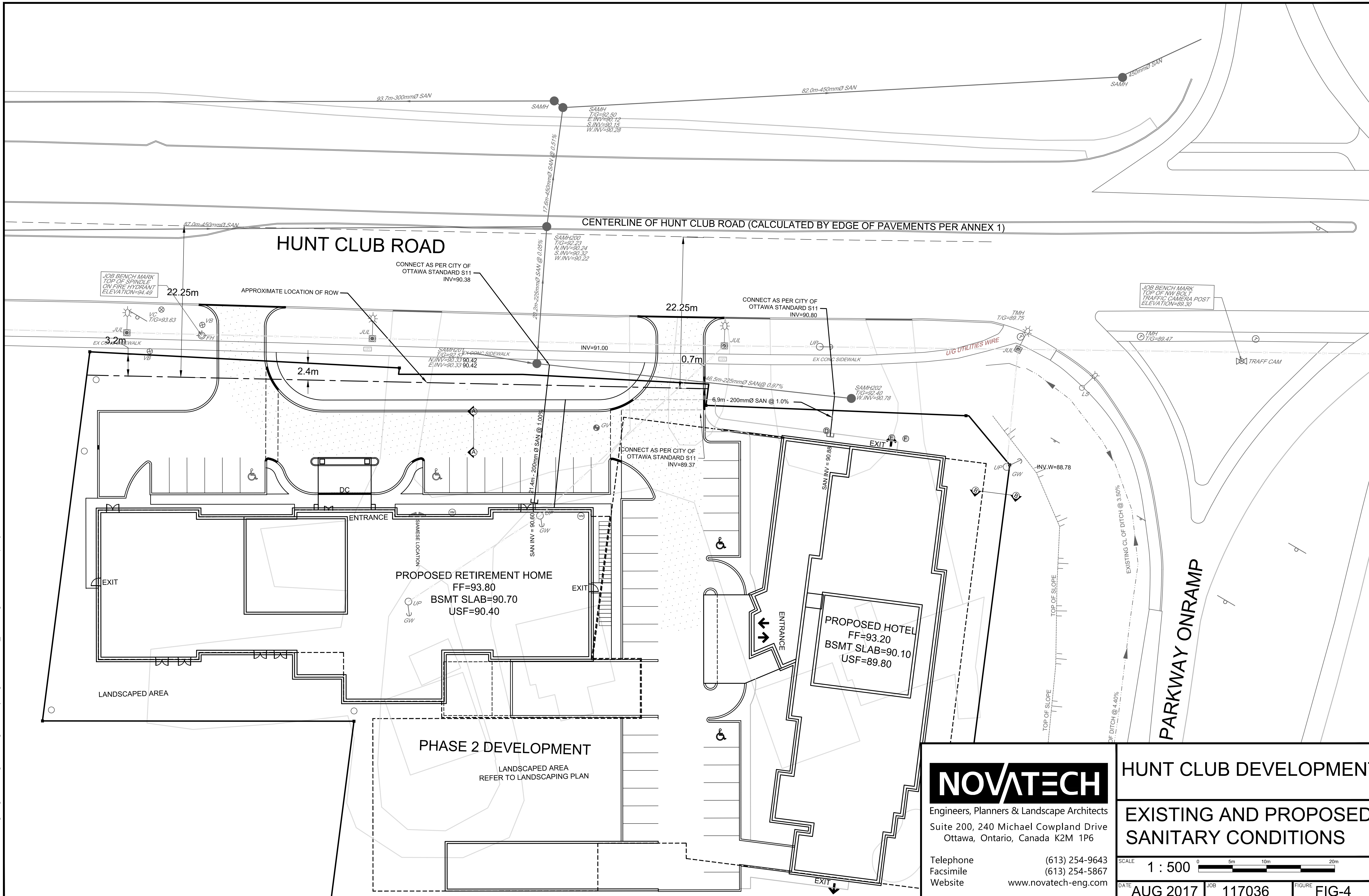
Based on the criteria from the City of Ottawa Sewer Design Guidelines, the peak sanitary flow for the retirement home is 2.69 L/s and the peak flow from the hotel is 1.49 L/s, totalling 4.18 L/s from the subject site. The flows will be directed by gravity into the existing 225mm sanitary sewer which quickly discharges to the 450mm dia on Hunt Club Road. The peak flows provided will have negligible impact on the existing infrastructure, as noted by the e-mail received from the City of Ottawa (See **Appendix A**). For detailed calculations refer to the Sanitary Sewer Design Sheet located in **Appendix A**. For existing and proposed sanitary conditions, see **Figure 4.**

3.0 WATERMAIN

3.1 Domestic

It is proposed to service the site with dual 150mm watermains to each building for redundancy as per City of Ottawa Water Distribution Guidelines. The 150mm watermains will tee to the existing 400mm watermain located within the southern boulevard of Hunt Club Road. The extent of the existing 400mm watermain is shown in the 2016 Water Distribution System drawing in **Appendix D.**

The Hunt Club Development watermain was analyzed under three operating conditions: high pressure, peak hour, and maximum daily demand plus fire flow. The high-pressure condition (average daily demand) was analyzed to ensure the system meets the design criteria for maximum pressure and age. The maximum daily demand plus fire flow and peak hour conditions were analyzed to ensure the system meets the design criteria for maximum flow and minimum pressure. Results are provided in **Table 3, 4 and 5**.



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HUNT CLUB DEVELOPMENT

EXISTING AND PROPOSED SANITARY CONDITIONS

SCALE	DATE	JOB	FIGURE
1 : 500	AUG 2017	117036	FIG-4

SHT11X17.DWG - 279mmX432mm

Table 3: Water Average Day Demands – Retirement Home

Type	Design Criteria[1]	No. of Units	Population	Average Day Demand
1 bedroom Units	1.4 people / unit (450 L/bed/day)	100	140	0.73 L/s
2 bedroom Units	2.1 people / unit (450 L/bed/day)	5	11	0.06 L/s
Assisted Care Units	1.4 people / unit (450 L/bed/day)	40	56	0.29 L/s
Beauty Salon	650 L/day/station	4 stations	-	0.03 L/s
Doctor/ Medical Staff	275 L/cap/day	20	20	0.17 L/s
Convenience Store	5 L/m^2 per day	50 m^2	-	0.0029 L/s
Laundry[2]	1200 L/day / machine	4 machines	-	0.06 L/s
Dining[2]	115 L/seat/day	212 seats (50 tables)	-	0.28 L/s
Total	**-**	**-**	**227**	**1.62 L/s**

[1]To be consistent with average flow criteria used in the sanitary analysis, a rate of 450 L/bed/day will be used as average water demand
[2] Dining and laundry facilities are currently unknown and have been assumed.

Table 4: Water Average Day Demands – Hotel

Type	Design Criteria[1]	No. of Units	Population	Average Day Demand
Hotel Room (1 bedroom)	1.4 people / unit (225 L/capita/day)	75	105	0.27 L/s
Hotel Room (2 bedroom)	2.1 people / unit (225 L/capita/day)	75	158	0.41 L/s
Dining Area	115 L/seat/day	30	30	0.04 L/s
Bar/Lounge Area	70 L/cap/day	25	25	0.02 L/s
Hotel Staff	40 L/cap/day	10	10	0.01 L/s
Laundry	1200 L/day/machine	4 machines		0.06 L/s
Total	**-**	**-**	**222**	**0.81 L/s**

[1]As per the City of Ottawa Sewer Design Guidelines (October 2012) – Appendix 4-A
[2] Dining and laundry facilities are currently unknown and have been assumed.

Table 5: Water Peaking Demands

Type	Maximum Daily Demand Factor/Maximum Hour Factor	Average Day Demand (L/s)	Maximum Daily Demand (L/s)	Peak Hour Demand (L/s)
Retirement Home Demands				
1 bedroom Units	1.5/1.8	0.73	1.01	1.97
2 bedroom Units	1.5/1.8	0.06	0.09	0.16
Assisted Care Units	1.5/1.8	0.29	0.44	0.78
Beauty Salon	1.5/1.8	0.03	0.05	0.08
Staff	1.5/1.8	0.17	0.26	0.46
Convenience Store	1.5/1.8	0.00	0.00	0.01
Laundry[1]	1.5/1.8	0.06	0.09	0.16
Dining[1]	1.5/1.8	0.28	0.42	0.76
Total	**-**	**1.62 L/s**	**2.43 L/s**	**4.38 L/s**
Hotel Demands				
1 bedroom Units	1.5/1.8	0.27	0.41	0.73
2 bedroom Units	1.5/1.8	0.41	0.62	1.11
Dining Area	1.5/1.8	0.04	0.06	0.11
Bar/Lounge Area	1.5/1.8	0.02	0.03	0.05
Hotel Staff	1.5/1.8	0.01	0.02	0.03
Laundry	1.5/1.8	0.06	0.09	0.16
Total	**-**	**0.81 L/s**	**1.22 L/s**	**2.19 L/s**

3.2 Fire Demand

The building will have fire protection from an internal sprinkler system (as per section 3.2.2.43 of the OBC) as well as the existing fire hydrant on Hunt Club Road. An estimate of the water required to meet firefighting demands using NFPA 13 is described below.

Section 4.2.11 of the City of Ottawa Water Design Guidelines reads:

"When calculating the fire flow requirements and affected pipe sizing, designers shall use the method developed by the Fire Underwriters Survey.", and "The requirements for levels of fire protection on private property are covered in Section 7.2.11 of the Ontario Building Code."

The Ontario Building Code governs the assessment of fire demand for individual buildings. Section 7.2.11.1 of the Ontario Building Codes states that the design, construction, installation and testing of fire service mains and water service pipe combined with fire service mains shall be in conformance with NFPA 24. NFPA 24 is the standard for the "Installation of Private Fire Service Mains and their Appurtenances". Chapter 13 of NFPA 24 discusses sizing the private service fire mains for fire protection systems which shall be approved by the authority having jurisdiction, considering the following factors:

- Construction and Occupancy of the building
- Fire Flow and Pressure of the Water Required
- Adequacy of the Water Supply

The 8 storey Retirement Building will be sprinklered per Section 3.2.2.45 of the OBC. Section 3.2.5.7 of the OBC requires that an adequate water supply for firefighting be provided to each building, and references Appendix A of the OBC. Sentence 3 of Section A 3.2.5.7 of the OBC states that NFPA 13 is to be used for determining both sprinkler and hose stream demands for a sprinklered building.

The design of the sprinkler system is completed by a Fire Protection Engineer, or typically computed by the sprinkler contractor and approved by the Fire Protection Engineer. This process involves detailed hydraulic calculations based on building layout, pipe runs, head losses, fire pump requirements, etc. At this stage in the planning process, these details are not available. However, using Chapter 11 of NFPA 13, it is possible to provide a fairly accurate estimate of the fire demand for the building. This estimate is provided below.

<u>NFPA Chapter 11 Calculation</u>

- 8 Story Retirement Building - Ordinary Hazard
- 8 Story Hotel - Ordinary Hazard

Section 11.2.3 of NFPA 13, “Water Demand Requirements – Hydraulic Calculation Method” is used to estimate the hose stream demand and the sprinkler demand. Figure 11.2.3.1.1 – Area/Density Curves is used for the worst-case scenario, which in this case is the Ordinary 1 Hazard Classification. For this classification, Figure 11.2.3.1.1 provides a density of 0.15 gpm/ft^2 using a coverage of 1500 ft^2, or 225 gpm (US).

Table 11.2.3.1.2 is used to determine the hose stream demand. For an Ordinary Hazard building, a total combined inside and outside hose stream demand of 250 gpm is required. Typically, 150 gpm would be drawn off the hydrant and 100 gpm off the hose cabinets.

Therefore, using the above, the total estimated demand would be 225 USgpm + 250 USgpm = 475 USgpm. It is recommended to add a 50% design contingency allowance to account for surcharges that may be applicable based on the final design of the building (e.g. dry system 30 %, sloped roof 30 %, etc.) and for head losses throughout the system. Therefore, a sprinkler demand of **712 USgpm (2695 L/m)** should be used at this stage. Reference material from NFPA 13 is contained in **Appendix B**.

Boundary conditions were requested from the City using the fire demands calculated with Fire Underwriter’s Survey. The hydraulic grade line for maximum day plus fire demand is 127.0 m or approximately 80 psi assuming top of watermain elevation to be 93.80m. These boundary conditions are included in **Appendix B.**

Hydraulic modelling was completed using EPANET 2.0. **Table 6** summarizes the performance of the watermain during all operating conditions.

Table 6: Water Demand Summary

Condition	Demand Retirement Home (L/s)	Demand Hotel (L/s)	Fire Flow (L/s)	Allowable Pressure (kPa/psi)	Max/Min Pressure (Ground Floor) (kPa/psi)	Time (hrs)
High Pressure	1.62	0.81	N/A	552/80 (Max)	447/65(Max)	2.66
Max Day + FF (From Retirement Home)	120	1.22	117[1]	138/20 (Min)	206/30 (Min)	N/A
Max Day + FF (From Hotel)	2.43	85.20	83[1]	138/20 (Min)	295/43 (Min)	N/A
Peak Hour	4.38	2.19	N/A	276/40 (Min)	310/45 (Min)	N/A

[1] The following flows are included within the Max Day plus fire flow demand within the respective columns.

Water age is well below the 5 days or less during average day demand. The analysis of the watermain during all operating conditions confirms the proposed watermain can service the site at ground level. Pumping will be provided internally to provide adequate pressures for each storey. A copy of the City of Ottawa boundary conditions, fire flow calculations, and detailed hydraulic analysis results are included in **Appendix B**.

4.0 STORMWATER MANAGEMENT

The total drainage area (1.88 ha) for this project includes both the subject site (0.93 ha) and a portion of the neighbouring NCC land south of the site (0.95 ha), which currently drains through the subject site. Under existing conditions, all runoff from the site either flows overland towards Hunt Club Road, or towards an existing ditch on the west side of the Airport Parkway on-ramp, where it is captured by existing DICBs and directed into City storm sewers which ultimately outlet to Sawmill Creek – refer to the Pre-Development Drainage Area Plan (**Figure 5**).

Under post-development conditions, storm runoff from the site will be divided into smaller sub-catchment areas based on the proposed land use, servicing and grading. Refer to the following Drawings:

117036-STM1 Storm Drainage Area Plan - Interim (Phase 1)
117036-STM2 Storm Drainage Area Plan - Ultimate (Phase 2)

4.1 Stormwater Management Criteria and Objectives

The stormwater management criteria and objectives for the proposed design have been developed based on the requirements of the Sawmill Creek Sub Watershed Study Update (CH2MHill, 2003), the City of Ottawa Sewer Design Guidelines (October 2012), and Technical Bulletin PIEDTB-20160-01 (September 2016).

Minor System (Storm Sewers)

- Provide 500m^3/ha of storage at a release rate of 4.8 L/s/ha;
- For runoff volumes which exceed the initial storage requirement of 500m^3/ha, control post-development flows to pre-development levels;

Water Quality Control

- Provide an *Enhanced* level of water quality control (minimum 80% TSS removal) prior to releasing flows from the site.

Erosion and Sediment Control

- A qualified inspector should conduct daily visits during construction to ensure that the contractor is working in accordance with the design drawings and that mitigation measures are being implemented as specified;
- All proposed and existing catch basins and storm manhole covers are to be protected from sediment during construction;
- After complete build-out, all sewers are to be inspected and cleaned and all sediment and construction fencing is to be removed;
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

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HUNT CLUB DEVELOPMENT

PRE-DEVELOPMENT DRAINAGE AREA PLAN

SCALE	DATE	JOB	FIGURE
1:750 (0, 7.5m, 15m, 30m)	AUG 2017	117036	FIGURE 5

M:\2017\117036\CAD\Design\Figures\SWM\CAD\FIGURE1-EXTDRAINAGE.dwg, EXT-STM, Aug 24, 2017 - 12:38pm, jmarcuccio

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4.2 Stormwater Management Design

Storm servicing for the subject development will be provided using a dual drainage system. Runoff from frequent events will be conveyed by storm sewers (minor system), while flows from larger storm events which exceed the capacity of the minor system will be conveyed overland along defined overland flow routes (major system).

Phasing

The development will be constructed in two phases:

- Phase 1 (0.47 ha) will consist of a retirement residence on the western portion of the site.
- Phase 2 (0.46 ha) will consist of a hotel on the eastern portion of the site.

The proposed stormwater management infrastructure has been designed to meet the stormwater management criteria for both phases of development.

Minor System

The minor system outlets for the site will consist of the following:

- The existing 1800mm storm trunk sewer to the east of the site;
- The existing ditch & DICBs along the western side of the Airport Parkway on-ramp.

Major System

Flows which exceed the available on-site storage will pond at low points will flow overland towards Hunt Club or the Airport Parkway.

4.2.1 Interim Conditions (Phase 1)

Phase 1 development will consist of the proposed retirement residence. Water quantity control for Phase 1 will be provided using a 3.0m x 1.8m concrete box culvert as a storage tank underneath the front parking lot adjacent to Hunt Club Road. Roof drains from the building will be directly connected to the storage tank, and runoff from the parking areas will enter the storage tank through two open-grate manholes located at low points – refer to the General Plan of Services – Interim Staging (Phase 1) **117076-GP1.**

Flows from the upstream external area (EXT-01) and from grassed areas to the south and west of the retirement residence (A-04, A-05) will be captured by perimeter swales and subdrains. The subdrains will connect with a storm sewer which will bypass the storage tank and connect to the existing 1800mm trunk sewer downstream.

Required Storage and Release Rates (Phase 1)

The overall drainage area for Phase 1 is 0.47 ha. However, the required storage and release rates for the Phase 1 storage tank are based on the contributing drainage areas under ultimate (Phase 2) conditions, which will increase to 0.50 ha – refer to **117036-STM2**.

Storage = (500 m^3/ha)*(0.496 ha)
= 247.9 m^3

Release Rate = (4.8 L/s/ha) * (0.496 ha)
= 2.4 L/s

The proposed box culvert will provide approximately 251 m^3 of storage. The low points in the parking lot above the storage tank will and additional storage volume of approximately 20 m^3 (refer to **117036-GR1**). Flows exiting the Phase 1 storage tank will be controlled to the allowable release rate by a vortex-type orifice. The size and type of orifice will be determined at the detailed design stage.

4.2.2 Ultimate Conditions (Phase 2)

Under ultimate build-out conditions, the remaining 0.46 ha of the site will be developed as a hotel. Water quantity control for Phase 2 will be provided using a second 3.0m x 1.8m concrete box culvert installed along the back of the hotel, parallel to the Airport Parkway. Roof drains and podium drainage from the hotel will be directly connected to the storage tank, and runoff from the parking areas will enter the storage tank through two open-grate manholes located at low points – refer to the General Plan of Services – Ultimate conditions (Phase 2) **117076-GP2**.

Flows from the external area upstream (EXT-02) will be captured by a perimeter swale along the southern property line, and directed towards the ditch along the western side of the Airport Parkway. Rip rap is to be provided where the perimeter swale meets the roadside ditch as a part of erosion and sediment control measures – refer to **117036-GR2**.

Required Storage and Release Rates (Phase 2)

The overall drainage area for Phase 2 is 0.46 ha. Approximately 0.03 ha of the Phase 2 area will be directed to the existing Phase 1 storage tank. Therefore, the required storage and release rates for the Phase 2 storage tank are based on a contributing drainage area of 0.43 ha – refer to **117036-STM2**.

Storage = (500 m^3/ha) * (0.430 ha)
= 215.0 m^3

Release Rate = (4.8 L/s/ha) * (0.430 ha)
= 2.1 L/s

The proposed box culvert will provide approximately 251 m^3 of storage. The low points in the parking lot above the storage tank will have an additional storage volume of approximately 20 m^3 (refer to **117036-GR2**). Flows exiting the Phase 2 storage tank will be controlled to the allowable release rate by a vortex-type orifice. The size and type of orifice will be determined at the detailed design stage.

5.0 HYDROLOGIC MODELING (SWMHYMO)

The City of Ottawa Sewer Design Guidelines (October 2012) requires hydrologic modeling for all dual drainage systems. The performance of the proposed storm drainage system for the Hunt Club Development was evaluated using the SWMHYMO hydrologic model.

5.1 Model Development

The SWMHYMO model has been developed to account for the storage provided by the proposed box culverts, and to determine the total peak flows leaving the site. The results of the analysis were used to:

- Determine the pre-development peak flows from the site;
- Evaluate the proposed storage volumes for the site under both interim and ultimate build-out conditions;
- Evaluate the overflow from the provided storage and ensure that it does not exceed the allowable flow outlined in the criteria.

5.1.1 Design Storms

The following design storms were used to determine which storm distribution generates the highest peak flows and storage requirements:

Chicago Storms	SCS Type II Storms
25mm 4hr Chicago storm	2-year 12 hour SCS Type II storm
2-year 4hr Chicago storm	2-year 12 hour SCS Type II storm
5-year 4hr Chicago storm	2-year 12 hour SCS Type II storm
100-year 4hr Chicago storm	

The 4-hour Chicago storm yielded the highest peak flows from the site and was therefore used as the critical storm distribution for the design. Design storms and simulation results for each storm event have been included in **Appendix C**.

5.1.2 Storm Drainage Areas

For modeling purposes, the site has been divided into sub catchment areas based on the proposed land use, grading, and servicing for the site. Two drainage area plans have been provided for post development conditions, outlining interim and ultimate build-out conditions – Refer to **117036-STM1**, and **117036-STM2** provided at the back of this report.

5.1.3 Sub Catchment Model Parameters

The total drainage area used in the hydrologic modeling (1.88 ha) includes both the subject site (0.93 ha) and contribution flows from the neighbouring NCC lands (0.95 ha) to the south, which sheet drains through the subject site.

All site drainage areas were simulated using the Standard Unit Hydrograph (STANDHYD) command. External drainage areas used the Nash Unit Hydrograph (NASHYD). Infiltration was simulated using Horton's Equation with the standard values listed in City of Ottawa Sewer Design Guidelines.

Existing Conditions

Existing conditions hydrologic parameters for each sub catchment were developed based on the existing conditions of the site, and the soil type as determined through boreholes completed as a part of a geotechnical investigation done by Paterson Group (March, 2017). Under existing conditions, the site is occupied by several residences, garages, and a roofing business. The upstream area which flows through the subject site is heavily forested. Sub catchment parameters for existing conditions are summarized in **Table** .

Table 7: Existing Conditions Sub Catchment Parameters

Area ID	Catchment Area (ha)	Runoff Coefficient	TIMP (%)	XIMP (%)	Time to Peak (hrs)	Curve Number	Average Slope (%)
PRE-01	0.924	0.49	0.41	0.33	-	-	3.98
EXT-01	0.296	0.20	-	-	0.17	55	3.35
EXT-02	0.653	0.20	-	-	0.17	55	3.87

Interim Conditions

As the site is to be developed in two phases, the proposed stormwater management system has been analyzed for each of the two phases. The hydrologic parameters for each sub catchment under interim conditions were developed based on the Site Plan (**Figure 2**) and the Interim (Phase 1) Storm Drainage Area Plan (**117036-STM1**). Under interim conditions, the retirement residence and adjacent parking area will be constructed, and the remainder of the site will remain undeveloped. Flows from the undeveloped portion of the site will continue to flow overland towards Hunt Club Road and the Airport Parkway, as per existing conditions. Interim conditions sub catchment parameters are outlined in the following **Table** .

Table 8: Interim Condition Sub Catchment Parameters

Area ID	Catchment Area (ha)	Runoff Coefficient	TIMP (%)	XIMP (%)	Time to Peak (hrs)	Curve Number	Average Slope (%)
PHASE 1							
A-01	0.077	0.78	0.83	0.66	-	-	1.50
A-02	0.058	0.90	1.00	0.80	-	-	1.50
A-03	0.095	0.72	0.74	0.59	-	-	1.10
A-04	0.047	0.30	0.14	0.11	-	-	0.30
A-05	0.010	0.30	0.14	0.11	-	-	1.00
A-06	0.019	0.90	1.00	0.80	-	-	0.50
BLDG-01	0.165	0.90	1.00	0.80	-	-	0.01
EXT-01	0.296	0.20	-	-	0.17	55	3.35
PHASE 2							
A-07	0.453	0.30	0.14	0.11	-	-	3.50
EXT-02	0.652	0.20	-	-	0.17	55	3.87

Ultimate Conditions

The hydrologic parameters for each sub catchment for the ultimate build-out conditions of the site were developed based on the Site Plan (**Figure 2**) and the Ultimate (Phase 2) Storm Drainage Area Plan (**117036-STM2**). Ultimate conditions sub catchment parameters are outlined in the following **Table** .

Table 9: Ultimate Conditions Sub Catchment Parameters

Area ID	Catchment Area (ha)	Runoff Coefficient	TIMP (%)	XIMP (%)	Time to Peak (hrs)	Curve Number	Average Slope (%)
PHASE 1							
A-01	0.077	0.78	0.83	0.66	-	-	1.50
A-02	0.058	0.90	1.00	0.80	-	-	1.50
A-03	0.120	0.73	0.76	0.61	-	-	1.10
A-04	0.047	0.30	0.14	0.11	-	-	0.30
A-05	0.010	0.30	0.14	0.11	-	-	1.00
A-06	0.019	0.90	1.00	0.80	-	-	0.50
BLDG-01	0.165	0.90	1.00	0.80	-	-	0.01
EXT-01	0.296	0.20	-	-	0.17	55	3.35
PHASE 2							
A-07	0.056	0.30	0.14	0.11	-	-	1.50
A-08	0.041	0.30	0.14	0.11	-	-	2.00
A-09	0.024	0.90	1.00	0.80	-	-	0.50
A-10	0.042	0.74	0.77	0.62	-	-	1.50
A-11	0.036	0.75	0.79	0.63	-	-	1.50
A-12	0.020	0.30	0.14	0.11	-	-	1.50
A-13	0.023	0.30	0.14	0.11	-	-	1.50
A-14	0.014	0.30	0.14	0.11	-	-	1.50
A-15	0.018	0.30	0.14	0.11	-	-	2.00
BLDG-02	0.136	0.90	1.00	0.80	-	-	0.01
NCC-01	0.020	0.30	0.14	0.11	-	-	2.00
EXT-02	0.652	0.20	-	-	0.17	55	3.87

5.2 Model Results

5.2.1 Existing Conditions

Peak flows for each storm event for existing conditions are as follows:

Table 10: Existing Conditions Peak Flows (L/s)

Storm Distribution->	SWMHYMO ID	4hr Chicago				12hr SCS		
Return Period->		25mm	2yr	5yr	100yr	2yr	5yr	100yr
Site - Existing Conditions	PRE-01	52	92	155	376	46	85	179
Upstream Area-01	EXT-01	2	3	7	20	4	7	19
Upstream Area-02	EXT-02	4	8	15	44	9	16	42
TOTAL*	TOTFLO	56	99	171	425	58	108	241

**Total flows are not always an exact sum of the peak flows from individual sources and have been calculated using the SWMHYMO model.*

5.2.2 Interim Conditions

Peak flows for each storm event during interim conditions are outlined as follows:

Table 11: Interim Conditions Peak Flows (L/s)

Storm Distribution->	SWMHYMO ID	4hr Chicago				12hr SCS		
Return Period->		25mm	2yr	5yr	100yr	2yr	5yr	100yr
Retirement Res. Tank	TANK-R	2	2	2	2	2	2	2
Low Point Overflow	OVFLP	0	0	0	0	0	0	3
Flow in Subdrain	TOTSUB	12	20	35	79	13	22	50
Overland Flow	TOTRD	11	29	64	198	20	48	123
TOTAL*	TOTFLO *(Existing)*	56	99	171	425	58	108	241
	TOTOUT *(Interim)*	24	50	101	280	35	73	175

**Total flows are not always an exact sum of the peak flows from individual sources and have been calculated using the SWMHYMO model.*

The modelling results for interim conditions indicate that during the 25mm, 2-year, and 5-year storm events, the box pipe will provide sufficient storage to control the flows to 2.4 L/s. Storage provided by the box pipe was modeled using the ROUTE RESERVOIR command. During the SCS 100-year storm, there will be an overflow of approximately 3 L/s from the low points in the parking lot above the box pipe. The SWMHYMO model accounts for the 20 m^3 of storage at the two low points. Overall, the peak flows from the site which exceed the capacity of the box pipe will be less than existing conditions peak flows. The sub-watershed storage requirement of 247.9 m^3 released at 2.4 L/s is attained at a rainfall volume of slightly less than the 100-year design storm and the peak flows have been controlled per the requirements of the Sawmill Creek Sub Watershed Study.

5.2.3 Ultimate Conditions

Peak flows for the ultimate build-out conditions are as follows:

Table 12: Ultimate Conditions Peak Flows (L/s)

Storm Distribution->	SWMHYMO ID	4hr Chicago				12hr SCS		
Return Period->		25mm	2yr	5yr	100yr	2yr	5yr	100yr
Retirement Res. Tank	TANK-R	2	2	2	2	2	2	2
Low Point Overflow	OVFLP	0	0	0	5	0	0	9
Hotel Tank	TANK-H	2	2	2	2	2	2	2
Overflow from Hotel Tank	OVFTNK	0	0	0	0	0	0	0
Flow in Subdrain	TOTSUB	2	4	10	32	5	10	28
Overland Flow	EXT-02	4	8	15	44	9	16	42
TOTAL*	TOTFLO *(Existing)*	56	99	171	425	58	108	241
	TOTOUT *(Interim)*	10	16	30	81	18	30	75

**Total flows are not always an exact sum of the peak flows from individual sources and have been calculated using the SWMHYMO model.*

The modelling results for the ultimate conditions indicate that during the 25mm, 2-year, and 5-year storm events, the hotel box pipe will provide sufficient storage to control the flows to 2.1 L/s. Storage provided by each box pipe was modeled using the ROUTE RESERVOIR command. During the 100-year storm events, there will be an overflow of approximately 5 L/s during the Chicago storm 9 L/s during the SCS storm from the retirement home box pipe. This increase of 5-6 L/s overflow from interim conditions is likely due to the increased drainage area being directed to the retirement residence box pipe. Overall, the peak flows from the site which exceed the capacity of the box pipe will be less than existing conditions peak flows. The total sub-watershed storage requirements are exceeded, with a total storage volume of 522 m^3, and the peak flows have been controlled per the requirements of the Sawmill Creek Sub Watershed Study. Model input and output files for the existing conditions, interim, and ultimate conditions can be found in **Appendix C** located at the back of this report.

5.3 Stormwater Quantity Control

The SWM criteria outlines that the development must provide 500m^3/ha of storage at a release rate of 4.8 L/s/ha. Release rates are as follows:

Retirement Residence Release Rate = (4.8 L/s/ha) * (0.496 ha)
= 2.4 L/s

Hotel Release Rate = (4.8 L/s/ha) * (0.430 ha)
= 2.1 L/s

To meet these release rates, a 55mm IPEX Tempest LMF 14 ICD is recommended. This is based on a maximum head of 1.65m and 1.63 m within each of the box culverts. ICDs are to be installed on the upstream side of the outlet manholes for each of the box culverts. Refer to **Appendix C** for details.

5.4 Stormwater Quality Control

The subject site is located within the jurisdiction of the Rideau Valley Conservation Authority (RVCA) and is tributary to Sawmill Creek. An *Enhanced* level of protection equivalent to a long-term average removal of 80% of total suspended solids (TSS) is required.

A water quality treatment unit will be installed upstream of the connection to the 1800mm trunk sewer as part of Phase 1, but has been sized to provide the required level of water quality treatment under ultimate conditions. It is recommended that either a Contech PMSU 20-20-5 or the Vortechs 1000 be installed. Refer to **Appendix C** for further sizing details and calculations for both units. The exact unit will be determined at the detailed design stage.

Maintenance and Monitoring of Storm Sewer and SWM Systems

It is recommended that the client implement a maintenance and monitoring program for both the on-site storm sewers and the stormwater management systems: The storm drainage system should be inspected routinely (at least annually); the vortex ICD unit should be inspected to ensure it is fitted securely and free of debris; and the oil-grit separator (located at the eastern entrance to the site) should be inspected at regular intervals and maintained when necessary to ensure optimum performance.

5.5 Water Balance Analysis

A water budget analysis has been completed and is included in **Appendix C**. A summary of the results is outlined in **Table 13**.

Table 13: Summary of Water Balance Analysis

Scenario	Evapotranspiration	Surplus	Infiltration	Runoff
Pre-Development	59.7%	40.3%	16.2%	24.2%
Post-Development	52.7%	47.3%	8.4%	38.9%

6.0 EROSION AND SEDIMENT CONTROL

Temporary erosion and sediment control measures will be implemented during construction in accordance with the “Guidelines on Erosion and Sediment Control for Urban Construction Sites” (Government of Ontario, May 1987). Details will be provided on the Erosion and Sediment Control Plan. Erosion and sediment control measures may include:

- Placement of insert in catch basins and filter fabric under all maintenance holes;
- Silt fences around the area under construction placed as per OPSS 577 and OPSD 219.110;
- Light duty straw bale check dam per OPSD 219.180; and
- Application of topsoil and sod to disturbed areas.

The erosion and sediment control measures are to be installed to the satisfaction of the Engineer, the City, and Conservation Authority prior to construction and will remain in place during construction until vegetation is established. The erosion and sediment control measures will also be subject to regular inspection to ensure the measures are operational.

7.0 CONCLUSIONS

This report confirms the proposed Hunt Club development can be adequately serviced with storm sewer, sanitary sewer and watermain. This report is respectfully submitted for site plan approval. Please contact the undersigned should you have questions or require additional information.

NOVATECH

Sanitary and Water
Prepared by:

Matthew Linton
CAD Technologist

Stormwater Management
Prepared by:

Kallie Auld
Project Coordinator | Water Resources

Reviewed by:

Greg MacDonald, P. Eng.
Director | Land Development and Public Sector Infrastructure

Appendix A

Sanitary Sewer Design Sheets
Sanitary Modelling Results

Matthew Linton

From: Oram, Cody <Cody.Oram@ottawa.ca>
Sent: May-16-17 8:39 AM
To: Matthew Linton
Subject: RE: Sanitary Values for Modelling (Hunt Club Development)

Hi Matt,

I've heard back from modelling and they don't see the sanitary flow as being a problem. At this time the City is building a detailed model of this area but it won't be done for another year. The South Keys CDP model doesn't show any sanitary issues that would impact this development.

That said the servicing brief will need to review the capacity of the high level sanitary sewer to ensure the flows can be conveyed to the main within Hunt Club.

If you have any questions, contact me to discuss.

Regards,

Cody Oram, P.Eng. Senior Engineer
Development Review, South Services
Planning, Infrastructure and Economic Development Department | Services de planification, d'infrastructure et de développement économique
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 **13422**, fax/téléc:613-580-2576, cody.oram@ottawa.ca

---

From: Matthew Linton [mailto:m.linton@novatech-eng.com]
Sent: Wednesday, May 10, 2017 4:15 PM
To: Oram, Cody <Cody.Oram@ottawa.ca>
Subject: RE: Sanitary Values for Modelling (Hunt Club Development)

Cody,

Just wondering the status of the modelling. If we cannot receive modelling soon, then I will find another way to obtain data to confirm our flows, by checking other reports in the area.

Thanks,

Matthew Linton, CAD Technologist
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 207 | Fax: 613.254.5867

From: Oram, Cody [mailto:Cody.Oram@ottawa.ca]
Sent: May-03-17 8:30 AM
To: Matthew Linton <m.linton@novatech-eng.com>
Subject: RE: Sanitary Values for Modelling (Hunt Club Development)

Hi Matthew,

I'm waiting for feedback from our modelling group. I expect a response by early next week.

Cody

From: Matthew Linton [mailto:m.linton@novatech-eng.com]
Sent: Tuesday, May 02, 2017 12:53 PM
To: Oram, Cody <Cody.Oram@ottawa.ca>
Subject: FW: Sanitary Values for Modelling (Hunt Club Development)

Is there any update to the status of the modelling on this Cody?

Thanks,

Matthew Linton, CAD Technologist
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 207 | Fax: 613.254.5867

From: Matthew Linton
Sent: April-24-17 10:28 AM
To: 'Oram, Cody' <Cody.Oram@ottawa.ca>
Subject: Sanitary Values for Modelling (Hunt Club Development)

Hello again Cody,

I have attached a PDF to this figure that better explains connections and peak flows from each development.

Thanks,

Matthew Linton, CAD Technologist
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 207 | Fax: 613.254.5867

From: Matthew Linton
Sent: April-24-17 10:14 AM
To: 'Oram, Cody' <Cody.Oram@ottawa.ca>
Subject: Sanitary Values for Modelling (Hunt Club Development)

Good morning Cody,

As per our phone call on Friday, I have calculated the peak sanitary flows for the Hunt Club Development. The peak flows calculated from the **Retirement Home** is 3.78 L/s and the peak flows from the proposed **Hotel** flow is 1.39 L/s. The total of the two flows is 5.17 L/s. The estimated pre-development flows from the site are .19 L/s (Assuming 3 single family dwellings and 1 commercial building on the east side of site).

I have found a report that states it has utilised Stantec's modelling to calculate the flows availiable for the site (948 Hunt Club Road, Development No. D07-12-14-0080), thus hopefully they can model our flows as well. Please let me know if this is sufficient, as I can send over the Design Sheets as well.

Thanks,

Matthew Linton, CAD Technologist
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 207 | Fax: 613.254.5867

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SANITARY SEWER DESIGN SHEET
Hunt Club Retirement Home and Hotel
Developer: Claridge Homes

NOVATECH
Engineers, Planners & Landscape Architects

HOTEL FLOWS

AREA			COMMERCIAL												INFILTRATION				PIPE					
			1 BEDROOM		2 BEDROOM		Staff		PEAK FLOWS															
ID	From	To	Units	Pop.	Units	Pop.	Units	Pop.	Total Pop.	Peak Factor (Commercial)	Peak Flow (Residents) (l/s)	Peak Flow (Staff) (l/s)	Peak Flow (Bar and Dining Room and Laundry) (l/s)	Total Peak Flow (l/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)	**Total Flow (l/s)**	Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
HUNT CLUB (HOTEL)	**BLD**	**TEE**	75	105.0	75	158.0	10.00	10.0	273.0	1.5	1.03	0.01	0.20	1.23	0.93	0.93	0.26	1.49	200	1.00	21.6	34.2	1.06	4.4%

Population Density:

Design Parameters:

Hotel Residential Sewage Flow	225	l/cap/day
Peaking Factor Comm./Inst. =	1.5	
Hotel Staff	40	L/cap/day
Dining Room Flow	115	L/cap/day
Bar/Cocktail Lounge Flow	70	L/cap/day
Infiltration =	0.28	l/s/ha
Pipe Friction n =	0.013	

Assumptions:
30 seat Dining Area with 25 seats of Bar/Lounge
Laundry Flows = 1200 L/machine/day

	ppl/unit
Studio	1.40
1 Bedroom	1.40
Assisted Care	1.00
2 Bedroom	2.10

Project: Hunt Club Hotel (117036)
Designed: MTL
Checked: GJM
Date: May 15th, 2017

RETIREMENT HOME FLOWS

AREA			RESIDENTIAL														ICI						INFILTRATION				PIPE					
			1 Bedroom		Assisted Care		2 Bedroom		Staff		TOTAL																					
ID	From	To	Units	Pop.	Units	Pop.	Units	Pop.	Units	Pop.	Pop.	Accum. Pop. (Nursing)	Accum. Pop. (Staff)	Peak Factor	Peak Flow (l/s)	Laundry and Dining Room Peak Flows	Beauty Salon Stations	Peak Beauty Salon Flow (L/s)	Convienience Store Area (m2)	Peak Convienience Store Flow (L/s)	Peak Flow (l/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)	**Total Flow (l/s)**	Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
HUNT CLUB (RETIREMENT)	BLD	**TEE**	100	140.0	40	56.0	5.0	11.0	20.00	20.0	227.0	207.0	20.0	1.5	1.87	0.50	4.00	0.05	50.00	0.004	0.55	0.93	0.93	0.26	2.69	200	1.00	21.4	34.2	1.06	7.9%

Design Parameters:

Doctor/Medical Staff Sewage Flow	275	l/cap/day
Appendix 4-A Nursing home flow	450	l/bed/day
Laundry Flows	450	l/machine/day
Appendix 4-A Nursing home flow	115	l/seat/day
Infiltration =	0.28	l/s/ha
Pipe Friction n =	0.013	
Residential Peaking Factor = Harmon Equation (max 4, min 2)		
Peaking Factor Comm./Inst. =	1.5	

Assumptions
Dining Room has been assumed as 160 seats
Assumed to have 4 Laundry Machines

Population Density:

	ppl/unit
Studio	1.40
1 Bedroom	1.40
Assisted Care	1.40
2 Bedroon	2.10

	L/unit/day
Beauty Salon Daily Volumes	650
	L/m2/day
Convienience Store Flows	5

Project: Hunt Club Retirement Home (117036)
Designed: MTL
Checked: GJM
Date: May 15th, 2017

EXISTING CAPACITY

AREA			COMMERCIAL								
ID	From	To	**HOTEL FLOWS**	**RETIREMENT HOME FLOW**	**Total Flow (l/s)**	Size (mm)	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q_{full} (%)
HUNT CLUB DEVELOPMENT	**MH202**	**MH201**	2.69	1.49	4.18	225	0.97	46.5	46.1	1.12	9.1%
HUNT CLUB DEVELOPMENT	**MH201**	**MH200**	0.00	0.00	4.18	225	0.05	20.2	10.5	0.26	39.9%

Appendix B

Boundary Conditions
Fire Flow Calculations
Hydraulic Analysis Results

Matthew Linton

From: Oram, Cody <Cody.Oram@ottawa.ca>
Sent: April-25-17 1:59 PM
To: Matthew Linton
Subject: RE: Water Boundary Conditions - Claridge Hunt Club Site
Attachments: 1026-1054 Hunt Club April 2017.pdf

Hi Matthew,

The following are boundary conditions, HGL, for hydraulic analysis at 1026-1054 Hunt Club (zone 2C) assumed to be connected to the 406 mm on Hunt Club Rd (see attached PDF for location).

Retirement Home

Minimum HGL = 125.6 m

Maximum HGL = 136.1 m

Max Day (2.4 L/s) + Fire Flow (117 L/s) = 127.0 m

Hotel

Minimum HGL = 125.6 m

Maximum HGL = 136.1 m

Max Day (0.88 L/s) + Fire Flow (83 L/s) = 127.7 m

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

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

Regards,

Cody Oram, P.Eng. Senior Engineer
Development Review, South Services
Planning, Infrastructure and Economic Development Department | Services de planification, d'infrastructure et de développement économique
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110 Laurier Avenue West. Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste **13422**, fax/téléc:613-580-2576, cody.oram@ottawa.ca

From: Matthew Linton [mailto:m.linton@novatech-eng.com]
Sent: Wednesday, April 19, 2017 11:09 AM
To: Oram, Cody
Subject: RE: Water Boundary Conditions - Claridge Hunt Club Site

Cody,

Thank you for the comments. I have attached a new figure that better explains the connection points. Below, I will state the demands for each building:

Retirement Home (West Building)
Average Day Demand – 1.20 L/s
Maximum Day Demand – 2.40 L/s
Peak Hour Demand – 4.94 L/s
Fire Flow = 7,000 L/min or 117 L/s (See attached FUS1-RetirementHome for reference, as the doors will have 1hr fire protection, thus will only need to provide gross floor area of largest floor plus 25% of the two closest adjoining floors)

Hotel (East Building)
Average Day Demand – 0.59 L/s
Maximum Day Demand – 0.88 L/s
Peak Hour Demand – 1.58 L/s
Fire Flow = 5,000 L/min or 83.33 L/s (See attached FUS2-Hotel for reference, as the doors will have 1hr fire protection, thus will only need to provide gross floor area of largest floor plus 25% of the two closest adjoining floors)

Let me know if you need anything else.

Thanks,

Matthew Linton, CAD Technologist
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 207 | Fax: 613.254.5867

From: Oram, Cody [mailto:Cody.Oram@ottawa.ca]
Sent: April-19-17 10:48 AM
To: Matthew Linton <m.linton@novatech-eng.com>
Subject: RE: Water Boundary Conditions - Claridge Hunt Club Site

Hi Matthew,

I've followed up with our modelling group and they had the following comments on the boundary condition request.

- Boundary conditions are only provided at the service connection locations.
- Provide the demand for each building. Do not combine the two building demands

Cody

From: Matthew Linton [mailto:m.linton@novatech-eng.com]
Sent: Tuesday, April 18, 2017 3:38 PM
To: Oram, Cody
Subject: RE: Water Boundary Conditions - Claridge Hunt Club Site

Hello Cody,

The boundary condition '1' is at the hydrant located at the west side of the site (highlighted as well). The demand has been calculated using total demands from both buildings. I can send you a break-down of the flows from each proposed building if you would like.

Thanks,

Matthew Linton, CAD Technologist
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 207 | Fax: 613.254.5867

From: Oram, Cody [mailto:Cody.Oram@ottawa.ca]
Sent: April-18-17 3:34 PM
To: Matthew Linton <m.linton@novatech-eng.com>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>
Subject: RE: Water Boundary Conditions - Claridge Hunt Club Site

Hi Matthew,

There are two locations shown in cyan on the attached figure. Can you confirm which connection is 'Point 1'? Also is the demand calculated for both buildings or just the building serviced at 'Point 1'?

Thanks,
Cody

From: Matthew Linton [mailto:m.linton@novatech-eng.com]
Sent: Tuesday, April 18, 2017 12:13 PM
To: Oram, Cody
Cc: Greg MacDonald
Subject: Water Boundary Conditions - Claridge Hunt Club Site

Good afternoon Cody,

We are looking to retrieve Water Boundary Conditions for the proposed Hunt Club Site. The service connection will be made from the existing 400mm watermain through the site. Can you please run the model providing boundary conditions at Point "1" on the attached drawing highlighted in Cyan.

Here is the attached information about water flows:

Average Day Demand = 1.27 L/s
Maximum Daily Demand = 2.52 L/s

Peak Hour Demand = 5.15 L/s
Fire Flow = 7,000 L/min or 117 L/s (See attached FUS for reference, as the doors will have 1hr fire protection, thus will only need to provide gross floor area of largest floor plus 25% of the two closest adjoining floors)

Please see attached PDFs for reference. If you require anything else, please feel free to contact me.

Thanks,

Matthew Linton, CAD Technologist
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext: 207 | Fax: 613.254.5867

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FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech #: 117036
Project Name: Claridge Hunt Club Site
Date: 18-Apr-17
Input By: Matthew Linton

Legend

Building Description: 8 Story Retirement Home

Step			Choose	Multiplier Options	Value Used	Total Fire Flow (L/min)
	Required Fire Flow					
1	**Construction Material**					
	Coefficient related to type of construction C	Wood frame		1.5	1	
		Ordinary construction	Yes	1		
		Non-combustible construction		0.8		
		Fire resistive construction (< 3 hrs)		0.7		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1651			
		Number of Floors/Storeys	6			
		Area of structure considered (m^2)			**2,475**	
	F	**Base fire flow without reductions**				**11,000**
		$F = 220\ C\ (A)^{0.5}$				
	Reductions or Surcharges					
3	**Occupancy hazard reduction or surcharge**					
	(1)	Non-combustible		-25%	-15%	**9,350**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**					
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	***-4,675***
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	***Exposure surcharge (cumulative (%))***					
	(3)	North Side	> 45.1m		0%	**2,805**
		East Side	20.1 - 30 m		10%	
		South Side	> 45.1m		0%	
		West Side	3.1 - 10 m		20%	
				Cumulative Total	**30%**	
	(1) + (2) + (3)	**Total Required fire Flow, rounded to nearest 1000L/min**			**L/min**	***7,000***
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**117**
				or	USGPM	1,849
		Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	840

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

Novatech #: 117036
Project Name: Claridge Hunt Club Site
Date: 18-Apr-17
Input By: Matthew Linton

Legend

Building Description: 8 Story Hotel

Step			Choose	Multiplier Options	Value Used	Total Fire Flow (L/min)
	Required Fire Flow					
1	**Construction Material**					
	Coefficient related to type of construction C	Wood frame		1.5	1	
		Ordinary construction	Yes	1		
		Non-combustible construction		0.8		
		Fire resistive construction (< 3 hrs)		0.7		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1360			
		Number of Floors/Storeys	6			
		Area of structure considered (m^2)			**2,040**	
	F	**Base fire flow without reductions**				**10,000**
		$F = 220\ C\ (A)^{0.5}$				
	Reductions or Surcharges					
3	**Occupancy hazard reduction or surcharge**					
	(1)	Non-combustible		-25%	-15%	**8,500**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**					
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	***-4,250***
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	***Exposure surcharge (cumulative (%))***					
	(3)	North Side	> 45.1m		0%	**850**
		East Side	> 45.1m		0%	
		South Side	> 45.1m		0%	
		West Side	20.1 - 30 m		10%	
				Cumulative Total	**10%**	
	(1) + (2) + (3)	**Total Required fire Flow, rounded to nearest 1000L/min**			**L/min**	***5,000***
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**83**
				or	USGPM	1,321
		Required Duration of Fire Flow (hours)			Hours	1.75
		Required Volume of Fire Flow (m^3)			m^3	525

Table 10.10.2.1.3 Flow Required to Produce a Velocity of 10 ft/sec (3 m/sec) in Pipes

Pipe Size		Flow Rate	
in.	mm	gpm	L/min
2	51	100	379
2½	63	150	568
3	76	220	833
4	102	390	1,476
5	127	610	2,309
6	152	880	3,331
8	203	1,560	5,905
10	254	2,440	9,235
12	305	3,520	13,323

[24: Table 10.10.2.1.3]

Table 10.10.2.2.6 Hydrostatic Testing Allowance at 200 psi (gph/100 ft of Pipe)

Nominal Pipe Diameter (in.)	Testing Allowance
2	0.019
4	0.038
6	0.057
8	0.076
10	0.096
12	0.115
14	0.134
16	0.153
18	0.172
20	0.191
24	0.229

Notes:

(1) For other length, diameters, and pressures, utilize Equation 10.10.2.2.6(a) or 10.10.2.2.6(b) to determine the appropriate testing allowance.

(2) For test sections that contain various sizes and sections of pipe, the testing allowance is the sum of the testing allowances for each size and section.

[24: Table 10.10.2.2.6]

Chapter 11 Design Approaches

11.1 General. The requirements of Section 11.1 shall apply to all sprinkler systems unless modified by a specific section of Chapter 11 or Chapter 12.

11.1.1 A building or portion thereof shall be permitted to be protected in accordance with any applicable design approach at the discretion of the designer.

11.1.2* Adjacent Hazards or Design Methods. For buildings with two or more adjacent hazards or design methods, the following shall apply:

(1) Where areas are not physically separated by a barrier or partition capable of delaying heat from a fire in one area from fusing sprinklers in the adjacent area, the required sprinkler protection for the more demanding design basis shall extend 15 ft (4.6 m) beyond its perimeter.

(2) The requirements of 11.1.2(1) shall not apply where the areas are separated by a barrier partition that is capable of preventing heat from a fire in one area from fusing sprinklers in the adjacent area.

(3) The requirements of 11.1.2(1) shall not apply to the extension of more demanding criteria from an upper ceiling level to beneath a lower ceiling level where the difference in height between the ceiling levels is at least 2 ft (0.6 m).

11.1.3 For hydraulically calculated systems, the total system water supply requirements for each design basis shall be determined in accordance with the procedures of Section 23.4 unless modified by a section of Chapter 11 or Chapter 12.

11.1.4 Water Demand.

11.1.4.1* The water demand requirements shall be determined from the following:

(1) Occupancy hazard fire control approach and special design approaches of Chapter 11

(2) Storage design approaches of Chapter 12 through Chapter 20

(3) Special occupancy approaches of Chapter 22

11.1.4.2* The minimum water demand requirements for a sprinkler system shall be determined by adding the hose stream allowance to the water demand for sprinklers.

11.1.5 Water Supplies.

11.1.5.1 The minimum water supply shall be available for the minimum duration specified in Chapter 11.

11.1.5.2* Tanks shall be sized to supply the equipment that they serve.

11.1.5.3* Pumps shall be sized to supply the equipment that they serve.

11.1.6 Hose Allowance.

11.1.6.1 Systems with Multiple Hazard Classifications. For systems with multiple hazard classifications, the hose stream allowance and water supply duration shall be in accordance with one of the following:

(1) The water supply requirements for the highest hazard classification within the system shall be used.

(2) The water supply requirements for each individual hazard classification shall be used in the calculations for the design area for that hazard.

(3)*For systems with multiple hazard classifications where the higher classification only lies within single rooms less than or equal to 400 ft^2 (37.2 m^2) in area with no such rooms adjacent, the water supply requirements for the principal occupancy shall be used for the remainder of the system.

11.1.6.2* Water allowance for outside hose shall be added to the sprinkler requirement at the connection to the city main or a private fire hydrant, whichever is closer to the system riser.

11.1.6.3 Where inside hose connections are planned or are required, the following shall apply:

(1) A total water allowance of 50 gpm (189 L/min) for a single hose connection installation shall be added to the sprinkler requirements.

(2) A total water allowance of 100 gpm (379 L/min) for a multiple hose connection installation shall be added to the sprinkler requirements.

(3) The water allowance shall be added in 50 gpm (189 L/min) increments beginning at the most remote hose connection, with each increment added at the pressure required by the sprinkler system design at that point.

11.1.6.4* When hose valves for fire department use are attached to wet pipe sprinkler system risers in accordance with 8.17.5.2, the following shall apply:

(1) The sprinkler system demand shall not be required to be added to standpipe demand as determined from NFPA 14.
(2) Where the combined sprinkler system demand and hose stream allowance of Table 11.2.3.1.2 exceeds the requirements of NFPA 14, this higher demand shall be used.
(3) For partially sprinklered buildings, the sprinkler demand, not including hose stream allowance, as indicated in Figure 11.2.3.1.1 shall be added to the requirements given in NFPA 14.

11.1.7* High Volume Low Speed (HVLS) Fans. The installation of HVLS fans in buildings equipped with sprinklers, including ESFR sprinklers, shall comply with the following:

(1) The maximum fan diameter shall be 24 ft (7.3 m).
(2) The HVLS fan shall be centered approximately between four adjacent sprinklers.
(3) The vertical clearance from the HVLS fan to sprinkler deflector shall be a minimum of 3 ft (0.9 m).
(4) All HVLS fans shall be interlocked to shut down immediately upon receiving a waterflow signal from the alarm system in accordance with the requirements of *NFPA 72*.

11.2 Occupancy Hazard Fire Control Approach for Spray Sprinklers.

11.2.1 General.

11.2.1.1* The water demand requirements shall be determined by either the pipe schedule method in accordance with 11.2.2 or the hydraulic calculation method in accordance with 11.2.3.

11.2.1.2 Occupancy Classifications.

11.2.1.2.1 Occupancy classifications for this standard shall relate to sprinkler installations and their water supplies only.

11.2.1.2.2 Occupancy classifications shall not be used as a general classification of occupancy hazards.

11.2.1.2.3 Occupancies or portions of occupancies shall be classified according to the quantity and combustibility of contents, the expected rates of heat release, the total potential for energy release, the heights of stockpiles, and the presence of flammable and combustible liquids, using the definitions contained in Section 5.2 through Section 5.5.

11.2.1.2.4 Classifications shall be as follows:

(1) Light hazard
(2) Ordinary hazard (Groups 1 and 2)
(3) Extra hazard (Groups 1 and 2)
(4) Special occupancy hazard *(see Chapter 22)*

11.2.2 Water Demand Requirements — Pipe Schedule Method.

11.2.2.1 Table 11.2.2.1 shall be used in determining the minimum water supply requirements for light and ordinary hazard occupancies protected by systems with pipe sized according to the pipe schedules of Section 23.5.

11.2.2.2 Pressure and flow requirements for extra hazard occupancies shall be based on the hydraulic calculation methods of 11.2.3.

Table 11.2.2.1 Water Supply Requirements for Pipe Schedule Sprinkler Systems

Occupancy Classification	Minimum Residual Pressure Required		Acceptable Flow at Base of Riser (Including Hose Stream Allowance)		Duration (minutes)
	psi	bar	gpm	L/min	
Light hazard	15	1	500–750	1893–2839	30–60
Ordinary hazard	20	1.4	850–1500	3218–5678	60–90

11.2.2.3 The pipe schedule method shall be permitted as follows:

(1) Additions or modifications to existing pipe schedule systems sized according to the pipe schedules of Section 23.5
(2) Additions or modifications to existing extra hazard pipe schedule systems
(3) New systems of 5000 ft² (465 m²) or less
(4) New systems exceeding 5000 ft² (465 m²) where the flows required in Table 11.2.2.1 are available at a minimum residual pressure of 50 psi (3.4 bar) at the highest elevation of sprinkler

11.2.2.4 Table 11.2.2.1 shall be used in determining the minimum water supply requirements.

11.2.2.5 The lower duration value of Table 11.2.2.1 shall be acceptable only where the sprinkler system waterflow alarm device(s) and supervisory device(s) are electrically supervised and such supervision is monitored at an approved, constantly attended location.

11.2.2.6* Residual Pressure.

11.2.2.6.1 The residual pressure requirement of Table 11.2.2.1 shall be met at the elevation of the highest sprinkler.

11.2.2.6.2 Friction Loss Due to Backflow Prevention Valves.

11.2.2.6.2.1 When backflow prevention valves are installed on pipe schedule systems, the friction losses of the device shall be accounted for when determining acceptable residual pressure at the top level of sprinklers.

11.2.2.6.2.2 The friction loss of this device [in psi (bar)] shall be added to the elevation loss and the residual pressure at the top row of sprinklers to determine the total pressure needed at the water supply.

11.2.2.7 The lower flow figure of Table 11.2.2.1 shall be permitted only where the building is of noncombustible construction or the potential areas of fire are limited by building size or compartmentation such that no open areas exceed 3000 ft² (279 m²) for light hazard or 4000 ft² (372 m²) for ordinary hazard.

11.2.3 Water Demand Requirements — Hydraulic Calculation Methods.

11.2.3.1 General.

11.2.3.1.1 The water demand for sprinklers shall be determined only from one of the following, at the discretion of the designer:

(1) Density/area curves of Figure 11.2.3.1.1 in accordance with the density/area method of 11.2.3.2

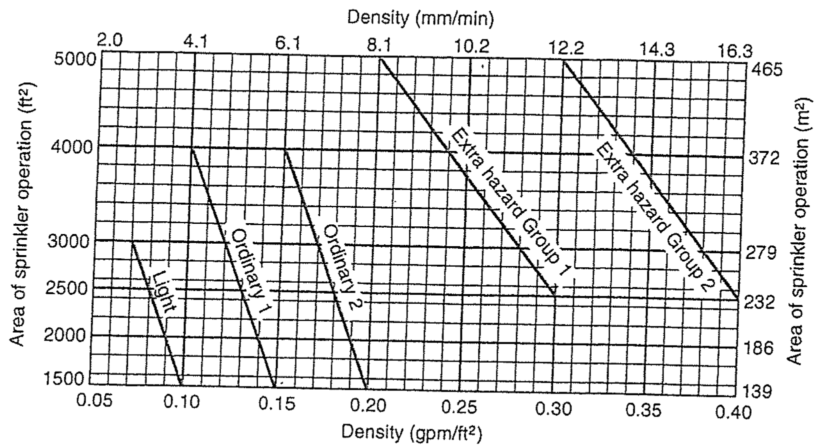


FIGURE 11.2.3.1.1 Density/Area Curves.

(2) The room that creates the greatest demand in accordance with the room design method of 11.2.3.3
(3) Special design areas in accordance with 11.2.3.4

11.2.3.1.2 The minimum water supply shall be available for the minimum duration specified in Table 11.2.3.1.2.

11.2.3.1.3 The lower duration values in Table 11.2.3.1.2 shall be permitted where the sprinkler system waterflow alarm device(s) and supervisory device(s) are electrically supervised and such supervision is monitored at an approved, constantly attended location.

11.2.3.1.4 Restrictions. When either the density/area method or room design method is used, the following shall apply:

(1)*For areas of sprinkler operation less than 1500 ft² (139 m²) used for light and ordinary hazard occupancies, the density for 1500 ft² (139 m²) shall be used.
(2) For areas of sprinkler operation less than 2500 ft² (232 m²) for extra hazard occupancies, the density for 2500 ft² (232 m²) shall be used.
(3)*Unless the requirements of 11.2.3.1.4(4) are met for buildings having unsprinklered combustible concealed spaces, as described in 8.15.1.2 and 8.15.6, the minimum area of sprinkler operation for that portion of the building shall be 3000 ft² (279 m²). The design area of 3000 ft² (279 m²) shall be applied only to the sprinkler system or portions of the sprinkler system that are adjacent to the qualifying combustible concealed space. The term *adjacent* shall apply to any sprinkler system protecting a space above, below, or next to the qualifying concealed space except where a barrier with a fire resistance rating at least equivalent to the water supply duration completely separates the concealed space from the sprinklered area.
(4) The following unsprinklered concealed spaces shall not require a minimum area of sprinkler operation of 3000 ft² (279 m²):
   (a) Noncombustible and limited-combustible concealed spaces with minimal combustible loading having no access. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.
   (b) Noncombustible and limited-combustible concealed spaces with limited access and not permitting occupancy or storage of combustibles. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.
   (c) Combustible concealed spaces filled entirely with noncombustible insulation.
   (d)*Light or ordinary hazard occupancies where noncombustible or limited-combustible ceilings are directly attached to the bottom of solid wood joists or solid limited-combustible construction or noncombustible construction so as to create enclosed joist spaces 160 ft³ (4.5 m³) or less in volume, including space below insulation that is laid directly on top or within the ceiling joists in an otherwise sprinklered concealed space.
   (e) Concealed spaces where rigid materials are used and the exposed surfaces have a flame spread index of 25 or less and the materials have been demonstrated to not propagate fire more than 10.5 ft (3.2 m) when tested in accordance with ASTM E 84, *Standard Test Method of Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, extended for an additional 20 minutes in the form in which they are installed in the space.

Table 11.2.3.1.2 Hose Stream Allowance and Water Supply Duration Requirements for Hydraulically Calculated Systems

Occupancy	Inside Hose		Total Combined Inside and Outside Hose		Duration (minutes)
	gpm	L/min	gpm	L/min	
Light hazard	0, 50, or 100	0, 189, or 379	100	379	30
Ordinary hazard	0, 50, or 100	0, 189, or 379	250	946	60–90
Extra hazard	0, 50, or 100	0, 189, or 379	500	1893	90–120

(f) Concealed spaces in which the exposed materials are constructed entirely of fire-retardant treated wood as defined by NFPA 703.

(g) Concealed spaces over isolated small rooms not exceeding 55 ft^2 (5.1 m^2) in area.

(h) Vertical pipe chases under 10 ft^2 (0.93 m^2), provided that in multifloor buildings the chases are firestopped at each floor using materials equivalent to the floor construction, and where such pipe chases shall contain no sources of ignition, piping shall be noncombustible, and pipe penetrations at each floor shall be properly sealed.

(i) Exterior columns under 10 ft^2 (0.93 m^2) in area formed by studs or wood joists, supporting exterior canopies that are fully protected with a sprinkler system.

(j)*Light or ordinary hazard occupancies where noncombustible or limited-combustible ceilings are attached to the bottom of composite wood joists either directly or on to metal channels not exceeding 1 in. (25.4 mm) in depth, provided the adjacent joist channels are firestopped into volumes not exceeding 160 ft^3 (4.5 m^3) using materials equivalent to ½ in. (12.7 mm) gypsum board and at least 3½ in. (90 mm) of batt insulation is installed at the bottom of the joist channels when the ceiling is attached utilizing metal channels.

11.2.3.2 Density/Area Method.

11.2.3.2.1 Water Supply.

11.2.3.2.1.1 The water supply requirement for sprinklers only shall be calculated from the density/area curves of Figure 11.2.3.1.1 or from Chapter 22 where density/area criteria are specified for special occupancy hazards.

11.2.3.2.1.2 When using Figure 11.2.3.1.1, the calculations shall satisfy any single point on the appropriate density/area curve.

11.2.3.2.1.3 When using Figure 11.2.3.1.1, it shall not be necessary to meet all points on the selected curves.

11.2.3.2.2 Sprinklers.

11.2.3.2.2.1 The densities and areas provided in Figure 11.2.3.1.1 shall be for use only with spray sprinklers.

11.2.3.2.2.2 Quick-response sprinklers shall not be permitted for use in extra hazard occupancies or other occupancies where there are substantial amounts of flammable liquids or combustible dusts.

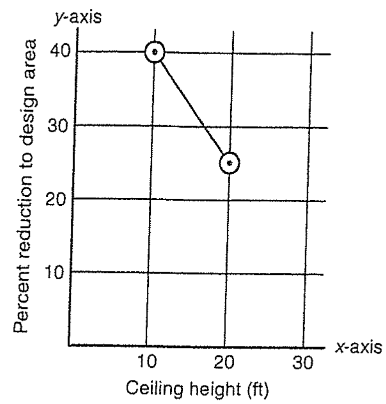
11.2.3.2.2.3 For extended coverage sprinklers, the minimum design area shall be that corresponding to the hazard in Figure 11.2.3.1.1 or the area protected by five sprinklers, whichever is greater.

11.2.3.2.2.4 Extended coverage sprinklers shall be listed with and designed for the minimum flow corresponding to the density for the hazard as specified in Figure 11.2.3.1.1.

11.2.3.2.3 Quick-Response Sprinklers.

11.2.3.2.3.1 Where listed quick-response sprinklers, including extended coverage quick-response sprinklers, are used throughout a system or portion of a system having the same hydraulic design basis, the system area of operation shall be permitted to be reduced without revising the density as indicated in Figure 11.2.3.2.3.1 when all of the following conditions are satisfied:

(1) Wet pipe system
(2) Light hazard or ordinary hazard occupancy
(3) 20 ft (6.1 m) maximum ceiling height
(4) There are no unprotected ceiling pockets as allowed by 8.6.7 and 8.8.7 exceeding 32 ft^2 (3 m^2)



Note: $y = \frac{-3x}{2} + 55$

For ceiling height ≥10 ft and ≤20 ft, $y = \frac{-3x}{2} + 55$
For ceiling height <10 ft, $y = 40$
For ceiling height >20, $y = 0$
For SI units, 1 ft = 0.31 m.

FIGURE 11.2.3.2.3.1 Design Area Reduction for Quick-Response Sprinklers.

11.2.3.2.3.2 The number of sprinklers in the design area shall never be less than five.

11.2.3.2.3.3 Where quick-response sprinklers are used on a sloped ceiling or roof, the maximum ceiling or roof height shall be used for determining the percent reduction in design area.

11.2.3.2.4 Sloped Ceilings. The system area of operation shall be increased by 30 percent without revising the density when the following types of sprinklers are used on sloped ceilings with a pitch exceeding 1 in 6 (a rise of 2 units in a run of 12 units, a roof slope of 16.7 percent) in nonstorage applications:

(1) Spray sprinklers, including extended coverage sprinklers listed in accordance with 8.4.3(4), and quick-response sprinklers
(2) CMSA sprinklers

11.2.3.2.5* Dry Pipe and Double Interlock Preaction Systems. For dry pipe systems and double interlock preaction systems, the area of sprinkler operation shall be increased by 30 percent without revising the density.

11.2.3.2.6 High-Temperature Sprinklers. Where high-temperature sprinklers are used for extra hazard occupancies, the area of sprinkler operation shall be permitted to be reduced by 25 percent without revising the density, but not to less than 2000 ft^2 (186 m^2).

11.2.3.2.7* Multiple Adjustments.

11.2.3.2.7.1 Where multiple adjustments to the area of operation are required to be made in accordance with 11.2.3.2.3, 11.2.3.2.4, 11.2.3.2.5, or 11.2.3.2.6, these adjustments shall be compounded based on the area of operation originally selected from Figure 11.2.3.1.1.

11.2.3.2.7.2 If the building has unsprinklered combustible concealed spaces, the rules of 11.2.3.1.4 shall be applied after all other modifications have been made.

11.2.3.3 Room Design Method.

11.2.3.3.1* The water supply requirements for sprinklers only shall be based upon the room that creates the greatest demand.

11.2.3.3.2 The density selected shall be that from Figure 11.2.3.1.1 corresponding to the occupancy hazard classification and room size.

11.2.3.3.3 To utilize the room design method, all rooms shall be enclosed with walls having a fire-resistance rating equal to the water supply duration indicated in Table 11.2.3.1.2.

11.2.3.3.4 If the room is smaller than the area specified in Figure 11.2.3.1.1, the provisions of 11.2.3.1.4(1) and 11.2.3.1.4(2) shall apply.

11.2.3.3.5 Minimum protection of openings shall be as follows:

(1) Light hazard — Nonrated automatic or self-closing doors.
(2) Light hazard with no opening protection — Where openings are not protected, calculations shall include the sprinklers in the room plus two sprinklers in the communicating space nearest each such unprotected opening unless the communicating space has only one sprinkler, in which case calculations shall be extended to the operation of that sprinkler. The selection of the room and communicating space sprinklers to be calculated shall be that which produces the greatest hydraulic demand. For light hazard occupancies with unprotected openings in walls, a minimum lintel of depth of 8 in. (203 mm) is required for openings and the opening shall not exceed 8 ft (2.44 m) in width. It shall be permitted to have a single opening of 36 in. (914 mm) or less without a lintel, provided there are no other openings to adjoining spaces.
(3) Ordinary and extra hazard — Automatic or self-closing doors with appropriate fire resistance ratings for the enclosure.

11.2.3.3.6 Where the room design method is used and the area under consideration is a corridor protected by a single row of sprinklers with protected openings in accordance with 11.2.3.3.5, the maximum number of sprinklers that needs to be calculated is five or, when extended coverage sprinklers are installed, all sprinklers contained within 75 linear feet (22.9 linear meters) of the corridor.

11.2.3.3.7 Where the area under consideration is a corridor protected by a single row of sprinklers with unprotected openings, in a light hazard occupancy, the design area shall include all sprinklers in the corridor to a maximum of five or, when extended coverage sprinklers are installed, all sprinklers within 75 linear feet (22.9 linear meters) of the corridor.

11.2.3.4 Special Design Areas.

11.2.3.4.1 Where the design area consists of a building service chute supplied by a separate riser, the maximum number of sprinklers that needs to be calculated is three, each with a minimum discharge of 15 gpm (57 L/min).

11.2.3.4.2* Where an area is to be protected by a single line of sprinklers, the design area shall include all sprinklers on the line up to a maximum of seven.

11.2.3.4.3 Sprinklers in ducts as described in Section 7.10 and 8.15.13 shall be hydraulically designed to provide a discharge pressure of not less than 7 psi (0.5 bar) at each sprinkler with all sprinklers within the duct flowing.

11.3 Special Design Approaches.

11.3.1 Residential Sprinklers.

11.3.1.1* The design area shall be the area that includes the four adjacent sprinklers that produce the greatest hydraulic demand.

11.3.1.2* Unless the requirements of 11.2.3.1.4(4) are met for buildings having unsprinklered combustible concealed spaces, as described in 8.15.1.2 and 8.15.6, the minimum design area of sprinkler operation for that portion of the building shall be eight sprinklers.

11.3.1.2.1* The design area of eight sprinklers shall be applied only to the portion of the residential sprinklers that are adjacent to the qualifying combustible concealed space.

11.3.1.2.2 The term *adjacent* shall apply to any sprinkler system protecting a space above, below, or next to the qualifying concealed space except where a barrier with a fire resistance rating at least equivalent to the water supply duration completely separates the concealed space from the sprinklered area.

11.3.1.3 Unless the requirements of 11.3.1.4 are met, the minimum required discharge from each of the four hydraulically most demanding sprinklers shall be the greater of the following:

(1) In accordance with minimum flow rates indicated in individual listings
(2) Calculated based on delivering a minimum of 0.1 gpm/ft^2 (4.1 mm/min) over the design area in accordance with the provisions of 8.5.2.1 or 8.6.2.1.2

11.3.1.4 For modifications or additions to existing systems equipped with residential sprinklers, the listed discharge criteria less than 0.1 gpm/ft^2 (4.1 mm/min) shall be permitted to be used.

11.3.1.5 Where areas such as attics, basements, or other types of occupancies are outside of dwelling units but within the same structure, these areas shall be protected as a separate design basis in accordance with Section 11.1.

11.3.1.6 Hose stream allowance and water supply duration requirements shall be in accordance with those for light hazard occupancies in Table 11.2.3.1.2.

11.3.2 Exposure Protection.

11.3.2.1* Piping shall be hydraulically calculated in accordance with Section 23.4 to furnish a minimum of 7 psi (0.5 bar) at any sprinkler with all sprinklers facing the exposure operating.

11.3.2.2 Where the water supply feeds other fire protection systems, it shall be capable of furnishing total demand for such systems as well as the exposure system demand.

11.3.3 Water Curtains.

11.3.3.1 Sprinklers in a water curtain such as described in 8.15.4 or 8.15.17.2 shall be hydraulically designed to provide a discharge of 3 gpm per lineal foot (37 L/min per lineal meter) of water curtain, with no sprinklers discharging less than 15 gpm (56.8 L/min).

11.3.3.2 For water curtains employing automatic sprinklers, the number of sprinklers calculated in this water curtain shall be the number in the length corresponding to the length parallel to the branch lines in the area determined by 23.4.4.1.1.

11.3.3.3 If a single fire can be expected to operate sprinklers within the water curtain and within the design area of a hydraulically calculated system, the water supply to the water curtain shall be added to the water demand of the hydraulic calculations and shall be balanced to the calculated area demand.

11.3.3.4 Hydraulic design calculations shall include a design area selected to include ceiling sprinklers adjacent to the water curtain.

11.3.4 Sprinklers Under Roof or Ceiling in Combustible Concealed Spaces of Wood Joist or Wood Truss Construction with Members 3 ft (914 mm) or Less on Center and Slope Having Pitch of 4 in 12 or Greater.

11.3.4.1 Where sprinkler spacing does not exceed 8 ft (2.5 m) measured perpendicular to the slope, the minimum sprinkler discharge pressure shall be 7 psi (0.5 bar).

11.3.4.2 Where sprinkler spacing exceeds 8 ft (2.5 m) measured perpendicular to the slope, the minimum sprinkler discharge pressure shall be 20 psi (1.4 bar).

11.3.4.3 Hose stream allowance and water supply duration requirements shall be in accordance with those for light hazard occupancies in Table 11.2.3.1.2.

Chapter 12 General Requirements for Storage

12.1 General. The requirements of Section 12.1 shall apply to all storage arrangements and commodities other than miscellaneous storage *(see Chapter 13)* and as modified by specific sections in Chapter 14 through Chapter 20.

12.1.1 Roof Vents and Draft Curtains. See Section C.6.

12.1.1.1* Manually operated roof vents or automatic roof vents with operating elements that have a higher temperature classification than the automatic sprinklers shall be permitted.

12.1.1.2 Early suppression fast-response (ESFR) sprinklers shall not be used in buildings with automatic heat or smoke vents unless the vents use a high-temperature rated, standard-response operating mechanism.

12.1.1.3* Draft curtains shall not be used within ESFR sprinkler systems.

12.1.1.3.1 Draft curtains separating ESFR sprinklers at system breaks or from control mode sprinklers or between hazards shall be permitted. *(See 8.4.6.4.)*

12.1.2 Ceiling Slope. The sprinkler system criteria specified in Chapter 12 and Chapters 14 through 20 are intended to apply to buildings with ceiling slopes not exceeding 2 in 12 (16.7 percent) unless modified by a specific section in Chapter 12 and Chapters 14 through 20.

12.1.3* Building and Storage Height.

12.1.3.1 The maximum building height shall be measured to the underside of the roof deck or ceiling.

12.1.3.2 ESFR sprinklers shall be used only in buildings equal to, or less than, the height of the building for which they have been listed.

12.1.3.3 The sprinkler system design shall be based on the storage height and clearance to ceiling that routinely or periodically exist in the building and create the greatest water demand. Where storage is placed above doors, the storage height shall be calculated from the base of storage above the door.

12.1.3.4 Clearance to Ceiling.

12.1.3.4.1* The clearance to ceiling shall be measured in accordance with 12.1.3.4.1.1 through 12.1.3.4.1.3.

12.1.3.4.1.1 For corrugated metal deck roofs up to 3 in. (76 mm) in depth, the clearance to ceiling shall be measured from the top of storage to the bottom of the deck.

12.1.3.4.1.2 For corrugated metal deck roofs deeper than 3 in. (76 mm), the clearance to ceiling shall be measured to the highest point on the deck.

12.1.3.4.1.3 For ceilings that have insulation attached directly to underside of the ceiling or roof structure, the clearance to ceiling shall be measured from the top of storage to the bottom of the insulation and shall be in accordance with 12.1.3.4.1.3(A) or 12.1.3.4.1.3(B).

(A) For insulation that is attached directly to the ceiling or roof structure and is installed flat and parallel to the ceiling or roof structure, the clearance to ceiling shall be measured from the top of storage to the underside of the insulation.

(B) For insulation that is installed in a manner that causes it to deflect or sag down from the ceiling or roof structure, the clearance to ceiling shall be measured from the top of storage to a point half of the distance of the deflection from the insulation high point to the insulation low point. If the deflection or sag in the insulation exceeds 6 in. (152 mm), the clearance to ceiling shall be measured from the top of storage to the high point of the insulation.

12.1.3.4.2 For spray sprinkler criteria where the clearance to ceiling exceeds those identified in this section, the requirements of 12.1.3.4.3 through 12.1.3.4.8 shall apply.

12.1.3.4.3 Where the clearance to ceiling exceeds 20 ft (6.1 m) for Chapters 14 and 15, protection shall be based upon the storage height that would result in a clearance to ceiling of 20 ft (6.1 m).

12.1.3.4.4 Where the clearance to ceiling exceeds 20 ft (6.1 m) for Section 16.2, protection shall be based upon the storage height that would result in a clearance to ceiling of 20 ft (6.1 m) or providing one level of supplemental, quick-response in-rack sprinklers located directly below the top tier of storage and at every flue space intersection.

12.1.3.4.5 Where the clearance to ceiling exceeds 10 ft (3.1 m) for Section 16.3 or Section 17.2, protection shall be based upon the storage height that would result in a clearance to ceiling of 10 ft (3.1 m) or providing one level of supplemental, quick-response in-rack sprinklers located directly below the top tier of storage and at every flue space intersection.

12.1.3.4.6 Where the clearance exceeds 10 ft (3.1 m) for Section 17.3, protection shall be based upon providing one level of supplemental, quick-response in-rack sprinklers located directly below the top tier of storage and at every flue space intersection.

12.1.3.4.7 When applying the supplemental in-rack sprinkler option, the ceiling density shall be based upon the given storage height with an assumed acceptable clearance to ceiling.

12.1.3.4.8 If in-rack sprinklers are required for the actual storage height with an acceptable clearance to ceiling, in-rack sprinklers shall be installed as indicated by that criteria.

12.1.4* High Volume Low Speed (HVLS) Fans.

12.1.4.1 The installation of HVLS fans in buildings equipped with sprinklers, including ESFR sprinklers, shall comply with the following:

(1) The maximum fan diameter shall be 24 ft (7.3 m).
(2) The HVLS fan shall be centered approximately between four adjacent sprinklers.
(3) The vertical clearance from the HVLS fan to sprinkler deflector shall be a minimum of 3 ft (0.9 m).
(4) All HVLS fans shall be interlocked to shut down immediately upon receiving a waterflow signal from the alarm system in accordance with the requirements of *NFPA 72*.

12.2* Hose Connections.

12.2.1 Small hose connections [1½ in. (38 mm)] shall be provided where required by the authority having jurisdiction in accordance with 8.17.5 for first-aid fire-fighting and overhaul operations.

12.2.2 Small hose connections shall not be required for the protection of Class I, II, III, and IV commodities stored 12 ft (3.7 m) or less in height.

12.3* Adjacent Hazards or Design Methods. For buildings with two or more adjacent hazards or design methods, the following shall apply:

(1) Where areas are not physically separated by a barrier or partition capable of delaying heat from a fire in one area from fusing sprinklers in the adjacent area, the required sprinkler protection for the more demanding design basis shall extend 15 ft (4.6 m) beyond its perimeter.
(2) The requirements of 12.3(1) shall not apply where the areas are separated by a barrier partition that is capable of preventing heat from a fire in one area from fusing sprinklers in the adjacent area.
(3) The requirements of 12.3(1) shall not apply to the extension of more demanding criteria from an upper ceiling level to beneath a lower ceiling level where the difference in height between the ceiling levels is at least 2 ft (0.6 m).

12.4* Wet Pipe Systems.

12.4.1 Sprinkler systems shall be wet pipe systems.

12.4.2* In areas that are subject to freezing or where special conditions exist, dry pipe systems and preaction systems shall be permitted to protect storage occupancies.

12.4.3 ESFR sprinklers shall only be permitted to be wet pipe systems.

12.5 Dry Pipe and Preaction Systems.

12.5.1 For dry pipe systems and preaction systems, the area of sprinkler operation shall be increased by 30 percent without revising the density.

12.5.2 Densities and areas shall be selected so that the final area of operation after the 30 percent increase is not greater than 3900 ft^2 (360 m^2).

12.6* Storage Applications.

12.6.1 For storage applications with densities of 0.20 gpm/ft^2 (8.2 mm/min) or less, standard-response sprinklers with a K-factor of K-5.6 (80) or larger shall be permitted.

12.6.2 For general storage applications, rack storage, rubber tire storage, roll paper storage, and baled cotton storage being protected with upright and pendent spray sprinklers with required densities of greater than 0.20 gpm/ft^2 to 0.34 gpm/ft^2 (8.2 mm/min to 13.9 mm/min), standard-response sprinklers with a nominal K-factor of K-8.0 (115) or larger shall be used.

12.6.3 For general storage applications, rack storage, rubber tire storage, roll paper storage, and baled cotton storage being protected with upright and pendent spray sprinklers with required densities greater than 0.34 gpm/ft^2 (13.9 mm/min), standard-response spray sprinklers with a K-factor of K-11.2 (161) or larger that are listed for storage applications shall be used.

12.6.4* Unless the requirements of 12.6.5 are met, the requirements of 12.6.2 and 12.6.3 shall not apply to modifications to existing storage application systems, using sprinklers with K-factors of K-8.0 (115) or less.

12.6.5 Where applying the requirements of Figure 17.2.1.2.1(b) and Figure 17.2.1.2.1(c) utilizing the design criteria of 0.6 gpm/ft^2 per 2000 ft^2 (24.4 mm/min per 186 m^2) to existing storage applications, the requirements of 12.6.3 shall apply.

12.6.6 The use of quick-response spray sprinklers for storage applications shall be permitted when listed for such use.

12.6.7 CMSA and ESFR sprinklers shall be permitted to protect storage of Class I through Class IV commodities, plastic commodities, miscellaneous storage, and other storage as specified in Chapter 12 through Chapter 20 or by other NFPA standards.

12.6.7.1 ESFR sprinklers designed to meet any criteria in Chapter 12 through Chapter 20 shall be permitted to protect light and ordinary hazard occupancies.

12.6.7.2 Quick-response CMSA sprinklers designed to meet any criteria in Chapter 12 through Chapter 20 shall be permitted to protect light and ordinary hazard occupancies.

12.6.7.3 Standard-response CMSA sprinklers designed to meet any criteria in Chapter 12 through Chapter 20 shall be permitted to protect ordinary hazard occupancies.

12.6.8 The design figures indicate water demands for ordinary-temperature-rated and nominal high-temperature-rated sprinklers at the ceiling.

12.6.8.1 The ordinary-temperature design densities correspond to ordinary-temperature-rated sprinklers and shall be used for sprinklers with ordinary- and intermediate-temperature classification.

12.6.8.2 The high-temperature design densities correspond to high-temperature-rated sprinklers and shall be used for sprinklers having a high-temperature rating.

12.6.9 Ordinary- and intermediate-temperature sprinklers with K-factors of K-11.2 (161) or larger, where listed for storage, shall be permitted to use the densities for high-temperature sprinklers.

12.7 Discharge Considerations.

12.7.1 The water supply for sprinklers only shall be determined either from the density/area requirements of Chapter 12 through Chapter 20 or shall be based upon the room design method in accordance with Section 12.10, at the discretion of the designer.

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*                             E P A N E T                            *
*                     Hydraulic and Water Quality                    *
*                     Analysis for Pipe Networks                     *
*                           Version 2.0                              *
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Input File: PeakHour.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	1	2	28	150
3	4	3	19	150
4	3	1	59	400

Node Results at 0:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	4.38	125.57	31.77	0.00	
4	2.19	125.60	32.40	0.00	
3	0.00	125.60	35.15	0.00	
1	-6.57	125.60	0.00	0.00	Reservoir

Link Results at 0:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	4.38	0.25	0.93	Open
3	-2.19	0.12	0.26	Open
4	-2.19	0.02	0.00	Open

Node Results at 1:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	4.38	125.57	31.77	0.08	
4	2.19	125.60	32.40	1.00	
3	0.00	125.60	35.15	0.94	
1	-6.57	125.60	0.00	0.00	Reservoir

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Link Results at 1:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	4.38	0.25	0.93	Open
3	-2.19	0.12	0.26	Open
4	-2.19	0.02	0.00	Open

Node Results at 2:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	4.38	125.57	31.77	0.08	
4	2.19	125.60	32.40	1.02	
3	0.00	125.60	35.15	0.94	
1	-6.57	125.60	0.00	0.00	Reservoir

Link Results at 2:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	4.38	0.25	0.93	Open
3	-2.19	0.12	0.26	Open
4	-2.19	0.02	0.00	Open

Node Results at 3:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	4.38	125.57	31.77	0.08	
4	2.19	125.60	32.40	1.02	
3	0.00	125.60	35.15	0.94	
1	-6.57	125.60	0.00	0.00	Reservoir

Link Results at 3:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	4.38	0.25	0.93	Open
3	-2.19	0.12	0.26	Open
4	-2.19	0.02	0.00	Open

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Node Results at 4:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	4.38	125.57	31.77	0.08	
4	2.19	125.60	32.40	1.02	
3	0.00	125.60	35.15	0.94	
1	-6.57	125.60	0.00	0.00	Reservoir

Link Results at 4:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	4.38	0.25	0.93	Open
3	-2.19	0.12	0.26	Open
4	-2.19	0.02	0.00	Open

Node Results at 5:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours

2	4.38	125.57	31.77	0.08	
4	2.19	125.60	32.40	1.02	
3	0.00	125.60	35.15	0.94	
1	-6.57	125.60	0.00	0.00	Reservoir

Link Results at 5:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	4.38	0.25	0.93	Open
3	-2.19	0.12	0.26	Open
4	-2.19	0.02	0.00	Open

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*                           E P A N E T                              *
*                   Hydraulic and Water Quality                      *
*                   Analysis for Pipe Networks                       *
*                         Version 2.0                                *
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Input File: HighPressure.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	1	2	28	150
3	4	3	19	150
4	3	1	59	400

Node Results at 0:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	1.62	136.10	42.30	0.00	
4	0.81	136.10	42.90	0.00	
3	0.00	136.10	45.65	0.00	
1	-2.43	136.10	0.00	0.00	Reservoir

Link Results at 0:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	1.62	0.09	0.15	Open
3	-0.81	0.05	0.04	Open
4	-0.81	0.01	0.00	Open

Node Results at 1:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	1.62	136.10	42.30	0.08	
4	0.81	136.10	42.90	1.00	
3	0.00	136.10	45.65	1.00	
1	-2.43	136.10	0.00	0.00	Reservoir

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Page 2

Link Results at 1:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	1.62	0.09	0.15	Open
3	-0.81	0.05	0.04	Open
4	-0.81	0.01	0.00	Open

Node Results at 2:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	1.62	136.10	42.30	0.08	
4	0.81	136.10	42.90	2.00	
3	0.00	136.10	45.65	2.00	
1	-2.43	136.10	0.00	0.00	Reservoir

Link Results at 2:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	1.62	0.09	0.15	Open
3	-0.81	0.05	0.04	Open
4	-0.81	0.01	0.00	Open

Node Results at 3:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	1.62	136.10	42.30	0.08	
4	0.81	136.10	42.90	2.66	
3	0.00	136.10	45.65	2.54	
1	-2.43	136.10	0.00	0.00	Reservoir

Link Results at 3:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	1.62	0.09	0.15	Open
3	-0.81	0.05	0.04	Open
4	-0.81	0.01	0.00	Open

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Node Results at 4:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	1.62	136.10	42.30	0.08	
4	0.81	136.10	42.90	2.66	
3	0.00	136.10	45.65	2.54	
1	-2.43	136.10	0.00	0.00	Reservoir

Link Results at 4:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	1.62	0.09	0.15	Open
3	-0.81	0.05	0.04	Open
4	-0.81	0.01	0.00	Open

Node Results at 5:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours

2	1.62	136.10	42.30	0.08	
4	0.81	136.10	42.90	2.66	
3	0.00	136.10	45.65	2.54	
1	-2.43	136.10	0.00	0.00	Reservoir

Link Results at 5:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	1.62	0.09	0.15	Open
3	-0.81	0.05	0.04	Open
4	-0.81	0.01	0.00	Open

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*                             E P A N E T                            *
*                     Hydraulic and Water Quality                    *
*                     Analysis for Pipe Networks                     *
*                            Version 2.0                             *
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Input File: MaxDay+FF-RetirementHome.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	1	2	28	150
3	4	3	19	150
4	3	1	59	400

Node Results at 0:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	120.00	115.00	21.20	0.00	
4	1.22	127.00	33.80	0.00	
3	0.00	127.00	36.55	0.00	
1	-121.22	127.00	0.00	0.00	Reservoir

Link Results at 0:00 Hrs:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
1	120.00	6.79	428.48	Open
3	-1.22	0.07	0.09	Open
4	-1.22	0.01	0.00	Open

Node Results at 1:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	120.00	115.00	21.20	0.08	
4	1.22	127.00	33.80	1.00	
3	0.00	127.00	36.55	1.00	
1	-121.22	127.00	0.00	0.00	Reservoir

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Link Results at 1:00 Hrs:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
1	120.00	6.79	428.48	Open
3	-1.22	0.07	0.09	Open
4	-1.22	0.01	0.00	Open

Node Results at 2:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	120.00	115.00	21.20	0.08	
4	1.22	127.00	33.80	1.77	
3	0.00	127.00	36.55	1.69	
1	-121.22	127.00	0.00	0.00	Reservoir

Link Results at 2:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	120.00	6.79	428.48	Open
3	-1.22	0.07	0.09	Open
4	-1.22	0.01	0.00	Open

Node Results at 3:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	120.00	115.00	21.20	0.08	
4	1.22	127.00	33.80	1.77	
3	0.00	127.00	36.55	1.69	
1	-121.22	127.00	0.00	0.00	Reservoir

Link Results at 3:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	120.00	6.79	428.48	Open
3	-1.22	0.07	0.09	Open
4	-1.22	0.01	0.00	Open

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Page 3

Node Results at 4:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	120.00	115.00	21.20	0.08	
4	1.22	127.00	33.80	1.77	
3	0.00	127.00	36.55	1.69	
1	-121.22	127.00	0.00	0.00	Reservoir

Link Results at 4:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	120.00	6.79	428.48	Open
3	-1.22	0.07	0.09	Open
4	-1.22	0.01	0.00	Open

Node Results at 5:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours

2	120.00	115.00	21.20	0.08	
4	1.22	127.00	33.80	1.77	
3	0.00	127.00	36.55	1.69	
1	-121.22	127.00	0.00	0.00	Reservoir

Link Results at 5:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	120.00	6.79	428.48	Open
3	-1.22	0.07	0.09	Open
4	-1.22	0.01	0.00	Open

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

Input File: MaxDay+FF-Hotel.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	1	2	28	150
3	4	3	19	150
4	3	1	59	400

Node Results at 0:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	2.43	127.69	33.89	0.00	
4	85.20	123.30	30.10	0.00	
3	0.00	127.62	37.17	0.00	
1	-87.63	127.70	0.00	0.00	Reservoir

Link Results at 0:00 Hrs:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
1	2.43	0.14	0.31	Open
3	-85.20	4.82	227.23	Open
4	-85.20	0.68	1.36	Open

Node Results at 1:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	2.43	127.69	33.89	0.08	
4	85.20	123.30	30.10	0.17	
3	0.00	127.62	37.17	0.08	
1	-87.63	127.70	0.00	0.00	Reservoir

♀

Link Results at 1:00 Hrs:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
1	2.43	0.14	0.31	Open
3	-85.20	4.82	227.23	Open
4	-85.20	0.68	1.36	Open

Node Results at 2:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	2.43	127.69	33.89	0.08	
4	85.20	123.30	30.10	0.17	
3	0.00	127.62	37.17	0.08	
1	-87.63	127.70	0.00	0.00	Reservoir

Link Results at 2:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	2.43	0.14	0.31	Open
3	-85.20	4.82	227.23	Open
4	-85.20	0.68	1.36	Open

Node Results at 3:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	2.43	127.69	33.89	0.08	
4	85.20	123.30	30.10	0.17	
3	0.00	127.62	37.17	0.08	
1	-87.63	127.70	0.00	0.00	Reservoir

Link Results at 3:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	2.43	0.14	0.31	Open
3	-85.20	4.82	227.23	Open
4	-85.20	0.68	1.36	Open

♀

Page 3

Node Results at 4:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
2	2.43	127.69	33.89	0.08	
4	85.20	123.30	30.10	0.17	
3	0.00	127.62	37.17	0.08	
1	-87.63	127.70	0.00	0.00	Reservoir

Link Results at 4:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	2.43	0.14	0.31	Open
3	-85.20	4.82	227.23	Open
4	-85.20	0.68	1.36	Open

Node Results at 5:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality hours

2	2.43	127.69	33.89	0.08	
4	85.20	123.30	30.10	0.17	
3	0.00	127.62	37.17	0.08	
1	-87.63	127.70	0.00	0.00	Reservoir

Link Results at 5:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	2.43	0.14	0.31	Open
3	-85.20	4.82	227.23	Open
4	-85.20	0.68	1.36	Open

Appendix C

Stormwater Management Calculations

1026-1054 Hunt Club Road
Claridge Hunt Club Development
Design Storm Time Series Data
Chicago Design Storms

C25mm-4.stm		C2-4.stm		C5-4.stm	
Duration min	Intensity mm/hr	Duration min	Intensity mm/hr	Duration min	Intensity mm/hr
0:00	0	0:00	0	0:00	0
0:10	1.34	0:10	1.98	0:10	2.49
0:20	1.49	0:20	2.23	0:20	2.77
0:30	1.69	0:30	2.58	0:30	3.14
0:40	1.96	0:40	3.06	0:40	3.62
0:50	2.33	0:50	3.81	0:50	4.31
1:00	2.91	1:00	5.1	1:00	5.37
1:10	3.91	1:10	7.91	1:10	7.19
1:20	6.1	1:20	19.04	1:20	11.14
1:30	14.53	1:30	76.81	1:30	26.25
1:40	58.72	1:40	23.64	1:40	104.19
1:50	17.11	1:50	11.91	1:50	30.86
2:00	8.32	2:00	7.98	2:00	15.15
2:10	5.5	2:10	6.03	2:10	10.07
2:20	4.13	2:20	4.87	2:20	7.58
2:30	3.32	2:30	4.1	2:30	6.11
2:40	2.79	2:40	3.55	2:40	5.14
2:50	2.41	2:50	3.14	2:50	4.45
3:00	2.12	3:00	2.82	3:00	3.93
3:10	1.9	3:10	2.57	3:10	3.53
3:20	1.73	3:20	2.35	3:20	3.21
3:30	1.58	3:30	2.18	3:30	2.94
3:40	1.46	3:40	2.03	3:40	2.72
3:50	1.36	3:50	1.9	3:50	2.53
4:00	1.27	4:00	1.79	4:00	2.37

1026-1054 Hunt Club Road
Claridge Hunt Club Development
Design Storm Time Series Data
Chicago Design Storms

C100-4.stm			C100-4+20%.stm	
Duration min	Intensity mm/hr		Duration min	Intensity mm/hr
0:00	0		0:00	0
0:10	4.07		0:10	4.88
0:20	4.54		0:20	5.45
0:30	5.14		0:40	7.14
0:40	5.95		0:50	8.51
0:50	7.09		1:00	10.62
1:00	8.85		1:10	14.28
1:10	11.9		1:20	22.25
1:20	18.54		1:30	53.03
1:30	44.19		1:40	214.27
1:40	178.56		1:50	62.45
1:50	52.04		2:00	30.37
2:00	25.31		2:10	20.08
2:10	16.73		2:20	15.07
2:20	12.56		2:30	12.11
2:30	10.09		2:40	10.16
2:40	8.47		2:50	8.78
2:50	7.32		3:00	7.75
3:00	6.46		3:10	6.95
3:10	5.79		3:20	6.3
3:20	5.25		3:30	5.78
3:30	4.82		3:40	5.34
3:40	4.45		3:50	4.97
3:50	4.14		4:00	4.66
4:00	3.88			

1026-1054 Hunt Club Road
Claridge Hunt Club Development
Design Storm Time Series Data
SCS Design Storms

S2-12.stm		S5-12.stm		S100-12.stm	
Duration min	Intensity mm/hr	Duration min	Intensity mm/hr	Duration min	Intensity mm/hr
0:00	0.00	0:00	0	0:00	0
0:30	1.27	0:30	1.69	0:30	2.82
1:00	0.59	1:00	0.79	1:00	1.31
1:30	1.10	1:30	1.46	1:30	2.44
2:00	1.10	2:00	1.46	2:00	2.44
2:30	1.44	2:30	1.91	2:30	3.19
3:00	1.27	3:00	1.69	3:00	2.82
3:30	1.69	3:30	2.25	3:30	3.76
4:00	1.69	4:00	2.25	4:00	3.76
4:30	2.29	4:30	3.03	4:30	5.07
5:00	2.88	5:00	3.82	5:00	6.39
5:30	4.57	5:30	6.07	5:30	10.14
6:00	36.24	6:00	48.08	6:00	80.38
6:30	9.23	6:30	12.25	6:30	20.47
7:00	4.06	7:00	5.39	7:00	9.01
7:30	2.71	7:30	3.59	7:30	6.01
8:00	2.37	8:00	3.15	8:00	5.26
8:30	1.86	8:30	2.47	8:30	4.13
9:00	1.95	9:00	2.58	9:00	4.32
9:30	1.27	9:30	1.69	9:30	2.82
10:00	1.02	10:00	1.35	10:00	2.25
10:30	1.44	10:30	1.91	10:30	3.19
11:00	0.93	11:00	1.24	11:00	2.07
11:30	0.85	11:30	1.12	11:30	1.88
12:00	0.85	12:00	1.12	12:00	1.88

Chart 1: LMF 14 Preset Flow Curves

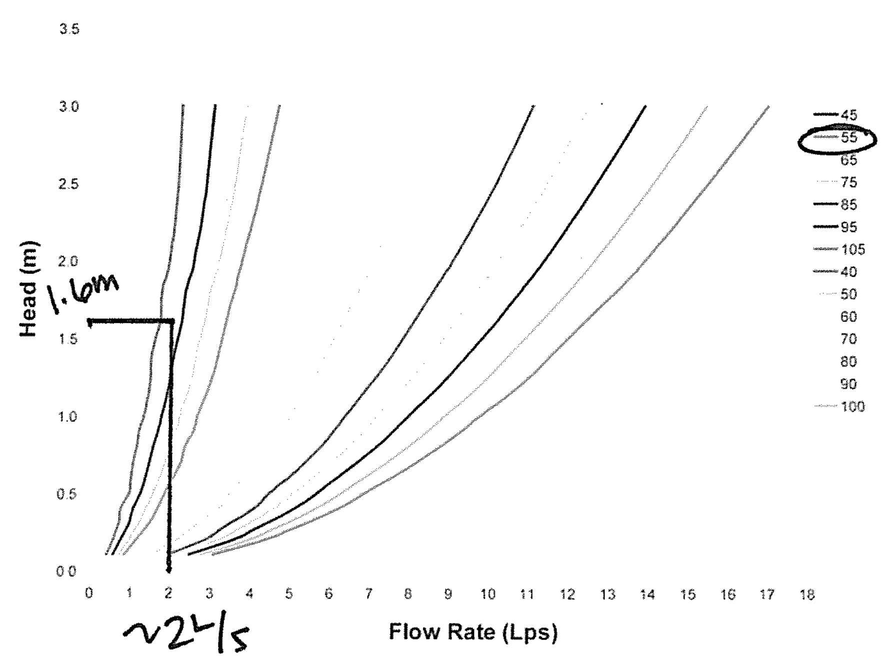
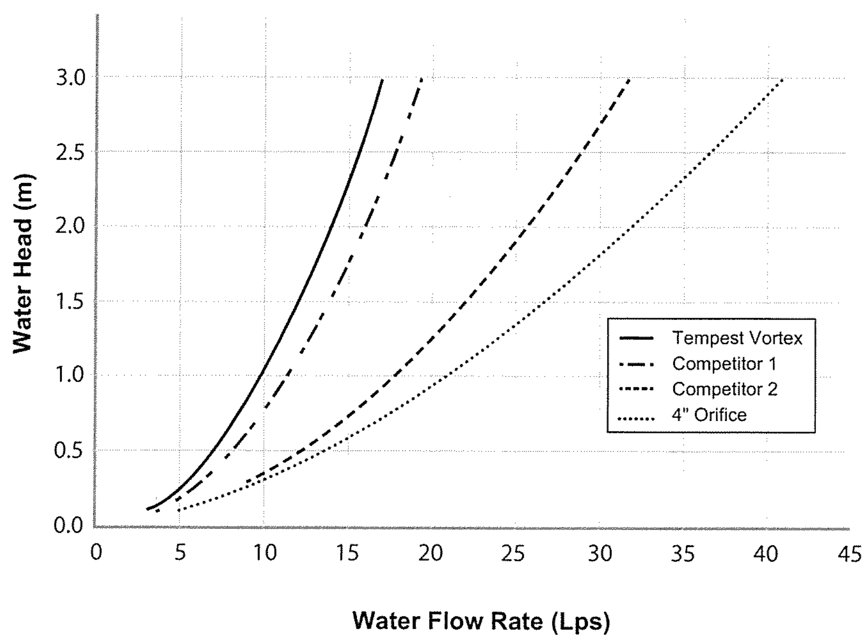


Chart 2: LMF Flow vs. ICD Alternatives



Water Balance Calculations: Riverstone Retirement Community

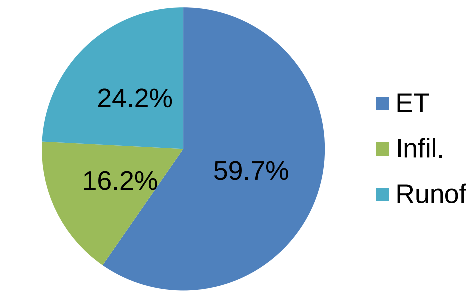
NOVATECH
Engineers, Planners & Landscape Architects

Pre-Development

Drainage Area 0.93 ha

Landuse	% of Watershed	Watershed Area	% of Pervious Area within Watershed	Water Holding Capacity	Infiltration Factor	Factor	Condition	Infiltration Factor
Mature Forest	39.0%	0.361	79.6%	300 mm	0.20	**Topography**	Hilly Land	0.10
Pasture/Meadow	0.0%	0.000	0.0%	150 mm	0.10	**Soils**	Open Sandy Loam	0.40
Urban Lawns	10.0%	0.093	20.4%	75 mm	0.10		**Pervious Infiltration Factor**	**0.68**
Imp. Areas	41.0%	0.380	-	0 mm	0.00		**Weighted Infiltration Factor**	**0.40**
Average				**125 mm**	**0.18**		**Runoff Factor**	**0.60**

*table 3.1 MOE

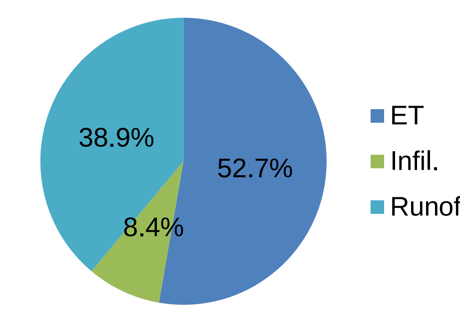


		Ottawa (6105976) 1981-2010												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total Precipitation (mm)	**P**	63	50	58	71	87	93	84	84	93	86	83	70	**920**
Potential Evapotranspiration (mm)	**PE**	0	0	0	0	112	129	136	115	72	43	0	0	**607**
Total Precip. - Potential ET (mm)	P-PE	63	50	58	71	-25	-36	-52	-31	21	43	83	70	
Soil Moisture Storage (mm)	ST	125	125	125	125	102	76	50	39	60	102	125	125	
Change in Soil Moisture Storage (mm)	ΔST	0	0	0	0	-23	-26	-26	-11	21	43	22	0	
Deficit (mm)	D	0	0	0	0	2	10	26	20	0	0	0	0	**59**
Actual Evapotranspiration (mm)	**AE**	0	0	0	0	109	119	110	95	72	43	0	0	**549**
Water Surplus (mm)	**S**	63	50	58	71	0	0	0	0	0	0	60	70	**371**
Annual Infiltration (mm)	**I**													**149**
Annual Runoff (mm)	**R**													**222**

Post-Development

Drainage Area 0.93 ha

Landuse	% of Watershed	Watershed Area	% of Pervious Area within Watershed	Water Holding Capacity	Infiltration Factor	Factor	Condition	Infiltration Factor
Mature Forest	0.0%	0.000	0.0%	300 mm	0.20	**Topography**	Hilly Land	0.10
Pasture/Meadow	0.0%	0.000	0.0%	150 mm	0.10	**Soils**	Open Sandy Loam	0.40
Urban Lawns	29.5%	0.273	100.0%	75 mm	0.10		**Pervious Infiltration Factor**	**0.60**
Imp. Areas	70.5%	0.653	-	0 mm	0.00		**Weighted Infiltration Factor**	**0.18**
Average				**22 mm**	**0.10**		**Runoff Factor**	**0.82**



		Ottawa (6105976) 1981-2010												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total Precipitation (mm)	**P**	63	50	58	71	87	93	84	84	93	86	83	70	**920**
Potential Evapotranspiration (mm)	**PE**	0	0	0	0	112	129	136	115	72	43	0	0	**607**
Total Precip. - Potential Evap. (mm)	P-PE	63	50	58	71	-25	-36	-52	-31	21	43	83	70	
Soil Moisture Storage (mm)	ST	22	22	22	22	7	1	0	0	21	22	22	22	
Change in Soil Moisture Storage (mm)	ΔST	0	0	0	0	-15	-6	-1	0	21	1	0	0	
Deficit (mm)	D	0	0	0	0	10	31	51	31	0	0	0	0	**122**
Actual Evapotranspiration (mm)	**AE**	0	0	0	0	102	98	86	84	72	43	0	0	**485**
Water Surplus (mm)	**S**	63	50	58	71	0	0	0	0	0	41	83	70	**435**
Annual Infiltration (mm)	**I**													**77**
Annual Runoff (mm)	**R**													**358**

Notes:
1) Uses measured average monthly total precipitation and potential evaporation data (converted to evapotranspiration based on a cover coefficient of 1.0).
2) Actual evapotranspiration and water surplus calculated using the Thornthwaite & Mather (1957) methodology.
3) Runoff and infiltration calculated as per the MOE SWM Planning and Design Manual (2003) methodology.
4) Impervious areas consist of rooftops, roads, and driveways.

Summary

Sceneario	ET	Surplus	Infil.	Runoff
Pre-Development	59.7%	40.3%	16.2%	24.2%
Post-Development	52.7%	47.3%	8.4%	38.9%

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CDS sizing report

Date: August 24, 2017 rev 0
Engineer: Ms. Kallie Auld, P.Eng.
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa,
ON, K2M 1P6

Project: Riverstone Retirement Community, Ottawa, ON

Unit: CDS PMSU 20_20_5

Design Parameters

The proposed CDS PMSU units were designed based on the following parameters:

Drainage Area:	1,2 Ha
Runoff Coefficient:	0,66 based upon I=66%
Time of Concentration:	10 Min (calculated, does not impact efficiency calculation)
Target Particle Size Distribution:	Fine PSD (see appendix I)
Rainfall Station:	40 year historical data, weather station 6105976,(City of Ottawa)
Treatment Level:	TSS: 80%, Treated Volume: >90% (MOE LEVEL I)
Hydraulic capacity:	15 CFS (~ 420 L/Sec) under ideal application, hydraulic validation available upon request
Flow Control:	41 l/sec for 100 year storm

OGS data:

Unit	Sediment Volume (L)	Treatment Chamber Volume (L)	Oil capacity (L)
PMSU 20_20_5	3150	3150	376

TSS Removal Calculation

The TSS removal calculation can be found in Appendix I. Expected Grit load in Appendix II

Reference Drawing

PMSU 20_20_5 reference drawing is in Appendix III. Drawing is for general unit configuration only. Submittal drawing available upon request.

Structural Design

The proposed CDS PMSU unit has been is designed to Canadian Highway Bridge Design Code (CHBDC) loadings. All concrete components are manufactured at an OPS pre-qualified plant. Certification is attached, Appendix IV.

Approval Background

The CDS Stormwater Treatment System is an approved product in Ontario and is servicing various jurisdictions throughout the province. Introduction into Ontario was in 2002. Units installed in Ontario are approximately 2000 units as of 2017. Eastern Ontario volumes are approximately 25 units a year, approximately 300 units as of 2017. (CDS installation precedent available upon request)

rev 0, Initial release 24-11-2016 ; rev 1 updated table, changed front sheet ; rev 2, changed area and C ; rev 3, changed area and C; rev 4, changed C

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.

APPENDIX I
CDS TSS REMOVAL CALCULATIONS
PSD VALIDATION

rev 0, Initial release 24-11-2016 ; rev 1 updated table, changed front sheet ; rev 2, changed area and C ; rev 3, changed area and C; rev 4, changed C

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

CONTECH STORMWATER SOLUTIONS — CDS TECHNOLOGIES

Project Name:	Riverstone Retirement Community	**Engineer:**	Novatech Engineering
Location:	Ottawa, ON	**Contact:**	M. Kallie Auld, P.Eng.
OGS #:	-	**Report Date:**	24/08/2017 rev 0

Area	1.22		**Rainfall Station #**		215	(select from Rainfall Data column D)
Imperviousness	65	%	**Flow Control**	41	l/sec	
Weighted C	0.66	(calculated) C (from table)	0.66			
Tc	10	minutes (assumed)	**Particle Size Distribution**		FINE	
CDS Model	2020	(select from pulldown)	**CDS Treatment Capacity**		31	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.5	9.2%	9.2%	1.1	1.1	3.6	97.8	9.0
1.0	10.6%	19.8%	2.2	2.2	7.1	96.8	10.3
1.5	9.9%	29.7%	3.3	3.3	10.7	95.8	9.5
2.0	8.4%	38.1%	4.4	4.4	14.3	94.8	7.9
2.5	7.7%	45.8%	5.6	5.6	17.8	93.7	7.2
3.0	5.9%	51.7%	6.7	6.7	21.4	92.7	5.5
3.5	4.4%	56.1%	7.8	7.8	25.0	91.7	4.0
4.0	4.7%	60.7%	8.9	8.9	28.5	90.7	4.2
4.5	3.3%	64.0%	10.0	10.0	32.1	89.7	3.0
5.0	3.0%	67.1%	11.1	11.1	35.7	88.6	2.7
6.0	5.4%	72.4%	13.3	13.3	42.8	86.6	4.7
7.0	4.4%	76.8%	15.6	15.6	49.9	84.5	3.7
8.0	3.5%	80.3%	17.8	17.8	57.0	82.5	2.9
9.0	2.8%	83.2%	20.0	20.0	64.2	80.5	2.3
10.0	2.2%	85.3%	22.2	22.2	71.3	78.4	1.7
15.0	7.0%	92.3%	33.3	31.2	100.0	65.6	4.6
20.0	4.5%	96.9%	41.0	31.2	100.0	53.3	2.4
25.0	1.4%	98.3%	41.0	31.2	100.0	53.3	0.8
30.0	0.7%	99.0%	41.0	31.2	100.0	53.3	0.4
35.0	0.5%	99.5%	41.0	31.2	100.0	53.3	0.3
40.0	0.5%	100.0%	41.0	31.2	100.0	53.3	0.3
45.0	0.0%	100.0%	41.0	31.2	100.0	53.3	0.0
50.0	0.0%	100.0%	41.0	31.2	100.0	53.3	0.0
							87.2

Removal Efficiency Adjustment[2] =	6.5%
Predicted Net Annual Load Removal Efficiency =	**80.7%**
Predicted % Annual Rainfall Treated =	**90.5%**

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS Stormwater Treatment Unit Performance

Table 1. Fine Particle Size Distribution (PSD)

Particle Size (μm)	% of Particle Mass
< 20	20
20 – 40	10
40 – 60	10
60 – 130	20
130 – 400	20
400 – 2000	20

Removal Efficiencies – CDS Unit Testing Under Various Flow Rates

The following performance curves are based on controlled tests using a full scale CDS Model PMSU20_20 (2400 micron screen), 1.1-cfs (494-gpm) capacity treatment unit.

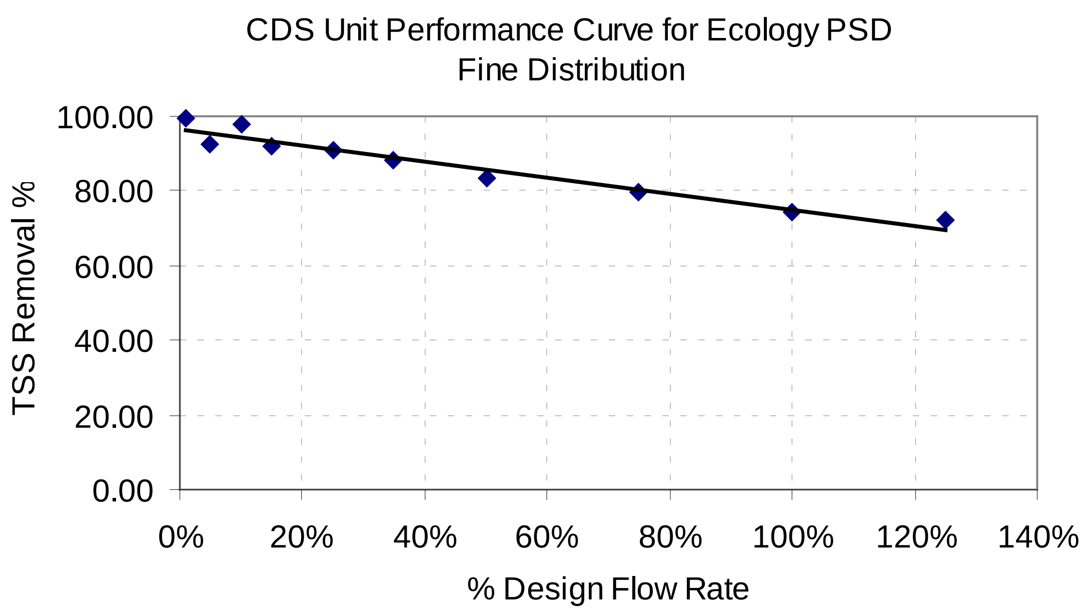

Figure 1. CDS Unit Performance for Fine PSD

CDS Unit Performance Testing Protocol

Tests were conducted using two types of sand – U.S. Silica OK-110 and UF sediment (a mixture of U.S. Silica sands). Particle size gradations for the two types of sand are illustrated in Figure 2.

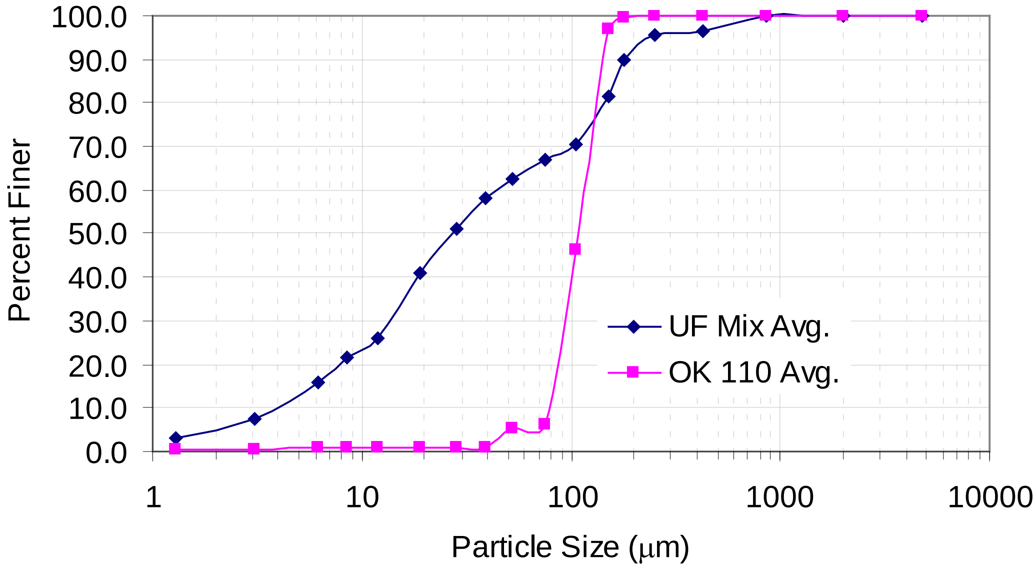

Figure 2. Test material particle size gradations - CDS Model PMSU20_20 test
(Analytical results provided by MACTEC Engineering and Consulting Inc. FL
ASTM D-422 with Hydrometer method)

The influent concentration (mg/L) for the test was set at 200-mg/L and verified from slurry feeding. Effluent samples were taken at fixed time intervals during each test run at various flow rates. The composite effluent samples were sent to Test American Analytical Testing Lab, OR for TSS analysis (ASTM D3977-97).

TSS removal rates for the specified PSD (d_{50} of 90 μm) under various flow rates were calculated from Figure 2 shows the removal efficiency as a function of operating flow rate. This removal efficiency curve as a function of percent flow rate can be applied to all CDS unit models.

ECHELON ENVIRONMENTAL
505 Hood Road Unit 26 Markham ON L3R 5V6
Tel: (905) 948-0000 Fax: (905) 948-0577
E-mail: info@echelonenvironmental.ca

APPENDIX II
ANTICIPATED GRIT LOAD/CLEANING CYCLE

rev 0, Initial release 24-11-2016 ; rev 1 updated table, changed front sheet ; rev 2, changed area and C ; rev 3, changed area and C; rev 4, changed C

ECHELON ENVIRONMENTAL

Phone: 905-948-0000
Fax: 905-948-0577
info@echelonenvironmental.ca
www.echelonenvironmental.ca

Estimate of Annual Grit Collection

Engineer:	**Novatech**	**Project:**	Riverstoen Retirement
Contact:	**M. K. Auld, P.Eng.**	**CDS Model:**	20_20_5
Report Date:	24-Aug-17	**OGS Location:**	Ottawa ON

Area :	1.2	ha
Imperviousness :	66	%
Runoff Coefficient :	0.66	

C from table 0.662

Assumptions:

1. Annual Rainfall	900	mm	Ottawa	(estimate)
2. Typical Grit Concentration	250	mg/l		
3. Apparent Grit Density	1.4	kg/l	(estimated)	
4. Grit Capture Efficiency	80%			

Runoff Volume = Area x Rainfall Depth x Runoff Coefficient = 7,150 cu.m

Grit Collected = Grit Concentration x Runoff Volume x Grit Capture Efficiency = 1,430 kg

Grit Volume = Mass / Apparent Density = 1,021 litres or **1.021** cu.m

Therefore it can be expected that this site will generate approximately 1.021cu.m of grit annually.

Sump Capacity of CDS unit = **1.749** cu.m

Therefore the design sump capacity will accommodate a cleaning frequency of one time per 12 to 14 months.

note: Typical Grit density may fluctuate. Presence of sand in winter will increase that value.

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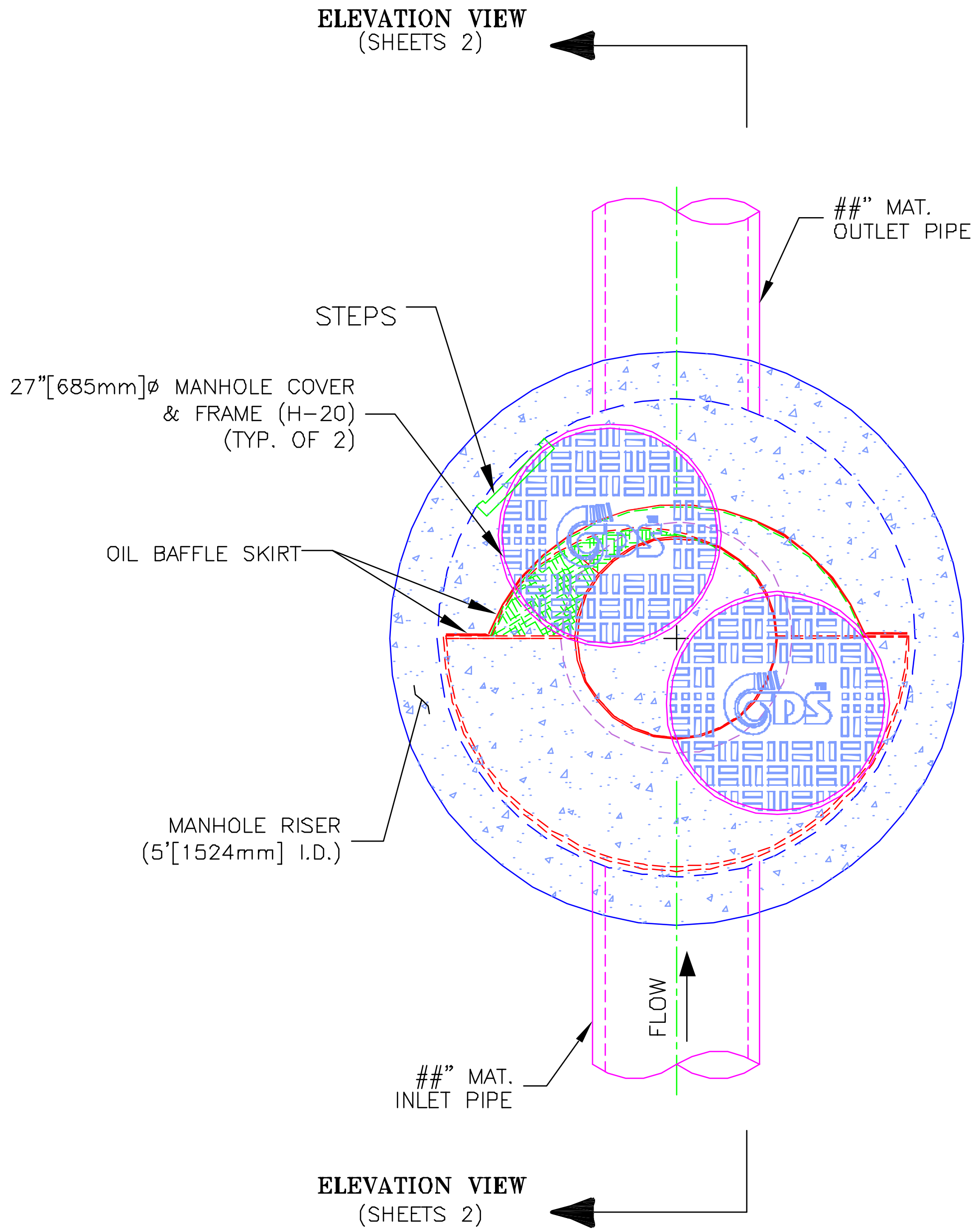
APPENDIX III
CDS PMSU 20_20_5 DRAWING, reference only

rev 0, Initial release 24-11-2016 ; rev 1 updated table, changed front sheet ; rev 2, changed area and C ; rev 3, changed area and C; rev 4, changed C

CDS TECHNOLOGIES

PLAN VIEW



MODEL CDS20_20m, 31 L/s TREATMENT CAPACITY
STORM WATER TREATMENT UNIT

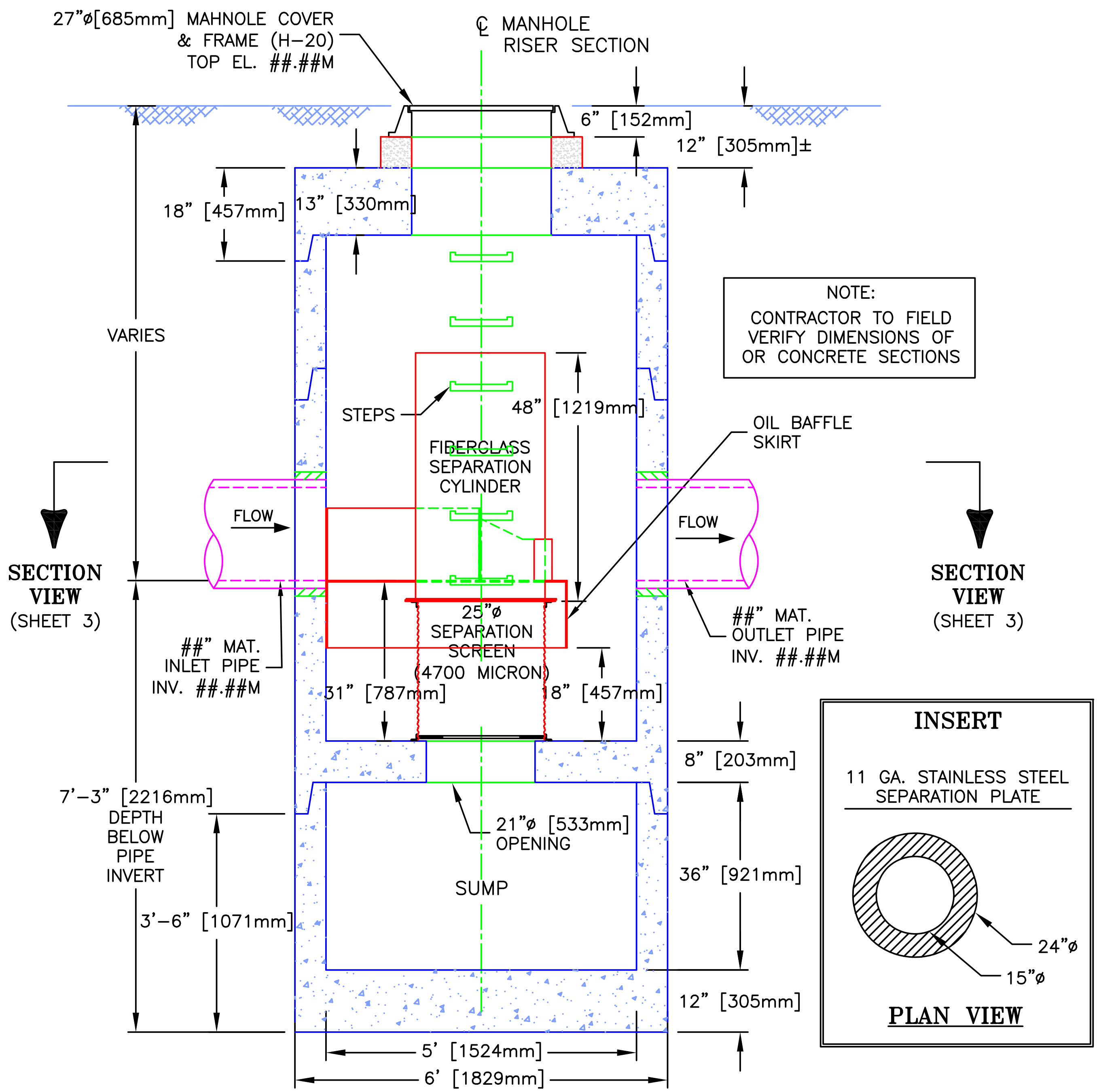
CONTECH STORMWATER SOLUTIONS

PROJECT NAME
CITY, STATE

JOB#	XX-##-###	SCALE 1" = 2'
DATE	##/##/##	SHEET
DRAWN	INITIALS	1
APPROV.		

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577

ELEVATION VIEW



MODEL CDS20_20m, 31 L/s TREATMENT CAPACITY STORM WATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB#	XX-##-###	SCALE 1" = 2.5'
		DATE	##/##/##	SHEET
		DRAWN	INITIALS	2
		APPROV.		

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577

ECHELON ENVIRONMENTAL
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E-mail: info@echelonenvironmental.ca

APPENDIX IV
Ontario Provincial Standards Approval
MOE Certificate

rev 0, Initial release 24-11-2016 ; rev 1 updated table, changed front sheet ; rev 2, changed area and C ; rev 3, changed area and C; rev 4, changed C

TECHNOLOGY ASSESSMENT • TECHNOLOGY ASSESSMENT

CERTIFICATE

OF TECHNOLOGY ASSESSMENT

CDS™ Technologies

The Ontario Ministry of the Environment has reviewed the solid/liquid separation system developed by ***CDS™ Technologies****. Based on the review of the documentation submitted by the company (see the Notable Aspects section and Appendix), and data from pilot-scale testing and full-scale operations conducted by various agencies, the Ministry concludes that the continuous deflection separation (CDS™) system can provide useful removal of solids and floatables as part of a stormwater management system.*

The CDS™ Technologies may be able to provide "basic to enhanced" level of protection when used alone, maintained for effective operation, and when appropriately designed for the development area to be serviced. CDS™ units may also be used for pretreatment in combination with other non-proprietary technologies such as man-made wetlands, treatment ponds and infiltration basins.

J R Mayes

John Mayes, (A) Director
Standards Development Branch
Ministry of the Environment
(September 2006)

New Environmental Technology Evaluation Program

Promoting the development and application of new environmental technologies

Ontario

TECHNOLOGY ASSESSMENT • TECHNOLOGY ASSESSMENT

Echelon Environmental

Supplier of stormwater treatment systems
Category: **Distributor**

Products

** For product details select the down arrow.*

Info **CDS Technologies Precast Manhole Stormwater Unit (PMSU)**

Info **ChamberMaxx**

Products Distributed

Contech Construction Products Inc.

CDS®

Using patented continuous deflective separation technology, the CDS® system, effectively screens, separates and traps debris, sediment, and oil from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material, without blinding. It is available in offline, inline, and grate inlet configurations. The unique inlet design provides more ways to receive stormwater in a single treatment unit. Its unique forebay design allows it to receive single or multiple pipes on a 170° arc. If needed, the system can perform as a catch basin or drop inlet and receive flow from the rest of the drainage collection system ? eliminating the need for additional structures. An oil baffle skirt surrounding the non-blocking screening process traps oil and grease. It separates previously captured oil and grease from high bypass flows, preventing re-entrainment. The CDS® system is available in precast or cast-in-place. Offline units can treat flows from 1 to 300 cfs (30 to 8500 L/s). Inline units can treat up to 7.5 cfs (170 L/s), and internally bypass larger flows in excess of 50 cfs (1420 L/s). The pollutant removal capability of the CDS system has been proven in the lab and field.

Contacts

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Echelon Environmental
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Markham, ON L3R 5V6
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Web: **http://www.echelonenvironmental.ca**

VORTECHS SYSTEM® ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON AN AVERAGE PARTICLE SIZE OF 80 MICRONS
RIVERSTONE RETIREMENT COMMUNITY
OTTAWA, ON
MODEL 1000 IN-LINE

CONTECH ENGINEERED SOLUTIONS

Design Ratio[1] = $\frac{(1.2 \text{ hectares}) \times (0.7) \times (2.775)}{(0.7 \text{ m2})}$ **= 3.52**

Rainfall Intensity mm/hr	Operating Rate[2] % of capacity	Flow Treated (l/s)	% Total Rainfall Volume[3]	Rmvl. Effcy[4] (%)	Rel. Effcy (%)
0.5	2.6	1.2	9.2%	98.0%	9.0%
1.0	5.2	2.3	10.6%	98.0%	10.4%
1.5	7.7	3.5	9.9%	97.6%	9.7%
2.0	10.3	4.7	8.4%	96.0%	8.0%
2.5	12.9	5.9	7.7%	94.7%	7.3%
3.0	15.5	7.0	5.9%	91.8%	5.5%
3.5	18.1	8.2	4.4%	88.8%	3.9%
4.0	20.7	9.4	4.7%	87.3%	4.1%
4.5	23.2	10.5	3.3%	85.7%	2.8%
5.0	25.8	11.7	3.0%	84.9%	2.6%
6.0	31.0	14.0	5.4%	82.0%	4.4%
7.0	36.2	16.4	4.4%	78.8%	3.4%
8.0	41.3	18.7	3.5%	75.0%	2.7%
9.0	46.5	21.1	2.8%	69.0%	1.9%
10.0	51.7	23.4	2.2%	63.6%	1.4%
15.0	77.5	35.1	7.0%	40.0%	2.8%
20.0	90.5	41.0	4.5%	18.2%	0.8%
25.0	90.5	41.0	1.4%	18.2%	0.3%
30.0	90.5	41.0	0.7%	18.2%	0.1%
35.0	90.5	41.0	0.5%	18.2%	0.1%
40.0	90.5	41.0	0.5%	18.2%	0.1%
					81.2%

Predicted Annual Runoff Volume Treated =	95.0%
Assumed Removal Efficiency of remaining % =	0.0%
Removal Efficiency Adjustment[5] =	6.5%
Predicted Net Annual Load Removal Efficiency =	**81%**

1 - Design Ratio = (Total Drainage Area) x (Runoff Coefficient) x (Rational Method Conversion) / Grit Chamber Area
- The Total Drainage Area and Runoff Coefficient are specified by the site engineer.
- The rational method conversion based on the units in the above equation is 2.775.

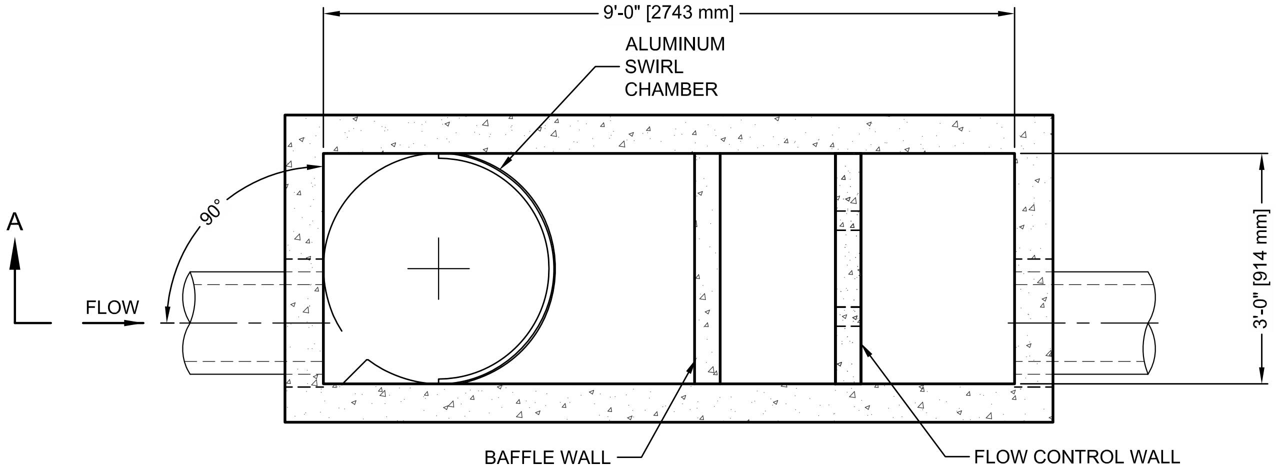
2 - Operating Rate (% of capacity) = percentage of peak operating rate of 68 l/s/m^2.
3 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa CDA, ON
4 - Based on Contech Construction Products laboratory verified removal of an average particle size of 80 microns (see Technical Bulletin #1).
5- Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Calculated by:	JAK	8/24	Checked by:

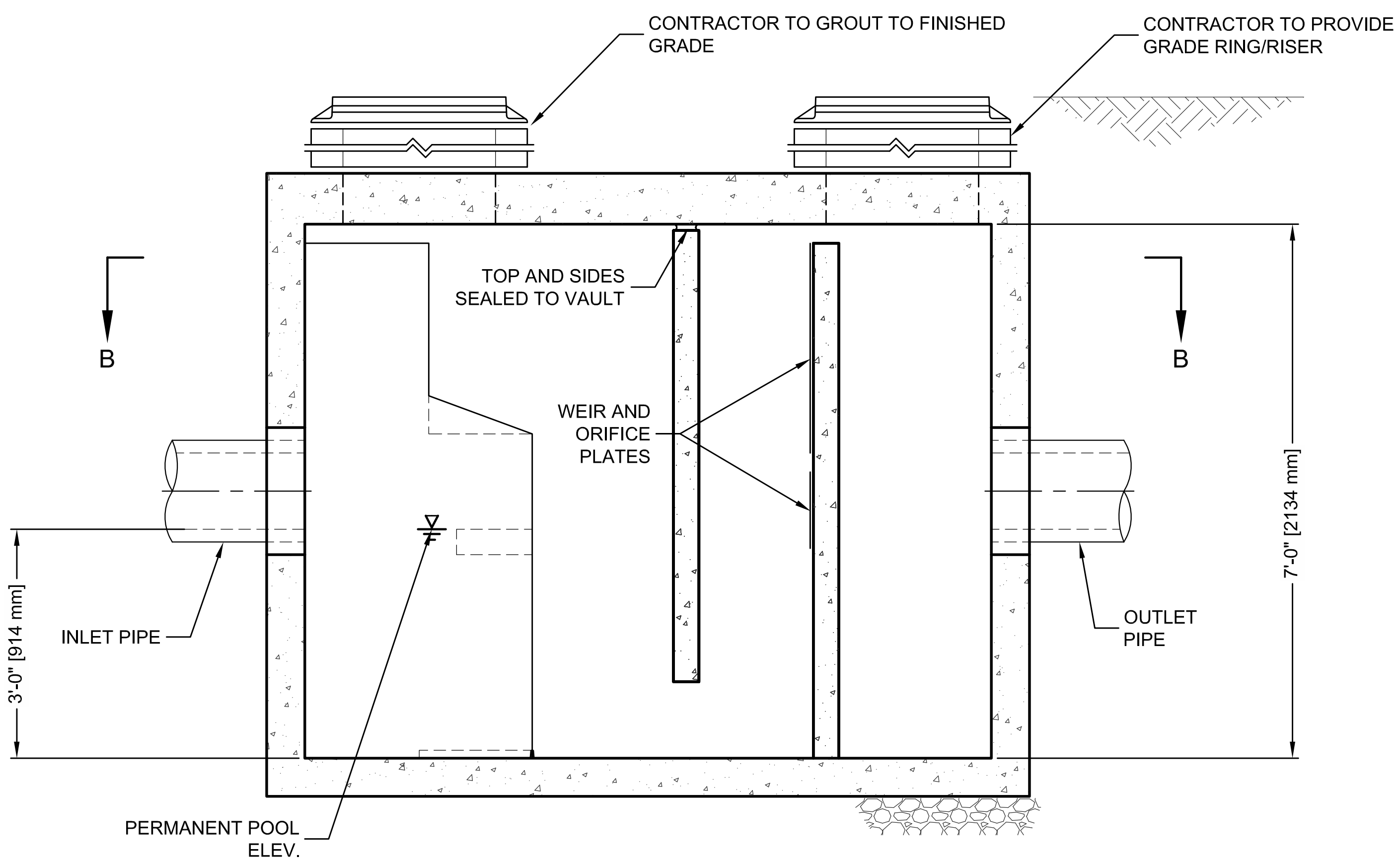
VORTECHS 1000 DESIGN NOTES

VORTECHS 1000 RATED TREATMENT CAPACITY IS 1.6 CFS, OR PER LOCAL REGULATIONS. IF THE SITE CONDITIONS EXCEED RATED TREATMENT CAPACITY, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

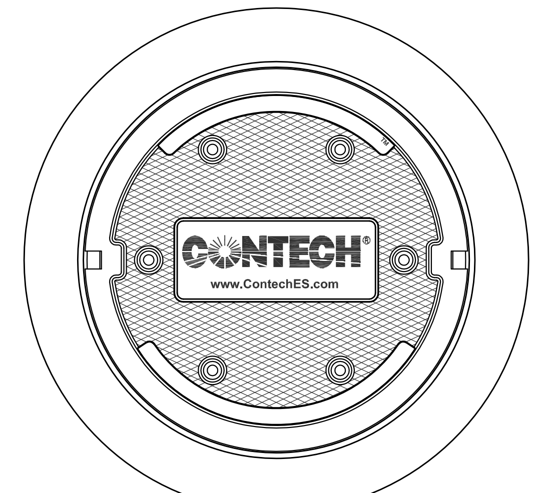
THE STANDARD INLET/OUTLET CONFIGURATION IS SHOWN. FOR OTHER CONFIGURATION OPTIONS , PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com



SECTION B-B



SECTION A-A



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

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			*
WATER QUALITY FLOW RATE (CFS)			*
PEAK FLOW RATE (CFS)			*
RETURN PERIOD OF PEAK FLOW (YRS)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*
NOTES/SPECIAL REQUIREMENTS:			

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
4. VORTECHS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET AASHTO M306 LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. INLET PIPE(S) MUST BE PERPEDICULAR TO THE VAULT AND AT THE CORNER TO INTRODUCE THE FLOW TANGENTIALLY TO THE SWIRL CHAMBER. DUAL INLETS NOT TO HAVE OPPOSING TANGENTIAL FLOW DIRECTIONS.
7. OUTLET PIPE(S) MUST BE DOWN STREAM OF THE FLOW CONTROL BAFFLE AND MAY BE LOCATED ON THE SIDE OR END OF THE VAULT. THE FLOW CONTROL WALL MAY BE TURNED TO ACCOMODATE OUTLET PIPE KNOCKOUTS ON THE SIDE OF THE VAULT.

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

Vortechs®

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

VORTECHS 1000
STANDARD DETAIL

```
2     Metric units
*#*******************************************************************************
*#  Project Name: [Claridge HUnt Club Retirement Residence]
*#  Project Number: [117036]
*#  Date         : 24/04/2017
*#  Modeller     : [Kallie Auld]
*#  Company      : NOVATECH
*#  License #    :  5320763
*#*******************************************************************************
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
                     C25mm-4.stm
*%-----------------|-----------------------------------------------------------|
READ STORM           STORM_FILENAME=["STORM.001"]
*%-----------------|-----------------------------------------------------------|
DEFAULT VALUES       ICASEdef=[1],  read and print values
                     DEFVAL_FILENAME=["OTTAWA.DEF"]
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[1], NHYD=["PRE-01"], DT=[5]min, AREA=[0.926](ha),
                     XIMP=[0.33], TIMP=[0.41], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[3.98](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN NASHYD        ID=[2], NHYD=["EXT-01"], DT=[5]min, AREA=[0.296](ha),
                     DWF=[0](cms), CN/C=[55], TP=[0.17]hrs,
                     END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN NASHYD        ID=[3], NHYD=["EXT-02"], DT=[5]min, AREA=[0.652](ha),
                     DWF=[0](cms), CN/C=[55], TP=[0.17]hrs,
                     END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[4], NHYD=["TOTFLO"], IDs to add=[1,2,3]
*%-----------------|-----------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
                     C2-4.stm
*%-----------------|-----------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
                     C5-4.stm
*%-----------------|-----------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
                     C100-4.stm
*%-----------------|-----------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
                     S2-12.stm
*%-----------------|-----------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
                     S5-12.stm
*%-----------------|-----------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[9]
                     S100-12.stm
*%-----------------|-----------------------------------------------------------|
FINISH
```

```
================================================================================

   SSSSS  W    W  M    M  H    H  Y    Y  M    M   OOO        999    999    =========
   S      W W W   MM MM   H    H   Y Y    MM MM   O    O     9    9  9    9
   SSSSS  W W W   M M M   HHHHH     Y     M M M   O    O  ##  9    9  9    9   Ver  4.05
       S   W W    M    M  H    H    Y     M    M  O    O      9999   9999    Sept 2011
   SSSSS   W W    M    M  H    H    Y     M    M   OOO           9      9    =========
                                                             9    9  9    9   # 5320763
        StormWater Management HYdrologic Model            999    999     =========

 *******************************************************************************
 ***************************** SWMHYMO Ver/4.05 ******************************
 *********  A single event and continuous hydrologic simulation model  *********
 *********     based on the principles of HYMO and its successors      *********
 *********                 OTTHYMO-83 and OTTHYMO-89.                  *********
 *******************************************************************************
 ********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
 *********                  Ottawa,  Ontario: (613) 836-3884            *********
 *********                  Gatineau, Quebec: (819) 243-6858            *********
 *********                  E-Mail: swmhymo@jfsa.Com                    *********
 *******************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: NOVATECH ENGINEERING CONSULTANTS LTD         +++++++++
 +++++++++                Nepean                 SERIAL#:5320763      +++++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 *******************************************************************************
 *********          ++++++ PROGRAM ARRAY DIMENSIONS ++++++             *********
 *********          Maximum value for ID numbers  :     10             *********
 *********          Max. number of rainfall points: 105408             *********
 *********          Max. number of flow points    : 105408             *********
 *******************************************************************************

 ***** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) *****
 *****-------------------------------------------------------------------------*****
 *****    ID:  Hydrograph IDentification numbers, (1-10).                 *****
 *****  NHYD:  Hydrograph reference numbers, (6 digits or characters).    *****
 *****  AREA:  Drainage area associated with hydrograph, (ac.) or (ha.).  *****
 ***** QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s).    *****
 ***** TpeakDate_hh:mm is the date and time of the peak flow.             *****
 *****  R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm).       *****
 *****  R.C.:  Runoff Coefficient of simulated hydrograph, (ratio).       *****
 *****     *:  see WARNING or NOTE message printed at end of run.         *****
 *****    **:  see  ERROR  message printed at end of run.                 *****
 *******************************************************************************
 *******************************************************************************

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

 *******************************************************************************

 **********************   S U M M A R Y   O U T P U T   **********************
 *******************************************************************************
 *        DATE: 2017-04-26     TIME: 12:49:54     RUN COUNTER: 000690          *
 *******************************************************************************
 * Input   filename: M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\hc-pre.dat  *
 * Output  filename: M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\hc-pre.out  *
 * Summary filename: M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\hc-pre.sum  *
 * User comments:                                                              *
 * 1:__________________________________________________________________________*
 * 2:__________________________________________________________________________*
 * 3:__________________________________________________________________________*
```

```
 *******************************************************************************

#*******************************************************************************
#  Project Name: [Claridge HUnt Club Retirement Residence]
#  Project Number: [117036]
#  Date         : 24/04/2017
#  Modeller     : [Kallie Auld]
#  Company      : NOVATECH
#  License #    :  5320763
#*******************************************************************************
 RUN:COMMAND#
 001:0001------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   1 ]
 001:0002------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=10.00:SDUR=   4.00:PTOT=  25.00]
 001:0003------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 001:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:PRE-01           .93     .052 No_date    1:40    9.04 .362
      [XIMP=.33:TIMP=.41]
      [SLP=3.98:DT= 5.00]
      [LOSS= 1 : HORTONS]
 001:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      02:EXT-01           .30     .002 No_date    1:50    1.81 .072
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      03:EXT-02           .65     .004 No_date    1:50    1.81 .072
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 001:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:PRE-01           .93     .052 No_date    1:40    9.04  n/a
                      + 02:EXT-01           .30     .002 No_date    1:50    1.81  n/a
                      + 03:EXT-02           .65     .004 No_date    1:50    1.81  n/a
      [DT= 5.00]  SUM=  04:TOTFLO          1.87     .056 No_date    1:40    5.38  n/a
  ** END OF RUN :    1

*******************************************************************************
```

```
 RUN:COMMAND#
 002:0001------------------------------------------------------------------------------
     START
      [TZERO =     .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   2 ]
#******************************************************************************
#  Project Name: [Claridge HUnt Club Retirement Residence]
#  Project Number: [117036]
#  Date        : 24/04/2017
#  Modeller    : [Kallie Auld]
#  Company     : NOVATECH
#  License #   :  5320763
#******************************************************************************
 002:0002------------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=10.00:SDUR=   4.00:PTOT=  33.89]
 002:0003------------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 002:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD     01:PRE-01          .93     .092 No_date    1:30   14.42 .425
      [XIMP=.33:TIMP=.41]
      [SLP=3.98:DT= 5.00]
      [LOSS= 1 : HORTONS]
 002:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD       02:EXT-01          .30     .003 No_date    1:40    3.60 .106
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 002:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD       03:EXT-02          .65     .008 No_date    1:40    3.60 .106
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 002:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD             01:PRE-01          .93     .092 No_date    1:30   14.42  n/a
                       + 02:EXT-01          .30     .003 No_date    1:40    3.60  n/a
                       + 03:EXT-02          .65     .008 No_date    1:40    3.60  n/a
      [DT= 5.00]  SUM=  04:TOTFLO         1.87     .099 No_date    1:30    8.95  n/a
  ** END OF RUN :    2

******************************************************************************



 RUN:COMMAND#
 003:0001------------------------------------------------------------------------------
     START
      [TZERO =     .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   3 ]
#******************************************************************************
#  Project Name: [Claridge HUnt Club Retirement Residence]
#  Project Number: [117036]
#  Date        : 24/04/2017
#  Modeller    : [Kallie Auld]
#  Company     : NOVATECH
#  License #   :  5320763
#******************************************************************************
 003:0002------------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=10.00:SDUR=   4.00:PTOT=  45.18]
 003:0003------------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 003:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD     01:PRE-01          .93     .155 No_date    1:40   22.90 .507
      [XIMP=.33:TIMP=.41]
      [SLP=3.98:DT= 5.00]
      [LOSS= 1 : HORTONS]
 003:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD       02:EXT-01          .30     .007 No_date    1:50    6.61 .146
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 003:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD       03:EXT-02          .65     .015 No_date    1:50    6.61 .146
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 003:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD             01:PRE-01          .93     .155 No_date    1:40   22.90  n/a
                       + 02:EXT-01          .30     .007 No_date    1:50    6.61  n/a
                       + 03:EXT-02          .65     .015 No_date    1:50    6.61  n/a
      [DT= 5.00]  SUM=  04:TOTFLO         1.87     .171 No_date    1:40   14.66  n/a
  ** END OF RUN :    3

******************************************************************************



 RUN:COMMAND#
 004:0001------------------------------------------------------------------------------
     START
      [TZERO =     .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
```

```
      [NRUN  =   4 ]
#******************************************************************************
#  Project Name: [Claridge HUnt Club Retirement Residence]
#  Project Number: [117036]
#  Date        : 24/04/2017
#  Modeller    : [Kallie Auld]
#  Company     : NOVATECH
#  License #   :  5320763
#******************************************************************************
 004:0002-------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=10.00:SDUR=   4.00:PTOT=  76.02]
 004:0003-------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 004:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:PRE-01          .93     .376 No_date    1:40   48.32 .636
      [XIMP=.33:TIMP=.41]
      [SLP=3.98:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      02:EXT-01          .30     .020 No_date    1:45   18.24 .240
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 004:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      03:EXT-02          .65     .044 No_date    1:45   18.24 .240
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 004:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:PRE-01          .93     .376 No_date    1:40   48.32  n/a
                    +  02:EXT-01          .30     .020 No_date    1:45   18.24  n/a
                    +  03:EXT-02          .65     .044 No_date    1:45   18.24  n/a
      [DT= 5.00]  SUM=  04:TOTFLO         1.87     .425 No_date    1:40   33.10  n/a
  ** END OF RUN :    4

******************************************************************************


 RUN:COMMAND#
 005:0001-------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   5 ]
#******************************************************************************
#  Project Name: [Claridge HUnt Club Retirement Residence]
#  Project Number: [117036]
#  Date        : 24/04/2017
#  Modeller    : [Kallie Auld]
#  Company     : NOVATECH
#  License #   :  5320763
#******************************************************************************
 005:0002-------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=30.00:SDUR=  12.00:PTOT=  42.34]
 005:0003-------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 005:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:PRE-01          .93     .046 No_date    6:00   16.71 .395
      [XIMP=.33:TIMP=.41]
      [SLP=3.98:DT= 5.00]
      [LOSS= 1 : HORTONS]
 005:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      02:EXT-01          .30     .004 No_date    6:00    5.78 .136
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 005:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      03:EXT-02          .65     .009 No_date    6:00    5.78 .136
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 005:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:PRE-01          .93     .046 No_date    6:00   16.71  n/a
                    +  02:EXT-01          .30     .004 No_date    6:00    5.78  n/a
                    +  03:EXT-02          .65     .009 No_date    6:00    5.78  n/a
      [DT= 5.00]  SUM=  04:TOTFLO         1.87     .058 No_date    6:00   11.18  n/a
  ** END OF RUN :    6

******************************************************************************


 RUN:COMMAND#
 007:0001-------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   7 ]
#******************************************************************************
#  Project Name: [Claridge HUnt Club Retirement Residence]
#  Project Number: [117036]
#  Date        : 24/04/2017
#  Modeller    : [Kallie Auld]
```

```
#  Company     : NOVATECH
#  License #   :  5320763
#*******************************************************************************
 007:0002-----------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=30.00:SDUR=  12.00:PTOT=  56.18]
 007:0003-----------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 007:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:PRE-01          .93     .085 No_date    6:00   26.46 .471
      [XIMP=.33:TIMP=.41]
      [SLP=3.98:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      02:EXT-01          .30     .007 No_date    6:00   10.23 .182
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 007:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      03:EXT-02          .65     .016 No_date    6:00   10.23 .182
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 007:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:PRE-01          .93     .085 No_date    6:00   26.46  n/a
                      + 02:EXT-01          .30     .007 No_date    6:00   10.23  n/a
                      + 03:EXT-02          .65     .016 No_date    6:00   10.23  n/a
      [DT= 5.00]  SUM=  04:TOTFLO         1.87     .108 No_date    6:00   18.25  n/a
  ** END OF RUN :   8

*******************************************************************************

 RUN:COMMAND#
 009:0001-----------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   9 ]
#*******************************************************************************
#  Project Name: [Claridge HUnt Club Retirement Residence]
#  Project Number: [117036]
#  Date        : 24/04/2017
#  Modeller    : [Kallie Auld]
#  Company     : NOVATECH
#  License #   :  5320763
#*******************************************************************************
```

```
 009:0002-----------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=10.00:SDUR=  12.00:PTOT=  93.91]
 009:0003-----------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 009:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:PRE-01          .93     .180 No_date    6:00   55.48 .591
      [XIMP=.33:TIMP=.41]
      [SLP=3.98:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      02:EXT-01          .30     .019 No_date    6:00   26.80 .285
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 009:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      03:EXT-02          .65     .042 No_date    6:00   26.81 .285
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 009:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:PRE-01          .93     .180 No_date    6:00   55.48  n/a
                      + 02:EXT-01          .30     .019 No_date    6:00   26.80  n/a
                      + 03:EXT-02          .65     .042 No_date    6:00   26.81  n/a
      [DT= 5.00]  SUM=  04:TOTFLO         1.87     .241 No_date    6:00   40.97  n/a
 009:0002-----------------------------------------------------------------------------
      FINISH
-------------------------------------------------------------------------------------
*************************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
 001:0004 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
   Simulation ended on 2017-04-26     at 12:49:56
=====================================================================================
```

117037 – Hunt Club Development
Interim Conditions SWMHYMO Input File

NOVATECH
Engineers, Planners & Landscape Architects

```
2     Metric units
*#*****************************************************************************
*#  Project Name: [Claridge Hunt Club Retirement Residence]
*#  Project Number: [117036]
*#  Date         : 24/04/2017
*#  Modeller     : [Kallie Auld]
*#  Company      : NOVATECH
*#  License #    :  5320763
*#*****************************************************************************
*# Final conditions model - both Phase 1 and Phase 2 full built out
*# see model HC-INT for interim conditions
*#*****************************************************************************
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
                     C25mm-4.stm
*%-----------------|-------------------------------------------------------------|
READ STORM           STORM_FILENAME=["STORM.001"]
*%-----------------|-------------------------------------------------------------|
DEFAULT VALUES       ICASEdef=[1],  read and print values
                     DEFVAL_FILENAME=["OTTAWA.DEF"]
*%-----------------|-------------------------------------------------------------|
**AREAS TO RETIREMENT HOME TANK**
*%-----------------|-------------------------------------------------------------|
DESIGN STANDHYD      ID=[1], NHYD=["A-01"], DT=[5]min, AREA=[0.077](ha),
                     XIMP=[0.66], TIMP=[0.83], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[1.5](%), END=-1
*%-----------------|-------------------------------------------------------------|
DESIGN STANDHYD      ID=[2], NHYD=["A-02"], DT=[5]min, AREA=[0.058](ha),
                     XIMP=[0.80], TIMP=[0.99], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[1.50](%), END=-1
*%-----------------|-------------------------------------------------------------|
DESIGN STANDHYD      ID=[3], NHYD=["A-03"], DT=[5]min, AREA=[0.095](ha),
                     XIMP=[0.59], TIMP=[0.74], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[1.50](%), END=-1
*%-----------------|-------------------------------------------------------------|
DESIGN STANDHYD      ID=[4], NHYD=["A-06"], DT=[5]min, AREA=[0.019](ha),
                     XIMP=[0.80], TIMP=[0.99], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[1.50](%), END=-1
*%-----------------|-------------------------------------------------------------|
DESIGN STANDHYD      ID=[5], NHYD=["BLDG01"], DT=[5]min, AREA=[0.165](ha),
                     XIMP=[0.80], TIMP=[0.99], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[0.01](%), END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[6], NHYD=["TNKTOT"], IDs to add=[1,2,3,4,5]
*%-----------------|-------------------------------------------------------------|
ROUTE RESERVOIR      IDout=[5],   NHYD=["TANK-R"],  IDin=[6],
                     RDT=[5](min),
                           TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms) - (ha-m)
                                      [ 0.0000 , 0.000 ]
                                      [ 0.0024 , 0.007 ]
                                      [ 0.0024 , 0.010 ]
                                      [ 0.0024 , 0.015 ]
                                      [ 0.0024 , 0.025 ]
                                      [   -1   ,   -1  ]  (max twenty pts)
                           IDovf=[8], NHYDovf=["PND"]
*%-----------------|-------------------------------------------------------------|
**LOW POINT PONDING AT RETIREMENT HOME, OVERFLOW FROM LOW PONT
**WORST CASE, NO 'OUTLET' FROM LOW POINT, GIVES MAX OVERFLOW FROM LP
ROUTE RESERVOIR      IDout=[1],   NHYD=["LOWPT"],  IDin=[8],
                     RDT=[5](min),
                           TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms) - (ha-m)
                                      [ 0.0000 , 0.000 ]
                                      [ 0.0000 , 0.000 ]
                                      [ 0.0000 , 0.000 ]
                                      [ 0.0000 , 0.000 ]
                                      [ 0.0000 , 0.002 ]
                                      [   -1   ,   -1  ]  (max twenty pts)
                           IDovf=[10], NHYDovf=["OVFLP"]
*%-----------------|-------------------------------------------------------------|
**AREAS TO SUBDRAIN**
*%-----------------|-------------------------------------------------------------|
DESIGN STANDHYD      ID=[1], NHYD=["A-04"], DT=[5]min, AREA=[0.047](ha),
                     XIMP=[0.11], TIMP=[0.14], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[3.98](%), END=-1
*%-----------------|-------------------------------------------------------------|
DESIGN STANDHYD      ID=[2], NHYD=["A-05"], DT=[5]min, AREA=[0.010](ha),
                     XIMP=[0.11], TIMP=[0.14], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[3.35](%), END=-1
*%-----------------|-------------------------------------------------------------|
DESIGN NASHYD        ID=[4], NHYD=["EXT-01"], DT=[5]min, AREA=[0.296](ha),
                     DWF=[0](cms), CN/C=[55], TP=[0.17]hrs,
                     END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[6], NHYD=["TOTSUB"], IDs to add=[1,2,3,4]
*%-----------------|-------------------------------------------------------------|
**AREAS TO ROADWAY**
*%-----------------|-------------------------------------------------------------|
DESIGN NASHYD        ID=[1], NHYD=["EXT-02"], DT=[5]min, AREA=[0.652](ha),
                     DWF=[0](cms), CN/C=[55], TP=[0.17]hrs,
                     END=-1
*%-----------------|-------------------------------------------------------------|
DESIGN STANDHYD      ID=[2], NHYD=["A-08"], DT=[5]min, AREA=[0.453](ha),
                     XIMP=[0.11], TIMP=[0.14], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[3.50](%), END=-1
*%-----------------|-------------------------------------------------------------|
ADD HYD              IDsum=[7], NHYD=["TOTRD"], IDs to add=[1,2]
*%-----------------|-------------------------------------------------------------|
***TOTAL FLOW FROM SITE***
ADD HYD              IDsum=[9], NHYD=["TOTOUT"], IDs to add=[5,10,6,7]
*%-----------------|-------------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
                     C2-4.stm
*%-----------------|-------------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
                     C5-4.stm
*%-----------------|-------------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
                     C100-4.stm
*%-----------------|-------------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
                     S2-12.stm
*%-----------------|-------------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
                     S5-12.stm
*%-----------------|-------------------------------------------------------------|
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[9]
                     S100-12.stm
*%-----------------|-------------------------------------------------------------|
FINISH
```

```
================================================================================

   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
   S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
       S   W W   M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9   =========
                                                        9   9  9   9   # 5320763
        StormWater Management HYdrologic Model           999    999    =========

 ******************************************************************************
 ***************************** SWMHYMO Ver/4.05  *****************************
 *********  A single event and continuous hydrologic simulation model  *********
 *********     based on the principles of HYMO and its successors      *********
 *********                 OTTHYMO-83 and OTTHYMO-89.                  *********
 ******************************************************************************
 ********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
 *********                  Ottawa,  Ontario: (613) 836-3884           *********
 *********                  Gatineau, Quebec: (819) 243-6858           *********
 *********                  E-Mail: swmhymo@jfsa.Com                   *********
 ******************************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: NOVATECH ENGINEERING CONSULTANTS LTD         +++++++++
 +++++++++                Nepean              SERIAL#:5320763          +++++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ******************************************************************************
 *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *********
 *********           Maximum value for ID numbers  :     10            *********
 *********           Max. number of rainfall points: 105408            *********
 *********           Max. number of flow points    : 105408            *********
 ******************************************************************************

 ***** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) *****
 *****-------------------------------------------------------------------*****
 *****    ID:  Hydrograph IDentification numbers, (1-10).                 *****
 *****  NHYD:  Hydrograph reference numbers, (6 digits or characters).    *****
 *****  AREA:  Drainage area associated with hydrograph, (ac.) or (ha.).  *****
 ***** QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s).    *****
 ***** TpeakDate_hh:mm is the date and time of the peak flow.             *****
 *****  R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm).       *****
 *****  R.C.:  Runoff Coefficient of simulated hydrograph, (ratio).       *****
 *****     *:  see WARNING or NOTE message printed at end of run.         *****
 *****    **:  see  ERROR  message printed at end of run.                 *****
 ******************************************************************************
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 ******************************************************************************

 ***********************  S U M M A R Y   O U T P U T  ***********************
 ******************************************************************************
 *         DATE: 2017-05-16     TIME: 11:30:09     RUN COUNTER: 000739        *
 ******************************************************************************
 * Input   filename: M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\hc-int.dat  *
 * Output  filename: M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\hc-int.out  *
 * Summary filename: M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\hc-int.sum  *
 * User comments:                                                             *
 * 1:__________________________________________________________________________*
 * 2:__________________________________________________________________________*
 * 3:__________________________________________________________________________*

 ******************************************************************************

#******************************************************************************
#  Project Name: [Claridge Hunt Club Retirement Residence]
#  Project Number: [117036]
#  Date         : 24/04/2017
#  Modeller     : [Kallie Auld]
#  Company      : NOVATECH
#  License #    :  5320763
#******************************************************************************
# Final conditions model - both Phase 1 and Phase 2 full built out
# see model HC-INT for interim conditions
#******************************************************************************
 RUN:COMMAND#
 001:0001-------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   1 ]
 001:0002-------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=10.00:SDUR=   4.00:PTOT=  25.00]
 001:0003-------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 001:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-01            .08      .010 No_date     1:40   17.82 .713
      [XIMP=.66:TIMP=.83]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 001:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-02            .06      .009 No_date     1:40   23.06 .922
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 001:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-03            .09      .010 No_date     1:40   15.80 .632
      [XIMP=.59:TIMP=.74]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 001:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-06            .02      .003 No_date     1:40   23.06 .922
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 001:0008---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    05:BLDG01          .17      .019 No_date     1:40   23.06 .922
      [XIMP=.80:TIMP=.99]
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     [SLP= .01:DT= 5.00]
     [LOSS= 1 : HORTONS]
 001:0009---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-01            .08      .010 No_date    1:40    17.82  n/a
                      + 02:A-02            .06      .009 No_date    1:40    23.06  n/a
                      + 03:A-03            .09      .010 No_date    1:40    15.80  n/a
                      + 04:A-06            .02      .003 No_date    1:40    23.06  n/a
                      + 05:BLDG01          .17      .019 No_date    1:40    23.06  n/a
     [DT= 5.00]  SUM=   06:TNKTOT          .41      .051 No_date    1:40    20.42  n/a
 001:0010---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 06:TNKTOT          .41      .051 No_date    1:40    20.42  n/a
     [RDT= 5.00] out<- 05:TANK-R           .41      .002 No_date    2:55    20.42  n/a
            overflow <= 08:PND             .00      .000 No_date    0:00      .00  n/a
    {MxStoUsed=.6772E-02, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
 001:0011---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 08:PND             .00      .000 No_date    0:00      .00  n/a
  *  [RDT= 5.00] out<- 01:LOWPT            .00      .000 No_date    0:00      .00  n/a
            overflow <= 10:OVFLP           .00      .000 No_date    0:00      .00  n/a
    {MxStoUsed=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
 001:0012---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-04            .05      .001 No_date    1:40     3.50 .140
     [XIMP=.11:TIMP=.14]
     [SLP=3.98:DT= 5.00]
     [LOSS= 1 : HORTONS]
 001:0013---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-05            .01      .000 No_date    1:40     3.50 .140
     [XIMP=.11:TIMP=.14]
     [SLP=3.35:DT= 5.00]
     [LOSS= 1 : HORTONS]
 001:0014---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      04:EXT-01          .30      .002 No_date    1:50     1.81 .072
     [CN= 55.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0015---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-04            .05      .001 No_date    1:40     3.50  n/a
                      + 02:A-05            .01      .000 No_date    1:40     3.50  n/a
                      + 03:A-03            .09      .010 No_date    1:40    15.80  n/a
                      + 04:EXT-01          .30      .002 No_date    1:50     1.81  n/a
     [DT= 5.00]  SUM=   06:TOTSUB          .45      .012 No_date    1:40     4.99  n/a
 001:0016---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      01:EXT-02          .65      .004 No_date    1:50     1.81 .072
     [CN= 55.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
 001:0017---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-08            .45      .008 No_date    1:40     3.50 .140
     [XIMP=.11:TIMP=.14]
     [SLP=3.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
 001:0018---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:EXT-02          .65      .004 No_date    1:50     1.81  n/a
                      + 02:A-08            .45      .008 No_date    1:40     3.50  n/a
     [DT= 5.00]  SUM=   07:TOTRD          1.11      .011 No_date    1:40     2.50  n/a
 001:0019---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            05:TANK-R          .41      .002 No_date    2:55    20.42  n/a
                      + 10:OVFLP           .00      .000 No_date    0:00      .00  n/a
                      + 06:TOTSUB          .45      .012 No_date    1:40     4.99  n/a
                      + 07:TOTRD          1.11      .011 No_date    1:40     2.50  n/a
     [DT= 5.00]  SUM=   09:TOTOUT         1.97      .024 No_date    1:40     6.84  n/a
  ** END OF RUN :    1

*******************************************************************************
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```
 RUN:COMMAND#
 002:0001------------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   2 ]
#******************************************************************************
#  Project Name: [Claridge Hunt Club Retirement Residence]
#  Project Number: [117036]
#  Date         : 24/04/2017
#  Modeller     : [Kallie Auld]
#  Company      : NOVATECH
#  License #    :  5320763
#******************************************************************************
# Final conditions model - both Phase 1 and Phase 2 full built out
# see model HC-INT for interim conditions
#******************************************************************************
 002:0002------------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=10.00:SDUR=   4.00:PTOT=  33.89]
 002:0003------------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 002:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-01            .08      .013 No_date    1:30    25.53 .753
      [XIMP=.66:TIMP=.83]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 002:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-02            .06      .012 No_date    1:30    31.94 .942
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 002:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-03            .09      .015 No_date    1:30    22.96 .677
      [XIMP=.59:TIMP=.74]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 002:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-06            .02      .004 No_date    1:30    31.94 .942
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 002:0008---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    05:BLDG01          .17      .026 No_date    1:30    31.93 .942
      [XIMP=.80:TIMP=.99]
```

```
     [SLP= .01:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0009---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-01            .08      .013 No_date    1:30   25.53  n/a
                    +  02:A-02            .06      .012 No_date    1:30   31.94  n/a
                    +  03:A-03            .09      .015 No_date    1:30   22.96  n/a
                    +  04:A-06            .02      .004 No_date    1:30   31.94  n/a
                    +  05:BLDG01          .17      .026 No_date    1:30   31.93  n/a
     [DT= 5.00]  SUM=  06:TNKTOT          .41      .070 No_date    1:30   28.68  n/a
002:0010---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 06:TNKTOT          .41      .070 No_date    1:30   28.68  n/a
     [RDT= 5.00] out<- 05:TANK-R          .41      .002 No_date    1:40   28.68  n/a
           overflow <= 08:PND             .00      .000 No_date    0:00     .00  n/a
    {MxStoUsed=.9697E-02, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
002:0011---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 08:PND             .00      .000 No_date    0:00     .00  n/a
 *   [RDT= 5.00] out<- 01:LOWPT           .00      .000 No_date    0:00     .00  n/a
           overflow <= 10:OVFLP           .00      .000 No_date    0:00     .00  n/a
    {MxStoUsed=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
002:0012---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    01:A-04            .05      .003 No_date    1:30    7.66 .226
     [XIMP=.11:TIMP=.14]
     [SLP=3.98:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0013---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-05            .01      .001 No_date    1:30    7.66 .226
     [XIMP=.11:TIMP=.14]
     [SLP=3.35:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0014---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    DESIGN NASHYD      04:EXT-01          .30      .003 No_date    1:40    3.60 .106
     [CN= 55.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
002:0015---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-04            .05      .003 No_date    1:30    7.66  n/a
                    +  02:A-05            .01      .001 No_date    1:30    7.66  n/a
                    +  03:A-03            .09      .015 No_date    1:30   22.96  n/a
                    +  04:EXT-01          .30      .003 No_date    1:40    3.60  n/a
     [DT= 5.00]  SUM=  06:TOTSUB          .45      .020 No_date    1:30    8.22  n/a
002:0016---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    DESIGN NASHYD      01:EXT-02          .65      .008 No_date    1:40    3.60 .106
     [CN= 55.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
002:0017---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-08            .45      .024 No_date    1:30    7.66 .226
     [XIMP=.11:TIMP=.14]
     [SLP=3.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0018---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:EXT-02          .65      .008 No_date    1:40    3.60  n/a
                    +  02:A-08            .45      .024 No_date    1:30    7.66  n/a
     [DT= 5.00]  SUM=  07:TOTRD          1.11      .029 No_date    1:30    5.26  n/a
002:0019---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            05:TANK-R          .41      .002 No_date    1:40   28.68  n/a
                    +  10:OVFLP           .00      .000 No_date    0:00     .00  n/a
                    +  06:TOTSUB          .45      .020 No_date    1:30    8.22  n/a
                    +  07:TOTRD          1.11      .029 No_date    1:30    5.26  n/a
     [DT= 5.00]  SUM=  09:TOTOUT         1.97      .050 No_date    1:30   10.87  n/a
 ** END OF RUN :    2

*******************************************************************************
```

```
 RUN:COMMAND#
 003:0001-------------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   3 ]
#*****************************************************************************
#  Project Name: [Claridge Hunt Club Retirement Residence]
#  Project Number: [117036]
#  Date         : 24/04/2017
#  Modeller     : [Kallie Auld]
#  Company      : NOVATECH
#  License #    :  5320763
#*****************************************************************************
# Final conditions model - both Phase 1 and Phase 2 full built out
# see model HC-INT for interim conditions
#*****************************************************************************
 003:0002-------------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=10.00:SDUR=   4.00:PTOT=  45.18]
 003:0003-------------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 003:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-01            .08      .020 No_date    1:40   36.13 .800
      [XIMP=.66:TIMP=.83]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 003:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-02            .06      .017 No_date    1:40   43.21 .956
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 003:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-03            .09      .021 No_date    1:40   33.03 .731
      [XIMP=.59:TIMP=.74]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 003:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-06            .02      .005 No_date    1:40   43.21 .956
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 003:0008---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    05:BLDG01          .17      .037 No_date    1:40   43.21 .956
      [XIMP=.80:TIMP=.99]
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     [SLP= .01:DT= 5.00]
     [LOSS= 1 : HORTONS]
 003:0009---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD           01:A-01             .08      .020 No_date    1:40   36.13  n/a
                    +  02:A-02             .06      .017 No_date    1:40   43.21  n/a
                    +  03:A-03             .09      .021 No_date    1:40   33.03  n/a
                    +  04:A-06             .02      .005 No_date    1:40   43.21  n/a
                    +  05:BLDG01           .17      .037 No_date    1:40   43.21  n/a
      [DT= 5.00]  SUM=  06:TNKTOT           .41      .101 No_date    1:40   39.55  n/a
 003:0010---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 06:TNKTOT           .41      .101 No_date    1:40   39.55  n/a
      [RDT= 5.00] out<- 05:TANK-R           .41      .002 No_date    1:45   39.55  n/a
            overflow <= 08:PND              .00      .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1411E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
 003:0011---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 08:PND              .00      .000 No_date    0:00     .00  n/a
  *   [RDT= 5.00] out<- 01:LOWPT            .00      .000 No_date    0:00     .00  n/a
            overflow <= 10:OVFLP            .00      .000 No_date    0:00     .00  n/a
     {MxStoUsed=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
 003:0012---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-04             .05      .007 No_date    1:40   14.72 .326
      [XIMP=.11:TIMP=.14]
      [SLP=3.98:DT= 5.00]
      [LOSS= 1 : HORTONS]
 003:0013---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-05             .01      .002 No_date    1:40   14.72 .326
      [XIMP=.11:TIMP=.14]
      [SLP=3.35:DT= 5.00]
      [LOSS= 1 : HORTONS]
 003:0014---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      04:EXT-01           .30      .007 No_date    1:50    6.61 .146
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 003:0015---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD           01:A-04             .05      .007 No_date    1:40   14.72  n/a
                    +  02:A-05             .01      .002 No_date    1:40   14.72  n/a
                    +  03:A-03             .09      .021 No_date    1:40   33.03  n/a
                    +  04:EXT-01           .30      .007 No_date    1:50    6.61  n/a
      [DT= 5.00]  SUM=  06:TOTSUB           .45      .035 No_date    1:40   13.24  n/a
 003:0016---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      01:EXT-02           .65      .015 No_date    1:50    6.61 .146
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 003:0017---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-08             .45      .053 No_date    1:40   14.72 .326
      [XIMP=.11:TIMP=.14]
      [SLP=3.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 003:0018---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD           01:EXT-02           .65      .015 No_date    1:50    6.61  n/a
                    +  02:A-08             .45      .053 No_date    1:40   14.72  n/a
      [DT= 5.00]  SUM=  07:TOTRD           1.11      .064 No_date    1:40    9.93  n/a
 003:0019---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD           05:TANK-R           .41      .002 No_date    1:45   39.55  n/a
                    +  10:OVFLP            .00      .000 No_date    0:00     .00  n/a
                    +  06:TOTSUB           .45      .035 No_date    1:40   13.24  n/a
                    +  07:TOTRD           1.11      .064 No_date    1:40    9.93  n/a
      [DT= 5.00]  SUM=  09:TOTOUT          1.97      .101 No_date    1:40   16.92  n/a
  ** END OF RUN :    3

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```
 RUN:COMMAND#
 004:0001-----------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   4 ]
#******************************************************************************
#  Project Name: [Claridge Hunt Club Retirement Residence]
#  Project Number: [117036]
#  Date        : 24/04/2017
#  Modeller    : [Kallie Auld]
#  Company     : NOVATECH
#  License #   :  5320763
#******************************************************************************
# Final conditions model - both Phase 1 and Phase 2 full built out
# see model HC-INT for interim conditions
#******************************************************************************
 004:0002-----------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=10.00:SDUR=   4.00:PTOT=  76.02]
 004:0003-----------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 004:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-01             .08      .036 No_date    1:40   65.45 .861
      [XIMP=.66:TIMP=.83]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-02             .06      .029 No_date    1:40   74.04 .974
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-03             .09      .043 No_date    1:40   61.65 .811
      [XIMP=.59:TIMP=.74]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-06             .02      .009 No_date    1:40   74.05 .974
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0008---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    05:BLDG01           .17      .067 No_date    1:40   74.05 .974
      [XIMP=.80:TIMP=.99]
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     [SLP= .01:DT= 5.00]
     [LOSS= 1 : HORTONS]
004:0009---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD           01:A-01            .08      .036 No_date    1:40   65.45  n/a
                  +   02:A-02            .06      .029 No_date    1:40   74.04  n/a
                  +   03:A-03            .09      .043 No_date    1:40   61.65  n/a
                  +   04:A-06            .02      .009 No_date    1:40   74.05  n/a
                  +   05:BLDG01          .17      .067 No_date    1:40   74.05  n/a
     [DT= 5.00]  SUM=  06:TNKTOT          .41      .184 No_date    1:40   69.60  n/a
004:0010---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 06:TNKTOT          .41      .184 No_date    1:40   69.60  n/a
     [RDT= 5.00] out<- 05:TANK-R          .39      .002 No_date    1:35   69.60  n/a
          overflow <= 08:PND             .02      .006 No_date    2:45   69.60  n/a
    {MxStoUsed=.2502E-01, TotOvfVol=.1371E-02, N-Ovf=    2, TotDurOvf=    1.hrs}
004:0011---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 08:PND             .02      .006 No_date    2:45   69.60  n/a
 *   [RDT= 5.00] out<- 01:LOWPT           .02      .000 No_date    0:00     .00  n/a
          overflow <= 10:OVFLP           .00      .000 No_date    0:00     .00  n/a
    {MxStoUsed=.1371E-02, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
004:0012---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    01:A-04            .05      .018 No_date    1:40   37.54 .494
     [XIMP=.11:TIMP=.14]
     [SLP=3.98:DT= 5.00]
     [LOSS= 1 : HORTONS]
004:0013---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-05            .01      .004 No_date    1:40   37.54 .494
     [XIMP=.11:TIMP=.14]
     [SLP=3.35:DT= 5.00]
     [LOSS= 1 : HORTONS]
004:0014---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    DESIGN NASHYD      04:EXT-01          .30      .020 No_date    1:45   18.24 .240
     [CN= 55.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
004:0015---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD           01:A-04            .05      .018 No_date    1:40   37.54  n/a
                  +   02:A-05            .01      .004 No_date    1:40   37.54  n/a
                  +   03:A-03            .09      .043 No_date    1:40   61.65  n/a
                  +   04:EXT-01          .30      .020 No_date    1:45   18.24  n/a
     [DT= 5.00]  SUM=  06:TOTSUB          .45      .079 No_date    1:40   29.90  n/a
004:0016---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    DESIGN NASHYD      01:EXT-02          .65      .044 No_date    1:45   18.24 .240
     [CN= 55.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
004:0017---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-08            .45      .165 No_date    1:40   37.54 .494
     [XIMP=.11:TIMP=.14]
     [SLP=3.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
004:0018---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD           01:EXT-02          .65      .044 No_date    1:45   18.24  n/a
                  +   02:A-08            .45      .165 No_date    1:40   37.54  n/a
     [DT= 5.00]  SUM=  07:TOTRD          1.11      .198 No_date    1:40   26.15  n/a
004:0019---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD           05:TANK-R          .39      .002 No_date    1:35   69.60  n/a
                  +   10:OVFLP           .00      .000 No_date    0:00     .00  n/a
                  +   06:TOTSUB          .45      .079 No_date    1:40   29.90  n/a
                  +   07:TOTRD          1.11      .198 No_date    1:40   26.15  n/a
     [DT= 5.00]  SUM=  09:TOTOUT         1.95      .280 No_date    1:40   35.81  n/a
 ** END OF RUN :    4

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```
 RUN:COMMAND#
 005:0001------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   5 ]
#*************************************************************************
#  Project Name: [Claridge Hunt Club Retirement Residence]
#  Project Number: [117036]
#  Date         : 24/04/2017
#  Modeller     : [Kallie Auld]
#  Company      : NOVATECH
#  License #    :  5320763
#*************************************************************************
# Final conditions model - both Phase 1 and Phase 2 full built out
# see model HC-INT for interim conditions
#*************************************************************************
 005:0002------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=30.00:SDUR=  12.00:PTOT=  42.34]
 005:0003------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 005:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-01            .08      .007 No_date    6:00   31.70 .749
      [XIMP=.66:TIMP=.83]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 005:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-02            .06      .006 No_date    5:55   39.40 .931
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 005:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-03            .09      .008 No_date    6:00   28.26 .668
      [XIMP=.59:TIMP=.74]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 005:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-06            .02      .002 No_date    5:50   39.40 .931
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 005:0008---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    05:BLDG01          .17      .015 No_date    6:00   39.40 .931
      [XIMP=.80:TIMP=.99]
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      [SLP= .01:DT= 5.00]
      [LOSS= 1 : HORTONS]
 005:0009---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-01            .08      .007 No_date    6:00   31.70  n/a
                      + 02:A-02            .06      .006 No_date    5:55   39.40  n/a
                      + 03:A-03            .09      .008 No_date    6:00   28.26  n/a
                      + 04:A-06            .02      .002 No_date    5:50   39.40  n/a
                      + 05:BLDG01          .17      .015 No_date    6:00   39.40  n/a
      [DT= 5.00]  SUM=  06:TNKTOT          .41      .037 No_date    6:00   35.41  n/a
 005:0010---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 06:TNKTOT          .41      .037 No_date    6:00   35.41  n/a
      [RDT= 5.00] out<- 05:TANK-R          .41      .002 No_date    6:00   35.41  n/a
            overflow <= 08:PND             .00      .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1052E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
 005:0011---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 08:PND             .00      .000 No_date    0:00     .00  n/a
  *   [RDT= 5.00] out<- 01:LOWPT           .00      .000 No_date    0:00     .00  n/a
            overflow <= 10:OVFLP           .00      .000 No_date    0:00     .00  n/a
     {MxStoUsed=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
 005:0012---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-04            .05      .001 No_date    6:00    7.44 .176
      [XIMP=.11:TIMP=.14]
      [SLP=3.98:DT= 5.00]
      [LOSS= 1 : HORTONS]
 005:0013---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-05            .01      .000 No_date    6:00    7.44 .176
      [XIMP=.11:TIMP=.14]
      [SLP=3.35:DT= 5.00]
      [LOSS= 1 : HORTONS]
 005:0014---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      04:EXT-01          .30      .004 No_date    6:00    5.78 .136
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 005:0015---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-04            .05      .001 No_date    6:00    7.44  n/a
                      + 02:A-05            .01      .000 No_date    6:00    7.44  n/a
                      + 03:A-03            .09      .008 No_date    6:00   28.26  n/a
                      + 04:EXT-01          .30      .004 No_date    6:00    5.78  n/a
      [DT= 5.00]  SUM=  06:TOTSUB          .45      .013 No_date    6:00   10.76  n/a
 005:0016---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      01:EXT-02          .65      .009 No_date    6:00    5.78 .136
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 005:0017---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-08            .45      .011 No_date    6:00    7.44 .176
      [XIMP=.11:TIMP=.14]
      [SLP=3.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 005:0018---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:EXT-02          .65      .009 No_date    6:00    5.78  n/a
                      + 02:A-08            .45      .011 No_date    6:00    7.44  n/a
      [DT= 5.00]  SUM=  07:TOTRD          1.11      .020 No_date    6:00    6.46  n/a
 005:0019---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            05:TANK-R          .41      .002 No_date    6:00   35.41  n/a
                      + 10:OVFLP           .00      .000 No_date    0:00     .00  n/a
                      + 06:TOTSUB          .45      .013 No_date    6:00   10.76  n/a
                      + 07:TOTRD          1.11      .020 No_date    6:00    6.46  n/a
      [DT= 5.00]  SUM=  09:TOTOUT         1.97      .035 No_date    6:00   13.53  n/a
  ** END OF RUN :    6

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```
 RUN:COMMAND#
 007:0001-------------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   7 ]
#******************************************************************************
#  Project Name: [Claridge Hunt Club Retirement Residence]
#  Project Number: [117036]
#  Date         : 24/04/2017
#  Modeller     : [Kallie Auld]
#  Company      : NOVATECH
#  License #    :  5320763
#******************************************************************************
# Final conditions model - both Phase 1 and Phase 2 full built out
# see model HC-INT for interim conditions
#******************************************************************************
 007:0002-------------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=30.00:SDUR=  12.00:PTOT=  56.18]
 007:0003-------------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 007:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-01            .08      .010 No_date    6:00   43.83 .780
      [XIMP=.66:TIMP=.83]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-02            .06      .008 No_date    5:55   53.21 .947
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-03            .09      .011 No_date    6:00   40.21 .716
      [XIMP=.59:TIMP=.74]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-06            .02      .003 No_date    5:55   53.21 .947
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0008---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    05:BLDG01          .17      .020 No_date    6:00   53.20 .947
      [XIMP=.80:TIMP=.99]
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      [SLP= .01:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0009---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-01            .08     .010 No_date    6:00   43.83  n/a
                     +  02:A-02            .06     .008 No_date    5:55   53.21  n/a
                     +  03:A-03            .09     .011 No_date    6:00   40.21  n/a
                     +  04:A-06            .02     .003 No_date    5:55   53.21  n/a
                     +  05:BLDG01          .17     .020 No_date    6:00   53.20  n/a
      [DT= 5.00]  SUM=  06:TNKTOT          .41     .051 No_date    6:00   48.48  n/a
 007:0010---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 06:TNKTOT          .41     .051 No_date    6:00   48.48  n/a
      [RDT= 5.00] out<- 05:TANK-R          .41     .002 No_date    5:50   48.48  n/a
            overflow <= 08:PND             .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1505E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
 007:0011---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 08:PND             .00     .000 No_date    0:00     .00  n/a
  *   [RDT= 5.00] out<- 01:LOWPT           .00     .000 No_date    0:00     .00  n/a
            overflow <= 10:OVFLP           .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
 007:0012---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-04            .05     .003 No_date    6:00   15.62 .278
      [XIMP=.11:TIMP=.14]
      [SLP=3.98:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0013---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-05            .01     .001 No_date    6:00   15.62 .278
      [XIMP=.11:TIMP=.14]
      [SLP=3.35:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0014---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      04:EXT-01          .30     .007 No_date    6:00   10.23 .182
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 007:0015---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-04            .05     .003 No_date    6:00   15.62  n/a
                     +  02:A-05            .01     .001 No_date    6:00   15.62  n/a
                     +  03:A-03            .09     .011 No_date    6:00   40.21  n/a
                     +  04:EXT-01          .30     .007 No_date    6:00   10.23  n/a
      [DT= 5.00]  SUM=  06:TOTSUB          .45     .022 No_date    6:00   17.27  n/a
 007:0016---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      01:EXT-02          .65     .016 No_date    6:00   10.23 .182
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 007:0017---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-08            .45     .032 No_date    6:00   15.62 .278
      [XIMP=.11:TIMP=.14]
      [SLP=3.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0018---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:EXT-02          .65     .016 No_date    6:00   10.23  n/a
                     +  02:A-08            .45     .032 No_date    6:00   15.62  n/a
      [DT= 5.00]  SUM=  07:TOTRD          1.11     .048 No_date    6:00   12.44  n/a
 007:0019---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            05:TANK-R          .41     .002 No_date    5:50   48.48  n/a
                     +  10:OVFLP           .00     .000 No_date    0:00     .00  n/a
                     +  06:TOTSUB          .45     .022 No_date    6:00   17.27  n/a
                     +  07:TOTRD          1.11     .048 No_date    6:00   12.44  n/a
      [DT= 5.00]  SUM=  09:TOTOUT         1.97     .073 No_date    6:00   21.13  n/a
  ** END OF RUN :    8

*******************************************************************************
```

```
 RUN:COMMAND#
 009:0001------------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   9 ]
#******************************************************************************
#  Project Name: [Claridge Hunt Club Retirement Residence]
#  Project Number: [117036]
#  Date        : 24/04/2017
#  Modeller    : [Kallie Auld]
#  Company     : NOVATECH
#  License #   :  5320763
#******************************************************************************
# Final conditions model - both Phase 1 and Phase 2 full built out
# see model HC-INT for interim conditions
#******************************************************************************
 009:0002------------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=10.00:SDUR=  12.00:PTOT=  93.91]
 009:0003------------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 009:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-01            .08     .017 No_date    6:00   76.82 .818
      [XIMP=.66:TIMP=.83]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-02            .06     .013 No_date    5:55   90.87 .968
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-03            .09     .020 No_date    6:00   71.93 .766
      [XIMP=.59:TIMP=.74]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-06            .02     .004 No_date    5:50   90.88 .968
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0008---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    05:BLDG01          .17     .035 No_date    6:00   90.88 .968
      [XIMP=.80:TIMP=.99]
```

```
      [SLP= .01:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0009---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-01             .08      .017 No_date    6:00   76.82  n/a
                     +  02:A-02             .06      .013 No_date    5:55   90.87  n/a
                     +  03:A-03             .09      .020 No_date    6:00   71.93  n/a
                     +  04:A-06             .02      .004 No_date    5:50   90.88  n/a
                     +  05:BLDG01           .17      .035 No_date    6:00   90.88  n/a
      [DT= 5.00]  SUM=  06:TNKTOT           .41      .089 No_date    6:00   83.91  n/a
 009:0010---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 06:TNKTOT           .41      .089 No_date    6:00   83.91  n/a
      [RDT= 5.00] out<- 05:TANK-R           .38      .002 No_date    5:40   83.91  n/a
            overflow <= 08:PND              .04      .011 No_date    6:40   83.91  n/a
     {MxStoUsed=.2500E-01, TotOvfVol=.3174E-02, N-Ovf=    3, TotDurOvf=    3.hrs}
 009:0011---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 08:PND              .04      .011 No_date    6:40   83.91  n/a
  *   [RDT= 5.00] out<- 01:LOWPT            .02      .000 No_date    0:00     .00  n/a
            overflow <= 10:OVFLP            .01      .003 No_date    7:40   83.91  n/a
     {MxStoUsed=.2000E-02, TotOvfVol=.1174E-02, N-Ovf=    4, TotDurOvf=    2.hrs}
 009:0012---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-04             .05      .009 No_date    6:00   41.42 .441
      [XIMP=.11:TIMP=.14]
      [SLP=3.98:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0013---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-05             .01      .002 No_date    6:00   41.41 .441
      [XIMP=.11:TIMP=.14]
      [SLP=3.35:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0014---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      04:EXT-01           .30      .019 No_date    6:00   26.80 .285
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 009:0015---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-04             .05      .009 No_date    6:00   41.42  n/a
                     +  02:A-05             .01      .002 No_date    6:00   41.41  n/a
                     +  03:A-03             .09      .020 No_date    6:00   71.93  n/a
                     +  04:EXT-01           .30      .019 No_date    6:00   26.80  n/a
      [DT= 5.00]  SUM=  06:TOTSUB           .45      .050 No_date    6:00   38.23  n/a
 009:0016---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      01:EXT-02           .65      .042 No_date    6:00   26.81 .285
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 009:0017---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-08             .45      .080 No_date    6:00   41.42 .441
      [XIMP=.11:TIMP=.14]
      [SLP=3.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0018---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:EXT-02           .65      .042 No_date    6:00   26.81  n/a
                     +  02:A-08             .45      .080 No_date    6:00   41.42  n/a
      [DT= 5.00]  SUM=  07:TOTRD           1.11      .123 No_date    6:00   32.80  n/a
 009:0019---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            05:TANK-R           .38      .002 No_date    5:40   83.91  n/a
                     +  10:OVFLP            .01      .003 No_date    7:40   83.91  n/a
                     +  06:TOTSUB           .45      .050 No_date    6:00   38.23  n/a
                     +  07:TOTRD           1.11      .123 No_date    6:00   32.80  n/a
      [DT= 5.00]  SUM=  09:TOTOUT          1.94      .175 No_date    6:00   44.31  n/a
 009:0002-----------------------------------------------------------------------------
      FINISH
------------------------------------------------------------------------------------
************************************************************************************
     WARNINGS / ERRORS / NOTES
```

```
    -------------------------
001:0004 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
001:0005 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
001:0006 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
001:0007 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
001:0011 ROUTE RESERVOIR
     *** WARNING: Inflow hydrograph is dry.
001:0012 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
001:0013 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
001:0017 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
002:0004 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
002:0005 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
002:0006 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
002:0007 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
002:0011 ROUTE RESERVOIR
     *** WARNING: Inflow hydrograph is dry.
002:0012 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
002:0013 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
002:0017 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
003:0004 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
003:0005 DESIGN STANDHYD
```

```
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
003:0006 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
003:0007 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
003:0011 ROUTE RESERVOIR
     *** WARNING: Inflow hydrograph is dry.
003:0012 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
003:0013 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
003:0017 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
004:0004 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
004:0005 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
004:0006 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
004:0007 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
004:0008 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
004:0011 ROUTE RESERVOIR
     *** WARNING: Outflow volume is less than inflow volume.
004:0012 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
004:0013 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
004:0017 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
005:0004 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
005:0005 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
005:0006 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
005:0007 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
005:0011 ROUTE RESERVOIR
     *** WARNING: Inflow hydrograph is dry.
005:0012 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
005:0013 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
005:0017 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
007:0004 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
007:0005 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
007:0006 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
007:0007 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
007:0011 ROUTE RESERVOIR
     *** WARNING: Inflow hydrograph is dry.
007:0012 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
007:0013 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
007:0017 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
009:0004 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
009:0005 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
009:0006 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
009:0007 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
```

```
                   Use a smaller DT or a larger area.
 009:0011 ROUTE RESERVOIR
      *** WARNING: Outflow volume is less than inflow volume.
 009:0012 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 009:0013 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 009:0017 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
   Simulation ended on 2017-05-16     at 11:30:13
=====================================================================================
```

```
2     Metric units
*#*****************************************************************************
*#  Project Name: [Claridge Hunt Club Retirement Residence]
*#  Project Number: [117036]
*#  Date        : 24/04/2017
*#  Modeller    : [Kallie Auld]
*#  Company     : NOVATECH
*#  License #   :  5320763
*#*****************************************************************************
*# Final conditions model - both Phase 1 and Phase 2 full built out
*# see model HC-INT for interim conditions
*#*****************************************************************************
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
                     C25mm-4.stm
*%-----------------|-----------------------------------------------------------|
READ STORM           STORM_FILENAME=["STORM.001"]
*%-----------------|-----------------------------------------------------------|
DEFAULT VALUES       ICASEdef=[1],  read and print values
                     DEFVAL_FILENAME=["OTTAWA.DEF"]
*%-----------------|-----------------------------------------------------------|
**AREAS TO BOX 1 - RETIREMENT HOME**
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[1], NHYD=["A-01"], DT=[5]min, AREA=[0.077](ha),
                     XIMP=[0.66], TIMP=[0.83], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[1.5](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[2], NHYD=["A-02"], DT=[5]min, AREA=[0.058](ha),
                     XIMP=[0.80], TIMP=[0.99], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[1.5](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[3], NHYD=["A-03"], DT=[5]min, AREA=[0.120](ha),
                     XIMP=[0.61], TIMP=[0.76], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[1.1](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[4], NHYD=["A-06"], DT=[5]min, AREA=[0.019](ha),
                     XIMP=[0.80], TIMP=[0.99], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[0.5](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[5], NHYD=["BLDG01"], DT=[5]min, AREA=[0.165](ha),
                     XIMP=[0.80], TIMP=[0.99], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[0.01](%), END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[7], NHYD=["TNKTOT"], IDs to add=[1,2,3,4,5]
*%-----------------|-----------------------------------------------------------|
ROUTE RESERVOIR      IDout=[6],   NHYD=["TANK-R"],  IDin=[7],
                     RDT=[5](min),
                           TABLE of ( OUTFLOW-STORAGE ) values
                                       (cms) - (ha-m)
                                     [ 0.0000 , 0.000 ]
                                     [ 0.0024 , 0.007 ]
                                     [ 0.0024 , 0.010 ]
                                     [ 0.0024 , 0.015 ]
                                     [ 0.0024 , 0.025 ]
                                     [   -1   ,   -1  ]  (max twenty pts)
                           IDovf=[8], NHYDovf=["PNF"]
*%-----------------|-----------------------------------------------------------|
**LOW POINT PONDING AT RETIREMENT HOME, OVERFLOW FROM LOW PONT
**WORST CASE, NO 'OUTLET' FROM LOW POINT, GIVES MAX OVERFLOW FROM LP
ROUTE RESERVOIR      IDout=[1],   NHYD=["LOWPT"],  IDin=[8],
                     RDT=[5](min),
                           TABLE of ( OUTFLOW-STORAGE ) values
                                       (cms) - (ha-m)
                                     [ 0.0000 , 0.000 ]
                                     [ 0.0000 , 0.000 ]
                                     [ 0.0000 , 0.000 ]
                                     [ 0.0000 , 0.000 ]
                                     [ 0.0000 , 0.002 ]
                                     [   -1   ,   -1  ]  (max twenty pts)
                           IDovf=[10], NHYDovf=["OVFLP"]
*%-----------------|-----------------------------------------------------------|
**AREAS TO BOX 2 - HOTEL**
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[1], NHYD=["A-07"], DT=[5]min, AREA=[0.056](ha),
                     XIMP=[0.11], TIMP=[0.14], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[1.5](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[2], NHYD=["A-08"], DT=[5]min, AREA=[0.041](ha),
                     XIMP=[0.11], TIMP=[0.14], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[2.0](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[3], NHYD=["A-09"], DT=[5]min, AREA=[0.024](ha),
                     XIMP=[0.80], TIMP=[0.99], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[0.5](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[4], NHYD=["A-10"], DT=[5]min, AREA=[0.042](ha),
                     XIMP=[0.62], TIMP=[0.77], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[1.5](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[5], NHYD=["A-11"], DT=[5]min, AREA=[0.036](ha),
                     XIMP=[0.79], TIMP=[0.63], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[1.5](%), END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[8], NHYD=["SUB1"], IDs to add=[1,2,3,4,5]
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[1], NHYD=["A-12"], DT=[5]min, AREA=[0.020](ha),
                     XIMP=[0.11], TIMP=[0.14], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[1.5](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[2], NHYD=["A-13"], DT=[5]min, AREA=[0.023](ha),
                     XIMP=[0.11], TIMP=[0.14], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[1.5](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[3], NHYD=["A-14"], DT=[5]min, AREA=[0.014](ha),
                     XIMP=[0.11], TIMP=[0.14], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[1.5](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[4], NHYD=["A-15"], DT=[5]min, AREA=[0.018](ha),
                     XIMP=[0.11], TIMP=[0.14], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[1.5](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD      ID=[5], NHYD=["BLDG02"], DT=[5]min, AREA=[0.136](ha),
                     XIMP=[0.80], TIMP=[0.99], DWF=[0](cms),  LOSS=[1],
                     SLOPE=[0.01](%), END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[9], NHYD=["SUB2"], IDs to add=[1,2,3,4,5]
*%-----------------|-----------------------------------------------------------|
ADD HYD              IDsum=[1], NHYD=["TNKTOT"], IDs to add=[8,9]
*%-----------------|-----------------------------------------------------------|
ROUTE RESERVOIR      IDout=[7],   NHYD=["TANK-H"],  IDin=[1],
                     RDT=[5](min),
                           TABLE of ( OUTFLOW-STORAGE ) values
                                       (cms) - (ha-m)
                                     [ 0.0000 , 0.000 ]
                                     [ 0.0021 , 0.004 ]
                                     [ 0.0021 , 0.007 ]
                                     [ 0.0021 , 0.010 ]
```

```
                                    [ 0.0021 , 0.025 ]
                                    [   -1  ,    -1  ]  (max twenty pts)
                          IDovf=[9], NHYDovf=["OVFTNK"]
*%-----------------|-----------------------------------------------------------|
**AREAS TO SUBDRAIN**
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD     ID=[1], NHYD=["A-04"], DT=[5]min, AREA=[0.036](ha),
                    XIMP=[0.11], TIMP=[0.14], DWF=[0](cms),  LOSS=[1],
                    SLOPE=[0.3](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD     ID=[2], NHYD=["A-05"], DT=[5]min, AREA=[0.010](ha),
                    XIMP=[0.11], TIMP=[0.14], DWF=[0](cms),  LOSS=[1],
                    SLOPE=[1.0](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN STANDHYD     ID=[3], NHYD=["A-06"], DT=[5]min, AREA=[0.010](ha),
                    XIMP=[0.11], TIMP=[0.14], DWF=[0](cms),  LOSS=[1],
                    SLOPE=[0.5](%), END=-1
*%-----------------|-----------------------------------------------------------|
DESIGN NASHYD       ID=[4], NHYD=["EXT-01"], DT=[5]min, AREA=[0.296](ha),
                    DWF=[0](cms), CN/C=[55], TP=[0.17]hrs,
                    END=-1
*%-----------------|-----------------------------------------------------------|
ADD HYD             IDsum=[8], NHYD=["TOTSUB"], IDs to add=[1,2,3,4]
*%-----------------|-----------------------------------------------------------|
DESIGN NASHYD       ID=[2], NHYD=["EXT-02"], DT=[5]min, AREA=[0.653](ha),
                    DWF=[0](cms), CN/C=[55], TP=[0.17]hrs,
                    END=-1
*%-----------------|-----------------------------------------------------------|
***TOTAL FLOW FROM SITE***
ADD HYD             IDsum=[1], NHYD=["TOTOUT"], IDs to add=[6,10,7,9,8,2]
*%-----------------|-----------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
                    C2-4.stm
*%-----------------|-----------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
                    C5-4.stm
*%-----------------|-----------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
                    C100-4.stm
*%-----------------|-----------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
                    S2-12.stm
*%-----------------|-----------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
                    S5-12.stm
*%-----------------|-----------------------------------------------------------|
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[9]
                    S100-12.stm
*%-----------------|-----------------------------------------------------------|
FINISH
```

```
================================================================================

   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
   S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
       S   W W   M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9   =========
                                                        9   9  9   9   # 5320763
        StormWater Management HYdrologic Model           999    999    =========

 *******************************************************************************
 ***************************** SWMHYMO Ver/4.05 ******************************
 *********  A single event and continuous hydrologic simulation model  *********
 *********     based on the principles of HYMO and its successors      *********
 *********                 OTTHYMO-83 and OTTHYMO-89.                  *********
 *******************************************************************************
 ********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
 *********                  Ottawa,  Ontario: (613) 836-3884           *********
 *********                  Gatineau, Quebec: (819) 243-6858           *********
 *********                  E-Mail: swmhymo@jfsa.Com                   *********
 *******************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: NOVATECH ENGINEERING CONSULTANTS LTD         +++++++++
 +++++++++                Nepean              SERIAL#:5320763         +++++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 *******************************************************************************
 *********          ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *********
 *********          Maximum value for ID numbers  :     10            *********
 *********          Max. number of rainfall points: 105408            *********
 *********          Max. number of flow points    : 105408            *********
 *******************************************************************************

 ***** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) *****
 *****-------------------------------------------------------------------------*****
 *****    ID:  Hydrograph IDentification numbers, (1-10).                 *****
 ***** NHYD:  Hydrograph reference numbers, (6 digits or characters).     *****
 *****  AREA:  Drainage area associated with hydrograph, (ac.) or (ha.).  *****
 ***** QPEAK:  Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s).    *****
 ***** TpeakDate_hh:mm is the date and time of the peak flow.             *****
 *****  R.V.:  Runoff Volume of simulated hydrograph, (in) or (mm).       *****
 *****  R.C.:  Runoff Coefficient of simulated hydrograph, (ratio).       *****
 *****     *:  see WARNING or NOTE message printed at end of run.         *****
 *****    **:  see  ERROR  message printed at end of run.                 *****
 *******************************************************************************
 *******************************************************************************

:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

 *******************************************************************************

 ***********************  S U M M A R Y   O U T P U T  ***********************
 *******************************************************************************
 *         DATE: 2017-05-16     TIME: 11:33:50     RUN COUNTER: 000741        *
 *******************************************************************************
 * Input   filename: M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\HC-FIN.dat  *
 * Output  filename: M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\HC-FIN.out  *
 * Summary filename: M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\HC-FIN.sum  *
 * User comments:                                                              *
 * 1:__________________________________________________________________________*
 * 2:__________________________________________________________________________*
 * 3:__________________________________________________________________________*
```

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 ********************************************************************************

#*******************************************************************************
#  Project Name: [Claridge Hunt Club Retirement Residence]
#  Project Number: [117036]
#  Date        : 24/04/2017
#  Modeller    : [Kallie Auld]
#  Company     : NOVATECH
#  License #   :  5320763
#*******************************************************************************
# Final conditions model - both Phase 1 and Phase 2 full built out
# see model HC-INT for interim conditions
#*******************************************************************************
 RUN:COMMAND#
 001:0001------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   1 ]
 001:0002------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=10.00:SDUR=   4.00:PTOT=  25.00]
 001:0003------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 001:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-01            .08     .010 No_date    1:40   17.82 .713
      [XIMP=.66:TIMP=.83]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 001:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-02            .06     .009 No_date    1:40   23.06 .922
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 001:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-03            .12     .013 No_date    1:40   16.25 .650
      [XIMP=.61:TIMP=.76]
      [SLP=1.10:DT= 5.00]
      [LOSS= 1 : HORTONS]
 001:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-06            .02     .003 No_date    1:40   23.06 .922
      [XIMP=.80:TIMP=.99]
      [SLP= .50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 001:0008---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    05:BLDG01          .17     .019 No_date    1:40   23.06 .922
      [XIMP=.80:TIMP=.99]
```

```
     [SLP= .01:DT= 5.00]
     [LOSS= 1 : HORTONS]
001:0009---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-01            .08     .010 No_date    1:40   17.82  n/a
                    +  02:A-02            .06     .009 No_date    1:40   23.06  n/a
                    +  03:A-03            .12     .013 No_date    1:40   16.25  n/a
                    +  04:A-06            .02     .003 No_date    1:40   23.06  n/a
                    +  05:BLDG01          .17     .019 No_date    1:40   23.06  n/a
     [DT= 5.00]  SUM=  07:TNKTOT          .44     .054 No_date    1:40   20.28  n/a
001:0010---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 07:TNKTOT          .44     .054 No_date    1:40   20.28  n/a
     [RDT= 5.00] out<- 06:TANK-R          .44     .002 No_date    2:30   20.28  n/a
           overflow <= 08:PNF             .00     .000 No_date    0:00     .00  n/a
    {MxStoUsed=.7140E-02, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
001:0011---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 08:PNF             .00     .000 No_date    0:00     .00  n/a
 *   [RDT= 5.00] out<- 01:LOWPT           .00     .000 No_date    0:00     .00  n/a
           overflow <= 10:OVFLP           .00     .000 No_date    0:00     .00  n/a
    {MxStoUsed=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
001:0012---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    01:A-07            .06     .001 No_date    1:40    3.50 .140
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
001:0013---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-08            .04     .001 No_date    1:40    3.50 .140
     [XIMP=.11:TIMP=.14]
     [SLP=2.00:DT= 5.00]
     [LOSS= 1 : HORTONS]
001:0014---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    03:A-09            .02     .004 No_date    1:40   23.06 .922
     [XIMP=.80:TIMP=.99]
     [SLP= .50:DT= 5.00]
     [LOSS= 1 : HORTONS]
001:0015---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    04:A-10            .04     .005 No_date    1:40   16.49 .660
     [XIMP=.62:TIMP=.77]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
001:0016---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    05:A-11            .04     .004 No_date    1:40   15.06 .603
     [XIMP=.63:TIMP=.63]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
001:0017---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-07            .06     .001 No_date    1:40    3.50  n/a
                    +  02:A-08            .04     .001 No_date    1:40    3.50  n/a
                    +  03:A-09            .02     .004 No_date    1:40   23.06  n/a
                    +  04:A-10            .04     .005 No_date    1:40   16.49  n/a
                    +  05:A-11            .04     .004 No_date    1:40   15.06  n/a
     [DT= 5.00]  SUM=  08:SUB1            .20     .014 No_date    1:40   10.69  n/a
001:0018---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    01:A-12            .02     .000 No_date    1:40    3.50 .140
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
001:0019---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-13            .02     .000 No_date    1:40    3.50 .140
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
001:0020---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    03:A-14            .01     .000 No_date    1:40    3.50 .140
```

```
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
001:0021---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    04:A-15            .02     .000 No_date    1:40    3.50 .140
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
001:0022---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    DESIGN STANDHYD    05:BLDG02          .14     .016 No_date    1:40   23.05 .922
     [XIMP=.80:TIMP=.99]
     [SLP= .01:DT= 5.00]
     [LOSS= 1 : HORTONS]
001:0023---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-12            .02     .000 No_date    1:40    3.50  n/a
                    +  02:A-13            .02     .000 No_date    1:40    3.50  n/a
                    +  03:A-14            .01     .000 No_date    1:40    3.50  n/a
                    +  04:A-15            .02     .000 No_date    1:40    3.50  n/a
                    +  05:BLDG02          .14     .016 No_date    1:40   23.05  n/a
     [DT= 5.00]  SUM=  09:SUB2            .21     .017 No_date    1:40   16.10  n/a
001:0024---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            08:SUB1            .20     .014 No_date    1:40   10.69  n/a
                    +  09:SUB2            .21     .017 No_date    1:40   16.10  n/a
     [DT= 5.00]  SUM=  01:TNKTOT          .41     .032 No_date    1:40   13.48  n/a
001:0025---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 01:TNKTOT          .41     .032 No_date    1:40   13.48  n/a
     [RDT= 5.00] out<- 07:TANK-H          .41     .002 No_date    2:15   13.47  n/a
           overflow <= 09:OVFTNK          .00     .000 No_date    0:00     .00  n/a
    {MxStoUsed=.4158E-02, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
001:0026---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    01:A-04            .04     .001 No_date    1:40    3.49 .140
     [XIMP=.11:TIMP=.14]
     [SLP= .30:DT= 5.00]
     [LOSS= 1 : HORTONS]
001:0027---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-05            .01     .000 No_date    1:40    3.50 .140
     [XIMP=.11:TIMP=.14]
     [SLP=1.00:DT= 5.00]
     [LOSS= 1 : HORTONS]
001:0028---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    03:A-06            .01     .000 No_date    1:40    3.50 .140
     [XIMP=.11:TIMP=.14]
     [SLP= .50:DT= 5.00]
     [LOSS= 1 : HORTONS]
001:0029---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    DESIGN NASHYD      04:EXT-01          .30     .002 No_date    1:50    1.81 .072
     [CN= 55.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
001:0030---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-04            .04     .001 No_date    1:40    3.49  n/a
                    +  02:A-05            .01     .000 No_date    1:40    3.50  n/a
                    +  03:A-06            .01     .000 No_date    1:40    3.50  n/a
                    +  04:EXT-01          .30     .002 No_date    1:50    1.81  n/a
     [DT= 5.00]  SUM=  08:TOTSUB          .35     .002 No_date    1:50    2.08  n/a
001:0031---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    DESIGN NASHYD      02:EXT-02          .65     .004 No_date    1:50    1.81 .072
     [CN= 55.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
001:0032---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            06:TANK-R          .44     .002 No_date    2:30   20.28  n/a
                    +  10:OVFLP           .00     .000 No_date    0:00     .00  n/a
                    +  07:TANK-H          .41     .002 No_date    2:15   13.47  n/a
                    +  09:OVFTNK          .00     .000 No_date    0:00     .00  n/a
```

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                    +  08:TOTSUB          .35     .002 No_date    1:50     2.08  n/a
                    +  02:EXT-02          .65     .004 No_date    1:50     1.81  n/a
      [DT= 5.00]  SUM=  01:TOTOUT        1.85     .010 No_date    1:50     8.81  n/a
  ** END OF RUN :    1

*******************************************************************************




 RUN:COMMAND#
 002:0001------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   2 ]
#******************************************************************************
#  Project Name: [Claridge Hunt Club Retirement Residence]
#  Project Number: [117036]
#  Date         : 24/04/2017
#  Modeller     : [Kallie Auld]
#  Company      : NOVATECH
#  License #    :  5320763
#******************************************************************************
# Final conditions model - both Phase 1 and Phase 2 full built out
# see model HC-INT for interim conditions
#******************************************************************************
 002:0002------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=10.00:SDUR=   4.00:PTOT=  33.89]
 002:0003------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 002:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-01            .08     .013 No_date    1:30   25.53 .753
      [XIMP=.66:TIMP=.83]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 002:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-02            .06     .012 No_date    1:30   31.94 .942
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 002:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-03            .12     .019 No_date    1:30   23.56 .695
      [XIMP=.61:TIMP=.76]
      [SLP=1.10:DT= 5.00]
      [LOSS= 1 : HORTONS]
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002:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    04:A-06            .02     .004 No_date    1:30   31.94 .942
     [XIMP=.80:TIMP=.99]
     [SLP= .50:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0008---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    DESIGN STANDHYD    05:BLDG01          .17     .026 No_date    1:30   31.93 .942
     [XIMP=.80:TIMP=.99]
     [SLP= .01:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0009---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-01            .08     .013 No_date    1:30   25.53  n/a
                    +  02:A-02            .06     .012 No_date    1:30   31.94  n/a
                    +  03:A-03            .12     .019 No_date    1:30   23.56  n/a
                    +  04:A-06            .02     .004 No_date    1:30   31.94  n/a
                    +  05:BLDG01          .17     .026 No_date    1:30   31.93  n/a
     [DT= 5.00]  SUM=  07:TNKTOT          .44     .074 No_date    1:30   28.52  n/a
002:0010---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 07:TNKTOT          .44     .074 No_date    1:30   28.52  n/a
     [RDT= 5.00] out<- 06:TANK-R          .44     .002 No_date    1:40   28.52  n/a
           overflow <= 08:PNF             .00     .000 No_date    0:00     .00  n/a
    {MxStoUsed=.1030E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
002:0011---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 08:PNF             .00     .000 No_date    0:00     .00  n/a
 *   [RDT= 5.00] out<- 01:LOWPT           .00     .000 No_date    0:00     .00  n/a
           overflow <= 10:OVFLP           .00     .000 No_date    0:00     .00  n/a
    {MxStoUsed=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
002:0012---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    01:A-07            .06     .002 No_date    1:30    7.66 .226
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0013---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-08            .04     .002 No_date    1:30    7.66 .226
     [XIMP=.11:TIMP=.14]
     [SLP=2.00:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0014---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    03:A-09            .02     .005 No_date    1:30   31.94 .942
     [XIMP=.80:TIMP=.99]
     [SLP= .50:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0015---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    04:A-10            .04     .007 No_date    1:30   23.87 .704
     [XIMP=.62:TIMP=.77]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0016---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    05:A-11            .04     .005 No_date    1:30   21.93 .647
     [XIMP=.63:TIMP=.63]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0017---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-07            .06     .002 No_date    1:30    7.66  n/a
                    +  02:A-08            .04     .002 No_date    1:30    7.66  n/a
                    +  03:A-09            .02     .005 No_date    1:30   31.94  n/a
                    +  04:A-10            .04     .007 No_date    1:30   23.87  n/a
                    +  05:A-11            .04     .005 No_date    1:30   21.93  n/a
     [DT= 5.00]  SUM=  08:SUB1            .20     .020 No_date    1:30   16.59  n/a
002:0018---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    01:A-12            .02     .001 No_date    1:30    7.66 .226
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
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     [LOSS= 1 : HORTONS]
002:0019---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-13           .02      .001 No_date    1:30     7.66 .226
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0020---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    03:A-14           .01      .001 No_date    1:30     7.66 .226
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0021---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    04:A-15           .02      .001 No_date    1:30     7.66 .226
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0022---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    DESIGN STANDHYD    05:BLDG02         .14      .022 No_date    1:30    31.93 .942
     [XIMP=.80:TIMP=.99]
     [SLP= .01:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0023---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-12           .02      .001 No_date    1:30     7.66  n/a
                   +   02:A-13           .02      .001 No_date    1:30     7.66  n/a
                   +   03:A-14           .01      .001 No_date    1:30     7.66  n/a
                   +   04:A-15           .02      .001 No_date    1:30     7.66  n/a
                   +   05:BLDG02         .14      .022 No_date    1:30    31.93  n/a
     [DT= 5.00]  SUM=  09:SUB2           .21      .024 No_date    1:30    23.30  n/a
002:0024---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            08:SUB1           .20      .020 No_date    1:30    16.59  n/a
                   +   09:SUB2           .21      .024 No_date    1:30    23.30  n/a
     [DT= 5.00]  SUM=  01:TNKTOT         .41      .045 No_date    1:30    20.04  n/a
002:0025---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 01:TNKTOT         .41      .045 No_date    1:30    20.04  n/a
     [RDT= 5.00] out<- 07:TANK-H         .41      .002 No_date    1:40    20.04  n/a
           overflow <= 09:OVFTNK         .00      .000 No_date    0:00      .00  n/a
    {MxStoUsed=.6465E-02, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
002:0026---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    01:A-04           .04      .001 No_date    1:30     7.66 .226
     [XIMP=.11:TIMP=.14]
     [SLP= .30:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0027---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-05           .01      .000 No_date    1:30     7.66 .226
     [XIMP=.11:TIMP=.14]
     [SLP=1.00:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0028---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    03:A-06           .01      .000 No_date    1:30     7.66 .226
     [XIMP=.11:TIMP=.14]
     [SLP= .50:DT= 5.00]
     [LOSS= 1 : HORTONS]
002:0029---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    DESIGN NASHYD      04:EXT-01         .30      .003 No_date    1:40     3.60 .106
     [CN= 55.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
002:0030---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-04           .04      .001 No_date    1:30     7.66  n/a
                   +   02:A-05           .01      .000 No_date    1:30     7.66  n/a
                   +   03:A-06           .01      .000 No_date    1:30     7.66  n/a
                   +   04:EXT-01         .30      .003 No_date    1:40     3.60  n/a
     [DT= 5.00]  SUM=  08:TOTSUB         .35      .004 No_date    1:40     4.25  n/a
002:0031---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    DESIGN NASHYD      02:EXT-02         .65      .008 No_date    1:40     3.60 .106
     [CN= 55.0: N= 3.00]
     [Tp=  .17:DT= 5.00]
002:0032---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            06:TANK-R         .44      .002 No_date    1:40    28.52  n/a
                   +   10:OVFLP          .00      .000 No_date    0:00      .00  n/a
                   +   07:TANK-H         .41      .002 No_date    1:40    20.04  n/a
                   +   09:OVFTNK         .00      .000 No_date    0:00      .00  n/a
                   +   08:TOTSUB         .35      .004 No_date    1:40     4.25  n/a
                   +   02:EXT-02         .65      .008 No_date    1:40     3.60  n/a
     [DT= 5.00]  SUM=  01:TOTOUT        1.85      .016 No_date    1:40    13.26  n/a
 ** END OF RUN :   2

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 RUN:COMMAND#
 003:0001------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   3 ]
#******************************************************************************
#  Project Name: [Claridge Hunt Club Retirement Residence]
#  Project Number: [117036]
#  Date         : 24/04/2017
#  Modeller     : [Kallie Auld]
#  Company      : NOVATECH
#  License #    :  5320763
#******************************************************************************
# Final conditions model - both Phase 1 and Phase 2 full built out
# see model HC-INT for interim conditions
#******************************************************************************
 003:0002------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=10.00:SDUR=   4.00:PTOT=  45.18]
 003:0003------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=    4.67 mm] [N= 3.00]
 003:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-01           .08      .020 No_date    1:40    36.13 .800
      [XIMP=.66:TIMP=.83]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 003:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-02           .06      .017 No_date    1:40    43.21 .956
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     [XIMP=.80:TIMP=.99]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    03:A-03            .12      .027 No_date    1:40   33.73 .747
     [XIMP=.61:TIMP=.76]
     [SLP=1.10:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    04:A-06            .02      .005 No_date    1:40   43.21 .956
     [XIMP=.80:TIMP=.99]
     [SLP= .50:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0008---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    DESIGN STANDHYD    05:BLDG01          .17      .037 No_date    1:40   43.21 .956
     [XIMP=.80:TIMP=.99]
     [SLP= .01:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0009---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-01            .08      .020 No_date    1:40   36.13  n/a
                  +    02:A-02            .06      .017 No_date    1:40   43.21  n/a
                  +    03:A-03            .12      .027 No_date    1:40   33.73  n/a
                  +    04:A-06            .02      .005 No_date    1:40   43.21  n/a
                  +    05:BLDG01          .17      .037 No_date    1:40   43.21  n/a
     [DT= 5.00]  SUM=  07:TNKTOT          .44      .106 No_date    1:40   39.38  n/a
003:0010---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 07:TNKTOT          .44      .106 No_date    1:40   39.38  n/a
     [RDT= 5.00] out<- 06:TANK-R          .44      .002 No_date    1:40   39.38  n/a
            overflow <= 08:PNF            .00      .000 No_date    0:00     .00  n/a
    {MxStoUsed=.1501E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
003:0011---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 08:PNF             .00      .000 No_date    0:00     .00  n/a
 *   [RDT= 5.00] out<- 01:LOWPT           .00      .000 No_date    0:00     .00  n/a
            overflow <= 10:OVFLP          .00      .000 No_date    0:00     .00  n/a
    {MxStoUsed=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
003:0012---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    01:A-07            .06      .006 No_date    1:40   14.72 .326
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0013---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-08            .04      .005 No_date    1:40   14.72 .326
     [XIMP=.11:TIMP=.14]
     [SLP=2.00:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0014---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    03:A-09            .02      .007 No_date    1:40   43.21 .956
     [XIMP=.80:TIMP=.99]
     [SLP= .50:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0015---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    04:A-10            .04      .010 No_date    1:40   34.08 .754
     [XIMP=.62:TIMP=.77]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0016---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    05:A-11            .04      .008 No_date    1:40   31.37 .694
     [XIMP=.63:TIMP=.63]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0017---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-07            .06      .006 No_date    1:40   14.72  n/a
                  +    02:A-08            .04      .005 No_date    1:40   14.72  n/a
                  +    03:A-09            .02      .007 No_date    1:40   43.21  n/a
                  +    04:A-10            .04      .010 No_date    1:40   34.08  n/a
                  +    05:A-11            .04      .008 No_date    1:40   31.37  n/a
     [DT= 5.00]  SUM=  08:SUB1            .20      .035 No_date    1:40   25.26  n/a
003:0018---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    01:A-12            .02      .002 No_date    1:40   14.72 .326
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0019---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-13            .02      .002 No_date    1:40   14.72 .326
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0020---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    03:A-14            .01      .002 No_date    1:40   14.72 .326
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0021---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    04:A-15            .02      .002 No_date    1:40   14.72 .326
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0022---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    05:BLDG02          .14      .031 No_date    1:40   43.21 .956
     [XIMP=.80:TIMP=.99]
     [SLP= .01:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0023---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-12            .02      .002 No_date    1:40   14.72  n/a
                  +    02:A-13            .02      .002 No_date    1:40   14.72  n/a
                  +    03:A-14            .01      .002 No_date    1:40   14.72  n/a
                  +    04:A-15            .02      .002 No_date    1:40   14.72  n/a
                  +    05:BLDG02          .14      .031 No_date    1:40   43.21  n/a
     [DT= 5.00]  SUM=  09:SUB2            .21      .039 No_date    1:40   33.08  n/a
003:0024---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            08:SUB1            .20      .035 No_date    1:40   25.26  n/a
                  +    09:SUB2            .21      .039 No_date    1:40   33.08  n/a
     [DT= 5.00]  SUM=  01:TNKTOT          .41      .075 No_date    1:40   29.28  n/a
003:0025---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 01:TNKTOT          .41      .075 No_date    1:40   29.28  n/a
     [RDT= 5.00] out<- 07:TANK-H          .41      .002 No_date    1:40   29.28  n/a
            overflow <= 09:OVFTNK         .00      .000 No_date    0:00     .00  n/a
    {MxStoUsed=.1012E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
003:0026---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    01:A-04            .04      .002 No_date    1:50   14.72 .326
     [XIMP=.11:TIMP=.14]
     [SLP= .30:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0027---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-05            .01      .001 No_date    1:40   14.72 .326
     [XIMP=.11:TIMP=.14]
     [SLP=1.00:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0028---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    03:A-06            .01      .001 No_date    1:50   14.72 .326
     [XIMP=.11:TIMP=.14]
     [SLP= .50:DT= 5.00]
     [LOSS= 1 : HORTONS]
003:0029---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    DESIGN NASHYD      04:EXT-01          .30      .007 No_date    1:50    6.61 .146
     [CN= 55.0: N= 3.00]
```

```
      [Tp=  .17:DT= 5.00]
 003:0030---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-04           .04      .002 No_date    1:50    14.72  n/a
                      + 02:A-05           .01      .001 No_date    1:40    14.72  n/a
                      + 03:A-06           .01      .001 No_date    1:50    14.72  n/a
                      + 04:EXT-01         .30      .007 No_date    1:50     6.61  n/a
      [DT= 5.00]  SUM=  08:TOTSUB         .35      .010 No_date    1:50     7.90  n/a
 003:0031---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      02:EXT-02         .65      .015 No_date    1:50     6.61 .146
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 003:0032---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            06:TANK-R         .44      .002 No_date    1:40    39.38  n/a
                      + 10:OVFLP          .00      .000 No_date    0:00      .00  n/a
                      + 07:TANK-H         .41      .002 No_date    1:40    29.28  n/a
                      + 09:OVFTNK         .00      .000 No_date    0:00      .00  n/a
                      + 08:TOTSUB         .35      .010 No_date    1:50     7.90  n/a
                      + 02:EXT-02         .65      .015 No_date    1:50     6.61  n/a
      [DT= 5.00]  SUM=  01:TOTOUT        1.85      .030 No_date    1:50    19.63  n/a
  ** END OF RUN :    3

*******************************************************************************




 RUN:COMMAND#
 004:0001------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   4 ]
#*******************************************************************************
#  Project Name: [Claridge Hunt Club Retirement Residence]
#  Project Number: [117036]
#  Date        : 24/04/2017
#  Modeller    : [Kallie Auld]
#  Company     : NOVATECH
#  License #   :  5320763
#*******************************************************************************
# Final conditions model - both Phase 1 and Phase 2 full built out
# see model HC-INT for interim conditions
#*******************************************************************************
 004:0002------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=10.00:SDUR=   4.00:PTOT=  76.02]
 004:0003------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
```

```
      [Ia=   4.67 mm] [N= 3.00]
 004:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-01           .08      .036 No_date    1:40    65.45 .861
      [XIMP=.66:TIMP=.83]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-02           .06      .029 No_date    1:40    74.04 .974
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-03           .12      .054 No_date    1:40    62.53 .823
      [XIMP=.61:TIMP=.76]
      [SLP=1.10:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-06           .02      .009 No_date    1:40    74.05 .974
      [XIMP=.80:TIMP=.99]
      [SLP= .50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0008---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    05:BLDG01         .17      .067 No_date    1:40    74.05 .974
      [XIMP=.80:TIMP=.99]
      [SLP= .01:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0009---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-01           .08      .036 No_date    1:40    65.45  n/a
                      + 02:A-02           .06      .029 No_date    1:40    74.04  n/a
                      + 03:A-03           .12      .054 No_date    1:40    62.53  n/a
                      + 04:A-06           .02      .009 No_date    1:40    74.05  n/a
                      + 05:BLDG01         .17      .067 No_date    1:40    74.05  n/a
      [DT= 5.00]  SUM=  07:TNKTOT         .44      .195 No_date    1:40    69.39  n/a
 004:0010---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 07:TNKTOT         .44      .195 No_date    1:40    69.39  n/a
      [RDT= 5.00] out<- 06:TANK-R         .40      .002 No_date    1:35    69.39  n/a
            overflow <= 08:PNF            .04      .014 No_date    2:20    69.39  n/a
     {MxStoUsed=.2502E-01, TotOvfVol=.3003E-02, N-Ovf=    2, TotDurOvf=    2.hrs}
 004:0011---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 08:PNF            .04      .014 No_date    2:20    69.39  n/a
  *   [RDT= 5.00] out<- 01:LOWPT          .03      .000 No_date    0:00      .00  n/a
            overflow <= 10:OVFLP          .01      .005 No_date    3:00    69.39  n/a
     {MxStoUsed=.1996E-02, TotOvfVol=.1007E-02, N-Ovf=    2, TotDurOvf=    1.hrs}
 004:0012---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-07           .06      .019 No_date    1:40    37.54 .494
      [XIMP=.11:TIMP=.14]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0013---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-08           .04      .014 No_date    1:40    37.54 .494
      [XIMP=.11:TIMP=.14]
      [SLP=2.00:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0014---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-09           .02      .012 No_date    1:40    74.05 .974
      [XIMP=.80:TIMP=.99]
      [SLP= .50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0015---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-10           .04      .019 No_date    1:40    62.96 .828
      [XIMP=.62:TIMP=.77]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
```

```
 004:0016---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    05:A-11            .04      .015 No_date    1:40   58.77 .773
      [XIMP=.63:TIMP=.63]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0017---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-07            .06      .019 No_date    1:40   37.54  n/a
                    +   02:A-08            .04      .014 No_date    1:40   37.54  n/a
                    +   03:A-09            .02      .012 No_date    1:40   74.05  n/a
                    +   04:A-10            .04      .019 No_date    1:40   62.96  n/a
                    +   05:A-11            .04      .015 No_date    1:40   58.77  n/a
      [DT= 5.00]  SUM=  08:SUB1            .20      .080 No_date    1:40   51.15  n/a
 004:0018---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-12            .02      .007 No_date    1:40   37.54 .494
      [XIMP=.11:TIMP=.14]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0019---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-13            .02      .008 No_date    1:40   37.54 .494
      [XIMP=.11:TIMP=.14]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0020---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-14            .01      .005 No_date    1:40   37.54 .494
      [XIMP=.11:TIMP=.14]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0021---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-15            .02      .006 No_date    1:40   37.54 .494
      [XIMP=.11:TIMP=.14]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0022---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    05:BLDG02          .14      .056 No_date    1:40   74.05 .974
      [XIMP=.80:TIMP=.99]
      [SLP= .01:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0023---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-12            .02      .007 No_date    1:40   37.54  n/a
                    +   02:A-13            .02      .008 No_date    1:40   37.54  n/a
                    +   03:A-14            .01      .005 No_date    1:40   37.54  n/a
                    +   04:A-15            .02      .006 No_date    1:40   37.54  n/a
                    +   05:BLDG02          .14      .056 No_date    1:40   74.05  n/a
      [DT= 5.00]  SUM=  09:SUB2            .21      .082 No_date    1:40   61.07  n/a
 004:0024---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            08:SUB1            .20      .080 No_date    1:40   51.15  n/a
                    +   09:SUB2            .21      .082 No_date    1:40   61.07  n/a
      [DT= 5.00]  SUM=  01:TNKTOT          .41      .162 No_date    1:40   56.25  n/a
 004:0025---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 01:TNKTOT          .41      .162 No_date    1:40   56.25  n/a
      [RDT= 5.00] out<- 07:TANK-H          .41      .002 No_date    1:35   56.25  n/a
            overflow <= 09:OVFTNK          .00      .000 No_date    0:00     .00  n/a
     {MxStoUsed=.2093E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
 004:0026---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-04            .04      .008 No_date    1:40   37.54 .494
      [XIMP=.11:TIMP=.14]
      [SLP= .30:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0027---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-05            .01      .003 No_date    1:40   37.54 .494
      [XIMP=.11:TIMP=.14]
      [SLP=1.00:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0028---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-06            .01      .002 No_date    1:40   37.54 .494
      [XIMP=.11:TIMP=.14]
      [SLP= .50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 004:0029---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      04:EXT-01          .30      .020 No_date    1:45   18.24 .240
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 004:0030---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-04            .04      .008 No_date    1:40   37.54  n/a
                    +   02:A-05            .01      .003 No_date    1:40   37.54  n/a
                    +   03:A-06            .01      .002 No_date    1:40   37.54  n/a
                    +   04:EXT-01          .30      .020 No_date    1:45   18.24  n/a
      [DT= 5.00]  SUM=  08:TOTSUB          .35      .032 No_date    1:45   21.31  n/a
 004:0031---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      02:EXT-02          .65      .044 No_date    1:45   18.24 .240
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 004:0032---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            06:TANK-R          .40      .002 No_date    1:35   69.39  n/a
                    +   10:OVFLP           .01      .005 No_date    3:00   69.39  n/a
                    +   07:TANK-H          .41      .002 No_date    1:35   56.25  n/a
                    +   09:OVFTNK          .00      .000 No_date    0:00     .00  n/a
                    +   08:TOTSUB          .35      .032 No_date    1:45   21.31  n/a
                    +   02:EXT-02          .65      .044 No_date    1:45   18.24  n/a
      [DT= 5.00]  SUM=  01:TOTOUT         1.83      .081 No_date    1:45   38.87  n/a
  ** END OF RUN :   4

********************************************************************************




 RUN:COMMAND#
 005:0001-----------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   5 ]
#*******************************************************************************
#  Project Name: [Claridge Hunt Club Retirement Residence]
#  Project Number: [117036]
#  Date          : 24/04/2017
#  Modeller      : [Kallie Auld]
#  Company       : NOVATECH
#  License #     :  5320763
#*******************************************************************************
# Final conditions model - both Phase 1 and Phase 2 full built out
# see model HC-INT for interim conditions
#*******************************************************************************
 005:0002-----------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=30.00:SDUR=  12.00:PTOT=  42.34]
 005:0003-----------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
```

```
   ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
     Horton's infiltration equation parameters:
     [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
     Parameters for PERVIOUS surfaces in STANDHYD:
     [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
     Parameters for IMPERVIOUS surfaces in STANDHYD:
     [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
     Parameters used in NASHYD:
     [Ia=   4.67 mm] [N= 3.00]
005:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    01:A-01            .08      .007 No_date    6:00    31.70 .749
     [XIMP=.66:TIMP=.83]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
005:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-02            .06      .006 No_date    5:55    39.40 .931
     [XIMP=.80:TIMP=.99]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
005:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    03:A-03            .12      .010 No_date    6:00    29.06 .686
     [XIMP=.61:TIMP=.76]
     [SLP=1.10:DT= 5.00]
     [LOSS= 1 : HORTONS]
005:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    04:A-06            .02      .002 No_date    5:55    39.40 .931
     [XIMP=.80:TIMP=.99]
     [SLP= .50:DT= 5.00]
     [LOSS= 1 : HORTONS]
005:0008---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    DESIGN STANDHYD    05:BLDG01          .17      .015 No_date    6:00    39.40 .931
     [XIMP=.80:TIMP=.99]
     [SLP= .01:DT= 5.00]
     [LOSS= 1 : HORTONS]
005:0009---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-01            .08      .007 No_date    6:00    31.70  n/a
                     + 02:A-02            .06      .006 No_date    5:55    39.40  n/a
                     + 03:A-03            .12      .010 No_date    6:00    29.06  n/a
                     + 04:A-06            .02      .002 No_date    5:55    39.40  n/a
                     + 05:BLDG01          .17      .015 No_date    6:00    39.40  n/a
     [DT= 5.00]  SUM=  07:TNKTOT          .44      .039 No_date    6:00    35.22  n/a
005:0010---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 07:TNKTOT          .44      .039 No_date    6:00    35.22  n/a
     [RDT= 5.00] out<- 06:TANK-R          .44      .002 No_date    6:00    35.22  n/a
           overflow <= 08:PNF             .00      .000 No_date    0:00      .00  n/a
    {MxStoUsed=.1119E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
005:0011---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 08:PNF             .00      .000 No_date    0:00      .00  n/a
 *   [RDT= 5.00] out<- 01:LOWPT           .00      .000 No_date    0:00      .00  n/a
           overflow <= 10:OVFLP           .00      .000 No_date    0:00      .00  n/a
    {MxStoUsed=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
005:0012---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    01:A-07            .06      .001 No_date    6:00     7.44 .176
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
005:0013---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-08            .04      .001 No_date    6:00     7.44 .176
     [XIMP=.11:TIMP=.14]
     [SLP=2.00:DT= 5.00]
     [LOSS= 1 : HORTONS]
005:0014---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    03:A-09            .02      .002 No_date    5:55    39.40 .931
     [XIMP=.80:TIMP=.99]
     [SLP= .50:DT= 5.00]
     [LOSS= 1 : HORTONS]
005:0015---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    04:A-10            .04      .004 No_date    6:00    29.47 .696
     [XIMP=.62:TIMP=.77]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
005:0016---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    05:A-11            .04      .002 No_date    6:00    26.70 .631
     [XIMP=.63:TIMP=.63]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
005:0017---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-07            .06      .001 No_date    6:00     7.44  n/a
                     + 02:A-08            .04      .001 No_date    6:00     7.44  n/a
                     + 03:A-09            .02      .002 No_date    5:55    39.40  n/a
                     + 04:A-10            .04      .004 No_date    6:00    29.47  n/a
                     + 05:A-11            .04      .002 No_date    6:00    26.70  n/a
     [DT= 5.00]  SUM=  08:SUB1            .20      .010 No_date    6:00    19.43  n/a
005:0018---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    01:A-12            .02      .000 No_date    6:00     7.44 .176
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
005:0019---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    02:A-13            .02      .000 No_date    6:00     7.44 .176
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
005:0020---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    03:A-14            .01      .000 No_date    6:00     7.44 .176
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
005:0021---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    04:A-15            .02      .000 No_date    6:00     7.44 .176
     [XIMP=.11:TIMP=.14]
     [SLP=1.50:DT= 5.00]
     [LOSS= 1 : HORTONS]
005:0022---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    DESIGN STANDHYD    05:BLDG02          .14      .012 No_date    6:00    39.40 .931
     [XIMP=.80:TIMP=.99]
     [SLP= .01:DT= 5.00]
     [LOSS= 1 : HORTONS]
005:0023---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            01:A-12            .02      .000 No_date    6:00     7.44  n/a
                     + 02:A-13            .02      .000 No_date    6:00     7.44  n/a
                     + 03:A-14            .01      .000 No_date    6:00     7.44  n/a
                     + 04:A-15            .02      .000 No_date    6:00     7.44  n/a
                     + 05:BLDG02          .14      .012 No_date    6:00    39.40  n/a
     [DT= 5.00]  SUM=  09:SUB2            .21      .014 No_date    6:00    28.04  n/a
005:0024---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ADD HYD            08:SUB1            .20      .010 No_date    6:00    19.43  n/a
                     + 09:SUB2            .21      .014 No_date    6:00    28.04  n/a
     [DT= 5.00]  SUM=  01:TNKTOT          .41      .024 No_date    6:00    23.86  n/a
005:0025---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
    ROUTE RESERVOIR -> 01:TNKTOT          .41      .024 No_date    6:00    23.86  n/a
     [RDT= 5.00] out<- 07:TANK-H          .41      .002 No_date    6:00    23.86  n/a
           overflow <= 09:OVFTNK          .00      .000 No_date    0:00      .00  n/a
    {MxStoUsed=.6607E-02, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
005:0026---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
 *  DESIGN STANDHYD    01:A-04            .04      .000 No_date    6:00     7.44 .176
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      [XIMP=.11:TIMP=.14]
      [SLP= .30:DT= 5.00]
      [LOSS= 1 : HORTONS]
 005:0027---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-05            .01      .000 No_date    6:00    7.44 .176
      [XIMP=.11:TIMP=.14]
      [SLP=1.00:DT= 5.00]
      [LOSS= 1 : HORTONS]
 005:0028---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-06            .01      .000 No_date    6:00    7.44 .176
      [XIMP=.11:TIMP=.14]
      [SLP= .50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 005:0029---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      04:EXT-01          .30      .004 No_date    6:00    5.78 .136
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 005:0030---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-04            .04      .000 No_date    6:00    7.44  n/a
                     +  02:A-05            .01      .000 No_date    6:00    7.44  n/a
                     +  03:A-06            .01      .000 No_date    6:00    7.44  n/a
                     +  04:EXT-01          .30      .004 No_date    6:00    5.78  n/a
      [DT= 5.00]  SUM=  08:TOTSUB          .35      .005 No_date    6:00    6.04  n/a
 005:0031---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      02:EXT-02          .65      .009 No_date    6:00    5.78 .136
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 005:0032---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            06:TANK-R          .44      .002 No_date    6:00   35.22  n/a
                     +  10:OVFLP           .00      .000 No_date    0:00     .00  n/a
                     +  07:TANK-H          .41      .002 No_date    6:00   23.86  n/a
                     +  09:OVFTNK          .00      .000 No_date    0:00     .00  n/a
                     +  08:TOTSUB          .35      .005 No_date    6:00    6.04  n/a
                     +  02:EXT-02          .65      .009 No_date    6:00    5.78  n/a
      [DT= 5.00]  SUM=  01:TOTOUT         1.85      .018 No_date    6:00   16.80  n/a
  ** END OF RUN :    6

*******************************************************************************




 RUN:COMMAND#
 007:0001------------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=   1 ]
      [NRUN  =   7 ]
#******************************************************************************
#  Project Name: [Claridge Hunt Club Retirement Residence]
#  Project Number: [117036]
#  Date        : 24/04/2017
#  Modeller    : [Kallie Auld]
#  Company     : NOVATECH
#  License #   :  5320763
#******************************************************************************
# Final conditions model - both Phase 1 and Phase 2 full built out
# see model HC-INT for interim conditions
#******************************************************************************
 007:0002------------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=30.00:SDUR=  12.00:PTOT=  56.18]
 007:0003------------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 007:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-01            .08      .010 No_date    6:00   43.83 .780
      [XIMP=.66:TIMP=.83]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-02            .06      .008 No_date    5:55   53.21 .947
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-03            .12      .014 No_date    6:00   41.14 .732
      [XIMP=.61:TIMP=.76]
      [SLP=1.10:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-06            .02      .003 No_date    5:55   53.21 .947
      [XIMP=.80:TIMP=.99]
      [SLP= .50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0008---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    05:BLDG01          .17      .020 No_date    6:00   53.20 .947
      [XIMP=.80:TIMP=.99]
      [SLP= .01:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0009---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-01            .08      .010 No_date    6:00   43.83  n/a
                     +  02:A-02            .06      .008 No_date    5:55   53.21  n/a
                     +  03:A-03            .12      .014 No_date    6:00   41.14  n/a
                     +  04:A-06            .02      .003 No_date    5:55   53.21  n/a
                     +  05:BLDG01          .17      .020 No_date    6:00   53.20  n/a
      [DT= 5.00]  SUM=  07:TNKTOT          .44      .054 No_date    6:00   48.26  n/a
 007:0010---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 07:TNKTOT          .44      .054 No_date    6:00   48.26  n/a
      [RDT= 5.00] out<- 06:TANK-R          .44      .002 No_date    5:50   48.26  n/a
            overflow <= 08:PNF             .00      .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1605E-01, TotOvfVol=.0000E+00, N-Ovf=     0, TotDurOvf=     0.hrs}
 007:0011---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 08:PNF             .00      .000 No_date    0:00     .00  n/a
  *   [RDT= 5.00] out<- 01:LOWPT           .00      .000 No_date    0:00     .00  n/a
            overflow <= 10:OVFLP           .00      .000 No_date    0:00     .00  n/a
     {MxStoUsed=.0000E+00, TotOvfVol=.0000E+00, N-Ovf=     0, TotDurOvf=     0.hrs}
 007:0012---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-07            .06      .003 No_date    6:00   15.62 .278
      [XIMP=.11:TIMP=.14]
      [SLP=1.50:DT= 5.00]
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      [LOSS= 1 : HORTONS]
 007:0013---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-08            .04     .003 No_date    6:00   15.62 .278
      [XIMP=.11:TIMP=.14]
      [SLP=2.00:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0014---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-09            .02     .003 No_date    5:55   53.21 .947
      [XIMP=.80:TIMP=.99]
      [SLP= .50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0015---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-10            .04     .005 No_date    6:00   41.59 .740
      [XIMP=.62:TIMP=.77]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0016---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    05:A-11            .04     .004 No_date    6:00   38.07 .678
      [XIMP=.63:TIMP=.63]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0017---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-07            .06     .003 No_date    6:00   15.62  n/a
                      + 02:A-08            .04     .003 No_date    6:00   15.62  n/a
                      + 03:A-09            .02     .003 No_date    5:55   53.21  n/a
                      + 04:A-10            .04     .005 No_date    6:00   41.59  n/a
                      + 05:A-11            .04     .004 No_date    6:00   38.07  n/a
      [DT= 5.00]  SUM=  08:SUB1            .20     .018 No_date    6:00   29.70  n/a
 007:0018---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-12            .02     .001 No_date    6:00   15.62 .278
      [XIMP=.11:TIMP=.14]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0019---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-13            .02     .001 No_date    6:00   15.62 .278
      [XIMP=.11:TIMP=.14]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0020---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-14            .01     .001 No_date    6:00   15.62 .278
      [XIMP=.11:TIMP=.14]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0021---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-15            .02     .001 No_date    6:00   15.62 .278
      [XIMP=.11:TIMP=.14]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0022---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    05:BLDG02          .14     .017 No_date    6:00   53.20 .947
      [XIMP=.80:TIMP=.99]
      [SLP= .01:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0023---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-12            .02     .001 No_date    6:00   15.62  n/a
                      + 02:A-13            .02     .001 No_date    6:00   15.62  n/a
                      + 03:A-14            .01     .001 No_date    6:00   15.62  n/a
                      + 04:A-15            .02     .001 No_date    6:00   15.62  n/a
                      + 05:BLDG02          .14     .017 No_date    6:00   53.20  n/a
      [DT= 5.00]  SUM=  09:SUB2            .21     .021 No_date    6:00   39.85  n/a
 007:0024---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            08:SUB1            .20     .018 No_date    6:00   29.70  n/a
                      + 09:SUB2            .21     .021 No_date    6:00   39.85  n/a
      [DT= 5.00]  SUM=  01:TNKTOT          .41     .040 No_date    6:00   34.92  n/a
 007:0025---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 01:TNKTOT          .41     .040 No_date    6:00   34.92  n/a
      [RDT= 5.00] out<- 07:TANK-H          .41     .002 No_date    5:50   34.92  n/a
            overflow <= 09:OVFTNK          .00     .000 No_date    0:00     .00  n/a
     {MxStoUsed=.1041E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
 007:0026---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-04            .04     .001 No_date    6:00   15.62 .278
      [XIMP=.11:TIMP=.14]
      [SLP= .30:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0027---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-05            .01     .001 No_date    6:00   15.62 .278
      [XIMP=.11:TIMP=.14]
      [SLP=1.00:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0028---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-06            .01     .000 No_date    6:00   15.62 .278
      [XIMP=.11:TIMP=.14]
      [SLP= .50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 007:0029---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      04:EXT-01          .30     .007 No_date    6:00   10.23 .182
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 007:0030---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-04            .04     .001 No_date    6:00   15.62  n/a
                      + 02:A-05            .01     .001 No_date    6:00   15.62  n/a
                      + 03:A-06            .01     .000 No_date    6:00   15.62  n/a
                      + 04:EXT-01          .30     .007 No_date    6:00   10.23  n/a
      [DT= 5.00]  SUM=  08:TOTSUB          .35     .010 No_date    6:00   11.09  n/a
 007:0031---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      02:EXT-02          .65     .016 No_date    6:00   10.23 .182
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 007:0032---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            06:TANK-R          .44     .002 No_date    5:50   48.26  n/a
                      + 10:OVFLP           .00     .000 No_date    0:00     .00  n/a
                      + 07:TANK-H          .41     .002 No_date    5:50   34.92  n/a
                      + 09:OVFTNK          .00     .000 No_date    0:00     .00  n/a
                      + 08:TOTSUB          .35     .010 No_date    6:00   11.09  n/a
                      + 02:EXT-02          .65     .016 No_date    6:00   10.23  n/a
      [DT= 5.00]  SUM=  01:TOTOUT         1.85     .030 No_date    6:00   24.86  n/a
  ** END OF RUN :    8

********************************************************************************




 RUN:COMMAND#
 009:0001------------------------------------------------------------------------
     START
      [TZERO =    .00 hrs on        0]
      [METOUT=   2    (1=imperial, 2=metric output)]
      [NSTORM=    1 ]
      [NRUN  =    9 ]
#*******************************************************************************
#  Project Name: [Claridge Hunt Club Retirement Residence]
#  Project Number: [117036]
#  Date         : 24/04/2017
#  Modeller     : [Kallie Auld]
```

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#  Company     : NOVATECH
#  License #   :  5320763
#*******************************************************************************
# Final conditions model - both Phase 1 and Phase 2 full built out
# see model HC-INT for interim conditions
#*******************************************************************************
 009:0002---------------------------------------------------------------------------
     READ STORM
      Filename = STORM.001
      Comment  =
      [SDT=10.00:SDUR=  12.00:PTOT=  93.91]
 009:0003---------------------------------------------------------------------------
     DEFAULT VALUES
      Filename = M:\2017\117036\DATA\CALCUL~1\SEWERC~1\SWMHYMO\OTTAWA.DEF
      ICASEdv  = 1 (read and print data)
      FileTitle= ------ ENTER YOUR COMMENTS ON THIS LINE AND THE NEXT ONE ---
                 ------ PARAMETER VALUES MUST BE ENTERD AFTER COLUMN 60 ----
      Horton's infiltration equation parameters:
      [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
      Parameters for PERVIOUS surfaces in STANDHYD:
      [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
      Parameters for IMPERVIOUS surfaces in STANDHYD:
      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
      Parameters used in NASHYD:
      [Ia=   4.67 mm] [N= 3.00]
 009:0004---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-01            .08     .017 No_date    6:00    76.82 .818
      [XIMP=.66:TIMP=.83]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0005---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-02            .06     .013 No_date    5:55    90.87 .968
      [XIMP=.80:TIMP=.99]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0006---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-03            .12     .025 No_date    6:00    73.16 .779
      [XIMP=.61:TIMP=.76]
      [SLP=1.10:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0007---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-06            .02     .004 No_date    5:55    90.88 .968
      [XIMP=.80:TIMP=.99]
      [SLP= .50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0008---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    05:BLDG01          .17     .035 No_date    6:00    90.88 .968
      [XIMP=.80:TIMP=.99]
      [SLP= .01:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0009---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-01            .08     .017 No_date    6:00    76.82  n/a
                      + 02:A-02            .06     .013 No_date    5:55    90.87  n/a
                      + 03:A-03            .12     .025 No_date    6:00    73.16  n/a
                      + 04:A-06            .02     .004 No_date    5:55    90.88  n/a
                      + 05:BLDG01          .17     .035 No_date    6:00    90.88  n/a
      [DT= 5.00]  SUM=  07:TNKTOT          .44     .094 No_date    6:00    83.57  n/a
 009:0010---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 07:TNKTOT          .44     .094 No_date    6:00    83.57  n/a
      [RDT= 5.00] out<- 06:TANK-R          .38     .002 No_date    5:40    83.57  n/a
            overflow <= 08:PNF             .06     .024 No_date    6:25    83.57  n/a
     {MxStoUsed=.2500E-01, TotOvfVol=.5002E-02, N-Ovf=    4, TotDurOvf=    3.hrs}
 009:0011---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 08:PNF             .06     .024 No_date    6:25    83.57  n/a
  *   [RDT= 5.00] out<- 01:LOWPT           .02     .000 No_date    0:00      .00  n/a
            overflow <= 10:OVFLP           .04     .009 No_date    6:50    83.57  n/a
     {MxStoUsed=.1996E-02, TotOvfVol=.3007E-02, N-Ovf=    3, TotDurOvf=    3.hrs}
 009:0012---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-07            .06     .010 No_date    6:00    41.42 .441
      [XIMP=.11:TIMP=.14]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0013---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-08            .04     .007 No_date    6:00    41.42 .441
      [XIMP=.11:TIMP=.14]
      [SLP=2.00:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0014---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-09            .02     .005 No_date    5:55    90.88 .968
      [XIMP=.80:TIMP=.99]
      [SLP= .50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0015---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-10            .04     .009 No_date    6:00    73.77 .786
      [XIMP=.62:TIMP=.77]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0016---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    05:A-11            .04     .007 No_date    6:00    70.87 .755
      [XIMP=.63:TIMP=.63]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0017---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-07            .06     .010 No_date    6:00    41.42  n/a
                      + 02:A-08            .04     .007 No_date    6:00    41.42  n/a
                      + 03:A-09            .02     .005 No_date    5:55    90.88  n/a
                      + 04:A-10            .04     .009 No_date    6:00    73.77  n/a
                      + 05:A-11            .04     .007 No_date    6:00    70.87  n/a
      [DT= 5.00]  SUM=  08:SUB1            .20     .038 No_date    6:00    59.54  n/a
 009:0018---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-12            .02     .003 No_date    6:00    41.42 .441
      [XIMP=.11:TIMP=.14]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0019---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-13            .02     .004 No_date    6:00    41.42 .441
      [XIMP=.11:TIMP=.14]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0020---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-14            .01     .002 No_date    6:00    41.42 .441
      [XIMP=.11:TIMP=.14]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0021---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    04:A-15            .02     .003 No_date    6:00    41.42 .441
      [XIMP=.11:TIMP=.14]
      [SLP=1.50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0022---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN STANDHYD    05:BLDG02          .14     .029 No_date    6:00    90.88 .968
      [XIMP=.80:TIMP=.99]
      [SLP= .01:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0023---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-12            .02     .003 No_date    6:00    41.42  n/a
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NOVATECH
Engineers, Planners & Landscape Architects

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                    +  02:A-13           .02      .004 No_date    6:00   41.42  n/a
                    +  03:A-14           .01      .002 No_date    6:00   41.42  n/a
                    +  04:A-15           .02      .003 No_date    6:00   41.42  n/a
                    +  05:BLDG02         .14      .029 No_date    6:00   90.88  n/a
      [DT= 5.00]  SUM=  09:SUB2          .21      .042 No_date    6:00   73.30  n/a
 009:0024---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            08:SUB1          .20      .038 No_date    6:00   59.54  n/a
                    +  09:SUB2           .21      .042 No_date    6:00   73.30  n/a
      [DT= 5.00]  SUM=  01:TNKTOT        .41      .080 No_date    6:00   66.62  n/a
 009:0025---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ROUTE RESERVOIR -> 01:TNKTOT        .41      .080 No_date    6:00   66.62  n/a
      [RDT= 5.00] out<- 07:TANK-H        .41      .002 No_date    5:40   66.62  n/a
            overflow <= 09:OVFTNK        .00      .000 No_date    0:00     .00  n/a
     {MxStoUsed=.2194E-01, TotOvfVol=.0000E+00, N-Ovf=    0, TotDurOvf=    0.hrs}
 009:0026---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    01:A-04          .04      .005 No_date    6:00   41.42 .441
      [XIMP=.11:TIMP=.14]
      [SLP= .30:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0027---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    02:A-05          .01      .002 No_date    6:00   41.42 .441
      [XIMP=.11:TIMP=.14]
      [SLP=1.00:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0028---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
  *  DESIGN STANDHYD    03:A-06          .01      .002 No_date    6:00   41.42 .441
      [XIMP=.11:TIMP=.14]
      [SLP= .50:DT= 5.00]
      [LOSS= 1 : HORTONS]
 009:0029---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      04:EXT-01        .30      .019 No_date    6:00   26.80 .285
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 009:0030---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            01:A-04          .04      .005 No_date    6:00   41.42  n/a
                    +  02:A-05           .01      .002 No_date    6:00   41.42  n/a
                    +  03:A-06           .01      .002 No_date    6:00   41.42  n/a
                    +  04:EXT-01         .30      .019 No_date    6:00   26.80  n/a
      [DT= 5.00]  SUM=  08:TOTSUB        .35      .028 No_date    6:00   29.13  n/a
 009:0031---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     DESIGN NASHYD      02:EXT-02        .65      .042 No_date    6:00   26.81 .285
      [CN= 55.0: N= 3.00]
      [Tp=  .17:DT= 5.00]
 009:0032---------------ID:NHYD-----------AREA----QPEAK-TpeakDate_hh:mm----R.V.-R.C.-
     ADD HYD            06:TANK-R        .38      .002 No_date    5:40   83.57  n/a
                    +  10:OVFLP          .04      .009 No_date    6:50   83.57  n/a
                    +  07:TANK-H         .41      .002 No_date    5:40   66.62  n/a
                    +  09:OVFTNK         .00      .000 No_date    0:00     .00  n/a
                    +  08:TOTSUB         .35      .028 No_date    6:00   29.13  n/a
                    +  02:EXT-02         .65      .042 No_date    6:00   26.81  n/a
      [DT= 5.00]  SUM=  01:TOTOUT       1.83      .075 No_date    6:00   49.05  n/a
 009:0002--------------------------------------------------------------------------
      FINISH
-----------------------------------------------------------------------------------
***********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
 001:0004 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 001:0005 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
```

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 001:0006 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 001:0007 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 001:0011 ROUTE RESERVOIR
      *** WARNING: Inflow hydrograph is dry.
 001:0012 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 001:0013 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 001:0014 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 001:0015 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 001:0016 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** ERROR: XIMP cannot be larger than TIMP.
                 XIMP was forced to equal TIMP.
 001:0018 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 001:0019 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 001:0020 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 001:0021 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 001:0026 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 001:0027 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 001:0028 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
```

```
                  20%, this routine may not be applicable.
 002:0004 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 002:0005 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 002:0006 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 002:0007 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 002:0011 ROUTE RESERVOIR
      *** WARNING: Inflow hydrograph is dry.
 002:0012 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 002:0013 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 002:0014 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 002:0015 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 002:0016 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** ERROR: XIMP cannot be larger than TIMP.
                 XIMP was forced to equal TIMP.
 002:0018 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 002:0019 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
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                   20%, this routine may not be applicable.
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      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
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                   20%, this routine may not be applicable.
 002:0026 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
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                   20%, this routine may not be applicable.
 002:0027 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 002:0028 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 003:0004 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 003:0005 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 003:0006 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 003:0007 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 003:0011 ROUTE RESERVOIR
      *** WARNING: Inflow hydrograph is dry.
 003:0012 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 003:0013 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 003:0014 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 003:0015 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 003:0016 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** ERROR: XIMP cannot be larger than TIMP.
                 XIMP was forced to equal TIMP.
 003:0018 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 003:0019 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 003:0020 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 003:0021 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
```

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003:0022 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
003:0026 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
003:0027 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
003:0028 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
004:0004 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
004:0005 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
004:0006 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
004:0007 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
004:0008 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
004:0011 ROUTE RESERVOIR
     *** WARNING: Outflow volume is less than inflow volume.
004:0012 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
004:0013 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
004:0014 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
004:0015 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
004:0016 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** ERROR: XIMP cannot be larger than TIMP.
                XIMP was forced to equal TIMP.
004:0018 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
004:0019 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
004:0020 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
004:0021 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
004:0022 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
004:0026 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
004:0027 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
004:0028 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
005:0004 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
005:0005 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
005:0006 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
005:0007 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
005:0011 ROUTE RESERVOIR
     *** WARNING: Inflow hydrograph is dry.
005:0012 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
005:0013 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
005:0014 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
005:0015 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
005:0016 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
```

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                  Use a smaller DT or a larger area.
     *** ERROR: XIMP cannot be larger than TIMP.
                XIMP was forced to equal TIMP.
005:0018 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
005:0019 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
005:0020 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
005:0021 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
005:0026 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
005:0027 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
005:0028 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
007:0004 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
007:0005 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
007:0006 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
007:0007 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
007:0011 ROUTE RESERVOIR
     *** WARNING: Inflow hydrograph is dry.
007:0012 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
007:0013 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
007:0014 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
007:0015 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
007:0016 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** ERROR: XIMP cannot be larger than TIMP.
                XIMP was forced to equal TIMP.
007:0018 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
007:0019 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
007:0020 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
007:0021 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
007:0026 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
007:0027 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
007:0028 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
                  20%, this routine may not be applicable.
009:0004 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
009:0005 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
009:0006 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
009:0007 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
009:0011 ROUTE RESERVOIR
     *** WARNING: Outflow volume is less than inflow volume.
009:0012 DESIGN STANDHYD
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.
     *** WARNING: For areas with impervious ratios below
```

```
                   20%, this routine may not be applicable.
 009:0013 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 009:0014 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 009:0015 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
 009:0016 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** ERROR: XIMP cannot be larger than TIMP.
                 XIMP was forced to equal TIMP.
 009:0018 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 009:0019 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 009:0020 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 009:0021 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 009:0026 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 009:0027 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
 009:0028 DESIGN STANDHYD
      *** WARNING: Storage Coefficient is smaller than DT!
                   Use a smaller DT or a larger area.
      *** WARNING: For areas with impervious ratios below
                   20%, this routine may not be applicable.
   Simulation ended on 2017-05-16     at 11:33:56
=====================================================================================
```

Appendix D

Sewer Distribution Map
Water Distribution Map

2016 Sewer Collection System

Department of Infrastructure Services

Scale 1:2500

Ottawa

Legend

- Storm Inlet
- Storm Outlet
- Storm Manhole
- Sanitary Manhole
- Combined Manhole
- Combined Pipe
- Sanitary Pipe
- Storm Pipe
- Pipe Cap
- Combined Trunk Sewer
- Sanitary Trunk Sewer
- Storm Trunk Sewer
- Regulator
- Storm Pumping Station
- Storm Water Management Pond
- Sanitary Pumping Station
- Treatment Plant

Pipe Equivalents

nominal (mm)	actual (inches)	nominal (mm)	actual (inches)	nominal (mm)	actual (inches)
100	4	675	27	1800	72
150	6	750	30	1950	78
200	8	825	33	2025	80
250	10	900	36	2100	84
300	12	975	39	2250	90
375	15	1050	42	2400	96
400	16	1200	48	2550	102
450	18	1350	54	2700	108
525	21	1500	60	2850	114
600	24	1650	66	3000	120

Pipe Materials

A - ASBESTOS
CI - CAST IRON
CO - COPPER
CO0 - AWWA C300
CO1 - AWWA C301
CO2 - AWWA C302
CO3 - AWWA C303
DI - DUCTILE IRON
PE - POLYETHYLENE (DR11 TO DR21)
PVC - POLYVINYL CHLORIDE
STC - CONCRETE LINED STEEL PIPE
UCI - UNLINED CAST IRON
UNK - UNKNOWN MATERIAL

370-023

2016 Water Distribution System

Department of Infrastructure Services

This map was compiled from existing & collected engineering information from the City of Ottawa Geographic Information System and is protected by copyright. The location of infrastructure is approximate and should not be used for construction purposes.

Scale 1:2500

Ottawa

Legend

- Public Hydrant
- Private Hydrant
- Summer only Flusher Hydrant
- Flusher Hydrant
- Acoustic Fibre Optic
- Gate Valve
- Tapping Valve
- Butterfly Valve
- Buried Valve
- Drain Pipe
- Check Valve
- Closed Valve
- Drain-Out Valve
- Left Hand Valve
- Spot Elevation
- Pressure Reducing Valve
- Air Relief Valve
- Bypass Valve
- Feedermain Valve
- Inspection Plate
- Cap
- Reducer
- Jump
- Water Meter
- Water Service
- Backbone Pipe
- 203 PVC-1981 Watermain with Pipe Diameter, Material and Install Year
- Pipe Casing
- 2W Pressure Zone Delineation and Identifier
- Well
- Elevated Tank
- Water Pumping Station
- Water Reservoir
- Water Treatment Plant

Pipe Equivalents

nominal (mm)	actual (inches)	nominal (mm)	actual (inches)	nominal (mm)	actual (inches)
100	4	675	27	1800	72
150	6	750	30	1950	78
200	8	825	33	2025	80
250	10	900	36	2100	84
300	12	975	39	2250	90
375	15	1050	42	2400	96
400	16	1200	48	2550	102
450	18	1350	54	2700	108
525	21	1500	60	2850	114
600	24	1650	66	3000	120

Pipe Materials

A - ASBESTOS
CI - CAST IRON
CO - COPPER
CO0 - AWWA C300
CO1 - AWWA C301
CO2 - AWWA C302
CO3 - AWWA C303
DI - DUCTILE IRON
PE - POLYETHYLENE (DR11 TO DR21)
PVC - POLYVINYL CHLORIDE
STC - CONCRETE LINED STEEL PIPE
UCI - UNLINED CAST IRON
UNK - UNKNOWN MATERIAL

368-024	370-024	372-024
368-023	370-023	372-023
368-022	370-022	372-022

Appendix E

Serviceability Report Checklist

Development Servicing Study Checklist

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
Executive Summary (for larger reports only).	NA		
Date and revision number of the report.	Y	Cover	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y		Figures 1 and 2
Plan showing the site and location of all existing services.	Y		Dwg. 117036-GP,
Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Y	1.0	
Summary of Pre-consultation Meetings with City and other approval agencies.	N		
Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Y		No Master Servicing Studies for the area
Statement of objectives and servicing criteria.	Y		
Identification of existing and proposed infrastructure available in the immediate area.	Y	2.0-4.0	
Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	N		
Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Y		117036-GR

Development Servicing Study Checklist

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	NA		Refer to Geotechnical Investigation Report
Proposed phasing of the development, if applicable.	Y		
Reference to geotechnical studies and recommendations concerning servicing.	NA		
All preliminary and formal site plan submissions should have the following information:	Y		
Metric scale	Y	ALL	
North arrow (including construction North)	Y	ALL	
Key plan	Y	ALL	
Name and contact information of applicant and property owner	Y	ALL	
Property limits including bearings and	Y	ALL	
Existing and proposed structures and parking	Y	ALL	
Easements, road widening and rights-of-way	Y	ALL	
Adjacent street names	Y	ALL	

Development Servicing Study Checklist

4.2 Water	**Addressed (Y/N/NA)**	**Section**	**Comments**
Confirm consistency with Master Servicing Study, if available.	NA		
Availability of public infrastructure to service proposed development.	Y		
Identification of system constraints.	Y	3.0	
Identify boundary conditions.	Y	3.0	
Confirmation of adequate domestic supply and pressure.	Y	3.0	
Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Y	3.0	
Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Y	3.0	
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	Y		
Address reliability requirements such as appropriate location of shut-off valves.	N		Detailed Design Requirement
Check on the necessity of a pressure zone boundary modification.	NA		
Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	N		Fire Demand Checked Only
Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Y	3.0	
Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	NA		
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	3.0	

Development Servicing Study Checklist

Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N		

Development Servicing Study Checklist

4.3 Wastewater	Addressed (Y/N/NA)	Section	Comments
Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Y	2.0	
Confirm consistency with Master Servicing Study and/or justifications for deviations.	NA		No Servicing Study for this area
Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	Y	2.0	
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	2.0	
Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	N	2.0	Awaiting upstream sanitary modelling calculations
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	NA		
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y	2.0	General Plan of Services
Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	NA		
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	NA		
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	NA		
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	NA		
Special considerations such as contamination, corrosive environment etc.	NA		

Development Servicing Study Checklist

4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y	4.0	
Analysis of the available capacity in existing public infrastructure.	Y	4.0	
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	N	4.0	Figure 2
Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Y	4.0	
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y	4.0	
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	4.0	
Set-back from private sewage disposal systems.	NA		
Watercourse and hazard lands setbacks.	NA		
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	NA		
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Y	4.0	Sawmill Creek Subwatershed Study
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y	4.0	
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	NA		
Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Y	4.0	
Any proposed diversion of drainage catchment areas from one outlet to another.	NA		
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM facilities.	Y	4.0	

Development Servicing Study Checklist

If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	NA	4.0	

Development Servicing Study Checklist

4.4 Stormwater	**Addressed (Y/N/NA)**	**Section**	**Comments**
Identification of municipal drains and related approval requirements.	NA		
Description of how the conveyance and storage capacity will be achieved for the development.	Y	4.0	
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Y	4.0	100 Year HGL not available
Inclusion of hydraulic analysis including HGL elevations.	N		
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y		
Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	NA		
Identification of fill constrains related to floodplain and geotechnical investigation.	NA		

Development Servicing Study Checklist

4.5 Approval and Permit Requirements	**Addressed (Y/N/NA)**	**Section**	**Comments**
Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	N/A		
Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N		
Changes to Municipal Drains.	N		
Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	NA		

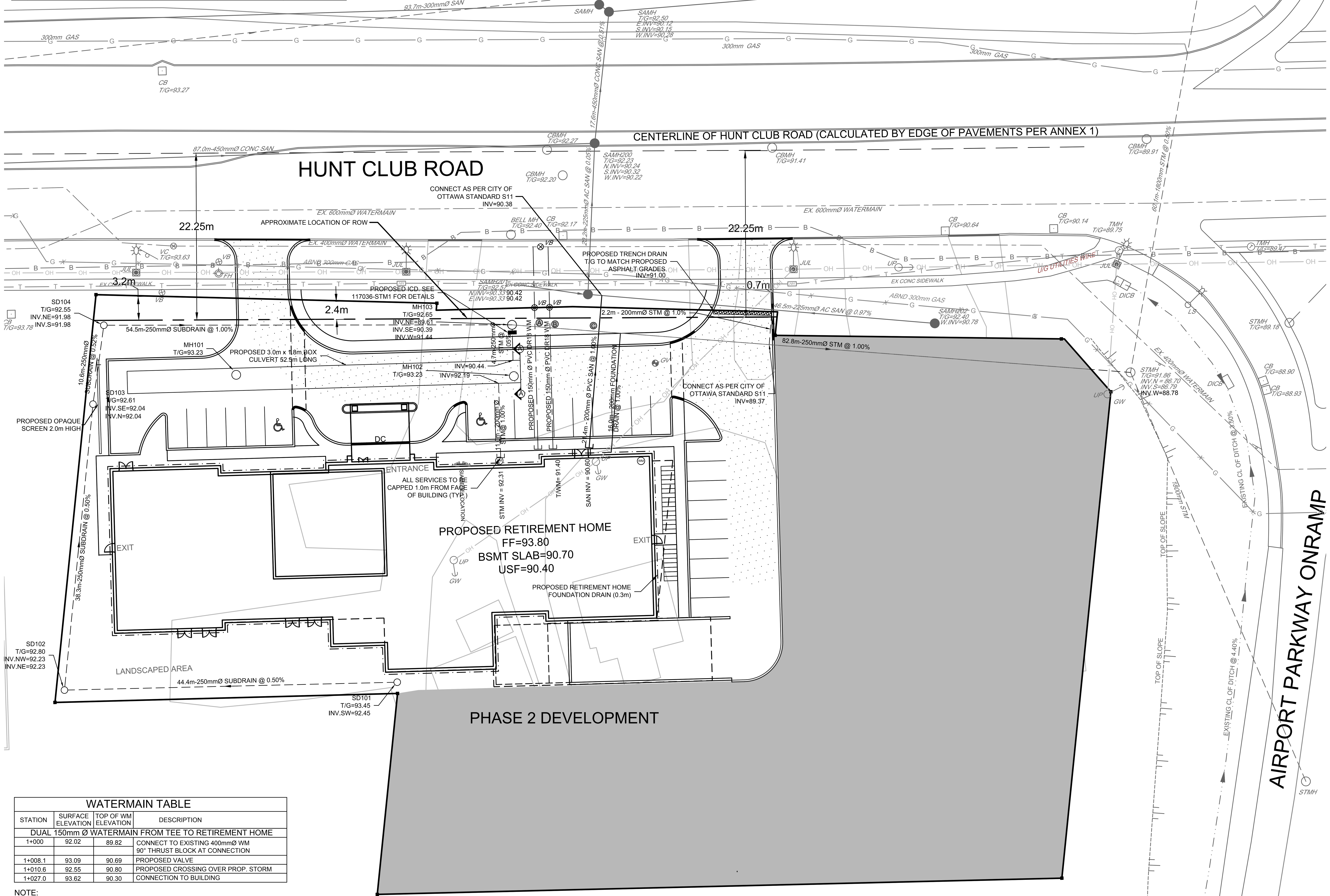
4.6 Conclusion	**Addressed (Y/N/NA)**	**Section**	**Comments**
Clearly stated conclusions and recommendations.	Y	5.0	
Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	NA		
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y	5.0	

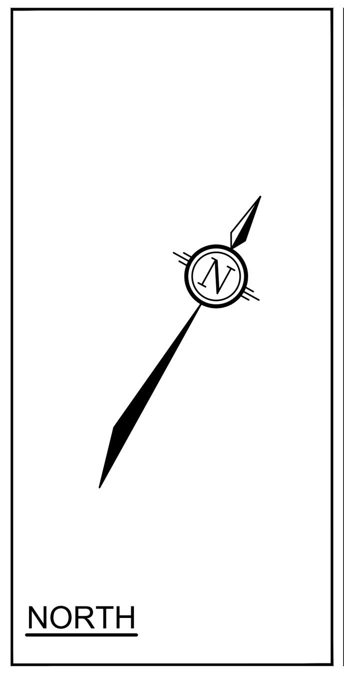
Appendix F

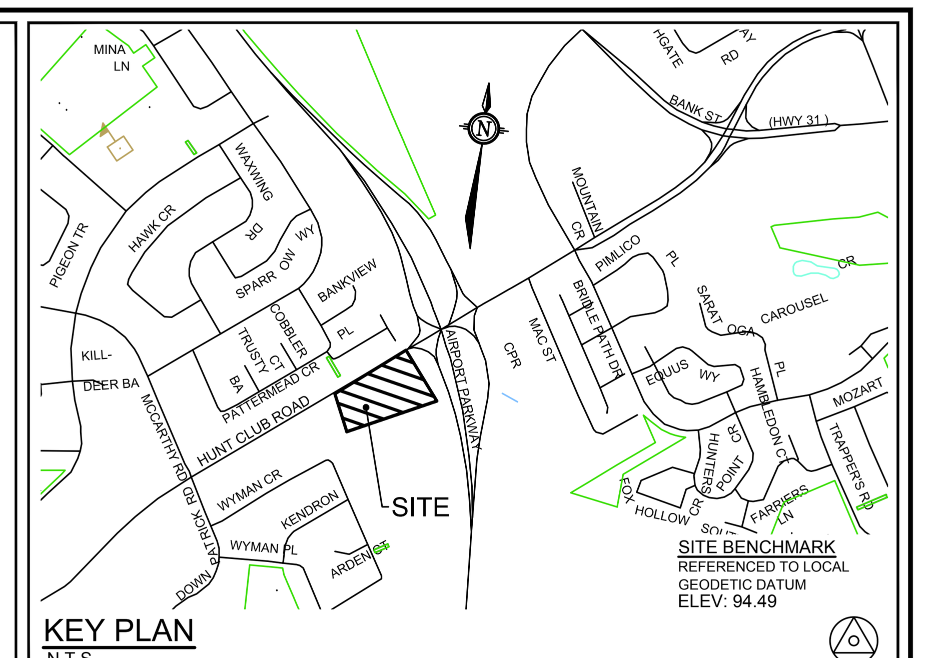
Drawings

PIPE CROSSINGS

NO.	TOP OF WATERMAIN	STORM INV	SANITARY INV	CLEARANCE (ACTUAL)	CLEARANCE (MIN)
A	90.80	89.56		0.84	0.50 (W25)
B	90.80	89.54		0.86	0.50 (W25)
C		89.52	90.38	0.61	0.50 (W25)







LEGEND

PROPOSED PROPERTY LINE
PROPOSED WATERMAIN
PROPOSED VALVE BOX
PROPOSED STORM MANHOLE
PROPOSED SANITARY SEWER
PROPOSED FOUNDATION DRAIN
UNDERGROUND PARKING LIMITS
PROPOSED STORM SEWER
PROPOSED STORM TRENCH DRAIN
PROPOSED CAP
EXISTING LEGAL ADJACENT LINE
EXISTING STANDARD IRON BAR / CONTROL POINT
EXISITING FLOW DIRECTION OF SEWERS
EXISITING SANITARY MANHOLE & SEWER
EXISITING STORM MANHOLE & SEWER
EXISITING CATCH BASIN
EXISITING WATERMAIN VALVE CHAMBER
EXISITING WATERMAIN SHUT-OFF VALVE BOX
EXISTING WATERMAIN
EXISTING HYDRANT C/W LEAD & SHUT OFF VALVE BOX
EXISTING GAS VALVE
EXISTING GAS MAIN
EXISTING ABANDONED GAS MAIN
EXISTING BELL CONDUIT
EXISTING OVER HEAD WIRE
EXISTING HYDRO/UTILITY POLE
EXISTING GUY WIRE
EXISTING TRAFFIC MANHOLE
EXISTING JOINT USE STREET LIGHT
EXISTING STREET LIGHT
EXISTING TRAFFIC HAND HOLE
EXISTING TRAFFIC SIGN
EXISITING DITCH INLET CATCH BASIN

SEWER NOTES:

1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
CATCHBASIN (600x600mm)	705.010	OPSD
STORM / SANITARY MANHOLE (1200Ø)	701.010	OPSD
CB, FRAME & COVER	400.020	OPSD
STORM / SANITARY MH FRAME & COVER	401.010	OPSD
SEWER TRENCH - BEDDING (GRANULAR A) COVER (GRANULAR A OR GRANULAR B TYPE I, WITH MAXIMUM PARTICLE SIZE=25mm)		
STORM SEWER	PVC DR 35	
SANITARY SEWER	PVC DR 35	
CATCHBASIN LEAD	PVC DR 35	

2. INSULATE ALL PIPES (SAN/STM) THAT HAVE LESS THAN 1.5m COVER WITH 50mmX1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
3. SERVICES ARE TO BE CONSTRUCTED TO 1.0m FROM FACE OF BUILDING AT A MINIMUM SLOPE OF 1.0%.
4. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 98% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.
5. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). THE CONCRETE CRADLE FOR THE PIPE CAN BE ELIMINATED.
6. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
7. STORM MANHOLES AND CBMHS ARE TO HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED.
8. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES.

WATERMAIN NOTES:

1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
WATERMAIN TRENCHING	W17	CITY OF OTTAWA
THERMAL INSULATION IN SHALLOW TRENCHES	W22	CITY OF OTTAWA
WATERMAIN CROSSING BELOW SEWER	W25	CITY OF OTTAWA
WATERMAIN	PVC DR 18	

2. SUPPLY AND CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN AND CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY CITY OFFICIALS.
3. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED.
4. PROVIDE MINIMUM 0.25m CLEARANCE BETWEEN OUTSIDE OF PIPES AT ALL CROSSINGS.
5. WATER SERVICE IS TO BE CONSTRUCTED TO WITHIN 1.0m OF FOUNDATION WALL AND CAPPED, UNLESS OTHERWISE INDICATED.
6. WATER DEMAND HAS BEEN CALCULATED AND INCLUDED IN THE "SERVICING AND STORMWATER MANAGEMENT REPORT" PREPARED BY NOVATECH

WATERMAIN TABLE

STATION	SURFACE ELEVATION	TOP OF WM ELEVATION	DESCRIPTION
DUAL 150mm Ø WATERMAIN FROM TEE TO RETIREMENT HOME			
1+000	92.02	89.82	CONNECT TO EXISTING 400mmØ WM 90° THRUST BLOCK AT CONNECTION
1+008.1	93.09	90.69	PROPOSED VALVE
1+010.6	92.55	90.80	PROPOSED CROSSING OVER PROP. STORM
1+027.0	93.62	90.30	CONNECTION TO BUILDING

NOTE:
WHERE PROPOSED WATERMAIN IS LESS THAN 2.4m BELOW GRADE, INSULATE WATERMAIN PER CITY OF OTTAWA STANDARD W22.

GENERAL NOTES:

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $5,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
6. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
7. ALL ELEVATIONS ARE GEODETIC.
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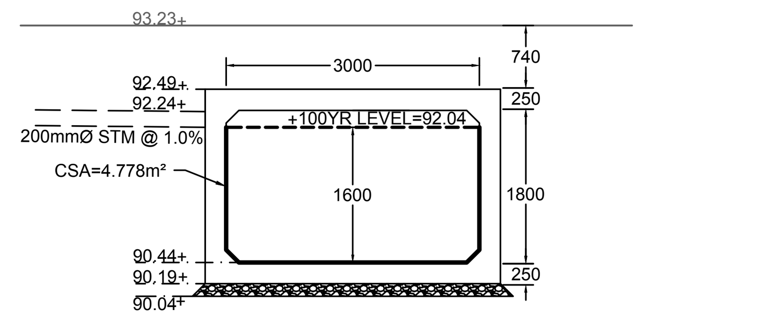
11. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
12. PROVIDE LINE/PARKING PAINTING.
13. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GENERAL PLAN OF SERVICES INDICATING ALL SERVICING AS-BUILT INFORMATION SHOWN ON THIS PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, I INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS, VALVE AND HYDRANT LOCATIONS, T/WM ELEVATIONS AND ANY ALIGNMENT CHANGES, ETC.

PAVEMENT STRUCTURE:

LIGHT DUTY
55mm HL3
150mm GRAN "A"
250mm GRAN "B" TYPE II

HEAVY DUTY
40mm HL3
50mm HL8
150mm GRAN "A"
400mm GRAN "B" TYPE II



SECTION 'A' - RETIREMENT HOME WATER STORAGE TANK
SCALE: 1:75

NOTE:
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NOTE:
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CLARIDGE HOMES
BUILDING QUALITY & VALUE FOR OVER 25 YEARS

APPROVED ☐ REFUSED ☐
THIS _____ DAY OF ___________, 20____
DON HERWEYER, MCIP, RPP, MANAGER
DEVELOPMENT REVIEW SOUTH
PLANNING, INFRASTRUCTURE AND

No.	REVISION	DATE	BY
2.	REVISED PER CITY COMMENTS	SEPT 7/17	GJM
1.	ISSUED FOR SITE PLAN APPLICATION	MAY 25/17	GJM

SCALE 1:300
1:300 0 3 6 9 12

DESIGN MTL
CHECKED GJM
DRAWN MTL
CHECKED GJM
APPROVED GJM

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
G.J. MacDONALD
PROVINCE OF ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

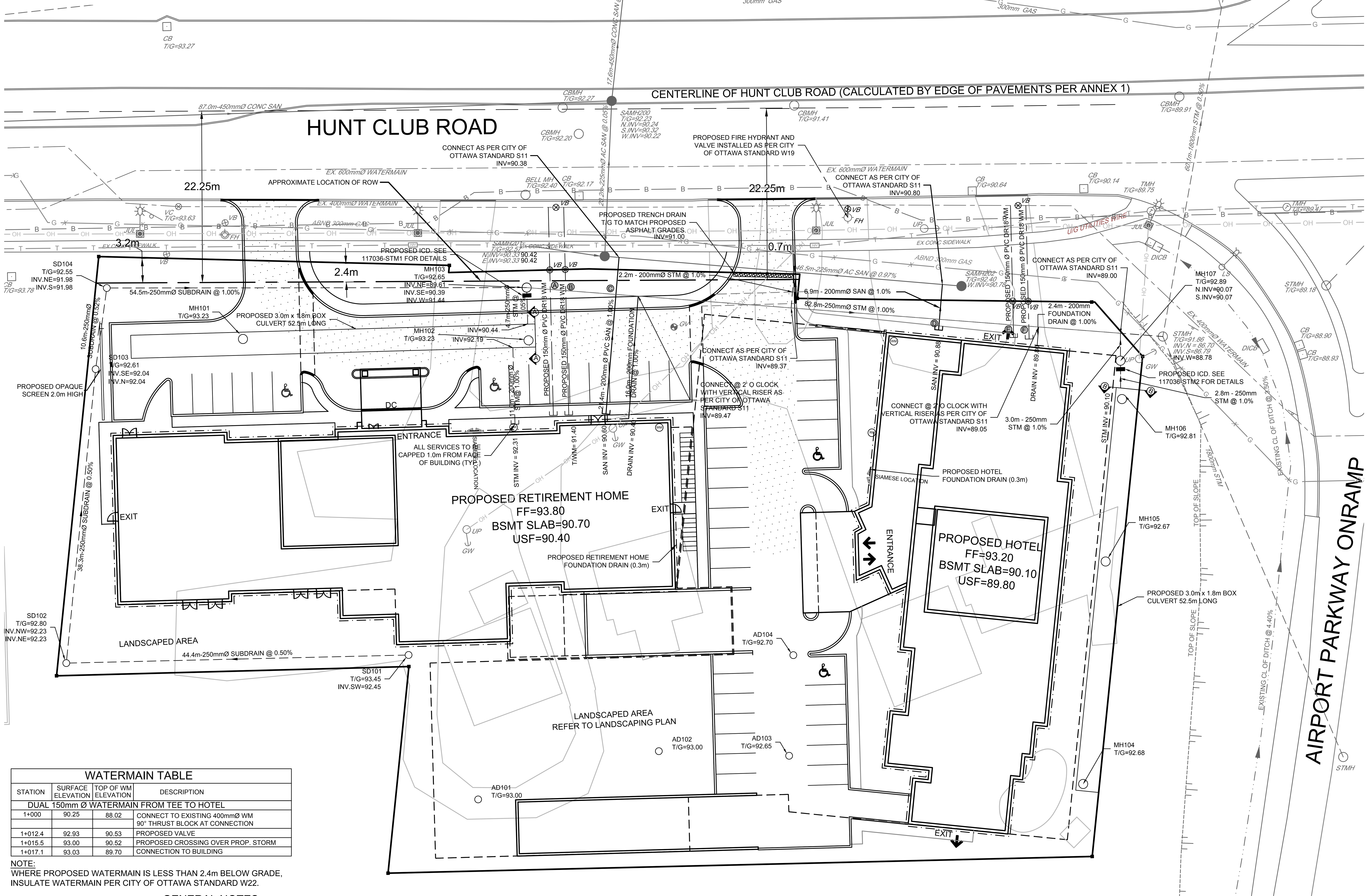
LOCATION
CITY OF OTTAWA
HUNT CLUB DEVELOPMENT

DRAWING NAME
GENERAL PLAN OF SERVICES
PHASE 1

PROJECT No. 117036-00
REV REV # 2
DRAWING No. 117036-GP1

D07-12-17-0068

PLANA1.DWG - 841mmx594mm



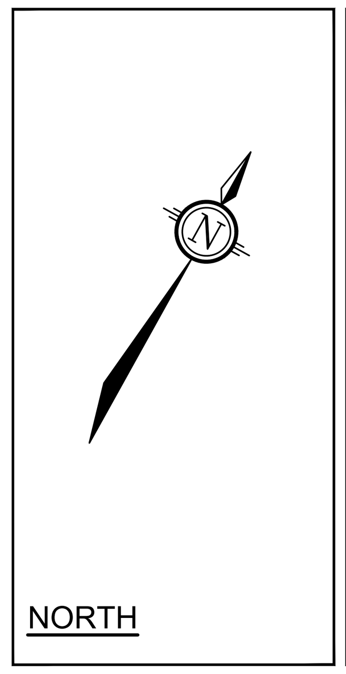
PIPE CROSSINGS

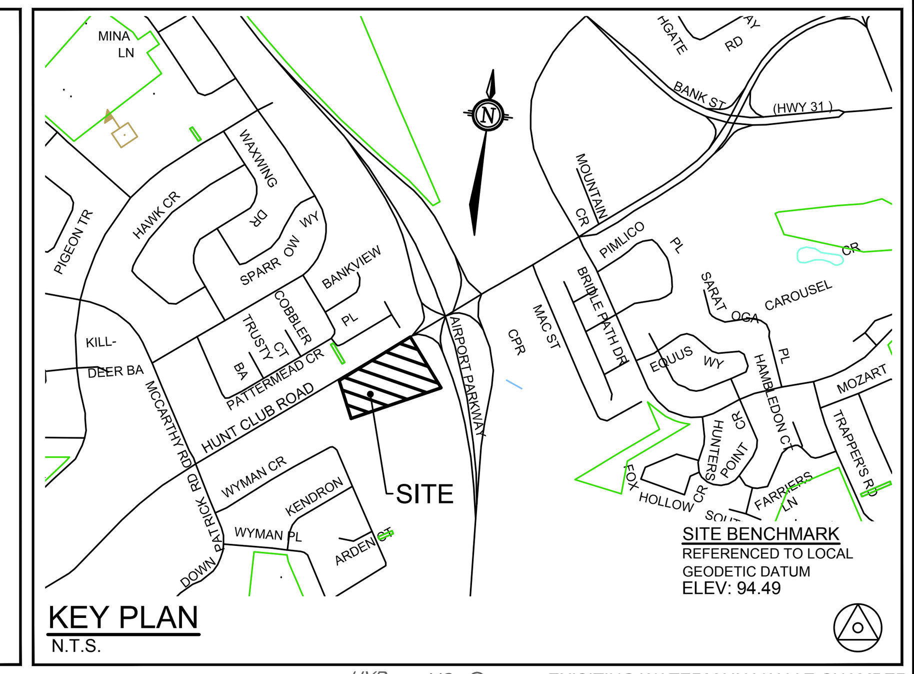
NO.	TOP OF WATERMAIN	STORM INV	SANITARY INV	CLEARANCE (ACTUAL)	CLEARANCE (MIN)
A	90.80	89.57		0.83	0.50 (W25)
B	90.80	89.55		0.85	0.50 (W25)
C		89.52	90.38	0.61	0.50 (W25)
D		89.07	90.85	1.53	0.50 (W25)
E	90.52	88.97		0.60	0.25 (W25.2)
F	90.52	88.95		0.62	0.25 (W25.2)

WATERMAIN TABLE

STATION	SURFACE ELEVATION	TOP OF WM ELEVATION	DESCRIPTION
DUAL 150mm Ø WATERMAIN FROM TEE TO HOTEL			
1+000	90.25	88.02	CONNECT TO EXISTING 400mmØ WM 90° THRUST BLOCK AT CONNECTION
1+012.4	92.93	90.53	PROPOSED VALVE
1+015.5	93.00	90.52	PROPOSED CROSSING OVER PROP. STORM
1+017.1	93.03	89.70	CONNECTION TO BUILDING

NOTE:
WHERE PROPOSED WATERMAIN IS LESS THAN 2.4m BELOW GRADE, INSULATE WATERMAIN PER CITY OF OTTAWA STANDARD W22.





LEGEND

PROPOSED PROPERTY LINE
PROPOSED WATERMAIN
PROPOSED VALVE BOX
PROPOSED STORM MANHOLE
PROPOSED SANITARY SEWER
PROPOSED FOUNDATION DRAIN
UNDERGROUND PARKING LIMITS
PROPOSED STORM SEWER
PROPOSED STORM TRENCH DRAIN
PROPOSED CAP
EXISTING LEGAL ADJACENT LINE
EXISTING STANDARD IRON BAR / CONTROL POINT
EXISITING FLOW DIRECTION OF SEWERS
EXISITING SANITARY MANHOLE & SEWER
EXISITING STORM MANHOLE & SEWER
EXISITING CATCH BASIN
EXISITING WATERMAIN VALV E CHAMBER
EXISITING WATERMAIN SHUT-OFF VALVE BOX
EXISTING WATERMAIN
EXISTING HYDRANT C/W LEAD & SHUT OFF VALVE BOX
EXISTING GAS VALVE
EXISTING GAS MAIN
EXISTING ABANDONED GAS MAIN
EXISTING BELL CONDUIT
EXISTING OVER HEAD WIRE
EXISTING HYDRO/UTILITY POLE
EXISTING GUY WIRE
EXISTING TRAFFIC MANHOLE
EXISTING JOINT USE STREET LIGHT
EXISTING STREET LIGHT
EXISTING TRAFFIC HAND HOLE
EXISTING TRAFFIC SIGN
EXISITING DITCH INLET CATCH BASIN

SEWER NOTES:

1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
CATCHBASIN (600x600mm)	705.010	OPSD
STORM / SANITARY MANHOLE (1200Ø)	701.010	OPSD
CB, FRAME & COVER	400.020	OPSD
STORM / SANITARY MH FRAME & COVER	401.010	OPSD
SEWER TRENCH - BEDDING (GRANULAR A) COVER (GRANULAR A OR GRANULAR B TYPE I, WITH MAXIMUM PARTICLE SIZE=25mm)		
STORM SEWER	PVC DR 35	
SANITARY SEWER	PVC DR 35	
CATCHBASIN LEAD	PVC DR 35	

2. INSULATE ALL PIPES (SAN/STM) THAT HAVE LESS THAN 1.5m COVER WITH 50mmX1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
3. SERVICES ARE TO BE CONSTRUCTED TO 1.0m FROM FACE OF BUILDING AT A MINIMUM SLOPE OF 1.0%.
4. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 98% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.
5. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). THE CONCRETE CRADLE FOR THE PIPE CAN BE ELIMINATED.
6. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
7. STORM MANHOLES AND CBMHS ARE TO HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED.
8. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES.

WATERMAIN NOTES:

1. SPECIFICATIONS:

ITEM	SPEC. No.	REFERENCE
WATERMAIN TRENCHING	W17	CITY OF OTTAWA
THERMAL INSULATION IN SHALLOW TRENCHES	W22	CITY OF OTTAWA
WATERMAIN CROSSING BELOW SEWER	W25	CITY OF OTTAWA
WATERMAIN	PVC DR 18	

2. SUPPLY AND CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN AND CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY CITY OFFICIALS.
3. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED.
4. PROVIDE MINIMUM 0.25m CLEARANCE BETWEEN OUTSIDE OF PIPES AT ALL CROSSINGS.
5. WATER SERVICE IS TO BE CONSTRUCTED TO WITHIN 1.0m OF FOUNDATION WALL AND CAPPED, UNLESS OTHERWISE INDICATED.
6. WATER DEMAND HAS BEEN CALCULATED AND INCLUDED IN THE "SERVICING AND STORMWATER MANAGEMENT REPORT" PREPARED BY NOVATECH

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PAVEMENT STRUCTURE:

LIGHT DUTY	HEAVY DUTY
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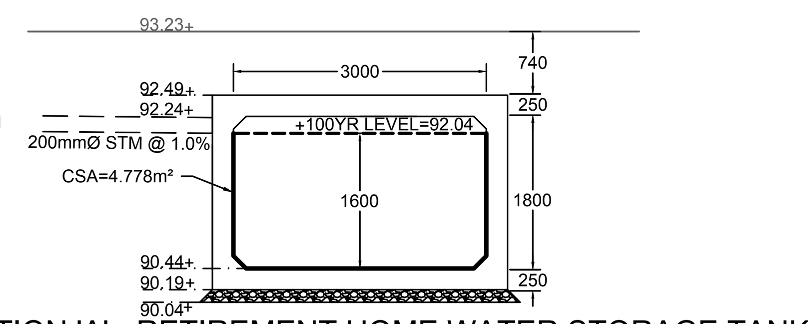
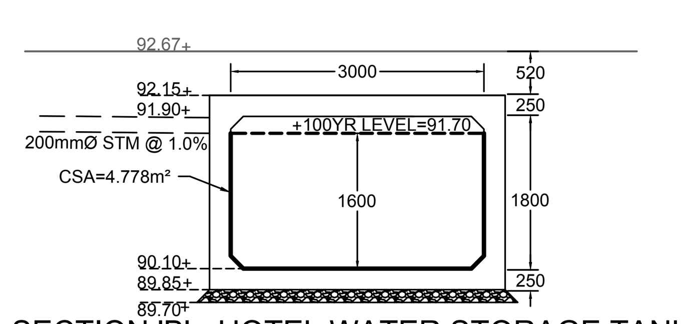


SECTION 'A' - RETIREMENT HOME WATER STORAGE TANK
SCALE: 1:75



SECTION 'B' - HOTEL WATER STORAGE TANK
SCALE: 1:75

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BUILDING QUALITY & VALUE FOR OVER 25 YEARS

APPROVED ☐ REFUSED ☐
THIS _____ DAY OF ____________, 20____
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DEVELOPMENT REVIEW SOUTH
PLANNING, INFRASTRUCTURE AND

No.	REVISION	DATE	BY
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SCALE 1:300

DESIGN	MTL
CHECKED	GJM
DRAWN	MTL
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LOCATION
CITY OF OTTAWA
HUNT CLUB DEVELOPMENT

DRAWING NAME
GENERAL PLAN OF SERVICES
PHASE 2

PROJECT No. 117036-00
REV # 2
DRAWING No. 117036-GP2

D07-12-17-0068

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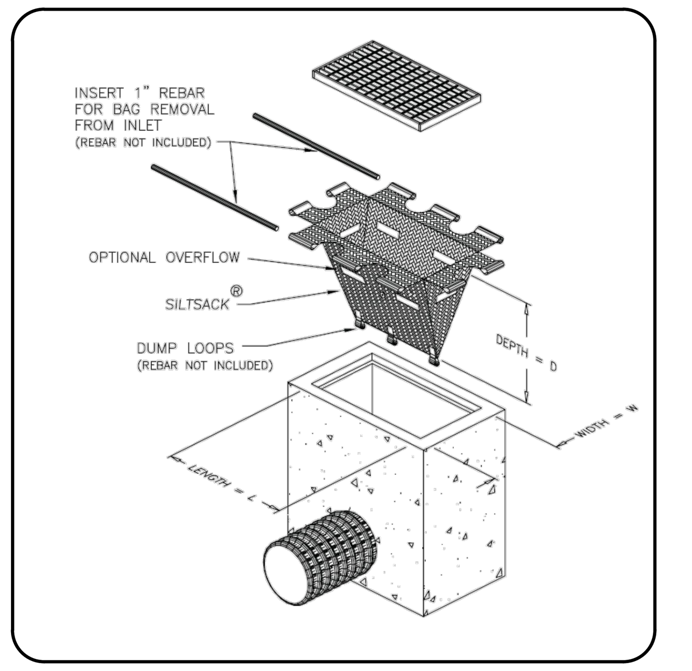
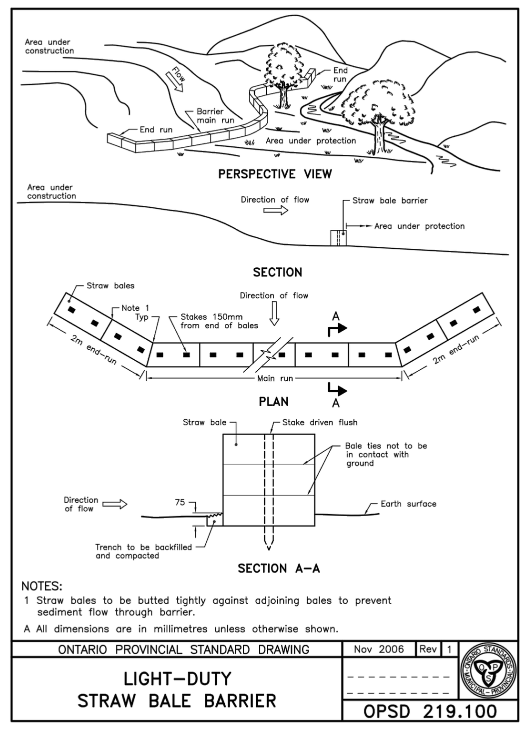
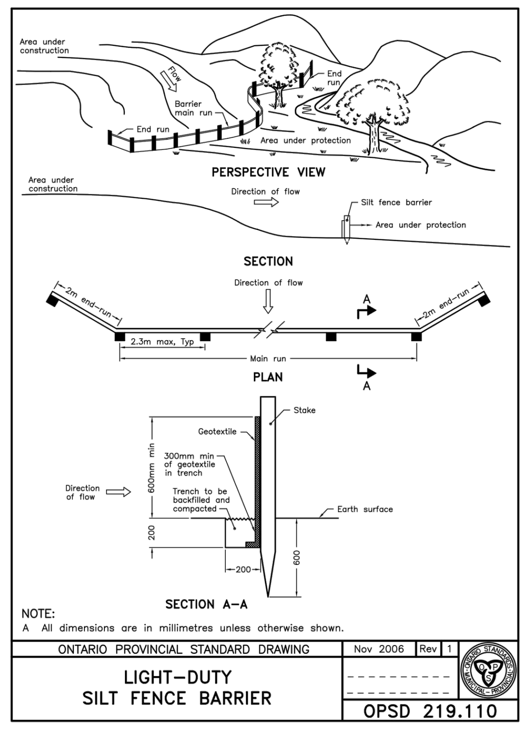


CATCHBASIN INSERT DETAIL
N.T.S.





LEGEND

- PROPOSED PROPERTY LINE
- EXISTING LEGAL ADJACENT LINE
- EXISTING ELEVATION
- PROPOSED GRADES
- PROPOSED SWALE GRADES
- PROPOSED TOP OF RETAINING WALL
- PROPOSED BOTTOM OF RETAINING WALL
- PROPOSED UNDERGROUND PARKING RAMP GRADES
- 2.4 % — PROPOSED SLOPE AND FLOW DIRECTION
- FF=93.80 — PROPOSED FINISHED FLOOR ELEVATION
- DC — PROPOSED DEPRESSED CURB
- PROPOSED TERRACING SLOPE 3:1 MAX
- PROPOSED PONDING AREA
- PROPOSED SILT FENCING
- SIB — EXISTING STANDARD IRON BAR
- CB — EXISTING CATCHBASIN
- DICB — EXISTING DITCH INLET CATCHBASIN
- PROPOSED STRAWBALE
- GV — EXISTING GAS VALVE
- G — EXISTING GAS MAIN
- G(A) — EXISTING ABANDONED GAS MAIN
- B — EXISTING BELL CONDUIT
- OH — EXISTING OVER HEAD WIRE
- T — EXISTING TRAFFIC CONDUIT
- HP/UP — EXISTING HYDRO/UTILITY POLE
- GW — EXISTING GUY WIRE
- TMH — EXISTING TRAFFIC MANHOLE
- JUL — EXISTING JOINT USE STREET LIGHT
- LS — EXISTING STREET LIGHT
- HH — EXISTING TRAFFIC HAND HOLE
- EXISTING TRAFFIC SIGN

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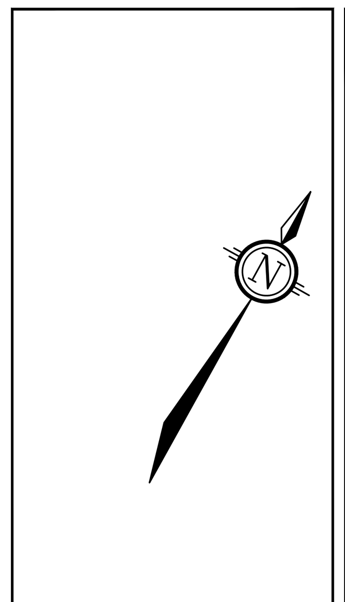
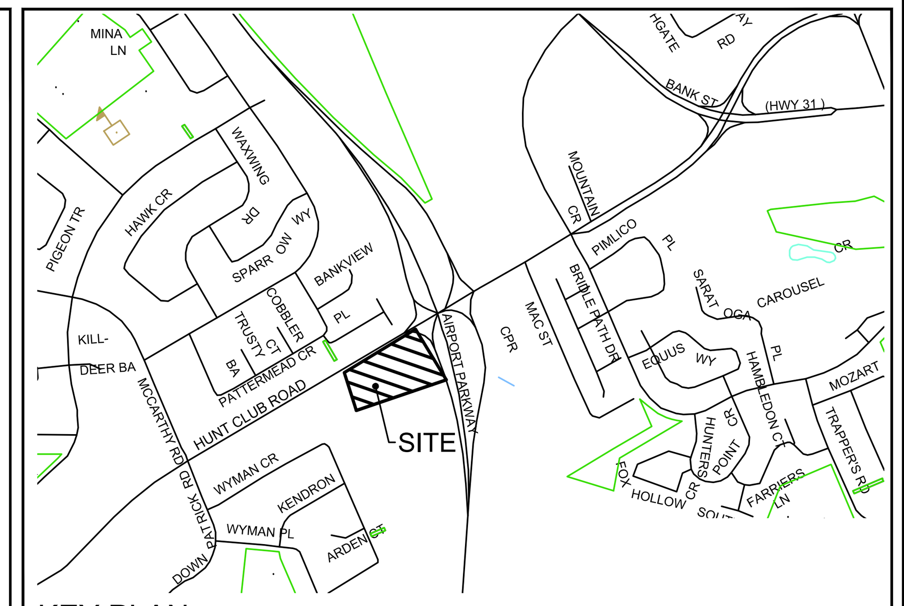
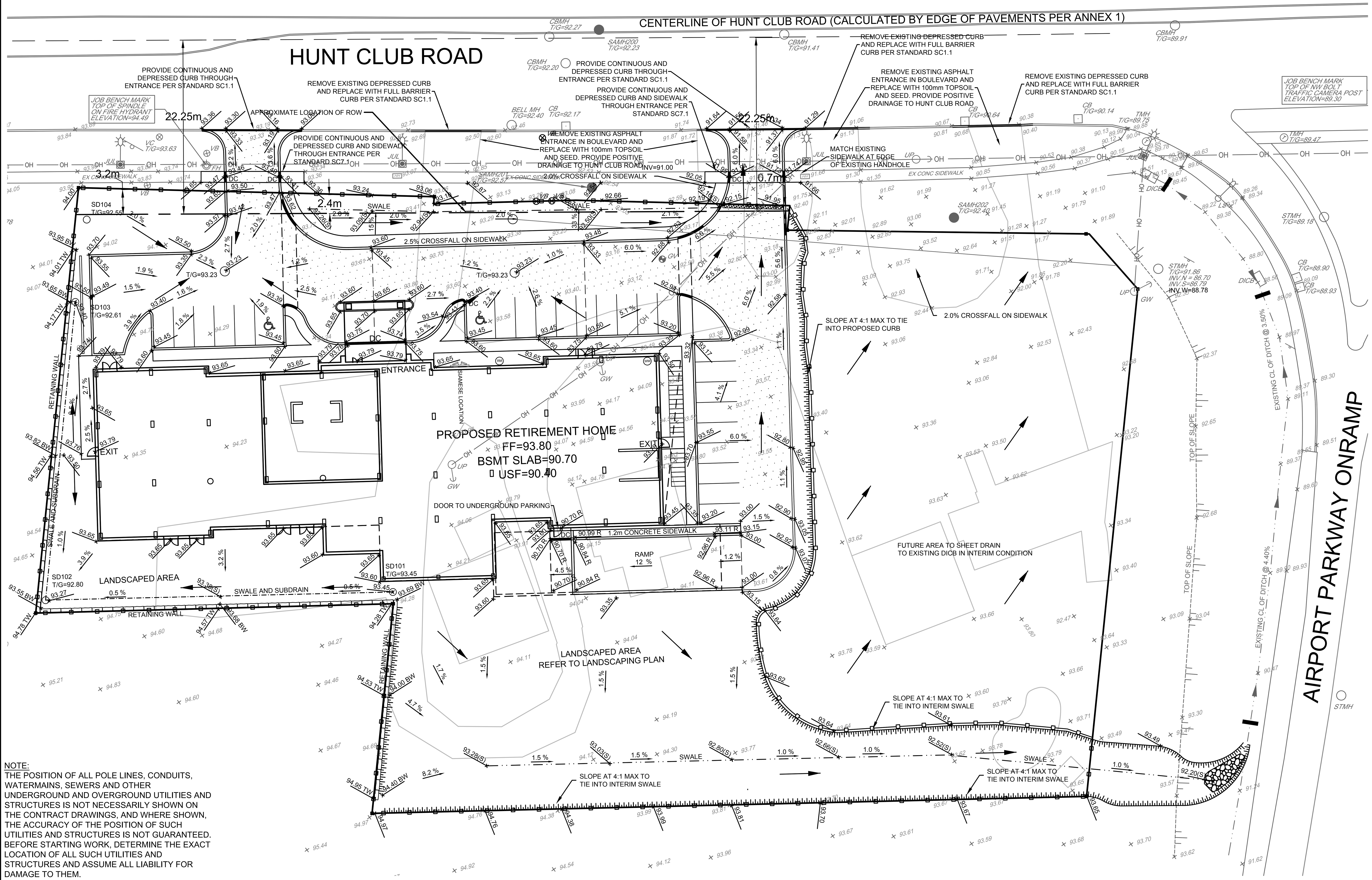




KEY PLAN
N.T.S.



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12. PROVIDE LINE/PARKING PAINTING.

GRADING NOTES:

1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED PAVED AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE PROOF ROLLED WITH A LARGE STEEL DRUM ROLLER AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.
3. ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
4. THE GRANULAR BASE SHOULD BE COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE COMPACTED TO AT LEAST 98% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
5. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
6. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
7. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
8. ALL CURBS SHALL BE BARRIER CURB (150mm) UNLESS OTHERWISE NOTED AND CONSTRUCTED AS PER CITY OF OTTAWA STANDARDS (SC1.1).
9. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.
13. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING AS-BUILT ELEVATIONS OF ALL DESIGN GRADES SHOWN ON THIS PLAN.

EROSION AND SEDIMENT CONTROL NOTES:

1. ALL EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED TO THE SATISFACTION OF THE ENGINEER, THE CITY OF OTTAWA, AND THE RIDEAU VALLEY CONSERVATION AUTHORITY. THEY ARE TO BE APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION. THESE PRACTICES ARE TO BE IMPLEMENTED IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL SUCH AS BUT NOT LIMITED TO: INSTALLING INSERTS UNDER CATCHBASIN GRATES AND FILTER CLOTH UNDER MANHOLE GRATES TO PREVENT SEDIMENT FROM ENTERING THE STRUCTURE AND INSTALLING AND MAINTAINING A LIGHT DUTY SILT FENCE BARRIER AS REQUIRED AS PER OPSD 219.110.
2. TO PREVENT SURFACE EROSION FROM ENTERING THE STORM SYSTEM DURING CONSTRUCTION, INSERTS AND FILTER CLOTH WILL BE PLACED UNDER ALL PROPOSED AND NEAR BY CATCHBASINS AND MANHOLES. THE FILTER CLOTH WILL REMAIN IN PLACE UNTIL VEGETATION HAS BEEN ESTABLISHED AND CONSTRUCTION COMPLETE.
3. TO LIMIT EROSION: MINIMIZE THE AMOUNT OF EXPOSED SOILS AT ANY GIVEN TIME, RE-VEGETATE EXPOSED AREAS AND SLOPES AS SOON AS POSSIBLE AND PROTECT EXPOSED SLOPES WITH NATURAL OR SYNTHETIC MULCHES.
4. ANY ONSITE STOCKPILES SHALL BE LOCATED IN AREAS TO BE DESIGNATED BY THE ENGINEER AND WELL AWAY FROM DRAINAGE SWALES AND OUTLET DITCHES.
5. THE CONTRACTOR SHALL IMPLEMENT SEQUENTIAL MEASURES ARRANGED SO AS TO ACHIEVE THE REQUIRED LEVEL OF SEDIMENT AND RUNOFF CONTROL. SOME ONSITE MEASURES INCLUDE, BUT ARE NOT LIMITED TO: SEDIMENT PONDS, SILT FENCES, STRAW BALES, FILTER CLOTHS, CATCHBASIN INSERTS, DAMS AND/OR BERMS, OR OTHER RECOGNIZED TECHNOLOGIES. SPECIFIC MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF OPSS 805 WHERE APPROPRIATE, OR IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
6. EROSION AND SEDIMENT CONTROL MEASURES WILL BE IMPLEMENTED DURING CONSTRUCTION IN ACCORDANCE WITH THE "GUIDELINES ON EROSION AND SEDIMENT CONTROL FOR URBAN CONSTRUCTION SITES" (GOVERNMENT OF ONTARIO, MAY 1987). THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR MEETING ALL REGULATORY AGENCY REQUIREMENTS.
7. WHERE, IN THE OPINION OF THE ENGINEER OR REGULATORY AGENCY, THE INSTALLED EROSION CONTROL MEASURES FAIL TO PERFORM ADEQUATELY, THE CONTRACTOR SHALL SUPPLY AND INSTALL ADDITIONAL OR ALTERNATIVE EROSION CONTROL MEASURES AS DIRECTED BY THE ENGINEER OR THE REGULATORY AGENCY. IF THE CONTRACTOR FAILS TO REVISE THE EROSION CONTROL MEASURES AS REQUESTED THE ENGINEER AND REGULATORY AGENCY HAS THE RIGHT TO IMMEDIATELY WITHDRAW ITS PERMISSION TO CONTINUE THE WORK. THE ENGINEER OR REGULATORY AGENCY MAY RENEW ITS PERMISSION TO CONTINUE THE WORK UPON BEING SATISFIED THAT THE DEFAULTS OR DEFICIENCIES HAVE BEEN RECTIFIED.
8. A VISUAL INSPECTION OF THE SEDIMENT CONTROL MEASURES WILL BE PERFORMED DAILY BY THE CONTRACTOR. THE CONTRACTOR SHALL SUBMIT TO THE CONTRACT ADMINISTRATOR WEEKLY INSPECTION REPORTS DETAILING AND PROVING THE SPECIFIED AND REQUIRED PERFORMANCE OF THE INSTALLED MEASURES. THE CONTRACTOR SHALL PERIODICALLY, AND WHEN REQUESTED BY THE ENGINEER, CLEAN OUT ACCUMULATED SEDIMENT DEPOSITS AS REQUIRED AT THE SEDIMENT CONTROL DEVICES WITHOUT DAMAGING THE DEVICES OR CAUSING DISCHARGE INTO THE SEWERS OR NEARBY WATERCOURSES.
9. THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE ENGINEER, THE MEASURE OR MEASURES, IS NO LONGER REQUIRED. NO CONTROL MEASURE MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE ENGINEER.
10. THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO ANY DITCH OR STORM SEWER SYSTEM. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.
11. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
12. ALL STREETS TO BE SWEPT WEEKLY FOR THE DURATION OF CONSTRUCTION. SURROUNDING EXISTING STREETS TO BE SWEPT REGULARLY AS REQUIRED OR AS DIRECTED BY THE ENGINEER AND/OR CITY OF OTTAWA. IF EXCESS SWEEPING IS REQUIRED THE USE OF MUD MATS WILL BE EXAMINED. EXACT RUN OF MUD MAT TO BE FIELD CONFIRMED.
13. THE CONTRACTOR SHALL ENSURE THAT ALL WORKS, INCLUDING SUB-CONTRACTORS, IN THE WORKING AREA ARE AWARE OF THE IMPORTANCE OF THE EROSION AND SEDIMENT CONTROL MEASURES AND INFORMED OF THE CONSEQUENCES OF THE FAILURE TO COMPLY WITH THE REQUIREMENTS OF ALL REGULATORY AGENCIES AND THE SPECIFICATIONS DETAILED HEREIN.
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15. THE CONTRACTOR SHALL KEEP MATERIAL FOR ADDITIONAL EROSION AND SEDIMENT CONTROLS ONSITE AT ALL TIMES. THESE MATERIALS INCLUDE BUT ARE NOT LIMITED TO: SILT FENCES, STRAW BALES, SEDIMENT BAGS AND CLEAR STONE. A CONTINGENCY PLAN TO INCLUDE THE PROVISION OF ADDITIONAL LABOUR, EQUIPMENT OR MATERIALS TO INSTALL ADDITIONAL CONTROL MEASURES, AS WELL AS PROVIDE AN EMERGENCY RESPONSE PLAN IN CASE OF AN ACCIDENTAL EVENT. AS SUCH, THE CONTRACTOR SHALL HAVE ADDITIONAL CONTROL MATERIALS ON SITE AT ALL TIMES WHICH ARE EASILY ACCESSIBLE AND MAY BE IMPLEMENTED AT A MOMENT'S NOTICE.
16. IN ADDITION TO ANY OTHER REMEDY AND/OR PENALTY PROVIDED BY LAW, WHERE THERE HAS BEEN DEFAULT OR NON-COMPLIANCE WITH ANY OF THE TERMS SPECIFIED HEREIN AND THE CONTRACTOR REFUSES TO PERFORM OR RECTIFY

CLARIDGE HOMES
BUILDING QUALITY & VALUE FOR OVER 25 YEARS

APPROVED ☐ REFUSED ☐

THIS _____ DAY OF ___________, 20____

DON HERWEYER, MCIP, RPP, MANAGER
DEVELOPMENT REVIEW SOUTH
PLANNING, INFRASTRUCTURE AND

No.	REVISION	DATE	BY
2.	REVISED PER CITY COMMENTS	SEPT 7/17	GJM
1.	ISSUED FOR SITE PLAN APPLICATION	MAY 25/17	GJM

SCALE 1:300

DESIGN	MTL
CHECKED	GJM
DRAWN	MTL
CHECKED	GJM
APPROVED	GJM

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER G.J. MacDONALD PROVINCE OF ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
HUNT CLUB DEVELOPMENT

DRAWING NAME
GRADING AND EROSION & SEDIMENT CONTROL PLAN PHASE 1

PROJECT No. 117036-00
REV # 2
DRAWING No. 117036-GR1

D07-12-17-0068

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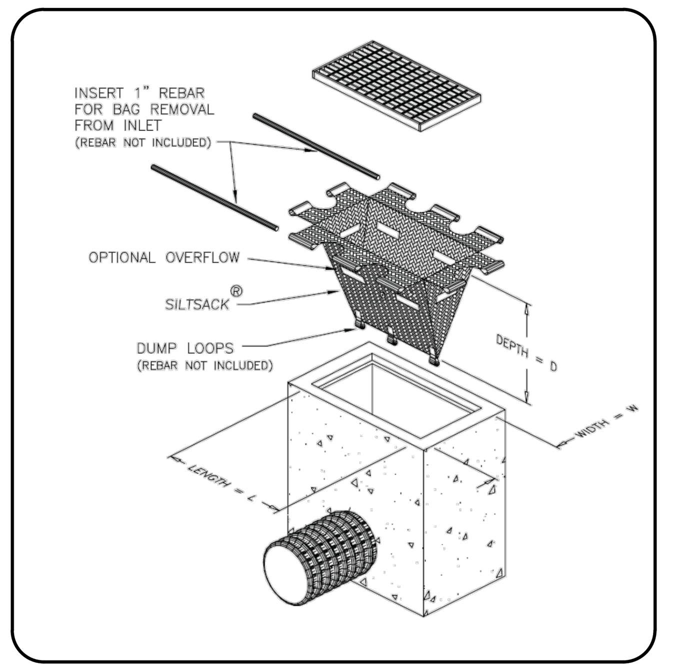
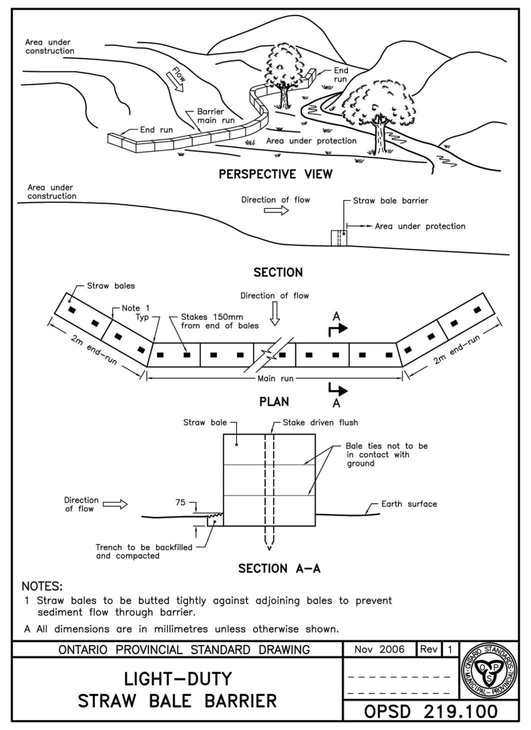
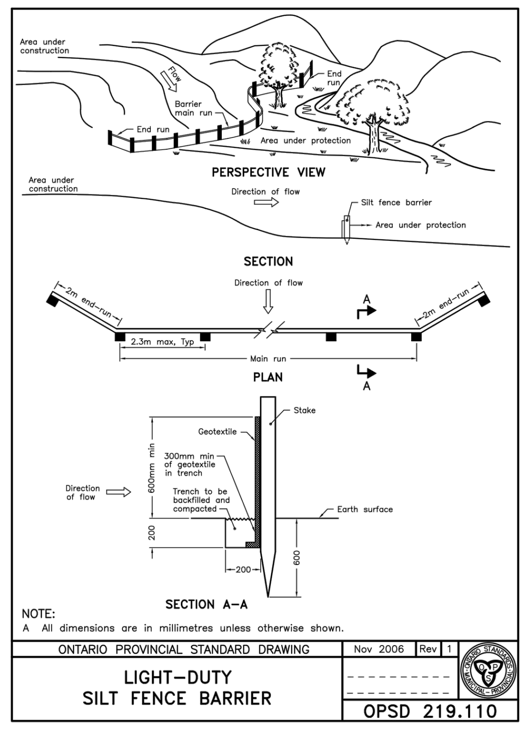


CATCHBASIN INSERT DETAIL
N.T.S.





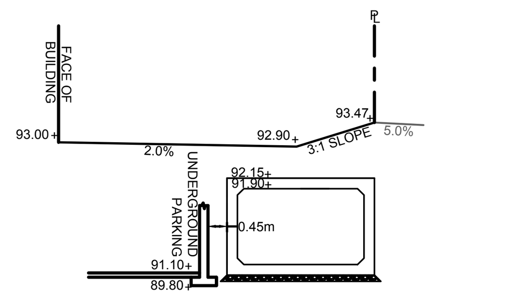
LEGEND

- PROPOSED PROPERTY LINE
- EXISTING LEGAL ADJACENT LINE
- ×71.23 — EXISTING ELEVATION
- 93.23 — PROPOSED GRADES
- 93.71(S) — PROPOSED SWALE GRADES
- 93.21 TW — PROPOSED TOP OF RETAINING WALL
- 93.11 BW — PROPOSED BOTTOM OF RETAINING WALL
- 93.11 R — PROPOSED UNDERGROUND PARKING RAMP GRADES
- 2.4 % — PROPOSED SLOPE AND FLOW DIRECTION
- FF=93.80 — PROPOSED FINISHED FLOOR ELEVATION
- DC — PROPOSED DEPRESSED CURB
- PROPOSED TERRACING SLOPE 3:1 MAX
- PROPOSED PONDING AREA
- OVERLAND FLOW ARROWS
- SIB — EXISTING STANDARD IRON BAR
- CB — EXISITING CATCHBASIN
- DICB — EXISITING DITCH INLET CATCHBASIN
- GV — EXISTING GAS VALVE
- G — EXISTING GAS MAIN
- G(A) — EXISTING ABANDONED GAS MAIN
- B — EXISTING BELL CONDUIT
- OH — EXISTING OVER HEAD WIRE
- T — EXISTING TRAFFIC CONDUIT
- HP/UP — EXISTING HYDRO/UTILITY POLE
- GW — EXISTING GUY WIRE
- TMH — EXISTING TRAFFIC MANHOLE
- JUL — EXISTING JOINT USE STREET LIGHT
- LS — EXISTING STREET LIGHT
- HH — EXISTING TRAFFIC HAND HOLE
- EXISTING TRAFFIC SIGN

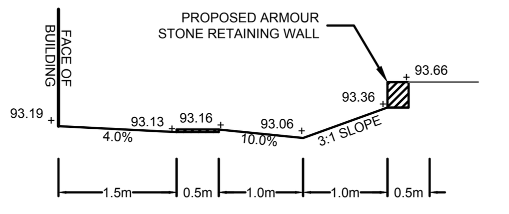
PAVEMENT STRUCTURE:

LIGHT DUTY
55mm HL3
150mm GRAN "A"
250mm GRAN "B" TYPE II

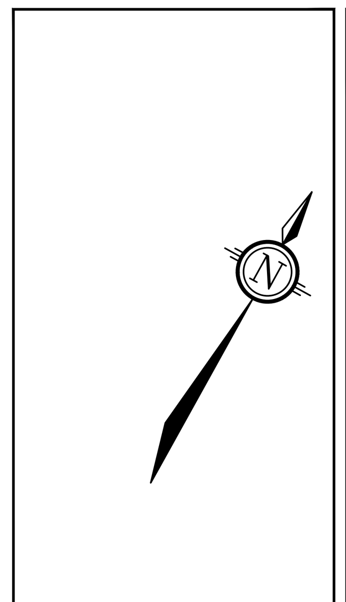
HEAVY DUTY
40mm HL3
50mm HL8
150mm GRAN "A"
400mm GRAN "B" TYPE II



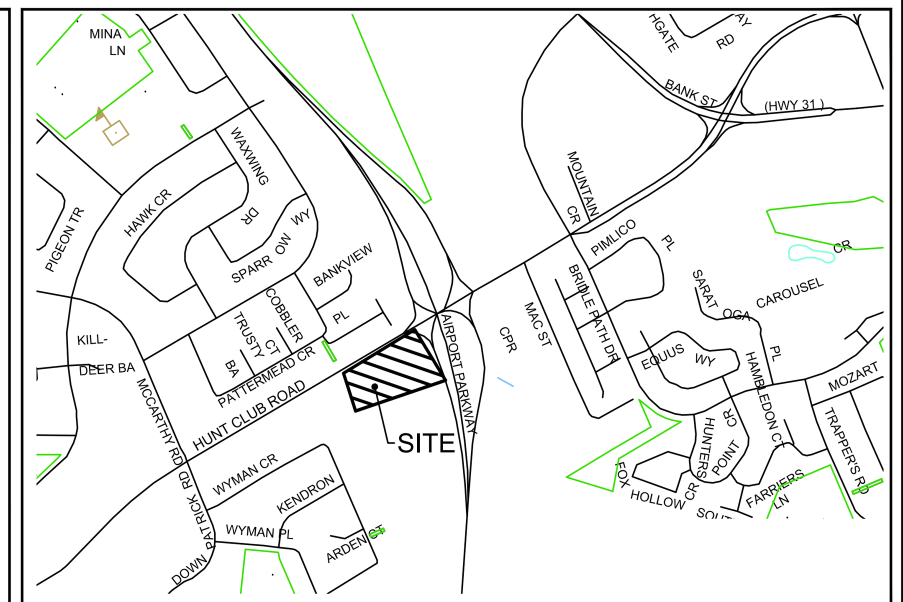
SECTION 'A'
SCALE: 1:150



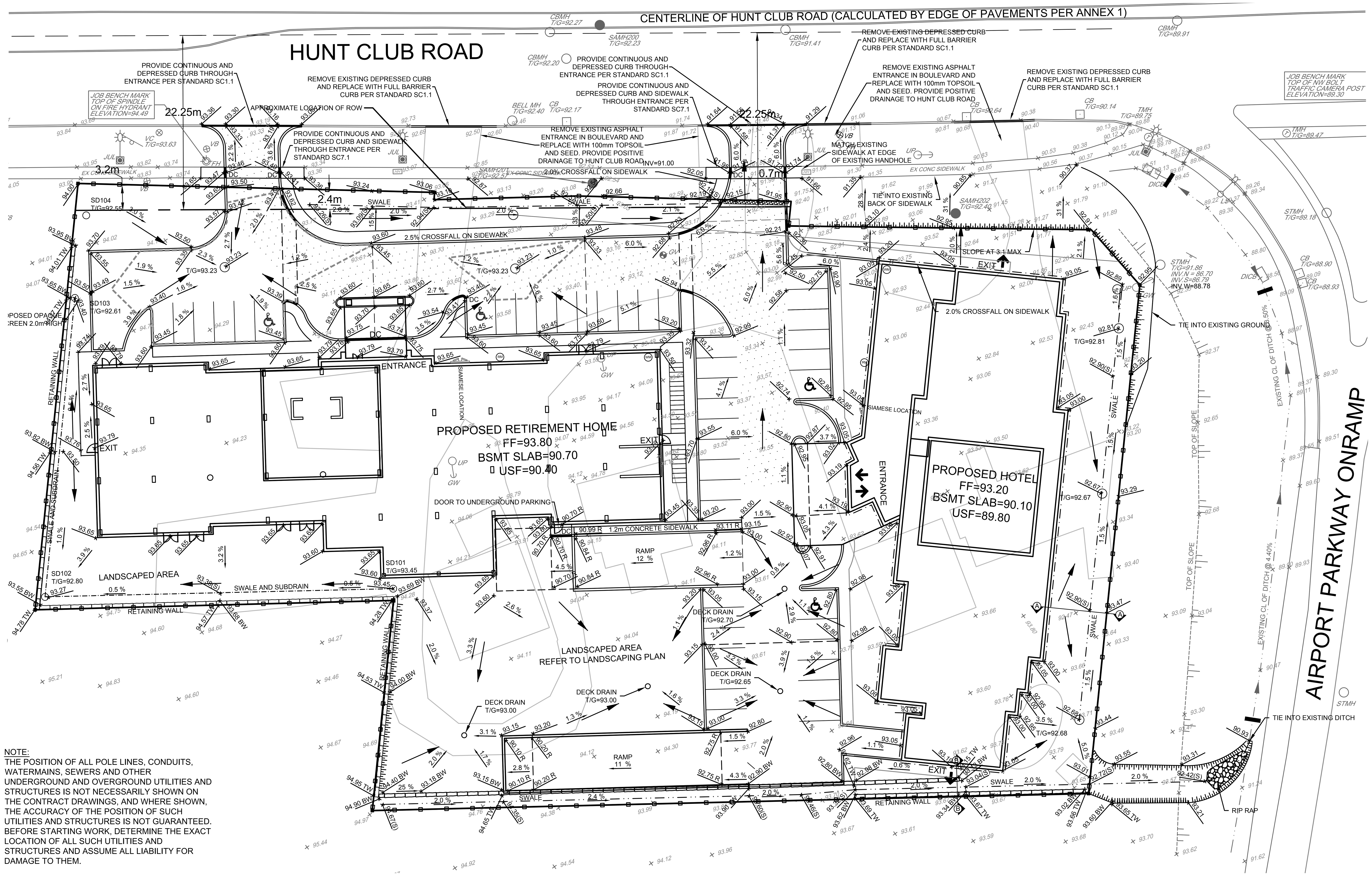
SECTION 'A'
SCALE: N.T.S



NORTH



KEY PLAN
N.T.S.



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

GENERAL NOTES:

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $5,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
6. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
7. ALL ELEVATIONS ARE GEODETIC.
8. REFER TO GEOTECHNICAL REPORT (No. PG4091-1, DATED APRIL 24TH, 2017), PREPARED BY PATTERSON GROUP FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT IS TO REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.
9. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARDSURFACE AREAS AND DIMENSIONS.
10. REFER TO STORMWATER MANAGEMENT REPORT(R-2017-058) PREPARED BY NOVATECH ENGINEERING CONSULTANTS LTD.
11. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
12. PROVIDE LINE/PARKING PAINTING.

GRADING NOTES:

1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED PAVED AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE PROOF ROLLED WITH A LARGE STEEL DRUM ROLLER AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.
3. ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
4. THE GRANULAR BASE SHOULD BE COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE COMPACTED TO AT LEAST 98% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
5. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
6. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
7. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
8. ALL CURBS SHALL BE BARRIER CURB (150mm) UNLESS OTHERWISE NOTED AND CONSTRUCTED AS PER CITY OF OTTAWA STANDARDS (SC1.1).
9. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.
13. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING AS-BUILT ELEVATIONS OF ALL DESIGN GRADES SHOWN ON THIS PLAN.

EROSION AND SEDIMENT CONTROL NOTES:

1. ALL EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED TO THE SATISFACTION OF THE ENGINEER, THE CITY OF OTTAWA, AND THE RIDEAU VALLEY CONSERVATION AUTHORITY. THEY ARE TO BE APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION. THESE PRACTICES ARE TO BE IMPLEMENTED IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL SUCH AS BUT NOT LIMITED TO: INSTALLING INSERTS UNDER CATCHBASIN GRATES AND FILTER CLOTH UNDER MANHOLE GRATES TO PREVENT SEDIMENT FROM ENTERING THE STRUCTURE AND INSTALLING AND MAINTAINING A LIGHT DUTY SILT FENCE BARRIER AS REQUIRED AS PER OPSD 219.110.
2. TO PREVENT SURFACE EROSION FROM ENTERING THE STORM SYSTEM DURING CONSTRUCTION, INSERTS AND FILTER CLOTH WILL BE PLACED UNDER ALL PROPOSED AND NEAR BY CATCHBASINS AND MANHOLES. THE FILTER CLOTH WILL REMAIN IN PLACE UNTIL VEGETATION HAS BEEN ESTABLISHED AND CONSTRUCTION COMPLETE.
3. TO LIMIT EROSION: MINIMIZE THE AMOUNT OF EXPOSED SOILS AT ANY GIVEN TIME, RE-VEGETATE EXPOSED AREAS AND SLOPES AS SOON AS POSSIBLE AND PROTECT EXPOSED SLOPES WITH NATURAL OR SYNTHETIC MULCHES.
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CLARIDGE HOMES
BUILDING QUALITY & VALUE FOR OVER 25 YEARS

APPROVED ☐ REFUSED ☐

THIS _____ DAY OF ____________, 20____

DON HERWEYER, MCIP, RPP, MANAGER
DEVELOPMENT REVIEW SOUTH
PLANNING, INFRASTRUCTURE AND

No.	REVISION	DATE	BY
2.	REVISED PER CITY COMMENTS	SEPT 7/17	GJM
1.	ISSUED FOR SITE PLAN APPLICATION	MAY 25/17	GJM

SCALE 1:300
1:300 (0 3 6 9 12)

DESIGN MTL
CHECKED GJM
DRAWN MTL
CHECKED GJM
APPROVED GJM

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
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Facsimile (613) 254-5867
Website www.novatech-eng.com

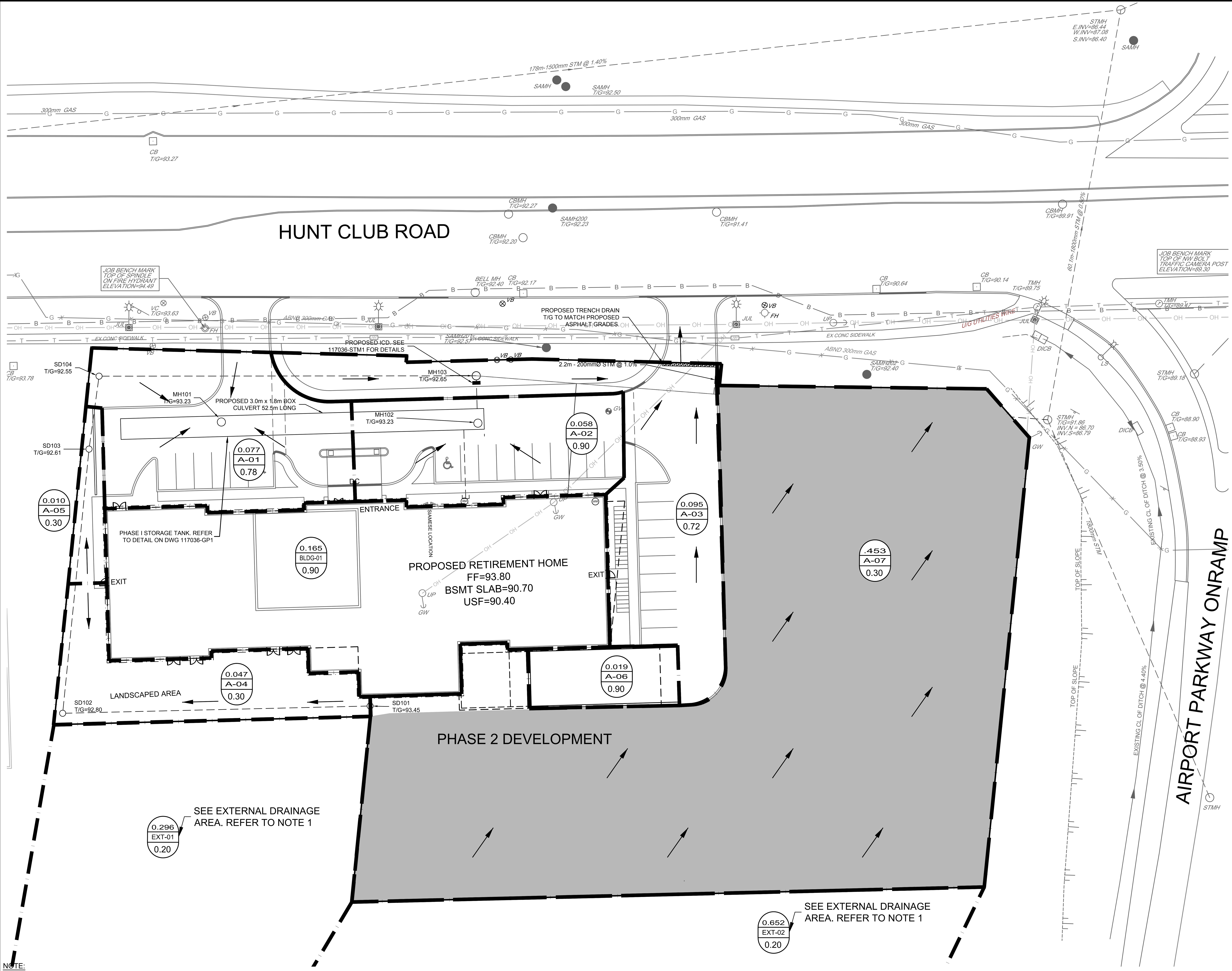
LOCATION
CITY OF OTTAWA
HUNT CLUB DEVELOPMENT

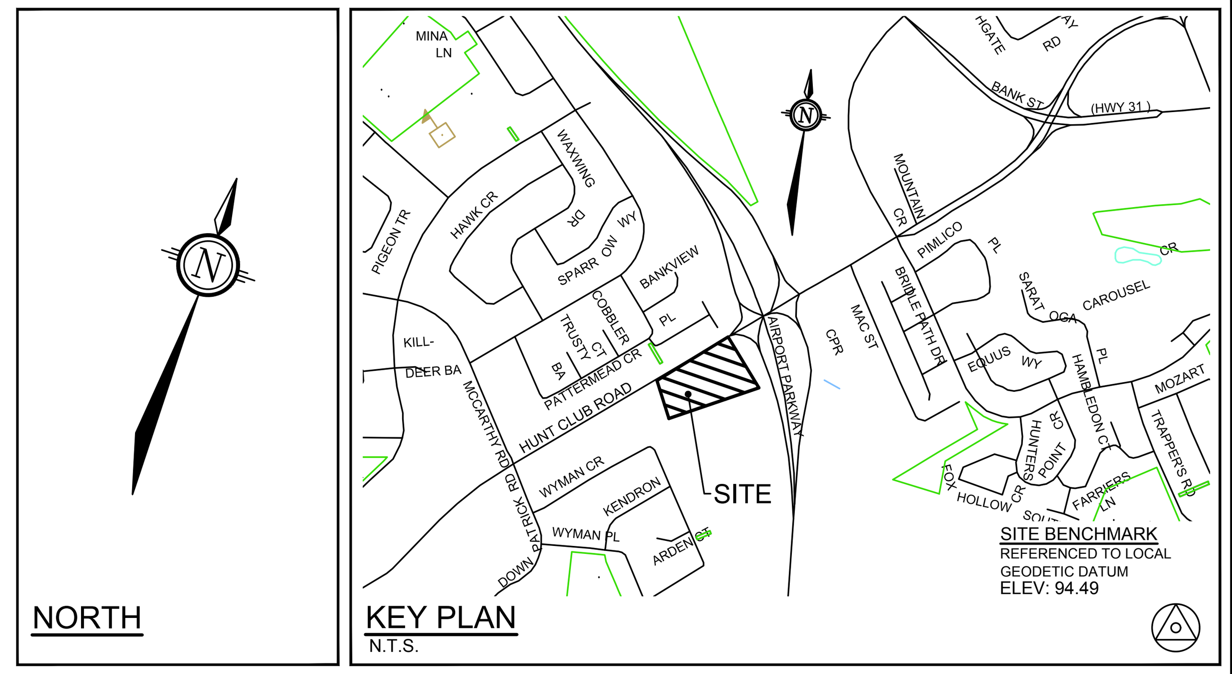
DRAWING NAME
GRADING AND EROSION & SEDIMENT CONTROL PLAN
PHASE 2

PROJECT No. 117036-00
REV REV # 2
DRAWING No. 117036-GR2

D07-12-17-0068

PLAN41.DWG - 841mmx594mm





LEGEND

- .453 / A-07 / 0.30 — DRAINAGE AREA (hectares), AREA ID, RUN-OFF COEFFICIENT
- STORM DRAINAGE AREA
- MH 100 — PROPOSED STORM SEWER AND MANHOLE
- DIRECTION OF OVERLAND FLOW

STORM ICD TABLE

STR. NO	T/G	100YR WL IN TANK	INVERT IN	ICD MODEL/SIZE	100-YR HEAD (m)	RELEASE RATE (L/s)
MH103	92.65	92.04	90.39	55mm IPEX TEMPEST LMF 14	1.65	2.4

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CLARIDGE HOMES
BUILDING QUALITY & VALUE FOR OVER 25 YEARS

APPROVED ☐ REFUSED ☐

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APPROVED	GJM

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER G.J. MacDONALD PROVINCE OF ONTARIO

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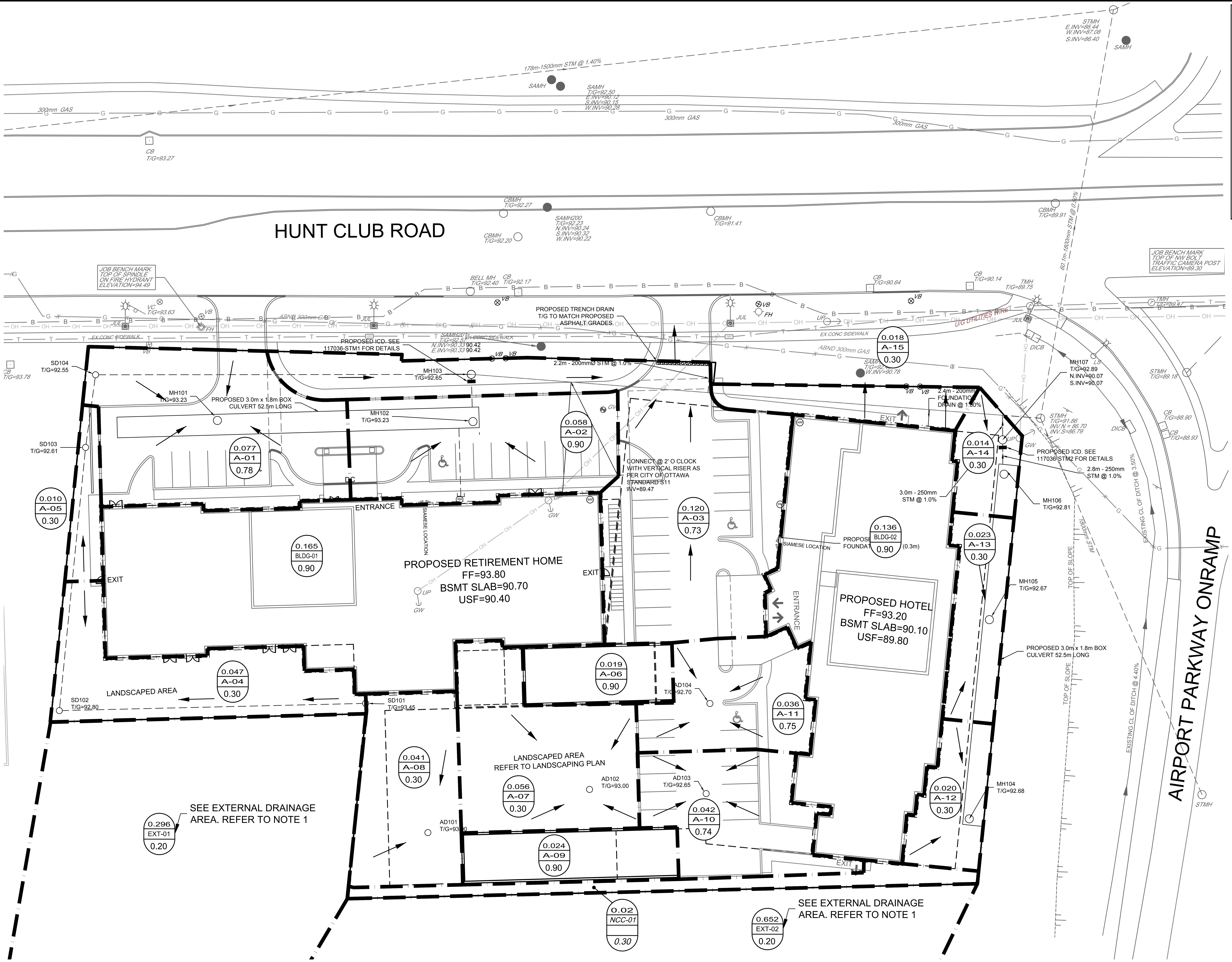
LOCATION
CITY OF OTTAWA
HUNT CLUB DEVELOPMENT

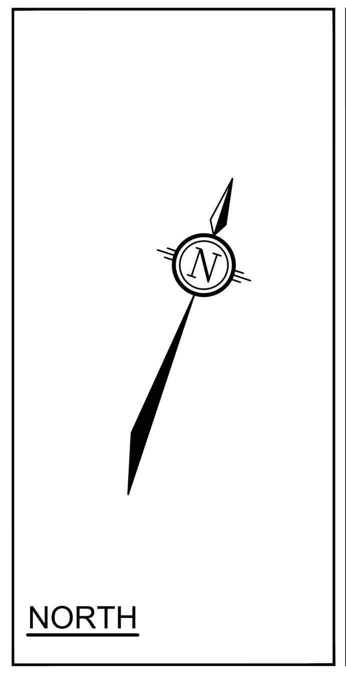
DRAWING NAME
STORM AREA DRAINAGE PLAN
PHASE 1

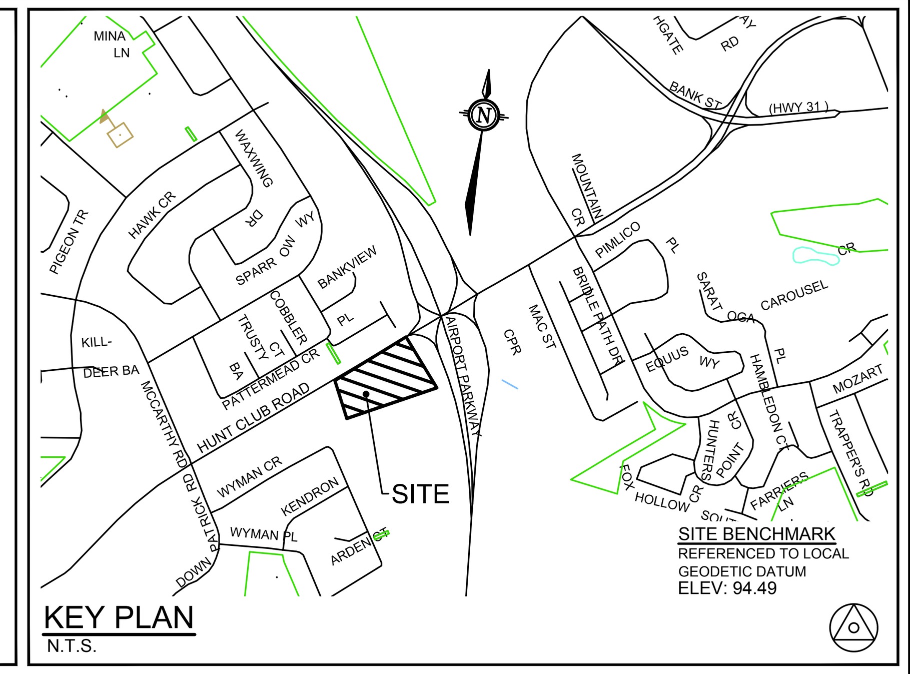
PROJECT No. 117036-00
REV: REV # 2
DRAWING No. 117036-STM1

D07-12-17-0068

PLANA1.DWG - 841mmx594mm







LEGEND

- .453 / A-07 / 0.30 — DRAINAGE AREA (hectares), AREA ID, RUN-OFF COEFFICIENT
- STORM DRAINAGE AREA
- MH 100 — PROPOSED STORM SEWER AND MANHOLE
- DIRECTION OF OVERLAND FLOW

STORM ICD TABLE

STR. NO	T/G	100YR WL IN TANK	INVERT IN	ICD MODEL/SIZE	100-YR HEAD (m)	RELEASE RATE (L/s)
MH103	92.65	92.04	90.39	55mm IPEX TEMPEST LMF 14	1.65	2.4
MH107	92.89	91.70	90.07	55mm IPEX TEMPEST LMF 14	1.63	2.1

NOTES:

1. REFER TO SERVICING REPORT *1026-1054 HUNT CLUB ROAD CLARIDGE HUNT CLUB DEVELOPMENT, SITE SERVICING AND STORMWATER MANAGEMENT REPORT - FIGURE 5 (NOVATECH, MAY 2017)*

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

M:\2017\117036\CAD\Design\117036_STM.dwg, STM2, Sep 07, 2017 - 12:38pm, mlinton

CLARIDGE HOMES
BUILDING QUALITY & VALUE FOR OVER 25 YEARS

APPROVED ☐ REFUSED ☐

THIS ____ DAY OF __________, 20____

DON HERWEYER, MCIP, RPP, MANAGER
DEVELOPMENT REVIEW SOUTH
PLANNING, INFRASTRUCTURE AND

No.	REVISION	DATE	BY
2.	REVISED PER CITY COMMENTS	SEPT 7/17	GJM
1.	ISSUED FOR SITE PLAN APPLICATION	MAY 25/17	GJM

SCALE 1:300

DESIGN	MTL
CHECKED	GJM
DRAWN	MTL
CHECKED	GJM
APPROVED	GJM

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