C.C. Tatham & Associates Ltd.
Consulting Engineers

# SIMCOE ESTATES LIMITED

## Residential Subdivision, Lot C, Plan 820

### Functional Servicing Report

### 2009 Addendum Report

prepared by:

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prepared for

Simcoe Estates Limited

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CCTA File 304844-5

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# 1 Introduction

C.C. Tatham & Associates Ltd. (CCTA) was retained by Simcoe Estates Ltd. to prepare a Functional Servicing Report (FSR) for a proposed residential subdivision on Block C, Plan 820 in the Township of Severn. This report addresses water supply and distribution, sanitary sewage collection, stormwater drainage and stormwater management.

The development site is approximately 20.4ha in size and is near Ardtrea. The site is located south of Highway 11 along Menoke Beach Road, bounded to the south by Couchiching Avenue, to the east by Wood Avenue and to the north by Amigo Drive. Figure 1.1 overleaf is a key plan showing the site location.

This addendum has been issued to address recent changes to the subdivision layout, the separation into distinct draft plans and the associated changes to the stormwater management concept. It is also intended to address a County of Simcoe request to support the issuance of Draft Plan Conditions for Phase I of this proposed subdivision.

# 2 Proposed Development

The original draft plan was prepared for 203 single family homes and 17 fourplex blocks (68 units) totalling 271 units. A park block, servicing easements, stormwater management blocks and roads make up the remainder of the site. The population of the subdivision when completed is estimated to be 732 persons (203 single detached units x 2.7 persons / unit + 68 fourplex units x 2.7 persons/unit).

In 2008, the 12 lots fronting Wood Avenue were separated and are now in RP 51M-933.

Phase I consists of 88 lots in the south half of the property, and includes development of an interim park block, a SWM pond along Couchiching Avenue and servicing easements for sewer and water.

The final park location, in either Phase II of this site or within another Simcoe Estates site, will be resolved with the Township of Severn during the final design process.

# 3 Background Information Review

A number of guidelines, background reports and studies relating to development in the Township of Severn and more specifically the proposed development were utilized during the preparation of this report as follows:

- Township of Severn Design Standards, December 1995;
- MOE Stormwater Management Planning and Design Manual (2003);
- MNR Shoreline Flood Elevations Study - Lake Simcoe, Marshall, Macklin, Monaghan Limited, June 1980;
- Township of Severn Westshore Water and Sewer Project Servicing Drawing, R.G. Robinson & Associates Ltd, February 2002;
- Geotechnical Investigation - Westshore Water and Sewer Projects Cumberland Beach Area, GEO SPEC Engineering Ltd., April 2002;
- 12 Lot Residential Subdivision, Part of Lot C, Plan 820, Detailed Servicing and Stormwater Management Report, C.C. Tatham & Associates Ltd, July 2008, Revised October 2008.

# 4 Site Servicing Concept

The general site servicing concepts are as follows:

- Water supply: Water mains will be extended from the existing water distribution system in the West Shore Water and Sewer Project (WSWSP)(Wood Avenue). Individual lot services, fire hydrants and all valves will be provided;
- Sanitary Sewers: Sanitary sewers will be extended by gravity from the existing adjacent WSWSP (Wood Avenue). Individual lot services will be provided;
- Drainage and Stormwater Management: Storm sewers and swales will collect runoff and discharge into stormwater management (SWM) facilities. All of the proposed SWM facilities will eventually outlet to Lake Couchiching.

All works will be designed in accordance with Township of Severn and Ministry of Environment (MOE) Guidelines.

# 5 Grading

Drawing G-1 appended at the rear of this report shows the proposed grading of the lots and roads. The grading generally follows the existing contours providing relatively low but acceptable road slopes. All lots will have split lot grading, with rear lot collection areas (swales, catchbasins). The use of rear collection systems minimizes the requirement for extensive fill operations in the lower portions of the site.

The entire site will require grading and topsoil stripping however, minimal cut/fill earthworks will be necessary to provide the required pipe cover and surface drainage for the development. The fill areas will be located at the north and south ends of the property with the cut area being located in the middle of the subject lands. The major component of the earthworks will be the topsoil stripping.

Stormwater management outlets have been designed to minimize the impact on the existing outlets to Lake Couchiching.

# 6 Water Supply and Distribution

Potable water will be conveyed to the subdivision via watermains to be constructed in two servicing/walkway blocks connecting the subdivision to Wood Avenue. Internally, all the watermain will be looped, ensuring no dead ends. A schematic of the proposed layout is shown on drawing WAT-1 appended at the rear of this report.

The existing ground elevations within the subject property do not increase or decrease significantly compared to the existing water mains on Wood Avenue and Couchiching Avenue. From the point of water main connection to existing ground the highest distribution point is approximately 2.5 m.

The average, maximum day and peak hour flow demands within the subject property were calculated using the Township of Severn and MOE design criteria as follows:

- Population densities: single family detached = 2.7 persons / unit;
  fourplex = 2.7 persons / unit;
- Average daily per capita flow = 450 L / cap / day;
- Peaking factors: Peak hour = 4.13;
  Max day = 2.75
- Fire flows = 37.8 L/s.

The subdivision design demands were determined to be 10.9 L/s and 15.7 L/s for max day and peak hour respectively, which are within the design capacities for the WSWSP service area. With respect to fire flows the guidelines of the MOE require a minimum of 37.8 L/s for two hours be available for developments greater than 119 lots. Under the MOE Guideline during max day and fire flow demands a pressure no less than 140kPa (20psi) must be available. Based on the longest length of watermain from the intersection of Wood Avenue and Couchiching Avenue to the northwest corner of the site, under max day plus fire flow conditions the pressure drop in a 200 mm diameter main is 154 kPa (22 psi). The minimum pressure is expected to be available as the typical pressure in the WSWSP are well in excess of 280 kPa.

A network of 200 mm and 150 mm diameter watermain will be sufficient to service the subdivision. The proposed distribution system will be modelled during the final design process to confirm it can operate within the Township and MOE requirements.

# 7 Sewage Collection System

Sanitary sewers are located east of the subject property on Wood Avenue, which is part of the WSWSP. The proposed sewers will drain via gravity flow through a 7m servicing walkway block and connect to the 200mm dia. sanitary main on Wood Avenue. This will require the installation of a manhole between MH 1-7 and 1-6 along Wood Avenue.

The 200mm dia. sewer under Wood Avenue outlets to pumping station (PS) #1 at the west end of Wood Avenue and sewage is then conveyed to the sewage treatment plant on the west side of Highway 11 via gravity sewers and force mains passing through two more pumping stations. After complete treatment the effluent flows via gravity in a 300mm dia. pipe south under Highway 11 and outlets to Lake Couchiching 860 m downstream from the water intake pipe.

The design criteria for the proposed development sewers in accordance with the Township of Severn engineering standards and the MOE design guidelines are as follows:

- Flow per person = 450 L / cap / day;
- Single family home = 2.7 persons / unit;
  Fourplex building = 2.7 persons / unit;
- Infiltration = 0.23 L/ha•s;
- Peak factor = Harmon's equation.

The calculated flows for the entire development are as follows:

- Average flow = 3.8 l/s
- Peak Flow= 22.2 l/s

The sewers will be 200mm dia. PVC pipe. Maintenance hole spacing will be a maximum of 110 metres and 125mm dia. services will be provided to each residential lot with larger services for the fourplex blocks. The sewers will flow via gravity to a manhole on Street A in front of the 7 m servicing block, and will then be conveyed through the servicing block to the existing sewer on Wood Avenue. Calculations are included in Appendix 'B'. Drawing SAN-1 appended at the rear of this report shows the proposed sewage collection system.

# 8 Drainage and Stormwater Management

## 8.1 Existing Conditions

The existing topography is relatively flat across the entire property. Elevations range from approximately 222.5m on the southwest side of the development to 220.0m on the northeast side. The property is almost completely covered with sod fields. The general trend of the topography is falling north-eastward towards Wood Avenue, with an average slope of 0.5%. A small portion of the property drains northward, to an existing low area along Amigo Drive. There are no defined watercourses within the proposed development. Drainage is conveyed by sheet flow to ditches parallel to Wood Avenue. Storm water is conveyed under Wood Avenue by two culverts. One culvert (south outlet) is a 625 mm x 500 mm CSP located at the intersection of Wood Avenue and Couchiching Avenue. A vegetated swale receives water from the CSP and conveys it to Lake Couchiching. The second culvert (north outlet) is a 300 mm x 350 mm CSP located approximately 300m north of the first CSP on Wood Avenue. A buried 300mm dia. PVC pipe conveys water from the CSP to Lake Couchiching across an easement on private property. The existing drainage patterns are shown on Drawing DP-1 appended at the rear of this report.

## 8.2 Proposed Development

The internal roadways will be constructed to an urban standard with all minor drainage from the roadways and the majority of the residential development being captured by a network of storm sewers sized to convey flow from a 5 year storm. These storm sewers will range in size from 300-800mm and discharge to SWM facilities as described in the following sections of this report. Roads, swales and overall lot grading will be constructed to follow the existing topography of the land as much as possible to maintain the pre-development drainage patterns, while still directing major flows overland to the SWM facilities. The proposed drainage patterns and outlets are shown on Drawing STM-1 appended at the rear of this report.

## 8.3 Stormwater Management Plan

Typical stormwater management requirements for new development include control of post-development peak flows to pre-development rates or less. For the intensive development of the residential area SWM facilities to provide both quantity and quality control of stormwater runoff are required. The SWMPD recommends using the following methods of stormwater management:

### Lot Level, Source Controls

Lot level controls include such things as roof leader soak away pits, rear yard ponding areas, reduced grading, rear and side yard swales and other localized lot grading. These methods of source stormwater control are beneficial since they reduce peak flow from storm events before being conveyed to the watershed. These controls are site specific based on the soil conditions and require regular maintenance to be effective. Use of these practices is recommended but only to an extent that is achievable without requiring excessive maintenance.

### Conveyance Controls

Infiltration trenches and perforated pipes are two examples of conveyance controls. Typically these controls attempt to attenuate peak flows on route to the watershed by allowing the stormwater to infiltrate the existing soil. These methods of controlling stormwater are only effective if the soils have good drainage capabilities. Poor construction practices also reduce the effectiveness of these stormwater management controls.

### End of Pipe Facilities

End of pipe facilities are typically wet or dry ponds that control the stormwater runoff from an entire development area. These facilities allow all stormwater to be retained and released at a rate equal to that of pre-development and are able to provide effective quality and quantity control of storm events. The major negative attributes of these facilities is that they require significant land area to provide the management thus the larger the development the greater the required pond size.

*SWM Facilities*

Referring to Drawing STM-1 two new SWM facilities are proposed. The proposed south SWM pond will be provided in two parcels to permit an access route to Couchiching Avenue. Design details are shown in the Post Development Schematic included on the drawing.

Although there are three distinct pre-development drainage areas with outlets, only two new SWM facilities are proposed to provide the required quality and quantity control. The use of only two facilities addresses key issues such as reducing the number of facilities to monitor and maintain and reducing the drainage area and flow to the north outlet. It was determined through communication with the Township and the final design for the 12 lots on Wood Avenue. that the existing north outlet was undersized for conveying the flows from the upstream drainage area. In directing flows away from this outlet, it reduces the volume of flow the outlet must convey during storm events.

Preliminary OTTHYMO computer models were used to model the pre and post-development hydrology of the subject property and to calculate the maximum SWM facility storage requirements for each of the proposed new SWM facilities. Each SWM facility should also include a permanent pool sized in accordance with MOE guidelines for "Enhanced" protection. Table 3.2 of the SWMPD suggests storage volumes based on impervious ratio and drainage area. The table ranges from 35% to 85%

impervious. The development will have a level of imperviousness of approximately 35%. Therefore the table suggests a permanent pool volume of 100m³/ha.

The following table presents preliminary design parameters for the proposed new SWM facilities. Input and summary output files for the OTTHYMO model are included in Appendix 'C'.

**Table 8. 1: SWM Facility Design Parameters**

| *Catchment* | *Volume ($m^3$)* | | | *Depth (m)* | *Total Area ($m^2$)* |
|---|---|---|---|---|---|
| | *Active Storage* | *Permanent Pool* | *Total* | | |
| B1 | 3202 | 814 | 4057 | 1.84 | 4978 |
| B3 | 5000 | 1066 + 161[1] | 6227 | 2.45 | 3296 (Block B)<br>3812 (Block A) |

[1]Additional storage provided for compensation measures in support of 12 Lots on Wood Ave.

## 8.4 Stormwater Management Plan

The SWM facilities will be designed to provide quantity and quality control in accordance with MOE / MNR and Township guidelines. In addition infiltration on individual lots will be promoted to reduce runoff quantity and improve runoff quality. The use of side yard swales with shallow grades will promote infiltration and help to control erosion. Roof drains will be discharged on to grass areas to promote infiltration.

## 8.5 Stormwater Management Design Criteria

Design of the facility should address the following objective:

- Sizing of the stormwater quantity control component of the facility must be exclusive of the storage needed for the quality control component based on current design guidelines;
- Sizing of the stormwater quality control component for the facility to achieve "Enhanced" protection must include provision for at least 24 hours detention of runoff from the 25mm storm event;
- Ensure any overtopping of the SWM facility from regional storm flows is safely conveyed to the watercourse;
- Quality control structures for the facility must incorporate a bottom-draw outlet to prevent thermal impacts to the cold water receiver;
- Optimize suspended solids and heavy metal removal efficiencies by locating minor system inlets and SWM facility outlets as far apart as possible to prevent short circuiting;
- Optimize nutrient uptake potential and diversity of plantings to enhance local aquatic and wildlife habitats;
- Consider operation and maintenance requirements and frequency and include as part of the design process;

### 8.5.1 Wet Pond and Extended Detention Compartments

Wet Pond

The SWM facility should incorporate a standing water pool to enhance diversity and habitat opportunities and provide local wildlife cover. Edge treatment should be included to create an irregular shallow edge margin which will support emerging wetland vegetation and a surrounding fringe of wooded material. Fringe planting recommendations are given in Table 8.2.

In addition to providing habitat and visual diversity the wet pond could sustain a variety of submergent aquatic plants, amphibians and other small wildlife, in turn providing foliage for common water fowl and wetland birds.

The wetland pond will also enhance the SWM facility's water quality treatment function through a variety of processes:

- Enhanced sedimentation and physical filtration (root entrapment, sediment stabilization);
- Absorption to wetland substrates, vegetation and organic detritus;
- Enhanced microbial activity removing nitrogen (nitrification / de-nitrification process) and organic matter (aerobic decomposition);
- Uptake by plants primarily through root systems.

The permanent pool within the wet pond should be sized in accordance with MOE / MNR guidelines for "Enhanced" protection. The depth of the wet pond should be at least 1.5m, side slopes should be 3:1 except at the elevation of the permanent water surface where a 3m wide 5:1 shelf should be incorporated for safety.

Extended Detention and Storm Attenuation Volume

The extended detention component of the facility to detain the 25mm storm water quality volume and release it over 24 hours should be designed with average side slopes of 5:1.

The remainder of the SWM facility around the forebay and wet pond is intended to be a wet meadow system which will support a variety of herbaceous plants, grasses and shrubs tolerant of periodic inundation. Micro topographic variations will be emphasized during grading. Some small woody materials will be introduced to provide additional shading and local cover. The basin floor will include a low flow channel connecting the forebay to the wet pond cell.

### 8.5.2 Bioengineered Outlet Channel

A bioengineered outlet channel should be constructed from each SWM facility outfall structure. The outlet channel should be designed to convey peak flows from the outfall structure and emergency spillway of the SWM facility. The channel bottom directly downstream from the SWM facility should have a hard bottom designed to reduce velocities and minimize erosion potential.

### 8.5.3 Emergency Spillway

The emergency spillway should consist of a wide, hard surface lined broad-crested weir and apron. Major system flows greater than those generated by the 100 year design storm events will be safely conveyed through the spillway to the outlet channel with no overtopping of other berm sections around the SWM facility.

## 8.6 Landscape and Enhancement Strategy

A landscape buffer should be planted along the edges of the SWM facility adjacent to proposed residential lots and roads. These trees should only be situated in areas of well drained soil conditions. The buffer should consist of clusters of trees planted in a random selection of both deciduous and coniferous species. Due to the narrow linear shelf available for this planting it is intended that the mature buffer should ultimately be similar in appearance and character to a natural farm hedgerow. All species should be characteristic of dry upland sites; all should be native to the region.

Table 8.2 overleaf summarizes the recommended list of plant material that should be considered for the SWM facility and bioengineered outlet channel.

## 8.7 Erosion and Sediment Control

Erosion and sediment controls should be implemented for all construction activities including topsoil stripping, road construction, foundation excavation and stock piling of materials. The basic principles considered to minimize erosion and sedimentation and resultant negative environmental impacts include:

- Minimize wherever possible local disturbance activities (e.g. grading);
- Expose the smallest possible land area, where practical, to erosion for the shortest possible time;
- Institute control measures where needed and as required immediately;
- Implement control measures before the outset of construction activities;
- Carry out regular inspections for all control measures and repair or maintain as necessary.

The proposed grading, servicing and house construction should be carried out in such a manner that a minimum amount of erosion occurs and such that sedimentation facilities control any erosion that does occur.

Erosion and silt / sediment control measures will include but not be limited to the following:

- Erection of silt fences around the construction sites;
- Provide sediment traps (e.g. berms, geotextiles, stone barriers and swales)
- Provide general "mud mats" at construction vehicle access points to minimize off site tracking of sediments;
- Confine refuelling / servicing equipment to areas well away from inlets to the minor or major system elements.

Removal of all erosion and sediment controls within the development should only be done once construction is complete and sediment runoff from the construction activities has stabilized.

**Table 8.2: Recommended List of Native and/or Naturalizing Plant Material for the SWM Facility and Bio-engineered Outlet Channel**

| *Within the Wet Pond, Wet Pockets, and/or Basin Floor (Wet Meadow)* | *Around Various Components (i.e. Active Storage and Forebay Components and Within the Outlet Channel Corridor)* |
|---|---|
| **Shoreline Fringe Ground Cover and Emergent Species**<br>Aster spp.<br>Canada Blue-Joint grass<br>Marsh marigold<br>Sedge spp.<br>Mannagrass spp.<br>Iris spp.<br>Reed Canary grass<br>Marsh smartweed<br>Arrowhead spp.<br>Hard/soft stem bulrush<br>Cattail spp.<br>Water arum<br>Marsh forget-me-not<br>Water plantain<br>Spikerush<br>Bur reed<br><br>**Submergent and Floating Species**<br>Water lily spp.<br>Water smartweed<br>Tape Grass<br>Pond weed spp.<br>Little Duckweed<br>Redhead Grass<br>Wild Celery | **Upland Deciduous Trees**<br>Maple spp.<br>Birch spp.<br>Common Hackberry<br>Shagbark Hickory<br>White Ash<br>Trembling ash<br>Oak spp.<br>American Linden<br><br>**Upland Coniferous Trees**<br>White Spruce<br>Red Pine<br>White Pine<br>Hemlock<br>Eastern White Cedar<br><br>**Upland Understorey Shrubs**<br>Serviceberry<br>Dogwood spp.<br>Witch-Hazel<br>Common Chokecherry<br>Sumac spp.<br>Viburnum spp.<br><br>**Riparian Deciduous Trees**<br>Red Maple<br>Silver Maple<br>Ash spp.<br>Black Willow<br><br>**Riparian Coniferous Trees**<br>Larch<br>Eastern White Cedar<br><br>**Riparian Understorey Shrubs**<br>Speckled Alder<br>Buttonbush<br>Dogwood spp.<br>Winterberry<br>Currant spp.<br>Willow spp.<br>Viburnum spp. |

# 9 Approvals

The following approvals will be required from the Township of Severn and the various agencies:

- Watermain: MOE and Township of Severn;
- Sanitary Sewers: MOE and Township of Severn;
- Storm Sewer and Stormwater Management Facilities: MOE, MNR, and Township of Severn.

# 10 Conclusions

*Water Supply & Distribution*

The proposed water distribution network for the subdivision can be designed to meet the maximum day design and fire demands of the subdivision, and comply with MOE and Township standards.

*Sewage Collection System*

Flows from the subdivision will be conveyed via gravity to the adjacent WSWSP, then through three sewage pumping stations eventually outletting to the new sewage treatment plant on the west side of Highway 11.

*Drainage and Stormwater Management*

Approximately 90% of the subject property will drain to two separate SWM facilities within the boundaries of the development. The remaining area of lots that front onto Wood Avenue and Couchiching Avenue, drains to existing ditches and maintains an existing drainage pattern.

Each of the proposed SWM facilities will be constructed as wet ponds with extended detention, to provide quality and quantity control in accordance with Township of Severn and MOE criteria.

LICENSED PROFESSIONAL ENGINEER
M.W.K. VALLINS
25/11/2009
PROVINCE OF ONTARIO

Authored by: Michael Vallins, B.A.Sc., P.Eng.
Project Manager

LICENSED PROFESSIONAL ENGINEER
T. C. COLLINGWOOD
25/11/2009
PROVINCE OF ONTARIO

Reviewed by: Tim Collingwood, B.A.Sc., P.Eng.
Director, Manager, Orillia Branch

# APPENDIX A:
# WATER SYSTEM CALCULATIONS

| C.C. Tatham & Associates Ltd. Consulting Engineers (Collingwood, Bracebridge, Orillia, Barrie) | Project: Orsi Developments | Date: 24-Nov-09 |
|---|---|---|
| | File No.: 304844-5 | Designed: MV/CJU |
| | Subject: Water Supply Calculations | Checked TCC |

## Water Supply

### 1.1 Proposed Development

Block C, Plan 820 - Subdivision consists of 271 units

450 daily flow per unit (L/unit/day)
2.7 cap/unit

Calculations

Population = 271 Units x 2.7
= 731.7 Persons

Average daily flow = 731.7 persons x 450 l/person/day
= 329265 L/day
= 329.27 m³/day
= 3.81 L/s

### 1.2 Design Flows

Design Factors

Max. Day Factor = 2.75 for a population between 500 & 1000 (from MOE design standards)
Peak Hour Factor = 4.13 (from MOE design standards)
Fire Flow = 37.8 L/s (from MOE design standards)

Design Flows

Max. Daily Flow = 329.3 x 2.75
= 905.5 m³/day
= 10.48 L/s

Peak Hour Flow = 329.3 x 4
= 1359.9 m³/day
= 15.7 L/s

Max. Day plus Fire = 10.48 + 37.80
= 48.28 L/s **Max Day Flow + Fire Flow**

### 1.3 Size of Water Main

Size of water main to accommodate - Max Day Flow and Fire Flow

The velocity in the water main with max day plus fire flow is:

$V = Q/A$

Where:

$Q$ = Flow in $m^3/s$
= 0.0483 $m^3/s$

$A$ = Area of pipe in $m^2$
= $\frac{Pi \times D^2}{4}$ = 0.0314 $m^2$

$D$ = 0.2 m (water main diameter)

$V = \frac{0.0483}{0.0314} = 1.50$ m/s

### 1.4 Headloss in Watermain

From the connection to the watermain at the intersection of Couchiching Ave. & Wood Ave. to the intersection of Menoke Beach Road and proposed Street 'A' (furthest single length)

$$h_f = \sqrt[0.54]{\frac{Q}{(0.278)(C)(D)^{2.63}}} \times L$$

$$h_f = \sqrt[0.54]{\frac{0.048}{0.28 \times 110 \times 0.2^{2.63}}} \times 955$$

$h_f$ = 15.7 m
= 22.3 psi

Where:

$h_f$ = headloss in watermain
$Q$ = Flow in $m^3/s$ (max. day + fire)
= 0.048 $m^3/s$
$C$ = pipe coefficient
= 110
$D$ = 0.2 m (watermain diameter)
$L$ = 955 m (watermain length)

# APPENDIX B:
# SANITARY SEWER CALCULATIONS

# SANITARY SEWAGE DESIGN FLOWS

Project - Simcoe Estates Block C Subdivision
Municipality - Township of Severn
Project No. - 304844-5

Designed By - CJU
Date - Oct 1 2009
Revised -
Checked By - MW/KV
Sheet - 1 of 1

FLOW CRITERIA

| LAND USE | | AVERAGE FLOW | | PEAKING FACTOR | PEAK FLOW |
|---|---|---|---|---|---|
| RESIDENTIAL | | 450 | L/cap.d | HARMON | VARIES |
| PEOPLE/UNIT= | 2.70 | | | | |
| INFILTRATION | | | | | 0.23 L/ha.s |

| LOCATION OF SECTION | AREA LABEL | FROM UPSTREAM | TO DOWNSTREAM | AREA | NUMBER OF UNITS | POPULATION | TOTAL POPULATION | PEAKING FACTOR | CUMULATIVE TRIBUTARY AREA | AVG. FLOW | PEAK FLOW | | | | | PROPOSED SEWER | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | RESIDENTIAL | RESIDENTIAL | TOTAL RES. FLOW IN RUN | INFILTRATION | FLOW IN RUN | TOTAL | LENGTH | DIAMETER | MIN. GRADE (for section) | FULL FLOW CAPACITY | FULL FLOW VELOCITY | ACTUAL VELOCITY incl. infiltration | ACTUAL VELOCITY excl. infiltratio |
| | | AREA | AREA | ha | | CAP. | | | ha | l/s | l/s | l/s | l/s | l/s | l/s | m | mm | % | l/s | m/s | m/s | m/s |
| A1 | | A1 | A9 | 5.00 | 86 | 232 | 232.20 | 4.12 | 5.00 | 1.21 | 4.99 | 4.99 | 1.15 | 6.14 | 6.14 | 539.0 | 200 | 0.40% | 20.74 | 0.66 | 0.55 | 0.52 |
| A2 | | A2 | A9 | 2.70 | 43 | 116 | 116.10 | 4.23 | 2.70 | 0.60 | 2.55 | 2.55 | 0.62 | 3.18 | 3.18 | 360.3 | 200 | 0.40% | 20.74 | 0.66 | 0.46 | 0.43 |
| A3 | | A3 | A9 | 2.20 | 35 | 95 | 94.50 | 4.25 | 2.20 | 0.49 | 2.09 | 2.09 | 0.51 | 2.60 | 2.60 | 281.7 | 200 | 0.40% | 20.74 | 0.66 | 0.43 | 0.41 |
| A9 | | A9 | External | 0.78 | 8 | 22 | 464.40 | 3.99 | 10.68 | 2.42 | 9.65 | 9.65 | 2.46 | 12.11 | 12.11 | 97.2 | 200 | 0.40% | 20.74 | 0.66 | 0.66 | 0.62 |
| A6 | | A6 | A7 | 2.10 | 26 | 70 | 70.20 | 4.28 | 2.10 | 0.37 | 1.57 | 1.57 | 0.48 | 2.05 | 2.05 | 275.8 | 200 | 0.40% | 20.74 | 0.66 | 0.41 | 0.38 |
| A5 | | A5 | A7 | 1.60 | 23 | 62 | 62.10 | 4.29 | 1.60 | 0.32 | 1.39 | 1.39 | 0.37 | 1.76 | 1.76 | 216.8 | 200 | 0.40% | 20.74 | 0.66 | 0.39 | 0.37 |
| A7 | | A7 | A8 | 0.66 | 8 | 22 | 153.90 | 4.19 | 4.36 | 0.80 | 3.36 | 3.36 | 1.00 | 4.36 | 5.21 | 80.1 | 200 | 0.40% | 20.74 | 0.66 | 0.52 | 0.46 |
| A4 | | A4 | A8 | 1.70 | 26 | 70 | 70.20 | 4.28 | 1.70 | 0.37 | 1.57 | 1.57 | 0.39 | 1.96 | 1.96 | 22.1 | 200 | 0.40% | 20.74 | 0.66 | 0.40 | 0.38 |
| A8 | | A8 | External | 0.44 | 4 | 11 | 234.90 | 4.12 | 0.44 | 1.22 | 5.04 | 5.04 | 0.10 | 5.14 | 7.39 | 105.2 | 200 | 0.40% | 20.74 | 0.66 | 0.57 | 0.52 |
| Total Flow to Existing | | All | External | 17.18 | 259 | 699 | 699.30 | 3.89 | 30.78 | 3.64 | 14.19 | 14.19 | 7.08 | 21.27 | 21.27 | 327.0 | 200 | 0.40% | 20.74 | 0.66 | 0.76 | 0.69 |
| A10 | | | | 1.35 | 12 | 32 | 32.40 | 4.35 | 1.35 | 0.17 | 0.73 | 0.73 | 0.31 | 1.04 | 1.04 | | | | | | | |
| Total Development Flow | | | | 18.53 | 271 | 732 | 731.70 | 3.88 | 32.13 | 3.81 | 14.80 | 14.80 | 7.39 | 22.19 | 22.19 | | | | | | | |

# APPENDIX C:

# STORM SEWER CALCULATIONS, OTTHYMO DATA FILES AND SUMMARY OUTPUT

Appendix C - Table 1: Existing and Proposed Condition Peak Flow Summary

| Storm Event | Amigo Drive Outlet | | Wood Avenue North Outlet | | Wood Avenue South Outlet | |
|---|---|---|---|---|---|---|
| | Existing | Proposed | Existing | Proposed | Existing | Proposed |
| 25 mm | 0.028 | 0.048 | 0.053 | 0.083 | 0.057 | 0.053 |
| 2 year | 0.058 | 0.055 | 0.110 | 0.103 | 0.118 | 0.107 |
| 5 year | 0.111 | 0.083 | 0.211 | 0.188 | 0.223 | 0.207 |
| 25 year | 0.217 | 0.196 | 0.412 | 0.395 | 0.429 | 0.418 |
| 100 year | 0.315 | 0.315 | 0.600 | 0.533 | 0.619 | 0.594 |
| Regional | 0.399 | 0.445 | 0.790 | 0.194 | 0.951 | 1.440 |

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Consulting Engineers
Collingwood Bracebridge Orillia Barrie

| | |
|---|---|
| **Project:** | Simcoe Estates, Block C, Plan 820 |
| **Date:** | Nov-09 |
| **File No.:** | 304844-5 |
| **Designed By:** | JA |
| **Checked By:** | MV |
| **Subject:** | Hydrologic Model Schematic |

## SIMCOE ESTATES, BLOCK C, PLAN 820
## PRE-DEVELOPMENT CONDITIONS


| | | | | | |
|---|---|---|---|---|---|
| 0 | Nashyd | 0 | Route Pipe | 0 | Duhyd |
| 0 | Standhyd | 0 | Route Channel | 1 | Diverthyd |
| 0 | Addhyd | 0 | Route Reservoir | | |

```
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, Version 2.0
O   O    T      T    H   H   Y Y   MM MM  O   O
O   O    T      T    H   H    Y    M   M  O   O   Licensed To: C.C. Tatham & Associates Ltd.
 OOO     T      T    H   H    Y    M   M   OOO                 VO2-0110
```

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***** D E T A I L E D  O U T P U T *****

Input filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat
Output filename: C:\DOCUME~1\jash\Desktop\PROJEC~1\304844~1\SIMCOE~1\Pre Development (Nov. 2009).out
Summary filename: C:\DOCUME~1\jash\Desktop\PROJEC~1\304844~1\SIMCOE~1\Pre Development (Nov. 2009).sum

DATE: 26/11/2009 TIME: 10:24:52 AM

USER:

COMMENTS: _____

**********
** SIMULATION NUMBER: 1 **
**********

READ STORM | Ptotal= 24.97 mm

Filename: C:\Documents and Settings\jash\Desktop\Project Files\304844 - Simcoe Estates\STORMS\CHIC25MM.4HR
Comments: 25 mm 4-hr Chicago storm

| TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr |
|---|---|---|---|---|---|---|---|
| .10 | 1.29 | 1.10 | 2.81 | 2.10 | 13.05 | 3.10 | 2.04 |
| .20 | 1.36 | 1.20 | 3.22 | 2.20 | 8.44 | 3.20 | 1.89 |
| .30 | 1.44 | 1.30 | 3.77 | 2.30 | 6.21 | 3.30 | 1.76 |
| .40 | 1.53 | 1.40 | 4.55 | 2.40 | 4.91 | 3.40 | 1.65 |
| .50 | 1.63 | 1.50 | 5.77 | 2.50 | 4.06 | 3.50 | 1.55 |
| .60 | 1.75 | 1.60 | 7.86 | 2.60 | 3.47 | 3.60 | 1.46 |
| .70 | 1.89 | 1.70 | 12.27 | 2.70 | 3.03 | 3.70 | 1.39 |
| .80 | 2.06 | 1.80 | 26.17 | 2.80 | 2.70 | 3.80 | 1.32 |
| .90 | 2.26 | 1.90 | 72.58 | 2.90 | 2.43 | 3.90 | 1.26 |
| 1.00 | 2.50 | 2.00 | 26.96 | 3.00 | 2.22 | 4.00 | 1.20 |

CALIB | NASHYD (0101) | ID= 1 DT= 5.0 min

Area (ha)= 4.90 Curve Number (CN)= 79.2
Ia (mm)= 8.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .60

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

| TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr |
|---|---|---|---|---|---|---|---|
| .083 | 1.29 | 1.083 | 2.81 | 2.083 | 13.05 | 3.08 | 2.04 |
| .167 | 1.35 | 1.167 | 3.14 | 2.167 | 9.36 | 3.17 | 1.92 |
| .250 | 1.41 | 1.250 | 3.55 | 2.250 | 7.10 | 3.25 | 1.81 |
| .333 | 1.48 | 1.333 | 4.08 | 2.333 | 5.69 | 3.33 | 1.72 |
| .417 | 1.55 | 1.417 | 4.79 | 2.417 | 4.74 | 3.42 | 1.63 |
| .500 | 1.63 | 1.500 | 5.77 | 2.500 | 4.06 | 3.50 | 1.55 |
| .583 | 1.75 | 1.583 | 7.86 | 2.583 | 3.47 | 3.58 | 1.46 |
| .667 | 1.86 | 1.667 | 11.39 | 2.667 | 3.12 | 3.67 | 1.40 |
| .750 | 1.99 | 1.750 | 20.61 | 2.750 | 2.83 | 3.75 | 1.35 |
| .833 | 2.14 | 1.833 | 44.73 | 2.833 | 2.59 | 3.83 | 1.30 |
| .917 | 2.31 | 1.917 | 63.46 | 2.917 | 2.39 | 3.92 | 1.25 |

```
                1.000    2.50 | 2.000   26.96 | 3.000    2.22 |  4.00    1.20

     Unit Hyd Qpeak  (cms)=     .312

     PEAK FLOW       (cms)=     .028 (i)
     TIME TO PEAK    (hrs)=    2.667
     RUNOFF VOLUME    (mm)=    3.442
     TOTAL RAINFALL   (mm)=   24.971
     RUNOFF COEFFICIENT   =     .138

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0102) |   Area     (ha)=   10.10   Curve Number    (CN)= 79.2
|ID= 1 DT= 5.0 min |   Ia       (mm)=    8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=     .67

     Unit Hyd Qpeak  (cms)=     .576

     PEAK FLOW       (cms)=     .053 (i)
     TIME TO PEAK    (hrs)=    2.750
     RUNOFF VOLUME    (mm)=    3.442
     TOTAL RAINFALL   (mm)=   24.971
     RUNOFF COEFFICIENT   =     .138

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0103) |   Area     (ha)=   14.65   Curve Number    (CN)= 80.7
|ID= 1 DT= 5.0 min |   Ia       (mm)=    8.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    1.11

     Unit Hyd Qpeak  (cms)=     .504

     PEAK FLOW       (cms)=     .057 (i)
     TIME TO PEAK    (hrs)=    3.333
     RUNOFF VOLUME    (mm)=    3.706
     TOTAL RAINFALL   (mm)=   24.971
     RUNOFF COEFFICIENT   =     .148

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

--------------------------------------------------------------------------------

 FINISH
================================================================================
```

```
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, Version 2.0
O   O    T      T    H   H   Y Y   MM MM  O   O
O   O    T      T    H   H    Y    M   M  O   O   Licensed To: C.C. Tatham & Associates Ltd.
 OOO     T      T    H   H    Y    M   M   OOO                 VO2-0110
```



***** S U M M A R Y  O U T P U T *****

Input filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat
Output filename: C:\DOCUME~1\jash\Desktop\PROJEC~1\304844~1\SIMCOE~1\Pre Development (Nov. 2009).out
Summary filename: C:\DOCUME~1\jash\Desktop\PROJEC~1\304844~1\SIMCOE~1\Pre Development (Nov. 2009).sum

DATE: 26/11/2009 TIME: 10:23:54 AM

USER:

COMMENTS: _____

```
*****************************
** SIMULATION NUMBER:   1 **
*****************************
```

| W/E | COMMAND | HYD ID | DT min | AREA ha | Qpeak cms | Tpeak hrs | R.V. mm | R.C. | Qbase cms |
|---|---|---|---|---|---|---|---|---|---|
| | START @ .00 hrs | | | | | | | | |
| | READ STORM | | 6.0 | | | | | | |
| | [ Ptot= 24.97 mm ] | | | | | | | | |
| | fname : C:\Documents and Settings\jash\Desktop\Project Files\304844 - Simcoe Estates\STORMS\CHIC25MM.4HR | | | | | | | | |
| | remark: 25 mm 4-hr Chicago storm | | | | | | | | |
| * | | | | | | | | | |
| ** | CALIB NASHYD | 0101 1 | 5.0 | 4.90 | .03 | 2.67 | 3.44 | .14 | .000 |
| | [CN=79.2 ] | | | | | | | | |
| | [ N = 3.0:Tp .60] | | | | | | | | |
| * | | | | | | | | | |
| ** | CALIB NASHYD | 0102 1 | 5.0 | 10.10 | .05 | 2.75 | 3.44 | .14 | .000 |
| | [CN=79.2 ] | | | | | | | | |
| | [ N = 3.0:Tp .67] | | | | | | | | |
| * | | | | | | | | | |
| ** | CALIB NASHYD | 0103 1 | 5.0 | 14.65 | .06 | 3.33 | 3.71 | .15 | .000 |
| | [CN=80.7 ] | | | | | | | | |
| | [ N = 3.0:Tp 1.11] | | | | | | | | |
| * | | | | | | | | | |

```
*****************************
** SIMULATION NUMBER:   2 **
*****************************
```

| W/E | COMMAND | HYD ID | DT min | AREA ha | Qpeak cms | Tpeak hrs | R.V. mm | R.C. | Qbase cms |
|---|---|---|---|---|---|---|---|---|---|
| | START @ .00 hrs | | | | | | | | |
| | READ STORM | | 12.0 | | | | | | |
| | [ Ptot= 33.30 mm ] | | | | | | | | |
| | fname : C:\Documents and Settings\jash\Desktop\Project Files\304844 - Simcoe Estates\STORMS\orchi2-4.stm | | | | | | | | |
| | remark: * Orillia Chicago 2 Year, 4 Hour Storm | | | | | | | | |
| * | | | | | | | | | |
| ** | CALIB NASHYD | 0101 1 | 5.0 | 4.90 | .06 | 2.67 | 6.96 | .21 | .000 |
| | [CN=79.2 ] | | | | | | | | |
| | [ N = 3.0:Tp .60] | | | | | | | | |
| * | | | | | | | | | |
| ** | CALIB NASHYD | 0102 1 | 5.0 | 10.10 | .11 | 2.83 | 6.96 | .21 | .000 |
| | [CN=79.2 ] | | | | | | | | |
| | [ N = 3.0:Tp .67] | | | | | | | | |
| * | | | | | | | | | |
| ** | CALIB NASHYD | 0103 1 | 5.0 | 14.65 | .12 | 3.33 | 7.44 | .22 | .000 |
| | [CN=80.7 ] | | | | | | | | |

```
     [ N = 3.0:Tp 1.11]
*
  ****************************
  ** 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                    12.0
     [ Ptot= 44.71 mm ]
     fname : C:\Documents and Settings\jash\Desktop\Project Files\304844 - Simcoe Estates\STORMS\orchi5-4.stm
     remark: * Orillia Chicago 5 Year, 4 Hour Storm
*
  **  CALIB NASHYD       0101  1  5.0    4.90     .11  2.67  13.03  .29    .000
     [CN=79.2          ]
     [ N = 3.0:Tp  .60]
*
  **  CALIB NASHYD       0102  1  5.0   10.10     .21  2.75  13.03  .29    .000
     [CN=79.2          ]
     [ N = 3.0:Tp  .67]
*
  **  CALIB NASHYD       0103  1  5.0   14.65     .22  3.33  13.83  .31    .000
     [CN=80.7          ]
     [ N = 3.0:Tp 1.11]
*
  ****************************
  ** 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                    12.0
     [ Ptot= 63.42 mm ]
     fname : C:\Documents and Settings\jash\Desktop\Project Files\304844 - Simcoe Estates\STORMS\orchi25.stm
     remark: *Orillia Chicago 25 Year, 4 Hour Storm
*
  **  CALIB NASHYD       0101  1  5.0    4.90     .22  2.67  25.15  .40    .000
     [CN=79.2          ]
     [ N = 3.0:Tp  .60]
*
  **  CALIB NASHYD       0102  1  5.0   10.10     .41  2.75  25.15  .40    .000
     [CN=79.2          ]
     [ N = 3.0:Tp  .67]
*
  **  CALIB NASHYD       0103  1  5.0   14.65     .43  3.25  26.44  .42    .000
     [CN=80.7          ]
     [ N = 3.0:Tp 1.11]
*
  ****************************
  ** 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                    12.0
     [ Ptot= 78.51 mm ]
     fname : C:\Documents and Settings\jash\Desktop\Project Files\304844 - Simcoe Estates\STORMS\orchi100.stm
     remark: *Orillia Chicago 100 Year, 4 Hour Storm
*
  **  CALIB NASHYD       0101  1  5.0    4.90     .32  2.58  36.23  .46    .000
     [CN=79.2          ]
     [ N = 3.0:Tp  .60]
*
  **  CALIB NASHYD       0102  1  5.0   10.10     .60  2.67  36.23  .46    .000
     [CN=79.2          ]
     [ N = 3.0:Tp  .67]
*
  **  CALIB NASHYD       0103  1  5.0   14.65     .62  3.25  37.88  .48    .000
     [CN=80.7          ]
     [ N = 3.0:Tp 1.11]
*
  ****************************
  ** SIMULATION NUMBER:   6 **
  ****************************

  W/E COMMAND              HYD ID   DT     AREA   Qpeak Tpeak   R.V. R.C.   Qbase
```

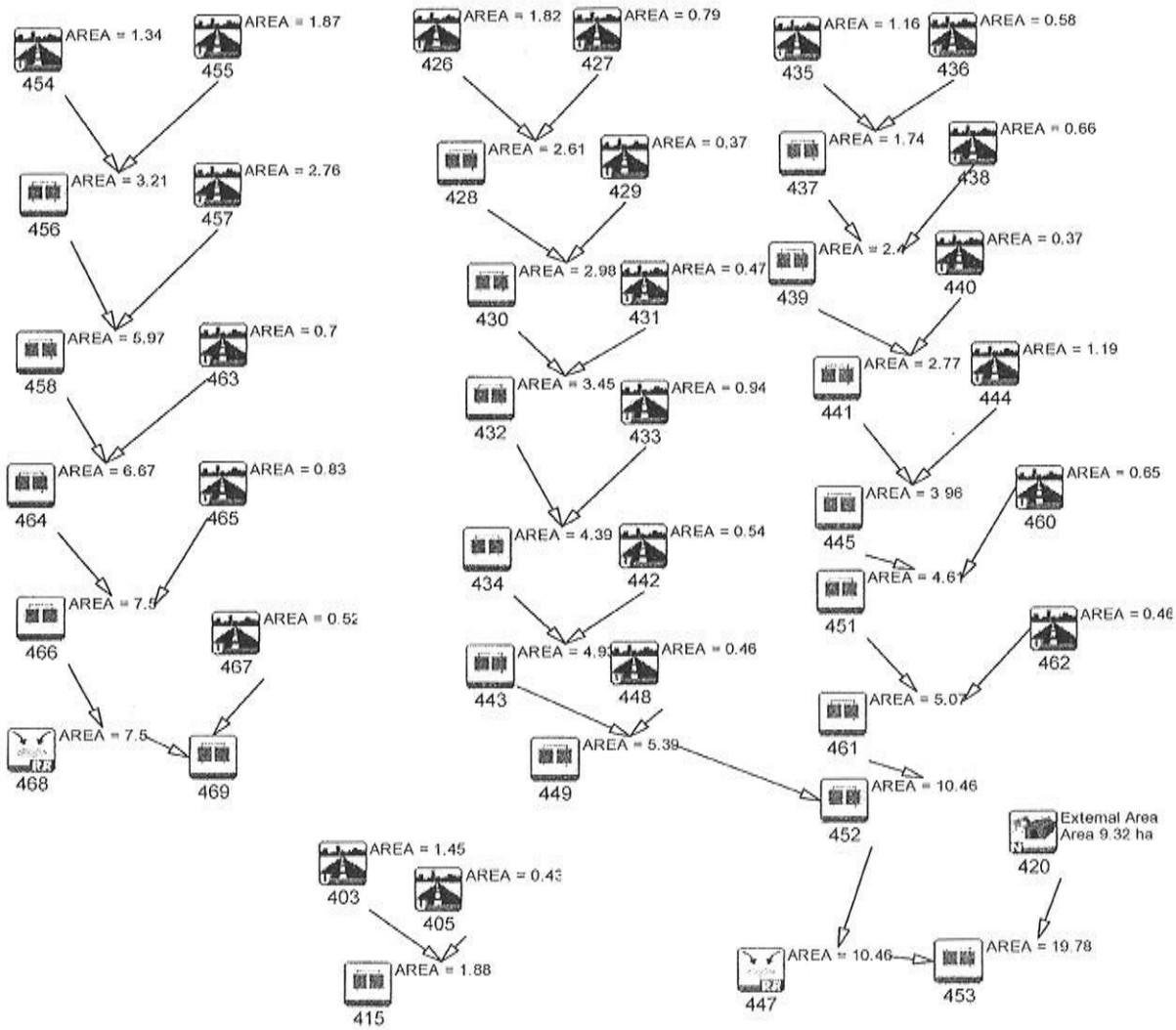
```
                                   min      ha      cms    hrs      mm          cms

      START @    .00 hrs
      --------------------
      READ STORM                    12.0
      [ Ptot=193.00 mm ]
      fname : C:\Documents and Settings\jash\Desktop\Project Files\304844 - Simcoe Estates\STORMS\TIMMINS.12
      remark: TIMMINS REGIONAL 12 HOUR DURATION STORM
*
  **  CALIB NASHYD        0101  1  5.0    4.90      .40  7.25 135.97  .70     .000
      [CN=79.2          ]
      [ N = 3.0:Tp  .60]
*
  **  CALIB NASHYD        0102  1  5.0   10.10      .79  7.33 135.97  .70     .000
      [CN=79.2          ]
      [ N = 3.0:Tp  .67]
*
  **  CALIB NASHYD        0103  1  5.0   14.65      .95  7.92 139.27  .72     .000
      [CN=80.7          ]
      [ N = 3.0:Tp 1.11]
*
 FINISH
```

==========

C.C.Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie

| | |
|---|---|
| **Project:** | Simcoe Estates, Block C, Plan 820 |
| **Date:** | Nov-09 |
| **File No.:** | 304844-5 |
| **Designed By:** | JA |
| **Checked By:** | MV |
| **Subject:** | Hydrologic Model Schematic |

## SIMCOE ESTATES, BLOCK C, PLAN 820
## POST DEVELOPMENT CONDITIONS




| | | | | | |
|---|---|---|---|---|---|
| 0 | Nashyd | 0 | Route Pipe | 0 | Duhyd |
| 0 | Standhyd | 0 | Route Channel | 1 | Diverthyd |
| 0 | Addhyd | 0 | Route Reservoir | | |

```
 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, Version 2.0
 O   O     T      T    H   H   Y Y   MM MM  O   O
 O   O     T      T    H   H    Y    M   M  O   O   Licensed To: C.C. Tatham & Associates Ltd.
  OOO      T      T    H   H    Y    M   M   OOO                 VO2-0110
```

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***** D E T A I L E D  O U T P U T *****

Input filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat
Output filename: C:\DOCUME~1\jash\Desktop\PROJEC~1\304844~1\SIMCOE~1\Post Development (Nov. 2009).out
Summary filename: C:\DOCUME~1\jash\Desktop\PROJEC~1\304844~1\SIMCOE~1\Post Development (Nov. 2009).sum

DATE: 27/11/2009 TIME: 9:19:03 AM

USER:

COMMENTS: _____

**********
** SIMULATION NUMBER: 1 **
**********

| READ STORM | Filename: C:\Documents and Settings\jash\Desktop\Project Files\304844 - Simcoe Estates\STORMS\CHIC25MM.4HR
| Ptotal= 24.97 mm | Comments: 25 mm 4-hr Chicago storm

| TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr |
|---|---|---|---|---|---|---|---|
| .10 | 1.29 | 1.10 | 2.81 | 2.10 | 13.05 | 3.10 | 2.04 |
| .20 | 1.36 | 1.20 | 3.22 | 2.20 | 8.44 | 3.20 | 1.89 |
| .30 | 1.44 | 1.30 | 3.77 | 2.30 | 6.21 | 3.30 | 1.76 |
| .40 | 1.53 | 1.40 | 4.55 | 2.40 | 4.91 | 3.40 | 1.65 |
| .50 | 1.63 | 1.50 | 5.77 | 2.50 | 4.06 | 3.50 | 1.55 |
| .60 | 1.75 | 1.60 | 7.86 | 2.60 | 3.47 | 3.60 | 1.46 |
| .70 | 1.89 | 1.70 | 12.27 | 2.70 | 3.03 | 3.70 | 1.39 |
| .80 | 2.06 | 1.80 | 26.17 | 2.80 | 2.70 | 3.80 | 1.32 |
| .90 | 2.26 | 1.90 | 72.58 | 2.90 | 2.43 | 3.90 | 1.26 |
| 1.00 | 2.50 | 2.00 | 26.96 | 3.00 | 2.22 | 4.00 | 1.20 |

| CALIB | STANDHYD (0403) | ID= 1 DT= 5.0 min | Area (ha)= 1.45 | Total Imp(%)= 25.00 | Dir. Conn.(%)= 25.00

| | | IMPERVIOUS | PERVIOUS (i) |
|---|---|---|---|
| Surface Area | (ha)= | .36 | 1.09 |
| Dep. Storage | (mm)= | 1.00 | 1.50 |
| Average Slope | (%)= | 1.00 | 2.00 |
| Length | (m)= | 98.30 | 40.00 |
| Mannings n | = | .013 | .250 |

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

| TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr |
|---|---|---|---|---|---|---|---|
| .083 | 1.29 | 1.083 | 2.81 | 2.083 | 13.05 | 3.08 | 2.04 |
| .167 | 1.35 | 1.167 | 3.14 | 2.167 | 9.36 | 3.17 | 1.92 |
| .250 | 1.41 | 1.250 | 3.55 | 2.250 | 7.10 | 3.25 | 1.81 |
| .333 | 1.48 | 1.333 | 4.08 | 2.333 | 5.69 | 3.33 | 1.72 |
| .417 | 1.55 | 1.417 | 4.79 | 2.417 | 4.74 | 3.42 | 1.63 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| .500 | 1.63 | 1.500 | 5.77 | 2.500 | 4.06 | 3.50 | 1.55 |
| .583 | 1.75 | 1.583 | 7.86 | 2.583 | 3.47 | 3.58 | 1.46 |
| .667 | 1.86 | 1.667 | 11.39 | 2.667 | 3.12 | 3.67 | 1.40 |
| .750 | 1.99 | 1.750 | 20.61 | 2.750 | 2.83 | 3.75 | 1.35 |
| .833 | 2.14 | 1.833 | 44.73 | 2.833 | 2.59 | 3.83 | 1.30 |
| .917 | 2.31 | 1.917 | 63.46 | 2.917 | 2.39 | 3.92 | 1.25 |
| 1.000 | 2.50 | 2.000 | 26.96 | 3.000 | 2.22 | 4.00 | 1.20 |

| | | | | |
|---|---|---|---|---|
| Max.Eff.Inten.(mm/hr)= | 63.46 | 4.59 | | |
| over (min) | 5.00 | 30.00 | | |
| Storage Coeff. (min)= | 3.03 (ii) | 27.25 (ii) | | |
| Unit Hyd. Tpeak (min)= | 5.00 | 30.00 | | |
| Unit Hyd. peak (cms)= | .27 | .04 | | |
| | | | *TOTALS* | |
| PEAK FLOW (cms)= | .06 | .01 | .061 (iii) | |
| TIME TO PEAK (hrs)= | 1.92 | 2.33 | 1.92 | |
| RUNOFF VOLUME (mm)= | 23.97 | 1.91 | 7.42 | |
| TOTAL RAINFALL (mm)= | 24.97 | 24.97 | 24.97 | |
| RUNOFF COEFFICIENT = | .96 | .08 | .30 | |

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(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.

---

| CALIB | | | |
|---|---|---|---|
| STANDHYD (0405) | Area (ha)= .43 | | |
| ID= 1 DT= 5.0 min | Total Imp(%)= 30.00 | Dir. Conn.(%)= 30.00 | |

| | | IMPERVIOUS | PERVIOUS (i) | |
|---|---|---|---|---|
| Surface Area | (ha)= | .13 | .30 | |
| Dep. Storage | (mm)= | 1.00 | 1.50 | |
| Average Slope | (%)= | 1.00 | 2.00 | |
| Length | (m)= | 53.50 | 40.00 | |
| Mannings n | = | .013 | .250 | |
| Max.Eff.Inten.(mm/hr)= | | 63.46 | 4.59 | |
| over (min) | | 5.00 | 30.00 | |
| Storage Coeff. (min)= | | 2.11 (ii) | 26.32 (ii) | |
| Unit Hyd. Tpeak (min)= | | 5.00 | 30.00 | |
| Unit Hyd. peak (cms)= | | .31 | .04 | |
| | | | | *TOTALS* |
| PEAK FLOW | (cms)= | .02 | .00 | .022 (iii) |
| TIME TO PEAK | (hrs)= | 1.92 | 2.33 | 1.92 |
| RUNOFF VOLUME | (mm)= | 23.97 | 1.91 | 8.51 |
| TOTAL RAINFALL | (mm)= | 24.97 | 24.97 | 24.97 |
| RUNOFF COEFFICIENT | = | .96 | .08 | .34 |

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(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.

---

| ADD HYD (0415) | | | | | |
|---|---|---|---|---|---|
| 1 + 2 = 3 | | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
| | ID1= 1 (0403): | 1.45 | .061 | 1.92 | 7.42 |
| | + ID2= 2 (0405): | .43 | .022 | 1.92 | 8.51 |
| | ID = 3 (0415): | 1.88 | .083 | 1.92 | 7.67 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| CALIB | | | |
|---|---|---|---|
| STANDHYD (0433) | Area (ha)= .94 | | |
| ID= 1 DT= 5.0 min | Total Imp(%)= 40.00 | Dir. Conn.(%)= 40.00 | |

| | | IMPERVIOUS | PERVIOUS (i) |
|---|---|---|---|
| Surface Area | (ha)= | .38 | .56 |
| Dep. Storage | (mm)= | 1.00 | 5.00 |

| | | | |
|---|---|---|---|
| Average Slope (%)= | 1.00 | 2.00 | |
| Length (m)= | 79.20 | 40.00 | |
| Mannings n = | .013 | .250 | |
| Max.Eff.Inten.(mm/hr)= | 63.46 | 7.46 | |
| over (min) | 5.00 | 25.00 | |
| Storage Coeff. (min)= | 2.66 (ii) | 22.60 (ii) | |
| Unit Hyd. Tpeak (min)= | 5.00 | 25.00 | |
| Unit Hyd. peak (cms)= | .29 | .05 | |
| | | | *TOTALS* |
| PEAK FLOW (cms)= | .06 | .01 | .064 (iii) |
| TIME TO PEAK (hrs)= | 1.92 | 2.33 | 1.92 |
| RUNOFF VOLUME (mm)= | 23.97 | 4.56 | 12.31 |
| TOTAL RAINFALL (mm)= | 24.97 | 24.97 | 24.97 |
| RUNOFF COEFFICIENT = | .96 | .18 | .49 |

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 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 (0426) | Area (ha)= | 1.82 | |
| ID= 1 DT= 5.0 min | Total Imp(%)= | 40.00 | Dir. Conn.(%)= 40.00 |

| | IMPERVIOUS | PERVIOUS (i) | |
|---|---|---|---|
| Surface Area (ha)= | .73 | 1.09 | |
| Dep. Storage (mm)= | 1.00 | 5.00 | |
| Average Slope (%)= | 1.00 | 2.00 | |
| Length (m)= | 110.20 | 40.00 | |
| Mannings n = | .013 | .250 | |
| Max.Eff.Inten.(mm/hr)= | 63.46 | 7.46 | |
| over (min) | 5.00 | 25.00 | |
| Storage Coeff. (min)= | 3.25 (ii) | 23.19 (ii) | |
| Unit Hyd. Tpeak (min)= | 5.00 | 25.00 | |
| Unit Hyd. peak (cms)= | .27 | .05 | |
| | | | *TOTALS* |
| PEAK FLOW (cms)= | .12 | .01 | .120 (iii) |
| TIME TO PEAK (hrs)= | 1.92 | 2.33 | 1.92 |
| RUNOFF VOLUME (mm)= | 23.97 | 4.56 | 12.32 |
| TOTAL RAINFALL (mm)= | 24.97 | 24.97 | 24.97 |
| RUNOFF COEFFICIENT = | .96 | .18 | .49 |

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 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 (0427) | Area (ha)= | .79 | |
| ID= 1 DT= 5.0 min | Total Imp(%)= | 40.00 | Dir. Conn.(%)= 40.00 |

| | IMPERVIOUS | PERVIOUS (i) | |
|---|---|---|---|
| Surface Area (ha)= | .32 | .47 | |
| Dep. Storage (mm)= | 1.00 | 5.00 | |
| Average Slope (%)= | 1.00 | 2.00 | |
| Length (m)= | 72.60 | 40.00 | |
| Mannings n = | .013 | .250 | |
| Max.Eff.Inten.(mm/hr)= | 63.46 | 7.46 | |
| over (min) | 5.00 | 25.00 | |
| Storage Coeff. (min)= | 2.53 (ii) | 22.47 (ii) | |
| Unit Hyd. Tpeak (min)= | 5.00 | 25.00 | |
| Unit Hyd. peak (cms)= | .29 | .05 | |
| | | | *TOTALS* |
| PEAK FLOW (cms)= | .05 | .01 | .054 (iii) |
| TIME TO PEAK (hrs)= | 1.92 | 2.33 | 1.92 |
| RUNOFF VOLUME (mm)= | 23.97 | 4.56 | 12.31 |
| TOTAL RAINFALL (mm)= | 24.97 | 24.97 | 24.97 |
| RUNOFF COEFFICIENT = | .96 | .18 | .49 |

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

CN* = 79.0 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 (0428) | | AREA | QPEAK | TPEAK | R.V. |
|---|---|---|---|---|---|
| 1 + 2 = 3 | | (ha) | (cms) | (hrs) | (mm) |
| | ID1= 1 (0426): | 1.82 | .120 | 1.92 | 12.32 |
| | + ID2= 2 (0427): | .79 | .054 | 1.92 | 12.31 |
| | ID = 3 (0428): | 2.61 | .174 | 1.92 | 12.31 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| CALIB | | | | | |
|---|---|---|---|---|---|
| STANDHYD (0429) | Area (ha)= .37 | | | | |
| ID= 1 DT= 5.0 min | Total Imp(%)= 40.00 | | Dir. Conn.(%)= 40.00 | | |
| | | IMPERVIOUS | PERVIOUS (i) | | |
| Surface Area | (ha)= | .15 | .22 | | |
| Dep. Storage | (mm)= | 1.00 | 5.00 | | |
| Average Slope | (%)= | 1.00 | 2.00 | | |
| Length | (m)= | 49.70 | 40.00 | | |
| Mannings n | = | .013 | .250 | | |
| Max.Eff.Inten.(mm/hr)= | | 63.46 | 7.46 | | |
| over (min) | | 5.00 | 25.00 | | |
| Storage Coeff. | (min)= | 2.01 (ii) | 21.95 (ii) | | |
| Unit Hyd. Tpeak | (min)= | 5.00 | 25.00 | | |
| Unit Hyd. peak | (cms)= | .31 | .05 | | |
| | | | | *TOTALS* | |
| PEAK FLOW | (cms)= | .03 | .00 | .026 (iii) | |
| TIME TO PEAK | (hrs)= | 1.92 | 2.33 | 1.92 | |
| RUNOFF VOLUME | (mm)= | 23.97 | 4.56 | 12.29 | |
| TOTAL RAINFALL | (mm)= | 24.97 | 24.97 | 24.97 | |
| RUNOFF COEFFICIENT | = | .96 | .18 | .49 | |

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 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 (0430) | | AREA | QPEAK | TPEAK | R.V. |
|---|---|---|---|---|---|
| 1 + 2 = 3 | | (ha) | (cms) | (hrs) | (mm) |
| | ID1= 1 (0428): | 2.61 | .174 | 1.92 | 12.31 |
| | + ID2= 2 (0429): | .37 | .026 | 1.92 | 12.29 |
| | ID = 3 (0430): | 2.98 | .200 | 1.92 | 12.31 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| CALIB | | | | | |
|---|---|---|---|---|---|
| STANDHYD (0431) | Area (ha)= .47 | | | | |
| ID= 1 DT= 5.0 min | Total Imp(%)= 40.00 | | Dir. Conn.(%)= 40.00 | | |
| | | IMPERVIOUS | PERVIOUS (i) | | |
| Surface Area | (ha)= | .19 | .28 | | |
| Dep. Storage | (mm)= | 1.00 | 5.00 | | |
| Average Slope | (%)= | 1.00 | 2.00 | | |
| Length | (m)= | 56.00 | 40.00 | | |
| Mannings n | = | .013 | .250 | | |
| Max.Eff.Inten.(mm/hr)= | | 63.46 | 7.46 | | |
| over (min) | | 5.00 | 25.00 | | |
| Storage Coeff. | (min)= | 2.16 (ii) | 22.10 (ii) | | |
| Unit Hyd. Tpeak | (min)= | 5.00 | 25.00 | | |
| Unit Hyd. peak | (cms)= | .31 | .05 | | |
| | | | | *TOTALS* | |
| PEAK FLOW | (cms)= | .03 | .00 | .033 (iii) | |
| TIME TO PEAK | (hrs)= | 1.92 | 2.33 | 1.92 | |

| | | | | |
|---|---|---|---|---|
| RUNOFF VOLUME | (mm)= | 23.97 | 4.56 | 12.30 |
| TOTAL RAINFALL | (mm)= | 24.97 | 24.97 | 24.97 |
| RUNOFF COEFFICIENT | = | .96 | .18 | .49 |

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 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 (0432) | | AREA | QPEAK | TPEAK | R.V. |
|---|---|---|---|---|---|
| 1 + 2 = 3 | | (ha) | (cms) | (hrs) | (mm) |
| | ID1= 1 (0430): | 2.98 | .200 | 1.92 | 12.31 |
| | + ID2= 2 (0431): | .47 | .033 | 1.92 | 12.30 |
| | ID = 3 (0432): | 3.45 | .232 | 1.92 | 12.31 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| ADD HYD (0434) | | AREA | QPEAK | TPEAK | R.V. |
|---|---|---|---|---|---|
| 1 + 2 = 3 | | (ha) | (cms) | (hrs) | (mm) |
| | ID1= 1 (0433): | .94 | .064 | 1.92 | 12.31 |
| | + ID2= 2 (0432): | 3.45 | .232 | 1.92 | 12.31 |
| | ID = 3 (0434): | 4.39 | .296 | 1.92 | 12.31 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| CALIB | | | | | |
|---|---|---|---|---|---|
| STANDHYD (0442) | Area (ha)= .54 | | | | |
| ID= 1 DT= 5.0 min | Total Imp(%)= 40.00 | | Dir. Conn.(%)= 40.00 | | |
| | | IMPERVIOUS | PERVIOUS (i) | | |
| Surface Area | (ha)= | .22 | .32 | | |
| Dep. Storage | (mm)= | 1.00 | 5.00 | | |
| Average Slope | (%)= | 1.00 | 2.00 | | |
| Length | (m)= | 60.00 | 40.00 | | |
| Mannings n | = | .013 | .250 | | |
| Max.Eff.Inten.(mm/hr)= | | 63.46 | 7.46 | | |
| over (min) | | 5.00 | 25.00 | | |
| Storage Coeff. | (min)= | 2.26 (ii) | 22.19 (ii) | | |
| Unit Hyd. Tpeak | (min)= | 5.00 | 25.00 | | |
| Unit Hyd. peak | (cms)= | .30 | .05 | | |
| | | | | *TOTALS* | |
| PEAK FLOW | (cms)= | .04 | .00 | .037 (iii) | |
| TIME TO PEAK | (hrs)= | 1.92 | 2.33 | 1.92 | |
| RUNOFF VOLUME | (mm)= | 23.97 | 4.56 | 12.30 | |
| TOTAL RAINFALL | (mm)= | 24.97 | 24.97 | 24.97 | |
| RUNOFF COEFFICIENT | = | .96 | .18 | .49 | |

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 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 (0443) | | AREA | QPEAK | TPEAK | R.V. |
|---|---|---|---|---|---|
| 1 + 2 = 3 | | (ha) | (cms) | (hrs) | (mm) |
| | ID1= 1 (0434): | 4.39 | .296 | 1.92 | 12.31 |
| | + ID2= 2 (0442): | .54 | .037 | 1.92 | 12.30 |
| | ID = 3 (0443): | 4.93 | .333 | 1.92 | 12.31 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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```
---------------------
| CALIB             |
| STANDHYD  (0448)  |   Area     (ha)=    .46
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
---------------------
                            IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=       .41           .05
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=     55.40         40.00
     Mannings n           =      .013          .250

     Max.Eff.Inten.(mm/hr)=     63.46         31.41
               over (min)        5.00         10.00
     Storage Coeff.  (min)=      2.15 (ii)     5.67 (ii)
     Unit Hyd. Tpeak (min)=      5.00         10.00
     Unit Hyd. peak  (cms)=       .31           .15
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .07           .00        .071 (iii)
     TIME TO PEAK    (hrs)=      1.92          2.00        1.92
     RUNOFF VOLUME    (mm)=     23.97          4.56       22.03
     TOTAL RAINFALL   (mm)=     24.97         24.97       24.97
     RUNOFF COEFFICIENT   =       .96           .18         .88

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0     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   (0449)  |
|   1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
---------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0443):      4.93      .333      1.92     12.31
        + ID2= 2 (0448):       .46      .071      1.92     22.03
          ==========================================================
          ID = 3 (0449):      5.39      .405      1.92     13.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
---------------------
| CALIB             |
| STANDHYD  (0435)  |   Area     (ha)=   1.16
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  40.00   Dir. Conn.(%)=  40.00
---------------------
                            IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=       .46           .70
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=     87.90         40.00
     Mannings n           =      .013          .250

     Max.Eff.Inten.(mm/hr)=     63.46          7.46
               over (min)        5.00         25.00
     Storage Coeff.  (min)=      2.84 (ii)    22.77 (ii)
     Unit Hyd. Tpeak (min)=      5.00         25.00
     Unit Hyd. peak  (cms)=       .28           .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .08           .01        .078 (iii)
     TIME TO PEAK    (hrs)=      1.92          2.33        1.92
     RUNOFF VOLUME    (mm)=     23.97          4.56       12.31
     TOTAL RAINFALL   (mm)=     24.97         24.97       24.97
     RUNOFF COEFFICIENT   =       .96           .18         .49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0     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  (0436)  |   Area     (ha)=    .58
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  40.00   Dir. Conn.(%)=  40.00
---------------------
                            IMPERVIOUS     PERVIOUS (i)
```

| | | | | |
|---|---|---|---|---|
| Surface Area | (ha)= | .23 | .35 | |
| Dep. Storage | (mm)= | 1.00 | 5.00 | |
| Average Slope | (%)= | 1.00 | 2.00 | |
| Length | (m)= | 62.20 | 40.00 | |
| Mannings n | = | .013 | .250 | |
| Max.Eff.Inten. | (mm/hr)= | 63.46 | 7.46 | |
| over | (min) | 5.00 | 25.00 | |
| Storage Coeff. | (min)= | 2.30 (ii) | 22.24 (ii) | |
| Unit Hyd. Tpeak | (min)= | 5.00 | 25.00 | |
| Unit Hyd. peak | (cms)= | .30 | .05 | |
| | | | | *TOTALS* |
| PEAK FLOW | (cms)= | .04 | .00 | .040 (iii) |
| TIME TO PEAK | (hrs)= | 1.92 | 2.33 | 1.92 |
| RUNOFF VOLUME | (mm)= | 23.97 | 4.56 | 12.30 |
| TOTAL RAINFALL | (mm)= | 24.97 | 24.97 | 24.97 |
| RUNOFF COEFFICIENT | = | .96 | .18 | .49 |

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 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 (0437) | | | | | |
|---|---|---|---|---|---|
| 1 + 2 = 3 | | AREA | QPEAK | TPEAK | R.V. |
| | | (ha) | (cms) | (hrs) | (mm) |
| ID1= 1 (0435): | | 1.16 | .078 | 1.92 | 12.31 |
| + ID2= 2 (0436): | | .58 | .040 | 1.92 | 12.30 |
| ID = 3 (0437): | | 1.74 | .118 | 1.92 | 12.31 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| CALIB | | | | | |
|---|---|---|---|---|---|
| STANDHYD (0438) | Area | (ha)= | .66 | | |
| ID= 1 DT= 5.0 min | Total Imp | (%)= | 40.00 | Dir. Conn.(%)= | 40.00 |

| | | IMPERVIOUS | PERVIOUS (i) | |
|---|---|---|---|---|
| Surface Area | (ha)= | .26 | .40 | |
| Dep. Storage | (mm)= | 1.00 | 5.00 | |
| Average Slope | (%)= | 1.00 | 2.00 | |
| Length | (m)= | 66.30 | 40.00 | |
| Mannings n | = | .013 | .250 | |
| Max.Eff.Inten. | (mm/hr)= | 63.46 | 7.46 | |
| over | (min) | 5.00 | 25.00 | |
| Storage Coeff. | (min)= | 2.39 (ii) | 22.33 (ii) | |
| Unit Hyd. Tpeak | (min)= | 5.00 | 25.00 | |
| Unit Hyd. peak | (cms)= | .30 | .05 | |
| | | | | *TOTALS* |
| PEAK FLOW | (cms)= | .04 | .00 | .045 (iii) |
| TIME TO PEAK | (hrs)= | 1.92 | 2.33 | 1.92 |
| RUNOFF VOLUME | (mm)= | 23.97 | 4.56 | 12.31 |
| TOTAL RAINFALL | (mm)= | 24.97 | 24.97 | 24.97 |
| RUNOFF COEFFICIENT | = | .96 | .18 | .49 |

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 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 (0439) | | | | | |
|---|---|---|---|---|---|
| 1 + 2 = 3 | | AREA | QPEAK | TPEAK | R.V. |
| | | (ha) | (cms) | (hrs) | (mm) |
| ID1= 1 (0437): | | 1.74 | .118 | 1.92 | 12.31 |
| + ID2= 2 (0438): | | .66 | .045 | 1.92 | 12.31 |
| ID = 3 (0439): | | 2.40 | .163 | 1.92 | 12.31 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
| CALIB             |
| STANDHYD  (0440)  |   Area     (ha)=     .37
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  40.00   Dir. Conn.(%)=  40.00
```

| | | IMPERVIOUS | PERVIOUS (i) | |
|---|---|---|---|---|
| Surface Area | (ha)= | .15 | .22 | |
| Dep. Storage | (mm)= | 1.00 | 5.00 | |
| Average Slope | (%)= | 1.00 | 2.00 | |
| Length | (m)= | 49.70 | 40.00 | |
| Mannings n | = | .013 | .250 | |
| Max.Eff.Inten. | (mm/hr)= | 63.46 | 7.46 | |
| over | (min) | 5.00 | 25.00 | |
| Storage Coeff. | (min)= | 2.01 (ii) | 21.95 (ii) | |
| Unit Hyd. Tpeak | (min)= | 5.00 | 25.00 | |
| Unit Hyd. peak | (cms)= | .31 | .05 | |
| | | | | *TOTALS* |
| PEAK FLOW | (cms)= | .03 | .00 | .026 (iii) |
| TIME TO PEAK | (hrs)= | 1.92 | 2.33 | 1.92 |
| RUNOFF VOLUME | (mm)= | 23.97 | 4.56 | 12.29 |
| TOTAL RAINFALL | (mm)= | 24.97 | 24.97 | 24.97 |
| RUNOFF COEFFICIENT | = | .96 | .18 | .49 |

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 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   (0441)  |
|   1 +  2 =  3     |
```

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0439): | 2.40 | .163 | 1.92 | 12.31 |
| + ID2= 2 (0440): | .37 | .026 | 1.92 | 12.29 |
| ID = 3 (0441): | 2.77 | .189 | 1.92 | 12.31 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

```
| CALIB             |
| STANDHYD  (0444)  |   Area     (ha)=   1.19
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  40.00   Dir. Conn.(%)=  40.00
```

| | | IMPERVIOUS | PERVIOUS (i) | |
|---|---|---|---|---|
| Surface Area | (ha)= | .48 | .71 | |
| Dep. Storage | (mm)= | 1.00 | 5.00 | |
| Average Slope | (%)= | 1.00 | 2.00 | |
| Length | (m)= | 89.10 | 40.00 | |
| Mannings n | = | .013 | .250 | |
| Max.Eff.Inten. | (mm/hr)= | 63.46 | 7.46 | |
| over | (min) | 5.00 | 25.00 | |
| Storage Coeff. | (min)= | 2.86 (ii) | 22.80 (ii) | |
| Unit Hyd. Tpeak | (min)= | 5.00 | 25.00 | |
| Unit Hyd. peak | (cms)= | .28 | .05 | |
| | | | | *TOTALS* |
| PEAK FLOW | (cms)= | .08 | .01 | .080 (iii) |
| TIME TO PEAK | (hrs)= | 1.92 | 2.33 | 1.92 |
| RUNOFF VOLUME | (mm)= | 23.97 | 4.56 | 12.31 |
| TOTAL RAINFALL | (mm)= | 24.97 | 24.97 | 24.97 |
| RUNOFF COEFFICIENT | = | .96 | .18 | .49 |

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 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   (0445)  |
|   1 +  2 =  3     |
```

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|

```
          ID1= 1 (0441):     2.77    .189     1.92    12.31
        + ID2= 2 (0444):     1.19    .080     1.92    12.31
          ================================================
          ID = 3 (0445):     3.96    .269     1.92    12.31

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0460) |   Area     (ha)=    .65
|ID= 1 DT= 5.0 min |   Total Imp(%)=  84.00   Dir. Conn.(%)=  84.00
--------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       .55          .10
     Dep. Storage      (mm)=      1.00         1.50
     Average Slope      (%)=      1.00         2.00
     Length             (m)=     65.80        40.00
     Mannings n            =      .013         .250

     Max.Eff.Inten.(mm/hr)=     63.46        19.63
               over (min)        5.00        10.00
     Storage Coeff.  (min)=     2.38 (ii)    6.75 (ii)
     Unit Hyd. Tpeak (min)=     5.00        10.00
     Unit Hyd. peak  (cms)=      .30          .14
                                                      *TOTALS*
     PEAK FLOW       (cms)=      .09          .00          .094 (iii)
     TIME TO PEAK    (hrs)=     1.92         2.00         1.92
     RUNOFF VOLUME    (mm)=    23.97         1.91        20.44
     TOTAL RAINFALL   (mm)=    24.97        24.97        24.97
     RUNOFF COEFFICIENT    =     .96          .08          .82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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.

--------------------------------------------------------------------------------

--------------------
| ADD HYD   (0451) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0445):     3.96     .269     1.92     12.31
        + ID2= 2 (0460):      .65     .094     1.92     20.44
          ================================================
          ID = 3 (0451):     4.61     .363     1.92     13.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0462) |   Area     (ha)=    .46
|ID= 1 DT= 5.0 min |   Total Imp(%)=  40.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       .18          .28
     Dep. Storage      (mm)=      1.00         1.50
     Average Slope      (%)=      1.00         2.00
     Length             (m)=     55.40        40.00
     Mannings n            =      .013         .250

     Max.Eff.Inten.(mm/hr)=     63.46         4.59
               over (min)        5.00        30.00
     Storage Coeff.  (min)=     2.15 (ii)   26.36 (ii)
     Unit Hyd. Tpeak (min)=     5.00        30.00
     Unit Hyd. peak  (cms)=      .31          .04
                                                      *TOTALS*
     PEAK FLOW       (cms)=      .03          .00          .032 (iii)
     TIME TO PEAK    (hrs)=     1.92         2.33         1.92
     RUNOFF VOLUME    (mm)=    23.97         1.91        10.72
     TOTAL RAINFALL   (mm)=    24.97        24.97        24.97
     RUNOFF COEFFICIENT    =     .96          .08          .43

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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.

---

| ADD HYD (0461) | | AREA | QPEAK | TPEAK | R.V. |
|---|---|---|---|---|---|
| 1 + 2 = 3 | | (ha) | (cms) | (hrs) | (mm) |
| | ID1= 1 (0451): | 4.61 | .363 | 1.92 | 13.45 |
| | + ID2= 2 (0462): | .46 | .032 | 1.92 | 10.72 |
| | ID = 3 (0461): | 5.07 | .394 | 1.92 | 13.21 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| ADD HYD (0452) | | AREA | QPEAK | TPEAK | R.V. |
|---|---|---|---|---|---|
| 1 + 2 = 3 | | (ha) | (cms) | (hrs) | (mm) |
| | ID1= 1 (0449): | 5.39 | .405 | 1.92 | 13.14 |
| | + ID2= 2 (0461): | 5.07 | .394 | 1.92 | 13.21 |
| | ID = 3 (0452): | 10.46 | .799 | 1.92 | 13.17 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| RESERVOIR (0447) |
|---|
| IN= 2---> OUT= 1 |
| DT= 5.0 min |

| OUTFLOW (cms) | STORAGE (ha.m.) | OUTFLOW (cms) | STORAGE (ha.m.) |
|---|---|---|---|
| .0000 | .0000 | .0830 | .3742 |
| .0050 | .0489 | .1100 | .4949 |
| .0110 | .1512 | .6670 | .6218 |
| .0360 | .2596 | .0000 | .0000 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| INFLOW : ID= 2 (0452) | 10.46 | .80 | 1.92 | 13.17 |
| OUTFLOW: ID= 1 (0447) | 10.46 | .01 | 4.17 | 12.93 |

PEAK FLOW REDUCTION [Qout/Qin](%)= 1.21
TIME SHIFT OF PEAK FLOW (min)=135.00
MAXIMUM STORAGE USED (ha.m.)= .1290

---

| CALIB | | | | | |
|---|---|---|---|---|---|
| NASHYD (0420) | Area (ha)= | 9.32 | Curve Number (CN)= | 80.7 |
| ID= 1 DT= 5.0 min | Ia (mm)= | 8.00 | # of Linear Res.(N)= | 3.00 |
| | U.H. Tp(hrs)= | .85 | | |

Unit Hyd Qpeak (cms)= .419

PEAK FLOW (cms)= .044 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 3.706
TOTAL RAINFALL (mm)= 24.971
RUNOFF COEFFICIENT = .148

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

---

| ADD HYD (0453) | | AREA | QPEAK | TPEAK | R.V. |
|---|---|---|---|---|---|
| 1 + 2 = 3 | | (ha) | (cms) | (hrs) | (mm) |
| | ID1= 1 (0447): | 10.46 | .010 | 4.17 | 12.93 |
| | + ID2= 2 (0420): | 9.32 | .044 | 3.00 | 3.71 |
| | ID = 3 (0453): | 19.78 | .053 | 3.00 | 8.58 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| CALIB | | | | | |
|---|---|---|---|---|---|
| STANDHYD (0454) | Area (ha)= | 1.34 | | |
| ID= 1 DT= 5.0 min | Total Imp(%)= | 40.00 | Dir. Conn.(%)= | 40.00 |

```
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=          .54           .80
     Dep. Storage      (mm)=         1.00          1.50
     Average Slope      (%)=         1.00          2.00
     Length             (m)=        94.50         40.00
     Mannings n            =         .013          .250

     Max.Eff.Inten.(mm/hr)=        63.46          4.59
               over (min)          5.00         30.00
     Storage Coeff.   (min)=        2.96 (ii)    27.18 (ii)
     Unit Hyd. Tpeak  (min)=        5.00         30.00
     Unit Hyd. peak   (cms)=         .28           .04
                                                          *TOTALS*
     PEAK FLOW         (cms)=         .09           .01          .089 (iii)
     TIME TO PEAK      (hrs)=        1.92          2.33          1.92
     RUNOFF VOLUME      (mm)=       23.97          1.91         10.72
     TOTAL RAINFALL     (mm)=       24.97         24.97         24.97
     RUNOFF COEFFICIENT    =         .96           .08           .43

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0455) |   Area    (ha)=   1.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  40.00   Dir. Conn.(%)=  40.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=          .75          1.12
     Dep. Storage      (mm)=         1.00          1.50
     Average Slope      (%)=         1.00          2.00
     Length             (m)=       111.70         40.00
     Mannings n            =         .013          .250

     Max.Eff.Inten.(mm/hr)=        63.46          4.59
               over (min)          5.00         30.00
     Storage Coeff.   (min)=        3.27 (ii)    27.49 (ii)
     Unit Hyd. Tpeak  (min)=        5.00         30.00
     Unit Hyd. peak   (cms)=         .27           .04
                                                          *TOTALS*
     PEAK FLOW         (cms)=         .12           .01          .122 (iii)
     TIME TO PEAK      (hrs)=        1.92          2.33          1.92
     RUNOFF VOLUME      (mm)=       23.97          1.91         10.73
     TOTAL RAINFALL     (mm)=       24.97         24.97         24.97
     RUNOFF COEFFICIENT    =         .96           .08           .43

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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.

--------------------------------------------------------------------------------

--------------------
| ADD HYD   (0456) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0454):      1.34      .089      1.92     10.72
       + ID2= 2 (0455):      1.87      .122      1.92     10.73
         ==========================================================
         ID = 3 (0456):      3.21      .211      1.92     10.73

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0457) |   Area    (ha)=   2.76
|ID= 1 DT= 5.0 min |   Total Imp(%)=  40.00   Dir. Conn.(%)=  40.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         1.10          1.66
     Dep. Storage      (mm)=         1.00          1.50
     Average Slope      (%)=         1.00          2.00
```

| | | | | |
|---|---|---|---|---|
| Length | (m)= | 135.60 | 40.00 | |
| Mannings n | = | .013 | .250 | |
| Max.Eff.Inten.(mm/hr)= | | 63.46 | 4.59 | |
| over (min) | | 5.00 | 30.00 | |
| Storage Coeff. (min)= | | 3.68 (ii) | 27.89 (ii) | |
| Unit Hyd. Tpeak (min)= | | 5.00 | 30.00 | |
| Unit Hyd. peak (cms)= | | .25 | .04 | |
| | | | | *TOTALS* |
| PEAK FLOW | (cms)= | .17 | .01 | .176 (iii) |
| TIME TO PEAK | (hrs)= | 1.92 | 2.33 | 1.92 |
| RUNOFF VOLUME | (mm)= | 23.97 | 1.91 | 10.73 |
| TOTAL RAINFALL | (mm)= | 24.97 | 24.97 | 24.97 |
| RUNOFF COEFFICIENT | = | .96 | .08 | .43 |

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(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.

---

| ADD HYD (0458) | | AREA | QPEAK | TPEAK | R.V. |
|---|---|---|---|---|---|
| 1 + 2 = 3 | | (ha) | (cms) | (hrs) | (mm) |
| ID1= 1 (0456): | | 3.21 | .211 | 1.92 | 10.73 |
| + ID2= 2 (0457): | | 2.76 | .176 | 1.92 | 10.73 |
| ID = 3 (0458): | | 5.97 | .388 | 1.92 | 10.73 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| CALIB | | | | | |
|---|---|---|---|---|---|
| STANDHYD (0463) | Area (ha)= | .70 | | | |
| ID= 1 DT= 5.0 min | Total Imp(%)= | 72.00 | Dir. Conn.(%)= | 72.00 | |
| | | IMPERVIOUS | PERVIOUS (i) | | |
| Surface Area | (ha)= | .50 | .20 | | |
| Dep. Storage | (mm)= | 1.00 | 1.50 | | |
| Average Slope | (%)= | 1.00 | 2.00 | | |
| Length | (m)= | 68.30 | 40.00 | | |
| Mannings n | = | .013 | .250 | | |
| Max.Eff.Inten.(mm/hr)= | | 63.46 | 4.59 | | |
| over (min) | | 5.00 | 30.00 | | |
| Storage Coeff. (min)= | | 2.44 (ii) | 26.65 (ii) | | |
| Unit Hyd. Tpeak (min)= | | 5.00 | 30.00 | | |
| Unit Hyd. peak (cms)= | | .30 | .04 | | |
| | | | | *TOTALS* | |
| PEAK FLOW | (cms)= | .08 | .00 | .085 (iii) | |
| TIME TO PEAK | (hrs)= | 1.92 | 2.33 | 1.92 | |
| RUNOFF VOLUME | (mm)= | 23.97 | 1.91 | 17.79 | |
| TOTAL RAINFALL | (mm)= | 24.97 | 24.97 | 24.97 | |
| RUNOFF COEFFICIENT | = | .96 | .08 | .71 | |

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(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.

---

| ADD HYD (0464) | | AREA | QPEAK | TPEAK | R.V. |
|---|---|---|---|---|---|
| 1 + 2 = 3 | | (ha) | (cms) | (hrs) | (mm) |
| ID1= 1 (0458): | | 5.97 | .388 | 1.92 | 10.73 |
| + ID2= 2 (0463): | | .70 | .085 | 1.92 | 17.79 |
| ID = 3 (0464): | | 6.67 | .473 | 1.92 | 11.47 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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```
--------------------
| CALIB            |
| STANDHYD  (0465) |   Area     (ha)=     .83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  40.00   Dir. Conn.(%)=  40.00
--------------------

                                IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=         .33           .50
     Dep. Storage      (mm)=        1.00          1.50
     Average Slope      (%)=        1.00          2.00
     Length             (m)=       74.40         40.00
     Mannings n            =        .013          .250

     Max.Eff.Inten.(mm/hr)=       63.46          4.59
               over (min)          5.00         30.00
     Storage Coeff.  (min)=        2.57 (ii)    26.78 (ii)
     Unit Hyd. Tpeak (min)=        5.00         30.00
     Unit Hyd. peak  (cms)=         .29           .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .06           .00          .056 (iii)
     TIME TO PEAK    (hrs)=        1.92          2.33          1.92
     RUNOFF VOLUME    (mm)=       23.97          1.91         10.72
     TOTAL RAINFALL   (mm)=       24.97         24.97         24.97
     RUNOFF COEFFICIENT   =         .96           .08           .43

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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.

--------------------------------------------------------------------------------

--------------------
| ADD HYD   (0466) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0464):      6.67      .473      1.92     11.47
       + ID2= 2 (0465):       .83      .056      1.92     10.72
         ==========================================================
         ID = 3 (0466):      7.50      .529      1.92     11.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0468) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
--------------------       (cms)      (ha.m.)   |    (cms)      (ha.m.)
                           .0000       .0000    |     .3150       .3358
                           .0080       .1400    |     .0000       .0000

                                AREA      QPEAK      TPEAK       R.V.
                                (ha)      (cms)      (hrs)       (mm)
     INFLOW : ID= 2 (0466)      7.50        .53       1.92       11.39
     OUTFLOW: ID= 1 (0468)      7.50        .00       4.08       10.79

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   .88
                   TIME SHIFT OF PEAK FLOW          (min)=130.00
                   MAXIMUM  STORAGE   USED        (ha.m.)=  .0819

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0467) |   Area     (ha)=     .52
|ID= 1 DT= 5.0 min |   Total Imp(%)=  52.00   Dir. Conn.(%)=  52.00
--------------------

                                IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=         .27           .25
     Dep. Storage      (mm)=        1.00          1.50
     Average Slope      (%)=        1.00          2.00
     Length             (m)=       58.90         40.00
     Mannings n            =        .013          .250

     Max.Eff.Inten.(mm/hr)=       63.46          4.59
               over (min)          5.00         30.00
     Storage Coeff.  (min)=        2.23 (ii)    26.44 (ii)
     Unit Hyd. Tpeak (min)=        5.00         30.00
     Unit Hyd. peak  (cms)=         .30           .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .05           .00          .046 (iii)
     TIME TO PEAK    (hrs)=        1.92          2.33          1.92
```

```
     RUNOFF VOLUME     (mm)=       23.97          1.91          13.37
     TOTAL RAINFALL    (mm)=       24.97         24.97          24.97
     RUNOFF COEFFICIENT    =         .96           .08            .54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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.

--------------------------------------------------------------------------------

--------------------
| ADD HYD   (0469) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)       (mm)
          ID1= 1 (0468):      7.50      .005      4.08     10.79
         + ID2= 2 (0467):       .52      .046      1.92     13.37
           ================================================
           ID = 3 (0469):      8.02      .048      1.92     10.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

 FINISH
================================================================================
```

```
 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, Version 2.0
 O   O    T      T    H   H   Y Y   MM MM  O   O
 O   O    T      T    H   H    Y    M   M  O   O   Licensed To: C.C. Tatham & Associates Ltd.
  OOO     T      T    H   H    Y    M   M   OOO                 VO2-0110
```



***** S U M M A R Y  O U T P U T *****

Input filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat
Output filename: C:\DOCUME~1\jash\Desktop\PROJEC~1\304844~1\SIMCOE~1\Post Development (Nov. 2009).out
Summary filename: C:\DOCUME~1\jash\Desktop\PROJEC~1\304844~1\SIMCOE~1\Post Development (Nov. 2009).sum

DATE: 27/11/2009 TIME: 9:13:10 AM

USER:

COMMENTS: _____

****************************
** SIMULATION NUMBER: 1 **
****************************

| W/E | COMMAND | HYD ID | DT min | AREA ha | Qpeak cms | Tpeak hrs | R.V. mm | R.C. | Qbase cms |
|---|---|---|---|---|---|---|---|---|---|
| | START @ .00 hrs | | | | | | | | |
| | READ STORM | | 6.0 | | | | | | |
| | [ Ptot= 24.97 mm ] | | | | | | | | |
| | fname : C:\Documents and Settings\jash\Desktop\Project Files\304844 - Simcoe Estates\STORMS\CHIC25MM.4HR | | | | | | | | |
| | remark: 25 mm 4-hr Chicago storm | | | | | | | | |
| * | | | | | | | | | |
| * | CALIB STANDHYD | 0403 1 | 5.0 | 1.45 | .06 | 1.92 | 7.42 | .30 | .000 |
| | [I%=25.0:S%= 2.00] | | | | | | | | |
| * | | | | | | | | | |
| * | CALIB STANDHYD | 0405 1 | 5.0 | .43 | .02 | 1.92 | 8.51 | .34 | .000 |
| | [I%=30.0:S%= 2.00] | | | | | | | | |
| * | | | | | | | | | |
| | ADD [0403 + 0405] | 0415 3 | 5.0 | 1.88 | .08 | 1.92 | 7.67 | n/a | .000 |
| * | | | | | | | | | |
| * | CALIB STANDHYD | 0433 1 | 5.0 | .94 | .06 | 1.92 | 12.31 | .49 | .000 |
| | [I%=40.0:S%= 2.00] | | | | | | | | |
| * | | | | | | | | | |
| * | CALIB STANDHYD | 0426 1 | 5.0 | 1.82 | .12 | 1.92 | 12.32 | .49 | .000 |
| | [I%=40.0:S%= 2.00] | | | | | | | | |
| * | | | | | | | | | |
| * | CALIB STANDHYD | 0427 1 | 5.0 | .79 | .05 | 1.92 | 12.31 | .49 | .000 |
| | [I%=40.0:S%= 2.00] | | | | | | | | |
| * | | | | | | | | | |
| | ADD [0426 + 0427] | 0428 3 | 5.0 | 2.61 | .17 | 1.92 | 12.31 | n/a | .000 |
| * | | | | | | | | | |
| * | CALIB STANDHYD | 0429 1 | 5.0 | .37 | .03 | 1.92 | 12.29 | .49 | .000 |
| | [I%=40.0:S%= 2.00] | | | | | | | | |
| * | | | | | | | | | |
| | ADD [0428 + 0429] | 0430 3 | 5.0 | 2.98 | .20 | 1.92 | 12.31 | n/a | .000 |
| * | | | | | | | | | |
| * | CALIB STANDHYD | 0431 1 | 5.0 | .47 | .03 | 1.92 | 12.30 | .49 | .000 |
| | [I%=40.0:S%= 2.00] | | | | | | | | |
| * | | | | | | | | | |
| | ADD [0430 + 0431] | 0432 3 | 5.0 | 3.45 | .23 | 1.92 | 12.31 | n/a | .000 |
| * | | | | | | | | | |
| | ADD [0433 + 0432] | 0434 3 | 5.0 | 4.39 | .30 | 1.92 | 12.31 | n/a | .000 |
| * | | | | | | | | | |
| * | CALIB STANDHYD | 0442 1 | 5.0 | .54 | .04 | 1.92 | 12.30 | .49 | .000 |
| | [I%=40.0:S%= 2.00] | | | | | | | | |
| * | | | | | | | | | |
| | ADD [0434 + 0442] | 0443 3 | 5.0 | 4.93 | .33 | 1.92 | 12.31 | n/a | .000 |
| * | | | | | | | | | |

```
  *   CALIB STANDHYD     0448  1  5.0     .46     .07  1.92  22.03  .88    .000
      [I%=90.0:S%= 2.00]
*
      ADD [0443 + 0448]  0449  3  5.0    5.39     .40  1.92  13.14  n/a    .000
*
  *   CALIB STANDHYD     0435  1  5.0    1.16     .08  1.92  12.31  .49    .000
      [I%=40.0:S%= 2.00]
*
  *   CALIB STANDHYD     0436  1  5.0     .58     .04  1.92  12.30  .49    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0435 + 0436]  0437  3  5.0    1.74     .12  1.92  12.31  n/a    .000
*
  *   CALIB STANDHYD     0438  1  5.0     .66     .05  1.92  12.31  .49    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0437 + 0438]  0439  3  5.0    2.40     .16  1.92  12.31  n/a    .000
*
  *   CALIB STANDHYD     0440  1  5.0     .37     .03  1.92  12.29  .49    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0439 + 0440]  0441  3  5.0    2.77     .19  1.92  12.31  n/a    .000
*
  *   CALIB STANDHYD     0444  1  5.0    1.19     .08  1.92  12.31  .49    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0441 + 0444]  0445  3  5.0    3.96     .27  1.92  12.31  n/a    .000
*
  *   CALIB STANDHYD     0460  1  5.0     .65     .09  1.92  20.44  .82    .000
      [I%=84.0:S%= 2.00]
*
      ADD [0445 + 0460]  0451  3  5.0    4.61     .36  1.92  13.45  n/a    .000
*
  *   CALIB STANDHYD     0462  1  5.0     .46     .03  1.92  10.72  .43    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0451 + 0462]  0461  3  5.0    5.07     .39  1.92  13.21  n/a    .000
*
      ADD [0449 + 0461]  0452  3  5.0   10.46     .80  1.92  13.17  n/a    .000
*
      RESRVR [ 2 : 0452] 0447  1  5.0   10.46     .01  4.17  12.93  n/a    .000
      (ST=   .13 ha.m )
*
  *   CALIB NASHYD       0420  1  5.0    9.32     .04  3.00   3.71  .15    .000
      [CN=80.7          ]
      [ N = 3.0:Tp  .85]
*
      ADD [0447 + 0420]  0453  3  5.0   19.78     .05  3.00   8.58  n/a    .000
*
  *   CALIB STANDHYD     0454  1  5.0    1.34     .09  1.92  10.72  .43    .000
      [I%=40.0:S%= 2.00]
*
  *   CALIB STANDHYD     0455  1  5.0    1.87     .12  1.92  10.73  .43    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0454 + 0455]  0456  3  5.0    3.21     .21  1.92  10.73  n/a    .000
*
  *   CALIB STANDHYD     0457  1  5.0    2.76     .18  1.92  10.73  .43    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0456 + 0457]  0458  3  5.0    5.97     .39  1.92  10.73  n/a    .000
*
  *   CALIB STANDHYD     0463  1  5.0     .70     .09  1.92  17.79  .71    .000
      [I%=72.0:S%= 2.00]
*
      ADD [0458 + 0463]  0464  3  5.0    6.67     .47  1.92  11.47  n/a    .000
*
  *   CALIB STANDHYD     0465  1  5.0     .83     .06  1.92  10.72  .43    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0464 + 0465]  0466  3  5.0    7.50     .53  1.92  11.39  n/a    .000
*
      RESRVR [ 2 : 0466] 0468  1  5.0    7.50     .00  4.08  10.79  n/a    .000
      (ST=   .08 ha.m )
*
  *   CALIB STANDHYD     0467  1  5.0     .52     .05  1.92  13.37  .54    .000
      [I%=52.0:S%= 2.00]
*
      ADD [0468 + 0467]  0469  3  5.0    8.02     .05  1.92  10.96  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                  12.0
      [ Ptot= 33.30 mm ]
      fname : C:\Documents and Settings\jash\Desktop\Project Files\304844 - Simcoe Estates\STORMS\orchi2-4.stm
      remark: * Orillia Chicago 2 Year, 4 Hour Storm
*
   *  CALIB STANDHYD      0403  1  5.0    1.45     .08  2.00  11.95  .36    .000
      [I%=25.0:S%= 2.00]
*
   *  CALIB STANDHYD      0405  1  5.0     .43     .03  2.00  13.30  .40    .000
      [I%=30.0:S%= 2.00]
*
      ADD [0403 + 0405]   0415  3  5.0    1.88     .10  2.00  12.26  n/a    .000
*
   *  CALIB STANDHYD      0433  1  5.0     .94     .07  2.00  17.93  .54    .000
      [I%=40.0:S%= 2.00]
*
   *  CALIB STANDHYD      0426  1  5.0    1.82     .14  2.00  17.93  .54    .000
      [I%=40.0:S%= 2.00]
*
   *  CALIB STANDHYD      0427  1  5.0     .79     .06  2.00  17.92  .54    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0426 + 0427]   0428  3  5.0    2.61     .20  2.00  17.93  n/a    .000
*
   *  CALIB STANDHYD      0429  1  5.0     .37     .03  2.00  17.91  .54    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0428 + 0429]   0430  3  5.0    2.98     .23  2.00  17.93  n/a    .000
*
   *  CALIB STANDHYD      0431  1  5.0     .47     .04  2.00  17.92  .54    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0430 + 0431]   0432  3  5.0    3.45     .27  2.00  17.92  n/a    .000
*
      ADD [0433 + 0432]   0434  3  5.0    4.39     .34  2.00  17.92  n/a    .000
*
   *  CALIB STANDHYD      0442  1  5.0     .54     .04  2.00  17.91  .54    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0434 + 0442]   0443  3  5.0    4.93     .38  2.00  17.92  n/a    .000
*
   *  CALIB STANDHYD      0448  1  5.0     .46     .08  2.00  29.90  .90    .000
      [I%=90.0:S%= 2.00]
*
      ADD [0443 + 0448]   0449  3  5.0    5.39     .46  2.00  18.95  n/a    .000
*
   *  CALIB STANDHYD      0435  1  5.0    1.16     .09  2.00  17.93  .54    .000
      [I%=40.0:S%= 2.00]
*
   *  CALIB STANDHYD      0436  1  5.0     .58     .05  2.00  17.92  .54    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0435 + 0436]   0437  3  5.0    1.74     .13  2.00  17.92  n/a    .000
*
   *  CALIB STANDHYD      0438  1  5.0     .66     .05  2.00  17.92  .54    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0437 + 0438]   0439  3  5.0    2.40     .19  2.00  17.92  n/a    .000
*
   *  CALIB STANDHYD      0440  1  5.0     .37     .03  2.00  17.91  .54    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0439 + 0440]   0441  3  5.0    2.77     .21  2.00  17.92  n/a    .000
*
   *  CALIB STANDHYD      0444  1  5.0    1.19     .09  2.00  17.93  .54    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0441 + 0444]   0445  3  5.0    3.96     .31  2.00  17.92  n/a    .000
*
   *  CALIB STANDHYD      0460  1  5.0     .65     .10  2.00  27.96  .84    .000
      [I%=84.0:S%= 2.00]
*
      ADD [0445 + 0460]   0451  3  5.0    4.61     .41  2.00  19.34  n/a    .000
*
   *  CALIB STANDHYD      0462  1  5.0     .46     .04  2.00  16.01  .48    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0451 + 0462]   0461  3  5.0    5.07     .45  2.00  19.04  n/a    .000
*
      ADD [0449 + 0461]   0452  3  5.0   10.46     .90  2.00  18.99  n/a    .000
*
```

```
*
      ADD [0451 + 0462]  0461  3  5.0    5.07    1.00  2.00  43.07  n/a    .000
*
      ADD [0449 + 0461]  0452  3  5.0   10.46    2.00  2.00  42.89  n/a    .000
*
      RESRVR [ 2 : 0452] 0447  1  5.0   10.46     .09  3.92  42.66  n/a    .000
      {ST=   .39 ha.m }
*
   *  CALIB NASHYD       0420  1  5.0    9.32     .34  2.92  26.44  .42    .000
      [CN=80.7        ]
      [ N = 3.0:Tp  .85]
*
      ADD [0447 + 0420]  0453  3  5.0   19.78     .42  2.92  35.02  n/a    .000
*
   *  CALIB STANDHYD     0454  1  5.0    1.34     .31  2.00  40.05  .63    .000
      [I%=40.0:S%= 2.00]
*
   *  CALIB STANDHYD     0455  1  5.0    1.87     .43  2.00  40.05  .63    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0454 + 0455]  0456  3  5.0    3.21     .74  2.00  40.05  n/a    .000
*
   *  CALIB STANDHYD     0457  1  5.0    2.76     .63  2.00  40.05  .63    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0456 + 0457]  0458  3  5.0    5.97    1.37  2.00  40.05  n/a    .000
*
   *  CALIB STANDHYD     0463  1  5.0     .70     .21  2.00  51.98  .82    .000
      [I%=72.0:S%= 2.00]
*
      ADD [0458 + 0463]  0464  3  5.0    6.67    1.58  2.00  41.30  n/a    .000
*
   *  CALIB STANDHYD     0465  1  5.0     .83     .19  2.00  40.05  .63    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0464 + 0465]  0466  3  5.0    7.50    1.77  2.00  41.16  n/a    .000
*
      RESRVR [ 2 : 0466] 0468  1  5.0    7.50     .18  2.58  40.44  n/a    .000
      {ST=   .25 ha.m }
*
   *  CALIB STANDHYD     0467  1  5.0     .52     .13  2.00  44.52  .70    .000
      [I%=52.0:S%= 2.00]
*
      ADD [0468 + 0467]  0469  3  5.0    8.02     .20  2.42  40.70  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                 12.0
      [ Ptot= 78.51 mm ]
      fname : C:\Documents and Settings\jash\Desktop\Project Files\304844 - Simcoe Estates\STORMS\orchi100.stm
      remark: *Orillia Chicago 100 Year, 4 Hour Storm
*
   *  CALIB STANDHYD     0403  1  5.0    1.45     .41  2.00  47.59  .61    .000
      [I%=25.0:S%= 2.00]
*
   *  CALIB STANDHYD     0405  1  5.0     .43     .13  2.00  49.58  .63    .000
      [I%=30.0:S%= 2.00]
*
      ADD [0403 + 0405]  0415  3  5.0    1.88     .53  2.00  48.04  n/a    .000
*
   *  CALIB STANDHYD     0433  1  5.0     .94     .23  2.00  53.99  .69    .000
      [I%=40.0:S%= 2.00]
*
   *  CALIB STANDHYD     0426  1  5.0    1.82     .45  2.00  53.99  .69    .000
      [I%=40.0:S%= 2.00]
*
   *  CALIB STANDHYD     0427  1  5.0     .79     .20  2.00  53.99  .69    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0426 + 0427]  0428  3  5.0    2.61     .64  2.00  53.99  n/a    .000
*
   *  CALIB STANDHYD     0429  1  5.0     .37     .09  2.00  53.98  .69    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0428 + 0429]  0430  3  5.0    2.98     .74  2.00  53.99  n/a    .000
*
   *  CALIB STANDHYD     0431  1  5.0     .47     .12  2.00  53.98  .69    .000
      [I%=40.0:S%= 2.00]
```

```
*
     ADD [0430 + 0431]  0432  3  5.0    3.45     .85  2.00  53.99  n/a    .000
*
     ADD [0433 + 0432]  0434  3  5.0    4.39    1.09  2.00  53.99  n/a    .000
*
  *  CALIB STANDHYD     0442  1  5.0     .54     .13  2.00  53.98  .69    .000
     [I%=40.0:S%= 2.00]
*
     ADD [0434 + 0442]  0443  3  5.0    4.93    1.22  2.00  53.99  n/a    .000
*
  *  CALIB STANDHYD     0448  1  5.0     .46     .18  2.00  73.59  .94    .000
     [I%=90.0:S%= 2.00]
*
     ADD [0443 + 0448]  0449  3  5.0    5.39    1.40  2.00  55.66  n/a    .000
*
  *  CALIB STANDHYD     0435  1  5.0    1.16     .29  2.00  53.99  .69    .000
     [I%=40.0:S%= 2.00]
*
  *  CALIB STANDHYD     0436  1  5.0     .58     .14  2.00  53.99  .69    .000
     [I%=40.0:S%= 2.00]
*
     ADD [0435 + 0436]  0437  3  5.0    1.74     .43  2.00  53.99  n/a    .000
*
  *  CALIB STANDHYD     0438  1  5.0     .66     .16  2.00  53.99  .69    .000
     [I%=40.0:S%= 2.00]
*
     ADD [0437 + 0438]  0439  3  5.0    2.40     .60  2.00  53.99  n/a    .000
*
  *  CALIB STANDHYD     0440  1  5.0     .37     .09  2.00  53.98  .69    .000
     [I%=40.0:S%= 2.00]
*
     ADD [0439 + 0440]  0441  3  5.0    2.77     .69  2.00  53.99  n/a    .000
*
  *  CALIB STANDHYD     0444  1  5.0    1.19     .29  2.00  53.99  .69    .000
     [I%=40.0:S%= 2.00]
*
     ADD [0441 + 0444]  0445  3  5.0    3.96     .98  2.00  53.99  n/a    .000
*
  *  CALIB STANDHYD     0460  1  5.0     .65     .26  2.00  71.13  .91    .000
     [I%=84.0:S%= 2.00]
*
     ADD [0445 + 0460]  0451  3  5.0    4.61    1.24  2.00  56.40  n/a    .000
*
  *  CALIB STANDHYD     0462  1  5.0     .46     .14  2.00  53.57  .68    .000
     [I%=40.0:S%= 2.00]
*
     ADD [0451 + 0462]  0461  3  5.0    5.07    1.38  2.00  56.15  n/a    .000
*
     ADD [0449 + 0461]  0452  3  5.0   10.46    2.78  2.00  55.90  n/a    .000
*
     RESRVR [ 2 : 0452] 0447  1  5.0   10.46     .13  3.50  55.66  n/a    .000
     {ST=    .50 ha.m }
*
  *  CALIB NASHYD       0420  1  5.0    9.32     .49  2.92  37.88  .48    .000
     [CN=80.7          ]
     [ N = 3.0:Tp  .85]
*
     ADD [0447 + 0420]  0453  3  5.0   19.78     .59  2.92  47.28  n/a    .000
*
  *  CALIB STANDHYD     0454  1  5.0    1.34     .41  2.00  53.57  .68    .000
     [I%=40.0:S%= 2.00]
*
  *  CALIB STANDHYD     0455  1  5.0    1.87     .57  2.00  53.57  .68    .000
     [I%=40.0:S%= 2.00]
*
     ADD [0454 + 0455]  0456  3  5.0    3.21     .98  2.00  53.57  n/a    .000
*
  *  CALIB STANDHYD     0457  1  5.0    2.76     .83  2.00  53.57  .68    .000
     [I%=40.0:S%= 2.00]
*
     ADD [0456 + 0457]  0458  3  5.0    5.97    1.80  2.00  53.57  n/a    .000
*
  *  CALIB STANDHYD     0463  1  5.0     .70     .26  2.00  66.34  .84    .000
     [I%=72.0:S%= 2.00]
*
     ADD [0458 + 0463]  0464  3  5.0    6.67    2.06  2.00  54.91  n/a    .000
*
  *  CALIB STANDHYD     0465  1  5.0     .83     .26  2.00  53.57  .68    .000
     [I%=40.0:S%= 2.00]
*
     ADD [0464 + 0465]  0466  3  5.0    7.50    2.32  2.00  54.76  n/a    .000
*
     RESRVR [ 2 : 0466] 0468  1  5.0    7.50     .29  2.50  54.03  n/a    .000
     {ST=    .32 ha.m }
*
```

```
*   CALIB STANDHYD     0467  1  5.0      .52      .17  2.00   58.36  .74     .000
     [I%=52.0:S%= 2.00]
*
     ADD [0468 + 0467]  0469  3  5.0     8.02      .32  2.42   54.31  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                 12.0
     [ Ptot=193.00 mm ]
     fname : C:\Documents and Settings\jash\Desktop\Project Files\304844 - Simcoe Estates\STORMS\TIMMINS.12
     remark: TIMMINS REGIONAL 12 HOUR DURATION STORM
*
*    CALIB STANDHYD     0403  1  5.0     1.45      .15  7.00  115.90  .60     .000
     [I%=25.0:S%= 2.00]
*
*    CALIB STANDHYD     0405  1  5.0      .43      .04  7.00  120.97  .63     .000
     [I%=30.0:S%= 2.00]
*
     ADD [0403 + 0405]  0415  3  5.0     1.88      .19  7.00  117.06  n/a     .000
*
*    CALIB STANDHYD     0433  1  5.0      .94      .10  7.00  159.79  .83     .000
     [I%=40.0:S%= 2.00]
*
*    CALIB STANDHYD     0426  1  5.0     1.82      .19  7.00  159.79  .83     .000
     [I%=40.0:S%= 2.00]
*
*    CALIB STANDHYD     0427  1  5.0      .79      .08  7.00  159.78  .83     .000
     [I%=40.0:S%= 2.00]
*
     ADD [0426 + 0427]  0428  3  5.0     2.61      .28  7.00  159.79  n/a     .000
*
*    CALIB STANDHYD     0429  1  5.0      .37      .04  7.00  159.78  .83     .000
     [I%=40.0:S%= 2.00]
*
     ADD [0428 + 0429]  0430  3  5.0     2.98      .32  7.00  159.78  n/a     .000
*
*    CALIB STANDHYD     0431  1  5.0      .47      .05  7.00  159.77  .83     .000
     [I%=40.0:S%= 2.00]
*
     ADD [0430 + 0431]  0432  3  5.0     3.45      .37  7.00  159.78  n/a     .000
*
     ADD [0433 + 0432]  0434  3  5.0     4.39      .47  7.00  159.78  n/a     .000
*
*    CALIB STANDHYD     0442  1  5.0      .54      .06  7.00  159.78  .83     .000
     [I%=40.0:S%= 2.00]
*
     ADD [0434 + 0442]  0443  3  5.0     4.93      .53  7.00  159.78  n/a     .000
*
*    CALIB STANDHYD     0448  1  5.0      .46      .05  7.00  186.62  .97     .000
     [I%=90.0:S%= 2.00]
*
     ADD [0443 + 0448]  0449  3  5.0     5.39      .58  7.00  162.07  n/a     .000
*
*    CALIB STANDHYD     0435  1  5.0     1.16      .12  7.00  159.79  .83     .000
     [I%=40.0:S%= 2.00]
*
*    CALIB STANDHYD     0436  1  5.0      .58      .06  7.00  159.78  .83     .000
     [I%=40.0:S%= 2.00]
*
     ADD [0435 + 0436]  0437  3  5.0     1.74      .19  7.00  159.78  n/a     .000
*
*    CALIB STANDHYD     0438  1  5.0      .66      .07  7.00  159.78  .83     .000
     [I%=40.0:S%= 2.00]
*
     ADD [0437 + 0438]  0439  3  5.0     2.40      .26  7.00  159.78  n/a     .000
*
*    CALIB STANDHYD     0440  1  5.0      .37      .04  7.00  159.78  .83     .000
     [I%=40.0:S%= 2.00]
*
     ADD [0439 + 0440]  0441  3  5.0     2.77      .30  7.00  159.78  n/a     .000
*
*    CALIB STANDHYD     0444  1  5.0     1.19      .13  7.00  159.79  .83     .000
     [I%=40.0:S%= 2.00]
*
     ADD [0441 + 0444]  0445  3  5.0     3.96      .42  7.00  159.78  n/a     .000
*
*    CALIB STANDHYD     0460  1  5.0      .65      .08  7.00  175.76  .91     .000
     [I%=84.0:S%= 2.00]
```

```
*
      ADD [0445 + 0460]  0451  3  5.0    4.61     .50  7.00 162.04  n/a    .000
*
   *  CALIB STANDHYD     0462  1  5.0     .46     .05  7.00 131.11  .68    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0451 + 0462]  0461  3  5.0    5.07     .55  7.00 159.23  n/a    .000
*
      ADD [0449 + 0461]  0452  3  5.0   10.46    1.13  7.00 160.70  n/a    .000
*
      RESRVR [ 2 : 0452] 0447  1  5.0   10.46     .80  7.17 160.46  n/a    .000
      (ST=    .65 ha.m )
*
   *  CALIB NASHYD       0420  1  5.0    9.32     .68  7.50 139.27  .72    .000
      [CN=80.7          ]
      [ N = 3.0:Tp  .85]
*
      ADD [0447 + 0420]  0453  3  5.0   19.78    1.44  7.25 150.47  n/a    .000
*
   *  CALIB STANDHYD     0454  1  5.0    1.34     .14  7.00 131.12  .68    .000
      [I%=40.0:S%= 2.00]
*
   *  CALIB STANDHYD     0455  1  5.0    1.87     .20  7.00 131.12  .68    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0454 + 0455]  0456  3  5.0    3.21     .34  7.00 131.12  n/a    .000
*
   *  CALIB STANDHYD     0457  1  5.0    2.76     .29  7.00 131.12  .68    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0456 + 0457]  0458  3  5.0    5.97     .63  7.00 131.12  n/a    .000
*
   *  CALIB STANDHYD     0463  1  5.0     .70     .08  7.00 163.58  .85    .000
      [I%=72.0:S%= 2.00]
*
      ADD [0458 + 0463]  0464  3  5.0    6.67     .71  7.00 134.53  n/a    .000
*
   *  CALIB STANDHYD     0465  1  5.0     .83     .09  7.00 131.12  .68    .000
      [I%=40.0:S%= 2.00]
*
      ADD [0464 + 0465]  0466  3  5.0    7.50     .80  7.00 134.15  n/a    .000
*
      RESRVR [ 2 : 0466] 0468  1  5.0    7.50     .42  7.42 133.28  n/a    .000
      (ST=    .40 ha.m )
*
   *  CALIB STANDHYD     0467  1  5.0     .52     .06  7.00 143.28  .74    .000
      [I%=52.0:S%= 2.00]
*
      ADD [0468 + 0467]  0469  3  5.0    8.02     .45  7.25 133.93  n/a    .000
*
 FINISH
```

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