Functional Servicing & Stormwater Management Report
Innisfil Executive Estates (Phase 2)
Stroud, ON
Town of Innisfil

File 17-431A
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Prepared by

WMI & Associates Limited
119 Collier Street, Barrie Ontario L4M 1H5

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Appendices

1.0 Introduction

WMI & Associates Limited was retained by Innisfil Executive Estates (1820839 Ontario Ltd.) to prepare a Functional Servicing & Stormwater Management Report in support of the design and construction of Innisfil Executive Estates Phase 2 (herein referred to as 'Phase 2', or the 'site') of the proposed residential development located north of the intersection of Robertson Avenue and Victoria Street in the Village of Stroud, Town of Innisfil.

The Functional Servicing & Stormwater Management Report provided herein has been based on discussions with the Town of Innisfil staff, as well as the recently constructed Innisfil Executive Estates Phase 1 (herein referred to as 'Phase 1'). All proposed works are considered to be in conformance with the current Town engineering design standards.

The subject area of Phase 2 that is proposed for development comprises 4.78ha. The property is located north of the intersection of Robertson Avenue and Victoria Street in the Village of Stroud. The property is legally referred to as Block 39 and 41 of Registered Plan 51M-1045, Town of Innisfil, County of Simcoe.

The proposed development will consist of 21 estate residential units accessed by the extension of Robertson Avenue and the addition of a cul-de-sac.

An investigation of proposed site servicing and stormwater management (SWM) has been undertaken in order to support the planning approvals associated with the development of the above-mentioned property.

2.0 Background

The following is a summary of drawings/reports utilized in establishing the site constraints for the subject lands:

- Innisfil Executive Estates Subdivision (Town File No. I-T-880008), Stormwater Management Report, prepared by Gemmell Engineering (R5, May 2014).
- Geotechnical Investigation, Robertson Subdivision Stroud, Geospec Project No. 10-1626. Prepared by Geospec Engineering Ltd. January 20, 2011.
- Hydrogeological Impact Assessment, Innisfil Executive Estates Phase 2, Town of Innisfil, ON. Prepared by Azimuth Environmental Consulting Inc., June 2020 (AEC 17-069).
- Gemmell Engineering SWM Report (R5 May, 2014)

3.0 Development Design Criteria

The stormwater management design for the proposed development will incorporate the policies and criteria of a number of agencies, including the Town of Innisfil (Town), Lake Simcoe Region Conversation Authority (LSRCA), Ministry of Transportation (MTO) and the Ministry of the Environment Conservation & Parks (MECP). The stormwater design criteria for the development of the site are summarized below:

- Stormwater quality controls will be provided based on the guidelines described in the <u>Ministry of the Environment, Stormwater Management Planning and Design Manual dated March 2003 and the Low Impact Development Stormwater Management Planning & Design Guide (LID Manual) prepared by the Credit Valley Conservation (CVC) and the Toronto and Region Conservation Authority (TRCA), Version 1.0, dated 2010.</u> Following the MECP and LID Guidelines noted above, the stormwater management design utilized for the site will provide water quality control at an Enhanced Level of Protection (minimum of 80% Total Suspended Solids removal efficiency).
- Engineering Design Standards and Specifications Manual, Town of Innisfil (2020).
    - Post-to-Pre-Development stormwater peak flow quantity controls
    - An enhanced level of stormwater quality control
    - Erosion and sediment control
    - Provide a sufficient outlet for stormwater
- Innisfil Our Place Official Plan (January 2018).
- Comprehensive Stormwater Management Master Plan, Town of Innisfil (2016).
    - Implementation of LID source controls and treatment train approach
- Site layout and stormwater management design are based on the guidelines described in the South Georgian Bay Lake Simcoe Source Protection Plan amended on May 14, 2015.
    - South Georgian Bay Lake Simcoe Source Water Protection
- LSRCA Technical Guidelines for Stormwater Management Submissions (June 2016).
- Lake Simcoe Phosphorus Offsetting Policy, LSRCA, (September 2017).
- Total Phosphorus Reduction controls will be provided based on the guidelines described in the Lake Simcoe Protection Plan and the LID Manual (prepared by CVC and TRCA, 2010).

- The City of Barrie's Water Pollution Control Centre (WPCC) Station Rainfall Intensity-Duration-Frequency (IDF) data, adjusted to account for climate change, will be used to determine the peak design flows and runoff volumes for each of the design storm events analyzed. IDF data is included in **Appendix B**.
- The entire Innisfil Executive Estates site has been confirmed to be accounted for within the existing Phase 1 Stormwater Management (SWM) Wet Pond and as a result no further quantity control is proposed on-site. Excerpts from the Innisfil Executive Estates Subdivision Stormwater Management Report (prepared by Gemmell Engineering, revised May 2014) have been highlighted and are included in **Appendix G**.
- Erosion and Sediment Control measures will be implemented prior to and during the construction of the development and maintained until the site is stabilized.

4.0 Pre-Development Conditions

4.1 General

Currently the site consists of an unimproved area accessed from Victoria Street by Robertson Road in Stroud. The site is triangular in shape and bordered by the residential development Innisfil Executive Estates (Phase 1) to the west, the existing stormwater management pond to the south, and the GO Transit Railway along the eastern perimeter of the property.

4.2 Pre-Development Drainage

Runoff from the site is in the form of overland sheet flow, in the north-west to south-east direction, and grades on the property are gently sloped, in the order of 0.5 to 3.0% with approximately 5.5m of total topographic relief.

The existing condition of the Phase 2 lands yields a total area of 4.78ha and a runoff coefficient of 0.10.

The northern and western limits of the site border the rear lots of the Phase 1 estate residential area. External runoff from the north is conveyed overland by a drainage swale (with subdrain) that runs parallel to the GO Transit railway along the eastern border of Phase 2. This drainage swale discharges directly into the existing SWM Wet Pond located at the southern border of Phase 2.

The Phase 1 engineering design oversized the SWM Wet Pond to account for the future development of the Phase 2 lands. All stormwater runoff generated on-site for Phase 1 & Phase 2 is currently captured by the SWM Wet Pond and ultimately drains through a channel at the southeast corner of the SWM Wet Pond that runs parallel to the GO Transit Railway southeast underneath Victoria Street.

The Stormwater Management Report prepared by Gemmell Engineering (R5 May 2014) used a Visual OTTHYMO hydrologic model to design the SWM Wet Pond considering both the Phase 1 and Phase 2 lands. To confirm the adequacy of the existing SWM Wet Pond to continue to service the further development of Phase 2, WMI & Associates has simulated this model using the SWMHYMO hydrologic modelling software. Refer to **Appendix C** for the SWMHYMO modelling files. The modelling is further discussed in **Section 5.3**.

No other external drainage contributes runoff to the site as it is bound to the south by the existing SWM Wet Pond and to the east by the existing GO Transit Railway which intercepts any external drainage prior to it entering the site. The pre-development condition is referenced as ‘PRE1’ for all intents and purposes of this report.

The pre-development peak flow target rates for the site are based on the Stormwater Management Report, prepared by Gemmell Engineering (R5, May 2014) for Phase 1.

Refer to **Figure 2** in **Appendix A** for the Pre-Development Drainage Plan.

4.3 Soil Conditions

According to the Soils Map of Simcoe County, Ontario, South Sheet, Soil Survey Report No. 29 prepared for the Department of Agriculture, the site consists of Bondhead sandy loam which belongs to Hydrologic Soil Group ‘AB’ and is considered a good draining soil. The Runoff Coefficients and Curve Numbers associated with the site drainage area were computed by calculating weighted values based on corresponding land uses and soil type. The Hydrologic Soil Group was determined in accordance with the Ontario Ministry of Transportation (MTO) Soil Classification System (Refer to **Appendix B**).

The Hydrogeological Impact Assessment that was prepared by Azimuth Environmental Consulting, Inc. (June 2020) is based on the observation of thirteen (13) test pits and seven (7) groundwater monitoring locations across the site, as well as the Geotechnical Investigation prepared by Geospec Engineering Ltd. (January 20, 2011). Native soils observed in the test pits were found to consist mainly of silty clay and gravel. The report indicates that the native soils exhibit a range of permeability across the site (45-50min/cm in the north and 2-12min/cm in the south) and groundwater elevations of up to 1.7m below ground surface (mbgs). The report recommends that a conservative value of 45min/cm (13.3mm/hr) be used for the design of infiltration-based features.

Groundwater monitoring took place across 7 monitoring locations (Oct. 6, 2017 – Aug. 29, 2018). To observe the seasonally-high water level, manual measurements were taken in March, April, and June 2018. Groundwater levels were detected at 1.7mbgs in April and it is recommended that this groundwater elevation be assumed for the design of stormwater management features.

Refer to **Appendix D** for both the Geotechnical Investigation and Hydrogeological Impact Assessment.

4.4 Source Water Protection

From a source water protection perspective, and based on a review of the South Georgian Bay Lake Simcoe Source Protection Region (Approved South Georgian Bay Lake Simcoe Source Protection Plan, January 26, 2015 - amended February 15, 2018 - and MECP's Source Protection Atlas), the site is located within a Wellhead Protection Area "D" (25-year capture zone boundary) and also a Highly Vulnerable Aquifer Area. Additionally, the northern portion of the site is located within a Significant Groundwater Recharge Area.

To mitigate the potential contamination of the highly vulnerable aquifer, the portion of the site which contains asphalt area (driveways, road, and cul-de-sac) will be graded such that runoff will be contained within the Robertson Avenue ROW and discharge into the existing SWM Wet Pond (which discharges to Hewitt's Creek) minimizing any infiltration of untreated contaminated runoff.

It is noted in the Hydrogeological Impact Assessment that was prepared by Azimuth Environmental Consulting, Inc. (June 2020) that due to the nature of the site grading, the site is downgradient of the municipal well locations. The report also suggests that since the Stroud water supply system obtains its water from the deep regional Aquifer A3, that the 60m thick aquitard above Aquifer A3 serves as adequate protection from infiltration practices on-site. The vulnerability of the site is in relation to the shallow unconfined aquifer above the aquitard.

Due to the findings above, it is assumed that the development and the associated engineering design is not subject to further design requirements related to source water protection. However, we note that water balance is still required in accordance with the Conservation Authority's hydrogeological guidelines (refer to **Section 10.0, Water Balance**).

5.0 Post-Development Conditions

5.1 General

Post-development drainage patterns on-site will be consistent with the pre-development condition. All runoff from the site will enter the existing SWM Wet Pond which has been designed to provide both quantity and quality control for Phase 1 and Phase 2. The existing (retrofitted) Crossroads Subdivision SWM pond currently discharges to the Hewitt’s Creek watercourse.

5.2 Post-Development Drainage

The proposed residential development includes twenty-one (21) estate residential lots complete with an urban road cross-section (Robertson Avenue) connecting to Victoria Street just south of the subject lands. The proposed development of Phase 2 will be comprised of a total area of 4.78ha.

External flows from the Phase 1 lands located to the north of the site will be captured and conveyed by a ditch inlet catchbasin located within the rear yard of Lot 7. The proposed storm sewer within Robertson Avenue will extend to this ditch inlet catchbasin and be sized to convey 100yr peak flows from the contributing upstream Phase 1 lands.

As stated in **Section 4.4**, the impervious areas of the site that generate contaminated runoff will be graded such that they will drain onto the Robertson Avenue right-of-way, where runoff will flow south within a combination of the Robertson Avenue storm sewer system and roadway to convey the minor and major system peak flows respectively. Upon surcharge of the storm sewer and during major storm events, runoff will flow overland along the Robertson Avenue ROW and discharge into the existing SWM Wet Pond.

Flows from Robertson Avenue will be conveyed directly into the existing SWM Wet Pond where both stormwater quantity and quality control will be provided. The adequacy of the existing SWM Wet Pond was confirmed through hydrologic modelling discussed in **Section 5.3**.

Stormwater quality control will be provided for the site via a treatment train consisting of a storm sewer which will capture and pre-treat contaminated runoff from the Robertson Avenue ROW prior to discharging into the existing SWM Wet Pond which will provide additional quality control benefits. Additionally, vegetated filter strips in conjunction with a network of enhanced grass swales will aid with quality control, water balance, runoff volume control, and phosphorus reduction for any clean runoff draining from the rear yards and building rooftops.

Refer to **Figure 3** for the Post-Development Drainage Plan included in **Appendix A**. Refer to **Appendix B** for supporting calculations. Refer to **Appendix G** for further details on the supporting documents and figures mentioned above.

5.3 Hydrologic Modelling (SWMHYMO Model)

To confirm the adequacy of the existing SWM Wet Pond to continue to service the further development of Phase 2, WMI & Associates has modelled the site using the SWMHYMO Stormwater Management Hydrologic Model.

For the construction of Phase 1, the Visual OTTHYMO hydrologic model was used to design the existing SWM Wet Pond intended to service both the Phase 1 and Phase 2 lands (as indicated in the Stormwater Management Report prepared by Gemmell Engineering (R5 May 2014).

To maintain consistency with Phase 1, a sensitivity analysis was conducted comparing the original OTTHYMO model and the simulated SWMHYMO model. The SWMHYMO model was then updated to reflect the proposed land use changes (21 lot estate residential) for the Phase 2 catchment (model catchment 206B) in the post-development condition while using the existing SWM Wet Pond (route reservoir). The resulting output indicated that the existing SWM Wet Pond will be adequate to service the Phase 2 development for both quantity and quality control.

Refer to **Appendix C** for the SWMHYMO modelling files.

5.3.1 Pre-Development Condition Parameters

Using the site drainage areas as illustrated on “Pre-Development Storm Catchment Plan”, Drawing No. SWM-1, prepared Innisfil Executive Estates by Gemmell Engineering Ltd., accepted for construction by AECOM June 3, 2014 and the OTTHYMO Model included within the Innisfil Executive Estates Subdivision (Town File No. I-T-880008), Stormwater Management Report, prepared by Gemmell Engineering (R5, May 2014), pre-development target rates were determined for the site. The pre-development targets for the total site are summarized in **Table 1** below.

Table 1: Pre-Development Target Peak Flow Rates (Total Site)

Catchment	Area (ha)	Pre-Development Target Peak Flow Rates (12-hr SCS Type II Distribution)			
		5 yr. m³/s	10 yr. m³/s	25 yr. m³/s	100 yr. m³/s
Innisfil Executive Estates (Phase 1 & Phase 2)	20.21	0.1500	0.2700	0.4900	0.6900

5.3.2 Post-Development Condition Parameters

As illustrated on the “Post-Development Storm Catchment Plan”, Drawing No. SWM-2, prepared Innisfil Executive Estates by Gemmell Engineering Ltd., revised as per AECOM May 27, 2014. The 6.18ha catchment area referred to as “206” includes the entire subject site including some Phase 1 lands located just north of the site in the pre-development condition. The original modelling parameters for catchment “206” are summarized in **Table 2a** below.

Table 2a: Phase 2 Original Post-Development Parameters

Catchment	Area (ha)	CN	IA (mm)
“206”	6.18	44	5.0

To reflect the post-development condition currently proposed for Phase 2 (21 Lot Estate Residential development), catchment 206 (6.18ha) was modelled in two parts (206A & 206B respectively) to represent the remaining Phase 1 lands (206A - 1.40ha) and the developed condition of the Phase 2 lands (206B - 4.78ha). The proposed modelling parameters for Phase 2 are summarized in **Table 2b** below.

Table 2b: Phase 2 Proposed Post-Development Parameters

Catchment	Area (ha)	CN	IA (mm)
“206A”	1.40	44	5.0
“206B”	4.78	66	4.5

By comparing **Tables 2a** and **2b**, it is evident that the proposed development of Phase 2 will include more impervious area (and subsequently generate more runoff) than the original hydrologic model accounted for. Therefore, the results of the updated hydrologic model must confirm that post-development peak flow attenuation is still achieved for the site.

The updated hydrologic model outputs have been summarized in **Table 3** and are discussed in **Section 6.**

6.0 Stormwater Quantity Control

Table 3 below summarizes the Pre-development target rates, Post-development attenuated peak flows, as well as the resulting storage volume requirements and water elevations within the existing SWM Wet Pond for the total post-development Innisfil Executive Estates site (Phase 1 & Phase 2).

Table 3: Phase 1 & Phase 2 Quantity Control Results (Updated Hydrologic Model)

Storm Event (Year)	Post-Development Peak Flows (m^3/s) & Storage Volumes (m^3) for the Total Site (Phase 1 & Phase 2)				
	Total Area (ha)	Total Outflow (PRE Target Rate) (m^3/s)	Total Outflow (POST Controlled) (m^3/s)	Storage Required (m^3)	SWM Wet Pond Elevation (m)
2	20.21	0.1500	0.0500	2316	266.02
5		0.2700	0.1350	3298	266.20
25		0.4900	0.4060	4067	266.33
100		0.6900	0.6000	6090	266.66

The modelling results indicate the existing SWM Wet Pond has capacity within its permanent pool and active storage volume to accommodate the increase in peak flows from the development of Phase 2. Additionally, the site's total post-development peak flows will be attenuated to their corresponding pre-development target rates (or less) for each of the 2-100 year design storm events as shown in **Table 3** above. This will be achieved using the existing outlet structure located within the existing SWM Wet Pond.

Further investigation into the existing SWM Wet Pond revealed that there is a substantial amount of additional capacity (1198m^3 required < 1729m^3 provided) within the extended detention portion of the pond for quality control.

Considering the above, it is conclusive that quantity control can be achieved using the existing design. Refer to **Appendix C** for the SWMHYMO modelling files.

7.0 Stormwater Quality Control

The stormwater management requirements for this site were determined in consultation with the Town of Innisfil and the LSRCA. In determining the stormwater management practices to implement for the proposed development, various methods were considered. During the review, the main factors considered were as follows:

- Existing land characteristics and uses (topography, treatment area, location, seasonally high ground water elevation, soil type, building offsets, site layout, etc.);
- Local requirements and maintenance considerations with regard to quality control, water balance and phosphorus reduction;
- Facility feasibility & proximity to a suitable stormwater outlet;
- Ability to provide water balance and phosphorus reduction benefits;
- Utilizing an 'integrated treatment train' approach to treat stormwater runoff;
- The existing SWM Wet Pond that services both Phase 1 and Phase 2;

Stormwater quality control will be provided for the site via a treatment train consisting of a storm sewer which will capture and provide pre-treatment of contaminated runoff from the Robertson Avenue ROW prior to discharging into the existing SWM Wet Pond. Additionally, the grass lawns of each estate lot will act as vegetated filter strips (20-80% TSS Removal) for any clean runoff draining from the rear yards and building rooftops. The rear yards of each lot will have an enhanced grass swale (76% TSS Removal) that collects and conveys flows from the rear yard to the existing SWM Wet Pond. Each enhanced grass swale will be constructed with gentle slopes and a wide bottom area allowing runoff to infiltrate directly into the native soils.

The site grading is such that contaminated runoff from the vast majority of impervious area (access road and parking area) will be captured by the storm sewer and conveyed directly to the SWM Wet Pond for treatment. Pre-treatment BMPs will be incorporated into the proposed storm sewer system including deep sumps within all storm structures and Nyloplast Envirohoods in all inlet structures. Deep sumps will allow suspended solids to settle in the base of the structure while stormwater is being captured. In contrast, Nyloplast Envirohoods will prevent any floating debris and oil from entering the storm sewer pipes. This combination of contaminate removal will provide complete pre-treatment of runoff generated on the site and increase the effectiveness of the downstream SWM Wet Pond to ensure an Enhanced Level of quality control is achieved.

As noted in **Section 5.3 & 6.0** above, the development of Phase 2 is accounted for within the existing SWM Wet Pond which currently provides 80% TSS removal.

This treatment train has been chosen as the preferred means of providing complete quality control treatment of contaminated runoff generated from impervious areas on-site. Considering the above, it is reasonable to assume that 80% Total Suspended Solids (TSS) removal efficiency is considered to be achievable on-site via the use of the proposed treatment train approach with implementation of pre-treatment features in the inlets of all storm sewer structures, and the existing SWM Wet Pond.

Refer to **Appendix A** for supporting figures and plans.

8.0 Runoff Volume Control

Each feature within the proposed stormwater management treatment train will aid in providing sufficient runoff volume control for the site. The existing SWM Wet Pond has been oversized to accommodate additional extended detention volume. In comparison, the 25mm runoff volume generated by impervious surfaces for Phase 2 is 212.5m^3 [(0.85ha) x 25mm x 10]. The existing SWM Wet Pond has been oversized to provide 1729m^3 of extended detention storage (843m^3 required). The additional volume will be accommodated within the SWM Wet Pond with room to spare. This in itself will provide adequate runoff volume control for the site, yet other proposed BMPs will continue to provide runoff volume control and pre-treatment of runoff prior to it entering the existing SWM Wet Pond.

Vegetated filter strips constructed over native soils belonging to Hydrologic Soil Groups (HSG) A & B have been observed to provide an average runoff reduction of 50%. As noted earlier, the in-situ soils on-site belong to HSG AB and are conservatively estimated to sustain an infiltration rate of 13.3mm/hr. The high groundwater table is conservatively estimated to be 1.7mbgs. All landscaped area on-site will allow overland runoff to infiltrate directly into the native soils. Since the rear yards of each estate lot are extensive and proposed to be gradually sloped (2.0-4.0%) they will act as vegetated filter strips. Vegetated filter strips will accept and treat (filter/infiltrate) overland runoff providing significant water quality, phosphorus removal, and water balance benefits. As stated in the LID Manual, vegetated filter strips should maintain a separation distance of 1.0m from the seasonally high groundwater table (which will be achieved on-site). The vegetated filter strips will be upstream of the proposed enhanced grass swales which will provide further runoff volume control for the site.

Enhanced grass swales are proposed along the rear lot-lines of the site to convey overland runoff from the vegetated filter strips into the existing SWM Wet Pond. According to the LID Manual, enhanced grass swales constructed over HSG A & B soils typically achieve between 20-40% runoff reduction. The enhanced grass swales will discharge into the existing SWM Wet Pond.

9.0 Phosphorus Removal Initiatives

Phosphorus removal initiatives are also proposed for the subject site, in accordance with the requirements of the Lake Simcoe Protection Plan.

All runoff from the site will ultimately be treated by the existing SWM Wet Pond. For the purposes of this estimate, it has been conservatively assumed that all impervious area will only experience phosphorus removal within the SWM Wet Pond (63% phosphorus removal efficiency). In contrast, the rooftops and rear yards will be treated by both the vegetated filter strips (65% phosphorus removal efficiency) and enhanced grass swales (25% phosphorus removal efficiency) before entering the SWM Wet Pond, and a composite phosphorus removal efficiency has been estimated for this treatment train.

Using the MECP's TP Analysis tool, the calculated total post-development phosphorus export from the site is **0.09kg/yr** with the proposed BMPs, whereas the phosphorus export from the site without the BMPs is **0.62kg/yr**. Based on the above, **85%** TP load reduction from the post-development condition is provided based on the implementation of the proposed BMPs. Based on the above, the proposed design is considered to have maximized the TP removal potential for the development as much as possible. These calculations will be updated during the detailed design stage.

It is important to note that the above values conservatively do not account for the fact that runoff generated by the proposed building rooftops is generally considered to be clean as per the LID TTT. Considering the above, a best effort has been made to provide as much phosphorus removal as possible considering the site constraints that limit the feasibility of certain stormwater management features.

For supporting calculations, refer to the Lake Simcoe Phosphorus Loading Development Tool Project Development Summary located in **Appendix B**.

10.0 Water Balance Initiatives

A Hydrogeological Impact Assessment was prepared by Azimuth Environmental Consulting, Inc. (June 2020) and concluded that in order to maintain infiltration rates to pre-development conditions, the proposed grass swale network will be required to have a total base area of 772m^2 (minimum) in order to infiltrate the necessary volume (3170m^3/year). This requirement can be met with in the proposed design. The total length of the rear yard enhanced grass swales is approximately 400m and with a minimum bottom width of 2.0m would yield an area (excluding side slopes) of 800m^2.

Reduced lot grading, lot line swales, grass filter strips, and an enhanced grass swale network will all contribute to the infiltration of the runoff on-site. These features will also provide opportunity for nutrient uptake and evapotranspiration through the vegetative cover and retention they provide.

Refer to the Hydrogeological Impact Assessment prepared by Azimuth Environmental Consulting, Inc. included in **Appendix D.**

11.0 Sediment and Erosion Controls

The development consists of gentle slopes falling in a northwest to southeast direction. Due to the desire to match existing topography within the post-development condition, the site will be graded as little as possible. Where site grading is required, exposure of the soil during construction should be minimized to avoid erosion and sedimentation.

The following measures must be carried out prior to construction and maintained until disturbed areas have regained significant grass cover:

<u>Silt Fence:</u> Silt fence will be placed along the down slope of all excavated material to prevent sediment transport. Periodic inspections and repairs to the silt fence should be performed regularly, as well as after every rainfall event.

<u>Inlet Protection:</u> Clear stone will be wrapped in filter cloth to prevent sediment deposition within the void spaces of the clear stone from occurring.

<u>Vegetated Buffers:</u> Existing grassland vegetation/wooded areas along the development limits are to be maintained wherever possible. These areas will provide a natural barrier to filter potentially sediment-laden overland flow before it is released from the site.

<u>Mud Mat:</u> Mud tracking from construction traffic must be controlled through the use of a mud mat consisting of large diameter stone. The mud mat will be placed at the site entrance/exit where the construction traffic is proposed to access the site in order to contain the sediment tracked from within the development to this location.

Refer to **Drawing ESC** located within the engineering drawing set.

12.0 Water Servicing

The Phase 2 development is proposed to consist of 21 single family dwellings with an Average Daily Demand (ADD) conservatively estimated to be 0.58L/s. According to the OBC guidelines, a minimum water supply flow rate of 2700L/min (45 L/s) for firefighting purposes has been estimated for the proposed development. Alternatively, as requested by the Town of Innisfil, a more conservative firefighting flow of 57L/s has been used as the target flow rate. Refer to **Appendix B** for all water servicing calculations.

Based on the estimated domestic & fire flows mentioned above, a Water Distribution Modelling and Analysis Report (prepared by Tatham Engineering Dec. 20, 2019), and a subsequent Memorandum provided by InnServices (Jan. 6, 2020) indicate that a 150mmø looped watermain will be adequate to provide on-site domestic and fire services (see drawing **GEN** in **Appendix A**). While this assessment was completed based on 22 lots, the resulting analysis is valid for the current 21 lot proposal. To prevent stagnation within the main, the proposed system will include a 50mmø servicing loop located at the end of the cul-de-sac where a hydrant will be connected at the end of the 150mmø watermain. The remaining hydrants will be spaced at 120m radii (maximum) along Robertson Avenue as per municipal design standards.

The proposed water distribution system will have a connection to the existing 150mmø watermain located within the Victoria Street right-of-way at the Robertson Avenue intersection (see **GEN** in **Appendix A**).

An additional connection is proposed to the existing 150mmø watermain located within the Sunnybrae Avenue right-of-way just west of Block 39 (Lot 20). The connection is proposed to be located on the east side of the Sunnybrae Avenue right-of-way just in front of Block 39 (see **GEN** in **Appendix A**). In order to accommodate this connection across private property, this section of 150mmø watermain is proposed along the north side of Block 39 (Lot 19), as well as through the northern portions of Lot 14, 16, 17 (Phase 2). For maintenance purposes, a 6.0m easement is proposed within these properties along their respective northern property lines.

Based on municipal design standards, the proposed residential buildings will be serviced via 25mmø domestic water service connections respectively. The watermain and fire flow design calculations are included in **Appendix B**.

13.0 Sewage Disposal

The local residences within the Stroud community are currently serviced by individual sewage disposal (septic) systems. Similar to Innisfil Executive Estates Phase 1, the Phase 2 site is not currently supplied with sanitary sewage services, and there is no municipal sewage system nearby. We conclude that the best option for sewage is to service each lot by a single residential treatment system. Therefore, individual on-site sewage disposal systems are proposed for each of the 21 lots within the subject development.

To determine the impact that 21 new septic systems will have on the environment and groundwater regime, a Preliminary Hydrogeological Impact Assessment has been prepared by Azimuth Environmental (June 2020) in support of the subject development. In summary, the findings of this study indicate that the subject site can be serviced by individual septic systems with the addition of pre-treatment (tertiary) units supplied for each lot. The report is contained in **Appendix D** for reference.

13.1 Proposed Sewage Disposal System

There are many pre-treatment sewage disposal systems on the market which provide tertiary treatment and are commonly employed in Ontario. Norweco's Hydro Kinetic FEV System or the Waterloo Biofilter Systems Inc. (whose products are authorized by the Building Materials Evaluation Commission, BMEC # 99-08-236) manufactures and supplies various different configurations of pre-treatment sewage disposal systems. Specifically, their HDPE tank treatment systems would be useful for this particular application since they can be applied to smaller land area footprints, and since they are buried systems, any undesirable aesthetic impact would be minimal. A typical Waterloo Biofilter HDPE tank system configuration is contained in **Appendix E** for reference.

It should be noted that tile trenches must be located 0.9m above the high groundwater table, and have a sizing based on a design flow of 1,000 L/day. It should be noted that appropriate setbacks to existing private wells located adjacent to the development boundaries will need be provided in accordance with OBC criteria.

Consultation with local registered sewage hauling businesses confirmed that the transport and treatment of sewage from a 21-lot single detached residential subdivision would be feasible, having negligible impacts on treatment services. It was noted that some businesses produce sewage at a rate of 18,000-21,000 gallons/day, whereas the proposed residential development would produce sludge at a rate of approximately 2,000 gallons/lot every 2-5 years. Additionally, it was noted that the local registered sewage hauling businesses had never been rejected with a load at a treatment facility on the basis of capacity restrictions (despite having some clients with very high sewage volumes as noted above). Moreover, there are multiple existing treatment facilities in the local area (Orillia, Collingwood, Alliston etc.) which can be used at the sewage haulers' discretion.

It is our opinion that in regard to the proposed Innisfil Executive Estates Phase 2 development, individual on-site sewage disposal systems are a feasible means of servicing the 21 lots within the subject development, and there are sufficient methods to remove/haul/dispose of the sewage through the services of local contractors.

14.0 Road Works and Site Grading

The preliminary grading of the site is shown on the Site Grading Plan, **SGR** included in **Appendix A**. The proposed grading will meet the requirements of the site layout and stormwater management strategy. In order to achieve these goals, the following design criteria were used;

- Grading of roadway, parking and landscaped areas to be completed according to the Town of Innisfil engineering standards where possible;
- Minimize earthworks operations on-site (i.e. minimize cut/fill);
- Provide overland conveyance of stormwater to the proposed stormwater management facilities;
- Minimize the need for steep slopes where practical.

Based on the Geotechnical Investigation prepared by Geospec Engineering Ltd. (January 20, 2011), the proposed design for the Robertson Avenue, is:

- 50mm HL-3
- 50mm HL-4
- 150mm Granular A
- 400mm Granular B

It is recommended that the geotechnical engineer review the final engineering drawings during detailed design to confirm pavement structure, pipe bedding, slope stability, etc.

The site will consist of a mix of front-to-rear and split lot drainage with the front yards being directed to the proposed Robertson Avenue ROW while the rear yards will be directed to enhanced grass swales. Stormwater runoff will ultimately be directed into the existing SWM Wet Pond.

Design grades on the site range from 0.5 to 4.0% with specific areas consisting of up to 3:1 (H:V) side slopes in order to match existing grades at property line.

Based on the recommendations in the Geotechnical Investigation prepared by Geospec Engineering Ltd. (January 20, 2011) the proposed residential buildings can be constructed with full basements and each building can be constructed with strip and spread footings.

15.0 Utilities

Existing gas, hydro and telecom infrastructure is present within the Victoria Street right-of-way. In order to confirm that each of these services are available to service the proposed subdivision, the following utilities have been circulated a copy of the Draft Plan;

- Bell
- Rogers
- Hydro One
- Enbridge
- Canada Post

Based on the utilities that currently service the surrounding community, it is anticipated that there will be no issues with providing utility servicing for the site. Specific utility servicing requirements will be confirmed at the detailed design stage.

16.0 Traffic Design Brief

A scoped Traffic Design Brief (WMI & Associates Ltd., April 1, 2020) has been prepared for the site to determine the projected traffic volume impacts on the existing road network, and assess the sight-distance geometry from the site access location.

Refer to **Appendix F** for the Traffic Design Brief.

17.0 Summary and Conclusions

In summary, this Functional Servicing & Stormwater Management Report demonstrates how the proposed residential development can be sufficiently integrated into the Village of Stroud (within the Town of Innisfil) without imposing any negative/adverse impacts to the surrounding lands. Specifically, we note the following:

- The development of Innisfil Executive Estates (Phase 2) was accounted for within the design of the existing Innisfil Executive Estates Subdivision (Phase 1) SWM Wet Pond. WMI & Associates Ltd. has confirmed that the existing SWM Wet Pond has adequate capacity to accommodate the increase in peak flows generated by the proposed development of Phase 2. Additionally, the existing outlet structure within the SWM Wet Pond can control post-development peak flows to below pre-development target rates. Considering this, the existing SWM Wet Pond will provide adequate stormwater quantity control for the site, as well as quality control and phosphorus reduction benefits;
- Stormwater quality control will be provided via stormwater management treatment train consisting of a storm sewer equipped with deep sumps and Nyloplast Envirohood's within all inlet structures (which will provide pre-treatment of runoff upstream of the existing SWM Wet Pond) as well as vegetated filter strips and rear yard enhanced grass swales equipped with subdrain. The downstream existing SWM Wet Pond will provide a final treatment of stormwater including both TSS removal and phosphorus reduction. The treatment train will provide sufficient stormwater quality control at an Enhanced Level of protection in addition to as much water balance and phosphorus reduction as is possible based on the site constraints.
- Runoff volume control will be provided by the existing SWM Wet Pond which has been sized to store and drawdown the full 25mm of runoff volume from the site's impervious surfaces. In addition to this, the vegetated filter strips and enhanced grass swales on site will provide runoff reduction as they allow overland runoff to infiltrate into the native soils.
- The use of silt fence, clear stone & filter cloth inlet protection, vegetated buffer strips and a construction mud mat, will provide adequate sediment and erosion controls during construction and until the site is fully stabilized.
- The existing GO Transit Railway borders the eastern property line of the site. Adequate safety precautions are proposed for the development as recommended by "Guidelines for New Development in Proximity to Railway Operations", prepared by Dialog Design & J.E. Coulter Associates Ltd, May 2013. Building setbacks, a crash berm, and acoustic/safety fencing are all proposed for the development where required.

The stormwater management design as described above, can be constructed and maintained as a functional method of treating all stormwater run-off generated by the development. This Functional Servicing & Stormwater Management Report and the associated engineering design drawings are based on information provided at the time of their preparation and are considered only applicable to the proposed works as described in this report. Any changes subsequent to the report and drawings date of issuance should be reviewed by WMI & Associates Ltd. to ensure applicability of the design contained within the documents.

Based on the above, we request that this report be received by the Town of Innisfil and Lake Simcoe Region Conservation Authority in support of planning level approvals and will be subject to a future detailed design prior to the construction of the proposed residential development.

Respectfully submitted,

WMI & Associates Limited

Ben Daniels

Benjamin Daniels, B. Eng. Stephen Morash, P. Eng.

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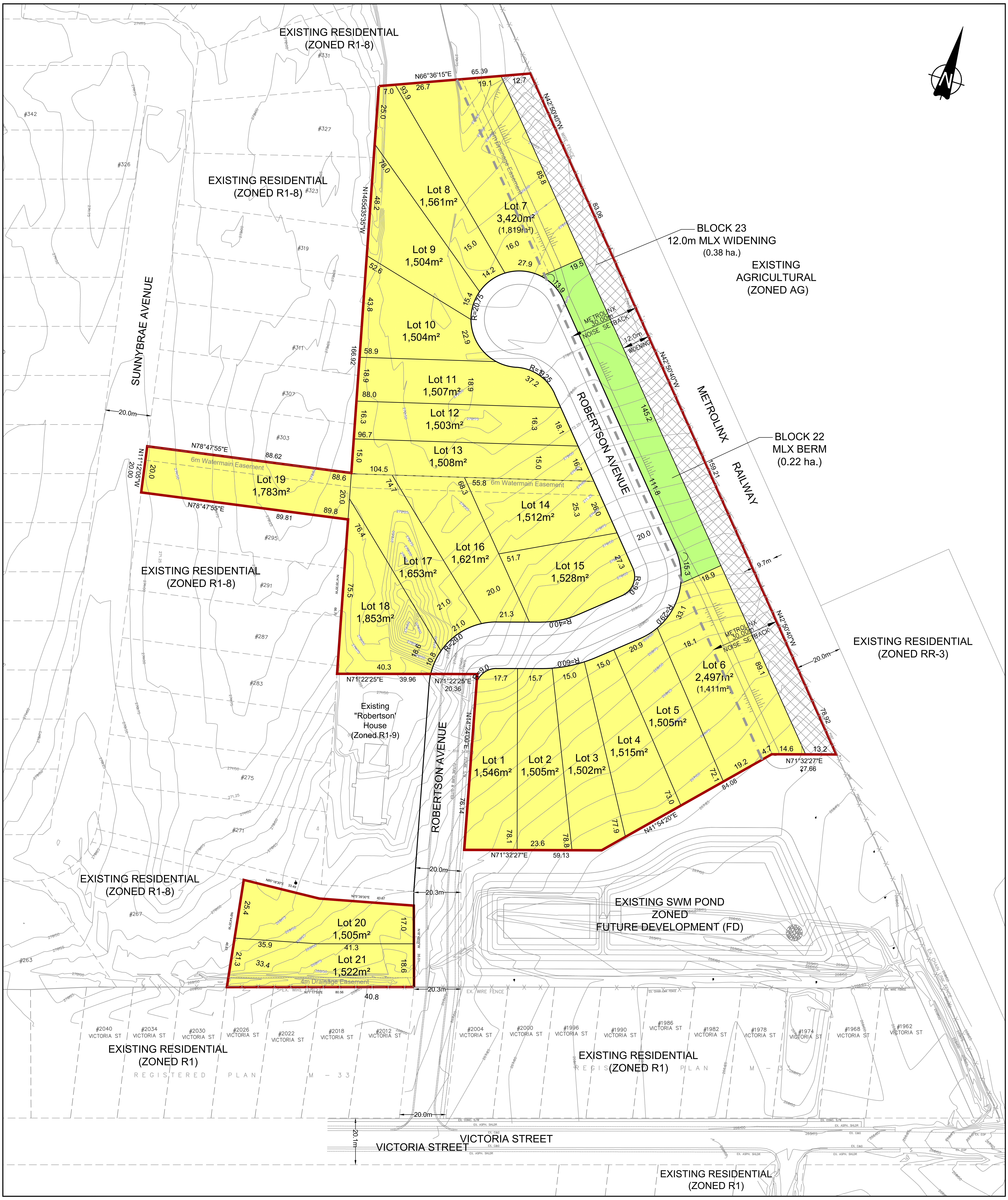
APPENDIX A

FIGURES / DRAWINGS



ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT

a) SHOWN ON PLAN
b) SHOWN ON PLAN
c) SEE KEY PLAN
d) LOW DENSITY RESIDENTIAL
e) SHOWN ON PLAN
f) SHOWN ON PLAN
g) SHOWN ON PLAN
h) MUNICIPAL WATER SERVICES
i) SANDY LOAM
j) SHOWN ON PLAN
k) INDIVIDUAL ON-SITE SEWAGE SERVICES
l) NONE

LAND USE STATISTICS

Land Use	Lot / Block No.	Area (ha.)	Units	Density
RESIDENTIAL SINGLE LOT (R1)	1-21	3.60	21	5.0 upha. 2.3 upac.
MLX BERM	22	0.22		
MLX 12.0m WIDENING	23	0.39		
ROADS (20.0m)	Robertson Avenue	0.57		
TOTAL	Lots -21 Blocks - 2 Total - 23	4.78	21	

APPROVED SUBJECT TO CONDITIONS IN ACCORDANCE WITH SECTION 51 OF THE PLANNING ACT. RSO, CHAP. P.13, AS AMENDED,

THIS _________ DAY OF _______________, 20___

DIRECTOR OF GROWTH
TOWN OF INNISFIL

DRAFT PLAN OF SUBDIVISION

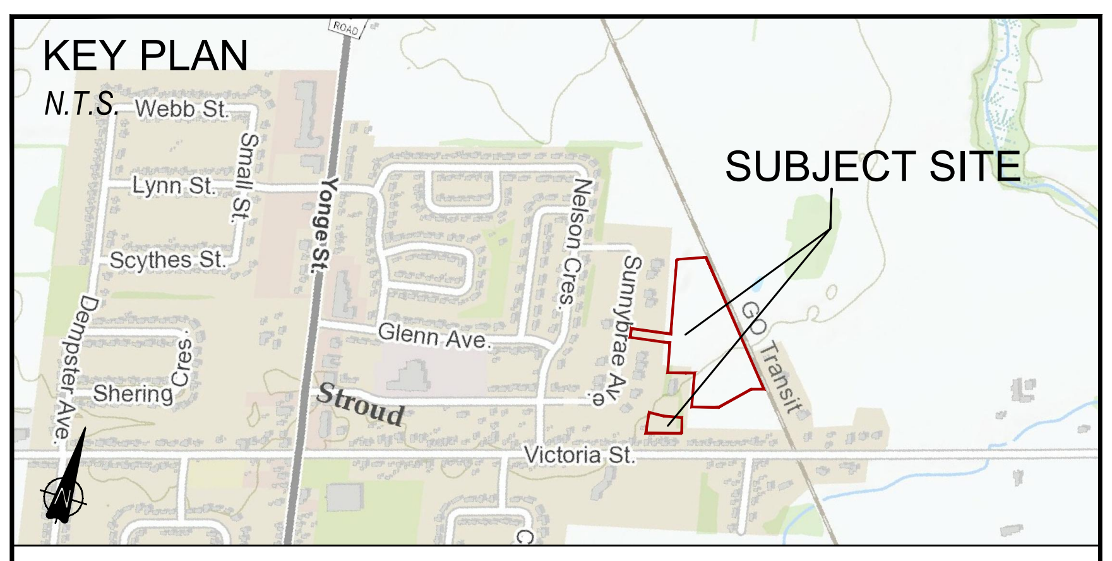
BLOCK 39 & 41, R.P. 51M-1045

FORMERLY IN THE GEOGRAPHIC TOWNSHIP OF INNISFIL
NOW IN THE
TOWN OF INNISFIL
COUNTY OF SIMCOE
2020

INNISFIL EXECUTIVE ESTATES PHASE 2

15 0 15 30 45 60 75
SCALE = 1:750

IPS
INNOVATIVE PLANNING SOLUTIONS
PLANNERS • PROJECT MANAGERS • LAND DEVELOPERS
647 WELHAM RD., UNIT 9, BARRIE, ONTARIO, L4N 0B7
tel: 705 • 812 • 3281 fax: 705 • 812 • 3438 e: info@ipsconsultinginc.com www.ipsconsultinginc.com



OWNER'S CERTIFICATE

I, THE UNDERSIGNED, BEING THE REGISTERED OWNER OF THE SUBJECT LANDS, HEREBY AUTHORIZE INNOVATIVE PLANNING SOLUTIONS TO PREPARE THIS DRAFT PLAN OF SUBDIVISION AND TO SUBMIT SAME TO THE TOWN OF INNISFIL FOR APPROVAL.

DATE

WAYNE EZEKEL, PRESIDENT
1820839 ONTARIO LIMITED

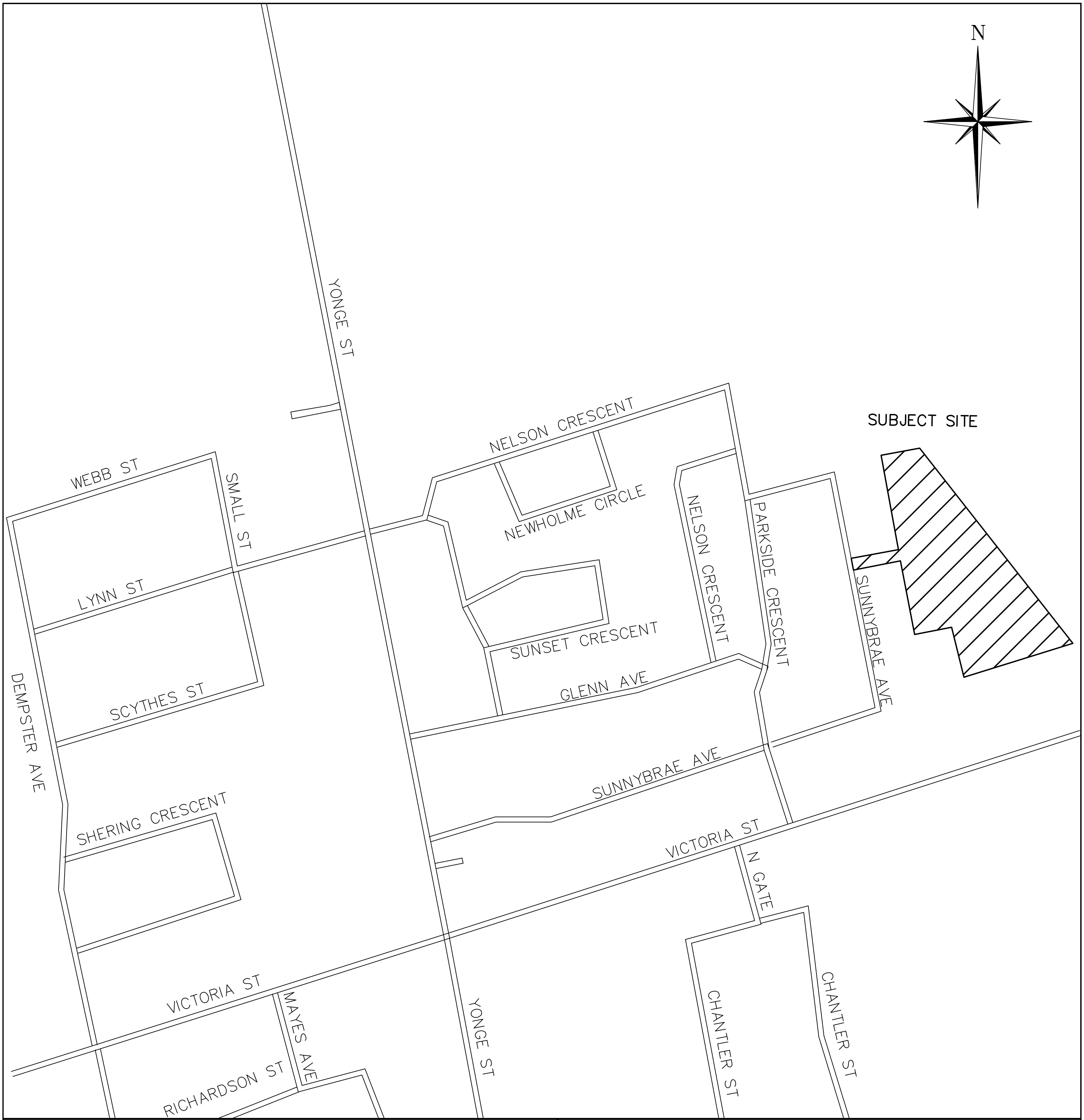
SURVEYOR'S CERTIFICATE

I CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATE

RUDY MAK, OLS

Date: May 27, 2020	Drawn By: BH
Scale: 1:750 metric (Arch D)	Project No.: IEE - Phase 2



Drawing Title

SITE LOCATION PLAN

Project Title

INNISFIL EXECUTIVE ESTATES
PHASE 2

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
705-797-2027
www.wmiengineering.ca

Drawn By BD	Checked By SM	Figure No. FIG 1
Scale N.T.S.	Project No. 17-431A	

Drawing Title

PRE-DEVELOPMENT DRAINAGE PLAN

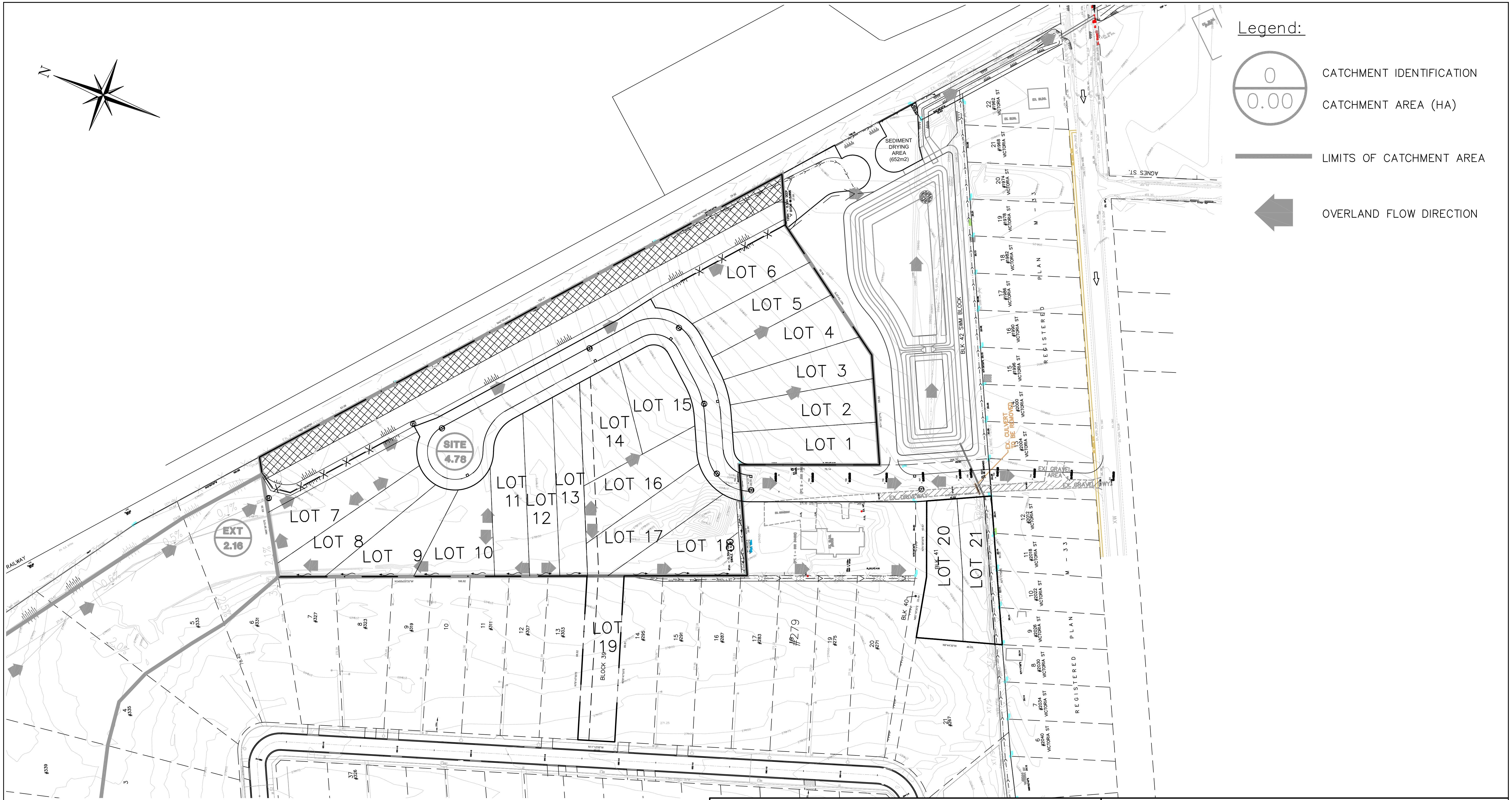
Project Title

INNISFIL EXECUTIVE ESTATES PHASE 2

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
705-797-2027
www.wmiengineering.ca

Drawn By BD
Checked By SM
Figure No. FIG 2
Scale 1:2000
Project No. 17-431A

C:\Users\BDANIELS\Desktop\COVID-19\1_Projects\17-431\Phase_2\CAD\WMI\Issue_No1\200519_17-431A_base.dwg, FIG2, 1:1



Drawing Title

POST–DEVELOPMENT
DRAINAGE PLAN

Project Title

INNISFIL EXECUTIVE ESTATES
PHASE 2

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
705-797-2027
www.wmiengineering.ca

Drawn By: BD
Checked By: SM
Figure No.: FIG 3
Scale: 1:2000
Project No.: 17–431A

NOTE
ALL ENHANCED GRASS SWALES c/w 200mmø SUBDRAIN.

CAUTION
CONTRACTOR TO DETERMINE LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.

Notes:

1. Unless noted otherwise, the measurements and distances shown on this drawing are shown in meters.

2. Do not scale drawings.

3. It is the contractor's responsibility to verify all dimensions, levels and datums on site and report any discrepancies or omissions to WMI & Associates Ltd. prior to construction.

4. This drawing is to be read and understood in conjunction with all other relevant documents applicable to this project.

5. This drawing is the exclusive property of WMI & Associates Ltd. and the reproduction of any part of this document without prior written consent is strictly prohibited.

SITE BENCHMARK: 272.38m
TOP NUT OF FIRE HYDRANT LOCATED AT THE NORTH–EAST CORNER OF SUNNYBRAE AVENUE, DUE SOUTH–WEST OF LOT 5.

MNR BENCHMARK: 270.600
0011931U461S TWP.: STROUD

TABLET LOCATION: PRESBYTERIAN CHURCH, IN VILLAGE, ABOUT 90m EAST OF TORONTO–NORTH BAY HWY. TABLET IN WEST CONCRETE FOUNDATION WALL OF WEST TOWER, 1.5m FROM S/W CORNER AND 1.37m BELOW CONCRETE BLOCKS.

DRAFT

No.	Issue / Revision	Date
1	SUBMISSION FOR NOISE ASSESSMENT	DEC. 20, 2019
2	TO CLIENT	JUN. 2, 2020

INNISFIL EXECUTIVE ESTATES
PHASE 2
GENERAL SERVICING PLAN

Client:

INNISFIL EXECUTIVE ESTATES
180839 ONTARIO Ltd.

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
Ph 705-797-2027
www.wmiengineering.ca

Drawn By BD	Checked By SM	Drawing No. GEN
Scale 1:750	Project No. 17–431A	

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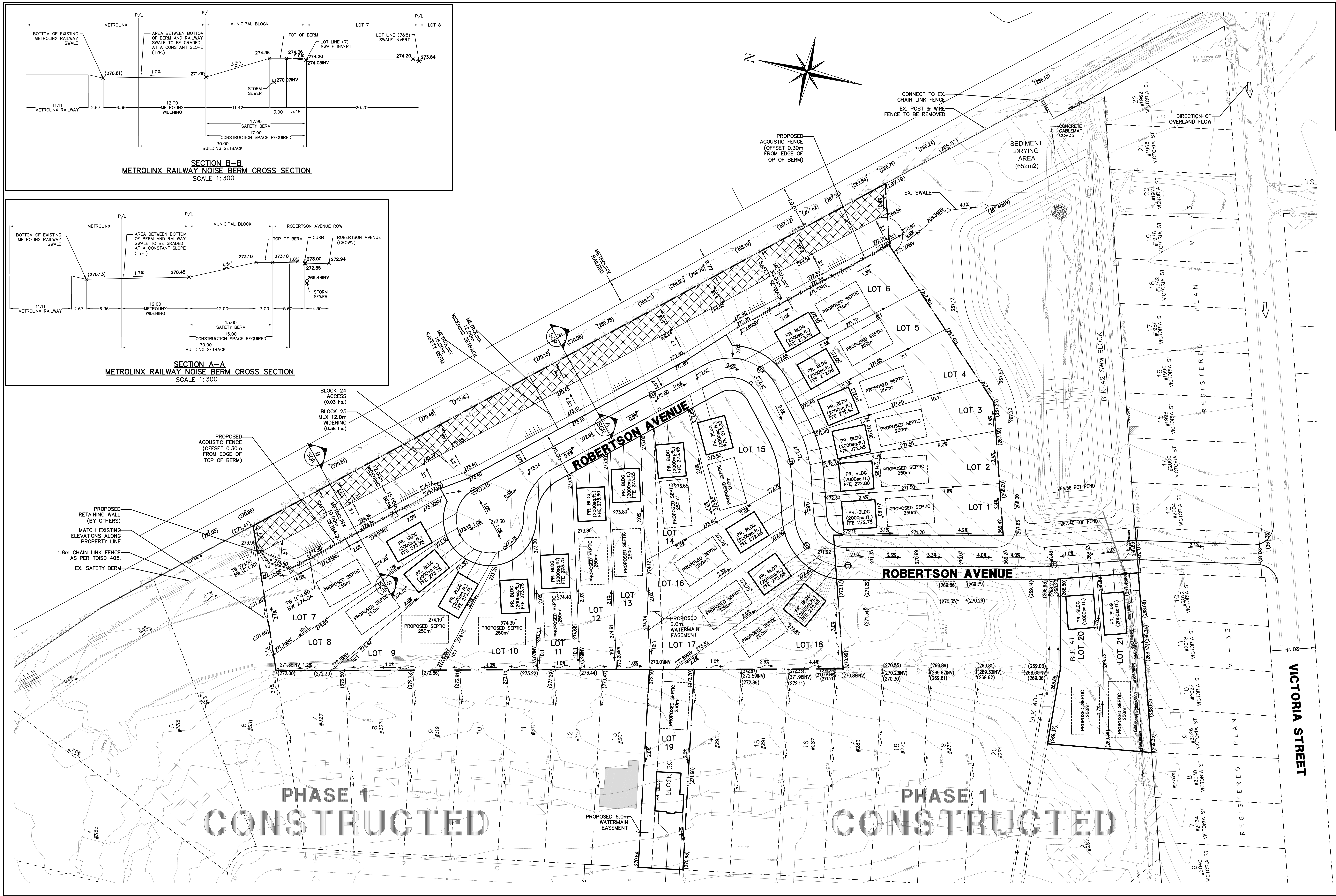

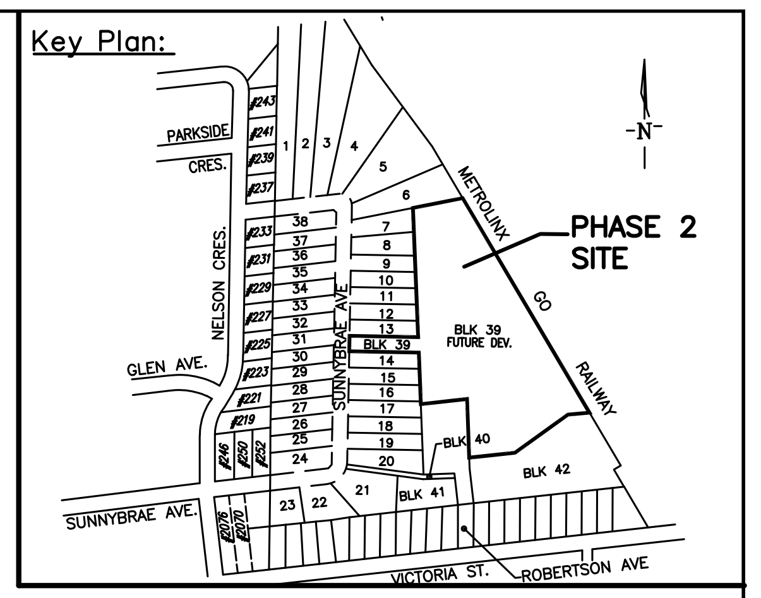

Legend:

EXISTING FEATURES (EX)

EX SIB	EX STD IRON BAR
EX IB	EX IRON BAR
EX UP	EX UTILITY POLE
☒	EX BELL PED
▼	EX HYDRO TRANSFORMER
EX WS	EX WATER SERVICE
EX HYD	EX FIRE HYD.
NS	EX ST NAME SIGN
SS	EX STOP SIGN
123.45	EX ELEVATION
—X—X—X—X—X—X—	EX FENCE
XG	EX U/G GASMAIN
XB	EX U/G BELL
XW EX WV	EX WATERMAIN & VALVE
EX 00mmø SAN @ 0.0%	EX SAN SEWER & MH
EX 00mmø STM @ 0.0%	EX STM SEWER & MH

PROPOSED FEATURES (PR)

NS	PR STREET NAME SIGN
SS	PR STOP SIGN
SF SF	PR SILT FENCE
Ⓛ	PR STREET LIGHT
▼	PR HYDRO TRANSFORMER
Ⓦ	PR WATER SERVICE
Ⓢ	PR SANITARY SERVICE
ST	PR STORM SERVICE
00mmø W/M	PR WATERMAIN
	PR FIRE HYDRANT
	PR WATER VALVE
0m—00mmø SAN @ 0.0%	PR SANITARY SEWER
MH K	PR SANITARY MANHOLE
0m—00mmø STM @ 0.0%	PR STORM SEWER
CBMH 4	PR CATCHBASIN MANHOLE
MH 4	PR MANHOLE
CB 4	PR CATCHBASIN
x 000.00	PR ELEVATION
x (000.00)	PR MATCH EXISTING ELEVATION (INTERPOLATED)
— — — —	PR EASEMENT
0.0%	PR SLOPE / SWALE
0.0%	EX SWALE

NOTE
ALL ENHANCED GRASS SWALES c/w 200mmø SUBDRAIN.

CAUTION
CONTRACTOR TO DETERMINE LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.

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DRAFT

No.	Issue / Revision	Date
1	SUBMISSION FOR NOISE ASSESSMENT	DEC. 20, 2019
2	TO CLIENT	JUN. 2, 2020

INNISFIL EXECUTIVE ESTATES
PHASE 2
SITE GRADING PLAN

Client:
INNISFIL EXECUTIVE ESTATES
180839 ONTARIO Ltd.

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
Ph 705-797-2027
www.wmiengineering.ca

Drawn By BD	Checked By SM	Drawing No.
Scale 1:750	Project No. 17-431A	SGR

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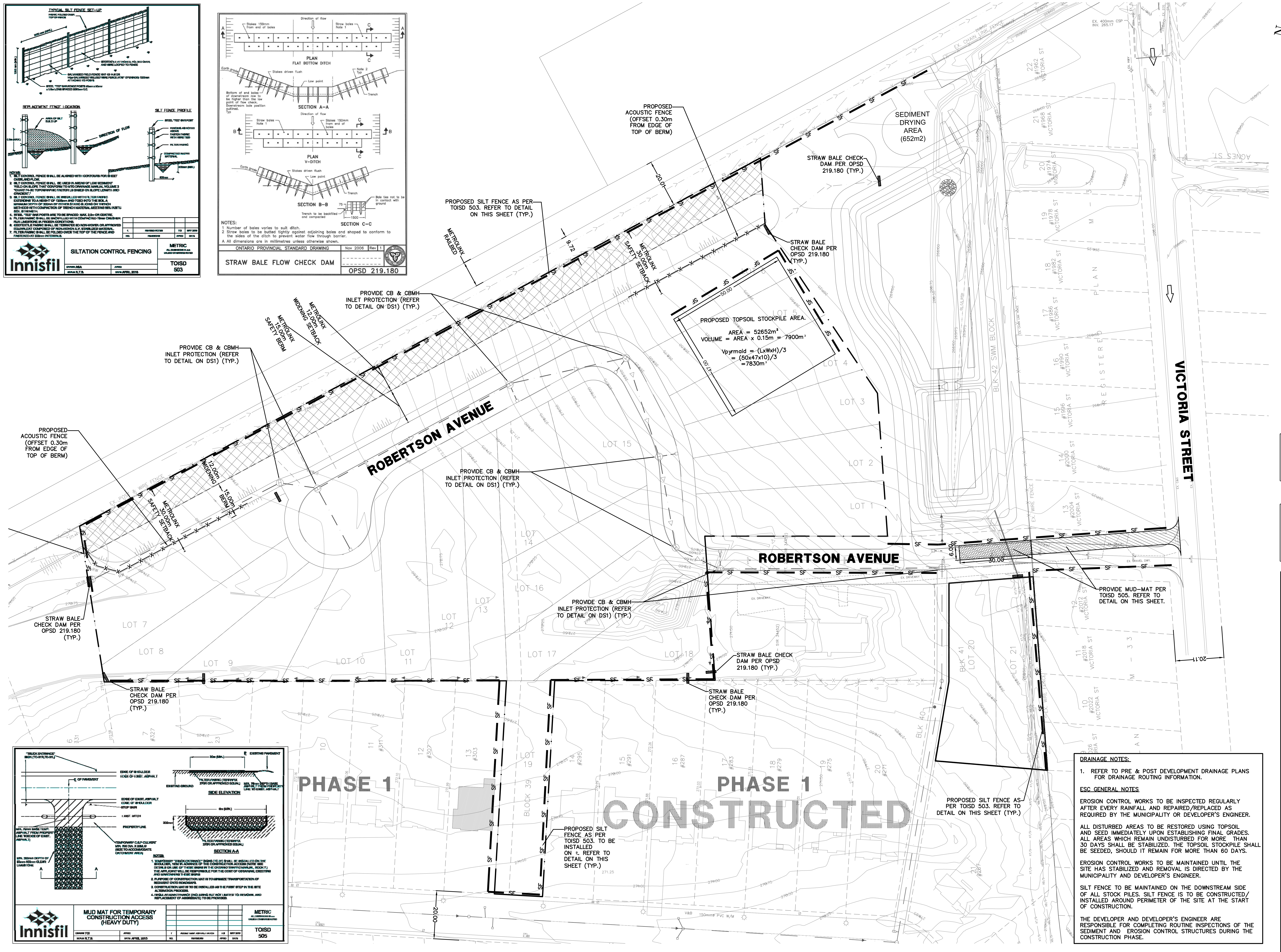

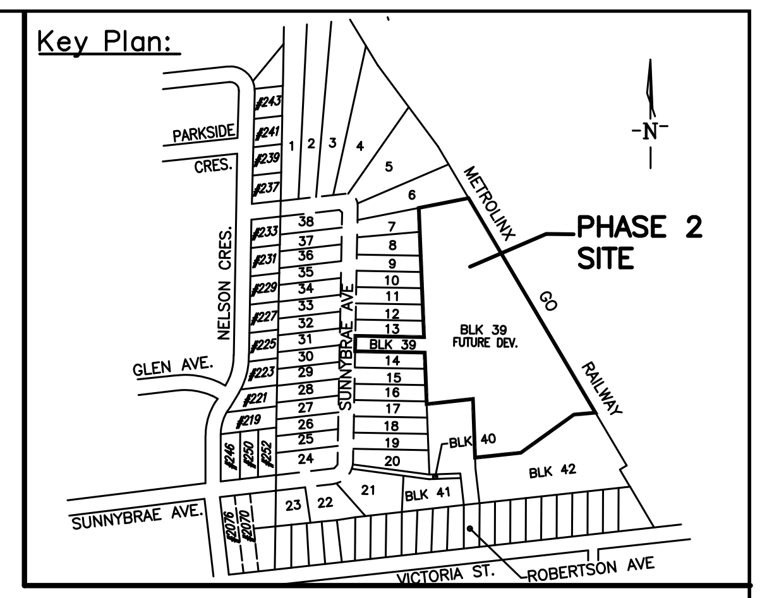

Legend:

EXISTING FEATURES (EX)

EX SIB	EX STD IRON BAR
EX IB	EX IRON BAR
EX UP	EX UTILITY POLE
☒	EX BELL PED
▼	EX HYDRO TRANSFORMER
EX WS	EX WATER SERVICE
EX HYD	EX FIRE HYD.
NS	EX ST NAME SIGN
SS	EX STOP SIGN
123.45	EX ELEVATION
—X—X—X—X—X—X—	EX FENCE
XG	EX U/G GASMAIN
XB	EX U/G BELL
EX WV XW	EX WATERMAIN & VALVE
EX 00mmø SAN @ 0.0%	EX SAN SEWER & MH
EX 00mmø STM @ 0.0%	EX STM SEWER & MH

PROPOSED FEATURES (PR)

NS	PR STREET NAME SIGN
SS	PR STOP SIGN
SF SF	PR SILT FENCE
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Ⓦ	PR WATER SERVICE
Ⓢ	PR SANITARY SERVICE
ST	PR STORM SERVICE
00mmø W/M	PR WATERMAIN
	PR FIRE HYDRANT
	PR WATER VALVE
0m–00mmø SAN @ 0.0%	PR SANITARY SEWER
● MH K	PR SANITARY MANHOLE
0m–00mmø STM @ 0.0%	PR STORM SEWER
CBMH 4	PR CATCHBASIN MANHOLE
○ MH 4	PR MANHOLE
□ CB 4	PR CATCHBASIN
x 000.00	PR ELEVATION
x (000.00)	PR MATCH EXISTING ELEVATION (INTERPOLATED)
— — — —	PR EASEMENT
0.0%	PR SLOPE / SWALE
0.0%	EX SWALE

NOTE

ALL ENHANCED GRASS SWALES c/w 200mmø SUBDRAIN.

CAUTION

CONTRACTOR TO DETERMINE LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.

EROSION AND SEDIMENT CONTROL DEVICE DETAILS

SILT FENCES

(A) EVERY SILT FENCE SHALL BE:
- (i) ALIGNED WITH SITE CONTOURS PREVENT THE DEVELOPMENT OF HIGH WATER VELOCITIES THAT CAUSE SOIL EROSION.
- (ii) A MINIMUM HEIGHT OF 1200mm.
- (iii) CONSTRUCTION OF SUITABLE WOVEN OR NON–WOVEN PERMEABLE GEOTEXTILE FABRICS FASTENED WITH WIRE FASTENERS TO PAGE WIRE FENCING OR ACCEPTABLE EQUIVALENT. FABRIC SHALL BE PLACED ON THE UPSLOPE SIDE AND A MINIMUM OF 300mm OF THE FABRIC SHALL BE TOED INTO THE GROUND TO A MINIMUM DEPTH OF 150mm.
- (iV) SUPPORTED WITH STEEL 'T' BAR FENCE POSTS WITH A SEPARATION DISTANCE OF NO MORE THAN 2.0 METERS.
- (V) ACCOMPANIED BY A VEGETATION BUFFER STRIP.
- (Vi) FREE OF DETERIORATION DUE TO PHYSICAL DAMAGE OR ULTRAVIOLET BREAKDOWN.
- (Vii) CLEARED OF SEDIMENT WHEN SEDIMENT DEPTH REACHES 150mm AT THE BASE OF THE FENCE.

CONSTRUCTION ACCESS MATS

(A) CONSTRUCTION ACCESS MATS SHALL BE INSTALLED AT ALL EXITS FROM THE SITE, AND SHALL BE DESIGNED AND MAINTAINED TO REMOVE MOST OF THE SEDIMENT ACCUMULATED ON VEHICLE TIRES

DRAIN INLET AND CATCHBASIN PROTECTION

(A) ALL POTENTIALLY AFFECTED STORM DRAIN INLETS AND CATCHBASINS SHALL BE PROTECTED WITH FILTER FABRIC OR EQUIVALENT BARRIERS, AS A SHORT TERM TEMPORARY SEDIMENT REDUCTION MEASURES.

(B) FILTER CLOTH PROTECTION MAY BE USED OVER THE CATCHBASIN INLET WHERE PONDING OF WATER WILL NOT OCCUR AND WHERE TRAFFIC WILL NOT AFFECT THE FILTER CLOTH.

(C) IN ALL OTHER CASES, CATCHBASIN INSERTS SHALL BE USED CONSTRUCTED OF FILTER CLOTH WITH OR WITHOUT A METAL SUPPORT STRUCTURE.

RUNOFF CONTROL

(A) CONCENTRATED RUNOFF FROM ADJACENT AREAS PASSING THROUGH THE SITE SHALL BE DIVERTED AROUND DISTURBED AREAS.

(B) RUNOFF FROM THE ENTIRE DISTURBED AREA ON THE SITE SHALL BE CONTROLLED AS FOLLOWS:
- (i) ALL DISTURBED GROUND LEFT INACTIVE SHALL BE PROMPTLY STABILIZED BY SEEDING, SODDING, MULCHING, OR COVERING, OR OTHER CONTROL MEASURES. THE MAXIMUM PERIOD OF INACTIVITY SHALL BE AT THE DISCRETION OF THE PROFESSIONAL BUT SHALL NOT EXCEED 60 DAYS.
- (ii) FOR SITES WITHOUT SEDIMENT CONTROL PONDS, SEDIMENT CONTROL FENCES AND CUT–OFF SWALE/CHANNEL OR EQUIVALENT CONTROL MEASURES SHALL BE PLACED ALONG ALL DOWNGRADIENT BOUNDARIES OF THE SITE.
- (iii) FOR THE SITES ADJACENT TO EXISTING RESIDENTIAL AREAS, A FENCE AND A CUT OFF SWALE/CHANNEL SHALL BE PLACED AROUND THE ENTIRE PERIMETER OF THE SITE TO PREVENT DRAINAGE ONTO PRIVATE LANDS. A THREE (3) METER WIDE BUFFER STRIP AND/OR SEDIMENT CONTROL FENCE SHALL BE PROVIDED ALONG THE PERIMETER OF THE DOWNGRADIENT BOUNDARIES OF THE SITE.

DRAINAGE NOTES:

1. REFER TO PRE & POST DEVELOPMENT DRAINAGE PLANS FOR DRAINAGE ROUTING INFORMATION.

ESC GENERAL NOTES

EROSION CONTROL WORKS TO BE INSPECTED REGULARLY AFTER EVERY RAINFALL AND REPAIRED/REPLACED AS REQUIRED BY THE MUNICIPALITY OR DEVELOPER'S ENGINEER.

ALL DISTURBED AREAS TO BE RESTORED USING TOPSOIL AND SEED IMMEDIATELY UPON ESTABLISHING FINAL GRADES. ALL AREAS WHICH REMAIN UNDISTURBED FOR MORE THAN 30 DAYS SHALL BE STABILIZED. THE TOPSOIL STOCKPILE SHALL BE SEEDED, SHOULD IT REMAIN FOR MORE THAN 60 DAYS.

EROSION CONTROL WORKS TO BE MAINTAINED UNTIL THE SITE HAS STABILIZED AND REMOVAL IS DIRECTED BY THE MUNICIPALITY AND DEVELOPER'S ENGINEER.

SILT FENCE TO BE MAINTAINED ON THE DOWNSTREAM SIDE OF ALL STOCK PILES. SILT FENCE IS TO BE CONSTRUCTED/ INSTALLED AROUND PERIMETER OF THE SITE AT THE START OF CONSTRUCTION.

THE DEVELOPER AND DEVELOPER'S ENGINEER ARE RESPONSIBLE FOR COMPLETING ROUTINE INSPECTIONS OF THE SEDIMENT AND EROSION CONTROL STRUCTURES DURING THE CONSTRUCTION PHASE.

Notes:

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DRAFT

No.	Issue / Revision	Date
1	SUBMISSION FOR NOISE ASSESSMENT	DEC. 20, 2019
2	TO CLIENT	JUN. 2, 2020

INNISFIL EXECUTIVE ESTATES
PHASE 2
EROSION & SEDIMENT
CONTROL PLAN

Client:

INNISFIL EXECUTIVE ESTATES
180839 ONTARIO Ltd.

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
Ph 705-797-2027
www.wmiengineering.ca

Drawn By JB
Checked By BD
Drawing No. ESC
Scale 1:750
Project No. 17–431A

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GENERAL – SUPPLEMENTARY NOTES:

1. ALL MEASUREMENTS ARE IN METRES, PIPE SIZES IN MILLIMETRES, UNLESS OTHERWISE NOTED.
2. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT MUNICIPAL STANDARDS IF MUNICIPAL STANDARDS ARE NOT APPLICABLE THEN THE MOST CURRENT ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS (IN THAT ORDER UNLESS NOTED OTHERWISE). IF A DISCREPANCY ARISES THE MUNICIPAL STANDARDS ARE TO GOVERN.
3. THE CONTRACTOR SHALL INFORM THE MUNICIPALITY AND ENGINEER A MINIMUM OF 48 HOURS IN ADVANCE OF COMMENCING ANY WORK. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING INSPECTION FOR ALL CIVIL WORKS WITH THE ENGINEER IN ORDER TO PROVIDE SUFFICIENT CERTIFICATION AS REQUIRED BY THE MUNICIPALITY.
4. ALL DIMENSIONS AND ELEVATIONS ARE TO BE CHECKED AND VERIFIED BY THE CONTRACTOR. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER.
5. TRAFFIC CONTROLS TO CONFORM TO THE LATEST REVISION OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES AND ONTARIO TRAFFIC MANUAL TEMPORARY CONDITIONS (BOOK 7).
6. STREET AND TRAFFIC SIGNS – M.T.O. STANDARDS IF MUNICIPAL STANDARDS DO NOT EXIST.
7. FILTER FABRIC – TERRAFIX 270R OR APPROVED EQUAL.
8. DEWATERING TO BE CARRIED OUT IN ACCORDANCE WITH OPSS–517 AND 518 TO MAINTAIN ALL TRENCHES IN A DRY CONDITION, CONTRACTOR IS RESPONSIBLE FOR OBTAINING NECESSARY PERMITS FOR DEWATERING.
9. ALL SEWER SYSTEMS INCLUDING SERVICE CONNECTIONS TO THE SEWER MAINS AS WELL AS CATCHBASINS AND MANHOLES SHALL BE THOROUGHLY FLUSHED AND/OR CLEANED OF DEBRIS AND ALL PIPES SHALL BE TESTED IN ACCORDANCE WITH OPS AND MUNICIPAL REQUIREMENTS – INCLUDING BUT NOT LIMITED TO DEFLECTION TESTING AND CCTV BY AN APPROVED VIDEO CAMERA TESTING COMPANY, THE ENGINEER SHALL BE PROVIDED A COPY OF APPROPRIATE DATA UPON COMPLETION OF CONSTRUCTION AND PRIOR TO FINAL APPROVAL. ANY SECTIONS OF SEWER OR SERVICE CONNECTIONS THAT FAIL TO MEET THE REQUIREMENTS SHALL BE REPAIRED OR REPLACED AT THE DIRECTION OF THE ENGINEER. ONLY CHEMICAL PRESSURE GROUTING REPAIR TECHNIQUES WILL BE CONSIDERED ACCEPTABLE.
10. THESE ENGINEERING DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF THE GEOTECHNICAL INVESTIGATION. GEOTECHNICAL INSPECTION & MATERIALS TESTING TO BE PROVIDED DURING ALL SERVICING, PARKING LOT SUB–GRADE, PARKING LOT BASE, PAVEMENT, AND CONCRETE WORKS.
11. FOR SPECIFIC DIMENSIONS AND BUILDING INFORMATION REFER TO SITE PLAN/ARCHITECTURAL DRAWINGS.
12. PIPE DEFLECTION SHOULD BE USED WHEREVER POSSIBLE TO MINIMIZE THE USE OF BENDS, WHEREVER IT IS NECESSARY TO DEFLECT FROM A STRAIGHT LINE, EITHER IN THE VERTICAL OR HORIZONTAL PLANE. THE AMOUNT OF DEFLECTION SHALL NOT EXCEED THE MANUFACTURER'S SPECIFICATIONS.

ABOVE GROUND WORKS:

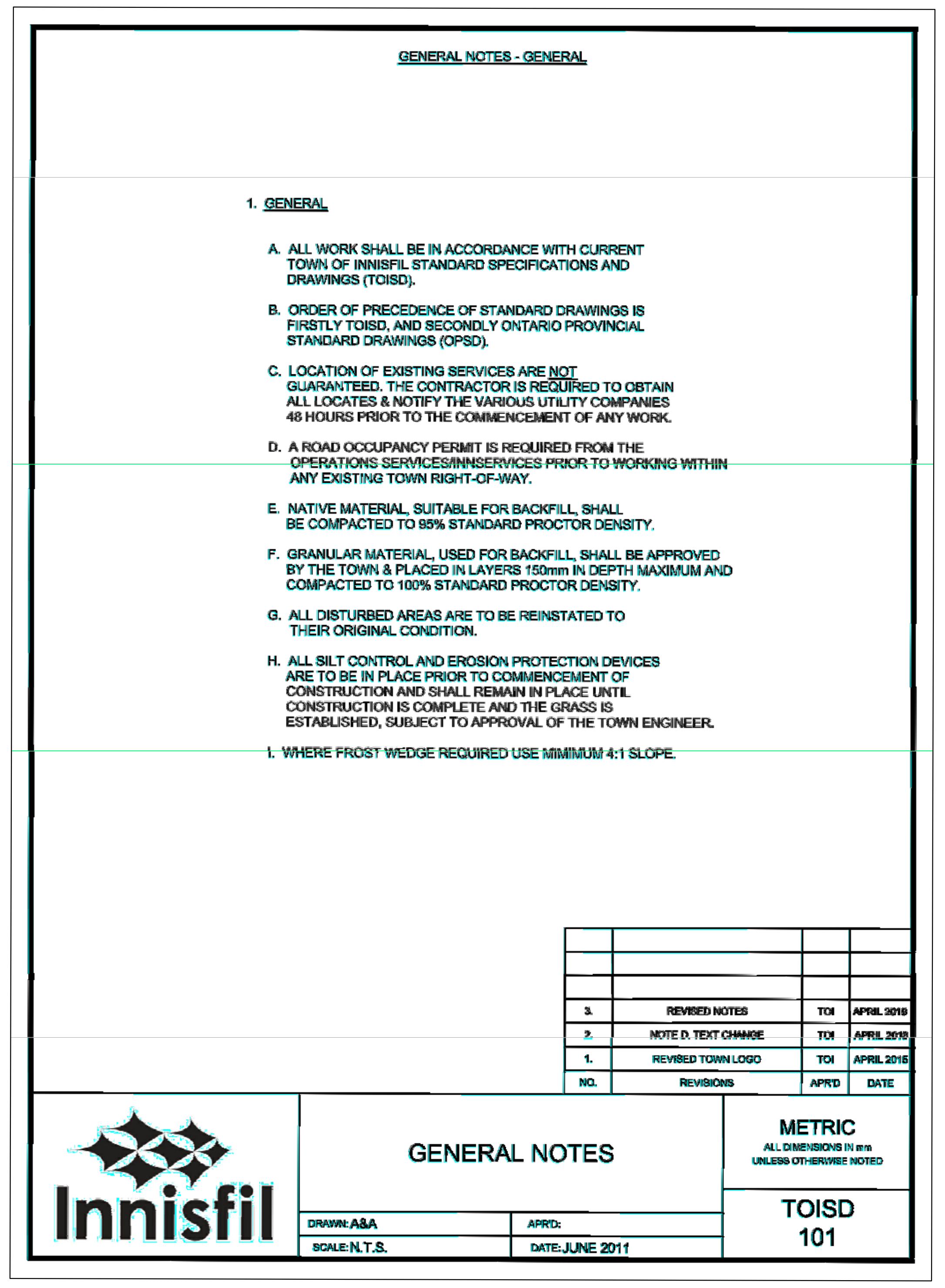
1. SUB–GRADE PREPARATION TO BE COMPLETED IN ACCORDANCE WITH THE GEOTECHNICAL INVESTIGATIONS RECOMMENDATIONS, AND SHALL BE PROOF ROLLED.
2. ASPHALT SURFACES TO BE CONSTRUCTED AS SHOWN ON THE PAVEMENT CROSS–SECTION DETAIL ON DRAWING DETAILS SHEET.
3. CONCRETE CURB ON THE PROPERTY TO BE AS PER OPSD–600.110 BARRIER CURB. CURBS RECONSTRUCTED IN THE MUNICIPAL RIGHT–OF–WAY ARE TO MATCH THE EXISTING CURB TYPE UNLESS OTHERWISE NOTED.
4. SIDEWALKS TO BE CONSTRUCTED AS PER OPSD 310.010, 310.020, & 310.030.
5. CONCRETE STRENGTH FOR CURB AND SIDEWALK IS TO BE 30MPa AT 28 DAYS.
6. A ROAD OCCUPANCY PERMIT IS REQUIRED PRIOR TO COMMENCEMENT OF WORK IN ANY MUNICIPAL RIGHT–OF–WAY.
7. A SITE ALTERATION PERMIT MAY BE REQUIRED FROM THE MUNICIPALITY PRIOR TO THE COMMENCEMENT OF EARTHWORKS.

STORM SEWER:

1. ALL SITE DRAINAGE POSSIBLE, INCLUDING ALL ROOF AND ASPHALT DRAINAGE, IS TO BE DIRECTED TO THE STORMWATER MANAGEMENT SYSTEM.
2. PIPE MATERIAL TO BE REINFORCED CONCRETE WITH A MINIMUM STRENGTH OF 50 N/m/mm CERTIFIED TO C.S.A. STANDARD A257.2 CLASS 50–D OR PVC CERTIFIED TO C.S.A. STANDARDS 182.2 AND 182.4.
3. STORM SEWER TO BE MINIMUM 300mm DIAMETER WITH JOINTS CONFORMING TO C.S.A. STANDARD A257.3.
4. MODULAR ADJUSTMENT UNITS FOR MANHOLES TO BE PROVIDED IN ACCORDANCE WITH OPSD 704.010. MAXIMUM THICKNESS OF ADJUSTMENTS UNITS IS 300mm.
5. STORM SEWER BEDDING AS PER OPSD 802.010 (FLEXIBLE PIPE) OR 802.030 (RIGID PIPE).
6. MANHOLES AND CATCHBASINS ARE TO BE IN ACCORDANCE WITH OPSD STANDARDS AND ARE TO INCLUDE SUMPS.
7. STORM SEWER COVER LESS THAN 1.2m TO PIPE OBVERT WILL REQUIRE FROST PROTECTION (INSULATION, SEE DETAIL ON DRAWING DS1).
8. ALL STORM MANHOLES SHALL BE COMPLETED WITH FROST STRAPS AS PER OPSD 701.100.

WATERMAINS:

1. WATERMAIN PIPES, FITTINGS, HYDRANTS, SERVICE PIPE TYPES & MANUFACTURERS ARE TO BE IN ACCORDANCE WITH MUNICIPAL STANDARDS.
2. WATERMAINS SHALL BE MINIMUM 150mmø, DR18. HYDRANT MAIN (150mmø) SHALL BE POLYVINYL CHLORIDE (PVC) CLASS 150 (DR18) OR APPROVED EQUIVALENT. TRACER WIRE (#12 STRANDED COPPER WIRE WITH OUTER PLASTIC COATING) SHALL BE INSTALLED ALONG THE ENTIRE LENGTH OF PVC WATERMAIN, SECURED TO FITTINGS AT INTERVALS NOT EXCEEDING 3m, AND BROUGHT UP AND LOOPED AT EACH VALVE BOX, CHAMBER AND HYDRANT SUCH THAT CONTINUITY IS MAINTAINED.
3. WATERMAIN BEDDING AS PER OPSD 802.010 (FLEXIBLE PIPE) OR 802.030 (RIGID PIPE).
4. HYDRANT INSTALLATION AS PER TOWN OF INNISFIL STANDARD DRAWING 703.
5. SERVICE CONNECTIONS SHALL BE IN ACCORDANCE WITH OPSD 1104.010 AND 1104.020.
6. THE MINIMUM HORIZONTAL SEPARATION BETWEEN THE WATERMAIN / WATER SERVICES AND THE SANITARY / STORM SEWER IS TO BE 2.5m.
7. A MINIMUM OF 0.5m VERTICAL CLEARANCE BETWEEN THE WATERMAIN / WATER SERVICES AND ALL UTILITIES SHALL BE MAINTAINED, WHILE MAINTAINING A MINIMUM DEPTH OF COVER AT ALL TIMES. WATERMAIN & WATER SERVICE TO BE INSULATED WITH HI–40 INSULATION AND/OR CONCRETE ENCASED AT THE ENGINEER'S DISCRETION WHERE 0.5m SEPARATION CANNOT BE MAINTAINED.
8. WATERMAIN / WATER SERVICE COVER LESS THAN 1.9m TO PIPE OBVERT WILL REQUIRE FROST PROTECTION (INSULATION, SEE DETAIL).
9. VALVE, VALVE BOXES AND CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH OPSD STANDARDS.
10. CONTRACTOR IS RESPONSIBLE FOR ALL TIE–INS INCLUDING MATERIALS, EXCAVATION AND BACKFILL AS REQUIRED TO FACILITATE THE SWABBING AND TESTING OF THE NEW WATERMAINS UNDER THE SUPERVISION OF THE ENGINEER.
11. FIRE HYDRANTS AND VALVES SHALL ONLY BE OPERATED BY MUNICIPAL WATER DEPARTMENT STAFF.
12. MECHANICAL JOINT RESTRAINTS ARE TO BE INSTALLED AT ALL TEES, HORIZONTAL BENDS, VERTICAL BENDS, HYDRANTS, END OF MAINS AND VALVES. THRUST BLOCKS PER TOISD 703 DETAIL. ALL MECHANICAL RESTRAINT SYSTEMS SHALL BE INSTALLED WITH CATHODIC PROTECTION CAPS.
13. THE CONTRACTOR SHALL SWAB, PRESSURE TEST, CHLORINATE AND FLUSH THE NEW WATERMAINS. ANY SWABBING, PRESSURE TESTING, CHLORINATING AND FLUSHING BEYOND THE INITIAL PROCEDURE WILL BE THE CONTRACTORS' RESPONSIBILITY. TESTING PROCEDURES TO BE IN ACCORDANCE WITH MUNICIPAL STANDARDS OR AS DIRECTED BY MUNICIPAL WATER DEPARTMENT STAFF.
14. CONTRACTOR MUST HAVE APPROPRIATE TOWN OF INNISFIL AND/OR INNSERVICES UTILITY INC. STAFF PRESENT WHEN TESTING PROPOSED WATERMAIN AND CONNECTING TO EXISTING WATERMAIN



GENERAL NOTES - GENERAL

1. GENERAL

A. ALL WORK SHALL BE IN ACCORDANCE WITH CURRENT TOWN OF INNISFIL STANDARD SPECIFICATIONS AND DRAWINGS (TOISD).

B. ORDER OF PRECEDENCE OF STANDARD DRAWINGS IS FIRSTLY TOISD, AND SECONDLY ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD).

C. LOCATION OF EXISTING SERVICES ARE NOT GUARANTEED. THE CONTRACTOR IS REQUIRED TO OBTAIN ALL LOCATES & NOTIFY THE VARIOUS UTILITY COMPANIES 48 HOURS PRIOR TO THE COMMENCEMENT OF ANY WORK.

D. A ROAD OCCUPANCY PERMIT IS REQUIRED FROM THE OPERATIONS SERVICES/INNSERVICES PRIOR TO WORKING WITHIN ANY EXISTING TOWN RIGHT-OF-WAY.

E. NATIVE MATERIAL, SUITABLE FOR BACKFILL, SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY.

F. GRANULAR MATERIAL, USED FOR BACKFILL, SHALL BE APPROVED BY THE TOWN & PLACED IN LAYERS 150mm IN DEPTH MAXIMUM AND COMPACTED TO 100% STANDARD PROCTOR DENSITY.

G. ALL DISTURBED AREAS ARE TO BE REINSTATED TO THEIR ORIGINAL CONDITION.

H. ALL SILT CONTROL AND EROSION PROTECTION DEVICES ARE TO BE IN PLACE PRIOR TO COMMENCEMENT OF CONSTRUCTION AND SHALL REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE AND THE GRASS IS ESTABLISHED, SUBJECT TO APPROVAL OF THE TOWN ENGINEER.

I. WHERE FROST WEDGE REQUIRED USE MIMIMUM 4:1 SLOPE.

NO.	REVISIONS	APR'D	DATE
3.	REVISED NOTES	TOI	APRIL 2019
2.	NOTE D. TEXT CHANGE	TOI	APRIL 2018
1.	REVISED TOWN LOGO	TOI	APRIL 2015

Innisfil

GENERAL NOTES

DRAWN: A&A
APR'D:
SCALE: N.T.S.
DATE: JUNE 2011

METRIC
ALL DIMENSIONS IN mm UNLESS OTHERWISE NOTED

TOISD 101

NYLOPLAST ENVIROHOOD SPECIFICATION

SCOPE

This specification describes the EnviroHood for use in stormwater conveyance systems.

REQUIREMENTS

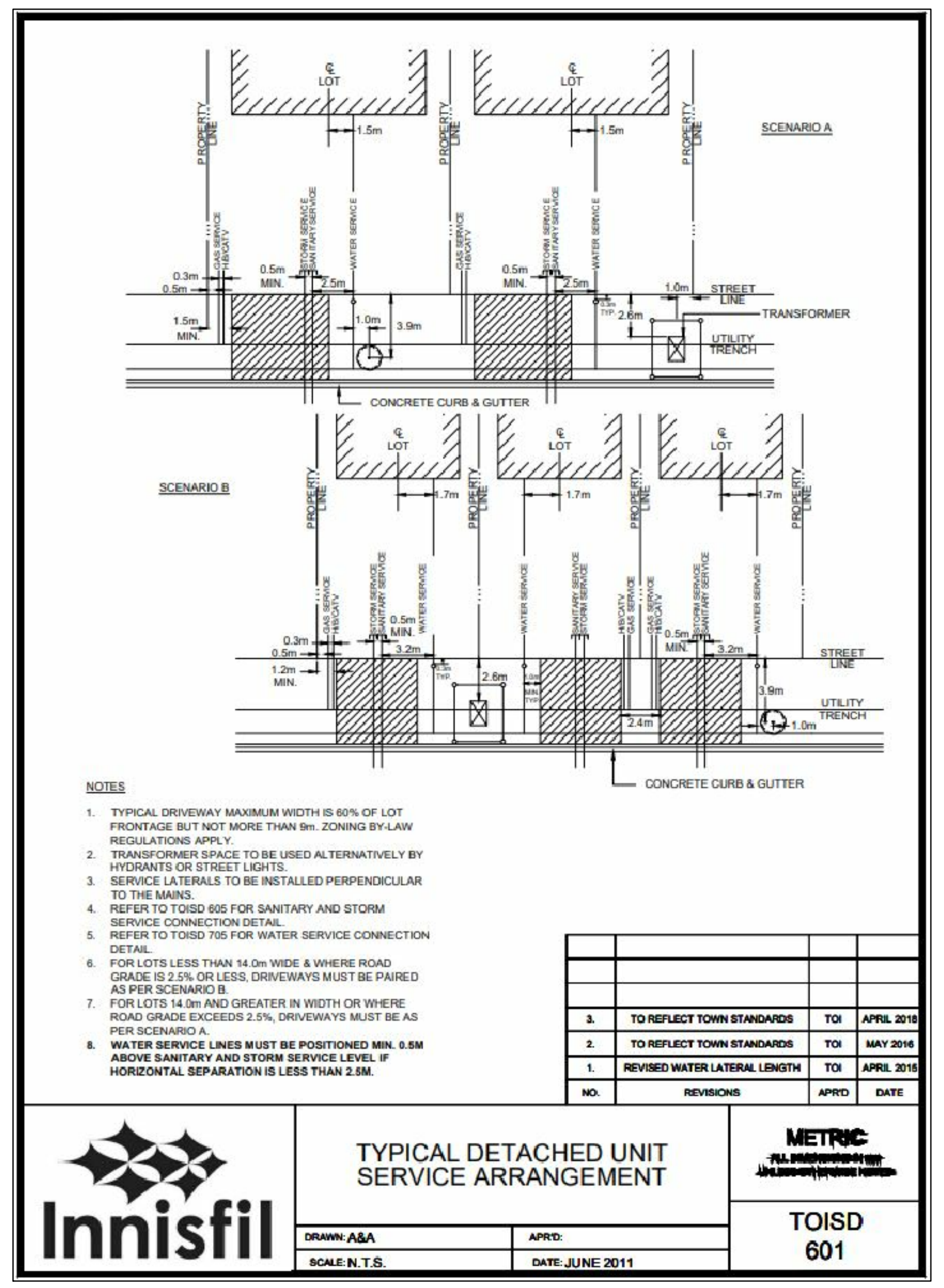
- All hoods shall be constructed of polyethylene.
- The size and position of the hood shall be determined by the outlet pipe size as per manufacturer's recommendation.
- The bottom of the hood shall extend downward a minimum distance of 6" (15 cm) for pipes < 12" (30 cm).
- Installation hardware and instructions shall be provided by manufacturer.
- Installation shall be in accordance with Nyloplast installation procedures and those issues by local building/construction regulations.

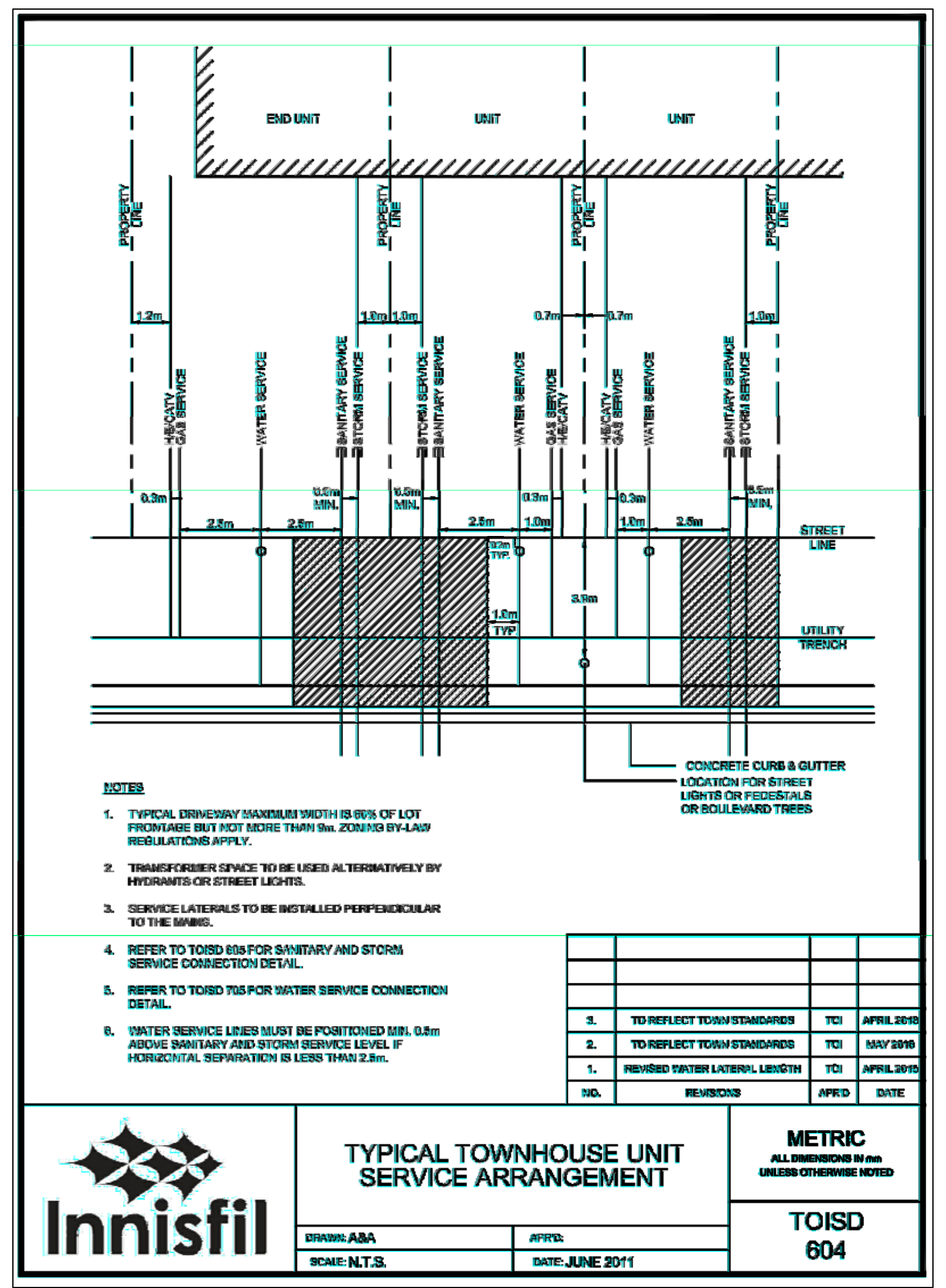
STRUCTURE TYPE	OUTLET COVERED	PART NUMBER*	GENERAL DIMENSIONS In. (cm) A	B	C	D
48" (120 cm) Round Concrete	up to 18" (45 cm)	5818AGR	30.2 (75)	14.9 (35)	17.2 (45)	20.5 (50)
48"-54" (120–135 cm) Round Concrete	up to 24" (60 cm)	5824AGR	41.7 (105)	18.0 (45)	26.9 (70)	26.9 (70)
54"-60" (135–150 cm) Round Concrete	up to 30" (75 cm)	5830AGR	48.7 (120)	20.5 (50)	30.5 (75)	33.1 (85)
Flat Concrete	up to 18" (45 cm)	5818AGF	30.2 (75)	11.8 (30)	17.2 (45)	20.4 (50)
Flat Concrete	up to 24" (60 cm)	5824AGF	41.8 (105)	15.3 (40)	26.9 (70)	27.0 (70)
Flat Concrete	up to 30" (75 cm)	5830AGF	48.8 (120)	18.3 (45)	30.5 (75)	34.0 (85)
18" (45 cm) Nyloplast	up to 12" (30 cm)	5818AG0412	19.4 (50)	9.8 (25)	12.3 (30)	13.8 (35)
24" (60 cm) Nyloplast	up to 15" (40 cm)	5824AG0415	26.5 (65)	12.8 (30)	14.5 (35)	20.0 (50)
30" (75 cm) Nyloplast	up to 18" (45 cm)	5830AG0418	32.8 (85)	15.4 (40)	18.7 (45)	26.0 (65)

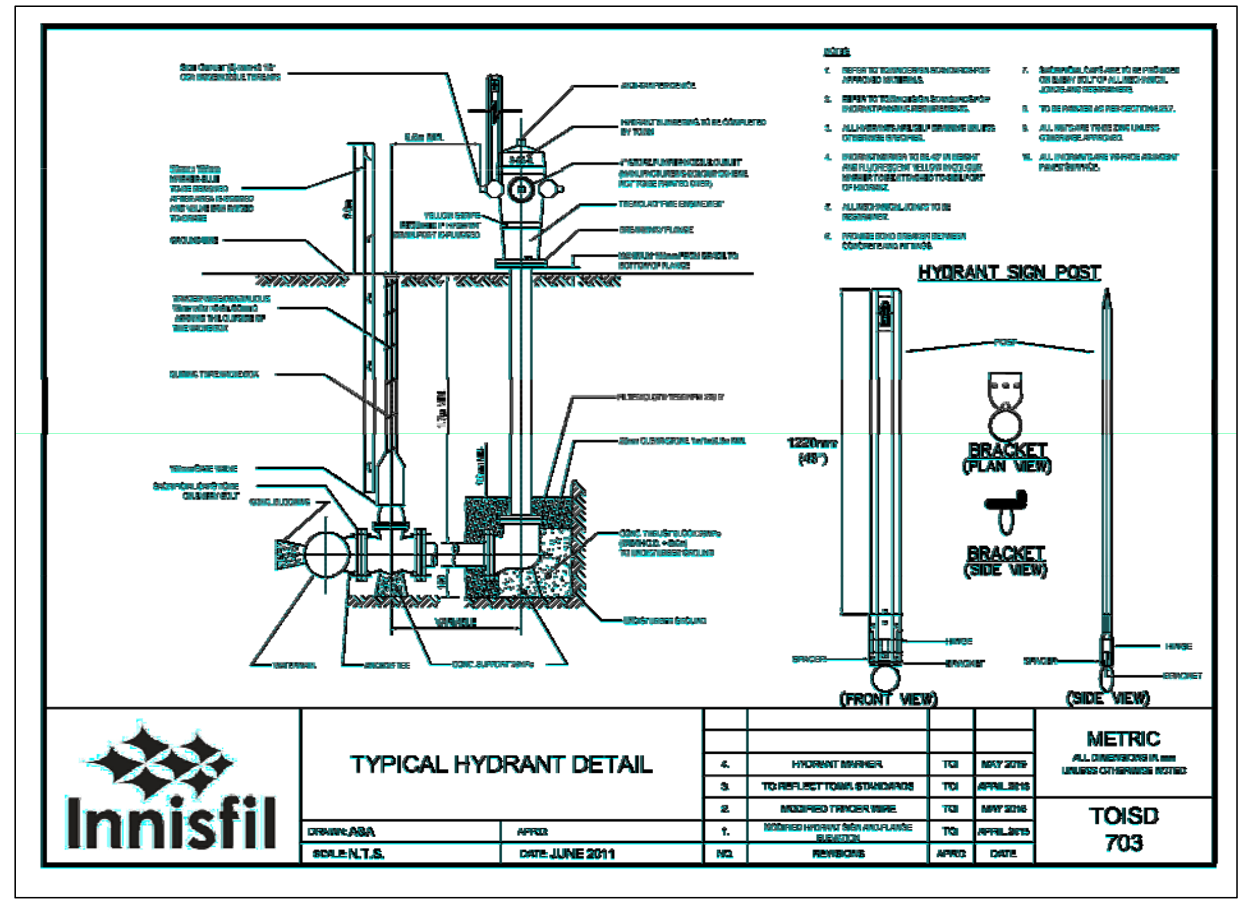
*Includes installation hardware

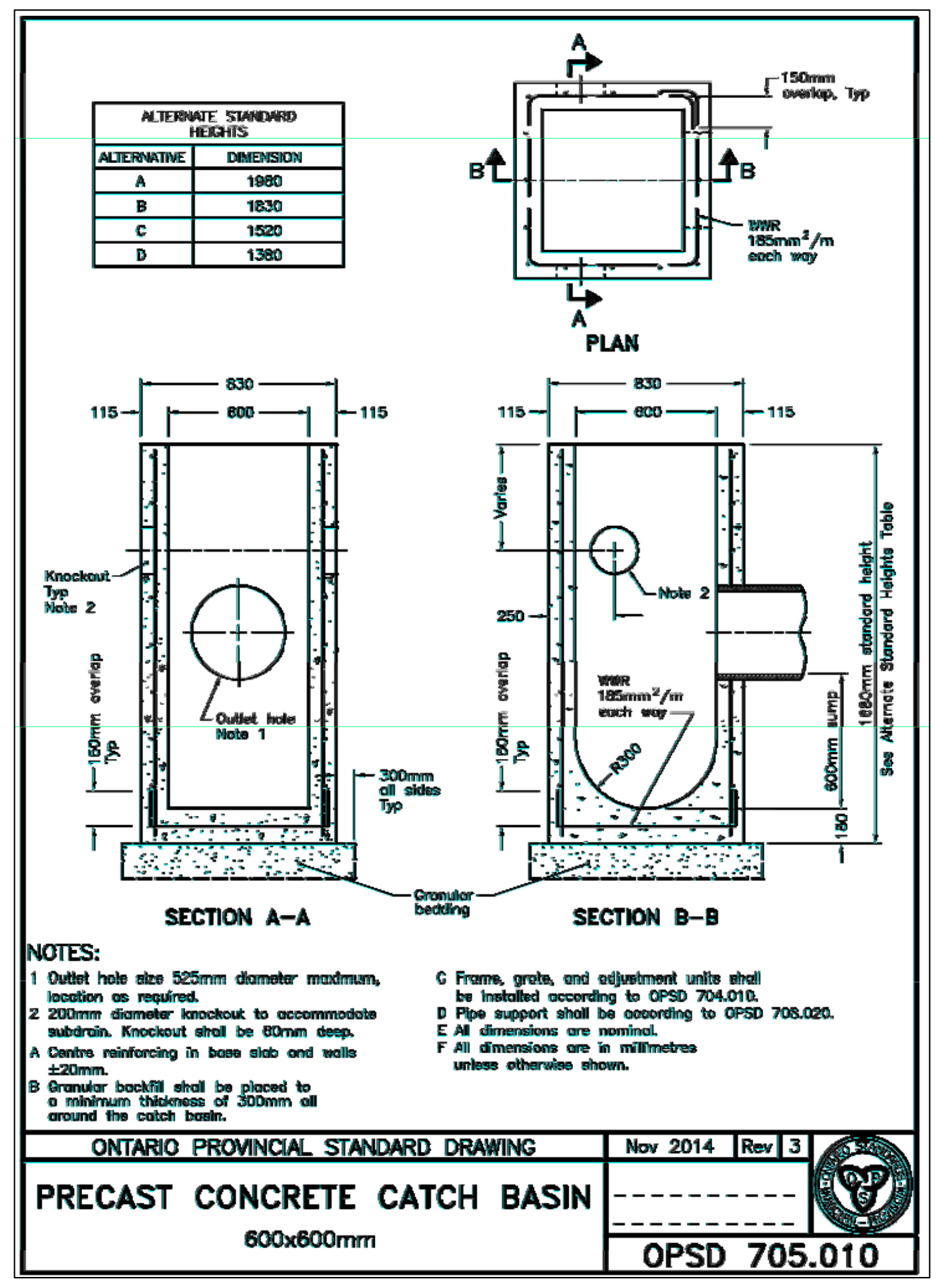
For more information on EnviroHood and other ADS products, please contact our Customer Service Representatives at 1-800-821-6710

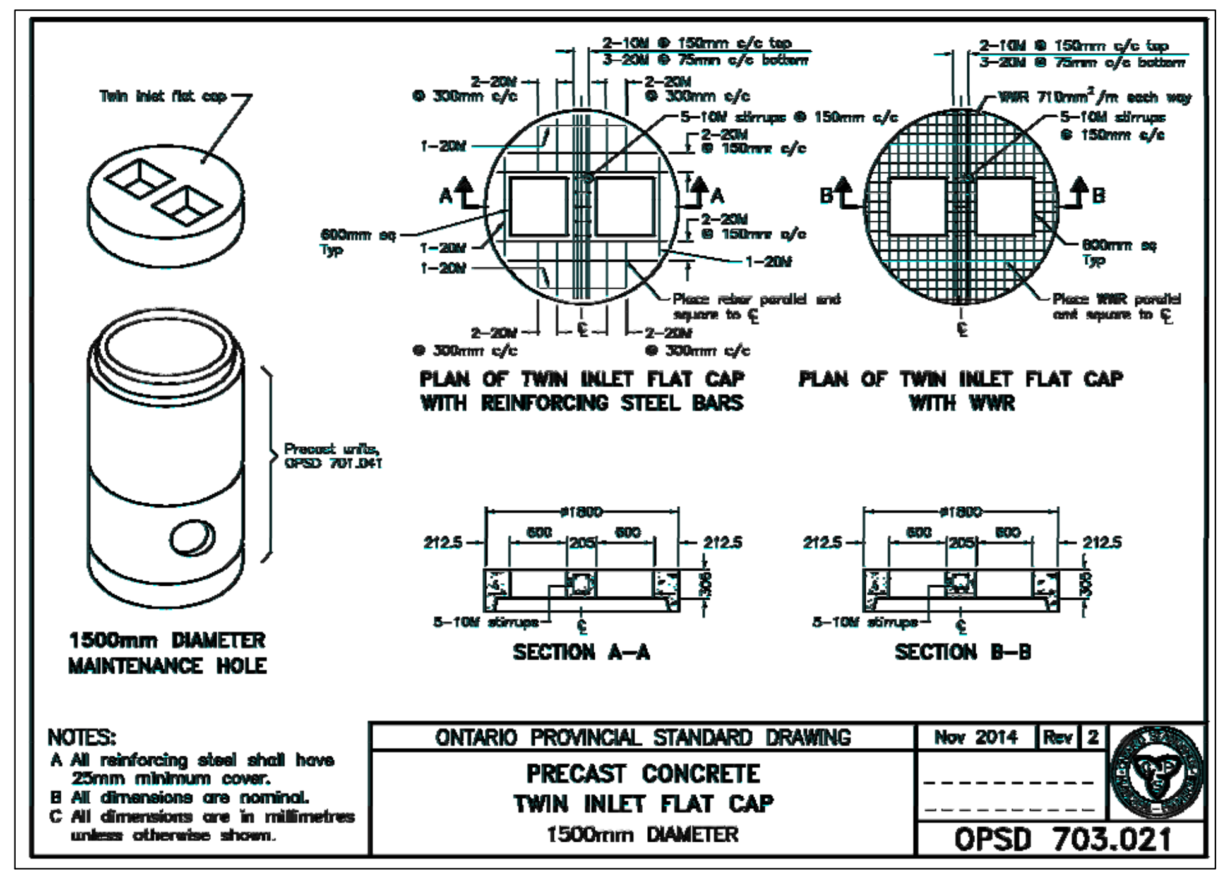
Advanced Drainage Systems, Inc.
4640 Trueman Blvd., Hilliard, OH 43026
1-800-821-6710 www.ads-pipe.com

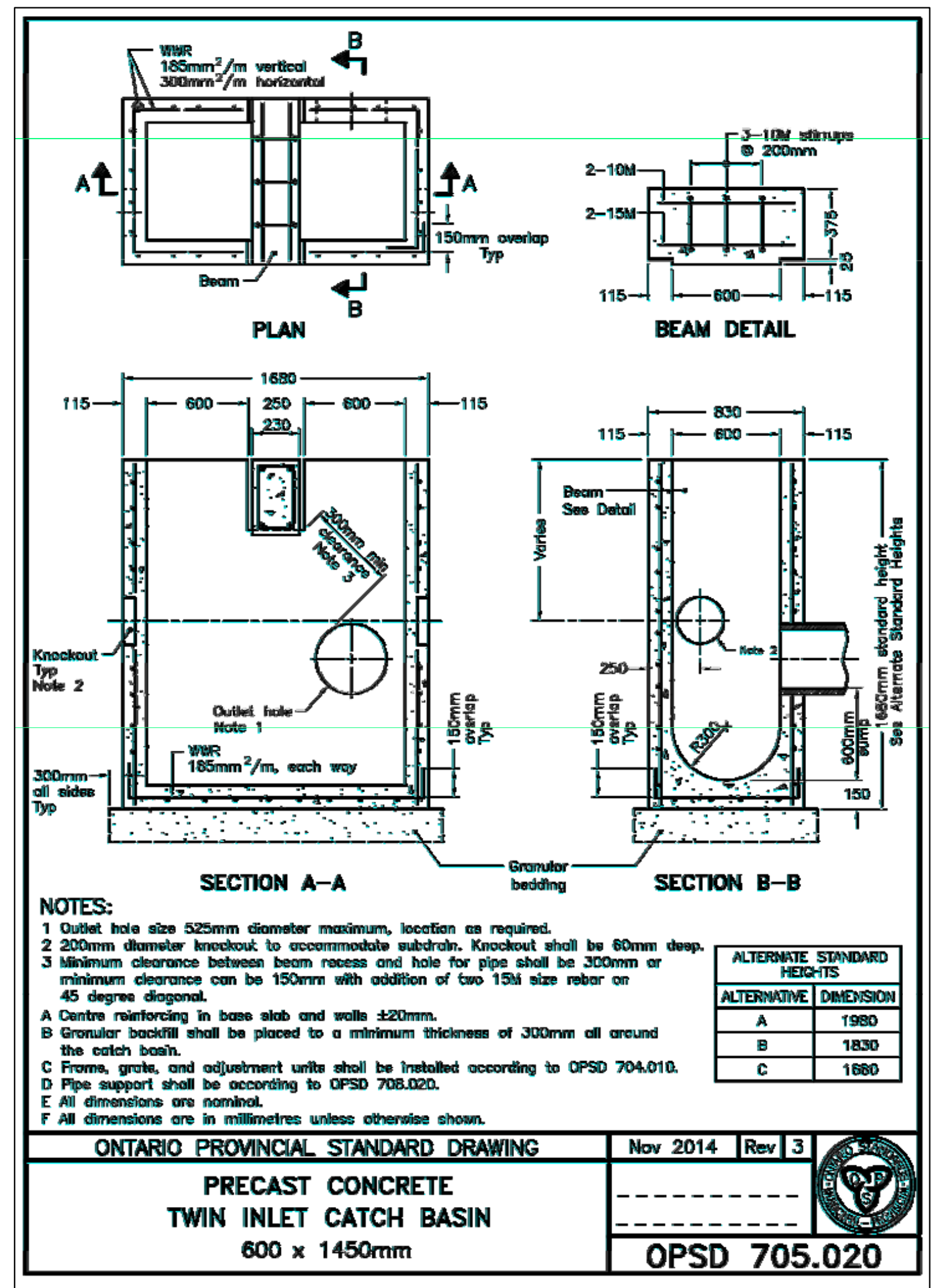


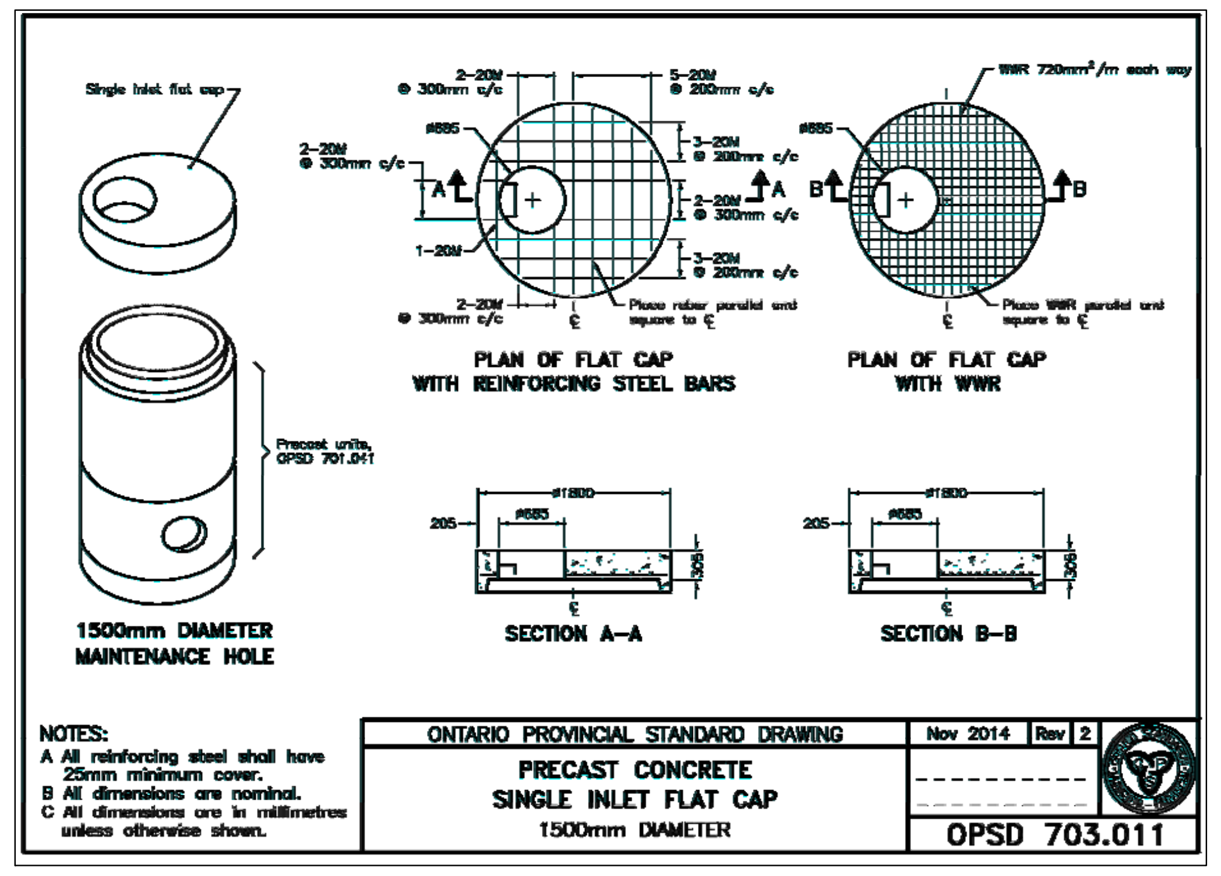


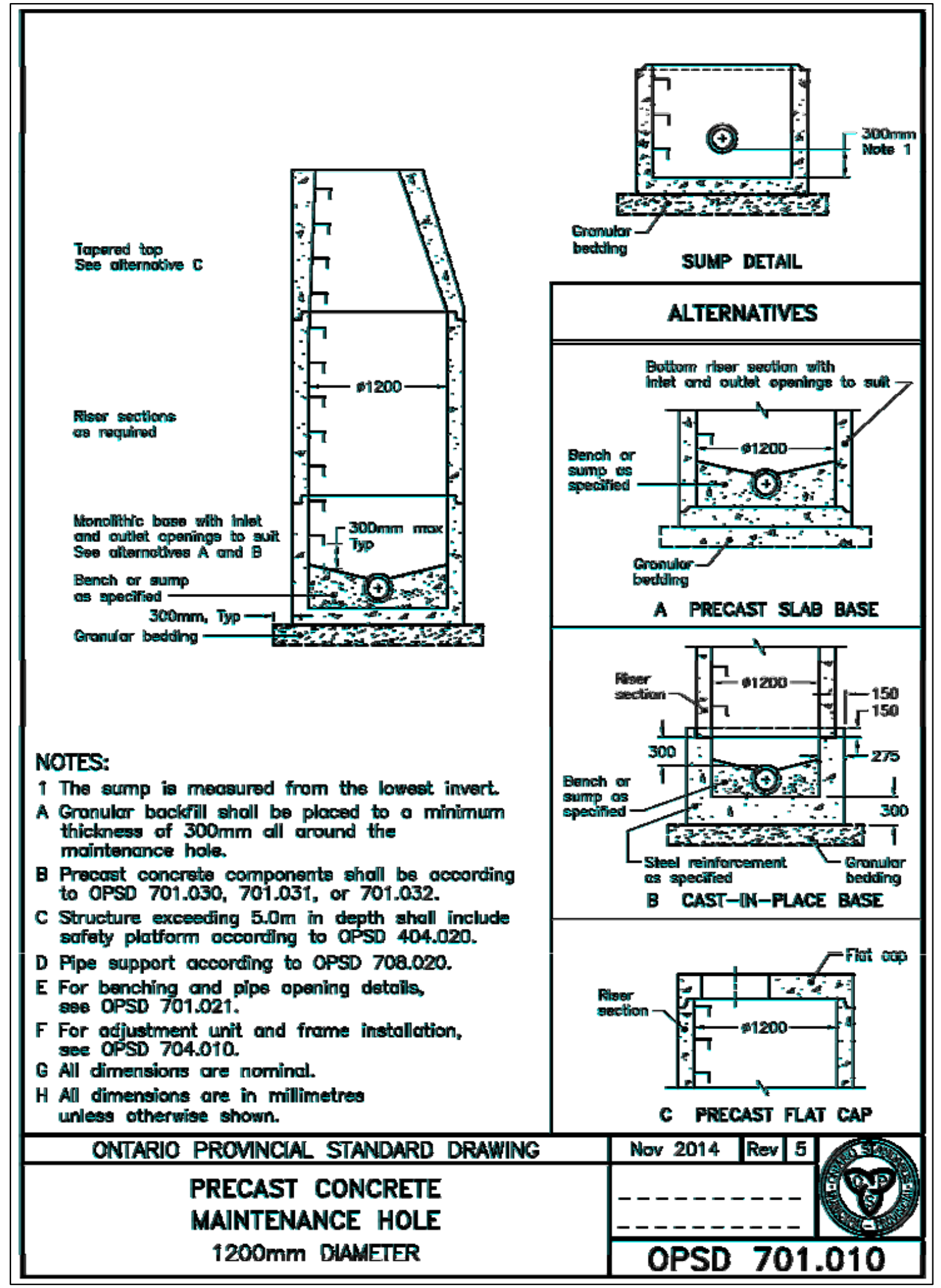


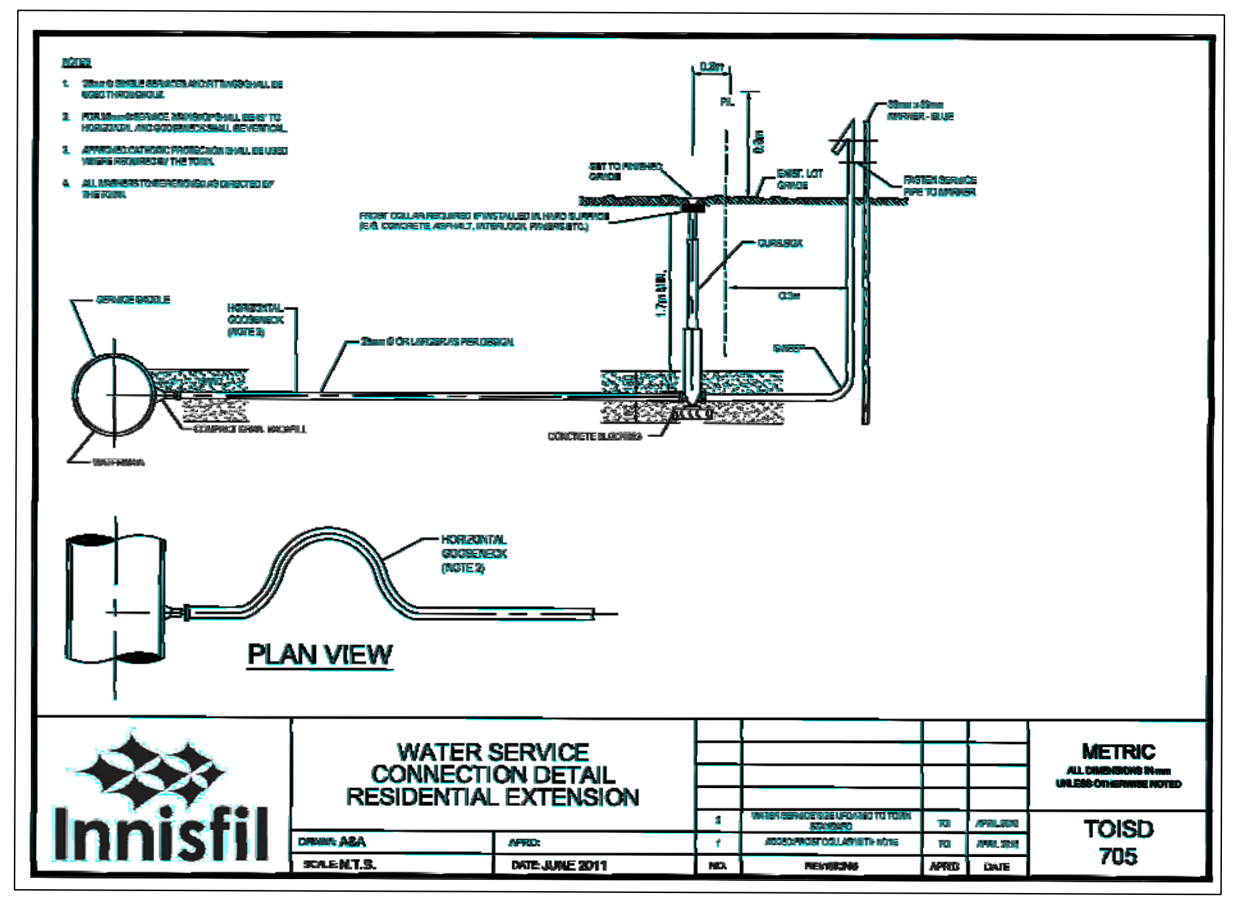




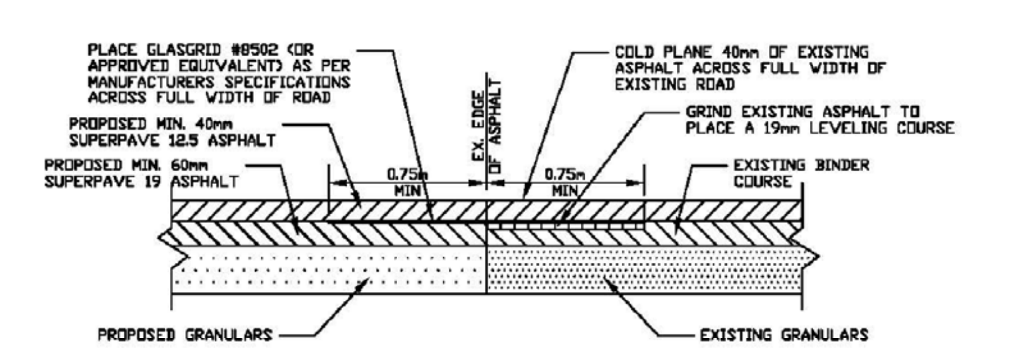








TYPICAL LAP JOINT SECTION



PAVEMENT DESIGN OPS
(SELECT SUBGRADE MATERIAL)

COURSE	OPS SPECIFICATION	MIN. DEPTH
ASPHALT SURFACE	SUPERPAVE 12.5	40 mm
BINDER COURSE	SUPERPAVE 19	60 mm
GRANULAR BASE	GRANULAR 'A'	150 mm
GRANULAR SUB-BASE	GRANULAR 'B', TYPE 1	450 mm

NOTES:

1. SUPERPAVE TO FOLLOW OPSS.MUNI 1151 SPECIFICATIONS.
2. GRANULAR 'A' AND 'B' SHALL NOT CONTAIN ANY RECYCLED MATERIAL WITHIN THE ROAD BASE.
3. DEPTHS OF ROADBASE MATERIAL ARE SUBJECT TO RECOMMENDATIONS OF A GEOTECHNICAL CONSULTANT. MINIMUM DEPTH OF GRANULAR IS 600mm.
4. ALL UTILITIES ARE TO BE LOCATED ON BETWEEN THE BACKSLOPE OF THE DITCH AND THE PROPERTY LINE.

COUNTY OF SIMCOE STANDARD
Typical Lap Joint Section
SCALE: N.T.S.
DATE: February 11, 2009
DRAWING No.: ST - 009
DIRECTOR, TRANSPORTATION CONSTRUCTION: James E. Hunter
DRAWN: J.P.M.

Notes:

1. Unless noted otherwise, the measurements and distances shown on this drawing are shown in meters.
2. Do not scale drawings.
3. It is the contractor's responsibility to verify all dimensions, levels and datums on site and report any discrepancies or omissions to WMI & Associates Ltd. prior to construction.
4. This drawing is to be read and understood in conjunction with all other relevant documents applicable to this project.
5. This drawing is the exclusive property of WMI & Associates Ltd. and the reproduction of any part of this document without prior written consent is strictly prohibited.

SITE BENCHMARK: 272.38m
TOP NUT OF FIRE HYDRANT LOCATED AT THE NORTH–EAST CORNER OF SUNNYBRAE AVENUE, DUE SOUTH–WEST OF LOT 5.

MNR BENCHMARK: 270.600
0011931U461S TWP.: STROUD

TABLET LOCATION: PRESBYTERIAN CHURCH, IN VILLAGE, ABOUT 90m EAST OF TORONTO–NORTH BAY HWY. TABLET IN WEST CONCRETE FOUNDATION WALL OF WEST TOWER, 1.5m FROM S/W CORNER AND 1.37m BELOW CONCRETE BLOCKS.

DRAFT

No.	Issue / Revision	Date
1	SUBMISSION FOR NOISE ASSESSMENT	DEC. 20, 2019
2	TO CLIENT	JUN. 2, 2020

INNISFIL EXECUTIVE ESTATES
PHASE 2
DETAILS SHEET

Client:
INNISFIL EXECUTIVE ESTATES
180839 ONTARIO Ltd.

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
Ph 705-797-2027
www.wmiengineering.ca

Drawn By JB
Checked By BD
Drawing No. DS1
Scale NTS
Project No. 17–431A

APPENDIX B

DESIGN CALCULATIONS

WMI & Associates Limited
119 Collier Street, Barrie, Ontario L4M 1H5
p (705) 797-2027 f (705) 797-2028

RUNOFF COEFFICIENT CALCULATIONS
"C" SPREADSHEET

Date: 2019-12-04
Project No.: 17-431A
Project: Innisfil Executive Estates Phase 2
Prepared By: BD

RUNOFF COEFFICIENT NUMBERS

Land Cover		**Hydrologic Soil Groups**		
		A-AB	**B-BC**	**C-D**
Cultivated Land	0 - 5% grade	0.22	0.35	0.55
	5 - 10% grade	0.3	0.45	0.6
	10 - 30% grade	0.4	0.65	0.7
Pasture Land	0 - 5% grade	0.1	0.28	0.4
	5 - 10% grade	0.15	0.35	0.45
	10 - 30% grade	0.22	0.4	0.55
Woodlot or Cutover	0 - 5% grade	0.08	0.25	0.35
	5 - 10% grade	0.12	0.3	0.42
	10 - 30% grade	0.18	0.35	0.52
Lakes and Wetlands		0.05	0.05	0.05
Impervious Area	(i.e. buildings, roads, parking lot, etc.)	0.95	0.95	0.95
Gravel	(not used for proposed parking or storage areas)	0.4	0.5	0.6
Residential	Single Family	0.3	0.4	0.5
	Multiple (i.e. semi, townhouse, apartment, etc.)	0.5	0.6	0.7
Industrial	Light	0.55	0.65	0.75
	Heavy	0.65	0.75	0.85
Commercial		0.6	0.7	0.8
Unimproved Areas		0.1	0.2	0.3
Lawn	< 2% grade	0.05	0.11	0.17
	2 - 7% grade	0.1	0.16	0.22
	> 7% grade	0.15	0.25	0.35

Ref: Runoff Coefficient Numbers - Adapted from Design Chart 1.07, Ontario Ministry of Transportation, "MTO Drainage Management Manual", MTO. (1997)

▨ <<< **Elements Requiring Input Information**

PRE-DEVELOPMENT CONDITION

Land Cover		**Hydrologic Soil Groups**		
		A-AB	**B-BC**	**C-D**
Cultivated Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Pasture Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Woodlot or Cutover	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Lakes and Wetlands				
Impervious Area	(i.e. buildings, roads, parking lot, etc.)			
Gravel	(not used for proposed parking or storage areas)			
Residential	Single Family			
	Multiple (i.e. semi, townhouse, apartment, etc.)			
Industrial	Light			
	Heavy			
Commercial				
Unimproved Areas		4.78		
Lawn	< 2% grade			
	2 - 7% grade			
	> 7% grade			

Total Area (ha) = 4.78
Runoff Coefficient, C = **0.1**

POST-DEVELOPMENT CONDITION

Land Cover		Hydrologic Soil Groups		
		A-AB	B-BC	C-D
Cultivated Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Pasture Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Woodlot or Cutover	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Lakes and Wetlands				
Impervious Area	(i.e. buildings, roads, parking lot, etc.)	0.85		
Gravel	(not used for proposed parking or storage areas)			
Residential	Single Family			
	Multiple (i.e. semi, townhouse, apartment, etc.)			
Industrial	Light			
	Heavy			
Commercial				
Unimproved Areas				
Lawn	< 2% grade	3.93		
	2 - 7% grade			
	> 7% grade			

Total Area (ha) = 4.78 **Runoff Coefficient, C =** **0.21**

\\WMI-SERVER\wmi-server\Data\Projects\2017\17-431\Phase_2\Design\Storm\[1_191204_C_CALCS.xlsx]C CALCS

WMI & Associates Limited
119 Collier Street, Barrie, Ontario L4M 1H5
p (705) 797-2027 f (705) 797-2028

CURVE NUMBER & INITIAL ABSTRACTION CALCULATIONS
CN & IA SPREADSHEET

Date: 2019-12-04
Project No.: 17-431A

Project: Innisfil Executive Estates Phase 2
Prepared By: BD

SCS CURVE NUMBERS (AMC II (NORMAL) CONDITION) **INITIAL RAINFALL ABSTRACTION**

	Hydrologic Soil Groups							IA
Land Cover	**A**	**AB**	**B**	**BC**	**C**	**CD**	**D**	**(mm)**
Wetlands/Lakes/SWMF's	50	50	50	50	50	50	50	
Woods	32	46	60	67	73	76	79	10
Meadows	38	51	65	71	76	79	81	8
Pasture/Lawn	49	59	69	74	79	82	84	5
Cultivated	62	68	74	78	82	84	86	7
Impervious Areas	100	100	100	100	100	100	100	2

Ref: SCS Curve Numbers - Adapted from Design Chart 1.09, Ontario Ministry of Transportation, "MTO Drainage Management Manual", MTO.(1997)
Ref: Initial Rainfall Abstraction Values - UNESCO, Manual on Drainage in Urbanized Areas, (1987)
Ref: AMC I & III Condition SCS Curve Number Values - Modern Sewer Design, Third Edition (Canadian), pg. 69, Table 3.6, (1996)

NOTES:
- **AMC II Condition** SCS Curve Number values are not applicable to frozen soils or to the period where snowmelt contributes to stormwater runoff.
- **STANDHYD COMMANDS** (Swmhymo) - CN values are based solely on the **pervious surfaces** within the catchment.
- **NASHYD COMMANDS** (Swmhymo) - CN values are based on both the **pervious and impervious surfaces** within the catchment (composite CN value).

▨ <<< **Elements Requiring Input Information**

PRE-DEVELOPMENT CONDITION - Phase 2

Area per Land Cover Type and Hydrologic Soil Group

	Hydrologic Soil Groups						
Land Cover	**A**	**AB**	**B**	**BC**	**C**	**CD**	**D**
Wetlands/Lakes/SWMF's							
Woods							
Meadows							
Pasture/Lawn		4.78					
Cultivated							
Impervious Areas							

(for Nashyd Command)
Total Area (ha) = 4.78

CN(I) = 39
CN(II) = 59
CN(III) = 77

IA (mm) = 5.0

POST-DEVELOPMENT CONDITION - Phase 2

Area per Land Cover Type and Hydrologic Soil Group

	Hydrologic Soil Groups						
Land Cover	**A**	**AB**	**B**	**BC**	**C**	**CD**	**D**
Wetlands/Lakes/SWMF's							
Woods							
Meadows							
Pasture/Lawn		3.93					
Cultivated							
Impervious Areas		0.85					

(for Nashyd Command)
Total Area (ha) = 4.78

CN(I) = 46
CN(II) = 66
CN(III) = 82

IA (mm) = 4.5

WMI & Associates Limited
119 Collier Street, Barrie, Ontario L4M 1H5
p (705) 797-2027 f (705) 797-2028

QUALITY CONTROL STORAGE CALCULATIONS
SWM FACILITY DESIGN SPREADSHEET

Date: 2019-12-04 **Project No.:** 17-431A

Project: Innisfil Executive Estates Phase 2 **Prepared By:** BD

▨ <<< **Elements Requiring Input Information**

Catchment I.D.'s	Drainage Area (ha)	Imperviousness (%)
Phase 1	15.43	21
Phase 2	4.78	18

Total Drainage Area (ha) = **20.21**

Total Imperviousness (%) = **20**

NOTE: For catchment areas consisting of a Total Imperviousness value less than 35% and greater than 85%, the corresponding Water Quality Storage Volume Requirement based on Table 3.2 of the 2003 MOE SWMP manual has been extrapolated from the values provided in Table 3.2.

SWM Facility Characteristics (based on 2003 MOE Guidelines, Table 3.2):

Protection Level = **Enhanced** (Options are Enhanced, Normal or Basic)
SWMP Type = **Wet Pond** (Options are Infiltration, Wetland, Hybrid, Wet Pond or Dry Pond **BUT** the Dry Pond Facility is only capable of providing a **Basic** Level of Protection)

2003 MOE Table 3.2 Water Quality Storage Requirements based on Receiving Waters:

Total Storage Volume = 110 m^3/ha
= **2223 m^3**

Permanent Pool Volume = 70 m^3/ha (for wet facilities only, i.e. Wetland, Hybrid OR Wet Pond)
= **1415 m^3**

Extended Detention Volume = 40 m^3/ha (Water Quality Control Volume (40m^3/ha), MOE Guidelines)
= 808 m^3
OR
= 1198 m^3 (Erosion Control Volume (25mm 4-hr Chicago Storm runoff volume), MOE Guidelines)

Extended Detention Volume = **1198 m^3** (greater of the Water Quality & Erosion Control Volume)

NOTE: - The Extended Detention Volume is to be the greater of the Water Quality Control Volume and the Erosion Control Volume.

\\WMI-SERVER\wmi-server\Data\Projects\2017\17-431\Phase_2\Design\Storm\[1_191204_C_CALCS.xlsx]C CALCS

c) Complete single event and continuous (if required) simulation rainfall/runoff event models to establish the baseline quality and quantity of stormwater runoff originating from the development area under existing conditions as a framework for evaluating combinations of structural LID components with conventional end-of-pipe controls;

d) Prepare an assessment of the various combinations and sizing requirements of LID components and end-of pipe controls based on their suitability for achieving the stormwater management control targets under typical post development conditions accounting for snow accumulation and frozen ground conditions;

e) Select a preferred alternative for achieving stormwater management control targets for consideration by the Town and the governing Conservation Authority prior to proceeding to detailed design; and

f) Prepare a monitoring program to assess the performance of the proposed design.

The assessment and recommendations can be included in the project SWM Report or be submitted as a separate document.

The implementation of any design that employs the use of Low Impact Development practices will be subject to Town and Conservation Authority Approval.

4.3 NUTRIENT MANAGEMENT STRATEGY AND WATER BALANCE

The Town, as an environmental leader, supports the reduction of phosphorous contributions from Greenfield development into the streams and lakes of the watershed within the Town. To achieve this goal, the Town encourages that effective measures be taken to mitigate and reduce phosphorous contributions from new developments wherever possible.

The Town also recognizes that reduced groundwater recharge because of new development can impact stream baseflows needed to sustain aquatic life and result in increased stream erosion.

As such, the Town will require that stormwater management design for new developments incorporate the most recent advances in phosphorus reduction and water balance technologies or strategies within the development proposal as per the most recent guidelines and standards as set out by the MOECC and relevant Conservation Authority.

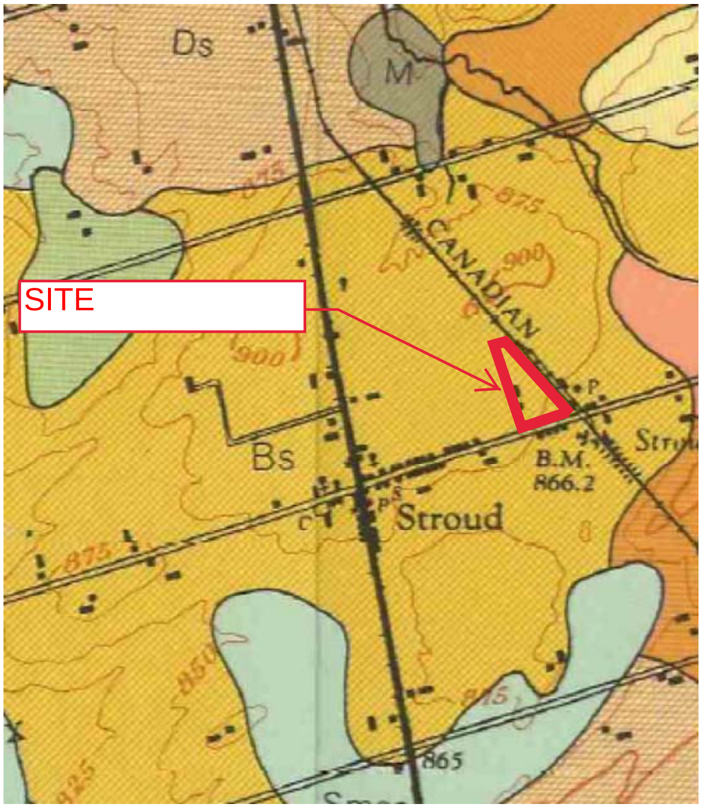
4.4 RAINFALL DATA

Stormwater management facilities should be designed based on the IDF tables developed by Environment Canada for Barrie WPCC based on rain gauge data for the period 1979 - 2003 including a 15% increase in rainfall intensity data to account for climate change. The adjusted Chicago distribution parameters for different return periods are provided below.

Barrie WPCC IDF Curve Parameters –Adjusted for Climate Change

Parameter	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
A	678.085	853.608	975.865	1146.275	1236.152	1426.408
B	4.699	4.699	4.699	4.922	4.699	5.273
C	0.781	0.766	0.760	0.757	0.751	0.759

Rainfall Intensity, I (mm/hr) = $A/(t+B)^C$, where t is time duration in minutes
Parameters based on rain gauge data for the period 1979 – 2003 for the Barrie WPCC Station #6110557



SITE
Ds
M
CANADIAN
875
900
Bs
Stroud
B.M.
866.2
P.
P.S.
C
875
850
865

BONDHEAD
loam Bl 41,400 sandy loam Bs 33,900 sandy loam — steep phase Bs-s 5,200 sandy loam — stony phase Bs-b 3,600
🟨
Light grey,
Good.
Smooth, moderately to steeply sloping.
Slightly to very stony.
Grey-Brown

CHART H2-6A - HYDROLOGIC SOIL GROUPS FOR PRINCIPAL SOIL TEXTURES IDENTIFIED ON AGRICULTURAL SOILS MAPS (6)

Soils Series	Soil Texture	Hyd. Soil Grp.	Soils Series	Soil Texture	Hyd. Soil Grp.	Soils Series	Soil Texture	Hyd. Soil Grp.
Alberton	si 1	BC	Bolingbr.	s	A	"	c	C
Allendale	s 1	B	Bondhead	s 1	AB	"	1	BC
Alliston	s 1	AB	"	1	B	Camilla	s 1	AB
Almonte	si c 1	C	Bookton	s 1	AB	"	si 1	BC
Ameliasbg	c 1	C	Boomer	1	B	Campbell	si c	C
"	1	B	Brady	s 1	AB	Cane	si 1	BC
Ancaster	si 1 &s	B	"	s	A	"	si c 1	C
"	si 1	BC	Brant	s &si 1	B	Carp	c &c 1	C
Anstruther	s	A	Brantford	si 1	BC	Casey	si 1	BC
Appleton	si 1 & s	B	"	si c 1	C	Cashel	c	D
Atherley	c	C	"	1	BC	Castor	s 1	AB
"	si c 1	C	"	c 1	D	"	si 1	BC
Athol	s 1	A	Brentha	s 1	A	"	c	C
Atwood	c	C	"	1	B	Chesley	si 1	BC
Ayr	s 1	B	Brethour	si 1	BC	"	si c 1	C
Bainsville	s	B	Breypen	limest.	B	"	c 1	C
"	si 1	B	Bridgman	s	A	Chinguac'y	1	BC
Balderson	s 1	B	Brighton	s	A	"	si 1	BC
Bamford	s	AB	"	s 1	AB	"	c 1	C
Bancroft	s	A	Brisbane	s g	AB	"	c	D
"	s 1	B		1	B	Christy	s 1	B
Bass	c	D	Brockport	c	D	Clyde	1	BC
Bastard	s	A	Brooke	1	B	"	si 1	BC
Battersea	si 1	BC	Brookston	s 1	B	"	c 1	C
"	s 1	AB	"	1	C	"	c	C
Bearbrook	s 1	B	"	si 1	C	Colborne	s	A
"	si c 1	C	"	si c 1	C	Colwood	s 1	B
"	c	C	"	c 1	C	"	si 1	B
Belmeade	m & c	B	"	c	C	"	1	BC
Bennington	s 1	B	Bucke	s	AB	Codrington	si 1	BC
"	s	A	"	s 1	AB	Conestogo	1	BC
"	si 1	A	Burford	s 1	A	Conover	c 1	C
Berrien	s	AB	"	1	AB	"	1	BC
"	s 1	AB	Burnbrae	1	B	Cooksville	c	D
Berriedale	s & si	AB	Burnstown	1	B	Coutts	s 1	AB
Beverly	1	BC	Burpee	s	A	"	1	BC
"	si 1	C	Burris	c 1	C	Craigleith	c	C
"	si c 1	C	Buzwah	si c 1	C	Cramahe	s g	A
Binbrook	si 1	C	Buzwah	c 1	D	Crombie	s 1	B
Blackwell	c	C	Caledon	s 1	A	"	si 1	BC
Blanche	si 1	BC	"	1	B	Dack	c	D
Blue	c 1	C	Caistor	c 1	C	Dalton	s	AB

Notes: 1. See footnotes to Chart H2-2.

2. Key to abbreviations: c - clay; f - fine; g - gravel; 1 - loam; ma - marl; m - muck; p - peat; r - rock; s - sand; si - silt.

Ontario

MINISTRY OF THE ENVIRONMENT

Database Version: **V 2.0 Release Update**
Update Date: **30-Mar-12**

Project DEVELOPMENT Summary

DEVELOPMENT: **17-431A Innisfil Executive Estates (Phase 2)**
Subwatershed: **Hewitts Creek**

Total Pre-Development Area (ha):	**4.780**	Total Pre-Development Phosphorus Load (kg/yr):	**0.29**

Pre-Development Land Use	Area (ha)	P coeff. (kg/ha)	P Load (kg/yr)
Transition	4.78	0.06	0.29

POST-DEVELOPMENT LOAD

Post-Development Land Use	Area (ha)	P coeff. (kg/ha)	Best Management Practice applied with P Removal Efficiency		P Load (kg/yr)
Low Intensity Development	4.78	0.13	Treatment Train Approach	85%	0.09

Weighted average which assumes the impervious surfaces (0.85ha) are treated by the SWM Wet Pond (63%), while the pervious areas (3.93ha) are treated by both the vegetated filter strips (65%), enhanced grass swales (25%) and the SWM Wet Pond (63%).

Post-Development Area Altered:	**4.78**
Total Pre-Development Area:	**4.78**
Unaffected Area:	**0**

	P Load (kg/yr)
Pre-Development:	**0.29**
Post-Development:	**0.62**
Change (Pre - Post):	**-0.33**
	117% Net Increase in Load
Post-Development (with BMPs):	**0.09**
Change (Pre - Post):	**0.19**
	68% Net Reduction in Load

DEVELOPMENT: **17-431A Innisfil Executive Estates (Phase 2)**
Subwatershed: **Hewitts Creek**

CONSTRUCTION PHASE LOAD

SUMMARY WITH IMPLEMENTATION OF BMPs	**P Load (kg/yr)**
Pre-Development:	**0.29**
Construction Phase Amortized Over 8 Years :	to be determined
Post-Development:	**0.09**
Post-Development + Amortized Construction:	**to be determined**
Pre-Development Load - Post-Development Load:	**0.19**
Conclusion:	**68% Reduction in Load**
Pre-Development Load - (Post-Development + Amortized Construction Load):	**to be determined**
Conclusion:	**to be determined**

Based on a comparison of Pre-Development and Post-Development loads, and in consideration of Construction Phase loads, the Ministry would encourage the Municipality to:

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FIRE PROTECTION WATER STORAGE
DESIGN CALCULATIONS

Date: 2019-11-28 **Project No.:** 17-431A

Project: Innisfil Executive Estates Phase 2 **Prepared By:** BD

▨ <<< **Elements Requiring Input Information**

Fire Protection Water Storage

Reference: Office of the Fire Marshal, OFM Guideline, Fire Protection Water Supply Guideline for Part 3 in the Ontario Building Code (OBC), October 1999
Subsection 3.2.2 of the Ontario Building Code, 2012

Calculate $Q=KVS_{TOTAL}$

Building Classification:

The proposed residential units are Group 'C', residential occupancies
It has been assumed that the building will be constructed with combustible materials and in accordance with Subsection 3.2.2. of the OBC.
Therefore, based on Table 1 of OBC A.3.2.5.7., Water Supply Coefficient, K:

K = 23

Approximate Building Volume:

(All space below and above grade within the building, measured to the underside of the roof deck, including basements and crawl spaces.)

V = Area x Height (2 storey bungalow bldg. based on typ. storey height of 2.60m)
\+ Roof Volume

= **185.9** m^2 x **2.6** m x **2** stories
\+ **212.9** m^3 roof volume (assumed 11m x 16.9m footprint; 5:12 pitch gable roof)

V = 1179.6 m^3

Approximate Exposure Distance From Proposed Buildings To:

(Exposure distances from a new building are measured from the exterior building faces to the property lines of the building. When facing a street, the property line shall be deemed to be the center of the street. When facing an existing building (exceeding 10 m^2 in building area) on the same property, the exposure distance shall be the greater of either the "limiting distance" of the new building face as obtained from Sentence 3.2.3.1.(1) of the Building Code, or the mid-point between the two buildings.)

from Figure 1 (OBC, A.3.2.5.7.)

West to Street >=	**13.8**	m	S_W =	0
North to P/L >=	**1.5**	m	S_N =	0.5
East to Railway >=	**30.0**	m	S_E =	0
South to P/L >=	**1.5**	m	S_S =	0.5

(no unprotected openings on south side of proposed building)
Zoning assumed to be R1-8 with minimum interior side yards 1.5m assuming the lot to have municipal water services and private septic systems

S_{TOTAL} = 1 + ($S_W + S_N + S_E + S_S$)
= 1 + 1
S_{TOTAL} = 2 (max. allowable is 2.0)

Minimum Water Supply,

Q = KVS_{TOTAL}
= 23 x 1179.6 x 2
Q = 54,261 L

Check

Q_{CHECK} = 2700 L/min x 30 min
Q_{CHECK} = 81,000 L

Q_{TOTAL} = greater of Q & Q_{CHECK}
Q_{TOTAL} = 81,000 L

where,
Q = Minimum Water Supply (L)
K = Water Supply Coefficient
V = Building Volume (m^3)
S_{TOTAL} = Total Spatial Coefficient

Minimum Water Supply Flow Rate:

From Table 2, Required Minimum Water Supply Flow Rate (L/min), provided in the OBC A.3.2.5.7.,

Flow Rate = 2700 L/min

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TOTAL DAILY DOMESTIC WATER SUPPLY FLOW CALCULATIONS
1124-1154 Innisfil Beach Road

Date: 2019-11-19
Project No.: 17-431A
Project: Innisfil Executive Estates Phase 2
Prepared By: BD

▨ <<< **Elements Requiring Input Information**

Total Daily Design Flow Calculations

References:
- Ontario Building Code (OBC), 2012, Division B, Part 8, Table 8.2.1.3.A. Residential Occupancy & Table 8.2.1.3.B. Other Occupancies
- Ministry of the Environment (MOE), Design Guidelines for Drinking-Water Systems (2008), Chapter 3
- Innisfil Master Servicing Plan Update, InnServices Utilities Inc., Final Draft Report, prepared by C.C. Tatham & Associates Ltd. (July 13, 2018).

Proposed Condition:

Establishment:	# of people	# of water closets	# of fuel outlets	# of seats	Gross Floor Area (m^2)	Land Area (ha)	Total Daily Design Volume		Avg Day Demand ADD (L/s)	Max Day Demand MDD (L/s)
Residential Uses:										
Dwellings (22 units, 3 bedrooms/unit @ 2.75ppu)	**181.5**						**275**	L/person/day	0.58	1.33
Subtotal =	**181.5**								**0.58**	**1.33**
Refer to Table 3-1 and/or Table 3.3 of the MOE Design Guidelines for Drinking-Water Systems (2008) >>>									**Peaking Factor =**	**2.3**

Notes:
* - # of people for the Single-Family Residential Dwellings is calculated based on # of units x # of bedrooms x 2 people per bedroom.
** - Local peaking factor (2.10) and Avg. Water Consumption (258 L/p/d) used as per Table 2 the Innisfil Master Servicing Plan Update (July 13, 2018)

\\WMI-SERVER\wmi-server\Data\Projects\2017\17-431\Phase_2\Design\Water\[191128_Total_Daily_Domestic_Water_Supply_Flow_Calcs.xlsx]Water_Supply_Flows

WMI & Associates Limited
119 Collier Street, Barrie, Ontario L4M 1H5
p (705) 797-2027 f (705) 797-2028

TOTAL DAILY DOMESTIC WATER SUPPLY FLOW CALCULATIONS
1124-1154 Innisfil Beach Road

Date: 2020-05-19 **Project No.:** 17-431A

Project: Innisfil Executive Estates Phase 2 **Prepared By:** BD

▨ <<< **Elements Requiring Input Information**

Total Daily Design Flow Calculations

References:
- Ontario Building Code (OBC), 2012, Division B, Part 8, Table 8.2.1.3.A. Residential Occupancy & Table 8.2.1.3.B. Other Occupancies
- Ministry of the Environment (MOE), Design Guidelines for Drinking-Water Systems (2008), Chapter 3
- Innisfil Master Servicing Plan Update, InnServices Utilities Inc., Final Draft Report, prepared by C.C. Tatham & Associates Ltd. (July 13, 2018).

Proposed Condition:

Establishment:	**# of people**	**# of water closets**	**# of fuel outlets**	**# of seats**	**Gross Floor Area (m^2)**	**Land Area (ha)**	**Total Daily Design Volume**		**Avg Day Demand ADD (L/s)**	**Max Day Demand MDD (L/s)**
Residential Uses:										
Dwellings (21 units, 3 bedrooms/unit @ 2.75ppu)	**173.25**						**275**	L/person/day	0.55	1.27
Subtotal =	**173.25**								**0.55**	**1.27**
Refer to Table 3-1 and/or Table 3.3 of the MOE Design Guidelines for Drinking-Water Systems (2008) >>>									**Peaking Factor =**	**2.3**

Notes:

* - # of people for the Single-Family Residential Dwellings is calculated based on # of units x # of bedrooms x 2 people per bedroom.

** - Local peaking factor (2.10) and Avg. Water Consumption (258 L/p/d) used as per Table 2 the Innisfil Master Servicing Plan Update (July 13, 2018)

C:\Users\BDANIELS\Desktop\COVID-19\1_Projects\17-431\Phase_2\Design\Water\[200519_Total_Daily_Domestic_Water_Supply_Flow_Calcs.xlsx]Water_Supply_Flows

APPENDIX C

HYDROLOGIC MODELLING (SWMHYMO)

SCS 12HR	REPORT	*Gemmel*	*WMI*	*Gemmel*	*WMI*	*Gemmel*	*WMI*	*Gemmel*	*WMI*	*Gemmel*	*WMI*
	STORM	**2yr**	**2yr**	**5yr**	**5yr**	**25yr**	**25yr**	**100yr**	**100yr**	**Regional**	**Regional**
ROUTE RESEVOIR	Inflow	0.5100	0.6800	0.8600	1.1460	1.4600	2.0250	2.1000	2.9060	1.8500	2.0630
	Outflow	0.0300	0.0360	0.0900	0.1260	0.3100	0.3790	0.4800	0.5580	1.6300	1.6870
	Storage	0.2133	0.2316	0.3113	0.3298	0.4214	0.4607	0.5363	0.6090	0.9795	0.9890
POST-DEVELOPMENT	Qpeak	0.0490	0.0500	0.0930	0.1350	0.3270	0.4060	0.5130	0.6000	1.7280	1.7950
PRE-DEVELOPMENT	Qpeak	0.1500		0.2700		0.4900		0.6900		1.6700	

CHI 4HR	REPORT	*Gemmel*	*WMI*	*Gemmel*	*WMI*	*Gemmel*	*WMI*	*Gemmel*	*WMI*	*Gemmel*	*WMI*	*Gemmel*	*WMI*
	STORM	**2yr**	**2yr**	**5yr**	**5yr**	**25yr**	**25yr**	**100yr**	**100yr**	**Regional**	**Regional**	**25mm**	**25mm**
ROUTE RESEVOIR	Inflow	0.5100	0.5910	0.7400	0.9110	1.1400	1.4980	1.5300	2.0420	1.8500	2.0630	0.2700	0.2890
	Outflow	0.0200	0.0210	0.0500	0.0650	0.2100	0.2500	0.3500	0.4170	1.6300	1.6870	0.0100	0.0130
	Storage	0.1646	0.1838	0.2611	0.2853	0.3673	0.3908	0.4429	0.4815	0.9795	0.9890	0.0850	0.0948
POST-DEVELOPMENT	Qpeak	0.0480	0.0480	0.0690	0.0710	0.2200	0.2670	0.3680	0.4440	1.7280	1.7950	0.0250	0.0260
PRE-DEVELOPMENT	Qpeak	0.1200		0.1900		0.3100		0.4600		1.6700			

Post-Development Condition
4-hour Chicago Storm Distribution

```
2     Metric units
*#***********************************************************************************
***********************************
*#  SWMHYMO Ver:4.05.00/Apr 2017 / INPUT DATA FILE
*#***********************************************************************************
***********************************
*#  Project Name: [IEE - Phase 2]    Project Number: [17-431]
*#  Date        : 02-02-2018
*#  Modeller    : [Ben Daniels]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#***********************************************************************************
***********************************
*%
*% RE-CREATION OF INNISFIL EXECUTIVE ESTATES PHASE 1, ORIGINAL GEMMEL HYDROLOGIC
MODEL (SWM REPORT DATED MAY 2014)
*% UPDATED TO REFLECT THE PROPOSED 22 ESTATE RESIDENTIAL DEVELOPMENT OF PHASE 2 (
CATCHMENT 206)
*% POST-DEVELOPMENT CONDITION
*%
*% 2-YEAR CHICAGO STORM DISTRIBUTION (4-HR)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
*%                   ["2CHI4.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------------
--------|
READ STORM          STORM_FILENAME=["STORM.001"]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[1], NHYD=["201"], DT=[1](min), AREA=[0.30](ha),
                    XIMP=[0.215], TIMP=[0.286], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[0.97](%),
                                         LGP=[119.6](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.97](%),
                                         LGI=[10](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[2], NHYD=["202"], DT=[1](min), AREA=[0.50](ha),
                    XIMP=[0.215], TIMP=[0.286], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[1.00](%),
                                         LGP=[218.2](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.80](%),
                                         LGI=[10](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------------
```

```
--------|
* 1000
ADD HYD             IDsum=[3], NHYD=["1000"], IDs to add=[1+2]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[4], NHYD=["203"], DT=[1](min), AREA=[8.01](ha),
                    XIMP=[0.257], TIMP=[0.343], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.00](%),
                                         LGP=[86](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.79](%),
                                         LGI=[414](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1001
ADD HYD             IDsum=[5], NHYD=["1001"], IDs to add=[3+4]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[6], NHYD=["204"], DT=[1](min), AREA=[2.82](ha),
                    XIMP=[0.107], TIMP=[0.143], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.50](%),
                                         LGP=[284.4](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[1.58](%),
                                         LGI=[140](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1002A
ADD HYD             IDsum=[7], NHYD=["1002A"], IDs to add=[5+6]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB NASHYD        ID=[8], NHYD=["206A"], DT=[1]min, AREA=[1.40](ha),
                    DWF=[0](cms),  CN/C=[44], IA=[5.0](mm),
                    N=[3], TP=[0.81]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1002B
ADD HYD             IDsum=[9], NHYD=["1002B"], IDs to add=[7+8]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB NASHYD        ID=[1], NHYD=["206B"], DT=[1]min, AREA=[4.78](ha),
                    DWF=[0](cms),  CN/C=[66], IA=[4.5](mm),
                    N=[3], TP=[0.11]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
```

```
*%-----------------|-----------------------------------------------------------------
--------|
* 1003
ADD HYD             IDsum=[2], NHYD=["1003"], IDs to add=[1+9]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB NASHYD        ID=[3], NHYD=["205"], DT=[1]min, AREA=[1.2](ha),
                    DWF=[0](cms),  CN/C=[71.2], IA=[2.0](mm),
                    N=[3], TP=[0.03]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1004
ADD HYD             IDsum=[4], NHYD=["1004"], IDs to add=[3+2]
*%-----------------|-----------------------------------------------------------------
--------|
ROUTE RESERVOIR     IDout=[5],   NHYD=["BASIN"],  IDin=[4],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                      (cms) - (ha-m)
                                    [ 0.0000 , 0.0000 ]
                                    [ 0.0110 , 0.0717 ]
                                    [ 0.0190 , 0.1729 ]
                                    [ 0.0250 , 0.1992 ]
                                    [ 0.0440 , 0.2529 ]
                                    [ 0.0800 , 0.3083 ]
                                    [ 0.2030 , 0.3652 ]
                                    [ 0.4210 , 0.4838 ]
                                    [ 0.5580 , 0.6088 ]
                                    [ 0.6660 , 0.7402 ]
                                    [ 0.6910 , 0.7740 ]
                                    [ 1.0560 , 0.8779 ]
                                    [ 1.6620 , 0.9853 ]
                                    [ 2.4240 , 1.0963 ]
                                    [     -1 ,     -1 ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[6], NHYD=["207"], DT=[1](min), AREA=[0.70](ha),
                    XIMP=[0.215], TIMP=[0.286], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[0.60](%),
                                         LGP=[191.4](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.94](%),
                                         LGI=[10](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------------
```

```
--------|
* 1005
ADD HYD             IDsum=[7], NHYD=["1005"], IDs to add=[6+5]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB NASHYD        ID=[8], NHYD=["208"], DT=[1]min, AREA=[0.5](ha),
                    DWF=[0](cms),  CN/C=[44], IA=[5.0](mm),
                    N=[3], TP=[0.04]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1006
ADD HYD             IDsum=[9], NHYD=["1006"], IDs to add=[8+7]
*%-----------------|-----------------------------------------------------------------
--------|
*% 5-YEAR CHICAGO STORM DISTRIBUTION (4-HR)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*%                   ["5CHI4.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------------
--------|
*% 25-YEAR CHICAGO STORM DISTRIBUTION (4-HR)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
*%                   ["25CHI4.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------------
--------|
*% 100-YEAR CHICAGO STORM DISTRIBUTION (4-HR)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*%                   ["100CHI4.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------------
--------|
*% 25mm CHICAGO STORM DISTRIBUTION (4-HR)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
*%                   ["25mm4hr.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------------
--------|
*% HURRICANE HAZEL (12-HR)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                   [      ] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------------
--------|
READ STORM          STORM_FILENAME=["Hzl12h12.stm"]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[1], NHYD=["201"], DT=[1](min), AREA=[0.30](ha),
                    XIMP=[0.215], TIMP=[0.286], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[0.97](%),
```

```
                                         LGP=[119.6](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.97](%),
                                         LGI=[10](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[2], NHYD=["202"], DT=[1](min), AREA=[0.50](ha),
                    XIMP=[0.215], TIMP=[0.286], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[1.00](%),
                                         LGP=[218.2](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.80](%),
                                         LGI=[10](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1000
ADD HYD             IDsum=[3], NHYD=["1000"], IDs to add=[1+2]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[4], NHYD=["203"], DT=[1](min), AREA=[8.01](ha),
                    XIMP=[0.257], TIMP=[0.343], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.00](%),
                                         LGP=[86](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.79](%),
                                         LGI=[414](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1001
ADD HYD             IDsum=[5], NHYD=["1001"], IDs to add=[3+4]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[6], NHYD=["204"], DT=[1](min), AREA=[2.82](ha),
                    XIMP=[0.107], TIMP=[0.143], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.50](%),
                                         LGP=[284.4](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[1.58](%),
                                         LGI=[140](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1002A
ADD HYD             IDsum=[7], NHYD=["1002A"], IDs to add=[5+6]
*%-----------------|-----------------------------------------------------------------
```

```
--------|
CALIB NASHYD        ID=[8], NHYD=["206A"], DT=[1]min, AREA=[1.40](ha),
                    DWF=[0](cms),  CN/C=[44], IA=[5.0](mm),
                    N=[3], TP=[0.81]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1002B
ADD HYD             IDsum=[9], NHYD=["1002B"], IDs to add=[7+8]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB NASHYD        ID=[1], NHYD=["206B"], DT=[1]min, AREA=[4.78](ha),
                    DWF=[0](cms),  CN/C=[66], IA=[4.5](mm),
                    N=[3], TP=[0.11]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1003
ADD HYD             IDsum=[2], NHYD=["1003"], IDs to add=[1+9]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB NASHYD        ID=[3], NHYD=["205"], DT=[1]min, AREA=[1.2](ha),
                    DWF=[0](cms),  CN/C=[71.2], IA=[2.0](mm),
                    N=[3], TP=[0.03]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1004
ADD HYD             IDsum=[4], NHYD=["1004"], IDs to add=[3+2]
*%-----------------|-----------------------------------------------------------------
--------|
ROUTE RESERVOIR     IDout=[5],   NHYD=["BASIN"],  IDin=[4],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                      (cms) - (ha-m)
                                    [ 0.0000 , 0.0000 ]
                                    [ 0.0110 , 0.0717 ]
                                    [ 0.0190 , 0.1729 ]
                                    [ 0.0250 , 0.1992 ]
                                    [ 0.0440 , 0.2529 ]
                                    [ 0.0800 , 0.3083 ]
                                    [ 0.2030 , 0.3652 ]
                                    [ 0.4210 , 0.4838 ]
                                    [ 0.5580 , 0.6088 ]
                                    [ 0.6660 , 0.7402 ]
                                    [ 0.6910 , 0.7740 ]
                                    [ 1.0560 , 0.8779 ]
```

```
                                    [ 1.6620 , 0.9853 ]
                                    [ 2.4240 , 1.0963 ]
                                    [     -1 ,     -1 ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[6], NHYD=["207"], DT=[1](min), AREA=[0.70](ha),
                    XIMP=[0.215], TIMP=[0.286], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[0.60](%),
                                         LGP=[191.4](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.94](%),
                                         LGI=[10](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1005
ADD HYD             IDsum=[7], NHYD=["1005"], IDs to add=[6+5]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB NASHYD        ID=[8], NHYD=["208"], DT=[1]min, AREA=[0.5](ha),
                    DWF=[0](cms),  CN/C=[62], IA=[5.0](mm),
                    N=[3], TP=[0.04]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1006
ADD HYD             IDsum=[9], NHYD=["1006"], IDs to add=[8+7]
*%-----------------|-----------------------------------------------------------------
--------|
FINISH
```

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

 SSSSS   W   W   M   M   H   H   Y   Y   M   M    OOO         222     000    11
77777 =========
 S       W W W   MM MM   H   H    Y Y    MM MM   O   O          2    0   0   11   7
  7
 SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O          2    0   0   11
  7 Ver4.05.0
     S    W W    M   M   H   H     Y     M   M   O   O       222     0   0   11
 7  APR 2017
 SSSSS    W W    M   M   H   H     Y     M   M    OOO        2       0   0   11
7   =========
                                                             2       0   0   11
7    # 2880720
       StormWater Management HYdrologic Model                 222     000    11
7    =========

 ************************************************************************************
**************
 **************************************  SWMHYMO Ver4.05.0  *************************
**************
 ******************  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.          *****
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 ******************                 E-Mail: swmhymo@jfsa.com                   *****
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 ************************************************************************************
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 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++++++++++++
 ++++++++++++++++++ Licensed user: WMI & Associates Ltd.                       +++++
++++++++++++++
 ++++++++++++++++++               Barrie               SERIAL#:2880720         +++++
++++++++++++++
```

```
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++++++++++++

 ************************************************************************************
**************
 ******************           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *****
**************
 ******************           Maximum value for ID numbers  :     11            *****
**************
 ******************           Max. number of rainfall points: 105408            *****
**************
 ******************           Max. number of flow points    : 105408            *****
**************
 ************************************************************************************
**************


 *******************************   D E T A I L E D   O U T P U T   *****************
**************
 ************************************************************************************
**************
 *                 RUN DATE: 2019-12-04     TIME: 14:48:28     RUN COUNTER: 000005
            *
 ************************************************************************************
**************
 * Input   file: C:\Temp\17-431\191204\CHI_4hr\2-CYRCHI.dat
            *
 * Output  file: C:\Temp\17-431\191204\CHI_4hr\2-CYRCHI.out
            *
 * Summary file: C:\Temp\17-431\191204\CHI_4hr\2-CYRCHI.sum
            *
 * User comments:
            *
 * 1:_________________________________________________________________________________
_____________*
 * 2:_________________________________________________________________________________
_____________*
 * 3:_________________________________________________________________________________
_____________*
 ************************************************************************************
**************

-------------------------------------------------------------------------------------
--------------
R0001:C00001-------------------------------------------------------------------------
---------------
*#***********************************************************************************
```

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


*#  SWMHYMO Ver:4.05.00/Apr 2017 / INPUT DATA FILE



*#************************************************************************************
***********************************


*#  Project Name: [IEE - Phase 2]    Project Number: [17-431]



*#  Date        : 02-02-2018



*#  Modeller    : [Ben Daniels]



*#  Company     : WMI & Associates Ltd.



*#  License #   :  2880720



*#************************************************************************************
***********************************


--------------------
| START            | Project  dir.:C:\Temp\17-431\191204\CHI_4hr\

-------------------- Rainfall dir.:C:\Temp\17-431\191204\CHI_4hr\

    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0001
    NSTORM=   1
           #  1=2CHI4.stm
-------------------------------------------------------------------------------------
--------------
```

```
R0001:C00002-------------------------------------------------------------------------
---------------
--------------------
| READ STORM       |  Filename: C:\Temp\17-431\191204\CHI_4hr\2CHI4.stm



| Ptotal=  36.95 mm|  Comments: 2-Year Chicago Storm Distribution (4-hour) Innisfil,
ON.


--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|
 TIME    RAIN
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|
hh:mm   mm/hr
      0:10   2.470|   0:50   5.300|   1:30  24.570|   2:10   5.730|   2:50   3.460|
 3:30   2.550
      0:20   2.820|   1:00   7.980|   1:40  13.010|   2:20   4.890|   3:00   3.170|
 3:40   2.390
      0:30   3.310|   1:10  18.780|   1:50   9.010|   2:30   4.280|   3:10   2.930|
 3:50   2.260
      0:40   4.050|   1:20  83.110|   2:00   6.970|   2:40   3.820|   3:20   2.720|
 4:00   2.150

-------------------------------------------------------------------------------------
--------------
R0001:C00003-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .30
| 01:201       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .09          .21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .97          .97
     Length            (m)=      10.00       119.60
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      83.11         6.87
                over (min)       1.00        50.00
     Storage Coeff.  (min)=        .70 (ii)   50.08 (ii)
     Unit Hyd. Tpeak (min)=       1.00        50.00
     Unit Hyd. peak  (cms)=       1.29          .03
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .01          .00           .015 (iii)
```

```
     TIME TO PEAK    (hrs)=       1.27         2.27          1.333
     RUNOFF VOLUME    (mm)=      35.95         7.99         14.002
     TOTAL RAINFALL   (mm)=      36.96        36.96         36.955
     RUNOFF COEFFICIENT   =        .97          .22           .379

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00004-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=      .50
| 02:202        DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14          .36
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .80         1.00
     Length            (m)=      10.00       218.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      83.11        18.43
                over (min)        1.00        48.00
     Storage Coeff.  (min)=        .74 (ii)   48.04 (ii)
     Unit Hyd. Tpeak (min)=       1.00        48.00
     Unit Hyd. peak  (cms)=       1.26          .02
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .02          .00           .025 (iii)
     TIME TO PEAK    (hrs)=       1.28         2.23          1.333
     RUNOFF VOLUME    (mm)=      35.95         7.99         14.003
     TOTAL RAINFALL   (mm)=      36.96        36.96         36.955
     RUNOFF COEFFICIENT   =        .97          .22           .379

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00005-------------------------------------------------------------------------
---------------
* 1000
```

```
------------------------
| ADD HYD              |
| 03:1000              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:201            .300      .015    1.333    14.002    .
000
                     +ID 2 02:202            .500      .025    1.333    14.003    .
000
                     ================================================================
==
                     SUM   03:1000           .800      .040    1.333    14.003    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00006-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    8.01
| 04:203        DT= 1.00 |   Total Imp(%)=   34.30   Dir. Conn.(%)=   25.70
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.75         5.26
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .79         2.00
     Length            (m)=     414.00        86.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      83.11         8.88
                over (min)        7.00        36.00
     Storage Coeff.  (min)=       6.92 (ii)   36.35 (ii)
     Unit Hyd. Tpeak (min)=       7.00        36.00
     Unit Hyd. peak  (cms)=        .16          .03
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .35          .07           .359 (iii)
     TIME TO PEAK    (hrs)=       1.38         2.00          1.383
     RUNOFF VOLUME    (mm)=      35.95         8.22         15.347
     TOTAL RAINFALL   (mm)=      36.96        36.96         36.955
     RUNOFF COEFFICIENT   =        .97          .22           .415
```

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------
--------------
R0001:C00007--------------------------------------------------------------------------
---------------
* 1001



------------------------
| ADD HYD              |
| 05:1001              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                     ID 1 03:1000            .800      .040    1.333    14.003    .
000
                    +ID 2 04:203            8.010      .359    1.383    15.347    .
000
                    ==================================================================
==
                    SUM   05:1001           8.810      .372    1.383    15.225    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------
--------------
R0001:C00008--------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    2.82
| 06:204        DT= 1.00 |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .40         2.42
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.58         2.50
     Length            (m)=     140.00       284.40
     Mannings n          =       .013         .250

     Max.eff.Inten.(mm/hr)=      83.11        15.51
                over (min)        3.00        48.00
```

```
     Storage Coeff.  (min)=       2.93 (ii)   48.07 (ii)
     Unit Hyd. Tpeak (min)=       3.00        48.00
     Unit Hyd. peak  (cms)=        .38          .02
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .07          .02           .068 (iii)
     TIME TO PEAK    (hrs)=       1.33         2.23          1.333
     RUNOFF VOLUME    (mm)=      35.95         7.57         10.606
     TOTAL RAINFALL   (mm)=      36.96        36.96         36.955
     RUNOFF COEFFICIENT   =        .97          .20           .287
*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------
--------------
R0001:C00009--------------------------------------------------------------------------
---------------
* 1002A



------------------------
| ADD HYD              |
| 07:1002A             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                     ID 1 05:1001           8.810      .372    1.383    15.225    .
000
                    +ID 2 06:204            2.820      .068    1.333    10.606    .
000
                    ==================================================================
==
                    SUM   07:1002A         11.630      .436    1.333    14.105    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------
--------------
R0001:C00010--------------------------------------------------------------------------
---------------
--------------------------
```

```
| CALIB NASHYD           |   Area    (ha)=    1.400   Curve Number   (CN)= 44.00
| 08:206A       DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .810

     Unit Hyd Qpeak  (cms)=     .066

     PEAK FLOW       (cms)=     .005 (i)
     TIME TO PEAK    (hrs)=    2.467
     DURATION        (hrs)=    9.150, (dddd|hh:mm:)=   0|09:09
     AVERAGE FLOW    (cms)=     .001
     RUNOFF VOLUME    (mm)=    2.875
     TOTAL RAINFALL   (mm)=   36.955
     RUNOFF COEFFICIENT   =     .078

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00011-------------------------------------------------------------------------
---------------
* 1002B



------------------------
| ADD HYD              |
| 09:1002B             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 07:1002A         11.630      .436    1.333    14.105    .
000
                     +ID 2 08:206A           1.400      .005    2.467     2.875    .
000
                     ================================================================
==
                     SUM   09:1002B         13.030      .437    1.333    12.898    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00012-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    4.780   Curve Number   (CN)= 66.00
```

```
| 01:206B       DT= 1.00 |   Ia      (mm)=    4.500   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .110

     Unit Hyd Qpeak  (cms)=    1.660

     PEAK FLOW       (cms)=     .117 (i)
     TIME TO PEAK    (hrs)=    1.417
     DURATION        (hrs)=    4.800, (dddd|hh:mm:)=   0|04:48
     AVERAGE FLOW    (cms)=     .018
     RUNOFF VOLUME    (mm)=    6.450
     TOTAL RAINFALL   (mm)=   36.955
     RUNOFF COEFFICIENT   =     .175

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00013-------------------------------------------------------------------------
---------------
* 1003



------------------------
| ADD HYD              |
| 02:1003              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:206B           4.780      .117    1.417     6.450    .
000
                     +ID 2 09:1002B         13.030      .437    1.333    12.898    .
000
                     ================================================================
==
                     SUM   02:1003          17.810      .536    1.367    11.168    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00014-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.200   Curve Number   (CN)= 71.20
| 03:205        DT= 1.00 |   Ia      (mm)=    2.000   # of Linear Res.(N)=  3.00
```

```
--------------------------   U.H. Tp(hrs)=     .030

     Unit Hyd Qpeak  (cms)=    1.528

     PEAK FLOW       (cms)=     .070 (i)
     TIME TO PEAK    (hrs)=    1.333
     DURATION        (hrs)=    4.250, (dddd|hh:mm:)=   0|04:15
     AVERAGE FLOW    (cms)=     .007
     RUNOFF VOLUME    (mm)=    8.874
     TOTAL RAINFALL   (mm)=   36.955
     RUNOFF COEFFICIENT   =     .240

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
-------------------------------------------------------------------------------------
--------------
R0001:C00015-------------------------------------------------------------------------
---------------
* 1004



------------------------
| ADD HYD              |
| 04:1004              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:205           1.200      .070    1.333     8.874    .
000
                     +ID 2 02:1003         17.810      .536    1.367    11.168    .
000
                     ================================================================
==
                     SUM   04:1004         19.010      .591    1.333    11.023    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00016-------------------------------------------------------------------------
---------------
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
```

```
|  IN>04:1004         |
| OUT<05:BASIN        | =========================  OUTLFOW STORAGE TABLE  ===========
==============
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE|
OUTFLOW   STORAGE
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (
cms)   (ha.m.)
                           .000 .0000E+00|    .044 .2529E+00|    .421 .4838E+00|   1.
056 .8779E+00
                           .011 .7170E-01|    .080 .3083E+00|    .558 .6088E+00|   1.
662 .9853E+00
                           .019 .1729E+00|    .203 .3652E+00|    .666 .7402E+00|   2.
424 .1096E+01
                           .025 .1992E+00|    .421 .4838E+00|    .691 .7740E+00|    .
000 .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 04:1004          19.010      .591     1.333     11.023
    OUTFLOW < 05:BASIN         19.010      .021     4.683     11.022

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=    3.640
                   TIME SHIFT OF PEAK FLOW         (min)=   201.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.1838E+00

-------------------------------------------------------------------------------------
--------------
R0001:C00017-------------------------------------------------------------------------
---------------
-------------------------
| CALIB STANDHYD         |   Area    (ha)=     .70
| 06:207       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
-------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .50
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .94          .60
     Length            (m)=      10.00       191.40
     Mannings n          =       .013         .250

     Max.eff.Inten.(mm/hr)=      83.11        19.37
                over (min)       1.00        51.00
     Storage Coeff.  (min)=        .70 (ii)   50.67 (ii)
     Unit Hyd. Tpeak (min)=       1.00        51.00
     Unit Hyd. peak  (cms)=       1.29          .02
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .03          .01          .035 (iii)
```

```
     TIME TO PEAK    (hrs)=       1.28         2.28          1.333
     RUNOFF VOLUME    (mm)=      35.95         7.99         14.003
     TOTAL RAINFALL   (mm)=      36.96        36.96         36.955
     RUNOFF COEFFICIENT   =        .97          .22           .379

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00018-------------------------------------------------------------------------
---------------
* 1005



------------------------
| ADD HYD              |
| 07:1005              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 06:207             .700      .035    1.333    14.003    .
000
                     +ID 2 05:BASIN         19.010      .021    4.683    11.022    .
000
                     ================================================================
==
                     SUM   07:1005          19.710      .040    1.333    11.128    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00019-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=     .500   Curve Number   (CN)= 44.00
| 08:208       DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .040

     Unit Hyd Qpeak  (cms)=     .477

     PEAK FLOW       (cms)=     .008 (i)
```

```
     TIME TO PEAK    (hrs)=    1.333
     DURATION        (hrs)=    4.333, (dddd|hh:mm:)=   0|04:20
     AVERAGE FLOW    (cms)=     .001
     RUNOFF VOLUME    (mm)=    2.875
     TOTAL RAINFALL   (mm)=   36.955
     RUNOFF COEFFICIENT   =     .078

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00020-------------------------------------------------------------------------
---------------
* 1006



------------------------
| ADD HYD              |
| 09:1006              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 08:208             .500      .008    1.333     2.875    .
000
                     +ID 2 07:1005          19.710      .040    1.333    11.128    .
000
                     ================================================================
==
                     SUM   09:1006          20.210      .048    1.333    10.924    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00021-------------------------------------------------------------------------
---------------
  ** END OF RUN :    0

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

```
--------------------
| START            | Project  dir.:C:\Temp\17-431\191204\CHI_4hr\

-------------------- Rainfall dir.:C:\Temp\17-431\191204\CHI_4hr\

    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0002
    NSTORM=   1
           #  1=5CHI4.stm
-------------------------------------------------------------------------------------
--------------
R0002:C00002-------------------------------------------------------------------------
---------------
*#***********************************************************************************
***********************************


*#  SWMHYMO Ver:4.05.00/Apr 2017 / INPUT DATA FILE


*#***********************************************************************************
***********************************


*#  Project Name: [IEE - Phase 2]    Project Number: [17-431]


*#  Date        : 02-02-2018


*#  Modeller    : [Ben Daniels]


*#  Company     : WMI & Associates Ltd.


*#  License #   :  2880720


*#***********************************************************************************
```

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


-------------------------------------------------------------------------------------
--------------
R0002:C00002-------------------------------------------------------------------------
---------------
--------------------
| READ STORM       |  Filename: C:\Temp\17-431\191204\CHI_4hr\5CHI4.stm


| Ptotal=  50.52 mm|  Comments: 5-Year Chicago Storm Distribution (4-hour) Mansfield,
 ON.


--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|
 TIME    RAIN
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|
hh:mm   mm/hr
      0:10   3.570|   0:50   7.530|   1:30  33.310|   2:10   8.120|   2:50   4.970|
 3:30   3.680
      0:20   4.070|   1:00  11.200|   1:40  17.990|   2:20   6.960|   3:00   4.560|
 3:40   3.470
      0:30   4.760|   1:10  25.640|   1:50  12.600|   2:30   6.120|   3:10   4.220|
 3:50   3.280
      0:40   5.790|   1:20 108.920|   2:00   9.820|   2:40   5.480|   3:20   3.930|
 4:00   3.120

-------------------------------------------------------------------------------------
--------------
R0002:C00003-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .30
| 01:201       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .09          .21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .97          .97
     Length            (m)=      10.00       119.60
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     108.92        14.95
                over (min)        1.00        37.00
```

```
     Storage Coeff.  (min)=        .63 (ii)   36.81 (ii)
     Unit Hyd. Tpeak (min)=       1.00        37.00
     Unit Hyd. peak  (cms)=       1.36          .03
                                                         *TOTALS*
     PEAK FLOW       (cms)=        .02          .01           .020 (iii)
     TIME TO PEAK    (hrs)=       1.27         2.00          1.333
     RUNOFF VOLUME    (mm)=      49.51        14.58         22.088
     TOTAL RAINFALL   (mm)=      50.52        50.52         50.518
     RUNOFF COEFFICIENT   =        .98          .29           .437

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0002:C00004-------------------------------------------------------------------------
---------------
-------------------------
| CALIB STANDHYD         |   Area    (ha)=     .50
| 02:202       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14          .36
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .80         1.00
     Length            (m)=      10.00       218.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     108.92        11.29
                over (min)       1.00        58.00
     Storage Coeff.  (min)=        .66 (ii)   58.21 (ii)
     Unit Hyd. Tpeak (min)=       1.00        58.00
     Unit Hyd. peak  (cms)=       1.32          .02
                                                         *TOTALS*
     PEAK FLOW       (cms)=        .03          .01           .033 (iii)
     TIME TO PEAK    (hrs)=       1.28         2.40          1.333
     RUNOFF VOLUME    (mm)=      49.52        14.58         22.089
     TOTAL RAINFALL   (mm)=      50.52        50.52         50.518
     RUNOFF COEFFICIENT   =        .98          .29           .437

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
-------------------------------------------------------------------------------------
--------------
R0002:C00005-------------------------------------------------------------------------
---------------
* 1000



------------------------
| ADD HYD               |
| 03:1000               |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:201             .300      .020    1.333    22.088    .
000
                     +ID 2 02:202             .500      .033    1.333    22.089    .
000
                     ================================================================
==
                     SUM   03:1000            .800      .053    1.333    22.088    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0002:C00006-------------------------------------------------------------------------
---------------
-------------------------
| CALIB STANDHYD         |   Area    (ha)=    8.01
| 04:203       DT= 1.00 |   Total Imp(%)=   34.30   Dir. Conn.(%)=   25.70
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.75         5.26
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .79         2.00
     Length            (m)=     414.00        86.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     108.92        18.61
                over (min)       6.00        28.00
     Storage Coeff.  (min)=       6.21 (ii)   28.10 (ii)
     Unit Hyd. Tpeak (min)=       6.00        28.00
     Unit Hyd. peak  (cms)=        .18          .04
                                                         *TOTALS*
     PEAK FLOW       (cms)=        .48          .15           .514 (iii)
```

```
     TIME TO PEAK    (hrs)=       1.37         1.80          1.367
     RUNOFF VOLUME    (mm)=      49.52        14.93         23.817
     TOTAL RAINFALL   (mm)=      50.52        50.52         50.518
     RUNOFF COEFFICIENT   =        .98          .30           .471

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0002:C00007-------------------------------------------------------------------------
---------------
* 1001



------------------------
| ADD HYD              |
| 05:1001              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:1000            .800      .053    1.333    22.088    .
000
                     +ID 2 04:203            8.010      .514    1.367    23.817    .
000
                     ================================================================
==
                     SUM   05:1001           8.810      .537    1.333    23.660    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0002:C00008-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    2.82
| 06:204       DT= 1.00 |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .40         2.42
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.58         2.50
```

```
     Length           (m)=     140.00       284.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     108.92        10.54
                over (min)       3.00        55.00
     Storage Coeff.  (min)=       2.63 (ii)   55.30 (ii)
     Unit Hyd. Tpeak (min)=       3.00        55.00
     Unit Hyd. peak  (cms)=        .41          .02
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .09          .04           .091 (iii)
     TIME TO PEAK    (hrs)=       1.33         2.35          1.333
     RUNOFF VOLUME    (mm)=      49.52        13.92         17.727
     TOTAL RAINFALL   (mm)=      50.52        50.52         50.518
     RUNOFF COEFFICIENT   =        .98          .28           .351
*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0002:C00009-------------------------------------------------------------------------
---------------
* 1002A



------------------------
| ADD HYD              |
| 07:1002A             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 05:1001           8.810      .537    1.333    23.660    .
000
                     +ID 2 06:204            2.820      .091    1.333    17.727    .
000
                     ================================================================
==
                     SUM   07:1002A         11.630      .628    1.333    22.221    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
-------------------------------------------------------------------------------------
--------------
R0002:C00010-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.400   Curve Number   (CN)= 44.00
| 08:206A       DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .810

     Unit Hyd Qpeak  (cms)=     .066

     PEAK FLOW       (cms)=     .009 (i)
     TIME TO PEAK    (hrs)=    2.450
     DURATION        (hrs)=    9.150, (dddd|hh:mm:)=   0|09:09
     AVERAGE FLOW    (cms)=     .002
     RUNOFF VOLUME    (mm)=    5.618
     TOTAL RAINFALL   (mm)=   50.518
     RUNOFF COEFFICIENT   =     .111

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0002:C00011-------------------------------------------------------------------------
---------------
* 1002B



------------------------
| ADD HYD              |
| 09:1002B             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 07:1002A        11.630      .628    1.333    22.221    .
000
                     +ID 2 08:206A          1.400      .009    2.450     5.618    .
000
                     ================================================================
==
                     SUM   09:1002B        13.030      .628    1.333    20.438    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
```

```
--------------
R0002:C00012-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    4.780   Curve Number   (CN)= 66.00
| 01:206B       DT= 1.00 |   Ia      (mm)=    4.500   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .110

     Unit Hyd Qpeak  (cms)=    1.660

     PEAK FLOW       (cms)=     .218 (i)
     TIME TO PEAK    (hrs)=    1.400
     DURATION        (hrs)=    4.800, (dddd|hh:mm:)=   0|04:48
     AVERAGE FLOW    (cms)=     .033
     RUNOFF VOLUME    (mm)=   11.973
     TOTAL RAINFALL   (mm)=   50.518
     RUNOFF COEFFICIENT   =     .237

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0002:C00013-------------------------------------------------------------------------
---------------
* 1003



------------------------
| ADD HYD              |
| 02:1003              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:206B          4.780      .218    1.400    11.973    .
000
                     +ID 2 09:1002B        13.030      .628    1.333    20.438    .
000
                     ================================================================
==
                     SUM   02:1003         17.810      .814    1.367    18.166    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
```

```
R0002:C00014---------------------------------------------------------------------
--------------
-------------------------
| CALIB NASHYD           |   Area    (ha)=    1.200   Curve Number   (CN)= 71.20
| 03:205        DT= 1.00 |   Ia      (mm)=    2.000   # of Linear Res.(N)=  3.00
-------------------------   U.H. Tp(hrs)=     .030

     Unit Hyd Qpeak  (cms)=    1.528

     PEAK FLOW       (cms)=     .119 (i)
     TIME TO PEAK    (hrs)=    1.333
     DURATION        (hrs)=    4.250, (dddd|hh:mm:)=   0|04:15
     AVERAGE FLOW    (cms)=     .012
     RUNOFF VOLUME    (mm)=   15.563
     TOTAL RAINFALL   (mm)=   50.518
     RUNOFF COEFFICIENT   =     .308

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
---------------------------------------------------------------------------------
--------------
R0002:C00015---------------------------------------------------------------------
--------------
* 1004



------------------------
| ADD HYD              |
| 04:1004              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:205           1.200      .119    1.333    15.563    .
000
                     +ID 2 02:1003         17.810      .814    1.367    18.166    .
000
                     ==============================================================
==
                     SUM   04:1004         19.010      .911    1.333    18.002    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------------
```

```
-------------
R0002:C00016---------------------------------------------------------------------
--------------
----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>04:1004         |
| OUT<05:BASIN        | =========================  OUTLFOW STORAGE TABLE  ===========
=============
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE|
OUTFLOW   STORAGE
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (
cms)   (ha.m.)
                           .000 .0000E+00|    .044 .2529E+00|    .421 .4838E+00|   1.
056 .8779E+00
                           .011 .7170E-01|    .080 .3083E+00|    .558 .6088E+00|   1.
662 .9853E+00
                           .019 .1729E+00|    .203 .3652E+00|    .666 .7402E+00|   2.
424 .1096E+01
                           .025 .1992E+00|    .421 .4838E+00|    .691 .7740E+00|    .
000 .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     -----------------------     (ha)     (cms)     (hrs)       (mm)
     INFLOW > 04:1004         19.010      .911     1.333     18.002
    OUTFLOW < 05:BASIN         19.010      .065     4.233     18.001

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=    7.139
                   TIME SHIFT OF PEAK FLOW         (min)=   174.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.2853E+00

---------------------------------------------------------------------------------
-------------
R0002:C00017---------------------------------------------------------------------
--------------
-------------------------
| CALIB STANDHYD         |   Area    (ha)=     .70
| 06:207        DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .50
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .94          .60
     Length            (m)=      10.00       191.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     108.92        10.59
               over (min)       1.00        64.00
```

```
     Storage Coeff.  (min)=        .63 (ii)   64.24 (ii)
     Unit Hyd. Tpeak (min)=       1.00        64.00
     Unit Hyd. peak  (cms)=       1.35          .02
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .05          .01           .046 (iii)
     TIME TO PEAK    (hrs)=       1.28         2.52          1.333
     RUNOFF VOLUME    (mm)=      49.52        14.58         22.089
     TOTAL RAINFALL   (mm)=      50.52        50.52         50.518
     RUNOFF COEFFICIENT   =        .98          .29           .437

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0002:C00018-------------------------------------------------------------------------
---------------
* 1005



------------------------
| ADD HYD              |
| 07:1005              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                     ID 1 06:207            .700      .046    1.333    22.089    .
000
                    +ID 2 05:BASIN         19.010      .065    4.233    18.001    .
000
                    =================================================================
==
                    SUM   07:1005          19.710      .070    4.000    18.146    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0002:C00019-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=     .500   Curve Number   (CN)= 44.00
| 08:208        DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
```

```
--------------------------   U.H. Tp(hrs)=     .040

     Unit Hyd Qpeak  (cms)=     .477

     PEAK FLOW       (cms)=     .015 (i)
     TIME TO PEAK    (hrs)=    1.333
     DURATION        (hrs)=    4.333, (dddd|hh:mm:)=   0|04:20
     AVERAGE FLOW    (cms)=     .002
     RUNOFF VOLUME    (mm)=    5.618
     TOTAL RAINFALL   (mm)=   50.518
     RUNOFF COEFFICIENT   =     .111

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0002:C00020-------------------------------------------------------------------------
---------------
* 1006



------------------------
| ADD HYD              |
| 09:1006              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                     ID 1 08:208            .500      .015    1.333     5.618    .
000
                    +ID 2 07:1005          19.710      .070    4.000    18.146    .
000
                    =================================================================
==
                    SUM   09:1006          20.210      .071    4.000    17.836    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0002:C00021-------------------------------------------------------------------------
---------------
-------------------------------------------------------------------------------------
--------------
R0002:C00002-------------------------------------------------------------------------
---------------
```

```
  ** END OF RUN :    1

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




--------------------
| START           | Project  dir.:C:\Temp\17-431\191204\CHI_4hr\

-------------------- Rainfall dir.:C:\Temp\17-431\191204\CHI_4hr\

    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0003
    NSTORM=   1
           #  1=25CHI4.stm
-------------------------------------------------------------------------------------
--------------
R0003:C00002-------------------------------------------------------------------------
---------------
*#***********************************************************************************
***********************************


*#  SWMHYMO Ver:4.05.00/Apr 2017 / INPUT DATA FILE


*#***********************************************************************************
***********************************


*#  Project Name: [IEE - Phase 2]    Project Number: [17-431]


*#  Date        : 02-02-2018


*#  Modeller    : [Ben Daniels]
```

```
*#  Company     : WMI & Associates Ltd.


*#  License #   :  2880720


*#***********************************************************************************
***********************************


-------------------------------------------------------------------------------------
--------------
R0003:C00002-------------------------------------------------------------------------
---------------
--------------------
| READ STORM       |  Filename: C:\Temp\17-431\191204\CHI_4hr\25CHI4.stm


| Ptotal=  71.24 mm|  Comments: 25-Year Chicago Storm Distribution (4-hour)
Mansfield, ON.


--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|
 TIME    RAIN
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|
hh:mm   mm/hr
      0:10   5.220|   0:50  10.910|   1:30  47.060|   2:10  11.740|   2:50   7.240|
 3:30   5.380
      0:20   5.940|   1:00  16.130|   1:40  25.720|   2:20  10.090|   3:00   6.650|
 3:40   5.080
      0:30   6.930|   1:10  36.370|   1:50  18.110|   2:30   8.890|   3:10   6.150|
 3:50   4.800
      0:40   8.420|   1:20 148.150|   2:00  14.170|   2:40   7.960|   3:20   5.740|
 4:00   4.570

-------------------------------------------------------------------------------------
--------------
R0003:C00003-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .30
| 01:201       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
```

```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .09          .21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .97          .97
     Length            (m)=      10.00       119.60
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.15        33.19
                over (min)        1.00        27.00
     Storage Coeff.  (min)=        .55 (ii)   26.85 (ii)
     Unit Hyd. Tpeak (min)=       1.00        27.00
     Unit Hyd. peak  (cms)=       1.42          .04
                                                         *TOTALS*
     PEAK FLOW       (cms)=        .03          .01          .029 (iii)
     TIME TO PEAK    (hrs)=       1.27         1.77         1.333
     RUNOFF VOLUME    (mm)=      70.24        26.84        36.170
     TOTAL RAINFALL   (mm)=      71.24        71.24        71.237
     RUNOFF COEFFICIENT   =        .99          .38          .508

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------------
--------------
R0003:C00004------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .50
| 02:202       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14          .36
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .80         1.00
     Length            (m)=      10.00       218.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.15        25.45
                over (min)        1.00        42.00
     Storage Coeff.  (min)=        .59 (ii)   42.16 (ii)
     Unit Hyd. Tpeak (min)=       1.00        42.00
     Unit Hyd. peak  (cms)=       1.39          .03
                                                         *TOTALS*
     PEAK FLOW       (cms)=        .04          .01          .046 (iii)
     TIME TO PEAK    (hrs)=       1.27         2.07         1.333
```

```
     RUNOFF VOLUME    (mm)=      70.23        26.84        36.170
     TOTAL RAINFALL   (mm)=      71.24        71.24        71.237
     RUNOFF COEFFICIENT   =        .99          .38          .508

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------------
--------------
R0003:C00005------------------------------------------------------------------------
---------------
* 1000



------------------------
| ADD HYD               |
| 03:1000               |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                        (ha)     (cms)    (hrs)      (mm)   (
cms)
                     ID 1 01:201            .300      .029    1.333    36.170    .
000
                    +ID 2 02:202            .500      .046    1.333    36.170    .
000
                    ================================================================
==
                    SUM   03:1000           .800      .074    1.333    36.170    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------------
--------------
R0003:C00006------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    8.01
| 04:203       DT= 1.00 |   Total Imp(%)=   34.30   Dir. Conn.(%)=   25.70
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.75         5.26
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .79         2.00
     Length            (m)=     414.00        86.00
```

```
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.15        39.28
                over (min)       5.00        22.00
     Storage Coeff.  (min)=       5.50 (ii)   21.73 (ii)
     Unit Hyd. Tpeak (min)=       5.00        22.00
     Unit Hyd. peak  (cms)=        .21          .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .69          .34           .794 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.68          1.367
     RUNOFF VOLUME    (mm)=      70.24        27.38         38.391
     TOTAL RAINFALL   (mm)=      71.24        71.24         71.237
     RUNOFF COEFFICIENT   =        .99          .38           .539

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------------------
--------------
R0003:C00007---------------------------------------------------------------------------
---------------
* 1001



------------------------
| ADD HYD              |
| 05:1001              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                     ID 1 03:1000            .800      .074    1.333    36.170    .
000
                    +ID 2 04:203            8.010      .794    1.367    38.391    .
000
                    ===================================================================
==
                    SUM   05:1001           8.810      .834    1.333    38.190    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0003:C00008---------------------------------------------------------------------------
```

```
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    2.82
| 06:204        DT= 1.00 |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .40         2.42
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.58         2.50
     Length            (m)=     140.00       284.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.15        23.91
                over (min)       2.00        40.00
     Storage Coeff.  (min)=       2.33 (ii)   40.29 (ii)
     Unit Hyd. Tpeak (min)=       2.00        40.00
     Unit Hyd. peak  (cms)=        .51          .03
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .12          .09           .132 (iii)
     TIME TO PEAK    (hrs)=       1.33         2.03          1.333
     RUNOFF VOLUME    (mm)=      70.24        25.83         30.579
     TOTAL RAINFALL   (mm)=      71.24        71.24         71.237
     RUNOFF COEFFICIENT   =        .99          .36           .429
*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------------------
--------------
R0003:C00009---------------------------------------------------------------------------
---------------
* 1002A



------------------------
| ADD HYD              |
| 07:1002A             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                     ID 1 05:1001           8.810      .834    1.333    38.190    .
000
```

```
                     +ID 2 06:204            2.820      .132    1.333    30.579    .
000
                     =================================================================
==
                     SUM   07:1002A         11.630      .966    1.333    36.344    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------
--------------
R0003:C00010--------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.400   Curve Number   (CN)= 44.00
| 08:206A       DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .810

     Unit Hyd Qpeak  (cms)=     .066

     PEAK FLOW       (cms)=     .018 (i)
     TIME TO PEAK    (hrs)=    2.433
     DURATION        (hrs)=    9.150, (dddd|hh:mm:)=   0|09:09
     AVERAGE FLOW    (cms)=     .005
     RUNOFF VOLUME    (mm)=   11.264
     TOTAL RAINFALL   (mm)=   71.237
     RUNOFF COEFFICIENT   =     .158

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------
--------------
R0003:C00011--------------------------------------------------------------------------
---------------
* 1002B



------------------------
| ADD HYD              |
| 09:1002B             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 07:1002A         11.630      .966    1.333    36.344    .
000
                     +ID 2 08:206A           1.400      .018    2.433    11.264    .
```

```
000
                     =================================================================
==
                     SUM   09:1002B         13.030      .967    1.333    33.649    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------
--------------
R0003:C00012--------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    4.780   Curve Number   (CN)= 66.00
| 01:206B       DT= 1.00 |   Ia      (mm)=    4.500   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .110

     Unit Hyd Qpeak  (cms)=    1.660

     PEAK FLOW       (cms)=     .416 (i)
     TIME TO PEAK    (hrs)=    1.400
     DURATION        (hrs)=    4.800, (dddd|hh:mm:)=   0|04:48
     AVERAGE FLOW    (cms)=     .062
     RUNOFF VOLUME    (mm)=   22.541
     TOTAL RAINFALL   (mm)=   71.237
     RUNOFF COEFFICIENT   =     .316

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------
--------------
R0003:C00013--------------------------------------------------------------------------
---------------
* 1003



------------------------
| ADD HYD              |
| 02:1003              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:206B           4.780      .416    1.400    22.541    .
000
                     +ID 2 09:1002B         13.030      .967    1.333    33.649    .
000
```

```
                     ================================================================
==
                     SUM   02:1003          17.810     1.314    1.367    30.668    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0003:C00014-------------------------------------------------------------------------
---------------
-------------------------
| CALIB NASHYD           |   Area    (ha)=    1.200   Curve Number   (CN)= 71.20
| 03:205       DT= 1.00 |   Ia      (mm)=    2.000   # of Linear Res.(N)=  3.00
-------------------------   U.H. Tp(hrs)=     .030

     Unit Hyd Qpeak  (cms)=    1.528

     PEAK FLOW       (cms)=     .207 (i)
     TIME TO PEAK    (hrs)=    1.333
     DURATION        (hrs)=    4.250, (dddd|hh:mm:)=   0|04:15
     AVERAGE FLOW    (cms)=     .022
     RUNOFF VOLUME    (mm)=   27.874
     TOTAL RAINFALL   (mm)=   71.237
     RUNOFF COEFFICIENT   =     .391

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
-------------------------------------------------------------------------------------
--------------
R0003:C00015-------------------------------------------------------------------------
---------------
* 1004



-----------------------
| ADD HYD              |
| 04:1004              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
-----------------------                     (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:205           1.200      .207    1.333    27.874    .
000
                     +ID 2 02:1003         17.810     1.314    1.367    30.668    .
```

```
000
                     ================================================================
==
                     SUM   04:1004          19.010     1.498    1.333    30.492    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0003:C00016-------------------------------------------------------------------------
---------------
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>04:1004         |
| OUT<05:BASIN        | ========================  OUTLFOW STORAGE TABLE  ===========
=============
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE|
OUTFLOW   STORAGE
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (
cms)   (ha.m.)
                           .000 .0000E+00|    .044 .2529E+00|    .421 .4838E+00|   1.
056 .8779E+00
                           .011 .7170E-01|    .080 .3083E+00|    .558 .6088E+00|   1.
662 .9853E+00
                           .019 .1729E+00|    .203 .3652E+00|    .666 .7402E+00|   2.
424 .1096E+01
                           .025 .1992E+00|    .421 .4838E+00|    .691 .7740E+00|    .
000 .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 04:1004          19.010     1.498     1.333     30.492
    OUTFLOW < 05:BASIN         19.010      .250     3.283     30.491

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   16.689
                   TIME SHIFT OF PEAK FLOW         (min)=   117.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.3908E+00

-------------------------------------------------------------------------------------
--------------
R0003:C00017-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .70
| 06:207       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
```

```
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .50
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .94          .60
     Length            (m)=      10.00       191.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.15        23.68
                over (min)       1.00        47.00
     Storage Coeff.  (min)=        .56 (ii)   46.66 (ii)
     Unit Hyd. Tpeak (min)=       1.00        47.00
     Unit Hyd. peak  (cms)=       1.42          .02
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .06          .02           .064 (iii)
     TIME TO PEAK    (hrs)=       1.27         2.17          1.333
     RUNOFF VOLUME    (mm)=      70.24        26.84         36.170
     TOTAL RAINFALL   (mm)=      71.24        71.24         71.237
     RUNOFF COEFFICIENT   =        .99          .38           .508

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0003:C00018-------------------------------------------------------------------------
---------------
* 1005



------------------------
| ADD HYD              |
| 07:1005              |   ID:NHYD           AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                     (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 06:207            .700      .064    1.333    36.170    .
000
                     +ID 2 05:BASIN        19.010      .250    3.283    30.491    .
000
                     ================================================================
==
                     SUM   07:1005         19.710      .264    3.167    30.693    .
000
```

```
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0003:C00019-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=     .500   Curve Number   (CN)= 44.00
| 08:208        DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .040

     Unit Hyd Qpeak  (cms)=     .477

     PEAK FLOW       (cms)=     .030 (i)
     TIME TO PEAK    (hrs)=    1.333
     DURATION        (hrs)=    4.333, (dddd|hh:mm:)=   0|04:20
     AVERAGE FLOW    (cms)=     .004
     RUNOFF VOLUME    (mm)=   11.264
     TOTAL RAINFALL   (mm)=   71.237
     RUNOFF COEFFICIENT   =     .158

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0003:C00020-------------------------------------------------------------------------
---------------
* 1006



------------------------
| ADD HYD              |
| 09:1006              |   ID:NHYD           AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                     (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 08:208            .500      .030    1.333    11.264    .
000
                     +ID 2 07:1005         19.710      .264    3.167    30.693    .
000
                     ================================================================
==
                     SUM   09:1006         20.210      .267    3.167    30.212    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
-------------------------------------------------------------------------------------
--------------
R0003:C00021-------------------------------------------------------------------------
---------------
-------------------------------------------------------------------------------------
--------------
R0003:C00002-------------------------------------------------------------------------
---------------
-------------------------------------------------------------------------------------
--------------
R0003:C00002-------------------------------------------------------------------------
---------------
  ** END OF RUN :    2

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--------------------
| START           | Project  dir.:C:\Temp\17-431\191204\CHI_4hr\

-------------------- Rainfall dir.:C:\Temp\17-431\191204\CHI_4hr\

    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0004
    NSTORM=   1
           #  1=100CHI4.stm
-------------------------------------------------------------------------------------
--------------
R0004:C00002-------------------------------------------------------------------------
---------------
*#***********************************************************************************
***********************************


*#  SWMHYMO Ver:4.05.00/Apr 2017 / INPUT DATA FILE



*#***********************************************************************************
***********************************
```

```
*#  Project Name: [IEE - Phase 2]    Project Number: [17-431]


*#  Date        : 02-02-2018


*#  Modeller    : [Ben Daniels]


*#  Company     : WMI & Associates Ltd.


*#  License #   :  2880720


*#***********************************************************************************
***********************************


-------------------------------------------------------------------------------------
--------------
R0004:C00002-------------------------------------------------------------------------
---------------
--------------------
| READ STORM      |  Filename: C:\Temp\17-431\191204\CHI_4hr\100CHI4.stm


| Ptotal=  87.74 mm|  Comments: 100-Year Chicago Storm Distribution (4-hour)
Mansfield, ON.


--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|
 TIME    RAIN
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|
hh:mm   mm/hr
      0:10   6.410|   0:50  13.450|   1:30  58.540|   2:10  14.500|   2:50   8.900|
 3:30   6.600
      0:20   7.290|   1:00  19.960|   1:40  31.960|   2:20  12.440|   3:00   8.160|
 3:40   6.220
```

```
     0:30   8.520|   1:10  45.220|   1:50  22.450|   2:30  10.940|   3:10   7.560|
 3:50   5.890
     0:40  10.360|   1:20 180.150|   2:00  18.520|   2:40   9.800|   3:20   7.040|
 4:00   5.590

-------------------------------------------------------------------------------------
--------------
R0004:C00003-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .30
| 01:201       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .09          .21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .97          .97
     Length            (m)=      10.00       119.60
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     180.15        53.41
                over (min)       1.00        22.00
     Storage Coeff.  (min)=        .51 (ii)   22.25 (ii)
     Unit Hyd. Tpeak (min)=       1.00        22.00
     Unit Hyd. peak  (cms)=       1.46          .05
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .03          .02           .037 (iii)
     TIME TO PEAK    (hrs)=       1.27         1.68          1.333
     RUNOFF VOLUME    (mm)=      86.74        37.99         48.471
     TOTAL RAINFALL   (mm)=      87.74        87.74         87.745
     RUNOFF COEFFICIENT   =        .99          .43           .552

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0004:C00004-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .50
| 02:202       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14          .36
```

```
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .80         1.00
     Length            (m)=      10.00       218.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     180.15        40.53
                over (min)       1.00        35.00
     Storage Coeff.  (min)=        .54 (ii)   35.05 (ii)
     Unit Hyd. Tpeak (min)=       1.00        35.00
     Unit Hyd. peak  (cms)=       1.43          .03
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .05          .02           .057 (iii)
     TIME TO PEAK    (hrs)=       1.27         1.92          1.333
     RUNOFF VOLUME    (mm)=      86.74        37.99         48.471
     TOTAL RAINFALL   (mm)=      87.74        87.74         87.745
     RUNOFF COEFFICIENT   =        .99          .43           .552

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0004:C00005-------------------------------------------------------------------------
---------------
* 1000



------------------------
| ADD HYD              |
| 03:1000              |   ID:NHYD           AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                     (ha)     (cms)    (hrs)      (mm)   (
cms)
                     ID 1 01:201            .300      .037    1.333    48.471    .
000
                    +ID 2 02:202            .500      .057    1.333    48.471    .
000
                    =================================================================
==
                    SUM   03:1000           .800      .094    1.333    48.471    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
------------------------------------------------------------------------------------
--------------
R0004:C00006------------------------------------------------------------------------
---------------
-------------------------
| CALIB STANDHYD         |   Area    (ha)=    8.01
| 04:203        DT= 1.00 |   Total Imp(%)=   34.30   Dir. Conn.(%)=   25.70
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.75         5.26
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .79         2.00
     Length            (m)=     414.00        86.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     180.15        60.60
                over (min)        5.00        19.00
     Storage Coeff.  (min)=       5.08 (ii)   18.73 (ii)
     Unit Hyd. Tpeak (min)=       5.00        19.00
     Unit Hyd. peak  (cms)=        .22          .06
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .86          .53          1.061 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.63          1.367
     RUNOFF VOLUME    (mm)=      86.74        38.66         51.019
     TOTAL RAINFALL   (mm)=      87.74        87.74         87.745
     RUNOFF COEFFICIENT   =        .99          .44           .581

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0004:C00007------------------------------------------------------------------------
---------------
* 1001



------------------------
| ADD HYD              |
| 05:1001              |   ID:NHYD           AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                     (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:1000           .800      .094    1.333    48.471    .
```

```
000
                     +ID 2 04:203           8.010     1.061    1.367    51.019    .
000
                     ===============================================================
==
                     SUM   05:1001          8.810     1.102    1.333    50.787    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------------
--------------
R0004:C00008------------------------------------------------------------------------
---------------
-------------------------
| CALIB STANDHYD         |   Area    (ha)=    2.82
| 06:204        DT= 1.00 |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .40         2.42
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.58         2.50
     Length            (m)=     140.00       284.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     180.15        37.69
                over (min)        2.00        34.00
     Storage Coeff.  (min)=       2.15 (ii)   33.79 (ii)
     Unit Hyd. Tpeak (min)=       2.00        34.00
     Unit Hyd. peak  (cms)=        .53          .03
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .15          .15           .170 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.90          1.333
     RUNOFF VOLUME    (mm)=      86.75        36.71         42.064
     TOTAL RAINFALL   (mm)=      87.74        87.74         87.745
     RUNOFF COEFFICIENT   =        .99          .42           .479
*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------------
--------------
R0004:C00009------------------------------------------------------------------------
```

```
---------------
* 1002A


------------------------
| ADD HYD              |
| 07:1002A             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 05:1001           8.810     1.102    1.333    50.787    .
000
                     +ID 2 06:204            2.820      .170    1.333    42.064    .
000
                     ================================================================
==
                     SUM   07:1002A         11.630     1.272    1.333    48.672    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0004:C00010-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.400   Curve Number   (CN)= 44.00
| 08:206A       DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
-------------------------   U.H. Tp(hrs)=     .810

     Unit Hyd Qpeak  (cms)=     .066

     PEAK FLOW       (cms)=     .027 (i)
     TIME TO PEAK    (hrs)=    2.417
     DURATION        (hrs)=    9.150, (dddd|hh:mm:)=   0|09:09
     AVERAGE FLOW    (cms)=     .007
     RUNOFF VOLUME    (mm)=   16.863
     TOTAL RAINFALL   (mm)=   87.745
     RUNOFF COEFFICIENT   =     .192

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0004:C00011-------------------------------------------------------------------------
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```

```
* 1002B


------------------------
| ADD HYD              |
| 09:1002B             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 07:1002A         11.630     1.272    1.333    48.672    .
000
                     +ID 2 08:206A           1.400      .027    2.417    16.863    .
000
                     ================================================================
==
                     SUM   09:1002B         13.030     1.273    1.333    45.255    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0004:C00012-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    4.780   Curve Number   (CN)= 66.00
| 01:206B       DT= 1.00 |   Ia      (mm)=    4.500   # of Linear Res.(N)=  3.00
-------------------------   U.H. Tp(hrs)=     .110

     Unit Hyd Qpeak  (cms)=    1.660

     PEAK FLOW       (cms)=     .605 (i)
     TIME TO PEAK    (hrs)=    1.400
     DURATION        (hrs)=    4.800, (dddd|hh:mm:)=   0|04:48
     AVERAGE FLOW    (cms)=     .090
     RUNOFF VOLUME    (mm)=   32.368
     TOTAL RAINFALL   (mm)=   87.745
     RUNOFF COEFFICIENT   =     .369

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0004:C00013-------------------------------------------------------------------------
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* 1003
```

```
------------------------
| ADD HYD              |
| 02:1003              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:206B           4.780      .605    1.400    32.368    .
000
                     +ID 2 09:1002B         13.030     1.273    1.333    45.255    .
000
                     ================================================================
==
                     SUM   02:1003          17.810     1.807    1.367    41.796    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0004:C00014-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.200   Curve Number   (CN)= 71.20
| 03:205        DT= 1.00 |   Ia      (mm)=    2.000   # of Linear Res.(N)=  3.00
-------------------------   U.H. Tp(hrs)=     .030

     Unit Hyd Qpeak  (cms)=    1.528

     PEAK FLOW       (cms)=     .288 (i)
     TIME TO PEAK    (hrs)=    1.333
     DURATION        (hrs)=    4.250, (dddd|hh:mm:)=   0|04:15
     AVERAGE FLOW    (cms)=     .031
     RUNOFF VOLUME    (mm)=   39.006
     TOTAL RAINFALL   (mm)=   87.745
     RUNOFF COEFFICIENT   =     .445

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
-------------------------------------------------------------------------------------
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R0004:C00015-------------------------------------------------------------------------
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```

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* 1004


------------------------
| ADD HYD              |
| 04:1004              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:205            1.200      .288    1.333    39.006    .
000
                     +ID 2 02:1003          17.810     1.807    1.367    41.796    .
000
                     ================================================================
==
                     SUM   04:1004          19.010     2.042    1.333    41.620    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0004:C00016-------------------------------------------------------------------------
---------------
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>04:1004         |
| OUT<05:BASIN        | ========================  OUTLFOW STORAGE TABLE  ===========
=============
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE|
OUTFLOW   STORAGE
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (
cms)   (ha.m.)
                           .000 .0000E+00|    .044 .2529E+00|    .421 .4838E+00|   1.
056 .8779E+00
                           .011 .7170E-01|    .080 .3083E+00|    .558 .6088E+00|   1.
662 .9853E+00
                           .019 .1729E+00|    .203 .3652E+00|    .666 .7402E+00|   2.
424 .1096E+01
                           .025 .1992E+00|    .421 .4838E+00|    .691 .7740E+00|    .
000 .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 04:1004         19.010     2.042     1.333     41.620
    OUTFLOW < 05:BASIN        19.010      .417     2.867     41.618
```

```
                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   20.410
                   TIME SHIFT OF PEAK FLOW         (min)=    92.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.4815E+00

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--------------
R0004:C00017-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .70
| 06:207        DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .50
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .94          .60
     Length            (m)=      10.00       191.40
     Mannings n          =       .013         .250

     Max.eff.Inten.(mm/hr)=     180.15        37.94
                over (min)       1.00        39.00
     Storage Coeff.  (min)=        .52 (ii)   38.69 (ii)
     Unit Hyd. Tpeak (min)=       1.00        39.00
     Unit Hyd. peak  (cms)=       1.45          .03
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .08          .03           .079 (iii)
     TIME TO PEAK    (hrs)=       1.27         2.00          1.333
     RUNOFF VOLUME    (mm)=      86.74        37.99         48.471
     TOTAL RAINFALL   (mm)=      87.74        87.74         87.745
     RUNOFF COEFFICIENT   =        .99          .43           .552

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0004:C00018-------------------------------------------------------------------------
---------------
* 1005



------------------------
| ADD HYD              |
```

```
| 07:1005              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                     ID 1 06:207             .700      .079    1.333    48.471    .
000
                    +ID 2 05:BASIN         19.010      .417    2.867    41.618    .
000
                    ================================================================
==
                    SUM   07:1005          19.710      .440    2.783    41.861    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0004:C00019-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=     .500   Curve Number   (CN)= 44.00
| 08:208        DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .040

     Unit Hyd Qpeak  (cms)=     .477

     PEAK FLOW       (cms)=     .045 (i)
     TIME TO PEAK    (hrs)=    1.333
     DURATION        (hrs)=    4.333, (dddd|hh:mm:)=   0|04:20
     AVERAGE FLOW    (cms)=     .005
     RUNOFF VOLUME    (mm)=   16.863
     TOTAL RAINFALL   (mm)=   87.745
     RUNOFF COEFFICIENT   =     .192

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0004:C00020-------------------------------------------------------------------------
---------------
* 1006



------------------------
| ADD HYD              |
| 09:1006              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
```

```
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 08:208             .500      .045    1.333    16.863    .
000
                     +ID 2 07:1005          19.710      .440    2.783    41.861    .
000
                     ================================================================
==
                     SUM   09:1006          20.210      .444    2.783    41.243    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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R0004:C00021-------------------------------------------------------------------------
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-------------------------------------------------------------------------------------
--------------
R0004:C00002-------------------------------------------------------------------------
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-------------------------------------------------------------------------------------
--------------
R0004:C00002-------------------------------------------------------------------------
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-------------------------------------------------------------------------------------
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R0004:C00002-------------------------------------------------------------------------
---------------
  ** END OF RUN :    3

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




--------------------
| START            | Project  dir.:C:\Temp\17-431\191204\CHI_4hr\

-------------------- Rainfall dir.:C:\Temp\17-431\191204\CHI_4hr\

    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0005
```

```
    NSTORM=   1
           #  1=25mm4hr.stm
-------------------------------------------------------------------------------------
--------------
R0005:C00002-------------------------------------------------------------------------
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*#***********************************************************************************
***********************************


*#  SWMHYMO Ver:4.05.00/Apr 2017 / INPUT DATA FILE


*#***********************************************************************************
***********************************


*#  Project Name: [IEE - Phase 2]    Project Number: [17-431]


*#  Date        : 02-02-2018


*#  Modeller    : [Ben Daniels]


*#  Company     : WMI & Associates Ltd.


*#  License #   :  2880720


*#***********************************************************************************
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R0005:C00002-------------------------------------------------------------------------
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```

```
| READ STORM       |  Filename: C:\Temp\17-431\191204\CHI_4hr\25mm4hr.stm



| Ptotal=  25.00 mm|  Comments: 25mm Chicago Storm Distribution (4-hour) Mansfield,
ON.


--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|
 TIME    RAIN
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|
hh:mm   mm/hr
      0:10   2.070|   0:50   3.380|   1:30  50.210|   2:10   5.190|   2:50   3.250|
 3:30   2.480
      0:20   2.270|   1:00   4.180|   1:40  13.370|   2:20   4.470|   3:00   3.010|
 3:40   2.350
      0:30   2.520|   1:10   5.700|   1:50   8.290|   2:30   3.950|   3:10   2.800|
 3:50   2.230
      0:40   2.880|   1:20  10.780|   2:00   6.300|   2:40   3.560|   3:20   2.620|
 4:00   2.140

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--------------
R0005:C00003-------------------------------------------------------------------------
--------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .30
| 01:201       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .09          .21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .97          .97
     Length            (m)=      10.00       119.60
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      50.21         7.35
                over (min)        1.00        49.00
     Storage Coeff.  (min)=        .85 (ii)   48.91 (ii)
     Unit Hyd. Tpeak (min)=       1.00        49.00
     Unit Hyd. peak  (cms)=       1.17          .03
                                                             *TOTALS*
     PEAK FLOW       (cms)=        .01          .00           .009 (iii)
     TIME TO PEAK    (hrs)=       1.45         2.55          1.500
     RUNOFF VOLUME    (mm)=      23.99         3.50          7.907
     TOTAL RAINFALL   (mm)=      25.00        25.00         25.000
```

```
     RUNOFF COEFFICIENT   =        .96          .14           .316

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0005:C00004-------------------------------------------------------------------------
--------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .50
| 02:202       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14          .36
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .80         1.00
     Length            (m)=      10.00       218.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      50.21         8.84
                over (min)        1.00        64.00
     Storage Coeff.  (min)=        .90 (ii)   64.35 (ii)
     Unit Hyd. Tpeak (min)=       1.00        64.00
     Unit Hyd. peak  (cms)=       1.14          .02
                                                             *TOTALS*
     PEAK FLOW       (cms)=        .01          .00           .015 (iii)
     TIME TO PEAK    (hrs)=       1.47         2.90          1.500
     RUNOFF VOLUME    (mm)=      24.00         3.50          7.908
     TOTAL RAINFALL   (mm)=      25.00        25.00         25.000
     RUNOFF COEFFICIENT   =        .96          .14           .316

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0005:C00005-------------------------------------------------------------------------
--------------
* 1000
```

```
------------------------
| ADD HYD              |
| 03:1000              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:201            .300      .009    1.500     7.907    .
000
                     +ID 2 02:202            .500      .015    1.500     7.908    .
000
                     ================================================================
==
                     SUM   03:1000           .800      .024    1.500     7.908    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------
R0005:C00006-------------------------------------------------------------------------
--------------
-------------------------
| CALIB STANDHYD         |   Area    (ha)=    8.01
| 04:203       DT= 1.00 |   Total Imp(%)=   34.30   Dir. Conn.(%)=   25.70
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.75         5.26
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .79         2.00
     Length            (m)=     414.00        86.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      50.21         2.58
                over (min)        8.00        57.00
     Storage Coeff.  (min)=       8.47 (ii)   56.72 (ii)
     Unit Hyd. Tpeak (min)=       8.00        57.00
     Unit Hyd. peak  (cms)=        .14          .02
                                                             *TOTALS*
     PEAK FLOW       (cms)=        .19          .02            .194 (iii)
     TIME TO PEAK    (hrs)=       1.57         2.73           1.567
     RUNOFF VOLUME    (mm)=      24.00         3.62           8.861
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.000
     RUNOFF COEFFICIENT   =        .96          .14            .354

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
```

```
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0005:C00007-------------------------------------------------------------------------
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* 1001



------------------------
| ADD HYD              |
| 05:1001              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:1000           .800      .024    1.500     7.908    .
000
                     +ID 2 04:203           8.010      .194    1.567     8.861    .
000
                     ================================================================
==
                     SUM   05:1001          8.810      .200    1.567     8.774    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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R0005:C00008-------------------------------------------------------------------------
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-------------------------
| CALIB STANDHYD         |   Area    (ha)=    2.82
| 06:204       DT= 1.00 |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .40         2.42
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.58         2.50
     Length            (m)=     140.00       284.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      50.21         7.80
                over (min)        4.00        63.00
     Storage Coeff.  (min)=       3.59 (ii)   63.01 (ii)
     Unit Hyd. Tpeak (min)=       4.00        63.00
     Unit Hyd. peak  (cms)=        .30          .02
```

```
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .04          .01           .039 (iii)
     TIME TO PEAK    (hrs)=        1.50         2.90          1.500
     RUNOFF VOLUME    (mm)=       24.00         3.27          5.491
     TOTAL RAINFALL   (mm)=       25.00        25.00         25.000
     RUNOFF COEFFICIENT   =         .96          .13           .220
*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0005:C00009--------------------------------------------------------------------------
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* 1002A



------------------------
| ADD HYD              |
| 07:1002A             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 05:1001           8.810      .200    1.567     8.774     .
000
                     +ID 2 06:204            2.820      .039    1.500     5.491     .
000
                     =================================================================
==
                     SUM   07:1002A         11.630      .233    1.533     7.978     .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0005:C00010--------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.400   Curve Number   (CN)= 44.00
| 08:206A      DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .810
```

```
     Unit Hyd Qpeak  (cms)=     .066

     PEAK FLOW       (cms)=     .002 (i)
     TIME TO PEAK    (hrs)=    2.833
     DURATION        (hrs)=    9.150, (dddd|hh:mm:)=   0|09:09
     AVERAGE FLOW    (cms)=     .000
     RUNOFF VOLUME    (mm)=    1.165
     TOTAL RAINFALL   (mm)=   25.000
     RUNOFF COEFFICIENT   =     .047

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------
--------------
R0005:C00011--------------------------------------------------------------------------
---------------
* 1002B



------------------------
| ADD HYD              |
| 09:1002B             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 07:1002A         11.630      .233    1.533     7.978     .
000
                     +ID 2 08:206A           1.400      .002    2.833     1.165     .
000
                     =================================================================
==
                     SUM   09:1002B         13.030      .233    1.533     7.246     .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0005:C00012--------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    4.780   Curve Number   (CN)= 66.00
| 01:206B      DT= 1.00 |   Ia      (mm)=    4.500   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .110
```

```
     Unit Hyd Qpeak  (cms)=    1.660

     PEAK FLOW       (cms)=     .040 (i)
     TIME TO PEAK    (hrs)=    1.583
     DURATION        (hrs)=    4.800, (dddd|hh:mm:)=   0|04:48
     AVERAGE FLOW    (cms)=     .008
     RUNOFF VOLUME    (mm)=    2.777
     TOTAL RAINFALL   (mm)=   25.000
     RUNOFF COEFFICIENT   =     .111

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0005:C00013-------------------------------------------------------------------------
---------------
* 1003



------------------------
| ADD HYD               |
| 02:1003               |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:206B           4.780      .040    1.583     2.777    .
000
                     +ID 2 09:1002B         13.030      .233    1.533     7.246    .
000
                     ================================================================
==
                     SUM   02:1003          17.810      .271    1.550     6.047    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0005:C00014-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.200   Curve Number   (CN)= 71.20
| 03:205        DT= 1.00 |   Ia      (mm)=    2.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .030

     Unit Hyd Qpeak  (cms)=    1.528
```

```
     PEAK FLOW       (cms)=     .029 (i)
     TIME TO PEAK    (hrs)=    1.500
     DURATION        (hrs)=    4.250, (dddd|hh:mm:)=   0|04:15
     AVERAGE FLOW    (cms)=     .003
     RUNOFF VOLUME    (mm)=    4.207
     TOTAL RAINFALL   (mm)=   25.000
     RUNOFF COEFFICIENT   =     .168

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
-------------------------------------------------------------------------------------
--------------
R0005:C00015-------------------------------------------------------------------------
---------------
* 1004



------------------------
| ADD HYD               |
| 04:1004               |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:205            1.200      .029    1.500     4.207    .
000
                     +ID 2 02:1003          17.810      .271    1.550     6.047    .
000
                     ================================================================
==
                     SUM   04:1004          19.010      .289    1.517     5.931    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0005:C00016-------------------------------------------------------------------------
---------------
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>04:1004         |
| OUT<05:BASIN        | =========================  OUTFLOW STORAGE TABLE  ===========
==============
```

```
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE|
OUTFLOW   STORAGE
                       (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (
cms)   (ha.m.)
                        .000 .0000E+00|    .044 .2529E+00|    .421 .4838E+00|   1.
056 .8779E+00
                        .011 .7170E-01|    .080 .3083E+00|    .558 .6088E+00|   1.
662 .9853E+00
                        .019 .1729E+00|    .203 .3652E+00|    .666 .7402E+00|   2.
424 .1096E+01
                        .025 .1992E+00|    .421 .4838E+00|    .691 .7740E+00|    .
000 .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 04:1004          19.010      .289     1.517      5.931
    OUTFLOW < 05:BASIN         19.010      .013     5.117      5.930

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=    4.444
                   TIME SHIFT OF PEAK FLOW         (min)=   216.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.9478E-01

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--------------
R0005:C00017--------------------------------------------------------------------------
--------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .70
| 06:207       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .50
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .94          .60
     Length            (m)=      10.00       191.40
     Mannings n          =       .013         .250

     Max.eff.Inten.(mm/hr)=      50.21         8.84
                over (min)       1.00        69.00
     Storage Coeff.  (min)=        .86 (ii)   69.22 (ii)
     Unit Hyd. Tpeak (min)=       1.00        69.00
     Unit Hyd. peak  (cms)=       1.17          .02
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .02          .00             .021 (iii)
     TIME TO PEAK    (hrs)=       1.47         3.03            1.500
     RUNOFF VOLUME    (mm)=      24.00         3.50            7.908
     TOTAL RAINFALL   (mm)=      25.00        25.00           25.000
```

```
     RUNOFF COEFFICIENT   =        .96          .14           .316

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0005:C00018--------------------------------------------------------------------------
---------------
* 1005



------------------------
| ADD HYD               |
| 07:1005               |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 06:207            .700      .021    1.500     7.908    .
000
                     +ID 2 05:BASIN        19.010      .013    5.117     5.930    .
000
                     =================================================================
==
                     SUM   07:1005         19.710      .024    1.500     6.001    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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R0005:C00019--------------------------------------------------------------------------
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-------------------------
| CALIB NASHYD           |   Area    (ha)=     .500   Curve Number   (CN)= 44.00
| 08:208       DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
-------------------------   U.H. Tp(hrs)=     .040

     Unit Hyd Qpeak  (cms)=     .477

     PEAK FLOW       (cms)=     .003 (i)
     TIME TO PEAK    (hrs)=    1.500
     DURATION        (hrs)=    4.333, (dddd|hh:mm:)=   0|04:20
     AVERAGE FLOW    (cms)=     .000
```

```
     RUNOFF VOLUME    (mm)=    1.165
     TOTAL RAINFALL   (mm)=   25.000
     RUNOFF COEFFICIENT   =     .047

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0005:C00020-------------------------------------------------------------------------
---------------
* 1006



------------------------
| ADD HYD               |
| 09:1006               |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 08:208            .500      .003    1.500     1.165    .
000
                     +ID 2 07:1005         19.710      .024    1.500     6.001    .
000
                     ================================================================
==
                     SUM   09:1006         20.210      .026    1.500     5.881    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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R0005:C00021-------------------------------------------------------------------------
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R0005:C00002-------------------------------------------------------------------------
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R0005:C00002-------------------------------------------------------------------------
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R0005:C00002-------------------------------------------------------------------------
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R0005:C00002-------------------------------------------------------------------------
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R0005:C00002-------------------------------------------------------------------------
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--------------------
| READ STORM       |  Filename: C:\Temp\17-431\191204\CHI_4hr\Hzl12h12.stm


| Ptotal= 212.00 mm|  Comments: HURRICANE HAZEL REGIONAL STORM (12-hour)



--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|
 TIME    RAIN
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|
hh:mm   mm/hr
      0:12   6.000|   2:12   6.000|   4:12  17.000|   6:12  23.000|   8:12  13.000|
10:12  38.000
      0:24   6.000|   2:24   6.000|   4:24  17.000|   6:24  23.000|   8:24  13.000|
10:24  38.000
      0:36   6.000|   2:36   6.000|   4:36  17.000|   6:36  23.000|   8:36  13.000|
10:36  38.000
      0:48   6.000|   2:48   6.000|   4:48  17.000|   6:48  23.000|   8:48  13.000|
10:48  38.000
      1:00   6.000|   3:00   6.000|   5:00  17.000|   7:00  23.000|   9:00  13.000|
11:00  38.000
      1:12   4.000|   3:12  13.000|   5:12  13.000|   7:12  13.000|   9:12  53.000|
11:12  13.000
      1:24   4.000|   3:24  13.000|   5:24  13.000|   7:24  13.000|   9:24  53.000|
11:24  13.000
      1:36   4.000|   3:36  13.000|   5:36  13.000|   7:36  13.000|   9:36  53.000|
11:36  13.000
      1:48   4.000|   3:48  13.000|   5:48  13.000|   7:48  13.000|   9:48  53.000|
11:48  13.000
      2:00   4.000|   4:00  13.000|   6:00  13.000|   8:00  13.000|  10:00  53.000|
12:00  13.000

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R0005:C00003-------------------------------------------------------------------------
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```

```
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .30
| 01:201        DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .09          .21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .97          .97
     Length            (m)=      10.00       119.60
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        48.76
                over (min)        1.00        23.00
     Storage Coeff.  (min)=        .83 (ii)   23.38 (ii)
     Unit Hyd. Tpeak (min)=       1.00        23.00
     Unit Hyd. peak  (cms)=       1.19          .05
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .01          .03           .035 (iii)
     TIME TO PEAK    (hrs)=       9.12        10.17         10.000
     RUNOFF VOLUME    (mm)=     210.95       140.43        155.592
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =       1.00          .66           .734

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0005:C00004----------------------------------------------------------------------------
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--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .50
| 02:202        DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14          .36
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .80         1.00
     Length            (m)=      10.00       218.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        48.39
                over (min)        1.00        33.00
     Storage Coeff.  (min)=        .88 (ii)   33.03 (ii)
     Unit Hyd. Tpeak (min)=       1.00        33.00
```

```
     Unit Hyd. peak  (cms)=       1.15          .03
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .02          .04           .052 (iii)
     TIME TO PEAK    (hrs)=       9.13        10.38         10.000
     RUNOFF VOLUME    (mm)=     210.97       140.43        155.597
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =       1.00          .66           .734

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0005:C00005----------------------------------------------------------------------------
--------------
* 1000



------------------------
| ADD HYD              |
| 03:1000              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:201            .300      .035   10.000   155.592    .
000
                     +ID 2 02:202            .500      .052   10.000   155.597    .
000
                     ===================================================================
==
                     SUM   03:1000           .800      .087   10.000   155.595    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------
R0005:C00006----------------------------------------------------------------------------
--------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    8.01
| 04:203        DT= 1.00 |   Total Imp(%)=   34.30   Dir. Conn.(%)=   25.70
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area     (ha)=       2.75         5.26
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .79         2.00
     Length            (m)=     414.00        86.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        50.49
                over (min)        8.00        23.00
     Storage Coeff.  (min)=       8.29 (ii)   22.97 (ii)
     Unit Hyd. Tpeak (min)=       8.00        23.00
     Unit Hyd. peak  (cms)=        .14          .05
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .30          .67           .954 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.17         10.050
     RUNOFF VOLUME    (mm)=     211.00       141.81        159.596
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =       1.00          .67           .753

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0005:C00007-------------------------------------------------------------------------
---------------
* 1001



------------------------
| ADD HYD              |
| 05:1001              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:1000            .800      .087   10.000   155.595    .
000
                     +ID 2 04:203            8.010      .954   10.050   159.596    .
000
                     ================================================================
==
                     SUM   05:1001           8.810     1.036   10.000   159.233    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

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R0005:C00008-------------------------------------------------------------------------
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--------------------------
| CALIB STANDHYD         |   Area    (ha)=    2.82
| 06:204       DT= 1.00 |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .40         2.42
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.58         2.50
     Length            (m)=     140.00       284.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        45.24
                over (min)        4.00        33.00
     Storage Coeff.  (min)=       3.51 (ii)   32.92 (ii)
     Unit Hyd. Tpeak (min)=       4.00        33.00
     Unit Hyd. peak  (cms)=        .31          .03
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .04          .25           .286 (iii)
     TIME TO PEAK    (hrs)=       9.47        10.38         10.383
     RUNOFF VOLUME    (mm)=     211.00       137.75        145.587
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =       1.00          .65           .687
*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0005:C00009-------------------------------------------------------------------------
---------------
* 1002A



------------------------
| ADD HYD              |
| 07:1002A             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
```

```
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 05:1001           8.810     1.036   10.000   159.233    .
000
                     +ID 2 06:204            2.820      .286   10.383   145.587    .
000
                     ================================================================
==
                     SUM   07:1002A         11.630     1.311   10.050   155.924    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
-------------
R0005:C00010-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.400   Curve Number   (CN)= 44.00
| 08:206A       DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .810

     Unit Hyd Qpeak  (cms)=     .066

     PEAK FLOW       (cms)=     .085 (i)
     TIME TO PEAK    (hrs)=   11.133
     DURATION        (hrs)=   17.150, (dddd|hh:mm:)=   0|17:09
     AVERAGE FLOW    (cms)=     .018
     RUNOFF VOLUME    (mm)=   80.805
     TOTAL RAINFALL   (mm)=  212.000
     RUNOFF COEFFICIENT   =     .381

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------
R0005:C00011-------------------------------------------------------------------------
---------------
* 1002B



------------------------
| ADD HYD              |
| 09:1002B             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
```

```
cms)
                      ID 1 07:1002A         11.630     1.311   10.050   155.924    .
000
                     +ID 2 08:206A           1.400      .085   11.133    80.805    .
000
                     ================================================================
==
                     SUM   09:1002B         13.030     1.370   10.050   147.853    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
-------------
R0005:C00012-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    4.780   Curve Number   (CN)= 66.00
| 01:206B       DT= 1.00 |   Ia      (mm)=    4.500   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .110

     Unit Hyd Qpeak  (cms)=    1.660

     PEAK FLOW       (cms)=     .549 (i)
     TIME TO PEAK    (hrs)=   10.000
     DURATION        (hrs)=   12.800, (dddd|hh:mm:)=   0|12:48
     AVERAGE FLOW    (cms)=     .132
     RUNOFF VOLUME    (mm)=  127.254
     TOTAL RAINFALL   (mm)=  212.000
     RUNOFF COEFFICIENT   =     .600

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
-------------
R0005:C00013-------------------------------------------------------------------------
---------------
* 1003



------------------------
| ADD HYD              |
| 02:1003              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
```

```
                      ID 1 01:206B           4.780      .549   10.000   127.254    .
000
                     +ID 2 09:1002B         13.030     1.370   10.050   147.853    .
000
                     ================================================================
==
                     SUM   02:1003          17.810     1.914   10.017   142.324    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0005:C00014-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.200   Curve Number   (CN)= 71.20
| 03:205        DT= 1.00 |   Ia      (mm)=    2.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .030

     Unit Hyd Qpeak  (cms)=    1.528

     PEAK FLOW       (cms)=     .149 (i)
     TIME TO PEAK    (hrs)=   10.000
     DURATION        (hrs)=   12.250, (dddd|hh:mm:)=   0|12:15
     AVERAGE FLOW    (cms)=     .038
     RUNOFF VOLUME    (mm)=  141.011
     TOTAL RAINFALL   (mm)=  212.000
     RUNOFF COEFFICIENT   =     .665

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
-------------------------------------------------------------------------------------
--------------
R0005:C00015-------------------------------------------------------------------------
---------------
* 1004



------------------------
| ADD HYD              |
| 04:1004              |   ID:NHYD           AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                     (ha)     (cms)    (hrs)      (mm)   (
```

```
cms)
                      ID 1 03:205            1.200      .149   10.000   141.011    .
000
                     +ID 2 02:1003          17.810     1.914   10.017   142.324    .
000
                     ================================================================
==
                     SUM   04:1004          19.010     2.063   10.000   142.242    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0005:C00016-------------------------------------------------------------------------
---------------
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>04:1004         |
| OUT<05:BASIN        | =========================  OUTLFOW STORAGE TABLE  ===========
=============
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE|
OUTFLOW   STORAGE
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (
cms)   (ha.m.)
                           .000 .0000E+00|    .044 .2529E+00|    .421 .4838E+00|   1.
056 .8779E+00
                           .011 .7170E-01|    .080 .3083E+00|    .558 .6088E+00|   1.
662 .9853E+00
                           .019 .1729E+00|    .203 .3652E+00|    .666 .7402E+00|   2.
424 .1096E+01
                           .025 .1992E+00|    .421 .4838E+00|    .691 .7740E+00|    .
000 .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     -----------------------     (ha)     (cms)     (hrs)       (mm)
     INFLOW > 04:1004          19.010     2.063    10.000    142.242
    OUTFLOW < 05:BASIN         19.010     1.687    11.033    142.238

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   81.779
                   TIME SHIFT OF PEAK FLOW         (min)=    62.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.9890E+00

-------------------------------------------------------------------------------------
--------------
R0005:C00017-------------------------------------------------------------------------
---------------
```

```
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .70
| 06:207       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .50
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .94          .60
     Length            (m)=      10.00       191.40
     Mannings n          =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        48.27
                over (min)       1.00        36.00
     Storage Coeff.  (min)=        .84 (ii)   35.51 (ii)
     Unit Hyd. Tpeak (min)=       1.00        36.00
     Unit Hyd. peak  (cms)=       1.18          .03
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .02          .06           .071 (iii)
     TIME TO PEAK    (hrs)=       9.13        10.45         10.450
     RUNOFF VOLUME    (mm)=     210.99       140.43        155.598
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =       1.00          .66           .734

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------------
--------------
R0005:C00018------------------------------------------------------------------------
---------------
* 1005



------------------------
| ADD HYD              |
| 07:1005              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 06:207             .700      .071   10.450   155.598    .
000
                     +ID 2 05:BASIN         19.010     1.687   11.033   142.238    .
000
                     ===============================================================
```

```
==
                     SUM   07:1005          19.710     1.753   11.000   142.709    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------------
--------------
R0005:C00019------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=     .500   Curve Number   (CN)= 62.00
| 08:208       DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .040

     Unit Hyd Qpeak  (cms)=     .477

     PEAK FLOW       (cms)=     .055 (i)
     TIME TO PEAK    (hrs)=   10.000
     DURATION        (hrs)=   12.333, (dddd|hh:mm:)=   0|12:20
     AVERAGE FLOW    (cms)=     .013
     RUNOFF VOLUME    (mm)=  118.146
     TOTAL RAINFALL   (mm)=  212.000
     RUNOFF COEFFICIENT   =     .557

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------------
--------------
R0005:C00020------------------------------------------------------------------------
---------------
* 1006



------------------------
| ADD HYD              |
| 09:1006              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 08:208             .500      .055   10.000   118.146    .
000
                     +ID 2 07:1005          19.710     1.753   11.000   142.709    .
000
                     ===============================================================
==
```

```
                     SUM   09:1006          20.210     1.795   11.000   142.102    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0005:C00021-------------------------------------------------------------------------
---------------
--------------------
| FINISH           |
--------------------
-------------------------------------------------------------------------------------
--------------
*************************************************************************************
**************
     WARNINGS / ERRORS / NOTES
     -------------------------
R0001:C00008  CALIB STANDHYD

*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.
R0001:C00014  CALIB NASHYD

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
R0002:C00008  CALIB STANDHYD

*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.
R0002:C00014  CALIB NASHYD

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
R0003:C00008  CALIB STANDHYD

*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.
R0003:C00014  CALIB NASHYD

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
R0004:C00008  CALIB STANDHYD

*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.
R0004:C00014  CALIB NASHYD
```

```
*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
R0005:C00008  CALIB STANDHYD

*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.
R0005:C00014  CALIB NASHYD

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
R0005:C00008  CALIB STANDHYD

*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.
R0005:C00014  CALIB NASHYD

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
   Simulation ended on 2019-12-04     at 14:48:29
=====================================================================================
==============
```

Post-Development Condition
12-hour SCS Type-II Storm Distribution

```
2     Metric units
*#*************************************************************************************
***********************************
*#  SWMHYMO Ver:4.05.00/Apr 2017 / INPUT DATA FILE
*#*************************************************************************************
***********************************
*#  Project Name: [IEE - Phase 2]    Project Number: [17-431]
*#  Date        : 02-02-2018
*#  Modeller    : [Ben Daniels]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*************************************************************************************
***********************************
*%
*% RE-CREATION OF INNISFIL EXECUTIVE ESTATES PHASE 1, ORIGINAL GEMMEL HYDROLOGIC
MODEL (SWM REPORT DATED MAY 2014)
*% UPDATED TO REFLECT THE PROPOSED 22 ESTATE RESIDENTIAL DEVELOPMENT OF PHASE 2 (
CATCHMENT 206)
*% POST-DEVELOPMENT CONDITION
*%
*% 2-YEAR SCS TYPE-II STORM DISTRIBUTION (12-HR)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
*%                   ["2SCS12.stm"] <--storm filename, one per line for NSTORM time
*%------------------|------------------------------------------------------------------
--------|
READ STORM          STORM_FILENAME=["STORM.001"]
*%------------------|------------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[1], NHYD=["201"], DT=[1](min), AREA=[0.30](ha),
                    XIMP=[0.215], TIMP=[0.286], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[0.97](%),
                                         LGP=[119.6](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.97](%),
                                         LGI=[10](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%------------------|------------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[2], NHYD=["202"], DT=[1](min), AREA=[0.50](ha),
                    XIMP=[0.215], TIMP=[0.286], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[1.00](%),
                                         LGP=[218.2](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.80](%),
                                         LGI=[10](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%------------------|------------------------------------------------------------------
```

```
--------|
* 1000
ADD HYD             IDsum=[3], NHYD=["1000"], IDs to add=[1+2]
*%------------------|------------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[4], NHYD=["203"], DT=[1](min), AREA=[8.01](ha),
                    XIMP=[0.257], TIMP=[0.343], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.00](%),
                                         LGP=[86](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.79](%),
                                         LGI=[414](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%------------------|------------------------------------------------------------------
--------|
* 1001
ADD HYD             IDsum=[5], NHYD=["1001"], IDs to add=[3+4]
*%------------------|------------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[6], NHYD=["204"], DT=[1](min), AREA=[2.82](ha),
                    XIMP=[0.107], TIMP=[0.143], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.50](%),
                                         LGP=[284.4](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[1.58](%),
                                         LGI=[140](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%------------------|------------------------------------------------------------------
--------|
* 1002A
ADD HYD             IDsum=[7], NHYD=["1002A"], IDs to add=[5+6]
*%------------------|------------------------------------------------------------------
--------|
CALIB NASHYD        ID=[8], NHYD=["206A"], DT=[1]min, AREA=[1.40](ha),
                    DWF=[0](cms),  CN/C=[44], IA=[5.0](mm),
                    N=[3], TP=[0.81]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%------------------|------------------------------------------------------------------
--------|
* 1002B
ADD HYD             IDsum=[9], NHYD=["1002B"], IDs to add=[7+8]
*%------------------|------------------------------------------------------------------
--------|
CALIB NASHYD        ID=[1], NHYD=["206B"], DT=[1]min, AREA=[4.78](ha),
                    DWF=[0](cms),  CN/C=[66], IA=[4.5](mm),
                    N=[3], TP=[0.11]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
```

```
*%-----------------|-----------------------------------------------------------------
--------|
* 1003
ADD HYD             IDsum=[2], NHYD=["1003"], IDs to add=[1+9]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB NASHYD        ID=[3], NHYD=["205"], DT=[1]min, AREA=[1.2](ha),
                    DWF=[0](cms),  CN/C=[71.2], IA=[2.0](mm),
                    N=[3], TP=[0.03]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1004
ADD HYD             IDsum=[4], NHYD=["1004"], IDs to add=[3+2]
*%-----------------|-----------------------------------------------------------------
--------|
ROUTE RESERVOIR     IDout=[5],   NHYD=["BASIN"],  IDin=[4],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                      (cms) - (ha-m)
                                    [ 0.0000 , 0.0000 ]
                                    [ 0.0110 , 0.0717 ]
                                    [ 0.0190 , 0.1729 ]
                                    [ 0.0250 , 0.1992 ]
                                    [ 0.0440 , 0.2529 ]
                                    [ 0.0800 , 0.3083 ]
                                    [ 0.2030 , 0.3652 ]
                                    [ 0.4210 , 0.4838 ]
                                    [ 0.5580 , 0.6088 ]
                                    [ 0.6660 , 0.7402 ]
                                    [ 0.6910 , 0.7740 ]
                                    [ 1.0560 , 0.8779 ]
                                    [ 1.6620 , 0.9853 ]
                                    [ 2.4240 , 1.0963 ]
                                    [     -1 ,     -1 ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[6], NHYD=["207"], DT=[1](min), AREA=[0.70](ha),
                    XIMP=[0.215], TIMP=[0.286], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[0.60](%),
                                         LGP=[191.4](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.94](%),
                                         LGI=[10](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------------
```

```
--------|
* 1005
ADD HYD             IDsum=[7], NHYD=["1005"], IDs to add=[6+5]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB NASHYD        ID=[8], NHYD=["208"], DT=[1]min, AREA=[0.5](ha),
                    DWF=[0](cms),  CN/C=[44], IA=[5.0](mm),
                    N=[3], TP=[0.04]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1006
ADD HYD             IDsum=[9], NHYD=["1006"], IDs to add=[8+7]
*%-----------------|-----------------------------------------------------------------
--------|
*% 5-YEAR SCS TYPE-II STORM DISTRIBUTION (12-HR)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*%                   ["5SCS12.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------------
--------|
*% 25-YEAR SCS TYPE-II STORM DISTRIBUTION (12-HR)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
*%                   ["25SCS12.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------------
--------|
*% 100-YEAR SCS TYPE-II STORM DISTRIBUTION (12-HR)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*%                   ["100SCS12.stm"] <--storm filename, one per line for NSTORM
time
*%-----------------|-----------------------------------------------------------------
--------|
*% HURRICANE HAZEL (12-HR)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[0],  NRUN=[0]
*%                   [      ] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------------
--------|
READ STORM          STORM_FILENAME=["Hzl12h12.stm"]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[1], NHYD=["201"], DT=[1](min), AREA=[0.30](ha),
                    XIMP=[0.215], TIMP=[0.286], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[0.97](%),
                                         LGP=[119.6](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.97](%),
                                         LGI=[10](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
```

```
*%-----------------|----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[2], NHYD=["202"], DT=[1](min), AREA=[0.50](ha),
                    XIMP=[0.215], TIMP=[0.286], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[1.00](%),
                                         LGP=[218.2](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.80](%),
                                         LGI=[10](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|----------------------------------------------------------------
--------|
* 1000
ADD HYD             IDsum=[3], NHYD=["1000"], IDs to add=[1+2]
*%-----------------|----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[4], NHYD=["203"], DT=[1](min), AREA=[8.01](ha),
                    XIMP=[0.257], TIMP=[0.343], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.00](%),
                                         LGP=[86](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.79](%),
                                         LGI=[414](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|----------------------------------------------------------------
--------|
* 1001
ADD HYD             IDsum=[5], NHYD=["1001"], IDs to add=[3+4]
*%-----------------|----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[6], NHYD=["204"], DT=[1](min), AREA=[2.82](ha),
                    XIMP=[0.107], TIMP=[0.143], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.50](%),
                                         LGP=[284.4](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[1.58](%),
                                         LGI=[140](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|----------------------------------------------------------------
--------|
* 1002A
ADD HYD             IDsum=[7], NHYD=["1002A"], IDs to add=[5+6]
*%-----------------|----------------------------------------------------------------
--------|
CALIB NASHYD        ID=[8], NHYD=["206A"], DT=[1]min, AREA=[1.40](ha),
                    DWF=[0](cms),  CN/C=[44], IA=[5.0](mm),
                    N=[3], TP=[0.81]hrs,
```

```
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|----------------------------------------------------------------
--------|
* 1002B
ADD HYD             IDsum=[9], NHYD=["1002B"], IDs to add=[7+8]
*%-----------------|----------------------------------------------------------------
--------|
CALIB NASHYD        ID=[1], NHYD=["206B"], DT=[1]min, AREA=[4.78](ha),
                    DWF=[0](cms),  CN/C=[66], IA=[4.5](mm),
                    N=[3], TP=[0.11]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|----------------------------------------------------------------
--------|
* 1003
ADD HYD             IDsum=[2], NHYD=["1003"], IDs to add=[1+9]
*%-----------------|----------------------------------------------------------------
--------|
CALIB NASHYD        ID=[3], NHYD=["205"], DT=[1]min, AREA=[1.2](ha),
                    DWF=[0](cms),  CN/C=[71.2], IA=[2.0](mm),
                    N=[3], TP=[0.03]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|----------------------------------------------------------------
--------|
* 1004
ADD HYD             IDsum=[4], NHYD=["1004"], IDs to add=[3+2]
*%-----------------|----------------------------------------------------------------
--------|
ROUTE RESERVOIR     IDout=[5],   NHYD=["BASIN"],  IDin=[4],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                      (cms) - (ha-m)
                                    [ 0.0000 , 0.0000 ]
                                    [ 0.0110 , 0.0717 ]
                                    [ 0.0190 , 0.1729 ]
                                    [ 0.0250 , 0.1992 ]
                                    [ 0.0440 , 0.2529 ]
                                    [ 0.0800 , 0.3083 ]
                                    [ 0.2030 , 0.3652 ]
                                    [ 0.4210 , 0.4838 ]
                                    [ 0.5580 , 0.6088 ]
                                    [ 0.6660 , 0.7402 ]
                                    [ 0.6910 , 0.7740 ]
                                    [ 1.0560 , 0.8779 ]
                                    [ 1.6620 , 0.9853 ]
                                    [ 2.4240 , 1.0963 ]
                                    [     -1 ,     -1 ]  (max twenty pts)
                          IDovf=[   ], NHYDovf=[   ]
```

```
*%-----------------|-----------------------------------------------------------------
--------|
CALIB STANDHYD      ID=[6], NHYD=["207"], DT=[1](min), AREA=[0.70](ha),
                    XIMP=[0.215], TIMP=[0.286], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[70],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[0.60](%),
                                         LGP=[191.4](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[0.94](%),
                                         LGI=[10](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1005
ADD HYD             IDsum=[7], NHYD=["1005"], IDs to add=[6+5]
*%-----------------|-----------------------------------------------------------------
--------|
CALIB NASHYD        ID=[8], NHYD=["208"], DT=[1]min, AREA=[0.5](ha),
                    DWF=[0](cms),  CN/C=[62], IA=[5.0](mm),
                    N=[3], TP=[0.04]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-----------------------------------------------------------------
--------|
* 1006
ADD HYD             IDsum=[9], NHYD=["1006"], IDs to add=[8+7]
*%-----------------|-----------------------------------------------------------------
--------|
FINISH
```

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

 SSSSS   W   W   M   M   H   H   Y   Y   M   M    OOO         222     000    11
77777 =========
 S       W W W   MM MM   H   H    Y Y    MM MM   O   O          2    0   0   11   7
  7
 SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O          2    0   0   11
  7 Ver4.05.0
     S    W W    M   M   H   H     Y     M   M   O   O       222     0   0   11
 7  APR 2017
 SSSSS    W W    M   M   H   H     Y     M   M    OOO        2       0   0   11
7   =========
                                                             2       0   0   11
7    # 2880720
       StormWater Management HYdrologic Model                 222     000    11
7    =========

 ************************************************************************************
**************
 **************************************  SWMHYMO Ver4.05.0  *************************
**************
 ******************  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: WMI & Associates Ltd.                       +++++
++++++++++++++
 ++++++++++++++++++                Barrie               SERIAL#:2880720        +++++
++++++++++++++
```

```
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++++++++++++

 ************************************************************************************
**************
 ******************           ++++++ PROGRAM ARRAY DIMENSIONS ++++++           *****
**************
 ******************           Maximum value for ID numbers  :     11           *****
**************
 ******************           Max. number of rainfall points: 105408           *****
**************
 ******************           Max. number of flow points    : 105408           *****
**************
 ************************************************************************************
**************


 *******************************   D E T A I L E D   O U T P U T   *****************
**************
 ************************************************************************************
**************
 *                 RUN DATE: 2019-12-04     TIME: 14:48:40     RUN COUNTER: 000006
            *
 ************************************************************************************
**************
 * Input   file: C:\Temp\17-431\191204\SCS_12hr\2-CYRSCS.dat
            *
 * Output  file: C:\Temp\17-431\191204\SCS_12hr\2-CYRSCS.out
            *
 * Summary file: C:\Temp\17-431\191204\SCS_12hr\2-CYRSCS.sum
            *
 * User comments:
            *
 * 1:________________________________________________________________________________
_____________*
 * 2:________________________________________________________________________________
_____________*
 * 3:________________________________________________________________________________
_____________*
 ************************************************************************************
**************

-------------------------------------------------------------------------------------
--------------
R0001:C00001-------------------------------------------------------------------------
---------------
*#***********************************************************************************
```

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


*#  SWMHYMO Ver:4.05.00/Apr 2017 / INPUT DATA FILE



*#*********************************************************************************
***********************************


*#  Project Name: [IEE - Phase 2]    Project Number: [17-431]



*#  Date        : 02-02-2018



*#  Modeller    : [Ben Daniels]



*#  Company     : WMI & Associates Ltd.



*#  License #   :  2880720



*#*********************************************************************************
***********************************



--------------------
| START            | Project  dir.:C:\Temp\17-431\191204\SCS_12hr\

-------------------- Rainfall dir.:C:\Temp\17-431\191204\SCS_12hr\

    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0001
    NSTORM=   1
           #  1=2SCS12.stm
-----------------------------------------------------------------------------------
--------------
```

```
R0001:C00002-------------------------------------------------------------------------
---------------
--------------------
| READ STORM       |  Filename: C:\Temp\17-431\191204\SCS_12hr\2SCS12.stm



| Ptotal=  46.69 mm|  Comments: 2-Year SCS Type-II Storm Distribution (12-hour)
Innisfil, ON.



--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|
 TIME    RAIN
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|
hh:mm   mm/hr
      0:15   1.170|   2:15   1.400|   4:15   2.800|   6:15   8.410|   8:15   1.630|
10:15    .930
      0:30   1.170|   2:30   1.400|   4:30   2.800|   6:30   8.410|   8:30   1.630|
10:30    .930
      0:45   1.170|   2:45   1.400|   4:45   3.740|   6:45   3.740|   8:45   1.630|
10:45    .930
      1:00   1.170|   3:00   1.400|   5:00   3.740|   7:00   3.740|   9:00   1.630|
11:00    .930
      1:15   1.170|   3:15   1.870|   5:15   5.600|   7:15   2.800|   9:15   1.630|
11:15    .930
      1:30   1.170|   3:30   1.870|   5:30   5.600|   7:30   2.800|   9:30   1.630|
11:30    .930
      1:45   1.170|   3:45   1.870|   5:45  22.420|   7:45   2.800|   9:45   1.630|
11:45    .930
      2:00   1.170|   4:00   1.870|   6:00  61.640|   8:00   2.800|  10:00   1.630|
12:00    .930

-----------------------------------------------------------------------------------
--------------
R0001:C00003-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .30
| 01:201       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .09          .21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .97          .97
     Length            (m)=      10.00       119.60
     Mannings n           =       .013         .250
```

```
     Max.eff.Inten.(mm/hr)=      61.64         9.98
               over (min)        1.00        43.00
     Storage Coeff.  (min)=        .79 (ii)   43.32 (ii)
     Unit Hyd. Tpeak (min)=       1.00        43.00
     Unit Hyd. peak  (cms)=       1.22          .03
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .01          .00           .012 (iii)
     TIME TO PEAK    (hrs)=       5.87         6.63          6.000
     RUNOFF VOLUME    (mm)=      45.68        12.58         19.699
     TOTAL RAINFALL   (mm)=      46.69        46.69         46.690
     RUNOFF COEFFICIENT   =        .98          .27           .422

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00004-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .50
| 02:202        DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14          .36
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .80         1.00
     Length            (m)=      10.00       218.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      61.64         7.39
               over (min)        1.00        69.00
     Storage Coeff.  (min)=        .83 (ii)   68.99 (ii)
     Unit Hyd. Tpeak (min)=       1.00        69.00
     Unit Hyd. peak  (cms)=       1.19          .02
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .02          .00           .019 (iii)
     TIME TO PEAK    (hrs)=       5.87         7.08          6.000
     RUNOFF VOLUME    (mm)=      45.68        12.58         19.698
     TOTAL RAINFALL   (mm)=      46.69        46.69         46.690
     RUNOFF COEFFICIENT   =        .98          .27           .422

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
```

```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00005-------------------------------------------------------------------------
---------------
* 1000



------------------------
| ADD HYD              |
| 03:1000              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:201            .300      .012    6.000    19.699    .
000
                     +ID 2 02:202            .500      .019    6.000    19.698    .
000
                     ================================================================
==
                     SUM   03:1000           .800      .031    6.000    19.698    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00006-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    8.01
| 04:203        DT= 1.00 |   Total Imp(%)=   34.30   Dir. Conn.(%)=   25.70
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.75         5.26
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .79         2.00
     Length            (m)=     414.00        86.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      61.64        12.27
               over (min)        8.00        34.00
     Storage Coeff.  (min)=       7.80 (ii)   33.66 (ii)
     Unit Hyd. Tpeak (min)=       8.00        34.00
```

```
     Unit Hyd. peak  (cms)=        .14          .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .30          .11           .342 (iii)
     TIME TO PEAK    (hrs)=       6.02         6.48          6.033
     RUNOFF VOLUME    (mm)=      45.69        12.90         21.325
     TOTAL RAINFALL   (mm)=      46.69        46.69         46.690
     RUNOFF COEFFICIENT   =        .98          .28           .457

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00007-------------------------------------------------------------------------
---------------
* 1001



------------------------
| ADD HYD              |
| 05:1001              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:1000            .800      .031    6.000    19.698    .
000
                     +ID 2 04:203            8.010      .342    6.033    21.325    .
000
                     ================================================================
==
                     SUM   05:1001           8.810      .363    6.000    21.177    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
-------------
R0001:C00008-------------------------------------------------------------------------
--------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    2.82
| 06:204        DT= 1.00 |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area     (ha)=        .40         2.42
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.58         2.50
     Length            (m)=     140.00       284.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      61.64         6.89
                over (min)       3.00        66.00
     Storage Coeff.  (min)=       3.31 (ii)   65.73 (ii)
     Unit Hyd. Tpeak (min)=       3.00        66.00
     Unit Hyd. peak  (cms)=        .35          .02
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .05          .03           .056 (iii)
     TIME TO PEAK    (hrs)=       6.00         7.03          6.000
     RUNOFF VOLUME    (mm)=      45.69        11.99         15.596
     TOTAL RAINFALL   (mm)=      46.69        46.69         46.690
     RUNOFF COEFFICIENT   =        .98          .26           .334
*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
-------------
R0001:C00009-------------------------------------------------------------------------
---------------
* 1002A



------------------------
| ADD HYD              |
| 07:1002A             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 05:1001           8.810      .363    6.000    21.177    .
000
                     +ID 2 06:204            2.820      .056    6.000    15.596    .
000
                     ================================================================
==
                     SUM   07:1002A         11.630      .419    6.000    19.824    .
000
```

```
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00010-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.400   Curve Number   (CN)= 44.00
| 08:206A       DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .810

     Unit Hyd Qpeak  (cms)=     .066

     PEAK FLOW       (cms)=     .007 (i)
     TIME TO PEAK    (hrs)=    6.850
     DURATION        (hrs)=   17.150, (dddd|hh:mm:)=   0|17:09
     AVERAGE FLOW    (cms)=     .001
     RUNOFF VOLUME    (mm)=    4.762
     TOTAL RAINFALL   (mm)=   46.690
     RUNOFF COEFFICIENT   =     .102

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00011-------------------------------------------------------------------------
---------------
* 1002B



------------------------
| ADD HYD              |
| 09:1002B             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 07:1002A        11.630      .419    6.000    19.824    .
000
                     +ID 2 08:206A          1.400      .007    6.850     4.762    .
000
                     ================================================================
==
                     SUM   09:1002B        13.030      .420    6.000    18.206    .
000
```

```
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00012-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    4.780   Curve Number   (CN)= 66.00
| 01:206B       DT= 1.00 |   Ia      (mm)=    4.500   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .110

     Unit Hyd Qpeak  (cms)=    1.660

     PEAK FLOW       (cms)=     .190 (i)
     TIME TO PEAK    (hrs)=    6.033
     DURATION        (hrs)=   12.800, (dddd|hh:mm:)=   0|12:48
     AVERAGE FLOW    (cms)=     .011
     RUNOFF VOLUME    (mm)=   10.287
     TOTAL RAINFALL   (mm)=   46.690
     RUNOFF COEFFICIENT   =     .220

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00013-------------------------------------------------------------------------
---------------
* 1003



------------------------
| ADD HYD              |
| 02:1003              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:206B          4.780      .190    6.033    10.287    .
000
                     +ID 2 09:1002B        13.030      .420    6.000    18.206    .
000
                     ================================================================
==
                     SUM   02:1003         17.810      .601    6.000    16.080    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
-------------------------------------------------------------------------------------
--------------
R0001:C00014-------------------------------------------------------------------------
---------------
-------------------------
| CALIB NASHYD           |   Area    (ha)=    1.200   Curve Number   (CN)= 71.20
| 03:205        DT= 1.00 |   Ia      (mm)=    2.000   # of Linear Res.(N)=  3.00
-------------------------   U.H. Tp(hrs)=     .030

     Unit Hyd Qpeak  (cms)=    1.528

     PEAK FLOW       (cms)=     .079 (i)
     TIME TO PEAK    (hrs)=    6.000
     DURATION        (hrs)=   12.250, (dddd|hh:mm:)=   0|12:15
     AVERAGE FLOW    (cms)=     .004
     RUNOFF VOLUME    (mm)=   13.547
     TOTAL RAINFALL   (mm)=   46.690
     RUNOFF COEFFICIENT   =     .290

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
-------------------------------------------------------------------------------------
--------------
R0001:C00015-------------------------------------------------------------------------
---------------
* 1004



------------------------
| ADD HYD                |
| 04:1004                |   ID:NHYD           AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:205           1.200      .079    6.000    13.547    .
000
                     +ID 2 02:1003         17.810      .601    6.000    16.080    .
000
                     ================================================================
==
                     SUM   04:1004         19.010      .680    6.000    15.920    .
000
```

```
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00016-------------------------------------------------------------------------
---------------
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>04:1004         |
| OUT<05:BASIN        | =========================  OUTLFOW STORAGE TABLE  ===========
==============
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE|
OUTFLOW   STORAGE
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (
cms)   (ha.m.)
                           .000 .0000E+00|    .044 .2529E+00|    .421 .4838E+00|   1.
056 .8779E+00
                           .011 .7170E-01|    .080 .3083E+00|    .558 .6088E+00|   1.
662 .9853E+00
                           .019 .1729E+00|    .203 .3652E+00|    .666 .7402E+00|   2.
424 .1096E+01
                           .025 .1992E+00|    .421 .4838E+00|    .691 .7740E+00|    .
000 .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 04:1004          19.010      .680     6.000     15.920
    OUTFLOW < 05:BASIN         19.010      .036    10.367     15.920

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=    5.362
                   TIME SHIFT OF PEAK FLOW         (min)=   262.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.2316E+00

-------------------------------------------------------------------------------------
--------------
R0001:C00017-------------------------------------------------------------------------
---------------
-------------------------
| CALIB STANDHYD         |   Area    (ha)=     .70
| 06:207       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
-------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .50
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .94          .60
     Length            (m)=      10.00       191.40
     Mannings n          =       .013         .250
```

```
     Max.eff.Inten.(mm/hr)=      61.64         6.81
                over (min)        1.00        77.00
     Storage Coeff.  (min)=        .79 (ii)   76.68 (ii)
     Unit Hyd. Tpeak (min)=       1.00        77.00
     Unit Hyd. peak  (cms)=       1.22          .02
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .03          .01          .027 (iii)
     TIME TO PEAK    (hrs)=       5.87         7.22         6.000
     RUNOFF VOLUME    (mm)=      45.68        12.58        19.699
     TOTAL RAINFALL   (mm)=      46.69        46.69        46.690
     RUNOFF COEFFICIENT   =        .98          .27          .422

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00018-------------------------------------------------------------------------
---------------
* 1005



------------------------
| ADD HYD              |
| 07:1005              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 06:207             .700      .027    6.000    19.699    .
000
                     +ID 2 05:BASIN         19.010      .036   10.367    15.920    .
000
                     ================================================================
==
                     SUM   07:1005          19.710      .039    9.667    16.054    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00019-------------------------------------------------------------------------
---------------
```

```
--------------------------
| CALIB NASHYD           |   Area    (ha)=     .500   Curve Number   (CN)= 44.00
| 08:208        DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .040

     Unit Hyd Qpeak  (cms)=     .477

     PEAK FLOW       (cms)=     .012 (i)
     TIME TO PEAK    (hrs)=    6.000
     DURATION        (hrs)=   12.333, (dddd|hh:mm:)=   0|12:20
     AVERAGE FLOW    (cms)=     .001
     RUNOFF VOLUME    (mm)=    4.762
     TOTAL RAINFALL   (mm)=   46.690
     RUNOFF COEFFICIENT   =     .102

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00020-------------------------------------------------------------------------
---------------
* 1006



------------------------
| ADD HYD              |
| 09:1006              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 08:208             .500      .012    6.000     4.762    .
000
                     +ID 2 07:1005          19.710      .039    9.667    16.054    .
000
                     ================================================================
==
                     SUM   09:1006          20.210      .050    6.000    15.775    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0001:C00021-------------------------------------------------------------------------
---------------
  ** END OF RUN :    0
```

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*************************************************************************************
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--------------------
| START            | Project  dir.:C:\Temp\17-431\191204\SCS_12hr\

-------------------- Rainfall dir.:C:\Temp\17-431\191204\SCS_12hr\

    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0002
    NSTORM=   1
           #  1=5SCS12.stm
-------------------------------------------------------------------------------------
--------------
R0002:C00002-------------------------------------------------------------------------
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*#***********************************************************************************
***********************************


*#  SWMHYMO Ver:4.05.00/Apr 2017 / INPUT DATA FILE


*#***********************************************************************************
***********************************


*#  Project Name: [IEE - Phase 2]    Project Number: [17-431]


*#  Date        : 02-02-2018


*#  Modeller    : [Ben Daniels]


*#  Company     : WMI & Associates Ltd.
```

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*#  License #   :  2880720


*#***********************************************************************************
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R0002:C00002-------------------------------------------------------------------------
---------------
--------------------
| READ STORM       |  Filename: C:\Temp\17-431\191204\SCS_12hr\5SCS12.stm



| Ptotal=  64.31 mm|  Comments: 5-Year SCS Type-II Storm Distribution (12-hour)
Innisfil, ON.


--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|
 TIME    RAIN
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|
hh:mm   mm/hr
      0:15   1.610|   2:15   1.930|   4:15   3.860|   6:15  11.570|   8:15   2.250|
10:15   1.290
      0:30   1.610|   2:30   1.930|   4:30   3.860|   6:30  11.570|   8:30   2.250|
10:30   1.290
      0:45   1.610|   2:45   1.930|   4:45   5.140|   6:45   5.140|   8:45   2.250|
10:45   1.290
      1:00   1.610|   3:00   1.930|   5:00   5.140|   7:00   5.140|   9:00   2.250|
11:00   1.290
      1:15   1.610|   3:15   2.570|   5:15   7.720|   7:15   3.860|   9:15   2.250|
11:15   1.290
      1:30   1.610|   3:30   2.570|   5:30   7.720|   7:30   3.860|   9:30   2.250|
11:30   1.290
      1:45   1.610|   3:45   2.570|   5:45  30.860|   7:45   3.860|   9:45   2.250|
11:45   1.290
      2:00   1.610|   4:00   2.570|   6:00  84.880|   8:00   3.860|  10:00   2.250|
12:00   1.290

-------------------------------------------------------------------------------------
```

```
--------------
R0002:C00003-----------------------------------------------------------------------
---------------
-------------------------
| CALIB STANDHYD         |   Area    (ha)=     .30
| 01:201        DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .09          .21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .97          .97
     Length            (m)=      10.00       119.60
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      84.88        22.63
                over (min)        1.00        31.00
     Storage Coeff.  (min)=        .69 (ii)   31.35 (ii)
     Unit Hyd. Tpeak (min)=       1.00        31.00
     Unit Hyd. peak  (cms)=       1.30          .04
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .02          .01           .019 (iii)
     TIME TO PEAK    (hrs)=       5.85         6.43          6.000
     RUNOFF VOLUME    (mm)=      63.30        22.49         31.267
     TOTAL RAINFALL   (mm)=      64.31        64.31         64.309
     RUNOFF COEFFICIENT   =        .98          .35           .486

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
--------------
R0002:C00004-----------------------------------------------------------------------
---------------
-------------------------
| CALIB STANDHYD         |   Area    (ha)=     .50
| 02:202        DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14          .36
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .80         1.00
     Length            (m)=      10.00       218.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      84.88        16.50
```

```
                over (min)        1.00        50.00
     Storage Coeff.  (min)=        .73 (ii)   50.18 (ii)
     Unit Hyd. Tpeak (min)=       1.00        50.00
     Unit Hyd. peak  (cms)=       1.27          .02
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .03          .01           .028 (iii)
     TIME TO PEAK    (hrs)=       5.87         6.75          6.000
     RUNOFF VOLUME    (mm)=      63.30        22.49         31.269
     TOTAL RAINFALL   (mm)=      64.31        64.31         64.309
     RUNOFF COEFFICIENT   =        .98          .35           .486

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0002:C00005-----------------------------------------------------------------------
---------------
* 1000



------------------------
| ADD HYD              |
| 03:1000              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:201             .300      .019    6.000    31.267  .
000
                     +ID 2 02:202             .500      .028    6.000    31.269  .
000
                     ================================================================
==
                     SUM   03:1000            .800      .047    6.000    31.268  .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0002:C00006-----------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    8.01
```

```
| 04:203        DT= 1.00 |   Total Imp(%)=   34.30   Dir. Conn.(%)=   25.70
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.75         5.26
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .79         2.00
     Length            (m)=     414.00        86.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      84.88        26.96
                over (min)        7.00        26.00
     Storage Coeff.  (min)=       6.87 (ii)   25.74 (ii)
     Unit Hyd. Tpeak (min)=       7.00        26.00
     Unit Hyd. peak  (cms)=        .16          .04
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .43          .25           .557 (iii)
     TIME TO PEAK    (hrs)=       6.02         6.33          6.033
     RUNOFF VOLUME    (mm)=      63.31        22.97         33.337
     TOTAL RAINFALL   (mm)=      64.31        64.31         64.309
     RUNOFF COEFFICIENT   =        .98          .36           .518

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0002:C00007-------------------------------------------------------------------------
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* 1001



------------------------
| ADD HYD              |
| 05:1001              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:1000            .800      .047    6.000    31.268    .
000
                     +ID 2 04:203            8.010      .557    6.033    33.337    .
000
                     ================================================================
==
                     SUM   05:1001           8.810      .586    6.000    33.149    .
```

```
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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R0002:C00008-------------------------------------------------------------------------
---------------
-------------------------
| CALIB STANDHYD         |   Area    (ha)=    2.82
| 06:204        DT= 1.00 |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .40         2.42
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.58         2.50
     Length            (m)=     140.00       284.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      84.88        15.35
                over (min)        3.00        48.00
     Storage Coeff.  (min)=       2.91 (ii)   48.23 (ii)
     Unit Hyd. Tpeak (min)=       3.00        48.00
     Unit Hyd. peak  (cms)=        .38          .02
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .07          .06           .087 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.72          6.000
     RUNOFF VOLUME    (mm)=      63.31        21.60         26.061
     TOTAL RAINFALL   (mm)=      64.31        64.31         64.309
     RUNOFF COEFFICIENT   =        .98          .34           .405
*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0002:C00009-------------------------------------------------------------------------
---------------
* 1002A



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```

```
| ADD HYD              |
| 07:1002A             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 05:1001           8.810      .586    6.000    33.149    .
000
                     +ID 2 06:204            2.820      .087    6.000    26.061    .
000
                     ================================================================
==
                     SUM   07:1002A         11.630      .674    6.000    31.431    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0002:C00010-------------------------------------------------------------------------
---------------
-------------------------
| CALIB NASHYD           |   Area    (ha)=    1.400   Curve Number   (CN)= 44.00
| 08:206A       DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
-------------------------   U.H. Tp(hrs)=     .810

     Unit Hyd Qpeak  (cms)=     .066

     PEAK FLOW       (cms)=     .013 (i)
     TIME TO PEAK    (hrs)=    6.833
     DURATION        (hrs)=   17.150, (dddd|hh:mm:)=   0|17:09
     AVERAGE FLOW    (cms)=     .002
     RUNOFF VOLUME    (mm)=    9.194
     TOTAL RAINFALL   (mm)=   64.309
     RUNOFF COEFFICIENT   =     .143

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0002:C00011-------------------------------------------------------------------------
---------------
* 1002B



------------------------
| ADD HYD              |
```

```
| 09:1002B             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 07:1002A         11.630      .674    6.000    31.431    .
000
                     +ID 2 08:206A           1.400      .013    6.833     9.194    .
000
                     ================================================================
==
                     SUM   09:1002B         13.030      .677    6.000    29.041    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0002:C00012-------------------------------------------------------------------------
---------------
-------------------------
| CALIB NASHYD           |   Area    (ha)=    4.780   Curve Number   (CN)= 66.00
| 01:206B       DT= 1.00 |   Ia      (mm)=    4.500   # of Linear Res.(N)=  3.00
-------------------------   U.H. Tp(hrs)=     .110

     Unit Hyd Qpeak  (cms)=    1.660

     PEAK FLOW       (cms)=     .348 (i)
     TIME TO PEAK    (hrs)=    6.033
     DURATION        (hrs)=   12.800, (dddd|hh:mm:)=   0|12:48
     AVERAGE FLOW    (cms)=     .019
     RUNOFF VOLUME    (mm)=   18.762
     TOTAL RAINFALL   (mm)=   64.309
     RUNOFF COEFFICIENT   =     .292

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0002:C00013-------------------------------------------------------------------------
---------------
* 1003



------------------------
| ADD HYD              |
| 02:1003              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
```

```
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:206B           4.780      .348    6.033    18.762    .
000
                     +ID 2 09:1002B         13.030      .677    6.000    29.041    .
000
                     ================================================================
==
                     SUM   02:1003          17.810     1.010    6.000    26.283    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0002:C00014-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.200   Curve Number   (CN)= 71.20
| 03:205       DT= 1.00 |   Ia      (mm)=    2.000   # of Linear Res.(N)=  3.00
-------------------------   U.H. Tp(hrs)=     .030

     Unit Hyd Qpeak  (cms)=    1.528

     PEAK FLOW       (cms)=     .136 (i)
     TIME TO PEAK    (hrs)=    6.000
     DURATION        (hrs)=   12.250, (dddd|hh:mm:)=   0|12:15
     AVERAGE FLOW    (cms)=     .006
     RUNOFF VOLUME    (mm)=   23.523
     TOTAL RAINFALL   (mm)=   64.309
     RUNOFF COEFFICIENT   =     .366

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
-------------------------------------------------------------------------------------
--------------
R0002:C00015-------------------------------------------------------------------------
---------------
* 1004



------------------------
| ADD HYD               |
```

```
| 04:1004              |   ID:NHYD           AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:205            1.200      .136    6.000    23.523    .
000
                     +ID 2 02:1003          17.810     1.010    6.000    26.283    .
000
                     ================================================================
==
                     SUM   04:1004          19.010     1.146    6.000    26.108    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0002:C00016-------------------------------------------------------------------------
---------------
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>04:1004         |
| OUT<05:BASIN        | =========================  OUTLFOW STORAGE TABLE  ===========
==============
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE|
OUTFLOW   STORAGE
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (
cms)   (ha.m.)
                           .000 .0000E+00|    .044 .2529E+00|    .421 .4838E+00|   1.
056 .8779E+00
                           .011 .7170E-01|    .080 .3083E+00|    .558 .6088E+00|   1.
662 .9853E+00
                           .019 .1729E+00|    .203 .3652E+00|    .666 .7402E+00|   2.
424 .1096E+01
                           .025 .1992E+00|    .421 .4838E+00|    .691 .7740E+00|    .
000 .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ----------------------     (ha)     (cms)     (hrs)       (mm)
     INFLOW > 04:1004          19.010     1.146     6.000     26.108
    OUTFLOW < 05:BASIN         19.010      .126     8.133     26.108

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   11.031
                   TIME SHIFT OF PEAK FLOW         (min)=   128.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.3298E+00

-------------------------------------------------------------------------------------
```

```
--------------
R0002:C00017----------------------------------------------------------------------
---------------
-------------------------
| CALIB STANDHYD         |   Area    (ha)=     .70
| 06:207        DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .50
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .94          .60
     Length            (m)=      10.00       191.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      84.88        15.60
                over (min)       1.00        55.00
     Storage Coeff.  (min)=        .70 (ii)   55.17 (ii)
     Unit Hyd. Tpeak (min)=       1.00        55.00
     Unit Hyd. peak  (cms)=       1.29          .02
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .04          .01           .039 (iii)
     TIME TO PEAK    (hrs)=       5.87         6.83          6.000
     RUNOFF VOLUME    (mm)=      63.31        22.49         31.269
     TOTAL RAINFALL   (mm)=      64.31        64.31         64.309
     RUNOFF COEFFICIENT   =        .98          .35           .486

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0002:C00018----------------------------------------------------------------------
---------------
* 1005



------------------------
| ADD HYD              |
| 07:1005              |   ID:NHYD           AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                     (ha)     (cms)    (hrs)      (mm)   (
cms)
                     ID 1 06:207            .700      .039    6.000    31.269    .
000
```

```
                    +ID 2 05:BASIN         19.010      .126    8.133    26.108    .
000
                    ================================================================
==
                    SUM   07:1005          19.710      .134    8.000    26.291    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0002:C00019----------------------------------------------------------------------
---------------
-------------------------
| CALIB NASHYD           |   Area    (ha)=     .500   Curve Number   (CN)= 44.00
| 08:208        DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
-------------------------   U.H. Tp(hrs)=     .040

     Unit Hyd Qpeak  (cms)=     .477

     PEAK FLOW       (cms)=     .022 (i)
     TIME TO PEAK    (hrs)=    6.000
     DURATION        (hrs)=   12.333, (dddd|hh:mm:)=   0|12:20
     AVERAGE FLOW    (cms)=     .001
     RUNOFF VOLUME    (mm)=    9.194
     TOTAL RAINFALL   (mm)=   64.309
     RUNOFF COEFFICIENT   =     .143

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------------
--------------
R0002:C00020----------------------------------------------------------------------
---------------
* 1006



------------------------
| ADD HYD              |
| 09:1006              |   ID:NHYD           AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                     (ha)     (cms)    (hrs)      (mm)   (
cms)
                     ID 1 08:208            .500      .022    6.000     9.194    .
000
                    +ID 2 07:1005         19.710      .134    8.000    26.291    .
```

```
000
                     ================================================================
==
                     SUM   09:1006          20.210      .135    8.000    25.868    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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R0002:C00021-------------------------------------------------------------------------
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R0002:C00002-------------------------------------------------------------------------
---------------
  ** END OF RUN :    1

*************************************************************************************
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--------------------
| START            | Project  dir.:C:\Temp\17-431\191204\SCS_12hr\

-------------------- Rainfall dir.:C:\Temp\17-431\191204\SCS_12hr\

    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0003
    NSTORM=   1
           #  1=25SCS12.stm
-------------------------------------------------------------------------------------
--------------
R0003:C00002-------------------------------------------------------------------------
---------------
*#***********************************************************************************
***********************************


*#  SWMHYMO Ver:4.05.00/Apr 2017 / INPUT DATA FILE
```

```
*#***********************************************************************************
***********************************


*#  Project Name: [IEE - Phase 2]    Project Number: [17-431]


*#  Date        : 02-02-2018


*#  Modeller    : [Ben Daniels]


*#  Company     : WMI & Associates Ltd.


*#  License #   :  2880720


*#***********************************************************************************
***********************************


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R0003:C00002-------------------------------------------------------------------------
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--------------------
| READ STORM       |  Filename: C:\Temp\17-431\191204\SCS_12hr\25SCS12.stm


| Ptotal=  90.69 mm|  Comments: 25-Year SCS Type-II Storm Distribution (12-hour)
Innisfil, ON.


--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|
 TIME    RAIN
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|
hh:mm   mm/hr
      0:15   2.270|   2:15   2.720|   4:15   5.440|   6:15  16.330|   8:15   3.170|
```

```
10:15   1.810
      0:30   2.270|   2:30   2.720|   4:30   5.440|   6:30  16.330|   8:30   3.170|
10:30   1.810
      0:45   2.270|   2:45   2.720|   4:45   7.260|   6:45   7.260|   8:45   3.170|
10:45   1.810
      1:00   2.270|   3:00   2.720|   5:00   7.260|   7:00   7.260|   9:00   3.170|
11:00   1.810
      1:15   2.270|   3:15   3.630|   5:15  10.880|   7:15   5.440|   9:15   3.170|
11:15   1.810
      1:30   2.270|   3:30   3.630|   5:30  10.880|   7:30   5.440|   9:30   3.170|
11:30   1.810
      1:45   2.270|   3:45   3.630|   5:45  43.540|   7:45   5.440|   9:45   3.170|
11:45   1.810
      2:00   2.270|   4:00   3.630|   6:00 119.720|   8:00   5.440|  10:00   3.170|
12:00   1.810

--------------------------------------------------------------------------------
--------------
R0003:C00003--------------------------------------------------------------------
---------------
-------------------------
| CALIB STANDHYD         |   Area    (ha)=     .30
| 01:201       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .09          .21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .97          .97
     Length            (m)=      10.00       119.60
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     119.72        50.45
                over (min)       1.00        23.00
     Storage Coeff.  (min)=        .60 (ii)   22.85 (ii)
     Unit Hyd. Tpeak (min)=       1.00        23.00
     Unit Hyd. peak  (cms)=       1.38          .05
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .02          .02           .032 (iii)
     TIME TO PEAK    (hrs)=       5.93         6.28          6.000
     RUNOFF VOLUME    (mm)=      89.69        40.08         50.743
     TOTAL RAINFALL   (mm)=      90.69        90.69         90.690
     RUNOFF COEFFICIENT   =        .99          .44           .560

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------
--------------
R0003:C00004--------------------------------------------------------------------
---------------
-------------------------
| CALIB STANDHYD         |   Area    (ha)=     .50
| 02:202       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14          .36
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .80         1.00
     Length            (m)=      10.00       218.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     119.72        36.29
                over (min)       1.00        37.00
     Storage Coeff.  (min)=        .64 (ii)   36.71 (ii)
     Unit Hyd. Tpeak (min)=       1.00        37.00
     Unit Hyd. peak  (cms)=       1.34          .03
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .04          .02           .044 (iii)
     TIME TO PEAK    (hrs)=       5.95         6.52          6.000
     RUNOFF VOLUME    (mm)=      89.69        40.08         50.744
     TOTAL RAINFALL   (mm)=      90.69        90.69         90.690
     RUNOFF COEFFICIENT   =        .99          .44           .560

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------
R0003:C00005--------------------------------------------------------------------
---------------
* 1000



------------------------
| ADD HYD               |
| 03:1000               |   ID:NHYD           AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
```

```
                      ID 1 01:201             .300      .032    6.000    50.743    .
000
                     +ID 2 02:202             .500      .044    6.000    50.744    .
000
                     ================================================================
==
                     SUM   03:1000            .800      .076    6.000    50.744    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------------
--------------
R0003:C00006------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    8.01
| 04:203       DT= 1.00 |   Total Imp(%)=   34.30   Dir. Conn.(%)=   25.70
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.75         5.26
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .79         2.00
     Length            (m)=     414.00        86.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     119.72        58.08
                over (min)        6.00        20.00
     Storage Coeff.  (min)=       5.98 (ii)   19.87 (ii)
     Unit Hyd. Tpeak (min)=       6.00        20.00
     Unit Hyd. peak  (cms)=        .19          .06
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .62          .53           .973 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.23          6.033
     RUNOFF VOLUME    (mm)=      89.69        40.77         53.345
     TOTAL RAINFALL   (mm)=      90.69        90.69         90.690
     RUNOFF COEFFICIENT   =        .99          .45           .588

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------------
--------------
R0003:C00007------------------------------------------------------------------------
---------------
```

```
* 1001



------------------------
| ADD HYD              |
| 05:1001              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:1000            .800      .076    6.000    50.744    .
000
                     +ID 2 04:203            8.010      .973    6.033    53.345    .
000
                     ================================================================
==
                     SUM   05:1001           8.810     1.017    6.000    53.109    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------------
--------------
R0003:C00008------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    2.82
| 06:204       DT= 1.00 |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .40         2.42
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.58         2.50
     Length            (m)=     140.00       284.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     119.72        34.49
                over (min)        3.00        35.00
     Storage Coeff.  (min)=       2.54 (ii)   35.32 (ii)
     Unit Hyd. Tpeak (min)=       3.00        35.00
     Unit Hyd. peak  (cms)=        .42          .03
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .10          .15           .159 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.48          6.483
     RUNOFF VOLUME    (mm)=      89.69        38.75         44.205
     TOTAL RAINFALL   (mm)=      90.69        90.69         90.690
     RUNOFF COEFFICIENT   =        .99          .43           .487
```

```
*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------
--------------
R0003:C00009--------------------------------------------------------------------------
---------------
* 1002A



------------------------
| ADD HYD              |
| 07:1002A             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 05:1001           8.810     1.017    6.000    53.109    .
000
                     +ID 2 06:204            2.820      .159    6.483    44.205    .
000
                     ================================================================
==
                     SUM   07:1002A         11.630     1.171    6.000    50.950    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------
--------------
R0003:C00010--------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.400   Curve Number   (CN)= 44.00
| 08:206A       DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .810

     Unit Hyd Qpeak  (cms)=     .066

     PEAK FLOW       (cms)=     .027 (i)
     TIME TO PEAK    (hrs)=    6.817
     DURATION        (hrs)=   17.150, (dddd|hh:mm:)=   0|17:09
```

```
     AVERAGE FLOW    (cms)=     .004
     RUNOFF VOLUME    (mm)=   17.954
     TOTAL RAINFALL   (mm)=   90.690
     RUNOFF COEFFICIENT   =     .198

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------
--------------
R0003:C00011--------------------------------------------------------------------------
---------------
* 1002B



------------------------
| ADD HYD              |
| 09:1002B             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 07:1002A         11.630     1.171    6.000    50.950    .
000
                     +ID 2 08:206A           1.400      .027    6.817    17.954    .
000
                     ================================================================
==
                     SUM   09:1002B         13.030     1.177    6.000    47.405    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------
--------------
R0003:C00012--------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    4.780   Curve Number   (CN)= 66.00
| 01:206B       DT= 1.00 |   Ia      (mm)=    4.500   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .110

     Unit Hyd Qpeak  (cms)=    1.660

     PEAK FLOW       (cms)=     .638 (i)
     TIME TO PEAK    (hrs)=    6.033
     DURATION        (hrs)=   12.800, (dddd|hh:mm:)=   0|12:48
     AVERAGE FLOW    (cms)=     .036
```

```
     RUNOFF VOLUME    (mm)=   34.227
     TOTAL RAINFALL   (mm)=   90.690
     RUNOFF COEFFICIENT   =     .377

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------------
--------------
R0003:C00013------------------------------------------------------------------------
---------------
* 1003



------------------------
| ADD HYD              |
| 02:1003              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:206B           4.780      .638    6.033    34.227    .
000
                     +ID 2 09:1002B         13.030     1.177    6.000    47.405    .
000
                     ===============================================================
==
                     SUM   02:1003          17.810     1.793    6.017    43.868    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------------
--------------
R0003:C00014------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.200   Curve Number   (CN)= 71.20
| 03:205        DT= 1.00 |   Ia      (mm)=    2.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .030

     Unit Hyd Qpeak  (cms)=    1.528

     PEAK FLOW       (cms)=     .234 (i)
     TIME TO PEAK    (hrs)=    6.000
     DURATION        (hrs)=   12.250, (dddd|hh:mm:)=   0|12:15
     AVERAGE FLOW    (cms)=     .011
     RUNOFF VOLUME    (mm)=   41.090
```

```
     TOTAL RAINFALL   (mm)=   90.690
     RUNOFF COEFFICIENT   =     .453

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
------------------------------------------------------------------------------------
--------------
R0003:C00015------------------------------------------------------------------------
---------------
* 1004



------------------------
| ADD HYD              |
| 04:1004              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:205            1.200      .234    6.000    41.090    .
000
                     +ID 2 02:1003          17.810     1.793    6.017    43.868    .
000
                     ===============================================================
==
                     SUM   04:1004          19.010     2.025    6.000    43.693    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------------
--------------
R0003:C00016------------------------------------------------------------------------
---------------
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>04:1004         |
| OUT<05:BASIN        | =========================  OUTLFOW STORAGE TABLE  ===========
==============
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE|
OUTFLOW   STORAGE
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (
cms)   (ha.m.)
                           .000 .0000E+00|    .044 .2529E+00|    .421 .4838E+00|   1.
056 .8779E+00
```

```
                           .011 .7170E-01|    .080 .3083E+00|    .558 .6088E+00|   1.
662 .9853E+00
                           .019 .1729E+00|    .203 .3652E+00|    .666 .7402E+00|   2.
424 .1096E+01
                           .025 .1992E+00|    .421 .4838E+00|    .691 .7740E+00|    .
000 .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 04:1004          19.010     2.025     6.000     43.693
    OUTFLOW < 05:BASIN         19.010      .379     7.083     43.691

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   18.691
                   TIME SHIFT OF PEAK FLOW         (min)=    65.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.4607E+00

-------------------------------------------------------------------------------------
--------------
R0003:C00017-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .70
| 06:207        DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .50
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .94          .60
     Length            (m)=      10.00       191.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     119.72        34.40
                over (min)       1.00        40.00
     Storage Coeff.  (min)=        .61 (ii)   40.31 (ii)
     Unit Hyd. Tpeak (min)=       1.00        40.00
     Unit Hyd. peak  (cms)=       1.37          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .05          .03           .060 (iii)
     TIME TO PEAK    (hrs)=       5.98         6.57          6.000
     RUNOFF VOLUME    (mm)=      89.69        40.08         50.744
     TOTAL RAINFALL   (mm)=      90.69        90.69         90.690
     RUNOFF COEFFICIENT   =        .99          .44           .560

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
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--------------
R0003:C00018-------------------------------------------------------------------------
---------------
* 1005



------------------------
| ADD HYD              |
| 07:1005              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 06:207             .700      .060    6.000    50.744    .
000
                     +ID 2 05:BASIN         19.010      .379    7.083    43.691    .
000
                     ================================================================
==
                     SUM   07:1005          19.710      .403    7.000    43.942    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
--------------
R0003:C00019-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=     .500   Curve Number   (CN)= 44.00
| 08:208        DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .040

     Unit Hyd Qpeak  (cms)=     .477

     PEAK FLOW       (cms)=     .043 (i)
     TIME TO PEAK    (hrs)=    6.000
     DURATION        (hrs)=   12.333, (dddd|hh:mm:)=   0|12:20
     AVERAGE FLOW    (cms)=     .002
     RUNOFF VOLUME    (mm)=   17.954
     TOTAL RAINFALL   (mm)=   90.690
     RUNOFF COEFFICIENT   =     .198

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
-------------------------------------------------------------------------------------
--------------
R0003:C00020-------------------------------------------------------------------------
---------------
* 1006



------------------------
| ADD HYD              |
| 09:1006              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 08:208             .500      .043    6.000    17.954    .
000
                     +ID 2 07:1005          19.710      .403    7.000    43.942    .
000
                     ================================================================
==
                     SUM   09:1006          20.210      .406    7.000    43.299    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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R0003:C00021-------------------------------------------------------------------------
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-------------------------------------------------------------------------------------
--------------
R0003:C00002-------------------------------------------------------------------------
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-------------------------------------------------------------------------------------
--------------
R0003:C00002-------------------------------------------------------------------------
---------------
  ** END OF RUN :    2

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

```
| START            | Project  dir.:C:\Temp\17-431\191204\SCS_12hr\

-------------------- Rainfall dir.:C:\Temp\17-431\191204\SCS_12hr\

    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0004
    NSTORM=   1
           #  1=100SCS12.stm
-------------------------------------------------------------------------------------
--------------
R0004:C00002-------------------------------------------------------------------------
---------------
*#***********************************************************************************
***********************************


*#  SWMHYMO Ver:4.05.00/Apr 2017 / INPUT DATA FILE


*#***********************************************************************************
***********************************


*#  Project Name: [IEE - Phase 2]    Project Number: [17-431]


*#  Date        : 02-02-2018


*#  Modeller    : [Ben Daniels]


*#  Company     : WMI & Associates Ltd.


*#  License #   :  2880720


*#***********************************************************************************
***********************************
```

```
------------------------------------------------------------------------------------
--------------
R0004:C00002------------------------------------------------------------------------
---------------
--------------------
| READ STORM       |  Filename: C:\Temp\17-431\191204\SCS_12hr\100SCS12.stm



| Ptotal= 112.50 mm|  Comments: 100-Year SCS Type-II Storm Distribution (12-hour)
Innisfil, ON.


--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|
 TIME    RAIN
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|
hh:mm   mm/hr
      0:15   2.810|   2:15   3.370|   4:15   6.750|   6:15  20.250|   8:15   3.940|
10:15   2.250
      0:30   2.810|   2:30   3.370|   4:30   6.750|   6:30  20.250|   8:30   3.940|
10:30   2.250
      0:45   2.810|   2:45   3.370|   4:45   9.000|   6:45   9.000|   8:45   3.940|
10:45   2.250
      1:00   2.810|   3:00   3.370|   5:00   9.000|   7:00   9.000|   9:00   3.940|
11:00   2.250
      1:15   2.810|   3:15   4.500|   5:15  13.500|   7:15   6.750|   9:15   3.940|
11:15   2.250
      1:30   2.810|   3:30   4.500|   5:30  13.500|   7:30   6.750|   9:30   3.940|
11:30   2.250
      1:45   2.810|   3:45   4.500|   5:45  54.000|   7:45   6.750|   9:45   3.940|
11:45   2.250
      2:00   2.810|   4:00   4.500|   6:00 148.500|   8:00   6.750|  10:00   3.940|
12:00   2.250

------------------------------------------------------------------------------------
--------------
R0004:C00003------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .30
| 01:201       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .09          .21
```

```
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .97          .97
     Length            (m)=      10.00       119.60
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.50        80.99
                over (min)        1.00        19.00
     Storage Coeff.  (min)=        .55 (ii)   18.96 (ii)
     Unit Hyd. Tpeak (min)=       1.00        19.00
     Unit Hyd. peak  (cms)=       1.42          .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .03          .03           .046 (iii)
     TIME TO PEAK    (hrs)=       5.85         6.20          6.000
     RUNOFF VOLUME    (mm)=     111.49        56.30         68.169
     TOTAL RAINFALL   (mm)=     112.50       112.50        112.495
     RUNOFF COEFFICIENT   =        .99          .50           .606

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------------
--------------
R0004:C00004------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .50
| 02:202       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14          .36
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .80         1.00
     Length            (m)=      10.00       218.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.50        59.92
                over (min)        1.00        30.00
     Storage Coeff.  (min)=        .59 (ii)   30.10 (ii)
     Unit Hyd. Tpeak (min)=       1.00        30.00
     Unit Hyd. peak  (cms)=       1.39          .04
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .04          .04           .061 (iii)
     TIME TO PEAK    (hrs)=       5.85         6.40          6.000
     RUNOFF VOLUME    (mm)=     111.49        56.30         68.169
     TOTAL RAINFALL   (mm)=     112.50       112.50        112.495
```

```
     RUNOFF COEFFICIENT   =        .99          .50           .606

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------
--------------
R0004:C00005--------------------------------------------------------------------------
---------------
* 1000



------------------------
| ADD HYD              |
| 03:1000              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:201             .300      .046    6.000    68.169    .
000
                     +ID 2 02:202             .500      .061    6.000    68.169    .
000
                     ================================================================
==
                     SUM   03:1000            .800      .106    6.000    68.169    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------
--------------
R0004:C00006--------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    8.01
| 04:203        DT= 1.00 |   Total Imp(%)=   34.30   Dir. Conn.(%)=   25.70
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.75         5.26
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .79         2.00
     Length            (m)=     414.00        86.00
     Mannings n           =       .013         .250
```

```
     Max.eff.Inten.(mm/hr)=     148.50        91.26
                over (min)        5.00        17.00
     Storage Coeff.  (min)=       5.49 (ii)   17.08 (ii)
     Unit Hyd. Tpeak (min)=       5.00        17.00
     Unit Hyd. peak  (cms)=        .21          .07
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .79          .82           1.401 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.18           6.033
     RUNOFF VOLUME    (mm)=     111.49        57.16          71.125
     TOTAL RAINFALL   (mm)=     112.50       112.50         112.495
     RUNOFF COEFFICIENT   =        .99          .51            .632

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0004:C00007--------------------------------------------------------------------------
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* 1001



------------------------
| ADD HYD              |
| 05:1001              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:1000            .800      .106    6.000    68.169    .
000
                     +ID 2 04:203            8.010     1.401    6.033    71.125    .
000
                     ================================================================
==
                     SUM   05:1001           8.810     1.462    6.000    70.856    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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R0004:C00008--------------------------------------------------------------------------
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```

```
| CALIB STANDHYD         |   Area    (ha)=    2.82
| 06:204       DT= 1.00 |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .40         2.42
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.58         2.50
     Length            (m)=     140.00       284.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.50        56.24
                over (min)        2.00        29.00
     Storage Coeff.  (min)=       2.33 (ii)   29.28 (ii)
     Unit Hyd. Tpeak (min)=       2.00        29.00
     Unit Hyd. peak  (cms)=        .51          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .12          .23           .251 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.38          6.383
     RUNOFF VOLUME    (mm)=     111.49        54.67         60.748
     TOTAL RAINFALL   (mm)=     112.50       112.50        112.495
     RUNOFF COEFFICIENT   =        .99          .49           .540
*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0004:C00009-------------------------------------------------------------------------
---------------
* 1002A



------------------------
| ADD HYD              |
| 07:1002A             |   ID:NHYD           AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                     (ha)     (cms)    (hrs)      (mm)   (
cms)
                     ID 1 05:1001          8.810     1.462    6.000    70.856    .
000
                    +ID 2 06:204           2.820      .251    6.383    60.748    .
000
```

```
                     ================================================================
==
                     SUM   07:1002A        11.630     1.693    6.000    68.405    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0004:C00010-------------------------------------------------------------------------
---------------
-------------------------
| CALIB NASHYD           |   Area    (ha)=    1.400   Curve Number   (CN)= 44.00
| 08:206A      DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
-------------------------   U.H. Tp(hrs)=     .810

     Unit Hyd Qpeak  (cms)=     .066

     PEAK FLOW       (cms)=     .040 (i)
     TIME TO PEAK    (hrs)=    6.817
     DURATION        (hrs)=   17.150, (dddd|hh:mm:)=   0|17:09
     AVERAGE FLOW    (cms)=     .006
     RUNOFF VOLUME    (mm)=   26.825
     TOTAL RAINFALL   (mm)=  112.495
     RUNOFF COEFFICIENT   =     .238

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0004:C00011-------------------------------------------------------------------------
---------------
* 1002B



------------------------
| ADD HYD              |
| 09:1002B             |   ID:NHYD           AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                     (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 07:1002A        11.630     1.693    6.000    68.405    .
000
                     +ID 2 08:206A          1.400      .040    6.817    26.825    .
000
                     ================================================================
```

```
==
                     SUM   09:1002B         13.030     1.703    6.000    63.938    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0004:C00012-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    4.780   Curve Number   (CN)= 66.00
| 01:206B       DT= 1.00 |   Ia      (mm)=    4.500   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .110

     Unit Hyd Qpeak  (cms)=    1.660

     PEAK FLOW       (cms)=     .910 (i)
     TIME TO PEAK    (hrs)=    6.033
     DURATION        (hrs)=   12.800, (dddd|hh:mm:)=   0|12:48
     AVERAGE FLOW    (cms)=     .051
     RUNOFF VOLUME    (mm)=   48.831
     TOTAL RAINFALL   (mm)=  112.495
     RUNOFF COEFFICIENT   =     .434

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0004:C00013-------------------------------------------------------------------------
---------------
* 1003



------------------------
| ADD HYD               |
| 02:1003               |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:206B           4.780      .910    6.033    48.831    .
000
                     +ID 2 09:1002B         13.030     1.703    6.000    63.938    .
000
                     ================================================================
==
```

```
                     SUM   02:1003          17.810     2.588    6.017    59.883    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0004:C00014-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.200   Curve Number   (CN)= 71.20
| 03:205        DT= 1.00 |   Ia      (mm)=    2.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .030

     Unit Hyd Qpeak  (cms)=    1.528

     PEAK FLOW       (cms)=     .322 (i)
     TIME TO PEAK    (hrs)=    6.000
     DURATION        (hrs)=   12.250, (dddd|hh:mm:)=   0|12:15
     AVERAGE FLOW    (cms)=     .016
     RUNOFF VOLUME    (mm)=   57.256
     TOTAL RAINFALL   (mm)=  112.495
     RUNOFF COEFFICIENT   =     .509

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
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--------------
R0004:C00015-------------------------------------------------------------------------
---------------
* 1004



------------------------
| ADD HYD               |
| 04:1004               |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:205            1.200      .322    6.000    57.256    .
000
                     +ID 2 02:1003          17.810     2.588    6.017    59.883    .
000
                     ================================================================
```

```
==
                     SUM   04:1004          19.010     2.906    6.000    59.717    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0004:C00016-------------------------------------------------------------------------
---------------
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>04:1004         |
| OUT<05:BASIN        | =========================  OUTLFOW STORAGE TABLE  ===========
==============
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE|
OUTFLOW   STORAGE
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (
cms)   (ha.m.)
                           .000 .0000E+00|    .044 .2529E+00|    .421 .4838E+00|   1.
056 .8779E+00
                           .011 .7170E-01|    .080 .3083E+00|    .558 .6088E+00|   1.
662 .9853E+00
                           .019 .1729E+00|    .203 .3652E+00|    .666 .7402E+00|   2.
424 .1096E+01
                           .025 .1992E+00|    .421 .4838E+00|    .691 .7740E+00|    .
000 .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 04:1004          19.010     2.906     6.000     59.717
    OUTFLOW < 05:BASIN         19.010      .558     6.950     59.716

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   19.207
                   TIME SHIFT OF PEAK FLOW         (min)=    57.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.6090E+00

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R0004:C00017-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .70
| 06:207        DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .50
```

```
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .94          .60
     Length            (m)=      10.00       191.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.50        55.84
                over (min)        1.00        33.00
     Storage Coeff.  (min)=        .56 (ii)   33.27 (ii)
     Unit Hyd. Tpeak (min)=       1.00        33.00
     Unit Hyd. peak  (cms)=       1.42          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .06          .05           .082 (iii)
     TIME TO PEAK    (hrs)=       5.85         6.45          6.000
     RUNOFF VOLUME    (mm)=     111.49        56.30         68.169
     TOTAL RAINFALL   (mm)=     112.50       112.50        112.495
     RUNOFF COEFFICIENT   =        .99          .50           .606

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0004:C00018-------------------------------------------------------------------------
---------------
* 1005



------------------------
| ADD HYD              |
| 07:1005              |   ID:NHYD           AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                     (ha)     (cms)    (hrs)      (mm)   (
cms)
                  ID 1 06:207            .700      .082    6.000    68.169    .
000
                 +ID 2 05:BASIN        19.010      .558    6.950    59.716    .
000
                 =================================================================
==
                 SUM   07:1005         19.710      .595    6.817    60.016    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

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R0004:C00019-------------------------------------------------------------------------
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--------------------------
| CALIB NASHYD           |   Area    (ha)=     .500   Curve Number   (CN)= 44.00
| 08:208        DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .040

     Unit Hyd Qpeak  (cms)=     .477

     PEAK FLOW       (cms)=     .064 (i)
     TIME TO PEAK    (hrs)=    6.000
     DURATION        (hrs)=   12.333, (dddd|hh:mm:)=   0|12:20
     AVERAGE FLOW    (cms)=     .003
     RUNOFF VOLUME    (mm)=   26.825
     TOTAL RAINFALL   (mm)=  112.495
     RUNOFF COEFFICIENT   =     .238

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0004:C00020-------------------------------------------------------------------------
---------------
* 1006



------------------------
| ADD HYD               |
| 09:1006               |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 08:208            .500      .064    6.000    26.825    .
000
                     +ID 2 07:1005         19.710      .595    6.817    60.016    .
000
                     ================================================================
==
                     SUM   09:1006         20.210      .600    6.817    59.195    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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R0004:C00021-------------------------------------------------------------------------
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R0004:C00002-------------------------------------------------------------------------
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R0004:C00002-------------------------------------------------------------------------
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R0004:C00002-------------------------------------------------------------------------
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R0004:C00002-------------------------------------------------------------------------
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--------------------
| READ STORM       |  Filename: C:\Temp\17-431\191204\SCS_12hr\Hzl12h12.stm



| Ptotal= 212.00 mm|  Comments: HURRICANE HAZEL REGIONAL STORM (12-hour)



--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|
 TIME    RAIN
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|
hh:mm   mm/hr
      0:12   6.000|   2:12   6.000|   4:12  17.000|   6:12  23.000|   8:12  13.000|
10:12  38.000
      0:24   6.000|   2:24   6.000|   4:24  17.000|   6:24  23.000|   8:24  13.000|
10:24  38.000
      0:36   6.000|   2:36   6.000|   4:36  17.000|   6:36  23.000|   8:36  13.000|
10:36  38.000
      0:48   6.000|   2:48   6.000|   4:48  17.000|   6:48  23.000|   8:48  13.000|
10:48  38.000
      1:00   6.000|   3:00   6.000|   5:00  17.000|   7:00  23.000|   9:00  13.000|
11:00  38.000
      1:12   4.000|   3:12  13.000|   5:12  13.000|   7:12  13.000|   9:12  53.000|
11:12  13.000
      1:24   4.000|   3:24  13.000|   5:24  13.000|   7:24  13.000|   9:24  53.000|
11:24  13.000
```

```
      1:36   4.000|   3:36  13.000|   5:36  13.000|   7:36  13.000|   9:36  53.000|
11:36  13.000
      1:48   4.000|   3:48  13.000|   5:48  13.000|   7:48  13.000|   9:48  53.000|
11:48  13.000
      2:00   4.000|   4:00  13.000|   6:00  13.000|   8:00  13.000|  10:00  53.000|
12:00  13.000

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R0004:C00003-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .30
| 01:201       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .09          .21
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .97          .97
     Length            (m)=      10.00       119.60
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        48.76
                over (min)       1.00        23.00
     Storage Coeff.  (min)=        .83 (ii)   23.38 (ii)
     Unit Hyd. Tpeak (min)=       1.00        23.00
     Unit Hyd. peak  (cms)=       1.19          .05
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .01          .03           .035 (iii)
     TIME TO PEAK    (hrs)=       9.12        10.17         10.000
     RUNOFF VOLUME    (mm)=     210.95       140.43        155.592
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =       1.00          .66           .734

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0004:C00004-------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=     .50
| 02:202       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------------
```

```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .14          .36
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .80         1.00
     Length            (m)=      10.00       218.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        48.39
                over (min)       1.00        33.00
     Storage Coeff.  (min)=        .88 (ii)   33.03 (ii)
     Unit Hyd. Tpeak (min)=       1.00        33.00
     Unit Hyd. peak  (cms)=       1.15          .03
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .02          .04           .052 (iii)
     TIME TO PEAK    (hrs)=       9.13        10.38         10.000
     RUNOFF VOLUME    (mm)=     210.97       140.43        155.597
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =       1.00          .66           .734

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0004:C00005-------------------------------------------------------------------------
---------------
* 1000



------------------------
| ADD HYD              |
| 03:1000              |   ID:NHYD           AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                     (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:201            .300      .035   10.000   155.592    .
000
                     +ID 2 02:202            .500      .052   10.000   155.597    .
000
                     ================================================================
==
                     SUM   03:1000           .800      .087   10.000   155.595    .
000
```

```
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0004:C00006--------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    8.01
| 04:203        DT= 1.00 |   Total Imp(%)=   34.30   Dir. Conn.(%)=   25.70
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.75         5.26
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .79         2.00
     Length            (m)=     414.00        86.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        50.49
                over (min)        8.00        23.00
     Storage Coeff.  (min)=       8.29 (ii)   22.97 (ii)
     Unit Hyd. Tpeak (min)=       8.00        23.00
     Unit Hyd. peak  (cms)=        .14          .05
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .30          .67           .954 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.17         10.050
     RUNOFF VOLUME    (mm)=     211.00       141.81        159.596
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =       1.00          .67           .753

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0004:C00007--------------------------------------------------------------------------
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* 1001



------------------------
| ADD HYD              |
| 05:1001              |   ID:NHYD           AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                     (ha)     (cms)    (hrs)      (mm)   (
```

```
cms)
                      ID 1 03:1000           .800      .087   10.000   155.595    .
000
                     +ID 2 04:203           8.010      .954   10.050   159.596    .
000
                     ===============================================================
==
                     SUM   05:1001          8.810     1.036   10.000   159.233    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0004:C00008--------------------------------------------------------------------------
---------------
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    2.82
| 06:204        DT= 1.00 |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .40         2.42
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.58         2.50
     Length            (m)=     140.00       284.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        45.24
                over (min)        4.00        33.00
     Storage Coeff.  (min)=       3.51 (ii)   32.92 (ii)
     Unit Hyd. Tpeak (min)=       4.00        33.00
     Unit Hyd. peak  (cms)=        .31          .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .04          .25           .286 (iii)
     TIME TO PEAK    (hrs)=       9.47        10.38         10.383
     RUNOFF VOLUME    (mm)=     211.00       137.75        145.587
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =       1.00          .65           .687
*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0004:C00009----------------------------------------------------------------------
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* 1002A



------------------------
| ADD HYD              |
| 07:1002A             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 05:1001           8.810     1.036   10.000   159.233    .
000
                     +ID 2 06:204            2.820      .286   10.383   145.587    .
000
                     =================================================================
==
                     SUM   07:1002A         11.630     1.311   10.050   155.924    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------
R0004:C00010----------------------------------------------------------------------
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--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.400   Curve Number   (CN)= 44.00
| 08:206A       DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .810

     Unit Hyd Qpeak  (cms)=     .066

     PEAK FLOW       (cms)=     .085 (i)
     TIME TO PEAK    (hrs)=   11.133
     DURATION        (hrs)=   17.150, (dddd|hh:mm:)=   0|17:09
     AVERAGE FLOW    (cms)=     .018
     RUNOFF VOLUME    (mm)=   80.805
     TOTAL RAINFALL   (mm)=  212.000
     RUNOFF COEFFICIENT   =     .381

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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```
R0004:C00011----------------------------------------------------------------------
---------------
* 1002B



------------------------
| ADD HYD              |
| 09:1002B             |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 07:1002A         11.630     1.311   10.050   155.924    .
000
                     +ID 2 08:206A           1.400      .085   11.133    80.805    .
000
                     =================================================================
==
                     SUM   09:1002B         13.030     1.370   10.050   147.853    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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R0004:C00012----------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    4.780   Curve Number   (CN)= 66.00
| 01:206B       DT= 1.00 |   Ia      (mm)=    4.500   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .110

     Unit Hyd Qpeak  (cms)=    1.660

     PEAK FLOW       (cms)=     .549 (i)
     TIME TO PEAK    (hrs)=   10.000
     DURATION        (hrs)=   12.800, (dddd|hh:mm:)=   0|12:48
     AVERAGE FLOW    (cms)=     .132
     RUNOFF VOLUME    (mm)=  127.254
     TOTAL RAINFALL   (mm)=  212.000
     RUNOFF COEFFICIENT   =     .600

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0004:C00013----------------------------------------------------------------------
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* 1003



------------------------
| ADD HYD              |
| 02:1003              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 01:206B           4.780      .549   10.000   127.254    .
000
                     +ID 2 09:1002B         13.030     1.370   10.050   147.853    .
000
                     ================================================================
==
                     SUM   02:1003          17.810     1.914   10.017   142.324    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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R0004:C00014-------------------------------------------------------------------------
---------------
--------------------------
| CALIB NASHYD           |   Area    (ha)=    1.200   Curve Number   (CN)= 71.20
| 03:205       DT= 1.00 |   Ia      (mm)=    2.000   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .030

     Unit Hyd Qpeak  (cms)=    1.528

     PEAK FLOW       (cms)=     .149 (i)
     TIME TO PEAK    (hrs)=   10.000
     DURATION        (hrs)=   12.250, (dddd|hh:mm:)=   0|12:15
     AVERAGE FLOW    (cms)=     .038
     RUNOFF VOLUME    (mm)=  141.011
     TOTAL RAINFALL   (mm)=  212.000
     RUNOFF COEFFICIENT   =     .665

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
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R0004:C00015-------------------------------------------------------------------------
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* 1004



------------------------
| ADD HYD              |
| 04:1004              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 03:205            1.200      .149   10.000   141.011    .
000
                     +ID 2 02:1003          17.810     1.914   10.017   142.324    .
000
                     ================================================================
==
                     SUM   04:1004          19.010     2.063   10.000   142.242    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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R0004:C00016-------------------------------------------------------------------------
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-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>04:1004         |
| OUT<05:BASIN        | =========================  OUTLFOW STORAGE TABLE  ===========
==============
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE|
OUTFLOW   STORAGE
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (
cms)   (ha.m.)
                           .000 .0000E+00|    .044 .2529E+00|    .421 .4838E+00|   1.
056 .8779E+00
                           .011 .7170E-01|    .080 .3083E+00|    .558 .6088E+00|   1.
662 .9853E+00
                           .019 .1729E+00|    .203 .3652E+00|    .666 .7402E+00|   2.
424 .1096E+01
                           .025 .1992E+00|    .421 .4838E+00|    .691 .7740E+00|    .
000 .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ----------------------     (ha)     (cms)     (hrs)       (mm)
```

```
     INFLOW > 04:1004          19.010     2.063    10.000    142.242
    OUTFLOW < 05:BASIN         19.010     1.687    11.033    142.238

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   81.779
                   TIME SHIFT OF PEAK FLOW         (min)=    62.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.9890E+00

------------------------------------------------------------------------------------
--------------
R0004:C00017------------------------------------------------------------------------
---------------
-------------------------
| CALIB STANDHYD         |   Area    (ha)=     .70
| 06:207       DT= 1.00 |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
-------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .20          .50
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=        .94          .60
     Length            (m)=      10.00       191.40
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        48.27
                over (min)       1.00        36.00
     Storage Coeff.  (min)=        .84 (ii)   35.51 (ii)
     Unit Hyd. Tpeak (min)=       1.00        36.00
     Unit Hyd. peak  (cms)=       1.18          .03
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .02          .06           .071 (iii)
     TIME TO PEAK    (hrs)=       9.13        10.45         10.450
     RUNOFF VOLUME    (mm)=     210.99       140.43        155.598
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =       1.00          .66           .734

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------
R0004:C00018------------------------------------------------------------------------
---------------
* 1005
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```
-----------------------
| ADD HYD               |
| 07:1005               |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
-----------------------                        (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 06:207            .700      .071   10.450   155.598    .
000
                     +ID 2 05:BASIN        19.010     1.687   11.033   142.238    .
000
                     ================================================================
==
                     SUM   07:1005         19.710     1.753   11.000   142.709    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------------
--------------
R0004:C00019------------------------------------------------------------------------
---------------
-------------------------
| CALIB NASHYD           |   Area    (ha)=     .500   Curve Number   (CN)= 62.00
| 08:208       DT= 1.00 |   Ia      (mm)=    5.000   # of Linear Res.(N)=  3.00
-------------------------   U.H. Tp(hrs)=     .040

     Unit Hyd Qpeak  (cms)=     .477

     PEAK FLOW       (cms)=     .055 (i)
     TIME TO PEAK    (hrs)=   10.000
     DURATION        (hrs)=   12.333, (dddd|hh:mm:)=   0|12:20
     AVERAGE FLOW    (cms)=     .013
     RUNOFF VOLUME    (mm)=  118.146
     TOTAL RAINFALL   (mm)=  212.000
     RUNOFF COEFFICIENT   =     .557

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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R0004:C00020------------------------------------------------------------------------
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* 1006



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| ADD HYD              |
| 09:1006              |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.
DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (
cms)
                      ID 1 08:208             .500      .055   10.000   118.146    .
000
                     +ID 2 07:1005          19.710     1.753   11.000   142.709    .
000
                     ================================================================
==
                     SUM   09:1006          20.210     1.795   11.000   142.102    .
000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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R0004:C00021-------------------------------------------------------------------------
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| FINISH           |
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*************************************************************************************
**************
     WARNINGS / ERRORS / NOTES
     -------------------------
R0001:C00008  CALIB STANDHYD

*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.
R0001:C00014  CALIB NASHYD

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
R0002:C00008  CALIB STANDHYD

*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.
R0002:C00014  CALIB NASHYD

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
R0003:C00008  CALIB STANDHYD
```

```
*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.
R0003:C00014  CALIB NASHYD

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
R0004:C00008  CALIB STANDHYD

*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.
R0004:C00014  CALIB NASHYD

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
R0004:C00008  CALIB STANDHYD

*** WARNING: For areas with impervious ratios below 20%, this routine may not be
applicable.
R0004:C00014  CALIB NASHYD

*** WARNING: Time step is too large for value of TP. RV may be ok.  Peak flow could
be off.
   Simulation ended on 2019-12-04     at 14:48:40
=====================================================================================
==============
```

APPENDIX D

GEOTECHNICAL INVESTIGATION & HYDROGEOLOGICAL EVALUATION

GEOSPEC ENGINEERING LTD.
287 Tiffin Street, Unit 10, Barrie, Ontario L4N 7R8 TEL: (705) 722-4638 FAX: (705) 722-4958

CONFIDENTIAL

DRAFT

GEOTECHNICAL INVESTIGATION

ROBERTSON SUBDIVISION
STROUD, ONTARIO

PREPARED FOR:

1820839 Ontario Inc.
950 Shoreview Drive
Innisfil, Ontario
L9S 5A7

Geospec Project N° 10-1626

January 20, 2011

Distribution: 2 – Client
1 – Gemmell Engineering (Electronically)

EXECUTIVE SUMMARY

Further to the authorization of Mr. Wayne Ezekiel, on behalf of 1820839 Ontario Inc., **Geospec Engineering Ltd.** carried out a geotechnical investigation for a proposed residential development, located north of Victoria Street, east of Nelson Crescent and west of the existing Go Train Railway line, in the community of Stroud, Ontario.

The fieldwork included the advancement of drilled boreholes to depths of 3.5 to 5.0 meters below the existing grade levels at locations specified by Gemmell Engineering. The approximate borehole locations are identified on the Borehole Plan.

Although a significant portion of the proposed development area was stripped of topsoil, some of the boreholes included a layer of topsoil and/or organically included silt over an original till deposit primarily comprised of silt & sand. The compactness condition of the original cohesionless soil, within the depth of the investigation, varied from very loose to very dense being generally compact to dense. Perched groundwater was encountered in the installed standpipes ten days after the drilling was completed. In this regard, the water level was measured at depths varying between 1.5 and 4.5 meters below the existing grade levels in the installed standpipes at an elevation of 264.6 to 266.9 m, at Borehole N°s 8 & 9, respectively.

DG

We understand that consideration is being given to the inclusion of a stormwater management facility (SMWF) along the south side of the development and private septic systems at each residential lot. In this regard and based on the results of the investigation, the soil type that predominated the north and west portions of the site was a compact to dense /silt & sand/sand & silt till. While the soil in the southeast portion of the site and in the area of the proposed stormwater management blocks comprised silt till occasionally underlain by sand (BH N° 7) and silt (BH N° 8) deposits. As such, we recommend that test pits be advanced in the area of the proposed ponds to confirm soil conditions at proposed design depths, to support stormwater pond design.

Based on the results of the investigation, we advise that typical frost depth footings may only be appropriate for the development if founded either on original undisturbed soil or engineered fill. If it is elected to extend the footings to the original undisturbed soil, footing excavations extended to the minimum depths of 0.5 to 1.5 m below the existing grade level, as detailed in Table 3, may be designed using a Soil Bearing Resistance (SLS) of 75 kPa.

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1.0 INTRODUCTION

Geospec Engineering Ltd. was retained by Mr. Wayne Ezekiel, on behalf of 1820839 Ontario Inc., to carry out a geotechnical investigation for a proposed residential development, located north of Victoria Street, east of Nelson Crescent and west of the existing Go Train Railway line in the community of Stroud, Ontario. The approximate site location is identified on the Site Location Plan (Figure 1).

Figure 1: Site Location Plan

Source: www.maps.google.com

Site: Proposed Robertson Subdivision, Stroud

The project and purpose of the investigation were discussed with Messrs. Wayne Ezekiel & Lou Kelly of 1820839 Ontario Inc. and Mr. Greg Gemmell, Engineer between September 14, 2010 & January 25, 2011. Based upon these discussions, it was our understanding that ultimately a residential development, including 40 single family lots with private septic systems, stormwater management blocks and open space lands are proposed for the site.

We understood that the geotechnical investigation was required in order to ascertain the shallow subsurface soil and groundwater conditions to assist in the design of foundations, an internal roadway, stormwater management and private septic systems currently proposed for the site.

This report briefly describes the fieldwork completed, subsurface conditions encountered and our general recommendations based on the information obtained.

2.0 FIELDWORK

Initially, the field investigation included the following:

- The advancement of six (6) boreholes drilled to a depth of 5.0 meters below the existing grade level, at the locations specified in the development area.
- The advancement of two (2) boreholes drilled to a depth of 3.5 meters below the existing grade level, at the locations specified in the development area.
- The installation of four (4) 19 mm PVC standpipes in selected drilled boreholes.

In order to gather information in the "future development" area, west of the existing railway line, an additional borehole was advanced to a depth of five meters below grade, as authorized on November 16, 2010 by Mr. Lou Kelly.

Our representative laid out the boreholes in close proximity to the specified locations. After the field drilling operations were completed, the borehole locations and elevations were determined by Gemmell Engineering and are shown on the Borehole Plan (Enclosure N° 1). Furthermore, fieldwork was carried out under the full time supervision of a field technician from our office, on December 11, 2011. A track mounted drilling machine provided and operated by a specialist drilling contractor augured the boreholes. Finally, Standard Penetration Tests were carried out intermittently and discontinuous soil samples were recovered at regular intervals through the subsurface soil during the borehole advancement.

A Standard Penetration Test (SPT) is a method of sampling soil, which has been standardized by ASTM D1586. The test consists of driving a standard split-barrel sampler a distance of 45 cm into undisturbed soil, at the elevation to be tested, using a 63.5 kg driving mass falling free from a height of 76 cm, and totaling the number of blows to drive the sampler the last 30 cm.

All soil samples recovered were visually classified and appropriately tested in the field. They were then individually bagged, labeled, and returned to our laboratory for a formal assessment.

The groundwater conditions were also observed in the open boreholes during and on completion of drilling. To reiterate, 19 mm standpipes were installed in four selected boreholes to facilitate groundwater measurements over an extended period of time. The resulting observations are detailed on the accompanying Borehole Logs.

3.0 SUMMARIZED SUBSURFACE SOIL CONDITIONS

The properties of the soil strata encountered in the boreholes are given in the appended Borehole Logs. Although a majority of the proposed development area was stripped of topsoil, some of the boreholes included organically included silt over an original till deposit. A detailed summary of the conditions encountered is outlined in the following sections.

3.1 Surface Cover

As the proposed development area was generally stripped of topsoil, the surface cover at Borehole N°s 1, 3 & 7 was comprised of moist to wet organically included silt which varied in thickness from 25 to 50 cm. However, original topsoil does remain in portions of the site with the surface cover at Borehole N° 9 including approximately 50 cm of black, moist topsoil over 50 cm of organically included silt. The surface cover at the remaining borehole locations included the original till, which is discussed in Section 3.2.

We point out that the thickness of organically included silt & topsoil can vary in between boreholes; therefore, allowances for possible variations across the site should be made. Furthermore, due to the potentially compressible nature of any organically included materials they are considered to be unreliable in a structural capacity.

3.2 Silt/Silt & Sand/Sand & Silt Till

Extending below the surface cover at Borehole N°s 1, 3, 7 & 9 and at the surface of the remaining borehole locations was a deposit of brown to grey till that varied in composition from sand & silt to silt with intermittent cobbles & boulders. The till extended beyond the final depths investigated at Borehole N°s 1 to 6 and 9, to an approximate depth of 4.0metres below the existing grade level and above a sand deposit at Borehole N° 7; and to an approximate depth of 3.3 metres below the existing grade level and above a silt deposit at Borehole N° 8. To reiterate, the till varied in composition from being predominantly silt to a mixture of sand & silt.

Standard Penetration Test results established that the compactness condition of the till varied from loose to very dense (N value= 6->80 blows/30 cm), being generally compact to dense. Moisture Content analysis established moistures ranging from 7 to 38%, which are indicative of a moist to wet deposit.

Based on a gradation analyses, the till (excluding cobbles & boulders) consisted predominantly of 44-55% sand, 36-46% silt and 6-14% gravel. Frequently, a till deposit contains gravel, sand & silt seams and pockets at variable depths. These seams are outwash sediments deposited primarily as a result of glacial recession. Often, these granular veins ‘store’ perched water and may be saturated. Consequently, the till mass around the saturated cohesionless pockets and veins is also saturated or quasi-saturated.

The geotechnical characteristics normally associated with the till deposit encountered at this site is provided in Table 1.

3.3 Sand

Encountered under the till at Borehole N° 7 (~ Elevation 265.3 m) was a deposit of sand with trace silt which extended beyond the final depth investigated at this particular location. The sand was considered moist (Moisture Content = 3%) with a compactness condition considered very dense (N value = 69 blows/30 cm). Based on a gradation analyses, the sand consisted of approximately 92% sand and 8% silt.

3.4 Silt

Encountered under the till at Borehole N° 8 (~ Elevation 262.8 m) was a deposit of silt with some clay and trace sand & gravel which extended beyond the final depth investigated at this particular location. The silt was considered moist (Moisture Content = 17-23%) with a compactness condition considered compact (N value= 16-29 blows/30 cm). Based on a gradation analyses, the silt deposit was comprised of approximately 74% silt, 16% clay, 5% sand and 5% gravel.

Table 1: Typical Soil Characteristics Associated with Site Soil

Soil Type	**Silt**	**Silt/Silt & Sand/Sand & Silt Till**
OHSA Soil Type	Type 2 & 3	Type 1 & 2
	(Above/Below water)	(Above/Below water)
Soil Characteristic		
SPT Result (N-value)	16-29	6->80
Moisture Content (%)	17-23	7-38
Approximate Effective Size D_{10} (mm)	<0.002	<0.01
Soil Properties		
Density	Compact	Loose to Very Dense
Moisture State	Moist	Moist to Very Moist
Cohesiveness	Slightly cohesive	Slightly cohesive
Bulk Unit Weight (kg/m^3)		
Compact/Firm	1400-1450	1950-2050
Dense	1450-1500	2050-2200
Internal Friction Angle (°)		
Loose to compact	28-29	
Compact	30-33	34-39
Dense	33-35	40-45
Lateral Earth Pressure Coefficient	32°	39°
(At Rest) K_o	0.47	0.37
(Active) K_a	0.31	0.23
(Passive) K_p	3.25	4.4
Susceptibility to Erosion	High	Moderate
Permeability (cm/sec)	$<10^{-6}$	$10^{-4} - 10^{-6}$
Drainage		
By Gravity	Poor	Poor
By Well Points	Poor	Success depends on silt content
Capillarity	High	Moderate to High
Frost Susceptibility	High	Objectionable
Adfreezing Potential	High	Objectionable
Response to Compaction	Poor	Fair to poor

4.0 GROUNDWATER CONDITIONS

During this investigation, perched groundwater was encountered in the two of the four 19 mm standpipes installed during fieldwork. More specifically, the groundwater was measured approximately ten days after the drilling was completed. In this regard, the water level was measured at depths varying between 1.5 and 4.5 meters below the existing grade levels in the installed standpipes at an elevation of 264.6 to 266.9 m, at Borehole N°s 8 & 9, respectively.

Depending upon the depth of short term excavations, it is our opinion that either isolated filtered sump pumps or a system of interconnected ditches and filtered sump pumps will be required to adequately control groundwater entering temporary excavations. In addition, shallow excavations may be drained by a series of ditches surrounding the excavation that extend to filtered sump pits or positive frost-free outlets.

We do advise that the groundwater level may fluctuate seasonally, especially during periods of high precipitation and spring runoff.

5.0 GEOTECHNICAL CONSIDERATIONS

To reiterate, we have been advised that consideration is being given to the construction of a residential subdivision, including 40 single family lots with private septic systems, stormwater management blocks and open space lands in the area of the boreholes. However, at the time of compilation of this geotechnical investigation, we were unaware of final development grades and service inverts. Therefore, only general recommendations are provided and a review of the final lot grading and profiles may be necessary in order to ascertain whether the recommendations given are appropriate or require modification(s).

Nevertheless, based upon the subsurface conditions encountered at the boreholes, we offer the following geotechnical recommendations.

5.1 Site Stripping & Grading

Drainage available due to site topography in combination with the moist surface conditions across a majority of the site, suggest that difficulties stripping or grading with conventional equipment through standard cut and fill practices should not occur from a wet ground perspective. However, complications in construction during periods of unfavourable weather should always be anticipated.

We do advise that the samples recovered suggest that the existing predominantly silt till will only be suitable for reuse provided it is maintained at or below the Optimum Moisture Content for compaction and organic inclusions are not encountered. Still the addition of water during the compaction operations may be necessary to enable the maximum soil density to be achieved in the deposit. We do stress that any organically included material is considered unsuitable for reuse in structurally sensitive areas. **More importantly all organically included material must be removed from any structurally sensitive area.**

In this regard, it is important to note that soil native to this site including greater than 8% silt is *not* considered an optimum material for reuse since it would be very difficult to compact to the specified degree without additional work effort as it is highly sensitive and becomes unstable when wet. Consequently, after periods of precipitation the material is difficult to handle and compact. As a result, construction methodology must be adapted for weather conditions including extended periods of delay due to weather with allowances for drying of the material. We advise that a mixing with an imported granular fill has proven to be a better alternative. Nevertheless, it is recommended that mass grading operations be completed during the dry summer months of the year in order to benefit from the potentially improved soil compaction characteristics.

Finally, all material, free of organic matter or other deleterious inclusions, may be placed at or below Optimum Moisture Content and uniformly compacted in maximum 30 cm thick lifts to a degree of compaction required by design. However, any oversized cobbles or boulders (> 150 mm diameter) must be discarded in designated non-structural areas.

5.2 Service Installation

We anticipate that a majority of the storm service excavations for this development will be carried out by open cut in cohesionless soil. All excavations must be carried out in full compliance with the most recent guidelines of the Occupational Health and Safety Act.

During the excavation of any underground opening deeper than 1.2 meters, the sides of the excavation must be sloped to a maximum 1:1 inclination based upon a Type 1, 2 or 3 Soil located above the prevailing water table. A 3:1 inclination for a Type 3 Soil below the groundwater level may be required where wet conditions are encountered. Geospec can provide recommendations in this regard during construction operations. Furthermore, for vertical cuts in excess of 1.2 m, temporary shoring (such as a structurally adequate, prefabricated box) will be required.

All services must be extended below any organically included material or fill. Consequently, the founding soils based upon our widely spaced boreholes will likely be comprised of till predominantly comprised of silt, which was generally considered compact to dense. As a result, the subgrade soil at the trench base will be suitable for the placement of service bedding provided the soil has been adequately surface compacted and does not become unstable during trench excavation. Finally, watermain bedding and cover must consist of uniform fine sand; while storm sewer bedding and cover must consist of a minimum of 15 cm & 30 cm, respectively of Granular A.

In the event perched groundwater is encountered during service installations, we advise that filtered sump pumps may be required to permit the advancement of the excavation to locally control the groundwater and permit the compaction of the subgrade soil prior to the installation of any underground service. Geospec can provide recommendations in this regard during construction operations.

We do reiterate that some soil at this site included a significant percentage of fine-grained soil that is moisture sensitive and frost susceptible. To reiterate, soil with a silt content greater than 8% is not considered an optimum material for reuse as backfill. Therefore, where service trenches follow the proposed driveway, particular attention must be given to the backfill placement in order to minimize settlement, which would have adverse effects on the pavement structure. Appropriately mixing native soil backfill with a well graded OPSS Granular B type backfill material improves compaction characteristics. However, care must be taken to avoid the development of subgrade with dramatically varying drainage characteristics. It is therefore strongly recommended that Geospec be engaged during the construction operations to ensure a uniform subgrade moisture and compaction degree is attained.

5.3 Road Construction

For normal road construction, we recommend that all fill and organically included matter be removed. Once the site has been adequately stripped, the exposed subgrade may be proofrolled and inspected, in order to detect any soft or saturated areas. Proofrolling is carried out prior to the placement of any subbase course fill materials. Questionable areas encountered during proofrolling must be removed and replaced with a select subgrade material. We do advise that continually wet low lying areas with limited drainage may require additional permeable granular fill to provide topographic relief and promote stability. Regardless, all fill must be uniformly compacted, in lifts not exceeding 30 cm in thickness, to at least 95% Standard Proctor Dry Density.

Approved on site excavated soil may be used for subgrade backfilling purposes. The following minimum town standard granular and pavement thickness will be satisfactory for pavement design over a stable subgrade:

Table 2: Pavement Section

Material	Designation	
	Local & Minor Collector (mm)	Major Collector (mm)
Surface Course Asphalt	50 HL-3	50 HL-3
Base Course Asphalt	50 HL-4	50 HL-4
Granular A Base Course	150	150
Granular B Subbase Course	400	450

We stress that the tabulated values assume stable subgrade conditions. Several factors including weather conditions experienced during service installation and construction practices significantly affect subgrade stability. It is imperative that the subgrade be assessed by a representative of **Geospec Engineering Ltd.** prior to the placement of granular fill in order to ascertain whether modifications to the tabulated values are required.

We recommend that all base and subbase fill materials be compacted in 15 -20 cm lifts to at least 98% Standard Proctor Dry Density and asphaltic concrete to 92% Maximum Relative Density.

In order to establish the suitability of the road subgrade preparation and fill placement, it is recommended that a qualified soil technologist be present during the cut and fill operations.

It is also recommended that subgrade preparation and paving take place during the dry summer months of the year. Finally, to prevent unnecessary saturation of the subgrade soil, we recommend that all surface run-off water be directed away from the pavement and longitudinal subdrains connected to a positive frost-free outlet be installed immediately below the subbase granular material level at both edges of the road.

5.4 Foundation Recommendations

Based on the results of our investigation, we advise that the density of the original undisturbed soil varied from loose to very dense, being generally compact to dense. As a result, it is our considered opinion that strip and spread footings may be incorporated into the development design. As requested, we also include recommendations for the construction of engineered fill.

5.4.1 Spread Footings Founded on Original Soil

Footing excavations extended to the minimum depths provided in Table 3 may be designed using the corresponding Soil Bearing Resistance (SLS) and Factored Bearing Resistance (ULS).

Table 3: Conventional Spread and Strip Footings Depths

Borehole N°	Approximate Depth (cm)	Approximate Elevation (m)	Soil Bearing Resistance kPa (SLS)	Factored Bearing Resistance kPa (ULS)
1	80	271.3	75	100
2	50	271.1	75	100
3	80	270.5	75	100
4	50	270.7	75	100
5	80	270.6	75	100
6	80	269.7	75	100
9	150	269.9	75	100

It must be noted that soil bearing resistance given is based on information obtained from the boreholes. Specific information with respect to soil conditions between boreholes is available during excavation of the foundations. Therefore, all excavated founding elevations must be inspected by a representative of **Geospec Engineering Ltd.** or a qualified building inspector prior to forming and the placement of concrete, to ensure that the required bearing capacity is being complied with.

For the purpose of frost protection, all exterior footings and footings exposed to frost action should be covered by at least 122 cm of soil.

5.4.2 Spread Footings Founded on Engineered Fill

In the event, mass fill is required to raise the site grade, recommendations for supporting the proposed residential structures on an engineered fill is provided.

In this regard, once the structurally sensitive areas of the building have been adequately stripped of organic material and fill, the construction of the engineered fill pad would begin. The exposed subgrade must then be inspected by personnel from **Geospec Engineering Ltd.** in order to assess the stability and compacted if necessary. Due to the silty nature of some of the underlying soil, it is recommended that the stripping for and construction of engineered fill proceed during the dry summer months of the year in order to minimize subgrade instability.

Following inspection, the area may be raised to the floor slab subbase grade and road subgrade levels with a uniformly compacted and supervised fill tested and approved by our office. All fill must be compacted in lifts not exceeding 20 cm in thickness, to at least 98% of the Standard Proctor Dry Density. The moisture content of the fill material placed should be within 2% of the Optimum Moisture Content in order to achieve optimum compactive effort.

Finally, the engineered fill *must* extend at least one meter beyond the proposed building envelopes and slope down to the surrounding subexcavated level at 45°.

In order to ensure the above criteria are satisfied, the removal of any existing fill and organic matter as well as the placement of engineered fill must be supervised on a continuous basis by a qualified soil technologist from our office. In addition, all footings founded on engineered fill and the top of the foundation walls must be reinforced with, at minimum, two 15 M continuous reinforcing bars in order to minimize the effects of variations in the degree of compaction of the engineered fill. Finally, for the purpose of frost protection, all exterior footings and footings exposed to frost action should be covered by at least 122 cm of soil.

Residence footings founded on an engineered fill constructed as described briefly above and detailed in Appendix A may be designed using an allowable design bearing pressure of 75 kPa (SLS).

5.5 Underground Wall Recommendations

We understand that the site development is to include private residences with full basements. In this regard, we offer the following remarks.

During the excavation of the basement or any underground opening deeper than 120 cm, the sides of the excavation must be sloped to a maximum 3:1 inclination for Type 4 "Bad" soil and 1:1 for Type 3 soil. All excavations must be carried out in full compliance with the most recent guidelines of the Occupational Health and Safety Act.

Based upon the relatively high perched groundwater levels encountered at the time of the investigation, we advise that localized variations of the groundwater level may be encountered across the site during and post development. We therefore recommend that at minimum the exterior underground wall be damp-proofed and perimeter weeping tiles be installed around the exterior footings. However, at those locations where evidence of groundwater is apparent consideration should be given to water proofing foundation walls as well as the inclusion of a system of under floor weeping tiles to improve groundwater control during periods of inclement weather.

Underground walls should be designed to resist a lateral earth pressure as defined by the following expression:

$$P[kN/m] = K_0(\frac{1}{2}h\gamma + q)$$

Where:

K_0	is the Coefficient of Lateral Earth Pressure at Rest (**$K_0 = 0.5$**)
γ	is the Bulk Unit Weight of Soil (**$\gamma = 20\ kN/m^3$**)
q	is the surcharge load (Minimum **$q = 20\ kPa$**)
h	is the Height of the underground wall below the finished exterior grade

See Appendix B drawing for the drainage and backfilling requirements for the exterior subsurface walls with perimeter weepers.

5.6 Slab on Grade Recommendations

For normal slab on grade construction, we recommend all non-engineered fill and organic matter be removed. The subgrade at the stripped grade level should then be proofrolled with a heavy smooth drum roller prior to placing any underfloor fill. Any soft areas encountered during proofrolling should be subexcavated and replaced with a well compacted and approved granular material. All fill must be uniformly compacted, in lifts not exceeding 15 cm in thickness, to at least 98% Standard Proctor Dry Density.

Furthermore, at least 15 cm of Granular 'A' type material should be placed directly below the floor slab to act as a moisture barrier.

The floor slab should be founded above the finished exterior grade and all surface run-off water should be directed away from the building.

In order to prevent frost heave of the slab and adfreezing to foundation walls, it is recommended that the backfill under the slab and adjacent to the foundation walls consist of a non-frost susceptible granular material compacted to a minimum 95% Standard Proctor Dry Density.

5.7 Infiltration Characteristics

We understand that consideration is being given to the inclusion of a stormwater management facility (SMWF) along the south side of the development and private septic systems at each residential lot. In this regard and based on the results of the investigation, the soil type that predominated the north and west portions of the site was a compact to dense /silt & sand/sand & silt till. While the soil in the southeast portion of the site and in the area of the proposed stormwater management blocks was comprised of silt till occasionally underlain by sand (BH N° 7) and silt (BH N° 8) deposits. As such, we recommend that test pits be advanced in the area of the proposed ponds to confirm soil conditions at proposed design depths, to support stormwater pond design.

Nevertheless, the soils as defined by the Ministry of the Environment in the Manual of Policy, Procedures and Guidelines for Onsite Sewage Systems, appendices 6.3.1 & 6.3.2, most closely resemble silt sand mixtures in the north and west portions of the site with a corresponding permeability in the order of 10^{-3} to 10^{-5} cm/sec range; while the soil in the south eastern portion of the site more closely resembles silt to silt and clay mixtures with a corresponding permeability in the order of 10^{-5} to less than 10^{-6} cm/sec range. Consequently, it is our considered opinion that residential lots will need to be assessed on a lot by lot basis and raised beds with imported sand will likely be required for some individual septic system construction. Furthermore, it may be possible to utilize a significant percentage of the existing silt with clay as a liner for subdivision pond construction, which will promote a “wet pond” design. It is recommended that verification samples be acquired and tested for gradation during construction operations.

It is important to stress that the permeability provided is based on Grain Size Distribution and the appendices 6.3.1 and 6.3.2 of the Ministry of the Environment Manual of Policy, Procedures and Guidelines for Onsite Septic Systems.

Enclosures

Borehole Plan
Borehole Logs
Grain Size Distribution Charts

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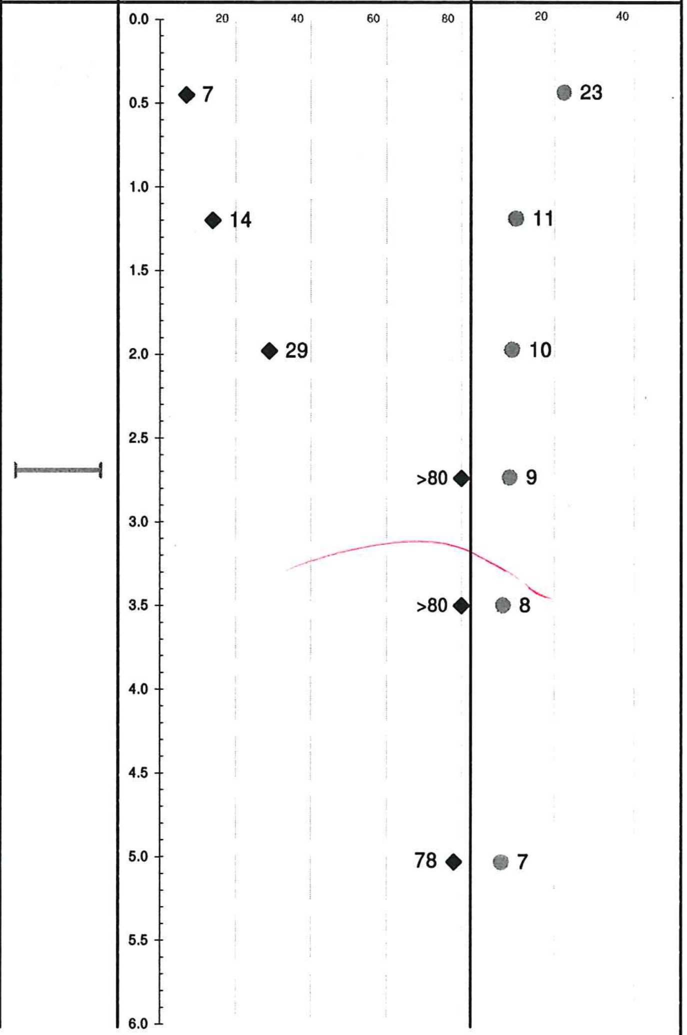
TEL: (705) 722-4638 FAX: (705) 722-4958

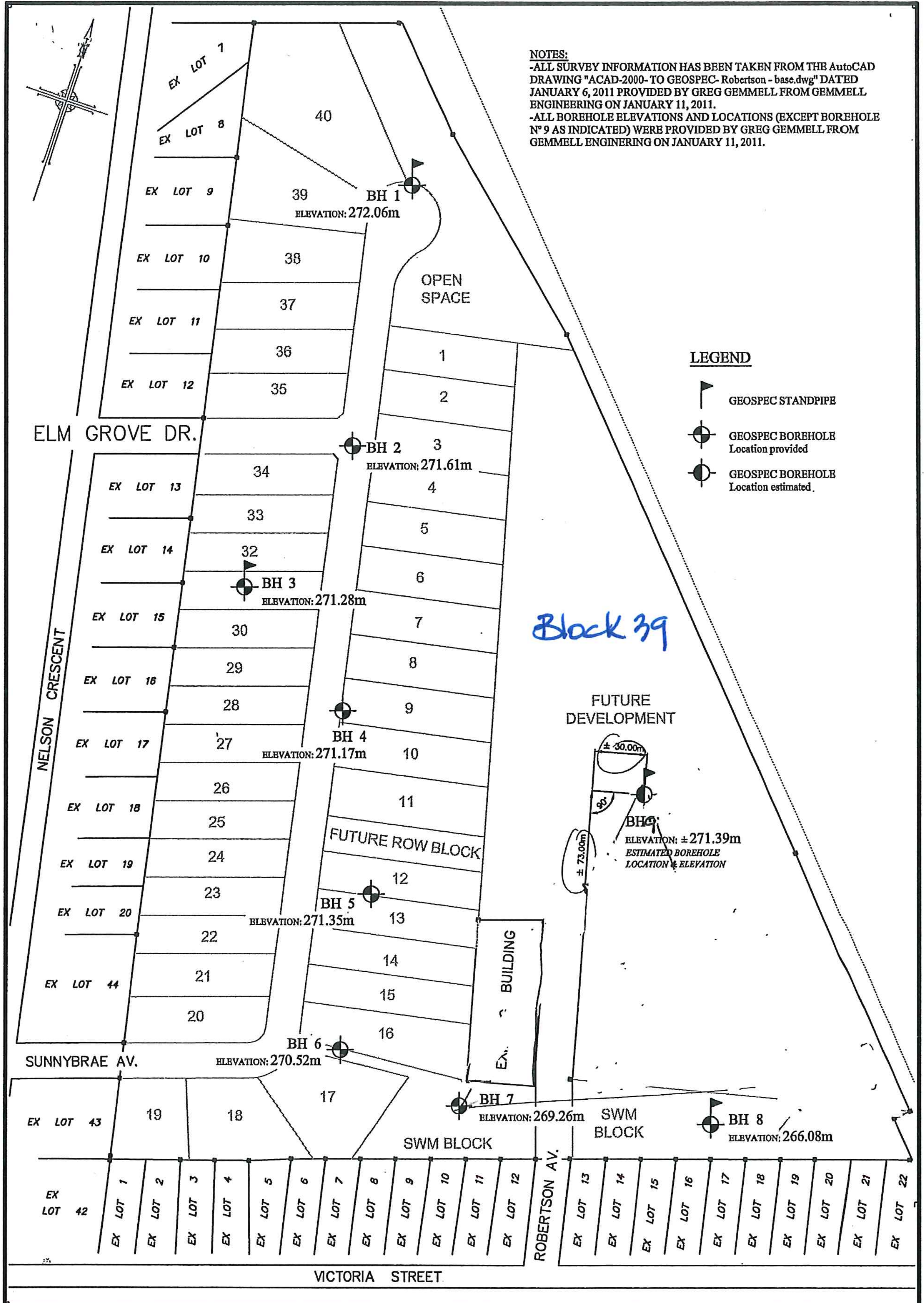
BOREHOLE LOG

CLIENT: 1820839 Ontario Inc.
DATE: December 23, 2010
PROJECT N°: 10 - 1626
PROJECT: Robertson Subdivision, Stroud
BOREHOLE N°: 1
ENCLOSURE N°: 2
GROUND ELEVATION: 272.06 m
BORING DATE: December 11, 2010
BORING METHOD: Solid Stem Auger
SAMPLING METHOD: Split Spoon
PAGE 1 **OF** 1

ELEV (m)	SOIL DESCRIPTION (Unified Soil Classification System)	WATER (m)	N VALUE (Blows per 0.3m)	WATER CONT (%)
	± 50cm of **ORGANICALLY INCLUDED SILT** with some Sand *over* **SILT TILL** with some Sand Brown, Very Moist to Wet, Loose			
271.1	**SILT & SAND TILL** with some Gravel Grey, Moist, Compact to Very Dense			
	Gradation @ 2.0m ¬ Silt 46%, Sand 44%, Gravel 10%			
	Cobbles			
	Cobbles			
267.0	END OF BH Open & dry to 4.6m upon completion. 19mm PVC standpipe installed to 4.6m Water level @ 2.7m measured on December 21, 2010			



◆ Standard Penetration Test ▲ Cone Penetration Test



NOTES:
-ALL SURVEY INFORMATION HAS BEEN TAKEN FROM THE AutoCAD DRAWING "ACAD-2000- TO GEOSPEC- Robertson - base.dwg" DATED JANUARY 6, 2011 PROVIDED BY GREG GEMMELL FROM GEMMELL ENGINEERING ON JANUARY 11, 2011.
-ALL BOREHOLE ELEVATIONS AND LOCATIONS (EXCEPT BOREHOLE Nº 9 AS INDICATED) WERE PROVIDED BY GREG GEMMELL FROM GEMMELL ENGINERING ON JANUARY 11, 2011.

LEGEND

- GEOSPEC STANDPIPE
- GEOSPEC BOREHOLE Location provided
- GEOSPEC BOREHOLE Location estimated.

Block 39

GEOSPEC
ENGINEERING LTD.

287 Tiffin Street, Unit 10
Barrie, Ontario, L4N 7R8
TEL: (705) 722-4638
FAX: (705) 722-4958

TITLE BOREHOLE PLAN				ENCLOSURE 1
CLIENT 1820839 Ontario Inc		PROJECT NAME Robertson Subdivision, Stroud		
PROJECT NUMBER 10 - 1626	DATE January 20 / 2010	DRAWN E.G.	CHECKED K.M.	GRAPHIC SCALE 0m 50m 100m

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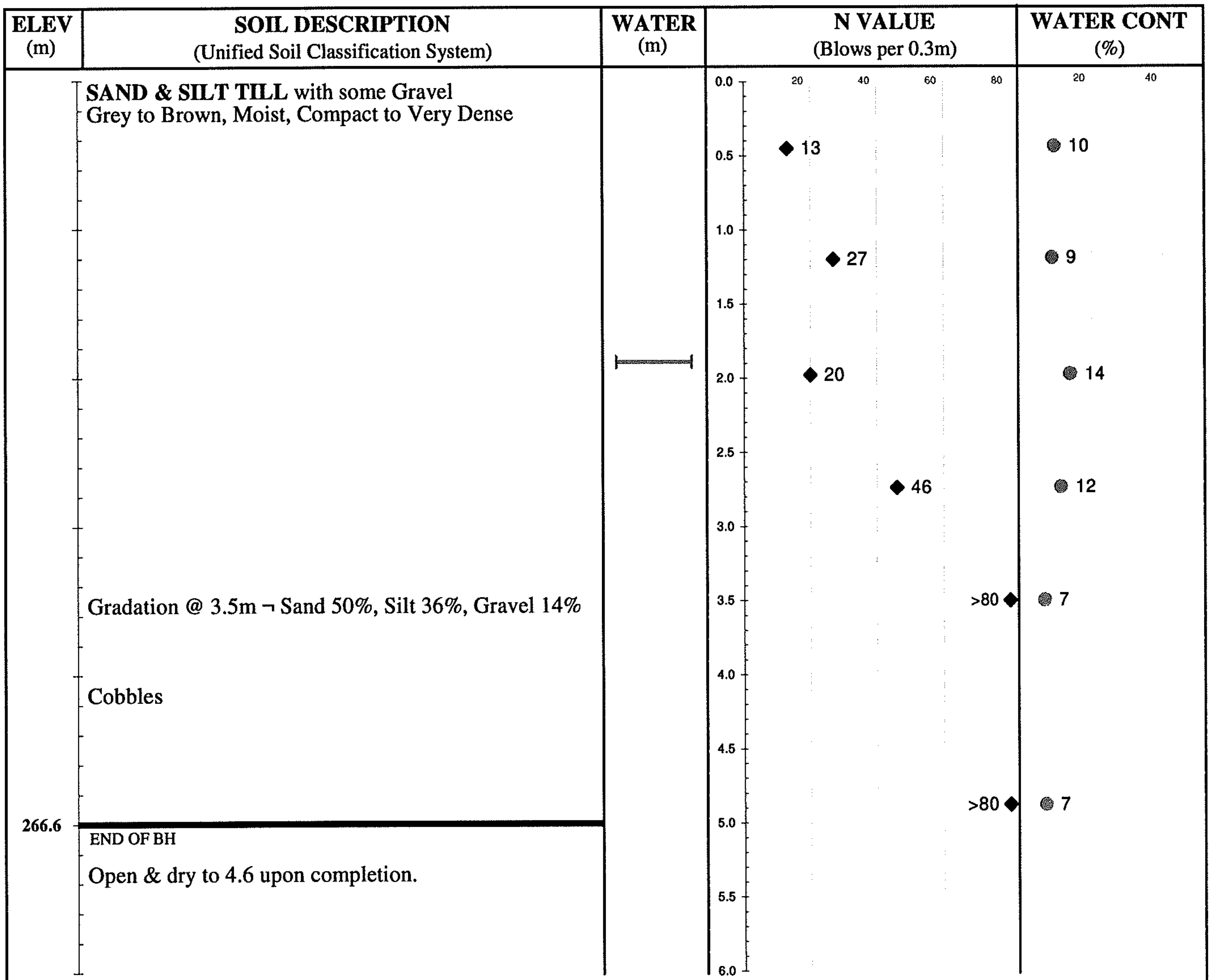
BOREHOLE LOG

CLIENT:	1820839 Ontario Inc.	**DATE:**	December 23, 2010
		PROJECT N°:	10 - 1626
PROJECT:	Robertson Subdivision, Stroud	**BOREHOLE N°:**	2
		ENCLOSURE N°:	3
GROUND ELEVATION:	271.61 m	**BORING METHOD:**	Solid Stem Auger
BORING DATE:	December 11, 2010	**SAMPLING METHOD:**	Split Spoon
PAGE 1 **OF** 1			



SAND & SILT TILL with some Gravel
Grey to Brown, Moist, Compact to Very Dense

Gradation @ 3.5m ¬ Sand 50%, Silt 36%, Gravel 14%

Cobbles

END OF BH

Open & dry to 4.6 upon completion.

◆ Standard Penetration Test ▲ Cone Penetration Test

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BOREHOLE LOG

CLIENT: 1820839 Ontario Inc.

DATE: December 23, 2010

PROJECT N°: 10 - 1626

PROJECT: Robertson Subdivision, Stroud

BOREHOLE N°: 3

ENCLOSURE N°: 4

GROUND ELEVATION: 271.28 m

BORING DATE: December 11, 2010

BORING METHOD: Solid Stem Auger

SAMPLING METHOD: Split Spoon

PAGE 1 **OF** 1

ELEV (m)	SOIL DESCRIPTION (Unified Soil Classification System)	WATER (m)	N VALUE (Blows per 0.3m)	WATER CONT (%)
	± 25cm of **ORGANICALLY INCLUDED SILT** with some Sand *over* **SILT TILL** with some Sand Brown, Very Moist to Wet, Loose		◆ 8	● 18
270.5	**SILT & SAND TILL** with some Gravel Grey, Very Moist to Moist, Compact to Very Dense		◆ 15 ◆ 57 ◆ 38 78 ◆ >80 ◆	● 19 ● 8 ● 9 ● 8 ● 10
266.3	END OF BH Open & Dry to 4.9m upon completion. 19mm PVC standpipe installed to 4.9m. Dry borehole measured on December 21, 2010			

◆ Standard Penetration Test ▲ Cone Penetration Test

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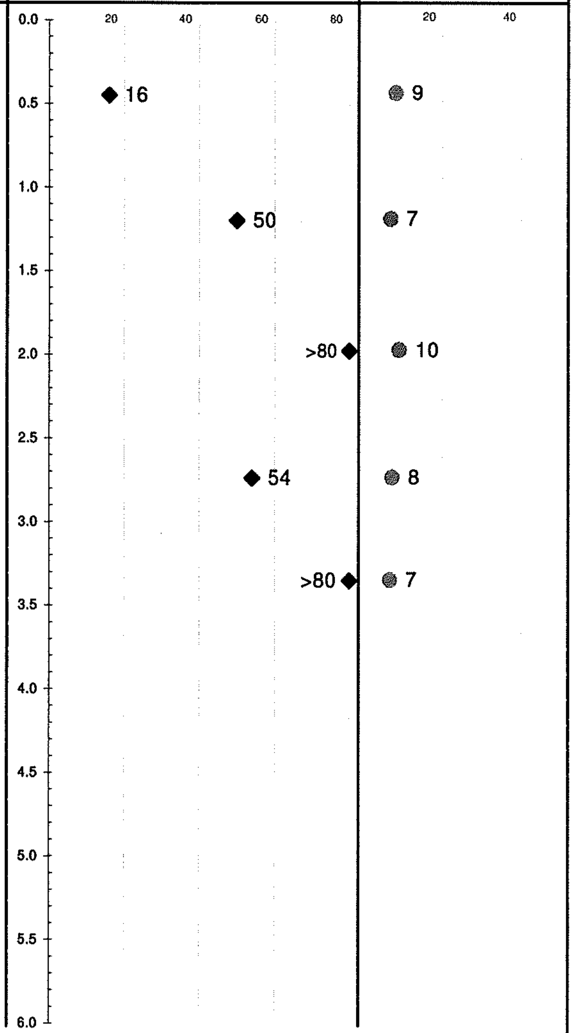
BOREHOLE LOG

CLIENT:	1820839 Ontario Inc.	**DATE:**	December 23, 2010
		PROJECT N°:	10 - 1626
PROJECT:	Robertson Subdivision, Stroud	**BOREHOLE N°:**	4
		ENCLOSURE N°:	5
GROUND ELEVATION:	271.17 m	**BORING METHOD:**	Solid Stem Auger
BORING DATE:	December 11, 2010	**SAMPLING METHOD:**	Split Spoon
PAGE 1 **OF** 1			

ELEV (m)	SOIL DESCRIPTION (Unified Soil Classification System)	WATER (m)
	SAND & SILT TILL with trace Gravel Grey, Moist, Compact to Very Dense	
	Gradation @ 1.2m ¬ Sand 55%, Silt 39%, Gravel 6%	
	Cobbles	
267.7	END OF BH	
	Open & Dry to 3.3m upon completion.	



✦ Standard Penetration Test ▲ Cone Penetration Test

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BOREHOLE LOG

CLIENT: 1820839 Ontario Inc.

DATE: December 23, 2010

PROJECT N°: 10 - 1626

PROJECT: Robertson Subdivision, Stroud

BOREHOLE N°: 5

ENCLOSURE N°: 6

GROUND ELEVATION: 271.35 m

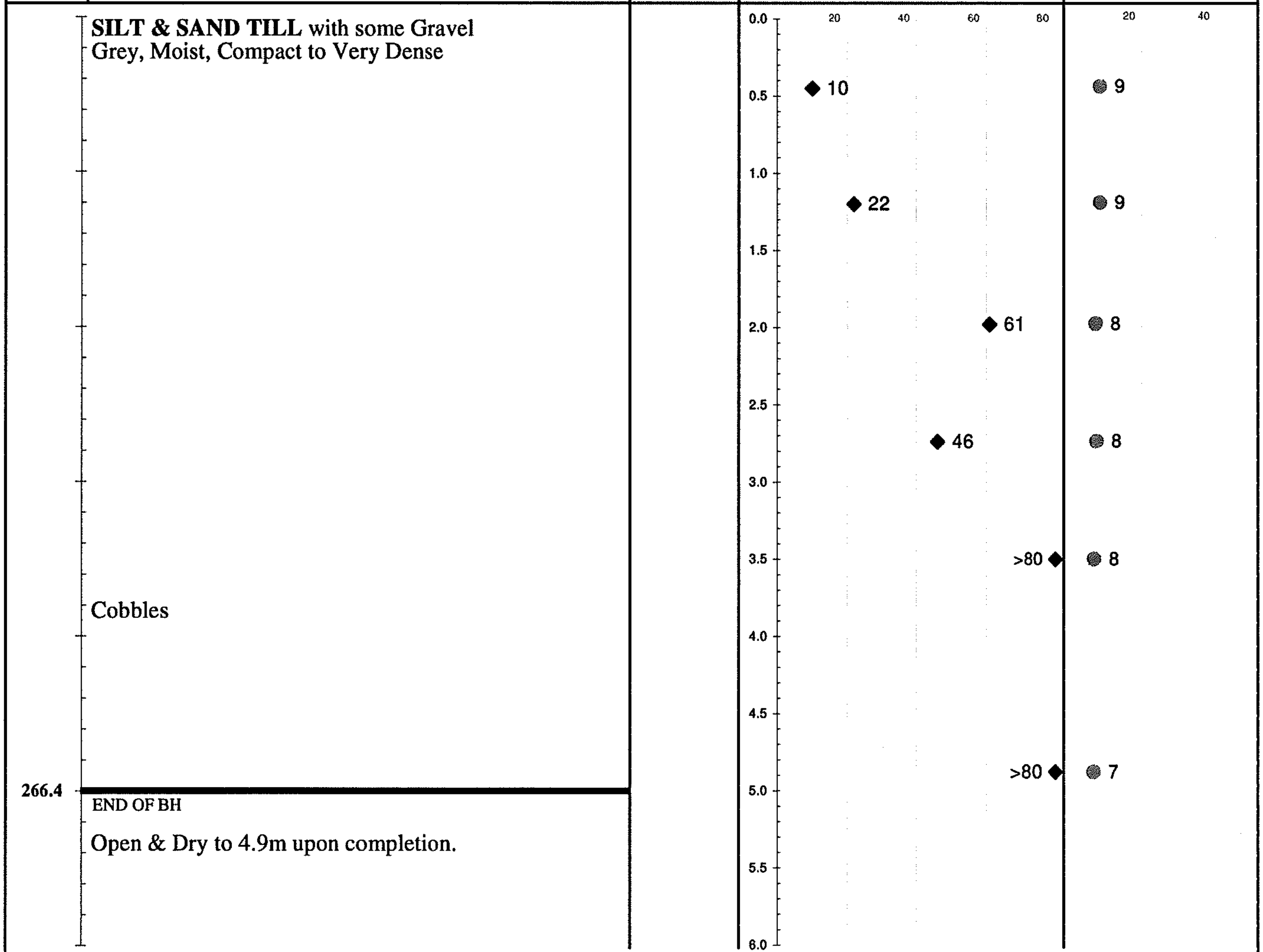
BORING DATE: December 11, 2010

PAGE 1 **OF** 1

BORING METHOD: Solid Stem Auger

SAMPLING METHOD: Split Spoon

ELEV (m)	**SOIL DESCRIPTION** (Unified Soil Classification System)	**WATER** (m)	**N VALUE** (Blows per 0.3m)	**WATER CONT** (%)



SILT & SAND TILL with some Gravel
Grey, Moist, Compact to Very Dense

Cobbles

END OF BH

Open & Dry to 4.9m upon completion.

◆ Standard Penetration Test ▲ Cone Penetration Test

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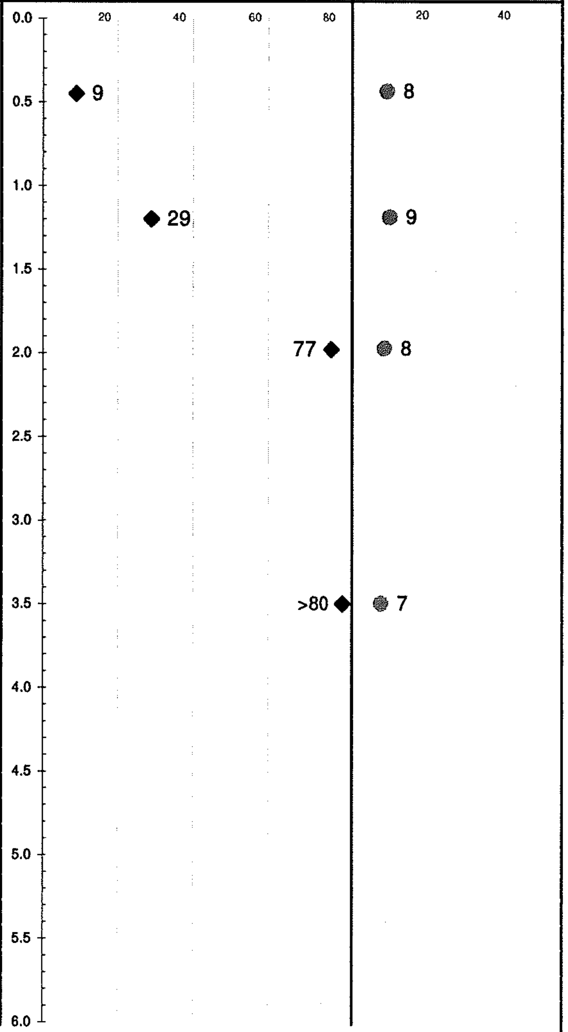
BOREHOLE LOG

CLIENT: 1820839 Ontario Inc.
DATE: December 23, 2010
PROJECT N°: 10 - 1626

PROJECT: Robertson Subdivision, Stroud
BOREHOLE N°: 6
ENCLOSURE N°: 7

GROUND ELEVATION: 270.52 m
BORING DATE: December 11, 2010
PAGE 1 **OF** 1
BORING METHOD: Solid Stem Auger
SAMPLING METHOD: Split Spoon

ELEV (m)	SOIL DESCRIPTION (Unified Soil Classification System)	WATER (m)	N VALUE (Blows per 0.3m)	WATER CONT (%)
	SAND & SILT TILL with trace Gravel Grey, Moist, Loose to Very Dense			
267.0	END OF BH Open & Dry to 3.5 upon completion.			

◆ Standard Penetration Test ▲ Cone Penetration Test

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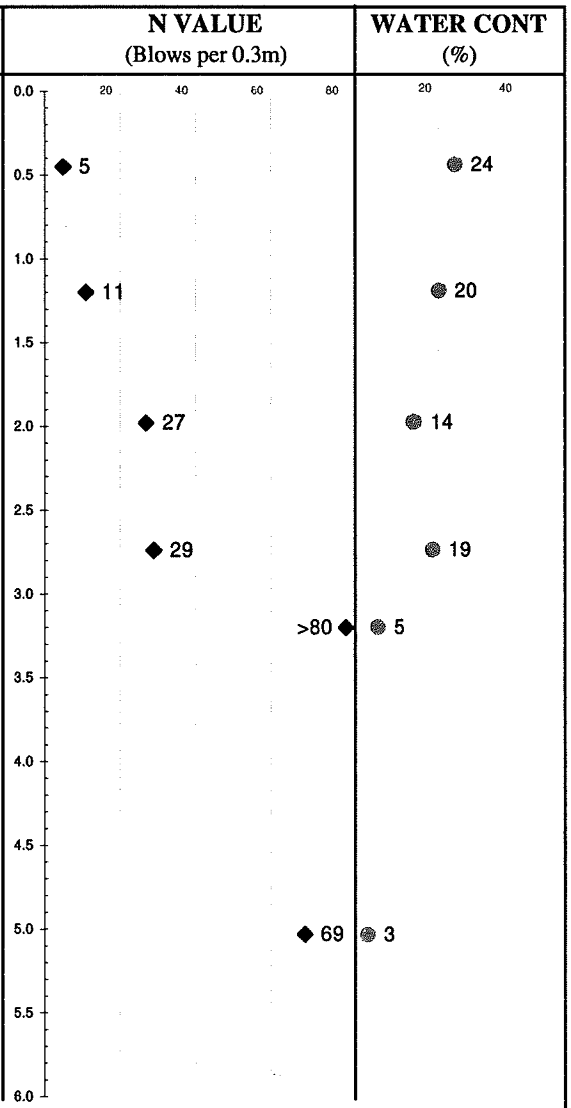
BOREHOLE LOG

CLIENT: 1820839 Ontario Inc.
DATE: December 23, 2010
PROJECT N°: 10 - 1626
PROJECT: Robertson Subdivision, Stroud
BOREHOLE N°: 7
ENCLOSURE N°: 8
GROUND ELEVATION: 269.26 m
BORING DATE: December 11, 2010
BORING METHOD: Solid Stem Auger
SAMPLING METHOD: Split Spoon
PAGE 1 **OF** 1

ELEV (m)	SOIL DESCRIPTION (Unified Soil Classification System)	WATER (m)
	± 40cm of **ORGANICALLY INCLUDED SILT** with some Sand *over* **SILT TILL** with some Sand Brown, Wet to Moist, Very Loose to Very Dense	
265.3	**SAND** with trace Silt Grey, Moist, Very Dense Gradation @ 5.0m ¬ Sand 92, Silt 8%	
264.2	END OF BH Open & Dry to 5.0m upon completion.	



◆ Standard Penetration Test ▲ Cone Penetration Test

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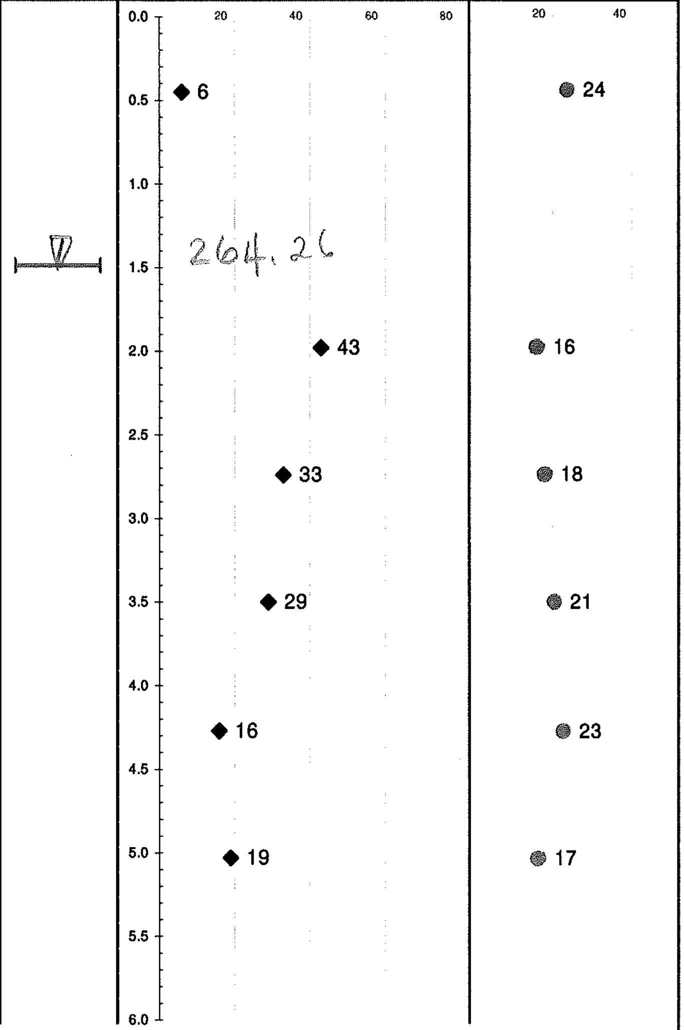
BOREHOLE LOG

CLIENT: 1820839 Ontario Inc.
DATE: December 23, 2010
PROJECT N°: 10 - 1626

PROJECT: Robertson Subdivision, Stroud
BOREHOLE N°: 8
ENCLOSURE N°: 9

GROUND ELEVATION: 266.08 m
BORING DATE: December 11, 2010
PAGE 1 **OF** 1
BORING METHOD: Solid Stem Auger
SAMPLING METHOD: Split Spoon

ELEV (m)	SOIL DESCRIPTION (Unified Soil Classification System)	WATER (m)	N VALUE (Blows per 0.3m)	WATER CONT (%)
	SILT TILL with some Gravel & Sand Brown, Very Moist to Moist, Loose to Compact			
262.8	**SILT** with some Clay and trace of Sand & Gravel Grey, Moist, Compact Gradation @ 4.3m ¬ Silt 74%, Clay 16%, Sand 5%, Gravel 5%			
260.9	END OF BH Open & Dry to 5.2 upon completion. 19mm PVC standpipe installed to 5.2m. — Water level @ 1.5m measured on December 21, 2010			



◆ Standard Penetration Test ▲ Cone Penetration Test

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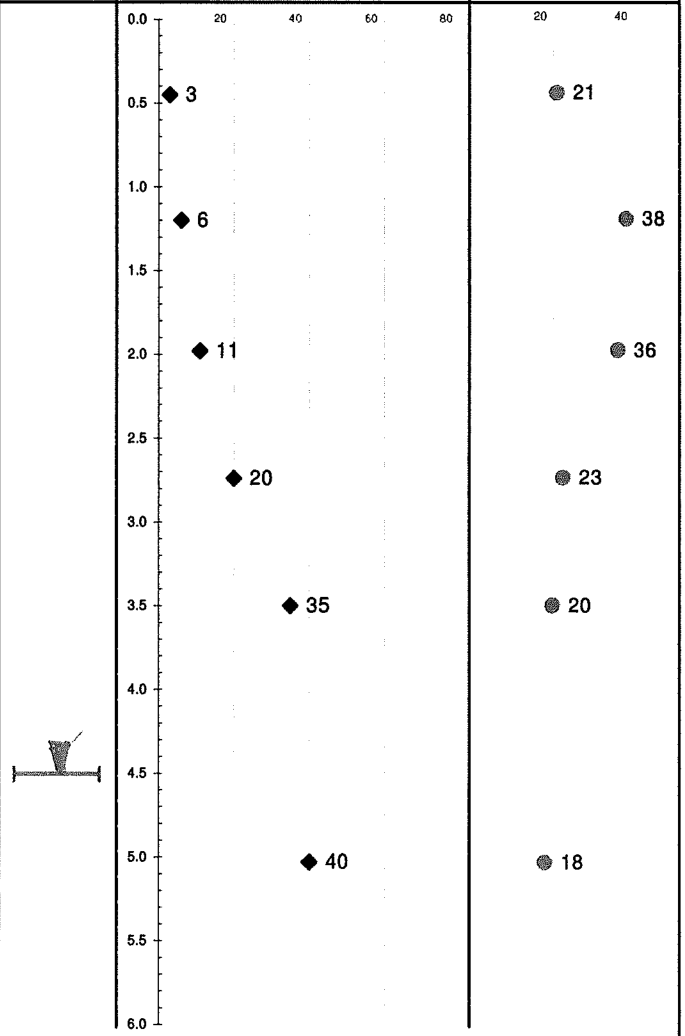
BOREHOLE LOG

CLIENT:	1820839 Ontario Inc.	**DATE:**	December 23, 2010
		PROJECT N°:	10 - 1626
PROJECT:	Robertson Subdivision, Stroud	**BOREHOLE N°:**	9
		ENCLOSURE N°:	10
GROUND ELEVATION:	271.39 m - *Approximate*	**BORING METHOD:**	Solid Stem Auger
BORING DATE:	December 11, 2010	**SAMPLING METHOD:**	Split Spoon
PAGE 1 **OF** 1			

ELEV (m)	SOIL DESCRIPTION (Unified Soil Classification System)	WATER (m)	N VALUE (Blows per 0.3m)	WATER CONT (%)
	±50cm **TOPSOIL**			
270.9	± 50cm of **ORGANICALLY INCLUDED SILT** with some Sand *over* **SILT TILL** with some Sand & trace Gravel & Clay Brown, Wet to Moist, Loose to Dense			
266.2	END OF BH Open & Dry to 5.2m upon completion. 19mm PVC standpipe installed to 5.2m. Water level @ 4.5m measured on December 21, 2010			



◆ Standard Penetration Test ▲ Cone Penetration Test

GEOSPEC ENGINEERING LTD.
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GRAIN SIZE DISTRIBUTION CHART

CLIENT: 1820839 Ontario Inc.

DATE: December 20, 2010

ENCLOSURE N°: 11

PROJECT: Robertson Subdivision, Stroud

PROJECT N°: 10 - 1626

LAB N° / TYPE: 257 / Native

SAMPLED BY: F.G.

SAMPLED TYPE: Split Spoon

DATE SAMPLED: December 11, 2010

DATE RECEIVED: December 11, 2010

DATE TESTED: December 15, 2010

SAMPLED FROM:

BH 1 / 2.0 m ■—■
SILT & SAND with some Gravel

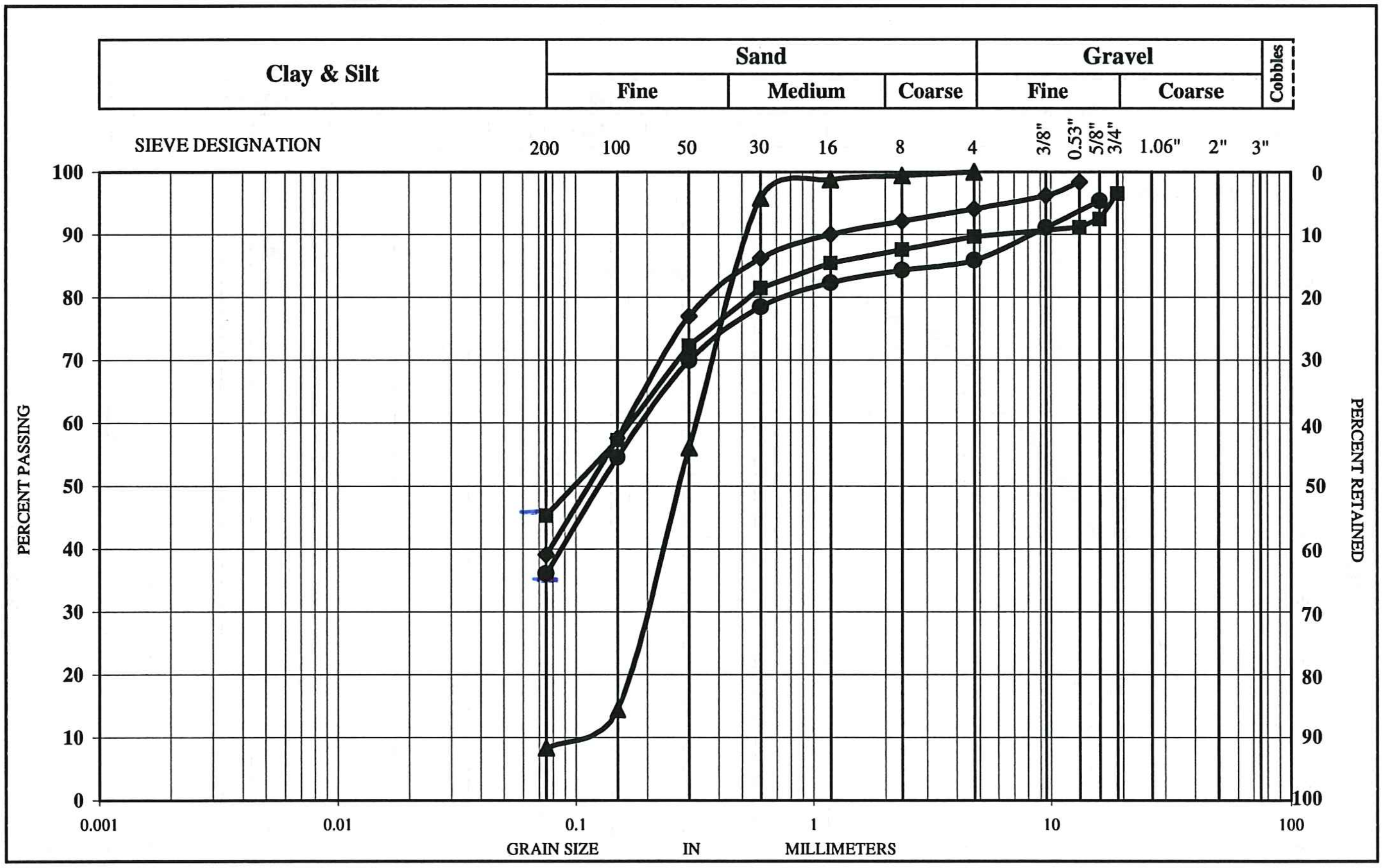
8-20min/cm

BH 2 / 3.5 m ●—●
SAND & Silt with some Gravel

BH 4 / 1.2 m ◆—◆
SAND & SILT with trace Gravel

BH 7 / 5.0 m ▲—▲
SAND with trace Silt

UNIFIED SOIL CLASSIFICATION SYSTEM *(ASTM D 2487)*



GEOSPEC ENGINEERING LTD.
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GRAIN SIZE DISTRIBUTION CHART

CLIENT: 1820839 Ontario Inc
DATE: December 21, 2010
ENCLOSURE N°: 12

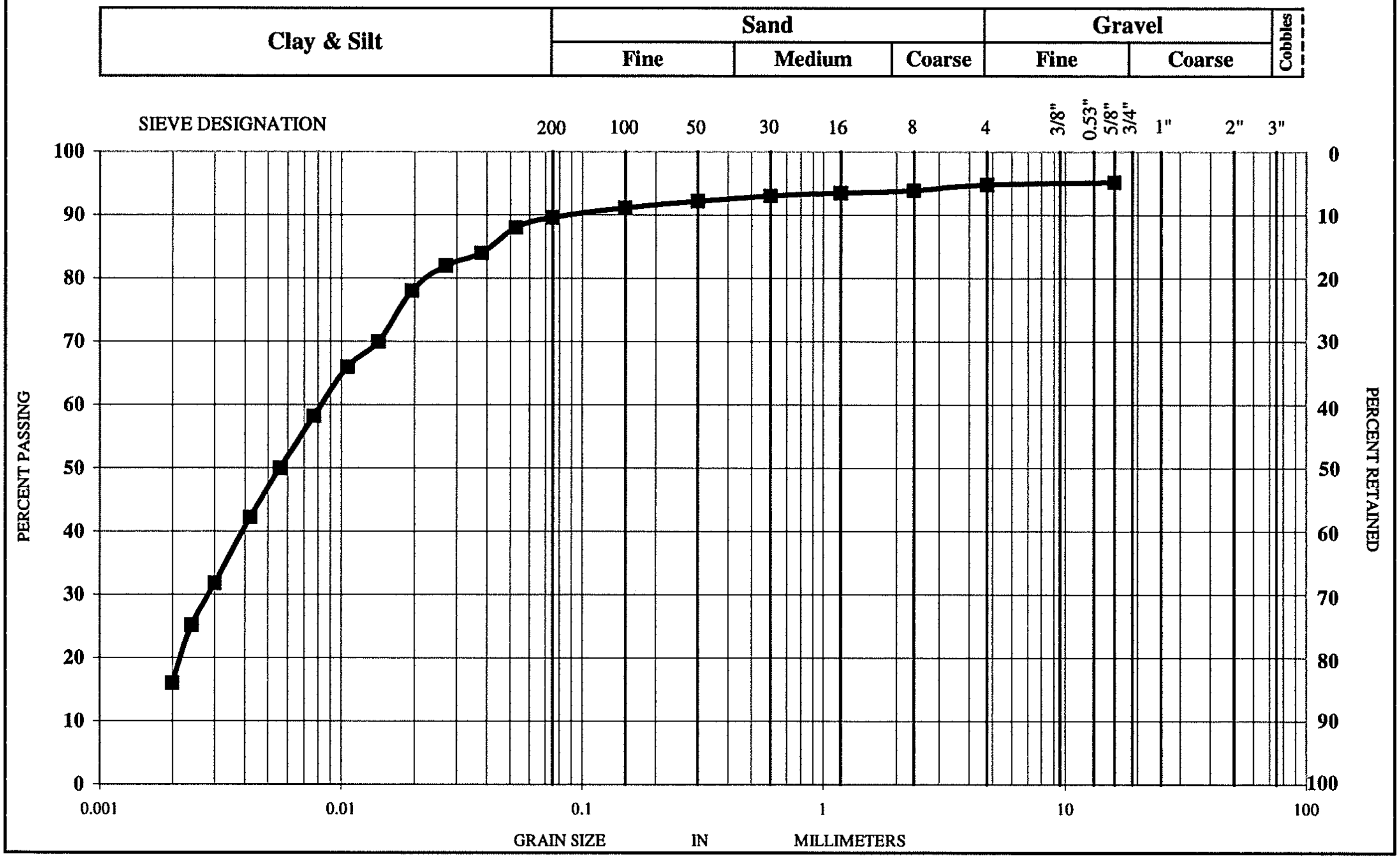
PROJECT: Robertson Subdivision, Stroud
PROJECT N°: 10 - 1626

LAB N° / TYPE: 257 / Original Undisturbed
SAMPLED BY: F.G
SAMPLED TYPE: Split Spoon
DATE SAMPLED: December 11, 2010
DATE RECEIVED: December 11, 2010
DATE TESTED: December 17, 2010

SAMPLED FROM: BH 8 / 4.3 m —■——■—
SILT with some Clay and trace Sand & Gravel

BH = BoreHole

UNIFIED SOIL CLASSIFICATION SYSTEM *(ASTM D 2487)*



Appendix A

Engineered Fill Certification

GEOSPEC ENGINEERING LTD.
287 Tiffin Street, Unit 10, Barrie, Ontario L4N 7R8 TEL: (705) 722-4638 FAX: (705) 722-4958

ENGINEERED FILL CERTIFICATION

PROCEDURES AND REQUIREMENTS FOR CONSTRUCTION OF ENGINEERED FILL

The following requirements must be followed to obtain a certifiable engineered fill designed for a Maximum Allowable Soil Bearing Pressure (SLS) of 75 kPa or less:

1. Before commencement of the work and prior to any changes made after commencement, Geospec Engineering Ltd. will require the following:

   i) A survey plan must be provided showing the exact dimensions of the engineered fill envelope, with reference to the front and rear property lines. The engineered fill should extend over the entire area proposed for building construction and/or service installation and must extend at least one metre beyond the building envelope and slope down to the surrounding stripped subgrade level at 45°.

   ii) The proposed finished engineered fill grade must extend either up to the proposed lot grade or a minimum of 50 cm above the highest level of the proposed grade for the foundations and must be recorded on the survey plan.

   iii) A finished grading plan(s) including the original surface contours.

   iv) A site plan showing all existing underground structures.

2. Placement of engineered fill <u>**MUST NOT**</u> be permitted until the following requirements are met:

   i) Survey stakes with exact elevations must be positioned to identify the engineered fill envelope and the proposed finished fill grade. It is strongly recommended that the survey be carried out by the general consultant's surveyor for the project or an independent legal surveyor. The position of the survey stakes must be related to existing permanent surface structures. All survey stakes must be maintained throughout the construction period.

   ii) All of the topsoil and organic matter must be removed, and the subgrade must be inspected and proofrolled. Badly weathered soils should be subexcavated and recompacted. A backhoe must be readily available in order to determine the thickness of the topsoil, organic matter, fill and/or loose soil to be removed and the appropriate depth of subexcavation. Furthermore, the stripped subgrade elevation must be determined by the general consultants surveyor or an independent legal surveyor.

   iii) The thickness of any existing fill must be determined by test pits or boreholes performed under the supervision of our engineer and the fill must be removed and assessed for as to suitability for reuse.

PROCEDURES AND REQUIREMENTS FOR CONSTRUCTION OF ENGINEERED FILL

iv) Written approval has been issued by Geospec Engineering Ltd. covering the inspected area.

3. The engineered fill should not be placed during late November to early April, when freezing ambient temperatures occur either persistently or intermittently. We will require authority to stop operations if conditions are found to be unfavourable. The fill must consist of inorganic soils, which are free of cobbles and boulders greater than 20 cm in diameter, and compacted in lifts no more the 30 cm thick to at least 98% of their maximum Standard Proctor Dry Density. The fill operation must be supervised full time by our field technician under the direction of our geotechnical engineer, and must proceed continuously until completion. If the building foundations are to be built soon after fill placement, the densification process for the engineered fill must be increased to 100% of the maximum Standard Proctor compaction.

4. Proposed engineered fill must be assessed by our engineer at the source to determine whether it is geotechnically suitable for engineered fill compaction. We advise that where the fill includes greater than 8% silt, the material is considered both moisture sensitive and frost susceptible. As such, one should anticipate additional construction complications with respect to the use of such a material during adverse site and weather conditions. Finally, the hauler must provide a document to certify that the material is free of hazardous contaminants.

5. Where fill is to be placed in a trench, the bottom of the trench must be widened to accommodate an appropriate compactor, and the sides must be sloped to at least 1 vertical to 3 horizontal for proper compaction.

   In order to achieve the required compaction, any ground slope within the fill envelope must be cut to 1 vertical to 3 horizontal to permit safe operation of the construction equipment.

   It is strongly recommended that engineered fill for a road embankment and adjacent lots be performed simultaneously.

   Access ramps for construction equipment must not be permitted within the engineered fill envelope.

6. Immediately after completion of the engineered fill operation and prior to lot grading, the following items must be checked and recorded on the plans by the general consultant or legal surveyor. The engineered fill will be certified only within the boundaries recorded on the plan(s).

   i) The boundaries of the engineered fill with exact reference to the front and rear property lines.

   ii) The exact elevation of the engineered fill grade as determined by the surveyor.

PROCEDURES AND REQUIREMENTS FOR CONSTRUCTION OF ENGINEERED FILL

7. If for any reason the ongoing engineered fill operation is suspended, the as-built engineered fill grade must be immediately determined by the surveyor for record purposes.

Should the fill operation resume in the future, the engineered fill area must be surveyed again in order to confirm that no unsupervised filling or dumping has taken place, and the as-built subgrade must be reassessesed prior to any further placement of engineered fill.

The certification of the engineered fill is subject to the following qualifications:

1. Proper surface drainage must be maintained within the engineered fill area(s). Geospec Engineering Ltd. must be informed of any construction activities within the engineered fill envelope that may cause disturbance and loosening of the engineered fill mantle.

2. If the engineered fill is to be left over the winter months, adequate earth cover or equivalent, must be provided to protect it against frost action. Otherwise, the finished engineered fill will require inspection to assess the extent of the frost loosening, and to determine the measures for recertification before foundation construction.

3. If the engineered fill exceeds four metres in depth; construction of the foundations must not begin until one year after completion of the engineered fill placement. Furthermore, the installation of settlement plates within the fill is strongly recommended.

4. Footings adjacent to easements for services within the engineered fill envelope must be placed on the undisturbed engineered fill or natural soil at or below the invert level of the pipe, or at a safe level as determined by our field inspection.

5. The footing subgrade must be inspected by our engineer to ensure the following:

    i) The footings are founded on the engineered fill and are within the limits of the controlled engineered fill envelope and a minimum of 50 cm below the finished engineered fill grade.

    ii) The subgrade has not been compromised by construction disturbance and/or environmental degradation.

6. The strip footings and the upper section of the foundation walls must be reinforced continuously (minimum of one metre overlap) by a minimum of two 15M reinforcing steel bars and the column pads must include at minimum a mat of three 15M reinforcing bars which must be inspected by out engineer.

If any one of the above qualifications is not met, the engineered fill cannot be certified.

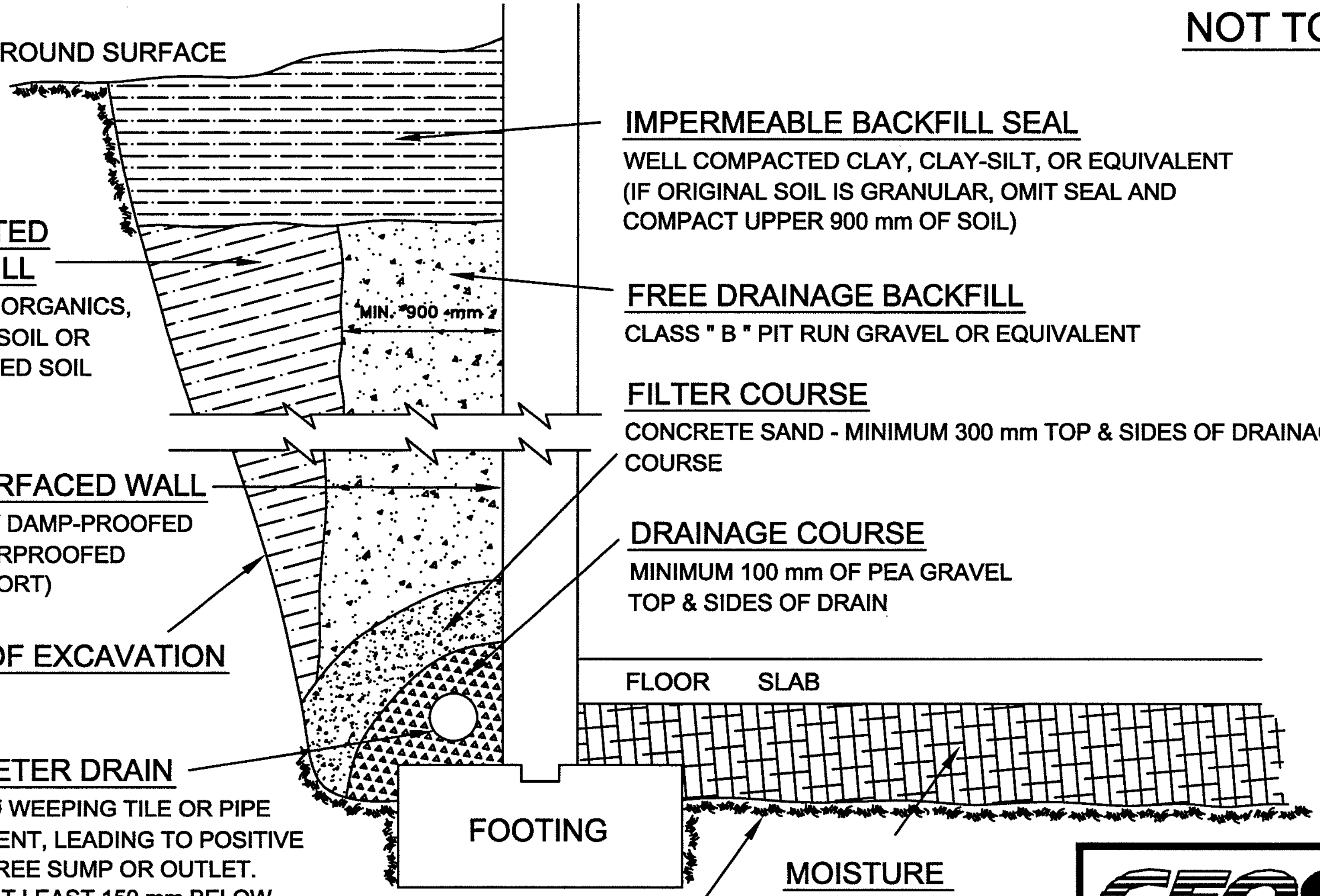
Appendix B

Underground Wall Recommendations

RECOMMENDED DRAINAGE AND BACKFILLING REQUIREMENTS FOR EXTERIOR SUBSURFACE WALLS WITH TILE DRAIN ABOVE FOOTING

FOR BASEMENT FLOOR LOCATED ADEQUATELY **ABOVE THE WATER TABLE**

NOT TO SCALE



SELECTED BACKFILL
FREE OF ORGANICS,
FROZEN SOIL OR
SATURATED SOIL

SUBSURFACED WALL
SUITABLY DAMP-PROOFED
OR WATERPROOFED
(SEE REPORT)

LIMIT OF EXCAVATION

PERIMETER DRAIN
100 mm Ø WEEPING TILE OR PIPE
EQUIVALENT, LEADING TO POSITIVE
FROST FREE SUMP OR OUTLET.
INVERT AT LEAST 150 mm BELOW
UNDERSIDE OF FLOOR SLAB

IMPERMEABLE BACKFILL SEAL
WELL COMPACTED CLAY, CLAY-SILT, OR EQUIVALENT
(IF ORIGINAL SOIL IS GRANULAR, OMIT SEAL AND
COMPACT UPPER 900 mm OF SOIL)

FREE DRAINAGE BACKFILL
CLASS " B " PIT RUN GRAVEL OR EQUIVALENT

FILTER COURSE
CONCRETE SAND - MINIMUM 300 mm TOP & SIDES OF DRAINAGE
COURSE

DRAINAGE COURSE
MINIMUM 100 mm OF PEA GRAVEL
TOP & SIDES OF DRAIN

SUBGRADE
COMPETENT ORIGINAL SOIL
OR WELL - COMPACTED FILL

MOISTURE BARRIER
MINIMUM 200 mm
CRUSHED STONE

GEOSPEC
ENGINEERING LTD.
287 Tiffin Street, Unit 10, Barrie, Ontario, L4N 7R8
TEL: (705) 722-4638 FAX: (705) 722-4958

Appendix C

Statement of Limitations

STATEMENT OF LIMITATIONS

The conclusions and recommendations provided in this report are based on information determined at the borehole locations. Soil and groundwater conditions between and beyond the boreholes may differ from those encountered at the borehole locations. Conditions may vary from time to time and as such conditions may exist which could not be detected or anticipated at the time of subsurface investigation.

The design recommendations given in this report are applicable only to the project as described in the text and then only if constructed in accordance with the details of the alignment and elevations as stated in the report. If all details of the design were not provided to **Geospec Engineering Ltd.**, certain assumptions had to be made based on the information provided to us. If actual conditions vary from those assumed, modifications will be required.

We recommend, that **Geospec Engineering Ltd.** be retained during the final design stage to review the design drawings and to verify that they are consistent with our recommendations or the assumptions that were made during our analysis. We further recommend that we be retained during the construction phase in order to confirm that the subsurface conditions throughout the site do not deviate significantly from those encountered in the boreholes. In instances where these limitations and recommendations are not followed, our responsibility is limited to accurately interpreting the information encountered at the boreholes.

The comments and recommendations given in this report on potential construction problems and possible methods are intended for the purpose of guidance only for the design engineer. The number of boreholes and parameters analysed may not be sufficient in order to determine all factors that may affect construction methods and cost. Therefore, the contractors bidding on this project or undertaking the construction shall make their own interpretation of the factual information presented and draw their own conclusions as to how subsurface conditions may affect their work.

Geospec Engineering Ltd. and its employees shall not be held liable for any special, indirect, incidental, consequential (including loss of profit), exemplary or punitive damages whatsoever arising out of or in connection with our services to the client or this agreement whether in contract, tort or other theories of law even if Geospec Engineering Ltd. has been advised of the possibility of those damages. The total cumulative liability of Geospec Engineering Ltd. arising from or relating to this project shall not exceed the total amount payable to Geospec Engineering Ltd. hereunder.

Except as set forth herein, **Geospec Engineering Ltd.** makes no warranties, express or implied, with respect to any services or deliverables provided hereunder, including, without limitation, any implied warranties of merchantability or fitness for a particular purpose. All such other warranties are hereby disclaimed.

Hydrogeological Impact Assessment

Innisfil Executive Estates Phase 2

Town of Innisfil, Ontario

Prepared for:
1820839 Ontario Ltd.

Prepared by:
Azimuth Environmental
Consulting, Inc.

June 2020

AEC 17-069

AZIMUTH ENVIRONMENTAL CONSULTING, INC.
Environmental Assessments & Approvals

June 18, 2020

AEC 17-069

1820839 Ontario Ltd.
950 Shoreview Drive
Innisfil, Ontario
L9S 5A7

Attention: Wayne Ezekiel

Re: Hydrogeological Impact Assessment
Innisfil Executive Estates Phase 2
Block 39 and 41, R.P. 51M-1045,
Town of Innisfil, County of Simcoe

Dear Mr. Ezekiel:

Azimuth Environmental Consulting, Inc. (Azimuth) is pleased to provide our Hydrogeological Impact Assessment for a property located in the Village of Stroud, Town of Innisfil, ON (the “Site”). This work is intended to support a Draft Plan of subdivision for the Innisfil Executive Estates Phase 2 (IEE Phase 2) development.

This evaluation focuses on the existing soil and ground water regime underlying the Site and the potential for the proposed development to impact the existing conditions. Our evaluation also includes a Reasonable Use Policy (RUP) assessment update in addition to a Water Balance evaluation to support the development of 21 lots on the above noted Site. Our assessments only addresses the Phase 2 lands, as the Phase 1 lands were previously evaluated and approved. Phase I lands were developed implementing 8 lots with tertiary treatment.

Based on the results of our analysis, it is concluded that the environmental conditions upon the Site will allow up to 21 residential lots to be developed in compliance with the Lake Simcoe Regional Conservation Authority (LSRCA’s) Water Budget Policies/standards as well as the Ministry of the Environment Conservation and Parks (MECP's) RUP. This is contingent on the use of tertiary treatment technology for all 21 IEE Phase 2 lots and 8 IEE Phase 1 lots.

If you have any questions or require further information, please do not hesitate to call the undersigned.

Yours truly,
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

JMillington

Jackie Coughlin, B.A.Sc., P.Eng.
Senior Environmental Engineer

Jennifer Millington, M.A.Sc., P.Geo.
Hydrogeologist

1.0 INTRODUCTION

Azimuth Environmental Consulting (Azimuth) was retained by1820839 Ontario Ltd. to complete a Hydrogeological Impact Assessment to support a Draft Plan of Subdivision for 21 lots for the Innisfil Executive Estate Phase 2 (IEE Phase 2) development. This study only addresses the Phase 2 lands, as the Phase 1 lands were previously evaluated and approved.

The purpose of this assessment is to characterize the existing hydrogeological conditions at the Site and the potential for the proposed IEE Phase 2 development to impact the existing environmental conditions including the potential for adverse effects from the proposed new sewage systems on local ground water resources.

A portion of the Site is considered a Significant Ground Water Recharge Area (SGRA) and the entire Site is considered a Highly Vulnerable Aquifer (HVA). The Site is also located within a Wellhead Protection Area D (WHPA-D) but is not in a WHPA-Q1 or WHPA-Q2. The Site is within 500m of a municipal well and is within the 25-year Capture Zone Boundary. Due to the Site's classification as a Major Development and its location within a SGRA, it is subject to the LSRCA's Water Budget policy and therefore a water balance was completed for the Site.Given that the proposed development is located within the WHPA-D boundary of a municipal well field, conformity with Source Water Protection and the Clean Water Act has also been evaluated as part of this work.

The remainder of this report presents the background information and provides the results of our evaluation and associated conclusions and recommendations.

2.0 BACKGROUND

The Site is located on the east boundary of the community of Stroud. The legal description of the Site is Block 39 and 41, Plan 51M-1045 (Part of Lot 17, Concession 10, in the former Geographic Township of Innisfil, Town of Innisfil, County of Simcoe, Ontario) (Figure 1).

The first phase of the IEE development ("IEE Phase 1")was approved in 2015 by the Town of Innisfil and included 38 single detached residential lots, internal roadways, a stormwater management block (Block 42) and two vacant blocks (Block 41 and 39) designated for future development (Figure 2).

The second phase of the IEE development ("IEE Phase 2") consists of future development Blocks 39 and 41 (4.78 hectares / 11.81 acres) which will be subdivided for the creation of 21 single detached residential lots (Figure 3). The Phase 2 draft plan also includes an internal roadway from Robinson Avenue (0.569 hectares/1.406 acres), appropriate buffers from the Metrolinx railway line (0.385ha/0.951aces), and the berm area to be transferred to the Town of Innisfil (0.222 ha. / 0.547 ac). Each lot will incorporate tertiary treatment with inground disposal of the treated effluent. Water supply will be provided from the Town of Innisfil.

As part of IEE Phase 1 development, Azimuth completed a Reasonable Use Policy (RUP) assessment for the IEE Phase 1development. The RUP assessment was accepted and resulted in the approval of 38 residential lots on conventional treatment systems (Azimuth, 2011). The RUP assessment has since been updated to reflect the IEE Phase 2 development for 21 lots. The ability to meet the MECP's RUP for the proposed development is contingent on the use of tertiary treatment technology for Phase 2 and the use of tertiary treatment units (TTU's) on 8 lots in the previously approved IEE Phase 1 development. TTU's have now been installed on Lots 8 in the IEE Phase 1 subdivision (Appendix D).The updated RUP assessment is provided in Section 6.0 of this report.

2.1 Adjacent Land use

Adjacent land use consists of existing single detached residential development to the south and west within the Village of Stroud (and includes the IEE Phase 1 residential subdivision), agricultural farm land to the north, the Metrolinx Railway to the east, and agricultural farm land and some rural residential dwellings to the east situated outside the settlement area boundary of Stroud).. There is one single detached residential dwelling (Robertson residence) located adjacent the southwest corner of the IEE Phase 2 development.

2.2 Information Sources

Our assessment considered available literature data / technical reports for the Site as well as the completion of an on-Site field program (*i.e.,* soil, ground water monitoring). Information provided by the following sources was utilized in the course of this evaluation:

- Reasonable Use Assessment IEE Phase 1 (Azimuth, 2011);
- Geotechnical Investigation (Terraprobe, 2011);
- Functional Servicing and Storm Water Management Report (WMI Engineering, (2020);

3.0 ENVIRONMENTAL SETTING

3.1 Physiography and Soils

Physiographically, Chapman and Putnam (1984) define the Site as part of a region known as the Peterborough Drumlin Fields. Most of this region is located to the south and east of Lake Simcoe, although the Site is within the western edge of a smaller portion of the drumlin field located just south of Kempenfelt Bay.

The Soil Map of Simcoe County (Canada Department of Agriculture, 1959) defines the surficial soils as part of "Bondhead Sandy Loam" that is grey, calcareous and exhibits good drainage characteristics. The Quaternary Geology Map of Ontario (Barnett, *et al*., 1991) states that the main surficial soil unit is classified as "Newmarket Till", which generally consists of a sandy silt to silt matrix containing moderate to high levels of carbonate and clasts.

Although the majority of Stroud is serviced by a municipal drinking water system, a review of the local MECP well records and the 2004 Golder South Simcoe Ground Water (SSGW) Study for the Town of Innisfil (Stroud) was undertaken to compile supporting hydrogeological data for the Site. The stratigraphic descriptions provided in water well records acquired from the MECP records indicate a surficial layer of sand, silty sand and/ or sand clay mixtures (<10m), underlain by a fine to medium sand layer (10-25m thick). Below the fine to medium sand are moderately thick, alternating clayey/ sandy silt and fine grain sand/ sand gravel mixtures which extend to >60 metres below ground surface (Golder *et al.,* 2004).

3.2 Topography and Site Drainage

The local topography of the area is defined as smooth to gently sloping. The Site has no marked relief, with a majority of the development sloping to the southeast towards the stormwater management pond situated adjacent along the south boundary of the IEE Phase 2 development. Elevations range from ~275metres above sea level (m asl) to ~268 m asl across the Site.

Shallow ground water on the Site would be controlled by the topography and thus would flow in a southeasterly direction towards the storm water management pond. Regional ground water flow is towards Lake Simcoe.

3.3 Hydrogeology

3.3.1 Municipal Supply

The SSGW Study for the Town of Innisfil (Golder *et al*., 2004) indicates the presence of two shallow aquifers (A1 and A2) and two (2) deep aquifers (A3 and A4) within the general area of Innisfil. The majority of the municipal water supply systems in Innisfil utilize the deeper aquifer units, which are typically found at elevations below 200m asl.

Flow in the upper aquifer system is primarily influenced by the local topography and drainage and flow in the lower aquifer systems are influence by the bedrock topography and the regional hydrogeological features.

The Golder *et al.,* (2004) report provides greater detail of the Site because of it location relative to the Stroud municipal wells. As shown in Figure 9.2.2 of the South Simcoe Ground Water (SSGW) Study, the shallow aquifer system (A1/A2) is present at elevations above 200 m asl within the vicinity of the study area and the deeper aquifer system is present at ~155-195 m asl (A3). The shallow aquifer system is composed of fine grained sand and/or sand and gravel and is separated by a ~20-30m thick confining layer consisting of clayey silt, clay and sandy silt and clay. Aquifer A3 is separated from A2 by a 20-30m thick silt and clayey confining layer.

The Stroud municipal drinking water system obtains its water from two (2) municipal wells (Wells 2 and 3) both of which pump from regional Aquifer A3 which is reportedly overlain by 60m or more of till material with intervening aquifers as described above (Golder *et al*., 2004).

3.3.2 Private Wells

At this property and in the general area of Stroud, the shallow aquifer is not the preferred potable water source because of potential connections to surface contaminant sources from septic beds located upgradient of the Site. As such, the deeper aquifer system is primarily used to supply water in the Village of Stroud.

The closest private well to the Phase 2 development is located on the Robertson property, adjacent the southwest corner of the IEE Phase 2 development. According to the well record, the well is 23.2m deep and consists of 3m of layer of sand overlying 7m of clay overlying 12.5 m sand (see Figure 6).

A well survey of the area downgradient of the Site was completed by Azimuth however mapping provided by InnServices indicates that servicing is provided along Victoria Street (west of the tracks), thus many of the dwellings to the south of the Site are presumed to be connected to the municipal drinking water system. Most of the wells (existing or otherwise decommissioned) are between 20-50 years old and target or previously targeted the shallow or intermediate aquifer at an average depth of 18m bgs.

There are a few dwellings situated east of the railway line. Mapping indicates that the closest well to the Site would be located~60m to the east of the Site however no information could be obtained about the location and/ or type of well from the owner and/ or MECP well record database. The next closest well is a drilled well located ~150m to the east-southeast however no information could be obtained from the MECP well record database. In general, most of the drilled wells in this area are old (1960's) and appear to have been previously dug wells according to the well records. Well depths range between 12.8m and 33.5m bgs.

4.0 HYDROGEOLOGY EVALUATION

4.1 Soil Investigations

Previous soils investigations which included the IEE Phase 1 development were completed by Geospec Engineering Ltd. (Geospec) in 2010. As part of these field investigations a total of eight (8) boreholes (BH-1 thru BH-9) were excavated to between 3.3 and 5.2 m bgs. Three boreholes were retrofitted as wells (i.e., G-3, G -8 and G-9).

Five of the excavations (BH-1 thru BH-8) were completed within the IEE Phase 1 development lands; and two excavations (BH-7 and BH -9) were completed within the IEE Phase 2 development lands including testwellG-9. Test well G-9 (now abandoned) is located within the centre part of IEE Phase 2 and is ~5.2m deep. BH-7 was located in the southwest corner of the Phase 2 area and is 5m deep (Figure 4).

The surficial soil descriptions provided by Geospec indicate a silt & sand/ sand & silt till in the IEE Phase 1 area and a silt till with some sand and gravel underlain by sand and silt deposits in the southeast part of the Site. Perched ground water conditions were noted in the southeast part of the Site (Geospec, 2011).

In support of the Phase 2 development plan, supplementary test pitting and soil sampling was completed by Azimuth in October 2017 and in March 2018. The purpose of the soil sampling was to identify the native soils, as well as the presence or absence of a shallow ground water table within the IEE Phase 2 lands.

A total of thirteen test pits (TP-1 through TP-13) were excavated to ~ 3m bgs, seven (7) of which were retrofitted with a standpipe for the purposes of monitoring shallow water table conditions. Test pits 1through 5were excavated within the north to the central part of Site and TP- 6 through TP-13 were excavated within the south part of the Site. Water levels were monitored at seven locations and at Geospec's Test well G-9.

The overburden soils in the north part of the Site can be described as silty sand and gravel. The overburden soils in the south part of the Site can be described as sand with a trace of silt. Ground water was not observed in any of Azimuth's test pits.

4.1.1 Grain Size Analysis

At the conclusion of Azimuth's field investigation, nine representative surficial soil samples were submitted to Terraprobe for grain size analysis and permeability testing ('T' time). The purpose of this testing is to characterize the grain size distribution for the shallow overburden soils, as well as to determine an estimated infiltration rate ('T' time)/ permeability rate for use in the design of the future septic beds.

The location of the test pits is provided on Figure 4 and the grain size reports are provided in Appendix B. The permeability of the native materials varies somewhat across the Site from a lower permeability soil being observed in the north half to a much higher permeable soil observed in the south half. Percolation rates ranged between 45-50min/cm at two locations within the north part and between 2-12min/cm at the seven remaining locations.

Table 1: Soil Summary

Location	Depth m bgs (feet)	Unified Soil Classification	Soil Description	T-Time (min/cm)
TP-1	0.6(2)	SM	Silty Sand, some Clay, trace gravel	45-50
TP-3	0.6(2)	SM	Silty Sand, trace gravel, trace silt	2-4
TP-4	0.9 (1)	SW-SP	Gravelly sand, trace silt	4-6
TP-6	0.6(2)	SM	Silty Sand, some Clay, trace gravel	45-50
TP-7	1.8 (6)	SP	Sand with trace silt, trace gravel	3-5
TP-8	1.8 (6)	SW-SP	Sand and Gravel with trace silt	2-4
TP-10	1.8 (6)	SP	Sand with trace silt, trace gravel	4-6
TP-11	1.0 (3)	SW-SP	Sand with some silt, some gravel	10-12
TP-12	1.2 (4)	SP	Sand with trace silt, trace gravel	4-6

4.1.2 Ground Water Monitoring

Ground water monitoring was completed at seven monitoring locations (TW-1 through TW-7) as well as at Terraprobe's existing monitoring well location (G9) between October 6, 2017 to August 29 2018. This includes manual measurements taken in March, April, and June 2018 to capture high water table conditions during spring freshet. With the exception of TW-3, TW-6, TW-7 and G9, all monitoring locations were dry (Figure 5).

In that regard, the water level was measured at depths between 1.7 and 4.3m bgs. The highest water levels were observed in March 2018at TW-3, TW-6, and TW-7 and April 2018at G9 (Table 2). It is noted that upon installation, the end cap of TW-6 and TW-7 was not punctured to allow for the drainage of collected water. This technique was applied for the remaining well locations. Since these two locations were the only wells to have recorded water levels in March, and since the recorded water level was less than 10cm above the base of the well (i.e. within the well cap and not within the screen as water within the screen has migrated back into the overburden), these measurements are not considered representative of the water table elevation. The high water level condition is therefore considered to be the levels measured in April, which are shown in red text and bold in Table 2.

Table 2: Ground Water Level Measurements

Monitoring Location	Location Relative to Site Boundary	Well Depth (mbgs)	Ground Elevation (masl)	March 7, 2018 mbgs/masl	April 26, 2018 mbgs/masl	June 12, 2018 mbgs/masl
TW-1	North	2.75	272.0	dry / <269.3	dry / <269.3	dry / <269.3
TW-2	Central northwest	2.83	272.5	dry / <269.7	dry / <269.7	dry / <269.7
TW-3	Central west	2.61	272.0	dry / <269.4	**1.91 / 270.1**	dry / <269.4
TW-4	Southwest	2.60	269.0	dry / <266.4	dry / <266.4	dry / <266.4
TW-5	Central east	2.20	270.0	dry / <267.8	dry / <267.8	dry / <267.8
TW-6	Central east	2.95	268.0	2.93 / 265.1	dry / <265.1	dry / <265.1
TW-7	Southeast	3.10	267.5	3.03 / 264.5	dry / <264.4	dry / <264.4
G9**	Center of Site	5.13	271.4	3.61 / 267.8	**1.70 / 269.7**	4.33 / 267.1

** Terraprobe well, 2011

Water level measurements are expected to fluctuate seasonally, particularly during periods of high precipitation and spring runoff. The presence of high water at TW-3 and G9 may indicate the presence of a localized perched condition. Based on the above, ground water control measuring during excavations may be required during foundation construction if work is completed in the spring. It is therefore recommended that construction occur in the dry summer months to reduce or eliminate the need for temporary dewatering.

5.0 WATER BALANCE

In order to determine the potential changes to the natural ground water recharge conditions, a pre- and post-development water balance assessment has been completed using the Thornthwaite and Mather method (1957). This method evaluates evapotranspiration based on precipitation and temperature. Residual soil saturation is a function of topography and soil type. Monthly data are tabulated from daily average temperature and precipitation, and the water budget is a continuous calculation over the period of record. To clarify, the method and the approach used by many individuals in examining infiltration resets annual conditions (moisture deficit, snow storage, etc.) over the winter months because of the general lack of infiltration during the frost period.

However, we maintain those records and carry them forward from month to month during the entire period of record.

Values were determined on a monthly basis, compiled from daily Environment Canada meteorological data station located in Barrie, Ontario between 1970 and 2017 (Station ID 6110557). The calculations are based on the average conditions during this period; the average precipitation was 908 mm, rainfall was 655 mm, evapotranspiration was 484 mm and the surplus was 424 mm.

5.1 Land Use

5.1.1 Pre-Development

The entire pre-development Site area can be classified as meadow land use (Table 3).

Table 3: Pre Development Area Classification

Land Use	Land Area (m^2)
Meadow	47,800
TOTAL	**47,800**

Land within the pre-development scenario is considered 0% impervious.

5.1.2 Post-Development

Land within the post-development Site is considered landscaped grass, driveway, roads, sidewalk, and structures. The post-development land area is summarized in the below Table 4:

Table 4: Post-Development Area Classification

Land Use	Land Area (m^2)
Landscaped Grass	39,322
Driveways	1,320
Roads	2,438
Sidewalk	540
Structures	4,180
TOTAL	**47,800**

Land within the post-development scenario is considered 18% impervious. The impervious area is associated with the structures, driveways, sidewalks, and internal roads.

5.2 Infiltration

Infiltration factors for the Site were estimated based on the underlying soil, local topography, and ground cover as per Table 2 of the Ministry of Environment and Energy (MOEE) Hydrogeological Technical Information Requirements for Land Development Applications (1995).

The soil variable factor was determined by taking into account information obtained from the previous field programs completed for the Site (Section 4.1.1). This information confirms that the surficial material is composed primarily by a silt/sand material.

The infiltration factors utilized in the water balance assessment are summarized in Table 5 below.

Table 5: Summary of Pervious Land Infiltration Factor

Land Use	Infiltration Factor	Assumption
Meadow	0.65	Rolling land, sand/silt soil, meadow land
Landscaped	0.60	Rolling land, sand/silt soil, lawn

5.2.1 Pre-Development

Pre-development infiltration was determined by multiplying the annual average surplus amount, the area of each land use, and the infiltration factor for each land use. The pre-development annual infiltration is therefore 13,174 m^3/year from meadow land (Appendix C).

5.2.2 Post-Development

Post-development infiltration (without mitigation) was determined by multiplying the annual average surplus amount, the area of each land use, and the infiltration factor for each land use. The post-development annual direct infiltration is therefore 10,004 m^3/year from landscaped grass. There is therefore a decrease in infiltration of 3,170 m^3/year from pre- to post-development without mitigation which represents 24%.

As noted above, the Site is considered a HVA and SGRA within a WHPA-D. Sites located within a HVA may have restrictions on the type or location of LIDs employed for additional infiltration. However, since the Site is considered low density residential, it is our understanding that there are no applicable infiltration restrictions.

Additional infiltration will be gained by directing rooftop runoff toward the adjacent grass surface. There is approximately 4,180 m^2 of rooftop area which will contribute to indirect infiltration. The infiltration volume for rooftop downspouts is determined by multiplying the area (4,180 m^2) by the annual rainfall (655 mm) by the infiltration coefficient of the receiving land use (0.60) and by 80% to account for a 20% evapotranspiration factor. The total infiltration gained through this method is 1,314 m^3/year. This brings the total infiltration to 11,318 m^3/year in the post-development (with mitigation) scenario which leaves a deficit of 1,856 m^3/year.

Through consultation with WMI & Associates Limited it is our understanding that a grass swale network will be used around the perimeter of the proposed development to capture runoff and convey this water to the storm water management pond. It is assumed that the majority of overland flow within the Site will be conveyed toward this feature.

Grain size analysis was completed at numerous locations across the Site (Section 4.1.1). Percolation rates ranged between 45-50min/cm at two locations within the north part and between 2-12min/cm at the seven remaining locations. Due to the variability in material, a conservative value of 45 min/cm (or 320 mm/day) was utilized for swale infiltration.

The water balance currently has a deficit of 1,856 m^3/year. If it is assumed that infiltration within the swale network will occur over 15 days, then the grass swale will be required to cover an area of 772 m^2. This was determined by dividing the required volume (1,856 m^3) by the length of infiltration (15 days), and by the infiltration rate (320 mm/day). The swale area was then multiplied by a conservative factor of 2. This represents a swale 1m by 772m long or 2m by 386m long swale network. This methodology assumes that the swale will be positioned so that it can collect the majority of runoff from the Site and that the runoff is available for infiltration. It is our understanding that this will be considered/ incorporated by WMI & Associates Limited into the storm water design.

Based on the information summarized in Section 4.1.2 the high water level at the Site is at maximum 1.7 mbgs. Significant grading is not anticipated prior to development. Since the incorporated LIDs will occur at the ground surface there is at least a 1m vertical separation between the high ground water table and the proposed LIDs (rooftop diversion and conveyance swale).

5.2.3 Water Balance Summary

Using the climate model data and calculations mentioned above, the following pre and post-development infiltration values have been summarized (Appendix C).

Ground water infiltration at the Site could decrease by up to approximately 24% if no mitigation measures are employed. This reduction is based on the creation of impervious surfaces associated with driveways, sidewalks, roads, and structures. The 24% reduction equates to approximately 3,170 m^3/year.

The reduction is eliminated when mitigative strategies are employed (i.e. rooftop diversion and swale conveyance network. The LIDs account for an additional 3,170 m^3 of infiltration per year, which brings the total post-development infiltration volume to match the pre-development infiltration volume. As such, the water balance for the Site meets the Lake Simcoe Region Conservation Authority (LSRCA) requirements.

5.3 Well Head Protection Areas

As indicated in Section 4.2 of the Town of Innisfil's Official Plan, well head protection areas were defined in the South Simcoe Ground Water Study (2004). The study identifies areas around municipal wells susceptible to ground water contamination.

As presented in Figure 9.6.1 of the South Simcoe Ground Water Study, the proposed development is located within the "25-year capture zone boundary" of the Stroud municipal well field. Although the Site is located in close proximity to these wells, the capture zone extends to the southeast, which would indicate that the subject development property is downgradient of the municipal well locations.

Furthermore, the Stroud water supply system obtains its water from regional Aquifer A3 which is less than 200 m asl and is overlain by ~60 m of till material (Golder *et al*, 2004). The SSGW study also indicates that the capture zones for the Stroud well field are completely within a medium vulnerability area (Golder *et al.*, 2004); however, the vulnerability is more representative of the shallow unconfined aquifer and does not reflect the 60 m thick aquitard that exists between the shallow aquifer and the municipal aquifer.

6.0 GROUND WATER / RUP ASSESSMENT

As part of the IEE Phase 1 development, Azimuth completed a Reasonable Use Policy ("RUP") assessment for the entire parcel of land. The RUP assessment was accepted and resulted in the approval of 38 residential lots, each serviced by a conventional treatment system (Azimuth, 2011). The RUP assessment is now being updated as part of this Report to reflect the IEE Phase 2 development containing 21 lots. The ability to meet RUP is contingent on the use of tertiary treatment units (TTUs) for all 21 lots and the installation of TTUs on 8 lots located within the previously approved IEE Phase 1 subdivision. TTU permits for the applicable Phase 1 lots are provided in Appendix D.

Tertiary treatment technology can reduce nitrate concentrations to between 15 – 25mg/L (NO_3-N) with an average 20mg/L depending on the technology used. In this case, a Norweco's Hydro-Kinetic FEU system is considered a typical system that could be used, reporting a removal rate of 67% for total nitrogen. For the purposes of demonstrating compliance with the RUP, the calculations include 21 Phase 2 TTUs, 8 Phase 1 TTUs and 30 Phase 1 conventional septic systems.

6.1 Private Well Evaluation

The primary focus of the ground water assessment is on impacts to off -site downgradient wells from septic beds. The closest private well to the IEE Phase 2 development is located on the Robertson property, located near the southwest corner of the Phase 2 development. The drilled well is located within the northwest corner of the Robertson property (Figure 6). The target aquifer is overlain with 7 m of clay which should be sufficient to protect this well from surface water contaminants, however sampling would be required to confirm this assumption.

According to the MECP well database, there are a number of wells located along Victoria Street to the south and southeast of the Site. Most of these wells (existing or otherwise decommissioned) are between 20-50 years old and target or previously targeted the shallow or intermediate aquifer at an average depth of 18m bgs. Although mapping from InnServices illustrates some of the dwellings along Victoria Street are municipally serviced, there are 2 dwellings located immediately adjacent Lots 20 and 21 of the IEE Phase 2 development that may not be municipally serviced (See Figure 6). No wells could be observed at the front or rear of these properties however the aerial imaging suggests that septic beds are located within the rear of these lots thus any wells (if present) would be located along the front or side of the dwelling to adhere to the minimum Ontario Building Code (OBC) setbacks between wells and septic systems (i.e., 15m-30m). If wells do exist on these properties, the proposed septic beds on Lots 20 and 21 can be strategically placed to maximize OBC setbacks between the proposed bed locations and any off site wells.

For the remainder of the Site, the treated effluent discharging to the proposed disposal beds would flow with shallow ground water in a southeasterly direction. Most of the wells along Victoria Street (if present) would also be located at the front of these properties (>100m away from the Phase 2 property), to maximize wells setbacks from their own septic systems located within the rear of these properties. Any wells situated on the east side of the railway line are more transgradient to the flow of ground water from the Phase 2 Site therefore impacts would not be anticipated.

6.2 Reasonable Use Policy Assessment

A ground water assessment is typically evaluated within the scope of the MECP Reasonable Use Policy (RUP Procedure B-7-1), the 2008 MECP Guideline for Sewage Works (MECP, 2008) and/ or MECP Procedure D-5-4 (MECP, 1996). The RUP describes acceptable levels of parameters that are permitted to reach the downgradient property boundary in the ground water regime.

In general, RUP is only applicable to large sewage works with a point source discharge (i.e., treatment systems that generate >10,000 Lpd). As the sewage volumes for each lot are significantly less than 10,000 Lpd, they are regulated under the OBC. Therefore, RUP does not strictly apply in this case however can be used as a guide to determine concentration levels at the downgradient property boundary and evaluate any undesirable environmental impacts from sewage disposal systems.

6.2.1 RUP Assumptions

The following assumptions were used in the RUP evaluation:

Nitrate Criteria: Nitrate (as nitrogen) is the main contaminant of concern for sewage works that discharge effluent to the ground water regime due to the potential for health related impacts in drinking water supplies. Under a Reasonable Use evaluation, the quality of drinking water must not be degraded by an amount in excess of 25% of the difference between background concentrations and the ODWQS for health related parameters (i.e., 10 mg/L for nitrate-N). Historical use of RUP has accepted the maximum compliance criteria for nitrate at the downgradient property boundary as 10 mg/L (ODWQS for nitrate-N) for residential lot development. For the purposes of this assessment, a value of 10 mg/L (nitrate-N) was used as the maximum RUP compliance criteria.

Dilution Area: RUP considers dilution only, and therefore it is highly conservative. Because an individual lot is relatively small, and infiltration from the full lot contributes to dilution, thus the entire property (4.78ha) is used for the dilution calculation. This includes areas designated for internal roads, the Metrolinx widening and other lands transferred to the Town.

Background Nitrate: MECP Guideline B-7-1 describes the background concentration to be used in the RUP calculations as “Background is considered to be the quality of ground water prior to any man-made contamination.” Any elevated nitrate concentrations observed at the Site are assumed would be related to agricultural fertilizer application, and therefore a pre-anthropogenic background of 0.2 mg/L is appropriate for this variable and is consistent with the MECP guideline since RUP uses this variable to reflect the concentration of the precipitation infiltrating on the property.

The value of ~10mg/L reflects the shallow ground water condition and represents the water that is underflowing the Site from upgradient areas, which is not used in the RUP calculation. However, the RUP allows the reviewer to consider site conditions in evaluating the “reasonable use” of the receiving ground water regime. In this case, the shallow ground water regime has been impacted by nitrate levels from both agricultural practices and septic inputs from the existing Stroud community. As described in Guideline B-7 (Section 4.1), it is appropriate for the proposed development to discharge septic effluent into the shallow unit, reflecting its “reasonable use”, as it has been contaminated and the contamination is expected to continue.

Influent Nitrate Concentrations: Typical nitrate (NO_3-N) values for weak to medium domestic sewage for a standard Class IV system range between 20 and 60mg/L (Metcalf & Eddy, 1972.) with an average concentration of 40 mg/L (NO_3-N). However, tertiary treatment can reduce nitrate concentrations by 50-67% (e.g., WBS, Norweco’s Hydro-Kinetic FEU system) depending on the technology used. Using the above tertiary treatment technologies, nitrate concentrations can be reduced to between 15 – 25mg/L (NO_3-N) with an average 20mg/L. For the purposes of this assessment, a nitrate concentration of 20mg/L is used for tertiary treatment and 40mg/L is used for conventional treatment.

Annual Sewage Volume: The average daily volume for a single residential home is typically between 800-1000Lpd. As per Procedure D-5-4 (MECP, 1996), the volume of sewage should not exceed 1,000Lpd when evaluating contaminant attenuation for residential development. For the purposes of this assessment, 1000Lpd is used.

Infiltration Rates: In 2008, the MECP modified the RUP assessment and have incorporated a constant quantity of dilution in the calculation (MECP, 2008). The quantity is 250mm of water per year (mm/a) over the area of the contaminant plume. For the purposes of the RUP evaluation, an average infiltration rate of 279.5 mm/a is used since it represents Site specific conditions (see below) The infiltration rate is lower than that used in the original 2011 RUP evaluation reflecting an updated water budget analysis.

As part of this evaluation, a water budget was prepared using the Thornthwaite and Mather (1957) method using the Environment Canada meteorological data at Station 6110557 (Barrie) between 1970 and 2018. The average annual water surplus is 430 mm representing the amount of water available annually to infiltrate into the ground water or run off as surface water. During this period, the average annual precipitation was 912 mm, the average annual rainfall was 657 mm, and the average annual evapotranspiration was 481 mm. Snowmelt accounts for 255 mm of the annual surplus and the remainder (175mm) is split between runoff and infiltration in the non-freezing times of the year (rain surplus). Considering that the surficial geology within the study, the majority of the site being cultivated and the flat nature of the topography, it was determined that between55 to 75% (average 65%) of the water surplus will infiltrate across the Site. By multiplying the annual average precipitation surplus amount (430) by the soil infiltration rate (65%), infiltration is estimated to be approximately 279.5 mm/year for the Site.

6.3 Prediction of Contaminant Attenuation

The nitrate concentration at the Phase 2 development boundary can be estimated using the nitrate dilution equation:

$$C_{pb}= \frac{Q_1C_1+ Q_2C_2}{C_T}$$

where,

- Q_1 = dilutions area (m^2) x infiltration (m/a) = total development area (m^2) x infiltration rate (m/a);
- C_1 = (background nitrate concentration from precipitation) ~ 0.2 mg/L;
- Q_2 = (annual sewage volume) =1,000 Lpd (MECP, 1996);
- C_2 = (effluent NO_3-N concentration in sewage) = 40.0 mg/L (conventional treatment) or 20mg/L (tertiary treatment);
- Q_T = (total offsite sewage volume) = Q_1+$Q_{2;}$
- C_{pb} = contribution of nitrate at downgradient property boundary is ≤10 mg/L.

<u>IEE Phase 2 Development:</u>

- Q_1 = Phase 2 dilution area (m^2) x infiltration (m/a) = 47,800 m^2 *179.5 m/a infiltration = 13,360 m^3/a);
- C_1 = (background nitrate concentration from precipitation) = ~ 0.2 mg/L;
- Q_2 = (Phase 2 sewage volume) =1,000x 21 = 21,000 Lpd;
- C_2 = (effluent NO_3-N concentration in sewage) = 20mg/L (tertiary treatment);
- Q_T = (total offsite sewage volume) = Q_1+$Q_{2;}$
- C_{pb} = contribution of nitrate at downgradient Phase 2 boundary is ≤10 mg/L.

Based on the above assumptions, the average nitrate-N concentration at the Phase 2 Site boundary is estimated to be 7.4 mg/L. The RUP results indicate that the average loading at the Site boundary is below the 10 mg/L criteria, thus the MECP RUP is met for the IEE Phase 2 development. A sensitivity analysis was also completed using a higher effluent NO_3-N concentration (25 mg/L NO_3-N) and the results indicated an RUP value is ≤10mg/L; therefore our approach is considered conservative.

IEE Phase 1 and Phase 2 Development:

As part of the technical evaluation undertaken in support of the IEE Phase I development, Azimuth completed a Reasonable Use Policy evaluation for the 17.5 ha parcel of land (Azimuth, 2011). The RUP assessment was accepted and resulted in the approval of 38 residential lots with conventional sewage treatment systems. In order to comply with MECPs RUP at the property boundary as a result of the Phase 2 development, the owner has installed eight (8) of the 38 previously approved conventional systems with tertiary treatment. In that regard, the RUP calculation was re-evaluated having consideration of cumulative impacts from both phases based on the following:

- 38 IEE Phase 1 development lots:
    - 30 conventional systems, and
    - 8 tertiary treatment systems.

- 21 IEE Phase 2 development lots (4.78ha):
    - 21 tertiary treatment systems

The nitrate concentration at the property boundary was estimated using the following equation:

$$C_{pb} = \frac{Q_1C_1 + Q_2C_2 + Q_3C_3 + Q_4C_4}{C_T}$$

where,

- Q_1 = dilutions area (m^2) x infiltration (m/a) = 175,520 m^2 *179.5 m/a infiltration = 48,959 m^3/a;
- C_1 = (background nitrate concentration from precipitation) = ~0.2 mg/L;
- Q_2 = (Phases I sewage volume) =1,000 x 30 units total = 30,000 Lpd;
- C_2 = (effluent NO_3-N concentration in sewage) = 40.0 mg/L (conventional treatment
- Q_3 = (Phase I sewage volume) =1,000 x 8 units total = 8,000 Lpd;
- C_3= (effluent NO_3-N concentration in sewage) =20 mg/L (tertiary treatment)
- Q_4 = (Phase 2 sewage volume) =1,000 x 21 units total = 21,000 Lpd;
- C_4= (effluent NO_3-N concentration in sewage) =20 mg/L (tertiary treatment)

- Q_T = (total offsite sewage volume) = Q_1+Q_2+ Q_3 +$Q_{4;}$
- C_{pb} = contribution of nitrate at downgradient property boundary is ≤10 mg/L.

Using the same general assumptions provided in Section 6.1.1, the average nitrate concentration at the property boundary is estimated to be 9.4mg/L. Based on the previous installation of 8 conventional systems with TTU's for the IEE Phase 1 development and by incorporating TTU's for all 21 Phase 2 lots, the net loading is below the 10 mg/L criteria. Therefore, we conclude the RUP guideline is met.

The results of the RUP assessment are considered to be conservative for individual lot development since Reasonable Use Policy is intended to be used to evaluate larger volumes of sewage from large wastewater treatment systems. As the proposed dwellings will be serviced by municipal water, there are no ground water wells proposed for the site. The deeper aquifer system will be used to supply water to the area.

7.0 CONLUSIONS AND RECOMMEDATIONS

The nitrate dilution calculation was used as a guide to determine concentration levels at the downgradient boundary to evaluate any undesirable impacts from the sewage works from the IEE Phase 2 development. In this case, the results of the assessment show that the net loading at the property boundary meets the 10 mg/L criteria provided that tertiary treatment technology is used with a greater than 50% removal rate for nitrate-N for all 21 Phase 2 lots and 8 Phase 1 lots. The use of tertiary technology is sufficient to protect the natural environment and will not result in any negative impact on the ground water quality.

Based on the physical characteristics of the Site, nitrate concentrations in the shallow subsurface would also be significantly reduced by nitrification and attenuation processes, as well as biological uptake, which are not considered within the RUP methodology. Denitrification also plays a primary role in polishing nitrate concentrations in the shallow subsurface will is also not factored in the RUP methodology. As such, impacts are expected to be minimal in nature as a result of the proposed development.

Ground water infiltration at the Site could decrease by approximately 24% if mitigation measures are employed. This reduction is based on the creation of impervious surfaces associated with driveways, sidewalks, roads, and structures. The 24% reduction equates to approximately 3,170 m^3/year. The reduction is eliminated when mitigative strategies are employed (i.e. rooftop diversion and swale conveyance network. The LIDs account for an additional 3,170 m^3 of infiltration per year, which brings the total post-development infiltration volume to match the pre-development infiltration volume. As such, the water balance for the Site meets the Lake Simcoe Region Conservation Authority (LSRCA) requirements.

8.0 REFERENCES

Barnett, P.J. Cowan, W.R. and Henry, A.P. 1991. Quaternary Geology of Ontario, southern sheet; Ontario Geological Survey, Map 2556, Scale 1:1,000,000.

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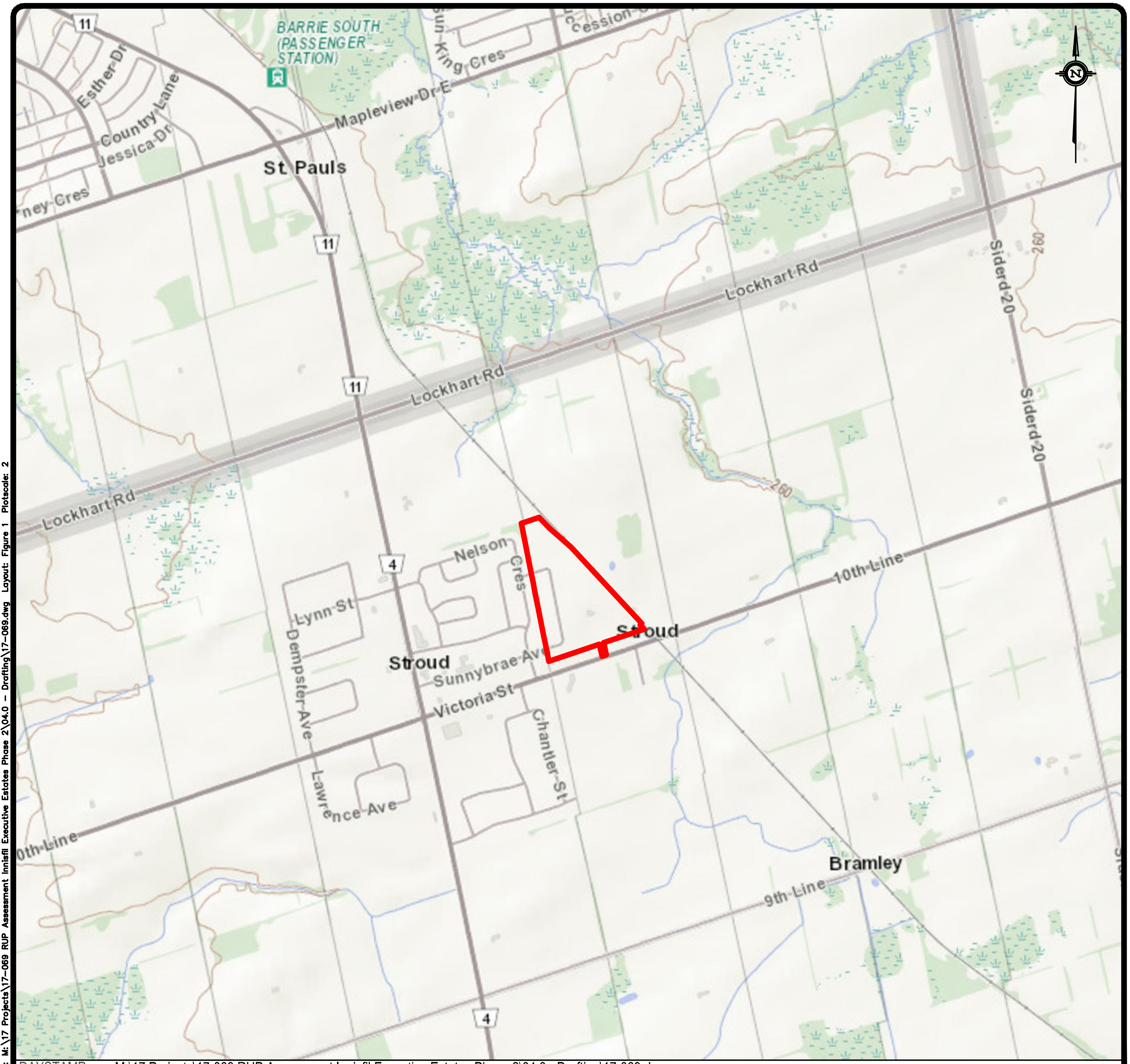
APPENDICES

Appendix A: Figures
Appendix B: Soils Information
Appendix C: Water Balance Summary
Appendix D: IEE Phase 1 Tertiary Treatment Permits

APPENDIX A

Figures



LEGEND:

🟥 Approx. Property Boundary

REG MAP

250m 0 750m

HORIZONTAL SCALE 1:25,000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Study Area Location

Innisfil Executive Estates,
Stroud, ON

DATE ISSUED: October 2019	Figure No.
CREATED BY: JLM	1
PROJECT NO.: 17-069	
REFERENCE: MNRF	

DAYSTAMP: M:\17 Projects\17-069 RUP Assessment Innisfil Executive Estates Phase 2\04.0 - Drafting\17-069.dwg

Plotted by: JMCCARTNEY on October 24, 2019 at 1:22pm
File: M:\17 Projects\17-069 RUP Assessment Innisfil Executive Estates Phase 2\04.0 – Drafting\17-069.dwg Layout: Figure 1 Plotscale: 2

LEGEND:

🟥 *Phase 1 Property Boundary (~17.1ha)*

🟩 *Phase 2 Boundaries (~4.78ha)*

25m 0 75m

HORIZONTAL SCALE 1:2,500

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Existing Conditions

Innisfil Executive Estates (Phase 2)

DATE ISSUED:	*October 2019*	Figure No. 2
CREATED BY:	*JLM*	
PROJECT NO.:	*17-069*	
REFERENCE:	*Simcoe County Maps*	

DAYSTAMP: M:\17 Projects\17-069 RUP Assessment Innisfil Executive Estates Phase 2\04.0 - Drafting\17-069.DWG

Plotted by: JMCCARTNEY on May 28, 2020 at 1:46pm Layout: HYD2 Plotscale: 2
File: C:\Users\jmccartney\AppData\Local\Temp\AcPublish_9376\17-069.dwg

LEGEND:
🟩 *Phase 2 Boundaries (~4.78ha)*

25m 0 75m
HORIZONTAL SCALE 1: 2,500

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Development Site Plan

Innisfil Executive Estates
(Phase 2)

DATE ISSUED:	*October 2019*	Figure No.
CREATED BY:	*JLM*	3
PROJECT NO.:	*17-069*	
REFERENCE:	*Simcoe County Maps*	

DAYSTAMP: M:\17 Projects\17-069 RUP Assessment Innisfil Executive Estates Phase 2\04.0 - Drafting\17-069.DWG

Plotted by: JMCCARTNEY on June 18, 2020 at 3:29pm
File: C:\Users\jmccartney\AppData\Local\Temp\AcPublish_5808\17-069.dwg Layout: HYD3 Plotscale: 2

LEGEND:

- 🟩 *Phase 2 Boundaries (~4.78ha)*
- ⊕ *Test Well Locations (Geospec, 2011)*
- ⊞ *Test Pit Locations*
- ⊕ *Test Well Locations*

30m 0 60m

HORIZONTAL SCALE 1: 2,000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Test Locations

Innisfil Executive Estates
(Phase 2)

DATE ISSUED:	*October 2019*	Figure No.
CREATED BY:	*JLM*	4
PROJECT NO.:	*17-069*	
REFERENCE:	*Simcoe County Maps*	

DAYSTAMP: M:\17 Projects\17-069 RUP Assessment Innisfil Executive Estates Phase 2\04.0 - Drafting\17-069.DWG

Plotted by: JMCCARTNEY on June 18, 2020 at 3:29pm Layout: HYD4 Plotscale: 2
File: C:\Users\jmccartney\AppData\Local\Temp\AcPublish_5808\17-069.dwg

LEGEND:

- 🟩 Phase 2 Boundaries (~4.78ha)
- ⊕ Test Well Locations (Geospec, 2011)
- ⊕ Test Pit Locations
- ⊕ Test Well Locations
- 269.7 Denotes Spring Water Level (masl) (April 26, 2018)

30m 0 60m

HORIZONTAL SCALE 1: 2,000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Water Levels

Innisfil Executive Estates
(Phase 2)

DATE ISSUED:	October 2019	Figure No.
CREATED BY:	JLM	5
PROJECT NO.:	17-069	
REFERENCE:	Simcoe County Maps	

DAYSTAMP: M:\17 Projects\17-069 RUP Assessment Innisfil Executive Estates Phase 2\04.0 - Drafting\17-069.DWG

Plotted by: JMCCARTNEY on June 18, 2020 at 3:30pm Layout: HYD5 Plotscale: 2
File: C:\Users\jmccartney\AppData\Local\Temp\AcPublish_5808\17-069.dwg

LEGEND:
- 🟥 Former Property Boundary (~17.1ha)
- 🟩 Phase 2 Boundaries (~4.78ha)
- ⊕ GIN Water Well Locations

Note:
Well locations are based on MECP well records and/or WWIS (2017) mapping.

30m 0 60m
HORIZONTAL SCALE 1:2,000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Well Map

Innisfil Executive Estates
(Phase 2)

DATE ISSUED:	June 2020	Figure No.
CREATED BY:	JLM	6
PROJECT NO.:	17-069	
REFERENCE:	Simcoe County Maps	

DAYSTAMP: M:\17 Projects\17-069 RUP Assessment Innisfil Executive Estates Phase 2\04.0 - Drafting\17-069.DWG

Plotted by: JMCCARTNEY on June 19, 2020 at 8:09am
File: P:\17 Projects\17-069 RUP Assessment Innisfil Executive Estates Phase 2\04.0 - Drafting\17-069.dwg Layout: HYD6 Plotscale: 2

APPENDIX B

Soils Information

Terraprobe

Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing

November 1, 2017 File No. 3-16-0041

Azimuth Environmental
642 Welham Road
Barrie, ON
L4N 9A1

Attention: Ms. Jackie Coughlin

RE: ESTIMATION OF SOIL PERCOLATION RATE SUBMITTED SOIL SAMPLES PROJECT NO. 17-069

Dear Sirs:

We are pleased to confirm the details of the estimation of soil percolation rate performed on the submitted soil samples for the above referenced project.

Terraprobe has performed a grain size distribution analysis on the four (4) soil samples delivered to our laboratory on October 13, 2017. The locations of delivered samples were identified as being from Project # 17-069.

Grain size distribution curves were plotted for the samples (Lab No. 1641a to 1641d). They are appended on the Wash Sieve and Sieve Hydrometer Analysis Test Report forms. Table 1 below represents a summary of the results of the samples tested.

Table 1

Lab No.	Location of sample	Soil Description	Unified Soil Classification	Estimated Soil "T"-Time
1641a	TP 1 sa 1	Silty sand, some clay, trace gravel	SM	45 to 50 min/cm
1641b	TP 3 sa 2	Silty sand, trace clay, trace gravel	SM	40 to 45 min/cm
1641c	TP 4 sa 1	Gravelly sand, trace silt	SW-SP	4 to 6 min/cm
1641d	TP 6 sa 1	Silty sand, some clay, trace gravel	SM	40 to 45 min/cm

It should be noted that Terraprobe Inc. did not conduct a field investigation in conjunction with the collection of these samples, or witness the collection of the samples tested. Terraprobe Inc. assumes no responsibility for the application of the above-noted percolation rates ("T"-Time) for use in design of an on-site sewage disposal system. The design of an on-site sewage system must be conducted by a qualified professional with due regard for a number of site-specific conditions in addition to the percolation rates of the soils.

Terraprobe Inc. does not present the estimated percolation rates given in this report as a warranty of performance for the soils tested. Furthermore, the estimate provided is indicative of the sample in a disturbed state only. It must be emphasized that factors such as, but not limited to, consistency, structure, organic content, density and degree of saturation could influence the estimate. The client or third party using this information as a basis for tile field design assumes all risk associated with their evaluation of this report and all other criteria used in the design of any private sewage disposal system.

We trust this information is sufficient for your present purposes. Should you have any questions concerning the content of the information presented, please do not hesitate to contact the undersigned.

Yours truly,

Terraprobe Inc.

Jerry Duguid, A. Sc. T.
Laboratory Manager

B Jackson

Brian H. Jackson
Barrie Branch Manager

BHJ/jd
Barrie Office

Terraprobe

SIEVE AND HYDROMETER ANALYSIS
TEST REPORT

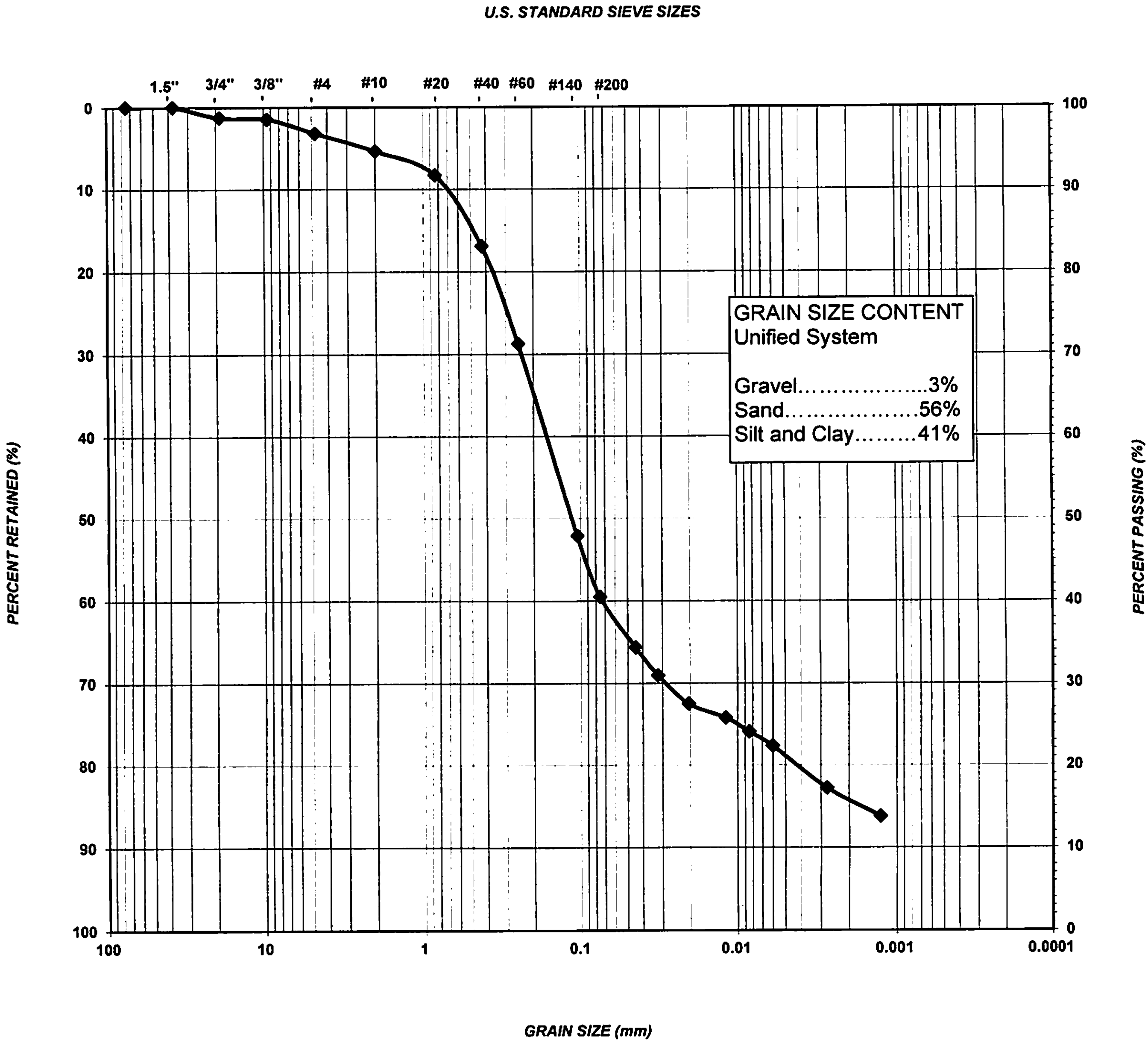
PROJECT: **Laboratory Testing; Septic T-Time**
LOCATION: **N/G**
CLIENT: **Azimuth Environmental**

FILE NO.: **3-16-0041**
LAB NO.: **1641a**
SAMPLE DATE: **Oct-13-17**
SAMPLED BY: **Client**

TEST PIT NUMBER: **1**
SAMPLE DEPTH: **0.6 to 1.1m**
SAMPLE NUMBER: **1**
SAMPLE LOCATION: **Project No. 17-069**
SAMPLE DESCRIPTION: **Silty sand, some clay, trace gravel**

Estimated Septic T-Time: 45 to 50 min/cm

GRAIN SIZE DISTRIBUTION



		COARSE	MEDIUM	FINE		
MIT SYSTEM	GRAVEL	SAND			SILT	CLAY

	COARSE	FINE	COARSE	MEDIUM	FINE	
UNIFIED SYSTEM	GRAVEL		SAND			SILT AND CLAY

Terraprobe

SIEVE AND HYDROMETER ANALYSIS
TEST REPORT

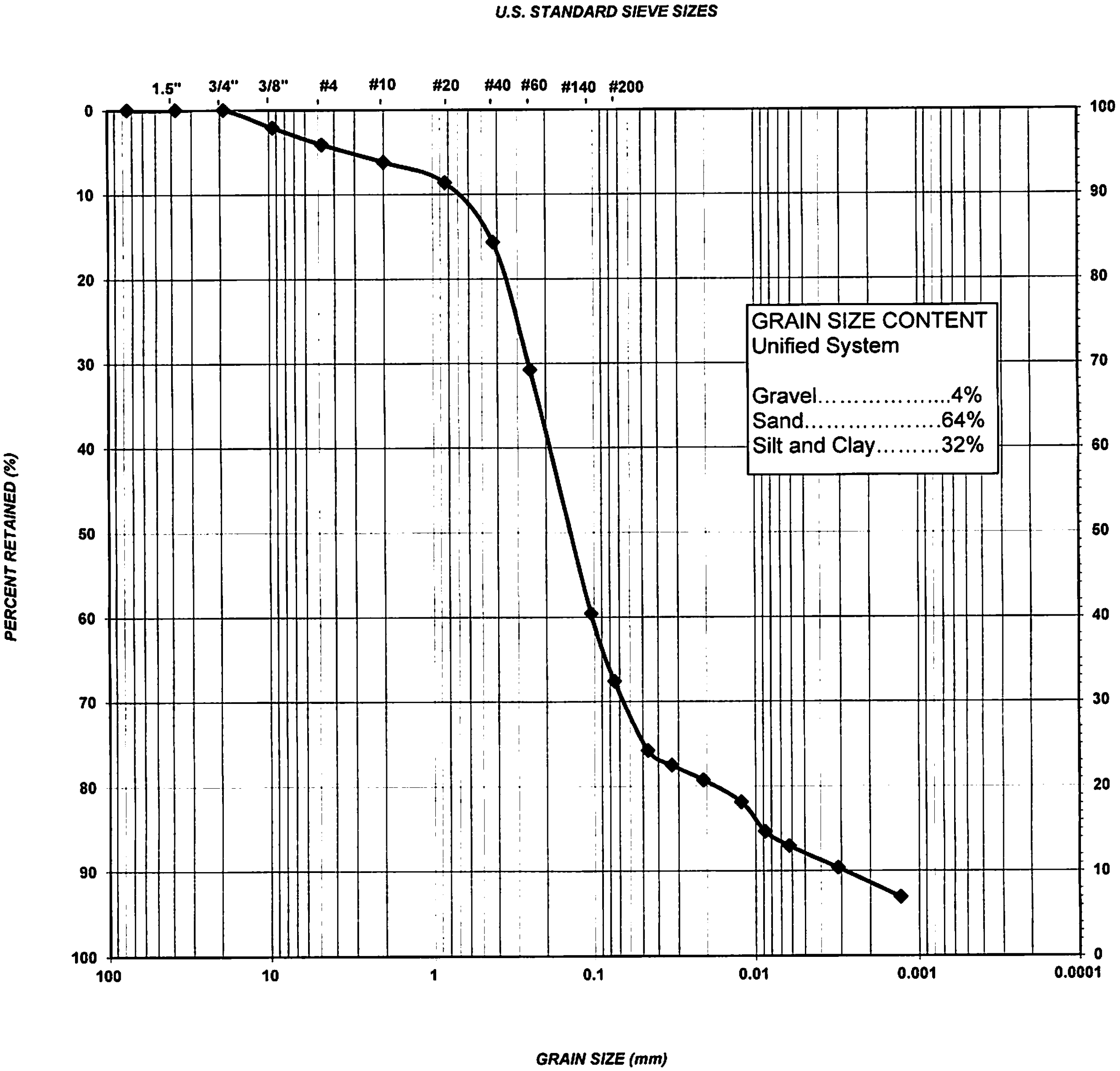
PROJECT:	**Laboratory Testing; Septic T-Time**
LOCATION:	**N/G**
CLIENT:	**Azimuth Environmental**

FILE NO.:	**3-16-0041**
LAB NO.:	**1641b**
SAMPLE DATE:	**Oct-13-17**
SAMPLED BY:	**Client**

TEST PIT NUMBER: **3** SAMPLE DEPTH: **1.1m**
SAMPLE NUMBER: **2**
SAMPLE LOCATION: **Project No. 17-069**
SAMPLE DESCRIPTION: **Silty sand, trace clay, trace gravel**

Estimated Septic T-Time: 40 to 45 min/cm

GRAIN SIZE DISTRIBUTION



GRAIN SIZE CONTENT
Unified System

Gravel....................4%
Sand.....................64%
Silt and Clay.........32%

MIT SYSTEM	GRAVEL	COARSE	MEDIUM	FINE	SILT	CLAY
		SAND				

UNIFIED SYSTEM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
	GRAVEL		SAND			

Terraprobe

WASH SIEVE ANALYSIS TEST REPORT

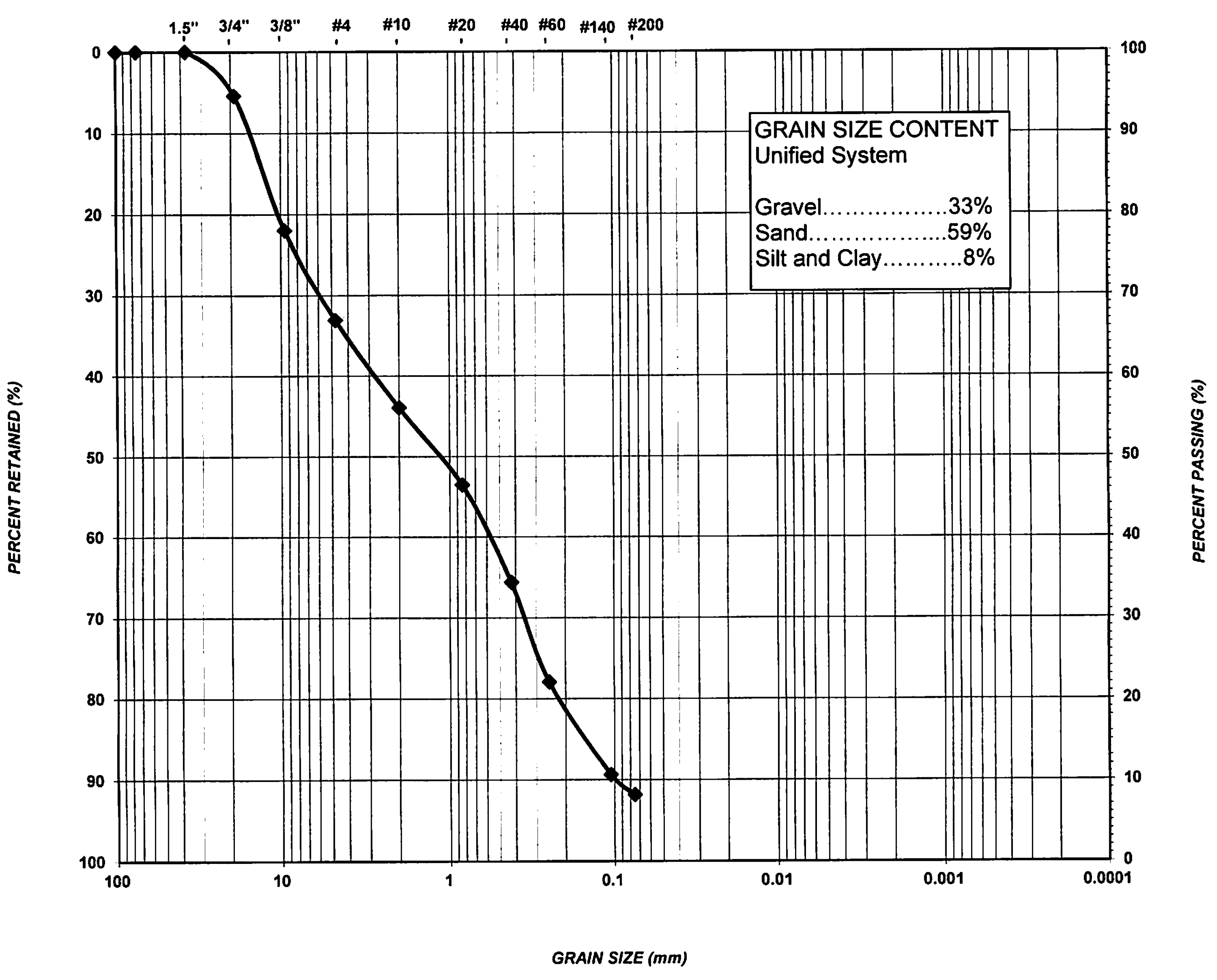
PROJECT: **Laboratory Testing; Septic T-Time**
LOCATION: **N/G**
CLIENT: **Azimuth Environmental**

FILE NO.: **3-16-0041**
LAB NO.: **1641c**
SAMPLE DATE: **Oct-13-17**
SAMPLED BY: **Client**

TEST PIT NUMBER: **4** SAMPLE DEPTH: **0.9 to 1.9m**
SAMPLE NUMBER: **1**
SAMPLE LOCATION: **Project No. 17-069**
SAMPLE DESCRIPTION: **Gravelly sand, trace silt**

Estimated Septic T-Time: 4 to 6 min/cm

GRAIN SIZE DISTRIBUTION



GRAIN SIZE CONTENT
Unified System

Gravel................33%
Sand...................59%
Silt and Clay...........8%

		COARSE	MEDIUM	FINE		
MIT SYSTEM	GRAVEL	SAND			SILT	CLAY

	COARSE	FINE	COARSE	MEDIUM	FINE	
UNIFIED SYSTEM	GRAVEL		SAND			SILT AND CLAY

Terraprobe

SIEVE AND HYDROMETER ANALYSIS TEST REPORT

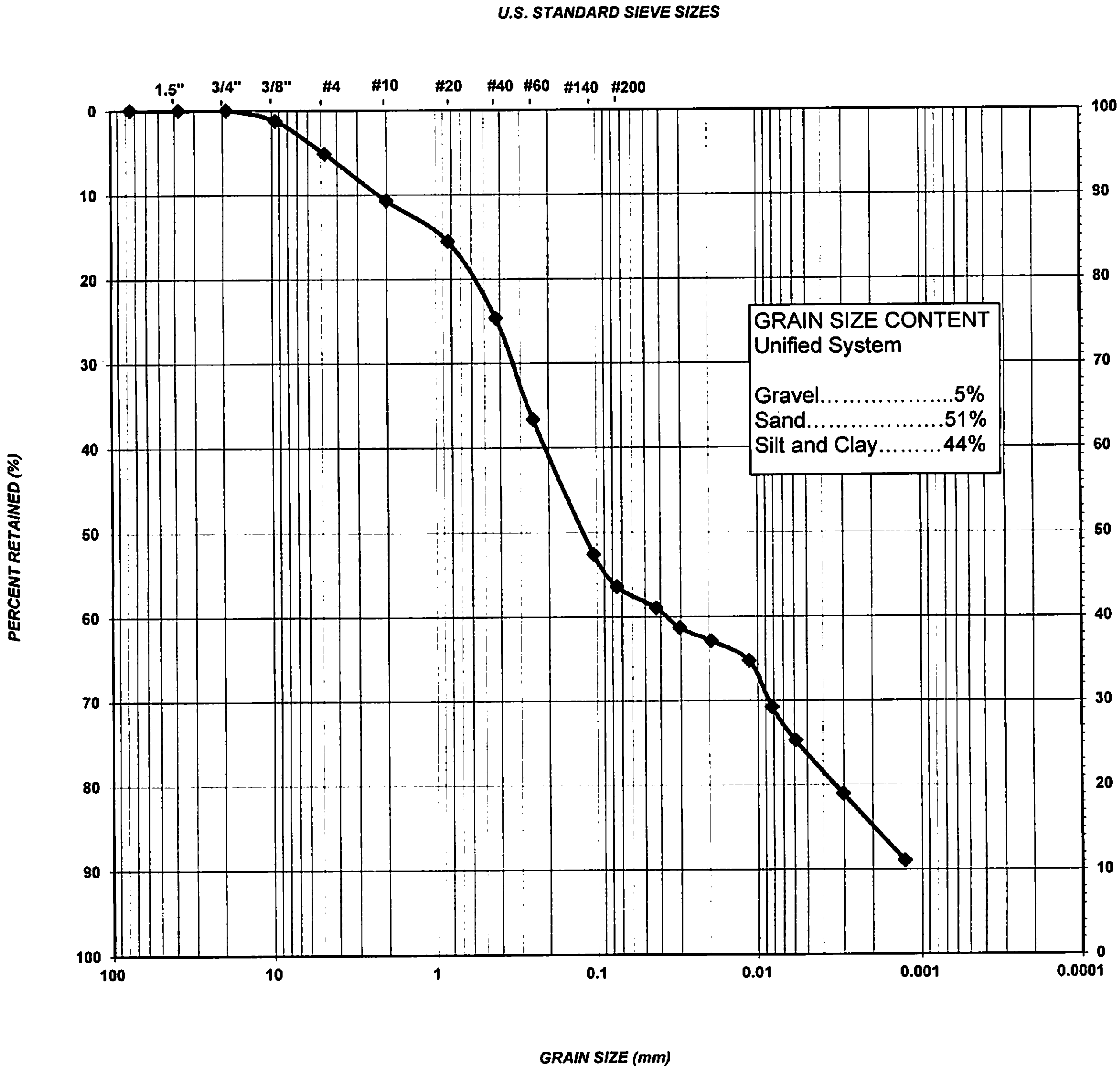
PROJECT: **Laboratory Testing; Septic T-Time**
LOCATION: **N/G**
CLIENT: **Azimuth Environmental**

FILE NO.: **3-16-0041**
LAB NO.: **1641d**
SAMPLE DATE: **Oct-13-17**
SAMPLED BY: **Client**

TEST PIT NUMBER: **6**
SAMPLE DEPTH: **0.6 to 1.3m**
SAMPLE NUMBER: **1**
SAMPLE LOCATION: **Project No. 17-069**
SAMPLE DESCRIPTION: **Silty sand, trace clay, trace gravel**

Estimated Septic T-Time: 40 to 45 min/cm

GRAIN SIZE DISTRIBUTION



MIT SYSTEM	GRAVEL	SAND COARSE	SAND MEDIUM	SAND FINE	SILT	CLAY

UNIFIED SYSTEM	GRAVEL COARSE	GRAVEL FINE	SAND COARSE	SAND MEDIUM	SAND FINE	SILT AND CLAY

Terraprobe

Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing

March 16, 2018

File No. 3-16-0041

Azimuth Environmental
642 Welham Road
Barrie, ON
L4N 9A1

Attention: Ms. Jackie Coughlin, B.A.Sc., P. Eng.

RE: ESTIMATION OF SOIL PERCOLATION RATE
SUBMITTED SOIL SAMPLES
PROJECT NO. 17-069

Dear Ms. Coughlin:

We are pleased to confirm the details of the estimation of soil percolation rates performed on the submitted soil samples for the above referenced project.

Terraprobe has performed a grain size distribution analysis on the five (5) soil samples delivered to our laboratory on March 2, 2018. The locations of delivered samples were identified as being from Project # 17-069.

Grain size distribution curves were plotted for the samples (Lab No. 1905a to 1905e). They are appended on the Wash Sieve Analysis Test Report forms. Table 1 below represents a summary of the results of the samples tested.

Table 1

Lab No.	Location of sample	Soil Description	Unified Soil Classification	Estimated Soil "T"-Time
1905a	TP 7	Sand, trace gravel, trace silt	SP	3 to 5 min/cm
1905b	TP 8	Sand and gravel, trace silt	SW-SP	2 to 4 min/cm
1905c	TP 10	Sand, trace gravel, trace silt	SP	4 to 6 min/cm
1905d	TP 11	Sand, some silt, some gravel	SW-SP	10 to 12 min/cm
1905e	TP 12	Sand, trace silt, trace gravel	SP	4 to 6 min/cm

It should be noted that Terraprobe Inc. did not conduct a field investigation in conjunction with the collection of these samples, or witness the collection of the samples tested. Terraprobe Inc. assumes no responsibility for the application of the above-noted percolation rates ("T"-Time) for use in design of an on-site sewage disposal system. The design of an on-site sewage system must be conducted by a qualified professional with due regard for a number of site-specific conditions in addition to the percolation rates of the soils.

Terraprobe Inc. does not present the estimated percolation rates given in this report as a warranty of performance for the soils tested. Furthermore, the estimate provided is indicative of the sample in a disturbed state only. It must be emphasized that factors such as, but not limited to, consistency, structure, organic content, density and degree of saturation could influence the estimate. The client or third party using this information as a basis for tile field design assumes all risk associated with their evaluation of this report and all other criteria used in the design of any private sewage disposal system.

We trust this information is sufficient for your present purposes. Should you have any questions concerning the content of the information presented, please do not hesitate to contact the undersigned.

Yours truly,

Terraprobe Inc.

Jerry Duguid, A. Sc. T.
Laboratory Manager

Steven Green, P. Eng.

SG/jd
Barrie Office

Terraprobe

WASH SIEVE ANALYSIS TEST REPORT

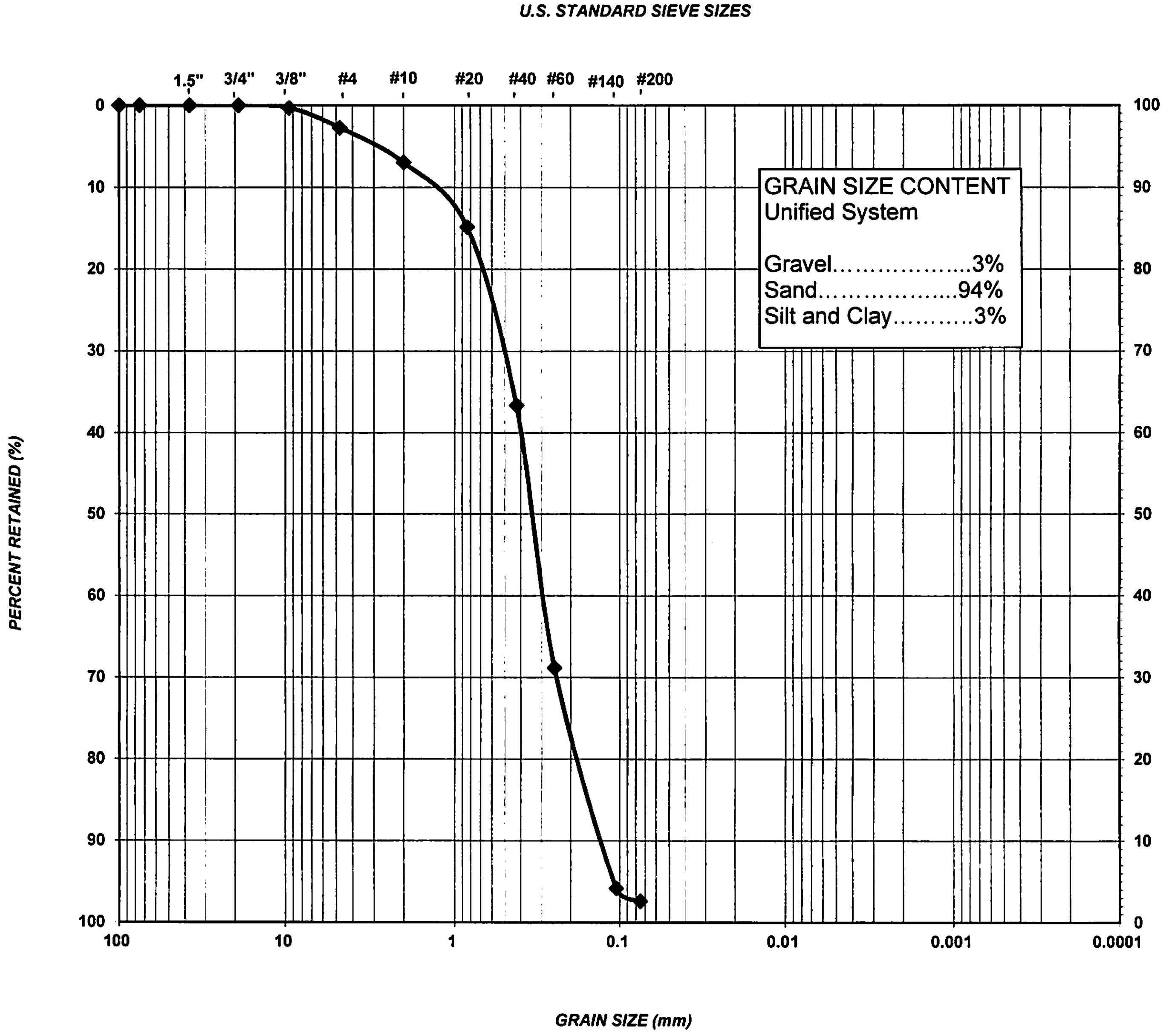
PROJECT: **Laboratory Testing; Septic T-Time**
LOCATION: **N/G**
CLIENT: **Azimuth Environmental**

FILE NO.: **3-16-0041**
LAB NO.: **1905a**
SAMPLE DATE: **Mar-02-18**
SAMPLED BY: **Client**

TEST PIT NUMBER: **7** SAMPLE DEPTH: **6.0'**
SAMPLE NUMBER: **1**
SAMPLE LOCATION: **Project 17-069**
SAMPLE DESCRIPTION: **Sand, trace gravel, trace silt**

Estimated Septic T-Time: 3 to 5 min/cm

GRAIN SIZE DISTRIBUTION



GRAIN SIZE CONTENT
Unified System

Gravel..................3%
Sand..................94%
Silt and Clay..........3%

MIT SYSTEM	GRAVEL	SAND			SILT	CLAY
		COARSE	MEDIUM	FINE		

UNIFIED SYSTEM	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Terraprobe

WASH SIEVE ANALYSIS TEST REPORT

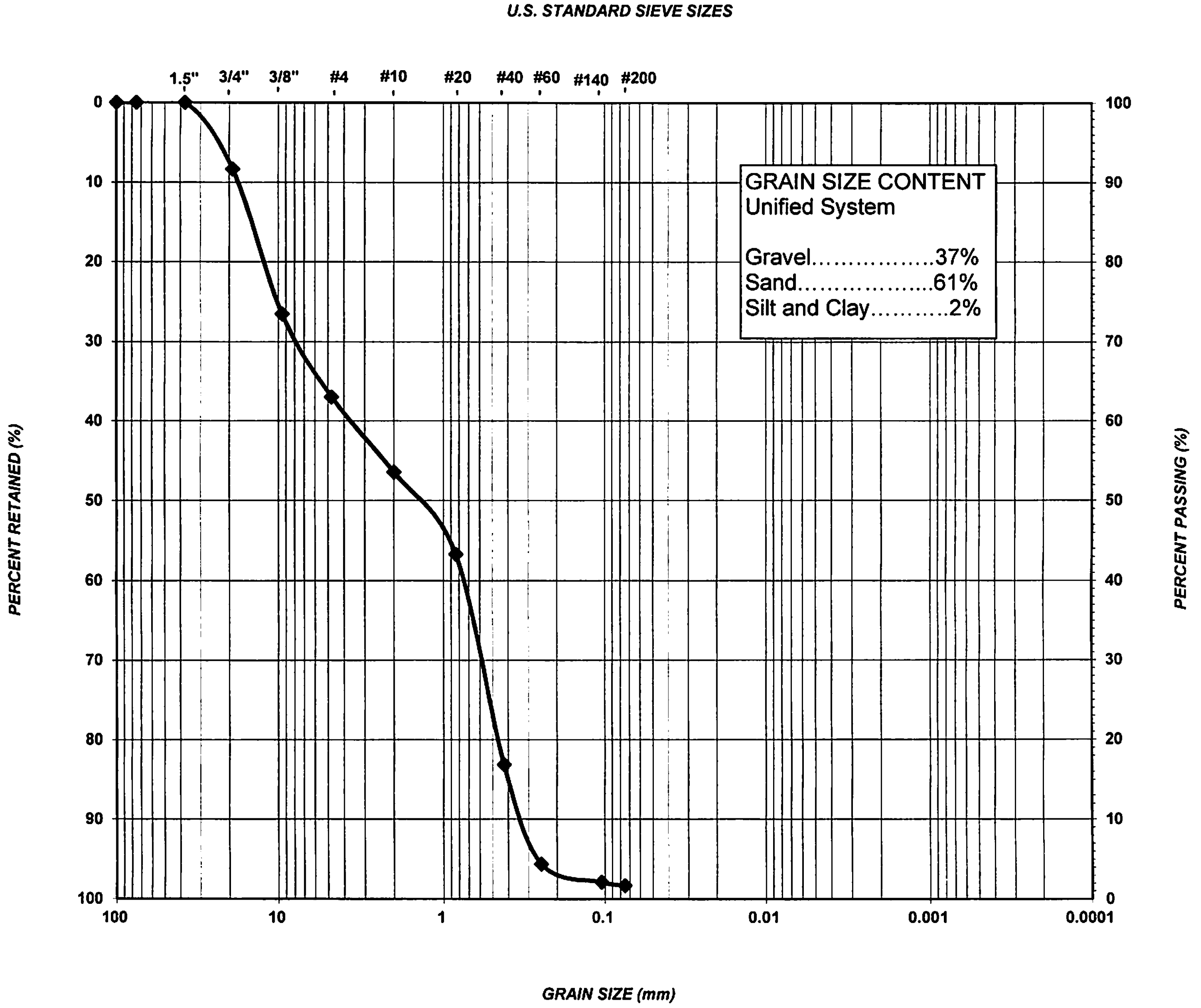
PROJECT: **Laboratory Testing; Septic T-Time**
LOCATION: **N/G**
CLIENT: **Azimuth Environmental**

FILE NO.: **3-16-0041**
LAB NO.: **1905b**
SAMPLE DATE: **Mar-02-18**
SAMPLED BY: **Client**

TEST PIT NUMBER: **8** SAMPLE DEPTH: **6.0'**
SAMPLE NUMBER: **1**
SAMPLE LOCATION: **Project 17-069**
SAMPLE DESCRIPTION: **Sand and gravel, trace silt**

Estimated Septic T-Time: 2 to 4 min/cm

GRAIN SIZE DISTRIBUTION



MIT SYSTEM	GRAVEL	COARSE	MEDIUM	FINE	SILT	CLAY
		SAND				

UNIFIED SYSTEM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
	GRAVEL		SAND			

Terraprobe

WASH SIEVE ANALYSIS TEST REPORT

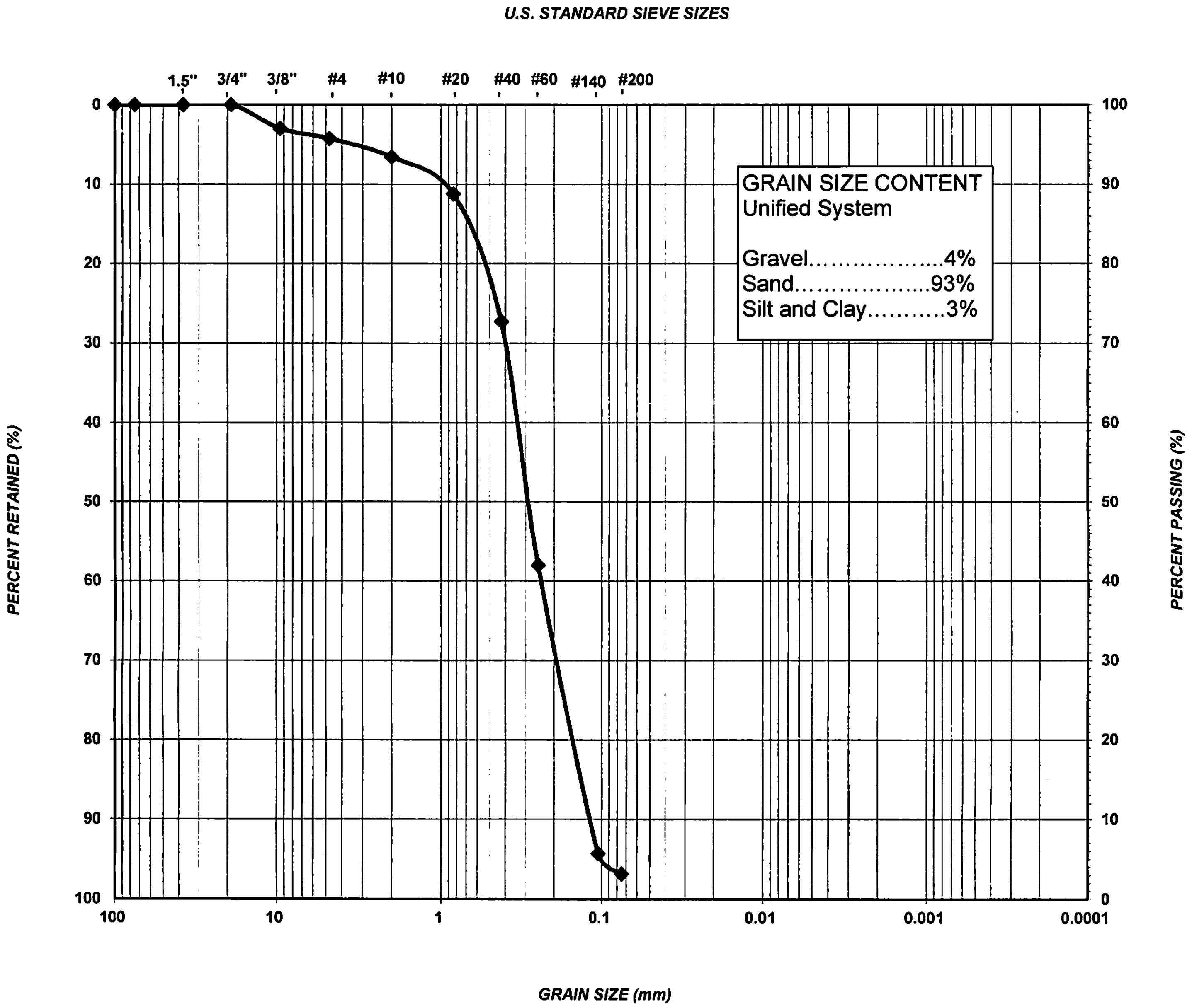
PROJECT: **Laboratory Testing; Septic T-Time**
LOCATION: **N/G**
CLIENT: **Azimuth Environmental**

FILE NO.: **3-16-0041**
LAB NO.: **1905c**
SAMPLE DATE: **Mar-02-18**
SAMPLED BY: **Client**

TEST PIT NUMBER: **10** SAMPLE DEPTH: **6.0'**
SAMPLE NUMBER: **1**
SAMPLE LOCATION: **Project 17-069**
SAMPLE DESCRIPTION: **Sand, trace gravel, trace silt**

Estimated Septic T-Time: 4 to 6 min/cm

GRAIN SIZE DISTRIBUTION



		COARSE	MEDIUM	FINE		
MIT SYSTEM	GRAVEL	SAND			SILT	CLAY

	COARSE	FINE	COARSE	MEDIUM	FINE	
UNIFIED SYSTEM	GRAVEL		SAND			SILT AND CLAY

Terraprobe

WASH SIEVE ANALYSIS TEST REPORT

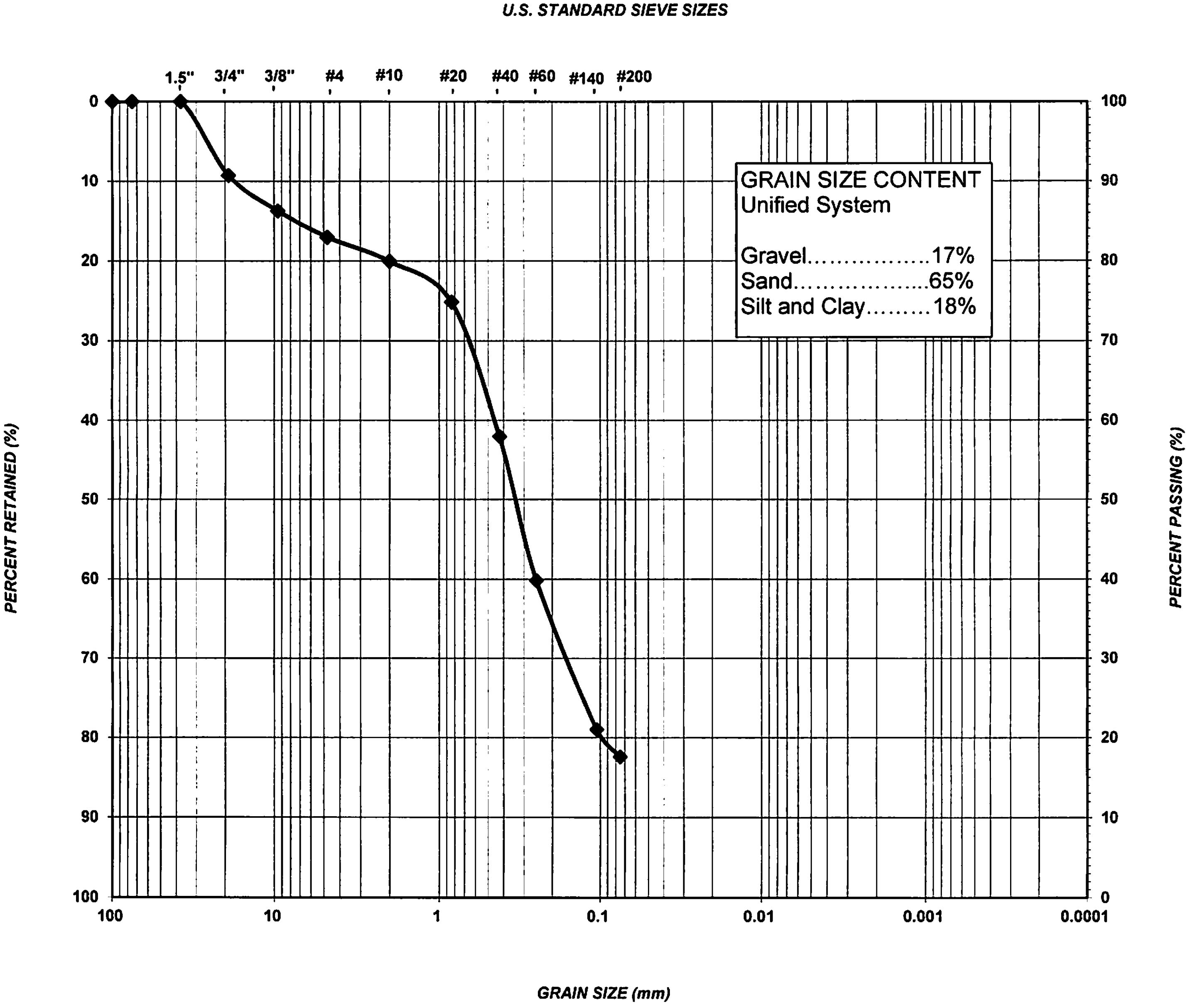
PROJECT: **Laboratory Testing; Septic T-Time**
LOCATION: **N/G**
CLIENT: **Azimuth Environmental**

FILE NO.: **3-16-0041**
LAB NO.: **1905d**
SAMPLE DATE: **Mar-02-18**
SAMPLED BY: **Client**

TEST PIT NUMBER: **11** SAMPLE DEPTH: **3.0'**
SAMPLE NUMBER: **1**
SAMPLE LOCATION: **Project 17-069**
SAMPLE DESCRIPTION: **Sand, some silt, some gravel**

Estimated Septic T-Time: 10 to 12 min/cm

GRAIN SIZE DISTRIBUTION



MIT SYSTEM	GRAVEL	SAND (COARSE / MEDIUM / FINE)	SILT	CLAY

UNIFIED SYSTEM	GRAVEL (COARSE / FINE)	SAND (COARSE / MEDIUM / FINE)	SILT AND CLAY

Terraprobe

WASH SIEVE ANALYSIS
TEST REPORT

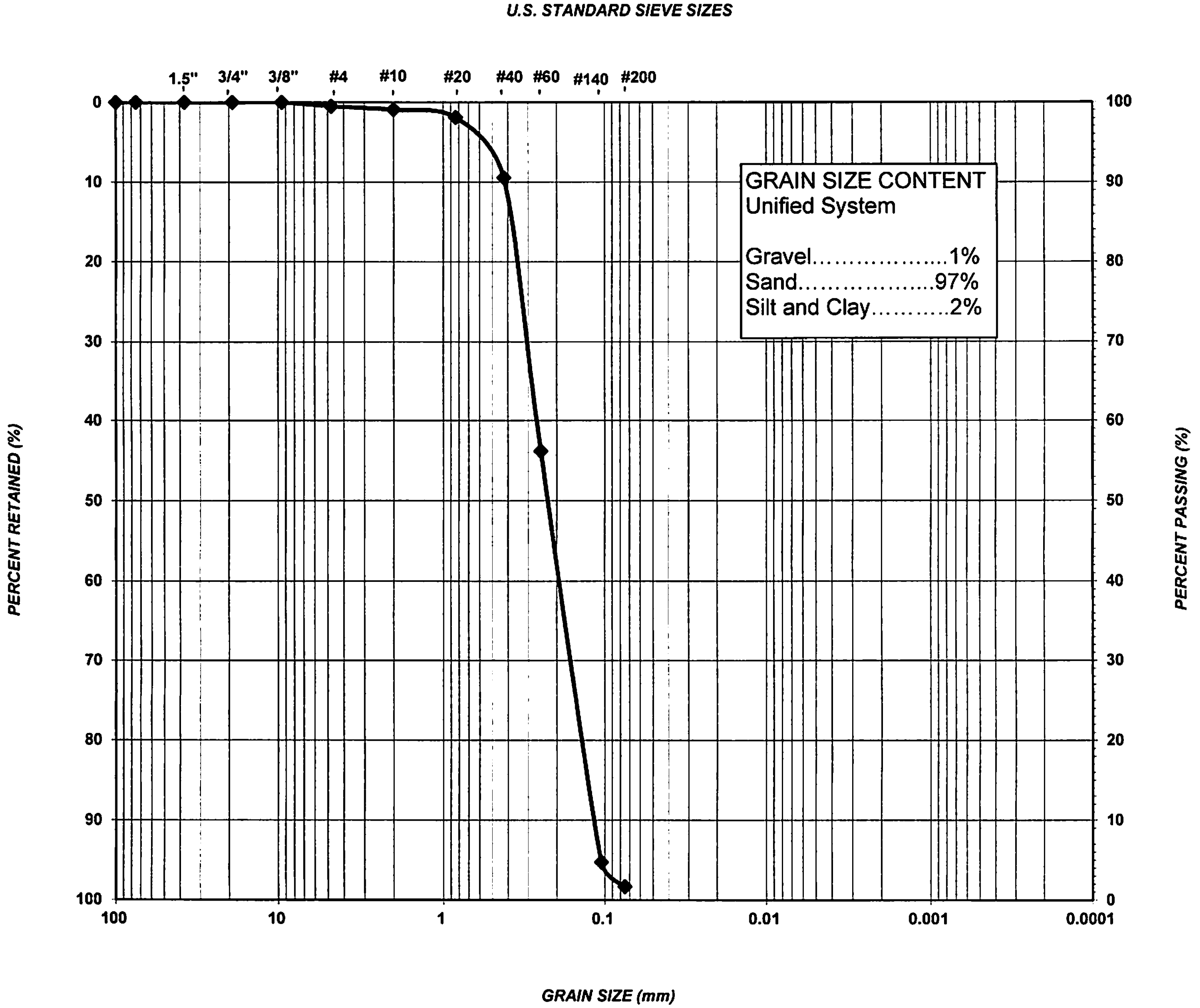
PROJECT: **Laboratory Testing; Septic T-Time**
LOCATION: **N/G**
CLIENT: **Azimuth Environmental**

FILE NO.: **3-16-0041**
LAB NO.: **1905e**
SAMPLE DATE: **Mar-02-18**
SAMPLED BY: **Client**

TEST PIT NUMBER: **12** SAMPLE DEPTH: **4 .0 to 5.5'**
SAMPLE NUMBER: **1**
SAMPLE LOCATION: **Project 17-069**
SAMPLE DESCRIPTION: **Sand, trace silt, trace gravel**

Estimated Septic T-Time: 4 to 6 min/cm

GRAIN SIZE DISTRIBUTION



MIT SYSTEM	GRAVEL	SAND: COARSE	SAND: MEDIUM	SAND: FINE	SILT	CLAY

UNIFIED SYSTEM	GRAVEL: COARSE	GRAVEL: FINE	SAND: COARSE	SAND: MEDIUM	SAND: FINE	SILT AND CLAY

APPENDIX C

Water Balance Summary

Table A: Pre-Development

Catchment Designation	**Meadow**	**Total**
Area (m^2)	47,800	47,800
Pervious Area (m^2)	47,800	47,800
Impervious Area (m^2)	0	0
Infiltration Factors		
Topography Infiltration Factor	0.2	
Soil Infiltration Factor	0.3	
Land Cover Infiltration Factor	0.15	
Infiltration Factor	0.65	
Run-Off Coefficient	0.35	
Run-Off From Impervious Surfaces	0.8	
Inputs (Per Unit Area)		
Precipitation (mm/yr)	908	908
Rainfall (mm/yr)	655	655
Run-On (mm/yr)	0	0
Other Inputs (mm/yr)	0	0
Total Inputs (mm/yr)	**908**	908
Outputs (Per Unit Area)		
Precipitation Surplus (mm/yr)	424	424
Net Surplus (mm/yr)	424	424
Evapotranspiration (mm/yr)	484	484
Infiltration (mm/yr)	276	276
Surplus Infiltration (mm/yr)	0	0
Total Infiltration (mm/yr)	276	276
Run-Off Pervious Areas (mm/yr)	148	148
Run-Off Impervious Areas (mm/yr)	0	0
Total Run-Off (mm/yr)	148	148
Total Outputs (mm/yr)	**908**	**908**
Difference (Inputs - Outputs)	**0**	**0**
Inputs (Volumes)		
Precipitation (m^3/yr)	43,402	43,402
Run-On (m^3/yr)	0	0
Other Inputs (m^3/yr)	0	0
Total Inputs (m^3/yr)	**43,402**	**43,402**
Outputs (Volumes)		
Precipitation Surplus (m^3/yr)	20,267	20,267
Net Surplus (m^3/yr)	20,267	20,267
Evapotranspiration (m^3/yr)	23,135	23,135
Infiltration (m^3/yr)	13,174	13,174
Surplus Infiltration (m^3/yr)	0	0
Total Infiltration (m^3/yr)	**13,174**	**13,174**
Run-Off Pervious Areas (m^3/yr)	7,094	7,094
Run-Off Impervious Areas (m^3/yr)	0	0
Total Run-Off (m^3/yr)	7,094	7,094
Total Outputs (m^3/yr)	43,402	43,402
Difference (Inputs - Outputs)	**0**	**0**

Table B: Post-Development (no mit)

Catchment Designation	**Landscaped Grass**	**Driveway**	**Roads**	**Sidewalk**	**Structure**	**Total**
Area (m^2)	39,322	1,320	2,438	540	4,180	47,800
Pervious Area (m^2)	39,322	0	0	0	0	39,322
Impervious Area (m^2)	0	1,320	2,438	540	4,180	8,478
Infiltration Factors						
Topography Infiltration Factor	0.2	0	0	0	0	
Soil Infiltration Factor	0.3	0	0	0	0	
Land Cover Infiltration Factor	0.1	0	0	0	0	
Infiltration Factor	0.6	0	0	0	0	
Run-Off Coefficient	0.4	1	1	1	1	
Run-Off From Impervious Surfaces	0.8	0.8	0.8	0.8	0.8	
Inputs (Per Unit Area)						
Precipitation (mm/yr)	908	908	908	908	908	908
Rainfall (mm/yr)	655	655	655	655	655	655
Run-On (mm/yr)	0	0	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0	0	0
Total Inputs (mm/yr)	**908**	**908**	**908**	**908**	**908**	908
Outputs (Per Unit Area)						
Precipitation Surplus (mm/yr)	424	726	726	726	726	478
Net Surplus (mm/yr)	424	726	726	726	726	478
Evapotranspiration (mm/yr)	484	182	182	182	182	430
Infiltration (mm/yr)	254	0	0	0	0	209
Surplus Infiltration (mm/yr)	0	0	0	0	0	0
Total Infiltration (mm/yr)	254	0	0	0	0	209
Run-Off Pervious Areas (mm/yr)	170	0	0	0	0	140
Run-Off Impervious Areas (mm/yr)	0	726	726	726	726	129
Total Run-Off (mm/yr)	170	726	726	726	726	268
Total Outputs (mm/yr)	**908**	**908**	**908**	**908**	**908**	**908**
Difference (Inputs - Outputs)	**0**	**0**	**0**	**0**	**0**	**0**
Inputs (Volumes)						
Precipitation (m^3/yr)	35,704	1,199	2,214	490	3,795	43,402
Run-On (m^3/yr)	0	0	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0	0	0
Total Inputs (m^3/yr)	**35,704**	**1,199**	**2,214**	**490**	**3,795**	**43,402**
Outputs (Volumes)						
Precipitation Surplus (m^3/yr)	16,673	959	1,771	392	3,036	22,831
Net Surplus (m^3/yr)	16,673	959	1,771	392	3,036	22,831
Evapotranspiration (m^3/yr)	19,032	240	443	98	759	20,571
Infiltration (m^3/yr)	10,004	0	0	0	0	10,004
Surplus Infiltration (m^3/yr)	0	0	0	0	0	0
Total Infiltration (m^3/yr)	**10,004**	**0**	**0**	**0**	**0**	**10,004**
Run-Off Pervious Areas (m^3/yr)	6,669	0	0	0	0	6,669
Run-Off Impervious Areas (m^3/yr)	0	959	1,771	392	3,036	6,158
Total Run-Off (m^3/yr)	6,669	959	1,771	392	3,036	12,827
Total Outputs (m^3/yr)	35,704	1,199	2,214	490	3,795	43,402
Difference (Inputs - Outputs)	**0**	**0**	**0**	**0**	**0**	**0**

18%

Table C: Post-Development (with mitigation)

Catchment Designation	**Landscaped Grass**	**Driveway**	**Roads**	**Sidewalk**	**Structure**	**Total**
Area (m^2)	39,322	1,320	2,438	540	4,180	47,800
Pervious Area (m^2)	39,322	0	0	0	0	39,322
Impervious Area (m^2)	0	1,320	2,438	540	4,180	8,478
Infiltration Factors						
Topography Infiltration Factor	0.2	0	0	0	0	
Soil Infiltration Factor	0.3	0	0	0	0	
Land Cover Infiltration Factor	0.1	0	0	0	0	
Infiltration Factor	0.6	0	0	0	0	
Run-Off Coefficient	0.4	1	1	1	1	
Run-Off From Impervious Surfaces	0.8	0.8	0.8	0.8	0.8	
Inputs (Per Unit Area)						
Precipitation (mm/yr)	908	908	908	908	908	908
Rainfall (mm/yr)	655	655	655	655	655	655
Run-On (mm/yr)	0	0	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0	0	0
Total Inputs (mm/yr)	**908**	**908**	**908**	**908**	**908**	908
Outputs (Per Unit Area)						
Precipitation Surplus (mm/yr)	424	726	726	726	726	478
Net Surplus (mm/yr)	424	726	726	726	726	478
Evapotranspiration (mm/yr)	484	182	182	182	182	430
Infiltration (mm/yr)	254	0	0	0	0	209
Surplus Infiltration (mm/yr)	47	0	0	0	314	66
Total Infiltration (mm/yr)	302	0	0	0	314	276
Run-Off Pervious Areas (mm/yr)	122	0	0	0	0	101
Run-Off Impervious Areas (mm/yr)	0	726	726	726	412	101
Total Run-Off (mm/yr)	122	726	726	726	412	202
Total Outputs (mm/yr)	**908**	**908**	**908**	**908**	**908**	**908**
Difference (Inputs - Outputs)	**0**	**0**	**0**	**0**	**0**	**0**
Inputs (Volumes)						
Precipitation (m^3/yr)	35,704	1,199	2,214	490	3,795	43,402
Run-On (m^3/yr)	0	0	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0	0	0
Total Inputs (m^3/yr)	**35,704**	**1,199**	**2,214**	**490**	**3,795**	**43,402**
Outputs (Volumes)						
Precipitation Surplus (m^3/yr)	16,673	959	1,771	392	3,036	22,831
Net Surplus (m^3/yr)	16,673	959	1,771	392	3,036	22,831
Evapotranspiration (m^3/yr)	19,032	240	443	98	759	20,571
Infiltration (m^3/yr)	10,004	0	0	0	0	10,004
Surplus Infiltration (m^3/yr)	1,856	0	0	0	1,314	3,170
Total Infiltration (m^3/yr)	**11,860**	**0**	**0**	**0**	**1,314**	**13,174**
Run-Off Pervious Areas (m^3/yr)	4,813	0	0	0	0	4,813
Run-Off Impervious Areas (m^3/yr)	0	959	1,771	392	1,722	4,844
Total Run-Off (m^3/yr)	4,813	959	1,771	392	1,722	9,657
Total Outputs (m^3/yr)	35,704	1,199	2,214	490	3,795	43,402
Difference (Inputs - Outputs)	0	0	0	0	0	0

Table D: Water Balance Summary Table

Characteristic	**Site**						
	Pre-Development	**Post-Development**	**Change (Pre to Post)**		**Post-Development with Mitigation**	**Change (Pre to Post with Mitigation)**	
			Inputs (Volume)				
Precipitation (m^3/yr)	43,402	43,402	0	0%	43,402	0	0%
Run-On (m^3/yr)	0	0	0	NA	0	0	NA
Other Inputs (m^3/yr)	0	0	0	NA	0	0	NA
Total Inputs (m^3/yr)	43,402	43,402	0	0%	43,402	0	0%
			Outputs (Volume)				
Precipitation Surplus (m^3/yr)	20,267	22,831	2,564	13%	22,831	2,564	13%
Net Surplus (m3/yr)	20,267	22,831	2,564	13%	22,831	2,564	13%
Evapotranspiration (m^3/yr)	23,135	20,571	-2,564	-11%	20,571	-2,564	-11%
Infiltration (m^3/yr)	13,174	10,004	-3,170	-24%	10,004	-3,170	-24%
Rooftop Infiltration (m^3/yr)	0	0	0	NA	3,170	3,170	NA
Total Infiltration (m^3/yr)	**13,174**	**10,004**	**-3,170**	**-24%**	**13,174**	**0**	**0%**
Run-Off Pervious Areas (m^3/yr)	7,094	6,669	-425	-6%	4,813	-2,281	-32%
Run-Off Impervious Areas (m^3/yr)	0	6,158	6,158	NA	4,844	4,844	NA
Total Run-Off (m^3/yr)	7,094	12,827	5,734	81%	9,657	2,564	36%
Total Outputs (m^3/yr)	**43,402**	**43,402**	**0**	**0%**	**43,402**	**0**	**0%**

APPENDIX D

IEE Phase 1 Tertiary Treatment Permits

Lot 4 (335 Sunnybrae Ave.)
Building Permit No.: 2018-0203

BUILDING PERMIT

Innisfil

Number: 2018-0203

Schedule a Building Inspection:

Please book your inspection(s) online by clicking this link: www.innisfil.ca/eservices
or Email: buildinginspections@innisfil.ca or Leave a phone message at: 705-436-3710 Ext. 3500

Applicant :	Lou Kelly
Owner :	Lou Kelly
Legal Description :	PLAN 51M1045 LOT 4
Roll Number :	010035054140000

SEPTIC PERMIT

WATER-LOO WIRE MESH BASKET SEPTIC SYSTEM

Inspections Required:

- Sewage System - Readiness to Construct
- Sewage System - Substantial Completion
- Notice of Completion

Conditions/Remarks:

Install new septic system for SFD

Water-Loo Wire mesh basket Septic system

Maintenance contract required for Water-Loo Treatment system

Ensure header and distribution piping is able to be detected magnetically via 14 gauge tracer wire or other means.

Ensure distribution piping and septic tank are minimum distance from all well and property lines.

SITE GRADING PLAN OF

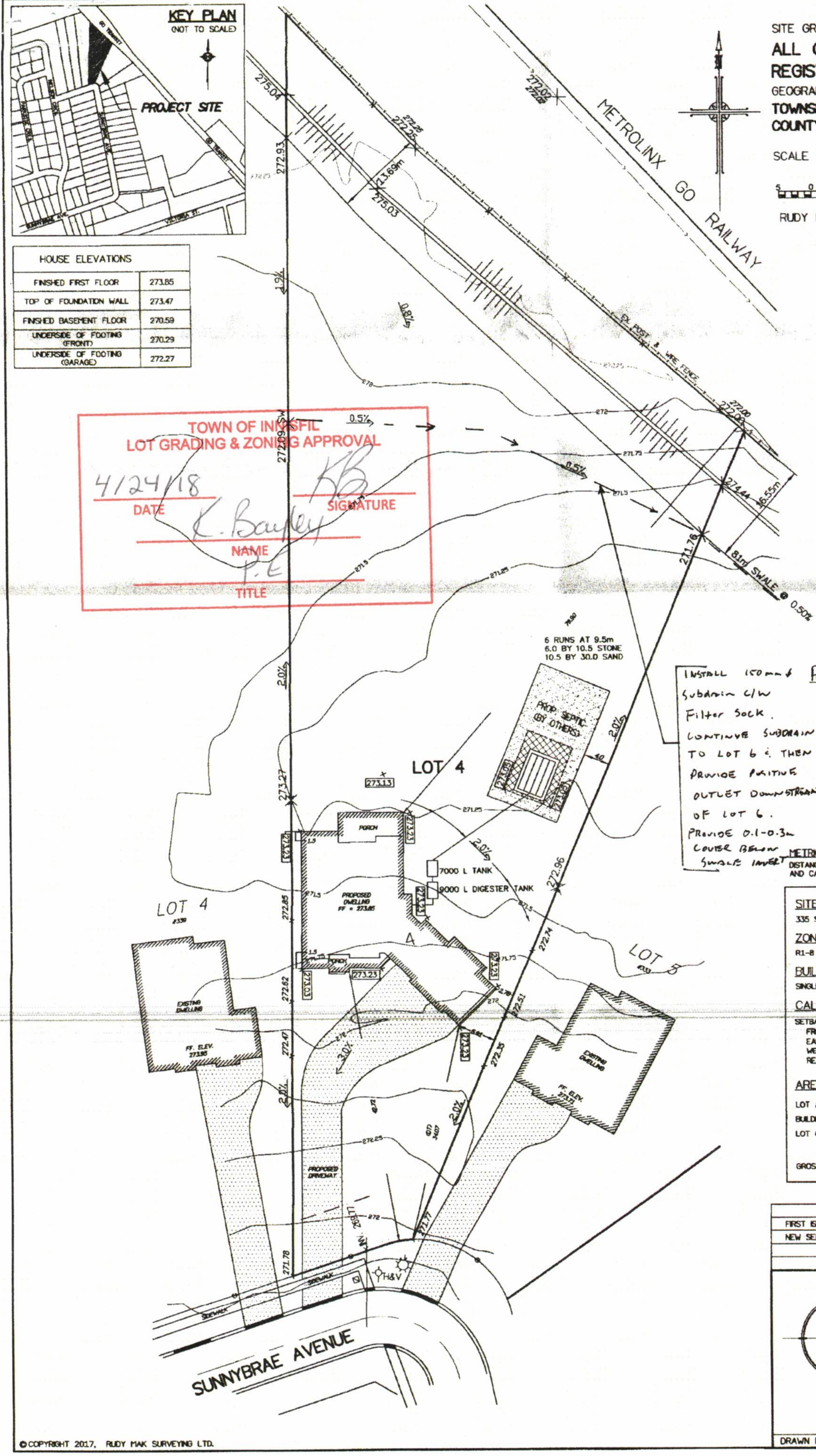
ALL OF LOT 4
REGISTERED PLAN 51M-1045

GEOGRAPHIC TOWNSHIP OF STROUD

TOWNSHIP OF INNISFIL
COUNTY OF SIMCOE

SCALE 1 : 400

RUDY MAK SURVEYING LTD.



HOUSE ELEVATIONS	
FINISHED FIRST FLOOR	273.85
TOP OF FOUNDATION WALL	273.47
FINISHED BASEMENT FLOOR	270.59
UNDERSIDE OF FOOTING (FRONT)	270.29
UNDERSIDE OF FOOTING (GARAGE)	272.27

TOWN OF INNISFIL
LOT GRADING & ZONING APPROVAL

4/24/18
DATE

KB
SIGNATURE

K. Bayley
NAME

P.E
TITLE

GENERAL NOTES

1. CONTRACTOR TO BE RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING UNDERGROUND AND ABOVE GROUND UTILITIES AND SERVICES. BUILDER TO VERIFY SANITARY INVERT ELEVATION AT PROPERTY LINE PRIOR TO GRADE CONSTRUCTION TO ENSURE 2.0% MIN. GRADE FROM EXISTING SERVICE TO BASEMENT. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF ANY DISCREPANCIES PRIOR TO PROCEEDING WITH CONSTRUCTION. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCE NOTICE PRIOR TO ANY DIGGING FOR STAKE OUT. RUDY MAK O.L.S. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.
2. THE BUILDER IS TO INSTALL THE VERTICAL RISER/ CLEANOUTS IN ACCORDANCE TO INNISFIL STD. 1001.02. THE BUILDER MUST ADVISE THE BUILDING DEPARTMENT FOR APPROPRIATE INSPECTIONS.
3. SUMP PUMP TO BE CONNECTED TO STORM SERVICE AS PER TOISD 607.
4. A MINIMUM SEPARATION OF 1.5 METERS BETWEEN WATER SERVICE AND ANY PROPOSED TREES SHALL BE PROVIDED.
5. FOOTINGS BEAR ON NATIVE UNDISTURBED SOIL OR ROCK AND BE A MINIMUM OF 1.22m BELOW FINISHED GRADE
6. SUITABILITY OF FOUNDATION SOILS TO BE CONFIRMED BY A GEO-TECHNICAL ENGINEER.

BENCHMARK

MNR BENCHMARK 001193U4B15 TWP.STROUD ELEV.270.800

TABLET LOCATION: PRESBYTERIAN CHURCH, IN VILLAGE, ABOUT 90m EAST OF TORONTO- NORTH BAY HWY. TABLET IN WEST CONCRETE FOUNDATION WALL OF WEST TOWER, 1.5m FROM S/W CORNER AND 1.37m BELOW CONCRETE BLOCKS.

BOUNDARY

THE BOUNDARY HAS BEEN COMPILED BY NOTES AND RECORDS OF RUDY MAK SURVEYING LTD.

SUBDRAIN ADDED APR. 23/18
WMI

INSTALL 150mm ø SUBDRAIN C/W FILTER SOCK. CONTINUE SUBDRAIN TO LOT 6 & THEN PROVIDE POSITIVE OUTLET DOWNSTREAM OF LOT 6. PROVIDE 0.1-0.3m COVER BELOW SWALE INVERT

Feb15, 2018
DATE

RUDY MAK
ONTARIO LAND SURVEYOR

LEGEND

-■-	DENOTES FOUND SURVEY MONUMENT
-□-	DENOTES PLANTED SURVEY MONUMENT
SIB	DENOTES STANDARD IRON BAR
IB	DENOTES IRON BAR
-x-x-	DENOTES FENCING
2% →	DENOTES FLOW DIRECTION & SLOPE GRADE
• 219.32	DENOTES EXISTING GRADE ELEVATION
x 220.80	DENOTES PROPOSED GRADE ELEVATION

METRIC

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SITE DEVELOPMENT

335 SUNNYBRAE AVENUE

ZONING (BY-LAW 080-13)

R1-8 - RESIDENTIAL 1 ZONE

BUILDING USE

SINGLE DETACHED DWELLING

CALCULATIONS:

SETBACKS:	REQUIRED MIN.	PROPOSED
FRONT YARD:	8.00 M.	34.07 M.
EAST SIDE YARD:	1.50 M.	2.78 M.
WEST SIDE YARD:	1.50 M.	1.50 M.
REAR YARD (WEST):	6.00 M.	79.90 M.

AREA CALCULATIONS:

LOT AREA:	7909.5 SQ.M.
BUILDING:	515.02 SQ.M.
LOT COVERAGE (SEC. 4.2a):	(6.5 %) (35% MAX)
GROSS FLOOR AREA (SEC. 4.2a):	515.02 SQ.M.

REVISION	BY	DATE
FIRST ISSUE	AP	12/18/17
NEW SEPTIC DESIGN	RJH	02/14/18

RUDY MAK SURVEYING LTD.
ONTARIO LAND SURVEYORS

89 BIG BAY POINT ROAD
BARRIE, ONTARIO L4N 8M5 (705) 722-3845
E-MAIL MAIL@MAKSURVEYING.COM

DRAWN BY: AP	CHECK BY: RH	FILE No. 11123 SP (4)

or plumbing for an upper-tier municipality, board of health or conservation authority to whom this application is made, or, c) Director, Building and Development Branch, Ministry of Municipal Affairs and Housing 777 Bay St., 2nd Floor. Toronto, M5G 2E5 (416) 585-6666.

Customer Copy

Schedule 1: Designer Information

Use one form for each individual who reviews and takes responsibility for design activities with respect to the project.

A. Project Information

Building number, street name | Unit no. | Lot/con.

Municipality | Postal code | Plan number/ other description

B. Individual who reviews and takes responsibility for design activities

Name Jason Cheslock | Firm Rumball Excavation and Haulage

Street address 408 Tiffin Street, | Unit no. | Lot/con.

Municipality Barrie | L4N 5W8 | Province ON | E-mail jscheslock@gmail.com

Telephone number (705) 722-1145 | Fax number (705) 735-1701 | Cell number (705) 623-3889

C. Design activities undertaken by individual identified in Section B. [Building Code Table 3.5.2.1. of Division C]

☐ House
☐ Small Buildings
☐ Large Buildings
☐ Complex Buildings
☐ HVAC – House
☐ Building Services
☐ Detection, Lighting and Power
☐ Fire Protection
☐ Building Structural
☐ Plumbing – House
☐ Plumbing – All Buildings
☑ On-site Sewage System

Description of designer's work

D. Declaration of Designer

I Jason Cheslock declare that (choose one as appropriate):
(print name)

☑ I review and take responsibility for the design work on behalf of a firm registered under subsection 3.2.4.of Division C, of the Building Code. I am qualified, and the firm is registered, in the appropriate classes/categories.

Individual BCIN: 10457

Firm BCIN: 15632

☐ I review and take responsibility for the design and am qualified in the appropriate category as an "other designer" under subsection 3.2.5.of Division C, of the Building Code.

Individual BCIN: ____________________

Basis for exemption from registration: ____________________

☐ The design work is exempt from the registration and qualification requirements of the Building Code.

Basis for exemption from registration and qualification: ____________________

I certify that:

1. The information contained in this schedule is true to the best of my knowledge.
2. I have submitted this application with the knowledge and consent of the firm.

February 7, 2018 Date

Signature of Designer

NOTE:

1.For the purposes of this form, "individual" means the "person" referred to in Clause 3.2.4.7(1) d).of Division C, Article 3.2.5.1. of Division C, and all other persons who are exempt from qualification under Subsections 3.2.4. and 3.2.5. of Division C.

2. Schedule 1 is not required to be completed by a holder of a license, temporary license, or a certificate of practice, issued by the Ontario Association of Architects. Schedule 1 is also not required to be completed by a holder of a license to practise, a limited license to practise, or a certificate of authorization, issued by the Association of Professional Engineers of Ontario.

Schedule 2: Sewage System Installer Information

A. Project Information

Building number, street name	Unit number	Lot/con.
Municipality	Postal code	Plan number/ other description

Sewage system installer

Is the installer of the sewage system engaged in the business of constructing on-site, installing, repairing, servicing, cleaning or emptying sewage systems, in accordance with Building Code Article 3.3.1.1, Division C?

☒ Yes (Continue to Section C) No (Continue to Section E) Installer unknown at time of application (Continue to Section E)

Registered installer information (where answer to B is "Yes")

Name Rumball Excavation and Haulage			BCIN 10457
Street address 408 Tiffin Street			Unit number | Lot/con.
Municipality Barrie	Postal code L4N 5W8	Province ON	E-mail jscheslock@gmail.com
Telephone number (705) 722-1145	Fax (705) 735-1701		Cell number (705) 623-3889

Qualified supervisor information (where answer to section B is "Yes")

Name of qualified supervisor(s)	Building Code Identification Number (BCIN)
J Cheslock	10457
R Cheslock	10456

Declaration of Applicant:

I Jason Cheslock declare that:
(print name)

☐ I am the applicant for the permit to construct the sewage system. If the installer is unknown at time of application, I shall submit a new Schedule 2 prior to construction when the installer is known;

OR

☒ I am the holder of the permit to construct the sewage system, and am submitting a new Schedule 2, now that the installer is known.

I certify that:

1. The information contained in this schedule is true to the best of my knowledge.
2. If the owner is a corporation or partnership, I have the authority to bind the corporation or partnership.

January 7, 2018 Date Signature of applicant

Lot 5 (333 Sunnybrae Ave.)
Building Permit No.: 2016-1177

From: Online Building Inspections [moar@innisfil.ca]
Sent: Monday, June 10, 2019 3:36 PM
To: Sigmund
Subject: Innisfil Building Permit Inspection - Permit 2016-1177

Application Number2016-1177
Address 333 SUNNYBRAE AVE
Owner(s): 1820839 ONTARIO INC
Legal description of Property: PLAN 51M1045 LOT 5 Roll Number 010035054150000

Inspected by Todd McCulloch on 2019-06-10
Inspection Type Sewage System - Substantial Completion
Inspection Status Acceptable with o/s deficiencies

Inspection Comments
Maintenance contract required
Alarm test required
As built drawing required for area change

Tanks not installed at time of inspection

Ok to cover bed area

CAUTION You are required to book an inspection when the corrections have been made. Acceptance and approval by a building inspector is required. Construction may not be concealed until the above infractions have been inspected by the Town of Innisfil and accepted by the building inspector. Failure to resolve the outstanding concerns listed above may result in the issuance of an Order, including a Stop Work Order.

New Treatment System Calcs

Rumball Excavation & Haulage
408 Tiffin St
Barrie, Ontario L4N 9W8
(705) 722-1145 Fax (705) 735-1701

February 3, 2019

ANT - IEE Remington A, Lot 5,
Revised Waterloo Baskets

1. "T" of original controlling soil layer 40 min/cm
2. Total "fixture units" value for all dwelling units: 31.5
3. Total number of bedrooms in all dwelling units: 4
4. Total finished floor area in all dwelling units: 327 square meters
5. Total daily design sanitary sewage flow: 3300 liters per day
6. Minimum septic tank size 7000 liters
7. Calculations:

A – is the area in m2
Q – is the daily design sanitary sewage flow in liters
T – is the percolation times of the underlying native soil in min/cm to a max of 50

Stone Area
A = Q/50
A =3300/50
A= 66 m^2

Sand Area
A = Q x T/850
A = (3300x 40)/400
A = 330 m^2

Stone Area	66 m^2
Sand Area	330 m^2

8. Benchmark established as original grade

BCIN Authorization #. 10457

Signature:

ZONING INFORMATION

ZONE DESIGNATION R1-8	PERMITTED	PROVIDED
LOT AREA (sq. m)	1400 (min.)	0868.55
LOT FRONTAGE (m)	17.0 (min.)	10.50m
FRONT YARD SETBACK (m)	8.0 (min.)	27.56m
INT. SIDE YARD (WEST) SETBACK (m)	1.5 (min.)	5.0m
INT. SIDE YARD (EAST) SETBACK (m)	1.5 (min.)	11.3m
REAR YARD SETBACK (m)	6.0 (min.)	77.87m
GROSS FLOOR AREA (sq. m)	N/A	320.35 sq. m
LOT COVERAGE (%)	35.0% (max.)	4.0%
BUILDING HEIGHT (m)	9.0 (max.)	±7.5m

STRUCTURE

MODEL NO.		REMINGTON A
HOUSE STYLE (i.e. walkout, bungalow etc.)		2 STOREY
ADJACENT MODEL	EAST	VACANT
	WEST	SUNNYBRAE AVENUE
	NORTH	VACANT RESIDENTIAL
	SOUTH	VACANT RESIDENTIAL
FIREBREAK LOT		NO

SERVICING CHECK BOX

SERVICES	YES/NO	DEPTH AT P/L	INVERT @ P/L
WATER	YES	2.28	252.03(APPROX)
SANITARY	NO	N/A	N/A
STORM	YES	2.05	200.61

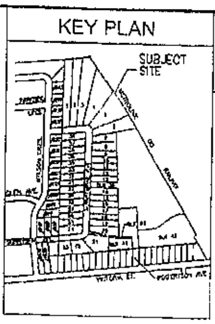
BUILDING ELEV./DETAILS

F.F.	273.71
T.F.W.	273.35
B.T.F.	271.01
U.S.F.	270.76
U.S.F. FRONT	———
U.S.F. REAR	———
T.F.W. GARAGE	273.26
U.S.F. GARAGE	271.58

LEGEND

- SUBJECT PROPERTY
- EXISTING CONTOUR
- PROPOSED CURB
- PROPOSED DWELLING
- PROPOSED DRIVEWAY
- PROP. SEPTIC TANK
- PROPOSED BASEMENT WINDOW LOCATION
- PROP. SEPTIC BED
- PROP. DOWNSPOUT LOCATION
- PROP. STORM SERVICE
- PROP. 45' BEND
- PROP. 25mm PE WATER SERVICE
- PROPOSED CURB STOP
- PROPOSED FIRE HYDRANT
- DIRECTION OF FLOW AND GRADE
- PROP. ELEVATION
- EXISTING ELEVATION
- MAX. 3:1 SLOPE
- PROP. TREE

KEY PLAN



GENERAL NOTES

1. CONTRACTOR TO BE RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING UNDERGROUND AND ABOVE GROUND UTILITIES ANDS SERVICES. BUILDER TO VERIFY SANITARY INVERT ELEVATION AT PROPERTY LINE PRIOR TO CONSTRUCTION TO ENSURE 2.0% MIN. GRADE FROM EXISTING SERVICE TO BASEMENT. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF ANY DISCREPANCIES PRIOR TO PROCEEDING WITH CONSTRUCTION. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCE NOTICE PRIOR TO ANY DIGGING FOR STAKE OUT. RUDY MAK O.L.S. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.
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4. A MINIMUM SEPARATION OF 1.5 METRES BETWEEN THE WATER SERVICE AND ANY PROPOSED TREES SHALL BE PROVIDED.
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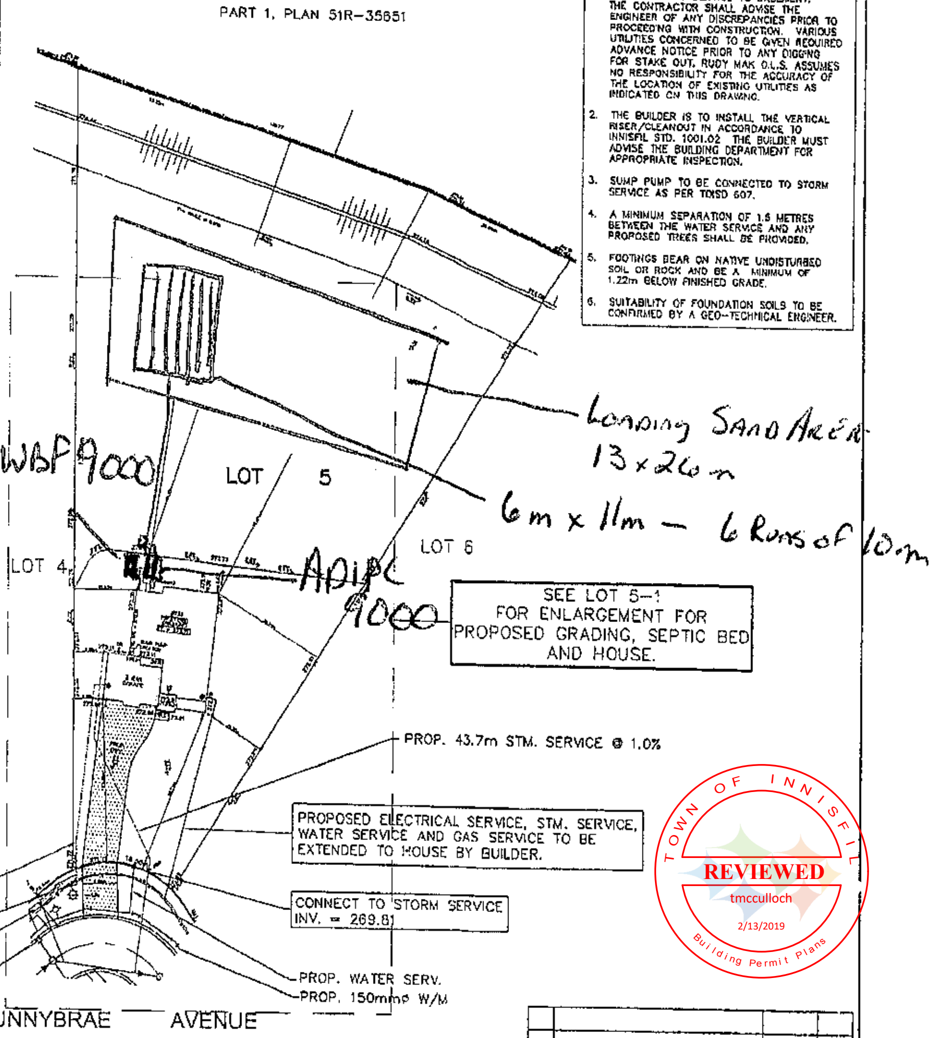
6. SUITABILITY OF FOUNDATION SOILS TO BE CONFIRMED BY A GEO-TECHNICAL ENGINEER.



Loading Sand Area 13 x 26 m

6m x 11m – 6 Runs of 10 m

WBP 9000

ADIPC 9000

SEE LOT 5-1 FOR ENLARGEMENT FOR PROPOSED GRADING, SEPTIC BED AND HOUSE.

PROP. 43.7m STM. SERVICE @ 1.0%

PROPOSED ELECTRICAL SERVICE, STM. SERVICE, WATER SERVICE AND GAS SERVICE TO BE EXTENDED TO HOUSE BY BUILDER.

CONNECT TO STORM SERVICE INV. = 269.81

PROP. SECONDARY ELECTRICAL SERVICE

PROP. CTV

PROP. GAS

PROP. CURB AS PER OPSD 600.06

PROP. WATER SERV.

PROP. 150mmø W/M

TOWN OF INNISFIL
REVIEWED
tmcculloch
2/13/2019
Building Permit Plans

BENCHMARK

[illegible]

NO.	REVISIONS	DATE	INITIAL
1	FIRST SUBMISSION	DEC. 13/16	R.M.

RUDY MAK SURVEYING LTD.
ONTARIO LAND SURVEYORS

O.L.S. STAMP

RM

TO BE STAMPED BY ONTARIO LAND SURVEYOR

THE PROPOSED LOT GRADING IS APPROVED AS BEING IN GENERAL CONFORMITY WITH THE OVERALL APPROVED GRADING PLAN FOR THE SUBDIVISION.

COMPANY NAME: RUDY MAK SURVEYING LTD.
APPROVED BY: RUDY MAK
SIGNATURE: RM
DATE: DEC. 13, 2016

TO BE COMPLETED BY ONTARIO LAND SURVEYOR

#333 SUNNYBRAE AVENUE
LOT 5, OF PLAN 51M-
INNISFIL EXECUTIVE ESTATES
TOWN OF INNISFIL

SCALE: 1:750
DATE: DEC. 13, 2016
DRAWN: GEMCAD INC.
DESIGNED: R.M.

DWG. NO.
LOT 5

Lot 6 (331 Sunnybrae Ave.)
Building Permit No.: 2017-0701

From: Peter Slusarczyk [moarinnisfil@gmail.com]
Sent: Friday, January 25, 2019 8:20 AM
To: Sigmund
Subject: Innisfil Building Permit Inspection - Permit 2017-0701

Application Number2017-0701
Address 331 SUNNYBRAE AVE
Owner(s): EZEKIEL TRACY LYNN
Legal description of Property: PLAN 51M1045 LOT 6 Roll Number 010035054160000

Inspected by Peter Slusarczyk on 2019-01-25 00:00:00.000
Inspection Type Sewage System - Substantial Completion
Inspection Status Acceptable with o/s deficiencies

Inspection Comments
-Maintenance contract received.
-Alarm test conducted.
-As built received.

Call for Final inspection when erosion control in place.

CAUTION You are required to book an inspection when the corrections have been made. Acceptance and approval by a building inspector is required. Construction may not be concealed until the above infractions have been inspected by the Town of Innisfil and accepted by the building inspector. Failure to resolve the outstanding concerns listed above may result in the issuance of an Order, including a Stop Work Order.

ZONING INFORMATION

ZONE DESIGNATION R1-8	PERMITTED	PROVIDED
LOT AREA (sq. m)	1400 (min.)	6868.55
LOT FRONTAGE (m)	17.0 (min.)	18.58m
FRONT YARD SETBACK (m)	8.0 (min.)	25.02m
INT. SIDE YARD (WEST) SETBACK (m)	1.5 (min.)	4.32m
INT. SIDE YARD (EAST) SETBACK (m)	1.5 (min.)	4.25m
REAR YARD SETBACK (m)	6.0 (min.)	82.70m
GROSS FLOOR AREA (sq. m)	N/A	343.37sq. m
LOT COVERAGE (%)	35.0% (max.)	4.8%
BUILDING HEIGHT (m)	9.0 (max.)	6.05m

STRUCTURE

MODEL NO.		KENTWOOD B
HOUSE STYLE (i.e. walkout, bungalow etc.)		BUNGALOW
ADJACENT MODEL	EAST	VACANT
	WEST	SUNNYBRAE AVENUE
	NORTH	VACANT RESIDENTIAL
	SOUTH	VACANT RESIDENTIAL
FIREBREAK LOT		NO

SERVICING CHECK BOX

SERVICES	YES/NO	DEPTH AT P/L	INVERT @ P/L
WATER	YES	2.28	269.37(APPROX)
SANITARY	NO	N/A	N/A
STORM	YES	2.05	269.60

BUILDING ELEV./DETAILS

F.F.	273.52
T.F.W.	273.16
B.T.F.	270.51
U.S.F.	270.26
U.S.F. FRONT	———
U.S.F. REAR	———
T.F.W. GARAGE	273.07
U.S.F. GARAGE	271.39

LEGEND

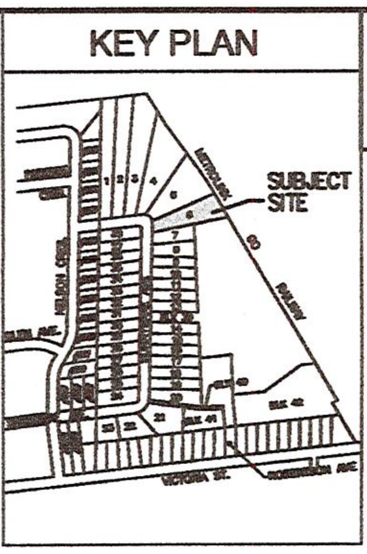
———	SUBJECT PROPERTY
200.00	EXISTING CONTOUR
═══	PROPOSED CURB
▭	PROPOSED DWELLING
▨	PROPOSED DRIVEWAY
-□-	PROP. SEPTIC TANK
OW	PROPOSED BASEMENT WINDOW LOCATION
▦	PROP. SEPTIC BED
—●	PROP. DOWNSPOUT LOCATION
———	PROP. STORM SERVICE
╭	PROP. 45° BEND
—·—·—	PROP. 25mmø PE WATER SERVICE
●	PROPOSED CURB STOP
◈	PROPOSED FIRE HYDRANT
2.0%	DIRECTION OF FLOW AND GRADE
282.40 / 282.40	PROP. ELEVATION EXISTING ELEVATION
┬┬┬┬	MAX. 3:1 SLOPE
⊕	PROP. TREE

BENCHMARK

MNR BENCHMARK: [illegible] TYP.: STROUD ELEV.: [illegible]

TABLET LOCATION: PRESBYTERIAN CHURCH, IN VILLAGE, ABOUT [illegible] EAST OF TORONTO–NORTH BAY HWY. TABLET IN WEST CONCRETE FOUNDATION WALL OF WEST TOWER, 1.8m FROM S/W CORNER AND 1.37m BELOW CONCRETE BLOCKS.

KEY PLAN



GENERAL NOTES

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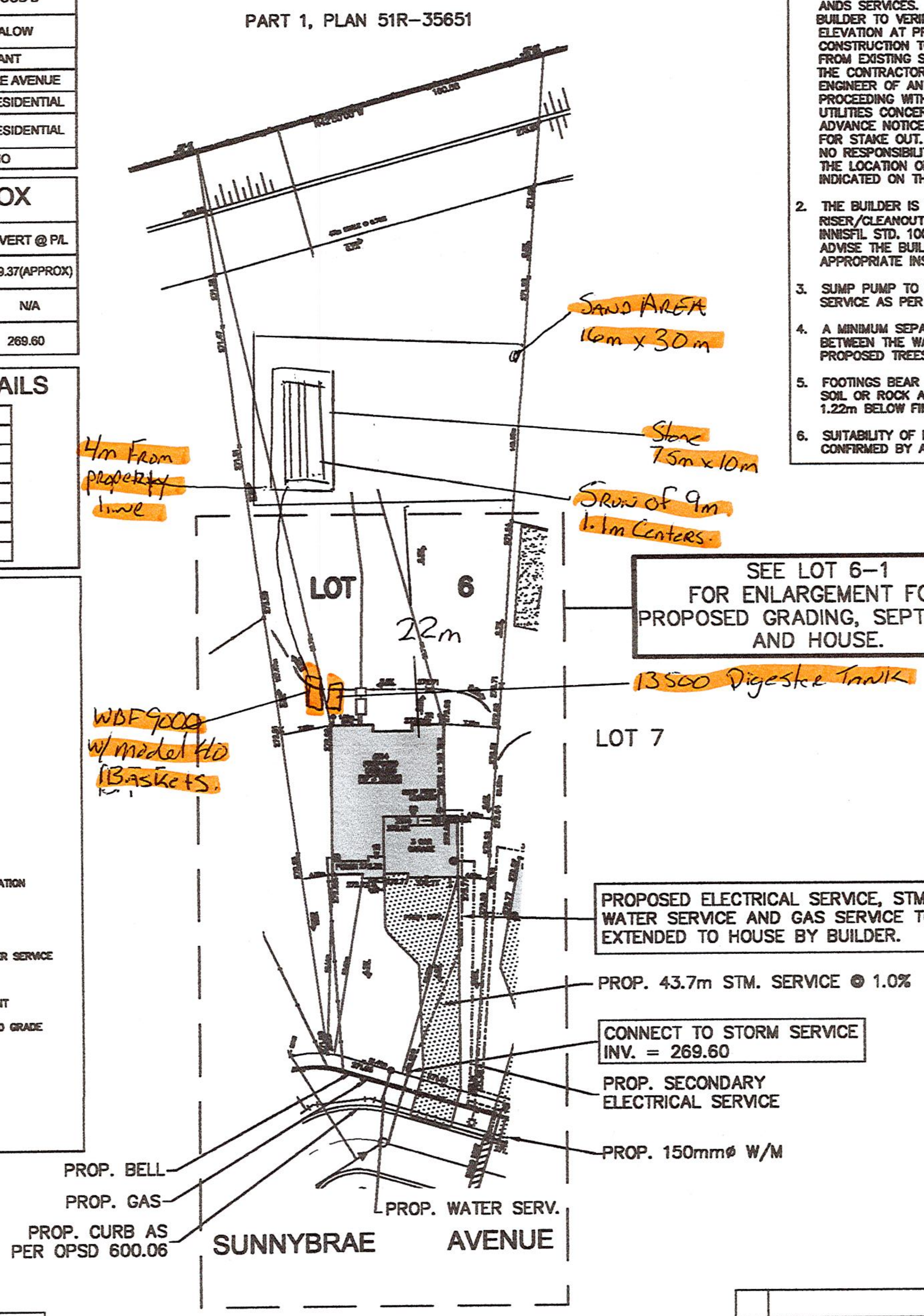
3. SUMP PUMP TO BE CONNECTED TO STORM SERVICE AS PER TOISD 607.
4. A MINIMUM SEPARATION OF 1.5 METRES BETWEEN THE WATER SERVICE AND ANY PROPOSED TREES SHALL BE PROVIDED.
5. FOOTINGS BEAR ON NATIVE UNDISTURBED SOIL OR ROCK AND BE A MINIMUM OF 1.22m BELOW FINISHED GRADE.
6. SUITABILITY OF FOUNDATION SOILS TO BE CONFIRMED BY A GEO-TECHNICAL ENGINEER.



NO.	REVISIONS	DATE	INITIAL
1	FIRST SUBMISSION	JAN. 23/17	R.M.

RUDY MAK
SURVEYING LTD.
ONTARIO LAND SURVEYORS

O.L.S. STAMP

TO BE STAMPED BY
ONTARIO LAND SURVEYOR

THE PROPOSED LOT GRADING IS APPROVED AS BEING IN GENERAL CONFORMITY WITH THE OVERALL APPROVED GRADING PLAN FOR THE SUBDIVISION.

COMPANY NAME: RUDY MAK SURVEYING LTD.
APPROVED BY: RUDY MAK
SIGNATURE:
DATE: JAN. 23, 2017

TO BE COMPLETED BY
ONTARIO LAND SURVEYOR

#331 SUNNYBRAE AVENUE
LOT 6, OF PLAN 51M-
INNISFIL EXECUTIVE ESTATES
TOWN OF INNISFIL

SCALE: 1:750
DATE: JAN. 23, 2017
DRAWN: GEMCAD INC.
DESIGNED: R.M.

DWG. NO.
LOT 6

Lot 13 (303 Sunnybrae Ave.)
Building Permit No.: 2018-0871

Innisfil

BUILDING PERMIT

Number: 2018-0871

Schedule a Building Inspection:
Please book your inspection(s) online by clicking this link: www.innisfil.ca/eservices
or Email: buildinginspections@innisfil.ca or Leave a phone message at: 705-436-3710 Ext. 3500

Applicant :	Sigmund Tronowicz, Ant Construction
Owner :	1820839 ONTARIO INC
Legal Description :	PLAN 51M1045 LOT 13
Roll Number :	010035054230000

Inspections Required:

- Sewage System - Readiness to Construct
- Sewage System - Substantial Completion
- Notice of Completion

Conditions/Remarks:

New Septic Installation

WATER_LOO Wire mesh basket

-Maintenance agreement required

-As built required

-Provide granular analysis for native and imported soil prior to install inspection.

-Ensure header and distribution piping is able to be detected magnetically via 14 gauge tracer wire or other means.

-Ensure distribution piping and septic tank are minimum distance from all wells and property lines

Page 2 of 2

Innisfil

BUILDING PERMIT

Number: 2018-0871

Project Location : 303 SUNNYBRAE AVE

Work Type : Septic

ATTENTION :

1. Owner/agent is required to arrange for all required site inspections as listed on this permit. Book your Inspection online at www.innisfil.ca/eservices two business days in advance of the preferred date of inspection.
2. Owner/agent is also required to be aware of the list of inspections and notes to this permit indicated on the next page(s) and also be aware of any notes/marks in red on the attached plans and/or documents.
3. All plans and/or documents attached to this permit form part of this permit and are to remain on site and available to the Inspector.
4. Owner/agent is required to comply with the Ontario Building Code and any other applicable law at all times.

DEC-17 2018

Date

for Chief Building Official (signature)

Community Development Standards Branch

Town of Innisfil 2101 Innisfil Beach Rd Innisfil, ON L9S 1A1 705-436-3710 888-436-3710

www.innisfil.ca

From: Online Building Inspections [moar@innisfil.ca]
Sent: Thursday, September 19, 2019 4:12 PM
To: Sigmund
Subject: Innisfil Building Permit Inspection - Permit 2018-0871

Application Number2018-0871
Address 303 SUNNYBRAE AVE
Owner(s): 1820839 ONTARIO INC
Legal description of Property: PLAN 51M1045 LOT 13 Roll Number 010035054230000

Inspected by Todd McCulloch on 2019-09-19
Inspection Type Sewage System - Substantial Completion
Inspection Status Acceptable with o/s deficiencies

Inspection Comments
Maintenance contract required
Alarm test required
As built required
Appears as per approved drawings

Tanks not hooked to house at time of inspection

Ok to cover

CAUTION You are required to book an inspection when the corrections have been made. Acceptance and approval by a building inspector is required. Construction may not be concealed until the above infractions have been inspected by the Town of Innisfil and accepted by the building inspector. Failure to resolve the outstanding concerns listed above may result in the issuance of an Order, including a Stop Work Order.

Lot 14 (288 Sunnybrae Ave.)
Building Permit No.: 2018-0850

Innisfil

BUILDING PERMIT

Number: 2018-0850

Project Location : 288 SUNNYBRAE AVE

Work Type : New Septic

ATTENTION :

1. Owner/agent is required to arrange for all required site inspections as listed on this permit. Book your Inspection online at www.innisfil.ca/eservices two business days in advance of the preferred date of inspection.
2. Owner/agent is also required to be aware of the list of inspections and notes to this permit indicated on the next page(s) and also be aware of any notes/marks in red on the attached plans and/or documents.
3. All plans and/or documents attached to this permit form part of this permit and are to remain on site and available to the Inspector.
4. Owner/agent is required to comply with the Ontario Building Code and any other applicable law at all times.

DEC 17, 2018
Date

for Chief Building Official (signature)

Community Development Standards Branch
Town of Innisfil 2101 Innisfil Beach Rd Innisfil, ON L9S 1A1 705-436-3710 888-436-3710
www.innisfil.ca

Jackie Coughlin

From:	Moar Automation [moar@innisfil.ca]
Sent:	Thursday, December 5, 2019 3:48 PM
To:	Sigmund
Subject:	Innisfil Building Permit Inspection - Permit 2017-0651

Application Number2017-0651
Address 295 SUNNYBRAE AVE
Owner(s): 1820839 ONTARIO INC
Legal description of Property: PLAN 51M1045 LOT 14 Roll Number 010035054240000

Inspected by Ryan Dobie on 2019-12-05
Inspection Type Sewage System - Substantial Completion
Inspection Status Acceptable with o/s deficiencies

Inspection Comments
Setbacks appear to comply to OBC
Appears as per approved drawings
Alarm test required
Maintenance contract required

Ok to cover

CAUTION You are required to book an inspection when the corrections have been made. Acceptance and approval by a building inspector is required. Construction may not be concealed until the above infractions have been inspected by the Town of Innisfil and accepted by the building inspector. Failure to resolve the outstanding concerns listed above may result in the issuance of an Order, including a Stop Work Order.

Lot 23 (255 Sunnybrae Ave.)
Building Permit No.: 2019-0202

Innisfil

BUILDING PERMIT

Number: 2019-0202

Project Location : 255 SUNNYBRAE AVE

Work Type : Septic

ATTENTION :

1. Owner/agent is required to arrange for all required site inspections as listed on this permit. Book your Inspection online at www.innisfil.ca/eservices two business days in advance of the preferred date of inspection.
2. Owner/agent is also required to be aware of the list of inspections and notes to this permit indicated on the next page(s) and also be aware of any notes/marks in red on the attached plans and/or documents.
3. All plans and/or documents attached to this permit form part of this permit and are to remain on site and available to the Inspector.
4. Owner/agent is required to comply with the Ontario Building Code and any other applicable law at all times.

June 11, 2019

Date

for Chief Building Official (signature)

Community Development Standards Branch

Town of Innisfil 2101 Innisfil Beach Rd Innisfil, ON L9S 1A1 705-436-3710 888-436-3710

www.innisfil.ca

BUILDING PERMIT

Number: 2019-0202

Schedule a Building Inspection:

Please book your inspection(s) online by clicking this link: www.innisfil.ca/eservices
or Email: buildinginspections@innisfil.ca or Leave a phone message at: 705-436-3710 Ext. 3500

Applicant :	Jason Cheslock, Rumball Excavation
Owner :	1820839 ONTARIO INC
Legal Description :	PLAN 51M1045 LOT 23
Roll Number :	010035054330000

Inspections Required:

- Sewage System - Readiness to Construct
- Sewage System - Substantial Completion
- Notice of Completion

Conditions/Remarks:

New Septic Installation
Water-Loo Biofilter Basket BA-30

-Maintenance agreement required for treatment system

-Ensure header and distribution piping is able to be detected magnetically via 14 gauge tracer wire or other means.

-Ensure distribution piping and septic tank are minimum distance from all wells.

Rumball Excavation & Haulage
408 Tiffin Street
Barrie, Ontario L4N 9W8
(705) 722-1145

February 25, 2019

Lauren Kelley Residence
Waterloo Baskets Model BA30

1. "T" of original controlling soil layer 50 min/cm

2. Total "fixture units" value for all dwelling units: 31

3. Total number of bedrooms in all dwelling units: 4

4. Total finished floor area in all dwelling units: 243 square meters

5. Total daily design sanitary sewage flow: 2550 liters per day

6. Calculations:

A – is the area in m2
Q – is the daily design sanitary sewage flow in liters
T – is the percolation times of the underlying native soil in min/cm to a max of 50

Stone Layer
$A = Q/75$
$A = 2550/75$
$A = 34\ m^2$

Sand Layer
$A = Q \times T/400$
$A = (2550 \times 50)/400$
$A = 320\ m^2$

Minimum Stone layer Area – 34 m² to a minimum depth of 250 mm
Minimum Sand layer Area – 320 m² to minimum depth of 250 mm

BCIN Authorization #. 10457

Signature:

Rumball Excavation & Haulage
408 Tiffin St
Barrie, Ontario L4N 9W8
(705) 722-1145 Fax (705) 735-1701

February 25, 2019

IEE, Lauren Kelley Residence

Total Daily Design Sanitary Sewage Flow Rate Calculations

Fixture Count	Units
Basement	
1 – 3 piece	6
Main Floor	
Kitchen Sink	1.5
Dishwasher	1.5
Laundry Tub	1.5
Washer	1.5
1 - 4 piece	7.5
1 - 3 Piece	6
1 - 2 piece	5.5
	TOTAL 31

4 Bedrooms – 2000 L/D
Fixture Count 31 = 550 L/D
243 m² = 500 L/D
Q = 2550
T = 50

Town
of
Innisfil

Do Not Complete
Permit No ______________
Revision No ____________

Date ________________

Schedule 3
Proposed Services

1. Engineered
   - ☐ Yes
   - ☐ No

2. Water supply
   - ☐ Proposed
   - ☑ Existing

3. Type of work proposed
   - ☑ New Installation
   - ☐ Replacement
   - ☐ Alteration

4. Type of Well
   - ☐ Dug/bored/Sandpoint well
   - ☐ Drilled well
   - ☑ Municipal
   - ☐ Other

5. Residential Sewage Design Flow Info.

Bedrooms 4
House (floor area) 243 m²
People ______
Total Fixture Units 31 (Schedule 7)
Residential Flow 2550 L/day

6. Sewage Design Flow for Other Occupancies

Design Flow ________________ L/day
Detailed sewage flow calculations:
____
____
____

7. Type of System
   - ☐ Treatment Unit ________________
   - ☐ Class 2 – Leaching Pit
   - ☐ Class 3 – Cesspool
   - ☐ Class 4 – Shallow Buried Trench
   - ☐ Class 4 – Trench
     - ☐ Fully raised
     - ☐ Partially raised
     - ☐ In-ground
   - ☐ Class 4 – Filter Media
     - ☐ Fully raised
     - ☐ Partially raised
     - ☐ In-ground
   - ☑ Class 4 – Area Bed
     - ☐ Fully raised
     - ☑ Partially raised
     - ☐ In-ground
   - ☐ Class 4 – Aerobic with Trench
     - ☐ Fully raised
     - ☐ Partially raised
     - ☐ In-ground
   - ☐ Class 4 – Aerobic with Filter Media
     - ☐ Fully raised
     - ☐ Partially raised
     - ☐ In-ground
   - ☐ Class 5 – Holding Tank

Do Not Complete
Permit No ____________
Revision No ____________
Date ____________

Schedule 4
Sewage System Details

Type of System WATERLOO Biofilter (Schedule 4)

Septic/Holding Tank 6135 L

Septic Tank Effluent Filter Digester tank

Treatment Unit – Make & Model WATERLOO Biofilter Basket BA30

Number of Units 1

Refer to Typical Drawing ____________

Mantle Information:

Native or imported =15m in 1 direction(s)

Slope subgrade 2 % slope

1 direction(s)

Pump(s) required yes

Pump Rate 100 L/15min

Note: Alarm required for all pumping systems

Site to be Scarified (If in clay) [✓ YES] / NO

Clay Seal Required (If in bedrock) YES / [✓ NO]

☐ **Trench**

Distribution Pipe Length ________ m

Loading Area ________ m²

Type of Chamber ________

Length of Chamber ________ m

☐ **Area Bed**

Stone 34 m²

Sand 320 m²

Pipe 30m m

☐ **Shallow Buried Trench**

Pipe Length ________ m

☐ **Filter Media Bed**

Stone ________ m²

Extended Base ________ m²

Pipe ________ m

Weight of Filter Media ________ Kg

Loading Area ________ m²

Construction Notes: Base Cut 600mm

INNISFIL

Do Not Complete
Permit No ____________
Revision No ____________
Date ____________

Schedule 6
Fixture unit count

Fixtures	# Existing	+	# Proposed	X	unit count	=	Fixture Count
Bathroom							
Bathroom group (toilet, sink and tub or shower) with flush tank		+	3	X	6	=	18
Bathtub with/without overhead shower		+	1	X	1.5	=	1.5
Shower stall		+		X	1.5	=	
Wash basin (1½inch trap)		+	1	X	1.5	=	1.5
Watercloset (toilet) tank operated		+	1	X	4	=	4
Bidet		+		X	1	=	
Kitchen							
Dishwasher		+	1	X	1	=	1
Sink with/without garbage grinder(s), domestic and other small type single, double or 2 single with a common trap		+	1	X	1.5	=	1.5
Other							
Domestic washing machine		+	1	X	1.5	=	1.5
Combination sink and laundry tray single or double (Installed on 1½ trap)		+	1	X	1.5	=	1.5

Total: 30.5

Insert the TOTAL in section 5 of Schedule 4 (0.Reb.403/97 Table 7.4.9.3)

1. Sump pumps and floor drains are not to be connected to the sewage system. Connection of such fixtures to a sewage system may lead to a hydraulic failure of the said system. The above mentioned fixtures should be discharged separately to an approved Class 2 (leaching pit) sewage system.
2. Where laundry waste is not more than 20% of the total daily design sanitary sewage flow, it may discharge to a sewage system (Part 8, OBC, 8.1.3.1(2)).

Agent/Owner signature

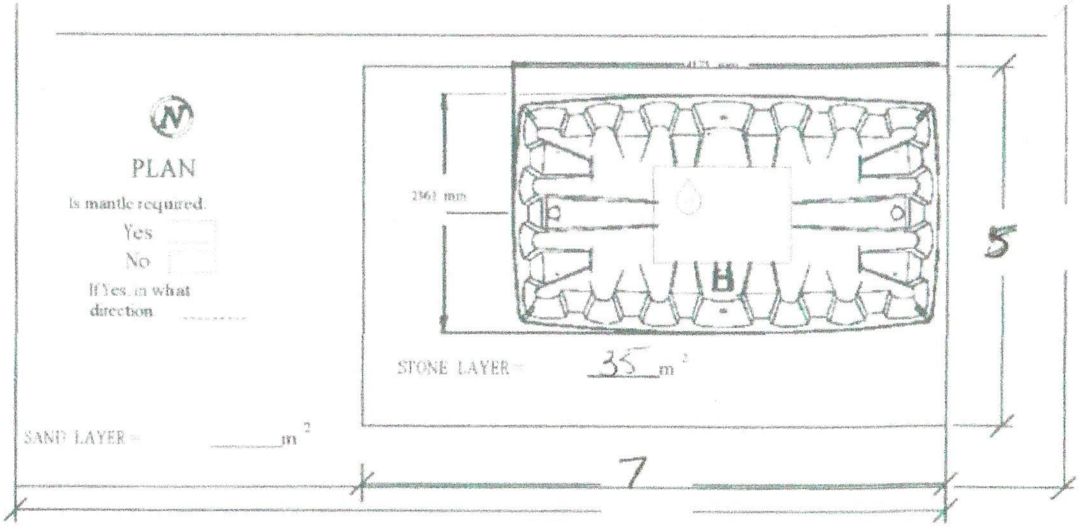
FEB 25 2019
Date

SCHEDULE 10 - TYPICAL DRAWING D

BIOFILTER METHOD

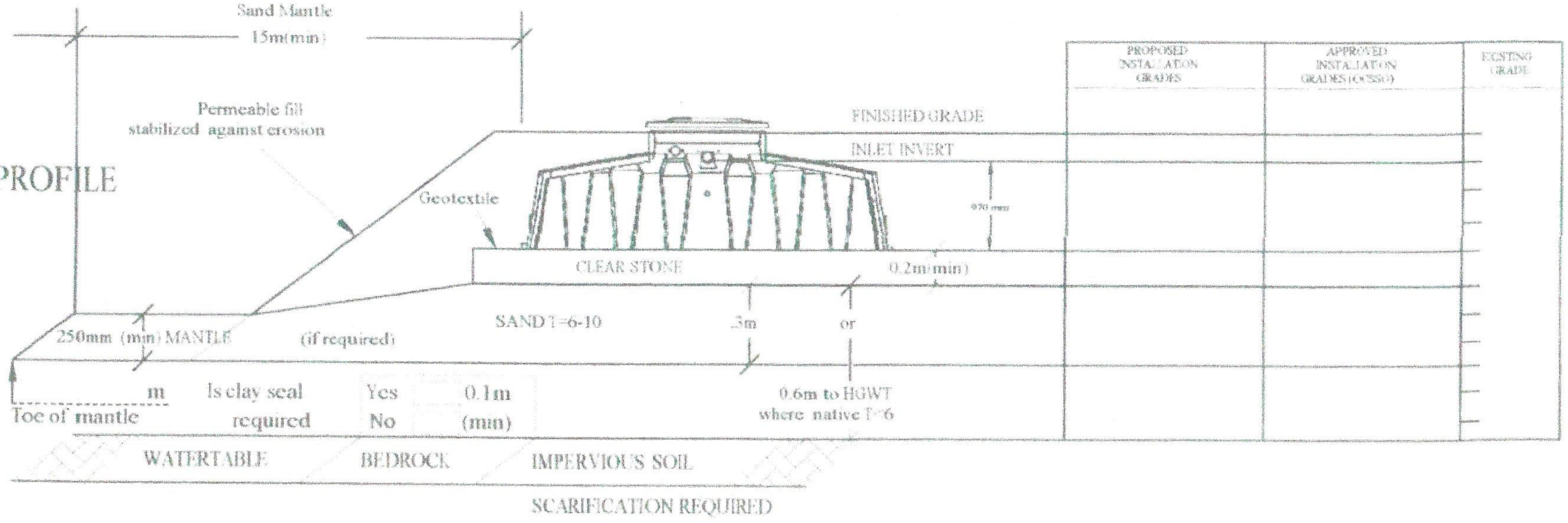
Septic Permit # ____________
Date ____________
Revision ____________
Applicant ____________
Municipality ____________
Scarification required Yes ☐ No ☐

____________ ____________
DATE INSPECTOR



NOT TO SCALE

PROFILE



Lot 26 (255 Sunnybrae Ave.)
Building Permit No.: 2018-0921

Innisfil

BUILDING PERMIT

Number: 2018-0921

Project Location : 280 SUNNYBRAE AVE

Work Type : Septic

ATTENTION :

1. Owner/agent is required to arrange for all required site inspections as listed on this permit. Book your Inspection online at www.innisfil.ca/eservices two business days in advance of the preferred date of inspection.
2. Owner/agent is also required to be aware of the list of inspections and notes to this permit indicated on the next page(s) and also be aware of any notes/marks in red on the attached plans and/or documents.
3. All plans and/or documents attached to this permit form part of this permit and are to remain on site and available to the Inspector.
4. Owner/agent is required to comply with the Ontario Building Code and any other applicable law at all times.

December 21, 2018

Date

for Chief Building Official (signature)

Community Development Standards Branch

Town of Innisfil 2101 Innisfil Beach Rd Innisfil, ON L9S 1A1 705-436-3710 888-436-3710

www.innisfil.ca

BUILDING PERMIT

Number: 2018-0921

Schedule a Building Inspection:

Please book your inspection(s) online by clicking this link: www.innisfil.ca/eservices
or Email: buildinginspections@innisfil.ca or Leave a phone message at: 705-436-3710 Ext. 3500

Applicant :	Andrea Kelly
Owner :	1820839 ONTARIO INC
Legal Description :	PLAN 51M1045 LOT 26
Roll Number :	010035054360000

Inspections Required:

- Sewage System - Readiness to Construct
- Sewage System - Substantial Completion
- Notice of Completion

Conditions/Remarks:

New Septic Installation for new SFD

Water-Loo Treatment system

Maintenance agreement required

Ensure header and distribution piping is able to be detected magnetically via 14 gauge tracer wire or other means.

Ensure distribution piping and septic tank are minimum distance from all wells and property lines

Rumball Excavation & Haulage
408 Tiffin St
Barrie, Ontario L4N 9W8
(705) 722-1145 Fax (705) 735-1701

November 27, 2018

ANT - IEE, Lot 26, Sunnybrae, The Belcourt A

1. "T" of original controlling soil layer 50 min/cm
2. Total "fixture units" value for all dwelling units: 32
3. Total number of bedrooms in all dwelling units: 4
4. Total finished floor area in all dwelling units: 272 square meters
5. Total daily design sanitary sewage flow: 2800 liters per day
6. Minimum septic tank size 6150 liters
7. Calculations:

A – is the area in m2
Q – is the daily design sanitary sewage flow in liters
T – is the percolation times of the underlying native soil in min/cm to a max of 50

Stone Area
A = Q/75
A =2800/75
A= 38 m²

Sand Area
A = Q x T/400
A = (2800x 50)/400
A = 350 m²

Minimum Stone Area	38 m²
Minimum Sand Area	350 m²

8. Benchmark established as original grade

Loading Rates for fill based absorption trenches and filter beds

Table 8.7.4.1.A

BCIN Authorization #. 10457

Signature:

Rumball Excavation & Haulage
408 Tiffin St
Barrie, Ontario L4N 9W8
(705) 722-1145 Fax (705) 735-1701

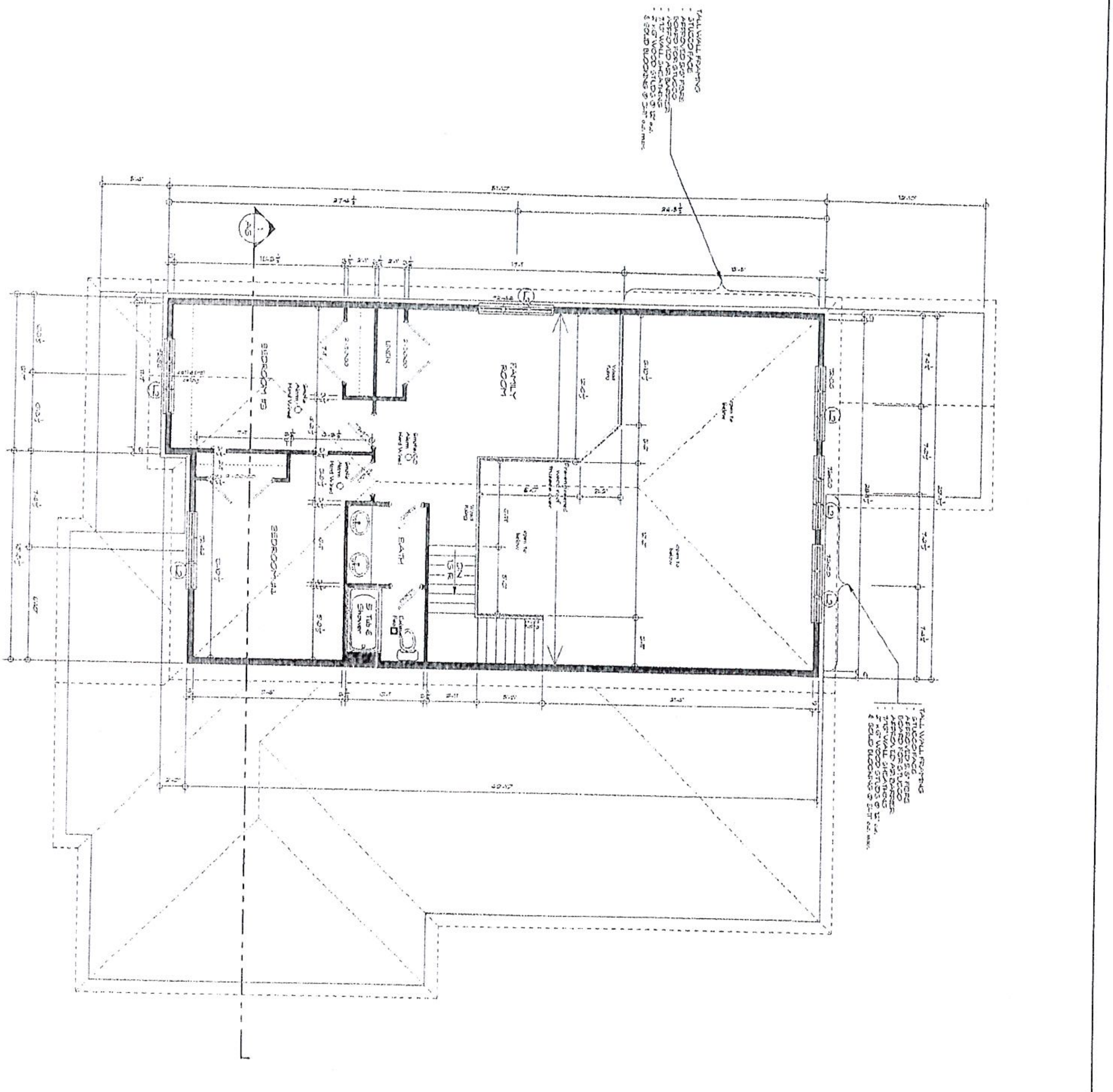
November 27, 2018

ANT - IEE, Lot 26, Sunnybrae, The Belcourt A

Total Daily Design
Sanitary Sewage Flow Rate
Calculations

Fixture Count	Units
Basement	
1 – 3 piece	6
Main Floor	
Kitchen Sink	1.5
Dishwasher	1.5
Laundry Tub	1.5
Washer	1.5
Bidet	1
1 - 4 piece	7.5
1 - 2 piece	5.5
Second Floor	
1 – 3 piece	6
	TOTAL 32

4 Bedrooms – 2000 L/D
Fixture Count 32 = 600 L/D
272 m² = 800 L/D
Q = 2800
T = 50



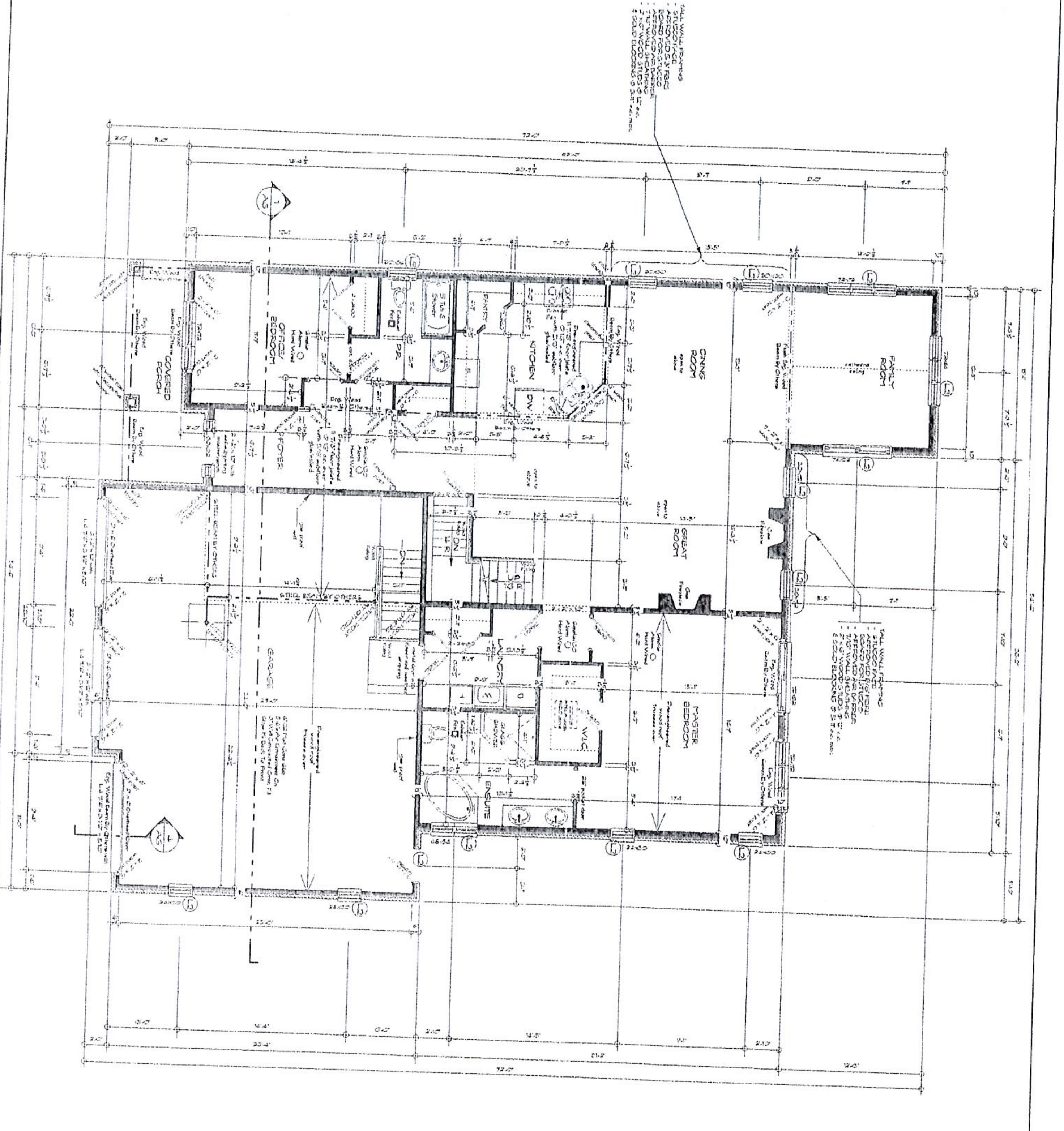
The Belcourt A

(1

Date 2013-12-01	A3	Sheet title 2nd FLOOR PLAN A - 779 Sq. Ft.		
Scale 3/16" = 1-0"	13-035	Project NEW 2 STOREY FOR INNISFIL ESTATES		
Drawn By J. LUCAS	2922 SQ. FT. 398 SQ. FT.			

LUCAS DRAFTING

21 Monique Cres.
Barrie, ON, L4M 6Y3
Tel/Fax: 705-725-0409



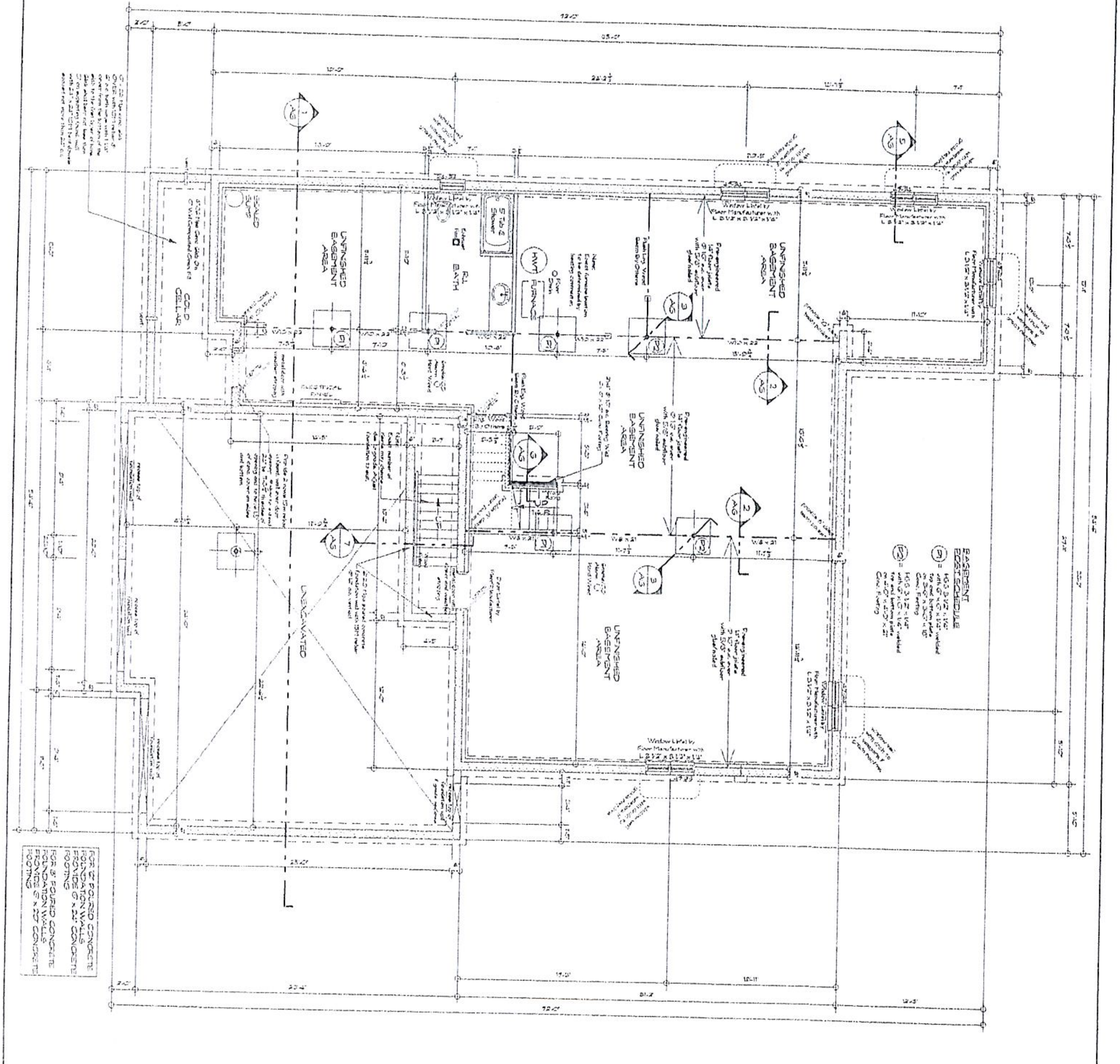
The Belcourt A

Date 2013-12-01
A2
Scale 3/16" = 1'-0"
13-025
Drawn By J. LUCAS
2922 SQ. FT.
3133 SQ. FT.

Sheet Name FLOOR PLAN A - 2143 Sq. Ft.

Project NEW 2 STOREY FOR
INNISFIL ESTATES

LUCAS
DRAFTING
21 Monique Cres.
Barrie, ON, L4M 6Y3



The Belcourt A

Date 2013-12-01	Sheet No. A1	Sheet Name BASEMENT	LUCAS DRAFTING
Scale 3/16" = 1'-0"	Project No. 13-033	Project NEW 2 STOREY FOR INNISFIL ESTATES	21 Montague Cres. Barrie, ON, L4M 6Y5
Drawn By J. LUCAS	2922 SQ. FT. 3128 SQ. FT.		

Lot 33

Schedule 3: Sewage System Design Specifications

Proposed Sewage System ☑ Residential ☐ Commercial

☑ New Install ☐ Replacement ☐ Repair/Alteration

Proposed Type of Sewage System

☐ CLASS 2 – Greywater System ☐ CLASS 3 – Cesspool

☑ CLASS 4 – Leaching Bed System ☐ CLASS 5 – Holding Tank

Building Information

Plumbing Fixtures

Description	Existing	+	Proposed	=	Total	x	Fixture Units	=	Count
Example; Sink	0	+	1	=	1	x	1.5	=	1.5
Bathroom Group – Toilet/Sink/Shower		+	4	=	4	x	6	=	24
Sinks/Wash Basins									
Bathtub/Showers		+	1	=	1	x	1.5	=	1.5
Toilets (flush tank)		+	1	=	1	x	1.5	=	1.5
Dishwasher		+		=		x	4	=	
Laundry Tub/Washing Machine		+	1	=	1	x	1.5	=	1.5
Other:		+	2	=	2	x	1.5	=	3
		+		=		x		=	
							TOTAL FIXTURE UNITS	=	31.5

FINISHED FLOOR AREA = 272 m²

Design Flow Calculations (Q)

BEDROOM FLOWS

	# of Bedrooms	Volume (Litres)	Total Flow
A	1 Bedroom	750	
	2 Bedrooms	1100	
	3 Bedrooms	1600	
	4 Bedrooms	2000	2000
	5 Bedrooms	2500	
ADDITIONAL FLOW FOR:			
B	Each Bedroom over 5 **OR***	500	
C	Each 10m² over 200m² - 400m²	100	800
	Each 10m² over 400m² - 600m²	75	
	Each 10m² over 600m² **OR***	50	
D	Each Fixture over 20 Fixture Units	50	600

DESIGN FLOW "Q"

Q = A + (B or C or D)

A = 2000

B = —

C = 800

D = 600

EXPECTED DAILY DESIGN SEWAGE FLOW (Q) = 2800 Liters Per Day

Septic Tank Size (Working Capacity) ☑ New ☐ Existing ☐ Replacement

Proposed/Existing Working Capacity = 6135 Litres (2 x Q for Residential)

Enc. T 53

Schedule 3: Sewage System Design Specifications

Percolation Rate (T)

A percolation test or a sieve analysis must be completed on the property that the proposed septic system is to be installed.

Percolation Test Completed? [✓ Yes]
___ No (sieve analysis of native soil MUST be completed and attached to permit application)

*** Requirements for "Percolation Test Procedure" are attached.

Percolation Rate of Native Soil	Percolation Rate of Imported Soil
T = 40 min/cm	T = 15 min/cm

Test Pit

A test pit should be dug at the location of the proposed leaching bed to observe subsoil profile and groundwater conditions. Test pits should be a minimum of 1m wide and 1.5m deep.

Soil Type	Coarse Gravel, No Fines	Gravel, Some Small Rocks	Gravel-Sand Mix, Some Fines	Sand, Fairly Uniform, Some Fines	Sandy-Loam Mix	Silty-Loam, Almost Clay	Clay Smears Well, Rolls into Ribbons
Percolation Rate (T)	0 to 1	1 to 5	5 to 10	10 to 15	15 to 25	25 to 50	>50

Soil Depth (meters)	Soil Type (See Above)	Percolation Rate (T)	Depth of Rock/Impervious Soil/Groundwater table
0.2			
0.4			
0.6			
0.8			
1.0		40	
1.2			
1.4			
1.6			

Topsoil to be removed:
Depth: — m

Usable Existing Soil:
Depth: — m

Excavation of Existing Soil:
Depth: 0.6 to 0.9 m

Imported Fill:
Depth: 0.3 to 1.05 m

Lot 33

Schedule 3: Sewage System Design Specifications

ABSORPTION TRENCH ☐ In-ground ☑ Raised ☐ Partially Raised

Length of Distribution Pipe:

$L = \frac{Q \times T}{200}$

L = ______________m

WATERLOO ☐ In-ground ☐ Raised ☐ Partially Raised

Effective Area :

If Q ≤ 3000L $A = Q/75$ Stone Effective Area = 38 m²

If Q > 3000L $A = Q/50$ Effective Area = ____________m²

Extended Contact Area:

$A = \frac{Q \times T}{400}$ Sand Contact Area = 350 m²

MANTLE/LOADING AREA

Loading Rates (LR)
Fill-Based Trenches and Filter Beds
(Table 8.7.4.1. A OBC)

Percolation Time of Soil (T) min/cm	Loading Rates (L/m²/day)
1 < T ≤ 20	10
20 < T ≤ 35	8
[✓ 35 < T ≤ 50]	6
T > 50	4

Loading Area = Q/LR Loading Area = 467 m² or plumbing for an upper-tier municipality, board of health or conservation authority to whom this application is made, or, c) Director, Building and Development Branch, Ministry of Municipal Affairs and Housing 777 Bay St., 2nd Floor. Toronto, M5G 2E5 (416) 585-6666.

Schedule 1: Designer Information

Use one form for each individual who reviews and takes responsibility for design activities with respect to the project.

A. Project Information

Building number, street name		Unit no.	Lot/con.
Municipality	Postal code	Plan number/ other description	

B. Individual who reviews and takes responsibility for design activities

Name Jason Cheslock		Firm Rumball Excavation and Haulage	
Street address 408 Tiffin Street,		Unit no.	Lot/con.
Municipality Barrie	L4N 5W8	Province ON	E-mail jscheslock@gmail.com
Telephone number (705) 722-1145	Fax number (705) 735-1701		Cell number (705) 623-3889

C. Design activities undertaken by individual identified in Section B. [Building Code Table 3.5.2.1. of Division C]

- ☐ House
- ☐ Small Buildings
- ☐ Large Buildings
- ☐ Complex Buildings
- ☐ HVAC – House
- ☐ Building Services
- ☐ Detection, Lighting and Power
- ☐ Fire Protection
- ☐ Building Structural
- ☐ Plumbing – House
- ☐ Plumbing – All Buildings
- ☑ On-site Sewage System

Description of designer's work

D. Declaration of Designer

I ______Jason Cheslock______ declare that (choose one as appropriate):

(print name)

☑ I review and take responsibility for the design work on behalf of a firm registered under subsection 3.2.4.of Division C, of the Building Code. I am qualified, and the firm is registered, in the appropriate classes/categories.

Individual BCIN: ___10457________

Firm BCIN: ___15632________

☐ I review and take responsibility for the design and am qualified in the appropriate category as an "other designer" under subsection 3.2.5.of Division C, of the Building Code.

Individual BCIN: ________

Basis for exemption from registration: ________

☐ The design work is exempt from the registration and qualification requirements of the Building Code.

Basis for exemption from registration and qualification:________

I certify that:

1. The information contained in this schedule is true to the best of my knowledge.
2. I have submitted this application with the knowledge and consent of the firm.

Nov 27 2018 Date Signature of Designer

NOTE:

1.For the purposes of this form, "individual" means the "person" referred to in Clause 3.2.4.7(1) d).of Division C, Article 3.2.5.1. of Division C, and all other persons who are exempt from qualification under Subsections 3.2.4. and 3.2.5. of Division C.

2. Schedule 1 is not required to be completed by a holder of a license, temporary license, or a certificate of practice, issued by the Ontario Association of Architects. Schedule 1 is also not required to be completed by a holder of a license to practise, a limited license to practise, or a certificate of authorization, issued by the Association of Professional Engineers of Ontario.

Schedule 2: Sewage System Installer Information

A. Project Information

Building number, street name | Unit number | Lot/con.

Municipality | Postal code | Plan number/ other description

Sewage system installer

Is the installer of the sewage system engaged in the business of constructing on-site, installing, repairing, servicing, cleaning or emptying sewage systems, in accordance with Building Code Article 3.3.1.1, Division C?

☑ Yes (Continue to Section C) No (Continue to Section E) Installer unknown at time of application (Continue to Section E)

Registered installer information (where answer to B is "Yes")

Name Rumball Excavation and Haulage | BCIN 10457

Street address 408 Tiffin Street | Unit number | Lot/con.

Municipality Barrie | Postal code L4N 5W8 | Province ON | E-mail jscheslock@gmail.com

Telephone number (705) 722-1145 | Fax (705) 735-1701 | Cell number (705) 623-3889

Qualified supervisor information (where answer to section B is "Yes")

Name of qualified supervisor(s)	Building Code Identification Number (BCIN)
J Cheslock	10457
R Cheslock	10456

Declaration of Applicant:

I Jason Cheslock declare that:
(print name)

☐ I am the applicant for the permit to construct the sewage system. If the installer is unknown at time of application, I shall submit a new Schedule 2 prior to construction when the installer is known;

OR

☑ I am the holder of the permit to construct the sewage system, and am submitting a new Schedule 2, now that the installer is known.

I certify that:

1. The information contained in this schedule is true to the best of my knowledge.
2. If the owner is a corporation or partnership, I have the authority to bind the corporation or partnership.

Nov 27 2018 Date Signature of applicant

Lot 28
Building Permit No.: 2018-0850

BUILDING PERMIT

Number: 2018-0850

Schedule a Building Inspection:

Please book your inspection(s) online by clicking this link: www.innisfil.ca/eservices
or Email: buildinginspections@innisfil.ca or Leave a phone message at: 705-436-3710 Ext. 3500

Applicant :	Sigmund Tronowicz, Ant Construction
Owner :	1820839 ONTARIO INC
Legal Description :	PLAN 51M1045 LOT 28
Roll Number :	010035054380000

Inspections Required:

- Sewage System - Readiness to Construct
- Sewage System - Substantial Completion
- Notice of Completion

Conditions/Remarks:

New Septic Installation
Water-Loo Wire Mesh Model 20

Maintenance agreement required for treatment system

Alarm Test required

Provide granular analysis for native and imported soil prior to install inspection.

Ensure header and distribution piping is able to be detected magnetically via 14 gauge tracer wire or other means.

Ensure distribution piping and septic tank are minimum distance from all wells and property lines.

APPENDIX E

MANUFACTURER’S LITERATURE

EnviroHood™

ENVIROHOOD STRUCTURE

The Nyloplast® EnviroHood™ is an innovative stormwater management device attached to the inside of a catch basin or manhole designed to prevent the outflow of floating debris and oil.

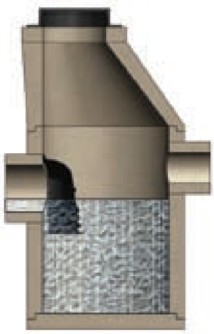
The need for cleaner stormwater has caused municipal leaders to demand forward-thinking solutions to improve their overall water quality. The EnviroHood offers lower installed costs and less intrusive installations than competitive devices.

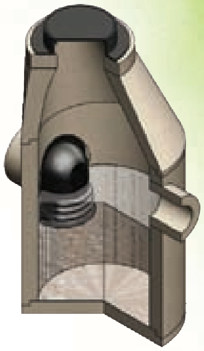
ENGINEERED FOR OPTIMAL PERFORMANCE

The innovative design incorporates the same proven corrugation technology used on ADS N-12® pipe products. This delivers maximum strength to weight ratio and ensures the structure is capable of supporting the hydraulic forces of a rainfall event.

FEATURES & BENEFITS:

- Molded from High Density Polyethylene (HDPE) for lightweight and sturdy design
- Corrugated design eliminates flat surfaces and provides increased structural capacity
- Effective low-cost solution for storm water treatment
- Easy to clean
- Highly corrosion-resistant for long service life





ADS Service: ADS representatives are committed to providing you with the answers to all your questions, including specifications, installation and more.

*The Most **Advanced** Name in Drainage Systems®*

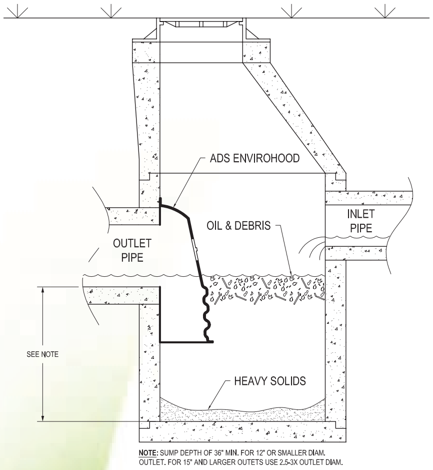
NYLOPLAST ENVIROHOOD SPECIFICATION

SCOPE

This specification describes the EnviroHood for use in stormwater conveyance systems.

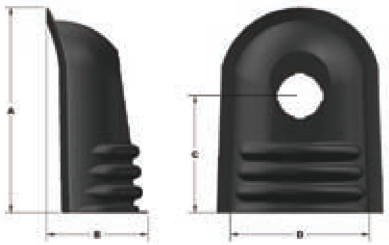
REQUIREMENTS

- All hoods shall be constructed of polyethylene.
- The size and position of the hood shall be determined by the outlet pipe size as per manufacturer's recommendation.
- The bottom of the hood shall extend downward a minimum distance of 6" (15 cm) for pipes < 12" (30 cm).
- Installation hardware and instructions shall be provided by manufacturer.
- Installation shall be in accordance with Nyloplast installation procedures and those issues by local building/construction regulations.



NOTE: SUMP DEPTH OF 36" MIN. FOR 12" OR SMALLER DIAM. OUTLET. FOR 15" AND LARGER OUTETS USE 2.5-3X OUTLET DIAM.

TYPICAL INSTALLATION



			GENERAL DIMENSIONS in. (cm)			
STRUCTURE TYPE	**OUTLET COVERED**	**PART NUMBER***	**A**	**B**	**C**	**D**
48" (120 cm) Round Concrete	up to 18" (45 cm)	5818AGR	30.2 (75)	14.9 (35)	17.2 (45)	20.5 (50)
48"–54" (120–135 cm) Round Concrete	up to 24" (60 cm)	5824AGR	41.7 (105)	18.0 (45)	26.9 (70)	26.9 (70)
54"–60" (135–150 cm)Round Concrete	up to 30" (75 cm)	5830AGR	48.7 (120)	20.5 (50)	30.5 (75)	33.1 (85)
Flat Concrete	up to 18" (45 cm)	5818AGF	30.2 (75)	11.8 (30)	17.2 (45)	20.4 (50)
Flat Concrete	up to 24" (60 cm)	5824AGF	41.8 (105)	15.3 (40)	26.9 (70)	27.0 (70)
Flat Concrete	up to 30" (75 cm)	5830AGF	48.8 (120)	18.3 (45)	30.5 (75)	34.0 (85)
18" (45 cm) Nyloplast	up to 12" (30 cm)	5818AG0412	19.4 (50)	9.8 (25)	12.3 (30)	13.8 (35)
24" (60 cm)Nyloplast	up to 15" (40 cm)	5824AG0415	26.5 (65)	12.8 (30)	14.5 (35)	20.0 (50)
30"(75 cm) Nyloplast	up to 18" (45 cm)	5830AG0418	32.8 (85)	15.4 (40)	18.7 (45)	26.0 (65)

*Includes installation hardware

For more information on EnviroHood and other ADS products, please contact our Customer Service Representatives at 1-800-821-6710

BRO 10853 07/12

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

APPENDIX F

TRAFFIC DESIGN BRIEF

WMI & Associates Limited
119 Collier Street, Barrie, Ontario, L4M 1H5
P (705) 797-2027 F (705)797-2028

Design Brief

DATE June 17, 2020 **FILE NO.** 17-431

RE Innisfil Executive Estates Phase 2 Subdivision
Village of Stroud, Town of Innisfil
Traffic Impact Brief

PREPARED BY Jonathan Reimer, P. Eng.

This Traffic Impact Brief has been prepared for the proposed Innisfil Executive Estates Phase 2 residential subdivision development located in the Community of Stroud, Town of Innisfil. It is based on the Draft Plan of Subdivision prepared by Innovative Planning Solutions (dated May 27, 2020) which is attached to this Design Brief for reference.

The following provides some background information on the proposed development, as well as considerations and opinions with regard to traffic (volume) impacts, vehicular circulation/ internal road geometry, and sight distance.

Background

The proposed Innisfil Executive Estates Phase 2 development is located at the east end of the Village of Stroud, and consists of 21 residential lots, and a proposed municipal roadway; Robertson Avenue.

It is bound by existing residential developments to the north, west, and south, which front onto Sunnybrae Avenue & Victoria Street, and a Metrolinx railway line which lies to the east. Twenty of the proposed lots are to be accessed by the proposed Robertson Avenue, which is to be constructed off of Victoria Street, and terminate via a cul-de-sac at the north end of the subdivision. An additional Lot (#19) is to be located on Sunnybrae Avenue to the west. The new intersection of Robertson Avenue & Victoria Street is located approximately 150m west of the Victoria Street & Agnes Street intersection; 250m west of the Victoria Street & Metrolinx railway intersection; and 330m east of the Nelson Crescent & Victoria Street intersection.

Traffic Volume Impacts

Trip generation rates were determined using the Institute of Transportation Engineers' (ITE) Trip Generation Manual, 10th Edition. The single family detached housing dataset (code # 210) provides a wide range of statistical data from a number of sites that are similar in nature to the proposed development; as such this data was utilized for the subject site. The data for the 'Weekday Peak hour of Adjacent Street Traffic, One Hour Between 4pm and 6pm' time period is utilized throughout this analysis since it results in conservative estimates of trips and is most representative of peak travel periods in residential neighborhoods such as this.

Using the fitted curve equation from the 'Weekday Peak hour of Adjacent Street Traffic, One Hour Between 4pm and 6pm' report, twenty three (23) total vehicular trips (entering + exiting) are expected to be generated by this development. Refer to the Trip Generation Spreadsheet appended to this Brief for calculation details.

From the review of the local road network relative to the location of County Road #4 (the primary arterial road through the Village of Stroud), it is estimated that 90% of the new trips, or 21 vehicles, generated from the development will travel to/ from Yonge Street to the west via Victoria Street, and the remaining 10% of vehicular trips (2 trips) will be towards the 20th Side Road to the east.

The minor increase in vehicular trips as a result of the proposed development is insignificant and will have little to no effect on traffic movements and capacities at the existing signalized Victoria Street/ Yonge Street intersection, in particular. Therefore, it is expected that the development can be accommodated within the existing transportation system without retrofits or improvements.

Sight-Distance Analysis

Ontario's Ministry of Transportation (MTO) outlines specific sight-distance geometry criteria to ensure safe vehicular movement to and from intersecting roadways and to ensure that through traffic on the adjacent roadway will have adequate time and space for manoeuvrability and braking. Based on a design speed of 60km/ hr, the minimum required sight-distance is approximately 180m (referenced from MTO Geometric Design Standards for Ontario Highways Manual, Figure E3-6).

From review of existing site conditions and sight-lines from the vantage point of the proposed intersection of Robertson Avenue & Victoria Street, visibility is noted to be adequate, since there are no notable obstructions, and the road alignment is relatively straight from the proposed intersection location up to and including 180m meters away in either direction. Based on these observations, sight-distance from the proposed site access location is noted to be satisfactory.

Vehicular Circulation/ Internal Road Geometry

The proposed new municipal roadway (Robertson Avenue) will comprise an urbanized cross section, consisting of curb and gutters and a road width of 8.5m. Likewise, the cul-de-sac will comprise turning radii that is in accordance with Town requirements, as will the intersection at Victoria Street, so to facilitate turning movements from emergency vehicles (fire trucks, in particular). On this basis, the proposed roadway geometry is adequate from a public safety perspective. In review of the internal site circulation we can confirm that the internal road cul-de-sac length is in general conformance with the Town of Innisfil engineering standards, Simcoe County Waste Collection Design Standards as well as the OBC. Specifically the Town of Innisfil engineering standards Section 2.4.4.4 dealing with cul-de-sacs has been accommodated and the turning radius does permit fire equipment turning movements. The proposed cul-de-sac also adheres to OBC 3.2.5.6 Access Route Design. The internal road pattern and specifically the cul-de-sac also adhere to Simcoe County waste collection requirements section 2.2.1 which requires a minimum turning radius of 13m from the centre line and required road width of 6.0m, both of which have been exceeded.

The residential lots are to contain private driveways to accommodate all parking needs; additional street parking will inherently be provided at the roadside. No additional parking facilities are proposed for the proposed subdivision.

Traffic Impact Summary

This design brief demonstrates that the proposed Innisfil Executive Estates Phase 2 subdivision development can be accommodated within the Community of Stroud without adverse impacts on existing transportation systems. In particular, the estimated 23 peak hourly trips onto Victoria Street is relatively insignificant in terms of traffic volume, and should be easily accommodated by existing roads. The sight-distance onto Victoria Street is noted to be adequate based on MTO design guidelines, and additionally, vehicular circulation for passenger vehicles as well Fire Trucks is determined to be adequate.

Should you have any questions or require additional information, please contact the undersigned.

Yours truly,

WMI & Associates Limited

Jonathan Reimer, P. Eng.

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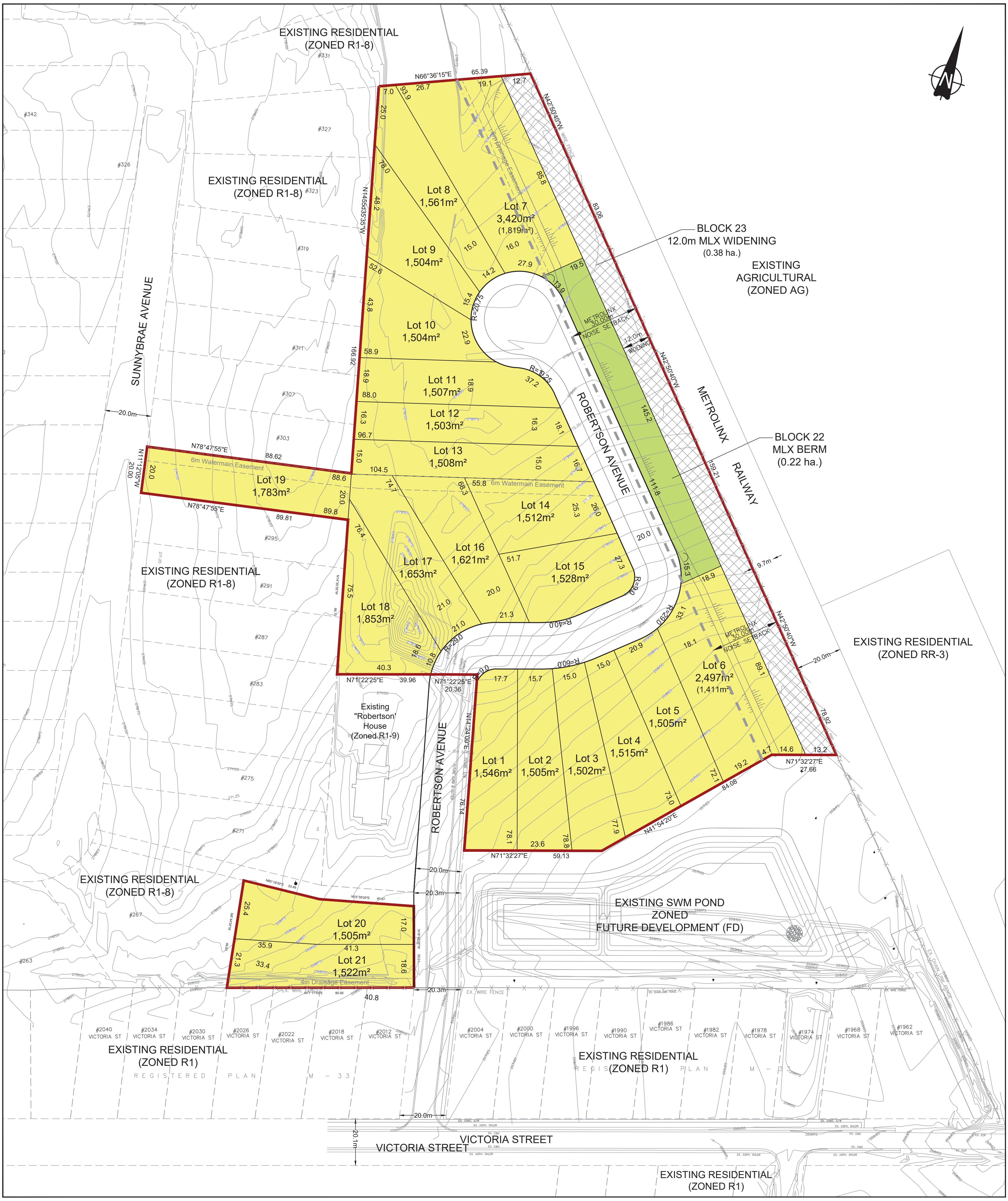


ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT

a) SHOWN ON PLAN
b) SHOWN ON PLAN
c) SEE KEY PLAN
d) LOW DENSITY RESIDENTIAL
e) SHOWN ON PLAN
f) SHOWN ON PLAN
g) SHOWN ON PLAN
h) MUNICIPAL WATER SERVICES
i) SANDY LOAM
j) SHOWN ON PLAN
k) INDIVIDUAL ON-SITE SEWAGE SERVICES
l) NONE

LAND USE STATISTICS

Land Use	Lot / Block No.	Area (ha.)	Units	Density
RESIDENTIAL SINGLE LOT (R1)	1-21	3.60	21	5.0 upha. 2.3 upac.
MLX BERM	22	0.22		
MLX 12.0m WIDENING	23	0.39		
ROADS (20.0m)	Robertson Avenue	0.57		
TOTAL	Lots -21 Blocks - 2 Total - 23	4.78	21	

APPROVED SUBJECT TO CONDITIONS IN ACCORDANCE WITH SECTION 51 OF THE PLANNING ACT. RSO, CHAP. P.13, AS AMENDED,

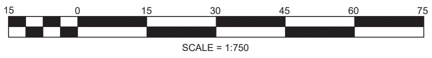
THIS _________ DAY OF________________, 20___

DIRECTOR OF GROWTH
TOWN OF INNISFIL

DRAFT PLAN OF SUBDIVISION

BLOCK 39 & 41, R.P. 51M-1045
FORMERLY IN THE GEOGRAPHIC TOWNSHIP OF INNISFIL
NOW IN THE
TOWN OF INNISFIL
COUNTY OF SIMCOE
2020

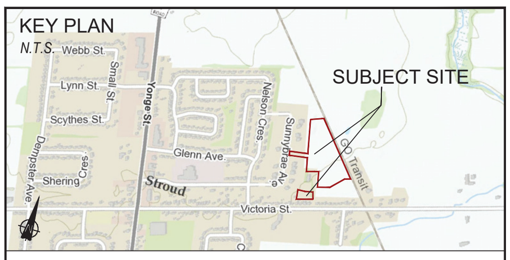
INNISFIL EXECUTIVE ESTATES PHASE 2



SCALE = 1:750

INNOVATIVE PLANNING SOLUTIONS
PLANNERS • PROJECT MANAGERS • LAND DEVELOPERS
647 WELHAM RD., UNIT 9, BARRIE, ONTARIO, L4N 0B7
tel: 705 • 812 • 3281 fax: 705 • 812 • 3438 e: info@ipsconsultinginc.com www.ipsconsultinginc.com

KEY PLAN
N.T.S.



OWNER'S CERTIFICATE

I, THE UNDERSIGNED, BEING THE REGISTERED OWNER OF THE SUBJECT LANDS, HEREBY AUTHORIZE INNOVATIVE PLANNING SOLUTIONS TO PREPARE THIS DRAFT PLAN OF SUBDIVISION AND TO SUBMIT SAME TO THE TOWN OF INNISFIL FOR APPROVAL.

DATE

WAYNE EZEKEL, PRESIDENT
1820839 ONTARIO LIMITED

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATE

RUDY MAK, OLS

Date: May 27, 2020	Drawn By: BH
Scale: 1:750 metric (Arch D)	Project No.: IEE - Phase 2

WMI & Associates Limited
119 Collier Street, Barrie, Ontario L4M 1H5
p (705) 797-2027 f (705) 797-2028

TRIP GENERATION SPREADSHEET

VEHICLE TRIP ENDS VS. DWELLING UNITS
ON A WEEKDAY, PEAK HOUR OF ADJACENT STREET TRAFFIC, ONE HOUR BETWEEN 7AM AND 9AM

Date: 17-Jun-19

Project No.: 17-431

Project: Innisfil Executive Estates Phase 2

Prepared By: JR

References: Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th edition

Development	**ITE Code & Land Use**	**Independent Variable**	**Total Trips- From Fitted Curve Equation [T = 0.71(X) + 4.80]**
Innisfil Executive Estates Phase 2	210: Single-Family Detached Housing	21 units	**20**

Notes:

This analysis is based on the Draft Plan of Subdivision (Block 39 & 41, R.P. 51M-1045) for Innisfil Executive Estates dated December 11, 2019.

C:\17-431\[200617_TripGen.xlsx]AM

WMI & Associates Limited
119 Collier Street, Barrie, Ontario L4M 1H5
p (705) 797-2027 f (705) 797-2028

TRIP GENERATION SPREADSHEET

VEHICLE TRIP ENDS VS. DWELLING UNITS
ON A WEEKDAY, PEAK HOUR OF ADJACENT STREET TRAFFIC, ONE HOUR BETWEEN 4PM AND 6PM

Date: 17-Jun-19
Project No.: 17-431
Project: Innisfil Executive Estates Phase 2
Prepared By: JR

References: Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th edition

Development	ITE Code & Land Use	Independent Variable	Total Trips- From Fitted Curve Equation [Ln(T) = 0.96Ln(X) + 0.20]
Innisfil Executive Estates Phase 2	210: Single-Family Detached Housing	21 units	**23**

Notes:

This analysis is based on the Draft Plan of Subdivision (Block 39 & 41, R.P. 51M-1045) for Innisfil Executive Estates dated December 11, 2019.

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- A - Minimum Stopping Sight Distance, Table E3-1.
- A_1 - Distance travelled in 3 s, Table E3-2.
- B - Safe Sight Distance for P vehicle, crossing 2-lane highway from stop.
- C - Safe Sight Distance for P vehicle, turning left into 2-lane highway across P vehicle approaching from left.
- D - Safe Sight Distance for P vehicle to turn left into 2-lane highway and attain assumed operating speed before being overtaken by P vehicle approaching in same direction at design speed.
- E - Safe Sight Distance for P vehicle to turn right into 2-lane highway and attain assumed operating speed before being overtaken by P vehicle approaching in same direction at design speed.

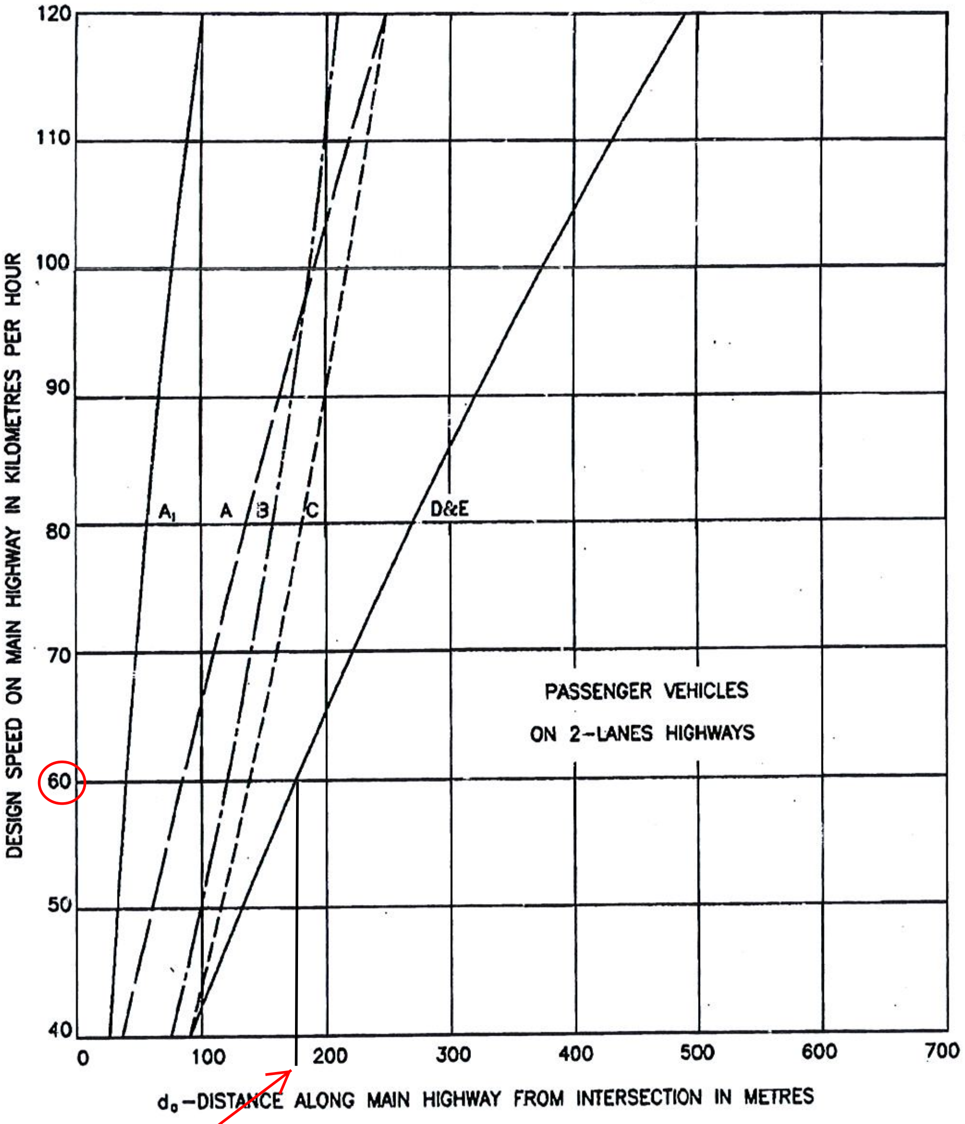


Figure E3–6

Sight Distance Requirements for Stopping Crossing and Turning Movements

Sight distance is approx. 180m for 60km/h design speed.

APPENDIX G

CORRESPONDENCE & SUPPORTING DOCUMENTS

MEMORANDUM

DATE: January 6th, 2020

TO: Benjamin Daniels, B.Eng, WMI & Associates Limited

FROM: Thomas Steube-Chapman, Associate Engineer, InnServices

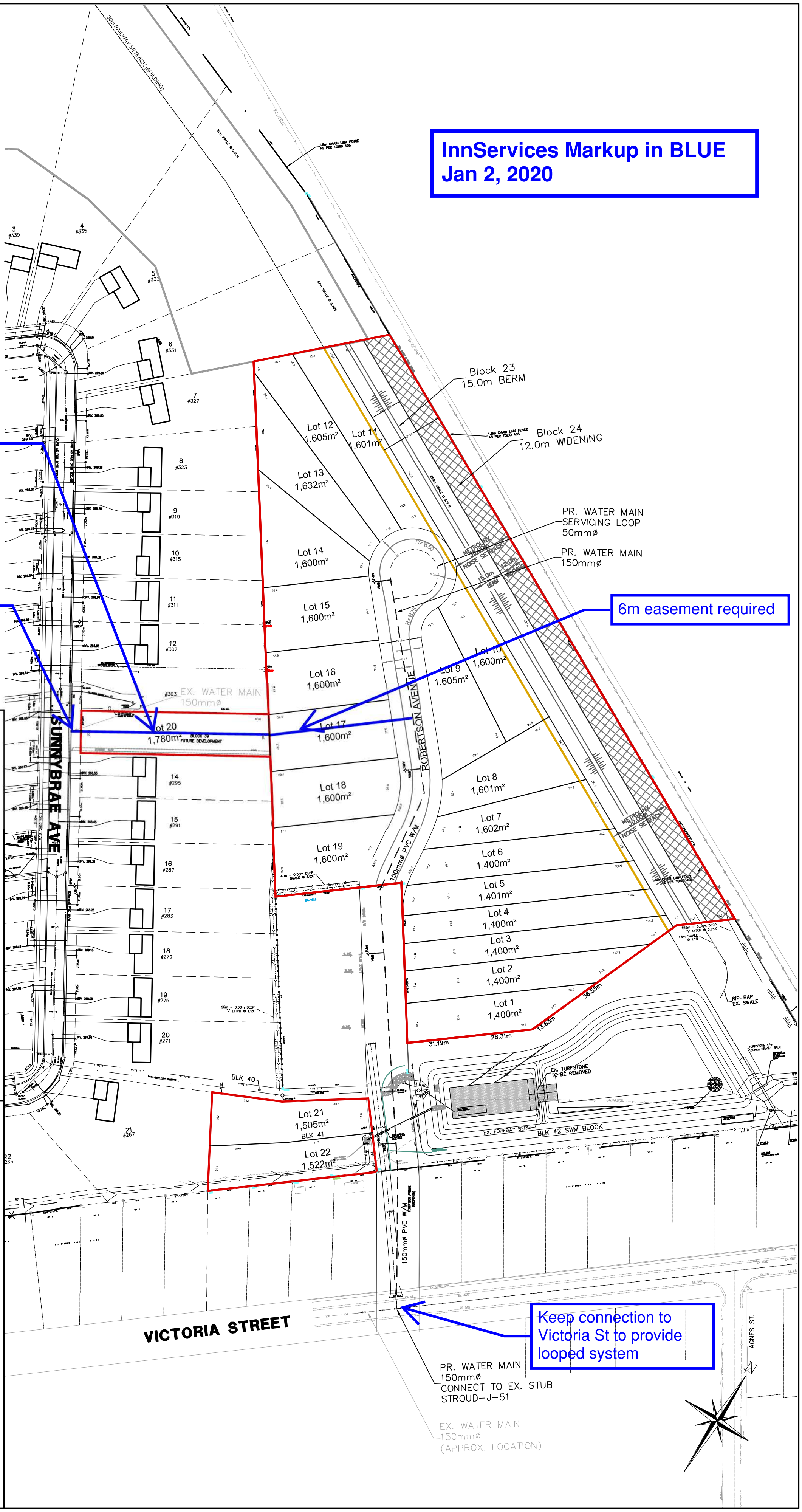
SUBJECT: Innisfil Executive Estates Phase 2 – Conceptual Watermain Layout

---

We have completed our review of the subject application provided on November 19th, 2019 and have the following comments for WMI & Associates for the preparation of the Functional Servicing & Stormwater Management Report:

COMMENTS:

- See attached a copy of the Water Distribution Modelling and Analysis report completed by Tatham Engineering for your reference.
- Town Standards requires a minimum fire flow of 57 L/s in residential developments. The available fire flow (AFF) to the development from Victoria Street is limited to 33 L/s. In order to increase the AFF and provide a looped system, connect the proposed watermain to the watermain on Sunnybrae Avenue, potentially utilizing Block 39 and requiring an adjustment to the proposed lot fabric.
    - A minimum 6m easement would be required for the section of watermain that will not be within the Town ROW.
    - See attached watermain mark-up for reference.
- Main line valves are not shown on the preliminary plan. Ensure main line valves are placed as required to meet spacing and intersection requirement per Town Standards and MECP guidelines.
- In Tatham Engineering's review, they considered that the cul-de-sac servicing loop should also convey fire flows, resulting in recommending that the 50mm servicing loop be upsized. However, if the last fire hydrant on the proposed 150mm dia. watermain is located less than 90m from the farthest building, there is no need to upsize the 50mm dia. servicing loop to provide fire flows. InnServices would prefer the 50mm servicing loop instead of upsizing the loop, if the proposed location of the fire hydrant satisfies Town Standards and the Ontario Building Code.



InnServices Markup in BLUE
Jan 2, 2020

Extend 150mm dia. watermain to Sunnybrae Ave to create a looped system/ allow higher available fire flow

WMI to confirm existing Tee/stub location (if it was installed during Phase 1) or connect with tapping sleeve

6m easement required

Keep connection to Victoria St to provide looped system

Drawing Title

GENERAL SERVICING PLAN
(PROPOSED WATERMAIN)

Project Title

INNISFIL EXECUTIVE ESTATES
PHASE 2

Nov. 19, 2019

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
705-797-2027
www.wmiengineering.ca

Drawn By BD

Checked By SM

Scale 1:1750

Project No. 17-431A

Figure No.

FIG A

UNEDITED DRAFT

January 2, 2020

Mitchinson Planning and Development Consultants
57 Highland Avenue
Barrie, Ontario
L4M 1N2

Attention: Nicola Mitchinson

Re: GROUND VIBRATION MONITORING OF
INNISFIL EXECUTIVE ESTATES – PHASE 2
TOWN OF INNISFIL

Ms. Mitchinson:

At the request of Mitchinson Planning and Development Consultants and as per the requirements of the CP Rail, J.E. Coulter Associates Limited has conducted on-site vibration monitoring of the proposed Phase 2 of the Innisfill Executive Estates residential development to be located on a parcel of land legally designated as Block 39 & 41 R.P. 51M-1045, Town of Innisfil, County of Simcoe. This development is located between Sunnybae Avenue and the GO Barrie railway corridor and extends north from Victoria Street for approximately 500m.

The vibration monitor was situated at the site, approximately 30m from the western edge of the GO R-O-W in the area to be designated as Lot 9. The accelerometer (vibration pickup) was mounted 10cm below surface grade on undisturbed soil. The vibration monitoring was conducted on Tuesday January 31, 2012 from 3:00pm to 8:00pm. During this period, 5 Northbound GO train passbys were observed, the results of which are summarized in the table, below.

Table #1 - Barrie Railway Corridor Vibration Monitoring Summary

Time	Train Type	Maximum Vibration Level (mm/s)
4:30PM	GO Passenger Train	0.03mm/s
5:45PM	GO Passenger Train	0.04mm/s
6:33PM	GO Passenger Train	0.03mm/s
7:00PM	GO Passenger Train	0.03mm/s
7:34PM	GO Passenger Train	0.02mm/s

It is clear from the results above that none of the passbys generated vibration levels that were high enough to invoke any attenuation measures as all events were below the level of perception of 0.14mm/sec RMS velocity. Even with the any feasible increase in operating speeds, the 0.14mm/s criterion will not be exceeded.

J.E. Coulter Associates Limited hereby concludes that no vibration isolation measures are required for any of the lots of Phase 2 of the Innisfil Executive Estates subdivision.

We trust the above will assist in expediting the project's approval process. Should there be any questions, please do not hesitate to contact the undersigned.

Yours truly,

J.E. COULTER ASSOCIATES LIMITED

John E. Coulter, B.A.Sc., P.Eng.

Tobin Cooper, C.E.T.

TC:jcc

Innisfil Executive Estates Subdivision

Town File No. I-T-880008

Stormwater Management Report

ACCEPTED FOR CONSTRUCTION

TOWN OF INNISFIL
DEVELOPMENT ENGINEERING

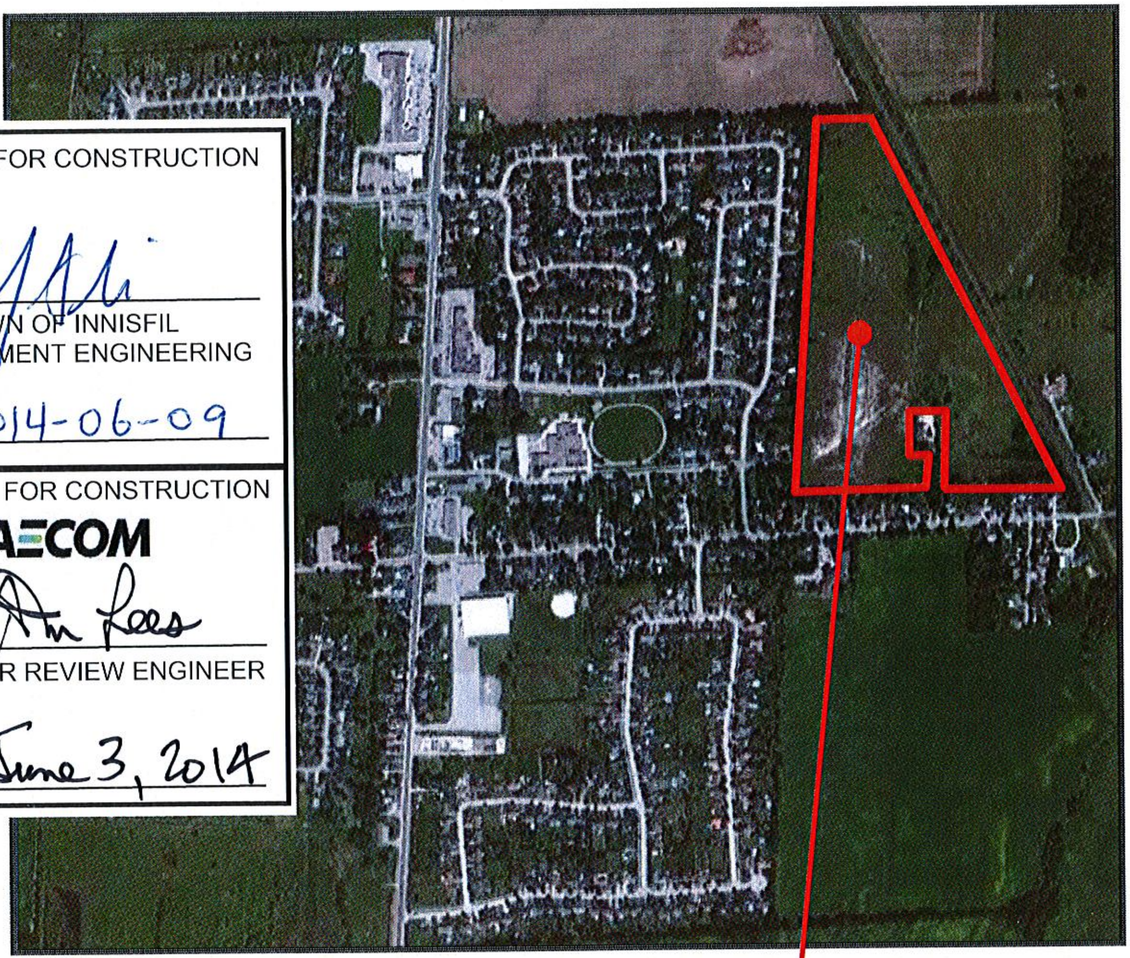
DATE: 2014-06-09

ACCEPTED FOR CONSTRUCTION

AECOM

TOWN PEER REVIEW ENGINEER

DATE: June 3, 2014



Subject Property

R1 – May 2012
R2 – January 2013
R3 – August 2013
R4 – January 2014
R5 –May 2014

GEMMELL
ENGINEERING
150 Dunlop Street, Suite 201, Barrie, ON L4M 1B2
Phone: (705) 812-1043 Fax: (705) 812-3707

TABLE OF CONTENTS

APPENDICES

1.0 Background

Gemmell Engineering has been retained by 1820839 Ontario Inc. to provide consulting engineering services for the subject lands. This report is provided in support of the detailed design of the subject lands.

Site Location and Description

The subject property is 17.5 ha (43.24 acres) and is legally described as Part of South Half Lot 17, Concession 10 in the Geographic Township of Innisfil, now in the Town of Innisfil, County of Simcoe.

The property is located south of existing agricultural lands, east of the Metrolinx (GO) Railway, west of existing residential lands located on Nelson Crescent and north of residential lands located on Victoria Street in the Village of Stroud, Town of Innisfil.

The subject property is currently vacant and includes sparse tree cover. The site is relatively flat with an average slope of approximately half a percent (0.5%). Primary topographical relief is from north to south with secondary relief in a west to east direction.

History and Approvals

The subject property was Draft Plan approved in 1989 and detailed design were completed by GM Sernas and Associates Ltd. and approved by the Township Engineer on August 9, 1990 and the Township of Innisfil on August 20, 1990.

The plan was redline revised in 2005 and approved. This change permitted the severance of the existing "Robertson Residence" dwelling from the Draft Plan and also created the unopened Robertson Road ROW that provides frontage to this dwelling. An easement is in place between the Town and landowner related to private maintenance of this unopened ROW and its use as a driveway.

Our client purchased the lands in 2011 and the plan was redline revised in 2012 and approved to permit an additional eight (8) lots on the existing road fabric. This was based on supporting hydro-geologic studies by Azimuth Environmental Consulting Inc. As part of this planning process, it was also identified that design criteria for Stormwater Management had changed and identified the need to provide quality treatment in addition to quantity treatment accommodated in that plan.

Updated SWM Reports and Prior Submissions

Given time between the original design approvals of the engineering plans (1990) and the redline revision the Town requested that a new Functional Servicing Report be completed. This report was prepared by Gemmell Engineering in February 2011 and included the conceptual design of an extended detention SWM pond.

This design demonstrated the suitability of the proposed redline plan to meet current engineering design standards including *enhanced* quality control in accordance with Town of Innisfil (Town), Lake Simcoe Regional Conservation Authority (LSRCA) and Ministry of Environment (MOE) standards.

Comments on this report were received by the LSRCA on March 31, 2011. Gemmell Engineering provided additional details to address these comments in our May 11, 2011 e-mail response. LSRCA approval of the revised Plan was provided on June 9, 2011 subject to standard conditions being incorporated into the Draft Plan conditions.

Comments were received by the Town on June 6, 2011 and included comments from their Engineering Consultant (AECOM) dated May 10, 2011. Gemmell Engineering provided additional details in our August 15th, 2011 letter (including the above noted LSRCA resubmission and associated letters). Town approval of the revised Plan was provided by means of its approval of the revised draft plan.

2.0 Stormwater Management Target and Objectives

Servicing for the subject lands requires the Stormwater Management Plan to provide *"enhanced"* quality control in accordance with the MOE, Town of Innisfil and Lake Simcoe Region Conservation Authority (LSRCA).

The control of post development peak flow rates must be at or below pre development levels for all storm events up to the 100-year event to ensure no impact to downstream flood-lines.

The subject site must have a legal and suitable outlet for stormwater discharge. This includes providing safe conveyance of the *Regional* storm to the receiving watercourse.

The proposed storm sewer system is to provide for the minor system flows (5-year rational event) to be conveyed without surcharge.

The proposed overland flow system is to provide for major system flows (Regional) within the ROW and other lands to be dedicated to the Town without discharging onto private lands.

3.0 Pre and Post Development Drainage

The pre and post development drainage pattern, catchment delineation and model parameters are provided on drawing SWM-1 and SWM-2 appended hereto in **Appendix 1**.

The external catchments and run-off coefficient are consistent with the G.M. Sernas & Associates Ltd. Storm Drainage Plan (G-102A), dated October 1989 that previously approved by the Town except in the northwest corner, where additional topographical survey provides this areas drains off-site. A copy of the original storm drainage plan is included in the Appendix.

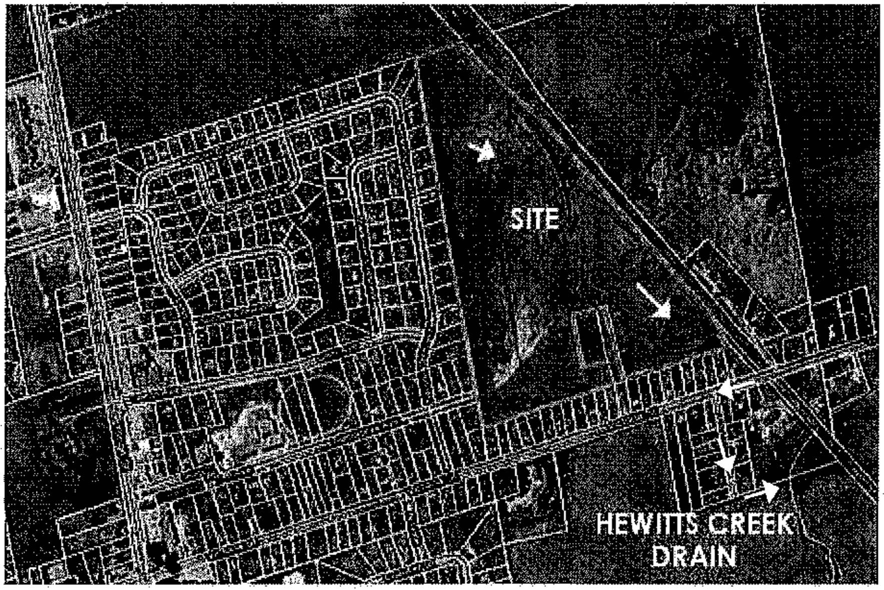
3.1 Pre Development

The subject property currently drains from north to south and west to east, as provided in Figure 1. Drainage from the site is towards an existing area of topographical relief, constructed by the previous owner. Drainage is then towards Victoria Street, within a ditch located on additional lands owned by the application, adjacent to the Metrolinx (Go) railway.

Drainage is then collected into a 400mm dia. CSP culvert located on the north side of the Victoria Street ROW and directed to a catch basin (CB) in front of 1962 Victoria Street. This CB is connected to the 750mm dia. storm sewer located within the Victoria Street that drains to an existing easement located on the western limits of 1959 Victoria Street to an existing Municipal Drain, known as the Hewett's Creek Drain.

Flows that surpass the capacity of the existing 400mm dia. CSP culvert would spill into the Victoria Street ROW and discharge to Agnes Street and then to Hewett's Creek Drain. Their does not appear to be a legal easement for the outlet from the Agnes Street ROW to the Hewitt's Creek Drain and as such the basis for this drainage would be based on common law and as such changes to the upstream drainage regime to this outlet would not be permitted without first obtaining legal permission to use the outlet from the downstream landowners[1].

Figure 1 – Existing Site Drainage Overview



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[1] Common law provides that riparian drainage rights are established for existing outlets where no objection from the impacted landowner had been recorded after a period of twenty (20) years. We recommend that Town confirm this with their solicitor to ensure they are not liable for damages from the municipal drainage over the existing private lands without a prescribed right of drainage.

3.2 Post Development

The post development drainage pattern is consistent with the pre-development pattern, namely in a north to south and west to east direction on site, however the outlet for this flow will now utilize the existing easement, located on 1959 Victoria Street, to convey all flows and provides a suitable and legal outlet for the subject lands.

Runoff from the proposed developed areas of the site will be generally towards the proposed road network where it will be conveyed to the proposed SWM ponds.

An *"extended detention wet pond"* is proposed to provide both quality and quantity control. The design is consistent with the requirements of the Stormwater Management Planning and Design Manual (MOE, 2003).

3.3 Hydrologic Modeling

Hydrologic modeling was undertaken using the Visual OTTHYMO Version 2.3 software (VO2) to determine the existing peak flows from the subject site. The 4-hour Chicago and 12-hour SCS storm distributions based on historical rainfall data were used to model existing and proposed conditions as well as the Hurricane Hazel storm (adjusted for AMC III conditions).

A summary of the pre- and post peak flows are provided below.

Table 1 – Peak Flow Comparisons

Storm Peak Event Flow (m^3/s) – Site Total					
	Area (ha)	Storm Distribution			
Return Period (years)		2	5	25	100
Pre-Development Condition					
SCS Storm Distribution	20.21	0.15	0.27	0.49	0.69
Chicago Storm Distribution	20.21	0.12	0.19	0.31	0.46
Regional Storm - Hazel Event	20.21	1.67			
Post Development Condition (with attenuation)					
SCS Storm Distribution	20.21	0.05	0.09	0.33	0.51
Chicago Storm Distribution	20.21	0.05	0.07	0.22	0.37
25 mm Chicago Storm	20.21	0.025			
Regional Storm - Hazel Event	20.21	1.72			

As can be seen, the proposed post development flows are considerably less then pre-development flows. This will assist in reducing the extend of existing flooding in this area that currently results.

Supporting calculations for the modeling parameters and the model results for the site are appended in **Appendix 2.**

3.4 Downstream LSRCA Flood-lines

The lands downstream of the property are subject to flooding and as such LSRCA was contacted to confirm the flood elevations downstream of the subject property.

A meeting with Mr. T. Hogenbirk and Mr. S. Troan, CET occurred on December 21st, 2012 in response to our requests for clarification on how they wanted us to address a prior comment on potential impact to frequency of flooding downstream and how to evaluate the conveyance system from the pond downstream.

It was agreed at that meeting the storm flows from the subject site and Victoria Street would occur well in advance of the anticipated flooding elevations by the LSRCA (refer to Appendix 3) and as such would not result in impacts to those flood elevations. It was also agreed that the conveyance system for the outlet would be based on backwater effect resulting from the 5-year LSRCA flood elevation.

These elevations were provided in their e-mail of November 21, 2011 attached hereto as **Appendix 3**.

4.0 Conveyance Calculations

4.1 Storm Sewer Design

The conveyance of the minor system storm drainage system internal to the subject property is by a closed conduit system (storm sewer) based on based on Manning's open channel flow.

The system has been designed to accommodate the 5-year storm based on the Rational Method with the intensity coefficient as per the Town of Innisfil Engineering Standard and the run-off coefficient based on the percent impervious converted to a runoff coefficient calculated for the OTTHYMO model.

The storm system has been designed to accommodate the 100-year flow (based on the OTTHYMO modeling) for catchments 1 & 2. These areas are along the northwest boundary of the site and could were lower than the proposed roadway grading. The drainage to these catchments was minimized and the inlet capacity in to the storm system is based on 50% blockage of the inlet capacity as per the MTO Drainage Manual recommendations.

The supporting storm drainage plan, storm design sheets and DICB inlet capacity calculations are included in **Appendix 4**.

Emergency spillways for catchment 201 and 202 that drain to the storm sewer have been designed to spill to the existing Nelson Crescent ROW in the event of 100% blockage scenario discussed in more detail in Section 4.3.

4.2 SWM Pond Inlet and Outlet Conveyance Calculations

Pond Inlet – Overland Flow Route in Block 40

The SWM pond inlet has been sized to convey the Major system flows from catchment 201 to 204 within Block 40. This block connects Sunnybrae Avenue to the unopened Robertson Road ROW and ultimately into the pond.

The required capacity for this block is the uncontrolled flow of 1.67 cms from the OTTHMYO model results[2].

The flow depth for the overland flow route has been determined based on Manning's open channel flow and the capacity required to convey this flow, based on the 100% blocked scenario for the storm sewer, has been found to be in excess of the required capacity. The flow depth at the required flow provides for 0.20m freeboard.

The flow spills over the existing driveway access in the unopened Robertson Road ROW and the design provides for a sag curve at this location and the driveway will lowered and graded to ensure the flows spill into the pond and not back toward Victoria Street.

Supporting sketches of the inlet geometry and Manning open channel flow calculations are included in **Appendix 5**.

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[2] The maximum flow is from the 100-Year SCS storm event as this exceeds the 100-Year Chicago storm event (1.12 cms) or the Regional Storm – Hazel storm event (1.12 cms). See ADD HYD 1002

SWM Pond Outlet – Pond to Victoria Street

Flows from the SWM pond are discharged via proposed control structures within the pond and discharge into an open channel that directs flow towards Victoria Street. This channel is uniform in geometrics and located in a parcel of land not included as part of the Plan of Subdivision but owned by our Client, located adjacent to the Metrolinx (Go) railway ROW to the east. This land will be dedicated to the Town at registration of the Plan of Subdivision.

The capacity required for this channel is the controlled Regional flow from the SWM pond and catchment 207[3]. This flow is 1.68 cms from the OTTHMYO model results.

The flow depth of this overland flow route was determined based on Manning's open channel flow and the found to be in excess of the required capacity. The flow depth at the required flow provides for 0.20m freeboard.

The flow depth in this channel near the rear of 1962 & 1968 Victoria Street would be (265.30 + 0.58m) 265.88 m and is higher than the rear year elevations on these properties. To avoid flow from the pond outlet bypassing the outlet channel and discharge spilling across 1962 or 1968 Victoria Street a berm has been designed behind these properties within the SWM block at a minimum elevation of 266.10.

Supporting Manning's open channel flow calculations are included in **Appendix 5**.

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[3] Refer to OTTHYMO ADD HYD 1005

SWM Pond Outlet –Victoria Street and 1959 Victoria Street

The Regional outflow from the pond is conveyed across the Victoria Street ROW by a proposed 1200mm dia. storm sewer and to Hewitt's Creek drain within a proposed 1350mm dia. storm sewer within the existing Town easement on 1959 Victoria Street.

The pond outflow enters the proposed storm sewer at a proposed Ditch Inlet Manhole (DICB MH 13) that is located at the north side of Victoria Street. The inlet capacity was designed to provide capacity based on 50% blockage condition, as per the MTO Drainage Manual. The maximum headwater required to convey 200% of the Regional Flow was determined to be 265.60. This exceeds the top of berm elevation of 265.65. Supporting calculations based on MTO design chart 4.2 are included in **Appendix 5**.

The proposed 1200mm dia. storm sewer will connect to the existing Town storm sewer that is installed within the Victoria Street ROW at a proposed MH (MH 15). The existing sewer is a 750mm dia. sewer and outlets to the Hewitt's Creek drain via an existing Town easement on 1959 Victoria Street. As a result of the proposed development, the existing 750mm dia. sewer will be upsized to a 1350mm dia. sewer to accommodate both the sites Regional Flow and the 5-year flow from the Victoria Street storm sewer system.

The 5-year flow from the upstream lands contributing flow into the existing 750mm dia. storm sewer was determined by delineating the catchment area based VMAP aerial contour data and completing them preparing an OTTHMYO model catchment (209).

The SCS storms provided the peak 5-year flow at 0.37 cms from the OTTHYMO model results. A sketch of the catchment area, OTTHMYO schematic and detailed OTTHMYO output results are included in **Appendix 5**.

The capacity required in the proposed upgraded sewer was determined from the Regional Flow from the SWM pond (1.68 cms) and the 5-year SCS flow from the upstream Victoria Street ROW (0.37cms). This flow is has been conservatively[4] approximated as 2.05 cms.

The headwater required to convey the above flow was determined to be 265.58 based on a tail water elevation corresponding to the 5-year LSRCA flood elevation of 265.16. This headwater is below the top of berm elevation at 265.65 at Victoria Street. We also reviewed the minimum top-of-lid elevation of the DCB's located at the low point in the Victoria Street ROW (intersection of Agnes Street). This elevation was approx. 265.70 and as such the elevation used will not result in surcharge above this elevation.

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[4] The time to peak for the peak flows from the upstream external catchment 209 draining to the existing storm 750mm dia. Stormsewer on Victoria Street is assumed to coincide with the Regional Flow outflow from the SWM pond and a straight summation of the peak flows from both catchments has been assumed. The actual Tp for the catchment 209 (Victoria Street) is 6.47 hrs and ADD HYD 1005 is 11.03hrs. This underestimates the peak flow as the actual flow rate released from Catchment 209 at 10.3 hrs will be less than the maximum value added to the Regional Flow.

We determined the headwater by examining each run (1200mm dia. and 1350mm dia.) of storm sewer based on outlet control from the storm pipe. Supporting sketches of the geometry and culvert calculations are included in **Appendix 5**.

4.3 Local Drainage Calculations

Rear Yard Swale – Lots 16 to 20

The 100-year SCS storm event flow for this local drainage area was determined from pro-rating the OTTHYMO results for catchment 205 based on the contributing area to the swale. This resulted in a required flow of 0.08 cms.

The flow depth of this overland flow route was determined based on Manning's open channel flow and the found to be in excess of the required capacity. The flow depth at the required flow provides for 0.10m freeboard.

Supporting sketches and calculations are included in **Appendix 6**.

Rear Yard Swale – Lots 21 to 23 and Block 41

The 100-year SCS storm event flow for this local drainage area was determined from pro-rating the OTTHYMO results for catchment 205 based on the contributing area to the swale. This resulted in a required flow of 0.15 cms.

The flow depth of this overland flow route was determined based on Manning's open channel flow and the found to be in excess of the required capacity. The flow depth at the required flow provides for 0.04m freeboard.

Supporting sketches and calculations are included in **Appendix 6**.

Robertson Road Culvert

The flow from the swale collecting flow from the rear of Lots 21 to 23 and BLK 41 is conveyed under the existing driveway that services the existing Robertson residence and the proposed SWM pond access road.

The capacity of the culvert was determined using culvert master based on an allowable headwater set to the minimum existing rear yard elevation at 2012 Victoria Street (268.16) and a tailwater elevations set to the top of the culvert at the outlet (266.90). This elevation exceeds the 100-year pond elevation (266.50).

The required headwater was determined to provide 0.11m freeboard.

Supporting sketches and calculations are included in **Appendix 6**.

4.4 Emergency Overflow Calculations

Catchment 201 – DICB No. 1

This catchment collects local drainage from catchment 201 and is directed to the DICB No. 1. The inlet capacity has been provided based on 50% blockage. We have also reviewed the emergency spill for this flow in the event of 100% blockage. In this unlikely event, the flow would spill west to ultimately the existing ditch system within the Nelson Crescent ROW.

The design of an emergency spillway has been provided from the DICB to the adjacent ROW drainage network. It includes the construction of a new swale across the flankage of 237 Nelson Crescent in conjunction with the sidewalk installation.

Supporting sketches and calculations are included in **Appendix 7**.

Catchment 202 – DICB No. 2

This catchment collects local drainage from catchment 202 and is directed to the DICB No. 2. The inlet capacity has been provided based on 50% blockage. We have also reviewed the emergency spill for this flow in the event of 100% blockage. In this unlikely event, the flow would spill west to ultimately the existing ditch system within the Nelson Crescent ROW.

The design of an emergency spillway has been provided from the DICB to the adjacent ROW drainage network. It includes the regrading of the existing roadside ditch along the flankage of 233 Nelson Crescent and replacement of the existing driveway culvert.

Supporting sketches and calculations are included in **Appendix 7**.

Robertson Road Culvert

This catchment collects local drainage from the rear yard areas of Lots 21 to 23 and BLK 41 and the external drainage from the rear yard areas adjacent to these lands. It is part of catchment 205 and its flow has been pro-rated (refer to Section 4.2).

This flow is directed to the SWM pond and conveyed under the ex. driveway under the unopened Robertson Road ROW by means of a 500mm dia. CSP culvert. In the event this culvert becomes 100% blocked, the flow will spill south to ultimately the existing Victoria Street ROW (storm sewers and curb and gutter drainage).

The design of an emergency spillway has been provided from the culvert to the adjacent ROW drainage network. It includes the regrading and paving of the existing driveway with an inverted crown.

Supporting sketches and calculations are included in **Appendix 7.**

5.0 Extended Detention SWM Pond

5.1 Water Quality Treatment Volumes

The area draining to the proposed SWM wet pond is 19.01 ha and has a corresponding percent impervious for the site is 17.2% and the study area of the is 20.21 ha and has a corresponding percent impervious for the site is 17.6%.

This sizing of the SWM pond has been based on the requirements for the whole site and requires the provision of 102.6 cu. per ha in accordance with Table 3.2 of the MOE SWM Planning and Design Manual.

The permanent pool (passive) volume required is (206.6 cu.m per ha – 40 cu.m per ha x 20.213 ha) 1,266 cu.m. The pond design provides 5,214 cu.m of passive storage and exceeds the minimum volume required.

The extended detention volume required is the greater of 40 cu.m per ha or the volume of run-off from the 25mm storm event collected within the pond. The volume based on 40 cu.m per ha x 20.21 ha is 808.4 cu.m whereas the volume based on 25mm storm event is 843 cu.m. The pond design provides a maximum of 1,729[5] cu.m of extended detention storage exceeds the minimum volume required.

The draw down time is based on the MOE equation and provides for approximately 43.86 hours. Supporting calculations are provided in **Appendix 8.**

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[5] This represents the maximum volume in the pond prior to outflow from the secondary orifice.

5.2 Forbay Sizing

The required length of the forbay is based on both the settling length and dispersion length. These lengths are 10m and 10.56m respectively. The pond provides a forbay length of 47m and exceeds the minimum requirements.

The required width of the forbay is to be greater than 1/8 of the maximum of the settling length and dispersion length. This would correspond to minimum width of 1.32m. The pond provides a forbay width of approx. 15m and exceeds the minimum requirements.

The forbay cross sectional area is to be such that the maximum velocity during the 100-year flow is less then 0.15m/s. The uncontrolled inlet flow is 1.67 cms and the forbay has a cross-sectional area is 19.9 sq.m. at the permanent pool elevation. The corresponding forbay velocity is 0.084 cms and exceeds the design requirement.

Supporting calculations are provided in **Appendix 8**.

6.0 Erosion and Sediment Control

A site specific Erosion and Sediment Control (ESC) plan was developed based on the *Erosion and Sediment Control Guidelines for Urban Construction* (Greater Golden Horseshoe Area Conservation Authorities, 2006). An erosion and sediment control plan with details has been prepared and is provided in along with associated sizing calculations. **Appendix 9**

Key design features of the plan include;

1. Temp. blade cut swales during earth works to direct runoff to two (2) temporary sediment ponds.
2. Construction traffic will only be permitted to enter the site from the southernmost entrance of Nelson Court[6] where a mud-matt will be installed and maintained to prevent tracking of dirt on to the Town road system. In the event that mud is tracked onto the road system, the Contractor shall clean the road to the Town's satisfaction.
3. Silt fence is to be installed around the perimeter of the site, around the proposed topsoil pile and around the drip line of trees to be protected. It will provide a final level of erosion protection in the case of breach of the other systems. It also will act as site hording to delineate the site as a construction area. This fence will also act as tree-preservation fencing.

Prior to commencing earth works, a site meeting is required with the Town of Innisfil to ensure the ESC plan is installed and functioning correctly.

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[6] All Construction Traffic is to enter the site from this entrance via. Nelson Court and Victoria Street. This is done to ensure that Sunnybrae Avenue is not used west of Nelson Court to avoid potential concerns with the public school located in this area. .

7.0 Inspection and Maintenance Requirements

A *stand-alone* Operations and Maintenance Manual has been completed. This report includes the catchment area for the pond, the MOE ECA certificate, recommended cleaning frequency based on MOE criteria and an inspection log that is to be filled out by Town staff as per the conditions included with the ECA.

8.0 Conclusions

1. The proposed Stormwater Management Plan for the Innisfil Executive Estates subdivision provides quantity control to below pre-development levels and quality control to the Ministry of Environment *Enhanced* level.

2. The storm sewer system has been designed to provide conveyance of the 5-year storm event based on the *Rational Method*[7] without surcharge.

3. Local drainage areas have been designed to provide conveyance of the 100-year event.

4. The overland flow route to the pond has been sized to convey the Regional Storm event.

5. The SWM pond discharges to a proposed drainage channel to the Victoria Street ROW and has been designed to convey the Regional Storm event.

6. Conveyance from the subject lands up to the Regional flow will be conveyed within a proposed storm sewer to the Hewitt's Creek Drain safely under the Victoria Street ROW to the existing municipal easement.

7. It is recommended that this report be accepted by the regulatory agents

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[7] *Included in the design of the storm system are two areas where the site grading constraints require inlet of the* 100-year flow and the system has been storm system has also been sized to accommodate these flows with an inlet capacity based on 50% blockage.

Respectfully Submitted;

LICENSED PROFESSIONAL ENGINEER
H.G. GEMMELL
100081079
May 6/14
PROVINCE OF ONTARIO

H. Gregory Gemmell, P.Eng

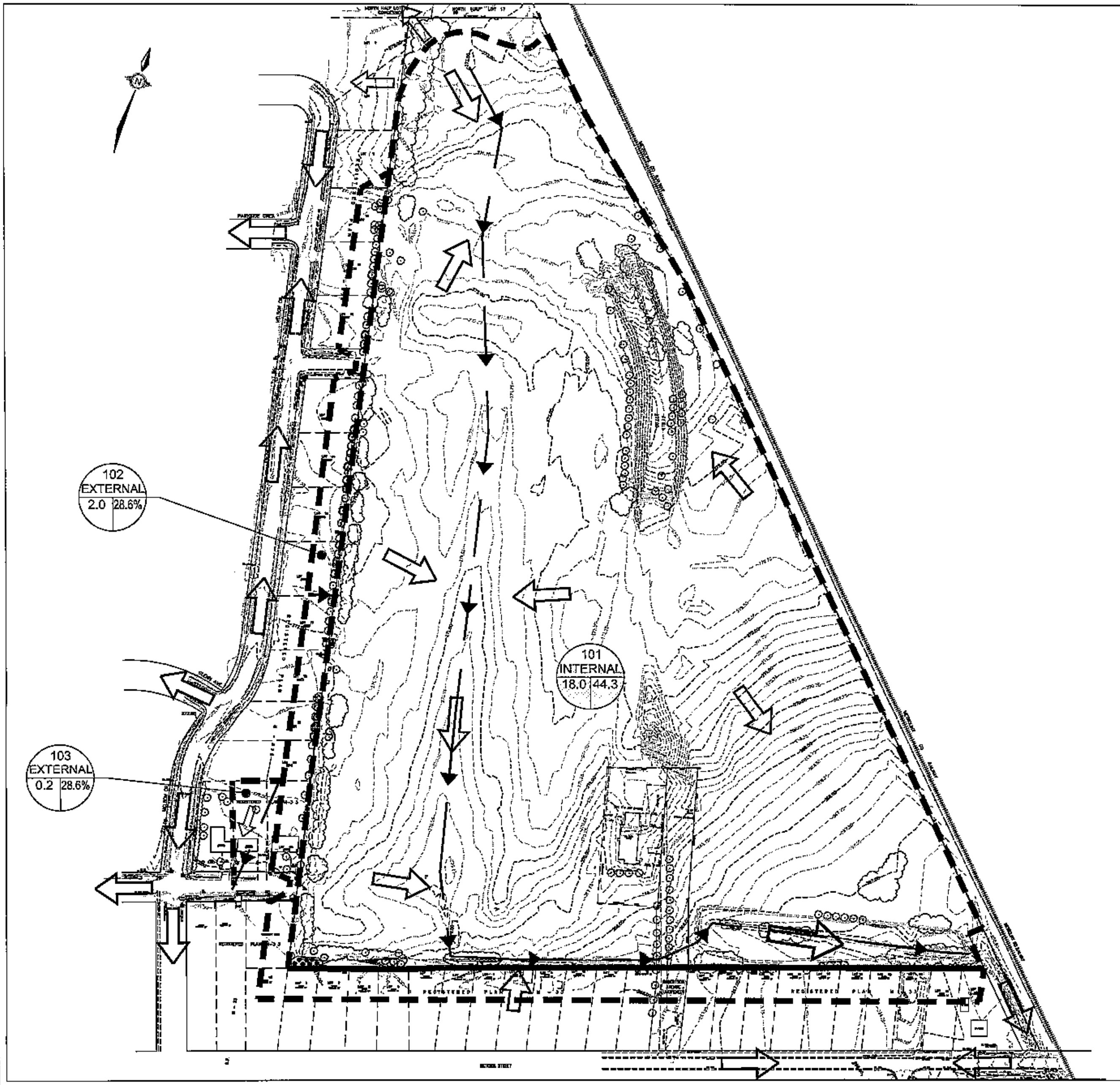
Gemmell Engineering

Appendix 1

Storm Catchment Plans

1.	Pre-Development Storm Catchment Plan	123	SWM-1
2.	Post Development Storm Catchment Plan	123	SWM-2
3.	Storm Drainage Plan (G.M. Sernas and Associates Ltd.)	43T-88008	G-102A

Pre-Development Storm Catchment Plan 123 SWM-1



THE EXTERNAL DRAINAGE AREA ALONG THE WEST AND SOUTH PROPERTY AND RUNOFF COEFFICIENT IS BASED ON THE PREVIOUSLY APPROVED PLAN FROM GM SERNAS G-102A STORM DRAINAGE PLAN EXCEPT WHERE ADDITIONAL SURVEY WORK AT THE NORTHWEST CORNER RESULTED IN REVISION BASED ON ACTUAL FIELD CONDITIONS.

FLOW PATH CALCULATIONS

Catchment 101

Length = 961.3m
Slope = (273.00m - 263.50m) / 961.3m
= 0.99%

Catchmont 102

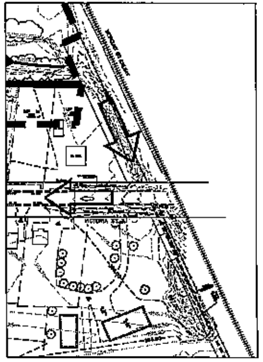
Length = 18.0m
Slope = (271.71m - 271.61m) / 18.0m
= 0.55%

Catchmont 103

Length = 78.3m
Slope = (272.61m - 271.33m) / 78.3m
= 1.63%

ACCEPTED FOR CONSTRUCTION	ACCEPTED FOR CONSTRUCTION AECOM
TOWN OF INNISFIL DEVELOPMENT ENGINEERING	TOWN PEER REVIEW ENGINEER
DATE:	DATE:

SWM–1 CONTINUATION



KEY PLAN
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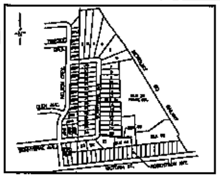


SURVEY NOTES:

BOUNDARY SURVEY BASED ON FIELD SURVEY BY PETER RAIKES O.L.S. DATED OCT. 28, 2010.

TOPOGRAPHIC INFORMATION BASED ON INFORMATION FROM ROCK SOLID CONSULTING RECEIVED JAN. 05, 2011.

MNR BENCHMARK: 0011031U4615 TWP.: STROUD ELEV.: 270.800

TABLET LOCATION: PRESBYTERIAN CHURCH, IN VILLAGE, ABOUT 00m EAST OF TORONTO–NORTH BAY HWY. TABLET IN WEST CONCRETE FOUNDATION WALL OF WEST TOWER, 1.5m FROM S/W CORNER AND 1.37m BELOW CONCRETE BLOCKS.

GENERAL NOTES:

1. DO NOT SCALE DRAWINGS.
2. ALL DIMENSIONS ARE TO BE CHECKED AND VERIFIED ON SITE PRIOR TO CONSTRUCTION.
3. ANY DISCREPANCIES, OMISSIONS, OR ERRORS ARE TO BE REPORTED TO THE CONSULTANT. NO WORK IS TO PROCEED BEFORE CLARIFICATION OF THE DISCREPANCIES, ERRORS, OR OMISSIONS IS RECEIVED FROM THE CONSULTANT.
4. ALL EXISTING CONDITIONS TO BE CHECKED AND VERIFIED ON SITE PRIOR TO CONSTRUCTION.
5. ONLY LATEST APPROVED DRAWINGS TO BE USED FOR CONSTRUCTION.
6. ALL DRAWINGS AND SPECIFICATIONS REMAIN THE PROPERTY OF THE CONSULTANT, AND SHALL BE RETURNED TO THE CONSULTANT UPON REQUEST. IN NO WAY SHALL THE DRAWINGS AND/OR SPECIFICATIONS IN WHOLE OR IN PART BE REPRODUCED OR DISTRIBUTED WITHOUT THE PERMISSION OF THE CONSULTANT.
7. PRIOR TO ANY WORKS ON MUNICIPAL PROPERTY A ROAD OCCUPANCY PERMIT SHALL BE OBTAINED FROM THE TOWN.
8. GEMMELL ENGINEERING TAKES NO LIABILITY FOR SURVEY DATA.

LEGEND:

101 — CATCHMENT AREA
52.2 — AREA (ha)
8.47 — TMP OR CN NUMBER

⇦ DIRECTION OF OVERLAND FLOW

▬ ▬ CATCHMENT BOUNDARY

← FLOW LENGTH(m) AND SLOPE %

ITEM	DESCRIPTION	DATE	BY	APPRV'D
1	MYLAR SUBMISSION	MAY 7/14	GEMCAD INC.	HGC

SCHEDULE OF REVISIONS

H.G.C. GEMMELL
100081075

ENGINEER'S SEAL

PROJECT:
INNISFIL
EXECUTIVE ESTATES

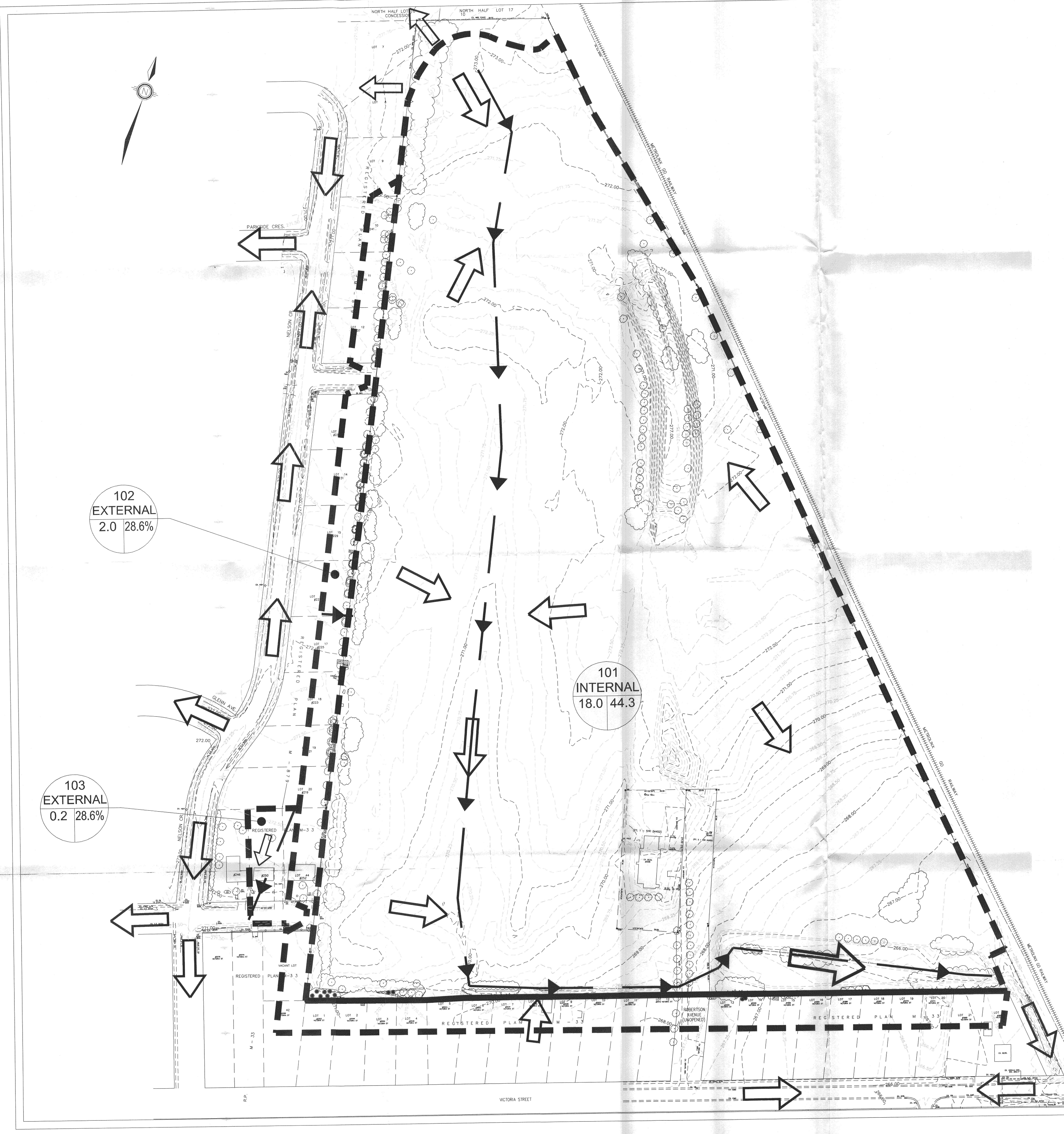
TITLE:
PRE-DEVELOPMENT
STORM CATCHMENT PLAN

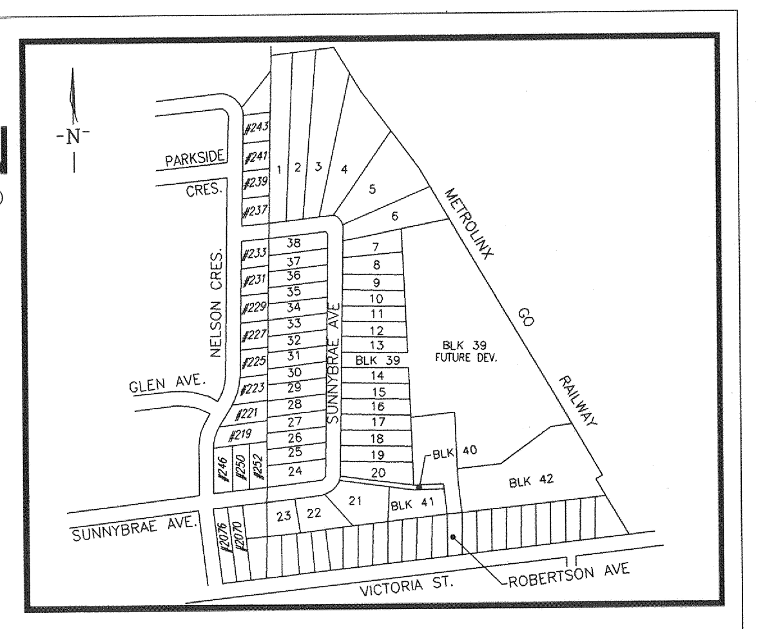
GEMMELL
Engineering

TOWN OF INNISFIL
PLANNING AND DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

DRAWN: GEMCAD	SCALE:	DWG. No.	PROJECT No.
DESIGNED: H.G.C.	HOR: 1:1250	SWM-1	123
CHECKED: H.G.C.	DATE: MAY 2012		

INNISFIL EXECUTIVE ESTATES - I-T-880008





THE EXTERNAL DRAINAGE AREA ALONG THE WEST AND SOUTH PROPERTY AND RUNOFF COEFFICIENT IS BASED ON THE PREVIOUSLY APPROVED PLAN FROM GM SERNAS G-102A STORM DRAINAGE PLAN EXCEPT WHERE ADDITIONAL SURVEY WORK AT THE NORTHWEST CORNER RESULTED IN REVISION BASED ON ACTUAL FIELD CONDITIONS.

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Slope = (272.61m - 271.33m) / 78.3m
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SURVEY NOTES:

BOUNDARY SURVEY BASED ON FIELD SURVEY BY PETER RAIKES O.L.S., DATED OCT. 26, 2010.

TOPOGRAPHIC INFORMATION BASED ON INFORMATION FROM ROCK SOLID CONSULTING RECEIVED JAN. 05, 2011.

MNR BENCHMARK: 0011931U461S TWP.: STROUD ELEV.: 270.600

TABLET LOCATION: PRESBYTERIAN CHURCH, IN VILLAGE, ABOUT 90m EAST OF TORONTO–NORTH BAY HWY. TABLET IN WEST CONCRETE FOUNDATION WALL OF WEST TOWER, 1.5m FROM S/W CORNER AND 1.37m BELOW CONCRETE BLOCKS.

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8. GEMMELL ENGINEERING TAKES NO LIABILITY FOR SURVEY DATA.

LEGEND:

101 — CATCHMENT AREA
62.2 — TIMP OR CN NUMBER
6.47 — AREA (ha)

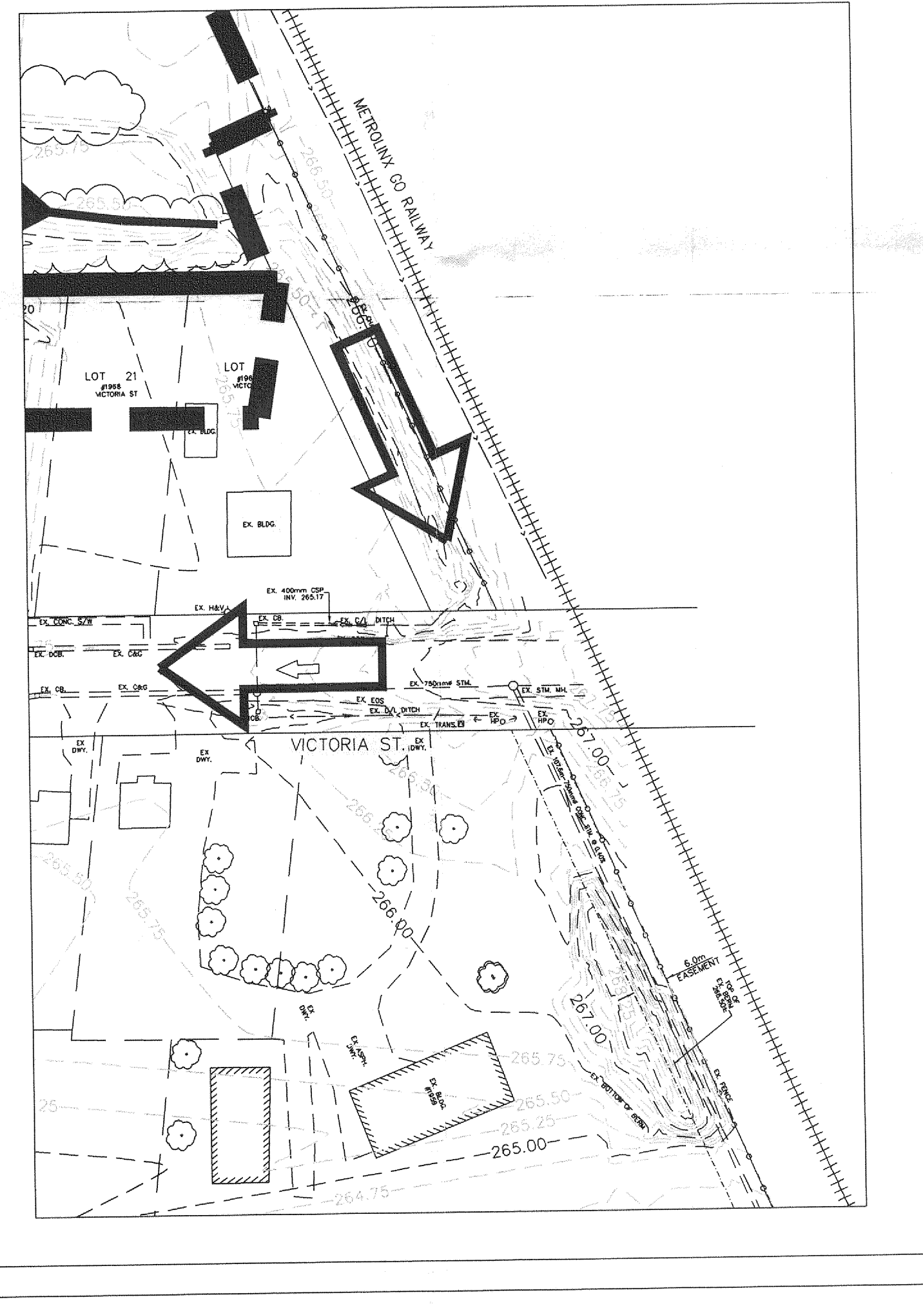
⇦ DIRECTION OF OVERLAND FLOW

▬ ▬ CATCHMENT BOUNDARY

← FLOW LENGTH(m) AND SLOPE %

ACCEPTED FOR CONSTRUCTION	ACCEPTED FOR CONSTRUCTION
	AECOM
TOWN OF INNISFIL DEVELOPMENT ENGINEERING	TOWN PEER REVIEW ENGINEER
DATE:	DATE: June 3, 2014

SWM-1 CONTINUATION



ITEM	DESCRIPTION	DATE	BY	APPRV'D
1	MYLAR SUBMMISSION	MAY 7/14	GEMCAD INC.	HGG

SCHEDULE OF REVISIONS

H.G. GEMMELL
100081079
May 7/14

ENGINEER'S SEAL

PROJECT:
INNISFIL
EXECUTIVE ESTATES

TITLE:
PRE-DEVELOPMENT
STORM CATCHMENT PLAN

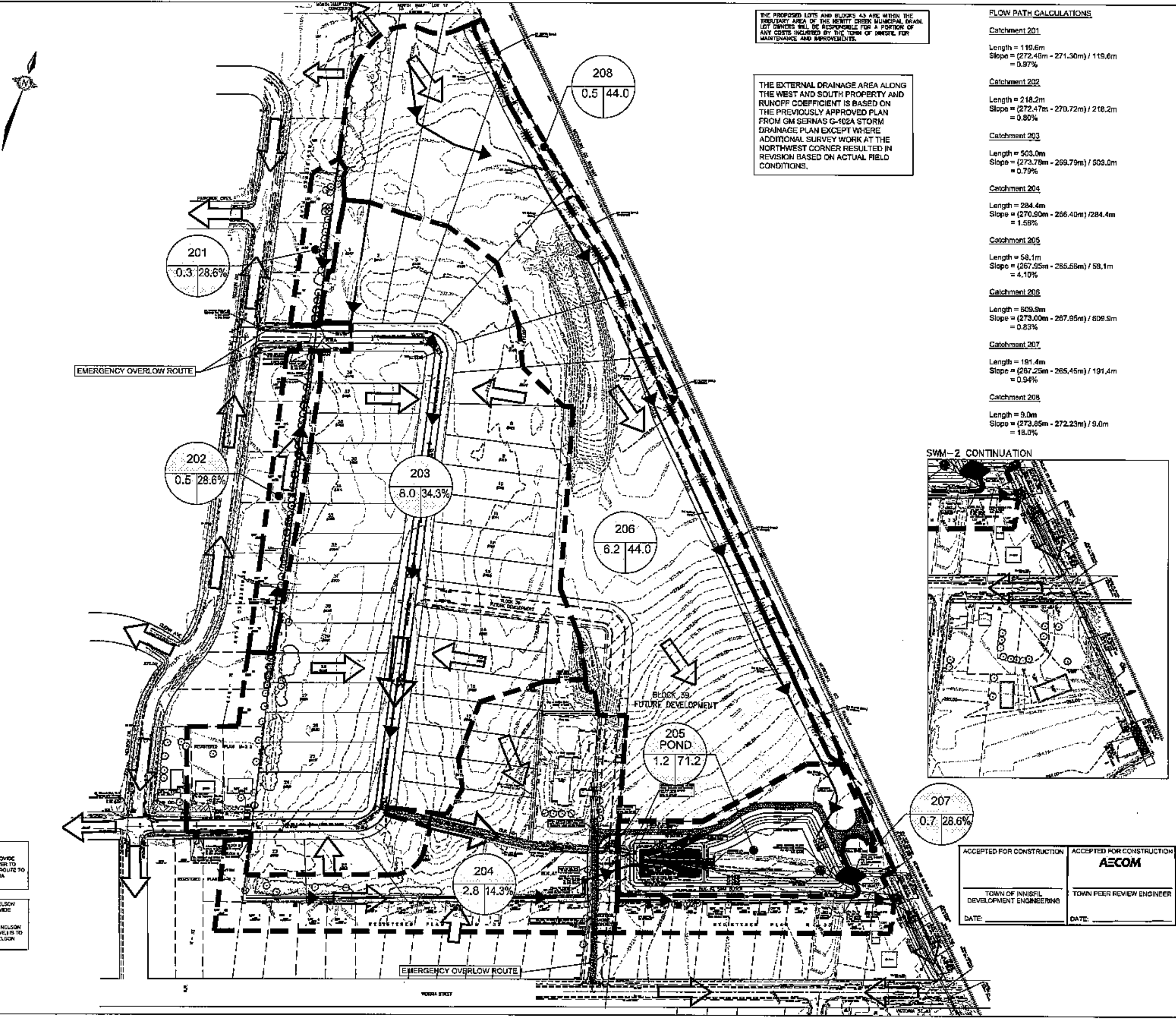
GEMMELL
ENGINEERING
144 Thrushwood Drive, Barrie, ON L4M 1Z0
Phone: (705) 309-0787 Fax: (705) 719-9578

TOWN OF INNISFIL
PLANNING AND DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

DRAWN: GEMCAD	SCALE:	DWG. No.	PROJECT No.
DESIGNED: H.G.G.	HOR: 1:1250	SWM-1	123
CHECKED: H.G.G.	DATE: MAY 2012		

INNISFIL EXECUTIVE ESTATES - I-T-880008

Post Development Storm Catchment Plan 123 SWM-2



THE PROPOSED LOTS AND BLOCKS 43 ARE WITHIN THE TRIBUTARY AREA OF THE HEWITT CREEK MUNICIPAL DRAIN. LOT OWNERS WILL BE RESPONSIBLE FOR A PORTION OF ANY COSTS INCURRED BY THE TOWN OF INNISFIL FOR MAINTENANCE AND IMPROVEMENTS.

THE EXTERNAL DRAINAGE AREA ALONG THE WEST AND SOUTH PROPERTY AND RUNOFF COEFFICIENT IS BASED ON THE PREVIOUSLY APPROVED PLAN FROM GM SERNAS G-102A STORM DRAINAGE PLAN EXCEPT WHERE ADDITIONAL SURVEY WORK AT THE NORTHWEST CORNER RESULTED IN REVISION BASED ON ACTUAL FIELD CONDITIONS.

FLOW PATH CALCULATIONS

Catchment 201

Length = 119.6m
Slope = (272.46m - 271.30m) / 119.6m
= 0.97%

Catchment 202

Length = 218.2m
Slope = (272.47m - 270.72m) / 218.2m
= 0.80%

Catchment 203

Length = 503.0m
Slope = (273.78m - 269.79m) / 503.0m
= 0.79%

Catchment 204

Length = 284.4m
Slope = (270.90m - 266.40m) /284.4m
= 1.58%

Catchment 205

Length = 58.1m
Slope = (267.95m - 265.56m) / 58.1m
= 4.10%

Catchment 206

Length = 609.9m
Slope = (273.00m - 267.95m) / 609.9m
= 0.83%

Catchment 207

Length = 191.4m
Slope = (267.25m - 265.45m) / 191.4m
= 0.94%

Catchment 208

Length = 9.0m
Slope = (273.85m - 272.23m) / 9.0m
= 18.0%

NOTE:

CATCHMENT AREAS 201 & 202 PROVIDE 100 - YEAR FLOW VIA STORM SEWER TO POND. EMERGENCY OVERFLOW ROUTE TO NELSON COURT DITCH SYSTEM VIA SUNNYBRAE AVE.

EX. DITCH ALONG S/E CORNER NELSON CRES. TO BE REGRADED TO PROVIDE POSITIVE DRAINAGE.

DRAINAGE FROM EAST DITCH ON NELSON CRES. (SOUTH OF SUNNYBRAE AVE.) IS TO EX. DICB AT INTERSECTION OF NELSON CRES. AND VICTORIA ST.

ACCEPTED FOR CONSTRUCTION

TOWN OF INNISFIL
DEVELOPMENT ENGINEERING

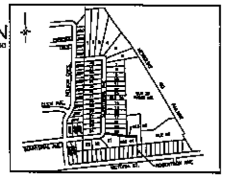
DATE:

ACCEPTED FOR CONSTRUCTION
AECOM

TOWN PEER REVIEW ENGINEER

DATE:

KEY PLAN
SCALE 1:1000



SURVEY NOTES:

BOUNDARY SURVEY BASED ON FIELD SURVEY BY PETER RAIKES O.L.S., DATED OCT. 26, 2010.

TOPOGRAPHIC INFORMATION BASED ON INFORMATION FROM ROCK SOLID CONSULTING RECEIVED JAN. 05, 2011.

MNR BENCHMARK: 0011531U4615 TWP.: SIPOLO ELEV.: 270.800

TABLET LOCATION: PRESBYTERIAN CHURCH IN VILLAGE, ABOUT 60m EAST OF TORONTO–NORTH BAY HWY. TABLET IN WEST CONCRETE FOUNDATION WALL OF WEST TOWER, 1.5m FROM S/E CORNER AND 1.37m BELOW CONCRETE BLOCKS.

GENERAL NOTES:

1. DO NOT SCALE DRAWINGS.
2. ALL DIMENSIONS ARE TO BE CHECKED AND VERIFIED ON SITE PRIOR TO CONSTRUCTION.
3. ANY DISCREPANCIES, OMISSIONS, OR ERRORS ARE TO BE REPORTED TO THE CONSULTANT. NO WORK IS TO PROCEED BEFORE CLARIFICATION OF THE DISCREPANCIES, ERRORS, OR OMISSIONS IS RECEIVED FROM THE CONSULTANT.
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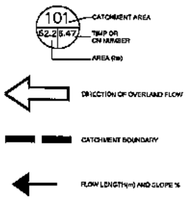
7. PRIOR TO ANY WORKS ON MUNICIPAL PROPERTY A ROAD OCCUPANCY PERMIT SHALL BE OBTAINED FROM THE TOWN.
8. GEMMELL ENGINEERING TAKES NO LIABILITY FOR SURVEY DATA.

LEGEND:



ITEM	DESCRIPTION	DATE	BY	APPRV'D
2	REVISED AS PER AECOM	MAY 27/14	GEMCAD INC.	HGG
1	MYLAR SUBMISSION	MAY 7/14	GEMCAD INC.	HGG

SCHEDULE OF REVISIONS

H.G. GEMMELL
100061079
May 26/14

ENGINEER'S SEAL

PROJECT:

INNISFIL
EXECUTIVE ESTATES

TITLE:

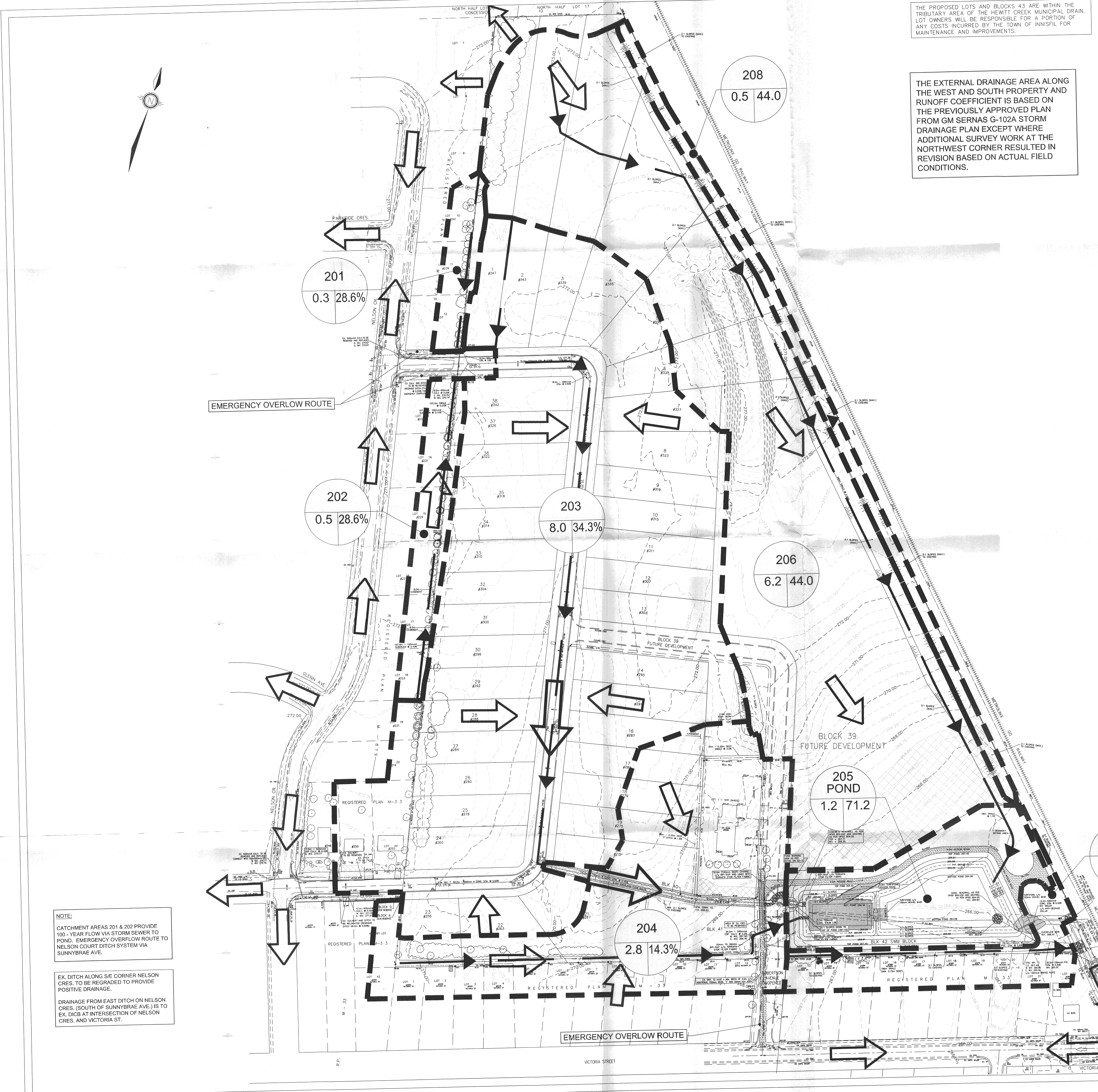
POST-DEVELOPMENT
STORM CATCHMENT PLAN

GEMMELL
Engineering

TOWN OF INNISFIL
PLANNING AND DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

DRAWN: GEMCAD	SCALE:	DWG. No.	PROJECT No.
DESIGNED: H.G.G.	HOR: 1:1230	SWM-2	123
CHECKED: H.G.G.	DATE: MAY 2012		

INNISFIL EXECUTIVE ESTATES - I-T-880008



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NOTE:

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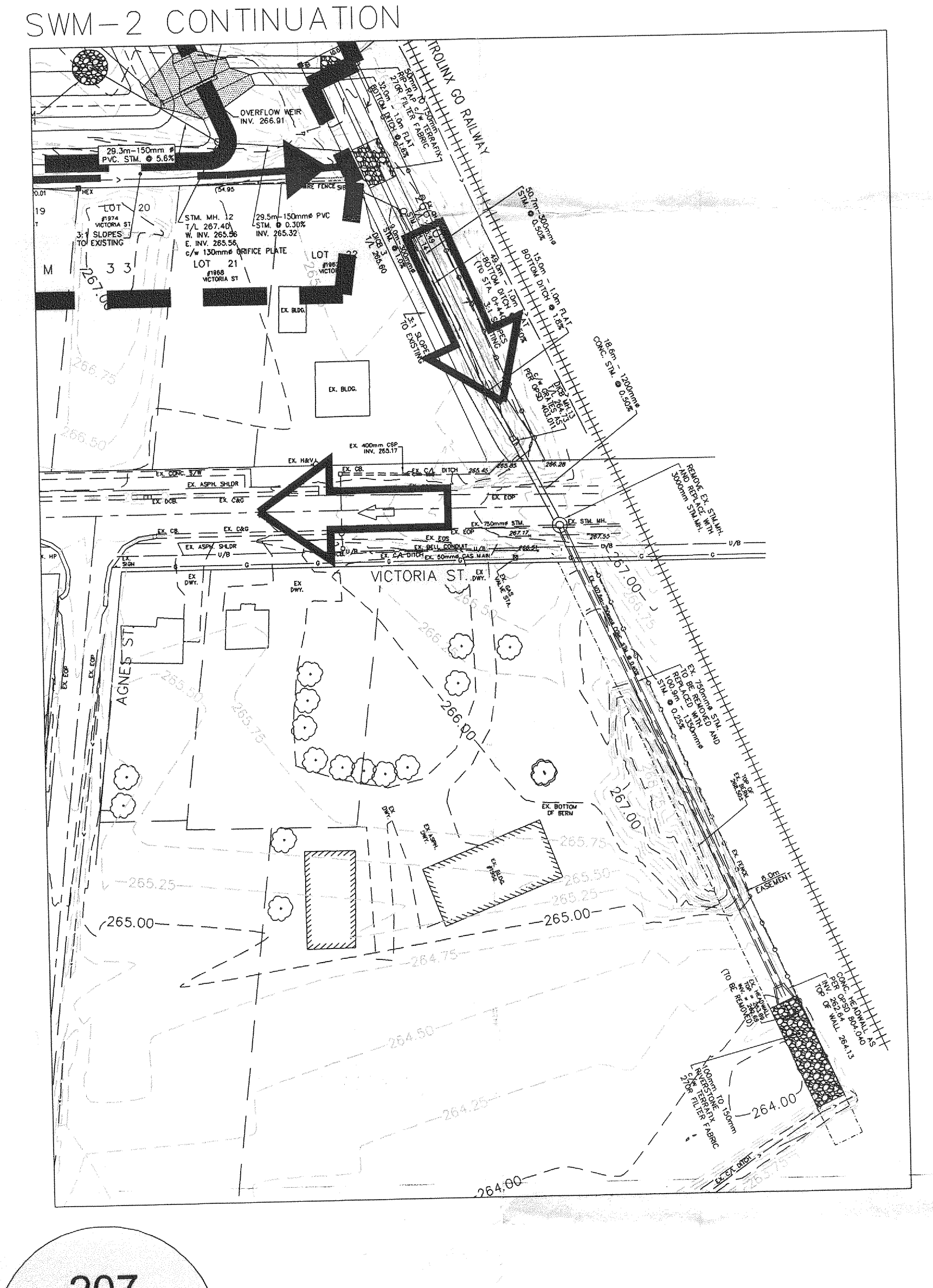
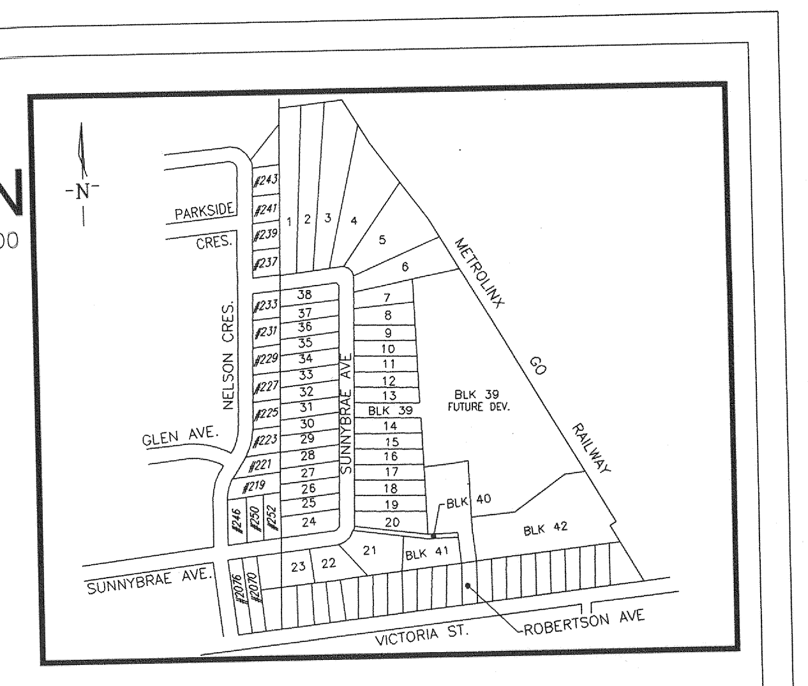
Slope = (273.85m - 272.23m) / 9.0m
= 18.0%

SWM-2 CONTINUATION



KEY PLAN

SCALE 1:1000



SURVEY NOTES:

BOUNDARY SURVEY BASED ON FIELD SURVEY BY PETER RAIKES O.L.S., DATED OCT. 26, 2010.

TOPOGRAPHIC INFORMATION BASED ON INFORMATION FROM ROCK SOLID CONSULTING RECEIVED JAN. 05, 2011.

MNR BENCHMARK: 0011931U461S TWP.: STROUD ELEV.: 270.600

TABLET LOCATION: PRESBYTERIAN CHURCH, IN VILLAGE, ABOUT 90m EAST OF TORONTO–NORTH BAY HWY. TABLET IN WEST CONCRETE FOUNDATION WALL OF WEST TOWER, 1.5m FROM S/W CORNER AND 1.37m BELOW CONCRETE BLOCKS.

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8. GEMMELL ENGINEERING TAKES NO LIABILITY FOR SURVEY DATA.

LEGEND:

101 / 62.2 | 6.47 — CATCHMENT AREA; TIMP OR CN NUMBER; AREA (ha)
⇦ DIRECTION OF OVERLAND FLOW
▬ ▬ CATCHMENT BOUNDARY
← FLOW LENGTH(m) AND SLOPE %

ITEM	DESCRIPTION	DATE	BY	APPRV'D
2	REVISED AS PER AECOM	MAY 27/14	GEMCAD INC.	HGG
1	MYLAR SUBMMISSION	MAY 7/14	GEMCAD INC.	HGG

SCHEDULE OF REVISIONS

H.G. GEMMELL
100081079
MAY 26/14

ENGINEER'S SEAL

ACCEPTED FOR CONSTRUCTION

TOWN OF INNISFIL
DEVELOPMENT ENGINEERING

DATE:

ACCEPTED FOR CONSTRUCTION
AECOM
TOWN PEER REVIEW ENGINEER
DATE: June 3, 2014

PROJECT:
INNISFIL EXECUTIVE ESTATES

TITLE:
POST-DEVELOPMENT STORM CATCHMENT PLAN

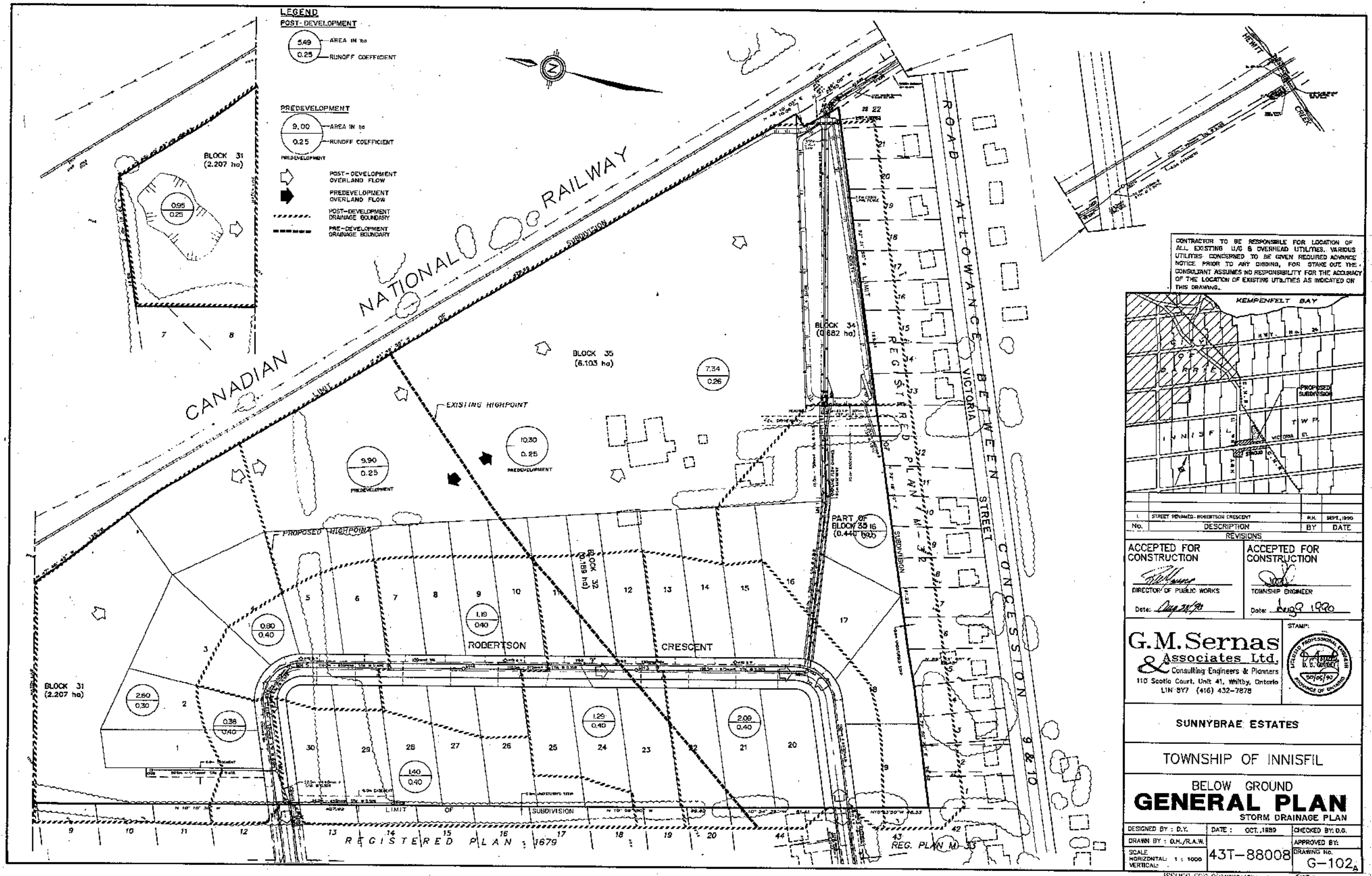
GEMMELL
ENGINEERING
144 Thrushwood Drive, Barrie, ON L4M 1Z0
Phone:(705) 309-0787 Fax:(705) 719-9578

TOWN OF INNISFIL
PLANNING AND DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

DRAWN: GEMCAD	SCALE:	DWG. No.	PROJECT No.
DESIGNED: H.G.G.	HOR: 1:1250	SWM-2	123
CHECKED: H.G.G.	DATE: MAY 2012		

INNISFIL EXECUTIVE ESTATES - I-T-880008

Storm Drainage Plan (G.M. Sernas and Associates Ltd.)	43T-88008	G-102A



CONTRACTOR TO BE RESPONSIBLE FOR LOCATION OF ALL EXISTING U/G & OVERHEAD UTILITIES. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCE NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. THE CONSULTANT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

No.	DESCRIPTION	BY	DATE
1.	STREET RENAMED - ROBERTSON CRESCENT	R.H.	SEPT., 1990

REVISIONS

ACCEPTED FOR CONSTRUCTION

DIRECTOR OF PUBLIC WORKS

Date: Aug 28/90

ACCEPTED FOR CONSTRUCTION

TOWNSHIP ENGINEER

Date: Aug 9 1990

G.M.Sernas & Associates Ltd.
Consulting Engineers & Planners
110 Scotia Court, Unit 41, Whitby, Ontario
L1N 8Y7 (416) 432-7878

STAMP:
D. B. GOUDEY
30/05/90

SUNNYBRAE ESTATES

TOWNSHIP OF INNISFIL

BELOW GROUND
GENERAL PLAN
STORM DRAINAGE PLAN

DESIGNED BY : D.Y.
DATE : OCT., 1989
CHECKED BY: D.G.
DRAWN BY : D.H./R.A.W.
APPROVED BY:
SCALE HORIZONTAL: 1 : 1000
VERTICAL: -
43T-88008
DRAWING No. G-102A

ISSUED FOR CONSTRUCTION

Sept 11, 1990

SEP 11 1990

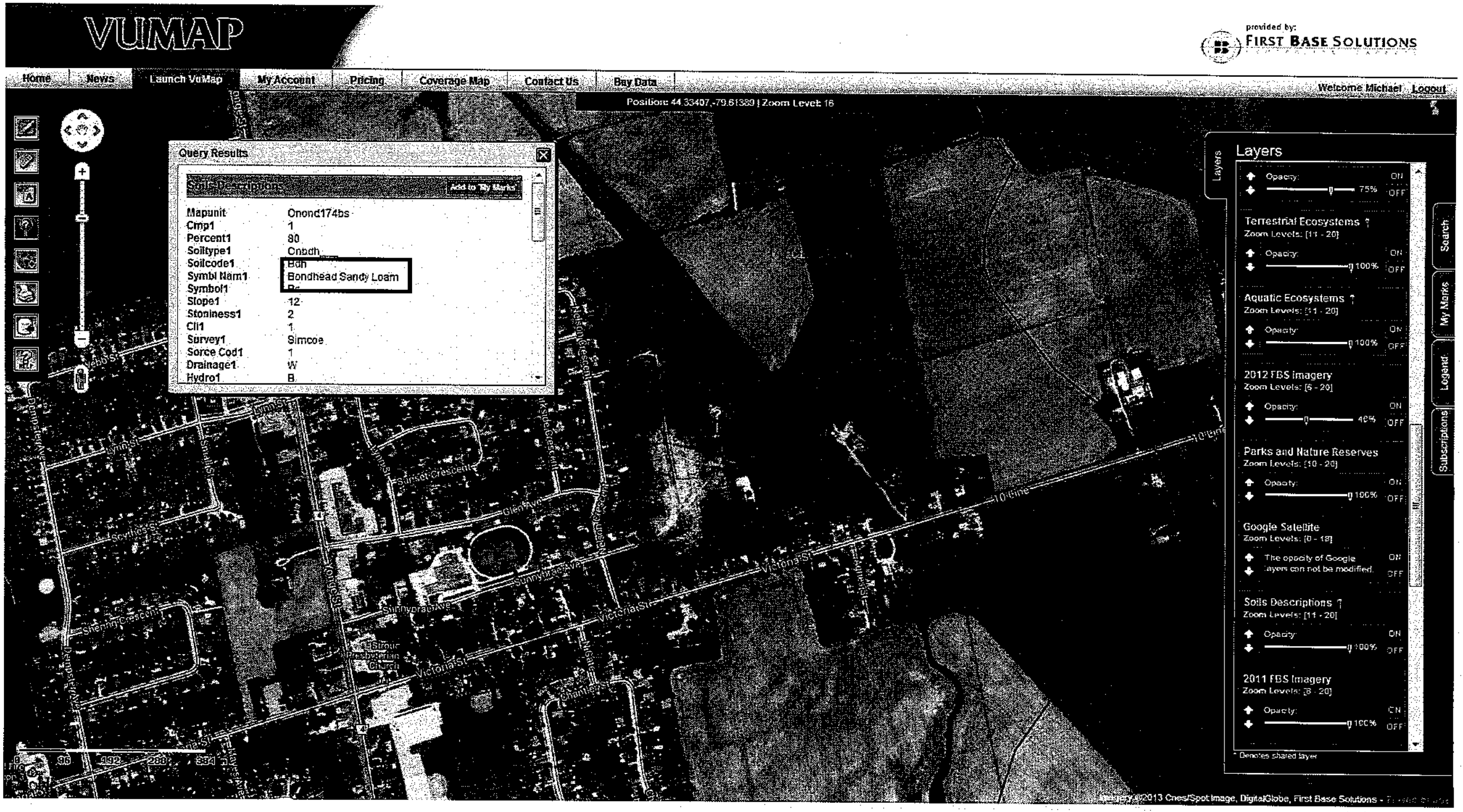
Appendix 2

OTTHYMO Model Information

1. Model Parameters
    a. CN Values and Soils Information
    b. NASHYD and Tp Calculations
    c. STANDHYD and TIMP Calculations
    d. SWM Pond Stage Storage Table
2. Pre-Development Model and Summary Results
3. Post Development Model and Summary Results

Model Parameters

a. CN Values and Soils Information
b. NASHYD and Tp Calculations
c. STANDHYD and TIMP Calculations
d. SWM Pond Stage Storage Table



Query Results

Soils Descriptions — Add to My Marks

Mapunit	Onond174bs
Cmp1	1
Percent1	80
Soiltype1	Cnbdh
Soilcode1	Bdh
Symbl Nam1	Bondhead Sandy Loam
Symbol1	Bc
Slope1	12
Stoniness1	2
Cli1	1
Survey1	Simcoe
Sorce Cod1	1
Drainage1	W
Hydro1	B

Layers

Opacity: 75% ON OFF

Terrestrial Ecosystems
Zoom Levels: [11 - 20]
Opacity: 100% ON OFF

Aquatic Ecosystems
Zoom Levels: [11 - 20]
Opacity: 100% ON OFF

2012 FBS Imagery
Zoom Levels: [6 - 20]
Opacity: 40% ON OFF

Parks and Nature Reserves
Zoom Levels: [10 - 20]
Opacity: 100% ON OFF

Google Satellite
Zoom Levels: [0 - 18]
The opacity of Google layers can not be modified. ON OFF

Soils Descriptions
Zoom Levels: [11 - 20]
Opacity: 100% ON OFF

2011 FBS Imagery
Zoom Levels: [6 - 20]
Opacity: 100% ON OFF

* Denotes shared layer

CHART H2 - 6A

CHART H2-6A - HYDROLOGIC SOIL GROUPS FOR PRINCIPAL SOIL TEXTURES IDENTIFIED ON AGRICULTURAL SOILS MAPS (6)

Soils Series	Soil Texture	Hyd. Soil Grp.	Soils Series	Soil Texture	Hyd. Soil Grp.	Soils Series	Soil Texture	Hyd. Soil Grp.
Alberton	si l	BC	Bolingbr.	s	A	"	c	C
Allendale	s l	B	Bondhead	s l	AB	"	l	BC
Alliston	s l	AB	"	l	B	Camilla	s l	AB
Almonte	si c l	C	Bookton	s l	AB	"	si l	BC
Ameliasbg	c l	C	Boomer	l	B	Campbell	si c	C
"	l	B	Brady	s l	AB	Cane	si l	BC
Ancaster	si l &s	B	"	s	A	"	si c l	C
"	si l	BC	Brant	s &si l	B	Carp	c &c l	C
Anstruther	s	A	Brantford	si l	BC	Casey	si l	BC
Appleton	si l & s	B	"	si c l	C	Cashel	c	D
Atherley	c	C	"	l	BC	Castor	s l	AB
"	si c l	C	"	c l	D	"	si l	BC
Athol	s l	A	Brentha	s l	A	"	c	C
Atwood	c	C	"	l	B	Chesley	si l	BC
Ayr	s l	B	Brethour	si l	BC	"	si c l	C
Bainsville	s	B	Breypen	limest.	B	"	c l	C
"	si l	B	Bridgman	s	A	Chinguac'y	l	BC
Balderson	s l	B	Brighton	s	A	"	si l	BC
Bamford	s	AB	"	s l	AB	"	c l	C
Bancroft	s	A	Brisbane	s g	AB	"	c	D
"	s l	B		l	B	Christy	s l	B
Bass	c	D	Brockport	c	D	Clyde	l	BC
Bastard	s	A	Brooke	l	B	"	si l	BC
Battersea	si l	BC	Brookston	s l	B	"	c l	C
"	s l	AB	"	l	C	"	c	C
Bearbrook	s l	B	"	si l	C	Colborne	s	A
"	si c l	C	"	si c l	C	Colwood	s l	B
"	c	C	"	c l	C	"	si l	B
Belmeade	m & c	B	"	c	C	"	l	BC
Bennington	s l	B	Bucke	s	AB	Codrington	si l	BC
"	s	A	"	s l	AB	Conestogo	l	BC
"	si l	A	Burford	s l	A	Conover	c l	C
Berrien	s	AB	"	l	AB	"	l	BC
"	s l	AB	Bumbrae	l	B	Cooksville	c	D
Berriedale	s & si	AB	Burnstown	l	B	Coutts	s l	AB
Beverly	l	BC	Burpee	s	A	"	l	BC
"	si l	C	Burris	c l	C	Craigleith	c	C
"	si c l	C	Buzwah	si c l	C	Cramahe	s g	A
Binbrook	si l	C	Buzwah	c l	D	Crombie	s l	B
Blackwell	c	C	Caledon	s l	A	"	si l	BC
Blanche	si l	BC	"	l	B	Dack	c	D
Blue	c l	C	Caistor	c l	C	Dalton	s	AB

Notes: 1. See footnotes to Chart H2-2.

2. Key to abbreviations: c - clay; f - fine; g - gravel; l - loam; ma - marl; m - muck; p - peat; r - rock; s - sand; si - silt.

Design Chart 1.09: Soil/Land Use Curve Numbers

Land Use	Treatment or Practice	Hydrologic Condition[4]	Hydrologic Soil Group			
			A	B	C	D
Fallow	Straight row	---	77	86	91	94
Row crops	"	Poor	72	81	88	91
	"	Good	67	78	85	89
	Contoured	Poor	70	79	84	88
	"	Good	65	75	82	86
	" and terraced	Poor	66	74	8	82
	" " "	Good	62	71	78	81
Small grain	Straight row	Poor	65	76	84	88
		Good	63	75	83	87
	Contoured	Poor	63	74	82	85
		Good	61	73	81	84
	" and terraced	Poor	61	72	79	82
		Good	59	70	78	81
Close-seeded legumes[2] or rotation meadow	Straight row	Poor	66	77	85	89
	" "	Good	58	72	81	85
	Contoured	Poor	64	75	83	85
	"	Good	55	69	78	83
	" and terraced	Poor	63	73	80	83
	" and terraced	Good	51	67	76	80
Pasture or range		Poor	68	79	86	89
		Fair	49	69	79	84
	Contoured	Good	39	61	74	80
	"	Poor	47	67	81	88
	"	Fair	25	59	75	83
		Good	6	35	70	79
Meadow		Good	30	58	71	78
Woods		Poor	45	66	77	83
		Fair	36	60	73	79
		Good	25	55	70	77
Farmsteads		---	59	74	82	86
		---	72	82	87	89
		---	74	84	90	92

For average anticedent soil moisture condition (AMC II)

[2] Close-drilled or broadcast.

[4] The hydrologic condition of cropland is good if a good crop rotation practice is used; it is poor if one crop is grown continuously.

CALCULATIONS TO CONVERT TO AB SOIL

Soil for subject lands is classified as Bondhead on Simcoe Soil Map and is considered hydrogeologic soil group AB. CN for AB soil is estimated as 50% CN value for A soil + 50% CN value for B soil

CN = 50%(30) + 50% (58)
= 44

NASHYD CACLCULATION SHEET

Pre-Development

Catchment	Area (ha)	L (m)	S (%)	CN	IA (mm)	RC	t_p (hr)	DT (min)
101	18.00	961.3	0.99	44.3	5.0	0.25	0.95	11
102	2.01	18.0	0.55			0.40	0.13	2
103	0.20	78.3	1.63			0.40	0.19	2
Total Area	20.210							

Land Use or Surface	CN	IA (mm)	RC
Pasture	44	5	0.25
Wooded	54	10	0.15
Cultivated	70	8	0.25

Catchment	Pasture Area (ha)	Lakes Area (ha)	Impervious Area (ha)	Weighted CN	Weighted IA (mm)	Weighted RC
101	17.90		0.10	44.3	5.0	0.25
102	STANDHYD					
103	STANDHYD					

Post-Development

Catchment	Area (ha)	L (m)	S (%)	CN	IA (mm)	RC	t_p (hr)	DT (min)
201	0.30	119.6	0.97			0.40	0.28	3
202	0.50	218.2	0.80			0.40	0.40	5
203	8.01	503.0	0.79			0.44	0.27	3
204	2.82	284.4	1.58			0.30	0.42	5
205	1.20	58.1	4.10	71.2	2.0	0.45	0.03	2
206	6.18	609.9	0.83	44.0	5.0	0.25	0.81	10
207	0.70	191.4	0.94			0.40	0.36	4
208	0.50	9.0	18.00	44.0	5.0	0.25	0.04	2
Total Area	20.210							

Land Use or Surface	CN	IA (mm)	RC
Pasture	44	5	0.25
Wooded	54	10	0.15
Cultivated	70	8	0.25
Lakes	50	2	0.05
Impervious	98	2	0.95

Catchment	Pasture Area (ha)	Lakes Area (ha)	Impervious Area (ha)	Weighted CN	Weighted IA (mm)	Weighted RC
201	STANDHYD					
202	STANDHYD					
203	STANDHYD					
204	STANDHYD					
205		0.67	0.53	71.2	2.0	0.45
206	6.18			44.0	5.0	0.25
207	STANDHYD					
208	0.50			44.0	5.0	0.25

Notes:

1) Soil is classified as Bondhead sandy loam as taken from V-Map (First Base Solutions) that is based on the Soil Map for Simcoe County (Soil Report No. 29)
2) Soil is classified as hydro geologic group AB
3) CN values adapted from MTO Design Chart 1.09 for an AMC II (normal) condition for all storms except for Regional Storm event.
4) CN values converted to AMC III (wet) condition for Regional Storm Event based on MTO Design Chart 1.10
5) Catchment 205 (SWM POND) is based on CN of 98 for permanent pool and access road
6) Tp and Dt values are calculated for all Catchments on this work sheet. Tp = 2/3 Tc and DT = Tp / 5 (min. value = 2.0 min as per OTTHYMO manual)
7) Refer STANHYD CALCULATION SHEET for RC values for 102, 103, 201, 202, 203, 204 & 207.
8) Tc value is based on Bransby-Williams Equation for RC > 0.4 and Airport Method for RC < 0.4 (see attached Table 4.2A from MTO design manual for equations)
9) Refer to SWM - 1 and SWM - 2 for longest flow path length and average slope for overland flow.

NASHYD CACLCULATION SHEET

Pre-Development

Catchment	Area (ha)	XIMP (%)	TIMP (%)	SLPP (%)	LGP (m)	SLPI (%)	LGI (m)	DT (min)
102	2.01	21.5	28.6	2.00	18.0	0.55	10	2
103	0.20	21.5	28.6	2.00	78.3	1.63	10	2
Total Area	2.21							

Land Use or Surface	C
Ex. Residential	0.4
Impervious	0.95

Catchment	Unimproved Area (ha)	Ex. Residential Area (ha)	Impervious Area (ha)	Grass/Park Area (ha)	Weighted	
					RC	TIMP (%)
102		2.01			0.40	28.6
103		0.20			0.40	28.6

Post-Development

Catchment	Area (ha)	XIMP (%)	TIMP (%)	SLPP (%)	LGP (m)	SLPI (%)	LGI (m)	DT (min)
201	0.30	21.5	28.6	0.97	119.6	1.00	10	3
202	0.50	21.5	28.6	0.80	218.2	1.00	10	5
203	8.01	25.7	34.3	2.00	86.0	0.79	503	3
204	2.82	10.7	14.3	1.58	284.4	1.00	140	5
207	0.70	21.5	28.6	0.94	191.4	1.00	10	4
Total Area	12.33							

Land Use or Surface	C
Unimproved	0.25
Ex. Residential	0.4
Impervious	0.95
Grass/Park	0.25

Catchment	Unimproved Area (ha)	Ex. Residential Area (ha)	Impervious Area (ha)	Grass/Park Area (ha)	Weighted	
					RC	TIMP (%)
201		0.30			0.40	28.6
202		0.50			0.40	28.6
203			2.13	5.88	0.44	34.3
204		0.50	0.09	2.23	0.30	14.3
207		0.70			0.40	28.6

Notes:

1) Catchment 203 Impervious Area is estiamted as follows:
    - 180 sq.m. avg. rooftop area x 38 lots = 6,840 sq.m.
    - 215 sq.m. avg. driveway area x 38 lots = 8,170 sq.m.
    - 570 m road x (9.5m + 1.5m) hard surface = 6,270 sq.m.

    Total Impervious Area - 21,280 sq.m. or 2.13 ha
2) TIMP is based on conversion from RC based on following equation:
    - RC = 0.7 x TIMP + 0.2
3) XIMP is equal to 3/4 TIMP
4) Refer to SWM - 1 and SWM - 2 for longest flow path length and average slope for overland flow.

Table 4A.2: Summary of Formulas (Cont'd)

Watershed Time of Concentration

(a) Bransby-Williams Equation

$$T_c = \frac{0.057 * L}{S_w^{0.2} * A^{0.1}} \qquad (8.15)$$

(b) Airport Formula

$$T_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}} \qquad (8.16)$$

where:

T_c = Time of concentration, min

L = Watershed length, m

S_w = Watershed slope, %

A = Watershed area, ha

Rational Method

$$Q = 0.0028 * C * I * A \qquad (8.19)$$

where:

Q = Peak runoff rate, m^3/s

C = Composite runoff coefficient

I = Rainfall intensity, mm/h

A = Drainage area, ha

Time to Peak (Hymo Method)

$$T_p = 0.0086 * A^{0.422} * S^{-0.46} * (L / W)^{0.133} \qquad (8.34)$$

where:

T_p = Time to peak, h

A = Drainage area, ha

S = Watershed slope, m/m

L = Watershed channel length, m

W = Watershed width, m

Project:	*Project N°*	
Description:	*Prepared By:*	*Date:*
	Other:	*Page* 1

Runoff Coefficient → Timp

$C = (0.7)(Timp) + 0.2$

$Timp = \frac{C - 0.2}{0.7}$

$Ximp = 75\% \, (Timp)$

i e : Catchment 203

C = 0.44

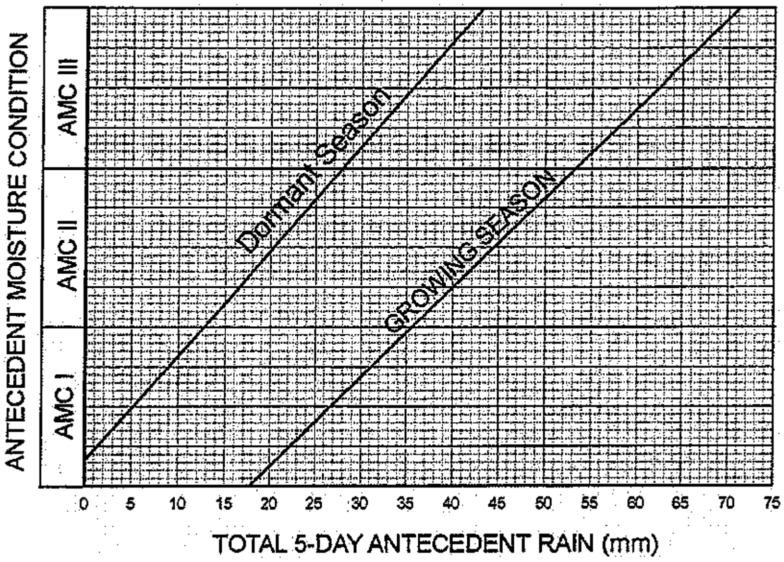
TIMP = (0.44 - 0.2) / 0.7
= 0.343 or 34.3%

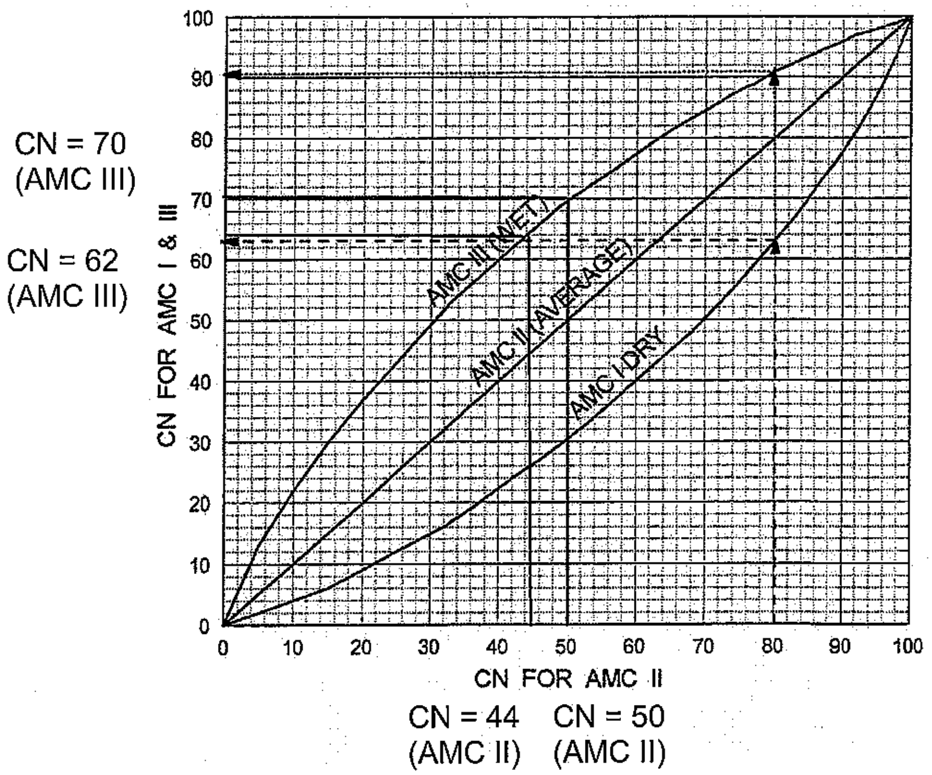
XIMP = 0.75% of 34.3%
= 25.7%

REV_2011-12-09

CONVERSION OF CN VALUES FOR STORM EVENTS FOR AMC III (WET) CONDITION

Design Chart 1.10: Antecedent Moisture Condition





EXAMPLE

AMC II	CN = 80
AMC I	CN = 63
AMC III	CN = 91

Innisfil Executive Estates
Stormwater Management Pond

Project Number: 123
Date: March 21, 2014

Hydraulic Calculation Sheet
Storage Stage Discharge Calculations

Extended Detention Orifice	
RADIUS=	0.065 m
Outlet Dia=	130.0 mm
Height=	1.50 m

Weir 1 Details	
Height	2.85 m
Length	3.00 m
Coefficient	1.705 (Broad-Crested)

Secondary Orifice	
RADIUS=	0.300 m
Outlet Dia=	600.0 mm
Height=	1.85 m

Weir 1 Details	
Height	3.14 m
Length	5.50 m
Coefficient	1.705 (Broad-Crested)

TOTAL STORAGE m^3	ACTIVE DETENTION STORAGE m^3	WATER DEPTH m	EXTENDED DETENTION ORIFICE m^3/s	SECONDARY ORIFICE m^3/s	OUTFLOW WEIR 1 m^3/s	OUTFLOW WEIR 2 m^3/s	TOTAL OUTFLOW m^3/s	Elevation m	
0	0	0.00	0.000	0.000	0.000	0.000	0.000	264.06	***Bottom of Pond***
116	0	0.05	0.000	0.000	0.000	0.000	0.000	264.11	
237	0	0.10	0.000	0.000	0.000	0.000	0.000	264.16	
361	0	0.15	0.000	0.000	0.000	0.000	0.000	264.21	
489	0	0.20	0.000	0.000	0.000	0.000	0.000	264.26	
622	0	0.25	0.000	0.000	0.000	0.000	0.000	264.31	
758	0	0.30	0.000	0.000	0.000	0.000	0.000	264.36	
898	0	0.35	0.000	0.000	0.000	0.000	0.000	264.41	
1,042	0	0.40	0.000	0.000	0.000	0.000	0.000	264.46	
1,190	0	0.45	0.000	0.000	0.000	0.000	0.000	264.51	
1,342	0	0.50	0.000	0.000	0.000	0.000	0.000	264.56	***Bottom of Forbay***
1,498	0	0.55	0.000	0.000	0.000	0.000	0.000	264.61	
1,658	0	0.60	0.000	0.000	0.000	0.000	0.000	264.66	
1,822	0	0.65	0.000	0.000	0.000	0.000	0.000	264.71	
1,990	0	0.70	0.000	0.000	0.000	0.000	0.000	264.76	
2,162	0	0.75	0.000	0.000	0.000	0.000	0.000	264.81	
2,338	0	0.80	0.000	0.000	0.000	0.000	0.000	264.86	
2,517	0	0.85	0.000	0.000	0.000	0.000	0.000	264.91	
2,701	0	0.90	0.000	0.000	0.000	0.000	0.000	264.96	
2,889	0	0.95	0.000	0.000	0.000	0.000	0.000	265.01	
3,080	0	1.00	0.000	0.000	0.000	0.000	0.000	265.06	
3,276	0	1.05	0.000	0.000	0.000	0.000	0.000	265.11	
3,475	0	1.10	0.000	0.000	0.000	0.000	0.000	265.16	
3,679	0	1.15	0.000	0.000	0.000	0.000	0.000	265.21	
3,886	0	1.20	0.000	0.000	0.000	0.000	0.000	265.26	
4,097	0	1.25	0.000	0.000	0.000	0.000	0.000	265.31	
4,313	0	1.30	0.000	0.000	0.000	0.000	0.000	265.36	
4,532	0	1.35	0.000	0.000	0.000	0.000	0.000	265.41	
4,755	0	1.40	0.000	0.000	0.000	0.000	0.000	265.46	
4,982	0	1.45	0.000	0.000	0.000	0.000	0.000	265.51	
5,214	0	1.50	0.000	0.000	0.000	0.000	0.000	265.56	***Extended Detention Orifice***
5,449	235	1.55	0.001	0.000	0.000	0.000	0.001	265.61	
5,688	474	1.60	0.007	0.000	0.000	0.000	0.007	265.66	
5,931	717	1.65	0.011	0.000	0.000	0.000	0.011	265.71	← 265.74 25mm Event
6,178	964	1.70	0.013	0.000	0.000	0.000	0.013	265.76	
6,429	1,215	1.75	0.016	0.000	0.000	0.000	0.016	265.81	
6,683	1,470	1.80	0.018	0.000	0.000	0.000	0.018	265.86	
6,942	1,729	1.85	0.019	0.000	0.000	0.000	0.019	265.91	***Secondary Orifice***
7,205	1,992	1.90	0.021	0.004	0.000	0.000	0.025	265.96	← 265.99 2-Year Event
7,472	2,258	1.95	0.023	0.007	0.000	0.000	0.030	266.01	
7,743	2,529	2.00	0.024	0.020	0.000	0.000	0.044	266.06	
8,017	2,804	2.05	0.025	0.035	0.000	0.000	0.061	266.11	
8,296	3,083	2.10	0.027	0.054	0.000	0.000	0.080	266.16	← 266.16 5-Year Event
8,579	3,365	2.15	0.028	0.075	0.000	0.000	0.103	266.21	
8,865	3,652	2.20	0.029	0.174	0.000	0.000	0.203	266.26	
9,156	3,942	2.25	0.030	0.245	0.000	0.000	0.276	266.31	
9,451	4,237	2.30	0.031	0.301	0.000	0.000	0.332	266.36	← 266.35 25-Year Event
9,749	4,536	2.35	0.032	0.347	0.000	0.000	0.379	266.41	

10,052	4,838	2.40	0.033	0.388	0.000	0.000	0.421	266.46	
10,358	5,145	2.45	0.034	0.425	0.000	0.000	0.459	266.51	← 266.54 100-Year Event
10,669	5,455	2.50	0.035	0.459	0.000	0.000	0.494	266.56	
10,983	5,770	2.55	0.036	0.491	0.000	0.000	0.527	266.61	
11,302	6,088	2.60	0.037	0.521	0.000	0.000	0.558	266.66	
11,624	6,410	2.65	0.038	0.549	0.000	0.000	0.587	266.71	
11,950	6,737	2.70	0.039	0.576	0.000	0.000	0.614	266.76	
12,281	7,067	2.75	0.040	0.601	0.000	0.000	0.641	266.81	
12,615	7,402	2.80	0.040	0.626	0.000	0.000	0.666	266.86	
12,953	7,740	2.85	0.041	0.649	0.000	0.000	0.691	266.91	***Overflow Weir***
13,296	8,082	2.90	0.042	0.672	0.057	0.000	0.771	266.96	
13,642	8,428	2.95	0.043	0.694	0.162	0.000	0.899	267.01	
13,992	8,779	3.00	0.044	0.716	0.297	0.000	1.056	267.06	
14,346	9,133	3.05	0.044	0.736	0.457	0.000	1.238	267.11	
14,704	9,491	3.10	0.045	0.756	0.639	0.000	1.441	267.16	← 267.20 Regional Storm (Hazel)
15,067	9,853	3.15	0.046	0.776	0.840	0.009	1.672	267.21	
15,433	10,219	3.20	0.047	0.795	1.059	0.138	2.039	267.26	
15,803	10,589	3.25	0.047	0.814	1.294	0.342	2.497	267.31	
16,177	10,963	3.30	0.048	0.832	1.544	0.600	3.024	267.36	
		3.34	0.049	0.847	1.754	0.839	3.488	267.40	***Top of Pond***

Q(Overflow Weir)= 2.144 cms > Q(100-year uncontrolled) = 2.101 cms

Notes:

1) Orifice Outflow equation is for orifice flow given by:

- Where ponding elevation is above orifice centroid. $Q = 0.62A \times 2g\ xH^{0.5}$
- Where ponding elevation is below orifice centroid $Q = [0.494x\ [H/(D/1000)]^{1.57} - 0.04*[H/(D/1000)]^{0.5}] \times 0.62 \times 9.81^{1/2} * D^{5/2}$

2) Flow over the top of the weir is given by: $Q=1.705LH^{1.5}$

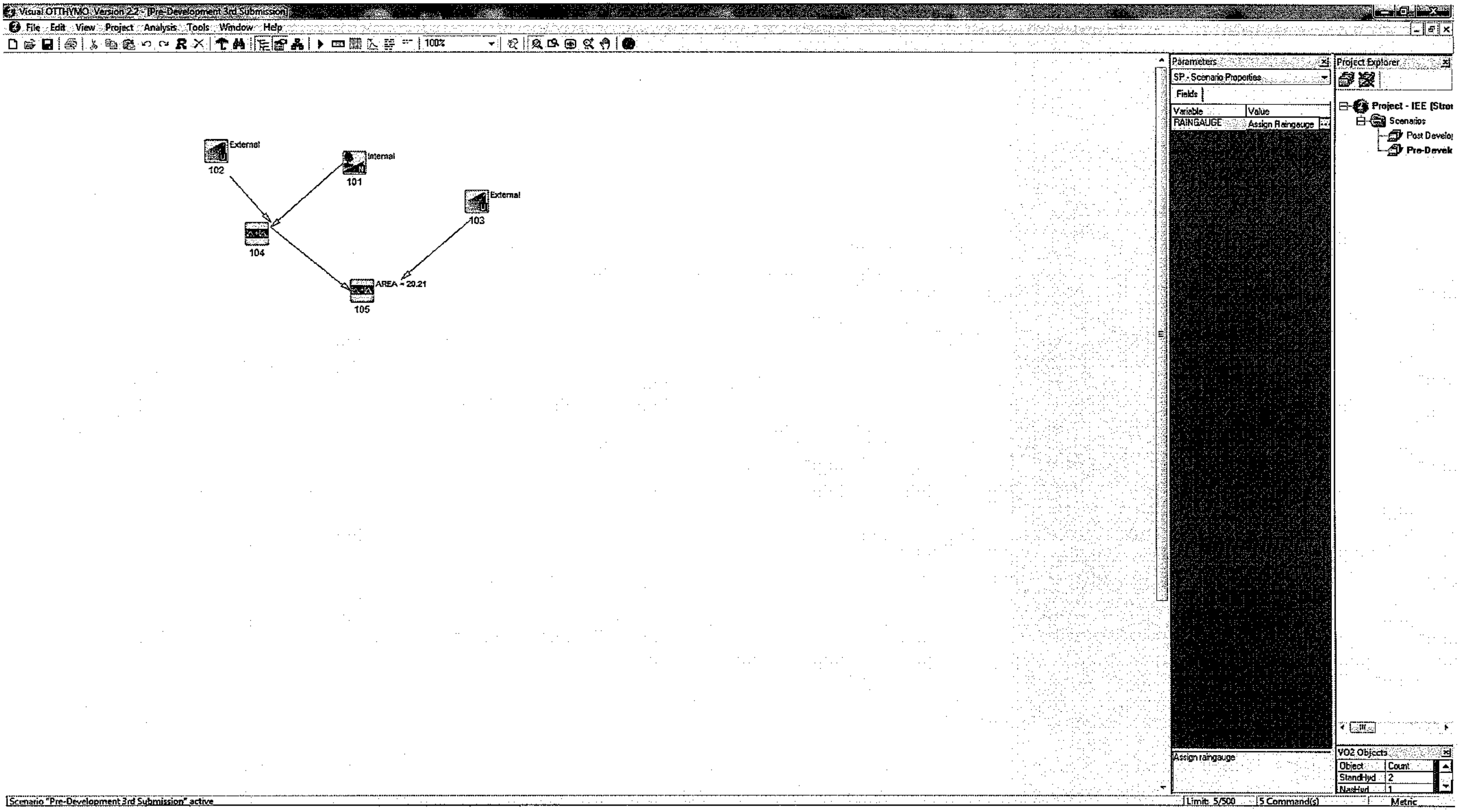
Where:
Q = flow (m^3/s)
H = head (m)
D = orifce diameter (m)
A = area of orfice (m^2)
L = weir lenght (m)
g = acceleration due to gravity (9.81 m^3/s)

3) Gray shaded cells including with OTTHYMO modeling

4) Blue shaded cells added to OTTHYMO modeling as per AECOM comments.

Pre-Development Model and Summary Results

Pre Development OTTHYMO Model Schematic



Variable	Value
RAINGAUGE	Assign Raingauge

Assign raingauge

Object	Count
StandHyd	2
NasHyd	1

Scenario "Pre-Development 3rd Submission" active

Limit: 5/500

5 Command(s)

Metric

PRE-DEVELOPMENT
SUMMARY OUTPUT
SCS AND CHICAGO STORM EVENTS

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

      V     V   I    SSSSS  U   U    A    L
      V     V   I    SS     U   U   A A   L
       V   V    I     SS    U   U  AAAAA  L
       V   V    I      SS   U   U  A   A  L
        VV      I    SSSSS  UUUUU  A   A  LLLLL

       OOO    TTTTT  TTTTT  H   H  Y   Y  M   M  OOO     TM
      O   O     T      T    H   H   Y Y   MM MM  O   O
      O   O     T      T    H   H    Y    M   M  O   O
       OOO      T      T    H   H    Y    M   M   OOO

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                ***** S U M M A R Y   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 2.2.4\voin.dat
  Output  filename: K:\PROJEC~1\200000~1\210987~4\SWM\4THSUB~1\IEE(ST~1\Pre-Development 4th Submission.out
  Summary filename: K:\PROJEC~1\200000~1\210987~4\SWM\4THSUB~1\IEE(ST~1\Pre-Development 4th Submission.sum


DATE: 2/8/2014                       TIME: 2:10:38 PM

USER:


COMMENTS: ________________________________________________________


  ****************************
  ** SIMULATION NUMBER:   1 **
  ****************************

 W/E COMMAND              HYD ID   DT     AREA    Qpeak Tpeak   R.V. R.C.    Qbase
                                   min     ha      cms   hrs     mm           cms

     START @   .00 hrs
     --------------------
     READ STORM                   15.0
     [ Ptot= 46.70 mm ]
     fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
     remark: 2 YR. SCS. STORM
*
  *  CALIB STANDHYD       0103  1  2.0      .20      .01  6.00  19.63  .42     .000
     [I%=21.5:S%= 1.63]
*
  *  CALIB NASHYD         0101  1 11.0    18.00      .08  6.97   4.82  .10     .000
     [CN=44.3          ]
     [ N = 3.0:Tp  .95]
*
  *  CALIB STANDHYD       0102  1  2.0     2.01      .12  6.00  19.70  .42     .000
     [I%=21.5:S%=  .55]
*
     ADD [0101 + 0102]    0104  3  2.0    20.01      .14  6.00   6.31  n/a     .000
*
     ADD [0103 + 0104]    0105  3  2.0    20.21      .15  6.00   6.44  n/a     .000
*
  ****************************
  ** SIMULATION NUMBER:   2 **
  ****************************

 W/E COMMAND              HYD ID   DT     AREA    Qpeak Tpeak   R.V. R.C.    Qbase
                                   min     ha      cms   hrs     mm           cms

     START @   .00 hrs
     --------------------
     READ STORM                   15.0
     [ Ptot= 64.30 mm ]
     fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
     remark: 5 YR. SCS. STORM
*
  *  CALIB STANDHYD       0103  1  2.0      .20      .01  6.00  31.21  .49     .000
     [I%=21.5:S%= 1.63]
*
  *  CALIB NASHYD         0101  1 11.0    18.00      .15  6.97   9.29  .14     .000
     [CN=44.3          ]
     [ N = 3.0:Tp  .95]
*
  *  CALIB STANDHYD       0102  1  2.0     2.01      .21  6.00  31.26  .49     .000
     [I%=21.5:S%=  .55]
*
     ADD [0101 + 0102]    0104  3  2.0    20.01      .25  6.00  11.49  n/a     .000
*
```

```
     ADD [0103 + 0104]  0105  3  2.0    20.21      .27  6.00  11.69  n/a     .000

 ****************************
 ** SIMULATION NUMBER:   3 **
 ****************************

 W/E COMMAND              HYD ID   DT     AREA    Qpeak Tpeak   R.V. R.C.    Qbase
                                  min      ha      cms   hrs     mm           cms

     START @   .00 hrs
     --------------------
     READ STORM                  15.0
     [ Ptot= 90.70 mm ]
     fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
     remark: 25 YR. SCS. STORM

  *  CALIB STANDHYD     0103  1  2.0      .20      .03  6.00  50.71  .56     .000
     [I%=21.5:S%= 1.63]

  *  CALIB NASHYD       0101  1 11.0    18.00      .31  6.97  18.13  .20     .000
     [CN=44.3        ]
     [ N = 3.0:Tp  .95]

  *  CALIB STANDHYD     0102  1  2.0     2.01      .36  6.00  50.75  .56     .000
     [I%=21.5:S%=  .55]

     ADD [0101 + 0102]  0104  3  2.0    20.01      .46  6.00  21.41  n/a     .000

     ADD [0103 + 0104]  0105  3  2.0    20.21      .49  6.00  21.70  n/a     .000

 ****************************
 ** SIMULATION NUMBER:   4 **
 ****************************

 W/E COMMAND              HYD ID   DT     AREA    Qpeak Tpeak   R.V. R.C.    Qbase
                                  min      ha      cms   hrs     mm           cms

     START @   .00 hrs
     --------------------
     READ STORM                  15.0
     [ Ptot=112.50 mm ]
     fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
     remark: 100 YR. SCS. STORM

  *  CALIB STANDHYD     0103  1  2.0      .20      .04  6.00  68.14  .61     .000
     [I%=21.5:S%= 1.63]

  *  CALIB NASHYD       0101  1 11.0    18.00      .46  6.97  27.07  .24     .000
     [CN=44.3        ]
     [ N = 3.0:Tp  .95]

  *  CALIB STANDHYD     0102  1  2.0     2.01      .50  6.00  68.17  .61     .000
     [I%=21.5:S%=  .55]

     ADD [0101 + 0102]  0104  3  2.0    20.01      .65  6.00  31.20  n/a     .000

     ADD [0103 + 0104]  0105  3  2.0    20.21      .69  6.00  31.56  n/a     .000

 ****************************
 ** SIMULATION NUMBER:   5 **
 ****************************

 W/E COMMAND              HYD ID   DT     AREA    Qpeak Tpeak   R.V. R.C.    Qbase
                                  min      ha      cms   hrs     mm           cms

     START @   .00 hrs
     --------------------
     READ STORM                  10.0
     [ Ptot= 36.95 mm ]
     fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
     remark: 2 YEAR - 4 hour - Chicago Storm

  *  CALIB STANDHYD     0103  1  2.0      .20      .01  1.33  13.92  .38     .000
     [I%=21.5:S%= 1.63]

  *  CALIB NASHYD       0101  1 11.0    18.00      .05  2.57   2.91  .08     .000
     [CN=44.3        ]
     [ N = 3.0:Tp  .95]

  *  CALIB STANDHYD     0102  1  2.0     2.01      .11  1.33  14.00  .38     .000
     [I%=21.5:S%=  .55]

     ADD [0101 + 0102]  0104  3  2.0    20.01      .11  1.33   4.02  n/a     .000

     ADD [0103 + 0104]  0105  3  2.0    20.21      .12  1.33   4.12  n/a     .000

 ****************************
 ** SIMULATION NUMBER:   6 **
 ****************************
```

```
 W/E COMMAND              HYD ID   DT     AREA    Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha      cms   hrs     mm          cms

      START @   .00 hrs
      --------------------
      READ STORM                 10.0
      [ Ptot= 50.52 mm ]
      fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
      remark: 5 YEAR - 4 hour - Chicago Storm
*
  *   CALIB STANDHYD      0103  1  2.0      .20      .01  1.33  22.02  .44    .000
      [I%=21.5:S%= 1.63]
*
  *   CALIB NASHYD        0101  1 11.0    18.00      .10  2.57   5.68  .11    .000
      [CN=44.3          ]
      [ N = 3.0:Tp  .95]
*
  *   CALIB STANDHYD      0102  1  2.0     2.01      .16  1.33  22.09  .44    .000
      [I%=21.5:S%=  .55]
*
      ADD [0101 + 0102]   0104  3  2.0    20.01      .17  1.33   7.33  n/a    .000
*
      ADD [0103 + 0104]   0105  3  2.0    20.21      .19  1.33   7.47  n/a    .000
*
 ****************************
 ** SIMULATION NUMBER:   7 **
 ****************************

 W/E COMMAND              HYD ID   DT     AREA    Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha      cms   hrs     mm          cms

      START @   .00 hrs
      --------------------
      READ STORM                 10.0
      [ Ptot= 71.24 mm ]
      fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
      remark: 25 YEAR - 4 hour - Chicago Storm
*
  *   CALIB STANDHYD      0103  1  2.0      .20      .02  1.33  36.13  .51    .000
      [I%=21.5:S%= 1.63]
*
  *   CALIB NASHYD        0101  1 11.0    18.00      .21  2.57  11.38  .16    .000
      [CN=44.3          ]
      [ N = 3.0:Tp  .95]
*
  *   CALIB STANDHYD      0102  1  2.0     2.01      .27  1.33  36.17  .51    .000
      [I%=21.5:S%=  .55]
*
      ADD [0101 + 0102]   0104  3  2.0    20.01      .29  1.33  13.87  n/a    .000
*
      ADD [0103 + 0104]   0105  3  2.0    20.21      .31  1.33  14.09  n/a    .000
*
 ****************************
 ** SIMULATION NUMBER:   8 **
 ****************************

 W/E COMMAND              HYD ID   DT     AREA    Qpeak Tpeak   R.V. R.C.   Qbase
                                   min     ha      cms   hrs     mm          cms

      START @   .00 hrs
      --------------------
      READ STORM                 10.0
      [ Ptot= 87.58 mm ]
      fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
      remark: 100 YEAR - 4 hour - Chicago Storm
*
  *   CALIB STANDHYD      0103  1  2.0      .20      .03  1.33  48.30  .55    .000
      [I%=21.5:S%= 1.63]
*
  *   CALIB NASHYD        0101  1 11.0    18.00      .32  2.57  16.96  .19    .000
      [CN=44.3          ]
      [ N = 3.0:Tp  .95]
*
  *   CALIB STANDHYD      0102  1  2.0     2.01      .39  1.33  48.34  .55    .000
      [I%=21.5:S%=  .55]
*
      ADD [0101 + 0102]   0104  3  2.0    20.01      .43  1.33  20.12  n/a    .000
*
      ADD [0103 + 0104]   0105  3  2.0    20.21      .46  1.33  20.39  n/a    .000
*
FINISH

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

PRE-DEVELOPMENT
DETAILED OUTPUT
SCS AND CHICAGO STORM EVENTS

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

      V    V   I   SSSSS  U   U    A    L
      V    V   I   SS     U   U   A A   L
       V  V    I    SS    U   U  AAAAA  L
       V  V    I     SS   U   U  A   A  L
        VV     I   SSSSS  UUUUU  A   A  LLLLL

       OOO    TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
      O   O     T      T    H   H   Y Y   MM MM  O   O
      O   O     T      T    H   H    Y    M   M  O   O
       OOO      T      T    H   H    Y    M   M   OOO

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                ***** D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 2.2.4\voin.dat
  Output  filename: K:\PROJEC~1\200000~1\210987~4\SWM\4THSUB~1\IEE(ST~1\Pre-Development 4th Submission.out
  Summary filename: K:\PROJEC~1\200000~1\210987~4\SWM\4THSUB~1\IEE(ST~1\Pre-Development 4th Submission.sum


DATE: 2/8/2014                              TIME: 2:10:38 PM

USER:


COMMENTS: ____________________________________________________________


  ---------------------------------------------------------------------------------------------------------
  ****************************
  ** SIMULATION NUMBER:   1 **
  ****************************


 ------------------
|    READ STORM    |     Filename: K:\PROJECT FILES\200000 - 299999\
|                  |               210987 - 010 - Innisfil Executive Estates\
|                  |               SWM\OTTHYMO 3rd Submission\SCS2.STM
|  Ptotal= 46.70 mm |     Comments: 2 YR. SCS. STORM
 ------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .25    1.17 |  3.25    1.87 |  6.25    8.41 |  9.25    1.63
                 .50    1.17 |  3.50    1.87 |  6.50    8.41 |  9.50    1.63
                 .75    1.17 |  3.75    1.87 |  6.75    3.74 |  9.75    1.63
                1.00    1.17 |  4.00    1.87 |  7.00    3.74 | 10.00    1.63
                1.25    1.17 |  4.25    2.80 |  7.25    2.80 | 10.25     .93
                1.50    1.17 |  4.50    2.80 |  7.50    2.80 | 10.50     .93
                1.75    1.17 |  4.75    3.74 |  7.75    2.80 | 10.75     .93
                2.00    1.17 |  5.00    3.74 |  8.00    2.80 | 11.00     .93
                2.25    1.40 |  5.25    5.60 |  8.25    1.63 | 11.25     .93
                2.50    1.40 |  5.50    5.60 |  8.50    1.63 | 11.50     .93
                2.75    1.40 |  5.75   22.42 |  8.75    1.63 | 11.75     .93
                3.00    1.40 |  6.00   61.64 |  9.00    1.63 | 12.00     .93

  ----------------------------------------------------------------------------


  -----------------
| CALIB             |
| STANDHYD  (0103)  |   Area     (ha)=     .20
| D= 1 DT= 2.0 min  |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
  -----------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        .06          .14
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       2.00         1.63
    Length            (m)=      10.00        78.30
    Mannings n          =       .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .033    1.17 | 3.033    1.87 | 6.033    8.41 |  9.03    1.63
                .067    1.17 | 3.067    1.87 | 6.067    8.41 |  9.07    1.63
                .100    1.17 | 3.100    1.87 | 6.100    8.41 |  9.10    1.63
                .133    1.17 | 3.133    1.87 | 6.133    8.41 |  9.13    1.63
                .167    1.17 | 3.167    1.87 | 6.167    8.41 |  9.17    1.63
                .200    1.17 | 3.200    1.87 | 6.200    8.41 |  9.20    1.63
                .233    1.17 | 3.233    1.87 | 6.233    8.41 |  9.23    1.63
```

```
         .267     1.17 | 3.267     1.87 | 6.267     8.41 |   9.27     1.63
         .300     1.17 | 3.300     1.87 | 6.300     8.41 |   9.30     1.63
         .333     1.17 | 3.333     1.87 | 6.333     8.41 |   9.33     1.63
         .367     1.17 | 3.367     1.87 | 6.367     8.41 |   9.37     1.63
         .400     1.17 | 3.400     1.87 | 6.400     8.41 |   9.40     1.63
         .433     1.17 | 3.433     1.87 | 6.433     8.41 |   9.43     1.63
         .467     1.17 | 3.467     1.87 | 6.467     8.41 |   9.47     1.63
         .500     1.17 | 3.500     1.87 | 6.500     8.41 |   9.50     1.63
         .533     1.17 | 3.533     1.87 | 6.533     3.74 |   9.53     1.63
         .567     1.17 | 3.567     1.87 | 6.567     3.74 |   9.57     1.63
         .600     1.17 | 3.600     1.87 | 6.600     3.74 |   9.60     1.63
         .633     1.17 | 3.633     1.87 | 6.633     3.74 |   9.63     1.63
         .667     1.17 | 3.667     1.87 | 6.667     3.74 |   9.67     1.63
         .700     1.17 | 3.700     1.87 | 6.700     3.74 |   9.70     1.63
         .733     1.17 | 3.733     1.87 | 6.733     3.74 |   9.73     1.63
         .767     1.17 | 3.767     1.87 | 6.767     3.74 |   9.77     1.63
         .800     1.17 | 3.800     1.87 | 6.800     3.74 |   9.80     1.63
         .833     1.17 | 3.833     1.87 | 6.833     3.74 |   9.83     1.63
         .867     1.17 | 3.867     1.87 | 6.867     3.74 |   9.87     1.63
         .900     1.17 | 3.900     1.87 | 6.900     3.74 |   9.90     1.63
         .933     1.17 | 3.933     1.87 | 6.933     3.74 |   9.93     1.63
         .967     1.17 | 3.967     1.87 | 6.967     3.74 |   9.97     1.63
        1.000     1.17 | 4.000     1.87 | 7.000     3.74 |  10.00     1.63
        1.033     1.17 | 4.033     2.80 | 7.033     2.80 |  10.03      .93
        1.067     1.17 | 4.067     2.80 | 7.067     2.80 |  10.07      .93
        1.100     1.17 | 4.100     2.80 | 7.100     2.80 |  10.10      .93
        1.133     1.17 | 4.133     2.80 | 7.133     2.80 |  10.13      .93
        1.167     1.17 | 4.167     2.80 | 7.167     2.80 |  10.17      .93
        1.200     1.17 | 4.200     2.80 | 7.200     2.80 |  10.20      .93
        1.233     1.17 | 4.233     2.80 | 7.233     2.80 |  10.23      .93
        1.267     1.17 | 4.267     2.80 | 7.267     2.80 |  10.27      .93
        1.300     1.17 | 4.300     2.80 | 7.300     2.80 |  10.30      .93
        1.333     1.17 | 4.333     2.80 | 7.333     2.80 |  10.33      .93
        1.367     1.17 | 4.367     2.80 | 7.367     2.80 |  10.37      .93
        1.400     1.17 | 4.400     2.80 | 7.400     2.80 |  10.40      .93
        1.433     1.17 | 4.433     2.80 | 7.433     2.80 |  10.43      .93
        1.467     1.17 | 4.467     2.80 | 7.467     2.80 |  10.47      .93
        1.500     1.17 | 4.500     2.80 | 7.500     2.80 |  10.50      .93
        1.533     1.17 | 4.533     3.74 | 7.533     2.80 |  10.53      .93
        1.567     1.17 | 4.567     3.74 | 7.567     2.80 |  10.57      .93
        1.600     1.17 | 4.600     3.74 | 7.600     2.80 |  10.60      .93
        1.633     1.17 | 4.633     3.74 | 7.633     2.80 |  10.63      .93
        1.667     1.17 | 4.667     3.74 | 7.667     2.80 |  10.67      .93
        1.700     1.17 | 4.700     3.74 | 7.700     2.80 |  10.70      .93
        1.733     1.17 | 4.733     3.74 | 7.733     2.80 |  10.73      .93
        1.767     1.17 | 4.767     3.74 | 7.767     2.80 |  10.77      .93
        1.800     1.17 | 4.800     3.74 | 7.800     2.80 |  10.80      .93
        1.833     1.17 | 4.833     3.74 | 7.833     2.80 |  10.83      .93
        1.867     1.17 | 4.867     3.74 | 7.867     2.80 |  10.87      .93
        1.900     1.17 | 4.900     3.74 | 7.900     2.80 |  10.90      .93
        1.933     1.17 | 4.933     3.74 | 7.933     2.80 |  10.93      .93
        1.967     1.17 | 4.967     3.74 | 7.967     2.80 |  10.97      .93
        2.000     1.17 | 5.000     3.74 | 8.000     2.80 |  11.00      .93
        2.033     1.40 | 5.033     5.60 | 8.033     1.63 |  11.03      .93
        2.067     1.40 | 5.067     5.60 | 8.067     1.63 |  11.07      .93
        2.100     1.40 | 5.100     5.60 | 8.100     1.63 |  11.10      .93
        2.133     1.40 | 5.133     5.60 | 8.133     1.63 |  11.13      .93
        2.167     1.40 | 5.167     5.60 | 8.167     1.63 |  11.17      .93
        2.200     1.40 | 5.200     5.60 | 8.200     1.63 |  11.20      .93
        2.233     1.40 | 5.233     5.60 | 8.233     1.63 |  11.23      .93
        2.267     1.40 | 5.267     5.60 | 8.267     1.63 |  11.27      .93
        2.300     1.40 | 5.300     5.60 | 8.300     1.63 |  11.30      .93
        2.333     1.40 | 5.333     5.60 | 8.333     1.63 |  11.33      .93
        2.367     1.40 | 5.367     5.60 | 8.367     1.63 |  11.37      .93
        2.400     1.40 | 5.400     5.60 | 8.400     1.63 |  11.40      .93
        2.433     1.40 | 5.433     5.60 | 8.433     1.63 |  11.43      .93
        2.467     1.40 | 5.467     5.60 | 8.467     1.63 |  11.47      .93
        2.500     1.40 | 5.500     5.60 | 8.500     1.63 |  11.50      .93
        2.533     1.40 | 5.533    22.41 | 8.533     1.63 |  11.53      .93
        2.567     1.40 | 5.567    22.42 | 8.567     1.63 |  11.57      .93
        2.600     1.40 | 5.600    22.42 | 8.600     1.63 |  11.60      .93
        2.633     1.40 | 5.633    22.42 | 8.633     1.63 |  11.63      .93
        2.667     1.40 | 5.667    22.42 | 8.667     1.63 |  11.67      .93
        2.700     1.40 | 5.700    22.42 | 8.700     1.63 |  11.70      .93
        2.733     1.40 | 5.733    22.42 | 8.733     1.63 |  11.73      .93
        2.767     1.40 | 5.767    42.03 | 8.767     1.63 |  11.77      .93
        2.800     1.40 | 5.800    61.64 | 8.800     1.63 |  11.80      .93
        2.833     1.40 | 5.833    61.64 | 8.833     1.63 |  11.83      .93
        2.867     1.40 | 5.867    61.64 | 8.867     1.63 |  11.87      .93
        2.900     1.40 | 5.900    61.64 | 8.900     1.63 |  11.90      .93
        2.933     1.40 | 5.933    61.64 | 8.933     1.63 |  11.93      .93
        2.967     1.40 | 5.967    61.64 | 8.967     1.63 |  11.97      .93
        3.000     1.40 | 6.000    61.64 | 9.000     1.63 |  12.00      .93

Max.Eff.Inten.(mm/hr)=       61.64          14.05
           over (min)         5.00          26.00
Storage Coeff.  (min)=         .63 (ii)     25.25 (ii)
Unit Hyd. Tpeak (min)=        4.00          26.00
Unit Hyd. peak  (cms)=         .55            .04
```

```
                                                              *TOTALS*
  PEAK FLOW       (cms)=        .01           .00            .009 (iii)
  TIME TO PEAK    (hrs)=        .00          6.33            6.00
  RUNOFF VOLUME    (mm)=      45.70         12.59           19.63
  TOTAL RAINFALL   (mm)=      46.70         46.70           46.70
  RUNOFF COEFFICIENT   =        .98           .27             .42

*** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
 ------------------
| CALIB            |
| NASHYD    (0101) |   Area     (ha)=  18.00   Curve Number    (CN)= 44.3
|ID= 1 DT=11.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
 ------------------    U.H. Tp(hrs)=     .95

        NOTE:  RAINFALL WAS TRANSFORMED TO  11.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .183    1.17 | 3.300    1.87 | 6.417    8.41 |  9.53    1.63
                 .367    1.17 | 3.483    1.87 | 6.600    5.86 |  9.72    1.63
                 .550    1.17 | 3.667    1.87 | 6.783    3.74 |  9.90    1.63
                 .733    1.17 | 3.850    1.87 | 6.967    3.74 | 10.08    1.32
                 .917    1.17 | 4.033    2.04 | 7.150    2.97 | 10.27     .93
                1.100    1.17 | 4.217    2.80 | 7.333    2.80 | 10.45     .93
                1.283    1.17 | 4.400    2.80 | 7.517    2.80 | 10.63     .93
                1.467    1.17 | 4.583    3.23 | 7.700    2.80 | 10.82     .93
                1.650    1.17 | 4.767    3.74 | 7.883    2.80 | 11.00     .93
                1.833    1.17 | 4.950    3.74 | 8.067    2.38 | 11.18     .93
                2.017    1.19 | 5.133    5.09 | 8.250    1.63 | 11.37     .93
                2.200    1.40 | 5.317    5.60 | 8.433    1.63 | 11.55     .93
                2.383    1.40 | 5.500    5.60 | 8.617    1.63 | 11.73     .93
                2.567    1.40 | 5.683   22.42 | 8.800    1.63 | 11.92     .93
                2.750    1.40 | 5.867   47.38 | 8.983    1.63 | 12.10     .42
                2.933    1.40 | 6.050   47.12 | 9.167    1.63 |
                3.117    1.70 | 6.233    8.41 | 9.350    1.63 |

   Unit Hyd Qpeak  (cms)=     .724

   PEAK FLOW       (cms)=     .079 (i)
   TIME TO PEAK    (hrs)=    6.967
   RUNOFF VOLUME    (mm)=    4.815
   TOTAL RAINFALL   (mm)=   46.700
   RUNOFF COEFFICIENT   =     .103

   (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
 ------------------
| CALIB            |
| STANDHYD  (0102) |   Area     (ha)=    2.01
|ID= 1 DT= 2.0 min |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
 ------------------
                              IMPERVIOUS    PERVIOUS (i)
   Surface Area      (ha)=         .57          1.44
   Dep. Storage      (mm)=        1.00          5.00
   Average Slope      (%)=        2.00           .55
   Length             (m)=       10.00         18.00
   Mannings n            =        .013          .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .033    1.17 | 3.033    1.87 | 6.033    8.41 |  9.03    1.63
                 .067    1.17 | 3.067    1.87 | 6.067    8.41 |  9.07    1.63
                 .100    1.17 | 3.100    1.87 | 6.100    8.41 |  9.10    1.63
                 .133    1.17 | 3.133    1.87 | 6.133    8.41 |  9.13    1.63
                 .167    1.17 | 3.167    1.87 | 6.167    8.41 |  9.17    1.63
                 .200    1.17 | 3.200    1.87 | 6.200    8.41 |  9.20    1.63
                 .233    1.17 | 3.233    1.87 | 6.233    8.41 |  9.23    1.63
                 .267    1.17 | 3.267    1.87 | 6.267    8.41 |  9.27    1.63
                 .300    1.17 | 3.300    1.87 | 6.300    8.41 |  9.30    1.63
                 .333    1.17 | 3.333    1.87 | 6.333    8.41 |  9.33    1.63
                 .367    1.17 | 3.367    1.87 | 6.367    8.41 |  9.37    1.63
                 .400    1.17 | 3.400    1.87 | 6.400    8.41 |  9.40    1.63
                 .433    1.17 | 3.433    1.87 | 6.433    8.41 |  9.43    1.63
                 .467    1.17 | 3.467    1.87 | 6.467    8.41 |  9.47    1.63
```

```
     .500     1.17 | 3.500     1.87 | 6.500     8.41 |   9.50     1.63
     .533     1.17 | 3.533     1.87 | 6.533     3.74 |   9.53     1.63
     .567     1.17 | 3.567     1.87 | 6.567     3.74 |   9.57     1.63
     .600     1.17 | 3.600     1.87 | 6.600     3.74 |   9.60     1.63
     .633     1.17 | 3.633     1.87 | 6.633     3.74 |   9.63     1.63
     .667     1.17 | 3.667     1.87 | 6.667     3.74 |   9.67     1.63
     .700     1.17 | 3.700     1.87 | 6.700     3.74 |   9.70     1.63
     .733     1.17 | 3.733     1.87 | 6.733     3.74 |   9.73     1.63
     .767     1.17 | 3.767     1.87 | 6.767     3.74 |   9.77     1.63
     .800     1.17 | 3.800     1.87 | 6.800     3.74 |   9.80     1.63
     .833     1.17 | 3.833     1.87 | 6.833     3.74 |   9.83     1.63
     .867     1.17 | 3.867     1.87 | 6.867     3.74 |   9.87     1.63
     .900     1.17 | 3.900     1.87 | 6.900     3.74 |   9.90     1.63
     .933     1.17 | 3.933     1.87 | 6.933     3.74 |   9.93     1.63
     .967     1.17 | 3.967     1.87 | 6.967     3.74 |   9.97     1.63
    1.000     1.17 | 4.000     1.87 | 7.000     3.74 |  10.00     1.63
    1.033     1.17 | 4.033     2.80 | 7.033     2.80 |  10.03      .93
    1.067     1.17 | 4.067     2.80 | 7.067     2.80 |  10.07      .93
    1.100     1.17 | 4.100     2.80 | 7.100     2.80 |  10.10      .93
    1.133     1.17 | 4.133     2.80 | 7.133     2.80 |  10.13      .93
    1.167     1.17 | 4.167     2.80 | 7.167     2.80 |  10.17      .93
    1.200     1.17 | 4.200     2.80 | 7.200     2.80 |  10.20      .93
    1.233     1.17 | 4.233     2.80 | 7.233     2.80 |  10.23      .93
    1.267     1.17 | 4.267     2.80 | 7.267     2.80 |  10.27      .93
    1.300     1.17 | 4.300     2.80 | 7.300     2.80 |  10.30      .93
    1.333     1.17 | 4.333     2.80 | 7.333     2.80 |  10.33      .93
    1.367     1.17 | 4.367     2.80 | 7.367     2.80 |  10.37      .93
    1.400     1.17 | 4.400     2.80 | 7.400     2.80 |  10.40      .93
    1.433     1.17 | 4.433     2.80 | 7.433     2.80 |  10.43      .93
    1.467     1.17 | 4.467     2.80 | 7.467     2.80 |  10.47      .93
    1.500     1.17 | 4.500     2.80 | 7.500     2.80 |  10.50      .93
    1.533     1.17 | 4.533     3.74 | 7.533     2.80 |  10.53      .93
    1.567     1.17 | 4.567     3.74 | 7.567     2.80 |  10.57      .93
    1.600     1.17 | 4.600     3.74 | 7.600     2.80 |  10.60      .93
    1.633     1.17 | 4.633     3.74 | 7.633     2.80 |  10.63      .93
    1.667     1.17 | 4.667     3.74 | 7.667     2.80 |  10.67      .93
    1.700     1.17 | 4.700     3.74 | 7.700     2.80 |  10.70      .93
    1.733     1.17 | 4.733     3.74 | 7.733     2.80 |  10.73      .93
    1.767     1.17 | 4.767     3.74 | 7.767     2.80 |  10.77      .93
    1.800     1.17 | 4.800     3.74 | 7.800     2.80 |  10.80      .93
    1.833     1.17 | 4.833     3.74 | 7.833     2.80 |  10.83      .93
    1.867     1.17 | 4.867     3.74 | 7.867     2.80 |  10.87      .93
    1.900     1.17 | 4.900     3.74 | 7.900     2.80 |  10.90      .93
    1.933     1.17 | 4.933     3.74 | 7.933     2.80 |  10.93      .93
    1.967     1.17 | 4.967     3.74 | 7.967     2.80 |  10.97      .93
    2.000     1.17 | 5.000     3.74 | 8.000     2.80 |  11.00      .93
    2.033     1.40 | 5.033     5.60 | 8.033     1.63 |  11.03      .93
    2.067     1.40 | 5.067     5.60 | 8.067     1.63 |  11.07      .93
    2.100     1.40 | 5.100     5.60 | 8.100     1.63 |  11.10      .93
    2.133     1.40 | 5.133     5.60 | 8.133     1.63 |  11.13      .93
    2.167     1.40 | 5.167     5.60 | 8.167     1.63 |  11.17      .93
    2.200     1.40 | 5.200     5.60 | 8.200     1.63 |  11.20      .93
    2.233     1.40 | 5.233     5.60 | 8.233     1.63 |  11.23      .93
    2.267     1.40 | 5.267     5.60 | 8.267     1.63 |  11.27      .93
    2.300     1.40 | 5.300     5.60 | 8.300     1.63 |  11.30      .93
    2.333     1.40 | 5.333     5.60 | 8.333     1.63 |  11.33      .93
    2.367     1.40 | 5.367     5.60 | 8.367     1.63 |  11.37      .93
    2.400     1.40 | 5.400     5.60 | 8.400     1.63 |  11.40      .93
    2.433     1.40 | 5.433     5.60 | 8.433     1.63 |  11.43      .93
    2.467     1.40 | 5.467     5.60 | 8.467     1.63 |  11.47      .93
    2.500     1.40 | 5.500     5.60 | 8.500     1.63 |  11.50      .93
    2.533     1.40 | 5.533    22.41 | 8.533     1.63 |  11.53      .93
    2.567     1.40 | 5.567    22.42 | 8.567     1.63 |  11.57      .93
    2.600     1.40 | 5.600    22.42 | 8.600     1.63 |  11.60      .93
    2.633     1.40 | 5.633    22.42 | 8.633     1.63 |  11.63      .93
    2.667     1.40 | 5.667    22.42 | 8.667     1.63 |  11.67      .93
    2.700     1.40 | 5.700    22.42 | 8.700     1.63 |  11.70      .93
    2.733     1.40 | 5.733    22.42 | 8.733     1.63 |  11.73      .93
    2.767     1.40 | 5.767    42.03 | 8.767     1.63 |  11.77      .93
    2.800     1.40 | 5.800    61.64 | 8.800     1.63 |  11.80      .93
    2.833     1.40 | 5.833    61.64 | 8.833     1.63 |  11.83      .93
    2.867     1.40 | 5.867    61.64 | 8.867     1.63 |  11.87      .93
    2.900     1.40 | 5.900    61.64 | 8.900     1.63 |  11.90      .93
    2.933     1.40 | 5.933    61.64 | 8.933     1.63 |  11.93      .93
    2.967     1.40 | 5.967    61.64 | 8.967     1.63 |  11.97      .93
    3.000     1.40 | 6.000    61.64 | 9.000     1.63 |  12.00      .93

Max.Eff.Inten.(mm/hr)=      61.64          22.27
          over (min)         5.00          14.00
Storage Coeff.  (min)=        .63 (ii)     12.37 (ii)
Unit Hyd. Tpeak (min)=       4.00          14.00
Unit Hyd. peak  (cms)=        .55            .09
                                                      *TOTALS*
PEAK FLOW       (cms)=        .07            .05         .117 (iii)
TIME TO PEAK    (hrs)=        .00           6.13         6.00
RUNOFF VOLUME    (mm)=      45.70          12.59        19.70
TOTAL RAINFALL   (mm)=      46.70          46.70        46.70
RUNOFF COEFFICIENT   =        .98            .27          .42
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 -----------------
 ADD HYD   (0104) |
   1 +  2 =  3    |            AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0101):      18.00     .079      6.97       4.82
        + ID2= 2 (0102):       2.01     .117      6.00      19.70
          ==============================================
          ID = 3 (0104):      20.01     .138      6.00       6.31

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------------

--------------------
 ADD HYD   (0105) |
   1 +  2 =  3    |            AREA     QPEAK     TPEAK      R.V.
 ------------------            (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0103):        .20     .009      6.00      19.63
        + ID2= 2 (0104):      20.01     .138      6.00       6.31
          ==============================================
          ID = 3 (0105):      20.21     .147      6.00       6.44

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ****************************
 ** SIMULATION NUMBER:   2 **
 ****************************


 -----------------
|   READ STORM     |      Filename: K:\PROJECT FILES\200000 - 299999\
|                  |                210987 - 010 - Innisfil Executive Estates\
|                  |                SWM\OTTHYMO 3rd Submission\SCS5.STM
 Ptotal= 64.30 mm  |      Comments: 5 YR. SCS. STORM
 -----------------
                 TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                  hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                  .25     1.61 |  3.25     2.57 |  6.25    11.57 |  9.25     2.25
                  .50     1.61 |  3.50     2.57 |  6.50    11.57 |  9.50     2.25
                  .75     1.61 |  3.75     2.57 |  6.75     5.14 |  9.75     2.25
                 1.00     1.61 |  4.00     2.57 |  7.00     5.14 | 10.00     2.25
                 1.25     1.61 |  4.25     3.86 |  7.25     3.86 | 10.25     1.29
                 1.50     1.61 |  4.50     3.86 |  7.50     3.86 | 10.50     1.29
                 1.75     1.61 |  4.75     5.14 |  7.75     3.86 | 10.75     1.29
                 2.00     1.61 |  5.00     5.14 |  8.00     3.86 | 11.00     1.29
                 2.25     1.93 |  5.25     7.72 |  8.25     2.25 | 11.25     1.29
                 2.50     1.93 |  5.50     7.72 |  8.50     2.25 | 11.50     1.29
                 2.75     1.93 |  5.75    30.86 |  8.75     2.25 | 11.75     1.29
                 3.00     1.93 |  6.00    84.88 |  9.00     2.25 | 12.00     1.29

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 CALIB             |
| STANDHYD  (0103) |   Area     (ha)=     .20
|ID= 1 DT= 2.0 min |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
 -----------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=        .06          .14
    Dep. Storage      (mm)=       1.00         5.00
    Average Slope      (%)=       2.00         1.63
    Length             (m)=      10.00        78.30
    Mannings n           =        .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                  hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                 .033     1.61 | 3.033     2.57 | 6.033    11.58 |  9.03     2.25
                 .067     1.61 | 3.067     2.57 | 6.067    11.57 |  9.07     2.25
                 .100     1.61 | 3.100     2.57 | 6.100    11.57 |  9.10     2.25
                 .133     1.61 | 3.133     2.57 | 6.133    11.57 |  9.13     2.25
                 .167     1.61 | 3.167     2.57 | 6.167    11.57 |  9.17     2.25
                 .200     1.61 | 3.200     2.57 | 6.200    11.57 |  9.20     2.25
                 .233     1.61 | 3.233     2.57 | 6.233    11.57 |  9.23     2.25
                 .267     1.61 | 3.267     2.57 | 6.267    11.57 |  9.27     2.25
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           .300     1.61 | 3.300     2.57 | 6.300    11.57 |   9.30     2.25
           .333     1.61 | 3.333     2.57 | 6.333    11.57 |   9.33     2.25
           .367     1.61 | 3.367     2.57 | 6.367    11.57 |   9.37     2.25
           .400     1.61 | 3.400     2.57 | 6.400    11.57 |   9.40     2.25
           .433     1.61 | 3.433     2.57 | 6.433    11.57 |   9.43     2.25
           .467     1.61 | 3.467     2.57 | 6.467    11.57 |   9.47     2.25
           .500     1.61 | 3.500     2.57 | 6.500    11.57 |   9.50     2.25
           .533     1.61 | 3.533     2.57 | 6.533     5.14 |   9.53     2.25
           .567     1.61 | 3.567     2.57 | 6.567     5.14 |   9.57     2.25
           .600     1.61 | 3.600     2.57 | 6.600     5.14 |   9.60     2.25
           .633     1.61 | 3.633     2.57 | 6.633     5.14 |   9.63     2.25
           .667     1.61 | 3.667     2.57 | 6.667     5.14 |   9.67     2.25
           .700     1.61 | 3.700     2.57 | 6.700     5.14 |   9.70     2.25
           .733     1.61 | 3.733     2.57 | 6.733     5.14 |   9.73     2.25
           .767     1.61 | 3.767     2.57 | 6.767     5.14 |   9.77     2.25
           .800     1.61 | 3.800     2.57 | 6.800     5.14 |   9.80     2.25
           .833     1.61 | 3.833     2.57 | 6.833     5.14 |   9.83     2.25
           .867     1.61 | 3.867     2.57 | 6.867     5.14 |   9.87     2.25
           .900     1.61 | 3.900     2.57 | 6.900     5.14 |   9.90     2.25
           .933     1.61 | 3.933     2.57 | 6.933     5.14 |   9.93     2.25
           .967     1.61 | 3.967     2.57 | 6.967     5.14 |   9.97     2.25
          1.000     1.61 | 4.000     2.57 | 7.000     5.14 |  10.00     2.25
          1.033     1.61 | 4.033     3.86 | 7.033     3.86 |  10.03     1.29
          1.067     1.61 | 4.067     3.86 | 7.067     3.86 |  10.07     1.29
          1.100     1.61 | 4.100     3.86 | 7.100     3.86 |  10.10     1.29
          1.133     1.61 | 4.133     3.86 | 7.133     3.86 |  10.13     1.29
          1.167     1.61 | 4.167     3.86 | 7.167     3.86 |  10.17     1.29
          1.200     1.61 | 4.200     3.86 | 7.200     3.86 |  10.20     1.29
          1.233     1.61 | 4.233     3.86 | 7.233     3.86 |  10.23     1.29
          1.267     1.61 | 4.267     3.86 | 7.267     3.86 |  10.27     1.29
          1.300     1.61 | 4.300     3.86 | 7.300     3.86 |  10.30     1.29
          1.333     1.61 | 4.333     3.86 | 7.333     3.86 |  10.33     1.29
          1.367     1.61 | 4.367     3.86 | 7.367     3.86 |  10.37     1.29
          1.400     1.61 | 4.400     3.86 | 7.400     3.86 |  10.40     1.29
          1.433     1.61 | 4.433     3.86 | 7.433     3.86 |  10.43     1.29
          1.467     1.61 | 4.467     3.86 | 7.467     3.86 |  10.47     1.29
          1.500     1.61 | 4.500     3.86 | 7.500     3.86 |  10.50     1.29
          1.533     1.61 | 4.533     5.14 | 7.533     3.86 |  10.53     1.29
          1.567     1.61 | 4.567     5.14 | 7.567     3.86 |  10.57     1.29
          1.600     1.61 | 4.600     5.14 | 7.600     3.86 |  10.60     1.29
          1.633     1.61 | 4.633     5.14 | 7.633     3.86 |  10.63     1.29
          1.667     1.61 | 4.667     5.14 | 7.667     3.86 |  10.67     1.29
          1.700     1.61 | 4.700     5.14 | 7.700     3.86 |  10.70     1.29
          1.733     1.61 | 4.733     5.14 | 7.733     3.86 |  10.73     1.29
          1.767     1.61 | 4.767     5.14 | 7.767     3.86 |  10.77     1.29
          1.800     1.61 | 4.800     5.14 | 7.800     3.86 |  10.80     1.29
          1.833     1.61 | 4.833     5.14 | 7.833     3.86 |  10.83     1.29
          1.867     1.61 | 4.867     5.14 | 7.867     3.86 |  10.87     1.29
          1.900     1.61 | 4.900     5.14 | 7.900     3.86 |  10.90     1.29
          1.933     1.61 | 4.933     5.14 | 7.933     3.86 |  10.93     1.29
          1.967     1.61 | 4.967     5.14 | 7.967     3.86 |  10.97     1.29
          2.000     1.61 | 5.000     5.14 | 8.000     3.86 |  11.00     1.29
          2.033     1.93 | 5.033     7.72 | 8.033     2.25 |  11.03     1.29
          2.067     1.93 | 5.067     7.72 | 8.067     2.25 |  11.07     1.29
          2.100     1.93 | 5.100     7.72 | 8.100     2.25 |  11.10     1.29
          2.133     1.93 | 5.133     7.72 | 8.133     2.25 |  11.13     1.29
          2.167     1.93 | 5.167     7.72 | 8.167     2.25 |  11.17     1.29
          2.200     1.93 | 5.200     7.72 | 8.200     2.25 |  11.20     1.29
          2.233     1.93 | 5.233     7.72 | 8.233     2.25 |  11.23     1.29
          2.267     1.93 | 5.267     7.72 | 8.267     2.25 |  11.27     1.29
          2.300     1.93 | 5.300     7.72 | 8.300     2.25 |  11.30     1.29
          2.333     1.93 | 5.333     7.72 | 8.333     2.25 |  11.33     1.29
          2.367     1.93 | 5.367     7.72 | 8.367     2.25 |  11.37     1.29
          2.400     1.93 | 5.400     7.72 | 8.400     2.25 |  11.40     1.29
          2.433     1.93 | 5.433     7.72 | 8.433     2.25 |  11.43     1.29
          2.467     1.93 | 5.467     7.72 | 8.467     2.25 |  11.47     1.29
          2.500     1.93 | 5.500     7.72 | 8.500     2.25 |  11.50     1.29
          2.533     1.93 | 5.533    30.86 | 8.533     2.25 |  11.53     1.29
          2.567     1.93 | 5.567    30.86 | 8.567     2.25 |  11.57     1.29
          2.600     1.93 | 5.600    30.86 | 8.600     2.25 |  11.60     1.29
          2.633     1.93 | 5.633    30.86 | 8.633     2.25 |  11.63     1.29
          2.667     1.93 | 5.667    30.86 | 8.667     2.25 |  11.67     1.29
          2.700     1.93 | 5.700    30.86 | 8.700     2.25 |  11.70     1.29
          2.733     1.93 | 5.733    30.86 | 8.733     2.25 |  11.73     1.29
          2.767     1.93 | 5.767    57.86 | 8.767     2.25 |  11.77     1.29
          2.800     1.93 | 5.800    84.88 | 8.800     2.25 |  11.80     1.29
          2.833     1.93 | 5.833    84.88 | 8.833     2.25 |  11.83     1.29
          2.867     1.93 | 5.867    84.88 | 8.867     2.25 |  11.87     1.29
          2.900     1.93 | 5.900    84.88 | 8.900     2.25 |  11.90     1.29
          2.933     1.93 | 5.933    84.88 | 8.933     2.25 |  11.93     1.29
          2.967     1.93 | 5.967    84.88 | 8.967     2.25 |  11.97     1.29
          3.000     1.93 | 6.000    84.88 | 9.000     2.25 |  12.00     1.28

Max.Eff.Inten.(mm/hr)=        84.88           33.18
           over (min)          5.00           20.00
Storage Coeff.  (min)=          .56 (ii)      18.01 (ii)
Unit Hyd. Tpeak (min)=         4.00           20.00
Unit Hyd. peak  (cms)=          .56             .06
                                                       *TOTALS*
```

```
   PEAK FLOW       (cms)=         .01            .01            .015 (iii)
   TIME TO PEAK    (hrs)=         .00           6.23           6.00
   RUNOFF VOLUME    (mm)=       63.30          22.49          31.21
   TOTAL RAINFALL   (mm)=       64.30          64.30          64.30
   RUNOFF COEFFICIENT   =         .98            .35            .49

 *** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
 -----------------
 CALIB            |
 NASHYD    (0101) |   Area     (ha)=  18.00   Curve Number   (CN)= 44.3
|ID= 1 DT=11.0 min |  Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
------------------    U.H. Tp(hrs)=     .95

       NOTE:  RAINFALL WAS TRANSFORMED TO  11.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .183    1.61 | 3.300    2.57 | 6.417   11.57 |   9.53   2.25
                .367    1.61 | 3.483    2.57 | 6.600    8.07 |   9.72   2.25
                .550    1.61 | 3.667    2.57 | 6.783    5.14 |   9.90   2.25
                .733    1.61 | 3.850    2.57 | 6.967    5.14 |  10.08   1.81
                .917    1.61 | 4.033    2.81 | 7.150    4.09 |  10.27   1.29
               1.100    1.61 | 4.217    3.86 | 7.333    3.86 |  10.45   1.29
               1.283    1.61 | 4.400    3.86 | 7.517    3.86 |  10.63   1.29
               1.467    1.61 | 4.583    4.44 | 7.700    3.86 |  10.82   1.29
               1.650    1.61 | 4.767    5.14 | 7.883    3.86 |  11.00   1.29
               1.833    1.61 | 4.950    5.14 | 8.067    3.27 |  11.18   1.29
               2.017    1.64 | 5.133    7.01 | 8.250    2.25 |  11.37   1.29
               2.200    1.93 | 5.317    7.72 | 8.433    2.25 |  11.55   1.29
               2.383    1.93 | 5.500    7.72 | 8.617    2.25 |  11.73   1.29
               2.567    1.93 | 5.683   30.86 | 8.800    2.25 |  11.92   1.29
               2.750    1.93 | 5.867   65.24 | 8.983    2.25 |  12.10    .58
               2.933    1.93 | 6.050   64.88 | 9.167    2.25 |
               3.117    2.34 | 6.233   11.57 | 9.350    2.25 |

   Unit Hyd Qpeak  (cms)=     .724

   PEAK FLOW       (cms)=     .155 (i)
   TIME TO PEAK    (hrs)=    6.967
   RUNOFF VOLUME    (mm)=    9.286
   TOTAL RAINFALL   (mm)=   64.300
   RUNOFF COEFFICIENT   =     .144

   (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
------------------
 CALIB            |
 STANDHYD  (0102) |   Area     (ha)=    2.01
 D= 1 DT= 2.0 min |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
------------------
                            IMPERVIOUS    PERVIOUS (i)
   Surface Area    (ha)=         .57          1.44
   Dep. Storage    (mm)=        1.00          5.00
   Average Slope    (%)=        2.00           .55
   Length           (m)=       10.00         18.00
   Mannings n          =        .013          .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .033    1.61 | 3.033    2.57 | 6.033   11.58 |   9.03   2.25
                .067    1.61 | 3.067    2.57 | 6.067   11.57 |   9.07   2.25
                .100    1.61 | 3.100    2.57 | 6.100   11.57 |   9.10   2.25
                .133    1.61 | 3.133    2.57 | 6.133   11.57 |   9.13   2.25
                .167    1.61 | 3.167    2.57 | 6.167   11.57 |   9.17   2.25
                .200    1.61 | 3.200    2.57 | 6.200   11.57 |   9.20   2.25
                .233    1.61 | 3.233    2.57 | 6.233   11.57 |   9.23   2.25
                .267    1.61 | 3.267    2.57 | 6.267   11.57 |   9.27   2.25
                .300    1.61 | 3.300    2.57 | 6.300   11.57 |   9.30   2.25
                .333    1.61 | 3.333    2.57 | 6.333   11.57 |   9.33   2.25
                .367    1.61 | 3.367    2.57 | 6.367   11.57 |   9.37   2.25
                .400    1.61 | 3.400    2.57 | 6.400   11.57 |   9.40   2.25
                .433    1.61 | 3.433    2.57 | 6.433   11.57 |   9.43   2.25
                .467    1.61 | 3.467    2.57 | 6.467   11.57 |   9.47   2.25
                .500    1.61 | 3.500    2.57 | 6.500   11.57 |   9.50   2.25
```

```
              .533     1.61 | 3.533    2.57 | 6.533    5.14 |  9.53    2.25
              .567     1.61 | 3.567    2.57 | 6.567    5.14 |  9.57    2.25
              .600     1.61 | 3.600    2.57 | 6.600    5.14 |  9.60    2.25
              .633     1.61 | 3.633    2.57 | 6.633    5.14 |  9.63    2.25
              .667     1.61 | 3.667    2.57 | 6.667    5.14 |  9.67    2.25
              .700     1.61 | 3.700    2.57 | 6.700    5.14 |  9.70    2.25
              .733     1.61 | 3.733    2.57 | 6.733    5.14 |  9.73    2.25
              .767     1.61 | 3.767    2.57 | 6.767    5.14 |  9.77    2.25
              .800     1.61 | 3.800    2.57 | 6.800    5.14 |  9.80    2.25
              .833     1.61 | 3.833    2.57 | 6.833    5.14 |  9.83    2.25
              .867     1.61 | 3.867    2.57 | 6.867    5.14 |  9.87    2.25
              .900     1.61 | 3.900    2.57 | 6.900    5.14 |  9.90    2.25
              .933     1.61 | 3.933    2.57 | 6.933    5.14 |  9.93    2.25
              .967     1.61 | 3.967    2.57 | 6.967    5.14 |  9.97    2.25
             1.000     1.61 | 4.000    2.57 | 7.000    5.14 | 10.00    2.25
             1.033     1.61 | 4.033    3.86 | 7.033    3.86 | 10.03    1.29
             1.067     1.61 | 4.067    3.86 | 7.067    3.86 | 10.07    1.29
             1.100     1.61 | 4.100    3.86 | 7.100    3.86 | 10.10    1.29
             1.133     1.61 | 4.133    3.86 | 7.133    3.86 | 10.13    1.29
             1.167     1.61 | 4.167    3.86 | 7.167    3.86 | 10.17    1.29
             1.200     1.61 | 4.200    3.86 | 7.200    3.86 | 10.20    1.29
             1.233     1.61 | 4.233    3.86 | 7.233    3.86 | 10.23    1.29
             1.267     1.61 | 4.267    3.86 | 7.267    3.86 | 10.27    1.29
             1.300     1.61 | 4.300    3.86 | 7.300    3.86 | 10.30    1.29
             1.333     1.61 | 4.333    3.86 | 7.333    3.86 | 10.33    1.29
             1.367     1.61 | 4.367    3.86 | 7.367    3.86 | 10.37    1.29
             1.400     1.61 | 4.400    3.86 | 7.400    3.86 | 10.40    1.29
             1.433     1.61 | 4.433    3.86 | 7.433    3.86 | 10.43    1.29
             1.467     1.61 | 4.467    3.86 | 7.467    3.86 | 10.47    1.29
             1.500     1.61 | 4.500    3.86 | 7.500    3.86 | 10.50    1.29
             1.533     1.61 | 4.533    5.14 | 7.533    3.86 | 10.53    1.29
             1.567     1.61 | 4.567    5.14 | 7.567    3.86 | 10.57    1.29
             1.600     1.61 | 4.600    5.14 | 7.600    3.86 | 10.60    1.29
             1.633     1.61 | 4.633    5.14 | 7.633    3.86 | 10.63    1.29
             1.667     1.61 | 4.667    5.14 | 7.667    3.86 | 10.67    1.29
             1.700     1.61 | 4.700    5.14 | 7.700    3.86 | 10.70    1.29
             1.733     1.61 | 4.733    5.14 | 7.733    3.86 | 10.73    1.29
             1.767     1.61 | 4.767    5.14 | 7.767    3.86 | 10.77    1.29
             1.800     1.61 | 4.800    5.14 | 7.800    3.86 | 10.80    1.29
             1.833     1.61 | 4.833    5.14 | 7.833    3.86 | 10.83    1.29
             1.867     1.61 | 4.867    5.14 | 7.867    3.86 | 10.87    1.29
             1.900     1.61 | 4.900    5.14 | 7.900    3.86 | 10.90    1.29
             1.933     1.61 | 4.933    5.14 | 7.933    3.86 | 10.93    1.29
             1.967     1.61 | 4.967    5.14 | 7.967    3.86 | 10.97    1.29
             2.000     1.61 | 5.000    5.14 | 8.000    3.86 | 11.00    1.29
             2.033     1.93 | 5.033    7.72 | 8.033    2.25 | 11.03    1.29
             2.067     1.93 | 5.067    7.72 | 8.067    2.25 | 11.07    1.29
             2.100     1.93 | 5.100    7.72 | 8.100    2.25 | 11.10    1.29
             2.133     1.93 | 5.133    7.72 | 8.133    2.25 | 11.13    1.29
             2.167     1.93 | 5.167    7.72 | 8.167    2.25 | 11.17    1.29
             2.200     1.93 | 5.200    7.72 | 8.200    2.25 | 11.20    1.29
             2.233     1.93 | 5.233    7.72 | 8.233    2.25 | 11.23    1.29
             2.267     1.93 | 5.267    7.72 | 8.267    2.25 | 11.27    1.29
             2.300     1.93 | 5.300    7.72 | 8.300    2.25 | 11.30    1.29
             2.333     1.93 | 5.333    7.72 | 8.333    2.25 | 11.33    1.29
             2.367     1.93 | 5.367    7.72 | 8.367    2.25 | 11.37    1.29
             2.400     1.93 | 5.400    7.72 | 8.400    2.25 | 11.40    1.29
             2.433     1.93 | 5.433    7.72 | 8.433    2.25 | 11.43    1.29
             2.467     1.93 | 5.467    7.72 | 8.467    2.25 | 11.47    1.29
             2.500     1.93 | 5.500    7.72 | 8.500    2.25 | 11.50    1.29
             2.533     1.93 | 5.533   30.86 | 8.533    2.25 | 11.53    1.29
             2.567     1.93 | 5.567   30.86 | 8.567    2.25 | 11.57    1.29
             2.600     1.93 | 5.600   30.86 | 8.600    2.25 | 11.60    1.29
             2.633     1.93 | 5.633   30.86 | 8.633    2.25 | 11.63    1.29
             2.667     1.93 | 5.667   30.86 | 8.667    2.25 | 11.67    1.29
             2.700     1.93 | 5.700   30.86 | 8.700    2.25 | 11.70    1.29
             2.733     1.93 | 5.733   30.86 | 8.733    2.25 | 11.73    1.29
             2.767     1.93 | 5.767   57.86 | 8.767    2.25 | 11.77    1.29
             2.800     1.93 | 5.800   84.88 | 8.800    2.25 | 11.80    1.29
             2.833     1.93 | 5.833   84.88 | 8.833    2.25 | 11.83    1.29
             2.867     1.93 | 5.867   84.88 | 8.867    2.25 | 11.87    1.29
             2.900     1.93 | 5.900   84.88 | 8.900    2.25 | 11.90    1.29
             2.933     1.93 | 5.933   84.88 | 8.933    2.25 | 11.93    1.29
             2.967     1.93 | 5.967   84.88 | 8.967    2.25 | 11.97    1.29
             3.000     1.93 | 6.000   84.88 | 9.000    2.25 | 12.00    1.28

    Max.Eff.Inten.(mm/hr)=        84.88          40.98
             over (min)           5.00          10.00
    Storage Coeff.   (min)=         .56 (ii)      9.76 (ii)
    Unit Hyd. Tpeak  (min)=        4.00          10.00
    Unit Hyd. peak   (cms)=         .56            .11
                                                           *TOTALS*
    PEAK FLOW        (cms)=         .10            .11          .206 (iii)
    TIME TO PEAK     (hrs)=         .00           6.07          6.00
    RUNOFF VOLUME     (mm)=       63.30          22.49         31.26
    TOTAL RAINFALL    (mm)=       64.30          64.30         64.30
    RUNOFF COEFFICIENT   =          .98            .35           .49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```

```
     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN*  =  70.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------

 -----------------
 ADD HYD   (0104) |
  1 +  2 =  3     |            AREA    QPEAK    TPEAK     R.V.
 -----------------             (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0101):        18.00    .155     6.97      9.29
      + ID2= 2 (0102):         2.01    .206     6.00     31.26
        ===================================================
        ID = 3 (0104):        20.01    .251     6.00     11.49

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 -----------------
 ADD HYD   (0105) |
  1 +  2 =  3     |            AREA    QPEAK    TPEAK     R.V.
 -----------------             (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0103):          .20    .015     6.00     31.21
      + ID2= 2 (0104):        20.01    .251     6.00     11.49
        ===================================================
        ID = 3 (0105):        20.21    .266     6.00     11.69

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ****************************
 ** SIMULATION NUMBER:   3 **
 ****************************


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    READ STORM     |    Filename: K:\PROJECT FILES\200000 - 299999\
                   |              210987 - 010 - Innisfil Executive Estates\
                   |              SWM\OTTHYMO 3rd Submission\SCS25.STM
 Ptotal= 90.70 mm |    Comments: 25 YR. SCS. STORM
 -----------------
                TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                 .25     2.27 |  3.25     3.63 |  6.25    16.33 |  9.25     3.17
                 .50     2.27 |  3.50     3.63 |  6.50    16.33 |  9.50     3.17
                 .75     2.27 |  3.75     3.63 |  6.75     7.26 |  9.75     3.17
                1.00     2.27 |  4.00     3.63 |  7.00     7.26 | 10.00     3.17
                1.25     2.27 |  4.25     5.44 |  7.25     5.44 | 10.25     1.81
                1.50     2.27 |  4.50     5.44 |  7.50     5.44 | 10.50     1.81
                1.75     2.27 |  4.75     7.26 |  7.75     5.44 | 10.75     1.81
                2.00     2.27 |  5.00     7.26 |  8.00     5.44 | 11.00     1.81
                2.25     2.72 |  5.25    10.88 |  8.25     3.17 | 11.25     1.81
                2.50     2.72 |  5.50    10.88 |  8.50     3.17 | 11.50     1.81
                2.75     2.72 |  5.75    43.54 |  8.75     3.17 | 11.75     1.81
                3.00     2.72 |  6.00   119.72 |  9.00     3.17 | 12.00     1.81

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 CALIB             |
 STANDHYD  (0103)  |   Area     (ha)=      .20
ID= 1 DT= 2.0 min  |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
 -----------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        .06          .14
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       2.00         1.63
    Length            (m)=      10.00        78.30
    Mannings n           =       .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                .033     2.27 | 3.033     3.63 | 6.033    16.34 |  9.03     3.17
                .067     2.27 | 3.067     3.63 | 6.067    16.33 |  9.07     3.17
                .100     2.27 | 3.100     3.63 | 6.100    16.33 |  9.10     3.17
                .133     2.27 | 3.133     3.63 | 6.133    16.33 |  9.13     3.17
                .167     2.27 | 3.167     3.63 | 6.167    16.33 |  9.17     3.17
                .200     2.27 | 3.200     3.63 | 6.200    16.33 |  9.20     3.17
                .233     2.27 | 3.233     3.63 | 6.233    16.33 |  9.23     3.17
                .267     2.27 | 3.267     3.63 | 6.267    16.33 |  9.27     3.17
                .300     2.27 | 3.300     3.63 | 6.300    16.33 |  9.30     3.17
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                .333    2.27 | 3.333    3.63 | 6.333   16.33 |  9.33    3.17
                .367    2.27 | 3.367    3.63 | 6.367   16.33 |  9.37    3.17
                .400    2.27 | 3.400    3.63 | 6.400   16.33 |  9.40    3.17
                .433    2.27 | 3.433    3.63 | 6.433   16.33 |  9.43    3.17
                .467    2.27 | 3.467    3.63 | 6.467   16.33 |  9.47    3.17
                .500    2.27 | 3.500    3.63 | 6.500   16.33 |  9.50    3.17
                .533    2.27 | 3.533    3.63 | 6.533    7.26 |  9.53    3.17
                .567    2.27 | 3.567    3.63 | 6.567    7.26 |  9.57    3.17
                .600    2.27 | 3.600    3.63 | 6.600    7.26 |  9.60    3.17
                .633    2.27 | 3.633    3.63 | 6.633    7.26 |  9.63    3.17
                .667    2.27 | 3.667    3.63 | 6.667    7.26 |  9.67    3.17
                .700    2.27 | 3.700    3.63 | 6.700    7.26 |  9.70    3.17
                .733    2.27 | 3.733    3.63 | 6.733    7.26 |  9.73    3.17
                .767    2.27 | 3.767    3.63 | 6.767    7.26 |  9.77    3.17
                .800    2.27 | 3.800    3.63 | 6.800    7.26 |  9.80    3.17
                .833    2.27 | 3.833    3.63 | 6.833    7.26 |  9.83    3.17
                .867    2.27 | 3.867    3.63 | 6.867    7.26 |  9.87    3.17
                .900    2.27 | 3.900    3.63 | 6.900    7.26 |  9.90    3.17
                .933    2.27 | 3.933    3.63 | 6.933    7.26 |  9.93    3.17
                .967    2.27 | 3.967    3.63 | 6.967    7.26 |  9.97    3.17
               1.000    2.27 | 4.000    3.63 | 7.000    7.26 | 10.00    3.17
               1.033    2.27 | 4.033    5.44 | 7.033    5.44 | 10.03    1.81
               1.067    2.27 | 4.067    5.44 | 7.067    5.44 | 10.07    1.81
               1.100    2.27 | 4.100    5.44 | 7.100    5.44 | 10.10    1.81
               1.133    2.27 | 4.133    5.44 | 7.133    5.44 | 10.13    1.81
               1.167    2.27 | 4.167    5.44 | 7.167    5.44 | 10.17    1.81
               1.200    2.27 | 4.200    5.44 | 7.200    5.44 | 10.20    1.81
               1.233    2.27 | 4.233    5.44 | 7.233    5.44 | 10.23    1.81
               1.267    2.27 | 4.267    5.44 | 7.267    5.44 | 10.27    1.81
               1.300    2.27 | 4.300    5.44 | 7.300    5.44 | 10.30    1.81
               1.333    2.27 | 4.333    5.44 | 7.333    5.44 | 10.33    1.81
               1.367    2.27 | 4.367    5.44 | 7.367    5.44 | 10.37    1.81
               1.400    2.27 | 4.400    5.44 | 7.400    5.44 | 10.40    1.81
               1.433    2.27 | 4.433    5.44 | 7.433    5.44 | 10.43    1.81
               1.467    2.27 | 4.467    5.44 | 7.467    5.44 | 10.47    1.81
               1.500    2.27 | 4.500    5.44 | 7.500    5.44 | 10.50    1.81
               1.533    2.27 | 4.533    7.26 | 7.533    5.44 | 10.53    1.81
               1.567    2.27 | 4.567    7.26 | 7.567    5.44 | 10.57    1.81
               1.600    2.27 | 4.600    7.26 | 7.600    5.44 | 10.60    1.81
               1.633    2.27 | 4.633    7.26 | 7.633    5.44 | 10.63    1.81
               1.667    2.27 | 4.667    7.26 | 7.667    5.44 | 10.67    1.81
               1.700    2.27 | 4.700    7.26 | 7.700    5.44 | 10.70    1.81
               1.733    2.27 | 4.733    7.26 | 7.733    5.44 | 10.73    1.81
               1.767    2.27 | 4.767    7.26 | 7.767    5.44 | 10.77    1.81
               1.800    2.27 | 4.800    7.26 | 7.800    5.44 | 10.80    1.81
               1.833    2.27 | 4.833    7.26 | 7.833    5.44 | 10.83    1.81
               1.867    2.27 | 4.867    7.26 | 7.867    5.44 | 10.87    1.81
               1.900    2.27 | 4.900    7.26 | 7.900    5.44 | 10.90    1.81
               1.933    2.27 | 4.933    7.26 | 7.933    5.44 | 10.93    1.81
               1.967    2.27 | 4.967    7.26 | 7.967    5.44 | 10.97    1.81
               2.000    2.27 | 5.000    7.26 | 8.000    5.44 | 11.00    1.81
               2.033    2.72 | 5.033   10.88 | 8.033    3.17 | 11.03    1.81
               2.067    2.72 | 5.067   10.88 | 8.067    3.17 | 11.07    1.81
               2.100    2.72 | 5.100   10.88 | 8.100    3.17 | 11.10    1.81
               2.133    2.72 | 5.133   10.88 | 8.133    3.17 | 11.13    1.81
               2.167    2.72 | 5.167   10.88 | 8.167    3.17 | 11.17    1.81
               2.200    2.72 | 5.200   10.88 | 8.200    3.17 | 11.20    1.81
               2.233    2.72 | 5.233   10.88 | 8.233    3.17 | 11.23    1.81
               2.267    2.72 | 5.267   10.88 | 8.267    3.17 | 11.27    1.81
               2.300    2.72 | 5.300   10.88 | 8.300    3.17 | 11.30    1.81
               2.333    2.72 | 5.333   10.88 | 8.333    3.17 | 11.33    1.81
               2.367    2.72 | 5.367   10.88 | 8.367    3.17 | 11.37    1.81
               2.400    2.72 | 5.400   10.88 | 8.400    3.17 | 11.40    1.81
               2.433    2.72 | 5.433   10.88 | 8.433    3.17 | 11.43    1.81
               2.467    2.72 | 5.467   10.88 | 8.467    3.17 | 11.47    1.81
               2.500    2.72 | 5.500   10.88 | 8.500    3.17 | 11.50    1.81
               2.533    2.72 | 5.533   43.53 | 8.533    3.17 | 11.53    1.81
               2.567    2.72 | 5.567   43.54 | 8.567    3.17 | 11.57    1.81
               2.600    2.72 | 5.600   43.54 | 8.600    3.17 | 11.60    1.81
               2.633    2.72 | 5.633   43.54 | 8.633    3.17 | 11.63    1.81
               2.667    2.72 | 5.667   43.54 | 8.667    3.17 | 11.67    1.81
               2.700    2.72 | 5.700   43.54 | 8.700    3.17 | 11.70    1.81
               2.733    2.72 | 5.733   43.54 | 8.733    3.17 | 11.73    1.81
               2.767    2.72 | 5.767   81.62 | 8.767    3.17 | 11.77    1.81
               2.800    2.72 | 5.800  119.72 | 8.800    3.17 | 11.80    1.81
               2.833    2.72 | 5.833  119.72 | 8.833    3.17 | 11.83    1.81
               2.867    2.72 | 5.867  119.72 | 8.867    3.17 | 11.87    1.81
               2.900    2.72 | 5.900  119.72 | 8.900    3.17 | 11.90    1.81
               2.933    2.72 | 5.933  119.72 | 8.933    3.17 | 11.93    1.81
               2.967    2.72 | 5.967  119.72 | 8.967    3.17 | 11.97    1.81
               3.000    2.72 | 6.000  119.72 | 9.000    3.17 | 12.00    1.81

Max.Eff.Inten.(mm/hr)=       119.72          68.80
           over (min)          5.00          14.00
Storage Coeff.  (min)=          .49 (ii)     13.53 (ii)
Unit Hyd. Tpeak (min)=         4.00          14.00
Unit Hyd. peak  (cms)=          .56            .08
                                                         *TOTALS*
PEAK FLOW       (cms)=          .01            .02          .028 (iii)
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    TIME TO PEAK     (hrs)=         .00           6.13            6.00
    RUNOFF VOLUME     (mm)=       89.70          40.08           50.71
    TOTAL RAINFALL    (mm)=       90.70          90.70           90.70
    RUNOFF COEFFICIENT    =         .99            .44             .56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
 CALIB             |
 NASHYD     (0101) |   Area      (ha)=  18.00   Curve Number    (CN)= 44.3
 D= 1 DT=11.0 min  |   Ia        (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------    U.H. Tp(hrs)=     .95

       NOTE:  RAINFALL WAS TRANSFORMED TO  11.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .183    2.27 | 3.300    3.63 | 6.417   16.33 |  9.53    3.17
                  .367    2.27 | 3.483    3.63 | 6.600   11.38 |  9.72    3.17
                  .550    2.27 | 3.667    3.63 | 6.783    7.26 |  9.90    3.17
                  .733    2.27 | 3.850    3.63 | 6.967    7.26 | 10.08    2.56
                  .917    2.27 | 4.033    3.96 | 7.150    5.77 | 10.27    1.81
                 1.100    2.27 | 4.217    5.44 | 7.333    5.44 | 10.45    1.81
                 1.283    2.27 | 4.400    5.44 | 7.517    5.44 | 10.63    1.81
                 1.467    2.27 | 4.583    6.27 | 7.700    5.44 | 10.82    1.81
                 1.650    2.27 | 4.767    7.26 | 7.883    5.44 | 11.00    1.81
                 1.833    2.27 | 4.950    7.26 | 8.067    4.62 | 11.18    1.81
                 2.017    2.31 | 5.133    9.89 | 8.250    3.17 | 11.37    1.81
                 2.200    2.72 | 5.317   10.88 | 8.433    3.17 | 11.55    1.81
                 2.383    2.72 | 5.500   10.88 | 8.617    3.17 | 11.73    1.81
                 2.567    2.72 | 5.683   43.54 | 8.800    3.17 | 11.92    1.81
                 2.750    2.72 | 5.867   92.02 | 8.983    3.17 | 12.10     .82
                 2.933    2.72 | 6.050   91.52 | 9.167    3.17 |
                 3.117    3.30 | 6.233   16.33 | 9.350    3.17 |

    Unit Hyd Qpeak   (cms)=     .724

    PEAK FLOW        (cms)=     .305  (i)
    TIME TO PEAK     (hrs)=    6.967
    RUNOFF VOLUME     (mm)=   18.130
    TOTAL RAINFALL    (mm)=   90.700
    RUNOFF COEFFICIENT    =     .200

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 ------------------
| CALIB            |
| STANDHYD  (0102) |   Area     (ha)=    2.01
  D= 1 DT= 2.0 min |   Total Imp(%)=   28.60   Dir. Conn.(%)=  21.50
 ------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=         .57          1.44
    Dep. Storage      (mm)=        1.00          5.00
    Average Slope      (%)=        2.00           .55
    Length             (m)=       10.00         18.00
    Mannings n            =        .013          .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .033    2.27 | 3.033    3.63 | 6.033   16.34 |  9.03    3.17
                  .067    2.27 | 3.067    3.63 | 6.067   16.33 |  9.07    3.17
                  .100    2.27 | 3.100    3.63 | 6.100   16.33 |  9.10    3.17
                  .133    2.27 | 3.133    3.63 | 6.133   16.33 |  9.13    3.17
                  .167    2.27 | 3.167    3.63 | 6.167   16.33 |  9.17    3.17
                  .200    2.27 | 3.200    3.63 | 6.200   16.33 |  9.20    3.17
                  .233    2.27 | 3.233    3.63 | 6.233   16.33 |  9.23    3.17
                  .267    2.27 | 3.267    3.63 | 6.267   16.33 |  9.27    3.17
                  .300    2.27 | 3.300    3.63 | 6.300   16.33 |  9.30    3.17
                  .333    2.27 | 3.333    3.63 | 6.333   16.33 |  9.33    3.17
                  .367    2.27 | 3.367    3.63 | 6.367   16.33 |  9.37    3.17
                  .400    2.27 | 3.400    3.63 | 6.400   16.33 |  9.40    3.17
                  .433    2.27 | 3.433    3.63 | 6.433   16.33 |  9.43    3.17
                  .467    2.27 | 3.467    3.63 | 6.467   16.33 |  9.47    3.17
                  .500    2.27 | 3.500    3.63 | 6.500   16.33 |  9.50    3.17
                  .533    2.27 | 3.533    3.63 | 6.533    7.26 |  9.53    3.17
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            .567    2.27 | 3.567    3.63 | 6.567    7.26 |  9.57    3.17
            .600    2.27 | 3.600    3.63 | 6.600    7.26 |  9.60    3.17
            .633    2.27 | 3.633    3.63 | 6.633    7.26 |  9.63    3.17
            .667    2.27 | 3.667    3.63 | 6.667    7.26 |  9.67    3.17
            .700    2.27 | 3.700    3.63 | 6.700    7.26 |  9.70    3.17
            .733    2.27 | 3.733    3.63 | 6.733    7.26 |  9.73    3.17
            .767    2.27 | 3.767    3.63 | 6.767    7.26 |  9.77    3.17
            .800    2.27 | 3.800    3.63 | 6.800    7.26 |  9.80    3.17
            .833    2.27 | 3.833    3.63 | 6.833    7.26 |  9.83    3.17
            .867    2.27 | 3.867    3.63 | 6.867    7.26 |  9.87    3.17
            .900    2.27 | 3.900    3.63 | 6.900    7.26 |  9.90    3.17
            .933    2.27 | 3.933    3.63 | 6.933    7.26 |  9.93    3.17
            .967    2.27 | 3.967    3.63 | 6.967    7.26 |  9.97    3.17
           1.000    2.27 | 4.000    3.63 | 7.000    7.26 | 10.00    3.17
           1.033    2.27 | 4.033    5.44 | 7.033    5.44 | 10.03    1.81
           1.067    2.27 | 4.067    5.44 | 7.067    5.44 | 10.07    1.81
           1.100    2.27 | 4.100    5.44 | 7.100    5.44 | 10.10    1.81
           1.133    2.27 | 4.133    5.44 | 7.133    5.44 | 10.13    1.81
           1.167    2.27 | 4.167    5.44 | 7.167    5.44 | 10.17    1.81
           1.200    2.27 | 4.200    5.44 | 7.200    5.44 | 10.20    1.81
           1.233    2.27 | 4.233    5.44 | 7.233    5.44 | 10.23    1.81
           1.267    2.27 | 4.267    5.44 | 7.267    5.44 | 10.27    1.81
           1.300    2.27 | 4.300    5.44 | 7.300    5.44 | 10.30    1.81
           1.333    2.27 | 4.333    5.44 | 7.333    5.44 | 10.33    1.81
           1.367    2.27 | 4.367    5.44 | 7.367    5.44 | 10.37    1.81
           1.400    2.27 | 4.400    5.44 | 7.400    5.44 | 10.40    1.81
           1.433    2.27 | 4.433    5.44 | 7.433    5.44 | 10.43    1.81
           1.467    2.27 | 4.467    5.44 | 7.467    5.44 | 10.47    1.81
           1.500    2.27 | 4.500    5.44 | 7.500    5.44 | 10.50    1.81
           1.533    2.27 | 4.533    7.26 | 7.533    5.44 | 10.53    1.81
           1.567    2.27 | 4.567    7.26 | 7.567    5.44 | 10.57    1.81
           1.600    2.27 | 4.600    7.26 | 7.600    5.44 | 10.60    1.81
           1.633    2.27 | 4.633    7.26 | 7.633    5.44 | 10.63    1.81
           1.667    2.27 | 4.667    7.26 | 7.667    5.44 | 10.67    1.81
           1.700    2.27 | 4.700    7.26 | 7.700    5.44 | 10.70    1.81
           1.733    2.27 | 4.733    7.26 | 7.733    5.44 | 10.73    1.81
           1.767    2.27 | 4.767    7.26 | 7.767    5.44 | 10.77    1.81
           1.800    2.27 | 4.800    7.26 | 7.800    5.44 | 10.80    1.81
           1.833    2.27 | 4.833    7.26 | 7.833    5.44 | 10.83    1.81
           1.867    2.27 | 4.867    7.26 | 7.867    5.44 | 10.87    1.81
           1.900    2.27 | 4.900    7.26 | 7.900    5.44 | 10.90    1.81
           1.933    2.27 | 4.933    7.26 | 7.933    5.44 | 10.93    1.81
           1.967    2.27 | 4.967    7.26 | 7.967    5.44 | 10.97    1.81
           2.000    2.27 | 5.000    7.26 | 8.000    5.44 | 11.00    1.81
           2.033    2.72 | 5.033   10.88 | 8.033    3.17 | 11.03    1.81
           2.067    2.72 | 5.067   10.88 | 8.067    3.17 | 11.07    1.81
           2.100    2.72 | 5.100   10.88 | 8.100    3.17 | 11.10    1.81
           2.133    2.72 | 5.133   10.88 | 8.133    3.17 | 11.13    1.81
           2.167    2.72 | 5.167   10.88 | 8.167    3.17 | 11.17    1.81
           2.200    2.72 | 5.200   10.88 | 8.200    3.17 | 11.20    1.81
           2.233    2.72 | 5.233   10.88 | 8.233    3.17 | 11.23    1.81
           2.267    2.72 | 5.267   10.88 | 8.267    3.17 | 11.27    1.81
           2.300    2.72 | 5.300   10.88 | 8.300    3.17 | 11.30    1.81
           2.333    2.72 | 5.333   10.88 | 8.333    3.17 | 11.33    1.81
           2.367    2.72 | 5.367   10.88 | 8.367    3.17 | 11.37    1.81
           2.400    2.72 | 5.400   10.88 | 8.400    3.17 | 11.40    1.81
           2.433    2.72 | 5.433   10.88 | 8.433    3.17 | 11.43    1.81
           2.467    2.72 | 5.467   10.88 | 8.467    3.17 | 11.47    1.81
           2.500    2.72 | 5.500   10.88 | 8.500    3.17 | 11.50    1.81
           2.533    2.72 | 5.533   43.53 | 8.533    3.17 | 11.53    1.81
           2.567    2.72 | 5.567   43.54 | 8.567    3.17 | 11.57    1.81
           2.600    2.72 | 5.600   43.54 | 8.600    3.17 | 11.60    1.81
           2.633    2.72 | 5.633   43.54 | 8.633    3.17 | 11.63    1.81
           2.667    2.72 | 5.667   43.54 | 8.667    3.17 | 11.67    1.81
           2.700    2.72 | 5.700   43.54 | 8.700    3.17 | 11.70    1.81
           2.733    2.72 | 5.733   43.54 | 8.733    3.17 | 11.73    1.81
           2.767    2.72 | 5.767   81.62 | 8.767    3.17 | 11.77    1.81
           2.800    2.72 | 5.800  119.72 | 8.800    3.17 | 11.80    1.81
           2.833    2.72 | 5.833  119.72 | 8.833    3.17 | 11.83    1.81
           2.867    2.72 | 5.867  119.72 | 8.867    3.17 | 11.87    1.81
           2.900    2.72 | 5.900  119.72 | 8.900    3.17 | 11.90    1.81
           2.933    2.72 | 5.933  119.72 | 8.933    3.17 | 11.93    1.81
           2.967    2.72 | 5.967  119.72 | 8.967    3.17 | 11.97    1.81
           3.000    2.72 | 6.000  119.72 | 9.000    3.17 | 12.00    1.81

     Max.Eff.Inten.(mm/hr)=      119.72          72.43
                over (min)        5.00           8.00
     Storage Coeff.  (min)=        .49 (ii)      7.81 (ii)
     Unit Hyd. Tpeak (min)=       4.00           8.00
     Unit Hyd. peak  (cms)=        .56            .14
                                                             *TOTALS*
     PEAK FLOW       (cms)=        .14            .23          .364 (iii)
     TIME TO PEAK    (hrs)=        .00           6.03          6.00
     RUNOFF VOLUME    (mm)=      89.70          40.08         50.75
     TOTAL RAINFALL   (mm)=      90.70          90.70         90.70
     RUNOFF COEFFICIENT   =        .99            .44           .56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
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     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN*  =  70.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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--------------------
| ADD HYD   (0104) |
| 1 +  2 =  3      |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0101):       18.00    .305     6.97     18.13
      + ID2= 2 (0102):        2.01    .364     6.00     50.75
        ==================================================
        ID = 3 (0104):       20.01    .459     6.00     21.41

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ------------------
| ADD HYD   (0105) |
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0103):         .20    .028     6.00     50.71
      + ID2= 2 (0104):       20.01    .459     6.00     21.41
        ==================================================
        ID = 3 (0105):       20.21    .487     6.00     21.70

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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  ****************************
  ** SIMULATION NUMBER:   4 **
  ****************************

--------------------
|   READ STORM     |     Filename: K:\PROJECT FILES\200000 - 299999\
|                  |               210987 - 010 - Innisfil Executive Estates\
|                  |               SWM\OTTHYMO 3rd Submission\SCS100.STM
| Ptotal=112.50 mm |     Comments: 100 YR. SCS. STORM
--------------------
              TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .25    2.81 |  3.25    4.50 |  6.25   20.25 |  9.25    3.94
               .50    2.81 |  3.50    4.50 |  6.50   20.25 |  9.50    3.94
               .75    2.81 |  3.75    4.50 |  6.75    9.00 |  9.75    3.94
              1.00    2.81 |  4.00    4.50 |  7.00    9.00 | 10.00    3.94
              1.25    2.81 |  4.25    6.75 |  7.25    6.75 | 10.25    2.25
              1.50    2.81 |  4.50    6.75 |  7.50    6.75 | 10.50    2.25
              1.75    2.81 |  4.75    9.00 |  7.75    6.75 | 10.75    2.25
              2.00    2.81 |  5.00    9.00 |  8.00    6.75 | 11.00    2.25
              2.25    3.37 |  5.25   13.50 |  8.25    3.94 | 11.25    2.25
              2.50    3.37 |  5.50   13.50 |  8.50    3.94 | 11.50    2.25
              2.75    3.37 |  5.75   54.00 |  8.75    3.94 | 11.75    2.25
              3.00    3.37 |  6.00  148.50 |  9.00    3.94 | 12.00    2.25

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| CALIB            |
| STANDHYD  (0103) |   Area    (ha)=    .20
| D= 1 DT= 2.0 min |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=        .06          .14
    Dep. Storage      (mm)=       1.00         5.00
    Average Slope      (%)=       2.00         1.63
    Length             (m)=      10.00        78.30
    Mannings n            =       .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
              .033    2.81 | 3.033    4.50 | 6.033   20.27 |  9.03    3.94
              .067    2.81 | 3.067    4.50 | 6.067   20.25 |  9.07    3.94
              .100    2.81 | 3.100    4.50 | 6.100   20.25 |  9.10    3.94
              .133    2.81 | 3.133    4.50 | 6.133   20.25 |  9.13    3.94
              .167    2.81 | 3.167    4.50 | 6.167   20.25 |  9.17    3.94
              .200    2.81 | 3.200    4.50 | 6.200   20.25 |  9.20    3.94
              .233    2.81 | 3.233    4.50 | 6.233   20.25 |  9.23    3.94
              .267    2.81 | 3.267    4.50 | 6.267   20.25 |  9.27    3.94
              .300    2.81 | 3.300    4.50 | 6.300   20.25 |  9.30    3.94
              .333    2.81 | 3.333    4.50 | 6.333   20.25 |  9.33    3.94
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        .367    2.81 | 3.367    4.50 | 6.367   20.25 |  9.37    3.94
        .400    2.81 | 3.400    4.50 | 6.400   20.25 |  9.40    3.94
        .433    2.81 | 3.433    4.50 | 6.433   20.25 |  9.43    3.94
        .467    2.81 | 3.467    4.50 | 6.467   20.25 |  9.47    3.94
        .500    2.81 | 3.500    4.50 | 6.500   20.25 |  9.50    3.94
        .533    2.81 | 3.533    4.50 | 6.533    9.00 |  9.53    3.94
        .567    2.81 | 3.567    4.50 | 6.567    9.00 |  9.57    3.94
        .600    2.81 | 3.600    4.50 | 6.600    9.00 |  9.60    3.94
        .633    2.81 | 3.633    4.50 | 6.633    9.00 |  9.63    3.94
        .667    2.81 | 3.667    4.50 | 6.667    9.00 |  9.67    3.94
        .700    2.81 | 3.700    4.50 | 6.700    9.00 |  9.70    3.94
        .733    2.81 | 3.733    4.50 | 6.733    9.00 |  9.73    3.94
        .767    2.81 | 3.767    4.50 | 6.767    9.00 |  9.77    3.94
        .800    2.81 | 3.800    4.50 | 6.800    9.00 |  9.80    3.94
        .833    2.81 | 3.833    4.50 | 6.833    9.00 |  9.83    3.94
        .867    2.81 | 3.867    4.50 | 6.867    9.00 |  9.87    3.94
        .900    2.81 | 3.900    4.50 | 6.900    9.00 |  9.90    3.94
        .933    2.81 | 3.933    4.50 | 6.933    9.00 |  9.93    3.94
        .967    2.81 | 3.967    4.50 | 6.967    9.00 |  9.97    3.94
       1.000    2.81 | 4.000    4.50 | 7.000    9.00 | 10.00    3.94
       1.033    2.81 | 4.033    6.75 | 7.033    6.75 | 10.03    2.25
       1.067    2.81 | 4.067    6.75 | 7.067    6.75 | 10.07    2.25
       1.100    2.81 | 4.100    6.75 | 7.100    6.75 | 10.10    2.25
       1.133    2.81 | 4.133    6.75 | 7.133    6.75 | 10.13    2.25
       1.167    2.81 | 4.167    6.75 | 7.167    6.75 | 10.17    2.25
       1.200    2.81 | 4.200    6.75 | 7.200    6.75 | 10.20    2.25
       1.233    2.81 | 4.233    6.75 | 7.233    6.75 | 10.23    2.25
       1.267    2.81 | 4.267    6.75 | 7.267    6.75 | 10.27    2.25
       1.300    2.81 | 4.300    6.75 | 7.300    6.75 | 10.30    2.25
       1.333    2.81 | 4.333    6.75 | 7.333    6.75 | 10.33    2.25
       1.367    2.81 | 4.367    6.75 | 7.367    6.75 | 10.37    2.25
       1.400    2.81 | 4.400    6.75 | 7.400    6.75 | 10.40    2.25
       1.433    2.81 | 4.433    6.75 | 7.433    6.75 | 10.43    2.25
       1.467    2.81 | 4.467    6.75 | 7.467    6.75 | 10.47    2.25
       1.500    2.81 | 4.500    6.75 | 7.500    6.75 | 10.50    2.25
       1.533    2.81 | 4.533    9.00 | 7.533    6.75 | 10.53    2.25
       1.567    2.81 | 4.567    9.00 | 7.567    6.75 | 10.57    2.25
       1.600    2.81 | 4.600    9.00 | 7.600    6.75 | 10.60    2.25
       1.633    2.81 | 4.633    9.00 | 7.633    6.75 | 10.63    2.25
       1.667    2.81 | 4.667    9.00 | 7.667    6.75 | 10.67    2.25
       1.700    2.81 | 4.700    9.00 | 7.700    6.75 | 10.70    2.25
       1.733    2.81 | 4.733    9.00 | 7.733    6.75 | 10.73    2.25
       1.767    2.81 | 4.767    9.00 | 7.767    6.75 | 10.77    2.25
       1.800    2.81 | 4.800    9.00 | 7.800    6.75 | 10.80    2.25
       1.833    2.81 | 4.833    9.00 | 7.833    6.75 | 10.83    2.25
       1.867    2.81 | 4.867    9.00 | 7.867    6.75 | 10.87    2.25
       1.900    2.81 | 4.900    9.00 | 7.900    6.75 | 10.90    2.25
       1.933    2.81 | 4.933    9.00 | 7.933    6.75 | 10.93    2.25
       1.967    2.81 | 4.967    9.00 | 7.967    6.75 | 10.97    2.25
       2.000    2.81 | 5.000    9.00 | 8.000    6.75 | 11.00    2.25
       2.033    3.37 | 5.033   13.50 | 8.033    3.94 | 11.03    2.25
       2.067    3.37 | 5.067   13.50 | 8.067    3.94 | 11.07    2.25
       2.100    3.37 | 5.100   13.50 | 8.100    3.94 | 11.10    2.25
       2.133    3.37 | 5.133   13.50 | 8.133    3.94 | 11.13    2.25
       2.167    3.37 | 5.167   13.50 | 8.167    3.94 | 11.17    2.25
       2.200    3.37 | 5.200   13.50 | 8.200    3.94 | 11.20    2.25
       2.233    3.37 | 5.233   13.50 | 8.233    3.94 | 11.23    2.25
       2.267    3.37 | 5.267   13.50 | 8.267    3.94 | 11.27    2.25
       2.300    3.37 | 5.300   13.50 | 8.300    3.94 | 11.30    2.25
       2.333    3.37 | 5.333   13.50 | 8.333    3.94 | 11.33    2.25
       2.367    3.37 | 5.367   13.50 | 8.367    3.94 | 11.37    2.25
       2.400    3.37 | 5.400   13.50 | 8.400    3.94 | 11.40    2.25
       2.433    3.37 | 5.433   13.50 | 8.433    3.94 | 11.43    2.25
       2.467    3.37 | 5.467   13.50 | 8.467    3.94 | 11.47    2.25
       2.500    3.37 | 5.500   13.50 | 8.500    3.94 | 11.50    2.25
       2.533    3.37 | 5.533   54.00 | 8.533    3.94 | 11.53    2.25
       2.567    3.37 | 5.567   54.00 | 8.567    3.94 | 11.57    2.25
       2.600    3.37 | 5.600   54.00 | 8.600    3.94 | 11.60    2.25
       2.633    3.37 | 5.633   54.00 | 8.633    3.94 | 11.63    2.25
       2.667    3.37 | 5.667   54.00 | 8.667    3.94 | 11.67    2.25
       2.700    3.37 | 5.700   54.00 | 8.700    3.94 | 11.70    2.25
       2.733    3.37 | 5.733   54.00 | 8.733    3.94 | 11.73    2.25
       2.767    3.37 | 5.767  101.24 | 8.767    3.94 | 11.77    2.25
       2.800    3.37 | 5.800  148.50 | 8.800    3.94 | 11.80    2.25
       2.833    3.37 | 5.833  148.50 | 8.833    3.94 | 11.83    2.25
       2.867    3.37 | 5.867  148.50 | 8.867    3.94 | 11.87    2.25
       2.900    3.37 | 5.900  148.50 | 8.900    3.94 | 11.90    2.25
       2.933    3.37 | 5.933  148.50 | 8.933    3.94 | 11.93    2.25
       2.967    3.37 | 5.967  148.50 | 8.967    3.94 | 11.97    2.25
       3.000    3.37 | 6.000  148.50 | 9.000    3.94 | 12.00    2.25

Max.Eff.Inten.(mm/hr)=     148.50         98.88
            over (min)       5.00         12.00
Storage Coeff.  (min)=        .44 (ii)    11.72 (ii)
Unit Hyd. Tpeak (min)=       4.00         12.00
Unit Hyd. peak  (cms)=        .56           .10
                                                      *TOTALS*
PEAK FLOW       (cms)=        .02           .03          .041 (iii)
TIME TO PEAK    (hrs)=        .00          6.10          6.00
```

```
   RUNOFF VOLUME    (mm)=      111.50          56.31            68.14
   TOTAL RAINFALL   (mm)=      112.50         112.50           112.50
   RUNOFF COEFFICIENT    =        .99            .50              .61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ----------------------------------------------------------------------------
--------------------
| CALIB              |
  NASHYD     (0101)  |   Area      (ha)=  18.00   Curve Number    (CN)= 44.3
  D= 1 DT=11.0 min   |   Ia        (mm)=   5.00   # of Linear Res.(N)= 3.00
  ------------------     U.H. Tp(hrs)=     .95

       NOTE:  RAINFALL WAS TRANSFORMED TO  11.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .183    2.81 | 3.300    4.50 | 6.417   20.25 |  9.53    3.94
               .367    2.81 | 3.483    4.50 | 6.600   14.11 |  9.72    3.94
               .550    2.81 | 3.667    4.50 | 6.783    9.00 |  9.90    3.94
               .733    2.81 | 3.850    4.50 | 6.967    9.00 | 10.08    3.17
               .917    2.81 | 4.033    4.91 | 7.150    7.16 | 10.27    2.25
              1.100    2.81 | 4.217    6.75 | 7.333    6.75 | 10.45    2.25
              1.283    2.81 | 4.400    6.75 | 7.517    6.75 | 10.63    2.25
              1.467    2.81 | 4.583    7.77 | 7.700    6.75 | 10.82    2.25
              1.650    2.81 | 4.767    9.00 | 7.883    6.75 | 11.00    2.25
              1.833    2.81 | 4.950    9.00 | 8.067    5.73 | 11.18    2.25
              2.017    2.86 | 5.133   12.27 | 8.250    3.94 | 11.37    2.25
              2.200    3.37 | 5.317   13.50 | 8.433    3.94 | 11.55    2.25
              2.383    3.37 | 5.500   13.50 | 8.617    3.94 | 11.73    2.25
              2.567    3.37 | 5.683   54.00 | 8.800    3.94 | 11.92    2.25
              2.750    3.37 | 5.867  114.14 | 8.983    3.94 | 12.10    1.02
              2.933    3.37 | 6.050  113.52 | 9.167    3.94 |
              3.117    4.09 | 6.233   20.25 | 9.350    3.94 |

    Unit Hyd Qpeak  (cms)=     .724

    PEAK FLOW       (cms)=     .459 (i)
    TIME TO PEAK    (hrs)=    6.967
    RUNOFF VOLUME    (mm)=   27.070
    TOTAL RAINFALL   (mm)=  112.500
    RUNOFF COEFFICIENT    =     .241

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ----------------------------------------------------------------------------
  ------------------
| CALIB              |
| STANDHYD  (0102)   |   Area      (ha)=    2.01
|ID= 1 DT= 2.0 min   |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
  ------------------

                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       .57         1.44
    Dep. Storage     (mm)=      1.00         5.00
    Average Slope     (%)=      2.00          .55
    Length            (m)=     10.00        18.00
    Mannings n            =      .013         .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .033    2.81 | 3.033    4.50 | 6.033   20.27 |  9.03    3.94
               .067    2.81 | 3.067    4.50 | 6.067   20.25 |  9.07    3.94
               .100    2.81 | 3.100    4.50 | 6.100   20.25 |  9.10    3.94
               .133    2.81 | 3.133    4.50 | 6.133   20.25 |  9.13    3.94
               .167    2.81 | 3.167    4.50 | 6.167   20.25 |  9.17    3.94
               .200    2.81 | 3.200    4.50 | 6.200   20.25 |  9.20    3.94
               .233    2.81 | 3.233    4.50 | 6.233   20.25 |  9.23    3.94
               .267    2.81 | 3.267    4.50 | 6.267   20.25 |  9.27    3.94
               .300    2.81 | 3.300    4.50 | 6.300   20.25 |  9.30    3.94
               .333    2.81 | 3.333    4.50 | 6.333   20.25 |  9.33    3.94
               .367    2.81 | 3.367    4.50 | 6.367   20.25 |  9.37    3.94
               .400    2.81 | 3.400    4.50 | 6.400   20.25 |  9.40    3.94
               .433    2.81 | 3.433    4.50 | 6.433   20.25 |  9.43    3.94
               .467    2.81 | 3.467    4.50 | 6.467   20.25 |  9.47    3.94
               .500    2.81 | 3.500    4.50 | 6.500   20.25 |  9.50    3.94
               .533    2.81 | 3.533    4.50 | 6.533    9.00 |  9.53    3.94
               .567    2.81 | 3.567    4.50 | 6.567    9.00 |  9.57    3.94
```

```
          .600    2.81 | 3.600    4.50 | 6.600    9.00 |  9.60    3.94
          .633    2.81 | 3.633    4.50 | 6.633    9.00 |  9.63    3.94
          .667    2.81 | 3.667    4.50 | 6.667    9.00 |  9.67    3.94
          .700    2.81 | 3.700    4.50 | 6.700    9.00 |  9.70    3.94
          .733    2.81 | 3.733    4.50 | 6.733    9.00 |  9.73    3.94
          .767    2.81 | 3.767    4.50 | 6.767    9.00 |  9.77    3.94
          .800    2.81 | 3.800    4.50 | 6.800    9.00 |  9.80    3.94
          .833    2.81 | 3.833    4.50 | 6.833    9.00 |  9.83    3.94
          .867    2.81 | 3.867    4.50 | 6.867    9.00 |  9.87    3.94
          .900    2.81 | 3.900    4.50 | 6.900    9.00 |  9.90    3.94
          .933    2.81 | 3.933    4.50 | 6.933    9.00 |  9.93    3.94
          .967    2.81 | 3.967    4.50 | 6.967    9.00 |  9.97    3.94
         1.000    2.81 | 4.000    4.50 | 7.000    9.00 | 10.00    3.94
         1.033    2.81 | 4.033    6.75 | 7.033    6.75 | 10.03    2.25
         1.067    2.81 | 4.067    6.75 | 7.067    6.75 | 10.07    2.25
         1.100    2.81 | 4.100    6.75 | 7.100    6.75 | 10.10    2.25
         1.133    2.81 | 4.133    6.75 | 7.133    6.75 | 10.13    2.25
         1.167    2.81 | 4.167    6.75 | 7.167    6.75 | 10.17    2.25
         1.200    2.81 | 4.200    6.75 | 7.200    6.75 | 10.20    2.25
         1.233    2.81 | 4.233    6.75 | 7.233    6.75 | 10.23    2.25
         1.267    2.81 | 4.267    6.75 | 7.267    6.75 | 10.27    2.25
         1.300    2.81 | 4.300    6.75 | 7.300    6.75 | 10.30    2.25
         1.333    2.81 | 4.333    6.75 | 7.333    6.75 | 10.33    2.25
         1.367    2.81 | 4.367    6.75 | 7.367    6.75 | 10.37    2.25
         1.400    2.81 | 4.400    6.75 | 7.400    6.75 | 10.40    2.25
         1.433    2.81 | 4.433    6.75 | 7.433    6.75 | 10.43    2.25
         1.467    2.81 | 4.467    6.75 | 7.467    6.75 | 10.47    2.25
         1.500    2.81 | 4.500    6.75 | 7.500    6.75 | 10.50    2.25
         1.533    2.81 | 4.533    9.00 | 7.533    6.75 | 10.53    2.25
         1.567    2.81 | 4.567    9.00 | 7.567    6.75 | 10.57    2.25
         1.600    2.81 | 4.600    9.00 | 7.600    6.75 | 10.60    2.25
         1.633    2.81 | 4.633    9.00 | 7.633    6.75 | 10.63    2.25
         1.667    2.81 | 4.667    9.00 | 7.667    6.75 | 10.67    2.25
         1.700    2.81 | 4.700    9.00 | 7.700    6.75 | 10.70    2.25
         1.733    2.81 | 4.733    9.00 | 7.733    6.75 | 10.73    2.25
         1.767    2.81 | 4.767    9.00 | 7.767    6.75 | 10.77    2.25
         1.800    2.81 | 4.800    9.00 | 7.800    6.75 | 10.80    2.25
         1.833    2.81 | 4.833    9.00 | 7.833    6.75 | 10.83    2.25
         1.867    2.81 | 4.867    9.00 | 7.867    6.75 | 10.87    2.25
         1.900    2.81 | 4.900    9.00 | 7.900    6.75 | 10.90    2.25
         1.933    2.81 | 4.933    9.00 | 7.933    6.75 | 10.93    2.25
         1.967    2.81 | 4.967    9.00 | 7.967    6.75 | 10.97    2.25
         2.000    2.81 | 5.000    9.00 | 8.000    6.75 | 11.00    2.25
         2.033    3.37 | 5.033   13.50 | 8.033    3.94 | 11.03    2.25
         2.067    3.37 | 5.067   13.50 | 8.067    3.94 | 11.07    2.25
         2.100    3.37 | 5.100   13.50 | 8.100    3.94 | 11.10    2.25
         2.133    3.37 | 5.133   13.50 | 8.133    3.94 | 11.13    2.25
         2.167    3.37 | 5.167   13.50 | 8.167    3.94 | 11.17    2.25
         2.200    3.37 | 5.200   13.50 | 8.200    3.94 | 11.20    2.25
         2.233    3.37 | 5.233   13.50 | 8.233    3.94 | 11.23    2.25
         2.267    3.37 | 5.267   13.50 | 8.267    3.94 | 11.27    2.25
         2.300    3.37 | 5.300   13.50 | 8.300    3.94 | 11.30    2.25
         2.333    3.37 | 5.333   13.50 | 8.333    3.94 | 11.33    2.25
         2.367    3.37 | 5.367   13.50 | 8.367    3.94 | 11.37    2.25
         2.400    3.37 | 5.400   13.50 | 8.400    3.94 | 11.40    2.25
         2.433    3.37 | 5.433   13.50 | 8.433    3.94 | 11.43    2.25
         2.467    3.37 | 5.467   13.50 | 8.467    3.94 | 11.47    2.25
         2.500    3.37 | 5.500   13.50 | 8.500    3.94 | 11.50    2.25
         2.533    3.37 | 5.533   54.00 | 8.533    3.94 | 11.53    2.25
         2.567    3.37 | 5.567   54.00 | 8.567    3.94 | 11.57    2.25
         2.600    3.37 | 5.600   54.00 | 8.600    3.94 | 11.60    2.25
         2.633    3.37 | 5.633   54.00 | 8.633    3.94 | 11.63    2.25
         2.667    3.37 | 5.667   54.00 | 8.667    3.94 | 11.67    2.25
         2.700    3.37 | 5.700   54.00 | 8.700    3.94 | 11.70    2.25
         2.733    3.37 | 5.733   54.00 | 8.733    3.94 | 11.73    2.25
         2.767    3.37 | 5.767  101.24 | 8.767    3.94 | 11.77    2.25
         2.800    3.37 | 5.800  148.50 | 8.800    3.94 | 11.80    2.25
         2.833    3.37 | 5.833  148.50 | 8.833    3.94 | 11.83    2.25
         2.867    3.37 | 5.867  148.50 | 8.867    3.94 | 11.87    2.25
         2.900    3.37 | 5.900  148.50 | 8.900    3.94 | 11.90    2.25
         2.933    3.37 | 5.933  148.50 | 8.933    3.94 | 11.93    2.25
         2.967    3.37 | 5.967  148.50 | 8.967    3.94 | 11.97    2.25
         3.000    3.37 | 6.000  148.50 | 9.000    3.94 | 12.00    2.25

    Max.Eff.Inten.(mm/hr)=      148.50         101.03
               over (min)        5.00           8.00
    Storage Coeff.  (min)=        .44 (ii)      6.86 (ii)
    Unit Hyd. Tpeak (min)=       4.00           8.00
    Unit Hyd. peak  (cms)=        .56            .16
                                                          *TOTALS*
    PEAK FLOW       (cms)=        .18            .33         .503 (iii)
    TIME TO PEAK    (hrs)=        .00           6.03         6.00
    RUNOFF VOLUME    (mm)=     111.50          56.31        68.17
    TOTAL RAINFALL   (mm)=     112.50         112.50       112.50
    RUNOFF COEFFICIENT   =        .99            .50          .61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
        CN*  =  70.0    Ia = Dep. Storage  (Above)
   (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
  (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 --------------------------------------------------------------------------------

 ------------------
| ADD HYD   (0104) |
|  1 +  2 =  3     |        AREA    QPEAK     TPEAK      R.V.
 ------------------         (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (0101):     18.00    .459      6.97     27.07
      + ID2= 2 (0102):      2.01    .503      6.00     68.17
        ===============================================
        ID = 3 (0104):     20.01    .649      6.00     31.20

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ------------------
 ADD HYD   (0105) |
  1 +  2 =  3     |         AREA    QPEAK     TPEAK      R.V.
 ------------------         (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (0103):       .20    .041      6.00     68.14
      + ID2= 2 (0104):     20.01    .649      6.00     31.20
        ===============================================
        ID = 3 (0105):     20.21    .690      6.00     31.56

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ****************************
 ** SIMULATION NUMBER:   5 **
 ****************************


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    READ STORM      |     Filename: K:\PROJECT FILES\200000 - 299999\
                    |               210987 - 010 - Innisfil Executive Estates\
                    |               SWM\OTTHYMO 3rd Submission\chica2.stm
 Ptotal= 36.95 mm   |     Comments: 2 YEAR - 4 hour - Chicago Storm
 ------------------
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .17    2.47 |  1.17   18.78 |  2.17    5.73 |  3.17    2.93
                  .33    2.82 |  1.33   83.11 |  2.33    4.89 |  3.33    2.72
                  .50    3.31 |  1.50   24.57 |  2.50    4.28 |  3.50    2.55
                  .67    4.05 |  1.67   13.01 |  2.67    3.82 |  3.67    2.39
                  .83    5.30 |  1.83    9.01 |  2.83    3.46 |  3.83    2.26
                 1.00    7.98 |  2.00    6.97 |  3.00    3.17 |  4.00    2.15

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 ------------------
 CALIB              |
 STANDHYD  (0103)   |   Area     (ha)=     .20
 ID= 1 DT= 2.0 min  |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
 ------------------

                             IMPERVIOUS     PERVIOUS (i)
    Surface Area        (ha)=       .06            .14
    Dep. Storage        (mm)=      1.00           5.00
    Average Slope        (%)=      2.00           1.63
    Length               (m)=     10.00          78.30
    Mannings n              =      .013           .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .033    2.47 | 1.033   18.78 | 2.033    5.73 |  3.03    2.93
                 .067    2.47 | 1.067   18.78 | 2.067    5.73 |  3.07    2.93
                 .100    2.47 | 1.100   18.78 | 2.100    5.73 |  3.10    2.93
                 .133    2.47 | 1.133   18.78 | 2.133    5.73 |  3.13    2.93
                 .167    2.47 | 1.167   18.78 | 2.167    5.73 |  3.17    2.93
                 .200    2.82 | 1.200   83.11 | 2.200    4.89 |  3.20    2.72
                 .233    2.82 | 1.233   83.11 | 2.233    4.89 |  3.23    2.72
                 .267    2.82 | 1.267   83.11 | 2.267    4.89 |  3.27    2.72
                 .300    2.82 | 1.300   83.11 | 2.300    4.89 |  3.30    2.72
                 .333    2.82 | 1.333   83.11 | 2.333    4.89 |  3.33    2.72
                 .367    3.31 | 1.367   24.57 | 2.367    4.28 |  3.37    2.55
                 .400    3.31 | 1.400   24.57 | 2.400    4.28 |  3.40    2.55
                 .433    3.31 | 1.433   24.57 | 2.433    4.28 |  3.43    2.55
                 .467    3.31 | 1.467   24.57 | 2.467    4.28 |  3.47    2.55
                 .500    3.31 | 1.500   24.57 | 2.500    4.28 |  3.50    2.55
                 .533    4.05 | 1.533   13.01 | 2.533    3.82 |  3.53    2.39
                 .567    4.05 | 1.567   13.01 | 2.567    3.82 |  3.57    2.39
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                .600     4.05 | 1.600    13.01 | 2.600     3.82 |  3.60    2.39
                .633     4.05 | 1.633    13.01 | 2.633     3.82 |  3.63    2.39
                .667     4.05 | 1.667    13.01 | 2.667     3.82 |  3.67    2.39
                .700     5.30 | 1.700     9.01 | 2.700     3.46 |  3.70    2.26
                .733     5.30 | 1.733     9.01 | 2.733     3.46 |  3.73    2.26
                .767     5.30 | 1.767     9.01 | 2.767     3.46 |  3.77    2.26
                .800     5.30 | 1.800     9.01 | 2.800     3.46 |  3.80    2.26
                .833     5.30 | 1.833     9.01 | 2.833     3.46 |  3.83    2.26
                .867     7.98 | 1.867     6.97 | 2.867     3.17 |  3.87    2.15
                .900     7.98 | 1.900     6.97 | 2.900     3.17 |  3.90    2.15
                .933     7.98 | 1.933     6.97 | 2.933     3.17 |  3.93    2.15
                .967     7.98 | 1.967     6.97 | 2.967     3.17 |  3.97    2.15
               1.000     7.98 | 2.000     6.97 | 3.000     3.17 |  4.00    2.15

     Max.Eff.Inten.(mm/hr)=      83.11          9.37
               over (min)        5.00          30.00
     Storage Coeff.  (min)=       .56 (ii)     29.52 (ii)
     Unit Hyd. Tpeak (min)=      4.00          30.00
     Unit Hyd. peak  (cms)=       .56            .04
                                                              *TOTALS*
     PEAK FLOW       (cms)=       .01            .00           .010 (iii)
     TIME TO PEAK    (hrs)=       .00           1.87           1.33
     RUNOFF VOLUME    (mm)=     35.96           7.99          13.92
     TOTAL RAINFALL   (mm)=     36.96          36.96          36.96
     RUNOFF COEFFICIENT   =       .97            .22            .38

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| NASHYD    (0101)   |   Area     (ha)=  18.00   Curve Number   (CN)= 44.3
|ID= 1 DT=11.0 min   |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=     .95

        NOTE:  RAINFALL WAS TRANSFORMED TO  11.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN  |  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs    mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .183    2.50 | 1.283    59.72 | 2.383    4.72 |  3.48    2.58
               .367    2.91 | 1.467    40.54 | 2.567    4.11 |  3.67    2.40
               .550    3.51 | 1.650    15.11 | 2.750    3.66 |  3.85    2.25
               .733    4.50 | 1.833     9.37 | 2.933    3.30 |  4.03    1.76
               .917    6.52 | 2.017     6.86 | 3.117    3.02 |
              1.100   13.87 | 2.200     5.58 | 3.300    2.78 |

     Unit Hyd Qpeak  (cms)=     .724

     PEAK FLOW       (cms)=     .054 (i)
     TIME TO PEAK    (hrs)=    2.567
     RUNOFF VOLUME    (mm)=    2.906
     TOTAL RAINFALL   (mm)=   36.955
     RUNOFF COEFFICIENT   =     .079

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD  (0102)   |   Area     (ha)=    2.01
|ID= 1 DT= 2.0 min   |   Total Imp(%)=   28.60   Dir. Conn.(%)=  21.50
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .57         1.44
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      2.00          .55
     Length            (m)=     10.00        18.00
     Mannings n           =      .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN  |  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs    mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .033    2.47 | 1.033    18.78 | 2.033    5.73 |  3.03    2.93
               .067    2.47 | 1.067    18.78 | 2.067    5.73 |  3.07    2.93
               .100    2.47 | 1.100    18.78 | 2.100    5.73 |  3.10    2.93
               .133    2.47 | 1.133    18.78 | 2.133    5.73 |  3.13    2.93
               .167    2.47 | 1.167    18.78 | 2.167    5.73 |  3.17    2.93
               .200    2.82 | 1.200    83.11 | 2.200    4.89 |  3.20    2.72
```

```
                .233     2.82 | 1.233   83.11 | 2.233     4.89 |  3.23     2.72
                .267     2.82 | 1.267   83.11 | 2.267     4.89 |  3.27     2.72
                .300     2.82 | 1.300   83.11 | 2.300     4.89 |  3.30     2.72
                .333     2.82 | 1.333   83.11 | 2.333     4.89 |  3.33     2.72
                .367     3.31 | 1.367   24.57 | 2.367     4.28 |  3.37     2.55
                .400     3.31 | 1.400   24.57 | 2.400     4.28 |  3.40     2.55
                .433     3.31 | 1.433   24.57 | 2.433     4.28 |  3.43     2.55
                .467     3.31 | 1.467   24.57 | 2.467     4.28 |  3.47     2.55
                .500     3.31 | 1.500   24.57 | 2.500     4.28 |  3.50     2.55
                .533     4.05 | 1.533   13.01 | 2.533     3.82 |  3.53     2.39
                .567     4.05 | 1.567   13.01 | 2.567     3.82 |  3.57     2.39
                .600     4.05 | 1.600   13.01 | 2.600     3.82 |  3.60     2.39
                .633     4.05 | 1.633   13.01 | 2.633     3.82 |  3.63     2.39
                .667     4.05 | 1.667   13.01 | 2.667     3.82 |  3.67     2.39
                .700     5.30 | 1.700    9.01 | 2.700     3.46 |  3.70     2.26
                .733     5.30 | 1.733    9.01 | 2.733     3.46 |  3.73     2.26
                .767     5.30 | 1.767    9.01 | 2.767     3.46 |  3.77     2.26
                .800     5.30 | 1.800    9.01 | 2.800     3.46 |  3.80     2.26
                .833     5.30 | 1.833    9.01 | 2.833     3.46 |  3.83     2.26
                .867     7.98 | 1.867    6.97 | 2.867     3.17 |  3.87     2.15
                .900     7.98 | 1.900    6.97 | 2.900     3.17 |  3.90     2.15
                .933     7.98 | 1.933    6.97 | 2.933     3.17 |  3.93     2.15
                .967     7.98 | 1.967    6.97 | 2.967     3.17 |  3.97     2.15
               1.000     7.98 | 2.000    6.97 | 3.000     3.17 |  4.00     2.15

   Max.Eff.Inten.(mm/hr)=       83.11          12.63
              over (min)         5.00          16.00
   Storage Coeff.  (min)=         .56 (ii)     15.29 (ii)
   Unit Hyd. Tpeak (min)=        4.00          16.00
   Unit Hyd. peak  (cms)=         .56            .07
                                                         *TOTALS*
   PEAK FLOW       (cms)=         .10            .03         .109 (iii)
   TIME TO PEAK    (hrs)=         .00           1.57         1.33
   RUNOFF VOLUME    (mm)=       35.96           7.99        14.00
   TOTAL RAINFALL   (mm)=       36.96          36.96        36.96
   RUNOFF COEFFICIENT   =         .97            .22          .38

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------

 ------------------
 ADD HYD   (0104) |
  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
 -----------------           (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0101):     18.00     .054     2.57     2.91
       + ID2= 2 (0102):      2.01     .109     1.33    14.00
         ==================================================
         ID = 3 (0104):     20.01     .113     1.33     4.02

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ------------------
 ADD HYD   (0105) |
  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
 -----------------           (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0103):       .20     .010     1.33    13.92
       + ID2= 2 (0104):     20.01     .113     1.33     4.02
         ==================================================
         ID = 3 (0105):     20.21     .124     1.33     4.12

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ****************************
 ** SIMULATION NUMBER:   6 **
 ****************************


 ------------------
   READ STORM      |    Filename: K:\PROJECT FILES\200000 - 299999\
                   |              210987 - 010 - Innisfil Executive Estates\
                   |              SWM\OTTHYMO 3rd Submission\chica5.stm
 Ptotal= 50.52 mm  |    Comments: 5 YEAR - 4 hour - Chicago Storm
 ------------------
                TIME     RAIN |  TIME    RAIN |  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs   mm/hr |   hrs    mm/hr |   hrs    mm/hr
                 .17     3.57 |  1.17   25.64 |  2.17     8.12 |  3.17     4.22
                 .33     4.07 |  1.33  108.92 |  2.33     6.96 |  3.33     3.93
                 .50     4.76 |  1.50   33.31 |  2.50     6.12 |  3.50     3.68
                 .67     5.79 |  1.67   17.99 |  2.67     5.48 |  3.67     3.47
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          .83    7.53 |  1.83   12.60 |  2.83    4.97 |  3.83    3.28
         1.00   11.20 |  2.00    9.82 |  3.00    4.56 |  4.00    3.12

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--------------------
| CALIB              |
| STANDHYD  (0103)   |   Area     (ha)=     .20
|ID= 1 DT= 2.0 min   |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
--------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=        .06           .14
     Dep. Storage      (mm)=       1.00          5.00
     Average Slope      (%)=       2.00          1.63
     Length             (m)=      10.00         78.30
     Mannings n            =       .013          .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN | TIME     RAIN | TIME     RAIN |  TIME     RAIN
                 hrs   mm/hr |  hrs    mm/hr |  hrs    mm/hr |   hrs    mm/hr
                .033    3.57 | 1.033   25.64 | 2.033    8.12 |  3.03     4.22
                .067    3.57 | 1.067   25.64 | 2.067    8.12 |  3.07     4.22
                .100    3.57 | 1.100   25.64 | 2.100    8.12 |  3.10     4.22
                .133    3.57 | 1.133   25.64 | 2.133    8.12 |  3.13     4.22
                .167    3.57 | 1.167   25.64 | 2.167    8.12 |  3.17     4.22
                .200    4.07 | 1.200  108.92 | 2.200    6.96 |  3.20     3.93
                .233    4.07 | 1.233  108.92 | 2.233    6.96 |  3.23     3.93
                .267    4.07 | 1.267  108.92 | 2.267    6.96 |  3.27     3.93
                .300    4.07 | 1.300  108.92 | 2.300    6.96 |  3.30     3.93
                .333    4.07 | 1.333  108.92 | 2.333    6.96 |  3.33     3.93
                .367    4.76 | 1.367   33.31 | 2.367    6.12 |  3.37     3.68
                .400    4.76 | 1.400   33.31 | 2.400    6.12 |  3.40     3.68
                .433    4.76 | 1.433   33.31 | 2.433    6.12 |  3.43     3.68
                .467    4.76 | 1.467   33.31 | 2.467    6.12 |  3.47     3.68
                .500    4.76 | 1.500   33.31 | 2.500    6.12 |  3.50     3.68
                .533    5.79 | 1.533   17.99 | 2.533    5.48 |  3.53     3.47
                .567    5.79 | 1.567   17.99 | 2.567    5.48 |  3.57     3.47
                .600    5.79 | 1.600   17.99 | 2.600    5.48 |  3.60     3.47
                .633    5.79 | 1.633   17.99 | 2.633    5.48 |  3.63     3.47
                .667    5.79 | 1.667   17.99 | 2.667    5.48 |  3.67     3.47
                .700    7.53 | 1.700   12.60 | 2.700    4.97 |  3.70     3.28
                .733    7.53 | 1.733   12.60 | 2.733    4.97 |  3.73     3.28
                .767    7.53 | 1.767   12.60 | 2.767    4.97 |  3.77     3.28
                .800    7.53 | 1.800   12.60 | 2.800    4.97 |  3.80     3.28
                .833    7.53 | 1.833   12.60 | 2.833    4.97 |  3.83     3.28
                .867   11.20 | 1.867    9.82 | 2.867    4.56 |  3.87     3.12
                .900   11.20 | 1.900    9.82 | 2.900    4.56 |  3.90     3.12
                .933   11.20 | 1.933    9.82 | 2.933    4.56 |  3.93     3.12
                .967   11.20 | 1.967    9.82 | 2.967    4.56 |  3.97     3.12
               1.000   11.20 | 2.000    9.82 | 3.000    4.56 |  4.00     3.12

     Max.Eff.Inten.(mm/hr)=       108.92          20.16
                over (min)          5.00          22.00
     Storage Coeff.  (min)=          .50 (ii)     21.81 (ii)
     Unit Hyd. Tpeak (min)=         4.00          22.00
     Unit Hyd. peak  (cms)=          .56            .05
                                                              *TOTALS*
     PEAK FLOW        (cms)=         .01            .00         .014 (iii)
     TIME TO PEAK     (hrs)=         .00           1.67         1.33
     RUNOFF VOLUME     (mm)=       49.52          14.58        22.02
     TOTAL RAINFALL    (mm)=       50.52          50.52        50.52
     RUNOFF COEFFICIENT   =          .98            .29          .44

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| NASHYD     (0101)  |   Area      (ha)=  18.00   Curve Number    (CN)= 44.3
|ID= 1 DT=11.0 min   |   Ia        (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=      .95

        NOTE:  RAINFALL WAS TRANSFORMED TO  11.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
               TIME     RAIN | TIME     RAIN | TIME     RAIN |  TIME     RAIN
                hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr |   hrs    mm/hr
               .183     3.62 | 1.283   78.64 | 2.383    6.73 |  3.48     3.73
               .367     4.20 | 1.467   53.93 | 2.567    5.89 |  3.67     3.49
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```
               .550    5.04 | 1.650   20.78 | 2.750    5.25 |  3.85    3.27
               .733    6.42 | 1.833   13.09 | 2.933    4.75 |  4.03    2.55
               .917    9.20 | 2.017    9.67 | 3.117    4.34 |
              1.100   19.08 | 2.200    7.91 | 3.300    4.01 |

   Unit Hyd Qpeak  (cms)=     .724

   PEAK FLOW       (cms)=     .105 (i)
   TIME TO PEAK    (hrs)=    2.567
   RUNOFF VOLUME    (mm)=    5.678
   TOTAL RAINFALL   (mm)=   50.518
   RUNOFF COEFFICIENT   =     .112

   (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-----------------
CALIB            |
STANDHYD  (0102) |    Area     (ha)=    2.01
ID= 1 DT= 2.0 min |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
-----------------
                          IMPERVIOUS    PERVIOUS (i)
   Surface Area    (ha)=       .57         1.44
   Dep. Storage    (mm)=      1.00         5.00
   Average Slope    (%)=      2.00          .55
   Length           (m)=     10.00        18.00
   Mannings n          =      .013         .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN | TIME    RAIN | TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |   hrs   mm/hr
               .033    3.57 | 1.033   25.64 | 2.033    8.12 |  3.03    4.22
               .067    3.57 | 1.067   25.64 | 2.067    8.12 |  3.07    4.22
               .100    3.57 | 1.100   25.64 | 2.100    8.12 |  3.10    4.22
               .133    3.57 | 1.133   25.64 | 2.133    8.12 |  3.13    4.22
               .167    3.57 | 1.167   25.64 | 2.167    8.12 |  3.17    4.22
               .200    4.07 | 1.200  108.92 | 2.200    6.96 |  3.20    3.93
               .233    4.07 | 1.233  108.92 | 2.233    6.96 |  3.23    3.93
               .267    4.07 | 1.267  108.92 | 2.267    6.96 |  3.27    3.93
               .300    4.07 | 1.300  108.92 | 2.300    6.96 |  3.30    3.93
               .333    4.07 | 1.333  108.92 | 2.333    6.96 |  3.33    3.93
               .367    4.76 | 1.367   33.31 | 2.367    6.12 |  3.37    3.68
               .400    4.76 | 1.400   33.31 | 2.400    6.12 |  3.40    3.68
               .433    4.76 | 1.433   33.31 | 2.433    6.12 |  3.43    3.68
               .467    4.76 | 1.467   33.31 | 2.467    6.12 |  3.47    3.68
               .500    4.76 | 1.500   33.31 | 2.500    6.12 |  3.50    3.68
               .533    5.79 | 1.533   17.99 | 2.533    5.48 |  3.53    3.47
               .567    5.79 | 1.567   17.99 | 2.567    5.48 |  3.57    3.47
               .600    5.79 | 1.600   17.99 | 2.600    5.48 |  3.60    3.47
               .633    5.79 | 1.633   17.99 | 2.633    5.48 |  3.63    3.47
               .667    5.79 | 1.667   17.99 | 2.667    5.48 |  3.67    3.47
               .700    7.53 | 1.700   12.60 | 2.700    4.97 |  3.70    3.28
               .733    7.53 | 1.733   12.60 | 2.733    4.97 |  3.73    3.28
               .767    7.53 | 1.767   12.60 | 2.767    4.97 |  3.77    3.28
               .800    7.53 | 1.800   12.60 | 2.800    4.97 |  3.80    3.28
               .833    7.53 | 1.833   12.60 | 2.833    4.97 |  3.83    3.28
               .867   11.20 | 1.867    9.82 | 2.867    4.56 |  3.87    3.12
               .900   11.20 | 1.900    9.82 | 2.900    4.56 |  3.90    3.12
               .933   11.20 | 1.933    9.82 | 2.933    4.56 |  3.93    3.12
               .967   11.20 | 1.967    9.82 | 2.967    4.56 |  3.97    3.12
              1.000   11.20 | 2.000    9.82 | 3.000    4.56 |  4.00    3.12

   Max.Eff.Inten.(mm/hr)=      108.92         26.18
              over (min)         5.00         12.00
   Storage Coeff.  (min)=         .50 (ii)    11.51 (ii)
   Unit Hyd. Tpeak (min)=        4.00         12.00
   Unit Hyd. peak  (cms)=         .56           .10
                                                             *TOTALS*
   PEAK FLOW       (cms)=         .13           .07            .163 (iii)
   TIME TO PEAK    (hrs)=         .00          1.50            1.33
   RUNOFF VOLUME    (mm)=       49.52         14.58           22.09
   TOTAL RAINFALL   (mm)=       50.52         50.52           50.52
   RUNOFF COEFFICIENT   =         .98           .29             .44

*** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN*  =  70.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-----------------
ADD HYD   (0104) |
```

```
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK     R.V.
 -------------------          (ha)     (cms)     (hrs)     (mm)
        ID1= 1 (0101):       18.00      .105      2.57      5.68
      + ID2= 2 (0102):        2.01      .163      1.33     22.09
        ===============================================
        ID = 3 (0104):       20.01      .173      1.33      7.33

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------

 -------------------
| ADD HYD   (0105) |
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK     R.V.
 -------------------          (ha)     (cms)     (hrs)     (mm)
        ID1= 1 (0103):         .20      .014      1.33     22.02
      + ID2= 2 (0104):       20.01      .173      1.33      7.33
        ===============================================
        ID = 3 (0105):       20.21      .187      1.33      7.47

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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  ****************************
  ** SIMULATION NUMBER:    7 **
  ****************************


 -------------------
|    READ STORM     |    Filename: K:\PROJECT FILES\200000 - 299999\
|                   |              210987 - 010 - Innisfil Executive Estates\
|                   |              SWM\OTTHYMO 3rd Submission\chica25.stm
| Ptotal= 71.24 mm  |    Comments: 25 YEAR - 4 hour - Chicago Storm
 -------------------
                TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN
                 hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr
                 .17    5.22  |  1.17   36.37  |  2.17   11.74  |  3.17    6.15
                 .33    5.94  |  1.33  148.15  |  2.33   10.09  |  3.33    5.74
                 .50    6.93  |  1.50   47.06  |  2.50    8.89  |  3.50    5.38
                 .67    8.42  |  1.67   25.72  |  2.67    7.96  |  3.67    5.08
                 .83   10.91  |  1.83   18.11  |  2.83    7.24  |  3.83    4.80
                1.00   16.13  |  2.00   14.17  |  3.00    6.65  |  4.00    4.57

------------------------------------------------------------------------------

 -------------------
| CALIB             |
| STANDHYD  (0103)  |   Area     (ha)=     .20
|ID= 1 DT= 2.0 min  |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
 -------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area    (ha)=        .06          .14
     Dep. Storage    (mm)=       1.00         5.00
     Average Slope    (%)=       2.00         1.63
     Length           (m)=      10.00        78.30
     Mannings n          =       .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN
                 hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr
                .033    5.22  | 1.033   36.37  | 2.033   11.74  |  3.03    6.15
                .067    5.22  | 1.067   36.37  | 2.067   11.74  |  3.07    6.15
                .100    5.22  | 1.100   36.37  | 2.100   11.74  |  3.10    6.15
                .133    5.22  | 1.133   36.37  | 2.133   11.74  |  3.13    6.15
                .167    5.22  | 1.167   36.37  | 2.167   11.74  |  3.17    6.15
                .200    5.94  | 1.200  148.15  | 2.200   10.09  |  3.20    5.74
                .233    5.94  | 1.233  148.15  | 2.233   10.09  |  3.23    5.74
                .267    5.94  | 1.267  148.15  | 2.267   10.09  |  3.27    5.74
                .300    5.94  | 1.300  148.15  | 2.300   10.09  |  3.30    5.74
                .333    5.94  | 1.333  148.15  | 2.333   10.09  |  3.33    5.74
                .367    6.93  | 1.367   47.06  | 2.367    8.89  |  3.37    5.38
                .400    6.93  | 1.400   47.06  | 2.400    8.89  |  3.40    5.38
                .433    6.93  | 1.433   47.06  | 2.433    8.89  |  3.43    5.38
                .467    6.93  | 1.467   47.06  | 2.467    8.89  |  3.47    5.38
                .500    6.93  | 1.500   47.06  | 2.500    8.89  |  3.50    5.38
                .533    8.42  | 1.533   25.72  | 2.533    7.96  |  3.53    5.08
                .567    8.42  | 1.567   25.72  | 2.567    7.96  |  3.57    5.08
                .600    8.42  | 1.600   25.72  | 2.600    7.96  |  3.60    5.08
                .633    8.42  | 1.633   25.72  | 2.633    7.96  |  3.63    5.08
                .667    8.42  | 1.667   25.72  | 2.667    7.96  |  3.67    5.08
                .700   10.91  | 1.700   18.11  | 2.700    7.24  |  3.70    4.80
                .733   10.91  | 1.733   18.11  | 2.733    7.24  |  3.73    4.80
                .767   10.91  | 1.767   18.11  | 2.767    7.24  |  3.77    4.80
                .800   10.91  | 1.800   18.11  | 2.800    7.24  |  3.80    4.80
                .833   10.91  | 1.833   18.11  | 2.833    7.24  |  3.83    4.80
                .867   16.13  | 1.867   14.17  | 2.867    6.65  |  3.87    4.57
```

```
           .900    16.13 | 1.900    14.17 | 2.900     6.65 |  3.90     4.57
           .933    16.13 | 1.933    14.17 | 2.933     6.65 |  3.93     4.57
           .967    16.13 | 1.967    14.17 | 2.967     6.65 |  3.97     4.57
          1.000    16.13 | 2.000    14.17 | 3.000     6.65 |  4.00     4.57

   Max.Eff.Inten.(mm/hr)=      148.15          43.02
             over (min)         5.00           18.00
   Storage Coeff.  (min)=        .45 (ii)      16.18 (ii)
   Unit Hyd. Tpeak (min)=       4.00           18.00
   Unit Hyd. peak  (cms)=        .56             .07
                                                           *TOTALS*
   PEAK FLOW       (cms)=        .02             .01          .021 (iii)
   TIME TO PEAK    (hrs)=        .00            1.60          1.33
   RUNOFF VOLUME    (mm)=      70.24           26.84         36.13
   TOTAL RAINFALL   (mm)=      71.24           71.24         71.24
   RUNOFF COEFFICIENT   =        .99             .38           .51

*** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0     Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
------------------
| CALIB            |
| NASHYD   (0101)  |   Area    (ha)=  18.00   Curve Number   (CN)= 44.3
| D= 1 DT=11.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
------------------     U.H. Tp(hrs)=    .95

      NOTE:  RAINFALL WAS TRANSFORMED TO  11.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN | TIME    RAIN | TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |   hrs   mm/hr
            .183    5.29 | 1.283 107.50 | 2.383    9.76 |  3.48    5.45
            .367    6.12 | 1.467  74.63 | 2.567    8.55 |  3.67    5.11
            .550    7.34 | 1.650  29.60 | 2.750    7.63 |  3.85    4.78
            .733    9.33 | 1.833  18.80 | 2.933    6.92 |  4.03    3.74
            .917   13.28 | 2.017  13.95 | 3.117    6.33 |
           1.100   27.17 | 2.200  11.44 | 3.300    5.85 |

   Unit Hyd Qpeak  (cms)=     .724

   PEAK FLOW       (cms)=     .211 (i)
   TIME TO PEAK    (hrs)=    2.567
   RUNOFF VOLUME    (mm)=   11.377
   TOTAL RAINFALL   (mm)=   71.237
   RUNOFF COEFFICIENT   =     .160

   (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
------------------
| CALIB            |
| STANDHYD  (0102) |   Area     (ha)=    2.01
| D= 1 DT= 2.0 min |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
------------------
                          IMPERVIOUS    PERVIOUS (i)
   Surface Area     (ha)=       .57          1.44
   Dep. Storage     (mm)=      1.00          5.00
   Average Slope     (%)=      2.00           .55
   Length            (m)=     10.00         18.00
   Mannings n          =       .013          .250

      NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN | TIME    RAIN | TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |   hrs   mm/hr
            .033    5.22 | 1.033  36.37 | 2.033   11.74 |  3.03    6.15
            .067    5.22 | 1.067  36.37 | 2.067   11.74 |  3.07    6.15
            .100    5.22 | 1.100  36.37 | 2.100   11.74 |  3.10    6.15
            .133    5.22 | 1.133  36.37 | 2.133   11.74 |  3.13    6.15
            .167    5.22 | 1.167  36.37 | 2.167   11.74 |  3.17    6.15
            .200    5.94 | 1.200 148.15 | 2.200   10.09 |  3.20    5.74
            .233    5.94 | 1.233 148.15 | 2.233   10.09 |  3.23    5.74
            .267    5.94 | 1.267 148.15 | 2.267   10.09 |  3.27    5.74
            .300    5.94 | 1.300 148.15 | 2.300   10.09 |  3.30    5.74
            .333    5.94 | 1.333 148.15 | 2.333   10.09 |  3.33    5.74
            .367    6.93 | 1.367  47.06 | 2.367    8.89 |  3.37    5.38
            .400    6.93 | 1.400  47.06 | 2.400    8.89 |  3.40    5.38
            .433    6.93 | 1.433  47.06 | 2.433    8.89 |  3.43    5.38
            .467    6.93 | 1.467  47.06 | 2.467    8.89 |  3.47    5.38
            .500    6.93 | 1.500  47.06 | 2.500    8.89 |  3.50    5.38
```

```
              .533    8.42 | 1.533   25.72 | 2.533    7.96 |  3.53    5.08
              .567    8.42 | 1.567   25.72 | 2.567    7.96 |  3.57    5.08
              .600    8.42 | 1.600   25.72 | 2.600    7.96 |  3.60    5.08
              .633    8.42 | 1.633   25.72 | 2.633    7.96 |  3.63    5.08
              .667    8.42 | 1.667   25.72 | 2.667    7.96 |  3.67    5.08
              .700   10.91 | 1.700   18.11 | 2.700    7.24 |  3.70    4.80
              .733   10.91 | 1.733   18.11 | 2.733    7.24 |  3.73    4.80
              .767   10.91 | 1.767   18.11 | 2.767    7.24 |  3.77    4.80
              .800   10.91 | 1.800   18.11 | 2.800    7.24 |  3.80    4.80
              .833   10.91 | 1.833   18.11 | 2.833    7.24 |  3.83    4.80
              .867   16.13 | 1.867   14.17 | 2.867    6.65 |  3.87    4.57
              .900   16.13 | 1.900   14.17 | 2.900    6.65 |  3.90    4.57
              .933   16.13 | 1.933   14.17 | 2.933    6.65 |  3.93    4.57
              .967   16.13 | 1.967   14.17 | 2.967    6.65 |  3.97    4.57
             1.000   16.13 | 2.000   14.17 | 3.000    6.65 |  4.00    4.57

    Max.Eff.Inten.(mm/hr)=      148.15         54.12
             over (min)          5.00         10.00
    Storage Coeff.  (min)=        .45 (ii)     8.68 (ii)
    Unit Hyd. Tpeak (min)=       4.00         10.00
    Unit Hyd. peak  (cms)=        .56           .12
                                                          *TOTALS*
    PEAK FLOW       (cms)=        .18           .14          .271 (iii)
    TIME TO PEAK    (hrs)=        .00          1.47         1.33
    RUNOFF VOLUME    (mm)=      70.24         26.84        36.17
    TOTAL RAINFALL   (mm)=      71.24         71.24        71.24
    RUNOFF COEFFICIENT   =        .99           .38          .51

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD   (0104) |
|   1 + 2 = 3      |          AREA     QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
        ID1= 1 (0101):       18.00     .211     2.57     11.38
      + ID2= 2 (0102):        2.01     .271     1.33     36.17
        ==================================================
        ID = 3 (0104):       20.01     .293     1.33     13.87

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD   (0105) |
|   1 + 2 = 3      |          AREA     QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
        ID1= 1 (0103):         .20     .021     1.33     36.13
      + ID2= 2 (0104):       20.01     .293     1.33     13.87
        ==================================================
        ID = 3 (0105):       20.21     .314     1.33     14.09

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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  ****************************
  ** SIMULATION NUMBER:   8 **
  ****************************


--------------------
|    READ STORM    |    Filename: K:\PROJECT FILES\200000 - 299999\
|                  |              210987 - 010 - Innisfil Executive Estates\
|                  |              SWM\OTTHYMO 3rd Submission\chica100.stm
| Ptotal= 87.58 mm |    Comments: 100 YEAR - 4 hour - Chicago Storm
--------------------
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .17    6.41 |  1.17   45.22 |  2.17   14.50 |  3.17    7.56
                  .33    7.29 |  1.33  180.15 |  2.33   12.44 |  3.33    7.04
                  .50    8.52 |  1.50   58.54 |  2.50   10.94 |  3.50    6.60
                  .67   10.36 |  1.67   31.96 |  2.67    9.80 |  3.67    6.22
                  .83   13.45 |  1.83   22.45 |  2.83    8.90 |  3.83    5.89
                 1.00   19.96 |  2.00   17.52 |  3.00    8.16 |  4.00    5.59

-------------------------------------------------------------------------------

--------------------
| CALIB            |
| STANDHYD  (0103) |   Area     (ha)=     .20
|ID= 1 DT= 2.0 min |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
```

```
-------------------
                          IMPERVIOUS    PERVIOUS (i)
   Surface Area     (ha)=       .06          .14
   Dep. Storage     (mm)=      1.00         5.00
   Average Slope     (%)=      2.00         1.63
   Length            (m)=     10.00        78.30
   Mannings n           =      .013         .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME   RAIN
                 hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs  mm/hr
                .033    6.41 | 1.033  45.22 | 2.033  14.50 | 3.03   7.56
                .067    6.41 | 1.067  45.22 | 2.067  14.50 | 3.07   7.56
                .100    6.41 | 1.100  45.22 | 2.100  14.50 | 3.10   7.56
                .133    6.41 | 1.133  45.22 | 2.133  14.50 | 3.13   7.56
                .167    6.41 | 1.167  45.22 | 2.167  14.50 | 3.17   7.56
                .200    7.29 | 1.200 180.15 | 2.200  12.44 | 3.20   7.04
                .233    7.29 | 1.233 180.15 | 2.233  12.44 | 3.23   7.04
                .267    7.29 | 1.267 180.15 | 2.267  12.44 | 3.27   7.04
                .300    7.29 | 1.300 180.15 | 2.300  12.44 | 3.30   7.04
                .333    7.29 | 1.333 180.15 | 2.333  12.44 | 3.33   7.04
                .367    8.52 | 1.367  58.54 | 2.367  10.94 | 3.37   6.60
                .400    8.52 | 1.400  58.54 | 2.400  10.94 | 3.40   6.60
                .433    8.52 | 1.433  58.54 | 2.433  10.94 | 3.43   6.60
                .467    8.52 | 1.467  58.54 | 2.467  10.94 | 3.47   6.60
                .500    8.52 | 1.500  58.54 | 2.500  10.94 | 3.50   6.60
                .533   10.36 | 1.533  31.96 | 2.533   9.80 | 3.53   6.22
                .567   10.36 | 1.567  31.96 | 2.567   9.80 | 3.57   6.22
                .600   10.36 | 1.600  31.96 | 2.600   9.80 | 3.60   6.22
                .633   10.36 | 1.633  31.96 | 2.633   9.80 | 3.63   6.22
                .667   10.36 | 1.667  31.96 | 2.667   9.80 | 3.67   6.22
                .700   13.45 | 1.700  22.45 | 2.700   8.90 | 3.70   5.89
                .733   13.45 | 1.733  22.45 | 2.733   8.90 | 3.73   5.89
                .767   13.45 | 1.767  22.45 | 2.767   8.90 | 3.77   5.89
                .800   13.45 | 1.800  22.45 | 2.800   8.90 | 3.80   5.89
                .833   13.45 | 1.833  22.45 | 2.833   8.90 | 3.83   5.89
                .867   19.96 | 1.867  17.52 | 2.867   8.16 | 3.87   5.59
                .900   19.96 | 1.900  17.52 | 2.900   8.16 | 3.90   5.59
                .933   19.96 | 1.933  17.52 | 2.933   8.16 | 3.93   5.59
                .967   19.96 | 1.967  17.52 | 2.967   8.16 | 3.97   5.59
               1.000   19.96 | 2.000  17.52 | 3.000   8.16 | 4.00   5.59

   Max.Eff.Inten.(mm/hr)=    180.15        65.47
              over (min)      5.00        14.00
   Storage Coeff.  (min)=       .41 (ii)   13.71 (ii)
   Unit Hyd. Tpeak (min)=      4.00        14.00
   Unit Hyd. peak  (cms)=       .56          .08
                                                        *TOTALS*
   PEAK FLOW       (cms)=       .02          .02          .029 (iii)
   TIME TO PEAK    (hrs)=       .00         1.53          1.33
   RUNOFF VOLUME    (mm)=     86.58        37.87         48.30
   TOTAL RAINFALL   (mm)=     87.58        87.58         87.58
   RUNOFF COEFFICIENT   =       .99          .43           .55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
' CALIB              |
  NASHYD     (0101)  |  Area     (ha)=  18.00   Curve Number    (CN)= 44.3
  D= 1 DT=11.0 min   |  Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------     U.H. Tp(hrs)=     .95

       NOTE:  RAINFALL WAS TRANSFORMED TO  11.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME   RAIN
                 hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs  mm/hr
                .183    6.49 | 1.283 131.08 | 2.383  12.03 | 3.48   6.68
                .367    7.51 | 1.467  91.71 | 2.567  10.53 | 3.67   6.25
                .550    9.02 | 1.650  36.79 | 2.750   9.39 | 3.85   5.86
                .733   11.48 | 1.833  23.31 | 2.933   8.50 | 4.03   4.57
                .917   16.41 | 2.017  17.25 | 3.117   7.78 |
               1.100   33.74 | 2.200  14.13 | 3.300   7.18 |

   Unit Hyd Qpeak  (cms)=    .724

   PEAK FLOW       (cms)=    .317 (i)
   TIME TO PEAK    (hrs)=   2.567
```

```
    RUNOFF VOLUME    (mm)=  16.964
    TOTAL RAINFALL   (mm)=  87.578
    RUNOFF COEFFICIENT   =    .194

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD  (0102)   |   Area     (ha)=    2.01
|ID= 1 DT= 2.0 min   |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .57          1.44
     Dep. Storage      (mm)=       1.00          5.00
     Average Slope      (%)=       2.00           .55
     Length             (m)=      10.00         18.00
     Mannings n           =        .013          .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                  hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                 .033     6.41 | 1.033    45.22 | 2.033    14.50 |  3.03     7.56
                 .067     6.41 | 1.067    45.22 | 2.067    14.50 |  3.07     7.56
                 .100     6.41 | 1.100    45.22 | 2.100    14.50 |  3.10     7.56
                 .133     6.41 | 1.133    45.22 | 2.133    14.50 |  3.13     7.56
                 .167     6.41 | 1.167    45.22 | 2.167    14.50 |  3.17     7.56
                 .200     7.29 | 1.200   180.15 | 2.200    12.44 |  3.20     7.04
                 .233     7.29 | 1.233   180.15 | 2.233    12.44 |  3.23     7.04
                 .267     7.29 | 1.267   180.15 | 2.267    12.44 |  3.27     7.04
                 .300     7.29 | 1.300   180.15 | 2.300    12.44 |  3.30     7.04
                 .333     7.29 | 1.333   180.15 | 2.333    12.44 |  3.33     7.04
                 .367     8.52 | 1.367    58.54 | 2.367    10.94 |  3.37     6.60
                 .400     8.52 | 1.400    58.54 | 2.400    10.94 |  3.40     6.60
                 .433     8.52 | 1.433    58.54 | 2.433    10.94 |  3.43     6.60
                 .467     8.52 | 1.467    58.54 | 2.467    10.94 |  3.47     6.60
                 .500     8.52 | 1.500    58.54 | 2.500    10.94 |  3.50     6.60
                 .533    10.36 | 1.533    31.96 | 2.533     9.80 |  3.53     6.22
                 .567    10.36 | 1.567    31.96 | 2.567     9.80 |  3.57     6.22
                 .600    10.36 | 1.600    31.96 | 2.600     9.80 |  3.60     6.22
                 .633    10.36 | 1.633    31.96 | 2.633     9.80 |  3.63     6.22
                 .667    10.36 | 1.667    31.96 | 2.667     9.80 |  3.67     6.22
                 .700    13.45 | 1.700    22.45 | 2.700     8.90 |  3.70     5.89
                 .733    13.45 | 1.733    22.45 | 2.733     8.90 |  3.73     5.89
                 .767    13.45 | 1.767    22.45 | 2.767     8.90 |  3.77     5.89
                 .800    13.45 | 1.800    22.45 | 2.800     8.90 |  3.80     5.89
                 .833    13.45 | 1.833    22.45 | 2.833     8.90 |  3.83     5.89
                 .867    19.96 | 1.867    17.52 | 2.867     8.16 |  3.87     5.59
                 .900    19.96 | 1.900    17.52 | 2.900     8.16 |  3.90     5.59
                 .933    19.96 | 1.933    17.52 | 2.933     8.16 |  3.93     5.59
                 .967    19.96 | 1.967    17.52 | 2.967     8.16 |  3.97     5.59
                1.000    19.96 | 2.000    17.52 | 3.000     8.16 |  4.00     5.59

     Max.Eff.Inten.(mm/hr)=      180.15          77.92
                over (min)        5.00           8.00
     Storage Coeff.  (min)=        .41 (ii)      7.53 (ii)
     Unit Hyd. Tpeak (min)=       4.00           8.00
     Unit Hyd. peak  (cms)=        .56            .15
                                                               *TOTALS*
     PEAK FLOW       (cms)=        .22            .22            .393 (iii)
     TIME TO PEAK    (hrs)=        .00           1.40            1.33
     RUNOFF VOLUME    (mm)=      86.58          37.87           48.34
     TOTAL RAINFALL   (mm)=      87.58          87.58           87.58
     RUNOFF COEFFICIENT   =        .99            .43             .55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
 ADD HYD    (0104) |
   1 +  2 =  3     |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
          ID1= 1 (0101):     18.00     .317      2.57     16.96
        + ID2= 2 (0102):      2.01     .393      1.33     48.34
          ==============================================
          ID = 3 (0104):     20.01     .428      1.33     20.12

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
--------------------------------------------------------------------------------
 -----------------
 ADD HYD   (0105) |
  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
 -----------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0103):        .20     .029     1.33    48.30
      + ID2= 2 (0104):      20.01     .428     1.33    20.12
        ==================================================
        ID = 3 (0105):      20.21     .457     1.33    20.39

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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INISH
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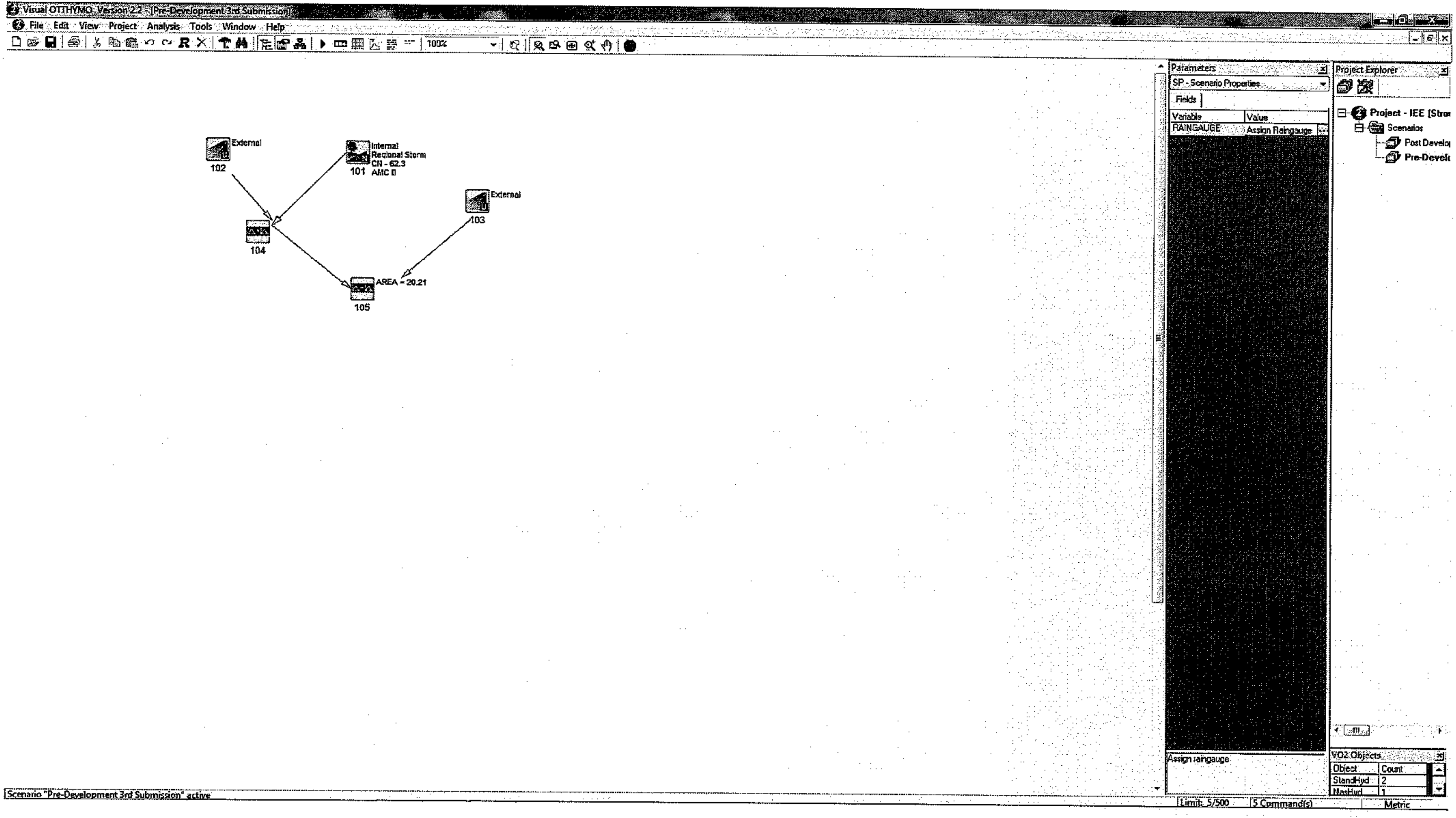
Pre Development OTTHYMO Model Schematic
Adjusted for AMC III (wet) Condition
Regional Storm Event



Variable	Value
RAINGAUGE	Assign Raingauge

Assign raingauge

Object	Count
StandHyd	2
NasHyd	1

Scenario "Pre-Development 3rd Submission" active

PRE-DEVELOPMENT
DETAILED OUTPUT
REGIONAL (HAZEL) STORM EVENT

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

    V     V   I    SSSSS  U    U     A      L
    V     V   I    SS     U    U    A A     L
     V   V    I     SS    U    U   AAAAA    L
     V   V    I      SS   U    U   A    A   L
      VV      I    SSSSS  UUUUU   A     A   LLLLL

     OOO    TTTTT   TTTTT  H    H  Y    Y  M    M   OOO      TM
    O   O     T       T    H    H   Y Y    MM  MM  O   O
    O   O     T       T    H    H    Y     M    M  O   O
     OOO      T       T    H    H    Y     M    M   OOO

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                  *****  D E T A I L E D   O U T P U T *****


 Input   filename: C:\Program Files (x86)\Visual OTTHYMO 2.2.4\voin.dat
 Output  filename: K:\PROJEC~1\200000~1\210987~4\SWM\4THSUB~1\IEE(ST~1\Pre-Development 4th Submission - AMC III.out
 Summary filename: K:\PROJEC~1\200000~1\210987~4\SWM\4THSUB~1\IEE(ST~1\Pre-Development 4th Submission - AMC III.sum


 TE: 2/8/2014                            TIME: 2:15:14 PM

SER:


OMMENTS: ____________________________________________________________


 -------------------------------------------------------------------------------------------------
 ****************************
 ** SIMULATION NUMBER:  10 **
 ****************************


 ------------------
    READ STORM    |     Filename: K:\PROJECT FILES\200000 - 299999\
                  |               210987 - 010 - Innisfil Executive Estates\
                  |               SWM\OTTHYMO 3rd Submission\HAZEL.STM
 Ptotal=212.00 mm |     Comments: * REGIONAL DESIGN STORM
 ------------------
               TIME     RAIN  |   TIME     RAIN  |   TIME     RAIN  |   TIME     RAIN
                hrs    mm/hr  |    hrs    mm/hr  |    hrs    mm/hr  |    hrs    mm/hr
                .20     6.00  |   3.20    13.00  |   6.20    23.00  |   9.20    53.00
                .40     6.00  |   3.40    13.00  |   6.40    23.00  |   9.40    53.00
                .60     6.00  |   3.60    13.00  |   6.60    23.00  |   9.60    53.00
                .80     6.00  |   3.80    13.00  |   6.80    23.00  |   9.80    53.00
               1.00     6.00  |   4.00    13.00  |   7.00    23.00  |  10.00    53.00
               1.20     4.00  |   4.20    17.00  |   7.20    13.00  |  10.20    38.00
               1.40     4.00  |   4.40    17.00  |   7.40    13.00  |  10.40    38.00
               1.60     4.00  |   4.60    17.00  |   7.60    13.00  |  10.60    38.00
               1.80     4.00  |   4.80    17.00  |   7.80    13.00  |  10.80    38.00
               2.00     4.00  |   5.00    17.00  |   8.00    13.00  |  11.00    38.00
               2.20     6.00  |   5.20    13.00  |   8.20    13.00  |  11.20    13.00
               2.40     6.00  |   5.40    13.00  |   8.40    13.00  |  11.40    13.00
               2.60     6.00  |   5.60    13.00  |   8.60    13.00  |  11.60    13.00
               2.80     6.00  |   5.80    13.00  |   8.80    13.00  |  11.80    13.00
               3.00     6.00  |   6.00    13.00  |   9.00    13.00  |  12.00    13.00

 -------------------------------------------------------------------------


 ------------------
 ALIB             |
 STANDHYD  (0103) |    Area     (ha)=     .20
ID= 1 DT= 2.0 min |    Total Imp(%)=   28.60    Dir. Conn.(%)=   21.50
 ------------------
                          IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=     .06          .14
    Dep. Storage      (mm)=    1.00         5.00
    Average Slope      (%)=    2.00         1.63
    Length             (m)=   10.00        78.30
    Mannings n            =    .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
               TIME     RAIN  |   TIME     RAIN  |   TIME     RAIN  |   TIME     RAIN
                hrs    mm/hr  |    hrs    mm/hr  |    hrs    mm/hr  |    hrs    mm/hr
               .033     6.00  |  3.033    13.00  |  6.033    23.00  |   9.03    53.00
               .067     6.00  |  3.067    13.00  |  6.067    23.00  |   9.07    53.00
               .100     6.00  |  3.100    13.00  |  6.100    23.00  |   9.10    53.00
               .133     6.00  |  3.133    13.00  |  6.133    23.00  |   9.13    53.00
```

```
   .167   6.00 | 3.167  13.00 | 6.167  23.00 |  9.17  53.00
   .200   6.00 | 3.200  13.00 | 6.200  23.00 |  9.20  53.00
   .233   6.00 | 3.233  13.00 | 6.233  23.00 |  9.23  53.00
   .267   6.00 | 3.267  13.00 | 6.267  23.00 |  9.27  53.00
   .300   6.00 | 3.300  13.00 | 6.300  23.00 |  9.30  53.00
   .333   6.00 | 3.333  13.00 | 6.333  23.00 |  9.33  53.00
   .367   6.00 | 3.367  13.00 | 6.367  23.00 |  9.37  53.00
   .400   6.00 | 3.400  13.00 | 6.400  23.00 |  9.40  53.00
   .433   6.00 | 3.433  13.00 | 6.433  23.00 |  9.43  53.00
   .467   6.00 | 3.467  13.00 | 6.467  23.00 |  9.47  53.00
   .500   6.00 | 3.500  13.00 | 6.500  23.00 |  9.50  53.00
   .533   6.00 | 3.533  13.00 | 6.533  23.00 |  9.53  53.00
   .567   6.00 | 3.567  13.00 | 6.567  23.00 |  9.57  53.00
   .600   6.00 | 3.600  13.00 | 6.600  23.00 |  9.60  53.00
   .633   6.00 | 3.633  13.00 | 6.633  23.00 |  9.63  53.00
   .667   6.00 | 3.667  13.00 | 6.667  23.00 |  9.67  53.00
   .700   6.00 | 3.700  13.00 | 6.700  23.00 |  9.70  53.00
   .733   6.00 | 3.733  13.00 | 6.733  23.00 |  9.73  53.00
   .767   6.00 | 3.767  13.00 | 6.767  23.00 |  9.77  53.00
   .800   6.00 | 3.800  13.00 | 6.800  23.00 |  9.80  53.00
   .833   6.00 | 3.833  13.00 | 6.833  23.00 |  9.83  53.00
   .867   6.00 | 3.867  13.00 | 6.867  23.00 |  9.87  53.00
   .900   6.00 | 3.900  13.00 | 6.900  23.00 |  9.90  53.00
   .933   6.00 | 3.933  13.00 | 6.933  23.00 |  9.93  53.00
   .967   6.00 | 3.967  13.00 | 6.967  23.00 |  9.97  53.00
  1.000   6.00 | 4.000  13.00 | 7.000  23.00 | 10.00  52.99
  1.033   4.00 | 4.033  17.00 | 7.033  13.00 | 10.03  38.00
  1.067   4.00 | 4.067  17.00 | 7.067  13.00 | 10.07  38.00
  1.100   4.00 | 4.100  17.00 | 7.100  13.00 | 10.10  38.00
  1.133   4.00 | 4.133  17.00 | 7.133  13.00 | 10.13  38.00
  1.167   4.00 | 4.167  17.00 | 7.167  13.00 | 10.17  38.00
  1.200   4.00 | 4.200  17.00 | 7.200  13.00 | 10.20  38.00
  1.233   4.00 | 4.233  17.00 | 7.233  13.00 | 10.23  38.00
  1.267   4.00 | 4.267  17.00 | 7.267  13.00 | 10.27  38.00
  1.300   4.00 | 4.300  17.00 | 7.300  13.00 | 10.30  38.00
  1.333   4.00 | 4.333  17.00 | 7.333  13.00 | 10.33  38.00
  1.367   4.00 | 4.367  17.00 | 7.367  13.00 | 10.37  38.00
  1.400   4.00 | 4.400  17.00 | 7.400  13.00 | 10.40  38.00
  1.433   4.00 | 4.433  17.00 | 7.433  13.00 | 10.43  38.00
  1.467   4.00 | 4.467  17.00 | 7.467  13.00 | 10.47  38.00
  1.500   4.00 | 4.500  17.00 | 7.500  13.00 | 10.50  38.00
  1.533   4.00 | 4.533  17.00 | 7.533  13.00 | 10.53  38.00
  1.567   4.00 | 4.567  17.00 | 7.567  13.00 | 10.57  38.00
  1.600   4.00 | 4.600  17.00 | 7.600  13.00 | 10.60  38.00
  1.633   4.00 | 4.633  17.00 | 7.633  13.00 | 10.63  38.00
  1.667   4.00 | 4.667  17.00 | 7.667  13.00 | 10.67  38.00
  1.700   4.00 | 4.700  17.00 | 7.700  13.00 | 10.70  38.00
  1.733   4.00 | 4.733  17.00 | 7.733  13.00 | 10.73  38.00
  1.767   4.00 | 4.767  17.00 | 7.767  13.00 | 10.77  38.00
  1.800   4.00 | 4.800  17.00 | 7.800  13.00 | 10.80  38.00
  1.833   4.00 | 4.833  17.00 | 7.833  13.00 | 10.83  38.00
  1.867   4.00 | 4.867  17.00 | 7.867  13.00 | 10.87  38.00
  1.900   4.00 | 4.900  17.00 | 7.900  13.00 | 10.90  38.00
  1.933   4.00 | 4.933  17.00 | 7.933  13.00 | 10.93  38.00
  1.967   4.00 | 4.967  17.00 | 7.967  13.00 | 10.97  38.00
  2.000   4.00 | 5.000  17.00 | 8.000  13.00 | 11.00  37.98
  2.033   6.00 | 5.033  13.00 | 8.033  13.00 | 11.03  13.00
  2.067   6.00 | 5.067  13.00 | 8.067  13.00 | 11.07  13.00
  2.100   6.00 | 5.100  13.00 | 8.100  13.00 | 11.10  13.00
  2.133   6.00 | 5.133  13.00 | 8.133  13.00 | 11.13  13.00
  2.167   6.00 | 5.167  13.00 | 8.167  13.00 | 11.17  13.00
  2.200   6.00 | 5.200  13.00 | 8.200  13.00 | 11.20  13.00
  2.233   6.00 | 5.233  13.00 | 8.233  13.00 | 11.23  13.00
  2.267   6.00 | 5.267  13.00 | 8.267  13.00 | 11.27  13.00
  2.300   6.00 | 5.300  13.00 | 8.300  13.00 | 11.30  13.00
  2.333   6.00 | 5.333  13.00 | 8.333  13.00 | 11.33  13.00
  2.367   6.00 | 5.367  13.00 | 8.367  13.00 | 11.37  13.00
  2.400   6.00 | 5.400  13.00 | 8.400  13.00 | 11.40  13.00
  2.433   6.00 | 5.433  13.00 | 8.433  13.00 | 11.43  13.00
  2.467   6.00 | 5.467  13.00 | 8.467  13.00 | 11.47  13.00
  2.500   6.00 | 5.500  13.00 | 8.500  13.00 | 11.50  13.00
  2.533   6.00 | 5.533  13.00 | 8.533  13.00 | 11.53  13.00
  2.567   6.00 | 5.567  13.00 | 8.567  13.00 | 11.57  13.00
  2.600   6.00 | 5.600  13.00 | 8.600  13.00 | 11.60  13.00
  2.633   6.00 | 5.633  13.00 | 8.633  13.00 | 11.63  13.00
  2.667   6.00 | 5.667  13.00 | 8.667  13.00 | 11.67  13.00
  2.700   6.00 | 5.700  13.00 | 8.700  13.00 | 11.70  13.00
  2.733   6.00 | 5.733  13.00 | 8.733  13.00 | 11.73  13.00
  2.767   6.00 | 5.767  13.00 | 8.767  13.00 | 11.77  13.00
  2.800   6.00 | 5.800  13.00 | 8.800  13.00 | 11.80  13.00
  2.833   6.00 | 5.833  13.00 | 8.833  13.00 | 11.83  13.00
  2.867   6.00 | 5.867  13.00 | 8.867  13.00 | 11.87  13.00
  2.900   6.00 | 5.900  13.00 | 8.900  13.00 | 11.90  13.00
  2.933   6.00 | 5.933  13.00 | 8.933  13.00 | 11.93  13.00
  2.967   6.00 | 5.967  13.00 | 8.967  13.00 | 11.97  13.00
  3.000   6.00 | 6.000  13.00 | 9.000  13.01 | 12.00  12.98

Max.Eff.Inten.(mm/hr)=      53.00         49.00
            over (min)       5.00         16.00
```

```
   Storage Coeff.  (min)=        .67 (ii)   15.61 (ii)
   Unit Hyd. Tpeak (min)=       4.00        16.00
   Unit Hyd. peak  (cms)=        .55          .07
                                                         *TOTALS*
   PEAK FLOW       (cms)=        .01          .02           .025 (iii)
   TIME TO PEAK    (hrs)=        .00        10.03          10.00
   RUNOFF VOLUME    (mm)=     211.00       140.43         155.56
   TOTAL RAINFALL   (mm)=     212.00       212.00         212.00
   RUNOFF COEFFICIENT   =       1.00          .66            .73

 *** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-------------------
 CALIB             |
 NASHYD    (0101)  |   Area     (ha)=  18.00   Curve Number   (CN)= 62.3
 ID= 1 DT=11.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------    U.H. Tp(hrs)=     .95

       NOTE:  RAINFALL WAS TRANSFORMED TO  11.0 MIN. TIME STEP.


                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .183    6.00 | 3.300   13.00 | 6.417   23.00 |  9.53   53.00
                .367    6.00 | 3.483   13.00 | 6.600   23.00 |  9.72   53.00
                .550    6.00 | 3.667   13.00 | 6.783   23.00 |  9.90   53.00
                .733    6.00 | 3.850   13.00 | 6.967   23.00 | 10.08   46.18
                .917    6.00 | 4.033   13.73 | 7.150   14.82 | 10.27   38.00
               1.100    4.91 | 4.217   17.00 | 7.333   13.00 | 10.45   38.00
               1.283    4.00 | 4.400   17.00 | 7.517   13.00 | 10.63   38.00
               1.467    4.00 | 4.583   17.00 | 7.700   13.00 | 10.82   38.00
               1.650    4.00 | 4.767   17.00 | 7.883   13.00 | 11.00   38.00
               1.833    4.00 | 4.950   17.00 | 8.067   13.00 | 11.18   13.00
               2.017    4.18 | 5.133   14.09 | 8.250   13.00 | 11.37   13.00
               2.200    6.00 | 5.317   13.00 | 8.433   13.00 | 11.55   13.00
               2.383    6.00 | 5.500   13.00 | 8.617   13.00 | 11.73   13.00
               2.567    6.00 | 5.683   13.00 | 8.800   13.00 | 11.92   13.00
               2.750    6.00 | 5.867   13.00 | 8.983   13.00 | 12.10    5.91
               2.933    6.00 | 6.050   15.73 | 9.167   49.36 |
               3.117   10.45 | 6.233   23.00 | 9.350   53.00 |

   Unit Hyd Qpeak  (cms)=     .724

   PEAK FLOW       (cms)=    1.450 (i)
   TIME TO PEAK    (hrs)=   11.183
   RUNOFF VOLUME    (mm)=  118.781
   TOTAL RAINFALL   (mm)=  212.000
   RUNOFF COEFFICIENT   =     .560

   (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

  -----------------------------------------------------------------------------
-------------------
| CALIB             |
  STANDHYD  (0102)  |   Area     (ha)=    2.01
  D= 1 DT= 2.0 min  |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
  -----------------
                             IMPERVIOUS     PERVIOUS (i)
   Surface Area      (ha)=        .57          1.44
   Dep. Storage      (mm)=       1.00          5.00
   Average Slope      (%)=       2.00           .55
   Length             (m)=      10.00         18.00
   Mannings n            =       .013          .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .033    6.00 | 3.033   13.00 | 6.033   23.00 |  9.03   53.00
                .067    6.00 | 3.067   13.00 | 6.067   23.00 |  9.07   53.00
                .100    6.00 | 3.100   13.00 | 6.100   23.00 |  9.10   53.00
                .133    6.00 | 3.133   13.00 | 6.133   23.00 |  9.13   53.00
                .167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
                .200    6.00 | 3.200   13.00 | 6.200   23.00 |  9.20   53.00
                .233    6.00 | 3.233   13.00 | 6.233   23.00 |  9.23   53.00
                .267    6.00 | 3.267   13.00 | 6.267   23.00 |  9.27   53.00
                .300    6.00 | 3.300   13.00 | 6.300   23.00 |  9.30   53.00
                .333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
                .367    6.00 | 3.367   13.00 | 6.367   23.00 |  9.37   53.00
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          .400    6.00 | 3.400   13.00 | 6.400   23.00 |  9.40    53.00
          .433    6.00 | 3.433   13.00 | 6.433   23.00 |  9.43    53.00
          .467    6.00 | 3.467   13.00 | 6.467   23.00 |  9.47    53.00
          .500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50    53.00
          .533    6.00 | 3.533   13.00 | 6.533   23.00 |  9.53    53.00
          .567    6.00 | 3.567   13.00 | 6.567   23.00 |  9.57    53.00
          .600    6.00 | 3.600   13.00 | 6.600   23.00 |  9.60    53.00
          .633    6.00 | 3.633   13.00 | 6.633   23.00 |  9.63    53.00
          .667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67    53.00
          .700    6.00 | 3.700   13.00 | 6.700   23.00 |  9.70    53.00
          .733    6.00 | 3.733   13.00 | 6.733   23.00 |  9.73    53.00
          .767    6.00 | 3.767   13.00 | 6.767   23.00 |  9.77    53.00
          .800    6.00 | 3.800   13.00 | 6.800   23.00 |  9.80    53.00
          .833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83    53.00
          .867    6.00 | 3.867   13.00 | 6.867   23.00 |  9.87    53.00
          .900    6.00 | 3.900   13.00 | 6.900   23.00 |  9.90    53.00
          .933    6.00 | 3.933   13.00 | 6.933   23.00 |  9.93    53.00
          .967    6.00 | 3.967   13.00 | 6.967   23.00 |  9.97    53.00
         1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00    52.99
         1.033    4.00 | 4.033   17.00 | 7.033   13.00 | 10.03    38.00
         1.067    4.00 | 4.067   17.00 | 7.067   13.00 | 10.07    38.00
         1.100    4.00 | 4.100   17.00 | 7.100   13.00 | 10.10    38.00
         1.133    4.00 | 4.133   17.00 | 7.133   13.00 | 10.13    38.00
         1.167    4.00 | 4.167   17.00 | 7.167   13.00 | 10.17    38.00
         1.200    4.00 | 4.200   17.00 | 7.200   13.00 | 10.20    38.00
         1.233    4.00 | 4.233   17.00 | 7.233   13.00 | 10.23    38.00
         1.267    4.00 | 4.267   17.00 | 7.267   13.00 | 10.27    38.00
         1.300    4.00 | 4.300   17.00 | 7.300   13.00 | 10.30    38.00
         1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33    38.00
         1.367    4.00 | 4.367   17.00 | 7.367   13.00 | 10.37    38.00
         1.400    4.00 | 4.400   17.00 | 7.400   13.00 | 10.40    38.00
         1.433    4.00 | 4.433   17.00 | 7.433   13.00 | 10.43    38.00
         1.467    4.00 | 4.467   17.00 | 7.467   13.00 | 10.47    38.00
         1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50    38.00
         1.533    4.00 | 4.533   17.00 | 7.533   13.00 | 10.53    38.00
         1.567    4.00 | 4.567   17.00 | 7.567   13.00 | 10.57    38.00
         1.600    4.00 | 4.600   17.00 | 7.600   13.00 | 10.60    38.00
         1.633    4.00 | 4.633   17.00 | 7.633   13.00 | 10.63    38.00
         1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67    38.00
         1.700    4.00 | 4.700   17.00 | 7.700   13.00 | 10.70    38.00
         1.733    4.00 | 4.733   17.00 | 7.733   13.00 | 10.73    38.00
         1.767    4.00 | 4.767   17.00 | 7.767   13.00 | 10.77    38.00
         1.800    4.00 | 4.800   17.00 | 7.800   13.00 | 10.80    38.00
         1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83    38.00
         1.867    4.00 | 4.867   17.00 | 7.867   13.00 | 10.87    38.00
         1.900    4.00 | 4.900   17.00 | 7.900   13.00 | 10.90    38.00
         1.933    4.00 | 4.933   17.00 | 7.933   13.00 | 10.93    38.00
         1.967    4.00 | 4.967   17.00 | 7.967   13.00 | 10.97    38.00
         2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00    37.98
         2.033    6.00 | 5.033   13.00 | 8.033   13.00 | 11.03    13.00
         2.067    6.00 | 5.067   13.00 | 8.067   13.00 | 11.07    13.00
         2.100    6.00 | 5.100   13.00 | 8.100   13.00 | 11.10    13.00
         2.133    6.00 | 5.133   13.00 | 8.133   13.00 | 11.13    13.00
         2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17    13.00
         2.200    6.00 | 5.200   13.00 | 8.200   13.00 | 11.20    13.00
         2.233    6.00 | 5.233   13.00 | 8.233   13.00 | 11.23    13.00
         2.267    6.00 | 5.267   13.00 | 8.267   13.00 | 11.27    13.00
         2.300    6.00 | 5.300   13.00 | 8.300   13.00 | 11.30    13.00
         2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33    13.00
         2.367    6.00 | 5.367   13.00 | 8.367   13.00 | 11.37    13.00
         2.400    6.00 | 5.400   13.00 | 8.400   13.00 | 11.40    13.00
         2.433    6.00 | 5.433   13.00 | 8.433   13.00 | 11.43    13.00
         2.467    6.00 | 5.467   13.00 | 8.467   13.00 | 11.47    13.00
         2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50    13.00
         2.533    6.00 | 5.533   13.00 | 8.533   13.00 | 11.53    13.00
         2.567    6.00 | 5.567   13.00 | 8.567   13.00 | 11.57    13.00
         2.600    6.00 | 5.600   13.00 | 8.600   13.00 | 11.60    13.00
         2.633    6.00 | 5.633   13.00 | 8.633   13.00 | 11.63    13.00
         2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67    13.00
         2.700    6.00 | 5.700   13.00 | 8.700   13.00 | 11.70    13.00
         2.733    6.00 | 5.733   13.00 | 8.733   13.00 | 11.73    13.00
         2.767    6.00 | 5.767   13.00 | 8.767   13.00 | 11.77    13.00
         2.800    6.00 | 5.800   13.00 | 8.800   13.00 | 11.80    13.00
         2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83    13.00
         2.867    6.00 | 5.867   13.00 | 8.867   13.00 | 11.87    13.00
         2.900    6.00 | 5.900   13.00 | 8.900   13.00 | 11.90    13.00
         2.933    6.00 | 5.933   13.00 | 8.933   13.00 | 11.93    13.00
         2.967    6.00 | 5.967   13.00 | 8.967   13.00 | 11.97    13.00
         3.000    6.00 | 6.000   13.00 | 9.000   13.01 | 12.00    12.98

Max.Eff.Inten.(mm/hr)=      53.00        49.20
            over (min)       5.00        10.00
Storage Coeff.  (min)=        .67 (ii)    9.22 (ii)
Unit Hyd. Tpeak (min)=       4.00        10.00
Unit Hyd. peak  (cms)=        .55          .12
                                                      *TOTALS*
PEAK FLOW       (cms)=        .06          .19           .257 (iii)
TIME TO PEAK    (hrs)=        .00        10.00          10.00
RUNOFF VOLUME    (mm)=     211.00       140.43         155.60
```

```
    TOTAL RAINFALL    (mm)=      212.00        212.00          212.00
    RUNOFF COEFFICIENT   =         1.00           .66             .73

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ----------------------------------------------------------------------------


-------------------
| ADD HYD   (0104) |
|  1 +  2 =  3     |        AREA    QPEAK    TPEAK     R.V.
 -------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0101):     18.00    1.450    11.18   118.78
      + ID2= 2 (0102):      2.01     .257    10.00   155.60
        ================================================
        ID = 3 (0104):     20.01    1.637    11.00   122.48

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------------

 ------------------
| ADD HYD   (0105) |
|  1 +  2 =  3     |        AREA    QPEAK    TPEAK     R.V.
 -------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0103):       .20     .025    10.00   155.56
      + ID2= 2 (0104):     20.01    1.637    11.00   122.48
        ================================================
        ID = 3 (0105):     20.21    1.656    11.00   122.81

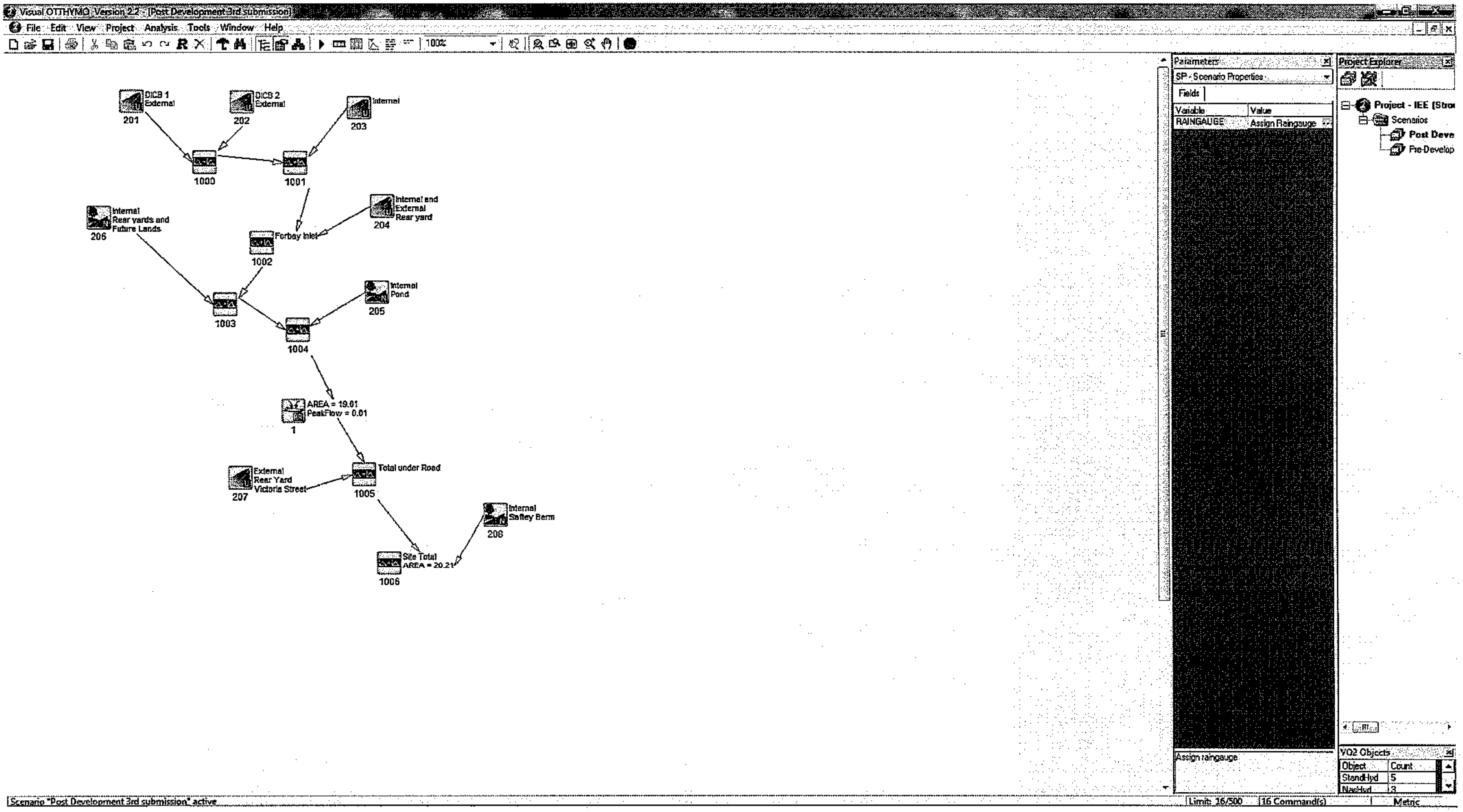
    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------------

 INISH
 =========================================================================================
```

Post Development Model and Summary Results

Post Development OTTHYMO Model Schematic



Variable	Value
RAINGAUGE	Assign Raingauge

Assign raingauge

VO2 Objects

Object	Count
StandHyd	5
NasHyd	3

Scenario "Post Development 3rd submission" active

POST DEVELOPMENT
SUMMARY OUTPUT
SCS AND CHICAGO STORM EVENTS

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

     V    V   I    SSSSS  U   U    A    L
     V    V   I    SS     U   U   A A   L
      V  V    I     SS    U   U  AAAAA  L
      V  V    I      SS   U   U  A   A  L
       VV     I    SSSSS  UUUUU  A   A  LLLLL

      OOO    TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
     O   O     T      T    H   H   Y Y   MM MM  O   O
     O   O     T      T    H   H    Y    M   M  O   O
      OOO      T      T    H   H    Y    M   M   OOO

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                ***** S U M M A R Y   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 2.2.4\voin.dat
  Output  filename: E:\Gemmell\123-IE~1\OTTHYM~1\Post Development 4th submission.out
  Summary filename: E:\Gemmell\123-IE~1\OTTHYM~1\Post Development 4th submission.sum


DATE: 2/10/2014                         TIME: 5:48:25 PM

USER:


COMMENTS: ____________________________________________________________


  ****************************
  ** SIMULATION NUMBER:   1 **
  ****************************

  W/E COMMAND              HYD ID   DT     AREA    Qpeak Tpeak    R.V. R.C.    Qbase
                                   min      ha      cms   hrs      mm           cms

      START @   .00 hrs
      --------------------
      READ STORM                  15.0
      [ Ptot= 46.70 mm ]
      fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
      remark: 2 YR. SCS. STORM
*
  **  CALIB NASHYD        0208  1  2.0      .50      .01  6.00    4.64  .10     .000
      [CN=44.0          ]
      [ N = 3.0:Tp   .04]
*
  **  CALIB NASHYD        0206  1 10.0     6.18      .03  6.83    4.76  .10     .000
      [CN=44.0          ]
      [ N = 3.0:Tp   .81]
*
  *   CALIB STANDHYD      0204  1  5.0     2.82      .06  6.00   15.59  .33     .000
      [I%=10.7:S%= 2.50]
*
  *   CALIB STANDHYD      0203  1  3.0     8.01      .35  6.05   21.33  .46     .000
      [I%=25.7:S%= 2.00]
*
  *   CALIB STANDHYD      0202  1  5.0      .50      .02  6.00   19.63  .42     .000
      [I%=21.5:S%= 1.00]
*
  *   CALIB STANDHYD      0201  1  3.0      .30      .01  6.00   19.62  .42     .000
      [I%=21.5:S%=  .97]
*
  *   CALIB NASHYD        0205  1  2.0     1.20      .07  6.00   12.60  .27     .000
      [CN=71.2          ]
      [ N = 3.0:Tp   .03]
*
  *   CALIB STANDHYD      0207  1  4.0      .70      .03  6.00   19.65  .42     .000
      [I%=21.5:S%=  .60]
*
      ADD [0202 + 0201]   1000  3  3.0      .80      .03  6.00   19.62  n/a     .000
*
      ADD [0203 + 1000]   1001  3  3.0     8.81      .37  6.00   21.17  n/a     .000
*
      ADD [0204 + 1001]   1002  3  3.0    11.63      .43  6.00   19.82  n/a     .000
*
      ADD [0206 + 1002]   1003  3  3.0    17.81      .44  6.00   14.59  n/a     .000
*
      ADD [1003 + 0205]   1004  3  2.0    19.01      .51  6.00   14.47  n/a     .000
*
      RESRVR [ 2 : 1004]  0001  1  2.0    19.01      .03 10.87   13.76  n/a     .000
      {ST=    .21 ha.m }
```

```
    ADD [0001 + 0207]  1005  3  2.0    19.71     .04  6.00  13.97  n/a    .000

    ADD [0208 + 1005]  1006  3  2.0    20.21     .05  6.00  13.73  n/a    .000

 ****************************
 ** SIMULATION NUMBER:   2 **
 ****************************

 W/E COMMAND            HYD ID   DT    AREA   Qpeak Tpeak   R.V. R.C.    Qbase
                                 min    ha     cms   hrs     mm           cms

    START @   .00 hrs
    --------------------
    READ STORM                 15.0
    [ Ptot= 64.30 mm ]
    fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
    remark: 5 YR. SCS. STORM

 ** CALIB NASHYD       0208  1  2.0      .50     .02  6.00   8.95  .14    .000
    [CN=44.0         ]
    [ N = 3.0:Tp  .04]

 ** CALIB NASHYD       0206  1 10.0     6.18     .06  6.83   9.19  .14    .000
    [CN=44.0         ]
    [ N = 3.0:Tp  .81]

  * CALIB STANDHYD     0204  1  5.0     2.82     .09  6.00  26.04  .41    .000
    [I%=10.7:S%= 2.50]

  * CALIB STANDHYD     0203  1  3.0     8.01     .58  6.00  33.33  .52    .000
    [I%=25.7:S%= 2.00]

  * CALIB STANDHYD     0202  1  5.0      .50     .03  6.00  31.20  .49    .000
    [I%=21.5:S%= 1.00]

  * CALIB STANDHYD     0201  1  3.0      .30     .02  6.00  31.20  .49    .000
    [I%=21.5:S%=  .97]

  * CALIB NASHYD       0205  1  2.0     1.20     .13  6.00  21.86  .34    .000
    [CN=71.2         ]
    [ N = 3.0:Tp  .03]

  * CALIB STANDHYD     0207  1  4.0      .70     .04  6.00  31.22  .49    .000
    [I%=21.5:S%=  .60]

    ADD [0202 + 0201]  1000  3  3.0      .80     .05  6.00  31.20  n/a    .000

    ADD [0203 + 1000]  1001  3  3.0     8.81     .63  6.00  33.14  n/a    .000

    ADD [0204 + 1001]  1002  3  3.0    11.63     .71  6.00  31.42  n/a    .000

    ADD [0206 + 1002]  1003  3  3.0    17.81     .74  6.00  23.70  n/a    .000

    ADD [1003 + 0205]  1004  3  2.0    19.01     .86  6.00  23.59  n/a    .000

    RESRVR [ 2 : 1004] 0001  1  2.0    19.01     .09  8.77  22.66  n/a    .000
    {ST=    .31 ha.m }

    ADD [0001 + 0207]  1005  3  2.0    19.71     .09  8.70  22.97  n/a    .000

    ADD [0208 + 1005]  1006  3  2.0    20.21     .09  8.70  22.62  n/a    .000

 ****************************
 ** SIMULATION NUMBER:   3 **
 ****************************

 W/E COMMAND            HYD ID   DT    AREA   Qpeak Tpeak   R.V. R.C.    Qbase
                                 min    ha     cms   hrs     mm           cms

    START @   .00 hrs
    --------------------
    READ STORM                 15.0
    [ Ptot= 90.70 mm ]
    fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
    remark: 25 YR. SCS. STORM

 ** CALIB NASHYD       0208  1  2.0      .50     .04  6.00  17.49  .19    .000
    [CN=44.0         ]
    [ N = 3.0:Tp  .04]

 ** CALIB NASHYD       0206  1 10.0     6.18     .12  6.67  17.96  .20    .000
    [CN=44.0         ]
    [ N = 3.0:Tp  .81]

  * CALIB STANDHYD     0204  1  5.0     2.82     .16  6.50  44.20  .49    .000
    [I%=10.7:S%= 2.50]

  * CALIB STANDHYD     0203  1  3.0     8.01     .97  6.00  53.35  .59    .000
    [I%=25.7:S%= 2.00]
```

```
*
 *   CALIB STANDHYD     0202  1  5.0      .50      .04  6.00  50.71  .56     .000
     [I%=21.5:S%= 1.00]
*
 *   CALIB STANDHYD     0201  1  3.0      .30      .03  6.00  50.70  .56     .000
     [I%=21.5:S%=  .97]
*
 *   CALIB NASHYD       0205  1  2.0     1.20      .22  6.00  38.21  .42     .000
     [CN=71.2         ]
     [ N = 3.0:Tp  .03]
*
 *   CALIB STANDHYD     0207  1  4.0      .70      .06  6.00  50.72  .56     .000
     [I%=21.5:S%=  .60]
*
     ADD [0202 + 0201]  1000  3  3.0      .80      .08  6.00  50.70  n/a     .000
*
     ADD [0203 + 1000]  1001  3  3.0     8.81     1.05  6.00  53.11  n/a     .000
*
     ADD [0204 + 1001]  1002  3  3.0    11.63     1.20  6.00  50.95  n/a     .000
*
     ADD [0206 + 1002]  1003  3  3.0    17.81     1.24  6.00  39.50  n/a     .000
*
     ADD [1003 + 0205]  1004  3  2.0    19.01     1.46  6.00  39.42  n/a     .000
*
     RESRVR [ 2 : 1004] 0001  1  2.0    19.01      .31  7.40  38.45  n/a     .000
     {ST=    .42 ha.m }
*
     ADD [0001 + 0207]  1005  3  2.0    19.71      .32  7.30  38.88  n/a     .000
*
     ADD [0208 + 1005]  1006  3  2.0    20.21      .33  7.30  38.35  n/a     .000
*
 ****************************
 ** SIMULATION NUMBER:   4 **
 ****************************

 W/E COMMAND             HYD ID   DT     AREA    Qpeak Tpeak   R.V. R.C.    Qbase
                                  min     ha      cms   hrs     mm           cms

     START @   .00 hrs
     --------------------
     READ STORM                 15.0
     [ Ptot=112.50 mm ]
     fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
     remark: 100 YR. SCS. STORM
*
 **  CALIB NASHYD       0208  1  2.0      .50      .06  6.00  26.13  .23     .000
     [CN=44.0         ]
     [ N = 3.0:Tp  .04]
*
 **  CALIB NASHYD       0206  1 10.0     6.18      .18  6.67  26.82  .24     .000
     [CN=44.0         ]
     [ N = 3.0:Tp  .81]
*
 *   CALIB STANDHYD     0204  1  5.0     2.82      .25  6.33  60.75  .54     .000
     [I%=10.7:S%= 2.50]
*
 *   CALIB STANDHYD     0203  1  3.0     8.01     1.40  6.05  71.13  .63     .000
     [I%=25.7:S%= 2.00]
*
 *   CALIB STANDHYD     0202  1  5.0      .50      .06  6.00  68.14  .61     .000
     [I%=21.5:S%= 1.00]
*
 *   CALIB STANDHYD     0201  1  3.0      .30      .05  6.00  68.14  .61     .000
     [I%=21.5:S%=  .97]
*
 *   CALIB NASHYD       0205  1  2.0     1.20      .30  6.00  53.24  .47     .000
     [CN=71.2         ]
     [ N = 3.0:Tp  .03]
*
 *   CALIB STANDHYD     0207  1  4.0      .70      .08  6.00  68.15  .61     .000
     [I%=21.5:S%=  .60]
*
     ADD [0202 + 0201]  1000  3  3.0      .80      .11  6.00  68.13  n/a     .000
*
     ADD [0203 + 1000]  1001  3  3.0     8.81     1.49  6.00  70.86  n/a     .000
*
     ADD [0204 + 1001]  1002  3  3.0    11.63     1.73  6.00  68.40  n/a     .000
*
     ADD [0206 + 1002]  1003  3  3.0    17.81     1.80  6.00  53.98  n/a     .000
*
     ADD [1003 + 0205]  1004  3  2.0    19.01     2.10  6.00  53.93  n/a     .000
*
     RESRVR [ 2 : 1004] 0001  1  2.0    19.01      .48  7.17  52.93  n/a     .000
     {ST=    .54 ha.m }
*
     ADD [0001 + 0207]  1005  3  2.0    19.71      .51  7.00  53.47  n/a     .000
*
     ADD [0208 + 1005]  1006  3  2.0    20.21      .51  7.00  52.79  n/a     .000
```

```
 ****************************
 ** SIMULATION NUMBER:   5 **
 ****************************

 W/E COMMAND              HYD ID   DT     AREA   Qpeak Tpeak   R.V. R.C.    Qbase
                                   min     ha     cms   hrs     mm           cms

     START @   .00 hrs
     --------------------
     READ STORM                  10.0
     [ Ptot= 36.95 mm ]
     fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
     remark: 2 YEAR - 4 hour - Chicago Storm
*
 **  CALIB NASHYD         0208  1  2.0      .50     .01  1.33   2.80  .08     .000
     [CN=44.0          ]
     [ N = 3.0:Tp  .04]

 **  CALIB NASHYD         0206  1 10.0     6.18     .02  2.33   2.81  .08     .000
     [CN=44.0          ]
     [ N = 3.0:Tp  .81]

  *  CALIB STANDHYD       0204  1  5.0     2.82     .07  1.33  10.59  .29     .000
     [I%=10.7:S%= 2.50]

  *  CALIB STANDHYD       0203  1  3.0     8.01     .36  1.35  15.34  .42     .000
     [I%=25.7:S%= 2.00]
*
  *  CALIB STANDHYD       0202  1  5.0      .50     .02  1.33  13.92  .38     .000
     [I%=21.5:S%= 1.00]

  *  CALIB STANDHYD       0201  1  3.0      .30     .01  1.30  13.91  .38     .000
     [I%=21.5:S%=  .97]
*
  *  CALIB NASHYD         0205  1  2.0     1.20     .07  1.33   8.25  .22     .000
     [CN=71.2          ]
     [ N = 3.0:Tp  .03]
*
  *  CALIB STANDHYD       0207  1  4.0      .70     .03  1.33  13.94  .38     .000
     [I%=21.5:S%=  .60]

     ADD [0202 + 0201]   1000  3  3.0      .80     .04  1.30  13.94  n/a     .000
*
     ADD [0203 + 1000]   1001  3  3.0     8.81     .39  1.35  15.22  n/a     .000

     ADD [0204 + 1001]   1002  3  3.0    11.63     .46  1.35  14.10  n/a     .000
*
     ADD [0206 + 1002]   1003  3  3.0    17.81     .46  1.35  10.18  n/a     .000

     ADD [1003 + 0205]   1004  3  2.0    19.01     .51  1.33  10.06  n/a     .000

     RESRVR [ 2 : 1004]  0001  1  2.0    19.01     .02  5.03   9.70  n/a     .000
     {ST=    .16 ha.m }

     ADD [0001 + 0207]   1005  3  2.0    19.71     .04  1.33   9.85  n/a     .000

     ADD [0208 + 1005]   1006  3  2.0    20.21     .05  1.33   9.68  n/a     .000
*
 ****************************
 ** SIMULATION NUMBER:   6 **
 ****************************

 W/E COMMAND              HYD ID   DT     AREA   Qpeak Tpeak   R.V. R.C.    Qbase
                                   min     ha     cms   hrs     mm           cms

     START @   .00 hrs
     --------------------
     READ STORM                  10.0
     [ Ptot= 50.52 mm ]
     fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
     remark: 5 YEAR - 4 hour - Chicago Storm
*
 **  CALIB NASHYD         0208  1  2.0      .50     .02  1.33   5.47  .11     .000
     [CN=44.0          ]
     [ N = 3.0:Tp  .04]
*
 **  CALIB NASHYD         0206  1 10.0     6.18     .04  2.33   5.50  .11     .000
     [CN=44.0          ]
     [ N = 3.0:Tp  .81]
*
  *  CALIB STANDHYD       0204  1  5.0     2.82     .09  1.33  17.72  .35     .000
     [I%=10.7:S%= 2.50]

  *  CALIB STANDHYD       0203  1  3.0     8.01     .51  1.35  23.82  .47     .000
     [I%=25.7:S%= 2.00]
*
  *  CALIB STANDHYD       0202  1  5.0      .50     .03  1.33  22.02  .44     .000
     [I%=21.5:S%= 1.00]
```

```
  *   CALIB STANDHYD      0201  1  3.0      .30      .02  1.30  22.02  .44     .000
      [I%=21.5:S%=  .97]
*
  *   CALIB NASHYD        0205  1  2.0     1.20      .11  1.33  14.47  .29     .000
      [CN=71.2          ]
      [ N = 3.0:Tp  .03]
*
  *   CALIB STANDHYD      0207  1  4.0      .70      .05  1.33  22.04  .44     .000
      [I%=21.5:S%=  .60]
*
      ADD [0202 + 0201]   1000  3  3.0      .80      .05  1.30  22.05  n/a     .000
*
      ADD [0203 + 1000]   1001  3  3.0     8.81      .55  1.35  23.65  n/a     .000
*
      ADD [0204 + 1001]   1002  3  3.0    11.63      .64  1.35  22.22  n/a     .000
*
      ADD [0206 + 1002]   1003  3  3.0    17.81      .64  1.35  16.42  n/a     .000
*
      ADD [1003 + 0205]   1004  3  2.0    19.01      .74  1.33  16.29  n/a     .000
*
      RESRVR [ 2 : 1004]  0001  1  2.0    19.01      .05  4.53  15.71  n/a     .000
      {ST=    .26 ha.m }
*
      ADD [0001 + 0207]   1005  3  2.0    19.71      .05  4.43  15.94  n/a     .000
*
      ADD [0208 + 1005]   1006  3  2.0    20.21      .07  1.33  15.68  n/a     .000
*
 ****************************
 ** SIMULATION NUMBER:   7 **
 ****************************

 W/E COMMAND              HYD ID   DT     AREA   Qpeak  Tpeak   R.V.  R.C.    Qbase
                                   min     ha     cms    hrs     mm            cms

      START @   .00 hrs
      --------------------
      READ STORM                  10.0
      [ Ptot= 71.24 mm ]
      fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
      remark: 25 YEAR - 4 hour - Chicago Storm
*
 **   CALIB NASHYD        0208  1  2.0      .50      .03  1.33  10.97  .15     .000
      [CN=44.0          ]
      [ N = 3.0:Tp  .04]
*
 **   CALIB NASHYD        0206  1 10.0     6.18      .08  2.33  11.03  .16     .000
      [CN=44.0          ]
      [ N = 3.0:Tp  .81]
*
  *   CALIB STANDHYD      0204  1  5.0     2.82      .13  1.33  30.57  .43     .000
      [I%=10.7:S%= 2.50]
*
  *   CALIB STANDHYD      0203  1  3.0     8.01      .78  1.35  38.39  .54     .000
      [I%=25.7:S%= 2.00]
*
  *   CALIB STANDHYD      0202  1  5.0      .50      .05  1.33  36.12  .51     .000
      [I%=21.5:S%= 1.00]
*
  *   CALIB STANDHYD      0201  1  3.0      .30      .03  1.30  36.12  .51     .000
      [I%=21.5:S%=  .97]
*
  *   CALIB NASHYD        0205  1  2.0     1.20      .20  1.33  25.92  .36     .000
      [CN=71.2          ]
      [ N = 3.0:Tp  .03]
*
  *   CALIB STANDHYD      0207  1  4.0      .70      .06  1.33  36.13  .51     .000
      [I%=21.5:S%=  .60]
*
      ADD [0202 + 0201]   1000  3  3.0      .80      .07  1.30  36.17  n/a     .000
*
      ADD [0203 + 1000]   1001  3  3.0     8.81      .84  1.35  38.19  n/a     .000
*
      ADD [0204 + 1001]   1002  3  3.0    11.63      .97  1.35  36.35  n/a     .000
*
      ADD [0206 + 1002]   1003  3  3.0    17.81      .98  1.35  27.56  n/a     .000
*
      ADD [1003 + 0205]   1004  3  2.0    19.01     1.14  1.33  27.46  n/a     .000
*
      RESRVR [ 2 : 1004]  0001  1  2.0    19.01      .21  3.67  26.78  n/a     .000
      {ST=    .37 ha.m }
*
      ADD [0001 + 0207]   1005  3  2.0    19.71      .22  3.57  27.12  n/a     .000
*
      ADD [0208 + 1005]   1006  3  2.0    20.21      .22  3.57  26.72  n/a     .000
*
 ****************************
 ** SIMULATION NUMBER:   8 **
 ****************************
```

```
W/E COMMAND               HYD ID    DT     AREA   Qpeak Tpeak   R.V. R.C.    Qbase
                                    min     ha     cms   hrs     mm            cms

      START @   .00 hrs
      --------------------
      READ STORM                   10.0
      [ Ptot= 87.58 mm ]
      fname : K:\PROJECT FILES\200000 - 299999\210987 - 010 - Innisfil Executive Estates\SWM\OTTHYMO 3rd Submissio
      remark: 100 YEAR - 4 hour - Chicago Storm
*
  **  CALIB NASHYD        0208  1  2.0      .50    .05  1.33  16.37  .19    .000
      [CN=44.0          ]
      [ N = 3.0:Tp  .04]
*
  **  CALIB NASHYD        0206  1 10.0     6.18    .12  2.33  16.46  .19    .000
      [CN=44.0          ]
      [ N = 3.0:Tp  .81]

   *  CALIB STANDHYD      0204  1  5.0     2.82    .18  1.33  41.94  .48    .000
      [I%=10.7:S%= 2.50]

   *  CALIB STANDHYD      0203  1  3.0     8.01   1.03  1.35  50.89  .58    .000
      [I%=25.7:S%= 2.00]
*
   *  CALIB STANDHYD      0202  1  5.0      .50    .06  1.33  48.30  .55    .000
      [I%=21.5:S%= 1.00]

   *  CALIB STANDHYD      0201  1  3.0      .30    .04  1.30  48.30  .55    .000
      [I%=21.5:S%=  .97]

   *  CALIB NASHYD        0205  1  2.0     1.20    .27  1.33  36.16  .41    .000
      [CN=71.2          ]
      [ N = 3.0:Tp  .03]
*
   *  CALIB STANDHYD      0207  1  4.0      .70    .08  1.33  48.31  .55    .000
      [I%=21.5:S%=  .60]

      ADD [0202 + 0201]   1000  3  3.0      .80    .09  1.30  48.36  n/a    .000
*
      ADD [0203 + 1000]   1001  3  3.0     8.81   1.12  1.35  50.66  n/a    .000

      ADD [0204 + 1001]   1002  3  3.0    11.63   1.28  1.35  48.55  n/a    .000
*
      ADD [0206 + 1002]   1003  3  3.0    17.81   1.30  1.35  37.42  n/a    .000

      ADD [1003 + 0205]   1004  3  2.0    19.01   1.53  1.33  37.33  n/a    .000
*
      RESRVR [ 2 : 1004]  0001  1  2.0    19.01    .35  3.17  36.64  n/a    .000
      {ST=    .44 ha.m }

      ADD [0001 + 0207]   1005  3  2.0    19.71    .36  3.10  37.06  n/a    .000
*
      ADD [0208 + 1005]   1006  3  2.0    20.21    .37  3.10  36.54  n/a    .000

  INISH
===========================================================================================================
```

POST DEVELOPMENT
DETAIL OUTPUT
SCS AND CHICAGO STORM EVENTS

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

       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO    TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
       O   O     T      T    H   H   Y Y   MM MM  O   O
       O   O     T      T    H   H    Y    M   M  O   O
        OOO      T      T    H   H    Y    M   M   OOO

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                  ***** D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 2.2.4\voin.dat
  Output  filename: E:\Gemmell\123-IE~1\OTTHYM~1\Post Development 4th submission.out
  Summary filename: E:\Gemmell\123-IE~1\OTTHYM~1\Post Development 4th submission.sum


DATE: 2/10/2014                         TIME: 5:48:25 PM

USER:


COMMENTS: ____________________________________________________________


-------------------------------------------------------------------------------------------
  ****************************
  ** SIMULATION NUMBER:   1 **
  ****************************


-------------------
|    READ STORM     |     Filename: K:\PROJECT FILES\200000 - 299999\
|                   |               210987 - 010 - Innisfil Executive Estates\
|                   |               SWM\OTTHYMO 3rd Submission\SCS2.STM
| Ptotal= 46.70 mm  |     Comments: 2 YR. SCS. STORM
-------------------
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .25    1.17 |  3.25    1.87 |  6.25    8.41 |  9.25    1.63
                  .50    1.17 |  3.50    1.87 |  6.50    8.41 |  9.50    1.63
                  .75    1.17 |  3.75    1.87 |  6.75    3.74 |  9.75    1.63
                 1.00    1.17 |  4.00    1.87 |  7.00    3.74 | 10.00    1.63
                 1.25    1.17 |  4.25    2.80 |  7.25    2.80 | 10.25     .93
                 1.50    1.17 |  4.50    2.80 |  7.50    2.80 | 10.50     .93
                 1.75    1.17 |  4.75    3.74 |  7.75    2.80 | 10.75     .93
                 2.00    1.17 |  5.00    3.74 |  8.00    2.80 | 11.00     .93
                 2.25    1.40 |  5.25    5.60 |  8.25    1.63 | 11.25     .93
                 2.50    1.40 |  5.50    5.60 |  8.50    1.63 | 11.50     .93
                 2.75    1.40 |  5.75   22.42 |  8.75    1.63 | 11.75     .93
                 3.00    1.40 |  6.00   61.64 |  9.00    1.63 | 12.00     .93

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-------------------
| CALIB             |
| NASHYD    (0208)  |    Area     (ha)=     .50   Curve Number   (CN)= 44.0
|ID= 1 DT= 2.0 min  |    Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
-------------------      U.H. Tp(hrs)=     .04

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .033    1.17 | 3.033    1.87 | 6.033    8.41 |  9.03    1.63
                 .067    1.17 | 3.067    1.87 | 6.067    8.41 |  9.07    1.63
                 .100    1.17 | 3.100    1.87 | 6.100    8.41 |  9.10    1.63
                 .133    1.17 | 3.133    1.87 | 6.133    8.41 |  9.13    1.63
                 .167    1.17 | 3.167    1.87 | 6.167    8.41 |  9.17    1.63
                 .200    1.17 | 3.200    1.87 | 6.200    8.41 |  9.20    1.63
                 .233    1.17 | 3.233    1.87 | 6.233    8.41 |  9.23    1.63
                 .267    1.17 | 3.267    1.87 | 6.267    8.41 |  9.27    1.63
                 .300    1.17 | 3.300    1.87 | 6.300    8.41 |  9.30    1.63
                 .333    1.17 | 3.333    1.87 | 6.333    8.41 |  9.33    1.63
                 .367    1.17 | 3.367    1.87 | 6.367    8.41 |  9.37    1.63
                 .400    1.17 | 3.400    1.87 | 6.400    8.41 |  9.40    1.63
                 .433    1.17 | 3.433    1.87 | 6.433    8.41 |  9.43    1.63
```

```
         .467    1.17 | 3.467    1.87 | 6.467    8.41 |  9.47    1.63
         .500    1.17 | 3.500    1.87 | 6.500    8.41 |  9.50    1.63
         .533    1.17 | 3.533    1.87 | 6.533    3.74 |  9.53    1.63
         .567    1.17 | 3.567    1.87 | 6.567    3.74 |  9.57    1.63
         .600    1.17 | 3.600    1.87 | 6.600    3.74 |  9.60    1.63
         .633    1.17 | 3.633    1.87 | 6.633    3.74 |  9.63    1.63
         .667    1.17 | 3.667    1.87 | 6.667    3.74 |  9.67    1.63
         .700    1.17 | 3.700    1.87 | 6.700    3.74 |  9.70    1.63
         .733    1.17 | 3.733    1.87 | 6.733    3.74 |  9.73    1.63
         .767    1.17 | 3.767    1.87 | 6.767    3.74 |  9.77    1.63
         .800    1.17 | 3.800    1.87 | 6.800    3.74 |  9.80    1.63
         .833    1.17 | 3.833    1.87 | 6.833    3.74 |  9.83    1.63
         .867    1.17 | 3.867    1.87 | 6.867    3.74 |  9.87    1.63
         .900    1.17 | 3.900    1.87 | 6.900    3.74 |  9.90    1.63
         .933    1.17 | 3.933    1.87 | 6.933    3.74 |  9.93    1.63
         .967    1.17 | 3.967    1.87 | 6.967    3.74 |  9.97    1.63
        1.000    1.17 | 4.000    1.87 | 7.000    3.74 | 10.00    1.63
        1.033    1.17 | 4.033    2.80 | 7.033    2.80 | 10.03     .93
        1.067    1.17 | 4.067    2.80 | 7.067    2.80 | 10.07     .93
        1.100    1.17 | 4.100    2.80 | 7.100    2.80 | 10.10     .93
        1.133    1.17 | 4.133    2.80 | 7.133    2.80 | 10.13     .93
        1.167    1.17 | 4.167    2.80 | 7.167    2.80 | 10.17     .93
        1.200    1.17 | 4.200    2.80 | 7.200    2.80 | 10.20     .93
        1.233    1.17 | 4.233    2.80 | 7.233    2.80 | 10.23     .93
        1.267    1.17 | 4.267    2.80 | 7.267    2.80 | 10.27     .93
        1.300    1.17 | 4.300    2.80 | 7.300    2.80 | 10.30     .93
        1.333    1.17 | 4.333    2.80 | 7.333    2.80 | 10.33     .93
        1.367    1.17 | 4.367    2.80 | 7.367    2.80 | 10.37     .93
        1.400    1.17 | 4.400    2.80 | 7.400    2.80 | 10.40     .93
        1.433    1.17 | 4.433    2.80 | 7.433    2.80 | 10.43     .93
        1.467    1.17 | 4.467    2.80 | 7.467    2.80 | 10.47     .93
        1.500    1.17 | 4.500    2.80 | 7.500    2.80 | 10.50     .93
        1.533    1.17 | 4.533    3.74 | 7.533    2.80 | 10.53     .93
        1.567    1.17 | 4.567    3.74 | 7.567    2.80 | 10.57     .93
        1.600    1.17 | 4.600    3.74 | 7.600    2.80 | 10.60     .93
        1.633    1.17 | 4.633    3.74 | 7.633    2.80 | 10.63     .93
        1.667    1.17 | 4.667    3.74 | 7.667    2.80 | 10.67     .93
        1.700    1.17 | 4.700    3.74 | 7.700    2.80 | 10.70     .93
        1.733    1.17 | 4.733    3.74 | 7.733    2.80 | 10.73     .93
        1.767    1.17 | 4.767    3.74 | 7.767    2.80 | 10.77     .93
        1.800    1.17 | 4.800    3.74 | 7.800    2.80 | 10.80     .93
        1.833    1.17 | 4.833    3.74 | 7.833    2.80 | 10.83     .93
        1.867    1.17 | 4.867    3.74 | 7.867    2.80 | 10.87     .93
        1.900    1.17 | 4.900    3.74 | 7.900    2.80 | 10.90     .93
        1.933    1.17 | 4.933    3.74 | 7.933    2.80 | 10.93     .93
        1.967    1.17 | 4.967    3.74 | 7.967    2.80 | 10.97     .93
        2.000    1.17 | 5.000    3.74 | 8.000    2.80 | 11.00     .93
        2.033    1.40 | 5.033    5.60 | 8.033    1.63 | 11.03     .93
        2.067    1.40 | 5.067    5.60 | 8.067    1.63 | 11.07     .93
        2.100    1.40 | 5.100    5.60 | 8.100    1.63 | 11.10     .93
        2.133    1.40 | 5.133    5.60 | 8.133    1.63 | 11.13     .93
        2.167    1.40 | 5.167    5.60 | 8.167    1.63 | 11.17     .93
        2.200    1.40 | 5.200    5.60 | 8.200    1.63 | 11.20     .93
        2.233    1.40 | 5.233    5.60 | 8.233    1.63 | 11.23     .93
        2.267    1.40 | 5.267    5.60 | 8.267    1.63 | 11.27     .93
        2.300    1.40 | 5.300    5.60 | 8.300    1.63 | 11.30     .93
        2.333    1.40 | 5.333    5.60 | 8.333    1.63 | 11.33     .93
        2.367    1.40 | 5.367    5.60 | 8.367    1.63 | 11.37     .93
        2.400    1.40 | 5.400    5.60 | 8.400    1.63 | 11.40     .93
        2.433    1.40 | 5.433    5.60 | 8.433    1.63 | 11.43     .93
        2.467    1.40 | 5.467    5.60 | 8.467    1.63 | 11.47     .93
        2.500    1.40 | 5.500    5.60 | 8.500    1.63 | 11.50     .93
        2.533    1.40 | 5.533   22.41 | 8.533    1.63 | 11.53     .93
        2.567    1.40 | 5.567   22.42 | 8.567    1.63 | 11.57     .93
        2.600    1.40 | 5.600   22.42 | 8.600    1.63 | 11.60     .93
        2.633    1.40 | 5.633   22.42 | 8.633    1.63 | 11.63     .93
        2.667    1.40 | 5.667   22.42 | 8.667    1.63 | 11.67     .93
        2.700    1.40 | 5.700   22.42 | 8.700    1.63 | 11.70     .93
        2.733    1.40 | 5.733   22.42 | 8.733    1.63 | 11.73     .93
        2.767    1.40 | 5.767   42.03 | 8.767    1.63 | 11.77     .93
        2.800    1.40 | 5.800   61.64 | 8.800    1.63 | 11.80     .93
        2.833    1.40 | 5.833   61.64 | 8.833    1.63 | 11.83     .93
        2.867    1.40 | 5.867   61.64 | 8.867    1.63 | 11.87     .93
        2.900    1.40 | 5.900   61.64 | 8.900    1.63 | 11.90     .93
        2.933    1.40 | 5.933   61.64 | 8.933    1.63 | 11.93     .93
        2.967    1.40 | 5.967   61.64 | 8.967    1.63 | 11.97     .93
        3.000    1.40 | 6.000   61.64 | 9.000    1.63 | 12.00     .93

Unit Hyd Qpeak  (cms)=     .477

PEAK FLOW        (cms)=     .011 (i)
TIME TO PEAK     (hrs)=    6.000
RUNOFF VOLUME     (mm)=    4.640
TOTAL RAINFALL    (mm)=   46.700
RUNOFF COEFFICIENT   =      .099

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
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```
--------------------
| CALIB              |
| NASHYD    (0206)   |   Area      (ha)=    6.18   Curve Number    (CN)= 44.0
|ID= 1 DT=10.0 min   |   Ia        (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=      .81

        NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN | TIME     RAIN | TIME     RAIN | TIME     RAIN
                 hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr
                .167     1.17 | 3.167     1.87 | 6.167     8.41 |  9.17    1.63
                .333     1.17 | 3.333     1.87 | 6.333     8.41 |  9.33    1.63
                .500     1.17 | 3.500     1.87 | 6.500     8.41 |  9.50    1.63
                .667     1.17 | 3.667     1.87 | 6.667     3.74 |  9.67    1.63
                .833     1.17 | 3.833     1.87 | 6.833     3.74 |  9.83    1.63
               1.000     1.17 | 4.000     1.87 | 7.000     3.74 | 10.00    1.63
               1.167     1.17 | 4.167     2.80 | 7.167     2.80 | 10.17     .93
               1.333     1.17 | 4.333     2.80 | 7.333     2.80 | 10.33     .93
               1.500     1.17 | 4.500     2.80 | 7.500     2.80 | 10.50     .93
               1.667     1.17 | 4.667     3.74 | 7.667     2.80 | 10.67     .93
               1.833     1.17 | 4.833     3.74 | 7.833     2.80 | 10.83     .93
               2.000     1.17 | 5.000     3.74 | 8.000     2.80 | 11.00     .93
               2.167     1.40 | 5.167     5.60 | 8.167     1.63 | 11.17     .93
               2.333     1.40 | 5.333     5.60 | 8.333     1.63 | 11.33     .93
               2.500     1.40 | 5.500     5.60 | 8.500     1.63 | 11.50     .93
               2.667     1.40 | 5.667    22.42 | 8.667     1.63 | 11.67     .93
               2.833     1.40 | 5.833    42.03 | 8.833     1.63 | 11.83     .93
               3.000     1.40 | 6.000    61.64 | 9.000     1.63 | 12.00     .93

    Unit Hyd Qpeak  (cms)=     .291

    PEAK FLOW        (cms)=     .030 (i)
    TIME TO PEAK     (hrs)=    6.833
    RUNOFF VOLUME     (mm)=    4.764
    TOTAL RAINFALL    (mm)=   46.700
    RUNOFF COEFFICIENT    =     .102

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD  (0204)   |   Area      (ha)=    2.82
|ID= 1 DT= 5.0 min   |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
--------------------
                             IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=        .40          2.42
    Dep. Storage      (mm)=       1.00          5.00
    Average Slope      (%)=       1.58          2.50
    Length             (m)=     140.00        284.40
    Mannings n            =       .013          .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME     RAIN | TIME     RAIN | TIME     RAIN | TIME     RAIN
                hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr
               .083     1.17 | 3.083     1.87 | 6.083     8.41 |  9.08    1.63
               .167     1.17 | 3.167     1.87 | 6.167     8.41 |  9.17    1.63
               .250     1.17 | 3.250     1.87 | 6.250     8.41 |  9.25    1.63
               .333     1.17 | 3.333     1.87 | 6.333     8.41 |  9.33    1.63
               .417     1.17 | 3.417     1.87 | 6.417     8.41 |  9.42    1.63
               .500     1.17 | 3.500     1.87 | 6.500     8.41 |  9.50    1.63
               .583     1.17 | 3.583     1.87 | 6.583     3.74 |  9.58    1.63
               .667     1.17 | 3.667     1.87 | 6.667     3.74 |  9.67    1.63
               .750     1.17 | 3.750     1.87 | 6.750     3.74 |  9.75    1.63
               .833     1.17 | 3.833     1.87 | 6.833     3.74 |  9.83    1.63
               .917     1.17 | 3.917     1.87 | 6.917     3.74 |  9.92    1.63
              1.000     1.17 | 4.000     1.87 | 7.000     3.74 | 10.00    1.63
              1.083     1.17 | 4.083     2.80 | 7.083     2.80 | 10.08     .93
              1.167     1.17 | 4.167     2.80 | 7.167     2.80 | 10.17     .93
              1.250     1.17 | 4.250     2.80 | 7.250     2.80 | 10.25     .93
              1.333     1.17 | 4.333     2.80 | 7.333     2.80 | 10.33     .93
              1.417     1.17 | 4.417     2.80 | 7.417     2.80 | 10.42     .93
              1.500     1.17 | 4.500     2.80 | 7.500     2.80 | 10.50     .93
              1.583     1.17 | 4.583     3.74 | 7.583     2.80 | 10.58     .93
              1.667     1.17 | 4.667     3.74 | 7.667     2.80 | 10.67     .93
              1.750     1.17 | 4.750     3.74 | 7.750     2.80 | 10.75     .93
              1.833     1.17 | 4.833     3.74 | 7.833     2.80 | 10.83     .93
              1.917     1.17 | 4.917     3.74 | 7.917     2.80 | 10.92     .93
              2.000     1.17 | 5.000     3.74 | 8.000     2.80 | 11.00     .93
              2.083     1.40 | 5.083     5.60 | 8.083     1.63 | 11.08     .93
              2.167     1.40 | 5.167     5.60 | 8.167     1.63 | 11.17     .93
              2.250     1.40 | 5.250     5.60 | 8.250     1.63 | 11.25     .93
              2.333     1.40 | 5.333     5.60 | 8.333     1.63 | 11.33     .93
              2.417     1.40 | 5.417     5.60 | 8.417     1.63 | 11.42     .93
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              2.500     1.40 | 5.500    5.60 | 8.500     1.63 | 11.50      .93
              2.583     1.40 | 5.583   22.42 | 8.583     1.63 | 11.58      .93
              2.667     1.40 | 5.667   22.42 | 8.667     1.63 | 11.67      .93
              2.750     1.40 | 5.750   22.42 | 8.750     1.63 | 11.75      .93
              2.833     1.40 | 5.833   61.64 | 8.833     1.63 | 11.83      .93
              2.917     1.40 | 5.917   61.64 | 8.917     1.63 | 11.92      .93
              3.000     1.40 | 6.000   61.64 | 9.000     1.63 | 12.00      .93

    Max.Eff.Inten.(mm/hr)=       61.64           7.42
               over (min)         5.00          65.00
    Storage Coeff.  (min)=        3.31 (ii)     63.93 (ii)
    Unit Hyd. Tpeak (min)=        5.00          65.00
    Unit Hyd. peak  (cms)=         .26            .02
                                                          *TOTALS*
    PEAK FLOW       (cms)=         .05            .03           .057 (iii)
    TIME TO PEAK    (hrs)=         .00           7.00           6.00
    RUNOFF VOLUME    (mm)=       45.70          12.00          15.59
    TOTAL RAINFALL   (mm)=       46.70          46.70          46.70
    RUNOFF COEFFICIENT   =         .98            .26            .33

 *** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
 *** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD  (0203) |   Area     (ha)=    8.01
| D= 1 DT= 3.0 min |   Total Imp(%)=   34.30   Dir. Conn.(%)=   25.70
 ------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        2.75          5.26
    Dep. Storage     (mm)=        1.00          5.00
    Average Slope     (%)=         .79          2.00
    Length            (m)=      414.00         86.00
    Mannings n          =         .013          .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN | TIME    RAIN | TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |   hrs   mm/hr
                .050    1.17 | 3.050   1.87 | 6.050   8.41 |  9.05    1.63
                .100    1.17 | 3.100   1.87 | 6.100   8.41 |  9.10    1.63
                .150    1.17 | 3.150   1.87 | 6.150   8.41 |  9.15    1.63
                .200    1.17 | 3.200   1.87 | 6.200   8.41 |  9.20    1.63
                .250    1.17 | 3.250   1.87 | 6.250   8.41 |  9.25    1.63
                .300    1.17 | 3.300   1.87 | 6.300   8.41 |  9.30    1.63
                .350    1.17 | 3.350   1.87 | 6.350   8.41 |  9.35    1.63
                .400    1.17 | 3.400   1.87 | 6.400   8.41 |  9.40    1.63
                .450    1.17 | 3.450   1.87 | 6.450   8.41 |  9.45    1.63
                .500    1.17 | 3.500   1.87 | 6.500   8.41 |  9.50    1.63
                .550    1.17 | 3.550   1.87 | 6.550   3.74 |  9.55    1.63
                .600    1.17 | 3.600   1.87 | 6.600   3.74 |  9.60    1.63
                .650    1.17 | 3.650   1.87 | 6.650   3.74 |  9.65    1.63
                .700    1.17 | 3.700   1.87 | 6.700   3.74 |  9.70    1.63
                .750    1.17 | 3.750   1.87 | 6.750   3.74 |  9.75    1.63
                .800    1.17 | 3.800   1.87 | 6.800   3.74 |  9.80    1.63
                .850    1.17 | 3.850   1.87 | 6.850   3.74 |  9.85    1.63
                .900    1.17 | 3.900   1.87 | 6.900   3.74 |  9.90    1.63
                .950    1.17 | 3.950   1.87 | 6.950   3.74 |  9.95    1.63
               1.000    1.17 | 4.000   1.87 | 7.000   3.74 | 10.00    1.63
               1.050    1.17 | 4.050   2.80 | 7.050   2.80 | 10.05     .93
               1.100    1.17 | 4.100   2.80 | 7.100   2.80 | 10.10     .93
               1.150    1.17 | 4.150   2.80 | 7.150   2.80 | 10.15     .93
               1.200    1.17 | 4.200   2.80 | 7.200   2.80 | 10.20     .93
               1.250    1.17 | 4.250   2.80 | 7.250   2.80 | 10.25     .93
               1.300    1.17 | 4.300   2.80 | 7.300   2.80 | 10.30     .93
               1.350    1.17 | 4.350   2.80 | 7.350   2.80 | 10.35     .93
               1.400    1.17 | 4.400   2.80 | 7.400   2.80 | 10.40     .93
               1.450    1.17 | 4.450   2.80 | 7.450   2.80 | 10.45     .93
               1.500    1.17 | 4.500   2.80 | 7.500   2.80 | 10.50     .93
               1.550    1.17 | 4.550   3.74 | 7.550   2.80 | 10.55     .93
               1.600    1.17 | 4.600   3.74 | 7.600   2.80 | 10.60     .93
               1.650    1.17 | 4.650   3.74 | 7.650   2.80 | 10.65     .93
               1.700    1.17 | 4.700   3.74 | 7.700   2.80 | 10.70     .93
               1.750    1.17 | 4.750   3.74 | 7.750   2.80 | 10.75     .93
               1.800    1.17 | 4.800   3.74 | 7.800   2.80 | 10.80     .93
               1.850    1.17 | 4.850   3.74 | 7.850   2.80 | 10.85     .93
               1.900    1.17 | 4.900   3.74 | 7.900   2.80 | 10.90     .93
               1.950    1.17 | 4.950   3.74 | 7.950   2.80 | 10.95     .93
               2.000    1.17 | 5.000   3.74 | 8.000   2.80 | 11.00     .93
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            2.050     1.40 | 5.050     5.60 | 8.050     1.63 | 11.05      .93
            2.100     1.40 | 5.100     5.60 | 8.100     1.63 | 11.10      .93
            2.150     1.40 | 5.150     5.60 | 8.150     1.63 | 11.15      .93
            2.200     1.40 | 5.200     5.60 | 8.200     1.63 | 11.20      .93
            2.250     1.40 | 5.250     5.60 | 8.250     1.63 | 11.25      .93
            2.300     1.40 | 5.300     5.60 | 8.300     1.63 | 11.30      .93
            2.350     1.40 | 5.350     5.60 | 8.350     1.63 | 11.35      .93
            2.400     1.40 | 5.400     5.60 | 8.400     1.63 | 11.40      .93
            2.450     1.40 | 5.450     5.60 | 8.450     1.63 | 11.45      .93
            2.500     1.40 | 5.500     5.60 | 8.500     1.63 | 11.50      .93
            2.550     1.40 | 5.550    22.42 | 8.550     1.63 | 11.55      .93
            2.600     1.40 | 5.600    22.42 | 8.600     1.63 | 11.60      .93
            2.650     1.40 | 5.650    22.42 | 8.650     1.63 | 11.65      .93
            2.700     1.40 | 5.700    22.42 | 8.700     1.63 | 11.70      .93
            2.750     1.40 | 5.750    22.42 | 8.750     1.63 | 11.75      .93
            2.800     1.40 | 5.800    61.64 | 8.800     1.63 | 11.80      .93
            2.850     1.40 | 5.850    61.64 | 8.850     1.63 | 11.85      .93
            2.900     1.40 | 5.900    61.64 | 8.900     1.63 | 11.90      .93
            2.950     1.40 | 5.950    61.64 | 8.950     1.63 | 11.95      .93
            3.000     1.40 | 6.000    61.64 | 9.000     1.63 | 12.00      .93

   Max.Eff.Inten.(mm/hr)=       61.64         15.73
            over (min)          9.00          33.00
   Storage Coeff.  (min)=       7.80 (ii)     31.21 (ii)
   Unit Hyd. Tpeak (min)=       9.00          33.00
   Unit Hyd. peak  (cms)=        .14            .04
                                                          *TOTALS*
   PEAK FLOW       (cms)=        .30            .12          .346 (iii)
   TIME TO PEAK    (hrs)=        .00           6.45          6.05
   RUNOFF VOLUME    (mm)=      45.70          12.90         21.33
   TOTAL RAINFALL   (mm)=      46.70          46.70         46.70
   RUNOFF COEFFICIENT   =        .98            .28           .46


     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0     Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB             |
| STANDHYD  (0202)  |   Area     (ha)=     .50
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
-------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=        .14          .36
    Dep. Storage      (mm)=       1.00         5.00
    Average Slope      (%)=        .80         1.00
    Length             (m)=      10.00       218.20
    Mannings n            =       .013         .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME    RAIN
             hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr
            .083    1.17 | 3.083   1.87 | 6.083   8.41 |  9.08   1.63
            .167    1.17 | 3.167   1.87 | 6.167   8.41 |  9.17   1.63
            .250    1.17 | 3.250   1.87 | 6.250   8.41 |  9.25   1.63
            .333    1.17 | 3.333   1.87 | 6.333   8.41 |  9.33   1.63
            .417    1.17 | 3.417   1.87 | 6.417   8.41 |  9.42   1.63
            .500    1.17 | 3.500   1.87 | 6.500   8.41 |  9.50   1.63
            .583    1.17 | 3.583   1.87 | 6.583   3.74 |  9.58   1.63
            .667    1.17 | 3.667   1.87 | 6.667   3.74 |  9.67   1.63
            .750    1.17 | 3.750   1.87 | 6.750   3.74 |  9.75   1.63
            .833    1.17 | 3.833   1.87 | 6.833   3.74 |  9.83   1.63
            .917    1.17 | 3.917   1.87 | 6.917   3.74 |  9.92   1.63
           1.000    1.17 | 4.000   1.87 | 7.000   3.74 | 10.00   1.63
           1.083    1.17 | 4.083   2.80 | 7.083   2.80 | 10.08    .93
           1.167    1.17 | 4.167   2.80 | 7.167   2.80 | 10.17    .93
           1.250    1.17 | 4.250   2.80 | 7.250   2.80 | 10.25    .93
           1.333    1.17 | 4.333   2.80 | 7.333   2.80 | 10.33    .93
           1.417    1.17 | 4.417   2.80 | 7.417   2.80 | 10.42    .93
           1.500    1.17 | 4.500   2.80 | 7.500   2.80 | 10.50    .93
           1.583    1.17 | 4.583   3.74 | 7.583   2.80 | 10.58    .93
           1.667    1.17 | 4.667   3.74 | 7.667   2.80 | 10.67    .93
           1.750    1.17 | 4.750   3.74 | 7.750   2.80 | 10.75    .93
           1.833    1.17 | 4.833   3.74 | 7.833   2.80 | 10.83    .93
           1.917    1.17 | 4.917   3.74 | 7.917   2.80 | 10.92    .93
           2.000    1.17 | 5.000   3.74 | 8.000   2.80 | 11.00    .93
           2.083    1.40 | 5.083   5.60 | 8.083   1.63 | 11.08    .93
           2.167    1.40 | 5.167   5.60 | 8.167   1.63 | 11.17    .93
           2.250    1.40 | 5.250   5.60 | 8.250   1.63 | 11.25    .93
           2.333    1.40 | 5.333   5.60 | 8.333   1.63 | 11.33    .93
           2.417    1.40 | 5.417   5.60 | 8.417   1.63 | 11.42    .93
           2.500    1.40 | 5.500   5.60 | 8.500   1.63 | 11.50    .93
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             2.583     1.40 | 5.583    22.42 | 8.583     1.63 | 11.58      .93
             2.667     1.40 | 5.667    22.42 | 8.667     1.63 | 11.67      .93
             2.750     1.40 | 5.750    22.42 | 8.750     1.63 | 11.75      .93
             2.833     1.40 | 5.833    61.64 | 8.833     1.63 | 11.83      .93
             2.917     1.40 | 5.917    61.64 | 8.917     1.63 | 11.92      .93
             3.000     1.40 | 6.000    61.64 | 9.000     1.63 | 12.00      .93

    Max.Eff.Inten.(mm/hr)=        61.64           8.23
               over (min)         5.00           70.00
    Storage Coeff.   (min)=         .83 (ii)     66.13 (ii)
    Unit Hyd. Tpeak  (min)=        5.00          70.00
    Unit Hyd. peak   (cms)=         .34            .02
                                                               *TOTALS*
    PEAK FLOW        (cms)=         .02            .00            .019 (iii)
    TIME TO PEAK     (hrs)=         .00           7.08            6.00
    RUNOFF VOLUME     (mm)=       45.70          12.59           19.63
    TOTAL RAINFALL    (mm)=       46.70          46.70           46.70
    RUNOFF COEFFICIENT   =          .98            .27             .42

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 CALIB              |
 STANDHYD  (0201)   |   Area     (ha)=     .30
 ID= 1 DT= 3.0 min  |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
--------------------
                               IMPERVIOUS    PERVIOUS (i)
    Surface Area       (ha)=        .09           .21
    Dep. Storage       (mm)=       1.00          5.00
    Average Slope       (%)=        .97           .97
    Length              (m)=      10.00        119.60
    Mannings n            =        .013          .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN | TIME     RAIN | TIME     RAIN | TIME     RAIN
                 hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr
                .050     1.17 | 3.050    1.87 | 6.050    8.41 |  9.05    1.63
                .100     1.17 | 3.100    1.87 | 6.100    8.41 |  9.10    1.63
                .150     1.17 | 3.150    1.87 | 6.150    8.41 |  9.15    1.63
                .200     1.17 | 3.200    1.87 | 6.200    8.41 |  9.20    1.63
                .250     1.17 | 3.250    1.87 | 6.250    8.41 |  9.25    1.63
                .300     1.17 | 3.300    1.87 | 6.300    8.41 |  9.30    1.63
                .350     1.17 | 3.350    1.87 | 6.350    8.41 |  9.35    1.63
                .400     1.17 | 3.400    1.87 | 6.400    8.41 |  9.40    1.63
                .450     1.17 | 3.450    1.87 | 6.450    8.41 |  9.45    1.63
                .500     1.17 | 3.500    1.87 | 6.500    8.41 |  9.50    1.63
                .550     1.17 | 3.550    1.87 | 6.550    3.74 |  9.55    1.63
                .600     1.17 | 3.600    1.87 | 6.600    3.74 |  9.60    1.63
                .650     1.17 | 3.650    1.87 | 6.650    3.74 |  9.65    1.63
                .700     1.17 | 3.700    1.87 | 6.700    3.74 |  9.70    1.63
                .750     1.17 | 3.750    1.87 | 6.750    3.74 |  9.75    1.63
                .800     1.17 | 3.800    1.87 | 6.800    3.74 |  9.80    1.63
                .850     1.17 | 3.850    1.87 | 6.850    3.74 |  9.85    1.63
                .900     1.17 | 3.900    1.87 | 6.900    3.74 |  9.90    1.63
                .950     1.17 | 3.950    1.87 | 6.950    3.74 |  9.95    1.63
               1.000     1.17 | 4.000    1.87 | 7.000    3.74 | 10.00    1.63
               1.050     1.17 | 4.050    2.80 | 7.050    2.80 | 10.05     .93
               1.100     1.17 | 4.100    2.80 | 7.100    2.80 | 10.10     .93
               1.150     1.17 | 4.150    2.80 | 7.150    2.80 | 10.15     .93
               1.200     1.17 | 4.200    2.80 | 7.200    2.80 | 10.20     .93
               1.250     1.17 | 4.250    2.80 | 7.250    2.80 | 10.25     .93
               1.300     1.17 | 4.300    2.80 | 7.300    2.80 | 10.30     .93
               1.350     1.17 | 4.350    2.80 | 7.350    2.80 | 10.35     .93
               1.400     1.17 | 4.400    2.80 | 7.400    2.80 | 10.40     .93
               1.450     1.17 | 4.450    2.80 | 7.450    2.80 | 10.45     .93
               1.500     1.17 | 4.500    2.80 | 7.500    2.80 | 10.50     .93
               1.550     1.17 | 4.550    3.74 | 7.550    2.80 | 10.55     .93
               1.600     1.17 | 4.600    3.74 | 7.600    2.80 | 10.60     .93
               1.650     1.17 | 4.650    3.74 | 7.650    2.80 | 10.65     .93
               1.700     1.17 | 4.700    3.74 | 7.700    2.80 | 10.70     .93
               1.750     1.17 | 4.750    3.74 | 7.750    2.80 | 10.75     .93
               1.800     1.17 | 4.800    3.74 | 7.800    2.80 | 10.80     .93
               1.850     1.17 | 4.850    3.74 | 7.850    2.80 | 10.85     .93
               1.900     1.17 | 4.900    3.74 | 7.900    2.80 | 10.90     .93
               1.950     1.17 | 4.950    3.74 | 7.950    2.80 | 10.95     .93
               2.000     1.17 | 5.000    3.74 | 8.000    2.80 | 11.00     .93
               2.050     1.40 | 5.050    5.60 | 8.050    1.63 | 11.05     .93
               2.100     1.40 | 5.100    5.60 | 8.100    1.63 | 11.10     .93
               2.150     1.40 | 5.150    5.60 | 8.150    1.63 | 11.15     .93
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             2.200     1.40 | 5.200     5.60 | 8.200     1.63 | 11.20      .93
             2.250     1.40 | 5.250     5.60 | 8.250     1.63 | 11.25      .93
             2.300     1.40 | 5.300     5.60 | 8.300     1.63 | 11.30      .93
             2.350     1.40 | 5.350     5.60 | 8.350     1.63 | 11.35      .93
             2.400     1.40 | 5.400     5.60 | 8.400     1.63 | 11.40      .93
             2.450     1.40 | 5.450     5.60 | 8.450     1.63 | 11.45      .93
             2.500     1.40 | 5.500     5.60 | 8.500     1.63 | 11.50      .93
             2.550     1.40 | 5.550    22.42 | 8.550     1.63 | 11.55      .93
             2.600     1.40 | 5.600    22.42 | 8.600     1.63 | 11.60      .93
             2.650     1.40 | 5.650    22.42 | 8.650     1.63 | 11.65      .93
             2.700     1.40 | 5.700    22.42 | 8.700     1.63 | 11.70      .93
             2.750     1.40 | 5.750    22.42 | 8.750     1.63 | 11.75      .93
             2.800     1.40 | 5.800    61.64 | 8.800     1.63 | 11.80      .93
             2.850     1.40 | 5.850    61.64 | 8.850     1.63 | 11.85      .93
             2.900     1.40 | 5.900    61.64 | 8.900     1.63 | 11.90      .93
             2.950     1.40 | 5.950    61.64 | 8.950     1.63 | 11.95      .93
             3.000     1.40 | 6.000    61.64 | 9.000     1.63 | 12.00      .93

    Max.Eff.Inten.(mm/hr)=        61.64          9.70
             over (min)           6.00          45.00
    Storage Coeff.  (min)=         .79 (ii)     43.80 (ii)
    Unit Hyd. Tpeak (min)=        6.00          45.00
    Unit Hyd. peak  (cms)=         .37            .03
                                                           *TOTALS*
    PEAK FLOW        (cms)=         .01            .00          .012 (iii)
    TIME TO PEAK     (hrs)=         .00           6.65          6.00
    RUNOFF VOLUME     (mm)=       45.70          12.59         19.62
    TOTAL RAINFALL    (mm)=       46.70          46.70         46.70
    RUNOFF COEFFICIENT   =          .98            .27           .42

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0205) |   Area     (ha)=   1.20   Curve Number   (CN)= 71.2
|ID= 1 DT= 2.0 min |   Ia       (mm)=   2.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=     .03

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                            ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN | TIME    RAIN | TIME    RAIN  | TIME    RAIN
               hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr  |  hrs   mm/hr
              .033    1.17 | 3.033   1.87 | 6.033   8.41  |  9.03   1.63
              .067    1.17 | 3.067   1.87 | 6.067   8.41  |  9.07   1.63
              .100    1.17 | 3.100   1.87 | 6.100   8.41  |  9.10   1.63
              .133    1.17 | 3.133   1.87 | 6.133   8.41  |  9.13   1.63
              .167    1.17 | 3.167   1.87 | 6.167   8.41  |  9.17   1.63
              .200    1.17 | 3.200   1.87 | 6.200   8.41  |  9.20   1.63
              .233    1.17 | 3.233   1.87 | 6.233   8.41  |  9.23   1.63
              .267    1.17 | 3.267   1.87 | 6.267   8.41  |  9.27   1.63
              .300    1.17 | 3.300   1.87 | 6.300   8.41  |  9.30   1.63
              .333    1.17 | 3.333   1.87 | 6.333   8.41  |  9.33   1.63
              .367    1.17 | 3.367   1.87 | 6.367   8.41  |  9.37   1.63
              .400    1.17 | 3.400   1.87 | 6.400   8.41  |  9.40   1.63
              .433    1.17 | 3.433   1.87 | 6.433   8.41  |  9.43   1.63
              .467    1.17 | 3.467   1.87 | 6.467   8.41  |  9.47   1.63
              .500    1.17 | 3.500   1.87 | 6.500   8.41  |  9.50   1.63
              .533    1.17 | 3.533   1.87 | 6.533   3.74  |  9.53   1.63
              .567    1.17 | 3.567   1.87 | 6.567   3.74  |  9.57   1.63
              .600    1.17 | 3.600   1.87 | 6.600   3.74  |  9.60   1.63
              .633    1.17 | 3.633   1.87 | 6.633   3.74  |  9.63   1.63
              .667    1.17 | 3.667   1.87 | 6.667   3.74  |  9.67   1.63
              .700    1.17 | 3.700   1.87 | 6.700   3.74  |  9.70   1.63
              .733    1.17 | 3.733   1.87 | 6.733   3.74  |  9.73   1.63
              .767    1.17 | 3.767   1.87 | 6.767   3.74  |  9.77   1.63
              .800    1.17 | 3.800   1.87 | 6.800   3.74  |  9.80   1.63
              .833    1.17 | 3.833   1.87 | 6.833   3.74  |  9.83   1.63
              .867    1.17 | 3.867   1.87 | 6.867   3.74  |  9.87   1.63
              .900    1.17 | 3.900   1.87 | 6.900   3.74  |  9.90   1.63
              .933    1.17 | 3.933   1.87 | 6.933   3.74  |  9.93   1.63
              .967    1.17 | 3.967   1.87 | 6.967   3.74  |  9.97   1.63
             1.000    1.17 | 4.000   1.87 | 7.000   3.74  | 10.00   1.63
             1.033    1.17 | 4.033   2.80 | 7.033   2.80  | 10.03    .93
             1.067    1.17 | 4.067   2.80 | 7.067   2.80  | 10.07    .93
             1.100    1.17 | 4.100   2.80 | 7.100   2.80  | 10.10    .93
             1.133    1.17 | 4.133   2.80 | 7.133   2.80  | 10.13    .93
             1.167    1.17 | 4.167   2.80 | 7.167   2.80  | 10.17    .93
             1.200    1.17 | 4.200   2.80 | 7.200   2.80  | 10.20    .93
             1.233    1.17 | 4.233   2.80 | 7.233   2.80  | 10.23    .93
             1.267    1.17 | 4.267   2.80 | 7.267   2.80  | 10.27    .93
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            1.300    1.17 | 4.300    2.80 | 7.300    2.80 | 10.30     .93
            1.333    1.17 | 4.333    2.80 | 7.333    2.80 | 10.33     .93
            1.367    1.17 | 4.367    2.80 | 7.367    2.80 | 10.37     .93
            1.400    1.17 | 4.400    2.80 | 7.400    2.80 | 10.40     .93
            1.433    1.17 | 4.433    2.80 | 7.433    2.80 | 10.43     .93
            1.467    1.17 | 4.467    2.80 | 7.467    2.80 | 10.47     .93
            1.500    1.17 | 4.500    2.80 | 7.500    2.80 | 10.50     .93
            1.533    1.17 | 4.533    3.74 | 7.533    2.80 | 10.53     .93
            1.567    1.17 | 4.567    3.74 | 7.567    2.80 | 10.57     .93
            1.600    1.17 | 4.600    3.74 | 7.600    2.80 | 10.60     .93
            1.633    1.17 | 4.633    3.74 | 7.633    2.80 | 10.63     .93
            1.667    1.17 | 4.667    3.74 | 7.667    2.80 | 10.67     .93
            1.700    1.17 | 4.700    3.74 | 7.700    2.80 | 10.70     .93
            1.733    1.17 | 4.733    3.74 | 7.733    2.80 | 10.73     .93
            1.767    1.17 | 4.767    3.74 | 7.767    2.80 | 10.77     .93
            1.800    1.17 | 4.800    3.74 | 7.800    2.80 | 10.80     .93
            1.833    1.17 | 4.833    3.74 | 7.833    2.80 | 10.83     .93
            1.867    1.17 | 4.867    3.74 | 7.867    2.80 | 10.87     .93
            1.900    1.17 | 4.900    3.74 | 7.900    2.80 | 10.90     .93
            1.933    1.17 | 4.933    3.74 | 7.933    2.80 | 10.93     .93
            1.967    1.17 | 4.967    3.74 | 7.967    2.80 | 10.97     .93
            2.000    1.17 | 5.000    3.74 | 8.000    2.80 | 11.00     .93
            2.033    1.40 | 5.033    5.60 | 8.033    1.63 | 11.03     .93
            2.067    1.40 | 5.067    5.60 | 8.067    1.63 | 11.07     .93
            2.100    1.40 | 5.100    5.60 | 8.100    1.63 | 11.10     .93
            2.133    1.40 | 5.133    5.60 | 8.133    1.63 | 11.13     .93
            2.167    1.40 | 5.167    5.60 | 8.167    1.63 | 11.17     .93
            2.200    1.40 | 5.200    5.60 | 8.200    1.63 | 11.20     .93
            2.233    1.40 | 5.233    5.60 | 8.233    1.63 | 11.23     .93
            2.267    1.40 | 5.267    5.60 | 8.267    1.63 | 11.27     .93
            2.300    1.40 | 5.300    5.60 | 8.300    1.63 | 11.30     .93
            2.333    1.40 | 5.333    5.60 | 8.333    1.63 | 11.33     .93
            2.367    1.40 | 5.367    5.60 | 8.367    1.63 | 11.37     .93
            2.400    1.40 | 5.400    5.60 | 8.400    1.63 | 11.40     .93
            2.433    1.40 | 5.433    5.60 | 8.433    1.63 | 11.43     .93
            2.467    1.40 | 5.467    5.60 | 8.467    1.63 | 11.47     .93
            2.500    1.40 | 5.500    5.60 | 8.500    1.63 | 11.50     .93
            2.533    1.40 | 5.533   22.41 | 8.533    1.63 | 11.53     .93
            2.567    1.40 | 5.567   22.42 | 8.567    1.63 | 11.57     .93
            2.600    1.40 | 5.600   22.42 | 8.600    1.63 | 11.60     .93
            2.633    1.40 | 5.633   22.42 | 8.633    1.63 | 11.63     .93
            2.667    1.40 | 5.667   22.42 | 8.667    1.63 | 11.67     .93
            2.700    1.40 | 5.700   22.42 | 8.700    1.63 | 11.70     .93
            2.733    1.40 | 5.733   22.42 | 8.733    1.63 | 11.73     .93
            2.767    1.40 | 5.767   42.03 | 8.767    1.63 | 11.77     .93
            2.800    1.40 | 5.800   61.64 | 8.800    1.63 | 11.80     .93
            2.833    1.40 | 5.833   61.64 | 8.833    1.63 | 11.83     .93
            2.867    1.40 | 5.867   61.64 | 8.867    1.63 | 11.87     .93
            2.900    1.40 | 5.900   61.64 | 8.900    1.63 | 11.90     .93
            2.933    1.40 | 5.933   61.64 | 8.933    1.63 | 11.93     .93
            2.967    1.40 | 5.967   61.64 | 8.967    1.63 | 11.97     .93
            3.000    1.40 | 6.000   61.64 | 9.000    1.63 | 12.00     .93

  Unit Hyd Qpeak  (cms)=    1.528

  PEAK FLOW       (cms)=     .074 (i)
  TIME TO PEAK    (hrs)=    6.000
  RUNOFF VOLUME    (mm)=   12.600
  TOTAL RAINFALL   (mm)=   46.700
  RUNOFF COEFFICIENT   =     .270

  (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
-----------------
| CALIB           |
| STANDHYD  (0207) |  Area     (ha)=     .70
| D= 1 DT= 4.0 min |  Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
-----------------
                              IMPERVIOUS    PERVIOUS (i)
  Surface Area      (ha)=          .20           .50
  Dep. Storage      (mm)=         1.00          5.00
  Average Slope      (%)=          .94           .60
  Length             (m)=        10.00        191.40
  Mannings n            =         .013          .250

      NOTE:  RAINFALL WAS TRANSFORMED TO   4.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
             TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME    RAIN
              hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr
             .067    1.17 | 3.067    1.87 | 6.067    8.41 |  9.07    1.63
             .133    1.17 | 3.133    1.87 | 6.133    8.41 |  9.13    1.63
             .200    1.17 | 3.200    1.87 | 6.200    8.41 |  9.20    1.63
             .267    1.17 | 3.267    1.87 | 6.267    8.41 |  9.27    1.63
             .333    1.17 | 3.333    1.87 | 6.333    8.41 |  9.33    1.63
             .400    1.17 | 3.400    1.87 | 6.400    8.41 |  9.40    1.63
             .467    1.17 | 3.467    1.87 | 6.467    8.41 |  9.47    1.63
```

```
             .533     1.17 | 3.533     1.87 | 6.533     6.07 |  9.53     1.63
             .600     1.17 | 3.600     1.87 | 6.600     3.74 |  9.60     1.63
             .667     1.17 | 3.667     1.87 | 6.667     3.74 |  9.67     1.63
             .733     1.17 | 3.733     1.87 | 6.733     3.74 |  9.73     1.63
             .800     1.17 | 3.800     1.87 | 6.800     3.74 |  9.80     1.63
             .867     1.17 | 3.867     1.87 | 6.867     3.74 |  9.87     1.63
             .933     1.17 | 3.933     1.87 | 6.933     3.74 |  9.93     1.63
            1.000     1.17 | 4.000     1.87 | 7.000     3.74 | 10.00     1.63
            1.067     1.17 | 4.067     2.80 | 7.067     2.80 | 10.07      .93
            1.133     1.17 | 4.133     2.80 | 7.133     2.80 | 10.13      .93
            1.200     1.17 | 4.200     2.80 | 7.200     2.80 | 10.20      .93
            1.267     1.17 | 4.267     2.80 | 7.267     2.80 | 10.27      .93
            1.333     1.17 | 4.333     2.80 | 7.333     2.80 | 10.33      .93
            1.400     1.17 | 4.400     2.80 | 7.400     2.80 | 10.40      .93
            1.467     1.17 | 4.467     2.80 | 7.467     2.80 | 10.47      .93
            1.533     1.17 | 4.533     3.27 | 7.533     2.80 | 10.53      .93
            1.600     1.17 | 4.600     3.74 | 7.600     2.80 | 10.60      .93
            1.667     1.17 | 4.667     3.74 | 7.667     2.80 | 10.67      .93
            1.733     1.17 | 4.733     3.74 | 7.733     2.80 | 10.73      .93
            1.800     1.17 | 4.800     3.74 | 7.800     2.80 | 10.80      .93
            1.867     1.17 | 4.867     3.74 | 7.867     2.80 | 10.87      .93
            1.933     1.17 | 4.933     3.74 | 7.933     2.80 | 10.93      .93
            2.000     1.17 | 5.000     3.74 | 8.000     2.80 | 11.00      .93
            2.067     1.40 | 5.067     5.60 | 8.067     1.63 | 11.07      .93
            2.133     1.40 | 5.133     5.60 | 8.133     1.63 | 11.13      .93
            2.200     1.40 | 5.200     5.60 | 8.200     1.63 | 11.20      .93
            2.267     1.40 | 5.267     5.60 | 8.267     1.63 | 11.27      .93
            2.333     1.40 | 5.333     5.60 | 8.333     1.63 | 11.33      .93
            2.400     1.40 | 5.400     5.60 | 8.400     1.63 | 11.40      .93
            2.467     1.40 | 5.467     5.60 | 8.467     1.63 | 11.47      .93
            2.533     1.40 | 5.533    14.01 | 8.533     1.63 | 11.53      .93
            2.600     1.40 | 5.600    22.42 | 8.600     1.63 | 11.60      .93
            2.667     1.40 | 5.667    22.42 | 8.667     1.63 | 11.67      .93
            2.733     1.40 | 5.733    22.42 | 8.733     1.63 | 11.73      .93
            2.800     1.40 | 5.800    51.84 | 8.800     1.63 | 11.80      .93
            2.867     1.40 | 5.867    61.64 | 8.867     1.63 | 11.87      .93
            2.933     1.40 | 5.933    61.64 | 8.933     1.63 | 11.93      .93
            3.000     1.40 | 6.000    61.64 | 9.000     1.63 | 12.00      .93

     Max.Eff.Inten.(mm/hr)=      61.64           8.18
               over (min)         5.00          72.00
     Storage Coeff.  (min)=        .79 (ii)     71.33 (ii)
     Unit Hyd. Tpeak (min)=       4.00          72.00
     Unit Hyd. peak  (cms)=        .42            .02
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .03            .01         .027 (iii)
     TIME TO PEAK    (hrs)=        .00           7.13         6.00
     RUNOFF VOLUME    (mm)=      45.70          12.59        19.65
     TOTAL RAINFALL   (mm)=      46.70          46.70        46.70
     RUNOFF COEFFICIENT   =        .98            .27          .42

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD   (1000) |
|   1 +  2 =  3    |       AREA    QPEAK    TPEAK     R.V.
-------------------        (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0202):     .50     .019     6.00    19.63
       + ID2= 2 (0201):     .30     .012     6.00    19.62
         ==================================================
         ID = 3 (1000):     .80     .031     6.00    19.62

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| ADD HYD   (1001) |
|   1 +  2 =  3    |       AREA    QPEAK    TPEAK     R.V.
-------------------        (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0203):    8.01     .346     6.05    21.33
       + ID2= 2 (1000):     .80     .031     6.00    19.62
         ==================================================
         ID = 3 (1001):    8.81     .373     6.00    21.17

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| ADD HYD   (1002) |
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|  1 +  2 =  3     |            AREA      QPEAK     TPEAK      R.V.
 ------------------             (ha)      (cms)     (hrs)      (mm)
         ID1= 1 (0204):         2.82      .057      6.00      15.59
       + ID2= 2 (1001):         8.81      .373      6.00      21.17
         ===============================================
         ID = 3 (1002):        11.63      .430      6.00      19.82

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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  -----------------
  ADD HYD   (1003) |
|  1 +  2 =  3     |            AREA      QPEAK     TPEAK      R.V.
 ------------------             (ha)      (cms)     (hrs)      (mm)
         ID1= 1 (0206):         6.18      .030      6.83       4.76
       + ID2= 2 (1002):        11.63      .430      6.00      19.82
         ===============================================
         ID = 3 (1003):        17.81      .439      6.00      14.59

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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  -----------------
  ADD HYD   (1004) |
   1 +  2 =  3     |            AREA      QPEAK     TPEAK      R.V.
 ------------------             (ha)      (cms)     (hrs)      (mm)
         ID1= 1 (1003):        17.81      .439      6.00      14.59
       + ID2= 2 (0205):         1.20      .074      6.00      12.60
         ===============================================
         ID = 3 (1004):        19.01      .514      6.00      14.47

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
 ------------------
| RESERVOIR (0001) |
| IN= 2---> OUT= 1 |
  DT=  5.0 min     |      OUTFLOW    STORAGE   |   OUTFLOW    STORAGE
  -----------------        (cms)     (ha.m.)   |    (cms)     (ha.m.)
                           .0000      .0000    |    .4210      .4838
                           .0110      .0717    |    .5580      .6088
                           .0190      .1729    |    .6660      .7402
                           .0250      .1992    |    .6910      .7740
                           .0440      .2529    |   1.0560      .8779
                           .0800      .3083    |   1.6620      .9853
                           .2030      .3652    |   2.4240     1.0963

                               AREA      QPEAK       TPEAK        R.V.
                               (ha)      (cms)       (hrs)        (mm)
    INFLOW : ID= 2 (1004)     19.01        .51        6.00       14.47
    OUTFLOW: ID= 1 (0001)     19.01        .03       10.87       13.76

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.84
                 TIME SHIFT OF PEAK FLOW         (min)=292.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=   .2133

    **** WARNING : SELECTED ROUTING TIME STEP DENIED.
  ----------------------------------------------------------------------

 ------------------
  ADD HYD   (1005) |
   1 +  2 =  3     |            AREA      QPEAK     TPEAK      R.V.
  -----------------             (ha)      (cms)     (hrs)      (mm)
         ID1= 1 (0001):        19.01      .030     10.87      13.76
       + ID2= 2 (0207):          .70      .027      6.00      19.65
         ===============================================
         ID = 3 (1005):        19.71      .037      6.00      13.97

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

  ----------------------------------------------------------------------

 ------------------
| ADD HYD   (1006) |
|  1 +  2 =  3     |            AREA      QPEAK     TPEAK      R.V.
  -----------------             (ha)      (cms)     (hrs)      (mm)
         ID1= 1 (0208):          .50      .011      6.00       4.64
       + ID2= 2 (1005):        19.71      .037      6.00      13.97
         ===============================================
         ID = 3 (1006):        20.21      .049      6.00      13.73

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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  ****************************
  ** SIMULATION NUMBER:   2 **
  ****************************
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 |   READ STORM      |     Filename: K:\PROJECT FILES\200000 - 299999\
 |                   |               210987 - 010 - Innisfil Executive Estates\
 |                   |               SWM\OTTHYMO 3rd Submission\SCS5.STM
 | Ptotal= 64.30 mm  |     Comments: 5 YR. SCS. STORM
 --------------------
                   TIME     RAIN |  TIME     RAIN  |  TIME     RAIN  |  TIME     RAIN
                    hrs    mm/hr |   hrs    mm/hr  |   hrs    mm/hr  |   hrs    mm/hr
                    .25     1.61 |  3.25     2.57  |  6.25    11.57  |  9.25     2.25
                    .50     1.61 |  3.50     2.57  |  6.50    11.57  |  9.50     2.25
                    .75     1.61 |  3.75     2.57  |  6.75     5.14  |  9.75     2.25
                   1.00     1.61 |  4.00     2.57  |  7.00     5.14  | 10.00     2.25
                   1.25     1.61 |  4.25     3.86  |  7.25     3.86  | 10.25     1.29
                   1.50     1.61 |  4.50     3.86  |  7.50     3.86  | 10.50     1.29
                   1.75     1.61 |  4.75     5.14  |  7.75     3.86  | 10.75     1.29
                   2.00     1.61 |  5.00     5.14  |  8.00     3.86  | 11.00     1.29
                   2.25     1.93 |  5.25     7.72  |  8.25     2.25  | 11.25     1.29
                   2.50     1.93 |  5.50     7.72  |  8.50     2.25  | 11.50     1.29
                   2.75     1.93 |  5.75    30.86  |  8.75     2.25  | 11.75     1.29
                   3.00     1.93 |  6.00    84.88  |  9.00     2.25  | 12.00     1.29

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 --------------------
| CALIB              |
| NASHYD     (0208)  |    Area     (ha)=     .50    Curve Number    (CN)= 44.0
|ID= 1 DT= 2.0 min   |    Ia       (mm)=    5.00    # of Linear Res.(N)= 3.00
 --------------------     U.H. Tp(hrs)=     .04

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                  .033     1.61 | 3.033     2.57 | 6.033    11.58 |  9.03     2.25
                  .067     1.61 | 3.067     2.57 | 6.067    11.57 |  9.07     2.25
                  .100     1.61 | 3.100     2.57 | 6.100    11.57 |  9.10     2.25
                  .133     1.61 | 3.133     2.57 | 6.133    11.57 |  9.13     2.25
                  .167     1.61 | 3.167     2.57 | 6.167    11.57 |  9.17     2.25
                  .200     1.61 | 3.200     2.57 | 6.200    11.57 |  9.20     2.25
                  .233     1.61 | 3.233     2.57 | 6.233    11.57 |  9.23     2.25
                  .267     1.61 | 3.267     2.57 | 6.267    11.57 |  9.27     2.25
                  .300     1.61 | 3.300     2.57 | 6.300    11.57 |  9.30     2.25
                  .333     1.61 | 3.333     2.57 | 6.333    11.57 |  9.33     2.25
                  .367     1.61 | 3.367     2.57 | 6.367    11.57 |  9.37     2.25
                  .400     1.61 | 3.400     2.57 | 6.400    11.57 |  9.40     2.25
                  .433     1.61 | 3.433     2.57 | 6.433    11.57 |  9.43     2.25
                  .467     1.61 | 3.467     2.57 | 6.467    11.57 |  9.47     2.25
                  .500     1.61 | 3.500     2.57 | 6.500    11.57 |  9.50     2.25
                  .533     1.61 | 3.533     2.57 | 6.533     5.14 |  9.53     2.25
                  .567     1.61 | 3.567     2.57 | 6.567     5.14 |  9.57     2.25
                  .600     1.61 | 3.600     2.57 | 6.600     5.14 |  9.60     2.25
                  .633     1.61 | 3.633     2.57 | 6.633     5.14 |  9.63     2.25
                  .667     1.61 | 3.667     2.57 | 6.667     5.14 |  9.67     2.25
                  .700     1.61 | 3.700     2.57 | 6.700     5.14 |  9.70     2.25
                  .733     1.61 | 3.733     2.57 | 6.733     5.14 |  9.73     2.25
                  .767     1.61 | 3.767     2.57 | 6.767     5.14 |  9.77     2.25
                  .800     1.61 | 3.800     2.57 | 6.800     5.14 |  9.80     2.25
                  .833     1.61 | 3.833     2.57 | 6.833     5.14 |  9.83     2.25
                  .867     1.61 | 3.867     2.57 | 6.867     5.14 |  9.87     2.25
                  .900     1.61 | 3.900     2.57 | 6.900     5.14 |  9.90     2.25
                  .933     1.61 | 3.933     2.57 | 6.933     5.14 |  9.93     2.25
                  .967     1.61 | 3.967     2.57 | 6.967     5.14 |  9.97     2.25
                 1.000     1.61 | 4.000     2.57 | 7.000     5.14 | 10.00     2.25
                 1.033     1.61 | 4.033     3.86 | 7.033     3.86 | 10.03     1.29
                 1.067     1.61 | 4.067     3.86 | 7.067     3.86 | 10.07     1.29
                 1.100     1.61 | 4.100     3.86 | 7.100     3.86 | 10.10     1.29
                 1.133     1.61 | 4.133     3.86 | 7.133     3.86 | 10.13     1.29
                 1.167     1.61 | 4.167     3.86 | 7.167     3.86 | 10.17     1.29
                 1.200     1.61 | 4.200     3.86 | 7.200     3.86 | 10.20     1.29
                 1.233     1.61 | 4.233     3.86 | 7.233     3.86 | 10.23     1.29
                 1.267     1.61 | 4.267     3.86 | 7.267     3.86 | 10.27     1.29
                 1.300     1.61 | 4.300     3.86 | 7.300     3.86 | 10.30     1.29
                 1.333     1.61 | 4.333     3.86 | 7.333     3.86 | 10.33     1.29
                 1.367     1.61 | 4.367     3.86 | 7.367     3.86 | 10.37     1.29
                 1.400     1.61 | 4.400     3.86 | 7.400     3.86 | 10.40     1.29
                 1.433     1.61 | 4.433     3.86 | 7.433     3.86 | 10.43     1.29
                 1.467     1.61 | 4.467     3.86 | 7.467     3.86 | 10.47     1.29
                 1.500     1.61 | 4.500     3.86 | 7.500     3.86 | 10.50     1.29
                 1.533     1.61 | 4.533     5.14 | 7.533     3.86 | 10.53     1.29
                 1.567     1.61 | 4.567     5.14 | 7.567     3.86 | 10.57     1.29
                 1.600     1.61 | 4.600     5.14 | 7.600     3.86 | 10.60     1.29
                 1.633     1.61 | 4.633     5.14 | 7.633     3.86 | 10.63     1.29
                 1.667     1.61 | 4.667     5.14 | 7.667     3.86 | 10.67     1.29
                 1.700     1.61 | 4.700     5.14 | 7.700     3.86 | 10.70     1.29
                 1.733     1.61 | 4.733     5.14 | 7.733     3.86 | 10.73     1.29
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            1.767     1.61 | 4.767     5.14 | 7.767     3.86 | 10.77     1.29
            1.800     1.61 | 4.800     5.14 | 7.800     3.86 | 10.80     1.29
            1.833     1.61 | 4.833     5.14 | 7.833     3.86 | 10.83     1.29
            1.867     1.61 | 4.867     5.14 | 7.867     3.86 | 10.87     1.29
            1.900     1.61 | 4.900     5.14 | 7.900     3.86 | 10.90     1.29
            1.933     1.61 | 4.933     5.14 | 7.933     3.86 | 10.93     1.29
            1.967     1.61 | 4.967     5.14 | 7.967     3.86 | 10.97     1.29
            2.000     1.61 | 5.000     5.14 | 8.000     3.86 | 11.00     1.29
            2.033     1.93 | 5.033     7.72 | 8.033     2.25 | 11.03     1.29
            2.067     1.93 | 5.067     7.72 | 8.067     2.25 | 11.07     1.29
            2.100     1.93 | 5.100     7.72 | 8.100     2.25 | 11.10     1.29
            2.133     1.93 | 5.133     7.72 | 8.133     2.25 | 11.13     1.29
            2.167     1.93 | 5.167     7.72 | 8.167     2.25 | 11.17     1.29
            2.200     1.93 | 5.200     7.72 | 8.200     2.25 | 11.20     1.29
            2.233     1.93 | 5.233     7.72 | 8.233     2.25 | 11.23     1.29
            2.267     1.93 | 5.267     7.72 | 8.267     2.25 | 11.27     1.29
            2.300     1.93 | 5.300     7.72 | 8.300     2.25 | 11.30     1.29
            2.333     1.93 | 5.333     7.72 | 8.333     2.25 | 11.33     1.29
            2.367     1.93 | 5.367     7.72 | 8.367     2.25 | 11.37     1.29
            2.400     1.93 | 5.400     7.72 | 8.400     2.25 | 11.40     1.29
            2.433     1.93 | 5.433     7.72 | 8.433     2.25 | 11.43     1.29
            2.467     1.93 | 5.467     7.72 | 8.467     2.25 | 11.47     1.29
            2.500     1.93 | 5.500     7.72 | 8.500     2.25 | 11.50     1.29
            2.533     1.93 | 5.533    30.86 | 8.533     2.25 | 11.53     1.29
            2.567     1.93 | 5.567    30.86 | 8.567     2.25 | 11.57     1.29
            2.600     1.93 | 5.600    30.86 | 8.600     2.25 | 11.60     1.29
            2.633     1.93 | 5.633    30.86 | 8.633     2.25 | 11.63     1.29
            2.667     1.93 | 5.667    30.86 | 8.667     2.25 | 11.67     1.29
            2.700     1.93 | 5.700    30.86 | 8.700     2.25 | 11.70     1.29
            2.733     1.93 | 5.733    30.86 | 8.733     2.25 | 11.73     1.29
            2.767     1.93 | 5.767    57.86 | 8.767     2.25 | 11.77     1.29
            2.800     1.93 | 5.800    84.88 | 8.800     2.25 | 11.80     1.29
            2.833     1.93 | 5.833    84.88 | 8.833     2.25 | 11.83     1.29
            2.867     1.93 | 5.867    84.88 | 8.867     2.25 | 11.87     1.29
            2.900     1.93 | 5.900    84.88 | 8.900     2.25 | 11.90     1.29
            2.933     1.93 | 5.933    84.88 | 8.933     2.25 | 11.93     1.29
            2.967     1.93 | 5.967    84.88 | 8.967     2.25 | 11.97     1.29
            3.000     1.93 | 6.000    84.88 | 9.000     2.25 | 12.00     1.28

   Unit Hyd Qpeak  (cms)=     .477

   PEAK FLOW        (cms)=     .022  (i)
   TIME TO PEAK     (hrs)=    6.000
   RUNOFF VOLUME     (mm)=    8.953
   TOTAL RAINFALL    (mm)=   64.300
   RUNOFF COEFFICIENT   =     .139

   (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| NASHYD    (0206) |   Area      (ha)=    6.18   Curve Number    (CN)= 44.0
| D= 1 DT=10.0 min |   Ia        (mm)=    5.00   # of Linear Res.(N)= 3.00
------------------     U.H. Tp(hrs)=     .81

       NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
               TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
               .167     1.61 | 3.167     2.57 | 6.167    11.57 |  9.17     2.25
               .333     1.61 | 3.333     2.57 | 6.333    11.57 |  9.33     2.25
               .500     1.61 | 3.500     2.57 | 6.500    11.57 |  9.50     2.25
               .667     1.61 | 3.667     2.57 | 6.667     5.14 |  9.67     2.25
               .833     1.61 | 3.833     2.57 | 6.833     5.14 |  9.83     2.25
              1.000     1.61 | 4.000     2.57 | 7.000     5.14 | 10.00     2.25
              1.167     1.61 | 4.167     3.86 | 7.167     3.86 | 10.17     1.29
              1.333     1.61 | 4.333     3.86 | 7.333     3.86 | 10.33     1.29
              1.500     1.61 | 4.500     3.86 | 7.500     3.86 | 10.50     1.29
              1.667     1.61 | 4.667     5.14 | 7.667     3.86 | 10.67     1.29
              1.833     1.61 | 4.833     5.14 | 7.833     3.86 | 10.83     1.29
              2.000     1.61 | 5.000     5.14 | 8.000     3.86 | 11.00     1.29
              2.167     1.93 | 5.167     7.72 | 8.167     2.25 | 11.17     1.29
              2.333     1.93 | 5.333     7.72 | 8.333     2.25 | 11.33     1.29
              2.500     1.93 | 5.500     7.72 | 8.500     2.25 | 11.50     1.29
              2.667     1.93 | 5.667    30.86 | 8.667     2.25 | 11.67     1.29
              2.833     1.93 | 5.833    57.87 | 8.833     2.25 | 11.83     1.29
              3.000     1.93 | 6.000    84.88 | 9.000     2.25 | 12.00     1.29

   Unit Hyd Qpeak  (cms)=     .291

   PEAK FLOW        (cms)=     .059  (i)
   TIME TO PEAK     (hrs)=    6.833
   RUNOFF VOLUME     (mm)=    9.190
   TOTAL RAINFALL    (mm)=   64.300
   RUNOFF COEFFICIENT   =     .143
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    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB             |
| STANDHYD  (0204)  |   Area     (ha)=    2.82
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  14.30   Dir. Conn.(%)=  10.70
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      .40          2.42
     Dep. Storage     (mm)=     1.00          5.00
     Average Slope     (%)=     1.58          2.50
     Length            (m)=   140.00        284.40
     Mannings n           =     .013          .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .083    1.61 | 3.083    2.57 | 6.083   11.57 |  9.08    2.25
                 .167    1.61 | 3.167    2.57 | 6.167   11.57 |  9.17    2.25
                 .250    1.61 | 3.250    2.57 | 6.250   11.57 |  9.25    2.25
                 .333    1.61 | 3.333    2.57 | 6.333   11.57 |  9.33    2.25
                 .417    1.61 | 3.417    2.57 | 6.417   11.57 |  9.42    2.25
                 .500    1.61 | 3.500    2.57 | 6.500   11.57 |  9.50    2.25
                 .583    1.61 | 3.583    2.57 | 6.583    5.14 |  9.58    2.25
                 .667    1.61 | 3.667    2.57 | 6.667    5.14 |  9.67    2.25
                 .750    1.61 | 3.750    2.57 | 6.750    5.14 |  9.75    2.25
                 .833    1.61 | 3.833    2.57 | 6.833    5.14 |  9.83    2.25
                 .917    1.61 | 3.917    2.57 | 6.917    5.14 |  9.92    2.25
                1.000    1.61 | 4.000    2.57 | 7.000    5.14 | 10.00    2.25
                1.083    1.61 | 4.083    3.86 | 7.083    3.86 | 10.08    1.29
                1.167    1.61 | 4.167    3.86 | 7.167    3.86 | 10.17    1.29
                1.250    1.61 | 4.250    3.86 | 7.250    3.86 | 10.25    1.29
                1.333    1.61 | 4.333    3.86 | 7.333    3.86 | 10.33    1.29
                1.417    1.61 | 4.417    3.86 | 7.417    3.86 | 10.42    1.29
                1.500    1.61 | 4.500    3.86 | 7.500    3.86 | 10.50    1.29
                1.583    1.61 | 4.583    5.14 | 7.583    3.86 | 10.58    1.29
                1.667    1.61 | 4.667    5.14 | 7.667    3.86 | 10.67    1.29
                1.750    1.61 | 4.750    5.14 | 7.750    3.86 | 10.75    1.29
                1.833    1.61 | 4.833    5.14 | 7.833    3.86 | 10.83    1.29
                1.917    1.61 | 4.917    5.14 | 7.917    3.86 | 10.92    1.29
                2.000    1.61 | 5.000    5.14 | 8.000    3.86 | 11.00    1.29
                2.083    1.93 | 5.083    7.72 | 8.083    2.25 | 11.08    1.29
                2.167    1.93 | 5.167    7.72 | 8.167    2.25 | 11.17    1.29
                2.250    1.93 | 5.250    7.72 | 8.250    2.25 | 11.25    1.29
                2.333    1.93 | 5.333    7.72 | 8.333    2.25 | 11.33    1.29
                2.417    1.93 | 5.417    7.72 | 8.417    2.25 | 11.42    1.29
                2.500    1.93 | 5.500    7.72 | 8.500    2.25 | 11.50    1.29
                2.583    1.93 | 5.583   30.86 | 8.583    2.25 | 11.58    1.29
                2.667    1.93 | 5.667   30.86 | 8.667    2.25 | 11.67    1.29
                2.750    1.93 | 5.750   30.86 | 8.750    2.25 | 11.75    1.29
                2.833    1.93 | 5.833   84.88 | 8.833    2.25 | 11.83    1.29
                2.917    1.93 | 5.917   84.88 | 8.917    2.25 | 11.92    1.29
                3.000    1.93 | 6.000   84.87 | 9.000    2.25 | 12.00    1.29

     Max.Eff.Inten.(mm/hr)=       84.88         15.97
               over (min)          5.00         50.00
     Storage Coeff.  (min)=        2.91 (ii)    47.52 (ii)
     Unit Hyd. Tpeak (min)=        5.00         50.00
     Unit Hyd. peak  (cms)=         .28           .02
                                                          *TOTALS*
     PEAK FLOW        (cms)=        .07           .06         .089 (iii)
     TIME TO PEAK     (hrs)=        .00          6.75         6.00
     RUNOFF VOLUME     (mm)=      63.30         21.59        26.04
     TOTAL RAINFALL    (mm)=      64.30         64.30        64.30
     RUNOFF COEFFICIENT   =         .98           .34          .41

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =   70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB             |
| STANDHYD  (0203)  |   Area     (ha)=    8.01
|ID= 1 DT= 3.0 min  |   Total Imp(%)=  34.30   Dir. Conn.(%)=  25.70
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     2.75          5.26
     Dep. Storage     (mm)=     1.00          5.00
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Average Slope      (%)=          .79          2.00
Length             (m)=       414.00         86.00
Mannings n            =         .013          .250

    NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                      ---- TRANSFORMED HYETOGRAPH ----
             TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
             .050    1.61 | 3.050    2.57 | 6.050   11.57 |  9.05    2.25
             .100    1.61 | 3.100    2.57 | 6.100   11.57 |  9.10    2.25
             .150    1.61 | 3.150    2.57 | 6.150   11.57 |  9.15    2.25
             .200    1.61 | 3.200    2.57 | 6.200   11.57 |  9.20    2.25
             .250    1.61 | 3.250    2.57 | 6.250   11.57 |  9.25    2.25
             .300    1.61 | 3.300    2.57 | 6.300   11.57 |  9.30    2.25
             .350    1.61 | 3.350    2.57 | 6.350   11.57 |  9.35    2.25
             .400    1.61 | 3.400    2.57 | 6.400   11.57 |  9.40    2.25
             .450    1.61 | 3.450    2.57 | 6.450   11.57 |  9.45    2.25
             .500    1.61 | 3.500    2.57 | 6.500   11.57 |  9.50    2.25
             .550    1.61 | 3.550    2.57 | 6.550    5.14 |  9.55    2.25
             .600    1.61 | 3.600    2.57 | 6.600    5.14 |  9.60    2.25
             .650    1.61 | 3.650    2.57 | 6.650    5.14 |  9.65    2.25
             .700    1.61 | 3.700    2.57 | 6.700    5.14 |  9.70    2.25
             .750    1.61 | 3.750    2.57 | 6.750    5.14 |  9.75    2.25
             .800    1.61 | 3.800    2.57 | 6.800    5.14 |  9.80    2.25
             .850    1.61 | 3.850    2.57 | 6.850    5.14 |  9.85    2.25
             .900    1.61 | 3.900    2.57 | 6.900    5.14 |  9.90    2.25
             .950    1.61 | 3.950    2.57 | 6.950    5.14 |  9.95    2.25
            1.000    1.61 | 4.000    2.57 | 7.000    5.14 | 10.00    2.25
            1.050    1.61 | 4.050    3.86 | 7.050    3.86 | 10.05    1.29
            1.100    1.61 | 4.100    3.86 | 7.100    3.86 | 10.10    1.29
            1.150    1.61 | 4.150    3.86 | 7.150    3.86 | 10.15    1.29
            1.200    1.61 | 4.200    3.86 | 7.200    3.86 | 10.20    1.29
            1.250    1.61 | 4.250    3.86 | 7.250    3.86 | 10.25    1.29
            1.300    1.61 | 4.300    3.86 | 7.300    3.86 | 10.30    1.29
            1.350    1.61 | 4.350    3.86 | 7.350    3.86 | 10.35    1.29
            1.400    1.61 | 4.400    3.86 | 7.400    3.86 | 10.40    1.29
            1.450    1.61 | 4.450    3.86 | 7.450    3.86 | 10.45    1.29
            1.500    1.61 | 4.500    3.86 | 7.500    3.86 | 10.50    1.29
            1.550    1.61 | 4.550    5.14 | 7.550    3.86 | 10.55    1.29
            1.600    1.61 | 4.600    5.14 | 7.600    3.86 | 10.60    1.29
            1.650    1.61 | 4.650    5.14 | 7.650    3.86 | 10.65    1.29
            1.700    1.61 | 4.700    5.14 | 7.700    3.86 | 10.70    1.29
            1.750    1.61 | 4.750    5.14 | 7.750    3.86 | 10.75    1.29
            1.800    1.61 | 4.800    5.14 | 7.800    3.86 | 10.80    1.29
            1.850    1.61 | 4.850    5.14 | 7.850    3.86 | 10.85    1.29
            1.900    1.61 | 4.900    5.14 | 7.900    3.86 | 10.90    1.29
            1.950    1.61 | 4.950    5.14 | 7.950    3.86 | 10.95    1.29
            2.000    1.61 | 5.000    5.14 | 8.000    3.86 | 11.00    1.29
            2.050    1.93 | 5.050    7.72 | 8.050    2.25 | 11.05    1.29
            2.100    1.93 | 5.100    7.72 | 8.100    2.25 | 11.10    1.29
            2.150    1.93 | 5.150    7.72 | 8.150    2.25 | 11.15    1.29
            2.200    1.93 | 5.200    7.72 | 8.200    2.25 | 11.20    1.29
            2.250    1.93 | 5.250    7.72 | 8.250    2.25 | 11.25    1.29
            2.300    1.93 | 5.300    7.72 | 8.300    2.25 | 11.30    1.29
            2.350    1.93 | 5.350    7.72 | 8.350    2.25 | 11.35    1.29
            2.400    1.93 | 5.400    7.72 | 8.400    2.25 | 11.40    1.29
            2.450    1.93 | 5.450    7.72 | 8.450    2.25 | 11.45    1.29
            2.500    1.93 | 5.500    7.72 | 8.500    2.25 | 11.50    1.29
            2.550    1.93 | 5.550   30.86 | 8.550    2.25 | 11.55    1.29
            2.600    1.93 | 5.600   30.86 | 8.600    2.25 | 11.60    1.29
            2.650    1.93 | 5.650   30.86 | 8.650    2.25 | 11.65    1.29
            2.700    1.93 | 5.700   30.86 | 8.700    2.25 | 11.70    1.29
            2.750    1.93 | 5.750   30.87 | 8.750    2.25 | 11.75    1.29
            2.800    1.93 | 5.800   84.88 | 8.800    2.25 | 11.80    1.29
            2.850    1.93 | 5.850   84.88 | 8.850    2.25 | 11.85    1.29
            2.900    1.93 | 5.900   84.88 | 8.900    2.25 | 11.90    1.29
            2.950    1.93 | 5.950   84.88 | 8.950    2.25 | 11.95    1.29
            3.000    1.93 | 6.000   84.87 | 9.000    2.25 | 12.00    1.29

Max.Eff.Inten.(mm/hr)=        84.88         34.88
           over (min)          6.00         24.00
Storage Coeff.  (min)=         6.87 (ii)    23.89 (ii)
Unit Hyd. Tpeak (min)=         6.00         24.00
Unit Hyd. peak  (cms)=          .17           .05
                                                       *TOTALS*
PEAK FLOW        (cms)=         .44           .26        .579 (iii)
TIME TO PEAK     (hrs)=         .00          6.30        6.00
RUNOFF VOLUME     (mm)=       63.30         22.96       33.33
TOTAL RAINFALL    (mm)=       64.30         64.30       64.30
RUNOFF COEFFICIENT    =         .98           .36         .52


    (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN*  =  70.0    Ia = Dep. Storage  (Above)
   (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
  (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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| CALIB              |
| STANDHYD  (0202)   |   Area     (ha)=     .50
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .14          .36
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=       .80         1.00
     Length            (m)=     10.00       218.20
     Mannings n           =      .013         .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .083    1.61 | 3.083    2.57 | 6.083   11.57 |  9.08    2.25
                 .167    1.61 | 3.167    2.57 | 6.167   11.57 |  9.17    2.25
                 .250    1.61 | 3.250    2.57 | 6.250   11.57 |  9.25    2.25
                 .333    1.61 | 3.333    2.57 | 6.333   11.57 |  9.33    2.25
                 .417    1.61 | 3.417    2.57 | 6.417   11.57 |  9.42    2.25
                 .500    1.61 | 3.500    2.57 | 6.500   11.57 |  9.50    2.25
                 .583    1.61 | 3.583    2.57 | 6.583    5.14 |  9.58    2.25
                 .667    1.61 | 3.667    2.57 | 6.667    5.14 |  9.67    2.25
                 .750    1.61 | 3.750    2.57 | 6.750    5.14 |  9.75    2.25
                 .833    1.61 | 3.833    2.57 | 6.833    5.14 |  9.83    2.25
                 .917    1.61 | 3.917    2.57 | 6.917    5.14 |  9.92    2.25
                1.000    1.61 | 4.000    2.57 | 7.000    5.14 | 10.00    2.25
                1.083    1.61 | 4.083    3.86 | 7.083    3.86 | 10.08    1.29
                1.167    1.61 | 4.167    3.86 | 7.167    3.86 | 10.17    1.29
                1.250    1.61 | 4.250    3.86 | 7.250    3.86 | 10.25    1.29
                1.333    1.61 | 4.333    3.86 | 7.333    3.86 | 10.33    1.29
                1.417    1.61 | 4.417    3.86 | 7.417    3.86 | 10.42    1.29
                1.500    1.61 | 4.500    3.86 | 7.500    3.86 | 10.50    1.29
                1.583    1.61 | 4.583    5.14 | 7.583    3.86 | 10.58    1.29
                1.667    1.61 | 4.667    5.14 | 7.667    3.86 | 10.67    1.29
                1.750    1.61 | 4.750    5.14 | 7.750    3.86 | 10.75    1.29
                1.833    1.61 | 4.833    5.14 | 7.833    3.86 | 10.83    1.29
                1.917    1.61 | 4.917    5.14 | 7.917    3.86 | 10.92    1.29
                2.000    1.61 | 5.000    5.14 | 8.000    3.86 | 11.00    1.29
                2.083    1.93 | 5.083    7.72 | 8.083    2.25 | 11.08    1.29
                2.167    1.93 | 5.167    7.72 | 8.167    2.25 | 11.17    1.29
                2.250    1.93 | 5.250    7.72 | 8.250    2.25 | 11.25    1.29
                2.333    1.93 | 5.333    7.72 | 8.333    2.25 | 11.33    1.29
                2.417    1.93 | 5.417    7.72 | 8.417    2.25 | 11.42    1.29
                2.500    1.93 | 5.500    7.72 | 8.500    2.25 | 11.50    1.29
                2.583    1.93 | 5.583   30.86 | 8.583    2.25 | 11.58    1.29
                2.667    1.93 | 5.667   30.86 | 8.667    2.25 | 11.67    1.29
                2.750    1.93 | 5.750   30.86 | 8.750    2.25 | 11.75    1.29
                2.833    1.93 | 5.833   84.88 | 8.833    2.25 | 11.83    1.29
                2.917    1.93 | 5.917   84.88 | 8.917    2.25 | 11.92    1.29
                3.000    1.93 | 6.000   84.87 | 9.000    2.25 | 12.00    1.29

    Max.Eff.Inten.(mm/hr)=       84.88          16.49
               over (min)        5.00           55.00
    Storage Coeff.   (min)=        .73 (ii)      50.18 (ii)
    Unit Hyd. Tpeak  (min)=       5.00           55.00
    Unit Hyd. peak   (cms)=        .34             .02
                                                               *TOTALS*
    PEAK FLOW        (cms)=        .03             .01             .028 (iii)
    TIME TO PEAK     (hrs)=        .00            6.75             6.00
    RUNOFF VOLUME     (mm)=      63.30           22.49            31.20
    TOTAL RAINFALL    (mm)=      64.30           64.30            64.30
    RUNOFF COEFFICIENT   =         .98             .35              .49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 CALIB             |
 STANDHYD  (0201)  |   Area     (ha)=     .30
ID= 1 DT= 3.0 min  |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
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                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       .09          .21
    Dep. Storage     (mm)=      1.00         5.00
    Average Slope     (%)=       .97          .97
    Length            (m)=     10.00       119.60
    Mannings n           =      .013         .250
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 NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN | TIME     RAIN | TIME     RAIN | TIME     RAIN
           hrs   mm/hr |  hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr
          .050    1.61 | 3.050    2.57 | 6.050   11.57 |  9.05    2.25
          .100    1.61 | 3.100    2.57 | 6.100   11.57 |  9.10    2.25
          .150    1.61 | 3.150    2.57 | 6.150   11.57 |  9.15    2.25
          .200    1.61 | 3.200    2.57 | 6.200   11.57 |  9.20    2.25
          .250    1.61 | 3.250    2.57 | 6.250   11.57 |  9.25    2.25
          .300    1.61 | 3.300    2.57 | 6.300   11.57 |  9.30    2.25
          .350    1.61 | 3.350    2.57 | 6.350   11.57 |  9.35    2.25
          .400    1.61 | 3.400    2.57 | 6.400   11.57 |  9.40    2.25
          .450    1.61 | 3.450    2.57 | 6.450   11.57 |  9.45    2.25
          .500    1.61 | 3.500    2.57 | 6.500   11.57 |  9.50    2.25
          .550    1.61 | 3.550    2.57 | 6.550    5.14 |  9.55    2.25
          .600    1.61 | 3.600    2.57 | 6.600    5.14 |  9.60    2.25
          .650    1.61 | 3.650    2.57 | 6.650    5.14 |  9.65    2.25
          .700    1.61 | 3.700    2.57 | 6.700    5.14 |  9.70    2.25
          .750    1.61 | 3.750    2.57 | 6.750    5.14 |  9.75    2.25
          .800    1.61 | 3.800    2.57 | 6.800    5.14 |  9.80    2.25
          .850    1.61 | 3.850    2.57 | 6.850    5.14 |  9.85    2.25
          .900    1.61 | 3.900    2.57 | 6.900    5.14 |  9.90    2.25
          .950    1.61 | 3.950    2.57 | 6.950    5.14 |  9.95    2.25
         1.000    1.61 | 4.000    2.57 | 7.000    5.14 | 10.00    2.25
         1.050    1.61 | 4.050    3.86 | 7.050    3.86 | 10.05    1.29
         1.100    1.61 | 4.100    3.86 | 7.100    3.86 | 10.10    1.29
         1.150    1.61 | 4.150    3.86 | 7.150    3.86 | 10.15    1.29
         1.200    1.61 | 4.200    3.86 | 7.200    3.86 | 10.20    1.29
         1.250    1.61 | 4.250    3.86 | 7.250    3.86 | 10.25    1.29
         1.300    1.61 | 4.300    3.86 | 7.300    3.86 | 10.30    1.29
         1.350    1.61 | 4.350    3.86 | 7.350    3.86 | 10.35    1.29
         1.400    1.61 | 4.400    3.86 | 7.400    3.86 | 10.40    1.29
         1.450    1.61 | 4.450    3.86 | 7.450    3.86 | 10.45    1.29
         1.500    1.61 | 4.500    3.86 | 7.500    3.86 | 10.50    1.29
         1.550    1.61 | 4.550    5.14 | 7.550    3.86 | 10.55    1.29
         1.600    1.61 | 4.600    5.14 | 7.600    3.86 | 10.60    1.29
         1.650    1.61 | 4.650    5.14 | 7.650    3.86 | 10.65    1.29
         1.700    1.61 | 4.700    5.14 | 7.700    3.86 | 10.70    1.29
         1.750    1.61 | 4.750    5.14 | 7.750    3.86 | 10.75    1.29
         1.800    1.61 | 4.800    5.14 | 7.800    3.86 | 10.80    1.29
         1.850    1.61 | 4.850    5.14 | 7.850    3.86 | 10.85    1.29
         1.900    1.61 | 4.900    5.14 | 7.900    3.86 | 10.90    1.29
         1.950    1.61 | 4.950    5.14 | 7.950    3.86 | 10.95    1.29
         2.000    1.61 | 5.000    5.14 | 8.000    3.86 | 11.00    1.29
         2.050    1.93 | 5.050    7.72 | 8.050    2.25 | 11.05    1.29
         2.100    1.93 | 5.100    7.72 | 8.100    2.25 | 11.10    1.29
         2.150    1.93 | 5.150    7.72 | 8.150    2.25 | 11.15    1.29
         2.200    1.93 | 5.200    7.72 | 8.200    2.25 | 11.20    1.29
         2.250    1.93 | 5.250    7.72 | 8.250    2.25 | 11.25    1.29
         2.300    1.93 | 5.300    7.72 | 8.300    2.25 | 11.30    1.29
         2.350    1.93 | 5.350    7.72 | 8.350    2.25 | 11.35    1.29
         2.400    1.93 | 5.400    7.72 | 8.400    2.25 | 11.40    1.29
         2.450    1.93 | 5.450    7.72 | 8.450    2.25 | 11.45    1.29
         2.500    1.93 | 5.500    7.72 | 8.500    2.25 | 11.50    1.29
         2.550    1.93 | 5.550   30.86 | 8.550    2.25 | 11.55    1.29
         2.600    1.93 | 5.600   30.86 | 8.600    2.25 | 11.60    1.29
         2.650    1.93 | 5.650   30.86 | 8.650    2.25 | 11.65    1.29
         2.700    1.93 | 5.700   30.86 | 8.700    2.25 | 11.70    1.29
         2.750    1.93 | 5.750   30.87 | 8.750    2.25 | 11.75    1.29
         2.800    1.93 | 5.800   84.88 | 8.800    2.25 | 11.80    1.29
         2.850    1.93 | 5.850   84.88 | 8.850    2.25 | 11.85    1.29
         2.900    1.93 | 5.900   84.88 | 8.900    2.25 | 11.90    1.29
         2.950    1.93 | 5.950   84.88 | 8.950    2.25 | 11.95    1.29
         3.000    1.93 | 6.000   84.87 | 9.000    2.25 | 12.00    1.29

 Max.Eff.Inten.(mm/hr)=      84.88         21.64
            over (min)        6.00         33.00
 Storage Coeff.  (min)=        .69 (ii)    31.90 (ii)
 Unit Hyd. Tpeak (min)=       6.00         33.00
 Unit Hyd. peak  (cms)=        .37           .04
                                                      *TOTALS*
 PEAK FLOW       (cms)=        .02           .01        .019 (iii)
 TIME TO PEAK    (hrs)=        .00          6.45        6.00
 RUNOFF VOLUME    (mm)=      63.30         22.49       31.20
 TOTAL RAINFALL   (mm)=      64.30         64.30       64.30
 RUNOFF COEFFICIENT   =        .98           .35         .49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN*  =  70.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| NASHYD     (0205)  |     Area      (ha)=     1.20    Curve Number    (CN)= 71.2
|ID= 1 DT= 2.0 min   |     Ia        (mm)=     2.00    # of Linear Res.(N)= 3.00
--------------------       U.H. Tp(hrs)=       .03

      NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
              TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
               hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
              .033     1.61 | 3.033     2.57 | 6.033    11.58 |  9.03     2.25
              .067     1.61 | 3.067     2.57 | 6.067    11.57 |  9.07     2.25
              .100     1.61 | 3.100     2.57 | 6.100    11.57 |  9.10     2.25
              .133     1.61 | 3.133     2.57 | 6.133    11.57 |  9.13     2.25
              .167     1.61 | 3.167     2.57 | 6.167    11.57 |  9.17     2.25
              .200     1.61 | 3.200     2.57 | 6.200    11.57 |  9.20     2.25
              .233     1.61 | 3.233     2.57 | 6.233    11.57 |  9.23     2.25
              .267     1.61 | 3.267     2.57 | 6.267    11.57 |  9.27     2.25
              .300     1.61 | 3.300     2.57 | 6.300    11.57 |  9.30     2.25
              .333     1.61 | 3.333     2.57 | 6.333    11.57 |  9.33     2.25
              .367     1.61 | 3.367     2.57 | 6.367    11.57 |  9.37     2.25
              .400     1.61 | 3.400     2.57 | 6.400    11.57 |  9.40     2.25
              .433     1.61 | 3.433     2.57 | 6.433    11.57 |  9.43     2.25
              .467     1.61 | 3.467     2.57 | 6.467    11.57 |  9.47     2.25
              .500     1.61 | 3.500     2.57 | 6.500    11.57 |  9.50     2.25
              .533     1.61 | 3.533     2.57 | 6.533     5.14 |  9.53     2.25
              .567     1.61 | 3.567     2.57 | 6.567     5.14 |  9.57     2.25
              .600     1.61 | 3.600     2.57 | 6.600     5.14 |  9.60     2.25
              .633     1.61 | 3.633     2.57 | 6.633     5.14 |  9.63     2.25
              .667     1.61 | 3.667     2.57 | 6.667     5.14 |  9.67     2.25
              .700     1.61 | 3.700     2.57 | 6.700     5.14 |  9.70     2.25
              .733     1.61 | 3.733     2.57 | 6.733     5.14 |  9.73     2.25
              .767     1.61 | 3.767     2.57 | 6.767     5.14 |  9.77     2.25
              .800     1.61 | 3.800     2.57 | 6.800     5.14 |  9.80     2.25
              .833     1.61 | 3.833     2.57 | 6.833     5.14 |  9.83     2.25
              .867     1.61 | 3.867     2.57 | 6.867     5.14 |  9.87     2.25
              .900     1.61 | 3.900     2.57 | 6.900     5.14 |  9.90     2.25
              .933     1.61 | 3.933     2.57 | 6.933     5.14 |  9.93     2.25
              .967     1.61 | 3.967     2.57 | 6.967     5.14 |  9.97     2.25
             1.000     1.61 | 4.000     2.57 | 7.000     5.14 | 10.00     2.25
             1.033     1.61 | 4.033     3.86 | 7.033     3.86 | 10.03     1.29
             1.067     1.61 | 4.067     3.86 | 7.067     3.86 | 10.07     1.29
             1.100     1.61 | 4.100     3.86 | 7.100     3.86 | 10.10     1.29
             1.133     1.61 | 4.133     3.86 | 7.133     3.86 | 10.13     1.29
             1.167     1.61 | 4.167     3.86 | 7.167     3.86 | 10.17     1.29
             1.200     1.61 | 4.200     3.86 | 7.200     3.86 | 10.20     1.29
             1.233     1.61 | 4.233     3.86 | 7.233     3.86 | 10.23     1.29
             1.267     1.61 | 4.267     3.86 | 7.267     3.86 | 10.27     1.29
             1.300     1.61 | 4.300     3.86 | 7.300     3.86 | 10.30     1.29
             1.333     1.61 | 4.333     3.86 | 7.333     3.86 | 10.33     1.29
             1.367     1.61 | 4.367     3.86 | 7.367     3.86 | 10.37     1.29
             1.400     1.61 | 4.400     3.86 | 7.400     3.86 | 10.40     1.29
             1.433     1.61 | 4.433     3.86 | 7.433     3.86 | 10.43     1.29
             1.467     1.61 | 4.467     3.86 | 7.467     3.86 | 10.47     1.29
             1.500     1.61 | 4.500     3.86 | 7.500     3.86 | 10.50     1.29
             1.533     1.61 | 4.533     5.14 | 7.533     3.86 | 10.53     1.29
             1.567     1.61 | 4.567     5.14 | 7.567     3.86 | 10.57     1.29
             1.600     1.61 | 4.600     5.14 | 7.600     3.86 | 10.60     1.29
             1.633     1.61 | 4.633     5.14 | 7.633     3.86 | 10.63     1.29
             1.667     1.61 | 4.667     5.14 | 7.667     3.86 | 10.67     1.29
             1.700     1.61 | 4.700     5.14 | 7.700     3.86 | 10.70     1.29
             1.733     1.61 | 4.733     5.14 | 7.733     3.86 | 10.73     1.29
             1.767     1.61 | 4.767     5.14 | 7.767     3.86 | 10.77     1.29
             1.800     1.61 | 4.800     5.14 | 7.800     3.86 | 10.80     1.29
             1.833     1.61 | 4.833     5.14 | 7.833     3.86 | 10.83     1.29
             1.867     1.61 | 4.867     5.14 | 7.867     3.86 | 10.87     1.29
             1.900     1.61 | 4.900     5.14 | 7.900     3.86 | 10.90     1.29
             1.933     1.61 | 4.933     5.14 | 7.933     3.86 | 10.93     1.29
             1.967     1.61 | 4.967     5.14 | 7.967     3.86 | 10.97     1.29
             2.000     1.61 | 5.000     5.14 | 8.000     3.86 | 11.00     1.29
             2.033     1.93 | 5.033     7.72 | 8.033     2.25 | 11.03     1.29
             2.067     1.93 | 5.067     7.72 | 8.067     2.25 | 11.07     1.29
             2.100     1.93 | 5.100     7.72 | 8.100     2.25 | 11.10     1.29
             2.133     1.93 | 5.133     7.72 | 8.133     2.25 | 11.13     1.29
             2.167     1.93 | 5.167     7.72 | 8.167     2.25 | 11.17     1.29
             2.200     1.93 | 5.200     7.72 | 8.200     2.25 | 11.20     1.29
             2.233     1.93 | 5.233     7.72 | 8.233     2.25 | 11.23     1.29
             2.267     1.93 | 5.267     7.72 | 8.267     2.25 | 11.27     1.29
             2.300     1.93 | 5.300     7.72 | 8.300     2.25 | 11.30     1.29
             2.333     1.93 | 5.333     7.72 | 8.333     2.25 | 11.33     1.29
             2.367     1.93 | 5.367     7.72 | 8.367     2.25 | 11.37     1.29
             2.400     1.93 | 5.400     7.72 | 8.400     2.25 | 11.40     1.29
             2.433     1.93 | 5.433     7.72 | 8.433     2.25 | 11.43     1.29
             2.467     1.93 | 5.467     7.72 | 8.467     2.25 | 11.47     1.29
             2.500     1.93 | 5.500     7.72 | 8.500     2.25 | 11.50     1.29
             2.533     1.93 | 5.533    30.86 | 8.533     2.25 | 11.53     1.29
             2.567     1.93 | 5.567    30.86 | 8.567     2.25 | 11.57     1.29
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          2.600     1.93 | 5.600    30.86 | 8.600      2.25 | 11.60     1.29
          2.633     1.93 | 5.633    30.86 | 8.633      2.25 | 11.63     1.29
          2.667     1.93 | 5.667    30.86 | 8.667      2.25 | 11.67     1.29
          2.700     1.93 | 5.700    30.86 | 8.700      2.25 | 11.70     1.29
          2.733     1.93 | 5.733    30.86 | 8.733      2.25 | 11.73     1.29
          2.767     1.93 | 5.767    57.86 | 8.767      2.25 | 11.77     1.29
          2.800     1.93 | 5.800    84.88 | 8.800      2.25 | 11.80     1.29
          2.833     1.93 | 5.833    84.88 | 8.833      2.25 | 11.83     1.29
          2.867     1.93 | 5.867    84.88 | 8.867      2.25 | 11.87     1.29
          2.900     1.93 | 5.900    84.88 | 8.900      2.25 | 11.90     1.29
          2.933     1.93 | 5.933    84.88 | 8.933      2.25 | 11.93     1.29
          2.967     1.93 | 5.967    84.88 | 8.967      2.25 | 11.97     1.29
          3.000     1.93 | 6.000    84.88 | 9.000      2.25 | 12.00     1.28

  Unit Hyd Qpeak  (cms)=    1.528

  PEAK FLOW        (cms)=     .127 (i)
  TIME TO PEAK     (hrs)=    6.000
  RUNOFF VOLUME     (mm)=   21.865
  TOTAL RAINFALL    (mm)=   64.300
  RUNOFF COEFFICIENT    =     .340

  (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 ------------------
| CALIB            |
| STANDHYD  (0207) |   Area     (ha)=      .70
|ID= 1 DT= 4.0 min |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
 ------------------
                           IMPERVIOUS     PERVIOUS (i)
  Surface Area      (ha)=        .20          .50
  Dep. Storage      (mm)=       1.00         5.00
  Average Slope      (%)=        .94          .60
  Length             (m)=      10.00       191.40
  Mannings n            =       .013         .250

      NOTE:  RAINFALL WAS TRANSFORMED TO   4.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
           TIME     RAIN |  TIME    RAIN |  TIME     RAIN |  TIME     RAIN
            hrs    mm/hr |   hrs   mm/hr |   hrs    mm/hr |   hrs    mm/hr
           .067     1.61 | 3.067    2.57 | 6.067    11.58 |  9.07     2.25
           .133     1.61 | 3.133    2.57 | 6.133    11.57 |  9.13     2.25
           .200     1.61 | 3.200    2.57 | 6.200    11.57 |  9.20     2.25
           .267     1.61 | 3.267    2.57 | 6.267    11.57 |  9.27     2.25
           .333     1.61 | 3.333    2.57 | 6.333    11.57 |  9.33     2.25
           .400     1.61 | 3.400    2.57 | 6.400    11.57 |  9.40     2.25
           .467     1.61 | 3.467    2.57 | 6.467    11.57 |  9.47     2.25
           .533     1.61 | 3.533    2.57 | 6.533     8.36 |  9.53     2.25
           .600     1.61 | 3.600    2.57 | 6.600     5.14 |  9.60     2.25
           .667     1.61 | 3.667    2.57 | 6.667     5.14 |  9.67     2.25
           .733     1.61 | 3.733    2.57 | 6.733     5.14 |  9.73     2.25
           .800     1.61 | 3.800    2.57 | 6.800     5.14 |  9.80     2.25
           .867     1.61 | 3.867    2.57 | 6.867     5.14 |  9.87     2.25
           .933     1.61 | 3.933    2.57 | 6.933     5.14 |  9.93     2.25
          1.000     1.61 | 4.000    2.57 | 7.000     5.14 | 10.00     2.25
          1.067     1.61 | 4.067    3.86 | 7.067     3.86 | 10.07     1.29
          1.133     1.61 | 4.133    3.86 | 7.133     3.86 | 10.13     1.29
          1.200     1.61 | 4.200    3.86 | 7.200     3.86 | 10.20     1.29
          1.267     1.61 | 4.267    3.86 | 7.267     3.86 | 10.27     1.29
          1.333     1.61 | 4.333    3.86 | 7.333     3.86 | 10.33     1.29
          1.400     1.61 | 4.400    3.86 | 7.400     3.86 | 10.40     1.29
          1.467     1.61 | 4.467    3.86 | 7.467     3.86 | 10.47     1.29
          1.533     1.61 | 4.533    4.50 | 7.533     3.86 | 10.53     1.29
          1.600     1.61 | 4.600    5.14 | 7.600     3.86 | 10.60     1.29
          1.667     1.61 | 4.667    5.14 | 7.667     3.86 | 10.67     1.29
          1.733     1.61 | 4.733    5.14 | 7.733     3.86 | 10.73     1.29
          1.800     1.61 | 4.800    5.14 | 7.800     3.86 | 10.80     1.29
          1.867     1.61 | 4.867    5.14 | 7.867     3.86 | 10.87     1.29
          1.933     1.61 | 4.933    5.14 | 7.933     3.86 | 10.93     1.29
          2.000     1.61 | 5.000    5.14 | 8.000     3.86 | 11.00     1.29
          2.067     1.93 | 5.067    7.72 | 8.067     2.25 | 11.07     1.29
          2.133     1.93 | 5.133    7.72 | 8.133     2.25 | 11.13     1.29
          2.200     1.93 | 5.200    7.72 | 8.200     2.25 | 11.20     1.29
          2.267     1.93 | 5.267    7.72 | 8.267     2.25 | 11.27     1.29
          2.333     1.93 | 5.333    7.72 | 8.333     2.25 | 11.33     1.29
          2.400     1.93 | 5.400    7.72 | 8.400     2.25 | 11.40     1.29
          2.467     1.93 | 5.467    7.72 | 8.467     2.25 | 11.47     1.29
          2.533     1.93 | 5.533   19.29 | 8.533     2.25 | 11.53     1.29
          2.600     1.93 | 5.600   30.86 | 8.600     2.25 | 11.60     1.29
          2.667     1.93 | 5.667   30.86 | 8.667     2.25 | 11.67     1.29
          2.733     1.93 | 5.733   30.86 | 8.733     2.25 | 11.73     1.29
          2.800     1.93 | 5.800   71.37 | 8.800     2.25 | 11.80     1.29
          2.867     1.93 | 5.867   84.88 | 8.867     2.25 | 11.87     1.29
          2.933     1.93 | 5.933   84.88 | 8.933     2.25 | 11.93     1.29
          3.000     1.93 | 6.000   84.88 | 9.000     2.25 | 12.00     1.29
```

```
     Max.Eff.Inten.(mm/hr)=       84.88          15.44
                over (min)         5.00          56.00
     Storage Coeff.  (min)=         .70 (ii)     55.40 (ii)
     Unit Hyd. Tpeak (min)=        4.00          56.00
     Unit Hyd. peak  (cms)=         .42            .02
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .04            .01         .039 (iii)
     TIME TO PEAK    (hrs)=         .00           6.80         6.00
     RUNOFF VOLUME    (mm)=       63.30          22.49        31.22
     TOTAL RAINFALL   (mm)=       64.30          64.30        64.30
     RUNOFF COEFFICIENT   =         .98            .35          .49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD   (1000) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0202):       .50     .028     6.00    31.20
        + ID2= 2 (0201):       .30     .019     6.00    31.20
          ===============================================
          ID = 3 (1000):       .80     .047     6.00    31.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD   (1001) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0203):      8.01     .579     6.00    33.33
        + ID2= 2 (1000):       .80     .047     6.00    31.20
          ===============================================
          ID = 3 (1001):      8.81     .625     6.00    33.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD   (1002) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0204):      2.82     .089     6.00    26.04
        + ID2= 2 (1001):      8.81     .625     6.00    33.14
          ===============================================
          ID = 3 (1002):     11.63     .715     6.00    31.42

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD   (1003) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0206):      6.18     .059     6.83     9.19
        + ID2= 2 (1002):     11.63     .715     6.00    31.42
          ===============================================
          ID = 3 (1003):     17.81     .735     6.00    23.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD   (1004) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (1003):     17.81     .735     6.00    23.70
        + ID2= 2 (0205):      1.20     .127     6.00    21.86
          ===============================================
          ID = 3 (1004):     19.01     .862     6.00    23.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
 RESERVOIR (0001) |
 IN= 2---> OUT= 1 |
```

```
| DT=  5.0 min     |      OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
 ------------------        (cms)      (ha.m.)    |   (cms)      (ha.m.)
                            .0000       .0000    |    .4210       .4838
                            .0110       .0717    |    .5580       .6088
                            .0190       .1729    |    .6660       .7402
                            .0250       .1992    |    .6910       .7740
                            .0440       .2529    |   1.0560       .8779
                            .0800       .3083    |   1.6620       .9853
                            .2030       .3652    |   2.4240      1.0963

                                  AREA      QPEAK      TPEAK        R.V.
                                  (ha)      (cms)      (hrs)        (mm)
    INFLOW : ID= 2 (1004)        19.01        .86       6.00       23.59
    OUTFLOW: ID= 1 (0001)        19.01        .09       8.77       22.66

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.02
                  TIME SHIFT OF PEAK FLOW         (min)=166.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=    .3113

    **** WARNING : SELECTED ROUTING TIME STEP DENIED.
 ---------------------------------------------------------------------------

 -------------------
| ADD HYD    (1005) |
|   1 +  2 =  3     |            AREA     QPEAK     TPEAK       R.V.
 -------------------             (ha)     (cms)     (hrs)       (mm)
         ID1= 1 (0001):        19.01      .086      8.77      22.66
       + ID2= 2 (0207):          .70      .039      6.00      31.22
         ==================================================
         ID = 3 (1005):        19.71      .092      8.70      22.97

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 -------------------
| ADD HYD    (1006) |
|   1 +  2 =  3     |            AREA     QPEAK     TPEAK       R.V.
 -------------------             (ha)     (cms)     (hrs)       (mm)
         ID1= 1 (0208):          .50      .022      6.00       8.95
       + ID2= 2 (1005):        19.71      .092      8.70      22.97
         ==================================================
         ID = 3 (1006):        20.21      .093      8.70      22.62

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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  ****************************
  ** SIMULATION NUMBER:   3 **
  ****************************


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|   READ STORM      |     Filename: K:\PROJECT FILES\200000 - 299999\
|                   |               210987 - 010 - Innisfil Executive Estates\
|                   |               SWM\OTTHYMO 3rd Submission\SCS25.STM
| Ptotal= 90.70 mm  |     Comments: 25 YR. SCS. STORM
 -------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .25    2.27 |  3.25    3.63 |  6.25   16.33 |  9.25    3.17
                 .50    2.27 |  3.50    3.63 |  6.50   16.33 |  9.50    3.17
                 .75    2.27 |  3.75    3.63 |  6.75    7.26 |  9.75    3.17
                1.00    2.27 |  4.00    3.63 |  7.00    7.26 | 10.00    3.17
                1.25    2.27 |  4.25    5.44 |  7.25    5.44 | 10.25    1.81
                1.50    2.27 |  4.50    5.44 |  7.50    5.44 | 10.50    1.81
                1.75    2.27 |  4.75    7.26 |  7.75    5.44 | 10.75    1.81
                2.00    2.27 |  5.00    7.26 |  8.00    5.44 | 11.00    1.81
                2.25    2.72 |  5.25   10.88 |  8.25    3.17 | 11.25    1.81
                2.50    2.72 |  5.50   10.88 |  8.50    3.17 | 11.50    1.81
                2.75    2.72 |  5.75   43.54 |  8.75    3.17 | 11.75    1.81
                3.00    2.72 |  6.00  119.72 |  9.00    3.17 | 12.00    1.81

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 -------------------
| CALIB             |
| NASHYD    (0208)  |    Area     (ha)=     .50   Curve Number   (CN)= 44.0
| D= 1 DT= 2.0 min  |    Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
 -------------------     U.H. Tp(hrs)=      .04

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .033    2.27 | 3.033    3.63 | 6.033   16.34 |  9.03    3.17
                .067    2.27 | 3.067    3.63 | 6.067   16.33 |  9.07    3.17
```

.100	2.27	3.100	3.63	6.100	16.33	9.10	3.17
.133	2.27	3.133	3.63	6.133	16.33	9.13	3.17
.167	2.27	3.167	3.63	6.167	16.33	9.17	3.17
.200	2.27	3.200	3.63	6.200	16.33	9.20	3.17
.233	2.27	3.233	3.63	6.233	16.33	9.23	3.17
.267	2.27	3.267	3.63	6.267	16.33	9.27	3.17
.300	2.27	3.300	3.63	6.300	16.33	9.30	3.17
.333	2.27	3.333	3.63	6.333	16.33	9.33	3.17
.367	2.27	3.367	3.63	6.367	16.33	9.37	3.17
.400	2.27	3.400	3.63	6.400	16.33	9.40	3.17
.433	2.27	3.433	3.63	6.433	16.33	9.43	3.17
.467	2.27	3.467	3.63	6.467	16.33	9.47	3.17
.500	2.27	3.500	3.63	6.500	16.33	9.50	3.17
.533	2.27	3.533	3.63	6.533	7.26	9.53	3.17
.567	2.27	3.567	3.63	6.567	7.26	9.57	3.17
.600	2.27	3.600	3.63	6.600	7.26	9.60	3.17
.633	2.27	3.633	3.63	6.633	7.26	9.63	3.17
.667	2.27	3.667	3.63	6.667	7.26	9.67	3.17
.700	2.27	3.700	3.63	6.700	7.26	9.70	3.17
.733	2.27	3.733	3.63	6.733	7.26	9.73	3.17
.767	2.27	3.767	3.63	6.767	7.26	9.77	3.17
.800	2.27	3.800	3.63	6.800	7.26	9.80	3.17
.833	2.27	3.833	3.63	6.833	7.26	9.83	3.17
.867	2.27	3.867	3.63	6.867	7.26	9.87	3.17
.900	2.27	3.900	3.63	6.900	7.26	9.90	3.17
.933	2.27	3.933	3.63	6.933	7.26	9.93	3.17
.967	2.27	3.967	3.63	6.967	7.26	9.97	3.17
1.000	2.27	4.000	3.63	7.000	7.26	10.00	3.17
1.033	2.27	4.033	5.44	7.033	5.44	10.03	1.81
1.067	2.27	4.067	5.44	7.067	5.44	10.07	1.81
1.100	2.27	4.100	5.44	7.100	5.44	10.10	1.81
1.133	2.27	4.133	5.44	7.133	5.44	10.13	1.81
1.167	2.27	4.167	5.44	7.167	5.44	10.17	1.81
1.200	2.27	4.200	5.44	7.200	5.44	10.20	1.81
1.233	2.27	4.233	5.44	7.233	5.44	10.23	1.81
1.267	2.27	4.267	5.44	7.267	5.44	10.27	1.81
1.300	2.27	4.300	5.44	7.300	5.44	10.30	1.81
1.333	2.27	4.333	5.44	7.333	5.44	10.33	1.81
1.367	2.27	4.367	5.44	7.367	5.44	10.37	1.81
1.400	2.27	4.400	5.44	7.400	5.44	10.40	1.81
1.433	2.27	4.433	5.44	7.433	5.44	10.43	1.81
1.467	2.27	4.467	5.44	7.467	5.44	10.47	1.81
1.500	2.27	4.500	5.44	7.500	5.44	10.50	1.81
1.533	2.27	4.533	7.26	7.533	5.44	10.53	1.81
1.567	2.27	4.567	7.26	7.567	5.44	10.57	1.81
1.600	2.27	4.600	7.26	7.600	5.44	10.60	1.81
1.633	2.27	4.633	7.26	7.633	5.44	10.63	1.81
1.667	2.27	4.667	7.26	7.667	5.44	10.67	1.81
1.700	2.27	4.700	7.26	7.700	5.44	10.70	1.81
1.733	2.27	4.733	7.26	7.733	5.44	10.73	1.81
1.767	2.27	4.767	7.26	7.767	5.44	10.77	1.81
1.800	2.27	4.800	7.26	7.800	5.44	10.80	1.81
1.833	2.27	4.833	7.26	7.833	5.44	10.83	1.81
1.867	2.27	4.867	7.26	7.867	5.44	10.87	1.81
1.900	2.27	4.900	7.26	7.900	5.44	10.90	1.81
1.933	2.27	4.933	7.26	7.933	5.44	10.93	1.81
1.967	2.27	4.967	7.26	7.967	5.44	10.97	1.81
2.000	2.27	5.000	7.26	8.000	5.44	11.00	1.81
2.033	2.72	5.033	10.88	8.033	3.17	11.03	1.81
2.067	2.72	5.067	10.88	8.067	3.17	11.07	1.81
2.100	2.72	5.100	10.88	8.100	3.17	11.10	1.81
2.133	2.72	5.133	10.88	8.133	3.17	11.13	1.81
2.167	2.72	5.167	10.88	8.167	3.17	11.17	1.81
2.200	2.72	5.200	10.88	8.200	3.17	11.20	1.81
2.233	2.72	5.233	10.88	8.233	3.17	11.23	1.81
2.267	2.72	5.267	10.88	8.267	3.17	11.27	1.81
2.300	2.72	5.300	10.88	8.300	3.17	11.30	1.81
2.333	2.72	5.333	10.88	8.333	3.17	11.33	1.81
2.367	2.72	5.367	10.88	8.367	3.17	11.37	1.81
2.400	2.72	5.400	10.88	8.400	3.17	11.40	1.81
2.433	2.72	5.433	10.88	8.433	3.17	11.43	1.81
2.467	2.72	5.467	10.88	8.467	3.17	11.47	1.81
2.500	2.72	5.500	10.88	8.500	3.17	11.50	1.81
2.533	2.72	5.533	43.53	8.533	3.17	11.53	1.81
2.567	2.72	5.567	43.54	8.567	3.17	11.57	1.81
2.600	2.72	5.600	43.54	8.600	3.17	11.60	1.81
2.633	2.72	5.633	43.54	8.633	3.17	11.63	1.81
2.667	2.72	5.667	43.54	8.667	3.17	11.67	1.81
2.700	2.72	5.700	43.54	8.700	3.17	11.70	1.81
2.733	2.72	5.733	43.54	8.733	3.17	11.73	1.81
2.767	2.72	5.767	81.62	8.767	3.17	11.77	1.81
2.800	2.72	5.800	119.72	8.800	3.17	11.80	1.81
2.833	2.72	5.833	119.72	8.833	3.17	11.83	1.81
2.867	2.72	5.867	119.72	8.867	3.17	11.87	1.81
2.900	2.72	5.900	119.72	8.900	3.17	11.90	1.81
2.933	2.72	5.933	119.72	8.933	3.17	11.93	1.81
2.967	2.72	5.967	119.72	8.967	3.17	11.97	1.81
3.000	2.72	6.000	119.72	9.000	3.17	12.00	1.81

```
    Unit Hyd Qpeak  (cms)=     .477

    PEAK FLOW       (cms)=     .042 (i)
    TIME TO PEAK    (hrs)=    6.000
    RUNOFF VOLUME    (mm)=   17.492
    TOTAL RAINFALL   (mm)=   90.700
    RUNOFF COEFFICIENT   =     .193

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| NASHYD     (0206) |   Area      (ha)=    6.18   Curve Number    (CN)= 44.0
|ID= 1 DT=10.0 min |   Ia        (mm)=    5.00   # of Linear Res.(N)= 3.00
 ------------------    U.H. Tp(hrs)=     .81

       NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN | TIME    RAIN | TIME     RAIN | TIME   RAIN
                hrs   mm/hr |  hrs   mm/hr |  hrs    mm/hr |  hrs  mm/hr
               .167    2.27 | 3.167   3.63 | 6.167   16.33 |  9.17   3.17
               .333    2.27 | 3.333   3.63 | 6.333   16.33 |  9.33   3.17
               .500    2.27 | 3.500   3.63 | 6.500   16.33 |  9.50   3.17
               .667    2.27 | 3.667   3.63 | 6.667    7.26 |  9.67   3.17
               .833    2.27 | 3.833   3.63 | 6.833    7.26 |  9.83   3.17
              1.000    2.27 | 4.000   3.63 | 7.000    7.26 | 10.00   3.17
              1.167    2.27 | 4.167   5.44 | 7.167    5.44 | 10.17   1.81
              1.333    2.27 | 4.333   5.44 | 7.333    5.44 | 10.33   1.81
              1.500    2.27 | 4.500   5.44 | 7.500    5.44 | 10.50   1.81
              1.667    2.27 | 4.667   7.26 | 7.667    5.44 | 10.67   1.81
              1.833    2.27 | 4.833   7.26 | 7.833    5.44 | 10.83   1.81
              2.000    2.27 | 5.000   7.26 | 8.000    5.44 | 11.00   1.81
              2.167    2.72 | 5.167  10.88 | 8.167    3.17 | 11.17   1.81
              2.333    2.72 | 5.333  10.88 | 8.333    3.17 | 11.33   1.81
              2.500    2.72 | 5.500  10.88 | 8.500    3.17 | 11.50   1.81
              2.667    2.72 | 5.667  43.54 | 8.667    3.17 | 11.67   1.81
              2.833    2.72 | 5.833  81.63 | 8.833    3.17 | 11.83   1.81
              3.000    2.72 | 6.000 119.72 | 9.000    3.17 | 12.00   1.81

    Unit Hyd Qpeak  (cms)=     .291

    PEAK FLOW       (cms)=     .117 (i)
    TIME TO PEAK    (hrs)=    6.667
    RUNOFF VOLUME    (mm)=   17.956
    TOTAL RAINFALL   (mm)=   90.700
    RUNOFF COEFFICIENT   =     .198

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD   (0204) |   Area     (ha)=    2.82
|ID= 1 DT= 5.0 min |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
 ------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=        .40         2.42
    Dep. Storage      (mm)=       1.00         5.00
    Average Slope      (%)=       1.58         2.50
    Length             (m)=     140.00       284.40
    Mannings n           =        .013         .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN | TIME    RAIN | TIME     RAIN | TIME   RAIN
                hrs   mm/hr |  hrs   mm/hr |  hrs    mm/hr |  hrs  mm/hr
               .083    2.27 | 3.083   3.63 | 6.083   16.33 |  9.08   3.17
               .167    2.27 | 3.167   3.63 | 6.167   16.33 |  9.17   3.17
               .250    2.27 | 3.250   3.63 | 6.250   16.33 |  9.25   3.17
               .333    2.27 | 3.333   3.63 | 6.333   16.33 |  9.33   3.17
               .417    2.27 | 3.417   3.63 | 6.417   16.33 |  9.42   3.17
               .500    2.27 | 3.500   3.63 | 6.500   16.33 |  9.50   3.17
               .583    2.27 | 3.583   3.63 | 6.583    7.26 |  9.58   3.17
               .667    2.27 | 3.667   3.63 | 6.667    7.26 |  9.67   3.17
               .750    2.27 | 3.750   3.63 | 6.750    7.26 |  9.75   3.17
               .833    2.27 | 3.833   3.63 | 6.833    7.26 |  9.83   3.17
               .917    2.27 | 3.917   3.63 | 6.917    7.26 |  9.92   3.17
              1.000    2.27 | 4.000   3.63 | 7.000    7.26 | 10.00   3.17
              1.083    2.27 | 4.083   5.44 | 7.083    5.44 | 10.08   1.81
              1.167    2.27 | 4.167   5.44 | 7.167    5.44 | 10.17   1.81
              1.250    2.27 | 4.250   5.44 | 7.250    5.44 | 10.25   1.81
              1.333    2.27 | 4.333   5.44 | 7.333    5.44 | 10.33   1.81
              1.417    2.27 | 4.417   5.44 | 7.417    5.44 | 10.42   1.81
              1.500    2.27 | 4.500   5.44 | 7.500    5.44 | 10.50   1.81
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           1.583    2.27 | 4.583    7.26 | 7.583    5.44 | 10.58    1.81
           1.667    2.27 | 4.667    7.26 | 7.667    5.44 | 10.67    1.81
           1.750    2.27 | 4.750    7.26 | 7.750    5.44 | 10.75    1.81
           1.833    2.27 | 4.833    7.26 | 7.833    5.44 | 10.83    1.81
           1.917    2.27 | 4.917    7.26 | 7.917    5.44 | 10.92    1.81
           2.000    2.27 | 5.000    7.26 | 8.000    5.44 | 11.00    1.81
           2.083    2.72 | 5.083   10.88 | 8.083    3.17 | 11.08    1.81
           2.167    2.72 | 5.167   10.88 | 8.167    3.17 | 11.17    1.81
           2.250    2.72 | 5.250   10.88 | 8.250    3.17 | 11.25    1.81
           2.333    2.72 | 5.333   10.88 | 8.333    3.17 | 11.33    1.81
           2.417    2.72 | 5.417   10.88 | 8.417    3.17 | 11.42    1.81
           2.500    2.72 | 5.500   10.88 | 8.500    3.17 | 11.50    1.81
           2.583    2.72 | 5.583   43.54 | 8.583    3.17 | 11.58    1.81
           2.667    2.72 | 5.667   43.54 | 8.667    3.17 | 11.67    1.81
           2.750    2.72 | 5.750   43.54 | 8.750    3.17 | 11.75    1.81
           2.833    2.72 | 5.833  119.72 | 8.833    3.17 | 11.83    1.81
           2.917    2.72 | 5.917  119.72 | 8.917    3.17 | 11.92    1.81
           3.000    2.72 | 6.000  119.72 | 9.000    3.17 | 12.00    1.81

    Max.Eff.Inten.(mm/hr)=      119.72         34.49
               over (min)        5.00          40.00
    Storage Coeff.  (min)=       2.54 (ii)     35.32 (ii)
    Unit Hyd. Tpeak (min)=       5.00          40.00
    Unit Hyd. peak  (cms)=        .29            .03
                                                             *TOTALS*
    PEAK FLOW       (cms)=        .10            .14            .156 (iii)
    TIME TO PEAK    (hrs)=        .00           6.50            6.50
    RUNOFF VOLUME    (mm)=      89.70          38.76           44.20
    TOTAL RAINFALL   (mm)=      90.70          90.70           90.70
    RUNOFF COEFFICIENT   =        .99            .43             .49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
           YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD  (0203) |   Area     (ha)=   8.01
|ID= 1 DT= 3.0 min |   Total Imp(%)=  34.30   Dir. Conn.(%)=  25.70
-------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       2.75         5.26
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=        .79         2.00
    Length            (m)=     414.00        86.00
    Mannings n          =        .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME    RAIN
                hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr
                .050   2.27 | 3.050   3.63 | 6.050  16.33 |  9.05   3.17
                .100   2.27 | 3.100   3.63 | 6.100  16.33 |  9.10   3.17
                .150   2.27 | 3.150   3.63 | 6.150  16.33 |  9.15   3.17
                .200   2.27 | 3.200   3.63 | 6.200  16.33 |  9.20   3.17
                .250   2.27 | 3.250   3.63 | 6.250  16.33 |  9.25   3.17
                .300   2.27 | 3.300   3.63 | 6.300  16.33 |  9.30   3.17
                .350   2.27 | 3.350   3.63 | 6.350  16.33 |  9.35   3.17
                .400   2.27 | 3.400   3.63 | 6.400  16.33 |  9.40   3.17
                .450   2.27 | 3.450   3.63 | 6.450  16.33 |  9.45   3.17
                .500   2.27 | 3.500   3.63 | 6.500  16.32 |  9.50   3.17
                .550   2.27 | 3.550   3.63 | 6.550   7.26 |  9.55   3.17
                .600   2.27 | 3.600   3.63 | 6.600   7.26 |  9.60   3.17
                .650   2.27 | 3.650   3.63 | 6.650   7.26 |  9.65   3.17
                .700   2.27 | 3.700   3.63 | 6.700   7.26 |  9.70   3.17
                .750   2.27 | 3.750   3.63 | 6.750   7.26 |  9.75   3.17
                .800   2.27 | 3.800   3.63 | 6.800   7.26 |  9.80   3.17
                .850   2.27 | 3.850   3.63 | 6.850   7.26 |  9.85   3.17
                .900   2.27 | 3.900   3.63 | 6.900   7.26 |  9.90   3.17
                .950   2.27 | 3.950   3.63 | 6.950   7.26 |  9.95   3.17
               1.000   2.27 | 4.000   3.63 | 7.000   7.26 | 10.00   3.17
               1.050   2.27 | 4.050   5.44 | 7.050   5.44 | 10.05   1.81
               1.100   2.27 | 4.100   5.44 | 7.100   5.44 | 10.10   1.81
               1.150   2.27 | 4.150   5.44 | 7.150   5.44 | 10.15   1.81
               1.200   2.27 | 4.200   5.44 | 7.200   5.44 | 10.20   1.81
               1.250   2.27 | 4.250   5.44 | 7.250   5.44 | 10.25   1.81
               1.300   2.27 | 4.300   5.44 | 7.300   5.44 | 10.30   1.81
               1.350   2.27 | 4.350   5.44 | 7.350   5.44 | 10.35   1.81
               1.400   2.27 | 4.400   5.44 | 7.400   5.44 | 10.40   1.81
               1.450   2.27 | 4.450   5.44 | 7.450   5.44 | 10.45   1.81
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             1.500     2.27 | 4.500     5.44 | 7.500     5.44 | 10.50     1.81
             1.550     2.27 | 4.550     7.26 | 7.550     5.44 | 10.55     1.81
             1.600     2.27 | 4.600     7.26 | 7.600     5.44 | 10.60     1.81
             1.650     2.27 | 4.650     7.26 | 7.650     5.44 | 10.65     1.81
             1.700     2.27 | 4.700     7.26 | 7.700     5.44 | 10.70     1.81
             1.750     2.27 | 4.750     7.26 | 7.750     5.44 | 10.75     1.81
             1.800     2.27 | 4.800     7.26 | 7.800     5.44 | 10.80     1.81
             1.850     2.27 | 4.850     7.26 | 7.850     5.44 | 10.85     1.81
             1.900     2.27 | 4.900     7.26 | 7.900     5.44 | 10.90     1.81
             1.950     2.27 | 4.950     7.26 | 7.950     5.44 | 10.95     1.81
             2.000     2.27 | 5.000     7.26 | 8.000     5.44 | 11.00     1.81
             2.050     2.72 | 5.050    10.88 | 8.050     3.17 | 11.05     1.81
             2.100     2.72 | 5.100    10.88 | 8.100     3.17 | 11.10     1.81
             2.150     2.72 | 5.150    10.88 | 8.150     3.17 | 11.15     1.81
             2.200     2.72 | 5.200    10.88 | 8.200     3.17 | 11.20     1.81
             2.250     2.72 | 5.250    10.88 | 8.250     3.17 | 11.25     1.81
             2.300     2.72 | 5.300    10.88 | 8.300     3.17 | 11.30     1.81
             2.350     2.72 | 5.350    10.88 | 8.350     3.17 | 11.35     1.81
             2.400     2.72 | 5.400    10.88 | 8.400     3.17 | 11.40     1.81
             2.450     2.72 | 5.450    10.88 | 8.450     3.17 | 11.45     1.81
             2.500     2.72 | 5.500    10.89 | 8.500     3.17 | 11.50     1.81
             2.550     2.72 | 5.550    43.54 | 8.550     3.17 | 11.55     1.81
             2.600     2.72 | 5.600    43.54 | 8.600     3.17 | 11.60     1.81
             2.650     2.72 | 5.650    43.54 | 8.650     3.17 | 11.65     1.81
             2.700     2.72 | 5.700    43.54 | 8.700     3.17 | 11.70     1.81
             2.750     2.72 | 5.750    43.54 | 8.750     3.17 | 11.75     1.81
             2.800     2.72 | 5.800   119.72 | 8.800     3.17 | 11.80     1.81
             2.850     2.72 | 5.850   119.72 | 8.850     3.17 | 11.85     1.81
             2.900     2.72 | 5.900   119.72 | 8.900     3.17 | 11.90     1.81
             2.950     2.72 | 5.950   119.72 | 8.950     3.17 | 11.95     1.81
             3.000     2.72 | 6.000   119.71 | 9.000     3.17 | 12.00     1.81

     Max.Eff.Inten.(mm/hr)=       119.72              70.99
               over (min)           6.00              21.00
     Storage Coeff.  (min)=         5.98 (ii)         18.80 (ii)
     Unit Hyd. Tpeak (min)=         6.00              21.00
     Unit Hyd. peak  (cms)=          .19                .06
                                                                    *TOTALS*
     PEAK FLOW       (cms)=          .63                .54           .972 (iii)
     TIME TO PEAK    (hrs)=          .00               6.20           6.00
     RUNOFF VOLUME    (mm)=        89.70              40.78          53.35
     TOTAL RAINFALL   (mm)=        90.70              90.70          90.70
     RUNOFF COEFFICIENT    =         .99                .45            .59

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0     Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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CALIB               |
STANDHYD   (0202)   |   Area     (ha)=      .50
D= 1 DT= 5.0 min    |   Total Imp(%)=    28.60    Dir. Conn.(%)=   21.50
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                               IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=        .14            .36
    Dep. Storage      (mm)=       1.00           5.00
    Average Slope      (%)=        .80           1.00
    Length             (m)=      10.00         218.20
    Mannings n            =       .013           .250

       NOTE:  RAINFALL WAS TRANSFORMED TO    5.0 MIN. TIME STEP.

                         ---- TRANSFORMED HYETOGRAPH ----
           TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
            hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
           .083     2.27 | 3.083     3.63 | 6.083    16.33 |  9.08     3.17
           .167     2.27 | 3.167     3.63 | 6.167    16.33 |  9.17     3.17
           .250     2.27 | 3.250     3.63 | 6.250    16.33 |  9.25     3.17
           .333     2.27 | 3.333     3.63 | 6.333    16.33 |  9.33     3.17
           .417     2.27 | 3.417     3.63 | 6.417    16.33 |  9.42     3.17
           .500     2.27 | 3.500     3.63 | 6.500    16.33 |  9.50     3.17
           .583     2.27 | 3.583     3.63 | 6.583     7.26 |  9.58     3.17
           .667     2.27 | 3.667     3.63 | 6.667     7.26 |  9.67     3.17
           .750     2.27 | 3.750     3.63 | 6.750     7.26 |  9.75     3.17
           .833     2.27 | 3.833     3.63 | 6.833     7.26 |  9.83     3.17
           .917     2.27 | 3.917     3.63 | 6.917     7.26 |  9.92     3.17
          1.000     2.27 | 4.000     3.63 | 7.000     7.26 | 10.00     3.17
          1.083     2.27 | 4.083     5.44 | 7.083     5.44 | 10.08     1.81
          1.167     2.27 | 4.167     5.44 | 7.167     5.44 | 10.17     1.81
          1.250     2.27 | 4.250     5.44 | 7.250     5.44 | 10.25     1.81
          1.333     2.27 | 4.333     5.44 | 7.333     5.44 | 10.33     1.81
          1.417     2.27 | 4.417     5.44 | 7.417     5.44 | 10.42     1.81
          1.500     2.27 | 4.500     5.44 | 7.500     5.44 | 10.50     1.81
          1.583     2.27 | 4.583     7.26 | 7.583     5.44 | 10.58     1.81
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      1.667     2.27 | 4.667     7.26 | 7.667     5.44 | 10.67     1.81
      1.750     2.27 | 4.750     7.26 | 7.750     5.44 | 10.75     1.81
      1.833     2.27 | 4.833     7.26 | 7.833     5.44 | 10.83     1.81
      1.917     2.27 | 4.917     7.26 | 7.917     5.44 | 10.92     1.81
      2.000     2.27 | 5.000     7.26 | 8.000     5.44 | 11.00     1.81
      2.083     2.72 | 5.083    10.88 | 8.083     3.17 | 11.08     1.81
      2.167     2.72 | 5.167    10.88 | 8.167     3.17 | 11.17     1.81
      2.250     2.72 | 5.250    10.88 | 8.250     3.17 | 11.25     1.81
      2.333     2.72 | 5.333    10.88 | 8.333     3.17 | 11.33     1.81
      2.417     2.72 | 5.417    10.88 | 8.417     3.17 | 11.42     1.81
      2.500     2.72 | 5.500    10.88 | 8.500     3.17 | 11.50     1.81
      2.583     2.72 | 5.583    43.54 | 8.583     3.17 | 11.58     1.81
      2.667     2.72 | 5.667    43.54 | 8.667     3.17 | 11.67     1.81
      2.750     2.72 | 5.750    43.54 | 8.750     3.17 | 11.75     1.81
      2.833     2.72 | 5.833   119.72 | 8.833     3.17 | 11.83     1.81
      2.917     2.72 | 5.917   119.72 | 8.917     3.17 | 11.92     1.81
      3.000     2.72 | 6.000   119.72 | 9.000     3.17 | 12.00     1.81

  Max.Eff.Inten.(mm/hr)=      119.72         34.40
             over (min)         5.00         40.00
  Storage Coeff.   (min)=        .64 (ii)    37.49 (ii)
  Unit Hyd. Tpeak  (min)=       5.00         40.00
  Unit Hyd. peak   (cms)=        .34           .03
                                                         *TOTALS*
  PEAK FLOW        (cms)=        .04           .02         .044 (iii)
  TIME TO PEAK     (hrs)=        .00          6.50         6.00
  RUNOFF VOLUME     (mm)=      89.70         40.08        50.71
  TOTAL RAINFALL    (mm)=      90.70         90.70        90.70
  RUNOFF COEFFICIENT   =         .99           .44          .56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  70.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD   (0201)  |   Area      (ha)=    .30
|ID= 1 DT= 3.0 min   |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .09          .21
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=       .97          .97
     Length            (m)=     10.00       119.60
     Mannings n           =      .013         .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.

                      ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
          .050    2.27 | 3.050    3.63 | 6.050   16.33 |  9.05    3.17
          .100    2.27 | 3.100    3.63 | 6.100   16.33 |  9.10    3.17
          .150    2.27 | 3.150    3.63 | 6.150   16.33 |  9.15    3.17
          .200    2.27 | 3.200    3.63 | 6.200   16.33 |  9.20    3.17
          .250    2.27 | 3.250    3.63 | 6.250   16.33 |  9.25    3.17
          .300    2.27 | 3.300    3.63 | 6.300   16.33 |  9.30    3.17
          .350    2.27 | 3.350    3.63 | 6.350   16.33 |  9.35    3.17
          .400    2.27 | 3.400    3.63 | 6.400   16.33 |  9.40    3.17
          .450    2.27 | 3.450    3.63 | 6.450   16.33 |  9.45    3.17
          .500    2.27 | 3.500    3.63 | 6.500   16.32 |  9.50    3.17
          .550    2.27 | 3.550    3.63 | 6.550    7.26 |  9.55    3.17
          .600    2.27 | 3.600    3.63 | 6.600    7.26 |  9.60    3.17
          .650    2.27 | 3.650    3.63 | 6.650    7.26 |  9.65    3.17
          .700    2.27 | 3.700    3.63 | 6.700    7.26 |  9.70    3.17
          .750    2.27 | 3.750    3.63 | 6.750    7.26 |  9.75    3.17
          .800    2.27 | 3.800    3.63 | 6.800    7.26 |  9.80    3.17
          .850    2.27 | 3.850    3.63 | 6.850    7.26 |  9.85    3.17
          .900    2.27 | 3.900    3.63 | 6.900    7.26 |  9.90    3.17
          .950    2.27 | 3.950    3.63 | 6.950    7.26 |  9.95    3.17
         1.000    2.27 | 4.000    3.63 | 7.000    7.26 | 10.00    3.17
         1.050    2.27 | 4.050    5.44 | 7.050    5.44 | 10.05    1.81
         1.100    2.27 | 4.100    5.44 | 7.100    5.44 | 10.10    1.81
         1.150    2.27 | 4.150    5.44 | 7.150    5.44 | 10.15    1.81
         1.200    2.27 | 4.200    5.44 | 7.200    5.44 | 10.20    1.81
         1.250    2.27 | 4.250    5.44 | 7.250    5.44 | 10.25    1.81
         1.300    2.27 | 4.300    5.44 | 7.300    5.44 | 10.30    1.81
         1.350    2.27 | 4.350    5.44 | 7.350    5.44 | 10.35    1.81
         1.400    2.27 | 4.400    5.44 | 7.400    5.44 | 10.40    1.81
         1.450    2.27 | 4.450    5.44 | 7.450    5.44 | 10.45    1.81
         1.500    2.27 | 4.500    5.44 | 7.500    5.44 | 10.50    1.81
         1.550    2.27 | 4.550    7.26 | 7.550    5.44 | 10.55    1.81
         1.600    2.27 | 4.600    7.26 | 7.600    5.44 | 10.60    1.81
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               1.650     2.27 | 4.650     7.26 | 7.650     5.44 | 10.65     1.81
               1.700     2.27 | 4.700     7.26 | 7.700     5.44 | 10.70     1.81
               1.750     2.27 | 4.750     7.26 | 7.750     5.44 | 10.75     1.81
               1.800     2.27 | 4.800     7.26 | 7.800     5.44 | 10.80     1.81
               1.850     2.27 | 4.850     7.26 | 7.850     5.44 | 10.85     1.81
               1.900     2.27 | 4.900     7.26 | 7.900     5.44 | 10.90     1.81
               1.950     2.27 | 4.950     7.26 | 7.950     5.44 | 10.95     1.81
               2.000     2.27 | 5.000     7.26 | 8.000     5.44 | 11.00     1.81
               2.050     2.72 | 5.050    10.88 | 8.050     3.17 | 11.05     1.81
               2.100     2.72 | 5.100    10.88 | 8.100     3.17 | 11.10     1.81
               2.150     2.72 | 5.150    10.88 | 8.150     3.17 | 11.15     1.81
               2.200     2.72 | 5.200    10.88 | 8.200     3.17 | 11.20     1.81
               2.250     2.72 | 5.250    10.88 | 8.250     3.17 | 11.25     1.81
               2.300     2.72 | 5.300    10.88 | 8.300     3.17 | 11.30     1.81
               2.350     2.72 | 5.350    10.88 | 8.350     3.17 | 11.35     1.81
               2.400     2.72 | 5.400    10.88 | 8.400     3.17 | 11.40     1.81
               2.450     2.72 | 5.450    10.88 | 8.450     3.17 | 11.45     1.81
               2.500     2.72 | 5.500    10.89 | 8.500     3.17 | 11.50     1.81
               2.550     2.72 | 5.550    43.54 | 8.550     3.17 | 11.55     1.81
               2.600     2.72 | 5.600    43.54 | 8.600     3.17 | 11.60     1.81
               2.650     2.72 | 5.650    43.54 | 8.650     3.17 | 11.65     1.81
               2.700     2.72 | 5.700    43.54 | 8.700     3.17 | 11.70     1.81
               2.750     2.72 | 5.750    43.54 | 8.750     3.17 | 11.75     1.81
               2.800     2.72 | 5.800   119.72 | 8.800     3.17 | 11.80     1.81
               2.850     2.72 | 5.850   119.72 | 8.850     3.17 | 11.85     1.81
               2.900     2.72 | 5.900   119.72 | 8.900     3.17 | 11.90     1.81
               2.950     2.72 | 5.950   119.72 | 8.950     3.17 | 11.95     1.81
               3.000     2.72 | 6.000   119.71 | 9.000     3.17 | 12.00     1.81

    Max.Eff.Inten.(mm/hr)=      119.72          49.02
               over (min)         6.00          24.00
    Storage Coeff.  (min)=         .60 (ii)     23.10 (ii)
    Unit Hyd. Tpeak (min)=        6.00          24.00
    Unit Hyd. peak  (cms)=         .38            .05
                                                             *TOTALS*
    PEAK FLOW       (cms)=         .02            .02           .032 (iii)
    TIME TO PEAK    (hrs)=         .00           6.30           6.00
    RUNOFF VOLUME    (mm)=       89.70          40.08          50.70
    TOTAL RAINFALL   (mm)=       90.70          90.70          90.70
    RUNOFF COEFFICIENT   =         .99            .44            .56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 -----------------
 CALIB            |
 NASHYD     (0205) |   Area     (ha)=    1.20   Curve Number    (CN)= 71.2
 D= 1 DT= 2.0 min |   Ia       (mm)=    2.00   # of Linear Res.(N)= 3.00
 -----------------    U.H. Tp(hrs)=     .03

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs    mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .033     2.27 | 3.033    3.63 | 6.033   16.34 |  9.03    3.17
                .067     2.27 | 3.067    3.63 | 6.067   16.33 |  9.07    3.17
                .100     2.27 | 3.100    3.63 | 6.100   16.33 |  9.10    3.17
                .133     2.27 | 3.133    3.63 | 6.133   16.33 |  9.13    3.17
                .167     2.27 | 3.167    3.63 | 6.167   16.33 |  9.17    3.17
                .200     2.27 | 3.200    3.63 | 6.200   16.33 |  9.20    3.17
                .233     2.27 | 3.233    3.63 | 6.233   16.33 |  9.23    3.17
                .267     2.27 | 3.267    3.63 | 6.267   16.33 |  9.27    3.17
                .300     2.27 | 3.300    3.63 | 6.300   16.33 |  9.30    3.17
                .333     2.27 | 3.333    3.63 | 6.333   16.33 |  9.33    3.17
                .367     2.27 | 3.367    3.63 | 6.367   16.33 |  9.37    3.17
                .400     2.27 | 3.400    3.63 | 6.400   16.33 |  9.40    3.17
                .433     2.27 | 3.433    3.63 | 6.433   16.33 |  9.43    3.17
                .467     2.27 | 3.467    3.63 | 6.467   16.33 |  9.47    3.17
                .500     2.27 | 3.500    3.63 | 6.500   16.33 |  9.50    3.17
                .533     2.27 | 3.533    3.63 | 6.533    7.26 |  9.53    3.17
                .567     2.27 | 3.567    3.63 | 6.567    7.26 |  9.57    3.17
                .600     2.27 | 3.600    3.63 | 6.600    7.26 |  9.60    3.17
                .633     2.27 | 3.633    3.63 | 6.633    7.26 |  9.63    3.17
                .667     2.27 | 3.667    3.63 | 6.667    7.26 |  9.67    3.17
                .700     2.27 | 3.700    3.63 | 6.700    7.26 |  9.70    3.17
                .733     2.27 | 3.733    3.63 | 6.733    7.26 |  9.73    3.17
                .767     2.27 | 3.767    3.63 | 6.767    7.26 |  9.77    3.17
                .800     2.27 | 3.800    3.63 | 6.800    7.26 |  9.80    3.17
                .833     2.27 | 3.833    3.63 | 6.833    7.26 |  9.83    3.17
                .867     2.27 | 3.867    3.63 | 6.867    7.26 |  9.87    3.17
                .900     2.27 | 3.900    3.63 | 6.900    7.26 |  9.90    3.17
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          .933      2.27 | 3.933     3.63 | 6.933     7.26 |  9.93     3.17
          .967      2.27 | 3.967     3.63 | 6.967     7.26 |  9.97     3.17
         1.000      2.27 | 4.000     3.63 | 7.000     7.26 | 10.00     3.17
         1.033      2.27 | 4.033     5.44 | 7.033     5.44 | 10.03     1.81
         1.067      2.27 | 4.067     5.44 | 7.067     5.44 | 10.07     1.81
         1.100      2.27 | 4.100     5.44 | 7.100     5.44 | 10.10     1.81
         1.133      2.27 | 4.133     5.44 | 7.133     5.44 | 10.13     1.81
         1.167      2.27 | 4.167     5.44 | 7.167     5.44 | 10.17     1.81
         1.200      2.27 | 4.200     5.44 | 7.200     5.44 | 10.20     1.81
         1.233      2.27 | 4.233     5.44 | 7.233     5.44 | 10.23     1.81
         1.267      2.27 | 4.267     5.44 | 7.267     5.44 | 10.27     1.81
         1.300      2.27 | 4.300     5.44 | 7.300     5.44 | 10.30     1.81
         1.333      2.27 | 4.333     5.44 | 7.333     5.44 | 10.33     1.81
         1.367      2.27 | 4.367     5.44 | 7.367     5.44 | 10.37     1.81
         1.400      2.27 | 4.400     5.44 | 7.400     5.44 | 10.40     1.81
         1.433      2.27 | 4.433     5.44 | 7.433     5.44 | 10.43     1.81
         1.467      2.27 | 4.467     5.44 | 7.467     5.44 | 10.47     1.81
         1.500      2.27 | 4.500     5.44 | 7.500     5.44 | 10.50     1.81
         1.533      2.27 | 4.533     7.26 | 7.533     5.44 | 10.53     1.81
         1.567      2.27 | 4.567     7.26 | 7.567     5.44 | 10.57     1.81
         1.600      2.27 | 4.600     7.26 | 7.600     5.44 | 10.60     1.81
         1.633      2.27 | 4.633     7.26 | 7.633     5.44 | 10.63     1.81
         1.667      2.27 | 4.667     7.26 | 7.667     5.44 | 10.67     1.81
         1.700      2.27 | 4.700     7.26 | 7.700     5.44 | 10.70     1.81
         1.733      2.27 | 4.733     7.26 | 7.733     5.44 | 10.73     1.81
         1.767      2.27 | 4.767     7.26 | 7.767     5.44 | 10.77     1.81
         1.800      2.27 | 4.800     7.26 | 7.800     5.44 | 10.80     1.81
         1.833      2.27 | 4.833     7.26 | 7.833     5.44 | 10.83     1.81
         1.867      2.27 | 4.867     7.26 | 7.867     5.44 | 10.87     1.81
         1.900      2.27 | 4.900     7.26 | 7.900     5.44 | 10.90     1.81
         1.933      2.27 | 4.933     7.26 | 7.933     5.44 | 10.93     1.81
         1.967      2.27 | 4.967     7.26 | 7.967     5.44 | 10.97     1.81
         2.000      2.27 | 5.000     7.26 | 8.000     5.44 | 11.00     1.81
         2.033      2.72 | 5.033    10.88 | 8.033     3.17 | 11.03     1.81
         2.067      2.72 | 5.067    10.88 | 8.067     3.17 | 11.07     1.81
         2.100      2.72 | 5.100    10.88 | 8.100     3.17 | 11.10     1.81
         2.133      2.72 | 5.133    10.88 | 8.133     3.17 | 11.13     1.81
         2.167      2.72 | 5.167    10.88 | 8.167     3.17 | 11.17     1.81
         2.200      2.72 | 5.200    10.88 | 8.200     3.17 | 11.20     1.81
         2.233      2.72 | 5.233    10.88 | 8.233     3.17 | 11.23     1.81
         2.267      2.72 | 5.267    10.88 | 8.267     3.17 | 11.27     1.81
         2.300      2.72 | 5.300    10.88 | 8.300     3.17 | 11.30     1.81
         2.333      2.72 | 5.333    10.88 | 8.333     3.17 | 11.33     1.81
         2.367      2.72 | 5.367    10.88 | 8.367     3.17 | 11.37     1.81
         2.400      2.72 | 5.400    10.88 | 8.400     3.17 | 11.40     1.81
         2.433      2.72 | 5.433    10.88 | 8.433     3.17 | 11.43     1.81
         2.467      2.72 | 5.467    10.88 | 8.467     3.17 | 11.47     1.81
         2.500      2.72 | 5.500    10.88 | 8.500     3.17 | 11.50     1.81
         2.533      2.72 | 5.533    43.53 | 8.533     3.17 | 11.53     1.81
         2.567      2.72 | 5.567    43.54 | 8.567     3.17 | 11.57     1.81
         2.600      2.72 | 5.600    43.54 | 8.600     3.17 | 11.60     1.81
         2.633      2.72 | 5.633    43.54 | 8.633     3.17 | 11.63     1.81
         2.667      2.72 | 5.667    43.54 | 8.667     3.17 | 11.67     1.81
         2.700      2.72 | 5.700    43.54 | 8.700     3.17 | 11.70     1.81
         2.733      2.72 | 5.733    43.54 | 8.733     3.17 | 11.73     1.81
         2.767      2.72 | 5.767    81.62 | 8.767     3.17 | 11.77     1.81
         2.800      2.72 | 5.800   119.72 | 8.800     3.17 | 11.80     1.81
         2.833      2.72 | 5.833   119.72 | 8.833     3.17 | 11.83     1.81
         2.867      2.72 | 5.867   119.72 | 8.867     3.17 | 11.87     1.81
         2.900      2.72 | 5.900   119.72 | 8.900     3.17 | 11.90     1.81
         2.933      2.72 | 5.933   119.72 | 8.933     3.17 | 11.93     1.81
         2.967      2.72 | 5.967   119.72 | 8.967     3.17 | 11.97     1.81
         3.000      2.72 | 6.000   119.72 | 9.000     3.17 | 12.00     1.81

    Unit Hyd Qpeak  (cms)=    1.528

    PEAK FLOW        (cms)=     .219 (i)
    TIME TO PEAK     (hrs)=    6.000
    RUNOFF VOLUME     (mm)=   38.210
    TOTAL RAINFALL    (mm)=   90.700
    RUNOFF COEFFICIENT    =     .421

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0207)   |    Area     (ha)=     .70
|ID= 1 DT= 4.0 min   |    Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------
                           IMPERVIOUS    PERVIOUS (i)
    Surface Area       (ha)=       .20         .50
    Dep. Storage       (mm)=      1.00        5.00
    Average Slope       (%)=       .94         .60
    Length              (m)=     10.00      191.40
    Mannings n             =      .013        .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   4.0 MIN. TIME STEP.
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```
                        ---- TRANSFORMED HYETOGRAPH ----
             TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
             .067    2.27 | 3.067    3.63 | 6.067   16.33 |  9.07    3.17
             .133    2.27 | 3.133    3.63 | 6.133   16.33 |  9.13    3.17
             .200    2.27 | 3.200    3.63 | 6.200   16.33 |  9.20    3.17
             .267    2.27 | 3.267    3.63 | 6.267   16.33 |  9.27    3.17
             .333    2.27 | 3.333    3.63 | 6.333   16.33 |  9.33    3.17
             .400    2.27 | 3.400    3.63 | 6.400   16.33 |  9.40    3.17
             .467    2.27 | 3.467    3.63 | 6.467   16.33 |  9.47    3.17
             .533    2.27 | 3.533    3.63 | 6.533   11.79 |  9.53    3.17
             .600    2.27 | 3.600    3.63 | 6.600    7.26 |  9.60    3.17
             .667    2.27 | 3.667    3.63 | 6.667    7.26 |  9.67    3.17
             .733    2.27 | 3.733    3.63 | 6.733    7.26 |  9.73    3.17
             .800    2.27 | 3.800    3.63 | 6.800    7.26 |  9.80    3.17
             .867    2.27 | 3.867    3.63 | 6.867    7.26 |  9.87    3.17
             .933    2.27 | 3.933    3.63 | 6.933    7.26 |  9.93    3.17
            1.000    2.27 | 4.000    3.63 | 7.000    7.26 | 10.00    3.17
            1.067    2.27 | 4.067    5.44 | 7.067    5.44 | 10.07    1.81
            1.133    2.27 | 4.133    5.44 | 7.133    5.44 | 10.13    1.81
            1.200    2.27 | 4.200    5.44 | 7.200    5.44 | 10.20    1.81
            1.267    2.27 | 4.267    5.44 | 7.267    5.44 | 10.27    1.81
            1.333    2.27 | 4.333    5.44 | 7.333    5.44 | 10.33    1.81
            1.400    2.27 | 4.400    5.44 | 7.400    5.44 | 10.40    1.81
            1.467    2.27 | 4.467    5.44 | 7.467    5.44 | 10.47    1.81
            1.533    2.27 | 4.533    6.35 | 7.533    5.44 | 10.53    1.81
            1.600    2.27 | 4.600    7.26 | 7.600    5.44 | 10.60    1.81
            1.667    2.27 | 4.667    7.26 | 7.667    5.44 | 10.67    1.81
            1.733    2.27 | 4.733    7.26 | 7.733    5.44 | 10.73    1.81
            1.800    2.27 | 4.800    7.26 | 7.800    5.44 | 10.80    1.81
            1.867    2.27 | 4.867    7.26 | 7.867    5.44 | 10.87    1.81
            1.933    2.27 | 4.933    7.26 | 7.933    5.44 | 10.93    1.81
            2.000    2.27 | 5.000    7.26 | 8.000    5.44 | 11.00    1.81
            2.067    2.72 | 5.067   10.88 | 8.067    3.17 | 11.07    1.81
            2.133    2.72 | 5.133   10.88 | 8.133    3.17 | 11.13    1.81
            2.200    2.72 | 5.200   10.88 | 8.200    3.17 | 11.20    1.81
            2.267    2.72 | 5.267   10.88 | 8.267    3.17 | 11.27    1.81
            2.333    2.72 | 5.333   10.88 | 8.333    3.17 | 11.33    1.81
            2.400    2.72 | 5.400   10.88 | 8.400    3.17 | 11.40    1.81
            2.467    2.72 | 5.467   10.88 | 8.467    3.17 | 11.47    1.81
            2.533    2.72 | 5.533   27.21 | 8.533    3.17 | 11.53    1.81
            2.600    2.72 | 5.600   43.54 | 8.600    3.17 | 11.60    1.81
            2.667    2.72 | 5.667   43.54 | 8.667    3.17 | 11.67    1.81
            2.733    2.72 | 5.733   43.54 | 8.733    3.17 | 11.73    1.81
            2.800    2.72 | 5.800  100.67 | 8.800    3.17 | 11.80    1.81
            2.867    2.72 | 5.867  119.72 | 8.867    3.17 | 11.87    1.81
            2.933    2.72 | 5.933  119.72 | 8.933    3.17 | 11.93    1.81
            3.000    2.72 | 6.000  119.72 | 9.000    3.17 | 12.00    1.81

     Max.Eff.Inten.(mm/hr)=      119.72         34.25
               over (min)          5.00         44.00
     Storage Coeff.  (min)=         .61 (ii)    40.38 (ii)
     Unit Hyd. Tpeak (min)=        4.00         44.00
     Unit Hyd. peak  (cms)=         .42           .03
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .05           .03         .060 (iii)
     TIME TO PEAK    (hrs)=         .00          6.60         6.00
     RUNOFF VOLUME     (mm)=       89.70         40.08        50.72
     TOTAL RAINFALL   (mm)=       90.70         90.70        90.70
     RUNOFF COEFFICIENT   =         .99           .44          .56

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  70.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 -----------------
 ADD HYD   (1000) |
   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
------------------           (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0202):      .50     .044     6.00    50.71
        + ID2= 2 (0201):      .30     .032     6.00    50.70
          ===============================================
          ID = 3 (1000):      .80     .076     6.00    50.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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------------------
 ADD HYD   (1001) |
   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
  ----------------           (ha)    (cms)    (hrs)     (mm)
```

```
         ID1= 1 (0203):     8.01    .972      6.00     53.35
       + ID2= 2 (1000):      .80    .076      6.00     50.70
         ==============================================
         ID = 3 (1001):     8.81   1.049      6.00     53.11

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 -------------------
| ADD HYD   (1002) |
|  1 +  2 =  3     |             AREA     QPEAK     TPEAK      R.V.
 -------------------             (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0204):     2.82    .156      6.50     44.20
       + ID2= 2 (1001):     8.81   1.049      6.00     53.11
         ==============================================
         ID = 3 (1002):    11.63   1.203      6.00     50.95

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 -------------------
| ADD HYD   (1003) |
|  1 +  2 =  3     |             AREA     QPEAK     TPEAK      R.V.
 -------------------             (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0206):     6.18    .117      6.67     17.96
       + ID2= 2 (1002):    11.63   1.203      6.00     50.95
         ==============================================
         ID = 3 (1003):    17.81   1.245      6.00     39.50

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

 -------------------
| ADD HYD   (1004) |
|  1 +  2 =  3     |             AREA     QPEAK     TPEAK      R.V.
 -------------------             (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (1003):    17.81   1.245      6.00     39.50
       + ID2= 2 (0205):     1.20    .219      6.00     38.21
         ==============================================
         ID = 3 (1004):    19.01   1.463      6.00     39.42

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
 -------------------
| RESERVOIR (0001) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW     STORAGE    |   OUTFLOW     STORAGE
 -------------------        (cms)      (ha.m.)    |    (cms)      (ha.m.)
                            .0000       .0000     |     .4210       .4838
                            .0110       .0717     |     .5580       .6088
                            .0190       .1729     |     .6660       .7402
                            .0250       .1992     |     .6910       .7740
                            .0440       .2529     |    1.0560       .8779
                            .0800       .3083     |    1.6620       .9853
                            .2030       .3652     |    2.4240      1.0963

                              AREA      QPEAK       TPEAK         R.V.
                              (ha)      (cms)       (hrs)         (mm)
    INFLOW : ID= 2 (1004)     19.01      1.46        6.00         39.42
    OUTFLOW: ID= 1 (0001)     19.01       .31        7.40         38.45

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.93
                 TIME SHIFT OF PEAK FLOW         (min)= 84.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=   .4214

    **** WARNING : SELECTED ROUTING TIME STEP DENIED.
--------------------------------------------------------------------------------

 -------------------
 ADD HYD   (1005) |
   1 +  2 =  3    |              AREA     QPEAK     TPEAK      R.V.
 -------------------             (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0001):    19.01    .306      7.40     38.45
       + ID2= 2 (0207):      .70    .060      6.00     50.72
         ==============================================
         ID = 3 (1005):    19.71    .325      7.30     38.88

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

 -------------------
 ADD HYD   (1006) |
   1 +  2 =  3    |              AREA     QPEAK     TPEAK      R.V.
 -------------------             (ha)     (cms)     (hrs)      (mm)
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```
      ID1= 1 (0208):       .50     .042      6.00     17.49
    + ID2= 2 (1005):     19.71     .325      7.30     38.88
      ==============================================
      ID = 3 (1006):     20.21     .327      7.30     38.35

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ****************************
 ** SIMULATION NUMBER:   4 **
 ****************************


 ------------------
 |  READ STORM     |    Filename: K:\PROJECT FILES\200000 - 299999\
 |                 |              210987 - 010 - Innisfil Executive Estates\
 |                 |              SWM\OTTHYMO 3rd Submission\SCS100.STM
 | Ptotal=112.50 mm|    Comments: 100 YR. SCS. STORM
 ------------------
               TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .25    2.81 |  3.25    4.50 |  6.25   20.25 |  9.25    3.94
                .50    2.81 |  3.50    4.50 |  6.50   20.25 |  9.50    3.94
                .75    2.81 |  3.75    4.50 |  6.75    9.00 |  9.75    3.94
               1.00    2.81 |  4.00    4.50 |  7.00    9.00 | 10.00    3.94
               1.25    2.81 |  4.25    6.75 |  7.25    6.75 | 10.25    2.25
               1.50    2.81 |  4.50    6.75 |  7.50    6.75 | 10.50    2.25
               1.75    2.81 |  4.75    9.00 |  7.75    6.75 | 10.75    2.25
               2.00    2.81 |  5.00    9.00 |  8.00    6.75 | 11.00    2.25
               2.25    3.37 |  5.25   13.50 |  8.25    3.94 | 11.25    2.25
               2.50    3.37 |  5.50   13.50 |  8.50    3.94 | 11.50    2.25
               2.75    3.37 |  5.75   54.00 |  8.75    3.94 | 11.75    2.25
               3.00    3.37 |  6.00  148.50 |  9.00    3.94 | 12.00    2.25

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 ------------------
 | CALIB           |
 | NASHYD   (0208) |   Area     (ha)=     .50   Curve Number   (CN)= 44.0
 | D= 1 DT= 2.0 min|   Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
 ------------------    U.H. Tp(hrs)=     .04

      NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .033    2.81 | 3.033    4.50 | 6.033   20.27 |  9.03    3.94
               .067    2.81 | 3.067    4.50 | 6.067   20.25 |  9.07    3.94
               .100    2.81 | 3.100    4.50 | 6.100   20.25 |  9.10    3.94
               .133    2.81 | 3.133    4.50 | 6.133   20.25 |  9.13    3.94
               .167    2.81 | 3.167    4.50 | 6.167   20.25 |  9.17    3.94
               .200    2.81 | 3.200    4.50 | 6.200   20.25 |  9.20    3.94
               .233    2.81 | 3.233    4.50 | 6.233   20.25 |  9.23    3.94
               .267    2.81 | 3.267    4.50 | 6.267   20.25 |  9.27    3.94
               .300    2.81 | 3.300    4.50 | 6.300   20.25 |  9.30    3.94
               .333    2.81 | 3.333    4.50 | 6.333   20.25 |  9.33    3.94
               .367    2.81 | 3.367    4.50 | 6.367   20.25 |  9.37    3.94
               .400    2.81 | 3.400    4.50 | 6.400   20.25 |  9.40    3.94
               .433    2.81 | 3.433    4.50 | 6.433   20.25 |  9.43    3.94
               .467    2.81 | 3.467    4.50 | 6.467   20.25 |  9.47    3.94
               .500    2.81 | 3.500    4.50 | 6.500   20.25 |  9.50    3.94
               .533    2.81 | 3.533    4.50 | 6.533    9.00 |  9.53    3.94
               .567    2.81 | 3.567    4.50 | 6.567    9.00 |  9.57    3.94
               .600    2.81 | 3.600    4.50 | 6.600    9.00 |  9.60    3.94
               .633    2.81 | 3.633    4.50 | 6.633    9.00 |  9.63    3.94
               .667    2.81 | 3.667    4.50 | 6.667    9.00 |  9.67    3.94
               .700    2.81 | 3.700    4.50 | 6.700    9.00 |  9.70    3.94
               .733    2.81 | 3.733    4.50 | 6.733    9.00 |  9.73    3.94
               .767    2.81 | 3.767    4.50 | 6.767    9.00 |  9.77    3.94
               .800    2.81 | 3.800    4.50 | 6.800    9.00 |  9.80    3.94
               .833    2.81 | 3.833    4.50 | 6.833    9.00 |  9.83    3.94
               .867    2.81 | 3.867    4.50 | 6.867    9.00 |  9.87    3.94
               .900    2.81 | 3.900    4.50 | 6.900    9.00 |  9.90    3.94
               .933    2.81 | 3.933    4.50 | 6.933    9.00 |  9.93    3.94
               .967    2.81 | 3.967    4.50 | 6.967    9.00 |  9.97    3.94
              1.000    2.81 | 4.000    4.50 | 7.000    9.00 | 10.00    3.94
              1.033    2.81 | 4.033    6.75 | 7.033    6.75 | 10.03    2.25
              1.067    2.81 | 4.067    6.75 | 7.067    6.75 | 10.07    2.25
              1.100    2.81 | 4.100    6.75 | 7.100    6.75 | 10.10    2.25
              1.133    2.81 | 4.133    6.75 | 7.133    6.75 | 10.13    2.25
              1.167    2.81 | 4.167    6.75 | 7.167    6.75 | 10.17    2.25
              1.200    2.81 | 4.200    6.75 | 7.200    6.75 | 10.20    2.25
              1.233    2.81 | 4.233    6.75 | 7.233    6.75 | 10.23    2.25
              1.267    2.81 | 4.267    6.75 | 7.267    6.75 | 10.27    2.25
              1.300    2.81 | 4.300    6.75 | 7.300    6.75 | 10.30    2.25
              1.333    2.81 | 4.333    6.75 | 7.333    6.75 | 10.33    2.25
              1.367    2.81 | 4.367    6.75 | 7.367    6.75 | 10.37    2.25
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             1.400    2.81 | 4.400     6.75 | 7.400     6.75 | 10.40     2.25
             1.433    2.81 | 4.433     6.75 | 7.433     6.75 | 10.43     2.25
             1.467    2.81 | 4.467     6.75 | 7.467     6.75 | 10.47     2.25
             1.500    2.81 | 4.500     6.75 | 7.500     6.75 | 10.50     2.25
             1.533    2.81 | 4.533     9.00 | 7.533     6.75 | 10.53     2.25
             1.567    2.81 | 4.567     9.00 | 7.567     6.75 | 10.57     2.25
             1.600    2.81 | 4.600     9.00 | 7.600     6.75 | 10.60     2.25
             1.633    2.81 | 4.633     9.00 | 7.633     6.75 | 10.63     2.25
             1.667    2.81 | 4.667     9.00 | 7.667     6.75 | 10.67     2.25
             1.700    2.81 | 4.700     9.00 | 7.700     6.75 | 10.70     2.25
             1.733    2.81 | 4.733     9.00 | 7.733     6.75 | 10.73     2.25
             1.767    2.81 | 4.767     9.00 | 7.767     6.75 | 10.77     2.25
             1.800    2.81 | 4.800     9.00 | 7.800     6.75 | 10.80     2.25
             1.833    2.81 | 4.833     9.00 | 7.833     6.75 | 10.83     2.25
             1.867    2.81 | 4.867     9.00 | 7.867     6.75 | 10.87     2.25
             1.900    2.81 | 4.900     9.00 | 7.900     6.75 | 10.90     2.25
             1.933    2.81 | 4.933     9.00 | 7.933     6.75 | 10.93     2.25
             1.967    2.81 | 4.967     9.00 | 7.967     6.75 | 10.97     2.25
             2.000    2.81 | 5.000     9.00 | 8.000     6.75 | 11.00     2.25
             2.033    3.37 | 5.033    13.50 | 8.033     3.94 | 11.03     2.25
             2.067    3.37 | 5.067    13.50 | 8.067     3.94 | 11.07     2.25
             2.100    3.37 | 5.100    13.50 | 8.100     3.94 | 11.10     2.25
             2.133    3.37 | 5.133    13.50 | 8.133     3.94 | 11.13     2.25
             2.167    3.37 | 5.167    13.50 | 8.167     3.94 | 11.17     2.25
             2.200    3.37 | 5.200    13.50 | 8.200     3.94 | 11.20     2.25
             2.233    3.37 | 5.233    13.50 | 8.233     3.94 | 11.23     2.25
             2.267    3.37 | 5.267    13.50 | 8.267     3.94 | 11.27     2.25
             2.300    3.37 | 5.300    13.50 | 8.300     3.94 | 11.30     2.25
             2.333    3.37 | 5.333    13.50 | 8.333     3.94 | 11.33     2.25
             2.367    3.37 | 5.367    13.50 | 8.367     3.94 | 11.37     2.25
             2.400    3.37 | 5.400    13.50 | 8.400     3.94 | 11.40     2.25
             2.433    3.37 | 5.433    13.50 | 8.433     3.94 | 11.43     2.25
             2.467    3.37 | 5.467    13.50 | 8.467     3.94 | 11.47     2.25
             2.500    3.37 | 5.500    13.50 | 8.500     3.94 | 11.50     2.25
             2.533    3.37 | 5.533    54.00 | 8.533     3.94 | 11.53     2.25
             2.567    3.37 | 5.567    54.00 | 8.567     3.94 | 11.57     2.25
             2.600    3.37 | 5.600    54.00 | 8.600     3.94 | 11.60     2.25
             2.633    3.37 | 5.633    54.00 | 8.633     3.94 | 11.63     2.25
             2.667    3.37 | 5.667    54.00 | 8.667     3.94 | 11.67     2.25
             2.700    3.37 | 5.700    54.00 | 8.700     3.94 | 11.70     2.25
             2.733    3.37 | 5.733    54.00 | 8.733     3.94 | 11.73     2.25
             2.767    3.37 | 5.767   101.24 | 8.767     3.94 | 11.77     2.25
             2.800    3.37 | 5.800   148.50 | 8.800     3.94 | 11.80     2.25
             2.833    3.37 | 5.833   148.50 | 8.833     3.94 | 11.83     2.25
             2.867    3.37 | 5.867   148.50 | 8.867     3.94 | 11.87     2.25
             2.900    3.37 | 5.900   148.50 | 8.900     3.94 | 11.90     2.25
             2.933    3.37 | 5.933   148.50 | 8.933     3.94 | 11.93     2.25
             2.967    3.37 | 5.967   148.50 | 8.967     3.94 | 11.97     2.25
             3.000    3.37 | 6.000   148.50 | 9.000     3.94 | 12.00     2.25

    Unit Hyd Qpeak  (cms)=    .477

    PEAK FLOW       (cms)=    .063 (i)
    TIME TO PEAK    (hrs)=   6.000
    RUNOFF VOLUME    (mm)=  26.129
    TOTAL RAINFALL   (mm)= 112.500
    RUNOFF COEFFICIENT   =    .232

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| CALIB             |
| NASHYD    (0206)  |    Area     (ha)=    6.18   Curve Number    (CN)= 44.0
|ID= 1 DT=10.0 min  |    Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
-------------------      U.H. Tp(hrs)=     .81

        NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
              .167    2.81 | 3.167    4.50 | 6.167   20.25 |  9.17    3.94
              .333    2.81 | 3.333    4.50 | 6.333   20.25 |  9.33    3.94
              .500    2.81 | 3.500    4.50 | 6.500   20.25 |  9.50    3.94
              .667    2.81 | 3.667    4.50 | 6.667    9.00 |  9.67    3.94
              .833    2.81 | 3.833    4.50 | 6.833    9.00 |  9.83    3.94
             1.000    2.81 | 4.000    4.50 | 7.000    9.00 | 10.00    3.94
             1.167    2.81 | 4.167    6.75 | 7.167    6.75 | 10.17    2.25
             1.333    2.81 | 4.333    6.75 | 7.333    6.75 | 10.33    2.25
             1.500    2.81 | 4.500    6.75 | 7.500    6.75 | 10.50    2.25
             1.667    2.81 | 4.667    9.00 | 7.667    6.75 | 10.67    2.25
             1.833    2.81 | 4.833    9.00 | 7.833    6.75 | 10.83    2.25
             2.000    2.81 | 5.000    9.00 | 8.000    6.75 | 11.00    2.25
             2.167    3.37 | 5.167   13.50 | 8.167    3.94 | 11.17    2.25
             2.333    3.37 | 5.333   13.50 | 8.333    3.94 | 11.33    2.25
             2.500    3.37 | 5.500   13.50 | 8.500    3.94 | 11.50    2.25
             2.667    3.37 | 5.667   54.00 | 8.667    3.94 | 11.67    2.25
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              2.833    3.37 | 5.833  101.25 | 8.833    3.94 | 11.83    2.25
              3.000    3.38 | 6.000  148.50 | 9.000    3.94 | 12.00    2.25

    Unit Hyd Qpeak  (cms)=    .291

    PEAK FLOW       (cms)=    .176 (i)
    TIME TO PEAK    (hrs)=   6.667
    RUNOFF VOLUME    (mm)=  26.823
    TOTAL RAINFALL   (mm)= 112.500
    RUNOFF COEFFICIENT   =    .238

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
 CALIB              |
 STANDHYD  (0204)   |   Area     (ha)=   2.82
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  14.30   Dir. Conn.(%)=  10.70
--------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      .40          2.42
    Dep. Storage     (mm)=     1.00          5.00
    Average Slope     (%)=     1.58          2.50
    Length            (m)=   140.00        284.40
    Mannings n           =     .013          .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN | TIME    RAIN | TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |   hrs   mm/hr
               .083    2.81 | 3.083   4.50 | 6.083  20.25 |  9.08    3.94
               .167    2.81 | 3.167   4.50 | 6.167  20.25 |  9.17    3.94
               .250    2.81 | 3.250   4.50 | 6.250  20.25 |  9.25    3.94
               .333    2.81 | 3.333   4.50 | 6.333  20.25 |  9.33    3.94
               .417    2.81 | 3.417   4.50 | 6.417  20.25 |  9.42    3.94
               .500    2.81 | 3.500   4.50 | 6.500  20.25 |  9.50    3.94
               .583    2.81 | 3.583   4.50 | 6.583   9.00 |  9.58    3.94
               .667    2.81 | 3.667   4.50 | 6.667   9.00 |  9.67    3.94
               .750    2.81 | 3.750   4.50 | 6.750   9.00 |  9.75    3.94
               .833    2.81 | 3.833   4.50 | 6.833   9.00 |  9.83    3.94
               .917    2.81 | 3.917   4.50 | 6.917   9.00 |  9.92    3.94
              1.000    2.81 | 4.000   4.50 | 7.000   9.00 | 10.00    3.94
              1.083    2.81 | 4.083   6.75 | 7.083   6.75 | 10.08    2.25
              1.167    2.81 | 4.167   6.75 | 7.167   6.75 | 10.17    2.25
              1.250    2.81 | 4.250   6.75 | 7.250   6.75 | 10.25    2.25
              1.333    2.81 | 4.333   6.75 | 7.333   6.75 | 10.33    2.25
              1.417    2.81 | 4.417   6.75 | 7.417   6.75 | 10.42    2.25
              1.500    2.81 | 4.500   6.75 | 7.500   6.75 | 10.50    2.25
              1.583    2.81 | 4.583   9.00 | 7.583   6.75 | 10.58    2.25
              1.667    2.81 | 4.667   9.00 | 7.667   6.75 | 10.67    2.25
              1.750    2.81 | 4.750   9.00 | 7.750   6.75 | 10.75    2.25
              1.833    2.81 | 4.833   9.00 | 7.833   6.75 | 10.83    2.25
              1.917    2.81 | 4.917   9.00 | 7.917   6.75 | 10.92    2.25
              2.000    2.81 | 5.000   9.00 | 8.000   6.75 | 11.00    2.25
              2.083    3.37 | 5.083  13.50 | 8.083   3.94 | 11.08    2.25
              2.167    3.37 | 5.167  13.50 | 8.167   3.94 | 11.17    2.25
              2.250    3.37 | 5.250  13.50 | 8.250   3.94 | 11.25    2.25
              2.333    3.37 | 5.333  13.50 | 8.333   3.94 | 11.33    2.25
              2.417    3.37 | 5.417  13.50 | 8.417   3.94 | 11.42    2.25
              2.500    3.37 | 5.500  13.50 | 8.500   3.94 | 11.50    2.25
              2.583    3.37 | 5.583  54.00 | 8.583   3.94 | 11.58    2.25
              2.667    3.37 | 5.667  54.00 | 8.667   3.94 | 11.67    2.25
              2.750    3.37 | 5.750  54.00 | 8.750   3.94 | 11.75    2.25
              2.833    3.37 | 5.833 148.50 | 8.833   3.94 | 11.83    2.25
              2.917    3.37 | 5.917 148.50 | 8.917   3.94 | 11.92    2.25
              3.000    3.37 | 6.000 148.50 | 9.000   3.94 | 12.00    2.25

   Max.Eff.Inten.(mm/hr)=     148.50         55.00
              over (min)       5.00         30.00
   Storage Coeff.   (min)=     2.33 (ii)     29.53 (ii)
   Unit Hyd. Tpeak  (min)=     5.00         30.00
   Unit Hyd. peak   (cms)=      .30           .04
                                                          *TOTALS*
   PEAK FLOW        (cms)=      .12           .23          .249 (iii)
   TIME TO PEAK     (hrs)=      .00          6.33          6.33
   RUNOFF VOLUME     (mm)=   111.50         54.67         60.75
   TOTAL RAINFALL    (mm)=   112.50        112.50        112.50
   RUNOFF COEFFICIENT    =      .99           .49           .54

*** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
*** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
            YOU SHOULD CONSIDER SPLITTING THE AREA.

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN*  =  70.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
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   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0203)   |   Area      (ha)=    8.01
|ID= 1 DT= 3.0 min   |   Total Imp(%)=  34.30   Dir. Conn.(%)=  25.70
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        2.75          5.26
     Dep. Storage     (mm)=        1.00          5.00
     Average Slope     (%)=         .79          2.00
     Length            (m)=      414.00         86.00
     Mannings n           =        .013          .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME    RAIN
                  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr
                 .050    2.81 | 3.050   4.50 | 6.050  20.25 |  9.05   3.94
                 .100    2.81 | 3.100   4.50 | 6.100  20.25 |  9.10   3.94
                 .150    2.81 | 3.150   4.50 | 6.150  20.25 |  9.15   3.94
                 .200    2.81 | 3.200   4.50 | 6.200  20.25 |  9.20   3.94
                 .250    2.81 | 3.250   4.50 | 6.250  20.25 |  9.25   3.94
                 .300    2.81 | 3.300   4.50 | 6.300  20.25 |  9.30   3.94
                 .350    2.81 | 3.350   4.50 | 6.350  20.25 |  9.35   3.94
                 .400    2.81 | 3.400   4.50 | 6.400  20.25 |  9.40   3.94
                 .450    2.81 | 3.450   4.50 | 6.450  20.25 |  9.45   3.94
                 .500    2.81 | 3.500   4.50 | 6.500  20.25 |  9.50   3.94
                 .550    2.81 | 3.550   4.50 | 6.550   9.00 |  9.55   3.94
                 .600    2.81 | 3.600   4.50 | 6.600   9.00 |  9.60   3.94
                 .650    2.81 | 3.650   4.50 | 6.650   9.00 |  9.65   3.94
                 .700    2.81 | 3.700   4.50 | 6.700   9.00 |  9.70   3.94
                 .750    2.81 | 3.750   4.50 | 6.750   9.00 |  9.75   3.94
                 .800    2.81 | 3.800   4.50 | 6.800   9.00 |  9.80   3.94
                 .850    2.81 | 3.850   4.50 | 6.850   9.00 |  9.85   3.94
                 .900    2.81 | 3.900   4.50 | 6.900   9.00 |  9.90   3.94
                 .950    2.81 | 3.950   4.50 | 6.950   9.00 |  9.95   3.94
                1.000    2.81 | 4.000   4.50 | 7.000   9.00 | 10.00   3.94
                1.050    2.81 | 4.050   6.75 | 7.050   6.75 | 10.05   2.25
                1.100    2.81 | 4.100   6.75 | 7.100   6.75 | 10.10   2.25
                1.150    2.81 | 4.150   6.75 | 7.150   6.75 | 10.15   2.25
                1.200    2.81 | 4.200   6.75 | 7.200   6.75 | 10.20   2.25
                1.250    2.81 | 4.250   6.75 | 7.250   6.75 | 10.25   2.25
                1.300    2.81 | 4.300   6.75 | 7.300   6.75 | 10.30   2.25
                1.350    2.81 | 4.350   6.75 | 7.350   6.75 | 10.35   2.25
                1.400    2.81 | 4.400   6.75 | 7.400   6.75 | 10.40   2.25
                1.450    2.81 | 4.450   6.75 | 7.450   6.75 | 10.45   2.25
                1.500    2.81 | 4.500   6.75 | 7.500   6.75 | 10.50   2.25
                1.550    2.81 | 4.550   9.00 | 7.550   6.75 | 10.55   2.25
                1.600    2.81 | 4.600   9.00 | 7.600   6.75 | 10.60   2.25
                1.650    2.81 | 4.650   9.00 | 7.650   6.75 | 10.65   2.25
                1.700    2.81 | 4.700   9.00 | 7.700   6.75 | 10.70   2.25
                1.750    2.81 | 4.750   9.00 | 7.750   6.75 | 10.75   2.25
                1.800    2.81 | 4.800   9.00 | 7.800   6.75 | 10.80   2.25
                1.850    2.81 | 4.850   9.00 | 7.850   6.75 | 10.85   2.25
                1.900    2.81 | 4.900   9.00 | 7.900   6.75 | 10.90   2.25
                1.950    2.81 | 4.950   9.00 | 7.950   6.75 | 10.95   2.25
                2.000    2.81 | 5.000   9.00 | 8.000   6.75 | 11.00   2.25
                2.050    3.37 | 5.050  13.50 | 8.050   3.94 | 11.05   2.25
                2.100    3.37 | 5.100  13.50 | 8.100   3.94 | 11.10   2.25
                2.150    3.37 | 5.150  13.50 | 8.150   3.94 | 11.15   2.25
                2.200    3.37 | 5.200  13.50 | 8.200   3.94 | 11.20   2.25
                2.250    3.37 | 5.250  13.50 | 8.250   3.94 | 11.25   2.25
                2.300    3.37 | 5.300  13.50 | 8.300   3.94 | 11.30   2.25
                2.350    3.37 | 5.350  13.50 | 8.350   3.94 | 11.35   2.25
                2.400    3.37 | 5.400  13.50 | 8.400   3.94 | 11.40   2.25
                2.450    3.37 | 5.450  13.50 | 8.450   3.94 | 11.45   2.25
                2.500    3.37 | 5.500  13.50 | 8.500   3.94 | 11.50   2.25
                2.550    3.37 | 5.550  54.00 | 8.550   3.94 | 11.55   2.25
                2.600    3.37 | 5.600  54.00 | 8.600   3.94 | 11.60   2.25
                2.650    3.37 | 5.650  54.00 | 8.650   3.94 | 11.65   2.25
                2.700    3.37 | 5.700  54.00 | 8.700   3.94 | 11.70   2.25
                2.750    3.37 | 5.750  54.01 | 8.750   3.94 | 11.75   2.25
                2.800    3.37 | 5.800 148.50 | 8.800   3.94 | 11.80   2.25
                2.850    3.37 | 5.850 148.50 | 8.850   3.94 | 11.85   2.25
                2.900    3.37 | 5.900 148.50 | 8.900   3.94 | 11.90   2.25
                2.950    3.37 | 5.950 148.50 | 8.950   3.94 | 11.95   2.25
                3.000    3.37 | 6.000 148.49 | 9.000   3.94 | 12.00   2.25

     Max.Eff.Inten.(mm/hr)=      148.50        103.19
               over (min)         6.00         18.00
     Storage Coeff.   (min)=      5.49 (ii)    16.52 (ii)
     Unit Hyd. Tpeak  (min)=      6.00         18.00
     Unit Hyd. peak   (cms)=       .20           .07
                                                           *TOTALS*
     PEAK FLOW        (cms)=       .80           .82         1.397 (iii)
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   TIME TO PEAK     (hrs)=         .00          6.15            6.05
   RUNOFF VOLUME     (mm)=      111.50         57.17           71.13
   TOTAL RAINFALL    (mm)=      112.50        112.50          112.50
   RUNOFF COEFFICIENT   =          .99           .51             .63


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
 STANDHYD  (0202)  |   Area     (ha)=     .50
 D= 1 DT= 5.0 min  |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
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                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       .14          .36
    Dep. Storage     (mm)=      1.00         5.00
    Average Slope     (%)=       .80         1.00
    Length            (m)=     10.00       218.20
    Mannings n          =       .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                            ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
              .083    2.81 | 3.083    4.50 | 6.083   20.25 |  9.08    3.94
              .167    2.81 | 3.167    4.50 | 6.167   20.25 |  9.17    3.94
              .250    2.81 | 3.250    4.50 | 6.250   20.25 |  9.25    3.94
              .333    2.81 | 3.333    4.50 | 6.333   20.25 |  9.33    3.94
              .417    2.81 | 3.417    4.50 | 6.417   20.25 |  9.42    3.94
              .500    2.81 | 3.500    4.50 | 6.500   20.25 |  9.50    3.94
              .583    2.81 | 3.583    4.50 | 6.583    9.00 |  9.58    3.94
              .667    2.81 | 3.667    4.50 | 6.667    9.00 |  9.67    3.94
              .750    2.81 | 3.750    4.50 | 6.750    9.00 |  9.75    3.94
              .833    2.81 | 3.833    4.50 | 6.833    9.00 |  9.83    3.94
              .917    2.81 | 3.917    4.50 | 6.917    9.00 |  9.92    3.94
             1.000    2.81 | 4.000    4.50 | 7.000    9.00 | 10.00    3.94
             1.083    2.81 | 4.083    6.75 | 7.083    6.75 | 10.08    2.25
             1.167    2.81 | 4.167    6.75 | 7.167    6.75 | 10.17    2.25
             1.250    2.81 | 4.250    6.75 | 7.250    6.75 | 10.25    2.25
             1.333    2.81 | 4.333    6.75 | 7.333    6.75 | 10.33    2.25
             1.417    2.81 | 4.417    6.75 | 7.417    6.75 | 10.42    2.25
             1.500    2.81 | 4.500    6.75 | 7.500    6.75 | 10.50    2.25
             1.583    2.81 | 4.583    9.00 | 7.583    6.75 | 10.58    2.25
             1.667    2.81 | 4.667    9.00 | 7.667    6.75 | 10.67    2.25
             1.750    2.81 | 4.750    9.00 | 7.750    6.75 | 10.75    2.25
             1.833    2.81 | 4.833    9.00 | 7.833    6.75 | 10.83    2.25
             1.917    2.81 | 4.917    9.00 | 7.917    6.75 | 10.92    2.25
             2.000    2.81 | 5.000    9.00 | 8.000    6.75 | 11.00    2.25
             2.083    3.37 | 5.083   13.50 | 8.083    3.94 | 11.08    2.25
             2.167    3.37 | 5.167   13.50 | 8.167    3.94 | 11.17    2.25
             2.250    3.37 | 5.250   13.50 | 8.250    3.94 | 11.25    2.25
             2.333    3.37 | 5.333   13.50 | 8.333    3.94 | 11.33    2.25
             2.417    3.37 | 5.417   13.50 | 8.417    3.94 | 11.42    2.25
             2.500    3.37 | 5.500   13.50 | 8.500    3.94 | 11.50    2.25
             2.583    3.37 | 5.583   54.00 | 8.583    3.94 | 11.58    2.25
             2.667    3.37 | 5.667   54.00 | 8.667    3.94 | 11.67    2.25
             2.750    3.37 | 5.750   54.00 | 8.750    3.94 | 11.75    2.25
             2.833    3.37 | 5.833  148.50 | 8.833    3.94 | 11.83    2.25
             2.917    3.37 | 5.917  148.50 | 8.917    3.94 | 11.92    2.25
             3.000    3.37 | 6.000  148.50 | 9.000    3.94 | 12.00    2.25

  Max.Eff.Inten.(mm/hr)=      148.50         59.93
            over (min)        5.00          35.00
  Storage Coeff.   (min)=       .59 (ii)     30.10 (ii)
  Unit Hyd. Tpeak  (min)=      5.00          35.00
  Unit Hyd. peak   (cms)=       .34            .04
                                                        *TOTALS*
  PEAK FLOW        (cms)=       .04            .04          .060 (iii)
  TIME TO PEAK     (hrs)=       .00           6.42          6.00
  RUNOFF VOLUME     (mm)=    111.50          56.31         68.14
  TOTAL RAINFALL    (mm)=    112.50         112.50        112.50
  RUNOFF COEFFICIENT   =        .99            .50           .61

**** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD  (0201) |   Area     (ha)=    .30
|ID= 1 DT= 3.0 min |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
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                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .09          .21
     Dep. Storage      (mm)=       1.00         5.00
     Average Slope      (%)=        .97          .97
     Length             (m)=      10.00       119.60
     Mannings n            =       .013         .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                 TIME     RAIN | TIME     RAIN | TIME     RAIN | TIME     RAIN
                  hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr
                 .050     2.81 | 3.050    4.50 | 6.050   20.25 |  9.05    3.94
                 .100     2.81 | 3.100    4.50 | 6.100   20.25 |  9.10    3.94
                 .150     2.81 | 3.150    4.50 | 6.150   20.25 |  9.15    3.94
                 .200     2.81 | 3.200    4.50 | 6.200   20.25 |  9.20    3.94
                 .250     2.81 | 3.250    4.50 | 6.250   20.25 |  9.25    3.94
                 .300     2.81 | 3.300    4.50 | 6.300   20.25 |  9.30    3.94
                 .350     2.81 | 3.350    4.50 | 6.350   20.25 |  9.35    3.94
                 .400     2.81 | 3.400    4.50 | 6.400   20.25 |  9.40    3.94
                 .450     2.81 | 3.450    4.50 | 6.450   20.25 |  9.45    3.94
                 .500     2.81 | 3.500    4.50 | 6.500   20.25 |  9.50    3.94
                 .550     2.81 | 3.550    4.50 | 6.550    9.00 |  9.55    3.94
                 .600     2.81 | 3.600    4.50 | 6.600    9.00 |  9.60    3.94
                 .650     2.81 | 3.650    4.50 | 6.650    9.00 |  9.65    3.94
                 .700     2.81 | 3.700    4.50 | 6.700    9.00 |  9.70    3.94
                 .750     2.81 | 3.750    4.50 | 6.750    9.00 |  9.75    3.94
                 .800     2.81 | 3.800    4.50 | 6.800    9.00 |  9.80    3.94
                 .850     2.81 | 3.850    4.50 | 6.850    9.00 |  9.85    3.94
                 .900     2.81 | 3.900    4.50 | 6.900    9.00 |  9.90    3.94
                 .950     2.81 | 3.950    4.50 | 6.950    9.00 |  9.95    3.94
                1.000     2.81 | 4.000    4.50 | 7.000    9.00 | 10.00    3.94
                1.050     2.81 | 4.050    6.75 | 7.050    6.75 | 10.05    2.25
                1.100     2.81 | 4.100    6.75 | 7.100    6.75 | 10.10    2.25
                1.150     2.81 | 4.150    6.75 | 7.150    6.75 | 10.15    2.25
                1.200     2.81 | 4.200    6.75 | 7.200    6.75 | 10.20    2.25
                1.250     2.81 | 4.250    6.75 | 7.250    6.75 | 10.25    2.25
                1.300     2.81 | 4.300    6.75 | 7.300    6.75 | 10.30    2.25
                1.350     2.81 | 4.350    6.75 | 7.350    6.75 | 10.35    2.25
                1.400     2.81 | 4.400    6.75 | 7.400    6.75 | 10.40    2.25
                1.450     2.81 | 4.450    6.75 | 7.450    6.75 | 10.45    2.25
                1.500     2.81 | 4.500    6.75 | 7.500    6.75 | 10.50    2.25
                1.550     2.81 | 4.550    9.00 | 7.550    6.75 | 10.55    2.25
                1.600     2.81 | 4.600    9.00 | 7.600    6.75 | 10.60    2.25
                1.650     2.81 | 4.650    9.00 | 7.650    6.75 | 10.65    2.25
                1.700     2.81 | 4.700    9.00 | 7.700    6.75 | 10.70    2.25
                1.750     2.81 | 4.750    9.00 | 7.750    6.75 | 10.75    2.25
                1.800     2.81 | 4.800    9.00 | 7.800    6.75 | 10.80    2.25
                1.850     2.81 | 4.850    9.00 | 7.850    6.75 | 10.85    2.25
                1.900     2.81 | 4.900    9.00 | 7.900    6.75 | 10.90    2.25
                1.950     2.81 | 4.950    9.00 | 7.950    6.75 | 10.95    2.25
                2.000     2.81 | 5.000    9.00 | 8.000    6.75 | 11.00    2.25
                2.050     3.37 | 5.050   13.50 | 8.050    3.94 | 11.05    2.25
                2.100     3.37 | 5.100   13.50 | 8.100    3.94 | 11.10    2.25
                2.150     3.37 | 5.150   13.50 | 8.150    3.94 | 11.15    2.25
                2.200     3.37 | 5.200   13.50 | 8.200    3.94 | 11.20    2.25
                2.250     3.37 | 5.250   13.50 | 8.250    3.94 | 11.25    2.25
                2.300     3.37 | 5.300   13.50 | 8.300    3.94 | 11.30    2.25
                2.350     3.37 | 5.350   13.50 | 8.350    3.94 | 11.35    2.25
                2.400     3.37 | 5.400   13.50 | 8.400    3.94 | 11.40    2.25
                2.450     3.37 | 5.450   13.50 | 8.450    3.94 | 11.45    2.25
                2.500     3.37 | 5.500   13.50 | 8.500    3.94 | 11.50    2.25
                2.550     3.37 | 5.550   54.00 | 8.550    3.94 | 11.55    2.25
                2.600     3.37 | 5.600   54.00 | 8.600    3.94 | 11.60    2.25
                2.650     3.37 | 5.650   54.00 | 8.650    3.94 | 11.65    2.25
                2.700     3.37 | 5.700   54.00 | 8.700    3.94 | 11.70    2.25
                2.750     3.37 | 5.750   54.01 | 8.750    3.94 | 11.75    2.25
                2.800     3.37 | 5.800  148.50 | 8.800    3.94 | 11.80    2.25
                2.850     3.37 | 5.850  148.50 | 8.850    3.94 | 11.85    2.25
                2.900     3.37 | 5.900  148.50 | 8.900    3.94 | 11.90    2.25
                2.950     3.37 | 5.950  148.50 | 8.950    3.94 | 11.95    2.25
                3.000     3.37 | 6.000  148.49 | 9.000    3.94 | 12.00    2.25

    Max.Eff.Inten.(mm/hr)=      148.50        75.73
               over (min)         6.00        21.00
    Storage Coeff.  (min)=         .55 (ii)   19.46 (ii)
    Unit Hyd. Tpeak (min)=        6.00        21.00
    Unit Hyd. peak  (cms)=         .38          .06
                                                          *TOTALS*
    PEAK FLOW       (cms)=         .03          .03          .045 (iii)
    TIME TO PEAK    (hrs)=         .00         6.20          6.00
    RUNOFF VOLUME    (mm)=      111.50        56.31         68.14
    TOTAL RAINFALL   (mm)=      112.50       112.50        112.50
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   RUNOFF COEFFICIENT   =         .99           .50           .61

 *** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| NASHYD   (0205)  |   Area     (ha)=    1.20   Curve Number   (CN)= 71.2
|ID= 1 DT= 2.0 min |   Ia       (mm)=    2.00   # of Linear Res.(N)= 3.00
 ------------------    U.H. Tp(hrs)=      .03

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME   RAIN
                   hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs  mm/hr
                  .033    2.81 | 3.033   4.50 | 6.033  20.27 |  9.03   3.94
                  .067    2.81 | 3.067   4.50 | 6.067  20.25 |  9.07   3.94
                  .100    2.81 | 3.100   4.50 | 6.100  20.25 |  9.10   3.94
                  .133    2.81 | 3.133   4.50 | 6.133  20.25 |  9.13   3.94
                  .167    2.81 | 3.167   4.50 | 6.167  20.25 |  9.17   3.94
                  .200    2.81 | 3.200   4.50 | 6.200  20.25 |  9.20   3.94
                  .233    2.81 | 3.233   4.50 | 6.233  20.25 |  9.23   3.94
                  .267    2.81 | 3.267   4.50 | 6.267  20.25 |  9.27   3.94
                  .300    2.81 | 3.300   4.50 | 6.300  20.25 |  9.30   3.94
                  .333    2.81 | 3.333   4.50 | 6.333  20.25 |  9.33   3.94
                  .367    2.81 | 3.367   4.50 | 6.367  20.25 |  9.37   3.94
                  .400    2.81 | 3.400   4.50 | 6.400  20.25 |  9.40   3.94
                  .433    2.81 | 3.433   4.50 | 6.433  20.25 |  9.43   3.94
                  .467    2.81 | 3.467   4.50 | 6.467  20.25 |  9.47   3.94
                  .500    2.81 | 3.500   4.50 | 6.500  20.25 |  9.50   3.94
                  .533    2.81 | 3.533   4.50 | 6.533   9.00 |  9.53   3.94
                  .567    2.81 | 3.567   4.50 | 6.567   9.00 |  9.57   3.94
                  .600    2.81 | 3.600   4.50 | 6.600   9.00 |  9.60   3.94
                  .633    2.81 | 3.633   4.50 | 6.633   9.00 |  9.63   3.94
                  .667    2.81 | 3.667   4.50 | 6.667   9.00 |  9.67   3.94
                  .700    2.81 | 3.700   4.50 | 6.700   9.00 |  9.70   3.94
                  .733    2.81 | 3.733   4.50 | 6.733   9.00 |  9.73   3.94
                  .767    2.81 | 3.767   4.50 | 6.767   9.00 |  9.77   3.94
                  .800    2.81 | 3.800   4.50 | 6.800   9.00 |  9.80   3.94
                  .833    2.81 | 3.833   4.50 | 6.833   9.00 |  9.83   3.94
                  .867    2.81 | 3.867   4.50 | 6.867   9.00 |  9.87   3.94
                  .900    2.81 | 3.900   4.50 | 6.900   9.00 |  9.90   3.94
                  .933    2.81 | 3.933   4.50 | 6.933   9.00 |  9.93   3.94
                  .967    2.81 | 3.967   4.50 | 6.967   9.00 |  9.97   3.94
                 1.000    2.81 | 4.000   4.50 | 7.000   9.00 | 10.00   3.94
                 1.033    2.81 | 4.033   6.75 | 7.033   6.75 | 10.03   2.25
                 1.067    2.81 | 4.067   6.75 | 7.067   6.75 | 10.07   2.25
                 1.100    2.81 | 4.100   6.75 | 7.100   6.75 | 10.10   2.25
                 1.133    2.81 | 4.133   6.75 | 7.133   6.75 | 10.13   2.25
                 1.167    2.81 | 4.167   6.75 | 7.167   6.75 | 10.17   2.25
                 1.200    2.81 | 4.200   6.75 | 7.200   6.75 | 10.20   2.25
                 1.233    2.81 | 4.233   6.75 | 7.233   6.75 | 10.23   2.25
                 1.267    2.81 | 4.267   6.75 | 7.267   6.75 | 10.27   2.25
                 1.300    2.81 | 4.300   6.75 | 7.300   6.75 | 10.30   2.25
                 1.333    2.81 | 4.333   6.75 | 7.333   6.75 | 10.33   2.25
                 1.367    2.81 | 4.367   6.75 | 7.367   6.75 | 10.37   2.25
                 1.400    2.81 | 4.400   6.75 | 7.400   6.75 | 10.40   2.25
                 1.433    2.81 | 4.433   6.75 | 7.433   6.75 | 10.43   2.25
                 1.467    2.81 | 4.467   6.75 | 7.467   6.75 | 10.47   2.25
                 1.500    2.81 | 4.500   6.75 | 7.500   6.75 | 10.50   2.25
                 1.533    2.81 | 4.533   9.00 | 7.533   6.75 | 10.53   2.25
                 1.567    2.81 | 4.567   9.00 | 7.567   6.75 | 10.57   2.25
                 1.600    2.81 | 4.600   9.00 | 7.600   6.75 | 10.60   2.25
                 1.633    2.81 | 4.633   9.00 | 7.633   6.75 | 10.63   2.25
                 1.667    2.81 | 4.667   9.00 | 7.667   6.75 | 10.67   2.25
                 1.700    2.81 | 4.700   9.00 | 7.700   6.75 | 10.70   2.25
                 1.733    2.81 | 4.733   9.00 | 7.733   6.75 | 10.73   2.25
                 1.767    2.81 | 4.767   9.00 | 7.767   6.75 | 10.77   2.25
                 1.800    2.81 | 4.800   9.00 | 7.800   6.75 | 10.80   2.25
                 1.833    2.81 | 4.833   9.00 | 7.833   6.75 | 10.83   2.25
                 1.867    2.81 | 4.867   9.00 | 7.867   6.75 | 10.87   2.25
                 1.900    2.81 | 4.900   9.00 | 7.900   6.75 | 10.90   2.25
                 1.933    2.81 | 4.933   9.00 | 7.933   6.75 | 10.93   2.25
                 1.967    2.81 | 4.967   9.00 | 7.967   6.75 | 10.97   2.25
                 2.000    2.81 | 5.000   9.00 | 8.000   6.75 | 11.00   2.25
                 2.033    3.37 | 5.033  13.50 | 8.033   3.94 | 11.03   2.25
                 2.067    3.37 | 5.067  13.50 | 8.067   3.94 | 11.07   2.25
                 2.100    3.37 | 5.100  13.50 | 8.100   3.94 | 11.10   2.25
                 2.133    3.37 | 5.133  13.50 | 8.133   3.94 | 11.13   2.25
                 2.167    3.37 | 5.167  13.50 | 8.167   3.94 | 11.17   2.25
                 2.200    3.37 | 5.200  13.50 | 8.200   3.94 | 11.20   2.25
```

```
            2.233     3.37 | 5.233    13.50 | 8.233     3.94 | 11.23     2.25
            2.267     3.37 | 5.267    13.50 | 8.267     3.94 | 11.27     2.25
            2.300     3.37 | 5.300    13.50 | 8.300     3.94 | 11.30     2.25
            2.333     3.37 | 5.333    13.50 | 8.333     3.94 | 11.33     2.25
            2.367     3.37 | 5.367    13.50 | 8.367     3.94 | 11.37     2.25
            2.400     3.37 | 5.400    13.50 | 8.400     3.94 | 11.40     2.25
            2.433     3.37 | 5.433    13.50 | 8.433     3.94 | 11.43     2.25
            2.467     3.37 | 5.467    13.50 | 8.467     3.94 | 11.47     2.25
            2.500     3.37 | 5.500    13.50 | 8.500     3.94 | 11.50     2.25
            2.533     3.37 | 5.533    54.00 | 8.533     3.94 | 11.53     2.25
            2.567     3.37 | 5.567    54.00 | 8.567     3.94 | 11.57     2.25
            2.600     3.37 | 5.600    54.00 | 8.600     3.94 | 11.60     2.25
            2.633     3.37 | 5.633    54.00 | 8.633     3.94 | 11.63     2.25
            2.667     3.37 | 5.667    54.00 | 8.667     3.94 | 11.67     2.25
            2.700     3.37 | 5.700    54.00 | 8.700     3.94 | 11.70     2.25
            2.733     3.37 | 5.733    54.00 | 8.733     3.94 | 11.73     2.25
            2.767     3.37 | 5.767   101.24 | 8.767     3.94 | 11.77     2.25
            2.800     3.37 | 5.800   148.50 | 8.800     3.94 | 11.80     2.25
            2.833     3.37 | 5.833   148.50 | 8.833     3.94 | 11.83     2.25
            2.867     3.37 | 5.867   148.50 | 8.867     3.94 | 11.87     2.25
            2.900     3.37 | 5.900   148.50 | 8.900     3.94 | 11.90     2.25
            2.933     3.37 | 5.933   148.50 | 8.933     3.94 | 11.93     2.25
            2.967     3.37 | 5.967   148.50 | 8.967     3.94 | 11.97     2.25
            3.000     3.37 | 6.000   148.50 | 9.000     3.94 | 12.00     2.25

   Unit Hyd Qpeak  (cms)=   1.528

   PEAK FLOW       (cms)=    .301 (i)
   TIME TO PEAK    (hrs)=   6.000
   RUNOFF VOLUME    (mm)=  53.237
   TOTAL RAINFALL   (mm)= 112.500
   RUNOFF COEFFICIENT   =    .473

   (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD  (0207)  |    Area     (ha)=     .70
|ID= 1 DT= 4.0 min  |    Total Imp(%)=   28.60   Dir. Conn.(%)=  21.50
-------------------
                              IMPERVIOUS    PERVIOUS (i)
   Surface Area      (ha)=        .20          .50
   Dep. Storage      (mm)=       1.00         5.00
   Average Slope      (%)=        .94          .60
   Length             (m)=      10.00       191.40
   Mannings n            =       .013         .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   4.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
             TIME     RAIN | TIME     RAIN | TIME     RAIN | TIME     RAIN
              hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr
             .067     2.81 | 3.067    4.50 | 6.067   20.26 |  9.07     3.94
             .133     2.81 | 3.133    4.50 | 6.133   20.25 |  9.13     3.94
             .200     2.81 | 3.200    4.50 | 6.200   20.25 |  9.20     3.94
             .267     2.81 | 3.267    4.50 | 6.267   20.25 |  9.27     3.94
             .333     2.81 | 3.333    4.50 | 6.333   20.25 |  9.33     3.94
             .400     2.81 | 3.400    4.50 | 6.400   20.25 |  9.40     3.94
             .467     2.81 | 3.467    4.50 | 6.467   20.25 |  9.47     3.94
             .533     2.81 | 3.533    4.50 | 6.533   14.63 |  9.53     3.94
             .600     2.81 | 3.600    4.50 | 6.600    9.00 |  9.60     3.94
             .667     2.81 | 3.667    4.50 | 6.667    9.00 |  9.67     3.94
             .733     2.81 | 3.733    4.50 | 6.733    9.00 |  9.73     3.94
             .800     2.81 | 3.800    4.50 | 6.800    9.00 |  9.80     3.94
             .867     2.81 | 3.867    4.50 | 6.867    9.00 |  9.87     3.94
             .933     2.81 | 3.933    4.50 | 6.933    9.00 |  9.93     3.94
            1.000     2.81 | 4.000    4.50 | 7.000    9.00 | 10.00     3.94
            1.067     2.81 | 4.067    6.75 | 7.067    6.75 | 10.07     2.25
            1.133     2.81 | 4.133    6.75 | 7.133    6.75 | 10.13     2.25
            1.200     2.81 | 4.200    6.75 | 7.200    6.75 | 10.20     2.25
            1.267     2.81 | 4.267    6.75 | 7.267    6.75 | 10.27     2.25
            1.333     2.81 | 4.333    6.75 | 7.333    6.75 | 10.33     2.25
            1.400     2.81 | 4.400    6.75 | 7.400    6.75 | 10.40     2.25
            1.467     2.81 | 4.467    6.75 | 7.467    6.75 | 10.47     2.25
            1.533     2.81 | 4.533    7.87 | 7.533    6.75 | 10.53     2.25
            1.600     2.81 | 4.600    9.00 | 7.600    6.75 | 10.60     2.25
            1.667     2.81 | 4.667    9.00 | 7.667    6.75 | 10.67     2.25
            1.733     2.81 | 4.733    9.00 | 7.733    6.75 | 10.73     2.25
            1.800     2.81 | 4.800    9.00 | 7.800    6.75 | 10.80     2.25
            1.867     2.81 | 4.867    9.00 | 7.867    6.75 | 10.87     2.25
            1.933     2.81 | 4.933    9.00 | 7.933    6.75 | 10.93     2.25
            2.000     2.81 | 5.000    9.00 | 8.000    6.75 | 11.00     2.25
            2.067     3.37 | 5.067   13.50 | 8.067    3.94 | 11.07     2.25
            2.133     3.37 | 5.133   13.50 | 8.133    3.94 | 11.13     2.25
            2.200     3.37 | 5.200   13.50 | 8.200    3.94 | 11.20     2.25
            2.267     3.37 | 5.267   13.50 | 8.267    3.94 | 11.27     2.25
            2.333     3.37 | 5.333   13.50 | 8.333    3.94 | 11.33     2.25
```

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              2.400     3.37 | 5.400    13.50 | 8.400      3.94 | 11.40     2.25
              2.467     3.37 | 5.467    13.50 | 8.467      3.94 | 11.47     2.25
              2.533     3.37 | 5.533    33.75 | 8.533      3.94 | 11.53     2.25
              2.600     3.37 | 5.600    54.00 | 8.600      3.94 | 11.60     2.25
              2.667     3.37 | 5.667    54.00 | 8.667      3.94 | 11.67     2.25
              2.733     3.37 | 5.733    54.00 | 8.733      3.94 | 11.73     2.25
              2.800     3.37 | 5.800   124.87 | 8.800      3.94 | 11.80     2.25
              2.867     3.37 | 5.867   148.50 | 8.867      3.94 | 11.87     2.25
              2.933     3.37 | 5.933   148.50 | 8.933      3.94 | 11.93     2.25
              3.000     3.37 | 6.000   148.50 | 9.000      3.94 | 12.00     2.25

     Max.Eff.Inten.(mm/hr)=      148.50          52.12
               over (min)          5.00          36.00
     Storage Coeff.   (min)=        .56 (ii)     34.18 (ii)
     Unit Hyd. Tpeak  (min)=       4.00          36.00
     Unit Hyd. peak   (cms)=        .42            .03
                                                              *TOTALS*
     PEAK FLOW        (cms)=        .06            .05          .082 (iii)
     TIME TO PEAK     (hrs)=        .00           6.47          6.00
     RUNOFF VOLUME     (mm)=     111.50          56.31         68.15
     TOTAL RAINFALL    (mm)=     112.50         112.50        112.50
     RUNOFF COEFFICIENT   =         .99            .50           .61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
 ADD HYD   (1000) |
  1 + 2 = 3       |          AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0202):       .50      .060      6.00     68.14
       + ID2= 2 (0201):       .30      .045      6.00     68.14
         ==============================================
         ID = 3 (1000):       .80      .106      6.00     68.13

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------

--------------------
 ADD HYD   (1001) |
  1 + 2 = 3       |          AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0203):      8.01     1.397      6.05     71.13
       + ID2= 2 (1000):       .80      .106      6.00     68.13
         ==============================================
         ID = 3 (1001):      8.81     1.492      6.00     70.86

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
 ADD HYD   (1002) |
  1 + 2 = 3       |          AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0204):      2.82      .249      6.33     60.75
       + ID2= 2 (1001):      8.81     1.492      6.00     70.86
         ==============================================
         ID = 3 (1002):     11.63     1.735      6.00     68.40

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
ADD HYD   (1003) |
 1 + 2 = 3       |          AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0206):      6.18      .176      6.67     26.82
      + ID2= 2 (1002):     11.63     1.735      6.00     68.40
        ==============================================
        ID = 3 (1003):     17.81     1.800      6.00     53.98

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
DD HYD   (1004) |
 1 + 2 = 3      |          AREA     QPEAK     TPEAK      R.V.
--------------------       (ha)     (cms)     (hrs)      (mm)
```

```
        ID1= 1 (1003):     17.81   1.800      6.00     53.98
      + ID2= 2 (0205):      1.20    .301      6.00     53.24
        ================================================
        ID = 3 (1004):     19.01   2.101      6.00     53.93

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| RESERVOIR (0001) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |        OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------         (cms)      (ha.m.)    |   (cms)      (ha.m.)
                             .0000       .0000     |    .4210       .4838
                             .0110       .0717     |    .5580       .6088
                             .0190       .1729     |    .6660       .7402
                             .0250       .1992     |    .6910       .7740
                             .0440       .2529     |   1.0560       .8779
                             .0800       .3083     |   1.6620       .9853
                             .2030       .3652     |   2.4240      1.0963

                                 AREA      QPEAK      TPEAK        R.V.
                                 (ha)      (cms)      (hrs)        (mm)
    INFLOW : ID= 2 (1004)       19.01       2.10       6.00        53.93
    OUTFLOW: ID= 1 (0001)       19.01        .48       7.17        52.93

                PEAK   FLOW   REDUCTION  [Qout/Qin](%)= 22.78
                TIME SHIFT OF PEAK FLOW          (min)= 70.00
                MAXIMUM  STORAGE   USED        (ha.m.)=   .5363

    **** WARNING : SELECTED ROUTING TIME STEP DENIED.
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--------------------
| ADD HYD   (1005) |
|  1 +  2 =  3     |        AREA    QPEAK     TPEAK      R.V.
--------------------        (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (0001):     19.01    .479      7.17     52.93
      + ID2= 2 (0207):       .70    .082      6.00     68.15
        ================================================
        ID = 3 (1005):     19.71    .509      7.00     53.47

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (1006) |
|  1 +  2 =  3     |        AREA    QPEAK     TPEAK      R.V.
--------------------        (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (0208):       .50    .063      6.00     26.13
      + ID2= 2 (1005):     19.71    .509      7.00     53.47
        ================================================
        ID = 3 (1006):     20.21    .513      7.00     52.79

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ****************************
 ** SIMULATION NUMBER:   5 **
 ****************************


--------------------
|    READ STORM     |    Filename: K:\PROJECT FILES\200000 - 299999\
|                   |              210987 - 010 - Innisfil Executive Estates\
|                   |              SWM\OTTHYMO 3rd Submission\chica2.stm
| Ptotal= 36.95 mm  |    Comments: 2 YEAR - 4 hour - Chicago Storm
--------------------
              TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .17    2.47 |  1.17   18.78 |  2.17    5.73 |  3.17    2.93
               .33    2.82 |  1.33   83.11 |  2.33    4.89 |  3.33    2.72
               .50    3.31 |  1.50   24.57 |  2.50    4.28 |  3.50    2.55
               .67    4.05 |  1.67   13.01 |  2.67    3.82 |  3.67    2.39
               .83    5.30 |  1.83    9.01 |  2.83    3.46 |  3.83    2.26
              1.00    7.98 |  2.00    6.97 |  3.00    3.17 |  4.00    2.15
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--------------------
| CALIB             |
| NASHYD    (0208)  |   Area     (ha)=      .50   Curve Number   (CN)= 44.0
|ID= 1 DT= 2.0 min  |   Ia       (mm)=     5.00   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=      .04

       NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
```

```
                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN
                hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr
               .033    2.47  | 1.033   18.78  | 2.033    5.73  |  3.03    2.93
               .067    2.47  | 1.067   18.78  | 2.067    5.73  |  3.07    2.93
               .100    2.47  | 1.100   18.78  | 2.100    5.73  |  3.10    2.93
               .133    2.47  | 1.133   18.78  | 2.133    5.73  |  3.13    2.93
               .167    2.47  | 1.167   18.78  | 2.167    5.73  |  3.17    2.93
               .200    2.82  | 1.200   83.11  | 2.200    4.89  |  3.20    2.72
               .233    2.82  | 1.233   83.11  | 2.233    4.89  |  3.23    2.72
               .267    2.82  | 1.267   83.11  | 2.267    4.89  |  3.27    2.72
               .300    2.82  | 1.300   83.11  | 2.300    4.89  |  3.30    2.72
               .333    2.82  | 1.333   83.11  | 2.333    4.89  |  3.33    2.72
               .367    3.31  | 1.367   24.57  | 2.367    4.28  |  3.37    2.55
               .400    3.31  | 1.400   24.57  | 2.400    4.28  |  3.40    2.55
               .433    3.31  | 1.433   24.57  | 2.433    4.28  |  3.43    2.55
               .467    3.31  | 1.467   24.57  | 2.467    4.28  |  3.47    2.55
               .500    3.31  | 1.500   24.57  | 2.500    4.28  |  3.50    2.55
               .533    4.05  | 1.533   13.01  | 2.533    3.82  |  3.53    2.39
               .567    4.05  | 1.567   13.01  | 2.567    3.82  |  3.57    2.39
               .600    4.05  | 1.600   13.01  | 2.600    3.82  |  3.60    2.39
               .633    4.05  | 1.633   13.01  | 2.633    3.82  |  3.63    2.39
               .667    4.05  | 1.667   13.01  | 2.667    3.82  |  3.67    2.39
               .700    5.30  | 1.700    9.01  | 2.700    3.46  |  3.70    2.26
               .733    5.30  | 1.733    9.01  | 2.733    3.46  |  3.73    2.26
               .767    5.30  | 1.767    9.01  | 2.767    3.46  |  3.77    2.26
               .800    5.30  | 1.800    9.01  | 2.800    3.46  |  3.80    2.26
               .833    5.30  | 1.833    9.01  | 2.833    3.46  |  3.83    2.26
               .867    7.98  | 1.867    6.97  | 2.867    3.17  |  3.87    2.15
               .900    7.98  | 1.900    6.97  | 2.900    3.17  |  3.90    2.15
               .933    7.98  | 1.933    6.97  | 2.933    3.17  |  3.93    2.15
               .967    7.98  | 1.967    6.97  | 2.967    3.17  |  3.97    2.15
              1.000    7.98  | 2.000    6.97  | 3.000    3.17  |  4.00    2.15

    Unit Hyd Qpeak  (cms)=    .477

    PEAK FLOW        (cms)=    .008 (i)
    TIME TO PEAK     (hrs)=   1.333
    RUNOFF VOLUME     (mm)=   2.800
    TOTAL RAINFALL    (mm)=  36.955
    RUNOFF COEFFICIENT   =    .076

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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------------------
CALIB             |
NASHYD     (0206) |  Area      (ha)=    6.18   Curve Number    (CN)= 44.0
D= 1 DT=10.0 min  |  Ia        (mm)=    5.00   # of Linear Res.(N)= 3.00
------------------   U.H. Tp(hrs)=      .81

       NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN
               hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr
              .167    2.47  | 1.167   18.78  | 2.167    5.73  |  3.17    2.93
              .333    2.82  | 1.333   83.11  | 2.333    4.89  |  3.33    2.72
              .500    3.31  | 1.500   24.57  | 2.500    4.28  |  3.50    2.55
              .667    4.05  | 1.667   13.01  | 2.667    3.82  |  3.67    2.39
              .833    5.30  | 1.833    9.01  | 2.833    3.46  |  3.83    2.26
             1.000    7.98  | 2.000    6.97  | 3.000    3.17  |  4.00     .00

   Unit Hyd Qpeak  (cms)=    .291

   PEAK FLOW        (cms)=    .020 (i)
   TIME TO PEAK     (hrs)=   2.333
   RUNOFF VOLUME     (mm)=   2.813
   TOTAL RAINFALL    (mm)=  36.597
   RUNOFF COEFFICIENT   =    .077

   (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
------------------
CALIB             |
STANDHYD   (0204) |  Area      (ha)=    2.82
D= 1 DT= 5.0 min  |  Total Imp(%)=  14.30   Dir. Conn.(%)=  10.70
------------------
                         IMPERVIOUS    PERVIOUS (i)
   Surface Area    (ha)=        .40        2.42
   Dep. Storage    (mm)=       1.00        5.00
   Average Slope    (%)=       1.58        2.50
   Length           (m)=     140.00      284.40
   Mannings n          =       .013        .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
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```
                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME     RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs    mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .083    2.47 | 1.083    18.78 | 2.083    5.73 |  3.08    2.93
                 .167    2.47 | 1.167    18.78 | 2.167    5.73 |  3.17    2.93
                 .250    2.82 | 1.250    83.11 | 2.250    4.89 |  3.25    2.72
                 .333    2.82 | 1.333    83.11 | 2.333    4.89 |  3.33    2.72
                 .417    3.31 | 1.417    24.57 | 2.417    4.28 |  3.42    2.55
                 .500    3.31 | 1.500    24.57 | 2.500    4.28 |  3.50    2.55
                 .583    4.05 | 1.583    13.01 | 2.583    3.82 |  3.58    2.39
                 .667    4.05 | 1.667    13.01 | 2.667    3.82 |  3.67    2.39
                 .750    5.30 | 1.750     9.01 | 2.750    3.46 |  3.75    2.26
                 .833    5.30 | 1.833     9.01 | 2.833    3.46 |  3.83    2.26
                 .917    7.98 | 1.917     6.97 | 2.917    3.17 |  3.92    2.15
                1.000    7.98 | 2.000     6.97 | 3.000    3.17 |  4.00    2.15

     Max.Eff.Inten.(mm/hr)=       83.11          5.48
                over (min)         5.00         75.00
     Storage Coeff.  (min)=        2.93 (ii)    71.38 (ii)
     Unit Hyd. Tpeak (min)=        5.00         75.00
     Unit Hyd. peak  (cms)=         .28           .02
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .07           .02        .069 (iii)
     TIME TO PEAK    (hrs)=         .00          2.67        1.33
     RUNOFF VOLUME    (mm)=       35.95          7.57       10.59
     TOTAL RAINFALL   (mm)=       36.95         36.95       36.95
     RUNOFF COEFFICIENT   =         .97           .20         .29

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =   70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0203)   |   Area     (ha)=    8.01
|ID= 1 DT= 3.0 min   |   Total Imp(%)=  34.30   Dir. Conn.(%)=  25.70
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       2.75         5.26
     Dep. Storage      (mm)=       1.00         5.00
     Average Slope      (%)=        .79         2.00
     Length             (m)=     414.00        86.00
     Mannings n           =        .013         .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME     RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs    mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .050    2.47 | 1.050    18.78 | 2.050    5.73 |  3.05    2.93
                 .100    2.47 | 1.100    18.78 | 2.100    5.73 |  3.10    2.93
                 .150    2.47 | 1.150    18.78 | 2.150    5.73 |  3.15    2.93
                 .200    2.70 | 1.200    61.67 | 2.200    5.17 |  3.20    2.79
                 .250    2.82 | 1.250    83.11 | 2.250    4.89 |  3.25    2.72
                 .300    2.82 | 1.300    83.11 | 2.300    4.89 |  3.30    2.72
                 .350    2.98 | 1.350    63.60 | 2.350    4.69 |  3.35    2.66
                 .400    3.31 | 1.400    24.57 | 2.400    4.28 |  3.40    2.55
                 .450    3.31 | 1.450    24.57 | 2.450    4.28 |  3.45    2.55
                 .500    3.31 | 1.500    24.57 | 2.500    4.28 |  3.50    2.55
                 .550    4.05 | 1.550    13.01 | 2.550    3.82 |  3.55    2.39
                 .600    4.05 | 1.600    13.01 | 2.600    3.82 |  3.60    2.39
                 .650    4.05 | 1.650    13.01 | 2.650    3.82 |  3.65    2.39
                 .700    4.88 | 1.700    10.34 | 2.700    3.58 |  3.70    2.30
                 .750    5.30 | 1.750     9.01 | 2.750    3.46 |  3.75    2.26
                 .800    5.30 | 1.800     9.01 | 2.800    3.46 |  3.80    2.26
                 .850    6.19 | 1.850     8.33 | 2.850    3.36 |  3.85    2.22
                 .900    7.98 | 1.900     6.97 | 2.900    3.17 |  3.90    2.15
                 .950    7.98 | 1.950     6.97 | 2.950    3.17 |  3.95    2.15
                1.000    7.98 | 2.000     6.97 | 3.000    3.17 |  4.00    2.15

     Max.Eff.Inten.(mm/hr)=       76.61          9.81
                over (min)         6.00         36.00
     Storage Coeff.  (min)=        7.15 (ii)    35.44 (ii)
     Unit Hyd. Tpeak (min)=        6.00         36.00
     Unit Hyd. peak  (cms)=         .17           .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .35           .07        .359 (iii)
     TIME TO PEAK    (hrs)=         .00          1.95        1.35
     RUNOFF VOLUME    (mm)=       35.96          8.22       15.34
     TOTAL RAINFALL   (mm)=       36.96         36.96       36.96
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  RUNOFF COEFFICIENT    =        .97          .22            .42

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN*  =  70.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 -----------------
 CALIB            |
 STANDHYD  (0202) |   Area    (ha)=    .50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
-----------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=         .14          .36
    Dep. Storage     (mm)=        1.00         5.00
    Average Slope     (%)=         .80         1.00
    Length            (m)=       10.00       218.20
    Mannings n          =         .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN | TIME    RAIN | TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |   hrs   mm/hr
               .083    2.47 | 1.083   18.78 | 2.083   5.73 |  3.08    2.93
               .167    2.47 | 1.167   18.78 | 2.167   5.73 |  3.17    2.93
               .250    2.82 | 1.250   83.11 | 2.250   4.89 |  3.25    2.72
               .333    2.82 | 1.333   83.11 | 2.333   4.89 |  3.33    2.72
               .417    3.31 | 1.417   24.57 | 2.417   4.28 |  3.42    2.55
               .500    3.31 | 1.500   24.57 | 2.500   4.28 |  3.50    2.55
               .583    4.05 | 1.583   13.01 | 2.583   3.82 |  3.58    2.39
               .667    4.05 | 1.667   13.01 | 2.667   3.82 |  3.67    2.39
               .750    5.30 | 1.750    9.01 | 2.750   3.46 |  3.75    2.26
               .833    5.30 | 1.833    9.01 | 2.833   3.46 |  3.83    2.26
               .917    7.98 | 1.917    6.97 | 2.917   3.17 |  3.92    2.15
              1.000    7.98 | 2.000    6.97 | 3.000   3.17 |  4.00    2.15

    Max.Eff.Inten.(mm/hr)=      83.11         6.12
               over (min)       5.00        75.00
    Storage Coeff.  (min)=       .74 (ii)    74.26 (ii)
    Unit Hyd. Tpeak (min)=      5.00        75.00
    Unit Hyd. peak  (cms)=       .34          .02
                                                        *TOTALS*
    PEAK FLOW       (cms)=       .02          .00          .025 (iii)
    TIME TO PEAK    (hrs)=       .00         2.67          1.33
    RUNOFF VOLUME    (mm)=     35.95         7.99         13.92
    TOTAL RAINFALL   (mm)=     36.95        36.95         36.95
    RUNOFF COEFFICIENT   =       .97          .22           .38

*** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN*  =  70.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 -----------------
 CALIB            |
 STANDHYD  (0201) |   Area    (ha)=    .30
ID= 1 DT= 3.0 min |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
-----------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=         .09          .21
    Dep. Storage     (mm)=        1.00         5.00
    Average Slope     (%)=         .97          .97
    Length            (m)=       10.00       119.60
    Mannings n          =         .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN | TIME    RAIN | TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |   hrs   mm/hr
               .050    2.47 | 1.050   18.78 | 2.050   5.73 |  3.05    2.93
               .100    2.47 | 1.100   18.78 | 2.100   5.73 |  3.10    2.93
               .150    2.47 | 1.150   18.78 | 2.150   5.73 |  3.15    2.93
               .200    2.70 | 1.200   61.67 | 2.200   5.17 |  3.20    2.79
               .250    2.82 | 1.250   83.11 | 2.250   4.89 |  3.25    2.72
               .300    2.82 | 1.300   83.11 | 2.300   4.89 |  3.30    2.72
               .350    2.98 | 1.350   63.60 | 2.350   4.69 |  3.35    2.66
               .400    3.31 | 1.400   24.57 | 2.400   4.28 |  3.40    2.55
               .450    3.31 | 1.450   24.57 | 2.450   4.28 |  3.45    2.55
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              .500    3.31 | 1.500   24.57 | 2.500    4.28 | 3.50    2.55
              .550    4.05 | 1.550   13.01 | 2.550    3.82 | 3.55    2.39
              .600    4.05 | 1.600   13.01 | 2.600    3.82 | 3.60    2.39
              .650    4.05 | 1.650   13.01 | 2.650    3.82 | 3.65    2.39
              .700    4.88 | 1.700   10.34 | 2.700    3.58 | 3.70    2.30
              .750    5.30 | 1.750    9.01 | 2.750    3.46 | 3.75    2.26
              .800    5.30 | 1.800    9.01 | 2.800    3.46 | 3.80    2.26
              .850    6.19 | 1.850    8.33 | 2.850    3.36 | 3.85    2.22
              .900    7.98 | 1.900    6.97 | 2.900    3.17 | 3.90    2.15
              .950    7.98 | 1.950    6.97 | 2.950    3.17 | 3.95    2.15
             1.000    7.98 | 2.000    6.97 | 3.000    3.17 | 4.00    2.15

    Max.Eff.Inten.(mm/hr)=      83.11          6.76
             over (min)          6.00         51.00
    Storage Coeff.  (min)=        .70 (ii)    50.41 (ii)
    Unit Hyd. Tpeak (min)=       6.00         51.00
    Unit Hyd. peak  (cms)=        .37           .02
                                                             *TOTALS*
    PEAK FLOW       (cms)=        .01           .00            .015 (iii)
    TIME TO PEAK    (hrs)=        .00          2.25            1.30
    RUNOFF VOLUME    (mm)=      35.96          7.99           13.91
    TOTAL RAINFALL   (mm)=      36.96         36.96           36.96
    RUNOFF COEFFICIENT   =        .97           .22             .38

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| NASHYD    (0205)  |   Area     (ha)=   1.20   Curve Number    (CN)= 71.2
|ID= 1 DT= 2.0 min  |   Ia       (mm)=   2.00   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=    .03

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME    RAIN
                hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr
               .033    2.47 | 1.033   18.78 | 2.033    5.73 | 3.03    2.93
               .067    2.47 | 1.067   18.78 | 2.067    5.73 | 3.07    2.93
               .100    2.47 | 1.100   18.78 | 2.100    5.73 | 3.10    2.93
               .133    2.47 | 1.133   18.78 | 2.133    5.73 | 3.13    2.93
               .167    2.47 | 1.167   18.78 | 2.167    5.73 | 3.17    2.93
               .200    2.82 | 1.200   83.11 | 2.200    4.89 | 3.20    2.72
               .233    2.82 | 1.233   83.11 | 2.233    4.89 | 3.23    2.72
               .267    2.82 | 1.267   83.11 | 2.267    4.89 | 3.27    2.72
               .300    2.82 | 1.300   83.11 | 2.300    4.89 | 3.30    2.72
               .333    2.82 | 1.333   83.11 | 2.333    4.89 | 3.33    2.72
               .367    3.31 | 1.367   24.57 | 2.367    4.28 | 3.37    2.55
               .400    3.31 | 1.400   24.57 | 2.400    4.28 | 3.40    2.55
               .433    3.31 | 1.433   24.57 | 2.433    4.28 | 3.43    2.55
               .467    3.31 | 1.467   24.57 | 2.467    4.28 | 3.47    2.55
               .500    3.31 | 1.500   24.57 | 2.500    4.28 | 3.50    2.55
               .533    4.05 | 1.533   13.01 | 2.533    3.82 | 3.53    2.39
               .567    4.05 | 1.567   13.01 | 2.567    3.82 | 3.57    2.39
               .600    4.05 | 1.600   13.01 | 2.600    3.82 | 3.60    2.39
               .633    4.05 | 1.633   13.01 | 2.633    3.82 | 3.63    2.39
               .667    4.05 | 1.667   13.01 | 2.667    3.82 | 3.67    2.39
               .700    5.30 | 1.700    9.01 | 2.700    3.46 | 3.70    2.26
               .733    5.30 | 1.733    9.01 | 2.733    3.46 | 3.73    2.26
               .767    5.30 | 1.767    9.01 | 2.767    3.46 | 3.77    2.26
               .800    5.30 | 1.800    9.01 | 2.800    3.46 | 3.80    2.26
               .833    5.30 | 1.833    9.01 | 2.833    3.46 | 3.83    2.26
               .867    7.98 | 1.867    6.97 | 2.867    3.17 | 3.87    2.15
               .900    7.98 | 1.900    6.97 | 2.900    3.17 | 3.90    2.15
               .933    7.98 | 1.933    6.97 | 2.933    3.17 | 3.93    2.15
               .967    7.98 | 1.967    6.97 | 2.967    3.17 | 3.97    2.15
              1.000    7.98 | 2.000    6.97 | 3.000    3.17 | 4.00    2.15

    Unit Hyd Qpeak  (cms)=   1.528

    PEAK FLOW       (cms)=    .067 (i)
    TIME TO PEAK    (hrs)=   1.333
    RUNOFF VOLUME    (mm)=   8.250
    TOTAL RAINFALL   (mm)=  36.955
    RUNOFF COEFFICIENT   =    .223

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB             |
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| STANDHYD  (0207) |   Area      (ha)=     .70
| D= 1 DT= 4.0 min |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
 ------------------
                               IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=        .20           .50
    Dep. Storage      (mm)=       1.00          5.00
    Average Slope     (%)=         .94           .60
    Length            (m)=       10.00        191.40
    Mannings n           =        .013          .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   4.0 MIN. TIME STEP.


                            ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .067    2.47 | 1.067   18.78 | 2.067    5.73 |  3.07    2.93
                 .133    2.47 | 1.133   18.78 | 2.133    5.73 |  3.13    2.93
                 .200    2.64 | 1.200   50.95 | 2.200    5.31 |  3.20    2.83
                 .267    2.82 | 1.267   83.11 | 2.267    4.89 |  3.27    2.72
                 .333    2.82 | 1.333   83.11 | 2.333    4.89 |  3.33    2.72
                 .400    3.31 | 1.400   24.57 | 2.400    4.28 |  3.40    2.55
                 .467    3.31 | 1.467   24.57 | 2.467    4.28 |  3.47    2.55
                 .533    3.68 | 1.533   18.79 | 2.533    4.05 |  3.53    2.47
                 .600    4.05 | 1.600   13.01 | 2.600    3.82 |  3.60    2.39
                 .667    4.05 | 1.667   13.01 | 2.667    3.82 |  3.67    2.39
                 .733    5.30 | 1.733    9.01 | 2.733    3.46 |  3.73    2.26
                 .800    5.30 | 1.800    9.01 | 2.800    3.46 |  3.80    2.26
                 .867    6.64 | 1.867    7.99 | 2.867    3.32 |  3.87    2.21
                 .933    7.98 | 1.933    6.97 | 2.933    3.17 |  3.93    2.15
                1.000    7.98 | 2.000    6.97 | 3.000    3.17 |  4.00    2.15

    Max.Eff.Inten.(mm/hr)=       83.11          6.07
              over (min)         5.00         84.00
    Storage Coeff.  (min)=        .70 (ii)     80.16 (ii)
    Unit Hyd. Tpeak (min)=       4.00         84.00
    Unit Hyd. peak  (cms)=        .42           .01
                                                           *TOTALS*
    PEAK FLOW       (cms)=        .03           .00          .035 (iii)
    TIME TO PEAK    (hrs)=        .00          2.87          1.33
    RUNOFF VOLUME    (mm)=      35.95          7.99         13.94
    TOTAL RAINFALL   (mm)=      36.95         36.95         36.95
    RUNOFF COEFFICIENT   =        .97           .22           .38

 *** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =   70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

 ------------------
 ADD HYD   (1000) |
   1 +  2 =  3    |         AREA      QPEAK     TPEAK      R.V.
 ------------------         (ha)      (cms)     (hrs)      (mm)
          ID1= 1 (0202):     .50      .025      1.33     13.92
        + ID2= 2 (0201):     .30      .015      1.30     13.91
          ================================================
          ID = 3 (1000):     .80      .040      1.30     13.94

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ------------------
 ADD HYD   (1001) |
   1 +  2 =  3    |         AREA      QPEAK     TPEAK      R.V.
 ------------------         (ha)      (cms)     (hrs)      (mm)
          ID1= 1 (0203):    8.01      .359      1.35     15.34
        + ID2= 2 (1000):     .80      .040      1.30     13.94
          ================================================
          ID = 3 (1001):    8.81      .394      1.35     15.22

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------

 ------------------
 ADD HYD   (1002) |
   1 +  2 =  3    |         AREA      QPEAK     TPEAK      R.V.
 ------------------         (ha)      (cms)     (hrs)      (mm)
          ID1= 1 (0204):    2.82      .069      1.33     10.59
        + ID2= 2 (1001):    8.81      .394      1.35     15.22
          ================================================
          ID = 3 (1002):   11.63      .455      1.35     14.10
```

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    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| ADD HYD   (1003) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK    R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0206):      6.18    .020     2.33     2.81
        + ID2= 2 (1002):     11.63    .455     1.35    14.10
          ===============================================
          ID = 3 (1003):     17.81    .457     1.35    10.18

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| ADD HYD   (1004) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK    R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (1003):     17.81    .457     1.35    10.18
        + ID2= 2 (0205):      1.20    .067     1.33     8.25
          ===============================================
          ID = 3 (1004):     19.01    .512     1.33    10.06

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------

-------------------
| RESERVOIR (0001) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------        (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            .0000      .0000   |    .4210      .4838
                            .0110      .0717   |    .5580      .6088
                            .0190      .1729   |    .6660      .7402
                            .0250      .1992   |    .6910      .7740
                            .0440      .2529   |   1.0560      .8779
                            .0800      .3083   |   1.6620      .9853
                            .2030      .3652   |   2.4240     1.0963

                                 AREA      QPEAK      TPEAK        R.V.
                                 (ha)      (cms)      (hrs)        (mm)
    INFLOW : ID= 2 (1004)       19.01        .51       1.33       10.06
    OUTFLOW: ID= 1 (0001)       19.01        .02       5.03        9.70

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.59
                  TIME SHIFT OF PEAK FLOW          (min)=222.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=   .1646

    **** WARNING : SELECTED ROUTING TIME STEP DENIED.
------------------------------------------------------------------------------

-------------------
| ADD HYD   (1005) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK    R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0001):     19.01    .018     5.03     9.70
        + ID2= 2 (0207):       .70    .035     1.33    13.94
          ===============================================
          ID = 3 (1005):     19.71    .040     1.33     9.85

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| ADD HYD   (1006) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK    R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0208):       .50    .008     1.33     2.80
        + ID2= 2 (1005):     19.71    .040     1.33     9.85
          ===============================================
          ID = 3 (1006):     20.21    .048     1.33     9.68

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ****************************
 ** SIMULATION NUMBER:   6 **
 ****************************


-------------------
|    READ STORM     |      Filename: K:\PROJECT FILES\200000 - 299999\
|                   |                210987 - 010 - Innisfil Executive Estates\
|                   |                SWM\OTTHYMO 3rd Submission\chica5.stm
| Ptotal= 50.52 mm  |      Comments: 5 YEAR - 4 hour - Chicago Storm
```

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-------------------
                    TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                     hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                     .17    3.57 |  1.17   25.64 |  2.17    8.12 |  3.17    4.22
                     .33    4.07 |  1.33  108.92 |  2.33    6.96 |  3.33    3.93
                     .50    4.76 |  1.50   33.31 |  2.50    6.12 |  3.50    3.68
                     .67    5.79 |  1.67   17.99 |  2.67    5.48 |  3.67    3.47
                     .83    7.53 |  1.83   12.60 |  2.83    4.97 |  3.83    3.28
                    1.00   11.20 |  2.00    9.82 |  3.00    4.56 |  4.00    3.12

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 -----------------
| CALIB            |
| NASHYD    (0208) |   Area      (ha)=      .50   Curve Number    (CN)= 44.0
 D= 1 DT= 2.0 min  |   Ia        (mm)=     5.00   # of Linear Res.(N)= 3.00
 -----------------     U.H. Tp(hrs)=       .04

       NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .033    3.57 | 1.033   25.64 | 2.033    8.12 |  3.03    4.22
                  .067    3.57 | 1.067   25.64 | 2.067    8.12 |  3.07    4.22
                  .100    3.57 | 1.100   25.64 | 2.100    8.12 |  3.10    4.22
                  .133    3.57 | 1.133   25.64 | 2.133    8.12 |  3.13    4.22
                  .167    3.57 | 1.167   25.64 | 2.167    8.12 |  3.17    4.22
                  .200    4.07 | 1.200  108.92 | 2.200    6.96 |  3.20    3.93
                  .233    4.07 | 1.233  108.92 | 2.233    6.96 |  3.23    3.93
                  .267    4.07 | 1.267  108.92 | 2.267    6.96 |  3.27    3.93
                  .300    4.07 | 1.300  108.92 | 2.300    6.96 |  3.30    3.93
                  .333    4.07 | 1.333  108.92 | 2.333    6.96 |  3.33    3.93
                  .367    4.76 | 1.367   33.31 | 2.367    6.12 |  3.37    3.68
                  .400    4.76 | 1.400   33.31 | 2.400    6.12 |  3.40    3.68
                  .433    4.76 | 1.433   33.31 | 2.433    6.12 |  3.43    3.68
                  .467    4.76 | 1.467   33.31 | 2.467    6.12 |  3.47    3.68
                  .500    4.76 | 1.500   33.31 | 2.500    6.12 |  3.50    3.68
                  .533    5.79 | 1.533   17.99 | 2.533    5.48 |  3.53    3.47
                  .567    5.79 | 1.567   17.99 | 2.567    5.48 |  3.57    3.47
                  .600    5.79 | 1.600   17.99 | 2.600    5.48 |  3.60    3.47
                  .633    5.79 | 1.633   17.99 | 2.633    5.48 |  3.63    3.47
                  .667    5.79 | 1.667   17.99 | 2.667    5.48 |  3.67    3.47
                  .700    7.53 | 1.700   12.60 | 2.700    4.97 |  3.70    3.28
                  .733    7.53 | 1.733   12.60 | 2.733    4.97 |  3.73    3.28
                  .767    7.53 | 1.767   12.60 | 2.767    4.97 |  3.77    3.28
                  .800    7.53 | 1.800   12.60 | 2.800    4.97 |  3.80    3.28
                  .833    7.53 | 1.833   12.60 | 2.833    4.97 |  3.83    3.28
                  .867   11.20 | 1.867    9.82 | 2.867    4.56 |  3.87    3.12
                  .900   11.20 | 1.900    9.82 | 2.900    4.56 |  3.90    3.12
                  .933   11.20 | 1.933    9.82 | 2.933    4.56 |  3.93    3.12
                  .967   11.20 | 1.967    9.82 | 2.967    4.56 |  3.97    3.12
                 1.000   11.20 | 2.000    9.82 | 3.000    4.56 |  4.00    3.12

   Unit Hyd Qpeak   (cms)=     .477

   PEAK FLOW        (cms)=     .016 (i)
   TIME TO PEAK     (hrs)=    1.333
   RUNOFF VOLUME     (mm)=    5.472
   TOTAL RAINFALL    (mm)=   50.518
   RUNOFF COEFFICIENT   =      .108

   (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
 CALIB             |
 NASHYD     (0206) |   Area      (ha)=     6.18   Curve Number    (CN)= 44.0
 D= 1 DT=10.0 min  |   Ia        (mm)=     5.00   # of Linear Res.(N)= 3.00
-------------------    U.H. Tp(hrs)=       .81

       NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .167    3.57 | 1.167   25.64 | 2.167    8.12 |  3.17    4.22
                  .333    4.07 | 1.333  108.92 | 2.333    6.96 |  3.33    3.93
                  .500    4.76 | 1.500   33.31 | 2.500    6.12 |  3.50    3.68
                  .667    5.79 | 1.667   17.99 | 2.667    5.48 |  3.67    3.47
                  .833    7.53 | 1.833   12.60 | 2.833    4.97 |  3.83    3.28
                 1.000   11.20 | 2.000    9.82 | 3.000    4.56 |  4.00     .00

   Unit Hyd Qpeak   (cms)=     .291

   PEAK FLOW        (cms)=     .039 (i)
   TIME TO PEAK     (hrs)=    2.333
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     RUNOFF VOLUME     (mm)=    5.497
     TOTAL RAINFALL    (mm)=   49.998
     RUNOFF COEFFICIENT    =     .110

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0204)   |   Area      (ha)=    2.82
|ID= 1 DT= 5.0 min   |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .40         2.42
     Dep. Storage      (mm)=       1.00         5.00
     Average Slope      (%)=       1.58         2.50
     Length             (m)=     140.00       284.40
     Mannings n            =       .013         .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .083    3.57 | 1.083   25.64 | 2.083    8.12 |  3.08    4.22
                .167    3.57 | 1.167   25.64 | 2.167    8.12 |  3.17    4.22
                .250    4.07 | 1.250  108.92 | 2.250    6.96 |  3.25    3.93
                .333    4.07 | 1.333  108.92 | 2.333    6.96 |  3.33    3.93
                .417    4.76 | 1.417   33.31 | 2.417    6.12 |  3.42    3.68
                .500    4.76 | 1.500   33.31 | 2.500    6.12 |  3.50    3.68
                .583    5.79 | 1.583   17.99 | 2.583    5.48 |  3.58    3.47
                .667    5.79 | 1.667   17.99 | 2.667    5.48 |  3.67    3.47
                .750    7.53 | 1.750   12.60 | 2.750    4.97 |  3.75    3.28
                .833    7.53 | 1.833   12.60 | 2.833    4.97 |  3.83    3.28
                .917   11.20 | 1.917    9.82 | 2.917    4.56 |  3.92    3.12
               1.000   11.20 | 2.000    9.82 | 3.000    4.56 |  4.00    3.12

     Max.Eff.Inten.(mm/hr)=      108.92        10.54
                over (min)        5.00        60.00
     Storage Coeff.  (min)=        2.63 (ii)    55.30 (ii)
     Unit Hyd. Tpeak (min)=        5.00        60.00
     Unit Hyd. peak  (cms)=         .29          .02
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .09          .04         .092 (iii)
     TIME TO PEAK    (hrs)=         .00         2.42         1.33
     RUNOFF VOLUME     (mm)=      49.52        13.92        17.72
     TOTAL RAINFALL    (mm)=      50.52        50.52        50.52
     RUNOFF COEFFICIENT    =        .98          .28          .35

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0203)   |   Area      (ha)=    8.01
|ID= 1 DT= 3.0 min   |   Total Imp(%)=   34.30   Dir. Conn.(%)=   25.70
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       2.75         5.26
     Dep. Storage      (mm)=       1.00         5.00
     Average Slope      (%)=        .79         2.00
     Length             (m)=     414.00        86.00
     Mannings n            =       .013         .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .050    3.57 | 1.050   25.64 | 2.050    8.12 |  3.05    4.22
                .100    3.57 | 1.100   25.64 | 2.100    8.12 |  3.10    4.22
                .150    3.57 | 1.150   25.64 | 2.150    8.12 |  3.15    4.22
                .200    3.90 | 1.200   81.16 | 2.200    7.35 |  3.20    4.03
                .250    4.07 | 1.250  108.92 | 2.250    6.96 |  3.25    3.93
                .300    4.07 | 1.300  108.92 | 2.300    6.96 |  3.30    3.93
                .350    4.30 | 1.350   83.72 | 2.350    6.68 |  3.35    3.85
                .400    4.76 | 1.400   33.31 | 2.400    6.12 |  3.40    3.68
                .450    4.76 | 1.450   33.31 | 2.450    6.12 |  3.45    3.68
                .500    4.76 | 1.500   33.31 | 2.500    6.12 |  3.50    3.68
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             .550     5.79 | 1.550    17.99 | 2.550     5.48 |   3.55     3.47
             .600     5.79 | 1.600    17.99 | 2.600     5.48 |   3.60     3.47
             .650     5.79 | 1.650    17.99 | 2.650     5.48 |   3.65     3.47
             .700     6.95 | 1.700    14.40 | 2.700     5.14 |   3.70     3.34
             .750     7.53 | 1.750    12.60 | 2.750     4.97 |   3.75     3.28
             .800     7.53 | 1.800    12.60 | 2.800     4.97 |   3.80     3.28
             .850     8.75 | 1.850    11.67 | 2.850     4.83 |   3.85     3.23
             .900    11.20 | 1.900     9.82 | 2.900     4.56 |   3.90     3.12
             .950    11.20 | 1.950     9.82 | 2.950     4.56 |   3.95     3.12
            1.000    11.20 | 2.000     9.82 | 3.000     4.56 |   4.00     3.12

    Max.Eff.Inten.(mm/hr)=      100.52          21.65
             over (min)          6.00           30.00
    Storage Coeff.  (min)=       6.42 (ii)      27.02 (ii)
    Unit Hyd. Tpeak (min)=       6.00           30.00
    Unit Hyd. peak  (cms)=        .18             .04
                                                             *TOTALS*
    PEAK FLOW       (cms)=        .48             .16           .506 (iii)
    TIME TO PEAK    (hrs)=        .00            1.80           1.35
    RUNOFF VOLUME    (mm)=      49.52           14.93          23.82
    TOTAL RAINFALL   (mm)=      50.52           50.52          50.52
    RUNOFF COEFFICIENT   =        .98             .30            .47

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 -----------------------------------------------------------------------------
 -----------------
| CALIB           |
| STANDHYD (0202) |   Area     (ha)=    .50
| D= 1 DT= 5.0 min |  Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
 -----------------

                            IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=      .14           .36
    Dep. Storage      (mm)=     1.00          5.00
    Average Slope      (%)=      .80          1.00
    Length             (m)=    10.00        218.20
    Mannings n            =     .013          .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
             TIME     RAIN | TIME     RAIN | TIME     RAIN  |  TIME     RAIN
              hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr  |   hrs    mm/hr
             .083     3.57 | 1.083    25.64 | 2.083     8.12 |   3.08     4.22
             .167     3.57 | 1.167    25.64 | 2.167     8.12 |   3.17     4.22
             .250     4.07 | 1.250   108.92 | 2.250     6.96 |   3.25     3.93
             .333     4.07 | 1.333   108.92 | 2.333     6.96 |   3.33     3.93
             .417     4.76 | 1.417    33.31 | 2.417     6.12 |   3.42     3.68
             .500     4.76 | 1.500    33.31 | 2.500     6.12 |   3.50     3.68
             .583     5.79 | 1.583    17.99 | 2.583     5.48 |   3.58     3.47
             .667     5.79 | 1.667    17.99 | 2.667     5.48 |   3.67     3.47
             .750     7.53 | 1.750    12.60 | 2.750     4.97 |   3.75     3.28
             .833     7.53 | 1.833    12.60 | 2.833     4.97 |   3.83     3.28
             .917    11.20 | 1.917     9.82 | 2.917     4.56 |   3.92     3.12
            1.000    11.20 | 2.000     9.82 | 3.000     4.56 |   4.00     3.12

    Max.Eff.Inten.(mm/hr)=      108.92          11.05
             over (min)          5.00           60.00
    Storage Coeff.  (min)=        .66 (ii)      58.69 (ii)
    Unit Hyd. Tpeak (min)=       5.00           60.00
    Unit Hyd. peak  (cms)=        .34             .02
                                                             *TOTALS*
    PEAK FLOW       (cms)=        .03             .01           .033 (iii)
    TIME TO PEAK    (hrs)=        .00            2.42           1.33
    RUNOFF VOLUME    (mm)=      49.52           14.58          22.02
    TOTAL RAINFALL   (mm)=      50.52           50.52          50.52
    RUNOFF COEFFICIENT   =        .98             .29            .44

*** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 -----------------
 CALIB            |
 STANDHYD (0201)  |   Area     (ha)=    .30
 D= 1 DT= 3.0 min |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
 -----------------
                            IMPERVIOUS     PERVIOUS (i)
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```
     Surface Area      (ha)=        .09           .21
     Dep. Storage      (mm)=       1.00          5.00
     Average Slope      (%)=        .97           .97
     Length             (m)=      10.00        119.60
     Mannings n            =       .013          .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME   RAIN
                  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs  mm/hr
                 .050    3.57 | 1.050  25.64 | 2.050   8.12 | 3.05   4.22
                 .100    3.57 | 1.100  25.64 | 2.100   8.12 | 3.10   4.22
                 .150    3.57 | 1.150  25.64 | 2.150   8.12 | 3.15   4.22
                 .200    3.90 | 1.200  81.16 | 2.200   7.35 | 3.20   4.03
                 .250    4.07 | 1.250 108.92 | 2.250   6.96 | 3.25   3.93
                 .300    4.07 | 1.300 108.92 | 2.300   6.96 | 3.30   3.93
                 .350    4.30 | 1.350  83.72 | 2.350   6.68 | 3.35   3.85
                 .400    4.76 | 1.400  33.31 | 2.400   6.12 | 3.40   3.68
                 .450    4.76 | 1.450  33.31 | 2.450   6.12 | 3.45   3.68
                 .500    4.76 | 1.500  33.31 | 2.500   6.12 | 3.50   3.68
                 .550    5.79 | 1.550  17.99 | 2.550   5.48 | 3.55   3.47
                 .600    5.79 | 1.600  17.99 | 2.600   5.48 | 3.60   3.47
                 .650    5.79 | 1.650  17.99 | 2.650   5.48 | 3.65   3.47
                 .700    6.95 | 1.700  14.40 | 2.700   5.14 | 3.70   3.34
                 .750    7.53 | 1.750  12.60 | 2.750   4.97 | 3.75   3.28
                 .800    7.53 | 1.800  12.60 | 2.800   4.97 | 3.80   3.28
                 .850    8.75 | 1.850  11.67 | 2.850   4.83 | 3.85   3.23
                 .900   11.20 | 1.900   9.82 | 2.900   4.56 | 3.90   3.12
                 .950   11.20 | 1.950   9.82 | 2.950   4.56 | 3.95   3.12
                1.000   11.20 | 2.000   9.82 | 3.000   4.56 | 4.00   3.12

     Max.Eff.Inten.(mm/hr)=     108.92         14.42
               over (min)       6.00          39.00
     Storage Coeff.  (min)=      .63 (ii)     37.34 (ii)
     Unit Hyd. Tpeak (min)=     6.00          39.00
     Unit Hyd. peak  (cms)=      .38           .03
                                                            *TOTALS*
     PEAK FLOW       (cms)=      .02           .00            .020 (iii)
     TIME TO PEAK    (hrs)=      .00          2.00            1.30
     RUNOFF VOLUME    (mm)=    49.52         14.58           22.02
     TOTAL RAINFALL   (mm)=    50.52         50.52           50.52
     RUNOFF COEFFICIENT   =      .98           .29             .44

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD     (0205)  |   Area     (ha)=    1.20   Curve Number    (CN)= 71.2
|ID= 1 DT= 2.0 min   |   Ia       (mm)=    2.00   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=     .03

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME   RAIN
                  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs  mm/hr
                 .033    3.57 | 1.033  25.64 | 2.033   8.12 | 3.03   4.22
                 .067    3.57 | 1.067  25.64 | 2.067   8.12 | 3.07   4.22
                 .100    3.57 | 1.100  25.64 | 2.100   8.12 | 3.10   4.22
                 .133    3.57 | 1.133  25.64 | 2.133   8.12 | 3.13   4.22
                 .167    3.57 | 1.167  25.64 | 2.167   8.12 | 3.17   4.22
                 .200    4.07 | 1.200 108.92 | 2.200   6.96 | 3.20   3.93
                 .233    4.07 | 1.233 108.92 | 2.233   6.96 | 3.23   3.93
                 .267    4.07 | 1.267 108.92 | 2.267   6.96 | 3.27   3.93
                 .300    4.07 | 1.300 108.92 | 2.300   6.96 | 3.30   3.93
                 .333    4.07 | 1.333 108.92 | 2.333   6.96 | 3.33   3.93
                 .367    4.76 | 1.367  33.31 | 2.367   6.12 | 3.37   3.68
                 .400    4.76 | 1.400  33.31 | 2.400   6.12 | 3.40   3.68
                 .433    4.76 | 1.433  33.31 | 2.433   6.12 | 3.43   3.68
                 .467    4.76 | 1.467  33.31 | 2.467   6.12 | 3.47   3.68
                 .500    4.76 | 1.500  33.31 | 2.500   6.12 | 3.50   3.68
                 .533    5.79 | 1.533  17.99 | 2.533   5.48 | 3.53   3.47
                 .567    5.79 | 1.567  17.99 | 2.567   5.48 | 3.57   3.47
                 .600    5.79 | 1.600  17.99 | 2.600   5.48 | 3.60   3.47
                 .633    5.79 | 1.633  17.99 | 2.633   5.48 | 3.63   3.47
                 .667    5.79 | 1.667  17.99 | 2.667   5.48 | 3.67   3.47
                 .700    7.53 | 1.700  12.60 | 2.700   4.97 | 3.70   3.28
                 .733    7.53 | 1.733  12.60 | 2.733   4.97 | 3.73   3.28
                 .767    7.53 | 1.767  12.60 | 2.767   4.97 | 3.77   3.28
```

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                .800    7.53 | 1.800   12.60 | 2.800    4.97 |  3.80    3.28
                .833    7.53 | 1.833   12.60 | 2.833    4.97 |  3.83    3.28
                .867   11.20 | 1.867    9.82 | 2.867    4.56 |  3.87    3.12
                .900   11.20 | 1.900    9.82 | 2.900    4.56 |  3.90    3.12
                .933   11.20 | 1.933    9.82 | 2.933    4.56 |  3.93    3.12
                .967   11.20 | 1.967    9.82 | 2.967    4.56 |  3.97    3.12
               1.000   11.20 | 2.000    9.82 | 3.000    4.56 |  4.00    3.12

    Unit Hyd Qpeak  (cms)=   1.528

    PEAK FLOW       (cms)=    .112 (i)
    TIME TO PEAK    (hrs)=   1.333
    RUNOFF VOLUME    (mm)=  14.469
    TOTAL RAINFALL   (mm)=  50.518
    RUNOFF COEFFICIENT   =    .286

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
 CALIB             |
 STANDHYD  (0207)  |   Area    (ha)=    .70
|ID= 1 DT= 4.0 min |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
--------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area    (ha)=        .20          .50
    Dep. Storage    (mm)=       1.00         5.00
    Average Slope    (%)=        .94          .60
    Length           (m)=      10.00       191.40
    Mannings n          =       .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   4.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .067    3.57 | 1.067   25.64 | 2.067    8.12 |  3.07    4.22
                .133    3.57 | 1.133   25.64 | 2.133    8.12 |  3.13    4.22
                .200    3.82 | 1.200   67.28 | 2.200    7.54 |  3.20    4.08
                .267    4.07 | 1.267  108.92 | 2.267    6.96 |  3.27    3.93
                .333    4.07 | 1.333  108.92 | 2.333    6.96 |  3.33    3.93
                .400    4.76 | 1.400   33.31 | 2.400    6.12 |  3.40    3.68
                .467    4.76 | 1.467   33.31 | 2.467    6.12 |  3.47    3.68
                .533    5.28 | 1.533   25.65 | 2.533    5.80 |  3.53    3.58
                .600    5.79 | 1.600   17.99 | 2.600    5.48 |  3.60    3.47
                .667    5.79 | 1.667   17.99 | 2.667    5.48 |  3.67    3.47
                .733    7.53 | 1.733   12.60 | 2.733    4.97 |  3.73    3.28
                .800    7.53 | 1.800   12.60 | 2.800    4.97 |  3.80    3.28
                .867    9.36 | 1.867   11.21 | 2.867    4.77 |  3.87    3.20
                .933   11.20 | 1.933    9.82 | 2.933    4.56 |  3.93    3.12
               1.000   11.20 | 2.000    9.82 | 3.000    4.56 |  4.00    3.12

    Max.Eff.Inten.(mm/hr)=      108.92          11.01
               over (min)         5.00          64.00
    Storage Coeff.   (min)=        .63 (ii)     63.26 (ii)
    Unit Hyd. Tpeak  (min)=       4.00          64.00
    Unit Hyd. peak   (cms)=        .42            .02
                                                          *TOTALS*
    PEAK FLOW        (cms)=        .05            .01        .046 (iii)
    TIME TO PEAK     (hrs)=        .00           2.47        1.33
    RUNOFF VOLUME     (mm)=      49.52          14.58       22.04
    TOTAL RAINFALL    (mm)=      50.52          50.52       50.52
    RUNOFF COEFFICIENT    =        .98            .29         .44

**** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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------------------
 ADD HYD   (1000) |
  1 +  2 =  3     |        AREA    QPEAK    TPEAK     R.V.
------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0202):     .50     .033     1.33    22.02
       + ID2= 2 (0201):     .30     .020     1.30    22.02
         ============================================
         ID = 3 (1000):     .80     .053     1.30    22.05

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| ADD HYD   (1001) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
-------------------          (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0203):      8.01      .506      1.35     23.82
       + ID2= 2 (1000):       .80      .053      1.30     22.05
         ===============================================
         ID = 3 (1001):      8.81      .553      1.35     23.65

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| ADD HYD   (1002) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
-------------------          (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0204):      2.82      .092      1.33     17.72
       + ID2= 2 (1001):      8.81      .553      1.35     23.65
         ===============================================
         ID = 3 (1002):     11.63      .636      1.35     22.22

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| ADD HYD   (1003) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
-------------------          (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0206):      6.18      .039      2.33      5.50
       + ID2= 2 (1002):     11.63      .636      1.35     22.22
         ===============================================
         ID = 3 (1003):     17.81      .641      1.35     16.42

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| ADD HYD   (1004) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
-------------------          (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (1003):     17.81      .641      1.35     16.42
       + ID2= 2 (0205):      1.20      .112      1.33     14.47
         ===============================================
         ID = 3 (1004):     19.01      .735      1.33     16.29

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
-------------------
| RESERVOIR (0001) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------        (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           .0000      .0000    |    .4210      .4838
                           .0110      .0717    |    .5580      .6088
                           .0190      .1729    |    .6660      .7402
                           .0250      .1992    |    .6910      .7740
                           .0440      .2529    |   1.0560      .8779
                           .0800      .3083    |   1.6620      .9853
                           .2030      .3652    |   2.4240     1.0963

                              AREA      QPEAK      TPEAK        R.V.
                              (ha)      (cms)      (hrs)        (mm)
    INFLOW : ID= 2 (1004)     19.01        .74      1.33       16.29
    OUTFLOW: ID= 1 (0001)     19.01        .05      4.53       15.71

                 PEAK   FLOW   REDUCTION  [Qout/Qin](%)=  6.71
                 TIME SHIFT OF PEAK FLOW         (min)=192.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=    .2611

    **** WARNING : SELECTED ROUTING TIME STEP DENIED.
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-------------------
| ADD HYD   (1005) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
-------------------          (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0001):     19.01      .049      4.53     15.71
       + ID2= 2 (0207):       .70      .046      1.33     22.04
         ===============================================
         ID = 3 (1005):     19.71      .053      4.43     15.94

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ADD HYD    (1006) |
  1 +  2 =  3      |          AREA     QPEAK     TPEAK      R.V.
 -----------------             (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0208):         .50     .016      1.33      5.47
        + ID2= 2 (1005):       19.71     .053      4.43     15.94
          ===============================================
          ID = 3 (1006):       20.21     .069      1.33     15.68

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ****************************
 ** SIMULATION NUMBER:   7 **
 ****************************


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 |   READ STORM    |     Filename: K:\PROJECT FILES\200000 - 299999\
 |                 |               210987 - 010 - Innisfil Executive Estates\
 |                 |               SWM\OTTHYMO 3rd Submission\chica25.stm
 Ptotal= 71.24 mm |      Comments: 25 YEAR - 4 hour - Chicago Storm
 -----------------
                TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                 .17     5.22 |  1.17    36.37 |  2.17    11.74 |  3.17     6.15
                 .33     5.94 |  1.33   148.15 |  2.33    10.09 |  3.33     5.74
                 .50     6.93 |  1.50    47.06 |  2.50     8.89 |  3.50     5.38
                 .67     8.42 |  1.67    25.72 |  2.67     7.96 |  3.67     5.08
                 .83    10.91 |  1.83    18.11 |  2.83     7.24 |  3.83     4.80
                1.00    16.13 |  2.00    14.17 |  3.00     6.65 |  4.00     4.57

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 CALIB             |
 NASHYD    (0208) |   Area     (ha)=      .50   Curve Number   (CN)= 44.0
|ID= 1 DT= 2.0 min |   Ia       (mm)=     5.00   # of Linear Res.(N)= 3.00
 -----------------    U.H. Tp(hrs)=      .04

       NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
               .033     5.22 | 1.033    36.37 | 2.033    11.74 |  3.03     6.15
               .067     5.22 | 1.067    36.37 | 2.067    11.74 |  3.07     6.15
               .100     5.22 | 1.100    36.37 | 2.100    11.74 |  3.10     6.15
               .133     5.22 | 1.133    36.37 | 2.133    11.74 |  3.13     6.15
               .167     5.22 | 1.167    36.37 | 2.167    11.74 |  3.17     6.15
               .200     5.94 | 1.200   148.15 | 2.200    10.09 |  3.20     5.74
               .233     5.94 | 1.233   148.15 | 2.233    10.09 |  3.23     5.74
               .267     5.94 | 1.267   148.15 | 2.267    10.09 |  3.27     5.74
               .300     5.94 | 1.300   148.15 | 2.300    10.09 |  3.30     5.74
               .333     5.94 | 1.333   148.15 | 2.333    10.09 |  3.33     5.74
               .367     6.93 | 1.367    47.06 | 2.367     8.89 |  3.37     5.38
               .400     6.93 | 1.400    47.06 | 2.400     8.89 |  3.40     5.38
               .433     6.93 | 1.433    47.06 | 2.433     8.89 |  3.43     5.38
               .467     6.93 | 1.467    47.06 | 2.467     8.89 |  3.47     5.38
               .500     6.93 | 1.500    47.06 | 2.500     8.89 |  3.50     5.38
               .533     8.42 | 1.533    25.72 | 2.533     7.96 |  3.53     5.08
               .567     8.42 | 1.567    25.72 | 2.567     7.96 |  3.57     5.08
               .600     8.42 | 1.600    25.72 | 2.600     7.96 |  3.60     5.08
               .633     8.42 | 1.633    25.72 | 2.633     7.96 |  3.63     5.08
               .667     8.42 | 1.667    25.72 | 2.667     7.96 |  3.67     5.08
               .700    10.91 | 1.700    18.11 | 2.700     7.24 |  3.70     4.80
               .733    10.91 | 1.733    18.11 | 2.733     7.24 |  3.73     4.80
               .767    10.91 | 1.767    18.11 | 2.767     7.24 |  3.77     4.80
               .800    10.91 | 1.800    18.11 | 2.800     7.24 |  3.80     4.80
               .833    10.91 | 1.833    18.11 | 2.833     7.24 |  3.83     4.80
               .867    16.13 | 1.867    14.17 | 2.867     6.65 |  3.87     4.57
               .900    16.13 | 1.900    14.17 | 2.900     6.65 |  3.90     4.57
               .933    16.13 | 1.933    14.17 | 2.933     6.65 |  3.93     4.57
               .967    16.13 | 1.967    14.17 | 2.967     6.65 |  3.97     4.57
              1.000    16.13 | 2.000    14.17 | 3.000     6.65 |  4.00     4.57

   Unit Hyd Qpeak  (cms)=     .477

   PEAK FLOW        (cms)=     .031 (i)
   TIME TO PEAK     (hrs)=    1.333
   RUNOFF VOLUME     (mm)=   10.971
   TOTAL RAINFALL    (mm)=   71.237
   RUNOFF COEFFICIENT   =     .154

   (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 CALIB            |
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| NASHYD    (0206) |   Area      (ha)=    6.18   Curve Number    (CN)= 44.0
|ID= 1 DT=10.0 min |   Ia        (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=     .81

        NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME    RAIN
                 hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr
                .167    5.22 | 1.167   36.37 | 2.167   11.74 | 3.17    6.15
                .333    5.94 | 1.333  148.15 | 2.333   10.09 | 3.33    5.74
                .500    6.93 | 1.500   47.06 | 2.500    8.89 | 3.50    5.38
                .667    8.42 | 1.667   25.72 | 2.667    7.96 | 3.67    5.08
                .833   10.91 | 1.833   18.11 | 2.833    7.24 | 3.83    4.80
               1.000   16.13 | 2.000   14.17 | 3.000    6.65 | 4.00     .00

    Unit Hyd Qpeak  (cms)=     .291

    PEAK FLOW       (cms)=     .079 (i)
    TIME TO PEAK    (hrs)=    2.333
    RUNOFF VOLUME    (mm)=   11.026
    TOTAL RAINFALL   (mm)=   70.475
    RUNOFF COEFFICIENT   =     .156

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD  (0204) |   Area      (ha)=    2.82
|ID= 1 DT= 5.0 min |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
--------------------
                             IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=        .40           2.42
    Dep. Storage      (mm)=       1.00           5.00
    Average Slope      (%)=       1.58           2.50
    Length             (m)=     140.00         284.40
    Mannings n           =        .013           .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME    RAIN
                 hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr
                .083    5.22 | 1.083   36.37 | 2.083   11.74 | 3.08    6.15
                .167    5.22 | 1.167   36.37 | 2.167   11.74 | 3.17    6.15
                .250    5.94 | 1.250  148.15 | 2.250   10.09 | 3.25    5.74
                .333    5.94 | 1.333  148.15 | 2.333   10.09 | 3.33    5.74
                .417    6.93 | 1.417   47.06 | 2.417    8.89 | 3.42    5.38
                .500    6.93 | 1.500   47.06 | 2.500    8.89 | 3.50    5.38
                .583    8.42 | 1.583   25.72 | 2.583    7.96 | 3.58    5.08
                .667    8.42 | 1.667   25.72 | 2.667    7.96 | 3.67    5.08
                .750   10.91 | 1.750   18.11 | 2.750    7.24 | 3.75    4.80
                .833   10.91 | 1.833   18.11 | 2.833    7.24 | 3.83    4.80
                .917   16.13 | 1.917   14.17 | 2.917    6.65 | 3.92    4.57
               1.000   16.13 | 2.000   14.17 | 3.000    6.65 | 4.00    4.57

    Max.Eff.Inten.(mm/hr)=      148.15          23.91
               over (min)        5.00          45.00
    Storage Coeff.  (min)=        2.33 (ii)     40.29 (ii)
    Unit Hyd. Tpeak (min)=        5.00          45.00
    Unit Hyd. peak  (cms)=         .30            .03
                                                           *TOTALS*
    PEAK FLOW       (cms)=         .12            .09         .134 (iii)
    TIME TO PEAK    (hrs)=         .00           2.08         1.33
    RUNOFF VOLUME    (mm)=       70.24          25.83        30.57
    TOTAL RAINFALL   (mm)=       71.24          71.24        71.24
    RUNOFF COEFFICIENT   =         .99            .36          .43

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD  (0203) |   Area      (ha)=    8.01
|ID= 1 DT= 3.0 min |   Total Imp(%)=   34.30   Dir. Conn.(%)=   25.70
--------------------
                             IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=       2.75           5.26
```

```
  Dep. Storage      (mm)=        1.00          5.00
  Average Slope      (%)=         .79          2.00
  Length             (m)=      414.00         86.00
  Mannings n            =        .013          .250

     NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME    RAIN
                 hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr
                .050    5.22 | 1.050  36.37 | 2.050  11.74 | 3.05    6.15
                .100    5.22 | 1.100  36.37 | 2.100  11.74 | 3.10    6.15
                .150    5.22 | 1.150  36.37 | 2.150  11.74 | 3.15    6.15
                .200    5.70 | 1.200 110.89 | 2.200  10.64 | 3.20    5.88
                .250    5.94 | 1.250 148.15 | 2.250  10.09 | 3.25    5.74
                .300    5.94 | 1.300 148.15 | 2.300  10.09 | 3.30    5.74
                .350    6.27 | 1.350 114.45 | 2.350   9.69 | 3.35    5.62
                .400    6.93 | 1.400  47.06 | 2.400   8.89 | 3.40    5.38
                .450    6.93 | 1.450  47.06 | 2.450   8.89 | 3.45    5.38
                .500    6.93 | 1.500  47.06 | 2.500   8.89 | 3.50    5.38
                .550    8.42 | 1.550  25.72 | 2.550   7.96 | 3.55    5.08
                .600    8.42 | 1.600  25.72 | 2.600   7.96 | 3.60    5.08
                .650    8.42 | 1.650  25.72 | 2.650   7.96 | 3.65    5.08
                .700   10.08 | 1.700  20.65 | 2.700   7.48 | 3.70    4.89
                .750   10.91 | 1.750  18.11 | 2.750   7.24 | 3.75    4.80
                .800   10.91 | 1.800  18.11 | 2.800   7.24 | 3.80    4.80
                .850   12.65 | 1.850  16.80 | 2.850   7.04 | 3.85    4.72
                .900   16.13 | 1.900  14.17 | 2.900   6.65 | 3.90    4.57
                .950   16.13 | 1.950  14.17 | 2.950   6.65 | 3.95    4.57
               1.000   16.13 | 2.000  14.17 | 3.000   6.65 | 4.00    4.57

 Max.Eff.Inten.(mm/hr)=       148.15         42.16
            over (min)          6.00         24.00
 Storage Coeff.  (min)=         5.50 (ii)    21.28 (ii)
 Unit Hyd. Tpeak (min)=         6.00         24.00
 Unit Hyd. peak  (cms)=          .20           .05
                                                          *TOTALS*
 PEAK FLOW       (cms)=          .68           .34          .777 (iii)
 TIME TO PEAK    (hrs)=          .00          1.70          1.35
 RUNOFF VOLUME    (mm)=        70.24         27.38         38.39
 TOTAL RAINFALL   (mm)=        71.24         71.24         71.24
 RUNOFF COEFFICIENT   =          .99           .38           .54


    (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
        CN*  =  70.0     Ia = Dep. Storage  (Above)
   (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
  (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-------------------
CALIB              |
STANDHYD  (0202)   |  Area     (ha)=     .50
ID= 1 DT= 5.0 min  |  Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
-------------------
                            IMPERVIOUS    PERVIOUS (i)
  Surface Area      (ha)=         .14           .36
  Dep. Storage      (mm)=        1.00          5.00
  Average Slope      (%)=         .80          1.00
  Length             (m)=       10.00        218.20
  Mannings n            =        .013          .250

     NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME    RAIN
                 hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr
                .083    5.22 | 1.083  36.37 | 2.083  11.74 | 3.08    6.15
                .167    5.22 | 1.167  36.37 | 2.167  11.74 | 3.17    6.15
                .250    5.94 | 1.250 148.15 | 2.250  10.09 | 3.25    5.74
                .333    5.94 | 1.333 148.15 | 2.333  10.09 | 3.33    5.74
                .417    6.93 | 1.417  47.06 | 2.417   8.89 | 3.42    5.38
                .500    6.93 | 1.500  47.06 | 2.500   8.89 | 3.50    5.38
                .583    8.42 | 1.583  25.72 | 2.583   7.96 | 3.58    5.08
                .667    8.42 | 1.667  25.72 | 2.667   7.96 | 3.67    5.08
                .750   10.91 | 1.750  18.11 | 2.750   7.24 | 3.75    4.80
                .833   10.91 | 1.833  18.11 | 2.833   7.24 | 3.83    4.80
                .917   16.13 | 1.917  14.17 | 2.917   6.65 | 3.92    4.57
               1.000   16.13 | 2.000  14.17 | 3.000   6.65 | 4.00    4.57

 Max.Eff.Inten.(mm/hr)=       148.15         24.34
            over (min)          5.00         45.00
 Storage Coeff.  (min)=          .59 (ii)    42.90 (ii)
 Unit Hyd. Tpeak (min)=         5.00         45.00
 Unit Hyd. peak  (cms)=          .34           .03
                                                          *TOTALS*
```

```
    PEAK FLOW       (cms)=          .04          .01             .046 (iii)
    TIME TO PEAK    (hrs)=          .00         2.08             1.33
    RUNOFF VOLUME    (mm)=        70.24        26.84            36.12
    TOTAL RAINFALL   (mm)=        71.24        71.24            71.24
    RUNOFF COEFFICIENT   =          .99          .38              .51

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD  (0201)  |   Area    (ha)=     .30
|ID= 1 DT= 3.0 min  |   Total Imp(%)=   28.60   Dir. Conn.(%)=  21.50
-------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area    (ha)=        .09           .21
    Dep. Storage    (mm)=       1.00          5.00
    Average Slope    (%)=        .97           .97
    Length           (m)=      10.00        119.60
    Mannings n          =       .013          .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN | TIME    RAIN | TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |   hrs   mm/hr
               .050    5.22 | 1.050  36.37 | 2.050  11.74 |  3.05    6.15
               .100    5.22 | 1.100  36.37 | 2.100  11.74 |  3.10    6.15
               .150    5.22 | 1.150  36.37 | 2.150  11.74 |  3.15    6.15
               .200    5.70 | 1.200 110.89 | 2.200  10.64 |  3.20    5.88
               .250    5.94 | 1.250 148.15 | 2.250  10.09 |  3.25    5.74
               .300    5.94 | 1.300 148.15 | 2.300  10.09 |  3.30    5.74
               .350    6.27 | 1.350 114.45 | 2.350   9.69 |  3.35    5.62
               .400    6.93 | 1.400  47.06 | 2.400   8.89 |  3.40    5.38
               .450    6.93 | 1.450  47.06 | 2.450   8.89 |  3.45    5.38
               .500    6.93 | 1.500  47.06 | 2.500   8.89 |  3.50    5.38
               .550    8.42 | 1.550  25.72 | 2.550   7.96 |  3.55    5.08
               .600    8.42 | 1.600  25.72 | 2.600   7.96 |  3.60    5.08
               .650    8.42 | 1.650  25.72 | 2.650   7.96 |  3.65    5.08
               .700   10.08 | 1.700  20.65 | 2.700   7.48 |  3.70    4.89
               .750   10.91 | 1.750  18.11 | 2.750   7.24 |  3.75    4.80
               .800   10.91 | 1.800  18.11 | 2.800   7.24 |  3.80    4.80
               .850   12.65 | 1.850  16.80 | 2.850   7.04 |  3.85    4.72
               .900   16.13 | 1.900  14.17 | 2.900   6.65 |  3.90    4.57
               .950   16.13 | 1.950  14.17 | 2.950   6.65 |  3.95    4.57
              1.000   16.13 | 2.000  14.17 | 3.000   6.65 |  4.00    4.57

    Max.Eff.Inten.(mm/hr)=      148.15          32.89
               over (min)         6.00          27.00
    Storage Coeff.  (min)=         .55 (ii)     26.95 (ii)
    Unit Hyd. Tpeak (min)=        6.00          27.00
    Unit Hyd. peak  (cms)=         .38            .04
                                                             *TOTALS*
    PEAK FLOW       (cms)=         .03            .01            .028 (iii)
    TIME TO PEAK    (hrs)=         .00           1.75            1.30
    RUNOFF VOLUME    (mm)=       70.24          26.84           36.12
    TOTAL RAINFALL   (mm)=       71.24          71.24           71.24
    RUNOFF COEFFICIENT   =         .99            .38             .51

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD    (0205)  |   Area    (ha)=    1.20   Curve Number   (CN)= 71.2
|ID= 1 DT= 2.0 min  |   Ia       (mm)=   2.00   # of Linear Res.(N)= 3.00
-------------------     U.H. Tp(hrs)=     .03

       NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN | TIME    RAIN | TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |   hrs   mm/hr
               .033    5.22 | 1.033  36.37 | 2.033  11.74 |  3.03    6.15
               .067    5.22 | 1.067  36.37 | 2.067  11.74 |  3.07    6.15
```

```
              .100    5.22 | 1.100   36.37 | 2.100   11.74 |  3.10    6.15
              .133    5.22 | 1.133   36.37 | 2.133   11.74 |  3.13    6.15
              .167    5.22 | 1.167   36.37 | 2.167   11.74 |  3.17    6.15
              .200    5.94 | 1.200  148.15 | 2.200   10.09 |  3.20    5.74
              .233    5.94 | 1.233  148.15 | 2.233   10.09 |  3.23    5.74
              .267    5.94 | 1.267  148.15 | 2.267   10.09 |  3.27    5.74
              .300    5.94 | 1.300  148.15 | 2.300   10.09 |  3.30    5.74
              .333    5.94 | 1.333  148.15 | 2.333   10.09 |  3.33    5.74
              .367    6.93 | 1.367   47.06 | 2.367    8.89 |  3.37    5.38
              .400    6.93 | 1.400   47.06 | 2.400    8.89 |  3.40    5.38
              .433    6.93 | 1.433   47.06 | 2.433    8.89 |  3.43    5.38
              .467    6.93 | 1.467   47.06 | 2.467    8.89 |  3.47    5.38
              .500    6.93 | 1.500   47.06 | 2.500    8.89 |  3.50    5.38
              .533    8.42 | 1.533   25.72 | 2.533    7.96 |  3.53    5.08
              .567    8.42 | 1.567   25.72 | 2.567    7.96 |  3.57    5.08
              .600    8.42 | 1.600   25.72 | 2.600    7.96 |  3.60    5.08
              .633    8.42 | 1.633   25.72 | 2.633    7.96 |  3.63    5.08
              .667    8.42 | 1.667   25.72 | 2.667    7.96 |  3.67    5.08
              .700   10.91 | 1.700   18.11 | 2.700    7.24 |  3.70    4.80
              .733   10.91 | 1.733   18.11 | 2.733    7.24 |  3.73    4.80
              .767   10.91 | 1.767   18.11 | 2.767    7.24 |  3.77    4.80
              .800   10.91 | 1.800   18.11 | 2.800    7.24 |  3.80    4.80
              .833   10.91 | 1.833   18.11 | 2.833    7.24 |  3.83    4.80
              .867   16.13 | 1.867   14.17 | 2.867    6.65 |  3.87    4.57
              .900   16.13 | 1.900   14.17 | 2.900    6.65 |  3.90    4.57
              .933   16.13 | 1.933   14.17 | 2.933    6.65 |  3.93    4.57
              .967   16.13 | 1.967   14.17 | 2.967    6.65 |  3.97    4.57
             1.000   16.13 | 2.000   14.17 | 3.000    6.65 |  4.00    4.57

   Unit Hyd Qpeak  (cms)=   1.528

   PEAK FLOW        (cms)=    .195 (i)
   TIME TO PEAK     (hrs)=   1.333
   RUNOFF VOLUME     (mm)=  25.916
   TOTAL RAINFALL    (mm)=  71.237
   RUNOFF COEFFICIENT   =     .364

   (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
-----------------
CALIB            |
STANDHYD  (0207) |   Area     (ha)=     .70
TD= 1 DT= 4.0 min |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
-----------------
                           IMPERVIOUS    PERVIOUS (i)
   Surface Area      (ha)=      .20           .50
   Dep. Storage      (mm)=     1.00          5.00
   Average Slope      (%)=      .94           .60
   Length             (m)=    10.00        191.40
   Mannings n            =     .013          .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   4.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
             TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
              .067    5.22 | 1.067   36.37 | 2.067   11.74 |  3.07    6.15
              .133    5.22 | 1.133   36.37 | 2.133   11.74 |  3.13    6.15
              .200    5.58 | 1.200   92.26 | 2.200   10.91 |  3.20    5.95
              .267    5.94 | 1.267  148.15 | 2.267   10.09 |  3.27    5.74
              .333    5.94 | 1.333  148.15 | 2.333   10.09 |  3.33    5.74
              .400    6.93 | 1.400   47.06 | 2.400    8.89 |  3.40    5.38
              .467    6.93 | 1.467   47.06 | 2.467    8.89 |  3.47    5.38
              .533    7.68 | 1.533   36.39 | 2.533    8.42 |  3.53    5.23
              .600    8.42 | 1.600   25.72 | 2.600    7.96 |  3.60    5.08
              .667    8.42 | 1.667   25.72 | 2.667    7.96 |  3.67    5.08
              .733   10.91 | 1.733   18.11 | 2.733    7.24 |  3.73    4.80
              .800   10.91 | 1.800   18.11 | 2.800    7.24 |  3.80    4.80
              .867   13.52 | 1.867   16.14 | 2.867    6.95 |  3.87    4.69
              .933   16.13 | 1.933   14.17 | 2.933    6.65 |  3.93    4.57
             1.000   16.13 | 2.000   14.17 | 3.000    6.65 |  4.00    4.57

   Max.Eff.Inten.(mm/hr)=     148.15         23.29
              over (min)       5.00          48.00
   Storage Coeff.   (min)=      .56 (ii)     46.97 (ii)
   Unit Hyd. Tpeak  (min)=     4.00          48.00
   Unit Hyd. peak   (cms)=      .42            .02
                                                      *TOTALS*
   PEAK FLOW        (cms)=      .06            .02         .064 (iii)
   TIME TO PEAK     (hrs)=      .00           2.13         1.33
   RUNOFF VOLUME     (mm)=    70.24          26.84        36.13
   TOTAL RAINFALL    (mm)=    71.24          71.24        71.24
   RUNOFF COEFFICIENT   =      .99            .38          .51

*** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
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```
          CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------

--------------------
| ADD HYD   (1000) |
|   1 +  2 =  3    |             AREA     QPEAK     TPEAK      R.V.
--------------------             (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0202):           .50      .046      1.33     36.12
       + ID2= 2 (0201):           .30      .028      1.30     36.12
         ==================================================
         ID = 3 (1000):           .80      .074      1.30     36.17

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------

--------------------
| ADD HYD   (1001) |
|   1 +  2 =  3    |             AREA     QPEAK     TPEAK      R.V.
--------------------             (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0203):          8.01      .777      1.35     38.39
       + ID2= 2 (1000):           .80      .074      1.30     36.17
         ==================================================
         ID = 3 (1001):          8.81      .845      1.35     38.19

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------

--------------------
| ADD HYD   (1002) |
|   1 +  2 =  3    |             AREA     QPEAK     TPEAK      R.V.
--------------------             (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0204):          2.82      .134      1.33     30.57
       + ID2= 2 (1001):          8.81      .845      1.35     38.19
         ==================================================
         ID = 3 (1002):         11.63      .965      1.35     36.35

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------

--------------------
| ADD HYD   (1003) |
|   1 +  2 =  3    |             AREA     QPEAK     TPEAK      R.V.
--------------------             (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0206):          6.18      .079      2.33     11.03
       + ID2= 2 (1002):         11.63      .965      1.35     36.35
         ==================================================
         ID = 3 (1003):         17.81      .976      1.35     27.56

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------

--------------------
| ADD HYD   (1004) |
|   1 +  2 =  3    |             AREA     QPEAK     TPEAK      R.V.
--------------------             (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (1003):         17.81      .976      1.35     27.56
       + ID2= 2 (0205):          1.20      .195      1.33     25.92
         ==================================================
         ID = 3 (1004):         19.01     1.142      1.33     27.46

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------

--------------------
| RESERVOIR (0001) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |   OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |    (cms)     (ha.m.)
                          .0000      .0000    |    .4210       .4838
                          .0110      .0717    |    .5580       .6088
                          .0190      .1729    |    .6660       .7402
                          .0250      .1992    |    .6910       .7740
                          .0440      .2529    |   1.0560       .8779
                          .0800      .3083    |   1.6620       .9853
                          .2030      .3652    |   2.4240      1.0963

                               AREA      QPEAK      TPEAK       R.V.
                               (ha)      (cms)      (hrs)       (mm)
    INFLOW : ID= 2 (1004)     19.01       1.14       1.33      27.46
    OUTFLOW: ID= 1 (0001)     19.01        .21       3.67      26.78
```

```
                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.11
                 TIME SHIFT OF PEAK FLOW          (min)=140.00
                 MAXIMUM  STORAGE   USED        (ha.m.)=    .3673

    **** WARNING : SELECTED ROUTING TIME STEP DENIED.
------------------------------------------------------------------------------

 ------------------
| ADD HYD   (1005) |
|   1 +  2 =  3    |            AREA     QPEAK     TPEAK      R.V.
 ------------------             (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0001):        19.01      .207      3.67     26.78
       + ID2= 2 (0207):          .70      .064      1.33     36.13
         ===============================================
         ID = 3 (1005):        19.71      .218      3.57     27.12

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------

 ------------------
| ADD HYD   (1006) |
|   1 +  2 =  3    |            AREA     QPEAK     TPEAK      R.V.
 ------------------             (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0208):          .50      .031      1.33     10.97
       + ID2= 2 (1005):        19.71      .218      3.57     27.12
         ===============================================
         ID = 3 (1006):        20.21      .220      3.57     26.72

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ****************************
 ** SIMULATION NUMBER:    8 **
 ****************************

 ------------------
|  READ STORM      |     Filename: K:\PROJECT FILES\200000 - 299999\
|                  |               210987 - 010 - Innisfil Executive Estates\
|                  |               SWM\OTTHYMO 3rd Submission\chica100.stm
| Ptotal= 87.58 mm |     Comments: 100 YEAR - 4 hour - Chicago Storm
 ------------------
                TIME     RAIN  |  TIME     RAIN  |  TIME     RAIN  |  TIME     RAIN
                 hrs    mm/hr  |   hrs    mm/hr  |   hrs    mm/hr  |   hrs    mm/hr
                 .17     6.41  |  1.17    45.22  |  2.17    14.50  |  3.17     7.56
                 .33     7.29  |  1.33   180.15  |  2.33    12.44  |  3.33     7.04
                 .50     8.52  |  1.50    58.54  |  2.50    10.94  |  3.50     6.60
                 .67    10.36  |  1.67    31.96  |  2.67     9.80  |  3.67     6.22
                 .83    13.45  |  1.83    22.45  |  2.83     8.90  |  3.83     5.89
                1.00    19.96  |  2.00    17.52  |  3.00     8.16  |  4.00     5.59

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 ------------------
| CALIB            |
| NASHYD    (0208) |   Area     (ha)=     .50   Curve Number    (CN)= 44.0
| ID= 1 DT= 2.0 min|   Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
 ------------------    U.H. Tp(hrs)=     .04

       NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN  |  TIME     RAIN  |  TIME     RAIN  |  TIME     RAIN
                 hrs    mm/hr  |   hrs    mm/hr  |   hrs    mm/hr  |   hrs    mm/hr
                .033     6.41  | 1.033    45.22  | 2.033    14.50  |  3.03     7.56
                .067     6.41  | 1.067    45.22  | 2.067    14.50  |  3.07     7.56
                .100     6.41  | 1.100    45.22  | 2.100    14.50  |  3.10     7.56
                .133     6.41  | 1.133    45.22  | 2.133    14.50  |  3.13     7.56
                .167     6.41  | 1.167    45.22  | 2.167    14.50  |  3.17     7.56
                .200     7.29  | 1.200   180.15  | 2.200    12.44  |  3.20     7.04
                .233     7.29  | 1.233   180.15  | 2.233    12.44  |  3.23     7.04
                .267     7.29  | 1.267   180.15  | 2.267    12.44  |  3.27     7.04
                .300     7.29  | 1.300   180.15  | 2.300    12.44  |  3.30     7.04
                .333     7.29  | 1.333   180.15  | 2.333    12.44  |  3.33     7.04
                .367     8.52  | 1.367    58.54  | 2.367    10.94  |  3.37     6.60
                .400     8.52  | 1.400    58.54  | 2.400    10.94  |  3.40     6.60
                .433     8.52  | 1.433    58.54  | 2.433    10.94  |  3.43     6.60
                .467     8.52  | 1.467    58.54  | 2.467    10.94  |  3.47     6.60
                .500     8.52  | 1.500    58.54  | 2.500    10.94  |  3.50     6.60
                .533    10.36  | 1.533    31.96  | 2.533     9.80  |  3.53     6.22
                .567    10.36  | 1.567    31.96  | 2.567     9.80  |  3.57     6.22
                .600    10.36  | 1.600    31.96  | 2.600     9.80  |  3.60     6.22
                .633    10.36  | 1.633    31.96  | 2.633     9.80  |  3.63     6.22
                .667    10.36  | 1.667    31.96  | 2.667     9.80  |  3.67     6.22
                .700    13.45  | 1.700    22.45  | 2.700     8.90  |  3.70     5.89
                .733    13.45  | 1.733    22.45  | 2.733     8.90  |  3.73     5.89
                .767    13.45  | 1.767    22.45  | 2.767     8.90  |  3.77     5.89
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                .800    13.45 | 1.800    22.45 | 2.800      8.90 |  3.80     5.89
                .833    13.45 | 1.833    22.45 | 2.833      8.90 |  3.83     5.89
                .867    19.96 | 1.867    17.52 | 2.867      8.16 |  3.87     5.59
                .900    19.96 | 1.900    17.52 | 2.900      8.16 |  3.90     5.59
                .933    19.96 | 1.933    17.52 | 2.933      8.16 |  3.93     5.59
                .967    19.96 | 1.967    17.52 | 2.967      8.16 |  3.97     5.59
               1.000    19.96 | 2.000    17.52 | 3.000      8.16 |  4.00     5.59

     Unit Hyd Qpeak  (cms)=     .477

     PEAK FLOW       (cms)=     .046 (i)
     TIME TO PEAK    (hrs)=    1.333
     RUNOFF VOLUME    (mm)=   16.365
     TOTAL RAINFALL   (mm)=   87.578
     RUNOFF COEFFICIENT   =     .187

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| NASHYD    (0206) |   Area      (ha)=    6.18   Curve Number    (CN)= 44.0
|ID= 1 DT=10.0 min |   Ia        (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=      .81

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN | TIME     RAIN  |  TIME     RAIN  |  TIME     RAIN
                 hrs    mm/hr |  hrs    mm/hr  |   hrs    mm/hr  |   hrs    mm/hr
                .167     6.41 | 1.167    45.22 | 2.167    14.50  |  3.17     7.56
                .333     7.29 | 1.333   180.15 | 2.333    12.44  |  3.33     7.04
                .500     8.52 | 1.500    58.54 | 2.500    10.94  |  3.50     6.60
                .667    10.36 | 1.667    31.96 | 2.667     9.80  |  3.67     6.22
                .833    13.45 | 1.833    22.45 | 2.833     8.90  |  3.83     5.89
               1.000    19.96 | 2.000    17.52 | 3.000     8.16  |  4.00      .00

     Unit Hyd Qpeak  (cms)=     .291

     PEAK FLOW       (cms)=     .119 (i)
     TIME TO PEAK    (hrs)=    2.333
     RUNOFF VOLUME    (mm)=   16.461
     TOTAL RAINFALL   (mm)=   86.647
     RUNOFF COEFFICIENT   =     .190

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD  (0204) |   Area      (ha)=    2.82
|ID= 1 DT= 5.0 min |   Total Imp(%)=   14.30   Dir. Conn.(%)=   10.70
--------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=        .40          2.42
     Dep. Storage      (mm)=       1.00          5.00
     Average Slope      (%)=       1.58          2.50
     Length             (m)=     140.00        284.40
     Mannings n            =       .013          .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME     RAIN | TIME     RAIN  |  TIME     RAIN  |  TIME     RAIN
                 hrs    mm/hr |  hrs    mm/hr  |   hrs    mm/hr  |   hrs    mm/hr
                .083     6.41 | 1.083    45.22 | 2.083    14.50  |  3.08     7.56
                .167     6.41 | 1.167    45.22 | 2.167    14.50  |  3.17     7.56
                .250     7.29 | 1.250   180.15 | 2.250    12.44  |  3.25     7.04
                .333     7.29 | 1.333   180.15 | 2.333    12.44  |  3.33     7.04
                .417     8.52 | 1.417    58.54 | 2.417    10.94  |  3.42     6.60
                .500     8.52 | 1.500    58.54 | 2.500    10.94  |  3.50     6.60
                .583    10.36 | 1.583    31.96 | 2.583     9.80  |  3.58     6.22
                .667    10.36 | 1.667    31.96 | 2.667     9.80  |  3.67     6.22
                .750    13.45 | 1.750    22.45 | 2.750     8.90  |  3.75     5.89
                .833    13.45 | 1.833    22.45 | 2.833     8.90  |  3.83     5.89
                .917    19.96 | 1.917    17.52 | 2.917     8.16  |  3.92     5.59
               1.000    19.96 | 2.000    17.52 | 3.000     8.16  |  4.00     5.59

     Max.Eff.Inten.(mm/hr)=      180.15         37.01
               over (min)          5.00         35.00
     Storage Coeff.  (min)=        2.15 (ii)    34.02 (ii)
     Unit Hyd. Tpeak (min)=        5.00         35.00
     Unit Hyd. peak  (cms)=         .31           .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .15           .15         .176 (iii)
     TIME TO PEAK    (hrs)=         .00          1.92         1.33
     RUNOFF VOLUME    (mm)=       86.58         36.60        41.94
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     TOTAL RAINFALL    (mm)=       87.58         87.58            87.58
     RUNOFF COEFFICIENT    =         .99           .42              .48

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
 CALIB             |
 STANDHYD  (0203)  |    Area     (ha)=    8.01
ID= 1 DT= 3.0 min  |    Total Imp(%)=  34.30   Dir. Conn.(%)=  25.70
--------------------
                             IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=       2.75          5.26
    Dep. Storage      (mm)=       1.00          5.00
    Average Slope      (%)=        .79          2.00
    Length             (m)=     414.00         86.00
    Mannings n            =       .013          .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN  | TIME    RAIN  | TIME    RAIN  |  TIME    RAIN
                hrs   mm/hr  |  hrs   mm/hr  |  hrs   mm/hr  |   hrs   mm/hr
               .050    6.41  | 1.050   45.22 | 2.050   14.50 |  3.05    7.56
               .100    6.41  | 1.100   45.22 | 2.100   14.50 |  3.10    7.56
               .150    6.41  | 1.150   45.22 | 2.150   14.50 |  3.15    7.56
               .200    7.00  | 1.200  135.17 | 2.200   13.13 |  3.20    7.21
               .250    7.29  | 1.250  180.15 | 2.250   12.44 |  3.25    7.04
               .300    7.29  | 1.300  180.15 | 2.300   12.44 |  3.30    7.04
               .350    7.70  | 1.350  139.61 | 2.350   11.94 |  3.35    6.89
               .400    8.52  | 1.400   58.54 | 2.400   10.94 |  3.40    6.60
               .450    8.52  | 1.450   58.54 | 2.450   10.94 |  3.45    6.60
               .500    8.52  | 1.500   58.54 | 2.500   10.94 |  3.50    6.60
               .550   10.36  | 1.550   31.96 | 2.550    9.80 |  3.55    6.22
               .600   10.36  | 1.600   31.96 | 2.600    9.80 |  3.60    6.22
               .650   10.36  | 1.650   31.96 | 2.650    9.80 |  3.65    6.22
               .700   12.42  | 1.700   25.62 | 2.700    9.20 |  3.70    6.00
               .750   13.45  | 1.750   22.45 | 2.750    8.90 |  3.75    5.89
               .800   13.45  | 1.800   22.45 | 2.800    8.90 |  3.80    5.89
               .850   15.62  | 1.850   20.81 | 2.850    8.65 |  3.85    5.79
               .900   19.96  | 1.900   17.52 | 2.900    8.16 |  3.90    5.59
               .950   19.96  | 1.950   17.52 | 2.950    8.16 |  3.95    5.59
              1.000   19.96  | 2.000   17.52 | 3.000    8.16 |  4.00    5.59

    Max.Eff.Inten.(mm/hr)=      180.15         64.99
               over (min)         6.00         21.00
    Storage Coeff.  (min)=        5.08 (ii)    18.36 (ii)
    Unit Hyd. Tpeak (min)=        6.00         21.00
    Unit Hyd. peak  (cms)=         .21           .06
                                                          *TOTALS*
    PEAK FLOW       (cms)=         .85           .53        1.034 (iii)
    TIME TO PEAK    (hrs)=         .00          1.65         1.35
    RUNOFF VOLUME     (mm)=      86.58         38.54        50.89
    TOTAL RAINFALL    (mm)=      87.58         87.58        87.58
    RUNOFF COEFFICIENT    =        .99           .44          .58


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 CALIB             |
 STANDHYD  (0202)  |    Area     (ha)=     .50
ID= 1 DT= 5.0 min  |    Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
 -------------------
                             IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=        .14           .36
    Dep. Storage      (mm)=       1.00          5.00
    Average Slope      (%)=        .80          1.00
    Length             (m)=      10.00        218.20
    Mannings n            =       .013          .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
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```
                TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME    RAIN
                 hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr
                .083    6.41 | 1.083   45.22 | 2.083   14.50 | 3.08    7.56
                .167    6.41 | 1.167   45.22 | 2.167   14.50 | 3.17    7.56
                .250    7.29 | 1.250  180.15 | 2.250   12.44 | 3.25    7.04
                .333    7.29 | 1.333  180.15 | 2.333   12.44 | 3.33    7.04
                .417    8.52 | 1.417   58.54 | 2.417   10.94 | 3.42    6.60
                .500    8.52 | 1.500   58.54 | 2.500   10.94 | 3.50    6.60
                .583   10.36 | 1.583   31.96 | 2.583    9.80 | 3.58    6.22
                .667   10.36 | 1.667   31.96 | 2.667    9.80 | 3.67    6.22
                .750   13.45 | 1.750   22.45 | 2.750    8.90 | 3.75    5.89
                .833   13.45 | 1.833   22.45 | 2.833    8.90 | 3.83    5.89
                .917   19.96 | 1.917   17.52 | 2.917    8.16 | 3.92    5.59
               1.000   19.96 | 2.000   17.52 | 3.000    8.16 | 4.00    5.59

     Max.Eff.Inten.(mm/hr)=      180.15          40.53
                over (min)         5.00          40.00
     Storage Coeff.  (min)=         .54 (ii)     35.05 (ii)
     Unit Hyd. Tpeak (min)=        5.00          40.00
     Unit Hyd. peak  (cms)=         .34            .03
                                                             *TOTALS*
     PEAK FLOW       (cms)=         .05            .02          .057 (iii)
     TIME TO PEAK    (hrs)=         .00           1.92          1.33
     RUNOFF VOLUME    (mm)=       86.58          37.87         48.30
     TOTAL RAINFALL   (mm)=       87.58          87.58         87.58
     RUNOFF COEFFICIENT   =         .99            .43           .55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0201)   |   Area     (ha)=     .30
|ID= 1 DT= 3.0 min   |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         .09           .21
     Dep. Storage      (mm)=        1.00          5.00
     Average Slope      (%)=         .97           .97
     Length             (m)=       10.00        119.60
     Mannings n            =        .013          .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME    RAIN
                 hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr
                .050    6.41 | 1.050   45.22 | 2.050   14.50 | 3.05    7.56
                .100    6.41 | 1.100   45.22 | 2.100   14.50 | 3.10    7.56
                .150    6.41 | 1.150   45.22 | 2.150   14.50 | 3.15    7.56
                .200    7.00 | 1.200  135.17 | 2.200   13.13 | 3.20    7.21
                .250    7.29 | 1.250  180.15 | 2.250   12.44 | 3.25    7.04
                .300    7.29 | 1.300  180.15 | 2.300   12.44 | 3.30    7.04
                .350    7.70 | 1.350  139.61 | 2.350   11.94 | 3.35    6.89
                .400    8.52 | 1.400   58.54 | 2.400   10.94 | 3.40    6.60
                .450    8.52 | 1.450   58.54 | 2.450   10.94 | 3.45    6.60
                .500    8.52 | 1.500   58.54 | 2.500   10.94 | 3.50    6.60
                .550   10.36 | 1.550   31.96 | 2.550    9.80 | 3.55    6.22
                .600   10.36 | 1.600   31.96 | 2.600    9.80 | 3.60    6.22
                .650   10.36 | 1.650   31.96 | 2.650    9.80 | 3.65    6.22
                .700   12.42 | 1.700   25.62 | 2.700    9.20 | 3.70    6.00
                .750   13.45 | 1.750   22.45 | 2.750    8.90 | 3.75    5.89
                .800   13.45 | 1.800   22.45 | 2.800    8.90 | 3.80    5.89
                .850   15.62 | 1.850   20.81 | 2.850    8.65 | 3.85    5.79
                .900   19.96 | 1.900   17.52 | 2.900    8.16 | 3.90    5.59
                .950   19.96 | 1.950   17.52 | 2.950    8.16 | 3.95    5.59
               1.000   19.96 | 2.000   17.52 | 3.000    8.16 | 4.00    5.59

     Max.Eff.Inten.(mm/hr)=      180.15          50.29
                over (min)         6.00          24.00
     Storage Coeff.  (min)=         .51 (ii)     22.78 (ii)
     Unit Hyd. Tpeak (min)=        6.00          24.00
     Unit Hyd. peak  (cms)=         .38            .05
                                                             *TOTALS*
     PEAK FLOW       (cms)=         .03            .02          .036 (iii)
     TIME TO PEAK    (hrs)=         .00           1.70          1.30
     RUNOFF VOLUME    (mm)=       86.58          37.87         48.30
     TOTAL RAINFALL   (mm)=       87.58          87.58         87.58
     RUNOFF COEFFICIENT   =         .99            .43           .55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
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```
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN*  =  70.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 -----------------
| CALIB           |
| NASHYD    (0205) |   Area     (ha)=    1.20   Curve Number    (CN)= 71.2
| D= 1 DT= 2.0 min |   Ia       (mm)=    2.00   # of Linear Res.(N)= 3.00
 -----------------     U.H. Tp(hrs)=     .03

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN | TIME    RAIN | TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |   hrs   mm/hr
                .033    6.41 | 1.033  45.22 | 2.033  14.50 |  3.03    7.56
                .067    6.41 | 1.067  45.22 | 2.067  14.50 |  3.07    7.56
                .100    6.41 | 1.100  45.22 | 2.100  14.50 |  3.10    7.56
                .133    6.41 | 1.133  45.22 | 2.133  14.50 |  3.13    7.56
                .167    6.41 | 1.167  45.22 | 2.167  14.50 |  3.17    7.56
                .200    7.29 | 1.200 180.15 | 2.200  12.44 |  3.20    7.04
                .233    7.29 | 1.233 180.15 | 2.233  12.44 |  3.23    7.04
                .267    7.29 | 1.267 180.15 | 2.267  12.44 |  3.27    7.04
                .300    7.29 | 1.300 180.15 | 2.300  12.44 |  3.30    7.04
                .333    7.29 | 1.333 180.15 | 2.333  12.44 |  3.33    7.04
                .367    8.52 | 1.367  58.54 | 2.367  10.94 |  3.37    6.60
                .400    8.52 | 1.400  58.54 | 2.400  10.94 |  3.40    6.60
                .433    8.52 | 1.433  58.54 | 2.433  10.94 |  3.43    6.60
                .467    8.52 | 1.467  58.54 | 2.467  10.94 |  3.47    6.60
                .500    8.52 | 1.500  58.54 | 2.500  10.94 |  3.50    6.60
                .533   10.36 | 1.533  31.96 | 2.533   9.80 |  3.53    6.22
                .567   10.36 | 1.567  31.96 | 2.567   9.80 |  3.57    6.22
                .600   10.36 | 1.600  31.96 | 2.600   9.80 |  3.60    6.22
                .633   10.36 | 1.633  31.96 | 2.633   9.80 |  3.63    6.22
                .667   10.36 | 1.667  31.96 | 2.667   9.80 |  3.67    6.22
                .700   13.45 | 1.700  22.45 | 2.700   8.90 |  3.70    5.89
                .733   13.45 | 1.733  22.45 | 2.733   8.90 |  3.73    5.89
                .767   13.45 | 1.767  22.45 | 2.767   8.90 |  3.77    5.89
                .800   13.45 | 1.800  22.45 | 2.800   8.90 |  3.80    5.89
                .833   13.45 | 1.833  22.45 | 2.833   8.90 |  3.83    5.89
                .867   19.96 | 1.867  17.52 | 2.867   8.16 |  3.87    5.59
                .900   19.96 | 1.900  17.52 | 2.900   8.16 |  3.90    5.59
                .933   19.96 | 1.933  17.52 | 2.933   8.16 |  3.93    5.59
                .967   19.96 | 1.967  17.52 | 2.967   8.16 |  3.97    5.59
               1.000   19.96 | 2.000  17.52 | 3.000   8.16 |  4.00    5.59

    Unit Hyd Qpeak   (cms)=    1.528

    PEAK FLOW        (cms)=     .271 (i)
    TIME TO PEAK     (hrs)=    1.333
    RUNOFF VOLUME     (mm)=   36.157
    TOTAL RAINFALL    (mm)=   87.578
    RUNOFF COEFFICIENT   =     .413

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 -----------------
 CALIB             |
 STANDHYD   (0207) |   Area     (ha)=     .70
 D= 1 DT= 4.0 min  |   Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
 -----------------

                             IMPERVIOUS    PERVIOUS (i)
    Surface Area       (ha)=       .20           .50
    Dep. Storage       (mm)=      1.00          5.00
    Average Slope       (%)=       .94           .60
    Length              (m)=     10.00        191.40
    Mannings n             =      .013          .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   4.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN | TIME    RAIN | TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |   hrs   mm/hr
               .067    6.41 | 1.067  45.22 | 2.067  14.50 |  3.07    7.56
               .133    6.41 | 1.133  45.22 | 2.133  14.50 |  3.13    7.56
               .200    6.85 | 1.200 112.69 | 2.200  13.47 |  3.20    7.30
               .267    7.29 | 1.267 180.15 | 2.267  12.44 |  3.27    7.04
               .333    7.29 | 1.333 180.15 | 2.333  12.44 |  3.33    7.04
               .400    8.52 | 1.400  58.54 | 2.400  10.94 |  3.40    6.60
               .467    8.52 | 1.467  58.54 | 2.467  10.94 |  3.47    6.60
               .533    9.44 | 1.533  45.25 | 2.533  10.37 |  3.53    6.41
               .600   10.36 | 1.600  31.96 | 2.600   9.80 |  3.60    6.22
               .667   10.36 | 1.667  31.96 | 2.667   9.80 |  3.67    6.22
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              .733    13.45 | 1.733   22.45 | 2.733     8.90 |  3.73     5.89
              .800    13.45 | 1.800   22.45 | 2.800     8.90 |  3.80     5.89
              .867    16.70 | 1.867   19.98 | 2.867     8.53 |  3.87     5.74
              .933    19.96 | 1.933   17.52 | 2.933     8.16 |  3.93     5.59
             1.000    19.96 | 2.000   17.52 | 3.000     8.16 |  4.00     5.59

     Max.Eff.Inten.(mm/hr)=      180.15         37.16
                over (min)         5.00         40.00
     Storage Coeff.  (min)=         .52 (ii)    39.01 (ii)
     Unit Hyd. Tpeak (min)=        4.00         40.00
     Unit Hyd. peak  (cms)=         .42           .03
                                                           *TOTALS*
     PEAK FLOW       (cms)=         .08           .03          .080 (iii)
     TIME TO PEAK    (hrs)=         .00          2.00          1.33
     RUNOFF VOLUME    (mm)=       86.58         37.87         48.31
     TOTAL RAINFALL   (mm)=       87.58         87.58         87.58
     RUNOFF COEFFICIENT   =         .99           .43           .55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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-------------------
| ADD HYD   (1000) |
|  1 +  2 =  3     |           AREA    QPEAK    TPEAK     R.V.
-------------------            (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0202):        .50     .057     1.33    48.30
        + ID2= 2 (0201):        .30     .036     1.30    48.30
          ===============================================
          ID = 3 (1000):        .80     .092     1.30    48.36

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------

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| ADD HYD   (1001) |
|  1 +  2 =  3     |           AREA    QPEAK    TPEAK     R.V.
-------------------            (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0203):       8.01    1.034     1.35    50.89
        + ID2= 2 (1000):        .80     .092     1.30    48.36
          ===============================================
          ID = 3 (1001):       8.81    1.120     1.35    50.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------

-------------------
| ADD HYD   (1002) |
|  1 +  2 =  3     |           AREA    QPEAK    TPEAK     R.V.
-------------------            (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0204):       2.82     .176     1.33    41.94
        + ID2= 2 (1001):       8.81    1.120     1.35    50.66
          ===============================================
          ID = 3 (1002):      11.63    1.281     1.35    48.55

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------

-------------------
| ADD HYD   (1003) |
|  1 +  2 =  3     |           AREA    QPEAK    TPEAK     R.V.
-------------------            (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0206):       6.18     .119     2.33    16.46
        + ID2= 2 (1002):      11.63    1.281     1.35    48.55
          ===============================================
          ID = 3 (1003):      17.81    1.298     1.35    37.42

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------

-------------------
| ADD HYD   (1004) |
|  1 +  2 =  3     |           AREA    QPEAK    TPEAK     R.V.
-------------------            (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (1003):      17.81    1.298     1.35    37.42
        + ID2= 2 (0205):       1.20     .271     1.33    36.16
          ===============================================
          ID = 3 (1004):      19.01    1.526     1.33    37.33
```

```
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
-------------------
| RESERVOIR (0001) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 ------------------        (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            .0000      .0000   |    .4210      .4838
                            .0110      .0717   |    .5580      .6088
                            .0190      .1729   |    .6660      .7402
                            .0250      .1992   |    .6910      .7740
                            .0440      .2529   |   1.0560      .8779
                            .0800      .3083   |   1.6620      .9853
                            .2030      .3652   |   2.4240     1.0963

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (1004)         19.01      1.53      1.33      37.33
   OUTFLOW: ID= 1 (0001)         19.01       .35      3.17      36.64

                 PEAK    FLOW    REDUCTION [Qout/Qin](%)= 22.66
                 TIME SHIFT OF PEAK FLOW          (min)=110.00
                 MAXIMUM  STORAGE   USED         (ha.m.)=   .4429

   **** WARNING : SELECTED ROUTING TIME STEP DENIED.
 ---------------------------------------------------------------------------

-------------------
| ADD HYD   (1005) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
 ------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0001):      19.01      .346      3.17     36.64
      + ID2= 2 (0207):        .70      .080      1.33     48.31
        ==============================================
        ID = 3 (1005):      19.71      .364      3.10     37.06

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------

-------------------
| ADD HYD   (1006) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
 ------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0208):        .50      .046      1.33     16.37
      + ID2= 2 (1005):      19.71      .364      3.10     37.06
        ==============================================
        ID = 3 (1006):      20.21      .368      3.10     36.54

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------

 INISH
=============================================================================================
```

POST DEVELOPMENT
DETAILED OUTPUT
CHICAGO 25mm STORM EVENT

```
===============================================================================================
      V     V    I     SSSSS  U     U     A     L
      V     V    I     SS     U     U    A A    L
       V   V     I      SS    U     U   AAAAA   L
       V   V     I       SS   U     U   A   A   L
        VV       I     SSSSS  UUUUU   A     A   LLLLL

       OOO     TTTTT   TTTTT  H    H   Y    Y   M    M    OOO      TM
      O    O     T       T    H    H    Y Y    MM MM   O    O
      O    O     T       T    H    H     Y     M    M   O    O
       OOO       T       T    H    H     Y     M    M    OOO

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                  *****  D E T A I L E D    O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 2.2.4\voin.dat
  Output  filename: E:\Gemmell\123-IE~1\OTTHYM~1\Post Development 4th submission.out
  Summary filename: E:\Gemmell\123-IE~1\OTTHYM~1\Post Development 4th submission.sum


DATE: 2/10/2014                         TIME: 5:58:24 PM

USER:


COMMENTS: ____________________________________________________________


-----------------------------------------------------------------------------------------------
  ****************************
  ** SIMULATION NUMBER:   9 **
  ****************************


--------------------
|    READ STORM     |     Filename: K:\STORMWATER FILES\OTTHYMO\STORMS
|                   |               \City of Barrie 2010\25MM4HR.STM
| Ptotal= 25.00 mm  |     Comments: Twenty-Five mm Four Hour Chicago Storm
--------------------
                 TIME     RAIN  |  TIME     RAIN  |  TIME     RAIN  |  TIME     RAIN
                  hrs    mm/hr  |   hrs    mm/hr  |   hrs    mm/hr  |   hrs    mm/hr
                  .17     2.07  |  1.17     5.70  |  2.17     5.19  |  3.17     2.80
                  .33     2.27  |  1.33    10.78  |  2.33     4.47  |  3.33     2.62
                  .50     2.52  |  1.50    50.21  |  2.50     3.95  |  3.50     2.48
                  .67     2.88  |  1.67    13.37  |  2.67     3.56  |  3.67     2.35
                  .83     3.38  |  1.83     8.29  |  2.83     3.25  |  3.83     2.23
                 1.00     4.18  |  2.00     6.30  |  3.00     3.01  |  4.00     2.14

-------------------------------------------------------------------------------


--------------------
| CALIB             |
| NASHYD    (0208)  |    Area     (ha)=     .50   Curve Number    (CN)= 44.0
|ID= 1 DT= 2.0 min  |    Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=      .04

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME     RAIN  |  TIME     RAIN  |  TIME     RAIN  |  TIME     RAIN
                  hrs    mm/hr  |   hrs    mm/hr  |   hrs    mm/hr  |   hrs    mm/hr
                 .033     2.07  | 1.033     5.70  | 2.033     5.19  |  3.03     2.80
                 .067     2.07  | 1.067     5.70  | 2.067     5.19  |  3.07     2.80
                 .100     2.07  | 1.100     5.70  | 2.100     5.19  |  3.10     2.80
                 .133     2.07  | 1.133     5.70  | 2.133     5.19  |  3.13     2.80
                 .167     2.07  | 1.167     5.70  | 2.167     5.19  |  3.17     2.80
                 .200     2.27  | 1.200    10.78  | 2.200     4.47  |  3.20     2.62
                 .233     2.27  | 1.233    10.78  | 2.233     4.47  |  3.23     2.62
                 .267     2.27  | 1.267    10.78  | 2.267     4.47  |  3.27     2.62
                 .300     2.27  | 1.300    10.78  | 2.300     4.47  |  3.30     2.62
                 .333     2.27  | 1.333    10.78  | 2.333     4.47  |  3.33     2.62
                 .367     2.52  | 1.367    50.21  | 2.367     3.95  |  3.37     2.48
                 .400     2.52  | 1.400    50.21  | 2.400     3.95  |  3.40     2.48
                 .433     2.52  | 1.433    50.21  | 2.433     3.95  |  3.43     2.48
                 .467     2.52  | 1.467    50.21  | 2.467     3.95  |  3.47     2.48
                 .500     2.52  | 1.500    50.21  | 2.500     3.95  |  3.50     2.48
                 .533     2.88  | 1.533    13.37  | 2.533     3.56  |  3.53     2.35
                 .567     2.88  | 1.567    13.37  | 2.567     3.56  |  3.57     2.35
                 .600     2.88  | 1.600    13.37  | 2.600     3.56  |  3.60     2.35
                 .633     2.88  | 1.633    13.37  | 2.633     3.56  |  3.63     2.35
                 .667     2.88  | 1.667    13.37  | 2.667     3.56  |  3.67     2.35
```

```
                 .700     3.38 | 1.700     8.29 | 2.700     3.25 |  3.70     2.23
                 .733     3.38 | 1.733     8.29 | 2.733     3.25 |  3.73     2.23
                 .767     3.38 | 1.767     8.29 | 2.767     3.25 |  3.77     2.23
                 .800     3.38 | 1.800     8.29 | 2.800     3.25 |  3.80     2.23
                 .833     3.38 | 1.833     8.29 | 2.833     3.25 |  3.83     2.23
                 .867     4.18 | 1.867     6.30 | 2.867     3.01 |  3.87     2.14
                 .900     4.18 | 1.900     6.30 | 2.900     3.01 |  3.90     2.14
                 .933     4.18 | 1.933     6.30 | 2.933     3.01 |  3.93     2.14
                 .967     4.18 | 1.967     6.30 | 2.967     3.01 |  3.97     2.14
                1.000     4.18 | 2.000     6.30 | 3.000     3.01 |  4.00     2.14

    Unit Hyd Qpeak  (cms)=    .477

    PEAK FLOW       (cms)=    .003 (i)
    TIME TO PEAK    (hrs)=   1.500
    RUNOFF VOLUME    (mm)=   1.134
    TOTAL RAINFALL   (mm)=  24.996
    RUNOFF COEFFICIENT   =    .045

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

  -------------------------------------------------------------------------------
--------------------
| CALIB             |
 NASHYD     (0206)  |   Area     (ha)=    6.18   Curve Number    (CN)= 44.0
 D= 1 DT=10.0 min   |   Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
 -------------------    U.H. Tp(hrs)=     .81

        NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                  hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                 .167     2.07 | 1.167     5.70 | 2.167     5.19 |  3.17     2.80
                 .333     2.27 | 1.333    10.78 | 2.333     4.47 |  3.33     2.62
                 .500     2.52 | 1.500    50.21 | 2.500     3.95 |  3.50     2.48
                 .667     2.88 | 1.667    13.37 | 2.667     3.56 |  3.67     2.35
                 .833     3.38 | 1.833     8.29 | 2.833     3.25 |  3.83     2.23
                1.000     4.17 | 2.000     6.30 | 3.000     3.01 |  4.00      .00

    Unit Hyd Qpeak  (cms)=    .291

    PEAK FLOW       (cms)=    .007 (i)
    TIME TO PEAK    (hrs)=   2.833
    RUNOFF VOLUME    (mm)=   1.124
    TOTAL RAINFALL   (mm)=  24.640
    RUNOFF COEFFICIENT   =    .046

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------------
--------------------
 CALIB              |
 STANDHYD   (0204)  |   Area     (ha)=    2.82
|D= 1 DT= 5.0 min   |   Total Imp(%)=  14.30   Dir. Conn.(%)=  10.70
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        .40         2.42
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.58         2.50
    Length            (m)=     140.00       284.40
    Mannings n          =        .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                  hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                 .083     2.07 | 1.083     5.70 | 2.083     5.19 |  3.08     2.80
                 .167     2.07 | 1.167     5.70 | 2.167     5.19 |  3.17     2.80
                 .250     2.27 | 1.250    10.78 | 2.250     4.47 |  3.25     2.62
                 .333     2.27 | 1.333    10.78 | 2.333     4.47 |  3.33     2.62
                 .417     2.52 | 1.417    50.21 | 2.417     3.95 |  3.42     2.48
                 .500     2.52 | 1.500    50.21 | 2.500     3.95 |  3.50     2.48
                 .583     2.88 | 1.583    13.37 | 2.583     3.56 |  3.58     2.35
                 .667     2.88 | 1.667    13.37 | 2.667     3.56 |  3.67     2.35
                 .750     3.38 | 1.750     8.29 | 2.750     3.25 |  3.75     2.23
                 .833     3.38 | 1.833     8.29 | 2.833     3.25 |  3.83     2.23
                 .917     4.17 | 1.917     6.30 | 2.917     3.01 |  3.92     2.14
                1.000     4.18 | 2.000     6.29 | 3.000     3.01 |  4.00     2.14

    Max.Eff.Inten.(mm/hr)=      50.21          2.07
               over (min)       5.00        105.00
    Storage Coeff.  (min)=       3.59 (ii)   104.56 (ii)
    Unit Hyd. Tpeak (min)=       5.00        105.00
    Unit Hyd. peak  (cms)=        .26           .01
                                                            *TOTALS*
```

```
     PEAK FLOW       (cms)=          .04            .01             .040 (iii)
     TIME TO PEAK    (hrs)=          .00           3.92            1.50
     RUNOFF VOLUME    (mm)=        24.00           3.27            5.47
     TOTAL RAINFALL   (mm)=        25.00          25.00           25.00
     RUNOFF COEFFICIENT   =          .96            .13             .22

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD  (0203)  |   Area     (ha)=   8.01
|ID= 1 DT= 3.0 min  |   Total Imp(%)=  34.30   Dir. Conn.(%)=  25.70
--------------------
                          IMPERVIOUS   PERVIOUS (i)
     Surface Area     (ha)=     2.75         5.26
     Dep. Storage     (mm)=     1.00         5.00
     Average Slope     (%)=      .79         2.00
     Length            (m)=   414.00        86.00
     Mannings n           =     .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME    RAIN
                  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr
                 .050    2.07 | 1.050   5.70 | 2.050   5.19 | 3.05    2.80
                 .100    2.07 | 1.100   5.70 | 2.100   5.19 | 3.10    2.80
                 .150    2.07 | 1.150   5.70 | 2.150   5.19 | 3.15    2.80
                 .200    2.20 | 1.200   9.08 | 2.200   4.71 | 3.20    2.68
                 .250    2.27 | 1.250  10.78 | 2.250   4.47 | 3.25    2.62
                 .300    2.27 | 1.300  10.78 | 2.300   4.47 | 3.30    2.62
                 .350    2.35 | 1.350  23.92 | 2.350   4.29 | 3.35    2.57
                 .400    2.52 | 1.400  50.21 | 2.400   3.95 | 3.40    2.48
                 .450    2.52 | 1.450  50.21 | 2.450   3.95 | 3.45    2.48
                 .500    2.52 | 1.500  50.21 | 2.500   3.95 | 3.50    2.48
                 .550    2.88 | 1.550  13.37 | 2.550   3.56 | 3.55    2.35
                 .600    2.88 | 1.600  13.37 | 2.600   3.56 | 3.60    2.35
                 .650    2.88 | 1.650  13.37 | 2.650   3.56 | 3.65    2.35
                 .700    3.21 | 1.700   9.98 | 2.700   3.35 | 3.70    2.27
                 .750    3.38 | 1.750   8.29 | 2.750   3.25 | 3.75    2.23
                 .800    3.38 | 1.800   8.29 | 2.800   3.25 | 3.80    2.23
                 .850    3.65 | 1.850   7.62 | 2.850   3.17 | 3.85    2.20
                 .900    4.18 | 1.900   6.30 | 2.900   3.01 | 3.90    2.14
                 .950    4.18 | 1.950   6.30 | 2.950   3.01 | 3.95    2.14
                1.000    4.18 | 2.000   6.30 | 3.000   3.01 | 4.00    2.14

     Max.Eff.Inten.(mm/hr)=       50.21          2.80
               over (min)         9.00          57.00
     Storage Coeff.  (min)=       8.47 (ii)     55.14 (ii)
     Unit Hyd. Tpeak (min)=       9.00          57.00
     Unit Hyd. peak  (cms)=        .13            .02
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .19            .02           .192 (iii)
     TIME TO PEAK    (hrs)=        .00           2.70           1.55
     RUNOFF VOLUME    (mm)=      24.00           3.62           8.85
     TOTAL RAINFALL   (mm)=      25.00          25.00          25.00
     RUNOFF COEFFICIENT   =        .96            .14            .35


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
 CALIB              |
 STANDHYD  (0202)   |   Area     (ha)=    .50
ID= 1 DT= 5.0 min   |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
--------------------
                          IMPERVIOUS   PERVIOUS (i)
    Surface Area     (ha)=      .14          .36
    Dep. Storage     (mm)=     1.00         5.00
    Average Slope     (%)=      .80         1.00
    Length            (m)=    10.00       218.20
    Mannings n           =     .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

```
                           ---- TRANSFORMED HYETOGRAPH ----
          TIME     RAIN | TIME     RAIN | TIME     RAIN |  TIME     RAIN
           hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr |   hrs    mm/hr
          .083     2.07 | 1.083    5.70 | 2.083    5.19 |  3.08     2.80
          .167     2.07 | 1.167    5.70 | 2.167    5.19 |  3.17     2.80
          .250     2.27 | 1.250   10.78 | 2.250    4.47 |  3.25     2.62
          .333     2.27 | 1.333   10.78 | 2.333    4.47 |  3.33     2.62
          .417     2.52 | 1.417   50.21 | 2.417    3.95 |  3.42     2.48
          .500     2.52 | 1.500   50.21 | 2.500    3.95 |  3.50     2.48
          .583     2.88 | 1.583   13.37 | 2.583    3.56 |  3.58     2.35
          .667     2.88 | 1.667   13.37 | 2.667    3.56 |  3.67     2.35
          .750     3.38 | 1.750    8.29 | 2.750    3.25 |  3.75     2.23
          .833     3.38 | 1.833    8.29 | 2.833    3.25 |  3.83     2.23
          .917     4.17 | 1.917    6.30 | 2.917    3.01 |  3.92     2.14
         1.000     4.18 | 2.000    6.29 | 3.000    3.01 |  4.00     2.14

  Max.Eff.Inten.(mm/hr)=      50.21           2.35
             over (min)        5.00         110.00
  Storage Coeff.  (min)=        .90 (ii)    108.62 (ii)
  Unit Hyd. Tpeak (min)=       5.00         110.00
  Unit Hyd. peak  (cms)=        .34            .01
                                                          *TOTALS*
  PEAK FLOW       (cms)=        .01            .00          .015 (iii)
  TIME TO PEAK    (hrs)=        .00           4.00          1.50
  RUNOFF VOLUME    (mm)=      24.00           3.50          7.78
  TOTAL RAINFALL   (mm)=      25.00          25.00         25.00
  RUNOFF COEFFICIENT   =        .96            .14           .31

 *** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
        CN*  =  70.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 -----------------
 CALIB            |
 STANDHYD  (0201) |   Area     (ha)=     .30
|ID= 1 DT= 3.0 min |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
 -----------------
                           IMPERVIOUS    PERVIOUS (i)
  Surface Area      (ha)=        .09          .21
  Dep. Storage      (mm)=       1.00         5.00
  Average Slope      (%)=        .97          .97
  Length             (m)=      10.00       119.60
  Mannings n            =       .013         .250

      NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
          TIME     RAIN | TIME     RAIN | TIME     RAIN |  TIME     RAIN
           hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr |   hrs    mm/hr
          .050     2.07 | 1.050    5.70 | 2.050    5.19 |  3.05     2.80
          .100     2.07 | 1.100    5.70 | 2.100    5.19 |  3.10     2.80
          .150     2.07 | 1.150    5.70 | 2.150    5.19 |  3.15     2.80
          .200     2.20 | 1.200    9.08 | 2.200    4.71 |  3.20     2.68
          .250     2.27 | 1.250   10.78 | 2.250    4.47 |  3.25     2.62
          .300     2.27 | 1.300   10.78 | 2.300    4.47 |  3.30     2.62
          .350     2.35 | 1.350   23.92 | 2.350    4.29 |  3.35     2.57
          .400     2.52 | 1.400   50.21 | 2.400    3.95 |  3.40     2.48
          .450     2.52 | 1.450   50.21 | 2.450    3.95 |  3.45     2.48
          .500     2.52 | 1.500   50.21 | 2.500    3.95 |  3.50     2.48
          .550     2.88 | 1.550   13.37 | 2.550    3.56 |  3.55     2.35
          .600     2.88 | 1.600   13.37 | 2.600    3.56 |  3.60     2.35
          .650     2.88 | 1.650   13.37 | 2.650    3.56 |  3.65     2.35
          .700     3.21 | 1.700    9.98 | 2.700    3.35 |  3.70     2.27
          .750     3.38 | 1.750    8.29 | 2.750    3.25 |  3.75     2.23
          .800     3.38 | 1.800    8.29 | 2.800    3.25 |  3.80     2.23
          .850     3.65 | 1.850    7.62 | 2.850    3.17 |  3.85     2.20
          .900     4.18 | 1.900    6.30 | 2.900    3.01 |  3.90     2.14
          .950     4.18 | 1.950    6.30 | 2.950    3.01 |  3.95     2.14
         1.000     4.18 | 2.000    6.30 | 3.000    3.01 |  4.00     2.14

  Max.Eff.Inten.(mm/hr)=      50.21           2.35
             over (min)        6.00          78.00
  Storage Coeff.  (min)=        .85 (ii)     76.75 (ii)
  Unit Hyd. Tpeak (min)=       6.00          78.00
  Unit Hyd. peak  (cms)=        .37            .01
                                                          *TOTALS*
  PEAK FLOW       (cms)=        .01            .00          .009 (iii)
  TIME TO PEAK    (hrs)=        .00           3.20          1.50
  RUNOFF VOLUME    (mm)=      24.00           3.50          7.75
  TOTAL RAINFALL   (mm)=      25.00          25.00         25.00
  RUNOFF COEFFICIENT   =        .96            .14           .31
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =   70.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD     (0205) |   Area      (ha)=    1.20   Curve Number    (CN)= 71.2
|ID= 1 DT= 2.0 min  |   Ia        (mm)=    2.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=      .03

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .033    2.07 | 1.033    5.70 | 2.033    5.19 |  3.03    2.80
                 .067    2.07 | 1.067    5.70 | 2.067    5.19 |  3.07    2.80
                 .100    2.07 | 1.100    5.70 | 2.100    5.19 |  3.10    2.80
                 .133    2.07 | 1.133    5.70 | 2.133    5.19 |  3.13    2.80
                 .167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
                 .200    2.27 | 1.200   10.78 | 2.200    4.47 |  3.20    2.62
                 .233    2.27 | 1.233   10.78 | 2.233    4.47 |  3.23    2.62
                 .267    2.27 | 1.267   10.78 | 2.267    4.47 |  3.27    2.62
                 .300    2.27 | 1.300   10.78 | 2.300    4.47 |  3.30    2.62
                 .333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
                 .367    2.52 | 1.367   50.21 | 2.367    3.95 |  3.37    2.48
                 .400    2.52 | 1.400   50.21 | 2.400    3.95 |  3.40    2.48
                 .433    2.52 | 1.433   50.21 | 2.433    3.95 |  3.43    2.48
                 .467    2.52 | 1.467   50.21 | 2.467    3.95 |  3.47    2.48
                 .500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
                 .533    2.88 | 1.533   13.37 | 2.533    3.56 |  3.53    2.35
                 .567    2.88 | 1.567   13.37 | 2.567    3.56 |  3.57    2.35
                 .600    2.88 | 1.600   13.37 | 2.600    3.56 |  3.60    2.35
                 .633    2.88 | 1.633   13.37 | 2.633    3.56 |  3.63    2.35
                 .667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
                 .700    3.38 | 1.700    8.29 | 2.700    3.25 |  3.70    2.23
                 .733    3.38 | 1.733    8.29 | 2.733    3.25 |  3.73    2.23
                 .767    3.38 | 1.767    8.29 | 2.767    3.25 |  3.77    2.23
                 .800    3.38 | 1.800    8.29 | 2.800    3.25 |  3.80    2.23
                 .833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
                 .867    4.18 | 1.867    6.30 | 2.867    3.01 |  3.87    2.14
                 .900    4.18 | 1.900    6.30 | 2.900    3.01 |  3.90    2.14
                 .933    4.18 | 1.933    6.30 | 2.933    3.01 |  3.93    2.14
                 .967    4.18 | 1.967    6.30 | 2.967    3.01 |  3.97    2.14
                1.000    4.18 | 2.000    6.30 | 3.000    3.01 |  4.00    2.14

     Unit Hyd Qpeak  (cms)=    1.528

     PEAK FLOW        (cms)=    .027 (i)
     TIME TO PEAK     (hrs)=   1.500
     RUNOFF VOLUME     (mm)=   3.910
     TOTAL RAINFALL    (mm)=  24.996
     RUNOFF COEFFICIENT    =    .156

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD  (0207)  |   Area      (ha)=     .70
|ID= 1 DT= 4.0 min  |   Total Imp(%)=   28.60    Dir. Conn.(%)=   21.50
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .20          .50
     Dep. Storage      (mm)=       1.00         5.00
     Average Slope      (%)=        .94          .60
     Length             (m)=      10.00       191.40
     Mannings n            =       .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   4.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .067    2.07 | 1.067    5.70 | 2.067    5.19 |  3.07    2.80
                 .133    2.07 | 1.133    5.70 | 2.133    5.19 |  3.13    2.80
                 .200    2.17 | 1.200    8.24 | 2.200    4.83 |  3.20    2.71
                 .267    2.27 | 1.267   10.78 | 2.267    4.47 |  3.27    2.62
                 .333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
                 .400    2.52 | 1.400   50.21 | 2.400    3.95 |  3.40    2.48
                 .467    2.52 | 1.467   50.21 | 2.467    3.95 |  3.47    2.48
```

```
                 .533     2.70 | 1.533   31.79 | 2.533    3.75 |  3.53    2.41
                 .600     2.88 | 1.600   13.37 | 2.600    3.56 |  3.60    2.35
                 .667     2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
                 .733     3.38 | 1.733    8.29 | 2.733    3.25 |  3.73    2.23
                 .800     3.38 | 1.800    8.29 | 2.800    3.25 |  3.80    2.23
                 .867     3.78 | 1.867    7.29 | 2.867    3.13 |  3.87    2.18
                 .933     4.18 | 1.933    6.30 | 2.933    3.01 |  3.93    2.14
                1.000     4.18 | 2.000    6.29 | 3.000    3.01 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=       50.21          2.35
                over (min)         5.00        120.00
     Storage Coeff.  (min)=         .86 (ii)   116.92 (ii)
     Unit Hyd. Tpeak (min)=        4.00        120.00
     Unit Hyd. peak  (cms)=         .42           .01
                                                             *TOTALS*
     PEAK FLOW       (cms)=         .02           .00           .021 (iii)
     TIME TO PEAK    (hrs)=         .00          4.13          1.47
     RUNOFF VOLUME    (mm)=       24.00          3.50          7.81
     TOTAL RAINFALL   (mm)=       25.00         25.00         25.00
     RUNOFF COEFFICIENT   =         .96           .14           .31

  *** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------

  ------------------
 | ADD HYD    (1000) |
 |   1 +  2 =  3     |            AREA     QPEAK     TPEAK      R.V.
  ------------------              (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0202):          .50      .015      1.50      7.78
         + ID2= 2 (0201):          .30      .009      1.50      7.75
           ==================================================
           ID = 3 (1000):          .80      .024      1.50      7.78

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------

  ------------------
 | ADD HYD    (1001) |
 |   1 +  2 =  3     |            AREA     QPEAK     TPEAK      R.V.
  ------------------              (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0203):         8.01      .192      1.55      8.85
         + ID2= 2 (1000):          .80      .024      1.50      7.78
           ==================================================
           ID = 3 (1001):         8.81      .208      1.55      8.76

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------

  ------------------
 | ADD HYD    (1002) |
 |   1 +  2 =  3     |            AREA     QPEAK     TPEAK      R.V.
  ------------------              (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0204):         2.82      .040      1.50      5.47
         + ID2= 2 (1001):         8.81      .208      1.55      8.76
           ==================================================
           ID = 3 (1002):        11.63      .238      1.50      7.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------

  ------------------
 | ADD HYD    (1003) |
 |   1 +  2 =  3     |            AREA     QPEAK     TPEAK      R.V.
  ------------------              (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0206):         6.18      .007      2.83      1.12
         + ID2= 2 (1002):        11.63      .238      1.50      7.96
           ==================================================
           ID = 3 (1003):        17.81      .238      1.50      5.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------

  ------------------
 | ADD HYD    (1004) |
 |   1 +  2 =  3     |            AREA     QPEAK     TPEAK      R.V.
  ------------------              (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (1003):        17.81      .238      1.50      5.59
         + ID2= 2 (0205):         1.20      .027      1.50      3.91
```

```
          ================================================
          ID = 3 (1004):     19.01     .266      1.50      5.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
-------------------
| RESERVOIR (0001) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |        OUTFLOW    STORAGE   |   OUTFLOW    STORAGE
-------------------          (cms)     (ha.m.)   |    (cms)     (ha.m.)
                             .0000       .0000   |    .4210       .4838
                             .0110       .0717   |    .5580       .6088
                             .0190       .1729   |    .6660       .7402
                             .0250       .1992   |    .6910       .7740
                             .0440       .2529   |   1.0560       .8779
                             .0800       .3083   |   1.6620       .9853
                             .2030       .3652   |   2.4240      1.0963

                                  AREA     QPEAK     TPEAK        R.V.
                                  (ha)     (cms)     (hrs)        (mm)
     INFLOW : ID= 2 (1004)      19.01        .27      1.50        5.49
     OUTFLOW: ID= 1 (0001)      19.01        .01      5.37        5.32

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.54
                  TIME SHIFT OF PEAK FLOW         (min)=232.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=   .0850

     **** WARNING : SELECTED ROUTING TIME STEP DENIED.
----------------------------------------------------------------------------

-------------------
| ADD HYD    (1005) |
|   1 +  2 =  3     |          AREA    QPEAK     TPEAK      R.V.
-------------------            (ha)    (cms)     (hrs)      (mm)
          ID1= 1 (0001):     19.01     .012      5.37      5.32
        + ID2= 2 (0207):       .70     .021      1.47      7.81
          ================================================
          ID = 3 (1005):     19.71     .023      1.47      5.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------

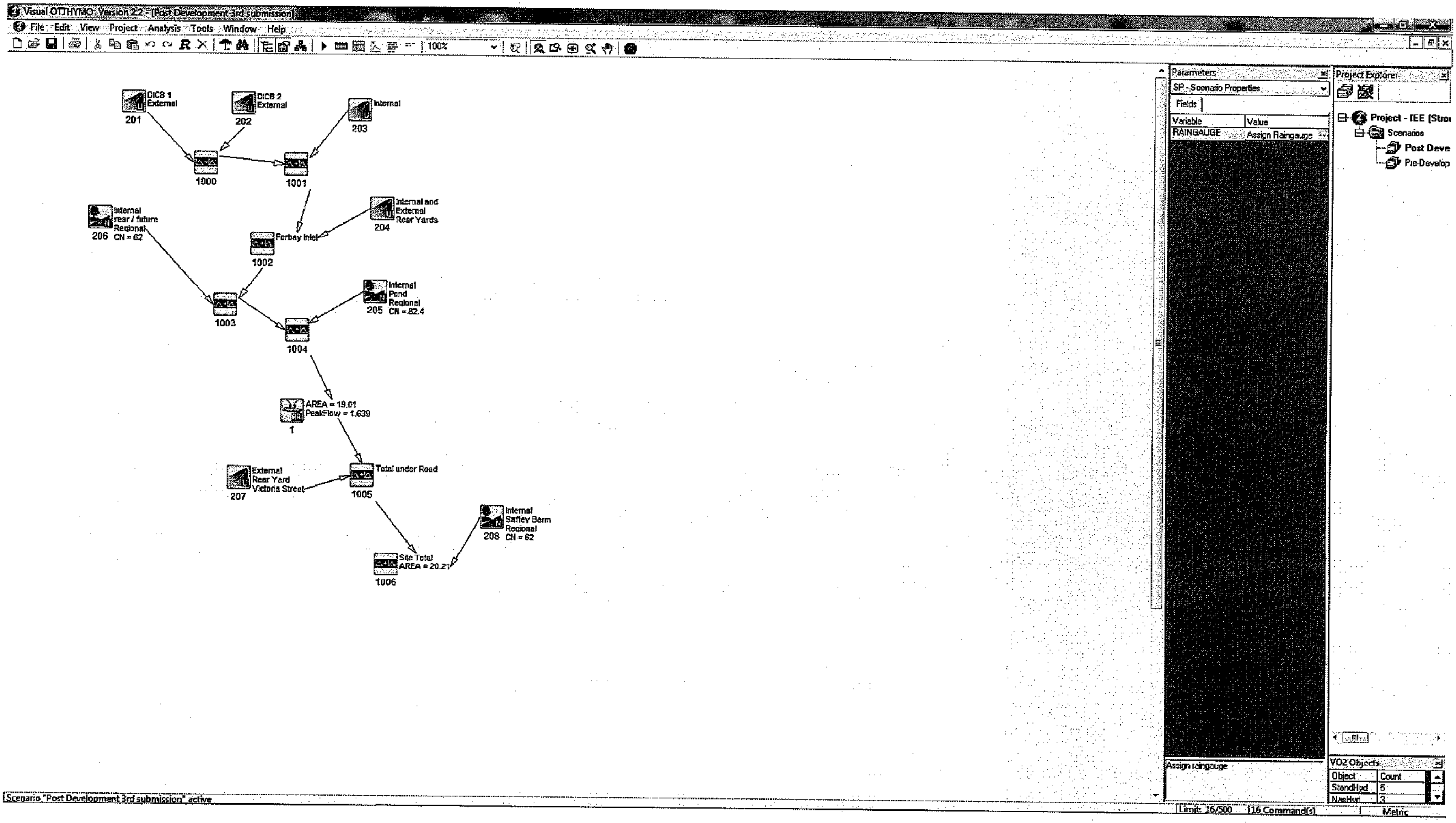
-------------------
| ADD HYD    (1006) |
|   1 +  2 =  3     |          AREA    QPEAK     TPEAK      R.V.
-------------------            (ha)    (cms)     (hrs)      (mm)
          ID1= 1 (0208):       .50     .003      1.50      1.13
        + ID2= 2 (1005):     19.71     .023      1.47      5.41
          ================================================
          ID = 3 (1006):     20.21     .025      1.47      5.30

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------

 FINISH
==========================================================================================
```

Post Development OTTHYMO Model Schematic
Adjusted for AMC III (wet) Condition
Regional Storm Event



Variable	Value
RAINGAUGE	Assign Raingauge

Assign raingauge

Object	Count
StandHyd	5
NasHyd	3

Scenario "Post Development 3rd submission" active

Limit: 16/500 | 16 Command(s) | Metric

POST DEVELOPMENT
DETAILED OUTPUT
REGIONAL (HAZEL) STORM EVENT

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

      V    V   I   SSSSS  U   U    A    L
      V    V   I   SS     U   U   A A   L
       V  V    I    SS    U   U  AAAAA  L
       V  V    I     SS   U   U  A   A  L
        VV     I   SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO

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                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 2.2.4\voin.dat
  Output  filename: E:\Gemmell\123-IE~1\OTTHYM~1\Post Development 4th submission - AMC III.out
  Summary filename: E:\Gemmell\123-IE~1\OTTHYM~1\Post Development 4th submission - AMC III.sum

DATE: 2/10/2014                          TIME: 6:08:36 PM

USER:


COMMENTS: ____________________________________________________________

-----------------------------------------------------------------------------------------------------
  ****************************
  ** SIMULATION NUMBER:  10 **
  ****************************

--------------------
|    READ STORM    |     Filename: K:\PROJECT FILES\200000 - 299999\
|                  |               210987 - 010 - Innisfil Executive Estates\
|                  |               SWM\OTTHYMO 3rd Submission\HAZEL.STM
| Ptotal=212.00 mm |     Comments: * REGIONAL DESIGN STORM
--------------------
                 TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN
                  hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr
                  .20    6.00  |  3.20   13.00  |  6.20   23.00  |  9.20   53.00
                  .40    6.00  |  3.40   13.00  |  6.40   23.00  |  9.40   53.00
                  .60    6.00  |  3.60   13.00  |  6.60   23.00  |  9.60   53.00
                  .80    6.00  |  3.80   13.00  |  6.80   23.00  |  9.80   53.00
                 1.00    6.00  |  4.00   13.00  |  7.00   23.00  | 10.00   53.00
                 1.20    4.00  |  4.20   17.00  |  7.20   13.00  | 10.20   38.00
                 1.40    4.00  |  4.40   17.00  |  7.40   13.00  | 10.40   38.00
                 1.60    4.00  |  4.60   17.00  |  7.60   13.00  | 10.60   38.00
                 1.80    4.00  |  4.80   17.00  |  7.80   13.00  | 10.80   38.00
                 2.00    4.00  |  5.00   17.00  |  8.00   13.00  | 11.00   38.00
                 2.20    6.00  |  5.20   13.00  |  8.20   13.00  | 11.20   13.00
                 2.40    6.00  |  5.40   13.00  |  8.40   13.00  | 11.40   13.00
                 2.60    6.00  |  5.60   13.00  |  8.60   13.00  | 11.60   13.00
                 2.80    6.00  |  5.80   13.00  |  8.80   13.00  | 11.80   13.00
                 3.00    6.00  |  6.00   13.00  |  9.00   13.00  | 12.00   13.00

--------------------------------------------------------------------------------

--------------------
| CALIB            |
| NASHYD    (0208) |   Area     (ha)=     .50   Curve Number   (CN)= 62.0
|ID= 1 DT= 2.0 min |   Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=     .04

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.

                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN
                  hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr
                 .033    6.00  | 3.033   13.00  | 6.033   23.00  |  9.03   53.00
                 .067    6.00  | 3.067   13.00  | 6.067   23.00  |  9.07   53.00
                 .100    6.00  | 3.100   13.00  | 6.100   23.00  |  9.10   53.00
                 .133    6.00  | 3.133   13.00  | 6.133   23.00  |  9.13   53.00
                 .167    6.00  | 3.167   13.00  | 6.167   23.00  |  9.17   53.00
                 .200    6.00  | 3.200   13.00  | 6.200   23.00  |  9.20   53.00
                 .233    6.00  | 3.233   13.00  | 6.233   23.00  |  9.23   53.00
                 .267    6.00  | 3.267   13.00  | 6.267   23.00  |  9.27   53.00
                 .300    6.00  | 3.300   13.00  | 6.300   23.00  |  9.30   53.00
                 .333    6.00  | 3.333   13.00  | 6.333   23.00  |  9.33   53.00
```

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                .367    6.00 | 3.367   13.00 | 6.367   23.00 |   9.37   53.00
                .400    6.00 | 3.400   13.00 | 6.400   23.00 |   9.40   53.00
                .433    6.00 | 3.433   13.00 | 6.433   23.00 |   9.43   53.00
                .467    6.00 | 3.467   13.00 | 6.467   23.00 |   9.47   53.00
                .500    6.00 | 3.500   13.00 | 6.500   23.00 |   9.50   53.00
                .533    6.00 | 3.533   13.00 | 6.533   23.00 |   9.53   53.00
                .567    6.00 | 3.567   13.00 | 6.567   23.00 |   9.57   53.00
                .600    6.00 | 3.600   13.00 | 6.600   23.00 |   9.60   53.00
                .633    6.00 | 3.633   13.00 | 6.633   23.00 |   9.63   53.00
                .667    6.00 | 3.667   13.00 | 6.667   23.00 |   9.67   53.00
                .700    6.00 | 3.700   13.00 | 6.700   23.00 |   9.70   53.00
                .733    6.00 | 3.733   13.00 | 6.733   23.00 |   9.73   53.00
                .767    6.00 | 3.767   13.00 | 6.767   23.00 |   9.77   53.00
                .800    6.00 | 3.800   13.00 | 6.800   23.00 |   9.80   53.00
                .833    6.00 | 3.833   13.00 | 6.833   23.00 |   9.83   53.00
                .867    6.00 | 3.867   13.00 | 6.867   23.00 |   9.87   53.00
                .900    6.00 | 3.900   13.00 | 6.900   23.00 |   9.90   53.00
                .933    6.00 | 3.933   13.00 | 6.933   23.00 |   9.93   53.00
                .967    6.00 | 3.967   13.00 | 6.967   23.00 |   9.97   53.00
               1.000    6.00 | 4.000   13.00 | 7.000   23.00 |  10.00   52.99
               1.033    4.00 | 4.033   17.00 | 7.033   13.00 |  10.03   38.00
               1.067    4.00 | 4.067   17.00 | 7.067   13.00 |  10.07   38.00
               1.100    4.00 | 4.100   17.00 | 7.100   13.00 |  10.10   38.00
               1.133    4.00 | 4.133   17.00 | 7.133   13.00 |  10.13   38.00
               1.167    4.00 | 4.167   17.00 | 7.167   13.00 |  10.17   38.00
               1.200    4.00 | 4.200   17.00 | 7.200   13.00 |  10.20   38.00
               1.233    4.00 | 4.233   17.00 | 7.233   13.00 |  10.23   38.00
               1.267    4.00 | 4.267   17.00 | 7.267   13.00 |  10.27   38.00
               1.300    4.00 | 4.300   17.00 | 7.300   13.00 |  10.30   38.00
               1.333    4.00 | 4.333   17.00 | 7.333   13.00 |  10.33   38.00
               1.367    4.00 | 4.367   17.00 | 7.367   13.00 |  10.37   38.00
               1.400    4.00 | 4.400   17.00 | 7.400   13.00 |  10.40   38.00
               1.433    4.00 | 4.433   17.00 | 7.433   13.00 |  10.43   38.00
               1.467    4.00 | 4.467   17.00 | 7.467   13.00 |  10.47   38.00
               1.500    4.00 | 4.500   17.00 | 7.500   13.00 |  10.50   38.00
               1.533    4.00 | 4.533   17.00 | 7.533   13.00 |  10.53   38.00
               1.567    4.00 | 4.567   17.00 | 7.567   13.00 |  10.57   38.00
               1.600    4.00 | 4.600   17.00 | 7.600   13.00 |  10.60   38.00
               1.633    4.00 | 4.633   17.00 | 7.633   13.00 |  10.63   38.00
               1.667    4.00 | 4.667   17.00 | 7.667   13.00 |  10.67   38.00
               1.700    4.00 | 4.700   17.00 | 7.700   13.00 |  10.70   38.00
               1.733    4.00 | 4.733   17.00 | 7.733   13.00 |  10.73   38.00
               1.767    4.00 | 4.767   17.00 | 7.767   13.00 |  10.77   38.00
               1.800    4.00 | 4.800   17.00 | 7.800   13.00 |  10.80   38.00
               1.833    4.00 | 4.833   17.00 | 7.833   13.00 |  10.83   38.00
               1.867    4.00 | 4.867   17.00 | 7.867   13.00 |  10.87   38.00
               1.900    4.00 | 4.900   17.00 | 7.900   13.00 |  10.90   38.00
               1.933    4.00 | 4.933   17.00 | 7.933   13.00 |  10.93   38.00
               1.967    4.00 | 4.967   17.00 | 7.967   13.00 |  10.97   38.00
               2.000    4.00 | 5.000   17.00 | 8.000   13.00 |  11.00   37.98
               2.033    6.00 | 5.033   13.00 | 8.033   13.00 |  11.03   13.00
               2.067    6.00 | 5.067   13.00 | 8.067   13.00 |  11.07   13.00
               2.100    6.00 | 5.100   13.00 | 8.100   13.00 |  11.10   13.00
               2.133    6.00 | 5.133   13.00 | 8.133   13.00 |  11.13   13.00
               2.167    6.00 | 5.167   13.00 | 8.167   13.00 |  11.17   13.00
               2.200    6.00 | 5.200   13.00 | 8.200   13.00 |  11.20   13.00
               2.233    6.00 | 5.233   13.00 | 8.233   13.00 |  11.23   13.00
               2.267    6.00 | 5.267   13.00 | 8.267   13.00 |  11.27   13.00
               2.300    6.00 | 5.300   13.00 | 8.300   13.00 |  11.30   13.00
               2.333    6.00 | 5.333   13.00 | 8.333   13.00 |  11.33   13.00
               2.367    6.00 | 5.367   13.00 | 8.367   13.00 |  11.37   13.00
               2.400    6.00 | 5.400   13.00 | 8.400   13.00 |  11.40   13.00
               2.433    6.00 | 5.433   13.00 | 8.433   13.00 |  11.43   13.00
               2.467    6.00 | 5.467   13.00 | 8.467   13.00 |  11.47   13.00
               2.500    6.00 | 5.500   13.00 | 8.500   13.00 |  11.50   13.00
               2.533    6.00 | 5.533   13.00 | 8.533   13.00 |  11.53   13.00
               2.567    6.00 | 5.567   13.00 | 8.567   13.00 |  11.57   13.00
               2.600    6.00 | 5.600   13.00 | 8.600   13.00 |  11.60   13.00
               2.633    6.00 | 5.633   13.00 | 8.633   13.00 |  11.63   13.00
               2.667    6.00 | 5.667   13.00 | 8.667   13.00 |  11.67   13.00
               2.700    6.00 | 5.700   13.00 | 8.700   13.00 |  11.70   13.00
               2.733    6.00 | 5.733   13.00 | 8.733   13.00 |  11.73   13.00
               2.767    6.00 | 5.767   13.00 | 8.767   13.00 |  11.77   13.00
               2.800    6.00 | 5.800   13.00 | 8.800   13.00 |  11.80   13.00
               2.833    6.00 | 5.833   13.00 | 8.833   13.00 |  11.83   13.00
               2.867    6.00 | 5.867   13.00 | 8.867   13.00 |  11.87   13.00
               2.900    6.00 | 5.900   13.00 | 8.900   13.00 |  11.90   13.00
               2.933    6.00 | 5.933   13.00 | 8.933   13.00 |  11.93   13.00
               2.967    6.00 | 5.967   13.00 | 8.967   13.00 |  11.97   13.00
               3.000    6.00 | 6.000   13.00 | 9.000   13.01 |  12.00   12.98

Unit Hyd Qpeak   (cms)=     .477

PEAK FLOW        (cms)=     .054  (i)
TIME TO PEAK     (hrs)=   10.000
RUNOFF VOLUME     (mm)=  115.075
TOTAL RAINFALL    (mm)=  211.999
RUNOFF COEFFICIENT    =     .543
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    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB             |
| NASHYD     (0206) |   Area      (ha)=    6.18   Curve Number    (CN)= 62.0
|ID= 1 DT=10.0 min  |   Ia        (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=      .81

        NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME    RAIN
                 hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr
                .167    6.00 | 3.167  13.00 | 6.167  23.00 |  9.17  53.00
                .333    6.00 | 3.333  13.00 | 6.333  23.00 |  9.33  53.00
                .500    6.00 | 3.500  13.00 | 6.500  23.00 |  9.50  53.00
                .667    6.00 | 3.667  13.00 | 6.667  23.00 |  9.67  53.00
                .833    6.00 | 3.833  13.00 | 6.833  23.00 |  9.83  53.00
               1.000    6.00 | 4.000  13.00 | 7.000  23.00 | 10.00  53.00
               1.167    4.00 | 4.167  17.00 | 7.167  13.00 | 10.17  38.00
               1.333    4.00 | 4.333  17.00 | 7.333  13.00 | 10.33  38.00
               1.500    4.00 | 4.500  17.00 | 7.500  13.00 | 10.50  38.00
               1.667    4.00 | 4.667  17.00 | 7.667  13.00 | 10.67  38.00
               1.833    4.00 | 4.833  17.00 | 7.833  13.00 | 10.83  38.00
               2.000    4.00 | 5.000  17.00 | 8.000  13.00 | 11.00  38.00
               2.167    6.00 | 5.167  13.00 | 8.167  13.00 | 11.17  13.00
               2.333    6.00 | 5.333  13.00 | 8.333  13.00 | 11.33  13.00
               2.500    6.00 | 5.500  13.00 | 8.500  13.00 | 11.50  13.00
               2.667    6.00 | 5.667  13.00 | 8.667  13.00 | 11.67  13.00
               2.833    6.00 | 5.833  13.00 | 8.833  13.00 | 11.83  13.00
               3.000    6.00 | 6.000  13.00 | 9.000  13.00 | 12.00  13.00

    Unit Hyd Qpeak  (cms)=     .291

    PEAK FLOW       (cms)=     .518 (i)
    TIME TO PEAK    (hrs)=  11.000
    RUNOFF VOLUME    (mm)= 118.132
    TOTAL RAINFALL   (mm)= 212.000
    RUNOFF COEFFICIENT   =     .557

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB             |
| STANDHYD  (0204)  |   Area     (ha)=    2.82
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  14.30   Dir. Conn.(%)=  10.70
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                            IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=       .40         2.42
    Dep. Storage      (mm)=      1.00         5.00
    Average Slope      (%)=      1.58         2.50
    Length             (m)=    140.00       284.40
    Mannings n            =      .013         .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME    RAIN
                 hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr
                .083    6.00 | 3.083  13.00 | 6.083  23.00 |  9.08  53.00
                .167    6.00 | 3.167  13.00 | 6.167  23.00 |  9.17  53.00
                .250    6.00 | 3.250  13.00 | 6.250  23.00 |  9.25  53.00
                .333    6.00 | 3.333  13.00 | 6.333  23.00 |  9.33  53.00
                .417    6.00 | 3.417  13.00 | 6.417  23.00 |  9.42  53.00
                .500    6.00 | 3.500  13.00 | 6.500  23.00 |  9.50  53.00
                .583    6.00 | 3.583  13.00 | 6.583  23.00 |  9.58  53.00
                .667    6.00 | 3.667  13.00 | 6.667  23.00 |  9.67  53.00
                .750    6.00 | 3.750  13.00 | 6.750  23.00 |  9.75  53.00
                .833    6.00 | 3.833  13.00 | 6.833  23.00 |  9.83  53.00
                .917    6.00 | 3.917  13.00 | 6.917  23.00 |  9.92  53.00
               1.000    6.00 | 4.000  13.00 | 7.000  23.00 | 10.00  53.00
               1.083    4.00 | 4.083  17.00 | 7.083  13.00 | 10.08  38.00
               1.167    4.00 | 4.167  17.00 | 7.167  13.00 | 10.17  38.00
               1.250    4.00 | 4.250  17.00 | 7.250  13.00 | 10.25  38.00
               1.333    4.00 | 4.333  17.00 | 7.333  13.00 | 10.33  38.00
               1.417    4.00 | 4.417  17.00 | 7.417  13.00 | 10.42  38.00
               1.500    4.00 | 4.500  17.00 | 7.500  13.00 | 10.50  38.00
               1.583    4.00 | 4.583  17.00 | 7.583  13.00 | 10.58  38.00
               1.667    4.00 | 4.667  17.00 | 7.667  13.00 | 10.67  38.00
               1.750    4.00 | 4.750  17.00 | 7.750  13.00 | 10.75  38.00
               1.833    4.00 | 4.833  17.00 | 7.833  13.00 | 10.83  38.00
               1.917    4.00 | 4.917  17.00 | 7.917  13.00 | 10.92  38.00
               2.000    4.00 | 5.000  17.00 | 8.000  13.00 | 11.00  38.00
               2.083    6.00 | 5.083  13.00 | 8.083  13.00 | 11.08  13.00
               2.167    6.00 | 5.167  13.00 | 8.167  13.00 | 11.17  13.00
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             2.250    6.00 | 5.250   13.00 | 8.250   13.00 | 11.25   13.00
             2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
             2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
             2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
             2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
             2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
             2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
             2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
             2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
             3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

    Max.Eff.Inten.(mm/hr)=        53.00           45.35
              over (min)           5.00           35.00
    Storage Coeff.  (min)=         3.51 (ii)      32.89 (ii)
    Unit Hyd. Tpeak (min)=         5.00           35.00
    Unit Hyd. peak  (cms)=          .26             .03
                                                                 *TOTALS*
    PEAK FLOW       (cms)=          .04             .25           .285 (iii)
    TIME TO PEAK    (hrs)=          .00           10.42          10.42
    RUNOFF VOLUME    (mm)=       211.00          137.75         145.58
    TOTAL RAINFALL   (mm)=       212.00          212.00         212.00
    RUNOFF COEFFICIENT   =         1.00             .65            .69

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 CALIB              |
 STANDHYD  (0203)   |   Area     (ha)=    8.01
ID= 1 DT= 3.0 min   |   Total Imp(%)=  34.30   Dir. Conn.(%)=  25.70
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                               IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=        2.75          5.26
    Dep. Storage      (mm)=        1.00          5.00
    Average Slope      (%)=         .79          2.00
    Length             (m)=      414.00         86.00
    Mannings n            =        .013          .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
              .050    6.00 | 3.050   13.00 | 6.050   23.00 |  9.05   53.00
              .100    6.00 | 3.100   13.00 | 6.100   23.00 |  9.10   53.00
              .150    6.00 | 3.150   13.00 | 6.150   23.00 |  9.15   53.00
              .200    6.00 | 3.200   13.00 | 6.200   23.00 |  9.20   53.00
              .250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
              .300    6.00 | 3.300   13.00 | 6.300   23.00 |  9.30   53.00
              .350    6.00 | 3.350   13.00 | 6.350   23.00 |  9.35   53.00
              .400    6.00 | 3.400   13.00 | 6.400   23.00 |  9.40   53.00
              .450    6.00 | 3.450   13.00 | 6.450   23.00 |  9.45   53.00
              .500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
              .550    6.00 | 3.550   13.00 | 6.550   23.00 |  9.55   53.00
              .600    6.00 | 3.600   13.00 | 6.600   23.00 |  9.60   53.00
              .650    6.00 | 3.650   13.00 | 6.650   23.00 |  9.65   53.00
              .700    6.00 | 3.700   13.00 | 6.700   23.00 |  9.70   53.00
              .750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
              .800    6.00 | 3.800   13.00 | 6.800   23.00 |  9.80   53.00
              .850    6.00 | 3.850   13.00 | 6.850   23.00 |  9.85   53.00
              .900    6.00 | 3.900   13.00 | 6.900   23.00 |  9.90   53.00
              .950    6.00 | 3.950   13.00 | 6.950   23.00 |  9.95   53.00
             1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   52.99
             1.050    4.00 | 4.050   17.00 | 7.050   13.00 | 10.05   38.00
             1.100    4.00 | 4.100   17.00 | 7.100   13.00 | 10.10   38.00
             1.150    4.00 | 4.150   17.00 | 7.150   13.00 | 10.15   38.00
             1.200    4.00 | 4.200   17.00 | 7.200   13.00 | 10.20   38.00
             1.250    4.00 | 4.250   17.00 | 7.250   13.00 | 10.25   38.00
             1.300    4.00 | 4.300   17.00 | 7.300   13.00 | 10.30   38.00
             1.350    4.00 | 4.350   17.00 | 7.350   13.00 | 10.35   38.00
             1.400    4.00 | 4.400   17.00 | 7.400   13.00 | 10.40   38.00
             1.450    4.00 | 4.450   17.00 | 7.450   13.00 | 10.45   38.00
             1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
             1.550    4.00 | 4.550   17.00 | 7.550   13.00 | 10.55   38.00
             1.600    4.00 | 4.600   17.00 | 7.600   13.00 | 10.60   38.00
             1.650    4.00 | 4.650   17.00 | 7.650   13.00 | 10.65   38.00
             1.700    4.00 | 4.700   17.00 | 7.700   13.00 | 10.70   38.00
             1.750    4.00 | 4.750   17.00 | 7.750   13.00 | 10.75   38.00
             1.800    4.00 | 4.800   17.00 | 7.800   13.00 | 10.80   38.00
             1.850    4.00 | 4.850   17.00 | 7.850   13.00 | 10.85   38.00
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             1.900     4.00 | 4.900    17.00 | 7.900    13.00 | 10.90    38.00
             1.950     4.00 | 4.950    17.00 | 7.950    13.00 | 10.95    38.00
             2.000     4.00 | 5.000    17.00 | 8.000    13.00 | 11.00    37.99
             2.050     6.00 | 5.050    13.00 | 8.050    13.00 | 11.05    13.00
             2.100     6.00 | 5.100    13.00 | 8.100    13.00 | 11.10    13.00
             2.150     6.00 | 5.150    13.00 | 8.150    13.00 | 11.15    13.00
             2.200     6.00 | 5.200    13.00 | 8.200    13.00 | 11.20    13.00
             2.250     6.00 | 5.250    13.00 | 8.250    13.00 | 11.25    13.00
             2.300     6.00 | 5.300    13.00 | 8.300    13.00 | 11.30    13.00
             2.350     6.00 | 5.350    13.00 | 8.350    13.00 | 11.35    13.00
             2.400     6.00 | 5.400    13.00 | 8.400    13.00 | 11.40    13.00
             2.450     6.00 | 5.450    13.00 | 8.450    13.00 | 11.45    13.00
             2.500     6.00 | 5.500    13.00 | 8.500    13.00 | 11.50    13.00
             2.550     6.00 | 5.550    13.00 | 8.550    13.00 | 11.55    13.00
             2.600     6.00 | 5.600    13.00 | 8.600    13.00 | 11.60    13.00
             2.650     6.00 | 5.650    13.00 | 8.650    13.00 | 11.65    13.00
             2.700     6.00 | 5.700    13.00 | 8.700    13.00 | 11.70    13.00
             2.750     6.00 | 5.750    13.00 | 8.750    13.00 | 11.75    13.00
             2.800     6.00 | 5.800    13.00 | 8.800    13.00 | 11.80    13.00
             2.850     6.00 | 5.850    13.00 | 8.850    13.00 | 11.85    13.00
             2.900     6.00 | 5.900    13.00 | 8.900    13.00 | 11.90    13.00
             2.950     6.00 | 5.950    13.00 | 8.950    13.00 | 11.95    13.00
             3.000     6.00 | 6.000    13.00 | 9.000    13.01 | 12.00    12.99

    Max.Eff.Inten.(mm/hr)=       53.00         50.77
               over (min)         9.00         24.00
    Storage Coeff.  (min)=        8.29 (ii)    22.94 (ii)
    Unit Hyd. Tpeak (min)=        9.00         24.00
    Unit Hyd. peak  (cms)=         .13           .05
                                                           *TOTALS*
    PEAK FLOW       (cms)=         .30           .66          .953 (iii)
    TIME TO PEAK    (hrs)=         .00         10.15         10.05
    RUNOFF VOLUME    (mm)=      211.00        141.82        159.59
    TOTAL RAINFALL   (mm)=      212.00        212.00        212.00
    RUNOFF COEFFICIENT   =        1.00           .67           .75


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB             |
| STANDHYD  (0202)  |    Area    (ha)=     .50
|ID= 1 DT= 5.0 min  |    Total Imp(%)=   28.60   Dir. Conn.(%)=   21.50
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=        .14           .36
    Dep. Storage      (mm)=       1.00          5.00
    Average Slope      (%)=        .80          1.00
    Length             (m)=      10.00        218.20
    Mannings n            =       .013          .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
              TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
               hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
              .083     6.00 | 3.083    13.00 | 6.083    23.00 |  9.08    53.00
              .167     6.00 | 3.167    13.00 | 6.167    23.00 |  9.17    53.00
              .250     6.00 | 3.250    13.00 | 6.250    23.00 |  9.25    53.00
              .333     6.00 | 3.333    13.00 | 6.333    23.00 |  9.33    53.00
              .417     6.00 | 3.417    13.00 | 6.417    23.00 |  9.42    53.00
              .500     6.00 | 3.500    13.00 | 6.500    23.00 |  9.50    53.00
              .583     6.00 | 3.583    13.00 | 6.583    23.00 |  9.58    53.00
              .667     6.00 | 3.667    13.00 | 6.667    23.00 |  9.67    53.00
              .750     6.00 | 3.750    13.00 | 6.750    23.00 |  9.75    53.00
              .833     6.00 | 3.833    13.00 | 6.833    23.00 |  9.83    53.00
              .917     6.00 | 3.917    13.00 | 6.917    23.00 |  9.92    53.00
             1.000     6.00 | 4.000    13.00 | 7.000    23.00 | 10.00    53.00
             1.083     4.00 | 4.083    17.00 | 7.083    13.00 | 10.08    38.00
             1.167     4.00 | 4.167    17.00 | 7.167    13.00 | 10.17    38.00
             1.250     4.00 | 4.250    17.00 | 7.250    13.00 | 10.25    38.00
             1.333     4.00 | 4.333    17.00 | 7.333    13.00 | 10.33    38.00
             1.417     4.00 | 4.417    17.00 | 7.417    13.00 | 10.42    38.00
             1.500     4.00 | 4.500    17.00 | 7.500    13.00 | 10.50    38.00
             1.583     4.00 | 4.583    17.00 | 7.583    13.00 | 10.58    38.00
             1.667     4.00 | 4.667    17.00 | 7.667    13.00 | 10.67    38.00
             1.750     4.00 | 4.750    17.00 | 7.750    13.00 | 10.75    38.00
             1.833     4.00 | 4.833    17.00 | 7.833    13.00 | 10.83    38.00
             1.917     4.00 | 4.917    17.00 | 7.917    13.00 | 10.92    38.00
             2.000     4.00 | 5.000    17.00 | 8.000    13.00 | 11.00    38.00
             2.083     6.00 | 5.083    13.00 | 8.083    13.00 | 11.08    13.00
             2.167     6.00 | 5.167    13.00 | 8.167    13.00 | 11.17    13.00
             2.250     6.00 | 5.250    13.00 | 8.250    13.00 | 11.25    13.00
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         2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
         2.417    6.00 | 5.417   13.00 | 8.417   13.00 | 11.42   13.00
         2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
         2.583    6.00 | 5.583   13.00 | 8.583   13.00 | 11.58   13.00
         2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
         2.750    6.00 | 5.750   13.00 | 8.750   13.00 | 11.75   13.00
         2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
         2.917    6.00 | 5.917   13.00 | 8.917   13.00 | 11.92   13.00
         3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

    Max.Eff.Inten.(mm/hr)=        53.00          48.31
               over (min)          5.00          35.00
    Storage Coeff.  (min)=          .88 (ii)     33.05 (ii)
    Unit Hyd. Tpeak (min)=         5.00          35.00
    Unit Hyd. peak  (cms)=          .34            .03
                                                                *TOTALS*
    PEAK FLOW       (cms)=          .02            .04             .052 (iii)
    TIME TO PEAK    (hrs)=          .00          10.42            10.00
    RUNOFF VOLUME    (mm)=       211.00         140.43           155.56
    TOTAL RAINFALL   (mm)=       212.00         212.00           212.00
    RUNOFF COEFFICIENT   =         1.00            .66              .73

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD  (0201) |   Area     (ha)=     .30
| D= 1 DT= 3.0 min |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
 ------------------
                              IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=        .09           .21
    Dep. Storage      (mm)=       1.00          5.00
    Average Slope      (%)=        .97           .97
    Length             (m)=      10.00        119.60
    Mannings n            =       .013          .250

       NOTE:  RAINFALL WAS TRANSFORMED TO   3.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN
             hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr
            .050    6.00  | 3.050   13.00  | 6.050   23.00  |  9.05   53.00
            .100    6.00  | 3.100   13.00  | 6.100   23.00  |  9.10   53.00
            .150    6.00  | 3.150   13.00  | 6.150   23.00  |  9.15   53.00
            .200    6.00  | 3.200   13.00  | 6.200   23.00  |  9.20   53.00
            .250    6.00  | 3.250   13.00  | 6.250   23.00  |  9.25   53.00
            .300    6.00  | 3.300   13.00  | 6.300   23.00  |  9.30   53.00
            .350    6.00  | 3.350   13.00  | 6.350   23.00  |  9.35   53.00
            .400    6.00  | 3.400   13.00  | 6.400   23.00  |  9.40   53.00
            .450    6.00  | 3.450   13.00  | 6.450   23.00  |  9.45   53.00
            .500    6.00  | 3.500   13.00  | 6.500   23.00  |  9.50   53.00
            .550    6.00  | 3.550   13.00  | 6.550   23.00  |  9.55   53.00
            .600    6.00  | 3.600   13.00  | 6.600   23.00  |  9.60   53.00
            .650    6.00  | 3.650   13.00  | 6.650   23.00  |  9.65   53.00
            .700    6.00  | 3.700   13.00  | 6.700   23.00  |  9.70   53.00
            .750    6.00  | 3.750   13.00  | 6.750   23.00  |  9.75   53.00
            .800    6.00  | 3.800   13.00  | 6.800   23.00  |  9.80   53.00
            .850    6.00  | 3.850   13.00  | 6.850   23.00  |  9.85   53.00
            .900    6.00  | 3.900   13.00  | 6.900   23.00  |  9.90   53.00
            .950    6.00  | 3.950   13.00  | 6.950   23.00  |  9.95   53.00
           1.000    6.00  | 4.000   13.00  | 7.000   23.00  | 10.00   52.99
           1.050    4.00  | 4.050   17.00  | 7.050   13.00  | 10.05   38.00
           1.100    4.00  | 4.100   17.00  | 7.100   13.00  | 10.10   38.00
           1.150    4.00  | 4.150   17.00  | 7.150   13.00  | 10.15   38.00
           1.200    4.00  | 4.200   17.00  | 7.200   13.00  | 10.20   38.00
           1.250    4.00  | 4.250   17.00  | 7.250   13.00  | 10.25   38.00
           1.300    4.00  | 4.300   17.00  | 7.300   13.00  | 10.30   38.00
           1.350    4.00  | 4.350   17.00  | 7.350   13.00  | 10.35   38.00
           1.400    4.00  | 4.400   17.00  | 7.400   13.00  | 10.40   38.00
           1.450    4.00  | 4.450   17.00  | 7.450   13.00  | 10.45   38.00
           1.500    4.00  | 4.500   17.00  | 7.500   13.00  | 10.50   38.00
           1.550    4.00  | 4.550   17.00  | 7.550   13.00  | 10.55   38.00
           1.600    4.00  | 4.600   17.00  | 7.600   13.00  | 10.60   38.00
           1.650    4.00  | 4.650   17.00  | 7.650   13.00  | 10.65   38.00
           1.700    4.00  | 4.700   17.00  | 7.700   13.00  | 10.70   38.00
           1.750    4.00  | 4.750   17.00  | 7.750   13.00  | 10.75   38.00
           1.800    4.00  | 4.800   17.00  | 7.800   13.00  | 10.80   38.00
           1.850    4.00  | 4.850   17.00  | 7.850   13.00  | 10.85   38.00
           1.900    4.00  | 4.900   17.00  | 7.900   13.00  | 10.90   38.00
           1.950    4.00  | 4.950   17.00  | 7.950   13.00  | 10.95   38.00
           2.000    4.00  | 5.000   17.00  | 8.000   13.00  | 11.00   37.99
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          2.050     6.00 | 5.050    13.00 | 8.050    13.00 | 11.05    13.00
          2.100     6.00 | 5.100    13.00 | 8.100    13.00 | 11.10    13.00
          2.150     6.00 | 5.150    13.00 | 8.150    13.00 | 11.15    13.00
          2.200     6.00 | 5.200    13.00 | 8.200    13.00 | 11.20    13.00
          2.250     6.00 | 5.250    13.00 | 8.250    13.00 | 11.25    13.00
          2.300     6.00 | 5.300    13.00 | 8.300    13.00 | 11.30    13.00
          2.350     6.00 | 5.350    13.00 | 8.350    13.00 | 11.35    13.00
          2.400     6.00 | 5.400    13.00 | 8.400    13.00 | 11.40    13.00
          2.450     6.00 | 5.450    13.00 | 8.450    13.00 | 11.45    13.00
          2.500     6.00 | 5.500    13.00 | 8.500    13.00 | 11.50    13.00
          2.550     6.00 | 5.550    13.00 | 8.550    13.00 | 11.55    13.00
          2.600     6.00 | 5.600    13.00 | 8.600    13.00 | 11.60    13.00
          2.650     6.00 | 5.650    13.00 | 8.650    13.00 | 11.65    13.00
          2.700     6.00 | 5.700    13.00 | 8.700    13.00 | 11.70    13.00
          2.750     6.00 | 5.750    13.00 | 8.750    13.00 | 11.75    13.00
          2.800     6.00 | 5.800    13.00 | 8.800    13.00 | 11.80    13.00
          2.850     6.00 | 5.850    13.00 | 8.850    13.00 | 11.85    13.00
          2.900     6.00 | 5.900    13.00 | 8.900    13.00 | 11.90    13.00
          2.950     6.00 | 5.950    13.00 | 8.950    13.00 | 11.95    13.00
          3.000     6.00 | 6.000    13.00 | 9.000    13.01 | 12.00    12.99

   Max.Eff.Inten.(mm/hr)=       53.00         48.72
             over (min)          6.00         24.00
   Storage Coeff.  (min)=         .83 (ii)    23.39 (ii)
   Unit Hyd. Tpeak (min)=        6.00         24.00
   Unit Hyd. peak  (cms)=         .37           .05
                                                           *TOTALS*
   PEAK FLOW       (cms)=         .01           .03          .035 (iii)
   TIME TO PEAK    (hrs)=         .00         10.15         10.00
   RUNOFF VOLUME    (mm)=      211.00        140.43        155.56
   TOTAL RAINFALL   (mm)=      212.00        212.00        212.00
   RUNOFF COEFFICIENT   =        1.00           .66           .73

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| NASHYD     (0205)  |   Area     (ha)=    1.20   Curve Number   (CN)= 82.4
|ID= 1 DT= 2.0 min   |   Ia       (mm)=    2.00   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=     .03

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
           TIME     RAIN  |  TIME     RAIN  |  TIME     RAIN  |  TIME     RAIN
            hrs    mm/hr  |   hrs    mm/hr  |   hrs    mm/hr  |   hrs    mm/hr
           .033     6.00  | 3.033    13.00  | 6.033    23.00  |  9.03    53.00
           .067     6.00  | 3.067    13.00  | 6.067    23.00  |  9.07    53.00
           .100     6.00  | 3.100    13.00  | 6.100    23.00  |  9.10    53.00
           .133     6.00  | 3.133    13.00  | 6.133    23.00  |  9.13    53.00
           .167     6.00  | 3.167    13.00  | 6.167    23.00  |  9.17    53.00
           .200     6.00  | 3.200    13.00  | 6.200    23.00  |  9.20    53.00
           .233     6.00  | 3.233    13.00  | 6.233    23.00  |  9.23    53.00
           .267     6.00  | 3.267    13.00  | 6.267    23.00  |  9.27    53.00
           .300     6.00  | 3.300    13.00  | 6.300    23.00  |  9.30    53.00
           .333     6.00  | 3.333    13.00  | 6.333    23.00  |  9.33    53.00
           .367     6.00  | 3.367    13.00  | 6.367    23.00  |  9.37    53.00
           .400     6.00  | 3.400    13.00  | 6.400    23.00  |  9.40    53.00
           .433     6.00  | 3.433    13.00  | 6.433    23.00  |  9.43    53.00
           .467     6.00  | 3.467    13.00  | 6.467    23.00  |  9.47    53.00
           .500     6.00  | 3.500    13.00  | 6.500    23.00  |  9.50    53.00
           .533     6.00  | 3.533    13.00  | 6.533    23.00  |  9.53    53.00
           .567     6.00  | 3.567    13.00  | 6.567    23.00  |  9.57    53.00
           .600     6.00  | 3.600    13.00  | 6.600    23.00  |  9.60    53.00
           .633     6.00  | 3.633    13.00  | 6.633    23.00  |  9.63    53.00
           .667     6.00  | 3.667    13.00  | 6.667    23.00  |  9.67    53.00
           .700     6.00  | 3.700    13.00  | 6.700    23.00  |  9.70    53.00
           .733     6.00  | 3.733    13.00  | 6.733    23.00  |  9.73    53.00
           .767     6.00  | 3.767    13.00  | 6.767    23.00  |  9.77    53.00
           .800     6.00  | 3.800    13.00  | 6.800    23.00  |  9.80    53.00
           .833     6.00  | 3.833    13.00  | 6.833    23.00  |  9.83    53.00
           .867     6.00  | 3.867    13.00  | 6.867    23.00  |  9.87    53.00
           .900     6.00  | 3.900    13.00  | 6.900    23.00  |  9.90    53.00
           .933     6.00  | 3.933    13.00  | 6.933    23.00  |  9.93    53.00
           .967     6.00  | 3.967    13.00  | 6.967    23.00  |  9.97    53.00
          1.000     6.00  | 4.000    13.00  | 7.000    23.00  | 10.00    52.99
          1.033     4.00  | 4.033    17.00  | 7.033    13.00  | 10.03    38.00
          1.067     4.00  | 4.067    17.00  | 7.067    13.00  | 10.07    38.00
          1.100     4.00  | 4.100    17.00  | 7.100    13.00  | 10.10    38.00
          1.133     4.00  | 4.133    17.00  | 7.133    13.00  | 10.13    38.00
          1.167     4.00  | 4.167    17.00  | 7.167    13.00  | 10.17    38.00
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          1.200    4.00 | 4.200   17.00 | 7.200   13.00 | 10.20   38.00
          1.233    4.00 | 4.233   17.00 | 7.233   13.00 | 10.23   38.00
          1.267    4.00 | 4.267   17.00 | 7.267   13.00 | 10.27   38.00
          1.300    4.00 | 4.300   17.00 | 7.300   13.00 | 10.30   38.00
          1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
          1.367    4.00 | 4.367   17.00 | 7.367   13.00 | 10.37   38.00
          1.400    4.00 | 4.400   17.00 | 7.400   13.00 | 10.40   38.00
          1.433    4.00 | 4.433   17.00 | 7.433   13.00 | 10.43   38.00
          1.467    4.00 | 4.467   17.00 | 7.467   13.00 | 10.47   38.00
          1.500    4.00 | 4.500   17.00 | 7.500   13.00 | 10.50   38.00
          1.533    4.00 | 4.533   17.00 | 7.533   13.00 | 10.53   38.00
          1.567    4.00 | 4.567   17.00 | 7.567   13.00 | 10.57   38.00
          1.600    4.00 | 4.600   17.00 | 7.600   13.00 | 10.60   38.00
          1.633    4.00 | 4.633   17.00 | 7.633   13.00 | 10.63   38.00
          1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
          1.700    4.00 | 4.700   17.00 | 7.700   13.00 | 10.70   38.00
          1.733    4.00 | 4.733   17.00 | 7.733   13.00 | 10.73   38.00
          1.767    4.00 | 4.767   17.00 | 7.767   13.00 | 10.77   38.00
          1.800    4.00 | 4.800   17.00 | 7.800   13.00 | 10.80   38.00
          1.833    4.00 | 4.833   17.00 | 7.833   13.00 | 10.83   38.00
          1.867    4.00 | 4.867   17.00 | 7.867   13.00 | 10.87   38.00
          1.900    4.00 | 4.900   17.00 | 7.900   13.00 | 10.90   38.00
          1.933    4.00 | 4.933   17.00 | 7.933   13.00 | 10.93   38.00
          1.967    4.00 | 4.967   17.00 | 7.967   13.00 | 10.97   38.00
          2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   37.98
          2.033    6.00 | 5.033   13.00 | 8.033   13.00 | 11.03   13.00
          2.067    6.00 | 5.067   13.00 | 8.067   13.00 | 11.07   13.00
          2.100    6.00 | 5.100   13.00 | 8.100   13.00 | 11.10   13.00
          2.133    6.00 | 5.133   13.00 | 8.133   13.00 | 11.13   13.00
          2.167    6.00 | 5.167   13.00 | 8.167   13.00 | 11.17   13.00
          2.200    6.00 | 5.200   13.00 | 8.200   13.00 | 11.20   13.00
          2.233    6.00 | 5.233   13.00 | 8.233   13.00 | 11.23   13.00
          2.267    6.00 | 5.267   13.00 | 8.267   13.00 | 11.27   13.00
          2.300    6.00 | 5.300   13.00 | 8.300   13.00 | 11.30   13.00
          2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
          2.367    6.00 | 5.367   13.00 | 8.367   13.00 | 11.37   13.00
          2.400    6.00 | 5.400   13.00 | 8.400   13.00 | 11.40   13.00
          2.433    6.00 | 5.433   13.00 | 8.433   13.00 | 11.43   13.00
          2.467    6.00 | 5.467   13.00 | 8.467   13.00 | 11.47   13.00
          2.500    6.00 | 5.500   13.00 | 8.500   13.00 | 11.50   13.00
          2.533    6.00 | 5.533   13.00 | 8.533   13.00 | 11.53   13.00
          2.567    6.00 | 5.567   13.00 | 8.567   13.00 | 11.57   13.00
          2.600    6.00 | 5.600   13.00 | 8.600   13.00 | 11.60   13.00
          2.633    6.00 | 5.633   13.00 | 8.633   13.00 | 11.63   13.00
          2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
          2.700    6.00 | 5.700   13.00 | 8.700   13.00 | 11.70   13.00
          2.733    6.00 | 5.733   13.00 | 8.733   13.00 | 11.73   13.00
          2.767    6.00 | 5.767   13.00 | 8.767   13.00 | 11.77   13.00
          2.800    6.00 | 5.800   13.00 | 8.800   13.00 | 11.80   13.00
          2.833    6.00 | 5.833   13.00 | 8.833   13.00 | 11.83   13.00
          2.867    6.00 | 5.867   13.00 | 8.867   13.00 | 11.87   13.00
          2.900    6.00 | 5.900   13.00 | 8.900   13.00 | 11.90   13.00
          2.933    6.00 | 5.933   13.00 | 8.933   13.00 | 11.93   13.00
          2.967    6.00 | 5.967   13.00 | 8.967   13.00 | 11.97   13.00
          3.000    6.00 | 6.000   13.00 | 9.000   13.01 | 12.00   12.98

   Unit Hyd Qpeak   (cms)=    1.528

   PEAK FLOW        (cms)=     .153 (i)
   TIME TO PEAK     (hrs)=   10.000
   RUNOFF VOLUME     (mm)=  155.159
   TOTAL RAINFALL    (mm)=  211.999
   RUNOFF COEFFICIENT    =     .732

   (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 CALIB               |
 STANDHYD  (0207)    |   Area      (ha)=      .70
ID= 1 DT= 4.0 min    |   Total Imp(%)=   28.60    Dir. Conn.(%)=   21.50
--------------------
                              IMPERVIOUS    PERVIOUS (i)
   Surface Area        (ha)=        .20          .50
   Dep. Storage        (mm)=       1.00         5.00
   Average Slope        (%)=        .94          .60
   Length               (m)=      10.00       191.40
   Mannings n             =        .013         .250

       NOTE:  RAINFALL WAS TRANSFORMED TO    4.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
          TIME     RAIN | TIME     RAIN | TIME     RAIN | TIME     RAIN
           hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr
          .067     6.00 | 3.067   13.00 | 6.067   23.00 |  9.07   53.00
          .133     6.00 | 3.133   13.00 | 6.133   23.00 |  9.13   53.00
          .200     6.00 | 3.200   13.00 | 6.200   23.00 |  9.20   53.00
          .267     6.00 | 3.267   13.00 | 6.267   23.00 |  9.27   53.00
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            .333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
            .400    6.00 | 3.400   13.00 | 6.400   23.00 |  9.40   53.00
            .467    6.00 | 3.467   13.00 | 6.467   23.00 |  9.47   53.00
            .533    6.00 | 3.533   13.00 | 6.533   23.00 |  9.53   53.00
            .600    6.00 | 3.600   13.00 | 6.600   23.00 |  9.60   53.00
            .667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
            .733    6.00 | 3.733   13.00 | 6.733   23.00 |  9.73   53.00
            .800    6.00 | 3.800   13.00 | 6.800   23.00 |  9.80   53.00
            .867    6.00 | 3.867   13.00 | 6.867   23.00 |  9.87   53.00
            .933    6.00 | 3.933   13.00 | 6.933   23.00 |  9.93   53.00
           1.000    6.00 | 4.000   13.00 | 7.000   23.00 | 10.00   53.00
           1.067    4.00 | 4.067   17.00 | 7.067   13.00 | 10.07   38.00
           1.133    4.00 | 4.133   17.00 | 7.133   13.00 | 10.13   38.00
           1.200    4.00 | 4.200   17.00 | 7.200   13.00 | 10.20   38.00
           1.267    4.00 | 4.267   17.00 | 7.267   13.00 | 10.27   38.00
           1.333    4.00 | 4.333   17.00 | 7.333   13.00 | 10.33   38.00
           1.400    4.00 | 4.400   17.00 | 7.400   13.00 | 10.40   38.00
           1.467    4.00 | 4.467   17.00 | 7.467   13.00 | 10.47   38.00
           1.533    4.00 | 4.533   17.00 | 7.533   13.00 | 10.53   38.00
           1.600    4.00 | 4.600   17.00 | 7.600   13.00 | 10.60   38.00
           1.667    4.00 | 4.667   17.00 | 7.667   13.00 | 10.67   38.00
           1.733    4.00 | 4.733   17.00 | 7.733   13.00 | 10.73   38.00
           1.800    4.00 | 4.800   17.00 | 7.800   13.00 | 10.80   38.00
           1.867    4.00 | 4.867   17.00 | 7.867   13.00 | 10.87   38.00
           1.933    4.00 | 4.933   17.00 | 7.933   13.00 | 10.93   38.00
           2.000    4.00 | 5.000   17.00 | 8.000   13.00 | 11.00   38.00
           2.067    6.00 | 5.067   13.00 | 8.067   13.00 | 11.07   13.00
           2.133    6.00 | 5.133   13.00 | 8.133   13.00 | 11.13   13.00
           2.200    6.00 | 5.200   13.00 | 8.200   13.00 | 11.20   13.00
           2.267    6.00 | 5.267   13.00 | 8.267   13.00 | 11.27   13.00
           2.333    6.00 | 5.333   13.00 | 8.333   13.00 | 11.33   13.00
           2.400    6.00 | 5.400   13.00 | 8.400   13.00 | 11.40   13.00
           2.467    6.00 | 5.467   13.00 | 8.467   13.00 | 11.47   13.00
           2.533    6.00 | 5.533   13.00 | 8.533   13.00 | 11.53   13.00
           2.600    6.00 | 5.600   13.00 | 8.600   13.00 | 11.60   13.00
           2.667    6.00 | 5.667   13.00 | 8.667   13.00 | 11.67   13.00
           2.733    6.00 | 5.733   13.00 | 8.733   13.00 | 11.73   13.00
           2.800    6.00 | 5.800   13.00 | 8.800   13.00 | 11.80   13.00
           2.867    6.00 | 5.867   13.00 | 8.867   13.00 | 11.87   13.00
           2.933    6.00 | 5.933   13.00 | 8.933   13.00 | 11.93   13.00
           3.000    6.00 | 6.000   13.00 | 9.000   13.00 | 12.00   13.00

    Max.Eff.Inten.(mm/hr)=      53.00          48.27
              over (min)        5.00          36.00
    Storage Coeff.  (min)=        .84 (ii)     35.51 (ii)
    Unit Hyd. Tpeak (min)=       4.00          36.00
    Unit Hyd. peak  (cms)=        .42            .03
                                                            *TOTALS*
    PEAK FLOW       (cms)=        .02            .06           .071 (iii)
    TIME TO PEAK    (hrs)=        .00          10.40          10.00
    RUNOFF VOLUME    (mm)=     211.00         140.43         155.57
    TOTAL RAINFALL   (mm)=     212.00         212.00         212.00
    RUNOFF COEFFICIENT   =       1.00            .66            .73

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  70.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------

-------------------
| ADD HYD   (1000) |
|  1 +  2 =  3     |           AREA    QPEAK    TPEAK      R.V.
-------------------            (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (0202):         .50     .052    10.00    155.56
       + ID2= 2 (0201):         .30     .035    10.00    155.56
         ===============================================
         ID = 3 (1000):         .80     .087    10.00    155.56

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------

-------------------
 ADD HYD   (1001) |
  1 +  2 =  3     |            AREA    QPEAK    TPEAK      R.V.
-------------------            (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (0203):        8.01     .953    10.05    159.59
       + ID2= 2 (1000):         .80     .087    10.00    155.56
         ===============================================
         ID = 3 (1001):        8.81    1.038    10.00    159.23

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
```

```
 -------------------
 ADD HYD   (1002) |
  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0204):      2.82     .285    10.42   145.58
       + ID2= 2 (1001):      8.81    1.038    10.00   159.23
         ===============================================
         ID = 3 (1002):     11.63    1.313    10.00   155.92

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------------

-------------------
 ADD HYD   (1003) |
  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
 ------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0206):      6.18     .518    11.00   118.13
       + ID2= 2 (1002):     11.63    1.313    10.00   155.92
         ===============================================
         ID = 3 (1003):     17.81    1.715    10.20   142.81

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------------

------------------
| ADD HYD   (1004) |
  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
 ------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (1003):     17.81    1.715    10.20   142.81
       + ID2= 2 (0205):      1.20     .153    10.00   155.16
         ===============================================
         ID = 3 (1004):     19.01    1.849    10.00   143.59

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
 ------------------
 RESERVOIR (0001) |
 IN= 2---> OUT= 1 |
 DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          .0000      .0000    |   .4210       .4838
                          .0110      .0717    |   .5580       .6088
                          .0190      .1729    |   .6660       .7402
                          .0250      .1992    |   .6910       .7740
                          .0440      .2529    |  1.0560       .8779
                          .0800      .3083    |  1.6620       .9853
                          .2030      .3652    |  2.4240      1.0963

                              AREA      QPEAK     TPEAK       R.V.
                              (ha)      (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (1004)     19.01       1.85     10.00     143.59
   OUTFLOW: ID= 1 (0001)     19.01       1.63     11.07     142.36

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 88.07
               TIME SHIFT OF PEAK FLOW          (min)= 64.00
               MAXIMUM  STORAGE   USED        (ha.m.)=   .9795

   **** WARNING : SELECTED ROUTING TIME STEP DENIED.
 ----------------------------------------------------------------------------

 ------------------
 ADD HYD   (1005) |
  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
 ------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0001):     19.01    1.629    11.07   142.36
       + ID2= 2 (0207):       .70     .071    10.00   155.57
         ===============================================
         ID = 3 (1005):     19.71    1.689    11.03   142.82

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------

 ------------------
 ADD HYD   (1006) |
  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0208):       .50     .054    10.00   115.07
       + ID2= 2 (1005):     19.71    1.689    11.03   142.82
         ===============================================
         ID = 3 (1006):     20.21    1.728    11.00   142.14

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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```

FINISH

```
=======================================================================================================
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Appendix 3

LSRCA Floodline Elevations

Subject: RE: 123 - Victoria St at Anges St, Innisifl - Floodplain Mapping
From: Marianne Maertens (M.Maertens@lsrca.on.ca)
To: ggemmell@rogers.com;
Cc: T.Hogenbirk@lsrca.on.ca;
Date: Monday, November 21, 2011 10:22:08 AM

Hi Greg,

As per your information request, the flood elevations at the location for the 2 Year through 100 Year storm events are included in the table below.

Reach	River Station	Profile	Vel Left (m/s)	Vel Right (m/s)	Vel Chnl (m/s)	E.G. Elev (m)	W.S. Elev (m)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Q Total (m3/s)
Main02	8709.171	Regional	0.04	0.06	0.13	266.7	266.7	29.55	2.48	10.37	42.40
Main02	8709.171	2 YR	0.02	0.02	0.06	265	265	1.91	0.47	0.28	2.66
Main02	8709.171	5 YR	0.03	0.03	0.1	265.16	265.16	4.24	0.85	0.76	5.85
Main02	8709.171	10 YR	0.04	0.04	0.14	265.21	265.2	6.09	1.16	1.16	8.42
Main02	8709.171	25 YR	0.04	0.05	0.15	265.36	265.36	8.43	1.44	1.96	11.84
Main02	8709.171	50 YR	0.04	0.06	0.16	265.46	265.46	10.32	1.59	2.59	14.5
Main02	8709.171	100 YR	0.04	0.06	0.16	265.56	265.56	12.34	1.73	3.25	17.32

If you have any other questions or need further information, please let us know.

Thanks,

Marianne

Proud Past · Focused Future

Marianne Maertens, MA.Sc, P.Eng
Water Resources Specialist
Lake Simcoe Region Conservation Authority
120 Bayview Parkway, Box 282, Newmarket, Ontario L3Y 4X1
905.895.1281 x285 |1.800.465.0437 | m.maertens@lsrca.on.ca | lsrca.on.ca

Consider the environment. Please don't print this e-mail unless you really need to.

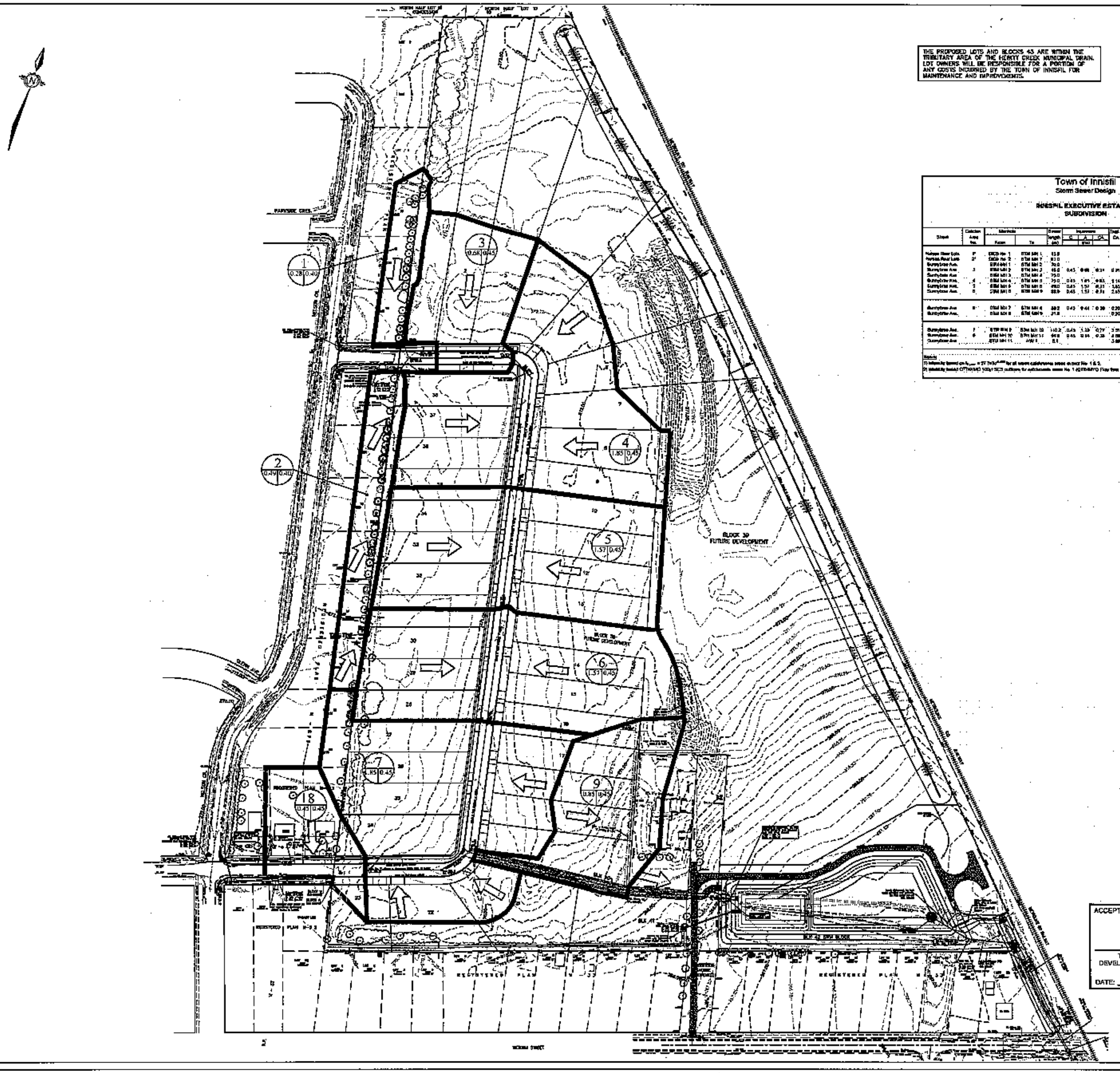
This e-mail message in its entirety (including attachments) is

Appendix 4

Storm Sewer Design

1. Storm Drainage Plan 123 STM-1
2. Storm Design Storm
3. Inlet Capacity Calculations to DICB No. 1
4. Inlet Capacity Calculations to DICB No. 2

Storm Drainage Plan 123 STM-1



THE PROPOSED LOTS AND BLOCKS 43 ARE WITHIN THE TRIBUTARY AREA OF THE HEWITT CREEK MUNICIPAL DRAIN. LOT OWNERS WILL BE RESPONSIBLE FOR A PORTION OF ANY COSTS INCURRED BY THE TOWN OF INNISFIL FOR MAINTENANCE AND IMPROVEMENTS.

Town of Innisfil
Storm Sewer Design

Town File No.: 'IT-880008
Date : Jan. 2014

INNISFIL EXECUTIVE ESTATES SUBDIVISION

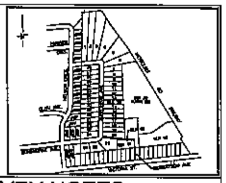
Street	Catchm. Area No.	Manhole From	Manhole To	Sewer length (m)	C	A (ha)	CA	Total CA	Flow Time Mt	In (min)	I 5-yr (mm/hr)	Total Q (m³/s)	S (%)	D nom. (mm)	Q full (m³/s)	V full (m/s)
Nelson Rear Lots	1*	DICB No. 1	STM MH 1	13.8					15.0	0.3		[redacted]	0.50	300	0.07	0.98
Parkside Rear Lots	2*	DICB No. 2	STM MH 7	87.0					15.0	1.1		[redacted]	0.60	300	0.07	0.98
Sunnybrae Ave.		STM MH 1	STM MH 2	72.0					16.1	5.0	49.0	0.12	0.50	375	0.13	1.14
Sunnybrae Ave.	3	STM MH 2	STM MH 3	45.0	0.45	0.68	0.31	0.31	17.1	0.7	48.1	0.16	0.50	450	0.21	1.30
Sunnybrae Ave.		STM MH 3	STM MH 4	75.0					17.3	1.0	46.5	0.16	0.50	450	0.21	1.30
Sunnybrae Ave.	4	STM MH 4	STM MH 5	75.0	0.45	1.85	0.83	1.14	18.9	0.8	45.0	0.32	0.50	600	0.45	1.58
Sunnybrae Ave.	5	STM MH 5	STM MH 6	80.0	0.45	1.57	0.71	1.85	19.3	0.9	43.6	0.45	0.45	675	0.58	1.58
Sunnybrae Ave.	6	STM MH 6	STM MH 9	88.0	0.45	1.57	0.71	2.55	19.2	0.8	40.0	0.50	0.45	675	0.58	1.58
Sunnybrae Ave.	8	STM MH 7	STM MH 8	68.2	0.45	0.44	0.20	0.20	15.0	0.9	72.4	0.04	0.50	300	0.07	0.98
Sunnybrae Ave.		STM MH 8	STM MH 9	21.8				0.20	15.9	0.4	68.7	0.04	0.50	300	0.07	0.98
Sunnybrae Ave.	7	STM MH 9	STM MH 10	110.2	0.45	1.35	0.77	3.31	20.2	1.0	39.0	0.42	0.50	750	0.67	1.50
Sunnybrae Ave.	9	STM MH 10	STM MH 11	64.0	0.45	0.84	0.38	4.00	21.2	0.8	37.0	0.47	0.60	750	0.80	1.80
Sunnybrae Ave.		STM MH 11	HW 1	8.1				3.00	21.9	0.0	35.5	0.55	1.00	750	1.00	2.40

Notes:
1) Intensity based on I_{5yr} = [illegible] for all storm catchments areas except No. 1 & 2.
2) Intensity based OTTHYMO 100yr SCS outflows for catchments areas No. 1 (OTTHYMO Flow from 201) & 2(Otthymo Flow from 202). [redacted]

ACCEPTED FOR CONSTRUCTION
TOWN OF INNISFIL
DEVELOPMENT ENGINEERING
DATE: ______

ACCEPTED FOR CONSTRUCTION
AECOM
TOWN PEER REVIEW ENGINEER
DATE: ______

KEY PLAN
SCALE 1:1000



SURVEY NOTES:

BOUNDARY SURVEY BASED ON FIELD SURVEY BY PETER RAIKES O.L.S., DATED OCT. 28, 2010.

TOPOGRAPHIC INFORMATION BASED ON INFORMATION FROM ROCK SOLID CONSULTING RECEIVED JAN. 05, 2011.

MNR BENCHMARK: 0011903U4879 TWP.: STROUD ELEV.: 270.600

TABLET LOCATION: PRESBYTERIAN CHURCH, IN VILLAGE, ABOUT 80m EAST OF TORONTO–NORTH BAY HWY. TABLET IN WEST CONCRETE FOUNDATION WALL OF WEST TOWER, 1.8m FROM S/W CORNER AND 1.37m BELOW CONCRETE BLOCKS.

GENERAL NOTES:

1. DO NOT SCALE DRAWINGS.
2. ALL DIMENSIONS ARE TO BE CHECKED AND VERIFIED ON SITE PRIOR TO CONSTRUCTION.
3. ANY DISCREPANCIES, OMISSIONS, OR ERRORS ARE TO BE REPORTED TO THE CONSULTANT. NO WORK IS TO PROCEED BEFORE CLARIFICATION OF THE DISCREPANCIES, ERRORS, OR OMISSIONS IS RECEIVED FROM THE CONSULTANT.
4. ALL EXISTING CONDITIONS TO BE CHECKED AND VERIFIED ON SITE PRIOR TO CONSTRUCTION.
5. ONLY LATEST APPROVED DRAWINGS TO BE USED FOR CONSTRUCTION.
6. ALL DRAWINGS AND SPECIFICATIONS REMAIN THE PROPERTY OF THE CONSULTANT, AND SHALL BE RETURNED TO THE CONSULTANT UPON REQUEST. IN NO WAY SHALL THE DRAWINGS AND/OR SPECIFICATIONS IN WHOLE OR IN PART BE REPRODUCED OR DISTRIBUTED WITHOUT THE PERMISSION OF THE CONSULTANT.
7. PRIOR TO ANY WORKS ON MUNICIPAL PROPERTY A ROAD OCCUPANCY PERMIT SHALL BE OBTAINED FROM THE TOWN.
8. GEMMELL ENGINEERING TAKES NO LIABILITY FOR SURVEY DATA.

LEGEND:

OHP	EX. HYDRO POLE
—o—o—o—	EX. FENCE
⌒⌒⌒⌒	EXISTING TREE LINE
14	LOT NUMBER
○	STORM MANHOLE
●	STORM CATCHBASIN MANHOLE
⇨	OVERLAND FLOW DIRECTION

1 — CATCHMENT AREA
1.47 — AREA (ha)
0.10 — RUN OFF COEFFICIENT

ITEM	DESCRIPTION	DATE	BY	APPRV'D
1	MYLAR SUBMISSION	MAY 7/14	GEMCAD INC.	HGG

SCHEDULE OF REVISIONS

H.G. GEMMELL
100061079
May 7/14

ENGINEER'S SEAL

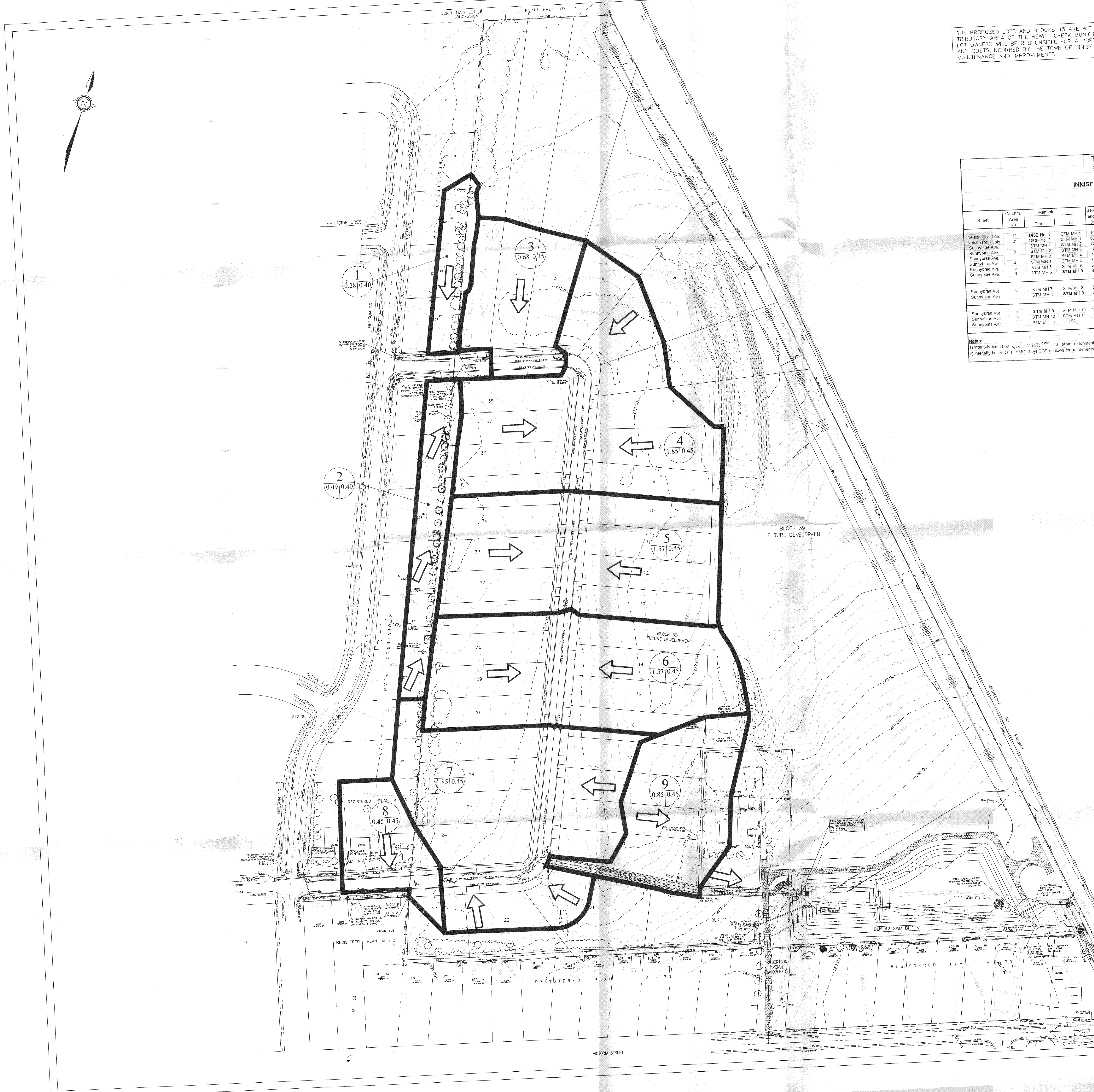
PROJECT:
INNISFIL
EXECUTIVE ESTATES

TITLE:
STORM DRAINAGE PLAN

GEMMELL
Engineering
244 Threadgold Drive, Barrie, ON L4N 1X0
Phone:(705) [illegible] Fax:(705) [illegible]

TOWN OF INNISFIL
PLANNING AND DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

DRAWN: GEMCAD	SCALE:	DWG. No.	PROJECT No.
DESIGNED: H.G.G.	HOR: 1:1250	STM-1	123
CHECKED: H.G.G.	DATE: MAY 2012		



THE PROPOSED LOTS AND BLOCKS 43 ARE WITHIN THE TRIBUTARY AREA OF THE HEWITT CREEK MUNICIPAL DRAIN. LOT OWNERS WILL BE RESPONSIBLE FOR A PORTION OF ANY COSTS INCURRED BY THE TOWN OF INNISFIL FOR MAINTENANCE AND IMPROVEMENTS.

Town of Innisfil
Storm Sewer Design

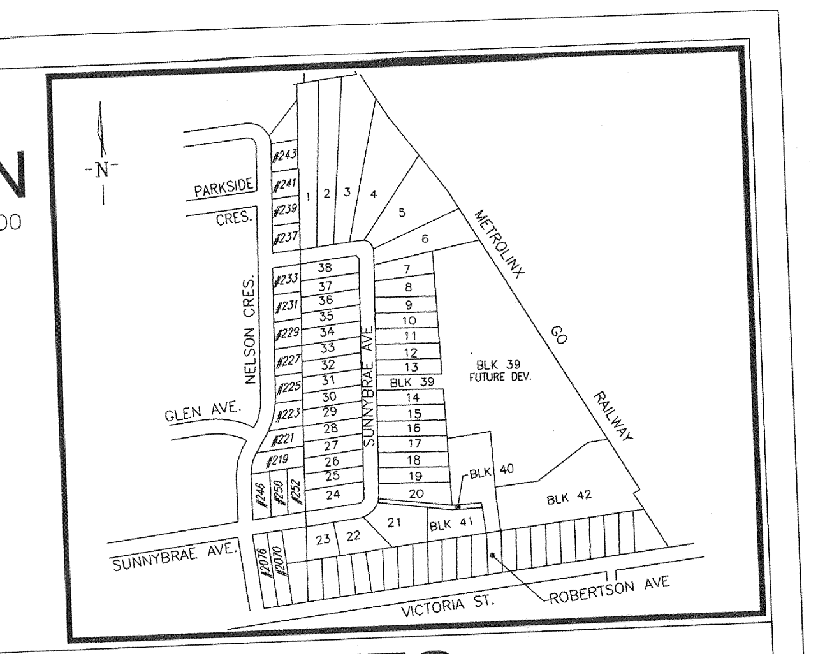
Town File No.: I-T-880008
Date : Jan. 2014

INNISFIL EXECUTIVE ESTATES SUBDIVISION

Street	Catchm. Area No.	Manhole From	Manhole To	Sewer length (m)	Increment C	Increment A (ha)	Increment CA	Total CA	Flow Time to (min)	Flow Time in (min)	I 5-yr (mm/h)	Total Q (cms)	S (%)	D nom. (mm)	Q full (cms)	V full (m/s)
Nelson Rear Lots	1*	DICB No. 1	STM MH 1	15.8					15.0	0.3		0.05	0.50	300	0.07	0.98
Nelson Rear Lots	2*	DICB No. 2	STM MH 1	63.0					15.0	1.1		0.07	0.50	300	0.07	0.98
Sunnybrae Ave.		STM MH 1	STM MH 2	70.0					16.1	1.0	69.0	0.12	0.50	375	0.13	1.14
Sunnybrae Ave.	3	STM MH 2	STM MH 3	18.5	0.45	0.68	0.31	0.31	17.1	0.2	66.1	0.18	0.50	450	0.21	1.28
Sunnybrae Ave.		STM MH 3	STM MH 4	75.0					17.3	1.0	65.5	0.18	0.50	450	0.21	1.28
Sunnybrae Ave.	4	STM MH 4	STM MH 5	75.0	0.45	1.85	0.83	1.14	18.3	0.8	63.0	0.32	0.50	600	0.45	1.55
Sunnybrae Ave.	5	STM MH 5	STM MH 6	89.0	0.45	1.57	0.71	1.85	18.3	0.9	63.0	0.45	0.45	675	0.59	1.59
Sunnybrae Ave.	6	STM MH 6	**STM MH 9**	88.9	0.45	1.57	0.71	2.55	19.2	0.9	60.9	0.56	0.45	675	0.59	1.59
Sunnybrae Ave.	8	STM MH 7	STM MH 8	50.2	0.45	0.44	0.20	0.20	15.0	0.9	72.4	0.04	0.50	300	0.07	0.98
Sunnybrae Ave.		STM MH 8	**STM MH 9**	21.8				0.20	15.9	0.4	69.7	0.04	0.50	300	0.07	0.98
Sunnybrae Ave.	7	**STM MH 9**	STM MH 10	110.2	0.45	1.70	0.77	3.51	20.2	1.0	59.0	0.63	0.50	750	0.82	1.80
Sunnybrae Ave.	9	STM MH 10	STM MH 11	64.5	0.45	0.84	0.38	3.89	21.2	0.6	57.0	0.67	0.50	750	0.82	1.80
Sunnybrae Ave.		STM MH 11	HW 1	5.1				3.89	21.8	0.0	55.9	0.66	1.00	750	1.16	2.55

Notes:
1) Intensity based on $I_{5-year} = 27.7xTc^{-0.693}$ for all storm catchments areas except No. 1 & 2.
2) Intensity based OTTHYMO 100yr SCS outflows for catchments areas No. 1 (OTTHMYO Flow from 201) & 2(Otthymo Flow from 202).

KEY PLAN
SCALE 1:1000



SURVEY NOTES:

BOUNDARY SURVEY BASED ON FIELD SURVEY BY PETER RAIKES O.L.S., DATED OCT. 26, 2010.

TOPOGRAPHIC INFORMATION BASED ON INFORMATION FROM ROCK SOLID CONSULTING RECEIVED JAN. 05, 2011.

MNR BENCHMARK: 0011931U461S TWP.: STROUD ELEV.: 270.600

TABLET LOCATION: PRESBYTERIAN CHURCH, IN VILLAGE, ABOUT 90m EAST OF TORONTO–NORTH BAY HWY. TABLET IN WEST CONCRETE FOUNDATION WALL OF WEST TOWER, 1.5m FROM S/W CORNER AND 1.37m BELOW CONCRETE BLOCKS.

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LEGEND:

○HP	EX. HYDRO POLE
—○—○—○—	EX. FENCE
⌒⌒⌒	EXISTING TREE LINE
14	LOT NUMBER
○	STORM MANHOLE
◎	STORM CATCHBASIN MAHOLE
⇨	OVERLAND FLOW DIRECTION
1	CATCHMENT AREA
0.10	RUN OFF COEFFICIENT
1.47	AREA (ha)

ITEM	DESCRIPTION	DATE	BY	APPRV'D
1	MYLAR SUBMMISSION	MAY 7/14	GEMCAD INC.	HGG

SCHEDULE OF REVISIONS

H.G. GEMMELL
100081079
May 7/14

ENGINEER'S SEAL

ACCEPTED FOR CONSTRUCTION

TOWN OF INNISFIL
DEVELOPMENT ENGINEERING

DATE:

ACCEPTED FOR CONSTRUCTION
AECOM

TOWN PEER REVIEW ENGINEER

DATE: June 3, 2014

PROJECT:
INNISFIL
EXECUTIVE ESTATES

TITLE:
STORM DRAINAGE PLAN

GEMMELL
ENGINEERING
144 Thrushwood Drive, Barrie, ON L4M 1Z0
Phone:(705) 309-0787 Fax:(705) 719-9578

TOWN OF INNISFIL
PLANNING AND DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

DRAWN: GEMCAD	SCALE:	DWG. No.	PROJECT No.
DESIGNED: H.G.G.	HOR: 1:1250	STM-1	123
CHECKED: H.G.G.	DATE: MAY 2012		

INNISFIL EXECUTIVE ESTATES - I-T-880008

Storm Design Sheet

Town of Innisfil

Storm Sewer Design

Town File No.: I-T-880008

Date : Aug 2013

INNISFIL EXECUATIVE ESTATES SUBDIVISION

Street	Catchm. Area	Manhole		Sewer length	Increment			Total CA	Flow Time		I 5-yr	Total Q	S	D nom.	Q full	V full
					C	A	CA		to	in						
Nelson Rear Lots	1*	DICB No. 1	STM MH 1	15.8					15.0	0.3		[redacted]	0.50	300	0.07	0.98
Nelson Rear Lots	2*	DICB No. 2	STM MH 1	63.0					15.0	1.1		[redacted]	0.50	300	0.07	0.98
Sunnybrae Ave.		STM MH 1	STM MH 2	70.0					16.1	1.0	69.0	0.12	0.50	375	0.13	1.14
Sunnybrae Ave.	3	STM MH 2	STM MH 3	18.5	0.45	0.68	0.31	0.31	17.1	0.2	66.1	0.18	0.50	450	0.21	1.28
Sunnybrae Ave.		STM MH 3	STM MH 4	75.0					17.3	1.0	65.5	0.18	0.50	450	0.21	1.28
Sunnybrae Ave.	4	STM MH 4	STM MH 5	75.0	0.45	1.85	0.83	1.14	18.3	0.8	63.0	0.32	0.50	600	0.45	1.55
Sunnybrae Ave.	5	STM MH 5	STM MH 6	89.0	0.45	1.57	0.71	1.85	18.3	0.9	63.0	0.45	0.45	675	0.59	1.59
Sunnybrae Ave.	6	STM MH 6		88.9	0.45	1.57	0.71	2.55	19.2	0.9	60.9	0.56	0.45	675	0.59	1.59
Sunnybrae Ave.	8	STM MH 7	STM MH 8	50.2	0.45	0.44	0.20	0.20	15.0	0.9	72.4	0.04	0.50	300	0.07	0.98
Sunnybrae Ave.	7		STM MH 10	110.2	0.45	1.70	0.77	3.51	20.2	1.0	59.0	0.63	0.50	750	0.82	1.80
Sunnybrae Ave.	9	STM MH 10	STM MH 11	64.5	0.36	0.84	0.30	3.82	21.2	0.6	57.0	0.66	0.50	750	0.82	1.80
Sunnybrae Ave.		STM MH 11	HW 1	5.1				3.82	21.8	0.0	55.9	0.65	1.00	750	1.16	2.55

NOTES

1) Intensity based on $I_{5\text{-year}} = 27.7 x Tc$ for all storm catchments areas except No. 1 & 2.

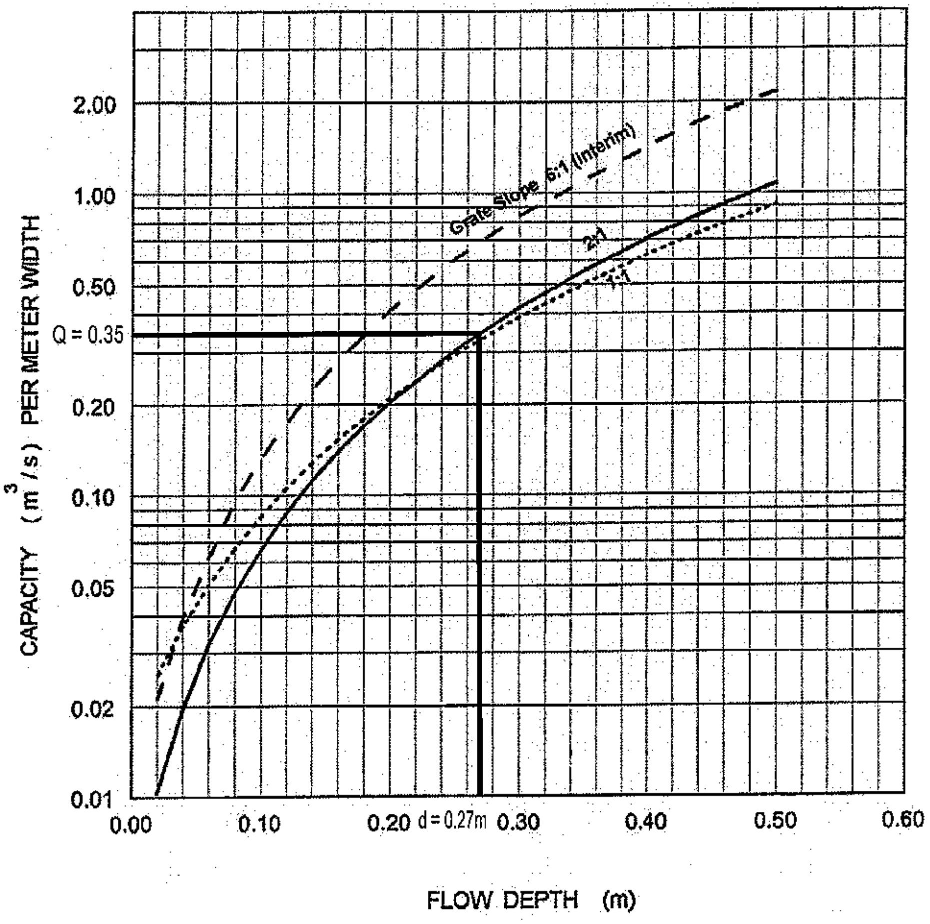
2) Intensity based OTTHYMO 100yr SCS outflows for catchments areas No. 1 (OTTHMYO Flow from 201) & 2(Otthymo Flow from 202). [redacted]

NOTES:

Q_{peak} for catchment 202 was reduced from 0.07 cms to 0.06cms between 3rd and 4th submission. The higher values has been used in design

Inlet Capacity Calculations to DICB No. 1

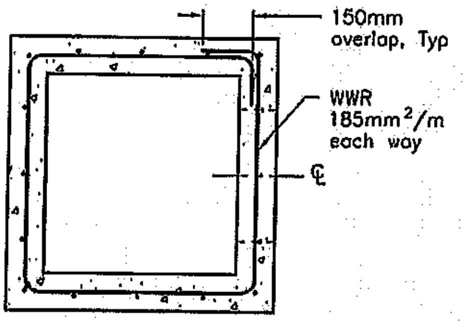
Design Chart 4.20: Ditch Inlet Capacity



Notes:

1. Curves apply to grate Type 403.01, but may be used for straight - bar inlets without significant loss of accuracy.
2. Capacities given by curves are for unobstructed grates only. For design use working capacity ≯ 0.5 x unobstructed capacity.
3. Capacities of grates operating in high velocity flows are less than indicated.

Q(inlet) = 50% 0.35 cms / m x 0.60m
= 50% x 0.21
= 0.105 cms > Q(100 Year) = 0.05 cms

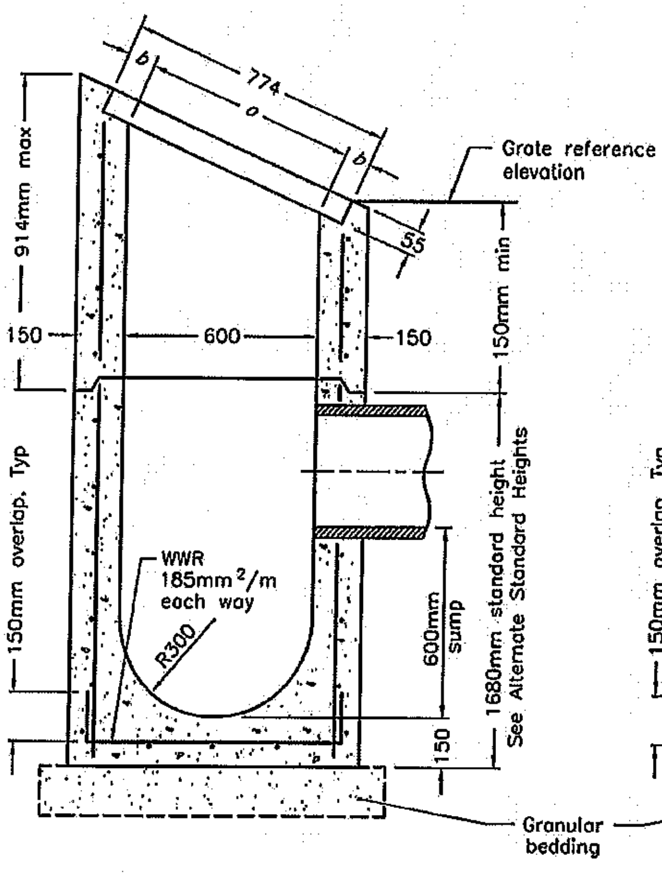


SECTION B-B

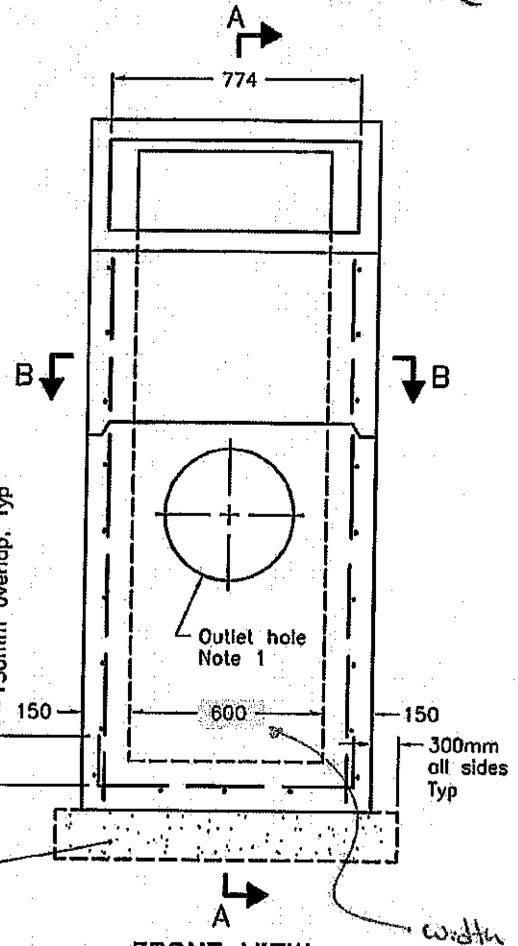
Alternate Standard Heights	
Alternate	Dimension
A	1980
B	1520
C	1380

Opening Dimensions			
Grate		a	b
Type	Slope		
A	2H:1V	670	52
	3H:1V	632	71
	4H:1V	618	78
	6H:1V	608	83
	HOR	600	87

Type of Grade



SECTION A-A



FRONT VIEW

Width of Inlet.

NOTES:

1 Outlet hole size 525mm maximum diameter, location as required.
A Where inlet is placed across ditch and is accessible to vehicular traffic, grating slope shall be 6H:1V or flatter.
B Center reinforcing in wall and slab ±25mm.
C Granular backfill shall be placed to a minimum thickness of 300mm all around the ditch inlet.
D Grating shall be according to OPSD 403.010.
E Pipe support shall be according to OPSD 708.020.
F All dimensions are nominal.
G All dimensions are in millimetres unless otherwise shown.

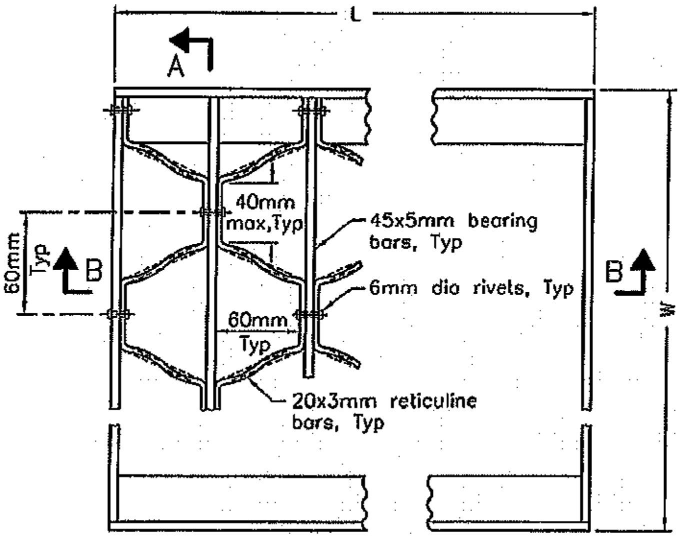
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2009 Rev 2

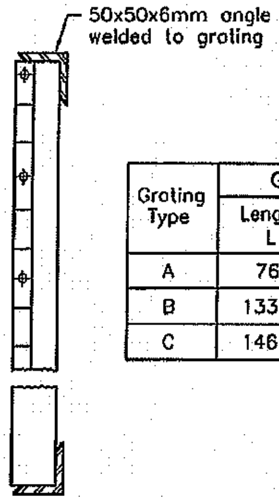
PRECAST CONCRETE DITCH INLET

600 x 600mm

OPSD 705.030



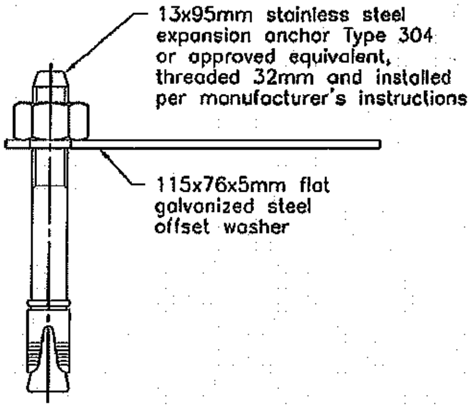
PLAN OF GRATE



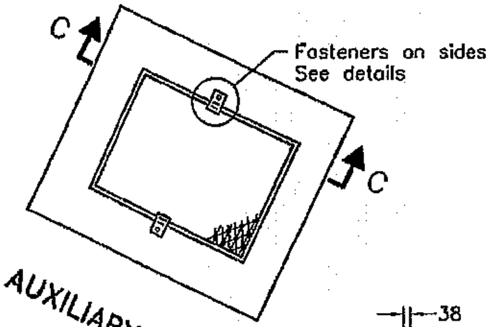
SECTION A–A

Grating Type	Grating Size	
	Length L	Width W
A	762	768
B	1338	768
C	1465	768

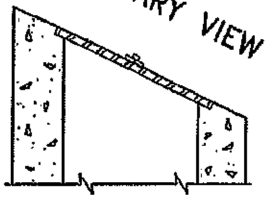
SECTION B–B



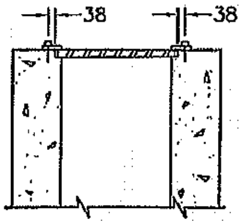
FASTENER DETAIL



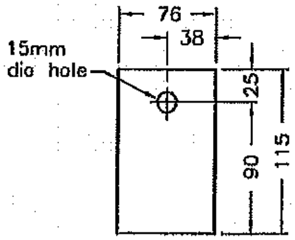
AUXILIARY VIEW



SECTION C–C



FASTENER EMBEDMENT DETAIL



OFFSET WASHER DETAIL

NOTES:

A Fastener to be inserted to maintain minimum concrete cover requirements.

B All dimensions are in millimetres unless otherwise shown.

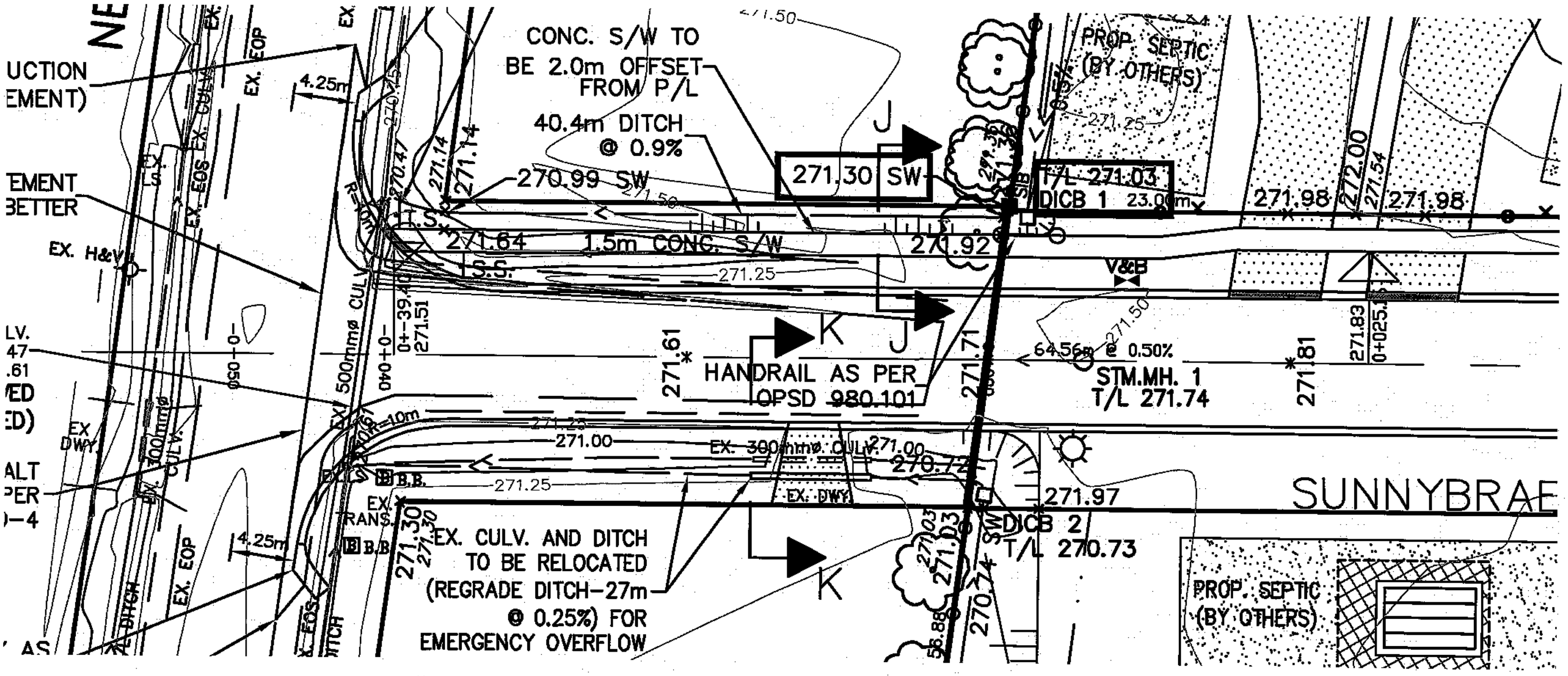
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2007 Rev 1

GALVANIZED STEEL
HONEYCOMB GRATING
FOR DITCH INLETS

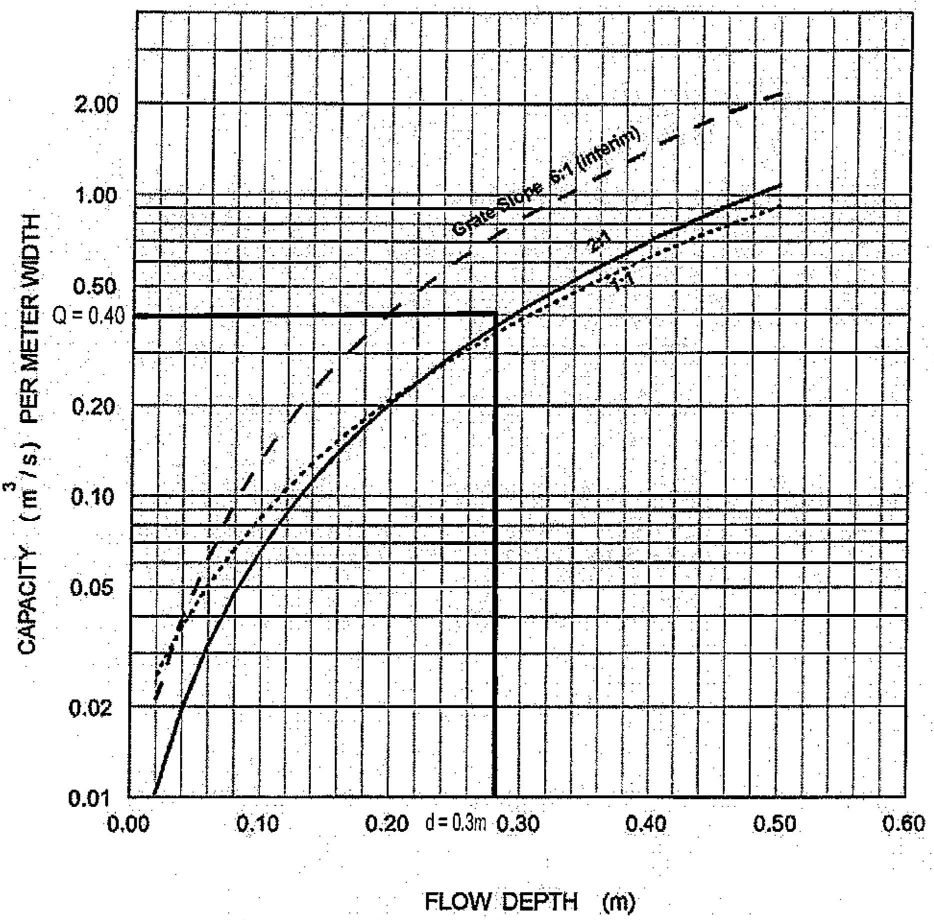
OPSD 403.010

Flow will spill to swale on side of DICB at invert of 271.30. Maxumum flow depth before spilling is 0.27m.



Inlet Capacity Calculations to DICB No. 2

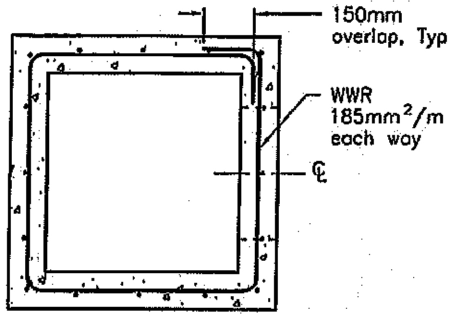
Design Chart 4.20: Ditch Inlet Capacity



Notes:

1. Curves apply to grate Type 403.01, but may be used for straight - bar inlets without significant loss of accuracy.
2. Capacities given by curves are for unobstructed grates only. For design use working capacity ≯ 0.5 x unobstructed capacity.
3. Capacities of grates operating in high velocity flows are less than indicated.

Q(inlet) = 50% 0.40 cms / m x 0.6m
= 50% x 0.24
= 0.12 cms > Q(100 Year) = 0.10 cms

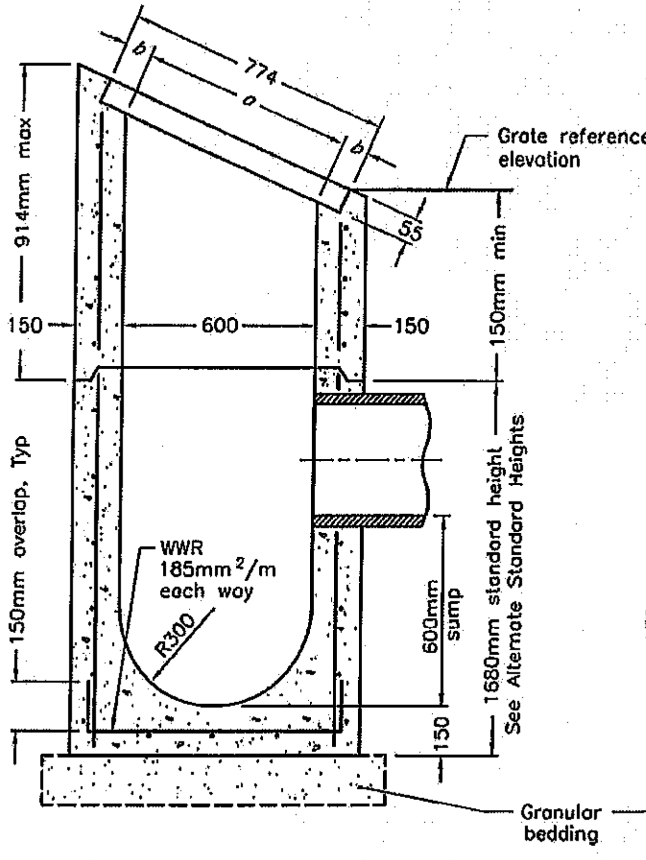


SECTION B–B

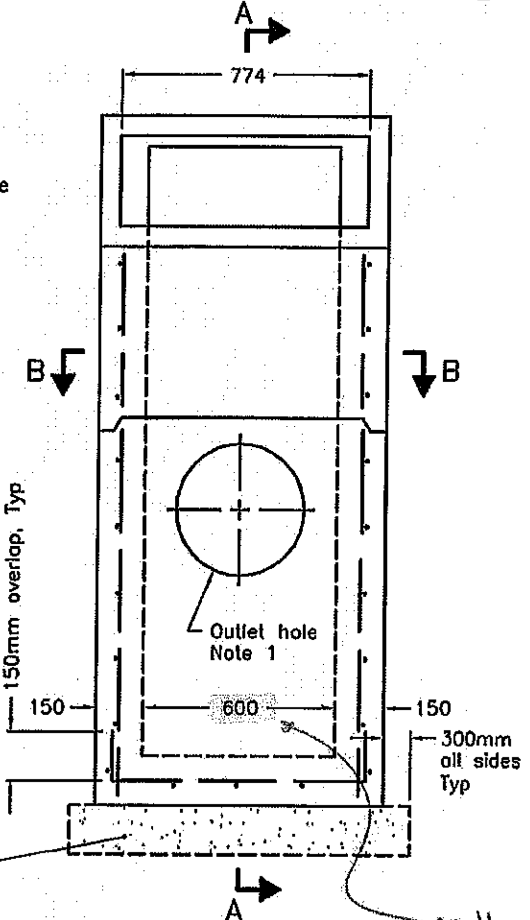
Alternate Standard Heights	
Alternate	Dimension
A	1980
B	1520
C	1380

Opening Dimensions			
Grate		a	b
Type	Slope		
A	2H:1V	670	52
	3H:1V	632	71
	4H:1V	618	78
	6H:1V	608	83
	HOR	600	87

Type of Grade



SECTION A–A



FRONT VIEW

Width of Inlet.

NOTES:

1 Outlet hole size 525mm maximum diameter, location as required.
A Where inlet is placed across ditch and is accessible to vehicular traffic, grating slope shall be 6H:1V or flatter.
B Center reinforcing in wall and slab ±25mm.
C Granular backfill shall be placed to a minimum thickness of 300mm all around the ditch inlet.
D Grating shall be according to OPSD 403.010.
E Pipe support shall be according to OPSD 708.020.
F All dimensions are nominal.
G All dimensions are in millimetres unless otherwise shown.

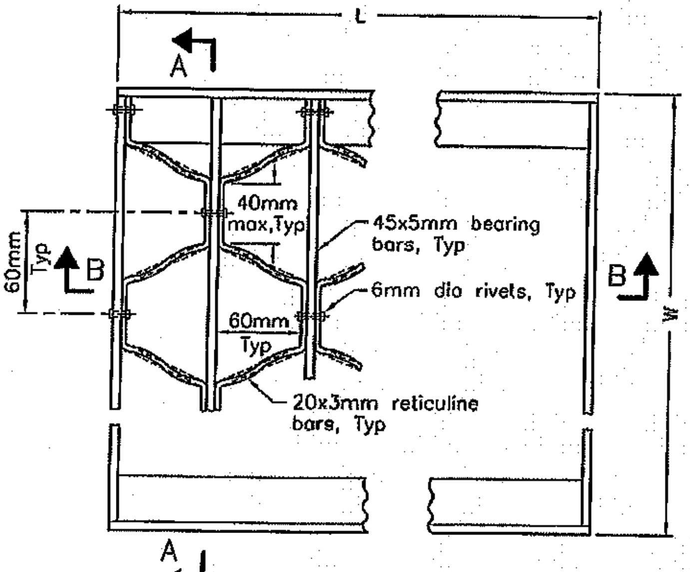
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2009 Rev 2

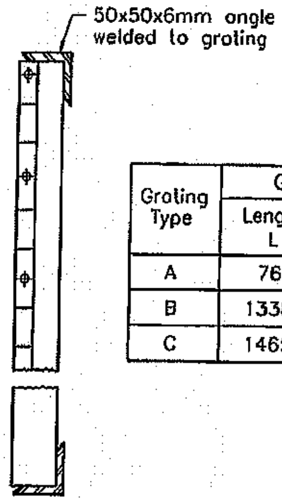
PRECAST CONCRETE DITCH INLET

600 x 600mm

OPSD 705.030



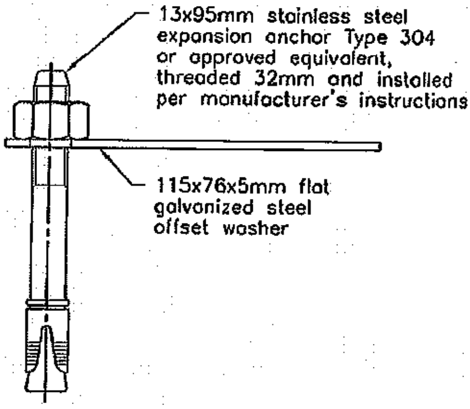
PLAN OF GRATE



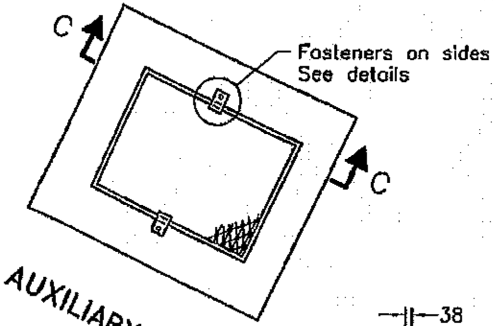
SECTION A-A

Grating Type	Grating Size	
	Length L	Width W
A	762	768
B	1338	768
C	1465	768

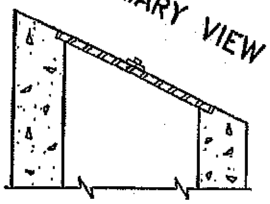
SECTION B-B



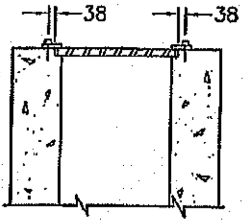
FASTENER DETAIL



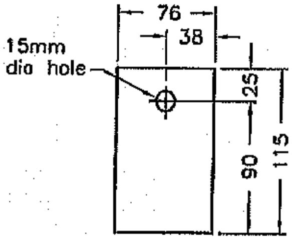
AUXILIARY VIEW



SECTION C-C



FASTENER EMBEDMENT DETAIL



OFFSET WASHER DETAIL

NOTES:

A Fastener to be inserted to maintain minimum concrete cover requirements.

B All dimensions are in millimetres unless otherwise shown.

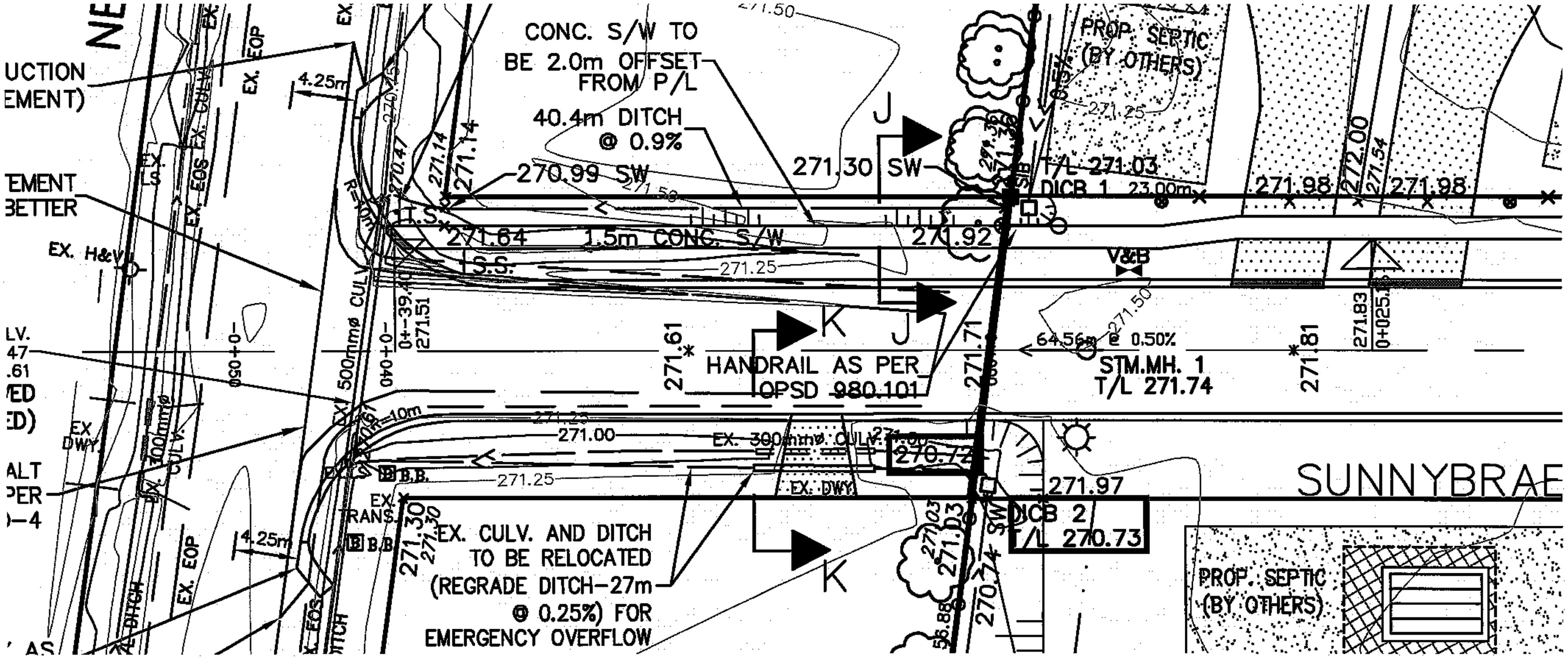
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2007 Rev 1

GALVANIZED STEEL
HONEYCOMB GRATING
FOR DITCH INLETS

OPSD 403.010

Flow will spill to swale to north after overtopping DICB lid (2:1 slope with 0.3m max. flow depth).



Appendix 5

SWM Pond Inlet & Outlet Conveyance Calculations

1. Pond Inlet
2. SWM Pond Outlet - Pond to Victoria Street
3. SWM Pond Outlet – Across the Victoria Street ROW
    a. Ditch Inlet Capacity into Storm Sewer
    b. External Area from Victoria Street to Ex. Town Easement
        i. Catchment Area
        ii. OTTHYMO Schematic
        iii. OTTHYMO Summary Output Files
    c. Upsized Storm Sewer Sizing / Capacity

Pond Inlet - Overland Flow within Block 40

Worksheet for Section A-A Pond Inlet

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.01000	m/m
Left Side Slope	2.50	m/m (H:V)
Right Side Slope	2.50	m/m (H:V)
Bottom Width	4.00	m
Discharge	1.67	m³/s

Q(MAX = 100-YEAR SCS) = 1.67 cms
REFER ADD HYD 1002

Results

Normal Depth	0.19	m
Flow Area	0.83	m²
Wetted Perimeter	5.00	m
Hydraulic Radius	0.17	m
Top Width	4.93	m
Critical Depth	0.25	m
Critical Slope	0.00375	m/m
Velocity	2.01	m/s
Velocity Head	0.21	m
Specific Energy	0.39	m
Froude Number	1.57	
Flow Type	Supercritical	

GVF Input Data

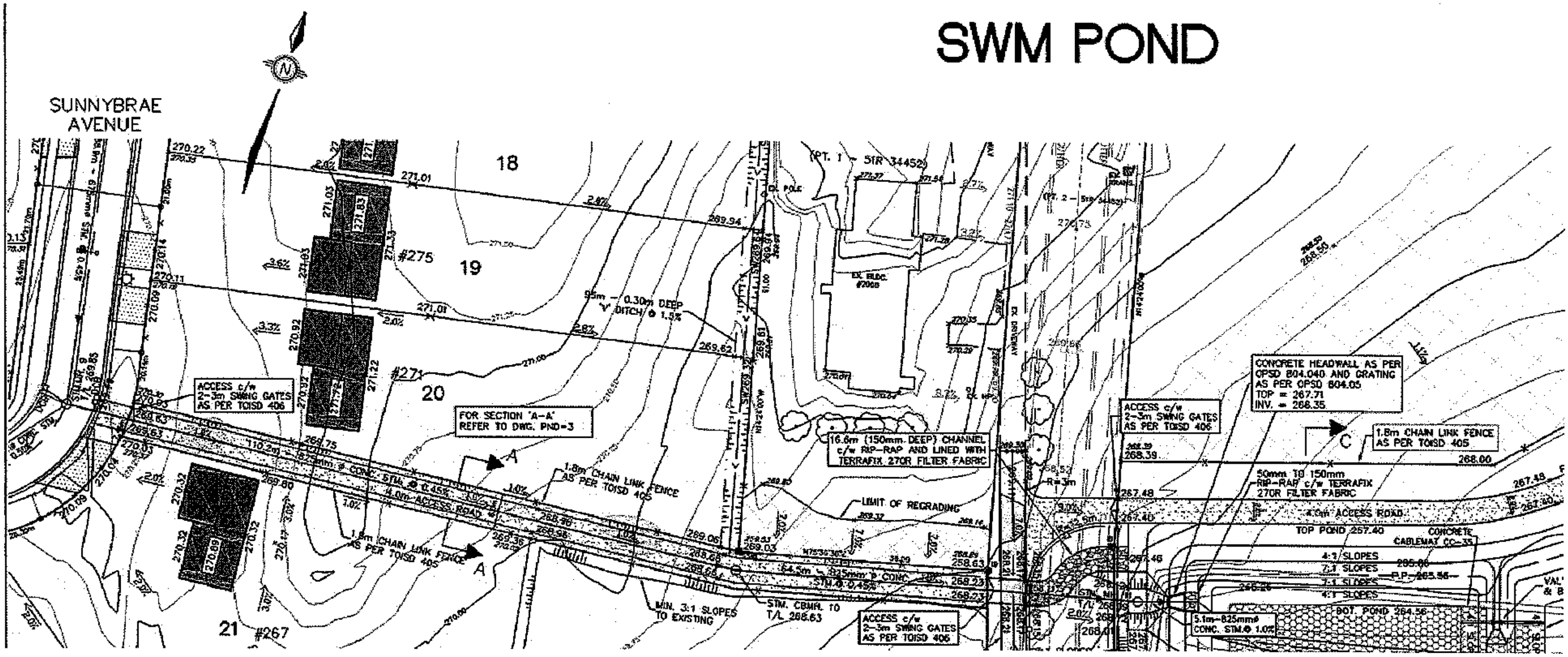
Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

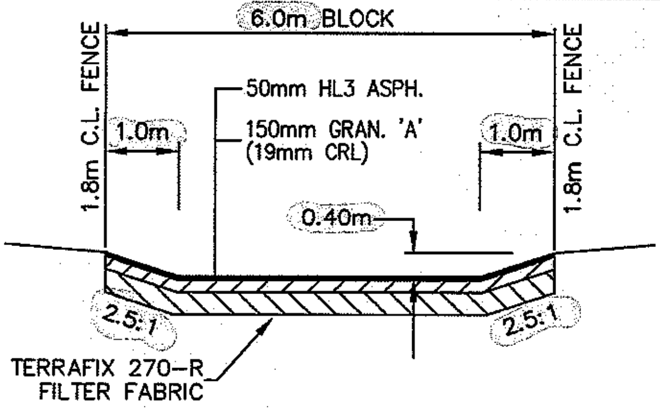
GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.19	m
Critical Depth	0.25	m
Channel Slope	0.01000	m/m

DEPTH OF OVERLAND FLOW ROUTE = 0.4m
FLOW DEPTH = 0.19m
FREEBOARD = 0.21m

SWM POND





SECTION A—A

SCALE 1:100

STORMWATER POND INLET

SWM Pond Outlet - Pond to Victoria Street

Worksheet for Section E-E to F-F Pond Outlet

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00500	m/m
Left Side Slope	3.00	m/m (H:V)
Right Side Slope	3.00	m/m (H:V)
Bottom Width	1.00	m
Discharge	1.68	m³/s

Q(MAX = Regional [Hazel]) = 1.68 cms
REFER ADD HYD 1005

Results

Normal Depth	0.60	m
Flow Area	1.67	m²
Wetted Perimeter	4.79	m
Hydraulic Radius	0.35	m
Top Width	4.59	m
Critical Depth	0.44	m
Critical Slope	0.01934	m/m
Velocity	1.00	m/s
Velocity Head	0.05	m
Specific Energy	0.65	m
Froude Number	0.53	
Flow Type	Subcritical	

GVF Input Data

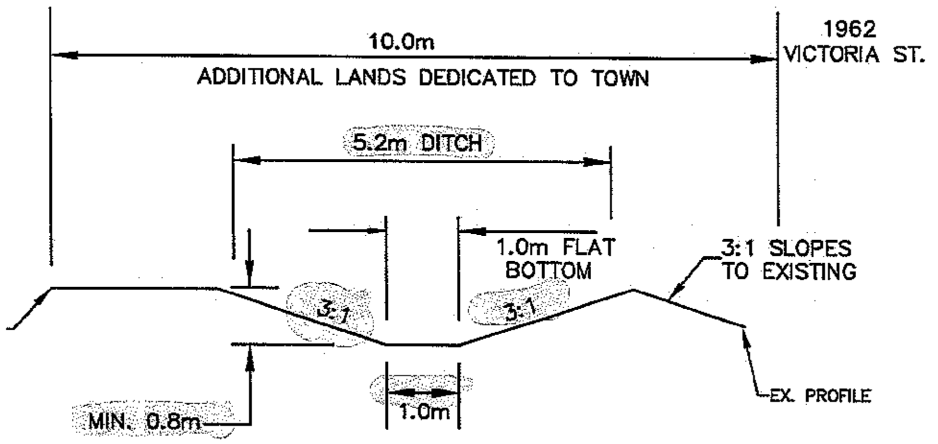
Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.60	m
Critical Depth	0.44	m
Channel Slope	0.00500	m/m

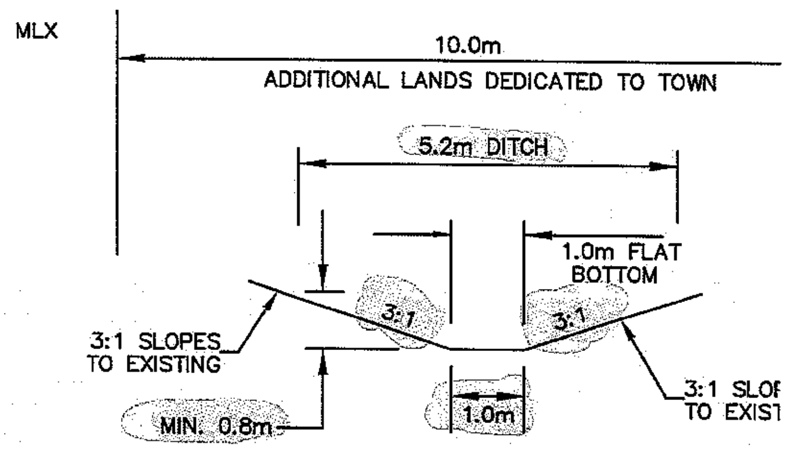
DEPTH OF OVERLAND FLOW ROUTE = 0.8m
FLOW DEPTH = 0.60m
FREEBOARD = 0.20m

STORMWATER POND OUTLET SECTIONS



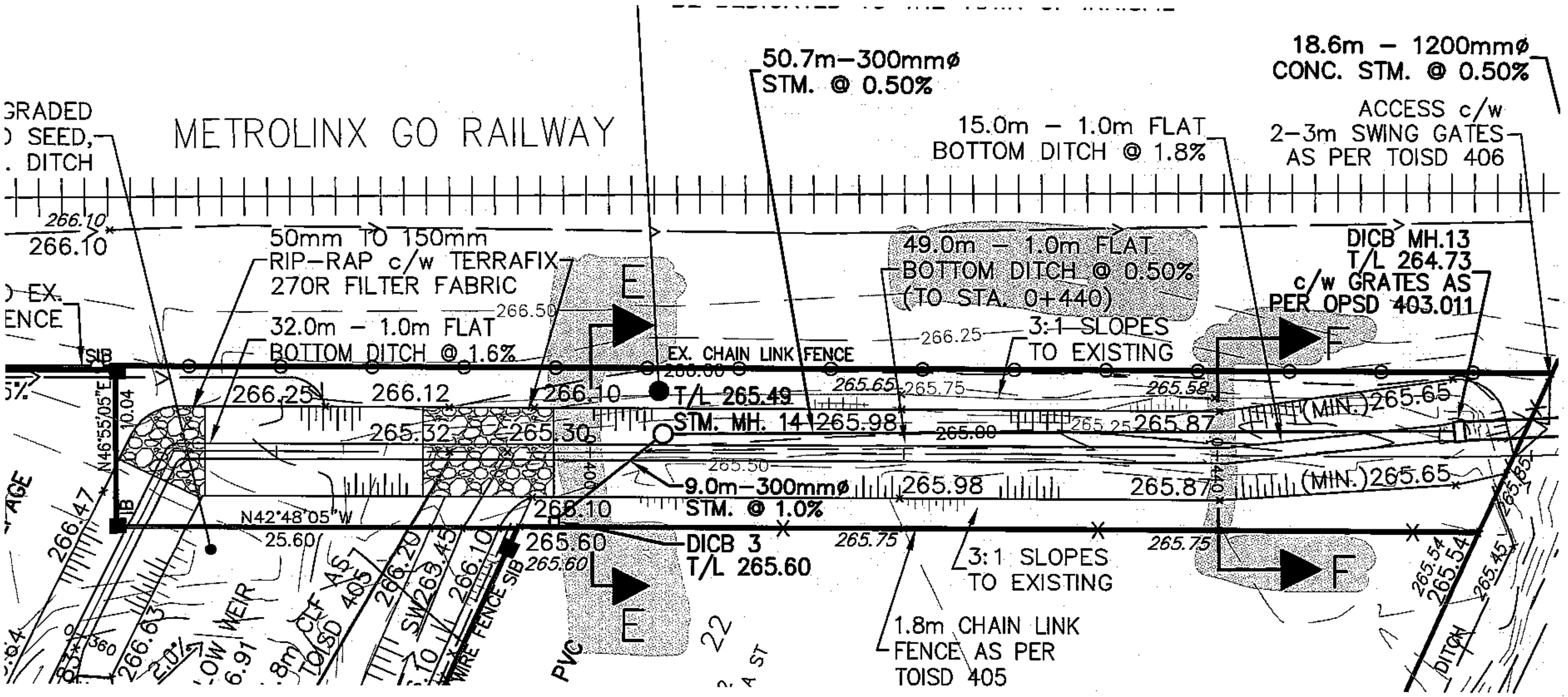
SECTION E-E

STA. 0+400
SCALE 1:100

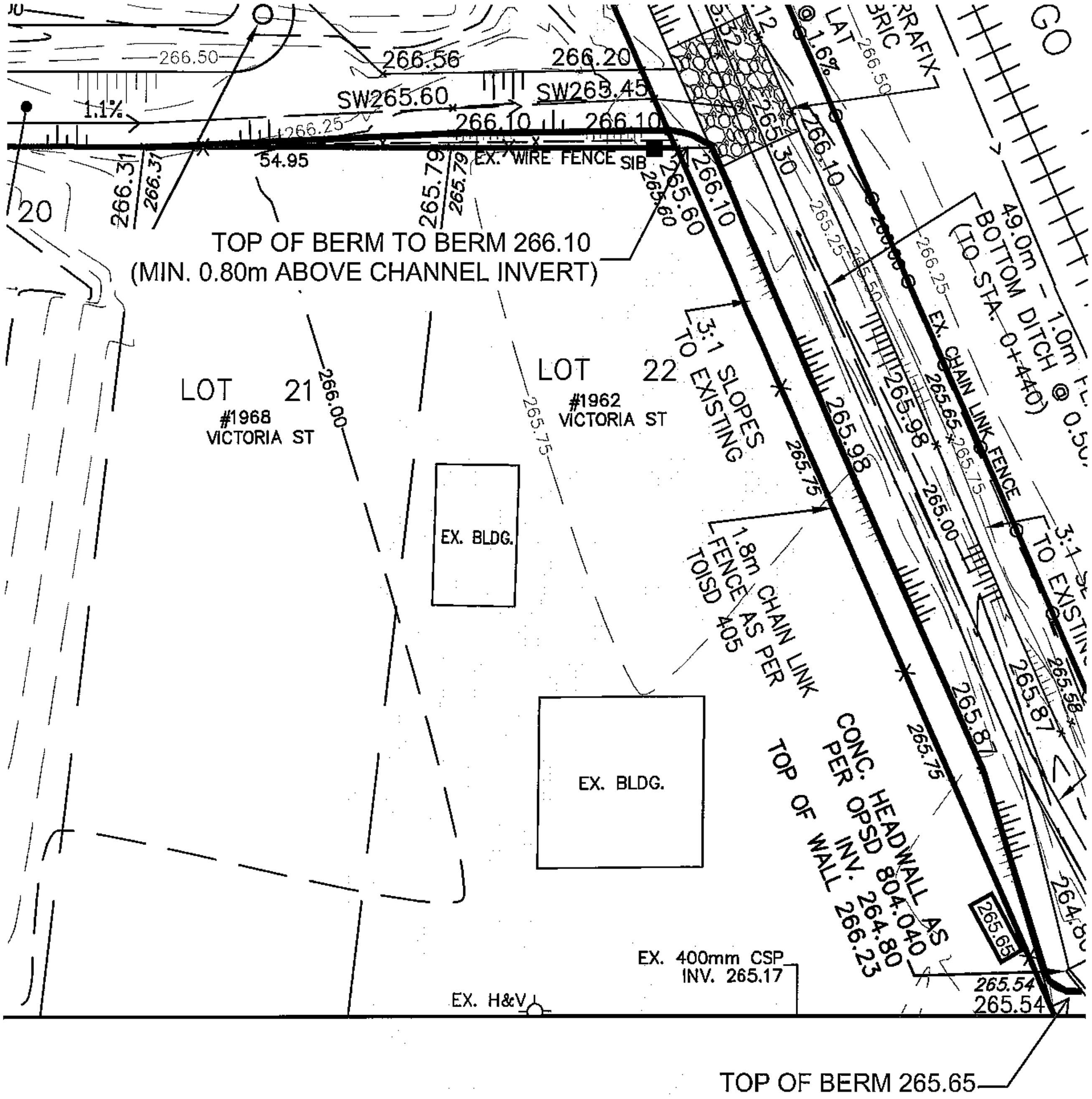


SECTION F-F

STA. 0+440
SCALE 1:100

18.6m – 1200mmø
CONC. STM. @ 0.50%
ACCESS c/w
2–3m SWING GATES
AS PER TOISD 406
50.7m–300mmø
STM. @ 0.50%
15.0m – 1.0m FLAT
BOTTOM DITCH @ 1.8%
METROLINX GO RAILWAY
RADED
SEED,
. DITCH
266.10
266.10
50mm TO 150mm
RIP–RAP c/w TERRAFIX
270R FILTER FABRIC
EX.
ENCE
SIB
32.0m – 1.0m FLAT
BOTTOM DITCH @ 1.6%
266.50
E
E
49.0m – 1.0m FLAT
BOTTOM DITCH @ 0.50%
(TO STA. 0+440)
266.25
3:1 SLOPES
TO EXISTING
DICB MH.13
T/L 264.73
c/w GRATES AS
PER OPSD 403.011
F
F
EX. CHAIN LINK FENCE
T/L 265.49
STM. MH. 14
265.98
265.65
265.75
265.58
(MIN.)265.65
266.25
266.12
266.10
265.32
265.30
265.00
265.25
265.87
265.50
9.0m–300mmø
STM. @ 1.0%
265.98
265.87
(MIN.)265.65
266.10
265.60
265.60
DICB 3
T/L 265.60
265.75
3:1 SLOPES
TO EXISTING
265.75
265.54
265.54
265.45
265.85
1.8m CHAIN LINK
FENCE AS PER
TOISD 405
N46°55'05"E
10.04
N42°48'05"W
25.60
IB
266.47
266.63
2.0%
LOW WEIR
6.91
.8m CLF AS
TOISD 405
266.20
SW263.45
266.10
WIRE FENCE SIB
PVC
22
A ST
DITCH
0+400
0+440
0+360

FALSE BERM AT REAR OF 1962 AND 1968 VICTORIA STREET



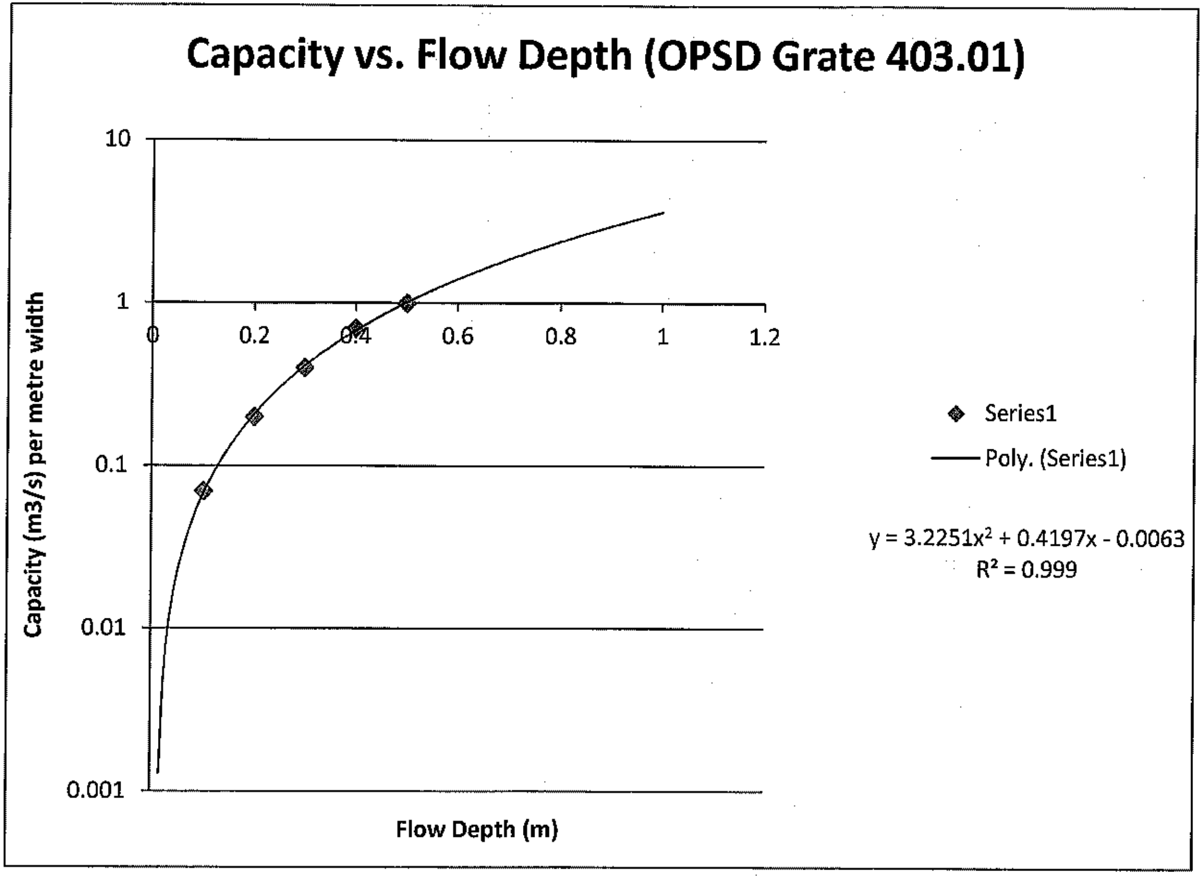
SWM Pond Outlet – Across the Victoria Street ROW

Ditch Inlet Capacity to Storm Sewer

Ditch Inlet Capacity

MTO Design Chart 4.2

Depth of Flow (m)	Capacity (m^3 / s per m)
0.01	0
0.1	0.07
0.2	0.2
0.3	0.4
0.4	0.7
0.5	1



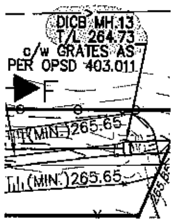
Calculator (based on regerssion analysis)

Depth of Flow (m)	Capacity (m^3 / s per m)
0.87	2.80
(user entry)	(calculated value)

Q(50%) blocked = 1.2m x 2.80 cms /m x 50%
1.68 cms

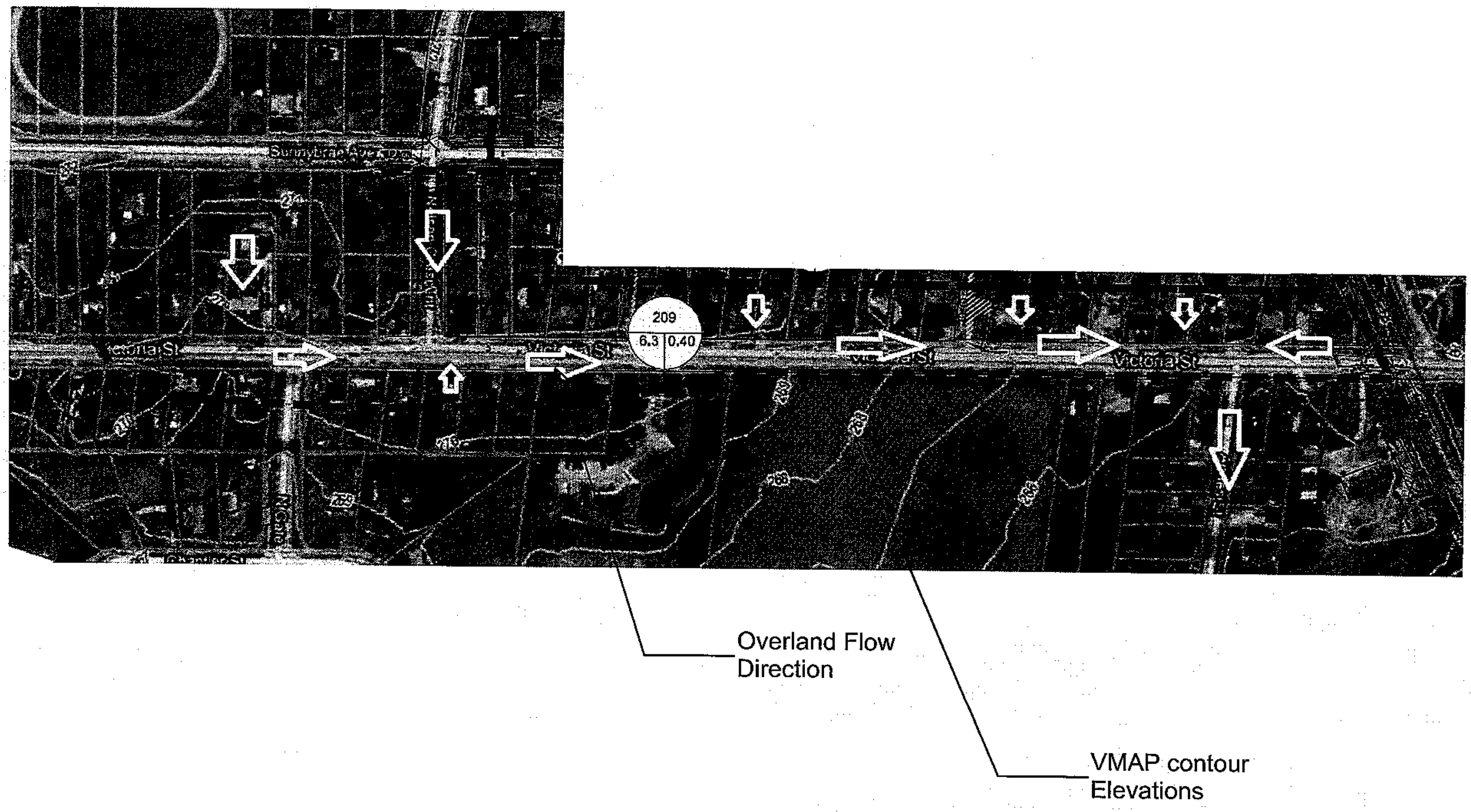
Q(Regional) = 1.68cms (ADD HYD 1005)

DICB MH 13 LID - 264.73m
+ 0.87m
Max. Headwater - 265.60 → $\boxed{265.60m}$



External Area from Victoria Street to Ex. Town Easement

a. Catchment Area
b. OTTHYMO Schematic
c. OTTHYMO Summary Output Files


Sunnybrae Ave
Victoria St
Victoria St
Victoria St
Victoria St
N Gate
209
6.3
0.40
Overland Flow Direction
VMAP contour Elevations

VICTORIA ST.
AREA = 6.3
Peak 5yr
209 Flow= 0.37cms

Catchment 209
Detailed 5yr output

```
 *****************************
 ** SIMULATION NUMBER:   2 **
 *****************************

--------------------
| CALIB              |
| STANDHYD  (0209)  |   Area     (ha)=   6.30
| )= 1 DT= 2.0 min  |   Total Imp(%)=  28.60   Dir. Conn.(%)=  21.50
--------------------

                            IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=      1.80          4.50
    Dep. Storage      (mm)=      1.00          1.50
    Average Slope     (%)=       1.00          1.00
    Length            (m)=     740.00        150.00
    Mannings n          =       .013          .250

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
               TIME     RAIN | TIME     RAIN | TIME     RAIN |  TIME     RAIN
                hrs    mm/hr |  hrs    mm/hr |  hrs    mm/hr |   hrs    mm/hr
               .033     1.61 | 3.033    2.57 | 6.033   11.58 |  9.03     2.25
               .067     1.61 | 3.067    2.57 | 6.067   11.57 |  9.07     2.25
               .100     1.61 | 3.100    2.57 | 6.100   11.57 |  9.10     2.25
               .133     1.61 | 3.133    2.57 | 6.133   11.57 |  9.13     2.25
               .167     1.61 | 3.167    2.57 | 6.167   11.57 |  9.17     2.25
               .200     1.61 | 3.200    2.57 | 6.200   11.57 |  9.20     2.25
               .233     1.61 | 3.233    2.57 | 6.233   11.57 |  9.23     2.25
               .267     1.61 | 3.267    2.57 | 6.267   11.57 |  9.27     2.25
               .300     1.61 | 3.300    2.57 | 6.300   11.57 |  9.30     2.25
               .333     1.61 | 3.333    2.57 | 6.333   11.57 |  9.33     2.25
               .367     1.61 | 3.367    2.57 | 6.367   11.57 |  9.37     2.25
               .400     1.61 | 3.400    2.57 | 6.400   11.57 |  9.40     2.25
               .433     1.61 | 3.433    2.57 | 6.433   11.57 |  9.43     2.25
               .467     1.61 | 3.467    2.57 | 6.467   11.57 |  9.47     2.25
               .500     1.61 | 3.500    2.57 | 6.500   11.57 |  9.50     2.25
               .533     1.61 | 3.533    2.57 | 6.533    5.14 |  9.53     2.25
               .567     1.61 | 3.567    2.57 | 6.567    5.14 |  9.57     2.25
               .600     1.61 | 3.600    2.57 | 6.600    5.14 |  9.60     2.25
               .633     1.61 | 3.633    2.57 | 6.633    5.14 |  9.63     2.25
               .667     1.61 | 3.667    2.57 | 6.667    5.14 |  9.67     2.25
               .700     1.61 | 3.700    2.57 | 6.700    5.14 |  9.70     2.25
               .733     1.61 | 3.733    2.57 | 6.733    5.14 |  9.73     2.25
               .767     1.61 | 3.767    2.57 | 6.767    5.14 |  9.77     2.25
               .800     1.61 | 3.800    2.57 | 6.800    5.14 |  9.80     2.25
               .833     1.61 | 3.833    2.57 | 6.833    5.14 |  9.83     2.25
               .867     1.61 | 3.867    2.57 | 6.867    5.14 |  9.87     2.25
               .900     1.61 | 3.900    2.57 | 6.900    5.14 |  9.90     2.25
               .933     1.61 | 3.933    2.57 | 6.933    5.14 |  9.93     2.25
               .967     1.61 | 3.967    2.57 | 6.967    5.14 |  9.97     2.25
              1.000     1.61 | 4.000    2.57 | 7.000    5.14 | 10.00     2.25
              1.033     1.61 | 4.033    3.86 | 7.033    3.86 | 10.03     1.29
              1.067     1.61 | 4.067    3.86 | 7.067    3.86 | 10.07     1.29
              1.100     1.61 | 4.100    3.86 | 7.100    3.86 | 10.10     1.29
              1.133     1.61 | 4.133    3.86 | 7.133    3.86 | 10.13     1.29
              1.167     1.61 | 4.167    3.86 | 7.167    3.86 | 10.17     1.29
              1.200     1.61 | 4.200    3.86 | 7.200    3.86 | 10.20     1.29
              1.233     1.61 | 4.233    3.86 | 7.233    3.86 | 10.23     1.29
              1.267     1.61 | 4.267    3.86 | 7.267    3.86 | 10.27     1.29
              1.300     1.61 | 4.300    3.86 | 7.300    3.86 | 10.30     1.29
              1.333     1.61 | 4.333    3.86 | 7.333    3.86 | 10.33     1.29
              1.367     1.61 | 4.367    3.86 | 7.367    3.86 | 10.37     1.29
              1.400     1.61 | 4.400    3.86 | 7.400    3.86 | 10.40     1.29
              1.433     1.61 | 4.433    3.86 | 7.433    3.86 | 10.43     1.29
              1.467     1.61 | 4.467    3.86 | 7.467    3.86 | 10.47     1.29
              1.500     1.61 | 4.500    3.86 | 7.500    3.86 | 10.50     1.29
              1.533     1.61 | 4.533    5.14 | 7.533    3.86 | 10.53     1.29
              1.567     1.61 | 4.567    5.14 | 7.567    3.86 | 10.57     1.29
              1.600     1.61 | 4.600    5.14 | 7.600    3.86 | 10.60     1.29
              1.633     1.61 | 4.633    5.14 | 7.633    3.86 | 10.63     1.29
              1.667     1.61 | 4.667    5.14 | 7.667    3.86 | 10.67     1.29
              1.700     1.61 | 4.700    5.14 | 7.700    3.86 | 10.70     1.29
              1.733     1.61 | 4.733    5.14 | 7.733    3.86 | 10.73     1.29
              1.767     1.61 | 4.767    5.14 | 7.767    3.86 | 10.77     1.29
              1.800     1.61 | 4.800    5.14 | 7.800    3.86 | 10.80     1.29
              1.833     1.61 | 4.833    5.14 | 7.833    3.86 | 10.83     1.29
              1.867     1.61 | 4.867    5.14 | 7.867    3.86 | 10.87     1.29
              1.900     1.61 | 4.900    5.14 | 7.900    3.86 | 10.90     1.29
              1.933     1.61 | 4.933    5.14 | 7.933    3.86 | 10.93     1.29
              1.967     1.61 | 4.967    5.14 | 7.967    3.86 | 10.97     1.29
              2.000     1.61 | 5.000    5.14 | 8.000    3.86 | 11.00     1.29
              2.033     1.93 | 5.033    7.72 | 8.033    2.25 | 11.03     1.29
              2.067     1.93 | 5.067    7.72 | 8.067    2.25 | 11.07     1.29
              2.100     1.93 | 5.100    7.72 | 8.100    2.25 | 11.10     1.29
              2.133     1.93 | 5.133    7.72 | 8.133    2.25 | 11.13     1.29
              2.167     1.93 | 5.167    7.72 | 8.167    2.25 | 11.17     1.29
              2.200     1.93 | 5.200    7.72 | 8.200    2.25 | 11.20     1.29
              2.233     1.93 | 5.233    7.72 | 8.233    2.25 | 11.23     1.29
```

```
              2.267     1.93 | 5.267     7.72 | 8.267     2.25 | 11.27      1.29
              2.300     1.93 | 5.300     7.72 | 8.300     2.25 | 11.30      1.29
              2.333     1.93 | 5.333     7.72 | 8.333     2.25 | 11.33      1.29
              2.367     1.93 | 5.367     7.72 | 8.367     2.25 | 11.37      1.29
              2.400     1.93 | 5.400     7.72 | 8.400     2.25 | 11.40      1.29
              2.433     1.93 | 5.433     7.72 | 8.433     2.25 | 11.43      1.29
              2.467     1.93 | 5.467     7.72 | 8.467     2.25 | 11.47      1.29
              2.500     1.93 | 5.500     7.72 | 8.500     2.25 | 11.50      1.29
              2.533     1.93 | 5.533    30.86 | 8.533     2.25 | 11.53      1.29
              2.567     1.93 | 5.567    30.86 | 8.567     2.25 | 11.57      1.29
              2.600     1.93 | 5.600    30.86 | 8.600     2.25 | 11.60      1.29
              2.633     1.93 | 5.633    30.86 | 8.633     2.25 | 11.63      1.29
              2.667     1.93 | 5.667    30.86 | 8.667     2.25 | 11.67      1.29
              2.700     1.93 | 5.700    30.86 | 8.700     2.25 | 11.70      1.29
              2.733     1.93 | 5.733    30.86 | 8.733     2.25 | 11.73      1.29
              2.767     1.93 | 5.767    57.86 | 8.767     2.25 | 11.77      1.29
              2.800     1.93 | 5.800    84.88 | 8.800     2.25 | 11.80      1.29
              2.833     1.93 | 5.833    84.88 | 8.833     2.25 | 11.83      1.29
              2.867     1.93 | 5.867    84.88 | 8.867     2.25 | 11.87      1.29
              2.900     1.93 | 5.900    84.88 | 8.900     2.25 | 11.90      1.29
              2.933     1.93 | 5.933    84.88 | 8.933     2.25 | 11.93      1.29
              2.967     1.93 | 5.967    84.88 | 8.967     2.25 | 11.97      1.29
              3.000     1.93 | 6.000    84.88 | 9.000     2.25 | 12.00      1.28

    Max.Eff.Inten.(mm/hr)=       84.88         50.37
               over (min)        10.00         36.00
    Storage Coeff.  (min)=        9.06 (ii)    34.33 (ii)
    Unit Hyd. Tpeak (min)=       10.00         36.00
    Unit Hyd. peak  (cms)=         .12           .03
                                                            *TOTALS*
    PEAK FLOW       (cms)=         .25           .28           .370 (iii)
    TIME TO PEAK    (hrs)=         .00          6.47           6.10
    RUNOFF VOLUME     (mm)=      63.30         20.65          29.82
    TOTAL RAINFALL    (mm)=      64.30         64.30          64.30
    RUNOFF COEFFICIENT   =         .98           .32            .46

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 50.00          K  (1/hr)=  2.00
            Fc    (mm/hr)=  7.50      Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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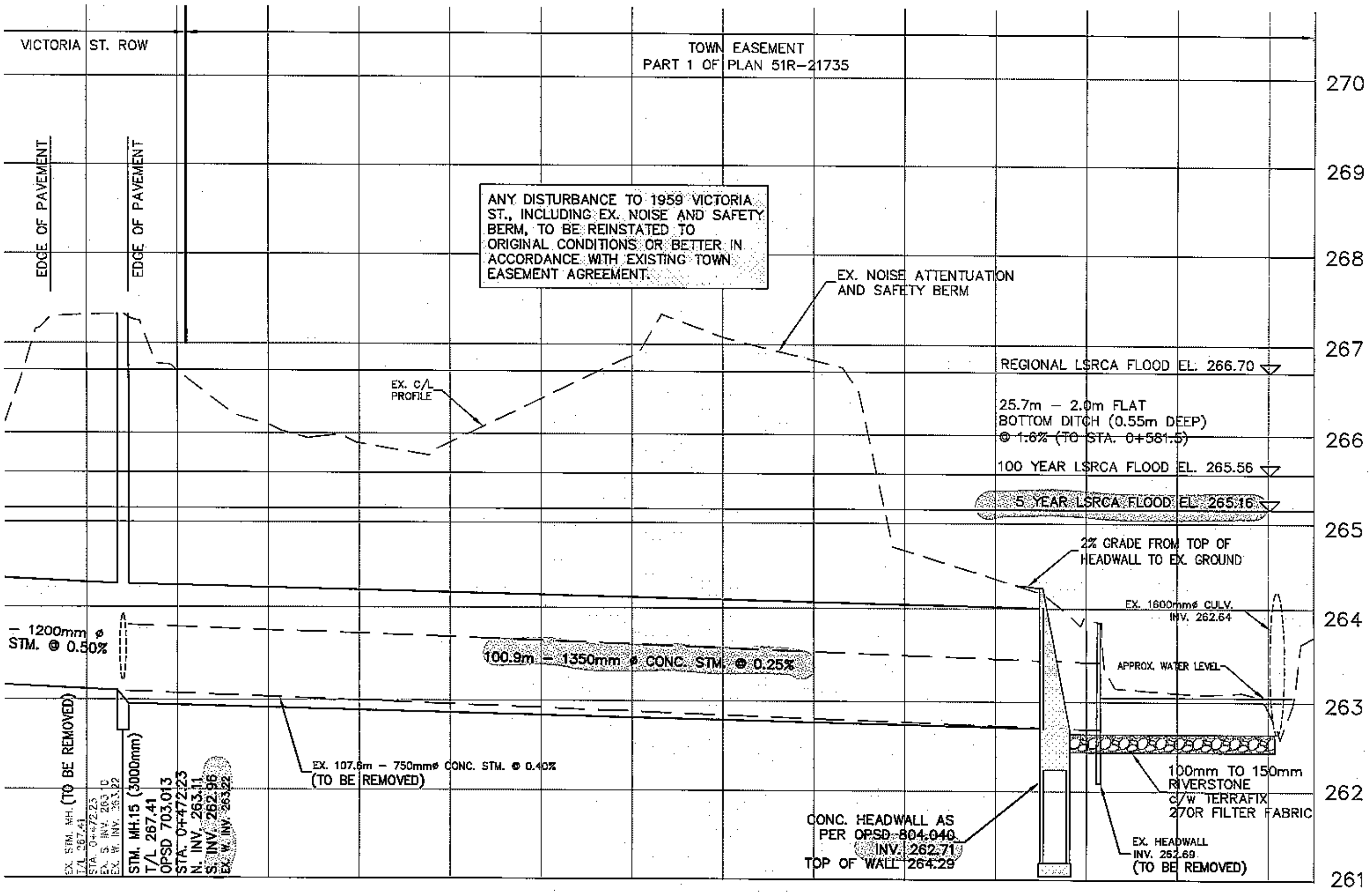
Upsized Storm Sewer Sizing / Capacity


VICTORIA ST. ROW
TOWN EASEMENT
PART 1 OF PLAN 51R-21735
270
269
268
267
266
265
264
263
262
261
EDGE OF PAVEMENT
EDGE OF PAVEMENT
ANY DISTURBANCE TO 1959 VICTORIA ST., INCLUDING EX. NOISE AND SAFETY BERM, TO BE REINSTATED TO ORIGINAL CONDITIONS OR BETTER IN ACCORDANCE WITH EXISTING TOWN EASEMENT AGREEMENT.
EX. NOISE ATTENTUATION AND SAFETY BERM
EX. C/L PROFILE
REGIONAL LSRCA FLOOD EL. 266.70
25.7m – 2.0m FLAT BOTTOM DITCH (0.55m DEEP) @ 1.6% (TO STA. 0+581.5)
100 YEAR LSRCA FLOOD EL. 265.56
5 YEAR LSRCA FLOOD EL. 265.16
2% GRADE FROM TOP OF HEADWALL TO EX. GROUND
EX. 1600mmø CULV. INV. 262.64
APPROX. WATER LEVEL
– 1200mm ø STM. @ 0.50%
100.9m – 1350mm ø CONC. STM. @ 0.25%
EX. 107.6m – 750mmø CONC. STM. @ 0.40% (TO BE REMOVED)
EX. STM. MH. (TO BE REMOVED)
T/L 267.41
STA. 0+472.23
EX. S. INV. 263.10
EX. W. INV. 263.22
STM. MH.15 (3000mm)
T/L 267.41
OPSD 703.013
STA. 0+472.23
N. INV. 263.11
S. INV. 262.96
EX. W. INV. 263.22
CONC. HEADWALL AS PER OPSD 804.040
INV. 262.71
TOP OF WALL 264.29
100mm TO 150mm RIVERSTONE c/w TERRAFIX 270R FILTER FABRIC
EX. HEADWALL INV. 262.69 (TO BE REMOVED)

Culvert Calculator Report
1350 mm diameter - Alternate Outlet

Solve For: Headwater Elevation

Max. headwater before discharge in DICB3 at 1962 Victoria Street

Culvert Summary

Allowable HW Elevation	265.60 m	Headwater Depth/Height	1.80
Computed Headwater Eleve	265.42 m	Discharge	2.0500 m³/s
Inlet Control HW Elev.	265.16 m	Tailwater Elevation	265.16 m
Outlet Control HW Elev.	265.42 m	Control Type	Outlet Control

See below for required design flow

Headwater developed in Prop. 3000mm dia. MH on Victoria Street

Grades

Upstream Invert	262.96 m	Downstream Invert	262.69 m
Length	107.60 m	Constructed Slope	0.002509 m/m

Hydraulic Profile

Profile	PressureProfile	Depth, Downstream	2.47 m
Slope Type	N/A	Normal Depth	0.87 m
Flow Regime	N/A	Critical Depth	0.76 m
Velocity Downstream	1.39 m/s	Critical Slope	0.003909 m/m

Section

Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.37 m
Section Size	1350 mm	Rise	1.37 m
Number Sections	1		

Outlet Control Properties

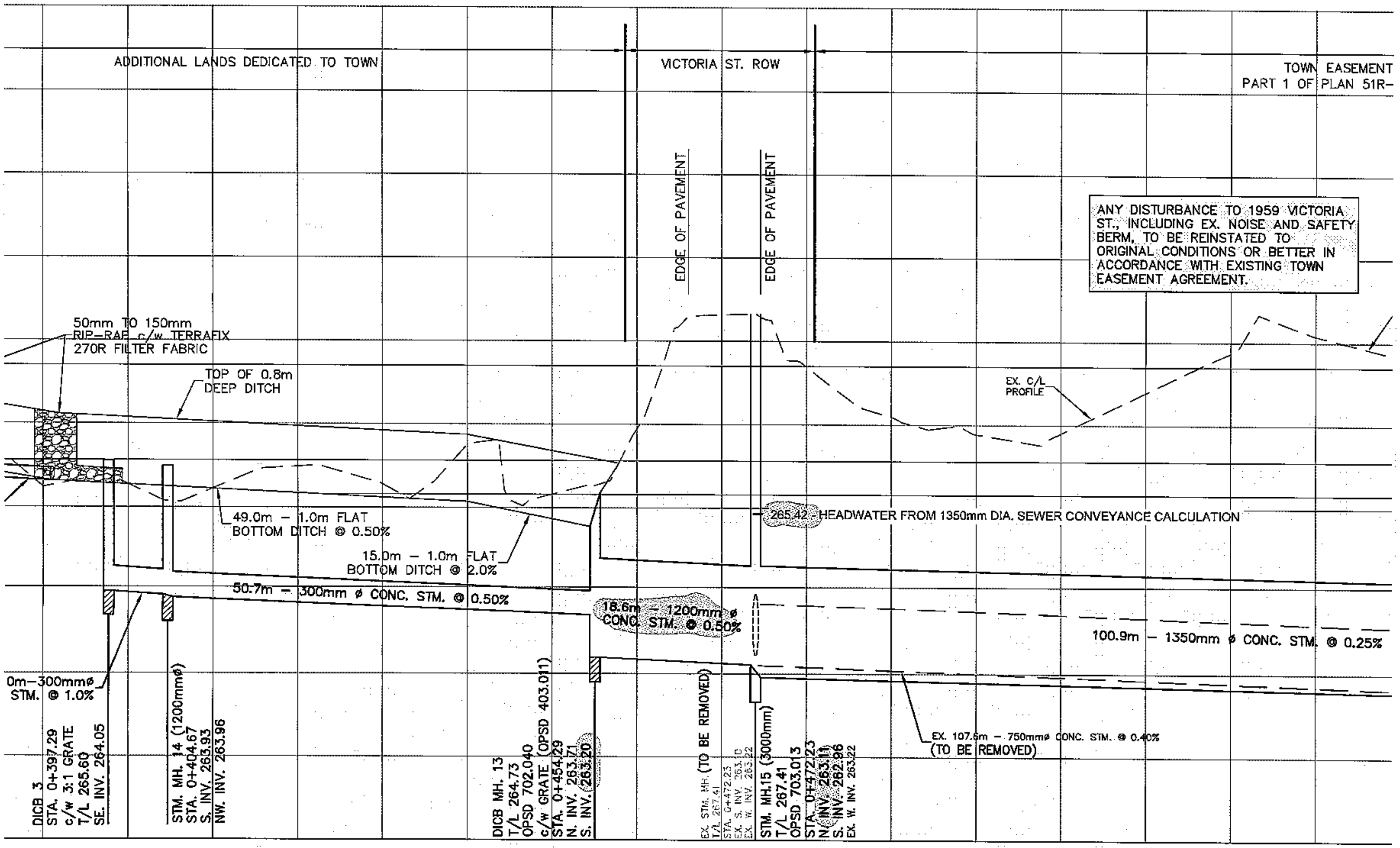
Outlet Control HW Elev.	265.42 m	Upstream Velocity Head	0.10 m
Ke	0.20	Entrance Loss	0.02 m

Inlet Control Properties

Inlet Control HW Elev.	265.16 m	Flow Control	Unsubmerged
Inlet Type	Beveled ring, 33.7° bevels	Area Full	1.5 m²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	B
C	0.02430	Equation Form	1
Y	0.83000		

REGIONAL FLOW FROM PROP. 3000mm DIA. TO EX. OUTLET WITHIN EASEMENT

SITE FLOW - 1.68 cms - REGIONAL FLOW - REFER TO ADD HYD 1005
EXTERNAL FLOW - 0.37 cms - 5-YEAR FLOW IN SEWER - REFER TO CATCHMENT 209
REQUIRED CAPACITY - 2.05 cms


ADDITIONAL LANDS DEDICATED TO TOWN
VICTORIA ST. ROW
TOWN EASEMENT
PART 1 OF PLAN 51R-
EDGE OF PAVEMENT
EDGE OF PAVEMENT
ANY DISTURBANCE TO 1959 VICTORIA ST., INCLUDING EX. NOISE AND SAFETY BERM, TO BE REINSTATED TO ORIGINAL CONDITIONS OR BETTER IN ACCORDANCE WITH EXISTING TOWN EASEMENT AGREEMENT.
50mm TO 150mm RIP-RAP c/w TERRAFIX 270R FILTER FABRIC
TOP OF 0.8m DEEP DITCH
EX. C/L PROFILE
49.0m – 1.0m FLAT BOTTOM DITCH @ 0.50%
15.0m – 1.0m FLAT BOTTOM DITCH @ 2.0%
265.42 HEADWATER FROM 1350mm DIA. SEWER CONVEYANCE CALCULATION
50.7m – 300mm ø CONC. STM. @ 0.50%
18.6m – 1200mm ø CONC. STM. @ 0.50%
100.9m – 1350mm ø CONC. STM. @ 0.25%
0m–300mmø STM. @ 1.0%
EX. 107.6m – 750mmø CONC. STM. @ 0.40% (TO BE REMOVED)
DICB 3
STA. 0+397.29
c/w 3:1 GRATE
T/L 265.60
SE. INV. 264.05
STM. MH. 14 (1200mmø)
STA. 0+404.67
S. INV. 263.93
NW. INV. 263.96
DICB MH. 13
T/L 264.73
OPSD 702.040
c/w GRATE (OPSD 403.011)
STA. 0+454.29
N. INV. 263.71
S. INV. 263.20
EX. STM. MH. (TO BE REMOVED)
T/L 267.41
STA. 0+472.23
EX. S. INV. 263.10
EX. W. INV. 263.22
STM. MH.15 (3000mm)
T/L 267.41
OPSD 703.013
STA. 0+472.23
N. INV. 263.11
S. INV. 282.96
EX. W. INV. 263.22

Culvert Calculator Report
1200mm diameter - Alternate Outlet

Solve For: Headwater Elevation

Max. headwater before discharge in DICB3 at 1962 Victoria Street

Culvert Summary

Allowable HW Elevation	265.60	m	Headwater Depth/Height	1.95	
Computed Headwater Eleva	265.58	m	Discharge	1.6800	m³/s
Inlet Control HW Elev.	265.42	m	Tailwater Elevation	265.42	m
Outlet Control HW Elev.	265.58	m	Control Type	Outlet Control	

See below for required design flow

Headwater developed at DICB MH 13

Grades

Upstream Invert	263.20	m	Downstream Invert	263.11	m
Length	18.60	m	Constructed Slope	0.004839	m/m

Hydraulic Profile

Profile	PressureProfile		Depth, Downstream	2.31	m
Slope Type	N/A		Normal Depth	0.68	m
Flow Regime	N/A		Critical Depth	0.71	m
Velocity Downstream	1.44	m/s	Critical Slope	0.004195	m/m

Section

Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	1.22	m
Section Size	1200 mm		Rise	1.22	m
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	265.58	m	Upstream Velocity Head	0.11	m
Ke	0.20		Entrance Loss	0.02	m

Inlet Control Properties

Inlet Control HW Elev.	265.42	m	Flow Control	Unsubmerged	
Inlet Type	Beveled ring, 33.7° bevels		Area Full	1.2	m²
K	0.00180		HDS 5 Chart	3	
M	2.50000		HDS 5 Scale	B	
C	0.02430		Equation Form	1	
Y	0.83000				

REGIONAL FLOW ACROSS VICTORIA STREET

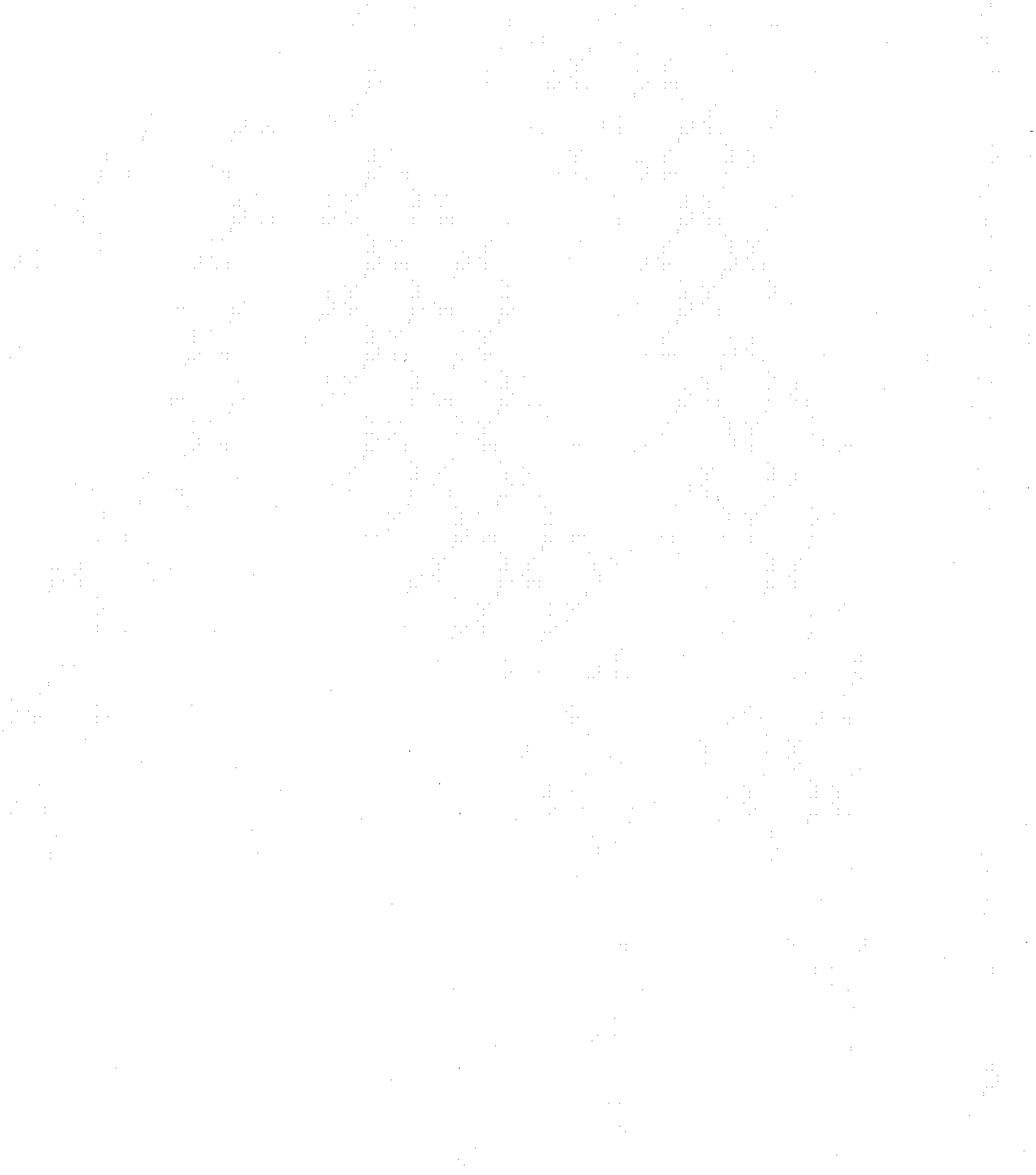
SITE FLOW - 1.68 cms - REGIONAL FLOW - REFER TO ADD HYD 1005
REQUIRED CAPACITY - 1.68 cms

Appendix 6

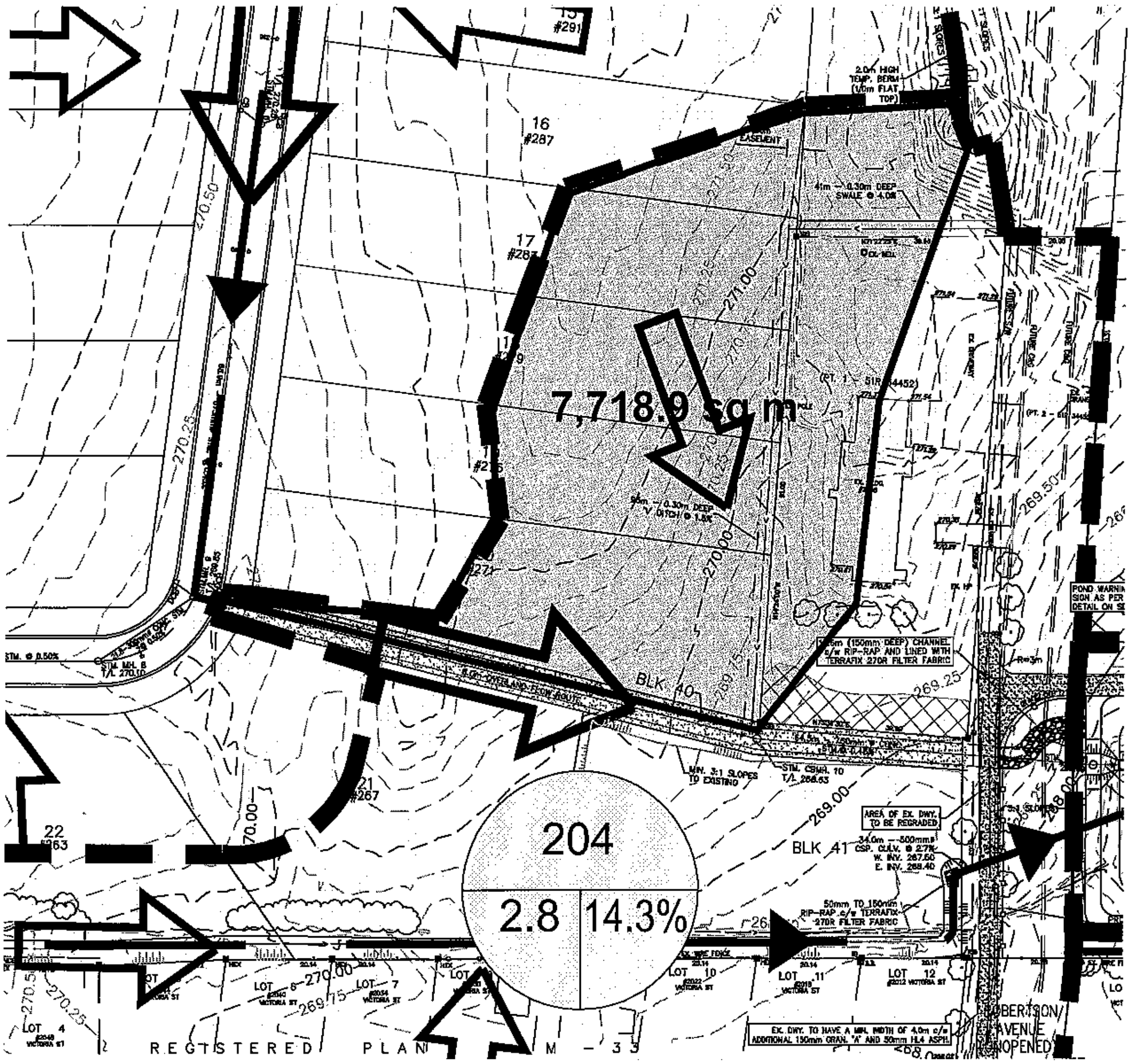
Local Drainage Conveyance Calculations

1. Rear Yard Swales Lot 16 to 20
2. Rear Yard Swales BLK 41, Lot 21 to 23
3. Robertson Road (unopened ROW) Culvert Calculations

Rear Yard Swales – Lot 16 to 20



Local Drainage
Rear Yard Swale (Lot 16 to 21)

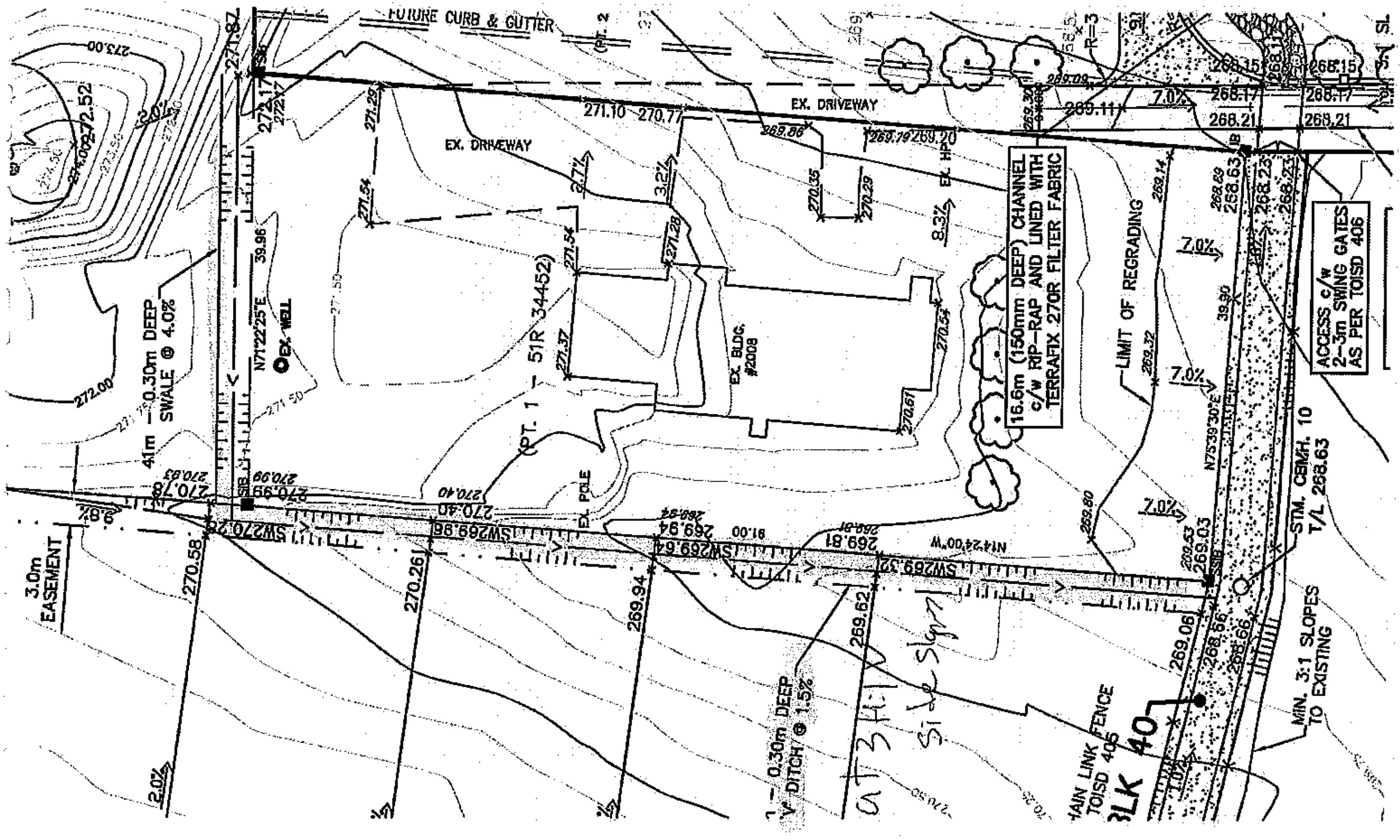


Pro-Rated Flow to Swale

Catchment 205 - Q(100 Year SCS) = 0.30 cms

$$\text{Pro-Rated Flow} = \frac{0.772\text{ ha}}{2.80\text{ ha}} \times 0.30\text{ cms}$$

$$= 0.083\text{ cms}$$


FUTURE CURB & GUTTER
PT. 2
EX. DRIVEWAY
EX. DRIVEWAY
EX. HP
EX. BLDG. #2008
PT. 1 - 51R 34452
EX. WELL
N71°22'25"E
39.96
41m - 0.30m DEEP SWALE @ 4.0%
3.0m EASEMENT
EX. POLE
N14°24'00"W
91.00
16.6m (150mm DEEP) CHANNEL c/w RIP-RAP AND LINED WITH TERRAFIX 270R FILTER FABRIC
LIMIT OF REGRADING
N75°39'30"E
39.30
ACCESS c/w 2-3m SWING GATES AS PER TOISD 406
STM. CBMH. 10 T/L 268.63
MIN. 3:1 SLOPES TO EXISTING
CHAIN LINK FENCE TOISD 405
BLK 40
0.30m DEEP 'V' DITCH @ 1.5%
at 3H:1 Side Slope
R=3
SIB
IB
7.0%
8.3%
3.2%
2.7%
2.0%
1.0%
273.00
272.52
272.00
271.50
271.10
270.77
271.54
271.28
271.37
270.35
270.29
270.54
270.61
269.20
269.11
268.63
268.23
268.21
268.17
268.15
269.14
269.32
269.80
269.03
269.06
268.56
268.66
SW270.26
SW269.96
SW269.64
SW269.32
270.58
270.26
269.94
269.62
270.40
270.99
270.78
269.81

Worksheet for Rear yard swale (Lots 16 to 20) - 4th Submission

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.01500	m/m
Left Side Slope	3.00	m/m (H:V)
Right Side Slope	3.00	m/m (H:V)
Discharge	0.08	m³/s

← Q(100-Year SCS) = 0.08cms
REFER OTTHMYO 205 (pro-rated)

Results

Normal Depth	0.20	m
Flow Area	0.12	m²
Wetted Perimeter	1.24	m
Hydraulic Radius	0.09	m
Top Width	1.18	m
Critical Depth	0.17	m
Critical Slope	0.02913	m/m
Velocity	0.72	m/s
Velocity Head	0.03	m
Specific Energy	0.22	m
Froude Number	0.73	
Flow Type	Subcritical	

GVF Input Data

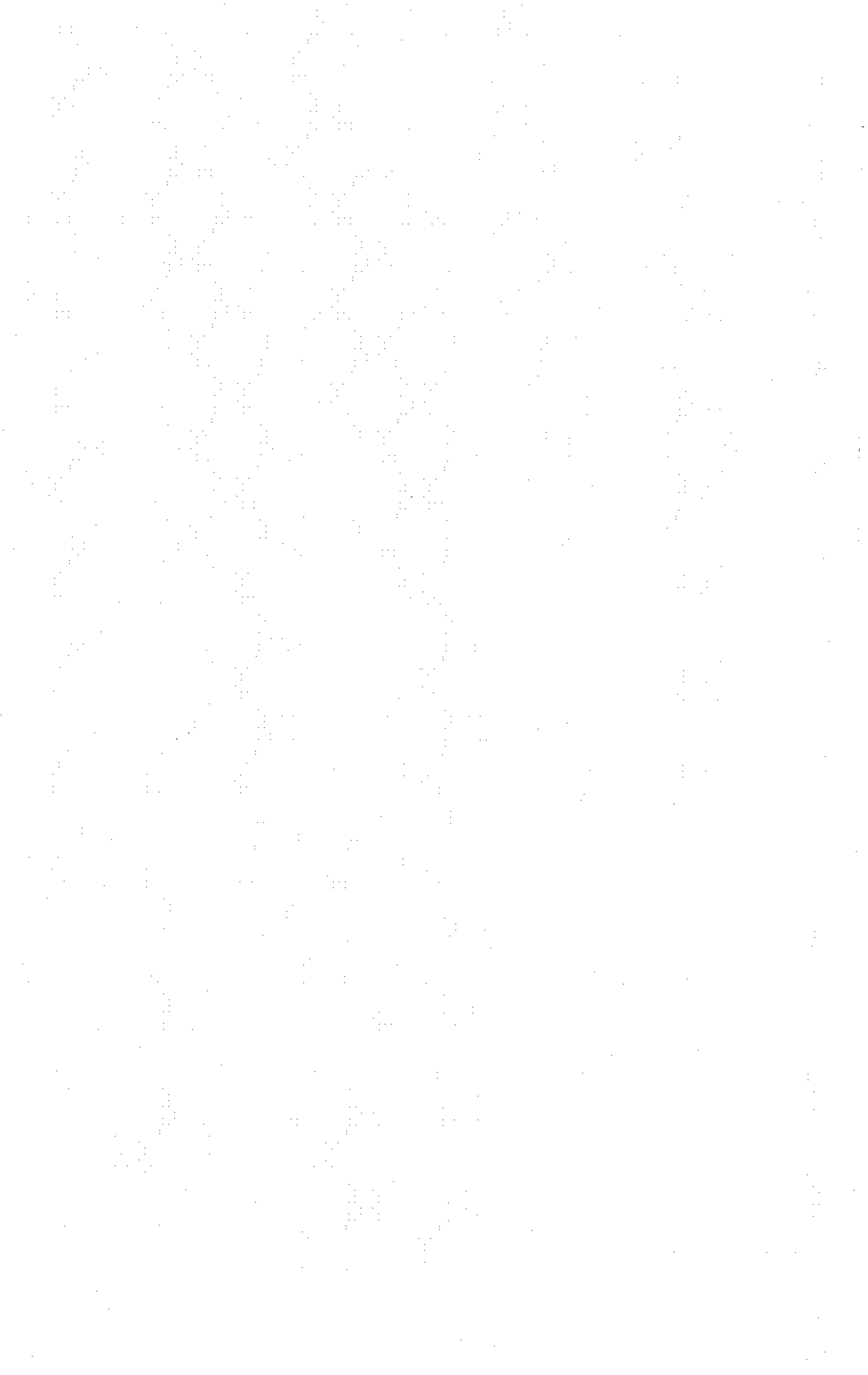
Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

GVF Output Data

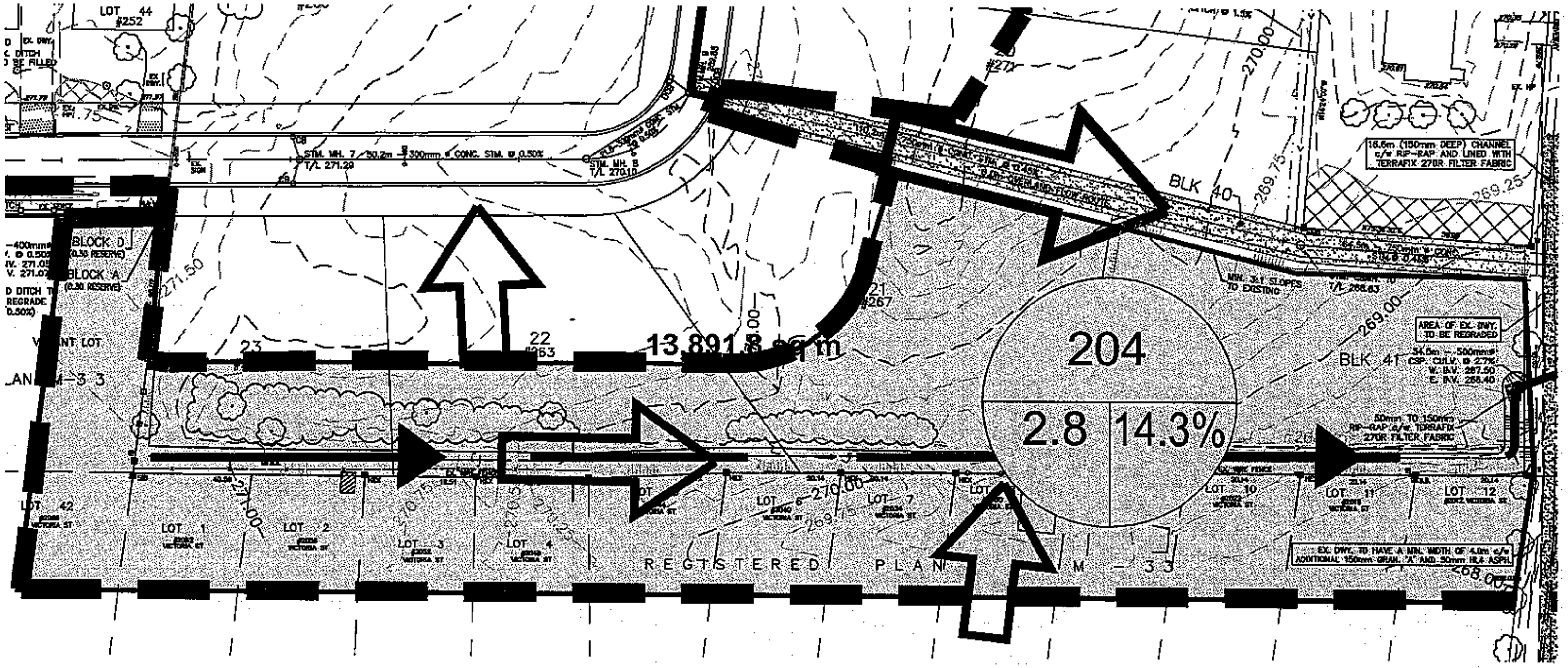
Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.20	m
Critical Depth	0.17	m
Channel Slope	0.01500	m/m
Critical Slope	0.02913	m/m

← DEPTH OF OVERLAND FLOW ROUTE = 0.3m
FLOW DEPTH = 0.20m
FREEBOARD = 0.10m

Rear Yard Swales – BLK 41, Lot 21 to 23



Local Drainage
Rear Yard Swale (Lot 21to 23 and BLK 41)

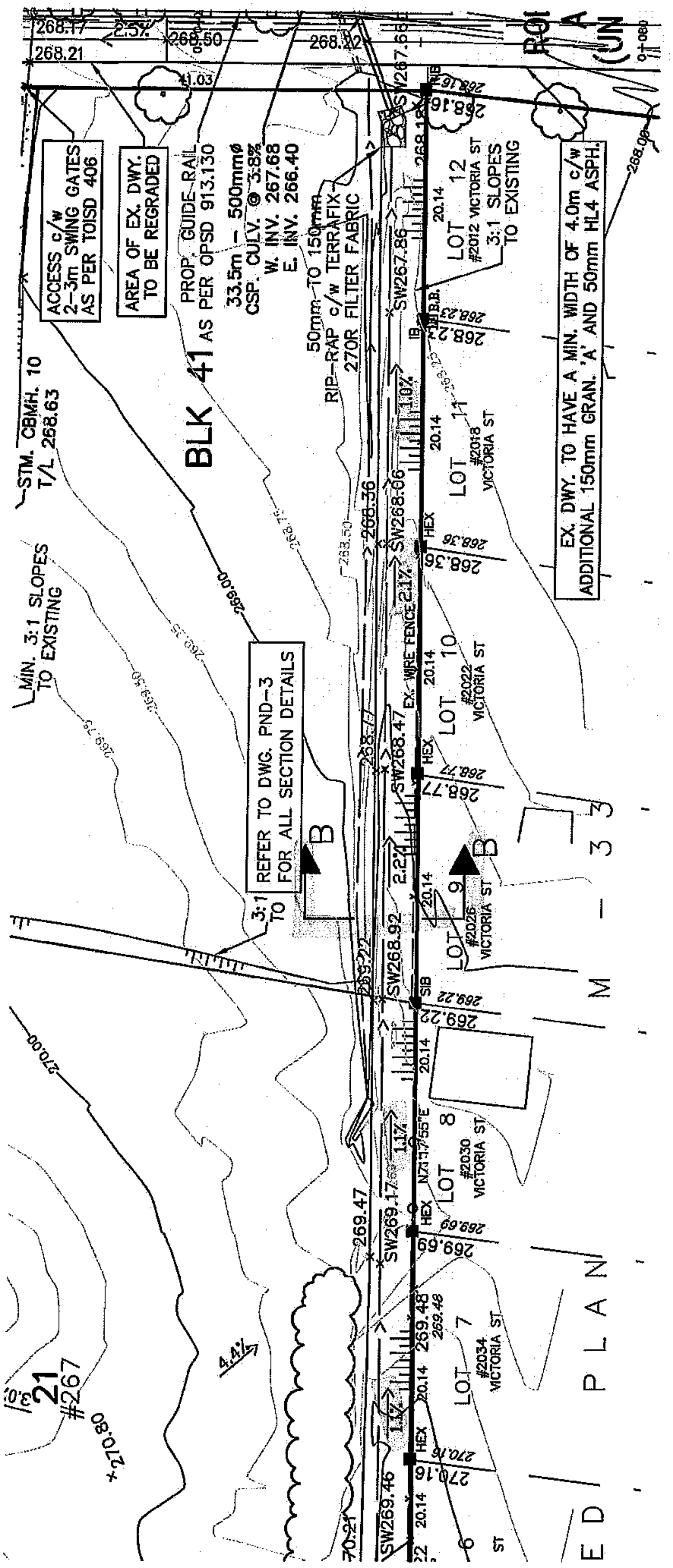


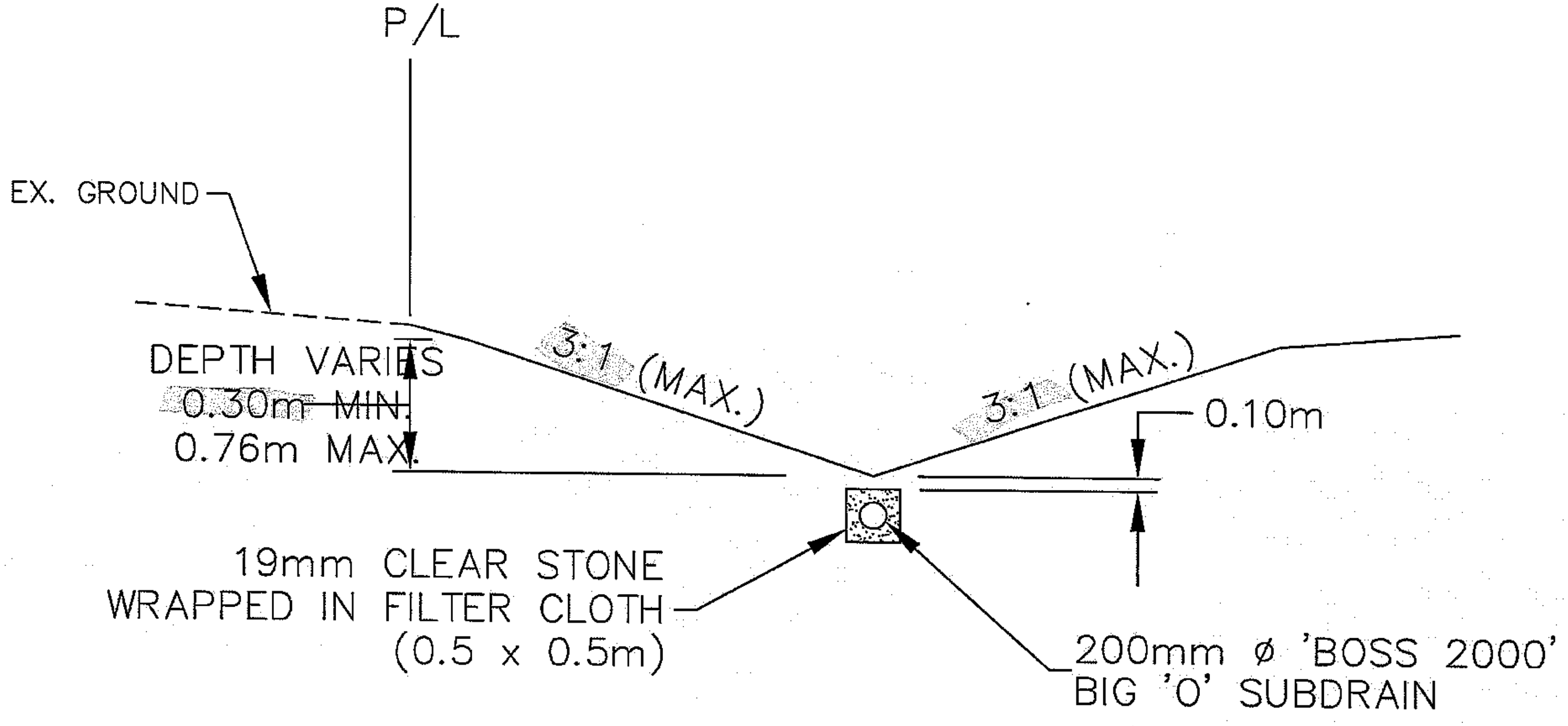
Pro-Rated Flow to Swale

Catchment 205 - Q(100 Year SCS) = 0.30 cms

Pro-Rated Flow = $\frac{1.389\ \text{ha}}{2.80\ \text{ha}} \times 0.30$ cms

= 0.148 cms


ACCESS c/w
2–3m SWING GATES
AS PER TOISD 406
AREA OF EX. DWY.
TO BE REGRADED
PROP. GUIDE-RAIL
AS PER OPSD 913.130
33.5m – 500mmø
CSP. CULV. @ 3.8%
W. INV. 267.68
E. INV. 266.40
50mm TO 150mm
RIP-RAP c/w TERRAFIX
270R FILTER FABRIC
BLK 41
STM. CBMH. 10
T/L 268.63
MIN. 3:1 SLOPES
TO EXISTING
REFER TO DWG. PND-3
FOR ALL SECTION DETAILS
3:1
TO
B
B
LOT 12
#2012 VICTORIA ST
3:1 SLOPES
TO EXISTING
LOT 11
#2018 VICTORIA ST
LOT 10
#2022 VICTORIA ST
LOT 9
#2026 VICTORIA ST
LOT 8
#2030 VICTORIA ST
LOT 7
#2034 VICTORIA ST
LOT 6
ST
21
#267
+270.80
4.4%
EX. DWY. TO HAVE A MIN. WIDTH OF 4.0m c/w
ADDITIONAL 150mm GRAN. 'A' AND 50mm HL4 ASPH.
EX. WIRE FENCE
N71°17'55"E
20.14
SW267.86
SW268.06
SW268.47
SW268.92
SW269.17
SW269.46
SW267.65
268.17
2.5%
268.50
268.21
268.22
268.16
268.13
268.23
268.36
268.77
269.22
269.69
269.48
270.16
269.47
270.21
1.10%
2.17%
2.27%
1.17%
1.17%
HEX
SIB
IB
269.00
270.00
268.75
268.50
M – 33
ED PLAN
ROI
A
(UN
0+080



SECTION B–B

SCALE 1:100

LOT 21–23 & BLK 40
SWALE DETAIL

Worksheet for Rear yard swale (Lots 21 to 23 & BLK 41) - 4th

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.01000	m/m
Left Side Slope	3.00	m/m (H:V)
Right Side Slope	3.00	m/m (H:V)
Discharge	0.15	m^3/s

Q(100-Year SCS) = 0.15 cms
REFER OTTHMYO 205 (pro-rated)

Results

Normal Depth	0.26	m
Flow Area	0.21	m^2
Wetted Perimeter	1.66	m
Hydraulic Radius	0.12	m
Top Width	1.58	m
Critical Depth	0.22	m
Critical Slope	0.02696	m/m
Velocity	0.71	m/s
Velocity Head	0.03	m
Specific Energy	0.29	m
Froude Number	0.63	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

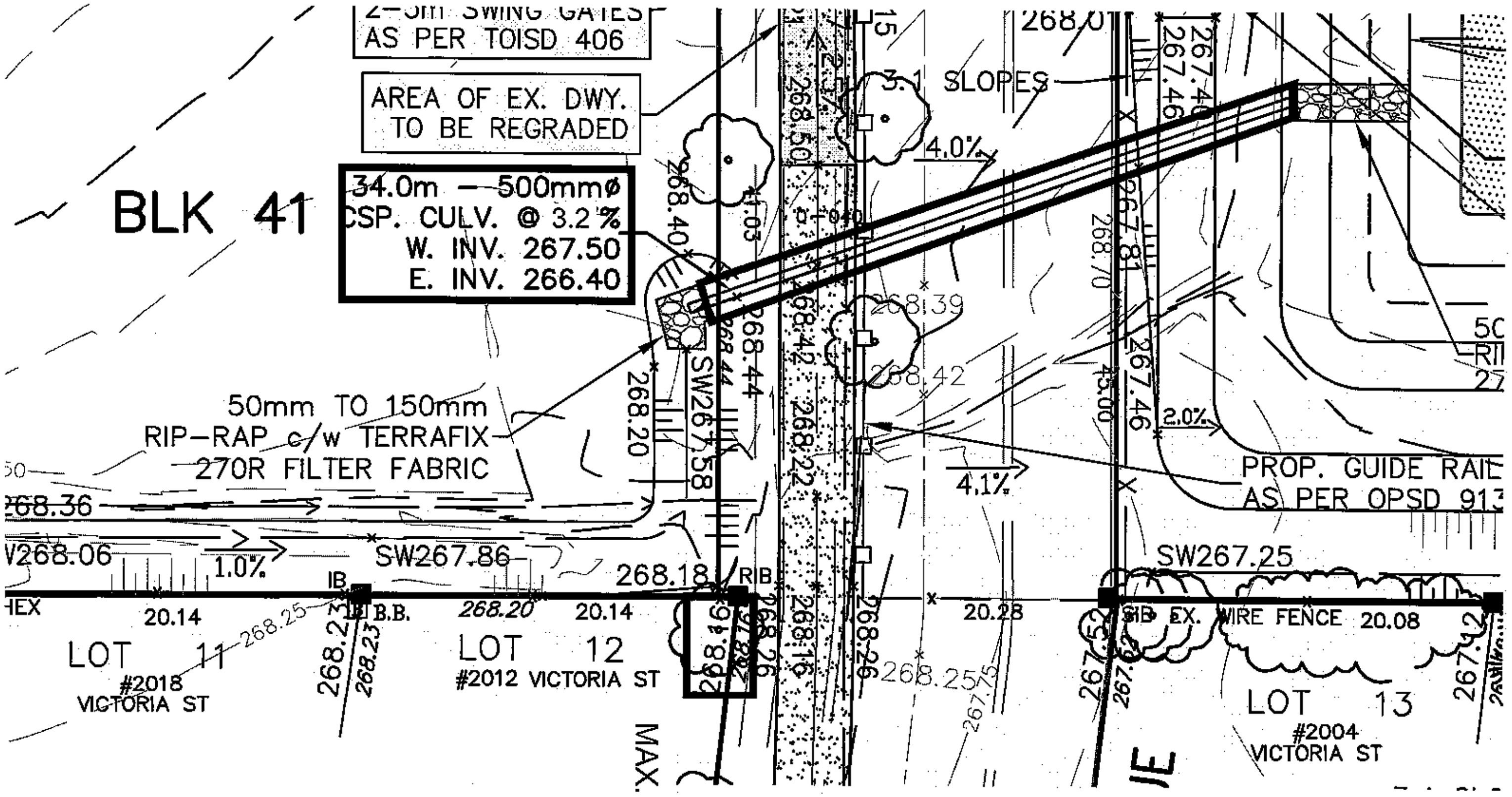
GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.26	m
Critical Depth	0.22	m
Channel Slope	0.01000	m/m
Critical Slope	0.02696	m/m

DEPTH OF OVERLAND FLOW ROUTE = 0.3m
FLOW DEPTH = 0.26m
FREEBOARD = 0.04m (min)

Robertson Road Culvert Calculations

ROBERTSON ROAD
CULVERT CALCULATION



MAX. HEADWATER ELEV

Culvert Calculator Report
Robertson Road Culvert

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	268.16	m	Headwater Depth/Height	0.90	
Computed Headwater Elev	267.95	m	Discharge	0.1480	m³/s
Inlet Control HW Elev.	267.90	m	Tailwater Elevation	266.90	m
Outlet Control HW Elev.	267.95	m	Control Type	Entrance Control	

FREEBOARD = 0.11m

Grades

Upstream Invert	267.50	m	Downstream Invert	266.40	m
Length	34.00	m	Constructed Slope	0.032353	m/m

Hydraulic Profile

Profile	CompositeS1S2		Depth, Downstream	0.50	m
Slope Type	Steep		Normal Depth	0.22	m
Flow Regime	N/A		Critical Depth	0.26	m
Velocity Downstream	0.73	m/s	Critical Slope	0.017830	m/m

Section

Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	0.51	m
Section Size	500 mm		Rise	0.51	m
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	267.95	m	Upstream Velocity Head	0.10	m
Ke	0.90		Entrance Loss	0.09	m

Inlet Control Properties

Inlet Control HW Elev.	267.90	m	Flow Control	Unsubmerged	
Inlet Type	Projecting		Area Full	0.2	m²
K	0.03400		HDS 5 Chart	2	
M	1.50000		HDS 5 Scale	3	
C	0.05530		Equation Form	1	
Y	0.54000				

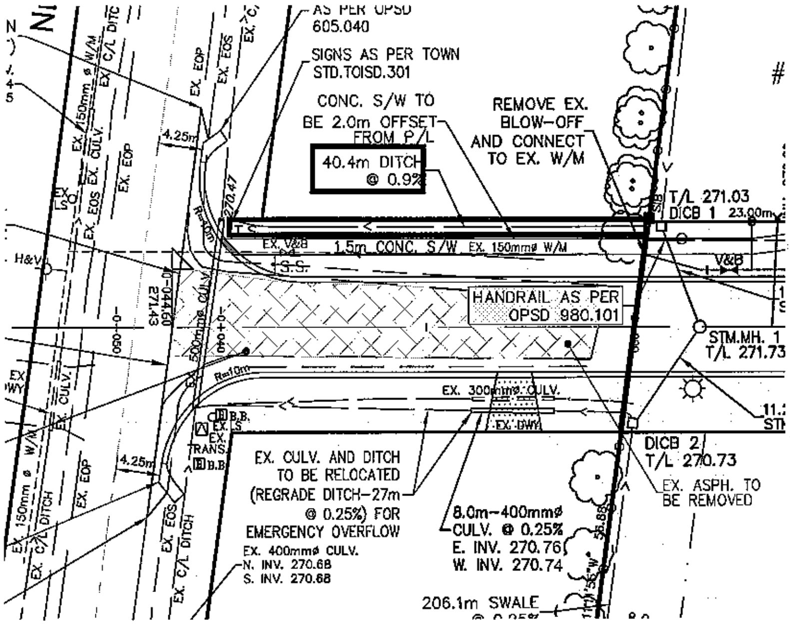
Appendix 7

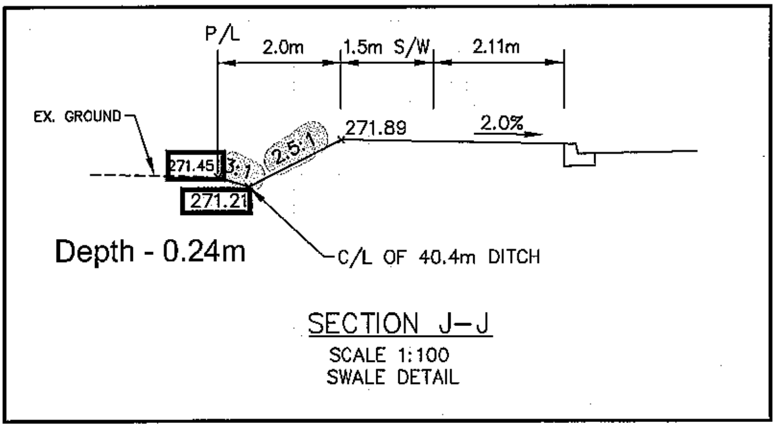
Emergency Blockage Calculations

1. Catchment 201 – DICB No. 1
2. Catchment 202 – DICB No. 2
3. Robertson Road Culvert

Catchment 201 – DICB No. 1

Emergency Spill for 100% blockage for DICB No. 1





Worksheet for Emergency Flow - Flow from DICB #1 to Nelson Cresent

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00900	m/m
Left Side Slope	3.00	m/m (H:V)
Right Side Slope	2.50	m/m (H:V)
Discharge	0.05	m³/s

Q(100-Year SCS) = 0.05cms
REFER TO Catchment 201 OTTHYMO

Results

Normal Depth	0.18	m
Flow Area	0.09	m²
Wetted Perimeter	1.08	m
Hydraulic Radius	0.09	m
Top Width	1.02	m
Critical Depth	0.15	m
Critical Slope	0.03121	m/m
Velocity	0.53	m/s
Velocity Head	0.01	m
Specific Energy	0.20	m
Froude Number	0.56	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

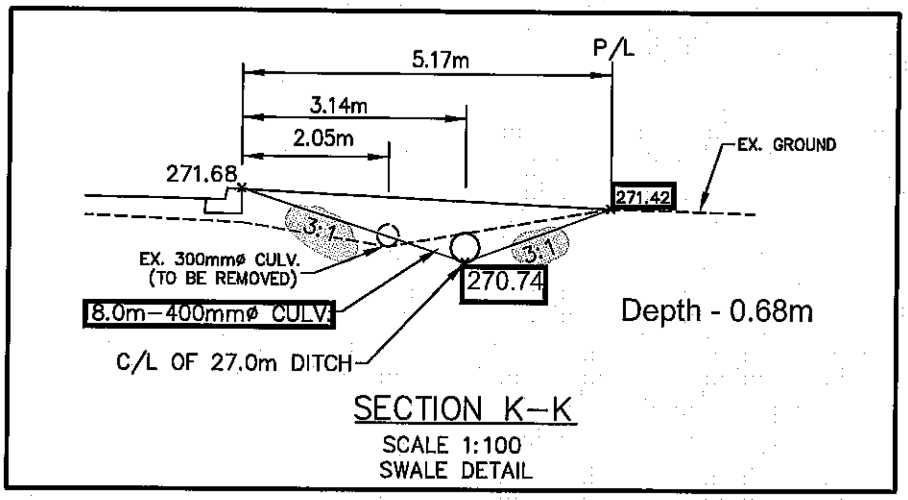
GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.18	m
Critical Depth	0.15	m
Channel Slope	0.00900	m/m
Critical Slope	0.03121	m/m

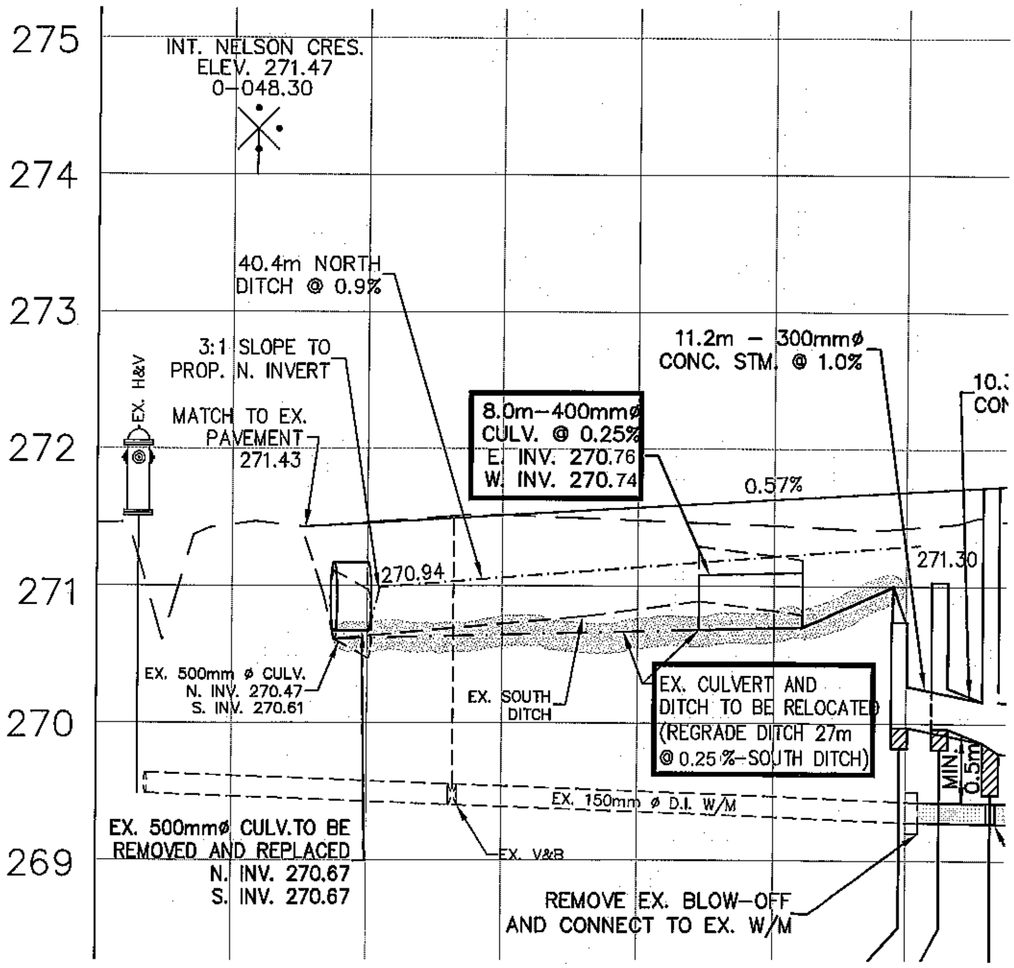
DEPTH OF OVERLAND FLOW ROUTE = 0.24 m
FLOW DEPTH = 0.18 m
FREEBOARD = 0.06 m

Catchment 202 – DICB No. 2

Emergency Spill for 100% blockage for DICB No. 2



SECTION K–K
SCALE 1:100
SWALE DETAIL



Worksheet for Emergency Flow - Flow from DICB #2 to Nelson

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00250	m/m
Left Side Slope	3.00	m/m (H:V)
Right Side Slope	3.00	m/m (H:V)
Discharge	0.06	m³/s

← Q(100-Year SCS) = 0.06 cms
REFER TO Catchment 202 OTTHYMO

Results

Normal Depth	0.24	m
Flow Area	0.18	m²
Wetted Perimeter	1.54	m
Hydraulic Radius	0.12	m
Top Width	1.46	m
Critical Depth	0.15	m
Critical Slope	0.03041	m/m
Velocity	0.34	m/s
Velocity Head	0.01	m
Specific Energy	0.25	m
Froude Number	0.31	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.24	m
Critical Depth	0.15	m
Channel Slope	0.00250	m/m
Critical Slope	0.03041	m/m

← DEPTH OF OVERLAND FLOW ROUTE = 0.68 m
FLOW DEPTH = 0.24 m
FREEBOARD = 0.44 m

Culvert Calculator Report
DICB#2 Driveway Culvert - 4th Submission

Solve For: Headwater Elevation

Headwater is less then top of lowest ex. elev.

Culvert Summary

Allowable HW Elevation	271.42 m	Headwater Depth/Height	0.76
Computed Headwater Eleva	271.07 m	Discharge	0.0600 m^3/s
Inlet Control HW Elev.	271.02 m	Tailwater Elevation	270.98 m
Outlet Control HW Elev.	271.07 m	Control Type	Outlet Control

Q(100-Year SCS) = 0.06 cms
REFER TO Catchment 202 OTTHYMO

Tailwater based on depth of flow for open channel flow

Grades

Upstream Invert	270.76 m	Downstream Invert	270.74 m
Length	8.00 m	Constructed Slope	0.002500 m/m

Hydraulic Profile

Profile	M2	Depth, Downstream	0.24 m
Slope Type	Mild	Normal Depth	0.34 m
Flow Regime	Subcritical	Critical Depth	0.17 m
Velocity Downstream	0.75 m/s	Critical Slope	0.018083 m/m

Section

Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	0.41 m
Section Size	400 mm	Rise	0.41 m
Number Sections	1		

Outlet Control Properties

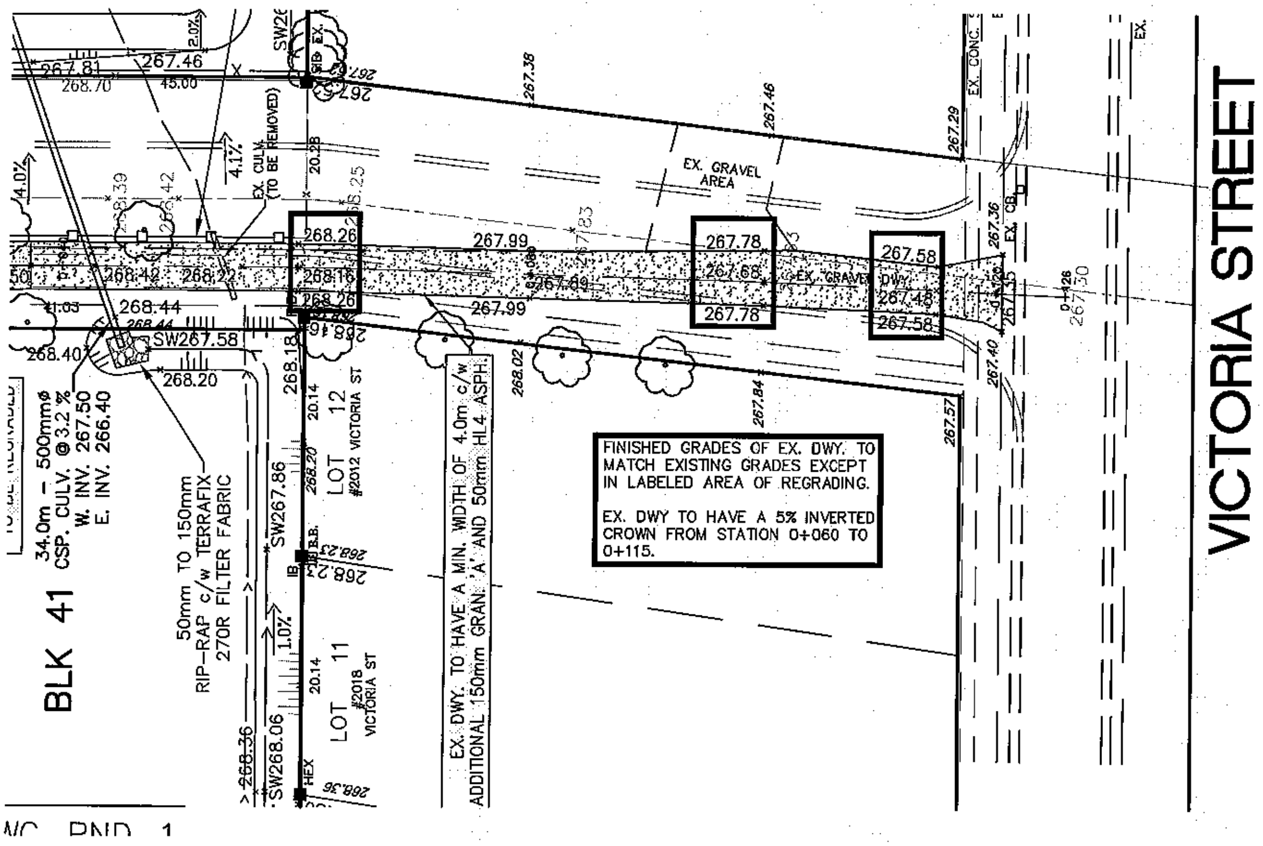
Outlet Control HW Elev.	271.07 m	Upstream Velocity Head	0.02 m
Ke	0.90	Entrance Loss	0.02 m

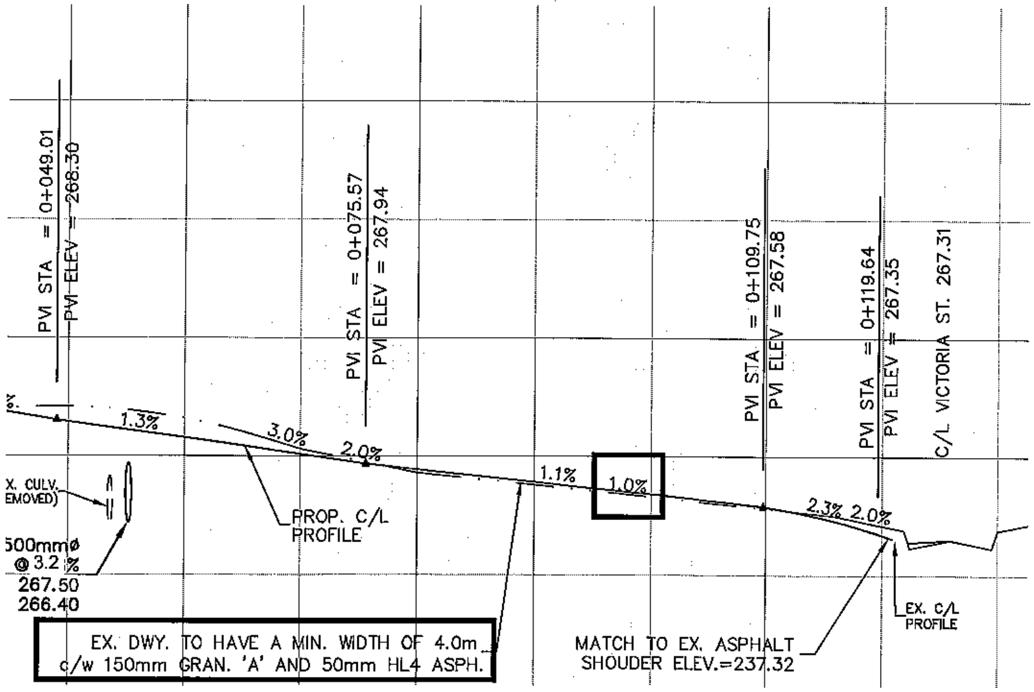
Inlet Control Properties

Inlet Control HW Elev.	271.02 m	Flow Control	Unsubmerged
Inlet Type	Projecting	Area Full	0.1 m^2
K	0.03400	HDS 5 Chart	2
M	1.50000	HDS 5 Scale	3
C	0.05530	Equation Form	1
Y	0.54000		

Robertson Road Culvert

Emergency Spill for 100% blockage for Robertson Road Culvert





Worksheet for Emergency Drainage - Robertson Road Blocked Culvert

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	m/m
Left Side Slope	20.00	m/m (H:V)
Right Side Slope	20.00	m/m (H:V)
Discharge	0.15	m^3/s

Q(100-Year SCS) = 0.15 cms
REFER OTTHYMO 205 (pro rated)

Results

Normal Depth	0.09	m
Flow Area	0.16	m^2
Wetted Perimeter	3.54	m
Hydraulic Radius	0.04	m
Top Width	3.53	m
Critical Depth	0.10	m
Critical Slope	0.00446	m/m
Velocity	0.96	m/s
Velocity Head	0.05	m
Specific Energy	0.14	m
Froude Number	1.46	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.09	m
Critical Depth	0.10	m
Channel Slope	0.01000	m/m
Critical Slope	0.00446	m/m

DEPTH OF OVERLAND FLOW ROUTE = 0.10 m
FLOW DEPTH = 0.09 m
FREEBOARD = 0.01 m

Appendix 8

SWM Pond Sizing Calculations

Innisfil Executive Estates

Date: 07-Feb-14

Stormwater Management Pond
Quality Sizing Calculations

Water Quality Storage Unit Rate (m^3/ha)			
Catchment Imperviousness	**wetpond**		
	Enhanced	**Normal**	**Basic**
0%	65	45	35
35%	140	90	60
55%	190	110	75
70%	225	130	85
85%	250	150	95
100%	290	165	105

Type of Pond	wetpond	
Fisheries Protection Level	enhanced	
Site Imperviousness	17.6%	
Site Area	20.21	
Water Quality Storage Volume Unit Rate	102.6	(m^3/ha)
Permanent Pool Volume Required	1266.0	(m^3)
Extended Detention Volume (40m^3/ha)	808.4	(m^3)
Extended Detention Volume (25 mm Storm)	843	(m^3)
Required Extended Detention Volume	843	(m^3)

Site Imperviousness

Catchment	**Area**	**Imp. Area**	
201	0.30	0.12	
202	0.50	0.2	
203	8.01	2.13	
204	2.82	0.29	
205	1.20	0.53	
206	6.18	0	
Total - Pond	**19.01**	**3.27**	**17.2%**
207	0.70	0.28	
208	0.50	0	
Total - Site	**20.21**	**3.55**	**17.6%**

Innisfil Executive Estates **Date:** 07-Feb-14

Stormwater Management Pond
Quality Sizing Calculations

Forebay Settling Length

r =	3	:1	Length to width ratio
Qp =	0.01	m3/s	peak flow rate <u>FROM</u> pond during design quality storm (25mm storm)
Vs =	0.0003	m/s	settling velocity
Dist =	**10.00**	**m**	

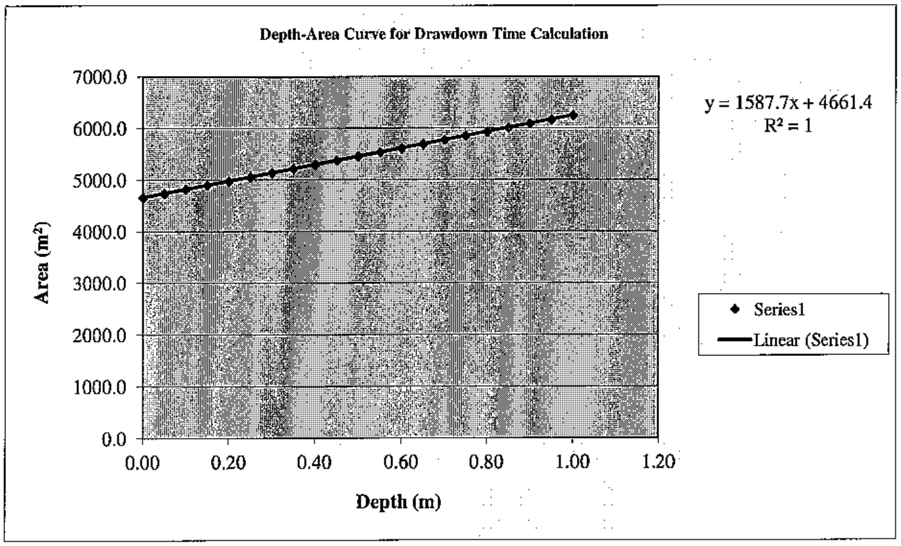
Dispersion Length

Q =	0.66	m3/s	Inlet flowrate from stormsewer - refer to storm design sheet
d =	1	m	depth of perm pool in forebay
Vf =	0.5	m/s	desired velocity in forebay
Dist =	**10.56**	**m**	

Provided Forebay Length
47 OK

Forebay Deep Zone Bottom Width
Width = 1.32 m

Provided Forebay Width
15 OK



Extended Detention Orifice Invert 265.56
Extended Detention Elevation 265.74

Elevation (m)	Depth (m)	Area (m2)
265.56	0.00	4662.3
265.61	0.05	4741.4
265.66	0.10	4820.6
265.71	0.15	4899.7
265.76	0.20	4978.8
265.81	0.25	5057.9
265.86	0.30	5137.2
265.91	0.35	5216.5
265.96	0.40	5295.9
266.01	0.45	5375.4
266.06	0.50	5454.9
266.11	0.55	5534.3
266.16	0.60	5613.8
266.21	0.65	5693.3
266.26	0.70	5772.7
266.31	0.75	5852.2
266.36	0.80	5931.6
266.41	0.85	6011.1
266.46	0.90	6090.6
266.51	0.95	6170.1
266.56	1.00	6249.5

Drawdown Equation

C2	1588
C3	4661
h	0.13
Ao	0.00785

$$t = \frac{3410.49}{0.02}$$

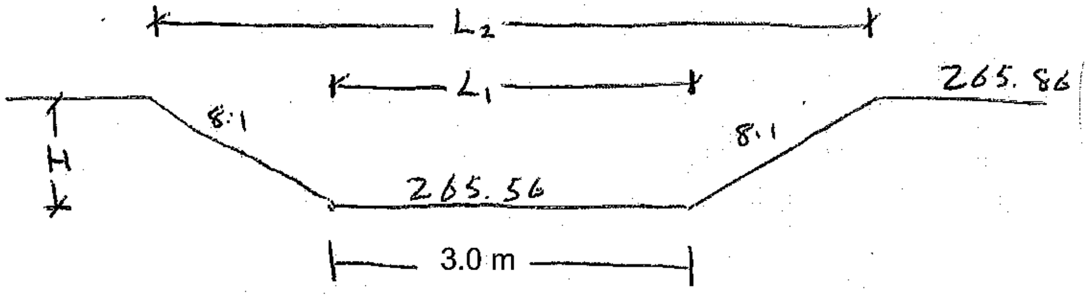
t= 157,904 seconds
t= 43.86 hours **OK > 24 hrs**

Forbay Velocity

1.67	100-Year Flow (SCS Storm) Inlet Flow Rate (refer to ADD HYD 1002) cms
19.9	Forbay Cross-Sectional Area (Perm. Pool Elevation) sq.m
0.084	**OK < 0.15** m/s

Project: I. E. E	*Project Nº*	
Description: Forebay weir check	*Prepared By:*	*Date:*
	Other:	*Page* 1

Forebay weir capacity (Broad crested)



$Q = 1.705 L H^{1.5}$

$\boxed{Q_w = 1.513 \text{ m}^3/s}$

$H = 0.3$ m

$L =$ average L

$= \frac{L_1 + L_2}{2}$

$= 5.4$ m

25 mm inflow $Q_{25} = 0.24 \text{ m}^3/S$ → from OTTHYMO

$\therefore \boxed{Q_w > Q_{25}}$ ✓

peak 10yr into pond = 1.13 m³/S (10yr SCS)

$\boxed{\therefore \; Q_w > Q_{10}}$ ✓

Appendix 9

Erosion and Sediment Control Plan

Erosion and Sediment Control Plan 123 ESC-1

CONSTRUCTION NOTES

1: CONTRACTOR RESPONSIBLE TO MAINTAIN ADJACENT MUNICIPAL STREETS FREE OF DEBRIS AND MUD. CONTRACTOR TO CLEAN STREETS AT REQUEST OF TOWN.

2: CONTRACTOR RESPONSIBLE TO INSPECT AND MAINTAIN ALL SILT FENCE, ROCK CHECK DAMS, MUD MATS, CATCH BASIN SEDIMENT CONTROL DEVICES AND BLADE CUT SWALES. WEEKLY AND AFTER RAINFALL EVENTS.

3: ALL DISTURBED GROUND LEFT INACTIVE FOR MORE THEN 30 DAYS SHALL BE STABILIZED BY SEEDING, SODDING, MULCHING, OR COVERING OR OTHER EQUIVALENT CONTROL MEASURES.

4: CONSTRUCTION FENCE TO BE INSTALLED AROUND SEDIMENT CONTROL PONDS AS DIRECTED BY ENGINEER.

5: THE CONTRACTOR SHALL CONSTRUCT ANY ADDITIONAL SWALES THAT MAY BE NECESSARY TO DIRECT RUNOFF TO PONDS

6: CONTRACTOR TO INSTALL CATCH BASIN SEDIMENT CONTROL DEVICES ON ALL CB's CBMH's AND DICB's. CATCH BASIN SEDIMENT CONTROL DEVICES TO BE REMOVED FOR THE FALL, WINTER AND SPRING SEASONS.

CONSTRUCTION SCHEDULE

1: A PRE-CONSTRUCTION MEETING WITH THE CONTRACTOR, DEVELOPER'S ENGINEER, TOWN AND THEIR ENGINEER WILL BE HELD PRIOR TO EARTHWORKS COMMENCING IN ORDER TO REVIEW AND APPROVE INSTALLED MUD MAT AND SILTATION CONTROL MEASURES, SO THAT NECESSARY CORRECTIVE MEASURES CAN BE CARRIED OUT PRIOR TO EARTHWORKS.

2: PROTECT BENCHMARK

3: SILT FENCE AND SILTATION CONTROL DEVICES TO BE INSTALLED PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS.

4: INSTALL MUD MAT ENTRANCE AS PER DETAIL ON DWG. ESC-2.

5: CONSTRUCT TEMPORARY SWM POND.

6: CONTRACTOR TO INSTALL AND MAINTAIN SILTATION CONTROL FENCING AND CHECK DAMS AS DIRECTED BY THE ENGINEER PRIOR TO ANY EARTHWORKS BEING CARRIED OUT.

7: EROSION CONTROLS TO BE MAINTAINED AS DIRECTED BY THE ENGINEER DURING THE CONSTRUCTION PERIOD.

8: EROSION AND SEDIMENTATION CONTROL DEVICES MUST BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY RAINFALL EVENT, AND MUST BE MAINTAINED AND REPAIRED IN A TIMELY MANNER TO PREVENT SEDIMENT FROM LEAVING THE SITE.

9: WEEKLY INSPECTION REPORTS BY THE DEVELOPER'S ENGINEER ARE TO BE SUBMITTED TO THE TOWN, AND THEIR ENGINEER ADDRESSING THE INSPECTION MAINTENANCE OF ALL CONTROL MEASURES, AS WELL AS THE PROGRESS ON SITE. LEAVING THE SITE.

10: TEMPORARY SWM POND TO BE MAINTAINED.

11: REMOVAL OF SILT FENCING AND CHECK DAMS AT THE END OF CONSTRUCTION MUST BE APPROVED BY THE ENGINEER, AFTER THE SITE HAS STABILIZED.

NOTES

1: REFER TO TREE INVENTORY AND TREE PRESERVATION PLAN.

2: POND BERM SHALL BE CONSTRUCTED WITH LOW PERMEABILITY SOIL AND BE COMPACTED TO 95% SPMDD AND BE INSPECTED BY A GEO-TECHNICAL ENGINEER.

TEMPORARY ESC PONDS

TEMPORARY ESC POND DESIGN AS PER EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN CONSTRUCTION, 2006.

TEMP. ESC POND #1

REQUIRED:

POND CATCHMENT = 11.1ha
PASSIVE VOLUME: 11.1ha x 125m³/ha = 1387.50m
ACTIVE VOLUME: 11.1ha x 125m³/ha = 1387.50m

PROVIDED:

PASSIVE VOLUME: 1387m³
ACTIVE VOLUME: 1404m³

TEMP. ESC POND #2

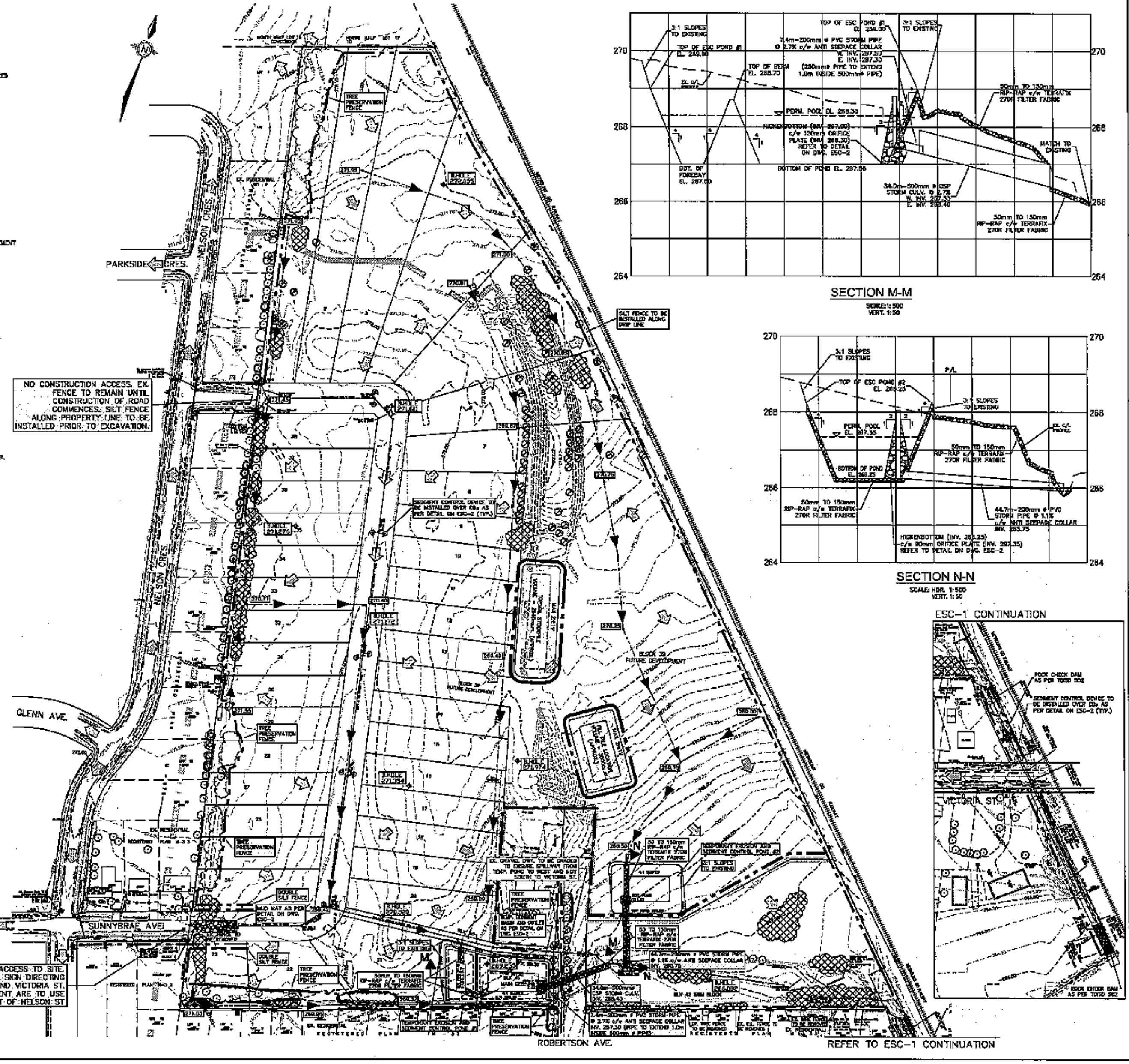
REQUIRED:

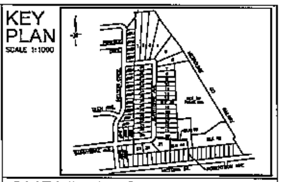
POND CATCHMENT = 6.4ha
PASSIVE VOLUME: 6.4ha x 125m³/ha³= 800m
ACTIVE VOLUME: 6.4ha x 125m³/ha³= 800m

PROVIDED:

PASSIVE VOLUME: 846m³
ACTIVE VOLUME: 854m³

ACCEPTED FOR CONSTRUCTION	ACCEPTED FOR CONSTRUCTION
	AECOM
TOWN OF INNISFIL DEVELOPMENT ENGINEERING	TOWN PEER REVIEW ENGINEER
DATE:	DATE:





SURVEY NOTES:

BOUNDARY SURVEY BASED ON FIELD SURVEY BY PETER RAIKES O.L.S., DATED OCT. 28, 2010.

TOPOGRAPHIC INFORMATION BASED ON INFORMATION FROM ROCK SOLID CONSULTING RECEIVED JAN. 05, 2011.

MNR BENCHMARK: 0011931U4615 TWP.: STROUD ELEV.: 270.500

TABLET LOCATION: PRESBYTERIAN CHURCH, IN VILLAGE, ABOUT 80m EAST OF TORONTO-NORTH BAY HWY. TABLET IN WEST CONCRETE FOUNDATION WALL OF WEST TOWER, 1.5m FROM S/W CORNER AND 1.37m BELOW CONCRETE BLOCKS.

GENERAL NOTES:

1. DO NOT SCALE DRAWINGS.
2. ALL DIMENSIONS ARE TO BE CHECKED AND VERIFIED ON SITE PRIOR TO CONSTRUCTION.
3. ANY DISCREPANCIES, OMISSIONS, OR ERRORS ARE TO BE REPORTED TO THE CONSULTANT. NO WORK IS TO PROCEED BEFORE CLARIFICATION OF THE DISCREPANCIES, ERRORS, OR OMISSIONS IS RECEIVED FROM THE CONSULTANT.
4. ALL EXISTING CONDITIONS TO BE CHECKED AND VERIFIED ON SITE PRIOR TO CONSTRUCTION.
5. ONLY LATEST APPROVED DRAWINGS TO BE USED FOR CONSTRUCTION.
6. ALL DRAWINGS AND SPECIFICATIONS REMAIN THE PROPERTY OF THE CONSULTANT, AND SHALL BE RETURNED TO THE CONSULTANT UPON REQUEST. IN NO WAY SHALL THE DRAWINGS AND/OR SPECIFICATIONS IN WHOLE OR IN PART BE REPRODUCED OR DISTRIBUTED WITHOUT THE PERMISSION OF THE CONSULTANT.
7. PRIOR TO ANY WORKS ON MUNICIPAL PROPERTY A ROAD OCCUPANCY PERMIT SHALL BE OBTAINED FROM THE TOWN.
8. GEMMELL ENGINEERING TAKES NO LIABILITY FOR SURVEY DATA.

LEGEND:

———	RIGHT-OF-WAY
O-HP	EX. HYDRO POLE
—o—o—o—	EX. FENCE
⌒⌒⌒⌒	EXISTING TREE LINE
14	LOT NUMBER
▬ ▪ ▪ ▬	TREE PRESERVATION & SILT FENCE AS PER DETAIL ON DWG ESC-2
▨ ⋮ ⋮ ▨	ESC CATCHMENT AREA
—-▶---	BLADE CUT SWALE
⇦	EXISTING OVERLAND FLOW DRAINAGE DIRECTION
—— 280.0 ——	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
	TEMPORARY STRAW BALE CHECK DAM
◆	ROCK CHECK DAM
CB ⊙	SEDIMENT CONTROL DEVICE AS PER DETAIL ON ESC-2
⊗	TREES TO BE REMOVED
BHOLE 271.276 ◆	BOREHOLE

ITEM	DESCRIPTION	DATE	BY	APPR'V'D
2	REVISED AS PER AECOM	MAY 27/14	GEMCAD INC.	HGG
1	MYLAR SUBMISSION	MAY 7/14	GEMCAD INC.	HGG

SCHEDULE OF REVISIONS

H.G. GEMMELL
100061073
May 26/14

ENGINEER'S SEAL

PROJECT:
INNISFIL
EXECUTIVE ESTATES

TITLE:
EROSION AND SEDIMENT
CONTROL PLAN

GEMMELL
Engineering

TOWN OF INNISFIL
PLANNING AND DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

DRAWN: GEMCAD	SCALE:	DWG. No.	PROJECT No.
DESIGNED: H.G.G.	HOR: 1:1250	ESC-1	123
CHECKED: H.G.G.	DATE: MAY 2012		

INNISFIL EXECUTIVE ESTATES - I-T-880008

CONSTRUCTION NOTES

1: CONTRACTOR RESPONSIBLE TO MAINTAIN ADJACENT MUNICIPAL STREETS FREE OF DEBRIS AND MUD. CONTRACTOR TO CLEAN STREETS AT REQUEST OF TOWN.

2: CONTRACTOR RESPONSIBLE TO INSPECT AND MAINTAIN ALL SILT FENCE, ROCK CHECK DAMS, MUD MATS, CATCH BASIN SEDIMENT CONTROL DEVICES AND BLADE CUT SWALES, WEEKLY AND AFTER RAINFALL EVENTS.

3: ALL DISTURBED GROUND LEFT INACTIVE FOR MORE THEN 30 DAYS SHALL BE STABILIZED BY SEEDING, SODDING, MULCHING, OR COVERING OR OTHER EQUIVALENT CONTROL MEASURES.

4: CONSTRUCTION FENCE TO BE INSTALLED AROUND SEDIMENT CONTROL PONDS AS DIRECTED BY ENGINEER.

5: THE CONTRACTOR SHALL CONSTRUCT ANY ADDITIONAL SWALES THAT MAY BE NECESSARY TO DIRECT RUNOFF TO PONDS

6: CONTRACTOR TO INSTALL CATCH BASIN SEDIMENT CONTROL DEVICES ON ALL CB's CBMH's AND DICB's. CATCH BASIN SEDIMENT CONTROL DEVICES TO BE REMOVED FOR THE FALL, WINTER AND SPRING SEASONS.

CONSTRUCTION SCHEDULE

1: A PRE-CONSTRUCTION MEETING WITH THE CONTRACTOR, DEVELOPER'S ENGINEER, TOWN AND THEIR ENGINEER WILL BE HELD PRIOR TO EARTHWORKS COMMENCING, IN ORDER TO REVIEW AND APPROVE INSTALLED MUD MAT AND SILTATION CONTROL MEASURES, SO THAT NECESSARY CORRECTIVE MEASURES CAN BE CARRIED OUT PRIOR TO EARTHWORKS.

2: PROTECT BENCHMARK

3: SILT FENCE AND SILTATION CONTROL DEVICES TO BE INSTALLED PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS.

4: INSTALL MUD MAT ENTRANCE AS PER DETAIL ON DWG. ESC-2.

5: CONSTRUCT TEMPORARY SWM POND.

6: CONTRACTOR TO INSTALL AND MAINTAIN SILTATION CONTROL FENCING AND CHECK DAMS AS DIRECTED BY THE ENGINEER PRIOR TO ANY EARTHWORKS BEING CARRIED OUT.

7: EROSION CONTROLS TO BE MAINTAINED AS DIRECTED BY THE ENGINEER DURING THE CONSTRUCTION PERIOD.

8: EROSION AND SEDIMENTATION CONTROL DEVICES MUST BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY RAINFALL EVENT, AND MUST BE MAINTAINED AND REPAIRED IN A TIMELY MANNER TO PREVENT SEDIMENT FROM LEAVING THE SITE.

9: WEEKLY INSPECTION REPORTS BY THE DEVELOPER'S ENGINEER ARE TO BE SUBMITTED TO THE TOWN, AND THEIR ENGINEER ADDRESSING THE INSPECTION MAINTENANCE OF ALL CONTROL MEASURES, AS WELL AS THE PROGRESS ON SITE. LEAVING THE SITE.

10: TEMPORARY SWM POND TO BE MAINTAINED.

11: REMOVAL OF SILT FENCING AND CHECK DAMS AT THE END OF CONSTRUCTION MUST BE APPROVED BY THE ENGINEER, AFTER THE SITE HAS STABILIZED.

NOTES

1: REFER TO TREE INVENTORY AND TREE PRESERVATION PLAN.

2: POND BERM SHALL BE CONSTRUCTED WITH LOW PERMEABILITY SOIL AND BE COMPACTED TO 95% SPMDD AND BE INSPECTED BY A GEO-TECHNICAL ENGINEER.

TEMPORARY ESC PONDS

TEMPORARY ESC POND DESIGN AS PER EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN CONSTRUCTION, 2006.

TEMP. ESC POND #1

REQUIRED:

POND CATCHMENT – 11.1ha
PASSIVE VOLUME: 11.1ha x 125m^3/ha = 1387.50m
ACTIVE VOLUME: 11.1ha x 125m^3/ha = 1387.50m

PROVIDED:

PASSIVE VOLUME: 1387m^3
ACTIVE VOLUME: 1404m^3

TEMP. ESC POND #2

REQUIRED:

POND CATCHMENT – 6.4ha
PASSIVE VOLUME: 6.4ha x 125m^3/ha^3= 800m
ACTIVE VOLUME: 6.4ha x 125m^3/ha^3= 800m

PROVIDED:

PASSIVE VOLUME: 848m^3
ACTIVE VOLUME: 854m^3

ACCEPTED FOR CONSTRUCTION

TOWN OF INNISFIL
DEVELOPMENT ENGINEERING

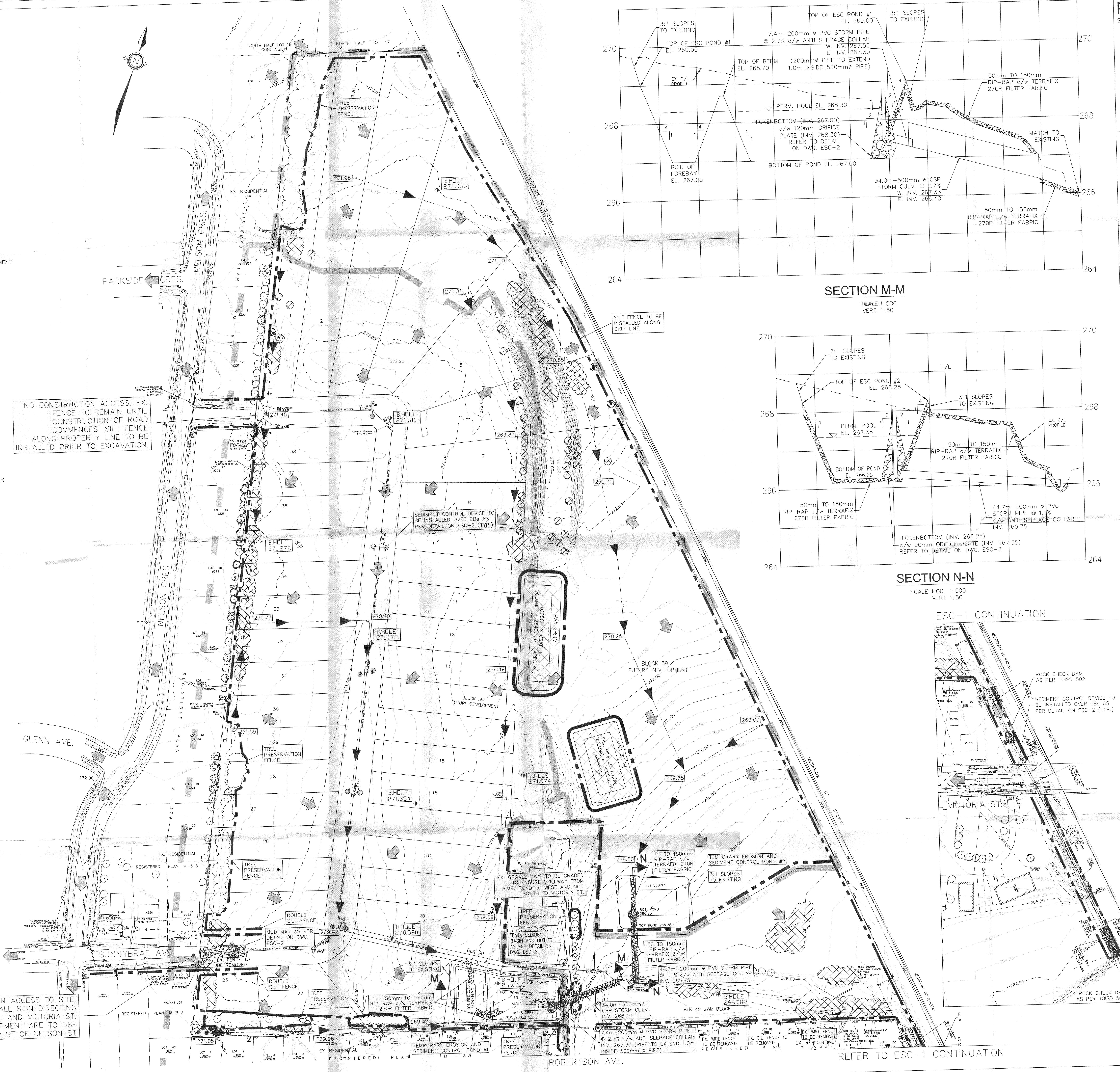
DATE: ____________

ACCEPTED FOR CONSTRUCTION

AECOM

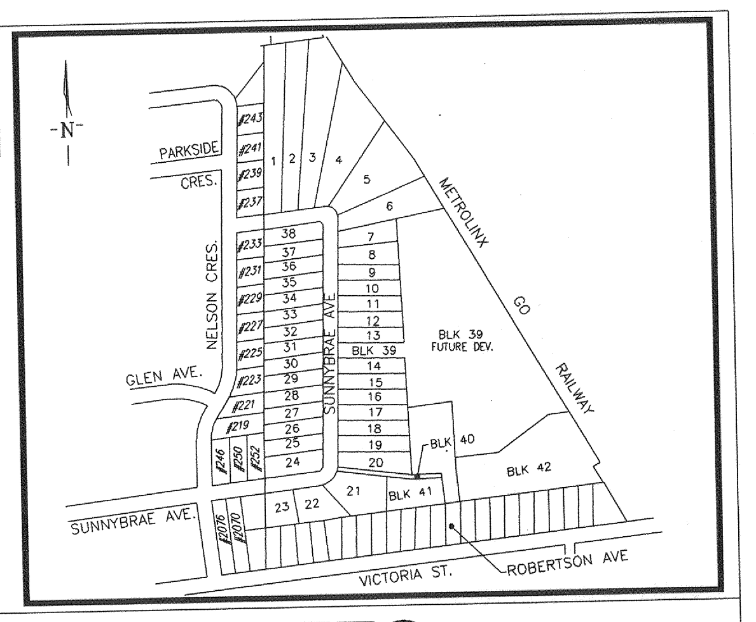
TOWN PEER REVIEW ENGINEER

DATE: June 3, 2014



KEY PLAN

SCALE 1:1000



SURVEY NOTES:

BOUNDARY SURVEY BASED ON FIELD SURVEY BY PETER RAIKES O.L.S., DATED OCT. 26, 2010.

TOPOGRAPHIC INFORMATION BASED ON INFORMATION FROM ROCK SOLID CONSULTING RECEIVED JAN. 05, 2011.

MNR BENCHMARK: 0011931U461S TWP.: STROUD ELEV.: 270.600

TABLET LOCATION: PRESBYTERIAN CHURCH, IN VILLAGE, ABOUT 90m EAST OF TORONTO-NORTH BAY HWY. TABLET IN WEST CONCRETE FOUNDATION WALL OF WEST TOWER, 1.5m FROM S/W CORNER AND 1.37m BELOW CONCRETE BLOCKS.

GENERAL NOTES:

1. DO NOT SCALE DRAWINGS.
2. ALL DIMENSIONS ARE TO BE CHECKED AND VERIFIED ON SITE PRIOR TO CONSTRUCTION.
3. ANY DISCREPANCIES, OMISSIONS, OR ERRORS ARE TO BE REPORTED TO THE CONSULTANT. NO WORK IS TO PROCEED BEFORE CLARIFICATION OF THE DISCREPANCIES, ERRORS, OR OMISSIONS IS RECEIVED FROM THE CONSULTANT.
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8. GEMMELL ENGINEERING TAKES NO LIABILITY FOR SURVEY DATA.

LEGEND:

———	RIGHT-OF-WAY
○HP	EX. HYDRO POLE
—○—○—○—	EX. FENCE
⌒⌒⌒⌒⌒	EXISTING TREE LINE
14	LOT NUMBER
▬ ▪ ▪ ▬ ▪ ▪ ▬	TREE PRESERVATION & SILT FENCE AS PER DETAIL ON DWG ESC-2
▨ ▨	ESC CATCHMENT AREA
– – ▶—— – –	BLADE CUT SWALE
⇦	EXISTING OVERLAND FLOW DRAINAGE DIRECTION
—— 220.0 ——	EXISTING MAJOR CONTOUR
—— 220.5 ——	EXISTING MINOR CONTOUR
⋀	TEMPORARY STRAW BALE CHECK DAM
◆	ROCK CHECK DAM
CB ◉	SEDIMENT CONTROL DEVICE AS PER DETAIL ON ESC-2
⊗	TREES TO BE REMOVED
B.HOLE 271.276 ⌖	BOREHOLE

ITEM	DESCRIPTION	DATE	BY	APPRV'D
2	REVISED AS PER AECOM	MAY 27/14	GEMCAD INC.	HGG
1	MYLAR SUBMISSION	MAY 7/14	GEMCAD INC.	HGG

SCHEDULE OF REVISIONS

H.G. GEMMELL
100081079
May 26/14

ENGINEER'S SEAL

PROJECT:

INNISFIL EXECUTIVE ESTATES

TITLE:

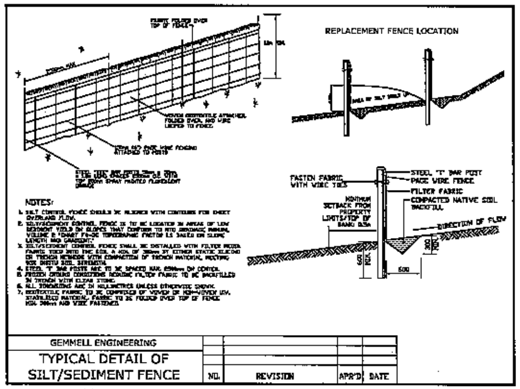
EROSION AND SEDIMENT CONTROL PLAN

GEMMELL
ENGINEERING
144 Thrushwood Drive, Barrie, ON L4M 1Z0
Phone:(705) 309-0787 Fax:(705) 719-9578

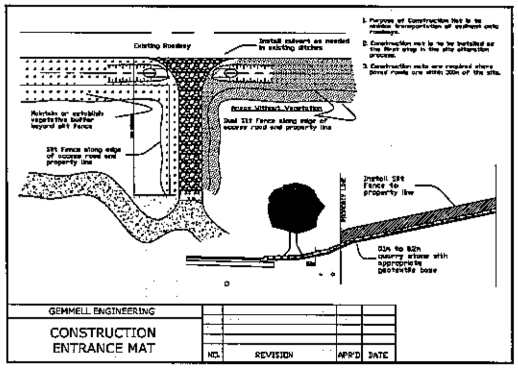
TOWN OF INNISFIL
PLANNING AND DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

DRAWN: GEMCAD	SCALE:	DWG. No.	PROJECT No.
DESIGNED: H.G.G.	HOR: 1:1250	ESC-1	123
CHECKED: H.G.G.	DATE: MAY 2012		

INNISFIL EXECUTIVE ESTATES - I-T-880008

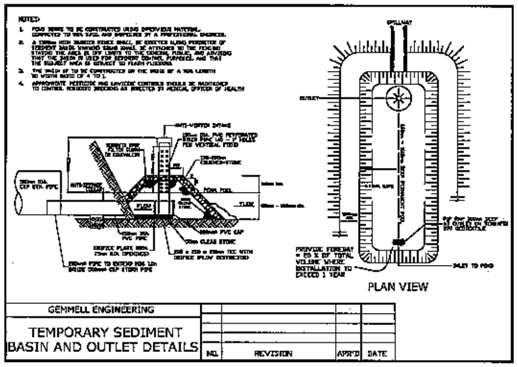


GEMMELL ENGINEERING
TYPICAL DETAIL OF SILT/SEDIMENT FENCE

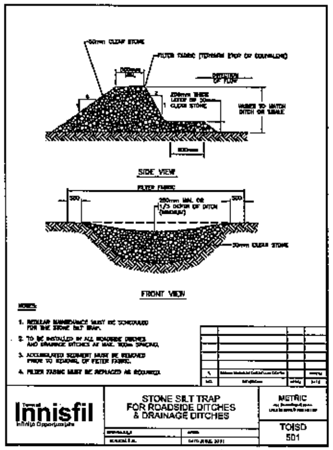


1. Purpose of Construction Mat is to minimize transportation of sediment onto roadways.
2. Construction mat is to be installed as the first step in the site alteration process.
3. Construction mats are required where paved roads are within 300m of the site.

GEMMELL ENGINEERING
CONSTRUCTION ENTRANCE MAT

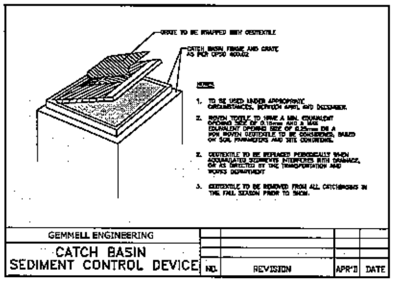


GEMMELL ENGINEERING
TEMPORARY SEDIMENT BASIN AND OUTLET DETAILS



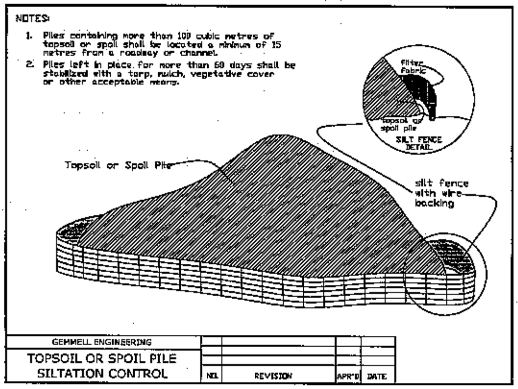
NOTES:
1. REGULAR MAINTENANCE MUST BE SCHEDULED FOR THE STONE SILT TRAP.
2. TO BE INSTALLED IN ALL ROADSIDE DITCHES AND DRAINAGE DITCHES AT MAX. 100m SPACING.
3. ACCUMULATED SEDIMENT MUST BE REMOVED PRIOR TO REMOVAL OF FILTER FABRIC.
4. FILTER FABRIC MUST BE REPLACED AS REQUIRED.

STONE SILT TRAP FOR ROADSIDE DITCHES & DRAINAGE DITCHES



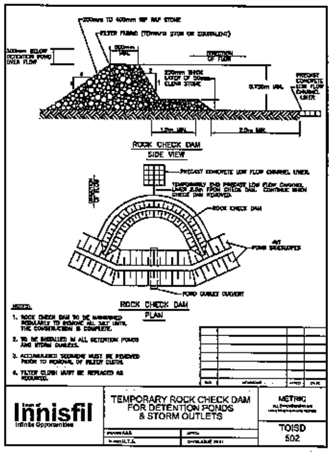
NOTES:
1. TO BE USED UNDER APPROPRIATE CIRCUMSTANCES, BETWEEN APRIL AND DECEMBER.
2. WOVEN TEXTILE TO HAVE A MIN. EQUIVALENT OPENING SIZE OF 0.15mm AND A MAX EQUIVALENT OPENING SIZE OF 0.25mm OR A NON WOVEN GEOTEXTILE TO BE CONSIDERED, BASED ON SOIL PARAMETERS AND SITE CONDITIONS.
3. GEOTEXTILE TO BE REPLACED PERIODICALLY WHEN ACCUMULATED SEDIMENTS INTERFERES WITH DRAINAGE, OR AS DIRECTED BY THE TRANSPORTATION AND WORKS DEPARTMENT
4. GEOTEXTILE TO BE REMOVED FROM ALL CATCHBASINS IN THE FALL SEASON PRIOR TO SNOW.

GEMMELL ENGINEERING
CATCH BASIN SEDIMENT CONTROL DEVICE



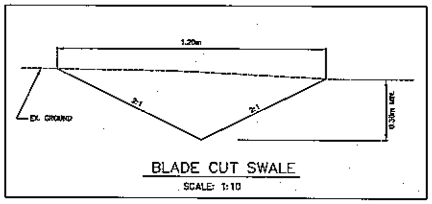
NOTES:
1. Piles containing more than 100 cubic metres of topsoil or spoil shall be located a minimum of 15 metres from a roadway or channel.
2. Piles left in place for more than 60 days shall be stabilized with a tarp, mulch, vegetative cover or other acceptable means.

GEMMELL ENGINEERING
TOPSOIL OR SPOIL PILE SILTATION CONTROL

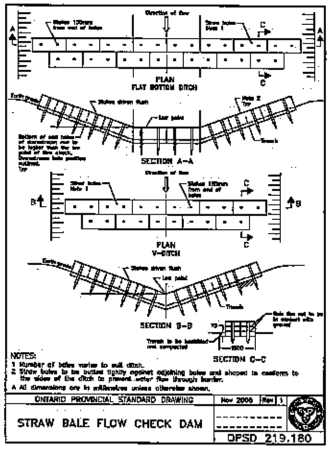


NOTES:
1. ROCK CHECK DAM TO BE MAINTAINED REGULARLY TO REMOVE ALL SILT UNTIL THE CONSTRUCTION IS COMPLETE.
2. TO BE INSTALLED IN ALL DETENTION PONDS AND STORM OUTLETS.
3. ACCUMULATED SEDIMENT MUST BE REMOVED PRIOR TO REMOVAL OF FILTER CLOTH.
4. FILTER CLOTH MUST BE REPLACED AS REQUIRED.

TEMPORARY ROCK CHECK DAM FOR DETENTION PONDS & STORM OUTLETS



BLADE CUT SWALE
SCALE: 1:10

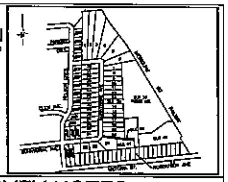


NOTES:
1 Number of bales varies to suit ditch.
2 Straw bales to be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.
A All dimensions are in millimetres unless otherwise shown.

STRAW BALE FLOW CHECK DAM
OPSD 219.180

KEY PLAN

SCALE 1:1000



SURVEY NOTES:

BOUNDARY SURVEY BASED ON FIELD SURVEY BY PETER BAKES O.L.S., DATED OCT. 26, 2010.

TOPOGRAPHIC INFORMATION BASED ON INFORMATION FROM ROCK SOLID CONSULTING RECEIVED JAN. 03, 2011.

MNR BENCHMARK: [illegible] TWP.: STROUD ELEV.: 270.600

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7. PRIOR TO ANY WORKS ON MUNICIPAL PROPERTY A ROAD OCCUPANCY PERMIT SHALL BE OBTAINED FROM THE TOWN.
8. GEMMELL ENGINEERING TAKES NO LIABILITY FOR SURVEY DATA.

LEGEND:

ACCEPTED FOR CONSTRUCTION

TOWN OF INNISFIL
DEVELOPMENT ENGINEERING

DATE: ____________

ACCEPTED FOR CONSTRUCTION
AECOM

TOWN PEER REVIEW ENGINEER

DATE: ____________

ITEM	DESCRIPTION	DATE	BY	APPR'D
1	MYLAR SUBMISSION	MAY 7/14	GEMCAD INC.	HGG

SCHEDULE OF REVISIONS

100061079

ENGINEER'S SEAL

PROJECT:
INNISFIL
EXECUTIVE ESTATES

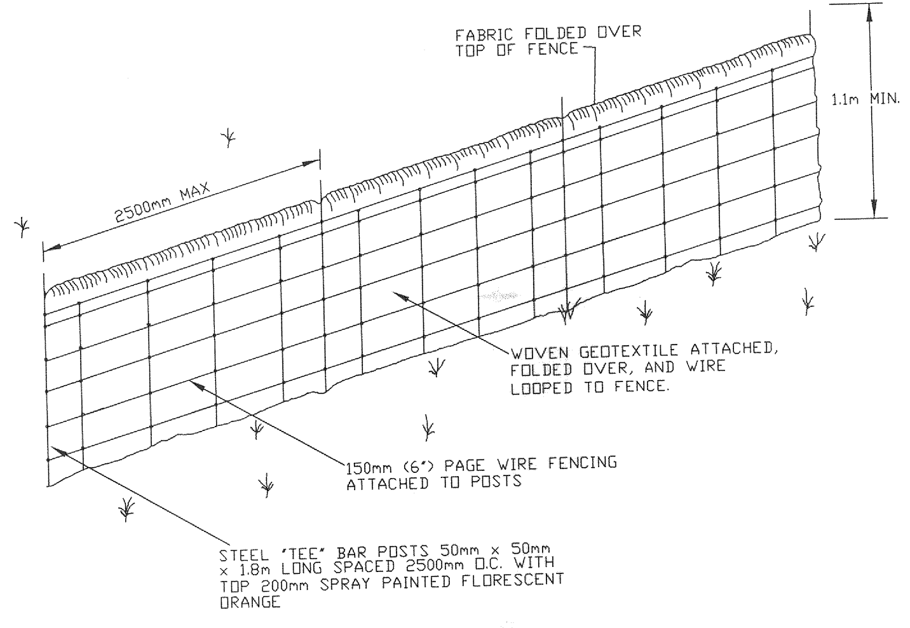
TITLE:
EROSION AND SEDIMENT
CONTROL DETAILS

GEMMELL
Engineering

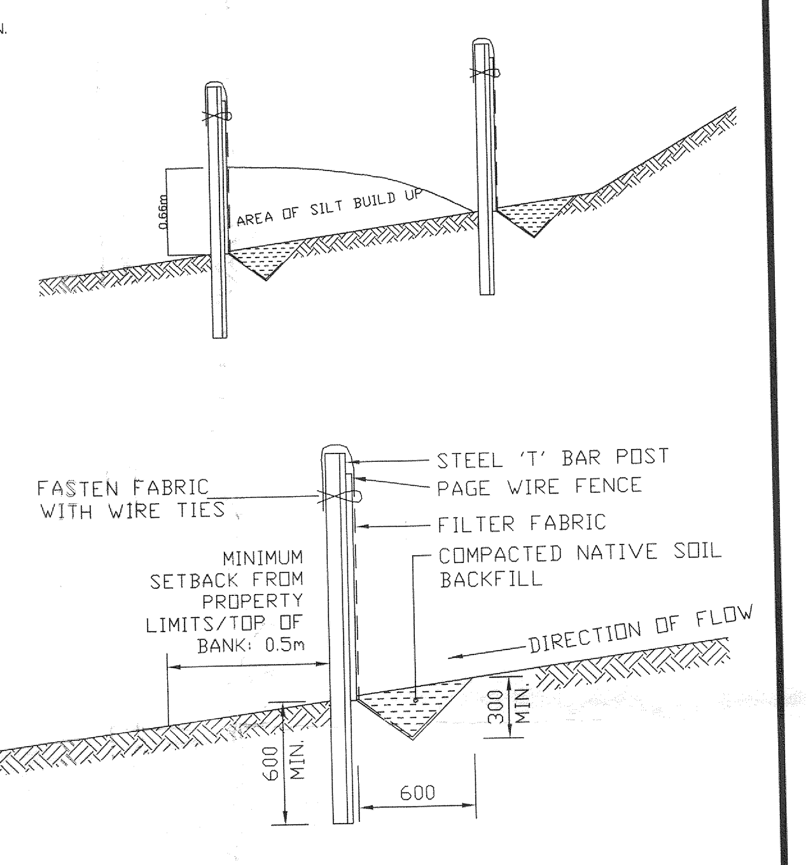
TOWN OF INNISFIL
PLANNING AND DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

DRAWN: GEMCAD
DESIGNED: H.G.G.
CHECKED: H.G.G.
SCALE: HOR: 1:1250
DATE: MAY 2012
DWG. No. ESC-2
PROJECT No. 123

INNISFIL EXECUTIVE ESTATES - I-T-880008



REPLACEMENT FENCE LOCATION



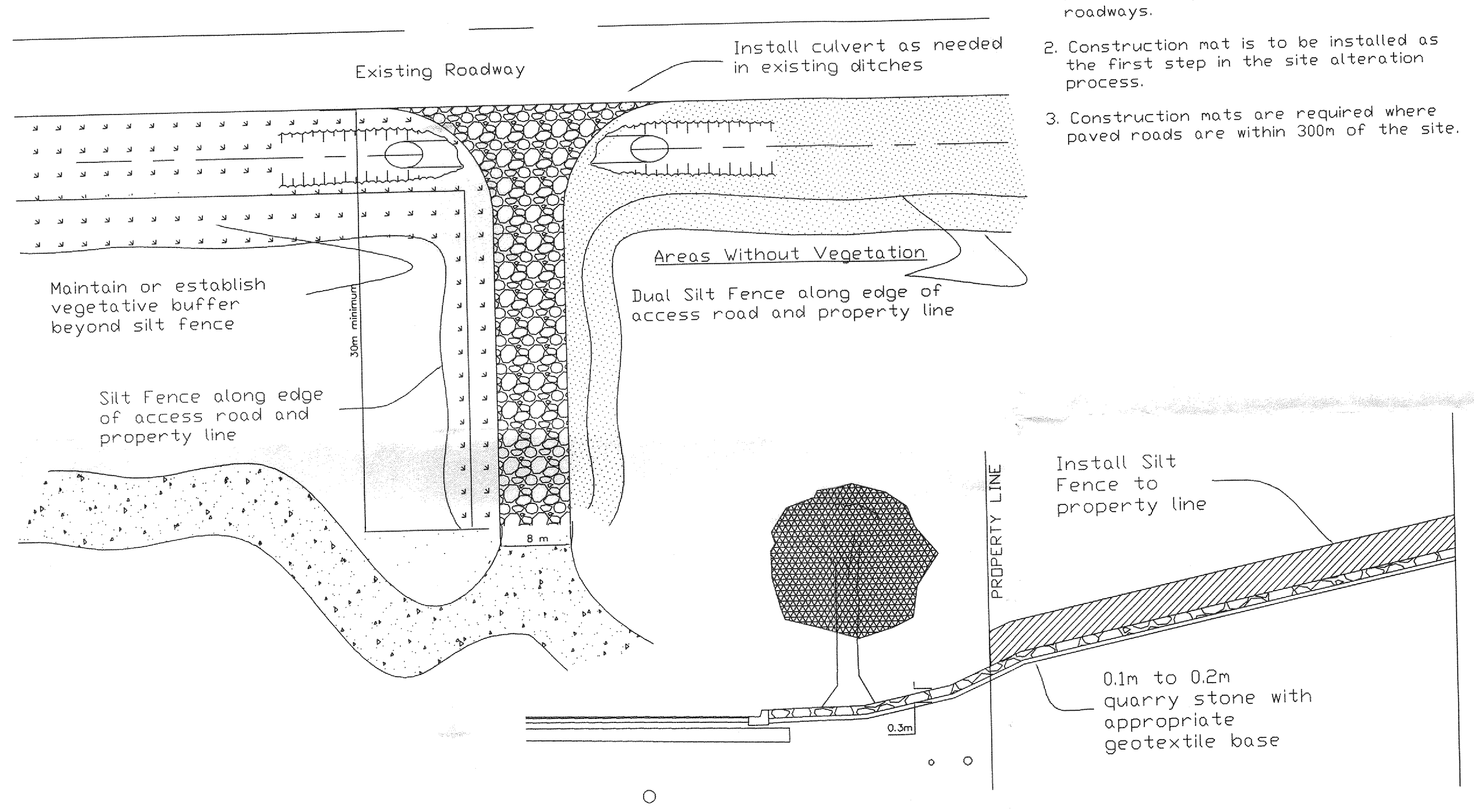
NOTES:

1. SILT CONTROL FENCE SHOULD BE ALIGNED WITH CONTOURS FOR SHEET OVERLAND FLOW.
2. SILT/SEDIMENT CONTROL FENCE IS TO BE LOCATED IN AREAS OF LOW SEDIMENT YIELD ON SLOPES THAT CONFORM TO MTO DRAINAGE MANUAL VOLUME 2 "CHART F4-3C TOPOGRAPHIC FACTOR LS BASED ON SLOPE LENGTH AND GRADIENT."
3. SILT/SEDIMENT CONTROL FENCE SHALL BE INSTALLED WITH FILTER MEDIA FABRIC TOED INTO THE SOIL A MIN. OF 300mm BY EITHER STATIC SLICING OR TRENCH METHODS WITH COMPACTION OF TRENCH MATERIAL MEETING 95% INSITU SOIL STRENGTH.
4. STEEL 'T' BAR POSTS ARE TO BE SPACED MAX. 2500mm ON CENTER.
5. FROZEN GROUND CONDITIONS REQUIRE FILTER FABRIC TO BE BACKFILLED IN TRENCH WITH CLEAR STONE.
6. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
7. GEOTEXTILE FABRIC TO BE COMPRISED OF WOVEN OR NON-WOVEN U.V. STABILIZED MATERIAL. FABRIC TO BE FOLDED OVER TOP OF FENCE MIN. 300mm AND WIRE FASTENED.

GEMMELL ENGINEERING

TYPICAL DETAIL OF SILT/SEDIMENT FENCE

NO.	REVISION	APR'D	DATE



1. Purpose of Construction Mat is to minimize transportation of sediment onto roadways.
2. Construction mat is to be installed as the first step in the site alteration process.
3. Construction mats are required where paved roads are within 300m of the site.

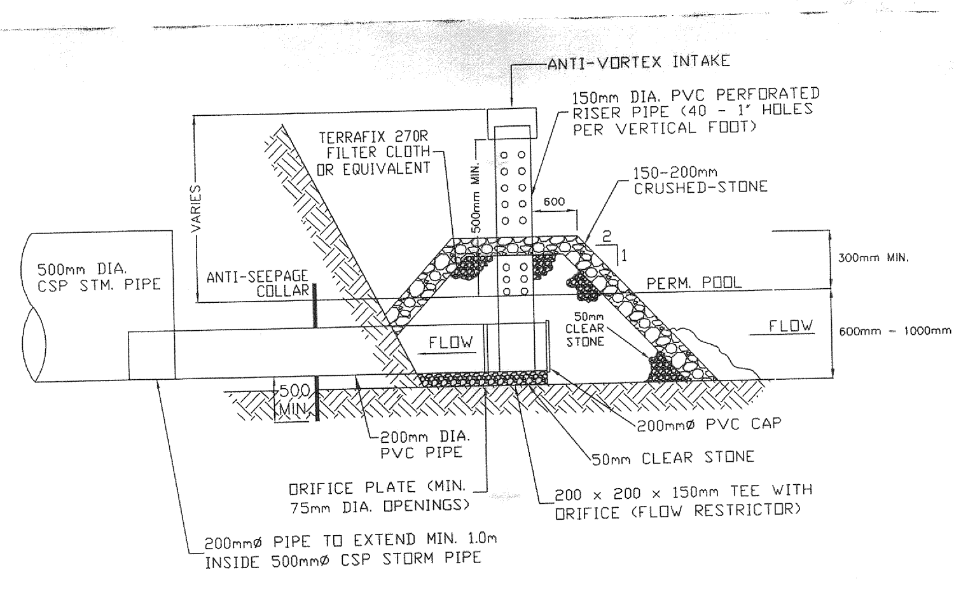
GEMMELL ENGINEERING

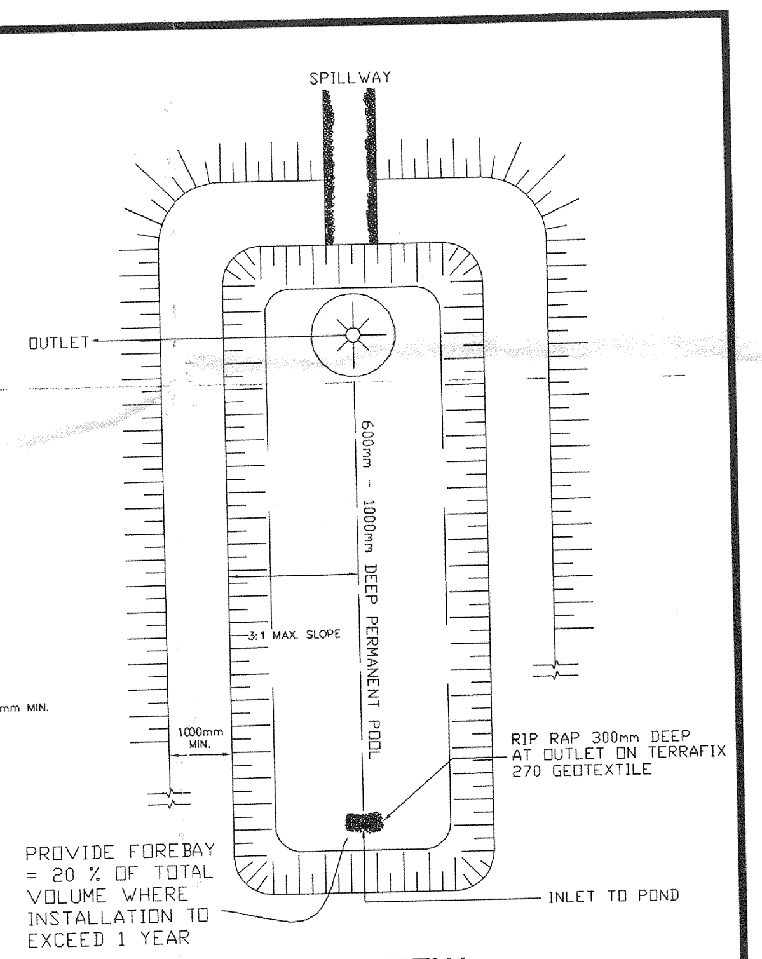
CONSTRUCTION ENTRANCE MAT

NO.	REVISION	APR'D	DATE

NOTES:

1. POND BERMS TO BE CONSTRUCTED USING IMPERVIOUS MATERIAL, COMPACTED TO 95% S.P.D, AND INSPECTED BY A PROFESSIONAL ENGINEER.
2. A 1500mm HIGH BARRIER FENCE SHALL BE ERECTED ALONG PERIMETER OF SEDIMENT BASIN. WARNING SIGNS SHALL BE ATTACHED TO THE FENCING STATING THE AREA IS OFF LIMITS TO THE GENERAL PUBLIC, AND ADVISING THAT THE BASIN IS USED FOR SEDIMENT CONTROL PURPOSES, AND THAT THE SUBJECT AREA IS SUBJECT TO FLASH FLOODING.
3. THE BASIN IS TO BE CONSTRUCTED ON THE BASIS OF A MIN. LENGTH TO WIDTH RATIO OF 4 TO 1.
4. APPROPRIATE PESTICIDE AND LAVICIDE CONTROLS SHOULD BE MAINTAINED TO CONTROL MOSQUITO BREEDING AS DIRECTED BY MEDICAL OFFICER OF HEALTH



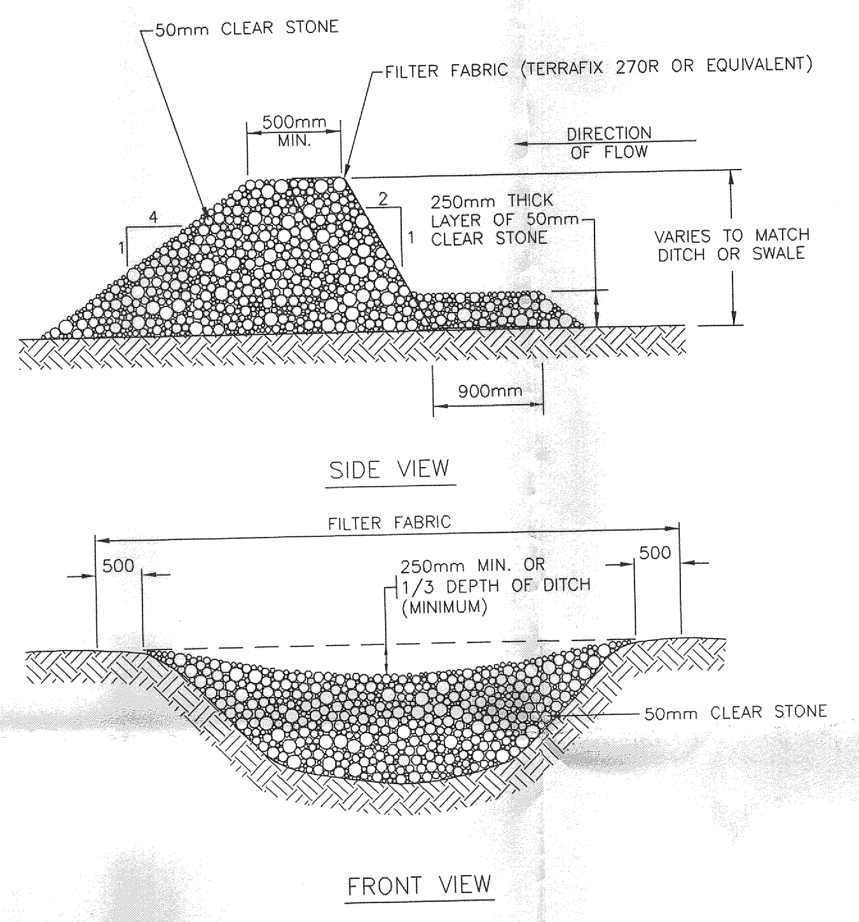


PLAN VIEW

GEMMELL ENGINEERING

TEMPORARY SEDIMENT BASIN AND OUTLET DETAILS

NO.	REVISION	APR'D	DATE



NOTES:

1. REGULAR MAINTENANCE MUST BE SCHEDULED FOR THE STONE SILT TRAP.
2. TO BE INSTALLED IN ALL ROADSIDE DITCHES AND DRAINAGE DITCHES AT MAX. 100m SPACING.
3. ACCUMULATED SEDIMENT MUST BE REMOVED PRIOR TO REMOVAL OF FILTER FABRIC.
4. FILTER FABRIC MUST BE REPLACED AS REQUIRED.

NO.	REVISIONS	APR'D	DATE
1.	250mm MINIMUM OVERFLOW DEPTH		MAR/92

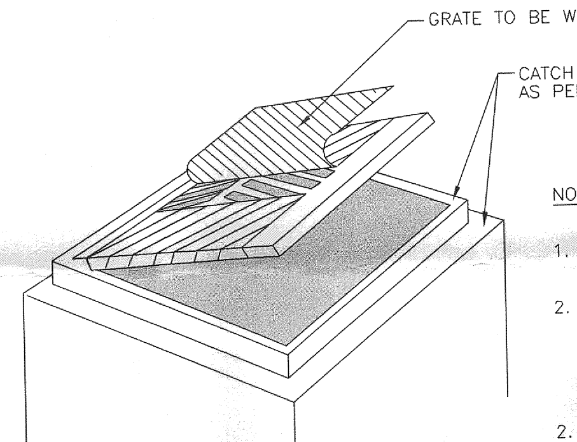
Town of Innisfil
Infinite Opportunities

STONE SILT TRAP FOR ROADSIDE DITCHES & DRAINAGE DITCHES

DRAWN: A&A
APR'D:
SCALE: N.T.S.
DATE: JUNE 2011

METRIC
ALL DIMENSIONS IN mm UNLESS OTHERWISE NOTED

TOISD
501



NOTES

1. TO BE USED UNDER APPROPRIATE CIRCUMSTANCES, BETWEEN APRIL AND DECEMBER.
2. WOVEN TEXTILE TO HAVE A MIN. EQUIVALENT OPENING SIZE OF 0.15mm AND A MAX EQUIVALENT OPENING SIZE OF 0.25mm OR A NON WOVEN GEOTEXTILE TO BE CONSIDERED, BASED ON SOIL PARAMETERS AND SITE CONDITIONS.
2. GEOTEXTILE TO BE REPLACED PERIODICALLY WHEN ACCUMULATED SEDIMENTS INTERFERES WITH DRAINAGE, OR AS DIRECTED BY THE TRANSPORTATION AND WORKS DEPARTMENT
3. GEOTEXTILE TO BE REMOVED FROM ALL CATCHBASINS IN THE FALL SEASON PRIOR TO SNOW.

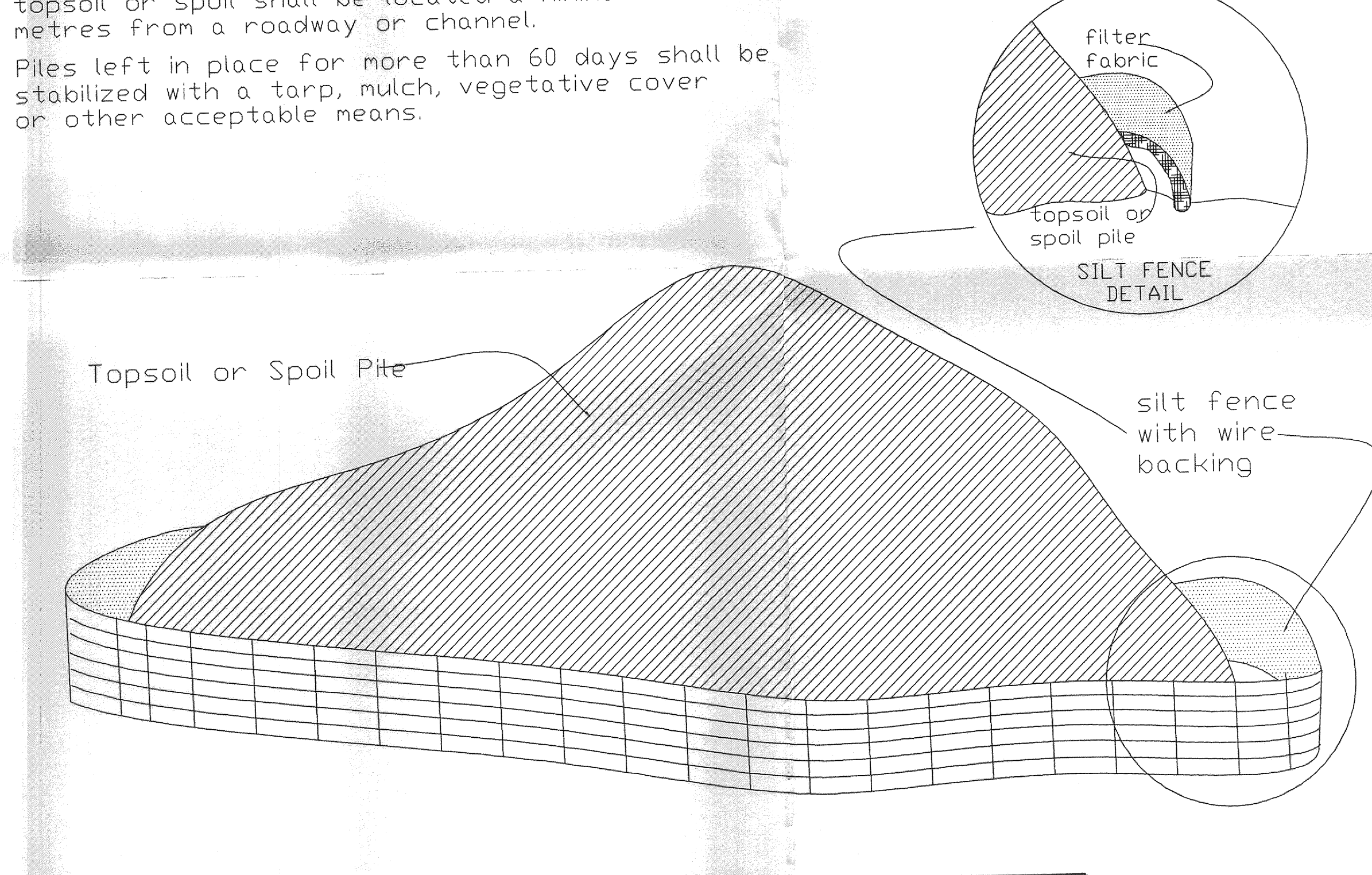
GEMMELL ENGINEERING

CATCH BASIN SEDIMENT CONTROL DEVICE

NO.	REVISION	APR'D	DATE

NOTES:

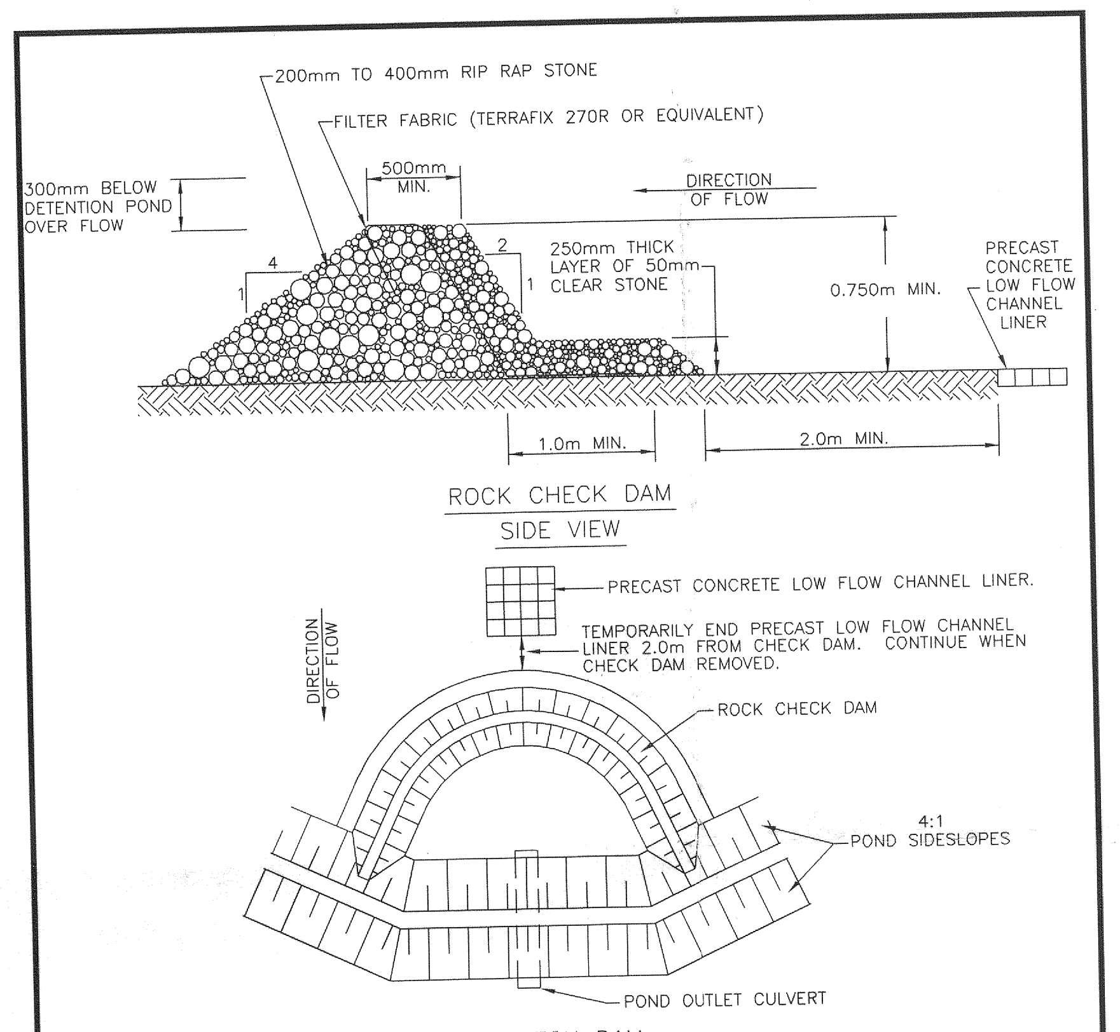
1. Piles containing more than 100 cubic metres of topsoil or spoil shall be located a minimum of 15 metres from a roadway or channel.
2. Piles left in place for more than 60 days shall be stabilized with a tarp, mulch, vegetative cover or other acceptable means.



GEMMELL ENGINEERING

TOPSOIL OR SPOIL PILE SILTATION CONTROL

NO.	REVISION	APR'D	DATE



NOTES:

1. ROCK CHECK DAM TO BE MAINTAINED REGULARLY TO REMOVE ALL SILT UNTIL THE CONSTRUCTION IS COMPLETE.
2. TO BE INSTALLED IN ALL DETENTION PONDS AND STORM OUTLETS.
3. ACCUMULATED SEDIMENT MUST BE REMOVED PRIOR TO REMOVAL OF FILTER CLOTH.
4. FILTER CLOTH MUST BE REPLACED AS REQUIRED.

NO.	REVISIONS	APR'D	DATE

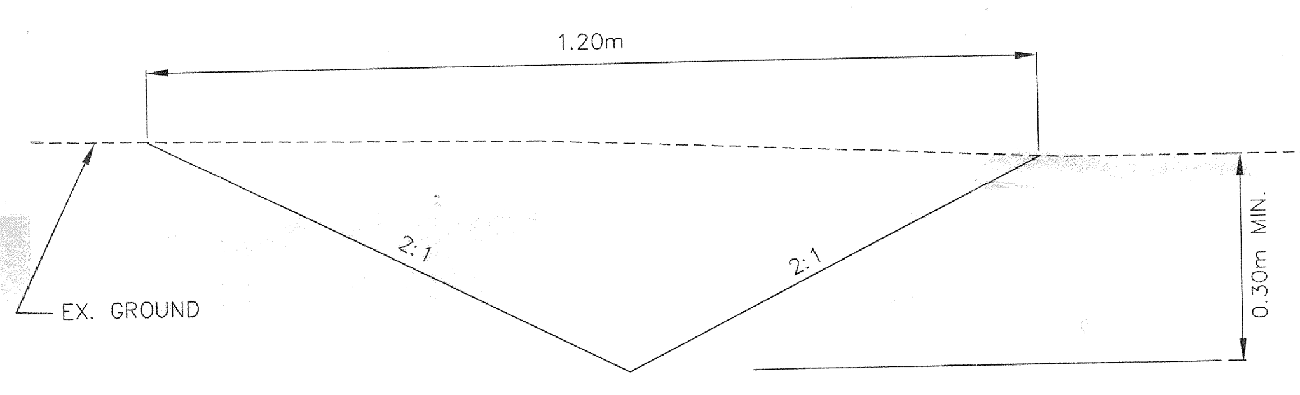
Town of Innisfil
Infinite Opportunities

TEMPORARY ROCK CHECK DAM FOR DETENTION PONDS & STORM OUTLETS

DRAWN: A&A
APR'D:
SCALE: N.T.S.
DATE: JUNE 2011

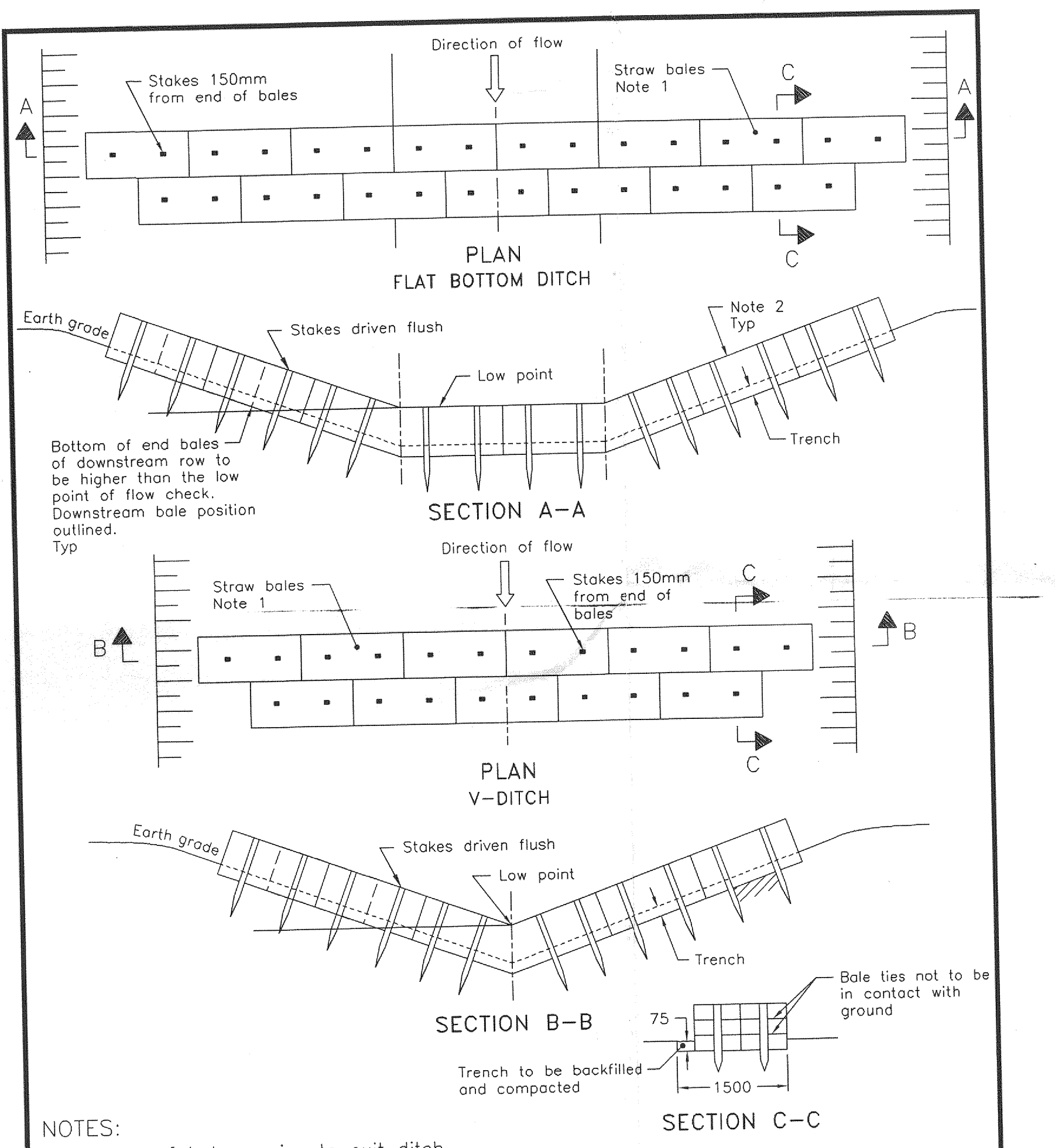
METRIC
ALL DIMENSIONS IN mm UNLESS OTHERWISE NOTED

TOISD
502



BLADE CUT SWALE

SCALE: 1:10



NOTES:

1 Number of bales varies to suit ditch.
2 Straw bales to be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

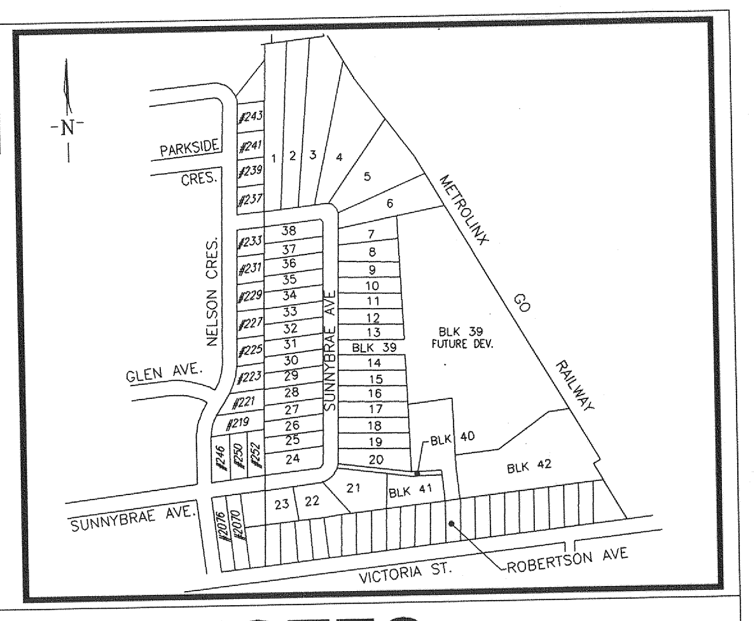
Nov 2006 | Rev 1

STRAW BALE FLOW CHECK DAM

OPSD 219.180

KEY PLAN

SCALE 1:1000



SURVEY NOTES:

BOUNDARY SURVEY BASED ON FIELD SURVEY BY PETER RAIKES O.L.S., DATED OCT. 26, 2010.

TOPOGRAPHIC INFORMATION BASED ON INFORMATION FROM ROCK SOLID CONSULTING RECEIVED JAN. 05, 2011.

MNR BENCHMARK: 0011931U461S TWP.: STROUD ELEV.: 270.600

TABLET LOCATION: PRESBYTERIAN CHURCH, IN VILLAGE, ABOUT 90m EAST OF TORONTO-NORTH BAY HWY. TABLET IN WEST CONCRETE FOUNDATION WALL OF WEST TOWER, 1.5m FROM S/W CORNER AND 1.37m BELOW CONCRETE BLOCKS.

GENERAL NOTES:

1. DO NOT SCALE DRAWINGS.
2. ALL DIMENSIONS ARE TO BE CHECKED AND VERIFIED ON SITE PRIOR TO CONSTRUCTION.
3. ANY DISCREPANCIES, OMISSIONS, OR ERRORS ARE TO BE REPORTED TO THE CONSULTANT. NO WORK IS TO PROCEED BEFORE CLARIFICATION OF THE DISCREPANCIES, ERRORS, OR OMISSIONS IS RECEIVED FROM THE CONSULTANT.
4. ALL EXISTING CONDITIONS TO BE CHECKED AND VERIFIED ON SITE PRIOR TO CONSTRUCTION.
5. ONLY LATEST APPROVED DRAWINGS TO BE USED FOR CONSTRUCTION.
6. ALL DRAWINGS AND SPECIFICATIONS REMAIN THE PROPERTY OF THE CONSULTANT, AND SHALL BE RETURNED TO THE CONSULTANT UPON REQUEST. IN NO WAY SHALL THE DRAWINGS AND/OR SPECIFICATIONS IN WHOLE OR IN PART BE REPRODUCED OR DISTRIBUTED WITHOUT THE PERMISSION OF THE CONSULTANT.
7. PRIOR TO ANY WORKS ON MUNICIPAL PROPERTY A ROAD OCCUPANCY PERMIT SHALL BE OBTAINED FROM THE TOWN.
8. GEMMELL ENGINEERING TAKES NO LIABILITY FOR SURVEY DATA.

LEGEND:

ACCEPTED FOR CONSTRUCTION
TOWN OF INNISFIL
DEVELOPMENT ENGINEERING
DATE:

ACCEPTED FOR CONSTRUCTION
AECOM
TOWN PEER REVIEW ENGINEER
DATE: June 3, 2014

ITEM	DESCRIPTION	DATE	BY	APPRV'D
1	MYLAR SUBMMISSION	MAY 7/14	GEMCAD INC.	HGG

SCHEDULE OF REVISIONS

H.G. GEMMELL
100081079
My 7/14

ENGINEER'S SEAL

PROJECT:
INNISFIL
EXECUTIVE ESTATES

TITLE:
EROSION AND SEDIMENT
CONTROL DETAILS

GEMMELL
ENGINEERING
144 Thrushwood Drive, Barrie, ON L4M 1Z0
Phone: (705) 309-0787 Fax: (705) 719-9578

TOWN OF INNISFIL
PLANNING AND DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

DRAWN: GEMCAD
DESIGNED: H.G.G.
CHECKED: H.G.G.
SCALE:
HOR: 1:1250
DATE: MAY 2012
DWG. No. ESC-2
PROJECT No. 123

INNISFIL EXECUTIVE ESTATES - I-T-880008

Temporary Pond Sizing Calculations

Project:

Project N°

Description:

Prepared By:

Date:

Other:

Page 1

ESC Ponds

Pond 1: Contributing area = 11.1 ha

Passive / Perm pool Volume = 125 m^3/ha x 11.1 ha

= 1387.50 m^3

Active Volume = 125 m^3/ha x 11.1 ha

= 1387.50 m^3

For 27.09 hr draw down time,
a 120 mm orifice is needed
at 268.30 m. (perm pool)

Pond 2: Contributing Area = 6.4 ha

Passive / Perm pool Volume = 125 m^3/ha x 6.4

= 800 m^3

Active Volume = 125 m^3/ha x 6.4

= 800 m^3

for 29.64 hr draw down time
a 90 mm orifice needed at 267.35 m
(perm pool)

Project:	Project Nº
Description:	Prepared By: Date:
	Other: Page 1

ESC Pond Flows - Weir Sizing

Peak Flows have been prorated from the predevelopment condition

ESC Pond 1 : contributing area = 11.1 ha

catchment 101 : Q regional = 1.45 m³/s
Area = 18 ha

$$Q_{\text{prorated}} = \frac{11.1}{18} \times 1.45 = 0.89 \text{ m}^3/\text{s}$$

Q weir = 1.119 m³/s at top of pond

ESC Pond 2 : contributing area = 6.4 ha

catchment 101 : Q reg = $\overset{1.45}{1.40}$ m³/s
Area = 18 ha

$$Q_{\text{prorated}} = \frac{6.4}{18} \times 1.45 = 0.52 \text{ m}^3/\text{s}$$

Q weir = 0.906 m³/s

Innisfil Executive Estates
ESC Pond #1

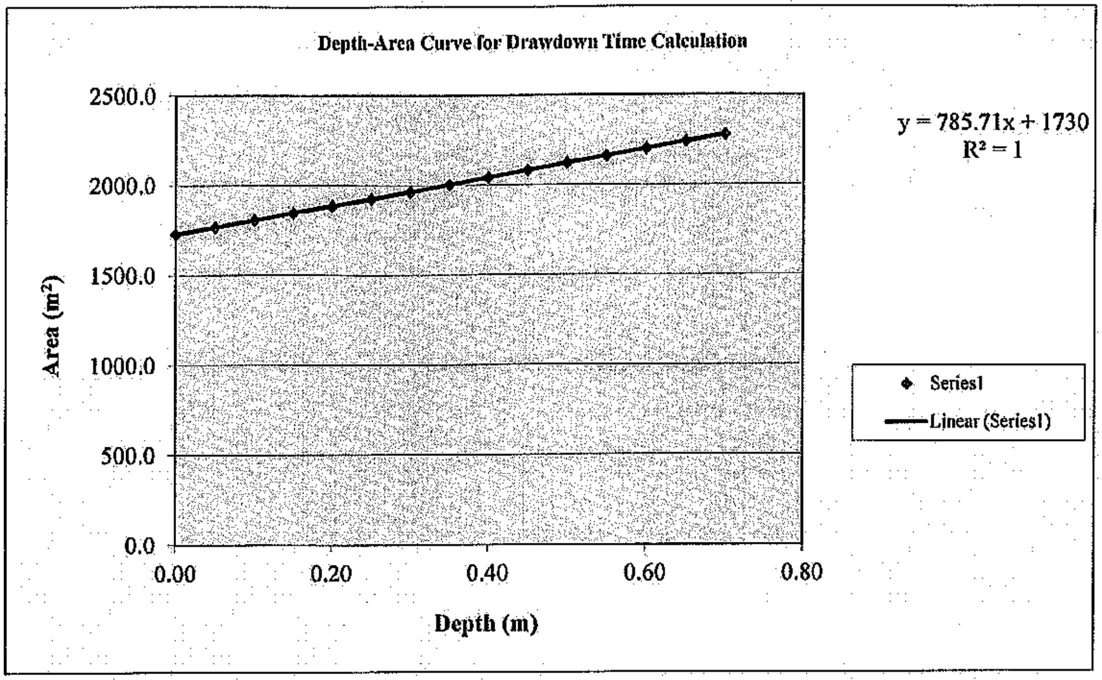
Hydraulic Calculation Sheet
Storage Stage Discharge Calculations

Extended Detention Orifice
RADIUS= 0.060 m
Outlet Dia= 120.0 mm
Height= 1.30 m

Weir 1 Details
Invert 1.75 m
Length 4.00 m
side slopes 5.00 :1
Coefficient 1.705 (Broad-Crested)

	Minimum		Provided	
Permanent Pool Volume	1388	m^3	1387	m^3
Extended Detention Volume	1388	m^3	1404	m^3

TOTAL STORAGE m^3	ACTIVE DETENTION STORAGE m^3	WATER DEPTH m	EXTENDED DETENTION ORIFICE m^3/s	SECONDARY ORIFICE m^3/s	OUTFLOW WEIR 1 m^3/s	OUTFLOW WEIR 2 m^3/s	TOTAL OUTFLOW m^3/s	Elevation m	
0	0	0.00	0.000	0.000	0.000	0.000	0.000	267.00	
27	0	0.05	0.000	0.000	0.000	0.000	0.000	267.05	
57	0	0.10	0.000	0.000	0.000	0.000	0.000	267.10	
89	0	0.15	0.000	0.000	0.000	0.000	0.000	267.15	
122	0	0.20	0.000	0.000	0.000	0.000	0.000	267.20	
158	0	0.25	0.000	0.000	0.000	0.000	0.000	267.25	
196	0	0.30	0.000	0.000	0.000	0.000	0.000	267.30	
236	0	0.35	0.000	0.000	0.000	0.000	0.000	267.35	
278	0	0.40	0.000	0.000	0.000	0.000	0.000	267.40	
322	0	0.45	0.000	0.000	0.000	0.000	0.000	267.45	
368	0	0.50	0.000	0.000	0.000	0.000	0.000	267.50	
416	0	0.55	0.000	0.000	0.000	0.000	0.000	267.55	
466	0	0.60	0.000	0.000	0.000	0.000	0.000	267.60	
518	0	0.65	0.000	0.000	0.000	0.000	0.000	267.65	
573	0	0.70	0.000	0.000	0.000	0.000	0.000	267.70	
629	0	0.75	0.000	0.000	0.000	0.000	0.000	267.75	
688	0	0.80	0.000	0.000	0.000	0.000	0.000	267.80	
748	0	0.85	0.000	0.000	0.000	0.000	0.000	267.85	
811	0	0.90	0.000	0.000	0.000	0.000	0.000	267.90	
876	0	0.95	0.000	0.000	0.000	0.000	0.000	267.95	
943	0	1.00	0.000	0.000	0.000	0.000	0.000	268.00	
1,012	0	1.05	0.000	0.000	0.000	0.000	0.000	268.05	
1,082	0	1.10	0.000	0.000	0.000	0.000	0.000	268.10	
1,156	0	1.15	0.000	0.000	0.000	0.000	0.000	268.15	
1,231	0	1.20	0.000	0.000	0.000	0.000	0.000	268.20	
1,308	0	1.25	0.000	0.000	0.000	0.000	0.000	268.25	
1,387	0	1.30	0.000	0.000	0.000	0.000	0.000	268.30	
1,475	87	1.35	0.001	0.000	0.000	0.000	0.001	268.35	
1,564	177	1.40	0.006	0.000	0.000	0.000	0.006	268.40	
1,655	268	1.45	0.009	0.000	0.000	0.000	0.009	268.45	
1,749	362	1.50	0.012	0.000	0.000	0.000	0.012	268.50	
1,844	457	1.55	0.014	0.000	0.000	0.000	0.014	268.55	
1,941	554	1.60	0.015	0.000	0.000	0.000	0.015	268.60	
2,041	654	1.65	0.017	0.000	0.000	0.000	0.017	268.65	
2,142	755	1.70	0.018	0.000	0.000	0.000	0.018	268.70	
2,245	858	1.75	0.019	0.000	0.000	0.000	0.019	268.75	weir
2,350	963	1.80	0.021	0.000	0.081	0.000	0.102	268.80	
2,457	1,070	1.85	0.022	0.000	0.243	0.000	0.264	268.85	
2,567	1,179	1.90	0.023	0.000	0.470	0.000	0.493	268.90	
2,678	1,290	1.95	0.024	0.000	0.762	0.000	0.786	268.95	
2,791	1,404	2.00	0.025	0.000	1.119	0.000	1.144	269.00	Top of Pond



Extended Detention Orifice Invert 268.30
Extended Detention Elevation 269.00
(25mm runoff or 40m^3/ha active volume in pond)

Drawdown Equation
C2 786
C3 1730
h 0.64
Ao 0.01131

$t = \frac{3033.51}{0.03}$

t= 97534.93 seconds
27.09 hours

OK

Elevation (m)	Depth (m)	Area (m2)
268.30	0.00	1730.0
268.35	0.05	1769.3
268.40	0.10	1808.6
268.45	0.15	1847.9
268.50	0.20	1887.1
268.55	0.25	1926.4
268.60	0.30	1965.7
268.65	0.35	2005.0
268.70	0.40	2044.3
268.75	0.45	2083.6
268.80	0.50	2122.9
268.85	0.55	2162.1
268.90	0.60	2201.4
268.95	0.65	2240.7
269.00	0.70	2280.0

Innisfil Executive Estates
ESC Pond #2

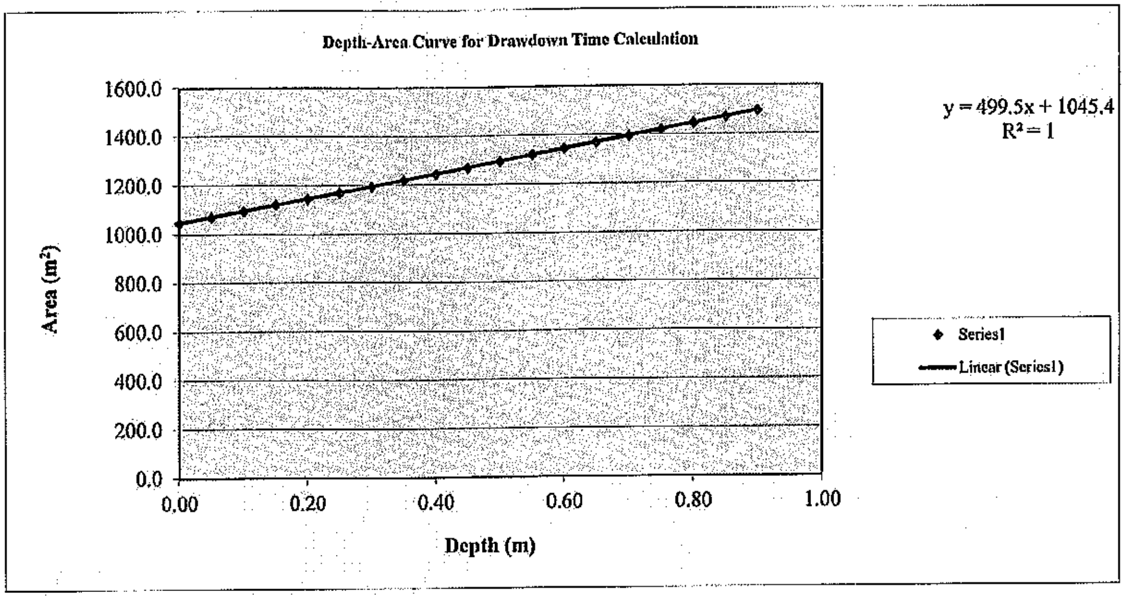
Hydraulic Calculation Sheet
Storage Stage Discharge Calculations

Extended Detention Orifice	
RADIUS=	0.045 m
Outlet Dia=	90.0 mm
Height=	1.10 m

Weir 1 Details	
Invert	1.75 m
Length	3.00 m
side slopes	5.00 :1
Coefficient	1.705 (Broad-Crested)

	Minimum		Provided	
Permanent Pool Volume	800	m^3	848	m^3
Extended Detention Volume	800	m^3	854	m^3

TOTAL STORAGE m^3	ACTIVE DETENTION STORAGE m^3	WATER DEPTH m	EXTENDED DETENTION ORIFICE m^3/s	SECONDARY ORIFICE m^3/s	OUTFLOW WEIR 1 m^3/s	OUTFLOW WEIR 2 m^3/s	TOTAL OUTFLOW m^3/s	Elevation m	
0	0	0.00	0.000	0.000	0.000	0.000	0.000	266.25	
25	0	0.05	0.000	0.000	0.000	0.000	0.000	266.30	
52	0	0.10	0.000	0.000	0.000	0.000	0.000	266.35	
80	0	0.15	0.000	0.000	0.000	0.000	0.000	266.40	
109	0	0.20	0.000	0.000	0.000	0.000	0.000	266.45	
140	0	0.25	0.000	0.000	0.000	0.000	0.000	266.50	
171	0	0.30	0.000	0.000	0.000	0.000	0.000	266.55	
204	0	0.35	0.000	0.000	0.000	0.000	0.000	266.60	
238	0	0.40	0.000	0.000	0.000	0.000	0.000	266.65	
274	0	0.45	0.000	0.000	0.000	0.000	0.000	266.70	
310	0	0.50	0.000	0.000	0.000	0.000	0.000	266.75	
348	0	0.55	0.000	0.000	0.000	0.000	0.000	266.80	
388	0	0.60	0.000	0.000	0.000	0.000	0.000	266.85	
428	0	0.65	0.000	0.000	0.000	0.000	0.000	266.90	
470	0	0.70	0.000	0.000	0.000	0.000	0.000	266.95	
512	0	0.75	0.000	0.000	0.000	0.000	0.000	267.00	
557	0	0.80	0.000	0.000	0.000	0.000	0.000	267.05	
602	0	0.85	0.000	0.000	0.000	0.000	0.000	267.10	
649	0	0.90	0.000	0.000	0.000	0.000	0.000	267.15	
697	0	0.95	0.000	0.000	0.000	0.000	0.000	267.20	
746	0	1.00	0.000	0.000	0.000	0.000	0.000	267.25	
796	0	1.05	0.000	0.000	0.000	0.000	0.000	267.30	
848	0	1.10	0.000	0.000	0.000	0.000	0.000	267.35	perm pool
901	53	1.15	0.001	0.000	0.000	0.000	0.001	267.40	
955	107	1.20	0.004	0.000	0.000	0.000	0.004	267.45	
1,010	162	1.25	0.006	0.000	0.000	0.000	0.006	267.50	
1,067	219	1.30	0.007	0.000	0.000	0.000	0.007	267.55	
1,125	277	1.35	0.008	0.000	0.000	0.000	0.008	267.60	
1,184	336	1.40	0.009	0.000	0.000	0.000	0.009	267.65	
1,244	397	1.45	0.010	0.000	0.000	0.000	0.010	267.70	
1,306	458	1.50	0.010	0.000	0.000	0.000	0.010	267.75	
1,369	521	1.55	0.011	0.000	0.000	0.000	0.011	267.80	
1,433	585	1.60	0.012	0.000	0.000	0.000	0.012	267.85	
1,498	651	1.65	0.012	0.000	0.000	0.000	0.012	267.90	
1,565	717	1.70	0.013	0.000	0.000	0.000	0.013	267.95	
1,633	785	1.75	0.014	0.000	0.000	0.000	0.014	268.00	weir
1,702	854	1.80	0.014	0.000	0.062	0.000	0.076	268.05	active storage
1,772	925	1.85	0.015	0.000	0.189	0.000	0.203	268.10	
1,844	996	1.90	0.015	0.000	0.371	0.000	0.387	268.15	
1,917	1,069	1.95	0.016	0.000	0.610	0.000	0.626	268.20	
1,991	1,143	2.00	0.016	0.000	0.906	0.000	0.922	268.25	Top of Pond



Extended Detention Orifice Invert 267.35
Extended Detention Elevation 268.05
(25mm runoff or 40m³/ha active volume in pond)

Drawdown Equation
C2 499
C3 1045
h 0.65
Ao 0.00636

$t=\frac{1866.97}{0.02}$

t= 106715.96 seconds
29.64 hours

OK

Elevation (m)	Depth (m)	Area (m2)
267.35	0.00	1045.5
267.40	0.05	1070.4
267.45	0.10	1095.4
267.50	0.15	1120.4
267.55	0.20	1145.4
267.60	0.25	1170.3
267.65	0.30	1195.3
267.70	0.35	1220.3
267.75	0.40	1245.3
267.80	0.45	1270.2
267.85	0.50	1295.2
267.90	0.55	1320.2
267.95	0.60	1345.2
268.00	0.65	1370.1
268.05	0.70	1395.1
268.10	0.75	1420.1
268.15	0.80	1445.1
268.20	0.85	1470.0
268.25	0.90	1495.0

FINAL APPROVAL STAMP

Approved under Section 51 of the Planning Act.

THIS __________ DAY OF ____________, 2014

DIRECTOR OF PLANNING

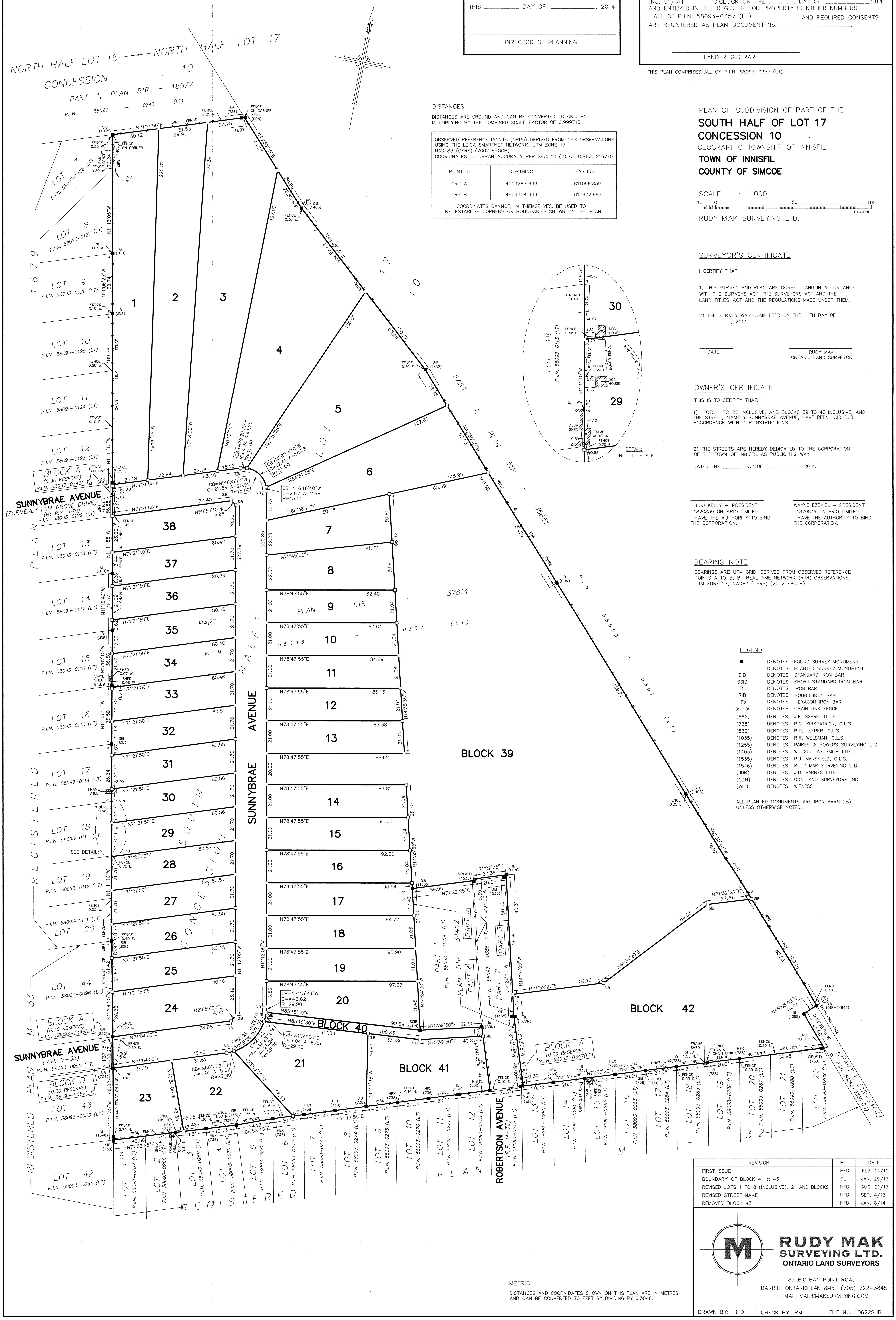
PLAN 51M–

CERTIFICATE OF REGISTRATION

I CERTIFY THAT THIS PLAN IS REGISTERED IN THE LAND REGISTRY OFFICE FOR THE LAND TITLES DIVISION OF SIMCOE COUNTY (No. 51) AT ______ O'CLOCK ON THE _______ DAY OF ___________2014 AND ENTERED IN THE REGISTER FOR PROPERTY IDENTIFIER NUMBERS ALL OF P.I.N. 58093–0357 (LT)____________, AND REQUIRED CONSENTS ARE REGISTERED AS PLAN DOCUMENT No. _________________.

LAND REGISTRAR

THIS PLAN COMPRISES ALL OF P.I.N. 58093–0357 (LT)



PLAN OF SUBDIVISION OF PART OF THE

SOUTH HALF OF LOT 17
CONCESSION 10

GEOGRAPHIC TOWNSHIP OF INNISFIL

TOWN OF INNISFIL

COUNTY OF SIMCOE

SCALE 1 : 1000

10 0 50 100 metres

RUDY MAK SURVEYING LTD.

DISTANCES

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999713.

OBSERVED REFERENCE POINTS (ORPs) DERIVED FROM GPS OBSERVATIONS USING THE LEICA SMARTNET NETWORK, UTM ZONE 17, NAD 83 (CSRS) (2002 EPOCH).
COORDINATES TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG. 216/10

POINT ID	NORTHING	EASTING
ORP A	4909267.693	611096.859
ORP B	4909704.949	610672.987

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE–ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THE PLAN.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1) THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.

2) THE SURVEY WAS COMPLETED ON THE TH DAY OF , 2014.

DATE

RUDY MAK
ONTARIO LAND SURVEYOR

OWNER'S CERTIFICATE

THIS IS TO CERTIFY THAT:

1) LOTS 1 TO 38 INCLUSIVE, AND BLOCKS 39 TO 42 INCLUSIVE, AND THE STREET, NAMELY SUNNYBRAE AVENUE, HAVE BEEN LAID OUT ACCORDANCE WITH OUR INSTRUCTIONS.

2) THE STREETS ARE HEREBY DEDICATED TO THE CORPORATION OF THE TOWN OF INNISFIL AS PUBLIC HIGHWAY.

DATED THE ______ DAY OF ___________ 2014.

LOU KELLY – PRESIDENT
1820839 ONTARIO LIMITED
I HAVE THE AUTHORITY TO BIND THE CORPORATION.

WAYNE EZEKIEL – PRESIDENT
1820839 ONTARIO LIMITED
I HAVE THE AUTHORITY TO BIND THE CORPORATION.

BEARING NOTE

BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE POINTS A TO B, BY REAL TIME NETWORK (RTN) OBSERVATIONS, UTM ZONE 17, NAD83 (CSRS) (2002 EPOCH).

LEGEND

■	DENOTES	FOUND SURVEY MONUMENT
□	DENOTES	PLANTED SURVEY MONUMENT
SIB	DENOTES	STANDARD IRON BAR
SSIB	DENOTES	SHORT STANDARD IRON BAR
IB	DENOTES	IRON BAR
RIB	DENOTES	ROUND IRON BAR
HEX	DENOTES	HEXAGON IRON BAR
—×—×—	DENOTES	CHAIN LINK FENCE
(662)	DENOTES	J.E. SEARS, O.L.S.
(738)	DENOTES	R.C. KIRKPATRICK, O.L.S.
(832)	DENOTES	R.P. LEEPER, O.L.S.
(1035)	DENOTES	R.R. WELSMAN, O.L.S.
(1255)	DENOTES	RAIKES & BOWERS SURVEYING LTD.
(1403)	DENOTES	W. DOUGLAS SMITH LTD.
(1535)	DENOTES	P.J. MANSFIELD, O.L.S.
(1546)	DENOTES	RUDY MAK SURVEYING LTD.
(JDB)	DENOTES	J.D. BARNES LTD.
(CDN)	DENOTES	CDN LAND SURVEYORS INC.
(WIT)	DENOTES	WITNESS

ALL PLANTED MONUMENTS ARE IRON BARS (IB) UNLESS OTHERWISE NOTED.

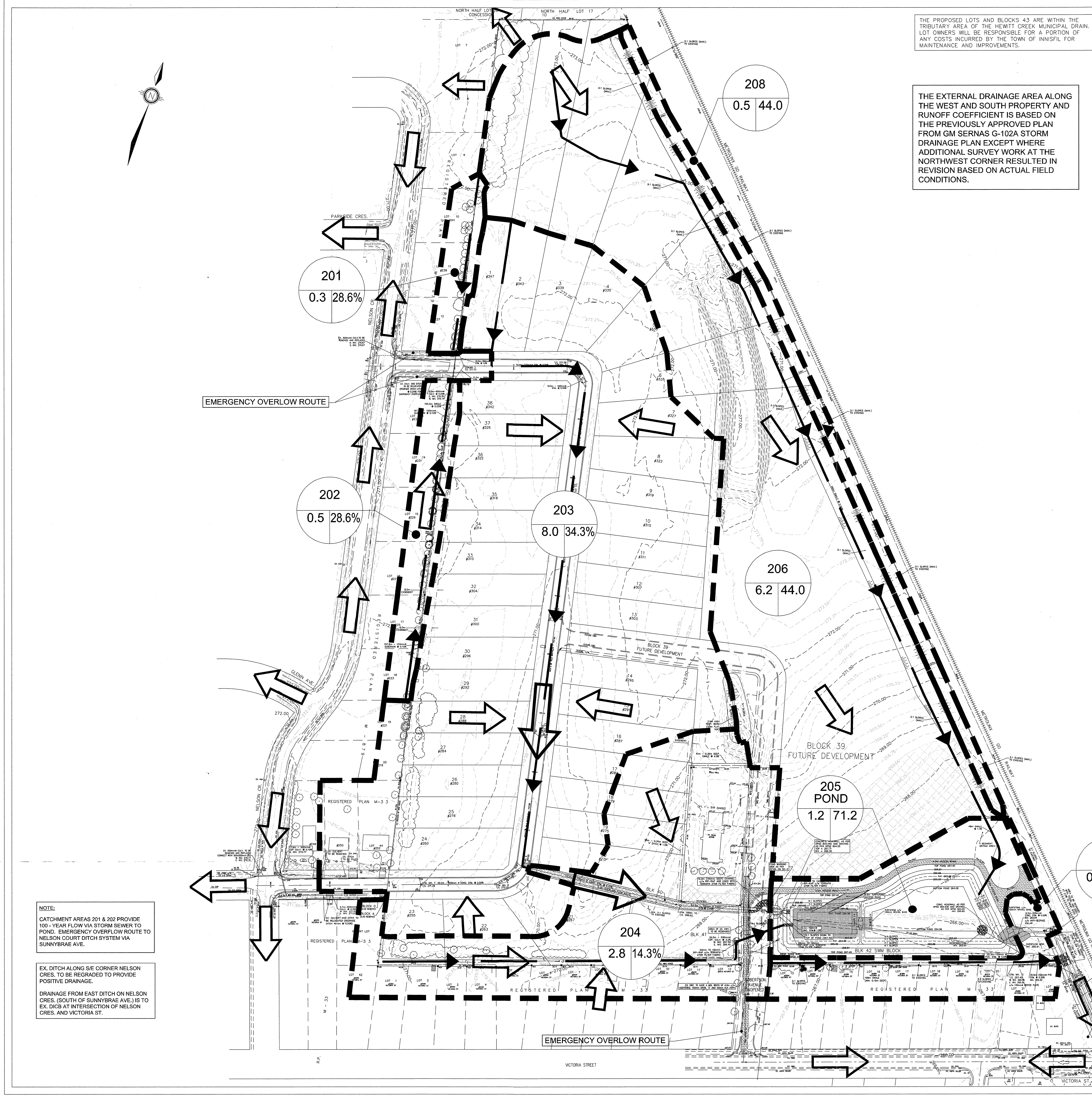
REVISION	BY	DATE
FIRST ISSUE	HFD	FEB. 14/12
BOUNDARY OF BLOCK 41 & 43	CL	JAN. 29/13
REVISED LOTS 1 TO 8 (INCLUSIVE), 21 AND BLOCKS	HFD	AUG. 21/13
REVISED STREET NAME	HFD	SEP. 4/13
REMOVED BLOCK 43	HFD	JAN. 8/14

METRIC

DISTANCES AND COORNIDATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

RUDY MAK SURVEYING LTD.
ONTARIO LAND SURVEYORS
89 BIG BAY POINT ROAD
BARRIE, ONTARIO L4N 8M5 (705) 722–3845
E–MAIL MAIL@MAKSURVEYING.COM

DRAWN BY: HFD | CHECK BY: RM | FILE No. 10622SUB



THE PROPOSED LOTS AND BLOCKS 43 ARE WITHIN THE TRIBUTARY AREA OF THE HEWITT CREEK MUNICIPAL DRAIN. LOT OWNERS WILL BE RESPONSIBLE FOR A PORTION OF ANY COSTS INCURRED BY THE TOWN OF INNISFIL FOR MAINTENANCE AND IMPROVEMENTS.

THE EXTERNAL DRAINAGE AREA ALONG THE WEST AND SOUTH PROPERTY AND RUNOFF COEFFICIENT IS BASED ON THE PREVIOUSLY APPROVED PLAN FROM GM SERNAS G-102A STORM DRAINAGE PLAN EXCEPT WHERE ADDITIONAL SURVEY WORK AT THE NORTHWEST CORNER RESULTED IN REVISION BASED ON ACTUAL FIELD CONDITIONS.

NOTE:

CATCHMENT AREAS 201 & 202 PROVIDE 100 - YEAR FLOW VIA STORM SEWER TO POND. EMERGENCY OVERFLOW ROUTE TO NELSON COURT DITCH SYSTEM VIA SUNNYBRAE AVE.

EX. DITCH ALONG S/E CORNER NELSON CRES. TO BE REGRADED TO PROVIDE POSITIVE DRAINAGE.

DRAINAGE FROM EAST DITCH ON NELSON CRES. (SOUTH OF SUNNYBRAE AVE.) IS TO EX. DICB AT INTERSECTION OF NELSON CRES. AND VICTORIA ST.

FLOW PATH CALCULATIONS

Catchment 201

Length = 119.6m
Slope = (272.46m - 271.30m) / 119.6m
= 0.97%

Catchment 202

Length = 218.2m
Slope = (272.47m - 270.72m) / 218.2m
= 0.80%

Catchment 203

Length = 503.0m
Slope = (273.78m - 269.79m) / 503.0m
= 0.79%

Catchment 204

Length = 284.4m
Slope = (270.90m - 266.40m) /284.4m
= 1.58%

Catchment 205

Length = 58.1m
Slope = (267.95m - 265.56m) / 58.1m
= 4.10%

Catchment 206

Length = 609.9m
Slope = (273.00m - 267.95m) / 609.9m
= 0.83%

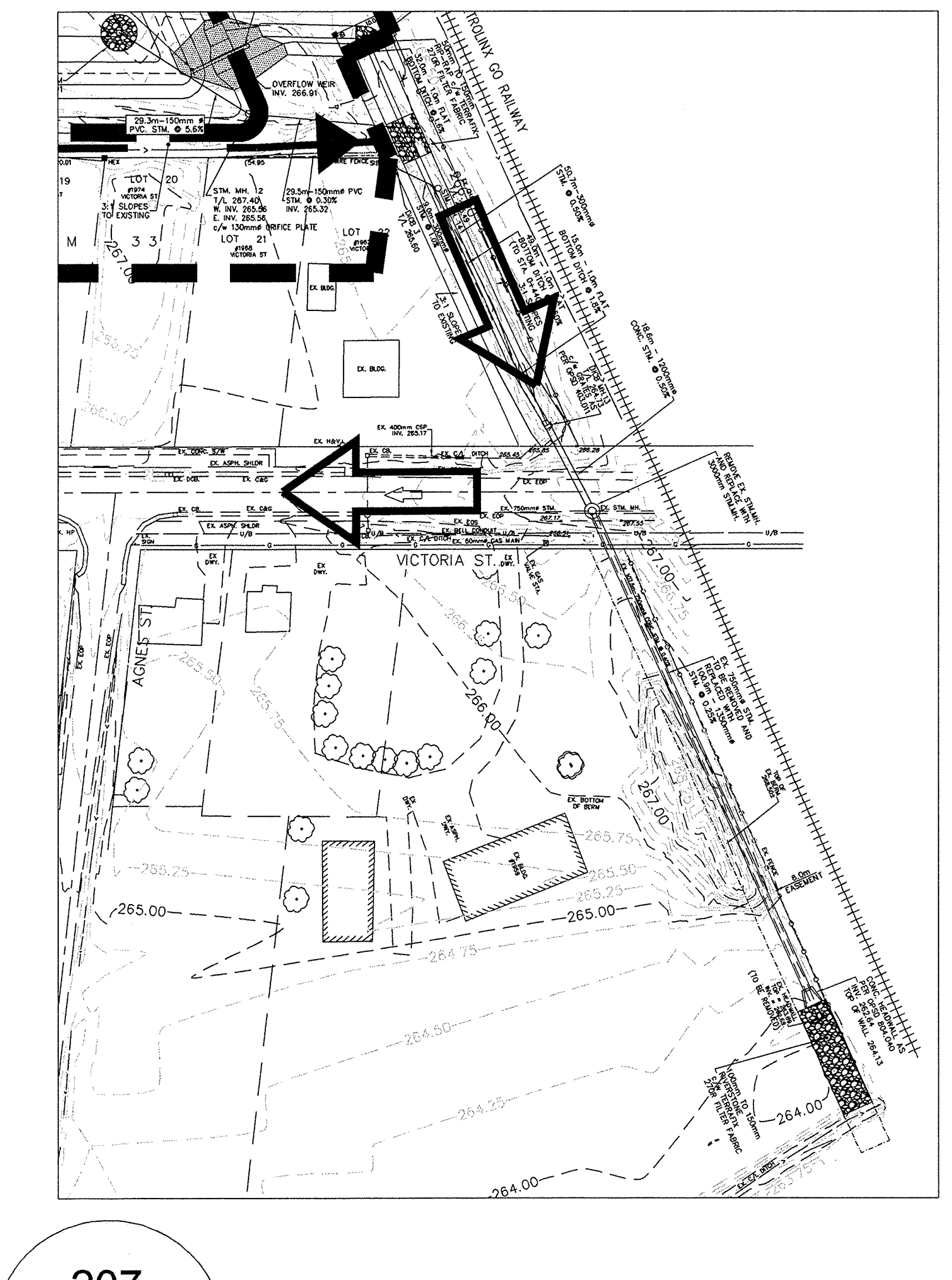
Catchment 207

Length = 191.4m
Slope = (267.25m - 265.45m) / 191.4m
= 0.94%

Catchment 208

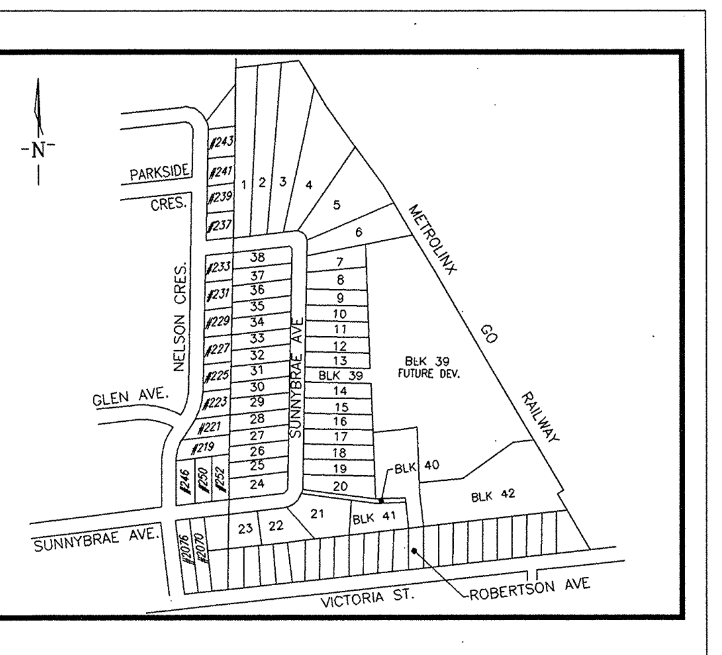
Length = 9.0m
Slope = (273.85m - 272.23m) / 9.0m
= 18.0%

SWM-2 CONTINUATION



KEY PLAN

SCALE 1:1000



SURVEY NOTES:

BOUNDARY SURVEY BASED ON FIELD SURVEY BY PETER RAIKES O.L.S., DATED OCT. 26, 2010.

TOPOGRAPHIC INFORMATION BASED ON INFORMATION FROM ROCK SOLID CONSULTING RECEIVED JAN. 05, 2011.

MNR BENCHMARK: 0011931U461S TWP.: STROUD ELEV.: 270.600

TABLET LOCATION: PRESBYTERIAN CHURCH, IN VILLAGE, ABOUT 90m EAST OF TORONTO--NORTH BAY HWY. TABLET IN WEST CONCRETE FOUNDATION WALL OF WEST TOWER, 1.5m FROM S/W CORNER AND 1.37m BELOW CONCRETE BLOCKS.

GENERAL NOTES:

1. DO NOT SCALE DRAWINGS.
2. ALL DIMENSIONS ARE TO BE CHECKED AND VERIFIED ON SITE PRIOR TO CONSTRUCTION.
3. ANY DISCREPANCIES, OMISSIONS, OR ERRORS ARE TO BE REPORTED TO THE CONSULTANT. NO WORK IS TO PROCEED BEFORE CLARIFICATION OF THE DISCREPANCIES, ERRORS, OR OMISSIONS IS RECEIVED FROM THE CONSULTANT.
4. ALL EXISTING CONDITIONS TO BE CHECKED AND VERIFIED ON SITE PRIOR TO CONSTRUCTION.
5. ONLY LATEST APPROVED DRAWINGS TO BE USED FOR CONSTRUCTION.
6. ALL DRAWINGS AND SPECIFICATIONS REMAIN THE PROPERTY OF THE CONSULTANT, AND SHALL BE RETURNED TO THE CONSULTANT UPON REQUEST. IN NO WAY SHALL THE DRAWINGS AND/OR SPECIFICATIONS IN WHOLE OR IN PART BE REPRODUCED OR DISTRIBUTED WITHOUT THE PERMISSION OF THE CONSULTANT.
7. PRIOR TO ANY WORKS ON MUNICIPAL PROPERTY A ROAD OCCUPANCY PERMIT SHALL BE OBTAINED FROM THE TOWN.
8. GEMMELL ENGINEERING TAKES NO LIABILITY FOR SURVEY DATA.

LEGEND:

101 — CATCHMENT AREA
62.2 | 6.47 — TIMP OR CN NUMBER — AREA (ha)

⇦ DIRECTION OF OVERLAND FLOW

▬ ▬ ▬ CATCHMENT BOUNDARY

← FLOW LENGTH(m) AND SLOPE %

ITEM	DESCRIPTION	DATE	BY	APPRV'D
2	REVISED AS PER AECOM	MAY 27/14	GEMCAD INC.	HGG
1	MYLAR SUBMMISSION	MAY 7/14	GEMCAD INC.	HGG

SCHEDULE OF REVISIONS

H.G. GEMMELL
100081079
May 26/14

ENGINEER'S SEAL

PROJECT:

INNISFIL EXECUTIVE ESTATES

TITLE:

POST-DEVELOPMENT STORM CATCHMENT PLAN

GEMMELL
ENGINEERING
144 Thrushwood Drive, Barrie, ON L4M 1Z0
Phone:(705) 309-0787 Fax:(705) 719-9578

TOWN OF INNISFIL
PLANNING AND DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION

DRAWN: GEMCAD	SCALE:	DWG. No.	PROJECT No.
DESIGNED: H.G.G.	HOR: 1:1250	SWM-2	123
CHECKED: H.G.G.	DATE: MAY 2012		

ACCEPTED FOR CONSTRUCTION

C Ali

TOWN OF INNISFIL
DEVELOPMENT ENGINEERING

DATE: June 6, 2014

ACCEPTED FOR CONSTRUCTION

AECOM

TOWN PEER REVIEW ENGINEER

DATE: June 3, 2014

INNISFIL EXECUTIVE ESTATES - I-T-880008