# PRELIMINARY SERVICING &
# STORMWATER MANAGEMENT REPORT
# CITYVIEW RIDGE SUBDIVISION
# CITY OF GUELPH
# REVISED: June 22, 2017

GAMSBY AND MANNEROW LIMITED
PEOPLE ENGINEERING ENVIRONMENTS
GUELPH – OWEN SOUND – LISTOWEL – KITCHENER – EXETER

Revised: June 2017
Our File: 105-172

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**STORMWATER MANAGEMENT REPORT**
**CITYVIEW RIDGE SUBDIVISION**
**CITY OF GUELPH**
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## 1.0 INTRODUCTION

In support of the Draft Plan of Subdivision Application for Part of Lot 4, Concession 3, Division 'C' (Geographic Township of Guelph) and Part of Lots 30, 32 & 33 and all of Lot 34, Registered Plan 53 (Division 'C' – Geographic Township of Guelph), in the City of Guelph herein after referred to as Cityview Ridge Subdivision, Gamsby and Mannerow Limited has prepared this revised report to address the preliminary servicing and stormwater management requirements for the site and to address the comments provided by the City of Guelph (dated September 18, 2015 and December 9, 2015).

The servicing and stormwater management techniques for the Cityview Ridge Subdivision were derived from the recommendations presented in the following reports:

- Final Stormwater Management Design Report for the Southern Hadati Creek Watershed prepared by Schaeffus Consulting Engineers (May 1997).
- Stormwater Management Design Report Draft Plan 23T-96501 and 23T-99501 Martini/Valeriote Subdivision prepared by Gamsby and Mannerow Limited (March 2004).
- Clythe Creek Subwatershed Overview prepared by Ecologistics Limited (January 1998).
- Eastview Secondary Plan and Addendum prepared by Cosburn Patterson Wardman Limited (1991 and 1992).
- Environmental Impact Study prepared by North-South Environmental Inc. (February 2012).
- Hydrogeological Investigation prepared by Banks Groundwater Engineering Limited (February 2012).
- Geotechnical Investigation prepared by Naylor Engineering Associates Limited (February 2012)

Together, these reports form the overview for the development of these lands.

## 2.0 LOCATION

Figure 1 shows the location of the Cityview Ridge Subdivision and the surrounding area. The site is bound by future development lands to the north, Watson Parkway to the east, CN Railway lands to the south and existing residential development (Valleyhaven Subdivision Phase 3) to the west.

# PRELIMINARY SERVICING AND STORMWATER MANAGEMENT REPORT
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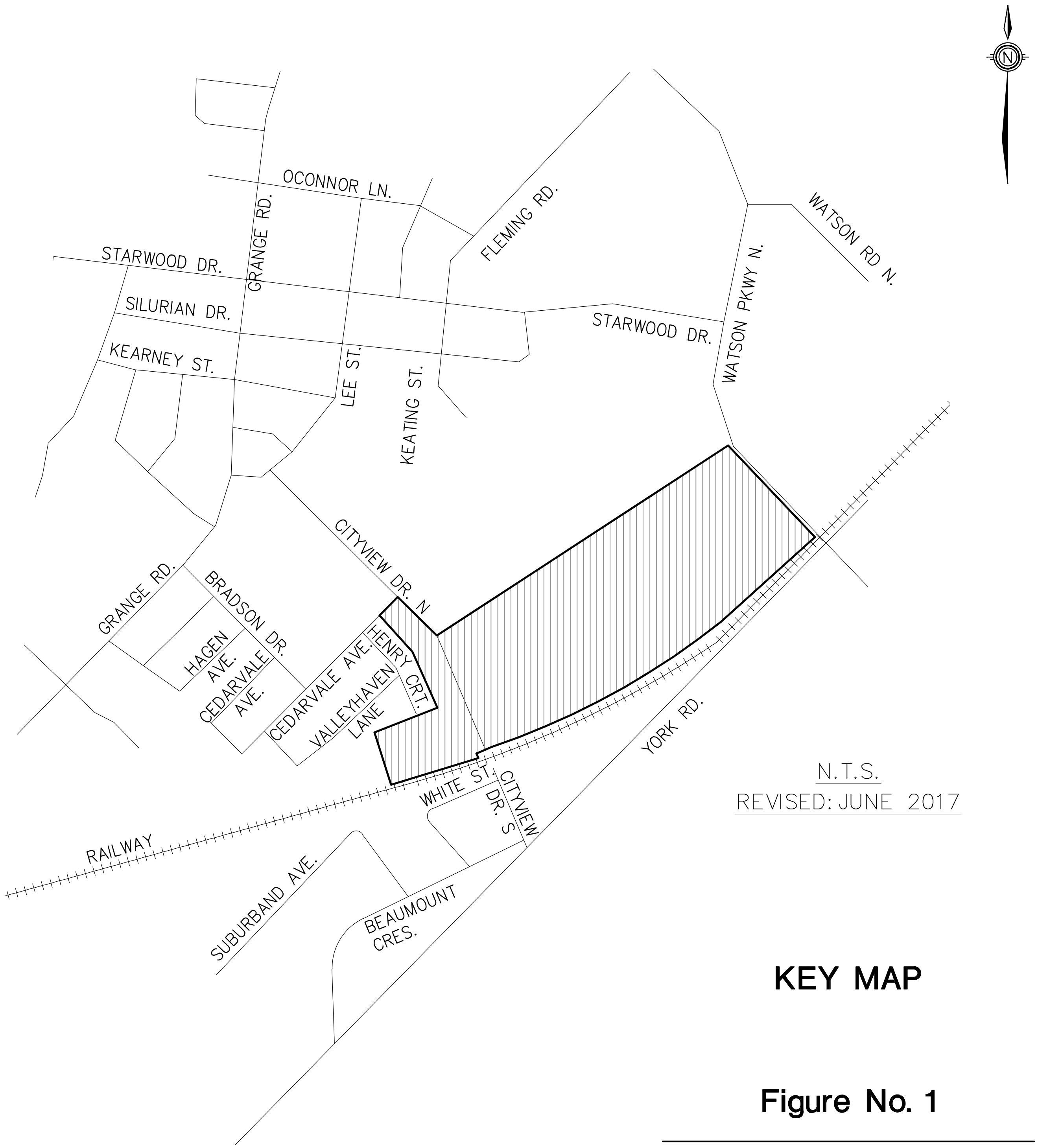


## KEY MAP

## Figure No. 1

Gamsby and Mannerow
ENGINEERS

Plotted On: June 22, 2017 105172–FIG1.dwg

# 3.0 EXISTING CONDITIONS

## 3.1 LAND USE

The existing land use on the site is vacant field and existing residential. Previously a portion of the site (east of Cityview Drive) was utilized as a Christmas tree farm with the remaining Christmas trees being harvested in 2006. The site has also been used as a borrow site for fill material in the past.

The lands to the north are currently vacant fields and are expected to be developed for residential purposes in the future. The lands to the east including Watson Parkway, are zoned to permit future commercial development. The lands to the south of the CN Railway lands have been developed for residential/commercial/industrial use. The lands to the west have been developed for residential use and include the Valleyhaven Subdivision Phase 3.

## 3.2 TOPOGRAPHY

The westerly portion of the site, west of Cityview Drive, generally drains in an east to west direction towards Hadati Creek. The average gradient across the westerly portion of the site ranges from 3.0% to 12.0%. The central portion of the site, east of Cityview Drive, generally drains in a west to southeast direction towards the low lying area and Clythe Creek. The average gradient across the central portion of the site, which includes the slope of the drumlin, ranges from 3.0% to 20.0%. The eastern portion of the site, adjacent to Watson Parkway, generally drains in an east to southwest direction towards the low lying area and Clythe Creek. The average gradient across this portion of the site ranges from 2.0% to 12.0%.

Under existing conditions there are two recognized historical drainage patterns through the site. The first is a former watercourse in the east of the site which runs north to south. This feature is identified in Figure 2 of Addendum #3 to the 2012 EIS by North-South Environmental Inc. During inspection of the watercourse in October 2016 by North-South Environmental Inc., there was evidence of surface runoff in the downstream end of the watercourse. This is not currently a recognized watercourse by the GRCA.

The historical drainage pattern is a drainage swale which runs through the middle of the site from the northwest to the southeast. During the preparation of the 2012 EIS by North-South Environmental Inc., this was not a recognized drainage pattern and no flows had ever been recorded in this area. Upon site inspection by North-South Environmental Inc., there was no evidence of a eroded channel in the area, until exiting the site area. Outside of the site, erosion has taken place and formed a channel which eventually discharges to Clythe Creek.

There currently exists a roadside ditch along Cityview drive which under existing conveys flows from the road, just to the north of the site, and the southwest corner of the site. This drainage ditch ultimately discharges to Clythe Creek via a culvert under the railroad tracks and a sewer which conveys flows under York Road. Under existing conditions a silt fence has been installed in the southwest corner of the site to discourage sediments from entering the drainage ditch and ultimately Clythe Creek. Currently flows are directed to a low point along the silt fence, where the silt fence has broken and sediment laden flows are free flowing into the roadside ditch.

## 3.3 SOILS

The predominant surface soil type on the site is Guelph Loam (Soil Survey of Wellington County Report No. 35). Guelph Loam has a hydrologic soil classification of BC and generally has good drainage characteristics.

The Geotechnical Investigation by Naylor Engineering Associates Limited (February 2012) established the characteristics of the underlying soils for the lands on the east side of Cityview Drive. The boreholes identified the underlying soils as topsoil overlying silt tills for the majority of the property and as topsoil overlying sand and gravel for the low lying easterly portions of the site. The results of the geotechnical investigation are included in Appendix ‘A’.

As part of the Geotechnical Investigation, groundwater observation wells were installed. Groundwater measurements have been collected from 2006 to the present to establish seasonably high groundwater elevations. From the groundwater measurements and the Geotechnical Investigation, the seasonably high groundwater level is estimated to range from 0.10 metres to 6.70 metres below ground surface.

Therefore, based on the underlying soils, the practical opportunities for recharge will be limited after the development has been built. The results of the groundwater measurements are attached in Appendix ‘C’.

# 4.0 PROPOSED DEVELOPMENT

The Draft Plan of Subdivision prepared by Black Shoemaker Robinson & Donaldson Limited (November 6, 2014) (Figure 2) illustrates the proposed lot fabric and road network. Cityview Drive will serve as the main connection and access point for this development. Access to the apartment block on the easterly half of the development will be provided by Watson Parkway.

## 4.1 SITE GRADING

The site layout and internal roads are shown on the Preliminary Grading and Drainage Plans (Gamsby and Mannerow Limited Drawing No. 1, 2 and 3). The grade and elevation of the streets are controlled by the elevation of Cityview Drive and the major overland flow route to the existing municipal stormwater management facility and proposed stormwater management facility.

The site has been graded to match the existing elevations along the property limits of the future development lands to the north and the CN Railway lands to the south. A portion of the site adjacent to Watson Parkway has been graded to allow for future development as an apartment block.

Under post-development conditions the former watercourse in the east of the site which runs north to south is to remain unchanged. This surface drainage feature is within the identified Natural Heritage System and is not within 100m of the closest lot line.

Under post-development conditions, the drainage swale which runs through the middle of the site from the northwest to the southeast will be removed. Surface runoff which may have discharged to this drainage swale will be routed to the stormwater management system, via the on-site storm sewers, ultimately discharging to the proposed energy dissipation structure prior to discharging to Clythe Creek.

Prior to construction, it is our recommendation that a hickenbottom be constructed at the culvert under the railroad tracks. The silt fence which is currently installed at the southwest corner of the site has failed and allows sediments to flow freely into the roadside ditch. Along with sediments from the site, sediments from the road are not stopped from flowing into Clythe Creek. A hickenbottom installed at the north end of the culvert under the railroad tracks will not disrupt the flows in the roadside ditch generated by the road and the southwest portion of the site, and will stop the flows of sediments from the road and site from discharging into Clythe Creek.

## 4.2 STREETS

All streets will be constructed with a minimum slope of 0.5% to a maximum slope of 6.0%. An urban road cross-section with concrete curb and gutter will be used along all streets.

Street Nos. 1, 2, 3, and 4 have an 18.0 metre right-of-way width.

Cityview Drive has a 20.0 metre right-of-way.

The extension of the cul-de-sac on Henry Court has an 18.5 metre radius.

Concrete sidewalks, with a width of 1.5 metres, will be constructed along both sides of each street.

# PRELIMINARY SERVICING AND STORMWATER MANAGEMENT REPORT
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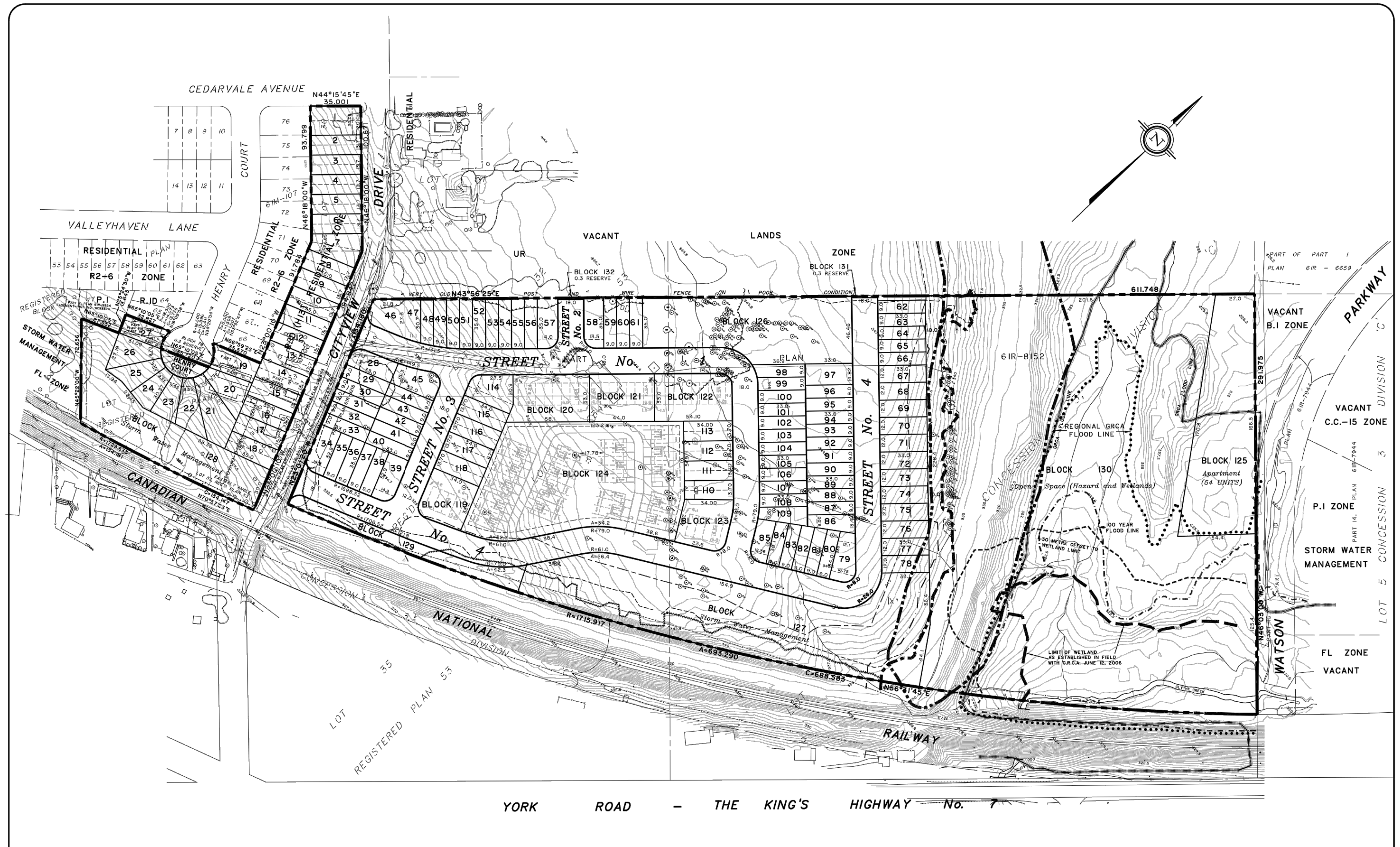


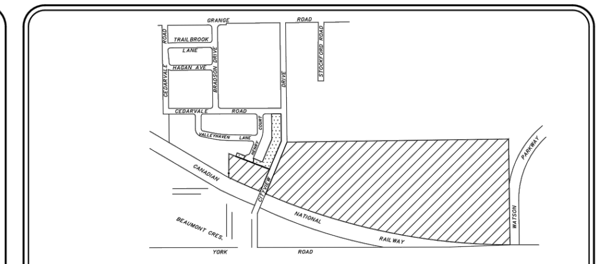


LANDS OF CITYVIEW RIDGE DEVELOPMENTS INC.

LANDS OF CARSON REID HOMES LTD.

KEY PLAN N.T.S.

LEGEND:

- REGIONAL GRCA FLOOD LINE
- GRCA DEFINED STEEP SLOPE
- LIMIT OF CULTURAL PLANTATION, MARCH, 2009
- 10m OFFSET TO CULTURAL PLANTATION
- LIMIT OF HEDGEROW MARCH, 2009
- LIMIT OF WETLAND AS ESTABLISHED IN FIELD WITH G.R.C.A. JUNE 12, 2006
- 30 METRE OFFSET TO WETLAND LIMIT

LAND USE SCHEDULE

| | | | |
|---|---|---|---|
| SINGLE FAMILY RESIDENTIAL | LOTS 19–109 | 91 UNITS | 3.228 HA. |
| SEMI-DETACHED RESIDENTIAL | LOTS 1–18 & 110–118 | 54 UNITS | 1.339 HA. |
| ON-STREET TOWNHOUSES | BLOCKS 119–123 | 31 UNITS | 0.734 HA. |
| CLUSTER TOWNHOUSES | BLOCK 124 | 37 UNITS | 1.085 HA. |
| APARTMENT | BLOCK 125 | 54 UNITS | 0.680 HA. |
| PARK | BLOCK 126 | | 0.599 HA. |
| STORM WATER MANAGEMENT | BLOCKS 127 & 128 | | 1.896 HA. |
| OPEN SPACE | BLOCKS 129 & 130 | | 6.000 HA. |
| 0.3 RESERVES | BLOCKS 131 & 132 | | 0.001 HA. |
| STREETS | | | 2.122 HA. |
| TOTAL | | 267 UNITS | 17.684 HA. |

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

51 (17) (a) – (c) AS SHOWN
(d) SEE SCHEDULE
(e) – (g) AS SHOWN
(h) MUNICIPAL WATER SUPPLY
(i) BURFORD AND GUELPH LOAM
(j) AS SHOWN
(k) MUNICIPAL STORM AND SANITARY SEWERS
(l) STORM SEWER EASEMENT AS SHOWN

OWNERS CERTIFICATE

WE HEREBY AUTHORIZE BLACK, SHOEMAKER, ROBINSON, AND DONALDSON LIMITED, ONTARIO LAND SURVEYORS, URBAN AND RURAL PLANNERS TO SUBMIT THIS DRAFT PLAN OF PROPOSED SUBDIVISION.

CITYVIEW RIDGE DEVELOPMENTS INC.
AND
CARSON REID HOMES LTD.

CARSON REID

SURVEYOR'S CERTIFICATE

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

KERRY F. HILLIS
ONTARIO LAND SURVEYOR

## CITYVIEW RIDGE
## DRAFT PLAN OF SUBDIVISION

OF PART OF
LOT 4, CONCESSION 3, DIVISION 'C'
(GEOGRAPHIC TOWNSHIP OF GUELPH)
AND PART OF LOTS 30, 32 & 33
AND ALL OF LOT 34, REGISTERED PLAN 53
(DIVISION 'C' – GEOGRAPHIC TOWNSHIP OF GUELPH)
CITY OF GUELPH
COUNTY OF WELLINGTON

SCALE 1 : 1500 (0 30 60 90 120 METRES)

METRIC
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

BLACK, SHOEMAKER, ROBINSON & DONALDSON LIMITED
BSR&D Ontario Land Surveyors Urban and Rural Planners
351 Speedvale Avenue West
Guelph, Ontario N1H 1C6
WWW.BSRD.COM
TEL: (519) 822-4031
FAX: (519) 822-1220

DATE: NOVEMBER 6, 2014
DRAWN BY: KS
PROJECT 05-6590-44-3

N.T.S.
REVISED: JUNE 2017

## DRAFT PLAN OF SUBDIVISION

Figure No. 2

Gamsby and Mannerow ENGINEERS

Plotted On: June 22, 2017 105172-FIG2.dwg

### 4.3 WATER SUPPLY

As part of the municipal servicing of the Valleyhaven Subdivision Phase 3, a 150 mm diameter watermain was terminated at the current limits of Henry Court and a 150 mm diameter watermain stub was extended from the 200 mm diameter watermain which crosses the CN Railway lands and terminated within the limits of the existing municipal stormwater management facility. A 200 mm diameter watermain was also terminated at the intersection of Cedarvale Avenue and Cityview Drive as part of these works.

The extension of the existing 150 mm diameter watermain on Henry Court will provide water service to the residential lots fronting on to Henry Court.

The extension of the 200 mm diameter watermain southerly on Cityview Drive from the intersection of Cedarvale Avenue and Cityview Drive will provide water supply to the residential lots fronting onto Cityview Drive.

The extension of the 150 mm diameter watermain from the existing municipal stormwater management facility, parallel to the CN Railway lands to the Cityview Drive right-of-way, along with the extension of the 200 mm diameter watermain southerly on Cityview Drive, will provide a looped watermain connection to service the Cityview Ridge Subdivision lands located on the east side of Cityview Drive. Upon development of the lands located to the north of the Cityview Ridge Subdivision, additional looping of the watermain can be achieved with future connections at Street Nos. 2 and 4.

Water supply for the apartment block located along Watson Parkway will be provided by a connection to the existing 300 mm diameter watermain on Watson Parkway.

### 4.4 SANITARY SEWER

As part of the municipal servicing of the Valleyhaven Subdivision Phase 3, a 200 mm diameter sanitary sewer was terminated at the current limits of Henry Court and a 200 mm diameter sanitary sewer stub was extended across the CN Railway lands and terminated within the limits of the existing municipal stormwater management facility.

The extension of the existing 200 mm diameter sanitary sewer on Henry Court will provide sanitary service to the residential lots fronting on to Henry Court.

Sanitary service for the lots fronting on to Cityview Drive and the remainder of the Cityview Ridge Subdivision (east of Cityview Drive) will be provided by the extension of a 200 mm diameter sanitary sewer from the existing 200 mm diameter sanitary sewer stub located in the existing municipal stormwater management facility, along the CN Railway lands to Cityview Drive.

Sanitary service for the apartment block on the west side of Watson Parkway will be provided by connection to the existing 525 mm diameter sanitary sewer on Watson Parkway.

## 4.5 STORM SEWER

All storm sewers within the Cityview Ridge Subdivision will be sized to accommodate the 5-year design storm event.

The storm sewers on Henry Court will discharge to existing municipal storm sewers, ultimately discharging to the existing municipal stormwater management facility constructed as part of the Valleyhaven Subdivision Phase 3. Storm sewers on the northerly reach of Street No.1, Streets No. 2 and 3, and the westerly reach of Street No. 4 and Cityview Drive will outlet to a stormwater conveyance channel, ultimately discharging to the existing municipal stormwater management facility constructed as part of the Valleyhaven Subdivision Phase 3. The existing municipal stormwater management facility constructed as part of the Valleyhaven Subdivision Phase 3 was designed, approved and constructed to accommodate drainage from the Cityview Ridge Subdivision. The storm sewers along the remainder of Street No. 4 will outlet to the proposed stormwater management facility.

Major storm runoff generated from the extension of Henry Court will be conveyed via the municipal right-of-way, ultimately discharging to the existing municipal stormwater management facility. Major storm runoff from Cityview Drive and the central portion of the site (lands located to the east of Cityview Drive) will be conveyed through the street right-of-ways to the stormwater conveyance channel, ultimately discharging to the existing municipal stormwater management facility constructed as part of the Valleyhaven Subdivision Phase 3. Major storm runoff from the remainder of the development will be conveyed through the street right-of-ways to the proposed stormwater management facility.

The topography of the site will generally allow for sufficient cover on the storm sewer to connect house foundation drains. Where a storm service connection is not possible, foundation drainage will be provided by sump pumps discharging to the grassed side and rear yard surfaces.

## 4.6 STORMWATER MANAGEMENT

Details of the stormwater management plan for the Cityview Ridge Subdivision are discussed in detail in Section 5.0.

## 4.7 SALT MANAGEMENT PLAN

As per the requirements of the City of Guelph, the following Salt management Plan has been developed for the Cityview Ridge Subdivision. Although not in the Region of Waterloo, this plan has been developed using the Region of Waterloo's Curb The Salt and Smart About Salt Program, as these are well respected programs and guidelines for reducing salt usage and minimizing the concentration of salt in infiltration and runoff. A two-stage salt management plan is recommended as per the Region of Waterloo Curb The Salt and Smart About Salt Program. Stage I of the salt management plan will address the ploughing of snow and the application of salt/sand within the limits of the right-of-way by municipal forces. Stage II of the salt management plan will include snow removal and placing of salt on private property by the homeowner.

The recommended best management practices for the removal of snow and application of salt/sand within the limits of the municipal right-of-way (Stage I) include the following:

- Ploughing of snow as required following snowfall events or as directed by the municipality to ensure safe passage for motorists.
- Application of salt/sand immediately following ploughing if required or as directed by the municipality. The application of salt/sand is not mandatory after each snow clearing operation.
- Monitor and document the application of salt/sand on municipal right-of-ways (i.e. frequency, concentration, etc.).
- Storage of all ploughed snow in an area appropriately designated for snow storage to minimize the impact of salt/sand on environmental features and to ensure that surface drainage is maintained. As part of the detailed engineering design, an appropriate snow storage area will be confirmed with the City.

Stage II of the salt management plan, which includes the removal and stockpiling of snow and application of salt/sand on private property, the recommended best management practices are as follows:

- Ploughing or shovelling snow on driveways and sidewalks immediately following a snowfall event to ensure the safe passage of motorists and pedestrians.
- Application of salt/sand immediately following ploughing or shovelling only as required (sand is recommended). The application of salt/sand is not mandatory after each snow clearing operation.
- Storage of all ploughed or shovelled snow in the front yards and boulevard areas (i.e. grassed areas) to a height which will not block the view of motorists and pedestrians and will not impede surface drainage.

As part of the two stage Salt Management Plan, an annual review of the plan shall be conducted by the Owner as a way to incorporate some adaptive strategies for continual improvement and reduction of salt concentrations in runoff and infiltration.

### 4.8 WATER BUDGET

Based on the Canadian Climate Normals for the Guelph Arboretum from 1971-2000, the average annual precipitation, for the area in which the site is located is estimated to be 923.3 mm. The potential for evapotranspiration for this area is estimated to be 555 mm for the drumlin and 495 mm for the low lying easterly portion of the site. Therefore, 368 mm and 428 mm remain available for infiltration and runoff from the drumlin and low lying areas, respectively.

From the Geotechnical Investigation (Naylor Engineering Associated Limited, February 2012), the surficial deposits across the majority of the site are described as silt tills, with sand and gravel across the low lying easterly portion of the site. A copy of the Geotechnical Investigation has been included in Appendix ‘A’. Typically infiltration and runoff in areas mapped as tills is estimated to be 180 mm and 190 mm, respectively. For the low lying easterly portion of the site, the average infiltration and runoff were estimated to be 380 mm and 50 mm, respectively. A copy of the Hydrogeological Investigation prepared by Banks Groundwater Engineering Limited has been included in Appendix ‘D’.

Therefore, based on the annual infiltration rates, as shown on the Monthly Water Balance calculations attached in Appendix ‘G’, the existing annual average groundwater recharge occurring within the 18.28-hectare site is estimated to be 41,003 $m^3$. Under post-development conditions, the annual natural groundwater recharge occurring on-site is estimated to be 23,573 $m^3$. Due to the high silt content in the native soils and the seasonably high groundwater level, infiltration structures cannot be constructed and still achieve the MOECC’s recommended 24 hour draindown and 1 metre separation from the seasonably high groundwater levels.

Under existing conditions the annual average runoff from the site is estimated to be 31,518 $m^3$. As a result of the proposed development the impervious area (rooftop and paved surfaces) of the site increases, the annual potential evapotranspiration for impervious surfaces decreases to 200 mm and the runoff from the site increases. The runoff from the site under post-development conditions is estimated to be 59,944 $m^3$ per year.

Enhanced infiltration can be provided in Block 125 to reduce the difference between existing and post-development condition infiltration volumes. An additional water balance has been provided where existing runoff volumes to the wetland are matched, and the remaining portion of the site which is not needed to discharge to the wetland is infiltrated. This results in an additional 2,161 $m^3$ in runoff volume, bringing the post-development total to 25,734 $m^3$.

The estimated existing and post-development recharge and runoff volumes for the Cityview Ridge Subdivision are detailed in Table 1. The estimations take into account the surficial geology, which is comprised of silt tills in the westerly portion of the site and sand and gravel in the easterly portion. The net recharge values are for the uppermost overburden aquifer.

In summary, the estimated recharge and runoff volume for the Cityview Ridge Subdivision are as follows:

**Table No. 1: Summary of Recharge and Runoff Volume**

| | **Existing Condition** | **Post-Development Condition** | **Percent Change** |
|---|---|---|---|
| Total Estimated Recharge | 41,003 $m^3$ | 25,734 $m^3$ | -37% |
| Total Estimated Runoff | 31,518 $m^3$ | 59,944 $m^3$ | 90% |

To minimize the impact of development on the adjacent lands, the stormwater management system has been designed to provide enhanced water quality treatment and to attenuate the post-development flows to the pre-development level. In addition, discharge from the proposed stormwater management facility will be dispersed over a large broad surface, ultimately sheetflowing overland towards Clythe Creek.

## 5.0 STORMWATER MANAGEMENT PLAN

In line with current practices and guidelines, the stormwater management plan for the Cityview Ridge Subdivision is a "treatment train" to attenuate post-development flows and to remove sediments prior to discharge to both Clythe Creek and Hadati Creek. Enhanced (80% total suspended solids removal) water quality control will be provided by the stormwater management system. Post-development runoff generated from the site will be attenuated to the existing condition level. The "treatment train" will include a combination of lot level, conveyance and end-of-pipe best management practices.

Lot level controls will simply consist of directing roof leaders to grassed rear lot areas and grassed rear lot and side yard swales. Lot level infiltration systems are not feasible due to the high groundwater levels and have not been incorporated into the stormwater management system for the development.

Conveyance controls will include the use a stormwater conveyance channel and oil/grit separator structure to provide quality control treatment for a portion of the runoff discharging from the site, prior to discharge to both Clythe Creek and Hadati Creek.

End-of-pipe controls will be provided by an existing stormwater management facility constructed as part of the Valleyhaven Subdivision Phase 3 (Stormwater Quality Facility No. 2 and Stormwater Quantity Control Facility) and a proposed stormwater management facility.

As part of the overall stormwater management analysis and design for the Valleyhaven Subdivision Phase 3, a stormwater management system consisting of both quality and quantity control facilities was designed, approved and constructed along Hadati Creek upstream of the CN Railway Tracks.

The existing Stormwater Quality Facility No. 2 was designed to provide Basic (MOE, 2003) (Formerly Level 3) quality control treatment for a maximum drainage area of 29.6-hectares (based on a maximum imperviousness coverage of 42%).

The existing Stormwater Quantity Control Facility, consisting of a detention pond located on-line with Hadati Creek, a quantity control berm and an outlet structure connected to the existing CN culvert, was designed to attenuate peak flows from a Catchment area of 72.7-hectares to the release rates recommended in the Eastview Secondary Plan.

Of the 29.6-hectare and 72.7-hectare catchment areas for the existing stormwater management facilities, 11.1-hectares represent the westerly portion of the Cityview Ridge Subdivision. Therefore, quality and quantity control treatment of runoff generated from 11.1-hectares of the Cityview Ridge Subdivision has been accounted for in the design, approval and construction of the existing Quality Facility No. 2 and the existing Quantity Control Facility. The drainage catchments utilized in the design of the existing quality and quantity control facilities are shown on Figure 3.

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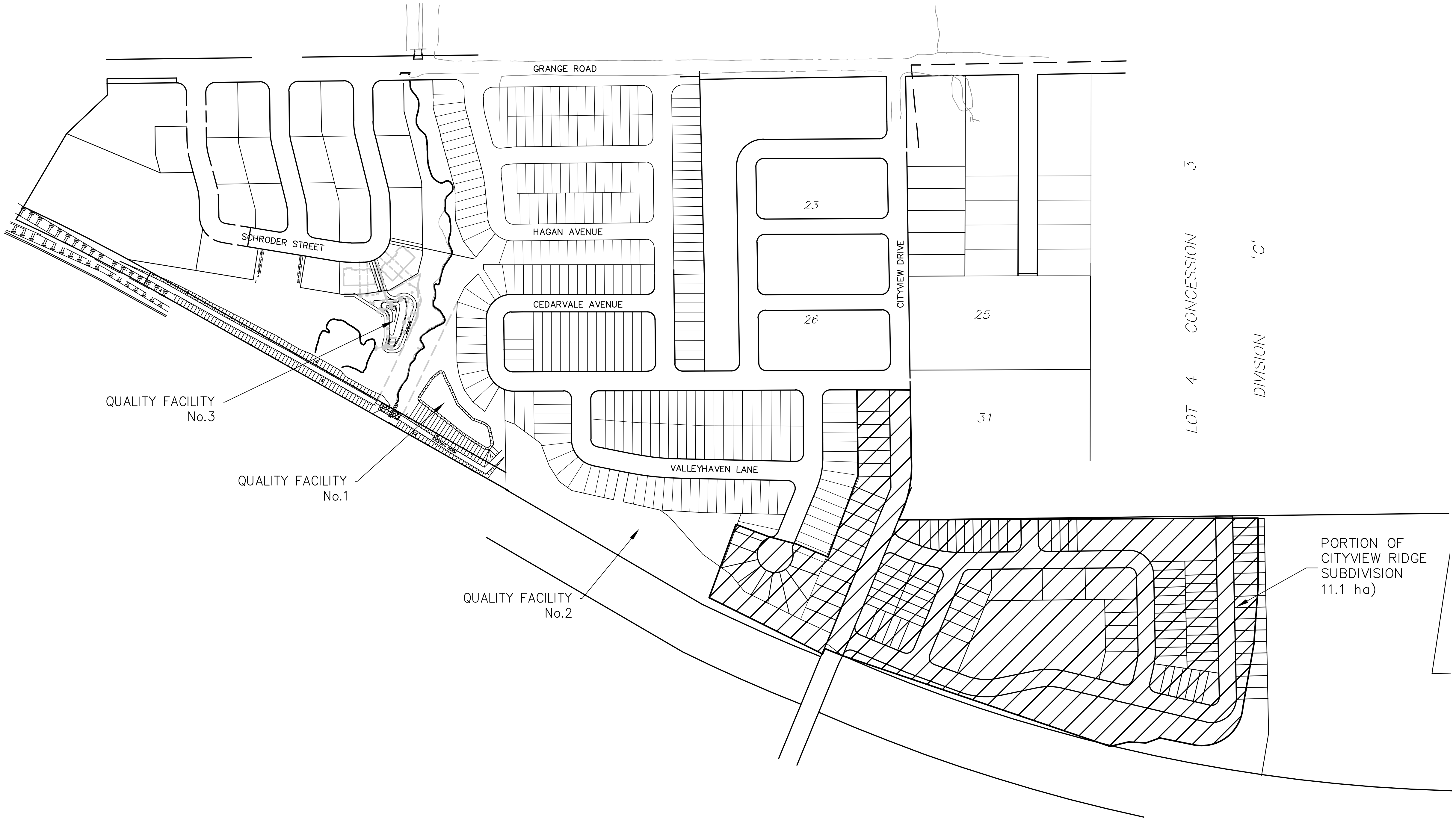


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REVISED: JUNE 2017

## OVERALL DRAINAGE AREAS

**Figure No. 3**

Gamsby and Mannerow
ENGINEERS

To provide quality and quantity control for the runoff generated from the Cityview Ridge Subdivision, while also maintaining the existing drainage patterns discharging to both Hadati Creek and Clythe Creek, runoff generated from the westerly portion of the development (approximately 7.62-hectares), which includes Henry Court and Cityview Drive, will be directed to the existing stormwater management Quality Facility No. 2 constructed as part of the Valleyhaven Subdivision Phase 3.

Runoff generated from the central portion of the development will be directed to the proposed stormwater management facility. The proposed stormwater management facility will attenuate stormwater runoff to the existing condition level prior to discharge to Clythe Creek.

Quality and quantity control for runoff generated from the easterly section of the site, which includes the future apartment block, will be provided by privately owned and operated on-site stormwater management controls. The on-site stormwater management controls will be designed, reviewed and approved as part of the site plan approval process for the development block.

This combination of lot-level, conveyance and end-of-pipe controls will control the release of the runoff from the site.

## 5.1 STORMWATER MANAGEMENT CRITERIA

The studies, policies and guidelines used to develop the stormwater management plan for this development were as follows:

1) Stormwater Management Planning and Design Manual, 2003
2) Design Principles for Stormwater Management Facilities, 1996
3) Eastview Secondary Plan and Addendum, 1991 and 1992
4) The Interim Stormwater Quality Control Guidelines, 1991
5) The Stormwater Quality Best Management Practices Manual, 1991
6) The MTO Drainage Management Technical Guidelines, 1989
7) The Ontario Urban Design Guidelines, 1987

The objectives of the stormwater management plan are as follows:

a) Provide enhanced (80% TSS) quality control by pre-treating the runoff prior to discharge to the receiving outlet.

b) Provide quantity control for a range of design storms.

c) Route the major storm to minimize flood damage to public and private lands.

d) In order to minimize sediment discharge to the wetland and/or lands adjacent to the working area, erosion and sediment control measures shall be incorporated for the entire duration of the contract.

e) Complete a Water Balance Analysis in order to evaluate total system water loss and identify measures to reduce those losses.

The method used to evaluate and design the stormwater management plan was as follows:

The City of Guelph design parameters were used to generate the mass rainfall data required to model the 2, 5, 25 and 100-year design storm events. The Regional Storm has also been modelled. The Chicago parameters and the total depth of rainfall for each storm are as follows:

**Table No. 2: Chicago Rainfall Parameters**

| | 2 Year | 5 Year | 25 Year | 100 Year |
|---|---|---|---|---|
| a = | 743.00 | 1,593.00 | 3,158.00 | 4,688.00 |
| b = | 6.000 | 11.000 | 15.000 | 17.000 |
| c = | 0.799 | 0.879 | 0.936 | 0.962 |
| r = | 0.400 | 0.400 | 0.400 | 0.400 |
| td = | 170.00 | 170.00 | 210.00 | 210.00 |
| Rainfall depth (mm) | 33.816 | 46.775 | 69.476 | 88.830 |

The Horton Infiltration method was used I n the post-development runoff calculations. The parameters used in the MIDUSS modelling are given in Table No. 3.

**Table No. 3: Horton Infiltration Parameters**

| | Impervious Areas | Pervious Areas |
|---|---|---|
| Maximum Infiltration | 0.0 mm/hr | 75.0 mm/hr |
| Minimum Infiltration | 0.0 mm/hr | 12.5 mm/hr |
| Lag Constant | 0.05 mm/hr | 0.25 mm/hr |
| Depression Storage | 1.5 mm | 5.00 mm |

## 5.2 STORMWATER MANAGEMENT DESIGN

As part of the stormwater management system, a “treatment train” to remove sediments and thereby any absorbed contaminants prior to discharging to Hadati Creek and Clythe Creek will be provided. The “treatment train” will include lot level, conveyance and end-of-pipe management practices.

The best management practices (BMP’s) in the Stormwater Management Planning and Design Manual (2003) were screened. Those found to be applicable to this development are discussed in the following sections.

### 5.2.1 LOT LEVEL CONTROLS

Stormwater management practices recommended to provide lot level control on this site are as follows:

**a) Roof Drainage to Ground Surface**

The driveways and front yards will drain to the street. The roof and rear yard will generally drain to the rear of the lot.

The roof runoff will be filtered across the grassed surface and some will infiltrate. The runoff for any event large enough to generate flow to the swale system will be adequately filtered by the grass enroute.

**b) Rear Yard Swales**

The lots will be graded to current City of Guelph Standards. Where practical, the length of the rear lot swales between catch basins will be increased to extend the contact time with the grassed surfaces.

To promote infiltration on the lots and in the swales, it is recommended that the average depth of graded topsoil be 300 mm.

**c) Lot Level Infiltration Systems**

The Stormwater Management Practices and Planning Manual (2003), recommends that infiltration structures be installed in soils having a hydraulic conductivity greater than or equal to 15 mm/hour ($4.2 \times 10^{-4}$ cm/s) and where a 1 metre minimum separation from the seasonally high groundwater level can be provided.

The soils on the site have high silt content and thus a low hydraulic conductivity, estimated to be in the order of $1 \times 10^{-4}$ cm/s. Seasonally high groundwater levels on the site range from 0.10 metres to 6.70 metres below the ground surface, therefore making the 1 metre separation from high groundwater level difficult to achieve.

For example, the rear yard and rooftop catchment area of Lot 93 is approximately 0.03 hectares in size and will have an average imperviousness of 55%. Under a “first flush” (25-mm) design storm, this lot would generate approximately 5.54 $m^3$ of runoff.

An infiltration trench, 6 metres long by 3 metre wide by 1 metre deep, constructed in this lot would have an effective contact area of 18 $m^2$. Based a hydraulic conductivity of $1.0 \times 10^{-4}$ cm/s, the estimated rate of recharge is $1.8 \times 10^{-5}$ $m^3/s$.

Therefore, the estimated “drain down” time for a rear lot infiltration structure would be approximately 85 hours. The Stormwater Management Planning and Design Manual (2003) recommend that infiltration structures drain within 24 hours.

As the soils on the westerly portion of the site have a high silt content, Naylor Engineering Associates Ltd. has identified that they are unsuitable for at-source drywell infiltration.

Therefore, based on the estimated “drain down” time of 85 hours and the high groundwater levels, it is our opinion that infiltration systems are **not** feasible and should **not** be incorporated as part of the development.

### 5.2.2 CONVEYANCE CONTROLS

The storm conveyance system for the development will consist of a stormwater conveyance channel and storm sewers. Conveyance controls will be achieved through the regular maintenance of the grassed channels and storm sewers as part of the City’s annual maintenance program. Maintenance requirements will include the annual cleanout of the manholes, catch basins, to remove sediment, oil and debris deposited during rainfall events.

The stormwater conveyance channel will have the capacity to convey the 100-year design storm event flows from both the Cityview Ridge Subdivision and the proposed development lands to the north. The channel will be constructed along the northern limits of the CN Railway lands, to provide a link between the Cityview Ridge Subdivision and the existing Stormwater Quality Facility No. 2 constructed as part of the Valleyhaven Subdivision Phase 3.

### 5.2.3 END-OF-PIPE CONTROLS

#### a) Existing Conditions

Under existing conditions, the site consists of two (2) existing buildings and various other buildings, with the remainder of the site being open space. For hydrologic modelling purposes, the site was modelled as three (3) catchments. These catchments, which include the Cityview Drive right-of-way, are shown on the Existing Conditions Drainage Area Plan (Figure 4).

***Catchment 10 (7.02 hectares, 8% impervious)*** represents the westerly portion of the development including the existing buildings, Cityview Drive and open space area.

Runoff generated from Catchment 10 currently sheetflows overland in an east to west direction, ultimately discharging to the existing Stormwater Quality Facility No. 2 constructed as part of the Valleyhaven Subdivision Phase 3.

***Catchment 20 (4.78 hectares, 0% impervious)*** represents the central portion of the site.

Runoff generated from Catchment 20 currently sheetflows overland to the east, ultimately discharging to the low lying area and Clythe Creek.

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LEGEND

| | |
|---|---|
| 100 | CATCHMENT |
| 6.11 ha | DRAINAGE AREA |
| ▬ ▬ ▬ | CATCHMENT BOUNDARY |

## EXISTING CONDITIONS DRAINAGE AREA

## Figure No. 4

Gamsby and Mannerow ENGINEERS

Plotted On: June 22, 2017 105172-FIG4.dwg

***Catchment 30 (6.48 hectares, 0% impervious)*** represents the remainder of the site (easterly portion).

Runoff generated from Catchment 30 currently sheetflows overland, ultimately discharging to the low lying area and Clythe Creek.

Table No. 4 summarizes the existing condition flow rates and runoff volumes from the site for the full range of design storm events.

**Table No. 4: Existing Condition Flow Rates and Runoff Volumes**

| | **CATCHMENTS** | | | | | |
|---|---|---|---|---|---|---|
| | **10** | **Total to Ex. SWM Pond** | **20** | **30** | **Total to Clythe Creek** | **Total from Site** |
| **2 year** | | | | | | |
| Flow Rate ($m^3/s$) | 0.130 | **0.130** | 0.054 | 0.073 | **0.127** | **0.220** |
| Runoff Volume ($m^3$) | 314.3 | **314.3** | 100.7 | 136.6 | **237.3** | **551.6** |
| **5 year** | | | | | | |
| Flow Rate ($m^3/s$) | 0.492 | **0.492** | 0.328 | 0.444 | **0.772** | **1.265** |
| Runoff Volume ($m^3$) | 951.8 | **951.8** | 519.7 | 704.5 | **1,224.2** | **2,176.0** |
| **25 year** | | | | | | |
| Flow Rate ($m^3/s$) | 1.344 | **1.344** | 0.931 | 1.261 | **2.192** | **3.536** |
| Runoff Volume ($m^3$) | 2,226.3 | **2,226.3** | 1,369.3 | 1,856.3 | **3,595.6** | **5,451.9** |
| **100 year** | | | | | | |
| Flow Rate ($m^3/s$) | 2.160 | **2.160** | 1.454 | 1.971 | **3.425** | **5.585** |
| Runoff Volume ($m^3$) | 3,420.5 | **3,420.5** | 2,173.5 | 2,946.5 | **5,119.9** | **8,540.4** |
| **Regional Storm** | | | | | | |
| Flow Rate ($m^3/s$) | 0.587 | **0.587** | 0.397 | 0.538 | **0.936** | **1.522** |
| Runoff Volume ($m^3$) | 6,423.1 | **6,423.1** | 3,728.8 | 5,054.9 | **8,783.7** | **15,206.8** |

**b) Allowable Release Rates**

The existing stormwater management facility constructed as part of the Valleyhaven Subdivision Phase 3 (Stormwater Quality Facility No. 2) was designed, approved and constructed to accommodate stormwater runoff generated from a total contributing drainage area of 29.6-hectares (42% imperviousness), of which 11.1-hectares represents the westerly portion of the Cityview Ridge Subdivision. Therefore, the allowable release rates from the Cityview Ridge Subdivision to the existing stormwater management facility constructed as part of the Valleyhaven Subdivision Phase 3 (Stormwater Quality Facility No. 2) are outlined in Table No. 5.

**Table No. 5: Allowable Release Rates from the Cityview Ridge Subdivision to the Existing Stormwater Management Facility (Stormwater Quality Facility No. 2)**

| | **Allowable Release Rate** |
|---|---|
| 2 Year | 0.294 $m^3/s$ |
| 5 Year | 0.929 $m^3/s$ |
| 25 Year | 1.689 $m^3/s$ |
| 100 Year | 2.246 $m^3/s$ |

The allowable release rate for the stormwater runoff discharging from the site to Clythe Creek was determined by calculating the existing condition flow rates discharging to Clythe Creek.

Therefore, the allowable release rates from the Cityview Ridge Subdivision to Clythe Creek are outlined in Table No. 6.

**Table No. 6: Allowable Release Rates from the Cityview Ridge Subdivision to Clythe Creek**

| | **Allowable Release Rate** |
|---|---|
| 2 Year | 0.127 $m^3/s$ |
| 5 Year | 0.772 $m^3/s$ |
| 25 Year | 2.192 $m^3/s$ |
| 100 Year | 3.425 $m^3/s$ |

**c) Post-Development Conditions**

Under post-development conditions, runoff generated from the westerly and central portions of the development will be directed towards either the existing stormwater management facility constructed as part of the Valleyhaven Subdivision Phase 3 (Stormwater Quality Facility No. 2) or the proposed municipal stormwater management facility.

Runoff generated from the easterly portion of the site will be attenuated through the use of privately owned and operated on-site stormwater management controls, prior to discharge to Clythe Creek. The on-site stormwater management controls will be designed, reviewed and approved as part of the site plan approval process.

For hydrologic modelling, two (2) separate hydrological models were prepared. One model was prepared for the western portion and one model was prepared for the eastern portion of the Cityview Ridge Subdivision.

The hydrologic model for the western portion of the subdivision has been adapted from the hydrological modelling created for the Valleyhaven Subdivision, Phase 3 as detailed in the Stormwater Management Design Report Draft Plan 23T-96501 and 23T-99501 for the Martini/Valeriote Subdivision (Gamsby and Mannerow Limited, March 2004). The analysis includes the watershed discharging to the southern reach of Hadati Creek, including the external areas, existing and future development areas (including the western portion of the Cityview Ridge Subdivision) and the lands downstream of the CN Railway. The stormwater management catchments for this model are shown on Figure 5 and described below. A schematic of this model has been appended.

***Catchment B2a (11.38 hectares, 42% impervious)*** represents the future development area north of the Cityview Ridge Subdivision and East of Cityview Drive. Stormwater runoff generated from Catchment B2a discharges to the existing Stormwater Quality Facility No. 2 constructed as part of the Valleyhaven Subdivision Phase 3 via a conveyance channel located in the southwest corner of the Cityview Ridge Subdivision.

***Catchment B2b (5.97 hectares, 42% impervious)*** represents the existing Valleyhaven Subdivision Phase 3. Stormwater runoff generated from Catchment B2b discharges to the existing Stormwater Quality Facility No. 2 constructed as part of the Valleyhaven Subdivision Phase 3.

***Catchment B2c (7.55 hectares, 46% impervious)*** represents the western portion of the Cityview Ridge Subdivision. Stormwater runoff generated from Catchment B2c discharges to the existing Stormwater Quality Facility No. 2 constructed as part of the Valleyhaven Subdivision Phase 3 via a conveyance channel located in the southwest corner of the Cityview Ridge Subdivision.

The existing Stormwater Quality Facility No. 2 constructed as part of the Valleyhaven Subdivision Phase 3, was designed to provide Basic (MOE, 2003) (Formerly Level 3) quality control treatment for Catchments B2a, B2b and B2c.

In order to provide enhanced water quality treatment (80% total suspended solids removal) for stormwater runoff generated from the Cityview Ridge Subdivision and discharging to the existing Stormwater Quality Facility No. 2 constructed as part of the Valleyhaven Subdivision Phase 3, an oil/grit separator structure (Stormceptor STC 14000 or approved equivalent along with a settling basin/forebay has been designed to provide additional quality control treatment

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LEGEND

B2a / 21.8 ha — CATCHMENT / DRAINAGE AREA

CATCHMENT BOUNDARY

N.T.S.

REVISED: JUNE 2017

## POST-DEVELOPMENT DRAINAGE AREAS WESTERN PORTION OF SUBDIVISION

## Figure No. 5

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ENGINEERS

Plotted On: June 22, 2017 105172-FIG5.dwg

for stormwater runoff generated from Catchments B2c and B2a, respectively. The settling basin/forebay has been sized to promote the settlement of particles at the inlet to the existing pond. The settling basin/forebay has been designed to meet the requirements for forebay depth, length-to-width ratio, dispersion length and flow velocity as specified in the Stormwater Management Planning and Design Manual (2003). Details of the settling basin/forebay sizing can be found in Appendix “D”.

The existing Stormwater Quantity Control Facility, consisting of a detention pond located on-line with Hadati Creek, a quantity control berm and an outlet structure connected to the existing CN culvert, will continue to provide quantity control for runoff generated from Catchments B2a, B2b and B2c.

For the eastern portion of the Cityview Ridge Subdivision, the site was modelled as three (3) catchments. These catchments are shown on Figure 6.

***Catchment 201 (3.35 hectares, 65% impervious, c=0.65)*** represents the central portion of the proposed development.

Runoff generated from Catchment 201 will be directed towards the proposed stormwater management facility prior to discharging to Clythe Creek. Quantity control for Catchment 201 will be provided by the proposed stormwater management facility. A multi-stage outlet structure consisting of a 90 mm diameter knockout, a 375 mm diameter outlet pipe and a 10.0 metre wide overflow weir will attenuate runoff generated from Catchment 201 prior to discharge to the energy dissipation/dispersion structure.

Quality control for Catchment 201 will be provided by a sediment forebay. The forebay of the Stormwater Management Facility will have a length of 42.0 m, top width of 7.0 m, bottom width of 1.0 m and a depth of 1.0 m. The forebay will have a required settling length of 41.5 m and a dispersion length of 10.6 m. The average flow velocity for the 5 year design storm event is 0.17 m/s through the forebay which is less than the allowable velocity of 0.5 m/s. The sediment forebay has been designed to meet the requirements for forebay depth, length-to-width ratio, dispersion length and flow velocity as specified in the Stormwater Management Planning and Design Manual (MOE, 2003).

Details of the sediment forebay sizing can be found in Appendix “E”.

The energy dissipation/dispersion structure (65 m long by 2.0 m wide by 1.0 m deep), consisting of 19 mm diameter clear stone and perforated storm sewer, will dissipate the energy from the runoff and disperse the flows over a large area. The perforated storm sewer located in the clear stone will disperse the flows throughout the length of the structure. Runoff will then percolate through the stone, ultimately discharging out the top of the stone. Discharge from the structure will then sheetflow along the entire length of the structure (65 m) overland towards Clythe Creek.

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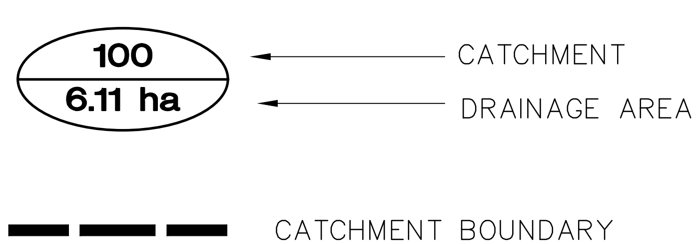
LEGEND




## POST-DEVELOPMENT DRAINAGE AREAS EASTERN PORTION OF SUBDIVISION

## Figure No. 6

Gamsby and Mannerow
ENGINEERS

Plotted On: June 22, 2017 105172-FIG6.dwg

The energy dissipation/dispersion structure will also act as a cooling trench to reduce the temperature of the stormwater runoff discharging to Clythe Creek. Details of the energy dissipation/dispersion and cooling structure are provided in Appendix "D".

During the detailed design stage of the Subdivision, additional measures will be investigated and considered to enhance the function of the energy dissipation/dispersion structure. These measures may include the planting of shrubs and ground covering vines to reduce the direct input of solar radiation on the trench.

In addition, the proposed stormwater management facility has been designed as a wetland type facility with a 0.40 metre deep permanent pool to provide the required water quality control storage volume. The total contributing area discharging to the facility is 3.41-hectares, with an average imperviousness of 65%. From Table 3.2 of the Stormwater Management Planning and Design Manual (2003), a wetland type facility designed for enhanced treatment (80% total suspended solids removal) requires 115 $m^3$/ha of storage volume for a contributing drainage area that is approximately 65% impervious. 40 $m^3$/ha of the required storage volume represents the extended detention storage volume, while the remaining 75 $m^3$/ha represents the permanent pool storage volume. Therefore, 255 $m^3$ of permanent pool storage is required. The permanent pool has been designed with approximately 714 $m^3$ of storage.

***Catchment 202 (0.74 hectares, 25% impervious, c=0.25)*** represents a portion of the rooftops, rear yard areas and open space areas of the proposed development.

Runoff generated from a portion of Catchment 202, including the rooftops and rear yards, will be directed to the energy dissipation/dispersion and cooling structure prior to discharge to Clythe Creek. Runoff generated from the remainder of the catchment will sheetflow uncontrolled, ultimately discharging to Clythe Creek.

Quality control treatment for runoff generated from Catchment 202 will be provided by directing runoff over grassed surfaces prior to discharge to Clythe Creek.

***Catchment 300 (6.48 hectares, 0% impervious)*** represents the remainder of development area which consists of open space area and a future apartment block along Watson Parkway.

Runoff generated from Catchment 300 will continue to sheetflow uncontrolled to Clythe Creek. At such time as development of the apartment block proceeds, privately owned and operated on-site quality and quantity control facilities will be required to attenuate stormwater runoff generated from the development block to the existing condition or pre-development level, prior to discharge to Clythe Creek.

The on-site stormwater management controls will be designed, reviewed and approved as part of the site plan approval process for the apartment block. The on-site stormwater management controls which may be utilized include, but are not limited to, stormwater management facility (i.e. SWM pond), rooftop storage, parking lot ponding (to a maximum depth of 0.3 m), below grade storage (i.e. clear stone storage, super pipe storage, etc.) and oil/grit separator structure.

Table No. 7 lists the uncontrolled post-development flow rates and runoff volumes for each catchment area shown on Figure No. 5 and Figure No. 6, for the 2, 5, 25 and 100-year design storm events and the Regional Storm.

**Table No. 7: Post-Development Uncontrolled Flow Rate and Runoff Volume**

| | **CATCHMENTS** | | | | | |
|---|---|---|---|---|---|---|
| | **B2c** | **Total to Ex. SWM Pond** | **201** | **202** | **300** | **Total to Clythe Creek** |
| **2 year** | | | | | | |
| Flow Rate ($m^3/s$) | 0.211 | **0.211** | 0.496 | 0.041 | 0.073 | **0.538** |
| Runoff Volume ($m^3$) | 563.2 | **563.2** | 730.6 | 70.6 | 136.6 | **937.8** |
| **5 year** | | | | | | |
| Flow Rate ($m^3/s$) | 0.674 | **0.674** | 0.675 | 0.069 | 0.444 | **0.868** |
| Runoff Volume ($m^3$) | 1,756.9 | **1,756.9** | 1,119.0 | 142.8 | 704.5 | **1,966.3** |
| **25 year** | | | | | | |
| Flow Rate ($m^3/s$) | 1.177 | **1.177** | 1.074 | 0.169 | 1.261 | **2.156** |
| Runoff Volume ($m^3$) | 2,791.2 | **2,791.2** | 1,829.9 | 283.2 | 1,856.3 | **3,969.4** |
| **100 year** | | | | | | |
| Flow Rate ($m^3/s$) | 1.563 | **1.563** | 1.469 | 0.256 | 1.971 | **3.366** |
| Runoff Volume ($m^3$) | 3,650.7 | **3,650.7** | 2,449.4 | 410.2 | 2,946.5 | **5,806.1** |
| **Regional Storm** | | | | | | |
| Flow Rate ($m^3/s$) | 0.928 | **0.928** | 0.376 | 0.067 | 0.538 | **0.911** |
| Runoff Volume ($m^3$) | 10,099.4 | **10,099.4** | 6,363.5 | 883.7 | 5,054.9 | **12,302.1** |

Table Nos. 8, 9 and 10 compare the routing results through the stormwater conveyance channel, proposed stormwater management facility and energy dissipation/dispersion and cooling structure against the available stage/storage discharge capacities, respectively.

**Table No. 8: Catchment B2a & B2c – Stormwater Conveyance Channel Stage/Velocity/Depth of Flow**

| Overland Flow Swale | Available | | | Actual | | |
|---|---|---|---|---|---|---|
| | Peak Flow $m^3/s$ | Channel Velocity m/s | Depth of Flow m | Peak Flow $m^3/s$ | Channel Velocity m/s | Depth of Flow m |
| Swale Bottom | 0.000 | 0.000 | 0.000 | --- | --- | --- |
| 2-Year | --- | --- | --- | 0.531 | 1.40 | 0.21 |
| 5-Year | --- | --- | --- | 1.605 | 1.88 | 0.35 |
| Regional Storm | --- | --- | --- | 2.304 | 2.07 | 0.42 |
| 25-Year | --- | --- | --- | 2.856 | 2.18 | 0.46 |
| 100-Year | --- | --- | --- | 3.746 | 2.33 | 0.52 |
| Top of Bank | 16.90 | 3.38 | 1.00 | --- | --- | --- |

**Table No. 9: Catchment 201 – Proposed Stormwater Management Facility Available Stage/Storage/Discharge**

| CONTROL | Available Capacity | | | Actual Capacity Used | | |
|---|---|---|---|---|---|---|
| | Peak Flow $m^3/s$ | Storage Volume $m^3$ | Storage Elevation m | Peak Flow $m^3/s$ | Storage Volume $m^3$ | Storage Elevation m |
| Pond Bottom | 0.00 | 0.0 | 339.35 | --- | --- | --- |
| Top of Permanent Pool | 0.000 | 0.0 | 339.75 | --- | --- | --- |
| 2 year | --- | --- | --- | 0.009 | 661.6 | 340.03 |
| 5 year | --- | --- | --- | 0.010 | 1,030.9 | 340.17 |
| CB Lip Elevation | 0.011 | 1,263.6 | 340.25 | --- | --- | --- |
| 25 year | --- | --- | --- | 0.176 | 1,389.4 | 340.29 |
| Regional Storm | --- | --- | --- | 0.307 | 1,518.1 | 340.33 |
| 100 year | --- | --- | --- | 0.412 | 1,610.3 | 340.36 |
| Weir | 0.470 | 3,771.9 | 340.95 | --- | --- | --- |
| Top of Bank | 1.736 | 4,653.3 | 341.15 | --- | --- | --- |

**Table No. 10: Catchment 201 – Energy Dissipation/Dispersion and Cooling Structure Available Stage/Storage/Discharge**

| CONTROL | Available Capacity | | | Actual Capacity Used | | |
|---|---|---|---|---|---|---|
| | Peak Flow $m^3/s$ | Storage Volume $m^3$ | Storage Elevation m | Peak Flow $m^3/s$ | Storage Volume $m^3$ | Storage Elevation m |
| Bottom of Stone | 0.00 | 0.0 | 336.00 | --- | --- | --- |
| Top of Stone / Weir | 0.0002 | 50.1 | 337.00 | --- | --- | --- |
| 2 year | --- | --- | --- | 0.009 | 50.1 | 337.00 |
| 5 year | --- | --- | --- | 0.010 | 50.1 | 337.00 |
| 25 year | --- | --- | --- | 0.176 | 50.9 | 337.01 |
| Regional Storm | --- | --- | --- | 0.307 | 51.4 | 337.01 |
| 100 year | --- | --- | --- | 0.412 | 51.9 | 337.02 |
| Overflow | 2.13 | 59.3 | 337.10 | --- | --- | --- |

Table No. 11 identifies the energy dissipation/dispersion and cooling structure inlet and outlet flow rates and velocities.

**Table No. 11: Energy Dissipation/Dispersion Structure Flow Rate and Velocity**

| DESIGN STORM | Inlet | | Outlet | | |
|---|---|---|---|---|---|
| | Flow Rate ($m^3/s$) | Velocity (m/s) | Flow Rate ($m^3/s$) | Velocity (m/s) | % Reduction |
| 2 year | 0.009 | 1.492 | 0.009 | 0.088 | 94.1 % |
| 5 year | 0.010 | 1.568 | 0.010 | 0.092 | 94.1 % |
| 25 year | 0.176 | 3.629 | 0.176 | 0.290 | 92.0 % |
| Regional Storm | 0.307 | 4.212 | 0.307 | 0.362 | 91.4 % |
| 100 year | 0.412 | 4.531 | 0.412 | 0.407 | 91.0 % |

Table Nos. 12 and 13 compare the allowable release rates to the post-development flow rates discharging to the existing Stormwater Quality Facility No. 2 and to Clythe Creek, respectively.

**Table No. 12: Comparison of Allowable and Post-Development Conditions Flows Discharging to Existing Stormwater Quality Facility No. 2**

| DESIGN STORM | ALLOWABLE RELEASE RATES TO EXISTING SWM POND | POST-DEVELOPMENT FLOW RATES TO EXISTING SWM POND (CATCHMENT B2C) |
|---|---|---|
| | Flow Rate ($m^3/s$) | Flow Rate ($m^3/s$) |
| 2 year | 0.294 | 0.212 |
| 5 year | 0.929 | 0.679 |
| 25 year | 1.689 | 1.186 |
| 100 year | 2.246 | 1.576 |

Therefore, the post-development flow rates discharging to the existing stormwater management facility (Stormwater Quality Facility No. 2) are less than the allowable release rates for the full range of design storm events.

**Table No. 13: Comparison of Allowable and Post-Development Conditions Flows Discharging to Clythe Creek**

| DESIGN STORM | ALLOWABLE RELEASE RATE TO CLYTHE CREEK | POST-DEVELOPMENT FLOW RATE TO CLYTHE CREEK (CATCHMENTS 201, 202 & 300) |
|---|---|---|
| | Flow Rate ($m^3/s$) | Flow Rate ($m^3/s$) |
| 2 year | 0.127 | 0.086 |
| 5 year | 0.772 | 0.507 |
| 25 year | 2.192 | 1.400 |
| 100 year | 3.425 | 2.335 |
| Regional Storm | 0.936 | 0.906 |

Therefore, the post-development flow rates discharging to Clythe Creek have been attenuated to less than the allowable release rates, for the full range of design storm events.

Upon development of the apartment block (Block 125) located adjacent to Watson Parkway, privately owned and operated on-site quality and quantity stormwater management controls will be required to attenuate post-development flows to the existing condition level prior to discharge from the apartment block.

The allowable release rates (i.e. the existing condition release rates) from the Apartment block are as follows:

**Table No. 14: Allowable Release Rates from the Apartment Block (Block 125)**

| DESIGN STORM | ALLOWABLE RELEASE RATE FROM APARTMENT BLOCK (BLOCK 125) Flow Rate ($m^3/s$) |
|---|---|
| 2 year | 0.008 |
| 5 year | 0.047 |
| 25 year | 0.132 |
| 100 year | 0.207 |
| Regional Storm | 0.056 |

### 5.2.4 MINOR / MAJOR DRAINAGE SYSTEM

Minor system drainage will be conveyed to the existing and proposed stormwater management facilities via storm sewers with the capacity to convey the 5-year design storm event.

Major design storm flows from the westerly portion of the development will be conveyed to the existing Stormwater Quality Facility No. 2 via the municipal right-of-way and the stormwater conveyance channel. Major design storm flows from the central portion of the development will be conveyed to the proposed stormwater management facility via the municipal right-of-way. Preliminary analysis indicates that the municipal right-of-ways have the capacity to convey the runoff from a major design storm event.

The major design storm drainage patterns expected for the Cityview Ridge Subdivision are shown on Figure 7.

### 5.2.5 FLOODPLAIN ANALYSIS

Cosburn Patterson Wardman Limited, as part of the Eastview Secondary Plan, analyzed the existing floodlines through Hadati Creek and Clythe Creek. As part of the Valleyhaven Subdivision Phase 3, the floodline analysis for Hadati Creek was updated. The floodline analysis for Clythe Creek was later revised by the Grand River Conservation Authority.

With the construction of the proposed stormwater management facility for the Cityview Ridge Subdivision, the flood storage volume for the major design storm event is being provided within the facility for the flows from the developable lands, along with the preliminary grading of the future apartment block, the floodplain storage volume has been maintained to ensure that the hazard to the public is minimized.

The HEC-RAS modelling has been edited to show the existing condition and post-development floodlines. A comparison to the pre- and post-development floodlines (flow rate, water surface elevation and flood width) through the Clythe Creek floodplain to the CN Railway lands has been included in Appendix ‘E’. The post-development Regional Storm and 100-year Design Storm Event floodlines are shown on Drawing No. 2.

The HEC-RAS analysis is attached in Appendix ‘F’.

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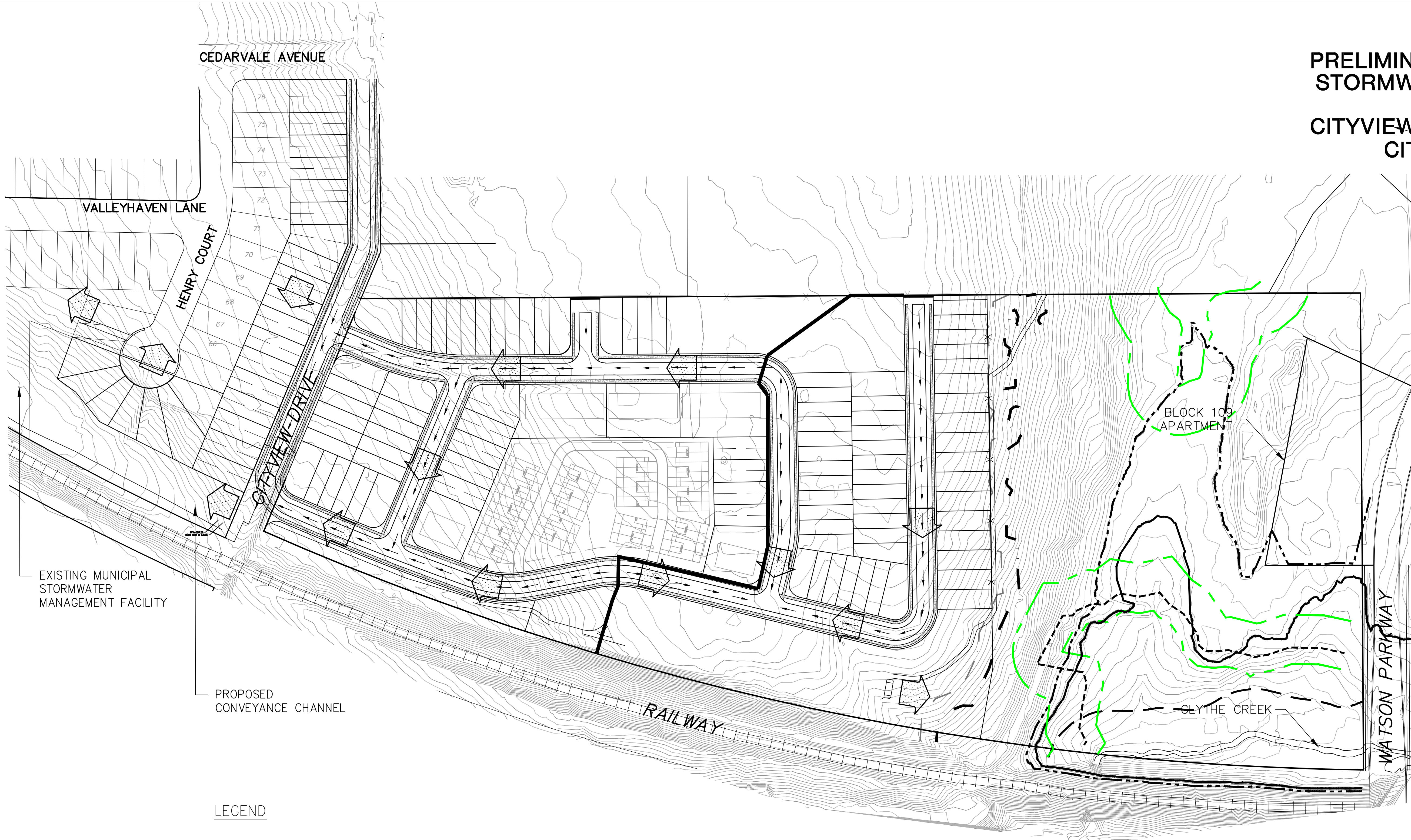


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LEGEND

MAJOR OVERFLOW DISCHARGE ROUTE

MAJOR INTERNAL OVERFLOW ROUTE

DRAINAGE AREA DIVIDE

LIMIT OF CITYVIEW RIDGE SUBDIVISION

## MAJOR STORM DRAINAGE PATTERN

**Figure No. 7**

Gamsby and Mannerow
ENGINEERS

Plotted On: June 22, 2017 105172-FIG7.dwg

## 6.0 SEDIMENT AND EROSION CONTROL PLAN

A silt fence will be installed along the property boundary and along the environmentally sensitive areas of the site. The silt fence will minimize the opportunity for water borne sediments to be transported from the site. The ecologist and/or the Environmental Inspector will flag the location of the silt fence with the contractor. In accordance with standard City practice, an Environmental Inspector will be retained to monitor the construction activities. The silt fence location is shown on the Preliminary Grading and Drainage Plans (Drawings No. 1, 2 and 3).

Temporary rock check dams will be installed in rear yard swales after the initial grading has been completed to slow the flow rates and promote the settlement of water borne sediments before they reach the silt fences and stormwater management facilities.

Upon completion of the grading, any area not subject to active construction within 30 days will be top soiled and seeded as per OPSS 572.

The proposed stormwater management facility will be rough graded and used as a temporary sediment pond for the central portion of the site during the servicing and house building construction. The storage capacity of this pond exceeds the combined 250 $m^3$/hectare of active and dead storage required. A heavy duty silt fence will be placed around the proposed stormwater management facility during construction.

A silt fence will be placed around the outlet structure of the existing stormwater management facility to restrict the movement of sediment. The discharge structure will restrict the release rate and provide extended detention for a minimum 24-hour period.

Once catch basins have been installed, the grates will be wrapped in filter cloth. This feature will be maintained until all building and landscaping has been completed.

Inspection and maintenance of all silt fencing and sediment and erosion controls will start after installation is complete. These features will be inspected on a weekly basis or after a rainfall event of 13 mm or greater. Maintenance will be carried out, within 48 hours, on any part of the controls found to need repair.

An Environmental Inspector will submit monthly reports on the conditions of the sediment and erosion control measures to the City of Guelph and the Grand River Conservation Authority.

Once construction and landscaping within the limits of the subdivision has been substantially completed (75% house building construction is complete), the silt fence will be removed, any accumulated sediment will be collected and the area will be restored. Upon final inspection by both the Environmental Inspector and City of Guelph, the monthly reporting on the condition of the sediment and erosion control measures will cease.

After construction of the complete development, erosion and sediment transport will be minimal.

## 7.0 MAINTENANCE PLAN

A two-phase maintenance plan is recommended. Phase I will address the short-term more intensive maintenance necessary during and immediately after construction. Once all landscaping has been completed, maintenance will shift to Phase II.

As outlined in the section on Sediment and Erosion Control, Phase I will include weekly inspection of all sediment control devices plus "as needed" inspection after any significant rainfall, with all immediate repair of any damaged works and collection of captured sediment. This work will be carried out by the Consultant and/or the Environmental Inspector during the construction of the works. A monthly status report will be prepared and distributed to the City of Guelph and the Grand River Conservation Authority.

Phase II will be the maintenance carried out by the City of Guelph after all construction has been completed. This work will involve a yearly visual inspection of the stormwater management facilities to determine the amount of sediment accumulation. Sediment should be removed as required and the recommended vegetation replanted.

# 8.0 CONCLUSIONS

From the foregoing analysis, the following conclusions are drawn:

1. Water supply for the proposed Cityview Ridge Subdivision will be provided by:

   a. the extension of the existing 150 mm diameter watermain on Henry Court,
   b. the extension of the existing 200 mm diameter watermain southerly on Cityview Drive,
   c. the extension of the existing 150 mm diameter watermain from the existing municipal stormwater management facility to the Cityview Drive right-of-way, and
   d. via a connection to the existing 300 mm diameter watermain on Watson Parkway.

2. Sanitary service for the Cityview Ridge Subdivision will be provided by:

   a. the extension of the existing 200 mm diameter sanitary sewer on Henry Court,
   b. the extension of a 200 mm diameter sanitary sewer from the 200 mm diameter sanitary sewer stub in the existing municipal stormwater management facility to the Cityview Drive right-of-way, and
   c. via a connection to the existing 525 mm diameter sanitary sewer on Watson Parkway.

3. All storm sewers within the Cityview Ridge Subdivision will be sized to accommodate the 5-year design storm event.

4. The topography of the site will generally allow for sufficient cover on the storm sewer to connect house foundation drains. Where a storm service connection is not possible, foundation drainage will be provided by sump pumps discharging to the grassed side and rear yard surfaces.

5. Quality and quantity control for runoff generated from the westerly portion of the development will be provided by the existing Stormwater Quality Facility No. 2 and the existing Stormwater Quantity Control Facility, constructed as part of the Valleyhaven Subdivision Phase 3.

   Quality and quantity control for runoff generated from the central portion of the development will be provided by a sediment forebay before entering the proposed stormwater management facility, prior to discharge to Clythe Creek.

   Quality and quantity control for runoff generated from the easterly section of the site which includes a future development apartment block will be provided by privately owned and operated on-site stormwater management controls, which will be designed, reviewed and approved as part of the site plan approval process for the development.

6. Installation of infiltration systems in the rear yard areas is not feasible due to the low hydraulic conductivity of the native underlying silty tills and the presence of high groundwater levels.

7. The floodplain storage volume has been maintained under post-development conditions to ensure that the hazard to the public is minimized.

8. The stormwater management systems meet the current Provincial and Municipal guidelines.

9. During the construction phase, the proposed stormwater management facility will be used as part of the erosion and sediment control plan. This in conjunction, with the other erosion control measures, will minimize the transport of sediment off-site during the construction period.

All of which is respectfully submitted.

GAMSBY AND MANNEROW LIMITED
Per:

Angela Kroetsch, P.Eng.

LICENSED PROFESSIONAL ENGINEER
June 22/17
A. E. KROETSCH
100072069
PROVINCE OF ONTARIO

AK/pg
Encl.

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**PRELIMINARY SERVICING &**
**STORMWATER MANAGEMENT REPORT**
**CITYVIEW RIDGE SUBDIVISION**
**CITY OF GUELPH**
**Revised: June 2017**

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**APPENDIX "A"**

**Geotechnical Investigation**
**Naylor Engineering Associates Ltd.**
**(February 2012)**

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105172

# GEOTECHNICAL INVESTIGATION
# P.T. VALERIOTE SUBDIVISION
# CITYVIEW DRIVE
# GUELPH, ONTARIO
# for
# CARSON REID HOMES LTD.

0353G4.R01_Rev.
February 2012

**DISTRIBUTION:**
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0353G4.R01_Rev.

February 17, 2012

Carson Reid Homes Ltd.
183 Dufferin Street
Guelph, Ontario
N1H 4B3

Attention: Mr. Carson Reid

Dear Sir:

**Re: Geotechnical Investigation**
**P.T. Valeriote Subdivision**
**Cityview Drive**
**Guelph, Ontario**

Naylor Engineering Associates Ltd. is pleased to submit this ***revised*** report for the geotechnical investigation recently completed for the above-referenced development site.

This report outlines the investigation procedures and provides a summary of the subsurface conditions encountered. Geotechnical comments and recommendations are provided for slope stability assessment, site grading, site servicing, pavement design, house foundations, industrial/commercial building foundations, stormwater infiltration, and stormwater management ponds design.

We trust that this report is suitable for your present requirements and we thank Carson Reid Homes Ltd. and Gamsby & Mannerow Limited for this opportunity to have been of service. If you have any questions or require any further geotechnical consultation, please do not hesitate to contact our office.

Yours very truly,

Dave S. Naylor, P.Eng.
Senior Consulting Engineer

## TABLE OF CONTENTS

# 1. Introduction

Naylor Engineering Associates Ltd. was retained by Carson Reid Homes Ltd. to carry out a geotechnical investigation for a proposed residential subdivision on Cityview Drive in Guelph, Ontario, as shown on the appended Location Plan, Drawing 1. This work was authorized by Mr. Carson Reid of Carson Reid Homes Ltd. on July 13, 2006, following submission of a detailed proposal.

The project involves the residential development of a 17.682 ha property. The proposed residential subdivision will contain about 150 lots with full municipal services. An apartment block is proposed for the northeast corner of the property. A stormwater management pond is proposed at the south central area of the property.

The purpose of this investigation was to determine the subsurface soil and groundwater conditions and, based on that information, prepare this engineering report with geotechnical recommendations pertaining to slope stability, site grading, site servicing, pavement design, house foundations, industrial/commercial foundation design, stormwater infiltration and stormwater management pond design. The report does not address site environmental or hydrogeological issues.

# 2. Investigation Procedure

## 2.1 Field Program

The fieldwork for this investigation was carried out between July 31 and August 2, 2006 and involved the drilling of ten boreholes (Boreholes 101 through 110) to depths of 5.6 to 11.1 m at the locations shown on the appended Site Plan, Drawing 2. Twenty topsoil thickness holes were dug to measure the topsoil thickness. Approximate topsoil thickness hole locations are also shown on Drawing 2.

The boreholes were advanced with a CME-75 track-mounted drillrig equipped with continuous flight solid stem augers, supplied and operated by a specialist drilling contractor. Soil samples were recovered from the boreholes at regular 0.75 and 1.50 m depth intervals using a 50 mm O.D. split spoon sampler in accordance with the Standard Penetration Test (SPT) procedure. The SPT N-values recorded are plotted on the appended borehole logs.

Monitoring wells were installed in all of the boreholes to allow measurement of the stabilized groundwater levels. These installations comprised 50 mm diameter PVC pipes with slotted filters, as well as betonite seals. At Boreholes 103, 104, 105, 106, and 107, a shallow 19 mm diameter CPVC pipe was also installed to determine the vertical hydraulic gradient. Groundwater levels were measured in the standpipes and monitoring wells on August 8, 2006 by Naylor Engineering Associates Ltd. Details of installations and groundwater measurements are provided on the appended borehole logs.

All standpipes and monitoring wells were installed by licensed well technicians in accordance with Ontario Regulation 903. A well tag was attached to the standpipe at Borehole 011. The standpipes must be properly decommissioned by a licensed well technician within six months of last use, and certainly before construction begins.

The fieldwork was supervised throughout by a member of our engineering staff who directed the drilling and sampling procedures; conducted SPT testing; documented the soil stratigraphies, and cared for the recovered soil samples.

The borehole locations and ground surface elevations were surveyed by Gamsby & Mannerow Limited and the data was supplied to us in AutoCAD format. It is understood that the elevations are related to a geodetic datum.

## 2.2 Laboratory Testing

All soil samples secured during this investigation were returned to our laboratory for moisture content tests; the results of which are plotted on the borehole logs. Geotechnical laboratory tests carried out on selected samples of the major subsurface soils from the investigation comprised three particle size distribution test with results presented on Figure 1, and two standard Proctor moisture-density tests with results plotted on Figures 2 and 3.

The soil samples will be stored for a period of four months (December 2006) from the date of sampling. After this time, they will be discarded unless prior arrangements have been made for longer storage.

# 3. Site Conditions

## 3.1 Site Description

The subject development is approximately 17.682 ha and is located in the northeast area of Guelph, Ontario. For the purpose of this report it was assumed Watson Parkway runs north-south adjacent to the east side of the property. The property is bordered on the north by a vacant field, on the south by a Canadian National Railway Line, on the east by Watson Parkway, and on the west by existing residential development.

The property is split in two pieces: with the proposed residential development on the west side of the property and a proposed apartment block on the east side. From the low-lying lands in the east part of the property area, the grade slopes up about 20 m to the higher lands in the west section.

The residential property is moderately sloped. A hill runs north-south and divides the residential property into east and west sloping sides. The residential property is vegetated with mostly tall grass and some medium sized deciduous trees.

The proposed apartment block is relatively level and is at the northeast corner of the property. The apartment block is densely vegetated with spruce trees. The topographic relief for this part of the property is less than 1 m.

## 3.2 Subsurface Soil Conditions

We refer to the appended borehole logs for detailed soil descriptions and stratigraphies, SPT N-values, moisture content profiles, details of standpipe installations, and groundwater observations and measurements.

The subsurface stratigraphy at the site generally comprises topsoil overlying silt till in the proposed residential area. At the proposed apartment block at the northeast corner of the property, the subsurface stratigraphy generally comprises topsoil overlying sand and gravel. Descriptions of the various soil deposits and the groundwater conditions encountered are provided in the following subsections.

### 3.2.1 Topsoil

Topsoil was contacted surficially throughout the property. The topsoil is typically 200 to 350 mm thick in the proposed residential area, and 400 mm thick in the low lying land. The topsoil generally comprises dark brown silt. The average topsoil thickness in the residential lands and commercial lands are 250 mm and 300 mm, respectively.

### 3.2.2 Sand and Gravel

Sand and gravel was encountered in the low lying area at the northeast corner of the site (Boreholes 109 and 110). The sand and gravel continues below the termination depths of the boreholes. This deposit consists of sand and gravel with some silt; and there were frequent cobbles and boulders in the soil matrix. A particle size distribution analysis performed on one sample of the sand and gravel indicated the sample contained 44% gravel, 41% sand, and 15% silt (see Figure 1).

Typically, the sand and gravel is very dense based on SPT N-values of greater than 50 blows per 300 mm penetration of the split-spoon sampler. The moisture content of the sand and gravel is typically about 5% above the water table, and between 8 and 12% in saturated conditions.

### 3.2.3 Silt Till

Silt till was encountered in all boreholes located in the proposed residential area. The silt till continues below the termination depths of the boreholes in which it was encountered. In Boreholes 102 and 105, possible weathered bedrock was encountered at borehole termination depth. This deposit ranges in composition from sandy silt with some gravel and cobbles, to silt with some clay sand and gravel. Particle size distribution analyses performed on two samples of the silt till indicated the samples contained 5% to 11% gravel, 41% sand, 36 to 44% silt, and 10 to 11% clay (see Figure 1).

Typically, within 2 m of the ground surface, the silt till is loose to compact based on SPT N-values of 5 to 25 blows per 300 mm. Below this upper portion, the silt till is dense to very dense based on SPT N-values from 30 to greater than 50 blows per 300 mm.

The moisture content of the silt till is typically between 8 and 12%. Two standard Proctor moisture-density tests performed on samples of the silt till from Boreholes 105 and 106 indicated maximum dry densities of 2.065 $t/m^3$ and 2.185 $t/m^3$ and optimum moistures of 9.0% and 8.7% (see Figures 2 and 3).

## 3.3 Groundwater

Groundwater was encountered in saturated seams within the silt till, and under water table (unconfined) conditions in the sand and gravel deposit. The stabilized levels were between Elevation 321.0 m (Borehole 110) to 344.5 m (Borehole 107).

Within the apartment block at the northeast corner, the horizontal gradient of the groundwater in the sand and gravel is from north to south towards Clythe Creek. Within the remainder of the residential area, the variable groundwater levels in seams within the silt till generally follow the topography.

# 4. Discussion and Recommendations

The project involves the residential development of an approximately 17.682 ha property. The proposed subdivision will be provided with full municipal services. It is assumed that on-site stormwater management controls will be required for the apartment block abutting Watson Parkway North. A portion of the lands on the west half of the site will drain to an existing stormwater management facility located to the west of Cityview Drive.

The subsurface stratigraphy at the site generally comprises topsoil overlying silt till in the proposed residential area, and topsoil overlying sand and gravel in the apartment block. Groundwater is contained in thin seams within the silt till at variable depths, and in the sand and gravel at about 3 to 4 m depth.

The following sections of this report provide geotechnical recommendations for the construction of the subdivision including slope stability assessment, site grading, site servicing, pavement design, house foundations, apartment building foundations, stormwater infiltration and stormwater management pond design.

## 4.1 Site Grading

At the time of the report preparation, grading plans were not available for review; however, we would anticipate area grading of the property to prepare the land for construction of the proposed residential subdivision. In general, material may be cut from the high areas to raise grades in lower areas of the site.

Prior to carrying out any area grading of the site, the surficial topsoil should be removed from cuts and critical fill areas. In calculating the approximate quantity of topsoil to be stripped, we note that the average thickness of topsoil contacted in the boreholes is about 300 mm for the residential lands and 300 mm for the commercial/industrial lands. We recommend that the topsoil thickness be increased by 50 mm for volume calculations to account for variations, and some stripping of the mineral soil below. The topsoil material could be used for landscaping fill to raise grades in the rear yards of the house lots or in park areas.

Following stripping of topsoil, the exposed subgrade should be inspected by Naylor Engineering Associates Ltd. Fill should be placed in maximum 300 mm thick lifts and compacted to the following minimum percentages of standard Proctor maximum dry density (SPMDD):

| Fill Use | Minimum Compaction Required |
|---|---|
| Structural fill to support residential houses | 98% SPMDD |
| Structural fill to support commercial/industrial buildings | 100% SPMDD |
| Subgrade fill beneath streets | 95% SPMDD |
| Bulk fill in landscaped areas | 90% SPMDD |

The major soil likely to be generated from the cut areas of the residential lands is silt till. The moisture content of the silt till generally ranges between 8 and 12%, and the optimum moisture for compaction is about 9% (see Figures 2 and 3). The silt till will have to be allowed to dry before it can be used as structural fill, and therefore we recommend that any structural filling be carried out in the drier summer months.

The structural fill should extend at least 1.0 m beyond the footing edge of any building and down to the subgrade level at a slope of 45° to the horizontal. A typical detail for structural fill placement beneath house foundations is shown on Drawing 5, appended.

The major soil likely to be generated from the apartment block side of the site is sand and gravel and this material will be well-suited for compaction.

Full-time inspection by experienced geotechnical personnel should be carried out during fill placement and compaction to examine and approve potential sources of fill material, and to carefully monitor the placement and verify the compaction by insitu density testing.

## 4.2 Site Servicing

Following the site grading operations, the property will be serviced to provide the individual lots and blocks with full municipal services. It is anticipated that the invert levels for the watermains and sewers will be at conventional depths, some 2 to 4 m below finished grade.

Temporary excavations to conventional depths for installation of underground pipes at this site should comply with Regulation 213/91 (Construction Projects) under the Ontario Occupational Health and Safety Act. The predominant soils encountered in the test holes would be classified as Type 2 soils, and temporary side slopes should be cut near vertical in the bottom 1.2 m and then trimmed back to an inclination of maximum 1 horizontal to 1 vertical.

No major groundwater problems are envisaged for excavations at this site. In general, low to moderate rates of seepage are to be expected from the silt till. It is expected that the groundwater inflow can be handled using conventional sump pumping techniques.

The subgrade soils beneath the watermain and sewer pipes will comprise native mineral soils or compacted fill placed during the site grading operations. No bearing problems are anticipated for flexible or rigid pipes founded in the native deposits or compacted on-site soils. The bedding should be placed in accordance with Ontario Provincial Standard Drawings (OPSD 802.030 and 802.033).

Pipe bedding for water and sewer services should be conventional Class 'B' pipe bedding comprising a minimum 150 mm thick layer of OPSS Granular 'A' aggregate below the pipe invert. The bedding course may be thickened if portions of the subgrade become unduly wet during excavation. Granular 'A' type aggregate should be provided around the pipe to at least 300 mm above the pipe. The bedding aggregate should be compacted to a minimum 98% SPMDD.

The trenches above the specified pipe bedding should be backfilled with inorganic on-site soils placed in 300 mm thick lifts and compacted to at least 95% SPMDD. Based on the results of insitu moisture content and standard Proctor moisture-density tests carried out on the native overburden deposits, the majority of the on-site excavated materials will be compactable to the required 95% SPMDD. The silt till soil may require some drying prior to re-use as trench backfill.

To minimize potential problems, backfilling operations should follow closely after excavation so that only a minimal length of trench is exposed. Care should be taken to protect side slopes of excavations by diverting surface run-off away from the excavations. If construction extends into the winter, then the backfilling operations should be planned so that exposure of the backfill material to frost is kept to a minimum and to ensure that frozen material is not used as backfill.

Excavations for the installation of sewers across the apartment block may extend into saturated sand and gravel deposits. The hydraulic conductivity of the granular soil is estimated to be in the order of $10^{-5}$ m/s based on the gradation analysis. Moderate to significant groundwater inflow through the granular soil is expected where the excavations extend below an elevation of 320.4 m. It is believed that the groundwater inflow can be controlled with high capacity pumps and perimeter interceptor ditches. In order to facilitate sewer installation more than 0.6 m below the stabilized groundwater table, a dewatering system installed by a specialist dewatering contractor may be required to lower groundwater level prior to excavation.

Frequent inspection and compaction testing by experienced geotechnical personnel should be carried out to examine and approve backfill materials, and to verify that the specified degree of compaction has been achieved.

## 4.3 Pavement Design

A number of local residential streets are planned for the residential subdivision. Following site grading and installation of services, the pavement subgrade will comprise predominantly recompacted excavated silt tilt soils. The following pavement component thicknesses are recommended based on the proposed pavement usage, and the frost-susceptibility and strength of the subgrade soils:

| Pavement Component | Local Streets |
|---|---|
| Asphaltic Concrete | 90 mm |
| Granular 'A' Base Course | 150 mm |
| Granular 'B' Subbase Course | 450 mm |

The pavement subgrade materials should be thoroughly proof-rolled under supervision of a geotechnical engineer prior to placement of the Granular 'B' subbase course. If any unstable areas are noted, then the Granular 'B' thickness may need to be increased to support pavement construction traffic. This should be left as a field decision at the time of construction, but it is recommended that these materials be carried as a provisional item under the construction contract.

Samples of both the Granular 'A' and Granular 'B' aggregates should be checked for conformance to OPSS 1010 prior to utilization on site and during construction. The Granular 'B' subbase and Granular 'A' base courses must be compacted to 100% SPMDD, as verified by insitu density testing.

The asphaltic concrete should comprise a binder layer of HL4 and a surface layer of HL3. It is recommended that the compacted thickness be 55 mm of HL4 binder and 35 mm of HL3 surface for the local streets. The purpose of the thicker HL4 layer is to support construction traffic during the time period before the HL3 is placed.

The asphaltic concrete paving materials should conform to the requirements of OPSS 1150. The asphalt should be placed in accordance with OPSS 310 and compacted to within the range of 92.0 to 97.5% of the plant produced Maximum Relative Density (MRD) value. The Performance Graded Asphalt Cement designation for the asphaltic concrete is 58-28.

The silt till subgrade soils has poor natural drainage and therefore continuous pavement subdrains are recommended. A typical detail of a pavement subdrain is provided in Drawing 4, appended.

The concrete for sidewalks, and curb and gutter should be proportioned, mixed, placed, and cured in accordance with the requirements of OPSS 351, 353, and 1350, and shall meet the following specific requirements:

- minimum 28-day compressive strength = 32 MPa
- slump = maximum 80 mm
- air entrainment = 6.5% ± 1.5%

During cold weather, the freshly placed concrete must be covered with insulating blankets to protect against freezing. Three cylinders from each day's pour should be taken for compressive strength testing. Air entrainment, temperature, and slump tests should be made from the same batch of concrete from which test cylinders are made.

The subgrade for the sidewalks should comprise undisturbed native mineral soil or well-compacted fill. A minimum 150 mm thick layer of compacted Granular 'A' type aggregate should be placed beneath the sidewalk slabs.

## 4.4 House Foundations

The undisturbed native mineral soil deposits underlying this site are considered suitable to support residential house foundations. Where the footing levels will be above the existing native mineral soil grade, structural fill will be utilized. The native soil or properly compacted structural fill will be suitable to support house footings proportioned to the minimum sizes provided in Part 9 of the Ontario Building Code.

All founding surfaces for residential dwellings on structural fill or native soils should be inspected by Naylor Engineering Associates Ltd. personnel prior to placing concrete. The purpose of the inspection is to ensure that the subgrade soils are capable of supporting the house foundations, and to confirm that the house envelope does not extend beyond the limits of the structural fill pad.

The subgrade soils are considered to be frost susceptible and must be protected from freezing at all times including during construction. The exterior footings, or footings in unheated areas, should be provided with a minimum 1.20 m of earth cover upon final grading for frost protection.

House basements at this site must be provided with perimeter weeping tile systems as per the Ontario Building Code. The drain tile or pipe should be laid on undisturbed or well-compacted soil so that the top of the tile or pipe is below the bottom of the basement floor slab. The weeping tile must drain to a suitable frost-free outlet or sump as per City of Guelph requirements. We recommend that the bedding for the tiles comprise concrete sand.

## 4.5 Stormwater Management

At the time of the report preparation, no design details of the SWM pond were available for review. In general, the silty soils at the site will not allow stormwater infiltration; however, the SWM pond will be suitable for storage and siltation control. The sand and gravel deposit on the east side of the property would allow stormwater infiltration.

It is anticipated that berms will be required to create the SWM pond. The berms should be constructed using the on-site silt till. The berm fill should be placed in thin lifts and compacted to at least 95% SPMDD.

The SWM pond berms should be sloped at 3 horizontal to 1 vertical, or flatter, and should be re-topsoiled and vegetated as soon as possible.

It is anticipated at-source dry well infiltration may be considered for the subdivision. The soils in the proposed residential area have a high silt content and are not suitable for at-source drywell infiltration. In the proposed apartment block, the sand and gravel deposits may be used for at-source infiltration. Based on particle size distribution analyses, we estimate that the hydraulic conductivity of the native sand and gravel is in the order of $10^{-5}$ m/s. We recommend that an infiltration rate of 15 mm/hr be assumed for sizing the dry wells. All drywell subgrades should be inspected by Naylor Engineering Associates Ltd. to confirm the conditions are suitable for infiltration.

## 4.6 Apartment Buildings

At the time of the report preparation, no building locations for the apartment blocks were available. We recommend further investigation when this information is available to determine subsurface condition details for foundations and services.

All organics and other deleterious materials should be removed from beneath the footprint of the proposed building(s) and new pavement areas.

Following removal of unsuitable material, the exposed subgrade should be inspected by a geotechnical engineer. Any soft or unstable areas should be subexcavated. The native subgrade soil will comprise sand and gravel and will be contacted below the topsoil.

The undisturbed native mineral soils are considered suitable to support conventional building foundations. If the footing levels will be above the existing native mineral soils, then structural fill should be placed as noted in Section 4.1. Building foundations constructed on the native mineral soil or approved structural fill may be proportioned for a nominal net allowable bearing pressure of 200 kPa.

All founding surfaces for buildings on structural fill or native soils should be inspected by Naylor Engineering Associates Ltd. personnel prior to placing concrete. The purpose of the inspection is to ensure that the subgrade soils are capable of supporting the foundations, and to confirm that the building envelope does not extend beyond the limits of the structural fill pad.

The subgrade soils are considered to be frost susceptible and must be protected from freezing at all times including during construction. The exterior footings or footings in unheated areas should be provided with a minimum 1.20 m of earth cover upon final grading for frost protection.

## 4.7 Slope Stability Assessment

In order to analyze the stability of the existing slope, Boreholes 104 to 106 were advanced near the top of slope. A slope profile at the steepest location is shown on Drawing 2. The information was then used for computer analyses of the slope stability using the Slope/W Program (Mortgenstern-Price Method). The results of the analyses are shown on Drawing 3.

The soil parameters used in the analyses have been estimated based on the results of the field and laboratory testing and are as follows:

| Soil Material | Unit Weight ($kN/m^3$) | Angle of Internal Friction | Cohesion (kPa) |
|---|---|---|---|
| Silt Till | 22 | 32° | 20 |

The slope stability analyses were carried out for a number of potential failure types. The various failures analyzed included shallow slumping type failure of the slope surface, medium depth rotational failures in the silt till, and deep rotational failures through the entire height of the slope.

In order to determine an appropriate development setback from the top of slope, a minimum factor of safety of 1.50 was used as per Grand River Conservation Authority policy. The steepest slope profile was used for the analyses to determine the setback required to achieve this factor of safety. The setback is typically determined based on the point at which the failure slipcircle (for factor of safety of 1.50) intersects the tableland of the crest of the slope; however, the analyses revealed that the slope has a factor of safety of greater than 1.50. The analysis reveals that the slope has a factor of safety of 2.75 which is well above the Grand River Conservation Authority minimum slope factor of safety.

Toe erosion at the wetland at the bottom of the slope is expected to be minor. A nominal 100 year erosion setback of 1 m is recommended.

A 6 m erosion access allowance is recommended for slopes by the Ministry of Natural Resources. The erosion access allowance is the setback needed to ensure enough space is available for workers and vehicles to access the area.

In conclusion, the primary causes of potential instability for the slope embankment would be development and loading directly at the crest, and general surface erosion caused by run-off from the site. To ensure no loading at the crest (from buildings, pools, fill, etc.) and to compensate for possible long-term erosion, the following setbacks from the top of slope are recommended:

| Cross-Section | Stability Setback for Factor of Safety of 1.50 (m) | 100 year Erosion Setback (m) | Erosion Access Allowance Setback (m) | Total Development Setback from Top of Slope (m) |
|---|---|---|---|---|
| A-A' | 0 | 1 | 6 | 7 |

The estimated top of slope and 'total development setback' lines are shown on Drawing 2, appended.

Surface run-off must be directed away from the slope crest if possible. No fill should be placed at the crest of the slope or over the face of the existing slope unless the fill placement is engineered. No excavation work should be carried out on the slope or at the bottom of the slope.

This investigation was conducted to determine geotechnical parameters for the construction of the proposed residential subdivision and apartment block on Cityview Drive in Guelph, Ontario. The recommendations in this report are based on subsurface conditions encountered at specific borehole locations, and conditions between the boreholes will vary. Should conditions be encountered which differ materially from those at the borehole locations, we ask that we be notified immediately in order to assess the additional information and its effects on our conclusions.

Respectfully submitted,

LICENSED PROFESSIONAL ENGINEER
D. S. NAYLOR
33646761
2012-02-17
PROVINCE OF ONTARIO

Neal Morris, B.Sc. (Eng)

Dave S. Naylor, P.Eng.
Senior Consulting Engineer

jb/jmp

# LIST OF ABBREVIATIONS

The abbreviations commonly employed on the borehole logs, on the figures, and in the text of the report, are as follows:

| Sample Types | | Soil Tests and Properties | |
|---|---|---|---|
| AS | auger sample | SPT | Standard Penetration Test |
| CS | chunk sample | UC | unconfined compression |
| RC | rock core | FV | field vane test |
| SS | split spoon | ø | angle of internal friction |
| TW | thin-walled, open | $\gamma$ | unit weight |
| WS | wash sample | $w_p$ | plastic limit |
| | | w | water content |
| | | $w_l$ | liquid limit |
| | | $I_L$ | liquidity index |
| | | $I_p$ | plasticity index |
| | | PP | pocket penetrometer |

**Penetration Resistances**

| | |
|---|---|
| Dynamic Penetration Resistance | The number of blows by a 63.5 kg (140 lb.) hammer dropped 0.76 m (30 in.) required to drive a 50 mm (2 in.) diameter 60 ° cone a distance 0.30 m (12 in.). The cone is attached to 'A' size drill rods and casing is not used. |
| Standard Penetration Resistance, N (ASTM D1586) | The number of blows by a 63.5 kg (140 lb.) hammer dropped 0.76 m (30 in.) required to drive a standard split spoon sampler 0.30 m (12 in.) |
| WH | sampler advanced by static weight of hammer |
| PH | sampler advanced by hydraulic pressure |
| PM | sampler advanced by manual pressure |

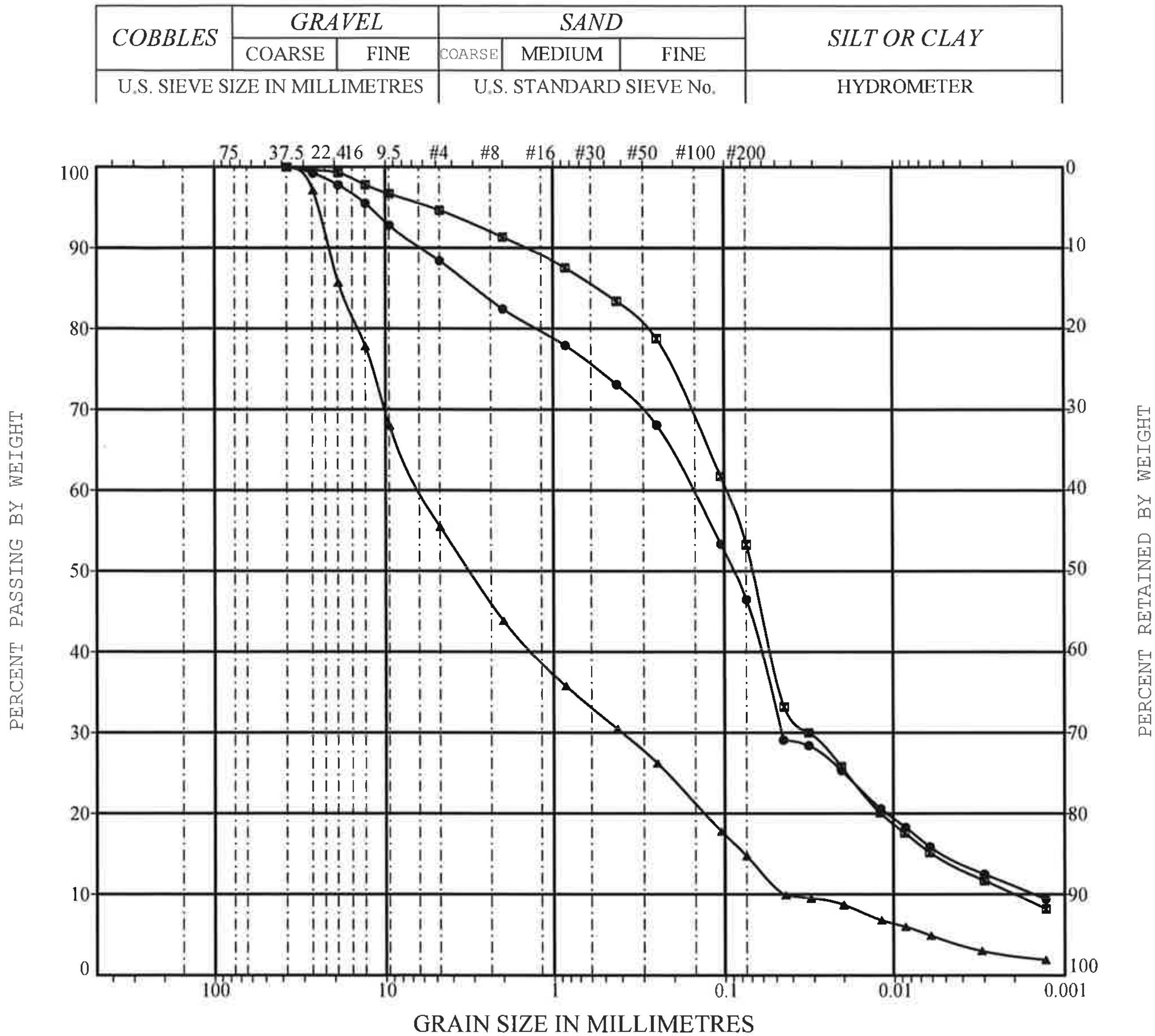
**Soil Description**

| **Cohesionless Soils** | **SPT 'N' Value** | **$D_r$ (%)** |
|---|---|---|
| **Relative Density ($D_r$)** | (blows per 0.30 m) | |
| Very Loose | 0 to 4 | 0 to 20 |
| Loose | 4 to 10 | 20 to 40 |
| Compact | 10 to 30 | 40 to 60 |
| Dense | 30 to 50 | 60 to 80 |
| Very Dense | over 50 | 80 to 100 |

| **Cohesive Soils** | Undrained Shear Strength ($C_u$) | |
|---|---|---|
| **Consistency** | **kPa** | **psf** |
| Very Soft | less than 12 | less than 250 |
| Soft | 12 to 25 | 250 to 500 |
| Firm | 25 to 50 | 500 to 1000 |
| Stiff | 50 to 100 | 1000 to 2000 |
| Very Stiff | 100 to 200 | 2000 to 4000 |
| Hard | over 200 | over 4000 |

| | |
|---|---|
| DTPL | Drier than plastic limit |
| APL | About plastic limit |
| WTPL | Wetter than plastic limit |

## UNIFIED SOIL CLASSIFICATION




PROJECT P.T. Valeriote Subdivision

LOCATION Cityview Drive, Guelph, Ontario JOB NO. 0353G4

| CURVE ID | BOREHOLE/ TEST PIT | SAMPLE NO. | DEPTH (m) | SOIL DESCRIPTION |
|---|---|---|---|---|
| ● | BH101 | BS | 1.85-3.05 | SILT TILL: SILT and SAND, some Gravel, trace Clay |
| ⊠ | BH105 | BS | 1.22-2.13 | SILT TILL: SAND and SILT, trace Gravel and Clay |
| ▲ | BH110 | Sa2 | 5.00-6.50 | SAND AND GRAVEL, some Silt |

REMARKS

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Figure No. 1

FIGURE NO. 2

Naylor Engineering Associates
CONSULTING ENGINEERS

# LABORATORY PROCTOR MOISTURE-DENSITY TEST

PROJECT P.T. Valeriote Subdivision

LOCATION Cityview Drive, Guelph, Ontario JOB NO. 0353G4

BOREHOLE NO. BH105 DATE TESTED August 21, 2006

SAMPLE DEPTH 1.22 - 2.13 TESTED BY WF

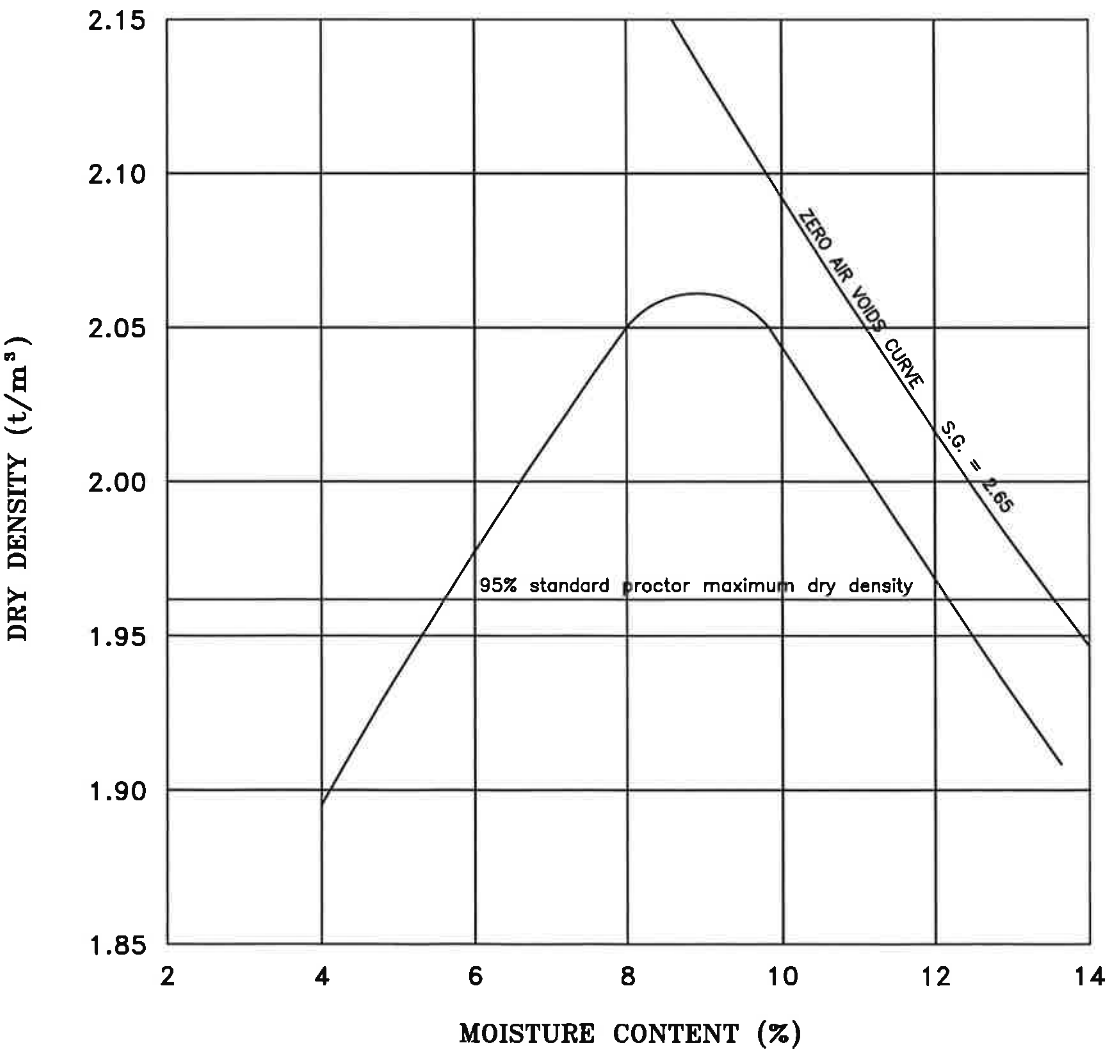
SOIL TYPE SILT TILL MOISTURE CONTENT 14.9%

REMARKS

STANDARD PROCTOR - ASTM D698-91
METHOD - A ☑ B ☐ C ☐ D ☐
MODIFIED PROCTOR - ASTM D1557-91
METHOD - A ☐ B ☐ C ☐ D ☐

MAXIMUM DRY DENSITY 2.065 $t/m^3$

OPTIMUM MOISTURE 9.0%




F:\0353\0353G4\0353G4_Figure 1.dwg
August 25, 2006 (GRL)

FIGURE NO. 3

Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

# LABORATORY PROCTOR MOISTURE-DENSITY TEST

PROJECT P.T. Valeriote Subdivision

LOCATION Cityview Drive, Guelph, Ontario JOB NO. 0353G4

BOREHOLE NO. BH106 DATE TESTED August 21, 2006

SAMPLE DEPTH 1.52 - 3.05m TESTED BY KJ

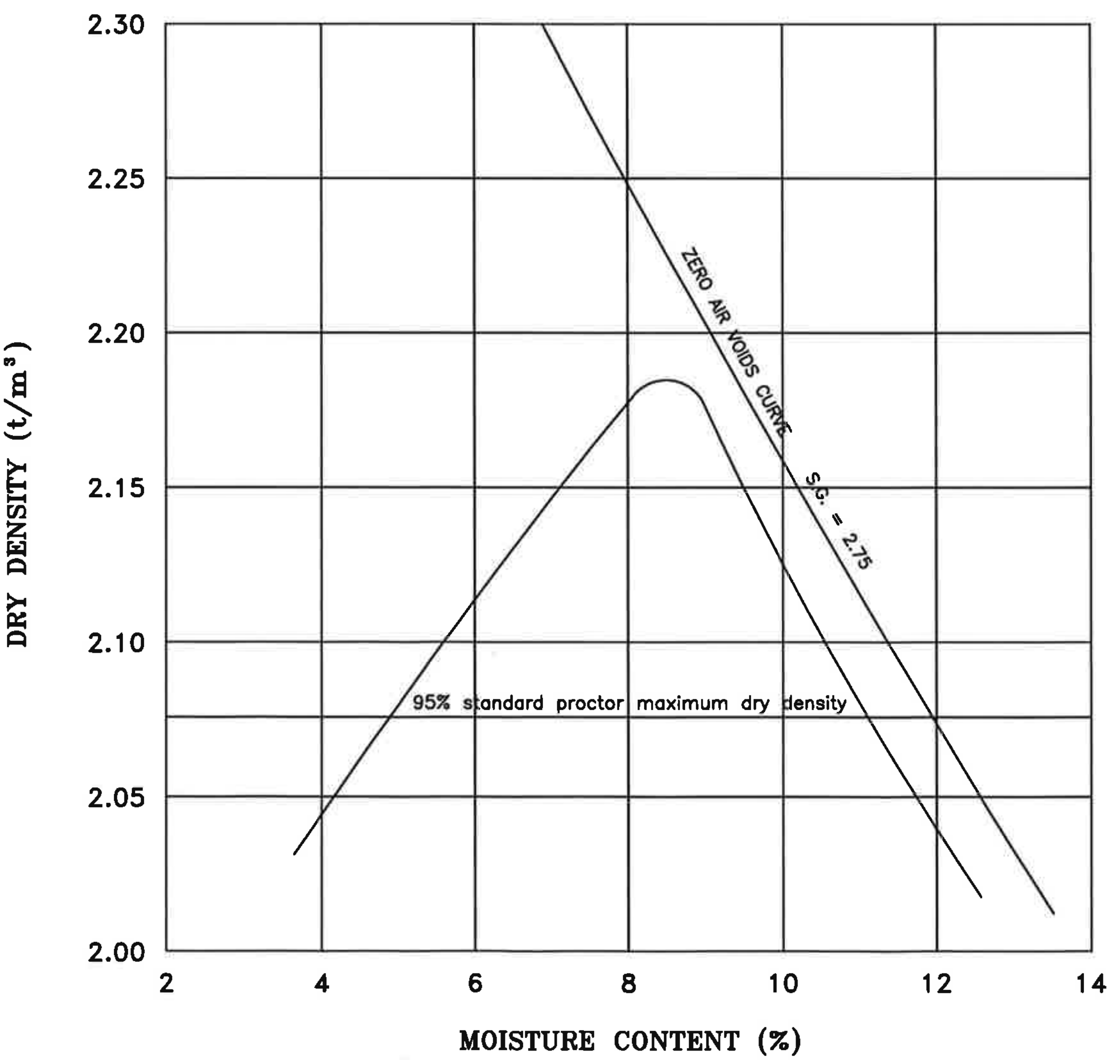
SOIL TYPE SILT TILL MOISTURE CONTENT 8.7%

REMARKS

STANDARD PROCTOR - ASTM D698-91
METHOD - A ☐ B ☐ C ☑ D ☐
MODIFIED PROCTOR - ASTM D1557-91
METHOD - A ☐ B ☐ C ☐ D ☐

MAXIMUM DRY DENSITY 2.185 $t/m^3$

OPTIMUM MOISTURE 8.7%




F:\0353\0353G4\0353G4_Figure 2.dwg
August 28, 2006 (GRL)

Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

# Borehole Number: 101

**Ground Elevation:** *338.61 m*

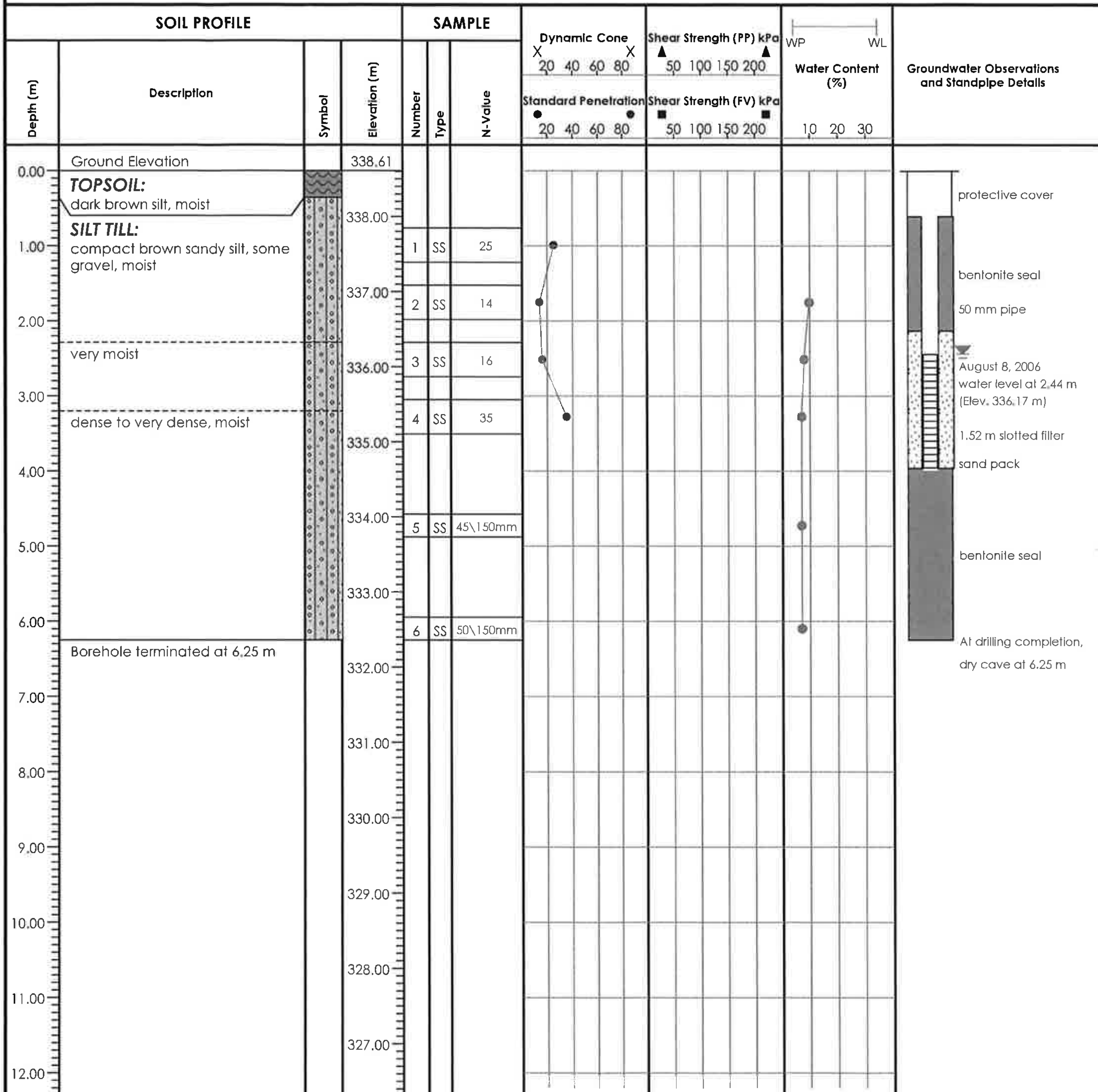
**Project:** *P.T. Valeriote Subdivision*

**Location:** *Cityview Drive, Guelph, Ontario*

**Job No.:** *0353G4*

**Drill Date:** *August 2, 2006*

| Depth (m) | Description | Elevation (m) | Sample Number | Type | N-Value |
|---|---|---|---|---|---|
| | Ground Elevation | 338.61 | | | |
| 0.00 | **TOPSOIL:** dark brown silt, moist | | | | |
| | **SILT TILL:** compact brown sandy silt, some gravel, moist | | 1 | SS | 25 |
| | | | 2 | SS | 14 |
| | very moist | | 3 | SS | 16 |
| | dense to very dense, moist | | 4 | SS | 35 |
| | | | 5 | SS | 45\150mm |
| | | | 6 | SS | 50\150mm |
| | Borehole terminated at 6.25 m | | | | |




**Reviewed by:** *DN*

**Drill Method:** *Solid Stem Auger*

**Notes:** *Bulk sample taken from 1.83 to 3.05 m.*

**Field Tech.:** *RM*

**Sheet:** *1 of 1*

**Drafted by:** *DC(01a)*

Naylor Engineering Associates

## Borehole Number: 102

**Ground Elevation:** *334.42 m*

**Project:** *P.T. Valeriote Subdivision*

**Job No.:** *0353G4*

**Location:** *Cityview Drive, Guelph, Ontario*

**Drill Date:** *August 2, 2006*

| SOIL PROFILE | | | | SAMPLE | | |
|---|---|---|---|---|---|---|
| Depth (m) | Description | Symbol | Elevation (m) | Number | Type | N-Value |
| | Ground Elevation | | 334.42 | | | |
| 0.00 | **TOPSOIL:** dark brown silt, moist | | | | | |
| | **SILT TILL:** loose brown sandy silt, some gravel, trace clay, very moist | | | | | |
| 1.00 | | | | 1 | SS | 9 |
| | | | 333.00 | | | |
| 2.00 | | | | 2 | SS | 5 |
| | compact, very moist | | 332.00 | 3 | SS | 11 |
| 3.00 | very dense, moist | | | 4 | SS | 50\150mm |
| | | | 331.00 | | | |
| 4.00 | | | | | | |
| | | | 330.00 | 5 | SS | 45\150mm |
| 5.00 | | | | | | |
| | augering on weathered bedrock or boulder | | 329.00 | | | |
| 6.00 | Borehole terminated at 5.74 m upon auger refusal on bedrock or boulder | | | | | |
| | | | 328.00 | | | |
| 7.00 | | | | | | |
| | | | 327.00 | | | |
| 8.00 | | | | | | |
| | | | 326.00 | | | |
| 9.00 | | | | | | |
| | | | 325.00 | | | |
| 10.00 | | | | | | |
| | | | 324.00 | | | |
| 11.00 | | | | | | |
| | | | 323.00 | | | |
| 12.00 | | | | | | |

Dynamic Cone X — 20 40 60 80

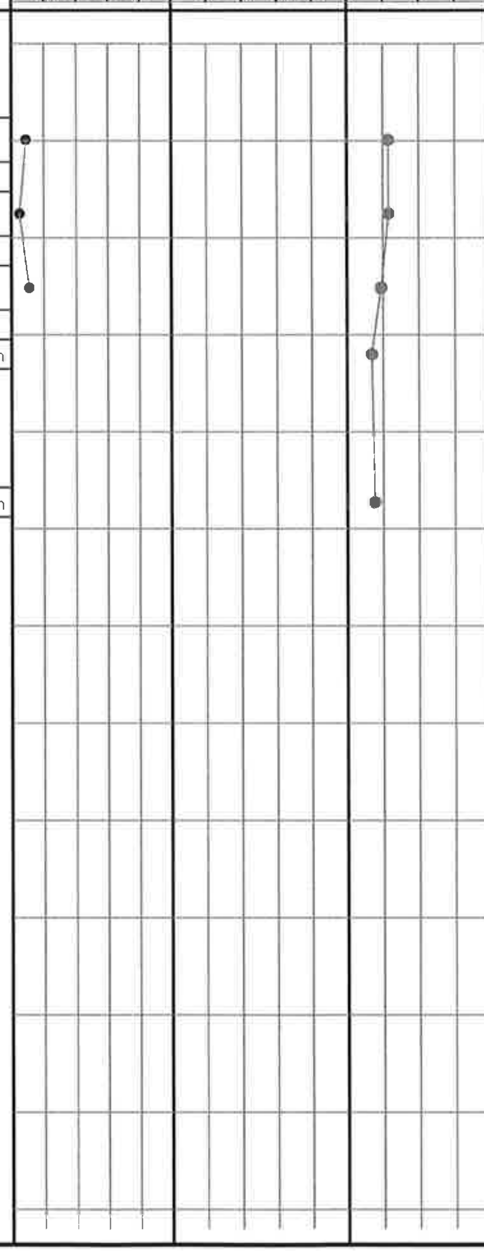
Standard Penetration ● — 20 40 60 80

Shear Strength (PP) kPa ▲ — 50 100 150 200

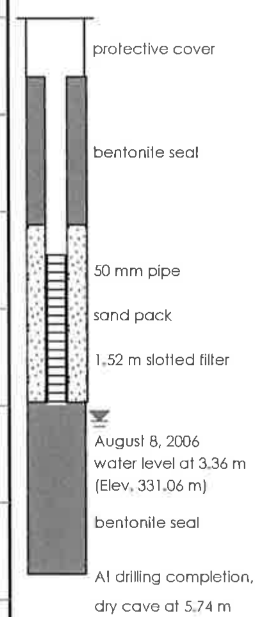
Shear Strength (FV) kPa ■ — 50 100 150 200

WP — WL

Water Content (%) — 10 20 30



Groundwater Observations and Standpipe Details




**Reviewed by:** *DN*

**Field Tech.:** *RM*

**Drill Method:** *Solid Stem Auger*

**Sheet:** *1 of 1*

**Notes:**

**Drafted by:** *DC(01a)*

Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

# Borehole Number: 103

**Ground Elevation:** *344.44 m*

**Project:** *P.T. Valeriote Subdivision*

**Location:** *Cityview Drive, Guelph, Ontario*

**Job No.:** *0353G4*

**Drill Date:** *July 31, 2006*

## SOIL PROFILE

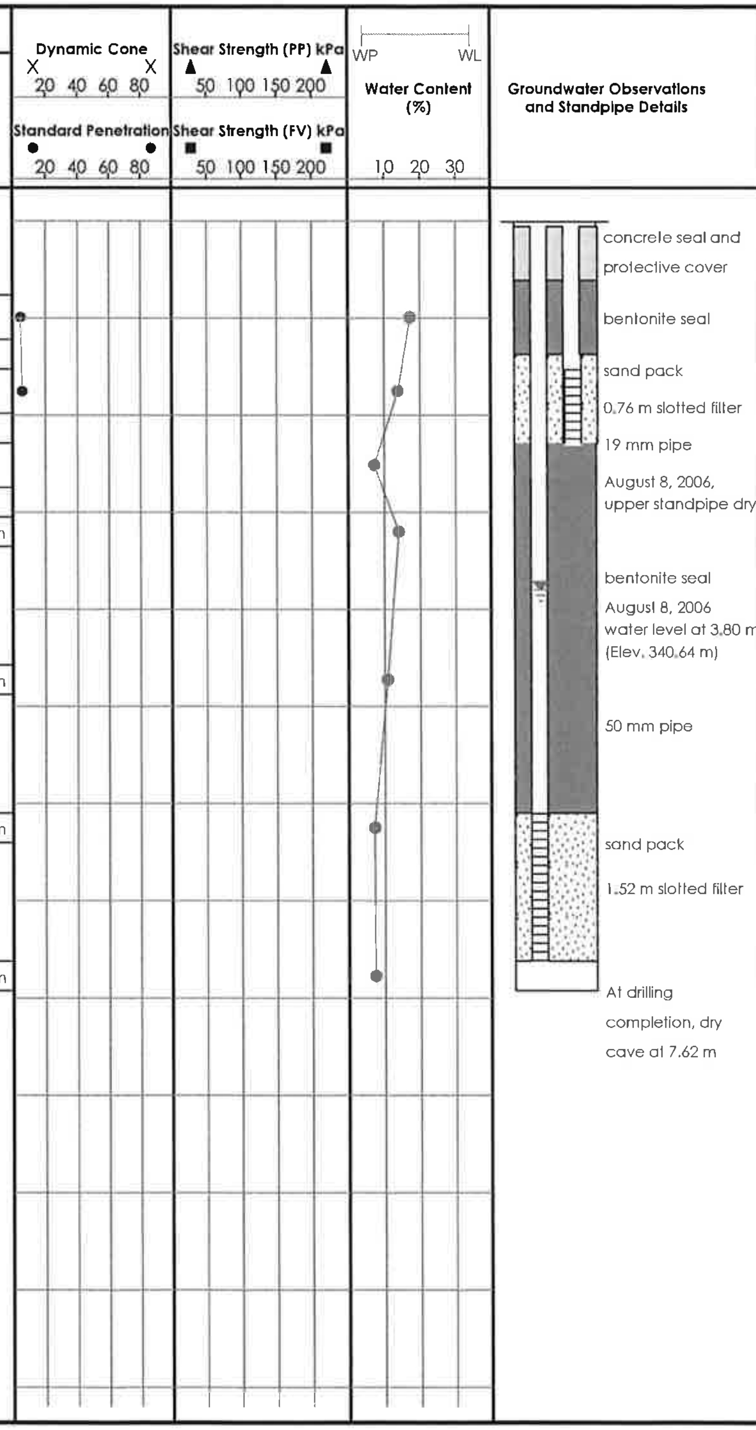
| Depth (m) | Description | Elevation (m) |
|---|---|---|
| | Ground Elevation | 344.44 |
| 0.00 | **TOPSOIL:** dark brown silt, moist | |
| | **SILT TILL:** loose rusty brown silt, some sand, trace clay and gravel, trace tree roots, moist to very moist | |
| | dense to very dense brown sandy silt, some gravel, trace clay, moist | |
| | grey, moist | |
| | Borehole terminated at 7.92 m | |

## SAMPLE

| Number | Type | N-Value |
|---|---|---|
| 1 | SS | 5 |
| 2 | SS | 6 |
| 3 | SS | * |
| 4 | SS | 55\150mm |
| 5 | SS | 45\150mm |
| 6 | SS | 60\150mm |
| 7 | SS | 75\150mm |

Depth scale (m): 0.00, 1.00, 2.00, 3.00, 4.00, 5.00, 6.00, 7.00, 8.00, 9.00, 10.00, 11.00, 12.00

Elevation scale (m): 343.00, 342.00, 341.00, 340.00, 339.00, 338.00, 337.00, 336.00, 335.00, 334.00, 333.00




**Reviewed by:** *DN*

**Drill Method:** *Solid Stem Auger*

**Notes:** ** Sampler driving on gravel.*

**Field Tech.:** *RM*

**Sheet:** *1 of 1*

**Drafted by:** *DC(01a)*

Naylor Engineering Associates Ltd.

**Borehole Number: 104**

**Ground Elevation:** *339.95 m*

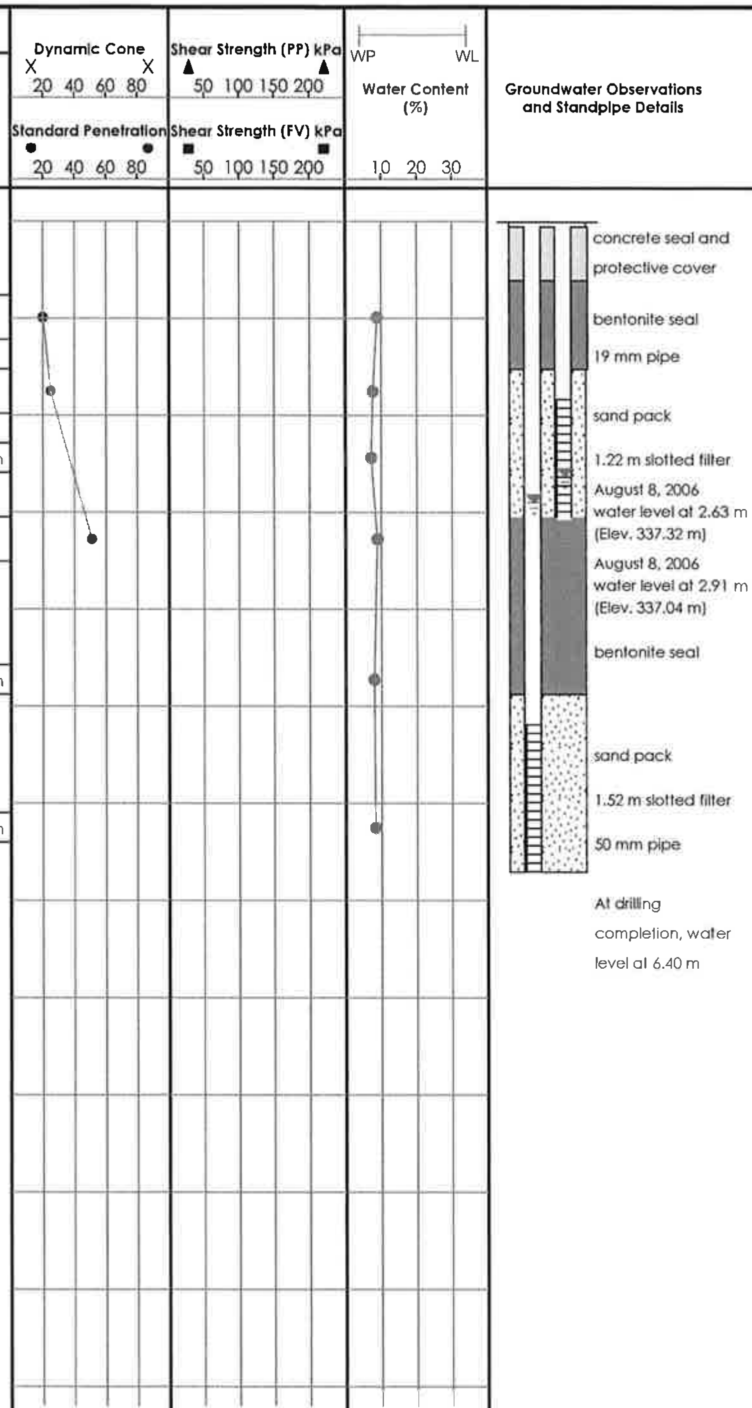
**Project:** *P.T. Valeriote Subdivision*

**Location:** *Cityview Drive, Guelph, Ontario*

**Job No.:** *0353G4*

**Drill Date:** *July 31, 2006*

| Depth (m) | Description | Elevation (m) | Number | Type | N-Value |
|---|---|---|---|---|---|
| | Ground Elevation | 339.95 | | | |
| 0.00 | **TOPSOIL:** dark brown silt, moist | | | | |
| | **SILT TILL:** compact brown sandy silt, some gravel, trace clay, moist | | | | |
| 1.00 | | 339.00 | 1 | SS | 20 |
| 2.00 | | 338.00 | 2 | SS | 25 |
| | very dense, moist | | 3 | SS | 30\150mm |
| 3.00 | | 337.00 | 4 | SS | 51 |
| 4.00 | | 336.00 | | | |
| 5.00 | | 335.00 | 5 | SS | 45\150mm |
| | cobbles, some dolostone | | | | |
| 6.00 | | 334.00 | 6 | SS | 65\150mm |
| 7.00 | Borehole terminated at 6.71 m | 333.00 | | | |
| 8.00 | | 332.00 | | | |
| 9.00 | | 331.00 | | | |
| 10.00 | | 330.00 | | | |
| 11.00 | | 329.00 | | | |
| 12.00 | | 328.00 | | | |




**Reviewed by:** *DN*

**Drill Method:** *Solid Stem Auger*

**Notes:**

**Field Tech.:** *RM*

**Sheet:** *1 of 1*

**Drafted by:** *DC(01a)*

Naylor Engineering Associates Ltd.
Consulting Engineers

# Borehole Number: 105

**Ground Elevation:** *343.82 m*

**Project:** *P.T. Valeriote Subdivision*

**Job No.:** *0353G4*

**Location:** *Cityview Drive, Guelph, Ontario*

**Drill Date:** *July 31, 2006*

## SOIL PROFILE

| Depth (m) | Description | Elevation (m) |
|---|---|---|
| | Ground Elevation | 343.82 |
| 0.00 | ***TOPSOIL:*** dark brown silt, moist | |
| | ***SILT TILL:*** loose brown silt, some sand, trace clay and gravel, very moist | 343.00 |
| | dense to very dense brown sandy silt | |
| | some cobbles | |
| | grey, moist | |
| 11.00 | augering on bedrock or boulder | |
| | Borehole terminated at 11.13 m upon auger refusal on bedrock or boulder | |

## SAMPLE

| Number | Type | N-Value |
|---|---|---|
| 1 | SS | 8 |
| 2 | SS | 4 |
| 3 | SS | 34 |
| 4 | SS | 50\150mm |
| 5 | SS | 55\150mm |
| 6 | SS | 70\150mm |
| 7 | SS | 70\150mm |
| 8 | SS | 60\150mm |

Depth (m): 0.00, 1.00, 2.00, 3.00, 4.00, 5.00, 6.00, 7.00, 8.00, 9.00, 10.00, 11.00, 12.00

Elevation (m): 343.00, 342.00, 341.00, 340.00, 339.00, 338.00, 337.00, 336.00, 335.00, 334.00, 333.00, 332.00

Dynamic Cone X — X: 20 40 60 80

Standard Penetration ● — ●: 20 40 60 80

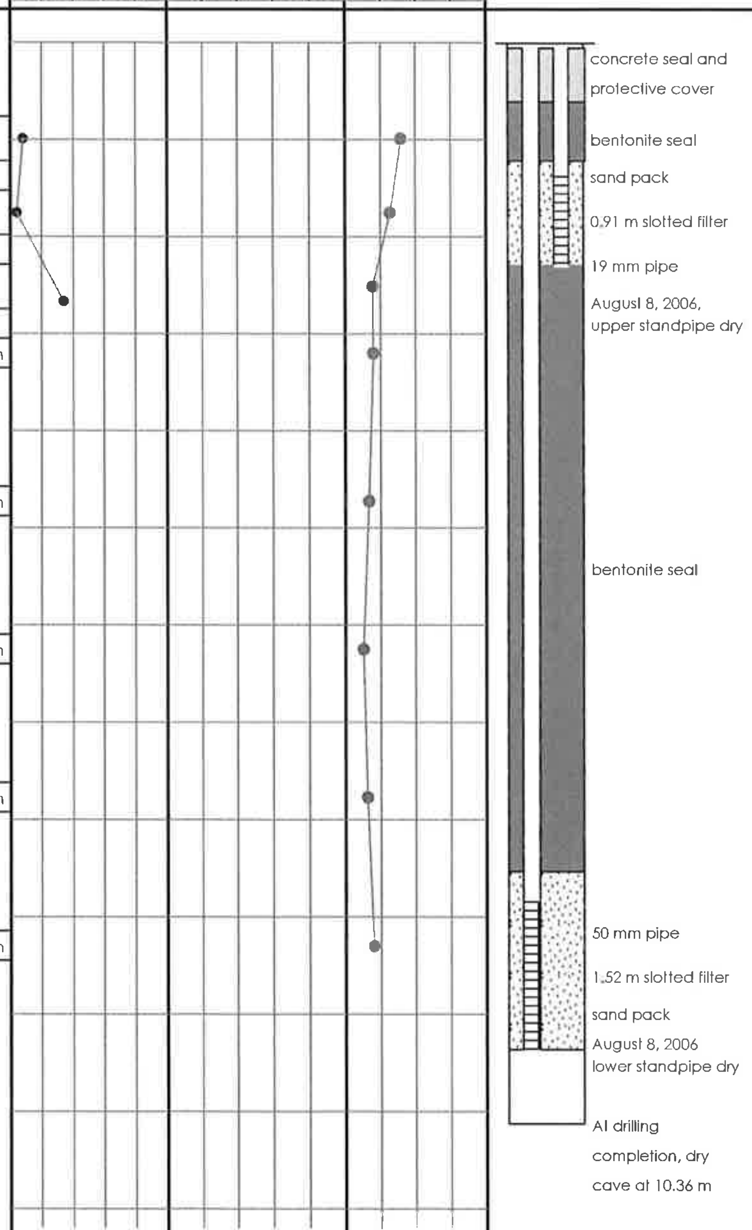
Shear Strength (PP) kPa ▲ — ▲: 50 100 150 200

Shear Strength (FV) kPa ■ — ■: 50 100 150 200

WP — WL

Water Content (%): 10 20 30

Groundwater Observations and Standpipe Details




**Reviewed by:** *DN*

**Drill Method:** *Solid Stem Auger*

**Notes:** *Bulk sample taken from 1.22 to 2.13 m.*

**Field Tech.:** *RM*

**Sheet:** *1 of 1*

**Drafted by:** *DC(01a)*

Naylor Engineering Associates Ltd.
Consulting Engineers

# Borehole Number: 106

**Ground Elevation:** *347.25 m*

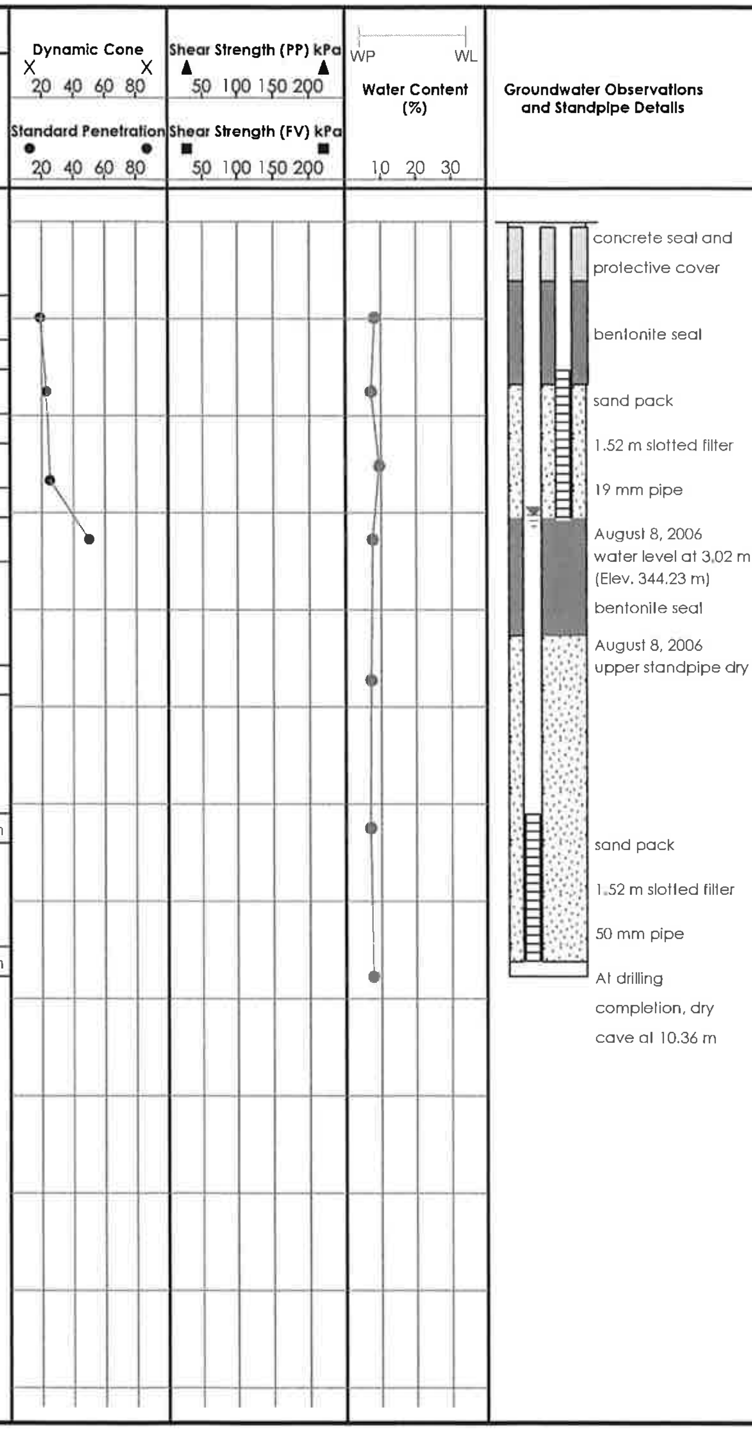
**Project:** *P.T. Valeriote Subdivision*

**Location:** *Cityview Drive, Guelph, Ontario*

**Job No.:** *0353G4*

**Drill Date:** *August 2, 2006*

| Depth (m) | Description | Elevation (m) | Number | Type | N-Value |
|---|---|---|---|---|---|
| 0.00 | Ground Elevation | 347.25 | | | |
| 0.00 | **TOPSOIL:** dark brown silt, moist | | | | |
| | **SILT TILL:** compact brown sandy silt, some gravel, trace clay, moist | | | | |
| 1.00 | | | 1 | SS | 19 |
| | some cobbles | 346.00 | | | |
| | | | 2 | SS | 23 |
| 2.00 | very moist | 345.00 | 3 | SS | 25 |
| 3.00 | dense to very dense, moist | 344.00 | 4 | SS | 50 |
| 4.00 | | 343.00 | 5 | SS | * |
| 5.00 | | 342.00 | | | |
| 6.00 | | 341.00 | 6 | SS | 40\150mm |
| 7.00 | | 340.00 | 7 | SS | 40\150mm |
| 8.00 | Borehole terminated at 7.77 m | 339.00 | | | |
| 9.00 | | 338.00 | | | |
| 10.00 | | 337.00 | | | |
| 11.00 | | 336.00 | | | |
| 12.00 | | 335.00 | | | |




**Reviewed by:** *DN*

**Drill Method:** *Solid Stem Auger*

**Notes:** *Bulk sample taken from 1.52 to 3.05 m. *Sampler bouncing on gravel.*

**Field Tech.:** *RM*

**Sheet:** *1 of 1*

**Drafted by:** *DC(01a)*

Naylor Engineering Associates Ltd.
Consulting Engineers

**Borehole Number: 107**

**Ground Elevation:** *345.47 m*

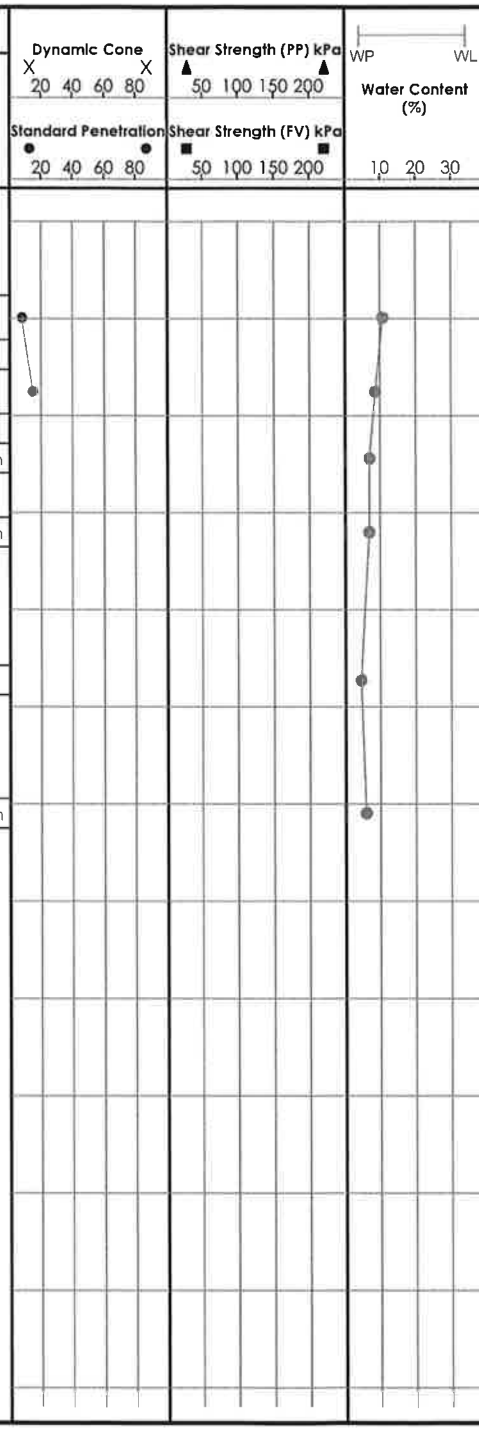
**Project:** *P.T. Valeriote Subdivision*

**Location:** *Cityview Drive, Guelph, Ontario*

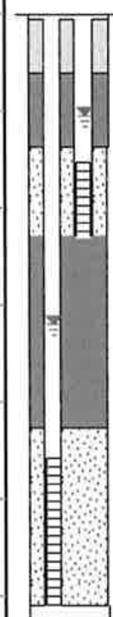
**Job No.:** *0353G4*

**Drill Date:** *July 31, 2006*

| SOIL PROFILE | | | | SAMPLE | | |
|---|---|---|---|---|---|---|
| Depth (m) | Description | Symbol | Elevation (m) | Number | Type | N-Value |
| 0.00 | Ground Elevation | | 345.47 | | | |
| | **TOPSOIL:** dark brown silt, moist | | | | | |
| 1.00 | **SILT TILL:** loose brown silt, some sand, trace clay, very moist | | | 1 | SS | 8 |
| | compact | | 344.00 | 2 | SS | 15 |
| 2.00 | compact to very dense brown sandy silt, some gravel | | | | | |
| | | | 343.00 | 3 | SS | 35\150mm |
| 3.00 | | | | 4 | SS | 50\150mm |
| | grey, moist | | 342.00 | | | |
| 4.00 | | | | | | |
| | | | 341.00 | 5 | SS | * |
| 5.00 | | | | | | |
| | | | 340.00 | | | |
| 6.00 | | | | 6 | SS | 60\150mm |
| | Borehole terminated at 6.25 m | | 339.00 | | | |
| 7.00 | | | | | | |
| | | | 338.00 | | | |
| 8.00 | | | | | | |
| | | | 337.00 | | | |
| 9.00 | | | | | | |
| | | | 336.00 | | | |
| 10.00 | | | | | | |
| | | | 335.00 | | | |
| 11.00 | | | | | | |
| | | | 334.00 | | | |
| 12.00 | | | | | | |




Groundwater Observations and Standpipe Details




At drilling completion, dry cave at 6.10 m

August 8, 2006 water level in upper standpipe at 1.05 m (Elev. 344.42 m) water level in lower standpipe at 3.20 m (Elev. 342.27 m)

**Reviewed by:** *DN*

**Drill Method:** *Solid Stem Auger*

**Notes:** ** Sampler bouncing on gravel.*

**Field Tech.:** *RM*

**Sheet:** *1 of 1*

**Drafted by:** *DC(01a)*

Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

**Borehole Number: 108**

**Ground Elevation:** *342.70 m*

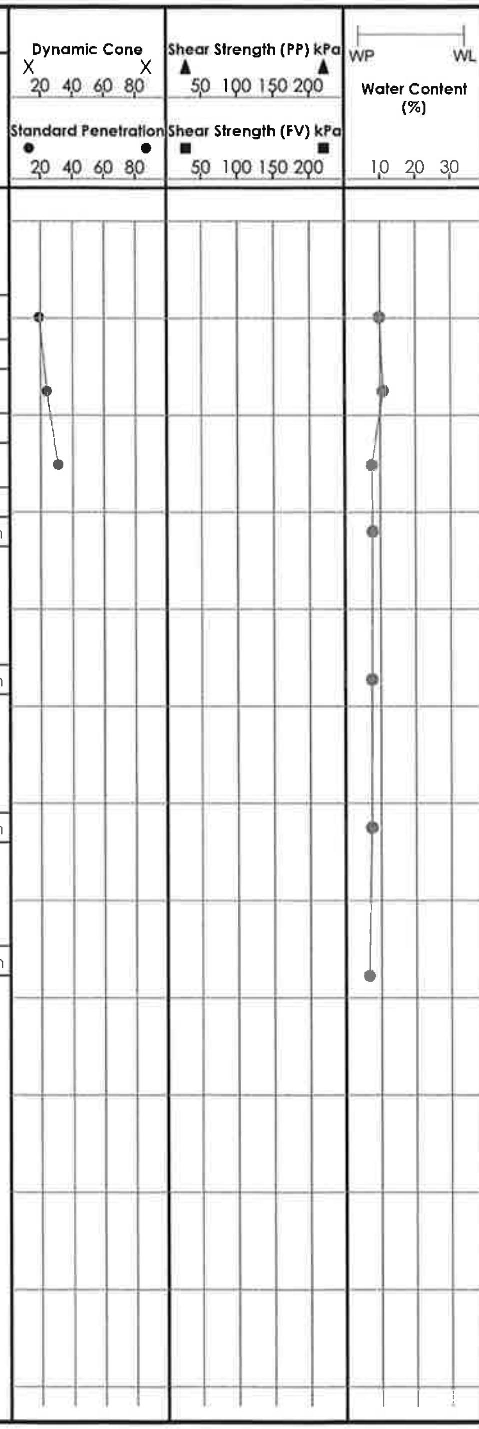
**Project:** *P.T. Valeriote Subdivision*

**Location:** *Cityview Drive, Guelph, Ontario*

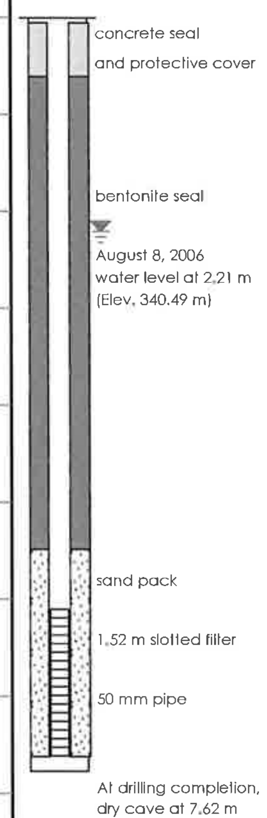
**Job No.:** *0353G4*

**Drill Date:** *July 31, 2006*

| Depth (m) | Description | Elevation (m) | Number | Type | N-Value |
|---|---|---|---|---|---|
| | Ground Elevation | 342.70 | | | |
| 0.00 | **TOPSOIL:** dark brown silt, moist | | | | |
| | **SILT TILL:** compact brown silt, some sand, gravel and clay, moist | | 1 | SS | 19 |
| | | | 2 | SS | 24 |
| | dense to very dense, trace clay, moist | | 3 | SS | 31 |
| 3.00 | some cobbles | | 4 | SS | 45\150mm |
| 4.00 | grey, moist | | 5 | SS | 45\125mm |
| | | | 6 | SS | 58\150mm |
| | | | 7 | SS | 65\150mm |
| | Borehole terminated at 7.77 m | | | | |




Groundwater Observations and Standpipe Details




**Reviewed by:** *DN*

**Drill Method:** *Solid Stem Auger*

**Notes:** *Bulk sample taken from 1.52 to 3.05 m.*

**Field Tech.:** *RM*

**Sheet:** *1 of 1*

**Drafted by:** *DC(01a)*

Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

**Borehole Number: 109**

**Ground Elevation:** *326.19 m*

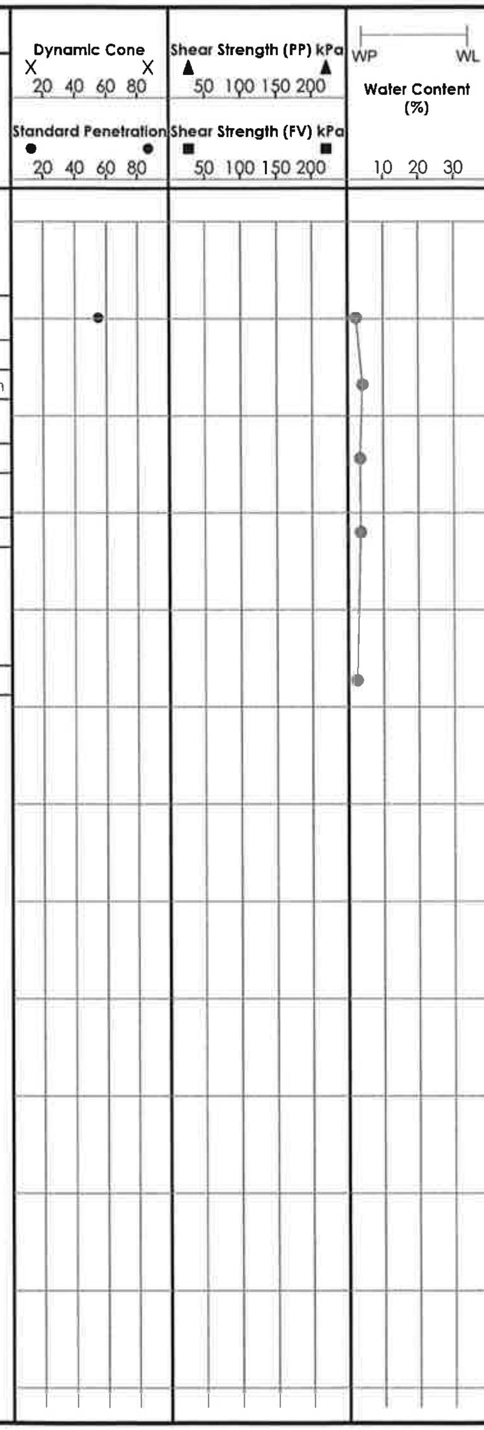
**Project:** *P.T. Valeriote Subdivision*

**Location:** *Cityview Drive, Guelph, Ontario*

**Job No.:** *0353G4*

**Drill Date:** *August 1, 2006*

| Depth (m) | Description | Elevation (m) | Sample Number | Type | N-Value | Groundwater Observations and Standpipe Details |
|---|---|---|---|---|---|---|
| | Ground Elevation | 326.19 | | | | |
| 0.00 | **TOPSOIL:** dark brown silt, moist | | | | | concrete seal and protective cover |
| | **SAND AND GRAVEL:** very dense brown sand and gravel, frequent cobbles and boulders, some silt, damp | | | | | |
| 1.00 | | 325.00 | 1 | SS | 55 | |
| | | | 2 | SS | 30\150mm | |
| 2.00 | | 324.00 | | | | bentonite seal |
| | | | 3 | SS | * | 50 mm pipe |
| 3.00 | | 323.00 | 4 | SS | * | |
| 4.00 | saturated | 322.00 | | | | sand pack; 1.52 m slotted filter |
| | | | 5 | SS | * | August 8, 2006 water level at 4.44 m (Elev. 321.75 m) |
| 5.00 | augering on possible bedrock | 321.00 | | | | |
| | Borehole terminated at 5.64 m | | | | | At drilling completion, wet cave at 3.96 m |
| 6.00 | | 320.00 | | | | |
| 7.00 | | 319.00 | | | | |
| 8.00 | | 318.00 | | | | |
| 9.00 | | 317.00 | | | | |
| 10.00 | | 316.00 | | | | |
| 11.00 | | 315.00 | | | | |
| 12.00 | | 314.00 | | | | |




**Reviewed by:** *DN*

**Drill Method:** *Solid Stem Auger*

**Notes:** ** Sampler bouncing on gravel.*

**Field Tech.:** *RM*

**Sheet:** *1 of 1*

**Drafted by:** *DC(01a)*

Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

**Borehole Number: 110**

**Ground Elevation:** *323.60 m*

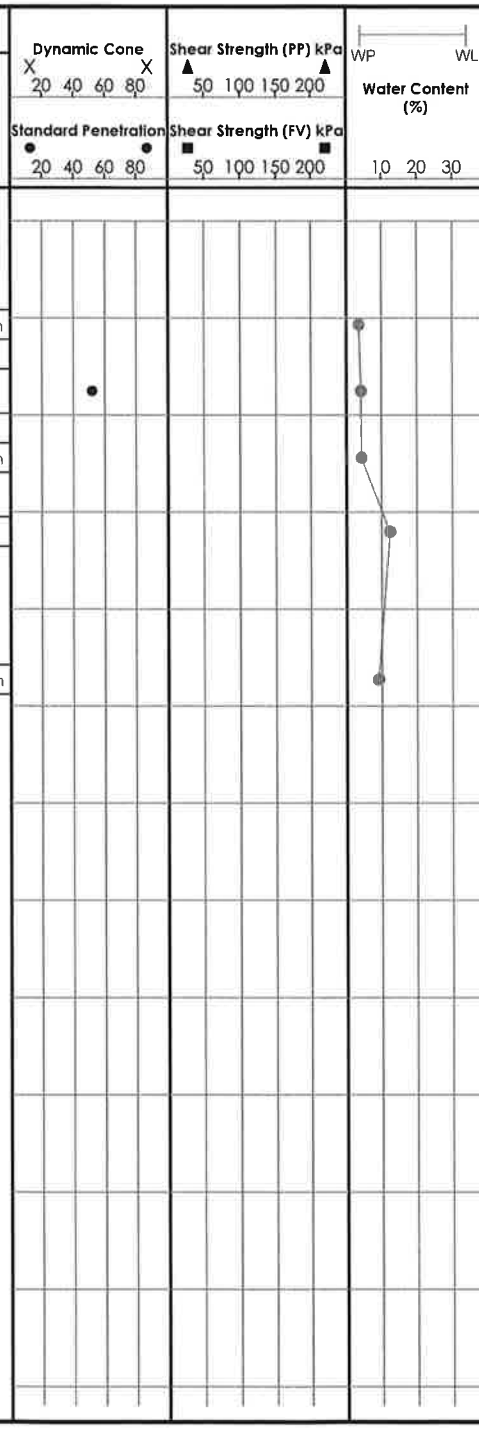
**Project:** *P.T. Valeriote Subdivision*

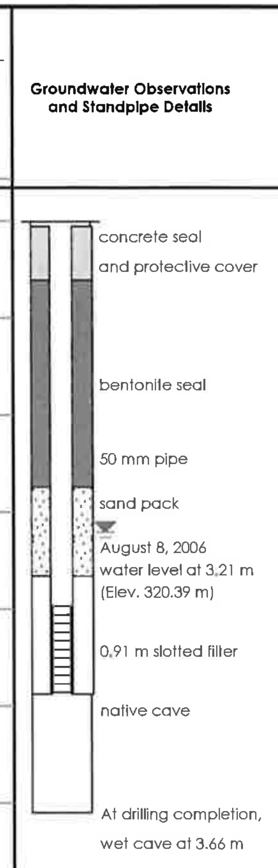
**Location:** *Cityview Drive, Guelph, Ontario*

**Job No.:** *0353G4*

**Drill Date:** *August 1, 2006*

| Depth (m) | Description | Elevation (m) | Sample Number | Type | N-Value |
|---|---|---|---|---|---|
| | Ground Elevation | 323.60 | | | |
| 0.00 | **TOPSOIL:** dark brown silt, moist | | | | |
| | **SAND AND GRAVEL:** very dense brown sand and gravel, frequent cobbles and boulders, some silt, damp | 323.00 | | | |
| 1.00 | | | 1 | SS | 40\150mm |
| 2.00 | | 322.00 | 2 | SS | 52 |
| | | 321.00 | 3 | SS | 35\150mm |
| 3.00 | saturated | | | | |
| | some silt | | 4 | SS | * |
| 4.00 | | 320.00 | | | |
| 5.00 | | 319.00 | 5 | SS | 55\150mm |
| 6.00 | Borehole terminated at 6.10 m | 318.00 | | | |
| 7.00 | | 317.00 | | | |
| 8.00 | | 316.00 | | | |
| 9.00 | | 315.00 | | | |
| 10.00 | | 314.00 | | | |
| 11.00 | | 313.00 | | | |
| 12.00 | | 312.00 | | | |




**Reviewed by:** *DN*

**Drill Method:** *Solid Stem Auger*

**Notes:** ** Sampler bouncing on gravel.*

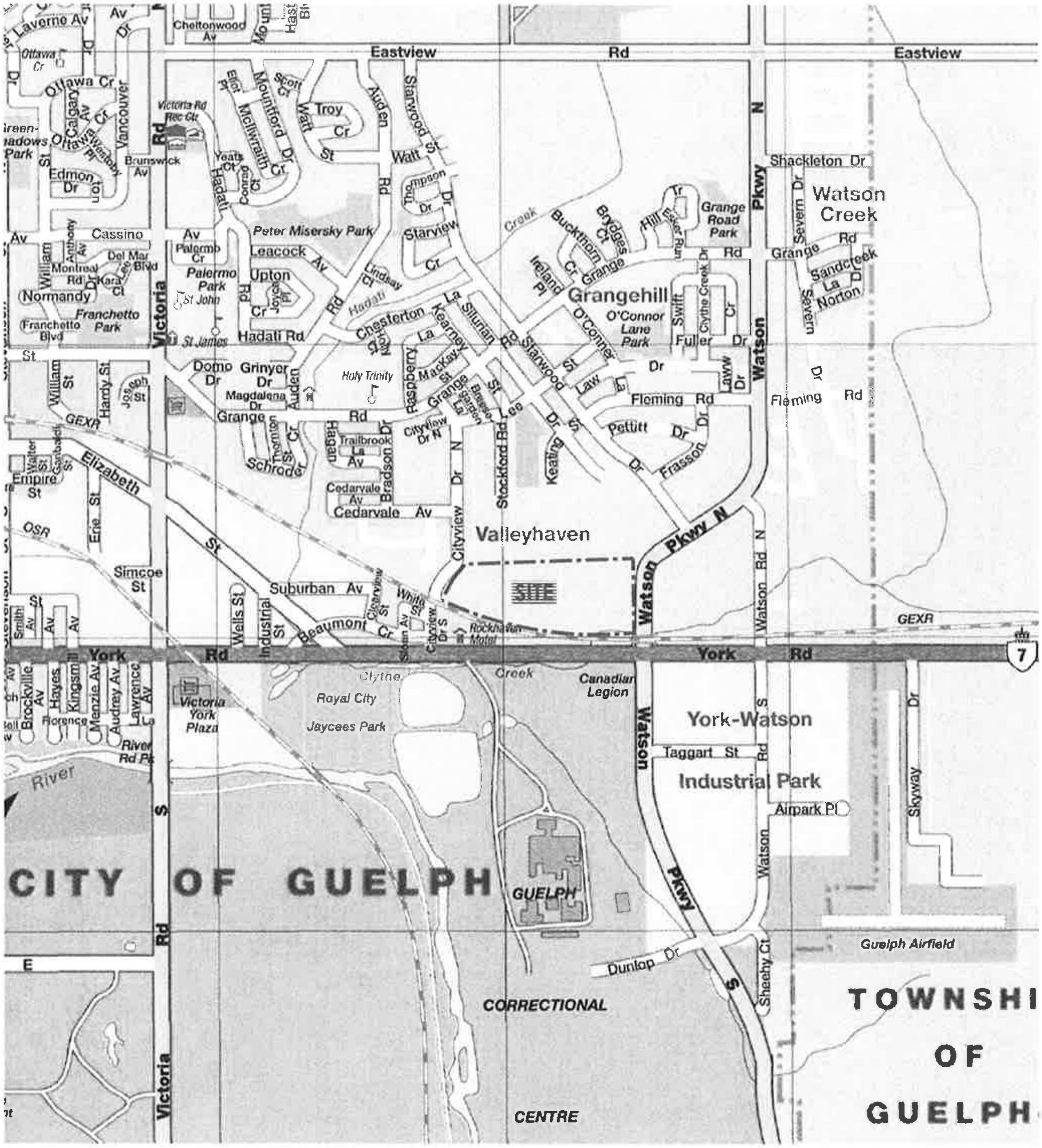
**Field Tech.:** *RM*

**Sheet:** *1 of 1*

**Drafted by:** *DC(01a)*

NORTH

| No. | Revisions | Date |
|---|---|---|
| 0 | **Report Issued** | **Sept. 2006** |
| 1 | | |
| 2 | | |
| 3 | | |




Drawing Reference: Base drawing from page 61 of MapArt's Kitchener-Waterloo Map Book (2006).

**P.T. Valeriote Subdivision**

**Cityview Drive**

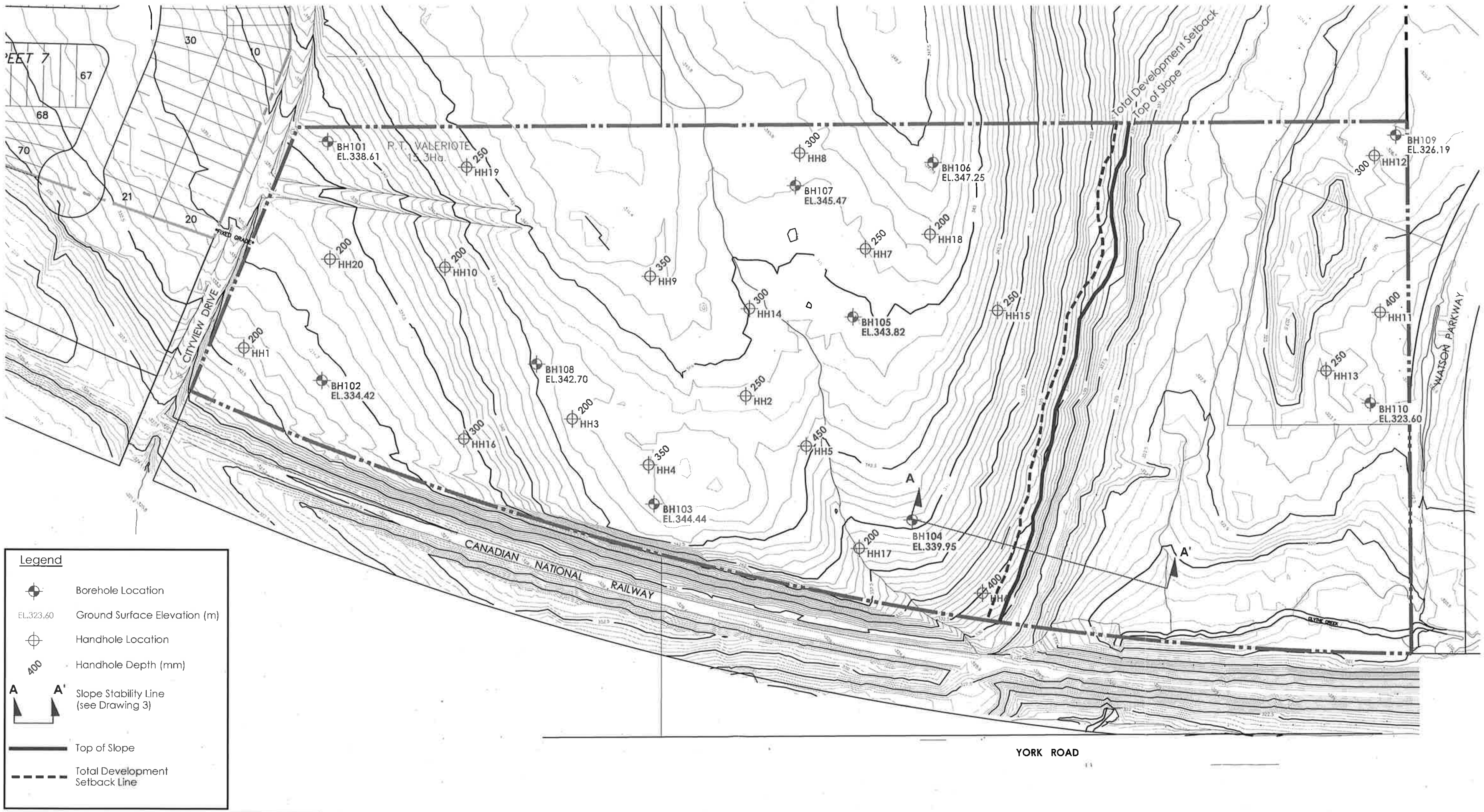
**Guelph, Ontario**

Naylor Engineering Associates Ltd
CONSULTING ENGINEERS

**LOCATION PLAN**

| Date | Scale | Job No. | Drawing No. |
|---|---|---|---|
| **Sept. 2006** | **1:20000** | **0353G4** | **1** |

F:\0353\0353G4\0353G4_01.dwg (dc)
August 14, 2006




Drawing Reference: Base drawing provided by City of Guelph.

Note:
Locations of site features in this drawing are approximate based on available information. Exact locations must be verified in the field.

| No. | Revisions | Date |
|---|---|---|
| 0 | **Report Issued** | **Sept. 2006** |
| 1 | **Report Revised** | **Jan. 2012** |
| 2 | | |
| 3 | | |

NORTH

Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

**P.T. Valeriote Subdivision**

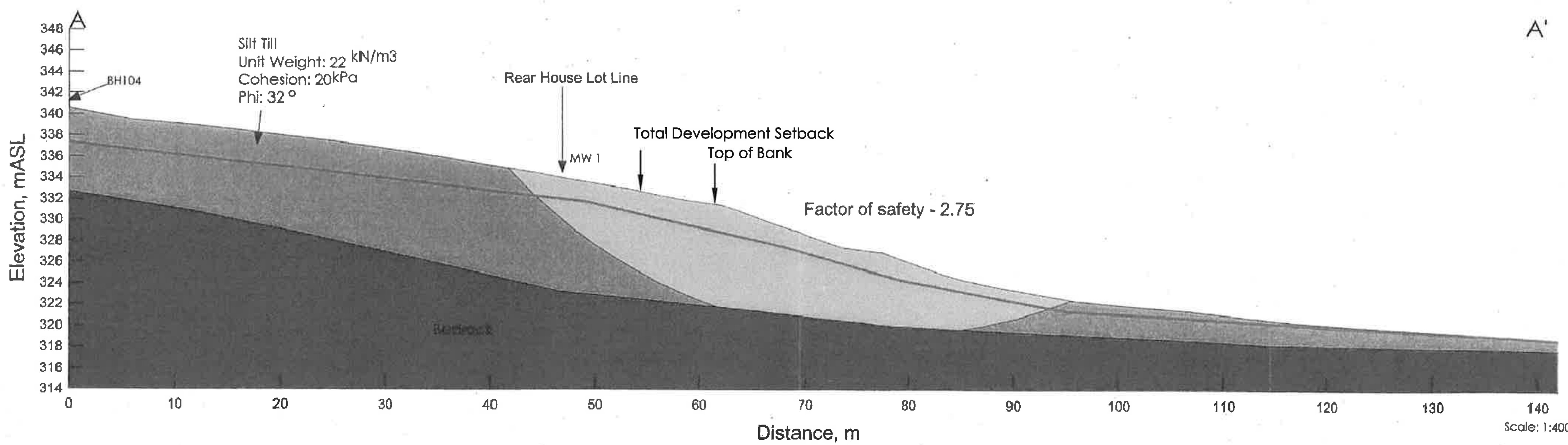
**Cityview Drive**

**Guelph, Ontario**

**SITE PLAN**

| Date | Scale | Job No. | Drawing No. |
|---|---|---|---|
| **Sept. 2006** | **1:2000** | **0353G4** | **2** |

F:\0353\0353G4\0353G4_02.dwg
August 31, 2006 (SR)




| No. | Revisions | Date |
|---|---|---|
| 0 | **Report Issued** | **Sept. 2006** |
| 1 | | |
| 2 | | |
| 3 | | |

Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

**P.T. Valeriote Subdivision**

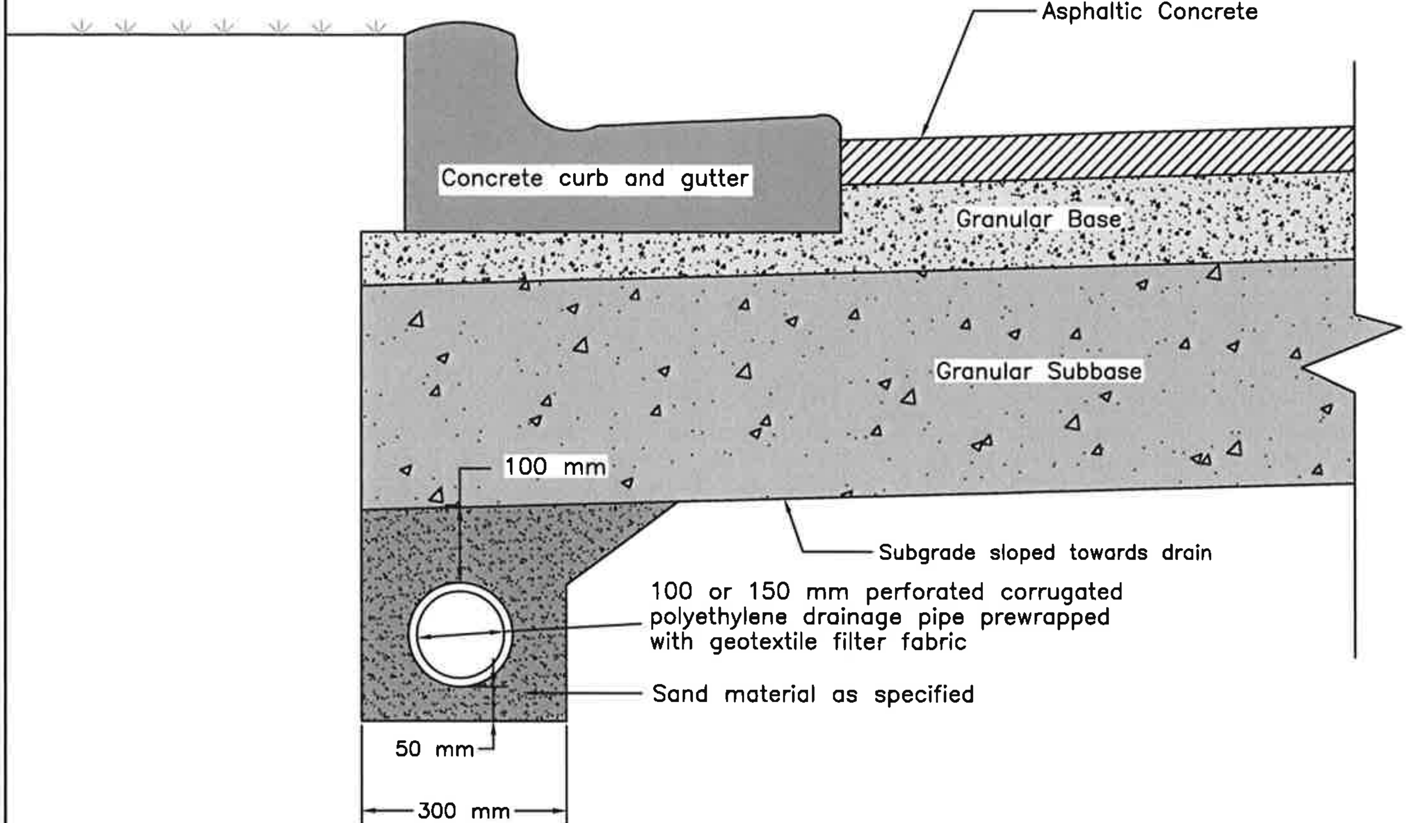
**Cityview Drive**

**Guelph, Ontario**

**SLOPE STABILITY A - A'**

| Date | Scale | Job No. | Drawing No. |
|---|---|---|---|
| **Sept. 2006** | **1:400** | **0353G4** | **3** |

F:\0353\0353G4\0353G4_03.dwg
September 8, 2006 (SR)




## GENERAL REQUIREMENTS FOR PAVEMENT SUBDRAINS

1. Perforated corrugated polyethylene drainage pipe shall meet the requirements of OPSS 1840.

2. Pipe filter fabric conforming to OPSS 1860 for geotextile Class 1 with a filtration opening size of 150 to 450 microns shall be supplied on all sections of perforated pipe.

3. The open upstream ends of pipes should be capped.

4. Subdrain pipes to be set on at least 1% grade draining to a positive frost-free outlet. If the subdrains are outletted to a ditch then the last 1.5 m of the outlet pipe should consist of a corrugated galvanized steel pipe equipped with a rodent gate.

5. Bedding and backfill material shall be concrete sand meeting the gradation requirements of OPSS 1002 (Fine Aggregate for Concrete).

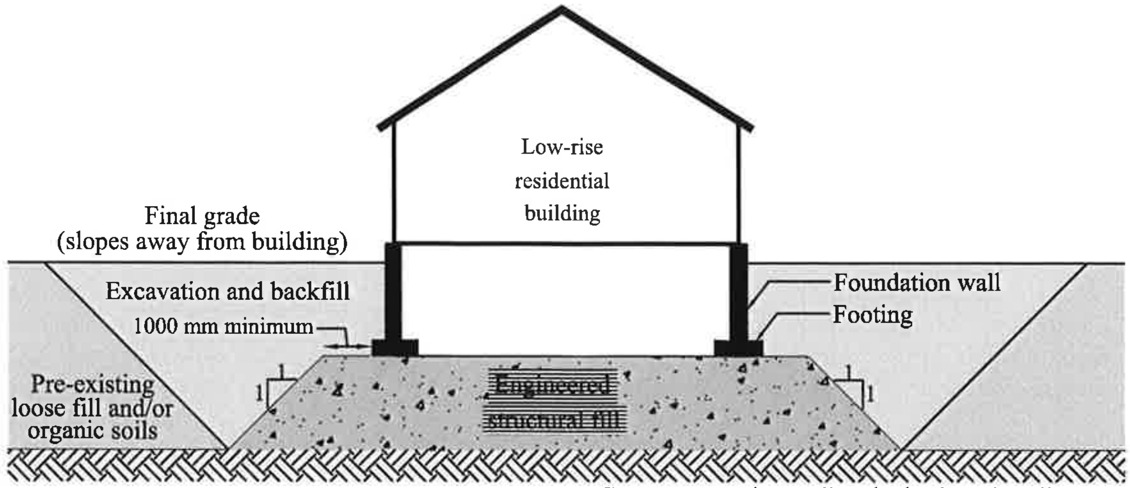
F:\0353\0353G4\0353G4_04.dwg
September 12, 2006 (SR)

Naylor Engineering Associates
CONSULTING ENGINEERS

**TYPICAL PAVEMENT SUBDRAIN DETAIL**

| Date | Scale | Job No. | Drawing No. |
|---|---|---|---|
| Sept. 2006 | NTS | 0353G4 | 4 |

# ENGINEERED STRUCTURAL FILL PAD




## GENERAL REQUIREMENTS FOR ENGINEERED STRUCTURAL FILL

1. The area must be excavated of all pre-existing loose fill, topsoil, and/or organic soil until competent native undisturbed soil is reached.

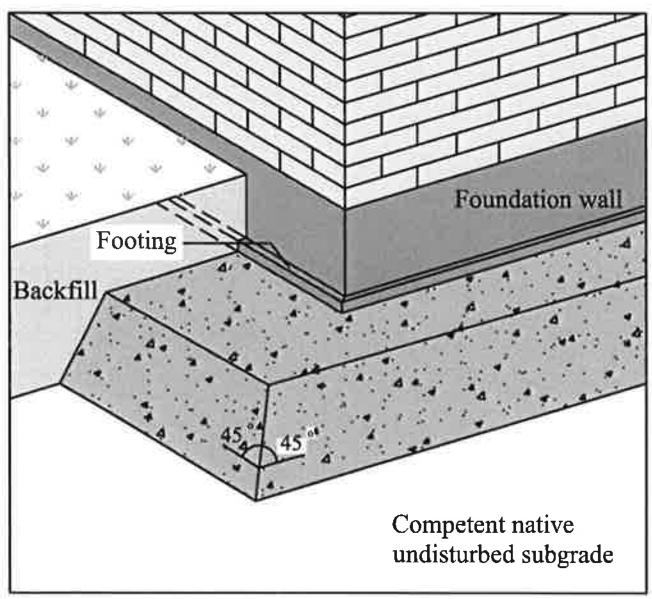
2. The excavation should allow for the structural fill to extend 1000 mm beyond the outside edge of the building footings and down to the approved subgrade soil at a slope of 1 horizontal to 1 vertical (45°).

3. The subgrade below the engineered fill should be inspected and approved by a geotechnical engineer prior to fill construction. Fill placement and compaction operations to be carried out under full-time geotechnical supervision.

4. The structural fill should comprise sand and gravel aggregate placed in 300 mm thick lifts and compacted to at least 98% Standard Proctor Maximum Dry Density (SPMDD). The exterior backfill should consist of approved inorganic soil also placed in 300 mm thick lifts and compacted to minimum 95% SPMDD.

5. All excavations must be carried out in conformance with the current Ontario Occupational Health and Safety Act and Regulations 213/91 for construction projects.

6. Exterior footings must be provided with minimum 1.2 m of soil cover for frost protection.




Naylor Engineering Associates
CONSULTING ENGINEERS

**TYPICAL STRUCTURAL FILL PAD DETAIL**

| Date | Scale | Job No. | Drawing No. |
|---|---|---|---|
| **Sept. 2006** | **NTS** | **0353G4** | **5** |

F:\0353\0353G4\0353G4_05.dwg
September 12, 2006 (SR)

**PRELIMINARY SERVICING &**
**STORMWATER MANAGEMENT REPORT**
**CITYVIEW RIDGE SUBDIVISION**
**CITY OF GUELPH**
**Revised: June 2017**

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**APPENDIX “B”**

**Slope Stability Assessment**
**Englobe Corp.**
**(February 2016)**

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February 17, 2016

Cityview Ridge Developments Inc.
c/o Ms. Angela Kroetsch, P.Eng**.**
GM BluePlan Engineering
330 Trillium Drive, Unit D
Kitchener, Ontario N2E 3J2

**Subject:** Cityview Ridge Subdivision
Slope Stability Assessment – Lots 62 to 78
Guelph, Ontario
Our ref.: 160-P-0009857-0-01-100-GE-L-0001-01

Dear Ms. Kroetsch:

Englobe Corp. (Englobe) is pleased to provide this letter report for the slope stability analysis recently completed for the proposed Cityview Ridge Subdivision at the location shown on the appended Location Plan, Drawing 1. The work for this investigation was authorized by Mr. Carson Reid of Cityview Ridge Developments Inc. on February 2, 2016.

The area being investigated comprises Lots 62 to 78 along the east side of the proposed development. It is understood that the proposed development will include the placement of fill and construction of retaining walls and a walking trail along the rear of the above mentioned lots.

The purpose of this slope stability analysis is to assess the impact of the proposed structures on the stability of the existing slope at the site.

## General Information

The subject site is located on Cityview Drive, Guelph Ontario and the area being investigated is located at the east side of the site, near the top of a slope. A Grand River Conservation Authority (GRCA) regulated wetland is located at the base of the subject slope.

Naylor Engineering Associates Ltd. (NEA) previously completed a geotechnical investigation and slope stability assessment at the subject site including the drilling of three boreholes near the top of the slope (Boreholes BH104 to BH106) to depths of 6.7 to 11.1 m. The findings of this investigation illustrated that the existing slope is comprised of native non-cohesive silt till. Groundwater was found to occur in saturated seams at variable depths within the silt till deposit. A slope stability analysis was carried out along the steepest portion of the slope located in the southeast portion of the site. The results of the slope stability analysis found that the slope had a factor of safety of greater than 1.5. We refer the reader to the geotechnical investigation for further information (NEA, Geotechnical Investigation, P.T. Valeriote Subdivision, Cityview Drive, Guelph, Ontario. 0353G4.R01_Rev, February 2012). The relevant borehole logs of the previous investigation and site plan (NEA – Drawing 2 – Site Plan) illustrating the borehole locations have been appended to this letter.

It is understood that proposed structures include three retaining walls, swales, houses, a walking trail, and fill placement will occur with the proposed site development, near the top of the slope. The three proposed retaining walls will traverse along the east side of Lots 72 to 78, Lot 67, and along the east side of the walking trail behind Lots 77 and 78 (Gamsby and Mannerow Engineers, Carson Reid Homes Cityview Ridge, Project Number 105-172, Preliminary Site Grading and Drainage Plan [Drawing 2] and Trail Plan and Sections [Drawing 8], Revised March 30, 2015). It is further understood that grades at the rear of Lots 75 to 78 are to be raised by up to 3.5 m with final grades near Elevation 340.5 to 341.0 m. The fill will be partially retained by the retaining walls, beyond which it is to be sloped to the east at an inclination of 3 horizontal to 1 vertical, then blends into the existing grades. The thickness of the fill decreases toward the north, and along Lots 68 to 72, the proposed elevation at the rear of the lots is close to or below the existing grades.

## Slope Stability Assessment

Cross-Section B-B' was created based on topographic data provided by Gamsby and Mannerow Engineers and the location of the section is shown on our Drawing 2 – Site Plan, and is illustrated in Drawing 3 – Cross Section B-B'. The cross section was created to represent a worst case scenario, where the slope was the steepest and the proposed additional loading was greatest. Cross-Sections X-X and O-O from the provided topographic plan were also used to assess the slope stability.

The information from the boreholes and cross-sections were used for computer analyses of the slope stability using the Slope/W Program (Morgenstern-Price Method). The soil parameters used in this analysis have been estimated based on the information from the existing boreholes, laboratory testing, as well as local experience and available literature values and are provided in Table 1.

Table 1 Soil Parameters

| SOIL MATERIAL | UNIT WEIGHT (kN/m$^3$) | ANGLE OF INTERNAL FRICTION (º) | COHESION (kPa) |
|---|---|---|---|
| Silt Till | 22 | 32 | 0 |

The following assumptions have been made in order to assess the possible impact of the proposed structures on the slope stability at the subject site:

- Soil conditions at the site comprise native silt till deposits. Suspected bedrock was encountered but was not proven by coring during the NEA investigation. As such the soil was assumed to be continuous to Elevation 300 m.
- Foundations will be designed as per the previous geotechnical report (NEA, 0353G4.R01_Rev).
- The proposed retaining wall will be adequately designed for sliding and overturning.
- Grades of the site will be raised (where applicable) with well compacted subgrade or structural fill. The fill is placed in 300 mm thick lifts and compacted to 95% SPMDD (subgrade fill) or 98% SPMDD (structural fill for residential buildings and below retaining walls) at a minimum.
- The proposed fill and retaining wall were assumed to have a unit weight of 24 kN/m3.
- The assumed groundwater depth is 2.6 m at the top of the slope and at ground surface at the GRCA 100-year floodplain.

A slope stability analysis was carried out on the three cross sections for a number of potential failure types. The various failures analyzed included shallow slumping type failure of the slope surface, medium depth rotational failures, and deep rotational failures.

Following the GRCA policy, the design range for the factor of safety must be 1.30 to 1.50 or greater.

The results of the slope stability assessment completed for the slope sections and considering the proposed retaining walls, houses and fill indicate factors of safety in excess of 1.5 for all three of the analyzed cross sections, at which medium depth to deep rotational failures would cause the loss of the structure.

In conclusion, the findings of our slope stability assessment do not show an aggravation of existing slope instabilities or future slope instabilities due to the proposed structures. As well, there is an adequate factor of safety against rotational slope failures that could adversely affect the stability of the proposed structures.

## Retaining Wall Design and Construction

The design of the retaining walls should be done by a licensed structural engineer. The retaining wall must be designed to resist the lateral earth pressures. For calculating the lateral earth pressure for walls restrained at the bottom only, an active earth pressure coefficient (Ka) of 0.36 and soil unit weight of 20 $kN/m^3$ may be used. An appropriate safety factor should be employed (Section 24.3.3.3 Canadian Foundation Engineering Manual).

We recommend that the backfill for the wall comprise clean free-draining granular material such as OPSS Granular ‘B’. The soils encountered on-site are not considered suitable for reuse as retaining wall backfill. The backfill should be placed in thin lifts and compacted to 95% standard Proctor maximum dry density (SPMDD). Over-compaction should be avoided since this may cause excessive lateral earth pressures against the retaining walls. It is recommended that backfilling operations be inspected in order to approve the backfill materials and ensure the proper degree of compaction is being achieved.

Subdrains should be installed behind the retaining wall foundations. The subdrains should comprise minimum 150 mm diameter perforated pipes with filter sock and sand bedding (OPSS Concrete Sand). The subdrains must drain by gravity to a frost free outlet.

The slope behind the retaining wall should be graded with an inclination of 3.0 horizontal to 1.0 vertical or less and the soil considered as surcharge in the retaining wall design. The finished slopes should be topsoiled and vegetated as soon as possible after construction to minimize surface erosion. The minimum topsoil thickness should be 100 mm. Some routine maintenance of the slope surfaces may be required to address minor long-term weathering and erosion.

To reduce surface runoff over the retaining wall and down the slope it is recommended that surface runoff be diverted behind the retaining wall and lead to a positive outlet.

Englobe should be contacted if the design of the proposed structures changes (i.e. size, location, or proposed footing depths) in order to provide updated recommendations on slope stability.

We trust that this information is complete and suitable for your present requirements. If you have any questions or require further information, please do not hesitate to contact our office.

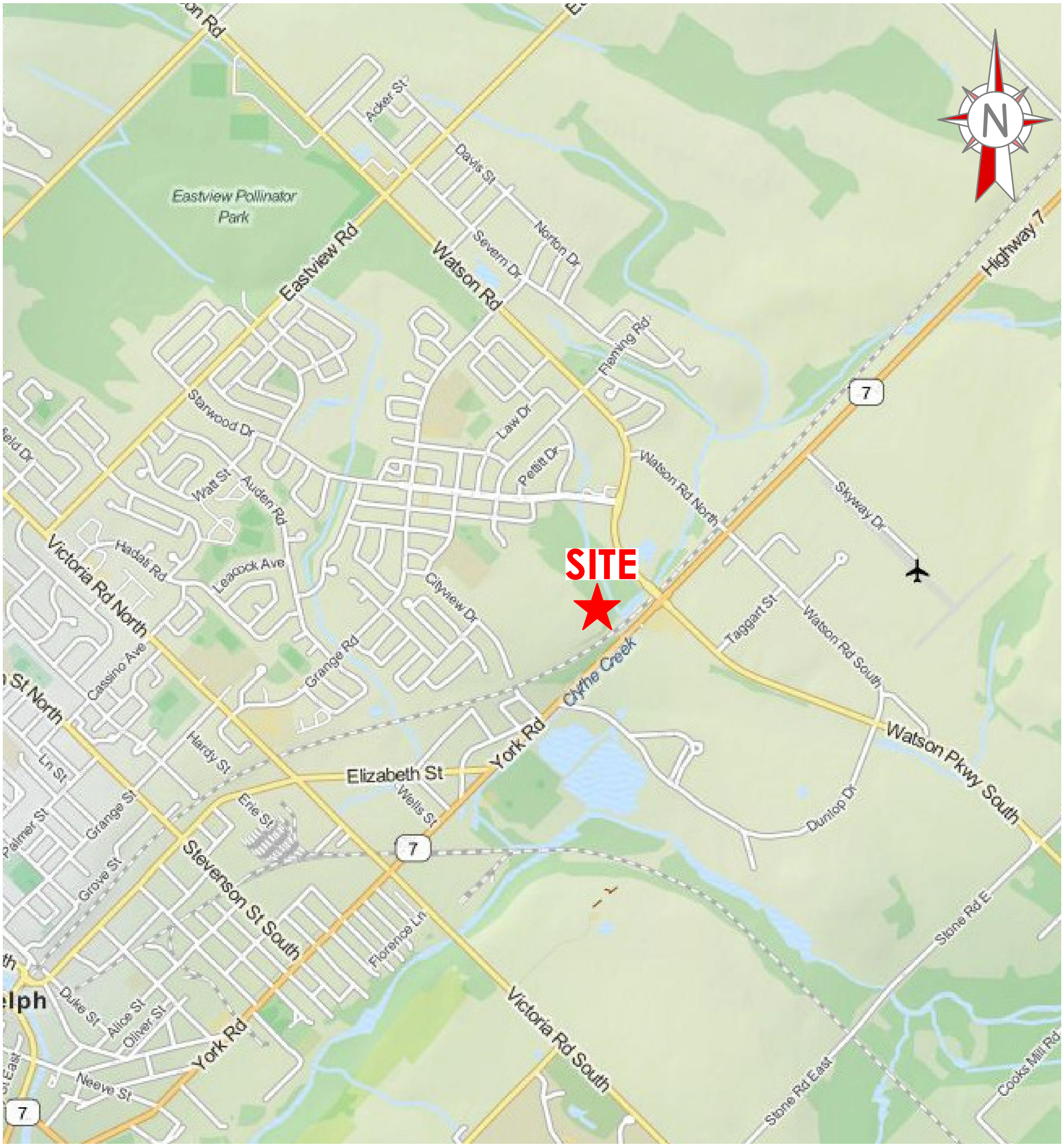
Yours very truly,

Dan Gonser EIT
Geotechnical Department

J.B. England, P.Eng.
Senior Geotechnical Engineer

alc

Encl. Drawing 1 – Site Plan
Encl. Drawing 2 – Site Plan
Encl. Drawing 3 – Cross-Section A-A'
Encl. NEA – Drawing 2 – Site Plan
Encl. NEA – Boreholes BH104 to BH106




NOTES :
1-REFERENCES : © OpenStreetMap contributors (2016).

0 250 500 750 1000 m

SCALE 1:25000

10 cm 5 4 3 2 1 0

G:\160\P0009857\Z4_CAD\P-0009857-0-01-100_DWG001.DWG

Project

**Cityview Ridge Subdivision**
**Slope Stability Assessment**

Guelph, Ontario

Title

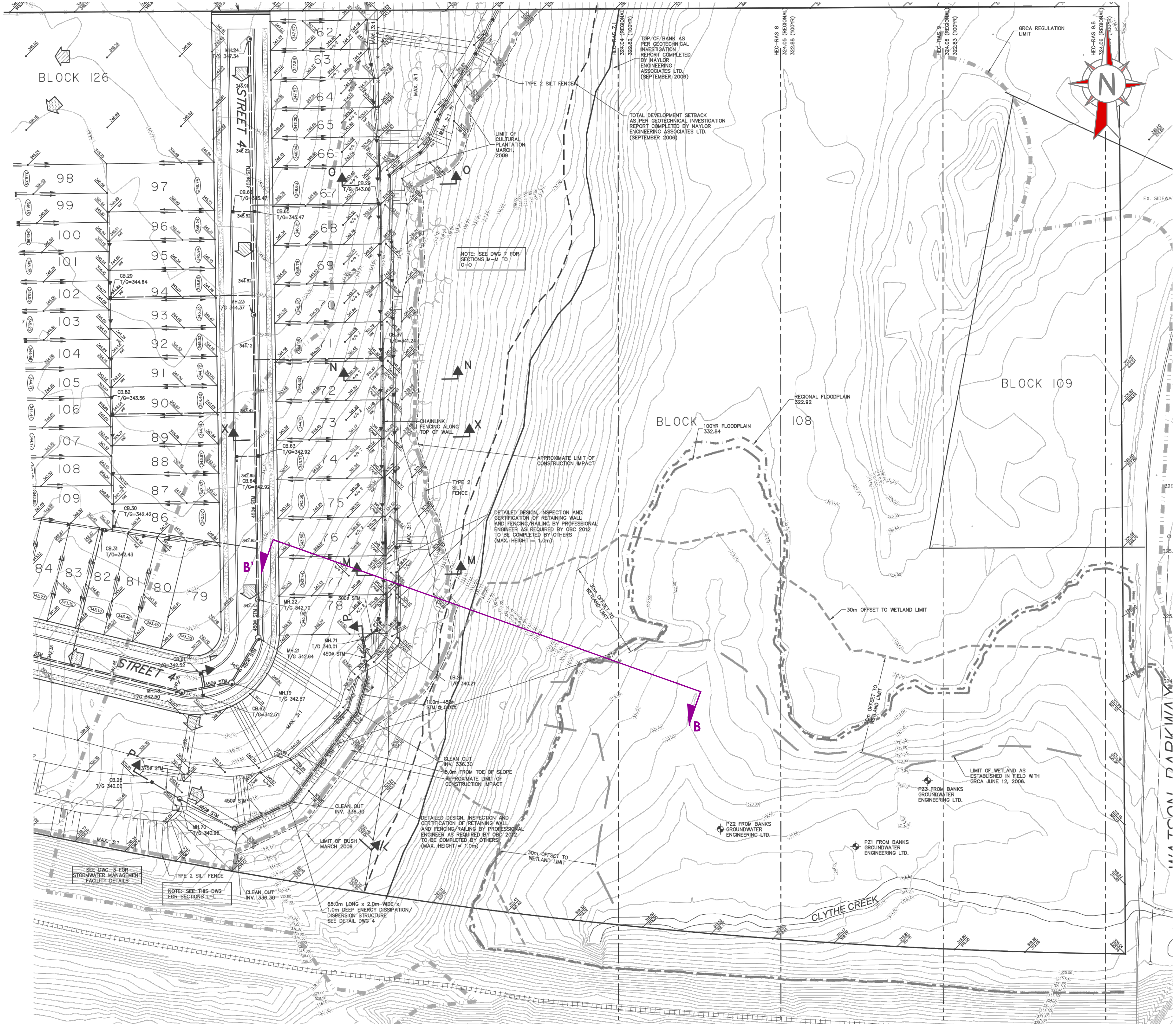
**LOCATION PLAN**

Englobe

Englobe Corp.
353, Bridge Street East
Kitchener (Ontario) N2K 2Y5
Telephone : 519.741.1313
Fax : 519.741.5422

| | |
|---|---|
| Prepared | K. Ashe |
| Drawn | K. Ashe |
| Checked | D. Gonser |
| Discipline | GEOTECHNICAL |
| Scale | 1 : 25000 |
| Date | 2015-02-04 |
| Project manager | D. Gonser |
| Sequence no. | 01 of 03 |

| M. dept. | Project | Disc. | Dwg no. | Rev. |
|---|---|---|---|---|
| 160 | P-0009857-0-01-100 | GE | 001 | 00 |




10 cm

G:\160\P0009857\24_CAD\P-0009857-0-01-100_DWG002.DWG

LEGEND :

B B' CROSS SECTION

0 10 20 30 40 50 m

SCALE 1:1250

NOTES :

1-REFERENCES : GAMSBY AND MANNEROW ENGINEERS, Carson Reid Homes Cityview Ridge, Preliminary Grading and Drainage Plan, Project Number 105-172, Drawing Number 2, Revised March 30, 2015.

2-Drawing scale may be distorted due to file conversion and/or copying. Measurements taken from the drawing must be verified in the field.

Project

# Cityview Ridge Subdivision
# Slope Stability Assessment

Guelph, Ontario

Title

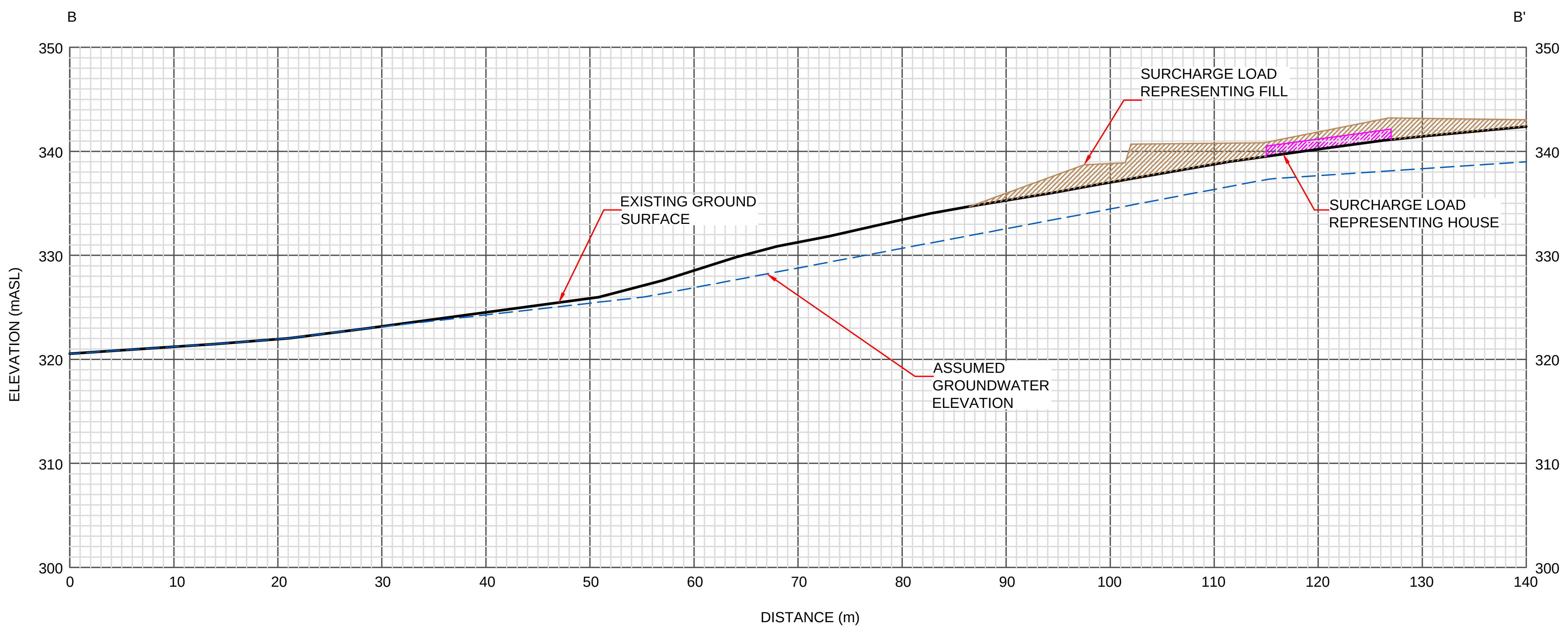
**SITE PLAN**

Englobe

Englobe Corp.
353, Bridge Street East
Kitchener (Ontario) N2K 2Y5
Telephone : 519.741.1313
Fax : 519.741.5422

| | | | |
|---|---|---|---|
| Prepared | K. Ashe | Discipline | GEOTECHNICAL |
| Drawn | K. Ashe | Scale | 1:1250 |
| Checked | D. Gonser | Date | 2016-02-04 |
| Project manager | D. Gonser | Sequence no. | 02 of 03 |

| M. dept. | Project | Disc. | Dwg no. | Rev. |
|---|---|---|---|---|
| 160 | P-0009857-0-01-100 | GE | 002 | 00 |




NOTES :

1-Drawing scale may be distorted due to file conversion and/or copying. Measurements taken from the drawing must be verified in the field.

0 5 10 15 m

SCALE 1:500

Project

**Cityview Ridge Subdivision**
**Slope Stability Assessment**

Guelph, Ontario

Title

**CROSS SECTION B - B'**

Englobe

Englobe Corp.
353, Bridge Street East
Kitchener (Ontario) N2K 2Y5
Telephone : 519.741.1313
Fax : 519.741.5422

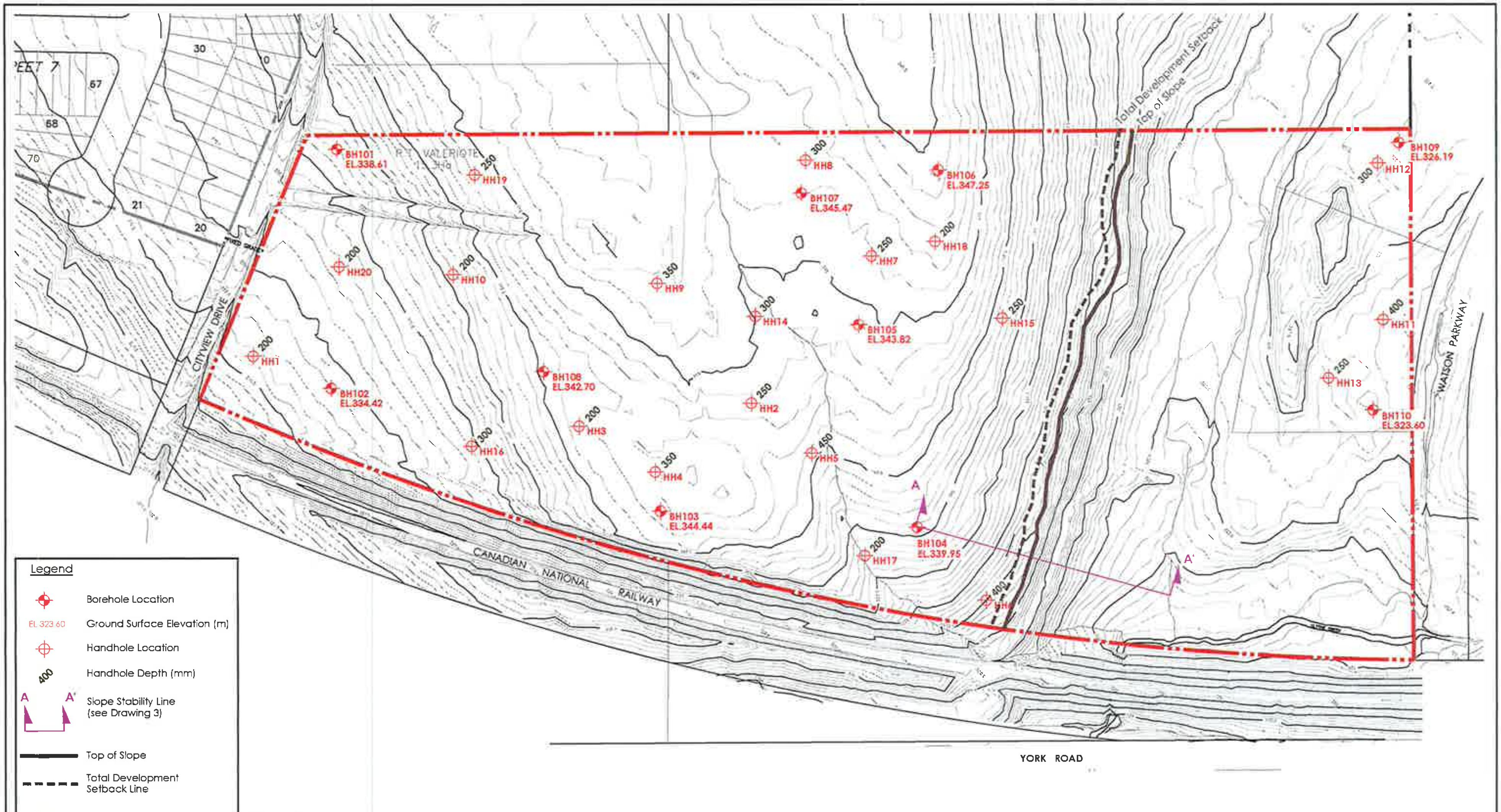
Prepared K. Ashe
Drawn K. Ashe
Checked D. Gonser

Discipline GEOTECHNICAL
Scale 1 : 500
Date 2016-02-04

Project manager D. Gonser
Sequence no. 03 of 03

| M. dept. | Project | Disc. | Dwg no. | Rev. |
|---|---|---|---|---|
| 160 | P-0009857-0-01-100 | GE | 003 | 00 |

G:\160\P0009857\Z4_CAD\P-0009857-0-01-100_DWG002.DWG




Drawing Reference: Base drawing provided by City of Guelph.

Note: Locations of site features in this drawing are approximate based on available information. Exact locations must be verified in the field.

| No. | Revisions | Date |
|---|---|---|
| 0 | **Report Issued** | **Sept. 2006** |
| 1 | **Report Revised** | **Jan. 2012** |
| 2 | | |
| 3 | | |

NORTH

Naylor Engineering Associates Ltd
CONSULTING ENGINEERS

**P.T. Valeriote Subdivision**

**Cityview Drive**

**Guelph, Ontario**

**SITE PLAN**

| Date | Scale | Job No. | Drawing No. |
|---|---|---|---|
| **Sept. 2006** | **1:2000** | **0353G4** | **2** |

F:\0353\0353G4\0353G4_02.dwg (SR) August 31, 2006

Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

# Borehole Number: 104

**Ground Elevation:** *339.95 m*

**Project:** *P.T. Valeriote Subdivision*

**Location:** *Cityview Drive, Guelph, Ontario*

**Job No.:** *0353G4*

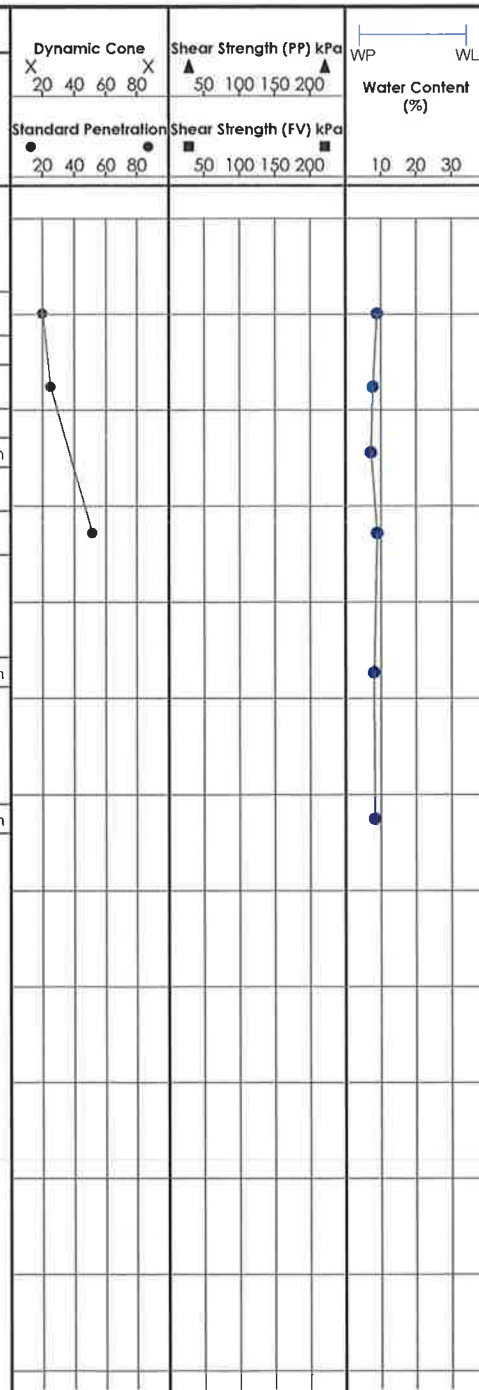
**Drill Date:** *July 31, 2006*

## SOIL PROFILE

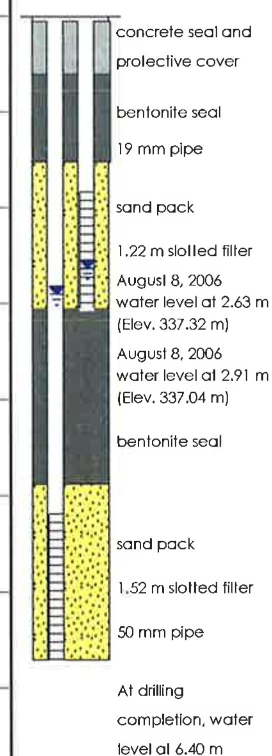
| Depth (m) | Description | Elevation (m) |
|---|---|---|
| 0.00 | Ground Elevation | 339.95 |
| 0.00 | ***TOPSOIL:*** dark brown silt, moist | |
| | ***SILT TILL:*** compact brown sandy silt, some gravel, trace clay, moist | |
| | very dense, moist | |
| | cobbles, some dolostone | |
| 6.71 | Borehole terminated at 6.71 m | |

## SAMPLE

| Number | Type | N-Value |
|---|---|---|
| 1 | SS | 20 |
| 2 | SS | 25 |
| 3 | SS | 30\150mm |
| 4 | SS | 51 |
| 5 | SS | 45\150mm |
| 6 | SS | 65\150mm |




### Groundwater Observations and Standpipe Details




**Reviewed by:** *DN*
**Drill Method:** *Solid Stem Auger*
**Notes:**

**Field Tech.:** *RM*
**Sheet:** *1 of 1*
**Drafted by:** *DC(01a)*

Naylor Engineering Associates Ltd
CONSULTING ENGINEERS

**Borehole Number: 105**

**Ground Elevation:** *343.82 m*

**Project:** *P.T. Valeriote Subdivision*

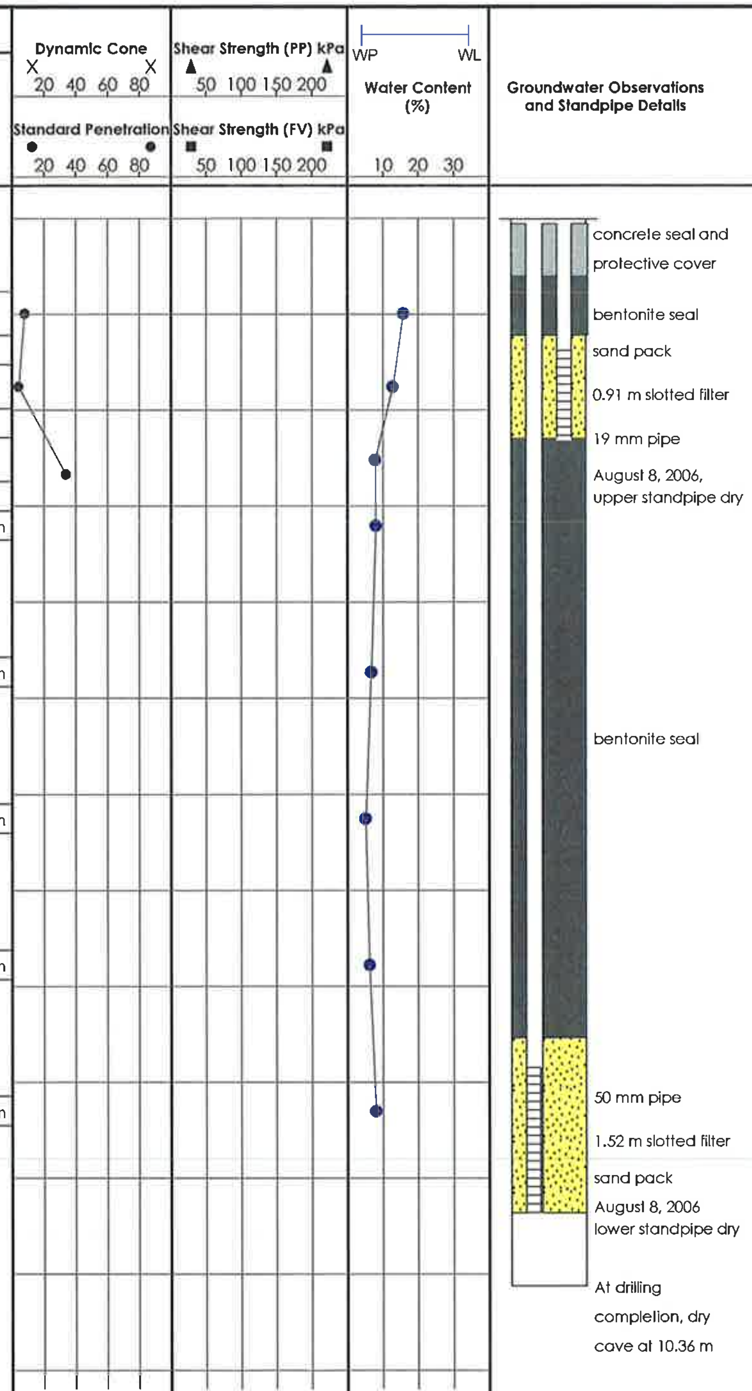
**Location:** *Cityview Drive, Guelph, Ontario*

**Job No.:** *0353G4*

**Drill Date:** *July 31, 2006*

## SOIL PROFILE / SAMPLE

| Depth (m) | Description | Elevation (m) | Number | Type | N-Value |
|---|---|---|---|---|---|
| 0.00 | Ground Elevation | 343.82 | | | |
| | ***TOPSOIL:*** dark brown silt, moist | | | | |
| | ***SILT TILL:*** loose brown silt, some sand, trace clay and gravel, very moist | 343.00 | 1 | SS | 8 |
| | | 342.00 | 2 | SS | 4 |
| | dense to very dense brown sandy silt | | 3 | SS | 34 |
| | | 341.00 | 4 | SS | 50\150mm |
| | some cobbles | 340.00 | | | |
| | grey, moist | 339.00 | 5 | SS | 55\150mm |
| | | 338.00 | 6 | SS | 70\150mm |
| | | 337.00 / 336.00 | 7 | SS | 70\150mm |
| | | 335.00 | 8 | SS | 60\150mm |
| | | 334.00 / 333.00 | | | |
| 11.00 | augering on bedrock or boulder | | | | |
| | Borehole terminated at 11.13 m upon auger refusal on bedrock or boulder | 332.00 | | | |




**Reviewed by:** *DN*

**Drill Method:** *Solid Stem Auger*

**Notes:** *Bulk sample taken from 1.22 to 2.13 m.*

**Field Tech.:** *RM*

**Sheet:** *1 of 1*

**Drafted by:** *DC(01a)*

Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

**Borehole Number: 106**

**Ground Elevation:** *347.25 m*

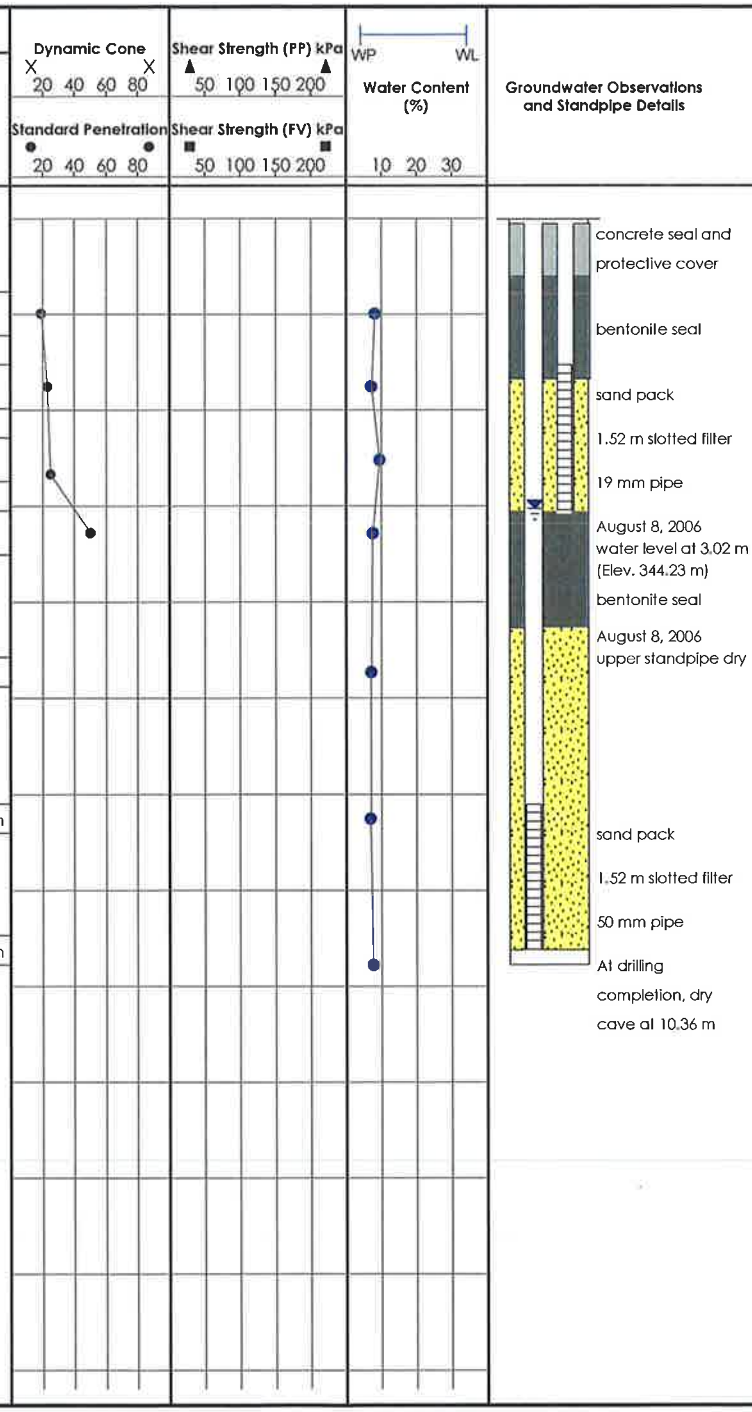
**Project:** *P.T. Valeriote Subdivision*

**Location:** *Cityview Drive, Guelph, Ontario*

**Job No.:** *0353G4*

**Drill Date:** *August 2, 2006*

| SOIL PROFILE | | | SAMPLE | | |
|---|---|---|---|---|---|
| Depth (m) | Description | Elevation (m) | Number | Type | N-Value |
| | Ground Elevation | 347.25 | | | |
| 0.00 | ***TOPSOIL:*** dark brown silt, moist | | | | |
| | ***SILT TILL:*** compact brown sandy silt, some gravel, trace clay, moist | | | | |
| 1.00 | | 346.00 | 1 | SS | 19 |
| | some cobbles | | 2 | SS | 23 |
| 2.00 | | 345.00 | | | |
| | very moist | | 3 | SS | 25 |
| 3.00 | dense to very dense, moist | 344.00 | 4 | SS | 50 |
| 4.00 | | 343.00 | | | |
| | | | 5 | SS | * |
| 5.00 | | 342.00 | | | |
| 6.00 | | 341.00 | 6 | SS | 40\150mm |
| 7.00 | | 340.00 | | | |
| | | | 7 | SS | 40\150mm |
| 8.00 | Borehole terminated at 7.77 m | 339.00 | | | |
| 9.00 | | 338.00 | | | |
| 10.00 | | 337.00 | | | |
| 11.00 | | 336.00 | | | |
| 12.00 | | 335.00 | | | |




**Reviewed by:** *DN*

**Drill Method:** *Solid Stem Auger*

**Notes:** *Bulk sample taken from 1.52 to 3.05 m. *Sampler bouncing on gravel.*

**Field Tech.:** *RM*

**Sheet:** *1 of 1*

**Drafted by:** *DC(01a)*

**PRELIMINARY SERVICING &**
**STORMWATER MANAGEMENT REPORT**
**CITYVIEW RIDGE SUBDIVISION**
**CITY OF GUELPH**
**Revised: June 2017**

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# APPENDIX "C"

## GROUNDWATER ELEVATION MEASUREMENTS

**Completed by Gamsby and Mannerow Limited**
**(August 2006 - November 2014)**

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CITYVIEW RIDGE SUBDIVISION
PROJECT NO.: 105-172

GROUNDWATER ELEVATIONS (m)

INSTALLED AUGUST 2006

| WELL ID. | GROUND ELEVATION (m) | TOP OF CASING ELEVATION (m) | DATE>> | AUG 8/06 | AUG 17/06 | OCT 3/06 | JAN 22/08 | APR 3/08 | MAY 30/08 | JUL 21/08 | OCT 15/08 | DEC 18/08 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BH 101 | 338.61 | 339.38 | | 336.94 | 336.79 | 336.98 | 337.81 | 338.62 | 337.41 | 337.06 | 337.25 | 338.37 |
| BH 102 | 334.42 | 335.22 | | 330.98 | 331.50 | 330.61 | 333.47 | 334.43 | 333.26 | 331.40 | 332.56 | 334.04 |
| BH 103 U | 344.44 | 345.74 | | | 342.97 | | 344.07 | 344.44 | 343.65 | 342.96 | 343.04 | 344.41 |
| BH 103 L | 344.44 | 345.70 | | 341.36 | 341.17 | 340.71 | 342.48 | 343.74 | 342.21 | 341.23 | 341.59 | |
| BH 104 U | 339.95 | 340.66 | | | 337.27 | | 338.77 | 339.68 | 338.36 | 337.47 | 337.47 | |
| BH 104 L | 339.95 | 340.59 | | 336.94 | 336.64 | 336.06 | 337.59 | 338.49 | 336.90 | 336.10 | 336.72 | 338.36 |
| BH 105 U | 343.82 | 344.49 | | | | | 342.54 | 343.72 | 342.41 | | 342.16 | |
| BH 105 L | 343.82 | 344.41 | | 333.66 | 334.53 | 334.85 | | 337.34 | 337.39 | 335.88 | 335.84 | |
| BH 106 U | 347.25 | 347.98 | | | 344.27 | | 346.12 | 346.92 | 345.25 | 344.48 | 344.60 | |
| BH 106 L | 347.25 | 347.92 | | 344.27 | 344.20 | 343.88 | 346.09 | 346.85 | 345.21 | 344.30 | 344.53 | 346.26 |
| BH 107 U | 345.47 | 346.21 | | 344.45 | 344.15 | 344.65 | 344.60 | | 344.69 | 344.66 | 344.77 | 345.30 |
| BH 107 L | 345.47 | 346.17 | | 342.30 | 344.71 | | 345.07 | 345.34 | 344.70 | 344.34 | 344.75 | 345.23 |
| BH 108 | 342.70 | 343.25 | | 340.46 | 340.29 | 340.39 | 341.62 | 342.12 | 340.81 | 340.27 | 340.38 | 341.93 |
| BH 109 | 326.19 | 326.83 | | 322.39 | 322.34 | 322.42 | 323.01 | 324.20 | 324.13 | 322.58 | 322.45 | |
| BH 110 | 323.60 | 324.25 | | 321.04 | 320.96 | 321.09 | 321.65 | 322.90 | 320.39 | 321.14 | 321.00 | |

Notes: Ground elevation represents shots on the ground beside the borehole
August 8, 2006 water level measurements taken by Naylor Engineering Associates Ltd.
May 13, 2009 water level measurments taken by Banks Groundwater Engineering

See Geotechnical Investigation (Naylor Engineering Associates Ltd., January 2012) for existing monitoring well locations

CITYVIEW RIDGE SUBDIVISION
PROJECT NO.: 105-172

INSTALLED AUGUST 2006

| WELL ID. | GROUND ELEVATION (m) | TOP OF CASING ELEVATION (m) | DATE>> | MAY 13/09 | AUG 4/09 | OCT 19/09 | DEC 15/09 | MAR 12/10 | JUL 17/10 | SEP 27/10 | DEC 1/10 | FEB 15/11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BH 101 | 338.61 | 339.38 | | 338.016 | 336.756 | 338.616 | 337.405 | 337.846 | 337.216 | 336.379 | 337.164 | 337.287 |
| BH 102 | 334.42 | 335.22 | | 333.743 | 330.583 | | 333.256 | 332.148 | 332.091 | 330.597 | 330.496 | 332.385 |
| BH 103 U | 344.44 | 345.74 | | 342.937 | | | | 343.802 | 343.03 | | 343.171 | |
| BH 103 L | 344.44 | 345.70 | | 343.846 | | | 342.208 | 342.056 | 341.566 | | 341.598 | 341.575 |
| BH 104 U | 339.95 | 340.66 | | 338.576 | | | | 337.466 | 337.725 | | 336.826 | |
| BH 104 L | 339.95 | 340.59 | | 337.936 | 334.576 | | | 337.036 | 336.544 | 333.358 | 335.704 | 336.095 |
| BH 105 U | 343.82 | 344.49 | | 342.599 | | | | 342.657 | | | 342.397 | 342.197 |
| BH 105 L | 343.82 | 344.41 | | 336.994 | 334.824 | | | 337.235 | 337.785 | 334.214 | 333.399 | 335.548 |
| BH 106 U | 347.25 | 347.98 | | 345.606 | | | | 345.451 | | | 344.161 | 344.705 |
| BH 106 L | 347.25 | 347.92 | | 345.614 | | 346.846 | 345.214 | 345.409 | 344.459 | 341.979 | 344.512 | 344.713 |
| BH 107 U | 345.47 | 346.21 | | 345.011 | 344.006 | | 344.691 | 345.406 | 344.377 | 343.763 | 345.388 | 344.87 |
| BH 107 L | 345.47 | 346.17 | | 344.96 | | | | | | | | 344.702 |
| BH 108 | 342.70 | 343.25 | | 341.207 | 339.812 | 342.119 | 340.811 | 341.112 | 340.335 | 339.598 | 340.234 | 341.471 |
| BH 109 | 326.19 | 326.83 | | 323.239 | | 324.202 | 324.126 | 322.619 | | 322.254 | 322.727 | 322.421 |
| BH 110 | 323.60 | 324.25 | | 321.859 | | 322.897 | 320.386 | 321.028 | | 320.795 | 321.097 | 320.982 |

CITYVIEW RIDGE SUBDIVISION
PROJECT NO.: 105-172

INSTALLED AUGUST 2006

| WELL ID. | GROUND ELEVATION (m) | TOP OF CASING ELEVATION (m) | DATE>> | MAY 13/11 | JUL 22/11 | SEP 28/11 | DEC 16/11 | FEB 16/12 | APR 3/12 | JUNE 8/12 | AUG 24/12 | OCT 10/12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BH 101 | 338.61 | 339.38 | | 337.362 | 336.301 | 335.260 | 337.682 | 338.080 | 338.023 | 337.129 | 335.967 | 335.908 |
| BH 102 | 334.42 | 335.22 | | 333.084 | 330.959 | 329.784 | 333.321 | 333.677 | 333.506 | 330.915 | 330.626 | 330.614 |
| BH 103 U | 344.44 | 345.74 | | 342.737 | | | 342.997 | 343.684 | 343.591 | | | |
| BH 103 L | 344.44 | 345.70 | | 341.914 | 340.369 | 338.465 | 341.492 | 342.494 | 342.395 | 341.096 | 339.126 | 338.081 |
| BH 104 U | 339.95 | 340.66 | | 337.975 | 336.696 | 336.315 | 338.222 | 338.475 | 338.476 | 337.021 | 337.005 | 336.998 |
| BH 104 L | 339.95 | 340.59 | | 336.921 | 335.663 | 332.665 | 337.555 | 337.651 | 337.570 | 335.969 | 333.466 | 333.419 |
| BH 105 U | 343.82 | 344.49 | | 342.092 | 341.215 | | 342.162 | 342.708 | 342.675 | 341.884 | | |
| BH 105 L | 343.82 | 344.41 | | 336.422 | 335.393 | 333.709 | | 336.390 | 336.352 | 335.437 | 333.666 | 333.279 |
| BH 106 U | 347.25 | 347.98 | | 345.159 | 343.733 | 343.590 | 344.719 | | 344.854 | 344.266 | 344.301 | 344.314 |
| BH 106 L | 347.25 | 347.92 | | 345.187 | 343.706 | 341.418 | 344.739 | 344.900 | 344.820 | 344.044 | 341.359 | 340.299 |
| BH 107 U | 345.47 | 346.21 | | 344.292 | 343.380 | 342.523 | 344.655 | | 345.102 | 344.453 | 343.361 | 343.256 |
| BH 107 L | 345.47 | 346.17 | | 344.369 | 343.426 | 342.334 | 344.573 | 345.088 | 345.040 | 344.330 | 342.484 | 342.494 |
| BH 108 | 342.70 | 343.25 | | 340.887 | 339.681 | | | | | | | |
| BH 109 | 326.19 | 326.83 | | 322.230 | 321.899 | 321.331 | 322.345 | 322.984 | 323.165 | 322.496 | 322.124 | 322.194 |
| BH 110 | 323.60 | 324.25 | | 321.200 | | 319.823 | 320.872 | 321.539 | 321.772 | 321.052 | 320.682 | 320.766 |

CITYVIEW RIDGE SUBDIVISION
PROJECT NO.: 105-172

INSTALLED AUGUST 2006

| WELL ID. | GROUND ELEVATION (m) | TOP OF CASING ELEVATION (m) | DATE>> | DEC 13/12 | FEB 6/13 | APR 18/13 | JUNE 4/13 | AUG 8/13 | OCT 29/13 | DEC 9/13 | FEB 19/14 | APR 28/14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BH 101 | 338.61 | 339.38 | | 338.135 | 338.011 | 338.466 | 337.828 | 337.681 | 337.677 | 338.064 | 337.792 | 338.326 |
| BH 102 | 334.42 | 335.22 | | 332.437 | 333.806 | 334.172 | 332.882 | 332.013 | 332.012 | 333.009 | 332.664 | 333.799 |
| BH 103 U | 344.44 | 345.74 | | 343.561 | 344.067 | 344.440 | 343.211 | 343.032 | 343.135 | 343.278 | 343.060 | 344.050 |
| BH 103 L | 344.44 | 345.70 | | 341.781 | 342.649 | 343.503 | 341.924 | 341.665 | 341.531 | 342.176 | 341.999 | 343.121 |
| BH 104 U | 339.95 | 340.66 | | 338.031 | 338.723 | 339.294 | 338.202 | 338.175 | 337.576 | 337.986 | 337.784 | 338.645 |
| BH 104 L | 339.95 | 340.59 | | 337.120 | 337.705 | 338.272 | 337.152 | 337.366 | 337.094 | 337.423 | 337.150 | 338.062 |
| BH 105 U | 343.82 | 344.49 | | 342.535 | 343.108 | 343.820 | 342.760 | 342.284 | 342.145 | 342.476 | | 343.322 |
| BH 105 L | 343.82 | 344.41 | | 333.610 | 336.497 | 337.289 | 336.624 | 336.070 | 335.160 | 336.139 | | 337.022 |
| BH 106 U | 347.25 | 347.98 | | 345.266 | 345.304 | 345.992 | 344.686 | 344.413 | 345.008 | 345.004 | 344.660 | 345.418 |
| BH 106 L | 347.25 | 347.92 | | 345.209 | 345.246 | 345.920 | 344.641 | 344.333 | 344.980 | 344.963 | 344.620 | 345.382 |
| BH 107 U | 345.47 | 346.21 | | 345.289 | | 345.245 | 345.075 | 344.844 | 345.234 | 345.176 | 345.160 | 345.150 |
| BH 107 L | 345.47 | 346.17 | | 345.175 | 345.017 | 345.202 | 345.142 | 344.853 | 345.203 | 345.185 | 345.140 | 345.157 |
| BH 108 | 342.70 | 343.25 | | | | | | | | | | |
| BH 109 | 326.19 | 326.83 | | 322.675 | 323.184 | 323.721 | 322.994 | 322.757 | 322.683 | 322.716 | 322.694 | 323.278 |
| BH 110 | 323.60 | 324.25 | | 321.275 | 321.835 | 322.524 | 321.555 | 321.436 | 321.265 | 321.298 | 321.253 | 321.937 |

CITYVIEW RIDGE SUBDIVISION
PROJECT NO.: 105-172

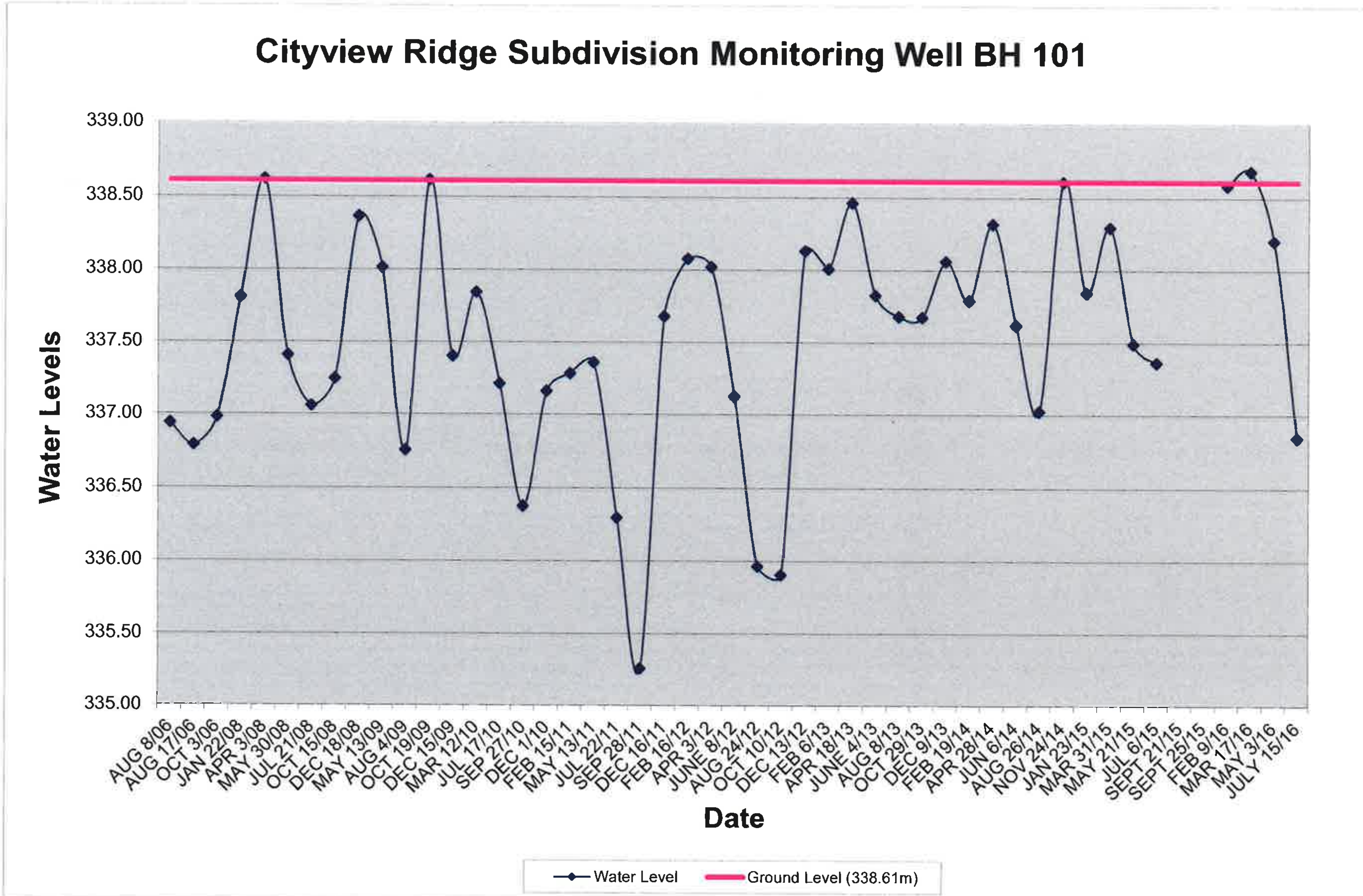
INSTALLED AUGUST 2006

| WELL ID. | GROUND ELEVATION (m) | TOP OF CASING ELEVATION (m) | DATE>> | JUN 6/14 | AUG 26/14 | NOV 24/14 | JAN 23/15 | MAR 31/15 | MAY 21/15 | JUL 6/15 | SEPT 21/15 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BH 101 | 338.61 | 339.38 | | 337.622 | 337.026 | 338.610 | 337.846 | 338.302 | 337.496 | 337.366 | |
| BH 102 | 334.42 | 335.22 | | 332.640 | | 333.183 | 332.687 | 333.400 | 332.443 | 332.369 | |
| BH 103 U | 344.44 | 345.74 | | 343.252 | | 342.978 | 343.070 | 343.595 | 343.112 | 343.027 | |
| BH 103 L | 344.44 | 345.70 | | 342.362 | 340.666 | 342.046 | 342.204 | 342.662 | 342.194 | 341.744 | 339.666 |
| BH 104 U | 339.95 | 340.66 | | 338.064 | | 337.421 | 337.713 | 338.286 | 337.539 | 337.760 | |
| BH 104 L | 339.95 | 340.59 | | 337.471 | 335.534 | 337.260 | 337.206 | 337.619 | 336.846 | 337.091 | |
| BH 105 U | 343.82 | 344.49 | | 342.466 | | 342.321 | 342.243 | 342.512 | 342.484 | 342.447 | |
| BH 105 L | 343.82 | 344.41 | | 336.664 | 334.894 | 335.766 | 336.011 | 335.276 | 336.302 | 336.462 | |
| BH 106 U | 347.25 | 347.98 | | 344.703 | | 345.362 | 344.633 | 345.061 | 344.708 | | |
| BH 106 L | 347.25 | 347.92 | | 344.690 | 343.153 | 345.412 | 344.612 | 345.043 | 344.654 | 344.872 | |
| BH 107 U | 345.47 | 346.21 | | 344.677 | 344.081 | 345.346 | 345.346 | | 344.466 | 344.486 | |
| BH 107 L | 345.47 | 346.17 | | 344.698 | 344.107 | 345.343 | 344.912 | 345.216 | 344.320 | 344.920 | |
| BH 108 | 342.70 | 343.25 | | | | | | | | | |
| BH 109 | 326.19 | 326.83 | | 322.911 | 322.487 | 322.946 | 322.697 | 322.795 | 322.785 | 322.827 | 322.233 |
| BH 110 | 323.60 | 324.25 | | 321.573 | | 321.261 | 321.307 | 321.302 | 321.389 | 321.555 | |

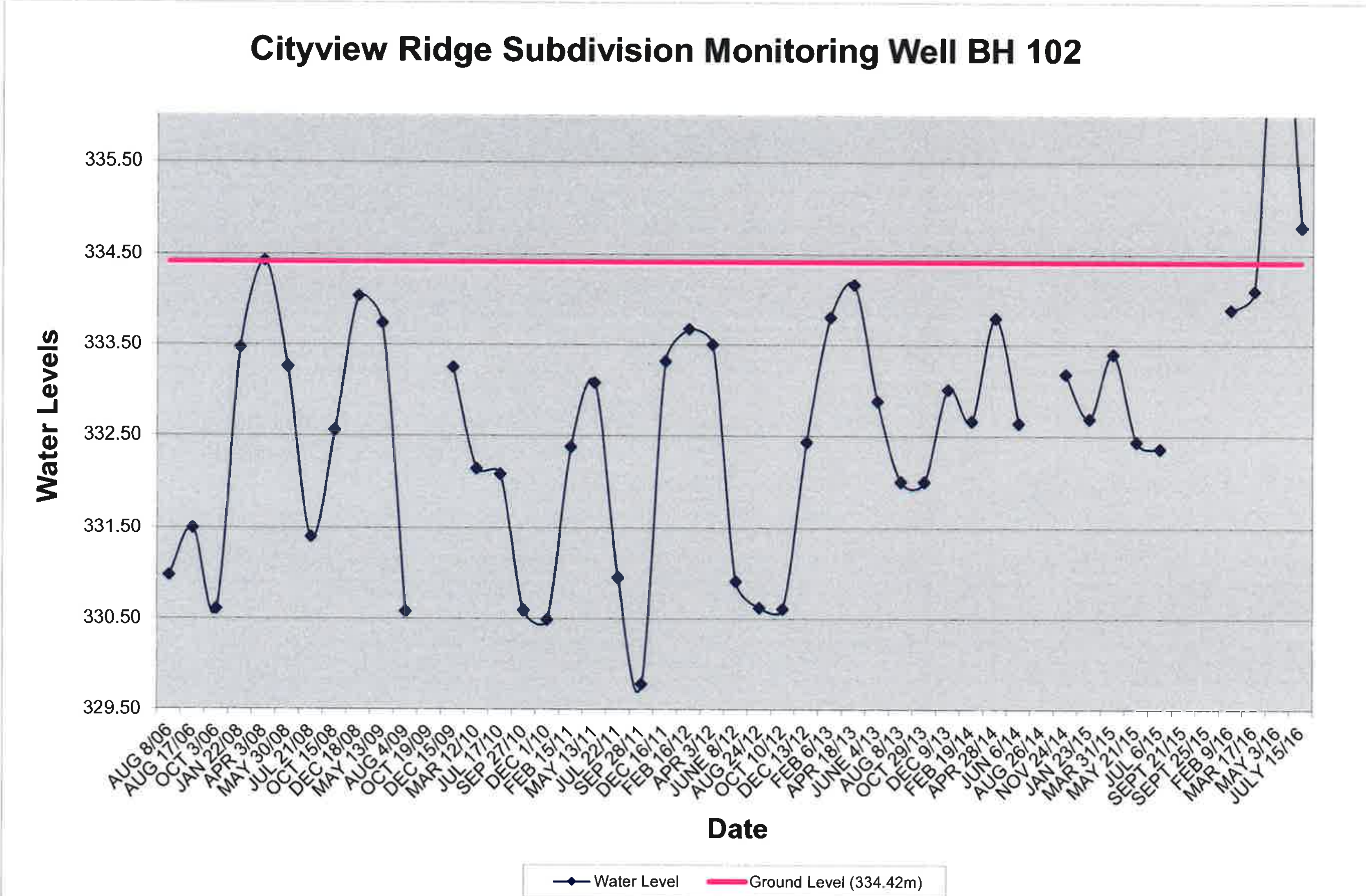
CITYVIEW RIDGE SUBDIVISION
PROJECT NO.: 105-172

INSTALLED AUGUST 2006

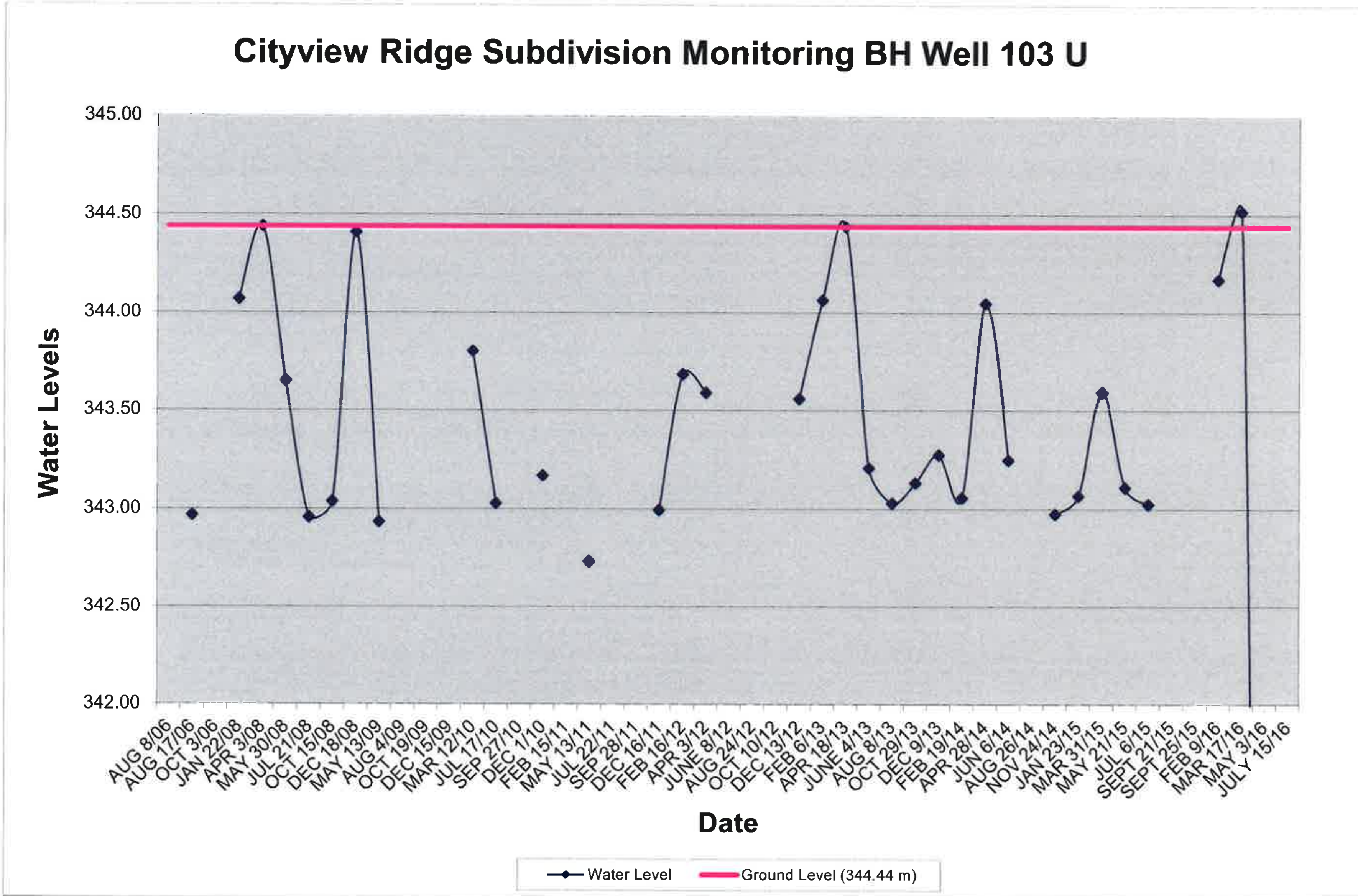
| WELL ID. | GROUND ELEVATION (m) | TOP OF CASING ELEVATION (m) | DATE>> | SEPT 25/15 | FEB 9/16 | MAR 17/16 | MAY 3/16 | JULY 15/16 |
|---|---|---|---|---|---|---|---|---|
| BH 101 | 338.61 | 339.38 | | | 338.586 | 338.681 | 338.209 | 336.846 |
| BH 102 | 334.42 | 335.22 | | | 333.895 | 334.103 | 337.911 | 334.806 |
| BH 103 U | 344.44 | 345.74 | | | 344.172 | 344.52 | 337.741 | 336.536 |
| BH 103 L | 344.44 | 345.70 | | | 342.889 | 343.329 | 336.691 | 334.486 |
| BH 104 U | 339.95 | 340.66 | | | 338.847 | 339.196 | 337.486 | 335.776 |
| BH 104 L | 339.95 | 340.59 | | | 337.889 | 338.248 | 336.526 | 336.106 |
| BH 105 U | 343.82 | 344.49 | | | 342.999 | 343.618 | 338.176 | 337.106 |
| BH 105 L | 343.82 | 344.41 | | | 335.251 | 336.283 | 332.116 | 332.106 |
| BH 106 U | 347.25 | 347.98 | | | 345.713 | 345.983 | 336.726 | 335.686 |
| BH 106 L | 347.25 | 347.92 | | 342.986 | 345.688 | 345.966 | 336.776 | 332.106 |
| BH 107 U | 345.47 | 346.21 | | 343.839 | 345.236 | 345.296 | 338.266 | 336.566 |
| BH 107 L | 345.47 | 346.17 | | | 345.23 | | | |
| BH 108 | 342.70 | 343.25 | | | | | | |
| BH 109 | 326.19 | 326.83 | | | 323.084 | 323.439 | 335.753 | 335.356 |
| BH 110 | 323.60 | 324.25 | | 322.777 | 321.635 | 321.934 | 336.931 | 337.006 |



Cityview Ridge Subdivision Monitoring Well BH 101
Water Levels
339.00
338.50
338.00
337.50
337.00
336.50
336.00
335.50
335.00
AUG 8/06
AUG 17/06
OCT 3/06
JAN 22/08
APR 3/08
MAY 30/08
JUL 21/08
OCT 15/08
DEC 18/08
MAY 13/09
AUG 4/09
OCT 19/09
DEC 15/09
MAR 12/10
JUL 17/10
SEP 27/10
DEC 1/10
FEB 15/11
MAY 13/11
JUL 22/11
SEP 28/11
DEC 16/11
FEB 16/12
APR 3/12
JUNE 8/12
AUG 24/12
OCT 10/12
DEC 13/12
FEB 6/13
APR 18/13
JUNE 4/13
AUG 8/13
OCT 29/13
DEC 9/13
FEB 19/14
APR 28/14
JUN 6/14
AUG 26/14
NOV 24/14
JAN 23/15
MAR 31/15
MAY 21/15
JUL 6/15
SEPT 21/15
SEPT 25/15
FEB 9/16
MAR 17/16
MAY 3/16
JULY 15/16
Date
Water Level
Ground Level (338.61m)



Cityview Ridge Subdivision Monitoring Well BH 102
Water Levels
335.50
334.50
333.50
332.50
331.50
330.50
329.50
AUG 8/06
AUG 17/06
OCT 3/06
JAN 22/08
APR 3/08
MAY 30/08
JUL 21/08
OCT 15/08
DEC 18/08
MAY 13/09
AUG 4/09
OCT 19/09
DEC 15/09
MAR 12/10
JUL 17/10
SEP 27/10
DEC 1/10
FEB 15/11
MAY 13/11
JUL 22/11
SEP 28/11
DEC 16/11
FEB 16/12
APR 3/12
JUNE 8/12
AUG 24/12
OCT 10/12
DEC 13/12
FEB 6/13
APR 18/13
JUNE 4/13
AUG 8/13
OCT 29/13
DEC 9/13
FEB 19/14
APR 28/14
JUN 6/14
AUG 26/14
NOV 24/14
JAN 23/15
MAR 31/15
MAY 21/15
JUL 6/15
SEPT 21/15
SEPT 25/15
FEB 9/16
MAR 17/16
MAY 3/16
JULY 15/16
Date
Water Level
Ground Level (334.42m)


Cityview Ridge Subdivision Monitoring BH Well 103 U
Water Levels
345.00
344.50
344.00
343.50
343.00
342.50
342.00
AUG 8/06
AUG 17/06
OCT 3/06
JAN 22/08
APR 3/08
MAY 30/08
JUL 21/08
OCT 15/08
DEC 18/08
MAY 13/09
AUG 4/09
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MAR 12/10
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SEP 27/10
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FEB 15/11
MAY 13/11
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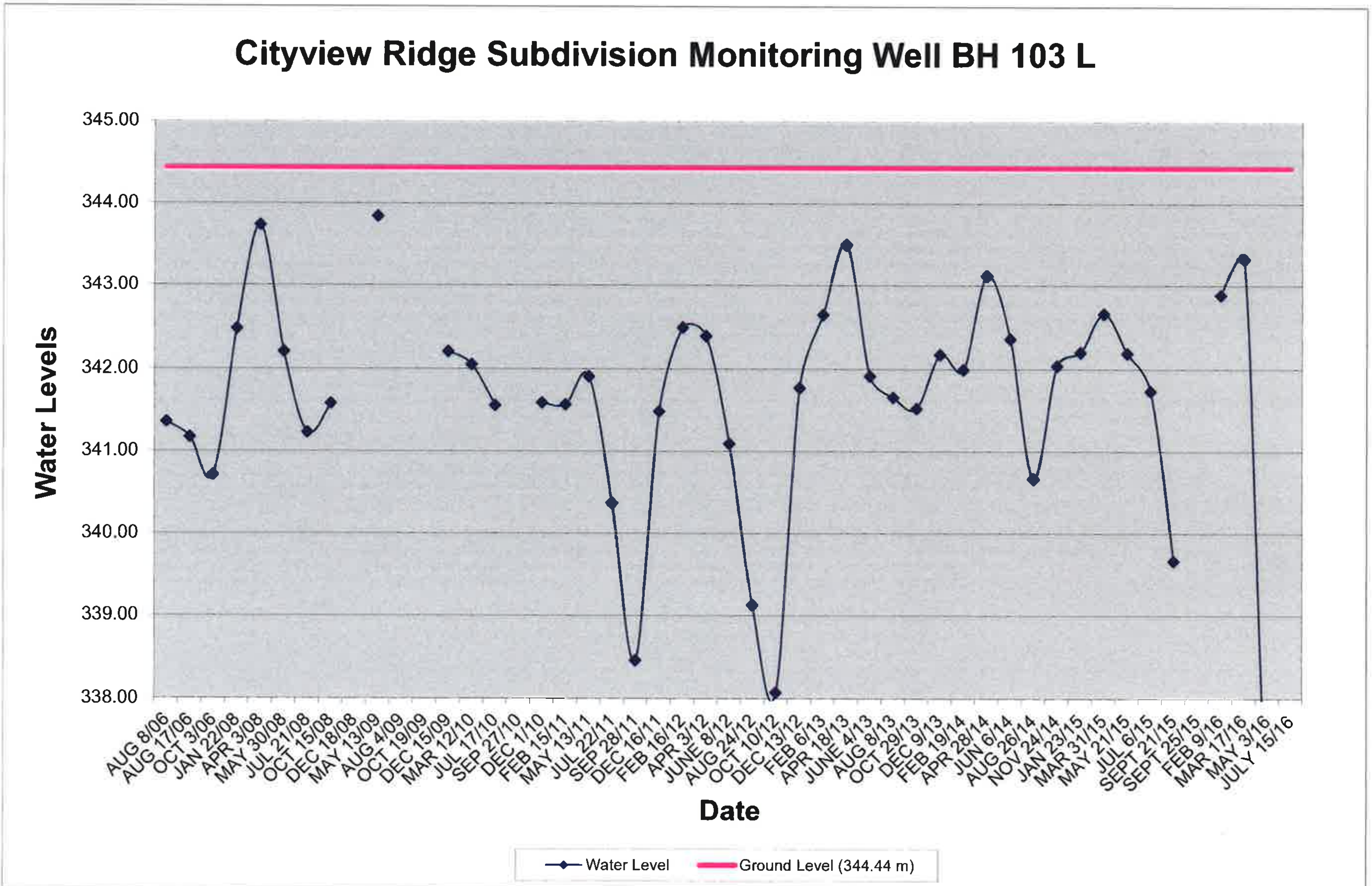
APR 28/14
JUN 6/14
AUG 26/14
NOV 24/14
JAN 23/15
MAR 31/15
MAY 21/15
JUL 6/15
SEPT 21/15
SEPT 25/15
FEB 9/16
MAR 17/16
MAY 3/16
JULY 15/16
Date
Water Level
Ground Level (344.44 m)



Cityview Ridge Subdivision Monitoring Well BH 103 L
Water Levels
345.00
344.00
343.00
342.00
341.00
340.00
339.00
338.00
AUG 8/06
AUG 17/06
OCT 3/06
JAN 22/08
APR 3/08
MAY 30/08
JUL 21/08
OCT 15/08
DEC 18/08
MAY 13/09
AUG 4/09
OCT 19/09
DEC 15/09
MAR 12/10
JUL 17/10
SEP 27/10
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MAY 13/11
JUL 22/11
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JUNE 8/12
AUG 24/12
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DEC 13/12
FEB 6/13
APR 18/13
JUNE 4/13
AUG 8/13
OCT 29/13
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APR 28/14
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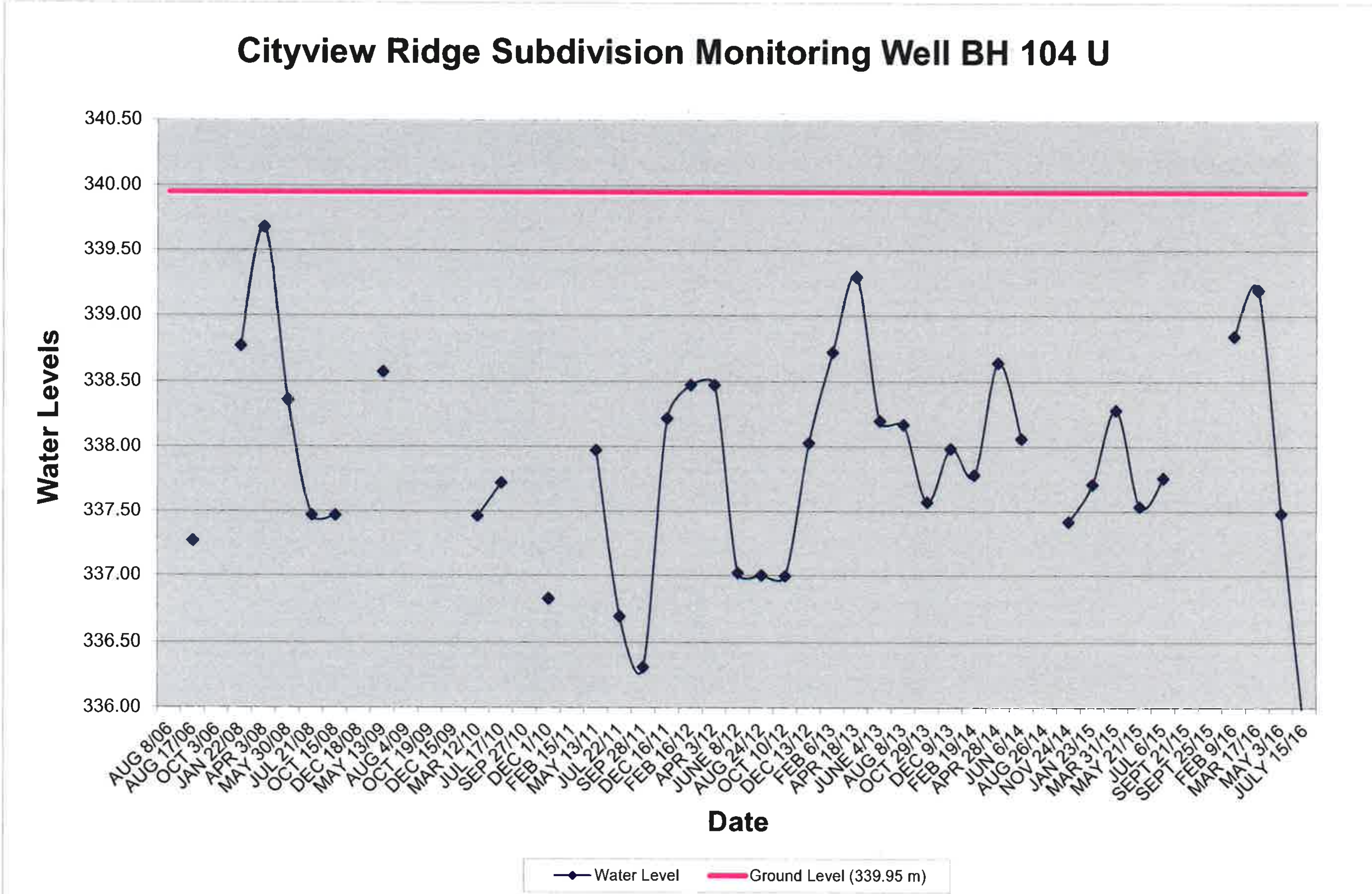
AUG 26/14
NOV 24/14
JAN 23/15
MAR 31/15
MAY 21/15
JUL 6/15
SEPT 21/15
SEPT 25/15
FEB 9/16
MAR 17/16
MAY 3/16
JULY 15/16
Date
Water Level
Ground Level (344.44 m)


Cityview Ridge Subdivision Monitoring Well BH 104 U
Water Levels
340.50
340.00
339.50
339.00
338.50
338.00
337.50
337.00
336.50
336.00
AUG 8/06
AUG 17/06
OCT 3/06
JAN 22/08
APR 3/08
MAY 30/08
JUL 21/08
OCT 15/08
DEC 18/08
MAY 13/09
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DEC 1/10
FEB 15/11
MAY 13/11
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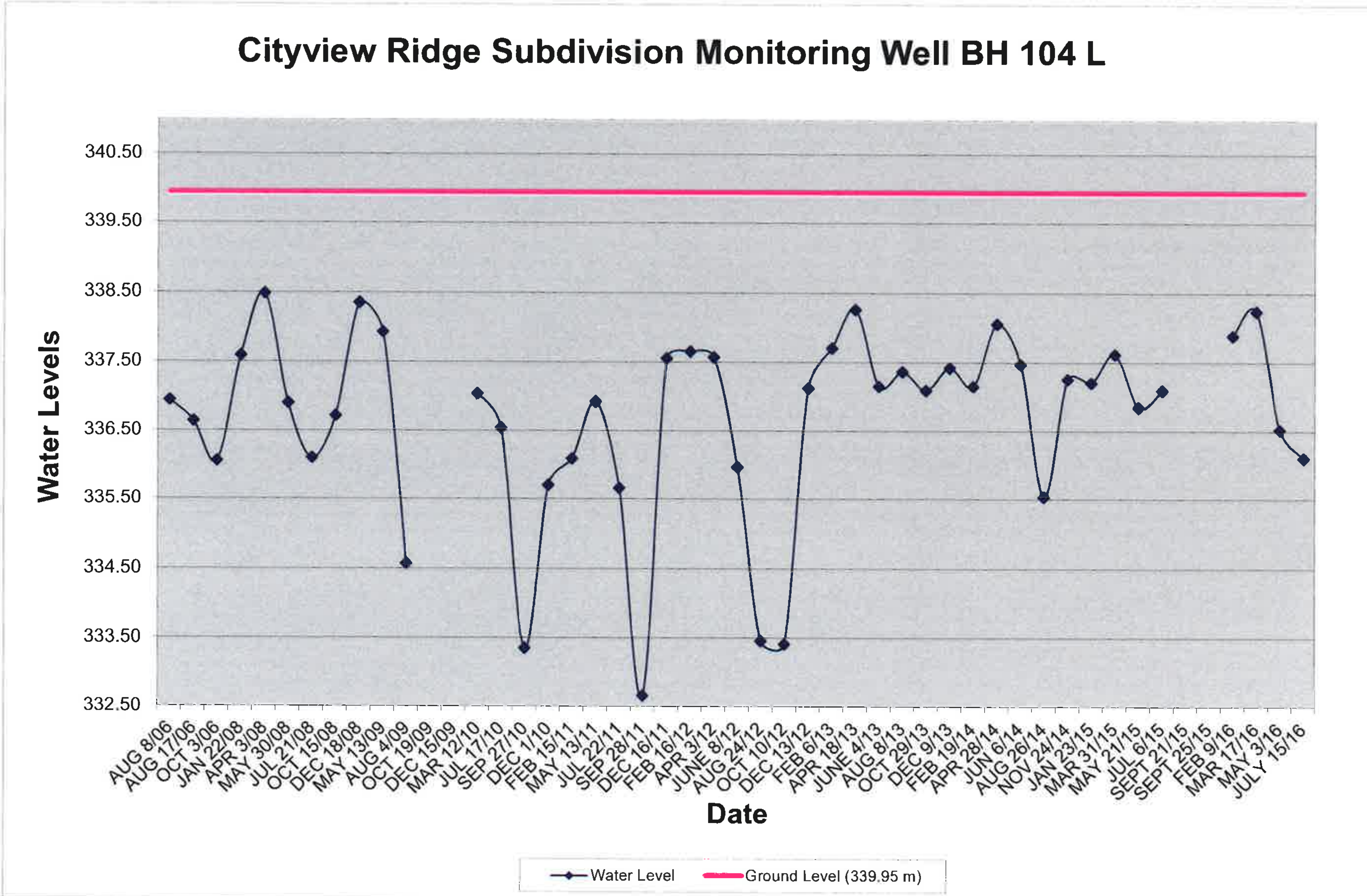
SEP 28/11
DEC 16/11
FEB 16/12
APR 3/12
JUNE 8/12
AUG 24/12
OCT 10/12
DEC 13/12
FEB 6/13
APR 18/13
JUNE 4/13
AUG 8/13
OCT 29/13
DEC 9/13
FEB 19/14
APR 28/14
JUN 6/14
AUG 26/14
NOV 24/14
JAN 23/15
MAR 31/15
MAY 21/15
JUL 6/15
SEPT 21/15
SEPT 25/15
FEB 9/16
MAR 17/16
MAY 3/16
JULY 15/16
Date
Water Level
Ground Level (339.95 m)


Cityview Ridge Subdivision Monitoring Well BH 104 L
Water Levels
340.50
339.50
338.50
337.50
336.50
335.50
334.50
333.50
332.50
AUG 8/06
AUG 17/06
OCT 3/06
JAN 22/08
APR 3/08
MAY 30/08
JUL 21/08
OCT 15/08
DEC 18/08
MAY 13/09
AUG 4/09
OCT 19/09
DEC 15/09
MAR 12/10
JUL 17/10
SEP 27/10
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FEB 15/11
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JUL 22/11
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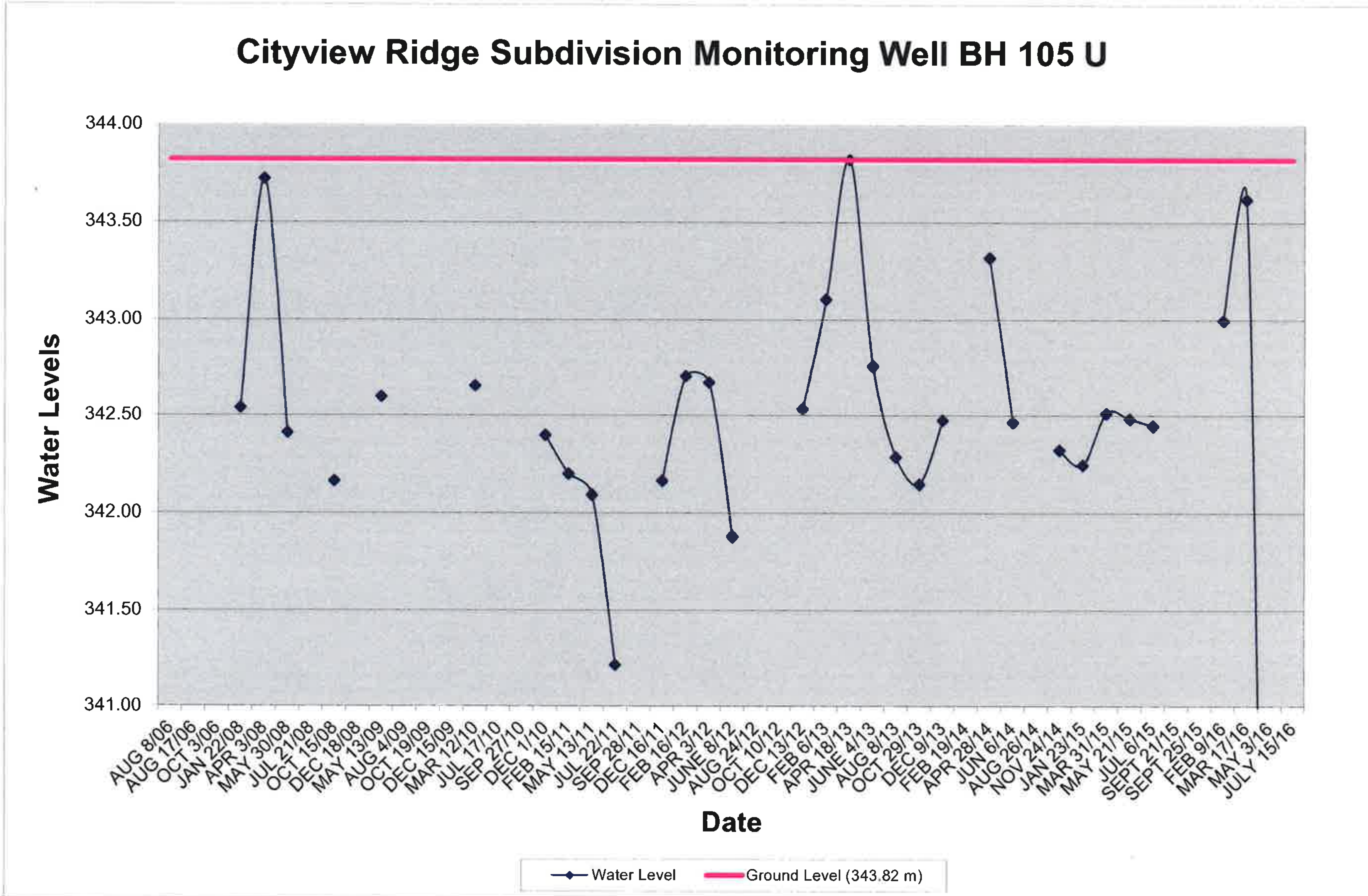
MAY 21/15
JUL 6/15
SEPT 21/15
SEPT 25/15
FEB 9/16
MAR 17/16
MAY 3/16
JULY 15/16
Date
Water Level
Ground Level (339.95 m)



Cityview Ridge Subdivision Monitoring Well BH 105 U
Water Levels
344.00
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AUG 8/06
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SEPT 21/15
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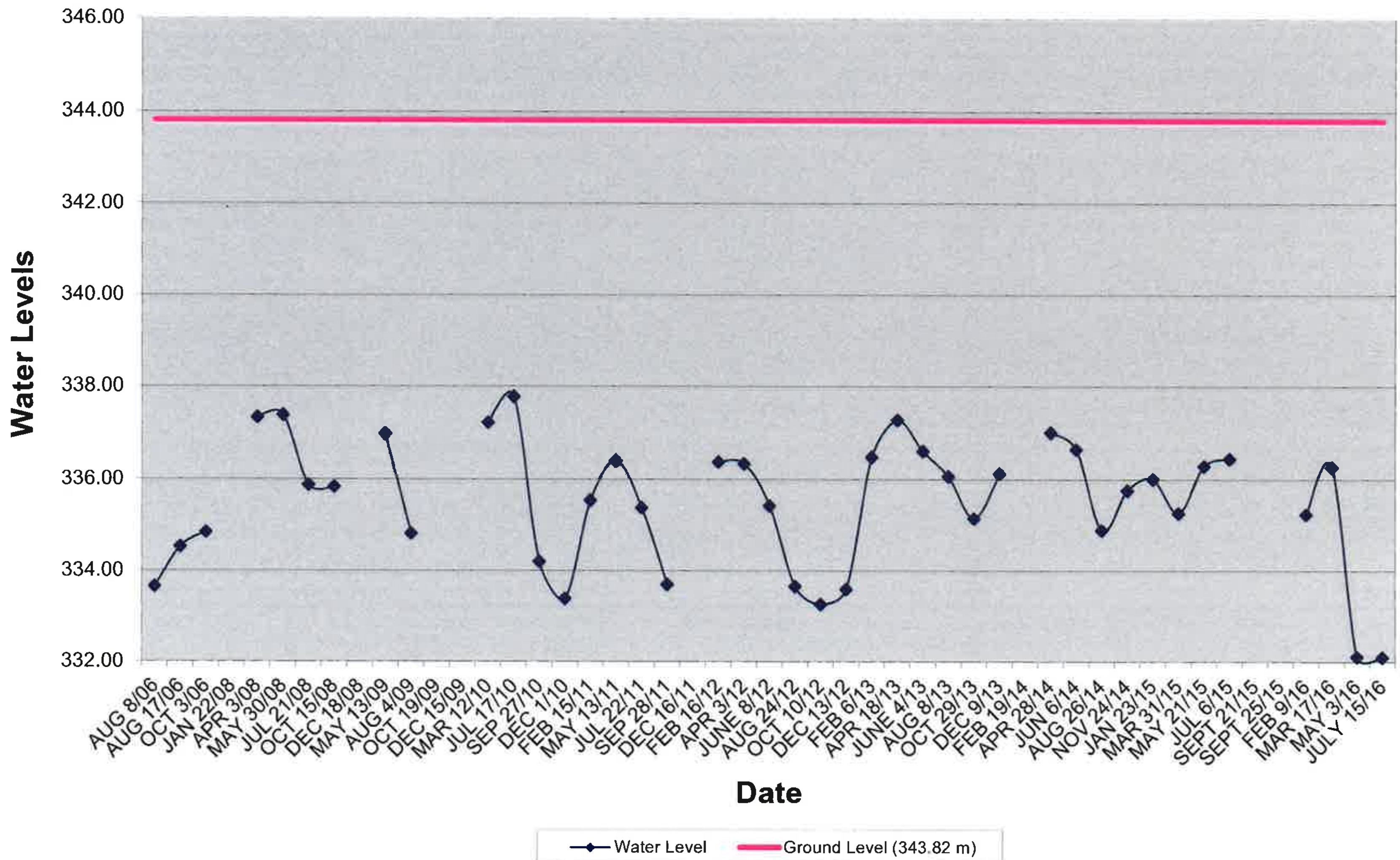
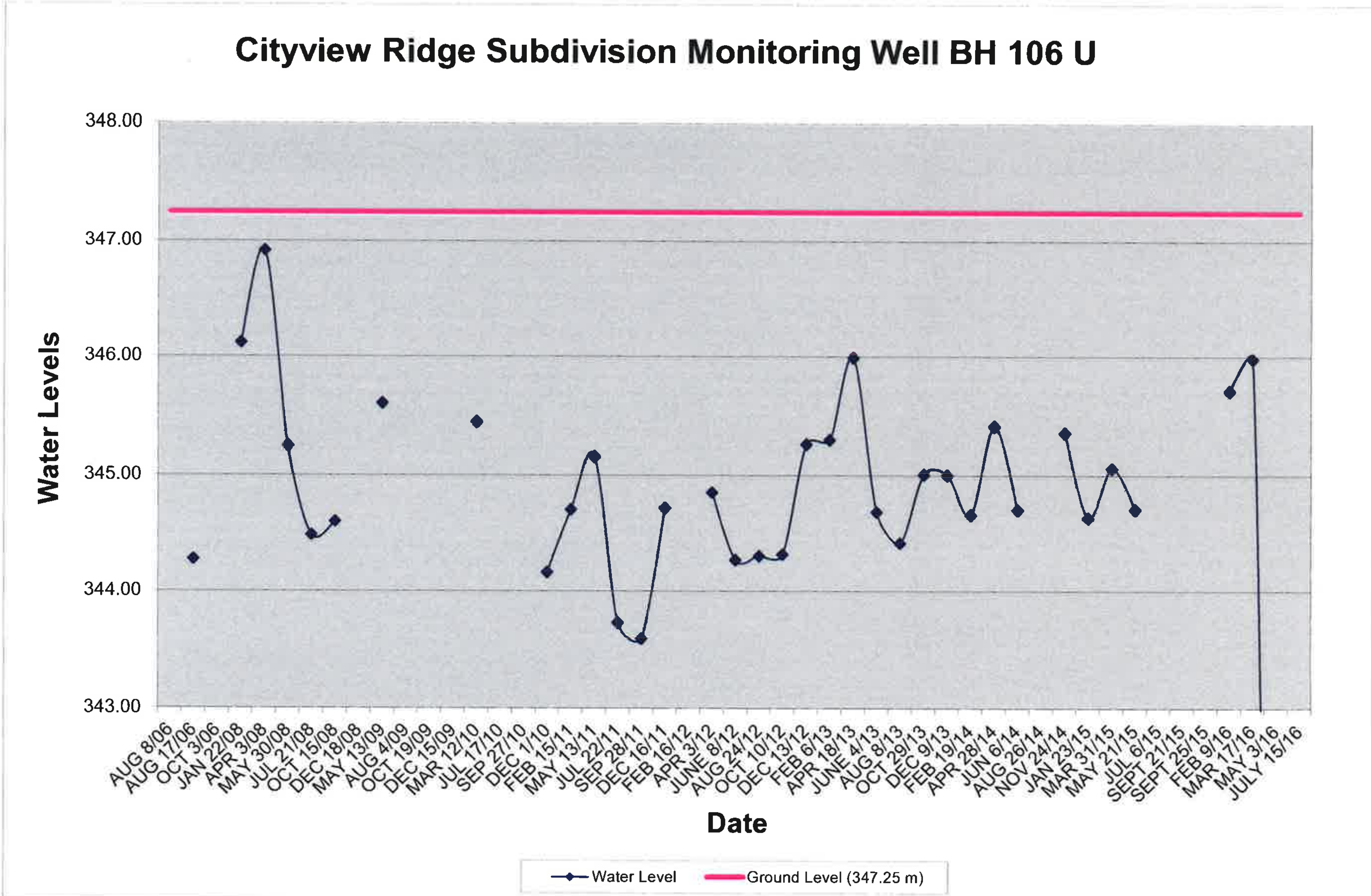
FEB 9/16
MAR 17/16
MAY 3/16
JULY 15/16
Date
Water Level
Ground Level (343.82 m)

## Cityview Ridge Subdivision Monitoring Well BH 105 L





Cityview Ridge Subdivision Monitoring Well BH 106 U
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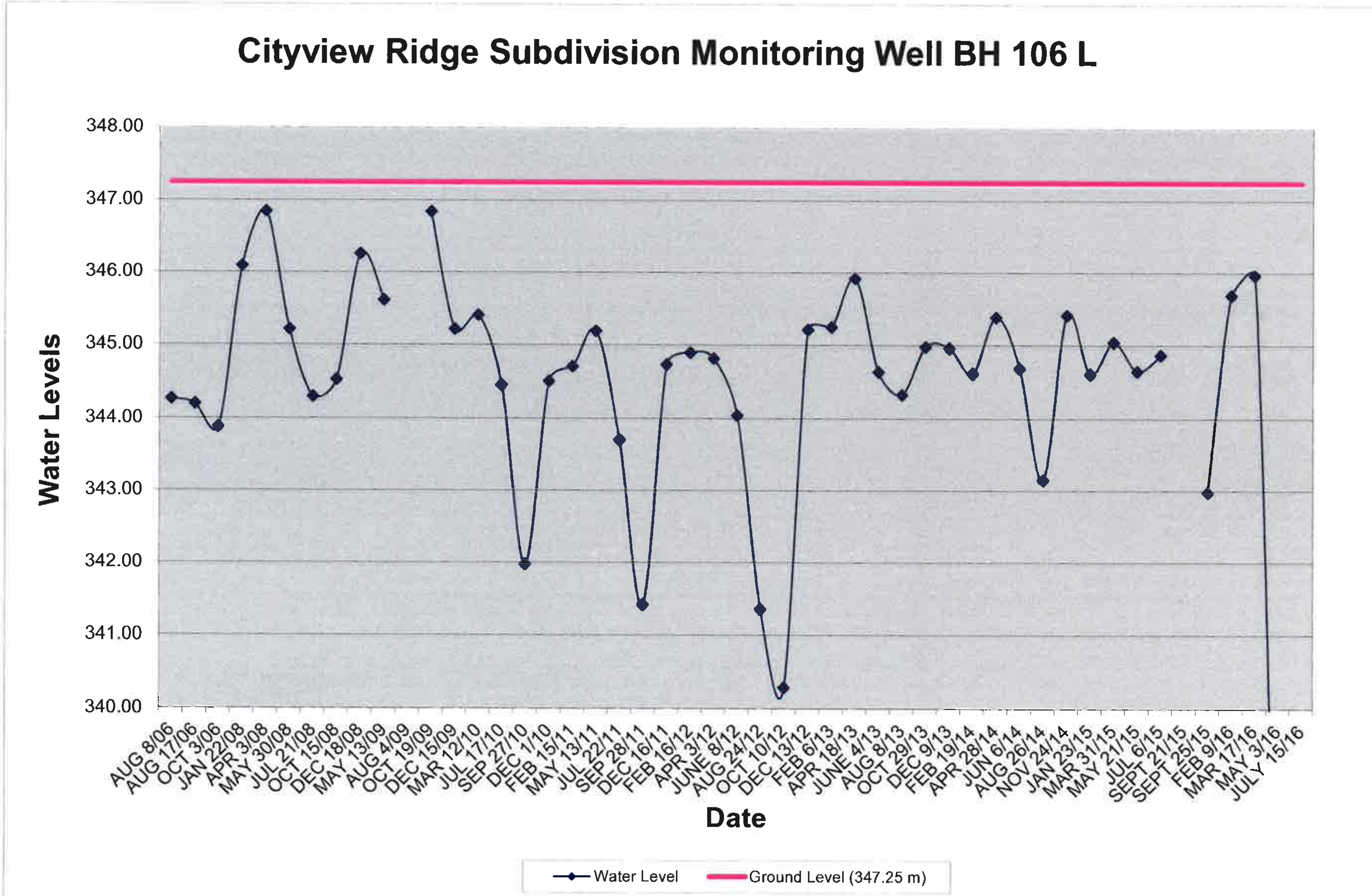
JULY 15/16
Date
Water Level
Ground Level (347.25 m)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Water Levels
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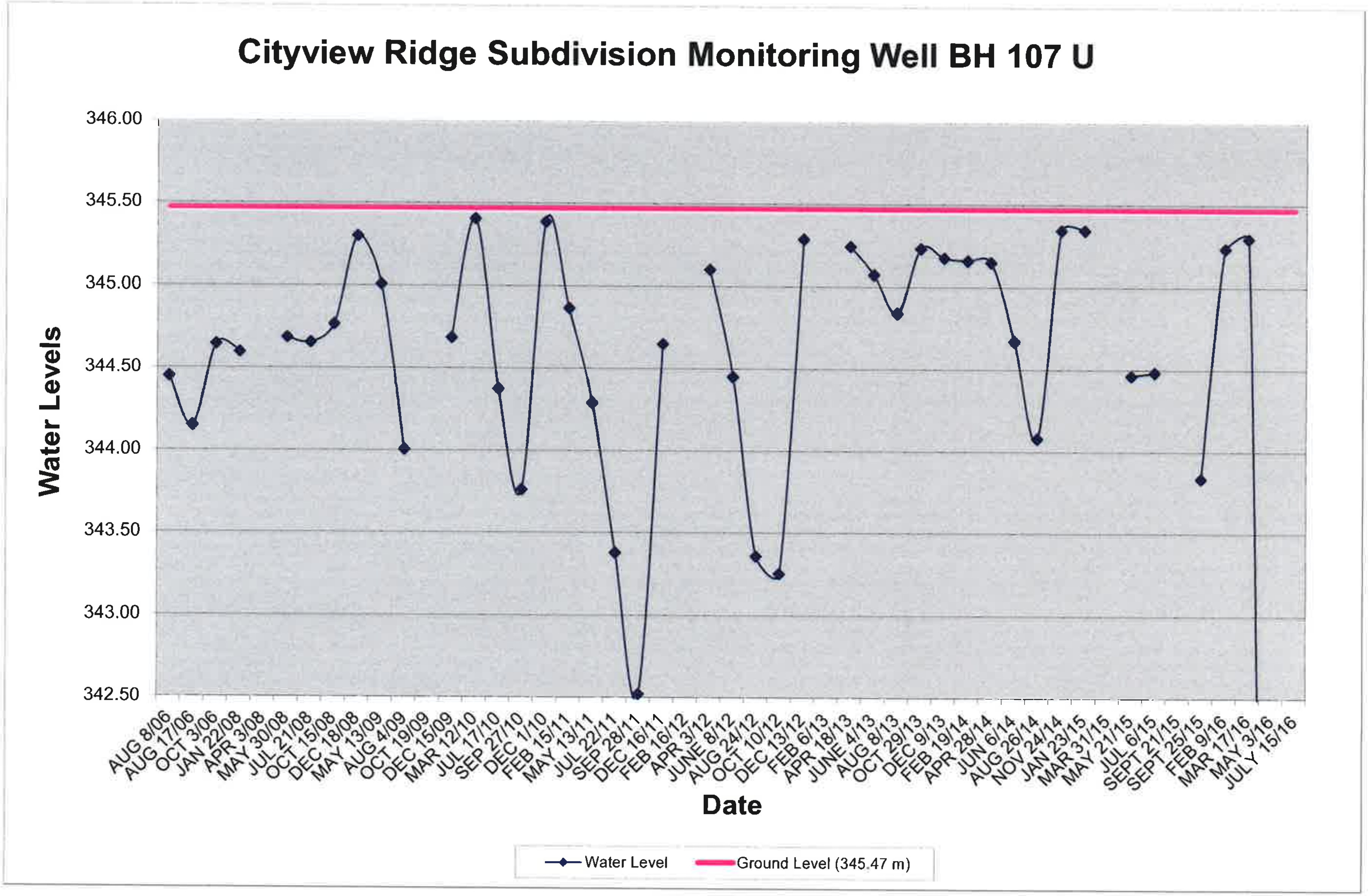
Date
Water Level
Ground Level (347.25 m)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Water Levels
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MAY 21/15
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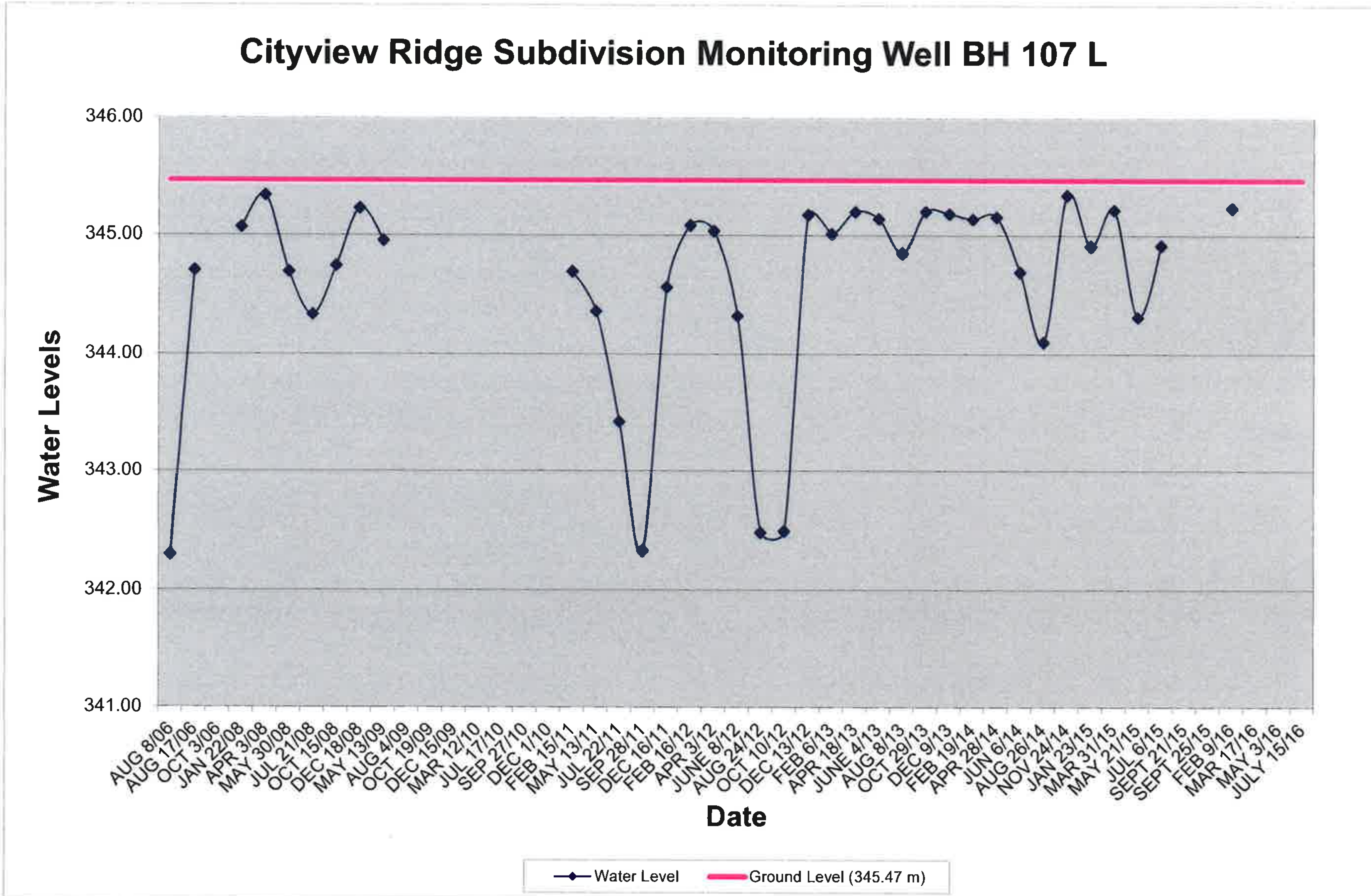
FEB 9/16
MAR 17/16
MAY 3/16
JULY 15/16
Date
Water Level
Ground Level (345.47 m)


Cityview Ridge Subdivision Monitoring Well BH 107 L
Water Levels
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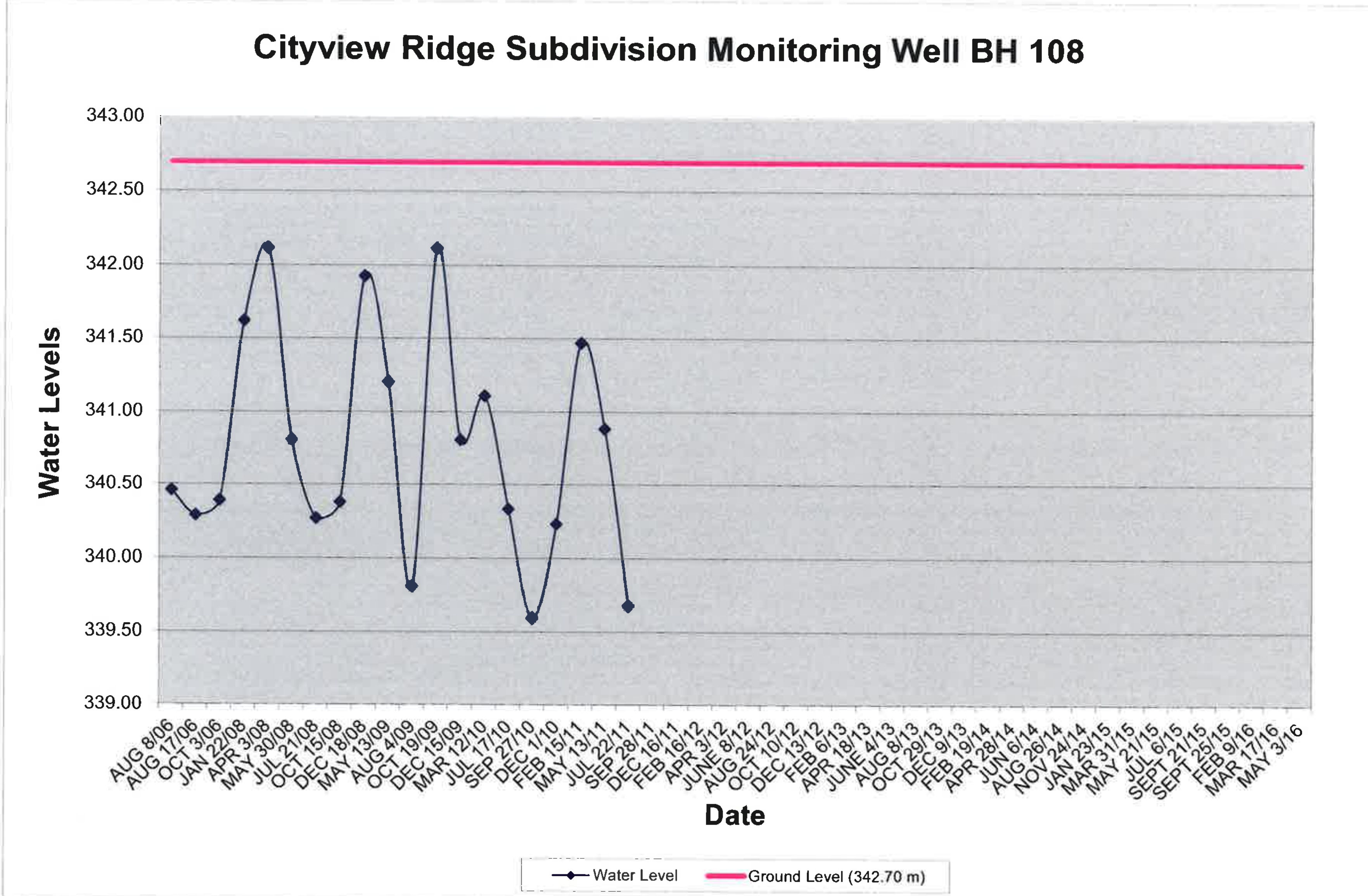
FEB 9/16
MAR 17/16
MAY 3/16
JULY 15/16
Date
Water Level
Ground Level (345.47 m)



Cityview Ridge Subdivision Monitoring Well BH 108
Water Levels
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342.00
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AUG 8/06
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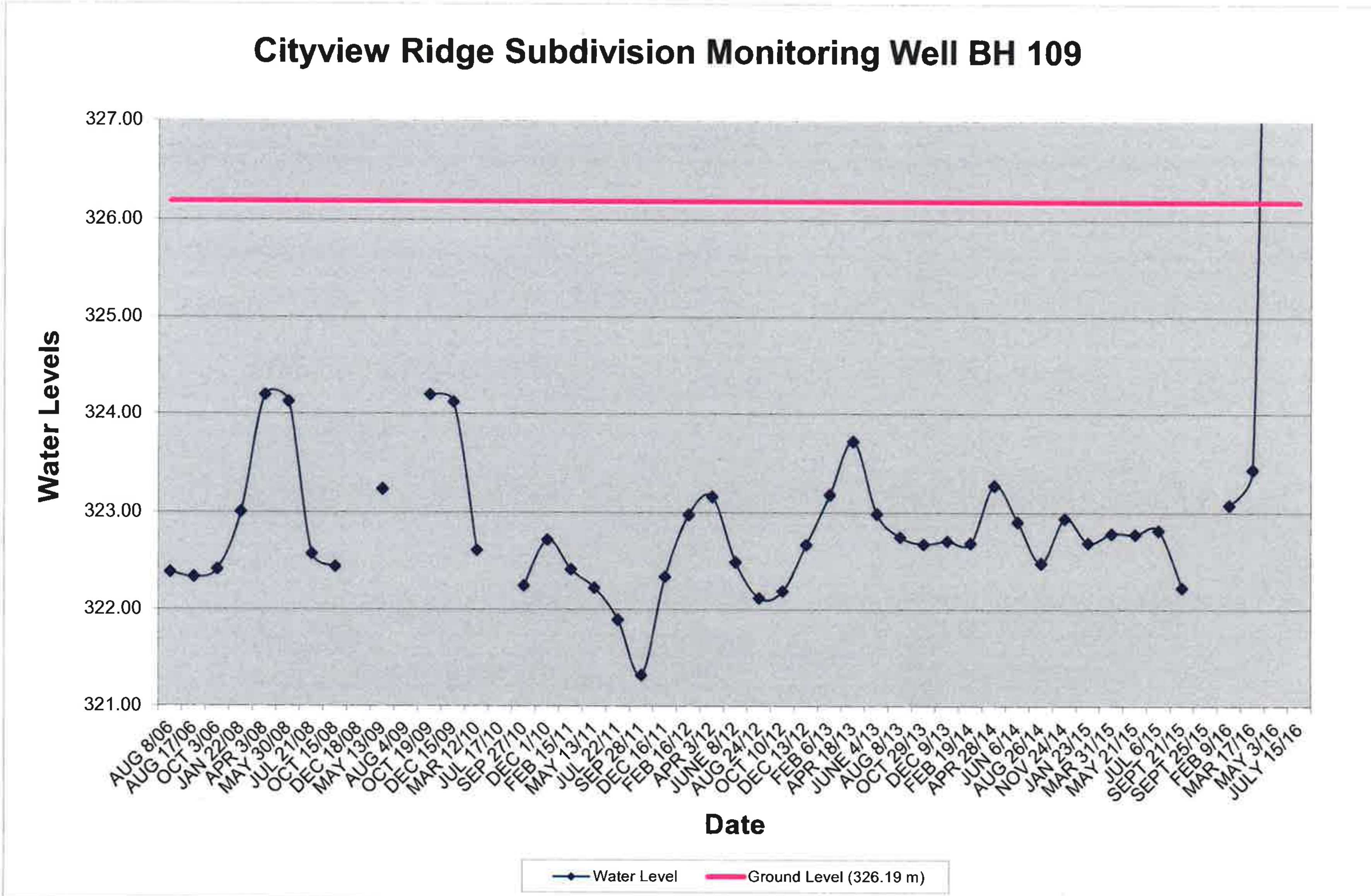
MAR 17/16
MAY 3/16
Date
Water Level
Ground Level (342.70 m)



Cityview Ridge Subdivision Monitoring Well BH 109
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325.00
324.00
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OCT 3/06
JAN 22/08
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MAY 30/08
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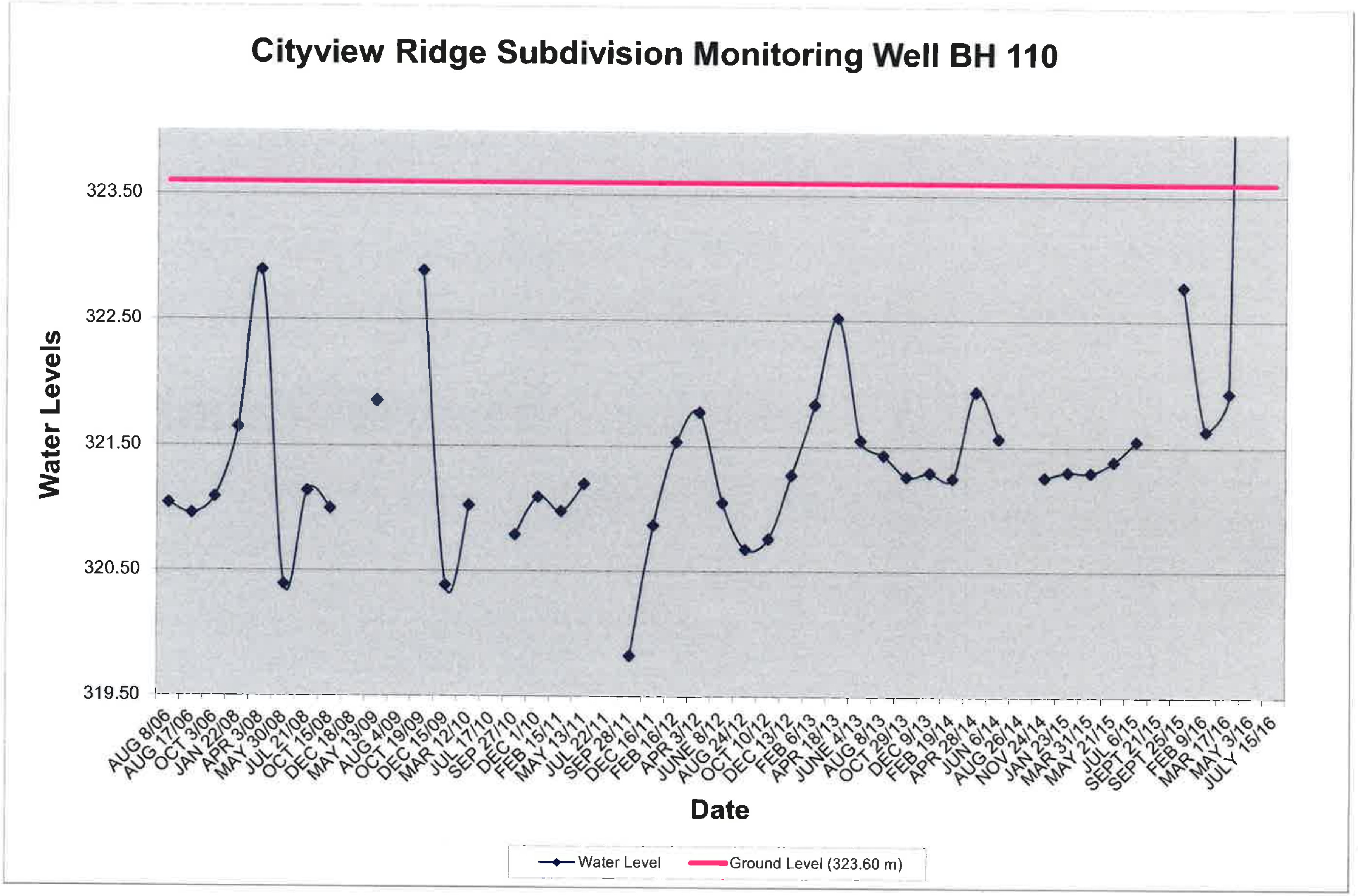
MAY 3/16
JULY 15/16
Date
Water Level
Ground Level (326.19 m)


Cityview Ridge Subdivision Monitoring Well BH 110
Water Levels
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MAR 17/16
MAY 3/16
JULY 15/16
Date
Water Level
Ground Level (323.60 m)

**PRELIMINARY SERVICING &**
**STORMWATER MANAGEMENT REPORT**
**CITYVIEW RIDGE SUBDIVISION**
**CITY OF GUELPH**
**Revised: June 2017**

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**APPENDIX "D"**

**Hydrogeological Investigation**
**Banks Groundwater Engineering Limited**
**(November 2014)**

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# Technical Memorandum (DRAFT)

Banks Groundwater Engineering Limited
940 Watson Road South, RR 1 Puslinch, Ontario N0B 2J0
519.829.4808 www.banksgroundwater.ca

17 November 2014

To: Carson Reid – Cityview Ridge Developments Inc.

Copies: Angela Kroetsch – GM BluePlan Engineering Limited
Mirek Sharp – North-South Environmental Inc.
Nancy Shoemaker – Black, Shoemaker, Robinson & Donaldson Limited

From: Bill Banks

Re: Hydrogeological Investigation
Environmental Impact Study
Proposed Cityview Ridge Development, City of Guelph

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## 1 Introduction

This Technical Memorandum presents the updated results of a hydrogeological investigation completed for this proposed development. The site is located immediately northwest of the intersection of York Road and Watson Parkway, adjacent to Cityview Drive, and north of the Canadian National Railway, in the City of Guelph.

The results of the hydrogeological investigation have been updated to include additional groundwater monitoring conducted on-site from December 2012 to October 2014. This investigation was also completed to support pre- and post-development water balance calculations, by providing estimates of current on-site infiltration of precipitation and groundwater discharge to an on-site wetland and adjacent creek. The results and the interpretation of hydrogeological conditions are provided for inclusion or reference in an Environmental Impact Study (EIS) for this proposed development. The hydrogeological investigation included the following tasks:

- Review of available information including: draft site plan, previous geotechnical investigation data, published geology maps and reports, City of Guelph groundwater study reports, aerial photography, wetland mapping and analyses, and stormwater management plans
- Site reconnaissance
- Initial installation of shallow piezometers in 2009 at three locations adjacent to an on-site wetland and creek, and the subsequent installation in 2012 of shallow piezometers at one additional location adjacent to the on-site wetland
- Initial short-term monitoring of groundwater levels in 2009 to determine hydraulic gradients and evaluate groundwater flows to the on-site wetland and adjacent creek
- Subsequent longer-term monitoring of groundwater levels in shallow piezometers to assess seasonal variations in groundwater discharge to the on-site wetland and adjacent creek
- Monitoring of groundwater levels in existing on-site monitoring wells
- Analysis of the results of the background review, groundwater monitoring and the local hydrogeological conditions

- Analysis of groundwater levels to establish depths to water table, directions and rates of groundwater flow, the need for stormwater management systems, and the interaction of groundwater and the wetland
- Consideration and evaluation of source water protection related to City of Guelph municipal wells.

Presented below is a summary of the geology and hydrogeology of the area in which the site is located, followed by the results of the groundwater monitoring, and analysis of groundwater recharge and discharge in relation to the wetland.

# 2 Surficial Geology

The study site is situated within the Guelph Drumlin Fields physiographic region, as defined by Chapman and Putnam (1984). The Guelph Drumlin Field consists of a series of northwest-southeast trending drumlins that are regionally situated to the northwest of the Paris Moraine. The drumlins are characterized by a series of elongated oval-shaped hills. The topography of the local area is dominated by three closely-spaced drumlins. The proposed residential development area of the site is located on the southern end of the middle drumlin. The eastern part of the site encompasses the slope of the drumlin and lower lying areas. Multiple residential development is proposed for the easternmost part of the site adjacent to Watson Parkway North.

The drumlins in the Guelph Drumlin Field are comprised of a sandy facies (up to 40 percent sand) of the Port Stanley Till, which is typically a silt to sandy silt till (Karrow, 1968, 1987). Overburden thickness is more than 30 m at the highest elevation of the drumlins. The overburden deposits in the lower areas comprise a series of terraced deposits of glacial outwash (sand and gravel) and lacustrine (sand) materials. The overburden thins to less than 4 m in the lower-lying areas. Wetland areas are generally found associated with the glacial outwash deposits within these lower lying areas. A wetland occurs in the south-eastern area of the site at the base of the drumlin, and is interpreted to drain to the adjacent Clythe Creek.

The results of a previous geotechnical investigation of this site, which included drilling and soil sampling at 10 locations on-site, confirmed the shallow soils on the drumlin comprise a sandy silt till and the shallow soils in the eastern part of the site comprise sand and gravel (Naylor Engineering Associates, 2006).

# 3 Overburden Hydrogeology

Groundwater occurs within the bedrock formations and overburden deposits throughout the region and flows horizontally and vertically under hydraulic gradients. The rate of groundwater flow is dependent on the hydraulic conductivity of the deposits and formations, as well as the magnitude of the local and regional hydraulic gradients. The rate of groundwater flow is typically very slow relative to the flow of surface water in creeks, streams, and rivers.

Groundwater flow in the local area is interpreted to be southerly towards discharge to the Eramosa River, which is about 700 metres south of the site. A component of localized groundwater flow on-site is expected to be south-easterly towards discharge to the wetland and Clythe Creek.

Drumlins comprising a silt to sandy silt glacial till typically have limited intergranular porosity and hydraulic conductivity. These deposits do not transmit water readily and will likely act to limit the flow of groundwater. The logs of the eight boreholes drilled on the drumlin indicate the sandy silt till increased in density with depth, with borehole depths ranging from 5.7 to 11.1 metres. Given the characteristics of the drumlin at this site it is interpreted that a limited amount of precipitation infiltrates in the upland portion and to a lesser extent along the slopes. This infiltration would recharge the local groundwater system, but it is expected that most of this shallow groundwater would flow towards the sand and gravel deposits situated around the southerly and easterly base of the drumlin. Infiltration in the area of the sand and gravel surficial deposits would be significantly greater. Groundwater flow in the sand and gravel deposits on-site is interpreted to be southerly towards discharge to the wetland and Clythe Creek. Groundwater seeps (i.e. surface discharge areas) were observed at several locations up-gradient of the wetland.

# 4 Groundwater Monitoring

## 4.1 Wetland Piezometers (2009)

To confirm the occurrence of groundwater flow and discharge to the wetland located in the southeast area of the site, shallow piezometers were installed at two locations (Refer to Plates 1 and 2). Shallow piezometers were also installed at a third location to determine if shallow groundwater discharge was occurring adjacent to Clythe Creek along the southern boundary of the site (Refer to Plate 3). The locations were selected during a site reconnaissance in early May 2009, when the groundwater seeps were visible and the area upgradient of the wetland was saturated.

At each site the piezometers were installed in pairs, with one set at a shallow depth (about 0.5 m) and another at an intermediate depth (about 1.1 m), to provide for measurement of the vertical hydraulic gradient at various times. Groundwater levels were measured in each piezometer and recorded relative to adjacent ground surface on three occasions: 13 and 25 May, and 4 June 2009.

Plate 1: Piezometer Station 1

Plate 2: Piezometer Station 2

On each occasion the monitoring at Stations 1 and 2 confirmed groundwater discharge conditions adjacent to the wetland and upgradient. Confirmation of local groundwater discharge to the wetland is based on the observation of groundwater seeps along the upgradient slope on the north edge of the wetland on each monitoring occasion. Shallow groundwater flow to the wetland is also confirmed by the groundwater levels in piezometers that were observed at or just above ground surface. On these three monitoring occasions a downward gradient was observed, as the groundwater level in the intermediate piezometer was below the adjacent groundwater level in the shallow piezometer.

This initial short-term monitoring indicated that the upgradient groundwater seeps, combined with shallow groundwater flow along the fringe of the wetland are important in terms of maintaining water levels in the wetland. These observations demonstrated the wetland's dependence on groundwater flow during this brief monitoring period.

Plate 3: Piezometer Station 3

The third pair of shallow piezometers located along the southern edge of the site, just west of the Clythe Creek culvert under the railway, indicated groundwater was at a depth of 1.2 m on 13 May, but declined below the intermediate piezometer soon after. The shallow piezometer was dry on each occasion. The monitoring confirmed there was no shallow groundwater discharge at this location on these occasions. It is considered possible that groundwater is discharging directly to Clythe Creek in this area.

These monitoring results confirmed that the shallow groundwater system was discharging to the wetland along the base of the drumlin during the mid- to late-spring 2009 monitoring period. It is expected that these conditions occur each spring; however, due to the limited period of monitoring it was uncertain if these discharge conditions continue during drier seasonal periods.

## 4.2 Wetland Piezometers (2012 - 2014)

In recognition of the need for seasonal monitoring of groundwater levels and discharge to the wetland, a second period of monitoring was initiated in December 2012. Prior to the start of this monitoring, another pair of shallow piezometers was installed at a third location that was at the edge of the wetland and downgradient of a groundwater seep area. Plate 4 is a photograph of Station 4 in December 2012. The groundwater discharge in this area is visible where the warmer groundwater is melting the recently-fallen snow. The approximate locations of the three piezometer stations are shown in the appended Figure 1.

Plate 4: Piezometer Station 4

Groundwater levels were then measured and recorded in piezometers at Stations 1, 2 and 4 on 14 December 2012. The groundwater in piezometers is typically frozen in January and February, and therefore was not measured during these months in 2013. Monitoring resumed on 15 March 2013 and continued on a monthly basis until 12 December 2013. During 2014 monitoring occurred in April, July and October. The groundwater monitoring data and discharge observations for 2009 and 2012 to 2014 are summarized in the appended Table 1.

Groundwater level monitoring and discharge observations from December 2012 to October 2014 confirmed that groundwater levels in the shallow piezometers were close to, and on some occasions above, ground surface. This confirmed that groundwater was flowing toward and discharging into the wetland on all monitoring occasions. Without continuous monitoring it cannot be concluded that discharge was constant; however, observations made during months with below-average precipitation during 2013 (i.e. March, May, August, September, November and December) confirmed discharge was occurring during "drier" periods. The quarterly monitoring events in 2014 occurred during months of above-average total precipitation, thus resulting in higher groundwater levels and flow conditions.

## 4.3 Monitoring Wells

Groundwater levels were also measured in each of the 10 on-site monitoring wells on 13 May 2009, for the purpose of assessing horizontal and vertical flow directions. At five locations pairs of monitoring wells were installed in the same borehole to provide for measurement of the vertical hydraulic gradient at various times. Groundwater elevations were representative of spring levels, with depths to groundwater ranging from 0.5 to 1.6 metres below ground surface in the seven shallow monitors (i.e. completed at depths less than 4.0 m). Groundwater levels ranged from 0.5 to 6.8 metres below ground surface in the eight deeper monitors. The lowest groundwater elevation occurred in the central part of the site in the deepest monitor, which is completed at a depth of about 10 metres at the crest of the southern slope of the drumlin.

Groundwater elevations in the shallow monitors confirm groundwater flow directions are radial from the top of the drumlin towards the base (i.e. ranging from southwest to east). A comparison of shallow and deeper groundwater elevations indicates a downward hydraulic gradient in the drumlin, as would be expected.

# 5 Groundwater Recharge and Discharge

Based on a review of local geology and hydrogeology and the results of the shallow groundwater monitoring, it is evident that there is limited groundwater recharge on the drumlin that dominates much of the site. It is interpreted that the rate of groundwater recharge and flow is more significant in the lower-lying, eastern part of the site, where the outwash sand and gravel deposit occurs at surface. The limited amount of groundwater that discharges along the eastern base of the drumlin likely flows through the outwash deposit, eventually discharging into the on-site wetland. It is further interpreted that a portion of the surface water runoff from up the slope and on the top of the drumlin also flows to the wetland.

The average annual precipitation has been estimated from an averaging of precipitation normals from meteorological stations in Guelph and the surrounding area, for the period 1981 to 2010. The average annual precipitation, for the area in which the study site is located, is estimated to be about 925 mm. It has also been estimated that the average annual evapotranspiration for this area is about 555 mm; however, evapotranspiration rates across a site will vary in relation to the depth to water table, soil texture, topography, extent of vegetation cover, and type of vegetation. Based on the results of research conducted in other parts of the Eramosa River and Speed River subwatersheds, estimates of evapotranspiration rates can be made for this site. It is estimated that evapotranspiration rates on the drumlin will average about 555 mm/year, whereas in the well-drained outwash sand and gravel deposit the rate is estimated to be about 495 mm/year. The net water available for infiltration and surface runoff is 370 mm on the drumlin and 430 mm in the sand and gravel area, on an annual average basis.

For the purpose of estimating recharge to the groundwater system, on and adjacent to the drumlin, that maintains discharge to the wetland, it is estimated that the average annual groundwater recharge on the drumlin under current conditions is 180 mm. The remaining 190 mm is the average annual surface runoff. These estimates are based on previous analyses completed for developments in Guelph where drumlins exist. The average annual rate of recharge in the eastern sand and gravel area is estimated to be as high as 380 mm, with the remaining 50 mm allocated to surface runoff.

The total area of the subject lands comprises 17.682 ha. However, a total area of 18.28 ha has been used for the purposes of a water budget, which includes the southern section of Cityview Drive. Reference should be made to the site description and maps included in the Preliminary Servicing and Stormwater Management Report (Gamsby and Mannerow Limited, 2012). The western and central parts of the development site (i.e. on top of the drumlins and on the western slope, which includes Catchments 10 and 20 of the existing conditions drainage area) represents an area of 11.80 ha. Accounting for no infiltration on a 0.56 ha impervious area within this part of the site, the average annual rate of recharge on this part of the site under existing conditions is estimated to be 20 230 $m^3$/year. It is interpreted that the recharge in this part of the site maintains local groundwater levels and groundwater flow in the overburden deposits in a southerly direction from the site.

The eastern 6.48 ha of the site (i.e. Catchment 30 of the existing conditions drainage area) comprises an area of about 2.1 ha along the eastern slope of the drumlin and about 4.38 ha in the sand and gravel outwash deposit area. Accounting for these areas and the differences in surficial soil types and slopes, the average annual rate of recharge in the eastern part of the site is estimated to be 20 420 $m^3$/year. It is interpreted that much of the recharge occurring in the eastern part of the site would maintain the shallow groundwater discharging to the wetland and Clythe Creek. The net total recharge for the site under existing conditions is therefore estimated to be about 40 650 $m^3$/year.

Surface water runoff onsite under existing conditions is estimated to be about 31 600 $m^3$/year, of which 25 420 $m^3$/year occurs in the western and central parts of the site (i.e. Catchments 10 and 20), and 6 180 $m^3$/year occurs in the eastern part of the site (i.e. Catchment 30).

It is anticipated that a monthly water budget under existing conditions will be requested by the City of Guelph at a later stage in the review/approval process. This will provide a comparison of pre- and post-development monthly and annual rates of recharge and runoff, that will be based on the stormwater management systems proposed for this site.

# 6 Stormwater Management

It is understood that stormwater management facilities will be designed to manage surface water runoff in the developed areas of the site (i.e. post-development catchments 100, 201, and 202). Based on the proposed development plan, groundwater recharge and surface water runoff on the eastern slope of the drumlin and within the eastern part of the site are expected to remain unchanged following development. The multiple residential development within a 0.68 ha area of the north-eastern part of the site will require separate stormwater management facilities designed to maintain the current rate of groundwater recharge in this area that will contribute to discharge to the wetland located on-site and to Clythe Creek.

The remaining part of the eastern low-lying area is to remain in the current natural state and it is expected that stormwater management in this area is not required. It can therefore be concluded that surface water runoff and shallow groundwater flow in the undeveloped area will continue to contribute to the maintenance of the wetland and flow in Clythe Creek.

# 7 Future Groundwater Monitoring

An on-site groundwater monitoring program is recommended to assess changes in groundwater elevations and quality during and following development of the site, as well as to assess the performance of the stormwater management facilities. The locations for groundwater monitoring would be established during preparation of the Environmental Implementation Report for review and consideration by City of Guelph staff.

Initially, groundwater levels should be monitored on a quarterly basis at a minimum in all available on-site monitoring wells before and, where possible, during grading of the site. The preferred monitoring periods would be January, April, July and October. Groundwater samples should be collected each spring and analyzed for general chemical parameters. Similar to other local sites, monitoring of groundwater levels and quality should continue for a period of up to two years following 75 percent completion of the development.

A review of the Ontario Ministry of the Environment on-line well record information service indicates there are (or were) several private water supply wells located in the vicinity of the site. The records for wells in this local area indicate each well has been completed in, and derives its' water supply from, the underlying bedrock aquifer. The records indicate the overburden in this area ranges in thickness from less than 10 m to more than 30 m, and wells are completed at depths ranging from about 20 m to more than 60 m below ground surface. If any of these wells are currently in use, the quantity and quality of water obtained from each well should not be affected by the proposed development, as groundwater flow in the overburden beneath the site is to the south and southeast. It is also noted that a number of water supply wells have been decommissioned and presumably residents are now obtaining their water from the municipal supply system.

If concerns are expressed by well owners regarding the potential for changes in quality and/or quantity of their water supply, baseline testing could be conducted before grading begins on the development site. This would provide background data that could be referenced in the event a well owner indicates they believe their water supply has been affected either during, or following, development in this area. Municipal water supply is available to all local residences and businesses within this part of the City of Guelph. If it were confirmed that the water quality and/or quantity available from a private well was detrimentally affected by local land development, a municipal water supply could be readily provided.

# 8 Source Water Protection

The Grand River Source Protection Area Approved Assessment Report (Lake Erie Region Source Protection Committee, 2012) includes mapping of Wellhead Protection Areas (WHPA) and Groundwater Vulnerability for the City of Guelph Municipal Well System. There are currently several municipal wells in the northeast part of Guelph and the mapping indicates part of the proposed residential development site is located within the WHPA-B zone (i.e. 2-year time-of-travel capture zone) for one or more of these wells. The Groundwater Vulnerability mapping indicates the site is located in an area with a vulnerability score that ranges from a value of 6 (i.e. medium) to a value of 10 (i.e. the highest value). It is therefore apparent that there may be source water protection implications related to this proposed development.

Proposed Source Protection Policies have been developed by the City of Guelph and submitted for approval by the Ontario Ministry of the Environment. Once approved (likely in 2015), the requirements of these policies can be expected to apply to this site. Various measures may be required to manage the risk of potential threats to groundwater quality, such as on-going educational measures directed at residents regarding the Province's ban on the use of cosmetic pesticides.

# 9 Summary

On the basis of an assessment of current site conditions, the net total average annual, pre-development, groundwater recharge for the site is estimated to be about 40 650 $m^3$/year. It is estimated that the average annual rate of recharge to the groundwater system in the western and central parts of the site, comprising an area of 11.80 ha (i.e. Catchments 10 and 20), is 20 230 $m^3$/year. It is also estimated that the average annual rate of recharge to the groundwater system in the eastern 6.48 ha of the site, including part of the eastern slope of the drumlin (i.e. Catchment 30), is 20 420 $m^3$/year.

It is interpreted that much of the recharge in the eastern area currently maintains the shallow groundwater discharging to the wetland and Clythe Creek occurring in the south-eastern part of the site. Under the proposed development, only a limited area along the top of the eastern slope of the drumlin will be developed for residential use and most of this area will comprise rear yards. Groundwater recharge along most of the eastern slope of the drumlin is expected to remain unchanged. Groundwater recharge within the remaining eastern part of the site should also remain unchanged as much of this area will not be developed.

The proposed multiple residential lands within a 0.68 ha area of the north-eastern part of the site will require stormwater management facilities designed to maintain the current rate of groundwater recharge in this area. Groundwater discharge to the wetland located on-site and to Clythe Creek should therefore continue to be maintained following the proposed development of this site. It is anticipated that a monthly water budget under existing conditions will be requested by the City of Guelph at a later stage in the review/approval process. This will provide a comparison of pre- and post-development monthly and annual rates of recharge and runoff, that will be based on the stormwater management systems proposed for this site.

An on-site groundwater monitoring program is recommended to assess any changes in groundwater elevations and quality during and following development of the site, as well as to assess the performance of the stormwater management facilities. The locations for groundwater monitoring would be established during preparation of the Environmental Implementation Report for review and consideration by City of Guelph staff.

There may be several private water supply wells located in the vicinity of the site. If concerns are expressed by well owners regarding the potential for changes in quality and/or quantity of their water supply, baseline testing could be conducted before grading begins on the development site. This would provide background data that could be referenced in the event a well owner indicates they believe their water supply has been affected either during, or following, development in this area. Municipal water supply is available to all local residences and businesses within this part of the City of Guelph.

Based on recent Source Water Protection mapping for the City of Guelph municipal well system, it is apparent that there may be source water protection implications related to this proposed development. Once Source Protection Policies are approved in the coming year, various measures may be required to manage the risk of potential threats to groundwater quality, and these will be explored as part of the detailed Environmental Implementation Report.

# 10 References

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Lake Erie Region Source Protection Committee. 2012. Grand River Source Protection Area Approved Assessment Report. Chapter 8, City of Guelph.

Karrow, P.F. 1968. Pleistocene Geology of the Guelph Area. Ontario Department of Mines, Geological Report 61.

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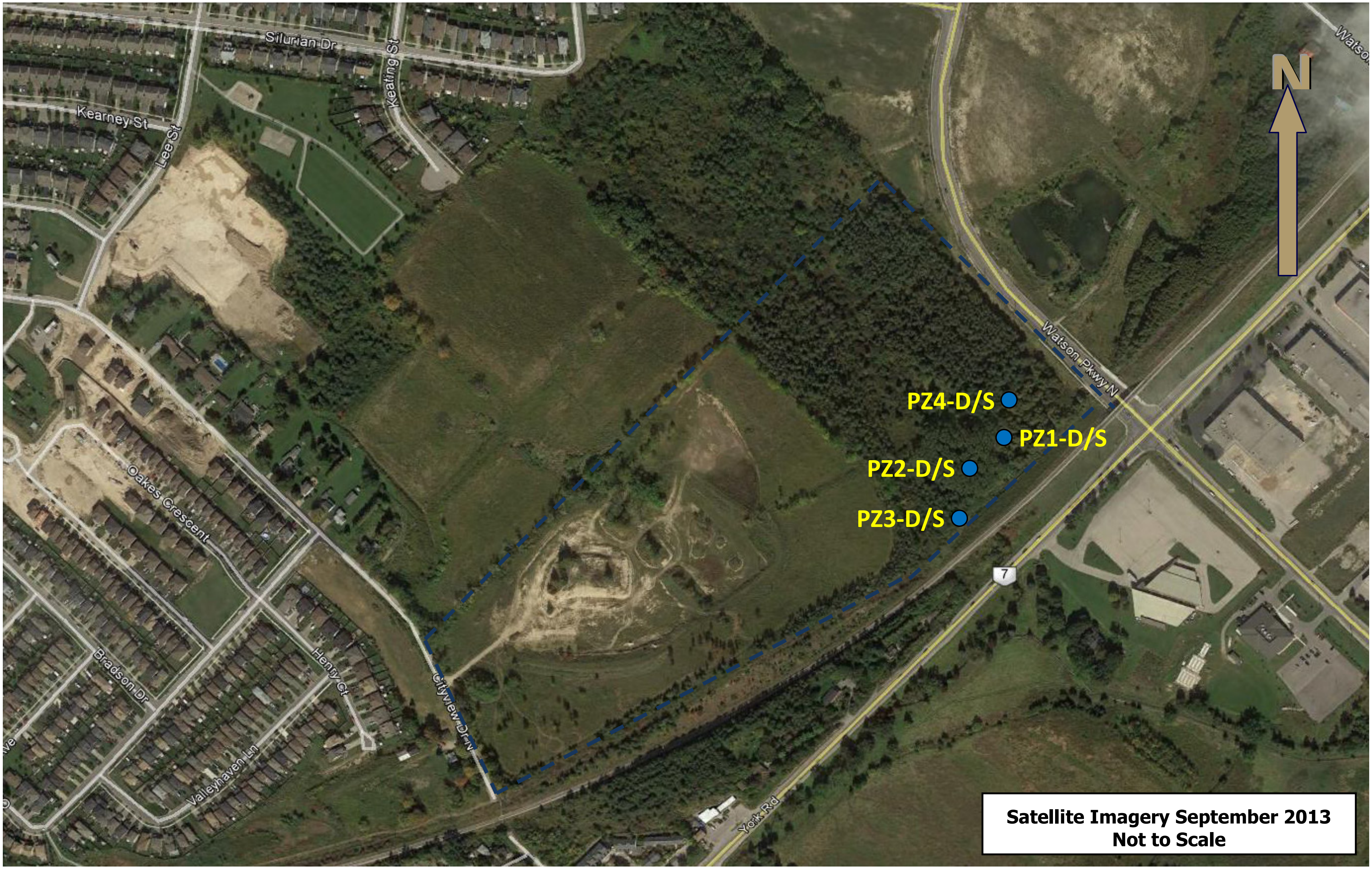
Naylor Engineering Associates Ltd. 2006 (Revised 2012). Geotechnical Investigation, P.T. Valeriote Subdivision, Cityview Drive, Guelph, Ontario, for Carson Reid Homes Ltd.

Respectfully submitted,
Banks Groundwater Engineering Limited

*final version to be signed by:*

William D. Banks, P.Eng.
Principal Hydrogeologist




Banks Groundwater Engineering Limited
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**Hydrogeological Investigation**
**Environmental Impact Study**
**Proposed Cityview Ridge Development**
**City of Guelph**

**Piezometer Locations**

**Figure 1**

**Table 1: Groundwater Levels Measured (metres below ground level*)**

| Date | PZ1-D | PZ1-S | PZ2-D | PZ2-S | PZ3-D | PZ3-S | PZ4-D | PZ4-S | Groundwater Discharge Observations |
|---|---|---|---|---|---|---|---|---|---|
| 13-May-09 | 0.03 | 0.08 | 0.90 | 0.01 | 0.95 | dry | - | - | low to moderate flow from seeps |
| 25-May-09 | 0.01 | -0.01 | 0.75 | 0.02 | 1.10 | dry | - | - | low to moderate flow from seeps |
| 04-Jun-09 | 0.01 | -0.01 | 0.69 | 0.05 | dry | dry | - | - | low to moderate flow from seeps |
| 14-Dec-12 | 0.04 | 0.07 | 0.26 | 0.10 | - | - | -0.07 | -0.04 | low to moderate flow from seeps |
| 15-Mar-13 | 0.00 | 0.02 | 0.24 | 0.06 | - | - | -0.11 | -0.04 | higher flows from seeps |
| 26-Apr-13 | 0.00 | 0.02 | 0.23 | 0.06 | - | - | -0.10 | -0.04 | higher flows from seeps |
| 15-May-13 | 0.01 | 0.01 | 0.23 | 0.06 | - | - | -0.09 | -0.03 | moderate flow from seeps |
| 11-Jun-13 | 0.01 | 0.00 | 0.23 | 0.07 | - | - | -0.08 | -0.03 | low to moderate flow from seeps |
| 11-Jul-13 | 0.00 | 0.00 | 0.22 | 0.08 | - | - | -0.09 | -0.03 | higher flows from seeps |
| 09-Aug-13 | 0.00 | 0.00 | 0.22 | 0.04 | - | - | -0.08 | -0.02 | low to moderate flow from seeps |
| 09-Sep-13 | 0.01 | 0.00 | 0.20 | 0.06 | - | - | -0.06 | -0.02 | lower flow from seeps |
| 08-Oct-13 | 0.01 | -0.01 | 0.20 | 0.05 | - | - | -0.07 | -0.02 | lower flow from seeps |
| 14-Nov-13 | 0.00 | -0.02 | 0.20 | 0.06 | - | - | -0.06 | -0.02 | low to moderate flow from seeps |
| 12-Dec-13 | 0.01 | -0.01 | 0.21 | 0.06 | - | - | -0.06 | -0.02 | low to moderate flow from seeps |
| 30-Apr-14 | 0.02 | 0.04 | 0.19 | 0.04 | - | - | -0.09 | -0.02 | higher flows from seeps |
| 16-Jul-14 | 0.03 | 0.04 | 0.18 | 0.08 | - | - | -0.06 | -0.01 | very low flow from seeps |
| 23-Oct-14 | 0.02 | 0.03 | 0.18 | 0.05 | - | - | -0.07 | -0.01 | moderate flow from seeps |

* negative values indicate groundwater above ground level

**PRELIMINARY SERVICING &**
**STORMWATER MANAGEMENT REPORT**
**CITYVIEW RIDGE SUBDIVISION**
**CITY OF GUELPH**
**Revised: June 2017**

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## APPENDIX "E"

## STORMWATER MANAGEMENT ANALYSIS

- **Existing Condition Modelling Files**
- **Hadati Creek Allowable Modelling Files**
- **Figure No. 8 – Hadati Creek Modelling Schematic**
- **Hadati Creek Post-Development Modelling Files (Western Portion of Cityview Ridge Subdivision)**
- **Post Development Uncontrolled Condition Modelling Files (Eastern Portion of Cityview Ridge Subdivision)**
- **Stage/Storage/Discharge Tables**
- **Post Development Controlled Condition Modelling Files (Eastern Portion of Cityview Ridge Subdivision)**
- **Cooling Trench Calculations**
- **Forebay Calculations**
- **Oil/Grit Separator Sizing Calculations**

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105172 Ex Cond 2year

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"            6   002hyd   Hydrograph extension used in this file"
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"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"           10   Catchment 10 - To Hadati Creek"
"        8.000   % Impervious"
"        7.020   Total Area"
"       45.000   Flow length"
"        2.000   Overland Slope"
"        6.458   Pervious Area"
"       45.000   Pervious length"
"        2.000   Pervious slope"
"        0.562   Impervious Area"
"       45.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious Max.infiltration"
"       12.500   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                    0.130      0.000      0.000      0.000 c.m/sec"
"             Catchment 10             Pervious   Impervious Total Area "
"             Surface Area             6.458      0.562      7.020      hectare"
"             Time of concentration    28.300     2.768      13.823     minutes"
"             Time to Centroid         98.613     85.041     90.917     minutes"
"             Rainfall depth           33.816     33.816     33.816     mm"
"             Rainfall volume          2183.97    189.91     2373.88    c.m"
"             Rainfall losses          31.709     2.082      29.339     mm"
"             Runoff depth             2.107      31.734     4.477      mm"
"             Runoff volume            136.09     178.22     314.31     c.m"
"             Runoff coefficient       0.000      0.000      0.000      "
"             Maximum flow             0.073      0.119      0.130      c.m/sec"
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"            1   Equal length"
"            2   Horton equation"
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"       45.000   Flow length"
"        2.000   Overland Slope"
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"       45.000   Pervious length"
"        2.000   Pervious slope"
"        0.000   Impervious Area"
"       45.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious Max.infiltration"
"       12.500   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                 0.054     0.000     0.130     0.130 c.m/sec"
"             Catchment 20              Pervious   Impervious Total Area "
"             Surface Area              4.780      0.000      4.780      hectare"
"             Time of concentration     28.300     2.768      28.300     minutes"
"             Time to Centroid          98.613     85.041     98.613     minutes"
"             Rainfall depth            33.816     33.816     33.816     mm"
"             Rainfall volume           1616.40    0.00       1616.40    c.m"
"             Rainfall losses           31.709     2.082      31.709     mm"
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"             Runoff coefficient        0.000      0.000      0.000      "
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"        2.000   Overland Slope"
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"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                    0.073      0.054      0.130      0.130 c.m/sec"
"              Catchment 30            Pervious    Impervious Total Area "
"              Surface Area            6.480       0.000      6.480      hectare"
"              Time of concentration   28.300      2.768      28.300     minutes"
"              Time to Centroid        98.613      85.041     98.613     minutes"
"              Rainfall depth          33.816      33.816     33.816     mm"
"              Rainfall volume         2191.27     0.00       2191.27    c.m"
"              Rainfall losses         31.709      2.082      31.709     mm"
"              Runoff depth            2.107       31.734     2.107      mm"
"              Runoff volume           136.54      0.00       136.55     c.m"
"              Runoff coefficient      0.000       0.000      0.000      "
"              Maximum flow            0.073       0.000      0.073      c.m/sec"
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"             8   Copy to Outflow"
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"              Hydrograph volume           551.577    c.m"
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"             1   Node #"
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"              Maximum flow                  0.220    c.m/sec"
"              Hydrograph volume           551.577    c.m"
"                    0.073      0.220      0.127      0.000"
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"           1  Equal length"
"           2  Horton equation"
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"       8.000  % Impervious"
"       7.020  Total Area"
"      45.000  Flow length"
"       2.000  Overland Slope"
"       6.458  Pervious Area"
"      45.000  Pervious length"
"       2.000  Pervious slope"
"       0.562  Impervious Area"
"      45.000  Impervious length"
"       2.000  Impervious slope"
"       0.250  Pervious Manning 'n'"
"      75.000  Pervious Max.infiltration"
"      12.500  Pervious Min.infiltration"
"       0.250  Pervious Lag constant (hours)"
"       5.000  Pervious Depression storage"
"       0.015  Impervious Manning 'n'"
"       0.000  Impervious Max.infiltration"
"       0.000  Impervious Min.infiltration"
"       0.050  Impervious Lag constant (hours)"
"       1.500  Impervious Depression storage"
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"             Surface Area           6.458      0.562      7.020      hectare"
"             Time of concentration  19.590     2.510      15.110     minutes"
"             Time to Centroid       92.382     83.161     89.963     minutes"
"             Rainfall depth         46.775     46.775     46.775     mm"
"             Rainfall volume        3020.92    262.69     3283.61    c.m"
"             Rainfall losses        35.903     2.312      33.216     mm"
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"        2.000   Overland Slope"
"        4.780   Pervious Area"
"       45.000   Pervious length"
"        2.000   Pervious slope"
"        0.000   Impervious Area"
"       45.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious Max.infiltration"
"       12.500   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                 0.328      0.000      0.492      0.492 c.m/sec"
"             Catchment 20            Pervious   Impervious Total Area  "
"             Surface Area            4.780      0.000      4.780      hectare"
"             Time of concentration   19.590     2.510      19.590     minutes"
"             Time to Centroid        92.382     83.161     92.382     minutes"
"             Rainfall depth          46.775     46.775     46.775     mm"
"             Rainfall volume         2235.84    0.00       2235.85    c.m"
"             Rainfall losses         35.903     2.312      35.903     mm"
"             Runoff depth            10.872     44.463     10.872     mm"
"             Runoff volume           519.68     0.00       519.68     c.m"
"             Runoff coefficient      0.000      0.000      0.000      "
"             Maximum flow            0.328      0.000      0.328      c.m/sec"
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"            4   Add Runoff "
"                 0.328      0.328      0.492      0.492"
" 33          CATCHMENT 30"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"           30   Catchment 30 - To Clythe Creek"
"        0.000   % Impervious"
"        6.480   Total Area"
"       45.000   Flow length"
"        2.000   Overland Slope"
```

```
"          6.480    Pervious Area"
"         45.000    Pervious length"
"          2.000    Pervious slope"
"          0.000    Impervious Area"
"         45.000    Impervious length"
"          2.000    Impervious slope"
"          0.250    Pervious Manning 'n'"
"         75.000    Pervious Max.infiltration"
"         12.500    Pervious Min.infiltration"
"          0.250    Pervious Lag constant (hours)"
"          5.000    Pervious Depression storage"
"          0.015    Impervious Manning 'n'"
"          0.000    Impervious Max.infiltration"
"          0.000    Impervious Min.infiltration"
"          0.050    Impervious Lag constant (hours)"
"          1.500    Impervious Depression storage"
"                       0.444     0.328     0.492     0.492 c.m/sec"
"                Catchment 30            Pervious   Impervious Total Area "
"                Surface Area            6.480      0.000      6.480      hectare"
"                Time of concentration   19.590     2.510      19.590     minutes"
"                Time to Centroid        92.382     83.161     92.382     minutes"
"                Rainfall depth          46.775     46.775     46.775     mm"
"                Rainfall volume         3031.02    0.00       3031.02    c.m"
"                Rainfall losses         35.903     2.312      35.903     mm"
"                Runoff depth            10.872     44.463     10.872     mm"
"                Runoff volume           704.50     0.00       704.50     c.m"
"                Runoff coefficient      0.000      0.000      0.000      "
"                Maximum flow            0.444      0.000      0.444      c.m/sec"
" 40             HYDROGRAPH Add Runoff "
"               4   Add Runoff "
"                       0.444     0.772     0.492     0.492"
" 40             HYDROGRAPH Copy to Outflow"
"               8   Copy to Outflow"
"                       0.444     0.772     0.772     0.492"
" 40             HYDROGRAPH   Combine    1"
"               6   Combine "
"               1   Node #"
"                   Total Discharge"
"                Maximum flow                  1.265    c.m/sec"
"                Hydrograph volume          2176.031    c.m"
"                       0.444     0.772     0.772     1.265"
" 40             HYDROGRAPH   Confluence    1"
"               7   Confluence "
"               1   Node #"
"                   Total Discharge"
"                Maximum flow                  1.265    c.m/sec"
"                Hydrograph volume          2176.031    c.m"
"                       0.444     1.265     0.772     0.000"
" 38             START/RE-START TOTALS 1"
"               3   Runoff Totals on EXIT"
"                Total Catchment area                          18.280    hectare"
"                Total Impervious area                          0.562    hectare"
"                Total % impervious                             3.072"
" 19             EXIT"
```

```
                          105172 Ex Cond 25year
"              MIDUSS Output ----------------------------------------------->"
"              MIDUSS version                            Version 2.07  rev. 379"
"              MIDUSS created                                   April 25, 2005"
"          10  Units used:                                         ie METRIC"
"              Job folder:                 Y:\SPrimmer\Miduss Modelling\105172"
"              Output filename:                   105172 Ex Cond 25year REV.out"
"              Licensee name:                                                 "
"              Company                            Gamsby and Mannerow Limited"
"              Date & Time last used:               04/04/2011 at 12:00:32 PM"
" 31          TIME PARAMETERS"
"       5.000  Time Step"
"     210.000  Max. Storm length"
"    1500.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"           1  Chicago storm"
"    3158.000  Coefficient A"
"      15.000  Constant B"
"       0.936  Exponent C"
"       0.400  Fraction R"
"     210.000  Duration"
"       1.000  Time step multiplier"
"             Maximum intensity           169.546    mm/hr"
"             Total depth                  69.476    mm"
"           6  025hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 10"
"           1  Triangular SCS"
"           1  Equal length"
"           2  Horton equation"
"          10  Catchment 10 - To Hadati Creek"
"       8.000  % Impervious"
"       7.020  Total Area"
"      45.000  Flow length"
"       2.000  Overland Slope"
"       6.458  Pervious Area"
"      45.000  Pervious length"
"       2.000  Pervious slope"
"       0.562  Impervious Area"
"      45.000  Impervious length"
"       2.000  Impervious slope"
"       0.250  Pervious Manning 'n'"
"      75.000  Pervious Max.infiltration"
"      12.500  Pervious Min.infiltration"
"       0.250  Pervious Lag constant (hours)"
"       5.000  Pervious Depression storage"
"       0.015  Impervious Manning 'n'"
"       0.000  Impervious Max.infiltration"
"       0.000  Impervious Min.infiltration"
"       0.050  Impervious Lag constant (hours)"
"       1.500  Impervious Depression storage"
"                    1.344     0.000     0.000     0.000 c.m/sec"
"             Catchment 10             Pervious   Impervious Total Area "
"             Surface Area             6.458      0.562      7.020      hectare"
"             Time of concentration    14.371     2.291      12.330     minutes"
"             Time to Centroid         105.688    98.958     104.551    minutes"
"             Rainfall depth           69.476     69.476     69.476     mm"
"             Rainfall volume          4487.06    390.18     4877.24    c.m"
"             Rainfall losses          40.830     2.498      37.763     mm"
"             Runoff depth             28.647     66.978     31.713     mm"
"             Runoff volume            1850.11    376.15     2226.26    c.m"
"             Runoff coefficient       0.000      0.000      0.000      "
"             Maximum flow             1.257      0.234      1.344      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4  Add Runoff "
```

```
"                    1.344     1.344     0.000     0.000"
" 40           HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                    1.344     1.344     1.344     0.000"
" 40           HYDROGRAPH   Combine    1"
"             6   Combine "
"             1   Node #"
"                 Total Discharge"
"              Maximum flow                  1.344    c.m/sec"
"              Hydrograph volume          2226.261    c.m"
"                    1.344     1.344     1.344     1.344"
" 40           HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                    1.344     0.000     1.344     1.344"
" 33           CATCHMENT 20"
"             1   Triangular SCS"
"             1   Equal length"
"             2   Horton equation"
"            20   Catchment 20 - To Clythe Creeek"
"         0.000   % Impervious"
"         4.780   Total Area"
"        45.000   Flow length"
"         2.000   Overland Slope"
"         4.780   Pervious Area"
"        45.000   Pervious length"
"         2.000   Pervious slope"
"         0.000   Impervious Area"
"        45.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        75.000   Pervious Max.infiltration"
"        12.500   Pervious Min.infiltration"
"         0.250   Pervious Lag constant (hours)"
"         5.000   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.050   Impervious Lag constant (hours)"
"         1.500   Impervious Depression storage"
"                    0.931     0.000     1.344     1.344 c.m/sec"
"              Catchment 20             Pervious   Impervious Total Area "
"              Surface Area             4.780      0.000      4.780      hectare"
"              Time of concentration    14.371     2.291      14.371     minutes"
"              Time to Centroid         105.688    98.958     105.688    minutes"
"              Rainfall depth           69.476     69.476     69.476     mm"
"              Rainfall volume          3320.97    0.00       3320.97    c.m"
"              Rainfall losses          40.830     2.498      40.830     mm"
"              Runoff depth             28.647     66.978     28.647     mm"
"              Runoff volume            1369.31    0.00       1369.31    c.m"
"              Runoff coefficient       0.000      0.000      0.000      "
"              Maximum flow             0.930      0.000      0.931      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.931     0.931     1.344     1.344"
" 33           CATCHMENT 30"
"             1   Triangular SCS"
"             1   Equal length"
"             2   Horton equation"
"            30   Catchment 30 - To Clythe Creek"
"         0.000   % Impervious"
"         6.480   Total Area"
"        45.000   Flow length"
"         2.000   Overland Slope"
```

```
"        6.480   Pervious Area"
"       45.000   Pervious length"
"        2.000   Pervious slope"
"        0.000   Impervious Area"
"       45.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious Max.infiltration"
"       12.500   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                     1.261     0.931     1.344     1.344 c.m/sec"
"               Catchment 30             Pervious   Impervious Total Area "
"               Surface Area             6.480      0.000      6.480      hectare"
"               Time of concentration    14.371     2.291      14.371     minutes"
"               Time to Centroid         105.688    98.958     105.688    minutes"
"               Rainfall depth           69.476     69.476     69.476     mm"
"               Rainfall volume          4502.07    0.00       4502.07    c.m"
"               Rainfall losses          40.830     2.498      40.830     mm"
"               Runoff depth             28.647     66.978     28.647     mm"
"               Runoff volume            1856.30    0.00       1856.30    c.m"
"               Runoff coefficient       0.000      0.000      0.000      "
"               Maximum flow             1.261      0.000      1.261      c.m/sec"
" 40            HYDROGRAPH Add Runoff "
"              4   Add Runoff "
"                     1.261     2.192     1.344     1.344"
" 40            HYDROGRAPH Copy to Outflow"
"              8   Copy to Outflow"
"                     1.261     2.192     2.192     1.344"
" 40            HYDROGRAPH   Combine    1"
"              6   Combine "
"              1   Node #"
"                  Total Discharge"
"               Maximum flow                  3.536    c.m/sec"
"               Hydrograph volume          5451.871    c.m"
"                     1.261     2.192     2.192     3.536"
" 40            HYDROGRAPH   Confluence    1"
"              7   Confluence "
"              1   Node #"
"                  Total Discharge"
"               Maximum flow                  3.536    c.m/sec"
"               Hydrograph volume          5451.870    c.m"
"                     1.261     3.536     2.192     0.000"
" 38            START/RE-START TOTALS 1"
"              3   Runoff Totals on EXIT"
"               Total Catchment area                     18.280    hectare"
"               Total Impervious area                     0.562    hectare"
"               Total % impervious                        3.072"
" 19            EXIT"
```

```
                        105172 Ex Cond 100year
"              MIDUSS Output ----------------------------------------------->"
"              MIDUSS version                          Version 2.07  rev. 379"
"              MIDUSS created                                April 25, 2005"
"          10  Units used:                                       ie METRIC"
"              Job folder:              Y:\SPrimmer\Miduss Modelling\105172"
"              Output filename:              105172 Ex Cond 100year REV.out"
"              Licensee name:                                             ."
"              Company                           Gamsby and Mannerow Limited"
"              Date & Time last used:              04/04/2011 at 12:01:05 PM"
" 31        TIME PARAMETERS"
"       5.000  Time Step"
"     210.000  Max. Storm length"
"    1500.000  Max. Hydrograph"
" 32        STORM Chicago storm"
"           1  Chicago storm"
"    4688.000  Coefficient A"
"      17.000  Constant B"
"       0.962  Exponent C"
"       0.400  Fraction R"
"     210.000  Duration"
"       1.000  Time step multiplier"
"           Maximum intensity         213.574    mm/hr"
"           Total depth                88.830    mm"
"           6  100hyd   Hydrograph extension used in this file"
" 33        CATCHMENT 10"
"           1  Triangular SCS"
"           1  Equal length"
"           2  Horton equation"
"          10  Catchment 10 - To Hadati Creek"
"       8.000  % Impervious"
"       7.020  Total Area"
"      45.000  Flow length"
"       2.000  Overland Slope"
"       6.458  Pervious Area"
"      45.000  Pervious length"
"       2.000  Pervious slope"
"       0.562  Impervious Area"
"      45.000  Impervious length"
"       2.000  Impervious slope"
"       0.250  Pervious Manning 'n'"
"      75.000  Pervious Max.infiltration"
"      12.500  Pervious Min.infiltration"
"       0.250  Pervious Lag constant (hours)"
"       5.000  Pervious Depression storage"
"       0.015  Impervious Manning 'n'"
"       0.000  Impervious Max.infiltration"
"       0.000  Impervious Min.infiltration"
"       0.050  Impervious Lag constant (hours)"
"       1.500  Impervious Depression storage"
"                  2.160     0.000     0.000     0.000 c.m/sec"
"           Catchment 10          Pervious   Impervious Total Area "
"           Surface Area          6.458      0.562      7.020      hectare"
"           Time of concentration 11.869     2.089      10.485     minutes"
"           Time to Centroid      104.828    98.071     103.872    minutes"
"           Rainfall depth        88.830     88.830     88.830     mm"
"           Rainfall volume       5736.98    498.87     6235.85    c.m"
"           Rainfall losses       43.360     2.670      40.105     mm"
"           Runoff depth          45.470     86.160     48.725     mm"
"           Runoff volume         2936.64    483.87     3420.51    c.m"
"           Runoff coefficient    0.000      0.000      0.000      "
"           Maximum flow          1.965      0.297      2.160      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
"           4  Add Runoff "
```

```
"                2.160     2.160     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                2.160     2.160     2.160     0.000"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Total Discharge"
"             Maximum flow                   2.160    c.m/sec"
"             Hydrograph volume           3420.511    c.m"
"                2.160     2.160     2.160     2.160"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                2.160     0.000     2.160     2.160"
" 33          CATCHMENT 20"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"           20   Catchment 20 - To Clythe Creeek"
"        0.000   % Impervious"
"        4.780   Total Area"
"       45.000   Flow length"
"        2.000   Overland Slope"
"        4.780   Pervious Area"
"       45.000   Pervious length"
"        2.000   Pervious slope"
"        0.000   Impervious Area"
"       45.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious Max.infiltration"
"       12.500   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                1.454     0.000     2.160     2.160 c.m/sec"
"             Catchment 20              Pervious   Impervious Total Area "
"             Surface Area              4.780      0.000      4.780      hectare"
"             Time of concentration     11.869     2.089      11.869     minutes"
"             Time to Centroid          104.828    98.071     104.828    minutes"
"             Rainfall depth            88.830     88.830     88.830     mm"
"             Rainfall volume           4246.06    0.00       4246.07    c.m"
"             Rainfall losses           43.360     2.670      43.360     mm"
"             Runoff depth              45.470     86.160     45.470     mm"
"             Runoff volume             2173.47    0.00       2173.47    c.m"
"             Runoff coefficient        0.000      0.000      0.000      "
"             Maximum flow              1.454      0.000      1.454      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                1.454     1.454     2.160     2.160"
" 33          CATCHMENT 30"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"           30   Catchment 30 - To Clythe Creek"
"        0.000   % Impervious"
"        6.480   Total Area"
"       45.000   Flow length"
"        2.000   Overland Slope"
```

```
"          6.480   Pervious Area"
"         45.000   Pervious length"
"          2.000   Pervious slope"
"          0.000   Impervious Area"
"         45.000   Impervious length"
"          2.000   Impervious slope"
"          0.250   Pervious Manning 'n'"
"         75.000   Pervious Max.infiltration"
"         12.500   Pervious Min.infiltration"
"          0.250   Pervious Lag constant (hours)"
"          5.000   Pervious Depression storage"
"          0.015   Impervious Manning 'n'"
"          0.000   Impervious Max.infiltration"
"          0.000   Impervious Min.infiltration"
"          0.050   Impervious Lag constant (hours)"
"          1.500   Impervious Depression storage"
"                       1.971     1.454     2.160     2.160 c.m/sec"
"                Catchment 30            Pervious   Impervious Total Area "
"                Surface Area            6.480      0.000      6.480      hectare"
"                Time of concentration   11.869     2.089      11.869     minutes"
"                Time to Centroid        104.828    98.071     104.828    minutes"
"                Rainfall depth          88.830     88.830     88.830     mm"
"                Rainfall volume         5756.17    0.01       5756.17    c.m"
"                Rainfall losses         43.360     2.670      43.360     mm"
"                Runoff depth            45.470     86.160     45.470     mm"
"                Runoff volume           2946.46    0.01       2946.46    c.m"
"                Runoff coefficient      0.000      0.000      0.000      "
"                Maximum flow            1.971      0.000      1.971      c.m/sec"
" 40             HYDROGRAPH Add Runoff "
"               4   Add Runoff "
"                       1.971     3.425     2.160     2.160"
" 40             HYDROGRAPH Copy to Outflow"
"               8   Copy to Outflow"
"                       1.971     3.425     3.425     2.160"
" 40             HYDROGRAPH   Combine    1"
"               6   Combine "
"               1   Node #"
"                   Total Discharge"
"                Maximum flow                  5.585    c.m/sec"
"                Hydrograph volume          8540.444    c.m"
"                       1.971     3.425     3.425     5.585"
" 40             HYDROGRAPH   Confluence    1"
"               7   Confluence "
"               1   Node #"
"                   Total Discharge"
"                Maximum flow                  5.585    c.m/sec"
"                Hydrograph volume          8540.444    c.m"
"                       1.971     5.585     3.425     0.000"
" 38             START/RE-START TOTALS 1"
"               3   Runoff Totals on EXIT"
"                Total Catchment area                        18.280    hectare"
"                Total Impervious area                        0.562    hectare"
"                Total % impervious                           3.072"
" 19             EXIT"
```

105172 Ex Cond Regional

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"                 MIDUSS Output ----------------------------------------------->"
"                 MIDUSS version                          Version 2.07  rev. 379"
"                 MIDUSS created                                  April 25, 2005"
"           10    Units used:                                        ie METRIC"
"                 Job folder:                Y:\SPrimmer\Miduss Modelling\105172"
"                 Output filename:             105172 Ex Cond Regional REV.out"
"                 Licensee name:                                              ."
"                 Company                          Gamsby and Mannerow Limited"
"                 Date & Time last used:             04/04/2011 at 12:01:39 PM"
" 31           TIME PARAMETERS"
"       60.000    Time Step"
"     2880.000    Max. Storm length"
"     3600.000    Max. Hydrograph"
" 32           STORM Historic"
"            5    Historic"
"     2880.000    Duration"
"       48.000    Rainfall intensity values"
"                    2.028      2.028      2.028      2.028      2.028"
"                    2.028      2.028      2.028      2.028      2.028"
"                    2.028      2.028      2.028      2.028      2.028"
"                    2.028      2.028      2.028      2.028      2.028"
"                    2.028      2.028      2.028      2.028      2.028"
"                    2.028      2.028      2.028      2.028      2.028"
"                    2.028      2.026      2.026      2.206      2.028"
"                    2.026      6.000      4.000      6.000     13.000"
"                   17.000     13.000     23.000     13.000     13.000"
"                   53.000     38.000     13.000"
"              Maximum intensity            53.000    mm/hr"
"              Total depth                 285.180    mm"
"            6    001hyd   Hydrograph extension used in this file"
" 33           CATCHMENT 10"
"            1    Triangular SCS"
"            1    Equal length"
"            2    Horton equation"
"           10    Catchment 10 - To Hadati Creek"
"        8.000    % Impervious"
"        7.020    Total Area"
"       45.000    Flow length"
"        2.000    Overland Slope"
"        6.458    Pervious Area"
"       45.000    Pervious length"
"        2.000    Pervious slope"
"        0.562    Impervious Area"
"       45.000    Impervious length"
"        2.000    Impervious slope"
"        0.250    Pervious Manning 'n'"
"       75.000    Pervious Max.infiltration"
"       12.500    Pervious Min.infiltration"
"        0.250    Pervious Lag constant (hours)"
"        5.000    Pervious Depression storage"
"        0.015    Impervious Manning 'n'"
"        0.000    Impervious Max.infiltration"
"        0.000    Impervious Min.infiltration"
"        0.050    Impervious Lag constant (hours)"
"        1.500    Impervious Depression storage"
"                      0.587      0.000      0.000      0.000 c.m/sec"
"              Catchment 10            Pervious   Impervious Total Area "
"              Surface Area            6.458      0.562      7.020      hectare"
"              Time of concentration   21.969     3.647      18.018     minutes"
"              Time to Centroid        2780.245   2236.863   2663.074   minutes"
"              Rainfall depth          285.180    285.180    285.180    mm"
"              Rainfall volume         1.8418     0.1602     2.0020     ha-m"
"              Rainfall losses         207.172    38.558     193.683    mm"
```

```
"              Runoff depth              78.008      246.622     91.497      mm"
"              Runoff volume             5038.08     1385.03     6423.11     c.m"
"              Runoff coefficient        0.000       0.000       0.000       "
"              Maximum flow              0.537       0.071       0.587       c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                     0.587      0.587      0.000      0.000"
" 40           HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                     0.587      0.587      0.587      0.000"
" 40           HYDROGRAPH   Combine    1"
"             6   Combine "
"             1   Node #"
"                 Total Discharge"
"              Maximum flow                    0.587     c.m/sec"
"              Hydrograph volume            6423.105     c.m"
"                     0.587      0.587      0.587      0.587"
" 40           HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                     0.587      0.000      0.587      0.587"
" 33           CATCHMENT 20"
"             1   Triangular SCS"
"             1   Equal length"
"             2   Horton equation"
"            20   Catchment 20 - To Clythe Creeek"
"         0.000   % Impervious"
"         4.780   Total Area"
"        45.000   Flow length"
"         2.000   Overland Slope"
"         4.780   Pervious Area"
"        45.000   Pervious length"
"         2.000   Pervious slope"
"         0.000   Impervious Area"
"        45.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        75.000   Pervious Max.infiltration"
"        12.500   Pervious Min.infiltration"
"         0.250   Pervious Lag constant (hours)"
"         5.000   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.050   Impervious Lag constant (hours)"
"         1.500   Impervious Depression storage"
"                     0.397      0.000      0.587      0.587 c.m/sec"
"              Catchment 20              Pervious    Impervious Total Area "
"              Surface Area              4.780       0.000       4.780       hectare"
"              Time of concentration     21.969      3.647       21.969      minutes"
"              Time to Centroid          2780.245    2236.863    2780.243    minutes"
"              Rainfall depth            285.180     285.180     285.180     mm"
"              Rainfall volume           1.3632      0.0000      1.3632      ha-m"
"              Rainfall losses           207.172     38.558      207.172     mm"
"              Runoff depth              78.008      246.622     78.008      mm"
"              Runoff volume             3728.78     0.01        3728.80     c.m"
"              Runoff coefficient        0.000       0.000       0.000       "
"              Maximum flow              0.397       0.000       0.397       c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                     0.397      0.397      0.587      0.587"
" 33           CATCHMENT 30"
"             1   Triangular SCS"
"             1   Equal length"
```

105172 Ex Cond Regional

```
"              2   Horton equation"
"             30   Catchment 30 - To Clythe Creek"
"          0.000   % Impervious"
"          6.480   Total Area"
"         45.000   Flow length"
"          2.000   Overland Slope"
"          6.480   Pervious Area"
"         45.000   Pervious length"
"          2.000   Pervious slope"
"          0.000   Impervious Area"
"         45.000   Impervious length"
"          2.000   Impervious slope"
"          0.250   Pervious Manning 'n'"
"         75.000   Pervious Max.infiltration"
"         12.500   Pervious Min.infiltration"
"          0.250   Pervious Lag constant (hours)"
"          5.000   Pervious Depression storage"
"          0.015   Impervious Manning 'n'"
"          0.000   Impervious Max.infiltration"
"          0.000   Impervious Min.infiltration"
"          0.050   Impervious Lag constant (hours)"
"          1.500   Impervious Depression storage"
"                       0.538     0.397     0.587     0.587 c.m/sec"
"               Catchment 30              Pervious   Impervious Total Area "
"               Surface Area              6.480      0.000      6.480      hectare"
"               Time of concentration     21.969     3.647      21.969     minutes"
"               Time to Centroid          2780.244   2236.863   2780.243   minutes"
"               Rainfall depth            285.180    285.180    285.180    mm"
"               Rainfall volume           1.8480     0.0000     1.8480     ha-m"
"               Rainfall losses           207.172    38.558     207.172    mm"
"               Runoff depth              78.008     246.622    78.008     mm"
"               Runoff volume             5054.92    0.02       5054.94    c.m"
"               Runoff coefficient        0.000      0.000      0.000      "
"               Maximum flow              0.538      0.000      0.538      c.m/sec"
" 40            HYDROGRAPH Add Runoff "
"              4   Add Runoff "
"                       0.538     0.936     0.587     0.587"
" 40            HYDROGRAPH Copy to Outflow"
"              8   Copy to Outflow"
"                       0.538     0.936     0.936     0.587"
" 40            HYDROGRAPH   Combine    1"
"              6   Combine "
"              1   Node #"
"                  Total Discharge"
"               Maximum flow                   1.522    c.m/sec"
"               Hydrograph volume          15206.841    c.m"
"                       0.538     0.936     0.936     1.522"
" 40            HYDROGRAPH   Confluence    1"
"              7   Confluence "
"              1   Node #"
"                  Total Discharge"
"               Maximum flow                   1.522    c.m/sec"
"               Hydrograph volume          15206.841    c.m"
"                       0.538     1.522     0.936     0.000"
" 38            START/RE-START TOTALS 1"
"              3   Runoff Totals on EXIT"
"               Total Catchment area                      18.280    hectare"
"               Total Impervious area                      0.562    hectare"
"               Total % impervious                         3.072"
" 19            EXIT"
```

Hadati Creek Watershed - Allowable

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

       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
       O   O     T      T    H    H   Y Y    MM  MM  O   O
       O   O     T      T    H    H    Y     M    M  O   O

        OOO      T      T    H    H    Y     M    M   OOO
```

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

Input filename: C:\Program Files\Visual OTTHYMO 2.3.2\voin.dat

Output filename: Y:\SPrimmer\Miduss Modelling\105172\Cityview Ridge - Ex Pond Allowable\Hadati Creek Watershed - Allowable.out
Summary filename: Y:\SPrimmer\Miduss Modelling\105172\Cityview Ridge - Ex Pond Allowable\Hadati Creek Watershed - Allowable.sum

DATE: 8/7/2012 TIME: 2:54:51 PM

USER:

COMMENTS: ____________________________________________

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


 --------------------
 |    READ STORM    |     Filename: Y:\SPrimmer\Miduss Modelling\105172\Ci
 |                  |               tyview Ridge\25mm4hr.stm
 | Ptotal= 25.00 mm |     Comments: 25 mm - 4 hour - 10 Minute Time Step
 --------------------
```

| TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr |
|---|---|---|---|---|---|---|---|
| .17 | .53 | 1.17 | 17.57 | 2.17 | 2.95 | 3.17 | .76 |
| .33 | .71 | 1.33 | 61.55 | 2.33 | 2.19 | 3.33 | .65 |
| .50 | .99 | 1.50 | 24.02 | 2.50 | 1.69 | 3.50 | .57 |
| .67 | 1.51 | 1.67 | 11.16 | 2.67 | 1.34 | 3.67 | .49 |
| .83 | 2.57 | 1.83 | 6.44 | 2.83 | 1.09 | 3.83 | .44 |
| 1.00 | 5.31 | 2.00 | 4.20 | 3.00 | .90 | 4.00 | .38 |

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

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--------------------
| CALIB             |
| STANDHYD  (0544)  |   Area    (ha)=   1.13
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .90          .23
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope    (%)=         .55          .55
     Length           (m)=       50.00        40.00
     Mannings n          =        .013         .300

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


                               ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .083     .53 | 1.083   17.57 | 2.083    2.95 |  3.08     .76
                  .167     .53 | 1.167   17.57 | 2.167    2.95 |  3.17     .76
                  .250     .71 | 1.250   61.55 | 2.250    2.19 |  3.25     .65
                  .333     .71 | 1.333   61.55 | 2.333    2.19 |  3.33     .65
                  .417     .99 | 1.417   24.02 | 2.417    1.69 |  3.42     .57
                  .500     .99 | 1.500   24.02 | 2.500    1.69 |  3.50     .57
                  .583    1.51 | 1.583   11.16 | 2.583    1.34 |  3.58     .49
                  .667    1.51 | 1.667   11.16 | 2.667    1.34 |  3.67     .49
                  .750    2.57 | 1.750    6.44 | 2.750    1.09 |  3.75     .44
                  .833    2.57 | 1.833    6.44 | 2.833    1.09 |  3.83     .44
                  .917    5.31 | 1.917    4.20 | 2.917     .90 |  3.92     .38
                 1.000    5.31 | 2.000    4.20 | 3.000     .90 |  4.00     .38

     Max.Eff.Inten.(mm/hr)=      61.55          .00
               over (min)         5.00       325.00
     Storage Coeff.  (min)=       2.45 (ii)  320.46 (ii)
     Unit Hyd. Tpeak (min)=       5.00       325.00
     Unit Hyd. peak  (cms)=        .30          .00
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .15          .00           .151 (iii)
     TIME TO PEAK    (hrs)=       1.33          .00           1.33
     RUNOFF VOLUME    (mm)=      23.50          .00          18.56
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =        .94          .00            .74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING: THE PERVIOUS AREA HAS NO FLOW .

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50    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  (0543)  |   Area    (ha)=  14.99
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.99         3.00
     Dep. Storage     (mm)=       1.50         5.00
```

```
     Average Slope     (%)=       .55            .55
     Length            (m)=    200.00          40.00
     Mannings n           =      .013           .300

     Max.Eff.Inten.(mm/hr)=     61.55            .00
               over (min)        5.00         325.00
     Storage Coeff.  (min)=      5.63 (ii)    323.64 (ii)
     Unit Hyd. Tpeak (min)=      5.00         325.00
     Unit Hyd. peak  (cms)=       .20            .00
                                                            *TOTALS*
     PEAK FLOW       (cms)=      1.77            .00          1.767 (iii)
     TIME TO PEAK    (hrs)=      1.33            .00           1.33
     RUNOFF VOLUME    (mm)=     23.50            .00          18.56
     TOTAL RAINFALL   (mm)=     25.00          25.00          25.00
     RUNOFF COEFFICIENT   =       .94            .00            .74

***** WARNING: THE PERVIOUS AREA HAS NO FLOW .

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0542)  |    Area    (ha)=  25.25
|ID= 1 DT= 5.0 min  |    Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     20.20           5.05
     Dep. Storage     (mm)=      1.50           5.00
     Average Slope     (%)=       .55            .55
     Length            (m)=    350.00          40.00
     Mannings n           =      .013           .300

     Max.Eff.Inten.(mm/hr)=     61.55            .00
               over (min)       10.00         330.00
     Storage Coeff.  (min)=      7.87 (ii)    325.88 (ii)
     Unit Hyd. Tpeak (min)=     10.00         330.00
     Unit Hyd. peak  (cms)=       .13            .00
                                                            *TOTALS*
     PEAK FLOW       (cms)=      2.41            .00          2.408 (iii)
     TIME TO PEAK    (hrs)=      1.42            .00           1.42
     RUNOFF VOLUME    (mm)=     23.50            .00          18.56
     TOTAL RAINFALL   (mm)=     25.00          25.00          25.00
     RUNOFF COEFFICIENT   =       .94            .00            .74

***** WARNING: THE PERVIOUS AREA HAS NO FLOW .

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0510)  |    Area    (ha)=  16.00
```

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                              Hadati Creek Watershed - Allowable
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        12.80          3.20
     Dep. Storage     (mm)=         1.50          5.00
     Average Slope     (%)=          .50           .20
     Length            (m)=       400.00         40.00
     Mannings n           =         .013          .300

     Max.Eff.Inten.(mm/hr)=        61.55           .00
                over (min)         10.00        440.00
     Storage Coeff.  (min)=         8.77 (ii)   439.54 (ii)
     Unit Hyd. Tpeak (min)=        10.00        440.00
     Unit Hyd. peak  (cms)=          .12           .00
                                                             *TOTALS*
     PEAK FLOW       (cms)=         1.48           .00         1.475 (iii)
     TIME TO PEAK    (hrs)=         1.42           .00          1.42
     RUNOFF VOLUME    (mm)=        23.50           .00         18.56
     TOTAL RAINFALL   (mm)=        25.00         25.00         25.00
     RUNOFF COEFFICIENT   =          .94           .00           .74

***** WARNING: THE PERVIOUS AREA HAS NO FLOW .

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD  (0500) |   Area    (ha)= 244.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  46.00   Dir. Conn.(%)=  26.00
--------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       112.24        131.76
     Dep. Storage     (mm)=         1.50          5.00
     Average Slope     (%)=          .80           .80
     Length            (m)=      1275.00         40.00
     Mannings n           =         .013          .300

     Max.Eff.Inten.(mm/hr)=        42.79          5.28
                over (min)         20.00         55.00
     Storage Coeff.  (min)=        17.67 (ii)    51.28 (ii)
     Unit Hyd. Tpeak (min)=        20.00         55.00
     Unit Hyd. peak  (cms)=          .06           .02
                                                             *TOTALS*
     PEAK FLOW       (cms)=         5.07           .82         5.342 (iii)
     TIME TO PEAK    (hrs)=         1.58          2.17          1.58
     RUNOFF VOLUME    (mm)=        23.50          2.25          7.77
     TOTAL RAINFALL   (mm)=        25.00         25.00         25.00
     RUNOFF COEFFICIENT   =          .94           .09           .31

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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--------------------
| CALIB              |
| STANDHYD  (0540)   |   Area    (ha)=   4.63
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      3.70          .93
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=       .55          .55
     Length            (m)=    150.00        40.00
     Mannings n           =      .013         .300

     Max.Eff.Inten.(mm/hr)=     61.55          .00
                over (min)      5.00       325.00
     Storage Coeff.  (min)=      4.73 (ii)  322.74 (ii)
     Unit Hyd. Tpeak (min)=      5.00       325.00
     Unit Hyd. peak  (cms)=       .22          .00
                                                            *TOTALS*
     PEAK FLOW       (cms)=       .57          .00            .569 (iii)
     TIME TO PEAK    (hrs)=      1.33          .00            1.33
     RUNOFF VOLUME    (mm)=     23.50          .00           18.56
     TOTAL RAINFALL   (mm)=     25.00        25.00           25.00
     RUNOFF COEFFICIENT   =       .94          .00             .74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING: THE PERVIOUS AREA HAS NO FLOW .

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50    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  (0484)   |   Area    (ha)=  12.60
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      5.29         7.31
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      2.00         2.00
     Length            (m)=    680.00        40.00
     Mannings n           =      .013         .300

     Max.Eff.Inten.(mm/hr)=     61.55         7.05
                over (min)     10.00        35.00
     Storage Coeff.  (min)=      7.96 (ii)   30.70 (ii)
     Unit Hyd. Tpeak (min)=     10.00        35.00
     Unit Hyd. peak  (cms)=       .13          .04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       .32          .07            .334 (iii)
     TIME TO PEAK    (hrs)=      1.42         1.83            1.42
     RUNOFF VOLUME    (mm)=     23.50         2.16            6.64
     TOTAL RAINFALL   (mm)=     25.00        25.00           25.00
     RUNOFF COEFFICIENT   =       .94          .09             .27

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
```

```
        Fc    (mm/hr)= 12.50      Cum.Inf.   (mm)=    .00
   (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
  (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0565)   |    Area    (ha)=  11.10
|ID= 1 DT= 5.0 min   |    Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.66         6.44
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     680.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      61.55         7.05
                over (min)       10.00        35.00
     Storage Coeff.  (min)=       7.96 (ii)   30.70 (ii)
     Unit Hyd. Tpeak (min)=      10.00        35.00
     Unit Hyd. peak  (cms)=        .13          .04
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .28          .06           .294 (iii)
     TIME TO PEAK    (hrs)=       1.42         1.83           1.42
     RUNOFF VOLUME    (mm)=      23.50         2.16           6.64
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =        .94          .09            .27

    (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo    (mm/hr)= 75.00             K  (1/hr)=  4.14
        Fc    (mm/hr)= 12.50      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  (0481)   |    Area    (ha)=   5.90
|ID= 1 DT= 5.0 min   |    Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.48         3.42
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     680.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      61.55         7.05
                over (min)       10.00        35.00
     Storage Coeff.  (min)=       7.96 (ii)   30.70 (ii)
     Unit Hyd. Tpeak (min)=      10.00        35.00
     Unit Hyd. peak  (cms)=        .13          .04
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .15          .03           .156 (iii)
     TIME TO PEAK    (hrs)=       1.42         1.83           1.42
     RUNOFF VOLUME    (mm)=      23.50         2.16           6.64
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =        .94          .09            .27
```

```
      (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
           Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0410)   |   Area    (ha)=  24.20
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        10.16         14.04
    Dep. Storage     (mm)=         1.50          5.00
    Average Slope     (%)=         2.00          2.00
    Length            (m)=       401.00         40.00
    Mannings n           =         .013          .300

    Max.Eff.Inten.(mm/hr)=        61.55          7.05
               over (min)          5.00         30.00
    Storage Coeff.  (min)=         5.80 (ii)    28.54 (ii)
    Unit Hyd. Tpeak (min)=         5.00         30.00
    Unit Hyd. peak  (cms)=          .20           .04
                                                            *TOTALS*
    PEAK FLOW       (cms)=          .75           .14          .770 (iii)
    TIME TO PEAK    (hrs)=         1.33          1.75          1.33
    RUNOFF VOLUME    (mm)=        23.50          2.16          6.64
    TOTAL RAINFALL   (mm)=        25.00         25.00         25.00
    RUNOFF COEFFICIENT   =          .94           .09           .27

      (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
           Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0415)   |   Area    (ha)=   4.99
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=         2.10          2.89
    Dep. Storage     (mm)=         1.50          5.00
    Average Slope     (%)=         2.86          2.86
    Length            (m)=       185.00         40.00
    Mannings n           =         .013          .300

    Max.Eff.Inten.(mm/hr)=        61.55          8.82
               over (min)          5.00         25.00
    Storage Coeff.  (min)=         3.27 (ii)    21.96 (ii)
    Unit Hyd. Tpeak (min)=         5.00         25.00
    Unit Hyd. peak  (cms)=          .27           .05
                                                            *TOTALS*
    PEAK FLOW       (cms)=          .17           .04          .179 (iii)
    TIME TO PEAK    (hrs)=         1.33          1.67          1.33
    RUNOFF VOLUME    (mm)=        23.50          2.16          6.64
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```
     TOTAL RAINFALL   (mm)=       25.00         25.00          25.00
     RUNOFF COEFFICIENT   =         .94           .09            .27

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0110)  |   Area    (ha)=  19.00
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.98        11.02
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     365.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      61.55         7.05
                over (min)        5.00        30.00
     Storage Coeff.  (min)=       5.48 (ii)   28.22 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .20          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .60          .11          .614 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.75          1.33
     RUNOFF VOLUME    (mm)=      23.50         2.16          6.64
     TOTAL RAINFALL   (mm)=      25.00        25.00         25.00
     RUNOFF COEFFICIENT   =        .94          .09           .27

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0101)  |   Area    (ha)=  16.32
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.85         9.47
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     309.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      61.55         7.05
                over (min)        5.00        30.00
     Storage Coeff.  (min)=       4.96 (ii)   27.70 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .22          .04
```

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                                                   *TOTALS*
     PEAK FLOW        (cms)=        .53          .10           .540 (iii)
     TIME TO PEAK     (hrs)=       1.33         1.75           1.33
     RUNOFF VOLUME     (mm)=      23.50         2.16           6.64
     TOTAL RAINFALL    (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =         .94          .09            .27

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0102)   |   Area    (ha)=  14.32
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        6.01         8.31
     Dep. Storage     (mm)=        1.50         5.00
     Average Slope     (%)=        2.00         2.00
     Length            (m)=      287.00        40.00
     Mannings n           =        .013         .300

     Max.Eff.Inten.(mm/hr)=       61.55         7.05
                over (min)         5.00        30.00
     Storage Coeff.  (min)=        4.74 (ii)   27.48 (ii)
     Unit Hyd. Tpeak (min)=        5.00        30.00
     Unit Hyd. peak  (cms)=         .22          .04
                                                   *TOTALS*
     PEAK FLOW        (cms)=        .47          .09           .479 (iii)
     TIME TO PEAK     (hrs)=       1.33         1.75           1.33
     RUNOFF VOLUME     (mm)=      23.50         2.16           6.64
     TOTAL RAINFALL    (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =         .94          .09            .27

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0105)   |   Area    (ha)=  51.32
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       21.55        29.77
     Dep. Storage     (mm)=        1.50         5.00
     Average Slope     (%)=        2.00         2.00
     Length            (m)=      550.00        40.00
     Mannings n           =        .013         .300
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```
     Max.Eff.Inten.(mm/hr)=      61.55          7.05
                over (min)        5.00         30.00
     Storage Coeff.  (min)=       7.01 (ii)    29.75 (ii)
     Unit Hyd. Tpeak (min)=       5.00         30.00
     Unit Hyd. peak  (cms)=        .17           .04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.50           .30          1.538 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.75           1.33
     RUNOFF VOLUME    (mm)=      23.50          2.16           6.64
     TOTAL RAINFALL   (mm)=      25.00         25.00          25.00
     RUNOFF COEFFICIENT   =        .94           .09            .27

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD  (0365) |   Area    (ha)= 117.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      49.35         68.15
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     885.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      61.55          7.05
                over (min)       10.00         35.00
     Storage Coeff.  (min)=       9.32 (ii)    32.06 (ii)
     Unit Hyd. Tpeak (min)=      10.00         35.00
     Unit Hyd. peak  (cms)=        .12           .03
                                                            *TOTALS*
     PEAK FLOW       (cms)=       2.82           .62          2.960 (iii)
     TIME TO PEAK    (hrs)=       1.42          1.83           1.42
     RUNOFF VOLUME    (mm)=      23.50          2.16           6.64
     TOTAL RAINFALL   (mm)=      25.00         25.00          25.00
     RUNOFF COEFFICIENT   =        .94           .09            .27

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD  (0355) |   Area    (ha)=  12.30
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.17          7.13
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       1.60          1.60
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```
     Length              (m)=      286.00        40.00
     Mannings n            =         .013         .300

     Max.Eff.Inten.(mm/hr)=         61.55         7.05
                over (min)          5.00        30.00
     Storage Coeff.  (min)=         5.06 (ii)   29.38 (ii)
     Unit Hyd. Tpeak (min)=         5.00        30.00
     Unit Hyd. peak  (cms)=          .21          .04
                                                             *TOTALS*
     PEAK FLOW       (cms)=          .40          .07           .405 (iii)
     TIME TO PEAK    (hrs)=         1.33         1.75           1.33
     RUNOFF VOLUME    (mm)=        23.50         2.16           6.64
     TOTAL RAINFALL   (mm)=        25.00        25.00          25.00
     RUNOFF COEFFICIENT   =          .94          .09            .27

      (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
           Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0350)   |   Area    (ha)=  16.30
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         6.85         9.45
     Dep. Storage     (mm)=         1.50         5.00
     Average Slope     (%)=         1.00         1.00
     Length            (m)=       330.00        40.00
     Mannings n           =         .013         .300

     Max.Eff.Inten.(mm/hr)=        61.55         5.04
                over (min)          5.00        40.00
     Storage Coeff.  (min)=         6.35 (ii)   38.38 (ii)
     Unit Hyd. Tpeak (min)=         5.00        40.00
     Unit Hyd. peak  (cms)=          .19          .03
                                                             *TOTALS*
     PEAK FLOW       (cms)=          .49          .07           .499 (iii)
     TIME TO PEAK    (hrs)=         1.33         1.92           1.33
     RUNOFF VOLUME    (mm)=        23.50         2.16           6.64
     TOTAL RAINFALL   (mm)=        25.00        25.00          25.00
     RUNOFF COEFFICIENT   =          .94          .09            .27

      (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
           Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0360)   |   Area    (ha)=  30.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  37.00   Dir. Conn.(%)=  19.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
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                    Hadati Creek Watershed - Allowable
     Surface Area     (ha)=       11.10          18.90
     Dep. Storage     (mm)=        1.50           5.00
     Average Slope     (%)=        2.00           2.00
     Length            (m)=      447.00          40.00
     Mannings n           =        .013           .300

     Max.Eff.Inten.(mm/hr)=       61.55           2.81
                over (min)         5.00          40.00
     Storage Coeff.  (min)=        6.19 (ii)     39.07 (ii)
     Unit Hyd. Tpeak (min)=        5.00          40.00
     Unit Hyd. peak  (cms)=         .19            .03
                                                               *TOTALS*
     PEAK FLOW       (cms)=         .83            .08            .834 (iii)
     TIME TO PEAK    (hrs)=        1.33           1.92            1.33
     RUNOFF VOLUME    (mm)=       23.50           1.27            5.50
     TOTAL RAINFALL   (mm)=       25.00          25.00           25.00
     RUNOFF COEFFICIENT   =         .94            .05             .22

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD  (0395)  |    Area    (ha)=   51.20
|ID= 1 DT= 5.0 min  |    Total Imp(%)=   10.00    Dir. Conn.(%)=    5.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        5.12          46.08
     Dep. Storage     (mm)=        1.50           5.00
     Average Slope     (%)=        2.00           2.00
     Length            (m)=      900.00          40.00
     Mannings n           =        .013           .300

     Max.Eff.Inten.(mm/hr)=       61.55            .00
                over (min)        10.00         230.00
     Storage Coeff.  (min)=        9.42 (ii)    225.31 (ii)
     Unit Hyd. Tpeak (min)=       10.00         230.00
     Unit Hyd. peak  (cms)=         .12            .00
                                                               *TOTALS*
     PEAK FLOW       (cms)=         .29            .00            .292 (iii)
     TIME TO PEAK    (hrs)=        1.42            .00            1.42
     RUNOFF VOLUME    (mm)=       23.50            .00            1.17
     TOTAL RAINFALL   (mm)=       25.00          25.00           25.00
     RUNOFF COEFFICIENT   =         .94            .00             .05

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.
***** WARNING: THE PERVIOUS AREA HAS NO FLOW .

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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| CALIB              |
| STANDHYD  (0455)   |   Area    (ha)=  12.70
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.33        7.37
     Dep. Storage     (mm)=       1.50        5.00
     Average Slope     (%)=       1.71        1.71
     Length            (m)=     300.00       40.00
     Mannings n           =       .013        .300

     Max.Eff.Inten.(mm/hr)=      61.55        7.05
                over (min)       5.00       30.00
     Storage Coeff.  (min)=       5.11 (ii)   28.94 (ii)
     Unit Hyd. Tpeak (min)=       5.00       30.00
     Unit Hyd. peak  (cms)=        .21         .04
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .41         .07            .417 (iii)
     TIME TO PEAK    (hrs)=       1.33        1.75            1.33
     RUNOFF VOLUME    (mm)=      23.50        2.16            6.64
     TOTAL RAINFALL   (mm)=      25.00       25.00           25.00
     RUNOFF COEFFICIENT   =        .94         .09             .27


       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0460)   |   Area    (ha)=  36.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      15.12       20.88
     Dep. Storage     (mm)=       1.50        5.00
     Average Slope     (%)=       2.03        2.03
     Length            (m)=     465.00       40.00
     Mannings n           =       .013        .300

     Max.Eff.Inten.(mm/hr)=      61.55        7.05
                over (min)       5.00       30.00
     Storage Coeff.  (min)=       6.31 (ii)   28.95 (ii)
     Unit Hyd. Tpeak (min)=       5.00       30.00
     Unit Hyd. peak  (cms)=        .19         .04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.09         .21           1.117 (iii)
     TIME TO PEAK    (hrs)=       1.33        1.75            1.33
     RUNOFF VOLUME    (mm)=      23.50        2.16            6.64
     TOTAL RAINFALL   (mm)=      25.00       25.00           25.00
     RUNOFF COEFFICIENT   =        .94         .09             .27


       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
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  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB             |
| STANDHYD  (0480) |   Area    (ha)=  43.10
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      18.10         25.00
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     680.00         40.00
     Mannings n          =        .013          .300

     Max.Eff.Inten.(mm/hr)=      61.55          7.05
                over (min)       10.00         35.00
     Storage Coeff.  (min)=       7.96 (ii)    30.70 (ii)
     Unit Hyd. Tpeak (min)=      10.00         35.00
     Unit Hyd. peak  (cms)=        .13           .04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.09           .23          1.142 (iii)
     TIME TO PEAK    (hrs)=       1.42          1.83           1.42
     RUNOFF VOLUME    (mm)=      23.50          2.16           6.64
     TOTAL RAINFALL   (mm)=      25.00         25.00          25.00
     RUNOFF COEFFICIENT   =        .94           .09            .27


   (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
        Fc    (mm/hr)= 12.50     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.

------------------------------------------------------------------------------
--------------------
| STORE HYD (0525) |   AREA      (ha)=    .00
| ID= 1 DT=****min |   QPEAK    (cms)=    .00
--------------------   TPEAK    (hrs)=    .00
                       VOLUME    (mm)=*******

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--------------------
| DUHYD     (0505) |
| Inlet Cap.=9.000 |
| #of Inlets=    1 |
| Total(cms)=  9.0 |      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1): 244.00      5.34      1.58    7.77
     =====================================================
     MAJOR SYS.(ID= 2):    .00       .00       .00     .00
     MINOR SYS.(ID= 3): 244.00      5.34      1.58    7.77

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0566) |
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK      R.V.
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                         Hadati Creek Watershed - Allowable
--------------------         (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0484):    12.60     .334      1.42      6.64
        + ID2= 2 (0565):    11.10     .294      1.42      6.64
          =================================================
          ID = 3 (0566):    23.70     .628      1.42      6.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0420) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0410):    24.20     .770      1.33      6.64
        + ID2= 2 (0415):     4.99     .179      1.33      6.64
          =================================================
          ID = 3 (0420):    29.19     .948      1.33      6.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| RESERVOIR (0111) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          .0000       .0000    |   1.0000      1.0000
                          .0100       .0100    |  20.0000      1.1000
                          .0120       .1000    |    .0000       .0000

                                 AREA      QPEAK       TPEAK        R.V.
                                 (ha)      (cms)       (hrs)        (mm)
     INFLOW : ID= 2 (0110)     19.000       .614        1.33         6.64
     OUTFLOW: ID= 1 (0111)     19.000       .024        2.92         6.63

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.93
                  TIME SHIFT OF PEAK FLOW         (min)= 95.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=   .1111

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--------------------
| ADD HYD   (0103) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0101):    16.32     .540      1.33      6.64
        + ID2= 2 (0102):    14.32     .479      1.33      6.64
          =================================================
          ID = 3 (0103):    30.64    1.019      1.33      6.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0106) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          .0000       .0000    |    .5000       .4000
                          .0100       .0100    |   6.6000       .8000
                          .0260       .2300    |    .0000       .0000
```

```
                        Hadati Creek Watershed - Allowable
                                 AREA       QPEAK        TPEAK        R.V.
                                 (ha)       (cms)        (hrs)        (mm)
    INFLOW : ID= 2 (0105)      51.320       1.538         1.33         6.64
    OUTFLOW: ID= 1 (0106)      51.320        .155         2.42         6.63

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.08
                    TIME SHIFT OF PEAK FLOW        (min)= 65.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=   .2763

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0358) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                    .00            .26         .0300
                   5.50            .15      .0300 / .0150  Main Channel
                   5.51            .00         .0150       Main Channel
                  10.00            .09         .0150       Main Channel
                  14.49            .00         .0150       Main Channel
                  14.50            .15      .0150 / .0300  Main Channel
                  20.00            .26         .0300

     <--------------------- TRAVEL TIME TABLE --------------------->
      DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
       (m)       (m)      (cu.m.)       (cms)         (m/s)       (min)
       .01       .01      .102E+02        .0            .17      109.52
       .03       .03      .409E+02        .0            .27       68.99
       .04       .04      .920E+02        .0            .35       52.65
       .05       .05      .163E+03        .1            .42       43.46
       .07       .07      .255E+03        .1            .49       37.45
       .08       .08      .368E+03        .2            .55       33.17
       .10       .10      .499E+03        .3            .64       28.86
       .11       .11      .634E+03        .4            .74       24.66
       .12       .12      .769E+03        .6            .84       21.72
       .14       .14      .904E+03        .8            .94       19.54
       .15       .15      .104E+04       1.0           1.03       17.84
       .16       .16      .119E+04       1.2           1.11       16.57
       .18       .18      .135E+04       1.4           1.17       15.71
       .19       .19      .154E+04       1.7           1.21       15.10
       .20       .20      .175E+04       2.0           1.25       14.65
       .22       .22      .198E+04       2.3           1.28       14.31
       .23       .23      .223E+04       2.6           1.31       14.04
       .25       .25      .250E+04       3.0           1.33       13.82
       .26       .26      .279E+04       3.4           1.34       13.65

                                     <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK    R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)    (mm)      (m)      (m/s)
    INFLOW : ID= 2 (0355)    12.30      .40    1.33    6.64      .11        .72
    OUTFLOW: ID= 1 (0358)    12.30      .15    1.58    6.59      .08        .52


--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0353) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                    .00            .26         .0300
                   5.50            .15      .0300 / .0150  Main Channel
```

| | | | |
|---|---|---|---|
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .26 | .0300 | |

<-------------------- TRAVEL TIME TABLE -------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .01 | .01 | .929E+01 | .0 | .17 | 99.56 |
| .03 | .03 | .372E+02 | .0 | .27 | 62.72 |
| .04 | .04 | .836E+02 | .0 | .35 | 47.86 |
| .05 | .05 | .149E+03 | .1 | .42 | 39.51 |
| .07 | .07 | .232E+03 | .1 | .49 | 34.05 |
| .08 | .08 | .334E+03 | .2 | .55 | 30.15 |
| .10 | .10 | .454E+03 | .3 | .64 | 26.24 |
| .11 | .11 | .576E+03 | .4 | .74 | 22.41 |
| .12 | .12 | .699E+03 | .6 | .84 | 19.75 |
| .14 | .14 | .822E+03 | .8 | .94 | 17.76 |
| .15 | .15 | .944E+03 | 1.0 | 1.03 | 16.22 |
| .16 | .16 | .108E+04 | 1.2 | 1.11 | 15.07 |
| .18 | .18 | .123E+04 | 1.4 | 1.17 | 14.28 |
| .19 | .19 | .140E+04 | 1.7 | 1.21 | 13.72 |
| .20 | .20 | .159E+04 | 2.0 | 1.25 | 13.31 |
| .22 | .22 | .180E+04 | 2.3 | 1.28 | 13.01 |
| .23 | .23 | .203E+04 | 2.6 | 1.31 | 12.76 |
| .25 | .25 | .227E+04 | 3.0 | 1.33 | 12.57 |
| .26 | .26 | .254E+04 | 3.4 | 1.34 | 12.41 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0350) | 16.30 | .50 | 1.33 | 6.64 | .12 | .78 |
| OUTFLOW: ID= 1 (0353) | 16.30 | .22 | 1.58 | 6.60 | .09 | .57 |

---

| ROUTE CHN (0362) |
| IN= 2---> OUT= 1 |    Routing time step (min)'= 5.00

<------ DATA FOR SECTION (  1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | .40 | .0300 | |
| 5.50 | .15 | .0300 / .0150 | Main Channel |
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .40 | .0300 | |

<-------------------- TRAVEL TIME TABLE -------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .02 | .02 | .176E+02 | .0 | .21 | 80.52 |
| .04 | .04 | .702E+02 | .0 | .33 | 50.72 |
| .06 | .06 | .158E+03 | .1 | .43 | 38.71 |
| .08 | .08 | .281E+03 | .1 | .52 | 31.95 |
| .09 | .09 | .438E+03 | .3 | .62 | 26.84 |
| .11 | .11 | .607E+03 | .5 | .77 | 21.66 |
| .13 | .13 | .776E+03 | .7 | .90 | 18.45 |
| .15 | .15 | .944E+03 | 1.0 | 1.03 | 16.22 |
| .17 | .17 | .116E+04 | 1.3 | 1.16 | 14.36 |

```
      .20        .20    .140E+04        1.8           1.27       13.13
      .22        .22    .166E+04        2.3           1.36       12.24
      .24        .24    .194E+04        2.8           1.44       11.58
      .26        .26    .225E+04        3.4           1.51       11.05
      .29        .29    .258E+04        4.0           1.57       10.63
      .31        .31    .293E+04        4.8           1.62       10.27
      .33        .33    .331E+04        5.5           1.67        9.97
      .35        .35    .371E+04        6.4           1.72        9.71
      .38        .38    .413E+04        7.3           1.76        9.48
      .40        .40    .457E+04        8.2           1.80        9.28

                                     <---- hydrograph ---->  <-pipe / channel->
                              AREA    QPEAK    TPEAK   R.V.   MAX DEPTH   MAX VEL
                              (ha)    (cms)    (hrs)   (mm)      (m)       (m/s)
     INFLOW : ID= 2 (0360)   30.00     .83     1.33   5.50       .14        .96
     OUTFLOW: ID= 1 (0362)   30.00     .41     1.50   5.48       .11        .71


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

 --------------------
 | ADD HYD   (0465) |
 |   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
 --------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0455):      12.70     .417      1.33      6.64
        + ID2= 2 (0460):      36.00    1.117      1.33      6.64
          ==================================================
          ID = 3 (0465):      48.70    1.534      1.33      6.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

 --------------------
 | ADD HYD   (0515) |
 |   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
 --------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0510):      16.00    1.475      1.42     18.56
        + ID2= 2 (0505):     244.00    5.342      1.58      7.77
          ==================================================
          ID = 3 (0515):     260.00    6.307      1.58      8.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
 --------------------
 | ROUTE CHN (0564) |
 | IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
 --------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance       Elevation        Manning
                    .00         101.50           .0500
                   1.00         100.70           .0500
                   1.50         100.55      .0500 / .0300   Main Channel
                   2.00          99.50           .0300      Main Channel
                   3.50          99.60           .0300      Main Channel
                   4.50         100.65      .0300 / .0500   Main Channel
                   6.00         101.45           .0500

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)     (cu.m.)       (cms)         (m/s)       (min)
        .10     99.60    .353E+02         .0           .19        43.69
```

| | | | | | |
|---|---|---|---|---|---|
| .19 | 99.69 | .112E+03 | .1 | .37 | 22.76 |
| .29 | 99.79 | .195E+03 | .2 | .49 | 17.03 |
| .38 | 99.88 | .285E+03 | .3 | .59 | 14.23 |
| .48 | 99.98 | .381E+03 | .5 | .67 | 12.51 |
| .57 | 100.07 | .484E+03 | .7 | .74 | 11.32 |
| .67 | 100.17 | .594E+03 | .9 | .80 | 10.43 |
| .76 | 100.26 | .710E+03 | 1.2 | .86 | 9.74 |
| .86 | 100.36 | .832E+03 | 1.5 | .91 | 9.18 |
| .95 | 100.45 | .961E+03 | 1.8 | .96 | 8.72 |
| 1.05 | 100.55 | .110E+04 | 2.2 | 1.00 | 8.32 |
| 1.16 | 100.66 | .127E+04 | 2.7 | 1.07 | 7.80 |
| 1.28 | 100.78 | .148E+04 | 3.4 | 1.14 | 7.31 |
| 1.39 | 100.89 | .170E+04 | 4.1 | 1.20 | 6.94 |
| 1.50 | 101.00 | .195E+04 | 4.9 | 1.25 | 6.65 |
| 1.61 | 101.11 | .221E+04 | 5.8 | 1.30 | 6.41 |
| 1.72 | 101.22 | .250E+04 | 6.7 | 1.34 | 6.22 |
| 1.84 | 101.34 | .280E+04 | 7.7 | 1.38 | 6.04 |
| 1.95 | 101.45 | .313E+04 | 8.8 | 1.41 | 5.90 |

**** WARNING:  INFLOW HYDROGRAPH IS DRY!!

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```
--------------------
| ROUTE CHN (0563) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
```

<------ DATA FOR SECTION (    2.2) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | 1.00 | .0350 | |
| 2.00 | .50 | .0350 | |
| 4.00 | .00 | .0350 / .0350 | Main Channel |
| 4.50 | .00 | .0350 | Main Channel |
| 5.00 | .00 | .0350 / .0350 | Main Channel |
| 7.00 | .50 | .0350 | |
| 9.00 | 1.00 | .0350 | |

<--------------------- TRAVEL TIME TABLE ---------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .05 | .05 | .573E+01 | .0 | .67 | 2.23 |
| .11 | .11 | .135E+02 | .1 | .99 | 1.51 |
| .16 | .16 | .232E+02 | .3 | 1.23 | 1.22 |
| .21 | .21 | .349E+02 | .5 | 1.42 | 1.06 |
| .26 | .26 | .486E+02 | .9 | 1.58 | .95 |
| .32 | .32 | .643E+02 | 1.2 | 1.73 | .87 |
| .37 | .37 | .820E+02 | 1.7 | 1.86 | .81 |
| .42 | .42 | .102E+03 | 2.2 | 1.98 | .76 |
| .47 | .47 | .123E+03 | 2.9 | 2.10 | .71 |
| .53 | .53 | .147E+03 | 3.6 | 2.21 | .68 |
| .58 | .58 | .173E+03 | 4.4 | 2.31 | .65 |
| .63 | .63 | .200E+03 | 5.4 | 2.42 | .62 |
| .68 | .68 | .230E+03 | 6.4 | 2.51 | .60 |
| .74 | .74 | .262E+03 | 7.6 | 2.61 | .58 |
| .79 | .79 | .295E+03 | 8.9 | 2.70 | .56 |
| .84 | .84 | .331E+03 | 10.3 | 2.79 | .54 |
| .89 | .89 | .369E+03 | 11.8 | 2.88 | .52 |
| .95 | .95 | .408E+03 | 13.5 | 2.97 | .51 |
| 1.00 | 1.00 | .450E+03 | 15.2 | 3.05 | .49 |

| | <---- hydrograph | ----> | | <-pipe / channel-> | |
|---|---|---|---|---|---|
| AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | MAX DEPTH (m) | MAX VEL (m/s) |

```
    INFLOW : ID= 2 (0566)    23.70      .63    1.42   6.64       .22      1.45
    OUTFLOW: ID= 1 (0563)    23.70      .65    1.42   6.64       .23      1.47

-------------------------------------------------------------------------------
--------------------
| DUHYD      (0425) |
| Inlet Cap.=1.980  |
| #of Inlets=     1 |
| Total(cms)=   2.0 |      AREA     QPEAK     TPEAK    R.V.
--------------------       (ha)     (cms)     (hrs)    (mm)
    TOTAL HYD.(ID= 1):   29.19       .95      1.33    6.64
    ====================================================
    MAJOR SYS.(ID= 2):     .00       .00       .00     .00
    MINOR SYS.(ID= 3):   29.19       .95      1.33    6.64

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (0104) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          .0000      .0000    |   1.0000      .5000
                          .0100      .0100    |  10.0000      .6000
                          .0150      .1332    |    .0000      .0000

                                 AREA      QPEAK       TPEAK      R.V.
                                 (ha)      (cms)       (hrs)      (mm)
    INFLOW : ID= 2 (0103)      30.640     1.019        1.33       6.64
    OUTFLOW: ID= 1 (0104)      30.640      .097        2.33       6.63

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.52
                TIME SHIFT OF PEAK FLOW         (min)= 60.00
                MAXIMUM  STORAGE   USED       (ha.m.)=   .1639

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

--------------------
| ADD HYD   (0359) |
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK      R.V.
--------------------        (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (0358):     12.30    .153     1.58      6.59
      + ID2= 2 (0353):     16.30    .216     1.58      6.60
        ================================================
        ID = 3 (0359):     28.60    .369     1.58      6.60

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0363) |
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK      R.V.
--------------------        (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (0359):     28.60    .369     1.58      6.60
      + ID2= 2 (0362):     30.00    .406     1.50      5.48
        ================================================
        ID = 3 (0363):     58.60    .769     1.50      6.03

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD    (0470) |
|   1 + 2 = 3       |          AREA     QPEAK     TPEAK     R.V.
--------------------           (ha)     (cms)     (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH 0425 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH 0003 = HYDROGRAPH 0001
*** W A R N I N G :  HYDROGRAPH 0003 = HYDROGRAPH 0001
          ID1= 1 (0465):    48.70   1.534     1.33     6.64
        + ID2= 2 (0425):      .00    .000      .00      .00
          ==================================================
          ID = 3 (0470):    48.70   1.534     1.33     6.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| DUHYD      (0520) |
| Inlet Cap.=3.050  |
| #of Inlets=    1  |
| Total(cms)=  3.0  |      AREA      QPEAK      TPEAK     R.V.
--------------------        (ha)      (cms)      (hrs)     (mm)
     TOTAL HYD.(ID= 1): 260.00       6.31       1.58     8.44
     =====================================================
     MAJOR SYS.(ID= 2):  59.59       3.26       1.58     8.44
     MINOR SYS.(ID= 3): 200.41       3.05       1.33     8.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0561)  |
| IN= 2---> OUT= 1  |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                    .00          1.00          .0350
                   2.00           .50          .0350
                   4.00           .00       .0350 / .0350   Main Channel
                   4.50           .00          .0350        Main Channel
                   5.00           .00       .0350 / .0350   Main Channel
                   7.00           .50          .0350
                   9.00          1.00          .0350

      <-------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)     (cu.m.)       (cms)         (m/s)       (min)
        .05       .05    .319E+01        .1             .87         .95
        .11       .11    .748E+01        .2            1.26         .66
        .16       .16    .129E+02        .4            1.54         .54
        .21       .21    .194E+02        .7            1.75         .48
        .26       .26    .270E+02       1.0            1.93         .43
        .32       .32    .357E+02       1.5            2.08         .40
        .37       .37    .456E+02       2.0            2.22         .38
        .42       .42    .565E+02       2.6            2.34         .36
        .47       .47    .686E+02       3.4            2.46         .34
        .53       .53    .817E+02       4.2            2.57         .32
        .58       .58    .960E+02       5.1            2.68         .31
        .63       .63    .111E+03       6.2            2.78         .30
        .68       .68    .128E+03       7.3            2.87         .29
        .74       .74    .145E+03       8.6            2.97         .28
        .79       .79    .164E+03      10.0            3.06         .27
```

```
      .84        .84    .184E+03      11.6          3.14        .27
      .89        .89    .205E+03      13.2          3.23        .26
      .95        .95    .227E+03      15.0          3.31        .25
     1.00       1.00    .250E+03      17.0          3.40        .25

                                 <---- hydrograph ---->  <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 2 (0563)   23.70      .65    1.42   6.64       .21      1.73
  OUTFLOW: ID= 1 (0561)   23.70      .66    1.42   6.64       .21      1.73


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

--------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |        AREA     QPEAK    TPEAK      R.V.
--------------------        (ha)     (cms)    (hrs)      (mm)
          ID1= 1 (0111):   19.00     .024     2.92      6.63
        + ID2= 2 (0104):   30.64     .097     2.33      6.63
          ==================================================
          ID = 3 (0114):   49.64     .118     2.42      6.63

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0380) |
|   1 +  2 =  3    |        AREA     QPEAK    TPEAK      R.V.
--------------------        (ha)     (cms)    (hrs)      (mm)
          ID1= 1 (0365):  117.50    2.960     1.42      6.64
        + ID2= 2 (0363):   58.60     .769     1.50      6.03
          ==================================================
          ID = 3 (0380):  176.10    3.653     1.42      6.44

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0475) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
                   <------ DATA FOR SECTION (   1.1) ------>
                   Distance      Elevation       Manning
                     100.00        324.60         .0500
                     115.00        321.60         .0500
                     120.00        320.80      .0500 / .0300  Main Channel
                     122.00        320.80      .0300 / .0500  Main Channel
                     138.00        321.60         .0500
                     148.00        322.30         .0500
                     154.00        323.10         .0500
                     164.00        324.60         .0500

     <-------------------- TRAVEL TIME TABLE --------------------->
      DEPTH     ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
       (m)       (m)     (cu.m.)      (cms)        (m/s)       (min)
       .20    321.00    .398E+03        .8           .84        8.53
       .40    321.20    .125E+04       3.3          1.13        6.33
       .60    321.40    .255E+04       8.1          1.36        5.27
       .80    321.60    .430E+04      15.6          1.56        4.59
      1.00    321.80    .644E+04      26.8          1.79        4.01
      1.20    322.00    .892E+04      41.2          1.99        3.61
```

```
       1.40    322.20    .117E+05       59.3          2.17         3.30
       1.60    322.40    .148E+05       81.9          2.37         3.02
       1.80    322.60    .182E+05      109.1          2.58         2.78
       2.00    322.80    .218E+05      140.2          2.77         2.59
       2.20    323.00    .256E+05      175.3          2.95         2.43
       2.40    323.20    .296E+05      214.7          3.12         2.29
       2.60    323.40    .338E+05      258.6          3.29         2.18
       2.80    323.60    .382E+05      306.7          3.46         2.07
       3.00    323.80    .428E+05      359.1          3.61         1.98
       3.20    324.00    .476E+05      416.0          3.76         1.91
       3.40    324.20    .526E+05      477.5          3.91         1.83
       3.60    324.40    .578E+05      543.5          4.05         1.77
       3.80    324.60    .632E+05      614.3          4.18         1.71

                                     <---- hydrograph ---->  <-pipe / channel->
                               AREA    QPEAK   TPEAK   R.V.  MAX DEPTH  MAX VEL
                               (ha)    (cms)   (hrs)   (mm)     (m)      (m/s)
     INFLOW : ID= 2 (0470)    48.70    1.53    1.33    6.64     .26       .91
     OUTFLOW: ID= 1 (0475)    48.70    1.10    1.42    6.64     .23       .87

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

 --------------------
 | ADD HYD   (0526) |
 |   1 +  2 =  3    |           AREA     QPEAK      TPEAK      R.V.
 --------------------           (ha)     (cms)      (hrs)      (mm)
           ID1= 1 (0520):      59.59    3.257       1.58       8.44
         + ID2= 2 (0525):        .00     .001        .00    *******
           ================================================
           ID = 3 (0526):      59.59    3.257       1.58       8.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

 --------------------
 | ADD HYD   (0492) |
 |   1 +  2 =  3    |           AREA     QPEAK      TPEAK      R.V.
 --------------------           (ha)     (cms)      (hrs)      (mm)
           ID1= 1 (0561):      23.70     .656       1.42       6.64
         + ID2= 2 (0481):       5.90     .156       1.42       6.64
           ================================================
           ID = 3 (0492):      29.60     .812       1.42       6.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

 --------------------
 | ADD HYD   (0115) |
 |   1 +  2 =  3    |           AREA     QPEAK      TPEAK      R.V.
 --------------------           (ha)     (cms)      (hrs)      (mm)
           ID1= 1 (0114):      49.64     .118       2.42       6.63
         + ID2= 2 (0106):      51.32     .155       2.42       6.63
           ================================================
           ID = 3 (0115):     100.96     .273       2.42       6.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 --------------------
 | RESERVOIR (0390) |
```

```
                          Hadati Creek Watershed - Allowable
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   | OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |  (cms)     (ha.m.)
                           .0000      .0000    | 1.3100      1.6000
                           .7700      .2870    | 1.8600     23.2300
                          1.2600      .9680    |  .0000       .0000

                                 AREA      QPEAK       TPEAK       R.V.
                                 (ha)      (cms)       (hrs)       (mm)
     INFLOW : ID= 2 (0380)     176.100     3.653        1.42        6.44
     OUTFLOW: ID= 1 (0390)     176.100      .982        2.25        6.43

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 26.88
                    TIME SHIFT OF PEAK FLOW        (min)= 50.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=   .5820

------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0527) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance      Elevation       Manning
                  100.00        313.20         .0500
                  140.00        312.40     .0500 / .0300  Main Channel
                  140.50        310.80         .0300      Main Channel
                  141.50        310.80         .0300      Main Channel
                  142.00        312.40     .0300 / .0500  Main Channel
                  160.00        313.20         .0500

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
        (m)       (m)      (cu.m.)       (cms)         (m/s)        (min)
        .12     310.92    .575E+02         .1           .40         18.86
        .25     311.05    .119E+03         .2           .57         13.13
        .37     311.17    .185E+03         .3           .69         10.87
        .49     311.29    .256E+03         .4           .78          9.61
        .62     311.42    .330E+03         .6           .86          8.77
        .74     311.54    .409E+03         .8           .92          8.17
        .86     311.66    .492E+03        1.1           .97          7.70
        .98     311.78    .579E+03        1.3          1.02          7.32
       1.11     311.91    .671E+03        1.6          1.07          7.01
       1.23     312.03    .767E+03        1.9          1.11          6.74
       1.35     312.15    .867E+03        2.2          1.15          6.50
       1.48     312.28    .971E+03        2.6          1.19          6.29
       1.60     312.40    .108E+04        2.9          1.23          6.11
       1.73     312.53    .149E+04        3.6          1.10          6.85
       1.87     312.67    .248E+04        4.9           .88          8.52
       2.00     312.80    .405E+04        6.9           .77          9.74
       2.13     312.93    .620E+04       10.1           .73         10.21
       2.27     313.07    .893E+04       14.6           .74         10.17
       2.40     313.20    .122E+05       20.7           .76          9.85

                                      <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK   TPEAK   R.V.    MAX DEPTH   MAX VEL
                               (ha)    (cms)   (hrs)   (mm)       (m)       (m/s)
     INFLOW : ID= 2 (0526)    59.59     3.26    1.58   8.44       1.66       1.16
     OUTFLOW: ID= 1 (0527)    59.59     2.80    1.67   8.44       1.54       1.21

------------------------------------------------------------------------------
--------------------
| RESERVOIR (0482) |
```

```
                         Hadati Creek Watershed - Allowable
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------       (cms)     (ha.m.)    |   (cms)     (ha.m.)
                            .0000       .0000    |    .2910       .3795
                            .2590       .0579    |    .2970       .4503
                            .2660       .1180    |   1.6320       .5232
                            .2720       .1802    |   4.1680       .5983
                            .2790       .2445    |   7.5660       .6756
                            .2850       .3109    |    .0000       .0000

                                  AREA      QPEAK        TPEAK        R.V.
                                  (ha)      (cms)        (hrs)        (mm)
     INFLOW : ID= 2 (0492)      29.600       .812         1.42         6.64
     OUTFLOW: ID= 1 (0482)      29.600       .262         2.00         6.64

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 32.30
                   TIME SHIFT OF PEAK FLOW        (min)= 35.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=   .0866

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

--------------------
| ADD HYD   (0400) |
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0390):   176.10      .982      2.25      6.43
        + ID2= 2 (0395):    51.20      .292      1.42      1.17
          ==================================================
          ID = 3 (0400):   227.30     1.022      1.58      5.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0403) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
                 <------ DATA FOR SECTION (   1.1) ------>
                 Distance      Elevation       Manning
                   100.00         338.30         .0500
                   110.00         336.80         .0500
                   135.00         336.00         .0300      Main Channel
                   142.00         335.30         .0500
                   148.00         335.30         .0500
                   156.00         336.00         .0500
                   165.00         338.30         .0000

        <-------------------- TRAVEL TIME TABLE --------------------->
         DEPTH     ELEV       VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
          (m)       (m)      (cu.m.)       (cms)       (m/s)        (min)
          .16    335.46     .231E+04          .9          .71        44.52
          .32    335.62     .563E+04         3.2         1.09        29.11
          .47    335.77     .997E+04         7.3         1.39        22.72
          .63    335.93     .153E+05        13.4         1.66        19.04
          .79    336.09     .218E+05        22.7         1.97        16.04
          .95    336.25     .299E+05        35.3         2.25        14.10
         1.11    336.41     .396E+05        51.2         2.46        12.89
         1.26    336.56     .510E+05        70.7         2.63        12.02
         1.42    336.72     .641E+05        94.1         2.79        11.35
         1.58    336.88     .787E+05       122.4         2.96        10.71
         1.74    337.04     .939E+05       155.6         3.15        10.06
         1.89    337.19     .110E+06       192.8         3.34         9.48
         2.05    337.35     .126E+06       233.9         3.53         8.97
```

```
    2.21     337.51     .143E+06     278.9           3.71        8.53
    2.37     337.67     .160E+06     327.7           3.89        8.13
    2.53     337.83     .178E+06     380.3           4.07        7.79
    2.68     337.98     .196E+06     436.7           4.23        7.48
    2.84     338.14     .215E+06     496.9           4.40        7.20
    3.00     338.30     .234E+06     561.0           4.56        6.95

                                   <---- hydrograph ---->    <-pipe / channel->
                            AREA     QPEAK    TPEAK   R.V.   MAX DEPTH   MAX VEL
                            (ha)     (cms)    (hrs)   (mm)      (m)       (m/s)
  INFLOW : ID= 2 (0400)   227.30      1.02     1.58   5.25      .17        .73
  OUTFLOW: ID= 1 (0403)   227.30       .88     3.17   5.25      .16        .71


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

--------------------
| ADD HYD    (0407) |
|   1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0115):     100.96     .273      2.42      6.63
        + ID2= 2 (0403):     227.30     .881      3.17      5.25
          ==================================================
          ID = 3 (0407):     328.26    1.112      2.83      5.67

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (0113) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------        (cms)      (ha.m.)    |   (cms)      (ha.m.)
                            .0000        .0000    |   1.6000       6.4000
                           1.1000       2.9000    |   9.1000      10.0000
                           1.3000       4.3000    |  12.0000      20.0000

                                 AREA        QPEAK        TPEAK        R.V.
                                 (ha)        (cms)        (hrs)        (mm)
  INFLOW : ID= 2 (0407)        328.260       1.112         2.83         5.67
  OUTFLOW: ID= 1 (0113)        328.260        .354         5.83         5.67

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 31.88
                  TIME SHIFT OF PEAK FLOW        (min)=180.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=   .9343

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

--------------------
| ADD HYD    (0430) |
|   1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0425):      29.19     .948      1.33      6.64
        + ID2= 2 (0113):     328.26     .354      5.83      5.67
          ==================================================
          ID = 3 (0430):     357.45     .951      1.33      5.75

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0440) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
```

<------ DATA FOR SECTION ( 1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| 100.00 | 325.40 | .0600 | |
| 120.00 | 324.60 | .0600 | |
| 126.00 | 323.90 | .0600 | |
| 130.00 | 323.00 | .0600 | |
| 140.00 | 322.30 | .0600 / .0300 | Main Channel |
| 142.00 | 322.30 | .0300 / .0600 | Main Channel |
| 150.00 | 323.90 | .0600 | |
| 155.00 | 324.60 | .0600 | |
| 160.00 | 325.40 | .0600 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .16 | 322.46 | .233E+03 | .6 | .96 | 6.96 |
| .33 | 322.63 | .672E+03 | 2.1 | 1.26 | 5.27 |
| .49 | 322.79 | .132E+04 | 4.9 | 1.48 | 4.51 |
| .65 | 322.95 | .216E+04 | 9.0 | 1.66 | 4.03 |
| .82 | 323.12 | .319E+04 | 14.9 | 1.87 | 3.57 |
| .98 | 323.28 | .433E+04 | 22.5 | 2.08 | 3.21 |
| 1.14 | 323.44 | .556E+04 | 31.6 | 2.27 | 2.93 |
| 1.31 | 323.61 | .689E+04 | 42.3 | 2.45 | 2.72 |
| 1.47 | 323.77 | .833E+04 | 54.6 | 2.62 | 2.54 |
| 1.63 | 323.93 | .987E+04 | 68.3 | 2.77 | 2.41 |
| 1.79 | 324.09 | .115E+05 | 82.8 | 2.87 | 2.33 |
| 1.96 | 324.26 | .134E+05 | 99.2 | 2.96 | 2.25 |
| 2.12 | 324.42 | .154E+05 | 117.9 | 3.06 | 2.18 |
| 2.28 | 324.58 | .176E+05 | 138.8 | 3.15 | 2.11 |
| 2.45 | 324.75 | .200E+05 | 157.4 | 3.14 | 2.12 |
| 2.61 | 324.91 | .228E+05 | 179.6 | 3.15 | 2.11 |
| 2.77 | 325.07 | .259E+05 | 205.8 | 3.18 | 2.09 |
| 2.94 | 325.24 | .293E+05 | 236.1 | 3.23 | 2.07 |
| 3.10 | 325.40 | .330E+05 | 270.6 | 3.28 | 2.03 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0430) | 357.45 | .95 | 1.33 | 5.75 | .20 | 1.02 |
| OUTFLOW: ID= 1 (0440) | 357.45 | .72 | 1.42 | 5.75 | .18 | .98 |

---

| ADD HYD (0485) |
| 1 + 2 = 3 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0440): | 357.45 | .720 | 1.42 | 5.75 |
| + ID2= 2 (0475): | 48.70 | 1.101 | 1.42 | 6.64 |
| ID = 3 (0485): | 406.15 | 1.820 | 1.42 | 5.86 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| ADD HYD (0490) |
| 1 + 2 = 3 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0485): | 406.15 | 1.820 | 1.42 | 5.86 |

```
     + ID2= 2 (0480):    43.10   1.142      1.42     6.64
       ==================================================
       ID = 3 (0490):   449.25   2.962      1.42     5.93

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0491) |
|   1 +  2 =  3    |            AREA    QPEAK    TPEAK     R.V.
--------------------            (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (0482):    29.60    .262      2.00     6.64
     + ID2= 2 (0490):   449.25   2.962      1.42     5.93
       ==================================================
       ID = 3 (0491):   478.85   3.142      1.42     5.98

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (0483) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |        OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------         (cms)      (ha.m.)    |   (cms)      (ha.m.)
                              .0000       .0000    |   7.0800      2.4860
                              .2760       .0600    |   8.1000      3.3240
                             1.2000       .3400    |   9.7980      4.6420
                             2.0400       .6182    |  10.4940      7.4397
                             2.6400      1.1630    |  11.6850     10.3000
                             3.1200      1.7070    |  12.3480     11.4000

                                   AREA       QPEAK        TPEAK         R.V.
                                   (ha)       (cms)        (hrs)         (mm)
  INFLOW : ID= 2 (0491)          478.850      3.142         1.42          5.98
  OUTFLOW: ID= 1 (0483)          478.850      1.356         2.00          5.98

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 43.16
               TIME SHIFT OF PEAK FLOW          (min)= 35.00
               MAXIMUM  STORAGE   USED        (ha.m.)=   .3923

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--------------------
| ADD HYD   (0530) |
|   1 +  2 =  3    |            AREA    QPEAK    TPEAK     R.V.
--------------------            (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (0540):     4.63    .569      1.33    18.56
     + ID2= 2 (0483):   478.85   1.356      2.00     5.98
       ==================================================
       ID = 3 (0530):   483.48   1.402      2.00     6.10

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0545) |
|   1 +  2 =  3    |            AREA    QPEAK    TPEAK     R.V.
--------------------            (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (0527):    59.59   2.796      1.67     8.44
     + ID2= 2 (0530):   483.48   1.402      2.00     6.10
       ==================================================
```

```
                    Hadati Creek Watershed - Allowable
       ID = 3 (0545):   543.07   4.103     1.67     6.35

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0546) |
|   1 +  2 =  3    |           AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (0542):    25.25   2.408     1.42    18.56
     + ID2= 2 (0545):   543.07   4.103     1.67     6.35
       ===============================================
       ID = 3 (0546):   568.32   5.491     1.58     6.90

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0547) |
|   1 +  2 =  3    |           AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (0543):    14.99   1.767     1.33    18.56
     + ID2= 2 (0546):   568.32   5.491     1.58     6.90
       ===============================================
       ID = 3 (0547):   583.31   6.172     1.50     7.20

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0548) |
|   1 +  2 =  3    |           AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (0544):     1.13    .151     1.33    18.56
     + ID2= 2 (0547):   583.31   6.172     1.50     7.20
       ===============================================
       ID = 3 (0548):   584.44   6.233     1.50     7.22

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
  ****************************
  ** SIMULATION NUMBER:   2 **
  ****************************


--------------------
|    READ STORM    |    Filename: Y:\SPrimmer\Miduss Modelling\105172\Ci
|                  |              tyview Ridge\5yrSCS12hr.stm
| Ptotal= 53.41 mm |    Comments: 5 year SCS Type II 12hour design storm
--------------------
                 TIME      RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                  hrs     mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                  .25      1.34 |  3.25     2.14 |  6.25     9.61 |  9.25     1.87
                  .50      1.34 |  3.50     2.14 |  6.50     9.61 |  9.50     1.87
                  .75      1.34 |  3.75     2.14 |  6.75     4.27 |  9.75     1.87
                 1.00      1.34 |  4.00     2.14 |  7.00     4.27 | 10.00     1.87
                 1.25      1.34 |  4.25     3.20 |  7.25     3.20 | 10.25     1.07
                 1.50      1.34 |  4.50     3.20 |  7.50     3.20 | 10.50     1.07
                 1.75      1.34 |  4.75     4.27 |  7.75     3.20 | 10.75     1.07
```

Hadati Creek Watershed - Allowable

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.00 | 1.34 | 5.00 | 4.27 | 8.00 | 3.20 | 11.00 | 1.07 |
| 2.25 | 1.60 | 5.25 | 6.41 | 8.25 | 1.87 | 11.25 | 1.07 |
| 2.50 | 1.60 | 5.50 | 6.41 | 8.50 | 1.87 | 11.50 | 1.07 |
| 2.75 | 1.60 | 5.75 | 25.64 | 8.75 | 1.87 | 11.75 | 1.07 |
| 3.00 | 1.60 | 6.00 | 70.50 | 9.00 | 1.87 | 12.00 | 1.07 |

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

--------------------
| CALIB              |
| STANDHYD  (0544)  |   Area     (ha)=   1.13
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .90          .23
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .55          .55
     Length            (m)=      50.00        40.00
     Mannings n          =        .013         .300

         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 | 1.34 | 3.083 | 2.14 | 6.083 | 9.61 | 9.08 | 1.87 |
| .167 | 1.34 | 3.167 | 2.14 | 6.167 | 9.61 | 9.17 | 1.87 |
| .250 | 1.34 | 3.250 | 2.14 | 6.250 | 9.61 | 9.25 | 1.87 |
| .333 | 1.34 | 3.333 | 2.14 | 6.333 | 9.61 | 9.33 | 1.87 |
| .417 | 1.34 | 3.417 | 2.14 | 6.417 | 9.61 | 9.42 | 1.87 |
| .500 | 1.34 | 3.500 | 2.14 | 6.500 | 9.61 | 9.50 | 1.87 |
| .583 | 1.34 | 3.583 | 2.14 | 6.583 | 4.27 | 9.58 | 1.87 |
| .667 | 1.34 | 3.667 | 2.14 | 6.667 | 4.27 | 9.67 | 1.87 |
| .750 | 1.34 | 3.750 | 2.14 | 6.750 | 4.27 | 9.75 | 1.87 |
| .833 | 1.34 | 3.833 | 2.14 | 6.833 | 4.27 | 9.83 | 1.87 |
| .917 | 1.34 | 3.917 | 2.14 | 6.917 | 4.27 | 9.92 | 1.87 |
| 1.000 | 1.34 | 4.000 | 2.14 | 7.000 | 4.27 | 10.00 | 1.87 |
| 1.083 | 1.34 | 4.083 | 3.20 | 7.083 | 3.20 | 10.08 | 1.07 |
| 1.167 | 1.34 | 4.167 | 3.20 | 7.167 | 3.20 | 10.17 | 1.07 |
| 1.250 | 1.34 | 4.250 | 3.20 | 7.250 | 3.20 | 10.25 | 1.07 |
| 1.333 | 1.34 | 4.333 | 3.20 | 7.333 | 3.20 | 10.33 | 1.07 |
| 1.417 | 1.34 | 4.417 | 3.20 | 7.417 | 3.20 | 10.42 | 1.07 |
| 1.500 | 1.34 | 4.500 | 3.20 | 7.500 | 3.20 | 10.50 | 1.07 |
| 1.583 | 1.34 | 4.583 | 4.27 | 7.583 | 3.20 | 10.58 | 1.07 |
| 1.667 | 1.34 | 4.667 | 4.27 | 7.667 | 3.20 | 10.67 | 1.07 |
| 1.750 | 1.34 | 4.750 | 4.27 | 7.750 | 3.20 | 10.75 | 1.07 |
| 1.833 | 1.34 | 4.833 | 4.27 | 7.833 | 3.20 | 10.83 | 1.07 |
| 1.917 | 1.34 | 4.917 | 4.27 | 7.917 | 3.20 | 10.92 | 1.07 |
| 2.000 | 1.34 | 5.000 | 4.27 | 8.000 | 3.20 | 11.00 | 1.07 |
| 2.083 | 1.60 | 5.083 | 6.41 | 8.083 | 1.87 | 11.08 | 1.07 |
| 2.167 | 1.60 | 5.167 | 6.41 | 8.167 | 1.87 | 11.17 | 1.07 |
| 2.250 | 1.60 | 5.250 | 6.41 | 8.250 | 1.87 | 11.25 | 1.07 |
| 2.333 | 1.60 | 5.333 | 6.41 | 8.333 | 1.87 | 11.33 | 1.07 |
| 2.417 | 1.60 | 5.417 | 6.41 | 8.417 | 1.87 | 11.42 | 1.07 |
| 2.500 | 1.60 | 5.500 | 6.41 | 8.500 | 1.87 | 11.50 | 1.07 |
| 2.583 | 1.60 | 5.583 | 25.64 | 8.583 | 1.87 | 11.58 | 1.07 |
| 2.667 | 1.60 | 5.667 | 25.64 | 8.667 | 1.87 | 11.67 | 1.07 |
| 2.750 | 1.60 | 5.750 | 25.64 | 8.750 | 1.87 | 11.75 | 1.07 |
| 2.833 | 1.60 | 5.833 | 70.50 | 8.833 | 1.87 | 11.83 | 1.07 |
| 2.917 | 1.60 | 5.917 | 70.50 | 8.917 | 1.87 | 11.92 | 1.07 |
| 3.000 | 1.60 | 6.000 | 70.50 | 9.000 | 1.87 | 12.00 | 1.07 |

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     Max.Eff.Inten.(mm/hr)=      70.50         30.06
                over (min)        5.00         25.00
     Storage Coeff.  (min)=       2.32 (ii)    21.08 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
     Unit Hyd. peak  (cms)=        .30           .05
                                                             *TOTALS*
     PEAK FLOW       (cms)=        .17           .01           .178 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.25           6.00
     RUNOFF VOLUME    (mm)=      51.91          9.54          43.01
     TOTAL RAINFALL   (mm)=      53.41         53.41          53.41
     RUNOFF COEFFICIENT   =        .97           .18            .81

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0543)   |   Area    (ha)=  14.99
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.99          3.00
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=        .55           .55
     Length            (m)=     200.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      70.50         30.06
                over (min)        5.00         25.00
     Storage Coeff.  (min)=       5.33 (ii)    24.09 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
     Unit Hyd. peak  (cms)=        .21           .05
                                                             *TOTALS*
     PEAK FLOW       (cms)=       2.23           .12          2.271 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.33           6.00
     RUNOFF VOLUME    (mm)=      51.91          9.54          43.01
     TOTAL RAINFALL   (mm)=      53.41         53.41          53.41
     RUNOFF COEFFICIENT   =        .97           .18            .81

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0542)   |   Area    (ha)=  25.25
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      20.20          5.05
     Dep. Storage     (mm)=       1.50          5.00
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     Average Slope      (%)=        .55             .55
     Length             (m)=     350.00           40.00
     Mannings n           =        .013            .300

     Max.Eff.Inten.(mm/hr)=       70.50           30.06
                over (min)         5.00           30.00
     Storage Coeff.  (min)=        7.45 (ii)      26.21 (ii)
     Unit Hyd. Tpeak (min)=        5.00           30.00
     Unit Hyd. peak  (cms)=         .17             .04
                                                                  *TOTALS*
     PEAK FLOW       (cms)=        3.56             .19             3.608 (iii)
     TIME TO PEAK    (hrs)=        6.00            6.33              6.00
     RUNOFF VOLUME    (mm)=       51.91            9.54             43.01
     TOTAL RAINFALL   (mm)=       53.41           53.41             53.41
     RUNOFF COEFFICIENT   =         .97             .18               .81

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0510)   |    Area    (ha)=  16.00
|ID= 1 DT= 5.0 min   |    Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area       (ha)=      12.80          3.20
     Dep. Storage       (mm)=       1.50          5.00
     Average Slope      (%)=         .50           .20
     Length             (m)=      400.00         40.00
     Mannings n           =         .013          .300

     Max.Eff.Inten.(mm/hr)=       70.50           20.04
                over (min)        10.00           40.00
     Storage Coeff.  (min)=        8.31 (ii)      38.19 (ii)
     Unit Hyd. Tpeak (min)=       10.00           40.00
     Unit Hyd. peak  (cms)=         .13             .03
                                                                  *TOTALS*
     PEAK FLOW       (cms)=        2.06             .09             2.080 (iii)
     TIME TO PEAK    (hrs)=        6.00            6.50              6.00
     RUNOFF VOLUME    (mm)=       51.91            9.54             43.01
     TOTAL RAINFALL   (mm)=       53.41           53.41             53.41
     RUNOFF COEFFICIENT   =         .97             .18               .81

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0500)   |    Area    (ha)= 244.00
|ID= 1 DT= 5.0 min   |    Total Imp(%)=  46.00   Dir. Conn.(%)=  26.00
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                          Hadati Creek Watershed - Allowable
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     112.24        131.76
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=        .80           .80
     Length            (m)=    1275.00         40.00
     Mannings n          =        .013          .300

     Max.Eff.Inten.(mm/hr)=      70.50         78.43
                over (min)       15.00         30.00
     Storage Coeff.  (min)=      14.47 (ii)    25.89 (ii)
     Unit Hyd. Tpeak (min)=      15.00         30.00
     Unit Hyd. peak  (cms)=        .08           .04
                                                             *TOTALS*
     PEAK FLOW       (cms)=       8.08          9.34          14.467 (iii)
     TIME TO PEAK    (hrs)=       6.08          6.33            6.25
     RUNOFF VOLUME    (mm)=      51.91         14.36           24.12
     TOTAL RAINFALL   (mm)=      53.41         53.41           53.41
     RUNOFF COEFFICIENT  =         .97           .27             .45

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0540)   |   Area    (ha)=   4.63
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.70           .93
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=        .55           .55
     Length            (m)=     150.00         40.00
     Mannings n          =        .013          .300

     Max.Eff.Inten.(mm/hr)=      70.50         30.06
                over (min)        5.00         25.00
     Storage Coeff.  (min)=       4.48 (ii)    23.24 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
     Unit Hyd. peak  (cms)=        .23           .05
                                                             *TOTALS*
     PEAK FLOW       (cms)=        .70           .04            .713 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.25            6.00
     RUNOFF VOLUME    (mm)=      51.91          9.54           43.01
     TOTAL RAINFALL   (mm)=      53.41         53.41           53.41
     RUNOFF COEFFICIENT  =         .97           .18             .81

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0484)   |   Area    (ha)=  12.60
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      5.29         7.31
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      2.00         2.00
     Length            (m)=    680.00        40.00
     Mannings n           =      .013         .300

     Max.Eff.Inten.(mm/hr)=     70.50        81.70
                over (min)      10.00        20.00
     Storage Coeff.  (min)=      7.54 (ii)   16.07 (ii)
     Unit Hyd. Tpeak (min)=     10.00        20.00
     Unit Hyd. peak  (cms)=       .13          .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       .44          .75           1.055 (iii)
     TIME TO PEAK    (hrs)=      6.00         6.17            6.08
     RUNOFF VOLUME    (mm)=     51.91        14.24           22.15
     TOTAL RAINFALL   (mm)=     53.41        53.41           53.41
     RUNOFF COEFFICIENT   =       .97          .27             .41

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0565)   |   Area    (ha)=  11.10
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      4.66         6.44
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      2.00         2.00
     Length            (m)=    680.00        40.00
     Mannings n           =      .013         .300

     Max.Eff.Inten.(mm/hr)=     70.50        81.70
                over (min)      10.00        20.00
     Storage Coeff.  (min)=      7.54 (ii)   16.07 (ii)
     Unit Hyd. Tpeak (min)=     10.00        20.00
     Unit Hyd. peak  (cms)=       .13          .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       .39          .66            .929 (iii)
     TIME TO PEAK    (hrs)=      6.00         6.17            6.08
     RUNOFF VOLUME    (mm)=     51.91        14.24           22.15
     TOTAL RAINFALL   (mm)=     53.41        53.41           53.41
     RUNOFF COEFFICIENT   =       .97          .27             .41

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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| CALIB              |
| STANDHYD  (0481)   |   Area    (ha)=   5.90
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.48         3.42
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     680.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      70.50        81.70
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       7.54 (ii)   16.07 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=        .13          .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .21          .35            .494 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.17            6.08
     RUNOFF VOLUME    (mm)=      51.91        14.24           22.15
     TOTAL RAINFALL   (mm)=      53.41        53.41           53.41
     RUNOFF COEFFICIENT   =        .97          .27             .41

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0410)   |   Area    (ha)=  24.20
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.16        14.04
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     401.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      70.50        81.70
                over (min)       5.00        15.00
     Storage Coeff.  (min)=       5.49 (ii)   14.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .20          .08
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .95         1.66           2.307 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08            6.00
     RUNOFF VOLUME    (mm)=      51.91        14.24           22.15
     TOTAL RAINFALL   (mm)=      53.41        53.41           53.41
     RUNOFF COEFFICIENT   =        .97          .27             .41

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
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  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0415)   |   Area    (ha)=   4.99
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.10          2.89
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.86          2.86
     Length            (m)=     185.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      70.50         81.70
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       3.10 (ii)    10.77 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .27           .09
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .20           .39             .532 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08            6.00
     RUNOFF VOLUME    (mm)=      51.91         14.24           22.15
     TOTAL RAINFALL   (mm)=      53.41         53.41           53.41
     RUNOFF COEFFICIENT   =        .97           .27             .41

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

   (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
        Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0110)   |   Area    (ha)=  19.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.98         11.02
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     365.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      70.50         81.70
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       5.19 (ii)    13.73 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .21           .08
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .75          1.32           1.831 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08            6.00
     RUNOFF VOLUME    (mm)=      51.91         14.24           22.15
     TOTAL RAINFALL   (mm)=      53.41         53.41           53.41
     RUNOFF COEFFICIENT   =        .97           .27             .41
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      (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
           Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0101) |    Area    (ha)=  16.32
|ID= 1 DT= 5.0 min |    Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.85         9.47
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     309.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=      70.50        81.70
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       4.70 (ii)   13.23 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .22          .08
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .65         1.15           1.601 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08            6.00
     RUNOFF VOLUME    (mm)=      51.91        14.24           22.15
     TOTAL RAINFALL   (mm)=      53.41        53.41           53.41
     RUNOFF COEFFICIENT   =        .97          .27             .41

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

      (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
           Fc    (mm/hr)= 12.50     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  (0102) |    Area    (ha)=  14.32
|ID= 1 DT= 5.0 min |    Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.01         8.31
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     287.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=      70.50        81.70
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       4.49 (ii)   13.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .23          .08
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .58         1.02           1.415 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08            6.00
```

```
     RUNOFF VOLUME    (mm)=      51.91        14.24           22.15
     TOTAL RAINFALL   (mm)=      53.41        53.41           53.41
     RUNOFF COEFFICIENT   =        .97          .27             .41

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50    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  (0105)  |   Area    (ha)=  51.32
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.55        29.77
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     550.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      70.50        81.70
                over (min)       5.00        20.00
     Storage Coeff.  (min)=       6.64 (ii)    15.17 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .18          .07
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.96         3.14           3.870 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.17            6.08
     RUNOFF VOLUME    (mm)=      51.91        14.24           22.15
     TOTAL RAINFALL   (mm)=      53.41        53.41           53.41
     RUNOFF COEFFICIENT   =        .97          .27             .41

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50    Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0365)  |   Area    (ha)= 117.50
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      49.35        68.15
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     885.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      70.50        81.70
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       8.83 (ii)    17.37 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
```

```
     Unit Hyd. peak  (cms)=        .12           .06
                                                             *TOTALS*
     PEAK FLOW       (cms)=       3.95          6.70          9.481 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.17           6.08
     RUNOFF VOLUME    (mm)=      51.91         14.24          22.15
     TOTAL RAINFALL   (mm)=      53.41         53.41          53.41
     RUNOFF COEFFICIENT   =        .97           .27            .41

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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  (0355)   |   Area    (ha)=  12.30
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.17          7.13
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       1.60          1.60
     Length            (m)=     286.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      70.50         81.70
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       4.79 (ii)    13.92 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .22           .08
                                                             *TOTALS*
     PEAK FLOW       (cms)=        .49           .85          1.183 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08           6.00
     RUNOFF VOLUME    (mm)=      51.91         14.24          22.15
     TOTAL RAINFALL   (mm)=      53.41         53.41          53.41
     RUNOFF COEFFICIENT   =        .97           .27            .41

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0350)   |   Area    (ha)=  16.30
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.85          9.45
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     330.00         40.00
     Mannings n           =       .013          .300
```

```
     Max.Eff.Inten.(mm/hr)=      70.50        77.46
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       6.01 (ii)   16.75 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .19          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .63          .95         1.186 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.17          6.00
     RUNOFF VOLUME    (mm)=      51.91        14.24         22.15
     TOTAL RAINFALL   (mm)=      53.41        53.41         53.41
     RUNOFF COEFFICIENT   =        .97          .27           .41

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0360)  |    Area    (ha)=  30.00
|ID= 1 DT= 5.0 min  |    Total Imp(%)=  37.00   Dir. Conn.(%)=  19.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.10        18.90
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     447.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      70.50        75.96
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       5.86 (ii)   14.65 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .20          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.06         1.94         2.582 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=      51.91        13.31         20.64
     TOTAL RAINFALL   (mm)=      53.41        53.41         53.41
     RUNOFF COEFFICIENT   =        .97          .25           .39

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0395)  |    Area    (ha)=  51.20
|ID= 1 DT= 5.0 min  |    Total Imp(%)=  10.00   Dir. Conn.(%)=   5.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.12        46.08
```

```
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     900.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      70.50         58.39
                over (min)       10.00         20.00
     Storage Coeff.  (min)=       8.92 (ii)    18.68 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=        .12           .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .41          2.36          2.601 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.25           6.17
     RUNOFF VOLUME    (mm)=      51.91          9.64          11.75
     TOTAL RAINFALL   (mm)=      53.41         53.41          53.41
     RUNOFF COEFFICIENT   =        .97           .18            .22

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0455)  |   Area    (ha)=  12.70
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.33          7.37
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       1.71          1.71
     Length            (m)=     300.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      70.50         81.70
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       4.84 (ii)    13.78 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .22           .08
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .51           .88          1.226 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08           6.00
     RUNOFF VOLUME    (mm)=      51.91         14.24          22.15
     TOTAL RAINFALL   (mm)=      53.41         53.41          53.41
     RUNOFF COEFFICIENT   =        .97           .27            .41

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0460)   |   Area    (ha)=  36.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      15.12         20.88
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.03          2.03
     Length            (m)=     465.00         40.00
     Mannings n          =        .013          .300

     Max.Eff.Inten.(mm/hr)=      70.50         81.70
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       5.97 (ii)    14.47 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .19           .08
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.40          2.42          3.376 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08           6.00
     RUNOFF VOLUME    (mm)=      51.91         14.24          22.15
     TOTAL RAINFALL   (mm)=      53.41         53.41          53.41
     RUNOFF COEFFICIENT  =         .97           .27            .41

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0480)   |   Area    (ha)=  43.10
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      18.10         25.00
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     680.00         40.00
     Mannings n          =        .013          .300

     Max.Eff.Inten.(mm/hr)=      70.50         81.70
                over (min)       10.00         20.00
     Storage Coeff.  (min)=       7.54 (ii)    16.07 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=        .13           .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.52          2.56          3.608 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.17           6.08
     RUNOFF VOLUME    (mm)=      51.91         14.24          22.15
     TOTAL RAINFALL   (mm)=      53.41         53.41          53.41
     RUNOFF COEFFICIENT  =         .97           .27            .41

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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--------------------
| STORE HYD (0525) |   AREA      (ha)=    .00
| ID= 1 DT=****min |   QPEAK    (cms)=    .00
--------------------   TPEAK    (hrs)=    .00
                       VOLUME    (mm)=*******

--------------------------------------------------------------------------------
--------------------
| DUHYD     (0505) |
| Inlet Cap.=9.000 |
| #of Inlets=    1 |
| Total(cms)=  9.0 |      AREA      QPEAK      TPEAK     R.V.
--------------------      (ha)      (cms)      (hrs)     (mm)
    TOTAL HYD.(ID= 1): 244.00      14.47       6.25    24.12
    ==========================================================
    MAJOR SYS.(ID= 2):  33.53       5.47       6.25    24.12
    MINOR SYS.(ID= 3): 210.47       9.00       6.00    24.12

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0566) |
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK       R.V.
--------------------         (ha)     (cms)     (hrs)       (mm)
        ID1= 1 (0484):     12.60    1.055      6.08      22.15
      + ID2= 2 (0565):     11.10     .929      6.08      22.15
        =====================================================
        ID = 3 (0566):     23.70    1.984      6.08      22.15

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0420) |
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK       R.V.
--------------------         (ha)     (cms)     (hrs)       (mm)
        ID1= 1 (0410):     24.20    2.307      6.00      22.15
      + ID2= 2 (0415):      4.99     .532      6.00      22.15
        =====================================================
        ID = 3 (0420):     29.19    2.839      6.00      22.15

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0111) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          .0000       .0000   |   1.0000      1.0000
                          .0100       .0100   |  20.0000      1.1000
                          .0120       .1000   |    .0000       .0000

                                 AREA       QPEAK         TPEAK        R.V.
                                 (ha)       (cms)         (hrs)        (mm)
    INFLOW : ID= 2 (0110)      19.000       1.831          6.00        22.15
    OUTFLOW: ID= 1 (0111)      19.000        .238          6.58        22.14
```

```
              Hadati Creek Watershed - Allowable
         PEAK    FLOW   REDUCTION [Qout/Qin](%)= 12.98
         TIME SHIFT OF PEAK FLOW         (min)= 35.00
         MAXIMUM  STORAGE   USED       (ha.m.)=   .3060

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--------------------
| ADD HYD   (0103) |
|  1 +  2 =  3     |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0101):   16.32   1.601     6.00    22.15
        + ID2= 2 (0102):   14.32   1.415     6.00    22.15
          ===============================================
          ID = 3 (0103):   30.64   3.016     6.00    22.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR (0106) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           .0000       .0000   |    .5000       .4000
                           .0100       .0100   |   6.6000       .8000
                           .0260       .2300   |    .0000       .0000

                                AREA      QPEAK       TPEAK       R.V.
                                (ha)      (cms)       (hrs)       (mm)
     INFLOW : ID= 2 (0105)     51.320     3.870        6.08       22.15
     OUTFLOW: ID= 1 (0106)     51.320     2.731        6.33       22.14

         PEAK    FLOW   REDUCTION [Qout/Qin](%)= 70.57
         TIME SHIFT OF PEAK FLOW         (min)= 15.00
         MAXIMUM  STORAGE   USED       (ha.m.)=   .5507

------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0358) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                    .00            .26         .0300
                   5.50            .15     .0300 / .0150  Main Channel
                   5.51            .00         .0150      Main Channel
                  10.00            .09         .0150      Main Channel
                  14.49            .00         .0150      Main Channel
                  14.50            .15     .0150 / .0300  Main Channel
                  20.00            .26         .0300

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY   TRAV.TIME
        (m)       (m)     (cu.m.)      (cms)         (m/s)       (min)
        .01       .01    .102E+02        .0            .17      109.52
        .03       .03    .409E+02        .0            .27       68.99
        .04       .04    .920E+02        .0            .35       52.65
        .05       .05    .163E+03        .1            .42       43.46
        .07       .07    .255E+03        .1            .49       37.45
        .08       .08    .368E+03        .2            .55       33.17
        .10       .10    .499E+03        .3            .64       28.86
        .11       .11    .634E+03        .4            .74       24.66
        .12       .12    .769E+03        .6            .84       21.72
```

| | | | | | |
|---|---|---|---|---|---|
| .14 | .14 | .904E+03 | .8 | .94 | 19.54 |
| .15 | .15 | .104E+04 | 1.0 | 1.03 | 17.84 |
| .16 | .16 | .119E+04 | 1.2 | 1.11 | 16.57 |
| .18 | .18 | .135E+04 | 1.4 | 1.17 | 15.71 |
| .19 | .19 | .154E+04 | 1.7 | 1.21 | 15.10 |
| .20 | .20 | .175E+04 | 2.0 | 1.25 | 14.65 |
| .22 | .22 | .198E+04 | 2.3 | 1.28 | 14.31 |
| .23 | .23 | .223E+04 | 2.6 | 1.31 | 14.04 |
| .25 | .25 | .250E+04 | 3.0 | 1.33 | 13.82 |
| .26 | .26 | .279E+04 | 3.4 | 1.34 | 13.65 |

| | | <---- hydrograph ----> | | | <-pipe / channel-> | |
|---|---|---|---|---|---|---|
| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | MAX DEPTH (m) | MAX VEL (m/s) |
| INFLOW : ID= 2 (0355) | 12.30 | 1.18 | 6.00 | 22.15 | .16 | 1.10 |
| OUTFLOW: ID= 1 (0358) | 12.30 | .74 | 6.17 | 22.10 | .13 | .92 |

---

| ROUTE CHN (0353) |
| IN= 2---> OUT= 1 |  Routing time step (min)'= 5.00

<------ DATA FOR SECTION ( 1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | .26 | .0300 | |
| 5.50 | .15 | .0300 / .0150 | Main Channel |
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .26 | .0300 | |

<--------------------- TRAVEL TIME TABLE ---------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .01 | .01 | .929E+01 | .0 | .17 | 99.56 |
| .03 | .03 | .372E+02 | .0 | .27 | 62.72 |
| .04 | .04 | .836E+02 | .0 | .35 | 47.86 |
| .05 | .05 | .149E+03 | .1 | .42 | 39.51 |
| .07 | .07 | .232E+03 | .1 | .49 | 34.05 |
| .08 | .08 | .334E+03 | .2 | .55 | 30.15 |
| .10 | .10 | .454E+03 | .3 | .64 | 26.24 |
| .11 | .11 | .576E+03 | .4 | .74 | 22.41 |
| .12 | .12 | .699E+03 | .6 | .84 | 19.75 |
| .14 | .14 | .822E+03 | .8 | .94 | 17.76 |
| .15 | .15 | .944E+03 | 1.0 | 1.03 | 16.22 |
| .16 | .16 | .108E+04 | 1.2 | 1.11 | 15.07 |
| .18 | .18 | .123E+04 | 1.4 | 1.17 | 14.28 |
| .19 | .19 | .140E+04 | 1.7 | 1.21 | 13.72 |
| .20 | .20 | .159E+04 | 2.0 | 1.25 | 13.31 |
| .22 | .22 | .180E+04 | 2.3 | 1.28 | 13.01 |
| .23 | .23 | .203E+04 | 2.6 | 1.31 | 12.76 |
| .25 | .25 | .227E+04 | 3.0 | 1.33 | 12.57 |
| .26 | .26 | .254E+04 | 3.4 | 1.34 | 12.41 |

| | | <---- hydrograph ----> | | | <-pipe / channel-> | |
|---|---|---|---|---|---|---|
| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | MAX DEPTH (m) | MAX VEL (m/s) |
| INFLOW : ID= 2 (0350) | 16.30 | 1.19 | 6.00 | 22.15 | .16 | 1.10 |
| OUTFLOW: ID= 1 (0353) | 16.30 | .95 | 6.25 | 22.11 | .15 | 1.02 |

```
-----------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0362) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation      Manning
                    .00            .40        .0300
                   5.50            .15    .0300 / .0150  Main Channel
                   5.51            .00        .0150      Main Channel
                  10.00            .09        .0150      Main Channel
                  14.49            .00        .0150      Main Channel
                  14.50            .15    .0150 / .0300  Main Channel
                  20.00            .40        .0300

      <--------------------- TRAVEL TIME TABLE ---------------------->
        DEPTH     ELEV       VOLUME    FLOW RATE    VELOCITY    TRAV.TIME
         (m)       (m)      (cu.m.)      (cms)        (m/s)       (min)
         .02       .02     .176E+02       .0           .21        80.52
         .04       .04     .702E+02       .0           .33        50.72
         .06       .06     .158E+03       .1           .43        38.71
         .08       .08     .281E+03       .1           .52        31.95
         .09       .09     .438E+03       .3           .62        26.84
         .11       .11     .607E+03       .5           .77        21.66
         .13       .13     .776E+03       .7           .90        18.45
         .15       .15     .944E+03      1.0          1.03        16.22
         .17       .17     .116E+04      1.3          1.16        14.36
         .20       .20     .140E+04      1.8          1.27        13.13
         .22       .22     .166E+04      2.3          1.36        12.24
         .24       .24     .194E+04      2.8          1.44        11.58
         .26       .26     .225E+04      3.4          1.51        11.05
         .29       .29     .258E+04      4.0          1.57        10.63
         .31       .31     .293E+04      4.8          1.62        10.27
         .33       .33     .331E+04      5.5          1.67         9.97
         .35       .35     .371E+04      6.4          1.72         9.71
         .38       .38     .413E+04      7.3          1.76         9.48
         .40       .40     .457E+04      8.2          1.80         9.28

                                     <---- hydrograph ---->   <-pipe / channel->
                             AREA     QPEAK    TPEAK   R.V.   MAX DEPTH   MAX VEL
                             (ha)     (cms)    (hrs)   (mm)      (m)       (m/s)
     INFLOW : ID= 2 (0360)  30.00      2.58     6.00  20.64       .23       1.41
     OUTFLOW: ID= 1 (0362)  30.00      2.01     6.17  20.63       .21       1.31

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

--------------------
| ADD HYD    (0465) |
|   1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0455):      12.70    1.226      6.00     22.15
        + ID2= 2 (0460):      36.00    3.376      6.00     22.15
          ==================================================
          ID = 3 (0465):      48.70    4.602      6.00     22.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD    (0515) |
|   1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
```

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                    Hadati Creek Watershed - Allowable
--------------------        (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0510):    16.00    2.080      6.00     43.01
        + ID2= 2 (0505):   210.47    9.000      6.00     24.12
          ================================================
          ID = 3 (0515):   226.47   11.080      6.00     25.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0564) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                    .00         101.50         .0500
                   1.00         100.70         .0500
                   1.50         100.55     .0500 / .0300  Main Channel
                   2.00          99.50         .0300      Main Channel
                   3.50          99.60         .0300      Main Channel
                   4.50         100.65     .0300 / .0500  Main Channel
                   6.00         101.45         .0500

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY   TRAV.TIME
        (m)       (m)      (cu.m.)       (cms)         (m/s)      (min)
        .10     99.60     .353E+02        .0            .19      43.69
        .19     99.69     .112E+03        .1            .37      22.76
        .29     99.79     .195E+03        .2            .49      17.03
        .38     99.88     .285E+03        .3            .59      14.23
        .48     99.98     .381E+03        .5            .67      12.51
        .57    100.07     .484E+03        .7            .74      11.32
        .67    100.17     .594E+03        .9            .80      10.43
        .76    100.26     .710E+03       1.2            .86       9.74
        .86    100.36     .832E+03       1.5            .91       9.18
        .95    100.45     .961E+03       1.8            .96       8.72
       1.05    100.55     .110E+04       2.2           1.00       8.32
       1.16    100.66     .127E+04       2.7           1.07       7.80
       1.28    100.78     .148E+04       3.4           1.14       7.31
       1.39    100.89     .170E+04       4.1           1.20       6.94
       1.50    101.00     .195E+04       4.9           1.25       6.65
       1.61    101.11     .221E+04       5.8           1.30       6.41
       1.72    101.22     .250E+04       6.7           1.34       6.22
       1.84    101.34     .280E+04       7.7           1.38       6.04
       1.95    101.45     .313E+04       8.8           1.41       5.90

                                    <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK    TPEAK   R.V.   MAX DEPTH   MAX VEL
                              (ha)    (cms)    (hrs)   (mm)      (m)       (m/s)
     INFLOW : ID= 2 (0505)   33.53     5.47     6.25  24.12      1.58       1.28
     OUTFLOW: ID= 1 (0564)   33.53     4.91     6.33  24.12      1.50       1.25


--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0563) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   2.2) ------>
               Distance      Elevation       Manning
                    .00           1.00         .0350
                   2.00            .50         .0350
                   4.00            .00     .0350 / .0350  Main Channel
```

| | | | |
|---|---|---|---|
| 4.50 | .00 | .0350 | Main Channel |
| 5.00 | .00 | .0350 / .0350 | Main Channel |
| 7.00 | .50 | .0350 | |
| 9.00 | 1.00 | .0350 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .05 | .05 | .573E+01 | .0 | .67 | 2.23 |
| .11 | .11 | .135E+02 | .1 | .99 | 1.51 |
| .16 | .16 | .232E+02 | .3 | 1.23 | 1.22 |
| .21 | .21 | .349E+02 | .5 | 1.42 | 1.06 |
| .26 | .26 | .486E+02 | .9 | 1.58 | .95 |
| .32 | .32 | .643E+02 | 1.2 | 1.73 | .87 |
| .37 | .37 | .820E+02 | 1.7 | 1.86 | .81 |
| .42 | .42 | .102E+03 | 2.2 | 1.98 | .76 |
| .47 | .47 | .123E+03 | 2.9 | 2.10 | .71 |
| .53 | .53 | .147E+03 | 3.6 | 2.21 | .68 |
| .58 | .58 | .173E+03 | 4.4 | 2.31 | .65 |
| .63 | .63 | .200E+03 | 5.4 | 2.42 | .62 |
| .68 | .68 | .230E+03 | 6.4 | 2.51 | .60 |
| .74 | .74 | .262E+03 | 7.6 | 2.61 | .58 |
| .79 | .79 | .295E+03 | 8.9 | 2.70 | .56 |
| .84 | .84 | .331E+03 | 10.3 | 2.79 | .54 |
| .89 | .89 | .369E+03 | 11.8 | 2.88 | .52 |
| .95 | .95 | .408E+03 | 13.5 | 2.97 | .51 |
| 1.00 | 1.00 | .450E+03 | 15.2 | 3.05 | .49 |

| | | <---- hydrograph ----> | | | <-pipe / channel-> | |
|---|---|---|---|---|---|---|
| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | MAX DEPTH (m) | MAX VEL (m/s) |
| INFLOW : ID= 2 (0566) | 23.70 | 1.98 | 6.08 | 22.15 | .40 | 1.92 |
| OUTFLOW: ID= 1 (0563) | 23.70 | 1.97 | 6.08 | 22.15 | .39 | 1.92 |

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

| DUHYD (0425) |
|---|
| Inlet Cap.=1.980 |
| #of Inlets= 1 |
| Total(cms)= 2.0 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| TOTAL HYD.(ID= 1): | 29.19 | 2.84 | 6.00 | 22.15 |
| MAJOR SYS.(ID= 2): | 2.28 | .86 | 6.00 | 22.15 |
| MINOR SYS.(ID= 3): | 26.91 | 1.98 | 6.00 | 22.15 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

| RESERVOIR (0104) |
|---|
| IN= 2---> OUT= 1 |
| DT= 5.0 min |

| OUTFLOW (cms) | STORAGE (ha.m.) | OUTFLOW (cms) | STORAGE (ha.m.) |
|---|---|---|---|
| .0000 | .0000 | 1.0000 | .5000 |
| .0100 | .0100 | 10.0000 | .6000 |
| .0150 | .1332 | .0000 | .0000 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| INFLOW : ID= 2 (0103) | 30.640 | 3.016 | 6.00 | 22.15 |
| OUTFLOW: ID= 1 (0104) | 30.640 | .801 | 6.42 | 22.14 |

```
                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 26.57
                 TIME SHIFT OF PEAK FLOW        (min)= 25.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=   .4263

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

--------------------
| ADD HYD   (0359) |
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0358):   12.30    .744     6.17     22.10
        + ID2= 2 (0353):   16.30    .952     6.25     22.11
          ==================================================
          ID = 3 (0359):   28.60   1.680     6.25     22.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0363) |
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0359):   28.60   1.680     6.25     22.11
        + ID2= 2 (0362):   30.00   2.013     6.17     20.63
          ==================================================
          ID = 3 (0363):   58.60   3.649     6.17     21.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0470) |
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0465):   48.70   4.602     6.00     22.15
        + ID2= 2 (0425):    2.28    .859     6.00     22.15
          ==================================================
          ID = 3 (0470):   50.98   5.461     6.00     22.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| DUHYD     (0520) |
| Inlet Cap.=3.050 |
| #of Inlets=    1 |
| Total(cms)=  3.0 |     AREA      QPEAK      TPEAK     R.V.
--------------------     (ha)      (cms)      (hrs)     (mm)
     TOTAL HYD.(ID= 1): 226.47     11.08       6.00    25.46
     ===================================================
     MAJOR SYS.(ID= 2):  88.85      8.03       6.00    25.46
     MINOR SYS.(ID= 3): 137.62      3.05       5.75    25.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0561) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
```

Hadati Creek Watershed - Allowable

<------ DATA FOR SECTION (   1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | 1.00 | .0350 | |
| 2.00 | .50 | .0350 | |
| 4.00 | .00 | .0350 / .0350 | Main Channel |
| 4.50 | .00 | .0350 | Main Channel |
| 5.00 | .00 | .0350 / .0350 | Main Channel |
| 7.00 | .50 | .0350 | |
| 9.00 | 1.00 | .0350 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .05 | .05 | .319E+01 | .1 | .87 | .95 |
| .11 | .11 | .748E+01 | .2 | 1.26 | .66 |
| .16 | .16 | .129E+02 | .4 | 1.54 | .54 |
| .21 | .21 | .194E+02 | .7 | 1.75 | .48 |
| .26 | .26 | .270E+02 | 1.0 | 1.93 | .43 |
| .32 | .32 | .357E+02 | 1.5 | 2.08 | .40 |
| .37 | .37 | .456E+02 | 2.0 | 2.22 | .38 |
| .42 | .42 | .565E+02 | 2.6 | 2.34 | .36 |
| .47 | .47 | .686E+02 | 3.4 | 2.46 | .34 |
| .53 | .53 | .817E+02 | 4.2 | 2.57 | .32 |
| .58 | .58 | .960E+02 | 5.1 | 2.68 | .31 |
| .63 | .63 | .111E+03 | 6.2 | 2.78 | .30 |
| .68 | .68 | .128E+03 | 7.3 | 2.87 | .29 |
| .74 | .74 | .145E+03 | 8.6 | 2.97 | .28 |
| .79 | .79 | .164E+03 | 10.0 | 3.06 | .27 |
| .84 | .84 | .184E+03 | 11.6 | 3.14 | .27 |
| .89 | .89 | .205E+03 | 13.2 | 3.23 | .26 |
| .95 | .95 | .227E+03 | 15.0 | 3.31 | .25 |
| 1.00 | 1.00 | .250E+03 | 17.0 | 3.40 | .25 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0563) | 23.70 | 1.97 | 6.08 | 22.15 | .36 | 2.20 |
| OUTFLOW: ID= 1 (0561) | 23.70 | 1.95 | 6.08 | 22.15 | .36 | 2.20 |

---

| ADD HYD (0114) |
| 1 + 2 = 3 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0111): | 19.00 | .238 | 6.58 | 22.14 |
| + ID2= 2 (0104): | 30.64 | .801 | 6.42 | 22.14 |
| ID = 3 (0114): | 49.64 | 1.029 | 6.50 | 22.14 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| ADD HYD (0380) |
| 1 + 2 = 3 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0365): | 117.50 | 9.481 | 6.08 | 22.15 |
| + ID2= 2 (0363): | 58.60 | 3.649 | 6.17 | 21.35 |
| ID = 3 (0380): | 176.10 | 12.674 | 6.17 | 21.88 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
---------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0475) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance       Elevation        Manning
                 100.00         324.60          .0500
                 115.00         321.60          .0500
                 120.00         320.80      .0500 / .0300  Main Channel
                 122.00         320.80      .0300 / .0500  Main Channel
                 138.00         321.60          .0500
                 148.00         322.30          .0500
                 154.00         323.10          .0500
                 164.00         324.60          .0500

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
        (m)      (m)     (cu.m.)     (cms)        (m/s)       (min)
        .20   321.00    .398E+03       .8           .84        8.53
        .40   321.20    .125E+04      3.3          1.13        6.33
        .60   321.40    .255E+04      8.1          1.36        5.27
        .80   321.60    .430E+04     15.6          1.56        4.59
       1.00   321.80    .644E+04     26.8          1.79        4.01
       1.20   322.00    .892E+04     41.2          1.99        3.61
       1.40   322.20    .117E+05     59.3          2.17        3.30
       1.60   322.40    .148E+05     81.9          2.37        3.02
       1.80   322.60    .182E+05    109.1          2.58        2.78
       2.00   322.80    .218E+05    140.2          2.77        2.59
       2.20   323.00    .256E+05    175.3          2.95        2.43
       2.40   323.20    .296E+05    214.7          3.12        2.29
       2.60   323.40    .338E+05    258.6          3.29        2.18
       2.80   323.60    .382E+05    306.7          3.46        2.07
       3.00   323.80    .428E+05    359.1          3.61        1.98
       3.20   324.00    .476E+05    416.0          3.76        1.91
       3.40   324.20    .526E+05    477.5          3.91        1.83
       3.60   324.40    .578E+05    543.5          4.05        1.77
       3.80   324.60    .632E+05    614.3          4.18        1.71

                                    <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
    INFLOW : ID= 2 (0470)    50.98     5.46    6.00  22.15      .49      1.23
    OUTFLOW: ID= 1 (0475)    50.98     4.60    6.08  22.15      .45      1.19

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--------------------
| ADD HYD   (0526) |
|   1 +  2 =  3    |        AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0520):  88.85    8.030      6.00     25.46
         + ID2= 2 (0525):    .00     .001       .00   *******
           ================================================
           ID = 3 (0526):  88.85    8.030      6.00     25.46
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 -------------------
| ADD HYD   (0492) |
|   1 +  2 =  3    |          AREA     QPEAK      TPEAK      R.V.
 -------------------          (ha)     (cms)      (hrs)      (mm)
          ID1= 1 (0561):     23.70    1.953      6.08     22.15
        + ID2= 2 (0481):      5.90     .494      6.08     22.15
          ==================================================
          ID = 3 (0492):     29.60    2.447      6.08     22.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 -------------------
| ADD HYD   (0115) |
|   1 +  2 =  3    |          AREA     QPEAK      TPEAK      R.V.
 -------------------          (ha)     (cms)      (hrs)      (mm)
          ID1= 1 (0114):     49.64    1.029      6.50     22.14
        + ID2= 2 (0106):     51.32    2.731      6.33     22.14
          ==================================================
          ID = 3 (0115):    100.96    3.732      6.33     22.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 -------------------
| RESERVOIR (0390) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |        OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 -------------------         (cms)     (ha.m.)   |   (cms)     (ha.m.)
                             .0000       .0000   |   1.3100     1.6000
                             .7700       .2870   |   1.8600    23.2300
                            1.2600       .9680   |    .0000      .0000

                                    AREA      QPEAK       TPEAK        R.V.
                                    (ha)      (cms)       (hrs)        (mm)
     INFLOW : ID= 2 (0380)       176.100     12.674        6.17        21.88
     OUTFLOW: ID= 1 (0390)       176.100      1.333        7.08        21.88

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.52
                   TIME SHIFT OF PEAK FLOW        (min)= 55.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  2.5065

 ------------------------------------------------------------------------------
 -------------------
| ROUTE CHN (0527) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
 -------------------
                 <------ DATA FOR SECTION (   1.1) ------>
                 Distance      Elevation      Manning
                   100.00        313.20        .0500
                   140.00        312.40    .0500 / .0300  Main Channel
                   140.50        310.80        .0300      Main Channel
                   141.50        310.80        .0300      Main Channel
                   142.00        312.40    .0300 / .0500  Main Channel
                   160.00        313.20        .0500

        <-------------------- TRAVEL TIME TABLE --------------------->
         DEPTH    ELEV     VOLUME     FLOW RATE    VELOCITY   TRAV.TIME
          (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
          .12   310.92    .575E+02        .1          .40       18.86
          .25   311.05    .119E+03        .2          .57       13.13
```

| | | | | | |
|---|---|---|---|---|---|
| .37 | 311.17 | .185E+03 | .3 | .69 | 10.87 |
| .49 | 311.29 | .256E+03 | .4 | .78 | 9.61 |
| .62 | 311.42 | .330E+03 | .6 | .86 | 8.77 |
| .74 | 311.54 | .409E+03 | .8 | .92 | 8.17 |
| .86 | 311.66 | .492E+03 | 1.1 | .97 | 7.70 |
| .98 | 311.78 | .579E+03 | 1.3 | 1.02 | 7.32 |
| 1.11 | 311.91 | .671E+03 | 1.6 | 1.07 | 7.01 |
| 1.23 | 312.03 | .767E+03 | 1.9 | 1.11 | 6.74 |
| 1.35 | 312.15 | .867E+03 | 2.2 | 1.15 | 6.50 |
| 1.48 | 312.28 | .971E+03 | 2.6 | 1.19 | 6.29 |
| 1.60 | 312.40 | .108E+04 | 2.9 | 1.23 | 6.11 |
| 1.73 | 312.53 | .149E+04 | 3.6 | 1.10 | 6.85 |
| 1.87 | 312.67 | .248E+04 | 4.9 | .88 | 8.52 |
| 2.00 | 312.80 | .405E+04 | 6.9 | .77 | 9.74 |
| 2.13 | 312.93 | .620E+04 | 10.1 | .73 | 10.21 |
| 2.27 | 313.07 | .893E+04 | 14.6 | .74 | 10.17 |
| 2.40 | 313.20 | .122E+05 | 20.7 | .76 | 9.85 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0526) | 88.85 | 8.03 | 6.00 | 25.46 | 2.05 | .76 |
| OUTFLOW: ID= 1 (0527) | 88.85 | 6.50 | 6.42 | 25.46 | 1.97 | .79 |

---

```
| RESERVOIR (0482) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |
```

| OUTFLOW (cms) | STORAGE (ha.m.) | OUTFLOW (cms) | STORAGE (ha.m.) |
|---|---|---|---|
| .0000 | .0000 | .2910 | .3795 |
| .2590 | .0579 | .2970 | .4503 |
| .2660 | .1180 | 1.6320 | .5232 |
| .2720 | .1802 | 4.1680 | .5983 |
| .2790 | .2445 | 7.5660 | .6756 |
| .2850 | .3109 | .0000 | .0000 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| INFLOW : ID= 2 (0492) | 29.600 | 2.447 | 6.08 | 22.15 |
| OUTFLOW: ID= 1 (0482) | 29.600 | .293 | 6.83 | 22.15 |

PEAK FLOW REDUCTION [Qout/Qin](%)= 11.99
TIME SHIFT OF PEAK FLOW (min)= 45.00
MAXIMUM STORAGE USED (ha.m.)= .4082

---

```
| ADD HYD   (0400) |
|   1 +  2 =  3    |
```

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0390): | 176.10 | 1.333 | 7.08 | 21.88 |
| + ID2= 2 (0395): | 51.20 | 2.601 | 6.17 | 11.75 |
| ID = 3 (0400): | 227.30 | 3.883 | 6.17 | 19.60 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

```
| ROUTE CHN (0403) |
```

```
                            Hadati Creek Watershed - Allowable
| IN= 2---> OUT= 1 |        Routing time step (min)'=  5.00
--------------------
                  <------ DATA FOR SECTION (   1.1) ------>
                  Distance      Elevation       Manning
                    100.00        338.30         .0500
                    110.00        336.80         .0500
                    135.00        336.00         .0300      Main Channel
                    142.00        335.30         .0500
                    148.00        335.30         .0500
                    156.00        336.00         .0500
                    165.00        338.30         .0000

         <--------------------- TRAVEL TIME TABLE --------------------->
          DEPTH    ELEV       VOLUME     FLOW RATE     VELOCITY   TRAV.TIME
           (m)      (m)      (cu.m.)       (cms)        (m/s)       (min)
           .16   335.46    .231E+04          .9           .71       44.52
           .32   335.62    .563E+04         3.2          1.09       29.11
           .47   335.77    .997E+04         7.3          1.39       22.72
           .63   335.93    .153E+05        13.4          1.66       19.04
           .79   336.09    .218E+05        22.7          1.97       16.04
           .95   336.25    .299E+05        35.3          2.25       14.10
          1.11   336.41    .396E+05        51.2          2.46       12.89
          1.26   336.56    .510E+05        70.7          2.63       12.02
          1.42   336.72    .641E+05        94.1          2.79       11.35
          1.58   336.88    .787E+05       122.4          2.96       10.71
          1.74   337.04    .939E+05       155.6          3.15       10.06
          1.89   337.19    .110E+06       192.8          3.34        9.48
          2.05   337.35    .126E+06       233.9          3.53        8.97
          2.21   337.51    .143E+06       278.9          3.71        8.53
          2.37   337.67    .160E+06       327.7          3.89        8.13
          2.53   337.83    .178E+06       380.3          4.07        7.79
          2.68   337.98    .196E+06       436.7          4.23        7.48
          2.84   338.14    .215E+06       496.9          4.40        7.20
          3.00   338.30    .234E+06       561.0          4.56        6.95

                                          <---- hydrograph ---->   <-pipe / channel->
                                  AREA     QPEAK   TPEAK   R.V.    MAX DEPTH  MAX VEL
                                  (ha)     (cms)   (hrs)   (mm)       (m)      (m/s)
    INFLOW : ID= 2 (0400)       227.30     3.88    6.17   19.60       .34      1.13
    OUTFLOW: ID= 1 (0403)       227.30     2.23    6.42   19.60       .25       .89


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

--------------------
| ADD HYD   (0407) |
|   1 +  2 =  3    |          AREA     QPEAK      TPEAK      R.V.
--------------------          (ha)     (cms)      (hrs)      (mm)
          ID1= 1 (0115):     100.96    3.732       6.33     22.14
        + ID2= 2 (0403):     227.30    2.232       6.42     19.60
          ===============================================
          ID = 3 (0407):     328.26    5.857       6.33     20.38

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
--------------------
| RESERVOIR (0113) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE    |   OUTFLOW     STORAGE
--------------------      (cms)      (ha.m.)    |    (cms)      (ha.m.)
                          .0000       .0000     |   1.6000      6.4000
                         1.1000      2.9000     |   9.1000     10.0000
```

```
                    Hadati Creek Watershed - Allowable
                     1.3000     4.3000    |  12.0000     20.0000

                                   AREA       QPEAK        TPEAK        R.V.
                                   (ha)       (cms)        (hrs)        (mm)
     INFLOW : ID= 2 (0407)       328.260      5.857         6.33        20.38
     OUTFLOW: ID= 1 (0113)       328.260      1.137        12.67        20.38

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.42
                    TIME SHIFT OF PEAK FLOW          (min)=380.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=  3.1599

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

 --------------------
 | ADD HYD   (0430) |
 |   1 +  2 =  3    |           AREA     QPEAK     TPEAK      R.V.
 --------------------           (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0425):      26.91    1.980      6.00     22.15
         + ID2= 2 (0113):     328.26    1.137     12.67     20.38
           ==============================================
           ID = 3 (0430):     355.17    2.137      6.17     20.51

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 --------------------
 | ROUTE CHN (0440) |
 | IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
 --------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance       Elevation        Manning
                  100.00         325.40          .0600
                  120.00         324.60          .0600
                  126.00         323.90          .0600
                  130.00         323.00          .0600
                  140.00         322.30       .0600 / .0300   Main Channel
                  142.00         322.30       .0300 / .0600   Main Channel
                  150.00         323.90          .0600
                  155.00         324.60          .0600
                  160.00         325.40          .0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV       VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)      (cu.m.)        (cms)         (m/s)       (min)
        .16    322.46     .233E+03          .6           .96        6.96
        .33    322.63     .672E+03         2.1          1.26        5.27
        .49    322.79     .132E+04         4.9          1.48        4.51
        .65    322.95     .216E+04         9.0          1.66        4.03
        .82    323.12     .319E+04        14.9          1.87        3.57
        .98    323.28     .433E+04        22.5          2.08        3.21
       1.14    323.44     .556E+04        31.6          2.27        2.93
       1.31    323.61     .689E+04        42.3          2.45        2.72
       1.47    323.77     .833E+04        54.6          2.62        2.54
       1.63    323.93     .987E+04        68.3          2.77        2.41
       1.79    324.09     .115E+05        82.8          2.87        2.33
       1.96    324.26     .134E+05        99.2          2.96        2.25
       2.12    324.42     .154E+05       117.9          3.06        2.18
       2.28    324.58     .176E+05       138.8          3.15        2.11
       2.45    324.75     .200E+05       157.4          3.14        2.12
       2.61    324.91     .228E+05       179.6          3.15        2.11
       2.77    325.07     .259E+05       205.8          3.18        2.09
       2.94    325.24     .293E+05       236.1          3.23        2.07
       3.10    325.40     .330E+05       270.6          3.28        2.03
```

```
                                 <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH   MAX VEL
                          (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
    INFLOW : ID= 2 (0430)  355.17   2.14    6.17  20.51      .33        1.26
    OUTFLOW: ID= 1 (0440)  355.17   2.11    6.17  20.51      .32        1.26

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

--------------------
| ADD HYD   (0485) |
|  1 +  2 =  3     |       AREA    QPEAK    TPEAK    R.V.
--------------------       (ha)    (cms)    (hrs)    (mm)
         ID1= 1 (0440):  355.17   2.113    6.17    20.51
       + ID2= 2 (0475):   50.98   4.600    6.08    22.15
         ==================================================
         ID = 3 (0485):  406.15   6.641    6.08    20.72

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0490) |
|  1 +  2 =  3     |       AREA    QPEAK    TPEAK    R.V.
--------------------       (ha)    (cms)    (hrs)    (mm)
         ID1= 1 (0485):  406.15   6.641    6.08    20.72
       + ID2= 2 (0480):   43.10   3.608    6.08    22.15
         ==================================================
         ID = 3 (0490):  449.25  10.249    6.08    20.86

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0491) |
|  1 +  2 =  3     |       AREA    QPEAK    TPEAK    R.V.
--------------------       (ha)    (cms)    (hrs)    (mm)
         ID1= 1 (0482):   29.60    .293    6.83    22.15
       + ID2= 2 (0490):  449.25  10.249    6.08    20.86
         ==================================================
         ID = 3 (0491):  478.85  10.519    6.08    20.94

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (0483) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          .0000      .0000    |   7.0800     2.4860
                          .2760      .0600    |   8.1000     3.3240
                         1.2000      .3400    |   9.7980     4.6420
                         2.0400      .6182    |  10.4940     7.4397
                         2.6400     1.1630    |  11.6850    10.3000
                         3.1200     1.7070    |  12.3480    11.4000

                             AREA       QPEAK        TPEAK        R.V.
                             (ha)       (cms)        (hrs)        (mm)
    INFLOW : ID= 2 (0491)   478.850     10.519        6.08        20.94
```

```
 OUTFLOW: ID= 1 (0483)    478.850      2.914        6.67       20.94

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 27.70
                TIME SHIFT OF PEAK FLOW         (min)= 35.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  1.4753

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

 --------------------
 | ADD HYD   (0530) |
 |  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
 --------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0540):       4.63     .713     6.00    43.01
        + ID2= 2 (0483):     478.85    2.914     6.67    20.94
          ==================================================
          ID = 3 (0530):     483.48    3.009     6.50    21.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

 --------------------
 | ADD HYD   (0545) |
 |  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
 --------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0527):      88.85    6.502     6.42    25.46
        + ID2= 2 (0530):     483.48    3.009     6.50    21.15
          ==================================================
          ID = 3 (0545):     572.33    9.488     6.50    21.82

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

 --------------------
 | ADD HYD   (0546) |
 |  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
 --------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0542):      25.25    3.608     6.00    43.01
        + ID2= 2 (0545):     572.33    9.488     6.50    21.82
          ==================================================
          ID = 3 (0546):     597.58   10.369     6.00    22.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

 --------------------
 | ADD HYD   (0547) |
 |  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
 --------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0543):      14.99    2.271     6.00    43.01
        + ID2= 2 (0546):     597.58   10.369     6.00    22.71
          ==================================================
          ID = 3 (0547):     612.57   12.640     6.00    23.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

 --------------------
 | ADD HYD   (0548) |
 |  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
```

```
                           Hadati Creek Watershed - Allowable
--------------------            (ha)     (cms)     (hrs)     (mm)
          ID1= 1 (0544):        1.13      .178     6.00     43.01
        + ID2= 2 (0547):      612.57    12.640     6.00     23.21
          ==================================================
          ID = 3 (0548):      613.70    12.818     6.00     23.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
  ****************************
  ** SIMULATION NUMBER:   3 **
  ****************************


--------------------
|    READ STORM     |     Filename: Y:\SPrimmer\Miduss Modelling\105172\Ci
|                   |               tyview Ridge\25yrSCS12hr.stm
| Ptotal= 73.56 mm  |     Comments: 25 year SCS Type II 12hr design storm
--------------------
                         TIME     RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                          hrs    mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                          .25     1.84 |  3.25    2.94 |  6.25   13.24 |  9.25    2.58
                          .50     1.84 |  3.50    2.94 |  6.50   13.24 |  9.50    2.58
                          .75     1.84 |  3.75    2.94 |  6.75    5.89 |  9.75    2.58
                         1.00     1.84 |  4.00    2.94 |  7.00    5.89 | 10.00    2.58
                         1.25     1.84 |  4.25    4.41 |  7.25    4.41 | 10.25    1.47
                         1.50     1.84 |  4.50    4.41 |  7.50    4.41 | 10.50    1.47
                         1.75     1.84 |  4.75    5.89 |  7.75    4.41 | 10.75    1.47
                         2.00     1.84 |  5.00    5.89 |  8.00    4.41 | 11.00    1.47
                         2.25     2.21 |  5.25    8.83 |  8.25    2.58 | 11.25    1.47
                         2.50     2.21 |  5.50    8.83 |  8.50    2.58 | 11.50    1.47
                         2.75     2.21 |  5.75   35.31 |  8.75    2.58 | 11.75    1.47
                         3.00     2.21 |  6.00   97.10 |  9.00    2.58 | 12.00    1.47

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

--------------------
| CALIB             |
| STANDHYD  (0544)  |    Area    (ha)=    1.13
|ID= 1 DT= 5.0 min  |    Total Imp(%)=   80.00    Dir. Conn.(%)=  79.00
--------------------
                                     IMPERVIOUS     PERVIOUS (i)
     Surface Area        (ha)=           .90           .23
     Dep. Storage        (mm)=          1.50          5.00
     Average Slope        (%)=           .55           .55
     Length               (m)=         50.00         40.00
     Mannings n              =          .013          .300

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


                                 ---- TRANSFORMED HYETOGRAPH ----
                         TIME     RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                          hrs    mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                         .083     1.84 | 3.083    2.94 | 6.083   13.24 |  9.08    2.58
                         .167     1.84 | 3.167    2.94 | 6.167   13.24 |  9.17    2.58
                         .250     1.84 | 3.250    2.94 | 6.250   13.24 |  9.25    2.58
                         .333     1.84 | 3.333    2.94 | 6.333   13.24 |  9.33    2.58
                         .417     1.84 | 3.417    2.94 | 6.417   13.24 |  9.42    2.58
                         .500     1.84 | 3.500    2.94 | 6.500   13.24 |  9.50    2.58
                         .583     1.84 | 3.583    2.94 | 6.583    5.89 |  9.58    2.58
                         .667     1.84 | 3.667    2.94 | 6.667    5.89 |  9.67    2.58
                         .750     1.84 | 3.750    2.94 | 6.750    5.89 |  9.75    2.58
```

```
          .833     1.84 | 3.833     2.94 | 6.833     5.89 |  9.83     2.58
          .917     1.84 | 3.917     2.94 | 6.917     5.89 |  9.92     2.58
         1.000     1.84 | 4.000     2.94 | 7.000     5.88 | 10.00     2.58
         1.083     1.84 | 4.083     4.41 | 7.083     4.41 | 10.08     1.47
         1.167     1.84 | 4.167     4.41 | 7.167     4.41 | 10.17     1.47
         1.250     1.84 | 4.250     4.41 | 7.250     4.41 | 10.25     1.47
         1.333     1.84 | 4.333     4.41 | 7.333     4.41 | 10.33     1.47
         1.417     1.84 | 4.417     4.41 | 7.417     4.41 | 10.42     1.47
         1.500     1.84 | 4.500     4.41 | 7.500     4.41 | 10.50     1.47
         1.583     1.84 | 4.583     5.88 | 7.583     4.41 | 10.58     1.47
         1.667     1.84 | 4.667     5.89 | 7.667     4.41 | 10.67     1.47
         1.750     1.84 | 4.750     5.89 | 7.750     4.41 | 10.75     1.47
         1.833     1.84 | 4.833     5.89 | 7.833     4.41 | 10.83     1.47
         1.917     1.84 | 4.917     5.89 | 7.917     4.41 | 10.92     1.47
         2.000     1.84 | 5.000     5.89 | 8.000     4.41 | 11.00     1.47
         2.083     2.21 | 5.083     8.83 | 8.083     2.58 | 11.08     1.47
         2.167     2.21 | 5.167     8.83 | 8.167     2.58 | 11.17     1.47
         2.250     2.21 | 5.250     8.83 | 8.250     2.58 | 11.25     1.47
         2.333     2.21 | 5.333     8.83 | 8.333     2.58 | 11.33     1.47
         2.417     2.21 | 5.417     8.83 | 8.417     2.58 | 11.42     1.47
         2.500     2.21 | 5.500     8.83 | 8.500     2.58 | 11.50     1.47
         2.583     2.21 | 5.583    35.31 | 8.583     2.58 | 11.58     1.47
         2.667     2.21 | 5.667    35.31 | 8.667     2.58 | 11.67     1.47
         2.750     2.21 | 5.750    35.31 | 8.750     2.58 | 11.75     1.47
         2.833     2.21 | 5.833    97.10 | 8.833     2.58 | 11.83     1.47
         2.917     2.21 | 5.917    97.10 | 8.917     2.58 | 11.92     1.47
         3.000     2.21 | 6.000    97.10 | 9.000     2.58 | 12.00     1.47

     Max.Eff.Inten.(mm/hr)=      97.10         87.19
               over (min)         5.00         15.00
     Storage Coeff.  (min)=       2.04 (ii)    14.29 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .31           .08
                                                             *TOTALS*
     PEAK FLOW       (cms)=        .24           .03            .266 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08            6.00
     RUNOFF VOLUME    (mm)=      72.06         21.22           61.38
     TOTAL RAINFALL   (mm)=      73.56         73.56           73.56
     RUNOFF COEFFICIENT   =        .98           .29             .83

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0543)   |   Area    (ha)=  14.99
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.99          3.00
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=        .55           .55
     Length            (m)=     200.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      97.10         87.19
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                   over (min)          5.00          20.00
     Storage Coeff.   (min)=           4.69 (ii)     16.94 (ii)
     Unit Hyd. Tpeak  (min)=           5.00          20.00
     Unit Hyd. peak   (cms)=            .22            .06
                                                                 *TOTALS*
     PEAK FLOW        (cms)=           3.11            .34          3.310 (iii)
     TIME TO PEAK     (hrs)=           6.00           6.17           6.00
     RUNOFF VOLUME     (mm)=          72.06          21.22          61.38
     TOTAL RAINFALL    (mm)=          73.56          73.56          73.56
     RUNOFF COEFFICIENT   =             .98            .29            .83

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0542)   |   Area    (ha)=  25.25
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=          20.20           5.05
     Dep. Storage     (mm)=           1.50           5.00
     Average Slope     (%)=            .55            .55
     Length            (m)=         350.00          40.00
     Mannings n           =           .013           .300

     Max.Eff.Inten.(mm/hr)=          97.10          87.19
                   over (min)          5.00          20.00
     Storage Coeff.   (min)=           6.56 (ii)     18.81 (ii)
     Unit Hyd. Tpeak  (min)=           5.00          20.00
     Unit Hyd. peak   (cms)=            .18            .06
                                                                 *TOTALS*
     PEAK FLOW        (cms)=           5.02            .53          5.333 (iii)
     TIME TO PEAK     (hrs)=           6.00           6.17           6.00
     RUNOFF VOLUME     (mm)=          72.06          21.22          61.38
     TOTAL RAINFALL    (mm)=          73.56          73.56          73.56
     RUNOFF COEFFICIENT   =             .98            .29            .83

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0510)   |   Area    (ha)=  16.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=          12.80           3.20
     Dep. Storage     (mm)=           1.50           5.00
     Average Slope     (%)=            .50            .20
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     Length            (m)=     400.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      97.10        65.53
                over (min)        5.00        30.00
     Storage Coeff.  (min)=       7.31 (ii)   25.92 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .17          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.12          .25         3.209 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.33          6.00
     RUNOFF VOLUME    (mm)=      72.06        21.22         61.38
     TOTAL RAINFALL   (mm)=      73.56        73.56         73.56
     RUNOFF COEFFICIENT   =        .98          .29           .83

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0500)   |   Area    (ha)= 244.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  46.00   Dir. Conn.(%)=  26.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     112.24       131.76
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .80          .80
     Length            (m)=    1275.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      97.10       120.22
                over (min)       15.00        25.00
     Storage Coeff.  (min)=      12.73 (ii)   22.36 (ii)
     Unit Hyd. Tpeak (min)=      15.00        25.00
     Unit Hyd. peak  (cms)=        .08          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=      11.66        18.11        27.658 (iii)
     TIME TO PEAK    (hrs)=       6.08         6.25          6.17
     RUNOFF VOLUME    (mm)=      72.06        26.62         38.44
     TOTAL RAINFALL   (mm)=      73.56        73.56         73.56
     RUNOFF COEFFICIENT   =        .98          .36           .52

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0540)   |   Area    (ha)=   4.63
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
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                             IMPERVIOUS    PERVIOUS (i)
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                        Hadati Creek Watershed - Allowable
     Surface Area      (ha)=       3.70           .93
     Dep. Storage      (mm)=       1.50          5.00
     Average Slope      (%)=        .55           .55
     Length             (m)=     150.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      97.10         87.19
                over (min)        5.00         20.00
     Storage Coeff.  (min)=       3.94 (ii)    16.20 (ii)
     Unit Hyd. Tpeak (min)=       5.00         20.00
     Unit Hyd. peak  (cms)=        .24           .06
                                                             *TOTALS*
     PEAK FLOW       (cms)=        .97           .11           1.036 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.17            6.00
     RUNOFF VOLUME    (mm)=      72.06         21.22           61.38
     TOTAL RAINFALL   (mm)=      73.56         73.56           73.56
     RUNOFF COEFFICIENT   =        .98           .29             .83

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0484)   |   Area    (ha)=  12.60
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       5.29          7.31
     Dep. Storage      (mm)=       1.50          5.00
     Average Slope      (%)=       2.00          2.00
     Length             (m)=     680.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      97.10        119.40
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       6.63 (ii)    13.97 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .18           .08
                                                             *TOTALS*
     PEAK FLOW       (cms)=        .66          1.43           1.918 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08            6.00
     RUNOFF VOLUME    (mm)=      72.06         26.53           36.09
     TOTAL RAINFALL   (mm)=      73.56         73.56           73.56
     RUNOFF COEFFICIENT   =        .98           .36             .49

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
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| STANDHYD  (0565) |   Area    (ha)=  11.10
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.66         6.44
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     680.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=      97.10       119.40
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       6.63 (ii)   13.97 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .18          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .59         1.26         1.689 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=      72.06        26.53         36.09
     TOTAL RAINFALL   (mm)=      73.56        73.56         73.56
     RUNOFF COEFFICIENT   =        .98          .36           .49

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD  (0481) |   Area    (ha)=   5.90
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.48         3.42
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     680.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=      97.10       119.40
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       6.63 (ii)   13.97 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .18          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .31          .67          .898 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=      72.06        26.53         36.09
     TOTAL RAINFALL   (mm)=      73.56        73.56         73.56
     RUNOFF COEFFICIENT   =        .98          .36           .49

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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| CALIB              |
| STANDHYD  (0410)  |   Area    (ha)=  24.20
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.16         14.04
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     401.00         40.00
     Mannings n          =       .013          .300

     Max.Eff.Inten.(mm/hr)=      97.10        119.40
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       4.83 (ii)    12.17 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .22           .09
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.33          2.92          3.938 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08           6.00
     RUNOFF VOLUME    (mm)=      72.06         26.53          36.09
     TOTAL RAINFALL   (mm)=      73.56         73.56          73.56
     RUNOFF COEFFICIENT   =        .98           .36            .49

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0415)  |   Area    (ha)=   4.99
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.10          2.89
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.86          2.86
     Length            (m)=     185.00         40.00
     Mannings n          =       .013          .300

     Max.Eff.Inten.(mm/hr)=      97.10        119.40
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       2.73 (ii)     9.32 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=        .29           .12
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .28           .73          1.007 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.00           6.00
     RUNOFF VOLUME    (mm)=      72.06         26.53          36.09
     TOTAL RAINFALL   (mm)=      73.56         73.56          73.56
     RUNOFF COEFFICIENT   =        .98           .36            .49

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
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         Fc    (mm/hr)= 12.50     Cum.Inf.    (mm)=    .00
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD  (0110) |   Area    (ha)=  19.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      7.98        11.02
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      2.00         2.00
     Length            (m)=    365.00        40.00
     Mannings n          =       .013         .300

     Max.Eff.Inten.(mm/hr)=     97.10       119.40
                over (min)       5.00        15.00
     Storage Coeff.  (min)=      4.57 (ii)   11.90 (ii)
     Unit Hyd. Tpeak (min)=      5.00        15.00
     Unit Hyd. peak  (cms)=       .23          .09
                                                         *TOTALS*
     PEAK FLOW       (cms)=      1.05         2.32         3.122 (iii)
     TIME TO PEAK    (hrs)=      6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=     72.06        26.53         36.09
     TOTAL RAINFALL   (mm)=     73.56        73.56         73.56
     RUNOFF COEFFICIENT   =       .98          .36           .49

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

      (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
         Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
         Fc    (mm/hr)= 12.50     Cum.Inf.    (mm)=    .00
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD  (0101) |   Area    (ha)=  16.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      6.85         9.47
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      2.00         2.00
     Length            (m)=    309.00        40.00
     Mannings n          =       .013         .300

     Max.Eff.Inten.(mm/hr)=     97.10       119.40
                over (min)       5.00        15.00
     Storage Coeff.  (min)=      4.13 (ii)   11.47 (ii)
     Unit Hyd. Tpeak (min)=      5.00        15.00
     Unit Hyd. peak  (cms)=       .24          .09
                                                         *TOTALS*
     PEAK FLOW       (cms)=       .91         2.02         2.725 (iii)
     TIME TO PEAK    (hrs)=      6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=     72.06        26.53         36.09
     TOTAL RAINFALL   (mm)=     73.56        73.56         73.56
     RUNOFF COEFFICIENT   =       .98          .36           .49
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***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0102)   |   Area    (ha)=  14.32
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      6.01          8.31
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=      2.00          2.00
     Length            (m)=    287.00         40.00
     Mannings n          =       .013          .300

     Max.Eff.Inten.(mm/hr)=     97.10        119.40
               over (min)        5.00         15.00
     Storage Coeff.  (min)=      3.95 (ii)    11.29 (ii)
     Unit Hyd. Tpeak (min)=      5.00         15.00
     Unit Hyd. peak  (cms)=       .24           .09
                                                            *TOTALS*
     PEAK FLOW       (cms)=       .80          1.79           2.406 (iii)
     TIME TO PEAK    (hrs)=      6.00          6.08           6.00
     RUNOFF VOLUME    (mm)=     72.06         26.53          36.09
     TOTAL RAINFALL   (mm)=     73.56         73.56          73.56
     RUNOFF COEFFICIENT   =       .98           .36            .49

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0105)   |   Area    (ha)=  51.32
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     21.55         29.77
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=      2.00          2.00
     Length            (m)=    550.00         40.00
     Mannings n          =       .013          .300

     Max.Eff.Inten.(mm/hr)=     97.10        119.40
               over (min)        5.00         15.00
     Storage Coeff.  (min)=      5.84 (ii)    13.17 (ii)
     Unit Hyd. Tpeak (min)=      5.00         15.00
     Unit Hyd. peak  (cms)=       .20           .08
                                                            *TOTALS*
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    PEAK FLOW         (cms)=       2.76          5.98            8.044 (iii)
    TIME TO PEAK      (hrs)=       6.00          6.08             6.00
    RUNOFF VOLUME      (mm)=      72.06         26.53            36.09
    TOTAL RAINFALL     (mm)=      73.56         73.56            73.56
    RUNOFF COEFFICIENT    =         .98           .36              .49

      (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
           Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0365)   |   Area    (ha)= 117.50
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=      49.35        68.15
    Dep. Storage      (mm)=       1.50         5.00
    Average Slope      (%)=       2.00         2.00
    Length             (m)=     885.00        40.00
    Mannings n            =       .013         .300

    Max.Eff.Inten.(mm/hr)=       97.10       119.40
              over (min)        10.00        20.00
    Storage Coeff.  (min)=        7.77 (ii)    15.10 (ii)
    Unit Hyd. Tpeak (min)=       10.00        20.00
    Unit Hyd. peak  (cms)=         .13          .07
                                                           *TOTALS*
    PEAK FLOW         (cms)=       5.65         11.98          16.238 (iii)
    TIME TO PEAK      (hrs)=       6.00          6.17             6.08
    RUNOFF VOLUME      (mm)=      72.06         26.53            36.09
    TOTAL RAINFALL     (mm)=      73.56         73.56            73.56
    RUNOFF COEFFICIENT    =         .98           .36              .49

      (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
           Fc    (mm/hr)= 12.50     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  (0355)   |   Area    (ha)=  12.30
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=       5.17         7.13
    Dep. Storage      (mm)=       1.50         5.00
    Average Slope      (%)=       1.60         1.60
    Length             (m)=     286.00        40.00
    Mannings n            =       .013         .300

    Max.Eff.Inten.(mm/hr)=       97.10       119.40
              over (min)         5.00        15.00
    Storage Coeff.  (min)=        4.22 (ii)    12.06 (ii)
```

```
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .24          .09
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .68         1.49        2.015 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08         6.00
     RUNOFF VOLUME    (mm)=      72.06        26.53        36.09
     TOTAL RAINFALL   (mm)=      73.56        73.56        73.56
     RUNOFF COEFFICIENT   =        .98          .36          .49

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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  (0350)   |   Area    (ha)=  16.30
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.85         9.45
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     330.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      97.10       119.40
                over (min)       5.00        15.00
     Storage Coeff.  (min)=       5.29 (ii)   14.32 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .21          .08
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .89         1.82        2.485 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08         6.00
     RUNOFF VOLUME    (mm)=      72.06        26.53        36.09
     TOTAL RAINFALL   (mm)=      73.56        73.56        73.56
     RUNOFF COEFFICIENT   =        .98          .36          .49


       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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  (0360)   |   Area    (ha)=  30.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  37.00   Dir. Conn.(%)=  19.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.10        18.90
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     447.00        40.00
     Mannings n           =       .013         .300
```

```
     Max.Eff.Inten.(mm/hr)=      97.10       111.81
               over (min)         5.00        15.00
     Storage Coeff.  (min)=       5.16 (ii)   12.69 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .21          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.48         3.58         4.647 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=      72.06        25.57         34.40
     TOTAL RAINFALL   (mm)=      73.56        73.56         73.56
     RUNOFF COEFFICIENT   =        .98          .35           .47

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     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  (0395)  |   Area    (ha)=  51.20
|ID= 1 DT= 5.0 min |   Total Imp(%)=  10.00   Dir. Conn.(%)=   5.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.12        46.08
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     900.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      97.10        88.55
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       7.85 (ii)   16.11 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=        .13          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .58         5.35         5.668 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.17          6.17
     RUNOFF VOLUME    (mm)=      72.06        21.36         23.89
     TOTAL RAINFALL   (mm)=      73.56        73.56         73.56
     RUNOFF COEFFICIENT   =        .98          .29           .32

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     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)=  12.70
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
```

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--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      5.33          7.37
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=      1.71          1.71
     Length            (m)=    300.00         40.00
     Mannings n           =      .013          .300

     Max.Eff.Inten.(mm/hr)=     97.10        119.40
                over (min)       5.00         15.00
     Storage Coeff.  (min)=      4.25 (ii)    11.94 (ii)
     Unit Hyd. Tpeak (min)=      5.00         15.00
     Unit Hyd. peak  (cms)=       .23           .09
                                                            *TOTALS*
     PEAK FLOW       (cms)=       .71          1.55          2.088 (iii)
     TIME TO PEAK    (hrs)=      6.00          6.08           6.00
     RUNOFF VOLUME    (mm)=     72.06         26.53          36.09
     TOTAL RAINFALL   (mm)=     73.56         73.56          73.56
     RUNOFF COEFFICIENT   =       .98           .36            .49

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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  (0460)  |   Area    (ha)=  36.00
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     15.12         20.88
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=      2.03          2.03
     Length            (m)=    465.00         40.00
     Mannings n           =      .013          .300

     Max.Eff.Inten.(mm/hr)=     97.10        119.40
                over (min)       5.00         15.00
     Storage Coeff.  (min)=      5.26 (ii)    12.56 (ii)
     Unit Hyd. Tpeak (min)=      5.00         15.00
     Unit Hyd. peak  (cms)=       .21           .08
                                                            *TOTALS*
     PEAK FLOW       (cms)=      1.96          4.29          5.772 (iii)
     TIME TO PEAK    (hrs)=      6.00          6.08           6.00
     RUNOFF VOLUME    (mm)=     72.06         26.53          36.09
     TOTAL RAINFALL   (mm)=     73.56         73.56          73.56
     RUNOFF COEFFICIENT   =       .98           .36            .49

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0480)   |   Area     (ha)=  43.10
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     18.10        25.00
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      2.00         2.00
     Length            (m)=    680.00        40.00
     Mannings n           =      .013         .300

     Max.Eff.Inten.(mm/hr)=     97.10       119.40
                over (min)       5.00        15.00
     Storage Coeff.  (min)=      6.63 (ii)   13.97 (ii)
     Unit Hyd. Tpeak (min)=      5.00        15.00
     Unit Hyd. peak  (cms)=       .18          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=      2.27         4.88          6.559 (iii)
     TIME TO PEAK    (hrs)=      6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=     72.06        26.53         36.09
     TOTAL RAINFALL   (mm)=     73.56        73.56         73.56
     RUNOFF COEFFICIENT   =       .98          .36           .49


       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     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.

--------------------------------------------------------------------------------
--------------------
| STORE HYD (0525) |   AREA       (ha)=     .00
| ID= 1 DT=****min |   QPEAK     (cms)=     .00
--------------------   TPEAK     (hrs)=     .00
                       VOLUME     (mm)=*******

--------------------------------------------------------------------------------
--------------------
| DUHYD     (0505) |
| Inlet Cap.=9.000 |
| #of Inlets=    1 |
| Total(cms)=  9.0 |      AREA      QPEAK      TPEAK     R.V.
--------------------      (ha)      (cms)      (hrs)     (mm)
     TOTAL HYD.(ID= 1): 244.00      27.66       6.17    38.44
     ====================================================
     MAJOR SYS.(ID= 2):  81.12      18.66       6.17    38.44
     MINOR SYS.(ID= 3): 162.88       9.00       5.92    38.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0566) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0484):     12.60    1.918      6.00     36.09
        + ID2= 2 (0565):     11.10    1.689      6.00     36.09
          =================================================
          ID = 3 (0566):     23.70    3.607      6.00     36.09
```

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     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0420) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0410):     24.20    3.938      6.00     36.09
        + ID2= 2 (0415):      4.99    1.007      6.00     36.09
          ===================================================
          ID = 3 (0420):     29.19    4.945      6.00     36.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0111) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------        (cms)     (ha.m.)   |   (cms)     (ha.m.)
                             .0000      .0000   |   1.0000     1.0000
                             .0100      .0100   |  20.0000     1.1000
                             .0120      .1000   |    .0000      .0000

                                  AREA        QPEAK        TPEAK        R.V.
                                  (ha)        (cms)        (hrs)        (mm)
     INFLOW : ID= 2 (0110)      19.000        3.122         6.00       36.09
     OUTFLOW: ID= 1 (0111)      19.000         .447         6.58       36.08

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.31
                     TIME SHIFT OF PEAK FLOW        (min)= 35.00
                     MAXIMUM  STORAGE   USED       (ha.m.)=   .4965

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--------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0101):     16.32    2.725      6.00     36.09
        + ID2= 2 (0102):     14.32    2.406      6.00     36.09
          ===================================================
          ID = 3 (0103):     30.64    5.131      6.00     36.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0106) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------        (cms)     (ha.m.)   |   (cms)     (ha.m.)
                             .0000      .0000   |    .5000      .4000
                             .0100      .0100   |   6.6000      .8000
                             .0260      .2300   |    .0000      .0000

                                  AREA        QPEAK        TPEAK        R.V.
                                  (ha)        (cms)        (hrs)        (mm)
     INFLOW : ID= 2 (0105)      51.320        8.044         6.00       36.09
     OUTFLOW: ID= 1 (0106)      51.320        5.545         6.17       36.09
```

Hadati Creek Watershed - Allowable

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PEAK   FLOW   REDUCTION [Qout/Qin](%)= 68.94
TIME SHIFT OF PEAK FLOW         (min)= 10.00
MAXIMUM  STORAGE   USED       (ha.m.)=   .7419
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--------------------
| ROUTE CHN (0358) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
```

<------ DATA FOR SECTION (   1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | .26 | .0300 | |
| 5.50 | .15 | .0300 / .0150 | Main Channel |
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .26 | .0300 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .01 | .01 | .102E+02 | .0 | .17 | 109.52 |
| .03 | .03 | .409E+02 | .0 | .27 | 68.99 |
| .04 | .04 | .920E+02 | .0 | .35 | 52.65 |
| .05 | .05 | .163E+03 | .1 | .42 | 43.46 |
| .07 | .07 | .255E+03 | .1 | .49 | 37.45 |
| .08 | .08 | .368E+03 | .2 | .55 | 33.17 |
| .10 | .10 | .499E+03 | .3 | .64 | 28.86 |
| .11 | .11 | .634E+03 | .4 | .74 | 24.66 |
| .12 | .12 | .769E+03 | .6 | .84 | 21.72 |
| .14 | .14 | .904E+03 | .8 | .94 | 19.54 |
| .15 | .15 | .104E+04 | 1.0 | 1.03 | 17.84 |
| .16 | .16 | .119E+04 | 1.2 | 1.11 | 16.57 |
| .18 | .18 | .135E+04 | 1.4 | 1.17 | 15.71 |
| .19 | .19 | .154E+04 | 1.7 | 1.21 | 15.10 |
| .20 | .20 | .175E+04 | 2.0 | 1.25 | 14.65 |
| .22 | .22 | .198E+04 | 2.3 | 1.28 | 14.31 |
| .23 | .23 | .223E+04 | 2.6 | 1.31 | 14.04 |
| .25 | .25 | .250E+04 | 3.0 | 1.33 | 13.82 |
| .26 | .26 | .279E+04 | 3.4 | 1.34 | 13.65 |

| | | <---- hydrograph ----> | | | <-pipe / channel-> | |
|---|---|---|---|---|---|---|
| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | MAX DEPTH (m) | MAX VEL (m/s) |
| INFLOW : ID= 2 (0355) | 12.30 | 2.02 | 6.00 | 36.09 | .21 | 1.25 |
| OUTFLOW: ID= 1 (0358) | 12.30 | 1.38 | 6.17 | 36.04 | .17 | 1.15 |

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| ROUTE CHN (0353) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
```

<------ DATA FOR SECTION (   1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | .26 | .0300 | |
| 5.50 | .15 | .0300 / .0150 | Main Channel |
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .26 | .0300 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .01 | .01 | .929E+01 | .0 | .17 | 99.56 |
| .03 | .03 | .372E+02 | .0 | .27 | 62.72 |
| .04 | .04 | .836E+02 | .0 | .35 | 47.86 |
| .05 | .05 | .149E+03 | .1 | .42 | 39.51 |
| .07 | .07 | .232E+03 | .1 | .49 | 34.05 |
| .08 | .08 | .334E+03 | .2 | .55 | 30.15 |
| .10 | .10 | .454E+03 | .3 | .64 | 26.24 |
| .11 | .11 | .576E+03 | .4 | .74 | 22.41 |
| .12 | .12 | .699E+03 | .6 | .84 | 19.75 |
| .14 | .14 | .822E+03 | .8 | .94 | 17.76 |
| .15 | .15 | .944E+03 | 1.0 | 1.03 | 16.22 |
| .16 | .16 | .108E+04 | 1.2 | 1.11 | 15.07 |
| .18 | .18 | .123E+04 | 1.4 | 1.17 | 14.28 |
| .19 | .19 | .140E+04 | 1.7 | 1.21 | 13.72 |
| .20 | .20 | .159E+04 | 2.0 | 1.25 | 13.31 |
| .22 | .22 | .180E+04 | 2.3 | 1.28 | 13.01 |
| .23 | .23 | .203E+04 | 2.6 | 1.31 | 12.76 |
| .25 | .25 | .227E+04 | 3.0 | 1.33 | 12.57 |
| .26 | .26 | .254E+04 | 3.4 | 1.34 | 12.41 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0350) | 16.30 | 2.49 | 6.00 | 36.09 | .23 | 1.29 |
| OUTFLOW: ID= 1 (0353) | 16.30 | 1.83 | 6.17 | 36.06 | .20 | 1.23 |

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

| ROUTE CHN (0362) |
| IN= 2---> OUT= 1 |    Routing time step (min)'=  5.00

<------ DATA FOR SECTION (   1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | .40 | .0300 | |
| 5.50 | .15 | .0300 / .0150 | Main Channel |
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .40 | .0300 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .02 | .02 | .176E+02 | .0 | .21 | 80.52 |
| .04 | .04 | .702E+02 | .0 | .33 | 50.72 |
| .06 | .06 | .158E+03 | .1 | .43 | 38.71 |
| .08 | .08 | .281E+03 | .1 | .52 | 31.95 |
| .09 | .09 | .438E+03 | .3 | .62 | 26.84 |
| .11 | .11 | .607E+03 | .5 | .77 | 21.66 |
| .13 | .13 | .776E+03 | .7 | .90 | 18.45 |
| .15 | .15 | .944E+03 | 1.0 | 1.03 | 16.22 |
| .17 | .17 | .116E+04 | 1.3 | 1.16 | 14.36 |
| .20 | .20 | .140E+04 | 1.8 | 1.27 | 13.13 |
| .22 | .22 | .166E+04 | 2.3 | 1.36 | 12.24 |
| .24 | .24 | .194E+04 | 2.8 | 1.44 | 11.58 |
| .26 | .26 | .225E+04 | 3.4 | 1.51 | 11.05 |
| .29 | .29 | .258E+04 | 4.0 | 1.57 | 10.63 |

```
      .31       .31    .293E+04       4.8          1.62       10.27
      .33       .33    .331E+04       5.5          1.67        9.97
      .35       .35    .371E+04       6.4          1.72        9.71
      .38       .38    .413E+04       7.3          1.76        9.48
      .40       .40    .457E+04       8.2          1.80        9.28

                                  <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (0360)   30.00     4.65    6.00  34.40      .31      1.61
   OUTFLOW: ID= 1 (0362)   30.00     3.64    6.17  34.39      .27      1.53


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

 -------------------
 | ADD HYD   (0465) |
 |   1 +  2 =  3    |         AREA    QPEAK      TPEAK      R.V.
 -------------------          (ha)    (cms)      (hrs)      (mm)
           ID1= 1 (0455):    12.70   2.088       6.00     36.09
         + ID2= 2 (0460):    36.00   5.772       6.00     36.09
           ==============================================
           ID = 3 (0465):    48.70   7.859       6.00     36.09

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 -------------------
 | ADD HYD   (0515) |
 |   1 +  2 =  3    |         AREA    QPEAK      TPEAK      R.V.
 -------------------          (ha)    (cms)      (hrs)      (mm)
           ID1= 1 (0510):    16.00   3.209       6.00     61.38
         + ID2= 2 (0505):   162.88   9.000       5.92     38.44
           ==============================================
           ID = 3 (0515):   178.88  12.209       6.00     40.49

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 -------------------
 | ROUTE CHN (0564) |
 | IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
 -------------------
                  <------ DATA FOR SECTION (   1.1) ------>
                  Distance       Elevation       Manning
                       .00         101.50         .0500
                      1.00         100.70         .0500
                      1.50         100.55     .0500 / .0300  Main Channel
                      2.00          99.50         .0300      Main Channel
                      3.50          99.60         .0300      Main Channel
                      4.50         100.65     .0300 / .0500  Main Channel
                      6.00         101.45         .0500

      <-------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV      VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)     (cu.m.)       (cms)         (m/s)        (min)
        .10     99.60    .353E+02         .0           .19        43.69
        .19     99.69    .112E+03         .1           .37        22.76
        .29     99.79    .195E+03         .2           .49        17.03
        .38     99.88    .285E+03         .3           .59        14.23
        .48     99.98    .381E+03         .5           .67        12.51
        .57    100.07    .484E+03         .7           .74        11.32
```

| | | | | | |
|---|---|---|---|---|---|
| .67 | 100.17 | .594E+03 | .9 | .80 | 10.43 |
| .76 | 100.26 | .710E+03 | 1.2 | .86 | 9.74 |
| .86 | 100.36 | .832E+03 | 1.5 | .91 | 9.18 |
| .95 | 100.45 | .961E+03 | 1.8 | .96 | 8.72 |
| 1.05 | 100.55 | .110E+04 | 2.2 | 1.00 | 8.32 |
| 1.16 | 100.66 | .127E+04 | 2.7 | 1.07 | 7.80 |
| 1.28 | 100.78 | .148E+04 | 3.4 | 1.14 | 7.31 |
| 1.39 | 100.89 | .170E+04 | 4.1 | 1.20 | 6.94 |
| 1.50 | 101.00 | .195E+04 | 4.9 | 1.25 | 6.65 |
| 1.61 | 101.11 | .221E+04 | 5.8 | 1.30 | 6.41 |
| 1.72 | 101.22 | .250E+04 | 6.7 | 1.34 | 6.22 |
| 1.84 | 101.34 | .280E+04 | 7.7 | 1.38 | 6.04 |
| 1.95 | 101.45 | .313E+04 | 8.8 | 1.41 | 5.90 |

**** WARNING:  TRAVEL TIME TABLE EXCEEDED

| | AREA | <---- hydrograph QPEAK | TPEAK | ----> R.V. | <-pipe / channel-> MAX DEPTH | MAX VEL |
|---|---|---|---|---|---|---|
| | (ha) | (cms) | (hrs) | (mm) | (m) | (m/s) |
| INFLOW : ID= 2 (0505) | 81.12 | 18.66 | 6.17 | 38.44 | 1.72 | 1.34 |
| OUTFLOW: ID= 1 (0564) | 81.12 | 28.30 | 6.50 | 38.44 | 1.95 | 1.41 |

**** WARNING:  COMPUTATIONS FAILED TO CONVERGE.

---

| ROUTE CHN (0563) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00

<------ DATA FOR SECTION (    2.2) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | 1.00 | .0350 | |
| 2.00 | .50 | .0350 | |
| 4.00 | .00 | .0350 / .0350 | Main Channel |
| 4.50 | .00 | .0350 | Main Channel |
| 5.00 | .00 | .0350 / .0350 | Main Channel |
| 7.00 | .50 | .0350 | |
| 9.00 | 1.00 | .0350 | |

<-------------------- TRAVEL TIME TABLE -------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .05 | .05 | .573E+01 | .0 | .67 | 2.23 |
| .11 | .11 | .135E+02 | .1 | .99 | 1.51 |
| .16 | .16 | .232E+02 | .3 | 1.23 | 1.22 |
| .21 | .21 | .349E+02 | .5 | 1.42 | 1.06 |
| .26 | .26 | .486E+02 | .9 | 1.58 | .95 |
| .32 | .32 | .643E+02 | 1.2 | 1.73 | .87 |
| .37 | .37 | .820E+02 | 1.7 | 1.86 | .81 |
| .42 | .42 | .102E+03 | 2.2 | 1.98 | .76 |
| .47 | .47 | .123E+03 | 2.9 | 2.10 | .71 |
| .53 | .53 | .147E+03 | 3.6 | 2.21 | .68 |
| .58 | .58 | .173E+03 | 4.4 | 2.31 | .65 |
| .63 | .63 | .200E+03 | 5.4 | 2.42 | .62 |
| .68 | .68 | .230E+03 | 6.4 | 2.51 | .60 |
| .74 | .74 | .262E+03 | 7.6 | 2.61 | .58 |
| .79 | .79 | .295E+03 | 8.9 | 2.70 | .56 |
| .84 | .84 | .331E+03 | 10.3 | 2.79 | .54 |
| .89 | .89 | .369E+03 | 11.8 | 2.88 | .52 |
| .95 | .95 | .408E+03 | 13.5 | 2.97 | .51 |
| 1.00 | 1.00 | .450E+03 | 15.2 | 3.05 | .49 |

| AREA | <---- hydrograph QPEAK | TPEAK | ----> R.V. | <-pipe / channel-> MAX DEPTH | MAX VEL |
|---|---|---|---|---|---|

```
                              (ha)      (cms)    (hrs)   (mm)        (m)        (m/s)
INFLOW : ID= 2 (0566)        23.70       3.61     6.00  36.09        .53         2.21
OUTFLOW: ID= 1 (0563)        23.70       3.52     6.08  36.09        .52         2.20
```

---

```
--------------------
| DUHYD     (0425) |
| Inlet Cap.=1.980 |
| #of Inlets=    1 |
| Total(cms)=  2.0 |        AREA      QPEAK      TPEAK    R.V.
--------------------        (ha)      (cms)      (hrs)    (mm)
    TOTAL HYD.(ID= 1):     29.19       4.94       6.00   36.09
                           ====================================
    MAJOR SYS.(ID= 2):      7.51       2.96       6.00   36.09
    MINOR SYS.(ID= 3):     21.68       1.98       5.83   36.09

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

---

```
--------------------
| RESERVOIR (0104) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)      (ha.m.)   |   (cms)     (ha.m.)
                           .0000       .0000    |  1.0000      .5000
                           .0100       .0100    | 10.0000      .6000
                           .0150       .1332    |   .0000      .0000

                                 AREA       QPEAK       TPEAK       R.V.
                                 (ha)       (cms)       (hrs)       (mm)
    INFLOW : ID= 2 (0103)       30.640      5.131        6.00      36.09
    OUTFLOW: ID= 1 (0104)       30.640      4.550        6.17      36.08

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 88.67
                  TIME SHIFT OF PEAK FLOW        (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=   .5514
```

---

```
--------------------
| ADD HYD   (0359) |
|  1 +  2 =  3     |        AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0358):   12.30    1.378      6.17     36.04
        + ID2= 2 (0353):   16.30    1.826      6.17     36.06
          ==============================================
          ID = 3 (0359):   28.60    3.204      6.17     36.05

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

---

```
--------------------
| ADD HYD   (0363) |
|  1 +  2 =  3     |        AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0359):   28.60    3.204      6.17     36.05
        + ID2= 2 (0362):   30.00    3.642      6.17     34.39
          ==============================================
          ID = 3 (0363):   58.60    6.846      6.17     35.20

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

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

 -------------------
 | ADD HYD   (0470) |
 |  1 +  2 =  3     |           AREA     QPEAK      TPEAK      R.V.
 -------------------            (ha)     (cms)      (hrs)      (mm)
          ID1= 1 (0465):       48.70     7.859       6.00     36.09
        + ID2= 2 (0425):        7.51     2.965       6.00     36.09
          ===============================================================
          ID = 3 (0470):       56.21    10.824       6.00     36.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
 -------------------
 | DUHYD     (0520) |
 | Inlet Cap.=3.050 |
 | #of Inlets=    1 |
 | Total(cms)=  3.0 |        AREA       QPEAK       TPEAK     R.V.
 -------------------         (ha)       (cms)       (hrs)     (mm)
     TOTAL HYD.(ID= 1): 178.88       12.21        6.00    40.49
     ==============================================================
     MAJOR SYS.(ID= 2):  74.76        9.16        6.00    40.49
     MINOR SYS.(ID= 3): 104.13        3.05        5.67    40.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
 -------------------
 | ROUTE CHN (0561) |
 | IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
 -------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance       Elevation        Manning
                   .00           1.00            .0350
                  2.00            .50            .0350
                  4.00            .00         .0350 / .0350   Main Channel
                  4.50            .00            .0350        Main Channel
                  5.00            .00         .0350 / .0350   Main Channel
                  7.00            .50            .0350
                  9.00           1.00            .0350

       <-------------------- TRAVEL TIME TABLE --------------------->
        DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
         (m)       (m)     (cu.m.)       (cms)        (m/s)        (min)
         .05       .05    .319E+01         .1           .87          .95
         .11       .11    .748E+01         .2          1.26          .66
         .16       .16    .129E+02         .4          1.54          .54
         .21       .21    .194E+02         .7          1.75          .48
         .26       .26    .270E+02        1.0          1.93          .43
         .32       .32    .357E+02        1.5          2.08          .40
         .37       .37    .456E+02        2.0          2.22          .38
         .42       .42    .565E+02        2.6          2.34          .36
         .47       .47    .686E+02        3.4          2.46          .34
         .53       .53    .817E+02        4.2          2.57          .32
         .58       .58    .960E+02        5.1          2.68          .31
         .63       .63    .111E+03        6.2          2.78          .30
         .68       .68    .128E+03        7.3          2.87          .29
         .74       .74    .145E+03        8.6          2.97          .28
         .79       .79    .164E+03       10.0          3.06          .27
         .84       .84    .184E+03       11.6          3.14          .27
         .89       .89    .205E+03       13.2          3.23          .26
```

```
       .95        .95    .227E+03      15.0          3.31         .25
      1.00       1.00    .250E+03      17.0          3.40         .25

                                      <---- hydrograph ---->   <-pipe / channel->
                              AREA     QPEAK   TPEAK    R.V.   MAX DEPTH  MAX VEL
                              (ha)     (cms)   (hrs)    (mm)      (m)      (m/s)
     INFLOW : ID= 2 (0563)   23.70      3.52    6.08   36.09      .48       2.48
     OUTFLOW: ID= 1 (0561)   23.70      3.57    6.08   36.09      .49       2.49


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--------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0111):     19.00     .447      6.58      36.08
        + ID2= 2 (0104):     30.64    4.550      6.17      36.08
          ===============================================
          ID = 3 (0114):     49.64    4.877      6.17      36.08

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0380) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0365):    117.50   16.238      6.08      36.09
        + ID2= 2 (0363):     58.60    6.846      6.17      35.20
          ===============================================
          ID = 3 (0380):    176.10   22.579      6.08      35.79

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0475) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
              <------ DATA FOR SECTION (    1.1) ------>
              Distance       Elevation       Manning
                100.00         324.60          .0500
                115.00         321.60          .0500
                120.00         320.80       .0500 / .0300  Main Channel
                122.00         320.80       .0300 / .0500  Main Channel
                138.00         321.60          .0500
                148.00         322.30          .0500
                154.00         323.10          .0500
                164.00         324.60          .0500

     <-------------------- TRAVEL TIME TABLE --------------------->
      DEPTH     ELEV       VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
       (m)       (m)      (cu.m.)        (cms)        (m/s)        (min)
       .20    321.00     .398E+03          .8           .84         8.53
       .40    321.20     .125E+04         3.3          1.13         6.33
       .60    321.40     .255E+04         8.1          1.36         5.27
       .80    321.60     .430E+04        15.6          1.56         4.59
      1.00    321.80     .644E+04        26.8          1.79         4.01
      1.20    322.00     .892E+04        41.2          1.99         3.61
      1.40    322.20     .117E+05        59.3          2.17         3.30
      1.60    322.40     .148E+05        81.9          2.37         3.02
```

```
    1.80    322.60    .182E+05     109.1          2.58        2.78
    2.00    322.80    .218E+05     140.2          2.77        2.59
    2.20    323.00    .256E+05     175.3          2.95        2.43
    2.40    323.20    .296E+05     214.7          3.12        2.29
    2.60    323.40    .338E+05     258.6          3.29        2.18
    2.80    323.60    .382E+05     306.7          3.46        2.07
    3.00    323.80    .428E+05     359.1          3.61        1.98
    3.20    324.00    .476E+05     416.0          3.76        1.91
    3.40    324.20    .526E+05     477.5          3.91        1.83
    3.60    324.40    .578E+05     543.5          4.05        1.77
    3.80    324.60    .632E+05     614.3          4.18        1.71

                                    <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.    MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 2 (0470)     56.21    10.82    6.00  36.09       .67       1.43
  OUTFLOW: ID= 1 (0475)     56.21     9.54    6.08  36.09       .64       1.39


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

--------------------
| ADD HYD   (0526) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0520):     74.76    9.159      6.00     40.49
        + ID2= 2 (0525):       .00     .001       .00    *******
          ==================================================
          ID = 3 (0526):     74.76    9.159      6.00     40.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0492) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0561):     23.70    3.571      6.08     36.09
        + ID2= 2 (0481):      5.90     .898      6.00     36.09
          ==================================================
          ID = 3 (0492):     29.60    4.410      6.08     36.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0115) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0114):     49.64    4.877      6.17     36.08
        + ID2= 2 (0106):     51.32    5.545      6.17     36.09
          ==================================================
          ID = 3 (0115):    100.96   10.422      6.17     36.08

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (0390) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
```

```
--------------------      (cms)      (ha.m.)    |   (cms)     (ha.m.)
                           .0000       .0000    |  1.3100      1.6000
                           .7700       .2870    |  1.8600     23.2300
                          1.2600       .9680    |   .0000       .0000

                                   AREA      QPEAK       TPEAK       R.V.
                                   (ha)      (cms)       (hrs)       (mm)
     INFLOW : ID= 2 (0380)      176.100     22.579        6.08       35.79
     OUTFLOW: ID= 1 (0390)      176.100      1.387        7.17       35.79

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.14
                     TIME SHIFT OF PEAK FLOW        (min)= 65.00
                     MAXIMUM  STORAGE   USED       (ha.m.)=  4.6291

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0527) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance      Elevation       Manning
                  100.00        313.20          .0500
                  140.00        312.40      .0500 / .0300   Main Channel
                  140.50        310.80          .0300       Main Channel
                  141.50        310.80          .0300       Main Channel
                  142.00        312.40      .0300 / .0500   Main Channel
                  160.00        313.20          .0500

      <---------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)      (cu.m.)       (cms)         (m/s)       (min)
        .12    310.92     .575E+02        .1            .40        18.86
        .25    311.05     .119E+03        .2            .57        13.13
        .37    311.17     .185E+03        .3            .69        10.87
        .49    311.29     .256E+03        .4            .78         9.61
        .62    311.42     .330E+03        .6            .86         8.77
        .74    311.54     .409E+03        .8            .92         8.17
        .86    311.66     .492E+03       1.1            .97         7.70
        .98    311.78     .579E+03       1.3           1.02         7.32
       1.11    311.91     .671E+03       1.6           1.07         7.01
       1.23    312.03     .767E+03       1.9           1.11         6.74
       1.35    312.15     .867E+03       2.2           1.15         6.50
       1.48    312.28     .971E+03       2.6           1.19         6.29
       1.60    312.40     .108E+04       2.9           1.23         6.11
       1.73    312.53     .149E+04       3.6           1.10         6.85
       1.87    312.67     .248E+04       4.9            .88         8.52
       2.00    312.80     .405E+04       6.9            .77         9.74
       2.13    312.93     .620E+04      10.1            .73        10.21
       2.27    313.07     .893E+04      14.6            .74        10.17
       2.40    313.20     .122E+05      20.7            .76         9.85

                                      <---- hydrograph ---->  <-pipe / channel->
                                 AREA    QPEAK   TPEAK   R.V.  MAX DEPTH  MAX VEL
                                 (ha)    (cms)   (hrs)   (mm)     (m)      (m/s)
     INFLOW : ID= 2 (0526)      74.76     9.16    6.00  40.49     2.09       .74
     OUTFLOW: ID= 1 (0527)      74.76     7.08    6.17  40.49     2.01       .77


--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0482) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
```

```
                         Hadati Creek Watershed - Allowable
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           .0000      .0000   |    .2910      .3795
                           .2590      .0579   |    .2970      .4503
                           .2660      .1180   |   1.6320      .5232
                           .2720      .1802   |   4.1680      .5983
                           .2790      .2445   |   7.5660      .6756
                           .2850      .3109   |    .0000      .0000

                                 AREA      QPEAK        TPEAK        R.V.
                                 (ha)      (cms)        (hrs)        (mm)
     INFLOW : ID= 2 (0492)      29.600     4.410         6.08        36.09
     OUTFLOW: ID= 1 (0482)      29.600     2.218         6.33        36.09

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 50.29
                   TIME SHIFT OF PEAK FLOW         (min)= 15.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=   .5440

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

--------------------
| ADD HYD   (0400) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK     R.V.
--------------------          (ha)     (cms)     (hrs)     (mm)
          ID1= 1 (0390):    176.10    1.387      7.17     35.79
        + ID2= 2 (0395):     51.20    5.668      6.17     23.89
          ==================================================
          ID = 3 (0400):    227.30    6.995      6.17     33.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0403) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance      Elevation      Manning
                  100.00        338.30         .0500
                  110.00        336.80         .0500
                  135.00        336.00         .0300      Main Channel
                  142.00        335.30         .0500
                  148.00        335.30         .0500
                  156.00        336.00         .0500
                  165.00        338.30         .0000

      <-------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV       VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)      (cu.m.)        (cms)         (m/s)       (min)
        .16    335.46     .231E+04          .9            .71       44.52
        .32    335.62     .563E+04         3.2           1.09       29.11
        .47    335.77     .997E+04         7.3           1.39       22.72
        .63    335.93     .153E+05        13.4           1.66       19.04
        .79    336.09     .218E+05        22.7           1.97       16.04
        .95    336.25     .299E+05        35.3           2.25       14.10
       1.11    336.41     .396E+05        51.2           2.46       12.89
       1.26    336.56     .510E+05        70.7           2.63       12.02
       1.42    336.72     .641E+05        94.1           2.79       11.35
       1.58    336.88     .787E+05       122.4           2.96       10.71
       1.74    337.04     .939E+05       155.6           3.15       10.06
       1.89    337.19     .110E+06       192.8           3.34        9.48
       2.05    337.35     .126E+06       233.9           3.53        8.97
       2.21    337.51     .143E+06       278.9           3.71        8.53
       2.37    337.67     .160E+06       327.7           3.89        8.13
```

```
      2.53    337.83    .178E+06     380.3          4.07        7.79
      2.68    337.98    .196E+06     436.7          4.23        7.48
      2.84    338.14    .215E+06     496.9          4.40        7.20
      3.00    338.30    .234E+06     561.0          4.56        6.95

                                    <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
    INFLOW : ID= 2 (0400)   227.30     7.00    6.17  33.11       .46      1.36
    OUTFLOW: ID= 1 (0403)   227.30     4.32    6.33  33.11       .36      1.16

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

 -------------------
 | ADD HYD   (0407) |
 |   1 +  2 =  3    |          AREA    QPEAK     TPEAK     R.V.
 -------------------           (ha)    (cms)     (hrs)     (mm)
           ID1= 1 (0115):    100.96  10.422      6.17     36.08
         + ID2= 2 (0403):    227.30   4.324      6.33     33.11
           ===============================================
           ID = 3 (0407):    328.26  13.657      6.17     34.03

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 -------------------
 | RESERVOIR (0113) |
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |      OUTFLOW     STORAGE    |  OUTFLOW    STORAGE
 -------------------        (cms)     (ha.m.)    |   (cms)     (ha.m.)
                             .0000       .0000    |   1.6000     6.4000
                            1.1000      2.9000    |   9.1000    10.0000
                            1.3000      4.3000    |  12.0000    20.0000

                                  AREA      QPEAK       TPEAK       R.V.
                                  (ha)      (cms)       (hrs)       (mm)
    INFLOW : ID= 2 (0407)      328.260     13.657        6.17      34.03
    OUTFLOW: ID= 1 (0113)      328.260      1.367       15.17      34.02

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.01
                  TIME SHIFT OF PEAK FLOW        (min)=540.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  4.7719

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

 -------------------
 | ADD HYD   (0430) |
 |   1 +  2 =  3    |          AREA    QPEAK     TPEAK     R.V.
 -------------------           (ha)    (cms)     (hrs)     (mm)
           ID1= 1 (0425):     21.68   1.980      5.83     36.09
         + ID2= 2 (0113):    328.26   1.367     15.17     34.02
           ===============================================
           ID = 3 (0430):    349.94   2.494      6.25     34.15

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 -------------------
 | ROUTE CHN (0440) |
 | IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
 -------------------
               <------ DATA FOR SECTION (    1.1) ------>
```

Hadati Creek Watershed - Allowable

| Distance | Elevation | Manning | |
|---|---|---|---|
| 100.00 | 325.40 | .0600 | |
| 120.00 | 324.60 | .0600 | |
| 126.00 | 323.90 | .0600 | |
| 130.00 | 323.00 | .0600 | |
| 140.00 | 322.30 | .0600 / .0300 | Main Channel |
| 142.00 | 322.30 | .0300 / .0600 | Main Channel |
| 150.00 | 323.90 | .0600 | |
| 155.00 | 324.60 | .0600 | |
| 160.00 | 325.40 | .0600 | |

<--------------------- TRAVEL TIME TABLE ---------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .16 | 322.46 | .233E+03 | .6 | .96 | 6.96 |
| .33 | 322.63 | .672E+03 | 2.1 | 1.26 | 5.27 |
| .49 | 322.79 | .132E+04 | 4.9 | 1.48 | 4.51 |
| .65 | 322.95 | .216E+04 | 9.0 | 1.66 | 4.03 |
| .82 | 323.12 | .319E+04 | 14.9 | 1.87 | 3.57 |
| .98 | 323.28 | .433E+04 | 22.5 | 2.08 | 3.21 |
| 1.14 | 323.44 | .556E+04 | 31.6 | 2.27 | 2.93 |
| 1.31 | 323.61 | .689E+04 | 42.3 | 2.45 | 2.72 |
| 1.47 | 323.77 | .833E+04 | 54.6 | 2.62 | 2.54 |
| 1.63 | 323.93 | .987E+04 | 68.3 | 2.77 | 2.41 |
| 1.79 | 324.09 | .115E+05 | 82.8 | 2.87 | 2.33 |
| 1.96 | 324.26 | .134E+05 | 99.2 | 2.96 | 2.25 |
| 2.12 | 324.42 | .154E+05 | 117.9 | 3.06 | 2.18 |
| 2.28 | 324.58 | .176E+05 | 138.8 | 3.15 | 2.11 |
| 2.45 | 324.75 | .200E+05 | 157.4 | 3.14 | 2.12 |
| 2.61 | 324.91 | .228E+05 | 179.6 | 3.15 | 2.11 |
| 2.77 | 325.07 | .259E+05 | 205.8 | 3.18 | 2.09 |
| 2.94 | 325.24 | .293E+05 | 236.1 | 3.23 | 2.07 |
| 3.10 | 325.40 | .330E+05 | 270.6 | 3.28 | 2.03 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0430) | 349.94 | 2.49 | 6.25 | 34.15 | .35 | 1.29 |
| OUTFLOW: ID= 1 (0440) | 349.94 | 2.40 | 6.33 | 34.15 | .34 | 1.28 |

---

| ADD HYD (0485) |
| 1 + 2 = 3 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0440): | 349.94 | 2.403 | 6.33 | 34.15 |
| + ID2= 2 (0475): | 56.21 | 9.543 | 6.08 | 36.09 |
| ID = 3 (0485): | 406.15 | 11.718 | 6.08 | 34.42 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| ADD HYD (0490) |
| 1 + 2 = 3 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0485): | 406.15 | 11.718 | 6.08 | 34.42 |
| + ID2= 2 (0480): | 43.10 | 6.559 | 6.00 | 36.09 |

```
      ID = 3 (0490):   449.25  17.844     6.08    34.58

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0491) |
|  1 +  2 =  3     |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
      ID1= 1 (0482):    29.60   2.218     6.33    36.09
    + ID2= 2 (0490):   449.25  17.844     6.08    34.58
      ==================================================
      ID = 3 (0491):   478.85  18.134     6.08    34.67

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| RESERVOIR (0483) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           .0000      .0000    |   7.0800     2.4860
                           .2760      .0600    |   8.1000     3.3240
                          1.2000      .3400    |   9.7980     4.6420
                          2.0400      .6182    |  10.4940     7.4397
                          2.6400     1.1630    |  11.6850    10.3000
                          3.1200     1.7070    |  12.3480    11.4000

                               AREA      QPEAK       TPEAK       R.V.
                               (ha)      (cms)       (hrs)       (mm)
   INFLOW : ID= 2 (0491)     478.850    18.134        6.08      34.67
   OUTFLOW: ID= 1 (0483)     478.850     7.118        6.50      34.67

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 39.25
               TIME SHIFT OF PEAK FLOW        (min)= 25.00
               MAXIMUM  STORAGE   USED       (ha.m.)=  2.5265

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--------------------
| ADD HYD   (0530) |
|  1 +  2 =  3     |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
      ID1= 1 (0540):     4.63   1.036     6.00    61.38
    + ID2= 2 (0483):   478.85   7.118     6.50    34.67
      ==================================================
      ID = 3 (0530):   483.48   7.293     6.50    34.93

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0545) |
|  1 +  2 =  3     |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
      ID1= 1 (0527):    74.76   7.076     6.17    40.49
    + ID2= 2 (0530):   483.48   7.293     6.50    34.93
      ==================================================
      ID = 3 (0545):   558.24  14.150     6.50    35.67
```

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

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--------------------
| ADD HYD   (0546) |
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0542):      25.25     5.333      6.00     61.38
       + ID2= 2 (0545):     558.24    14.150      6.50     35.67
         ==================================================
         ID = 3 (0546):     583.49    15.241      6.42     36.79

NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0547) |
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0543):      14.99     3.310      6.00     61.38
       + ID2= 2 (0546):     583.49    15.241      6.42     36.79
         ==================================================
         ID = 3 (0547):     598.48    18.314      6.00     37.40

NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0548) |
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0544):       1.13      .266      6.00     61.38
       + ID2= 2 (0547):     598.48    18.314      6.00     37.40
         ==================================================
         ID = 3 (0548):     599.61    18.579      6.00     37.45

NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ****************************
 ** SIMULATION NUMBER:   4 **
 ****************************


--------------------
|    READ STORM    |    Filename: Y:\SPrimmer\Miduss Modelling\105172\Ci
|                  |              tyview Ridge\100yrSCS12hr.stm
| Ptotal= 90.18 mm |    Comments: 100 year SCS Type II 12hr design storm
--------------------
             TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
              .25    2.26 |  3.25    3.61 |  6.25   16.23 |  9.25    3.16
              .50    2.26 |  3.50    3.61 |  6.50   16.23 |  9.50    3.16
              .75    2.26 |  3.75    3.61 |  6.75    7.21 |  9.75    3.16
             1.00    2.26 |  4.00    3.61 |  7.00    7.21 | 10.00    3.16
             1.25    2.26 |  4.25    5.41 |  7.25    5.41 | 10.25    1.80
             1.50    2.26 |  4.50    5.41 |  7.50    5.41 | 10.50    1.80
             1.75    2.26 |  4.75    7.21 |  7.75    5.41 | 10.75    1.80
             2.00    2.26 |  5.00    7.21 |  8.00    5.41 | 11.00    1.80
             2.25    2.70 |  5.25   10.82 |  8.25    3.16 | 11.25    1.80
```

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.50 | 2.70 | 5.50 | 10.82 | 8.50 | 3.16 | 11.50 | 1.80 |
| 2.75 | 2.70 | 5.75 | 43.29 | 8.75 | 3.16 | 11.75 | 1.80 |
| 3.00 | 2.70 | 6.00 | 119.04 | 9.00 | 3.16 | 12.00 | 1.80 |

---

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--------------------
| CALIB              |
| STANDHYD  (0544)   |   Area     (ha)=    1.13
|ID= 1 DT= 5.0 min   |   Total Imp(%)=   80.00   Dir. Conn.(%)=  79.00
--------------------
```

| | | IMPERVIOUS | PERVIOUS (i) |
|---|---|---|---|
| Surface Area | (ha)= | .90 | .23 |
| Dep. Storage | (mm)= | 1.50 | 5.00 |
| Average Slope | (%)= | .55 | .55 |
| Length | (m)= | 50.00 | 40.00 |
| Mannings n | = | .013 | .300 |

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 | 2.26 | 3.083 | 3.61 | 6.083 | 16.23 | 9.08 | 3.16 |
| .167 | 2.26 | 3.167 | 3.61 | 6.167 | 16.23 | 9.17 | 3.16 |
| .250 | 2.26 | 3.250 | 3.61 | 6.250 | 16.23 | 9.25 | 3.16 |
| .333 | 2.26 | 3.333 | 3.61 | 6.333 | 16.23 | 9.33 | 3.16 |
| .417 | 2.26 | 3.417 | 3.61 | 6.417 | 16.23 | 9.42 | 3.16 |
| .500 | 2.26 | 3.500 | 3.61 | 6.500 | 16.23 | 9.50 | 3.16 |
| .583 | 2.26 | 3.583 | 3.61 | 6.583 | 7.21 | 9.58 | 3.16 |
| .667 | 2.26 | 3.667 | 3.61 | 6.667 | 7.21 | 9.67 | 3.16 |
| .750 | 2.26 | 3.750 | 3.61 | 6.750 | 7.21 | 9.75 | 3.16 |
| .833 | 2.26 | 3.833 | 3.61 | 6.833 | 7.21 | 9.83 | 3.16 |
| .917 | 2.26 | 3.917 | 3.61 | 6.917 | 7.21 | 9.92 | 3.16 |
| 1.000 | 2.26 | 4.000 | 3.61 | 7.000 | 7.21 | 10.00 | 3.16 |
| 1.083 | 2.26 | 4.083 | 5.41 | 7.083 | 5.41 | 10.08 | 1.80 |
| 1.167 | 2.26 | 4.167 | 5.41 | 7.167 | 5.41 | 10.17 | 1.80 |
| 1.250 | 2.26 | 4.250 | 5.41 | 7.250 | 5.41 | 10.25 | 1.80 |
| 1.333 | 2.26 | 4.333 | 5.41 | 7.333 | 5.41 | 10.33 | 1.80 |
| 1.417 | 2.26 | 4.417 | 5.41 | 7.417 | 5.41 | 10.42 | 1.80 |
| 1.500 | 2.26 | 4.500 | 5.41 | 7.500 | 5.41 | 10.50 | 1.80 |
| 1.583 | 2.26 | 4.583 | 7.21 | 7.583 | 5.41 | 10.58 | 1.80 |
| 1.667 | 2.26 | 4.667 | 7.21 | 7.667 | 5.41 | 10.67 | 1.80 |
| 1.750 | 2.26 | 4.750 | 7.21 | 7.750 | 5.41 | 10.75 | 1.80 |
| 1.833 | 2.26 | 4.833 | 7.21 | 7.833 | 5.41 | 10.83 | 1.80 |
| 1.917 | 2.26 | 4.917 | 7.21 | 7.917 | 5.41 | 10.92 | 1.80 |
| 2.000 | 2.26 | 5.000 | 7.21 | 8.000 | 5.41 | 11.00 | 1.80 |
| 2.083 | 2.70 | 5.083 | 10.82 | 8.083 | 3.16 | 11.08 | 1.80 |
| 2.167 | 2.70 | 5.167 | 10.82 | 8.167 | 3.16 | 11.17 | 1.80 |
| 2.250 | 2.70 | 5.250 | 10.82 | 8.250 | 3.16 | 11.25 | 1.80 |
| 2.333 | 2.70 | 5.333 | 10.82 | 8.333 | 3.16 | 11.33 | 1.80 |
| 2.417 | 2.70 | 5.417 | 10.82 | 8.417 | 3.16 | 11.42 | 1.80 |
| 2.500 | 2.70 | 5.500 | 10.82 | 8.500 | 3.16 | 11.50 | 1.80 |
| 2.583 | 2.70 | 5.583 | 43.29 | 8.583 | 3.16 | 11.58 | 1.80 |
| 2.667 | 2.70 | 5.667 | 43.29 | 8.667 | 3.16 | 11.67 | 1.80 |
| 2.750 | 2.70 | 5.750 | 43.29 | 8.750 | 3.16 | 11.75 | 1.80 |
| 2.833 | 2.70 | 5.833 | 119.04 | 8.833 | 3.16 | 11.83 | 1.80 |
| 2.917 | 2.70 | 5.917 | 119.04 | 8.917 | 3.16 | 11.92 | 1.80 |
| 3.000 | 2.70 | 6.000 | 119.04 | 9.000 | 3.16 | 12.00 | 1.80 |

| | | |
|---|---|---|
| Max.Eff.Inten.(mm/hr)= | 119.04 | 111.85 |
| over (min) | 5.00 | 15.00 |

```
     Storage Coeff.  (min)=       1.88 (ii)   12.97 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .32          .08
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .30          .04          .333 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=      88.68        31.37         76.65
     TOTAL RAINFALL   (mm)=      90.18        90.18         90.18
     RUNOFF COEFFICIENT   =        .98          .35           .85

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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  (0543)   |   Area    (ha)=  14.99
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.99         3.00
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .55          .55
     Length            (m)=     200.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=     119.04       111.85
                over (min)       5.00        20.00
     Storage Coeff.  (min)=       4.32 (ii)   15.41 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .23          .07
                                                           *TOTALS*
     PEAK FLOW       (cms)=       3.84          .48         4.164 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.17          6.00
     RUNOFF VOLUME    (mm)=      88.68        31.37         76.65
     TOTAL RAINFALL   (mm)=      90.18        90.18         90.18
     RUNOFF COEFFICIENT   =        .98          .35           .85

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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  (0542)   |   Area    (ha)=  25.25
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      20.20         5.05
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .55          .55
```

```
     Length            (m)=      350.00        40.00
     Mannings n           =        .013         .300

     Max.Eff.Inten.(mm/hr)=      119.04       111.85
                over (min)         5.00        20.00
     Storage Coeff.  (min)=        6.05 (ii)   17.13 (ii)
     Unit Hyd. Tpeak (min)=        5.00        20.00
     Unit Hyd. peak  (cms)=         .19          .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=        6.23          .77          6.749 (iii)
     TIME TO PEAK    (hrs)=        6.00         6.17          6.00
     RUNOFF VOLUME    (mm)=       88.68        31.37          76.65
     TOTAL RAINFALL   (mm)=       90.18        90.18          90.18
     RUNOFF COEFFICIENT   =         .98          .35            .85

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50    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  (0510)   |   Area    (ha)=  16.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       12.80         3.20
     Dep. Storage     (mm)=        1.50         5.00
     Average Slope     (%)=         .50          .20
     Length            (m)=      400.00        40.00
     Mannings n           =        .013         .300

     Max.Eff.Inten.(mm/hr)=      119.04        91.82
                over (min)         5.00        25.00
     Storage Coeff.  (min)=        6.74 (ii)   22.99 (ii)
     Unit Hyd. Tpeak (min)=        5.00        25.00
     Unit Hyd. peak  (cms)=         .18          .05
                                                            *TOTALS*
     PEAK FLOW       (cms)=        3.88          .40          4.080 (iii)
     TIME TO PEAK    (hrs)=        6.00         6.25          6.00
     RUNOFF VOLUME    (mm)=       88.68        31.37          76.65
     TOTAL RAINFALL   (mm)=       90.18        90.18          90.18
     RUNOFF COEFFICIENT   =         .98          .35            .85

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50    Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0500)   |   Area    (ha)= 244.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  46.00   Dir. Conn.(%)=  26.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
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                  Hadati Creek Watershed - Allowable
Surface Area     (ha)=     112.24        131.76
Dep. Storage     (mm)=       1.50          5.00
Average Slope     (%)=        .80           .80
Length            (m)=    1275.00         40.00
Mannings n           =       .013          .300

Max.Eff.Inten.(mm/hr)=     119.04        150.55
           over (min)       10.00         25.00
Storage Coeff.  (min)=      11.73 (ii)    20.53 (ii)
Unit Hyd. Tpeak (min)=      10.00         25.00
Unit Hyd. peak  (cms)=        .10           .05
                                                        *TOTALS*
PEAK FLOW       (cms)=      15.54         24.76          34.262 (iii)
TIME TO PEAK    (hrs)=       6.00          6.25            6.17
RUNOFF VOLUME    (mm)=      88.68         36.25           49.88
TOTAL RAINFALL   (mm)=      90.18         90.18           90.18
RUNOFF COEFFICIENT   =        .98           .40             .55


  (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
       Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
       Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
      THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0540)  |   Area    (ha)=   4.63
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
Surface Area     (ha)=       3.70           .93
Dep. Storage     (mm)=       1.50          5.00
Average Slope     (%)=        .55           .55
Length            (m)=     150.00         40.00
Mannings n           =       .013          .300

Max.Eff.Inten.(mm/hr)=     119.04        111.85
           over (min)        5.00         15.00
Storage Coeff.  (min)=       3.64 (ii)    14.73 (ii)
Unit Hyd. Tpeak (min)=       5.00         15.00
Unit Hyd. peak  (cms)=        .25           .08
                                                        *TOTALS*
PEAK FLOW       (cms)=       1.20           .16           1.339 (iii)
TIME TO PEAK    (hrs)=       6.00          6.08            6.00
RUNOFF VOLUME    (mm)=      88.68         31.37           76.65
TOTAL RAINFALL   (mm)=      90.18         90.18           90.18
RUNOFF COEFFICIENT   =        .98           .35             .85

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

  (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
       Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
       Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
      THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
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| STANDHYD  (0484) |   Area    (ha)=  12.60
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        5.29         7.31
     Dep. Storage     (mm)=        1.50         5.00
     Average Slope     (%)=        2.00         2.00
     Length            (m)=      680.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=      119.04       149.56
                over (min)        5.00        15.00
     Storage Coeff.  (min)=        6.11 (ii)   12.82 (ii)
     Unit Hyd. Tpeak (min)=        5.00        15.00
     Unit Hyd. peak  (cms)=         .19          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .83         1.92        2.550 (iii)
     TIME TO PEAK    (hrs)=        6.00         6.08         6.00
     RUNOFF VOLUME    (mm)=       88.68        36.13        47.17
     TOTAL RAINFALL   (mm)=       90.18        90.18        90.18
     RUNOFF COEFFICIENT   =         .98          .40          .52

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD  (0565) |   Area    (ha)=  11.10
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        4.66         6.44
     Dep. Storage     (mm)=        1.50         5.00
     Average Slope     (%)=        2.00         2.00
     Length            (m)=      680.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=      119.04       149.56
                over (min)        5.00        15.00
     Storage Coeff.  (min)=        6.11 (ii)   12.82 (ii)
     Unit Hyd. Tpeak (min)=        5.00        15.00
     Unit Hyd. peak  (cms)=         .19          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .73         1.69        2.246 (iii)
     TIME TO PEAK    (hrs)=        6.00         6.08         6.00
     RUNOFF VOLUME    (mm)=       88.68        36.13        47.17
     TOTAL RAINFALL   (mm)=       90.18        90.18        90.18
     RUNOFF COEFFICIENT   =         .98          .40          .52

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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| CALIB              |
| STANDHYD  (0481)   |   Area    (ha)=    5.90
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        2.48        3.42
     Dep. Storage     (mm)=        1.50        5.00
     Average Slope     (%)=        2.00        2.00
     Length            (m)=      680.00       40.00
     Mannings n          =         .013        .300

     Max.Eff.Inten.(mm/hr)=      119.04      149.56
               over (min)          5.00       15.00
     Storage Coeff.  (min)=        6.11 (ii)  12.82 (ii)
     Unit Hyd. Tpeak (min)=        5.00       15.00
     Unit Hyd. peak  (cms)=         .19         .08
                                                         *TOTALS*
     PEAK FLOW       (cms)=         .39         .90        1.194 (iii)
     TIME TO PEAK    (hrs)=        6.00        6.08         6.00
     RUNOFF VOLUME    (mm)=       88.68       36.13        47.17
     TOTAL RAINFALL   (mm)=       90.18       90.18        90.18
     RUNOFF COEFFICIENT  =          .98         .40          .52


       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0410)   |   Area    (ha)=   24.20
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       10.16       14.04
     Dep. Storage     (mm)=        1.50        5.00
     Average Slope     (%)=        2.00        2.00
     Length            (m)=      401.00       40.00
     Mannings n          =         .013        .300

     Max.Eff.Inten.(mm/hr)=      119.04      149.56
               over (min)          5.00       15.00
     Storage Coeff.  (min)=        4.45 (ii)  11.16 (ii)
     Unit Hyd. Tpeak (min)=        5.00       15.00
     Unit Hyd. peak  (cms)=         .23         .09
                                                         *TOTALS*
     PEAK FLOW       (cms)=        1.64        3.90        5.204 (iii)
     TIME TO PEAK    (hrs)=        6.00        6.08         6.00
     RUNOFF VOLUME    (mm)=       88.68       36.13        47.17
     TOTAL RAINFALL   (mm)=       90.18       90.18        90.18
     RUNOFF COEFFICIENT  =          .98         .40          .52

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
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     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0415)   |   Area    (ha)=   4.99
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       2.10          2.89
     Dep. Storage      (mm)=       1.50          5.00
     Average Slope      (%)=       2.86          2.86
     Length             (m)=     185.00         40.00
     Mannings n            =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        149.56
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       2.51 (ii)     8.54 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=        .29           .12
                                                              *TOTALS*
     PEAK FLOW        (cms)=        .35           .96          1.304 (iii)
     TIME TO PEAK     (hrs)=       6.00          6.00           6.00
     RUNOFF VOLUME     (mm)=      88.68         36.13          47.17
     TOTAL RAINFALL    (mm)=      90.18         90.18          90.18
     RUNOFF COEFFICIENT   =        .98           .40            .52

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

      (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
           Fc   (mm/hr)= 12.50      Cum.Inf.   (mm)=   .00
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0110)   |   Area    (ha)=  19.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       7.98         11.02
     Dep. Storage      (mm)=       1.50          5.00
     Average Slope      (%)=       2.00          2.00
     Length             (m)=     365.00         40.00
     Mannings n            =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        149.56
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       4.21 (ii)    10.91 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .24           .09
                                                              *TOTALS*
     PEAK FLOW        (cms)=       1.30          3.09          4.123 (iii)
     TIME TO PEAK     (hrs)=       6.00          6.08           6.00
     RUNOFF VOLUME     (mm)=      88.68         36.13          47.17
     TOTAL RAINFALL    (mm)=      90.18         90.18          90.18
     RUNOFF COEFFICIENT   =        .98           .40            .52
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***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0101)  |   Area    (ha)=  16.32
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.85         9.47
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     309.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=     119.04       149.56
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.81 (ii)   10.51 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .25          .09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.12         2.69         3.593 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=      88.68        36.13         47.17
     TOTAL RAINFALL   (mm)=      90.18        90.18         90.18
     RUNOFF COEFFICIENT   =        .98          .40           .52

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0102)  |   Area    (ha)=  14.32
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.01         8.31
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     287.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=     119.04       149.56
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.64 (ii)   10.35 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .25          .09
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .98         2.37         3.171 (iii)
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     TIME TO PEAK     (hrs)=       6.00          6.08            6.00
     RUNOFF VOLUME     (mm)=      88.68         36.13           47.17
     TOTAL RAINFALL    (mm)=      90.18         90.18           90.18
     RUNOFF COEFFICIENT    =        .98           .40             .52

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0105)  |   Area    (ha)=  51.32
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.55         29.77
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     550.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        149.56
                over (min)       5.00         15.00
     Storage Coeff.  (min)=       5.38 (ii)    12.09 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .21           .09
                                                             *TOTALS*
     PEAK FLOW       (cms)=       3.42          8.01          10.668 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08            6.00
     RUNOFF VOLUME    (mm)=      88.68         36.13           47.17
     TOTAL RAINFALL   (mm)=      90.18         90.18           90.18
     RUNOFF COEFFICIENT   =        .98           .40             .52

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0365)  |   Area    (ha)= 117.50
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      49.35         68.15
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     885.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        149.56
                over (min)       5.00         15.00
     Storage Coeff.  (min)=       7.16 (ii)    13.86 (ii)
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     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .17           .08
                                                              *TOTALS*
     PEAK FLOW       (cms)=       7.49         17.25           22.881 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08             6.00
     RUNOFF VOLUME    (mm)=      88.68         36.13            47.17
     TOTAL RAINFALL   (mm)=      90.18         90.18            90.18
     RUNOFF COEFFICIENT   =        .98           .40              .52

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0355)   |   Area    (ha)=  12.30
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.17          7.13
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       1.60          1.60
     Length            (m)=     286.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        149.56
                over (min)       5.00         15.00
     Storage Coeff.  (min)=       3.89 (ii)    11.05 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .25           .09
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .84          1.99            2.661 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08             6.00
     RUNOFF VOLUME    (mm)=      88.68         36.13            47.17
     TOTAL RAINFALL   (mm)=      90.18         90.18            90.18
     RUNOFF COEFFICIENT   =        .98           .40              .52

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0350)   |   Area    (ha)=  16.30
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.85          9.45
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     330.00         40.00
     Mannings n           =       .013          .300
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     Max.Eff.Inten.(mm/hr)=     119.04        149.56
               over (min)         5.00         15.00
     Storage Coeff.  (min)=       4.88 (ii)    13.13 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .22           .08
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.10          2.45          3.299 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08          6.00
     RUNOFF VOLUME    (mm)=      88.68         36.13         47.17
     TOTAL RAINFALL   (mm)=      90.18         90.18         90.18
     RUNOFF COEFFICIENT   =        .98           .40           .52

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0360)   |   Area    (ha)=  30.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  37.00   Dir. Conn.(%)=  19.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.10         18.90
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     447.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        140.44
               over (min)         5.00         15.00
     Storage Coeff.  (min)=       4.75 (ii)    11.63 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .22           .09
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.83          4.81          6.183 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08          6.00
     RUNOFF VOLUME    (mm)=      88.68         35.04         45.23
     TOTAL RAINFALL   (mm)=      90.18         90.18         90.18
     RUNOFF COEFFICIENT   =        .98           .39           .50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     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  (0395)   |   Area    (ha)=  51.20
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  10.00   Dir. Conn.(%)=   5.00
```

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--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.12        46.08
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     900.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=     119.04       112.64
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       7.23 (ii)   14.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .17          .08
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .78         8.19          8.631 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08           6.08
     RUNOFF VOLUME    (mm)=      88.68        31.49          34.35
     TOTAL RAINFALL   (mm)=      90.18        90.18          90.18
     RUNOFF COEFFICIENT   =        .98          .35            .38

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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)=  12.70
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.33         7.37
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.71         1.71
     Length            (m)=     300.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=     119.04       149.56
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.92 (ii)   10.95 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .24          .09
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .87         2.06          2.756 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08           6.00
     RUNOFF VOLUME    (mm)=      88.68        36.13          47.17
     TOTAL RAINFALL   (mm)=      90.18        90.18          90.18
     RUNOFF COEFFICIENT   =        .98          .40            .52

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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--------------------
| CALIB              |
| STANDHYD  (0460)   |   Area    (ha)=  36.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     15.12         20.88
     Dep. Storage      (mm)=      1.50          5.00
     Average Slope      (%)=      2.03          2.03
     Length             (m)=    465.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        149.56
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       4.84 (ii)    11.52 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .22           .09
                                                               *TOTALS*
     PEAK FLOW       (cms)=       2.43          5.73             7.639 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08             6.00
     RUNOFF VOLUME    (mm)=      88.68         36.13            47.17
     TOTAL RAINFALL   (mm)=      90.18         90.18            90.18
     RUNOFF COEFFICIENT  =         .98           .40              .52

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0480)   |   Area    (ha)=  43.10
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     18.10         25.00
     Dep. Storage      (mm)=      1.50          5.00
     Average Slope      (%)=      2.00          2.00
     Length             (m)=    680.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        149.56
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       6.11 (ii)    12.82 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .19           .08
                                                               *TOTALS*
     PEAK FLOW       (cms)=       2.82          6.56             8.721 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08             6.00
     RUNOFF VOLUME    (mm)=      88.68         36.13            47.17
     TOTAL RAINFALL   (mm)=      90.18         90.18            90.18
     RUNOFF COEFFICIENT  =         .98           .40              .52

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
```

```
          Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| STORE HYD (0525) |   AREA       (ha)=    .00
| ID= 1 DT=****min |   QPEAK     (cms)=    .00
--------------------   TPEAK     (hrs)=    .00
                       VOLUME     (mm)=*******

-------------------------------------------------------------------------------
--------------------
| DUHYD     (0505) |
| Inlet Cap.=9.000 |
| #of Inlets=    1 |
| Total(cms)=  9.0 |      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
    TOTAL HYD.(ID= 1): 244.00      34.26      6.17   49.88
    ======================================================
    MAJOR SYS.(ID= 2): 102.03      25.26      6.17   49.88
    MINOR SYS.(ID= 3): 141.97       9.00      5.83   49.88

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD    (0566) |
|   1 +  2 =  3     |        AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0484):     12.60   2.550     6.00    47.17
       + ID2= 2 (0565):     11.10   2.246     6.00    47.17
         ===================================================
         ID = 3 (0566):     23.70   4.796     6.00    47.17

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD    (0420) |
|   1 +  2 =  3     |        AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0410):     24.20   5.204     6.00    47.17
       + ID2= 2 (0415):      4.99   1.304     6.00    47.17
         ===================================================
         ID = 3 (0420):     29.19   6.509     6.00    47.17

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (0111) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           .0000       .0000   |   1.0000     1.0000
                           .0100       .0100   |  20.0000     1.1000
                           .0120       .1000   |    .0000      .0000

                                 AREA       QPEAK        TPEAK        R.V.
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                              Hadati Creek Watershed - Allowable
                                (ha)        (cms)        (hrs)        (mm)
     INFLOW : ID= 2 (0110)     19.000       4.123         6.00        47.17
     OUTFLOW: ID= 1 (0111)     19.000        .613         6.58        47.16

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.87
                    TIME SHIFT OF PEAK FLOW        (min)= 35.00
                    MAXIMUM  STORAGE   USED      (ha.m.)=   .6478

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--------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0101):    16.32   3.593      6.00    47.17
        + ID2= 2 (0102):    14.32   3.171      6.00    47.17
          ==================================================
          ID = 3 (0103):    30.64   6.763      6.00    47.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0106) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------       (cms)      (ha.m.)    |   (cms)      (ha.m.)
                           .0000        .0000    |    .5000        .4000
                           .0100        .0100    |   6.6000        .8000
                           .0260        .2300    |    .0000        .0000
     **** WARNING : STORAGE-DISCHARGE TABLE WAS EXCEEDED.

                                AREA       QPEAK        TPEAK        R.V.
                                (ha)       (cms)        (hrs)        (mm)
     INFLOW : ID= 2 (0105)     51.320     10.668         6.00        47.17
     OUTFLOW: ID= 1 (0106)     51.320      7.689         6.17        47.16

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 72.08
                    TIME SHIFT OF PEAK FLOW        (min)= 10.00
                    MAXIMUM  STORAGE   USED      (ha.m.)=   .8782

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--------------------
| ROUTE CHN (0358) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                    .00           .26          .0300
                   5.50           .15      .0300 / .0150  Main Channel
                   5.51           .00          .0150      Main Channel
                  10.00           .09          .0150      Main Channel
                  14.49           .00          .0150      Main Channel
                  14.50           .15      .0150 / .0300  Main Channel
                  20.00           .26          .0300

      <-------------------- TRAVEL TIME TABLE -------------------->
       DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)      (cu.m.)       (cms)         (m/s)       (min)
        .01       .01     .102E+02        .0            .17       109.52
        .03       .03     .409E+02        .0            .27        68.99
        .04       .04     .920E+02        .0            .35        52.65
        .05       .05     .163E+03        .1            .42        43.46
```

| | | | | | |
|---|---|---|---|---|---|
| .07 | .07 | .255E+03 | .1 | .49 | 37.45 |
| .08 | .08 | .368E+03 | .2 | .55 | 33.17 |
| .10 | .10 | .499E+03 | .3 | .64 | 28.86 |
| .11 | .11 | .634E+03 | .4 | .74 | 24.66 |
| .12 | .12 | .769E+03 | .6 | .84 | 21.72 |
| .14 | .14 | .904E+03 | .8 | .94 | 19.54 |
| .15 | .15 | .104E+04 | 1.0 | 1.03 | 17.84 |
| .16 | .16 | .119E+04 | 1.2 | 1.11 | 16.57 |
| .18 | .18 | .135E+04 | 1.4 | 1.17 | 15.71 |
| .19 | .19 | .154E+04 | 1.7 | 1.21 | 15.10 |
| .20 | .20 | .175E+04 | 2.0 | 1.25 | 14.65 |
| .22 | .22 | .198E+04 | 2.3 | 1.28 | 14.31 |
| .23 | .23 | .223E+04 | 2.6 | 1.31 | 14.04 |
| .25 | .25 | .250E+04 | 3.0 | 1.33 | 13.82 |
| .26 | .26 | .279E+04 | 3.4 | 1.34 | 13.65 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0355) | 12.30 | 2.66 | 6.00 | 47.17 | .23 | 1.31 |
| OUTFLOW: ID= 1 (0358) | 12.30 | 1.86 | 6.17 | 47.12 | .20 | 1.23 |

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--------------------
| ROUTE CHN (0353) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
```

<------ DATA FOR SECTION (   1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | .26 | .0300 | |
| 5.50 | .15 | .0300 / .0150 | Main Channel |
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .26 | .0300 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .01 | .01 | .929E+01 | .0 | .17 | 99.56 |
| .03 | .03 | .372E+02 | .0 | .27 | 62.72 |
| .04 | .04 | .836E+02 | .0 | .35 | 47.86 |
| .05 | .05 | .149E+03 | .1 | .42 | 39.51 |
| .07 | .07 | .232E+03 | .1 | .49 | 34.05 |
| .08 | .08 | .334E+03 | .2 | .55 | 30.15 |
| .10 | .10 | .454E+03 | .3 | .64 | 26.24 |
| .11 | .11 | .576E+03 | .4 | .74 | 22.41 |
| .12 | .12 | .699E+03 | .6 | .84 | 19.75 |
| .14 | .14 | .822E+03 | .8 | .94 | 17.76 |
| .15 | .15 | .944E+03 | 1.0 | 1.03 | 16.22 |
| .16 | .16 | .108E+04 | 1.2 | 1.11 | 15.07 |
| .18 | .18 | .123E+04 | 1.4 | 1.17 | 14.28 |
| .19 | .19 | .140E+04 | 1.7 | 1.21 | 13.72 |
| .20 | .20 | .159E+04 | 2.0 | 1.25 | 13.31 |
| .22 | .22 | .180E+04 | 2.3 | 1.28 | 13.01 |
| .23 | .23 | .203E+04 | 2.6 | 1.31 | 12.76 |
| .25 | .25 | .227E+04 | 3.0 | 1.33 | 12.57 |
| .26 | .26 | .254E+04 | 3.4 | 1.34 | 12.41 |

| AREA | <---- hydrograph ----> QPEAK | TPEAK | R.V. | <-pipe / channel-> MAX DEPTH | MAX VEL |
|---|---|---|---|---|---|

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                     Hadati Creek Watershed - Allowable
                                (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
     INFLOW : ID= 2 (0350)     16.30     3.30    6.00  47.17        .26      1.34
     OUTFLOW: ID= 1 (0353)     16.30     2.44    6.17  47.13        .22      1.29


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--------------------
| ROUTE CHN (0362) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation      Manning
                    .00            .40       .0300
                   5.50            .15    .0300 / .0150   Main Channel
                   5.51            .00       .0150        Main Channel
                  10.00            .09       .0150        Main Channel
                  14.49            .00       .0150        Main Channel
                  14.50            .15    .0150 / .0300   Main Channel
                  20.00            .40       .0300

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)     (cu.m.)       (cms)         (m/s)       (min)
        .02       .02    .176E+02         .0            .21       80.52
        .04       .04    .702E+02         .0            .33       50.72
        .06       .06    .158E+03         .1            .43       38.71
        .08       .08    .281E+03         .1            .52       31.95
        .09       .09    .438E+03         .3            .62       26.84
        .11       .11    .607E+03         .5            .77       21.66
        .13       .13    .776E+03         .7            .90       18.45
        .15       .15    .944E+03        1.0           1.03       16.22
        .17       .17    .116E+04        1.3           1.16       14.36
        .20       .20    .140E+04        1.8           1.27       13.13
        .22       .22    .166E+04        2.3           1.36       12.24
        .24       .24    .194E+04        2.8           1.44       11.58
        .26       .26    .225E+04        3.4           1.51       11.05
        .29       .29    .258E+04        4.0           1.57       10.63
        .31       .31    .293E+04        4.8           1.62       10.27
        .33       .33    .331E+04        5.5           1.67        9.97
        .35       .35    .371E+04        6.4           1.72        9.71
        .38       .38    .413E+04        7.3           1.76        9.48
        .40       .40    .457E+04        8.2           1.80        9.28

                                       <---- hydrograph ---->   <-pipe / channel->
                                AREA    QPEAK   TPEAK   R.V.    MAX DEPTH  MAX VEL
                                (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
     INFLOW : ID= 2 (0360)     30.00     6.18    6.00  45.23        .35      1.71
     OUTFLOW: ID= 1 (0362)     30.00     4.88    6.17  45.22        .31      1.63


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--------------------
| ADD HYD   (0465) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0455):     12.70   2.756     6.00     47.17
        + ID2= 2 (0460):     36.00   7.639     6.00     47.17
          ==================================================
          ID = 3 (0465):     48.70  10.395     6.00     47.17

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

| ADD HYD (0515) |
| 1 + 2 = 3 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0510): | 16.00 | 4.080 | 6.00 | 76.65 |
| + ID2= 2 (0505): | 141.97 | 9.000 | 5.83 | 49.88 |
| ID = 3 (0515): | 157.97 | 13.080 | 6.00 | 52.60 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| ROUTE CHN (0564) |
| IN= 2---> OUT= 1 |

Routing time step (min)'= 5.00

<------ DATA FOR SECTION ( 1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | 101.50 | .0500 | |
| 1.00 | 100.70 | .0500 | |
| 1.50 | 100.55 | .0500 / .0300 | Main Channel |
| 2.00 | 99.50 | .0300 | Main Channel |
| 3.50 | 99.60 | .0300 | Main Channel |
| 4.50 | 100.65 | .0300 / .0500 | Main Channel |
| 6.00 | 101.45 | .0500 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .10 | 99.60 | .353E+02 | .0 | .19 | 43.69 |
| .19 | 99.69 | .112E+03 | .1 | .37 | 22.76 |
| .29 | 99.79 | .195E+03 | .2 | .49 | 17.03 |
| .38 | 99.88 | .285E+03 | .3 | .59 | 14.23 |
| .48 | 99.98 | .381E+03 | .5 | .67 | 12.51 |
| .57 | 100.07 | .484E+03 | .7 | .74 | 11.32 |
| .67 | 100.17 | .594E+03 | .9 | .80 | 10.43 |
| .76 | 100.26 | .710E+03 | 1.2 | .86 | 9.74 |
| .86 | 100.36 | .832E+03 | 1.5 | .91 | 9.18 |
| .95 | 100.45 | .961E+03 | 1.8 | .96 | 8.72 |
| 1.05 | 100.55 | .110E+04 | 2.2 | 1.00 | 8.32 |
| 1.16 | 100.66 | .127E+04 | 2.7 | 1.07 | 7.80 |
| 1.28 | 100.78 | .148E+04 | 3.4 | 1.14 | 7.31 |
| 1.39 | 100.89 | .170E+04 | 4.1 | 1.20 | 6.94 |
| 1.50 | 101.00 | .195E+04 | 4.9 | 1.25 | 6.65 |
| 1.61 | 101.11 | .221E+04 | 5.8 | 1.30 | 6.41 |
| 1.72 | 101.22 | .250E+04 | 6.7 | 1.34 | 6.22 |
| 1.84 | 101.34 | .280E+04 | 7.7 | 1.38 | 6.04 |
| 1.95 | 101.45 | .313E+04 | 8.8 | 1.41 | 5.90 |

**** WARNING: TRAVEL TIME TABLE EXCEEDED

| | | <---- hydrograph ----> | | | <-pipe / channel-> | |
|---|---|---|---|---|---|---|
| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | MAX DEPTH (m) | MAX VEL (m/s) |
| INFLOW : ID= 2 (0505) | 102.03 | 25.26 | 6.17 | 49.88 | 1.80 | 1.37 |
| OUTFLOW: ID= 1 (0564) | 102.03 | 39.67 | 6.58 | 49.88 | 1.95 | 1.41 |

**** WARNING: COMPUTATIONS FAILED TO CONVERGE.

| ROUTE CHN (0563) |

```
                          Hadati Creek Watershed - Allowable
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   2.2) ------>
               Distance      Elevation       Manning
                    .00           1.00         .0350
                   2.00            .50         .0350
                   4.00            .00     .0350 / .0350  Main Channel
                   4.50            .00         .0350      Main Channel
                   5.00            .00     .0350 / .0350  Main Channel
                   7.00            .50         .0350
                   9.00           1.00         .0350

       <--------------------- TRAVEL TIME TABLE --------------------->
        DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
         (m)       (m)      (cu.m.)       (cms)        (m/s)        (min)
         .05       .05      .573E+01        .0           .67         2.23
         .11       .11      .135E+02        .1           .99         1.51
         .16       .16      .232E+02        .3          1.23         1.22
         .21       .21      .349E+02        .5          1.42         1.06
         .26       .26      .486E+02        .9          1.58          .95
         .32       .32      .643E+02       1.2          1.73          .87
         .37       .37      .820E+02       1.7          1.86          .81
         .42       .42      .102E+03       2.2          1.98          .76
         .47       .47      .123E+03       2.9          2.10          .71
         .53       .53      .147E+03       3.6          2.21          .68
         .58       .58      .173E+03       4.4          2.31          .65
         .63       .63      .200E+03       5.4          2.42          .62
         .68       .68      .230E+03       6.4          2.51          .60
         .74       .74      .262E+03       7.6          2.61          .58
         .79       .79      .295E+03       8.9          2.70          .56
         .84       .84      .331E+03      10.3          2.79          .54
         .89       .89      .369E+03      11.8          2.88          .52
         .95       .95      .408E+03      13.5          2.97          .51
        1.00      1.00      .450E+03      15.2          3.05          .49

                                        <---- hydrograph ---->   <-pipe / channel->
                               AREA     QPEAK    TPEAK    R.V.   MAX DEPTH   MAX VEL
                               (ha)     (cms)    (hrs)    (mm)      (m)       (m/s)
     INFLOW : ID= 2 (0566)    23.70      4.80     6.00   47.17      .60        2.35
     OUTFLOW: ID= 1 (0563)    23.70      4.63     6.08   47.17      .59        2.33


-------------------------------------------------------------------------------
--------------------
| DUHYD     (0425) |
| Inlet Cap.=1.980 |
| #of Inlets=    1 |
| Total(cms)=  2.0 |      AREA      QPEAK       TPEAK     R.V.
--------------------      (ha)      (cms)       (hrs)     (mm)
    TOTAL HYD.(ID= 1):   29.19      6.51        6.00     47.17
    ==========================================================
    MAJOR SYS.(ID= 2):   10.15      4.53        6.00     47.17
    MINOR SYS.(ID= 3):   19.04      1.98        5.83     47.17

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (0104) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
--------------------      (cms)      (ha.m.)   |   (cms)      (ha.m.)
                          .0000       .0000    |  1.0000       .5000
```

```
                    Hadati Creek Watershed - Allowable
                      .0100      .0100   |  10.0000      .6000
                      .0150      .1332   |    .0000      .0000

                              AREA      QPEAK      TPEAK      R.V.
                              (ha)      (cms)      (hrs)      (mm)
    INFLOW : ID= 2 (0103)    30.640     6.763       6.00      47.17
    OUTFLOW: ID= 1 (0104)    30.640     7.048       6.08      47.16

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=104.21
                TIME SHIFT OF PEAK FLOW        (min)=  5.00
                MAXIMUM  STORAGE   USED       (ha.m.)=   .5855

    **** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
                   CHECK OUTFLOW/STORAGE TABLE  OR REDUCE DT.
-------------------------------------------------------------------------------

--------------------
| ADD HYD   (0359) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0358):      12.30   1.856     6.17     47.12
       + ID2= 2 (0353):      16.30   2.435     6.17     47.13
         ==================================================
         ID = 3 (0359):      28.60   4.291     6.17     47.13

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0363) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0359):      28.60   4.291     6.17     47.13
       + ID2= 2 (0362):      30.00   4.880     6.17     45.22
         ==================================================
         ID = 3 (0363):      58.60   9.171     6.17     46.15

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0470) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0465):      48.70  10.395     6.00     47.17
       + ID2= 2 (0425):      10.15   4.529     6.00     47.17
         ==================================================
         ID = 3 (0470):      58.85  14.924     6.00     47.17

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| DUHYD     (0520) |
| Inlet Cap.=3.050 |
| #of Inlets=    1 |
| Total(cms)=  3.0 |      AREA      QPEAK      TPEAK     R.V.
--------------------      (ha)      (cms)      (hrs)     (mm)
    TOTAL HYD.(ID= 1): 157.97      13.08       6.00     52.60
    ====================================================
    MAJOR SYS.(ID= 2):  67.54      10.03       6.00     52.60
```

```
MINOR SYS.(ID= 3):  90.43      3.05      5.58   52.60

NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0561) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
              <------ DATA FOR SECTION (   1.1) ------>
              Distance      Elevation      Manning
                   .00          1.00         .0350
                  2.00           .50         .0350
                  4.00           .00      .0350 / .0350  Main Channel
                  4.50           .00         .0350       Main Channel
                  5.00           .00      .0350 / .0350  Main Channel
                  7.00           .50         .0350
                  9.00          1.00         .0350

       <---------------------- TRAVEL TIME TABLE ---------------------->
        DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
         (m)       (m)      (cu.m.)       (cms)         (m/s)       (min)
         .05       .05      .319E+01        .1           .87         .95
         .11       .11      .748E+01        .2          1.26         .66
         .16       .16      .129E+02        .4          1.54         .54
         .21       .21      .194E+02        .7          1.75         .48
         .26       .26      .270E+02       1.0          1.93         .43
         .32       .32      .357E+02       1.5          2.08         .40
         .37       .37      .456E+02       2.0          2.22         .38
         .42       .42      .565E+02       2.6          2.34         .36
         .47       .47      .686E+02       3.4          2.46         .34
         .53       .53      .817E+02       4.2          2.57         .32
         .58       .58      .960E+02       5.1          2.68         .31
         .63       .63      .111E+03       6.2          2.78         .30
         .68       .68      .128E+03       7.3          2.87         .29
         .74       .74      .145E+03       8.6          2.97         .28
         .79       .79      .164E+03      10.0          3.06         .27
         .84       .84      .184E+03      11.6          3.14         .27
         .89       .89      .205E+03      13.2          3.23         .26
         .95       .95      .227E+03      15.0          3.31         .25
        1.00      1.00      .250E+03      17.0          3.40         .25

                                         <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK    TPEAK    R.V.    MAX DEPTH   MAX VEL
                               (ha)    (cms)    (hrs)    (mm)       (m)       (m/s)
    INFLOW : ID= 2 (0563)     23.70     4.63     6.08   47.17       .55        2.62
    OUTFLOW: ID= 1 (0561)     23.70     4.69     6.08   47.17       .55        2.63

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

--------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |        AREA     QPEAK     TPEAK       R.V.
--------------------        (ha)     (cms)     (hrs)       (mm)
          ID1= 1 (0111):   19.00      .613      6.58      47.16
        + ID2= 2 (0104):   30.64     7.048      6.08      47.16
          ===================================================
          ID = 3 (0114):   49.64     7.421      6.08      47.16

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

```
--------------------
| ADD HYD    (0380) |
|   1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0365):    117.50   22.881     6.00     47.17
        + ID2= 2 (0363):     58.60    9.171     6.17     46.15
          ==================================================
          ID = 3 (0380):    176.10   30.231     6.08     46.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0475) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
                   <------ DATA FOR SECTION (   1.1) ------>
                   Distance      Elevation       Manning
                     100.00         324.60         .0500
                     115.00         321.60         .0500
                     120.00         320.80     .0500 / .0300  Main Channel
                     122.00         320.80     .0300 / .0500  Main Channel
                     138.00         321.60         .0500
                     148.00         322.30         .0500
                     154.00         323.10         .0500
                     164.00         324.60         .0500

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV       VOLUME      FLOW RATE     VELOCITY     TRAV.TIME
        (m)       (m)      (cu.m.)        (cms)         (m/s)        (min)
        .20     321.00    .398E+03          .8            .84         8.53
        .40     321.20    .125E+04         3.3           1.13         6.33
        .60     321.40    .255E+04         8.1           1.36         5.27
        .80     321.60    .430E+04        15.6           1.56         4.59
       1.00     321.80    .644E+04        26.8           1.79         4.01
       1.20     322.00    .892E+04        41.2           1.99         3.61
       1.40     322.20    .117E+05        59.3           2.17         3.30
       1.60     322.40    .148E+05        81.9           2.37         3.02
       1.80     322.60    .182E+05       109.1           2.58         2.78
       2.00     322.80    .218E+05       140.2           2.77         2.59
       2.20     323.00    .256E+05       175.3           2.95         2.43
       2.40     323.20    .296E+05       214.7           3.12         2.29
       2.60     323.40    .338E+05       258.6           3.29         2.18
       2.80     323.60    .382E+05       306.7           3.46         2.07
       3.00     323.80    .428E+05       359.1           3.61         1.98
       3.20     324.00    .476E+05       416.0           3.76         1.91
       3.40     324.20    .526E+05       477.5           3.91         1.83
       3.60     324.40    .578E+05       543.5           4.05         1.77
       3.80     324.60    .632E+05       614.3           4.18         1.71

                                      <---- hydrograph ---->   <-pipe / channel->
                               AREA     QPEAK    TPEAK   R.V.    MAX DEPTH   MAX VEL
                               (ha)     (cms)    (hrs)   (mm)       (m)       (m/s)
     INFLOW : ID= 2 (0470)    58.85     14.92     6.00  47.17       .78        1.54
     OUTFLOW: ID= 1 (0475)    58.85     13.38     6.08  47.17       .74        1.49


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--------------------
| ADD HYD    (0526) |
|   1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
```

```
                       Hadati Creek Watershed - Allowable
--------------------         (ha)     (cms)     (hrs)     (mm)
          ID1= 1 (0520):    67.54   10.030     6.00     52.60
        + ID2= 2 (0525):      .00     .001      .00   *******
          ================================================
          ID = 3 (0526):    67.54   10.030     6.00     52.60

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD    (0492) |
|   1 +  2 =  3     |        AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0561):    23.70    4.690     6.08     47.17
        + ID2= 2 (0481):     5.90    1.194     6.00     47.17
          ================================================
          ID = 3 (0492):    29.60    5.789     6.08     47.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD    (0115) |
|   1 +  2 =  3     |        AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0114):    49.64    7.421     6.08     47.16
        + ID2= 2 (0106):    51.32    7.689     6.17     47.16
          ================================================
          ID = 3 (0115):   100.96   14.393     6.08     47.16

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0390) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
--------------------      (cms)      (ha.m.)   |   (cms)      (ha.m.)
                          .0000        .0000   |   1.3100      1.6000
                          .7700        .2870   |   1.8600     23.2300
                         1.2600        .9680   |    .0000       .0000

                                  AREA       QPEAK       TPEAK        R.V.
                                  (ha)       (cms)       (hrs)        (mm)
     INFLOW : ID= 2 (0380)      176.100     30.231        6.08        46.83
     OUTFLOW: ID= 1 (0390)      176.100      1.430        7.25        46.83

                   PEAK    FLOW    REDUCTION [Qout/Qin](%)=  4.73
                   TIME SHIFT OF PEAK FLOW         (min)= 70.00
                   MAXIMUM   STORAGE   USED       (ha.m.)=  6.3304

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0527) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance       Elevation        Manning
                 100.00          313.20          .0500
                 140.00          312.40      .0500 / .0300   Main Channel
                 140.50          310.80          .0300       Main Channel
```

| | | | |
|---|---|---|---|
| 141.50 | 310.80 | .0300 | Main Channel |
| 142.00 | 312.40 | .0300 / .0500 | Main Channel |
| 160.00 | 313.20 | .0500 | |

<---------------------- TRAVEL TIME TABLE ---------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .12 | 310.92 | .575E+02 | .1 | .40 | 18.86 |
| .25 | 311.05 | .119E+03 | .2 | .57 | 13.13 |
| .37 | 311.17 | .185E+03 | .3 | .69 | 10.87 |
| .49 | 311.29 | .256E+03 | .4 | .78 | 9.61 |
| .62 | 311.42 | .330E+03 | .6 | .86 | 8.77 |
| .74 | 311.54 | .409E+03 | .8 | .92 | 8.17 |
| .86 | 311.66 | .492E+03 | 1.1 | .97 | 7.70 |
| .98 | 311.78 | .579E+03 | 1.3 | 1.02 | 7.32 |
| 1.11 | 311.91 | .671E+03 | 1.6 | 1.07 | 7.01 |
| 1.23 | 312.03 | .767E+03 | 1.9 | 1.11 | 6.74 |
| 1.35 | 312.15 | .867E+03 | 2.2 | 1.15 | 6.50 |
| 1.48 | 312.28 | .971E+03 | 2.6 | 1.19 | 6.29 |
| 1.60 | 312.40 | .108E+04 | 2.9 | 1.23 | 6.11 |
| 1.73 | 312.53 | .149E+04 | 3.6 | 1.10 | 6.85 |
| 1.87 | 312.67 | .248E+04 | 4.9 | .88 | 8.52 |
| 2.00 | 312.80 | .405E+04 | 6.9 | .77 | 9.74 |
| 2.13 | 312.93 | .620E+04 | 10.1 | .73 | 10.21 |
| 2.27 | 313.07 | .893E+04 | 14.6 | .74 | 10.17 |
| 2.40 | 313.20 | .122E+05 | 20.7 | .76 | 9.85 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0526) | 67.54 | 10.03 | 6.00 | 52.60 | 2.13 | .74 |
| OUTFLOW: ID= 1 (0527) | 67.54 | 7.92 | 6.08 | 52.59 | 2.04 | .76 |

---

| RESERVOIR (0482) |
| IN= 2---> OUT= 1 |
| DT= 5.0 min |

| OUTFLOW (cms) | STORAGE (ha.m.) | OUTFLOW (cms) | STORAGE (ha.m.) |
|---|---|---|---|
| .0000 | .0000 | .2910 | .3795 |
| .2590 | .0579 | .2970 | .4503 |
| .2660 | .1180 | 1.6320 | .5232 |
| .2720 | .1802 | 4.1680 | .5983 |
| .2790 | .2445 | 7.5660 | .6756 |
| .2850 | .3109 | .0000 | .0000 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| INFLOW : ID= 2 (0492) | 29.600 | 5.789 | 6.08 | 47.17 |
| OUTFLOW: ID= 1 (0482) | 29.600 | 3.997 | 6.25 | 47.17 |

PEAK FLOW REDUCTION [Qout/Qin](%)= 69.05
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= .5994

---

| ADD HYD (0400) |
| 1 + 2 = 3 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0390): | 176.10 | 1.430 | 7.25 | 46.83 |

```
 + ID2= 2 (0395):    51.20   8.631      6.08    34.35
   ==============================================
   ID = 3 (0400):   227.30   9.969      6.08    44.02

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

---

```
--------------------
| ROUTE CHN (0403) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
```

<------ DATA FOR SECTION (   1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| 100.00 | 338.30 | .0500 | |
| 110.00 | 336.80 | .0500 | |
| 135.00 | 336.00 | .0300 | Main Channel |
| 142.00 | 335.30 | .0500 | |
| 148.00 | 335.30 | .0500 | |
| 156.00 | 336.00 | .0500 | |
| 165.00 | 338.30 | .0000 | |

<---------------------- TRAVEL TIME TABLE ---------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .16 | 335.46 | .231E+04 | .9 | .71 | 44.52 |
| .32 | 335.62 | .563E+04 | 3.2 | 1.09 | 29.11 |
| .47 | 335.77 | .997E+04 | 7.3 | 1.39 | 22.72 |
| .63 | 335.93 | .153E+05 | 13.4 | 1.66 | 19.04 |
| .79 | 336.09 | .218E+05 | 22.7 | 1.97 | 16.04 |
| .95 | 336.25 | .299E+05 | 35.3 | 2.25 | 14.10 |
| 1.11 | 336.41 | .396E+05 | 51.2 | 2.46 | 12.89 |
| 1.26 | 336.56 | .510E+05 | 70.7 | 2.63 | 12.02 |
| 1.42 | 336.72 | .641E+05 | 94.1 | 2.79 | 11.35 |
| 1.58 | 336.88 | .787E+05 | 122.4 | 2.96 | 10.71 |
| 1.74 | 337.04 | .939E+05 | 155.6 | 3.15 | 10.06 |
| 1.89 | 337.19 | .110E+06 | 192.8 | 3.34 | 9.48 |
| 2.05 | 337.35 | .126E+06 | 233.9 | 3.53 | 8.97 |
| 2.21 | 337.51 | .143E+06 | 278.9 | 3.71 | 8.53 |
| 2.37 | 337.67 | .160E+06 | 327.7 | 3.89 | 8.13 |
| 2.53 | 337.83 | .178E+06 | 380.3 | 4.07 | 7.79 |
| 2.68 | 337.98 | .196E+06 | 436.7 | 4.23 | 7.48 |
| 2.84 | 338.14 | .215E+06 | 496.9 | 4.40 | 7.20 |
| 3.00 | 338.30 | .234E+06 | 561.0 | 4.56 | 6.95 |

| | | <---- hydrograph ----> | | | <-pipe / channel-> | |
|---|---|---|---|---|---|---|
| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | MAX DEPTH (m) | MAX VEL (m/s) |
| INFLOW : ID= 2 (0400) | 227.30 | 9.97 | 6.08 | 44.02 | .54 | 1.50 |
| OUTFLOW: ID= 1 (0403) | 227.30 | 6.22 | 6.25 | 44.02 | .43 | 1.29 |

---

```
--------------------
| ADD HYD   (0407) |
|  1 +  2 =  3     |        AREA    QPEAK     TPEAK      R.V.
--------------------        (ha)    (cms)     (hrs)      (mm)
   ID1= 1 (0115):   100.96  14.393     6.08     47.16
 + ID2= 2 (0403):   227.30   6.216     6.25     44.02
   ==============================================
   ID = 3 (0407):   328.26  18.926     6.17     44.98

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

```
------------------------------------------------------------------------------
--------------------
| RESERVOIR (0113) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
--------------------        (cms)      (ha.m.)   |   (cms)      (ha.m.)
                             .0000       .0000   |   1.6000      6.4000
                            1.1000      2.9000   |   9.1000     10.0000
                            1.3000      4.3000   |  12.0000     20.0000

                                  AREA       QPEAK        TPEAK        R.V.
                                  (ha)       (cms)        (hrs)        (mm)
     INFLOW : ID= 2 (0407)      328.260     18.926         6.17        44.98
     OUTFLOW: ID= 1 (0113)      328.260      1.552        12.50        44.98

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.20
                    TIME SHIFT OF PEAK FLOW         (min)=380.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  6.0640

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

--------------------
| ADD HYD   (0430) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0425):     19.04    1.980      5.83     47.17
        + ID2= 2 (0113):    328.26    1.552     12.50     44.98
          ===============================================
          ID = 3 (0430):    347.30    3.000      6.33     45.10

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0440) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
                  <------ DATA FOR SECTION (    1.1) ------>
                  Distance      Elevation       Manning
                    100.00        325.40          .0600
                    120.00        324.60          .0600
                    126.00        323.90          .0600
                    130.00        323.00          .0600
                    140.00        322.30      .0600 / .0300  Main Channel
                    142.00        322.30      .0300 / .0600  Main Channel
                    150.00        323.90          .0600
                    155.00        324.60          .0600
                    160.00        325.40          .0600

      <-------------------- TRAVEL TIME TABLE --------------------->
       DEPTH    ELEV       VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
        (m)      (m)       (cu.m.)       (cms)         (m/s)       (min)
        .16    322.46     .233E+03         .6           .96         6.96
        .33    322.63     .672E+03        2.1          1.26         5.27
        .49    322.79     .132E+04        4.9          1.48         4.51
        .65    322.95     .216E+04        9.0          1.66         4.03
        .82    323.12     .319E+04       14.9          1.87         3.57
        .98    323.28     .433E+04       22.5          2.08         3.21
       1.14    323.44     .556E+04       31.6          2.27         2.93
       1.31    323.61     .689E+04       42.3          2.45         2.72
       1.47    323.77     .833E+04       54.6          2.62         2.54
       1.63    323.93     .987E+04       68.3          2.77         2.41
```

| | | | | | |
|---|---|---|---|---|---|
| 1.79 | 324.09 | .115E+05 | 82.8 | 2.87 | 2.33 |
| 1.96 | 324.26 | .134E+05 | 99.2 | 2.96 | 2.25 |
| 2.12 | 324.42 | .154E+05 | 117.9 | 3.06 | 2.18 |
| 2.28 | 324.58 | .176E+05 | 138.8 | 3.15 | 2.11 |
| 2.45 | 324.75 | .200E+05 | 157.4 | 3.14 | 2.12 |
| 2.61 | 324.91 | .228E+05 | 179.6 | 3.15 | 2.11 |
| 2.77 | 325.07 | .259E+05 | 205.8 | 3.18 | 2.09 |
| 2.94 | 325.24 | .293E+05 | 236.1 | 3.23 | 2.07 |
| 3.10 | 325.40 | .330E+05 | 270.6 | 3.28 | 2.03 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0430) | 347.30 | 3.00 | 6.33 | 45.10 | .38 | 1.33 |
| OUTFLOW: ID= 1 (0440) | 347.30 | 2.86 | 6.42 | 45.10 | .37 | 1.31 |

---

ADD HYD (0485)
1 + 2 = 3

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0440): | 347.30 | 2.860 | 6.42 | 45.10 |
| + ID2= 2 (0475): | 58.85 | 13.381 | 6.08 | 47.17 |
| ID = 3 (0485): | 406.15 | 15.674 | 6.08 | 45.40 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

ADD HYD (0490)
1 + 2 = 3

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0485): | 406.15 | 15.674 | 6.08 | 45.40 |
| + ID2= 2 (0480): | 43.10 | 8.721 | 6.00 | 47.17 |
| ID = 3 (0490): | 449.25 | 23.705 | 6.08 | 45.57 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

ADD HYD (0491)
1 + 2 = 3

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0482): | 29.60 | 3.997 | 6.25 | 47.17 |
| + ID2= 2 (0490): | 449.25 | 23.705 | 6.08 | 45.57 |
| ID = 3 (0491): | 478.85 | 24.885 | 6.08 | 45.67 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

RESERVOIR (0483)
IN= 2---> OUT= 1
DT= 5.0 min

| OUTFLOW (cms) | STORAGE (ha.m.) | OUTFLOW (cms) | STORAGE (ha.m.) |
|---|---|---|---|
| .0000 | .0000 | 7.0800 | 2.4860 |

```
                 Hadati Creek Watershed - Allowable
                   .2760        .0600  |   8.1000      3.3240
                  1.2000        .3400  |   9.7980      4.6420
                  2.0400        .6182  |  10.4940      7.4397
                  2.6400       1.1630  |  11.6850     10.3000
                  3.1200       1.7070  |  12.3480     11.4000

                               AREA      QPEAK        TPEAK        R.V.
                               (ha)      (cms)        (hrs)        (mm)
     INFLOW : ID= 2 (0491)   478.850    24.885         6.08        45.67
     OUTFLOW: ID= 1 (0483)   478.850     8.373         6.58        45.67

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 33.65
               TIME SHIFT OF PEAK FLOW        (min)= 30.00
               MAXIMUM  STORAGE   USED       (ha.m.)=  3.5408

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--------------------
| ADD HYD   (0530) |
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK      R.V.
--------------------           (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0540):       4.63    1.339     6.00     76.65
        + ID2= 2 (0483):     478.85    8.373     6.58     45.67
          ==================================================
          ID = 3 (0530):     483.48    8.559     6.50     45.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0545) |
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK      R.V.
--------------------           (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0527):      67.54    7.924     6.08     52.59
        + ID2= 2 (0530):     483.48    8.559     6.50     45.97
          ==================================================
          ID = 3 (0545):     551.02   15.770     6.42     46.78

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0546) |
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK      R.V.
--------------------           (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0542):      25.25    6.749     6.00     76.65
        + ID2= 2 (0545):     551.02   15.770     6.42     46.78
          ==================================================
          ID = 3 (0546):     576.27   18.223     6.00     48.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0547) |
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK      R.V.
--------------------           (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0543):      14.99    4.164     6.00     76.65
        + ID2= 2 (0546):     576.27   18.223     6.00     48.09
          ==================================================
```

```
        ID = 3 (0547):   591.26  22.387     6.00    48.81

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0548) |
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0544):        1.13      .333     6.00     76.65
      + ID2= 2 (0547):      591.26    22.387     6.00     48.81
        ==================================================
        ID = 3 (0548):      592.39    22.720     6.00     48.86

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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  ****************************
  ** SIMULATION NUMBER:   5 **
  ****************************

--------------------
|    READ STORM    |    Filename: Y:\SPrimmer\Miduss Modelling\105172\Ci
|                  |              tyview Ridge\RegSCS12hr.stm
| Ptotal=211.07 mm |    Comments: Regional SCS Type II 12hr design storm
--------------------
```

| TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr |
|---|---|---|---|---|---|---|---|
| .25 | 6.35 | 3.25 | 12.70 | 6.25 | 23.11 | 9.25 | 52.83 |
| .50 | 6.35 | 3.50 | 12.70 | 6.50 | 23.11 | 9.50 | 52.83 |
| .75 | 6.35 | 3.75 | 12.70 | 6.75 | 23.11 | 9.75 | 52.83 |
| 1.00 | 6.35 | 4.00 | 12.70 | 7.00 | 23.11 | 10.00 | 52.83 |
| 1.25 | 4.32 | 4.25 | 16.76 | 7.25 | 12.70 | 10.25 | 37.85 |
| 1.50 | 4.32 | 4.50 | 16.76 | 7.50 | 12.70 | 10.50 | 37.85 |
| 1.75 | 4.32 | 4.75 | 16.76 | 7.75 | 12.70 | 10.75 | 37.85 |
| 2.00 | 4.32 | 5.00 | 16.76 | 8.00 | 12.70 | 11.00 | 37.85 |
| 2.25 | 6.35 | 5.25 | 12.70 | 8.25 | 12.70 | 11.25 | 12.70 |
| 2.50 | 6.35 | 5.50 | 12.70 | 8.50 | 12.70 | 11.50 | 12.70 |
| 2.75 | 6.35 | 5.75 | 12.70 | 8.75 | 12.70 | 11.75 | 12.70 |
| 3.00 | 6.35 | 6.00 | 12.70 | 9.00 | 12.70 | 12.00 | 12.70 |

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| CALIB            |
| STANDHYD  (0544) |   Area    (ha)=    1.13
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .90          .23
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=       .55          .55
     Length            (m)=     50.00        40.00
     Mannings n           =      .013         .300

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

                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
```

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| .083 | 6.35 | 3.083 | 12.70 | 6.083 | 23.11 | 9.08 | 52.83 |
| .167 | 6.35 | 3.167 | 12.70 | 6.167 | 23.11 | 9.17 | 52.83 |
| .250 | 6.35 | 3.250 | 12.70 | 6.250 | 23.11 | 9.25 | 52.83 |
| .333 | 6.35 | 3.333 | 12.70 | 6.333 | 23.11 | 9.33 | 52.83 |
| .417 | 6.35 | 3.417 | 12.70 | 6.417 | 23.11 | 9.42 | 52.83 |
| .500 | 6.35 | 3.500 | 12.70 | 6.500 | 23.11 | 9.50 | 52.83 |
| .583 | 6.35 | 3.583 | 12.70 | 6.583 | 23.11 | 9.58 | 52.83 |
| .667 | 6.35 | 3.667 | 12.70 | 6.667 | 23.11 | 9.67 | 52.83 |
| .750 | 6.35 | 3.750 | 12.70 | 6.750 | 23.11 | 9.75 | 52.83 |
| .833 | 6.35 | 3.833 | 12.70 | 6.833 | 23.11 | 9.83 | 52.83 |
| .917 | 6.35 | 3.917 | 12.70 | 6.917 | 23.11 | 9.92 | 52.83 |
| 1.000 | 6.35 | 4.000 | 12.70 | 7.000 | 23.11 | 10.00 | 52.83 |
| 1.083 | 4.32 | 4.083 | 16.76 | 7.083 | 12.70 | 10.08 | 37.85 |
| 1.167 | 4.32 | 4.167 | 16.76 | 7.167 | 12.70 | 10.17 | 37.85 |
| 1.250 | 4.32 | 4.250 | 16.76 | 7.250 | 12.70 | 10.25 | 37.85 |
| 1.333 | 4.32 | 4.333 | 16.76 | 7.333 | 12.70 | 10.33 | 37.85 |
| 1.417 | 4.32 | 4.417 | 16.76 | 7.417 | 12.70 | 10.42 | 37.85 |
| 1.500 | 4.32 | 4.500 | 16.76 | 7.500 | 12.70 | 10.50 | 37.85 |
| 1.583 | 4.32 | 4.583 | 16.76 | 7.583 | 12.70 | 10.58 | 37.85 |
| 1.667 | 4.32 | 4.667 | 16.76 | 7.667 | 12.70 | 10.67 | 37.85 |
| 1.750 | 4.32 | 4.750 | 16.76 | 7.750 | 12.70 | 10.75 | 37.85 |
| 1.833 | 4.32 | 4.833 | 16.76 | 7.833 | 12.70 | 10.83 | 37.85 |
| 1.917 | 4.32 | 4.917 | 16.76 | 7.917 | 12.70 | 10.92 | 37.85 |
| 2.000 | 4.32 | 5.000 | 16.76 | 8.000 | 12.70 | 11.00 | 37.85 |
| 2.083 | 6.35 | 5.083 | 12.70 | 8.083 | 12.70 | 11.08 | 12.70 |
| 2.167 | 6.35 | 5.167 | 12.70 | 8.167 | 12.70 | 11.17 | 12.70 |
| 2.250 | 6.35 | 5.250 | 12.70 | 8.250 | 12.70 | 11.25 | 12.70 |
| 2.333 | 6.35 | 5.333 | 12.70 | 8.333 | 12.70 | 11.33 | 12.70 |
| 2.417 | 6.35 | 5.417 | 12.70 | 8.417 | 12.70 | 11.42 | 12.70 |
| 2.500 | 6.35 | 5.500 | 12.70 | 8.500 | 12.70 | 11.50 | 12.70 |
| 2.583 | 6.35 | 5.583 | 12.70 | 8.583 | 12.70 | 11.58 | 12.70 |
| 2.667 | 6.35 | 5.667 | 12.70 | 8.667 | 12.70 | 11.67 | 12.70 |
| 2.750 | 6.35 | 5.750 | 12.70 | 8.750 | 12.70 | 11.75 | 12.70 |
| 2.833 | 6.35 | 5.833 | 12.70 | 8.833 | 12.70 | 11.83 | 12.70 |
| 2.917 | 6.35 | 5.917 | 12.70 | 8.917 | 12.70 | 11.92 | 12.70 |
| 3.000 | 6.35 | 6.000 | 12.70 | 9.000 | 12.70 | 12.00 | 12.70 |

```
     Max.Eff.Inten.(mm/hr)=      52.83        42.97
               over (min)         5.00        20.00
     Storage Coeff.  (min)=       2.60 (ii)   18.86 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .29          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .13          .03          .156 (iii)
     TIME TO PEAK    (hrs)=       9.67        10.00         10.00
     RUNOFF VOLUME    (mm)=     209.57        81.35        182.64
     TOTAL RAINFALL   (mm)=     211.07       211.07        211.07
     RUNOFF COEFFICIENT   =        .99          .39           .87

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

        (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
             Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
             Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

| CALIB              |
| STANDHYD  (0543)   |   Area    (ha)=  14.99
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
```

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--------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        11.99         3.00
     Dep. Storage     (mm)=         1.50         5.00
     Average Slope     (%)=          .55          .55
     Length            (m)=       200.00        40.00
     Mannings n           =         .013         .300

     Max.Eff.Inten.(mm/hr)=        52.83        42.97
                over (min)          5.00        25.00
     Storage Coeff.  (min)=         5.98 (ii)   22.24 (ii)
     Unit Hyd. Tpeak (min)=         5.00        25.00
     Unit Hyd. peak  (cms)=          .19          .05
                                                              *TOTALS*
     PEAK FLOW       (cms)=         1.74          .32           2.054 (iii)
     TIME TO PEAK    (hrs)=        10.00        10.08          10.00
     RUNOFF VOLUME    (mm)=       209.57        81.35         182.64
     TOTAL RAINFALL   (mm)=       211.07       211.07         211.07
     RUNOFF COEFFICIENT   =          .99          .39            .87

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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  (0542)   |   Area    (ha)=  25.25
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        20.20         5.05
     Dep. Storage     (mm)=         1.50         5.00
     Average Slope     (%)=          .55          .55
     Length            (m)=       350.00        40.00
     Mannings n           =         .013         .300

     Max.Eff.Inten.(mm/hr)=        52.83        42.97
                over (min)         10.00        25.00
     Storage Coeff.  (min)=         8.37 (ii)   24.63 (ii)
     Unit Hyd. Tpeak (min)=        10.00        25.00
     Unit Hyd. peak  (cms)=          .12          .05
                                                              *TOTALS*
     PEAK FLOW       (cms)=         2.92          .53           3.443 (iii)
     TIME TO PEAK    (hrs)=        10.00        10.17          10.00
     RUNOFF VOLUME    (mm)=       209.57        81.35         182.64
     TOTAL RAINFALL   (mm)=       211.07       211.07         211.07
     RUNOFF COEFFICIENT   =          .99          .39            .87

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0510)   |   Area    (ha)=  16.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      12.80         3.20
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .50          .20
     Length            (m)=     400.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      52.83        42.97
                over (min)       10.00        35.00
     Storage Coeff.  (min)=       9.33 (ii)   31.35 (ii)
     Unit Hyd. Tpeak (min)=      10.00        35.00
     Unit Hyd. peak  (cms)=        .12          .03
                                                              *TOTALS*
     PEAK FLOW       (cms)=       1.85          .31             2.134 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.33            10.00
     RUNOFF VOLUME    (mm)=     209.57        81.35           182.64
     TOTAL RAINFALL   (mm)=     211.07       211.07           211.07
     RUNOFF COEFFICIENT   =        .99          .39              .87

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0500)   |   Area    (ha)= 244.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  46.00   Dir. Conn.(%)=  26.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     112.24       131.76
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .80          .80
     Length            (m)=    1275.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      52.83        59.90
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      16.24 (ii)   28.96 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=        .07          .04
                                                              *TOTALS*
     PEAK FLOW       (cms)=       9.05        18.51            27.108 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.25            10.08
     RUNOFF VOLUME    (mm)=     209.57       107.75           134.22
     TOTAL RAINFALL   (mm)=     211.07       211.07           211.07
     RUNOFF COEFFICIENT   =        .99          .51              .64

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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--------------------
| CALIB             |
| STANDHYD  (0540)  |   Area    (ha)=   4.63
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.70          .93
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .55          .55
     Length            (m)=     150.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      52.83        42.97
                over (min)        5.00        25.00
     Storage Coeff.  (min)=       5.03 (ii)   21.29 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .21          .05
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .54          .10              .636 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.08             10.00
     RUNOFF VOLUME    (mm)=     209.57        81.35            182.64
     TOTAL RAINFALL   (mm)=     211.07       211.07            211.07
     RUNOFF COEFFICIENT   =        .99          .39               .87

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD  (0484)  |   Area    (ha)=  12.60
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.29         7.31
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     680.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      52.83        59.46
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       8.46 (ii)   18.15 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=        .12          .06
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .39         1.14             1.527 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.00             10.00
     RUNOFF VOLUME    (mm)=     209.57       107.20            128.70
     TOTAL RAINFALL   (mm)=     211.07       211.07            211.07
     RUNOFF COEFFICIENT   =        .99          .51               .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
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    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0565)   |   Area    (ha)=  11.10
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=       4.66          6.44
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     680.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      52.83         59.46
                over (min)       10.00         20.00
     Storage Coeff.  (min)=       8.46 (ii)    18.15 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=        .12           .06
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .34          1.00            1.345 (iii)
     TIME TO PEAK    (hrs)=      10.00         10.00           10.00
     RUNOFF VOLUME    (mm)=     209.57        107.20          128.70
     TOTAL RAINFALL   (mm)=     211.07        211.07          211.07
     RUNOFF COEFFICIENT   =        .99           .51             .61

     (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
          Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
          Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0481)   |   Area    (ha)=   5.90
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=       2.48          3.42
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     680.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      52.83         59.46
                over (min)       10.00         20.00
     Storage Coeff.  (min)=       8.46 (ii)    18.15 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=        .12           .06
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .18           .53             .715 (iii)
     TIME TO PEAK    (hrs)=      10.00         10.00           10.00
     RUNOFF VOLUME    (mm)=     209.57        107.20          128.70
     TOTAL RAINFALL   (mm)=     211.07        211.07          211.07
     RUNOFF COEFFICIENT   =        .99           .51             .61
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```
     (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
          Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
          Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0410)   |   Area    (ha)=  24.20
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area    (ha)=     10.16        14.04
     Dep. Storage    (mm)=      1.50         5.00
     Average Slope    (%)=      2.00         2.00
     Length           (m)=    401.00        40.00
     Mannings n          =      .013         .300

     Max.Eff.Inten.(mm/hr)=     52.83        59.46
                over (min)      5.00        20.00
     Storage Coeff.  (min)=     6.16 (ii)   15.86 (ii)
     Unit Hyd. Tpeak (min)=     5.00        20.00
     Unit Hyd. peak  (cms)=      .19          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=      .75         2.23          2.975 (iii)
     TIME TO PEAK    (hrs)=    10.00        10.00          10.00
     RUNOFF VOLUME    (mm)=    209.57      107.20         128.70
     TOTAL RAINFALL   (mm)=    211.07      211.07         211.07
     RUNOFF COEFFICIENT   =      .99          .51            .61

     (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
          Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
          Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0415)   |   Area    (ha)=   4.99
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area    (ha)=      2.10         2.89
     Dep. Storage    (mm)=      1.50         5.00
     Average Slope    (%)=      2.86         2.86
     Length           (m)=    185.00        40.00
     Mannings n          =      .013         .300

     Max.Eff.Inten.(mm/hr)=     52.83        59.46
                over (min)      5.00        15.00
     Storage Coeff.  (min)=     3.48 (ii)   12.19 (ii)
     Unit Hyd. Tpeak (min)=     5.00        15.00
     Unit Hyd. peak  (cms)=      .26          .09
                                                          *TOTALS*
     PEAK FLOW       (cms)=      .15          .47           .626 (iii)
     TIME TO PEAK    (hrs)=     9.92        10.00          10.00
     RUNOFF VOLUME    (mm)=    209.57      107.20         128.70
     TOTAL RAINFALL   (mm)=    211.07      211.07         211.07
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     RUNOFF COEFFICIENT   =        .99          .51            .61

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0110)  |    Area    (ha)=  19.00
|ID= 1 DT= 5.0 min  |    Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.98         11.02
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     365.00         40.00
     Mannings n          =       .013          .300

     Max.Eff.Inten.(mm/hr)=      52.83         59.46
                over (min)        5.00         20.00
     Storage Coeff.  (min)=       5.82 (ii)    15.52 (ii)
     Unit Hyd. Tpeak (min)=       5.00         20.00
     Unit Hyd. peak  (cms)=        .20           .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .59          1.75          2.340 (iii)
     TIME TO PEAK    (hrs)=      10.00         10.00          10.00
     RUNOFF VOLUME    (mm)=     209.57        107.20         128.70
     TOTAL RAINFALL   (mm)=     211.07        211.07         211.07
     RUNOFF COEFFICIENT   =        .99           .51            .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0101)  |    Area    (ha)=  16.32
|ID= 1 DT= 5.0 min  |    Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.85          9.47
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     309.00         40.00
     Mannings n          =       .013          .300

     Max.Eff.Inten.(mm/hr)=      52.83         59.46
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       5.27 (ii)    14.96 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .21           .08
                                                          *TOTALS*
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     PEAK FLOW        (cms)=        .50         1.52          2.027 (iii)
     TIME TO PEAK     (hrs)=      10.00        10.00          10.00
     RUNOFF VOLUME     (mm)=     209.57       107.20         128.70
     TOTAL RAINFALL    (mm)=     211.07       211.07         211.07
     RUNOFF COEFFICIENT    =        .99          .51            .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD  (0102) |   Area    (ha)=  14.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.01         8.31
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     287.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      52.83        59.46
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       5.04 (ii)   14.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .21          .08
                                                          *TOTALS*
     PEAK FLOW        (cms)=        .44         1.34          1.780 (iii)
     TIME TO PEAK     (hrs)=      10.00        10.00          10.00
     RUNOFF VOLUME     (mm)=     209.57       107.20         128.70
     TOTAL RAINFALL    (mm)=     211.07       211.07         211.07
     RUNOFF COEFFICIENT    =        .99          .51            .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD  (0105) |   Area    (ha)=  51.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.55        29.77
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     550.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      52.83        59.46
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       7.45 (ii)   17.14 (ii)
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     Unit Hyd. Tpeak (min)=       5.00         20.00
     Unit Hyd. peak  (cms)=        .17           .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.58          4.68          6.260 (iii)
     TIME TO PEAK    (hrs)=      10.00         10.00         10.00
     RUNOFF VOLUME    (mm)=     209.57        107.20        128.70
     TOTAL RAINFALL   (mm)=     211.07        211.07        211.07
     RUNOFF COEFFICIENT   =        .99           .51           .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0365)   |   Area    (ha)= 117.50
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      49.35         68.15
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     885.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      52.83         59.46
                over (min)       10.00         20.00
     Storage Coeff.  (min)=       9.91 (ii)    19.60 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=        .11           .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       3.61         10.49         14.089 (iii)
     TIME TO PEAK    (hrs)=      10.00         10.08         10.00
     RUNOFF VOLUME    (mm)=     209.57        107.20        128.70
     TOTAL RAINFALL   (mm)=     211.07        211.07        211.07
     RUNOFF COEFFICIENT   =        .99           .51           .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0355)   |   Area    (ha)=  12.30
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.17          7.13
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       1.60          1.60
     Length            (m)=     286.00         40.00
     Mannings n           =       .013          .300
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     Max.Eff.Inten.(mm/hr)=       52.83         59.46
                over (min)         5.00         20.00
     Storage Coeff.  (min)=        5.38 (ii)    15.74 (ii)
     Unit Hyd. Tpeak (min)=        5.00         20.00
     Unit Hyd. peak  (cms)=         .21           .07
                                                             *TOTALS*
     PEAK FLOW       (cms)=         .38          1.13          1.513 (iii)
     TIME TO PEAK    (hrs)=       10.00         10.00          10.00
     RUNOFF VOLUME    (mm)=      209.57        107.20         128.70
     TOTAL RAINFALL   (mm)=      211.07        211.07         211.07
     RUNOFF COEFFICIENT   =         .99           .51            .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50      Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD  (0350) |   Area    (ha)=  16.30
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        6.85          9.45
     Dep. Storage     (mm)=        1.50          5.00
     Average Slope     (%)=        1.00          1.00
     Length            (m)=      330.00         40.00
     Mannings n           =        .013          .300

     Max.Eff.Inten.(mm/hr)=       52.83         59.46
                over (min)         5.00         20.00
     Storage Coeff.  (min)=        6.75 (ii)    18.68 (ii)
     Unit Hyd. Tpeak (min)=        5.00         20.00
     Unit Hyd. peak  (cms)=         .18           .06
                                                             *TOTALS*
     PEAK FLOW       (cms)=         .50          1.47          1.968 (iii)
     TIME TO PEAK    (hrs)=       10.00         10.00          10.00
     RUNOFF VOLUME    (mm)=      209.57        107.20         128.70
     TOTAL RAINFALL   (mm)=      211.07        211.07         211.07
     RUNOFF COEFFICIENT   =         .99           .51            .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50      Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD  (0360) |   Area    (ha)=  30.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  37.00   Dir. Conn.(%)=  19.00
--------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       11.10         18.90
     Dep. Storage     (mm)=        1.50          5.00
     Average Slope     (%)=        2.00          2.00
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     Length             (m)=      447.00        40.00
     Mannings n           =         .013         .300

     Max.Eff.Inten.(mm/hr)=        52.83        55.42
                over (min)          5.00        20.00
     Storage Coeff.  (min)=         6.58 (ii)   16.55 (ii)
     Unit Hyd. Tpeak (min)=         5.00        20.00
     Unit Hyd. peak  (cms)=          .18          .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=          .84         2.78         3.618 (iii)
     TIME TO PEAK    (hrs)=        10.00        10.00         10.00
     RUNOFF VOLUME    (mm)=       209.57       101.80        122.28
     TOTAL RAINFALL   (mm)=       211.07       211.07        211.07
     RUNOFF COEFFICIENT   =          .99          .48           .58

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0395)  |   Area    (ha)=  51.20
|ID= 1 DT= 5.0 min |   Total Imp(%)=  10.00   Dir. Conn.(%)=   5.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         5.12        46.08
     Dep. Storage     (mm)=         1.50         5.00
     Average Slope     (%)=         2.00         2.00
     Length            (m)=       900.00        40.00
     Mannings n           =         .013         .300

     Max.Eff.Inten.(mm/hr)=        52.83        43.26
                over (min)         10.00        25.00
     Storage Coeff.  (min)=        10.01 (ii)   21.02 (ii)
     Unit Hyd. Tpeak (min)=        10.00        25.00
     Unit Hyd. peak  (cms)=          .11          .05
                                                            *TOTALS*
     PEAK FLOW       (cms)=          .37         5.03         5.388 (iii)
     TIME TO PEAK    (hrs)=        10.00        10.08         10.08
     RUNOFF VOLUME    (mm)=       209.57        81.91         88.29
     TOTAL RAINFALL   (mm)=       211.07       211.07        211.07
     RUNOFF COEFFICIENT   =          .99          .39           .42

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
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| STANDHYD  (0455) |   Area    (ha)=  12.70
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     5.33         7.37
     Dep. Storage     (mm)=     1.50         5.00
     Average Slope     (%)=     1.71         1.71
     Length            (m)=   300.00        40.00
     Mannings n           =     .013         .300

     Max.Eff.Inten.(mm/hr)=    52.83        59.46
               over (min)      5.00        20.00
     Storage Coeff.  (min)=     5.43 (ii)   15.59 (ii)
     Unit Hyd. Tpeak (min)=     5.00        20.00
     Unit Hyd. peak  (cms)=      .20          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=      .39         1.17           1.564 (iii)
     TIME TO PEAK    (hrs)=    10.00        10.00          10.00
     RUNOFF VOLUME    (mm)=   209.57       107.20         128.70
     TOTAL RAINFALL   (mm)=   211.07       211.07         211.07
     RUNOFF COEFFICIENT   =      .99          .51            .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     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  (0460) |   Area    (ha)=  36.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=    15.12        20.88
     Dep. Storage     (mm)=     1.50         5.00
     Average Slope     (%)=     2.03         2.03
     Length            (m)=   465.00        40.00
     Mannings n           =     .013         .300

     Max.Eff.Inten.(mm/hr)=    52.83        59.46
               over (min)      5.00        20.00
     Storage Coeff.  (min)=     6.71 (ii)   16.36 (ii)
     Unit Hyd. Tpeak (min)=     5.00        20.00
     Unit Hyd. peak  (cms)=      .18          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=     1.11         3.30           4.413 (iii)
     TIME TO PEAK    (hrs)=    10.00        10.00          10.00
     RUNOFF VOLUME    (mm)=   209.57       107.20         128.70
     TOTAL RAINFALL   (mm)=   211.07       211.07         211.07
     RUNOFF COEFFICIENT   =      .99          .51            .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

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--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD  (0480) |   Area    (ha)=  43.10
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      18.10        25.00
     Dep. Storage      (mm)=       1.50         5.00
     Average Slope      (%)=       2.00         2.00
     Length             (m)=     680.00        40.00
     Mannings n           =        .013         .300

     Max.Eff.Inten.(mm/hr)=       52.83        59.46
                over (min)        10.00        20.00
     Storage Coeff.  (min)=        8.46 (ii)   18.15 (ii)
     Unit Hyd. Tpeak (min)=       10.00        20.00
     Unit Hyd. peak  (cms)=         .12          .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=        1.33         3.90          5.222 (iii)
     TIME TO PEAK    (hrs)=       10.00        10.00         10.00
     RUNOFF VOLUME    (mm)=      209.57       107.20        128.70
     TOTAL RAINFALL   (mm)=      211.07       211.07        211.07
     RUNOFF COEFFICIENT   =         .99          .51           .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     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.

--------------------------------------------------------------------------------
--------------------
| STORE HYD (0525) |   AREA        (ha)=     .00
| ID= 1 DT=****min |   QPEAK      (cms)=     .00
--------------------   TPEAK      (hrs)=     .00
                       VOLUME      (mm)=*******

--------------------------------------------------------------------------------
--------------------
| DUHYD     (0505) |
| Inlet Cap.=9.000 |
| #of Inlets=    1 |
| Total(cms)=  9.0 |      AREA       QPEAK      TPEAK    R.V.
--------------------      (ha)       (cms)      (hrs)    (mm)
     TOTAL HYD.(ID= 1): 244.00      27.11      10.08  134.22
     =====================================================
     MAJOR SYS.(ID= 2):  78.53      18.11      10.08  134.22
     MINOR SYS.(ID= 3): 165.47       9.00       6.75  134.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD    (0566) |
|   1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0484):      12.60    1.527     10.00    128.70
        + ID2= 2 (0565):      11.10    1.345     10.00    128.70
          ==================================================
```

```
     ID = 3 (0566):    23.70   2.872    10.00   128.70

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0420) |
|  1 +  2 =  3     |       AREA     QPEAK    TPEAK     R.V.
--------------------       (ha)     (cms)    (hrs)     (mm)
     ID1= 1 (0410):       24.20    2.975    10.00   128.70
   + ID2= 2 (0415):        4.99     .626    10.00   128.70
     ==================================================
     ID = 3 (0420):       29.19    3.602    10.00   128.70

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0111) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------      (cms)      (ha.m.)    |   (cms)      (ha.m.)
                          .0000        .0000    |   1.0000      1.0000
                          .0100        .0100    |  20.0000      1.1000
                          .0120        .1000    |    .0000       .0000

                               AREA       QPEAK       TPEAK       R.V.
                               (ha)       (cms)       (hrs)       (mm)
  INFLOW : ID= 2 (0110)      19.000       2.340       10.00     128.70
  OUTFLOW: ID= 1 (0111)      19.000       2.069       10.50     128.68

                 PEAK    FLOW    REDUCTION [Qout/Qin](%)= 88.39
                 TIME SHIFT OF PEAK FLOW          (min)= 30.00
                 MAXIMUM  STORAGE   USED        (ha.m.)=  1.0100

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

--------------------
| ADD HYD   (0103) |
|  1 +  2 =  3     |       AREA     QPEAK    TPEAK     R.V.
--------------------       (ha)     (cms)    (hrs)     (mm)
     ID1= 1 (0101):       16.32    2.027    10.00   128.70
   + ID2= 2 (0102):       14.32    1.780    10.00   128.70
     ==================================================
     ID = 3 (0103):       30.64    3.807    10.00   128.70

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0106) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------      (cms)      (ha.m.)    |   (cms)      (ha.m.)
                          .0000        .0000    |    .5000       .4000
                          .0100        .0100    |   6.6000       .8000
                          .0260        .2300    |    .0000       .0000

                               AREA       QPEAK       TPEAK       R.V.
                               (ha)       (cms)       (hrs)       (mm)
  INFLOW : ID= 2 (0105)      51.320       6.260       10.00     128.70
  OUTFLOW: ID= 1 (0106)      51.320       5.997       10.08     128.69
```

```
                PEAK    FLOW    REDUCTION [Qout/Qin](%)= 95.79
                TIME SHIFT OF PEAK FLOW         (min)=  5.00
                MAXIMUM   STORAGE   USED       (ha.m.)=   .7608

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0358) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance      Elevation        Manning
                    .00            .26          .0300
                   5.50            .15      .0300 / .0150  Main Channel
                   5.51            .00          .0150      Main Channel
                  10.00            .09          .0150      Main Channel
                  14.49            .00          .0150      Main Channel
                  14.50            .15      .0150 / .0300  Main Channel
                  20.00            .26          .0300

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)      (cu.m.)       (cms)         (m/s)       (min)
        .01       .01     .102E+02        .0            .17      109.52
        .03       .03     .409E+02        .0            .27       68.99
        .04       .04     .920E+02        .0            .35       52.65
        .05       .05     .163E+03        .1            .42       43.46
        .07       .07     .255E+03        .1            .49       37.45
        .08       .08     .368E+03        .2            .55       33.17
        .10       .10     .499E+03        .3            .64       28.86
        .11       .11     .634E+03        .4            .74       24.66
        .12       .12     .769E+03        .6            .84       21.72
        .14       .14     .904E+03        .8            .94       19.54
        .15       .15     .104E+04       1.0           1.03       17.84
        .16       .16     .119E+04       1.2           1.11       16.57
        .18       .18     .135E+04       1.4           1.17       15.71
        .19       .19     .154E+04       1.7           1.21       15.10
        .20       .20     .175E+04       2.0           1.25       14.65
        .22       .22     .198E+04       2.3           1.28       14.31
        .23       .23     .223E+04       2.6           1.31       14.04
        .25       .25     .250E+04       3.0           1.33       13.82
        .26       .26     .279E+04       3.4           1.34       13.65

                                         <---- hydrograph ---->   <-pipe / channel->
                                   AREA    QPEAK    TPEAK    R.V.   MAX DEPTH   MAX VEL
                                   (ha)    (cms)    (hrs)    (mm)      (m)       (m/s)
     INFLOW : ID= 2 (0355)        12.30     1.51    10.00  128.70      .18        1.18
     OUTFLOW: ID= 1 (0358)        12.30     1.44    10.08  128.64      .18        1.17


--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0353) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance      Elevation        Manning
                    .00            .26          .0300
                   5.50            .15      .0300 / .0150  Main Channel
                   5.51            .00          .0150      Main Channel
                  10.00            .09          .0150      Main Channel
                  14.49            .00          .0150      Main Channel
                  14.50            .15      .0150 / .0300  Main Channel
```

| | | |
|---|---|---|
| 20.00 | .26 | .0300 |

<------------------- TRAVEL TIME TABLE ------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .01 | .01 | .929E+01 | .0 | .17 | 99.56 |
| .03 | .03 | .372E+02 | .0 | .27 | 62.72 |
| .04 | .04 | .836E+02 | .0 | .35 | 47.86 |
| .05 | .05 | .149E+03 | .1 | .42 | 39.51 |
| .07 | .07 | .232E+03 | .1 | .49 | 34.05 |
| .08 | .08 | .334E+03 | .2 | .55 | 30.15 |
| .10 | .10 | .454E+03 | .3 | .64 | 26.24 |
| .11 | .11 | .576E+03 | .4 | .74 | 22.41 |
| .12 | .12 | .699E+03 | .6 | .84 | 19.75 |
| .14 | .14 | .822E+03 | .8 | .94 | 17.76 |
| .15 | .15 | .944E+03 | 1.0 | 1.03 | 16.22 |
| .16 | .16 | .108E+04 | 1.2 | 1.11 | 15.07 |
| .18 | .18 | .123E+04 | 1.4 | 1.17 | 14.28 |
| .19 | .19 | .140E+04 | 1.7 | 1.21 | 13.72 |
| .20 | .20 | .159E+04 | 2.0 | 1.25 | 13.31 |
| .22 | .22 | .180E+04 | 2.3 | 1.28 | 13.01 |
| .23 | .23 | .203E+04 | 2.6 | 1.31 | 12.76 |
| .25 | .25 | .227E+04 | 3.0 | 1.33 | 12.57 |
| .26 | .26 | .254E+04 | 3.4 | 1.34 | 12.41 |

| | | <---- hydrograph ----> | | | <-pipe / channel-> | |
|---|---|---|---|---|---|---|
| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | MAX DEPTH (m) | MAX VEL (m/s) |
| INFLOW : ID= 2 (0350) | 16.30 | 1.97 | 10.00 | 128.70 | .20 | 1.25 |
| OUTFLOW: ID= 1 (0353) | 16.30 | 1.87 | 10.08 | 128.66 | .20 | 1.24 |

---

| ROUTE CHN (0362) |
| IN= 2---> OUT= 1 |     Routing time step (min)'= 5.00

<------ DATA FOR SECTION ( 1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | .40 | .0300 | |
| 5.50 | .15 | .0300 / .0150 | Main Channel |
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .40 | .0300 | |

<------------------- TRAVEL TIME TABLE ------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .02 | .02 | .176E+02 | .0 | .21 | 80.52 |
| .04 | .04 | .702E+02 | .0 | .33 | 50.72 |
| .06 | .06 | .158E+03 | .1 | .43 | 38.71 |
| .08 | .08 | .281E+03 | .1 | .52 | 31.95 |
| .09 | .09 | .438E+03 | .3 | .62 | 26.84 |
| .11 | .11 | .607E+03 | .5 | .77 | 21.66 |
| .13 | .13 | .776E+03 | .7 | .90 | 18.45 |
| .15 | .15 | .944E+03 | 1.0 | 1.03 | 16.22 |
| .17 | .17 | .116E+04 | 1.3 | 1.16 | 14.36 |
| .20 | .20 | .140E+04 | 1.8 | 1.27 | 13.13 |
| .22 | .22 | .166E+04 | 2.3 | 1.36 | 12.24 |
| .24 | .24 | .194E+04 | 2.8 | 1.44 | 11.58 |
| .26 | .26 | .225E+04 | 3.4 | 1.51 | 11.05 |

```
   .29       .29    .258E+04       4.0          1.57       10.63
   .31       .31    .293E+04       4.8          1.62       10.27
   .33       .33    .331E+04       5.5          1.67        9.97
   .35       .35    .371E+04       6.4          1.72        9.71
   .38       .38    .413E+04       7.3          1.76        9.48
   .40       .40    .457E+04       8.2          1.80        9.28

                                   <---- hydrograph ---->  <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
 INFLOW : ID= 2 (0360)      30.00     3.62   10.00 122.28      .27      1.53
 OUTFLOW: ID= 1 (0362)      30.00     3.50   10.08 122.26      .27      1.52


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

--------------------
| ADD HYD   (0465) |
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0455):      12.70    1.564     10.00    128.70
      + ID2= 2 (0460):      36.00    4.413     10.00    128.70
        ===================================================
        ID = 3 (0465):      48.70    5.977     10.00    128.70

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0515) |
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0510):      16.00    2.134     10.00    182.64
      + ID2= 2 (0505):     165.47    9.000      6.75    134.22
        ===================================================
        ID = 3 (0515):     181.47   11.134     10.00    138.49

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------
--------------------
| ROUTE CHN (0564) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
            <------ DATA FOR SECTION (   1.1) ------>
            Distance      Elevation       Manning
                 .00        101.50          .0500
                1.00        100.70          .0500
                1.50        100.55      .0500 / .0300  Main Channel
                2.00         99.50          .0300      Main Channel
                3.50         99.60          .0300      Main Channel
                4.50        100.65      .0300 / .0500  Main Channel
                6.00        101.45          .0500

     <-------------------- TRAVEL TIME TABLE -------------------->
      DEPTH     ELEV      VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
       (m)       (m)     (cu.m.)        (cms)         (m/s)       (min)
       .10     99.60    .353E+02         .0            .19        43.69
       .19     99.69    .112E+03         .1            .37        22.76
       .29     99.79    .195E+03         .2            .49        17.03
       .38     99.88    .285E+03         .3            .59        14.23
       .48     99.98    .381E+03         .5            .67        12.51
```

| | | | | | |
|---|---|---|---|---|---|
| .57 | 100.07 | .484E+03 | .7 | .74 | 11.32 |
| .67 | 100.17 | .594E+03 | .9 | .80 | 10.43 |
| .76 | 100.26 | .710E+03 | 1.2 | .86 | 9.74 |
| .86 | 100.36 | .832E+03 | 1.5 | .91 | 9.18 |
| .95 | 100.45 | .961E+03 | 1.8 | .96 | 8.72 |
| 1.05 | 100.55 | .110E+04 | 2.2 | 1.00 | 8.32 |
| 1.16 | 100.66 | .127E+04 | 2.7 | 1.07 | 7.80 |
| 1.28 | 100.78 | .148E+04 | 3.4 | 1.14 | 7.31 |
| 1.39 | 100.89 | .170E+04 | 4.1 | 1.20 | 6.94 |
| 1.50 | 101.00 | .195E+04 | 4.9 | 1.25 | 6.65 |
| 1.61 | 101.11 | .221E+04 | 5.8 | 1.30 | 6.41 |
| 1.72 | 101.22 | .250E+04 | 6.7 | 1.34 | 6.22 |
| 1.84 | 101.34 | .280E+04 | 7.7 | 1.38 | 6.04 |
| 1.95 | 101.45 | .313E+04 | 8.8 | 1.41 | 5.90 |

**** WARNING: TRAVEL TIME TABLE EXCEEDED

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0505) | 78.53 | 18.11 | 10.08 | 134.22 | 1.92 | 1.40 |
| OUTFLOW: ID= 1 (0564) | 78.53 | 17.83 | 10.25 | 134.22 | 1.95 | 1.41 |

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--------------------
| ROUTE CHN (0563) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
```

<------ DATA FOR SECTION ( 2.2) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | 1.00 | .0350 | |
| 2.00 | .50 | .0350 | |
| 4.00 | .00 | .0350 / .0350 | Main Channel |
| 4.50 | .00 | .0350 | Main Channel |
| 5.00 | .00 | .0350 / .0350 | Main Channel |
| 7.00 | .50 | .0350 | |
| 9.00 | 1.00 | .0350 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .05 | .05 | .573E+01 | .0 | .67 | 2.23 |
| .11 | .11 | .135E+02 | .1 | .99 | 1.51 |
| .16 | .16 | .232E+02 | .3 | 1.23 | 1.22 |
| .21 | .21 | .349E+02 | .5 | 1.42 | 1.06 |
| .26 | .26 | .486E+02 | .9 | 1.58 | .95 |
| .32 | .32 | .643E+02 | 1.2 | 1.73 | .87 |
| .37 | .37 | .820E+02 | 1.7 | 1.86 | .81 |
| .42 | .42 | .102E+03 | 2.2 | 1.98 | .76 |
| .47 | .47 | .123E+03 | 2.9 | 2.10 | .71 |
| .53 | .53 | .147E+03 | 3.6 | 2.21 | .68 |
| .58 | .58 | .173E+03 | 4.4 | 2.31 | .65 |
| .63 | .63 | .200E+03 | 5.4 | 2.42 | .62 |
| .68 | .68 | .230E+03 | 6.4 | 2.51 | .60 |
| .74 | .74 | .262E+03 | 7.6 | 2.61 | .58 |
| .79 | .79 | .295E+03 | 8.9 | 2.70 | .56 |
| .84 | .84 | .331E+03 | 10.3 | 2.79 | .54 |
| .89 | .89 | .369E+03 | 11.8 | 2.88 | .52 |
| .95 | .95 | .408E+03 | 13.5 | 2.97 | .51 |
| 1.00 | 1.00 | .450E+03 | 15.2 | 3.05 | .49 |

| | AREA | <---- hydrograph ----> QPEAK | TPEAK | R.V. | <-pipe / channel-> MAX DEPTH | MAX VEL |
|---|---|---|---|---|---|---|

```
                    Hadati Creek Watershed - Allowable
                        (ha)     (cms)    (hrs)   (mm)        (m)      (m/s)
   INFLOW : ID= 2 (0566)  23.70     2.87    10.00 128.70        .47      2.10
   OUTFLOW: ID= 1 (0563)  23.70     2.87    10.00 128.70        .47      2.10


-------------------------------------------------------------------------------
-------------------
| DUHYD     (0425) |
| Inlet Cap.=1.980 |
| #of Inlets=    1 |
| Total(cms)=  2.0 |     AREA     QPEAK     TPEAK    R.V.
-------------------      (ha)     (cms)     (hrs)    (mm)
   TOTAL HYD.(ID= 1):   29.19      3.60     10.00  128.70
   =====================================================
   MAJOR SYS.(ID= 2):    4.95      1.62     10.00  128.70
   MINOR SYS.(ID= 3):   24.24      1.98      9.33  128.70

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
-------------------
| RESERVOIR (0104) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         .0000       .0000   |   1.0000      .5000
                         .0100       .0100   |  10.0000      .6000
                         .0150       .1332   |    .0000      .0000

                                 AREA       QPEAK       TPEAK        R.V.
                                 (ha)       (cms)       (hrs)        (mm)
   INFLOW : ID= 2 (0103)       30.640      3.807       10.00       128.70
   OUTFLOW: ID= 1 (0104)       30.640      3.797       10.00       128.69

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 99.73
               TIME SHIFT OF PEAK FLOW         (min)=   .00
               MAXIMUM  STORAGE   USED       (ha.m.)=   .5312

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

-------------------
| ADD HYD   (0359) |
|   1 +  2 =  3    |       AREA    QPEAK    TPEAK      R.V.
-------------------        (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (0358):   12.30   1.436    10.08    128.64
       + ID2= 2 (0353):   16.30   1.875    10.08    128.66
         ==================================================
         ID = 3 (0359):   28.60   3.311    10.08    128.65

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD   (0363) |
|   1 +  2 =  3    |       AREA    QPEAK    TPEAK      R.V.
-------------------        (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (0359):   28.60   3.311    10.08    128.65
       + ID2= 2 (0362):   30.00   3.504    10.08    122.26
         ==================================================
         ID = 3 (0363):   58.60   6.814    10.08    125.38

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

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--------------------------------------------------------------------------------
--------------------
| ADD HYD    (0470) |
|  1 +  2 =  3      |          AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0465):      48.70     5.977     10.00    128.70
        + ID2= 2 (0425):       4.95     1.622     10.00    128.70
          ==================================================
          ID = 3 (0470):      53.65     7.598     10.00    128.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD      (0520) |
| Inlet Cap.=3.050  |
| #of Inlets=     1 |
| Total(cms)=  3.0  |       AREA       QPEAK       TPEAK      R.V.
--------------------        (ha)       (cms)       (hrs)      (mm)
     TOTAL HYD.(ID= 1): 181.47       11.13       10.00    138.49
     ======================================================
     MAJOR SYS.(ID= 2):  98.04        8.08       10.00    138.49
     MINOR SYS.(ID= 3):  83.43        3.05        4.25    138.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ROUTE CHN (0561)  |
| IN= 2---> OUT= 1  |      Routing time step (min)'=  5.00
--------------------
              <------ DATA FOR SECTION (    1.1) ------>
              Distance       Elevation         Manning
                   .00            1.00           .0350
                  2.00             .50           .0350
                  4.00             .00     .0350 / .0350   Main Channel
                  4.50             .00           .0350     Main Channel
                  5.00             .00     .0350 / .0350   Main Channel
                  7.00             .50           .0350
                  9.00            1.00           .0350

     <-------------------- TRAVEL TIME TABLE --------------------->
      DEPTH     ELEV      VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
       (m)       (m)     (cu.m.)        (cms)         (m/s)       (min)
       .05       .05    .319E+01          .1           .87         .95
       .11       .11    .748E+01          .2          1.26         .66
       .16       .16    .129E+02          .4          1.54         .54
       .21       .21    .194E+02          .7          1.75         .48
       .26       .26    .270E+02         1.0          1.93         .43
       .32       .32    .357E+02         1.5          2.08         .40
       .37       .37    .456E+02         2.0          2.22         .38
       .42       .42    .565E+02         2.6          2.34         .36
       .47       .47    .686E+02         3.4          2.46         .34
       .53       .53    .817E+02         4.2          2.57         .32
       .58       .58    .960E+02         5.1          2.68         .31
       .63       .63    .111E+03         6.2          2.78         .30
       .68       .68    .128E+03         7.3          2.87         .29
       .74       .74    .145E+03         8.6          2.97         .28
       .79       .79    .164E+03        10.0          3.06         .27
       .84       .84    .184E+03        11.6          3.14         .27
       .89       .89    .205E+03        13.2          3.23         .26
```

```
    .95       .95     .227E+03      15.0          3.31         .25
   1.00      1.00     .250E+03      17.0          3.40         .25

                                  <---- hydrograph ---->  <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
 INFLOW : ID= 2 (0563)    23.70     2.87   10.00 128.70      .44      2.38
 OUTFLOW: ID= 1 (0561)    23.70     2.87   10.00 128.70      .44      2.38

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-------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0111):   19.00   2.069    10.50   128.68
        + ID2= 2 (0104):   30.64   3.797    10.00   128.69
          ===============================================
          ID = 3 (0114):   49.64   4.896    10.50   128.69

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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-------------------
| ADD HYD   (0380) |
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0365):  117.50  14.089    10.00   128.70
        + ID2= 2 (0363):   58.60   6.814    10.08   125.38
          ===============================================
          ID = 3 (0380):  176.10  20.834    10.00   127.59

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
-------------------
| ROUTE CHN (0475) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
-------------------
              <------ DATA FOR SECTION (   1.1) ------>
              Distance       Elevation        Manning
                100.00         324.60           .0500
                115.00         321.60           .0500
                120.00         320.80       .0500 / .0300  Main Channel
                122.00         320.80       .0300 / .0500  Main Channel
                138.00         321.60           .0500
                148.00         322.30           .0500
                154.00         323.10           .0500
                164.00         324.60           .0500

    <-------------------- TRAVEL TIME TABLE --------------------->
     DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
      (m)       (m)      (cu.m.)       (cms)         (m/s)       (min)
      .20    321.00     .398E+03        .8            .84         8.53
      .40    321.20     .125E+04       3.3           1.13         6.33
      .60    321.40     .255E+04       8.1           1.36         5.27
      .80    321.60     .430E+04      15.6           1.56         4.59
     1.00    321.80     .644E+04      26.8           1.79         4.01
     1.20    322.00     .892E+04      41.2           1.99         3.61
     1.40    322.20     .117E+05      59.3           2.17         3.30
     1.60    322.40     .148E+05      81.9           2.37         3.02
```

```
  1.80    322.60    .182E+05     109.1          2.58        2.78
  2.00    322.80    .218E+05     140.2          2.77        2.59
  2.20    323.00    .256E+05     175.3          2.95        2.43
  2.40    323.20    .296E+05     214.7          3.12        2.29
  2.60    323.40    .338E+05     258.6          3.29        2.18
  2.80    323.60    .382E+05     306.7          3.46        2.07
  3.00    323.80    .428E+05     359.1          3.61        1.98
  3.20    324.00    .476E+05     416.0          3.76        1.91
  3.40    324.20    .526E+05     477.5          3.91        1.83
  3.60    324.40    .578E+05     543.5          4.05        1.77
  3.80    324.60    .632E+05     614.3          4.18        1.71

                                   <---- hydrograph ---->   <-pipe / channel->
                            AREA     QPEAK   TPEAK   R.V.   MAX DEPTH   MAX VEL
                            (ha)     (cms)   (hrs)   (mm)      (m)       (m/s)
  INFLOW : ID= 2 (0470)    53.65      7.60   10.00 128.70      .58        1.33
  OUTFLOW: ID= 1 (0475)    53.65      7.51   10.00 128.70      .58        1.33

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--------------------
| ADD HYD   (0526) |
|   1 +  2 =  3    |        AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0520):    98.04    8.084     10.00    138.49
        + ID2= 2 (0525):      .00     .001       .00   *******
          ================================================
          ID = 3 (0526):    98.04    8.084     10.00    138.49

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0492) |
|   1 +  2 =  3    |        AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0561):    23.70    2.867     10.00    128.70
        + ID2= 2 (0481):     5.90     .715     10.00    128.70
          ================================================
          ID = 3 (0492):    29.60    3.582     10.00    128.70

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0115) |
|   1 +  2 =  3    |        AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0114):    49.64    4.896     10.50    128.69
        + ID2= 2 (0106):    51.32    5.997     10.08    128.69
          ================================================
          ID = 3 (0115):   100.96   10.540     10.08    128.69

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0390) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
```

Hadati Creek Watershed - Allowable

| | | | |
|---|---|---|---|
| (cms) | (ha.m.) | (cms) | (ha.m.) |
| .0000 | .0000 | 1.3100 | 1.6000 |
| .7700 | .2870 | 1.8600 | 23.2300 |
| 1.2600 | .9680 | .0000 | .0000 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| INFLOW : ID= 2 (0380) | 176.100 | 20.834 | 10.00 | 127.59 |
| OUTFLOW: ID= 1 (0390) | 176.100 | 1.714 | 12.33 | 127.59 |

PEAK FLOW REDUCTION [Qout/Qin](%)= 8.23
TIME SHIFT OF PEAK FLOW (min)=140.00
MAXIMUM STORAGE USED (ha.m.)= 17.4981

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| ROUTE CHN (0527) |
| IN= 2---> OUT= 1 |    Routing time step (min)'= 5.00

<------ DATA FOR SECTION ( 1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| 100.00 | 313.20 | .0500 | |
| 140.00 | 312.40 | .0500 / .0300 | Main Channel |
| 140.50 | 310.80 | .0300 | Main Channel |
| 141.50 | 310.80 | .0300 | Main Channel |
| 142.00 | 312.40 | .0300 / .0500 | Main Channel |
| 160.00 | 313.20 | .0500 | |

<-------------------- TRAVEL TIME TABLE -------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .12 | 310.92 | .575E+02 | .1 | .40 | 18.86 |
| .25 | 311.05 | .119E+03 | .2 | .57 | 13.13 |
| .37 | 311.17 | .185E+03 | .3 | .69 | 10.87 |
| .49 | 311.29 | .256E+03 | .4 | .78 | 9.61 |
| .62 | 311.42 | .330E+03 | .6 | .86 | 8.77 |
| .74 | 311.54 | .409E+03 | .8 | .92 | 8.17 |
| .86 | 311.66 | .492E+03 | 1.1 | .97 | 7.70 |
| .98 | 311.78 | .579E+03 | 1.3 | 1.02 | 7.32 |
| 1.11 | 311.91 | .671E+03 | 1.6 | 1.07 | 7.01 |
| 1.23 | 312.03 | .767E+03 | 1.9 | 1.11 | 6.74 |
| 1.35 | 312.15 | .867E+03 | 2.2 | 1.15 | 6.50 |
| 1.48 | 312.28 | .971E+03 | 2.6 | 1.19 | 6.29 |
| 1.60 | 312.40 | .108E+04 | 2.9 | 1.23 | 6.11 |
| 1.73 | 312.53 | .149E+04 | 3.6 | 1.10 | 6.85 |
| 1.87 | 312.67 | .248E+04 | 4.9 | .88 | 8.52 |
| 2.00 | 312.80 | .405E+04 | 6.9 | .77 | 9.74 |
| 2.13 | 312.93 | .620E+04 | 10.1 | .73 | 10.21 |
| 2.27 | 313.07 | .893E+04 | 14.6 | .74 | 10.17 |
| 2.40 | 313.20 | .122E+05 | 20.7 | .76 | 9.85 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0526) | 98.04 | 8.08 | 10.00 | 138.49 | 2.05 | .76 |
| OUTFLOW: ID= 1 (0527) | 98.04 | 7.97 | 10.08 | 138.49 | 2.04 | .76 |

---

| RESERVOIR (0482) |
| IN= 2---> OUT= 1 |
| DT= 5.0 min |    OUTFLOW    STORAGE | OUTFLOW    STORAGE

```
                         Hadati Creek Watershed - Allowable
--------------------       (cms)      (ha.m.)   |   (cms)     (ha.m.)
                           .0000       .0000    |    .2910      .3795
                           .2590       .0579    |    .2970      .4503
                           .2660       .1180    |   1.6320      .5232
                           .2720       .1802    |   4.1680      .5983
                           .2790       .2445    |   7.5660      .6756
                           .2850       .3109    |    .0000      .0000

                                    AREA       QPEAK       TPEAK        R.V.
                                    (ha)       (cms)       (hrs)        (mm)
     INFLOW : ID= 2 (0492)        29.600       3.582       10.00      128.70
     OUTFLOW: ID= 1 (0482)        29.600       3.550       10.08      128.69

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 99.13
                   TIME SHIFT OF PEAK FLOW         (min)=  5.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=   .5800

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--------------------
| ADD HYD   (0400) |
|   1 +  2 =  3    |            AREA      QPEAK     TPEAK      R.V.
--------------------            (ha)      (cms)     (hrs)      (mm)
          ID1= 1 (0390):      176.10     1.714     12.33    127.59
        + ID2= 2 (0395):       51.20     5.388     10.08     88.29
          ===================================================
          ID = 3 (0400):      227.30     6.909     10.08    118.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0403) |
| IN= 2---> OUT= 1 |       Routing time step (min)'=  5.00
--------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance       Elevation       Manning
                  100.00         338.30         .0500
                  110.00         336.80         .0500
                  135.00         336.00         .0300       Main Channel
                  142.00         335.30         .0500
                  148.00         335.30         .0500
                  156.00         336.00         .0500
                  165.00         338.30         .0000

      <-------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV       VOLUME      FLOW RATE     VELOCITY   TRAV.TIME
        (m)       (m)      (cu.m.)        (cms)        (m/s)       (min)
        .16    335.46     .231E+04          .9          .71       44.52
        .32    335.62     .563E+04         3.2         1.09       29.11
        .47    335.77     .997E+04         7.3         1.39       22.72
        .63    335.93     .153E+05        13.4         1.66       19.04
        .79    336.09     .218E+05        22.7         1.97       16.04
        .95    336.25     .299E+05        35.3         2.25       14.10
       1.11    336.41     .396E+05        51.2         2.46       12.89
       1.26    336.56     .510E+05        70.7         2.63       12.02
       1.42    336.72     .641E+05        94.1         2.79       11.35
       1.58    336.88     .787E+05       122.4         2.96       10.71
       1.74    337.04     .939E+05       155.6         3.15       10.06
       1.89    337.19     .110E+06       192.8         3.34        9.48
       2.05    337.35     .126E+06       233.9         3.53        8.97
       2.21    337.51     .143E+06       278.9         3.71        8.53
       2.37    337.67     .160E+06       327.7         3.89        8.13
```

```
    2.53    337.83    .178E+06    380.3          4.07       7.79
    2.68    337.98    .196E+06    436.7          4.23       7.48
    2.84    338.14    .215E+06    496.9          4.40       7.20
    3.00    338.30    .234E+06    561.0          4.56       6.95

                                  <---- hydrograph ---->  <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.  MAX DEPTH   MAX VEL
                            (ha)    (cms)   (hrs)   (mm)     (m)       (m/s)
   INFLOW : ID= 2 (0400)  227.30     6.91   10.08 118.74     .46        1.36
   OUTFLOW: ID= 1 (0403)  227.30     6.38   10.33 118.74     .44        1.30


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--------------------
| ADD HYD    (0407) |
|   1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0115):    100.96  10.540    10.08   128.69
        + ID2= 2 (0403):    227.30   6.377    10.33   118.74
          ==================================================
          ID = 3 (0407):    328.26  16.526    10.17   121.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| RESERVOIR (0113) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
--------------------        (cms)      (ha.m.)   |   (cms)      (ha.m.)
                            .0000        .0000   |   1.6000      6.4000
                           1.1000       2.9000   |   9.1000     10.0000
                           1.3000       4.3000   |  12.0000     20.0000

                              AREA        QPEAK        TPEAK        R.V.
                              (ha)        (cms)        (hrs)        (mm)
   INFLOW : ID= 2 (0407)    328.260      16.526       10.17       121.80
   OUTFLOW: ID= 1 (0113)    328.260       9.456       11.50       121.80

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 57.22
                 TIME SHIFT OF PEAK FLOW         (min)= 80.00
                 MAXIMUM  STORAGE   USED       (ha.m.)= 11.2348

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--------------------
| ADD HYD    (0430) |
|   1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0425):     24.24   1.980     9.33   128.70
        + ID2= 2 (0113):    328.26   9.456    11.50   121.80
          ==================================================
          ID = 3 (0430):    352.50  11.349    11.08   122.27

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0440) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
              <------ DATA FOR SECTION (    1.1) ------>
```

```
       Distance        Elevation         Manning
         100.00          325.40           .0600
         120.00          324.60           .0600
         126.00          323.90           .0600
         130.00          323.00           .0600
         140.00          322.30      .0600 / .0300  Main Channel
         142.00          322.30      .0300 / .0600  Main Channel
         150.00          323.90           .0600
         155.00          324.60           .0600
         160.00          325.40           .0600

 <-------------------- TRAVEL TIME TABLE --------------------->
  DEPTH    ELEV       VOLUME     FLOW RATE    VELOCITY   TRAV.TIME
   (m)      (m)      (cu.m.)      (cms)        (m/s)       (min)
   .16    322.46    .233E+03        .6           .96        6.96
   .33    322.63    .672E+03       2.1          1.26        5.27
   .49    322.79    .132E+04       4.9          1.48        4.51
   .65    322.95    .216E+04       9.0          1.66        4.03
   .82    323.12    .319E+04      14.9          1.87        3.57
   .98    323.28    .433E+04      22.5          2.08        3.21
  1.14    323.44    .556E+04      31.6          2.27        2.93
  1.31    323.61    .689E+04      42.3          2.45        2.72
  1.47    323.77    .833E+04      54.6          2.62        2.54
  1.63    323.93    .987E+04      68.3          2.77        2.41
  1.79    324.09    .115E+05      82.8          2.87        2.33
  1.96    324.26    .134E+05      99.2          2.96        2.25
  2.12    324.42    .154E+05     117.9          3.06        2.18
  2.28    324.58    .176E+05     138.8          3.15        2.11
  2.45    324.75    .200E+05     157.4          3.14        2.12
  2.61    324.91    .228E+05     179.6          3.15        2.11
  2.77    325.07    .259E+05     205.8          3.18        2.09
  2.94    325.24    .293E+05     236.1          3.23        2.07
  3.10    325.40    .330E+05     270.6          3.28        2.03

                                  <---- hydrograph ---->  <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
 INFLOW : ID= 2 (0430)   352.50    11.35   11.08 122.27      .72       1.73
 OUTFLOW: ID= 1 (0440)   352.50    11.32   11.08 122.27      .71       1.73

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 --------------------
| ADD HYD    (0485) |
|   1 +  2 =  3     |         AREA    QPEAK     TPEAK      R.V.
 --------------------         (ha)    (cms)     (hrs)      (mm)
          ID1= 1 (0440):    352.50   11.321     11.08    122.27
        + ID2= 2 (0475):     53.65    7.511     10.00    128.70
          ==================================================
          ID = 3 (0485):    406.15   16.120     10.75    123.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 --------------------
| ADD HYD    (0490) |
|   1 +  2 =  3     |         AREA    QPEAK     TPEAK      R.V.
 --------------------         (ha)    (cms)     (hrs)      (mm)
          ID1= 1 (0485):    406.15   16.120     10.75    123.12
        + ID2= 2 (0480):     43.10    5.222     10.00    128.70
          ==================================================
```

```
        ID = 3 (0490):   449.25  19.973    10.67   123.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0491) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0482):      29.60    3.550     10.08    128.69
      + ID2= 2 (0490):     449.25   19.973     10.67    123.66
        ==================================================
        ID = 3 (0491):     478.85   23.211     10.17    123.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
--------------------
| RESERVOIR (0483) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |        OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------         (cms)      (ha.m.)    |   (cms)      (ha.m.)
                             .0000        .0000    |   7.0800       2.4860
                             .2760        .0600    |   8.1000       3.3240
                            1.2000        .3400    |   9.7980       4.6420
                            2.0400        .6182    |  10.4940       7.4397
                            2.6400       1.1630    |  11.6850      10.3000
                            3.1200       1.7070    |  12.3480      11.4000

                                   AREA      QPEAK       TPEAK        R.V.
                                   (ha)      (cms)       (hrs)        (mm)
     INFLOW : ID= 2 (0491)      478.850     23.211       10.17      123.97
     OUTFLOW: ID= 1 (0483)      478.850     11.874       12.08      123.97

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 51.15
                    TIME SHIFT OF PEAK FLOW        (min)=115.00
                    MAXIMUM  STORAGE   USED       (ha.m.)= 10.6135

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

--------------------
| ADD HYD   (0530) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0540):       4.63     .636     10.00    182.64
      + ID2= 2 (0483):     478.85   11.874     12.08    123.97
        ==================================================
        ID = 3 (0530):     483.48   12.008     12.00    124.53

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0545) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0527):      98.04    7.968     10.08    138.49
      + ID2= 2 (0530):     483.48   12.008     12.00    124.53
        ==================================================
        ID = 3 (0545):     581.52   19.161     11.00    126.88
```
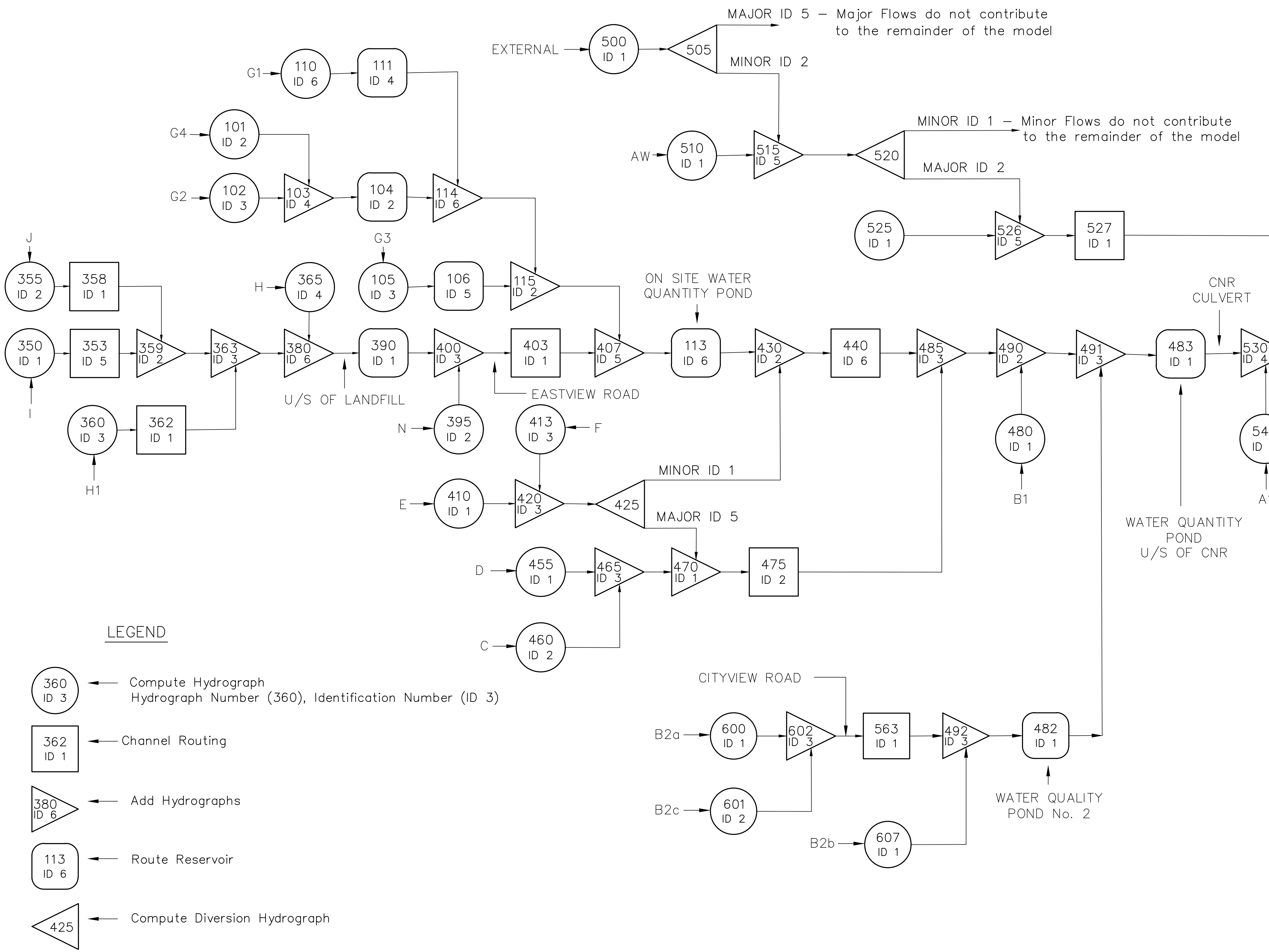

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

 --------------------
 | ADD HYD   (0546) |
 |   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
 --------------------          (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0542):     25.25    3.443     10.00    182.64
         + ID2= 2 (0545):    581.52   19.161     11.00    126.88
           ==================================================
           ID = 3 (0546):    606.77   21.671     10.08    129.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

 --------------------
 | ADD HYD   (0547) |
 |   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
 --------------------          (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0543):     14.99    2.054     10.00    182.64
         + ID2= 2 (0546):    606.77   21.671     10.08    129.20
           ==================================================
           ID = 3 (0547):    621.76   23.685     10.00    130.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

 --------------------
 | ADD HYD   (0548) |
 |   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
 --------------------          (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0544):      1.13     .156     10.00    182.64
         + ID2= 2 (0547):    621.76   23.685     10.00    130.49
           ==================================================
           ID = 3 (0548):    622.89   23.841     10.00    130.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

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

# PRELIMINARY SERVICING AND STORMWATER MANAGEMENT REPORT
# CITYVIEW RIDGE SUBDIVISION
# CITY OF GUELPH




REVISED: JUNE 2017

## HADATI CREEK MODELLING SCHEMATIC

**Figure No. 8**

Gamsby and Mannerow
ENGINEERS

Gamsby and Mannerow Limited OCT 23 2003 03027002.DWG

Plotted On: June 22, 2017 105172–FIG8.dwg

Hadati Creek Watershed - Post Development with Cityview Ridge
=====================================================================================================

```
    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
    O   O    T      T    H   H   Y Y   MM MM  O   O
    O   O    T      T    H   H    Y    M   M  O   O
     OOO     T      T    H   H    Y    M   M   OOO
```

Developed and Distributed by Clarifica Inc.


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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 2.3.2\voin.dat

Output filename: Y:\SPrimmer\OTTHYMO\Cityview Ridge\Hadati Creek Watershed - Post Development with Cityview Ridge.out
Summary filename: Y:\SPrimmer\OTTHYMO\Cityview Ridge\Hadati Creek Watershed - Post Development with Cityview Ridge.sum

DATE: 3/30/2015 TIME: 3:05:13 PM

USER:

COMMENTS: ____________________________________________

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

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

| READ STORM | Filename: Y:\SPrimmer\OTTHYMO\Cityview Ridge\25mm4hr.stm |
|---|---|
| Ptotal= 25.00 mm | Comments: 25 mm - 4 hour - 10 Minute Time Step |

| TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr | TIME hrs | RAIN mm/hr |
|---|---|---|---|---|---|---|---|
| .17 | .53 | 1.17 | 17.57 | 2.17 | 2.95 | 3.17 | .76 |
| .33 | .71 | 1.33 | 61.55 | 2.33 | 2.19 | 3.33 | .65 |
| .50 | .99 | 1.50 | 24.02 | 2.50 | 1.69 | 3.50 | .57 |
| .67 | 1.51 | 1.67 | 11.16 | 2.67 | 1.34 | 3.67 | .49 |
| .83 | 2.57 | 1.83 | 6.44 | 2.83 | 1.09 | 3.83 | .44 |
| 1.00 | 5.31 | 2.00 | 4.20 | 3.00 | .90 | 4.00 | .38 |

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

```
--------------------
| CALIB             |
| STANDHYD  (0480)  |   Area    (ha)=  43.10
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     18.10        25.00
     Dep. Storage      (mm)=      1.50         5.00
     Average Slope      (%)=      2.00         2.00
     Length             (m)=    680.00        40.00
     Mannings n           =       .013         .300

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


                          ---- TRANSFORMED HYETOGRAPH ----
             TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
             .083     .53 | 1.083   17.57 | 2.083    2.95 |  3.08     .76
             .167     .53 | 1.167   17.57 | 2.167    2.95 |  3.17     .76
             .250     .71 | 1.250   61.55 | 2.250    2.19 |  3.25     .65
             .333     .71 | 1.333   61.55 | 2.333    2.19 |  3.33     .65
             .417     .99 | 1.417   24.02 | 2.417    1.69 |  3.42     .57
             .500     .99 | 1.500   24.02 | 2.500    1.69 |  3.50     .57
             .583    1.51 | 1.583   11.16 | 2.583    1.34 |  3.58     .49
             .667    1.51 | 1.667   11.16 | 2.667    1.34 |  3.67     .49
             .750    2.57 | 1.750    6.44 | 2.750    1.09 |  3.75     .44
             .833    2.57 | 1.833    6.44 | 2.833    1.09 |  3.83     .44
             .917    5.31 | 1.917    4.20 | 2.917     .90 |  3.92     .38
            1.000    5.31 | 2.000    4.20 | 3.000     .90 |  4.00     .38

     Max.Eff.Inten.(mm/hr)=      61.55         7.05
                over (min)       10.00        35.00
     Storage Coeff.  (min)=       7.96 (ii)   30.70 (ii)
     Unit Hyd. Tpeak (min)=      10.00        35.00
     Unit Hyd. peak  (cms)=        .13          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.09          .23         1.142 (iii)
     TIME TO PEAK    (hrs)=       1.42         1.83          1.42
     RUNOFF VOLUME    (mm)=      23.50         2.16          6.64
     TOTAL RAINFALL   (mm)=      25.00        25.00         25.00
     RUNOFF COEFFICIENT   =        .94          .09           .27


       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     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  (0415)  |   Area    (ha)=   4.99
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      2.10         2.89
     Dep. Storage      (mm)=      1.50         5.00
     Average Slope      (%)=      2.86         2.86
     Length             (m)=    185.00        40.00
```

```
     Mannings n          =       .013         .300

     Max.Eff.Inten.(mm/hr)=      61.55         8.82
               over (min)         5.00        25.00
     Storage Coeff.  (min)=       3.27 (ii)   21.96 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .27          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .17          .04          .179 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.67          1.33
     RUNOFF VOLUME    (mm)=      23.50         2.16          6.64
     TOTAL RAINFALL   (mm)=      25.00        25.00         25.00
     RUNOFF COEFFICIENT   =        .94          .09           .27

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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  (0410)   |   Area    (ha)=  24.20
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.16        14.04
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     401.00        40.00
     Mannings n          =       .013         .300

     Max.Eff.Inten.(mm/hr)=      61.55         7.05
               over (min)         5.00        30.00
     Storage Coeff.  (min)=       5.80 (ii)   28.54 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .20          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .75          .14          .770 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.75          1.33
     RUNOFF VOLUME    (mm)=      23.50         2.16          6.64
     TOTAL RAINFALL   (mm)=      25.00        25.00         25.00
     RUNOFF COEFFICIENT   =        .94          .09           .27

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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  (0460)   |   Area    (ha)=  36.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area     (ha)=      15.12         20.88
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.03          2.03
     Length            (m)=     465.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      61.55          7.05
               over (min)        5.00         30.00
     Storage Coeff.  (min)=       6.31 (ii)     28.95 (ii)
     Unit Hyd. Tpeak (min)=       5.00         30.00
     Unit Hyd. peak  (cms)=        .19           .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.09           .21        1.117 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.75         1.33
     RUNOFF VOLUME    (mm)=      23.50          2.16         6.64
     TOTAL RAINFALL   (mm)=      25.00         25.00        25.00
     RUNOFF COEFFICIENT   =        .94           .09          .27

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     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)=  12.70
|ID= 1 DT= 5.0 min |    Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.33          7.37
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       1.71          1.71
     Length            (m)=     300.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      61.55          7.05
               over (min)        5.00         30.00
     Storage Coeff.  (min)=       5.11 (ii)     28.94 (ii)
     Unit Hyd. Tpeak (min)=       5.00         30.00
     Unit Hyd. peak  (cms)=        .21           .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .41           .07         .417 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.75         1.33
     RUNOFF VOLUME    (mm)=      23.50          2.16         6.64
     TOTAL RAINFALL   (mm)=      25.00         25.00        25.00
     RUNOFF COEFFICIENT   =        .94           .09          .27

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     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  (0395) |    Area    (ha)=  51.20
```

```
|ID= 1 DT= 5.0 min |   Total Imp(%)=  10.00   Dir. Conn.(%)=   5.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      5.12        46.08
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      2.00         2.00
     Length            (m)=    900.00        40.00
     Mannings n           =      .013         .300

     Max.Eff.Inten.(mm/hr)=     61.55          .00
               over (min)      10.00       230.00
     Storage Coeff.  (min)=      9.42 (ii)  225.31 (ii)
     Unit Hyd. Tpeak (min)=     10.00       230.00
     Unit Hyd. peak  (cms)=       .12          .00
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .29          .00          .292 (iii)
     TIME TO PEAK    (hrs)=      1.42          .00          1.42
     RUNOFF VOLUME    (mm)=     23.50          .00          1.17
     TOTAL RAINFALL   (mm)=     25.00        25.00         25.00
     RUNOFF COEFFICIENT   =       .94          .00           .05

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.
***** WARNING: THE PERVIOUS AREA HAS NO FLOW .

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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  (0360)   |   Area    (ha)=  30.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  37.00   Dir. Conn.(%)=  19.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     11.10        18.90
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      2.00         2.00
     Length            (m)=    447.00        40.00
     Mannings n           =      .013         .300

     Max.Eff.Inten.(mm/hr)=     61.55         2.81
               over (min)       5.00        40.00
     Storage Coeff.  (min)=      6.19 (ii)   39.07 (ii)
     Unit Hyd. Tpeak (min)=      5.00        40.00
     Unit Hyd. peak  (cms)=       .19          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .83          .08          .834 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.92          1.33
     RUNOFF VOLUME    (mm)=     23.50         1.27          5.50
     TOTAL RAINFALL   (mm)=     25.00        25.00         25.00
     RUNOFF COEFFICIENT   =       .94          .05           .22

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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  (0350)  |    Area    (ha)=  16.30
|ID= 1 DT= 5.0 min  |    Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.85         9.45
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     330.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      61.55         5.04
                over (min)        5.00        40.00
     Storage Coeff.  (min)=       6.35 (ii)   38.38 (ii)
     Unit Hyd. Tpeak (min)=       5.00        40.00
     Unit Hyd. peak  (cms)=        .19          .03
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .49          .07             .499 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.92             1.33
     RUNOFF VOLUME    (mm)=      23.50         2.16             6.64
     TOTAL RAINFALL   (mm)=      25.00        25.00            25.00
     RUNOFF COEFFICIENT   =        .94          .09              .27

   (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
        Fc    (mm/hr)= 12.50     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  (0355)  |    Area    (ha)=  12.30
|ID= 1 DT= 5.0 min  |    Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.17         7.13
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.60         1.60
     Length            (m)=     286.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      61.55         7.05
                over (min)        5.00        30.00
     Storage Coeff.  (min)=       5.06 (ii)   29.38 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .21          .04
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .40          .07             .405 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.75             1.33
     RUNOFF VOLUME    (mm)=      23.50         2.16             6.64
     TOTAL RAINFALL   (mm)=      25.00        25.00            25.00
     RUNOFF COEFFICIENT   =        .94          .09              .27
```

```
        Hadati Creek Watershed - Post Development with Cityview Ridge
    (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
         Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
         Fc    (mm/hr)= 12.50     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  (0365) |   Area    (ha)= 117.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      49.35        68.15
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     885.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      61.55         7.05
                over (min)       10.00        35.00
     Storage Coeff.  (min)=       9.32 (ii)   32.06 (ii)
     Unit Hyd. Tpeak (min)=      10.00        35.00
     Unit Hyd. peak  (cms)=        .12          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.82          .62         2.960 (iii)
     TIME TO PEAK    (hrs)=       1.42         1.83          1.42
     RUNOFF VOLUME    (mm)=      23.50         2.16          6.64
     TOTAL RAINFALL   (mm)=      25.00        25.00         25.00
     RUNOFF COEFFICIENT   =        .94          .09           .27

    (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
         Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
         Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
   (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
  (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0105) |   Area    (ha)=  51.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.55        29.77
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     550.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      61.55         7.05
                over (min)        5.00        30.00
     Storage Coeff.  (min)=       7.01 (ii)   29.75 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .17          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.50          .30         1.538 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.75          1.33
     RUNOFF VOLUME    (mm)=      23.50         2.16          6.64
     TOTAL RAINFALL   (mm)=      25.00        25.00         25.00
```

```
 RUNOFF COEFFICIENT   =         .94            .09              .27

   (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
        Fc   (mm/hr)= 12.50     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  (0102)   |   Area    (ha)=  14.32
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        6.01         8.31
    Dep. Storage     (mm)=        1.50         5.00
    Average Slope     (%)=        2.00         2.00
    Length            (m)=      287.00        40.00
    Mannings n          =         .013         .300

    Max.Eff.Inten.(mm/hr)=       61.55         7.05
              over (min)          5.00        30.00
    Storage Coeff.  (min)=        4.74 (ii)   27.48 (ii)
    Unit Hyd. Tpeak (min)=        5.00        30.00
    Unit Hyd. peak  (cms)=         .22          .04
                                                            *TOTALS*
    PEAK FLOW       (cms)=         .47          .09           .479 (iii)
    TIME TO PEAK    (hrs)=        1.33         1.75           1.33
    RUNOFF VOLUME    (mm)=       23.50         2.16           6.64
    TOTAL RAINFALL   (mm)=       25.00        25.00          25.00
    RUNOFF COEFFICIENT   =         .94          .09            .27

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

   (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
        Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0101)   |   Area    (ha)=  16.32
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        6.85         9.47
    Dep. Storage     (mm)=        1.50         5.00
    Average Slope     (%)=        2.00         2.00
    Length            (m)=      309.00        40.00
    Mannings n          =         .013         .300

    Max.Eff.Inten.(mm/hr)=       61.55         7.05
              over (min)          5.00        30.00
    Storage Coeff.  (min)=        4.96 (ii)   27.70 (ii)
    Unit Hyd. Tpeak (min)=        5.00        30.00
    Unit Hyd. peak  (cms)=         .22          .04
                                                            *TOTALS*
```

```
     PEAK FLOW        (cms)=          .53            .10              .540 (iii)
     TIME TO PEAK     (hrs)=         1.33           1.75             1.33
     RUNOFF VOLUME     (mm)=        23.50           2.16             6.64
     TOTAL RAINFALL    (mm)=        25.00          25.00            25.00
     RUNOFF COEFFICIENT   =           .94            .09              .27

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0110)   |   Area    (ha)=  19.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         7.98          11.02
     Dep. Storage     (mm)=         1.50           5.00
     Average Slope     (%)=         2.00           2.00
     Length            (m)=       365.00          40.00
     Mannings n           =         .013           .300

     Max.Eff.Inten.(mm/hr)=        61.55           7.05
               over (min)          5.00          30.00
     Storage Coeff.  (min)=         5.48 (ii)     28.22 (ii)
     Unit Hyd. Tpeak (min)=         5.00          30.00
     Unit Hyd. peak  (cms)=          .20            .04
                                                              *TOTALS*
     PEAK FLOW       (cms)=          .60            .11              .614 (iii)
     TIME TO PEAK    (hrs)=         1.33           1.75             1.33
     RUNOFF VOLUME    (mm)=        23.50           2.16             6.64
     TOTAL RAINFALL   (mm)=        25.00          25.00            25.00
     RUNOFF COEFFICIENT  =           .94            .09              .27

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0600)   |   Area    (ha)=  11.38
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         4.78           6.60
     Dep. Storage     (mm)=         1.50           5.00
     Average Slope     (%)=         2.00           2.00
     Length            (m)=       680.00          40.00
     Mannings n           =         .013           .300

     Max.Eff.Inten.(mm/hr)=        61.55           7.05
               over (min)         10.00          35.00
```

```
     Storage Coeff.  (min)=       7.96 (ii)   30.70 (ii)
     Unit Hyd. Tpeak (min)=      10.00        35.00
     Unit Hyd. peak  (cms)=        .13          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .29          .06         .301 (iii)
     TIME TO PEAK    (hrs)=       1.42         1.83         1.42
     RUNOFF VOLUME    (mm)=      23.50         2.16         6.64
     TOTAL RAINFALL   (mm)=      25.00        25.00        25.00
     RUNOFF COEFFICIENT   =        .94          .09          .27

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0601)   |   Area    (ha)=   7.62
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  46.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.51         4.11
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     680.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      61.55        13.97
                over (min)       10.00        30.00
     Storage Coeff.  (min)=       7.96 (ii)   25.26 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=        .13          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .19          .07         .212 (iii)
     TIME TO PEAK    (hrs)=       1.42         1.75         1.42
     RUNOFF VOLUME    (mm)=      23.50         3.18         7.45
     TOTAL RAINFALL   (mm)=      25.00        25.00        25.00
     RUNOFF COEFFICIENT   =        .94          .13          .30

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0607)   |   Area    (ha)=   5.97
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=   2.50
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.51         3.46
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     680.00        40.00
     Mannings n           =       .013         .300
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```
     Max.Eff.Inten.(mm/hr)=      61.55        33.18
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       7.96 (ii)   20.20 (ii)
     Unit Hyd. Tpeak (min)=      10.00        25.00
     Unit Hyd. peak  (cms)=        .13          .05
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .02          .13          .141 (iii)
     TIME TO PEAK    (hrs)=       1.42         1.67          1.67
     RUNOFF VOLUME    (mm)=      23.50         4.97          5.44
     TOTAL RAINFALL   (mm)=      25.00        25.00         25.00
     RUNOFF COEFFICIENT   =        .94          .20           .22

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD  (0540)  |   Area    (ha)=   4.63
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.70          .93
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .55          .55
     Length            (m)=     150.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      61.55          .00
               over (min)         5.00       325.00
     Storage Coeff.  (min)=       4.73 (ii)  322.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00       325.00
     Unit Hyd. peak  (cms)=        .22          .00
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .57          .00          .569 (iii)
     TIME TO PEAK    (hrs)=       1.33          .00          1.33
     RUNOFF VOLUME    (mm)=      23.50          .00         18.56
     TOTAL RAINFALL   (mm)=      25.00        25.00         25.00
     RUNOFF COEFFICIENT   =        .94          .00           .74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING: THE PERVIOUS AREA HAS NO FLOW .

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD  (0500)  |   Area    (ha)= 244.00
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  46.00   Dir. Conn.(%)=  26.00
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--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     112.24       131.76
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .80          .80
     Length            (m)=    1275.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=      42.79         5.28
               over (min)        20.00        55.00
     Storage Coeff.  (min)=      17.67 (ii)   51.28 (ii)
     Unit Hyd. Tpeak (min)=      20.00        55.00
     Unit Hyd. peak  (cms)=        .06          .02
                                                           *TOTALS*
     PEAK FLOW       (cms)=       5.07          .82          5.342 (iii)
     TIME TO PEAK    (hrs)=       1.58         2.17           1.58
     RUNOFF VOLUME    (mm)=      23.50         2.25           7.77
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT  =         .94          .09            .31

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0510)   |   Area    (ha)=  16.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      12.80         3.20
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .50          .20
     Length            (m)=     400.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=      61.55          .00
               over (min)        10.00       440.00
     Storage Coeff.  (min)=       8.77 (ii)  439.54 (ii)
     Unit Hyd. Tpeak (min)=      10.00       440.00
     Unit Hyd. peak  (cms)=        .12          .00
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.48          .00          1.475 (iii)
     TIME TO PEAK    (hrs)=       1.42          .00           1.42
     RUNOFF VOLUME    (mm)=      23.50          .00          18.56
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT  =         .94          .00            .74

***** WARNING: THE PERVIOUS AREA HAS NO FLOW .

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0542)   |   Area    (ha)=  25.25
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      20.20          5.05
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=        .55           .55
     Length            (m)=     350.00         40.00
     Mannings n          =        .013          .300

     Max.Eff.Inten.(mm/hr)=      61.55           .00
               over (min)       10.00        330.00
     Storage Coeff.  (min)=       7.87 (ii)   325.88 (ii)
     Unit Hyd. Tpeak (min)=      10.00        330.00
     Unit Hyd. peak  (cms)=        .13           .00
                                                         *TOTALS*
     PEAK FLOW       (cms)=       2.41           .00        2.408 (iii)
     TIME TO PEAK    (hrs)=       1.42           .00        1.42
     RUNOFF VOLUME    (mm)=      23.50           .00       18.56
     TOTAL RAINFALL   (mm)=      25.00         25.00       25.00
     RUNOFF COEFFICIENT   =        .94           .00         .74

***** WARNING: THE PERVIOUS AREA HAS NO FLOW .

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0543)   |   Area    (ha)=  14.99
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.99          3.00
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=        .55           .55
     Length            (m)=     200.00         40.00
     Mannings n          =        .013          .300

     Max.Eff.Inten.(mm/hr)=      61.55           .00
               over (min)        5.00        325.00
     Storage Coeff.  (min)=       5.63 (ii)   323.64 (ii)
     Unit Hyd. Tpeak (min)=       5.00        325.00
     Unit Hyd. peak  (cms)=        .20           .00
                                                         *TOTALS*
     PEAK FLOW       (cms)=       1.77           .00        1.767 (iii)
     TIME TO PEAK    (hrs)=       1.33           .00        1.33
     RUNOFF VOLUME    (mm)=      23.50           .00       18.56
     TOTAL RAINFALL   (mm)=      25.00         25.00       25.00
     RUNOFF COEFFICIENT   =        .94           .00         .74

***** WARNING: THE PERVIOUS AREA HAS NO FLOW .

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
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   (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
  (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0544)  |   Area    (ha)=   1.13
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .90          .23
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .55          .55
     Length            (m)=      50.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      61.55          .00
                over (min)        5.00       325.00
     Storage Coeff.  (min)=       2.45 (ii)  320.46 (ii)
     Unit Hyd. Tpeak (min)=       5.00       325.00
     Unit Hyd. peak  (cms)=        .30          .00
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .15          .00          .151 (iii)
     TIME TO PEAK    (hrs)=       1.33          .00          1.33
     RUNOFF VOLUME    (mm)=      23.50          .00         18.56
     TOTAL RAINFALL   (mm)=      25.00        25.00         25.00
     RUNOFF COEFFICIENT   =        .94          .00           .74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING: THE PERVIOUS AREA HAS NO FLOW .

    (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
         Fo    (mm/hr)= 75.00          K   (1/hr)=  4.14
         Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
   (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
  (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| STORE HYD (0525) |   AREA       (ha)=     .00
| ID= 1 DT=****min |   QPEAK     (cms)=     .00
--------------------   TPEAK     (hrs)=     .00
                       VOLUME     (mm)=*******

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--------------------
| ADD HYD    (0420) |
|   1 +  2 =  3     |        AREA     QPEAK    TPEAK      R.V.
--------------------         (ha)     (cms)    (hrs)      (mm)
         ID1= 1 (0415):      4.99     .179     1.33      6.64
       + ID2= 2 (0410):     24.20     .770     1.33      6.64
         ================================================
         ID = 3 (0420):     29.19     .948     1.33      6.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| ADD HYD    (0465) |
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            Hadati Creek Watershed - Post Development with Cityview Ridge
|   1 +  2 =  3     |           AREA    QPEAK     TPEAK     R.V.
--------------------            (ha)    (cms)     (hrs)     (mm)
          ID1= 1 (0460):       36.00   1.117      1.33      6.64
        + ID2= 2 (0455):       12.70    .417      1.33      6.64
          ================================================
          ID = 3 (0465):       48.70   1.534      1.33      6.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ROUTE CHN (0362) |
| IN= 2---> OUT= 1 |       Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance       Elevation        Manning
                    .00             .40          .0300
                   5.50             .15      .0300 / .0150  Main Channel
                   5.51             .00          .0150      Main Channel
                  10.00             .09          .0150      Main Channel
                  14.49             .00          .0150      Main Channel
                  14.50             .15      .0150 / .0300  Main Channel
                  20.00             .40          .0300

     <--------------------- TRAVEL TIME TABLE ---------------------->
      DEPTH      ELEV        VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
       (m)        (m)       (cu.m.)       (cms)         (m/s)        (min)
       .02        .02      .176E+02         .0           .21         80.52
       .04        .04      .702E+02         .0           .33         50.72
       .06        .06      .158E+03         .1           .43         38.71
       .08        .08      .281E+03         .1           .52         31.95
       .09        .09      .438E+03         .3           .62         26.84
       .11        .11      .607E+03         .5           .77         21.66
       .13        .13      .776E+03         .7           .90         18.45
       .15        .15      .944E+03        1.0          1.03         16.22
       .17        .17      .116E+04        1.3          1.16         14.36
       .20        .20      .140E+04        1.8          1.27         13.13
       .22        .22      .166E+04        2.3          1.36         12.24
       .24        .24      .194E+04        2.8          1.44         11.58
       .26        .26      .225E+04        3.4          1.51         11.05
       .29        .29      .258E+04        4.0          1.57         10.63
       .31        .31      .293E+04        4.8          1.62         10.27
       .33        .33      .331E+04        5.5          1.67          9.97
       .35        .35      .371E+04        6.4          1.72          9.71
       .38        .38      .413E+04        7.3          1.76          9.48
       .40        .40      .457E+04        8.2          1.80          9.28

                                    <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)    (hrs)    (mm)      (m)      (m/s)
     INFLOW : ID= 2 (0360)   30.00     .83     1.33    5.50       .14       .96
     OUTFLOW: ID= 1 (0362)   30.00     .41     1.50    5.48       .11       .71


--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0353) |
| IN= 2---> OUT= 1 |       Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance       Elevation        Manning
                    .00             .26          .0300
                   5.50             .15      .0300 / .0150  Main Channel
```

| | | | |
|---|---|---|---|
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .26 | .0300 | |

<-------------------- TRAVEL TIME TABLE -------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .01 | .01 | .929E+01 | .0 | .17 | 99.56 |
| .03 | .03 | .372E+02 | .0 | .27 | 62.72 |
| .04 | .04 | .836E+02 | .0 | .35 | 47.86 |
| .05 | .05 | .149E+03 | .1 | .42 | 39.51 |
| .07 | .07 | .232E+03 | .1 | .49 | 34.05 |
| .08 | .08 | .334E+03 | .2 | .55 | 30.15 |
| .10 | .10 | .454E+03 | .3 | .64 | 26.24 |
| .11 | .11 | .576E+03 | .4 | .74 | 22.41 |
| .12 | .12 | .699E+03 | .6 | .84 | 19.75 |
| .14 | .14 | .822E+03 | .8 | .94 | 17.76 |
| .15 | .15 | .944E+03 | 1.0 | 1.03 | 16.22 |
| .16 | .16 | .108E+04 | 1.2 | 1.11 | 15.07 |
| .18 | .18 | .123E+04 | 1.4 | 1.17 | 14.28 |
| .19 | .19 | .140E+04 | 1.7 | 1.21 | 13.72 |
| .20 | .20 | .159E+04 | 2.0 | 1.25 | 13.31 |
| .22 | .22 | .180E+04 | 2.3 | 1.28 | 13.01 |
| .23 | .23 | .203E+04 | 2.6 | 1.31 | 12.76 |
| .25 | .25 | .227E+04 | 3.0 | 1.33 | 12.57 |
| .26 | .26 | .254E+04 | 3.4 | 1.34 | 12.41 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0350) | 16.30 | .50 | 1.33 | 6.64 | .12 | .78 |
| OUTFLOW: ID= 1 (0353) | 16.30 | .22 | 1.58 | 6.60 | .09 | .57 |

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

| ROUTE CHN (0358) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00

<------ DATA FOR SECTION (   1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | .26 | .0300 | |
| 5.50 | .15 | .0300 / .0150 | Main Channel |
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .26 | .0300 | |

<-------------------- TRAVEL TIME TABLE -------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .01 | .01 | .102E+02 | .0 | .17 | 109.52 |
| .03 | .03 | .409E+02 | .0 | .27 | 68.99 |
| .04 | .04 | .920E+02 | .0 | .35 | 52.65 |
| .05 | .05 | .163E+03 | .1 | .42 | 43.46 |
| .07 | .07 | .255E+03 | .1 | .49 | 37.45 |
| .08 | .08 | .368E+03 | .2 | .55 | 33.17 |
| .10 | .10 | .499E+03 | .3 | .64 | 28.86 |
| .11 | .11 | .634E+03 | .4 | .74 | 24.66 |
| .12 | .12 | .769E+03 | .6 | .84 | 21.72 |

```
  .14       .14     .904E+03          .8            .94       19.54
  .15       .15     .104E+04         1.0           1.03       17.84
  .16       .16     .119E+04         1.2           1.11       16.57
  .18       .18     .135E+04         1.4           1.17       15.71
  .19       .19     .154E+04         1.7           1.21       15.10
  .20       .20     .175E+04         2.0           1.25       14.65
  .22       .22     .198E+04         2.3           1.28       14.31
  .23       .23     .223E+04         2.6           1.31       14.04
  .25       .25     .250E+04         3.0           1.33       13.82
  .26       .26     .279E+04         3.4           1.34       13.65

                                <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
 INFLOW : ID= 2 (0355)   12.30      .40    1.33   6.64      .11        .72
 OUTFLOW: ID= 1 (0358)   12.30      .15    1.58   6.59      .08        .52

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (0106) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
--------------------      (cms)      (ha.m.)   |   (cms)      (ha.m.)
                          .0000        .0000   |    .5000       .4000
                          .0100        .0100   |   6.6000       .8000
                          .0260        .2300   |    .0000       .0000

                              AREA       QPEAK        TPEAK        R.V.
                              (ha)       (cms)        (hrs)        (mm)
 INFLOW : ID= 2 (0105)      51.320       1.538         1.33         6.64
 OUTFLOW: ID= 1 (0106)      51.320        .155         2.42         6.63

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.08
               TIME SHIFT OF PEAK FLOW         (min)= 65.00
               MAXIMUM  STORAGE   USED       (ha.m.)=   .2763

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

--------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |       AREA     QPEAK     TPEAK      R.V.
--------------------       (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0102):    14.32      .479      1.33      6.64
      + ID2= 2 (0101):    16.32      .540      1.33      6.64
        ==================================================
        ID = 3 (0103):    30.64     1.019      1.33      6.64

 NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (0111) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
--------------------      (cms)      (ha.m.)   |   (cms)      (ha.m.)
                          .0000        .0000   |   1.0000      1.0000
                          .0100        .0100   |  20.0000      1.1000
                          .0120        .1000   |    .0000       .0000

                              AREA       QPEAK        TPEAK        R.V.
                              (ha)       (cms)        (hrs)        (mm)
 INFLOW : ID= 2 (0110)      19.000        .614         1.33         6.64
```

```
OUTFLOW: ID= 1 (0111)     19.000       .024        2.92        6.63

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.93
                TIME SHIFT OF PEAK FLOW         (min)= 95.00
                MAXIMUM  STORAGE   USED       (ha.m.)=   .1111

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--------------------
| ADD HYD   (0602) |
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0600):    11.38     .301      1.42      6.64
        + ID2= 2 (0601):     7.62     .212      1.42      7.45
          ===============================================
          ID = 3 (0602):    19.00     .514      1.42      6.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD     (0505) |
| Inlet Cap.=9.000 |
| #of Inlets=    1 |
| Total(cms)=  9.0 |      AREA      QPEAK      TPEAK    R.V.
--------------------      (ha)      (cms)      (hrs)    (mm)
     TOTAL HYD.(ID= 1): 244.00       5.34       1.58    7.77
     ====================================================
     MAJOR SYS.(ID= 2):    .00        .00        .00     .00
     MINOR SYS.(ID= 3): 244.00       5.34       1.58    7.77

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0515) |
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0505):   244.00    5.342      1.58      7.77
        + ID2= 2 (0510):    16.00    1.475      1.42     18.56
          ===============================================
          ID = 3 (0515):   260.00    6.307      1.58      8.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD     (0425) |
| Inlet Cap.=1.980 |
| #of Inlets=    1 |
| Total(cms)=  2.0 |      AREA      QPEAK      TPEAK    R.V.
--------------------      (ha)      (cms)      (hrs)    (mm)
     TOTAL HYD.(ID= 1):  29.19        .95       1.33    6.64
     ====================================================
     MAJOR SYS.(ID= 2):    .00        .00        .00     .00
     MINOR SYS.(ID= 3):  29.19        .95       1.33    6.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| ADD HYD   (0470) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
*** W A R N I N G :  HYDROGRAPH 0425 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH 0470 = HYDROGRAPH 0465
*** W A R N I N G :  HYDROGRAPH 0470 = HYDROGRAPH 0465
          ID1= 1 (0425):       .00     .000       .00       .00
        + ID2= 2 (0465):     48.70    1.534      1.33      6.64
          ==================================================
          ID = 3 (0470):     48.70    1.534      1.33      6.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0359) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0353):     16.30     .216      1.58      6.60
        + ID2= 2 (0358):     12.30     .153      1.58      6.59
          ==================================================
          ID = 3 (0359):     28.60     .369      1.58      6.60

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0104) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           .0000      .0000    |   1.0000      .5000
                           .0100      .0100    |  10.0000      .6000
                           .0150      .1332    |    .0000      .0000

                                   AREA       QPEAK       TPEAK       R.V.
                                   (ha)       (cms)       (hrs)       (mm)
     INFLOW : ID= 2 (0103)       30.640      1.019        1.33        6.64
     OUTFLOW: ID= 1 (0104)       30.640       .097        2.33        6.63

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.52
                  TIME SHIFT OF PEAK FLOW         (min)= 60.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=   .1639

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--------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0104):     30.64     .097      2.33      6.63
        + ID2= 2 (0111):     19.00     .024      2.92      6.63
          ==================================================
          ID = 3 (0114):     49.64     .118      2.42      6.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0563) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
```

<------ DATA FOR SECTION ( 2.2) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | 1.00 | .0350 | |
| 2.00 | .50 | .0350 | |
| 4.00 | .00 | .0350 / .0350 | Main Channel |
| 4.50 | .00 | .0350 | Main Channel |
| 5.00 | .00 | .0350 / .0350 | Main Channel |
| 7.00 | .50 | .0350 | |
| 9.00 | 1.00 | .0350 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .05 | .05 | .745E+01 | .0 | .64 | 3.06 |
| .11 | .11 | .175E+02 | .1 | .96 | 2.03 |
| .16 | .16 | .301E+02 | .3 | 1.21 | 1.61 |
| .21 | .21 | .454E+02 | .6 | 1.42 | 1.37 |
| .26 | .26 | .632E+02 | .9 | 1.61 | 1.21 |
| .32 | .32 | .836E+02 | 1.3 | 1.77 | 1.10 |
| .37 | .37 | .107E+03 | 1.8 | 1.93 | 1.01 |
| .42 | .42 | .132E+03 | 2.3 | 2.08 | .94 |
| .47 | .47 | .160E+03 | 3.0 | 2.22 | .88 |
| .53 | .53 | .191E+03 | 3.8 | 2.35 | .83 |
| .58 | .58 | .225E+03 | 4.8 | 2.48 | .79 |
| .63 | .63 | .261E+03 | 5.8 | 2.60 | .75 |
| .68 | .68 | .299E+03 | 7.0 | 2.72 | .72 |
| .74 | .74 | .340E+03 | 8.2 | 2.84 | .69 |
| .79 | .79 | .384E+03 | 9.7 | 2.95 | .66 |
| .84 | .84 | .430E+03 | 11.3 | 3.06 | .64 |
| .89 | .89 | .479E+03 | 13.0 | 3.17 | .62 |
| .95 | .95 | .531E+03 | 14.8 | 3.27 | .60 |
| 1.00 | 1.00 | .585E+03 | 16.9 | 3.38 | .58 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0602) | 19.00 | .51 | 1.42 | 6.96 | .20 | 1.38 |
| OUTFLOW: ID= 1 (0563) | 19.00 | .53 | 1.42 | 6.96 | .21 | 1.40 |

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

| ROUTE CHN (0564) |
| IN= 2---> OUT= 1 |   Routing time step (min)'= 5.00

<------ DATA FOR SECTION ( 1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | 101.50 | .0500 | |
| 1.00 | 100.70 | .0500 | |
| 1.50 | 100.55 | .0500 / .0300 | Main Channel |
| 2.00 | 99.50 | .0300 | Main Channel |
| 3.50 | 99.60 | .0300 | Main Channel |
| 4.50 | 100.65 | .0300 / .0500 | Main Channel |
| 6.00 | 101.45 | .0500 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .10 | 99.60 | .353E+02 | .0 | .19 | 43.69 |
| .19 | 99.69 | .112E+03 | .1 | .37 | 22.76 |
| .29 | 99.79 | .195E+03 | .2 | .49 | 17.03 |
| .38 | 99.88 | .285E+03 | .3 | .59 | 14.23 |
| .48 | 99.98 | .381E+03 | .5 | .67 | 12.51 |

| | | | | | |
|---|---|---|---|---|---|
| .57 | 100.07 | .484E+03 | .7 | .74 | 11.32 |
| .67 | 100.17 | .594E+03 | .9 | .80 | 10.43 |
| .76 | 100.26 | .710E+03 | 1.2 | .86 | 9.74 |
| .86 | 100.36 | .832E+03 | 1.5 | .91 | 9.18 |
| .95 | 100.45 | .961E+03 | 1.8 | .96 | 8.72 |
| 1.05 | 100.55 | .110E+04 | 2.2 | 1.00 | 8.32 |
| 1.16 | 100.66 | .127E+04 | 2.7 | 1.07 | 7.80 |
| 1.28 | 100.78 | .148E+04 | 3.4 | 1.14 | 7.31 |
| 1.39 | 100.89 | .170E+04 | 4.1 | 1.20 | 6.94 |
| 1.50 | 101.00 | .195E+04 | 4.9 | 1.25 | 6.65 |
| 1.61 | 101.11 | .221E+04 | 5.8 | 1.30 | 6.41 |
| 1.72 | 101.22 | .250E+04 | 6.7 | 1.34 | 6.22 |
| 1.84 | 101.34 | .280E+04 | 7.7 | 1.38 | 6.04 |
| 1.95 | 101.45 | .313E+04 | 8.8 | 1.41 | 5.90 |

```
**** WARNING:  INFLOW HYDROGRAPH IS DRY!!

-------------------------------------------------------------------------------
--------------------
| DUHYD     (0520) |
| Inlet Cap.=3.050 |
| #of Inlets=    1 |
| Total(cms)=  3.0 |       AREA      QPEAK      TPEAK     R.V.
--------------------       (ha)      (cms)      (hrs)     (mm)
    TOTAL HYD.(ID= 1): 260.00        6.31       1.58     8.44
    =======================================================
    MAJOR SYS.(ID= 2):  59.59        3.26       1.58     8.44
    MINOR SYS.(ID= 3): 200.41        3.05       1.33     8.44

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0475) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
```

<------ DATA FOR SECTION (   1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| 100.00 | 324.60 | .0500 | |
| 115.00 | 321.60 | .0500 | |
| 120.00 | 320.80 | .0500 / .0300 | Main Channel |
| 122.00 | 320.80 | .0300 / .0500 | Main Channel |
| 138.00 | 321.60 | .0500 | |
| 148.00 | 322.30 | .0500 | |
| 154.00 | 323.10 | .0500 | |
| 164.00 | 324.60 | .0500 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .20 | 321.00 | .398E+03 | .8 | .84 | 8.53 |
| .40 | 321.20 | .125E+04 | 3.3 | 1.13 | 6.33 |
| .60 | 321.40 | .255E+04 | 8.1 | 1.36 | 5.27 |
| .80 | 321.60 | .430E+04 | 15.6 | 1.56 | 4.59 |
| 1.00 | 321.80 | .644E+04 | 26.8 | 1.79 | 4.01 |
| 1.20 | 322.00 | .892E+04 | 41.2 | 1.99 | 3.61 |
| 1.40 | 322.20 | .117E+05 | 59.3 | 2.17 | 3.30 |
| 1.60 | 322.40 | .148E+05 | 81.9 | 2.37 | 3.02 |
| 1.80 | 322.60 | .182E+05 | 109.1 | 2.58 | 2.78 |
| 2.00 | 322.80 | .218E+05 | 140.2 | 2.77 | 2.59 |
| 2.20 | 323.00 | .256E+05 | 175.3 | 2.95 | 2.43 |
| 2.40 | 323.20 | .296E+05 | 214.7 | 3.12 | 2.29 |

| | | | | | |
|---|---|---|---|---|---|
| 2.60 | 323.40 | .338E+05 | 258.6 | 3.29 | 2.18 |
| 2.80 | 323.60 | .382E+05 | 306.7 | 3.46 | 2.07 |
| 3.00 | 323.80 | .428E+05 | 359.1 | 3.61 | 1.98 |
| 3.20 | 324.00 | .476E+05 | 416.0 | 3.76 | 1.91 |
| 3.40 | 324.20 | .526E+05 | 477.5 | 3.91 | 1.83 |
| 3.60 | 324.40 | .578E+05 | 543.5 | 4.05 | 1.77 |
| 3.80 | 324.60 | .632E+05 | 614.3 | 4.18 | 1.71 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0470) | 48.70 | 1.53 | 1.33 | 6.64 | .26 | .91 |
| OUTFLOW: ID= 1 (0475) | 48.70 | 1.10 | 1.42 | 6.64 | .23 | .87 |

---

| ADD HYD (0363) 1 + 2 = 3 | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0362): | 30.00 | .406 | 1.50 | 5.48 |
| + ID2= 2 (0359): | 28.60 | .369 | 1.58 | 6.60 |
| ID = 3 (0363): | 58.60 | .769 | 1.50 | 6.03 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| ADD HYD (0115) 1 + 2 = 3 | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0106): | 51.32 | .155 | 2.42 | 6.63 |
| + ID2= 2 (0114): | 49.64 | .118 | 2.42 | 6.63 |
| ID = 3 (0115): | 100.96 | .273 | 2.42 | 6.63 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| ADD HYD (0492) 1 + 2 = 3 | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0563): | 19.00 | .533 | 1.42 | 6.96 |
| + ID2= 2 (0607): | 5.97 | .141 | 1.67 | 5.44 |
| ID = 3 (0492): | 24.97 | .596 | 1.42 | 6.60 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| ADD HYD (0526) 1 + 2 = 3 | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0525): | .00 | .001 | .00 | ******* |
| + ID2= 2 (0520): | 59.59 | 3.257 | 1.58 | 8.44 |

```
     ID = 3 (0526):    59.59   3.257     1.58     8.44

 NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD    (0380) |
|   1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0363):     58.60     .769      1.50      6.03
        + ID2= 2 (0365):    117.50    2.960      1.42      6.64
          ==================================================
          ID = 3 (0380):    176.10    3.653      1.42      6.44

 NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (0482) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          .0000       .0000    |    .2910       .3795
                          .2590       .0579    |    .2970       .4503
                          .2660       .1180    |   1.6320       .5232
                          .2720       .1802    |   4.1680       .5983
                          .2790       .2445    |   7.5660       .6756
                          .2850       .3109    |    .0000       .0000

                                    AREA        QPEAK        TPEAK        R.V.
                                    (ha)        (cms)        (hrs)        (mm)
    INFLOW : ID= 2 (0492)         24.970         .596         1.42         6.60
    OUTFLOW: ID= 1 (0482)         24.970         .260         2.00         6.60

                  PEAK    FLOW   REDUCTION [Qout/Qin](%)= 43.68
                  TIME SHIFT OF PEAK FLOW          (min)= 35.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=   .0700

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0527) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                 100.00         313.20          .0500
                 140.00         312.40      .0500 / .0300   Main Channel
                 140.50         310.80          .0300       Main Channel
                 141.50         310.80          .0300       Main Channel
                 142.00         312.40      .0300 / .0500   Main Channel
                 160.00         313.20          .0500

      <--------------------- TRAVEL TIME TABLE --------------------->
      DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
       (m)       (m)      (cu.m.)       (cms)        (m/s)        (min)
       .12    310.92     .575E+02         .1           .40        18.86
       .25    311.05     .119E+03         .2           .57        13.13
       .37    311.17     .185E+03         .3           .69        10.87
       .49    311.29     .256E+03         .4           .78         9.61
       .62    311.42     .330E+03         .6           .86         8.77
       .74    311.54     .409E+03         .8           .92         8.17
       .86    311.66     .492E+03        1.1           .97         7.70
```

| | | | | | |
|---|---|---|---|---|---|
| .98 | 311.78 | .579E+03 | 1.3 | 1.02 | 7.32 |
| 1.11 | 311.91 | .671E+03 | 1.6 | 1.07 | 7.01 |
| 1.23 | 312.03 | .767E+03 | 1.9 | 1.11 | 6.74 |
| 1.35 | 312.15 | .867E+03 | 2.2 | 1.15 | 6.50 |
| 1.48 | 312.28 | .971E+03 | 2.6 | 1.19 | 6.29 |
| 1.60 | 312.40 | .108E+04 | 2.9 | 1.23 | 6.11 |
| 1.73 | 312.53 | .149E+04 | 3.6 | 1.10 | 6.85 |
| 1.87 | 312.67 | .248E+04 | 4.9 | .88 | 8.52 |
| 2.00 | 312.80 | .405E+04 | 6.9 | .77 | 9.74 |
| 2.13 | 312.93 | .620E+04 | 10.1 | .73 | 10.21 |
| 2.27 | 313.07 | .893E+04 | 14.6 | .74 | 10.17 |
| 2.40 | 313.20 | .122E+05 | 20.7 | .76 | 9.85 |

| | | <---- hydrograph | ----> | | <-pipe / | channel-> |
|---|---|---|---|---|---|---|
| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | MAX DEPTH (m) | MAX VEL (m/s) |
| INFLOW : ID= 2 (0526) | 59.59 | 3.26 | 1.58 | 8.44 | 1.66 | 1.16 |
| OUTFLOW: ID= 1 (0527) | 59.59 | 2.80 | 1.67 | 8.44 | 1.54 | 1.21 |

---

| RESERVOIR (0390) |
| IN= 2---> OUT= 1 |
| DT= 5.0 min |

| OUTFLOW (cms) | STORAGE (ha.m.) | OUTFLOW (cms) | STORAGE (ha.m.) |
|---|---|---|---|
| .0000 | .0000 | 1.3100 | 1.6000 |
| .7700 | .2870 | 1.8600 | 23.2300 |
| 1.2600 | .9680 | .0000 | .0000 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| INFLOW : ID= 2 (0380) | 176.100 | 3.653 | 1.42 | 6.44 |
| OUTFLOW: ID= 1 (0390) | 176.100 | .982 | 2.25 | 6.43 |

PEAK FLOW REDUCTION [Qout/Qin](%)= 26.88
TIME SHIFT OF PEAK FLOW (min)= 50.00
MAXIMUM STORAGE USED (ha.m.)= .5820

---

| ADD HYD (0400) |
| 1 + 2 = 3 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0395): | 51.20 | .292 | 1.42 | 1.17 |
| + ID2= 2 (0390): | 176.10 | .982 | 2.25 | 6.43 |
| ID = 3 (0400): | 227.30 | 1.022 | 1.58 | 5.25 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| ROUTE CHN (0403) |
| IN= 2---> OUT= 1 |

Routing time step (min)'= 5.00

<------ DATA FOR SECTION ( 1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| 100.00 | 338.30 | .0500 | |
| 110.00 | 336.80 | .0500 | |
| 135.00 | 336.00 | .0300 | Main Channel |
| 142.00 | 335.30 | .0500 | |

```
              148.00          335.30         .0500
              156.00          336.00         .0500
              165.00          338.30         .0000

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV       VOLUME      FLOW RATE    VELOCITY    TRAV.TIME
        (m)       (m)       (cu.m.)       (cms)        (m/s)       (min)
        .16    335.46     .231E+04          .9          .71       44.52
        .32    335.62     .563E+04         3.2         1.09       29.11
        .47    335.77     .997E+04         7.3         1.39       22.72
        .63    335.93     .153E+05        13.4         1.66       19.04
        .79    336.09     .218E+05        22.7         1.97       16.04
        .95    336.25     .299E+05        35.3         2.25       14.10
       1.11    336.41     .396E+05        51.2         2.46       12.89
       1.26    336.56     .510E+05        70.7         2.63       12.02
       1.42    336.72     .641E+05        94.1         2.79       11.35
       1.58    336.88     .787E+05       122.4         2.96       10.71
       1.74    337.04     .939E+05       155.6         3.15       10.06
       1.89    337.19     .110E+06       192.8         3.34        9.48
       2.05    337.35     .126E+06       233.9         3.53        8.97
       2.21    337.51     .143E+06       278.9         3.71        8.53
       2.37    337.67     .160E+06       327.7         3.89        8.13
       2.53    337.83     .178E+06       380.3         4.07        7.79
       2.68    337.98     .196E+06       436.7         4.23        7.48
       2.84    338.14     .215E+06       496.9         4.40        7.20
       3.00    338.30     .234E+06       561.0         4.56        6.95

                                         <---- hydrograph ---->   <-pipe / channel->
                                 AREA     QPEAK    TPEAK    R.V.   MAX DEPTH   MAX VEL
                                 (ha)     (cms)    (hrs)    (mm)      (m)       (m/s)
     INFLOW : ID= 2 (0400)     227.30      1.02     1.58    5.25       .17         .73
     OUTFLOW: ID= 1 (0403)     227.30       .88     3.17    5.25       .16         .71

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 --------------------
 | ADD HYD   (0407) |
 |   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
 --------------------          (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0403):     227.30     .881      3.17      5.25
         + ID2= 2 (0115):     100.96     .273      2.42      6.63
           ==================================================
           ID = 3 (0407):     328.26    1.112      2.83      5.67

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 --------------------
 | RESERVOIR (0113) |
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |      OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
 --------------------       (cms)      (ha.m.)    |   (cms)      (ha.m.)
                            .0000        .0000    |   1.6000      6.4000
                           1.1000       2.9000    |   9.1000     10.0000
                           1.3000       4.3000    |  12.0000     20.0000

                                    AREA       QPEAK        TPEAK        R.V.
                                    (ha)       (cms)        (hrs)        (mm)
     INFLOW : ID= 2 (0407)       328.260       1.112         2.83        5.67
     OUTFLOW: ID= 1 (0113)       328.260        .354         5.83        5.67

                  PEAK    FLOW    REDUCTION [Qout/Qin](%)= 31.88
```

```
                TIME SHIFT OF PEAK FLOW        (min)=180.00
                MAXIMUM  STORAGE   USED       (ha.m.)=   .9343

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

--------------------
| ADD HYD   (0430) |
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK     R.V.
--------------------          (ha)     (cms)     (hrs)     (mm)
          ID1= 1 (0113):    328.26     .354      5.83      5.67
        + ID2= 2 (0425):     29.19     .948      1.33      6.64
          ==================================================
          ID = 3 (0430):    357.45     .951      1.33      5.75

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0440) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                 100.00        325.40         .0600
                 120.00        324.60         .0600
                 126.00        323.90         .0600
                 130.00        323.00         .0600
                 140.00        322.30      .0600 / .0300  Main Channel
                 142.00        322.30      .0300 / .0600  Main Channel
                 150.00        323.90         .0600
                 155.00        324.60         .0600
                 160.00        325.40         .0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH    ELEV      VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
        (m)      (m)     (cu.m.)        (cms)         (m/s)       (min)
        .16    322.46    .233E+03         .6            .96        6.96
        .33    322.63    .672E+03        2.1           1.26        5.27
        .49    322.79    .132E+04        4.9           1.48        4.51
        .65    322.95    .216E+04        9.0           1.66        4.03
        .82    323.12    .319E+04       14.9           1.87        3.57
        .98    323.28    .433E+04       22.5           2.08        3.21
       1.14    323.44    .556E+04       31.6           2.27        2.93
       1.31    323.61    .689E+04       42.3           2.45        2.72
       1.47    323.77    .833E+04       54.6           2.62        2.54
       1.63    323.93    .987E+04       68.3           2.77        2.41
       1.79    324.09    .115E+05       82.8           2.87        2.33
       1.96    324.26    .134E+05       99.2           2.96        2.25
       2.12    324.42    .154E+05      117.9           3.06        2.18
       2.28    324.58    .176E+05      138.8           3.15        2.11
       2.45    324.75    .200E+05      157.4           3.14        2.12
       2.61    324.91    .228E+05      179.6           3.15        2.11
       2.77    325.07    .259E+05      205.8           3.18        2.09
       2.94    325.24    .293E+05      236.1           3.23        2.07
       3.10    325.40    .330E+05      270.6           3.28        2.03

                                    <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.    MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
     INFLOW : ID= 2 (0430)  357.45     .95    1.33   5.75       .20      1.02
     OUTFLOW: ID= 1 (0440)  357.45     .72    1.42   5.75       .18       .98
```

```
--------------------
| ADD HYD   (0485) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0475):     48.70    1.101      1.42      6.64
        + ID2= 2 (0440):    357.45     .720      1.42      5.75
          ==================================================
          ID = 3 (0485):    406.15    1.820      1.42      5.86

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0490) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0480):     43.10    1.142      1.42      6.64
        + ID2= 2 (0485):    406.15    1.820      1.42      5.86
          ==================================================
          ID = 3 (0490):    449.25    2.962      1.42      5.93

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0491) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0490):    449.25    2.962      1.42      5.93
        + ID2= 2 (0482):     24.97     .260      2.00      6.60
          ==================================================
          ID = 3 (0491):    474.22    3.086      1.42      5.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0483) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            .0000      .0000   |   7.0800     2.4860
                            .2760      .0600   |   8.1000     3.3240
                           1.2000      .3400   |   9.7980     4.6420
                           2.0400      .6182   |  10.4940     7.4397
                           2.6400     1.1630   |  11.6850    10.3000
                           3.1200     1.7070   |  12.3480    11.4000

                                   AREA      QPEAK       TPEAK       R.V.
                                   (ha)      (cms)       (hrs)       (mm)
     INFLOW : ID= 2 (0491)      474.220      3.086        1.42        5.97
     OUTFLOW: ID= 1 (0483)      474.220      1.344        2.00        5.97

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 43.57
                    TIME SHIFT OF PEAK FLOW         (min)= 35.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=   .3886

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

```
--------------------
| ADD HYD   (0530) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK       R.V.
--------------------         (ha)     (cms)     (hrs)       (mm)
       ID1= 1 (0483):      474.22     1.344      2.00       5.97
     + ID2= 2 (0540):        4.63      .569      1.33      18.56
       ===================================================
       ID = 3 (0530):      478.85     1.391      2.00       6.09

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0545) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK       R.V.
--------------------         (ha)     (cms)     (hrs)       (mm)
       ID1= 1 (0530):      478.85     1.391      2.00       6.09
     + ID2= 2 (0527):       59.59     2.796      1.67       8.44
       ===================================================
       ID = 3 (0545):      538.44     4.086      1.67       6.35

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0546) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK       R.V.
--------------------         (ha)     (cms)     (hrs)       (mm)
       ID1= 1 (0545):      538.44     4.086      1.67       6.35
     + ID2= 2 (0542):       25.25     2.408      1.42      18.56
       ===================================================
       ID = 3 (0546):      563.69     5.474      1.58       6.90

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0547) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK       R.V.
--------------------         (ha)     (cms)     (hrs)       (mm)
       ID1= 1 (0546):      563.69     5.474      1.58       6.90
     + ID2= 2 (0543):       14.99     1.767      1.33      18.56
       ===================================================
       ID = 3 (0547):      578.68     6.159      1.50       7.20

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0548) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK       R.V.
--------------------         (ha)     (cms)     (hrs)       (mm)
       ID1= 1 (0547):      578.68     6.159      1.50       7.20
     + ID2= 2 (0544):        1.13      .151      1.33      18.56
       ===================================================
       ID = 3 (0548):      579.81     6.220      1.50       7.22

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

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


--------------------
|    READ STORM    |     Filename: Y:\SPrimmer\OTTHYMO\Ci
|                  |               tyview Ridge\5yrSCS12hr.stm
| Ptotal= 53.41 mm |     Comments: 5 year SCS Type II 12hour design storm
--------------------
                   TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                    hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                    .25     1.34 |  3.25     2.14 |  6.25     9.61 |  9.25     1.87
                    .50     1.34 |  3.50     2.14 |  6.50     9.61 |  9.50     1.87
                    .75     1.34 |  3.75     2.14 |  6.75     4.27 |  9.75     1.87
                   1.00     1.34 |  4.00     2.14 |  7.00     4.27 | 10.00     1.87
                   1.25     1.34 |  4.25     3.20 |  7.25     3.20 | 10.25     1.07
                   1.50     1.34 |  4.50     3.20 |  7.50     3.20 | 10.50     1.07
                   1.75     1.34 |  4.75     4.27 |  7.75     3.20 | 10.75     1.07
                   2.00     1.34 |  5.00     4.27 |  8.00     3.20 | 11.00     1.07
                   2.25     1.60 |  5.25     6.41 |  8.25     1.87 | 11.25     1.07
                   2.50     1.60 |  5.50     6.41 |  8.50     1.87 | 11.50     1.07
                   2.75     1.60 |  5.75    25.64 |  8.75     1.87 | 11.75     1.07
                   3.00     1.60 |  6.00    70.50 |  9.00     1.87 | 12.00     1.07

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--------------------
| CALIB            |
| STANDHYD  (0480) |    Area     (ha)=  43.10
|ID= 1 DT= 5.0 min |    Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area       (ha)=       18.10         25.00
     Dep. Storage       (mm)=        1.50          5.00
     Average Slope       (%)=        2.00          2.00
     Length              (m)=      680.00         40.00
     Mannings n            =         .013          .300

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


                                ---- TRANSFORMED HYETOGRAPH ----
                   TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                    hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                   .083     1.34 | 3.083     2.14 | 6.083     9.61 |  9.08     1.87
                   .167     1.34 | 3.167     2.14 | 6.167     9.61 |  9.17     1.87
                   .250     1.34 | 3.250     2.14 | 6.250     9.61 |  9.25     1.87
                   .333     1.34 | 3.333     2.14 | 6.333     9.61 |  9.33     1.87
                   .417     1.34 | 3.417     2.14 | 6.417     9.61 |  9.42     1.87
                   .500     1.34 | 3.500     2.14 | 6.500     9.61 |  9.50     1.87
                   .583     1.34 | 3.583     2.14 | 6.583     4.27 |  9.58     1.87
                   .667     1.34 | 3.667     2.14 | 6.667     4.27 |  9.67     1.87
                   .750     1.34 | 3.750     2.14 | 6.750     4.27 |  9.75     1.87
                   .833     1.34 | 3.833     2.14 | 6.833     4.27 |  9.83     1.87
                   .917     1.34 | 3.917     2.14 | 6.917     4.27 |  9.92     1.87
                  1.000     1.34 | 4.000     2.14 | 7.000     4.27 | 10.00     1.87
                  1.083     1.34 | 4.083     3.20 | 7.083     3.20 | 10.08     1.07
                  1.167     1.34 | 4.167     3.20 | 7.167     3.20 | 10.17     1.07
                  1.250     1.34 | 4.250     3.20 | 7.250     3.20 | 10.25     1.07
                  1.333     1.34 | 4.333     3.20 | 7.333     3.20 | 10.33     1.07
                  1.417     1.34 | 4.417     3.20 | 7.417     3.20 | 10.42     1.07
```

```
          1.500     1.34 | 4.500     3.20 | 7.500     3.20 | 10.50     1.07
          1.583     1.34 | 4.583     4.27 | 7.583     3.20 | 10.58     1.07
          1.667     1.34 | 4.667     4.27 | 7.667     3.20 | 10.67     1.07
          1.750     1.34 | 4.750     4.27 | 7.750     3.20 | 10.75     1.07
          1.833     1.34 | 4.833     4.27 | 7.833     3.20 | 10.83     1.07
          1.917     1.34 | 4.917     4.27 | 7.917     3.20 | 10.92     1.07
          2.000     1.34 | 5.000     4.27 | 8.000     3.20 | 11.00     1.07
          2.083     1.60 | 5.083     6.41 | 8.083     1.87 | 11.08     1.07
          2.167     1.60 | 5.167     6.41 | 8.167     1.87 | 11.17     1.07
          2.250     1.60 | 5.250     6.41 | 8.250     1.87 | 11.25     1.07
          2.333     1.60 | 5.333     6.41 | 8.333     1.87 | 11.33     1.07
          2.417     1.60 | 5.417     6.41 | 8.417     1.87 | 11.42     1.07
          2.500     1.60 | 5.500     6.41 | 8.500     1.87 | 11.50     1.07
          2.583     1.60 | 5.583    25.64 | 8.583     1.87 | 11.58     1.07
          2.667     1.60 | 5.667    25.64 | 8.667     1.87 | 11.67     1.07
          2.750     1.60 | 5.750    25.64 | 8.750     1.87 | 11.75     1.07
          2.833     1.60 | 5.833    70.50 | 8.833     1.87 | 11.83     1.07
          2.917     1.60 | 5.917    70.50 | 8.917     1.87 | 11.92     1.07
          3.000     1.60 | 6.000    70.50 | 9.000     1.87 | 12.00     1.07

     Max.Eff.Inten.(mm/hr)=      70.50          81.70
               over (min)        10.00          20.00
     Storage Coeff.   (min)=      7.54 (ii)     16.07 (ii)
     Unit Hyd. Tpeak (min)=      10.00          20.00
     Unit Hyd. peak   (cms)=       .13            .06
                                                              *TOTALS*
     PEAK FLOW        (cms)=      1.52           2.56           3.608 (iii)
     TIME TO PEAK     (hrs)=      6.00           6.17            6.08
     RUNOFF VOLUME     (mm)=     51.91          14.24           22.15
     TOTAL RAINFALL    (mm)=     53.41          53.41           53.41
     RUNOFF COEFFICIENT    =       .97            .27             .41

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0415)   |   Area     (ha)=   4.99
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00    Dir. Conn.(%)=  21.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       2.10          2.89
     Dep. Storage      (mm)=       1.50          5.00
     Average Slope      (%)=       2.86          2.86
     Length             (m)=     185.00         40.00
     Mannings n            =       .013          .300

     Max.Eff.Inten.(mm/hr)=      70.50          81.70
               over (min)         5.00          15.00
     Storage Coeff.   (min)=      3.10 (ii)     10.77 (ii)
     Unit Hyd. Tpeak (min)=       5.00          15.00
     Unit Hyd. peak   (cms)=       .27            .09
                                                              *TOTALS*
     PEAK FLOW        (cms)=       .20            .39            .532 (iii)
     TIME TO PEAK     (hrs)=      6.00           6.08            6.00
     RUNOFF VOLUME     (mm)=     51.91          14.24           22.15
     TOTAL RAINFALL    (mm)=     53.41          53.41           53.41
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     RUNOFF COEFFICIENT   =        .97           .27            .41

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50    Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0410)   |   Area    (ha)=  24.20
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.16        14.04
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     401.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      70.50        81.70
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       5.49 (ii)   14.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .20          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .95         1.66         2.307 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=      51.91        14.24         22.15
     TOTAL RAINFALL   (mm)=      53.41        53.41         53.41
     RUNOFF COEFFICIENT   =        .97          .27           .41

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50    Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0460)   |   Area    (ha)=  36.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      15.12        20.88
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.03         2.03
     Length            (m)=     465.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      70.50        81.70
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       5.97 (ii)   14.47 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .19          .08
                                                          *TOTALS*
```

```
 PEAK FLOW        (cms)=       1.40          2.42            3.376 (iii)
 TIME TO PEAK     (hrs)=       6.00          6.08             6.00
 RUNOFF VOLUME     (mm)=      51.91         14.24            22.15
 TOTAL RAINFALL    (mm)=      53.41         53.41            53.41
 RUNOFF COEFFICIENT   =         .97           .27              .41

   (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
        Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0455)   |   Area    (ha)=  12.70
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
 Surface Area     (ha)=        5.33          7.37
 Dep. Storage     (mm)=        1.50          5.00
 Average Slope     (%)=        1.71          1.71
 Length            (m)=      300.00         40.00
 Mannings n           =        .013          .300

 Max.Eff.Inten.(mm/hr)=       70.50         81.70
            over (min)         5.00         15.00
 Storage Coeff.  (min)=        4.84 (ii)    13.78 (ii)
 Unit Hyd. Tpeak (min)=        5.00         15.00
 Unit Hyd. peak  (cms)=         .22           .08
                                                           *TOTALS*
 PEAK FLOW        (cms)=        .51           .88            1.226 (iii)
 TIME TO PEAK     (hrs)=       6.00          6.08             6.00
 RUNOFF VOLUME     (mm)=      51.91         14.24            22.15
 TOTAL RAINFALL    (mm)=      53.41         53.41            53.41
 RUNOFF COEFFICIENT   =         .97           .27              .41

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

   (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
        Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0395)   |   Area    (ha)=  51.20
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  10.00   Dir. Conn.(%)=   5.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
 Surface Area     (ha)=        5.12         46.08
 Dep. Storage     (mm)=        1.50          5.00
 Average Slope     (%)=        2.00          2.00
 Length            (m)=      900.00         40.00
 Mannings n           =        .013          .300

 Max.Eff.Inten.(mm/hr)=       70.50         58.39
            over (min)        10.00         20.00
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     Storage Coeff.  (min)=      8.92 (ii)   18.68 (ii)
     Unit Hyd. Tpeak (min)=     10.00        20.00
     Unit Hyd. peak  (cms)=       .12          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .41         2.36          2.601 (iii)
     TIME TO PEAK    (hrs)=      6.00         6.25           6.17
     RUNOFF VOLUME    (mm)=     51.91         9.64          11.75
     TOTAL RAINFALL   (mm)=     53.41        53.41          53.41
     RUNOFF COEFFICIENT   =       .97          .18            .22

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0360)   |   Area    (ha)=  30.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  37.00   Dir. Conn.(%)=  19.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       11.10        18.90
     Dep. Storage     (mm)=        1.50         5.00
     Average Slope     (%)=        2.00         2.00
     Length            (m)=      447.00        40.00
     Mannings n           =        .013         .300

     Max.Eff.Inten.(mm/hr)=       70.50        75.96
                over (min)         5.00        15.00
     Storage Coeff.  (min)=        5.86 (ii)   14.65 (ii)
     Unit Hyd. Tpeak (min)=        5.00        15.00
     Unit Hyd. peak  (cms)=         .20          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        1.06         1.94          2.582 (iii)
     TIME TO PEAK    (hrs)=        6.00         6.08           6.00
     RUNOFF VOLUME    (mm)=       51.91        13.31          20.64
     TOTAL RAINFALL   (mm)=       53.41        53.41          53.41
     RUNOFF COEFFICIENT   =         .97          .25            .39

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0350)   |   Area    (ha)=  16.30
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
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                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        6.85         9.45
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Dep. Storage      (mm)=       1.50          5.00
Average Slope      (%)=       1.00          1.00
Length             (m)=     330.00         40.00
Mannings n            =       .013          .300

Max.Eff.Inten.(mm/hr)=      70.50         77.46
          over (min)        5.00         20.00
Storage Coeff.  (min)=      6.01 (ii)    16.75 (ii)
Unit Hyd. Tpeak (min)=      5.00         20.00
Unit Hyd. peak  (cms)=       .19           .06
                                                          *TOTALS*
PEAK FLOW       (cms)=       .63           .95           1.186 (iii)
TIME TO PEAK    (hrs)=      6.00          6.17            6.00
RUNOFF VOLUME    (mm)=     51.91         14.24           22.15
TOTAL RAINFALL   (mm)=     53.41         53.41           53.41
RUNOFF COEFFICIENT   =       .97           .27             .41

  (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
       Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
       Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
      THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0355)   |   Area    (ha)=  12.30
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
Surface Area      (ha)=       5.17          7.13
Dep. Storage      (mm)=       1.50          5.00
Average Slope      (%)=       1.60          1.60
Length             (m)=     286.00         40.00
Mannings n            =       .013          .300

Max.Eff.Inten.(mm/hr)=      70.50         81.70
          over (min)        5.00         15.00
Storage Coeff.  (min)=      4.79 (ii)    13.92 (ii)
Unit Hyd. Tpeak (min)=      5.00         15.00
Unit Hyd. peak  (cms)=       .22           .08
                                                          *TOTALS*
PEAK FLOW       (cms)=       .49           .85           1.183 (iii)
TIME TO PEAK    (hrs)=      6.00          6.08            6.00
RUNOFF VOLUME    (mm)=     51.91         14.24           22.15
TOTAL RAINFALL   (mm)=     53.41         53.41           53.41
RUNOFF COEFFICIENT   =       .97           .27             .41

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

  (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
       Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
       Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
      THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0365)   |   Area    (ha)= 117.50
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|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     49.35        68.15
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      2.00         2.00
     Length            (m)=    885.00        40.00
     Mannings n           =      .013         .300

     Max.Eff.Inten.(mm/hr)=     70.50        81.70
               over (min)       10.00        20.00
     Storage Coeff.  (min)=      8.83 (ii)   17.37 (ii)
     Unit Hyd. Tpeak (min)=     10.00        20.00
     Unit Hyd. peak  (cms)=       .12          .06
                                                           *TOTALS*
     PEAK FLOW       (cms)=      3.95         6.70           9.481 (iii)
     TIME TO PEAK    (hrs)=      6.00         6.17            6.08
     RUNOFF VOLUME    (mm)=     51.91        14.24           22.15
     TOTAL RAINFALL   (mm)=     53.41        53.41           53.41
     RUNOFF COEFFICIENT   =       .97          .27             .41

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0105) |   Area    (ha)=  51.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     21.55        29.77
     Dep. Storage     (mm)=      1.50         5.00
     Average Slope     (%)=      2.00         2.00
     Length            (m)=    550.00        40.00
     Mannings n           =      .013         .300

     Max.Eff.Inten.(mm/hr)=     70.50        81.70
               over (min)        5.00        20.00
     Storage Coeff.  (min)=      6.64 (ii)   15.17 (ii)
     Unit Hyd. Tpeak (min)=      5.00        20.00
     Unit Hyd. peak  (cms)=       .18          .07
                                                           *TOTALS*
     PEAK FLOW       (cms)=      1.96         3.14           3.870 (iii)
     TIME TO PEAK    (hrs)=      6.00         6.17            6.08
     RUNOFF VOLUME    (mm)=     51.91        14.24           22.15
     TOTAL RAINFALL   (mm)=     53.41        53.41           53.41
     RUNOFF COEFFICIENT   =       .97          .27             .41

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 | CALIB              |
 | STANDHYD  (0102)   |   Area    (ha)=  14.32
 |ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
 --------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.01          8.31
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     287.00         40.00
     Mannings n          =        .013          .300

     Max.Eff.Inten.(mm/hr)=      70.50         81.70
              over (min)        5.00         15.00
     Storage Coeff.  (min)=       4.49 (ii)    13.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .23           .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .58          1.02        1.415 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08         6.00
     RUNOFF VOLUME    (mm)=      51.91         14.24        22.15
     TOTAL RAINFALL   (mm)=      53.41         53.41        53.41
     RUNOFF COEFFICIENT   =        .97           .27          .41

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 --------------------
 | CALIB              |
 | STANDHYD  (0101)   |   Area    (ha)=  16.32
 |ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
 --------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.85          9.47
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     309.00         40.00
     Mannings n          =        .013          .300

     Max.Eff.Inten.(mm/hr)=      70.50         81.70
              over (min)        5.00         15.00
     Storage Coeff.  (min)=       4.70 (ii)    13.23 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .22           .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .65          1.15        1.601 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08         6.00
     RUNOFF VOLUME    (mm)=      51.91         14.24        22.15
     TOTAL RAINFALL   (mm)=      53.41         53.41        53.41
     RUNOFF COEFFICIENT   =        .97           .27          .41

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
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  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0110)   |   Area    (ha)=  19.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.98        11.02
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     365.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      70.50        81.70
               over (min)         5.00        15.00
     Storage Coeff.  (min)=       5.19 (ii)   13.73 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .21          .08
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .75         1.32          1.831 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08           6.00
     RUNOFF VOLUME    (mm)=      51.91        14.24          22.15
     TOTAL RAINFALL   (mm)=      53.41        53.41          53.41
     RUNOFF COEFFICIENT   =        .97          .27            .41

   (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo    (mm/hr)= 75.00           K   (1/hr)=  4.14
        Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0600)   |   Area    (ha)=  11.38
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.78         6.60
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     680.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      70.50        81.70
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       7.54 (ii)   16.07 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=        .13          .06
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .40          .68           .953 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.17           6.08
     RUNOFF VOLUME    (mm)=      51.91        14.24          22.15
     TOTAL RAINFALL   (mm)=      53.41        53.41          53.41
     RUNOFF COEFFICIENT   =        .97          .27            .41
```

```
     (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
          Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
          Fc    (mm/hr)= 12.50     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  (0601)   |   Area    (ha)=   7.62
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  46.00   Dir. Conn.(%)=  21.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        3.51         4.11
     Dep. Storage      (mm)=        1.50         5.00
     Average Slope      (%)=        2.00         2.00
     Length             (m)=      680.00        40.00
     Mannings n            =        .013         .300

     Max.Eff.Inten.(mm/hr)=        70.50        89.23
                over (min)         10.00        20.00
     Storage Coeff.  (min)=         7.54 (ii)   15.78 (ii)
     Unit Hyd. Tpeak (min)=        10.00        20.00
     Unit Hyd. peak  (cms)=          .13          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=          .27          .49          .679 (iii)
     TIME TO PEAK    (hrs)=         6.00         6.17          6.08
     RUNOFF VOLUME    (mm)=        51.91        15.62         23.24
     TOTAL RAINFALL   (mm)=        53.41        53.41         53.41
     RUNOFF COEFFICIENT   =          .97          .29           .44

     (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
          Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
          Fc    (mm/hr)= 12.50     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  (0607)   |   Area    (ha)=   5.97
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=   2.50
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        2.51         3.46
     Dep. Storage      (mm)=        1.50         5.00
     Average Slope      (%)=        2.00         2.00
     Length             (m)=      680.00        40.00
     Mannings n            =        .013         .300

     Max.Eff.Inten.(mm/hr)=        70.50       105.29
                over (min)         10.00        20.00
     Storage Coeff.  (min)=         7.54 (ii)   15.25 (ii)
     Unit Hyd. Tpeak (min)=        10.00        20.00
     Unit Hyd. peak  (cms)=          .13          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=          .03          .52          .534 (iii)
     TIME TO PEAK    (hrs)=         6.00         6.17          6.17
     RUNOFF VOLUME    (mm)=        51.91        17.87         18.72
     TOTAL RAINFALL   (mm)=        53.41        53.41         53.41
```

```
     RUNOFF COEFFICIENT   =        .97           .33             .35

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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  (0540)  |   Area    (ha)=   4.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.70          .93
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .55          .55
     Length            (m)=     150.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=      70.50        30.06
                over (min)        5.00        25.00
     Storage Coeff.  (min)=       4.48 (ii)   23.24 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .23          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .70          .04          .713 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.25          6.00
     RUNOFF VOLUME    (mm)=      51.91         9.54         43.01
     TOTAL RAINFALL   (mm)=      53.41        53.41         53.41
     RUNOFF COEFFICIENT   =        .97          .18           .81

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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  (0500)  |   Area    (ha)= 244.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  46.00   Dir. Conn.(%)=  26.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     112.24       131.76
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .80          .80
     Length            (m)=    1275.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=      70.50        78.43
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      14.47 (ii)   25.89 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
```

```
Unit Hyd. peak  (cms)=        .08            .04
                                                        *TOTALS*
PEAK FLOW       (cms)=       8.08           9.34         14.467 (iii)
TIME TO PEAK    (hrs)=       6.08           6.33          6.25
RUNOFF VOLUME    (mm)=      51.91          14.36         24.12
TOTAL RAINFALL   (mm)=      53.41          53.41         53.41
RUNOFF COEFFICIENT   =        .97            .27           .45

  (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
       Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
       Fc   (mm/hr)= 12.50     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  (0510) |   Area    (ha)=  16.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area    (ha)=     12.80         3.20
     Dep. Storage    (mm)=      1.50         5.00
     Average Slope    (%)=       .50          .20
     Length           (m)=    400.00        40.00
     Mannings n          =      .013         .300

     Max.Eff.Inten.(mm/hr)=     70.50        20.04
              over (min)      10.00        40.00
     Storage Coeff.  (min)=      8.31 (ii)   38.19 (ii)
     Unit Hyd. Tpeak (min)=     10.00        40.00
     Unit Hyd. peak  (cms)=       .13          .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=      2.06          .09         2.080 (iii)
     TIME TO PEAK    (hrs)=      6.00         6.50          6.00
     RUNOFF VOLUME    (mm)=     51.91         9.54         43.01
     TOTAL RAINFALL   (mm)=     53.41        53.41         53.41
     RUNOFF COEFFICIENT   =       .97          .18           .81

  (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
       Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
       Fc   (mm/hr)= 12.50     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  (0542) |   Area    (ha)=  25.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area    (ha)=     20.20         5.05
     Dep. Storage    (mm)=      1.50         5.00
     Average Slope    (%)=       .55          .55
     Length           (m)=    350.00        40.00
     Mannings n          =      .013         .300

     Max.Eff.Inten.(mm/hr)=     70.50        30.06
```

```
             over (min)         5.00          30.00
Storage Coeff.  (min)=          7.45 (ii)     26.21 (ii)
Unit Hyd. Tpeak (min)=          5.00          30.00
Unit Hyd. peak  (cms)=           .17            .04
                                                             *TOTALS*
PEAK FLOW       (cms)=          3.56            .19           3.608 (iii)
TIME TO PEAK    (hrs)=          6.00           6.33            6.00
RUNOFF VOLUME    (mm)=         51.91           9.54           43.01
TOTAL RAINFALL   (mm)=         53.41          53.41           53.41
RUNOFF COEFFICIENT   =           .97            .18             .81

  (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
       Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
       Fc   (mm/hr)= 12.50     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  (0543) |   Area    (ha)=  14.99
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
Surface Area     (ha)=          11.99          3.00
Dep. Storage     (mm)=           1.50          5.00
Average Slope     (%)=            .55           .55
Length            (m)=         200.00         40.00
Mannings n          =            .013          .300

Max.Eff.Inten.(mm/hr)=          70.50         30.06
             over (min)          5.00         25.00
Storage Coeff.  (min)=           5.33 (ii)    24.09 (ii)
Unit Hyd. Tpeak (min)=           5.00         25.00
Unit Hyd. peak  (cms)=            .21           .05
                                                             *TOTALS*
PEAK FLOW       (cms)=           2.23           .12           2.271 (iii)
TIME TO PEAK    (hrs)=           6.00          6.33            6.00
RUNOFF VOLUME    (mm)=          51.91          9.54           43.01
TOTAL RAINFALL   (mm)=          53.41         53.41           53.41
RUNOFF COEFFICIENT   =            .97           .18             .81

  (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
       Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
       Fc   (mm/hr)= 12.50     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  (0544) |   Area    (ha)=   1.13
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
Surface Area     (ha)=            .90           .23
Dep. Storage     (mm)=           1.50          5.00
Average Slope     (%)=            .55           .55
Length            (m)=          50.00         40.00
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```
     Mannings n           =        .013         .300

     Max.Eff.Inten.(mm/hr)=       70.50        30.06
               over (min)          5.00        25.00
     Storage Coeff.  (min)=        2.32 (ii)   21.08 (ii)
     Unit Hyd. Tpeak (min)=        5.00        25.00
     Unit Hyd. peak  (cms)=         .30          .05
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .17          .01           .178 (iii)
     TIME TO PEAK    (hrs)=        6.00         6.25           6.00
     RUNOFF VOLUME    (mm)=       51.91         9.54          43.01
     TOTAL RAINFALL   (mm)=       53.41        53.41          53.41
     RUNOFF COEFFICIENT   =         .97          .18            .81

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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.

--------------------------------------------------------------------------------
--------------------
| STORE HYD (0525) |   AREA       (ha)=    .00
| ID= 1 DT=****min |   QPEAK     (cms)=    .00
--------------------   TPEAK     (hrs)=    .00
                       VOLUME     (mm)=*******

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

--------------------
| ADD HYD   (0420) |
|   1 +  2 =  3    |         AREA    QPEAK     TPEAK     R.V.
--------------------         (ha)    (cms)     (hrs)     (mm)
          ID1= 1 (0415):     4.99     .532      6.00    22.15
        + ID2= 2 (0410):    24.20    2.307      6.00    22.15
          ==================================================
          ID = 3 (0420):    29.19    2.839      6.00    22.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0465) |
|   1 +  2 =  3    |         AREA    QPEAK     TPEAK     R.V.
--------------------         (ha)    (cms)     (hrs)     (mm)
          ID1= 1 (0460):    36.00    3.376      6.00    22.15
        + ID2= 2 (0455):    12.70    1.226      6.00    22.15
          ==================================================
          ID = 3 (0465):    48.70    4.602      6.00    22.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0362) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
```

| | | | |
|---|---|---|---|
| .00 | .40 | .0300 | |
| 5.50 | .15 | .0300 / .0150 | Main Channel |
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .40 | .0300 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .02 | .02 | .176E+02 | .0 | .21 | 80.52 |
| .04 | .04 | .702E+02 | .0 | .33 | 50.72 |
| .06 | .06 | .158E+03 | .1 | .43 | 38.71 |
| .08 | .08 | .281E+03 | .1 | .52 | 31.95 |
| .09 | .09 | .438E+03 | .3 | .62 | 26.84 |
| .11 | .11 | .607E+03 | .5 | .77 | 21.66 |
| .13 | .13 | .776E+03 | .7 | .90 | 18.45 |
| .15 | .15 | .944E+03 | 1.0 | 1.03 | 16.22 |
| .17 | .17 | .116E+04 | 1.3 | 1.16 | 14.36 |
| .20 | .20 | .140E+04 | 1.8 | 1.27 | 13.13 |
| .22 | .22 | .166E+04 | 2.3 | 1.36 | 12.24 |
| .24 | .24 | .194E+04 | 2.8 | 1.44 | 11.58 |
| .26 | .26 | .225E+04 | 3.4 | 1.51 | 11.05 |
| .29 | .29 | .258E+04 | 4.0 | 1.57 | 10.63 |
| .31 | .31 | .293E+04 | 4.8 | 1.62 | 10.27 |
| .33 | .33 | .331E+04 | 5.5 | 1.67 | 9.97 |
| .35 | .35 | .371E+04 | 6.4 | 1.72 | 9.71 |
| .38 | .38 | .413E+04 | 7.3 | 1.76 | 9.48 |
| .40 | .40 | .457E+04 | 8.2 | 1.80 | 9.28 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0360) | 30.00 | 2.58 | 6.00 | 20.64 | .23 | 1.41 |
| OUTFLOW: ID= 1 (0362) | 30.00 | 2.01 | 6.17 | 20.63 | .21 | 1.31 |

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| ROUTE CHN (0353) |
| IN= 2---> OUT= 1 |

Routing time step (min)'= 5.00

<------ DATA FOR SECTION ( 1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | .26 | .0300 | |
| 5.50 | .15 | .0300 / .0150 | Main Channel |
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .26 | .0300 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .01 | .01 | .929E+01 | .0 | .17 | 99.56 |
| .03 | .03 | .372E+02 | .0 | .27 | 62.72 |
| .04 | .04 | .836E+02 | .0 | .35 | 47.86 |
| .05 | .05 | .149E+03 | .1 | .42 | 39.51 |
| .07 | .07 | .232E+03 | .1 | .49 | 34.05 |
| .08 | .08 | .334E+03 | .2 | .55 | 30.15 |
| .10 | .10 | .454E+03 | .3 | .64 | 26.24 |

| | | | | | |
|---|---|---|---|---|---|
| .11 | .11 | .576E+03 | .4 | .74 | 22.41 |
| .12 | .12 | .699E+03 | .6 | .84 | 19.75 |
| .14 | .14 | .822E+03 | .8 | .94 | 17.76 |
| .15 | .15 | .944E+03 | 1.0 | 1.03 | 16.22 |
| .16 | .16 | .108E+04 | 1.2 | 1.11 | 15.07 |
| .18 | .18 | .123E+04 | 1.4 | 1.17 | 14.28 |
| .19 | .19 | .140E+04 | 1.7 | 1.21 | 13.72 |
| .20 | .20 | .159E+04 | 2.0 | 1.25 | 13.31 |
| .22 | .22 | .180E+04 | 2.3 | 1.28 | 13.01 |
| .23 | .23 | .203E+04 | 2.6 | 1.31 | 12.76 |
| .25 | .25 | .227E+04 | 3.0 | 1.33 | 12.57 |
| .26 | .26 | .254E+04 | 3.4 | 1.34 | 12.41 |

| | | <---- hydrograph ----> | | | <-pipe / channel-> | |
|---|---|---|---|---|---|---|
| | AREA | QPEAK | TPEAK | R.V. | MAX DEPTH | MAX VEL |
| | (ha) | (cms) | (hrs) | (mm) | (m) | (m/s) |
| INFLOW : ID= 2 (0350) | 16.30 | 1.19 | 6.00 | 22.15 | .16 | 1.10 |
| OUTFLOW: ID= 1 (0353) | 16.30 | .95 | 6.25 | 22.11 | .15 | 1.02 |

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| ROUTE CHN (0358) |
| IN= 2---> OUT= 1 |    Routing time step (min)'=  5.00

<------ DATA FOR SECTION (   1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | .26 | .0300 | |
| 5.50 | .15 | .0300 / .0150 | Main Channel |
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .26 | .0300 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .01 | .01 | .102E+02 | .0 | .17 | 109.52 |
| .03 | .03 | .409E+02 | .0 | .27 | 68.99 |
| .04 | .04 | .920E+02 | .0 | .35 | 52.65 |
| .05 | .05 | .163E+03 | .1 | .42 | 43.46 |
| .07 | .07 | .255E+03 | .1 | .49 | 37.45 |
| .08 | .08 | .368E+03 | .2 | .55 | 33.17 |
| .10 | .10 | .499E+03 | .3 | .64 | 28.86 |
| .11 | .11 | .634E+03 | .4 | .74 | 24.66 |
| .12 | .12 | .769E+03 | .6 | .84 | 21.72 |
| .14 | .14 | .904E+03 | .8 | .94 | 19.54 |
| .15 | .15 | .104E+04 | 1.0 | 1.03 | 17.84 |
| .16 | .16 | .119E+04 | 1.2 | 1.11 | 16.57 |
| .18 | .18 | .135E+04 | 1.4 | 1.17 | 15.71 |
| .19 | .19 | .154E+04 | 1.7 | 1.21 | 15.10 |
| .20 | .20 | .175E+04 | 2.0 | 1.25 | 14.65 |
| .22 | .22 | .198E+04 | 2.3 | 1.28 | 14.31 |
| .23 | .23 | .223E+04 | 2.6 | 1.31 | 14.04 |
| .25 | .25 | .250E+04 | 3.0 | 1.33 | 13.82 |
| .26 | .26 | .279E+04 | 3.4 | 1.34 | 13.65 |

| | | <---- hydrograph ----> | | | <-pipe / channel-> | |
|---|---|---|---|---|---|---|
| | AREA | QPEAK | TPEAK | R.V. | MAX DEPTH | MAX VEL |
| | (ha) | (cms) | (hrs) | (mm) | (m) | (m/s) |
| INFLOW : ID= 2 (0355) | 12.30 | 1.18 | 6.00 | 22.15 | .16 | 1.10 |
| OUTFLOW: ID= 1 (0358) | 12.30 | .74 | 6.17 | 22.10 | .13 | .92 |

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--------------------
| RESERVOIR (0106) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------       (cms)      (ha.m.)    |   (cms)      (ha.m.)
                            .0000       .0000    |    .5000        .4000
                            .0100       .0100    |   6.6000        .8000
                            .0260       .2300    |    .0000        .0000

                                   AREA        QPEAK        TPEAK         R.V.
                                   (ha)        (cms)        (hrs)         (mm)
    INFLOW : ID= 2 (0105)        51.320        3.870         6.08        22.15
    OUTFLOW: ID= 1 (0106)        51.320        2.731         6.33        22.14

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 70.57
                  TIME SHIFT OF PEAK FLOW         (min)= 15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=   .5507

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

--------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |        AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0102):     14.32    1.415      6.00     22.15
      + ID2= 2 (0101):     16.32    1.601      6.00     22.15
        ==================================================
        ID = 3 (0103):     30.64    3.016      6.00     22.15

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0111) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------       (cms)      (ha.m.)    |   (cms)      (ha.m.)
                            .0000       .0000    |   1.0000       1.0000
                            .0100       .0100    |  20.0000       1.1000
                            .0120       .1000    |    .0000        .0000

                                   AREA        QPEAK        TPEAK         R.V.
                                   (ha)        (cms)        (hrs)         (mm)
    INFLOW : ID= 2 (0110)        19.000        1.831         6.00        22.15
    OUTFLOW: ID= 1 (0111)        19.000         .238         6.58        22.14

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.98
                  TIME SHIFT OF PEAK FLOW         (min)= 35.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=   .3060

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

--------------------
| ADD HYD   (0602) |
|   1 +  2 =  3    |        AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0600):     11.38     .953      6.08     22.15
      + ID2= 2 (0601):      7.62     .679      6.08     23.24
        ==================================================
        ID = 3 (0602):     19.00    1.632      6.08     22.59
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------------------------------------------------------------------
--------------------
| DUHYD     (0505) |
| Inlet Cap.=9.000 |
| #of Inlets=    1 |
| Total(cms)=  9.0 |      AREA      QPEAK      TPEAK     R.V.
--------------------      (ha)      (cms)      (hrs)     (mm)
     TOTAL HYD.(ID= 1): 244.00      14.47       6.25    24.12
     =======================================================
     MAJOR SYS.(ID= 2):  33.53       5.47       6.25    24.12
     MINOR SYS.(ID= 3): 210.47       9.00       6.00    24.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0515) |
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK       R.V.
--------------------         (ha)     (cms)     (hrs)       (mm)
          ID1= 1 (0505):   210.47    9.000      6.00      24.12
        + ID2= 2 (0510):    16.00    2.080      6.00      43.01
          ==================================================
          ID = 3 (0515):   226.47   11.080      6.00      25.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD     (0425) |
| Inlet Cap.=1.980 |
| #of Inlets=    1 |
| Total(cms)=  2.0 |      AREA      QPEAK      TPEAK     R.V.
--------------------      (ha)      (cms)      (hrs)     (mm)
     TOTAL HYD.(ID= 1):  29.19       2.84       6.00    22.15
     =======================================================
     MAJOR SYS.(ID= 2):   2.28        .86       6.00    22.15
     MINOR SYS.(ID= 3):  26.91       1.98       6.00    22.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0470) |
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK       R.V.
--------------------         (ha)     (cms)     (hrs)       (mm)
          ID1= 1 (0425):     2.28     .859      6.00      22.15
        + ID2= 2 (0465):    48.70    4.602      6.00      22.15
          ==================================================
          ID = 3 (0470):    50.98    5.461      6.00      22.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0359) |
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK       R.V.
--------------------         (ha)     (cms)     (hrs)       (mm)
```

```
        ID1= 1 (0353):     16.30    .952     6.25    22.11
      + ID2= 2 (0358):     12.30    .744     6.17    22.10
        ==================================================
        ID = 3 (0359):     28.60   1.680     6.25    22.11

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0104) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------        (cms)      (ha.m.)    |   (cms)      (ha.m.)
                            .0000        .0000    |   1.0000        .5000
                            .0100        .0100    |  10.0000        .6000
                            .0150        .1332    |    .0000        .0000

                                  AREA      QPEAK       TPEAK       R.V.
                                  (ha)      (cms)       (hrs)       (mm)
   INFLOW : ID= 2 (0103)        30.640      3.016        6.00      22.15
   OUTFLOW: ID= 1 (0104)        30.640       .801        6.42      22.14

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 26.57
                 TIME SHIFT OF PEAK FLOW         (min)= 25.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=   .4263

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

--------------------
| ADD HYD    (0114) |
|   1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0104):     30.64    .801     6.42    22.14
      + ID2= 2 (0111):     19.00    .238     6.58    22.14
        ==================================================
        ID = 3 (0114):     49.64   1.029     6.50    22.14

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0563) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
              <------ DATA FOR SECTION (   2.2) ------>
              Distance      Elevation       Manning
                   .00           1.00         .0350
                  2.00            .50         .0350
                  4.00            .00      .0350 / .0350  Main Channel
                  4.50            .00         .0350       Main Channel
                  5.00            .00      .0350 / .0350  Main Channel
                  7.00            .50         .0350
                  9.00           1.00         .0350

       <-------------------- TRAVEL TIME TABLE -------------------->
        DEPTH    ELEV      VOLUME     FLOW RATE    VELOCITY   TRAV.TIME
         (m)      (m)     (cu.m.)       (cms)       (m/s)       (min)
         .05      .05    .745E+01        .0           .64        3.06
         .11      .11    .175E+02        .1           .96        2.03
         .16      .16    .301E+02        .3          1.21        1.61
         .21      .21    .454E+02        .6          1.42        1.37
         .26      .26    .632E+02        .9          1.61        1.21
         .32      .32    .836E+02       1.3          1.77        1.10
```

```
  .37       .37    .107E+03        1.8          1.93         1.01
  .42       .42    .132E+03        2.3          2.08          .94
  .47       .47    .160E+03        3.0          2.22          .88
  .53       .53    .191E+03        3.8          2.35          .83
  .58       .58    .225E+03        4.8          2.48          .79
  .63       .63    .261E+03        5.8          2.60          .75
  .68       .68    .299E+03        7.0          2.72          .72
  .74       .74    .340E+03        8.2          2.84          .69
  .79       .79    .384E+03        9.7          2.95          .66
  .84       .84    .430E+03       11.3          3.06          .64
  .89       .89    .479E+03       13.0          3.17          .62
  .95       .95    .531E+03       14.8          3.27          .60
 1.00      1.00    .585E+03       16.9          3.38          .58

                                  <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.    MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
INFLOW : ID= 2 (0602)    19.00     1.63    6.08  22.59       .35       1.89
OUTFLOW: ID= 1 (0563)    19.00     1.61    6.08  22.59       .35       1.88


--------------------------------------------------------------------------
--------------------
| ROUTE CHN (0564) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
              <------ DATA FOR SECTION (   1.1) ------>
              Distance      Elevation      Manning
                   .00       101.50         .0500
                  1.00       100.70         .0500
                  1.50       100.55     .0500 / .0300  Main Channel
                  2.00        99.50         .0300      Main Channel
                  3.50        99.60         .0300      Main Channel
                  4.50       100.65     .0300 / .0500  Main Channel
                  6.00       101.45         .0500

     <-------------------- TRAVEL TIME TABLE --------------------->
      DEPTH    ELEV     VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
       (m)      (m)    (cu.m.)       (cms)         (m/s)       (min)
       .10    99.60    .353E+02        .0            .19       43.69
       .19    99.69    .112E+03        .1            .37       22.76
       .29    99.79    .195E+03        .2            .49       17.03
       .38    99.88    .285E+03        .3            .59       14.23
       .48    99.98    .381E+03        .5            .67       12.51
       .57   100.07    .484E+03        .7            .74       11.32
       .67   100.17    .594E+03        .9            .80       10.43
       .76   100.26    .710E+03       1.2            .86        9.74
       .86   100.36    .832E+03       1.5            .91        9.18
       .95   100.45    .961E+03       1.8            .96        8.72
      1.05   100.55    .110E+04       2.2           1.00        8.32
      1.16   100.66    .127E+04       2.7           1.07        7.80
      1.28   100.78    .148E+04       3.4           1.14        7.31
      1.39   100.89    .170E+04       4.1           1.20        6.94
      1.50   101.00    .195E+04       4.9           1.25        6.65
      1.61   101.11    .221E+04       5.8           1.30        6.41
      1.72   101.22    .250E+04       6.7           1.34        6.22
      1.84   101.34    .280E+04       7.7           1.38        6.04
      1.95   101.45    .313E+04       8.8           1.41        5.90

                                  <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.    MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
INFLOW : ID= 2 (0505)    33.53     5.47    6.25  24.12      1.58       1.28
```

```
OUTFLOW: ID= 1 (0564)    33.53      4.91     6.33  24.12       1.50       1.25


-------------------------------------------------------------------------------
--------------------
| DUHYD     (0520) |
| Inlet Cap.=3.050 |
| #of Inlets=    1 |
| Total(cms)=  3.0 |      AREA      QPEAK      TPEAK     R.V.
--------------------      (ha)      (cms)      (hrs)     (mm)
    TOTAL HYD.(ID= 1): 226.47      11.08       6.00    25.46
    ================================================================
    MAJOR SYS.(ID= 2):  88.85       8.03       6.00    25.46
    MINOR SYS.(ID= 3): 137.62       3.05       5.75    25.46

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0475) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
                <------ DATA FOR SECTION (    1.1) ------>
                Distance       Elevation        Manning
                  100.00         324.60           .0500
                  115.00         321.60           .0500
                  120.00         320.80      .0500 / .0300  Main Channel
                  122.00         320.80      .0300 / .0500  Main Channel
                  138.00         321.60           .0500
                  148.00         322.30           .0500
                  154.00         323.10           .0500
                  164.00         324.60           .0500

     <--------------------- TRAVEL TIME TABLE --------------------->
      DEPTH    ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
       (m)      (m)     (cu.m.)      (cms)         (m/s)       (min)
       .20    321.00    .398E+03        .8           .84        8.53
       .40    321.20    .125E+04       3.3          1.13        6.33
       .60    321.40    .255E+04       8.1          1.36        5.27
       .80    321.60    .430E+04      15.6          1.56        4.59
      1.00    321.80    .644E+04      26.8          1.79        4.01
      1.20    322.00    .892E+04      41.2          1.99        3.61
      1.40    322.20    .117E+05      59.3          2.17        3.30
      1.60    322.40    .148E+05      81.9          2.37        3.02
      1.80    322.60    .182E+05     109.1          2.58        2.78
      2.00    322.80    .218E+05     140.2          2.77        2.59
      2.20    323.00    .256E+05     175.3          2.95        2.43
      2.40    323.20    .296E+05     214.7          3.12        2.29
      2.60    323.40    .338E+05     258.6          3.29        2.18
      2.80    323.60    .382E+05     306.7          3.46        2.07
      3.00    323.80    .428E+05     359.1          3.61        1.98
      3.20    324.00    .476E+05     416.0          3.76        1.91
      3.40    324.20    .526E+05     477.5          3.91        1.83
      3.60    324.40    .578E+05     543.5          4.05        1.77
      3.80    324.60    .632E+05     614.3          4.18        1.71

                                    <---- hydrograph ---->  <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
    INFLOW : ID= 2 (0470)    50.98    5.46    6.00  22.15       .49       1.23
    OUTFLOW: ID= 1 (0475)    50.98    4.60    6.08  22.15       .45       1.19
```

```
--------------------
| ADD HYD   (0363) |
|  1 +  2 =  3     |        AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0362):    30.00    2.013      6.17     20.63
       + ID2= 2 (0359):    28.60    1.680      6.25     22.11
         ==================================================
         ID = 3 (0363):    58.60    3.649      6.17     21.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0115) |
|  1 +  2 =  3     |        AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0106):    51.32    2.731      6.33     22.14
       + ID2= 2 (0114):    49.64    1.029      6.50     22.14
         ==================================================
         ID = 3 (0115):   100.96    3.732      6.33     22.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0492) |
|  1 +  2 =  3     |        AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0563):    19.00    1.610      6.08     22.59
       + ID2= 2 (0607):     5.97     .534      6.17     18.72
         ==================================================
         ID = 3 (0492):    24.97    2.115      6.08     21.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0526) |
|  1 +  2 =  3     |        AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0525):      .00     .001       .00   *******
       + ID2= 2 (0520):    88.85    8.030      6.00     25.46
         ==================================================
         ID = 3 (0526):    88.85    8.030      6.00     25.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0380) |
|  1 +  2 =  3     |        AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0363):    58.60    3.649      6.17     21.35
       + ID2= 2 (0365):   117.50    9.481      6.08     22.15
         ==================================================
         ID = 3 (0380):   176.10   12.674      6.17     21.88
```

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

 ------------------------------------------------------------------------------
 -------------------
 | RESERVOIR (0482) |
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |       OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
 -------------------         (cms)     (ha.m.)    |   (cms)     (ha.m.)
                              .0000      .0000    |    .2910      .3795
                              .2590      .0579    |    .2970      .4503
                              .2660      .1180    |   1.6320      .5232
                              .2720      .1802    |   4.1680      .5983
                              .2790      .2445    |   7.5660      .6756
                              .2850      .3109    |    .0000      .0000

                                   AREA      QPEAK        TPEAK        R.V.
                                   (ha)      (cms)        (hrs)        (mm)
      INFLOW : ID= 2 (0492)      24.970      2.115         6.08       21.66
      OUTFLOW: ID= 1 (0482)      24.970       .288         6.83       21.66

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.60
                     TIME SHIFT OF PEAK FLOW         (min)= 45.00
                     MAXIMUM  STORAGE   USED       (ha.m.)=   .3412

 ------------------------------------------------------------------------------
 -------------------
 | ROUTE CHN (0527) |
 | IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
 -------------------
                 <------ DATA FOR SECTION (   1.1) ------>
                 Distance      Elevation       Manning
                   100.00        313.20          .0500
                   140.00        312.40     .0500 / .0300   Main Channel
                   140.50        310.80          .0300      Main Channel
                   141.50        310.80          .0300      Main Channel
                   142.00        312.40     .0300 / .0500   Main Channel
                   160.00        313.20          .0500

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH    ELEV       VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
        (m)      (m)      (cu.m.)        (cms)         (m/s)       (min)
        .12    310.92    .575E+02          .1           .40        18.86
        .25    311.05    .119E+03          .2           .57        13.13
        .37    311.17    .185E+03          .3           .69        10.87
        .49    311.29    .256E+03          .4           .78         9.61
        .62    311.42    .330E+03          .6           .86         8.77
        .74    311.54    .409E+03          .8           .92         8.17
        .86    311.66    .492E+03         1.1           .97         7.70
        .98    311.78    .579E+03         1.3          1.02         7.32
       1.11    311.91    .671E+03         1.6          1.07         7.01
       1.23    312.03    .767E+03         1.9          1.11         6.74
       1.35    312.15    .867E+03         2.2          1.15         6.50
       1.48    312.28    .971E+03         2.6          1.19         6.29
       1.60    312.40    .108E+04         2.9          1.23         6.11
       1.73    312.53    .149E+04         3.6          1.10         6.85
       1.87    312.67    .248E+04         4.9           .88         8.52
       2.00    312.80    .405E+04         6.9           .77         9.74
       2.13    312.93    .620E+04        10.1           .73        10.21
       2.27    313.07    .893E+04        14.6           .74        10.17
       2.40    313.20    .122E+05        20.7           .76         9.85

                                     <---- hydrograph ---->   <-pipe / channel->
                             AREA     QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
```

```
                           (ha)     (cms)    (hrs)   (mm)       (m)      (m/s)
 INFLOW : ID= 2 (0526)    88.85     8.03     6.00  25.46       2.05        .76
 OUTFLOW: ID= 1 (0527)    88.85     6.50     6.42  25.46       1.97        .79

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (0390) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          .0000       .0000    |  1.3100      1.6000
                          .7700       .2870    |  1.8600     23.2300
                         1.2600       .9680    |   .0000       .0000

                                AREA      QPEAK       TPEAK       R.V.
                                (ha)      (cms)       (hrs)       (mm)
 INFLOW : ID= 2 (0380)        176.100    12.674        6.17      21.88
 OUTFLOW: ID= 1 (0390)        176.100     1.333        7.08      21.88

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.52
                 TIME SHIFT OF PEAK FLOW         (min)= 55.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  2.5065

-------------------------------------------------------------------------------
--------------------
| ADD HYD   (0400) |
|   1 +  2 =  3    |       AREA    QPEAK    TPEAK     R.V.
--------------------       (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0395):    51.20   2.601     6.17    11.75
      + ID2= 2 (0390):   176.10   1.333     7.08    21.88
        ==================================================
        ID = 3 (0400):   227.30   3.883     6.17    19.60

 NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0403) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
            <------ DATA FOR SECTION (   1.1) ------>
            Distance      Elevation       Manning
              100.00        338.30         .0500
              110.00        336.80         .0500
              135.00        336.00         .0300     Main Channel
              142.00        335.30         .0500
              148.00        335.30         .0500
              156.00        336.00         .0500
              165.00        338.30         .0000

     <-------------------- TRAVEL TIME TABLE --------------------->
      DEPTH    ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
       (m)      (m)     (cu.m.)       (cms)         (m/s)       (min)
       .16   335.46    .231E+04         .9           .71        44.52
       .32   335.62    .563E+04        3.2          1.09        29.11
       .47   335.77    .997E+04        7.3          1.39        22.72
       .63   335.93    .153E+05       13.4          1.66        19.04
       .79   336.09    .218E+05       22.7          1.97        16.04
       .95   336.25    .299E+05       35.3          2.25        14.10
      1.11   336.41    .396E+05       51.2          2.46        12.89
      1.26   336.56    .510E+05       70.7          2.63        12.02
```

```
   1.42    336.72    .641E+05     94.1          2.79      11.35
   1.58    336.88    .787E+05    122.4          2.96      10.71
   1.74    337.04    .939E+05    155.6          3.15      10.06
   1.89    337.19    .110E+06    192.8          3.34       9.48
   2.05    337.35    .126E+06    233.9          3.53       8.97
   2.21    337.51    .143E+06    278.9          3.71       8.53
   2.37    337.67    .160E+06    327.7          3.89       8.13
   2.53    337.83    .178E+06    380.3          4.07       7.79
   2.68    337.98    .196E+06    436.7          4.23       7.48
   2.84    338.14    .215E+06    496.9          4.40       7.20
   3.00    338.30    .234E+06    561.0          4.56       6.95

                                   <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
 INFLOW : ID= 2 (0400)     227.30     3.88    6.17  19.60      .34       1.13
 OUTFLOW: ID= 1 (0403)     227.30     2.23    6.42  19.60      .25        .89

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--------------------
| ADD HYD   (0407) |
|  1 +  2 =  3     |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0403):   227.30   2.232     6.42    19.60
        + ID2= 2 (0115):   100.96   3.732     6.33    22.14
          ==================================================
          ID = 3 (0407):   328.26   5.857     6.33    20.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (0113) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            .0000      .0000   |   1.6000     6.4000
                           1.1000     2.9000   |   9.1000    10.0000
                           1.3000     4.3000   |  12.0000    20.0000

                              AREA       QPEAK       TPEAK       R.V.
                              (ha)       (cms)       (hrs)       (mm)
 INFLOW : ID= 2 (0407)      328.260      5.857        6.33       20.38
 OUTFLOW: ID= 1 (0113)      328.260      1.137       12.67       20.38

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.42
              TIME SHIFT OF PEAK FLOW        (min)=380.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  3.1599

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--------------------
| ADD HYD   (0430) |
|  1 +  2 =  3     |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0113):   328.26   1.137    12.67    20.38
        + ID2= 2 (0425):    26.91   1.980     6.00    22.15
          ==================================================
          ID = 3 (0430):   355.17   2.137     6.17    20.51

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

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--------------------
| ROUTE CHN (0440) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
             <------ DATA FOR SECTION (   1.1) ------>
             Distance      Elevation      Manning
              100.00        325.40         .0600
              120.00        324.60         .0600
              126.00        323.90         .0600
              130.00        323.00         .0600
              140.00        322.30     .0600 / .0300  Main Channel
              142.00        322.30     .0300 / .0600  Main Channel
              150.00        323.90         .0600
              155.00        324.60         .0600
              160.00        325.40         .0600

     <-------------------- TRAVEL TIME TABLE --------------------->
      DEPTH    ELEV       VOLUME     FLOW RATE     VELOCITY   TRAV.TIME
       (m)      (m)      (cu.m.)      (cms)         (m/s)       (min)
       .16    322.46    .233E+03        .6           .96        6.96
       .33    322.63    .672E+03       2.1          1.26        5.27
       .49    322.79    .132E+04       4.9          1.48        4.51
       .65    322.95    .216E+04       9.0          1.66        4.03
       .82    323.12    .319E+04      14.9          1.87        3.57
       .98    323.28    .433E+04      22.5          2.08        3.21
      1.14    323.44    .556E+04      31.6          2.27        2.93
      1.31    323.61    .689E+04      42.3          2.45        2.72
      1.47    323.77    .833E+04      54.6          2.62        2.54
      1.63    323.93    .987E+04      68.3          2.77        2.41
      1.79    324.09    .115E+05      82.8          2.87        2.33
      1.96    324.26    .134E+05      99.2          2.96        2.25
      2.12    324.42    .154E+05     117.9          3.06        2.18
      2.28    324.58    .176E+05     138.8          3.15        2.11
      2.45    324.75    .200E+05     157.4          3.14        2.12
      2.61    324.91    .228E+05     179.6          3.15        2.11
      2.77    325.07    .259E+05     205.8          3.18        2.09
      2.94    325.24    .293E+05     236.1          3.23        2.07
      3.10    325.40    .330E+05     270.6          3.28        2.03

                                    <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.    MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (0430)   355.17     2.14    6.17  20.51       .33       1.26
   OUTFLOW: ID= 1 (0440)   355.17     2.11    6.17  20.51       .32       1.26


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--------------------
| ADD HYD   (0485) |
|   1 +  2 =  3    |        AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0475):    50.98    4.600      6.08     22.15
        + ID2= 2 (0440):   355.17    2.113      6.17     20.51
          ==================================================
          ID = 3 (0485):   406.15    6.641      6.08     20.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0490) |
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0480):     43.10   3.608     6.08    22.15
        + ID2= 2 (0485):    406.15   6.641     6.08    20.72
          ===============================================
          ID = 3 (0490):    449.25  10.249     6.08    20.86

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0491) |
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0490):    449.25  10.249     6.08    20.86
        + ID2= 2 (0482):     24.97    .288     6.83    21.66
          ===============================================
          ID = 3 (0491):    474.22  10.516     6.08    20.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| RESERVOIR (0483) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            .0000      .0000   |   7.0800     2.4860
                            .2760      .0600   |   8.1000     3.3240
                           1.2000      .3400   |   9.7980     4.6420
                           2.0400      .6182   |  10.4940     7.4397
                           2.6400     1.1630   |  11.6850    10.3000
                           3.1200     1.7070   |  12.3480    11.4000

                                   AREA      QPEAK       TPEAK        R.V.
                                   (ha)      (cms)       (hrs)        (mm)
     INFLOW : ID= 2 (0491)      474.220     10.516        6.08        20.90
     OUTFLOW: ID= 1 (0483)      474.220      2.907        6.67        20.90

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 27.65
                   TIME SHIFT OF PEAK FLOW          (min)= 35.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.4680

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--------------------
| ADD HYD   (0530) |
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0483):    474.22   2.907     6.67    20.90
        + ID2= 2 (0540):      4.63    .713     6.00    43.01
          ===============================================
          ID = 3 (0530):    478.85   3.002     6.50    21.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| ADD HYD   (0545) |
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|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0530):    478.85   3.002     6.50    21.11
        + ID2= 2 (0527):     88.85   6.502     6.42    25.46
          ==================================================
          ID = 3 (0545):    567.70   9.482     6.50    21.79

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0546) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0545):    567.70   9.482     6.50    21.79
        + ID2= 2 (0542):     25.25   3.608     6.00    43.01
          ==================================================
          ID = 3 (0546):    592.95  10.345     6.00    22.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0547) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0546):    592.95  10.345     6.00    22.70
        + ID2= 2 (0543):     14.99   2.271     6.00    43.01
          ==================================================
          ID = 3 (0547):    607.94  12.615     6.00    23.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0548) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0547):    607.94  12.615     6.00    23.20
        + ID2= 2 (0544):      1.13    .178     6.00    43.01
          ==================================================
          ID = 3 (0548):    609.07  12.793     6.00    23.23

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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  ****************************
  ** SIMULATION NUMBER:   3 **
  ****************************


--------------------
|    READ STORM    |    Filename: Y:\SPrimmer\OTTHYMO\Ci
|                  |              tyview Ridge\25yrSCS12hr.stm
| Ptotal= 73.56 mm |    Comments: 25 year SCS Type II 12hr design storm
--------------------
                  TIME    RAIN | TIME    RAIN | TIME    RAIN | TIME    RAIN
                   hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr |  hrs   mm/hr
                   .25    1.84 | 3.25    2.94 | 6.25   13.24 | 9.25    2.58
                   .50    1.84 | 3.50    2.94 | 6.50   13.24 | 9.50    2.58
```

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| .75 | 1.84 | 3.75 | 2.94 | 6.75 | 5.89 | 9.75 | 2.58 |
| 1.00 | 1.84 | 4.00 | 2.94 | 7.00 | 5.89 | 10.00 | 2.58 |
| 1.25 | 1.84 | 4.25 | 4.41 | 7.25 | 4.41 | 10.25 | 1.47 |
| 1.50 | 1.84 | 4.50 | 4.41 | 7.50 | 4.41 | 10.50 | 1.47 |
| 1.75 | 1.84 | 4.75 | 5.89 | 7.75 | 4.41 | 10.75 | 1.47 |
| 2.00 | 1.84 | 5.00 | 5.89 | 8.00 | 4.41 | 11.00 | 1.47 |
| 2.25 | 2.21 | 5.25 | 8.83 | 8.25 | 2.58 | 11.25 | 1.47 |
| 2.50 | 2.21 | 5.50 | 8.83 | 8.50 | 2.58 | 11.50 | 1.47 |
| 2.75 | 2.21 | 5.75 | 35.31 | 8.75 | 2.58 | 11.75 | 1.47 |
| 3.00 | 2.21 | 6.00 | 97.10 | 9.00 | 2.58 | 12.00 | 1.47 |

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--------------------
| CALIB              |
| STANDHYD  (0480)   |   Area     (ha)=  43.10
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
```

| | | IMPERVIOUS | PERVIOUS (i) |
|---|---|---|---|
| Surface Area | (ha)= | 18.10 | 25.00 |
| Dep. Storage | (mm)= | 1.50 | 5.00 |
| Average Slope | (%)= | 2.00 | 2.00 |
| Length | (m)= | 680.00 | 40.00 |
| Mannings n | = | .013 | .300 |

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 | 1.84 | 3.083 | 2.94 | 6.083 | 13.24 | 9.08 | 2.58 |
| .167 | 1.84 | 3.167 | 2.94 | 6.167 | 13.24 | 9.17 | 2.58 |
| .250 | 1.84 | 3.250 | 2.94 | 6.250 | 13.24 | 9.25 | 2.58 |
| .333 | 1.84 | 3.333 | 2.94 | 6.333 | 13.24 | 9.33 | 2.58 |
| .417 | 1.84 | 3.417 | 2.94 | 6.417 | 13.24 | 9.42 | 2.58 |
| .500 | 1.84 | 3.500 | 2.94 | 6.500 | 13.24 | 9.50 | 2.58 |
| .583 | 1.84 | 3.583 | 2.94 | 6.583 | 5.89 | 9.58 | 2.58 |
| .667 | 1.84 | 3.667 | 2.94 | 6.667 | 5.89 | 9.67 | 2.58 |
| .750 | 1.84 | 3.750 | 2.94 | 6.750 | 5.89 | 9.75 | 2.58 |
| .833 | 1.84 | 3.833 | 2.94 | 6.833 | 5.89 | 9.83 | 2.58 |
| .917 | 1.84 | 3.917 | 2.94 | 6.917 | 5.89 | 9.92 | 2.58 |
| 1.000 | 1.84 | 4.000 | 2.94 | 7.000 | 5.88 | 10.00 | 2.58 |
| 1.083 | 1.84 | 4.083 | 4.41 | 7.083 | 4.41 | 10.08 | 1.47 |
| 1.167 | 1.84 | 4.167 | 4.41 | 7.167 | 4.41 | 10.17 | 1.47 |
| 1.250 | 1.84 | 4.250 | 4.41 | 7.250 | 4.41 | 10.25 | 1.47 |
| 1.333 | 1.84 | 4.333 | 4.41 | 7.333 | 4.41 | 10.33 | 1.47 |
| 1.417 | 1.84 | 4.417 | 4.41 | 7.417 | 4.41 | 10.42 | 1.47 |
| 1.500 | 1.84 | 4.500 | 4.41 | 7.500 | 4.41 | 10.50 | 1.47 |
| 1.583 | 1.84 | 4.583 | 5.88 | 7.583 | 4.41 | 10.58 | 1.47 |
| 1.667 | 1.84 | 4.667 | 5.89 | 7.667 | 4.41 | 10.67 | 1.47 |
| 1.750 | 1.84 | 4.750 | 5.89 | 7.750 | 4.41 | 10.75 | 1.47 |
| 1.833 | 1.84 | 4.833 | 5.89 | 7.833 | 4.41 | 10.83 | 1.47 |
| 1.917 | 1.84 | 4.917 | 5.89 | 7.917 | 4.41 | 10.92 | 1.47 |
| 2.000 | 1.84 | 5.000 | 5.89 | 8.000 | 4.41 | 11.00 | 1.47 |
| 2.083 | 2.21 | 5.083 | 8.83 | 8.083 | 2.58 | 11.08 | 1.47 |
| 2.167 | 2.21 | 5.167 | 8.83 | 8.167 | 2.58 | 11.17 | 1.47 |
| 2.250 | 2.21 | 5.250 | 8.83 | 8.250 | 2.58 | 11.25 | 1.47 |
| 2.333 | 2.21 | 5.333 | 8.83 | 8.333 | 2.58 | 11.33 | 1.47 |
| 2.417 | 2.21 | 5.417 | 8.83 | 8.417 | 2.58 | 11.42 | 1.47 |
| 2.500 | 2.21 | 5.500 | 8.83 | 8.500 | 2.58 | 11.50 | 1.47 |
| 2.583 | 2.21 | 5.583 | 35.31 | 8.583 | 2.58 | 11.58 | 1.47 |
| 2.667 | 2.21 | 5.667 | 35.31 | 8.667 | 2.58 | 11.67 | 1.47 |

```
          2.750     2.21 | 5.750   35.31 | 8.750    2.58 | 11.75    1.47
          2.833     2.21 | 5.833   97.10 | 8.833    2.58 | 11.83    1.47
          2.917     2.21 | 5.917   97.10 | 8.917    2.58 | 11.92    1.47
          3.000     2.21 | 6.000   97.10 | 9.000    2.58 | 12.00    1.47

     Max.Eff.Inten.(mm/hr)=      97.10       119.40
               over (min)         5.00        15.00
     Storage Coeff.  (min)=       6.63 (ii)   13.97 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .18          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.27         4.88         6.559 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=      72.06        26.53         36.09
     TOTAL RAINFALL   (mm)=      73.56        73.56         73.56
     RUNOFF COEFFICIENT   =        .98          .36           .49

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0415) |   Area    (ha)=   4.99
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.10         2.89
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.86         2.86
     Length            (m)=     185.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      97.10       119.40
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       2.73 (ii)    9.32 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=        .29          .12
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .28          .73         1.007 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.00          6.00
     RUNOFF VOLUME    (mm)=      72.06        26.53         36.09
     TOTAL RAINFALL   (mm)=      73.56        73.56         73.56
     RUNOFF COEFFICIENT   =        .98          .36           .49

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0410) |   Area    (ha)=  24.20
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```
          Hadati Creek Watershed - Post Development with Cityview Ridge
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.16        14.04
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     401.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=      97.10       119.40
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       4.83 (ii)   12.17 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .22          .09
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.33         2.92          3.938 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08           6.00
     RUNOFF VOLUME    (mm)=      72.06        26.53          36.09
     TOTAL RAINFALL   (mm)=      73.56        73.56          73.56
     RUNOFF COEFFICIENT  =         .98          .36            .49

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0460)  |   Area    (ha)=  36.00
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      15.12        20.88
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.03         2.03
     Length            (m)=     465.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=      97.10       119.40
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       5.26 (ii)   12.56 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .21          .08
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.96         4.29          5.772 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08           6.00
     RUNOFF VOLUME    (mm)=      72.06        26.53          36.09
     TOTAL RAINFALL   (mm)=      73.56        73.56          73.56
     RUNOFF COEFFICIENT  =         .98          .36            .49

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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--------------------
| CALIB            |
| STANDHYD  (0455) |   Area    (ha)=  12.70
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      5.33          7.37
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=      1.71          1.71
     Length            (m)=    300.00         40.00
     Mannings n           =      .013          .300

     Max.Eff.Inten.(mm/hr)=     97.10        119.40
                over (min)      5.00         15.00
     Storage Coeff.  (min)=      4.25 (ii)    11.94 (ii)
     Unit Hyd. Tpeak (min)=      5.00         15.00
     Unit Hyd. peak  (cms)=       .23           .09
                                                           *TOTALS*
     PEAK FLOW       (cms)=       .71          1.55          2.088 (iii)
     TIME TO PEAK    (hrs)=      6.00          6.08           6.00
     RUNOFF VOLUME    (mm)=     72.06         26.53          36.09
     TOTAL RAINFALL   (mm)=     73.56         73.56          73.56
     RUNOFF COEFFICIENT   =       .98           .36            .49

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD  (0395) |   Area    (ha)=  51.20
|ID= 1 DT= 5.0 min |   Total Imp(%)=  10.00   Dir. Conn.(%)=   5.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      5.12         46.08
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=      2.00          2.00
     Length            (m)=    900.00         40.00
     Mannings n           =      .013          .300

     Max.Eff.Inten.(mm/hr)=     97.10         88.55
                over (min)     10.00         20.00
     Storage Coeff.  (min)=      7.85 (ii)    16.11 (ii)
     Unit Hyd. Tpeak (min)=     10.00         20.00
     Unit Hyd. peak  (cms)=       .13           .06
                                                           *TOTALS*
     PEAK FLOW       (cms)=       .58          5.35          5.668 (iii)
     TIME TO PEAK    (hrs)=      6.00          6.17           6.17
     RUNOFF VOLUME    (mm)=     72.06         21.36          23.89
     TOTAL RAINFALL   (mm)=     73.56         73.56          73.56
     RUNOFF COEFFICIENT   =       .98           .29            .32

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
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          Hadati Creek Watershed - Post Development with Cityview Ridge
           Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
           Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB                |
| STANDHYD  (0360) |   Area    (ha)=  30.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  37.00   Dir. Conn.(%)=  19.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.10         18.90
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     447.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      97.10        111.81
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       5.16 (ii)    12.69 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .21           .08
                                                             *TOTALS*
     PEAK FLOW       (cms)=       1.48          3.58           4.647 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08           6.00
     RUNOFF VOLUME    (mm)=      72.06         25.57          34.40
     TOTAL RAINFALL   (mm)=      73.56         73.56          73.56
     RUNOFF COEFFICIENT   =        .98           .35            .47

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
           Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB                |
| STANDHYD  (0350) |   Area    (ha)=  16.30
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.85          9.45
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     330.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      97.10        119.40
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       5.29 (ii)    14.32 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .21           .08
                                                             *TOTALS*
     PEAK FLOW       (cms)=        .89          1.82           2.485 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08           6.00
     RUNOFF VOLUME    (mm)=      72.06         26.53          36.09
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     TOTAL RAINFALL   (mm)=       73.56         73.56           73.56
     RUNOFF COEFFICIENT   =         .98           .36             .49

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0355)   |   Area    (ha)=  12.30
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        5.17          7.13
     Dep. Storage     (mm)=        1.50          5.00
     Average Slope     (%)=        1.60          1.60
     Length            (m)=      286.00         40.00
     Mannings n           =        .013          .300

     Max.Eff.Inten.(mm/hr)=       97.10        119.40
                over (min)         5.00         15.00
     Storage Coeff.  (min)=        4.22 (ii)    12.06 (ii)
     Unit Hyd. Tpeak (min)=        5.00         15.00
     Unit Hyd. peak  (cms)=         .24           .09
                                                               *TOTALS*
     PEAK FLOW       (cms)=         .68          1.49           2.015 (iii)
     TIME TO PEAK    (hrs)=        6.00          6.08            6.00
     RUNOFF VOLUME    (mm)=       72.06         26.53           36.09
     TOTAL RAINFALL   (mm)=       73.56         73.56           73.56
     RUNOFF COEFFICIENT   =         .98           .36             .49

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0365)   |   Area    (ha)= 117.50
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       49.35         68.15
     Dep. Storage     (mm)=        1.50          5.00
     Average Slope     (%)=        2.00          2.00
     Length            (m)=      885.00         40.00
     Mannings n           =        .013          .300

     Max.Eff.Inten.(mm/hr)=       97.10        119.40
                over (min)        10.00         20.00
     Storage Coeff.  (min)=        7.77 (ii)    15.10 (ii)
     Unit Hyd. Tpeak (min)=       10.00         20.00
     Unit Hyd. peak  (cms)=         .13           .07
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                                                            *TOTALS*
     PEAK FLOW         (cms)=        5.65          11.98          16.238 (iii)
     TIME TO PEAK      (hrs)=        6.00           6.17           6.08
     RUNOFF VOLUME      (mm)=       72.06          26.53          36.09
     TOTAL RAINFALL     (mm)=       73.56          73.56          73.56
     RUNOFF COEFFICIENT    =          .98            .36            .49

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00             K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50      Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0105)  |   Area    (ha)=  51.32
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      21.55        29.77
     Dep. Storage      (mm)=       1.50         5.00
     Average Slope      (%)=       2.00         2.00
     Length             (m)=     550.00        40.00
     Mannings n            =       .013         .300

     Max.Eff.Inten.(mm/hr)=       97.10       119.40
               over (min)          5.00        15.00
     Storage Coeff.  (min)=        5.84 (ii)   13.17 (ii)
     Unit Hyd. Tpeak (min)=        5.00        15.00
     Unit Hyd. peak  (cms)=         .20          .08
                                                            *TOTALS*
     PEAK FLOW        (cms)=        2.76          5.98           8.044 (iii)
     TIME TO PEAK     (hrs)=        6.00          6.08           6.00
     RUNOFF VOLUME     (mm)=       72.06         26.53          36.09
     TOTAL RAINFALL    (mm)=       73.56         73.56          73.56
     RUNOFF COEFFICIENT   =          .98           .36            .49

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00             K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50      Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0102)  |   Area    (ha)=  14.32
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       6.01         8.31
     Dep. Storage      (mm)=       1.50         5.00
     Average Slope      (%)=       2.00         2.00
     Length             (m)=     287.00        40.00
     Mannings n            =       .013         .300

     Max.Eff.Inten.(mm/hr)=       97.10       119.40
               over (min)          5.00        15.00
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     Storage Coeff.  (min)=       3.95 (ii)   11.29 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .24          .09
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .80         1.79          2.406 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=      72.06        26.53         36.09
     TOTAL RAINFALL   (mm)=      73.56        73.56         73.56
     RUNOFF COEFFICIENT   =        .98          .36           .49

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0101)   |   Area    (ha)=  16.32
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.85         9.47
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     309.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      97.10       119.40
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       4.13 (ii)   11.47 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .24          .09
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .91         2.02          2.725 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=      72.06        26.53         36.09
     TOTAL RAINFALL   (mm)=      73.56        73.56         73.56
     RUNOFF COEFFICIENT   =        .98          .36           .49

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0110)   |   Area    (ha)=  19.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.98        11.02
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
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     Length           (m)=     365.00         40.00
     Mannings n         =       .013          .300

     Max.Eff.Inten.(mm/hr)=      97.10        119.40
               over (min)        5.00         15.00
     Storage Coeff.  (min)=       4.57 (ii)   11.90 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .23          .09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.05         2.32        3.122 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08        6.00
     RUNOFF VOLUME    (mm)=      72.06        26.53       36.09
     TOTAL RAINFALL   (mm)=      73.56        73.56       73.56
     RUNOFF COEFFICIENT   =        .98          .36         .49

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

      (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
           Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0600)   |   Area    (ha)=  11.38
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.78         6.60
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     680.00        40.00
     Mannings n         =       .013          .300

     Max.Eff.Inten.(mm/hr)=      97.10        119.40
               over (min)        5.00         15.00
     Storage Coeff.  (min)=       6.63 (ii)   13.97 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .18          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .60         1.29        1.732 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08        6.00
     RUNOFF VOLUME    (mm)=      72.06        26.53       36.09
     TOTAL RAINFALL   (mm)=      73.56        73.56       73.56
     RUNOFF COEFFICIENT   =        .98          .36         .49

      (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
           Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0601)   |   Area    (ha)=   7.62
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  46.00   Dir. Conn.(%)=  21.00
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                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     3.51         4.11
     Dep. Storage     (mm)=     1.50         5.00
     Average Slope     (%)=     2.00         2.00
     Length            (m)=   680.00        40.00
     Mannings n          =      .013         .300

     Max.Eff.Inten.(mm/hr)=    97.10       129.34
                over (min)      5.00        15.00
     Storage Coeff.  (min)=     6.63 (ii)   13.74 (ii)
     Unit Hyd. Tpeak (min)=     5.00        15.00
     Unit Hyd. peak  (cms)=      .18          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=      .40          .89           1.186 (iii)
     TIME TO PEAK    (hrs)=     6.00         6.08            6.00
     RUNOFF VOLUME    (mm)=    72.06        27.57           36.92
     TOTAL RAINFALL   (mm)=    73.56        73.56           73.56
     RUNOFF COEFFICIENT  =       .98          .37             .50

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0607)   |   Area    (ha)=    5.97
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00    Dir. Conn.(%)=   2.50
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     2.51         3.46
     Dep. Storage     (mm)=     1.50         5.00
     Average Slope     (%)=     2.00         2.00
     Length            (m)=   680.00        40.00
     Mannings n          =      .013         .300

     Max.Eff.Inten.(mm/hr)=    97.10       150.66
                over (min)      5.00        15.00
     Storage Coeff.  (min)=     6.63 (ii)   13.32 (ii)
     Unit Hyd. Tpeak (min)=     5.00        15.00
     Unit Hyd. peak  (cms)=      .18          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=      .04          .90            .921 (iii)
     TIME TO PEAK    (hrs)=     6.00         6.08            6.08
     RUNOFF VOLUME    (mm)=    72.06        29.58           30.64
     TOTAL RAINFALL   (mm)=    73.56        73.56           73.56
     RUNOFF COEFFICIENT  =       .98          .40             .42

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB             |
| STANDHYD  (0540) |   Area    (ha)=   4.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     3.70          .93
     Dep. Storage     (mm)=     1.50         5.00
     Average Slope     (%)=      .55          .55
     Length            (m)=   150.00        40.00
     Mannings n           =     .013         .300

     Max.Eff.Inten.(mm/hr)=    97.10        87.19
                over (min)      5.00        20.00
     Storage Coeff.  (min)=     3.94 (ii)   16.20 (ii)
     Unit Hyd. Tpeak (min)=     5.00        20.00
     Unit Hyd. peak  (cms)=      .24          .06
                                                           *TOTALS*
     PEAK FLOW       (cms)=      .97          .11            1.036 (iii)
     TIME TO PEAK    (hrs)=     6.00         6.17             6.00
     RUNOFF VOLUME    (mm)=    72.06        21.22            61.38
     TOTAL RAINFALL   (mm)=    73.56        73.56            73.56
     RUNOFF COEFFICIENT   =      .98          .29              .83

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB             |
| STANDHYD  (0500) |   Area    (ha)= 244.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  46.00   Dir. Conn.(%)=  26.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=   112.24       131.76
     Dep. Storage     (mm)=     1.50         5.00
     Average Slope     (%)=      .80          .80
     Length            (m)=  1275.00        40.00
     Mannings n           =     .013         .300

     Max.Eff.Inten.(mm/hr)=    97.10       120.22
                over (min)     15.00        25.00
     Storage Coeff.  (min)=    12.73 (ii)   22.36 (ii)
     Unit Hyd. Tpeak (min)=    15.00        25.00
     Unit Hyd. peak  (cms)=      .08          .05
                                                           *TOTALS*
     PEAK FLOW       (cms)=    11.66        18.11           27.658 (iii)
     TIME TO PEAK    (hrs)=     6.08         6.25             6.17
     RUNOFF VOLUME    (mm)=    72.06        26.62            38.44
     TOTAL RAINFALL   (mm)=    73.56        73.56            73.56
     RUNOFF COEFFICIENT   =      .98          .36              .52


       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
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      THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD  (0510)   |   Area    (ha)=  16.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      12.80         3.20
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .50          .20
     Length            (m)=     400.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=      97.10        65.53
              over (min)         5.00        30.00
     Storage Coeff.  (min)=       7.31 (ii)    25.92 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .17          .04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       3.12          .25          3.209 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.33           6.00
     RUNOFF VOLUME    (mm)=      72.06        21.22          61.38
     TOTAL RAINFALL   (mm)=      73.56        73.56          73.56
     RUNOFF COEFFICIENT   =        .98          .29            .83

  (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
       Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
       Fc   (mm/hr)= 12.50     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  (0542)   |   Area    (ha)=  25.25
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      20.20         5.05
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .55          .55
     Length            (m)=     350.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=      97.10        87.19
              over (min)         5.00        20.00
     Storage Coeff.  (min)=       6.56 (ii)    18.81 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .18          .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       5.02          .53          5.333 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.17           6.00
     RUNOFF VOLUME    (mm)=      72.06        21.22          61.38
     TOTAL RAINFALL   (mm)=      73.56        73.56          73.56
     RUNOFF COEFFICIENT   =        .98          .29            .83

  (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
```

```
        Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
        Fc    (mm/hr)= 12.50     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  (0543)   |   Area    (ha)=  14.99
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.99         3.00
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .55          .55
     Length            (m)=     200.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      97.10        87.19
                over (min)       5.00        20.00
     Storage Coeff.  (min)=       4.69 (ii)   16.94 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .22          .06
                                                           *TOTALS*
     PEAK FLOW       (cms)=       3.11          .34          3.310 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.17          6.00
     RUNOFF VOLUME    (mm)=      72.06        21.22          61.38
     TOTAL RAINFALL   (mm)=      73.56        73.56          73.56
     RUNOFF COEFFICIENT   =        .98          .29            .83

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

    (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
        Fc    (mm/hr)= 12.50     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  (0544)   |   Area    (ha)=   1.13
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .90          .23
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .55          .55
     Length            (m)=      50.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      97.10        87.19
                over (min)       5.00        15.00
     Storage Coeff.  (min)=       2.04 (ii)   14.29 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .31          .08
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .24          .03           .266 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=      72.06        21.22          61.38
     TOTAL RAINFALL   (mm)=      73.56        73.56          73.56
```

```
     RUNOFF COEFFICIENT   =        .98          .29            .83

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| STORE HYD (0525) |   AREA       (ha)=    .00
| ID= 1 DT=****min |   QPEAK     (cms)=    .00
--------------------   TPEAK     (hrs)=    .00
                       VOLUME     (mm)=*******

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

--------------------
| ADD HYD   (0420) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0415):     4.99   1.007     6.00    36.09
        + ID2= 2 (0410):    24.20   3.938     6.00    36.09
          ==================================================
          ID = 3 (0420):    29.19   4.945     6.00    36.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0465) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0460):    36.00   5.772     6.00    36.09
        + ID2= 2 (0455):    12.70   2.088     6.00    36.09
          ==================================================
          ID = 3 (0465):    48.70   7.859     6.00    36.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0362) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                    .00            .40         .0300
                   5.50            .15     .0300 / .0150  Main Channel
                   5.51            .00         .0150      Main Channel
                  10.00            .09         .0150      Main Channel
                  14.49            .00         .0150      Main Channel
                  14.50            .15     .0150 / .0300  Main Channel
                  20.00            .40         .0300

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
        (m)       (m)     (cu.m.)      (cms)        (m/s)      (min)
        .02       .02    .176E+02        .0          .21       80.52
```

| | | | | | |
|---|---|---|---|---|---|
| .04 | .04 | .702E+02 | .0 | .33 | 50.72 |
| .06 | .06 | .158E+03 | .1 | .43 | 38.71 |
| .08 | .08 | .281E+03 | .1 | .52 | 31.95 |
| .09 | .09 | .438E+03 | .3 | .62 | 26.84 |
| .11 | .11 | .607E+03 | .5 | .77 | 21.66 |
| .13 | .13 | .776E+03 | .7 | .90 | 18.45 |
| .15 | .15 | .944E+03 | 1.0 | 1.03 | 16.22 |
| .17 | .17 | .116E+04 | 1.3 | 1.16 | 14.36 |
| .20 | .20 | .140E+04 | 1.8 | 1.27 | 13.13 |
| .22 | .22 | .166E+04 | 2.3 | 1.36 | 12.24 |
| .24 | .24 | .194E+04 | 2.8 | 1.44 | 11.58 |
| .26 | .26 | .225E+04 | 3.4 | 1.51 | 11.05 |
| .29 | .29 | .258E+04 | 4.0 | 1.57 | 10.63 |
| .31 | .31 | .293E+04 | 4.8 | 1.62 | 10.27 |
| .33 | .33 | .331E+04 | 5.5 | 1.67 | 9.97 |
| .35 | .35 | .371E+04 | 6.4 | 1.72 | 9.71 |
| .38 | .38 | .413E+04 | 7.3 | 1.76 | 9.48 |
| .40 | .40 | .457E+04 | 8.2 | 1.80 | 9.28 |

| | | <---- hydrograph | ----> | | <-pipe / channel-> | |
|---|---|---|---|---|---|---|
| | AREA | QPEAK | TPEAK | R.V. | MAX DEPTH | MAX VEL |
| | (ha) | (cms) | (hrs) | (mm) | (m) | (m/s) |
| INFLOW : ID= 2 (0360) | 30.00 | 4.65 | 6.00 | 34.40 | .31 | 1.61 |
| OUTFLOW: ID= 1 (0362) | 30.00 | 3.64 | 6.17 | 34.39 | .27 | 1.53 |

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--------------------
| ROUTE CHN (0353) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
```

<------ DATA FOR SECTION ( 1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | .26 | .0300 | |
| 5.50 | .15 | .0300 / .0150 | Main Channel |
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .26 | .0300 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .01 | .01 | .929E+01 | .0 | .17 | 99.56 |
| .03 | .03 | .372E+02 | .0 | .27 | 62.72 |
| .04 | .04 | .836E+02 | .0 | .35 | 47.86 |
| .05 | .05 | .149E+03 | .1 | .42 | 39.51 |
| .07 | .07 | .232E+03 | .1 | .49 | 34.05 |
| .08 | .08 | .334E+03 | .2 | .55 | 30.15 |
| .10 | .10 | .454E+03 | .3 | .64 | 26.24 |
| .11 | .11 | .576E+03 | .4 | .74 | 22.41 |
| .12 | .12 | .699E+03 | .6 | .84 | 19.75 |
| .14 | .14 | .822E+03 | .8 | .94 | 17.76 |
| .15 | .15 | .944E+03 | 1.0 | 1.03 | 16.22 |
| .16 | .16 | .108E+04 | 1.2 | 1.11 | 15.07 |
| .18 | .18 | .123E+04 | 1.4 | 1.17 | 14.28 |
| .19 | .19 | .140E+04 | 1.7 | 1.21 | 13.72 |
| .20 | .20 | .159E+04 | 2.0 | 1.25 | 13.31 |
| .22 | .22 | .180E+04 | 2.3 | 1.28 | 13.01 |
| .23 | .23 | .203E+04 | 2.6 | 1.31 | 12.76 |
| .25 | .25 | .227E+04 | 3.0 | 1.33 | 12.57 |
| .26 | .26 | .254E+04 | 3.4 | 1.34 | 12.41 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| | | <---- hydrograph ----> | | | <-pipe / channel-> | |
| INFLOW : ID= 2 (0350) | 16.30 | 2.49 | 6.00 | 36.09 | .23 | 1.29 |
| OUTFLOW: ID= 1 (0353) | 16.30 | 1.83 | 6.17 | 36.06 | .20 | 1.23 |

---

| ROUTE CHN (0358) |
| IN= 2---> OUT= 1 |

Routing time step (min)'= 5.00

<------ DATA FOR SECTION ( 1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | .26 | .0300 | |
| 5.50 | .15 | .0300 / .0150 | Main Channel |
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .26 | .0300 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .01 | .01 | .102E+02 | .0 | .17 | 109.52 |
| .03 | .03 | .409E+02 | .0 | .27 | 68.99 |
| .04 | .04 | .920E+02 | .0 | .35 | 52.65 |
| .05 | .05 | .163E+03 | .1 | .42 | 43.46 |
| .07 | .07 | .255E+03 | .1 | .49 | 37.45 |
| .08 | .08 | .368E+03 | .2 | .55 | 33.17 |
| .10 | .10 | .499E+03 | .3 | .64 | 28.86 |
| .11 | .11 | .634E+03 | .4 | .74 | 24.66 |
| .12 | .12 | .769E+03 | .6 | .84 | 21.72 |
| .14 | .14 | .904E+03 | .8 | .94 | 19.54 |
| .15 | .15 | .104E+04 | 1.0 | 1.03 | 17.84 |
| .16 | .16 | .119E+04 | 1.2 | 1.11 | 16.57 |
| .18 | .18 | .135E+04 | 1.4 | 1.17 | 15.71 |
| .19 | .19 | .154E+04 | 1.7 | 1.21 | 15.10 |
| .20 | .20 | .175E+04 | 2.0 | 1.25 | 14.65 |
| .22 | .22 | .198E+04 | 2.3 | 1.28 | 14.31 |
| .23 | .23 | .223E+04 | 2.6 | 1.31 | 14.04 |
| .25 | .25 | .250E+04 | 3.0 | 1.33 | 13.82 |
| .26 | .26 | .279E+04 | 3.4 | 1.34 | 13.65 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| | | <---- hydrograph ----> | | | <-pipe / channel-> | |
| INFLOW : ID= 2 (0355) | 12.30 | 2.02 | 6.00 | 36.09 | .21 | 1.25 |
| OUTFLOW: ID= 1 (0358) | 12.30 | 1.38 | 6.17 | 36.04 | .17 | 1.15 |

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| RESERVOIR (0106) |
| IN= 2---> OUT= 1 |
| DT= 5.0 min |

| OUTFLOW (cms) | STORAGE (ha.m.) | OUTFLOW (cms) | STORAGE (ha.m.) |
|---|---|---|---|
| .0000 | .0000 | .5000 | .4000 |
| .0100 | .0100 | 6.6000 | .8000 |
| .0260 | .2300 | .0000 | .0000 |

```
                             AREA       QPEAK       TPEAK       R.V.
                             (ha)       (cms)       (hrs)       (mm)
 INFLOW : ID= 2 (0105)      51.320      8.044        6.00      36.09
 OUTFLOW: ID= 1 (0106)      51.320      5.545        6.17      36.09

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 68.94
              TIME SHIFT OF PEAK FLOW        (min)= 10.00
              MAXIMUM  STORAGE   USED       (ha.m.)=   .7419

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--------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |        AREA    QPEAK     TPEAK     R.V.
--------------------        (ha)    (cms)     (hrs)     (mm)
        ID1= 1 (0102):     14.32    2.406     6.00     36.09
      + ID2= 2 (0101):     16.32    2.725     6.00     36.09
        ==================================================
        ID = 3 (0103):     30.64    5.131     6.00     36.09

 NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0111) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------      (cms)      (ha.m.)    |   (cms)      (ha.m.)
                          .0000        .0000    |   1.0000      1.0000
                          .0100        .0100    |  20.0000      1.1000
                          .0120        .1000    |    .0000       .0000

                             AREA       QPEAK       TPEAK       R.V.
                             (ha)       (cms)       (hrs)       (mm)
 INFLOW : ID= 2 (0110)      19.000      3.122        6.00      36.09
 OUTFLOW: ID= 1 (0111)      19.000       .447        6.58      36.08

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.31
              TIME SHIFT OF PEAK FLOW        (min)= 35.00
              MAXIMUM  STORAGE   USED       (ha.m.)=   .4965

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--------------------
| ADD HYD   (0602) |
|   1 +  2 =  3    |        AREA    QPEAK     TPEAK     R.V.
--------------------        (ha)    (cms)     (hrs)     (mm)
        ID1= 1 (0600):     11.38    1.732     6.00     36.09
      + ID2= 2 (0601):      7.62    1.186     6.00     36.92
        ==================================================
        ID = 3 (0602):     19.00    2.918     6.00     36.42

 NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD     (0505) |
| Inlet Cap.=9.000 |
| #of Inlets=    1 |
| Total(cms)=  9.0 |     AREA      QPEAK      TPEAK    R.V.
--------------------     (ha)      (cms)      (hrs)    (mm)
 TOTAL HYD.(ID= 1): 244.00     27.66       6.17   38.44
 ====================================================
```

```
    MAJOR SYS.(ID= 2):  81.12       18.66       6.17   38.44
    MINOR SYS.(ID= 3): 162.88        9.00       5.92   38.44

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD    (0515) |
|   1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0505):      162.88    9.000      5.92     38.44
       + ID2= 2 (0510):       16.00    3.209      6.00     61.38
         ==================================================
         ID = 3 (0515):      178.88   12.209      6.00     40.49

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD      (0425) |
| Inlet Cap.=1.980  |
| #of Inlets=     1 |
| Total(cms)=  2.0  |       AREA      QPEAK      TPEAK     R.V.
--------------------        (ha)      (cms)      (hrs)     (mm)
    TOTAL HYD.(ID= 1):   29.19        4.94       6.00    36.09
    ======================================================
    MAJOR SYS.(ID= 2):    7.51        2.96       6.00    36.09
    MINOR SYS.(ID= 3):   21.68        1.98       5.83    36.09

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD    (0470) |
|   1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0425):        7.51    2.965      6.00     36.09
       + ID2= 2 (0465):       48.70    7.859      6.00     36.09
         ==================================================
         ID = 3 (0470):       56.21   10.824      6.00     36.09

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD    (0359) |
|   1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0353):       16.30    1.826      6.17     36.06
       + ID2= 2 (0358):       12.30    1.378      6.17     36.04
         ==================================================
         ID = 3 (0359):       28.60    3.204      6.17     36.05

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0104)  |
| IN= 2---> OUT= 1  |
| DT=  5.0 min      |       OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
```

```
--------------------       (cms)      (ha.m.)    |   (cms)     (ha.m.)
                            .0000       .0000    |  1.0000       .5000
                            .0100       .0100    | 10.0000       .6000
                            .0150       .1332    |   .0000       .0000

                                 AREA       QPEAK        TPEAK        R.V.
                                 (ha)       (cms)        (hrs)        (mm)
     INFLOW : ID= 2 (0103)      30.640      5.131         6.00        36.09
     OUTFLOW: ID= 1 (0104)      30.640      4.550         6.17        36.08

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)= 88.67
                     TIME SHIFT OF PEAK FLOW         (min)= 10.00
                     MAXIMUM  STORAGE   USED       (ha.m.)=   .5514

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--------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK     R.V.
--------------------          (ha)     (cms)     (hrs)     (mm)
          ID1= 1 (0104):     30.64    4.550      6.17    36.08
        + ID2= 2 (0111):     19.00     .447      6.58    36.08
          ===============================================
          ID = 3 (0114):     49.64    4.877      6.17    36.08

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0563) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
                   <------ DATA FOR SECTION (   2.2) ------>
                   Distance      Elevation       Manning
                        .00          1.00          .0350
                       2.00           .50          .0350
                       4.00           .00      .0350 / .0350  Main Channel
                       4.50           .00          .0350      Main Channel
                       5.00           .00      .0350 / .0350  Main Channel
                       7.00           .50          .0350
                       9.00          1.00          .0350

      <-------------------- TRAVEL TIME TABLE -------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)      (m)      (cu.m.)       (cms)         (m/s)       (min)
        .05      .05      .745E+01         .0           .64        3.06
        .11      .11      .175E+02         .1           .96        2.03
        .16      .16      .301E+02         .3          1.21        1.61
        .21      .21      .454E+02         .6          1.42        1.37
        .26      .26      .632E+02         .9          1.61        1.21
        .32      .32      .836E+02        1.3          1.77        1.10
        .37      .37      .107E+03        1.8          1.93        1.01
        .42      .42      .132E+03        2.3          2.08         .94
        .47      .47      .160E+03        3.0          2.22         .88
        .53      .53      .191E+03        3.8          2.35         .83
        .58      .58      .225E+03        4.8          2.48         .79
        .63      .63      .261E+03        5.8          2.60         .75
        .68      .68      .299E+03        7.0          2.72         .72
        .74      .74      .340E+03        8.2          2.84         .69
        .79      .79      .384E+03        9.7          2.95         .66
        .84      .84      .430E+03       11.3          3.06         .64
        .89      .89      .479E+03       13.0          3.17         .62
        .95      .95      .531E+03       14.8          3.27         .60
```

```
   1.00     1.00    .585E+03      16.9          3.38        .58

                                  <---- hydrograph ---->   <-pipe / channel->
                          AREA     QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)     (cms)   (hrs)   (mm)      (m)      (m/s)
 INFLOW : ID= 2 (0602)   19.00      2.92    6.00  36.42       .46      2.19
 OUTFLOW: ID= 1 (0563)   19.00      2.87    6.08  36.42       .46      2.18


-----------------------------------------------------------------------------
--------------------
| ROUTE CHN (0564) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
              <------ DATA FOR SECTION (   1.1) ------>
              Distance      Elevation       Manning
                   .00        101.50          .0500
                  1.00        100.70          .0500
                  1.50        100.55       .0500 / .0300  Main Channel
                  2.00         99.50          .0300       Main Channel
                  3.50         99.60          .0300       Main Channel
                  4.50        100.65       .0300 / .0500  Main Channel
                  6.00        101.45          .0500

    <--------------------- TRAVEL TIME TABLE --------------------->
     DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
      (m)       (m)      (cu.m.)       (cms)         (m/s)       (min)
      .10     99.60     .353E+02          .0           .19        43.69
      .19     99.69     .112E+03          .1           .37        22.76
      .29     99.79     .195E+03          .2           .49        17.03
      .38     99.88     .285E+03          .3           .59        14.23
      .48     99.98     .381E+03          .5           .67        12.51
      .57    100.07     .484E+03          .7           .74        11.32
      .67    100.17     .594E+03          .9           .80        10.43
      .76    100.26     .710E+03         1.2           .86         9.74
      .86    100.36     .832E+03         1.5           .91         9.18
      .95    100.45     .961E+03         1.8           .96         8.72
     1.05    100.55     .110E+04         2.2          1.00         8.32
     1.16    100.66     .127E+04         2.7          1.07         7.80
     1.28    100.78     .148E+04         3.4          1.14         7.31
     1.39    100.89     .170E+04         4.1          1.20         6.94
     1.50    101.00     .195E+04         4.9          1.25         6.65
     1.61    101.11     .221E+04         5.8          1.30         6.41
     1.72    101.22     .250E+04         6.7          1.34         6.22
     1.84    101.34     .280E+04         7.7          1.38         6.04
     1.95    101.45     .313E+04         8.8          1.41         5.90

 **** WARNING:  TRAVEL TIME TABLE EXCEEDED
                                  <---- hydrograph ---->   <-pipe / channel->
                          AREA     QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)     (cms)   (hrs)   (mm)      (m)      (m/s)
 INFLOW : ID= 2 (0505)   81.12     18.66    6.17  38.44      1.72      1.34
 OUTFLOW: ID= 1 (0564)   81.12     28.30    6.50  38.44      1.95      1.41

 **** WARNING:  COMPUTATIONS FAILED TO CONVERGE.

-----------------------------------------------------------------------------
--------------------
| DUHYD     (0520) |
| Inlet Cap.=3.050 |
| #of Inlets=    1 |
| Total(cms)=  3.0 |      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
```

```
TOTAL HYD.(ID= 1): 178.88      12.21       6.00   40.49
=====================================================
MAJOR SYS.(ID= 2):  74.76       9.16       6.00   40.49
MINOR SYS.(ID= 3): 104.13       3.05       5.67   40.49

NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0475) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                 100.00        324.60         .0500
                 115.00        321.60         .0500
                 120.00        320.80     .0500 / .0300  Main Channel
                 122.00        320.80     .0300 / .0500  Main Channel
                 138.00        321.60         .0500
                 148.00        322.30         .0500
                 154.00        323.10         .0500
                 164.00        324.60         .0500

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)      (cu.m.)       (cms)         (m/s)       (min)
        .20    321.00     .398E+03          .8           .84        8.53
        .40    321.20     .125E+04         3.3          1.13        6.33
        .60    321.40     .255E+04         8.1          1.36        5.27
        .80    321.60     .430E+04        15.6          1.56        4.59
       1.00    321.80     .644E+04        26.8          1.79        4.01
       1.20    322.00     .892E+04        41.2          1.99        3.61
       1.40    322.20     .117E+05        59.3          2.17        3.30
       1.60    322.40     .148E+05        81.9          2.37        3.02
       1.80    322.60     .182E+05       109.1          2.58        2.78
       2.00    322.80     .218E+05       140.2          2.77        2.59
       2.20    323.00     .256E+05       175.3          2.95        2.43
       2.40    323.20     .296E+05       214.7          3.12        2.29
       2.60    323.40     .338E+05       258.6          3.29        2.18
       2.80    323.60     .382E+05       306.7          3.46        2.07
       3.00    323.80     .428E+05       359.1          3.61        1.98
       3.20    324.00     .476E+05       416.0          3.76        1.91
       3.40    324.20     .526E+05       477.5          3.91        1.83
       3.60    324.40     .578E+05       543.5          4.05        1.77
       3.80    324.60     .632E+05       614.3          4.18        1.71

                                    <---- hydrograph ---->  <-pipe / channel->
                           AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)    (hrs)   (mm)      (m)      (m/s)
    INFLOW : ID= 2 (0470)  56.21    10.82     6.00  36.09       .67      1.43
    OUTFLOW: ID= 1 (0475)  56.21     9.54     6.08  36.09       .64      1.39

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

--------------------
| ADD HYD   (0363) |
|   1 +  2 =  3    |          AREA      QPEAK      TPEAK      R.V.
--------------------          (ha)      (cms)      (hrs)      (mm)
        ID1= 1 (0362):       30.00     3.642       6.17      34.39
      + ID2= 2 (0359):       28.60     3.204       6.17      36.05
        =====================================================
        ID = 3 (0363):       58.60     6.846       6.17      35.20
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

```
 --------------------
 | ADD HYD   (0115) |
 |  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
 --------------------          (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0106):     51.32    5.545      6.17     36.09
         + ID2= 2 (0114):     49.64    4.877      6.17     36.08
           ===================================================
           ID = 3 (0115):    100.96   10.422      6.17     36.08
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

```
 --------------------
 | ADD HYD   (0492) |
 |  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
 --------------------          (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0563):     19.00    2.866      6.08     36.42
         + ID2= 2 (0607):      5.97     .921      6.08     30.64
           ===================================================
           ID = 3 (0492):     24.97    3.787      6.08     35.04
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

```
 --------------------
 | ADD HYD   (0526) |
 |  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
 --------------------          (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0525):       .00     .001       .00   *******
         + ID2= 2 (0520):     74.76    9.159      6.00     40.49
           ===================================================
           ID = 3 (0526):     74.76    9.159      6.00     40.49
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

```
 --------------------
 | ADD HYD   (0380) |
 |  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
 --------------------          (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0363):     58.60    6.846      6.17     35.20
         + ID2= 2 (0365):    117.50   16.238      6.08     36.09
           ===================================================
           ID = 3 (0380):    176.10   22.579      6.08     35.79
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

```
 --------------------
 | RESERVOIR (0482) |
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------       (cms)    (ha.m.)   |   (cms)    (ha.m.)
                            .0000      .0000   |   .2910       .3795
                            .2590      .0579   |   .2970       .4503
```

```
                         .2660        .1180   |   1.6320        .5232
                         .2720        .1802   |   4.1680        .5983
                         .2790        .2445   |   7.5660        .6756
                         .2850        .3109   |    .0000        .0000

                             AREA       QPEAK        TPEAK        R.V.
                             (ha)       (cms)        (hrs)        (mm)
    INFLOW : ID= 2 (0492)   24.970      3.787         6.08        35.04
    OUTFLOW: ID= 1 (0482)   24.970      1.351         6.42        35.04

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 35.67
                  TIME SHIFT OF PEAK FLOW         (min)= 20.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=   .5079

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

--------------------
| ROUTE CHN (0527) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance      Elevation       Manning
                  100.00         313.20         .0500
                  140.00         312.40      .0500 / .0300   Main Channel
                  140.50         310.80         .0300        Main Channel
                  141.50         310.80         .0300        Main Channel
                  142.00         312.40      .0300 / .0500   Main Channel
                  160.00         313.20         .0500

     <--------------------- TRAVEL TIME TABLE --------------------->
      DEPTH     ELEV        VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
       (m)       (m)       (cu.m.)        (cms)         (m/s)       (min)
       .12    310.92      .575E+02          .1            .40       18.86
       .25    311.05      .119E+03          .2            .57       13.13
       .37    311.17      .185E+03          .3            .69       10.87
       .49    311.29      .256E+03          .4            .78        9.61
       .62    311.42      .330E+03          .6            .86        8.77
       .74    311.54      .409E+03          .8            .92        8.17
       .86    311.66      .492E+03         1.1            .97        7.70
       .98    311.78      .579E+03         1.3           1.02        7.32
      1.11    311.91      .671E+03         1.6           1.07        7.01
      1.23    312.03      .767E+03         1.9           1.11        6.74
      1.35    312.15      .867E+03         2.2           1.15        6.50
      1.48    312.28      .971E+03         2.6           1.19        6.29
      1.60    312.40      .108E+04         2.9           1.23        6.11
      1.73    312.53      .149E+04         3.6           1.10        6.85
      1.87    312.67      .248E+04         4.9            .88        8.52
      2.00    312.80      .405E+04         6.9            .77        9.74
      2.13    312.93      .620E+04        10.1            .73       10.21
      2.27    313.07      .893E+04        14.6            .74       10.17
      2.40    313.20      .122E+05        20.7            .76        9.85

                                     <---- hydrograph ---->    <-pipe / channel->
                             AREA     QPEAK   TPEAK    R.V.    MAX DEPTH   MAX VEL
                             (ha)     (cms)   (hrs)    (mm)       (m)       (m/s)
    INFLOW : ID= 2 (0526)   74.76      9.16    6.00   40.49      2.09        .74
    OUTFLOW: ID= 1 (0527)   74.76      7.08    6.17   40.49      2.01        .77


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

--------------------
| RESERVOIR (0390) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
```

```
--------------------      (cms)      (ha.m.)    |   (cms)     (ha.m.)
                           .0000       .0000    |   1.3100     1.6000
                           .7700       .2870    |   1.8600    23.2300
                          1.2600       .9680    |    .0000      .0000

                                 AREA      QPEAK       TPEAK        R.V.
                                 (ha)      (cms)       (hrs)        (mm)
     INFLOW : ID= 2 (0380)     176.100    22.579        6.08        35.79
     OUTFLOW: ID= 1 (0390)     176.100     1.387        7.17        35.79

               PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.14
               TIME SHIFT OF PEAK FLOW          (min)= 65.00
               MAXIMUM  STORAGE   USED       (ha.m.)=  4.6291

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

--------------------
| ADD HYD    (0400) |
|   1 +  2 =  3     |           AREA     QPEAK     TPEAK      R.V.
--------------------            (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0395):       51.20    5.668      6.17     23.89
        + ID2= 2 (0390):      176.10    1.387      7.17     35.79
          ==================================================
          ID = 3 (0400):      227.30    6.995      6.17     33.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0403) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance       Elevation        Manning
                 100.00         338.30          .0500
                 110.00         336.80          .0500
                 135.00         336.00          .0300      Main Channel
                 142.00         335.30          .0500
                 148.00         335.30          .0500
                 156.00         336.00          .0500
                 165.00         338.30          .0000

     <--------------------- TRAVEL TIME TABLE ---------------------->
      DEPTH     ELEV      VOLUME      FLOW RATE     VELOCITY   TRAV.TIME
       (m)       (m)      (cu.m.)       (cms)        (m/s)       (min)
       .16    335.46    .231E+04          .9           .71       44.52
       .32    335.62    .563E+04         3.2          1.09       29.11
       .47    335.77    .997E+04         7.3          1.39       22.72
       .63    335.93    .153E+05        13.4          1.66       19.04
       .79    336.09    .218E+05        22.7          1.97       16.04
       .95    336.25    .299E+05        35.3          2.25       14.10
      1.11    336.41    .396E+05        51.2          2.46       12.89
      1.26    336.56    .510E+05        70.7          2.63       12.02
      1.42    336.72    .641E+05        94.1          2.79       11.35
      1.58    336.88    .787E+05       122.4          2.96       10.71
      1.74    337.04    .939E+05       155.6          3.15       10.06
      1.89    337.19    .110E+06       192.8          3.34        9.48
      2.05    337.35    .126E+06       233.9          3.53        8.97
      2.21    337.51    .143E+06       278.9          3.71        8.53
      2.37    337.67    .160E+06       327.7          3.89        8.13
      2.53    337.83    .178E+06       380.3          4.07        7.79
      2.68    337.98    .196E+06       436.7          4.23        7.48
      2.84    338.14    .215E+06       496.9          4.40        7.20
```

```
  3.00   338.30    .234E+06     561.0          4.56       6.95

                                         <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.    MAX DEPTH   MAX VEL
                              (ha)    (cms)   (hrs)   (mm)       (m)       (m/s)
    INFLOW : ID= 2 (0400)   227.30     7.00    6.17  33.11        .46        1.36
    OUTFLOW: ID= 1 (0403)   227.30     4.32    6.33  33.11        .36        1.16

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

--------------------
| ADD HYD   (0407) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0403):    227.30   4.324      6.33     33.11
        + ID2= 2 (0115):    100.96  10.422      6.17     36.08
          ==================================================
          ID = 3 (0407):    328.26  13.657      6.17     34.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR (0113) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------        (cms)      (ha.m.)    |   (cms)      (ha.m.)
                             .0000       .0000    |   1.6000       6.4000
                            1.1000      2.9000    |   9.1000      10.0000
                            1.3000      4.3000    |  12.0000      20.0000

                                AREA       QPEAK        TPEAK        R.V.
                                (ha)       (cms)        (hrs)        (mm)
    INFLOW : ID= 2 (0407)     328.260     13.657         6.17       34.03
    OUTFLOW: ID= 1 (0113)     328.260      1.367        15.17       34.02

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.01
                  TIME SHIFT OF PEAK FLOW          (min)=540.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  4.7719

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

--------------------
| ADD HYD   (0430) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0113):    328.26   1.367     15.17     34.02
        + ID2= 2 (0425):     21.68   1.980      5.83     36.09
          ==================================================
          ID = 3 (0430):    349.94   2.494      6.25     34.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0440) |
| IN= 2---> OUT= 1 |       Routing time step (min)'=  5.00
--------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance      Elevation        Manning
                  100.00        325.40          .0600
                  120.00        324.60          .0600
```

| | | | |
|---|---|---|---|
| 126.00 | 323.90 | .0600 | |
| 130.00 | 323.00 | .0600 | |
| 140.00 | 322.30 | .0600 / .0300 | Main Channel |
| 142.00 | 322.30 | .0300 / .0600 | Main Channel |
| 150.00 | 323.90 | .0600 | |
| 155.00 | 324.60 | .0600 | |
| 160.00 | 325.40 | .0600 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .16 | 322.46 | .233E+03 | .6 | .96 | 6.96 |
| .33 | 322.63 | .672E+03 | 2.1 | 1.26 | 5.27 |
| .49 | 322.79 | .132E+04 | 4.9 | 1.48 | 4.51 |
| .65 | 322.95 | .216E+04 | 9.0 | 1.66 | 4.03 |
| .82 | 323.12 | .319E+04 | 14.9 | 1.87 | 3.57 |
| .98 | 323.28 | .433E+04 | 22.5 | 2.08 | 3.21 |
| 1.14 | 323.44 | .556E+04 | 31.6 | 2.27 | 2.93 |
| 1.31 | 323.61 | .689E+04 | 42.3 | 2.45 | 2.72 |
| 1.47 | 323.77 | .833E+04 | 54.6 | 2.62 | 2.54 |
| 1.63 | 323.93 | .987E+04 | 68.3 | 2.77 | 2.41 |
| 1.79 | 324.09 | .115E+05 | 82.8 | 2.87 | 2.33 |
| 1.96 | 324.26 | .134E+05 | 99.2 | 2.96 | 2.25 |
| 2.12 | 324.42 | .154E+05 | 117.9 | 3.06 | 2.18 |
| 2.28 | 324.58 | .176E+05 | 138.8 | 3.15 | 2.11 |
| 2.45 | 324.75 | .200E+05 | 157.4 | 3.14 | 2.12 |
| 2.61 | 324.91 | .228E+05 | 179.6 | 3.15 | 2.11 |
| 2.77 | 325.07 | .259E+05 | 205.8 | 3.18 | 2.09 |
| 2.94 | 325.24 | .293E+05 | 236.1 | 3.23 | 2.07 |
| 3.10 | 325.40 | .330E+05 | 270.6 | 3.28 | 2.03 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0430) | 349.94 | 2.49 | 6.25 | 34.15 | .35 | 1.29 |
| OUTFLOW: ID= 1 (0440) | 349.94 | 2.40 | 6.33 | 34.15 | .34 | 1.28 |

---

| ADD HYD (0485) |
| 1 + 2 = 3 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0475): | 56.21 | 9.543 | 6.08 | 36.09 |
| + ID2= 2 (0440): | 349.94 | 2.403 | 6.33 | 34.15 |
| ID = 3 (0485): | 406.15 | 11.718 | 6.08 | 34.42 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

| ADD HYD (0490) |
| 1 + 2 = 3 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0480): | 43.10 | 6.559 | 6.00 | 36.09 |
| + ID2= 2 (0485): | 406.15 | 11.718 | 6.08 | 34.42 |
| ID = 3 (0490): | 449.25 | 17.844 | 6.08 | 34.58 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0491) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0490):   449.25   17.844      6.08      34.58
        + ID2= 2 (0482):    24.97    1.351      6.42      35.04
          ==================================================
          ID = 3 (0491):   474.22   18.128      6.08      34.60

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| RESERVOIR (0483) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------        (cms)      (ha.m.)    |   (cms)      (ha.m.)
                            .0000       .0000     |   7.0800      2.4860
                            .2760       .0600     |   8.1000      3.3240
                           1.2000       .3400     |   9.7980      4.6420
                           2.0400       .6182     |  10.4940      7.4397
                           2.6400      1.1630     |  11.6850     10.3000
                           3.1200      1.7070     |  12.3480     11.4000

                                  AREA       QPEAK        TPEAK        R.V.
                                  (ha)       (cms)        (hrs)        (mm)
     INFLOW : ID= 2 (0491)      474.220     18.128         6.08        34.60
     OUTFLOW: ID= 1 (0483)      474.220      6.839         6.50        34.60

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 37.72
                  TIME SHIFT OF PEAK FLOW         (min)= 25.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  2.4478

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--------------------
| ADD HYD   (0530) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0483):   474.22    6.839      6.50      34.60
        + ID2= 2 (0540):     4.63    1.036      6.00      61.38
          ==================================================
          ID = 3 (0530):   478.85    7.014      6.50      34.86

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0545) |
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0530):   478.85    7.014      6.50      34.86
        + ID2= 2 (0527):    74.76    7.076      6.17      40.49
          ==================================================
          ID = 3 (0545):   553.61   13.871      6.50      35.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0546) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0545):    553.61   13.871      6.50     35.62
        + ID2= 2 (0542):     25.25    5.333      6.00     61.38
          ===================================================
          ID = 3 (0546):    578.86   14.994      6.00     36.75

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0547) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0546):    578.86   14.994      6.00     36.75
        + ID2= 2 (0543):     14.99    3.310      6.00     61.38
          ===================================================
          ID = 3 (0547):    593.85   18.304      6.00     37.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0548) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0547):    593.85   18.304      6.00     37.37
        + ID2= 2 (0544):      1.13     .266      6.00     61.38
          ===================================================
          ID = 3 (0548):    594.98   18.570      6.00     37.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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  ****************************
  ** SIMULATION NUMBER:   4 **
  ****************************


--------------------
|    READ STORM    |    Filename: Y:\SPrimmer\OTTHYMO\Ci
|                  |              tyview Ridge\100yrSCS12hr.stm
| Ptotal= 90.18 mm |    Comments: 100 year SCS Type II 12hr design storm
--------------------
                    TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                     hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                     .25    2.26 |  3.25    3.61 |  6.25   16.23 |  9.25    3.16
                     .50    2.26 |  3.50    3.61 |  6.50   16.23 |  9.50    3.16
                     .75    2.26 |  3.75    3.61 |  6.75    7.21 |  9.75    3.16
                    1.00    2.26 |  4.00    3.61 |  7.00    7.21 | 10.00    3.16
                    1.25    2.26 |  4.25    5.41 |  7.25    5.41 | 10.25    1.80
                    1.50    2.26 |  4.50    5.41 |  7.50    5.41 | 10.50    1.80
                    1.75    2.26 |  4.75    7.21 |  7.75    5.41 | 10.75    1.80
                    2.00    2.26 |  5.00    7.21 |  8.00    5.41 | 11.00    1.80
                    2.25    2.70 |  5.25   10.82 |  8.25    3.16 | 11.25    1.80
                    2.50    2.70 |  5.50   10.82 |  8.50    3.16 | 11.50    1.80
                    2.75    2.70 |  5.75   43.29 |  8.75    3.16 | 11.75    1.80
                    3.00    2.70 |  6.00  119.04 |  9.00    3.16 | 12.00    1.80
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--------------------
| CALIB              |
| STANDHYD  (0480)   |   Area    (ha)=  43.10
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     18.10         25.00
     Dep. Storage      (mm)=      1.50          5.00
     Average Slope      (%)=      2.00          2.00
     Length             (m)=    680.00         40.00
     Mannings n            =      .013          .300

        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 | 2.26 | 3.083 | 3.61 | 6.083 | 16.23 | 9.08 | 3.16 |
| .167 | 2.26 | 3.167 | 3.61 | 6.167 | 16.23 | 9.17 | 3.16 |
| .250 | 2.26 | 3.250 | 3.61 | 6.250 | 16.23 | 9.25 | 3.16 |
| .333 | 2.26 | 3.333 | 3.61 | 6.333 | 16.23 | 9.33 | 3.16 |
| .417 | 2.26 | 3.417 | 3.61 | 6.417 | 16.23 | 9.42 | 3.16 |
| .500 | 2.26 | 3.500 | 3.61 | 6.500 | 16.23 | 9.50 | 3.16 |
| .583 | 2.26 | 3.583 | 3.61 | 6.583 | 7.21 | 9.58 | 3.16 |
| .667 | 2.26 | 3.667 | 3.61 | 6.667 | 7.21 | 9.67 | 3.16 |
| .750 | 2.26 | 3.750 | 3.61 | 6.750 | 7.21 | 9.75 | 3.16 |
| .833 | 2.26 | 3.833 | 3.61 | 6.833 | 7.21 | 9.83 | 3.16 |
| .917 | 2.26 | 3.917 | 3.61 | 6.917 | 7.21 | 9.92 | 3.16 |
| 1.000 | 2.26 | 4.000 | 3.61 | 7.000 | 7.21 | 10.00 | 3.16 |
| 1.083 | 2.26 | 4.083 | 5.41 | 7.083 | 5.41 | 10.08 | 1.80 |
| 1.167 | 2.26 | 4.167 | 5.41 | 7.167 | 5.41 | 10.17 | 1.80 |
| 1.250 | 2.26 | 4.250 | 5.41 | 7.250 | 5.41 | 10.25 | 1.80 |
| 1.333 | 2.26 | 4.333 | 5.41 | 7.333 | 5.41 | 10.33 | 1.80 |
| 1.417 | 2.26 | 4.417 | 5.41 | 7.417 | 5.41 | 10.42 | 1.80 |
| 1.500 | 2.26 | 4.500 | 5.41 | 7.500 | 5.41 | 10.50 | 1.80 |
| 1.583 | 2.26 | 4.583 | 7.21 | 7.583 | 5.41 | 10.58 | 1.80 |
| 1.667 | 2.26 | 4.667 | 7.21 | 7.667 | 5.41 | 10.67 | 1.80 |
| 1.750 | 2.26 | 4.750 | 7.21 | 7.750 | 5.41 | 10.75 | 1.80 |
| 1.833 | 2.26 | 4.833 | 7.21 | 7.833 | 5.41 | 10.83 | 1.80 |
| 1.917 | 2.26 | 4.917 | 7.21 | 7.917 | 5.41 | 10.92 | 1.80 |
| 2.000 | 2.26 | 5.000 | 7.21 | 8.000 | 5.41 | 11.00 | 1.80 |
| 2.083 | 2.70 | 5.083 | 10.82 | 8.083 | 3.16 | 11.08 | 1.80 |
| 2.167 | 2.70 | 5.167 | 10.82 | 8.167 | 3.16 | 11.17 | 1.80 |
| 2.250 | 2.70 | 5.250 | 10.82 | 8.250 | 3.16 | 11.25 | 1.80 |
| 2.333 | 2.70 | 5.333 | 10.82 | 8.333 | 3.16 | 11.33 | 1.80 |
| 2.417 | 2.70 | 5.417 | 10.82 | 8.417 | 3.16 | 11.42 | 1.80 |
| 2.500 | 2.70 | 5.500 | 10.82 | 8.500 | 3.16 | 11.50 | 1.80 |
| 2.583 | 2.70 | 5.583 | 43.29 | 8.583 | 3.16 | 11.58 | 1.80 |
| 2.667 | 2.70 | 5.667 | 43.29 | 8.667 | 3.16 | 11.67 | 1.80 |
| 2.750 | 2.70 | 5.750 | 43.29 | 8.750 | 3.16 | 11.75 | 1.80 |
| 2.833 | 2.70 | 5.833 | 119.04 | 8.833 | 3.16 | 11.83 | 1.80 |
| 2.917 | 2.70 | 5.917 | 119.04 | 8.917 | 3.16 | 11.92 | 1.80 |
| 3.000 | 2.70 | 6.000 | 119.04 | 9.000 | 3.16 | 12.00 | 1.80 |

```
     Max.Eff.Inten.(mm/hr)=     119.04        149.56
               over (min)       5.00         15.00
     Storage Coeff.  (min)=      6.11 (ii)    12.82 (ii)
     Unit Hyd. Tpeak (min)=      5.00         15.00
     Unit Hyd. peak  (cms)=       .19           .08
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                                                              *TOTALS*
     PEAK FLOW        (cms)=       2.82          6.56          8.721 (iii)
     TIME TO PEAK     (hrs)=       6.00          6.08           6.00
     RUNOFF VOLUME     (mm)=      88.68         36.13          47.17
     TOTAL RAINFALL    (mm)=      90.18         90.18          90.18
     RUNOFF COEFFICIENT    =        .98           .40            .52

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0415)   |   Area    (ha)=   4.99
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.10          2.89
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.86          2.86
     Length            (m)=     185.00         40.00
     Mannings n            =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        149.56
                over (min)       5.00         10.00
     Storage Coeff.  (min)=       2.51 (ii)     8.54 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=        .29           .12
                                                              *TOTALS*
     PEAK FLOW        (cms)=        .35           .96          1.304 (iii)
     TIME TO PEAK     (hrs)=       6.00          6.00           6.00
     RUNOFF VOLUME     (mm)=      88.68         36.13          47.17
     TOTAL RAINFALL    (mm)=      90.18         90.18          90.18
     RUNOFF COEFFICIENT    =        .98           .40            .52

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0410)   |   Area    (ha)=  24.20
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.16         14.04
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     401.00         40.00
     Mannings n            =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        149.56
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```
                  over (min)           5.00         15.00
     Storage Coeff.  (min)=           4.45 (ii)    11.16 (ii)
     Unit Hyd. Tpeak (min)=           5.00         15.00
     Unit Hyd. peak  (cms)=            .23           .09
                                                                 *TOTALS*
     PEAK FLOW       (cms)=           1.64          3.90           5.204 (iii)
     TIME TO PEAK    (hrs)=           6.00          6.08           6.00
     RUNOFF VOLUME    (mm)=          88.68         36.13          47.17
     TOTAL RAINFALL   (mm)=          90.18         90.18          90.18
     RUNOFF COEFFICIENT   =            .98           .40            .52

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0460)   |   Area    (ha)=  36.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       15.12        20.88
     Dep. Storage     (mm)=        1.50         5.00
     Average Slope     (%)=        2.03         2.03
     Length            (m)=      465.00        40.00
     Mannings n           =        .013         .300

     Max.Eff.Inten.(mm/hr)=      119.04       149.56
                over (min)         5.00        15.00
     Storage Coeff.  (min)=        4.84 (ii)   11.52 (ii)
     Unit Hyd. Tpeak (min)=        5.00        15.00
     Unit Hyd. peak  (cms)=         .22          .09
                                                                 *TOTALS*
     PEAK FLOW       (cms)=        2.43         5.73           7.639 (iii)
     TIME TO PEAK    (hrs)=        6.00         6.08           6.00
     RUNOFF VOLUME    (mm)=       88.68        36.13          47.17
     TOTAL RAINFALL   (mm)=       90.18        90.18          90.18
     RUNOFF COEFFICIENT   =         .98          .40            .52

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0455)   |   Area    (ha)=  12.70
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        5.33         7.37
     Dep. Storage     (mm)=        1.50         5.00
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```
     Average Slope     (%)=       1.71          1.71
     Length            (m)=     300.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        149.56
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       3.92 (ii)    10.95 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .24           .09
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .87          2.06          2.756 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08           6.00
     RUNOFF VOLUME    (mm)=      88.68         36.13          47.17
     TOTAL RAINFALL   (mm)=      90.18         90.18          90.18
     RUNOFF COEFFICIENT   =        .98           .40            .52

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB               |
| STANDHYD  (0395)  |   Area    (ha)=  51.20
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  10.00   Dir. Conn.(%)=   5.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.12         46.08
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     900.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        112.64
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       7.23 (ii)    14.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .17           .08
                                                            *TOTALS*
     PEAK FLOW       (cms)=        .78          8.19          8.631 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08           6.08
     RUNOFF VOLUME    (mm)=      88.68         31.49          34.35
     TOTAL RAINFALL   (mm)=      90.18         90.18          90.18
     RUNOFF COEFFICIENT   =        .98           .35            .38

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB               |
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| STANDHYD  (0360) |   Area    (ha)=  30.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  37.00   Dir. Conn.(%)=  19.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.10        18.90
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     447.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=     119.04       140.44
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       4.75 (ii)   11.63 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .22          .09
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.83         4.81           6.183 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08            6.00
     RUNOFF VOLUME    (mm)=      88.68        35.04           45.23
     TOTAL RAINFALL   (mm)=      90.18        90.18           90.18
     RUNOFF COEFFICIENT   =        .98          .39             .50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
           Fc   (mm/hr)= 12.50      Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD  (0350) |   Area    (ha)=  16.30
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.85         9.45
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     330.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=     119.04       149.56
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       4.88 (ii)   13.13 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .22          .08
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.10         2.45           3.299 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08            6.00
     RUNOFF VOLUME    (mm)=      88.68        36.13           47.17
     TOTAL RAINFALL   (mm)=      90.18        90.18           90.18
     RUNOFF COEFFICIENT   =        .98          .40             .52

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
           Fc   (mm/hr)= 12.50      Cum.Inf.   (mm)=   .00
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  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0355) |   Area    (ha)=  12.30
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.17          7.13
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       1.60          1.60
     Length            (m)=     286.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        149.56
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       3.89 (ii)    11.05 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .25           .09
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .84          1.99         2.661 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08          6.00
     RUNOFF VOLUME    (mm)=      88.68         36.13         47.17
     TOTAL RAINFALL   (mm)=      90.18         90.18         90.18
     RUNOFF COEFFICIENT   =        .98           .40           .52

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

   (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
        Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0365) |   Area    (ha)= 117.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      49.35         68.15
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     885.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        149.56
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       7.16 (ii)    13.86 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .17           .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       7.49         17.25        22.881 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08          6.00
     RUNOFF VOLUME    (mm)=      88.68         36.13         47.17
     TOTAL RAINFALL   (mm)=      90.18         90.18         90.18
     RUNOFF COEFFICIENT   =        .98           .40           .52
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```
     (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
          Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
          Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0105) |   Area    (ha)=  51.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.55        29.77
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     550.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=     119.04       149.56
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       5.38 (ii)   12.09 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .21          .09
                                                           *TOTALS*
     PEAK FLOW       (cms)=       3.42         8.01         10.668 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=      88.68        36.13         47.17
     TOTAL RAINFALL   (mm)=      90.18        90.18         90.18
     RUNOFF COEFFICIENT   =        .98          .40           .52

     (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
          Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
          Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0102) |   Area    (ha)=  14.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.01         8.31
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     287.00        40.00
     Mannings n          =        .013         .300

     Max.Eff.Inten.(mm/hr)=     119.04       149.56
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.64 (ii)   10.35 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .25          .09
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .98         2.37          3.171 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=      88.68        36.13         47.17
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     TOTAL RAINFALL    (mm)=       90.18          90.18           90.18
     RUNOFF COEFFICIENT   =          .98            .40             .52

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

        (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
             Fo    (mm/hr)= 75.00             K  (1/hr)=  4.14
             Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0101)  |   Area    (ha)=  16.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         6.85          9.47
     Dep. Storage     (mm)=         1.50          5.00
     Average Slope     (%)=         2.00          2.00
     Length            (m)=       309.00         40.00
     Mannings n           =         .013          .300

     Max.Eff.Inten.(mm/hr)=       119.04        149.56
               over (min)          5.00         15.00
     Storage Coeff.  (min)=         3.81 (ii)    10.51 (ii)
     Unit Hyd. Tpeak (min)=         5.00         15.00
     Unit Hyd. peak  (cms)=          .25           .09
                                                              *TOTALS*
     PEAK FLOW       (cms)=         1.12          2.69          3.593 (iii)
     TIME TO PEAK    (hrs)=         6.00          6.08           6.00
     RUNOFF VOLUME    (mm)=        88.68         36.13          47.17
     TOTAL RAINFALL   (mm)=        90.18         90.18          90.18
     RUNOFF COEFFICIENT   =          .98           .40            .52

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

        (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
             Fo    (mm/hr)= 75.00             K  (1/hr)=  4.14
             Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0110)  |   Area    (ha)=  19.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         7.98         11.02
     Dep. Storage     (mm)=         1.50          5.00
     Average Slope     (%)=         2.00          2.00
     Length            (m)=       365.00         40.00
     Mannings n           =         .013          .300

     Max.Eff.Inten.(mm/hr)=       119.04        149.56
               over (min)          5.00         15.00
     Storage Coeff.  (min)=         4.21 (ii)    10.91 (ii)
     Unit Hyd. Tpeak (min)=         5.00         15.00
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     Unit Hyd. peak  (cms)=        .24           .09
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.30          3.09         4.123 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08          6.00
     RUNOFF VOLUME    (mm)=      88.68         36.13         47.17
     TOTAL RAINFALL   (mm)=      90.18         90.18         90.18
     RUNOFF COEFFICIENT   =        .98           .40           .52

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
           Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD  (0600) |   Area    (ha)=  11.38
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.78          6.60
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     680.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        149.56
                over (min)       5.00         15.00
     Storage Coeff.  (min)=       6.11 (ii)    12.82 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .19           .08
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .75          1.73         2.303 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08          6.00
     RUNOFF VOLUME    (mm)=      88.68         36.13         47.17
     TOTAL RAINFALL   (mm)=      90.18         90.18         90.18
     RUNOFF COEFFICIENT   =        .98           .40           .52

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
           Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
           Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD  (0601) |   Area    (ha)=   7.62
|ID= 1 DT= 5.0 min |   Total Imp(%)=  46.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.51          4.11
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     680.00         40.00
     Mannings n           =       .013          .300
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```
     Max.Eff.Inten.(mm/hr)=     119.04       161.60
               over (min)         5.00        15.00
     Storage Coeff.  (min)=       6.11 (ii)   12.61 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .19          .08
                                                             *TOTALS*
     PEAK FLOW       (cms)=        .50         1.19            1.576 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08            6.00
     RUNOFF VOLUME    (mm)=      88.68        37.55           48.29
     TOTAL RAINFALL   (mm)=      90.18        90.18           90.18
     RUNOFF COEFFICIENT   =        .98          .42             .54


       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0607)   |   Area    (ha)=   5.97
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=   2.50
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.51         3.46
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     680.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=     119.04       187.59
               over (min)         5.00        15.00
     Storage Coeff.  (min)=       6.11 (ii)   12.24 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .19          .09
                                                             *TOTALS*
     PEAK FLOW       (cms)=        .05         1.19            1.215 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08            6.08
     RUNOFF VOLUME    (mm)=      88.68        39.89           41.11
     TOTAL RAINFALL   (mm)=      90.18        90.18           90.18
     RUNOFF COEFFICIENT   =        .98          .44             .46

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0540)   |   Area    (ha)=   4.63
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.70          .93
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     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=        .55           .55
     Length            (m)=     150.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        111.85
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       3.64 (ii)    14.73 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .25           .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.20           .16        1.339 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.08         6.00
     RUNOFF VOLUME    (mm)=      88.68         31.37        76.65
     TOTAL RAINFALL   (mm)=      90.18         90.18        90.18
     RUNOFF COEFFICIENT   =        .98           .35          .85

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD  (0500) |   Area    (ha)= 244.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  46.00   Dir. Conn.(%)=  26.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     112.24        131.76
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=        .80           .80
     Length            (m)=    1275.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=     119.04        150.55
                over (min)       10.00         25.00
     Storage Coeff.  (min)=      11.73 (ii)    20.53 (ii)
     Unit Hyd. Tpeak (min)=      10.00         25.00
     Unit Hyd. peak  (cms)=        .10           .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=      15.54         24.76       34.262 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.25         6.17
     RUNOFF VOLUME    (mm)=      88.68         36.25        49.88
     TOTAL RAINFALL   (mm)=      90.18         90.18        90.18
     RUNOFF COEFFICIENT   =        .98           .40          .55

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD  (0510) |   Area    (ha)=  16.00
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|ID= 1 DT= 5.0 min |    Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     12.80          3.20
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=       .50           .20
     Length            (m)=    400.00         40.00
     Mannings n           =      .013          .300

     Max.Eff.Inten.(mm/hr)=    119.04         91.82
                over (min)       5.00         25.00
     Storage Coeff.  (min)=      6.74 (ii)    22.99 (ii)
     Unit Hyd. Tpeak (min)=      5.00         25.00
     Unit Hyd. peak  (cms)=       .18           .05
                                                           *TOTALS*
     PEAK FLOW       (cms)=      3.88           .40          4.080 (iii)
     TIME TO PEAK    (hrs)=      6.00          6.25           6.00
     RUNOFF VOLUME    (mm)=     88.68         31.37          76.65
     TOTAL RAINFALL   (mm)=     90.18         90.18          90.18
     RUNOFF COEFFICIENT   =       .98           .35            .85

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0542)   |   Area    (ha)=  25.25
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     20.20          5.05
     Dep. Storage     (mm)=      1.50          5.00
     Average Slope     (%)=       .55           .55
     Length            (m)=    350.00         40.00
     Mannings n           =      .013          .300

     Max.Eff.Inten.(mm/hr)=    119.04        111.85
                over (min)       5.00         20.00
     Storage Coeff.  (min)=      6.05 (ii)    17.13 (ii)
     Unit Hyd. Tpeak (min)=      5.00         20.00
     Unit Hyd. peak  (cms)=       .19           .06
                                                           *TOTALS*
     PEAK FLOW       (cms)=      6.23           .77          6.749 (iii)
     TIME TO PEAK    (hrs)=      6.00          6.17           6.00
     RUNOFF VOLUME    (mm)=     88.68         31.37          76.65
     TOTAL RAINFALL   (mm)=     90.18         90.18          90.18
     RUNOFF COEFFICIENT   =       .98           .35            .85

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0543)   |   Area    (ha)=  14.99
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.99         3.00
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .55          .55
     Length            (m)=     200.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=     119.04       111.85
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.32 (ii)   15.41 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .23          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.84          .48         4.164 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.17          6.00
     RUNOFF VOLUME    (mm)=      88.68        31.37         76.65
     TOTAL RAINFALL   (mm)=      90.18        90.18         90.18
     RUNOFF COEFFICIENT   =        .98          .35           .85

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0544)   |   Area    (ha)=   1.13
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .90          .23
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=        .55          .55
     Length            (m)=      50.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=     119.04       111.85
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       1.88 (ii)   12.97 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=        .32          .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .30          .04          .333 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.08          6.00
     RUNOFF VOLUME    (mm)=      88.68        31.37         76.65
     TOTAL RAINFALL   (mm)=      90.18        90.18         90.18
     RUNOFF COEFFICIENT   =        .98          .35           .85

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
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   (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
  (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| STORE HYD (0525) |    AREA      (ha)=     .00
| ID= 1 DT=****min |    QPEAK     (cms)=    .00
--------------------    TPEAK     (hrs)=    .00
                        VOLUME    (mm)=*******

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| ADD HYD   (0420) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0415):      4.99    1.304      6.00     47.17
        + ID2= 2 (0410):     24.20    5.204      6.00     47.17
          ==================================================
          ID = 3 (0420):     29.19    6.509      6.00     47.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0465) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0460):     36.00    7.639      6.00     47.17
        + ID2= 2 (0455):     12.70    2.756      6.00     47.17
          ==================================================
          ID = 3 (0465):     48.70   10.395      6.00     47.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0362) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance      Elevation       Manning
                    .00            .40         .0300
                   5.50            .15     .0300 / .0150   Main Channel
                   5.51            .00         .0150       Main Channel
                  10.00            .09         .0150       Main Channel
                  14.49            .00         .0150       Main Channel
                  14.50            .15     .0150 / .0300   Main Channel
                  20.00            .40         .0300

     <--------------------- TRAVEL TIME TABLE --------------------->
      DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
       (m)       (m)     (cu.m.)       (cms)         (m/s)       (min)
       .02       .02    .176E+02         .0            .21       80.52
       .04       .04    .702E+02         .0            .33       50.72
       .06       .06    .158E+03         .1            .43       38.71
       .08       .08    .281E+03         .1            .52       31.95
       .09       .09    .438E+03         .3            .62       26.84
       .11       .11    .607E+03         .5            .77       21.66
       .13       .13    .776E+03         .7            .90       18.45
       .15       .15    .944E+03        1.0           1.03       16.22
```

| | | | | | |
|---|---|---|---|---|---|
| .17 | .17 | .116E+04 | 1.3 | 1.16 | 14.36 |
| .20 | .20 | .140E+04 | 1.8 | 1.27 | 13.13 |
| .22 | .22 | .166E+04 | 2.3 | 1.36 | 12.24 |
| .24 | .24 | .194E+04 | 2.8 | 1.44 | 11.58 |
| .26 | .26 | .225E+04 | 3.4 | 1.51 | 11.05 |
| .29 | .29 | .258E+04 | 4.0 | 1.57 | 10.63 |
| .31 | .31 | .293E+04 | 4.8 | 1.62 | 10.27 |
| .33 | .33 | .331E+04 | 5.5 | 1.67 | 9.97 |
| .35 | .35 | .371E+04 | 6.4 | 1.72 | 9.71 |
| .38 | .38 | .413E+04 | 7.3 | 1.76 | 9.48 |
| .40 | .40 | .457E+04 | 8.2 | 1.80 | 9.28 |

| | AREA | <---- hydrograph ----> QPEAK | TPEAK | R.V. | <-pipe / channel-> MAX DEPTH | MAX VEL |
|---|---|---|---|---|---|---|
| | (ha) | (cms) | (hrs) | (mm) | (m) | (m/s) |
| INFLOW : ID= 2 (0360) | 30.00 | 6.18 | 6.00 | 45.23 | .35 | 1.71 |
| OUTFLOW: ID= 1 (0362) | 30.00 | 4.88 | 6.17 | 45.22 | .31 | 1.63 |

---

| ROUTE CHN (0353) |
| IN= 2---> OUT= 1 |    Routing time step (min)'=  5.00

<------ DATA FOR SECTION (   1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| .00 | .26 | .0300 | |
| 5.50 | .15 | .0300 / .0150 | Main Channel |
| 5.51 | .00 | .0150 | Main Channel |
| 10.00 | .09 | .0150 | Main Channel |
| 14.49 | .00 | .0150 | Main Channel |
| 14.50 | .15 | .0150 / .0300 | Main Channel |
| 20.00 | .26 | .0300 | |

<-------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .01 | .01 | .929E+01 | .0 | .17 | 99.56 |
| .03 | .03 | .372E+02 | .0 | .27 | 62.72 |
| .04 | .04 | .836E+02 | .0 | .35 | 47.86 |
| .05 | .05 | .149E+03 | .1 | .42 | 39.51 |
| .07 | .07 | .232E+03 | .1 | .49 | 34.05 |
| .08 | .08 | .334E+03 | .2 | .55 | 30.15 |
| .10 | .10 | .454E+03 | .3 | .64 | 26.24 |
| .11 | .11 | .576E+03 | .4 | .74 | 22.41 |
| .12 | .12 | .699E+03 | .6 | .84 | 19.75 |
| .14 | .14 | .822E+03 | .8 | .94 | 17.76 |
| .15 | .15 | .944E+03 | 1.0 | 1.03 | 16.22 |
| .16 | .16 | .108E+04 | 1.2 | 1.11 | 15.07 |
| .18 | .18 | .123E+04 | 1.4 | 1.17 | 14.28 |
| .19 | .19 | .140E+04 | 1.7 | 1.21 | 13.72 |
| .20 | .20 | .159E+04 | 2.0 | 1.25 | 13.31 |
| .22 | .22 | .180E+04 | 2.3 | 1.28 | 13.01 |
| .23 | .23 | .203E+04 | 2.6 | 1.31 | 12.76 |
| .25 | .25 | .227E+04 | 3.0 | 1.33 | 12.57 |
| .26 | .26 | .254E+04 | 3.4 | 1.34 | 12.41 |

| | AREA | <---- hydrograph ----> QPEAK | TPEAK | R.V. | <-pipe / channel-> MAX DEPTH | MAX VEL |
|---|---|---|---|---|---|---|
| | (ha) | (cms) | (hrs) | (mm) | (m) | (m/s) |
| INFLOW : ID= 2 (0350) | 16.30 | 3.30 | 6.00 | 47.17 | .26 | 1.34 |
| OUTFLOW: ID= 1 (0353) | 16.30 | 2.44 | 6.17 | 47.13 | .22 | 1.29 |

```
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0358) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
              <------ DATA FOR SECTION (   1.1) ------>
              Distance       Elevation       Manning
                   .00             .26         .0300
                  5.50             .15     .0300 / .0150   Main Channel
                  5.51             .00         .0150       Main Channel
                 10.00             .09         .0150       Main Channel
                 14.49             .00         .0150       Main Channel
                 14.50             .15     .0150 / .0300   Main Channel
                 20.00             .26         .0300

     <--------------------- TRAVEL TIME TABLE --------------------->
      DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
       (m)       (m)      (cu.m.)       (cms)        (m/s)        (min)
       .01       .01     .102E+02        .0            .17       109.52
       .03       .03     .409E+02        .0            .27        68.99
       .04       .04     .920E+02        .0            .35        52.65
       .05       .05     .163E+03        .1            .42        43.46
       .07       .07     .255E+03        .1            .49        37.45
       .08       .08     .368E+03        .2            .55        33.17
       .10       .10     .499E+03        .3            .64        28.86
       .11       .11     .634E+03        .4            .74        24.66
       .12       .12     .769E+03        .6            .84        21.72
       .14       .14     .904E+03        .8            .94        19.54
       .15       .15     .104E+04       1.0           1.03        17.84
       .16       .16     .119E+04       1.2           1.11        16.57
       .18       .18     .135E+04       1.4           1.17        15.71
       .19       .19     .154E+04       1.7           1.21        15.10
       .20       .20     .175E+04       2.0           1.25        14.65
       .22       .22     .198E+04       2.3           1.28        14.31
       .23       .23     .223E+04       2.6           1.31        14.04
       .25       .25     .250E+04       3.0           1.33        13.82
       .26       .26     .279E+04       3.4           1.34        13.65

                                        <---- hydrograph ---->  <-pipe / channel->
                                 AREA    QPEAK    TPEAK   R.V.   MAX DEPTH   MAX VEL
                                 (ha)    (cms)    (hrs)   (mm)      (m)       (m/s)
      INFLOW : ID= 2 (0355)     12.30     2.66     6.00  47.17       .23       1.31
      OUTFLOW: ID= 1 (0358)     12.30     1.86     6.17  47.12       .20       1.23


--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0106) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            .0000      .0000   |    .5000      .4000
                            .0100      .0100   |   6.6000      .8000
                            .0260      .2300   |    .0000      .0000

                                   AREA      QPEAK       TPEAK       R.V.
                                   (ha)      (cms)       (hrs)       (mm)
      INFLOW : ID= 2 (0105)      51.320     10.668        6.00      47.17
      OUTFLOW: ID= 1 (0106)      51.320      7.689        6.17      47.16

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 72.08
                  TIME SHIFT OF PEAK FLOW        (min)= 10.00
```

```
            MAXIMUM  STORAGE   USED       (ha.m.)=   .8782

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-------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK      R.V.
-------------------          (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0102):     14.32    3.171      6.00      47.17
       + ID2= 2 (0101):     16.32    3.593      6.00      47.17
         ==================================================
         ID = 3 (0103):     30.64    6.763      6.00      47.17

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
-------------------
| RESERVOIR (0111) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
-------------------        (cms)      (ha.m.)   |   (cms)      (ha.m.)
                            .0000       .0000   |   1.0000      1.0000
                            .0100       .0100   |  20.0000      1.1000
                            .0120       .1000   |    .0000       .0000

                                 AREA       QPEAK        TPEAK        R.V.
                                 (ha)       (cms)        (hrs)        (mm)
    INFLOW : ID= 2 (0110)      19.000       4.123         6.00        47.17
    OUTFLOW: ID= 1 (0111)      19.000        .613         6.58        47.16

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.87
                TIME SHIFT OF PEAK FLOW         (min)= 35.00
                MAXIMUM  STORAGE   USED       (ha.m.)=   .6478

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

-------------------
| ADD HYD   (0602) |
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK      R.V.
-------------------          (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0600):     11.38    2.303      6.00      47.17
       + ID2= 2 (0601):      7.62    1.576      6.00      48.29
         ==================================================
         ID = 3 (0602):     19.00    3.878      6.00      47.62

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
-------------------
| DUHYD     (0505) |
| Inlet Cap.=9.000 |
| #of Inlets=    1 |
| Total(cms)=  9.0 |      AREA      QPEAK      TPEAK     R.V.
-------------------       (ha)      (cms)      (hrs)     (mm)
    TOTAL HYD.(ID= 1): 244.00      34.26       6.17    49.88
    ======================================================
    MAJOR SYS.(ID= 2): 102.03      25.26       6.17    49.88
    MINOR SYS.(ID= 3): 141.97       9.00       5.83    49.88

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

```
--------------------
| ADD HYD   (0515) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0505):    141.97   9.000     5.83     49.88
        + ID2= 2 (0510):     16.00   4.080     6.00     76.65
          ===============================================
          ID = 3 (0515):    157.97  13.080     6.00     52.60

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD     (0425) |
| Inlet Cap.=1.980 |
| #of Inlets=    1 |
| Total(cms)=  2.0 |       AREA      QPEAK      TPEAK     R.V.
--------------------       (ha)      (cms)      (hrs)     (mm)
     TOTAL HYD.(ID= 1):  29.19       6.51       6.00    47.17
     ===================================================
     MAJOR SYS.(ID= 2):  10.15       4.53       6.00    47.17
     MINOR SYS.(ID= 3):  19.04       1.98       5.83    47.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0470) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0425):     10.15   4.529     6.00     47.17
        + ID2= 2 (0465):     48.70  10.395     6.00     47.17
          ===============================================
          ID = 3 (0470):     58.85  14.924     6.00     47.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0359) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0353):     16.30   2.435     6.17     47.13
        + ID2= 2 (0358):     12.30   1.856     6.17     47.12
          ===============================================
          ID = 3 (0359):     28.60   4.291     6.17     47.13

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0104) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
--------------------        (cms)      (ha.m.)   |    (cms)      (ha.m.)
                            .0000       .0000    |   1.0000        .5000
                            .0100       .0100    |  10.0000        .6000
                            .0150       .1332    |    .0000        .0000

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

```
 INFLOW : ID= 2 (0103)     30.640      6.763         6.00        47.17
 OUTFLOW: ID= 1 (0104)     30.640      7.048         6.08        47.16

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=104.21
                TIME SHIFT OF PEAK FLOW        (min)=  5.00
                MAXIMUM  STORAGE   USED       (ha.m.)=   .5855

 **** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
                 CHECK OUTFLOW/STORAGE TABLE  OR REDUCE DT.
--------------------------------------------------------------------------------

--------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |           AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0104):     30.64    7.048      6.08     47.16
        + ID2= 2 (0111):     19.00     .613      6.58     47.16
          ==================================================
          ID = 3 (0114):     49.64    7.421      6.08     47.16

 NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0563) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    2.2) ------>
               Distance      Elevation       Manning
                    .00           1.00         .0350
                   2.00            .50         .0350
                   4.00            .00     .0350 / .0350  Main Channel
                   4.50            .00         .0350      Main Channel
                   5.00            .00     .0350 / .0350  Main Channel
                   7.00            .50         .0350
                   9.00           1.00         .0350

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)     (cu.m.)       (cms)         (m/s)       (min)
        .05       .05    .745E+01         .0           .64        3.06
        .11       .11    .175E+02         .1           .96        2.03
        .16       .16    .301E+02         .3          1.21        1.61
        .21       .21    .454E+02         .6          1.42        1.37
        .26       .26    .632E+02         .9          1.61        1.21
        .32       .32    .836E+02        1.3          1.77        1.10
        .37       .37    .107E+03        1.8          1.93        1.01
        .42       .42    .132E+03        2.3          2.08         .94
        .47       .47    .160E+03        3.0          2.22         .88
        .53       .53    .191E+03        3.8          2.35         .83
        .58       .58    .225E+03        4.8          2.48         .79
        .63       .63    .261E+03        5.8          2.60         .75
        .68       .68    .299E+03        7.0          2.72         .72
        .74       .74    .340E+03        8.2          2.84         .69
        .79       .79    .384E+03        9.7          2.95         .66
        .84       .84    .430E+03       11.3          3.06         .64
        .89       .89    .479E+03       13.0          3.17         .62
        .95       .95    .531E+03       14.8          3.27         .60
       1.00      1.00    .585E+03       16.9          3.38         .58

                                   <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
```

```
    INFLOW : ID= 2 (0602)   19.00     3.88    6.00  47.62       .53      2.35
    OUTFLOW: ID= 1 (0563)   19.00     3.76    6.08  47.62       .52      2.33


------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0564) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
              <------ DATA FOR SECTION (   1.1) ------>
              Distance      Elevation      Manning
                   .00        101.50        .0500
                  1.00        100.70        .0500
                  1.50        100.55      .0500 / .0300  Main Channel
                  2.00         99.50        .0300        Main Channel
                  3.50         99.60        .0300        Main Channel
                  4.50        100.65      .0300 / .0500  Main Channel
                  6.00        101.45        .0500

     <--------------------- TRAVEL TIME TABLE --------------------->
      DEPTH     ELEV      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
       (m)       (m)     (cu.m.)      (cms)        (m/s)        (min)
       .10     99.60    .353E+02       .0            .19        43.69
       .19     99.69    .112E+03       .1            .37        22.76
       .29     99.79    .195E+03       .2            .49        17.03
       .38     99.88    .285E+03       .3            .59        14.23
       .48     99.98    .381E+03       .5            .67        12.51
       .57    100.07    .484E+03       .7            .74        11.32
       .67    100.17    .594E+03       .9            .80        10.43
       .76    100.26    .710E+03      1.2            .86         9.74
       .86    100.36    .832E+03      1.5            .91         9.18
       .95    100.45    .961E+03      1.8            .96         8.72
      1.05    100.55    .110E+04      2.2           1.00         8.32
      1.16    100.66    .127E+04      2.7           1.07         7.80
      1.28    100.78    .148E+04      3.4           1.14         7.31
      1.39    100.89    .170E+04      4.1           1.20         6.94
      1.50    101.00    .195E+04      4.9           1.25         6.65
      1.61    101.11    .221E+04      5.8           1.30         6.41
      1.72    101.22    .250E+04      6.7           1.34         6.22
      1.84    101.34    .280E+04      7.7           1.38         6.04
      1.95    101.45    .313E+04      8.8           1.41         5.90

    **** WARNING:  TRAVEL TIME TABLE EXCEEDED
                                       <---- hydrograph ---->   <-pipe / channel->
                              AREA     QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)     (cms)    (hrs)   (mm)      (m)      (m/s)
    INFLOW : ID= 2 (0505)   102.03    25.26     6.17  49.88      1.80      1.37
    OUTFLOW: ID= 1 (0564)   102.03    39.67     6.58  49.88      1.95      1.41

    **** WARNING:  COMPUTATIONS FAILED TO CONVERGE.

------------------------------------------------------------------------------
--------------------
| DUHYD     (0520) |
| Inlet Cap.=3.050 |
| #of Inlets=    1 |
| Total(cms)=  3.0 |     AREA      QPEAK      TPEAK     R.V.
--------------------     (ha)      (cms)      (hrs)     (mm)
    TOTAL HYD.(ID= 1): 157.97     13.08       6.00    52.60
    ======================================================
    MAJOR SYS.(ID= 2):  67.54     10.03       6.00    52.60
    MINOR SYS.(ID= 3):  90.43      3.05       5.58    52.60
```

Hadati Creek Watershed - Post Development with Cityview Ridge
NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0475) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
              <------ DATA FOR SECTION (   1.1) ------>
              Distance      Elevation       Manning
                100.00        324.60          .0500
                115.00        321.60          .0500
                120.00        320.80      .0500 / .0300  Main Channel
                122.00        320.80      .0300 / .0500  Main Channel
                138.00        321.60          .0500
                148.00        322.30          .0500
                154.00        323.10          .0500
                164.00        324.60          .0500

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH    ELEV      VOLUME     FLOW RATE    VELOCITY   TRAV.TIME
        (m)      (m)     (cu.m.)       (cms)        (m/s)      (min)
        .20   321.00    .398E+03          .8          .84       8.53
        .40   321.20    .125E+04         3.3         1.13       6.33
        .60   321.40    .255E+04         8.1         1.36       5.27
        .80   321.60    .430E+04        15.6         1.56       4.59
       1.00   321.80    .644E+04        26.8         1.79       4.01
       1.20   322.00    .892E+04        41.2         1.99       3.61
       1.40   322.20    .117E+05        59.3         2.17       3.30
       1.60   322.40    .148E+05        81.9         2.37       3.02
       1.80   322.60    .182E+05       109.1         2.58       2.78
       2.00   322.80    .218E+05       140.2         2.77       2.59
       2.20   323.00    .256E+05       175.3         2.95       2.43
       2.40   323.20    .296E+05       214.7         3.12       2.29
       2.60   323.40    .338E+05       258.6         3.29       2.18
       2.80   323.60    .382E+05       306.7         3.46       2.07
       3.00   323.80    .428E+05       359.1         3.61       1.98
       3.20   324.00    .476E+05       416.0         3.76       1.91
       3.40   324.20    .526E+05       477.5         3.91       1.83
       3.60   324.40    .578E+05       543.5         4.05       1.77
       3.80   324.60    .632E+05       614.3         4.18       1.71

                                    <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.    MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (0470)   58.85    14.92    6.00  47.17       .78       1.54
   OUTFLOW: ID= 1 (0475)   58.85    13.38    6.08  47.17       .74       1.49

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

--------------------
| ADD HYD   (0363) |
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0362):    30.00    4.880     6.17    45.22
       + ID2= 2 (0359):    28.60    4.291     6.17    47.13
         ==============================================
         ID = 3 (0363):    58.60    9.171     6.17    46.15

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

```
--------------------
| ADD HYD   (0115) |
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0106):       51.32    7.689      6.17      47.16
      + ID2= 2 (0114):       49.64    7.421      6.08      47.16
        ==================================================
        ID = 3 (0115):      100.96   14.393      6.08      47.16

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0492) |
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0563):       19.00    3.758      6.08      47.62
      + ID2= 2 (0607):        5.97    1.215      6.08      41.11
        ==================================================
        ID = 3 (0492):       24.97    4.973      6.08      46.06

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0526) |
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0525):         .00     .001       .00    *******
      + ID2= 2 (0520):       67.54   10.030      6.00      52.60
        ==================================================
        ID = 3 (0526):       67.54   10.030      6.00      52.60

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0380) |
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0363):       58.60    9.171      6.17      46.15
      + ID2= 2 (0365):      117.50   22.881      6.00      47.17
        ==================================================
        ID = 3 (0380):      176.10   30.231      6.08      46.83

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (0482) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
--------------------      (cms)      (ha.m.)   |    (cms)      (ha.m.)
                          .0000       .0000    |    .2910       .3795
                          .2590       .0579    |    .2970       .4503
                          .2660       .1180    |   1.6320       .5232
                          .2720       .1802    |   4.1680       .5983
                          .2790       .2445    |   7.5660       .6756
                          .2850       .3109    |    .0000       .0000
```

Hadati Creek Watershed - Post Development with Cityview Ridge

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| INFLOW : ID= 2 (0492) | 24.970 | 4.973 | 6.08 | 46.06 |
| OUTFLOW: ID= 1 (0482) | 24.970 | 3.025 | 6.25 | 46.06 |

PEAK FLOW REDUCTION [Qout/Qin](%)= 60.83
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= .5657

---

| ROUTE CHN (0527) |
| IN= 2---> OUT= 1 |    Routing time step (min)'= 5.00

<------ DATA FOR SECTION ( 1.1) ------>

| Distance | Elevation | Manning | |
|---|---|---|---|
| 100.00 | 313.20 | .0500 | |
| 140.00 | 312.40 | .0500 / .0300 | Main Channel |
| 140.50 | 310.80 | .0300 | Main Channel |
| 141.50 | 310.80 | .0300 | Main Channel |
| 142.00 | 312.40 | .0300 / .0500 | Main Channel |
| 160.00 | 313.20 | .0500 | |

<--------------------- TRAVEL TIME TABLE --------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .12 | 310.92 | .575E+02 | .1 | .40 | 18.86 |
| .25 | 311.05 | .119E+03 | .2 | .57 | 13.13 |
| .37 | 311.17 | .185E+03 | .3 | .69 | 10.87 |
| .49 | 311.29 | .256E+03 | .4 | .78 | 9.61 |
| .62 | 311.42 | .330E+03 | .6 | .86 | 8.77 |
| .74 | 311.54 | .409E+03 | .8 | .92 | 8.17 |
| .86 | 311.66 | .492E+03 | 1.1 | .97 | 7.70 |
| .98 | 311.78 | .579E+03 | 1.3 | 1.02 | 7.32 |
| 1.11 | 311.91 | .671E+03 | 1.6 | 1.07 | 7.01 |
| 1.23 | 312.03 | .767E+03 | 1.9 | 1.11 | 6.74 |
| 1.35 | 312.15 | .867E+03 | 2.2 | 1.15 | 6.50 |
| 1.48 | 312.28 | .971E+03 | 2.6 | 1.19 | 6.29 |
| 1.60 | 312.40 | .108E+04 | 2.9 | 1.23 | 6.11 |
| 1.73 | 312.53 | .149E+04 | 3.6 | 1.10 | 6.85 |
| 1.87 | 312.67 | .248E+04 | 4.9 | .88 | 8.52 |
| 2.00 | 312.80 | .405E+04 | 6.9 | .77 | 9.74 |
| 2.13 | 312.93 | .620E+04 | 10.1 | .73 | 10.21 |
| 2.27 | 313.07 | .893E+04 | 14.6 | .74 | 10.17 |
| 2.40 | 313.20 | .122E+05 | 20.7 | .76 | 9.85 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0526) | 67.54 | 10.03 | 6.00 | 52.60 | 2.13 | .74 |
| OUTFLOW: ID= 1 (0527) | 67.54 | 7.92 | 6.08 | 52.59 | 2.04 | .76 |

---

| RESERVOIR (0390) |
| IN= 2---> OUT= 1 |
| DT= 5.0 min |

| OUTFLOW (cms) | STORAGE (ha.m.) | OUTFLOW (cms) | STORAGE (ha.m.) |
|---|---|---|---|
| .0000 | .0000 | 1.3100 | 1.6000 |
| .7700 | .2870 | 1.8600 | 23.2300 |
| 1.2600 | .9680 | .0000 | .0000 |

```
      Hadati Creek Watershed - Post Development with Cityview Ridge
                                   AREA       QPEAK       TPEAK       R.V.
                                   (ha)       (cms)       (hrs)       (mm)
     INFLOW : ID= 2 (0380)       176.100     30.231       6.08       46.83
     OUTFLOW: ID= 1 (0390)       176.100      1.430       7.25       46.83

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.73
                  TIME SHIFT OF PEAK FLOW         (min)= 70.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  6.3304

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

 --------------------
 | ADD HYD   (0400) |
 |   1 +  2 =  3    |         AREA     QPEAK     TPEAK      R.V.
 --------------------         (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0395):    51.20    8.631     6.08     34.35
         + ID2= 2 (0390):   176.10    1.430     7.25     46.83
           ===============================================
           ID = 3 (0400):   227.30    9.969     6.08     44.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 --------------------
 | ROUTE CHN (0403) |
 | IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
 --------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                 100.00         338.30         .0500
                 110.00         336.80         .0500
                 135.00         336.00         .0300      Main Channel
                 142.00         335.30         .0500
                 148.00         335.30         .0500
                 156.00         336.00         .0500
                 165.00         338.30         .0000

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV       VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)       (cu.m.)       (cms)         (m/s)       (min)
        .16     335.46     .231E+04          .9            .71       44.52
        .32     335.62     .563E+04         3.2           1.09       29.11
        .47     335.77     .997E+04         7.3           1.39       22.72
        .63     335.93     .153E+05        13.4           1.66       19.04
        .79     336.09     .218E+05        22.7           1.97       16.04
        .95     336.25     .299E+05        35.3           2.25       14.10
       1.11     336.41     .396E+05        51.2           2.46       12.89
       1.26     336.56     .510E+05        70.7           2.63       12.02
       1.42     336.72     .641E+05        94.1           2.79       11.35
       1.58     336.88     .787E+05       122.4           2.96       10.71
       1.74     337.04     .939E+05       155.6           3.15       10.06
       1.89     337.19     .110E+06       192.8           3.34        9.48
       2.05     337.35     .126E+06       233.9           3.53        8.97
       2.21     337.51     .143E+06       278.9           3.71        8.53
       2.37     337.67     .160E+06       327.7           3.89        8.13
       2.53     337.83     .178E+06       380.3           4.07        7.79
       2.68     337.98     .196E+06       436.7           4.23        7.48
       2.84     338.14     .215E+06       496.9           4.40        7.20
       3.00     338.30     .234E+06       561.0           4.56        6.95

                                   <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK    R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)    (mm)      (m)      (m/s)
```

```
 INFLOW : ID= 2 (0400)  227.30     9.97    6.08  44.02        .54       1.50
 OUTFLOW: ID= 1 (0403)  227.30     6.22    6.25  44.02        .43       1.29

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

--------------------
| ADD HYD   (0407) |
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0403):   227.30   6.216     6.25    44.02
       + ID2= 2 (0115):   100.96  14.393     6.08    47.16
         ================================================
         ID = 3 (0407):   328.26  18.926     6.17    44.98

 NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (0113) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------        (cms)     (ha.m.)   |   (cms)     (ha.m.)
                             .0000       .0000  |   1.6000      6.4000
                            1.1000      2.9000  |   9.1000     10.0000
                            1.3000      4.3000  |  12.0000     20.0000

                                  AREA      QPEAK       TPEAK       R.V.
                                  (ha)      (cms)       (hrs)       (mm)
 INFLOW : ID= 2 (0407)          328.260    18.926        6.17       44.98
 OUTFLOW: ID= 1 (0113)          328.260     1.552       12.50       44.98

              PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.20
              TIME SHIFT OF PEAK FLOW         (min)=380.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  6.0640

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

--------------------
| ADD HYD   (0430) |
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0113):   328.26   1.552    12.50    44.98
       + ID2= 2 (0425):    19.04   1.980     5.83    47.17
         ================================================
         ID = 3 (0430):   347.30   3.000     6.33    45.10

 NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0440) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
              <------ DATA FOR SECTION (   1.1) ------>
              Distance      Elevation       Manning
                100.00        325.40          .0600
                120.00        324.60          .0600
                126.00        323.90          .0600
                130.00        323.00          .0600
                140.00        322.30     .0600 / .0300  Main Channel
                142.00        322.30     .0300 / .0600  Main Channel
                150.00        323.90          .0600
```

```
        155.00          324.60          .0600
        160.00          325.40          .0600
```

<---------------------- TRAVEL TIME TABLE ---------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .16 | 322.46 | .233E+03 | .6 | .96 | 6.96 |
| .33 | 322.63 | .672E+03 | 2.1 | 1.26 | 5.27 |
| .49 | 322.79 | .132E+04 | 4.9 | 1.48 | 4.51 |
| .65 | 322.95 | .216E+04 | 9.0 | 1.66 | 4.03 |
| .82 | 323.12 | .319E+04 | 14.9 | 1.87 | 3.57 |
| .98 | 323.28 | .433E+04 | 22.5 | 2.08 | 3.21 |
| 1.14 | 323.44 | .556E+04 | 31.6 | 2.27 | 2.93 |
| 1.31 | 323.61 | .689E+04 | 42.3 | 2.45 | 2.72 |
| 1.47 | 323.77 | .833E+04 | 54.6 | 2.62 | 2.54 |
| 1.63 | 323.93 | .987E+04 | 68.3 | 2.77 | 2.41 |
| 1.79 | 324.09 | .115E+05 | 82.8 | 2.87 | 2.33 |
| 1.96 | 324.26 | .134E+05 | 99.2 | 2.96 | 2.25 |
| 2.12 | 324.42 | .154E+05 | 117.9 | 3.06 | 2.18 |
| 2.28 | 324.58 | .176E+05 | 138.8 | 3.15 | 2.11 |
| 2.45 | 324.75 | .200E+05 | 157.4 | 3.14 | 2.12 |
| 2.61 | 324.91 | .228E+05 | 179.6 | 3.15 | 2.11 |
| 2.77 | 325.07 | .259E+05 | 205.8 | 3.18 | 2.09 |
| 2.94 | 325.24 | .293E+05 | 236.1 | 3.23 | 2.07 |
| 3.10 | 325.40 | .330E+05 | 270.6 | 3.28 | 2.03 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0430) | 347.30 | 3.00 | 6.33 | 45.10 | .38 | 1.33 |
| OUTFLOW: ID= 1 (0440) | 347.30 | 2.86 | 6.42 | 45.10 | .37 | 1.31 |

---

```
--------------------
| ADD HYD   (0485) |
|   1 +  2 =  3    |
--------------------
```

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0475): | 58.85 | 13.381 | 6.08 | 47.17 |
| + ID2= 2 (0440): | 347.30 | 2.860 | 6.42 | 45.10 |
| ID = 3 (0485): | 406.15 | 15.674 | 6.08 | 45.40 |

NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

```
--------------------
| ADD HYD   (0490) |
|   1 +  2 =  3    |
--------------------
```

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0480): | 43.10 | 8.721 | 6.00 | 47.17 |
| + ID2= 2 (0485): | 406.15 | 15.674 | 6.08 | 45.40 |
| ID = 3 (0490): | 449.25 | 23.705 | 6.08 | 45.57 |

NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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```
--------------------
| ADD HYD   (0491) |
```

```
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0490):     449.25  23.705     6.08     45.57
        + ID2= 2 (0482):      24.97   3.025     6.25     46.06
          ===============================================
          ID = 3 (0491):     474.22  24.000     6.08     45.60

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR (0483) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------        (cms)     (ha.m.)    |   (cms)     (ha.m.)
                            .0000       .0000    |   7.0800      2.4860
                            .2760       .0600    |   8.1000      3.3240
                           1.2000       .3400    |   9.7980      4.6420
                           2.0400       .6182    |  10.4940      7.4397
                           2.6400      1.1630    |  11.6850     10.3000
                           3.1200      1.7070    |  12.3480     11.4000

                                     AREA       QPEAK        TPEAK        R.V.
                                     (ha)       (cms)        (hrs)        (mm)
     INFLOW : ID= 2 (0491)        474.220      24.000         6.08       45.60
     OUTFLOW: ID= 1 (0483)        474.220       8.205         6.58       45.60

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.19
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  3.4099

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--------------------
| ADD HYD   (0530) |
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0483):     474.22   8.205     6.58     45.60
        + ID2= 2 (0540):       4.63   1.339     6.00     76.65
          ===============================================
          ID = 3 (0530):     478.85   8.393     6.50     45.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0545) |
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0530):     478.85   8.393     6.50     45.90
        + ID2= 2 (0527):      67.54   7.924     6.08     52.59
          ===============================================
          ID = 3 (0545):     546.39  15.614     6.33     46.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0546) |
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
```

```
   Hadati Creek Watershed - Post Development with Cityview Ridge
     ID1= 1 (0545):    546.39  15.614     6.33    46.72
   + ID2= 2 (0542):     25.25   6.749     6.00    76.65
     ==================================================
     ID = 3 (0546):    571.64  18.214     6.00    48.05

 NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0547) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
     ID1= 1 (0546):    571.64  18.214     6.00    48.05
   + ID2= 2 (0543):     14.99   4.164     6.00    76.65
     ==================================================
     ID = 3 (0547):    586.63  22.378     6.00    48.78

 NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0548) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
     ID1= 1 (0547):    586.63  22.378     6.00    48.78
   + ID2= 2 (0544):      1.13    .333     6.00    76.65
     ==================================================
     ID = 3 (0548):    587.76  22.711     6.00    48.83

 NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
  ****************************
  ** SIMULATION NUMBER:   5 **
  ****************************


--------------------
|   READ STORM     |    Filename: Y:\SPrimmer\OTTHYMO\Ci
|                  |              tyview Ridge\RegSCS12hr.stm
| Ptotal=211.07 mm |    Comments: Regional SCS Type II 12hr design storm
--------------------
                   TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                    .25    6.35 |  3.25   12.70 |  6.25   23.11 |  9.25   52.83
                    .50    6.35 |  3.50   12.70 |  6.50   23.11 |  9.50   52.83
                    .75    6.35 |  3.75   12.70 |  6.75   23.11 |  9.75   52.83
                   1.00    6.35 |  4.00   12.70 |  7.00   23.11 | 10.00   52.83
                   1.25    4.32 |  4.25   16.76 |  7.25   12.70 | 10.25   37.85
                   1.50    4.32 |  4.50   16.76 |  7.50   12.70 | 10.50   37.85
                   1.75    4.32 |  4.75   16.76 |  7.75   12.70 | 10.75   37.85
                   2.00    4.32 |  5.00   16.76 |  8.00   12.70 | 11.00   37.85
                   2.25    6.35 |  5.25   12.70 |  8.25   12.70 | 11.25   12.70
                   2.50    6.35 |  5.50   12.70 |  8.50   12.70 | 11.50   12.70
                   2.75    6.35 |  5.75   12.70 |  8.75   12.70 | 11.75   12.70
                   3.00    6.35 |  6.00   12.70 |  9.00   12.70 | 12.00   12.70

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| CALIB            |
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Hadati Creek Watershed - Post Development with Cityview Ridge

```
| STANDHYD  (0480) |    Area    (ha)=  43.10
|ID= 1 DT= 5.0 min |    Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      18.10         25.00
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     680.00         40.00
     Mannings n          =        .013          .300

         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 | 6.35 | 3.083 | 12.70 | 6.083 | 23.11 | 9.08 | 52.83 |
| .167 | 6.35 | 3.167 | 12.70 | 6.167 | 23.11 | 9.17 | 52.83 |
| .250 | 6.35 | 3.250 | 12.70 | 6.250 | 23.11 | 9.25 | 52.83 |
| .333 | 6.35 | 3.333 | 12.70 | 6.333 | 23.11 | 9.33 | 52.83 |
| .417 | 6.35 | 3.417 | 12.70 | 6.417 | 23.11 | 9.42 | 52.83 |
| .500 | 6.35 | 3.500 | 12.70 | 6.500 | 23.11 | 9.50 | 52.83 |
| .583 | 6.35 | 3.583 | 12.70 | 6.583 | 23.11 | 9.58 | 52.83 |
| .667 | 6.35 | 3.667 | 12.70 | 6.667 | 23.11 | 9.67 | 52.83 |
| .750 | 6.35 | 3.750 | 12.70 | 6.750 | 23.11 | 9.75 | 52.83 |
| .833 | 6.35 | 3.833 | 12.70 | 6.833 | 23.11 | 9.83 | 52.83 |
| .917 | 6.35 | 3.917 | 12.70 | 6.917 | 23.11 | 9.92 | 52.83 |
| 1.000 | 6.35 | 4.000 | 12.70 | 7.000 | 23.11 | 10.00 | 52.83 |
| 1.083 | 4.32 | 4.083 | 16.76 | 7.083 | 12.70 | 10.08 | 37.85 |
| 1.167 | 4.32 | 4.167 | 16.76 | 7.167 | 12.70 | 10.17 | 37.85 |
| 1.250 | 4.32 | 4.250 | 16.76 | 7.250 | 12.70 | 10.25 | 37.85 |
| 1.333 | 4.32 | 4.333 | 16.76 | 7.333 | 12.70 | 10.33 | 37.85 |
| 1.417 | 4.32 | 4.417 | 16.76 | 7.417 | 12.70 | 10.42 | 37.85 |
| 1.500 | 4.32 | 4.500 | 16.76 | 7.500 | 12.70 | 10.50 | 37.85 |
| 1.583 | 4.32 | 4.583 | 16.76 | 7.583 | 12.70 | 10.58 | 37.85 |
| 1.667 | 4.32 | 4.667 | 16.76 | 7.667 | 12.70 | 10.67 | 37.85 |
| 1.750 | 4.32 | 4.750 | 16.76 | 7.750 | 12.70 | 10.75 | 37.85 |
| 1.833 | 4.32 | 4.833 | 16.76 | 7.833 | 12.70 | 10.83 | 37.85 |
| 1.917 | 4.32 | 4.917 | 16.76 | 7.917 | 12.70 | 10.92 | 37.85 |
| 2.000 | 4.32 | 5.000 | 16.76 | 8.000 | 12.70 | 11.00 | 37.85 |
| 2.083 | 6.35 | 5.083 | 12.70 | 8.083 | 12.70 | 11.08 | 12.70 |
| 2.167 | 6.35 | 5.167 | 12.70 | 8.167 | 12.70 | 11.17 | 12.70 |
| 2.250 | 6.35 | 5.250 | 12.70 | 8.250 | 12.70 | 11.25 | 12.70 |
| 2.333 | 6.35 | 5.333 | 12.70 | 8.333 | 12.70 | 11.33 | 12.70 |
| 2.417 | 6.35 | 5.417 | 12.70 | 8.417 | 12.70 | 11.42 | 12.70 |
| 2.500 | 6.35 | 5.500 | 12.70 | 8.500 | 12.70 | 11.50 | 12.70 |
| 2.583 | 6.35 | 5.583 | 12.70 | 8.583 | 12.70 | 11.58 | 12.70 |
| 2.667 | 6.35 | 5.667 | 12.70 | 8.667 | 12.70 | 11.67 | 12.70 |
| 2.750 | 6.35 | 5.750 | 12.70 | 8.750 | 12.70 | 11.75 | 12.70 |
| 2.833 | 6.35 | 5.833 | 12.70 | 8.833 | 12.70 | 11.83 | 12.70 |
| 2.917 | 6.35 | 5.917 | 12.70 | 8.917 | 12.70 | 11.92 | 12.70 |
| 3.000 | 6.35 | 6.000 | 12.70 | 9.000 | 12.70 | 12.00 | 12.70 |

```
     Max.Eff.Inten.(mm/hr)=      52.83          59.46
               over (min)        10.00          20.00
     Storage Coeff.  (min)=       8.46 (ii)     18.15 (ii)
     Unit Hyd. Tpeak (min)=      10.00          20.00
     Unit Hyd. peak  (cms)=        .12            .06
                                                               *TOTALS*
     PEAK FLOW       (cms)=       1.33           3.90           5.222 (iii)
     TIME TO PEAK    (hrs)=      10.00          10.00          10.00
     RUNOFF VOLUME    (mm)=     209.57         107.20         128.70
     TOTAL RAINFALL   (mm)=     211.07         211.07         211.07
```

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 RUNOFF COEFFICIENT   =        .99           .51            .61

   (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
        Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0415)   |   Area    (ha)=   4.99
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.10          2.89
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.86          2.86
     Length            (m)=     185.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      52.83         59.46
               over (min)        5.00         15.00
     Storage Coeff.  (min)=       3.48 (ii)    12.19 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .26           .09
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .15           .47          .626 (iii)
     TIME TO PEAK    (hrs)=       9.92         10.00         10.00
     RUNOFF VOLUME    (mm)=     209.57        107.20        128.70
     TOTAL RAINFALL   (mm)=     211.07        211.07        211.07
     RUNOFF COEFFICIENT   =        .99           .51           .61

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

   (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
        Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0410)   |   Area    (ha)=  24.20
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.16         14.04
     Dep. Storage     (mm)=       1.50          5.00
     Average Slope     (%)=       2.00          2.00
     Length            (m)=     401.00         40.00
     Mannings n           =       .013          .300

     Max.Eff.Inten.(mm/hr)=      52.83         59.46
               over (min)        5.00         20.00
     Storage Coeff.  (min)=       6.16 (ii)    15.86 (ii)
     Unit Hyd. Tpeak (min)=       5.00         20.00
     Unit Hyd. peak  (cms)=        .19           .07
                                                          *TOTALS*
```

```
     PEAK FLOW       (cms)=       .75          2.23           2.975 (iii)
     TIME TO PEAK    (hrs)=     10.00         10.00           10.00
     RUNOFF VOLUME    (mm)=    209.57        107.20          128.70
     TOTAL RAINFALL   (mm)=    211.07        211.07          211.07
     RUNOFF COEFFICIENT   =       .99           .51             .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0460) |   Area    (ha)=  36.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      15.12        20.88
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       2.03         2.03
     Length            (m)=     465.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      52.83        59.46
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       6.71 (ii)   16.36 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .18          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.11         3.30          4.413 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.00          10.00
     RUNOFF VOLUME    (mm)=     209.57       107.20         128.70
     TOTAL RAINFALL   (mm)=     211.07       211.07         211.07
     RUNOFF COEFFICIENT   =        .99          .51            .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0455) |   Area    (ha)=  12.70
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.33         7.37
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.71         1.71
     Length            (m)=     300.00        40.00
     Mannings n           =       .013         .300

     Max.Eff.Inten.(mm/hr)=      52.83        59.46
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       5.43 (ii)   15.59 (ii)
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     Unit Hyd. Tpeak (min)=        5.00        20.00
     Unit Hyd. peak  (cms)=         .20          .07
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .39         1.17          1.564 (iii)
     TIME TO PEAK    (hrs)=       10.00        10.00          10.00
     RUNOFF VOLUME    (mm)=      209.57       107.20         128.70
     TOTAL RAINFALL   (mm)=      211.07       211.07         211.07
     RUNOFF COEFFICIENT   =         .99          .51            .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.    (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0395)   |   Area    (ha)=  51.20
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  10.00   Dir. Conn.(%)=   5.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        5.12        46.08
     Dep. Storage     (mm)=        1.50         5.00
     Average Slope     (%)=        2.00         2.00
     Length            (m)=      900.00        40.00
     Mannings n           =        .013         .300

     Max.Eff.Inten.(mm/hr)=       52.83        43.26
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       10.01 (ii)   21.02 (ii)
     Unit Hyd. Tpeak (min)=       10.00        25.00
     Unit Hyd. peak  (cms)=         .11          .05
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .37         5.03          5.388 (iii)
     TIME TO PEAK    (hrs)=       10.00        10.08          10.08
     RUNOFF VOLUME    (mm)=      209.57        81.91          88.29
     TOTAL RAINFALL   (mm)=      211.07       211.07         211.07
     RUNOFF COEFFICIENT   =         .99          .39            .42

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00            K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.    (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0360)   |   Area    (ha)=  30.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  37.00   Dir. Conn.(%)=  19.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       11.10        18.90
     Dep. Storage     (mm)=        1.50         5.00
     Average Slope     (%)=        2.00         2.00
     Length            (m)=      447.00        40.00
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     Mannings n          =       .013         .300

     Max.Eff.Inten.(mm/hr)=      52.83        55.42
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       6.58 (ii)   16.55 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .18          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .84         2.78         3.618 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.00         10.00
     RUNOFF VOLUME    (mm)=     209.57       101.80        122.28
     TOTAL RAINFALL   (mm)=     211.07       211.07        211.07
     RUNOFF COEFFICIENT   =        .99          .48           .58

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD  (0350)  |   Area    (ha)=  16.30
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.85         9.45
     Dep. Storage     (mm)=       1.50         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     330.00        40.00
     Mannings n          =       .013         .300

     Max.Eff.Inten.(mm/hr)=      52.83        59.46
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       6.75 (ii)   18.68 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .18          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .50         1.47         1.968 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.00         10.00
     RUNOFF VOLUME    (mm)=     209.57       107.20        128.70
     TOTAL RAINFALL   (mm)=     211.07       211.07        211.07
     RUNOFF COEFFICIENT   =        .99          .51           .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD  (0355)  |   Area    (ha)=  12.30
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
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                           IMPERVIOUS    PERVIOUS (i)
 Surface Area      (ha)=       5.17          7.13
 Dep. Storage      (mm)=       1.50          5.00
 Average Slope      (%)=       1.60          1.60
 Length             (m)=     286.00         40.00
 Mannings n            =       .013          .300

 Max.Eff.Inten.(mm/hr)=       52.83         59.46
           over (min)          5.00         20.00
 Storage Coeff.  (min)=        5.38 (ii)    15.74 (ii)
 Unit Hyd. Tpeak (min)=        5.00         20.00
 Unit Hyd. peak  (cms)=         .21           .07
                                                          *TOTALS*
 PEAK FLOW       (cms)=         .38          1.13           1.513 (iii)
 TIME TO PEAK    (hrs)=       10.00         10.00          10.00
 RUNOFF VOLUME    (mm)=      209.57        107.20         128.70
 TOTAL RAINFALL   (mm)=      211.07        211.07         211.07
 RUNOFF COEFFICIENT   =         .99           .51            .61

   (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
        Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD  (0365) |   Area    (ha)= 117.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
 Surface Area      (ha)=      49.35         68.15
 Dep. Storage      (mm)=       1.50          5.00
 Average Slope      (%)=       2.00          2.00
 Length             (m)=     885.00         40.00
 Mannings n            =       .013          .300

 Max.Eff.Inten.(mm/hr)=       52.83         59.46
           over (min)         10.00         20.00
 Storage Coeff.  (min)=        9.91 (ii)    19.60 (ii)
 Unit Hyd. Tpeak (min)=       10.00         20.00
 Unit Hyd. peak  (cms)=         .11           .06
                                                          *TOTALS*
 PEAK FLOW       (cms)=        3.61         10.49          14.089 (iii)
 TIME TO PEAK    (hrs)=       10.00         10.08          10.00
 RUNOFF VOLUME    (mm)=      209.57        107.20         128.70
 TOTAL RAINFALL   (mm)=      211.07        211.07         211.07
 RUNOFF COEFFICIENT   =         .99           .51            .61

   (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
        Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB             |
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        Hadati Creek Watershed - Post Development with Cityview Ridge
| STANDHYD  (0105) |   Area    (ha)=  51.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     21.55       29.77
     Dep. Storage     (mm)=      1.50        5.00
     Average Slope     (%)=      2.00        2.00
     Length            (m)=    550.00       40.00
     Mannings n           =      .013        .300

     Max.Eff.Inten.(mm/hr)=     52.83       59.46
               over (min)       5.00       20.00
     Storage Coeff.  (min)=      7.45 (ii)  17.14 (ii)
     Unit Hyd. Tpeak (min)=      5.00       20.00
     Unit Hyd. peak  (cms)=       .17         .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=      1.58        4.68          6.260 (iii)
     TIME TO PEAK    (hrs)=     10.00       10.00          10.00
     RUNOFF VOLUME    (mm)=    209.57      107.20         128.70
     TOTAL RAINFALL   (mm)=    211.07      211.07         211.07
     RUNOFF COEFFICIENT   =       .99         .51            .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD  (0102) |   Area    (ha)=  14.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      6.01        8.31
     Dep. Storage     (mm)=      1.50        5.00
     Average Slope     (%)=      2.00        2.00
     Length            (m)=    287.00       40.00
     Mannings n           =      .013        .300

     Max.Eff.Inten.(mm/hr)=     52.83       59.46
               over (min)       5.00       15.00
     Storage Coeff.  (min)=      5.04 (ii)  14.74 (ii)
     Unit Hyd. Tpeak (min)=      5.00       15.00
     Unit Hyd. peak  (cms)=       .21         .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .44        1.34          1.780 (iii)
     TIME TO PEAK    (hrs)=     10.00       10.00          10.00
     RUNOFF VOLUME    (mm)=    209.57      107.20         128.70
     TOTAL RAINFALL   (mm)=    211.07      211.07         211.07
     RUNOFF COEFFICIENT   =       .99         .51            .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=    .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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| CALIB              |
| STANDHYD  (0101)   |   Area    (ha)=  16.32
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      6.85          9.47
     Dep. Storage      (mm)=      1.50          5.00
     Average Slope      (%)=      2.00          2.00
     Length             (m)=    309.00         40.00
     Mannings n            =      .013          .300

     Max.Eff.Inten.(mm/hr)=      52.83         59.46
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       5.27 (ii)    14.96 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=        .21           .08
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .50          1.52            2.027 (iii)
     TIME TO PEAK    (hrs)=      10.00         10.00            10.00
     RUNOFF VOLUME    (mm)=     209.57        107.20           128.70
     TOTAL RAINFALL   (mm)=     211.07        211.07           211.07
     RUNOFF COEFFICIENT   =        .99           .51              .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     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  (0110)   |   Area    (ha)=  19.00
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      7.98         11.02
     Dep. Storage      (mm)=      1.50          5.00
     Average Slope      (%)=      2.00          2.00
     Length             (m)=    365.00         40.00
     Mannings n            =      .013          .300

     Max.Eff.Inten.(mm/hr)=      52.83         59.46
                over (min)        5.00         20.00
     Storage Coeff.  (min)=       5.82 (ii)    15.52 (ii)
     Unit Hyd. Tpeak (min)=       5.00         20.00
     Unit Hyd. peak  (cms)=        .20           .07
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .59          1.75            2.340 (iii)
     TIME TO PEAK    (hrs)=      10.00         10.00            10.00
     RUNOFF VOLUME    (mm)=     209.57        107.20           128.70
     TOTAL RAINFALL   (mm)=     211.07        211.07           211.07
     RUNOFF COEFFICIENT   =        .99           .51              .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
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        THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD  (0600)   |   Area    (ha)=  11.38
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=  21.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        4.78         6.60
     Dep. Storage     (mm)=        1.50         5.00
     Average Slope     (%)=        2.00         2.00
     Length            (m)=      680.00        40.00
     Mannings n           =        .013         .300

     Max.Eff.Inten.(mm/hr)=       52.83        59.46
                over (min)        10.00        20.00
     Storage Coeff.  (min)=        8.46 (ii)    18.15 (ii)
     Unit Hyd. Tpeak (min)=       10.00        20.00
     Unit Hyd. peak  (cms)=         .12          .06
                                                             *TOTALS*
     PEAK FLOW       (cms)=         .35         1.03           1.379 (iii)
     TIME TO PEAK    (hrs)=       10.00        10.00           10.00
     RUNOFF VOLUME    (mm)=      209.57       107.20          128.70
     TOTAL RAINFALL   (mm)=      211.07       211.07          211.07
     RUNOFF COEFFICIENT   =         .99          .51             .61

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo    (mm/hr)= 75.00          K  (1/hr)=  4.14
            Fc    (mm/hr)= 12.50     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  (0601)   |   Area    (ha)=   7.62
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  46.00   Dir. Conn.(%)=  21.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        3.51         4.11
     Dep. Storage     (mm)=        1.50         5.00
     Average Slope     (%)=        2.00         2.00
     Length            (m)=      680.00        40.00
     Mannings n           =        .013         .300

     Max.Eff.Inten.(mm/hr)=       52.83        64.79
                over (min)        10.00        20.00
     Storage Coeff.  (min)=        8.46 (ii)    17.83 (ii)
     Unit Hyd. Tpeak (min)=       10.00        20.00
     Unit Hyd. peak  (cms)=         .12          .06
                                                             *TOTALS*
     PEAK FLOW       (cms)=         .23          .70            .936 (iii)
     TIME TO PEAK    (hrs)=       10.00        10.00           10.00
     RUNOFF VOLUME    (mm)=      209.57       113.39          133.59
     TOTAL RAINFALL   (mm)=      211.07       211.07          211.07
     RUNOFF COEFFICIENT   =         .99          .54             .63

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
```

```
         Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
         Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0607)   |   Area    (ha)=   5.97
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  42.00   Dir. Conn.(%)=   2.50
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        2.51         3.46
     Dep. Storage      (mm)=        1.50         5.00
     Average Slope      (%)=        2.00         2.00
     Length             (m)=      680.00        40.00
     Mannings n            =        .013         .300

     Max.Eff.Inten.(mm/hr)=        52.83        76.31
                over (min)         10.00        20.00
     Storage Coeff.  (min)=         8.46 (ii)   17.23 (ii)
     Unit Hyd. Tpeak (min)=        10.00        20.00
     Unit Hyd. peak  (cms)=          .12          .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=          .02          .70          .721 (iii)
     TIME TO PEAK    (hrs)=        10.00        10.00         10.00
     RUNOFF VOLUME    (mm)=       209.57       124.06        126.19
     TOTAL RAINFALL   (mm)=       211.07       211.07        211.07
     RUNOFF COEFFICIENT   =          .99          .59           .60

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

     (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
         Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
         Fc    (mm/hr)= 12.50     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  (0540)   |   Area    (ha)=   4.63
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        3.70          .93
     Dep. Storage      (mm)=        1.50         5.00
     Average Slope      (%)=         .55          .55
     Length             (m)=      150.00        40.00
     Mannings n            =        .013         .300

     Max.Eff.Inten.(mm/hr)=        52.83        42.97
                over (min)          5.00        25.00
     Storage Coeff.  (min)=         5.03 (ii)   21.29 (ii)
     Unit Hyd. Tpeak (min)=         5.00        25.00
     Unit Hyd. peak  (cms)=          .21          .05
                                                            *TOTALS*
     PEAK FLOW       (cms)=          .54          .10          .636 (iii)
     TIME TO PEAK    (hrs)=        10.00        10.08         10.00
     RUNOFF VOLUME    (mm)=       209.57        81.35        182.64
```

```
 TOTAL RAINFALL    (mm)=     211.07        211.07         211.07
 RUNOFF COEFFICIENT   =         .99           .39            .87

   (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
        Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB                |
| STANDHYD  (0500)     |   Area    (ha)= 244.00
|ID= 1 DT= 5.0 min     |   Total Imp(%)=  46.00   Dir. Conn.(%)=  26.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
 Surface Area     (ha)=       112.24        131.76
 Dep. Storage     (mm)=         1.50          5.00
 Average Slope     (%)=          .80           .80
 Length            (m)=      1275.00         40.00
 Mannings n           =         .013          .300

 Max.Eff.Inten.(mm/hr)=        52.83         59.90
           over (min)          15.00         30.00
 Storage Coeff.  (min)=        16.24 (ii)    28.96 (ii)
 Unit Hyd. Tpeak (min)=        15.00         30.00
 Unit Hyd. peak  (cms)=          .07           .04
                                                         *TOTALS*
 PEAK FLOW       (cms)=         9.05         18.51        27.108 (iii)
 TIME TO PEAK    (hrs)=        10.00         10.25         10.08
 RUNOFF VOLUME    (mm)=       209.57        107.75        134.22
 TOTAL RAINFALL   (mm)=       211.07        211.07        211.07
 RUNOFF COEFFICIENT   =          .99           .51           .64

   (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
        Fo   (mm/hr)= 75.00          K  (1/hr)=  4.14
        Fc   (mm/hr)= 12.50     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  (0510)     |   Area    (ha)=  16.00
|ID= 1 DT= 5.0 min     |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
 Surface Area     (ha)=        12.80          3.20
 Dep. Storage     (mm)=         1.50          5.00
 Average Slope     (%)=          .50           .20
 Length            (m)=       400.00         40.00
 Mannings n           =         .013          .300

 Max.Eff.Inten.(mm/hr)=        52.83         42.97
           over (min)          10.00         35.00
 Storage Coeff.  (min)=         9.33 (ii)    31.35 (ii)
 Unit Hyd. Tpeak (min)=        10.00         35.00
 Unit Hyd. peak  (cms)=          .12           .03
                                                         *TOTALS*
```

```
PEAK FLOW        (cms)=        1.85          .31           2.134 (iii)
TIME TO PEAK     (hrs)=       10.00        10.33          10.00
RUNOFF VOLUME     (mm)=      209.57        81.35         182.64
TOTAL RAINFALL    (mm)=      211.07       211.07         211.07
RUNOFF COEFFICIENT   =         .99          .39             .87

  (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
       Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
       Fc    (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
      THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0542)   |   Area    (ha)=  25.25
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
Surface Area      (ha)=       20.20         5.05
Dep. Storage      (mm)=        1.50         5.00
Average Slope      (%)=         .55          .55
Length             (m)=      350.00        40.00
Mannings n           =        .013         .300

Max.Eff.Inten.(mm/hr)=       52.83        42.97
           over (min)        10.00        25.00
Storage Coeff.  (min)=        8.37 (ii)   24.63 (ii)
Unit Hyd. Tpeak (min)=       10.00        25.00
Unit Hyd. peak  (cms)=         .12          .05
                                                        *TOTALS*
PEAK FLOW       (cms)=        2.92          .53           3.443 (iii)
TIME TO PEAK    (hrs)=       10.00        10.17          10.00
RUNOFF VOLUME    (mm)=      209.57        81.35         182.64
TOTAL RAINFALL   (mm)=      211.07       211.07         211.07
RUNOFF COEFFICIENT   =         .99          .39             .87

  (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
       Fo    (mm/hr)= 75.00           K  (1/hr)=  4.14
       Fc    (mm/hr)= 12.50     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  (0543)   |   Area    (ha)=  14.99
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
Surface Area      (ha)=       11.99         3.00
Dep. Storage      (mm)=        1.50         5.00
Average Slope      (%)=         .55          .55
Length             (m)=      200.00        40.00
Mannings n           =        .013         .300

Max.Eff.Inten.(mm/hr)=       52.83        42.97
           over (min)         5.00        25.00
Storage Coeff.  (min)=        5.98 (ii)   22.24 (ii)
```

```
     Unit Hyd. Tpeak (min)=        5.00         25.00
     Unit Hyd. peak  (cms)=         .19           .05
                                                             *TOTALS*
     PEAK FLOW       (cms)=        1.74           .32          2.054 (iii)
     TIME TO PEAK    (hrs)=       10.00         10.08          10.00
     RUNOFF VOLUME    (mm)=      209.57         81.35         182.64
     TOTAL RAINFALL   (mm)=      211.07        211.07         211.07
     RUNOFF COEFFICIENT   =         .99           .39            .87

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     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  (0544)   |   Area    (ha)=   1.13
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  80.00   Dir. Conn.(%)=  79.00
--------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .90           .23
     Dep. Storage     (mm)=        1.50          5.00
     Average Slope     (%)=         .55           .55
     Length            (m)=       50.00         40.00
     Mannings n           =        .013          .300

     Max.Eff.Inten.(mm/hr)=       52.83         42.97
                over (min)         5.00         20.00
     Storage Coeff.  (min)=        2.60 (ii)    18.86 (ii)
     Unit Hyd. Tpeak (min)=        5.00         20.00
     Unit Hyd. peak  (cms)=         .29           .06
                                                             *TOTALS*
     PEAK FLOW       (cms)=         .13           .03           .156 (iii)
     TIME TO PEAK    (hrs)=        9.67         10.00          10.00
     RUNOFF VOLUME    (mm)=      209.57         81.35         182.64
     TOTAL RAINFALL   (mm)=      211.07        211.07         211.07
     RUNOFF COEFFICIENT   =         .99           .39            .87

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

       (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
            Fo   (mm/hr)= 75.00           K  (1/hr)=  4.14
            Fc   (mm/hr)= 12.50     Cum.Inf.   (mm)=   .00
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| STORE HYD (0525)   |   AREA       (ha)=     .00
| ID= 1 DT=****min   |   QPEAK     (cms)=     .00
--------------------     TPEAK     (hrs)=     .00
                         VOLUME     (mm)=*******

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

--------------------
| ADD HYD   (0420)   |
|   1 +  2 =  3      |         AREA     QPEAK     TPEAK      R.V.
```

```
--------------------           (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0415):         4.99      .626     10.00    128.70
      + ID2= 2 (0410):        24.20     2.975     10.00    128.70
        ==================================================
        ID = 3 (0420):        29.19     3.602     10.00    128.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD    (0465) |
|   1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0460):        36.00     4.413     10.00    128.70
      + ID2= 2 (0455):        12.70     1.564     10.00    128.70
        ==================================================
        ID = 3 (0465):        48.70     5.977     10.00    128.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ROUTE CHN (0362) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
                  <------ DATA FOR SECTION (   1.1) ------>
                  Distance      Elevation        Manning
                       .00            .40          .0300
                      5.50            .15     .0300 / .0150  Main Channel
                      5.51            .00          .0150     Main Channel
                     10.00            .09          .0150     Main Channel
                     14.49            .00          .0150     Main Channel
                     14.50            .15     .0150 / .0300  Main Channel
                     20.00            .40          .0300

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH      ELEV       VOLUME     FLOW RATE    VELOCITY   TRAV.TIME
        (m)        (m)      (cu.m.)       (cms)        (m/s)       (min)
        .02        .02      .176E+02        .0           .21       80.52
        .04        .04      .702E+02        .0           .33       50.72
        .06        .06      .158E+03        .1           .43       38.71
        .08        .08      .281E+03        .1           .52       31.95
        .09        .09      .438E+03        .3           .62       26.84
        .11        .11      .607E+03        .5           .77       21.66
        .13        .13      .776E+03        .7           .90       18.45
        .15        .15      .944E+03       1.0          1.03       16.22
        .17        .17      .116E+04       1.3          1.16       14.36
        .20        .20      .140E+04       1.8          1.27       13.13
        .22        .22      .166E+04       2.3          1.36       12.24
        .24        .24      .194E+04       2.8          1.44       11.58
        .26        .26      .225E+04       3.4          1.51       11.05
        .29        .29      .258E+04       4.0          1.57       10.63
        .31        .31      .293E+04       4.8          1.62       10.27
        .33        .33      .331E+04       5.5          1.67        9.97
        .35        .35      .371E+04       6.4          1.72        9.71
        .38        .38      .413E+04       7.3          1.76        9.48
        .40        .40      .457E+04       8.2          1.80        9.28

                                    <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
     INFLOW : ID= 2 (0360)   30.00     3.62   10.00 122.28      .27       1.53
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 OUTFLOW: ID= 1 (0362)   30.00     3.50   10.08 122.26       .27      1.52

----------------------------------------------------------------------------
--------------------
| ROUTE CHN (0353) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance       Elevation       Manning
                   .00            .26          .0300
                  5.50            .15       .0300 / .0150   Main Channel
                  5.51            .00          .0150        Main Channel
                 10.00            .09          .0150        Main Channel
                 14.49            .00          .0150        Main Channel
                 14.50            .15       .0150 / .0300   Main Channel
                 20.00            .26          .0300

        <--------------------- TRAVEL TIME TABLE --------------------->
         DEPTH     ELEV       VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
          (m)       (m)      (cu.m.)        (cms)         (m/s)       (min)
          .01       .01     .929E+01         .0            .17        99.56
          .03       .03     .372E+02         .0            .27        62.72
          .04       .04     .836E+02         .0            .35        47.86
          .05       .05     .149E+03         .1            .42        39.51
          .07       .07     .232E+03         .1            .49        34.05
          .08       .08     .334E+03         .2            .55        30.15
          .10       .10     .454E+03         .3            .64        26.24
          .11       .11     .576E+03         .4            .74        22.41
          .12       .12     .699E+03         .6            .84        19.75
          .14       .14     .822E+03         .8            .94        17.76
          .15       .15     .944E+03        1.0           1.03        16.22
          .16       .16     .108E+04        1.2           1.11        15.07
          .18       .18     .123E+04        1.4           1.17        14.28
          .19       .19     .140E+04        1.7           1.21        13.72
          .20       .20     .159E+04        2.0           1.25        13.31
          .22       .22     .180E+04        2.3           1.28        13.01
          .23       .23     .203E+04        2.6           1.31        12.76
          .25       .25     .227E+04        3.0           1.33        12.57
          .26       .26     .254E+04        3.4           1.34        12.41

                                      <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK   TPEAK   R.V.    MAX DEPTH  MAX VEL
                               (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
 INFLOW : ID= 2 (0350)        16.30     1.97   10.00 128.70       .20      1.25
 OUTFLOW: ID= 1 (0353)        16.30     1.87   10.08 128.66       .20      1.24

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--------------------
| ROUTE CHN (0358) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance       Elevation       Manning
                   .00            .26          .0300
                  5.50            .15       .0300 / .0150   Main Channel
                  5.51            .00          .0150        Main Channel
                 10.00            .09          .0150        Main Channel
                 14.49            .00          .0150        Main Channel
                 14.50            .15       .0150 / .0300   Main Channel
                 20.00            .26          .0300
```

Hadati Creek Watershed - Post Development with Cityview Ridge

<--------------------- TRAVEL TIME TABLE ---------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .01 | .01 | .102E+02 | .0 | .17 | 109.52 |
| .03 | .03 | .409E+02 | .0 | .27 | 68.99 |
| .04 | .04 | .920E+02 | .0 | .35 | 52.65 |
| .05 | .05 | .163E+03 | .1 | .42 | 43.46 |
| .07 | .07 | .255E+03 | .1 | .49 | 37.45 |
| .08 | .08 | .368E+03 | .2 | .55 | 33.17 |
| .10 | .10 | .499E+03 | .3 | .64 | 28.86 |
| .11 | .11 | .634E+03 | .4 | .74 | 24.66 |
| .12 | .12 | .769E+03 | .6 | .84 | 21.72 |
| .14 | .14 | .904E+03 | .8 | .94 | 19.54 |
| .15 | .15 | .104E+04 | 1.0 | 1.03 | 17.84 |
| .16 | .16 | .119E+04 | 1.2 | 1.11 | 16.57 |
| .18 | .18 | .135E+04 | 1.4 | 1.17 | 15.71 |
| .19 | .19 | .154E+04 | 1.7 | 1.21 | 15.10 |
| .20 | .20 | .175E+04 | 2.0 | 1.25 | 14.65 |
| .22 | .22 | .198E+04 | 2.3 | 1.28 | 14.31 |
| .23 | .23 | .223E+04 | 2.6 | 1.31 | 14.04 |
| .25 | .25 | .250E+04 | 3.0 | 1.33 | 13.82 |
| .26 | .26 | .279E+04 | 3.4 | 1.34 | 13.65 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0355) | 12.30 | 1.51 | 10.00 | 128.70 | .18 | 1.18 |
| OUTFLOW: ID= 1 (0358) | 12.30 | 1.44 | 10.08 | 128.64 | .18 | 1.17 |

---

| RESERVOIR (0106) |
| IN= 2---> OUT= 1 |
| DT= 5.0 min |

| OUTFLOW (cms) | STORAGE (ha.m.) | OUTFLOW (cms) | STORAGE (ha.m.) |
|---|---|---|---|
| .0000 | .0000 | .5000 | .4000 |
| .0100 | .0100 | 6.6000 | .8000 |
| .0260 | .2300 | .0000 | .0000 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| INFLOW : ID= 2 (0105) | 51.320 | 6.260 | 10.00 | 128.70 |
| OUTFLOW: ID= 1 (0106) | 51.320 | 5.997 | 10.08 | 128.69 |

PEAK FLOW REDUCTION [Qout/Qin](%)= 95.79
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= .7608

---

| ADD HYD (0103) |
| 1 + 2 = 3 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0102): | 14.32 | 1.780 | 10.00 | 128.70 |
| + ID2= 2 (0101): | 16.32 | 2.027 | 10.00 | 128.70 |
| ID = 3 (0103): | 30.64 | 3.807 | 10.00 | 128.70 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

```
 --------------------
 | RESERVOIR (0111) |
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |       OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------        (cms)     (ha.m.)   |   (cms)     (ha.m.)
                              .0000      .0000   |   1.0000     1.0000
                              .0100      .0100   |  20.0000     1.1000
                              .0120      .1000   |    .0000      .0000

                                     AREA     QPEAK      TPEAK      R.V.
                                     (ha)     (cms)      (hrs)      (mm)
     INFLOW : ID= 2 (0110)         19.000     2.340      10.00     128.70
     OUTFLOW: ID= 1 (0111)         19.000     2.069      10.50     128.68

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 88.39
                   TIME SHIFT OF PEAK FLOW       (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.0100

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

 --------------------
 | ADD HYD   (0602) |
 |   1 +  2 =  3    |         AREA     QPEAK    TPEAK      R.V.
 --------------------         (ha)     (cms)    (hrs)      (mm)
          ID1= 1 (0600):     11.38    1.379    10.00    128.70
        + ID2= 2 (0601):      7.62     .936    10.00    133.59
          ====================================================
          ID = 3 (0602):     19.00    2.315    10.00    130.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 --------------------
 | DUHYD     (0505) |
 | Inlet Cap.=9.000 |
 | #of Inlets=    1 |
 | Total(cms)=  9.0 |       AREA      QPEAK      TPEAK    R.V.
 --------------------       (ha)      (cms)      (hrs)    (mm)
     TOTAL HYD.(ID= 1): 244.00      27.11      10.08   134.22
     =======================================================
     MAJOR SYS.(ID= 2):  78.53      18.11      10.08   134.22
     MINOR SYS.(ID= 3): 165.47       9.00       6.75   134.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

 --------------------
 | ADD HYD   (0515) |
 |   1 +  2 =  3    |         AREA     QPEAK    TPEAK      R.V.
 --------------------         (ha)     (cms)    (hrs)      (mm)
          ID1= 1 (0505):    165.47    9.000     6.75    134.22
        + ID2= 2 (0510):     16.00    2.134    10.00    182.64
          ====================================================
          ID = 3 (0515):    181.47   11.134    10.00    138.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
 --------------------
 | DUHYD     (0425) |
 | Inlet Cap.=1.980 |
 | #of Inlets=    1 |
```

```
| Total(cms)=  2.0 |       AREA     QPEAK     TPEAK    R.V.
--------------------       (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   29.19      3.60     10.00  128.70
     =====================================================
     MAJOR SYS.(ID= 2):    4.95      1.62     10.00  128.70
     MINOR SYS.(ID= 3):   24.24      1.98      9.33  128.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0470) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0425):      4.95    1.622    10.00    128.70
        + ID2= 2 (0465):     48.70    5.977    10.00    128.70
          ==================================================
          ID = 3 (0470):     53.65    7.598    10.00    128.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0359) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0353):     16.30    1.875    10.08    128.66
        + ID2= 2 (0358):     12.30    1.436    10.08    128.64
          ==================================================
          ID = 3 (0359):     28.60    3.311    10.08    128.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR (0104) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           .0000       .0000   |  1.0000       .5000
                           .0100       .0100   | 10.0000       .6000
                           .0150       .1332   |   .0000       .0000

                                  AREA        QPEAK        TPEAK        R.V.
                                  (ha)        (cms)        (hrs)        (mm)
     INFLOW : ID= 2 (0103)      30.640        3.807        10.00      128.70
     OUTFLOW: ID= 1 (0104)      30.640        3.797        10.00      128.69

                    PEAK    FLOW   REDUCTION [Qout/Qin](%)= 99.73
                    TIME SHIFT OF PEAK FLOW         (min)=   .00
                    MAXIMUM   STORAGE   USED       (ha.m.)=  .5312

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

--------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0104):     30.64    3.797    10.00    128.69
        + ID2= 2 (0111):     19.00    2.069    10.50    128.68
          ==================================================
```

```
        ID = 3 (0114):    49.64   4.896    10.50   128.69

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0563) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   2.2) ------>
               Distance      Elevation       Manning
                    .00          1.00          .0350
                   2.00           .50          .0350
                   4.00           .00      .0350 / .0350  Main Channel
                   4.50           .00          .0350      Main Channel
                   5.00           .00      .0350 / .0350  Main Channel
                   7.00           .50          .0350
                   9.00          1.00          .0350

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV       VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)       (m)      (cu.m.)       (cms)        (m/s)       (min)
        .05       .05     .745E+01         .0           .64        3.06
        .11       .11     .175E+02         .1           .96        2.03
        .16       .16     .301E+02         .3          1.21        1.61
        .21       .21     .454E+02         .6          1.42        1.37
        .26       .26     .632E+02         .9          1.61        1.21
        .32       .32     .836E+02        1.3          1.77        1.10
        .37       .37     .107E+03        1.8          1.93        1.01
        .42       .42     .132E+03        2.3          2.08         .94
        .47       .47     .160E+03        3.0          2.22         .88
        .53       .53     .191E+03        3.8          2.35         .83
        .58       .58     .225E+03        4.8          2.48         .79
        .63       .63     .261E+03        5.8          2.60         .75
        .68       .68     .299E+03        7.0          2.72         .72
        .74       .74     .340E+03        8.2          2.84         .69
        .79       .79     .384E+03        9.7          2.95         .66
        .84       .84     .430E+03       11.3          3.06         .64
        .89       .89     .479E+03       13.0          3.17         .62
        .95       .95     .531E+03       14.8          3.27         .60
       1.00      1.00     .585E+03       16.9          3.38         .58

                                   <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (0602)    19.00     2.31   10.00 130.66       .42      2.07
   OUTFLOW: ID= 1 (0563)    19.00     2.31   10.00 130.66       .42      2.07


--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0564) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                    .00        101.50          .0500
                   1.00        100.70          .0500
                   1.50        100.55      .0500 / .0300  Main Channel
                   2.00         99.50          .0300      Main Channel
                   3.50         99.60          .0300      Main Channel
                   4.50        100.65      .0300 / .0500  Main Channel
                   6.00        101.45          .0500
```

```
 <--------------------- TRAVEL TIME TABLE --------------------->
  DEPTH     ELEV       VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
   (m)       (m)      (cu.m.)        (cms)         (m/s)       (min)
   .10     99.60     .353E+02         .0            .19        43.69
   .19     99.69     .112E+03         .1            .37        22.76
   .29     99.79     .195E+03         .2            .49        17.03
   .38     99.88     .285E+03         .3            .59        14.23
   .48     99.98     .381E+03         .5            .67        12.51
   .57    100.07     .484E+03         .7            .74        11.32
   .67    100.17     .594E+03         .9            .80        10.43
   .76    100.26     .710E+03        1.2            .86         9.74
   .86    100.36     .832E+03        1.5            .91         9.18
   .95    100.45     .961E+03        1.8            .96         8.72
  1.05    100.55     .110E+04        2.2           1.00         8.32
  1.16    100.66     .127E+04        2.7           1.07         7.80
  1.28    100.78     .148E+04        3.4           1.14         7.31
  1.39    100.89     .170E+04        4.1           1.20         6.94
  1.50    101.00     .195E+04        4.9           1.25         6.65
  1.61    101.11     .221E+04        5.8           1.30         6.41
  1.72    101.22     .250E+04        6.7           1.34         6.22
  1.84    101.34     .280E+04        7.7           1.38         6.04
  1.95    101.45     .313E+04        8.8           1.41         5.90

**** WARNING:  TRAVEL TIME TABLE EXCEEDED
                                     <---- hydrograph ---->   <-pipe / channel->
                            AREA     QPEAK    TPEAK   R.V.    MAX DEPTH  MAX VEL
                            (ha)     (cms)    (hrs)   (mm)       (m)      (m/s)
INFLOW : ID= 2 (0505)      78.53     18.11    10.08 134.22      1.92       1.40
OUTFLOW: ID= 1 (0564)      78.53     17.83    10.25 134.22      1.95       1.41


--------------------------------------------------------------------------------
--------------------
| DUHYD      (0520) |
| Inlet Cap.=3.050  |
| #of Inlets=    1  |
| Total(cms)=  3.0  |       AREA      QPEAK      TPEAK    R.V.
--------------------        (ha)      (cms)      (hrs)    (mm)
    TOTAL HYD.(ID= 1): 181.47      11.13      10.00  138.49
    ======================================================
    MAJOR SYS.(ID= 2):  98.04       8.08      10.00  138.49
    MINOR SYS.(ID= 3):  83.43       3.05       4.25  138.49

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0475) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
                 <------ DATA FOR SECTION (   1.1) ------>
                 Distance      Elevation       Manning
                   100.00        324.60          .0500
                   115.00        321.60          .0500
                   120.00        320.80      .0500 / .0300  Main Channel
                   122.00        320.80      .0300 / .0500  Main Channel
                   138.00        321.60          .0500
                   148.00        322.30          .0500
                   154.00        323.10          .0500
                   164.00        324.60          .0500

 <--------------------- TRAVEL TIME TABLE --------------------->
```

Hadati Creek Watershed - Post Development with Cityview Ridge

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .20 | 321.00 | .398E+03 | .8 | .84 | 8.53 |
| .40 | 321.20 | .125E+04 | 3.3 | 1.13 | 6.33 |
| .60 | 321.40 | .255E+04 | 8.1 | 1.36 | 5.27 |
| .80 | 321.60 | .430E+04 | 15.6 | 1.56 | 4.59 |
| 1.00 | 321.80 | .644E+04 | 26.8 | 1.79 | 4.01 |
| 1.20 | 322.00 | .892E+04 | 41.2 | 1.99 | 3.61 |
| 1.40 | 322.20 | .117E+05 | 59.3 | 2.17 | 3.30 |
| 1.60 | 322.40 | .148E+05 | 81.9 | 2.37 | 3.02 |
| 1.80 | 322.60 | .182E+05 | 109.1 | 2.58 | 2.78 |
| 2.00 | 322.80 | .218E+05 | 140.2 | 2.77 | 2.59 |
| 2.20 | 323.00 | .256E+05 | 175.3 | 2.95 | 2.43 |
| 2.40 | 323.20 | .296E+05 | 214.7 | 3.12 | 2.29 |
| 2.60 | 323.40 | .338E+05 | 258.6 | 3.29 | 2.18 |
| 2.80 | 323.60 | .382E+05 | 306.7 | 3.46 | 2.07 |
| 3.00 | 323.80 | .428E+05 | 359.1 | 3.61 | 1.98 |
| 3.20 | 324.00 | .476E+05 | 416.0 | 3.76 | 1.91 |
| 3.40 | 324.20 | .526E+05 | 477.5 | 3.91 | 1.83 |
| 3.60 | 324.40 | .578E+05 | 543.5 | 4.05 | 1.77 |
| 3.80 | 324.60 | .632E+05 | 614.3 | 4.18 | 1.71 |

```
                                    <---- hydrograph ---->   <-pipe / channel->
                          AREA      QPEAK    TPEAK   R.V.    MAX DEPTH  MAX VEL
                          (ha)      (cms)    (hrs)   (mm)       (m)      (m/s)
 INFLOW : ID= 2 (0470)   53.65       7.60    10.00 128.70       .58      1.33
 OUTFLOW: ID= 1 (0475)   53.65       7.51    10.00 128.70       .58      1.33

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

--------------------
| ADD HYD   (0363) |
|   1 +  2 =  3    |        AREA     QPEAK     TPEAK       R.V.
--------------------        (ha)     (cms)     (hrs)       (mm)
          ID1= 1 (0362):   30.00    3.504     10.08     122.26
        + ID2= 2 (0359):   28.60    3.311     10.08     128.65
          ===================================================
          ID = 3 (0363):   58.60    6.814     10.08     125.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0115) |
|   1 +  2 =  3    |        AREA     QPEAK     TPEAK       R.V.
--------------------        (ha)     (cms)     (hrs)       (mm)
          ID1= 1 (0106):   51.32    5.997     10.08     128.69
        + ID2= 2 (0114):   49.64    4.896     10.50     128.69
          ===================================================
          ID = 3 (0115):  100.96   10.540     10.08     128.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0492) |
|   1 +  2 =  3    |        AREA     QPEAK     TPEAK       R.V.
--------------------        (ha)     (cms)     (hrs)       (mm)
          ID1= 1 (0563):   19.00    2.311     10.00     130.66
        + ID2= 2 (0607):    5.97     .721     10.00     126.19
```

```
        ==================================================
        ID = 3 (0492):     24.97   3.032    10.00   129.59

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD   (0526) |
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK      R.V.
-------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0525):        .00      .001       .00   *******
      + ID2= 2 (0520):      98.04     8.084     10.00    138.49
        ==================================================
        ID = 3 (0526):      98.04     8.084     10.00    138.49

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD   (0380) |
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK      R.V.
-------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (0363):      58.60     6.814     10.08    125.38
      + ID2= 2 (0365):     117.50    14.089     10.00    128.70
        ==================================================
        ID = 3 (0380):     176.10    20.834     10.00    127.59

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR (0482) |
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
-------------------         (cms)      (ha.m.)   |   (cms)      (ha.m.)
                            .0000       .0000    |    .2910       .3795
                            .2590       .0579    |    .2970       .4503
                            .2660       .1180    |   1.6320       .5232
                            .2720       .1802    |   4.1680       .5983
                            .2790       .2445    |   7.5660       .6756
                            .2850       .3109    |    .0000       .0000

                               AREA        QPEAK        TPEAK        R.V.
                               (ha)        (cms)        (hrs)        (mm)
    INFLOW : ID= 2 (0492)     24.970       3.032        10.00       129.59
    OUTFLOW: ID= 1 (0482)     24.970       3.007        10.08       129.59

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 99.18
                  TIME SHIFT OF PEAK FLOW         (min)=  5.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=   .5640

--------------------------------------------------------------------------------
-------------------
| ROUTE CHN (0527) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
-------------------

              <------ DATA FOR SECTION (   1.1) ------>
              Distance      Elevation       Manning
               100.00        313.20          .0500
               140.00        312.40      .0500 / .0300   Main Channel
               140.50        310.80          .0300       Main Channel
```

| | | | |
|---|---|---|---|
| 141.50 | 310.80 | .0300 | Main Channel |
| 142.00 | 312.40 | .0300 / .0500 | Main Channel |
| 160.00 | 313.20 | .0500 | |

<---------------------- TRAVEL TIME TABLE ---------------------->

| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | FLOW RATE (cms) | VELOCITY (m/s) | TRAV.TIME (min) |
|---|---|---|---|---|---|
| .12 | 310.92 | .575E+02 | .1 | .40 | 18.86 |
| .25 | 311.05 | .119E+03 | .2 | .57 | 13.13 |
| .37 | 311.17 | .185E+03 | .3 | .69 | 10.87 |
| .49 | 311.29 | .256E+03 | .4 | .78 | 9.61 |
| .62 | 311.42 | .330E+03 | .6 | .86 | 8.77 |
| .74 | 311.54 | .409E+03 | .8 | .92 | 8.17 |
| .86 | 311.66 | .492E+03 | 1.1 | .97 | 7.70 |
| .98 | 311.78 | .579E+03 | 1.3 | 1.02 | 7.32 |
| 1.11 | 311.91 | .671E+03 | 1.6 | 1.07 | 7.01 |
| 1.23 | 312.03 | .767E+03 | 1.9 | 1.11 | 6.74 |
| 1.35 | 312.15 | .867E+03 | 2.2 | 1.15 | 6.50 |
| 1.48 | 312.28 | .971E+03 | 2.6 | 1.19 | 6.29 |
| 1.60 | 312.40 | .108E+04 | 2.9 | 1.23 | 6.11 |
| 1.73 | 312.53 | .149E+04 | 3.6 | 1.10 | 6.85 |
| 1.87 | 312.67 | .248E+04 | 4.9 | .88 | 8.52 |
| 2.00 | 312.80 | .405E+04 | 6.9 | .77 | 9.74 |
| 2.13 | 312.93 | .620E+04 | 10.1 | .73 | 10.21 |
| 2.27 | 313.07 | .893E+04 | 14.6 | .74 | 10.17 |
| 2.40 | 313.20 | .122E+05 | 20.7 | .76 | 9.85 |

| | AREA (ha) | <---- hydrograph ----> QPEAK (cms) | TPEAK (hrs) | R.V. (mm) | <-pipe / channel-> MAX DEPTH (m) | MAX VEL (m/s) |
|---|---|---|---|---|---|---|
| INFLOW : ID= 2 (0526) | 98.04 | 8.08 | 10.00 | 138.49 | 2.05 | .76 |
| OUTFLOW: ID= 1 (0527) | 98.04 | 7.97 | 10.08 | 138.49 | 2.04 | .76 |

---

| RESERVOIR (0390) |
| IN= 2---> OUT= 1 |
| DT= 5.0 min |

| OUTFLOW (cms) | STORAGE (ha.m.) | OUTFLOW (cms) | STORAGE (ha.m.) |
|---|---|---|---|
| .0000 | .0000 | 1.3100 | 1.6000 |
| .7700 | .2870 | 1.8600 | 23.2300 |
| 1.2600 | .9680 | .0000 | .0000 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| INFLOW : ID= 2 (0380) | 176.100 | 20.834 | 10.00 | 127.59 |
| OUTFLOW: ID= 1 (0390) | 176.100 | 1.714 | 12.33 | 127.59 |

PEAK FLOW REDUCTION [Qout/Qin](%)= 8.23
TIME SHIFT OF PEAK FLOW (min)=140.00
MAXIMUM STORAGE USED (ha.m.)= 17.4981

---

| ADD HYD (0400) |
| 1 + 2 = 3 |

| | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|---|---|---|---|---|
| ID1= 1 (0395): | 51.20 | 5.388 | 10.08 | 88.29 |
| + ID2= 2 (0390): | 176.10 | 1.714 | 12.33 | 127.59 |
| ID = 3 (0400): | 227.30 | 6.909 | 10.08 | 118.74 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0403) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
              <------ DATA FOR SECTION (   1.1) ------>
              Distance      Elevation      Manning
                100.00         338.30        .0500
                110.00         336.80        .0500
                135.00         336.00        .0300     Main Channel
                142.00         335.30        .0500
                148.00         335.30        .0500
                156.00         336.00        .0500
                165.00         338.30        .0000

    <-------------------- TRAVEL TIME TABLE -------------------->
     DEPTH     ELEV       VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
      (m)       (m)      (cu.m.)       (cms)         (m/s)       (min)
      .16    335.46     .231E+04          .9           .71       44.52
      .32    335.62     .563E+04         3.2          1.09       29.11
      .47    335.77     .997E+04         7.3          1.39       22.72
      .63    335.93     .153E+05        13.4          1.66       19.04
      .79    336.09     .218E+05        22.7          1.97       16.04
      .95    336.25     .299E+05        35.3          2.25       14.10
     1.11    336.41     .396E+05        51.2          2.46       12.89
     1.26    336.56     .510E+05        70.7          2.63       12.02
     1.42    336.72     .641E+05        94.1          2.79       11.35
     1.58    336.88     .787E+05       122.4          2.96       10.71
     1.74    337.04     .939E+05       155.6          3.15       10.06
     1.89    337.19     .110E+06       192.8          3.34        9.48
     2.05    337.35     .126E+06       233.9          3.53        8.97
     2.21    337.51     .143E+06       278.9          3.71        8.53
     2.37    337.67     .160E+06       327.7          3.89        8.13
     2.53    337.83     .178E+06       380.3          4.07        7.79
     2.68    337.98     .196E+06       436.7          4.23        7.48
     2.84    338.14     .215E+06       496.9          4.40        7.20
     3.00    338.30     .234E+06       561.0          4.56        6.95

                                    <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
    INFLOW : ID= 2 (0400)   227.30     6.91   10.08 118.74      .46       1.36
    OUTFLOW: ID= 1 (0403)   227.30     6.38   10.33 118.74      .44       1.30

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

--------------------
| ADD HYD   (0407) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0403):    227.30   6.377    10.33   118.74
        + ID2= 2 (0115):    100.96  10.540    10.08   128.69
          ==================================================
          ID = 3 (0407):    328.26  16.526    10.17   121.80

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

```
          Hadati Creek Watershed - Post Development with Cityview Ridge
 | RESERVOIR (0113) |
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            .0000       .0000   |   1.6000      6.4000
                           1.1000      2.9000   |   9.1000     10.0000
                           1.3000      4.3000   |  12.0000     20.0000

                                  AREA       QPEAK        TPEAK        R.V.
                                  (ha)       (cms)        (hrs)        (mm)
      INFLOW : ID= 2 (0407)     328.260     16.526        10.17      121.80
      OUTFLOW: ID= 1 (0113)     328.260      9.456        11.50      121.80

                    PEAK    FLOW   REDUCTION [Qout/Qin](%)= 57.22
                    TIME SHIFT OF PEAK FLOW          (min)= 80.00
                    MAXIMUM  STORAGE   USED        (ha.m.)= 11.2348

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

 --------------------
 | ADD HYD   (0430) |
 |   1 +  2 =  3    |         AREA     QPEAK     TPEAK      R.V.
 --------------------         (ha)     (cms)     (hrs)      (mm)
           ID1= 1 (0113):   328.26    9.456     11.50    121.80
         + ID2= 2 (0425):    24.24    1.980      9.33    128.70
           ==================================================
           ID = 3 (0430):   352.50   11.349     11.08    122.27

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 --------------------
 | ROUTE CHN (0440) |
 | IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
 --------------------
                     <------ DATA FOR SECTION (   1.1) ------>
                      Distance      Elevation        Manning
                        100.00        325.40          .0600
                        120.00        324.60          .0600
                        126.00        323.90          .0600
                        130.00        323.00          .0600
                        140.00        322.30       .0600 / .0300   Main Channel
                        142.00        322.30       .0300 / .0600   Main Channel
                        150.00        323.90          .0600
                        155.00        324.60          .0600
                        160.00        325.40          .0600

        <--------------------- TRAVEL TIME TABLE --------------------->
         DEPTH      ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
          (m)       (m)       (cu.m.)       (cms)        (m/s)        (min)
          .16     322.46     .233E+03         .6           .96         6.96
          .33     322.63     .672E+03        2.1          1.26         5.27
          .49     322.79     .132E+04        4.9          1.48         4.51
          .65     322.95     .216E+04        9.0          1.66         4.03
          .82     323.12     .319E+04       14.9          1.87         3.57
          .98     323.28     .433E+04       22.5          2.08         3.21
         1.14     323.44     .556E+04       31.6          2.27         2.93
         1.31     323.61     .689E+04       42.3          2.45         2.72
         1.47     323.77     .833E+04       54.6          2.62         2.54
         1.63     323.93     .987E+04       68.3          2.77         2.41
         1.79     324.09     .115E+05       82.8          2.87         2.33
         1.96     324.26     .134E+05       99.2          2.96         2.25
         2.12     324.42     .154E+05      117.9          3.06         2.18
```

```
        2.28    324.58     .176E+05     138.8           3.15        2.11
        2.45    324.75     .200E+05     157.4           3.14        2.12
        2.61    324.91     .228E+05     179.6           3.15        2.11
        2.77    325.07     .259E+05     205.8           3.18        2.09
        2.94    325.24     .293E+05     236.1           3.23        2.07
        3.10    325.40     .330E+05     270.6           3.28        2.03

                                         <---- hydrograph ---->   <-pipe / channel->
                                   AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                   (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
     INFLOW : ID= 2 (0430)       352.50    11.35   11.08 122.27      .72       1.73
     OUTFLOW: ID= 1 (0440)       352.50    11.32   11.08 122.27      .71       1.73


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

 --------------------
 | ADD HYD   (0485) |
 |   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
 --------------------        (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0475):    53.65   7.511    10.00    128.70
        + ID2= 2 (0440):   352.50  11.321    11.08    122.27
          ==================================================
          ID = 3 (0485):   406.15  16.120    10.75    123.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 --------------------
 | ADD HYD   (0490) |
 |   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
 --------------------        (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0480):    43.10   5.222    10.00    128.70
        + ID2= 2 (0485):   406.15  16.120    10.75    123.12
          ==================================================
          ID = 3 (0490):   449.25  19.973    10.67    123.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

 --------------------
 | ADD HYD   (0491) |
 |   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
 --------------------        (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0490):   449.25  19.973    10.67    123.66
        + ID2= 2 (0482):    24.97   3.007    10.08    129.59
          ==================================================
          ID = 3 (0491):   474.22  22.680    10.17    123.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 --------------------
 | RESERVOIR (0483) |
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |     OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
 --------------------      (cms)      (ha.m.)   |    (cms)      (ha.m.)
                            .0000       .0000   |    7.0800      2.4860
                            .2760       .0600   |    8.1000      3.3240
                           1.2000       .3400   |    9.7980      4.6420
                           2.0400       .6182   |   10.4940      7.4397
```

```
                    2.6400      1.1630    |  11.6850     10.3000
                    3.1200      1.7070    |  12.3480     11.4000

                              AREA       QPEAK        TPEAK        R.V.
                              (ha)       (cms)        (hrs)        (mm)
  INFLOW : ID= 2 (0491)     474.220     22.680        10.17       123.97
  OUTFLOW: ID= 1 (0483)     474.220     11.709        12.08       123.97

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 51.63
               TIME SHIFT OF PEAK FLOW         (min)=115.00
               MAXIMUM  STORAGE   USED       (ha.m.)= 10.3422

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

--------------------
| ADD HYD   (0530) |
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (0483):     474.22  11.709     12.08    123.97
       + ID2= 2 (0540):       4.63    .636     10.00    182.64
         ==================================================
         ID = 3 (0530):     478.85  11.843     12.00    124.54

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0545) |
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (0530):     478.85  11.843     12.00    124.54
       + ID2= 2 (0527):      98.04   7.968     10.08    138.49
         ==================================================
         ID = 3 (0545):     576.89  19.057     11.00    126.91

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0546) |
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (0545):     576.89  19.057     11.00    126.91
       + ID2= 2 (0542):      25.25   3.443     10.00    182.64
         ==================================================
         ID = 3 (0546):     602.14  21.640     10.08    129.24

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0547) |
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (0546):     602.14  21.640     10.08    129.24
       + ID2= 2 (0543):      14.99   2.054     10.00    182.64
         ==================================================
         ID = 3 (0547):     617.13  23.544     10.00    130.54

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

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

--------------------
| ADD HYD   (0548) |
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0547):    617.13   23.544     10.00    130.54
        + ID2= 2 (0544):      1.13     .156     10.00    182.64
          ==================================================
          ID = 3 (0548):    618.26   23.700     10.00    130.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

```
"                  MIDUSS Output ----------------------------------------------->"
"                  MIDUSS version                            Version 2.25  rev. 473"
"                  MIDUSS created                         Sunday, February 07, 2010"
"            10    Units used:                                            ie METRIC"
"                  Job folder:                 W:\Guelph\105-2005\105172\Design Data\"
"                                               Modelling Files\MIDUSS\2016 Revisions"
"                  Output filename:                        105172_POST_2yr UC.out"
"                  Licensee name:                                              gmbp"
"                  Company                                 Hewlett-Packard Company"
"                  Date & Time last used:                  6/2/2016 at 3:21:13 PM"
" 31            TIME PARAMETERS"
"        5.000     Time Step"
"      170.000     Max. Storm length"
"     1500.000     Max. Hydrograph"
" 32            STORM Chicago storm"
"            1     Chicago storm"
"      743.000     Coefficient A"
"        6.000     Constant B"
"        0.799     Exponent C"
"        0.400     Fraction R"
"      170.000     Duration"
"        1.000     Time step multiplier"
"               Maximum intensity            105.606    mm/hr"
"               Total depth                   33.816    mm"
"            6     002hyd   Hydrograph extension used in this file"
" 33            CATCHMENT 201"
"            1     Triangular SCS"
"            1     Equal length"
"            2     Horton equation"
"          201     Catchment 201 - To Clythe Creeek"
"       65.000     % Impervious"
"        3.410     Total Area"
"       30.000     Flow length"
"        2.000     Overland Slope"
"        1.194     Pervious Area"
"       30.000     Pervious length"
"        2.000     Pervious slope"
"        2.217     Impervious Area"
"       30.000     Impervious length"
"        2.000     Impervious slope"
"        0.250     Pervious Manning 'n'"
"       75.000     Pervious Max.infiltration"
"       12.500     Pervious Min.infiltration"
"        0.250     Pervious Lag constant (hours)"
"        5.000     Pervious Depression storage"
"        0.015     Impervious Manning 'n'"
"        0.000     Impervious Max.infiltration"
"        0.000     Impervious Min.infiltration"
"        0.050     Impervious Lag constant (hours)"
"        1.500     Impervious Depression storage"
"                       0.496      0.000      0.000      0.000 c.m/sec"
"               Catchment 201           Pervious   Impervious Total Area  "
"               Surface Area            1.194      2.217      3.410      hectare"
"               Time of concentration   22.189     2.170      2.858      minutes"
"               Time to Centroid        93.436     84.151     84.470     minutes"
"               Rainfall depth          33.816     33.816     33.816     mm"
"               Rainfall volume         403.59     749.53     1153.12    c.m"
"               Rainfall losses         31.713     1.985      12.390     mm"
"               Runoff depth            2.103      31.830     21.426     mm"
"               Runoff volume           25.10      705.52     730.63     c.m"
"               Runoff coefficient      0.062      0.941      0.634      "
"               Maximum flow            0.017      0.496      0.496      c.m/sec"
" 40            HYDROGRAPH Add Runoff "
```

```
"             4   Add Runoff "
"                       0.496      0.496      0.000      0.000"
" 33               CATCHMENT 202"
"             1   Triangular SCS"
"             1   Equal length"
"             2   Horton equation"
"           202   Catchment 202 - To Clythe Creeek"
"        25.000   % Impervious"
"         0.740   Total Area"
"        30.000   Flow length"
"         2.000   Overland Slope"
"         0.555   Pervious Area"
"        30.000   Pervious length"
"         2.000   Pervious slope"
"         0.185   Impervious Area"
"        30.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        75.000   Pervious Max.infiltration"
"        12.500   Pervious Min.infiltration"
"         0.250   Pervious Lag constant (hours)"
"         5.000   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.050   Impervious Lag constant (hours)"
"         1.500   Impervious Depression storage"
"                       0.041      0.496      0.000      0.000 c.m/sec"
"                Catchment 202          Pervious   Impervious Total Area "
"                Surface Area           0.555      0.185      0.740      hectare"
"                Time of concentration  22.189     2.170      5.482      minutes"
"                Time to Centroid       93.436     84.151     85.688     minutes"
"                Rainfall depth         33.816     33.816     33.816     mm"
"                Rainfall volume        187.68     62.56      250.24     c.m"
"                Rainfall losses        31.713     1.985      24.281     mm"
"                Runoff depth           2.103      31.830     9.535      mm"
"                Runoff volume          11.67      58.89      70.56      c.m"
"                Runoff coefficient     0.062      0.941      0.282      "
"                Maximum flow           0.008      0.041      0.041      c.m/sec"
" 40             HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                       0.041      0.537      0.000      0.000"
" 33             CATCHMENT 300"
"             1   Triangular SCS"
"             1   Equal length"
"             2   Horton equation"
"           300   Catchment 300 - To Clythe Creek"
"         0.000   % Impervious"
"         6.480   Total Area"
"        45.000   Flow length"
"         2.000   Overland Slope"
"         6.480   Pervious Area"
"        45.000   Pervious length"
"         2.000   Pervious slope"
"         0.000   Impervious Area"
"        45.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        75.000   Pervious Max.infiltration"
"        12.500   Pervious Min.infiltration"
"         0.250   Pervious Lag constant (hours)"
"         5.000   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
```

```
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.050   Impervious Lag constant (hours)"
"         1.500   Impervious Depression storage"
"                 0.073       0.537      0.000      0.000 c.m/sec"
"            Catchment 300              Pervious    Impervious Total Area "
"            Surface Area               6.480       0.000      6.480      hectare"
"            Time of concentration      28.300      2.768      28.300     minutes"
"            Time to Centroid           98.613      85.041     98.613     minutes"
"            Rainfall depth             33.816      33.816     33.816     mm"
"            Rainfall volume            2191.27     0.00       2191.27    c.m"
"            Rainfall losses            31.709      2.082      31.709     mm"
"            Runoff depth               2.107       31.734     2.107      mm"
"            Runoff volume              136.54      0.00       136.55     c.m"
"            Runoff coefficient         0.062       0.000      0.062      "
"            Maximum flow               0.073       0.000      0.073      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                 0.073       0.538      0.000      0.000"
" 64         SHOW TABLE"
"          2   Flow hydrograph"
"          4   Inflow Hydrograph"
"            Maximum flow                      0.538    c.m/sec"
"            Hydrograph volume               937.732    c.m"
" 38         START/RE-START TOTALS 300"
"          3   Runoff Totals on EXIT"
"            Total Catchment area                         10.630    hectare"
"            Total Impervious area                         2.402    hectare"
"            Total % impervious                           22.592"
" 19         EXIT"
```

```
"              MIDUSS Output ----------------------------------------------->"
"              MIDUSS version                            Version 2.25  rev. 473"
"              MIDUSS created                        Sunday, February 07, 2010"
"          10  Units used:                                           ie METRIC"
"              Job folder:                  W:\Guelph\105-2005\105172\Design Data\"
"                                            Modelling Files\MIDUSS\2016 Revisions"
"              Output filename:                          105172_POST_5yr UC.out"
"              Licensee name:                                             gmbp"
"              Company                                  Hewlett-Packard Company"
"              Date & Time last used:                    6/2/2016 at 3:28:36 PM"
" 31        TIME PARAMETERS"
"       5.000  Time Step"
"     170.000  Max. Storm length"
"    1500.000  Max. Hydrograph"
" 32        STORM Chicago storm"
"           1  Chicago storm"
"    1593.000  Coefficient A"
"      11.000  Constant B"
"       0.879  Exponent C"
"       0.400  Fraction R"
"     170.000  Duration"
"       1.000  Time step multiplier"
"           Maximum intensity          134.894    mm/hr"
"           Total depth                 46.775    mm"
"           6  005hyd   Hydrograph extension used in this file"
" 33        CATCHMENT 201"
"           1  Triangular SCS"
"           1  Equal length"
"           2  Horton equation"
"         201  Catchment 201 - To Clythe Creeek"
"      65.000  % Impervious"
"       3.410  Total Area"
"      30.000  Flow length"
"       2.000  Overland Slope"
"       1.194  Pervious Area"
"      30.000  Pervious length"
"       2.000  Pervious slope"
"       2.217  Impervious Area"
"      30.000  Impervious length"
"       2.000  Impervious slope"
"       0.250  Pervious Manning 'n'"
"      75.000  Pervious Max.infiltration"
"      12.500  Pervious Min.infiltration"
"       0.250  Pervious Lag constant (hours)"
"       5.000  Pervious Depression storage"
"       0.015  Impervious Manning 'n'"
"       0.000  Impervious Max.infiltration"
"       0.000  Impervious Min.infiltration"
"       0.050  Impervious Lag constant (hours)"
"       1.500  Impervious Depression storage"
"                0.675     0.000     0.000     0.000 c.m/sec"
"           Catchment 201           Pervious   Impervious Total Area "
"           Surface Area            1.194      2.217      3.410      hectare"
"           Time of concentration   15.360     1.968      3.517      minutes"
"           Time to Centroid        88.710     82.363     83.097     minutes"
"           Rainfall depth          46.775     46.775     46.775     mm"
"           Rainfall volume         558.26     1036.77    1595.03    c.m"
"           Rainfall losses         35.929     2.131      13.960     mm"
"           Runoff depth            10.846     44.644     32.815     mm"
"           Runoff volume           129.45     989.54     1118.99    c.m"
"           Runoff coefficient      0.232      0.954      0.702      "
"           Maximum flow            0.099      0.665      0.675      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
```

```
"              4   Add Runoff "
"                       0.675      0.675      0.000      0.000"
" 33              CATCHMENT 202"
"              1   Triangular SCS"
"              1   Equal length"
"              2   Horton equation"
"            202   Catchment 202 - To Clythe Creeek"
"         25.000   % Impervious"
"          0.740   Total Area"
"         30.000   Flow length"
"          2.000   Overland Slope"
"          0.555   Pervious Area"
"         30.000   Pervious length"
"          2.000   Pervious slope"
"          0.185   Impervious Area"
"         30.000   Impervious length"
"          2.000   Impervious slope"
"          0.250   Pervious Manning 'n'"
"         75.000   Pervious Max.infiltration"
"         12.500   Pervious Min.infiltration"
"          0.250   Pervious Lag constant (hours)"
"          5.000   Pervious Depression storage"
"          0.015   Impervious Manning 'n'"
"          0.000   Impervious Max.infiltration"
"          0.000   Impervious Min.infiltration"
"          0.050   Impervious Lag constant (hours)"
"          1.500   Impervious Depression storage"
"                       0.069      0.675      0.000      0.000 c.m/sec"
"                 Catchment 202           Pervious    Impervious Total Area  "
"                 Surface Area            0.555       0.185      0.740       hectare"
"                 Time of concentration   15.360      1.968      7.614       minutes"
"                 Time to Centroid        88.710      82.363     85.039      minutes"
"                 Rainfall depth          46.775      46.775     46.775      mm"
"                 Rainfall volume         259.60      86.53      346.14      c.m"
"                 Rainfall losses         35.929      2.131      27.479      mm"
"                 Runoff depth            10.846      44.644     19.296      mm"
"                 Runoff volume           60.20       82.59      142.79      c.m"
"                 Runoff coefficient      0.232       0.954      0.413       "
"                 Maximum flow            0.046       0.055      0.069       c.m/sec"
" 40              HYDROGRAPH Add Runoff "
"              4   Add Runoff "
"                       0.069      0.735      0.000      0.000"
" 33              CATCHMENT 300"
"              1   Triangular SCS"
"              1   Equal length"
"              2   Horton equation"
"            300   Catchment 300 - To Clythe Creek"
"          0.000   % Impervious"
"          6.480   Total Area"
"         45.000   Flow length"
"          2.000   Overland Slope"
"          6.480   Pervious Area"
"         45.000   Pervious length"
"          2.000   Pervious slope"
"          0.000   Impervious Area"
"         45.000   Impervious length"
"          2.000   Impervious slope"
"          0.250   Pervious Manning 'n'"
"         75.000   Pervious Max.infiltration"
"         12.500   Pervious Min.infiltration"
"          0.250   Pervious Lag constant (hours)"
"          5.000   Pervious Depression storage"
"          0.015   Impervious Manning 'n'"
```

```
"          0.000    Impervious Max.infiltration"
"          0.000    Impervious Min.infiltration"
"          0.050    Impervious Lag constant (hours)"
"          1.500    Impervious Depression storage"
"                        0.444      0.735      0.000      0.000 c.m/sec"
"               Catchment 300              Pervious   Impervious Total Area "
"               Surface Area               6.480      0.000      6.480      hectare"
"               Time of concentration      19.590     2.510      19.590     minutes"
"               Time to Centroid           92.382     83.161     92.382     minutes"
"               Rainfall depth             46.775     46.775     46.775     mm"
"               Rainfall volume            3031.02    0.00       3031.02    c.m"
"               Rainfall losses            35.903     2.312      35.903     mm"
"               Runoff depth               10.872     44.463     10.872     mm"
"               Runoff volume              704.50     0.00       704.50     c.m"
"               Runoff coefficient         0.232      0.000      0.232      "
"               Maximum flow               0.444      0.000      0.444      c.m/sec"
" 40            HYDROGRAPH Add Runoff "
"              4   Add Runoff "
"                        0.444      0.868      0.000      0.000"
" 64            SHOW TABLE"
"              2   Flow hydrograph"
"              4   Inflow Hydrograph"
"               Maximum flow                    0.868     c.m/sec"
"               Hydrograph volume            1966.276     c.m"
" 38            START/RE-START TOTALS 300"
"              3   Runoff Totals on EXIT"
"               Total Catchment area                         10.630    hectare"
"               Total Impervious area                         2.402    hectare"
"               Total % impervious                           22.592"
" 19            EXIT"
```

```
"              MIDUSS Output ----------------------------------------------->"
"              MIDUSS version                             Version 2.25  rev. 473"
"              MIDUSS created                           Sunday, February 07, 2010"
"        10    Units used:                                             ie METRIC"
"              Job folder:                 W:\Guelph\105-2005\105172\Design Data\"
"                                          Modelling Files\MIDUSS\2016 Revisions"
"              Output filename:                          105172_POST_25yr UC.out"
"              Licensee name:                                              gmbp"
"              Company                                   Hewlett-Packard Company"
"              Date & Time last used:                    6/2/2016 at 3:30:00 PM"
" 31        TIME PARAMETERS"
"         5.000  Time Step"
"       210.000  Max. Storm length"
"      1500.000  Max. Hydrograph"
" 32        STORM Chicago storm"
"            1   Chicago storm"
"      3158.000  Coefficient A"
"        15.000  Constant B"
"         0.936  Exponent C"
"         0.400  Fraction R"
"       210.000  Duration"
"         1.000  Time step multiplier"
"           Maximum intensity           169.546    mm/hr"
"           Total depth                  69.476    mm"
"            6   025hyd    Hydrograph extension used in this file"
" 33        CATCHMENT 201"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"          201   Catchment 201 - To Clythe Creeek"
"        65.000  % Impervious"
"         3.410  Total Area"
"        30.000  Flow length"
"         2.000  Overland Slope"
"         1.194  Pervious Area"
"        30.000  Pervious length"
"         2.000  Pervious slope"
"         2.217  Impervious Area"
"        30.000  Impervious length"
"         2.000  Impervious slope"
"         0.250  Pervious Manning 'n'"
"        75.000  Pervious Max.infiltration"
"        12.500  Pervious Min.infiltration"
"         0.250  Pervious Lag constant (hours)"
"         5.000  Pervious Depression storage"
"         0.015  Impervious Manning 'n'"
"         0.000  Impervious Max.infiltration"
"         0.000  Impervious Min.infiltration"
"         0.050  Impervious Lag constant (hours)"
"         1.500  Impervious Depression storage"
"                    1.074     0.000     0.000     0.000 c.m/sec"
"           Catchment 201          Pervious   Impervious Total Area "
"           Surface Area           1.194      2.217      3.410      hectare"
"           Time of concentration  11.267     1.796      3.566      minutes"
"           Time to Centroid       102.758    98.258     99.099     minutes"
"           Rainfall depth         69.476     69.476     69.476     mm"
"           Rainfall volume        829.20     1539.94    2369.15    c.m"
"           Rainfall losses        40.822     2.348      15.814     mm"
"           Runoff depth           28.654     67.128     53.663     mm"
"           Runoff volume          341.99     1487.90    1829.89    c.m"
"           Runoff coefficient     0.412      0.966      0.772      "
"           Maximum flow           0.258      0.912      1.074      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
```

```
"              4   Add Runoff "
"                      1.074     1.074     0.000     0.000"
" 33               CATCHMENT 202"
"              1   Triangular SCS"
"              1   Equal length"
"              2   Horton equation"
"            202   Catchment 202 - To Clythe Creeek"
"         25.000   % Impervious"
"          0.740   Total Area"
"         30.000   Flow length"
"          2.000   Overland Slope"
"          0.555   Pervious Area"
"         30.000   Pervious length"
"          2.000   Pervious slope"
"          0.185   Impervious Area"
"         30.000   Impervious length"
"          2.000   Impervious slope"
"          0.250   Pervious Manning 'n'"
"         75.000   Pervious Max.infiltration"
"         12.500   Pervious Min.infiltration"
"          0.250   Pervious Lag constant (hours)"
"          5.000   Pervious Depression storage"
"          0.015   Impervious Manning 'n'"
"          0.000   Impervious Max.infiltration"
"          0.000   Impervious Min.infiltration"
"          0.050   Impervious Lag constant (hours)"
"          1.500   Impervious Depression storage"
"                      0.169     1.074     0.000     0.000 c.m/sec"
"                Catchment 202          Pervious   Impervious Total Area "
"                Surface Area           0.555      0.185      0.740      hectare"
"                Time of concentration  11.267     1.796      7.114      minutes"
"                Time to Centroid       102.758    98.258     100.785    minutes"
"                Rainfall depth         69.476     69.476     69.476     mm"
"                Rainfall volume        385.59     128.53     514.13     c.m"
"                Rainfall losses        40.822     2.348      31.204     mm"
"                Runoff depth           28.654     67.128     38.273     mm"
"                Runoff volume          159.03     124.19     283.22     c.m"
"                Runoff coefficient     0.412      0.966      0.551      "
"                Maximum flow           0.120      0.076      0.169      c.m/sec"
" 40             HYDROGRAPH Add Runoff "
"              4   Add Runoff "
"                      0.169     1.226     0.000     0.000"
" 33             CATCHMENT 300"
"              1   Triangular SCS"
"              1   Equal length"
"              2   Horton equation"
"            300   Catchment 300 - To Clythe Creek"
"          0.000   % Impervious"
"          6.480   Total Area"
"         45.000   Flow length"
"          2.000   Overland Slope"
"          6.480   Pervious Area"
"         45.000   Pervious length"
"          2.000   Pervious slope"
"          0.000   Impervious Area"
"         45.000   Impervious length"
"          2.000   Impervious slope"
"          0.250   Pervious Manning 'n'"
"         75.000   Pervious Max.infiltration"
"         12.500   Pervious Min.infiltration"
"          0.250   Pervious Lag constant (hours)"
"          5.000   Pervious Depression storage"
"          0.015   Impervious Manning 'n'"
```

```
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                    1.261      1.226      0.000      0.000 c.m/sec"
"             Catchment 300           Pervious   Impervious Total Area  "
"             Surface Area            6.480      0.000      6.480      hectare"
"             Time of concentration   14.371     2.291      14.371     minutes"
"             Time to Centroid        105.688    98.958     105.688    minutes"
"             Rainfall depth          69.476     69.476     69.476     mm"
"             Rainfall volume         4502.07    0.00       4502.07    c.m"
"             Rainfall losses         40.830     2.498      40.830     mm"
"             Runoff depth            28.647     66.978     28.647     mm"
"             Runoff volume           1856.30    0.00       1856.30    c.m"
"             Runoff coefficient      0.412      0.000      0.412      "
"             Maximum flow            1.261      0.000      1.261      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    1.261      2.156      0.000      0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                 2.156     c.m/sec"
"             Hydrograph volume         3969.412     c.m"
" 38          START/RE-START TOTALS 300"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                  10.630     hectare"
"             Total Impervious area                  2.402     hectare"
"             Total % impervious                    22.592"
" 19          EXIT"
```

```
"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                              Version 2.25  rev. 473"
"               MIDUSS created                          Sunday, February 07, 2010"
"          10   Units used:                                            ie METRIC"
"               Job folder:                 W:\Guelph\105-2005\105172\Design Data\"
"                                            Modelling Files\MIDUSS\2016 Revisions"
"               Output filename:                       105172_POST_100yr UC.out"
"               Licensee name:                                             gmbp"
"               Company                                  Hewlett-Packard Company"
"               Date & Time last used:                     6/2/2016 at 3:31:23 PM"
" 31         TIME PARAMETERS"
"        5.000   Time Step"
"      210.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32         STORM Chicago storm"
"            1   Chicago storm"
"     4688.000   Coefficient A"
"       17.000   Constant B"
"        0.962   Exponent C"
"        0.400   Fraction R"
"      210.000   Duration"
"        1.000   Time step multiplier"
"            Maximum intensity            213.574    mm/hr"
"            Total depth                   88.830    mm"
"            6   100hyd   Hydrograph extension used in this file"
" 33         CATCHMENT 201"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"          201   Catchment 201 - To Clythe Creeek"
"       65.000   % Impervious"
"        3.410   Total Area"
"       30.000   Flow length"
"        2.000   Overland Slope"
"        1.194   Pervious Area"
"       30.000   Pervious length"
"        2.000   Pervious slope"
"        2.217   Impervious Area"
"       30.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious Max.infiltration"
"       12.500   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                    1.469     0.000     0.000     0.000 c.m/sec"
"            Catchment 201             Pervious   Impervious Total Area "
"            Surface Area              1.194      2.217      3.410      hectare"
"            Time of concentration     9.306      1.638      3.326      minutes"
"            Time to Centroid          102.153    97.460     98.493     minutes"
"            Rainfall depth            88.830     88.830     88.830     mm"
"            Rainfall volume           1060.18    1968.91    3029.10    c.m"
"            Rainfall losses           43.655     2.647      17.000     mm"
"            Runoff depth              45.175     86.183     71.830     mm"
"            Runoff volume             539.17     1910.24    2449.40    c.m"
"            Runoff coefficient        0.509      0.970      0.809      "
"            Maximum flow              0.418      1.149      1.469      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
```

```
"           4   Add Runoff "
"                   1.469     1.469     0.000     0.000"
" 33            CATCHMENT 202"
"           1   Triangular SCS"
"           1   Equal length"
"           2   Horton equation"
"         202   Catchment 202 - To Clythe Creeek"
"      25.000   % Impervious"
"       0.740   Total Area"
"      30.000   Flow length"
"       2.000   Overland Slope"
"       0.555   Pervious Area"
"      30.000   Pervious length"
"       2.000   Pervious slope"
"       0.185   Impervious Area"
"      30.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      75.000   Pervious Max.infiltration"
"      12.500   Pervious Min.infiltration"
"       0.250   Pervious Lag constant (hours)"
"       5.000   Pervious Depression storage"
"       0.015   Impervious Manning 'n'"
"       0.000   Impervious Max.infiltration"
"       0.000   Impervious Min.infiltration"
"       0.050   Impervious Lag constant (hours)"
"       1.500   Impervious Depression storage"
"                   0.256     1.469     0.000     0.000 c.m/sec"
"               Catchment 202          Pervious   Impervious Total Area "
"               Surface Area           0.555      0.185      0.740      hectare"
"               Time of concentration  9.306      1.638      6.325      minutes"
"               Time to Centroid       102.153    97.460     100.328    minutes"
"               Rainfall depth         88.830     88.830     88.830     mm"
"               Rainfall volume        493.01     164.34     657.34     c.m"
"               Rainfall losses        43.655     2.647      33.403     mm"
"               Runoff depth           45.175     86.183     55.427     mm"
"               Runoff volume          250.72     159.44     410.16     c.m"
"               Runoff coefficient     0.509      0.970      0.624      "
"               Maximum flow           0.195      0.096      0.256      c.m/sec"
" 40            HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.256     1.714     0.000     0.000"
" 33            CATCHMENT 300"
"           1   Triangular SCS"
"           1   Equal length"
"           2   Horton equation"
"         300   Catchment 300 - To Clythe Creek"
"       0.000   % Impervious"
"       6.480   Total Area"
"      45.000   Flow length"
"       2.000   Overland Slope"
"       6.480   Pervious Area"
"      45.000   Pervious length"
"       2.000   Pervious slope"
"       0.000   Impervious Area"
"      45.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      75.000   Pervious Max.infiltration"
"      12.500   Pervious Min.infiltration"
"       0.250   Pervious Lag constant (hours)"
"       5.000   Pervious Depression storage"
"       0.015   Impervious Manning 'n'"
```

```
"          0.000   Impervious Max.infiltration"
"          0.000   Impervious Min.infiltration"
"          0.050   Impervious Lag constant (hours)"
"          1.500   Impervious Depression storage"
"                       1.971     1.714      0.000      0.000 c.m/sec"
"                Catchment 300              Pervious    Impervious Total Area "
"                Surface Area               6.480       0.000      6.480      hectare"
"                Time of concentration      11.869      2.089      11.869     minutes"
"                Time to Centroid           104.828     98.071     104.828    minutes"
"                Rainfall depth             88.830      88.830     88.830     mm"
"                Rainfall volume            5756.17     0.01       5756.17    c.m"
"                Rainfall losses            43.360      2.670      43.360     mm"
"                Runoff depth               45.470      86.160     45.470     mm"
"                Runoff volume              2946.46     0.01       2946.46    c.m"
"                Runoff coefficient         0.512       0.000      0.512      "
"                Maximum flow               1.971       0.000      1.971      c.m/sec"
" 40             HYDROGRAPH Add Runoff "
"               4   Add Runoff "
"                       1.971     3.386      0.000      0.000"
" 64             SHOW TABLE"
"               2   Flow hydrograph"
"               4   Inflow Hydrograph"
"                Maximum flow                    3.386    c.m/sec"
"                Hydrograph volume            5806.026    c.m"
" 38             START/RE-START TOTALS 300"
"               3   Runoff Totals on EXIT"
"                Total Catchment area                        10.630    hectare"
"                Total Impervious area                        2.402    hectare"
"                Total % impervious                          22.592"
" 19             EXIT"
```

```
"             MIDUSS Output ----------------------------------------------->"
"             MIDUSS version                             Version 2.25  rev. 473"
"             MIDUSS created                        Sunday, February 07, 2010"
"        10   Units used:                                          ie METRIC"
"             Job folder:               W:\Guelph\105-2005\105172\Design Data\"
"                                        Modelling Files\MIDUSS\2016 Revisions"
"             Output filename:                     105172_POST_Regional UC.out"
"             Licensee name:                                             gmbp"
"             Company                                  Hewlett-Packard Company"
"             Date & Time last used:                   6/2/2016 at 3:36:32 PM"
" 31       TIME PARAMETERS"
"      60.000   Time Step"
"    2880.000   Max. Storm length"
"    3600.000   Max. Hydrograph"
" 32       STORM Historic"
"           5   Historic"
"    2880.000   Duration"
"      48.000   Rainfall intensity values"
"                 2.028      2.028      2.028      2.028      2.028"
"                 2.028      2.028      2.028      2.028      2.028"
"                 2.028      2.028      2.028      2.028      2.028"
"                 2.028      2.028      2.028      2.028      2.028"
"                 2.028      2.028      2.028      2.028      2.028"
"                 2.028      2.028      2.028      2.028      2.028"
"                 2.028      2.026      2.026      2.026      2.028"
"                 2.026      6.000      4.000      6.000     13.000"
"                17.000     13.000     23.000     13.000     13.000"
"                53.000     38.000     13.000"
"           Maximum intensity               53.000    mm/hr"
"           Total depth                    285.000    mm"
"           6   000hyd   Hydrograph extension used in this file"
" 33       CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           2   Horton equation"
"         201   Catchment 201 - To Clythe Creeek"
"      65.000   % Impervious"
"       3.410   Total Area"
"      30.000   Flow length"
"       2.000   Overland Slope"
"       1.194   Pervious Area"
"      30.000   Pervious length"
"       2.000   Pervious slope"
"       2.217   Impervious Area"
"      30.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      75.000   Pervious Max.infiltration"
"      12.500   Pervious Min.infiltration"
"       0.250   Pervious Lag constant (hours)"
"       5.000   Pervious Depression storage"
"       0.015   Impervious Manning 'n'"
"       0.000   Impervious Max.infiltration"
"       0.000   Impervious Min.infiltration"
"       0.050   Impervious Lag constant (hours)"
"       1.500   Impervious Depression storage"
"                     0.376     0.000      0.000      0.000 c.m/sec"
"           Catchment 201           Pervious   Impervious Total Area "
"           Surface Area            1.194      2.217      3.410      hectare"
"           Time of concentration   17.225     2.860      4.946      minutes"
"           Time to Centroid        2775.198   2251.465   2327.523   minutes"
"           Rainfall depth          285.000    285.000    285.000    mm"
"           Rainfall volume         3401.48    6317.02    9718.50    c.m"
```

```
"            Rainfall losses        207.571     39.596      98.387      mm"
"            Runoff depth           77.429      245.404     186.613     mm"
"            Runoff volume          924.12      5439.38     6363.50     c.m"
"            Runoff coefficient     0.272       0.861       0.655       "
"            Maximum flow           0.094       0.282       0.376       c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4    Add Runoff "
"                   0.376      0.376      0.000      0.000"
" 33         CATCHMENT 202"
"          1    Triangular SCS"
"          1    Equal length"
"          2    Horton equation"
"        202    Catchment 202 - To Clythe Creeek"
"     25.000    % Impervious"
"      0.740    Total Area"
"     30.000    Flow length"
"      2.000    Overland Slope"
"      0.555    Pervious Area"
"     30.000    Pervious length"
"      2.000    Pervious slope"
"      0.185    Impervious Area"
"     30.000    Impervious length"
"      2.000    Impervious slope"
"      0.250    Pervious Manning 'n'"
"     75.000    Pervious Max.infiltration"
"     12.500    Pervious Min.infiltration"
"      0.250    Pervious Lag constant (hours)"
"      5.000    Pervious Depression storage"
"      0.015    Impervious Manning 'n'"
"      0.000    Impervious Max.infiltration"
"      0.000    Impervious Min.infiltration"
"      0.050    Impervious Lag constant (hours)"
"      1.500    Impervious Depression storage"
"                   0.067      0.376      0.000      0.000 c.m/sec"
"            Catchment 202          Pervious    Impervious  Total Area  "
"            Surface Area           0.555       0.185       0.740       hectare"
"            Time of concentration  17.225      2.860       9.845       minutes"
"            Time to Centroid       2775.197    2251.465    2506.141    minutes"
"            Rainfall depth         285.000     285.000     285.000     mm"
"            Rainfall volume        1581.75     527.25      2109.00     c.m"
"            Rainfall losses        207.571     39.596      165.577     mm"
"            Runoff depth           77.429      245.404     119.423     mm"
"            Runoff volume          429.73      454.00      883.73      c.m"
"            Runoff coefficient     0.272       0.861       0.419       "
"            Maximum flow           0.044       0.024       0.067       c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4    Add Runoff "
"                   0.067      0.443      0.000      0.000"
" 33         CATCHMENT 300"
"          1    Triangular SCS"
"          1    Equal length"
"          2    Horton equation"
"        300    Catchment 300 - To Clythe Creek"
"      0.000    % Impervious"
"      6.480    Total Area"
"     45.000    Flow length"
"      2.000    Overland Slope"
"      6.480    Pervious Area"
"     45.000    Pervious length"
"      2.000    Pervious slope"
"      0.000    Impervious Area"
"     45.000    Impervious length"
"      2.000    Impervious slope"
```

```
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious Max.infiltration"
"       12.500   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                    0.538     0.443     0.000     0.000 c.m/sec"
"             Catchment 300           Pervious    Impervious Total Area  "
"             Surface Area            6.480       0.000      6.480       hectare"
"             Time of concentration   21.969      3.647      21.969      minutes"
"             Time to Centroid        2780.244    2236.986   2780.242    minutes"
"             Rainfall depth          285.000     285.000    285.000     mm"
"             Rainfall volume         1.8468      0.0000     1.8468      ha-m"
"             Rainfall losses         206.992     38.537     206.992     mm"
"             Runoff depth            78.008      246.463    78.008      mm"
"             Runoff volume           5054.92     0.02       5054.94     c.m"
"             Runoff coefficient      0.274       0.000      0.274       "
"             Maximum flow            0.538       0.000      0.538       c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.538     0.911     0.000     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                    0.911    c.m/sec"
"             Hydrograph volume           12302.162    c.m"
" 38          START/RE-START TOTALS 300"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                      10.630    hectare"
"             Total Impervious area                      2.402    hectare"
"             Total % impervious                        22.592"
" 19          EXIT"
```

**Cityview Ridge Subdivision (Formerely P.T. Valeriote Property)**
**City of Guelph**
**Our File: 105-172**
**June 2016**

**Catchment 201 - Proposed Stormwater Management Facility**

**STORAGE VOLUME CALCULATIONS**

| Elevation (m) | Depth (m) | Surface Area ($m^2$) | Permanent Pool Volume ($m^3$) | Accumulated Perm. Pool Volume ($m^3$) | Incremental Storage Volume ($m^3$) | Accum. Inc. Storage Volume ($m^3$) | |
|---|---|---|---|---|---|---|---|
| 339.35 | 0.00 | 1486.7 | 0.0 | 0.0 | | | Bottom of Pond |
| 339.45 | 0.10 | 1618.7 | 155.3 | 155.3 | | | |
| 339.55 | 0.20 | 1779.1 | 169.9 | 325.2 | | | |
| 339.65 | 0.30 | 1941.5 | 186.0 | 511.2 | | | |
| 339.75 | 0.40 | 2092.1 | 201.7 | 712.9 | 0.0 | 0.0 | Top of Permanent Pool |
| 339.85 | 0.50 | 2253.8 | | | 217.3 | 217.3 | |
| 339.95 | 0.60 | 2417.1 | | | 233.5 | 450.8 | |
| 340.05 | 0.70 | 2581.7 | | | 249.9 | 700.8 | |
| 340.15 | 0.80 | 2748.8 | | | 266.5 | 967.3 | |
| 340.25 | 0.90 | 2918.6 | | | 283.4 | 1250.7 | CB Lip Elevation |
| 340.35 | 1.00 | 3090.9 | | | 300.5 | 1551.1 | |
| 340.45 | 1.10 | 3265.6 | | | 317.8 | 1869.0 | |
| 340.55 | 1.20 | 3442.9 | | | 335.4 | 2204.4 | |
| 340.65 | 1.30 | 3622.9 | | | 353.3 | 2557.7 | |
| 340.75 | 1.40 | 3805.4 | | | 371.4 | 2929.1 | |
| 340.85 | 1.50 | 3990.6 | | | 389.8 | 3318.9 | |
| 340.95 | 1.60 | 4178.4 | | | 408.4 | 3727.4 | Weir Elevation |
| 341.05 | 1.70 | 4335.3 | | | 425.7 | 4153.0 | |
| 341.15 | 1.80 | 4497.0 | | | 441.6 | 4594.6 | Top of Bank |

**Cityview Ridge Subdivision (Formerely P.T. Valeriote Property)**
**City of Guelph**
**Our File: 105-172**
**June 2016**

**Catchment 201 - Proposed Stormwater Management Facility (continued)**

**WEIR CALCULATIONS**

| | | |
|---|---|---|
| d1 = | 1.80 | m |
| h = | 1.60 | m |
| H = | 0.20 | m |
| 2g = | 19.62 | |
| L = | 10 | m |
| Q = | 1.2482 | cu m/s |

**ORIFICE CALCULATIONS**
375 mm Diameter Outlet Pipe
Invert Elevation = 338.20 m

| | | |
|---|---|---|
| Q = | 0.470 | $m^3/s$ |
| Cd = | 0.6 | |
| H = | 2.763 | m |
| 2g = | 19.62 | |
| A = | 0.110 | $m^2$ |
| D = | 0.375 | m |
| D/2 | 0.188 | |

**ORIFICE CALCULATIONS**
90 mm Diameter Knockout
Invert Elevation = 339.75 m

| | | |
|---|---|---|
| Q = | 0.011 | $m^3/s$ |
| Cd = | 0.6 | |
| H = | 0.455 | m |
| 2g = | 19.62 | |
| A = | 0.006 | $m^2$ |
| D = | 0.090 | m |
| D/2 | 0.045 | m |

**STAGE/STORAGE/DISCHARGE TABLE**

| Elevation (m) | Stage (m) | Storage ($m^3$) | Orifice Control 90 mm | Orifice Control 375 mm | Weir | Discharge ($m^3/s$) | |
|---|---|---|---|---|---|---|---|
| 339.75 | 0.00 | 0.0 | 0.000 | 0.00 | 0.00 | 0.000 | Top of Permanent Pool |
| 339.85 | 0.10 | 217.3 | 0.004 | 0.00 | 0.00 | 0.004 | |
| 339.95 | 0.20 | 450.8 | 0.007 | 0.00 | 0.00 | 0.007 | |
| 340.05 | 0.30 | 700.8 | 0.009 | 0.00 | 0.00 | 0.009 | |
| 340.15 | 0.40 | 967.3 | 0.010 | 0.00 | 0.00 | 0.010 | |
| 340.25 | 0.50 | 1250.7 | 0.011 | 0.00 | 0.00 | 0.011 | CB Lip Elevation |
| 340.35 | 0.60 | 1551.1 | 0.000 | 0.411 | 0.00 | 0.411 | |
| 340.45 | 0.70 | 1869.0 | 0.000 | 0.422 | 0.00 | 0.422 | |
| 340.55 | 0.80 | 2204.4 | 0.000 | 0.432 | 0.00 | 0.432 | |
| 340.65 | 0.90 | 2557.7 | 0.000 | 0.442 | 0.00 | 0.442 | |
| 340.75 | 1.00 | 2929.1 | 0.000 | 0.451 | 0.00 | 0.451 | |
| 340.85 | 1.10 | 3318.9 | 0.000 | 0.461 | 0.00 | 0.461 | |
| 340.95 | 1.20 | 3727.4 | 0.000 | 0.470 | 0.00 | 0.470 | Weir Elevation |
| 341.05 | 1.30 | 4153.0 | 0.000 | 0.479 | 0.4353 | 0.914 | |
| 341.15 | 1.40 | 4594.6 | 0.000 | 0.488 | 1.2482 | 1.736 | Top of Bank |

**Cityview Ridge Subdivision (Formerely P.T. Valeriote Property)**
**City of Guelph**
**Our File: 105-172**
**June 2016**

**Catchment 202 - Energy Dissipation/Dispersion Structure**

**STORAGE VOLUME TABLE**

| Elevation (m) | Depth (m) | Surface Area ($m^2$) | Increm. Storage ($m^3$) | Total Storage ($m^3$) | |
|---|---|---|---|---|---|
| 336.00 | 0.00 | 130.00 | 0.00 | 0.00 | Bottom of Stone |
| 336.10 | 0.10 | 130.00 | 4.33 | 4.33 | |
| 336.20 | 0.20 | 130.00 | 4.33 | 8.67 | |
| 336.30 | 0.30 | 130.00 | 4.33 | 13.00 | |
| 336.40 | 0.40 | 130.00 | 4.33 | 17.33 | |
| 336.50 | 0.50 | 130.00 | 4.33 | 21.67 | |
| 336.60 | 0.60 | 130.00 | 4.33 | 26.00 | |
| 336.70 | 0.70 | 130.00 | 4.33 | 30.33 | |
| 336.80 | 0.80 | 130.00 | 4.33 | 34.67 | |
| 336.90 | 0.90 | 130.00 | 7.20 | 41.87 | |
| 337.00 | 1.00 | 130.00 | 8.20 | 50.07 | Top of Stone / Weir |
| 337.10 | 1.10 | 130.00 | 9.20 | 59.27 | Overflow |

**Cityview Ridge Subdivision (Formerely P.T. Valeriote Property)**
**City of Guelph**
**Our File: 105-172**
**June 2016**

**Catchment 202 - Energy Dissipation/Dispersion Structure (continued)**

**BOTTOM**

| | | |
|---|---|---|
| L(dw) = | 65.00 | m |
| W(dw) = | 2.00 | m |
| D(dw) = | 1.00 | m |
| A(c) = | 130.0 | $m^2$ |
| VOL(dw)= | 130.0 | $m^3$ |
| VOL(st)= | 43.3 | $m^3$ |
| K = | 1.00E-04 | cm/s |

**SIDES**

| | | |
|---|---|---|
| L(dw) = | 65.00 | m |
| D(dw) = | 1.00 | m |
| A(c) = | 130.0 | sq m |
| K = | 1.00E-04 | cm/s |

**OVERFLOW WEIR**

| | | |
|---|---|---|
| d1 = | 1.10 | m |
| h = | 1.00 | m |
| H = | 0.10 | m |
| 2g = | 19.62 | |
| L = | 48.50 | m |
| Q = | 2.1290 | $m^3/s$ |

**STORAGE VOLUME TABLE**

| Elevation (m) | Stage (m) | Storage ($m^3$) | Infiltration Discharge ($m^3/s$) | Weir Discharge ($m^3/s$) | Total Discharge ($m^3/s$) | |
|---|---|---|---|---|---|---|
| 336.00 | 0.00 | 0.0 | 0.0000 | 0.0000 | 0.0000 | Bottom of Stone |
| 336.10 | 0.10 | 4.3 | 0.0001 | 0.0000 | 0.0001 | |
| 336.20 | 0.20 | 8.7 | 0.0002 | 0.0000 | 0.0002 | |
| 336.30 | 0.30 | 13.0 | 0.0002 | 0.0000 | 0.0002 | |
| 336.40 | 0.40 | 17.3 | 0.0002 | 0.0000 | 0.0002 | |
| 336.50 | 0.50 | 21.7 | 0.0002 | 0.0000 | 0.0002 | |
| 336.60 | 0.60 | 26.0 | 0.0002 | 0.0000 | 0.0002 | |
| 336.70 | 0.70 | 30.3 | 0.0002 | 0.0000 | 0.0002 | |
| 336.80 | 0.80 | 34.7 | 0.0002 | 0.0000 | 0.0002 | |
| 336.90 | 0.90 | 41.9 | 0.0002 | 0.0000 | 0.0002 | |
| 337.00 | 1.00 | 50.1 | 0.0003 | 0.0000 | 0.0003 | Top of Stone / Weir |
| 337.10 | 1.10 | 59.3 | 0.0003 | 2.1290 | 2.1292 | Overflow |

**Cityview Ridge Subdivision (Formerely P.T. Valeriote Property)**
**City of Guelph**
**Our File: 105-172**
**June 2016**

**Catchment B2a: Existing Stormwater Quality Pond No. 2**

**Stage Storage Discharge Calculations**

| Elevation (m) | Stage (m) | Surface Area ($m^2$) | Incremental Storage Volume ($m^3$) | Accumulated Storage Volume ($m^3$) | |
|---|---|---|---|---|---|
| 321.50 | 0.00 | 5,688.0 | 0.00 | 0.00 | Pond Bottom |
| 321.60 | 0.10 | 5,900.0 | 579.40 | 579.40 | |
| 321.70 | 0.20 | 6,110.0 | 600.50 | 1,179.90 | |
| 321.80 | 0.30 | 6,323.0 | 621.65 | 1,801.55 | |
| 321.90 | 0.40 | 6,537.0 | 643.00 | 2,444.55 | |
| 322.00 | 0.50 | 6,752.0 | 664.45 | 3,109.00 | |
| 322.10 | 0.60 | 6,967.0 | 685.95 | 3,794.95 | |
| 322.20 | 0.70 | 7,184.0 | 707.55 | 4,502.50 | Weir |
| 322.30 | 0.80 | 7,401.0 | 729.25 | 5,231.75 | |
| 322.40 | 0.90 | 7,619.0 | 751.00 | 5,982.75 | |
| 322.50 | 1.00 | 7,839.0 | 772.90 | 6,755.65 | Overflow |

**Cityview Ridge Subdivision (Formerely P.T. Valeriote Property)**
**City of Guelph**
**Our File: 105-172**
**June 2016**

**Catchment B2a: Existing Stormwater Quality Pond No. 2 (continued)**

**OUTLET #1**
**300 mm diameter orifice (pipe inv. = 319.55)**

| | | |
|---|---|---|
| Q = | 0.303 | $m^3/s$ |
| Cd = | 0.6 | |
| H = | 2.60 | m |
| 2g = | 19.62 | |
| A = | 0.071 | $m^2$ |
| D = | 0.300 | m |
| D/2 | 0.150 | |

**OVERFLOW WEIR**

| | | |
|---|---|---|
| dl = | 1.00 | m |
| h = | 0.70 | m |
| H = | 0.30 | m |
| 2g = | 19.62 | |
| L = | 30.00 | m |
| Q = | 7.251 | $m^3/s$ |

**Stage/Storage/Discharge Table**

| Elevation (m) | Stage (m) | Storage ($m^3$) | Outlet #1 1050 mm dia. pipe ($m^3/s$) | Overflow Weir ($m^3/s$) | Total Discharge ($m^3/s$) | |
|---|---|---|---|---|---|---|
| 321.50 | 0.00 | 0.00 | 0.000 | 0.000 | 0.000 | Pond Bottom |
| 321.60 | 0.10 | 579.40 | 0.259 | 0.000 | 0.259 | |
| 321.70 | 0.20 | 1,179.90 | 0.266 | 0.000 | 0.266 | |
| 321.80 | 0.30 | 1,801.55 | 0.272 | 0.000 | 0.272 | |
| 321.90 | 0.40 | 2,444.55 | 0.279 | 0.000 | 0.279 | |
| 322.00 | 0.50 | 3,109.00 | 0.285 | 0.000 | 0.285 | |
| 322.10 | 0.60 | 3,794.95 | 0.291 | 0.000 | 0.291 | |
| 322.20 | 0.70 | 4,502.50 | 0.297 | 0.000 | 0.297 | Weir |
| 322.30 | 0.80 | 5,231.75 | 0.303 | 1.329 | 1.632 | |
| 322.40 | 0.90 | 5,982.75 | 0.309 | 3.860 | 4.168 | |
| 322.50 | 1.00 | 6,755.65 | 0.314 | 7.251 | 7.566 | Overflow |

```
"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                              Version 2.25  rev. 473"
"               MIDUSS created                          Sunday, February 07, 2010"
"          10   Units used:                                           ie METRIC"
"               Job folder:                W:\Guelph\105-2005\105172\Design Data\"
"                                          Modelling Files\MIDUSS\2016 Revisions"
"               Output filename:                            105172_POST_2yr.out"
"               Licensee name:                                             gmbp"
"               Company                                   Hewlett-Packard Company"
"               Date & Time last used:                      6/2/2016 at 4:05:28 PM"
" 31          TIME PARAMETERS"
"        5.000  Time Step"
"      170.000  Max. Storm length"
"     1500.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"            1  Chicago storm"
"      743.000  Coefficient A"
"        6.000  Constant B"
"        0.799  Exponent C"
"        0.400  Fraction R"
"      170.000  Duration"
"        1.000  Time step multiplier"
"             Maximum intensity          105.606    mm/hr"
"             Total depth                 33.816    mm"
"            6  002hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"            1  Triangular SCS"
"            1  Equal length"
"            2  Horton equation"
"          201  Catchment 201 - To Clythe Creeek"
"       65.000  % Impervious"
"        3.410  Total Area"
"       30.000  Flow length"
"        2.000  Overland Slope"
"        1.194  Pervious Area"
"       30.000  Pervious length"
"        2.000  Pervious slope"
"        2.217  Impervious Area"
"       30.000  Impervious length"
"        2.000  Impervious slope"
"        0.250  Pervious Manning 'n'"
"       75.000  Pervious Max.infiltration"
"       12.500  Pervious Min.infiltration"
"        0.250  Pervious Lag constant (hours)"
"        5.000  Pervious Depression storage"
"        0.015  Impervious Manning 'n'"
"        0.000  Impervious Max.infiltration"
"        0.000  Impervious Min.infiltration"
"        0.050  Impervious Lag constant (hours)"
"        1.500  Impervious Depression storage"
"                    0.496     0.000     0.000     0.000 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area "
"             Surface Area           1.194      2.217      3.410      hectare"
"             Time of concentration  22.189     2.170      2.858      minutes"
"             Time to Centroid       93.436     84.151     84.470     minutes"
"             Rainfall depth         33.816     33.816     33.816     mm"
"             Rainfall volume        403.59     749.53     1153.12    c.m"
"             Rainfall losses        31.713     1.985      12.390     mm"
"             Runoff depth           2.103      31.830     21.426     mm"
"             Runoff volume          25.10      705.52     730.63     c.m"
"             Runoff coefficient     0.062      0.941      0.634      "
"             Maximum flow           0.017      0.496      0.496      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
```

```
"             4   Add Runoff "
"                       0.496      0.496      0.000      0.000"
" 54            POND DESIGN"
"         0.496   Current peak flow    c.m/sec"
"         0.171   Target outflow    c.m/sec"
"         730.6   Hydrograph volume    c.m"
"           15.   Number of stages"
"         0.000   Minimum water level    metre"
"         3.000   Maximum water level    metre"
"         0.000   Starting water level    metre"
"             0   Keep Design Data: 1 = True; 0 = False"
"                   Level Discharge    Volume"
"                 339.750     0.000     0.000"
"                 339.850   0.00400   217.300"
"                 339.950   0.00700   450.800"
"                 340.050   0.00900   700.800"
"                 340.150   0.01000   967.300"
"                 340.250   0.01100  1250.700"
"                 340.350    0.4110  1551.100"
"                 340.450    0.4220  1869.000"
"                 340.550    0.4320  2204.400"
"                 340.650    0.4420  2557.700"
"                 340.750    0.4510  2929.100"
"                 340.850    0.4610  3318.900"
"                 340.950    0.4700  3727.400"
"                 341.050    0.9140  4153.000"
"                 341.150     1.736  4594.600"
"              Peak outflow                  0.009    c.m/sec"
"              Maximum level               340.039    metre"
"              Maximum storage             673.523    c.m"
"              Centroidal lag               17.512   hours"
"                   0.496     0.496     0.009     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"             5   Next link "
"                       0.496      0.009      0.009      0.000"
" 51          PIPE DESIGN"
"         0.009   Current peak flow    c.m/sec"
"         0.013   Manning 'n'"
"         0.450   Diameter    metre"
"         4.420   Gradient   %"
"              Depth of flow                 0.038    metre"
"              Velocity                      1.359    m/sec"
"              Pipe capacity                 0.599    c.m/sec"
"              Critical depth                0.063    metre"
" 53          ROUTE     Pipe Route 19"
"         19.20      Pipe Route 19 Reach length   ( metre)"
"         0.488   X-factor <= 0.5"
"        10.600   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"        10.714   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                  0.009    c.m/sec"
"                       0.496      0.009      0.009      0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"             5   Next link "
"                       0.496      0.009      0.009      0.000"
" 54          POND DESIGN"
"         0.009   Current peak flow    c.m/sec"
"         0.171   Target outflow    c.m/sec"
"         540.4   Hydrograph volume    c.m"
```

```
"          12.   Number of stages"
"        0.000   Minimum water level     metre"
"        3.000   Maximum water level     metre"
"        0.000   Starting water level     metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                336.000     0.000     0.000"
"                336.100  1.00E-05     4.300"
"                336.200  2.00E-05     8.700"
"                336.300  3.00E-05    13.000"
"                336.400  4.00E-05    17.300"
"                336.500  5.00E-05    21.700"
"                336.600  6.00E-05    26.000"
"                336.700  7.00E-05    30.300"
"                336.800  8.00E-05    34.700"
"                336.900  9.00E-05    41.900"
"                337.000  1.00E-04    50.100"
"                337.100     2.129    59.300"
"             Peak outflow                   0.009    c.m/sec"
"             Maximum level                337.000    metre"
"             Maximum storage               50.138    c.m"
"             Centroidal lag                13.761   hours"
"                  0.496     0.009     0.009     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                    0.496     0.009     0.009     0.000"
" 52          CHANNEL DESIGN"
"        0.009   Current peak flow    c.m/sec"
"        0.065   Manning 'n'"
"           0.   Cross-section type: 0=trapezoidal; 1=general"
"       65.000   Basewidth    metre"
"        3.000   Left bank slope"
"        3.000   Right bank slope"
"        0.100   Channel depth    metre"
"       18.000   Gradient   %"
"             Depth of flow                  0.002    metre"
"             Velocity                       0.088    m/sec"
"             Channel capacity               9.152    c.m/sec"
"             Critical depth                 0.001    metre"
" 53          ROUTE    Channel Route 50"
"        50.00      Channel Route 50 Reach length   ( metre)"
"        0.500   X-factor <= 0.5"
"      212.649   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"      300.000   Routing time step   ( seconds)"
"            2   No. of sub-reaches"
"             Peak outflow                   0.009    c.m/sec"
"                    0.496     0.009     0.009     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                    0.496     0.009     0.009     0.000"
" 33          CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"          202   Catchment 202 - To Clythe Creeek"
"       25.000   % Impervious"
"        0.740   Total Area"
"       30.000   Flow length"
"        2.000   Overland Slope"
```

```
"         0.555    Pervious Area"
"        30.000    Pervious length"
"         2.000    Pervious slope"
"         0.185    Impervious Area"
"        30.000    Impervious length"
"         2.000    Impervious slope"
"         0.250    Pervious Manning 'n'"
"        75.000    Pervious Max.infiltration"
"        12.500    Pervious Min.infiltration"
"         0.250    Pervious Lag constant (hours)"
"         5.000    Pervious Depression storage"
"         0.015    Impervious Manning 'n'"
"         0.000    Impervious Max.infiltration"
"         0.000    Impervious Min.infiltration"
"         0.050    Impervious Lag constant (hours)"
"         1.500    Impervious Depression storage"
"                      0.041      0.009      0.009      0.000 c.m/sec"
"              Catchment 202            Pervious    Impervious Total Area "
"              Surface Area             0.555       0.185      0.740      hectare"
"              Time of concentration    22.189      2.170      5.482      minutes"
"              Time to Centroid         93.436      84.151     85.688     minutes"
"              Rainfall depth           33.816      33.816     33.816     mm"
"              Rainfall volume          187.68      62.56      250.24     c.m"
"              Rainfall losses          31.713      1.985      24.281     mm"
"              Runoff depth             2.103       31.830     9.535      mm"
"              Runoff volume            11.67       58.89      70.56      c.m"
"              Runoff coefficient       0.062       0.941      0.282      "
"              Maximum flow             0.008       0.041      0.041      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.041      0.041      0.009      0.000"
" 33           CATCHMENT 300"
"             1   Triangular SCS"
"             1   Equal length"
"             2   Horton equation"
"           300   Catchment 300 - To Clythe Creek"
"         0.000   % Impervious"
"         6.480   Total Area"
"        45.000   Flow length"
"         2.000   Overland Slope"
"         6.480   Pervious Area"
"        45.000   Pervious length"
"         2.000   Pervious slope"
"         0.000   Impervious Area"
"        45.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        75.000   Pervious Max.infiltration"
"        12.500   Pervious Min.infiltration"
"         0.250   Pervious Lag constant (hours)"
"         5.000   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.050   Impervious Lag constant (hours)"
"         1.500   Impervious Depression storage"
"                      0.073      0.041      0.009      0.000 c.m/sec"
"              Catchment 300            Pervious    Impervious Total Area "
"              Surface Area             6.480       0.000      6.480      hectare"
"              Time of concentration    28.300      2.768      28.300     minutes"
"              Time to Centroid         98.613      85.041     98.613     minutes"
"              Rainfall depth           33.816      33.816     33.816     mm"
"              Rainfall volume          2191.27     0.00       2191.27    c.m"
```

```
"            Rainfall losses       31.709     2.082      31.709     mm"
"            Runoff depth          2.107      31.734     2.107      mm"
"            Runoff volume         136.54     0.00       136.55     c.m"
"            Runoff coefficient    0.062      0.000      0.062      "
"            Maximum flow          0.073      0.000      0.073      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.073     0.086     0.009     0.000"
" 64         SHOW TABLE"
"           2   Flow hydrograph"
"           4   Inflow Hydrograph"
"            Maximum flow                    0.086    c.m/sec"
"            Hydrograph volume             695.173    c.m"
" 38         START/RE-START TOTALS 300"
"           3   Runoff Totals on EXIT"
"            Total Catchment area                       10.630    hectare"
"            Total Impervious area                       2.402    hectare"
"            Total % impervious                         22.592"
" 19         EXIT"
```

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                           Version 2.25  rev. 473"
"                MIDUSS created                        Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                 W:\Guelph\105-2005\105172\Design Data\"
"                                             Modelling Files\MIDUSS\2016 Revisions"
"                Output filename:                           105172_POST_5yr.out"
"                Licensee name:                                            gmbp"
"                Company                                 Hewlett-Packard Company"
"                Date & Time last used:                    6/2/2016 at 4:08:30 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      170.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"     1593.000   Coefficient A"
"       11.000   Constant B"
"        0.879   Exponent C"
"        0.400   Fraction R"
"      170.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity           134.894     mm/hr"
"             Total depth                  46.775     mm"
"            6   005hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"          201   Catchment 201 - To Clythe Creeek"
"       65.000   % Impervious"
"        3.410   Total Area"
"       30.000   Flow length"
"        2.000   Overland Slope"
"        1.194   Pervious Area"
"       30.000   Pervious length"
"        2.000   Pervious slope"
"        2.217   Impervious Area"
"       30.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious Max.infiltration"
"       12.500   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                     0.675     0.000     0.000      0.000 c.m/sec"
"             Catchment 201           Pervious   Impervious Total Area "
"             Surface Area            1.194      2.217      3.410      hectare"
"             Time of concentration   15.360     1.968      3.517      minutes"
"             Time to Centroid        88.710     82.363     83.097     minutes"
"             Rainfall depth          46.775     46.775     46.775     mm"
"             Rainfall volume         558.26     1036.77    1595.03    c.m"
"             Rainfall losses         35.929     2.131      13.960     mm"
"             Runoff depth            10.846     44.644     32.815     mm"
"             Runoff volume           129.45     989.54     1118.99    c.m"
"             Runoff coefficient      0.232      0.954      0.702      "
"             Maximum flow            0.099      0.665      0.675      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
```

```
"            4   Add Runoff "
"                    0.675     0.675     0.000     0.000"
" 54          POND DESIGN"
"        0.675   Current peak flow    c.m/sec"
"        0.171   Target outflow    c.m/sec"
"       1119.0   Hydrograph volume    c.m"
"          15.   Number of stages"
"        0.000   Minimum water level    metre"
"        3.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level  Discharge    Volume"
"                339.750     0.000     0.000"
"                339.850   0.00400   217.300"
"                339.950   0.00700   450.800"
"                340.050   0.00900   700.800"
"                340.150   0.01000   967.300"
"                340.250   0.01100  1250.700"
"                340.350    0.4110  1551.100"
"                340.450    0.4220  1869.000"
"                340.550    0.4320  2204.400"
"                340.650    0.4420  2557.700"
"                340.750    0.4510  2929.100"
"                340.850    0.4610  3318.900"
"                340.950    0.4700  3727.400"
"                341.050    0.9140  4153.000"
"                341.150     1.736  4594.600"
"             Peak outflow                  0.010    c.m/sec"
"             Maximum level               340.179    metre"
"             Maximum storage            1049.820    c.m"
"             Centroidal lag               20.307   hours"
"                  0.675     0.675     0.010     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                    0.675     0.010     0.010     0.000"
" 51          PIPE DESIGN"
"        0.010   Current peak flow    c.m/sec"
"        0.013   Manning 'n'"
"        0.450   Diameter    metre"
"        4.420   Gradient   %"
"             Depth of flow                 0.041    metre"
"             Velocity                      1.425    m/sec"
"             Pipe capacity                 0.599    c.m/sec"
"             Critical depth                0.068    metre"
" 53          ROUTE     Pipe Route 19"
"        19.20      Pipe Route 19 Reach length   ( metre)"
"        0.487   X-factor <= 0.5"
"       10.104   K-lag   ( seconds)"
"        0.000   Default(0) or user spec.(1) values used"
"        0.500   X-factor <= 0.5"
"       30.000   K-lag   ( seconds)"
"        0.500   Beta weighting factor"
"       10.345   Routing time step   ( seconds)"
"            1   No. of sub-reaches"
"             Peak outflow                  0.010    c.m/sec"
"                    0.675     0.010     0.010     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"            5   Next link "
"                    0.675     0.010     0.010     0.000"
" 54          POND DESIGN"
"        0.010   Current peak flow    c.m/sec"
"        0.171   Target outflow    c.m/sec"
"        743.2   Hydrograph volume    c.m"
```

```
"          12.    Number of stages"
"        0.000    Minimum water level     metre"
"        3.000    Maximum water level     metre"
"        0.000    Starting water level     metre"
"            0    Keep Design Data: 1 = True; 0 = False"
"                   Level  Discharge    Volume"
"                 336.000      0.000     0.000"
"                 336.100   1.00E-05     4.300"
"                 336.200   2.00E-05     8.700"
"                 336.300   3.00E-05    13.000"
"                 336.400   4.00E-05    17.300"
"                 336.500   5.00E-05    21.700"
"                 336.600   6.00E-05    26.000"
"                 336.700   7.00E-05    30.300"
"                 336.800   8.00E-05    34.700"
"                 336.900   9.00E-05    41.900"
"                 337.000   1.00E-04    50.100"
"                 337.100      2.129    59.300"
"              Peak outflow                   0.010    c.m/sec"
"              Maximum level                337.000    metre"
"              Maximum storage               50.144    c.m"
"              Centroidal lag                13.776   hours"
"                  0.675      0.010     0.010     0.000 c.m/sec"
" 40           HYDROGRAPH Next link "
"            5    Next link "
"                     0.675      0.010      0.010      0.000"
" 52           CHANNEL DESIGN"
"        0.010    Current peak flow    c.m/sec"
"        0.065    Manning 'n'"
"           0.    Cross-section type: 0=trapezoidal; 1=general"
"       65.000    Basewidth    metre"
"        3.000    Left bank slope"
"        3.000    Right bank slope"
"        0.100    Channel depth    metre"
"       18.000    Gradient   %"
"              Depth of flow                  0.002    metre"
"              Velocity                       0.092    m/sec"
"              Channel capacity               9.152    c.m/sec"
"              Critical depth                 0.001    metre"
" 53           ROUTE     Channel Route 50"
"        50.00       Channel Route 50 Reach length   ( metre)"
"        0.500    X-factor <= 0.5"
"      203.874    K-lag   ( seconds)"
"        0.000    Default(0) or user spec.(1) values used"
"        0.500    X-factor <= 0.5"
"       30.000    K-lag   ( seconds)"
"        0.500    Beta weighting factor"
"      300.000    Routing time step   ( seconds)"
"            2    No. of sub-reaches"
"              Peak outflow                   0.010    c.m/sec"
"                     0.675      0.010      0.010      0.000 c.m/sec"
" 40           HYDROGRAPH Next link "
"            5    Next link "
"                     0.675      0.010      0.010      0.000"
" 33           CATCHMENT 202"
"            1    Triangular SCS"
"            1    Equal length"
"            2    Horton equation"
"          202    Catchment 202 - To Clythe Creeek"
"       25.000    % Impervious"
"        0.740    Total Area"
"       30.000    Flow length"
"        2.000    Overland Slope"
```

```
"          0.555    Pervious Area"
"         30.000    Pervious length"
"          2.000    Pervious slope"
"          0.185    Impervious Area"
"         30.000    Impervious length"
"          2.000    Impervious slope"
"          0.250    Pervious Manning 'n'"
"         75.000    Pervious Max.infiltration"
"         12.500    Pervious Min.infiltration"
"          0.250    Pervious Lag constant (hours)"
"          5.000    Pervious Depression storage"
"          0.015    Impervious Manning 'n'"
"          0.000    Impervious Max.infiltration"
"          0.000    Impervious Min.infiltration"
"          0.050    Impervious Lag constant (hours)"
"          1.500    Impervious Depression storage"
"                        0.069      0.010      0.010      0.000 c.m/sec"
"                Catchment 202          Pervious    Impervious Total Area "
"                Surface Area           0.555       0.185      0.740      hectare"
"                Time of concentration  15.360      1.968      7.614      minutes"
"                Time to Centroid       88.710      82.363     85.039     minutes"
"                Rainfall depth         46.775      46.775     46.775     mm"
"                Rainfall volume        259.60      86.53      346.14     c.m"
"                Rainfall losses        35.929      2.131      27.479     mm"
"                Runoff depth           10.846      44.644     19.296     mm"
"                Runoff volume          60.20       82.59      142.79     c.m"
"                Runoff coefficient     0.232       0.954      0.413      "
"                Maximum flow           0.046       0.055      0.069      c.m/sec"
" 40             HYDROGRAPH Add Runoff "
"                 4    Add Runoff "
"                        0.069      0.069      0.010      0.000"
" 33             CATCHMENT 300"
"                 1    Triangular SCS"
"                 1    Equal length"
"                 2    Horton equation"
"               300    Catchment 300 - To Clythe Creek"
"          0.000    % Impervious"
"          6.480    Total Area"
"         45.000    Flow length"
"          2.000    Overland Slope"
"          6.480    Pervious Area"
"         45.000    Pervious length"
"          2.000    Pervious slope"
"          0.000    Impervious Area"
"         45.000    Impervious length"
"          2.000    Impervious slope"
"          0.250    Pervious Manning 'n'"
"         75.000    Pervious Max.infiltration"
"         12.500    Pervious Min.infiltration"
"          0.250    Pervious Lag constant (hours)"
"          5.000    Pervious Depression storage"
"          0.015    Impervious Manning 'n'"
"          0.000    Impervious Max.infiltration"
"          0.000    Impervious Min.infiltration"
"          0.050    Impervious Lag constant (hours)"
"          1.500    Impervious Depression storage"
"                        0.444      0.069      0.010      0.000 c.m/sec"
"                Catchment 300          Pervious    Impervious Total Area "
"                Surface Area           6.480       0.000      6.480      hectare"
"                Time of concentration  19.590      2.510      19.590     minutes"
"                Time to Centroid       92.382      83.161     92.382     minutes"
"                Rainfall depth         46.775      46.775     46.775     mm"
"                Rainfall volume        3031.02     0.00       3031.02    c.m"
```

```
"              Rainfall losses        35.903      2.312       35.903      mm"
"              Runoff depth           10.872      44.463      10.872      mm"
"              Runoff volume          704.50      0.00        704.50      c.m"
"              Runoff coefficient     0.232       0.000       0.232       "
"              Maximum flow           0.444       0.000       0.444       c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.444     0.507      0.010      0.000"
" 64           SHOW TABLE"
"             2   Flow hydrograph"
"             4   Inflow Hydrograph"
"              Maximum flow                  0.507    c.m/sec"
"              Hydrograph volume          1538.107    c.m"
" 38           START/RE-START TOTALS 300"
"             3   Runoff Totals on EXIT"
"              Total Catchment area                      10.630    hectare"
"              Total Impervious area                      2.402    hectare"
"              Total % impervious                        22.592"
" 19           EXIT"
```

```
"              MIDUSS Output ----------------------------------------------->"
"              MIDUSS version                               Version 2.25  rev. 473"
"              MIDUSS created                           Sunday, February 07, 2010"
"         10   Units used:                                               ie METRIC"
"              Job folder:                  W:\Guelph\105-2005\105172\Design Data\"
"                                             Modelling Files\MIDUSS\2016 Revisions"
"              Output filename:                               105172_POST_25yr.out"
"              Licensee name:                                                 gmbp"
"              Company                                     Hewlett-Packard Company"
"              Date & Time last used:                      6/2/2016 at 4:10:20 PM"
" 31         TIME PARAMETERS"
"       5.000  Time Step"
"     210.000  Max. Storm length"
"    1500.000  Max. Hydrograph"
" 32         STORM Chicago storm"
"           1  Chicago storm"
"    3158.000  Coefficient A"
"      15.000  Constant B"
"       0.936  Exponent C"
"       0.400  Fraction R"
"     210.000  Duration"
"       1.000  Time step multiplier"
"            Maximum intensity           169.546    mm/hr"
"            Total depth                  69.476    mm"
"           6  025hyd   Hydrograph extension used in this file"
" 33         CATCHMENT 201"
"           1  Triangular SCS"
"           1  Equal length"
"           2  Horton equation"
"         201  Catchment 201 - To Clythe Creeek"
"      65.000  % Impervious"
"       3.410  Total Area"
"      30.000  Flow length"
"       2.000  Overland Slope"
"       1.194  Pervious Area"
"      30.000  Pervious length"
"       2.000  Pervious slope"
"       2.217  Impervious Area"
"      30.000  Impervious length"
"       2.000  Impervious slope"
"       0.250  Pervious Manning 'n'"
"      75.000  Pervious Max.infiltration"
"      12.500  Pervious Min.infiltration"
"       0.250  Pervious Lag constant (hours)"
"       5.000  Pervious Depression storage"
"       0.015  Impervious Manning 'n'"
"       0.000  Impervious Max.infiltration"
"       0.000  Impervious Min.infiltration"
"       0.050  Impervious Lag constant (hours)"
"       1.500  Impervious Depression storage"
"                    1.074     0.000     0.000     0.000 c.m/sec"
"            Catchment 201          Pervious   Impervious Total Area "
"            Surface Area           1.194      2.217      3.410     hectare"
"            Time of concentration  11.267     1.796      3.566     minutes"
"            Time to Centroid       102.758    98.258     99.099    minutes"
"            Rainfall depth         69.476     69.476     69.476    mm"
"            Rainfall volume        829.20     1539.94    2369.15   c.m"
"            Rainfall losses        40.822     2.348      15.814    mm"
"            Runoff depth           28.654     67.128     53.663    mm"
"            Runoff volume          341.99     1487.90    1829.89   c.m"
"            Runoff coefficient     0.412      0.966      0.772     "
"            Maximum flow           0.258      0.912      1.074     c.m/sec"
" 40         HYDROGRAPH Add Runoff "
```

```
"             4   Add Runoff "
"                     1.074      1.074      0.000      0.000"
" 54             POND DESIGN"
"         1.074   Current peak flow    c.m/sec"
"         0.171   Target outflow    c.m/sec"
"        1829.9   Hydrograph volume    c.m"
"           15.   Number of stages"
"         0.000   Minimum water level    metre"
"         3.000   Maximum water level    metre"
"         0.000   Starting water level    metre"
"             0   Keep Design Data: 1 = True; 0 = False"
"                   Level Discharge    Volume"
"                 339.750     0.000     0.000"
"                 339.850   0.00400   217.300"
"                 339.950   0.00700   450.800"
"                 340.050   0.00900   700.800"
"                 340.150   0.01000   967.300"
"                 340.250   0.01100  1250.700"
"                 340.350    0.4110  1551.100"
"                 340.450    0.4220  1869.000"
"                 340.550    0.4320  2204.400"
"                 340.650    0.4420  2557.700"
"                 340.750    0.4510  2929.100"
"                 340.850    0.4610  3318.900"
"                 340.950    0.4700  3727.400"
"                 341.050    0.9140  4153.000"
"                 341.150     1.736  4594.600"
"               Peak outflow                     0.196    c.m/sec"
"               Maximum level                  340.296    metre"
"               Maximum storage               1390.030    c.m"
"               Centroidal lag                  17.013    hours"
"                   1.074     1.074      0.196      0.000 c.m/sec"
" 40             HYDROGRAPH Next link "
"             5   Next link "
"                     1.074      0.196      0.196      0.000"
" 51             PIPE DESIGN"
"         0.196   Current peak flow    c.m/sec"
"         0.013   Manning 'n'"
"         0.450   Diameter    metre"
"         4.420   Gradient   %"
"               Depth of flow                    0.177    metre"
"               Velocity                         3.375    m/sec"
"               Pipe capacity                    0.599    c.m/sec"
"               Critical depth                   0.312    metre"
" 53             ROUTE     Pipe Route 19"
"         19.20        Pipe Route 19 Reach length    ( metre)"
"         0.441   X-factor <= 0.5"
"         4.267   K-lag    ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag    ( seconds)"
"         0.500   Beta weighting factor"
"         4.762   Routing time step    ( seconds)"
"             1   No. of sub-reaches"
"               Peak outflow                     0.196    c.m/sec"
"                     1.074      0.196      0.196      0.000 c.m/sec"
" 40             HYDROGRAPH Next link "
"             5   Next link "
"                     1.074      0.196      0.196      0.000"
" 54             POND DESIGN"
"         0.196   Current peak flow    c.m/sec"
"         0.171   Target outflow    c.m/sec"
"        1306.6   Hydrograph volume    c.m"
```

```
"           12.    Number of stages"
"         0.000    Minimum water level      metre"
"         3.000    Maximum water level      metre"
"         0.000    Starting water level      metre"
"             0    Keep Design Data: 1 = True; 0 = False"
"                    Level Discharge     Volume"
"                  336.000      0.000     0.000"
"                  336.100   1.00E-05     4.300"
"                  336.200   2.00E-05     8.700"
"                  336.300   3.00E-05    13.000"
"                  336.400   4.00E-05    17.300"
"                  336.500   5.00E-05    21.700"
"                  336.600   6.00E-05    26.000"
"                  336.700   7.00E-05    30.300"
"                  336.800   8.00E-05    34.700"
"                  336.900   9.00E-05    41.900"
"                  337.000   1.00E-04    50.100"
"                  337.100      2.129    59.300"
"              Peak outflow                   0.196    c.m/sec"
"              Maximum level                337.009    metre"
"              Maximum storage               50.948    c.m"
"              Centroidal lag                 9.663   hours"
"                   1.074      0.196     0.196     0.000 c.m/sec"
" 40           HYDROGRAPH Next link "
"            5    Next link "
"                      1.074      0.196     0.196     0.000"
" 52           CHANNEL DESIGN"
"         0.196    Current peak flow     c.m/sec"
"         0.065    Manning 'n'"
"            0.    Cross-section type: 0=trapezoidal; 1=general"
"        65.000    Basewidth     metre"
"         3.000    Left bank slope"
"         3.000    Right bank slope"
"         0.100    Channel depth     metre"
"        18.000    Gradient    %"
"              Depth of flow                  0.010    metre"
"              Velocity                       0.302    m/sec"
"              Channel capacity               9.152    c.m/sec"
"              Critical depth                 0.010    metre"
" 53           ROUTE     Channel Route 50"
"         50.00       Channel Route 50 Reach length    ( metre)"
"         0.500    X-factor <= 0.5"
"       124.059    K-lag    ( seconds)"
"         0.000    Default(0) or user spec.(1) values used"
"         0.500    X-factor <= 0.5"
"        30.000    K-lag    ( seconds)"
"         0.500    Beta weighting factor"
"       100.000    Routing time step    ( seconds)"
"             1    No. of sub-reaches"
"              Peak outflow                   0.192    c.m/sec"
"                      1.074      0.196     0.192     0.000 c.m/sec"
" 40           HYDROGRAPH Next link "
"            5    Next link "
"                      1.074      0.192     0.192     0.000"
" 33           CATCHMENT 202"
"             1    Triangular SCS"
"             1    Equal length"
"             2    Horton equation"
"           202    Catchment 202 - To Clythe Creeek"
"        25.000    % Impervious"
"         0.740    Total Area"
"        30.000    Flow length"
"         2.000    Overland Slope"
```

```
"          0.555    Pervious Area"
"         30.000    Pervious length"
"          2.000    Pervious slope"
"          0.185    Impervious Area"
"         30.000    Impervious length"
"          2.000    Impervious slope"
"          0.250    Pervious Manning 'n'"
"         75.000    Pervious Max.infiltration"
"         12.500    Pervious Min.infiltration"
"          0.250    Pervious Lag constant (hours)"
"          5.000    Pervious Depression storage"
"          0.015    Impervious Manning 'n'"
"          0.000    Impervious Max.infiltration"
"          0.000    Impervious Min.infiltration"
"          0.050    Impervious Lag constant (hours)"
"          1.500    Impervious Depression storage"
"                      0.169      0.192      0.192      0.000 c.m/sec"
"              Catchment 202            Pervious   Impervious Total Area "
"              Surface Area             0.555      0.185      0.740      hectare"
"              Time of concentration    11.267     1.796      7.114      minutes"
"              Time to Centroid         102.758    98.258     100.785    minutes"
"              Rainfall depth           69.476     69.476     69.476     mm"
"              Rainfall volume          385.59     128.53     514.13     c.m"
"              Rainfall losses          40.822     2.348      31.204     mm"
"              Runoff depth             28.654     67.128     38.273     mm"
"              Runoff volume            159.03     124.19     283.22     c.m"
"              Runoff coefficient       0.412      0.966      0.551      "
"              Maximum flow             0.120      0.076      0.169      c.m/sec"
" 40           HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.169      0.229      0.192      0.000"
" 33           CATCHMENT 300"
"             1   Triangular SCS"
"             1   Equal length"
"             2   Horton equation"
"           300   Catchment 300 - To Clythe Creek"
"         0.000   % Impervious"
"         6.480   Total Area"
"        45.000   Flow length"
"         2.000   Overland Slope"
"         6.480   Pervious Area"
"        45.000   Pervious length"
"         2.000   Pervious slope"
"         0.000   Impervious Area"
"        45.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        75.000   Pervious Max.infiltration"
"        12.500   Pervious Min.infiltration"
"         0.250   Pervious Lag constant (hours)"
"         5.000   Pervious Depression storage"
"         0.015   Impervious Manning 'n'"
"         0.000   Impervious Max.infiltration"
"         0.000   Impervious Min.infiltration"
"         0.050   Impervious Lag constant (hours)"
"         1.500   Impervious Depression storage"
"                      1.261      0.229      0.192      0.000 c.m/sec"
"              Catchment 300            Pervious   Impervious Total Area "
"              Surface Area             6.480      0.000      6.480      hectare"
"              Time of concentration    14.371     2.291      14.371     minutes"
"              Time to Centroid         105.688    98.958     105.688    minutes"
"              Rainfall depth           69.476     69.476     69.476     mm"
"              Rainfall volume          4502.07    0.00       4502.07    c.m"
```

```
"               Rainfall losses         40.830      2.498       40.830      mm"
"               Runoff depth            28.647      66.978      28.647      mm"
"               Runoff volume           1856.30     0.00        1856.30     c.m"
"               Runoff coefficient      0.412       0.000       0.412       "
"               Maximum flow            1.261       0.000       1.261       c.m/sec"
" 40            HYDROGRAPH Add Runoff "
"              4    Add Runoff "
"                       1.261      1.400      0.192      0.000"
" 64            SHOW TABLE"
"              2    Flow hydrograph"
"              4    Inflow Hydrograph"
"               Maximum flow                        1.400     c.m/sec"
"               Hydrograph volume                3394.234     c.m"
" 38            START/RE-START TOTALS 300"
"              3    Runoff Totals on EXIT"
"               Total Catchment area                          10.630     hectare"
"               Total Impervious area                          2.402     hectare"
"               Total % impervious                            22.592"
" 19            EXIT"
```

```
"              MIDUSS Output ----------------------------------------------->"
"              MIDUSS version                              Version 2.25  rev. 473"
"              MIDUSS created                         Sunday, February 07, 2010"
"          10  Units used:                                            ie METRIC"
"              Job folder:                  W:\Guelph\105-2005\105172\Design Data\"
"                                            Modelling Files\MIDUSS\2016 Revisions"
"              Output filename:                              105172_POST_100yr.out"
"              Licensee name:                                              gmbp"
"              Company                                     Hewlett-Packard Company"
"              Date & Time last used:                         6/2/2016 at 4:14:14 PM"
" 31        TIME PARAMETERS"
"      5.000   Time Step"
"    210.000   Max. Storm length"
"   1500.000   Max. Hydrograph"
" 32        STORM Chicago storm"
"          1   Chicago storm"
"   4688.000   Coefficient A"
"     17.000   Constant B"
"      0.962   Exponent C"
"      0.400   Fraction R"
"    210.000   Duration"
"      1.000   Time step multiplier"
"           Maximum intensity          213.574    mm/hr"
"           Total depth                 88.830    mm"
"          6   100hyd   Hydrograph extension used in this file"
" 33        CATCHMENT 201"
"          1   Triangular SCS"
"          1   Equal length"
"          2   Horton equation"
"        201   Catchment 201 - To Clythe Creeek"
"     65.000   % Impervious"
"      3.410   Total Area"
"     30.000   Flow length"
"      2.000   Overland Slope"
"      1.194   Pervious Area"
"     30.000   Pervious length"
"      2.000   Pervious slope"
"      2.217   Impervious Area"
"     30.000   Impervious length"
"      2.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"     75.000   Pervious Max.infiltration"
"     12.500   Pervious Min.infiltration"
"      0.250   Pervious Lag constant (hours)"
"      5.000   Pervious Depression storage"
"      0.015   Impervious Manning 'n'"
"      0.000   Impervious Max.infiltration"
"      0.000   Impervious Min.infiltration"
"      0.050   Impervious Lag constant (hours)"
"      1.500   Impervious Depression storage"
"                   1.469     0.000     0.000     0.000 c.m/sec"
"           Catchment 201          Pervious    Impervious Total Area "
"           Surface Area           1.194       2.217      3.410      hectare"
"           Time of concentration  9.306       1.638      3.326      minutes"
"           Time to Centroid       102.153     97.460     98.493     minutes"
"           Rainfall depth         88.830      88.830     88.830     mm"
"           Rainfall volume        1060.18     1968.91    3029.10    c.m"
"           Rainfall losses        43.655      2.647      17.000     mm"
"           Runoff depth           45.175      86.183     71.830     mm"
"           Runoff volume          539.17      1910.24    2449.40    c.m"
"           Runoff coefficient     0.509       0.970      0.809      "
"           Maximum flow           0.418       1.149      1.469      c.m/sec"
" 40        HYDROGRAPH Add Runoff "
```

```
"            4   Add Runoff "
"                     1.469     1.469     0.000     0.000"
" 54           POND DESIGN"
"       1.469   Current peak flow    c.m/sec"
"       0.171   Target outflow    c.m/sec"
"      2449.4   Hydrograph volume    c.m"
"         15.   Number of stages"
"       0.000   Minimum water level    metre"
"       3.000   Maximum water level    metre"
"       0.000   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level  Discharge    Volume"
"               339.750     0.000     0.000"
"               339.850   0.00400   217.300"
"               339.950   0.00700   450.800"
"               340.050   0.00900   700.800"
"               340.150   0.01000   967.300"
"               340.250   0.01100  1250.700"
"               340.350    0.4110  1551.100"
"               340.450    0.4220  1869.000"
"               340.550    0.4320  2204.400"
"               340.650    0.4420  2557.700"
"               340.750    0.4510  2929.100"
"               340.850    0.4610  3318.900"
"               340.950    0.4700  3727.400"
"               341.050    0.9140  4153.000"
"               341.150     1.736  4594.600"
"            Peak outflow                    0.413    c.m/sec"
"            Maximum level                 340.373    metre"
"            Maximum storage              1624.434    c.m"
"            Centroidal lag                 13.176   hours"
"                 1.469     1.469     0.413     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                     1.469     0.413     0.413     0.000"
" 51         PIPE DESIGN"
"       0.413   Current peak flow    c.m/sec"
"       0.013   Manning 'n'"
"       0.450   Diameter    metre"
"       4.420   Gradient   %"
"            Depth of flow                   0.275    metre"
"            Velocity                        4.065    m/sec"
"            Pipe capacity                   0.599    c.m/sec"
"            Critical depth                  0.423    metre"
" 53         ROUTE    Pipe Route 19"
"       19.20      Pipe Route 19 Reach length   ( metre)"
"       0.392   X-factor <= 0.5"
"       3.543   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"       4.286   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                    0.413    c.m/sec"
"                     1.469     0.413     0.413     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                     1.469     0.413     0.413     0.000"
" 54         POND DESIGN"
"       0.413   Current peak flow    c.m/sec"
"       0.171   Target outflow    c.m/sec"
"      1927.7   Hydrograph volume    c.m"
```

```
"          12.   Number of stages"
"       0.000   Minimum water level     metre"
"       3.000   Maximum water level     metre"
"       0.000   Starting water level     metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"               336.000     0.000     0.000"
"               336.100  1.00E-05     4.300"
"               336.200  2.00E-05     8.700"
"               336.300  3.00E-05    13.000"
"               336.400  4.00E-05    17.300"
"               336.500  5.00E-05    21.700"
"               336.600  6.00E-05    26.000"
"               336.700  7.00E-05    30.300"
"               336.800  8.00E-05    34.700"
"               336.900  9.00E-05    41.900"
"               337.000  1.00E-04    50.100"
"               337.100     2.129    59.300"
"            Peak outflow                     0.413    c.m/sec"
"            Maximum level                  337.019    metre"
"            Maximum storage                 51.886    c.m"
"            Centroidal lag                   7.142   hours"
"                 1.469     0.413     0.413     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                    1.469     0.413     0.413     0.000"
" 52         CHANNEL DESIGN"
"       0.413   Current peak flow    c.m/sec"
"       0.065   Manning 'n'"
"          0.   Cross-section type: 0=trapezoidal; 1=general"
"      65.000   Basewidth    metre"
"       3.000   Left bank slope"
"       3.000   Right bank slope"
"       0.100   Channel depth    metre"
"      18.000   Gradient   %"
"            Depth of flow                    0.016    metre"
"            Velocity                         0.407    m/sec"
"            Channel capacity                 9.152    c.m/sec"
"            Critical depth                   0.016    metre"
" 53         ROUTE    Channel Route 50"
"       50.00      Channel Route 50 Reach length   ( metre)"
"       0.499   X-factor <= 0.5"
"      92.097   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"      75.000   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                     0.413    c.m/sec"
"                    1.469     0.413     0.413     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                    1.469     0.413     0.413     0.000"
" 33         CATCHMENT 202"
"           1   Triangular SCS"
"           1   Equal length"
"           2   Horton equation"
"         202   Catchment 202 - To Clythe Creeek"
"      25.000   % Impervious"
"       0.740   Total Area"
"      30.000   Flow length"
"       2.000   Overland Slope"
```

```
"        0.555   Pervious Area"
"       30.000   Pervious length"
"        2.000   Pervious slope"
"        0.185   Impervious Area"
"       30.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious Max.infiltration"
"       12.500   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.015   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.050   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                     0.256      0.413      0.413      0.000 c.m/sec"
"            Catchment 202          Pervious   Impervious Total Area "
"            Surface Area           0.555      0.185      0.740      hectare"
"            Time of concentration  9.306      1.638      6.325      minutes"
"            Time to Centroid       102.153    97.460     100.328    minutes"
"            Rainfall depth         88.830     88.830     88.830     mm"
"            Rainfall volume        493.01     164.34     657.34     c.m"
"            Rainfall losses        43.655     2.647      33.403     mm"
"            Runoff depth           45.175     86.183     55.427     mm"
"            Runoff volume          250.72     159.44     410.16     c.m"
"            Runoff coefficient     0.509      0.970      0.624      "
"            Maximum flow           0.195      0.096      0.256      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                     0.256      0.527      0.413      0.000"
" 33         CATCHMENT 300"
"           1   Triangular SCS"
"           1   Equal length"
"           2   Horton equation"
"         300   Catchment 300 - To Clythe Creek"
"       0.000   % Impervious"
"       6.480   Total Area"
"      45.000   Flow length"
"       2.000   Overland Slope"
"       6.480   Pervious Area"
"      45.000   Pervious length"
"       2.000   Pervious slope"
"       0.000   Impervious Area"
"      45.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      75.000   Pervious Max.infiltration"
"      12.500   Pervious Min.infiltration"
"       0.250   Pervious Lag constant (hours)"
"       5.000   Pervious Depression storage"
"       0.015   Impervious Manning 'n'"
"       0.000   Impervious Max.infiltration"
"       0.000   Impervious Min.infiltration"
"       0.050   Impervious Lag constant (hours)"
"       1.500   Impervious Depression storage"
"                     1.971      0.527      0.413      0.000 c.m/sec"
"            Catchment 300          Pervious   Impervious Total Area "
"            Surface Area           6.480      0.000      6.480      hectare"
"            Time of concentration  11.869     2.089      11.869     minutes"
"            Time to Centroid       104.828    98.071     104.828    minutes"
"            Rainfall depth         88.830     88.830     88.830     mm"
"            Rainfall volume        5756.17    0.01       5756.17    c.m"
```

```
"               Rainfall losses        43.360      2.670       43.360     mm"
"               Runoff depth           45.470      86.160      45.470     mm"
"               Runoff volume          2946.46     0.01        2946.46    c.m"
"               Runoff coefficient     0.512       0.000       0.512      "
"               Maximum flow           1.971       0.000       1.971      c.m/sec"
" 40            HYDROGRAPH Add Runoff "
"              4   Add Runoff "
"                    1.971      2.362      0.413      0.000"
" 64            SHOW TABLE"
"              2   Flow hydrograph"
"              4   Inflow Hydrograph"
"               Maximum flow                    2.362     c.m/sec"
"               Hydrograph volume            5236.133     c.m"
" 38            START/RE-START TOTALS 300"
"              3   Runoff Totals on EXIT"
"               Total Catchment area                        10.630    hectare"
"               Total Impervious area                        2.402    hectare"
"               Total % impervious                          22.592"
" 19            EXIT"
```

```
"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                               Version 2.25  rev. 473"
"               MIDUSS created                         Sunday, February 07, 2010"
"          10   Units used:                                          ie METRIC"
"               Job folder:                  W:\Guelph\105-2005\105172\Design Data\"
"                                             Modelling Files\MIDUSS\2016 Revisions"
"               Output filename:                        105172_POST_Regional.out"
"               Licensee name:                                             gmbp"
"               Company                                  Hewlett-Packard Company"
"               Date & Time last used:                      6/2/2016 at 4:15:52 PM"
" 31         TIME PARAMETERS"
"      60.000   Time Step"
"    2880.000   Max. Storm length"
"    3600.000   Max. Hydrograph"
" 32         STORM Historic"
"           5   Historic"
"    2880.000   Duration"
"      48.000   Rainfall intensity values"
"                 2.028      2.028      2.028      2.028      2.028"
"                 2.028      2.028      2.028      2.028      2.028"
"                 2.028      2.028      2.028      2.028      2.028"
"                 2.028      2.028      2.028      2.028      2.028"
"                 2.028      2.028      2.028      2.028      2.028"
"                 2.028      2.028      2.028      2.028      2.028"
"                 2.028      2.026      2.026      2.026      2.028"
"                 2.026      6.000      4.000      6.000     13.000"
"                17.000     13.000     23.000     13.000     13.000"
"                53.000     38.000     13.000"
"            Maximum intensity             53.000     mm/hr"
"            Total depth                  285.000     mm"
"           6   000hyd   Hydrograph extension used in this file"
" 33         CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           2   Horton equation"
"         201   Catchment 201 - To Clythe Creeek"
"      65.000   % Impervious"
"       3.410   Total Area"
"      30.000   Flow length"
"       2.000   Overland Slope"
"       1.194   Pervious Area"
"      30.000   Pervious length"
"       2.000   Pervious slope"
"       2.217   Impervious Area"
"      30.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      75.000   Pervious Max.infiltration"
"      12.500   Pervious Min.infiltration"
"       0.250   Pervious Lag constant (hours)"
"       5.000   Pervious Depression storage"
"       0.015   Impervious Manning 'n'"
"       0.000   Impervious Max.infiltration"
"       0.000   Impervious Min.infiltration"
"       0.050   Impervious Lag constant (hours)"
"       1.500   Impervious Depression storage"
"                     0.376      0.000      0.000      0.000 c.m/sec"
"            Catchment 201          Pervious   Impervious Total Area "
"            Surface Area           1.194      2.217      3.410      hectare"
"            Time of concentration  17.225     2.860      4.946      minutes"
"            Time to Centroid       2775.198   2251.465   2327.523   minutes"
"            Rainfall depth         285.000    285.000    285.000    mm"
"            Rainfall volume        3401.48    6317.02    9718.50    c.m"
```

```
"            Rainfall losses          207.571    39.596     98.387     mm"
"            Runoff depth             77.429     245.404    186.613    mm"
"            Runoff volume            924.12     5439.38    6363.50    c.m"
"            Runoff coefficient       0.272      0.861      0.655      "
"            Maximum flow             0.094      0.282      0.376      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.376     0.376     0.000     0.000"
" 54         POND DESIGN"
"       0.376   Current peak flow    c.m/sec"
"       0.171   Target outflow    c.m/sec"
"      6363.5   Hydrograph volume    c.m"
"         15.   Number of stages"
"       0.000   Minimum water level    metre"
"       3.000   Maximum water level    metre"
"       0.000   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"               339.750     0.000     0.000"
"               339.850   0.00400   217.300"
"               339.950   0.00700   450.800"
"               340.050   0.00900   700.800"
"               340.150   0.01000   967.300"
"               340.250   0.01100  1250.700"
"               340.350    0.4110  1551.100"
"               340.450    0.4220  1869.000"
"               340.550    0.4320  2204.400"
"               340.650    0.4420  2557.700"
"               340.750    0.4510  2929.100"
"               340.850    0.4610  3318.900"
"               340.950    0.4700  3727.400"
"               341.050    0.9140  4153.000"
"               341.150     1.736  4594.600"
"            Peak outflow                    0.312    c.m/sec"
"            Maximum level                 340.335    metre"
"            Maximum storage              1507.016    c.m"
"            Centroidal lag                 47.728   hours"
"                 0.376     0.376     0.312     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  0.376     0.312     0.312     0.000"
" 51         PIPE DESIGN"
"       0.312   Current peak flow    c.m/sec"
"       0.013   Manning 'n'"
"       0.450   Diameter    metre"
"       4.420   Gradient   %"
"            Depth of flow                   0.230    metre"
"            Velocity                        3.807    m/sec"
"            Pipe capacity                   0.599    c.m/sec"
"            Critical depth                  0.387    metre"
" 53         ROUTE    Pipe Route 19"
"       19.20      Pipe Route 19 Reach length   ( metre)"
"       0.419   X-factor <= 0.5"
"       3.783   K-lag   ( seconds)"
"       0.000   Default(0) or user spec.(1) values used"
"       0.500   X-factor <= 0.5"
"      30.000   K-lag   ( seconds)"
"       0.500   Beta weighting factor"
"       4.390   Routing time step   ( seconds)"
"           1   No. of sub-reaches"
"            Peak outflow                    0.312    c.m/sec"
"                  0.376     0.312     0.312     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
```

```
"           5   Next link "
"                    0.376      0.312      0.312      0.000"
" 54             POND DESIGN"
"         0.312   Current peak flow    c.m/sec"
"         0.171   Target outflow    c.m/sec"
"        5475.3   Hydrograph volume    c.m"
"           12.   Number of stages"
"         0.000   Minimum water level    metre"
"         3.000   Maximum water level    metre"
"         0.000   Starting water level    metre"
"             0   Keep Design Data: 1 = True; 0 = False"
"                   Level Discharge    Volume"
"                 336.000     0.000     0.000"
"                 336.100  1.00E-05     4.300"
"                 336.200  2.00E-05     8.700"
"                 336.300  3.00E-05    13.000"
"                 336.400  4.00E-05    17.300"
"                 336.500  5.00E-05    21.700"
"                 336.600  6.00E-05    26.000"
"                 336.700  7.00E-05    30.300"
"                 336.800  8.00E-05    34.700"
"                 336.900  9.00E-05    41.900"
"                 337.000  1.00E-04    50.100"
"                 337.100     2.129    59.300"
"              Peak outflow                    0.312    c.m/sec"
"              Maximum level                 337.015    metre"
"              Maximum storage                51.448    c.m"
"              Centroidal lag                 43.394   hours"
"                   0.376     0.312     0.312     0.000 c.m/sec"
" 40           HYDROGRAPH Next link "
"           5   Next link "
"                    0.376      0.312      0.312      0.000"
" 52           CHANNEL DESIGN"
"         0.312   Current peak flow    c.m/sec"
"         0.065   Manning 'n'"
"            0.   Cross-section type: 0=trapezoidal; 1=general"
"        65.000   Basewidth    metre"
"         3.000   Left bank slope"
"         3.000   Right bank slope"
"         0.100   Channel depth    metre"
"        18.000   Gradient   %"
"              Depth of flow                   0.013    metre"
"              Velocity                        0.364    m/sec"
"              Channel capacity                9.152    c.m/sec"
"              Critical depth                  0.013    metre"
" 53           ROUTE    Channel Route 50"
"         50.00      Channel Route 50 Reach length   ( metre)"
"         0.500   X-factor <= 0.5"
"       103.020   K-lag   ( seconds)"
"         0.000   Default(0) or user spec.(1) values used"
"         0.500   X-factor <= 0.5"
"        30.000   K-lag   ( seconds)"
"         0.500   Beta weighting factor"
"       102.857   Routing time step   ( seconds)"
"             1   No. of sub-reaches"
"              Peak outflow                    0.312    c.m/sec"
"                    0.376      0.312      0.312      0.000 c.m/sec"
" 40           HYDROGRAPH Next link "
"           5   Next link "
"                    0.376      0.312      0.312      0.000"
" 33           CATCHMENT 202"
"           1   Triangular SCS"
"           1   Equal length"
```

```
"              2   Horton equation"
"            202   Catchment 202 - To Clythe Creeek"
"         25.000   % Impervious"
"          0.740   Total Area"
"         30.000   Flow length"
"          2.000   Overland Slope"
"          0.555   Pervious Area"
"         30.000   Pervious length"
"          2.000   Pervious slope"
"          0.185   Impervious Area"
"         30.000   Impervious length"
"          2.000   Impervious slope"
"          0.250   Pervious Manning 'n'"
"         75.000   Pervious Max.infiltration"
"         12.500   Pervious Min.infiltration"
"          0.250   Pervious Lag constant (hours)"
"          5.000   Pervious Depression storage"
"          0.015   Impervious Manning 'n'"
"          0.000   Impervious Max.infiltration"
"          0.000   Impervious Min.infiltration"
"          0.050   Impervious Lag constant (hours)"
"          1.500   Impervious Depression storage"
"                         0.067      0.312      0.312      0.000 c.m/sec"
"               Catchment 202           Pervious    Impervious Total Area  "
"               Surface Area            0.555       0.185      0.740       hectare"
"               Time of concentration   17.225      2.860      9.845       minutes"
"               Time to Centroid        2775.197    2251.465   2506.141    minutes"
"               Rainfall depth          285.000     285.000    285.000     mm"
"               Rainfall volume         1581.75     527.25     2109.00     c.m"
"               Rainfall losses         207.571     39.596     165.577     mm"
"               Runoff depth            77.429      245.404    119.423     mm"
"               Runoff volume           429.73      454.00     883.73      c.m"
"               Runoff coefficient      0.272       0.861      0.419       "
"               Maximum flow            0.044       0.024      0.067       c.m/sec"
" 40            HYDROGRAPH Add Runoff "
"              4   Add Runoff "
"                         0.067      0.373      0.312      0.000"
" 33            CATCHMENT 300"
"              1   Triangular SCS"
"              1   Equal length"
"              2   Horton equation"
"            300   Catchment 300 - To Clythe Creek"
"          0.000   % Impervious"
"          6.480   Total Area"
"         45.000   Flow length"
"          2.000   Overland Slope"
"          6.480   Pervious Area"
"         45.000   Pervious length"
"          2.000   Pervious slope"
"          0.000   Impervious Area"
"         45.000   Impervious length"
"          2.000   Impervious slope"
"          0.250   Pervious Manning 'n'"
"         75.000   Pervious Max.infiltration"
"         12.500   Pervious Min.infiltration"
"          0.250   Pervious Lag constant (hours)"
"          5.000   Pervious Depression storage"
"          0.015   Impervious Manning 'n'"
"          0.000   Impervious Max.infiltration"
"          0.000   Impervious Min.infiltration"
"          0.050   Impervious Lag constant (hours)"
"          1.500   Impervious Depression storage"
"                         0.538      0.373      0.312      0.000 c.m/sec"
```

```
"               Catchment 300           Pervious    Impervious  Total Area  "
"               Surface Area            6.480       0.000       6.480       hectare"
"               Time of concentration   21.969      3.647       21.969      minutes"
"               Time to Centroid        2780.244    2236.986    2780.242    minutes"
"               Rainfall depth          285.000     285.000     285.000     mm"
"               Rainfall volume         1.8468      0.0000      1.8468      ha-m"
"               Rainfall losses         206.992     38.537      206.992     mm"
"               Runoff depth            78.008      246.463     78.008      mm"
"               Runoff volume           5054.92     0.02        5054.94     c.m"
"               Runoff coefficient      0.274       0.000       0.274       "
"               Maximum flow            0.538       0.000       0.538       c.m/sec"
" 40            HYDROGRAPH Add Runoff "
"              4   Add Runoff "
"                       0.538       0.911       0.312       0.000"
" 64            SHOW TABLE"
"              2   Flow hydrograph"
"              4   Inflow Hydrograph"
"               Maximum flow                  0.911     c.m/sec"
"               Hydrograph volume         11368.914     c.m"
" 38            START/RE-START TOTALS 300"
"              3   Runoff Totals on EXIT"
"               Total Catchment area                      10.630    hectare"
"               Total Impervious area                      2.402    hectare"
"               Total % impervious                        22.592"
" 19            EXIT"
```

## 105172 - Cityview Ridge Subdivision
## Cooling Trench Sizing Calculations (Energy Dissipation/Dispersion Structure)

**Assumptions:**

| | | |
|---|---|---|
| Tin = | 36 | °C |
| = | 309 | K |
| Tout = | 24 | °C |
| = | 297 | K |
| Tavg = | 30 | °C |
| = | 303 | K |
| Tstone = | 21 | °C |
| = | 294 | K |
| L = | 65 | m |
| W = | 2 | m |
| D = | 1 | m |
| Diam. = | 0.02 | m |

**Knowns:**

| | | |
|---|---|---|
| Rho = | 998 | $kg/m^3$ |
| Cp = | 4181 | J/kg·K |
| Prf = | 6.62 | |
| Gamma = | 1.04E-06 | $m^3/s$ |
| kf = | 2.79 | J/m·K·s |
| Q 2yr = | 0.009 | $m^3/s$ |
| Q 5yr = | 0.010 | $m^3/s$ |
| Q 25yr = | 0.176 | $m^3/s$ |
| Q 100yr = | 0.412 | $m^3/s$ |
| Q Regional = | 0.307 | $m^3/s$ |

| Storm | qr (J/s) | As $m^2$ | Af $m^2$ | Vf (m/s) | hs $J/m^2$·K·s | qa (J/s) | SF (%) |
|---|---|---|---|---|---|---|---|
| 2 | 450,645 | 20420 | 27.9 | 0.0003 | 655 | 120,399,575 | 26617% |
| 5 | 500,717 | 20420 | 27.9 | 0.0004 | 678 | 124,540,667 | 24772% |
| 25 | 8,812,611 | 20420 | 27.9 | 0.0063 | 2,081 | 382,385,866 | 4239% |
| 100 | 20,629,522 | 20420 | 27.9 | 0.0148 | 3,057 | 561,814,119 | 2623% |
| Regional | 15,371,998 | 20420 | 27.9 | 0.0110 | 2,671 | 490,965,210 | 3094% |

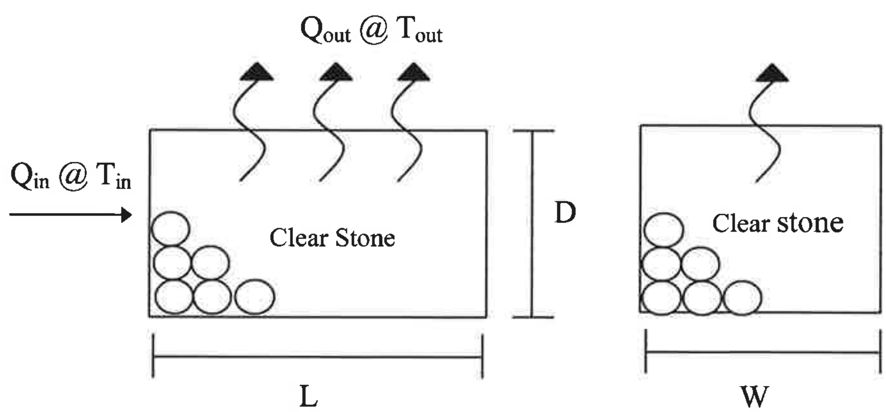
**Cityview Ridge Subdivision**
**City of Guelph**
**G&M File: 105-172**

**Cooling Trench Details**
**Sample Calculation**

**Assumptions:**

- Cooling trench is treated as a "black box", therefore the specific design of the trench is ignored.
- Solid media (clear stone) in trench is isothermal (ie. at a constant temperature).
- Temperature of fluid moving through trench is assumed to be constant.
- Temperature of fluid moving through trench is approximated as the average inlet and outlet temperature.
- Each trench section is rectangular with spherical particles.
- Thermal conductivity of granite is approximate to the thermal conductivity of clear stone.

**Schematic:**



**Design Variables:**

Q = flowrate through trench ($m^3/s$)
= 0.009 $m^3/s$ for 2 year design storm event.

$T_{in}$ = temperature of fluid at inlet (K)
= 36°C
= 309 K

$T_{out}$ = temperature of fluid at outlet (K)
= 24°C
= 297 K

$T_{avg}$ = average temperature of inflow and outflow (K)
= 30°C
= 303 K

$T_{stone}$ = average temperature of clear stone (K)
= 21°C
= 294 K

L = length of trench (m)
= 65 m

W = width of trench (m)
= 2.0 m

D = depth of trench (m)
= 1.0 m

Dia. = diameter of clear stone (m)
= 0.020 m

**Physical Properties:**

$\rho$ = fluid density
= 998 $kg/m^3$ for water at 295 K
(Incropera, DeWitt, p. 846)

$C_p$ = specific heat of fluid
= 4181 J/kg.K for water at 295 K
(Incropera, DeWitt, p. 846)

$P_{rf}$ = Prandt number of fluid
= 6.62 for water (dimensionless)
(Incropera, DeWitt, p. 846)

$\gamma_f$ = kinetic viscosity of fluid
= $1.04 \times 10^{-6}$ $m^3/s$ for water at 295 K
(Roberson, Crowe, p. A-24)

$k_f$ = thermal conductivity of solid
= 2.79 W/m.K for granite
(Incropera, DeWitt, p.838)

Note: temperature measured in Kelvins (K) is calculated as follows:

K = (°C + 273.15)

i.e. 295K = 21.85°C

**Analysis:**

Calculate the required heat transfer rate ($q_r$) using the following equation:

$$q_r = \dot{m} C_p \Delta T \qquad \text{Eq. 1}$$

$$q_r = Q \rho C_p (Tin - Tout)$$

Where:

$\dot{m}$ = mass flow rate (kg/s)
$\rho$ = fluid density (kg/m$^3$)
$C_p$ = fluid specific heat (J/kg.K)

$$q_r = \left(0.007 \frac{m^3}{s}\right)\left(998 \frac{kg}{m^3}\right)\left(4181 \frac{J}{kg \cdot K}\right)(309K - 297K)$$

$$q_r = 450{,}645 \text{ J/s}$$
$$q_r = 450{,}645 \text{ W}$$

Therefore the heat transfer rate required to reduce the temperature of water to 297 K (24°C) from 309 K (36°C) is 350,502 W.

Calculate the available heat transfer rate ($q_a$) using the following equation:

$$q_a = h_s A_s (T_{avg} - T_{stone}) \qquad \text{Eq. 2}$$

Where:

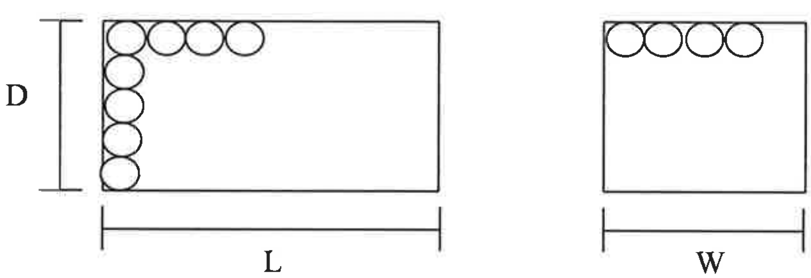
$h_s$ = convective heat transfer coefficient $\left(\frac{W}{m^3 \cdot K}\right)$ for clear stone

$A_s$ = surface area of clear stone particles ($m^2$)

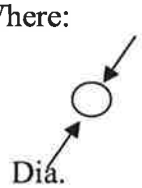
Step 1: Estimate the available surface area of the clear stone particles using the following equation:

$$A = (\pi \times Dia.^2) \times \left(\frac{L}{Dia.} \times \frac{W}{Dia.} \times \frac{H}{Dia.}\right) \qquad \text{Eq. 3}$$

$$A = \pi \times \frac{L \times W \times D}{Dia.}$$




Where:




Dia: = diameter of spherical particles (m)
= diameter of "clear stone" particles (m)

A = available surface area ($m^2$)
= (area of one "clear stone" particle) * (Estimate of the total number of clear stone particles)

$$A = \pi \times \left(\frac{65m \times 2m \times 1.0m}{0.020m}\right)$$

$$A = 20{,}420 \text{ m}^2$$

Therefore the available surface area of the clear stone particles is estimated to be 20,420 $m^2$.

Step 2: Estimate the heat transfer coefficient of the clear stone particles using the equation:

$$h_s = \left(0.97 + 0.68\left(\frac{v_f Dia.}{\gamma_f}\right)^{0.5}\right)\frac{k_f P_{rf}^{\;0.3}}{Dia.} \qquad \text{Eq. 4}$$

*Note:* *The equation used to estimate the heat transfer coefficient ($h_g$) utilizes Kramer's correlation for flow of liquids past spheres, for which ($1 < Re_{Dia} < 2000$). The scenario under analysis is very close to the lower limit acceptable for use with Kramer's correlation for the convective heat transfer coefficient.*

Where:

$v_f$ = velocity of fluid through trench (m/s)

$\gamma_f$ = kinematic viscosity of fluid ($m^3/s$)

$k_f$ = thermal conductivity of solid $\left(\frac{W}{m \cdot K}\right)$

$P_{rf}$ = Prandt number (dimensionless)

Calculate $v_f$ using the following equation:

$$v_f = \frac{Q}{A_{flow}} \qquad \text{Eq. 5}$$

Where:

Q = flow rate through trench ($m^3/s$)

$A_{flow}$ = available flow area through trench ($m^2$)

Calculate $A_{flow}$ using the following equation:

$A_{flow}$ = Cross-sectional area of trench - Cross-sectional area of particles

$$A_{flow} = \underbrace{(L \times W)}_{\text{Overall section area}} - \underbrace{\left(\frac{\pi \times Dia.^2}{4}\right)}_{\text{Cross-sectional area of a single sphere}} \times \underbrace{\left(\frac{L}{D} \times \frac{W}{D}\right)}_{\text{Estimate of number of spheres in section}} \qquad \text{Eq. 6}$$

$$A_{flow} = \text{LxW}\left(1 - \frac{\pi}{4}\right)$$

Substitute equation for $A_{flow}$ (Eq. 6) into the equation for $v_f$ (Eq. 5) and solve

$$v_f = \frac{Q}{L \times W\left(1 - \frac{\pi}{4}\right)} \qquad \text{Eq. 7}$$

$$v_f = \frac{0.009\frac{m^3}{s}}{(65m \times 2m) \times \left(1 - \frac{\pi}{4}\right)}$$

$$v_f = 0.0003\ \frac{m}{s}$$

Therefore the velocity of fluid through the trench is $0.0003\frac{m}{s}$.

Calculate the heat transfer coefficient ($h_s$) using the following equation:

$$h_s = \left(0.97 + 0.68\left(\frac{v_f Dia.}{\gamma_f}\right)^{0.5}\right)\frac{k_f P_{rf}^{\ 0.3}}{Dia.} \qquad \text{Eq. 4}$$

$$h_s = \left(0.97 + 0.68\left(\frac{0.0003\frac{m^2}{s} \times 0.020m}{1.04 \times 10^{-6}\frac{m^3}{s}}\right)^{0.5}\right)\frac{2.79\frac{W}{m \cdot K} \times 6.62^{0.3}}{0.020m}$$

$$h_s = 655\ \frac{W}{m^2 \cdot K}$$

Therefore the heat transfer coefficient ($h_s$) for clear stone particles is $655\frac{W}{m^2 \cdot K}$

Calculate the available heat transfer rate ($q_a$) using the following equation:

$$q_a = h_s A_s \left(T_{avg} - T_{stone}\right) \qquad \text{Eq. 2}$$

$$q_a = \left(655 \frac{W}{m^2 \cdot K}\right)\left(20{,}420 m^2\right)\left(303K - 294K\right)$$

$$q_a = 120{,}399{,}575 \text{ W}$$

Therefore the available heat transfer rate to reduce the temperature of water to 297 K (24°C) from 309 K (36°C) is 120,399,575 W.

Calculate the Safety Factor (SF) using the following equation:

$$\text{SF} = \frac{q_a - q_r}{q_r} \times 100\% \qquad \text{Eq. 8}$$

$$\text{SF} = \frac{120{,}399{,}575\ W - 450{,}645 W}{450{,}645 W} \times 100\%$$

$$\text{SF} = 26{,}617\%$$

Therefore the Safety Factor for the cooling trench is 26,617% based on the assumptions used in the calculations.

Therefore since the available heat transfer rate ($q_a$) of 120,399.575 W is greater than the required heat transfer rate ($q_r$) of 450,645 W, we conclude that in our opinion a cooling trench 65 m long by 2 m wide by 1 m deep, constructed with 0.020 m diameter clear stone, has the ability to reduce the temperature of the inflow from 309 K (36°C) to 297 K (24°C).

**Cityview Ridge Subdivision**
**City of Guelph**
**G&M File: 105-172**
**Revised: June 2016**

**Stormwater Management Facility - Forebay (Catchment 201)**

| | | |
|---|---|---|
| Forebay Length = | 42.0 m | (Dist) |
| Forebay Width = | 7.0 m | |
| Forebay Depth = | 1.0 m | (d) |
| Forebay Bottom Width = | 1.0 m | |
| Approximate Permanent Forebay Pool Volume = | 168.0 cu m | |
| Length Width Ratio = | 6 :1 | (r) |
| 2 Year Storm Peak Flowrate = | 0.086 cu m/s | (Qp) |
| 5 Year Storm Inflow Rate = | 0.663 cu m/s | (Q5) |
| Desired Forebay Velocity = | 0.500 m/s | (Vf) |
| Desired Settling Velocity (recommended) = | 0.0003 m/s | (Vs) |

**Settling Length**

Dist = ((r x Qp)/Vs)^.5 = 41.5 m

Forebay length (42m) exceeds the settling length (41.5).

**Dispersion Length**

Dist = (8 x Q5)/(d x Vf) = 10.6 m

Forebay length (45m) exceeds dispersion length (10.6m).

**Flow Velocity in Forebay**

| | |
|---|---|
| Cross-sectional Area = | 4 sq m |
| Q5 = | 0.663 cu m/s |
| Velocity = Q5/A = | 0.17 m/s |

The average flow velocity through the forebay is less than the allowable velocity of 0.5 m/s.

Stormceptor®

# Stormceptor Design Summary
## PCSWMM for Stormceptor

### Project Information

| | |
|---|---|
| Date | 3/27/2015 |
| Project Name | Cityview Ridge Subdivision |
| Project Number | 105172 |
| Location | City of Guelph |

### Designer Information

| | |
|---|---|
| Company | N/A |
| Contact | N/A |

### Notes

N/A

### Drainage Area

| | |
|---|---|
| Total Area (ha) | 7.62 |
| Imperviousness (%) | 65 |

The Stormceptor System model STC 14000 removes 78% TSS for a Fine (organics, silts and sand) particle size distribution and 92% runoff volume.

### Rainfall

| | |
|---|---|
| Name | TORONTO CENTRAL |
| State | ON |
| ID | 100 |
| Years of Records | 1982 to 1999 |
| Latitude | 45°30'N |
| Longitude | 90°30'W |

### Water Quality Objective

| | |
|---|---|
| TSS Removal (%) | 80 |
| Runoff Volume (%) | 90 |

### Upstream Storage

| Storage (ha-m) | Discharge (L/s) |
|---|---|
| 0 | 0 |

### Stormceptor Sizing Summary

| Stormceptor Model | TSS Removal % | Runoff Volume % |
|---|---|---|
| STC 300 | 36 | 30 |
| STC 750 | 48 | 50 |
| STC 1000 | 49 | 50 |
| STC 1500 | 50 | 50 |
| STC 2000 | 57 | 64 |
| STC 3000 | 58 | 64 |
| STC 4000 | 65 | 77 |
| STC 5000 | 65 | 77 |
| STC 6000 | 70 | 83 |
| STC 9000 | 74 | 88 |
| STC 10000 | 74 | 88 |
| STC 14000 | 78 | 92 |

Stormceptor®

## Particle Size Distribution

Removing silt particles from runoff ensures that the majority of the pollutants, such as hydrocarbons and heavy metals that adhere to fine particles, are not discharged into our natural water courses. The table below lists the particle size distribution used to define the annual TSS removal.

| Fine (organics, silts and sand) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Particle Size µm | Distribution % | Specific Gravity | Settling Velocity m/s | | Particle Size µm | Distribution % | Specific Gravity | Settling Velocity m/s |
| 20 | 20 | 1.3 | 0.0004 | | | | | |
| 60 | 20 | 1.8 | 0.0016 | | | | | |
| 150 | 20 | 2.2 | 0.0108 | | | | | |
| 400 | 20 | 2.65 | 0.0647 | | | | | |
| 2000 | 20 | 2.65 | 0.2870 | | | | | |

## Stormceptor Design Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor version 1.0
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal.
- Only the STC 300 is adaptable to function with a catch basin inlet and/or inline pipes.
- Only the Stormceptor models STC 750 to STC 6000 may accommodate multiple inlet pipes.
- Inlet and outlet invert elevation differences are as follows:

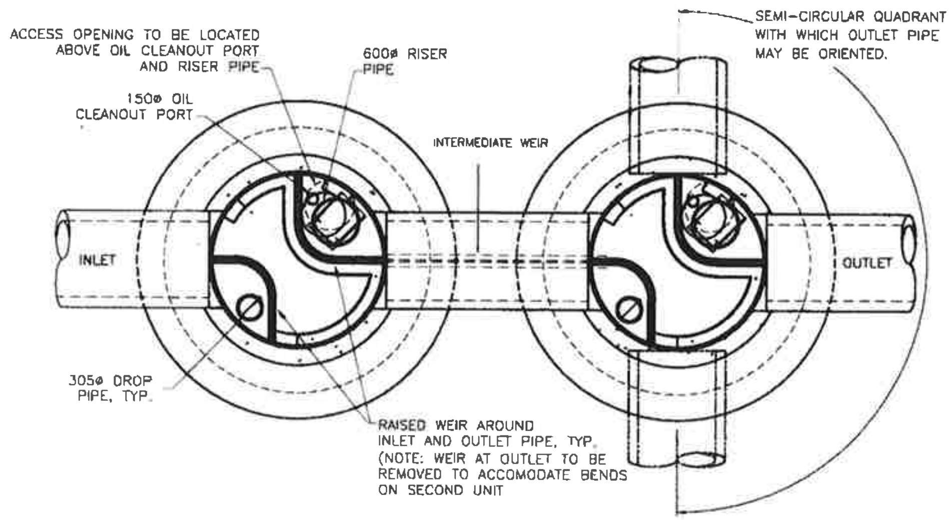
**Inlet and Outlet Pipe Invert Elevations Differences**

| Inlet Pipe Configuration | STC 300 | STC 750 to STC 6000 | STC 9000 to STC 14000 |
|---|---|---|---|
| Single inlet pipe | 75 mm | 25 mm | 75 mm |
| Multiple inlet pipes | 75 mm | 75 mm | Only one inlet pipe. |

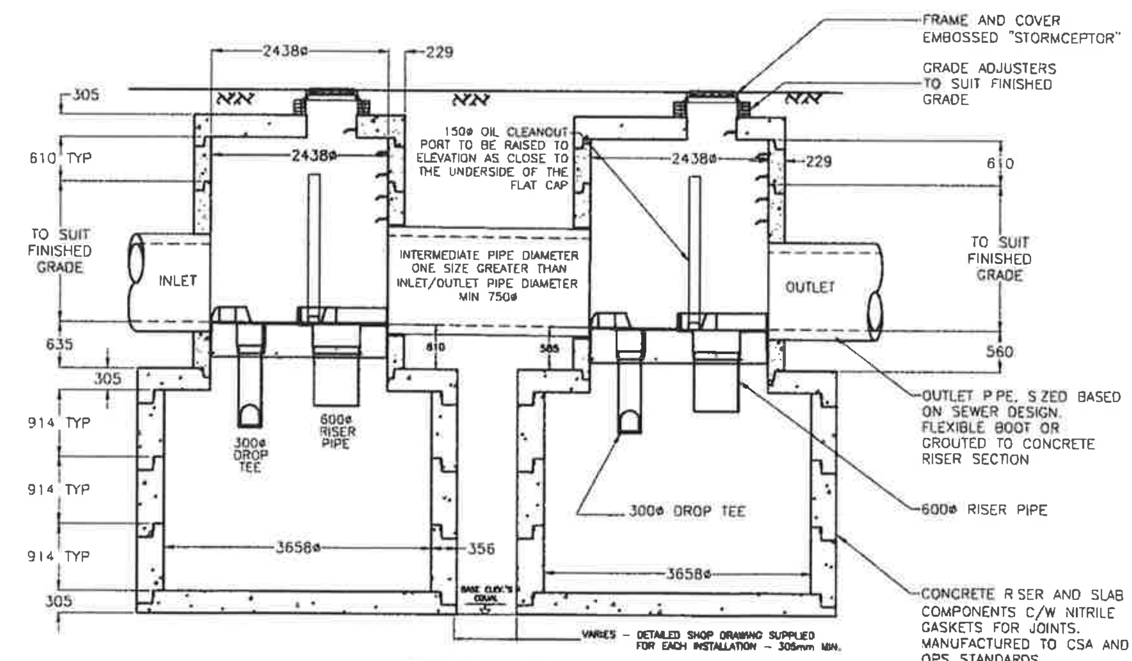
- Design estimates are based on stable site conditions only, after construction is completed.
- Design estimates assume that the storm drain is not submerged during zero flows. For submerged applications, please contact your local Stormceptor representative.
- Design estimates may be modified for specific spills controls. Please contact your local Stormceptor representative for further assistance.
- For pricing inquiries or assistance, please contact Imbrium Systems Inc., 1-800-565-4801.

# DRAWING NOT TO BE USED FOR CONSTRUCTION






PLAN VIEW




SECTION VIEW

**Stormceptor**



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STC 14000
STANDARD MODEL
####

| REV # | DATE | REVISION DESCRIPTION | BY | SHEET NUMBER |
|---|---|---|---|---|
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| | | | | OF 1 |

DATE: ######## | SCALE: 100 | PROJECT No.: ##### | DRAWN: ### | CHECKED: ###

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**PRELIMINARY SERVICING &**
**STORMWATER MANAGEMENT REPORT**
**CITYVIEW RIDGE SUBDIVISION**
**CITY OF GUELPH**
**Revised: June 2017**

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# APPENDIX “F”

## FLOODPLAIN ANALYSIS

**Comparison of Pre and Post-Development Flood Levels**

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Cityview Ridge Subdivision (Formerly th P.T. Valeriote Property)
City of Guelph
Our File: 105-172
July 17, 2012

## Comparison of Pre and Post-Development Flood Levels

| Sec No. | Design Storm | Flow (cu m/s) | | | W.S. Elevation (m) | | | Tope Width (m) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | POST | PRE | Difference | POST | PRE | Difference | POST | PRE | Difference |
| 1 | 5 Year | 3.99 | 3.99 | 0 | 316.29 | 316.29 | 0 | 34.52 | 34.52 | 0 |
| 1 | 25 Year | 19.70 | 19.70 | 0 | 316.51 | 316.51 | 0 | 41.05 | 41.05 | 0 |
| 1 | 100 Year | 34.10 | 34.10 | 0 | 316.66 | 316.66 | 0 | 45.22 | 45.22 | 0 |
| 1 | Regional | 38.60 | 38.60 | 0 | 316.70 | 316.70 | 0 | 46.40 | 46.40 | 0 |
| 2 | 5 Year | 3.99 | 3.99 | 0 | 316.77 | 316.77 | 0 | 9.22 | 9.22 | 0 |
| 2 | 25 Year | 19.70 | 19.70 | 0 | 317.84 | 317.84 | 0 | 28.11 | 28.11 | 0 |
| 2 | 100 Year | 34.10 | 34.10 | 0 | 318.56 | 318.56 | 0 | 43.67 | 43.67 | 0 |
| 2 | Regional | 38.60 | 38.60 | 0 | 318.76 | 318.76 | 0 | 52.31 | 52.31 | 0 |
| 3 | 5 Year | 3.99 | 3.99 | 0 | 317.26 | 317.26 | 0 | 21.89 | 21.89 | 0 |
| 3 | 25 Year | 19.70 | 19.70 | 0 | 319.16 | 319.16 | 0 | 69.40 | 69.40 | 0 |
| 3 | 100 Year | 34.10 | 34.10 | 0 | 319.74 | 319.74 | 0 | 141.61 | 141.61 | 0 |
| 3 | Regional | 38.60 | 38.60 | 0 | 320.43 | 320.43 | 0 | 154.38 | 154.38 | 0 |
| 4 | 5 Year | 3.99 | 3.99 | 0 | 317.51 | 317.51 | 0 | 28.81 | 28.81 | 0 |
| 4 | 25 Year | 19.70 | 19.70 | 0 | 319.16 | 319.16 | 0 | 69.44 | 69.44 | 0 |
| 4 | 100 Year | 34.10 | 34.10 | 0 | 319.74 | 319.74 | 0 | 141.74 | 141.74 | 0 |
| 4 | Regional | 38.60 | 38.60 | 0 | 320.43 | 320.43 | 0 | 154.39 | 154.39 | 0 |
| 5 | 5 Year | 3.99 | 3.99 | 0 | 317.51 | 317.51 | 0 | 28.83 | 28.83 | 0 |
| 5 | 25 Year | 19.70 | 19.70 | 0 | 319.16 | 319.16 | 0 | 69.45 | 69.45 | 0 |
| 5 | 100 Year | 34.10 | 34.10 | 0 | 319.74 | 319.74 | 0 | 141.75 | 141.75 | 0 |
| 5 | Regional | 38.60 | 38.60 | 0 | 320.43 | 320.43 | 0 | 154.39 | 154.39 | 0 |
| 6 | 5 Year | 3.99 | 3.99 | 0 | 317.61 | 317.61 | 0 | 2.70 | 2.70 | 0 |
| 6 | 25 Year | 19.70 | 19.70 | 0 | 319.15 | 319.15 | 0 | 47.90 | 47.90 | 0 |
| 6 | 100 Year | 34.10 | 34.10 | 0 | 319.73 | 319.73 | 0 | 70.63 | 70.63 | 0 |
| 6 | Regional | 38.60 | 38.60 | 0 | 320.43 | 320.43 | 0 | 111.99 | 111.99 | 0 |
| 7 | 5 Year | 3.99 | 3.99 | 0 | 317.92 | 317.92 | 0 | 2.70 | 2.70 | 0 |
| 7 | 25 Year | 19.70 | 19.70 | 0 | 321.90 | 321.90 | 0 | 217.71 | 217.71 | 0 |
| 7 | 100 Year | 34.10 | 34.10 | 0 | 322.84 | 322.84 | 0 | 256.71 | 256.71 | 0 |
| 7 | Regional | 38.60 | 38.60 | 0 | 322.92 | 322.92 | 0 | 257.16 | 257.16 | 0 |
| 7.1 | 5 Year | 3.88 | 3.88 | 0 | 318.29 | 318.29 | 0 | 9.93 | 9.93 | 0 |
| 7.1 | 25 Year | 19.10 | 19.10 | 0 | 321.90 | 321.90 | 0 | 87.25 | 87.25 | 0 |
| 7.1 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 108.01 | 108.01 | 0 |
| 7.1 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 108.76 | 108.76 | 0 |

| Sec No. | Design Storm | Flow (cu m/s) | | | W.S. Elevation (m) | | | Tope Width (m) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | POST | PRE | Difference | POST | PRE | Difference | POST | PRE | Difference |
| 7.2 | 5 Year | 3.88 | 3.88 | 0 | 318.46 | 318.46 | 0 | 17.77 | 17.77 | 0 |
| 7.2 | 25 Year | 19.10 | 19.10 | 0 | 321.90 | 321.90 | 0 | 102.47 | 102.47 | 0 |
| 7.2 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 143.19 | 143.19 | 0 |
| 7.2 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 147.12 | 147.12 | 0 |
| 7.4 | 5 Year | 3.88 | 3.88 | 0 | 318.49 | 318.49 | 0 | 20.75 | 20.75 | 0 |
| 7.4 | 25 Year | 19.10 | 19.10 | 0 | 321.90 | 321.90 | 0 | 115.51 | 115.51 | 0 |
| 7.4 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 164.21 | 164.21 | 0 |
| 7.4 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 167.36 | 167.36 | 0 |
| 7.6 | 5 Year | 3.88 | 3.88 | 0 | 318.50 | 318.50 | 0 | 23.07 | 23.07 | 0 |
| 7.6 | 25 Year | 19.10 | 19.10 | 0 | 321.90 | 321.90 | 0 | 135.91 | 135.91 | 0 |
| 7.6 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 171.13 | 171.13 | 0 |
| 7.6 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 173.49 | 173.49 | 0 |
| 7.8 | 5 Year | 3.88 | 3.88 | 0 | 318.52 | 318.52 | 0 | 24.59 | 24.59 | 0 |
| 7.8 | 25 Year | 19.10 | 19.10 | 0 | 321.90 | 321.90 | 0 | 86.10 | 86.10 | 0 |
| 7.8 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 167.67 | 167.67 | 0 |
| 7.8 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 172.11 | 172.11 | 0 |
| 8 | 5 Year | 3.88 | 3.88 | 0 | 318.53 | 318.53 | 0 | 27.37 | 27.37 | 0 |
| 8 | 25 Year | 19.10 | 19.10 | 0 | 321.90 | 321.90 | 0 | 71.51 | 71.51 | 0 |
| 8 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 124.61 | 124.61 | 0 |
| 8 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 148.81 | 148.81 | 0 |
| 8.2 | 5 Year | 3.88 | 3.88 | 0 | 318.54 | 318.54 | 0 | 25.89 | 25.89 | 0 |
| 8.2 | 25 Year | 19.10 | 19.10 | 0 | 321.90 | 321.90 | 0 | 68.91 | 68.91 | 0 |
| 8.2 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 80.54 | 80.54 | 0 |
| 8.2 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 81.53 | 81.53 | 0 |
| 8.4 | 5 Year | 3.88 | 3.88 | 0 | 318.56 | 318.56 | 0 | 26.08 | 26.08 | 0 |
| 8.4 | 25 Year | 19.10 | 19.10 | 0 | 321.90 | 321.90 | 0 | 67.40 | 67.40 | 0 |
| 8.4 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 79.88 | 79.88 | 0 |
| 8.4 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 81.30 | 81.30 | 0 |
| 8.6 | 5 Year | 3.88 | 3.88 | 0 | 318.68 | 318.68 | 0 | 18.51 | 18.51 | 0 |
| 8.6 | 25 Year | 19.10 | 19.10 | 0 | 321.90 | 321.90 | 0 | 72.10 | 72.10 | 0 |
| 8.6 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 83.91 | 83.91 | 0 |
| 8.6 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 85.08 | 85.08 | 0 |
| 8.8 | 5 Year | 3.88 | 3.88 | 0 | 318.85 | 318.85 | 0 | 29.43 | 29.43 | 0 |
| 8.8 | 25 Year | 19.10 | 19.10 | 0 | 321.91 | 321.91 | 0 | 76.87 | 76.87 | 0 |
| 8.8 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 94.39 | 94.39 | 0 |
| 8.8 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 96.47 | 96.47 | 0 |
| 9 | 5 Year | 3.88 | 3.88 | 0 | 318.89 | 318.89 | 0 | 19.97 | 19.97 | 0 |
| 9 | 25 Year | 19.10 | 19.10 | 0 | 321.91 | 321.91 | 0 | 79.78 | 79.78 | 0 |
| 9 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 93.77 | 93.77 | 0 |
| 9 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 95.54 | 95.54 | 0 |

| Sec No. | Design Storm | Flow (cu m/s) | | | W.S. Elevation (m) | | | Tope Width (m) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | POST | PRE | Difference | POST | PRE | Difference | POST | PRE | Difference |
| 9.2 | 5 Year | 3.88 | 3.88 | 0 | 319.17 | 319.17 | 0 | 27.90 | 27.90 | 0 |
| 9.2 | 25 Year | 19.10 | 19.10 | 0 | 321.91 | 321.91 | 0 | 80.39 | 80.39 | 0 |
| 9.2 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 98.70 | 98.70 | 0 |
| 9.2 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 102.83 | 102.83 | 0 |
| 9.4 | 5 Year | 3.88 | 3.88 | 0 | 319.29 | 319.29 | 0 | 26.48 | 26.48 | 0 |
| 9.4 | 25 Year | 19.10 | 19.10 | 0 | 321.91 | 321.91 | 0 | 90.30 | 90.30 | 0 |
| 9.4 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 114.82 | 114.82 | 0 |
| 9.4 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 116.91 | 116.91 | 0 |
| 9.6 | 5 Year | 3.88 | 3.88 | 0 | 319.33 | 319.33 | 0 | 22.08 | 22.08 | 0 |
| 9.6 | 25 Year | 19.10 | 19.10 | 0 | 321.91 | 321.91 | 0 | 99.68 | 99.68 | 0 |
| 9.6 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 117.49 | 117.49 | 0 |
| 9.6 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 119.01 | 119.01 | 0 |
| 9.7 | 5 Year | 3.88 | 3.88 | 0 | 319.57 | 319.57 | 0 | 23.64 | 23.64 | 0 |
| 9.7 | 25 Year | 19.10 | 19.10 | 0 | 321.91 | 321.91 | 0 | 101.41 | 101.41 | 0 |
| 9.7 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 126.95 | 126.95 | 0 |
| 9.7 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 128.23 | 128.23 | 0 |
| 9.8 | 5 Year | 3.88 | 3.88 | 0 | 319.77 | 319.77 | 0 | 25.74 | 25.74 | 0 |
| 9.8 | 25 Year | 19.10 | 19.10 | 0 | 321.91 | 321.91 | 0 | 92.21 | 92.21 | 0 |
| 9.8 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 127.80 | 136.09 | 8.29 |
| 9.8 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 128.37 | 139.38 | 11.01 |
| 9.9 | 5 Year | 3.88 | 3.88 | 0 | 320.09 | 320.09 | 0 | 30.93 | 30.93 | 0 |
| 9.9 | 25 Year | 19.10 | 19.10 | 0 | 321.90 | 321.90 | 0 | 81.14 | 81.14 | 0 |
| 9.9 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 99.50 | 99.50 | 0 |
| 9.9 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 101.27 | 101.27 | 0 |
| 10 | 5 Year | 3.88 | 3.88 | 0 | 320.14 | 320.14 | 0 | 44.86 | 44.86 | 0 |
| 10 | 25 Year | 19.10 | 19.10 | 0 | 321.91 | 321.91 | 0 | 83.79 | 83.79 | 0 |
| 10 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 102.95 | 102.95 | 0 |
| 10 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 104.59 | 104.59 | 0 |
| 11 | 5 Year | 3.88 | 3.88 | 0 | 321.11 | 321.11 | 0 | 40.43 | 40.43 | 0 |
| 11 | 25 Year | 19.10 | 19.10 | 0 | 322.72 | 322.72 | 0 | 87.53 | 87.53 | 0 |
| 11 | 100 Year | 33.20 | 33.20 | 0 | 323.08 | 323.08 | 0 | 97.09 | 97.09 | 0 |
| 11 | Regional | 37.50 | 37.50 | 0 | 323.15 | 323.15 | 0 | 98.83 | 98.83 | 0 |
| 12 | 5 Year | 3.88 | 3.88 | 0 | 321.14 | 321.14 | 0 | 47.28 | 47.28 | 0 |
| 12 | 25 Year | 19.10 | 19.10 | 0 | 322.72 | 322.72 | 0 | 116.46 | 116.46 | 0 |
| 12 | 100 Year | 33.20 | 33.20 | 0 | 323.09 | 323.09 | 0 | 125.46 | 125.46 | 0 |
| 12 | Regional | 37.50 | 37.50 | 0 | 323.15 | 323.15 | 0 | 127.11 | 127.11 | 0 |
| 13 | 5 Year | 3.88 | 3.88 | 0 | 321.21 | 321.21 | 0 | 22.30 | 22.30 | 0 |
| 13 | 25 Year | 19.10 | 19.10 | 0 | 322.73 | 322.73 | 0 | 58.71 | 58.71 | 0 |
| 13 | 100 Year | 33.20 | 33.20 | 0 | 323.09 | 323.09 | 0 | 110.98 | 110.98 | 0 |
| 13 | Regional | 37.50 | 37.50 | 0 | 323.16 | 323.16 | 0 | 114.67 | 114.67 | 0 |

| Sec No. | Design Storm | Flow (cu m/s) | | | W.S. Elevation (m) | | | Tope Width (m) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | POST | PRE | Difference | POST | PRE | Difference | POST | PRE | Difference |
| 14 | 5 Year | 3.88 | 3.88 | 0 | 321.80 | 321.80 | 0 | 10.32 | 10.32 | 0 |
| 14 | 25 Year | 19.10 | 19.10 | 0 | 322.72 | 322.72 | 0 | 64.91 | 64.91 | 0 |
| 14 | 100 Year | 33.20 | 33.20 | 0 | 323.14 | 323.14 | 0 | 117.03 | 117.03 | 0 |
| 14 | Regional | 37.50 | 37.50 | 0 | 323.22 | 323.22 | 0 | 118.73 | 118.73 | 0 |
| 15 | 5 Year | 3.69 | 3.69 | 0 | 322.84 | 322.84 | 0 | 26.55 | 26.55 | 0 |
| 15 | 25 Year | 18.20 | 18.20 | 0 | 323.37 | 323.37 | 0 | 53.68 | 53.68 | 0 |
| 15 | 100 Year | 31.60 | 31.60 | 0 | 323.65 | 323.65 | 0 | 76.40 | 76.40 | 0 |
| 15 | Regional | 35.80 | 35.80 | 0 | 323.72 | 323.72 | 0 | 84.70 | 84.70 | 0 |
| 16 | 5 Year | 3.69 | 3.69 | 0 | 322.92 | 322.92 | 0 | 28.44 | 28.44 | 0 |
| 16 | 25 Year | 18.20 | 18.20 | 0 | 323.43 | 323.43 | 0 | 41.85 | 41.85 | 0 |
| 16 | 100 Year | 31.60 | 31.60 | 0 | 323.70 | 323.70 | 0 | 75.16 | 75.16 | 0 |
| 16 | Regional | 35.80 | 35.80 | 0 | 323.78 | 323.78 | 0 | 86.70 | 86.70 | 0 |
| 17 | 5 Year | 3.69 | 3.69 | 0 | 324.97 | 324.97 | 0 | 328.35 | 328.35 | 0 |
| 17 | 25 Year | 18.20 | 18.20 | 0 | 325.82 | 325.82 | 0 | 383.09 | 383.09 | 0 |
| 17 | 100 Year | 31.60 | 31.60 | 0 | 325.90 | 325.90 | 0 | 387.87 | 387.87 | 0 |
| 17 | Regional | 35.80 | 35.80 | 0 | 325.92 | 325.92 | 0 | 389.45 | 389.45 | 0 |
| 18 | 5 Year | 6.09 | 6.09 | 0 | 325.06 | 325.06 | 0 | 229.43 | 229.43 | 0 |
| 18 | 25 Year | 19.30 | 19.30 | 0 | 325.82 | 325.82 | 0 | 279.50 | 279.50 | 0 |
| 18 | 100 Year | 32.10 | 32.10 | 0 | 325.90 | 325.90 | 0 | 284.38 | 284.38 | 0 |
| 18 | Regional | 35.80 | 35.80 | 0 | 325.92 | 325.92 | 0 | 285.99 | 285.99 | 0 |
| 19 | 5 Year | 6.09 | 6.09 | 0 | 325.06 | 325.06 | 0 | 206.06 | 206.06 | 0 |
| 19 | 25 Year | 19.30 | 19.30 | 0 | 325.82 | 325.82 | 0 | 224.41 | 224.41 | 0 |
| 19 | 100 Year | 32.10 | 32.10 | 0 | 325.90 | 325.90 | 0 | 225.63 | 225.63 | 0 |
| 19 | Regional | 35.80 | 35.80 | 0 | 325.92 | 325.92 | 0 | 226.04 | 226.04 | 0 |
| 20 | 5 Year | 5.78 | 5.78 | 0 | 325.06 | 325.06 | 0 | 97.36 | 97.36 | 0 |
| 20 | 25 Year | 18.30 | 18.30 | 0 | 325.82 | 325.82 | 0 | 108.08 | 108.08 | 0 |
| 20 | 100 Year | 30.10 | 30.10 | 0 | 325.90 | 325.90 | 0 | 109.14 | 109.14 | 0 |
| 20 | Regional | 33.10 | 33.10 | 0 | 325.92 | 325.92 | 0 | 109.49 | 109.49 | 0 |
| 21 | 5 Year | 5.78 | 5.78 | 0 | 325.06 | 325.06 | 0 | 122.56 | 122.56 | 0 |
| 21 | 25 Year | 18.30 | 18.30 | 0 | 325.83 | 325.83 | 0 | 140.66 | 140.66 | 0 |
| 21 | 100 Year | 30.10 | 30.10 | 0 | 325.90 | 325.90 | 0 | 142.72 | 142.72 | 0 |
| 21 | Regional | 33.10 | 33.10 | 0 | 325.93 | 325.93 | 0 | 143.40 | 143.40 | 0 |

**PRELIMINARY SERVICING &**
**STORMWATER MANAGEMENT REPORT**
**CITYVIEW RIDGE SUBDIVISION**
**CITY OF GUELPH**
**Revised: June 2017**

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# APPENDIX "G"

**Rip Rap Protection Calculations, Monthly Water Balance, Monthly Enhanced Infiltration for Block 125**

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**105172 - 600mm Outlet**
**Riprap Outlet Protection Design Calculations**

**Assumptions:**

- pipe discharges onto a relatively flat surface
- there is no well defined channel immediately downstream
- minimum tailwater conditions apply
- outlet pipe is flowing full

**Given:**

| | | |
|---|---|---|
| pipe diameter ($D_o$) = | 0.6 | m |
| = | 24 | inches |
| pipe slope = | 0.5 | % |
| maximum flow = | 1.61 | $m^3/s$ |
| = | 56.86 | $ft^3/s$ |
| outlet slope = | 2.9 | % |

**From Figure 7.45 (Erosion and Sediment Control Handbook, 1986)**

| | | |
|---|---|---|
| Rip Rap Depth (d) = | 30 | in |
| = | 0.76 | m |
| Apron Length ($L_a$) = | 22.00 | ft |
| = | 6.71 | m |
| Median Stone Size ($d_{50}$) = | 0.75 | ft |
| = | 0.23 | m |
| = | 229 | mm |
| Upstream Apron Width ($W_u$) = | $3 \times D_o$ | |
| = | 70.87 | inches |
| = | 1.80 | m |
| Downstream Apron Width ($W_d$) = | $D_o + L_a$ | |
| = | 23.97 | ft |
| = | 7.31 | m |

Definition of Median Stone Size ($d_{50}$) :
50 percent by weight of a rock mixture is greater than or less than the $d_{50}$ size.

**Conclusions:**

The actual depth of rip-rap (0.76m) is equal to the required rip-rap depth (0.76m)

The median stone size required for the rip rap of 229 mm is less than the specified mean size of 250 mm.

The required Upstream and Downstream Apron Width ($W_u$ and $W_d$) of 1.80 m and 7.31 m, respectively are less than the specified width of 8.0m.

The required Apron Length ($L_a$) of 6.71m, is less than the specified length of 7.0m.

**References:**

Goldman, Steven J., Jackson, Katharine, and Bursztynsky, Taras A., 1986. Erosion andSediment Control Handbook. New York: McGraw-Hill Incorporated.

**Cityview Ridge Subdivision**
**City of Guelph**
**Monthly Water Balance (Thornthwaite and Mather Method)**
**Date: June 21, 2017**

**EXISTING CONDITIONS**

Contributing Catchments: 10, 20 & 30
Contributing Area = 18.28 ha
Percent Impervious = 3.0%

Soil Type: Guelph Loam - 76% Till; 24% Sand and Gravel
Vegetation: Shallow-rooted unkept vegetation
Root Zone Depth = 0.50m
Soil Moisture Retention Capacity = 75mm

| | | | Percent of Total Area |
|---|---|---|---|
| Impervious Area = | 0.56 | ha | 3% |
| Pervious Till Area = | 13.34 | ha | 73% |
| Pervious S&G Area = | 4.38 | ha | 24% |
| Total Area = | 18.28 | ha | 100% |

Runoff Factor = 0.43
Evapotranspiration Factor for Impervious Surfaces = 0.36

| Month | Daily Average Temperature | Monthly Heat Index (I) | Unadjusted Daily Potential Evapotranspiration | Correction Factors | Adjusted Potential Evapotranspiration (PE) | Average Precipitation (P) | P-PE | Accum. Pot. Water Loss | Storage (ST) | ΔS | Pervious ET | Actual Evapotrans-piration (AE) | Pervious ET - Actual ET | Moisture Deficit (D) | Moisture Surplus (S) | Water Runoff (RO) | Snow Melt Runoff | Total Recharge and Runoff | Actual Runoff | Runoff Volume | Recharge Volume |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (°C) | | (mm) | | (mm) | (mm) | (mm) | (mm) | (mm) | (mm) | | (mm) | | (mm) | (mm) | (mm) | (mm) | (mm) | (mm) | (m³) | (m³) |
| Jan | -7.6 | 0.0 | 0.0 | 24.3 | 0.0 | 56.4 | 56.4 | | 209.1 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 9.8 | 0.0 | 9.8 | 4.3 | 781 | 1,016 |
| Feb | -6.9 | 0.0 | 0.0 | 24.6 | 0.0 | 50.8 | 50.8 | | 259.9 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 4.9 | 0.0 | 4.9 | 2.1 | 390 | 508 |
| Mar | -1.3 | 0.0 | 0.0 | 30.6 | 0.0 | 72.1 | 72.1 | | 332.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 2.5 | 0.0 | 2.5 | 1.1 | 195 | 254 |
| Apr | 5.9 | 1.3 | 0.9 | 33.6 | 30.2 | 78.3 | 48.1 | | 75.0 | 0.0 | 30.2 | 29.7 | 0.6 | 0.6 | 48.6 | 25.5 | 25.7 | 51.2 | 22.3 | 4,069 | 5,294 |
| May | 12.3 | 3.9 | 2.0 | 37.8 | 75.6 | 79.9 | 4.3 | | 75.0 | 0.0 | 75.6 | 74.1 | 1.5 | 1.5 | 5.8 | 15.6 | 115.7 | 131.3 | 57.1 | 10,430 | 13,569 |
| Jun | 16.9 | 6.3 | 2.8 | 38.4 | 107.5 | 76.0 | -31.5 | -31.5 | 48.0 | -27.0 | 103.0 | 101.0 | 2.0 | 6.5 | 2.0 | 8.8 | 57.8 | 66.6 | 29.0 | 5,294 | 6,887 |
| Jul | 19.7 | 8.0 | 3.3 | 38.7 | 127.7 | 88.5 | -39.2 | -70.7 | 28.0 | -20.0 | 108.5 | 106.4 | 2.1 | 21.3 | 2.1 | 5.4 | 28.9 | 34.4 | 14.9 | 2,730 | 3,551 |
| Aug | 18.6 | 7.3 | 3.1 | 36.0 | 111.6 | 95.9 | -15.7 | -86.4 | 23.0 | -5.0 | 100.9 | 99.0 | 1.9 | 12.6 | 1.9 | 3.7 | 14.5 | 18.1 | 7.9 | 1,442 | 1,876 |
| Sep | 14.1 | 4.8 | 2.3 | 31.2 | 71.8 | 92.1 | 20.3 | | 43.3 | 20.3 | 71.8 | 70.4 | 1.4 | 1.4 | 1.4 | 2.5 | 7.5 | 10.0 | 4.4 | 797 | 1,037 |
| Oct | 7.9 | 2.0 | 1.3 | 28.5 | 37.1 | 69.2 | 32.2 | | 75.0 | 31.7 | 37.1 | 36.3 | 0.7 | 0.7 | 1.2 | 1.9 | 3.9 | 5.8 | 2.5 | 458 | 596 |
| Nov | 2.4 | 0.3 | 0.4 | 24.3 | 9.7 | 86.3 | 76.6 | | 75.0 | 0.0 | 9.7 | 9.5 | 0.2 | 0.2 | 76.8 | 39.3 | 2.0 | 41.3 | 18.0 | 3,282 | 4,270 |
| Dec | -4.0 | 0.0 | 0.0 | 23.1 | 0.0 | 77.7 | 77.7 | | 152.7 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 19.7 | 1.1 | 20.8 | 9.0 | 1,649 | 2,146 |
| **Total** | | **33.9** | | | | **923.2** | **352.0** | | | | | **526.5** | **10.3** | **44.7** | **139.7** | **139.7** | **257.0** | **396.7** | **172.4** | **31,518** | **41,003** |

**POST-DEVELOPMENT CONDITIONS**

Contributing Catchments: B2c, 201, 202 & 300
Contributing Area = 17.60 ha
Percent Impervious = 32.0%

Soil Type: Guelph Loam - 76% Till; 24% Sand and Gravel
Vegetation: Urban lawns
Root Zone Depth = 0.5m
Soil Moisture Retention Capacity = 75mm

| | | | Percent of Total Area |
|---|---|---|---|
| Impervious Area = | 5.91 | ha | 34% |
| Pervious Till Area = | 7.99 | ha | 45% |
| Pervious S&G Area = | 3.7 | ha | 21% |
| Total Area = | 17.6 | ha | 100% |

Runoff Factor = 0.71
Evapotranspiration Factor for Impervious Surfaces = 0.36

| Month | Daily Average Temperature | Monthly Heat Index | Unadjusted Daily Potential Evapotranspiration | Correction Factors | Adjusted Potential Evapotranspiration | Average Precipitation | P-PE | Accum. Pot. Water Loss | Storage | ΔS | Pervious ET | Actual Evapotrans-piration | Pervious ET - Actual ET | Moisture Deficit | Moisture Surplus | Water Runoff | Snow Melt Runoff | Total Recharge & Runoff | Actual Runoff | Runoff Volume | Recharge Volume | Enhanced Recharge |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (°C) | | (mm) | | (mm) | (mm) | (mm) | (mm) | (mm) | (mm) | | (mm) | | (mm) | (mm) | (mm) | (mm) | (mm) | (mm) | (m³) | (m³) | (m³) |
| Jan | -7.6 | 0.0 | 0.0 | 24.3 | 0.0 | 56.4 | 56.4 | | 209.1 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 11.6 | 0.0 | 11.6 | 8.2 | 1,500 | 590 | 55 |
| Feb | -6.9 | 0.0 | 0.0 | 24.6 | 0.0 | 50.8 | 50.8 | | 259.9 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 5.8 | 0.0 | 5.8 | 4.1 | 750 | 295 | 28 |
| Mar | -1.3 | 0.0 | 0.0 | 30.6 | 0.0 | 72.1 | 72.1 | | 332.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 2.9 | 0.0 | 2.9 | 2.1 | 375 | 147 | 14 |
| Apr | 5.9 | 1.3 | 0.9 | 33.6 | 30.2 | 78.3 | 48.1 | | 75.0 | 0.0 | 30.2 | 20.9 | 9.4 | 9.4 | 57.4 | 30.2 | 25.7 | 55.9 | 39.7 | 7,249 | 2,851 | 246 |
| May | 12.3 | 3.9 | 2.0 | 37.8 | 75.6 | 79.9 | 4.3 | | 75.0 | 0.0 | 75.6 | 52.2 | 23.4 | 23.4 | 27.7 | 28.9 | 115.7 | 144.6 | 102.6 | 18,763 | 7,379 | 646 |
| Jun | 16.9 | 6.3 | 2.8 | 38.4 | 107.5 | 76.0 | -31.5 | -31.5 | 48.0 | -27.0 | 103.0 | 101.0 | 2.0 | 6.5 | 2.0 | 15.4 | 57.8 | 73.3 | 52.0 | 9,510 | 3,740 | 323 |
| Jul | 19.7 | 8.0 | 3.3 | 38.7 | 127.7 | 88.5 | -39.2 | -70.7 | 28.0 | -20.0 | 108.5 | 106.4 | 2.1 | 21.3 | 2.1 | 8.8 | 28.9 | 37.7 | 26.8 | 4,890 | 1,923 | 161 |
| Aug | 18.6 | 7.3 | 3.1 | 36.0 | 111.6 | 95.9 | -15.7 | -86.4 | 23.0 | -5.0 | 100.9 | 99.0 | 1.9 | 12.6 | 1.9 | 5.4 | 14.5 | 19.8 | 14.1 | 2,571 | 1,011 | 81 |
| Sep | 14.1 | 4.8 | 2.3 | 31.2 | 71.8 | 92.1 | 20.3 | | 43.3 | 20.3 | 71.8 | 49.6 | 22.2 | 22.2 | 22.2 | 13.8 | 7.5 | 21.3 | 15.1 | 2,761 | 1,086 | 141 |
| Oct | 7.9 | 2.0 | 1.3 | 28.5 | 37.1 | 69.2 | 32.2 | | 75.0 | 31.7 | 37.1 | 25.6 | 11.5 | 11.5 | 11.9 | 12.9 | 3.9 | 16.8 | 11.9 | 2,175 | 855 | 124 |
| Nov | 2.4 | 0.3 | 0.4 | 24.3 | 9.7 | 86.3 | 76.6 | | 75.0 | 0.0 | 9.7 | 6.7 | 3.0 | 3.0 | 79.6 | 46.2 | 2.0 | 48.2 | 34.2 | 6,259 | 2,461 | 228 |
| Dec | -4.0 | 0.0 | 0.0 | 23.1 | 0.0 | 77.7 | 77.7 | | 152.7 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 23.1 | 1.1 | 24.2 | 17.2 | 3,142 | 1,236 | 114 |
| **Total** | | **33.9** | | | | **923.3** | **352.0** | | | | | **461.4** | **75.4** | **109.8** | **204.8** | **204.8** | **257.0** | **461.9** | **327.9** | **59,944** | **23,573** | **2,161** |
| | | | | | | | | | | | | | | | | | | | | **Total Recharge** | | **25,734** |

Notes: Precipitation and Temperature data from Environment Canada Climate Normals 1971-200 for the Guelph Arboretum

Monthly water balance strategy as outlined in the document *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance (Thornthwaite and Mather, 1957)*

Evaporation Factor for Impervious Surfaces = Average Annual Evapotranspiration for Impervious Surfaces (200mm/year) / Average Annual Evapotranspiration for Pervious Till Surfaces (555mm/year) = 0.36

Runoff Factor = [(Impervious Percentage of Site x Average Annual Runoff for Impervious Surfaces (725mm/year)) + (Pervious Till Percentage of Site x Average Annual Runoff for Pervious Till Surfaces (190 mm/year)) + (Pervious Sand & Gravel Percentage of Site x Average Annual Runoff for Pervious S & G Surfaces (50 mm/year)] / Total Annual Recharge & Runoff

**EXISTING CONDITIONS**

Contributing Catchments: Block 125
Contributing Area = 0.65 ha
Percent Impervious = 0.0%

Soil Type: 100% Sand and Gravel
Vegetation: Shallow-rooted unkept vegetation
Root Zone Depth = 0.50m
Soil Moisture Retention Capacity = 75mm

| | | | Percent of Total Area |
|---|---|---|---|
| Impervious Area = | 0 | ha | 0% |
| Pervious Till Area = | 0.00 | ha | 0% |
| Pervious S&G Area = | 0.65 | ha | 100% |
| Total Area = | 0.65 | ha | 100% |

Runoff Factor = 0.12

Evapotranspiration Factor for Impervious Surfaces = 0.36

| Month | Daily Average Temperature | Monthly Heat Index (I) | Unadjusted Daily Potential Evapotranspiration | Correction Factors | Adjusted Potential Evapotranspiration (PE) | Average Precipitation (P) | P-PE | Accum. Pot. Water Loss | Storage (ST) | ΔS | Pervious ET | Actual Evapotrans-piration (AE) | Pervious ET - Actual ET | Moisture Deficit (D) | Moisture Surplus (S) | Water Runoff (RO) | Snow Melt Runoff | Total Recharge and Runoff | Actual Runoff | Runoff Volume | Recharge Volume |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (°C) | | (mm) | | (mm) | (mm) | (mm) | (mm) | (mm) | (mm) | | (mm) | | (mm) | (mm) | (mm) | (mm) | (mm) | (mm) | ($m^3$) | ($m^3$) |
| Jan | -7.6 | 0.0 | 0.0 | 24.3 | 0.0 | 56.4 | 56.4 | | 209.1 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 9.7 | 0.0 | 9.7 | 1.2 | 8 | 55 |
| Feb | -6.9 | 0.0 | 0.0 | 24.6 | 0.0 | 50.8 | 50.8 | | 259.9 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 4.8 | 0.0 | 4.8 | 0.6 | 4 | 28 |
| Mar | -1.3 | 0.0 | 0.0 | 30.6 | 0.0 | 72.1 | 72.1 | | 332.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 2.4 | 0.0 | 2.4 | 0.3 | 2 | 14 |
| Apr | 5.9 | 1.3 | 0.9 | 33.6 | 30.2 | 78.3 | 48.1 | | 75.0 | 0.0 | 30.2 | 30.2 | 0.0 | 0.0 | 48.1 | 25.2 | 25.7 | 50.9 | 6.1 | 40 | 291 |
| May | 12.3 | 3.9 | 2.0 | 37.8 | 75.6 | 79.9 | 4.3 | | 75.0 | 0.0 | 75.6 | 75.6 | 0.0 | 0.0 | 4.3 | 14.8 | 115.7 | 130.4 | 15.6 | 102 | 746 |
| Jun | 16.9 | 6.3 | 2.8 | 38.4 | 107.5 | 76.0 | -31.5 | -31.5 | 48.0 | -27.0 | 103.0 | 103.0 | 0.0 | 4.5 | 0.0 | 7.4 | 57.8 | 65.2 | 7.8 | 51 | 373 |
| Jul | 19.7 | 8.0 | 3.3 | 38.7 | 127.7 | 88.5 | -39.2 | -70.7 | 28.0 | -20.0 | 108.5 | 108.5 | 0.0 | 19.2 | 0.0 | 3.7 | 28.9 | 32.6 | 3.9 | 25 | 186 |
| Aug | 18.6 | 7.3 | 3.1 | 36.0 | 111.6 | 95.9 | -15.7 | -86.4 | 23.0 | -5.0 | 100.9 | 100.9 | 0.0 | 10.7 | 0.0 | 1.8 | 14.5 | 16.3 | 2.0 | 13 | 93 |
| Sep | 14.1 | 4.8 | 2.3 | 31.2 | 71.8 | 92.1 | 20.3 | | 43.3 | 20.3 | 71.8 | 71.8 | 0.0 | 0.0 | 0.0 | 0.9 | 7.5 | 8.4 | 1.0 | 7 | 48 |
| Oct | 7.9 | 2.0 | 1.3 | 28.5 | 37.1 | 69.2 | 32.2 | | 75.0 | 31.7 | 37.1 | 37.1 | 0.0 | 0.0 | 0.5 | 0.7 | 3.9 | 4.6 | 0.6 | 4 | 26 |
| Nov | 2.4 | 0.3 | 0.4 | 24.3 | 9.7 | 86.3 | 76.6 | | 75.0 | 0.0 | 9.7 | 9.7 | 0.0 | 0.0 | 76.6 | 38.6 | 2.0 | 40.6 | 4.9 | 32 | 232 |
| Dec | -4.0 | 0.0 | 0.0 | 23.1 | 0.0 | 77.7 | 77.7 | | 152.7 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 19.3 | 1.1 | 20.4 | 2.5 | 16 | 117 |
| **Total** | | **33.9** | | | | **923.2** | **352.0** | | | | | **536.8** | **0.0** | **34.4** | **129.4** | **129.4** | **257.0** | **386.5** | **46.4** | **301** | **2,211** |

**POST-DEVELOPMENT CONDITIONS**

Contributing Catchments: Block 125
Contributing Area = 0.65 ha
Percent Impervious = 70.0%

Soil Type: 100% Sand and Gravel
Vegetation: Urban lawns
Root Zone Depth = 0.5m
Soil Moisture Retention Capacity = 75mm

| | | | Percent of Total Area |
|---|---|---|---|
| Impervious Area = | 0.46 | ha | 70% |
| Pervious Till Area = | 0.00 | ha | 0% |
| Pervious S&G Area = | 0.20 | ha | 30% |
| Total Area = | 0.65 | ha | 100% |

Runoff Factor = 0.74

Evapotranspiration Factor for Impervious Surfaces = 0.36

| Month | Daily Average Temperature | Monthly Heat Index | Unadjusted Daily Potential Evapotranspiration | Correction Factors | Adjusted Potential Evapotranspiration | Average Precipitation | P-PE | Accum. Pot. Water Loss | Storage | ΔS | Pervious ET | Actual Evapotrans-piration | Pervious ET - Actual ET | Moisture Deficit | Moisture Surplus | Water Runoff | Snow Melt Runoff | Total Recharge & Runoff | Actual Runoff | Runoff Volume | Recharge Volume | Enhanced Recharge Volume |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (°C) | | (mm) | | (mm) | (mm) | (mm) | (mm) | (mm) | (mm) | | (mm) | | (mm) | (mm) | (mm) | (mm) | (mm) | (mm) | ($m^3$) | ($m^3$) | ($m^3$) |
| Jan | -7.6 | 0.0 | 0.0 | 24.3 | 0.0 | 56.4 | 56.4 | | 209.1 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 13.8 | 0.0 | 13.8 | 10.2 | 66 | 24 | 55 |
| Feb | -6.9 | 0.0 | 0.0 | 24.6 | 0.0 | 50.8 | 50.8 | | 259.9 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 6.9 | 0.0 | 6.9 | 5.1 | 33 | 12 | 28 |
| Mar | -1.3 | 0.0 | 0.0 | 30.6 | 0.0 | 72.1 | 72.1 | | 332.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 3.5 | 0.0 | 3.5 | 2.5 | 17 | 6 | 14 |
| Apr | 5.9 | 1.3 | 0.9 | 33.6 | 30.2 | 78.3 | 48.1 | | 75.0 | 0.0 | 30.2 | 9.1 | 21.2 | 21.2 | 69.2 | 36.1 | 25.7 | 61.8 | 45.5 | 295 | 106 | 246 |
| May | 12.3 | 3.9 | 2.0 | 37.8 | 75.6 | 79.9 | 4.3 | | 75.0 | 0.0 | 75.6 | 22.7 | 52.9 | 52.9 | 57.2 | 46.6 | 115.7 | 162.3 | 119.4 | 776 | 278 | 646 |
| Jun | 16.9 | 6.3 | 2.8 | 38.4 | 107.5 | 76.0 | -31.5 | -31.5 | 48.0 | -27.0 | 103.0 | 103.0 | 0.0 | 4.5 | 0.0 | 23.3 | 57.8 | 81.1 | 59.7 | 388 | 139 | 323 |
| Jul | 19.7 | 8.0 | 3.3 | 38.7 | 127.7 | 88.5 | -39.2 | -70.7 | 28.0 | -20.0 | 108.5 | 108.5 | 0.0 | 19.2 | 0.0 | 11.7 | 28.9 | 40.6 | 29.9 | 194 | 70 | 161 |
| Aug | 18.6 | 7.3 | 3.1 | 36.0 | 111.6 | 95.9 | -15.7 | -86.4 | 23.0 | -5.0 | 100.9 | 100.9 | 0.0 | 10.7 | 0.0 | 5.8 | 14.5 | 20.3 | 14.9 | 97 | 35 | 81 |
| Sep | 14.1 | 4.8 | 2.3 | 31.2 | 71.8 | 92.1 | 20.3 | | 43.3 | 20.3 | 71.8 | 21.5 | 50.2 | 50.2 | 50.2 | 28.0 | 7.5 | 35.5 | 26.2 | 170 | 61 | 141 |
| Oct | 7.9 | 2.0 | 1.3 | 28.5 | 37.1 | 69.2 | 32.2 | | 75.0 | 31.7 | 37.1 | 11.1 | 25.9 | 25.9 | 26.4 | 27.2 | 3.9 | 31.1 | 22.9 | 149 | 53 | 124 |
| Nov | 2.4 | 0.3 | 0.4 | 24.3 | 9.7 | 86.3 | 76.6 | | 75.0 | 0.0 | 9.7 | 2.9 | 6.8 | 6.8 | 83.4 | 55.3 | 2.0 | 57.3 | 42.2 | 274 | 98 | 228 |
| Dec | -4.0 | 0.0 | 0.0 | 23.1 | 0.0 | 77.7 | 77.7 | | 152.7 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 27.7 | 1.1 | 28.8 | 21.2 | 138 | 49 | 114 |
| **Total** | | **33.9** | | | | **923.3** | **352.0** | | | | | **379.7** | **157.1** | **191.5** | **286.5** | **285.9** | **257.0** | **543.0** | **399.6** | **2,598** | **932** | **2,161** |

| | |
|---|---|
| **Total Recharge Volume** | **3,093** |
| **Runoff Volume After Enhancement** | **437** |
| **Pre-Runoff - Post-Runoff** | **-135** |

Notes: Precipitation and Temperature data from Environment Canada Climate Normals 1971-200 for the Guelph Arboretum
Monthly water balance strategy as outlined in the document *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance (Thornthwaite and Mather, 1957)*
Evaporation Factor for Impervious Surfaces = Average Annual Evapotranspiration for Impervious Surfaces (200mm/year) / Average Annual Evapotranspiration for Pervious Till Surfaces (555mm/year) = 0.36
Runoff Factor = 1-[(Pervious Sand & Gravel Percentage of Site x Average Annual Infiltration for Pervious S & G Surfaces (380 mm/year)] / Total Annual Recharge & Runoff

## Enhanced Infiltration Structure - Catchment 100

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Structure Length = | 20.00 | m | | | | | |
| Structure Width = | 9.00 | | | | | | |
| Structure Depth = | 1.00 | | | | | | |
| Area of Stone = | 9.00 | sq m | Volume of Stone = | 180.00 | cu m | | |
| | | | Stone Porosity = | 0.33333 | | | |
| | | | **Storage Volume of Stone =** | | | **60.00** | **cu m** |

| | | |
|---|---|---|
| A = contact area of structure = | 180.00 | sq m |
| V = runoff volume to be infiltrated = | 60.00 | cu m |
| P = percolation rate of native soils = | 15.00000 | mm/hr |
| n = porosity of storage media (weighted) = | 0.33 | |
| T = retention time = | Solve for T | |

T = (1000 x V) / (P x n x A) = 67.34 hours or 2.8 day draindown period

| | | | | | |
|---|---|---|---|---|---|
| Contributing Area | 0.398 | ha | | (Area to Infiltration Gallery) | |
| Recharge Time | 67.34 | hours | / | 2.81 | days |
| Recharge Volume Potential | 60.00 | $m^3$ | | | |

| Month | Total Recharge & Runoff (mm) | No. of days | Max Potential Recharge ($m^3$) | Available Recharge ($m^3$) | Enhanced Recharge ($m^3$) |
|---|---|---|---|---|---|
| Jan | 13.8 | 31 | 663 | 55 | 55 |
| Feb | 6.9 | 28 | 599 | 28 | 28 |
| Mar | 3.5 | 31 | 663 | 14 | 14 |
| Apr | 61.8 | 30 | 642 | 246 | 246 |
| May | 162.3 | 31 | 663 | 646 | 646 |
| Jun | 81.1 | 30 | 642 | 323 | 323 |
| Jul | 40.6 | 31 | 663 | 161 | 161 |
| Aug | 20.3 | 31 | 663 | 81 | 81 |
| Sep | 35.5 | 30 | 642 | 141 | 141 |
| Oct | 31.1 | 31 | 663 | 124 | 124 |
| Nov | 57.3 | 30 | 642 | 228 | 228 |
| Dec | 28.8 | 31 | 663 | 114 | 114 |
| **Total** | **543.0** | **365** | **7,805** | **2,161** | **2,161** |