



Cityview Ridge Subdivision

Preliminary Servicing & Stormwater Management Report

GMBP File: 105172

August 2021

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER |LONDON | HAMILTON | GTA 650 WOODLAWN RD. W., BLOCK C, UNIT 2, GUELPH ON N1K 1B8 P: 519-824-8150 WWW.GMBLUEPLAN.CA



TABLE OF CONTENTS

| 1. | INT | RODUCTION | 1 |
|----|------|---|----|
| 2. | LO | CATION | 1 |
| 3. | EXI | STING CONDITIONS | 2 |
| | 3.1 | Land Use | 2 |
| | 3.2 | Topography | 2 |
| | 3.3 | Soils | 2 |
| 4. | PRO | OPOSED DEVELOPMENT | 3 |
| | 4.1 | Site Grading | 3 |
| | 4.2 | Streets | 4 |
| | 4.3 | Water Supply | 4 |
| | 4.4 | Sanitary Sewer | 4 |
| | 4.5 | Storm Sewer | 4 |
| | 4.6 | Stormwater Management | 5 |
| | 4.7 | Salt Management Plan | 5 |
| | 4.8 | Permeameter Testing | 6 |
| | 4.9 | Slope Stability Assessment | 6 |
| | 4.10 | Water Budget | 6 |
| 5. | STO | ORMWATER MANAGEMENT PLAN | 7 |
| | 5.1 | Stormwater Management Criteria | 8 |
| | 5.2 | Stormwater Management Design | 9 |
| | 5.2. | 1 Lot Level Controls | 9 |
| | 5.2. | 2 Conveyance Controls | 10 |
| | 5.2. | 3 Proposed Stormwater Management Facility | 10 |
| | 5.2. | 4 Cooling Trench and Dispersion Structure | 10 |
| | 5.2. | 5 End of Pipe Controls | 11 |
| | 5.2. | 6 Minor/Major Drainage System | |
| | 5.2. | 7 Floodplain Analysis | |
| 6. | SE | DIMENT AND EROSION CONTROL PLAN | 19 |
| 7. | MA | INTENANCE PLAN | 20 |
| 8. | CO | NCLUSIONS | 20 |
| | | | |



APPENDICES

APPENDIX A: GEOTECHNICAL INVESTIGATION

NAYLOR ENGINEERING ASSOCIATES LTD.

(FEBRUARY 2012)

APPENDIX B: SLOPE STABILITY ASSESSMENT

ENGLOBE CORP.

(FEBRUARY 2016)

UPDATED SLOPE STABILITY ASSESSMENT OF EAST FACING SLOPE

(DECEMBER 2020)

AND

SLOPE STABILITY ASSESSMENT OF SOUTH-FACING SLOPE

ENGLOBE CORP. (MARCH 2019)

APPENDIX C: GROUNDWATER ELEVATION MEASUREMENTS

COMPLETED BY GM BLUEPLAN ENGINEERING LIMITED

(AUGUST 2006 - AUGUST 2020)

APPENDIX D: HYDROGEOLOGICAL INVESTIGATION

BANKS GROUNDWATER ENGINEERING LIMITED

(NOVEMBER 2014)

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)

STAGE/STORAGE/DISCHARGE TABLES

POST DEVELOPMENT CONTROLLED CONDITION MODELLING FILES (EASTERN PORTION OF CITYVIEW RIDGE SUBDIVISION)

COOLING TRENCH CALCULATIONS

OIL/GRIT SEPARATOR SIZING CALCULATIONS

APPENDIX F: FLOODPLAIN ANALYSIS

COMPARISON OF PRE AND POST DEVELOPMENT FLOOD LEVELS

APPENDIX G: INSITU PERMEAMETER TESTING (CMT ENGINEERING INC., OCTOBER 23, 2020)

MONTHLY WATER BALANCE

MONTHLY ENHANCED INFILTRATION



CITYVIEW RIDGE SUBDIVISION

PRELIMINARY SERVICING AND STORMWATER MANAGEMENT REPORT

AUGUST 2021

GMBP FILE: 105172

1. 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, GM BluePlan Engineering 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, December 9, 2015, and November 1, 2017).

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

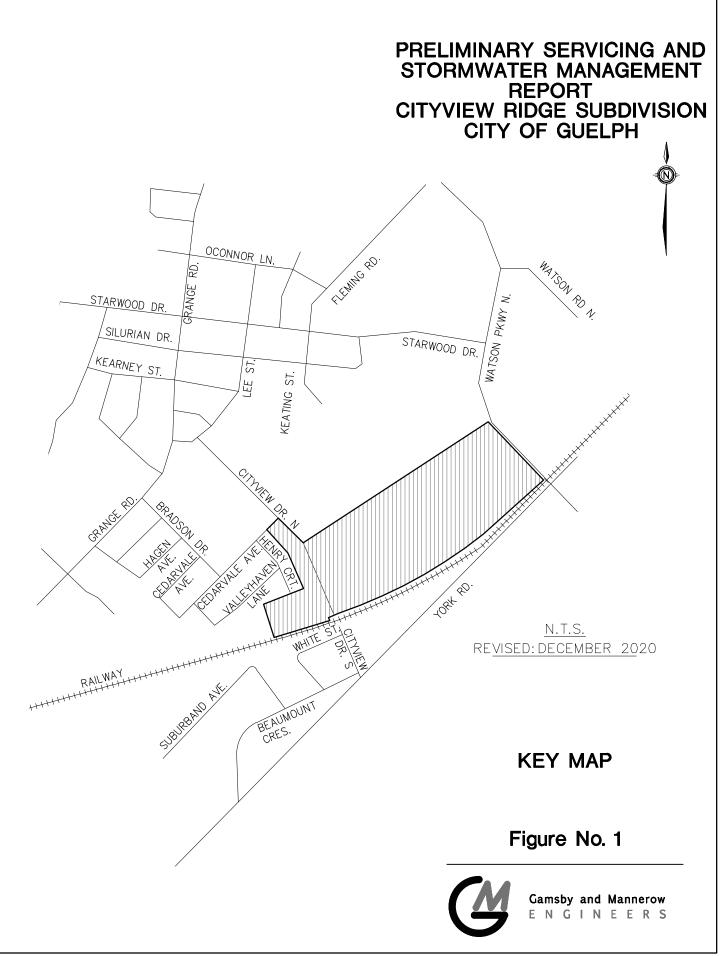
- Final Stormwater Management Design Report for the Southern Hadati Creek Watershed prepared by Schaeffus Consulting Engineers (May 1997).
- Stormwater Management Design Report Draft Plan 23T-96501 and 23T-99501 Martini/Valeriote Subdivision prepared by Gamsby and Mannerow Limited (March 2004).
- Clythe 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. (July 2017 Amendment).
- Environmental Impact Study prepared by North-South Environmental Inc. (January 21, 2021 update memorandum)
- Hydrogeological Investigation prepared by Banks Groundwater Engineering Limited (November 2014).
- Geotechnical Investigation prepared by Naylor Engineering Associates Limited (February 2012).
- Slope Stability Assessment of East-Facing Slope prepared by Englobe Corp. (December 14, 2020).
- Slope Stability Assessment of South-Facing Slope prepared by Englobe Corp. (March 1, 2019).

Together, these reports form the overview for the design and development of the Cityview Ridge lands. Please note that some of these reports pre-date the current draft plan, though the findings of these reports are not affected by the change.

The following sections will describe the grading, servicing and stormwater management design for the Cityview Ridge Subdivision. At a later date, further details of the Erosion and Sediment Control Plan and Monitoring plan will be provided in an Environmental Impact Report.

2. LOCATION

Figure 1 shows the location of the Cityview Ridge Subdivision and the surrounding area. The site is bound by lands which have been draft plan approved 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.



Plotted On: December 10, 2020 105172-FIG1.dwg



3. 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 have currently received draft plan approval and are being developed for residential purposes. 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. East of Cityview Drive, the southwesterly portion of the site drains towards Clythe Creek via the roadside ditch along Cityview Drive. 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.

Along Cityview Drive there is an existing roadside ditch which conveys flows from the road and the southwest corner of the site 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.

Permeameter testing at various locations throughout the site was completed in October 2020 by CMT Engineering Inc., further discussion regarding these testing results is discussed in Section 4.8.

Further discussion regarding the on-site soils can be found in Section 3.2 of the Environmental Impact Study completed by North-South Environmental Inc.

4. **PROPOSED DEVELOPMENT**

The Draft Plan of Subdivision prepared by Black Shoemaker Robinson & Donaldson Limited (May 25, 2020) (Figure 2) illustrates the proposed lot fabric and road network. Cityview Drive will serve as the main connection and access point for this development.

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 lands to the north and the CN Railway lands to the south. We note that no grading is proposed east of the total development setback from the easterly steep slopes. Additionally, there is no grading proposed within the natural features and the buffers of the natural features.

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. There will be no grading within the natural features and the buffers of the natural features with the exception of the following,

- Grading to permit construction of the cooling and energy dispersion structure.
- Construction of the trail.
- Encroachment during construction of the retaining wall at the rear of Lots 65-79.

To facilitate development of the site while minimizing impacts on the adjacent natural areas and in order to match existing elevations at the limits of the development, retaining walls have been proposed to reduce or eliminate grading encroachments into the natural areas. To minimize the construction footprint during the construction of the retaining walls, only small (ex. Mini excavator) equipment shall be used when adjacent to the protected natural areas. Additionally, prior to construction of the retaining walls, the natural areas will be flagged and a minimum of one row of heavy-duty silt fence will be placed along the boundary of the natural area to provide protection from sediment runoff during construction of the retaining walls.

At the southwest corner of the site, the existing silt fence has failed and allows flows from the site to discharge, freely to the existing roadside ditch. The additional discharge from the Cityview Ridge lands compounds the existing erosion and sediment issues on Cityview Drive. Prior to construction, it is recommended that the silt fence be repaired, a second layer of silt fence installed along with straw bales to reduce discharge velocities to the existing roadside ditch. Should any additional sediment and erosion control measures be required in this area, they should be explored during the detailed design of the reconstruction of Cityview Drive.



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 and 3 are proposed to 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 one side of each street.

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 150 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 and the remainder of the Cityview Ridge Subdivision. A looped connection has been provided for Street No. 3, Street No. 1 and 2 will have a looped connection completed upon connection the to proposed watermain on the lands to the north

Water supply for Blocks 116 and 126 will be provided to property line via a connection to the proposed watermain in the adjacent rights-of-way.

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.

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. 3, and the westerly reach of Street No. 1 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 western 11.1-ha of the Cityview Ridge Subdivision. The storm sewers along the remainder of Street No. 1 and the easterly portion of Street No. 3 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 rights-of-way 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 rights-of-way 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 Programs. 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 rights-of-way (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 Permeameter Testing

As per the City of Guelph Development Engineering Manual, in-situ permeameter testing was completed on-site. The field investigation was completed by CMT Engineering Inc. on September 30 and October 1, 2020 and the report can be found in Appendix G.

Conservative infiltration rates were calculated for the soils at the bottom of the infiltration structure, and any different soils encountered within 1.5m of the bottom of the infiltration structures. As shown in the attached report, infiltration is not suitable for Lots 1-11 due to wet soil conditions, and for Lots 80-102 and Blocks 114-115 due to poor infiltration rates of 0.2-0.3mm/hr. Infiltration galleries have been proposed in the rear yards of the remaining lots and blocks for the infiltration of rooftop runoff. Further discussion on the site water balance is discussed in Section 4.9.

4.9 Slope Stability Assessment

Updated slope stability analysis' have been completed for the south and east facing steep slopes adjacent to the development, specifically, the slopes adjacent to the rail corridor and Lots 65 to 79. The results of the updated slope stability analysis' have been included in Appendix B. Three cross sections of the east-facing slope were analysed to determine the location of the top of stable slope with a factor of safety of 1.5. The total development setback of 7.0m from the top of slope of the east-facing slope is required. As shown on Drawing No. 2 of the Englobe Report and the Preliminary Grading and Drainage Plan (GP-2), no portion of the development is proposed to be within the total development setback of the east facing slope.

Four sections of the south facing slope were analysed to determine the location of the top of stable slope with a factor of safety of 1.5. The resultant total development setback is indicated on Drawing No. 1 of the report prepared by Englobe Corp. and the Preliminary Grading and Drainage Plan (GP-1). As shown on the Preliminary Grading and Drainage Plan (GP-1), no portion of the development is proposed to be within the top of stable slope, or the 6.0m setback from the top of stable slope.

4.10 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 41,772 m³. Under post-development conditions, the annual natural groundwater recharge occurring on-site is estimated to be 23,953 m³.

Under existing conditions, the annual average runoff from the site is estimated to be 32,109 m³. 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 60,909 m³ per year.

Enhanced infiltration has been proposed to reduce the difference between existing and post-development condition infiltration volumes. Enhanced infiltration for rooftop runoff under post-development conditions has been provided in the rear yard of as many lots as possible. The result of the rear yard infiltration galleries (0.5m deep, 2.0m wide and varying length) is an additional 11,121 m³, of infiltration, bringing the post-development total to 35,074 m³.

The estimated existing and post-development recharge and runoff volumes for the Cityview Ridge Subdivision are detailed in Table 1. In summary, the estimated recharge and runoff volume for the Cityview Ridge Subdivision are as follows:

| | Existing Condition | Post-Development Condition | Percentage Change |
|--------------------------|-----------------------|-------------------------------|-------------------|
| Total Estimated Recharge | 41,772 m ³ | 35,074 m ³ | -16% |
| Total Estimate Runoff | 32,109 m ³ | 60,909 m ³ | +90% |

Table No. 1: Summary of Recharge and Runoff Volume

As shown in the above table, the estimated recharge under post-development conditions is approximately 16% below the pre-development levels. We understand the City of Guelph wishes to have a balance of post and predevelopment recharge levels. As discussed in Section 4.8, due to soils which are not suitable for infiltration at Lots 1-11, 80-102 and Blocks 114-115, a 16% post-development recharge deficit is as close as possible to matching pre-development recharge levels.

5. 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 consist of rear yard infiltration galleries along with rear and side yard swales.

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, 11.1hectares 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.

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 Cityview Ridge Subdivision will be directed to the proposed stormwater management facility. 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.

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

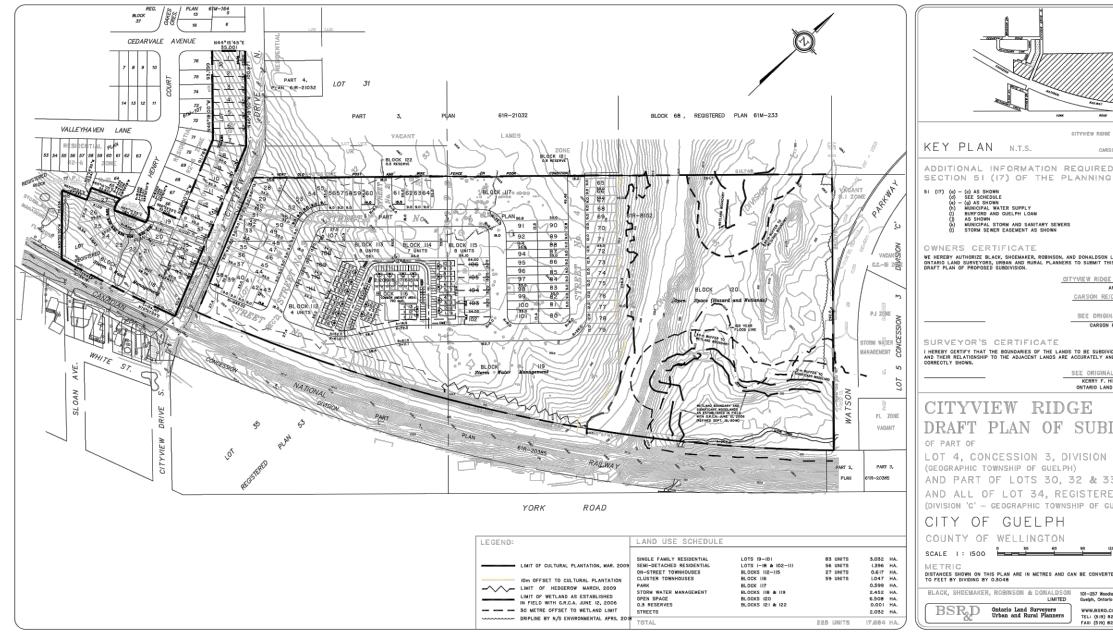
5.1 Stormwater Management Criteria

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

- Stormwater Management Planning and Design Manual, 2003
- Design Principles for Stormwater Management Facilities, 1996
- Eastview Secondary Plan and Addendum, 1991 and 1992
- The Interim Stormwater Quality Control Guidelines, 1991
- The Stormwater Quality Best Management Practices Manual, 1991
- The MTO Drainage Management Technical Guidelines, 1989
- The Ontario Urban Design Guidelines, 1987

The objectives of the stormwater management plan are as follows:

- 1. Provide enhanced (80% TSS) quality control by pre-treating the runoff prior to discharge to the receiving outlet.
- 2. Provide quantity control for a range of design storms.
- 3. Route the major storm to minimize flood damage to public and private lands.



PRELIMINARY SERVICING AND STORMWATER MANAGEMENT REPORT CITYVIEW RIDGE SUBDIVISION CITY OF GUELPH

| , |
|---|
| |
| |
| |
| |
| AL BAY |
| 1040 |
| LANDS OF |
| LANDS OF |
| IRED UNDER |
| NING ACT |
| |
| |
| |
| |
| |
| |
| LDSON LIMITED, BMIT THIS |
| RIDGE DEVELOPMENTS INC. |
| AND IN REID HOMES LTD. |
| eres reporter differilitional in 2.864. |
| ORIGINAL SUBMISSION |
| CARSON REID |
| - |
| SURDIVIDED |
| SUBDIVIDED TELY AND |
| RIGINAL SUBMISSION |
| RY F. HILLIS 10 LAND SURVEYOR |
| |
| |
| |
| JBDIVISION |
| ON 'C' |
| VIA C |
| \$ 33 |
| ERED PLAN 53 |
| |
| OF GUELPH) |

| 120 | WETRES | |
|-----|--------|--|
| | | |

| 257 Woodlawn Rd. W. ah, Ontario N1H^8J1 | DATE: DECEMBER 8, 2020 |
|--|---------------------------|
| | DRAWN BY: KS |
| W.BSRD.COM | PROJECT |
| : (519) 822-4031 : (519) 822-1220 | 16-14-214-00- |

<u>N.T.S.</u> RE<u>VISED: DECEMBER_20</u>20

DRAFT PLAN OF SUBDIVISION

Figure No. 2





- 4. 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.
- 5. Complete a Water Balance Analysis in order to evaluate total system water loss and identify measures to reduce those losses.
- 6. 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:

| | 2-Year | 5-Year | 25-Year | 100-Year |
|---------------------|--------|---------|---------|----------|
| а | 743.0 | 1,593.0 | 3,158.0 | 4,688.0 |
| b | 6.0 | 11.0 | 15.0 | 17.0 |
| с | 0.799 | 0.879 | 0.936 | 0.962 |
| r | 0.400 | 0.400 | 0.400 | 0.400 |
| Duration (min) | 170 | 170.0 | 210.0 | 210.0 |
| Rainfall Depth (mm) | 33.816 | 46.775 | 69.476 | 88.83 |

Table No. 2: Chicago Rainfall Parameters

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

| | Impervious Areas | Previous 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 | 5.0 mm | | | |

Table No. 3: Horton Infiltration Parameters

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 Infiltration Galleries

The driveways and front yards will drain to the street. The rear yard will generally drain to the rear of the lot. The runoff for any event large enough to generate flow to the swale system will be adequately filtered by the grass enroute.

The roof runoff will be directed to proposed rear-yard infiltration galleries. As roof runoff is generally considered to be "clean" runoff, no quality control treatment is required.



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

In order to provide more infiltration under post-development conditions, lot level infiltration galleries have been proposed in the rear yards. These galleries are 0.5m deep, 2.0m wide and vary in length, they will be placed at a depth of 1.2m below ground in order to be operable year-round.

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.

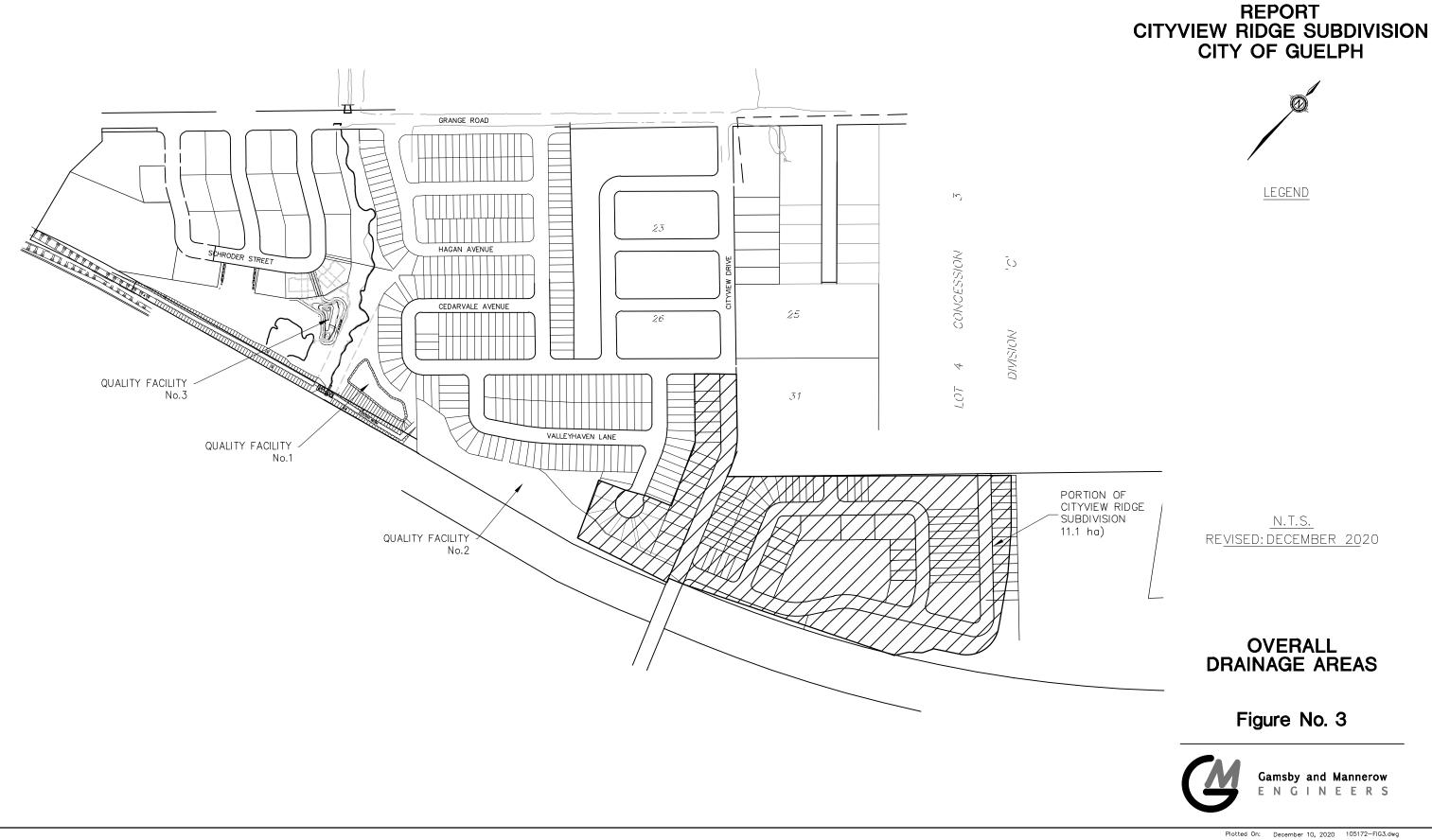
5.2.3 Proposed Stormwater Management Facility

Runoff generated from the central portion of the Cityview Ridge Subdivision will be directed towards the proposed stormwater management facility for quantity and quality control prior to discharging to Clythe Creek. A multistage outlet structure consisting of a 90 mm diameter knockout, a 375 mm diameter outlet pipe and a 10.0metre-wide overflow weir will attenuate runoff prior to discharging to the cooling trench and energy dissipation/ dispersion structure.

Quality control will be provided by a sediment forebay and the permanent pool of the Stormwater Management Facility. 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 m³/ha of storage volume for a contributing drainage area that is approximately 65% impervious. Of the 115m³/ha required, 40m³/ha of the required storage volume represents the extended detention storage volume, while the remaining 75 m³/ha represents the permanent pool storage volume. Therefore, 134m³ and 251m³ of storage are required in extended detention and permanent pool, respectively. The proposed facility has been designed with approximately 3,426.2m³ of extended detention below the weir and 715.2m³ of permanent pool storage.

5.2.4 Cooling Trench and Dispersion Structure

As part of the stormwater management design for the Cityview Ridge Subdivision, thermal mitigation and flow dispersion are required prior to flow discharging to Clythe Creek. Following discharge from the proposed stormwater management facility, flows are directed to the proposed cooling trench and energy dispersion structure. The proposed cooling trench and energy dispersion structure (25 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 (25 m) overland towards the plantation and provincially significant wetland.



PRELIMINARY SERVICING AND STORMWATER MANAGEMENT REPORT





The proposed cooling trench and energy dispersion structure will also act as a cooling trench to reduce the temperature of the stormwater runoff discharging towards the plantation and provincially significant wetland. Detailed calculations for the proposed cooling trench and energy dispersion structure provided in Appendix "E".

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.

It is recommended that the area downstream of the energy dispersion structure be monitored following major storm events to ensure that no erosion down gradient of the structure has occurred.

5.2.5 End of Pipe Controls

a) Existing Conditions

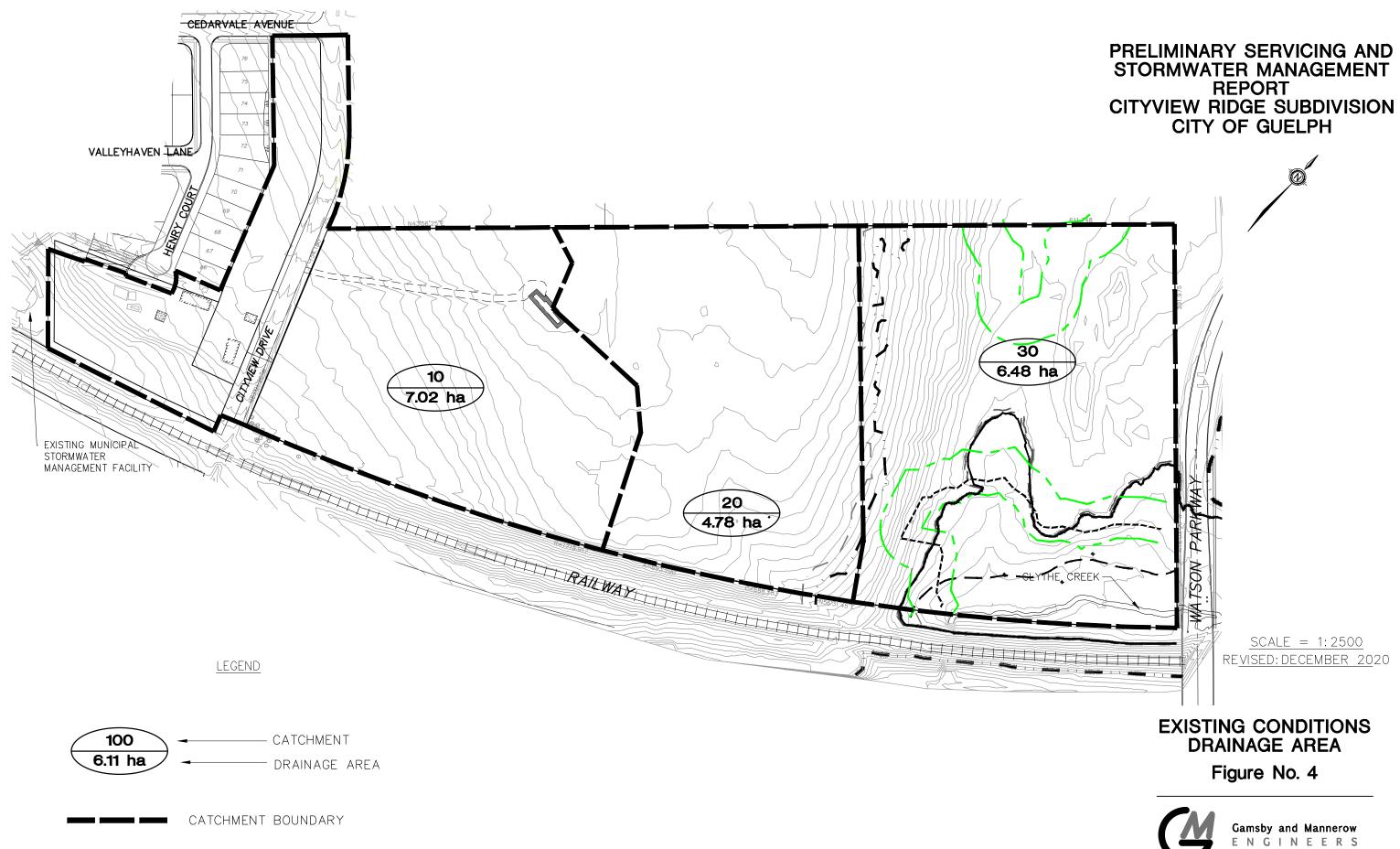
Under existing conditions, the site consists of two (2) existing buildings and various other buildings, with the remainder of the site being open space. For hydrologic modelling purposes, the site was modelled as three (3) catchments. These catchments, which include the Cityview Drive right-of-way, are 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 the westerly portion 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. Runoff generated by the eastrly portion of Catchemnt 10 is intercepted by the existing ditch on Cityview Drive, and ultimately discharges to Hadati Creek.

Catchment 20 (4.78 hectares, 0% impervious) represents the central portion of the site. Runoff generated from Catchment 20 currently discharges to the existing drainage swale ultimately discharging to Clythe Creek.

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: Exis | | ition Flow Rate | | | | |
|------------------------------------|---------|--------------------------|---------|---------|---------------------|--------------------|
| | | Catchments | | | | |
| | 10 | Total to Ex. SWM Pond | 20 | 30 | Total to Wetland | 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 | 1 | | | | | |
| 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 |

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

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 m³/s |
| 5-Year | 0.929 m³/s |
| 25-Year | 1.689 m³/s |
| 100-Year | 2.246 m ³ /s |
| Regional Storm | 0.587 m³/s |



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

| Allowable Release Rate | | |
|------------------------|------------|--|
| 2-Year | 0.127 m³/s | |
| 5-Year | 0.772 m³/s | |
| 25-Year | 2.192 m³/s | |
| 100-Year | 3.425 m³/s | |
| Regional Storm | 0.936 m³/s | |

Table No. 6: Allowable Release Rates from the Cityview Ridge Subdivision to the existing Wetland

Therefore, post-development flows generated by the site which discharge to the existing wetland, and ultimately Clythe Creek, will be attenuated to the allowable release rates above.

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 in the Cityview.

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 residential lands 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 for stormwater runoff generated from Catchments B2c and B2a, respectively.

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 (3.44 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 the proposed energy dissipation/dispersion structure and provincially significant wetland. Quantity control for Catchment 201 will be provided by the proposed stormwater management facility. A multi-stage outlet structure consisting of a 230 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 and the permanent pool of the Stormwater Management Facility. 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 m³/ha of storage volume for a contributing drainage area that is approximately 65% impervious. Of the 115m³/ha required, 40m³/ha of the required storage volume represents the extended detention storage volume, while the remaining 75 m³/ha represents the permanent pool storage volume. Therefore, 134m³ and 251m³ of storage are required in extended detention and permanent pool, respectively. The proposed facility has been designed with approximately 3,426.2m³ of extended detention below the weir and 715.2m³ of permanent pool storage.

Catchment 202 (0.98 hectares, 25% impervious, c=0.25) represents the rear yards of Lots 65-79 including the rooftops, rear yard areas and open space areas of the proposed development.

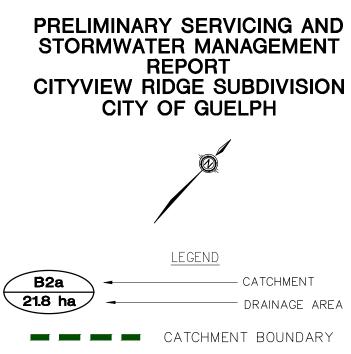
Runoff generated from Catchment 202, including the rooftops and rear yards, will be directed to the energy dissipation/dispersion and cooling structure prior to discharge to Clythe Creek.

Quality control treatment for runoff generated from Catchment 202 is not required as runoff generated by rooftops and grassed surfaces is considered "clean" runoff.

Catchment 300 (6.48 hectares, 0% impervious) represents the remainder of development area which consists of open space area and an area along Watson Parkway. Runoff generated from Catchment 300 will continue to sheetflow uncontrolled to Clythe Creek.

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.





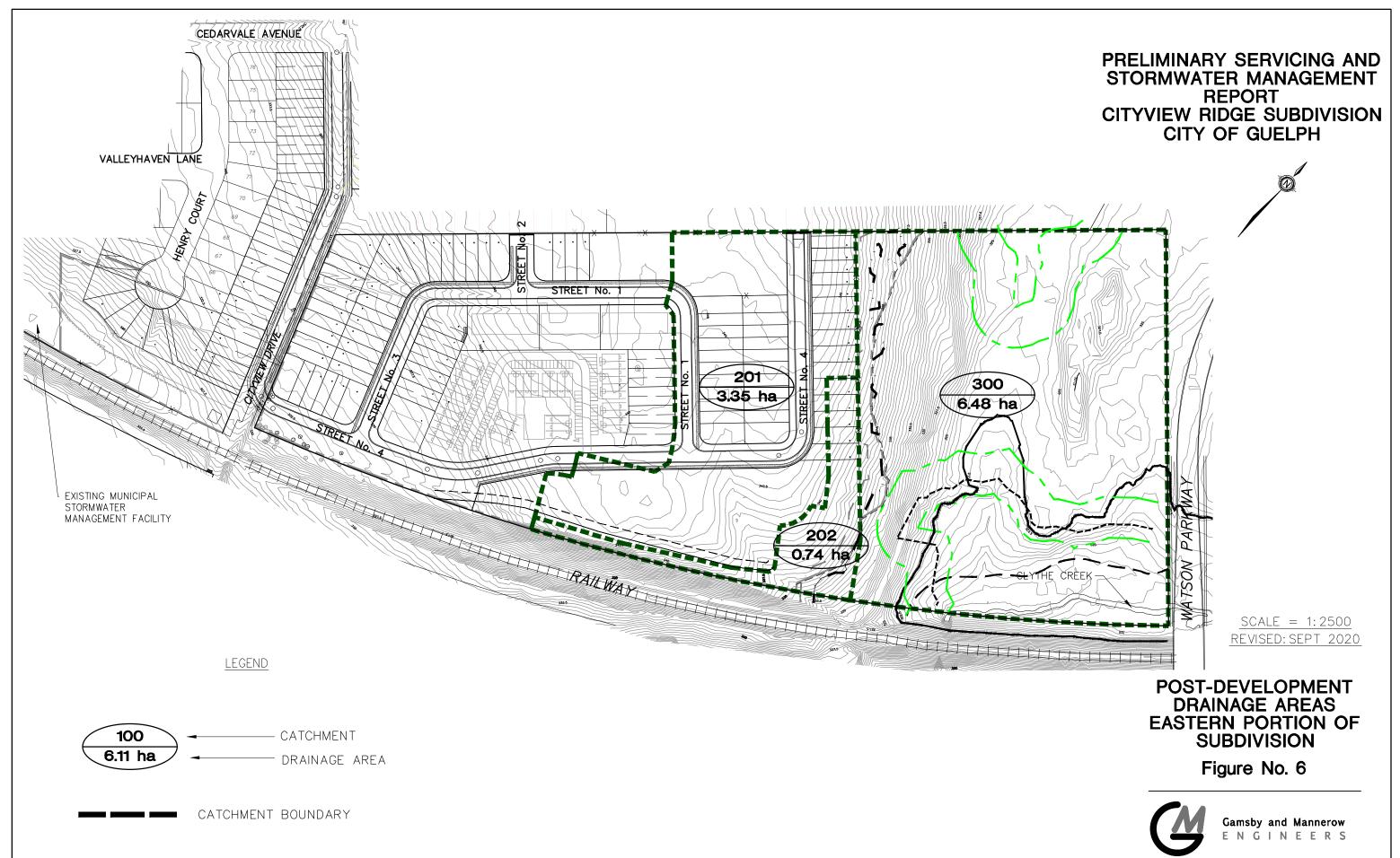


POST-DEVELOPMENT DRAINAGE AREAS WESTERN PORTION OF SUBDIVISION

Figure No. 5



Gamsby and Mannerow ENGINEERS





| | | Catchments | | | | |
|------------------------------------|----------|--------------------------|---------|---------|---------|--------------------------------------|
| | B2c | Total to Ex. SWM Pond | 201 | 202 | 300 | Total to Wetland/ Clythe Creek |
| 2-Year | | | | | | |
| Flow Rate (m ³ /s) | 0.211 | 0.211 | 0.500 | 0.055 | 0.073 | 0.628 |
| Runoff Volume (m ³) | 563.2 | 563.2 | 737.05 | 93.44 | 136.55 | 967.0 |
| 5-Year | | | | | | |
| Flow Rate (m ³ /s) | 0.674 | 0.674 | 0.681 | 0.091 | 0.444 | 1.216 |
| Runoff Volume (m ³) | 1,756.9 | 1,756.9 | 1,128.8 | 189.1 | 704.5 | 2,022.4 |
| 25-Year | | | | | | |
| Flow Rate (m ³ /s) | 1.177 | 1.177 | 1.084 | 0.223 | 1.261 | 2,568 |
| Runoff Volume (m ³) | 2,791.2 | 2,791.2 | 1,846.0 | 375.07 | 1,856.3 | 4,077.4 |
| 100-Year | | | | | | |
| Flow Rate (m ³ /s) | 1.563 | 1.563 | 1.482 | 0.340 | 1.971 | 3.793 |
| Runoff Volume (m ³) | 3,650.7 | 3,650.7 | 2,471.0 | 543.2 | 2,946.5 | 5,960.7 |
| Regional Storm | | | | | | |
| Flow Rate (m ³ /s) | 0.928 | 0.928 | 0.379 | 0.089 | 0.538 | 1.006 |
| Runoff Volume (m ³) | 10,099.4 | 10,099.4 | 6,419.5 | 1,170.3 | 5,054.9 | 12,644.7 |

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

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.



| Stage/Velocity/Depth of Flow | | | | | | |
|------------------------------|---------------------|------------------------------|----------------------|---------------------|------------------------------|----------------------|
| | Available Capacity | | | Actual Capacity | | |
| | Peak Flow (m³/s) | Channel Velocity (m/s) | Depth of Flow (m) | Peak Flow (m³/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 |
| 100-Year | | | | 2.856 | 2.18 | 0.46 |
| 25-Year | | | | 3.746 | 2.33 | 0.52 |
| Top of Bank | 16.90 | 3.38 | 1.00 | | | |

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

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

| | Available Capacity | | | Actual Capacity | | |
|-----------------------------|----------------------------------|--|-----------------------------|----------------------------------|--|-----------------------------|
| | 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 | 0.000 | 0.0 | 339.35 | | | |
| Top of Permanent Pool | 0.000 | 0.0 | 339.75 | | | |
| 2-Year | | | | 0.039 | 535.2 | 339.99 |
| 5-Year | | | | 0.056 | 861.8 | 340.13 |
| CB Lip | 0.069 | 1,178.1 | 340.25 | | | |
| 25-Year | | | | 0.222 | 1,303.9 | 340.30 |
| Regional Storm | | | | 0.315 | 1,405.3 | 340.28 |
| 100-Year | | | | 0.415 | 1,564.6 | 340.39 |
| Weir | 0.470 | 3,426.2 | 340.95 | | | |
| Top of Bank | 5.622 | 5,487.8 | 341.45 | | | |



| | Available Capacity | | | Actual Capacity | | |
|--------------------|----------------------------------|--|-----------------------------|----------------------------------|--|-----------------------------|
| | 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 | 0.000 | 0.0 | 337.05 | | | |
| Overflow Pipe | 0.00005 | 14.8 | 337.70 | | | |
| 2-Year | | | | 0.009 | 14.80 | 337.70 |
| 5-Year | | | | 0.011 | 14.82 | 337.70 |
| 25-Year | | | | 0.243 | 15.28 | 337.73 |
| Regional Storm | | | | 0.319 | 15.43 | 337.74 |
| 100-Year | | | | 0.416 | 15.62 | 337.75 |
| Top of Stone | 0.421 | 20.60 | 338.05 | | | |

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

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

| | Inlet | | Οι | | |
|-------------------|----------------------------------|----------------|---------------------|----------------|-------------|
| | Peak Flow (m ³ /s) | Velocity (m/s) | Peak Flow (m³/s) | Velocity (m/s) | % Reduction |
| 2-Year | 0.009 | 1.039 | 0.009 | 0.119 | 88.5% |
| 5-Year | 0.011 | 1.087 | 0.011 | 0.129 | 88.1% |
| 25-Year | 0.243 | 23 | 0.243 | 0.407 | 84.7% |
| Regional Storm | 0.317 | 2.918 | 0.319 | 0.447 | 84.7% |
| 100-Year | 0.416 | 3.031 | 0.416 | 0.487 | 83.3% |

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

| | Allowable Release Rates to Existing SWM Pond | Post Development Flow Rates to Existing SWM Pond (Catchment B2c) |
|----------|---|--|
| 2-Year | 0.294 m³/s | 0.212 m ³ /s |
| 5-Year | 0.929 m³/s | 0.679 m³/s |
| 25-Year | 1.689 m ³ /s | 1.186 m³/s |
| 100-Year | 2.246 m ³ /s | 1.576 m³/s |



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.

| | Allowable Release Rates to the existing Wetland | Post Development Flow Rates to the existing Wetland |
|----------------|--|--|
| 2-Year | 0.127 m³/s | 0.126 m³/s |
| 5-Year | 0.772 m³/s | 0.575 m³/s |
| 25-Year | 2.192 m³/s | 1.511 m³/s |
| 100-Year | 3.425 m ³ /s | 2.535 m ³ /s |
| Regional Storm | 0.936 m³/s | 0.934 m³/s |

Table No. 13: Comparison of Allowable and Post-Development Condition Flows Discharging to the existing Wetland

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

5.2.6 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 rights-of-way 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.

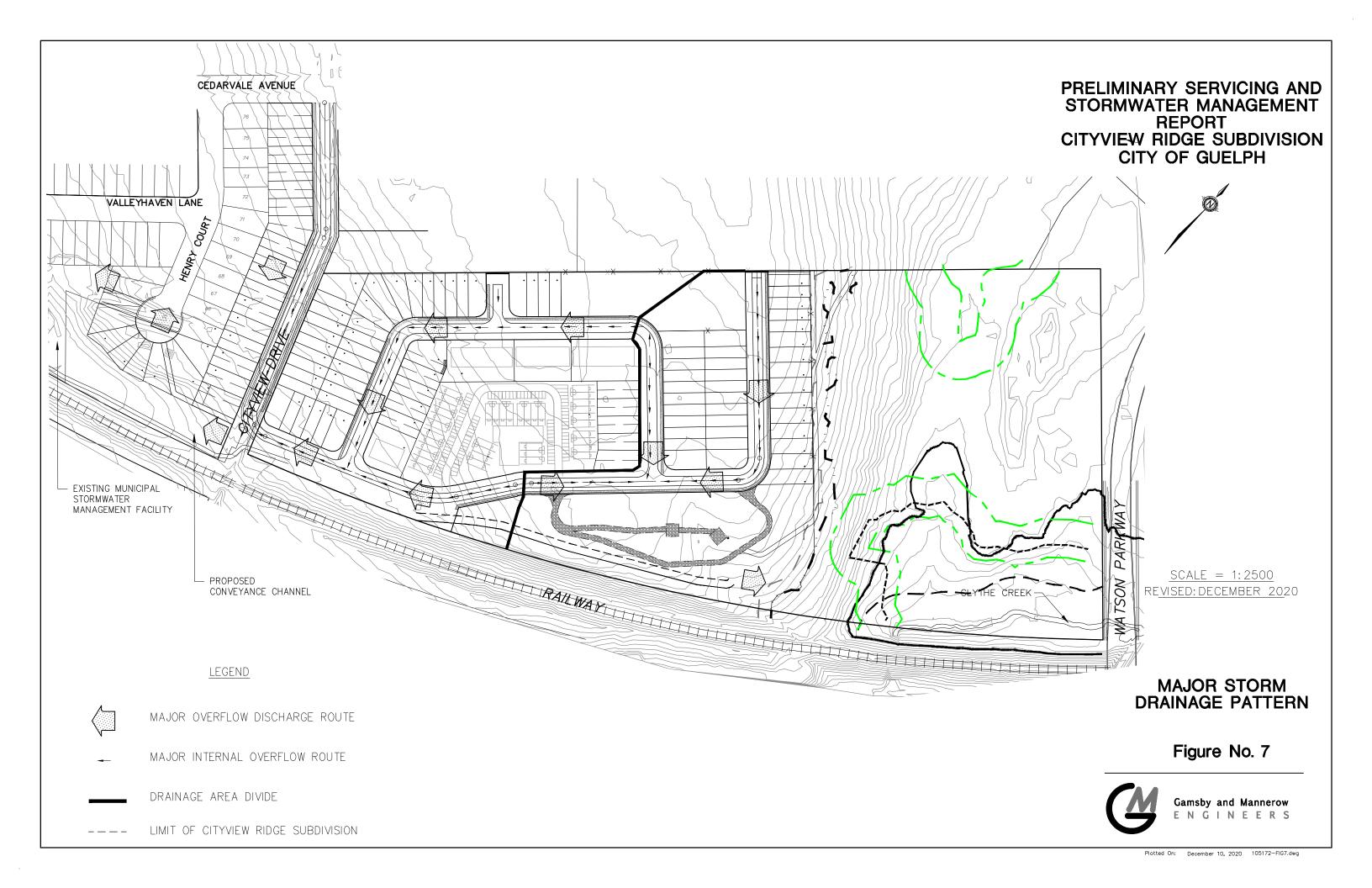
5.2.7 Floodplain Analysis

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, 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'.





6. SEDIMENT AND EROSION CONTROL PLAN

A silt fence will be installed along the property boundary and along the outer edge of buffers to the Natural Heritage System as identified in the Memorandum to the Environmental Impact Study (North-South Environmental Inc. 2021). 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 m³/hectare of active and dead storage required. A heavy-duty silt fence will be placed around the proposed stormwater management facility during construction.

As previously discussed, the southwest corner of the site currently serves as a discharge point for the site. Prior to construction, a temporary sediment pond will be constructed for sediment collection prior to flows discharging from the site to the existing roadside ditch and ultimately Clythe Creek. The design of this temporary sediment pond will be completed at the detailed design stage for the Cityview Ridge Subdivision.

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. A full detailed design and monitoring program will be provided in the future Environmental Impact Report.

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

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. 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.

Phase II will be the maintenance carried out 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. This work will be carried out by the Consultant and/or the Environmental Inspector. A monthly status report will be prepared and distributed to the City of Guelph.

8. CONCLUSIONS

From the foregoing analysis, the following conclusions and recommendations are drawn:

- 1. Water supply for the proposed Cityview Ridge Subdivision will be provided by:
 - the extension of the existing 150 mm diameter watermain on Henry Court,
 - the extension of the existing 200 mm diameter watermain southerly on Cityview Drive,
 - the extension of the existing 150 mm diameter watermain from the existing municipal stormwater management facility to the Cityview Drive right-of-way, and
- 2. Sanitary service for the Cityview Ridge Subdivision will be provided by:
 - the extension of the existing 200 mm diameter sanitary sewer on Henry Court,
 - 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.
- 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.
- 6. 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 the existing wetland and ultimately Clythe Creek.
- 7. Following the installation of rear yard infiltration galleries in many of the lots, the recharge volume under post-development conditions is 19% lower than under existing conditions. If not for saturated ground conditions near Lots 1-11, and poor infiltration rates for Lots 80-106 and Blocks 114 and 115. The post-development recharge deficit may have been brought to 4%.
- 8. The floodplain storage volume has been maintained under post-development conditions to ensure that the hazard to the public is minimized.
- 9. The stormwater management systems meet the current Provincial and Municipal guidelines.
- 10. 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.



- 11. Tree protection measures to be undertaken are as follows,
 - Protective fencing should be installed prior to any grading or site clearing and should remain in place until all site work has been completed. Wherever possible fencing should be installed at the drip-line plus 1 m from the canopy edge of retained trees.
 - Proper root pruning should be undertaken when and if roots of retained trees are exposed by construction activities. Exposed roots should be covered with soil or mulch to the extent possible, as soon as possible following damage to prevent further damage and desiccation.
 - Trees to be retained should be monitored and reported on as part of the regular environmental inspections undertaken throughout the construction period.
 - In the instance construction activities are taking place in close proximity to the drip-line of trees (e.g., the installation of the stormwater dissipation/dispersion structure) smaller machinery is recommended in order to minimize soil compaction and reduce the construction envelope required.
 - Within the area proposed for tree retention there should be no:
 - grade changes;
 - dumping, stockpiling or storage of any materials;
 - parking or storage of any machinery or equipment;
 - disposal of waste, garbage, brush or stumps or any burning of materials or disposal of ashes; or
 - use of any machinery without prior approval from the City.
 - Monitor trees along the northern property line for potential impact
- 12. It is recommended that if access for construction is required down-slope of the dissipation/dispersion structure, that only small machinery (e.g., bobcat or similar) be used to minimize the potential for encroachment in the buffer.
- 13. A heavy-duty (Type 2) silt fence be installed during the construction of the energy dissipation/dispersion structure.
- 14. It is recommended that construction of the retaining wall behind lots 65-79, and the stormwater dissipation/dispersion structure, be undertaken outside of the breeding season (mid May to mid July) to reduce the possibility of impacts to locally significant bird species. If this is not possible, a field investigation to determine if any locally significant bird species are breeding near the proposed construction should be undertaken to determine if construction should proceed.

All of which is respectfully submitted.

GM BLUEPLAN ENGINEERING LIMITED Per:

yukidr?

Angela Kroetsch, P.Eng. AK/pg Encl.



W:\Guelph\105-2005\105172\Documents\Reports, Manuals, Contracts\105172 SWM Design Report_Revised Aug 2021 - 2021-08-30.docx

APPENDIX A:

GEOTECHNICAL INVESTIGATION NAYLOR ENGINEERING ASSOCIATES LTD. (FEBRUARY 2012)

105172

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

0353G4.R01_Rev. February 2012

DISTRIBUTION: 1ec: Client 1ec: Gamsby & Mannerow Limited 1cc: File

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

Page

| 1. Intr | roduction1 | |
|-----------------------|---------------------------------|---|
| 2. Invo 2.1 2.2 | estigation Procedure | L |
| 3. Site | e Conditions |) |
| 3.1 | Site Description2 | |
| 3.2 | Subsurface Soil Conditions | ; |
| 3.2. | | ; |
| 3.2. | 2 Sand and Gravel | 3 |
| 3.2. | .3 Silt Till | ł |
| 3.3 | Groundwater | ł |
| 4. Disc | cussion and Recommendations | ł |
| 4.1 | Site Grading5 | 5 |
| 4.2 | Site Servicing | |
| 4.3 | Pavement Design | 7 |
| 4.4 | House Foundations | 3 |
| 4.5 | Stormwater Management | |
| 4.6 | Commercial/Industrial Buildings | |
| 4.7 | Slope Stability Assessment | |

List of Abbreviations

Figure 1 – Particle Size Distribution Curves Figures 2 and 3 – Standard Proctor Moisture-Density Test Results

Borehole Logs – Boreholes 101 through 110

- Drawing 1 Location Plan
- Drawing 2 Site Plan
- Drawing 3 Slope Stability A-A'
- Drawing 4 Typical Structural Fill Pad Detail
- Drawing 5 Typical Pavement Subdrain Detail

0353G4.R01_Rev.

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/m³ and 2.185 t/m³ 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 onsite 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.

0353G4.R01_Rev.

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 = $6.5\% \pm 1.5\%$

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 wellcompacted 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.

0353G4.R01_Rev.

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 retopsoiled 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 | Unit Weight | Angle of | Cohesion |
|-----------|----------------------|-------------------|----------|
| Material | (kN/m ³) | Internal Friction | (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 Safcty of 1.50 (m) | | Erosion Access Allowance Setback (m) | Total Development Setback from Top of Slope (m) | |
|---------------|--|---|---|---|--|
| A-A' | 0 | 1 | б | 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,

Neal Morris, B.Sc. (Img) ib/imp

PROFESSIONAL SL D. S. NAYLOR 33646761 2012-02-HOUNCE OF ONTARIO Dave S. Naylor, P.Bng. Senior Consulting Phgineer

0353G4.R01_Rev.

LIST OF ABBREVIATIONS

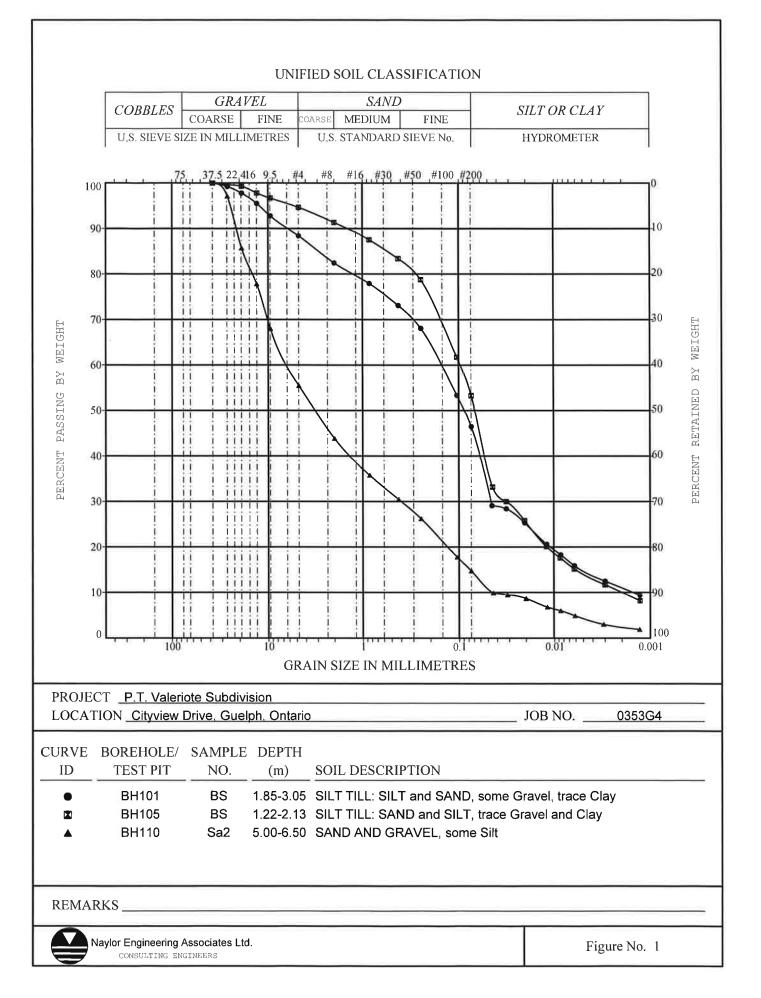
The abbreviations commonly employed on the borehole logs, on the figures, and in the text of the report, are as follows:

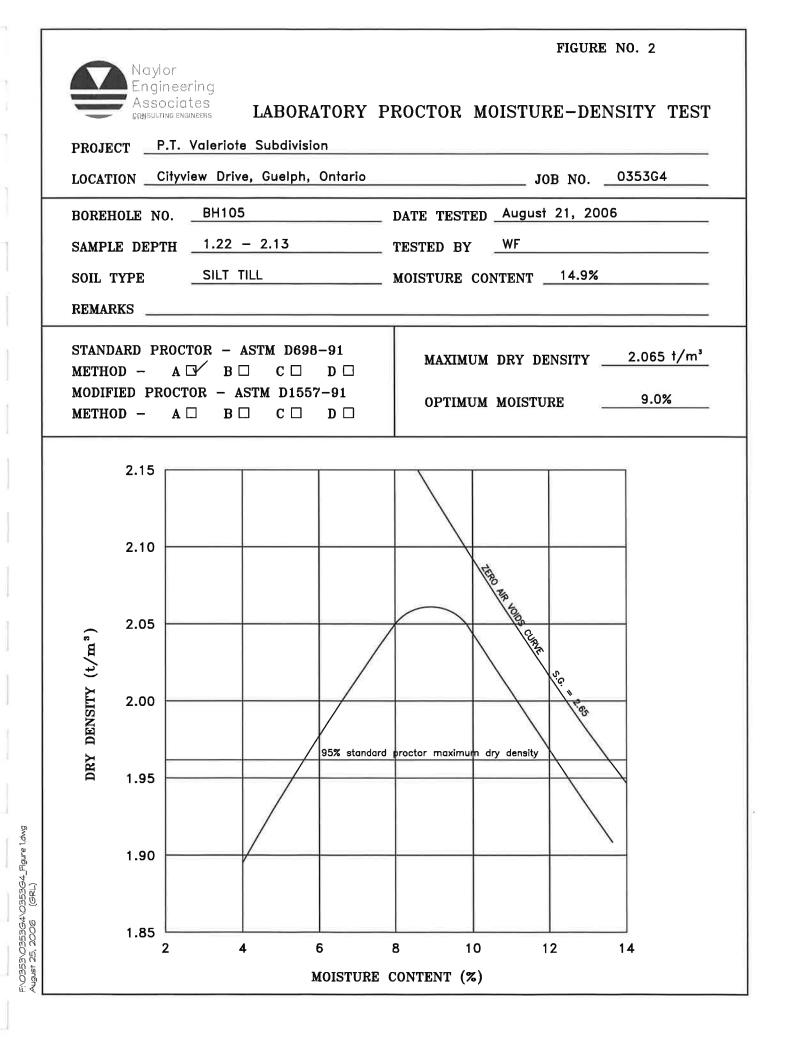
| | Sample Types | | Soil Tests and Properties | | | | |
|----------------------------------|--|--|---|--|--|--|--|
| AS CS RC SS TW WS | auger sample chunk sample rock core split spoon thin-walled, open wash sample | SPT UC FV Ø γ w _p W | Standard Penetration Test unconfined compression field vane test angle of internal friction unit weight plastic limit water content | | | | |
| | | $egin{array}{c} \mathbf{W}_1 & & \ \mathbf{I}_{\mathcal{L}} & & \ \mathbf{I}_{\mathbf{p}} & & \ \mathbf{PP} \end{array}$ | liquid limit liquidity index plasticity index pocket penetrometer | | | | |

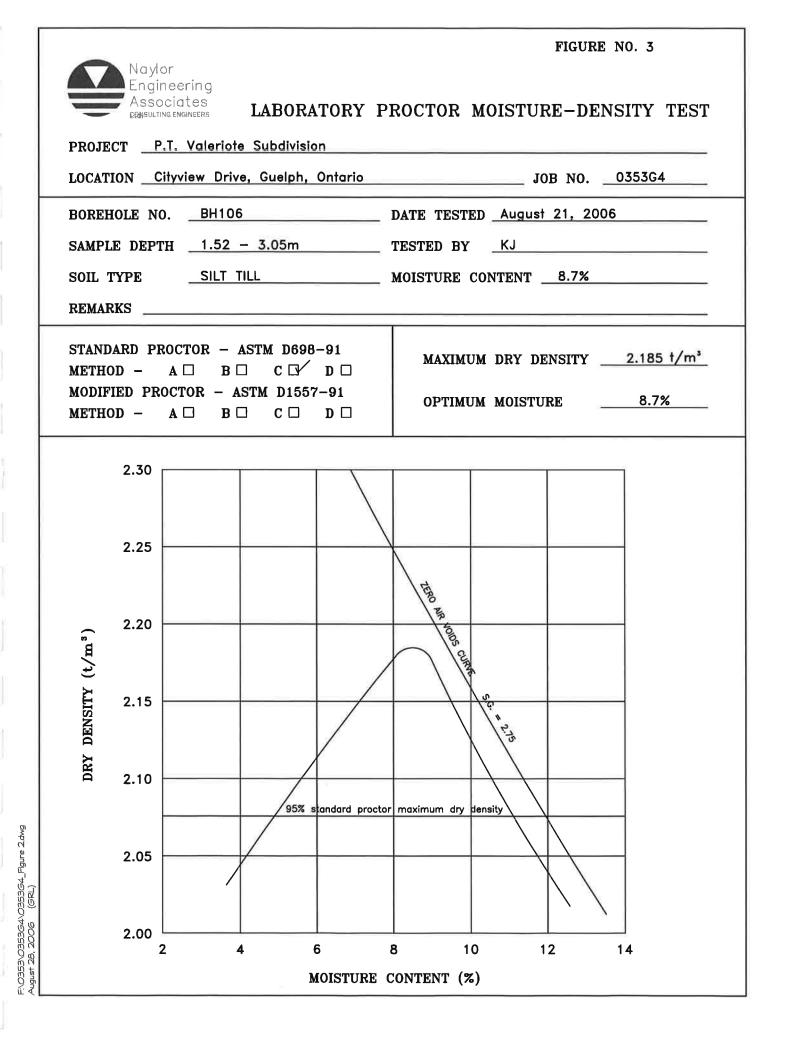
| Penetration Resistances | | | | | | | |
|--|--|--|--|--|--|--|--|
| The number of blows by a 63.5 kg (140 lb.) hammer dropped 0.76 m (30 in.) required to drive a 50 mm (2 in.) diameter 60 ° cone a distance 0.30 m (12 in.). The cone is attached to 'A' size drill rods and casing is not used. | | | | | | | |
| 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.) | | | | | | | |
| sampler advanced by static weight of hammer | | | | | | | |
| sampler advanced by hydraulic pressure | | | | | | | |
| sampler advanced by manual pressure | | | | | | | |
| | | | | | | | |

| | Soil Description | | | |
|--|--|-------------------------------|--|--|
| Cohesionless Soils Relative Density (D _r) | SPT 'N' Value (blows per 0.30 m) | D _r (%) | | |
| 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 Shea | ar 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 | | | |

Naylor Engineering Associates Ltd.









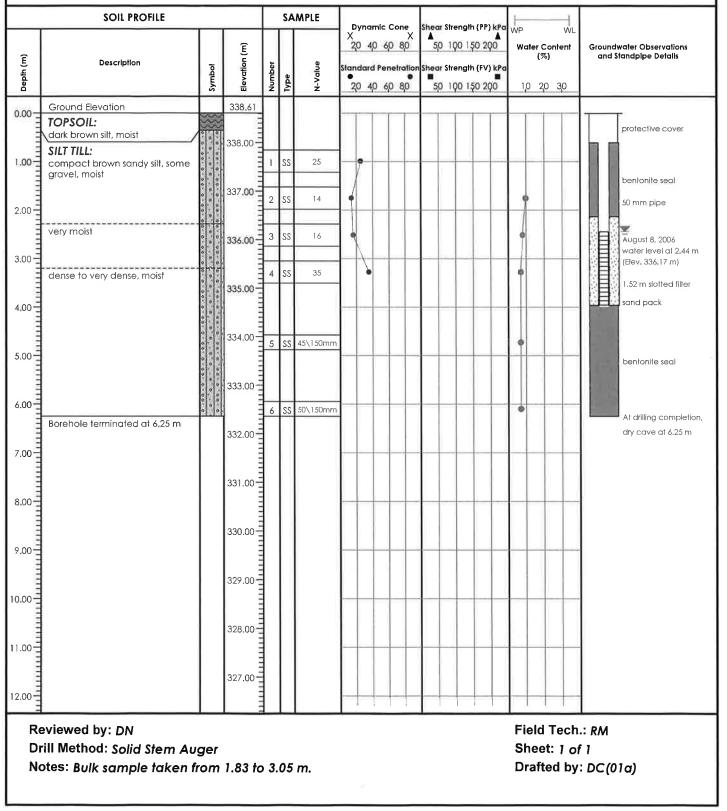
Location: Cityview Drive, Guelph, Ontario

Borehole Number: 101

Ground Elevation: 338.61 m

Job No.: 0353G4

Drill Date: August 2, 2006





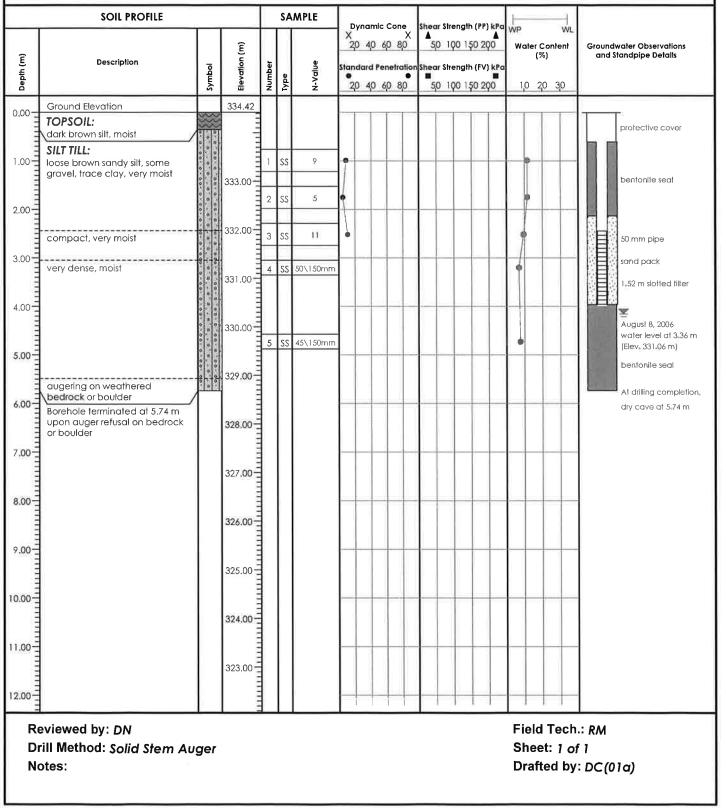
Location: Cityview Drive, Guelph, Ontario

Borehole Number: 102

Ground Elevation: 334.42 m

Job No.: 0353G4

Drill Date: August 2, 2006





Engineering Associates at CAS. IN VEW YEAR

Project: P.T. Valeriote Subdivision

Location: Cityview Drive, Guelph, Ontario

Borehole Number: 103

Ground Elevation: 344.44 m

Job No.: 0353G4

| | SOIL PROFILE | | | | SA | MPLE | , | Dvr | amic | Cone | | Shear Strength (PP) kPa | | | |
|-----------|---|---|---------------|--------|----------|---------------|------|------------|----------------|-------|-------------|---|----------------------|----|---|
| Depth (m) | Description | Symbol | Elevation (m) | Number | Type | N-Value | Star | 20 Inde | 40 d ard Pe | 40 80 | X) ● | 50 100 150 200 Shear Strength (FV) kPa 50 100 150 200 | Water Content (%) | | r Observations pipe Details |
| 0.00 | Ground Elevation TOPSOIL: dark brown silt, moist | | 344.44 | | | | | T | | | | | | | concrele seal and protective cover |
| 1.00 | SILT TILL: loose rusty brown silt, some sand, trace clay and gravel, trace tree roots, moist to very | 0.00.0 | 343.00 | 1 | SS | 5 | 0 | I | | | | | | | bentonite seal |
| 2.00 | moist | 0 0 0 0 0 0 | | 2 | SS | 6 | • | + | + | | | | | | sand pack 0.76 m slotted filter 19 mm pipe |
| 3,00 | dense to very dense brown sandy silt, some gravel, trace clay, moist | | 342.00 | 3 | SS SS | • 55\150mm | | | | | | | • | | August 8, 2006, upper standpipe dry |
| 4.00 | | | 341.00 | | | | | | | | | | | N. | bentonite seal August 8, 2006 water level at 3,80 m |
| 5.00 | | 0 . 0 . 0 . 0 0 . 0 0 . 0 . 0 . 0 . 0 . | 340.00 | 5 | SS | 45\150mm | | | | | | | | | (Elev, 340,64 m) 50 mm pipe |
| 6.00 | | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 339.00 | | | | | | | | | | | | |
| 7.00 | grey, moist | | 338.00 | 6 | SS | 60\150mm | | | | 1 | | | | | sand pack 1.52 m slotted filter |
| 8.00 | Borehole terminated at 7.92 m | 0 0 0 0 0 0 0 0 0 | 337.00 | 7 | SS | 75\150mm | | | | | | | • | | At drilling |
| | borentole reiminared di 7.72 m | 1 | 336.00 | | | | | | | | | | | | completion, dry cave at 7.62 m |
| 9.00 | | | 335.00 | | | | | | | | | | | | |
| 10.00 | | | 334.00 | | | | | | | | | | | | |
| 11.00 | | | 333.00- | | | | | | | | | | | | |
| 12.00- | | | | L | | | | ł | | | | | | - | |
| Dr | Reviewed by: DNField Tech.: RMDrill Method: Solid Stem AugerSheet: 1 of 1Notes: * Sampler driving on gravel.Drafted by: DC(01a) | | | | | | | | | | | | | | |



Naylor Engineering Associates of contact of all of the

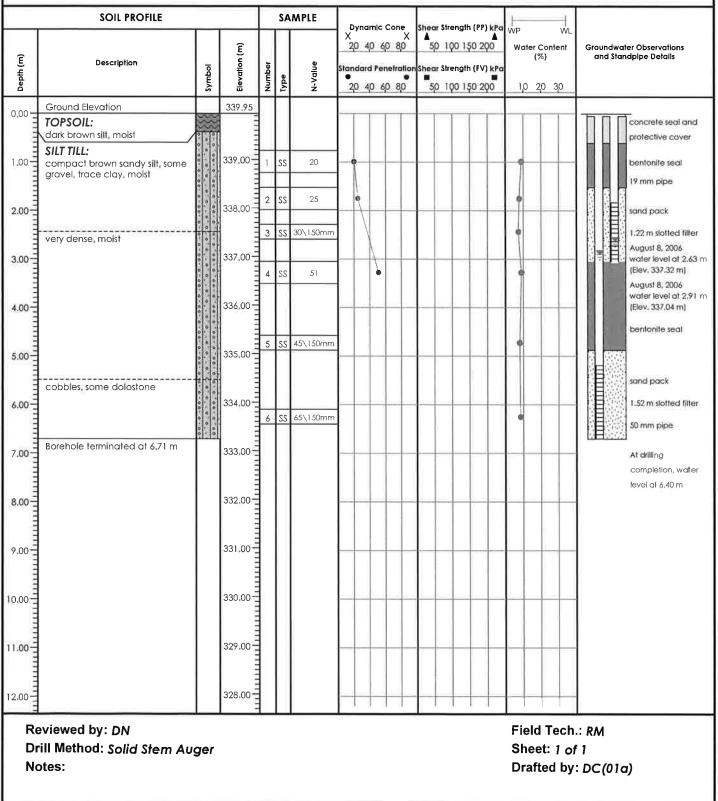
Project: P.T. Valeriote Subdivision

Location: Cityview Drive, Guelph, Ontario

Borehole Number: 104

Ground Elevation: 339.95 m

Job No.: 0353G4



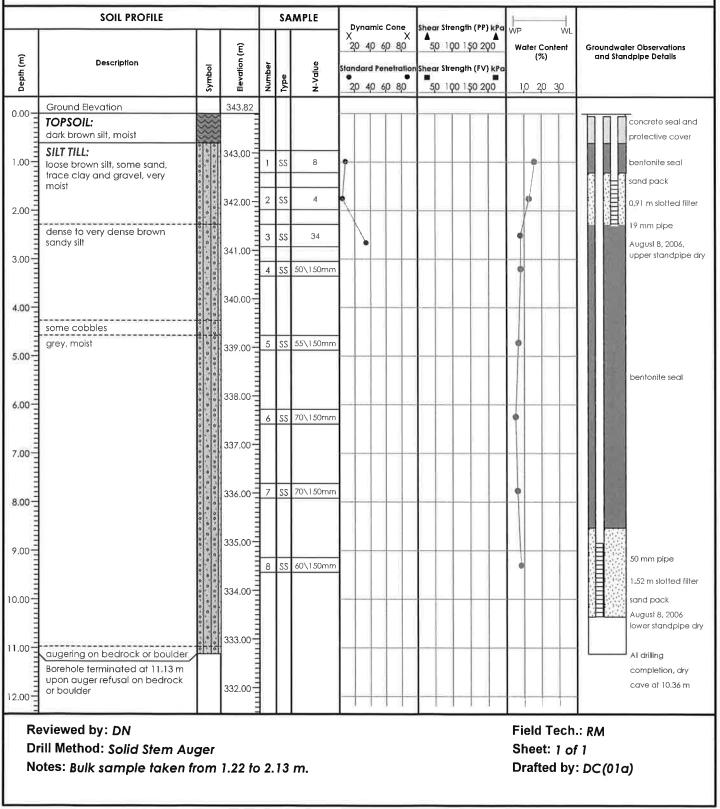


Location: Cityview Drive, Guelph, Ontario

Borehole Number: 105

Ground Elevation: 343.82 m

Job No.: 0353G4





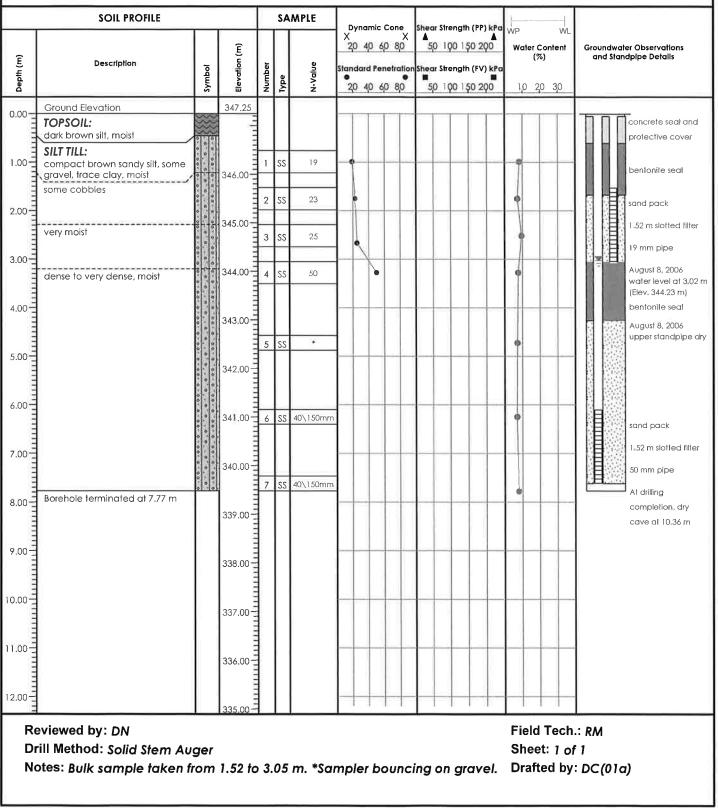
Location: Cityview Drive, Guelph, Ontario

Borehole Number: 106

Ground Elevation: 347.25 m

Job No.: 0353G4

Drill Date: August 2, 2006



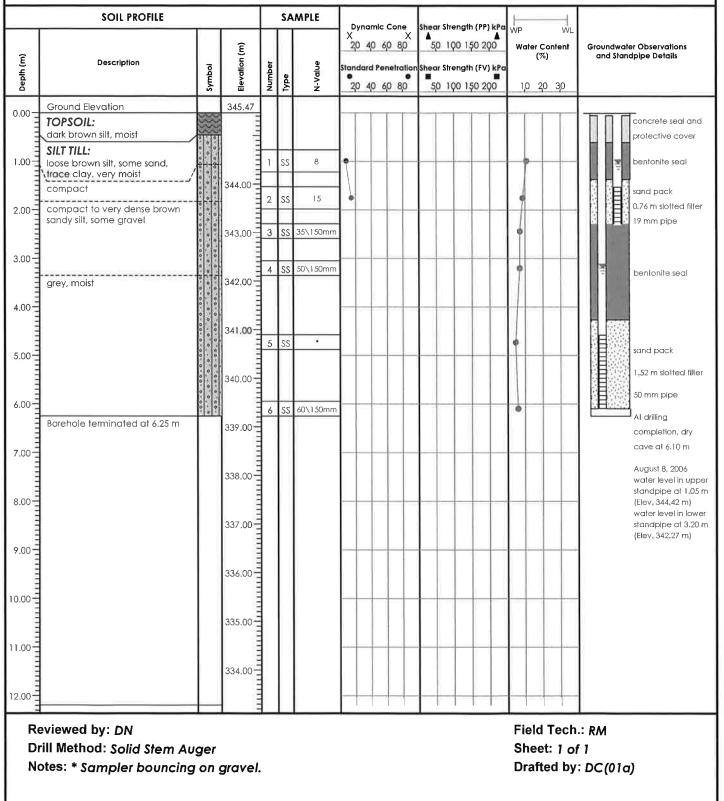


Location: Cityview Drive, Guelph, Ontario

Borehole Number: 107

Ground Elevation: 345.47 m

Job No.: 0353G4





Engineering Associates

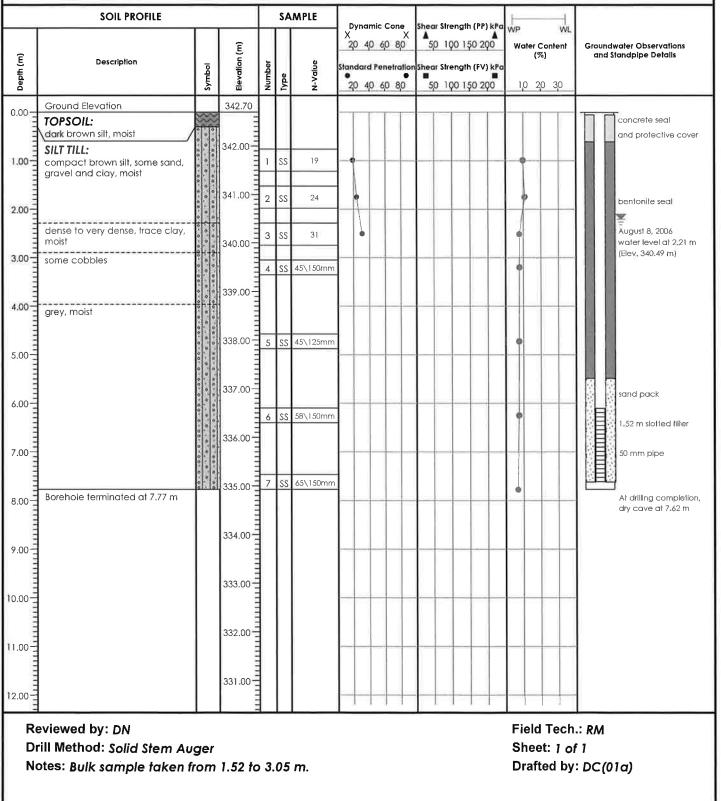
Project: P.T. Valeriote Subdivision

Location: Cityview Drive, Guelph, Ontario

Borehole Number: 108

Ground Elevation: 342.70 m

Job No.: 0353G4





Location: Cityview Drive, Guelph, Ontario

Borehole Number: 109

Ground Elevation: 326.19 m

Job No.: 0353G4

Drill Date: August 1, 2006

| | SOIL PROFILE | | | | SA | MPLE | | Vnar | nic C | one | Shear Strength (PP) kPa | H | | | |
|-----------|--|---------|---------------|--------|------|----------|------|-------|-------|---------|-------------------------|-----|---------------------------|----------------|---|
| | | | Ē | | | | X | | 0 60 | X | 50 100 150 200 | 200 | Vater Content | | twater Observations |
| Depth (m) | Description | वि | Elevation (m) | ber | | N-Value | Star | ndard | Pene | tration | Shear Strength (FV) kPa | | (%) | and | Standpipe Details |
| Dep | | Symbol | Elev | Number | Type | ž-z | 2 | 0 4 | 0 60 | 8,0 | 50 100 150 200 | L | 1,0 2,0 3,0 | | |
| 0.00- | Ground Elevation TOPSOIL: | | 326.19 | | | | | | T | | | | 1 1 1 | | concrete seal |
| | dark brown silt, moist | 0. | | | | | | | | | | | | | and protective cover |
| 1.00 | SAND AND GRAVEL: very dense brown sand and | 0.00 | | 1 | SS | 55 | - | | | _ | | 9 | | | - |
| | gravel, frequent cobbles and boulders, some silt, damp | 0.00 | 325.00 | | | | | | | | | | | | |
| 2.00 | | 0.00 | Ē | 2 | SS | 30\150mm | _ | | | _ | | ľ | | | |
| | | 0.00 | 324.00 | 3 | SS | • | | | | | | | | | bentonite seal |
| 3.00- | | 0.0 | | | | | | | | _ | | | | | 50 mm pipe |
| | | 0.0 | 323.00 | 4 | SS | • | | | | | | • | | | |
| 4.00 | saturated | 000 | | | | | | | | | | | | | - |
| 4.00 | | 0.00 | 322.00 | | | | | | | | | | | | 1.52 m slotled filler |
| 5.00 | | 0.00 | | 5 | SS | • | | | | | | ٠ | | | August 8, 2006 water level at 4.44 m |
| 5.00 | augering on possible bedrock | 000 | 321.00 | | | | | | | | | | | | (Elev. 321.75 m) |
| 6.00 | Borehole terminated at 5.64 m | 8-1-1-2 | Ē | | | | | | | | | | | | At drilling completion, wet cave at 3.96 m |
| 0.00 | | | 320.00 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 7.00 | | | 319.00 | | | | | | | | | | | 1 | |
| | | | | | | | | | | | | | | | |
| 8.00 | | | 318.00 | | | | 1 | | | | | | | 1 | |
| 1 | | | | | | | | | | | | | | | |
| 9.00 | | | 317.00 | | | | | | | | | | | 1 | |
| | | | 9 | | | | | | | | | | | | |
| 10.00 | | | 316.00 | | | | | | | | | | | 1 | |
| 1111 | | | | | | | | | | | | | | | |
| 11.00 | | | 315.00 | | | | - | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 12.00 | | | 314.00 | | L | | | 1 | | 1 | | | | | |
| | eviewed by: DN | | | | | | | | | | | | ield Tech | | |
| | ill Method: Solid Stem Au otes: * Sampler bouncing | | aravel | | | | | | | | | | Sheet: 1 of Drafted by | | |
| | nes. Sumpler bouncing | UI | giuvel. | • | | | | | | | | L | raiteu Dy | . <i>D</i> C(l | //u) |
| | | | | | | | | | | | | | | | |



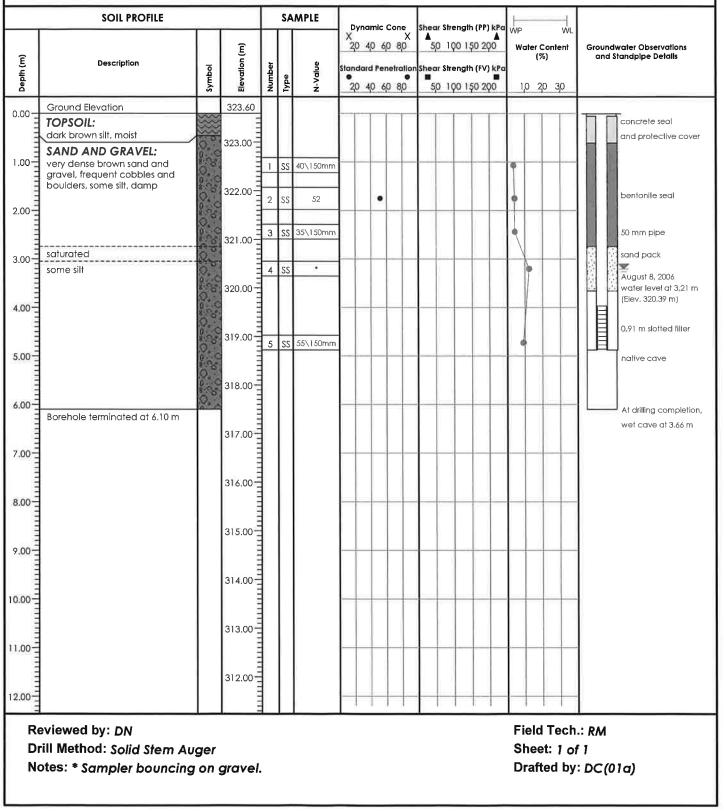
Location: Cityview Drive, Guelph, Ontario

Borehole Number: 110

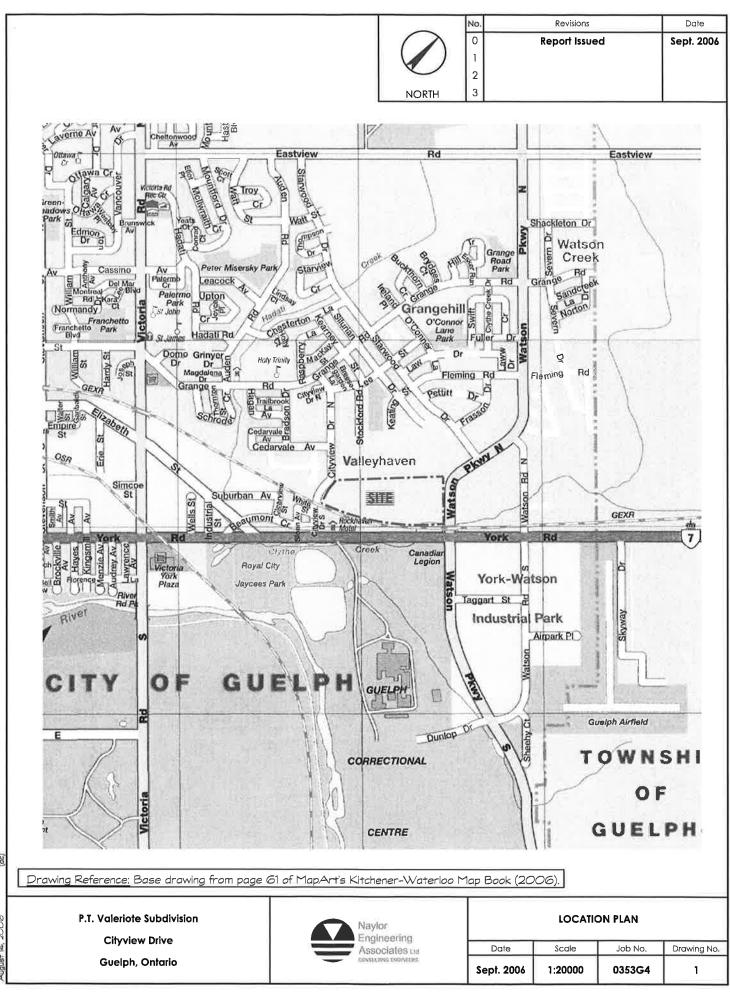
Ground Elevation: 323.60 m

Job No.: 0353G4

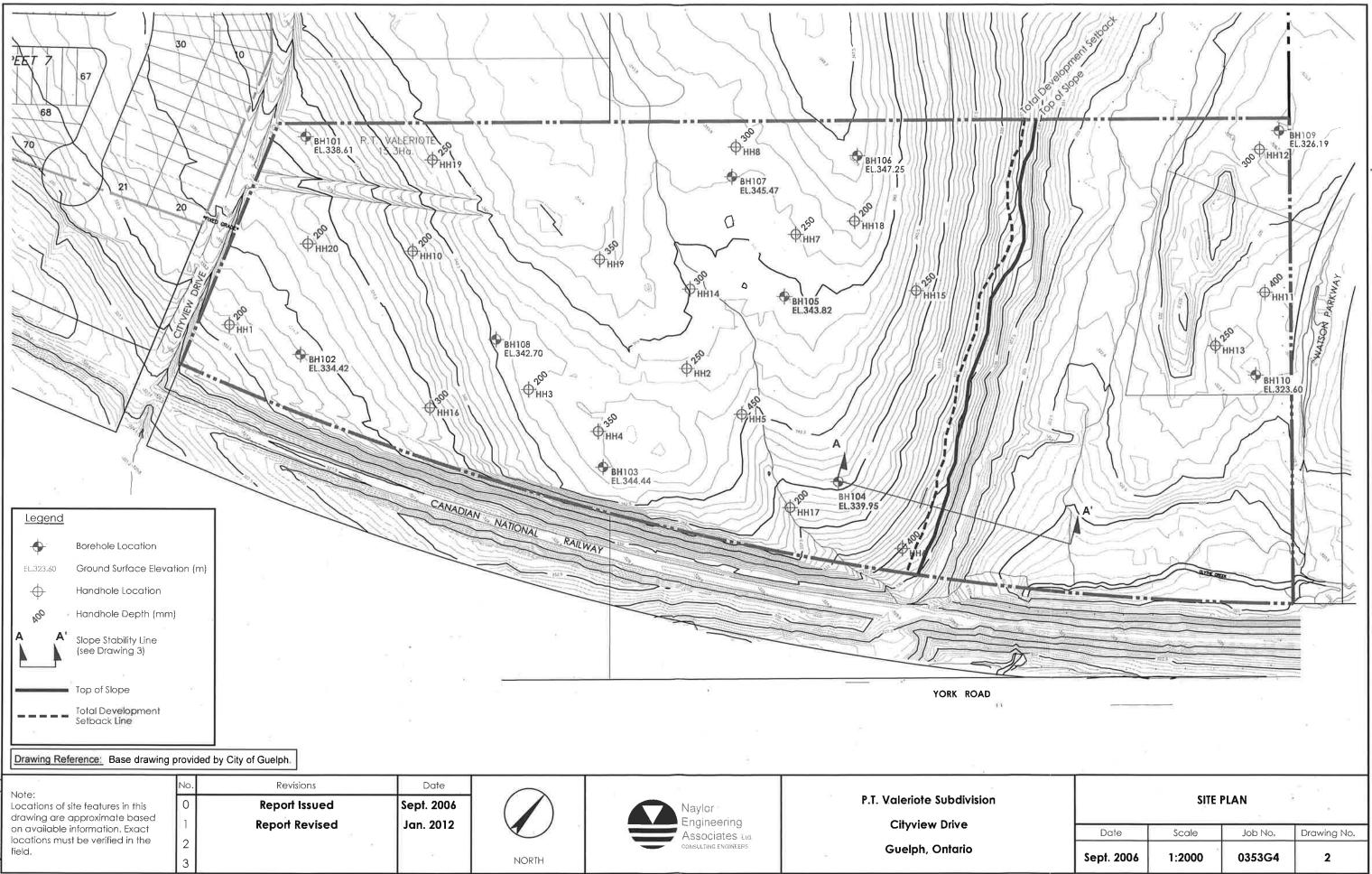
Drill Date: August 1, 2006



1

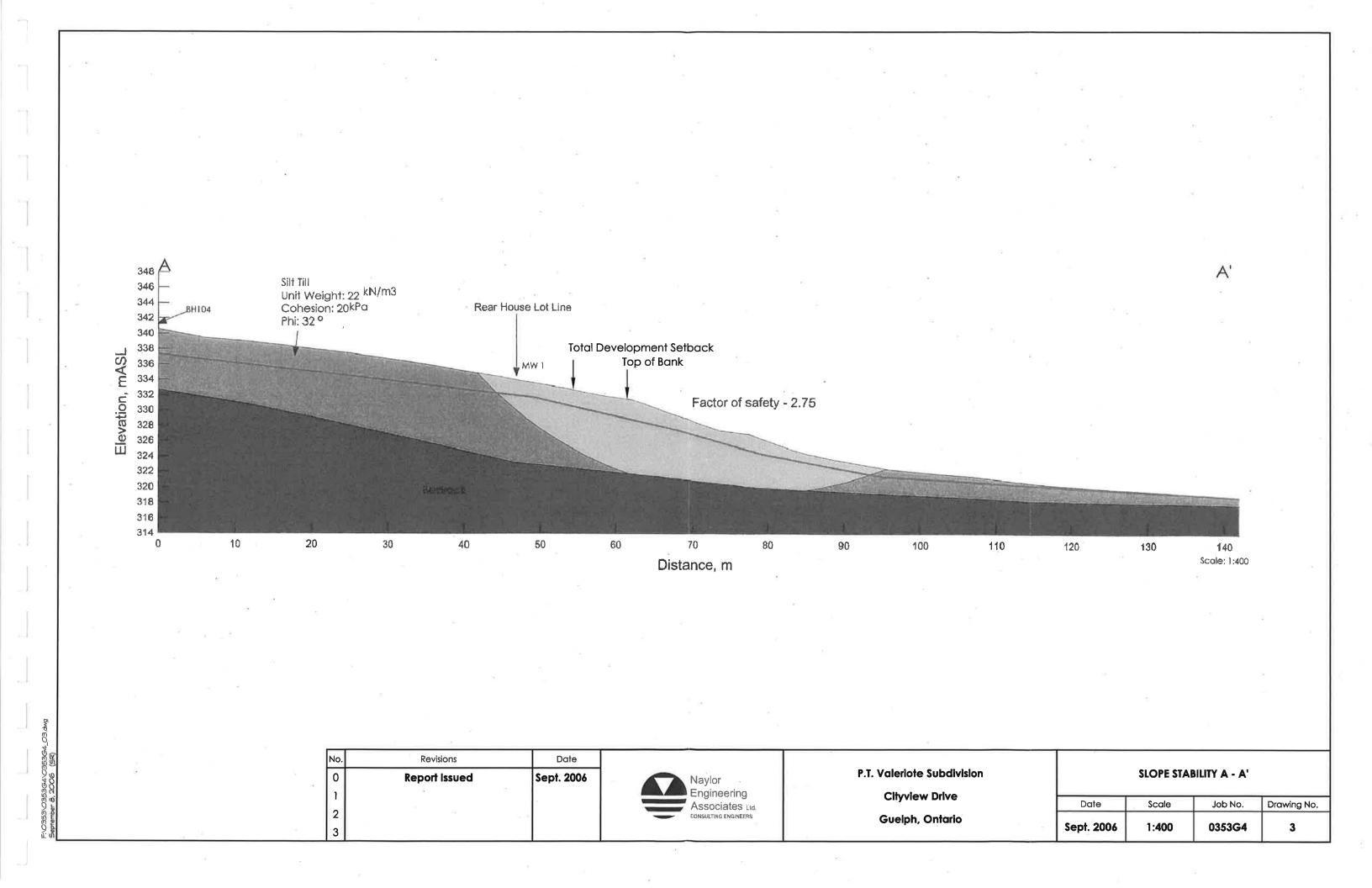


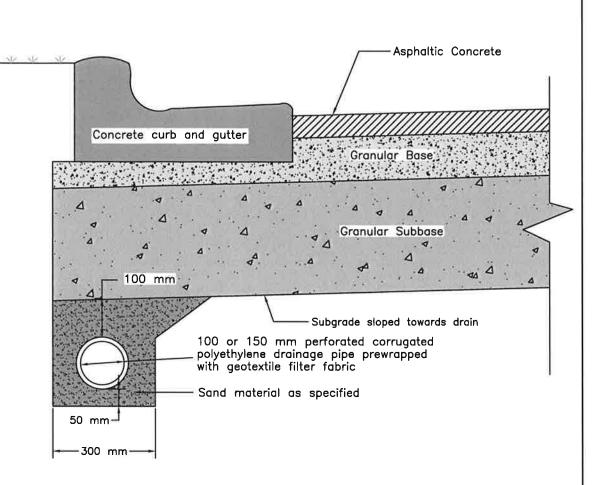
F:\0353\0353G4\0353G4_01,dwg August 14, 2006 (dc)



\0353\035364\035364 igust 31, 2006 (SR)

ii.



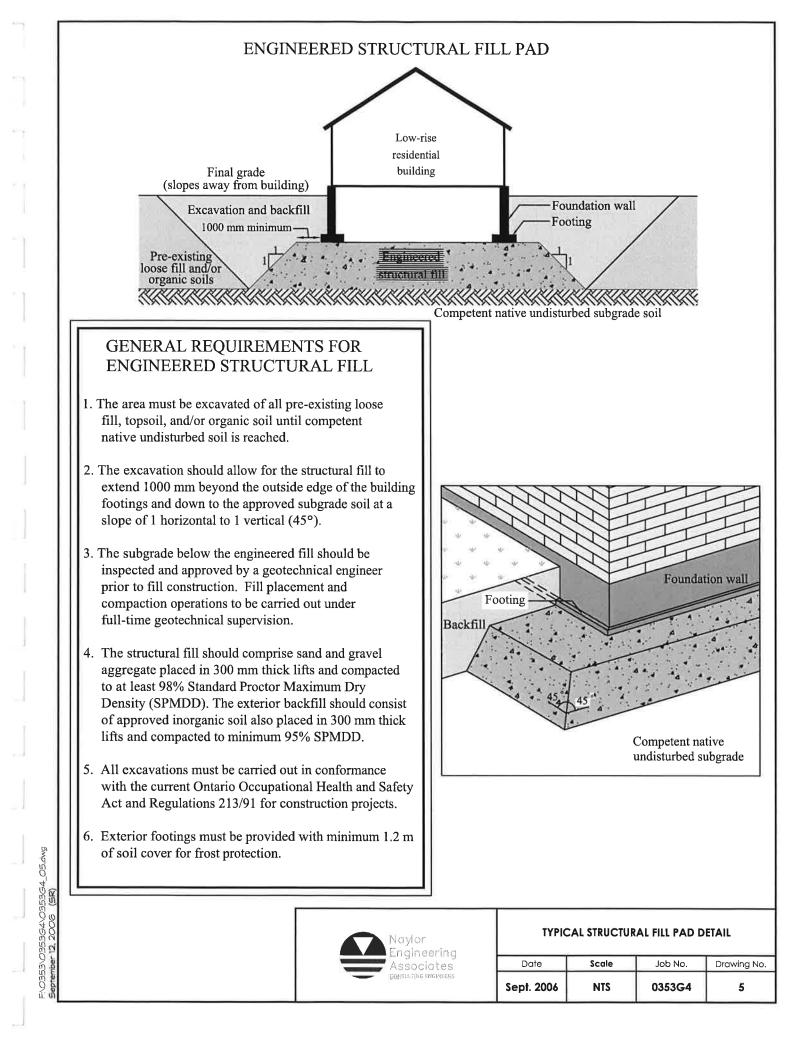


GENERAL REQUIREMENTS FOR PAVEMENT SUBDRAINS

- 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).

| Naylor | TYPIC | AL PAVEMENT SUBDRAIN DETAIL | | | | |
|----------------------|------------|-----------------------------|---------|-------------|--|--|
| Associates | Date | Scale | Job No. | Drawing No. | | |
| CONSULTING ENGINEERS | Sept. 2006 | NTS | 0353G4 | 4 | | |

F:\0353\0353G4\0353G4_04,dvg September 12, 2006 (5R)



APPENDIX B:

SLOPE STABILITY ASSESSMENT ENGLOBE CORP. (FEBRUARY 2016) UPDATED SLOPE STABILITY ASSESSMENT OF EAST FACING SLOPE (DECEMBER 2020) AND SLOPE STABILITY ASSESSMENT OF SOUTH-FACING SLOPE ENGLOBE CORP. (MARCH 2019)



englobecorp.com

February 11, 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-0001-00

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.

Subject : Cityview Ridge Subdivision, Slope Stability Assessment – Lots 62 to 78 Guelph, Ontario 160-P-0009857-0-01-100-GE-L-0001-00

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.

| SOIL MATERIAL | UNIT WEIGHT (kN/m³) | ANGLE OF INTERNAL FRICTION (°) | COHESION (kPa) |
|---------------|------------------------|--------------------------------------|-------------------|
| Silt Till | 22 | 32 | 0 |

Table 1 Soil Parameters

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.

Subject : Cityview Ridge Subdivision, Slope Stability Assessment – Lots 62 to 78 Guelph, Ontario 160-P-0009857-0-01-100-GE-L-0001-00

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.

Some maintenance and minor slope repairs should be expected over the life span of the structures, especially along the upper portion of the slope. The placed fill should be vegetated as soon as possible after placement.

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,

jw

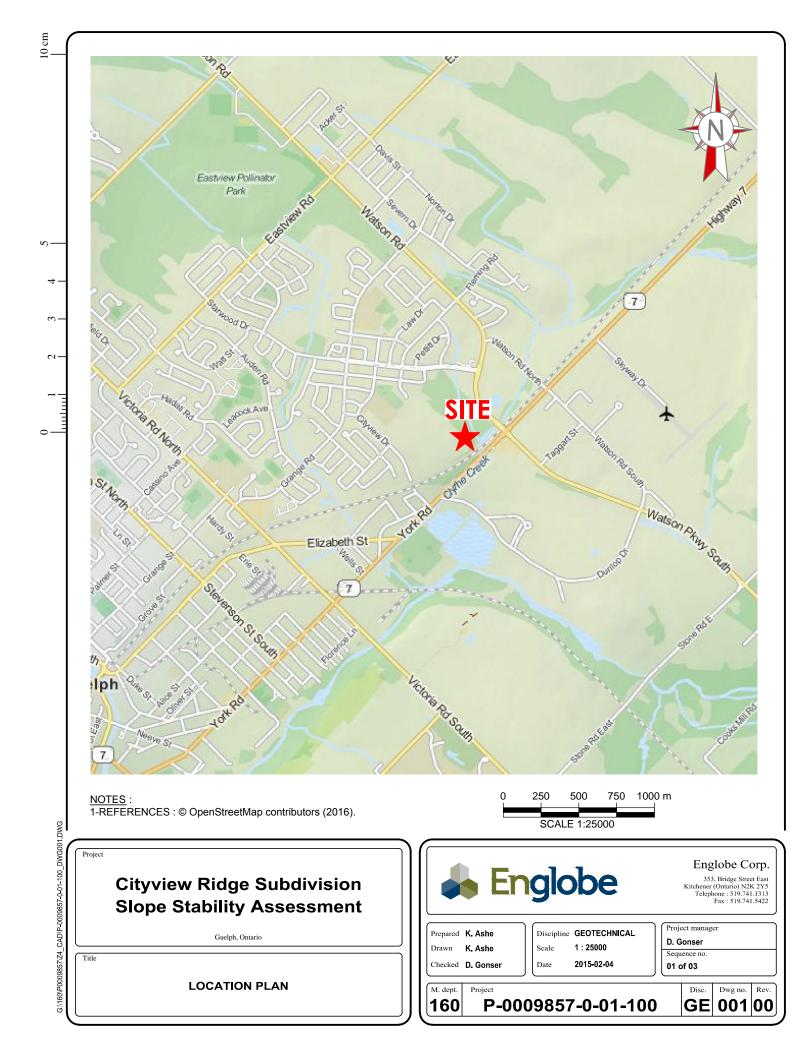
Dan Gonser EIT Geotechnical Department

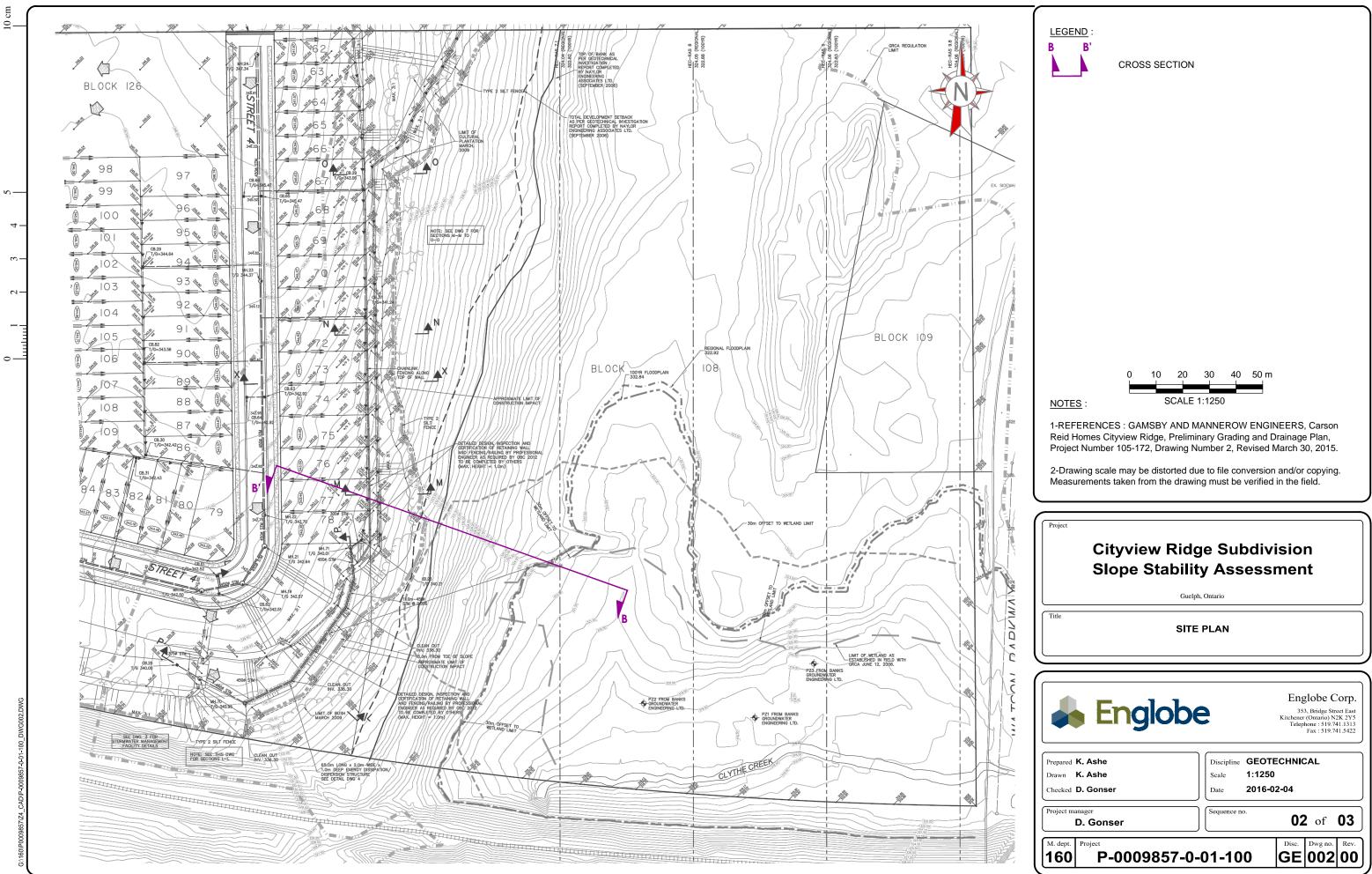


J.B. England, P.Eng. Senior Geotechnical Engineer

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

Englobe Corp.



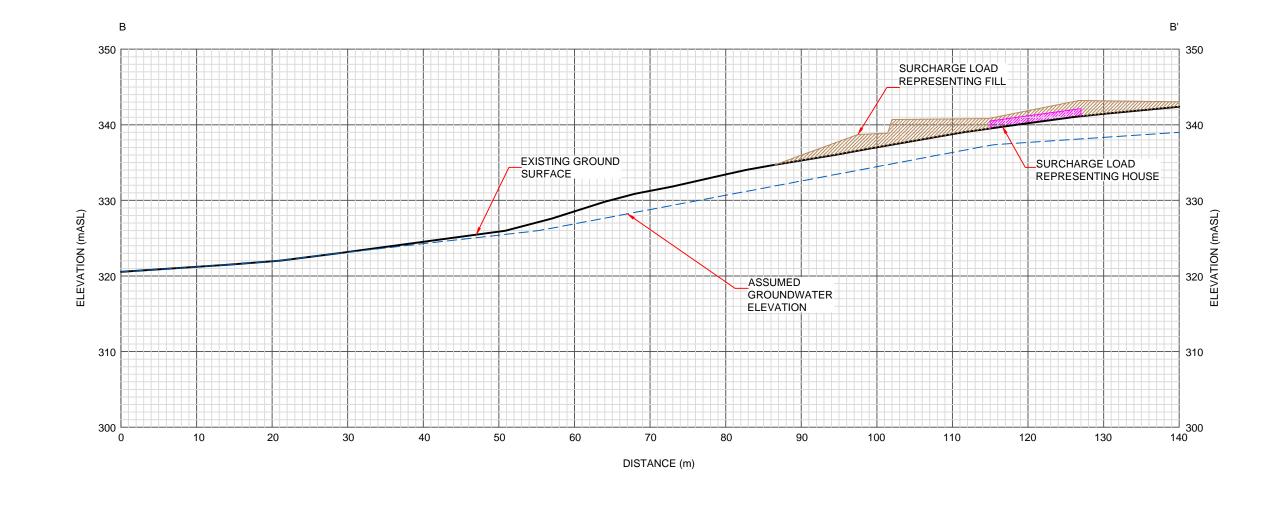


10 cm

4

0-

| | . Ashe . Ashe . Gonser | Discipline Scale Date | GEOTE 1:1250 2016-02 | | CAL | |
|-----------------|------------------------------|-----------------------------|----------------------------|-------|---------|------|
| oject mana D | . Gonser | Sequence no | э. | 02 | of of | 03 |
| . dept. P | roject | | | Disc. | Dwg no. | Rev. |
| | | | | | | |



\160\P0009857\Z4_CAD\P-0009857-0-01-100_DWG002.DWC

10 cm

v –

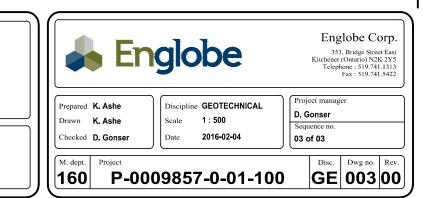
4.

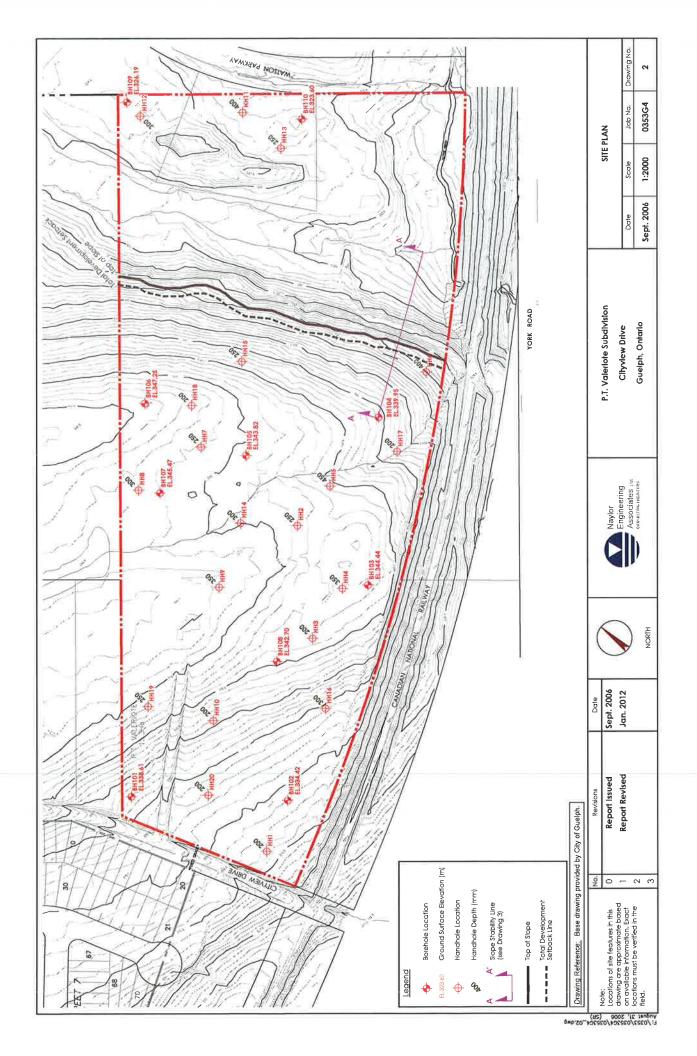
 ω

<u>с</u>-

0-

 $\frac{\text{NOTES}}{\text{1-Drawing scale may be distorted due to file conversion and/or copying.}}{\text{Measurements taken from the drawing must be verified in the field.}} \\ \int \frac{1}{5} \int \frac{10}{15} \int \frac{15}{5} \int \frac{10}{5} \int \frac{10}{5} \int \frac{15}{5} \int \frac{10}{5} \int$







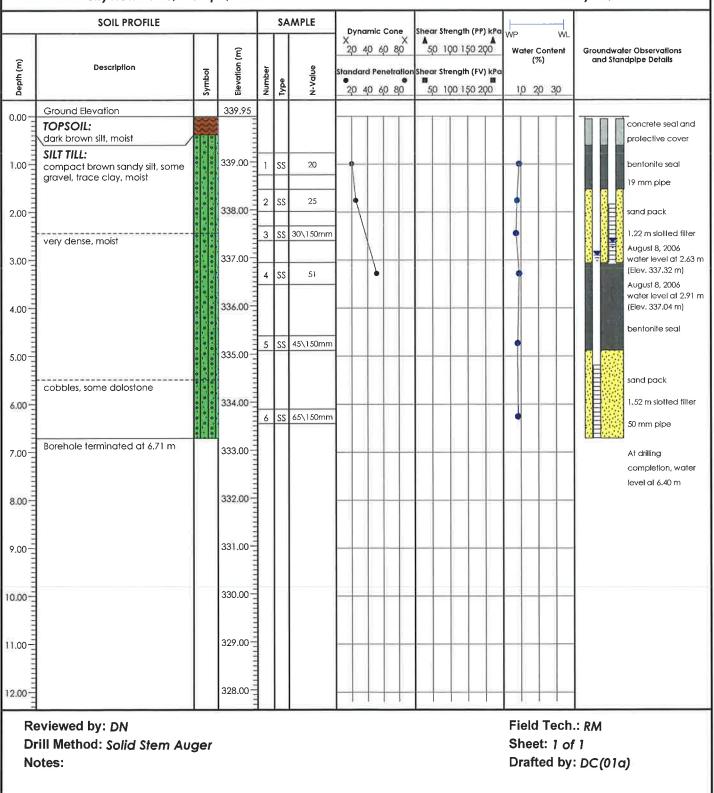
Borehole Number: 104

Ground Elevation: 339.95 m

Job No.: 0353G4

Drill Date: July 31, 2006

Location: Cityview Drive, Guelph, Ontario





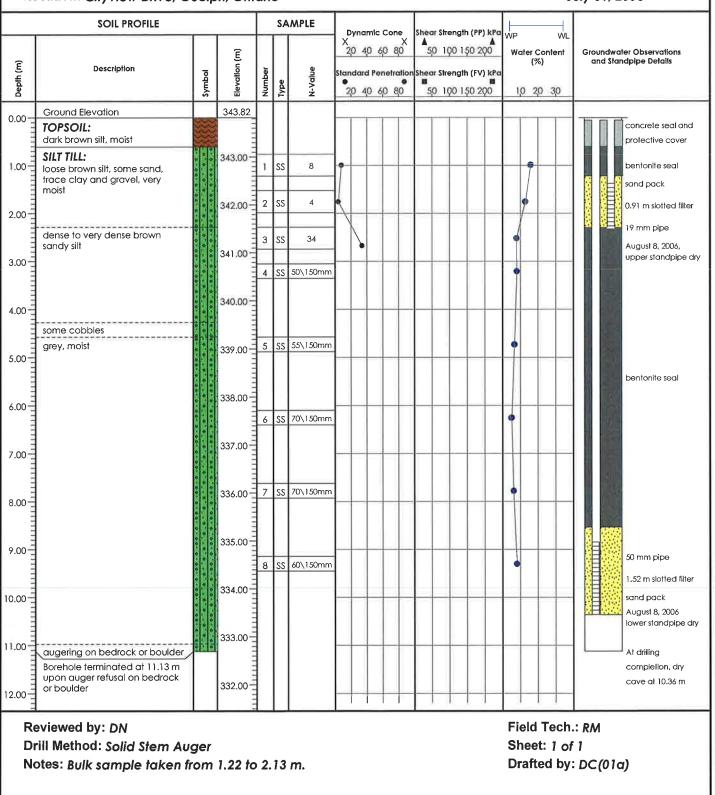
Borehole Number: 105

Ground Elevation: 343.82 m

Job No.: 0353G4

Drill Date: July 31, 2006

Location: Cityview Drive, Guelph, Ontario





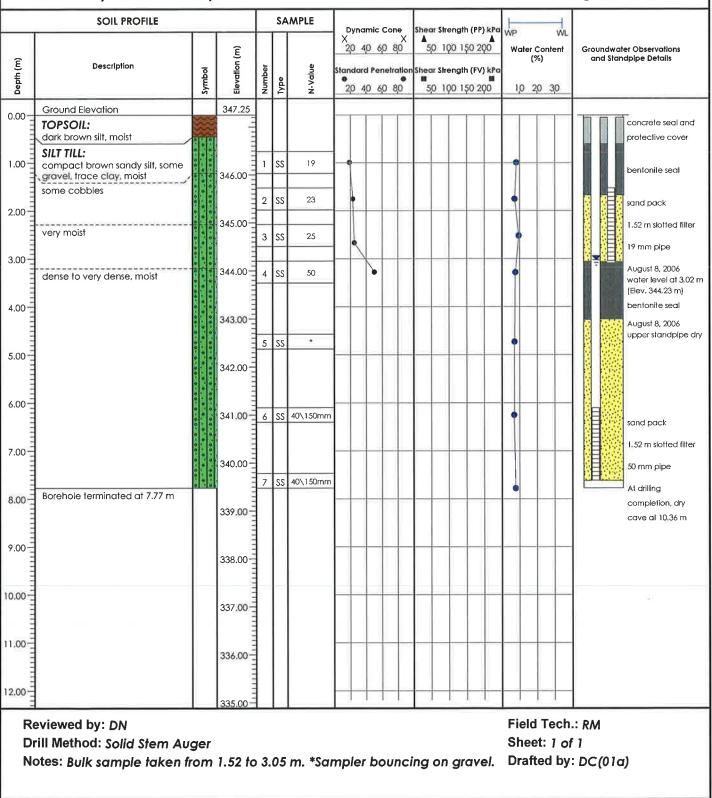
Borehole Number: 106

Ground Elevation: 347.25 m

Job No.: 0353G4

Drill Date: August 2, 2006

Location: Cityview Drive, Guelph, Ontario





December 14, 2020

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

Subject: Slope Stability Assessment of East-Facing Slope Cityview Ridge Subdivision Cityview Drive Guelph, Ontario Our ref.: 160-P-0009857-0-01-100-GE-L-0001-00

Ms. Angela Kroetsch:

Englobe Corp. (Englobe) is pleased to provide this letter report for the slope stability assessment completed for the proposed Cityview Ridge Subdivision on Cityview Drive, Guelph (Location Plan, Drawing 1). The work for this investigation was authorized by Mr. Carson Reid of Cityview Ridge Developments Inc. on January 15, 2018 with additional analyses authorized on February 6, 2019.

The areas being investigated comprise Lots 62 to 78 along the east side of the proposed development. It is understood that a proposed stormwater management (SWM) facility, and adjacent rail corridor are located to the south of the site. Based on preliminary site grading plan, it is understood that the proposed development will involve the placement of fill and construction of retaining walls and a walking trail along the rear of the above-mentioned lots. In addition, the SWM facility construction will include the placement of fill near the top of the slope towards the east side of the site and cutting of the native soils towards the west side of the site.

The purpose of this slope stability assessment is to analyze the impact of the proposed development on the stability of the existing slope at the east side of the site near Lots 62 to 78 (i.e. Cross Sections OO', BB' and XX' as shown in Drawing 2 of attached appendices).

Reference is made to Englobe letter 160-P-0009857-0-01-100-GE-L-0002-00 dated March 01, 2019 for slope stability findings related to the south slope on this site.

General Information

The subject site is located on Cityview Drive, in Guelph Ontario and the area being investigated is located at the east site of the site, near the top of a slope. It is understood that protected natural heritage features (Clythe Creek and a Grand River Conservation Authority (GRCA) regulated wetland) are located at the base of the east slope and a rail line is located at the base of the south slope.

Naylor Engineering Associates Ltd. (NEA) previously completed a geotechnical investigation and slope stability assessment at the subject site including drilling of ten boreholes (Boreholes BH101 to BH110) to depths of 5.6 to 11.1 m for the general area of the proposed development. Based on the findings of this investigation, it is assumed that the existing slopes are comprised of native non-cohesive glacial silt till. It is recommended that a supplementary borehole investigation be conducted specifically for the purpose of slope stability assessment. Groundwater was found to occur in saturated seams at variable depths within the silt till deposit. A slope stability analysis was carried out in the southeast portion of the site and 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.

In 2016, Englobe completed further slope stability analyses on the east side slope near Lots 62 to 78 to assess the proposed placement of fill, construction of retaining walls, and construction of a walking trail. The results of the analyses conducted on the east side slope found that the slopes remained stable under the proposed development loading conditions (Englobe Corp., Cityview Ridge Subdivision, Slope Stability Assessment – Lots 62 – 78, Guelph, Ontario, 160-P-0009857-0-01-100-GE-L-0001-01, February 2016).

It is understood that proposed development includes retaining walls, swales, houses, a walking trail, SWM facility, and fill placement near the top of the slope. The proposed retaining walls will traverse along the east side of Lots 72 to 78 and Lot 67, along the east side of the walking trail behind Lots 77 and 78 and along the east side of the walking trail between lot 78 and the SWM facility.

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 blend 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.

The proposed SWM facility will have a pond bottom at Elevation 339.35 m with a permanent pool water level at Elevation 339.75 m and a design regional storm event water level at Elevation 340.32 m. It is understood that the pond will be constructed with a clay liner to Elevation 340.64 m. It is assumed that the clay liner will be designed and constructed in a manner that the storm water management pond will not increase the moisture content of the underlying soil, causing excessive forces and reducing strength of the soil. Toward the west and central portions of the SWM facility, the existing grades are above the proposed finished grades and material will be cut for construction of the facility. Toward the east portion of the SWM facility, the existing grade is near the proposed pond base and material will placed to construct the berms along the outside of the pond. Based on conversation with GM BluePlan Engineering (GMBP), it is understood that surplus onsite material (silt till) will be reused for construction of the SWM facility.

(Gamsby and Mannerow Engineers, Carson Reid Homes, Cityview Ridge, Project Number 105-172, Preliminary Site Grading and Drainage Plan [Drawings 1 and 2], Stormwater Pond Plan and Sections [Drawing 4), Stormwater Pond Cross-Sections [Drawing 5], and Trail Plan and Sections [Drawing 8], Revised June 6, 2017).

Slope Inspection

Englobe completed a site visit on January 20, 2018 to inspect the existing slope conditions. The slope inspections were carried out based on the guidance provided in the Ontario Ministry of Natural Resources (MNR) document: *Technical Guide, River & Stream Systems: Erosion Hazard Limit* and slope ratings for the east slope was produced in accordance with Table 4.2 of the MNR document. The slope inspection rating chart is attached to this letter and show that the east slope had a rating of 25 points, indicating Slight Potential.

Slope Stability Assessment

For the slope stability analyses, Cross-Sections X-X and O-O were used from the provided topographic plan whereas, the Cross-Section B-B' was created based on topographic data provided by Gamsby and Mannerow Engineers. The locations of the sections are shown on our Drawing 2, Site Plan. These cross sections were created to represent worst case scenarios, where the slopes were the steepest and the proposed additional loading was greatest.

Following the GRCA policy, the design range for the factor of safety (FOS) must be 1.3 to 1.5 or greater. Considering the potential for loss of life or significant injury in the event of slope failure, Englobe recommends that a factor of safety of 1.5 should be targeted as the design factor of safety.

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, site laboratory testing, local experience, and available literature correlations and are provided in Table 1.

| SOIL MATERIAL | UNIT WEIGHT (kN/m³) | ANGLE OF INTERNAL FRICTION (°) | COHESION (kPa) |
|--------------------------------|------------------------|-----------------------------------|-------------------|
| Silt Till, loose | 22 | 32 | 0 |
| Silt Till, compact | 22-23 | 32-33 | 0 |
| Silt Till, dense to very dense | 23.3 | 35 | 0 |

Table 1: Soil Parameters

Standard Proctor moisture-density testing carried out during the previously referenced NEA indicated that if the soil was compacted to 100% standard Proctor maximum dry density (SPMDD) at the approximate optimum moisture content, the bulk unit weight of the material would be in the range of 22 to 23.3 kN/m3 and such, this range of unit weights were selected in the analysis.

Based on the gradation analyses carried out on samples of the glacial till during the NEA investigation, the material was found to comprise sand and silt with trace to some gravel, and traces of clay. Typically soils containing trace amounts of clay do not exhibit reliable and consistent cohesive strength, therefore, no cohesion was applied in the analyses.

The angle of internal frictions that were used in the analyses are based on the measured standard penetration testing (SPT) N-values obtained during the NEA investigation. The relative density of the glacial till soils, based on the SPT N-values was found to range from loose to very dense, and increased with depth. The soil layers modelled in the analysis were based on the relative densities as determined by the N-values. The angle of internal frictions that were utilized for each soil layer are based on local experience and laboratory testing performed on projects with similar soil conditions as well as published correlations summarized in the publication *Performance and use of the Standard Penetration Test in Geotechnical Engineering Practice* (McGregor, and Duncan, Centre for Geotechnical Practice and Research, Virginia Polytechnic Institute and State University, October 1998).

Suspected bedrock was encountered but was not proven by coring during the NEA investigation. Based on local area knowledge, bedrock outcrops are present to the south of the site in the area between the railroad tracks, York Road, and Cityview Drive South. Based on available bedrock mapping and water well records, it is anticipated that the bedrock surface is located at depths exceeding 20 m below ground surface to the north of the site. Based on the available data, bedrock is suspected to slope downwards towards the north but reliable data to determine the bedrock elevation on the site is not available and as such the soil was conservatively assumed to be continuous to Elevation 300 m.

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

- Residential foundations will be designed as per the previous NEA geotechnical report and the Ontario Building Code and were modelled to exhibit a surcharge load equivalent to 75 kPa.
- > 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 utilizing the onsite glacial till. The fill is placed in 300 mm thick lifts and compacted to 95% SPMDD (general subgrade fill) or 98% SPMDD (structural fill for residential buildings and below retaining walls) at a minimum.
- The proposed fill materials were conservatively assumed to exhibit a surcharge load of 23.3 kN/m³ based on a compaction of 100% SPMDD.
- The assumed groundwater depth was modelled at the top of the slope to be approximately 0.5 m higher than the groundwater level encountered in the closest relevant NEA monitoring well for each cross section. It is recommended supplementary borehole investigation with monitoring wells, provide current information for the slope stability assessment. For the east side slope, the groundwater was modelled to be at ground surface where the slope met the GRCA 100-year floodplain.

A slope stability analysis was carried out on three cross sections (O-O', X-X' and B-B')for a number of potential failure types using computer software (GeoStudio SLOPE/W – Morgenstern-Price Method). The various failures analyzed included shallow slumping type failure of the slope surface, medium depth rotational failures, and deep rotational failures. At each cross-section location, the existing and proposed conditions were modelled to determine the impact of the proposed development on the slope stability. The GeoStudio SLOPE/W print outs for each analyzed scenario are attached as Slope Figures 1 to 6 and the results are summarized below, and in Table 2.

| CROSS SECTION | EXISTING MINIMUM FACTOR OF SAFETY | MINIMUM FACTOR OF SAFETY UNDER PROPOSED CONDITIONS | STABLE SLOPE SETBACK FOR FACTOR OF SAFETY OF 1.5 | EROSION SETBACK | ACCESS ALLOWANCE SETBACK | TOTAL DEVELOPMENT SETBACK FROM TOP OF SLOPE |
|--------------------|--|--|---|--------------------|--------------------------------|---|
| Cross Section B-B' | >1.5 | >1.5 | N/A | 1.0 m | 6.0 m | 7.0 m |
| Cross Section O-O' | >1.5 | >1.5 | N/A | 1.0 m | 6.0 m | 7.0 m |
| Cross Section X-X' | >1.5 | >1.5 | N/A | 1.0 m | 6.0 m | 7.0 m |

Table 2: Cross Section Summary

The results of the slope stability assessment completed for the slope sections on the east side of the site and considering the proposed retaining walls, houses and fill indicate FOS in excess of 1.5 for all three of the analyzed cross sections on the east side of the site. The slope setbacks applied during the aforementioned NEA investigation, as shown on the attached Drawing 2, are appropriate for the given conditions.

The top of slope and development setback lines are shown on the attached Drawings 2. As portions of the proposed development are located beyond the stable slope and development setback limits, the development will need to be modified and the slope should be analyzed under the actual proposed conditions when they are finalized.

The protected natural heritage features (Clythe Creek and the associated wetlands) are located beyond the toe of the east side slope. As the calculated factor of safety of the slope on the east side is greater than 1.5 under the proposed development conditions, there is a low potential for these areas to be impacted by slope failure.

Retaining Wall Design and Construction Considerations

The construction of the proposed retaining walls and trail along the east side of the site should be feasible with the following considerations. The design of the retaining walls should be performed 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, an active earth pressure coefficient (Ka) of 0.36, an at-rest earth pressure coefficient (Ko) of 0.53 and a soil unit weight of 19 to 21 kN/m3 may be used. An

December 14, 2020

Subject: Slope Stability Assessment of East-Facing Slope Cityview Ridge Subdivision Cityview Drive, Guelph, ON 160-P-0009857-0-01-100-GE-L-0001-00

appropriate safety factor should be employed and recommendations of Section 24 of Canadian Foundation Engineering Manual should be followed.

We recommend that the backfill for the wall comprise clean free-draining granular material such as OPSS.MUNI 1010 Granular B Type 1. 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 flatter 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.

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,

Puneet Verma, P.Eng. Geotechnical Engineer

Ala Abu Obeid, M.Sc., P.Eng., PMP Senior Geotechnical Engineer

| Encl. | Drawing 1 – Location Plan |
|-------|--|
| Encl. | Drawing 2 – Site Plan – East Side |
| Encl. | Slope Figures 1 to 6 – GeoStudio printouts |
| Encl. | Slope Stability Rating Chart – East Side Slope |
| Encl. | NEA – Drawing 2 – Site Plan |
| Encl. | NEA – Figures 1 to 3 – Lab Testing Results |
| Encl. | NEA – Boreholes BH101 to BH108 |
| | |





Englobe Corp.

Statement of Limitations

The geotechnical recommendations provided in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known at the time of report preparation, we recommend that we be retained during the final design stage to verify that the geotechnical recommendations have been correctly interpreted in the design. Also, if any further clarification and/or elaboration are needed concerning the geotechnical aspects of the project, Englobe should be contacted. We recommend that we be retained during construction to confirm that the subsurface conditions do not deviate materially from those encountered in the test holes and to ensure that our recommendations are properly understood.

The geotechnical recommendations provided in this report are intended for the use of the owner and its retained designer. They are not intended as specifications or instructions to contractors. Any use which a contractor makes of this report, or decisions made based on it, are the responsibility of the contractor. The contractor must also accept the responsibility for means and methods of construction, seek additional information if required, and draw their own conclusions as to how the subsurface conditions may affect their work. Englobe accepts no responsibility and denies any liability whatsoever for any damages arising from improper or unauthorized use of the report or parts thereof.

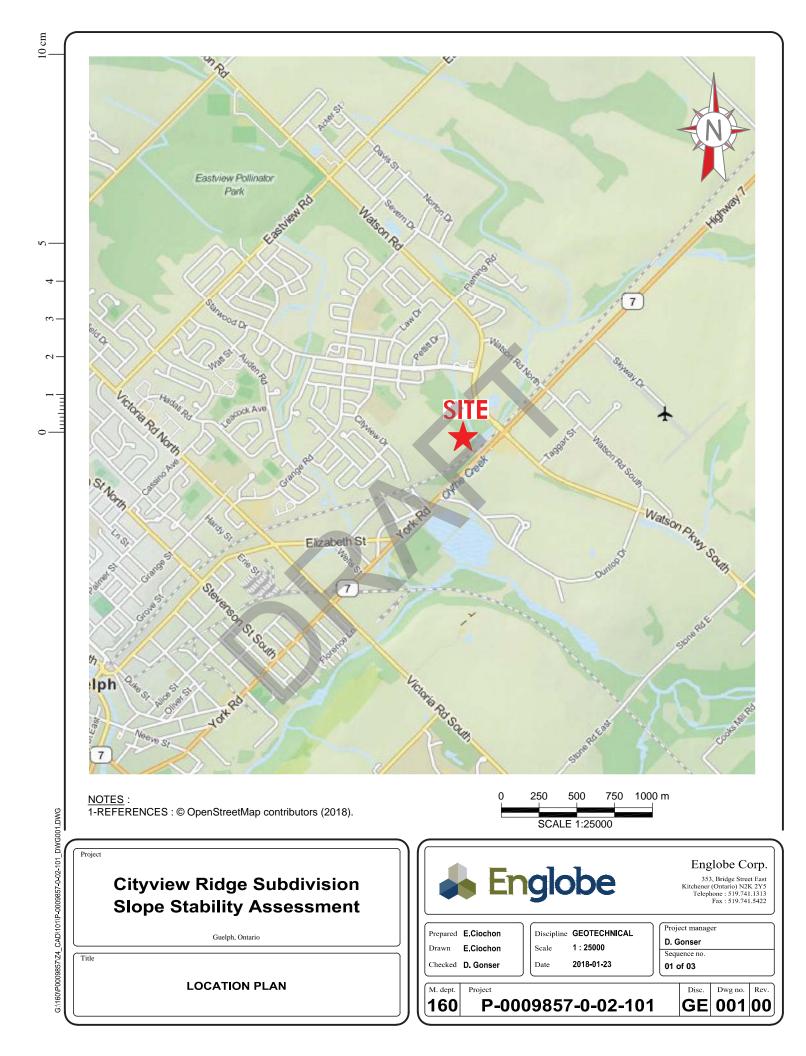
It should be noted that the soil boundaries indicated on the borehole log are inferred from noncontinuous sampling and observations during drilling and should not be interpreted as exact planes of geological change. These boundaries are intended to reflect approximate transition zones for the purpose of geotechnical design. Also, the subsoil and groundwater conditions have been determined at the borehole locations only.

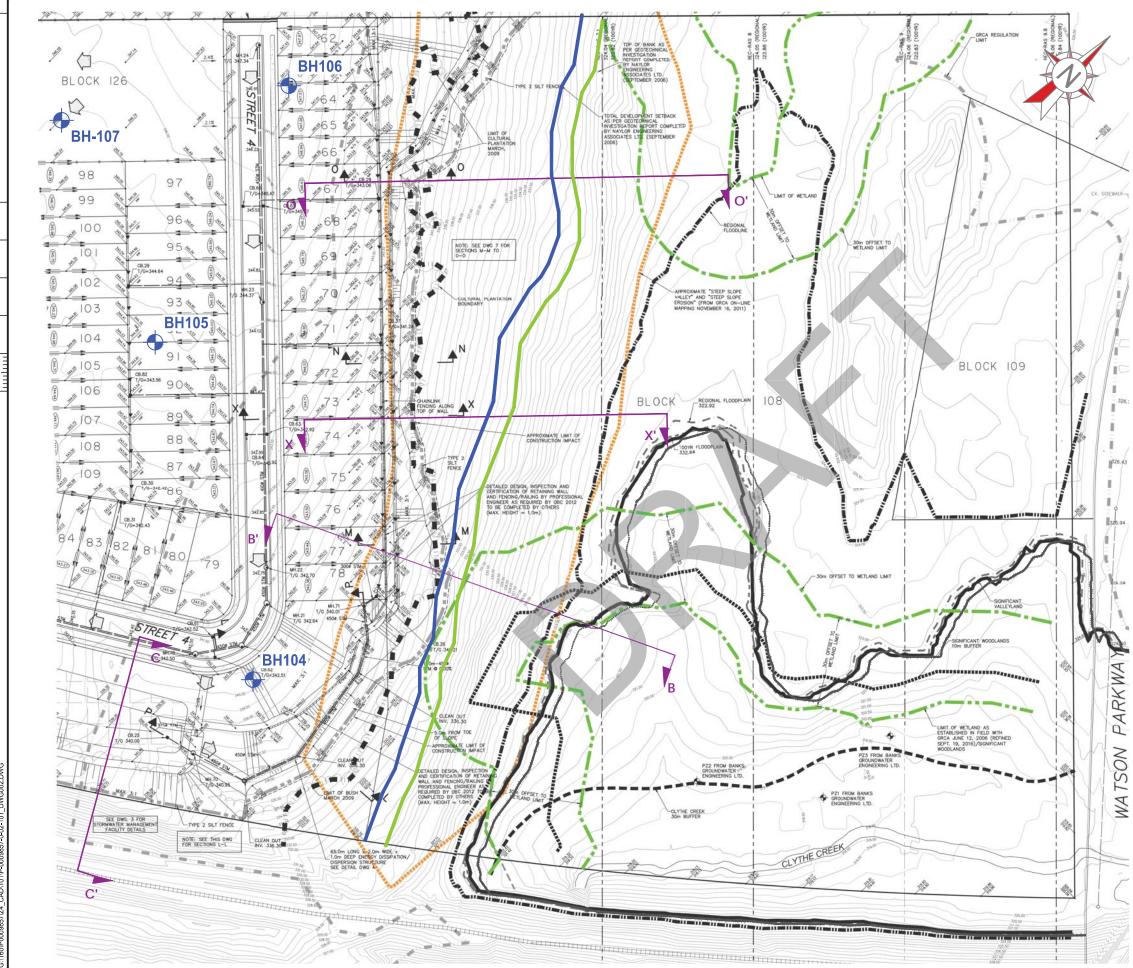
It is further noted that, depending on the time of year the field work was completed, water levels should be expected to vary, perhaps significantly from those observed at the time of this investigation.

It is important to note that the geotechnical investigation involves a limited sampling of the site gathered at specific test hole locations and the conclusions in this report are based on this information gathered. The subsurface geotechnical, hydrogeological, environmental and geologic conditions between and beyond the test holes will differ from those encountered at the test holes. Also, such conditions are not uniform and can vary over time. Should subsurface conditions be encountered which differ materially from those indicated at the test holes, we request that we be notified in order to assess the additional information and determine whether or not changes should be made as a result of the conditions.

The Englobe recommendations are contingent upon provision of a consistently competent, stable subgrade, which is properly drained and free of soft spots and objectionable materials such as organics.

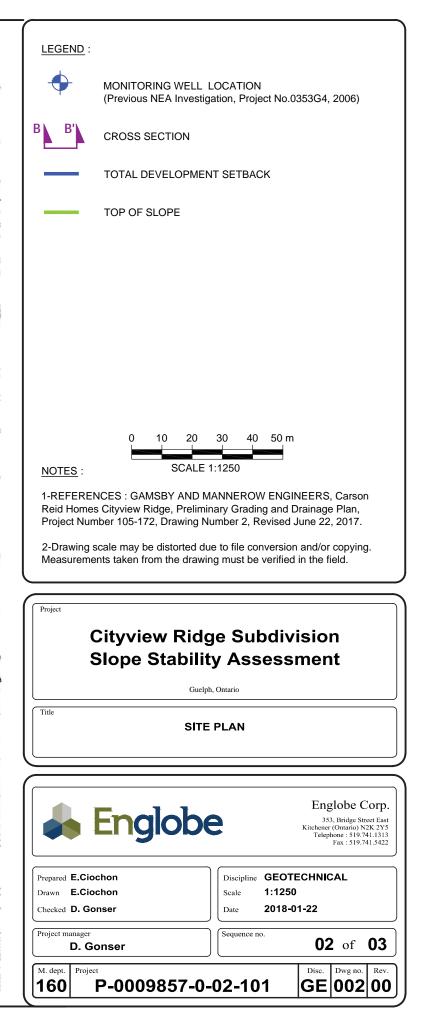
All construction works should only be completed during periods of favourable weather. The need for continuous construction supervision by a qualified, experienced technician, and quality control testing during construction projects cannot be over-emphasized. All materials and construction services required should be in accordance with Ontario Provincial Standard Specifications.



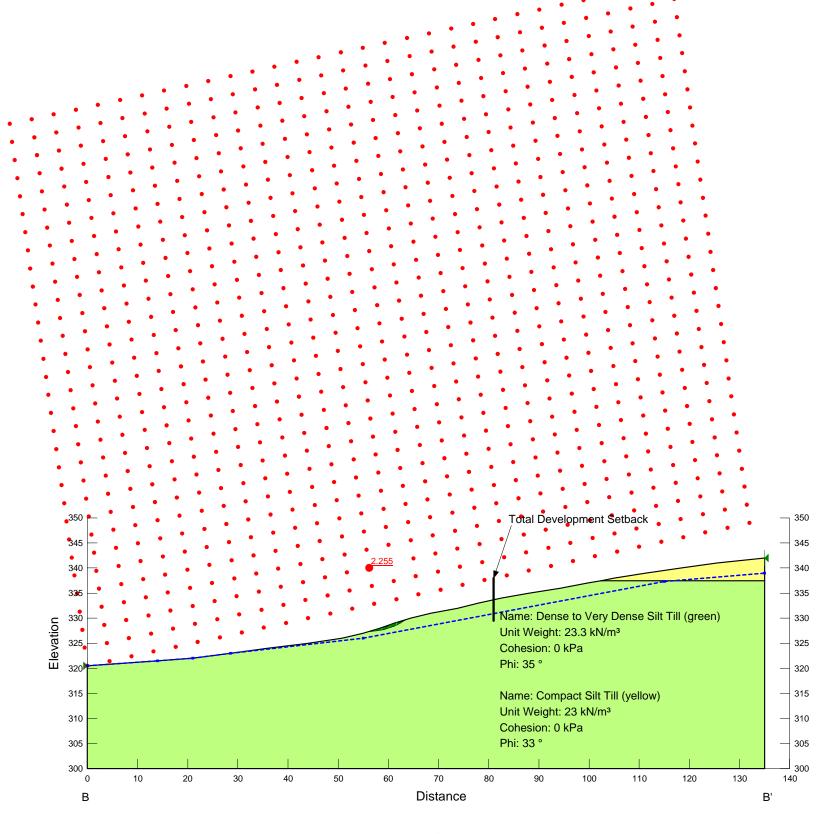


10 cm

0-

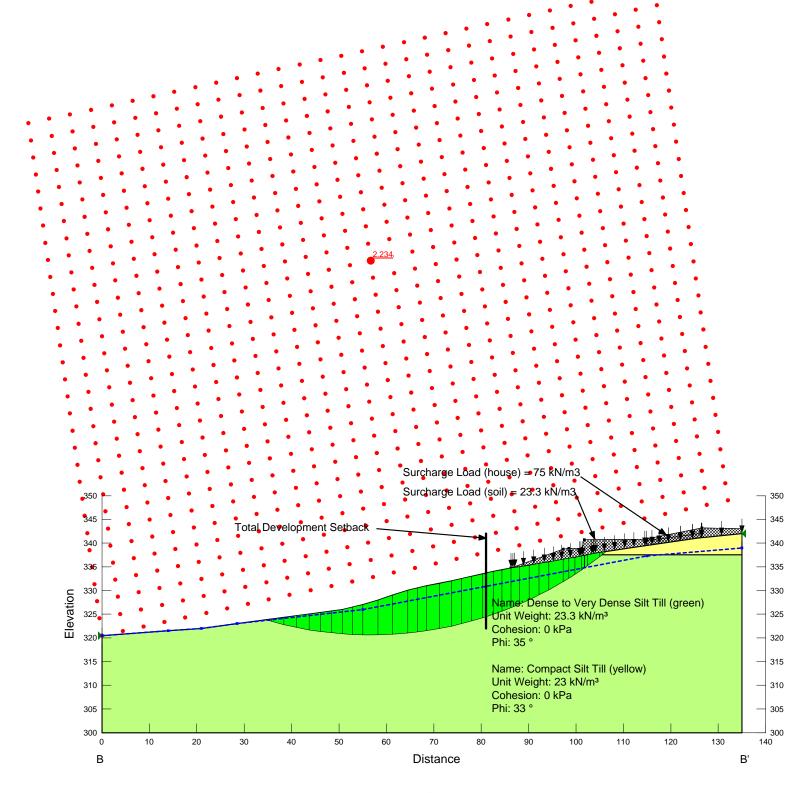


Slope Figure 1: Cross Section BB – Existing Conditions Cityview Ridge Subdivision Guelph, Ontario 160-P-0009857-0-02-101-GE-L-0001



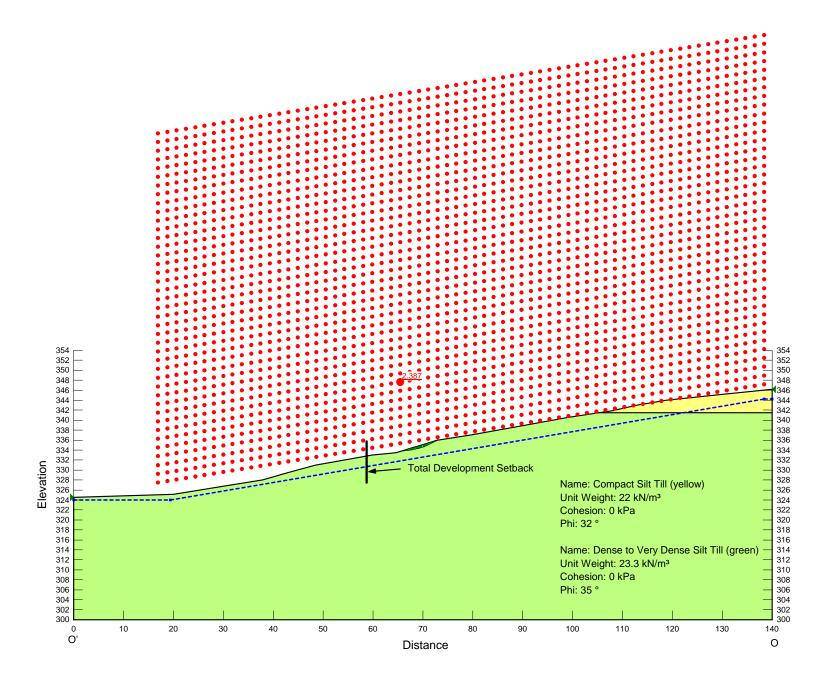


Slope Figure 2: Cross Section BB – Proposed Conditions Cityview Ridge Subdivision Guelph, Ontario 160-P-0009857-0-02-101-GE-L-0001



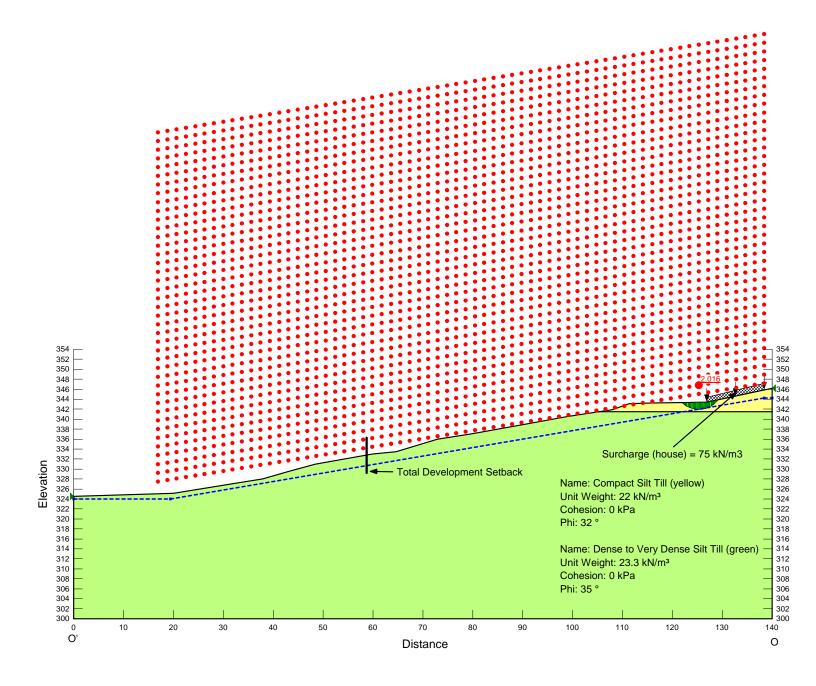


Slope Figure 11: Cross Section OO – Existing Conditions Cityview Ridge Subdivision Guelph, Ontario 160-P-0009857-0-02-101-GE-L-0001



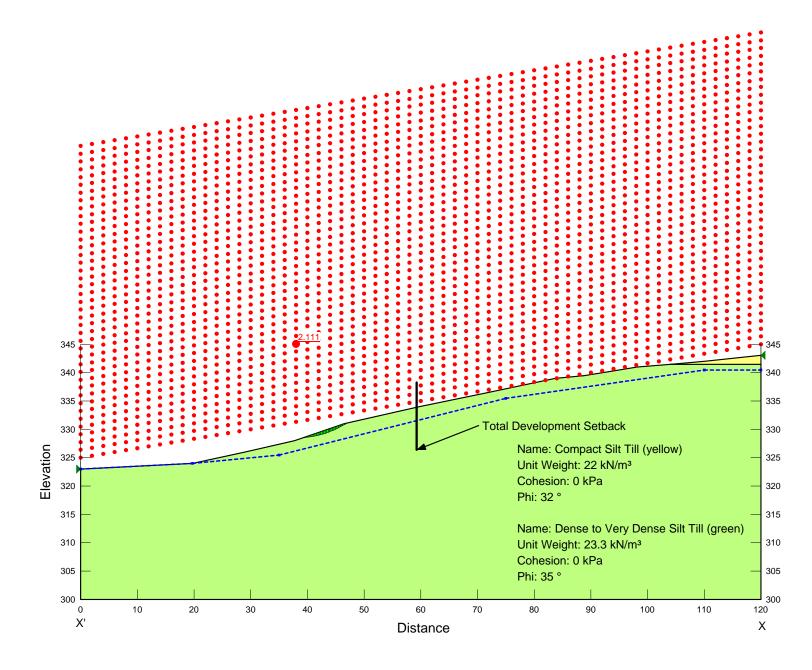


Slope Figure 12: Cross Section OO – Proposed Conditions Cityview Ridge Subdivision Guelph, Ontario 160-P-0009857-0-02-101-GE-L-0001



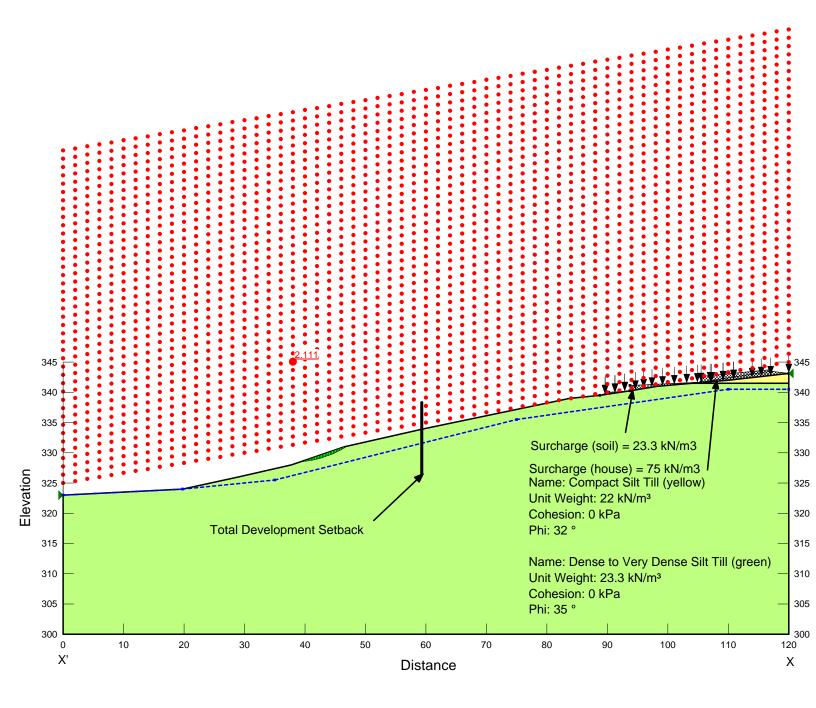


Slope Figure 13: Cross Section XX – Existing Conditions Cityview Ridge Subdivision Guelph, Ontario 160-P-0009857-0-02-101-GE-L-0001





Slope Figure 14: Cross Section XX – Proposed Conditions Cityview Ridge Subdivision Guelph, Ontario 160-P-0009857-0-02-101-GE-L-0001





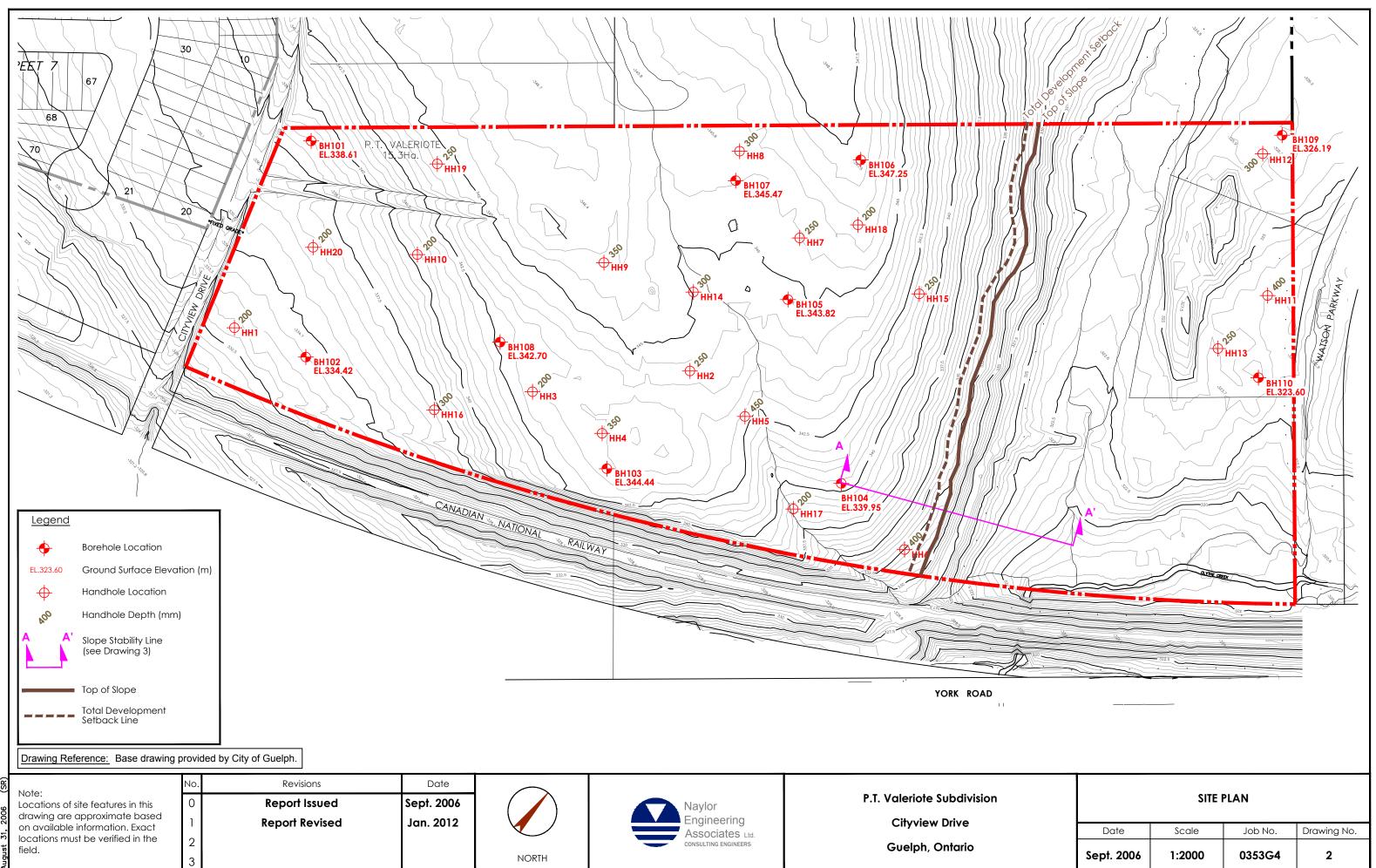
SLOPE STABILITY RATING CHART

East Side Slope

| Site Location: | Cityview Ridge Developme | nt Project No.: | P-0009857-0-02-101 | |
|-----------------------|------------------------------|---------------------|------------------------|----|
| Client: | Carson Reid Homes | Inspection Date: | January 20, 2018 | |
| Inspected By: | D.Gonser | Weather: | Sun & Cloud, 5 degrees | |
| 1. SLOPE INCLINAT | ION | | | |
| Degrees. | Ho | izontal : Vertical | | |
| a) 18 or less | 3 : | or flatter | 0 | |
| b) 18–26 | 2: | to more than 3 : 1 | 6 | |
| c) more than 26 | ste | per than 2 : 1 | 16 | 0 |
| 2. SOIL STRATIGRA | РНҮ | | | |
| a) Shale, Limeston | e, Granite (Bedrock) | | 0 | |
| b) Sand, Gravel | | | 6 | |
| c) Glacial Till | | | 9 | |
| d) Clay, Silt | | | 12 | |
| e) Fill | | | 16 | 82 |
| f) Leda Clay | | | 24 | 9 |
| 3. SEEPAGE FROM | SLOPE FACE | 3 | | |
| a) None or near bo | ottom only | | 0 | |
| b) Near mid-slope | only | | 6 | |
| c) Near crest only | or from several levels | | 12 | 0 |
| 4. SLOPE HEIGHT | | | | |
| a) 2.0 m or less | | | 0 | |
| b) 2.1 to 5.0 m | 3 | | 2 | |
| c) 5.1 to 10.0 m | | | 4 | |
| d) more than 10.0 | m | | 8 | 8 |
| 5. VEGETATION CO | VER ON SLOPE FACE | | | 12 |
| a) Well vegetated, | heavy shrubs or forested w | th mature trees | 0 | |
| b) Light vegetatior | a, mostly grass, weeds, occa | ional trees, shrubs | 4 | |
| c) No vegetation, b | bare | | 8 | 0 |
| 6. TABLE LAND DR | AINAGE | | | |
| a) Table land flat, i | no apparent drainage over s | ope | 0 | |
| b) Minor drainage | over slope, no active erosio | ı | 2 | |
| c) Drainage over sl | ope, active erosion, gullies | | 4 | 2 |
| 7. PROXIMITY OF V | VATERCOURSE TO SLOPE TO | 1 | | |
| a) 15 m or more fr | om slope toe | 3 | 0 | |
| b) less than 15 m f | | | 6 | 6 |
| 8. PREVIOUS LAND | SLIDE ACTIVITY | | | |
| a) No | | | 0 | |
| b) Yes | | | 6 | 0 |
| | RATING VALUES INVESTIGA | | TOTAL | |

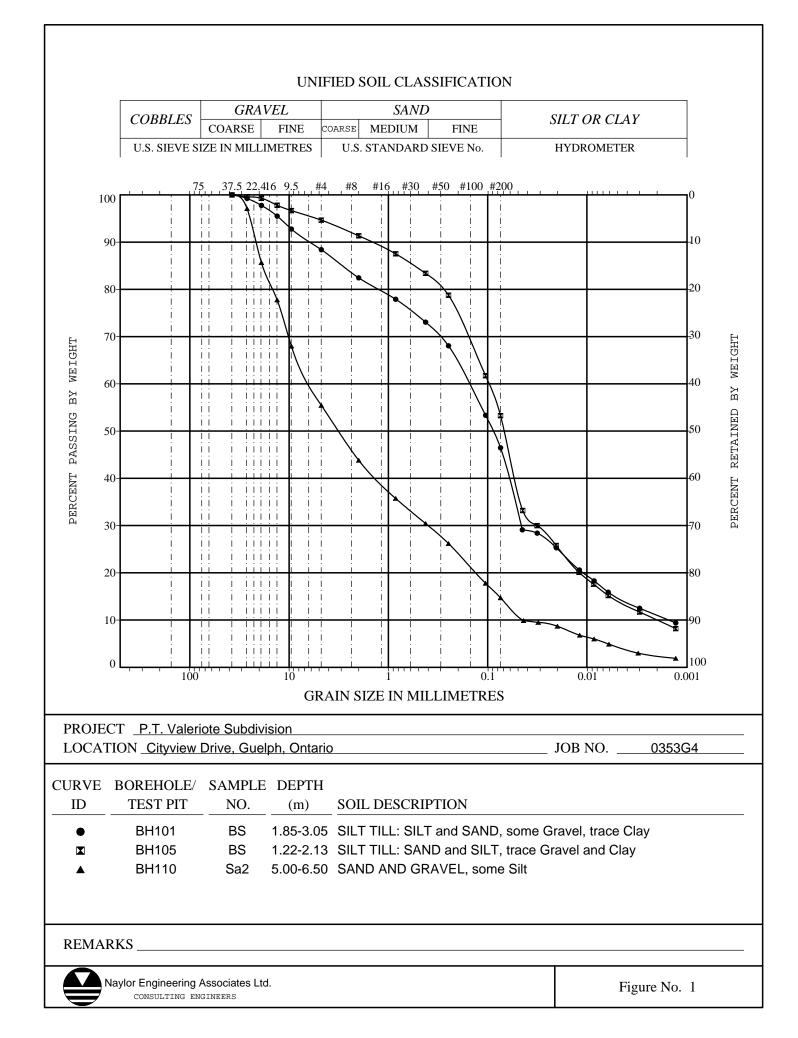
Reference: Ministry of Natural Resources, Technical Guide River & Stream Systems: Erosion Hazard Limit, Table 4.2





F: \0353\0353G4\0353G4

6



| | Naylo | FIGURE NO. 2 |
|-----------------------|---------------------------|--|
| | Engir Assc ernsulti | ciates NG ENGINEERS LABORATORY PROCTOR MOISTURE-DENSITY TEST |
| | | .T. Valeriote Subdivision |
| | | ityview Drive, Guelph, Ontario JOB NO. 0353G4 |
| | | BH105 DATE TESTED August 21, 2006 PH 1.22 - 2.13 TESTED BY WF |
| | | H 1.22 - 2.13 TESTED BY WF SILT TILL MOISTURE CONTENT 14.9% |
| | | |
| METHO MODIFI | D – IED PR | COCTOR - ASTM D698-91MAXIMUM DRY DENSITY 2.065 t/m^3 A \square B \square C \square D \square OCTOR - ASTM D1557-91OPTIMUM MOISTURE 9.0% |
| | 2.15 | |
| | 2.10 | |
| 3) | 2.05 | |
| DRY DENSITY (t/m^3) | 2.00 | |
| DENS | | 95% standard proctor maximum dry density |
| DRY | 1.95 | |
| | 1 00 | |
| | 1.90 | |
| | 1.85 | |
| | 2 | 2 4 6 8 10 12 14 MOISTURE CONTENT (%) |

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

| | | | | | | | FIGURE | NO. 3 |
|--------------------|-----------------|---------|---------------------------------------|-----------------|--------------|------------------------|--------------|--------------------|
| | 🗕 Asso | neering | | | DACTAD | MOISTII | DE DEN | ISITY TEST |
| | | | e Subdivisio | | | | | |
| | | | <u>e, Guelph,</u> | | | | | |
| | | | | | | | | 6 |
| | | | | | | | | <u> </u> |
| | | | | | | | | |
| REMAR | rks | | | | | | | |
| METHO MODIFI | DD — IED PRO | A 🗆 🛛 B | ASTM D698 C C ASTM D1557 C C | D □ 7-91 | | UM DRY DE UM MOISTU | | 2.185 t/m³ 8.7% |
| | 2.30 r | | 1 | | | | | |
| | 2.50 | | | | | | | |
| | | | | | | | | |
| | 2.25 | | | ` | | | | |
| | | | | | TERO MR | | | |
| Ω ³) | 2.20 | | | | R WOIDS CURY | | | _ |
| DRY DENSITY (t/m³) | | | | | CURR | T | | |
| ISITY | 2.15 | | | | | | | |
| DEN | | | | | | F.15 | | |
| DRY | 2.10 | | | | | | | |
| | - | | 95% s | tandard proctor | maximum dry | density | | _ |
| | 2.05 | | | | | | | _ |
| | | / | 1 | | | | \backslash | |
| | 2.00 | | | | | | | |
| | 2.00 | 2 | | | | | 2 | 14 |
| | | | M | IOISTURE C | CONTENT (% | 6) | | |

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



Location: Cityview Drive, Guelph, Ontario

Borehole Number: 101

Ground Elevation: 338.61 m

Job No.: 0353G4

Drill Date: August 2, 2006

| | SOIL PROFILE | | | | SA | MPLE | | vnar | nic C | one | Shear | Strend | gth (PP) |) kPa | | 14 | - VL | |
|-----------|--|-------------------------|---------------|--------|------|----------|----------------|---------------|-------|----------------|-------------------------|---------------|------------------------------|-------------|------|------------------------------|--|-------------|
| Depth (m) | Description | Symbol | Elevation (m) | Number | Type | N-Value | X 2 Stan | 0 4(0 dard | 0 60 | 8 ₀ | 5 ₀ Shear | 100 Streng | 150 20 gth (FV) 150 20 | ∧0) kPa | Wate | er Content (%) 2 0 3 0 | d Groundwater Obser and Standpipe D | |
| 0.00 | Ground Elevation <i>TOPSOIL:</i> dark brown silt, moist | *** | 338.61 | | | | | | | | | | | | | | protective | cover |
| 1.00 | <i>SILT TILL:</i> compact brown sandy silt, some gravel, moist | · · · · · · · · · · · · | | 1 | SS | 25 | | • | | | | | | | | | bentonite | seal |
| 2.00 | | · · · · · · · · · | 337.00 | 2 | SS | 14 | • | | _ | | | | | | • | | 50 mm pip | e |
| 3.00 | very moist | · · · · · · · · | 336.00 | 3 | SS | 16 | | | | | | | | | • | | August 8, 2 water level (Elev. 336. | l at 2.44 m |
| | dense to very dense, moist | | 335.00 | 4 | SS | 35 | | | | | | | | | • | | 1.52 m slot | ted filter |
| 4.00 | | · · · · · · · · · | 334.00 | | | | | | | | | | | | | | Sand pack | |
| 5.00 | | 00-0-00- 00-0-00-00- | | 5 | SS | 45\150mm | | | | | | | | | • | | bentonite | seal |
| 6.00 | | 0 0 0 0 0 0 | 333.00 | 6 | SS | 50\150mm | | | | _ | | | | | | | At drilling (| completion, |
| 7.00 | Borehole terminated at 6.25 m | | 332.00 | | | | | | | | | | | | | | dry cave a | |
| | | | 331.00 | | | | | | | | | | | | | | | |
| 8.00 | | | 330.00 | | | | | | | | | | | | | | | |
| 9.00 | | | | | | | | | | | | | | | | | | |
| 0.00 | | | 329.00 | | | | | | | | | | | | | | _ | |
| 1.00 | | | 328.00 | | | | | | | | | | | | | | _ | |
| 2 00 | | | 327.00 | | | | | | | | | | | | | | | |
| 2.00 | winwod hy: DA | | | | | | | | | | | | | | Fiel | | | |
| Dr | eviewed by: DN ill Method: Solid Stem Aug otes: Bulk sample taken fi | | 1.83 tc | o 3. | 05 | m. | | | | | | | | | She | et: 1 | :h.: <i>RM</i> of 1 oy: DC(01a) | |



Location: Cityview Drive, Guelph, Ontario

Borehole Number: 102

Ground Elevation: 334.42 m

Job No.: 0353G4

Drill Date: August 2, 2006

| | SOIL PROFILE | | | | SA | MPLE | | Dyn | amic (| Cone | s | hear S | Streng | ith (PP |) kPa | | | W | | | |
|--------------|---|---|---------------|--------|----------|----------|----------------|-------------------|-------------------------|-----------------------------------|---|-------------------------------|-----------------|---------|------------------|----|-------------------------|--------|------|--|---|
| Depth (m) | Description | Symbol | Elevation (m) | Number | Type | N-Value | X 2 Star | 2 <u>0</u> nda | 40 6 ard Per 40 6 | X 0 8 ₀ netratic | | ▲ 5 ₀ hear S | 100 1 Streng | 150 2 | 00) kPa ∎ | Wa | ater Co (%) 0 2 0 | ontent | | | ater Observations andpipe Details |
| 0.00 | Ground Elevation TOPSOIL: \dark brown silt, moist | · · · | 334.42 | | | | | | | | | | | | | | | | _ | | protective cover |
| 1.00 | <i>SILT TILL:</i> loose brown sandy silt, some gravel, trace clay, very moist | · · · · · · · · · · · · · · · · · · · | 333.00 | 1 | SS | 9 | | | | | | | | | | | | | | | bentonite seal |
| 2.00 | | | 332.00 | 2 | SS SS | 5 | | | | | | | | | | | | | | | |
| 3.00 | compact, very moist very dense, moist | • • • • • • • • • | 331.00 | 4 | | 50\150mm | | | | | | | | | | • | | | | | 50 mm pipe sand pack 1.52 m slotted filter |
| 4.00 | | 00-0-00-0 00-0-00-0 | 330.00 | | | | | | | | | | | | | | | | | | August 8, 2006 |
| 5.00 | | · • • • • • • • • • • • • • • • • • • • | 329.00 | 5 | SS | 45\150mm | | | | | | | | | | • | | | | | water level at 3.36 m (Elev. 331.06 m) bentonite seal |
| 6.00 | augering on weathered bedrock or boulder Borehole terminated at 5.74 m upon auger refusal on bedrock or boulder | | 328.00 | | | | | | | | | | | | | | | | | | At drilling completion, dry cave at 5.74 m |
| 7.00 | | | 327.00 | | | | | | | | | | | | | | | | | | |
| 8.00 | | | 326.00 | | | | | | | | | | | | | | | | | | |
| 9.00 | | | 325.00 | | | | | | | | | | | | | | | | | | |
| 10.00 | | | 324.00 | | | | | | | | | | | | | | | | | | |
| 11.00 | | | 323.00 | | | | | | | | | | | | | | | | | | |
| Re Dr | eviewed by: <i>DN</i> ill Method: <i>Solid Stem Au</i> gotes: | ger | <u> </u> | | | <u> </u> | <u> </u> | 1 | 1 1 | 1 | | I | 1 | 1 | ſ | Sł | eld 1 neet: afte | 10 | of 1 | | a) |



Location: Cityview Drive, Guelph, Ontario

Borehole Number: 103

Ground Elevation: 344.44 m

Job No.: 0353G4

| | SOIL PROFILE | | | | SA | MPLE | | Dynan | nic Co | ne | Shear | Streng | jth (PP) k | Pau | <u> </u> | | |
|-----------|---|---------------------------------------|---------------|--------|------|----------|----------------|---------------------|------------------|-------------------|--------------|---------|----------------------------------|----------|---|--|-----------|
| Depth (m) | Description | Symbol | Elevation (m) | Number | Type | N-Value | X 2 Star | 2 <mark>0 4(</mark> |) 6 ₀ | X 80 ration | _50 Shear |) 100 1 | 150 200 Ith (FV) k 150 200 |) (Pa | VP WL Water Content (%) 10 20 30 | - Groundwater Observati and Standpipe Detail | |
| 0.00- | Ground Elevation | | 344.44 | | | | | | | | | | | | | | |
| 0.00 | TOPSOIL: dark brown silt, moist SILT TILL: | | | | | | | | | | | | | | | concrete s protective | |
| 1.00 | loose rusty brown silt, some sand, trace clay and gravel, trace tree roots, moist to very | 00-0-00 -00-0-00 | 343.00 | 1 | SS | 5 | • | | | | | | | | | bentonite : | |
| 2.00 | moist | - 0 - 00 - 0 0 - 0 - 0 | | 2 | SS | 6 | • | | | | | | | | | sand pack 0.76 m slot 19 mm pip | ed filter |
| 3.00 | dense to very dense brown sandy silt, some gravel, trace clay, moist | - 0 - 0 - 00 - 0 - 0 - 0 | 342.00 | 3 | SS | * | | | | | | | | | • | August 8, 2 | 006, |
| | | · · · · · · · · | 341.00 | 4 | SS | 55\150mm | | | | | | | | | | bentonite | seal |
| 4.00 | | · · · · · · · · · · · · | 340.00 | | | | | | | | | | | | | August 8, 2 water leve (Elev. 340.6 | at 3.80 m |
| 5.00 | | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | | 5 | SS | 45\150mm | | | _ | - | | | | + | <u> </u> | 50 mm pip | e |
| 6.00 | | 0.00.0 | 339.00 | | | | | | | | | | | | | | |
| 0.00 | grey, moist | 10 - 0 - 00 - 0 | 338.00 | 6 | SS | 60\150mm | | | | | | | | | • | sand pack | |
| 7.00 | | 0 00 0 0 00 0 | 337.00 | | | | | | | | | | | | | _ 1.52 m slot | ed filter |
| | | · · · · | | 7 | SS | 75\150mm | | | | | | | | | • | At drilling | |
| 8.00 | Borehole terminated at 7.92 m | | 336.00 | | | | | | | | | | | | | completion cave at 7. | |
| 9.00 | | | 335.00 | | | | | | - | | | | | | | _ | |
| 10.00 | | | | | | | | | _ | | | | | | | _ | |
| 11.00 | | | 334.00 | | | | | | | | | | | | | | |
| | | | 333.00 | | | | | | | | | | | | | | |
| 12.00 | | | | | | | | | | - | | | | | | _ | |
| Dr | eviewed by: DN fill Method: Solid Stem Aug otes: * Sampler driving on | | vel. | | | | | | | | | | | \$ | Field Tech Sheet: <i>1 o</i> Drafted by | | |



Location: Cityview Drive, Guelph, Ontario

Borehole Number: 104

Ground Elevation: 339.95 m

Job No.: 0353G4

| | SOIL PROFILE | | | | SA | MPLE | | Dvna | mic | Cone | Shea | r Stre | nath (| PP) kPa | - | | | | | |
|-----------|--|--|---------------|--------|----------|----------------|-----------|--------------|-----------|--------------------------------|-------------|---------------|--------|--------------------------------|------|-------------|-------------------------------------|---|---------|--|
| Depth (m) | Description | Symbol | Elevation (m) | Number | Type | N-Value | X Star | 2 <u>0</u> 4 | 06 Der | X 0 80 netration 0 80 | _5(Shea |) 10 rStre | 0 150 | 200 FV) kPa | Wa | (% | WL Content S) D 3 <u>0</u> | | | ter Observations ndpipe Details |
| 0.00 | Ground Elevation <i>TOPSOIL:</i> dark brown silt, moist | | 339.95 | | | | | | | | | | | | | | | | | concrete seal and protective cover |
| 1.00 | <i>SILT TILL:</i> compact brown sandy silt, some gravel, trace clay, moist | 0 · 00 · 0 · 00 • • 00 · 0 · 0 | 339.00 | 1 | SS | 20 | | | | | | | | | | | | | | bentonite seal 19 mm pipe |
| 2.00 | | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 338.00 | 2 | SS | 25 | | • | | | | | | _ | | | | _ | | sand pack |
| 3.00 | very dense, moist | 0.0.00.0.0 | 337.00 | 3 | SS SS | 30\150mm 51 | | | • | | | | | | | | | _ | | 1.22 m slotted filter August 8, 2006 water level at 2.63 m (Elev. 337.32 m) |
| 4.00 | | 0 · 0 · 00 · 0 · 0 · 0 · 0 | 336.00 | | | | | | | | | | | | | | | | | August 8, 2006 water level at 2.91 m (Elev. 337.04 m) bentonite seal |
| 5.00 | | 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 335.00 | 5 | SS | 45\150mm | | | | | | | | - | • | | | - | | |
| 6.00 | cobbles, some dolostone | 10 - 0 - 00 - 0 - 0 - 0 - 0 - 0 - 0 - 0 | 334.00 | 6 | SS | 65\150mm | | | | | | | | | | | | - | | sand pack 1.52 m slotted filter 50 mm pipe |
| 7.00 | Borehole terminated at 6.71 m | <u> </u> | 333.00 | | | | | | | | | | | _ | | | | | <u></u> | At drilling completion, water |
| 8.00 | | | 332.00 | | | | | | | | | | | | | | | _ | | level at 6.40 m |
| 9.00 | | | 331.00 | | | | | | | | | | | | | | | | | |
| 10.00 | | | 330.00 | | | | | | | | | | | | | | | _ | | |
| 11.00 | | | 329.00 | | | | | | | | | | | | | | | | | |
| 12.00 | | | | | | | | | | | | | | | | | | | | |
| Dr | eviewed by: <i>DN</i> ill Method: <i>Solid Stem Au</i> otes: | | | | | | | | | | | Sł | neet | Tech t: <i>1 o</i> ed by | of 1 | 01 <i>i</i> | a) | | | |

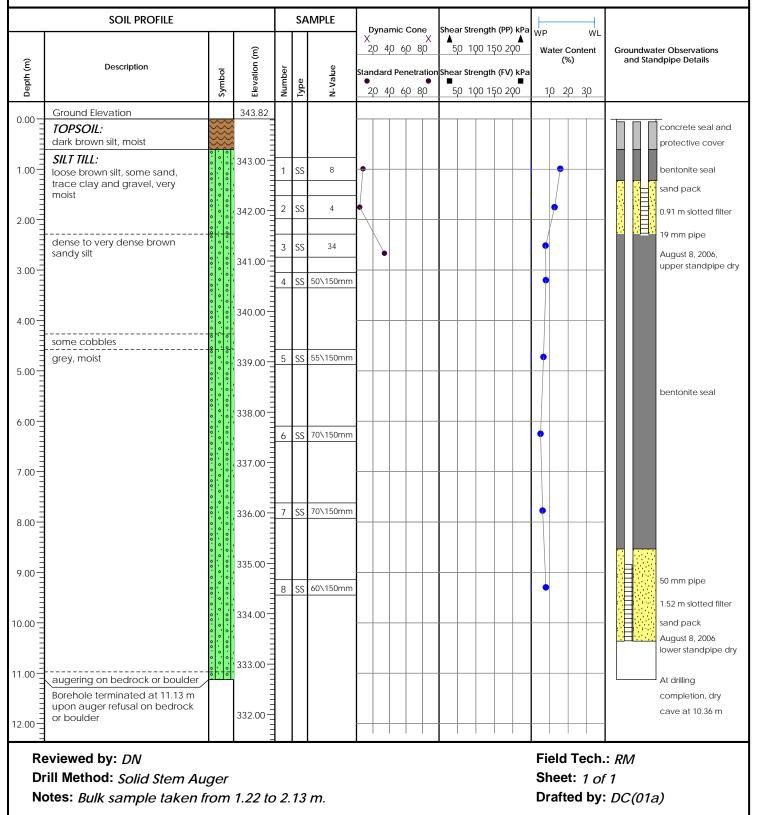


Location: Cityview Drive, Guelph, Ontario

Borehole Number: 105

Ground Elevation: 343.82 m

Job No.: 0353G4





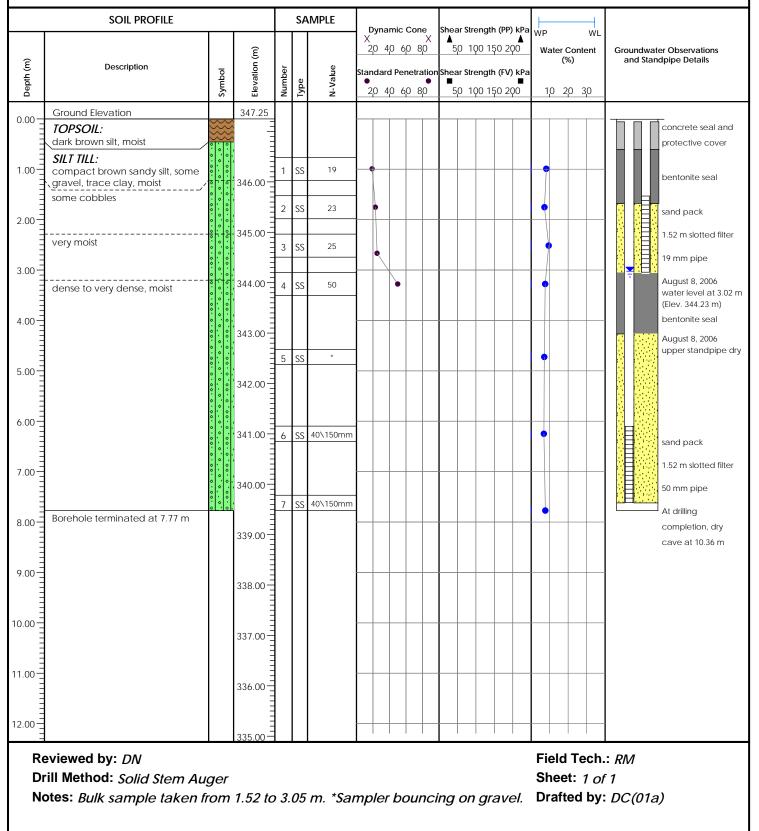
Location: Cityview Drive, Guelph, Ontario

Borehole Number: 106

Ground Elevation: 347.25 m

Job No.: 0353G4

Drill Date: August 2, 2006





Location: Cityview Drive, Guelph, Ontario

Borehole Number: 107

Ground Elevation: 345.47 m

Job No.: 0353G4

| | SOIL PROFILE | | | | SA | MPLE | | Dyr | namic | Cone | | Shear Stre | ngth (PF | P) kPa | WD | WL | |
|-----------|---|--|---------------|--------|----------|----------------|------|-----|-------------------------|---------|----|---------------------------------|---|----------------------------|------|----------------------------|--|
| Depth (m) | Description | Symbol | Elevation (m) | Number | Type | N-Value | Star | nda | 40 6 ard Per 40 6 | netrati | on | 5 ₀ 10 Shear Stre | 0 150 2 | 2 <u>00</u> /) kPa ■ | Wate | er Content (%) 20 30 | Groundwater Observations and Standpipe Details |
| 0.00 | Ground Elevation <i>TOPSOIL:</i> dark brown silt, moist | | 345.47 | | | | | | | | | | | | | | concrete seal and protective cover |
| 1.00 | SILT TILL: loose brown silt, some sand, \trace clay, very moist | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 344.00 | 1 | SS | 8 | | | | | | | | | | | - bentonite seal |
| 2.00 | compact to very dense brown sandy silt, some gravel | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 343.00 | 2 | SS SS | 15 35\150mm | | | | | | | | | | | sand pack 0.76 m slotted filter 19 mm pipe |
| 3.00 | | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | | 4 | SS | 50\150mm | | | | | | | | | • | | - bentonite seal |
| 4.00 | grey, moist | · • · • • • • • • • • | 342.00 | | | | | | | | | | | | | | |
| 5.00 | | 0 · 0 · 00 · 0 · 0 · 0 · 0 · 0 · 0 · 0 | 341.00 | 5 | SS | * | | | | | | | | | • | | sand pack 1.52 m slotted filter |
| 6.00 | Borehole terminated at 6.25 m | 0 · 0 · 00 · 0 | 339.00 | 6 | SS | 60\150mm | - | | | | | | | | • | | 50 mm pipe At drilling |
| 7.00 | | | | | | | | | | _ | | | | | | | completion, dry cave at 6.10 m August 8, 2006 |
| 8.00 | | | 338.00 | | | | | | | | | | | | | | water level in upper standpipe at 1.05 m (Elev. 344.42 m) water level in lower standpipe at 3.20 m |
| 9.00 | | | 336.00 | | | | | | | | | | | | | | (Elev. 342.27 m) - |
| 10.00 | | | 335.00 | | | | | | | | | | | | | | - |
| 11.00 | | | 334.00 | | | | | | | | | | | | | | _ |
| 12.00 | | | | | | | | | | | | | | | | | _ |
| Dı | eviewed by: DN fill Method: Solid Stem Aug otes: * Sampler bouncing | | | | | | | | | | | She | d Tech. eet: <i>1 of</i> fted by: | | | | |



Location: Cityview Drive, Guelph, Ontario

Borehole Number: 108

Ground Elevation: 342.70 m

Job No.: 0353G4

| | SOIL PROFILE | 1 | | | SA | MPLE | | Dyna | amic (| Cone | Shea | ır Stren | gth (PP |) kPa | WP | | WL | | |
|-----------|---|--|---------------|--------|------|----------|------|------|--------|------|-----------|--------------------|---------|-------------|----|-------------------------|-------|-----|---|
| Depth (m) | Description | Symbol | Elevation (m) | Number | Type | N-Value | Star | 0 4 | | Х | 5 Shea | 0 100 ir Streng | 150 2 | 00) kPa | Wa | ter Con (%) | itent | G | dwater Observations I Standpipe Details |
| 0.00 | Ground Elevation TOPSOIL: dark brown silt, moist | >>> • • • • | 342.70 | | | | | | | | | | | | | | | | concrete seal and protective cover |
| 1.00 | <i>SILT TILL:</i> compact brown silt, some sand, gravel and clay, moist | 00-0-00- 0-00 | | 1 | SS | 19 | | | | | | | | | - | | | | |
| 2.00 | | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 341.00 | 2 | SS | 24 | | | | | | | | | | | | | bentonite seal |
| 3.00 | dense to very dense, trace clay, moist some cobbles | • • • • • • • • • • • • • • • • • • • | 340.00 | | SS | 31 | | • | | | | | | | | | | | August 8, 2006 water level at 2.21 m (Elev. 340.49 m) |
| 4.00 | | 00000000000000000000000000000000000000 | 339.00 | 4 | SS | 45\150mm | | | | | | | | | | | | | |
| +.00 | grey, moist | 0 - 0 - 00 - 0 0 - 0 - 00 - 0 | 338.00 | 5 | SS | 45\125mm | | | | | | | | | • | | | | |
| 5.00 | | · • • • • • • • • | | | | | | | | | | | | | | | | | |
| 6.00 | | · o · o o · o · o | 337.00 | 6 | SS | 58\150mm | | | | | | | | | • | | | | sand pack |
| 7.00 | | 00-0-00- 0-00 | 336.00 | | | | | | | | | | | | | | | | 50 mm pipe |
| 8.00 | Borehole terminated at 7.77 m | 0 0 0 0 0 0 0 0 0 0 0 | 335.00 | 7 | SS | 65\150mm | | | | | | | | | | | | | At drilling completion, dry cave at 7.62 m |
| 9.00 | | | 334.00 | | | | | | | | | | | | | | | | |
| | | | 333.00 | | | | | | | | | | | | | | | | |
| 0.00 | | | 332.00 | | | | | | | | | | | | | | | | |
| 1.00 | | | 331.00 | | | | | | | | | | | | | | | | |
| 2.00 | | | | | | | | | | | | | | 1 | | | | 1 | |
| Dr | eviewed by: DN ill Method: Solid Stem Aug otes: Bulk sample taken fi | | 1.52 tc | o 3. | 05 | m. | | | | | | | | | Sh | eld To eet: afted | 1 01 | f 1 | 01a) |



englobecorp.com

March 1, 2019

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

Subject: Slope Stability Assessment of South-Facing Slope Cityview Ridge Subdivision Cityview Drive Guelph, Ontario Our ref.: 160-P-0009857-0-01-100-GE-L-0002-00

Ms. Angela Kroetsch:

Englobe Corp. (Englobe) is pleased to provide this letter report for the slope stability assessment completed for the proposed Cityview Ridge Subdivision on Cityview Drive, Guelph. The initial work for this investigation was authorized by Mr. Carson Reid of Cityview Ridge Developments Inc. on January 15, 2018 with additional analyses authorized on February 6, 2019.

The site being investigated comprises the area of the proposed stormwater management (SWM) facility, and adjacent rail corridor to the south of the site. The SWM facility construction will include the placement of fill near the top of the slope towards the east side of the site and cutting of the native soils towards the west side of the site.

The purpose of this slope stability assessment is to analyze the impact of the proposed development on the stability of the existing south slope at the site. Reference is made to Englobe letter 160-P-0009857-0-02-101-L-0001-0B dated April 4, 2018 for findings related to the east slope.

General Information

The subject site is located on Cityview Drive, Guelph Ontario and the area being investigated is located at the south side of the site, near the top of a slope. A rail line is located at the base of the south slope.

Naylor Engineering Associates Ltd. (NEA) previously completed a geotechnical investigation and slope stability assessment at the subject site including drilling of ten boreholes (Boreholes BH101 to BH110) to depths of 5.6 to 11.1 m for the general area of the proposed development. Based on the findings of this investigation, it is assumed that the existing slopes are comprised of native non-cohesive glacial silt till.

Englobe Corp.

T 519.741.1313 F 519.741.5422 kitchener@englobecorp.com

353 Bridge Street West Kitchener (ON) N2K 2Y5 Groundwater was found to occur in saturated seams at variable depths within the silt till deposit. A slope stability analysis was carried out in the southeast portion of the site and the results of the slope stability analysis found that the slope had a factor of safety (FS) 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 are illustrated on Drawing 1 appended to this letter. Englobe recommends that a supplementary borehole investigation be conducted specifically for the purpose of slope stability assessment.

The proposed SWM facility will have a pond bottom at Elevation 339.35 m with a permanent pool water level at Elevation 339.75 m and a design regional storm event water level at Elevation 340.32 m. It is understood that the pond will be constructed with a clay liner to Elevation 340.64 m. It is assumed that the clay liner will be designed and constructed in a manner that the storm water management pond will not increase the moisture content of the underlying soil, causing excessive forces and reducing strength of the soil. Toward the west and central portions of the SWM facility, the existing grades are above the proposed finished grades and material will be cut for construction of the facility. Toward the east portion of the SWM facility, the existing grade is near the proposed pond base and material will placed to construct the berms along the outside of the pond. Based on conversation with GM BluePlan Engineering Limited (GMBP), it is understood that surplus onsite material (silt till) will be reused for construction of the SWM facility.

(Gamsby and Mannerow Engineers, Carson Reid Homes, Cityview Ridge, Project Number 105-172, Preliminary Site Grading and Drainage Plan [Drawings 1 & 2], Stormwater Pond Plan and Sections [Drawing 4), Stormwater Pond Cross-Sections [Drawing 5], and Trail Plan and Sections [Drawing 8], Revised June 6, 2017).

Slope Inspection

Englobe completed a site visit on January 20, 2018 to inspect the existing slope conditions. The slope inspection was carried out based on the guidance provided in the Ontario Ministry of Natural Resources (MNR) document: *Technical Guide, River & Stream Systems: Erosion Hazard Limit* and slope ratings for the south slope was produced in accordance with Table 4.2 of the MNR document. Based on the results of the slope inspection the south slope had a rating of 35 points, indicating Moderate Potential for slope instability.

Slope Stability Assessment

Cross-Section C-C' through F-F' were created based on topographic data provided by Gamsby and Mannerow Engineers and the location of the sections are shown on our Drawing 1– Site Plan – South Side. The cross-sections were created to represent worst case scenarios, where the slopes were the steepest and the proposed additional loading was greatest.

Following the GRCA policy, the design range for the FS must be 1.3 to 1.5 or greater. As per our meeting with GMBP on February 4, 2019, the proposed conditions for Cross-Sections C-C' to F-F' were analyzed for a minimum FS of 1.3 and a minimum FS of 1.5 to illustrate the required setback requirements for each FS. Englobe notes that an additional slope inspection during the Spring as well as additional borehole investigation including the installation of monitoring wells near the slope section at SWM facility is recommended if a FS of 1.3 is considered for use in the site plan design. The additional information collected would be analyzed in order to refine the geotechnical model for the cross-sections under discussion. It is further noted that Englobe is not able to comment if CN will permit a FS of 1.3.

The information from the existing 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, site laboratory testing, local experience, and available literature correlations and are provided in Table 1.

| SOIL MATERIAL | UNIT WEIGHT (kN/m³) | ANGLE OF INTERNAL FRICTION (°) | COHESION (kPa) |
|--------------------------------|------------------------|-----------------------------------|-------------------|
| Silt Till, loose | 22 | 32 | 0 |
| Silt Till, compact | 22-23 | 32 | 0 |
| Silt Till, dense to very dense | 23.3 | 35 | 0 |

Table 1: Soil Parameters

Standard Proctor moisture-density testing carried out during the previously referenced NEA indicated that if the soil was compacted to 100% standard Proctor maximum dry density (SPMDD) at the approximate optimum moisture content, the bulk unit weight of the material would be in the range of 22 to 23.3 kN/m³ and such, this range of unit weights were selected in the analysis.

Based on the gradation analyses carried out on samples of the glacial till during the NEA investigation, the material was found to comprise sand and silt with trace to some gravel, and traces of clay. Typically soils containing trace amounts of clay do not exhibit reliable and consistent cohesive strength, therefore, no cohesion was applied in the analyses.

The angle of internal frictions that were used in the analyses are based on the measured standard penetration testing (SPT) N-values obtained during the NEA investigation. The relative density of the glacial till soils, based on the SPT N-values was found to range from loose to very dense, and increased with depth. The soil layers modelled in the analysis were based on the relative densities as determined by the N-values. The angle of internal frictions that were utilized for each soil layer are based on local experience and laboratory testing performed on projects with similar soil conditions as well as published correlations summarized in the publication *Performance and use of the Standard Penetration Test in Geotechnical Engineering Practice* (McGregor, and Duncan, Centre for Geotechnical Practice and Research, Virginia Polytechnic Institute and State University, October 1998).

Suspected bedrock was encountered but was not proven by coring during the NEA investigation. Based on local area knowledge, bedrock outcrops are present to the south of the site in the area between the railroad tracks, York Road, and Cityview Drive South. Based on available bedrock mapping and water well records, it is anticipated that the bedrock surface is located at depths in excess of 20 m below ground surface to the north of the site. Based on the available data, bedrock is suspected to slope downwards towards the north but reliable data to determine the bedrock elevation on the site is not available and as such the soil was conservatively assumed to be continuous to Elevation 300 m.

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

- Grades of the site will be raised (where applicable) with well compacted subgrade or structural fill utilizing the onsite glacial till. 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 materials were conservatively assumed to exhibit a surcharge load of 23.3 kN/m³ based on a compaction of 100% SPMDD.
- The assumed groundwater depth along the south-facing slope was modelled under consideration of the groundwater monitoring data provided by GMBP on February 5, 2019 (105-172 Updated_Water_Level_Data_Feb.2019.pdf). The provided groundwater data indicates fluctuations in the groundwater levels across the site with the seasonal high generally recorded during the Spring and localized water elevations near or above the ground surface. For the purpose of this preliminary analysis for the south-facing slopes the recorded high groundwater levels were considered. A supplementary borehole investigation with monitoring wells is recommended, to confirm the assumptions made for the slope stability assessment. It is further recommended that a slope inspection is completed during the Spring, 2019 to identify possible seepage zones within the slope.

A slope stability analysis was carried out on four representative cross-sections to identify critical slip surfaces and potential failure types using computer software (GeoStudio SLOPE/W – Morgenstern-Price Method). The various failures analyzed included shallow slumping type failure of the slope surface, medium depth rotational failures, and deep rotational failures. At each cross-section location, the existing and proposed conditions were modelled to determine the impact of the proposed development on the slope stability. The GeoStudio SLOPE/W results are summarized below in Table 2.

Subject: Slope Stability Assessment of South-Facing Slope Cityview Ridge Subdivision Cityview Drive, Guelph, Ontario Our Ref.: 160-P-0009857-0-01-100-GE-L-0002-00

Table 2: Cross-Section Summary

| CROSS-SECTION | EXISTING MINIMUM FS | MINIMUM FS UNDER PROPOSED CONDITIONS | STABLE SLOPE SETBACK* FOR FS OF 1.3 | STABLE SLOPE SETBACK* FOR FS OF 1.5 | EROSION SETBACK |
|------------------|------------------------|--|---|---|--------------------|
| Cross-Section C | 1.32 | 1.32 | N/A | 9.5 m | N/A |
| Cross- Section D | 1.02 | 1.20 | 5.9 m | 12.1 m | N/A |
| Cross- Section E | 1.05 | 1.06 | 9.1 m | 14.1 m | N/A |
| Cross- Section F | 1.33 | 1.33 | N/A | 4.6 m | N/A |

Note: * Stable Slope Setback refers to setback from proposed top of slope.

The results of the slope stability assessment completed for slope sections CC, DD, EE, and FF, on the south side of the site, indicate the existing minimum FS are below 1.5 and/or 1.3, and therefore a stable slope setback should be applied as per Table 2. In addition to the stable slope setback, the GRCA policy recommends an access allowance ranging from 6 to 15 m and a 6 m access allowance setback is considered suitable for this site. It is noted that as long as access for maintenance to the slopes is provided this access allowance may be excluded from the total development setback. An erosion setback allowance was not considered in the analysis as no watercourse is present near the toe of the existing slope.

The top of slope and development setback lines for FS of 1.5 and 1.3 are shown on the attached Drawing 1. As portions of the proposed development are located beyond the stable slope and development setback limits for a FS of 1.5, the development will need to be modified and the slope should be re-analyzed under the actual proposed conditions when they are finalized. Alternatively, the results for a FS of 1.3 may be used for the site plan of the proposed development provided additional borehole investigation including monitoring wells and site inspection are being completed.

Subject: Slope Stability Assessment of South-Facing Slope Cityview Ridge Subdivision Cityview Drive, Guelph, Ontario Our Ref.: 160-P-0009857-0-01-100-GE-L-0002-00

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,

Karen Thrams, Dipl.-Ing., M.Eng, P.Eng. Geotechnical Engineer

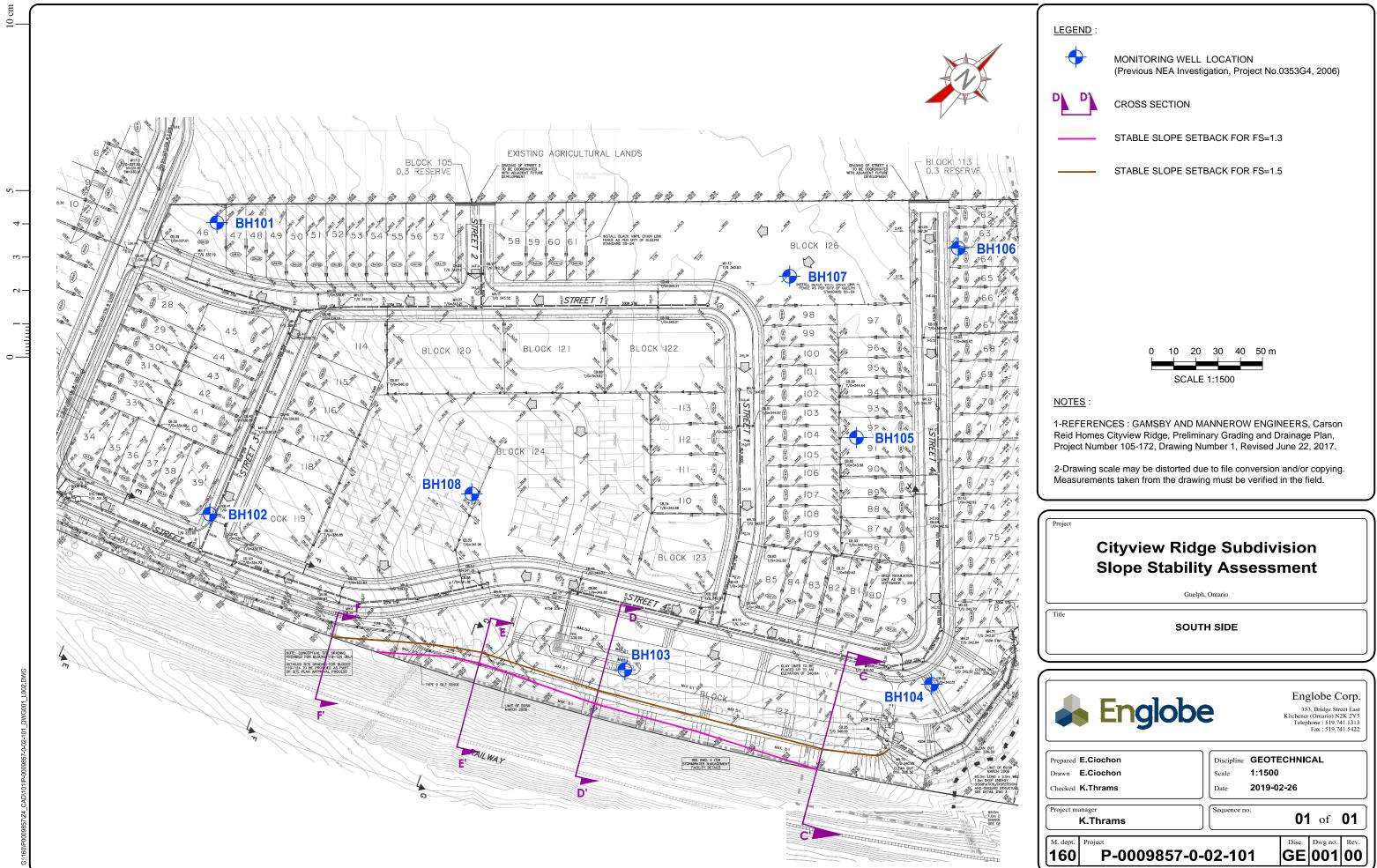
Devi-Tulasi, PE, P.Eng. Director, Geotechnical Engineer

jw

Drawing 1 – Site Plan – South Side





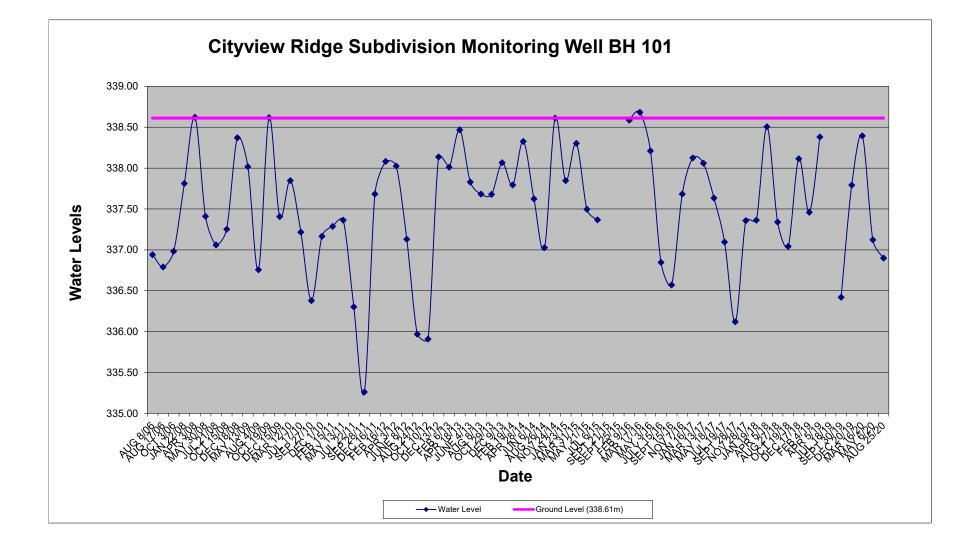


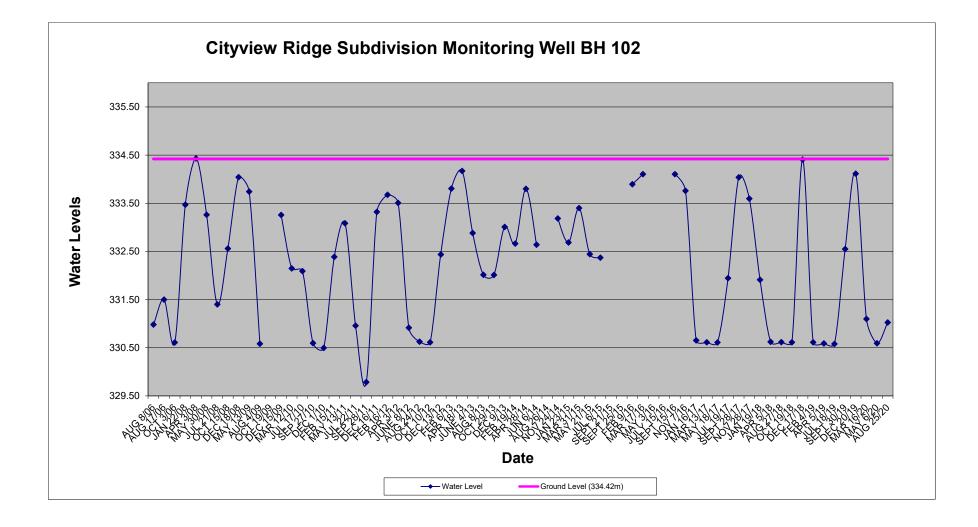
| Englobe | Englobe Corp. 353, Bridge Street East Kitchener (Ontario) N2K 2Y5 Telephone : 519.741.1313 Fax : 519.741.5422 |
|---|---|
| Prepared E.Ciochon Drawn E.Ciochon Checked K.Thrams | DisciplineGEOTECHNICALScale1:1500Date2019-02-26 |
| Project manager K.Thrams | Sequence no. 01 of 01 |
| M. dept. Project P-0009857-0- | 02-101 Disc. Dwg no. Rev. 002-101 |

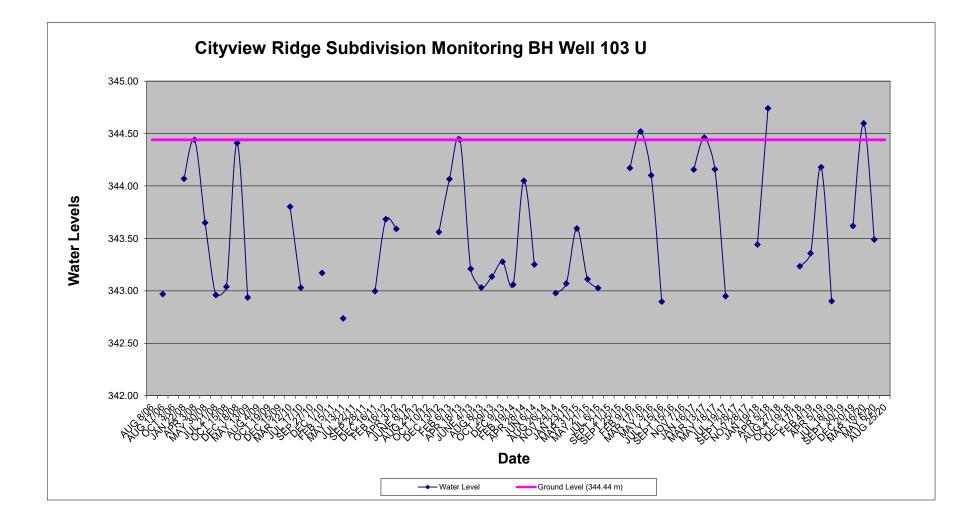
APPENDIX C:

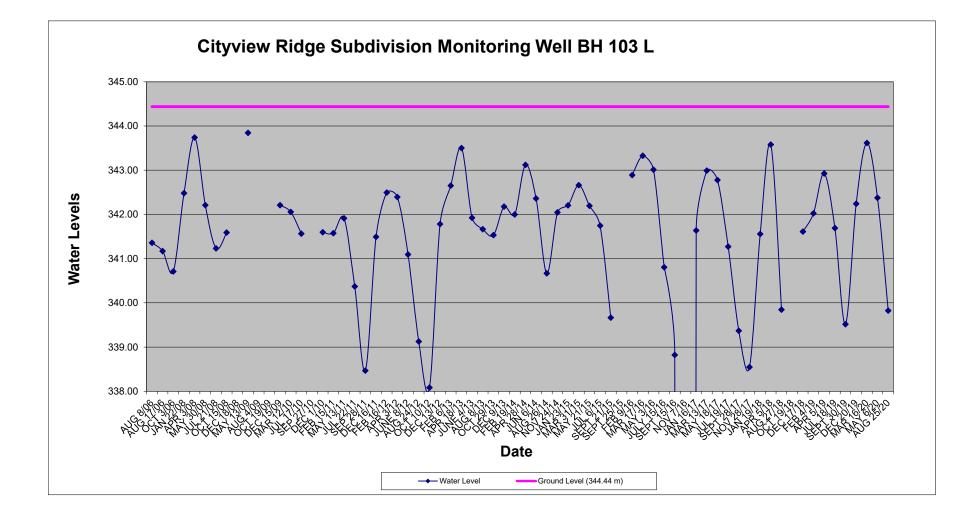
GROUNDWATER ELEVATION MEASUREMENTS

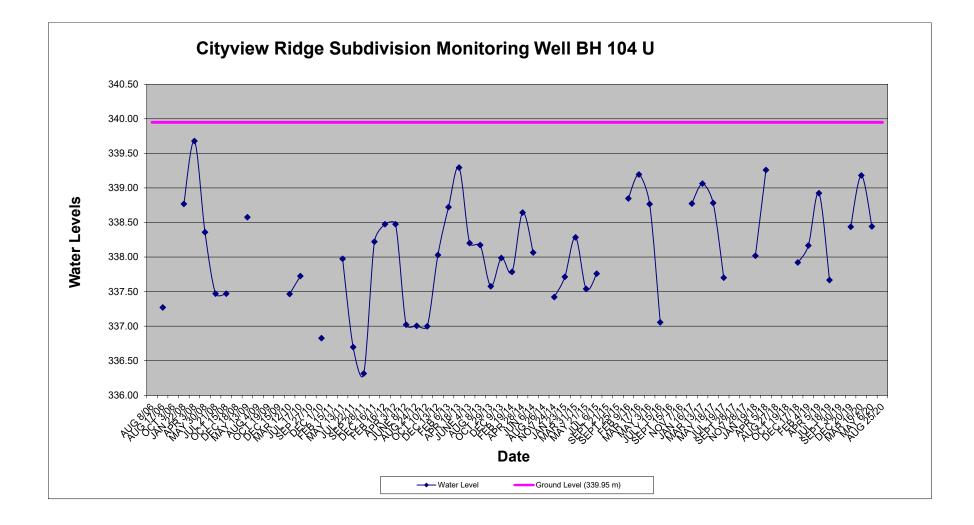
COMPLETED BY GM BLUEPLAN ENGINEERING LIMITED (AUGUST 2006 – AUGUST 2020)

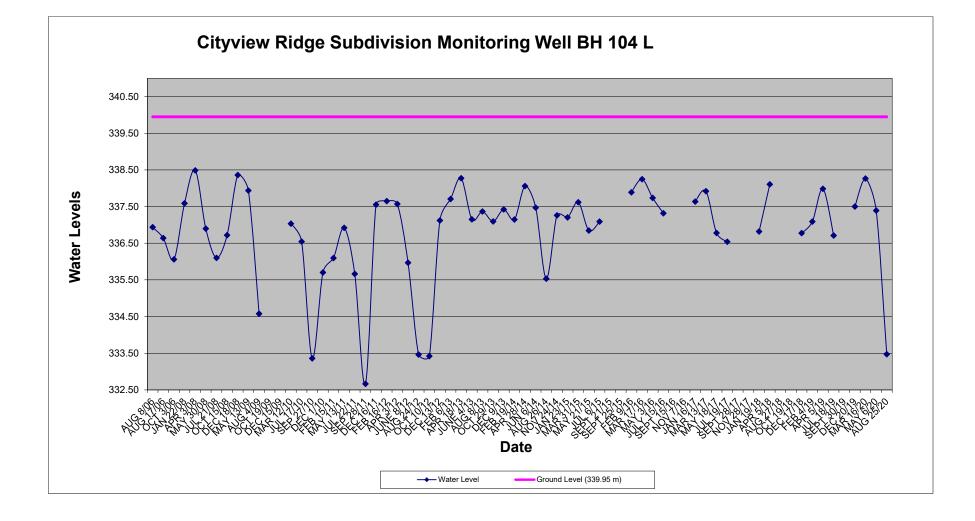


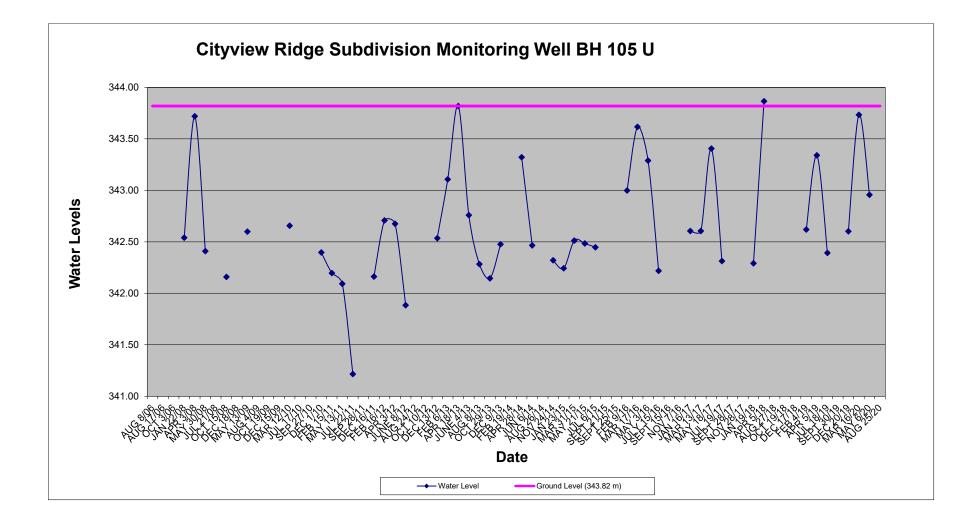


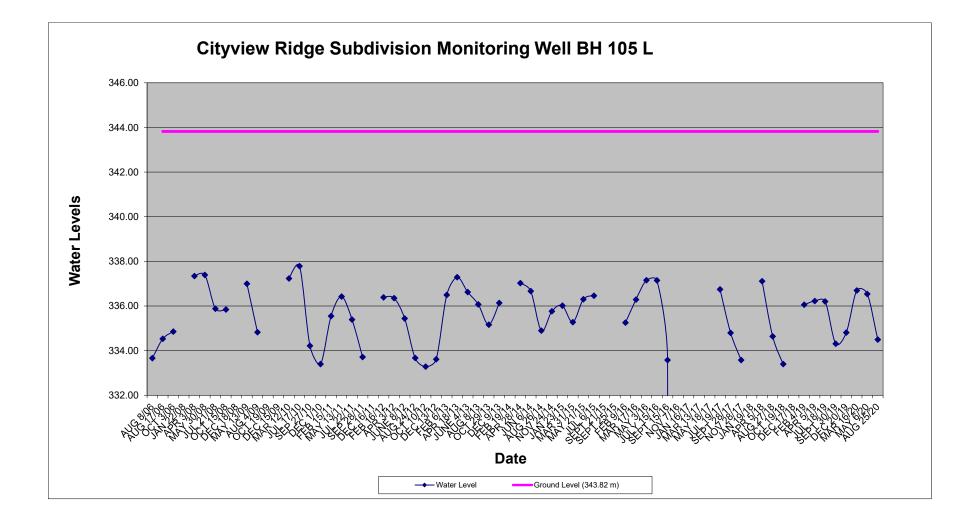


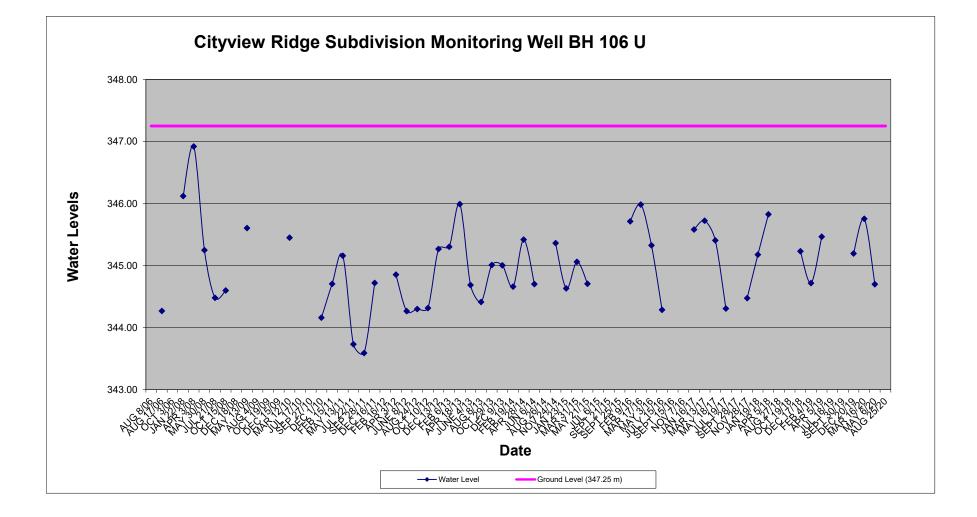


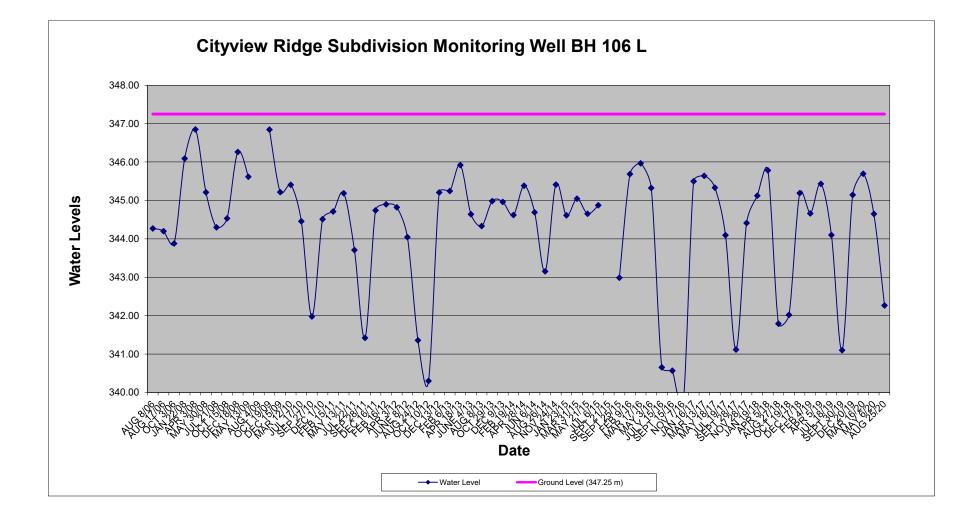


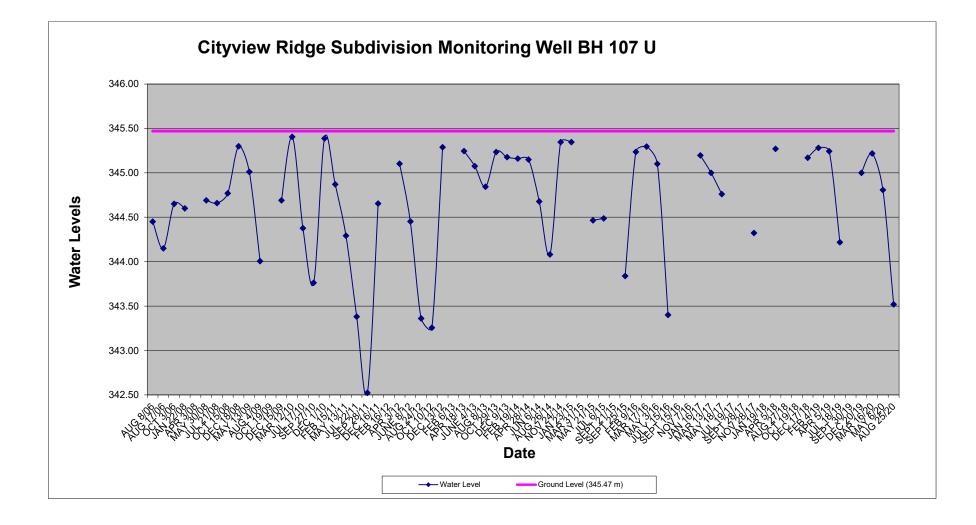


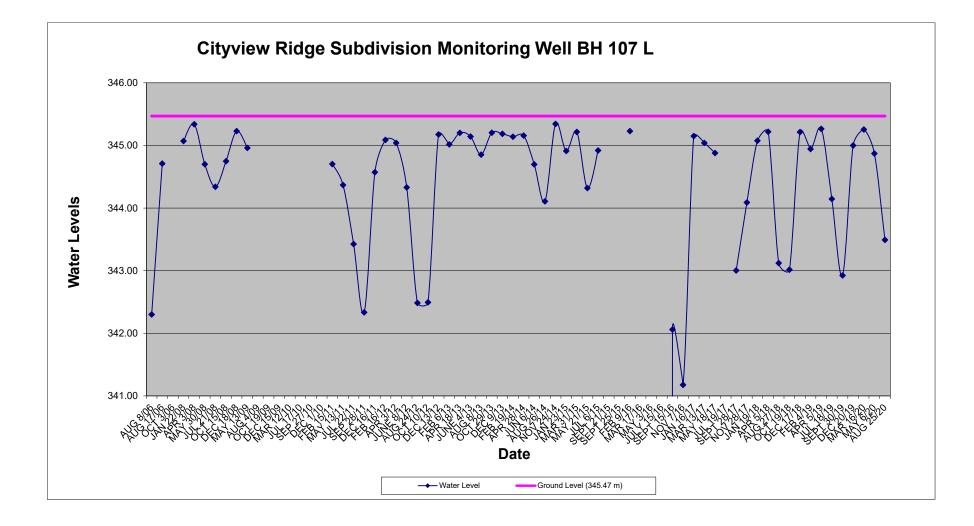


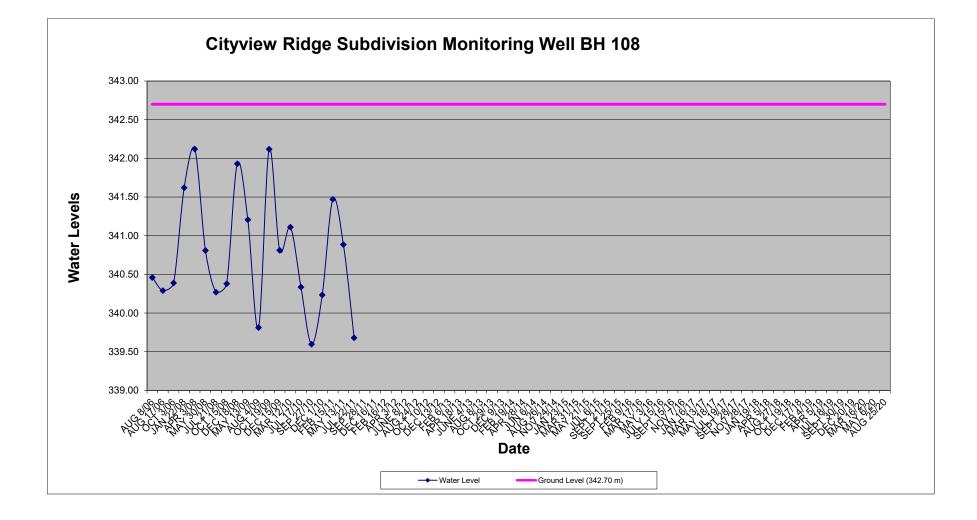


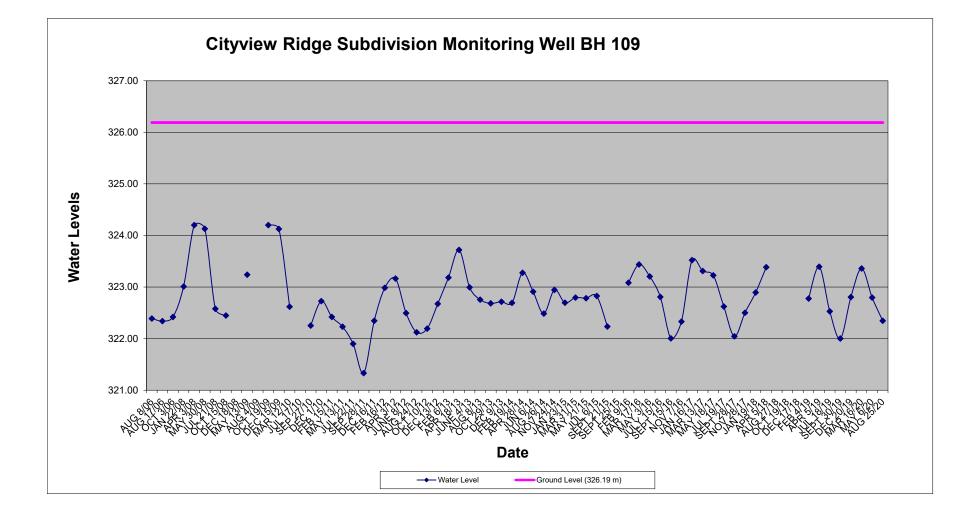


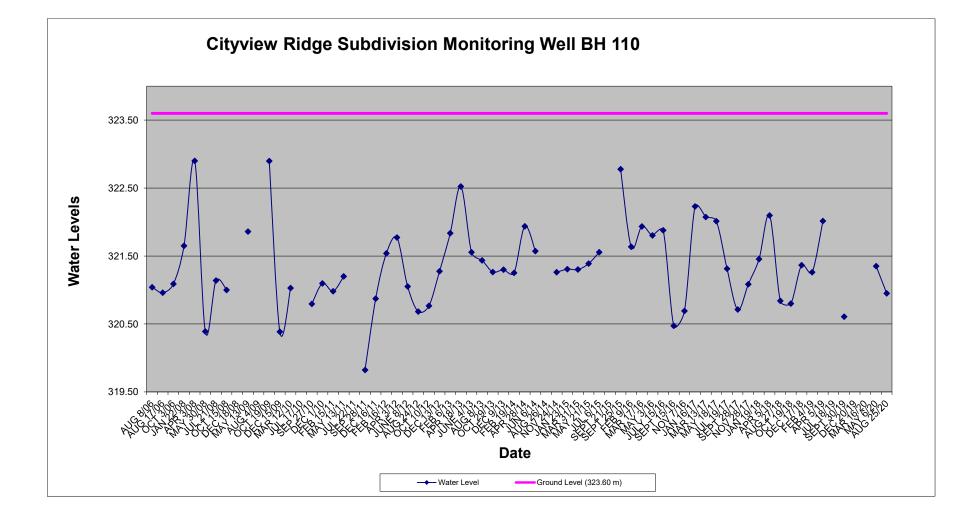












APPENDIX D:

HYDROGEOLOGICAL INVESTIGATION BANKS GROUNDWATER ENGINEERING LIMITED (NOVEMBER 2014)

Technical Memorandum (DRAFT)



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

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 onsite 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 m³/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 m³/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 m³/year.

Surface water runoff onsite under existing conditions is estimated to be about 31 600 m³/year, of which 25 420 m³/year occurs in the western and central parts of the site (i.e. Catchments 10 and 20), and 6 180 m³/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 preand 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, predevelopment, groundwater recharge for the site is estimated to be about 40 650 m³/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 m³/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 m³/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

Chapman, L. J. and D.F. Putnam. 1984. The Physiography of Southern Ontario. Ontario Geological Survey.

Gamsby and Mannerow Limited. 2012. Preliminary Servicing and Stormwater Management Report, Cityview Ridge Subdivision, City of Guelph.

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.

Karrow, P.F. 1987. Quaternary Geology of the Hamilton-Cambridge Area, Southern Ontario. Ministry of Northern Development and Mines, Ontario Geological Survey Report 255.

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 940 Watson Road South, RR 1 Puslinch, Ontario NOB 230 519.829.4808 www.banksgroundwater.ca

Hydrogeological Investigation **Environmental Impact Study Proposed Cityview Ridge Development City of Guelph**

Piezometer Locations

Figure 1

| 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 |

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

* negative values indicate groundwater above ground level

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) STAGE/STORAGE/DISCHARGE TABLES POST DEVELOPMENT CONTROLLED CONDITION MODELLING FILES (EASTERN PORTION OF CITYVIEW RIDGE SUBDIVISION) COOLING TRENCH CALCULATIONS OIL/GRIT SEPARATOR SIZING CALCULATIONS

| | | | | | _ | | |
|------|----|------------------|---|------------------|------------------|------------------|-----------------|
| | | | 105 MIDUSS Output | 172 Ex Cond | 2year | | . 11 |
| | | | MIDUSS Version | | | Version 2 0 | 7 rev. 379" |
| ** | | | MIDUSS created | | | | 1 25, 2005" |
| | | 10 | Units used: | | | - | ie METRIC" |
| | | | Job folder: Output filename: | Y:' | | | ling\105172" |
| ** | | | Licensee name: | | 1021/2 | EX CONG 296 | ear REV.out" |
| | | | Company | | Gamsb | v and Mannei | 'ow Limited' |
| - 11 | | | Date & Time last u | sed: | | | L1:58:40 AM" |
| | 31 | T: 5.000 | IME PARAMETERS" | | | | |
| | | 170.000 | Time Step" Max. Storm length" | | | | |
| " | | 1500.000 | Max. Hydrograph" | | | | |
| ** | 32 | S | FORM Chicago storm" | | | | |
| | | 1 | Chicago storm" | | | | |
| ** | | 743.000 6.000 | Coefficient A" Constant B" | | | | |
| ** | | 0.799 | Exponent C" | | | | |
| | | 0.400 | Fraction R" | | | | |
| 11 | | 170.000 | Duration" | | | | |
| | | 1.000 | Time step multipli | | | | |
| п | | | aximum intensity otal depth | 105.6 33.8 | | r'' | |
| 11 | | 6 | | h extension | used in th | is filo" | |
| | 33 | | ATCHMENT 10" | in excension | useu m un | IS HIE | |
| | | 1 | Triangular SCS" | | | | |
| | | 1 | Equal length" | | | | |
| | | 2 10 | Horton equation" | uadati Crook | , 11 | | |
| п | | 8.000 | Catchment 10 - To % Impervious" | Hauati Creek | K | | |
| 11 | | 7.020 | Total Area" | | | | |
| | | 45.000 | Flow_length" | | | | |
| | | 2.000 | Overland Slope" | | | | |
| | | 6.458 45.000 | Pervious Area" | | | | |
| ** | | 2.000 | Pervious length" Pervious slope" | | | | |
| п | | 0.562 | Impervious Area" | | | | |
| | | 45.000 | Impervious length" | | | | |
| ** | | 2.000 | Impervious slope" | | | | |
| н | | 0.250 75.000 | Pervious Manning ' | 1''' | | | |
| | | 12.500 | Pervious Max.infil Pervious Min.infil | tration" | | | |
| ** | | 0.250 | Pervious Lag consta | ant (hours)" | , | | |
| ** | | 5.000 | Pervious Depression | ו storage" | | | |
| | | 0.015 | Impervious Manning | | | | |
| ** | | $0.000 \\ 0.000$ | Impervious Max.inf | | | | |
| ** | | 0.050 | Impervious Min.inf Impervious Lag cons | TTALION | | | |
| | | 1.500 | Impervious Depress | ion storage" | | | |
| | | | 0.130 0.00 | | | c.m/sec" | |
| ** | | | tchment 10 | Pervious | Impervious | Total Area | 11 |
| | | | rface Area | 6.458 | 0.562 | 7.020 | hectare" |
| | | 11 Ti | me of concentration me to Centroid | 28.300 | 2.768 | 13.823 | minutes" |
| ** | | | infall depth | 98.613 33.816 | 85.041 33.816 | 90.917 33.816 | minutes" mm" |
| ** | | Ra | infall volume | 2183.97 | 189.91 | 2373.88 | C.M" |
| | | Ra | infall losses | 31.709 | 2.082 | 29.339 | mm'' |
| | | | noff depth | 2.107 | 31.734 | 4.477 | mm'' |
| | | | noff volume noff coefficient | 136.09 | 178.22 | 314.31 | c .m" |
| | | | ximum flow | 0.000 0.073 | $0.000 \\ 0.119$ | 0.000 0.130 | |
| 11 | 40 | HY | DROGRAPH Add Runoff | " | 0.113 | 0.100 | c.m/sec" |
| 11 | | 4 | Add Runoff " | | | | |
| | | | | Dage 1 | | | |

| | | 105172 Ex Cond 2year | |
|----------|----|--|--|
| 11 17 | 40 | 0.130 0.130 0.000 0.000" HYDROGRAPH Copy to Outflow" | |
| 11 11 | | 8 Copy to Outflow" | |
| " | 40 | 0.130 0.130 0.130 0.000" HYDROGRAPH Combine 1" | |
| 11 11 | | 6 Combine " 1 Node #" | |
| - 11 | | Total_Discharge" | |
| | | Maximum flow 0.130 c.m/sec" Hydrograph volume 314.307 c.m" | |
| 11 11 | 40 | 0.130 0.130 0.130 0.130 | |
| " | 40 | HYDROGRAPH Start - New Tributary" 2 Start - New Tributary" | |
| | 33 | 0.130 0.000 0.130 0.130" CATCHMENT 20" | |
| 11 11 | 55 | 1 Triangular SCS" | |
| | | 1 Equallength" 2 Horton equation" | |
| | | 20 Catchment 20 - To Clythe Creeek" | |
| ** | | 0.000 % Impervious" 4.780 Total Area" | |
| 11 11 | | 45.000 Flow length" 2.000 Overland Slope" | |
| ** | | 4.780 Pervious Area" | |
| н | | 45.000 Pervious length" 2.000 Pervious slope" | |
| ** | | 0.000 Impervious Area" | |
| 11 11 | | 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" | |
| 11 11 | | 0.000 Impervious Min.infiltration" | |
| " | | 0.050 Impervious Lag constant (hours)" 1.500 Impervious Depression storage" | |
| 11 11 | | 0.054 0.000 0.130 0.130 c.m/sec" | |
| 11 11 | | 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" | |
| 11 11 | | 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" | |
| | | Runoff depth 2.107 31.734 2.107 mm" | |
| 11 11 | | Runoff coefficient 0.000 0.000 0.000 | |
| 11 | 40 | Maximum flow 0.054 0.000 0.054 c.m/sec" HYDROGRAPH Add Runoff " | |
| 11 11 | | 4 Add Runoff " 0.054 0.054 0.130 0.130" | |
| 11 11 | 33 | CATCHMENT 30" | |
| ** | | 1 Triangular SCS" 1 Equal length" | |
| ** | | 2 Horton equation" 30 Catchment 30 - To Clythe Creek" | |
| 11 17 | | 0.000 % Impervious" | |
| ** | | 6.480 Total Area" 45.000 Flow length" | |
| ** | | 2.000 Overland Slope" | |
| | | Page 2 | |

| 6.480 Pervious Area" 45.000 Pervious Slope" 0.000 Impervious Area" 45.000 Impervious Slope" 0.250 Impervious Manning 'n'" 75.000 Pervious Manning 'n'" 0.250 Pervious Manning 'n'" 0.250 Pervious Manning 'n'" 0.250 Pervious Max.infiltration" 0.251 Impervious Max.infiltration" 0.000 Impervious Max.infiltration" 0.000 Impervious Max.infiltration" 0.000 Impervious Max.infiltration" 0.001 Impervious Capconstant (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 hecta minut Time of concentration 28.300 2.168 28.00 minut Rainfall volume 136.16 33.816 33.816 mminut Rainfall volume 136.54 0.00 136.55 | | | 105172 Ex Cond Ducan |
|--|-----|----|--|
| 45.000 Pervious length" 2.000 Impervious Slope" 0.000 Impervious length" 2.000 Impervious length" 2.000 Pervious Manning 'n" 0.250 Pervious Manning 'n" 0.250 Pervious Manning 'n" 0.250 Pervious Manning 'n" 0.001 Impervious Max.infiltration" 0.250 Pervious Manning 'n" 0.000 Impervious Max.infiltration" 0.001 Impervious Max.infiltration" 0.000 Impervious Manning 'n" 0.000 Impervious Manning 'n" 0.000 Impervious Manning 'n" 0.000 Impervious Manning 'n" 0.000 Impervious Lag constant (hours)" 1.500 Impervious Lag constant (hours)" 1.500 Impervious bepression 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 hecta Time of concentration 28.300 2.768 28.300 minut Rainfall depth 33.816 33.816 33.816 minut Rainfall volume 2191.27 0.00 2191.27 c.m" Rainfall volume 2191.27 0.00 2191.27 c.m" Runoff depth 2.107 31.734 2.107 mm" Runoff coefficient 0.000 0.000 1.36.55 c.m" Runoff coefficient 0.000 0.000 0.000 " Maximum flow 0.073 0.127 0.130 0.130" 40 HYDROGRAPH Add Runoff " 4 Add Runoff " 0.073 0.127 0.127 0.130" 40 HYDROGRAPH Combine 1" 6 Combine " 1 Node #" Total Discharge" Maximum flow 0.127 0.127 0.220" 40 HYDROGRAPH Confluence 1" <li< td=""><td>п</td><td></td><td>105172 Ex Cond 2year</td></li<> | п | | 105172 Ex Cond 2year |
| 2.000 Pervious Slope" 0.000 Impervious Area" 45.000 Impervious Slope" 0.250 Pervious Manning 'n'" 75.000 Pervious Max.infiltration" 12.500 Pervious Max.infiltration" 0.250 Pervious Lag constant (hours)" 5.000 Pervious Max.infiltration" 0.015 Impervious Max.infiltration" 0.000 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 hecta Time of concentration 28.300 2.768 28.300 minut Rainfall depth 33.816 33.816 minut Rainfall volume 2191.27 0.00 2191.27 c.m" Rainfall volume 2191.27 0.00 2191.27 c.m" Runoff depth 2.107 31.734 2.107 mm" Runoff volume 136.54 0.00 136.55 c.m" Maximum flow 0.073 0.000 0.073 c.m/s 40 HYDROGRAPH Add Runoff " 4 Add Runof | ** | | 6.400 Pervious Area |
| 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 Max.infiltration" 0.251 Pervious Lag constant (hours)" 5.000 Pervious Manning 'n'" 0.001 Impervious Manning 'n'" 0.000 Impervious Manning 'n'" 0.001 Impervious Manning 'n'" 0.000 Impervious Max.infiltration" 0.001 Impervious Depression storage" 0.002 Impervious Depression storage" 0.073 0.054 0.130 c.m/sec" Catchment 30 Pervious Impervious Total Area Surface Area 6.480 0.000 6.480 Time of concentration 28.300 2.768 28.300 minut Rainfall depth 33.816 33.816 33.816 mm" Rainfall volume 136.54 0.00 136.55 c.m" Runoff coefficient 0.000 0.0073 c.m/sec" | | | |
| 0.000 Impervious Area" 45.000 Impervious Slope" 0.250 Pervious Manning 'n'" 75.000 Pervious Max.infiltration" 12.500 Pervious Max.infiltration" 0.250 Pervious Lag constant (hours)" 5.000 Impervious Max.infiltration" 0.015 Impervious Max.infiltration" 0.000 Impervious Max.infiltration" 0.001 Impervious Max.infiltration" 0.000 Impervious Max.infiltration" 0.001 Impervious Max.infiltration" 0.000 Impervious Max.infiltration" 0.001 Impervious Compersion storage" 1.500 Impervious Depression storage" 0.073 0.054 0.130 c.m/sec" Immervious Depression storage 2.83.00 minut Time of concentration 28.00 2.768 28.300 Iminut Tainfall opth <td< td=""><td></td><td></td><td>2.000 Pervious slope"</td></td<> | | | 2.000 Pervious slope" |
| 43.000 Impervious slope" 0.250 Pervious Manning 'n'" 75.000 Pervious Max.infiltration" 12.500 Pervious Max.infiltration" 0.250 Pervious Depression storage" 0.015 Impervious Max.infiltration" 0.000 Impervious Max.infiltration" 0.001 Impervious Max.infiltration" 0.003 Impervious Constant (hours)" 1.500 Impervious Lag constant (hours)" 1.50 | | | |
| 2.000 Impervious Slope" 0.250 Pervious Manning 'n'" 75.000 Pervious Max.infiltration" 12.500 Pervious Lag constant (hours)" 5.000 Pervious Max.infiltration" 0.015 Impervious Max.infiltration" 0.000 Impervious Lag constant (hours)" 1.500 Impervious Lag constant (hours)" 1.500 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 hecta Time of concentration 28.300 2.768 28.300 minut Time of concentration 28.300 2.768 28.300 minut Rainfall depth 33.816 33.816 33.816 mm" Rainfall volume 2191.27 0.00 2191.27 c.m" Runoff depth 2.107 31.734 2.107 mm" Runoff colume 136.54 0.00 136.55 c.m" Maximum flow 0.073 0.0127 0.130 0.130" 40 HYDROGRAPH Add Runoff " 4 Add Runoff " 0.073 0.127 0.127 0.130" HYDROGRAPH Copy to outflow" 6 Combine 1" 6 Combine 551.577 c.m" 0.073 0.220 c.m/sec" Hydrograph volume 551.577 c.m" 0.073 0.220 c.m/sec" Hydrograph volume 551.577 c.m" 0.073 0.220 | | | |
| 0.250 Pervious Max.infiltration" 75.000 Pervious Max.infiltration" 0.250 Pervious Lag constant (hours)" 0.015 Impervious Max.infiltration" 0.015 Impervious Max.infiltration" 0.000 Impervious Max.infiltration" 0.001 Impervious Max.infiltration" 0.000 Impervious Max.infiltration" 0.001 Impervious Lag constant (hours)" 1.500 Impervious Lag constant (hours)" 0.053 0.054 0.130 c.m/sec" Catchment 30 Pervious Impervious Total Area " Surface Area 6.480 0.000 Time of concentration 28.300 2.768 28.300 Rainfall volume 2191.27 0.00 2191.27 Rainfall volume 2191.27 0.00 136.55 Runoff depth 2.107 31.734 2.107 Runoff coefficient 0.003 0.000 0.000 Maximum flow 0.073 0.127 0.130" Maximum flow 0.073 0.127 0.130" Maxim | ** | | |
| 75.000 Pervious Max.infiltration" 12.500 Pervious Lag constant (hours)" 5.000 Pervious Depression storage" 0.015 Impervious Man.infiltration" 0.000 Impervious Man.infiltration" 0.001 Impervious Man.infiltration" 0.000 Impervious Man.infiltration" 0.001 Impervious Max.infiltration" 0.000 Impervious Lag constant (hours)" 1.500 Impervious Depression storage" 0.073 0.054 0.130 c.m/sec" Catchment 30 Pervious Impervious Total Area " Surface Area 6.480 0.000 6.480 Time of concentration 28.300 2.768 28.300 minut Time of concentration 28.300 2.768 28.300 minut Rainfall depth 31.816 33.816 33.816 minut Rainfall losses 31.709 2.007 mm" Runoff depth 2.107 31.734 2.107 mm" Runoff coefficient 0.000 0.000 0.000 "mo" Wan | - 0 | | |
| 12.500 Pervious Min.infiltration" 0.250 Pervious Lag constant (hours)" 5.000 Pervious Manning 'n'" 0.015 Impervious Manning 'n'" 0.000 Impervious Max.infiltration" 0.000 Impervious Lag constant (hours)" 1.500 Impervious Lag constant (hours)" 1.500 Impervious Lag constant (hours)" 1.500 Impervious Depression storage" 0.073 0.054 0.130 0.130 c.m/sec" 1.500 Impervious Depression storage" 0.073 0.076 2.8300 minut 1.500 Impervious Depression storage 0.130 c.m/sec" minut 1.500 Impervious Depression storage 0.076 2.800 2.768 28.300 minut 1.500 Impervious 200 2.062 31.709 2.082 31.709 mm" 1.500 Impervious 200 2.082 31.709 mm" Runoff coefficient <td></td> <td></td> <td></td> | | | |
| 0.250 Pervious Lag constant (hours)" 5.000 Pervious Depression storage" 0.015 Impervious Max.infiltration" 0.000 Impervious Starage 0.001 Impervious Max.infiltration" 0.002 Impervious Lag constant (hours)" 1.500 Impervious Lag constant (hours)" 1.501 Impervious Depression storage" 0.073 0.054 0.130 c.m/sec" Catchment 30 Pervious Impervious Total Area " Surface Area 6.480 0.000 6.480 hecta Time of concentration 28.300 2.768 28.300 minut Rainfall depth 33.816 33.816 minut Rainfall volume 2191.27 0.00 2191.27 c.m" Runoff depth 2.107 31.734 2.107 mm" mm" Runoff depth 2.107 0.130 0.130 " Maximum flow 0.073 0.000 0.000 " Maximum flow 0.073 0.127 0.130 0.130" | ** | | |
| 0.230 Pervious Lag constant (hours)" 5.000 Pervious Depression storage" 0.015 Impervious Manning 'n'" 0.000 Impervious Main infiltration" 0.001 Impervious Main infiltration" 0.002 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 Time of concentration 28.300 2.768 28.300 minut Rainfall depth 33.816 33.816 33.816 minut Rainfall volume 2.107 31.734 2.107 mm" Runoff coefficient 0.000 0.000 0.000 .000 " Waximum flow 0.073 0.127 0.130" " 4 4 Add Runoff 0.073 0.127 0.130" " *** 0.073 0.127 0.130" " 0 *** < | | | |
| 3.000 Pervious Depression storage" 0.015 Impervious Max.infiltration" 0.000 Impervious Max.infiltration" 0.001 Impervious Lag constant (hours)" 1.500 Impervious Depression storage" 0.073 0.054 0.130 c.m/sec" Catchment 30 Pervious Impervious Total Area " Surface Area 6.480 0.000 6.480 Time of concentration 28.300 2.768 28.300 minut Rainfall depth 23.816 33.816 33.816 33.816 minut Rainfall losses 31.709 z.000 2.107 31.734 2.107 mm" Runoff depth 2.107 31.734 2.107 mm" mm" Runoff coefficient 0.000 0.000 .0000 .0000 .0000 "Maxinum flow 0.073 0.127 0.130 .130" "Maxinum flow 0.0217 0.130" m/s 0.073 0.127 0.127 0.130" "Maxinum flow < | | | |
| 0.015 Impervious Maining 'n'" 0.000 Impervious Maining 'n'" 0.001 Impervious Lag constant (hours)" 1.500 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 hecta Time of concentration 28.300 2.768 28.300 minut Time to centroid 98.613 85.041 98.613 minut Rainfall depth 33.816 33.816 33.816 mm" Rainfall volume 2191.27 0.00 2191.27 c.m" Runoff depth 2.107 31.734 2.107 mm" Runoff coefficient 0.000 0.000 0.000 "" 40 HYDROGRAPH Add Runoff " 4 Add Runoff " 0.073 0.127 0.130 0.130" 40 HYDROGRAPH Add Runoff " 4 Add Runoff " 0.073 0.127 0.127 0.130" 40 HYDROGRAPH Add Runoff " 4 Add Runoff " 0.073 0.127 0.127 0.130" 40 HYDROGRAPH Add Runoff " 4 Add Runoff " 51.577 c.m" 0.073 0.127 0.127 0.220" 40 HYDROGRAPH Confluence 1" 7 Confluence " 1 Node #" Total Discharge" Maximum flow 0.220 c.m/sec" Hydrograph volume 551.577 c.m" 0.073 0.220 0.127 0.020" 40 HYDROGRAPH Confluence 1" 7 Confluence " 1 Node #" Total Discharge" Maximum flow 0.220 c.m/sec" Hydrograph volume 551.577 c.m" 0.073 0.220 0.127 0.000" 38 START/RE-START TOTALS 1" 3 Runoff Totals on EXIT" Total Catchment area 0.562 hectare" | | | |
| 0.000 Impervious Max.infiltration" 0.000 Impervious Lag constant (hours)" 1.500 Impervious Depression storage" 0.073 0.054 Surface Area 6.480 Time of concentration 28.300 2.768 Rainfall depth 33.816 Rainfall volume 2191.27 Rainfall volume 2191.27 Runoff depth 2.107 Runoff coefficient 0.000 Noff depth 2.107 Runoff coefficient 0.000 0.073 0.127 0.073 0.127 0.073 0.127 0.073 0.127 0.073 0.127 0.073 0.127 0.073 0.127 1 Node #" 4 Add Runoff 40 HVDROGRAPH Comptue HVDROGRAPH 0.127 0.073 <td></td> <td></td> <td></td> | | | |
| 0.000 Impervious Lag constant (hours)" 1.500 Impervious Lag constant (hours)" 1.500 Impervious Depression storage" 0.073 0.054 0.130 c.m/sec" Catchment 30 Evervious Impervious Total Area " Surface Area 6.480 0.000 6.480 hecta Time of concentration 28.613 85.041 minut Rainfall depth 33.816 33.816 33.816 mm" Rainfall volume 2191.27 0.00 2191.27 c.m" Runoff depth 2.107 31.734 2.107 mm" Runoff depth 2.107 31.734 2.107 mm" Runoff coefficient 0.000 0.000 136.55 c.m/s WHORGRAPH Add Runoff " 0.073 0.127 0.130 c.m/s 40 HYDROGRAPH Add Runoff " 0.073 0.127 0.130" 40 HYDROGRAPH Combine 1" 0.073 0.127 0.130" 40 HYDROGRAPH Combine 551.577 | ** | | |
| 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 Time of concentration 28.613 85.041 98.613 Rainfall depth 33.816 33.816 33.816 33.816 Rainfall volume 2191.27 0.002 2191.27 c.m" 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 0.127 0.130" "" 40 HYDROGRAPH Add Runoff " 4 Add Runoff * 0.073 0.127 0.130" 0.130" ** 0.073 0.127 0.130" 0.130" ** 0.073 0.127 0.130" <td< td=""><td></td><td></td><td></td></td<> | | | |
| 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 hecta Time of concentration 28.300 2.768 28.300 minut Rainfall depth 33.816 | | | |
| 0.073 0.054 0.130 c.m/sec" Catchment 30 Pervious Impervious Total Area " Surface Area 6.480 0.000 6.480 hecta Time of concentration 28.300 2.768 28.300 minut Time to Centroid 98.613 85.041 98.613 minut Rainfall depth 33.816 33.816 33.816 minut Rainfall losses 31.709 2.082 31.709 mm" Runoff depth 2.107 31.734 2.107 mm" Runoff coefficient 0.000 0.000 0.000 " Maximum flow 0.073 0.127 0.130 0.073 40 HYDROGRAPH Copy to Outflow" 0.073 0.127 0.130" 40 HYDROGRAPH Copy to Outflow" 0.073 0.127 0.130" 40 HYDROGRAPH Combine 1" 0.073 0.127 0.130" 40 HYDROGRAPH Combine 1" 0.127 0.130" | ** | | |
| Catchment 30 Pervious Impervious Total Area Surface Area 6.480 0.000 6.480 hecta Time of concentration 28.300 2.768 28.300 minut Time to Centroid 98.613 85.041 98.613 minut Rainfall depth 33.816 33.816 mm" Rainfall losses 31.709 2.082 31.709 mm" Runoff depth 2.107 31.734 2.107 mm" Runoff coefficient 0.000 0.000 0.000 "." Maximum flow 0.073 0.000 0.000 "." 40 HYDROGRAPH Add Runoff " 4 Add Runoff " 0.073 0.127 0.130 0.130" 40 HYDROGRAPH Combine 1" 6 Combine " 1 Node #" Total Discharge" 40 HYDROGRAPH Confluence 1" 7 Confluence 1" 40 HYDROGRAPH Confluence 1" 40 HYDROGRAPH Combine 1" 6 Combine " 1 Node #" Total Discharge" 40 HYDROGRAPH Confluence 1" 7 Confluence 1" 1 Node #" Total Discharge" 40 HYDROGRAPH Confluence 1" 7 Confluence 1" 7 Confluence 1" 7 Confluence 1" 8 START/RE-START TOTALS 1" 3 Runoff Totals on EXIT" Total Catchment area 18.280 hectare" 7 Total Catchment area 0.562 hectare" | | | |
| Surface Area 6.480 0.000 6.480 hecta Time of concentration 28.300 2.768 28.300 minut Time to Centroid 98.613 35.041 98.613 minut Rainfall depth 33.816 33.816 33.816 33.816 mm" Rainfall losses 31.709 2.082 31.709 mm" Runoff depth 2.107 31.734 2.107 mm" Runoff coefficient 0.000 0.000 0.000 " Maximum flow 0.073 0.000 0.000 " Maximum flow 0.073 0.127 0.130" " 40 HYDROGRAPH Add Runoff " 0.073 0.127 0.130" 40 HYDROGRAPH Combine 1" 6 Combine 1" 6 Combine 1" 0.127 0.130" 140 HYDROGRAPH Combine 1" 0.073 0.127 0.130" 7 Confluence 1" | | | |
| Surface Area 6.480 0.000 6.480 hecta Time of concentration 28.300 2.768 28.300 minut Rainfall depth 33.816 33.816 33.816 minut 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 coefficient 0.000 0.000 0.000 .000 Maximum flow 0.073 0.000 0.000 .000 .m" "4 Add Runoff 0.073 0.127 0.130 .130" "40 HYDROGRAPH Add Runoff " 0.073 0.127 0.130" "40 HYDROGRAPH Copy to Outflow" 0.073 0.127 0.130" "40 HYDROGRAPH Copy to Outflow" 0.020 c.m/sec" "51 Node #" 0.073 0.127 0.127 0.220" "6 Combine 1" 1 Node #" Node #" 0.073 0.220 c.m/sec" | | | |
| Time of concentration 28.300 2.768 28.300 minut Time to Centroid 98.613 85.041 98.613 minut Rainfall depth 33.816 33.816 33.816 mm" Rainfall losses 31.709 2.082 31.709 mm" Runoff depth 2.107 31.734 2.107 mm" Runoff coefficient 0.000 0.000 136.55 c.m" Maximum flow 0.073 0.000 0.000 " | | | Surface Area 6.480 0.000 6.480 hectare" |
| Time to Centroid 98.613 85.041 98.613 minut 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 coefficient 0.000 0.000 136.55 c.m" Runoff coefficient 0.000 0.000 0.000 " Maximum flow 0.073 0.000 0.073 c.m/s 40 HYDROGRAPH Add Runoff " 4 Add Runoff " 5 Copy to Outflow" 6 Combine 1" 6 Combine 1" 6 Combine 1" 7 total Discharge" Maximum flow 0.220 c.m/sec" Hydrograph volume 551.577 c.m" 0.073 0.127 0.127 0.220" 40 HYDROGRAPH Confluence 1" 7 Confluence 1" 8 START/RE-START TOTALS 1" 8 START/RE-START TOTALS 1" 8 Runoff Totals on EXIT" 7 Total Catchment area 18.280 hectare" | | | Time of concentration 28.300 2.768 28.300 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 coefficient 0.000 0.000 136.55 c.m" Maximum flow 0.073 0.000 0.000 " 40 HYDROGRAPH Add Runoff 4 Add Runoff " 0.073 0.100 0.073 c.m/s 40 HYDROGRAPH Copy to Outflow" 0.073 0.127 0.130 .130" 40 HYDROGRAPH Compt to Outflow" 0.073 0.127 0.130" 40 HYDROGRAPH combine 1" 6 Combine " 1 1 Node #" 0.073 0.127 0.130" 40 HYDROGRAPH confluence 1" 0.073 0.127 0.220 40 HYDROGRAPH Confluence 1" 0.127 0.220" 40 HYDROGRAPH Confluence 1" Node #" 0.0 | | | |
| 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" Maximum flow 0.073 0.000 0.000 "" Maximum flow 0.073 0.000 0.073 c.m/s "40 HYDROGRAPH Add Runoff " 4 Add Runoff " 40 HYDROGRAPH Copy to Outflow" 0.073 0.127 0.130" " 40 HYDROGRAPH Combine 1" 6 Combine " 0.073 0.127 0.130" 40 HYDROGRAPH Combine 1" 6 Combine " 1 Node #" " 0.073 0.127 0.127 0.130" 1 1 1 40 HYDROGRAPH Combine 1" 6 Combine " 1 1 Node #" 0.073 0.127 0.130" " Maximum flow 0.220 c.m/sec" 1 Note # | | | |
| 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 0.000 "40 HYDROGRAPH Add Runoff " 0.073 0.127 0.130 0.130" "40 HYDROGRAPH Copy to Outflow" 0.073 0.127 0.130" 0.130" "40 HYDROGRAPH Combine 1" 0.073 0.127 0.220" "40 HYDROGRAPH Confluence 1" 0.073 0.127 0.220" "40 HYDROGRAPH Confluence 1" 0.073 0.220" c.m/sec" "40 HYDROGRAPH Confluence 1" 0.073 0.220 | ** | | |
| 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 """ 40 HYDROGRAPH Add Runoff " 4 Add Runoff " 0.073 0.127 0.130 0.073 c.m/s "40 HYDROGRAPH Copy to Outflow" 0.073 0.127 0.130" 0.130" "40 HYDROGRAPH Copy to Outflow" 0.073 0.127 0.130" 0.130" "40 HYDROGRAPH Combine 1" 6 Combine" 1 Node #" "40 HYDROGRAPH Combine 1" 6 Combine" 1 Node #" "51.577 c.m" 0.073 0.127 0.127 0.220" 1 "40 HYDROGRAPH Confluence 1" 7 Confluence 1" 7 "40 HYDROGRAPH Confluence 1" 7 0.073 0.220" C.m/sec" "40 HYDROGRAPH Confluence 1" 7 Confluence 1" "51.577 c.m" | | | |
| Runoff volume 136.54 0.00 136.55 c.m" Runoff coefficient 0.000 0.000 0.000 "" Maximum flow 0.073 0.000 0.000 "" "40 HYDROGRAPH Add Runoff " 4 Add Runoff " 0.073 0.127 0.130 0.130" "40 HYDROGRAPH Copy to Outflow" 8 Copy to Outflow" 0.073 0.127 0.130" "40 HYDROGRAPH Combine 1" 0.073 0.127 0.220" "40 HYDROGRAPH Confluence 1" 0.073 0.127 0.220" "40 HYDROGRAPH Confluence 1" 7 Confluence 1" "40 HYDROGRAPH Confluence 1" Node #" 0.073 0.220 | | | |
| Runoff coefficient 0.000 0.000 0.000 Maximum flow 0.073 0.000 0.073 c.m/s "40 HYDROGRAPH Add Runoff " 4 Add Runoff " 0.073 0.127 0.130 0.130" "40 HYDROGRAPH Copy to Outflow" 8 Copy to Outflow" 0.073 0.127 0.130" "40 HYDROGRAPH Copy to Outflow" 8 Copy to Outflow" 0.073 0.127 0.130" "40 HYDROGRAPH combine 1" 6 Combine " 1 0.073 0.127 0.130" "40 HYDROGRAPH combine 1" 6 Combine " 1 0.073 0.127 0.130" "40 HYDROGRAPH combine 1" 6 Combine " 1 Node #" 0.073 0.127 0.220" C.m/sec" "40 HYDROGRAPH Confluence 1" 7 Confluence " 1 Node #" 0.073 0.220 C.m/sec" "40 HYDROGRAPH Confluence 1" Node #" 0.073 0.220 C.m/sec" "40 HYDROGRAPH C | ** | | |
| Maximum flow 0.073 0.000 0.000 "" Maximum flow 0.073 0.000 0.073 c.m/s "40 HYDROGRAPH Add Runoff" 4 Add Runoff" 0.073 0.127 0.130 0.130" "40 HYDROGRAPH Copy to Outflow" 0.073 0.127 0.130" " "40 HYDROGRAPH Copy to Outflow" 0.073 0.127 0.130" "40 HYDROGRAPH Combine 1" 6 Combine" "40 HYDROGRAPH Confluence 1" 0.073 0.127 0.127 0.220" "40 HYDROGRAPH Confluence 1" 7 Confluence 1" 7 Confluence 1" 1 Node #" 0.073 0.220 c.m/sec" 1 "40 HYDROGRAPH Confluence 1" 0.073 0.220 c.m/sec" 1 <t< td=""><td></td><td></td><td>- CC - CC - C - C - C - C - C - C - C -</td></t<> | | | - CC - CC - C - C - C - C - C - C - C - |
| 40 HYDROGRAPH Add Runoff " 4 Add Runoff " 0.073 0.127 0.130 0.130" 40 HYDROGRAPH Copy to Outflow" 8 Copy to Outflow" 0.073 0.127 0.130" 40 HYDROGRAPH Copy to Outflow" 0.073 0.127 0.127 0.130" 40 HYDROGRAPH Combine 1" 0.073 0.127 0.130" 40 HYDROGRAPH Combine 1" 6 Combine 1" 6 Combine 1" 0.127 0.127 0.130" 40 HYDROGRAPH Combine 1" 6 Combine 1" 7 Total Discharge" Maximum flow 0.220 c.m/sec" 40 HYDROGRAPH Confluence 1" 7 Confluence 1" 7 Confluence 1" 7 Confluence 1" 7 Confluence 1" 7 Confluence 1" 8 START/RE-START TOTALS 1" 0.0000" 18.280 hectare" 8 START/RE-START TOTALS 1" 1 18.280 hectare" 9 </td <td></td> <td></td> <td></td> | | | |
| 40 HYDROGRAPH Add Runoff " 4 Add Runoff " 0.073 0.127 0.130 40 HYDROGRAPH Copy to Outflow" 8 Copy to Outflow" 0.073 0.127 0.130" 40 HYDROGRAPH Copy to Outflow" 0.073 0.127 0.127 40 HYDROGRAPH Combine 1" 6 Combine " 1 Node #" 7 Total Discharge" Maximum flow 0.220 c.m/sec" 0.073 0.127 0.127 0.073 0.127 0.220" "40 HYDROGRAPH Confluence 1" 7 Confluence 1" 7 Confluence 1" 7 Confluence 1" 7 Confluence 551.577 8 START/RE-START TOTALS 1" 8 START/RE-START TOTALS 1" 7 Otal Catchment area 1 Node # 1 Total Catchment area 1 Noff Totals on EXIT" 1 Total Impervious area | | 10 | |
| 4 Add Runoff " 0.073 0.127 0.130 0.130" 40 HYDROGRAPH Copy to Outflow" 0.073 0.127 0.130" " 0.073 0.127 0.130" " 0.073 0.127 0.130" " 0.073 0.127 0.130" " 0.073 0.127 0.130" " 0.073 0.127 0.130" " 0.073 0.127 0.130" " 1 Node #" " " Total Discharge" Maximum flow 0.220 c.m/sec" " 0.073 0.127 0.220" " " 0.073 0.127 0.220" " " 0.073 0.127 0.220" " " Total Discharge" " " 0.073 0.220 c.m/sec" " Node #" " 0.073 0.220 c.m/sec" " Node #" " 0.073 0.220 c.m/sec" " 0.073 0.220 0.127 </td <td></td> <td>40</td> <td>HYDROGRAPH Add Runott "</td> | | 40 | HYDROGRAPH Add Runott " |
| 0.073 0.127 0.130 0.130" 40 HYDROGRAPH Copy to Outflow" 8 Copy to Outflow" 8 Copy to Outflow" 0.073 0.127 0.127 40 HYDROGRAPH combine 1" 0.073 0.127 0.130" "40 HYDROGRAPH combine 1" 6 Combine " 1 "40 HYDROGRAPH combine 1" 6 Combine " 1 "40 HYDROGRAPH combine 551.577 c.m/sec" Hydrograph volume 551.577 c.m" "40 HYDROGRAPH confluence 1" 7 Confluence " 1 Node #" "40 HYDROGRAPH confluence 1" 7 Confluence " 1 Node #" "40 HYDROGRAPH confluence 1" 7 Confluence " 1 Node #" "40 HYDROGRAPH confluence 1" 7 Confluence " 1 Node #" "40 HYDROGRAPH confluence 1" 7 Confluence * 1 Node # "41 Node #" 0.073 0.220 C.m/sec" 0.000" </td <td></td> <td></td> <td>4 Add Runoff "</td> | | | 4 Add Runoff " |
| 40 HYDROGRAPH Copy to Outflow" 8 Copy to Outflow" 0.073 0.127 0.130" 40 HYDROGRAPH Combine 1" 6 Combine " 1 40 HYDROGRAPH Combine 1" 6 Combine " 1 1 Node #" Total Discharge" 0.220 c.m/sec" 40 HYDROGRAPH Confluence 551.577 c.m" 0.073 0.127 0.220" 40 HYDROGRAPH Confluence 1" 7 Confluence 1" 7 Confluence 1" 7 Confluence " 1 Node #" Total Discharge" Maximum flow 0.220 c.m/sec" 40 HYDROGRAPH Confluence 1" 7 Confluence 1" 7 Confluence 1" 7 Confluence " 1 Node #" 0.220 c.m/sec" 8 START/RE-START TOTALS 1" 0.000" 3 Runoff Totals on EXIT" 7 Total Catchment area 18.280 hectare" 7 Total Impervious area 0.562 hectare" | | | 0.073 0.127 0.130 0.130" |
| 8 Copy to Outflow" 0.073 0.127 0.130" "40 HYDROGRAPH Combine HYDROGRAPH Combine 1" 6 Combine 1" 7 Total Discharge" Maximum flow 0.220 c.m/sec" Hydrograph volume 551.577 c.m" 0.073 0.127 0.120" "40 HYDROGRAPH Confluence 1" 7 Confluence 1" 7 7 Confluence 1" 7 7 Confluence 1" 7 7 Confluence 1" 7 8 START/RE-START TOTALS 1" 0.127 0.000" "38 START/RE-START TOTALS 1" 3 8 hectare" "0al Catchment area 18.280 hectare" "0al Impervious area 0.562 hectare" | | 40 | |
| 0.073 0.127 0.127 0.130" HYDROGRAPH Combine 1" 6 Combine 1" 1 Node #" Total Discharge" 0.220 c.m/sec" Maximum flow 0.220 c.m/sec" Hydrograph volume 551.577 c.m" 0.073 0.127 0.127 0.220" "40 HYDROGRAPH Confluence 1" 7 Confluence 1" 7 7 Confluence 1" 7 7 Confluence 1" 7 1 Node #" 0.073 0.220 c.m/sec" Hydrograph volume 551.577 c.m" 0.000" "38 START/RE-START TOTALS 1" 3 8 3 Runoff Totals on EXIT" 18.280 hectare" "0.127 0.562 hectare" | ** | | 8 Copy to Outflow" |
| <pre>" 40 HYDROGRAPH Combine 1" " 6 Combine " 1 Node #" Total Discharge" Maximum flow 0.220 c.m/sec" Hydrograph volume 551.577 c.m" 0.073 0.127 0.127 0.220" " 40 HYDROGRAPH Confluence 1" 7 Confluence " 1 Node #" Total Discharge" Maximum flow 0.220 c.m/sec" Hydrograph volume 551.577 c.m" 0.073 0.220 0.127 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"</pre> | 87 | | |
| 6 Combine " 1 Node #" Total Discharge" Maximum flow 0.220 c.m/sec" Hydrograph volume 551.577 c.m" 0.073 0.127 0.127 0.220" 40 HYDROGRAPH Confluence 1" 7 Confluence " 1 Node #" Total Discharge" Maximum flow 0.220 c.m/sec" Hydrograph volume 551.577 c.m" 0.073 0.220 0.127 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" | | 40 | HVDPOCPAPH Combine 1" |
| 1Node #" Total Discharge" Maximum flow0.220c.m/sec" c.m" 0.073"Maximum flow0.220c.m/sec" c.m""0.0730.1270.127"0.0730.1270.220""40HYDROGRAPH Total Discharge" Maximum flow0.220c.m/sec" c.m""1Node #" Total Discharge" Maximum flow0.220c.m/sec" c.m""38START/RE-START TOTALS 1" 3 Runoff Totals on EXIT" Total Catchment area18.280hectare" hectare" | | τu | |
| Total Discharge" Maximum flow0.220c.m/sec" c.m"Hydrograph volume551.577c.m"0.0730.1270.1270.220""40HYDROGRAPH Confluence1"7Confluence1"1Node #" Total Discharge" Maximum flow0.220c.m/sec" c.m"Maximum flow0.220c.m/sec" c.m"0.0730.2200.1270.000""38START/RE-START TOTALS 1" 3 Runoff Totals on EXIT" Total Catchment area18.280"1hectare" 0.5620.562 | | | |
| Notal Discharge"Maximum flow0.220c.m/sec"Hydrograph volume551.577c.m"0.0730.1270.1270.220""40HYDROGRAPHConfluence1"7Confluence1"71Node #"Total Discharge""Maximum flow0.220c.m/sec"Hydrograph volume551.577c.m"0.0730.2200.1270.000""38START/RE-START TOTALS 1"3Runoff Totals on EXIT""Total Catchment area18.280hectare""Total Impervious area0.562hectare" | ** | | |
| Maximum flow0.220c.m/sec"Hydrograph volume551.577c.m"0.0730.1270.12740HYDROGRAPHConfluence7Confluence1"7Confluence1"1Node #"0.220Total Discharge"Maximum flow0.2200.0730.2200.0730.2200.1270.000"38START/RE-START TOTALS 1"3Runoff Totals on EXIT"Total Catchment area18.28018.280hectare" | | | |
| Hydrograph volume551.577c.m"0.0730.1270.1270.220""40HYDROGRAPHConfluence1"7Confluence "1Node #"1Node #"Total Discharge"Maximum flow0.220c.m/sec"Hydrograph volume551.577c.m"0.0730.2200.1270.000""38START/RE-START TOTALS 1"3Runoff Totals on EXIT"Total Catchment area18.280hectare""Total Impervious area0.562hectare" | | | |
| 0.0730.1270.1270.220""40HYDROGRAPH Confluence1""7Confluence "1Node #""Total Discharge"Maximum flow0.220Confluence"0.0730.2200.0730.2200.1270.000""38START/RE-START TOTALS 1""3Runoff Totals on EXIT""Total Catchment area18.280"Total Impervious area0.562 | | | Hydrograph volume 551.577 c.m" |
| <pre>"40 HYDROGRAPH Confluence 1" 7 Confluence " 1 Node #" Total Discharge" Maximum flow 0.220 c.m/sec" Hydrograph volume 551.577 c.m" 0.073 0.220 0.127 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"</pre> | | | |
| 7Confluence "1Node #"Total Discharge"Maximum flow0.220Hydrograph volume551.5770.0730.2200.1270.000"38START/RE-START TOTALS 1"3Runoff Totals on EXIT"Total Catchment area18.280Total Impervious area0.562 | ** | 40 | HYDROGRAPH Confluence 1" |
| 1Node #"Total Discharge"Maximum flow0.220Hydrograph volume551.5770.0730.2200.1270.000"38START/RE-START TOTALS 1"3Runoff Totals on EXIT"Total Catchment area18.280Total Impervious area0.562 | | | |
| Total Discharge" Maximum flow 0.220 c.m/sec" Hydrograph volume 551.577 c.m" 0.073 0.220 0.127 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" | ** | | 1 Node #" |
| Maximum flow0.220c.m/sec"Hydrograph volume551.577c.m"0.0730.2200.1270.000"38START/RE-START TOTALS 1"3Runoff Totals on EXIT"Total Catchment area18.280hectare"Total Impervious area0.562hectare" | ** | | Total Dischargo" |
| Hydrograph volume551.577c.m"0.0730.2200.1270.000""38START/RE-START TOTALS 1"""3Runoff Totals on EXIT"18.280"Total Catchment area18.280hectare""Total Impervious area0.562hectare" | | | |
| "0.0730.2200.1270.000""38START/RE-START TOTALS 1""3Runoff Totals on EXIT""5Total Catchment area18.280"5Total Impervious area0.562 | | | |
| 0.0730.2200.1270.000""38START/RE-START TOTALS 1""3Runoff Totals on EXIT""5Total Catchment area18.280"5Total Impervious area0.562 | | | |
| 38START/RE-START TOTALS 1""3Runoff Totals on EXIT""Total Catchment area18.280"Total Impervious area0.562 | | | |
| " Total Catchment area 18.280 hectare" " Total Impervious area 0.562 hectare" | | 38 | START/RE-START TOTALS 1" |
| " Total Catchment area 18.280 hectare" "Total Impervious area 0.562 hectare" | | | |
| " | | | |
| | 11 | | |
| | | | Total % impervious 3.072" |
| " 19 EXIT" | " | 19 | FXTT" 5.072 |
| | | | |

| | | | | | _ | | |
|----|----|---------------------------|------------------------------------|------------------|-----------------|------------------|-----------------|
| | | мты | 1051 ISS Output | 72 Ex Cond | | | . 11 |
| ** | | | ISS version | | | ersion 2.07 | >" rov 370" |
| | | | ISS created | | • | Apri | 1 25, 2005" |
| | | | s used: | | | | ie METRIC" |
| | | | folder: out filename: | Y:\! | SPrimmer\Mi | | |
| ** | | | insee name: | | 103172 | Ex Cond 5ye | ar REV.OUT |
| | | Comp | any | | Gamsby | and Manner | ow Limited" |
| 11 | 74 | Date | & Time last us | ed: | 04/04 | 4/2011 at 1 | 2:00:01 PM" |
| 11 | 31 | TIME PA 5.000 Time | RAMETERS" | | | | |
| 11 | | | Step" Storm length" | | | | |
| | | | Hydrograph" | | | | |
| 11 | 32 | STORM C | hicago storm" | | | | |
| ** | | 1 Chic | ago storm" | | | | |
| •• | | | ficient A" tant B" | | | | |
| п | | 0.879 Expo | nent C" | | | | |
| | | 0.400 Frac | tion R" | | | | |
| ** | | | tion" | | | | |
| | | | step multiplie | | | | |
| п | | Total d | intensity | 134.89 46.77 | | | |
| | | 6 005h | | extension i | | s file" | |
| ** | 33 | CATCHME | | excension | | 5 1110 | |
| | | | ngular SCS" | | | | |
| | | | l length" | | | | |
| " | | | on equation" | adati Crook! | | | |
| ** | | | hment 10 - To H pervious" | auati treek | | | |
| | | | l Area" | | | | |
| | | 45.000 Flow | length" | | | | |
| | | | land Slope" | | | | |
| | | | ious Area" | | | | |
| | | | ious length" ious slope" | | | | |
| | | | rvious Area" | | | | |
| ** | | 45.000 Impe | rvious length" | | | | |
| ** | | 2.000 Impe | rvious slope" | • | | | |
| | | 0.250 Perv 75.000 Perv | ious Manning 'n | notion" | | | |
| 11 | | | ious Max.infilt ious Min.infilt | | | | |
| ** | | | ious Lag consta | | | | |
| ** | | 5.000 Perv | ious Depression | storage" | | | |
| | | 0.015 Impe | rvious Manning | 'n'" | | | |
| | | | rvious Max.infi rvious Min.infi | | | | |
| 11 | | | rvious Lag cons | | | | |
| ** | | | rvious Depressi | on storage" | , | | |
| ** | | | 0.492 0.000 | | 0.000 0 | .m/sec" | |
| | | Catchme | | Pervious | Impervious | | ** |
| | | Surface | | 6.458 | 0.562 | 7.020 | hectare" |
| " | | | concentration Centroid | 19.590 92.382 | 2.510 83.161 | 15.110 | minutes" |
| ** | | Rainfal | | 46.775 | 46.775 | 89.963 46.775 | minutes" mm" |
| | | Rainfal | l volume | 3020.92 | 262.69 | 3283.61 | C.m" |
| | | Rainfal | llosses | 35.903 | 2.312 | 33.216 | mm'' |
| •• | | Runoff | depth | 10.872 | 44.463 | 13.559 | mm'' |
| ** | | Runoff | volume coefficient | 702.15 0.000 | 249.70 | 951.85 | c. m" |
| ** | | Maximum | | 0.443 | 0.000 0.162 | 0.000 0.492 | c.m/sec" |
| | 40 | HYDROGR | APH Add Runoff ' | 1 | ~· + 1/2 | VITJL | C. III/ 3CL |
| 11 | | 4 Add | Runoff " | | | | |
| | | | | Page 1 | | | |

| | | 105172 Ex Cond 5year |
|----------|-----|--|
| 11 11 | 4.0 | 0.492 0.492 0.000 0.000" |
| | 40 | HYDROGRAPH Copy to Outflow" 8 Copy to Outflow" |
| | | 0.492 0.492 0.492 0.000" |
| | 40 | HYDROGRAPH Combine 1" |
| ** | | 6 Combine " 1 Node #" |
| ** | | Total Discharge" |
| 11 | | Maximum flow 0.492 c.m/sec" |
| 11 | | Hydrograph volume 951.854 c.m" 0.492 0.492 0.492 0.492" |
| ** | 40 | 0.492 0.492 0.492 0.492" HYDROGRAPH Start - New Tributary" |
| | | 2 Start - New Tributary" |
| 11 | 33 | 0.492 0.000 0.492 0.492" CATCHMENT 20" |
| " | | 1 Triangular SCS" |
| | | 1 Equal length" |
| | | 2 Horton equation" 20 Catchment 20 - To Clythe Creeek" |
| ** | | 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" |
| 11 | | 2.000 Pervious slope" 0.000 Impervious Area" |
| | | 45.000 Impervious length" |
| 11 11 | | 2.000 Impervious slope" |
| | | 0.250 Pervious Manning 'n'" 75.000 Pervious Max.infiltration" |
| - 11 | | 12.500 Pervious Min.infiltration" |
| 11 | | 0.250 Pervious Lag constant (hours)" 5.000 Pervious Depression storage" |
| ** | | 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 |
| | | Time of concentration 19.590 2.510 19.590 minutes" |
| 97 17 | | 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 cm/sec" |
| | 40 | HYDROGRAPH Add Runoff " 4 Add Runoff " |
| 11 | | 4 Add Runoff 0.328 0.328 0.492 0.492" |
| 11 11 | 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" |
| | | Page 2 |

| | | 105172 | Ex Cond | Svear | | |
|----------|----|--|-------------|---------------------|---------|--------------|
| - 11 | | 6.480 Pervious Area" | | Jyeai | | |
| ** | | 45.000 Pervious length" | | | | |
| | | 2.000 Pervious slope" | | | | |
| | | 0.000 Impervious Area" | | | | |
| ** | | 45.000 Impervious length" | | | | |
| | | 2.000 Impervious slope" | | | | |
| - 11 | | 0.250 Pervious Manning 'n'" | | | | |
| | | 75.000 Pervious Max.infiltrati | ion" | | | |
| | | 12.500 Pervious Min.infiltrati | | | | |
| | | 0.250 Pervious Lag constant (| | | | |
| 11 | | 5.000 Pervious Depression sto | prage" | | | |
| ** | | 0.015 Impervious Manning 'n'' 0.000 Impervious Max.infiltra | and on U | | | |
| | | 0.000 Impervious Max.infiltra 0.000 Impervious Min.infiltra | | | | |
| н | | 0.050 Impervious Lag constant | | \ '' | | |
| 11 | | 1.500 Impervious Depression s | |) | | |
| ** | | 0.444 0.328 | 0.492 | 0 492 6 | .m/sec' | T |
| 11 | | | vious | Impervious | | |
| | | Surface Area 6.4 | | 0.000 | 6.480 | hectare" |
| 11 | | | 590 | 2.510 | 19.590 | minutes" |
| ** | | Time to Centroid 92. | . 382 | 83.161 | 92.382 | minutes" |
| ••• | | | .775 | 46.775 | 46.775 | mm'' |
| | | | 31.02 | 0.00 | 3031.02 | |
| | | | . 903 | 2.312 | 35.903 | mm'' |
| 11 | | | .872 | 44.463 | 10.872 | mm'' |
| п | | | 4.50 | 0.00 | 704.50 | c .m" |
| | | Runoff coefficient 0.0 Maximum flow 0.4 | | 0.000 | 0.000 | |
| ** | 40 | Maximum flow 0.4 HYDROGRAPH Add Runoff " | +44 | 0.000 | 0.444 | c.m/sec" |
| ** | 10 | 4 Add Runoff " | | | | |
| | | 0.444 0.772 | 0.492 | 0.492" | | |
| 11 | 40 | HYDROGRAPH Copy to Outflow | v" | 0.452 | | |
| ** | | 8 Copy to Outflow" | • | | | |
| ** | | 0.444 0.772 | 0.772 | 0.492" | | |
| | 40 | HYDROGRAPH Combine 1 | | | | |
| | | 6 Combine " | | | | |
| | | 1 Node #" | | | | |
| | | Total Discharge" | | - | | |
| | | Maximum flow | 1.26 | | ec" | |
| 11 | | Hydrograph volume | 2176.03 | 31 c.m ["] | | |
| ** | 40 | 0.444 0.772 HYDROGRAPH Confluence | 0.772 1" | 1.265" | | |
| 11 | 40 | 7 Confluence " | T | | | |
| 11 | | 1 Node #" | | | | |
| 11 | | Total Discharge" | | | | |
| ** | | Maximum flow | 1.26 | 55 c.m/se | د" د | |
| 11 | | Hydrograph volume | 2176.03 | 31 c.m" | | |
| | | 0.444 1.265 | 0.772 | 0.000" | | |
| | 38 | START/RE-START TOTALS 1" | | | | |
| 11 11 | | 3 Runoff Totals on EXIT" | | | | |
| | | Total Catchment area | | | 280 | hectare" |
| | | Total Impervious area | | <u>0</u> . | 562 | hectare" |
| | 19 | Total % impervious | | 3. | 072" | |
| | TA | EXIT" | | | | |

| | | 105172 E | x Cond 25year |
|----|----|---|---|
| ** | | MIDUSS Output | >" |
| | | MIDUSS version MIDUSS created | Version 2.07 rev. 379" |
| | | 10 Units used: | April 25, 2005" ie METRIC" |
| | | Job folder: | Y:\SPrimmer\Miduss Modelling\105172" |
| ** | | Output filename: | 105172 Ex Cond 25year REV.out" |
| п | | Licensee name: Company | Complex and Managers Limits - |
| | | Date & Time last used: | Gamsby and Mannerow Limited" 04/04/2011 at 12:00:32 PM" |
| ** | 31 | TIME PARAMETERS" | 0470472011 at 12:00.52 PM |
| | | 5.000 Time Step" | |
| | | 210.000 Max. Storm length" 1500.000 Max. Hydrograph" | |
| 11 | 32 | 1500.000 Max. Hydrograph" 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" |
| 11 | | Total depth 6 025hyd Hydrograph ext | 69.476 mm" tension used in this file" |
| ** | 33 | CATCHMENT 10" | cension used in this file |
| | | 1 Triangular SCS" | |
| | | 1 Equallength" | |
| ** | | 2 Horton equation" 10 Catchment 10 - To Hadat | ti 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" | |
| 11 | | 45.000 Impervious length" 2.000 Impervious slope" | |
| ** | | _0.250 Pervious Manning 'n'" | |
| | | 75.000 Pervious Max.infiltrati | |
| | | 12.500 Pervious Min.infiltrati 0.250 Pervious Lag constant (| |
| ** | | 0.250 Pervious Lag constant (5.000 Pervious Depression sto | |
| ** | | 0.015 Impervious Manning 'n'" | l age |
| ** | | 0.000 Impervious Max.infiltra | ation" |
| | | 0.000 Impervious Min.infiltra 0.050 Impervious Lag constant | ation" |
| | | 0.050 Impervious Lag constant 1.500 Impervious Depression s | torage" |
| ** | | 1.344 0.000 | 0.000 0.000 c.m/sec" |
| | | | vious Impervious Total Area " |
| | | Surface Area 6.4 | |
| 11 | | | .371 2.291 12.330 minutes" 5.688 98.958 104.551 minutes" |
| ** | | | .688 98.958 104.551 minutes" .476 69.476 69.476 mm" |
| ** | | Rainfall volume 448 | 37.06 390.18 4877.24 c.m" |
| | | | 830 2.498 37.763 mm" |
| 11 | | | 647 66.978 31.713 mm" 50.11 376.15 2226.26 c.m" |
| ** | | Runoff coefficient 0.0 | |
| | | Maximum flow 1.2 | |
| | 40 | HYDROGRAPH Add Runoff " | , |
| | | 4 Add Runoff" | Page 1 |

| | | 105172 Ex Cond 25vcan |
|----|----|--|
| 11 | | 105172 Ex Cond 25year 1.344 1.344 0.000 0.000" |
| ** | 40 | HYDROGRAPH Copy to Outflow" |
| | | 8 Copy to Outflow" |
| | 40 | 1.344 1.344 1.344 0.000" HYDROGRAPH Combine 1" |
| ** | 40 | HYDROGRAPH Combine 1" 6 Combine " |
| ** | | 1 Node #" |
| | | Total Discharge" |
| 11 | | Maximum flow 1.344 c.m/sec" |
| | | Hydrograph volume 2226.261 c.m" |
| п | 40 | 1.344 1.344 1.344 1.344" |
| н | 40 | HYDROGRAPH Start - New Tributary" 2 Start - New Tributary" |
| 11 | | 1.344 0.000 1.344 1.344" |
| ** | 33 | CATCHMENT 20" |
| | | 1 Triangular SCS" |
| 11 | | 1 Equal length" 2 Horton equation" |
| 11 | | 2 Horton equation" 20 Catchment 20 - To Clythe Creeek" |
| " | | 0.000 % Impervious" |
| | | 4.780 Total Area" |
| ** | | 45.000 Flow length" |
| 11 | | 2.000 Overland Slope" |
| н | | 4.780 Pervious Area" 45.000 Pervious length" |
| н | | 2.000 Pervious slope" |
| | | 0.000 Impervious Area" |
| ** | | 45.000 Impervious length" |
| | | 2.000 Impervious slope" 0.250 Pervious Manning 'n'" |
| 11 | | 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" |
| 11 | | 0.015 Impervious Manning 'n'" 0.000 Impervious Max.infiltration" |
| 11 | | 0.000 Impervious Max.infiltration" 0.000 Impervious Min.infiltration" |
| ** | | 0.050 Impervious Lag constant (hours)" |
| | | 1.500 Impervious Depression storage" |
| 11 | | 0.931 0.000 1.344 1.344 c.m/sec" |
| 11 | | Catchment 20 |
| | | |
| | | Time of concentration 14.371 2.291 14.371 minutes" Time to Centroid 105.688 98.958 105.688 minutes" |
| 11 | | Rainfall depth 69.476 69.476 69.476 mm" |
| | | Rainfall volume 3320.97 0.00 3320.97 c.m" |
| п | | Rainfall losses 40.830 2.498 40.830 mm" Runoff depth 28.647 66.978 28.647 mm" |
| | | Runoff depth 28.647 66.978 28.647 mm" Runoff volume 1369.31 0.00 1369.31 c.m" |
| 11 | | Runoff coefficient 0.000 0.000 0.000 " |
| ** | | Maximum flow 0.930 0.000 0.931 cm/sec" |
| 11 | 40 | HYDROGRAPH Add Runott " |
| | | 4 Add Runoff " 0.931 0.931 1.344 1.344" |
| | 33 | 0.931 0.931 1.344 1.344" 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" |
| | | Page 2 |

| | 105172 Ex Cond 25year |
|-----------|--|
| | 6.480 Pervious Area" |
| | 45.000 Pervious length" |
| ** | 2.000 Pervious slope" |
| 11 | 0.000 Impervious Area" |
| | 45.000 Impervious length" |
| | 2.000 Impervious slope" |
| 11 | 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" |
| 11 | 0.000 Impervious Min.infiltration" |
| ** | 0.050 Impervious Lag constant (hours)" |
| | 1.500 Impervious Depression storage" |
| п | 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 hectar |
| ** | Time of concentration 14.371 2.291 14.371 minute |
| | Time to Centroid 105.688 98.958 105.688 minute |
| | 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" |
| н | 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/se |
| " 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" |
| 11 | 1.261 2.192 2.192 3.536" |
| " 40 | HYDROGRAPH Confluence 1" |
| | 7 Confluence " |
| 11 | 1 Node #" |
| ** | Total Discharge" |
| ** | Maximum flow 3.536 c.m/sec" |
| 11 | Hydrograph volume 5451.870 c.m" |
| | 1.261 3.536 2.192 0.000" |
| " 38 | START/RE-START TOTALS 1" |
| 11 | 3 Runoff Totals on EXIT" |
| 11 | Total Catchment area 18.280 hectare" |
| | Total Impervious area 0.562 hectare" |
| | Total % impervious 3.072" |
| " " 19 | EXIT" |

| ., | | | 10517 | 2 Ex Cond 1 | 00year | | |
|------|----|---------------------|---|--------------------|------------------|---------------------|--------------------------|
| | | | AIDUSS Output AIDUSS version | | | | >" |
| 11 | | | AIDUSS created | | v | | rev. 379" 1 25, 2005" |
| ** | | 10 U | Units used: | | | | ie METRIC" |
| | | | lob folder: | Y:\ | | | ing\105172" |
| " | | | Dutput filename: .icensee name: | | 105172 EX | Cond 100ye | ar REV.out" |
| | | C | Company | | Gamsby | and Manner | ow Limited" |
| ** | | | ate & Time last us | ed: | | | 2:01:05 PM" |
| ** | 31 | | E PARAMETERS" Time Step" | | | | |
| | | | Max. Storm length" | | | | |
| - 11 | | 1500.000 M | lax. Hydrograph" | | | | |
| | 32 | | M Chicago storm" hicago storm" | | | | |
| п | | 4688.000 C | Coefficient A" | | | | |
| | | 17.000 C | onstant B" | | | | |
| 11 | | 0.962 E 0.400 F | Exponent C" Fraction R" | | | | |
| •• | | | Puration" | | | | |
| | | 1.000 T | ime step multiplie | | | | |
| 11 | | | mum intensity 1 depth | 213.5 | | 1 | |
| ** | | | | 88.83 extension | | s file" | |
| ** | 33 | CATC | CHMENT 10" | | | | |
| | | | riangular SCS" qual length" | | | | |
| 11 | | | orton equation" | | | | |
| ** | | 10 C | atchment 10 - To Ha | adati Creek' | 19 | | |
| | | 8.000 % 7.020 T | 5 Impervious" otal Area" | | | | |
| | | | low length" | | | | |
| ** | | 2.000 o | verland Slope" | | | | |
| | | | ervious Area" | | | | |
| | | 45.000 P 2.000 P | ervious length" ervious slope" | | | | |
| - 11 | | 0.562 I | mpervious Area" | | | | |
| | | | mpervious length" | | | | |
| ** | | 2.000 I 0.250 P | mpervious slope" ervious Manning 'n | F 11 | | | |
| | | 75.000 P | ervious Max.infilt | ration" | | | |
| | | 12.500 P 0.250 P | ervious Min.infilt | ration" | | | |
| 11 | | | ervious Lag constan ervious Depression | storage" | | | |
| ** | | 0.015 I | mpervious Manning | 'n'" | | | |
| | | 0.000 I 0.000 I | mpervious Max.infi | Itration" | | | |
| | | | mpervious Min.infi mpervious Lag const | tant (hours) |) '' | | |
| ** | | | mpervious Depressio | on storage" | | | |
| | | Cate | 2.160 	0.000 | | | .m/sec" | ** |
| 11 | | | hment 10 ace Area | Pervious 6.458 | 0.562 | Total Area 7.020 | hectare" |
| | | ⊤ime | of concentration | 11.869 | 2.089 | 10.485 | minutes" |
| | | | to Centroid fall depth | 104.828 | 98.071 | 103.872 | minutes" |
| 11 | | | fall volume | 88.830 5736.98 | 88.830 498.87 | 88.830 6235.85 | mm" c.m" |
| | | Rain | fall losses | 43.360 | 2.670 | 40.105 | mm" |
| | | | ff depth | 45.470 | 86.160 | 48.725 | mm'' |
| 11 | | | ff volume ff coefficient | 2936.64 0.000 | 483.87 0.000 | 3420.51 0.000 | c.m" |
| " | | Maxi | mum flow | 1.965 | 0.297 | 2.160 | c.m/sec" |
| ** | 40 | HYDR | OGRAPH Add Runoff ' | T | | | , |
| | | 4 A | dd Runoff " | Page 1 | | | |
| | | | | ruge I | | | |

| | | 105172 Ex Cond 100year | |
|----|----|--|--|
| | 40 | 2.160 2.160 0.000 0.000" HYDROGRAPH Copy to Outflow" | |
| 11 | | 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" | |
| н | | 2.160 0.000 2.160 2.160" | |
| ** | 33 | CATCHMENT 20" | |
| ** | | 1 Triangular SCS" | |
| | | 1 Equal length" 2 Horton equation" | |
| | | | |
| 11 | | 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" | |
| | | lime of concentration 11.869 2.089 11.869 minutes" | |
| | | Time to Centroid 104.828 98.071 104.828 minutes" | |
| 11 | | Rainfall depth 88.830 88.830 88.830 mm" Rainfall volume 4246.06 0.00 4246.07 c.m" | |
| | | | |
| | | | |
| | | 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" | |
| 11 | | 0.000 % Impervious" 6.480 Total Area" | |
| " | | 45.000 Flow length" | |
| ** | | 2.000 Overland Slope" | |
| | | Page 2 | |
| | | | |

| | | 105172 | Ex Cond 1 | 00.000 | | |
|------|----|------------------------------|-----------------|------------------------|----------|----------|
| ** | | 6.480 Pervious Area" | Ex Cond 1 | ooyear | | |
| ** | | 45.000 Pervious length" | | | | |
| п | | 2.000 Pervious slope" | | | | |
| п | | 0.000 Impervious Area" | | | | |
| 11 | | 45.000 Impervious length" | | | | |
| - 11 | | 2.000 Impervious slope" | | | | |
| - 11 | | 0.250 Pervious Manning 'n'" | 1 | | | |
| н | | 75.000 Pervious Max.infiltra | tion" | | | |
| 11 | | 12.500 Pervious Min.infiltra | | | | |
| ** | | 0.250 Pervious Lag constant | | | | |
| п | | 5.000 Pervious Depression s | tonago" | | | |
| | | 0.015 Impervious Manning 'n | storage | | | |
| 11 | | 0.000 Impervious Max.infilt | " | | | |
| 11 | | 0.000 Impervious Max. Infilt | | | | |
| | | 0.050 Impervious Lag consta | nt (houng) | N ¹¹ | | |
| | | 1.500 Impervious Depression | unt (nours) |) | | |
| 11 | | 1.971 1.454 | | 2 160 | | |
| | | | 2.160 | 2.100 0 | c.m/sec" | noo " |
| ** | | - 6 | Pervious | Impervious | | |
| н | | | 5.480 | 0.000 | 6.480 | hectare" |
| 11 | | | 1.869 | 2.089 | 11.869 | minutes" |
| 11 | | | .04.828 | 98.071 | 104.828 | minutes" |
| ** | | | 8.830 756.17 | 88.830 | 88.830 | mm" |
| | | | | 0.01 | 5756.17 | |
| п | | | 3.360 | 2.670 | 43.360 | mm'' |
| 11 | | | 5.470 946.46 | 86.160 | 45.470 | mm'' |
| ** | | | | 0.01 | 2946.46 | ç.m" |
| п | | | .000 971 | 0.000 | 0.000 | |
| | 40 | HYDROGRAPH Add Runoff " | | 0.000 | 1.971 | c.m/sec" |
| 11 | 40 | 4 Add Runoff " | | | | |
| ** | | 1.971 3.425 | 2 160 | 2 160" | | |
| ** | 40 | HYDROGRAPH Copy to Outfl | 2.160 | 2.160" | | |
| н | 10 | 8 Copy to Outflow" | OW | | | |
| 11 | | 1.971 3.425 | 3.425 | 2.160" | | |
| 11 | 40 | | 1" | 2.100 | | |
| ** | 10 | 6 Combine " | T | | | |
| н | | 1 Node #" | | | | |
| н | | Total Discharge" | | | | |
| 11 | | Maximum flow | 5.58 | 35 c.m/se |).c.'' | |
| ** | | Hydrograph volume | 8540.44 | 14 c.m" | | |
| ** | | 1.971 3.425 | 3.425 | 5.585" | | |
| | 40 | HYDROGRAPH Confluence | 1" | 7.707 | | |
| 11 | | 7 Confluence " | Ŧ | | | |
| ** | | 1 Node #" | | | | |
| ** | | Total Discharge" | | | | |
| | | Maximum flow | 5.58 | 35 c.m/se | ~" | |
| н | | Hydrograph volume | 8540.44 | | | |
| " | | 1.971 5.585 | 3.425 | 0.000" | | |
| ** | 38 | START/RE-START TOTALS 1" | 5.723 | 0.000 | | |
| ** | | 3 Runoff Totals on EXIT | 11 | | | |
| •• | | Total Catchment area | | 12 | 280 | hectare" |
| | | Total Impervious area | | | | hectare" |
| " | | Total % impervious | | 2. | 072" | nectare |
| 11 | 19 | EXIT" | | | 012 | |
| | | | | | | |

| | | ond Regional |
|----------------------|--|---|
| 11 11 | MIDUSS Output MIDUSS version MIDUSS created 10 Units used: | Version 2.07 rev. 379" April 25, 2005" ie METRIC" |
| 11 11 66 | Job folder: Output filename: Licensee name: | Y:\SPrimmer\Miduss Modelling\105172" 105172 Ex Cond Regional REV.out" |
| " "31 | | Gamsby and Mannerow Limited" 04/04/2011 at 12:01:39 PM" |
| " " 32 | 60.000 Time Step" 2880.000 Max. Storm length" 3600.000 Max. Hydrograph" 2 STORM Historic" | |
| ** •* •• | 5 Historic" 2880.000 Duration" 48.000 Rainfall intensity values 2.028 2.028 2.0 | |
| ** ** ** | 2.028 2.028 2.0 2.028 2.028 2.0 2.028 2.028 2.0 2.028 2.028 2.0 2.028 2.028 2.0 | 028 2.028 2.028" 028 2.028 2.028" 028 2.028 2.028" |
| 11 17 11 | 2.028 2.028 2.0 2.028 2.026 2.0 2.026 6.000 4.0 | 028 2.028 2.028" 026 2.206 2.028" 000 6.000 13.000" |
| ** ** ** | 17.000 13.000 23.0 53.000 38.000 13.0 Maximum intensity Total depth | |
| " 33 " | 6 001hyd Hydrograph exten 3 CATCHMENT 10" 1 Triangular SCS" | ision used in this file" |
| 11 11 11 | 1 Equal length" 2 Horton equation" 10 Catchment 10 - To Hadati 8.000 % Impervious" | Creek" |
| 77 77 77 | 7.020 Total Area" 45.000 Flow length" 2.000 Overland Slope" | |
| 87 78 87 77 | 6.458 Pervious Area" 45.000 Pervious length" 2.000 Pervious slope" 0.562 Impervious Area" | |
| 11 11 11 | 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 (ho 5.000 Pervious Depression stora | "urs)" |
| 11 11 11 | 0.015 Impervious Manning 'n'" 0.000 Impervious Max.infiltrati 0.000 Impervious Min.infiltrati 0.050 Impervious Lag constant (| on" on" |
| 11 11 11 | 1.500 Impervious Depression sto 0.587 0.000 Catchment 10 Pervi | rage" 0.000 0.000 c.m/sec" ous Impervious Total Area " |
| ** ** ** | Surface Area 6.458 Time of concentration 21.96 Time to Centroid 2780. Rainfall depth 285.1 | 9 3.647 18.018 minutes" 245 2236.863 2663.074 minutes" 80 285.180 285.180 mm" |
| 11 | Rainfall volume 1.841 Rainfall losses 207.1 Pag | 8 0.1602 2.0020 ha-m" |

| | | 105172 Ex Cond Regional | |
|------|----|---|--|
| 11 | | 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 " | |
| 11 | | 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" | |
| | 40 | 0.587 0.587 0.587 0.000" | |
| п | 40 | HYDROGRAPH Combine 1" | |
| п | | 6 Combine " 1 Node #" | |
| 11 | | Total Discharge" | |
| 11 | | | |
| | | 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" | |
| 11 | | 2 Start - New Tributary" | |
| ** | | 0.587 0.000 0.587 0.587" | |
| ** | 33 | CATCHMENT 20" | |
| - 11 | | 1 Triangular SCS" | |
| | | 1 Equallength" | |
| | | 2 Horton equation" | |
| | | 20 Catchment 20 - To Clythe Creeek" | |
| | | 0.000 % Impervious" | |
| п | | 4.780 Total Area" | |
| | | 45.000 Flow length" 2.000 Overland Slope" | |
| | | 2.000 Overland Slope" 4.780 Pervious Area" | |
| 11 | | 45.000 Pervious length" | |
| ** | | 2.000 Pervious slope" | |
| 11 | | 0.000 Impervious Area" | |
| | | 45.000 Impervious length" | |
| | | 2.000 Impervious slope" | |
| 11 | | 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" | |
| 11 | | 0.000 Impervious Min.infiltration" 0.050 Impervious Lag constant (hours)" | |
| | | 1.500 Impervious Depression storage" | |
| н | | 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 | |
| ** | | | |
| " | 40 | Maximum flow 0.397 0.000 0.397 c.m/sec" HYDROGRAPH Add Runoff " | |
| | -0 | 4 Add Runoff " | |
| | | 0.397 0.397 0.587 0.587" | |
| 11 | 33 | CATCHMENT 30" | |
| 11 | | 1 Triangular SCS" | |
| ** | | 1 Equal length" | |
| | | Page 2 | |
| | | | |

| | | 10517 | 2 Ex Cond Re | Icnoipa | | |
|------|----|--|----------------------|-------------|------------|-------------|
| | | 2 Horton equation" | Z EX CONU Ke | ey i ona i | | |
| | | 30 Catchment 30 - To (| lvthe Creek | ** | | |
| 11 | | 0.000 % Impervious" | eryche ereek | | | |
| ** | | 6.480 Total Area" | | | | |
| ** | | 45.000 Flow length" | | | | |
| | | 2.000 Overland Slope" | | | | |
| 11 | | 6.480 Pervious Area" | | | | |
| ** | | 45.000 Pervious length" | | | | |
| ** | | 2.000 Pervious slope" | | | | |
| | | 0.000 Impervious Area" | | | | |
| н | | 45.000 Impervious length" | | | | |
| 11 | | 2.000 Impervious slope" | | | | |
| ** | | 0.250 Pervious Manning 'r | | | | |
| 11 | | 75.000 Pervious Max.infili | " | | | |
| | | 12.500 Pervious Min.infilt | | | | |
| - 11 | | | | | | |
| 11 | | | ant (nours) | | | |
| ** | | 5.000 Pervious Depression 0.015 Impervious Manning | 'storage | | | |
| | | 0.000 Impervious Max.infi | Il Itration" | | | |
| | | 0.000 Impervious Min.infi | | | | |
| | | | | \ '' | | |
| 11 | | 0.050 Impervious Lag cons 1.500 Impervious Depressi | on storage" |) | | |
| ** | | | | 0 507 | | |
| | | 0.538 0.39 Catchment 30 | 97 0.587 Pervious | | c.m/sec" | |
| | | Surface Area | | | Total Area | |
| н | | Time of concentration | 6.480 | 0.000 | 6.480 | hectare" |
| ** | | Time to Centroid | 21.969 | 3.647 | 21.969 | minutes" |
| ** | | Rainfall depth | 2780.244 | 2236.863 | 2780.243 | minutes" |
| | | Rainfall volume | 285.180 | 285.180 | 285.180 | mm'' |
| п | | | 1.8480 | 0.0000 | 1.8480 | ha-m" |
| | | Rainfall losses | 207.172 | 38.558 | 207.172 | mm'' |
| | | Runoff depth Runoff volume | 78.008 | 246.622 | 78.008 | mm" |
| ** | | Runoff coefficient | 5054.92 | 0.02 | 5054.94 | c.m" |
| | | | 0.000 | 0.000 | 0.000 | |
| н | 40 | Maximum flow | "0.538 | 0.000 | 0.538 | c.m/sec" |
| н | 40 | HYDROGRAPH Add Runoff 4 Add Runoff " | | | | |
| 11 | | | | 0 5071 | | |
| ** | 40 | | 6 0.587 | 0.587" | | |
| ** | 40 | HYDROGRAPH Copy to Out 8 Copy to Outflow" | TIOW | | | |
| | | | | 0 5071 | | |
| н | 40 | 0.538 0.93 HYDROGRAPH Combine | 1" 0.936 | 0.587" | | |
| н | 40 | HYDROGRAPH Combine 6 Combine " | T | | | |
| 11 | | 1 Node #" | | | | |
| 11 | | Total Discharge" | | | | |
| н | | Maximum flow | 1 5 | | !! | |
| | | | 1.52 | | ec | |
| 11 | | Hydrograph volume | 15206.84 | | | |
| ** | 40 | 0.538 0.93 HYDROGRAPH Confluenc | | 1.522" | | |
| ** | 40 | HYDROGRAPH Confluenc 7 Confluence " | .e I | | | |
| | | 1 Node #" | | | | |
| | | Total Discharge" | | | | |
| | | | 1 51 | | | |
| 11 | | Maximum flow | 1.52 | | ec | |
| ** | | Hydrograph volume | 15206.84 | | | |
| 11 | 38 | 0.538 1.52 | | 0.000" | | |
| | 50 | START/RE-START TOTALS 3 Runoff Totals on Fx | | | | |
| | | | ι Τ Ι | 10 | 200 | • • • • • U |
| | | Total Catchment area | | | | tare" |
| 11 | | Total Impervious area Total % impervious | | Ū Q | .562 hec | tare" |
| | 19 | EXIT" | | 3 | .072" | |
| | 19 | | | | | |

Hadati Creek Watershed - Allowable _____ __________ v ν Τ SSSSS U U Α L v Ι SS U U AA L ۷ Ι SS U U AAAAA L SS V V Ι U U Α Α L vv Ι SSSSS UUUUU Α Α LLLLL 000 TTTTT TTTT Н н Υ Y M M 000 0 0 т Т н Н YY MM MM 0 0 Т 0 т 0 н Н Y М М 0 0 000 Т Т Н 000 н Y Μ Μ Developed and Distributed by Clarifica Inc. Copyright 1996, 2007 Clarifica Inc. All rights reserved. **** DETAILED OUTPUT ***** filename: C:\Program Files\Visual OTTHYMO 2.3.2\voin.dat Input 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: _ ********* ** SIMULATION NUMBER: 1 ** ****** _____ **READ STORM** Filename: Y:\SPrimmer\Miduss Modelling\105172\Ci tyview Ridge\25mm4hr.stm Comments: 25 mm - 4 hour - 10 Minute Time Step Ptota]= 25.00 mm | TIME RAIN TIME TIME RAIN RAIN TIME RAIN hrs mm/hr mm/hr hrs hrs mm/hr hrs mm/hr .17 .53 1.17 17.57 2.17 3.17 2.95 .76 .71 .33 61.55 1.33 2.33 2.19 3.33 .65 .99 .50 1.50 24.02 2.50 .57 1.69 3.50 1.51 .67 1.67 11.16 2.67 1.34 3.67 .49 .83 2.57 1.83 1.09 6.44 2.83 3.83 .44 1.00 5.31 2.00 4.20 3.00 .90 4.00 .38

| Hadati Creek Watershed - Allowable |
|---|
| CALIB STANDHYD (0544) Area (ha)= 1.13 ID= 1 DT= 5.0 min Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 |
| IMPERVIOUSPERVIOUS (i)Surface Area $(ha) =$.90.23Dep. Storage $(mm) =$ 1.505.00Average Slope $(\%) =$.55.55Length $(m) =$ 50.0040.00Mannings n=.013.300 |
| NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP. |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ |
| $\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$ |
| CALIB Area (ha)= 14.99 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 Dep. Storage (ha)= 11.99 3.00 Page 2 Page 2 |

Hadati Creek Watershed - Allowable

Hadati Creek Watershed - Allowable .55 Average Slope (%)= . 55 200.00 40.00 Length (m) =Mannings n .013 .300 = 61.55 Max.Eff.Inten.(mm/hr)= .00 325.00 over (min) 5.00 5.63 (ii) 323.64 (ii) Storage Coeff. (min) =Unit Hyd. Tpeak (min)= 325.00 5.00 Unit Hyd. peak (cms)= .20 .00 *TOTALS* .00 PEAK FLOW 1.77 (cms) =1.767 (iii) TIME TO PEAK 1.33 18.56 (hrs) =1.33 RUNOFF VOLUME 23.50 (mm) =.00 TOTAL RAINFALL 25.00 25.00 (mm) =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) = 4.14K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 12.50FC (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) (ha) = 25.25Area ID= 1 DT= 5.0 min Total Imp(%) = 80.00Dir. Conn.(%)= 79.00 PERVIOUS (i) IMPERVIOUS Surface Area (ha) =20.20 5.05 1.50 Dep. Storage (mm) =5.00 Average Slope (%)= .55 .55 350.00 40.00 Length (m) =Mannings n .013 . 300 Max.Eff.Inten.(mm/hr)= 61.55 .00 330.00 over (min) 10.00 (min) =7.87 (ii) 325.88 (ii) Storage Coeff. Unit Hyd. Tpeak (min)= 10.00 330.00 Unit Hyd. peak (cms)= .13 .00 ***TOTALS*** .00 PEAK FLOW (cms) =2.41 2.408 (iii) TIME TO PEAK (hrs) =1.42 1.42 RUNOFF VOLUME 23.50 18.56 (mm) =.00 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)= 4.1 K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 12.50FC (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) | (ha) = 16.00Area Page 3

| ID= 1 DT= 5.0 min | Had Total | ati Creek Waters Imp(%)= 80.00 | shed - Allowabl Dir. Conn.(% | e 6)= 79.00 |
|--|--|--|--|---|
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 12.80 1.50 .50 400.00 .013 | PERVIOUS (i) 3.20 5.00 .20 40.00 .300 | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | (mm/hr)= (min) (min)= (min)= (cms)= | 61.55 10.00 8.77 (ii) 10.00 .12 | .00 440.00 439.54 (ii) 440.00 .00 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | 1.48 1.42 23.50 25.00 .94 | .00 .00 .00 25.00 .00 | 1.475 (iii) 1.42 18.56 25.00 .74 |
| ***** WARNING: THE F | PERVIOUS | AREA HAS NO FLOW | v . | |
| Fo (mn Fc (mn (ii) TIME STEF THAN THE (iii) PEAK FLOW | n/hr)= 75 n/hr)= 12 (DT) SH STORAGE DOES NO | SELECTED FOR PEF .00 K .50 Cum.Inf. OULD BE SMALLER COEFFICIENT. T INCLUDE BASEFI | (1/hr)= 4.14 . (mm)= .00 OR EQUAL _OW IF ANY. |) |
| STANDHYD (USUU) | Area | | | |
| ID= 1 DT= 5.0 min | Total | (ha)= 244.00 Imp(%)= 46.00 | Dir. Conn.(% | 6)= 26.00 |
| ID= 1 DT= 5.0 min | Total | Imp(%)= 46.00 | Dir. Conn.(% | 6)= 26.00 |
| ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(| Total (ha)= (mm)= (%)= (m)= = (mm/hr)= (min) (min)= | <pre>Imp(%)= 46.00 IMPERVIOUS 112.24 1.50 .80 1275.00 .013</pre> | Dir. Conn.(% | |
| ID= 1 DT= 5.0 min Surface Area Dep. Storage Average Slope Length Mannings n Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak | Total (ha)= (mm)= (%)= (m)= = (min)= (min)= (cms)= (cms)= (hrs)= (mm)= (mm)= | <pre>Imp(%)= 46.00 IMPERVIOUS 112.24 1.50 .80 1275.00 .013 42.79 20.00 17.67 (ii) 20.00</pre> | Dir. Conn.(% PERVIOUS (i) 131.76 5.00 .80 40.00 .300 5.28 55.00 51.28 (ii) 55.00 | <pre>%)= 26.00 *TOTALS* 5.342 (iii) 1.58 7.77 25.00 .31</pre> |

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

Hadati Creek Watershed - Allowable CALIB STANDHYD (0540) Area (ha)= 4.63 ID= 1 DT= 5.0 min | Total Imp(%) = 80.00Dir. Conn.(%)= 79.00 ------IMPERVIOUS PERVIOUS (i) Surface Area (ha) =3.70 .93 .93 5.00 1.50 .55 150.00 .013 Dep. Storage (mm)= .55 Average Slope (%)= 40.00 Length (m) =Mannings n .300 -----Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 61.55 5.00 4.73 (ii) 322.74 (ii) 325.00 (cms)= .57 .00 (hrs)= 1.33 .00 (mm)= 23.50 .00 (mm)= 25.00 25.00 IENT = .94 ***TOTALS*** .5<u>69</u> (iii) PEAK FLOW TIME TO PEAK 1.33 RUNOFF VOLUME 18.56 TOTAL RAINFALL 25.00 RUNOFF COEFFICIENT .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) = 4.14Fc (mm/hr) = 12.50 Cum.Inf. (mm) = .00.00 (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 _____ _KVIOL 5.29 1.50 2.00 680 IMPERVIOUS PERVIOUS (i) Surface Area Dep. Storage Average Slope (ha) =5.29 7.31 5.00 (mm)= 2.00 680.00 013 Average Slope (%)= 2.00 Length (m)= 40.00 Mannings n = .300 61.55 7.05 10.00 35.00 7.96 (ii) 30.70 (ii) 10.00 35.00 .13 Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= *TOTALS* CCMS)=.32RUNOFF VOLUME1.42RUNOFF VOLUME(mm)=23.50TOTAL RAINFALL(mm)=RUNOFF COEFFICIENT.94 .334 (iii) .07 1.83 2.16 1.42 6.64 25.00 25.00 .09 .27

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr)=75.00 K (1/hr)=4.14Page 5

| (ii) TIME STEP | /hr)= 12 (DT) SHO STORAGE (| .50 Cum.I OULD BE SMALL COEFFICIENT. | ER OR EQUAL | |
|---|---|--|---|--|
| CALIB STANDHYD (0565) ID= 1 DT= 5.0 min | Area Total | (ha)= 11. Imp(%)= 42. | 10 00 Dir. Conn.(%)= | 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 4.66 1.50 2.00 680.00 .013 | PERVIOUS (i) 6.44 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | | | * | TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .28 1.42 23.50 25.00 .94 | .06 | .294 (iii) 1.42 6.64 25.00 .27 |
| Fo (mm Fc (mm (ii) TIME STEP | /hr)= 75 /hr)= 12 (DT) SH(STORAGE (| .00 .50 Cum.I DULD BE SMALL COEFFICIENT. | ER OR EQUAL | |
| CALIB STANDHYD (0481) ID= 1 DT= 5.0 min | Area Total | (ha)= 5. Imp(%)= 42. | 90 00 Dir. Conn.(%)= | 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 2.48 1.50 2.00 680.00 .013 | PERVIOUS (i) 3.42 5.00 2.00 40.00 .300 | |
| Storage Coeff. Unit Hyd. Tpeak | (min) (min)= | 61.55 10.00 7.96 (i 10.00 .13 | 35.00 | TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .15 1.42 23.50 25.00 .94 | .03 1.83 2.16 25.00 .09 | .156 (iii) 1.42 6.64 25.00 .27 |

Page 6

Hadati Creek Watershed - Allowable (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr)= 75.00 K (1/hr)= 4.1 K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 12.50FC (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) ID= 1 DT= 5.0 min (ha) = 24.20Area Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =10.16 14.04 1.50 5.00 Dep. Storage (mm) =(%)= Average Slope 2.00 2.00 Length (m) =401.00 40.00 Mannings n -.013 .300 Max.Eff.Inten.(mm/hr)= 7.05 61.55 5.00 5.80 (ii) 5.00 over (min) 30.00 Storage Coeff. (min)= 28.54 (ii) Unit Hyd. Tpeak (min)= 30.00 Unit Hyd. peak (cms)= .04 .20 ***TOTALS*** .14 .75 1.33 .770 (iii) PEAK FLOW (cms) =TIME TO PEAK (hrs) =1.33 RUNOFF VOLUME (mm)= 23.50 2.16 6.64 25.00 TOTAL RAINFALL (mm) =25.00 25.00 .94 RUNOFF COEFFICIENT = .09 .27 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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. STANDHYD (0415) ID= 1 DT= 5.0 min Area (ha)= 4.99 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 Area IMPERVIOUS PERVIOUS (i) 2.10 Surface Area (ha) =2.89 1.50 2.86 5.00 Dep. Storage (mm) =Average Slope (%)= 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. 3.27 (ii) 21.96 (ii) (min) =5.00 Unit Hyd. Tpeak (min)= 25.00 Unit Hyd. peak (cms)= .27 .05 *TOTALS* .17 PEAK FLOW .04 (cms) =.179 (iii) TIME TO PEAK (hrs) =1.67 1.33 (mm)= RUNOFF VOLUME 23.50 2.16 6.64 Page 7

| Hadati Creek Watershed - Allowable 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 (0110) Area (ha)= 19.00 ID= 1 DT= 5.0 min Tota] Imp(%)= 42.00 Dir. Conn.(%)= 21.00 | | | | | |
| $\begin{array}{rcrcrcr} & \text{IMPERVIOUS} & \text{PERVIOUS} & (i) \\ \text{Surface Area} & (ha) = & 7.98 & 11.02 \\ \text{Dep. Storage} & (mm) = & 1.50 & 5.00 \\ \text{Average Slope} & (\%) = & 2.00 & 2.00 \\ \text{Length} & (m) = & 365.00 & 40.00 \\ \text{Mannings n} & = & .013 & .300 \\ \end{array}$ | | | | | |
| 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 | | | | | |
| 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 | | | | | |
| <pre>(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: F0 (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.</pre> | | | | | |
| CALIB STANDHYD (0101) Area (ha)= 16.32 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 | | | | | |
| IMPERVIOUSPERVIOUS (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 Page 8 | | | | | |

Hadati Creek Watershed - Allowable *TOTALS* PEAK FLOW TIME TO PEAK .53 .10 (cms) =.540 (iii) (hrs) =1.75 1.33 RUNOFF VOLUME (mm) =23.50 2.16 6.64 25.00 TOTAL RAINFALL (mm) =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) = 4.1K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 12.50FC (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 Total Imp(%)= 42.00 ID= 1 DT= 5.0 min 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 287.00 (m) =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* .09 1.75 PEAK FLOW (cms) =.47 1.33 .479 (iii) TIME TO PEAK (hrs) =1.33 23.50 RUNOFF VOLUME (mm) =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: (mm/hr) = 75.00K (1/hr)= 4.14 Fo FC (mm/hr)= 12.50 Cum.Inf. (mm)= (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL Cum.Inf. (mm)= .00 THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ ______ CALIB STANDHYD (0105) Area (ha)= 51.32 Total Imp(%)= 42.00 ID= 1 DT= 5.0 min Dir. Conn. (%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =21.55 29.77 1.50 5.00 Dep. Storage (mm) =Average Slope (%)= 2.00 2.00 550.00 Length (m) =40.00 Mannings n .013 .300 =

| Max.Eff.Inten. over Storage Coeff. Unit Hyd. Tpeal Unit Hyd. peak PEAK FLOW | (mm/hr)= (min) (min)= (min)= (cms)= | 61.55 5.00 7.01 (ii) 5.00 .17 | .04 | e *TOTALS* 1.538 (iii) |
|--|---|---|---|---|
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (hrs)= (mm)= (mm)= [ENT = | 1.33 23.50 25.00 .94 | 1.75 2.16 25.00 .09 | 1.33 6.64 25.00 .27 |
| Fo (mr Fc (mr (ii) TIME STE | n/hr)= 75.0 n/hr)= 12.5 ? (DT) SHOU STORAGE CO | 0 k 0 Cum.Inf 1LD BE SMALLER DEFFICIENT. | | |
| CALIB STANDHYD (0365) ID= 1 DT= 5.0 min | Area Total I | (ha)= 117.50 mp(%)= 42.00 |) Dir. Conn.(% |)= 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | | 68.15 5.00 2.00 40.00 | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | (mm/hr)= (min)= (min)= (min)= (cms)= | 61.55 10.00 9.32 (ii) 10.00 .12 | 7.05 35.00 32.06 (ii) 35.00 .03 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (Cms)= (hrs)= (mm)= (mm)= | 2.82 1.42 23.50 | .62 1.83 2.16 25.00 .09 | 2.960 (iii) 1.42 6.64 25.00 .27 |
| Fo (mr Fc (mr (ii) TIME STEF | 1/hr)= 75.0 1/hr)= 12.5 2 (DT) SHOU STORAGE CO | 0 k 0 Cum.Inf ULD BE SMALLER DEFFICIENT. | | |
| CALIB STANDHYD (0355) ID= 1 DT= 5.0 min | Area Total I | (ha)= 12.30 mp(%)= 42.00 | Dir. Conn.(% |)= 21.00 |
| Surface Area Dep. Storage Average Slope | (ha)= (mm)= (%)= | IMPERVIOUS 5.17 1.50 1.60 Page | 7.13 5.00 1.60 | |

Hadati Creek Watershed - Allowable Lenath (m)= 286.00 40.00 Mannings n .300 = .013 Max.Eff.Inten.(mm/hr)= 61.55 7.05 over (min) Storage Coeff. (min)= 30.00 5.00 5.00 5.06 (ii) 5.00 21 29.38 (ii) Unit Hyd. Tpeak (min)= 30.00 Unit Hyd. peak (cms)= .21 .04 *TOTALS* CMIS)=.40RUNOFF VOLUME1.33RUNOFF VOLUME(mm)=23.50TOTAL RAINFALL(mm)=RUNOFF COEFFICIENT.94 .07 1.75 2.15 .405 (iii) 1.33 2.16 6.64 25.00 25.00 .09 .27 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00FO FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALIB Area (ha)= 16.30 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 STANDHYD (0350) | |ID= 1 DT= 5.0 min | -----IMPERVIOUS PERVIOUS (i) 6.85 (ha) =Surface Area 9.45 1.50 1.00 330.00 .013 Dep. Storage (mm) =5.00 Average Slope (%)= 1.00 Length (m)= 40.00 Mannings n .300 = Storage Coeff. (min)= 61.55 over (min) 5.00 Unit Hyd. Tpeak (min)= 5.00 Unit Hyd. peak (cms)= .19 5.04 40.00 38.38 (ii) 40.00 .03 *TOTALS* .49 1.33 .07 PEAK FLOW (cms)= .499 (iii) .07 1.92 2 16 TIME TO PEAK (hrs)= 1.33 (mm)= (mm)-RUNOFF VOLUME 23.50 2.16 6.64 TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = 25.00 25.00 25.00 . 94 .09 .27 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14FO FC (mm/hr) = 12.50Cum.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) = 30.00ID= 1 DT= 5.0 min Total Imp(%)= 37.00 Dir. Conn.(%)= 19.00 _____ IMPERVIOUS PERVIOUS (i) Page 11

| Surface Area Dep. Storage Average Slope Length Mannings n | Hadat (ha)= (mm)= (%)= (m)= = | i Creek Water 11.10 1.50 2.00 447.00 .013 | shed - Allowab 18.90 5.00 2.00 40.00 .300 | le |
|--|---|--|--|--|
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | nm/hr)= (min) (min)= (min)= (cms)= | 61.55 5.00 6.19 (ii) 5.00 .19 | 2.81 40.00 39.07 (ii) 40.00 .03 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .83 1.33 23.50 25.00 .94 | .08 1.92 1.27 25.00 .05 | .834 (iii) 1.33 5.50 25.00 .22 |
| ***** WARNING:FOR ARI YOU SHO | | MPERVIOUS RAT DER SPLITTING | | |
| Fo (mm, Fc (mm, (ii) TIME STEP | /hr)= 75.0 /hr)= 12.5 (DT) SHOU STORAGE CO | 0 K 0 Cum.Inf LD BE SMALLER EFFICIENT. | | 4 D |
| CALIB STANDHYD (0395) ID= 1 DT= 5.0 min | Area Total I | (ha)= 51.20 mp(%)= 10.00 | Dir. Conn.(| %)= 5.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 5.12 1.50 2.00 900.00 .013 | PERVIOUS (i) 46.08 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(r over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | (min)= | 61.55 10.00 9.42 (ii) 10.00 .12 | .00 230.00 225.31 (ii) 230.00 .00 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE | (cms)= (hrs)= (mm)= (mm)= ENT = | .29 1.42 23.50 25.00 .94 | .00 .00 .00 25.00 .00 | .292 (iii) 1.42 1.17 25.00 .05 |
| ***** WARNING:FOR ARI YOU SHO ***** WARNING: THE PI | OULD CONSI | DER SPLITTING | THE AREA. | |
| Fo (mm, Fc (mm, (ii) TIME STEP | (hr)= 75.00 (hr)= 12.50 (DT) SHOU STORAGE CO | 0 K 0 Cum.Inf LD BE SMALLER EFFICIENT. | . (mm)= .00 OR EQUAL LOW IF ANY. | |

CALIB STANDHYD (0455) ID= 1 DT= 5.0 min Area (ha)= 12.70 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 -----IMPERVIOUS PERVIOUS (i) Surface Area(ha) =5.33Dep. Storage(mm) =1.50Average Slope(%) =1.71Length(m) =300.00Mannings n=.013 7.37 5.00 1.71 40.00 Mannings n .013 . 300 Max.Eff.Inten.(mm/hr)= 61.55 7.05

 01.35
 7.05

 5.00
 30.00

 5.11 (ii)
 28.94 (ii)

 5.00
 30.00

 .21
 .04

 over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= ***TOTALS***

 PEAK FLOW
 (cms)=
 .41
 .07

 TIME TO PEAK
 (hrs)=
 1.33
 1.75

 RUNOFF VOLUME
 (mm)=
 23.50
 2.16

 TOTAL RAINFALL
 (mm)=
 25.00
 25.00

 RUNOFF COEFFICIENT
 .94
 .09

 .417 (iii) 1.33 6.64 25.00 .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
 Area
 (ha)=
 36.00

 ID=
 1
 DT=
 5.0
 min
 Total
 Imp(%)=
 42.00
 Dir.
 Conn.(%)=
 21.00

 . _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ . IMPERVIOUS $\begin{array}{rrrr} \text{IMPERVICES} \\ (ha) = & 15.12 \\ (mm) = & 1.50 \\ (\%) = & 2.03 \\ (m) = & 465.00 \\ - & .013 \end{array}$ PERVIOUS (i) Surface Area (ha)= Dep. Storage (mm)= 20.88 5.00 Average Slope Length 40.00 .300 Mannings n Max.Eft.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)=1.09.211.117TIME TO PEAK(hrs)=1.331.751.33RUNOFF VOLUME(mm)=23.502.166.64TOTAL RAINFALL(mm)=25.0025.0025.00RUNOFF COEFFICIENT=.94.09.27 1.117 (iii) (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (mm/hr) = 12.50 Cum.Inf. (mm) = .00Page 13

Hadati Creek Watershed - Allowable

Hadati Creek Watershed - Allowable (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALIB | STANDHYD (0480) | |ID= 1 DT= 5.0 min | Area (ha)= 43.10 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 ~-----IMPERVIOUS PERVIOUS (i) 25.00 Surface Area (ha) =18.10 1.50 2.00 680.00 .013 5.00 Dep. Storage (mm) =Average Slope (%)= Length (m) =40.00 .300 Mannings n ----Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 10.00 10.00 10.00 10.00 35.00 10.00 35.00 10.00 35.00 10.00 35.00 10.00 35.00 10.00 35.00 10.00 35.00 10.00 35.00 10.00 30.70 (ii) 10.00 35.00 10.00 10 .04 *TOTALS* .23 1.83 2.16 PEAK FLOW(cms)=1.09TIME TO PEAK(hrs)=1.42RUNOFF VOLUME(mm)=23.50TOTAL RAINFALL(mm)=25.00RUNOFF COEFFICIENT=.94 1.142 (iii) 1.42 2.16 6.64 25.00 25.00 .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. (ha)= .00 (cms)= .00 (hrs)= .00 | STORE HYD (0525) | AREA ID= 1 DT=****min | QPEAK _____ TPEAK (mm)=****** VOLUME ____ | DUHYD (0505) | Inlet Cap.=9.000 #of Inlets= 1 tal(cms)= 9.0 | AREA QPEAK TPEAK R.V. ----- (ha) (cms) (hrs) (mm) TOTAL HYD.(ID= 1): 244.00 5.34 1.58 7.77 | Total(cms)= 9.0 | 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. ADD HYD (0566) | 1 + 2 = 3 | AREA QPEAK TPEAK R.V. Page 14

Hadati Creek Watershed - Allowable (ha) (cms) (hrs) (mm) -----ID1= 1 (0484): 12.60 + ID2= 2 (0565): 11.10 .334 6.64 1.42 1.42 .294 6.64 ____ ID = 3 (0566): 23.70 .628 1.42 6.64NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0420) 1 + 2 = 3AREA QPEAK TPEAK R.V. _____ (ha) (cms) (hrs) (mm) ID1= 1 (0410): + ID2= 2 (0415): 24.20 .770 6.64 1.33 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. RESERVOIR (0111) | IN= 2---> OUT= 1 | STORAGE | OUTFLOW | DT= 5.0 min | OUTFLOW STORAGE
 (cms)
 (ha.m.)

 1.0000
 1.000

 20.0000
 1.100

 .0000
 .0000
 (cms) (ha.m.) .0000 .0000 1.0000 .0100 1.1000 .0100 .0120 .1000 .0000 TPEAK QPEAK AREA R.V. AREA QPEAK (ha) (cms) 19.000 .614 19.000 .024 (mm) (hrs) INFLOW : ID= 2 (0110) OUTFLOW: ID= 1 (0111) 1.33 6.64 19.000 .024 2.92 6.63 PEAK FLOW REDUCTION [Qout/Qin](%)= 3.93 TIME SHIFT OF PEAK FLOW (min)= 95.00 (min)= 95.00 (ha.m.)= .1111 MAXIMUM STORAGE USED ADD HYD (0103) | 1 + 2 = 3 | (ha) (cms) (hrs) L6.32 .540 AREA R.V. _____ (mm) ID1= 1 (0101): + ID2= 2 (0102): 6.64 16.32 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) .5000 (ha.m.) (cms) (ha.m.) .4000 .0000 . 5000 .0000 .0100 .0100 6.6000 . 8000 .0260 .2300 .0000 .0000

| INFLOW : OUTFLOW: | PEAK | Hadati Cre AR (h 05) 51.3 06) 51.3 FLOW RE | EA QF a) (c 20 1. 20 . | PEAK (ms) 538 155)out/Oin | TPEAL (hrs) 1.3 2.42 | 0.08 | 4 3 |
|---|--|--|--|--|---|--|--|
| | TIME MAXIN | SHIFT OF PE MUM STORAGE | AK FLOW USED |) (ha | (min)= 69 (.m.)= | 5.00 .2763 | |
| ROUTE CHN (0 IN= 2> OU |)358) JT= 1 | Routing ti | me step (n | nin)'= | 5.00 | | |
| | < [Distance 5.50 5.51 10.00 14.49 14.50 20.00 | DATA FOR SEC Elevat | ion 26 | Manning | l | in Channel in Channel in Channel in Channel in Channel | |
| DEPTH (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 | (Cu.m.) .102E+02 .920E+02 .163E+03 .255E+03 .368E+03 .634E+03 .769E+03 904E+03 | TIME TABL FLOW RATE (cms) .0 .0 .0 .1 .1 .1 .2 .3 .4 .6 .8 1.0 1.2 1.4 1.7 2.0 2.3 2.6 3.0 3.4 | | OCITY m/s) .17 .27 .35 .42 .49 .55 .64 .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 | (m1n) 109.52 68.99 52.65 43.46 37.45 33.17 28.86 24.66 21.72 19.54 | |
| INFLOW : OUTFLOW: | ID= 2 (035 ID= 1 (035 | AREA (ha) 55) 12.30 58) 12.30 | | TPEAK (hrs) | R.V. (mm) | <-pipe / c MAX DEPTH (m) .11 .08 | hannel-> MAX VEL (m/s) .72 .52 |
| ROUTE CHN (C IN= 2> OL | | Routing ti | me step (n | nin)'= | 5.00 | | |
| | < [Distance .00 5.50 | | zion 26 | Manning .0300 300 / .0 |) | in Channel | |

| | 5.51 10.00 14.49 14.50 20.00 | | 00 | ed - Allowable .0150 Ma .0150 Ma .0150 Ma 50 / .0300 Ma .0300 | the channel | |
|--|--|---|---|--|---|--|
| DEPTH (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 | VOLUME (cu.m.) .929E+01 .372E+02 .836E+02 .149E+03 .232E+03 .334E+03 .454E+03 .576E+03 .699E+03 .822E+03 .944E+03 .108E+04 .123E+04 .140E+04 .159E+04 .180E+04 | FLOW RATE (cms) .0 .0 .1 .1 .2 .3 .4 .6 .8 1.0 1.2 1.4 1.7 2.0 2.3 2.6 | .35 .42 .49 .55 .64 .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 | TRAV.TIME (min) 99.56 62.72 47.86 39.51 34.05 30.15 26.24 22.41 19.75 17.76 16.22 15.07 14.28 13.72 13.31 13.01 12.76 | |
| INFLOW : OUTFLOW: | ID= 2 (03 ID= 1 (03 | AREA (ha) 50) 16.30 53) 16.30 | < hydr QPEAK (cms) .50 .22 | rograph> TPEAK R.V. (hrs) (mm) 1.33 6.64 1.58 6.60 | <-pipe / c MAX DEPTH (m) .12 .09 | hannel-> MAX VEL (m/s) .78 .57 |
| ROUTE CHN (0 IN= 2> OU | 362) T= 1 | Routing ti | me step (mi | n)'= 5.00 | | |
| | <pre>< Distance .00 5.50 5.51 10.00 14.49 14.50 20.00</pre> | | tion M 40 15 .030 00 09 00 | Manning .0300 00 / .0150 Ma .0150 Ma .0150 Ma .0150 Ma | ain Channel ain Channel ain Channel ain Channel ain Channel | |
| < DEPTH (m) .02 .04 .06 .08 .09 .11 .13 .15 .17 | ELEV (m) .02 .04 .06 .08 .09 .11 .13 .15 .17 | TRAVEL VOLUME (cu.m.) .176E+02 .702E+02 .158E+03 .281E+03 .438E+03 .607E+03 .776E+03 .944E+03 .116E+04 | TIME TABLE FLOW RATE (cms) .0 .0 .1 .1 .1 .3 .5 .7 1.0 1.3 Page 17 | VELOCITY (m/s) .21 .33 .43 .52 .62 .77 .90 1.03 1.16 | TRAV.TIME (min) 80.52 50.72 38.71 31.95 26.84 21.66 18.45 16.22 14.36 | |

| . 20 . 22 . 24 . 26 . 29 . 31 . 33 . 35 . 38 . 40 | .22 | .194E+04 | ek Waters 1.8 2.3 2.8 3.4 4.0 4.8 5.5 6.4 7.3 8.2 |]]]]]]]]]]]]]]]]]]] | 27 36 44 51 57 62 67 | 13.13 12.24 11.58 11.05 10.63 10.27 9.97 9.71 9.48 9.28 | |
|--|---|---|---|---|--|--|--|
| INFLOW : : OUTFLOW: : | ID= 2 (0360 ID= 1 (0362 | AREA (ha) 0) 30.00 2) 30.00 | < hyd QPEAK (cms) .83 .41 | drograph TPEAK (hrs) 1.33 1.50 | > R.V. (mm) 5.50 5.48 | <-pipe / c MAX DEPTH (m) .14 .11 | hannel-> MAX VEL (m/s) .96 .71 |
| ID = | 1 (0455): 2 (0460): 3 (0465): | AREA (ha) 12.70 36.00 48.70 NOT INCLU | 1.534 | 1.33 | 6.64 | | |
| ===== ID = | 3 1 (0510): 2 (0505): 3 (0515): | AREA (ha) 16.00 244.00 260.00 D NOT INCLU | 6.307 | (hrs) 1.42 1.58 | (mm) 18.56 7.77 | | |
| (0) ROUTE CHN (0) IN= 2> OU | r= 1 DA Distance .00 1.00 1.50 2.00 3.50 4.50 6.00 | Routing ti ATA FOR SEC Elevat 101. 100. 100. 99. 99. 100. 101. TRAVEL VOLUME | TION (2 ion 50 70 55 .01 50 60 65 .02 45 | L.1) Manning .0500 .0500 500 / .03 .0300 .0300 300 / .05 .0500 | > 800 Mai Mai 800 Mai | n Channel n Channel n Channel n Channel n Channel | |
| (m) .10 | (m) | (cu.m.) .353E+02 | (cms) .0 Page 1 | (n | .19 | (min) 43.69 | |

| | | | eek Watershed .1 .2 .3 .5 .7 .9 1.2 1.5 1.8 2.2 2.7 3.4 4.1 4.9 5.8 6.7 7.7 8.8 APH IS DRY!! | - Allowabl .37 .49 .59 .67 .74 .80 .86 .91 .96 1.00 1.07 1.14 1.20 1.25 1.30 1.34 1.38 1.41 | e 22.76 17.03 14.23 12.51 11.32 10.43 9.74 9.18 8.72 8.32 7.80 7.31 6.94 6.65 6.41 6.22 6.04 5.90 | |
|--|---|---|---|---|---|------------------------------|
| | | | | | | |
| ROUTE CHN (0 IN= 2> OU | | Routing t | ime step (min |)'= 5.00 | | |
| ~ | < [Distance 2.00 4.00 4.50 5.00 7.00 9.00 | DATA FOR SEC Elevat 1 | CTION (2.2 tion Ma .00 . .50 . .00 .0350 .00 .0350 .00 .0350 .00 .0350 .00 .0350 .00 .0350 .00 .0350 .00 .0350 |)> nning 0350 0350 / .0350 M 0350 M 0350 0350 | | |
| DEPTH (m) .05 .11 .16 .21 .26 .32 .37 .42 .47 .53 .58 .63 .68 .74 .79 .84 .89 .95 1.00 | ELEV (m) .05 .11 .16 | VOLUME (cu.m.) .573E+01 .135E+02 .232E+02 | FLOW RATE (cms) .0 .1 .3 .5 .9 1.2 1.7 2.2 2.9 3.6 4.4 5.4 6.4 7.6 8.9 10.3 11.8 13.5 15.2 | VELOCITY (m/s) .67 .99 1.23 1.42 1.58 1.73 1.86 1.98 2.10 2.21 2.31 2.42 2.51 2.61 2.70 2.79 2.88 2.97 3.05 | TRAV.TIME (min) 2.23 1.51 1.22 1.06 .95 .87 .81 .76 .71 .68 .65 .62 .60 .58 .54 .54 .52 .51 .49 | |
| | | AREA (ha) | | graph> PEAK R.V. hrs) (mm) | MAX DEPTH | hannel-> MAX VEL (m/s) |

Hadati Creek Watershed - Allowable INFLOW : ID= 2 (0566) 23.70 .63 1.42 6.64 OUTFLOW: ID= 1 (0563) 23.70 .65 1.42 6.64 .22 1.45 .23 1.47 OUTFLOW: ID = 1 (0563) 23.70 .65 1.42 6.64 1.47 (0425) DUHYD Inlet Cap.=1.980 | #of Inlets= 1 | | Total(cms)= 2.0 | tal(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):.00.00.00.00MINOR SYS.(ID= 3):29.19.951.336.64 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. RESERVOIR (0104) | IN= 2---> OUT= 1 | STORAGEOUTFLOW(ha.m.)(cms).00001.0000.010010.0000.1332.0000 DT= 5.0 min | OUTFLOW STORAGE ______ (cms) (ha.m.) . 5000 .0000 .0100 . 6000 .0150 .0000 R.V. AREAQPEAKTPEAK(ha)(cms)(hrs)30.6401.0191.3330.640.0972.33 TPEAK (mm) INFLOW : ID= 2 (0103) 6.64 OUTFLOW: ID = 1 (0104)6.63 PEAK FLOW REDUCTION [Qout/Qin](%)= 9.52 TIME SHIFT OF PEAK FLOW $(\min) = 60.00$ MAXIMUM STORAGE USED (ha.m.) = .1639ADD HYD (0359) | 1 + 2 = 3 |

 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 .3691.58 6.60 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0363)

 2 = 3
 AREA
 QPEAK
 TPEAK
 R.V.

 2 = 3
 (ha)
 (cms)
 (hrs)
 (mm)

 ID1=1
 (0359):
 28.60
 .369
 1.58
 6.60

 + ID2=2
 (0362):
 30.00
 .406
 1.50
 5.48

 1 + 2 = 3R.V. (mm) _____ _____ ====== _____ ID = 3 (0363): 58.60 .769 1.506.03 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Page 20

Hadati Creek Watershed - Allowable ADD HYD (0470) | AREA QPEAK TPEAK (ha) (cms) (hrs) *** 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 + ID2= 2 (0425): .00 .000 .00 R.V. (mm) 6.64 .00 ____ ID = 3 (0470): 48.70 1.534 1.336.64 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ______ DUHYD (0520) Inlet Cap.=3.050

 #of Inlets=
 1

 Total(cms)=
 3.0

 AREA
 QPEAK

 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) -----> <----- 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 / .0350 Main Channel
 5.00 .00 .0350 / .0350 Main Channel
 7.00 .50 .0350
 0.00 .0350 9.00 1.00 .0350
 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

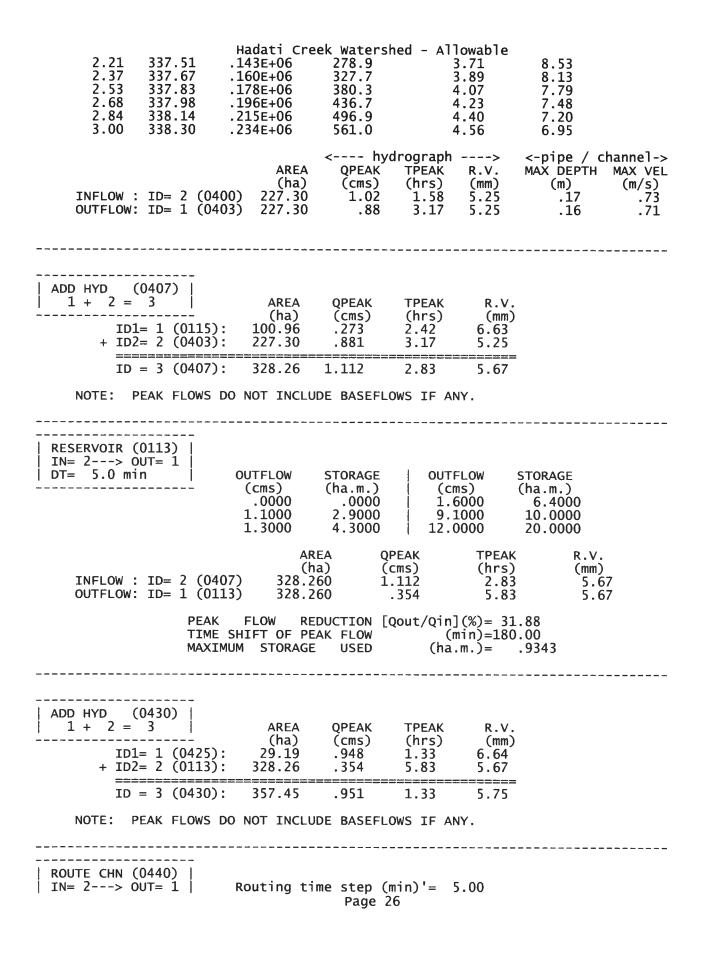
 .32
 .32
 .357E+02
 1.5
 .202
 .43
 <----> .7 1.0 1.5 2.0 2.6 3.4 4.2 5.1 6.2 7.3 8.6 10.0 Page 2 .32 2.08 .32 .357E+02 .40 .32 .35/E+U2 .37 .456E+02 .42 .565E+02 .47 .686E+02 .53 .817E+02 .58 .960E+02 .63 .111E+03 .68 .128E+03 .74 .145E+03 .79 .164E+03 2.22 .37 .38 2.34 .42 .36 2.34 2.46 2.57 2.68 2.78 2.87 2.97 3.06 .34 .47 .53 .32 .58 .31 .63 .30 .68 .29 .74 .79 .28 .27 Page 21

Hadati Creek Watershed - Allowable .84 .84 .27 .184E+03 11.6 3.14 .89 .89 .205E+03 13.2 .26 3.23 .95 .95 15.0 .25 .227E+03 3.31 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) OUTFLOW: ID= 1 (0561) 23.70 **.**65 1.42 .21 6.64 1.73 23.70 .66 1.42 6.64 .21 1.73 _____ ADD HYD (0114) 1 + 2 = 3 | QPEAK AREA TPEAK R.V. (ha) (cms) (hrs) 19.00 .024 2.92 30.64 .097 2.33 (mm) ID1= 1 (0111): + ID2= 2 (0104): 6.63 6.63 _____ ID = 3 (0114): 49.64 .118 2.42 6.63NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0380) | 1 + 2 = 3 | **QPEAK** AREA TPEAK R.V. _____ (ha) (mm) 6.64 (cms) (hrs) ID1= 1 (0365): 117.50 1.42 2.960 + ID2= 2 (0363): 58.60 .769 1.50 6.03 _____ ______ _____ _____ ID = 3 (0380):176.10 3.653 6.44 1.42 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 .0500 100.00 324.60 115.00 321.60 .0500 .0500 / .0300 Main Channel .0300 / .0500 Main Channel .0500 320.80 120.00 122.00 320.80 138.00 321.60 148.00 322.30 .0500 154.00 323.10 .0500 164.00 324.60 .0500 <----ELEV VOLUME (m) (cu.m.) 21.00 .398E+03 DEPTH FLOW RATE VELOCITY TRAV.TIME (m) 321.00 (m) (cms) (m/s) (min) .8 3.3 .84 .20 8.53 321.20 .40 .125E+04 1.13 6.33 321.40 8.1 .60 .255E+04 1.36 5.27 1.56 321.60 .430E+04 .80 15.6 4.59 321.80 1.00 .644E+04 26.8 1.79 4.01 1.20 322.00 .892E+04 3.61 41.2 1.99 Page 22

Hadati Creek Watershed - Allowable .117E+05 59.3 .148E+05 81.9 1.40 322.20 3.30 2.17 1.60 322.40 .148E+05 2.37 3.02 .182E+05 109.1 140.2 322.60 1.80 2.58 2.78 2.77 2.00 322.80 .218E+05 2.59 175.3 2.20 323.00 .256E+05 2.43 323.20 2.40 3.12 .296E+05 214.7 2.29 2.60 323.40 .338E+05 258.6 3.29 2.18 .382E+05 2.80 323.60 306.7 3.46 2.07 3.00 359.1 323.80 .428E+05 3.61 1.98 3.20 324.00 .476E+05 416.0 1.91 3.76 477.5 3.40 324.20 .526E+05 3.91 1.83 .578E+05 3.60 324.40 543.5 4.05 1.77 3.80 324.60 .632E+05 614.3 4.18 1.71 .23 .91 ADD HYD (0526) | 1 + 2 = 3______ 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_____ ID = 3 (0492): 29.60 .812 1.42 6.64 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0115) 1 + 2 = 3ID = 3 (0115): 100.96 .273 2.42 6.63 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ______ | RESERVOIR (0390) |

| IN= 2> OUT= 1 DT= 5.0 min | | STORAGE (ha.m.) .0000 .2870 | d - Allowable OUTFLOW (cms) 1.3100 1.8600 .0000 | STORAGE (ha.m.) 1.6000 23.2300 .0000 | |
|--|---|--|---|---|--|
| INFLOW : ID= 2 (03 OUTFLOW: ID= 1 (03 PEAK TIME | (h 80) 176.1 90) 176.1 FLOW RE | DUCTION TOO | ut/0in](%)= 2 | 6.88 | 4 3 |
| MAXI | MUM STORAGE | USED | (min)= 5 (ha.m.)= | .5820 | |
| ROUTE CHN (0527) IN= 2> OUT= 1 | Routing ti | me step (mi | n)'= 5.00 | | |
| <pre> Distance 100.00 140.00 140.50 141.50 142.00 160.00</pre> | DATA FOR SEC Elevat 313. 312. 310. 310. 312. 313. | ion M 20 40 .050 80 80 40 .030 | 1)> anning .0500 0 / .0300 Ma .0300 Ma .0300 Ma 0 / .0500 Ma .0500 | in Channel in Channel in Channel in Channel | |
| DEPTH ELEV (m) (m) .12 310.92 .25 311.05 .37 311.17 .49 311.29 .62 311.42 .74 311.54 .86 311.66 .98 311.78 1.11 311.91 | TRAVEL VOLUME (cu.m.) .575E+02 .119E+03 .185E+03 .256E+03 .330E+03 .409E+03 .492E+03 .579E+03 .671E+03 .671E+03 .767E+03 .867E+03 .971E+03 .108E+04 .149E+04 .248E+04 .405E+04 .620E+04 .893E+04 .122E+05 | TIME TABLE FLOW RATE (cms) .1 .2 .3 .4 .6 .8 1.1 1.3 1.6 1.9 2.2 2.6 2.9 3.6 4.9 6.9 10.1 14.6 20.7 | VELOCITY (m/s) .40 .57 .69 .78 .86 .92 .97 1.02 1.07 1.11 1.15 1.19 1.23 1.10 .88 .77 .73 .74 .76 | TRAV.TIME (min) 18.86 13.13 10.87 9.61 8.77 8.17 7.70 7.32 7.01 6.74 6.50 6.29 6.11 6.85 8.52 9.74 10.21 10.17 9.85 | |
| INFLOW : ID= 2 (05 OUTFLOW: ID= 1 (05 | | QPEAK (cms) | ograph> TPEAK R.V. (hrs) (mm) 1.58 8.44 1.67 8.44 | <-pipe / c MAX DEPTH (m) 1.66 1.54 | hannel-> MAX VEL (m/s) 1.16 1.21 |
| RESERVOIR (0482) | | Page 24 | | | |

| | | Creek Watersh | ed - Allowable | |
|--|---|--|--|------------------------------|
| IN= 2> OUT= DT= 5.0 min | OUTFLO (cms) .000 .259 .266 .272 | 0.1180 | (cms) .2910 .2970 1.6320 4.1680 | .3795 .4503 .5232 |
| | | | | |
| INFLOW : ID= OUTFLOW: ID= | 2 (0492) 1 (0482) | AREA QP (ha) (c 29.600 . 29.600 . | PEAK TPEAK ms) (hrs) 812 1.42 262 2.00 | R.V. (mm) 6.64 6.64 |
| | TIME SHIFT O MAXIMUM STO | F PEAK FLOW RAGE USED | (min)= 35 (ha.m.)= | .00 .0866 |
| | | | | |
| ADD HYD (0400 1 + 2 = 3 ID1= 1 + ID2= 2 | | EA QPEAK a) (cms) 10 .982 20 .292 | TPEAK R.V. (hrs) (mm) 2.25 6.43 1.42 1.17 | |
| | (0400): 227. | | | |
| | FLOWS DO NOT I | | | |
| | | | | |
| | | | | |
| ROUTE CHN (0403 IN= 2> OUT= |) 1 Routin | g time step (m | nin)'= 5.00 | |
| IN= 2> OUT= | 1 Routin stance El 100.00 110.00 135.00 142.00 148.00 156.00 | SECTION (1 evation 338.30 | 1)> Manning .0500 .0500 | n Channel |



| Hadati Creek Watershed - Allowable | | | | | | | |
|---|---|---|--|--|--|--|---|
| | <pre>< C Distance 100.00 120.00 126.00 130.00 140.00 142.00 150.00 155.00 160.00</pre> | 325. 324. 323. 323. 322. 322. 322. 323. | ion 40 60 90 00 30 .06 30 .03 90 | .0600 | | n Channel n Channel | |
| < DEPTH (m) .16 .33 .49 .65 .82 .98 1.14 1.31 1.47 1.63 1.79 1.96 2.12 2.28 2.45 2.61 2.77 2.94 3.10 | ELEV (m) 322.46 322.63 322.79 322.95 323.12 323.28 323.44 323.61 323.77 323.93 324.09 324.26 324.42 324.58 324.42 324.58 324.75 324.91 325.07 325.24 325.40 | VOLUME (cu.m.) .233E+03 .672E+03 .132E+04 .216E+04 .319E+04 .433E+04 .433E+04 .556E+04 .689E+04 .833E+04 .833E+04 .115E+05 .134E+05 .134E+05 .154E+05 .200E+05 .200E+05 .228E+05 .259E+05 .330E+05 | FLOW RATE (cms) .6 2.1 4.9 9.0 14.9 22.5 31.6 42.3 54.6 68.3 82.8 99.2 117.9 138.8 157.4 179.6 205.8 236.1 270.6 | E VELO (m 1 1 1 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 | CITY -96 -26 -48 -66 -87 -08 -27 -45 -62 -77 -87 -96 -15 -14 -15 -18 -23 -28 | TRAV.TIME (min) 6.96 5.27 4.51 4.03 3.57 3.21 2.93 2.72 2.54 2.41 2.33 2.25 2.18 2.11 2.12 2.11 2.09 2.07 2.03 | |
| INFLOW : OUTFLOW: | ID= 2 (043 ID= 1 (044 | AREA (ha) 30) 357.45 0) 357.45 | < hyc QPEAK (cms) .95 .72 | drograph TPEAK (hrs) 1.33 1.42 | > R.V. (mm) 5.75 5.75 | <-pipe / c MAX DEPTH (m) .20 .18 | hannel-> MAX VEL (m/s) 1.02 .98 |
| 3=== | 3 1 (0440): 2 (0475): | (ha) 357.45 48.70 | | (hrs) 1.42 1.42 ========= | (mm) 5.75 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 QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) ID1= 1 (0485): 406.15 1.820 1.42 5.86 Page 27 | | | | | | | |

Hadati Creek Watershed - Allowable + ID2= 2 (0480): 43.10 1.142 1.42 6.64 ___________ ID = 3 (0490): 449.25 2.9621.42 5.93 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0491) | 1 + 2 = 3 | AREA (ha) QPEAK TPEAK R.V. (cms) .262 (hrs) (mm) 29.60 ID1= 1 (0482): 6.64 2.00 + 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

 (ha.m.)
 (cms)

 .0000
 7.0800

 .0600
 8.1000

 .3400
 9.7980

 .6182
 10.4940

 1.1630
 11.6850

 1.7070
 12.3480

 _____ (cms) (ha.m.) .0000 2.4860 3.3240 4.6420 7.4397 .2760 1.2000 2.0400 2.6400 10.3000 3.1200 11.4000 AREA QPEAK (ha) (cms) 478.850 3.142 478.850 1.356 TPEAK R.V. (hrs) 1.42 2.00 (mm) INFLOW : ID= 2 (0491) OUTFLOW: ID= 1 (0483) 5.98 5.98 PEAK FLOW REDUCTION [Qout/Qin](%)= 43.16 TIME SHIFT OF PEAK FLOW (min)= 35.00 $(\min) = 35.00$ (ha.m.)= .3923 MAXIMUM STORAGE USED _____ ADD HYD (0530) 1 + 2 = 3 AREA R.V. (mm) QPEAK TPEAK QFEAK (ha) (cms) 4.63 .569 478.85 1.356 к.V. (mrs) (mm) 1.33 18.56 2.00 5 ID1= 1 (0540): + ID2= 2 (0483): ====== _____ _______ ID = 3 (0530):483.48 1.402 2.00 6.10 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0545) |

 2 = 3
 |
 AREA
 QPEAK
 TPEAK

 ID1= 1
 (0527):
 59.59
 2.796
 1.67

 + ID2= 2
 (0530):
 483.48
 1.402
 2.00

 1 + 2 = 3 R.V. _____ (mm) 8.44 6.10 Page 28

Hadati Creek Watershed - Allowable ID = 3 (0545);543.07 4.103 1.67 6.35 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0546) | 1 + 2 = 3

 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

 R.V. ------(mm) 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========= _____ 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 = 3ID = 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 Comments: 5 year SCS Type II 12hour design storm Ptotal= 53.41 mm TIME RAIN TIME RAIN TIME RAIN | TIME RAIN
 Mm/hr
 hrs
 mm/hr
 hrs</thr>
 1.34
 4.00
 <t mm/hr 1.34 1.34 hrs mm/hr 1.87 .25 .50 1.87 .75 1.87 1.87 1.00 1.07 1.25 1.50 1.07 1.75 1.34 4.75 1.07

Page 29

| 2.00 2.25 2.50 2.75 3.00 | $1.34 \\ 1.60$ | 5.00 5.25 5.50 5.75 | 4.27 6.41 6.41 25.64 70.50 | d - Allow 8.00 8.25 8.50 8.75 9.00 | 3.20 1.87 1.87 1.87 1.87 1.87 | | 1.07 1.07 1.07 1.07 1.07 |
|---|--|---|---|---|---|--|---|
| CALIB STANDHYD (0544) ID= 1 DT= 5.0 min | Area Total In | (ha)= np(%)= { | 1.13 30.00 I | Dir. Conr | n.(%)= 7 | 79.00 | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOU .90 1.50 .55 50.00 .013 | JS PEI | RVIOUS (i .23 5.00 .55 40.00 .300 |) | | |
| NOTE: RAINFA | LL WAS T | RANSFORM | ED TO | 5.0 MIN. | TIME ST | EP. | |
| TIME hrs .083 .167 .250 .333 .417 .500 .583 .667 .750 .833 .917 1.000 1.083 1.167 1.250 1.333 1.417 1.500 1.583 1.667 1.750 1.833 1.917 2.000 2.083 2.167 2.250 2.333 2.417 2.500 2.583 2.667 2.750 2.583 2.667 2.750 2.833 2.917 3.000 | 1.34 1.34 1.34 1.34 1.34 1.34 1.34 1.34 1.34 1.34 1.34 1.34 1.34 1.34 1.34 1.34 1.34 1.34 1.34 | TIME hrs 3.083 3.167 3.250 3.333 3.417 3.500 3.583 3.667 3.750 3.833 3.917 4.000 4.083 4.167 4.250 4.333 | RAIN mm/hr 2.14 2.14 2.14 2.14 2.14 2.14 2.14 2.14 | hrs 6.083 6.167 6.250 6.333 6.417 6.500 6.583 6.667 6.750 6.833 6.917 7.000 7.083 7.167 7.250 7.333 | RAIN mm/hr 9.61 9.61 9.61 9.61 9.61 4.27 4.27 4.27 4.27 4.27 3.20 3.20 3.20 3.20 | TIME hrs 9.08 9.17 9.25 9.33 9.42 9.50 9.58 9.67 9.75 9.83 9.92 10.00 10.08 10.17 10.25 10.33 | RAIN mm/hr 1.87 1.87 1.87 1.87 1.87 1.87 1.87 1.87 |

| Hadati Creek Watershed - Allowable 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 $(cms) = .30 .05$ 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: F0 $(mm/hr) = 75.00 K (1/hr) = 4.14$ 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. | | | | | | |
|---|--|--|--|--|--|--|
| (111) 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 | | | | | | |
| IMPERVIOUSPERVIOUS (i)Surface Area $(ha) =$ 11.99 3.00 Dep. Storage $(mm) =$ 1.50 5.00 Average Slope $(\%) =$.55.55Length $(m) =$ 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 (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 Page 31 | | | | | | |

Hadati Creek Watershed - Allowable (%)= .55 .55 Average Slope 350.00 40.00 Length (m)= .013 Mannings n -----. 300

 Imax.ETT.Inten.(mm/hr)=
 70.50

 over (min)
 5.00

 Storage Coeff. (min)=
 7.45 (ii)

 Unit Hyd. Tpeak (min)=
 5.00

 Unit Hyd. peak (cms)=
 17

 30.06 30.00 26.21 (ii) 30.00 .04 *TOTALS* CCMS)=3.56RUNOFF VOLUME(hrs)=RUNOFF VOLUME(mm)=TOTAL RAINFALL(mm)=S3.41RUNOFF COEFFICIENT97 .19 6.33 9.54 3.608 (iii) 6.00 43.01 53.41 53.41 .81 .18 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. ----------------CALTB STANDHYD (0510) ID= 1 DT= 5.0 min Area (ha)= 16.00 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 IMPERVIOUS PERVIOUS (i) $\begin{array}{cccc} (ha) = & 12.00 \\ (mm) = & 1.50 \\ (\%) = & .50 \\ (m) = & 400.00 \\ - & .013 \end{array}$ Surface Area (ha) =12.80 3.20 Dep. Storage 5.00 Average Slope 40.00 Length . 300 Mannings n Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= .13 70.50 10.00 10.00 10.00 .13 20.04 40.00 38.19 (ii) 40.00 .03 (cms)= 2.06 (hrs)= 6.00 (mm)= 51.91 (mm)= 53.41 ENT = 07 *TOTALS* .09 6.50 9.54 2.080 (iii) PEAK FLOW TIME TO PEAK 6.00 RUNOFF VOLUME 43.01 53.41 TOTAL RAINFALL 53.41 RUNOFF COEFFICIENT = .18 .81 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00FO FC (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 Page 32

| 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)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= 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 (0540) Area (ha)= 4.63 ID= 1 DT= 5.0 min Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 | | | | | | | |
| IMPERVIOUSPERVIOUS (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)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= TOTALS* 30.06 25.00 | | | | | | | |
| 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 | | | | | | | |
| <pre>***** 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.</pre> | | | | | | | |

| CALIB | Hadat | ti Creek Wat | ershed - Allowable | e | | | |
|---|---|--|---|---|--|--|--|
| STANDHYD (0484) ID= 1 DT= 5.0 min | | | |)= 21.00 | | | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 5.29 1.50 2.00 680.00 .013 | 7.31 5.00 2.00 40.00 .300 | | | | |
| | | | 81.70 20.00 i) 16.07 (ii) 20.00 .06 | *TOTALS* | | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .44 6.00 51.91 53.41 .97 | .75 6.17 14.24 53.41 .27 | 1.055 (iii) 6.08 22 15 | | | |
| Fo (mn Fc (mn (ii) TIME STEF | 1/hr)= 75.0 1/hr)= 12.5 9 (DT) SHOU STORAGE CO |)0 50 Cum.I JLD BE SMALL DEFFICIENT. | | | | | |
| CALIB STANDHYD (0565) ID= 1 DT= 5.0 min | Area Total 1 | (ha)= 11. [mp(%)= 42. | 10 00 Dir. Conn.(% |)= 21.00 | | | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 4.66 1.50 2.00 680.00 .013 | PERVIOUS (i) 6.44 5.00 2.00 40.00 .300 | | | | |
| Max.Eff.Inten.(| (mm/hr)= (min) (min)= (min)= | 70.50 10.00 7.54 (i 10.00 .13 | 81.70 20.00 | *TOTALS* | | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .39 6.00 51.91 53.41 .97 | .66 6.17 14.24 53.41 .27 | .929 (iii) 6.08 22.15 53.41 .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. Page 34 | | | | | | | |

-----CALIB STANDHYD (0481) ID= 1 DT= 5.0 min Area (ha)= 5.90 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 IMPERVIOUS PERVIOUS (i) 2.48 1.50 2.00 680.00 (ha)= Surface Area 3.42 Average Slope (%)= 5.00 2.00 (m) =40.00 Mannings n .013 = . 300 Max.Eff.Inten.(mm/hr)= 70.50 81.70 10.00 20.00 7.54 (ii) 16.07 (ii) 10.00 20.00 over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= .13 .06 (cms)= .21 RUNOFF VOLUME (hrs)= 6.00 RUNOFF VOLUME (mm)= 51.91 TOTAL RAINFALL (mm)= 53.41 RUNOFF COEFFICIENT = .97 ***TOTALS*** .494 (iii) .35 6.17 14.24 53.41 6.08 22.15 53.41 .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 (0410) | |ID= 1 DT= 5.0 min | Area (ha)= 24.20 Total Imp(%)= 42.00 Dir. Conn. (%) = 21.00______ IMPERVIOUS PERVIOUS (i) 10.16 Surface Area (ha) =14.04 $\begin{array}{c} \text{(mm)} = & 1.50 \\ \text{(\%)} = & 2.00 \\ \text{(m)} = & 401.00 \\ \end{array}$ (mm)= Dep. Storage 5.00 2.00 Average Slope (%)= Length 40.00 .013 Mannings n . 300 -/0.50 5.00 5.49 (ii) 5.00 _20 Max.Eff.Inten.(mm/hr)= 81.70 15.00 over (min) Storage Coeff. 14.03 (ii) (min) =Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .08 RUNOFF VOLUME (mm) = 51.91 TOTAL RAINFALL (mm) = 53.41 RUNOFF COEFFICIENT = 07 *TOTALS* $\begin{array}{c} 1.66\\ 6.08\end{array}$ 2.307 (iii) 6.00 14.24 53.41 27 22.15 53.41 .27 .41 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (mm/hr) = 12.50 Cum.Inf. (mm) = .00Page 35

Hadati Creek Watershed - Allowable (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) |ID= 1 DT= 5.0 min | (ha) = 4.99Area Total Imp(%) = 42.00Dir. Conn.(%)= 21.00 -----IMPERVIOUS IMPERVICE 2.10 1.50 2.86 185.00 .013 PERVIOUS (i) (ha) =Surface Area 2.89 5.00 Dep. Storage (mm) =Average Slope (%)= Length (m)= 40.00 Mannings n .300 Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 70.50 5.00 15.00 10.77 (ii) 10.77 (ii) 15.00 10.77 ***TOTALS*** .20 6.00 51 01 .39 6.08 PEAK FLOW (cms)= .532 (iii) TIME TO PEAK (hrs) =6.00 51.91 RUNOFF VOLUME (mm)= 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) = 4.14Fc (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(%) = 42.00Dir. Conn.(%) = 21.00_____ IMPERVIOUS PERVIOUS (i) 7.98 1.50 2.00 365.00 .013 Surface Area (ha) =11.02 5.00 Dep. Storage (mm) =Average Slope (%)= 2.00 40.00 Length (m) =Mannings n .013 .300 $\begin{array}{ccc} & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & \\ &$ 81.70 15.00 13.73 (ii) 15.00 .08 ***TOTALS*** 1.32 6.08 1.831 (iii) 6.00 14.24 22.15 53.41 53.41 .27 .41

Hadati Creek Watershed - Allowable (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 75.00FO (mm/hr) = 12.50FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALIB STANDHYD (0101) ID= 1 DT= 5.0 min Area (ha)= 16.32 Total Imp(%)= 42.00 Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =6.85 9.47 Dep. Storage (mm) =1.50 5.00 Average Slope (%)= 2.00 2.00 309.00 Length (m) =40.00 Mannings n .013 .300 = 81.70 Max.Eff.Inten.(mm/hr)= 70.50 5.00 over (min) 15.00 4.70 (ii) 13.23 (ii) Storage Coeff. (min) =Unit Hyd. Tpeak (min)= 5.00 15.00 Unit Hyd. peak (cms)= .08 .22 *TOTALS* .65 6.00 PEAK FLOW (cms) =1.15 1.601 (iii) TIME TO PEAK (hrs) =6.08 6.00 RUNOFF VOLUME 51.91 (mm) =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: (mm/hr) = 75.00FO K (1/hr) = 4.14(mm/hr) = 12.50FC Cum.Inf. .00 (mm)= (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(%) = 42.00Dir. Conn.(%)= 21.00 ______ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =6.01 8.31 Dep. Storage 1.50 5.00 (mm) =Average Slope (%)= 2.00 2.00 Length (m)= 287.00 40.00 Mannings n .013 _ . 300 81.70 Max.Eff.Inten.(mm/hr)= 70.50 5.00 over (min) 15.00 Storage Coeff. (min) =4.49 (ii) 13.03 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 5.00 15.00 .23 .08 ***TOTALS*** 1.02 PEAK FLOW (cms) =.58 1.415 (iii) TIME TO PEAK (hrs)= 6.00 6.08 6.00 Page 37

Hadati Creek Watershed - Allowable 51.91 RUNOFF VOLUME (mm) =14.24 22.15 TOTAL RAINFALL (mm)= 53.41 53.41 53.41 .97 RUNOFF COEFFICIENT .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) = 4.14Fc (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. _____ CALTR STANDHYD (0105) Area (ha)= 51.32 |ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) $21.55 \\ 1.50$ 29.77 Surface Area (ha) =5.00 Dep. Storage (mm) =2.00 Average Slope (%)= Length 550.00 (m) =40.00 Mannings n .013 . 300 -7<u>0</u>.50 Max.Eff.Inten.(mm/hr)= 81.70 5.00 6.64 5.00 20.00 over (min) Storage Coeff. (min)= 6.64 (ii) 15.17 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 20.00 .18 .07 *TOTALS* PEAK FLOW 1.96 (cms) =3.14 3.870 (iii) 6.00 TIME TO PEAK (hrs) =6.17 6.08 51.91 22.15 RUNOFF VOLUME (mm)= 14.24 53.41 TOTAL RAINFALL (mm)= 53.41 53.41 RUNOFF COEFFICIENT = .97 .27 .41 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00K (1/hr)= 4.14 Cum.Inf. (mm)= .00 FO (mm/hr) = 12.50FC (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) | ID= 1 DT= 5.0 min | (ha)= 117.50 Area Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) 49.35 Surface Area (ha) =68.15 1.50 5.00 (mm) =Dep. Storage 2.00 Average Slope (%)= Length (m) =885.00 40.00 Mannings n .013 .300 70.50 10.00 8.83 (ii) 10.00 Max.Eff.Inten.(mm/hr)= 81.70 over (min) 20.00 Storage Coeff. (min)= 17.37 (ii) Unit Hyd. Tpeak (min)= 20.00

Page 38

Hadati Creek Watershed - Allowable Unit Hyd. peak (cms)= .12 .06 ***TOTALS*** (cms)= PEAK FLOW 3.95 9.481 (iii) 6.70 6.00 51.91 TIME TO PEAK (hrs) =6.17 6.08 RUNOFF VOLUME (mm) =14.24 22.15 53.41 TOTAL RAINFALL (mm) =53.41 53.41 RUNOFF COEFFICIENT = .97 .27 .41 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00K (1/hr)= 4.14 Cum.Inf. (mm)= .00 FO FC (mm/hr) = 12.50(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 Total Imp(%)= 42.00 |ID= 1 DT= 5.0 min | Dir. Conn.(%)= 21.00 IMPERVIOUS PERVIOUS (i) Surface Area (ha) =5.17 7.13 Dep. Storage 1.50 5.00 (mm) =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 5.00 over (min) 15.00 13.92 (ii) Storage Coeff. 4.79 (ii) (min) =5.00 Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .22 .08 *TOTALS* .49 6.00 .85 PEAK FLOW 1.183 (iii) (cms) =6.08 TIME TO PEAK (hrs) =6.00 (mm)= RUNOFF VOLUME 51.91 22.15 14.24 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: K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 75.00FO (mm/hr) = 12.50FC (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) = 16.30ID= 1 DT= 5.0 min Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) (ha) =Surface Area 6.85 9.45 5.00 Dep. Storage (mm) =1.50 Average Slope (%)= 1.00 1.00 330.00 Lenath 40.00 (m)= Mannings n .300 .013 =

| | $\begin{array}{llllllllllllllllllllllllllllllllllll$ | 77.46 20.00 16.75 (ii) 20.00 .06 | TOTALS* 1.186 (iii) 6.00 22.15 53.41 .41 |
|--|--|--|---|
| Fo (mm/hr)= Fc (mm/hr)= (ii) TIME STEP (DT) THAN THE STOR/ | ION SELECTED FOR PERV = 75.00 K = 12.50 Cum.Inf.) SHOULD BE SMALLER O AGE COEFFICIENT. S NOT INCLUDE BASEFLO | (1/hr)= 4.14 (mm)= .00 R EQUAL | |
| CALIB STANDHYD (0360) AI ID= 1 DT= 5.0 min To | rea (ha)= 30.00 otal Imp(%)= 37.00 | Dir. Conn.(%)= | 19.00 |
| | $\begin{array}{llllllllllllllllllllllllllllllllllll$ | | |
| | r)= 70.50 n) 5.00 n)= 5.86 (ii) n)= 5.00 s)= .20 | 75.96 15.00 14.65 (ii) 15.00 .08 | TOTALS* |
| PEAK FLOW (cms TIME TO PEAK (hrs RUNOFF VOLUME (mr TOTAL RAINFALL (mr RUNOFF COEFFICIENT | n)= 53.41 | 1.94 6.08 13.31 53.41 .25 | 2.582 (iii) 6.00 20.64 53.41 .39 |
| ***** WARNING:FOR AREAS WYOU SHOULD | WITH IMPERVIOUS RATIO CONSIDER SPLITTING T | | |
| Fo (mm/hr)= Fc (mm/hr)= (ii) TIME STEP (DT) THAN THE STOR | ION SELECTED FOR PERV = 75.00 K = 12.50 Cum.Inf.) SHOULD BE SMALLER O AGE COEFFICIENT. S NOT INCLUDE BASEFLO | (1/hr)= 4.14 (mm)= .00 R EQUAL | |
| CALIB STANDHYD (0395) AI ID= 1 DT= 5.0 min To | rea (ha)= 51.20 otal Imp(%)= 10.00 | Dir. Conn.(%)= | 5.00 |
| Surface Area (ha | IMPERVIOUS P a)= 5.12 Page 4(| 46.08 | |

Hadati Creek Watershed - Allowable (mm)= 1.50 Dep. Storage 5.00 2.00 2.00 Average Slope (%)= 900.00 Length (m) =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* .41 6.00 2.36 PEAK FLOW (cms) =2.601 (iii) (hrs)= TIME TO PEAK 6.25 6.17 51.91 RUNOFF VOLUME (mm) =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) = 4.14Fc (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 Area (ha)= 12.70 Total Imp(%)= 42.00 STANDHYD (0455) ID= 1 DT= 5.0 min Dir. Conn.(%)= 21.00 . ______ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =5.33 7.37 1.50 5.00 Dep. Storage (mm) =Average Slope (%)= 1.711.71 300.00 Length (m) =40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 70.50 81.70 5.00 15.00 over (min) Storage Coeff. (min) =4.84 (ii) 13.78 (ii) 15.00 Unit Hyd. Tpeak (min)= 5.00 Unit Hyd. peak (cms)= .22 .08 *TOTALS* .51 6.00 PEAK FLOW (cms) =.88 1.226 (iii) 6.08 TIME TO PEAK (hrs) =6.00 RUNOFF VOLUME (mm) =51.91 14.24 22.15 TOTAL RAINFALL 53.41 (mm) =53.41 53.41 RUNOFF COEFFICIENT .97 .27 = .41 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14Fo (mm/hr) = 12.50Cum.Inf. (mm)= FC .00 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| CALIB | Hadati | Creek Waters | shed - Allowable | | | | |
|---|---|--|--|--|--|--|--|
| STANDHYD (0460) ID= 1 DT= 5.0 min | Area (Total Imp | (ha) = 36.00 (%) = 42.00 | Dir. Conn.(%)= | = 21.00 | | | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IPERVIOUS 15.12 1.50 2.03 465.00 .013 | PERVIOUS (i) 20.88 5.00 2.03 40.00 .300 | | | | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | mm/hr)= (min) (min)= (min)= (cms)= | 70.50 5.00 5.97 (ii) 5.00 .19 | 81.70 15.00 14.47 (ii) 15.00 .08 | 'TOTALS* | | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | 1.40 6.00 51.91 53.41 .97 | 2.42 6.08 14.24 53.41 .27 | 3.376 (iii) 6.00 22.15 53.41 .41 | | | |
| Fo (mm Fc (mm (ii) TIME STEF | /hr)= 75.00 /hr)= 12.50 (DT) SHOULD STORAGE COEF | K Cum.Inf BE SMALLER FICIENT. | • | | | | |
| CALIB STANDHYD (0480) ID= 1 DT= 5.0 min | Area (Total Imp | (%)= 43.10 (%)= 42.00 | Dir. Conn.(%)= | = 21.00 | | | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= | IPERVIOUS 18.10 1.50 2.00 680.00 .013 | PERVIOUS (i) 25.00 5.00 2.00 40.00 .300 | | | | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | (min) (min)= (min)= | 70.50 10.00 7.54 (ii) 10.00 .13 | 81.70 20.00 16.07 (ii) 20.00 .06 | *TOTALS* | | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | 1.52 6.00 51.91 53.41 .97 | 2.56 6.17 14.24 53.41 .27 | 3.608 (iii) 6.08 22.15 53.41 .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. Page 42 | | | | | | | |

AREA (ha)= .00 QPEAK (cms)= .00 TPEAK (hrs)= .00 VOLUME (mm)=****** STORE HYD (0525) | ID= 1 DT=****min _____ DUHYD (0505) Inlet Cap.=9.000 | #of Inlets= 1 | | Total(cms)= 9.0 | tal(cms)=9.0AREAQPEAKTPEAKTOTAL HYD.(ID=1):244.0014.476.25 R.V. (mm) 6.25 24.12 MAJOR SYS.(ID= 2): 33.53 5.47 MINOR SYS.(ID= 3): 210.47 9.00 6.25 24.12 6.00 24.12 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0566) | 1 + 2 = 3______ ID = 3 (0566): 23.70 1.984 6.08 22.15 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0420) | AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)24.202.3076.0022.15 1 + 2 = 3ID1= 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 STORAGE | OUTFLOW (ha.m.) | (cms) .0000 | 1.0000 .0100 | 20.0000 .1000 | .0000 | DT= 5.0 min | OUTFLOW STORAGE ---------------(cms) (ha.m.) 1.0000 .0000 1.1000 .0100 .0120 .0000 AREA
(ha)QPEAK
(cms)TPEAK
(hrs)R.V.
(mm)INFLOW : ID= 2 (0110)19.0001.8316.0022.15OUTFLOW: ID= 1 (0111)19.000.2386.5822.14

Hadati Creek Watershed - Allowable PEAKFLOWREDUCTION[Qout/Qin](%)=12.98TIME SHIFT OF PEAK FLOW(min)=35.00MAXIMUMSTORAGEUSED(ha.m.)=.3060 ADD HYD (0103) 1 + 2 = 3------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 | OUTFLOWSTORAGEOUTFLOWSTORAGE(cms)(ha.m.)(cms)(ha.m.).0000.0000.5000.4000.0100.01006.6000.8000.0260.2300.0000.0000 DT= 5.0 min | ------.4000 .8000 .0000 AREA
(ha)QPEAK
(cms)TPEAK
(hrs)R.V.
(mm)INFLOW:ID= 2 (0105)51.3203.8706.0822.15OUTFLOW:ID= 1 (0106)51.3202.7316.3322.14 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

 .26
 .0300

 .15
 .0300 / .0150

 .00
 .0150

 .09
 .0150

 .00
 .0150

 Main Channel

 .09
 .0150

 .0150
 Main Channel

 .00
 .0150

 Main Channel

 .02
 .0150

 Main Channel

 .030
 .0150

 .0300
 Main Channel

 .15
 .0150 / .0300

 .26
 .0300

 .00 5.50 5.51 10.00 14.49 14.50 20.00 <---->

 Construction
 TRAVEL
 TIME
 TABLE
 Construction
 TRAV.TIME

 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

 .3 .4 .6 Page 44

| .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | .14 .90 |)4E+03)4E+04 L9E+04 35E+04 54E+04 75E+04 23E+04 23E+04 50E+04 79E+04 | .8 1.0 1.2 1.4 1.7 2.0 2.3 2.6 3.0 3.4 | d - Allowable .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 | 16.57 15.71 15.10 14.65 14.31 14.04 13.82 13.65 | |
|--|---|--|---|---|---|--|
| INFLOW : OUTFLOW: | ID= 2 (0355) ID= 1 (0358) | AREA (ha) 12.30 12.30 | < hydr QPEAK (cms) 1.18 .74 | ograph> TPEAK R.V. (hrs) (mm) 6.00 22.15 6.17 22.10 | <-pipe / cl MAX DEPTH (m) .16 .13 | 1annel-> MAX VEL (m/s) 1.10 .92 |
| ROUTE CHN ((IN= 2> OU |)353) JT= 1 RC | outing ti | me step (mi | n)'= 5.00 | | |
| | | Elevat | ion M 26 15 .030 00 09 00 15 .015 26 | anning .0300 0 / .0150 Mai .0150 Mai .0150 Mai .0150 Mai 0 / .0300 Mai .0300 | | |
| < DEPTH (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | ELEV (m) (c (m) (c .01 .92 .03 .37 .04 .83 .05 .14 .07 .23 .08 .33 .10 .45 .11 .57 .12 .69 .14 .82 .15 .94 .16 .10 .18 .12 .19 .14 .20 .15 .22 .18 .23 .20 .25 .22 | /OLUME cu.m.) 29E+01 72E+02 36E+02 49E+03 32E+03 34E+03 | FLOW RATE (cms) .0 .0 .1 .1 .1 .2 .3 .4 .6 .8 1.0 1.2 1.4 1.7 2.0 2.3 2.6 3.0 3.4 | .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 | TRAV.TIME (min) 99.56 62.72 47.86 39.51 34.05 30.15 26.24 22.41 19.75 17.76 16.22 15.07 14.28 13.72 13.31 13.01 12.76 12.57 12.41 | |
| INFLOW : OUTFLOW: | ID= 2 (0350) ID= 1 (0353) | AREA (ha) 16.30 16.30 | QPEAK | ograph> TPEAK R.V. (hrs) (mm) 6.00 22.15 6.25 22.11 | <-pipe / cl MAX DEPTH (m) .16 .15 | hannel-> MAX VEL (m/s) 1.10 1.02 |

| Hadati Creek Watershed - Allowable |
|---|
| ROUTE CHN (0362) IN= 2> OUT= 1 Routing time step (min)'= 5.00 |
| < DATA FOR SECTION (|
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ |
| <pre>< 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</pre> |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ |
| NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. |
| $\begin{vmatrix} ADD HYD & (0515) \\ 1 + 2 = 3 \end{vmatrix}$ AREA QPEAK TPEAK R.V. Page 46 |

| | | Hadati Cre | ek Watersh (cms) | | | | |
|---------------------------------|--|--|---|---|--------------------------------------|--|-----------------------|
| ID1= + ID2= | = 1 (0510) = 2 (0505) | 16.00 210.47 | 2.080 | 6.00 | (mm) 43.01 24.12 | | |
| | | 226.47 | | | | | |
| | | O NOT INCLU | | | | | |
| | | | | | | | |
| ROUTE CHN (0 IN= 2> 0 | 0564) UT= 1 | Routing ti | me step (m | in)'= 5. | 00 | | |
| | < [Distance .00 1.00 1.50 2.00 3.50 4.50 6.00 | DATA FOR SEC Elevat 101. 100. 100. 99. 99. 100. 101. | TION (1 ion 50 70 55 .05 50 60 65 .03 45 | .1) Manning .0500 .0500 00 / .030 .0300 .0300 00 / .050 .0500 | -> Main Main Main 0 Main | Channe] Channe] Channe] Channe] | |
| < DEPTH (m) .10 .19 | ELEV (m) 99.60 99.69 | TRAVEL VOLUME (cu.m.) .353E+02 .112E+03 .195E+03 .285E+03 .381E+03 .484E+03 .594E+03 .594E+03 .710E+04 .10E+04 .127E+04 .148E+04 .170E+04 .221E+04 .250E+04 .250E+04 .250E+04 | TIME TABL FLOW RATE (cms) .0 | E VELOC (m/ | ITY T s) 19 37 | > RAV.TIME (min) 43.69 22.76 | |
| . 29 . 38 . 48 | 99.79 99.88 99.98 | .195E+03 .285E+03 .381E+03 | .2 .3 .5 | | 49 59 67 | 17.03 14.23 12.51 | |
| .57 .67 .76 | 100.07 100.17 100.26 | .484E+03 .594E+03 .710E+03 | .7 .9 1.2 | • | 74 80 86 | 11.32 10.43 9.74 | |
| .86 .95 1.05 | 100.36 100.45 100.55 | .832E+03 .961E+03 .110E+04 | 1.5 1.8 2.2 | 1. | 91 96 00 | 9.18 8.72 8.32 | |
| $1.16 \\ 1.28 \\ 1.39$ | 100.66 100.78 100.89 | .127E+04 .148E+04 170E+04 | 2.7 3.4 4 1 | 1. 1. 1 | 07 14 20 | 7.80 7.31 | |
| 1.50 1.61 | 101.00 101.11 | .195E+04 .221E+04 | 4.9 | 1. 1. 1. | 25 30 | 6.65 6.41 | |
| 1.72 1.84 1.95 | 101.22 101.34 101.45 | .250E+04 .280E+04 .313E+04 | 6.7 7.7 8.8 | 1. 1. 1. | 50 | 6.22 6.04 5.90 | |
| | | AREA | < hyd | rograph - TPEAK | > | <-pipe / cl MAX DEPTH | nannel-> MAX VEL |
| INFLOW : OUTFLOW: | ID= 2 (050 ID= 1 (050 | (ha) | (cms) 5.47 4.91 | (hrs) | (mm) | (m) 1.58 1.50 | (m/s) 1.28 1.25 |
| | | | | | | | |
| ROUTE CHN (0 IN= 2> O | | Routing ti | me step (m | in)'= 5. | 00 | | |
| | Distance | | ion | Manning | -> | | |
| | .00 2.00 4.00 | | 00 50 00 .03 | .0350 .0350 50 / .035 | 0 Main | Channel | |
| | | | Page 47 | | | | |

| | 4.50 5.00 7.00 9.00 | Hadati Cre 1. | ek Watersh 00 00 .03 50 00 | ed - Allowab .0350 50 / .0350 .0350 .0350 | le Main Channel Main Channel | |
|--|--|---|--|---|---|---|
| < DEPT (m) .05 .11 .16 .21 .26 .32 .37 .42 .47 .53 .58 .63 .68 .74 .79 .84 .89 .95 1.00 | H ELEV (m) .05 .11 .20 .21 .26 .32 .37 .42 .47 .53 .58 .63 .68 .68 .74 .79 .84 .89 .95 | VOLUME (cu.m.) .573E+01 .135E+02 .232E+02 .349E+02 .486E+02 .643E+02 .820E+02 .102E+03 .123E+03 .147E+03 .173E+03 .200E+03 .230E+03 .262E+03 .331E+03 .331E+03 .369E+03 .408E+03 .450E+03 | FLOW RATE (cms) .0 .1 .3 .9 1.2 1.7 2.2 2.9 3.6 4.4 5.4 6.4 7.6 8.9 10.3 11.8 13.5 15.2 | VELOCITY (m/s) .67 .99 1.23 1.42 1.58 1.73 1.86 1.98 2.10 2.21 2.31 2.42 2.51 2.61 2.70 2.79 2.88 2.97 3.05 | .58 .56 .54 .52 .51 .49 | |
| INFLOW OUTFLO | : ID= 2 (05 N: ID= 1 (05 | AREA (ha) 66) 23.70 63) 23.70 | < hyd QPEAK (cms) 1.98 1.97 | rograph> TPEAK R.V. (hrs) (mm) 6.08 22.15 6.08 22.15 | <pre><-pipe / MAX DEPTH (m)</pre> | channel-> MAX VEL (m/s) 1.92 1.92 |
| TOTAL I | .=1.980 s= 1)= 2.0 HYD.(ID= 1): | (ha) 29.19 ======== | 2.84 | (hrs) (mm) 6.00 22.19 |) 5 = | |
| | SYS.(ID= 2): SYS.(ID= 3): PEAK FLOWS | | | 6.00 22.19 6.00 22.19 WS IF ANY. | | |
| RESERVOIR IN= 2> DT= 5.0 r | OUT= 1 | OUTFLOW (cms) .0000 .0100 .0150 | (ha.m.) | OUTFLOW (cms) 1.0000 10.0000 .0000 | STORAGE (ha.m.) .5000 .6000 .0000 | |
| INFLOW OUTFLOW | : ID= 2 (010 N: ID= 1 (010 | (h | EA QP a) (c 40 3. 40 . Page 48 | ms) (hr 016 6 801 6 | EAK R.V rs) (mm 00 22. 42 22. |) 15 |

Hadati Creek Watershed - Allowable REDUCTION [Qout/Qin](%)= 26.57 PEAK FLOW TIME SHIFT OF PEAK FLOW (min) = 25.00MAXIMUM STORAGE USED (ha.m.)= .4263 ADD HYD (0359) 1 + 2 = 3R.V. (mm) AREA QPEAK TPEAK ------(ha) (cms) (hrs) ID1= 1 (0358): + ID2= 2 (0353): .744 12.30 22.10 6.17 .952 16.30 22.11 6.25 == ID = 3 (0359):28.60 1.680 6.25 22.11 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ______ _____ ADD HYD (0363) | QPEAK (cms) 1 + 2 = 3AREA TPEAK R.V. (mm) (ha) (hrs) ID1= 1 (0359): + ID2= 2 (0362): 28.60 22.11 28.60 1.680 6.25 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 QPEAK (cms) AREA TPEAK R.V. (ha) (hrs) _____ (mm) ID1= 1 (0465): 48.70 4.602 + ID2= 2 (0425): 2.28 .859 6.00 22.15 6.00 22.15 _____ _____ _____ ID = 3 (0470):50.98 5.461 6.00 22.15 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ (0520) DUHYD Inlet Cap.=3.050 #of Inlets= 1 | Total(cms)= 3.0 | R.V. QPEAK AREA TPEAK (cms) (hrs) --------(ha) (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 PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. NOTE: ROUTE CHN (0561) IN= 2---> OUT= 1 Routing time step (min)' = 5.00

| | < Distance .00 2.00 4.00 4.50 5.00 7.00 9.00 | DATA FOR SE Eleva | eek Watersh CTION (1 tion .00 .50 .00 .03 .00 .03 .50 .00 | .1) Manning | > | n Channel n Channel n Channel | |
|--|---|--|--|---|--|---|--|
| DEPTH (m) .05 .11 .16 .21 .26 .32 .37 .42 .47 .53 .58 .63 .68 .74 .79 .84 .89 .95 1.00 | ELEV (m) .05 .11 .26 .32 .37 .42 .47 .53 .58 .63 .68 .74 .79 .84 .89 .95 1.00 | .357E+02 .456E+02 .565E+02 .686E+02 .817E+02 .960E+02 .111E+03 .128E+03 .145E+03 .164E+03 .184E+03 .184E+03 .205E+03 .227E+03 .250E+03 | FLOW RATE (cms) .1 .2 .4 .7 1.0 1.5 2.0 2.6 3.4 4.2 5.1 6.2 7.3 8.6 10.0 11.6 13.2 15.0 17.0 | VEL (| OCITY m/s) .87 1.26 1.54 1.75 1.93 2.08 2.22 2.34 2.46 2.57 2.68 2.78 2.57 2.68 2.78 2.87 2.97 3.06 3.14 3.23 3.31 3.40 | TRAV.TIME (min) .95 .66 .54 .48 .43 .40 .38 .36 .34 .32 .31 .30 .29 .28 .27 .27 .26 .25 .25 | |
| INFLOW : OUTFLOW: | ID= 2 (05) ID= 1 (05) | AREA (ha) 53) 23.70 51) 23.70 | < hyd QPEAK (cms) 1.97 1.95 | rograph TPEAK (hrs) 6.08 6.08 | > R.V. (mm) 22.15 22.15 | <-pipe / c MAX DEPTH (m) .36 .36 | hannel-> MAX VEL (m/s) 2.20 2.20 |
| + ID2 === ID | 3 = 1 (0111) = 2 (0104) = 3 (0114) | AREA (ha) : 19.00 : 30.64 : 49.64 CO NOT INCL | 1.029 | 6.50 | R.V. (mm) 22.14 22.14 22.14 22.14 NY. | | |
| + ID2 === | 3 = 1 (0365) = 2 (0363) | | 9.481 3.649 | TPEAK (hrs) 6.08 6.17 6.17 | R.V. (mm) 22.15 21.35 21.88 | | |

Hadati Creek Watershed - Allowable

| ROUTE CHN (IN= 2> O | UT= 1 Distance 100.00 115.00 120.00 122.00 138.00 148.00 154.00 164.00 | 320. 321. 322. 323. 324. | CTION (50 60 60 80 80 60 30 10 60 | 1.1) Manning .0500 .0500 500 / .03 .0500 .0500 .0500 .0500 .0500 | > 300 Mai 500 Mai | n Channel n Channel | |
|--|---|---|---|---|--|--|--|
| 1.00 1.20 1.40 1.60 1.80 2.00 2.20 2.40 2.60 2.80 3.00 3.20 3.40 | ELEV (m) 321.00 321.20 321.40 321.60 321.60 321.80 322.00 322.20 322.40 322.60 322.60 323.00 323.00 323.20 323.40 323.60 323.60 323.80 324.00 324.00 324.20 | TRAVEL VOLUME (cu.m.) .398E+03 .125E+04 .255E+04 .430E+04 .644E+04 .892E+04 .117E+05 .148E+05 .182E+05 .218E+05 .256E+05 .382E+05 .382E+05 .428E+05 .526E+05 .578E+05 .632E+05 | FLOW RATH (cms) .8 3.3 8.1 15.6 26.8 41.2 59.3 81.9 109.1 140.2 175.3 214.7 258.6 306.7 359.1 416.0 477.5 543.5 614.3 | | DCITY n/s) .84 L.13 L.36 L.79 L.99 2.17 2.37 2.58 2.77 2.58 2.77 2.95 3.12 3.29 3.46 3.61 3.76 3.91 4.05 4.18 | 4.01 3.61 3.30 2.78 2.59 2.43 2.29 2.18 2.07 1.98 1.91 1.83 1.77 1.71 | |
| INFLOW : OUTFLOW: | ID= 2 (04 ID= 1 (04 | AREA (ha) 70) 50.98 75) 50.98 | < hyd QPEAK (cms) 5.46 4.60 | drograph TPEAK (hrs) 6.00 6.08 | > R.V. (mm) 22.15 22.15 | <-pipe / c MAX DEPTH (m) .49 .45 | hannel-> MAX VEL (m/s) 1.23 1.19 |
| + ID2= | | : .00 | QPEAK (cms) 8.030 .001 8.030 | TPEAK (hrs) 6.00 .00 ; | R.V. (mm) 25.46 ****** 25.46 | | |
| NOTE: P | EAK FLOWS | DO NOT INCLU | JDE BASEFLO Page 5 | | ۱Y. | | |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

______ ADD HYD (0492) | 1 + 2 = 3QPEAK AREA TPEAK R.V. (cms) (ha) (hrs) (mm) ID1= 1 (0561): + ID2= 2 (0481): 23.70 1.953 6.08 .494 6.08 22.15 23.70 22.15 -----____ ID = 3 (0492): 29.60 2.447 6.08 22.15 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0115) 1 + 2 = 3AREA QPEAK R.V. (mm) 22.14 TPEAK (cms) (ha) (hrs) ID1= 1 (0114): + ID2= 2 (0106): 1.029 49.64 6.50 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) 1.3100 1.8600 _____ (cms) (ha.m.) (ha.m.) .0000 .0000 1.6000 .2870 1.8600 .7700 23.2300 | .0000 1.2600 .9680 .0000 QPEAK (cms) AREA TPEAK R.V. (hrs) (ha) (mm) 176.100 176.100 12.674 INFLOW : ID= 2 (0380) 6.17 21.88 OUTFLOW: ID = 1 (0390) 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 1.1) ----> <---- DATA FOR SECTION (</pre> Distance Elevation Manning 100.00 313.20 .0500 312.40 .0500 / .0300 Main Channel .0300 Main Channel 140.00 140.50 310.80 141.50 310.80 .0300 Main Channel 142.00 .0300 / .0500 Main Channel 312.40 .0500 160.00 313.20 <-----> ELEV VOLUME (m) (cu.m.) 310.92 .575E+02 311.05 .119E+03 DEPTH FLOW RATE VELOCITY TRAV.TIME (m) (cms) (m/s) (min) .40 18.86 .12 .1 . 2 .25 13.13 .57 Page 52

| .37 .49 .62 .74 .86 .98 1.11 1.23 1.35 1.48 1.60 1.73 1.87 2.00 2.13 2.27 2.40 | 312.40 312.53 312.67 312.80 312.93 | Hadati Cree .185E+03 .256E+03 .330E+03 .409E+03 .492E+03 .579E+03 .671E+03 .767E+03 .867E+03 .971E+03 .108E+04 .149E+04 .248E+04 .405E+04 .620E+04 .893E+04 .122E+05 | ek Watersh .3 .4 .6 .8 1.1 1.3 1.6 1.9 2.2 2.6 2.9 3.6 4.9 6.9 10.1 14.6 20.7 | 1 1 1 1 1 1 1 | owable .69 .78 .86 .92 .97 .02 .07 .11 .15 .19 .23 .10 .88 .77 .73 .74 .76 | $ \begin{array}{r} 10.87 \\ 9.61 \\ 8.77 \\ 8.17 \\ 7.70 \\ 7.32 \\ 7.01 \\ 6.74 \\ 6.50 \\ 6.29 \\ 6.11 \\ 6.85 \\ 8.52 \\ 9.74 \\ 10.21 \\ 10.17 \\ 9.85 \\ \end{array} $ | |
|--|--|---|--|--|---|---|--|
| INFLOW : OUTFLOW: | ID= 2 (052 ID= 1 (052 | AREA (ha) 6) 88.85 7) 88.85 | < hyc QPEAK (cms) 8.03 6.50 | Irograph TPEAK (hrs) 6.00 6.42 | R.V. (mm) 25.46 25.46 | <-pipe / cł MAX DEPTH (m) 2.05 1.97 | mannel-> MAX VEL (m/s) .76 .79 |
| RESERVOIR ((IN= 2> OL DT= 5.0 min | 丌= 1 | OUTFLOW (cms) .0000 .2590 .2660 .2720 .2790 .2850 | STORAGE (ha.m.) .0000 .0579 .1180 .1802 .2445 .3109 | (cm .2 .2 1.6 4.1 | ELOW 15) 2910 2970 320 680 660 0000 | STORAGE (ha.m.) .3795 .4503 .5232 .5983 .6756 .0000 | |
| INFLOW : OUTFLOW: | PEAK TIME | 2) 29.60 2) 29.60 FLOW RED SHIFT OF PEA | а) (с 00 2. 00 . DUCTION [С | .447 .293 Qout/Qin] (n | nin)= 45 | (mm) 22.15 22.15 99 | |
| + ID2= | 3 = 1 (0390): = 2 (0395): | 176.10 51.20 | 2.601 ======= | 7.08 6.17 | 21.88 11.75 | | |
| ID = | = 3 (0400): | 227.30 O NOT INCLU | 3.883 | 6.17 | 19.60 | | |
| ROUTE CHN (|)403) | | Page 5 | 3 | | | |

| IN= 2> OUT= 1 | Hadati Cre Routing ti | ek Watersh me step (m | ed - Allowable in)'= 5.00 | 2 | |
|---|---|--|--|---|---|
| Distance 100.00 110.00 135.00 | DATA FOR SEC Elevat 338. 336. 336. 335. 335. 335. 338. 338. | ion 30 80 00 | .0500 .0300 ма | in Channel | |
| DEPTH ELEV (m) (m) .16 335.46 .32 335.62 .47 335.77 .63 335.93 .79 336.09 .95 336.25 1.11 336.41 1.26 336.56 1.42 336.72 1.58 336.88 1.74 337.04 1.89 337.19 2.05 337.35 2.21 337.51 2.37 337.67 2.53 337.83 | VOLUME (cu.m.) .231E+04 .563E+04 .997E+04 .153E+05 .218E+05 .299E+05 .396E+05 .510E+05 .641E+05 .787E+05 .110E+06 .126E+06 .143E+06 .160E+06 .196E+06 | FLOW RATE (cms) .9 3.2 7.3 13.4 22.7 35.3 51.2 70.7 94.1 122.4 155 6 | VELOCITY (m/s) .71 1.09 1.39 1.66 1.97 2.25 2.46 2.63 2.79 2.96 3.15 3.34 3.53 3.71 3.89 4.07 | TRAV.TIME (min) 44.52 29.11 22.72 19.04 16.04 14.10 12.89 12.02 11.35 10.71 10.06 9.48 8.97 8.53 8.13 7.79 7.48 7.20 | |
| INFLOW : ID= 2 (040 OUTFLOW: ID= 1 (040 | AREA (ha) 0) 227.30 3) 227.30 | < hyd QPEAK (cms) 3.88 2.23 | rograph> TPEAK R.V. (hrs) (mm) 6.17 19.60 6.42 19.60 | <-pipe / c MAX DEPTH (m) .34 .25 | hannel-> MAX VEL (m/s) 1.13 .89 |
| ADD HYD (0407) 1 + 2 = 3 ID1= 1 (0115): + ID2= 2 (0403): ID = 3 (0407): NOTE: PEAK FLOWS D | 227.30 328.26 | 5.857 | TPEAK R.V (hrs) (mm 6.33 22.14 6.42 19.60 |)) ;; ;= | |
| RESERVOIR (0113) IN= 2> OUT= 1 DT= 5.0 min | OUTFLOW (cms) .0000 1.1000 | STORAGE (ha.m.) .0000 2.9000 Page 54 | OUTFLOW (cms) 1.6000 9.1000 | STORAGE (ha.m.) 6.4000 10.0000 | |

Hadati Creek Watershed - Allowable 1.3000 4.3000 | 12.0000 20,0000 AREA
(ha)QPEAK
(cms)TPEAK
(hrs)R.V.
(mm)INFLOW : ID= 2 (0407)328.2605.8576.3320.38OUTFLOW: ID= 1 (0113)328.2601.13712.6720.38 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 ______ 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) ----> <----- 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

 Zepth
 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

 <tr <---->

 2.87
 2.33

 2.96
 2.25

 3.06
 2.18

 3.15
 2.11

 3.14
 2.12

 3.15
 2.11

 3.18
 2.09

 3.23
 2.07

 3.28
 2.03

 .134E+05 .154E+05 117.9 2.12 324.42 .176E+05 2.28 324.58 138.8

 324.75
 .200E+05

 324.91
 .228E+05

 325.07
 .259E+05

 325.24
 .293E+05

 325.40
 .330E+05

 2.45 157.4 179.6 2.61 2.77 205.8 205.8 236.1 270.6 2.94 3.10

Page 55

Hadati Creek Watershed - Allowable

<---- hydrograph ----> <-pipe / channel-> AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEL (m) (m/s) (cms) (ha) (hrs) (mm) INFLOW : ID= 2 (0430) OUTFLOW: ID= 1 (0440) 355.17 .33 2.14 6.17 20.51 1.26 355.17 2.11 6.17 20.51 .32 1.26 ADD HYD (0485) | 1 + 2 = 3 | AREA QPEAK TPEAK (ha) (cms) (hrs) 355.17 2.113 6.17 50.98 4.600 6.08 R.V. -----(mm) ID1= 1 (0440): 20.51 + ID2= 2 (0475): 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

 2 = 3
 AREA
 QPEAK
 TPEAK
 R.V.

 ID1= 1
 (0485):
 406.15
 6.641
 6.08
 20.72

 + ID2= 2
 (0480):
 43.10
 3.608
 6.08
 22.15

 R.V. (mm) _____ 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_____ 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

 (ha.m.)
 (cms)

 .0000
 7.0800

 .0600
 8.1000

 .3400
 9.7980

 .6182
 10.4940

 1.1630
 11.6850

 1.7070
 12.3480

 -----(cms) (ha.m.) .0000 2.4860 .2760 3.3240 4.6420 7.4397 1.2000 2.0400 2.6400 10.3000 10.300011.40003.1200 AREA
(ha)QPEAK
(cms)TPEAK
(hrs)R.V.
(mm)INFLOW : ID= 2 (0491)478.85010.5196.0820.94 Page 56

Hadati Creek Watershed - Allowable 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 (ha.m.) = 1.4753MAXIMUM STORAGE USED ***** ADD HYD (0530) | 1 + 2 = 3 R.V. (mm) 43.01 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 = 3R.V. (mm) 25.46 _____ 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 AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)25.253.6086.0043.01572.339.4886.5021.82 _____ ID1= 1 (0542): + ID2= 2 (0545): _____ 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) 14.99 2.271 6.00 43.01 597.58 10.369 6.00 22.71 _____ ID1 = 1 (0543):+ ID2= 2 (0546): _____ ____ ____ ID = 3 (0547): 612.57 12.6406.00 23.21 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0548) | 1 + 2 = 3 | QPEAK TPEAK R.V. AREA Page 57

| | * | Hadati (h | Creek | watershe | d - Allo (hrs) | owable (mm) | | |
|---|---|---|--|---|---|--|--|---|
| ID1= + ID2= | 1 (0544) 2 (0547) | | 13 .: 57 12.0 | 178 640 | 6.00 6.00 | 43.01 23.21 | | |
| | | : 613. | | | | 23.25 | | |
| NOTE: PEA | K FLOWS | DO NOT I | NCLUDE | BASEFLOW | S IF AN | Υ. | | |
| ************************************** | NUMBER: | 3 ** | | | | | | |
| READ STORM | | Filenam | | | | Modelling | \105172\0 | i |
| Ptotal= 73.56 | mm | Comment | s: 25 y | ew Ridge ear SCS | \25yrSC Type II | S12hr.stm 12hr desi | ign storm | I |
| | TIME hrs .25 .50 .75 1.00 1.25 | RAIN mm/hr 1.84 1.84 1.84 1.84 1.84 | hrs 3.25 3.50 | RAIN mm/hr 2.94 2.94 2.94 2.94 2.94 | hrs 6.25 6.50 | RAIN mm/hr 13.24 13.24 5.89 5.89 4.41 | hrs 9.25 9.50 | RAIN mm/hr 2.58 2.58 2.58 2.58 1.47 |
| | 1.50 1.75 2.00 2.25 2.50 2.75 | $1.84 \\ 1.84 \\ 1.84 $ | 4.50 4.75 5.00 5.25 5.50 5.75 | 4.41 5.89 5.89 | 7.50 7.75 8.00 8.25 8.50 8.75 | 4.41 4.41 2.58 2.58 2.58 | 10.50 10.75 11.00 11.25 11.50 11.75 | 1.47 1.47 1.47 1.47 1.47 1.47 1.47 |
| CALIB STANDHYD (0544) Area (ha)= 1.13 ID= 1 DT= 5.0 min Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 | | | | | | | | |
| Surface Ard Dep. Storad Average Slo Length Mannings n | ge (| I ha)= mm)= (%)= (m)= = | MPERVIO .90 1.50 .55 50.00 .013 | | RVIOUS .23 5.00 .55 40.00 .300 | (i) | | ¥ |
| NOTE: | RAINFAL | L WAS TR | ANSFORM | ED TO | 5.0 MIN | . TIME STE | EP. | |
| | TIME hrs .083 .167 .250 .333 .417 .500 .583 .667 .750 | RAIN mm/hr 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 1.84 | TR TIME hrs 3.083 3.167 3.250 3.333 3.417 3.500 3.583 3.667 3.750 | ANSFORME RAIN mm/hr 2.94 2.94 2.94 2.94 2.94 2.94 2.94 2.94 | D HYETO TIME hrs 6.083 6.167 6.250 6.333 6.417 6.500 6.583 6.667 6.750 | GRAPH RAIN mm/hr 13.24 13.24 13.24 13.24 13.24 13.24 13.24 13.24 5.89 5.89 5.89 | TIME 9.08 9.17 9.25 9.33 9.42 9.50 9.58 9.67 9.75 | RAIN mm/hr 2.58 2.58 2.58 2.58 2.58 2.58 2.58 2.58 |

| Hac . 833 1. .917 1. 1.000 1. 1.083 1. 1.167 1. 1.250 1. 1.333 1. 1.417 1. 1.500 1. 1.583 1. 1.667 1. 1.750 1. 1.833 1. 1.917 1. 2.000 1. 2.083 2. 2.167 2. 2.250 2. 2.333 2. 2.417 2. 2.500 2. 2.583 2. 2.667 2. 2.750 2. 2.833 2. 2.917 2. 3.000 2. | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | d - Allowable 6.833 5.89 6.917 5.89 7.000 5.88 7.083 4.41 7.167 4.41 7.250 4.41 7.333 4.41 7.417 4.41 7.500 4.41 7.583 4.41 7.583 4.41 7.583 4.41 7.583 4.41 7.667 4.41 7.750 4.41 7.750 4.41 7.833 4.41 7.917 4.41 8.000 4.41 8.083 2.58 8.167 2.58 8.250 2.58 8.250 2.58 8.333 2.58 8.417 2.58 8.583 2.58 8.5 | 9.832.589.922.5810.002.5810.081.4710.171.4710.251.4710.331.4710.421.4710.501.4710.581.4710.671.4710.751.4710.831.4710.921.4711.081.4711.171.4711.251.4711.331.4711.501.4711.581.4711.671.4711.751.4711.831.4711.921.4712.001.47 | | | | |
|---|--|--|---|--|--|--|--|
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | 5.00 2.04 (ii) 5.00 .31 .24 6.00 72.06 | .03 6.08 21.22 6 | TALS* .266 (iii) 6.00 1.38 3.56 .83 | | | | |
| <pre>***** 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.</pre> | | | | | | | |
| CALIB STANDHYD (0543) Area ID= 1 DT= 5.0 min Tota Surface Area (ha)= | 1 Imp(%)= 80.00 | Dir. Conn.(%)= 3 RVIOUS (i) 3.00 | 79.00 | | | | |
| Dep. Storage (mm)= Average Slope (%)= | 1.50 .55 200.00 .013 97.10 | 5.00 .55 40.00 .300 87.19 | | | | | |
| | Page 59 | | | | | | |

Hadati Creek Watershed - Allowable 20.00 over (min) 5.00 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 TIME TO PEAK (cms) =3.11 .34 6.17 3.310 (iii) (hrs) =6.00 6.00 RUNOFF VOLUME 61.38 73.56 21.22 72.06 (mm)= TOTAL RAINFALL (mm)= 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)= 4.1 K (1/hr)= 4.14 Cum.Inf. (mm)= .00 Fc (mm/hr)= 12.50 Cum.Inf. (mm)= (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 Total Imp(%)= 80.00 ID= 1 DT= 5.0 min Dir. Conn.(%) = 79.00_____ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =20.20 5.05 1.50 5.00 Dep. Storage (mm) =Average Slope .55 (%)= .55 40.00 Length (m) =350.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 97.10 87.19 over (min) 5.00 20.00 Storage Coeff. 6.56 (ii) (min) =18.81 (ii) Unit Hyd. Tpeak (min)= 5.00 20.00 Unit Hyd. peak (cms) =.18 .06 *TOTALS* (cms)= 5.02 6.00 .53 PEAK FLOW 5.333 (iii) 6.00 TIME TO PEAK (hrs) =72.06 73.56 RUNOFF VOLUME (mm) =21.22 61.38 TOTAL RAINFALL (mm)= 73.56 73.56 RUNOFF COEFFICIENT . 98 .29 = .83 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (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) = 16.00ID= 1 DT= 5.0 min Total Imp(%) = 80.00Dir. Conn.(%) = 79.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =12.80 3.20 Dep. Storage (mm) =1.50 5.00 Average Slope . 50 .20 (%)= Page 60

Hadati Creek Watershed - Allowable (m) = 400.0040.00 Lenath Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 97.10 65.53 5.00 over (min) 30.00 Storage Coeff. (min)= 7.31 (ii) 25.92 (ii) 5.00 30.00 17 .04 Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= ***TOTALS*** PEAK FLOW(cms)=3.12TIME TO PEAK(hrs)=6.00RUNOFF VOLUME(mm)=72.06TOTAL RAINFALL(mm)=73.56RUNOFF COEFFICIENT=.98 .25 6.33 21.22 3.209 (iii) 6.00 61.38 73.56 73.56 .29 .83 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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 CALIB STANDHYD (0500) Area_ (ha)= 244.00 |ID= 1 DT= 5.0 min | Total Imp(%) = 46.00 Dir. Conn.(%) = 26.00 _____ IMPERVIOUS PERVIOUS (i) 112.24 Surface Area (ha) =131.76 5.00 1.50 Dep. Storage (mm)= (%) = .80(m) = 1275.00 = .013 .80 Average Slope Length 40.00 Mannings n .300 22.36 (ii) .05 TIME TO PEAK (hrs)= 11.66 18.11 TIME TO PEAK (hrs)= 6.08 6.25 RUNOFF VOLUME (mm)= 72.06 26.62 TOTAL RAINFALL (mm)= 73.56 73.56 RUNOFF COEFFICIENT = .98 ***TOTALS*** 27.658 (iii) $\begin{array}{r} 6.17\\ \underline{38.44}\end{array}$ 73.56 . 52 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC .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) ID= 1 DT= 5.0 min Area (ha)= 4.63 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 _____ IMPERVIOUS PERVIOUS (i) Page 61

Hadati Creek Watershed - Allowable 3.70 .93 Surface Area (ha) =5.00 1.50 Dep. Storage (mm)= . 55 Average Slope (%)= .55 150.00 40.00 Length (m)= Mannings n . 300 = .013 Storage Coeff.(min) =97.10Unit Hyd.5.00Unit Hyd.5.00Unit Hyd.764 (ii)2487.19 20.00 16.20 (ii) 20.00 .06 ***TOTALS*** .97 _6.00 .11 6.17 PEAK FLOW (cms) =1.036 (iii) 6.00 TIME TO PEAK (hrs) =72.06 RUNOFF VOLUME 21.22 61.38 (mm)= TOTAL RAINFALL 73.56 (mm) =73.56 73.56 RUNOFF COEFFICIENT = . 98 .29 .83 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00Fo FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALTR STANDHYD (0484) ID= 1 DT= 5.0 min Area (ha)= 12.60 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 2.00 680.00 Average Slope (%)= 2.00 Length (m)= 40.00 Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 97.10 over (min) 5.00 Storage Coeff. (min)= 6.63 (ii) Unit Hyd. Tpeak (min)= 5.00 Unit Hyd. neak (cms)= 18 119.40 15.00 13.97 (ii) 15.00 Unit Hyd. peak (cms)= .08 .18 *TOTALS* 1.43 6.08 1.918 (iii) 6.00 26.53 36.09 73.56 73.56 .36 .49 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. | CALIB |

| STANDHYD (0565) ID= 1 DT= 5.0 min | Area | (ha) = 11.10 | shed - Allowabl Dir. Conn.(% | |
|---|---|--|---|--|
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 4.66 1.50 2.00 680.00 .013 | 6.44 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(ove Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | (mm/hr)= (min) (min)= (min)= (cms)= | 97.10 5.00 6.63 (ii) 5.00 .18 | 119.40 15.00 13.97 (ii) 15.00 .08 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .59 6.00 72.06 73.56 .98 | 1.26 6.08 26.53 73.56 .36 | 1.689 (iii) 6.00 36.09 73.56 .49 |
| Fo (mr Fc (mr (ii) TIME STEF | 1/hr)= 75. 1/hr)= 12. 9 (DT) SHC STORAGE (| .50 Cum.Inf DULD BE SMALLER COEFFICIENT. | (1/hr)= 4.14 . (mm)= .00 OR EQUAL |) |
| CALIB STANDHYD (0481) ID= 1 DT= 5.0 min | Area Total | (ha)= 5.90 Imp(%)= 42.00 | Dir. Conn.(% | 5)= 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 2.48 1.50 2.00 680.00 .013 | PERVIOUS (i) 3.42 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(| (mm/hr)= (min) (min)= | | 119.40 15.00 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .31 6.00 72.06 73.56 .98 | .67 6.08 26.53 73.56 .36 | .898 (iii) 6.00 36.09 73.56 .49 |
| Fo (mr Fc (mr (ii) TIME STEF | 1/hr)= 75. 1/hr)= 12. 9 (DT) SHC STORAGE (| .50 Cum.Inf DULD BE SMALLER COEFFICIENT. | (1/hr)= 4.14 . (mm)= .00 OR EQUAL | |

Hadati Creek Watershed - Allowable CALIB STANDHYD (0410) Area (ha)= 24.20 Total Imp(%)= 42.00 ID= 1 DT= 5.0 min Dir. Conn.(%) = 21.00------IMPERVIOUS PERVIOUS (i) Surface Area (ha) =10.1614.04 1.50 Dep. Storage (mm) =5.00 Average Slope (%)= 2.00 2.00 Length 401.00 (m) =40.00 Mannings n .013 .300 97.10 Max.Eff.Inten.(mm/hr)= 119.40 over (min) 5.00 15.00 4.83 5.00 Storage Coeff. (min) =4.83 (ii) 12.17 (ii) Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .22 .09 ***TOTALS*** 2.92 PEAK FLOW (cms) =1.33 3.938 (iii) TIME TO PEAK 6.00 (hrs) =6.00 RUNOFF VOLUME (mm)= = 72.06 26.53 36.09 73.56 TOTAL RAINFALL 73.56 73.56 RUNOFF COEFFICIENT = .98 .49 . 36 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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) | |ID= 1 DT= 5.0 min | Area (ha)= 4.99 Total Imp(%)= 42.00 Dir. Conn.(%) = 21.00PERVIOUS (i) IMPERVIOUS Surface Area (ha) =2.10 2.89 1.50 5.00 Dep. Storage (mm) =Average Slope (%)= 2.86 185.00 2.86 2.86 Length (m)= 40.00 Mannings n .013 . 300 = Max.Eff.Inten.(mm/hr)= 97.10 119.40 5.00 2.73 5.00 over (min) 10.00 Storage Coeff. (min)= 2.73 (ii) 9.32 (ii) Unit Hyd. Tpeak (min)= 10.00 Unit Hyd. peak (cms)= .29 .12 *TOTALS* .28 .73 1.007 (iii) PEAK FLOW (cms) =(hrs)= TIME TO PEAK 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 Page 64

Hadati Creek Watershed - Allowable (mm/hr) = 12.50FC 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 Total Imp(%)= 42.00 ID= 1 DT= 5.0 min Dir. Conn. (%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =7.98 11.02 1.50 5.00 Dep. Storage (mm) =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 .09 (cms) =.23 *TOTALS* 2.32 PEAK FLOW (cms) =1.05 3.122 (iii) TIME TO PEAK 6.00 (hrs) =6.00 6.08 RUNOFF VOLUME 72.06 26.53 (mm) =36.09 TOTAL RAINFALL 73.56 (mm) =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) = 4.1K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 12.50FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. ____ _____ CALIB STANDHYD (0101) Area (ha)= 16.32 Total Imp(%)= 42.00 |ID= 1 DT= 5.0 min | Dir. Conn. (%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =6.85 9.47 5.00 Dep. Storage (mm) =1.50 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* .91 6.00 PEAK FLOW (cms) =2.02 2.725 (iii) 6.00 TIME TO PEAK (hrs) =6.08 RUNOFF VOLUME (mm) =72.06 26.53 36.09 TOTAL RAINFALL 73.56 73.56 (mm) =73.56 RUNOFF COEFFICIENT = .98 .36 .49 Page 65

Hadati Creek Watershed - Allowable ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00K (1/hr)= 4.14 Cum.Inf. (mm)= .00 FO FC (mm/hr) = 12.50(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CAL TR STANDHYD (0102) | |ID= 1 DT= 5.0 min | Area (ha)= 14.32 Total Imp(%)= 42.00 Dir. Conn.(%) = 21.00-----IMPERVIOUS PERVIOUS (i) Surface Area (ha) =6.01 8.31 1.50 Dep. Storage (mm) =5.00 Average Slope (%)= 2.00 2.00 287.00 Length (m) =40.00 Mannings n .013 .300 -Max.Eff.Inten.(mm/hr)= 97.10 119.40 over (min) 5.00 15.00 5.00 3.95 5.00 Storage Coeff. 3.95 (ii) 11.29 (ii) (min) =Unit Hyd. Tpeak (min)= 15.00 .24 .09 Unit Hyd. peak (cms)= *TOTALS* (cms) =.80 6.00 PEAK FLOW 1.79 2.406 (iii) (hrs)= TIME TO PEAK 6.08 6.00 RUNOFF VOLUME (mm) =72.06 36.09 26.53 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: (mm/hr)= 75.00 FO K (1/hr) = 4.14(mm/hr) = 12.50Cum.Inf. FC .00 (mm) =(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) (ha) = 51.32Area |ID= 1 DT= 5.0 min | Tota] Imp(%) = 42.00Dir. Conn.(%)= 21.00 ______ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =21.55 29.77 1.50 Dep. Storage (mm) =5.00 Average Slope (%)= 2.00 2.00 550.00 Length (m) =40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 5.00 5.84 5.00 97.10 119.40 over (min) 15.00 Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 5.84 (ii) 13.17 (ii) 15.00 .20 .08

TOTALS

| Hadati Creek Watershed - Allowable 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. | | | | | | |
| CALIB STANDHYD (0365) Area (ha)= 117.50 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 | | | | | | |
| $\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$ | | | | | | |
| 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 | | | | | | |
| $\begin{array}{rcrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$ | | | | | | |
| Max.Eff.Inten.(mm/hr)= 97.10 119.40 over (min) 5.00 15.00 Storage Coeff. (min)= 4.22 (ii) 12.06 (ii) Page 67 | | | | | | |

Hadati Creek Watershed - Allowable 15.00 5.00 Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= .24 .09 *TOTALS* 1.49 .68 6.00 2.015 (iii) PEAK FLOW (cms) =6.00 TIME TO PEAK (hrs) =6.08 (mm)= RUNOFF VOLUME 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: (mm/hr) = 75.00K (1/hr)= 4.14 Cum.Inf. (mm)= .00 FO FC (mm/hr) = 12.50(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 Total Imp(%)= 42.00 ID= 1 DT= 5.0 min | Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =6.85 9.45 Dep. Storage 1.50 5.00 (mm) =Average Slope (%)= 1.00 1.00 330.00 Length (m) =40.00 Mannings n = .013 .300 Max.Eff.Inten.(mm/hr)= 97.10 15.00 14 119.40 5.00 5.29 (ii) 5.00 over (min) 14.32 (ii) 15.00 Storage Coeff. (min) =Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= .21 .08 ***TOTALS*** .89 6.00 72.06 1.82 6.08 PEAK FLOW (cms) =2.485 (iii) TIME TO PEAK (hrs) =6.00 (mm)= (mm)= RUNOFF VOLUME 36.09 26.53 TOTAL RAINFALL 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) = 4.14Fc (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) = 30.00ID= 1 DT= 5.0 min | Total Imp(%) = 37.00Dir. Conn. (%) = 19.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =11.1018.90 1.50 2.00 Dep. Storage (mm) =5.00 2.00 (%)= Average Slope Length (m) =447.00 40.00 .013 Mannings n = . 300 Page 68

Hadati Creek Watershed - Allowable

| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | 5.00 5.16 (ii) 5.00 .21 1.48 6.00 72.06 73.56 | | *TOTALS* 4.647 (iii) 6.00 34.40 73.56 .47 |
|--|--|--|--|
| ***** WARNING:FOR AREAS WITH | | DS BELOW 20% | |
| (i) HORTONS EQUATION S Fo (mm/hr)= 75 Fc (mm/hr)= 12 (ii) TIME STEP (DT) SHOTTHAN THE STORAGE ((iii) PEAK FLOW DOES NOT | 00 K 50 Cum.Inf. DULD BE SMALLER (COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 DR EQUAL | 4 D |
| CALIB STANDHYD (0395) Area ID= 1 DT= 5.0 min Tota] | (ha)= 51.20 Imp(%)= 10.00 | Dir. Conn.(9 | %)= 5.00 |
| Surface Area (ha)= Dep. Storage (mm)= Average Slope (%)= Length (m)= Mannings n = | IMPERVIOUS 5.12 1.50 2.00 900.00 .013 | PERVIOUS (i) 46.08 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | 97.10 10.00 7.85 (ii) 10.00 .13 | 88.55 20.00 16.11 (ii) 20.00 .06 | *TOTALS* |
| PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | 72.06 | 6.17 21.36 | 5.668 (iii) 6.17 23.89 73.56 .32 |
| **** WARNING:FOR AREAS WITH YOU SHOULD CONS | IMPERVIOUS RATIONS IDER SPLITTING | | |
| (i) HORTONS EQUATION S Fo (mm/hr)= 75 Fc (mm/hr)= 12 (ii) TIME STEP (DT) SHOTTHAN THE STORAGE C (iii) PEAK FLOW DOES NOT | 00 K 50 Cum.Inf. DULD BE SMALLER (COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 DR EQUAL | 4 D |
| CALIB STANDHYD (0455) Area ID= 1 DT= 5.0 min Tota] | (ha)= 12.70 Imp(%)= 42.00 Page 6 | Dir. Conn.() 9 | %)= 21.00 |

| | Hadati Creek Wa | tershed - Allowable | | | | |
|--|--|--|--|--|--|--|
| Surface Area (l Dep. Storage (l Average Slope Length Mannings n | IMPERVIOUS ha)= 5.33 mm)= 1.50 (%)= 1.71 (m)= 300.00 = .013 | 7.37 5.00 1.71 40.00 | | | | |
| Max.Eff.Inten.(mm/l over (m Storage Coeff. (m Unit Hyd. Tpeak (m Unit Hyd. peak (c | hr)= 97.10 in) 5.00 in)= 4.25 (in)= 5.00 ms)= .23 | 15.00 ii) 11.94 (ii) 15.00 .09 | *TOTALS* | | | |
| PEAK FLOW (CI TIME TO PEAK (h RUNOFF VOLUME (I TOTAL RAINFALL (I RUNOFF COEFFICIENT | ns)= .71 rs)= 6.00 nm)= 72.06 nm)= 73.56 = .98 | 1.55 6.08 26.53 73.56 .36 | 2.088 (iii) 6.00 36.09 73.56 .49 | | | |
| ***** WARNING: STORAGE | COEFF. IS SMALLER | THAN TIME STEP! | | | | |
| Fo (mm/hr Fc (mm/hr (ii) TIME STEP (D |)= 75.00)= 12.50 Cum. T) SHOULD BE SMAL RAGE COEFFICIENT. | | | | | |
| | | | | | | |
| CALIB STANDHYD (0460) / ID= 1 DT= 5.0 min - | Area (ha)= 36 Total Imp(%)= 42 | .00 .00 Dir. Conn.(%) | = 21.00 | | | |
| Surface Area (l Dep. Storage (n Average Slope Length Mannings n | IMPERVIOUS ha)= 15.12 nm)= 1.50 (%)= 2.03 (m)= 465.00 = .013 | PERVIOUS (i) 20.88 5.00 2.03 40.00 .300 | | | | |
| Max.Eff.Inten.(mm/) over (m Storage Coeff. (m Unit Hyd. Tpeak (m | hr)= 97.10 in) 5.00 in)= 5.26 (| 119.40 15.00 ii) 12.56 (ii) 15.00 .08 | *TOTALS* | | | |
| TIME TO PEAK (h) RUNOFF VOLUME (I | $\begin{array}{rll}ns)=&1.96\\rs)=&6.00\\nm)=&72.06\\nm)=&73.56\\=&.98\end{array}$ | 4.29 | 5.772 (iii) 6.00 36.09 73.56 .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. | | | | | | |

Hadati Creek Watershed - Allowable CALIB STANDHYD (0480) Area (ha) = 43.10ID= 1 DT= 5.0 min Total Imp(%) = 42.00 Dir. Conn.(%) = 21.00 IMPERVIOUS PERVIOUS (i) 18.10 Surface Area 🗉 (ha) =25.00 1.50 2.00 5.00 2.00 Dep. Storage (mm) =(m)= = Average Slope Length 680.00 40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 97.10 5.00 119.40 5.00 15.00 13.97 (ii) 13.97 (ii) 15.00 15.00 15.00 15.00 15.00 15.00 15.00 15.00 15.00 15.00 15.00 10.00 Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= .18 . 08 ***TOTALS*** 4.88 6.08 26.53 PEAK FLOW (cms) =2.27 6.559 (iii) (hrs) = 6.00 (mr) = 72.06 (mr) = 73.566.00 TIME TO PEAK 6.00 RUNOFF VOLUME 36.09 TOTAL RAINFALL 73.56 73.56 .36 RUNOFF COEFFICIENT = .98 .49 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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) | | ID= 1 DT=****min | AREA (ha)= .00 QPEAK TPEAK (cms)= .00 (hrs)= .00 _____ (mm)=****** VOLUME _____ DUHYD (0505) Inlet Cap.=9.000 #of Inlets= 1 cal(cms)= 9.0 | AREA QPEAK TPEAK R.V. ----- (ha) (cms) (hrs) (mm) TOTAL HYD.(ID= 1): 244.00 27.66 6.17 38.44 | Total(cms)= 9.0 | (mm) 38.44 _____ MAJOR SYS.(ID= 2): 81.12 MINOR SYS.(ID= 3): 162.88 6.17 18.66 38.44 9.00 5.92 38.44 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0566) 1 + 2 = 3

 2 = 3
 |
 AREA
 QPEAK
 TPEAK

 ID1= 1
 (0484):
 12.60
 1.918
 6.00

 + ID2= 2
 (0565):
 11.10
 1.689
 6.00

 R.V. (mm) 36.09 36.09 _______ ID = 3 (0566): 23.70 3.607 6.00 36.09Page 71

Hadati Creek Watershed - Allowable

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

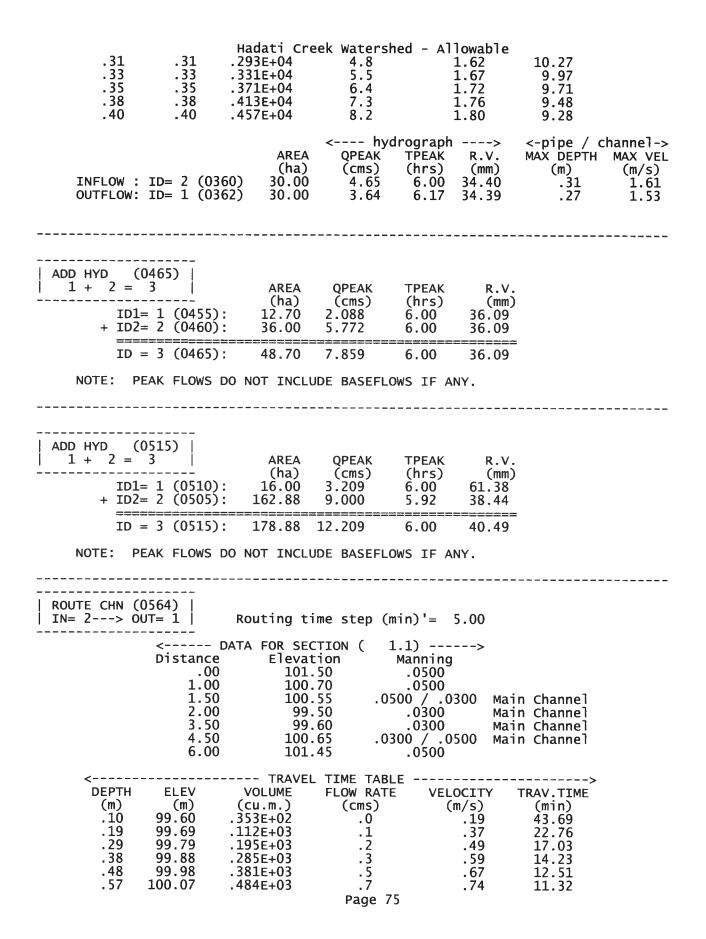
_____ ADD HYD (0420) QPEAK (cms) 1 + 2 = 3R.V. (mm) 36.09 AREA TPEAK (ha) (hrs) ID1= 1 (0410): + ID2= 2 (0415): 24.20 3.938 6.00 4.99 1.007 6.00 36.09 _____ _____ ID = 3 (0420):29.19 4.945 6.00 36.09 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. RESERVOIR (0111) IN= 2---> OUT= 1 | | DT= 5.0 min | OUTFLOW STORAGE | OUTFLOW STORAGE (ha.m.) (cms) .0000 1.0000 .0100 20.0000 .1000 .0000 _____ (cms) (ha.m.) .0000 .0000 1.0000 .0100 .0100 1.1000 .0000 .0120 AREA QPEAK TPEAK R.V. (ha) 19.000 19.000 (cms) 3.122 (hrs) (mm) INFLOW : ID= 2 (0110) OUTFLOW: ID= 1 (0111) 36.09 6.00 .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 _____ ADD HYD (0103) | 1 + 2 = 3 AREA QPEAK (cms) R.V. TPEAK (ha) (mm) 36.09 (hrs) ID1= 1 (0101): + ID2= 2 (0102): 2.725 16.32 6.00 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) -----(cms) (ha.m.) (ha.m.) .000Ó .4000 .0000 . 5000 .0100 .8000 .0100 6.6000 .0260 .0000 .2300 .0000 TPEAK AREA QPEAK R.V. (cms) (mm) 36.09 (ha) 51.320 (hrs) 6.00 INFLOW : ID= 2 (0105) OUTFLOW: ID= 1 (0106) 8.044 51.320 5.545 6.17 36.09

| Hadati Creek Watershed - Allowable PEAK FLOW REDUCTION [Qout/Qin](%)= 68.94 TIME SHIFT OF PEAK FLOW (min)= 10.00 MAXIMUM STORAGE USED (ha.m.)= .7419 |
|---|
| ROUTE CHN (0358) IN= 2> OUT= 1 Routing time step (min)'= 5.00 |
| <pre>< 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</pre> |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ |
| <pre>< hydrograph> <-pipe / channel-: AREA QPEAK TPEAK R.V. MAX DEPTH MAX VE (ha) (cms) (hrs) (mm) (m) (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</pre> |
| 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 10.00 10.00 14.49 14.50 15 15 15 15 15 15 15 15 15 15 |

Hadati Creek Watershed - Allowable

| < DEPTH (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 | VOLUME (cu.m.) .929E+01 .372E+02 .836E+02 .149E+03 .232E+03 .334E+03 .454E+03 .576E+03 .699E+03 .822E+03 .944E+03 .108E+04 .123E+04 .140E+04 .159E+04 .159E+04 .180E+04 .203E+04 | TIME TABLE FLOW RATE (cms) .0 .0 .0 .1 .1 .1 .2 .3 .4 .6 .8 1.0 1.2 1.4 1.7 2.0 2.3 2.6 3.0 3.4 | | TRAV.TIME (min) 99.56 62.72 47.86 39.51 34.05 30.15 26.24 22.41 19.75 17.76 16.22 15.07 14.28 13.72 13.31 13.01 12.76 12.57 12.41 | |
|--|---|---|---|--|---|--|
| INFLOW : OUTFLOW: | ID= 2 (03 ID= 1 (03 | AREA (ha) 50) 16.30 53) 16.30 | < hydro QPEAK T (cms) (2.49 1.83 | graph> PEAK R.V. hrs) (mm) 6.00 36.09 6.17 36.06 | <-pipe / c MAX DEPTH (m) .23 .20 | hannel-> MAX VEL (m/s) 1.29 1.23 |
| ROUTE CHN (0 IN= 2> OU |)362) JT= 1 | Routing ti | ime step (min |)'= 5.00 | | |
| | <pre>< Distance</pre> | Eleva | 40 15 .0300 00 . 09 . 15 .0150 | nning 0300 /.0150 Ma 0150 Ma 0150 Ma 0150 Ma | in Channel in Channel in Channel in Channel in Channel | |
| < DEPTH (m) .02 .04 .06 .08 .09 .11 .13 .15 .17 .20 .22 .24 .26 .29 | ELEV (m) .02 .04 .06 .08 .09 .11 .13 .15 .17 .20 .22 .24 .26 .29 | TRAVEL VOLUME (cu.m.) .176E+02 .702E+02 .158E+03 .281E+03 .438E+03 .607E+03 .776E+03 .776E+03 .116E+04 .140E+04 .140E+04 .166E+04 .194E+04 .258E+04 | TIME TABLE FLOW RATE (cms) .0 .1 .1 .3 .5 .7 1.0 1.3 1.8 2.3 2.8 3.4 4.0 Page 74 | VELOCITY (m/s) .21 .33 .43 .52 .62 .77 .90 1.03 1.16 1.27 1.36 1.44 1.51 1.57 | TRAV.TIME (min) 80.52 50.72 38.71 31.95 26.84 21.66 18.45 16.22 14.36 13.13 12.24 11.58 11.05 10.63 | |

Page 74



Hadati Creek Watershed - Allowable (ha) (cms) (hrs) 23.70 3.61 6.00 (m) (m/s) .53 2.21 (mm) 36.09 INFLOW : ID= 2 (0566) 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 TPEAK R.V. (hrs) (mm) AREA QPEAK -----(ha) (cms) 4.94 6.00 TOTAL HYD. (ID= 1): 29.19 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 TORAGEOUTFLOWSTORAGEha.m.)(cms)(ha.m.).00001.0000.5000.010010.0000.6000.1332.0000.0000 STORAGE (ha.m.) DT= 5.0 min | OUTFLOW _____ (ha.m.) (cms) .0000 .5000 .6000 .0000 .0000 .0100 .0150 .1332 AREA QPEAK TPEAK R.V. (ha) 30.640 (cms) (hrs) (mm) INFLOW : ID= 2 (0103) OUTFLOW: ID= 1 (0104) 5.131 6.00 36.09 30.640 4.550 6.17 36.08 FLOW REDUCTION [Qout/Qin](%)= 88.67 PEAK TIME SHIFT OF PEAK FLOW (min) = 10.00MAXIMUM STORAGE USED (ha.m.) = .5514ADD HYD (0359) 1 + 2 = 3R.V. (mm) 36.04 _____ ____ ===== ID = 3 (0359): 28.60 3.204 6.17 36.05NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0363) | 1 + 2 = 3 | AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)28.603.2046.1736.0530.003.6426.1734.39 ID1= 1 (0359): + ID2= 2 (0362): _____ ID = 3 (0363): 58.60 6.846 6.17 35.20 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. Page 77

_____ _____ -----ADD HYD (0470) |

 2 = 3
 AREA
 QPEAK
 TPEAK
 R.V.

 ID1= 1
 (0465):
 48.70
 7.859
 6.00
 36.09

 + ID2= 2
 (0425):
 7.51
 2.965
 6.00
 36.09

 1 + 2 = 3 | R.V. (mm) 36.09 ______ _____ _____ _____ ID = 3 (0470): 56.21 10.824 6.00 36.09NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ DUHYD (0520) | Inlet Cap.=3.050 | #of Inlets= 1 MAJOR SYS.(ID= 2):74.769.166.0040.49MINOR SYS.(ID= 3):104.133.055.6740.49 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

 4.50
 .00
 .0350

 5.00
 .00
 .0350

 7.00
 .50
 .0350
 .0350 / .0350 Main Channel .0350 7.00 . 50 9.00 1.00 .0350 <-----TRAVEL TIME TABLE -------

 C----- 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

 .53 .53 2.57 .32 .817E+02 4.2 4.2 5.1 6.2 7.3 8.6 10.0 11.6 13 2 .58 .58 .960E+02 2.68 .31 .38 .300E+02 .63 .111E+03 .68 .128E+03 .74 .145E+03 .79 .164E+03 .84 .184E+03 .89 .205E+03 .63 2.78 .30 2.87 2.97 3.06 3.14 .68 .29 .74 .28 .79 .27 .84 .27 13.2 3.23 .89 .26 Page 78

Hadati Creek Watershed - Allowable

Hadati Creek Watershed - Allowable .95 15.0 3.31 .25 .95 .227E+03 1.00 1.00 .250E+03 17.0 3.40 .25 <---- hydrograph ----> <-pipe / channel-> QPEAK TPEAK R.V. MAX DEPTH MAX VEL (cms) (hrs) (mm) (m) (m/s) AREA (m) (m/s) .48 2.48 .49 2.49 (ha) INFLOW : ID= 2 (0563) OUTFLOW: ID= 1 (0561) 23.70 3.52 3.57 6.08 36.09 23.70 6.08 36.09 ------ADD HYD (0114) | 1 + 2 = 3 |

 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 36.08NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0380) | 1 + 2 = 3

 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) -----> <----- 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
 VELOCITY TRAV.TIN (m/s) (min) .84 8.53 1.13 6.33 1.36 5.27 1.56 4.59 1.79 4.01 1.99 3.61 2.17 3.30 2.37 3.02 .430E+04 .644E+04 .892E+04 15.6 26.8 41.2 59.3 81.9 .80 321.60 1.00 321.80 322.00 1.20 .117E+05 322.20 1.40 322.40 1.60 .148E+05

Page 79

Hadati Creek Watershed - Allowable .182E+05 109.1 1.80 322.60 2.78 2.58 140.2 2.00 322.80 .218E+05 2.77 2.59 2.20 .256E+05 175.3 2.43 323.00 2.95 .296E+05 2.40 323.20 214.7 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
 323.80
 .428E+05

 324.00
 .476E+05

 324.20
 .526E+05

 324.40
 .578E+05

 324.60
 .632E+05
 1.98 3.00 359.1 3.61 1.91 3.20 3.76 3.91 416.0 1.83 3.40 477.5 4.05 3.60 543.5 1.77 3.80 4.18 1.71 614.3 <---- 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

 2 = 3
 AREA
 QPEAK
 TPEAK
 R.V.

 ID1= 1
 (0520):
 74.76
 9.159
 6.00
 40.49

 + ID2= 2
 (0525):
 .00
 .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 |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 | -----ID = 3 (0115); 100.96 10.4226.1736.08 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ______ | RESERVOIR (0390) | IN= 2---> OUT= 1 DT= 5.0 min OUTFLOW STORAGE OUTFLOW STORAGE Page 80

| 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 |
|--|
| AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)INFLOW:ID=2(0380)176.10022.5796.0835.79OUTFLOW:ID=1(0390)176.1001.3877.1735.79 |
| 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 |
| <pre>< 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</pre> |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ |
| <pre>< hydrograph> <-pipe / channel-></pre> |
| RESERVOIR (0482) IN= 2> OUT= 1 DT= 5.0 min OUTFLOW STORAGE OUTFLOW STORAGE Page 81 |

| | (cms)(ha.m.0000.00.2590.05.2660.11.2720.18.2790.24 | 00 .2910 79 .2970 80 1.6320 | (ha.m.) .3795 .4503 .5232 .5983 .6756 .0000 |
|--|--|---|---|
| INFLOW : ID= 2 (049 OUTFLOW: ID= 1 (048 | 92) 29.600 | QPEAK TPEA (cms) (hrs 4.410 6.0 2.218 6.3 |) (mm) 8 36.09 |
| TIME | FLOW REDUCTIO SHIFT OF PEAK FLO IUM STORAGE USE | N [Qout/Qin](%)= 5 W (min)= 1 D (ha.m.)= | 5.00 |
| + ID2= 2 (0395): | (ha) (cms 176.10 1.387 | |) |
| | 227.30 6.995 | 6.17 33.11 | _ |
| | | | |
| ROUTE CHN (0403) IN= 2> OUT= 1 | Routing time ste | p (min)'= 5.00 | |
| < Distance 100.00 110.00 135.00 142.00 148.00 156.00 165.00 | DATA FOR SECTION (Elevation 338.30 336.80 336.00 335.30 335.30 336.00 338.30 | Manning .0500 .0500 | in Channel |
| <pre></pre> | VOLUME FLOW VOLUME FLOW (cu.m.) (cm .231E+04 . .563E+04 3. .997E+04 7. .153E+05 13. .218E+05 22. .299E+05 35. .396E+05 51. .510E+05 70. .641E+05 94. .787E+05 122. .939E+05 155. .110E+06 192. .126E+06 233. .143E+06 278. .160E+06 327. | RATE VELOCITY s) (m/s) 9 .71 2 1.09 3 1.39 4 1.66 7 1.97 3 2.25 2 2.46 7 2.63 1 2.79 4 2.96 6 3.15 8 3.34 9 3.53 9 3.71 | TRAV.TIME (min) 44.52 29.11 22.72 19.04 16.04 14.10 12.89 12.02 11.35 10.71 10.06 9.48 8.97 8.53 8.13 |

Hadati Creek Watershed - Allowable .178E+06 2.53 337.83 380.3 7.79 4.07 .196E+06 436.7 2.68 337.98 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** MAX DEPTH MAX VEL TPEAK R.V. (m) (ha) 227.30 (cms) (hrs) (mm) (m/s) INFLOW : ID= 2 (0400) .46 7.00 6.17 33.11 1.36 OUTFLOW: ID = 1 (0403) 227.30 4.32 6.33 33.11 .36 1.16ADD HYD (0407) | AREA 1 + 2 = 3QPEAK (cms) R.V. (mm) 36.08 TPEAK (ha) (hrs) 100.96 10.422 ID1= 1 (0115): 6.17 + 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) (cms) 1.6000 _____ (ha.m.) (ha.m.) .0000 .0000 2.9000 6.4000 10.0000 9.1000 9.1000 1.3000 4.3000 20.0000 QPEAK (cms) AREA TPEAK R.V. (ha) (hrs) (mm) 328.260 INFLOW : ID= 2 (0407) OUTFLOW: ID= 1 (0113) 13.657 6.17 34.03 328.260 15.17 1.367 34.02 PEAK FLOW REDUCTION [Qout/Qin](%)= 10.01 TIME SHIFT OF PEAK FLOW (min)=540.00 (min)=540.00 (ha.m.) = 4.7719MAXIMUM STORAGE USED ____ ADD HYD (0430) | 1 + 2 = 3QPEAK AREA TPEAK R.V. (cms) (ha) _____. (hrs) (mm) 36.09 21.68 ID1= 1 (0425): 1.980 5.83 + 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) -----> Page 83

| Distance 100.00 120.00 126.00 130.00 140.00 142.00 150.00 155.00 160.00 | | 40 60 90 00 30 .060 30 .030 90 60 | Manning .0600 .0600 .0600 .0600 00 / .0300 | ble Main Channel Main Channel | |
|--|---|---|---|--|---------------|
| DEPTH ELEV (m) (m) .16 322.46 .33 322.63 .49 322.79 .65 322.95 .82 323.12 .98 323.28 1.14 323.44 1.31 323.61 1.47 323.77 1.63 323.93 1.79 324.09 1.96 324.26 2.12 324.42 2.28 324.42 2.28 324.42 2.61 324.91 2.77 325.07 2.94 325.24 3.10 325.40 | VOLUME (cu.m.) .233E+03 .672E+03 .132E+04 .216E+04 .319E+04 .433E+04 .556E+04 .689E+04 .833E+04 .833E+04 .987E+04 .115E+05 .154E+05 .154E+05 .154E+05 .200E+05 .228E+05 .259E+05 .293E+05 .330E+05 | CLOW DATE | VELOCIT (m/s) .96 1.26 | Y TRAV.TIME (min) 6.96 5.27 4.51 4.03 3.57 3.21 2.93 2.72 2.54 2.41 2.33 2.25 2.18 2.11 2.12 2.11 2.09 2.07 | |
| INFLOW : ID= 2 (043 OUTFLOW: ID= 1 (044 | AREA (ha) 30) 349.94 40) 349.94 | < hydr QPEAK (cms) 2.49 2.40 | (hrs) (m | > <-pipe / V. MAX DEPTH m) (m) 15 .35 15 .34 | (m/s) 1.29 |
| ADD HYD (0485) 1 + 2 = 3 ID1= 1 (0440): + ID2= 2 (0475): ID = 3 (0485): NOTE: PEAK FLOWS D | 56.21 406.15 | (cms) 2.403 9.543 ==================================== | (hrs) 6.33 34 6.08 36 6.08 34 | R.V. (mm) .15 .09 | |
| ADD HYD (0490) | | | | | |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | (ha) 406.15 | (cms) 11.718 6.559 | 6.08 34 6.00 36 | (mm) .42 .09 | |

Hadati Creek Watershed - Allowable ID = 3 (0490): 449.25 17.844 6.08 34.58 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0491) | 1 + 2 = 3 | AREA QPEAK (ha) (cms) 29.60 2.218 R.V (mm) 36.09 TPEAK (hrs) ID1= 1 (0482): + ID2= 2 (0490): 6.33 449.25 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. RESERVOIR (0483) IN= 2---> OUT= 1 | DT= 5.0 min | OUTFLOW STORAGE OUTFLOW STORAGE

 STORAGE
 00111000

 (ha.m.)
 (cms)

 .0000
 7.0800

 .0600
 8.1000

 .3400
 9.7980

 .6182
 10.4940

 1.1630
 11.6850

 1.7070
 12.3480

 _____ (cms) (ha.m.) .0000 2.4860 3.3240 4.6420 7.4397 .2760 1.2000 2.0400 2.6400 10.3000 3.1200 11.4000
 QPEAK
 TPEAK

 (cms)
 (hrs)

 18.134
 6.08

 7.118
 6.50
 AREA R.V. (ha) (cms) 478.850 18.134 478.850 7.118 (mm) 34.67 INFLOW : ID= 2 (0491) OUTFLOW: ID= 1 (0483) 34.67 PEAK FLOW REDUCTION [Qout/Qin] (%) = 39.25 TIME SHIFT OF PEAK FLOW (min)= 25.00 MAXIMUM STORAGE USED (ha.m.) = 2.5265ADD HYD (0530) | 1 + 2 = 3 |
 TPEAK
 R.V.

 (hrs)
 (mm)

 6.00
 61.38
 QPEAK TPEAK (cms) (hrs) 1.036 6.00 AREA (ha) 4.63 _____ ID1= 1 (0540): + 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. _____ ADD HYD (0545) | 1 + 2 = 3ID = 3 (0545): 558.24 14.150 6.50 35.67

Hadati Creek Watershed - Allowable NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0546) 1 + 2 = 3

 2 = 3
 AREA QPEAK TPEAK R.V.

 ID1= 1 (0542):
 25.25 5.333
 6.00
 61.38

 + ID2= 2 (0545):
 558.24
 14.150
 6.50
 35.67

 R.V. (mm) 61.38 ===== _____ ID = 3 (0546): 583.49 15.241 6.42 36.79 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0547) | 1 + 2 = 3______ ID = 3 (0547): 598.48 18.314 6.00 37.40 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0548) | 1 + 2 = 3 | AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)1.13.2666.0061.38598.4818.3146.0037.40 _____ ID1= 1 (0544): + ID2= 2 (0547): ______ ____ ID = 3 (0548): 599.61 18.579 6.00 37.45 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ********* ** SIMULATION NUMBER: 4 ** ****** Filename: Y:\SPrimmer\Miduss Modelling\105172\Ci READ STORM tyview Ridge\100yrSCS12hr.stm | Ptotal= 90.18 mm | Comments: 100 year SCS Type II 12hr design storm ---------------RAIN TIME RAIN | TIME TIME RAIN | TIME RAIN hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr 3.25 3.61 16.23 | .25 2.26 6.25 9.25 3.16

 2.26
 3.25

 2.26
 3.50

 2.26
 3.75

 2.26
 4.00

 2.26
 4.25

 2.26
 4.50

 2.26
 4.50

 2.26
 4.50

 2.26
 4.50

 2.26
 4.50

 2.26
 5.00

 2.70
 5.25

 .50 16.23 | 9.50 3.61 | 6.50 3.61 | 6.75 3.61 | 7.00 5.41 | 7.25 5.41 | 7.50 7.21 | 7.75 7.21 | 8.00 10.82 | 8.25 3.61 | 6.50 3.16 .75 9.75 7.21 | 3.16 1.00 7.21 | 10.00 3.16 5.41 | 10.25 5.41 | 10.50 5.41 | 10.75 5.41 | 11.00 1.80 1.25 1.50 1.80 1.80 1.80 1.75 2.00 1.80 3.16 | 11.25 2.25 1.80 Page 86

| 2.50 2.75 3.00 | Hadati 2.70 2.70 2.70 | 5.50 5.75 | Vatershed 10.82 43.29 119.04 | 8.50 | 3.16 | 11.75 | 1.80 1.80 1.80 |
|--|--|--|---|--|---------------|--|---|
| - | I ha)= mm)= (%)= (m)= = | MPERVIOL .90 1.50 .55 50.00 .013 | JS PEF | RVIOUS († .23 5.00 .55 40.00 .300 | i) | | |
| | | | | | | | |
| TIME hrs .083 .167 .250 .333 .417 .500 .583 .667 .750 .833 .917 1.000 1.083 1.167 1.250 1.333 1.417 1.500 1.583 1.667 1.750 1.833 1.917 2.000 2.083 2.167 2.250 2.333 2.417 2.500 2.583 2.667 2.750 2.833 2.917 3.000 | 2.26 2.26 2.26 2.26 2.26 2.26 2.26 2.26 | TIME hrs 3.083 3.167 3.250 3.333 3.417 3.500 3.583 3.667 3.750 3.833 3.917 4.000 4.083 4.167 4.250 4.333 4.417 4.250 4.333 4.417 4.500 4.583 4.417 4.500 4.583 4.417 5.000 5.167 5.250 5.333 5.167 5.250 5.333 5.167 5.250 5.333 5.167 5.250 5.333 5.167 5.250 5.333 5.167 5.250 5.333 5.167 6.000 | 3.61 3.61 3.61 3.61 3.61 3.61 3.61 3.61 3.61 3.61 3.61 3.61 5.41 5.41 5.41 5.41 5.41 7.21 7.21 7.21 7.21 7.21 7.21 10.82 10.94 119.04 119.04 | TIME hrs 6.083 6.167 6.250 6.333 6.417 6.500 6.583 6.667 6.750 6.833 6.917 7.000 7.083 7.167 7.250 7.333 7.417 7.500 7.333 7.417 7.500 7.583 7.417 7.500 7.583 7.417 7.500 7.583 7.417 7.500 7.583 7.417 8.000 8.083 8.167 8.250 8.333 8.417 8.500 8.583 8.417 8.500 8.583 8.417 9.000 | RAIN mm/hr | TIME hrs 9.08 9.17 9.25 9.33 9.42 9.50 9.58 9.67 9.75 9.83 9.92 10.00 10.08 10.17 10.25 10.33 10.42 10.50 | RAIN mm/hr 3.16 3.16 3.16 3.16 3.16 3.16 3.16 3.16 |
| /Max.Eff.Inten.(mm over (m | | $\begin{array}{r} 119.04\\ 5.00\end{array}$ | | L1.85 L5.00 | | | |

Page 87

Hadati Creek Watershed - Allowable (min)= 1.88 (ii) 12.97 (ii) Storage Coeff. Unit Hyd. Tpeak (min)= 5.00 15.00 Unit Hyd. peak (cms)= . 32 .08 *TOTALS* .30 6.00 .04 6.08 PEAK FLOW (cms) =.333 (iii) TIME TO PEAK (hrs) =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) = 4.14Fc (mm/hr) = 12.50 Cum.Inf. (mm) = .00FC (mm/hr)= 12.50 Cum.Inf. (mm)= (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALIB | CALIB | STANDHYD (0543) | |ID= 1 DT= 5.0 min | Area (ha)= 14.99 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 _____ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =11.99 3.00 1.50 5.00 Dep. Storage (mm) =.55 Average Slope (%)= .55 200.00 40.00 Length (m) =Mannings n .013 . 300 = 5.00 4.32 (ii) 5.00 Max.Eff.Inten.(mm/hr)= 111.85 over (min) 20.00 Storage Coeff. 15.41 (ii) (min) =Unit Hyd. Tpeak (min)= 20.00 Unit Hyd. peak (cms)= .23 .07 *TOTALS* 3.84 PEAK FLOW (cms) =.48 6.17 4.164 (iii) 6.00 TIME TO PEAK (hrs) =6.00 (mm)= RUNOFF VOLUME 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: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (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) ID= 1 DT= 5.0 min (ha) = 25.25Area Total Imp(%) = 80.00Dir. Conn.(%)= 79.00 IMPERVIOUS PERVIOUS (i) (ha) =20.20 Surface Area 5.05 Dep. Storage (mm) =1.50 5.00 Average Slope (%)= . 55 .55 Page 88

Hadati Creek Watershed - Allowable 40.00 Length (m)= 350.00 Mannings n ----.013 .300 119.04 Max.Eff.Inten.(mm/hr)= 111.85 5.00 over (min) 20.00 Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 6.05 (ii) 17.13 (ii) 5.00 20.00 .06 .19 ***TOTALS*** 6.23 6.00 88.68 90.19 .77 6.17 PEAK FLOW (cms) =6.749 (iii) TIME TO PEAK (hrs)= 6.00 RUNOFF VOLUME (mm)= 88.68 31.37 76.65 TOTAL RAINFALL (mm)= 90.18 90.18 RUNOFF COEFFICIENT = . 98 .35 .85 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (mm/hr) = 12.50 Cum.Inf. (mm) = .00. 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) | |ID= 1 DT= 5.0 min | Area (ha) = 16.00Dir. Conn.(%)= 79.00 Total Imp(%) = 80.00------IMPERVIOUS PERVIOUS (i) (ha) =Surface Area 12.80 3.20 Dep. Storage (mm) =1.50 5.00 .50 400.00 .20 Average Slope (%)= Length 40.00 (m) =Mannings n .013 .300 119.04 Max.Eff.Inten.(mm/hr)= 91.82 5.00 6.74 (ii) 5.00 .18 over (min) 25.00 22.99 (ii) Storage Coeff. (min) =Unit Hyd. Tpeak (min)= 25.00 .05 Unit Hyd. peak (cms)= .18 (nrs)= 3.88 (nrs)= 6.00 (mm)= 88.68 (mm)= 90.18 T = ***TOTALS*** .40 6.25 PEAK FLOW 4.080 (iii) TIME TO PEAK 6.00 RUNOFF VOLUME 31.37 76.65 TOTAL RAINFALL 90.18 90.18 RUNOFF COEFFICIENT .35 . 85 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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 Total Imp(%)= 46.00 Dir. Conn.(%)= 26.00 ID= 1 DT= 5.0 min | IMPERVIOUS PERVIOUS (i) Page 89

| Surface Area Dep. Storage Average Slope Length Mannings n | (ha) = | 112 24 | rshed - Allowab 131.76 5.00 .80 40.00 .300 | le |
|---|---|---|---|--|
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | <pre>(min) (min)= (min)= (cms)=</pre> | 10.00 11.73 (ii) 10.00 .10 | 25.00) 20.53 (ii) 25.00 .05 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | 15.54 6.00 88.68 90.18 .98 | 24.76 6.25 36.25 90.18 .40 | 34.262 (iii) 6.17 49.88 90.18 .55 |
| Fo (mn Fc (mn (ii) TIME STEF | 1/hr)= 75.0 1/hr)= 12.5 9 (DT) SHOU STORAGE CO | 0 I O Cum.In [.] LD BE SMALLEI EFFICIENT. | - | 4) |
| CALIB STANDHYD (0540) ID= 1 DT= 5.0 min | Area Total I | (ha)= 4.63 mp(%)= 80.00 | 3) Dir. Conn.(% | <pre>%)= 79.00</pre> |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 3.70 1.50 .55 150.00 .013 | PERVIOUS (i) .93 5.00 .55 40.00 .300 | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | (mm/hr)= (min) (min)= ((min)= | 119.04 5.00 3.64 (ii) 5.00 .25 | 111.85 15.00) 14.73 (ii) 15.00 .08 | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC3 | (cms)= (hrs)= (mm)= (mm)= EENT = | 1.20 6.00 88.68 90.18 .98 | .16 6.08 31.37 90.18 .35 | *TOTALS* 1.339 (iii) 6.00 76.65 90.18 .85 |
| ***** WARNING: STORA (i) HORTONS E Fo (mn Fc (mn (ii) TIME STEF | AGE COEFF. QUATION SE 1/hr)= 75.0 1/hr)= 12.5 (DT) SHOU STORAGE CO | IS SMALLER TH LECTED FOR PH O H O Cum.Int LD BE SMALLEH EFFICIENT. | ERVIOUS LOSSES: < (1/hr)= 4.14 f. (mm)= .00 R OR EQUAL | 4 D |
| CALIB | | Page | 90 | |

| STANDHYD (0484) ID= 1 DT= 5.0 min | Area | (ha) = 12.60 | shed - Allowab Dir. Conn.(| | | |
|---|--|--|---|--|--|--|
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 5.29 1.50 2.00 680.00 .013 | 7.31 5.00 2.00 40.00 .300 | | | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | mm/hr)= (min) (min)= (min)= (cms)= | 119.04 5.00 6.11 (ii) 5.00 .19 | 149.56 15.00 12.82 (ii) 15.00 .08 | *TOTALS* | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .83 6.00 88.68 90.18 .98 | 1.92 6.08 36.13 90.18 .40 | 2.550 (iii) 6.00 47.17 90.18 .52 | | |
| <pre>(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr)= 75.00</pre> | | | | | | |
| STANDHYD (0565) ID= 1 DT= 5.0 min | Area Total | (ha)= 11.10 Imp(%)= 42.00 | Dir. Conn.(| %)= 21.00 | | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 4.66 1.50 2.00 680.00 .013 | PERVIOUS (i) 6.44 5.00 2.00 40.00 .300 | | | |
| Max.Eff.Inten.(| mm/hr)= (min) (min)= | | 149.56 15.00 | | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .73 6.00 88.68 90.18 .98 | 1.69 6.08 36.13 90.18 .40 | *TOTALS* 2.246 (iii) 6.00 47.17 90.18 .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. | | | | | | |

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

Hadati Creek Watershed - Allowable CALIB STANDHYD (0481) Area (ha) = 5.90|ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn.(%) = 21.00_____ **IMPERVIOUS** PERVIOUS (i) Surface Area (ha) =2.48 3.42 1.50 5.00 Dep. Storage (mm) =Average Slope (%)= 2.00 2.00 680.00 Length (m) =40.00 Mannings n = .013 .300 Max.Eff.Inten.(mm/hr)= 119.04 149.56 over (min) 5.00 15.00 Storage Coeff. 6.11 (ii) 12.82 (ii) (min) =Unit Hyd. Tpeak (min)= 5.00 15.00 Unit Hyd. peak (cms)= .19 .08 ***TOTALS*** . 39 .90 1.194 (iii) PEAK FLOW (cms) =TIME TO PEAK (hrs) =6.00 6.08 6.00 RUNOFF VOLUME (mm)= 88.68 36.13 47.17 (mm)= 90.18 TOTAL RAINFALL 90.18 90.18 RUNOFF COEFFICIENT = .98 .40 . 52 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 75.00FO FC (mm/hr) = 12.50(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) = 24.20ID= 1 DT= 5.0 min Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =10.1614.04 Dep. Storage 1.50 (mm) =5.00 Average Slope (%)= 2.00 2.00 (m) =401.00 Length 40.00 Mannings n .300 .013 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)= Unit Hyd. peak (cms)= 5.00 15.00 .23 .09 *TOTALS* 3.90 PEAK FLOW (cms) =1.64 5.204 (iii) (hrs)= 6.00 TIME TO PEAK 6.08 6.00 RUNOFF VOLUME (mm) =88.68 36.13 47.17 (mm) =TOTAL RAINFALL 90.18 90.18 90.18 RUNOFF COEFFICIENT .40 = .98 .52 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00K (1/hr) = 4.14Cum.Inf. (mm)= .00 FO FC (mm/hr) = 12.50Page 92

Hadati Creek Watershed - Allowable (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) 2.10 1.50 2.86 185.00 .013 Surface Area Dep. Storage (ha) =2.89 5.00 (mm)= Average Slope (%)= 2.86 Length 40.00 (m)= .013 Mannings n = .300 Max.Eff.Inten.(mm/hr)= 119.04 over (min) 5.00 Storage Coeff. (min)= 2.51 (ii) Unit Hyd. Tpeak (min)= 5.00 Unit Hyd. peak (cms)= .29 149.56 10.00 8.54 (ii) 10.00 .12 *TOTALS* .35 6.00 88.68 90.18 .96 6.00 36.13 PEAK FLOW (cms) =1.304 (iii) TIME TO PEAK (hrs)= 6.00 (mm)= RUNOFF VOLUME 47.17 (mm)= TOTAL RAINFALL 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) = 4.14Fc (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) 7.98 Surface Area (ha) =11.02 1.50 2.00 365.00 5.00 Dep. Storage (mm)= 2.00 Average Slope (%)= Length (m)= 40.00 Mannings n .013 . 300 119.04 Max.Eff.Inten.(mm/hr)= 5.00 4.21 (ii) 5.00 .24 149.56 over (min) 15.00 Storage Coeff. (min)= 10.91 (ii) Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .09 LCMS)=1.30LIME TO PEAK (hrs)=6.00RUNOFF VOLUME (mm)=88.68TOTAL RAINFALL (mm)=90.18RUNOFF COEFFICIENT =.92 ***TOTALS*** 3.09 6.08 4.123 (iii) 6.00 47.17 36.13 90.18 90.18 .40 . 52

Hadati Creek Watershed - Allowable ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALIB STANDHYD (0101) | Area (ha)= 16.32 Total Imp(%)= 42.00 |ID= 1 DT= 5.0 min | Dir. Conn.(%) = 21.00______ IMPERVIOUS PERVIOUS (i) Surface Area (ha)= 6.85 9.47 1.50 5.00 Dep. Storage (mm) =Average Slope (%)= 2.00 2.00 309.00 Length (m)= 40.00 Mannings n ----.013 .300 Max.Eff.Inten.(mm/hr)= 119.04 149.56 over (min) 5.00 15.00 3.81 (ii) Storage Coeff. 10.51 (ii) (min) =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) 6.00 TIME TO PEAK (hrs) =6.00 6.08 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: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (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) ID= 1 DT= 5.0 min Area (ha)= 14.32 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 (%)= 2.00 Average Slope 2.00 287.00 Length (m) =40.00 Mannings n _ .013 .300 119.04 Max.Eff.Inten.(mm/hr)= 149.56 over (min) 5.00 15.00 3.64 (ii) 10.35 (ii) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= 5.00 15.00 Unit Hyd. peak (cms)= .25 .09 ***TOTALS*** PEAK FLOW (cms) =.98 2.37 3.171 (iii) Page 94

Hadati Creek Watershed - Allowable (hrs) =TIME TO PEAK 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: (mm/hr) = 75.00K (1/hr)= 4.14 Cum.Inf. (mm)= .00 Fo (mm/hr) = 12.50FC (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) (ha) = 51.32Area ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) 21.55 1.50 Surface Area (ha) =29.77 Dep. Storage (mm) =5.00 2.00 Average Slope (%)= 2.00 Length 550.00 (m)= 40.00 Mannings n .013 . 300 Max.Eff.Inten.(mm/hr)= 119.04 149.56 5.00 5.38 5.00 over (min) 15.00 Storage Coeff. (min)= 5.38 (ii) 12.09 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 15.00 .21 .09 *TOTALS* PEAK FLOW (cms) =3.42 8.01 10.668 (iii) TIME TO PEAK 6.00 6.00 (hrs) =6.08 88.68 RUNOFF VOLUME (mm) =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) = 4.14Fc (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) | |ID= 1 DT= 5.0 min | Area (ha)= 117.50 Total Imp(%) = 42.00Dir. Conn.(%)= 21.00 IMPERVIOUS PERVIOUS (i) 49.35 Surface Area (ha) =68.15 5.00 Dep. Storage (mm) =1.50 Average Slope (%)= 2.00 2.00 885.00 Length (m) =40.00 Mannings n .013 .300 -Max.Eff.Inten.(mm/hr)= 119.04 149.56 5.00 over (min) 15.00 7.16 (ii) 13.86 (ii) Storage Coeff. (min)= Page 95

Hadati Creek Watershed - Allowable Unit Hyd. Tpeak (min)= 5.00 15.00 Unit Hyd. peak (cms)= .17 .08 ***TOTALS*** 17.25 6.08 36.13 22.881 (iii) PEAK FLOW (cms)= TIME TO PEAK (hrs)= 6.00 RUNOFF VOLUME 47.17 TOTAL RAINFALL 90.18 90.18 = RUNOFF COEFFICIENT .98 .40 . 52 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: F0 (mm/hr)= 75.00 K (1/hr)= 4.14Fc (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) ID= 1 DT= 5.0 min Area (ha)= 12.30 Total Imp(%)= 42.00 Dir. Conn. (%) = 21.00_____ IMPERVIOUS PERVIOUS (i) 5.17 Surface Area (ha) =7.13 Dep. Storage (mm) =1.50 5.00 1.60 Average Slope (%)= 1.60 $\begin{array}{c}1.60\\286.00\end{array}$ Length (m) =40.00 Mannings n . 300 .013 Max.Eff.Inten.(mm/hr)= 119.04 149.56 5.00 3.89 (ii) 5.00 .25 over (min) 15.00 Storage Coeff. (min)= 11.05 (ii) Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .09 *TOTALS* PEAK FLOW .84 6.00 1.99 (cms) =2.661 (iii) TIME TO PEAK (hrs) =6.08 6.00 RUNOFF VOLUME (mm) =88.68 36.13 47.17 (mm)= TOTAL RAINFALL 90.18 90.18 90.18 RUNOFF COEFFICIENT = .98 . 52 . 40 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (mm/hr)= 12.50 Cum.Inf. (mm)= (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) | |ID= 1 DT= 5.0 min | Area (ha)= 16.30 Total Imp(%)= 42.00 Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =6.85 9.45 Dep. Storage (mm) =1.50 5.00 1.00 Average Slope (%)= 1.00 330.00 Length (m) =40.00 Mannings n .013 = .300 Page 96

Hadati Creek Watershed - Allowable

| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | 5.00 4.88 (ii) 5.00 .22 1.10 6.00 88.68 90.18 .98 | 15.00 13.13 (ii) 15.00 .08 2.45 6.08 36.13 90.18 .40 | *TOTALS* 3.299 (iii) 6.00 47.17 90.18 .52 | | | |
|---|---|--|--|--|--|--|
| <pre>***** 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.</pre> | | | | | | |
| CALIB STANDHYD (0360) Area ID= 1 DT= 5.0 min Total | (ha)= 30.00 Imp(%)= 37.00 | Dir. Conn.(9 | %)= 19.00 | | | |
| Surface Area (ha)= Dep. Storage (mm)= Average Slope (%)= Length (m)= Mannings n = | IMPERVIOUS 11.10 1.50 2.00 447.00 .013 | PERVIOUS (i) 18.90 5.00 2.00 40.00 .300 | | | | |
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | 5.00 4.75 (ii) 5.00 .22 | 15.00 11.63 (ii) 15.00 .09 | *TOTALS* | | | |
| PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | 1.83 6.00 88.68 90.18 .98 | 4.81 6.08 35.04 90.18 .39 | 6.183 (iii) 6.00 45.23 90.18 .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 Page 97 | | | | | | |

| | Hada | ati Creek Water | shed - Allowab | le |
|---|---|--|---|--|
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 5.12 1.50 2.00 900.00 .013 | 46.08 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | mm/hr)= (min) (min)= (min)= (cms)= | 119.04 5.00 7.23 (ii) 5.00 .17 | 112.64 15.00 14.74 (ii) 15.00 .08 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .78 6.00 88.68 90.18 .98 | 8.19 6.08 31.49 90.18 .35 | 8.631 (iii) 6.08 34.35 90.18 .38 |
| ***** WARNING:FOR AR YOU SH | | IMPERVIOUS RAT | | |
| Fo (mm Fc (mm (ii) TIME STEP | /hr)= 75. /hr)= 12. / (DT) SHC STORAGE C | OULD BE SMALLER | (1/hr)= 4.14 (mm)= .00 OR EQUAL | 1 |
| CALIB STANDHYD (0455) ID= 1 DT= 5.0 min | Area Total | (ha)= 12.70 Imp(%)= 42.00 |) Dir. Conn.(% | 6)= 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 5.33 1.50 1.71 300.00 .013 | PERVIOUS (i) 7.37 5.00 1.71 40.00 .300 | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak | mm/hr)= (min) (min)= | | 149.56 15.00 | *** |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .87 6.00 88.68 90.18 .98 | 2.06 6.08 36.13 90.18 .40 | *TOTALS* 2.756 (iii) 6.00 47.17 90.18 .52 |
| ***** WARNING: STORA | GE COEFF. | IS SMALLER TH | AN TIME STEP! | |
| Fo (mm Fc (mm (ii) TIME STEP | /hr)= 75. /hr)= 12. (DT) SHO STORAGE C | 50 Cum.Inf DULD BE SMALLER COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 OR EQUAL LOW IF ANY. | |

_____ _____ CALIB STANDHYD (0460) |ID= 1 DT= 5.0 min | Area (ha)= 36.00 Total Imp(%)= 42.00 Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =15.12 20.88 1.50 Dep. Storage (mm) =5.00 Average Slope (%)= 2.03 2.03 Length (m) =465.00 40.00 Mannings n = .013 .300 149.56 Max.Eff.Inten.(mm/hr)= 119.04 5.00 over (min) 15.00 Storage Coeff. 4.84 (ii) (min) =11.52 (ii) Unit Hyd. Tpeak (min)= 5.00 15.00 Unit Hyd. peak (cms) =.22 .09 ***TOTALS*** 5.73 PEAK FLOW (cms) =2.43 7.639 (iii) TIME TO PEAK (hrs)= 6.00 6.08 6.00 36.13 47.17 RUNOFF VOLUME (mm) =88.68 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: (mm/hr) = 75.00K (1/hr)= 4.14 Cum.Inf. (mm)= .00 Fo FC (mm/hr) = 12.50(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ _____ CALIB STANDHYD (0480) (ha) = 43.10Area |ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =18.10 25.00 (mm) =5.00 Dep. Storage 1.50 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. 6.11 (ii) (min)= 12.82 (ii) Unit Hyd. Tpeak (min)= 5.00 15.00 Unit Hyd. peak .19 (cms) =.08 *TOTALS* 8.721 (iii) PEAK FLOW (cms) =2.82 6.56 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 . 52 RUNOFF COEFFICIENT .98 = .40

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr)= 75.00 K (1/hr)= 4.14 Page 99

Hadati Creek Watershed - Allowable (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FC (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) | ID= 1 DT=****min | .00 (ha)= AREA (hrs)= .00 QPEAK TPEAK _____ (mm)=****** VOLUME -----DUHYD (0505) Inlet Cap.=9.000#of Inlets= 1 AREA Total(cms)= 9.0 QPEAK TPEAK R.V. (cms) 34.26 (ha) (hrs) (mm) TOTAL HYD. (ID= 1): 244.00 49.88 6.17 د خذ خذ خذ جه جه جه جه حد حد حد خذ خذ خذ خذ خذ حد حد حد جه جه جه حد ______ _____ _____ 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 (0566) |1 + 2 = 3 |AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)12.602.5506.0047.1711.102.2466.0047.17 R.V. (mm) 47.17 _____ ID1 = 1 (0484):+ ID2= 2 (0565): ID = 3 (0566):23.70 4.796 6.00 47.17 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0420) 1 + 2 = 3 R.V. (mm) 47.17 AREA QPEAK TPEAK (ha) (cms) 24.20 5.204 (hrs) _ _ _ _ _ _ _ _ _ _ _ _ ID1= 1 (0410): 6.00 + 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 | STORAGE
(ha.m.)OUTFLOW
(cms).00001.0000.010020.0000.1000.0000 DT= 5.0 min OUTFLOW STORAGE (cms) (ha.m.) $1.0000 \\ 1.1000$.0000 .0100 .0120 .0000 AREA QPEAK TPEAK R.V.

Hadati Creek Watershed - Allowable (ha) (cms) (hrs) 19.000 4.123 6.00 (mm) INFLOW : ID= 2 (0110) OUTFLOW: ID= 1 (0111) 6.00 47.17 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 (0103) 1 + 2 = 3 QPEAK (cms) 3.593 R.V. (mm) 47.17 TPEAK _____ (hrs) 6.00 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 OUTFLOWSTORAGEOUTFLOW(cms)(ha.m.)(cms).0000.0000.5000.0100.01006.6000.0260.2300.0000 DT= 5.0 min STORAGE ------(ha.m.) .4000 .8000 .0000 **** WARNING : STORAGE-DISCHARGE TABLE WAS EXCEEDED. QPEAK (cms) AREA TPEAK R.V. (ha) 51.320 51.320 (hrs) (mm) INFLOW : ID= 2 (0105) OUTFLOW: ID= 1 (0106) 6.00 6.17 47.17 10.668 7.689 47.16 PEAK FLOW REDUCTION [Qout/Qin](%)= 72.08 TIME SHIFT OF PEAK FLOW (min)= 10.00 (hà.m.)= MAXIMUM STORAGE USED .8782 ROUTE CHN (0358) | | IN= 2---> OUT= 1 | Routing time step (min)'= 5.00 <---- DATA FOR SECTION (1.1) ----> Elevation Manning .26 .0300 Distance .00 .26 .0300 / .0150 Main Channel .0150 Main Channel .15 .00 5.51 .09 .0150 10.00 .0150 Main Channel .0150 Main Channel .00 14.49 .15 14.50 .0150 / .0300 Main Channel .0300 20.00 .26 <----- TRAVEL TIME TABLE ----->
DEPTH ELEV VOLUME FLOW RATE VELOCITY TRAV.TIME
 DEPTH
 ELEV
 VOLUME

 (m)
 (m)
 (cu.m.)

 .01
 .01
 .102E+02

 .03
 .03
 .409E+02

 .04
 .04
 .920E+02

 .05
 .05
 .163E+03
 (m/s) (min) .17 109.52 (cms) .0 .0 .0 .1 .27 68.99 52.65 .35 .42 43.46 Page 101

| | .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | 49912+03 634E+03 769E+03 104E+04 119E+04 135E+04 154E+04 175E+04 198E+04 223E+04 223E+04 250E+04 279E+04 | .1 .2 .3 .4 .6 .8 1.0 1.2 1.4 1.7 2.0 2.3 2.6 3.0 3.4 | .49 .55 .64 .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 | 13.65 |
|-----------------------------|---|---|--|---|--|
| INFLOW : OUTFLOW: | ID= 2 (0355) ID= 1 (0358) | <pre></pre> | hydro <u>c</u> QPEAK TF (cms) (h 2.66 6 1.86 6 | graph> PEAK R.V. ars) (mm) 5.00 47.17 5.17 47.12 | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) .23 1.31 .20 1.23 |
| ROUTE CHN (0 IN= 2> OL | JT= 1 F DA1 | TA FOR SECTIO Elevatio .26 .15 .00 | ON (1.1) n Mar .(.0300 .(|)> nning)300 / .0150 Maiu)150 Maiu | n Channel n Channel n Channel n Channel n Channel n Channel |
| DEPTH (m) | ELEV (m) (.01 .2 .03 .3 .04 .8 .05 .1 .07 .2 .08 .3 .10 .4 .11 .5 .12 .6 .14 .8 .15 .9 .16 .1 .18 .1 .19 .1 .20 .1 .22 .1 .23 .2 | VOLUME F (cu.m.) 929E+01 372E+02 336E+02 149E+03 232E+03 334E+03 576E+03 576E+03 576E+03 576E+03 576E+03 522E+03 944E+03 108E+04 123E+04 123E+04 140E+04 159E+04 159E+04 203E+04 227E+04 254E+04 | LOW RATE (cms) .0 .0 .1 .1 .2 .3 .4 .6 .8 1.0 1.2 1.4 1.7 2.0 2.3 2.6 3.0 3.4 | VELOCITY (m/s) .17 .27 .35 .42 .49 .55 .64 .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 yraph> | TRAV.TIME |
| | | AREA | | PEAK R.V. | MAX DEPTH MAX VEL |

| INFLOW : OUTFLOW: | ID= 2 (03 ID= 1 (03 | Hadati Cr (ha) 50) 16.30 53) 16.30 | eek Watersl (cms) 3.30 2.44 | ned - Al (hrs) 6.00 6.17 | lowable (mm) 47.17 47.13 | (m) .26 .22 | (m/s) 1.34 1.29 |
|---|--|---|---|-----------------------------------|---|---|--|
| ROUTE CHN (IN= 2> O | 0362) UT= 1 | Routing t | ime step (r | nin)'= | 5.00 | | |
| | <pre>< Distance .00 5.50 5.51 10.00 14.49 14.50 20.00</pre> | DATA FOR SE Eleva | CTION (2 tion .40 .15 .02 .00 .09 .00 .15 .02 .40 | Manning .0300 300 / 0 | 150 Mai | n Channel n Channel n Channel n Channel n Channel | |
| .06 .08 .09 .11 .13 .15 .17 .20 .22 .24 .26 .29 .31 .33 .35 | ELEV (m) .02 .04 .06 .08 .09 .11 .13 .15 .17 .20 .22 .24 .26 .29 .31 .33 .35 | .607E+03 .776E+03 .944E+03 | L TIME TAB FLOW RAT (cms) .0 .1 .1 .3 .7 1.0 1.3 1.8 2.3 2.8 3.4 4.0 4.8 5.5 6.4 7.3 8.2 | E VEL (| OCITY m/s) .21 .33 .52 .62 .77 .90 1.03 1.16 1.27 1.36 1.44 1.51 1.57 1.62 1.67 1.72 | TRAV.TIME (min) 80.52 50.72 38.71 31.95 26.84 21.66 18.45 16.22 14.36 13.13 12.24 11.58 11.05 10.63 10.27 9.97 9.71 9.48 9.28 | |
| | ID= 2 (03 ID= 1 (03 | | (cms) 6.18 | | R.V. (mm) 45.23 | <-pipe / c MAX DEPTH (m) .35 .31 | hannel-> MAX VEL (m/s) 1.71 1.63 |
| + ID2 | 3 = 1 (0455) = 2 (0460) | : 36.00 | QPEAK (cms) 2.756 7.639 | (hrs) 6.00 6.00 | (mm) 47.17 47.17 | | |
| ID | = 3 (0465) | | 10.395 | 6.00 | 47.17 | | |
| NUTE: P | EAK FLUWS | DO NOT INCL | UDE BASEFLO | JWS IF A | .INEY . | | |

Hadati Creek Watershed - Allowable _____ ADD HYD (0515) | 2 = 3AREAQPEAKTPEAKR.V.ID1= 1(0510):16.004.0806.0076.65+ ID2= 2(0505):141.979.0005.8349.88 1 + 2 = 3_____ 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
 Intervention
 Maining

 101.50
 .0500

 100.70
 .0500

 100.55
 .0500 / .0300

 99.50
 .0300

 99.60
 .0300

 100.65
 .0300 / .0500

 Main Channel
 .0300

 101.45
 .0500
 .0500 .00 1.00 1.50 2.00 3.50 4.50 6.00 <---->
 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

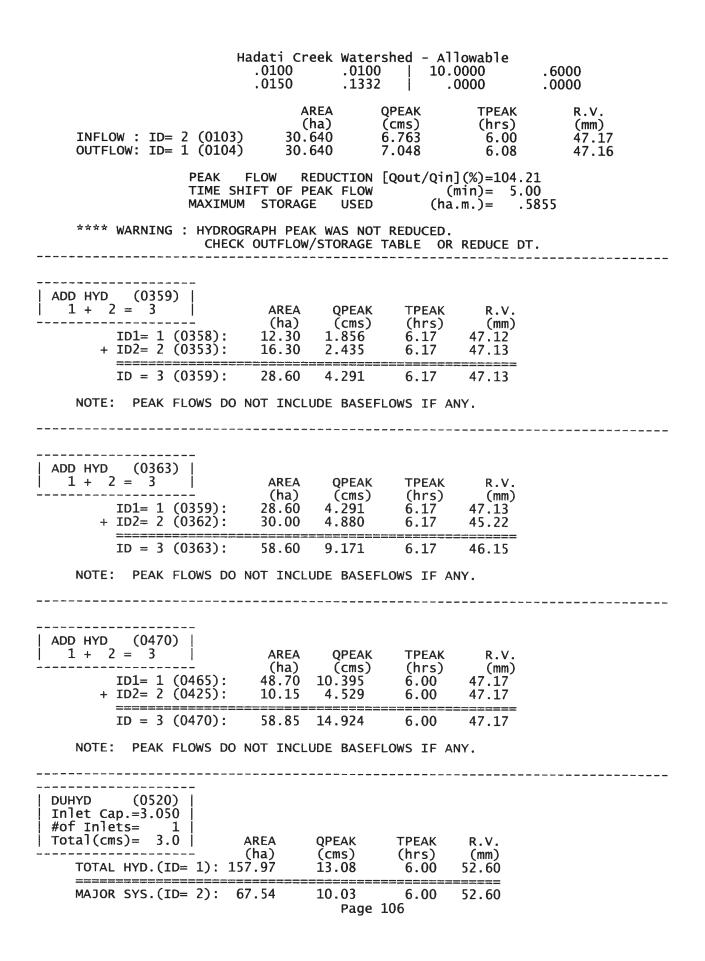
 .38
 99.88
 .285E+03
 .3
 .59
 14.23

 .48
 00
 .231E+02
 .5
 .67
 12.51
 .3 .48 99.98 .381E+03 .67 12.51 100.07 .74 .57 11.32 .80 10.43 .67 100.17 100.26 .86 9.74 9.18 .76 .86 100.36 .91 8.72 .95 100.45 .96 1.00 1.05 100.55 8.32 1.16 100.66 1.07 7.80 1.28 100.78 7.31 1.141.39 100.89 1.20 6.94 1.50 101.00 1.25 6.65 1.30 1.34 1.38 1.61 101.11 6.41 101.22 6.22 1.72 101.34 1.84 6.04 101.45 1.41 1.95 5.90 **** WARNING: TRAVEL TIME TABLE EXCEEDED <---- hydrograph ----> <-pipe / channel->
 QPEAK
 TPEAK
 R.V.
 MAX
 DEPTH
 MAX
 VEL

 (cms)
 (hrs)
 (mm)
 (m)
 (m/s)

 25.26
 6.17
 49.88
 1.80
 1.37
 AREA (ha) 102.03 102.03 (m) (m/s) 1.80 1.37 1.95 1.41 INFLOW : ID= 2 (0505) OUTFLOW: ID= 1 (0564) 6.58 49.88 39.67 **** WARNING: COMPUTATIONS FAILED TO CONVERGE. _____ | ROUTE CHN (0563) |

| IN= 2> OUT= 1 | Hadati Cree Routing tin | ek Watershed ne step (min) | - Allowable '= 5.00 | |
|--|---|--|---|---|
| < Distance .00 2.00 4.00 4.50 5.00 7.00 9.00 | DATA FOR SECT Elevati 1.0 .5 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 | TION (2.2) ion Man 00 .0 50 .0 50 .0350 00 .0350 50 .0 50 .0 50 .0 | ning 350 350 / .0350 Ma 350 Ma / .0350 Ma 350 350 | in Channel in Channel in Channel |
| $\begin{array}{c} <$ | VOLUME (cu.m.) .573E+01 .135E+02 .232E+02 .349E+02 .486E+02 .643E+02 .643E+02 .820E+02 .102E+03 .123E+03 .147E+03 .173E+03 .200E+03 .230E+03 .295E+03 .331E+03 .369E+03 .408E+03 .450E+03 | FLOW RATE (cms) .0 .1 .3 .5 .9 1.2 1.7 2.2 2.9 3.6 4.4 5.4 6.4 7.6 8.9 10.3 11.8 13.5 15.2 | VELOCITY (m/s) .67 .99 1.23 1.42 1.58 1.73 1.86 1.98 2.10 2.21 2.31 2.42 2.51 2.61 2.70 2.79 2.88 2.97 3.05 | TRAV.TIME (min) 2.23 1.51 1.22 1.06 .95 .87 .81 .76 .71 .68 .65 .62 .60 .58 .56 .54 .52 .51 .49 |
| INFLOW : ID= 2 (05 OUTFLOW: ID= 1 (05 | AREA (ha) 66) 23.70 63) 23.70 | < hydrog QPEAK TPI (cms) (hi 4.80 6 4.63 6 | raph> EAK R.V. rs) (mm) .00 47.17 .08 47.17 | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) .60 2.35 .59 2.33 |
| DUHYD (0425) Inlet Cap.=1.980 #of Inlets= 1 Total(cms)= 2.0 TOTAL HYD.(ID= 1): | (ha) (29.19 | QPEAK TPE/ (cms) (hr: 6.51 6.0 | s) (mm) | |
| MAJOR SYS.(ID= 2): MINOR SYS.(ID= 3): | 10.15 | 4.53 6.0 1.98 5.8 | | |
| NOTE: PEAK FLOWS | DO NOT INCLUD | DE BASEFLOWS | IF ANY. | |
| RESERVOIR (0104) IN= 2> OUT= 1 DT= 5.0 min | OUTFLOW (cms) .0000 | STORAGE (ha.m.) .0000 Page 105 | OUTFLOW (cms) 1.0000 | STORAGE (ha.m.) .5000 |



| Ha MINOR SYS.(ID= 3): 90 | adati Creek Waters 0.43 3.05 | hed - Allowable 5.58 52.60 | |
|--|---|---|--|
| NOTE: PEAK FLOWS DO | | | |
| ROUTE CHN (0561) IN= 2> OUT= 1 R(| | | |
| Distance .00 2.00 4.00 4.50 5.00 7.00 9.00 | A FOR SECTION (Elevation 1.00 .50 .00 .0 .00 .00 .0 .50 1.00 | Manning .0350 .0350 350 / .0350 Mair .0350 Mair .0350 / .0350 Mair .0350 .0350 | 1 Channel 1 Channel 1 Channel |
| <pre> DEPTH ELEV ((m) (m) (0 .05 .05 .33 .11 .11 .74 .16 .16 .11 .21 .21 .19 .26 .26 .26 .32 .32 .32 .37 .37 .44 .42 .42 .50 .47 .47 .68 .53 .53 .83 .58 .58 .99 .63 .63 .11 .68 .68 .12 .74 .74 .14 .79 .79 .10 .84 .84 .18 .89 .89 .20 .95 .95 .22 1.00 1.00 .25 </pre> | TRAVEL TIME TAE VOLUME FLOW RAT cu.m.) (cms) 19E+01 .1 48E+01 .2 29E+02 .4 94E+02 .7 70E+02 1.0 57E+02 1.5 56E+02 2.0 65E+02 2.0 65E+02 2.0 65E+02 3.4 17E+02 4.2 60E+02 5.1 11E+03 6.2 28E+03 7.3 45E+03 8.6 64E+03 10.0 84E+03 11.6 05E+03 13.2 27E+03 15.0 50E+03 17.0 | E E VELOCITY 1 (m/s) .87 1.26 1.54 1.75 1.93 2.08 2.22 2.34 2.46 2.57 2.68 2.78 2.87 2.97 3.06 3.14 3.23 3.31 3.40 | FRAV.TIME (min) .95 .66 .54 .48 .43 .40 .38 .36 .34 .32 .31 .30 .29 .28 .27 .27 .27 .26 .25 .25 |
| INFLOW : ID= 2 (0563) OUTFLOW: ID= 1 (0561) | AREA QPEAK (ha) (cms) | TPEAK R.V. (hrs) (mm) | <pre><-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s)</pre> |
| ADD HYD (0114) 1 + 2 = 3 ID1= 1 (0111): + ID2= 2 (0104): | AREA QPEAK (ha) (cms) 19.00 .613 30.64 7.048 | TPEAK R.V. (hrs) (mm) 6.58 47.16 6.08 47.16 | |
| ID = 3 (0114): | 49.64 7.421 | 6.08 47.16 | |
| NOTE: PEAK FLOWS DO N | NOT INCLUDE BASEFL | | |
| | Page 1 | | |

Hadati Creek Watershed - Allowable ADD HYD (0380) | R.V. (mm) 47.17

 2 = 3
 AREA QPEAK TPEAK R.V.

 ID1= 1 (0365):
 117.50 22.881 6.00 47.17

 + ID2= 2 (0363):
 58.60 9.171 6.17 46.15

 1 + 2 = 3ID = 3 (0380): 176.10 30.2316.08 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 .0500 100.00 324.60
 321.60
 .0500

 320.80
 .0500 / .0300
 Main Channel

 320.80
 .0300 / .0500
 Main Channel

 321.60
 .0300 / .0500
 Main Channel
 115.00 120.00 122.00 138.00 322.30 .0500 148.00 154.00 323.10 164.00 324.60 .0500 <---->
 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
 FLOW RATE (cms) .8 3.3 8.1 15.6 26.8 41.2 59.3 81.9 109.1 140.2 175.3 1.131.36.80 1.00 321.60 .430E+04 1.56 4.59 321.80 .644E+04 1.79 4.01 1.99 322.00 .892E+04 1.20 3.61 .117E+05 .148E+05 .182E+05 3.30 1.40 322.20 2.17 $\frac{1}{2}.\frac{1}{3}7$ 1.60 322.40 3.02 1.80 322.60 2.58 2.00 322.80 2.77 2.95 .218E+05 2.59 .256E+05 2.20 323.00 175.3 2.43 3.12 3.29 2.40 323.20 .296E+05 214.7 2.29 2.60 323.40 258.6 .338E+05 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 .476E+05 416.0 3.20 324.00 3.76 1.91 324.20 .526E+05 477.5 543.5 3.91 3.40 1.83 1.77 3.60 324.40 .578E+05 4.05 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) 58.85 (cms) (hrs) (m) (m/s) (mm) INFLOW : ID= 2 (0470) OUTFLOW: ID= 1 (0475) 6.00 47.17 .78 14.92 1.54 58.85 13.38 6.08 47.17 .74 1.49 _____ ADD HYD (0526) | 1 + 2 = 3 | AREA QPEAK TPEAK R.V. Page 108

Hadati Creek Watershed - Allowable (ha) (cms) (hrs) 67.54 10.030 6.00 -----(mm) 10.030 6.00 52.60 .001 .00 ****** ID1= 1 (0520): 52.60 .00 + ID2= 2 (0525): _____ 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 | QPEAK (cms) R.V. (mm) 47.17 AREA TPEAK (ha) 23.70 -----(hrs) 23.70 4.690 5.90 1.194 ID1= 1 (0561): 6.08 + ID2= 2 (0481): 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 = 3AREA QPEAK (ha) (cms) 49.64 7.421 TPEAK R.V. ID1= 1 (0114): 49.64 7.421 + ID2= 2 (0106): 51.32 7.689 ------(mm) (hrs) 47.16 6.08 6.17 47.16 ID = 3 (0115): 100.96 14.3936.08 47.16 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ **RESERVOIR** (0390) | IN= 2---> OUT= 1UUTFLOW STORAGE (cms) (ha.m.) 1.3100 1 6000 DT= 5.0 min OUTFLOW STORAGE _____ (ha.m.) (cms) .0000 1.6000 .0000 .2870 .7700 1.8600 23.2300 1.2600 Í .0000 .0000 QPEAK (cms) TPEAK AREA TPEAK (hrs) R.V. (ha) 176.100 176.100 (mm) INFLOW : ID= 2 (0380) OUTFLOW: ID= 1 (0390) 6.08 30.231 46.83 1.430 46.83 PEAK FLOW REDUCTION [Qout/Qin](%)= 4.73 TIME SHIFT OF PEAK FLOW (min)= 70.00 (ha.m.) = 6.3304MAXIMUM STORAGE USED _____ ROUTE CHN (0527) | IN= 2---> OUT= 1 | Routing time step (min)'= 5.00 <---- DATA FOR SECTION (1.1) ----> Elevation Manning .0500 Distance 100.00 313.20 312.40 .0500 / .0300 Main Channel 310.80 .0300 Main Channel 140.00 140.50 Page 109

| 141.5142.0160.0 | Hadati Cree 0 310.3 0 312.4 0 313.3 | ek Watershe 80 40 .0300 20 | d - Allowable .0300 Ма 0 / .0500 Ма .0500 | in Channel in Channel | |
|---|---|--|--|--|--------------------------------|
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | TRAVEL VOLUME (cu.m.) .575E+02 .119E+03 .185E+03 .256E+03 .330E+03 .409E+03 .492E+03 .579E+03 .671E+03 .671E+03 .767E+03 .867E+03 .971E+03 .108E+04 .149E+04 .248E+04 .405E+04 .620E+04 .893E+04 .122E+05 | FLOW RATE (cms) .1 .2 .3 .4 .6 .8 1.1 1.3 1.6 1.9 2.2 2.6 2.9 3.6 4.9 6 9 | VELOCITY (m/s) .40 .57 .69 .78 .86 .92 .97 1.02 1.07 1.11 1.15 1.19 | TRAV.TIME (min) 18.86 13.13 10.87 9.61 8.77 8.17 7.70 7.32 7.01 6.74 6.50 6.29 6.11 6.85 8.52 9.74 10.21 | |
| INFLOW : ID= 2 (0) OUTFLOW: ID= 1 (0) | AREA (ha) 526) 67.54 527) 67.54 | < hydro QPEAK (cms) 10.03 7.92 | ograph> TPEAK R.V. (hrs) (mm) 6.00 52.60 6.08 52.59 | <-pipe / ch MAX DEPTH (m) 2.13 2.04 | MAX VEL (m/s) .74 .76 |
| RESERVOIR (0482) IN= 2> OUT= 1 DT= 5.0 min | OUTFLOW (cms) .0000 .2590 .2660 .2720 .2790 .2850 | STORAGE (ha.m.) .0000 .0579 .1180 .1802 .2445 .3109 | OUTFLOW (cms) .2910 .2970 1.6320 4.1680 7.5660 .0000 | STORAGE (ha.m.) .3795 .4503 .5232 .5983 .6756 .0000 | |
| | 182) 29.60 K FLOW REI E SHIFT OF PE/ | a) (cm 00 5.78 00 3.99 DUCTION [QOU AK FLOW | s) (hrs 39 6.0 97 6.2 ut/Qin](%)= 6 (min)= 1 |) (mm) 8 47.17 5 47.17 9.05 0.00 | |
| ADD HYD (0400) | IMUM STORAGE | USED | (ha.m.)= | .5994 | |
| $\begin{vmatrix} 1 + 2 = 3 \\ ID1 = 1 (0390) \end{vmatrix}$ | AREA (ha)): 176.10 | (cms) | FPEAK R.V (hrs) (mm 7.25 46.83 |) | |

| | | Hadati Cre 51.20 | 8.631 | 6.08 | 34.35 | | |
|--|---|---|---|--------------------------------|--|---|--|
| ===== ID = | · 3 (0400): | 227.30 | 9.969 | 6.08 | 44.02 | | |
| NOTE: PE | AK FLOWS D | O NOT INCLU | DE BASEFLO | OWS IF A | NY. | | |
| | | | | | | | |
| ROUTE CHN (0 IN= 2> OU | 403) T= 1 | Routing ti | me step (r | min)'= ! | 5.00 | | |
| | Distance | ATA FOR SEC Elevat 338. 336. 336. 335. 335. 335. 336. 338. | ion | Manning | | n Channel | |
| | 165.00 | 336. 338. | 00 30 | .0500 | | | |
| DEPTH (m) .16 .32 .47 .63 .79 .95 1.11 1.26 1.42 1.58 1.74 1.89 2.05 2.21 2.37 2.53 2.68 2.84 | ELEV (m) 335.46 335.62 335.77 335.93 336.09 336.25 336.41 336.56 336.56 336.72 336.88 337.04 337.19 337.51 337.51 337.67 337.83 | TRAVEL VOLUME (cu.m.) .231E+04 .563E+04 .997E+04 .153E+05 .218E+05 .299E+05 .396E+05 .510E+05 .641E+05 .787E+05 .939E+05 .110E+06 .126E+06 .143E+06 .160E+06 .178E+06 | TIME TABI FLOW RATU (cms) 3.2 7.3 13.4 22.7 35.3 51.2 70.7 94.1 122.4 155.6 192.8 233.9 278.9 327.7 380.3 436.7 496.9 561.0 | LE E VELO | DCITY m/s) .71 1.09 1.39 1.66 1.97 2.25 2.46 2.63 2.79 2.96 3.15 3.34 3.53 3.71 3.89 4.07 4.23 4.07 4.23 4.40 | TRAV.TIME (min) 44.52 29.11 22.72 19.04 16.04 14.10 12.89 12.02 11.35 10.71 10.06 9.48 8.97 8.53 8.13 7.79 7.48 7.20 6.95 | |
| | | AREA (ha) 0) 227.30 3) 227.30 | < hyd QPEAK (cms) 9.97 6.22 | TPEAK (hrs) | R.V. | <-pipe / c MAX DEPTH (m) .54 .43 | |
| + ID2= | 3 1 (0115): 2 (0403): | 227.30 | QPEAK (cms) 14.393 6.216 | TPEAK (hrs) 6.08 6.25 | R.V. (mm) 47.16 44.02 | | |
| | | 328.26 | 18.926 | 6.17 | 44.98 | | |
| NOTE: PE | AK FLOWS D | O NOT INCLU | DE BASEFLO Page 1 | | NY. | | |

| RESERVOIR (1 IN= 2> 0 DT= 5.0 mi | UT= 1 | | TORAGE | OUTFLOW | STORAGE (ha.m.) |
|---|---|---|--|--|--|
| | | .0000 1.1000 | .0000 | (cms) 1.6000 9.1000 12.0000 | 10.0000 |
| INFLOW : OUTFLOW: | ID= 2 (040 ID= 1 (012 | AREA (ha))7) 328.260 L3) 328.260 | QPEAK (cms) 18.926 1.552 | TPEA (hrs 6.1 12.5 |) (mm) |
| | PEAK TIME MAXIM | FLOW REDU SHIFT OF PEAK UUM STORAGE | CTION [Qout FLOW USED | /Qin](%)= (min)=38 (ha.m.)= | 8.20 0.00 6.0640 |
| ADD HYD (| 0430) | | | | |
| 1 + 2 = ID1: + ID2: | = 1 (0425) = 2 (0113) | (ha) : 19.04 1 : 328.26 1 | QPEAK TF (cms) (h 980 5. 552 12. | nrs) (mm 83 47.17 50 44.98 | |
| | | 347.30 3 | | 33 45.10 | |
| NOTE: PI | EAK FLOWS [| OO NOT INCLUDE | BASEFLOWS | IF ANY. | |
| | | | | | |
| ROUTE CHN (0 IN= 2> O | 0440) | Routing time | step (min) | '= 5.00 | |
| | < [Distance 100.00 120.00 126.00 130.00 140.00 142.00 150.00 155.00 160.00 | 325.40 324.60 323.90 323.00 322.30 322.30 322.30 323.90 324.60 325.40 | m Man .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 | ning 600 600 600 / .0300 Ma / .0600 Ma 600 600 | in Channel in Channel |
| < DEPTH (m) .16 .33 .49 .65 .82 .98 1.14 1.31 | ELEV (m) 322.46 322.63 322.79 322.95 323.12 323.28 323.44 323.61 | TRAVEL T VOLUME F (cu.m.) .233E+03 .672E+03 .132E+04 .216E+04 .319E+04 .433E+04 .556E+04 .689E+04 | <pre>TME TABLE - LOW RATE (cms) .6 2.1 4.9 9.0 14.9 22.5 31.6 42.3</pre> | VELOCITY (m/s) .96 1.26 1.48 1.66 1.87 2.08 2.27 2.45 | TRAV.TIME (min) 6.96 5.27 4.51 4.03 3.57 3.21 2.93 2.72 |

Hadati Creek Watershed - Allowable .115E+05 82.8 134E+05 99.2 1.79 324.09 2.87 2.33 324.26 .134E+05 1.96 117.9 120 2.96 2.25 3.06 .154E+05 2.18 2.12 324.42 .176E+05 3.15 3.14 3.15 2.28 324.58 138.8 2.11 .200E+05 2.45 157.4 324.75 2.12 324.91.228E+05325.07.259E+05325.24.293E+05325.40.330E+05 179.6 2.61 2.11 2.77 3.18 205.8 2.09 236.1 2.94 3.23 2.07 3.10 270.6 3.28 2.03 ADD HYD (0485) 1 + 2 = 3ID = 3 (0485): 406.15 15.674 6.08 45.40 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0490) 1 + 2 = 3ID = 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 |

 2 = 3
 AREA QPEAK TPEAK R.V.

 ----- (ha) (cms) (hrs) (mm)

 ID1= 1 (0482):
 29.60 3.997 6.25 47.17

 + ID2= 2 (0490):
 449.25 23.705 6.08 45.57

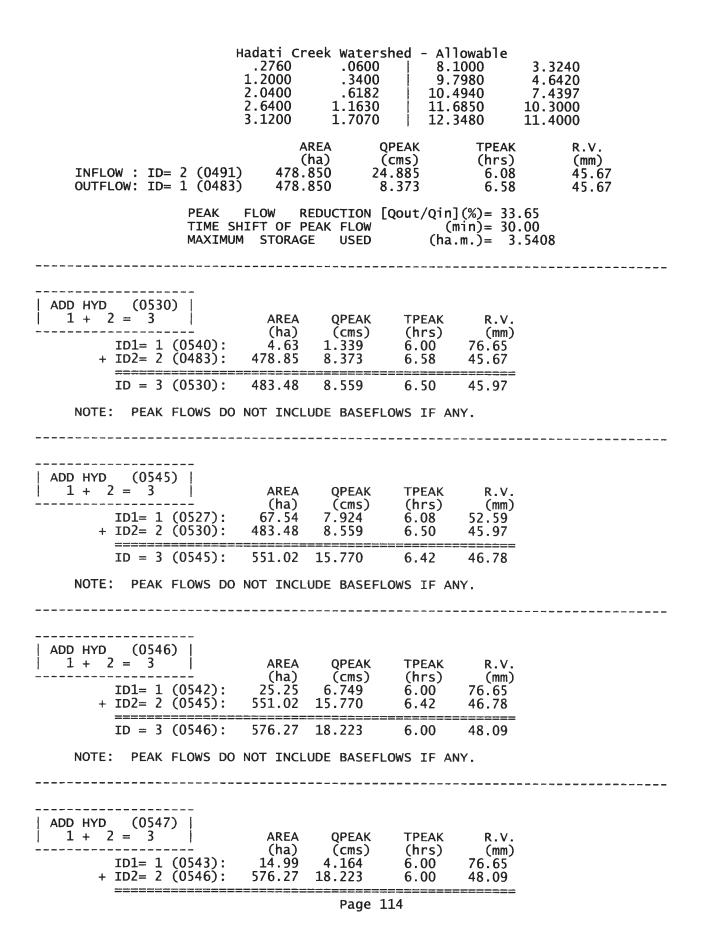
 ______ ID = 3 (0491): 478.85 24.885 6.08 45.67NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. --------------| RESERVOIR (0483) | IN= 2---> OUT= 1

 IN= 2---> OUT= 1
 OUTFLOW
 STORAGE
 OUTFLOW
 STORAGE

 DT= 5.0 min
 OUTFLOW
 STORAGE
 OUTFLOW
 STORAGE

 .0000
 .0000
 .0000
 7.0800
 2.4860

 Page 113



Hadati Creek Watershed - Allowable ID = 3 (0547);591.26 22.387 6.00 48.81 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0548) | 1 + 2 = 3R.V. -----(mm) ID = 3 (0548): 592.39 22.720 6.00 48.86 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ****** ** 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 RAIN | RAIN TIME TIME RAIN TIME RAIN mm/hr | hrs 6.35 | 3.25 6.35 | 3.50 6.35 | 3.75 hrs mm/hr | hrs mm/hr hrs mm/hr .25 12.70 6.25 23.11 9.25 52.83 .50 3.50 12.70 6.50 23.11 9.50 52.83 .75 6.75 12.70 23.11 9.75 52.83 1.00 6.35 | 4.00 7.00 23.11 10.00 12.70 52.83 1.25 4.32 | 4.25 37.85 16.76 7.25 12.70 | 10.25 1.50 4.32 | 4.50 16.76 7.50 12.70 | 10.50 37.85 4.32 | 4.75 1.75 16.76 7.75 12.70 10.75 37.85 4.32 | 6.35 | 16.76 12.70 2.00 8.00 5.00 37.85 12.70 11.00 12.70 | 11.25 12.70 | 11.50 12.70 | 11.75 2.25 5.25 8.25 12.70 8.50 6.35 12.70 2.50 5.50 12.70 6.35 İ 5.75 8.75 2.75 12.70 12.70 3.00 6.35 6.00 12.70 | 9.00 12.70 | 12.00 12.70 CALIB STANDHYD (0544) | Area (ha) = 1.13Total Imp(%) = 80.00 Dir. Conn.(%) = 79.00 ID= 1 DT= 5.0 min ______ IMPERVIOUS PERVIOUS (i) .90 .23 1.50 5.00 Surface Area (ha) =1.50 .55 50.00 Dep. Storage (mm)= 5.0 .55 00 Average Slope (%)= 40.00 Length (m)= 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 Page 115

| $\begin{array}{c} & \text{Hadatt}\\ .083 & 6.35\\ .167 & 6.35\\ .250 & 6.35\\ .250 & 6.35\\ .333 & 6.35\\ .333 & 6.35\\ .417 & 6.35\\ .583 & 6.35\\ .583 & 6.35\\ .583 & 6.35\\ .583 & 6.35\\ .750 & 6.35\\ .833 & 6.35\\ .917 & 6.35\\ .917 & 6.35\\ 1.000 & 6.35\\ 1.000 & 6.35\\ 1.083 & 4.32\\ 1.250 & 4.32\\ 1.250 & 4.32\\ 1.250 & 4.32\\ 1.333 & 4.32\\ 1.417 & 4.32\\ 1.583 & 4.32\\ 1.583 & 4.32\\ 1.583 & 4.32\\ 1.583 & 4.32\\ 1.583 & 4.32\\ 1.583 & 4.32\\ 1.583 & 4.32\\ 1.667 & 4.32\\ 1.583 & 4.32\\ 1.667 & 4.32\\ 1.583 & 4.32\\ 1.917 & 4.32\\ 2.000 & 4.32\\ 1.917 & 4.32\\ 2.000 & 4.32\\ 1.917 & 4.32\\ 2.000 & 4.32\\ 1.917 & 4.32\\ 2.083 & 6.35\\ 2.167 & 6.35\\ 2.250 & 6.35\\ 2.583 & 6.35\\ 2.583 & 6.35\\ 2.583 & 6.35\\ 2.583 & 6.35\\ 2.917 & 6.35\\ 3.000 & 6.35\\ \end{array}$ | i Creek Waters 3.083 12.70 3.167 12.70 3.250 12.70 3.250 12.70 3.333 12.70 3.417 12.70 3.583 12.70 3.583 12.70 3.667 12.70 3.750 12.70 3.750 12.70 4.000 12.70 4.000 12.70 4.083 16.70 4.167 16.70 4.250 16.70 4.333 16.70 4.417 16.70 4.583 16.70 4.583 16.70 4.583 16.70 4.583 16.70 4.583 16.70 4.583 16.70 4.583 16.70 4.583 16.70 5.000 16.70 5.083 12.70 5.167 12.70 5.250 12.70 5.333 12.70 5.167 12.70 5.583 12.70 5.667 12.70 5.750 12.70 5. | $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | /able 23.11 23.70 12.70 12.70 12.70 12.70 12.70 12.70 12.70 12.70 12.70 12.70 12.70 12.70 12.70 12.70 12.70 | $\begin{array}{c} 9.08\\ 9.17\\ 9.25\\ 9.33\\ 9.42\\ 9.50\\ 9.58\\ 9.67\\ 9.75\\ 9.83\\ 9.92\\ 10.00\\ 10.08\\ 10.17\\ 10.25\\ 10.33\\ 10.42\\ 10.50\\ 10.58\\ 10.67\\ 10.75\\ 10.83\\ 10.92\\ 11.00\\ 11.08\\ 11.17\\ 11.25\\ 11.33\\ 11.42\\ 11.50\\ 11.58\\ 11.67\\ 11.58\\ 11.67\\ 11.58\\ 11.67\\ 11.58\\ 11.67\\ 11.75\\ 11.83\\ 11.92\\ 12.00\\ \end{array}$ | 52.83 57.85 37.70 37.70 37.70 | | |
|---|--|---|---|---|--|--|--|
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | 52.83 5.00 2.60 (ii) 5.00 .29 | 42.97 20.00 18.86 (ii 20.00 .06 | - | | | | |
| RUNOFF VOLUME (Mrs)= | 9.67 209.57 211.07 | .03 10.00 81.35 211.07 .39 | 10 182 | FALS* .156 (iii).00 2.64 L.07 .87 |) | | |
| ***** WARNING: STORAGE COEFF. I | IS SMALLER THAN | N 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 Page 116 | | | | | | | |

| | Hada | ati Creek Water | shed - Allowab | e |
|---|---|--|--|---|
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 11.99 1.50 .55 200.00 .013 | 3.00 5.00 .55 40.00 .300 | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | nm/hr)= (min) (min)= (min)= (cms)= | 52.83 5.00 5.98 (ii) 5.00 .19 | 42.97 25.00 22.24 (ii) 25.00 .05 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | 1.74 10.00 209.57 211.07 .99 | .32 10.08 81.35 211.07 .39 | 2.054 (iii) 10.00 182.64 211.07 .87 |
| Fo (mm, Fc (mm, (ii) TIME STEP | /hr)= 75. /hr)= 12. (DT) SHG STORAGE (| OULD BE SMALLER | (1/hr)= 4.14 . (mm)= .00 OR EQUAL | l) |
| CALIB STANDHYD (0542) ID= 1 DT= 5.0 min | Area Total | (ha)= 25.25 Imp(%)= 80.00 | Dir. Conn.(% | 6)= 79.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 20.20 1.50 .55 350.00 .013 | PERVIOUS (i) 5.05 5.00 .55 40.00 .300 | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | nm/hr)= (min) (min)= | 52.83 10.00 | 42.97 25.00 | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | 211.07 | .53 10.17 81.35 211.07 .39 | *TOTALS* 3.443 (iii) 10.00 182.64 211.07 .87 |
| Fo (mm, Fc (mm, (ii) TIME STEP | /hr)= 75. /hr)= 12. (DT) SHO STORAGE (| 50 Cum.Inf DULD BE SMALLER COEFFICIENT. | (1/hr)= 4.14 . (mm)= .00 OR EQUAL | |
| | | | | |

Page 117

| CALIB | Hada | ti Creek Wate | rshed - Allowabl | e |
|--|---|--|---|--|
| STANDHYD (0510) ID= 1 DT= 5.0 min | Area Total | (ha)= 16.0 Imp(%)= 80.0 | 0 0 Dir. Conn.(% | ()= 79.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 12.80 1.50 .50 400.00 .013 | 3.20 5.00 .20 40.00 .300 | |
| Max.Eff.Inten. ove Storage Coeff. Unit Hyd. Tpea Unit Hyd. peak | | | | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC | (cms)= (hrs)= (mm)= (mm)= IENT = | 1.85 10.00 209.57 211.07 .99 | .31 10.33 81.35 211.07 .39 | 2.134 (iii) 10.00 182.64 211.07 .87 |
| Fo (m Fc (m (ii) TIME STE | n/hr)= 75. n/hr)= 12. P (DT) SHO STORAGE C | 00 50 Cum.In OLD BE SMALLE OEFFICIENT. | ERVIOUS LOSSES: K (1/hr)= 4.14 f. (mm)= .00 R OR EQUAL FLOW IF ANY. | |
| CALIB STANDHYD (0500) ID= 1 DT= 5.0 min | Area Total | (ha)= 244.0 Imp(%)= 46.0 | 0 0 Dir. Conn.(% | b)= 26.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 112.24 1.50 .80 1275.00 .013 | PERVIOUS (i) 131.76 5.00 .80 40.00 .300 | |
| Max.Eff.Inten. ove Storage Coeff. Unit Hyd. Tpea Unit Hyd. peak | (min) (min)= | 52.83 15.00 16.24 (ii 15.00 .07 | 59.90 30.00 28.96 (ii) 30.00 .04 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC | (cms)= (hrs)= (mm)= (mm)= IENT = | 9.05 10.00 209.57 211.07 .99 | 18.51 10.25 107.75 211.07 .51 | 27.108 (iii) 10.08 134.22 211.07 .64 |
| Fo (m Fc (m (ii) TIME STE | n/hr)= 75. n/hr)= 12. P (DT) SHO STORAGE C | 00 50 Cum.In ULD BE SMALLE OEFFICIENT. | R OR EQUAL FLOW IF ANY. | |

CALIB | CALIB | STANDHYD (0540) | |ID= 1 DT= 5.0 min | Area (ha)= 4.63 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 . *-----IMPERVIOUS PERVIOUS (i) .93 5.00 .55 3.70 Surface Area (ha) =1.50 .55 150.00 Dep. Storage (mm)= Average Slope (%)= 40.00 Length (m)= Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 52.83 42.97 5.00 25.00 5.03 (ii) 21.29 5.00 25.00 over (min) Storage Coeff. (min) =21.29 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= .21 .05 *TOTALS*

 PEAK FLOW
 (cms) =
 .54
 .10

 TIME TO PEAK
 (hrs) =
 10.00
 10.08

 RUNOFF VOLUME
 (mm) =
 209.57
 81.35

 TOTAL RAINFALL
 (mm) =
 211.07
 211.07

 .636 (iii) 10.00 182.64 211.07 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 (0484) | |ID= 1 DT= 5.0 min | Area (ha)= 12.60 Total Imp(%)= 42.00 Dir. Conn.(%) = 21.00_____ IMPERVIOUS PERVIOUS (i) 5.29 Surface Area (ha) =(%)= 2.00 (m)= 680 00 = 7.31 (mm)= Dep. Storage 5.00 Average Slope (%)= 2.00 680.00 Length 40.00 Mannings n . 300 Max.Eff.Inten.(mm/hr)= 52.83 59.46 over (min) Storage Coeff. 18.15 (ii) (min) =Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= .12 .06 ***TOTALS*** .39 10.00 PEAK FLOW (cms) =1.141.527 (iii) (hrs)= TIME TO PEAK 10.00 10.00 107.20 (mm)= RUNOFF VOLUME (mm)= 209.57 128.70 211.07 TOTAL RAINFALL 211.07 211.07 RUNOFF COEFFICIENT = .99 .51 .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (mm/hr) = 12.50 Cum.Inf. (mm) = .00Page 119

Hadati Creek Watershed - Allowable (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ _____ CAL TB STANDHYD (0565) (ha)= 11.10 Area ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn.(%)= 21.00 _____ IMPERVIOUS PERVIOUS (i) (ha) =Surface Area 4.66 6.44 Dep. Storage (mm)= 1.50 5.00 Average Slope (%)= 2.00 2.00 680.00 Length (m) =40.00 .013 Mannings n . 300 10.00 8.46 (ii) 10.00 Max.Eff.Inten.(mm/hr)= 59.46 over (min) 20.00 Storage Coeff. 18.15 (ii) (min)= Unit Hyd. Tpeak (min)= 20.00 .12 Unit Hyd. peak (cms)= .06 ***TOTALS*** (hrs)= .34 (hrs)= 10.00 (mm)= 209.57 (mm)= 211.07 IT = 00 1.345 (iii) 10.00 PEAK FLOW (cms) =1.0010.00 TIME TO PEAK (hrs) =RUNOFF VOLUME 107.20 128.70 TOTAL RAINFALL 211.07 211.07 RUNOFF COEFFICIENT .51 61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |ID= 1 DT= 5.0 min | PERVIOUS (i) IMPERVIOUS (ha) =Surface Area 2.48 3.42 Dep. Storage (mm)= 1.50 5.00 2.00 Average Slope (%)= 2.00 Length (m) =680.00 40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 52.83 59.46 10.00 8.46 (ii) 10.00 over (min) 20.00 Storage Coeff. (min) =18.15 (ii) Unit Hyd. Tpeak (min)= 20.00 Unit Hyd. peak (cms)= .12 .06 ***TOTALS*** .18 10.00 200 .53 10.00 .715 (iii) PEAK FLOW (cms) =TIME TO PEAK (hrs) =10.00 107.20 RUNOFF VOLUME RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= 128.70 211.07 211.07 211.07 . 99 RUNOFF COEFFICIENT = .51 .61

Hadati Creek Watershed - Allowable (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (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) =14.04 10.16 Dep. Storage 1.50 2.00 401 00 5.00 (mm) =Average Slope (%)= 401.00 Length 40.00 (m) =Mannings n .013 .300 = 52.83 Max.Eff.Inten.(mm/hr)= 59.46 5.00 6.16 (ii) 5.00 over (min) 20.00 Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 15.86 (ii) 20.00 .19 .07 ***TOTALS*** (cms)=.752.23(hrs)=10.0010.00(mm)=209.57107.20(mm)=211.07211.07FNT=.99.51 PEAK FLOW 2.975 (iii) 10.00 TIME TO PEAK RUNOFF VOLUME 128.70 TOTAL RAINFALL 211.07 RUNOFF COEFFICIENT = .99 .51 .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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. _____ Area (ha)= 4.99 STANDHYD (0415) ID= 1 DT= 5.0 min Total Imp(%) = 42.00Dir. Conn.(%)= 21.00 ------IMPERVIOUS PERVIOUS (i) IMPERVISES 2.10 1.50 2.86 185.00 013 Surface Area (ha) =2.89 5.00 Dep. Storage (mm) =2.86 Average Slope (%)= 40.00 Length (m) =.300 Mannings n 52.83 Max.Eff.Inten.(mm/hr)= 59.46

 Unit Hyd. Tpeak (min)=
 5.00

 Unit Hyd. Tpeak (min)=
 3.48 (

 Unit Hyd. peak (cms)=
 26

 15.00 3.48 (ii) 12.19 (ii) 15.00 .09 ***TOTALS*** .47 10.00 PEAK FLOW (cms) =9.92 .15 .626 (iii) ΤΙΜΕ ΤΟ ΡΕΑΚ 10.00 (hrs) =209.57 RUNOFF VOLUME 107.20 (mm) =128.70 211.07 211.07 TOTAL RAINFALL (mm) =211.07 Page 121

| RUNOFF COEFFICIE | | ati Creek Water .99 | shed - Allowab .51 | le .61 | | | |
|---|---|--|--|---|--|--|--|
| ***** WARNING: STORAG | E COEFF | . IS SMALLER TH | AN TIME STEP! | | | | |
| Fo (mm, Fc (mm, (ii) TIME STEP THAN THE S | <pre>***** 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.</pre> | | | | | | |
| CALIB STANDHYD (0110) ID= 1 DT= 5.0 min | Area Total | (ha)= 19.00 Imp(%)= 42.00 | Dir. Conn.(S | %)= 21.00 | | | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 7.98 1.50 2.00 365.00 .013 | PERVIOUS (i) 11.02 5.00 2.00 40.00 .300 | | | | |
| Max.Eff.Inten.(n over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | nm/hr)= (min) (min)= (min)= (cms)= | 52.83 5.00 5.82 (ii) 5.00 .20 | 59.46 20.00 15.52 (ii) 20.00 .07 | *TOTALS* | | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIE | (cms)= (hrs)= (mm)= (mm)= ENT = | .59 10.00 209.57 211.07 .99 | 1.75 10.00 107.20 211.07 .51 | 2.340 (iii) 10.00 128.70 211.07 .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 (0101) ID= 1 DT= 5.0 min | Area Total | (ha)= 16.32 Imp(%)= 42.00 | Dir. Conn.(S | %)= 21.00 | | | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 6.85 1.50 2.00 309.00 .013 | PERVIOUS (i) 9.47 5.00 2.00 40.00 .300 | | | | |
| Max.Eff.Inten.(n over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | (min) (min)= (min)= | 52.83 5.00 5.27 (ii) 5.00 .21 | 15.00 .08 | *TOTALS* | | | |
| | | Page | 177 | | | | |

| Hadati Creek Watershed - Allowable 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 (0102) Area (ha)= 14.32 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| $\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$ |
| 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 |
| 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. |
| CALIB STANDHYD (0105) Area (ha)= 51.32 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| $\begin{array}{rcrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$ |
| Max.Eff.Inten.(mm/hr)= 52.83 59.46 over (min) 5.00 20.00 Storage Coeff. (min)= 7.45 (ii) 17.14 (ii) Page 123 |

Hadati Creek Watershed - Allowable 5.00 20.00 Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= .17 .06 *TOTALS* PEAK FLOW (cms)= $1.58 \\
 10.00 \\
 209.57 \\
 211 07$ 1.58 4.68 6.260 (iii) 10.00 TIME TO PEAK (hrs)= 10.00 RUNOFF VOLUME (mm) =107.20 128.70 211.07 TOTAL RAINFALL (mm)= 211.07 211.07 RUNOFF COEFFICIENT .99 = .51 .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (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) | |ID= 1 DT= 5.0 min | Area (ha)= 117.50 Total Imp(%) = 42.00Dir. Conn. (%) = 21.00PERVIOUS (i) IMPERVIOUS Surface Area (ha) =49.35 68.15 1.50 Dep. Storage (mm) =5.00 Average Slope (%)= 2.00 2.00 885.00 Length (m) =40.00 Mannings n . 300 = .013 52.83 10.00 9.91 (ii) 10.00 Max.Eff.Inten.(mm/hr)= 59.46 over (min) 20.00 19.60 (ii) 20.00 Storage Coeff. (min) =Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= .11 .06 ***TOTALS*** 14.089 (iii) PEAK FLOW (cms) =3.61 10.49 10.00 TIME TO PEAK (hrs) =10.08 10.00 (mm)= RUNOFF VOLUME 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: (mm/hr) = 75.00K (1/hr)= 4.14 Cum.Inf. (mm)= .00 FO (mm/hr) = 12.50FC (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) = 12.30ID= 1 DT= 5.0 min Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) 5.17 Surface Area (ha) =7.13 (m) = 286Dep. Storage (mm) =5.00 1.60 Average Slope (%)= Length 40.00 Mannings n .300

| (i) HORTONS E Fo (mm Fc (mm (ii) TIME STEP | <pre>mm/hr)= (min)= (min)= (cms)= (cms)= (hrs)= (hrs)= (mm)= ENT = QUATION SE /hr)= 75.0 /hr)= 12.5 (DT) SHOU STORAGE CO</pre> | 52.83 5.00 5.38 (ii 5.00 .21 .38 10.00 209.57 211.07 .99 LECTED FOR P 0 0 Cum.In LD BE SMALLE EFFICIENT. | 1.13 10.00 107.20 211.07 .51 ERVIOUS LOSSES: K (1/hr)= 4.14 f. (mm)= .00 R OR EQUAL | *TOTALS* 1.513 (iii) 10.00 128.70 211.07 .61 |
|---|--|--|---|---|
| CALIB STANDHYD (0350) ID= 1 DT= 5.0 min | Area Total I | (ha)= 16.3 mp(%)= 42.0 | 0 0 Dir. Conn.(% | <i>i</i>)= 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | .013 | .300 | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | mm/hr)= (min) (min)= (min)= (cms)= | 52.83 5.00 6.75 (ii 5.00 .18 | 59.46 20.00) 18.68 (ii) 20.00 .06 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | | LTT.0/ | 1.47 10.00 107.20 211.07 .51 | 1.968 (iii) 10.00 128.70 211.07 .61 |
| Fo (mm Fc (mm (ii) TIME STEP | /hr)= 75.00 /hr)= 12.50 (DT) SHOU STORAGE CO | 0 O Cum.In LD BE SMALLE EFFICIENT. | R OR EQUAL | |
| CALIB STANDHYD (0360) ID= 1 DT= 5.0 min | Area Total I | (ha)= 30.0 mp(%)= 37.0 | 0 0 Dir. Conn.(% | ()= 19.00 |
| Surface Area Dep. Storage Average Slope | (ha)= (mm)= (%)= | IMPERVIOUS 11.10 1.50 2.00 Page | PERVIOUS (i) 18.90 5.00 2.00 125 | |

| Length Mannings n | (m)= | i Creek Water 447.00 .013 | rshed - Allowat 40.00 .300 | ole | | | |
|--|---|--|--|---|--|--|--|
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | mm/hr)= (min) (min)= (min)= (cms)= | 52.83 5.00 6.58 (ii) 5.00 .18 | 55.42 20.00 16.55 (ii) 20.00 .06 | **** | | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | | | | *TOTALS* 3.618 (iii) 10.00 122.28 211.07 .58 | | | |
| ***** WARNING:FOR AR YOU SH | | MPERVIOUS RAT DER SPLITTING | | | | | |
| Fo (mm Fc (mm (ii) TIME STEP | /hr)= 75.0 /hr)= 12.5 (DT) SHOU STORAGE CO | 0 K O Cum.Inf LD BE SMALLEF EFFICIENT. | - | L4 00 | | | |
| CALIB STANDHYD (0395) ID= 1 DT= 5.0 min | Area Total I | (ha)= 51.20 mp(%)= 10.00 |)) Dir. Conn.(| (%)= 5.00 | | | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 5.12 1.50 2.00 900.00 .013 | PERVIOUS (i) 46.08 5.00 2.00 40.00 .300 | | | | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | mm/hr)= (min) (min)= (min)= (cms)= | 52.83 10.00 10.01 (ii) 10.00 .11 | 43.26 25.00 21.02 (ii) 25.00 .05 | *TOTAL 5 * | | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (mm)= | .37 10.00 209.57 211.07 .99 | 5.03 10.08 81.91 211.07 .39 | *TOTALS* 5.388 (iii) 10.08 88.29 211.07 .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. | | | | | | | |
| CALIB | | Page | 126 | | | | |

| STANDHYD (0455) ID= 1 DT= 5.0 min | Area | ati Creek Water (ha)= 12.70 Imp(%)= 42.00 |) | | |
|---|---|---|--|---|--|
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 5.33 1.50 1.71 300.00 .013 | 7.37 5.00 1.71 40.00 .300 | | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | (mm/hr)= (min) (min)= (min)= (cms)= | 52.83 5.00 5.43 (ii) 5.00 .20 | 59.46 20.00 15.59 (ii) 20.00 .07 | *TOTALS* | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .39 10.00 209.57 211.07 .99 | 1.17 10.00 107.20 211.07 .51 | 1.564 (iii) 10.00 128.70 211.07 .61 | |
| Fo (mn Fc (mn (ii) TIME STEF THAN THE (iii) PEAK FLOW | 1/hr)= 75. 1/hr)= 12. 9 (DT) SHC STORAGE (| SELECTED FOR PE 00 F 50 Cum.Inf DULD BE SMALLEF COEFFICIENT. F INCLUDE BASEF | <pre>((1/hr)= 4.: f. (mm)= .(R OR EQUAL</pre> | L4 | |
| CALIB STANDHYD (0460) ID= 1 DT= 5.0 min | Area Total | (ha)= 36.00 Imp(%)= 42.00 |)) Dir. Conn. | (%)= 21.00 | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 15.12 1.50 2.03 465.00 .013 | PERVIOUS (i) 20.88 5.00 2.03 40.00 .300 | | |
| Max.Eff.Inten.(| mm/hr)= (min) (min)= | | 59.46 20.00 | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | 1.11 10.00 209.57 211.07 .99 | 3.30 10.00 107.20 211.07 .51 | *TOTALS* 4.413 (iii) 10.00 128.70 211.07 .61 | |
| Fo (mn Fc (mn (ii) TIME STEF | /hr)= 75. //hr)= 12. / (DT) SHC STORAGE (| 50 Cum.Inf DULD BE SMALLEF COEFFICIENT. | <pre>((1/hr)= 4.2 f. (mm)= .(R OR EQUAL</pre> | | |

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

| CALIB STANDHYD (0480) ID= 1 DT= 5.0 min | - Area Total I | (ha)= :mp(%)= | 43.10 42.00 | Dir. (| :onn.(%)= | = 21.00 |
|--|---|---|----------------------------|--|----------------------------------|---|
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIO 18.10 1.50 2.00 680.00 .013 | | PERVIOUS 25.00 5.00 2.00 40.00 .300 | | |
| Max.Eff.Inten. over Storage Coeff. Unit Hyd. Tpeal Unit Hyd. peak | (mm/hr)= r (min) (min)= < (min)= (cms)= | 52.83 10.00 8.46 10.00 .12 | (ii) | 59.46 20.00 18.15 20.00 .06 | | 'TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC: | (cms)= (hrs)= (mm)= (mm)= IENT = | 1.33 10.00 209.57 211.07 .99 | | 3.90 10.00 107.20 211.07 .51 | | 5.222 (iii) 10.00 128.70 211.07 .61 |
| (ii) TIME STE | n/hr)= 75.0 n/hr)= 12.5 > (DT) SHOU STORAGE CO | 0 Cu D E SM EFFICIEN | K m.Inf. ALLER T. | =(1/hr) (mm) OR EQUAL | 4.14 .00 | |
| STORE HYD (0525) ID= 1 DT=****min | AREA QPEAK - TPEAK | (ha) (cms) (hrs) (mm) | = . = . =**** | 00 00 00 ** | | |
| DUHYD (0505) Inlet Cap.=9.000 #of Inlets= 1 Total(cms)= 9.0 TOTAL HYD.(ID= | (ha) 1): 244.00 | (cm 27. | s) 11 | TPEAK (hrs) 10.08 | R.V. (mm) 134.22 | |
| MAJOR SYS.(ID= MINOR SYS.(ID= | 2): 78.53 | | 11 | | 134.22 134.22 | |
| NOTE: PEAK FLO | OWS DO NOT | INCLUDE | BASEFL | OWS IF A | NY. | |
| ADD HYD (0566) 1 + 2 = 3 ID1= 1 (04 + ID2= 2 (09) | - (184): 12 | ha) (.60 1. | PEAK cms) 527 345 | TPEAK (hrs) 10.00 10.00 | R.V. (mm) 128.70 128.70 | |
| | | | 1 0000 | | | |

Hadati Creek Watershed - Allowable 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 _____ 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 | OUTFLOWSTORAGEOUTFLOWSTORAGE(cms)(ha.m.)(cms)(ha.m.).0000.00001.00001.0000.0100.010020.00001.1000.0120.1000.0000.0000 DT= 5.0 min | -----AREA
(ha)QPEAK
(cms)TPEAK
(hrs)INFLOW : ID= 2 (0110)19.0002.34010.00OUTFLOW: ID= 1 (0111)19.0002.06910.50 R.V. (mm) 128.70 128.68 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)

 2 = 3
 AREA
 QPEAK
 TPEAK
 R.V.

 ID1= 1
 (0101):
 16.32
 2.027
 10.00
 128.70

 + ID2= 2
 (0102):
 14.32
 1.780
 10.00
 128.70

 1 + 2 = 3________________________________ 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 OUTFLOWSTORAGEOUTFLOW(cms)(ha.m.)(cms).0000.0000.5000.0100.01006.6000.0260.2300.0000 | DT= 5.0 min | STORAGE -----(ha.m.) .4000 . 8000 .0000 AREA
(ha)QPEAK
(cms)TPEAK
(hrs)R.V.
(mm)INFLOW:ID= 2 (0105)51.3206.26010.00128.70OUTFLOW:ID= 1 (0106)51.3205.99710.08128.69

| Hadati Creek Watershed - Allowable | |
|---|--|
| PEAK FLOW REDUCTION [Qout/Qin](%)= 95.79 TIME SHIFT OF PEAK FLOW (min)= 5.00 MAXIMUM STORAGE USED (ha.m.)= .760 | 20 |
| MAXIMUM STORAGE USED (na.m.)= .760 | J8 |
| ROUTE CHN (0358) IN= 2> OUT= 1 Routing time step (min)'= 5.00 | |
| <pre>< DATA FOR SECTION (1.1)> Distance Elevation Manning</pre> | nannel nannel nannel nannel nannel |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | /.TIME nin) 9.52 3.99 2.65 3.46 7.45 |
| (ha) (cms) (hrs) (mm) TNELOW : TD= 2 (0355) 12.30 1.51 10.00 128.70 | oipe / channel-> K DEPTH MAX VEL (m) (m/s) .18 1.18 .18 1.17 |
| ROUTE CHN (0353) IN= 2> OUT= 1 Routing time step (min)'= 5.00 | |
| <pre>< DATA FOR SECTION (1.1)> Distance Elevation Manning</pre> | hannel hannel hannel |

| | 20.00 | | | 0300 | | |
|---|--|---|---|--|---|--|
| DEPTH (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | VOLUME (cu.m.) .929E+01 .372E+02 .836E+02 .149E+03 .232E+03 .334E+03 .454E+03 .576E+03 .699E+03 .822E+03 .944E+03 .108E+04 .123E+04 .140E+04 .159E+04 .180E+04 .203E+04 .227E+04 .254E+04 | FLOW RATE (cms) .0 .0 .1 .1 .2 .3 .4 .6 .8 1.0 1.2 1.4 1.7 2.0 2.3 2.6 3.0 3.4 | .35 .42 .49 .55 .64 .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 | TRAV.TIME (min) 99.56 62.72 47.86 39.51 34.05 30.15 26.24 22.41 19.75 17.76 16.22 15.07 14.28 13.72 13.31 13.01 12.76 12.57 12.41 | |
| ROUTE CHN (0 | 362) | | | ograph> TPEAK R.V. (hrs) (mm) l0.00 128.70 l0.08 128.66 | <-pipe / c MAX DEPTH (m) .20 .20 | hannel-> MAX VEL (m/s) 1.25 1.24 |
| IN= 2> OL | JT= 1 1 Distance .00 5.50 5.51 10.00 14.49 14.50 20.00 | DATA FOR SEC Elevat | CTION (1.1 tion Ma 40 . 15 .0300 .00 . .09 . .00 . .15 .0150 .40 . | L)> anning .0300) / .0150 Ma .0150 Ma .0150 Ma .0150 Ma .0300 Ma | in Channel | |
| < DEPTH (m) .02 .04 .06 .08 .09 .11 .13 .15 .17 .20 .22 .24 .26 | ELEV (m) .02 .04 .06 .08 .09 .11 .13 .15 .17 .20 .22 .24 .26 | TRAVEL VOLUME (cu.m.) .176E+02 .702E+02 .158E+03 .281E+03 .438E+03 .607E+03 .607E+03 .776E+03 .116E+04 .140E+04 .166E+04 .194E+04 .225E+04 | TIME TABLE FLOW RATE (cms) .0 .1 .1 .3 .5 .7 1.0 1.3 1.8 2.3 2.8 3.4 Page 131 | VELOCITY (m/s) .21 .33 .43 .52 .62 .77 .90 1.03 1.16 1.27 1.36 1.44 1.51 | TRAV.TIME (min) 80.52 50.72 38.71 31.95 26.84 21.66 18.45 16.22 14.36 13.13 12.24 11.58 11.05 | |

Hadati Creek Watershed - Allowable .29 .29 .258E+04 4.0 1.57 10.63 .31 .293E+04 .31 4.8 1.62 10.27 .33 .33 .331E+04 5.5 1.67 9.97 .35 .371E+04 .35 9.71 6.4 1.72 .38 .38 .413E+04 7.3 1.76 9.48 .40 8.2 .40 .457E+04 9.28 1.80 <---- hydrograph ----> <-pipe / channel-> AREA **QPEAK** TPEAK R.V. MAX DEPTH MAX VEL (mm) (m/s)(ha) (cms) (hrs) (m) . 27 30.00 INFLOW : ID= 2 (0360) 3.62 10.00 122.28 1.53 OUTFLOW: ID = 1 (0362) 30.00 3.50 10.08 122.26 .27 1.52 ADD HYD (0465) | 1 + 2 = 3AREA QPEAK (cms) TPEAK R.V. (ha) (hrs) (mm) ID1= 1 (0455): + ID2= 2 (0460): 12.70 L.304 36.00 4.413 128.70 10.00 10.00 128.70 ID = 3 (0465): 48.70 5.97710.00 128.70 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0515) 1 + 2 = 3AREA QPEAK TPEAK R.V. (cms) 2.134 _____ (ha) (hrs) (mm) 182.64 ID1= 1 (0510): 10.00 16.00 + 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) | Routing time step (min)' = 5.00IN= 2---> OUT= 1 | <---- DATA FOR SECTION (1.1) ----> Distance Elevation Manning .00 101.50 100.70 .0500 1.00 .0500 .0500 / .0300 Main Channel .0300 Main Channel 1.50 100.55 2.00 99.50 3.50 99.60 .0300 Main Channel 4.50 100.65 .0300 / .0500 Main Channel .0500 6.00 101.45 <----> DEPTH ELEV VOLUME FLOW RATE VELOCITY TRAV.TIME (m) 99.60 (cu.m.) (m) (cms) (m/s) (min) .353E+02 .0 .10 .19 43.69 99.69 .112E+03 .19 .37 22.76 .1 .195E+03 .2 .29 .49 99.79 17.03 .285E+03 .3 .38 99.88 14.23 . 59 .48 99.98 .381E+03 .67 12.51 Page 132

| .57 .67 .76 .86 .95 1.05 1.16 1.28 1.39 1.50 1.61 1.72 1.84 1.95 | 100.07 100.17 100.26 100.36 100.45 100.55 100.66 100.78 100.89 101.00 101.11 101.22 101.34 101.45 | Hadati Creek .484E+03 .594E+03 .710E+03 .832E+03 .961E+03 .110E+04 .127E+04 .148E+04 .170E+04 .195E+04 .221E+04 .250E+04 .280E+04 .313E+04 | <pre> Watershe .7 .9 1.2 1.5 1.8 2.2 2.7 3.4 4.1 4.9 5.8 6.7 7.7 8.8 </pre> | d - Allowable .74 .80 .86 .91 .96 1.00 1.07 1.14 1.20 1.25 1.30 1.34 1.38 1.41 | 11.32 10.43 9.74 9.18 8.72 8.32 7.80 7.31 6.94 6.65 6.41 6.22 6.04 5.90 | |
|---|---|---|---|---|--|----------------------------------|
| **** WAD | | VEL TIME TADLE | | | | hannel-> |
| INFLOW : OUTFLOW: | ID= 2 (05) ID= 1 (05) | AREA (ha) 05) 78.53 64) 78.53 | QPEAK (cms) 18.11 17.83 | ograph> TPEAK R.V. (hrs) (mm) 10.08 134.22 10.25 134.22 | MAX DEPTH (m) 1.92 1.95 | MAX VEL (m/s) 1.40 1.41 |
| ROUTE CHN (IN= 2> 0 | UT= 1 | Routing time | e step (mi | n)'= 5.00 | | |
| | < [Distance 2.00 4.00 4.50 5.00 7.00 9.00 | DATA FOR SECTI Elevatic 1.00 .50 .00 .00 .00 .50 1.00 | CON (2. Dn M)) .035) .035) | 2)> anning .0350 .0350 0 / .0350 Mai .0350 Mai 0 / .0350 Mai .0350 .0350 | n Channel n Channel n Channel | |
| <pre> DEPTH (m) .05 .11 .16 .21 .26 .32 .37 .42 .47 .53 .58 .63 .63 .68 .74 .79 .84 .89 .95 1.00 </pre> | ELEV (m) .05 .11 .16 .21 .26 .32 .37 .42 .47 .53 .58 .63 .68 .74 .79 .84 .89 .95 1.00 | VOLUME F (cu.m.) .573E+01 .135E+02 .232E+02 .349E+02 .486E+02 .643E+02 .643E+02 .102E+03 .123E+03 .123E+03 .147E+03 .173E+03 .200E+03 .230E+03 .262E+03 .331E+03 .369E+03 .408E+03 .450E+03 | LOW RATE (cms) .0 .1 .3 .5 .9 1.2 1.7 2.2 2.9 3.6 4.4 5.4 6.4 7.6 8.9 10.3 11.8 13.5 15.2 | VELOCITY (m/s) .67 .99 1.23 1.42 1.58 1.73 1.86 1.98 2.10 2.21 2.31 2.42 2.51 2.61 2.70 2.79 2.88 2.97 3.05 | TRAV.TIME (min) 2.23 1.51 1.22 1.06 .95 .87 .81 .76 .71 .68 .62 .60 .58 .56 .54 .52 .51 .49 | |
| | | AREA | | ograph> TPEAK R.V. | <-ріре / с МАХ DEPTH | hannel-> MAX VEL |

Hadati Creek Watershed - Allowable (ha) (cms) (hrs) (mm) 23.70 2.87 10.00 128.70 23.70 2.87 10.00 128.70 (m) (m/s) .47 2.10 INFLOW : ID= 2 (0566) OUTFLOW: ID= 1 (0563) .47 2.10 _____ DUHYD (0425) | Inlet Cap.=1.980 #of Inlets= 1
Total(cms)= 2.0
 tal(cms)=
 2.0
 AREA
 QPEAK

 ----- (ha)
 (cms)

 TOTAL
 HYD.(ID=
 1):
 29.19
 3.60
 TPEAK R.V. (hrs) (mm) 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) | İ IN= 2---> OUT= 1 STORAGEOUTFLOW(ha.m.)(cms).00001.0000.010010.0000.1332.0000 DT= 5.0 min OUTFLOW STORAGE (cms) (ha.m.) . 5000 .0000 .0100 . 6000 .0150 .0000 AREA QPEAK (ha) (cms) 30.640 3.807 30.640 3.707 TPEAK R.V. (hrs) 10.00 (mm) INFLOW : ID= 2 (0103) 128.70 OUTFLOW: ID = 1 (0104)10.00 128.69 PEAK FLOW REDUCTION [Qout/Qin](%)= 99.73 TIME SHIFT OF PEAK FLOW (min)= .00 (ha.m.)= .5312 MAXIMUM STORAGE USED ADD HYD (0359) | 1 + 2 = 3

 2 = 3
 AREA
 QPEAK
 TPEAK
 R.V.

 ID1= 1
 (0358):
 12.30
 1.436
 10.08
 128.64

 + ID2= 2
 (0353):
 16.30
 1.875
 10.08
 128.66

 R.V. _____ (mm) 128.64 ID = 3 (0359): 28.60 3.31110.08 128.65 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0363) | 1 + 2 = 3R.V. (mm) 128.65 _____ ID = 3 (0363): 58.60 6.814 10.08 125.38NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. Page 134

ADD HYD (0470) 1 + 2 = 3..... _____ ID = 3 (0470): 53.65 7.598 10.00128.70 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ------DUHYD (0520) | Inlet Cap.=3.050| #of Inlets= 1 | | Total(cms)= 3.0 | tal(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):98.048.0810.00138.49MINOR SYS.(ID= 3):83.433.054.25138.49 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 1.00 .0350 .50 .0350 .00 .0350 / .0350 Main Channel .00 .0350 / .0350 Main Channel .00 .0350 / .0350 Main Channel .50 .0350 .00 2.00 4.00 4.50 5.00 7.00 9.00 1.00 .0350 <---->
 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
 .202
 .43
 .26 .270E+02 .32 .357E+02 .37 .456E+02 .42 .565E+02 .47 .686E+02 .53 .817E+02 .58 .960E+02 .63 .111E+03 .68 .128E+03 .74 .145E+03 .79 .164E+03 .84 .184E+03 .89 .205E+03 1... 2.0 2.6 2.08 .32 .40 .37 2.22 . 38 2.6 2.34 .42 .36 3.4 2.46 .34 .47 2.57 .53 4.2 .32 5.1 6.2 7.3 8.6 10.0 11.6 13.2 .31 .58 2.68 2.78 .63 .30 .68 2.87 2.97 .29 .74 .28 .79 3.06 3.14 3.23 .27 .84 .27 .84 .89 13.2 .26 Page 135

Hadati Creek watershed - Allowable

Hadati Creek Watershed - Allowable .95 1.00 .95 1.00 15.0 3.31 .227E+03 .25 .250E+03 17.0 3.40 <---- hydrograph ----> <-pipe / channel-> QPEAK TPEAK R.V. MAX DEPTH MAX VEL TPEAK R.V. (hrs) (mm) AREA (m) (m/s) (cms) (ha) INFLOW : ID= 2 (0563) 23.70 2.87 .44 .44 2.38 10.00 128.70 10.00 128.70 OUTFLOW: ID = 1 (0561) 23.70 2.87 2.38 ADD HYD (0114) | 1 + 2 = 3ID = 3 (0114): 49.64 4.89610.50 128.69 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ------ADD HYD (0380) | 1 + 2 = 3 | _____ _____ ID = 3 (0380): 176.10 20.834 10.00 127.59NOTE: 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 100.00 324.60 .0500

 321.60
 .0500

 320.80
 .0500 / .0300
 Main Channel

 320.80
 .0300 / .0500
 Main Channel

 321.60
 .0300 / .0500
 Main Channel

 321.60
 .0500
 322.30

 323.10
 .0500

 115.00 120.00 122.00 138.00 148.00 323.10 154.00 .0500 164.00 324.60 .0500 <----> FLOW RATE VELOCITY TRAV.TIME (m/s) (cms) (min)

 (m/s)
 (m1n)

 .84
 8.53

 1.13
 6.33

 1.36
 5.27

 1.56
 4.59

 1.79
 4.01

 1.99
 3.61

 2.17
 3.30

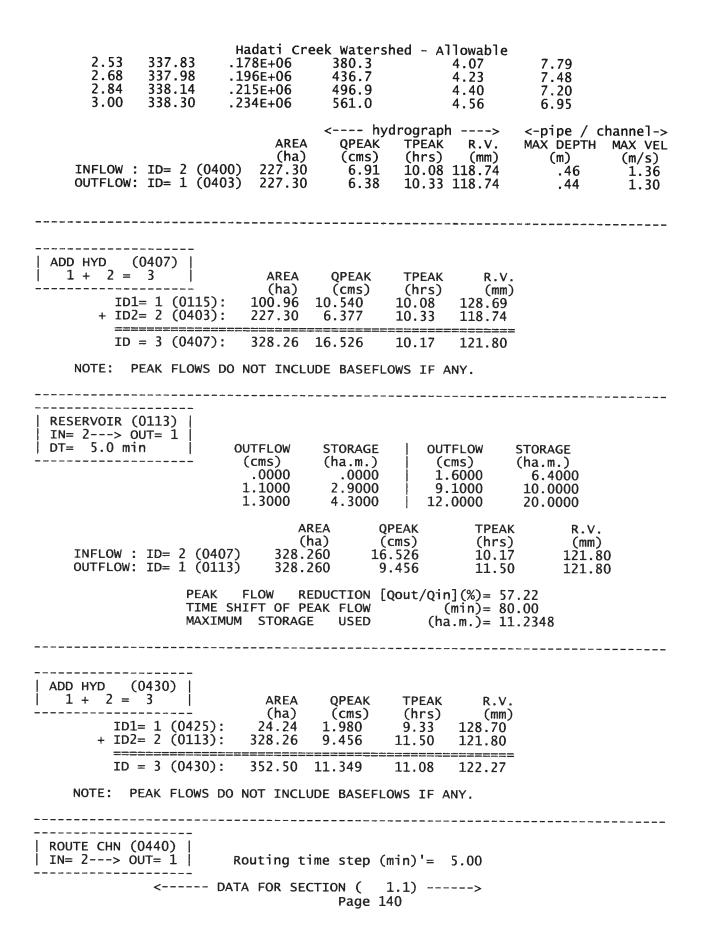
 2.37
 3.02

 .8 3.3 8.1 15.6 26.8 41.2 59.3 81.9 Page 136

| 2.00 32 2.20 32 2.40 32 2.60 32 3.00 32 3.20 32 3.40 32 3.60 32 | 22.60 .1 22.80 .2 23.00 .2 | 82E+05 18E+05 56E+05 | eek Waters 109.1 140.2 175.3 214.7 258.6 306.7 359.1 416.0 477.5 543.5 614.3 | | 2.58 2.77 2.95 | 2.78 2.59 2.43 2.29 2.18 2.07 1.98 1.91 1.83 1.77 1.71 | |
|--|---|----------------------------|---|-----------------------|---|--|--|
| INFLOW : II OUTFLOW: II | | | | | | <-pipe / cl MAX DEPTH (m) .58 .58 | nannel-> MAX VEL (m/s) 1.33 1.33 |
| ADD HYD (052 1 + 2 = 3 ID1= 1 + ID2= 2 | 26) 1 (0520): 2 (0525): | (ha) 98.04 .00 | QPEAK (cms) 8.084 .001 | (hrs) 10.00 .00 | (mm) 138.49 ****** | | |
| | 3 (0526): | 98.04 | 8.084 | 10.00 | 138.49 | | |
| + 1DZ= 2 ====== | L (0561): 2 (0481): 3 (0492): | 5.90 ======= 29.60 | .715 ==================================== | 10.00 | 128.70 128.70 | | |
| + ID2= 2 | 2 (0114): 2 (0106): 3 (0115): | 100.96 | 5.997 10.540 | 10.08 | R.V. (mm) 128.69 128.69 128.69 128.69 NY. | | |
| RESERVOIR (039 IN= 2> OUT= DT= 5.0 min | = 1 | UTFLOW | STORAGE Page 1 | | FLOW | STORAGE | |

| | Hadati Creek Watersl (cms) (ha.m.) .0000 .0000 .7700 .2870 1.2600 .9680 | hed - Allowable (cms) 1.3100 1.8600 .0000 | (ha.m.) 1.6000 23.2300 .0000 |
|---|---|---|---|
| INFLOW : ID= 2 (0380 OUTFLOW: ID= 1 (0390 | AREA Q (ha) (0 0) 176.100 20 0) 176.100 1 | PEAK TPEAK cms) (hrs) .834 10.00 .714 12.33 | (mm) 127.59 |
| PEAK TIME S MAXIMU | FLOW REDUCTION [(SHIFT OF PEAK FLOW JM STORAGE USED | Qout/Qin](%)= 8 (min)=140 (ha.m.)= 17 | .23 .00 .4981 |
| ROUTE CHN (0527) IN= 2> OUT= 1 | Routing time step (r | nin)'= 5.00 | |
| <pre>< DA Distance 100.00 140.00 140.50 141.50 142.00 160.00</pre> | ATA FOR SECTION (Elevation 313.20 312.40 .09 310.80 310.80 312.40 .03 313.20 | 1.1)> Manning .0500 500 / .0300 Mai .0300 Mai .0300 Mai .0500 | n Channel n Channel n Channel n Channel |
| DEPTH ELEV (m) (m) .12 310.92 . .25 311.05 . .37 311.17 . .49 311.29 . .62 311.42 . .74 311.54 . .86 311.66 . .98 311.78 . 1.11 311.91 . 1.23 312.03 . 1.35 312.15 . 1.48 312.28 . 1.60 312.40 . 1.73 312.53 . 1.87 312.67 . 2.00 312.80 . 2.13 312.93 . 2.27 313.07 . | .119E+03 .2 .185E+03 .3 .256E+03 .4 .330E+03 .6 .409E+03 .8 .492E+03 1.1 .579E+03 1.3 .671E+03 1.6 .767E+03 1.9 .867E+03 2.2 .971E+03 2.6 .108E+04 2.9 .149E+04 3.6 .248E+04 4.9 .405E+04 6.9 .620E+04 10.1 .893E+04 14.6 .122E+05 20.7 | E VELOCITY (m/s) .40 .57 .69 .78 .86 .92 .97 1.02 1.07 1.11 1.15 1.19 1.23 1.10 .88 .77 .73 .74 .76 | TRAV.TIME (min) 18.86 13.13 10.87 9.61 8.77 8.17 7.70 7.32 7.01 6.74 6.50 6.29 6.11 6.85 8.52 9.74 10.21 10.17 9.85 |
| INFLOW : ID= 2 (0526 OUTFLOW: ID= 1 (0527 | AREA QPEAK (ha) (cms) 5) 98.04 8.08 | 10.00 138.49 | <pre><-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) 2.05 .76 2.04 .76</pre> |
| RESERVOIR (0482) IN= 2> OUT= 1 DT= 5.0 min | OUTFLOW STORAGE Page 13 | | STORAGE |

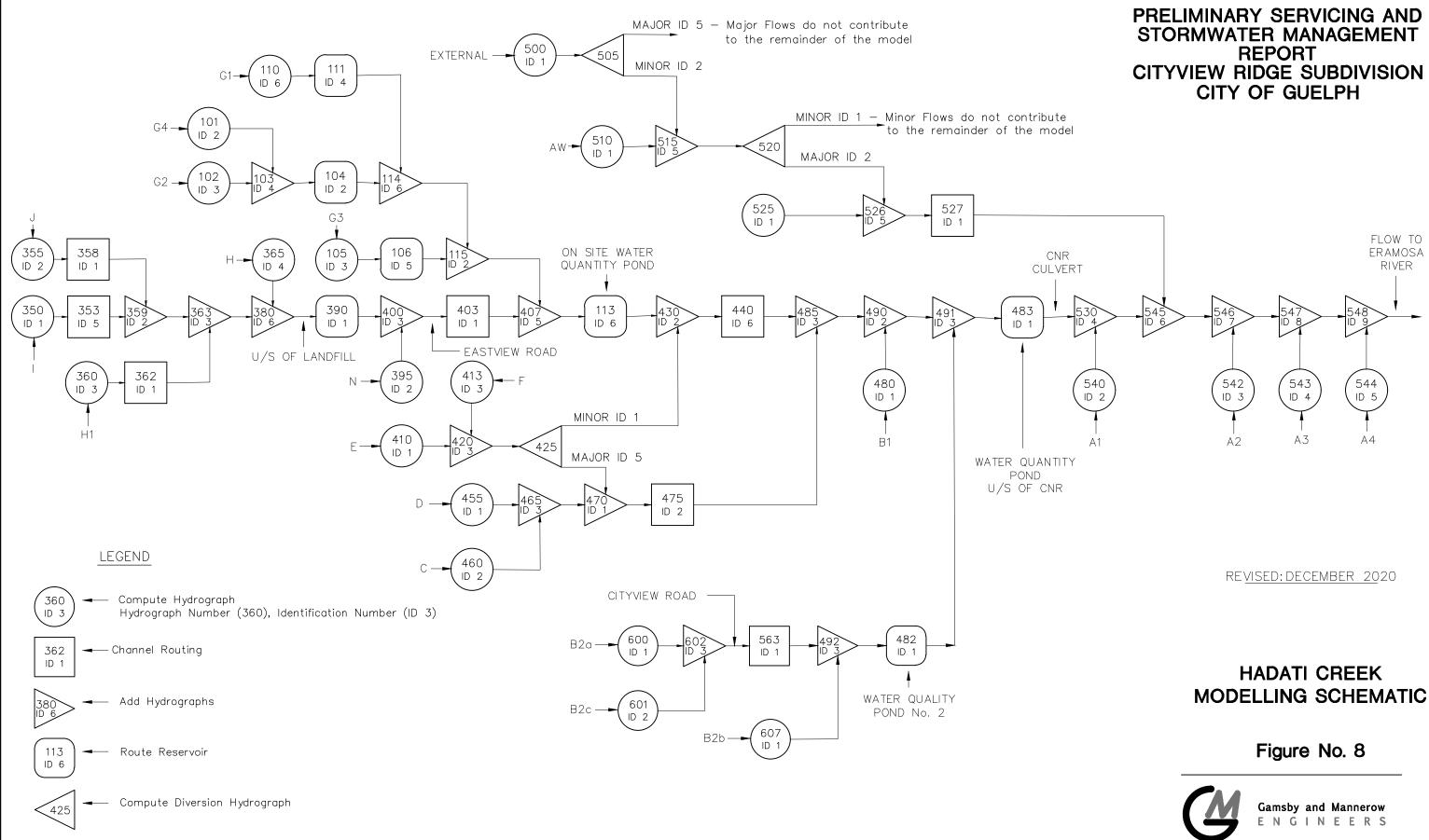
| | Hadati Creek Wate (cms) (ha.m. .0000 .000 .2590 .057 .2660 .118 .2720 .180 .2790 .244 .2850 .310 |) (cms) 0 .2910 9 .2970 0 1.6320 2 4.1680 5 7.5660 | ole (ha.m.) .3795 .4503 .5232 .5983 .6756 .0000 |
|--|---|--|---|
| INFLOW : ID= 2 (049) OUTFLOW: ID= 1 (048) | AREA (ha) 2) 29.600 2) 29.600 | (cms) (ł | PEAK R.V. hrs) (mm) 0.00 128.70 0.08 128.69 |
| TIME | FLOW REDUCTION SHIFT OF PEAK FLOW UM STORAGE USED | (min)= | = 99.13 = 5.00 = .5800 |
| + ID2= 2 (0395): | AREA QPEAK (ha) (cms) 176.10 1.714 51.20 5.388 | 10.08 88. | mm) 59 29 |
| | 227.30 6.909 | 10.08 118. | |
| ROUTE CHN (0403) | | | |
| IN= 2> OUT= 1 | - | | |
| Distance 100.00 110.00 135.00 142.00 148.00 156.00 165.00 | ATA FOR SECTION (Elevation 338.30 336.80 336.00 335.30 335.30 336.00 338.30 | Manning .0500 .0500 | Main Channel |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | TRAVEL TIME T. VOLUME FLOW R. (cu.m.) (cms .231E+04 .9 .563E+04 3.2 .997E+04 7.3 .153E+05 13.4 .218E+05 22.7 .299E+05 35.3 .396E+05 51.2 .510E+05 70.7 .641E+05 94.1 .787E+05 122.4 .939E+05 155.6 .110E+06 192.8 .126E+06 233.9 .143E+06 278.9 .160E+06 327.7 Page | ATE VELOCITY (m/s) .71 1.09 1.39 1.66 1.97 2.25 2.46 2.63 2.79 2.96 3.15 3.34 3.53 3.71 3.89 | TRAV.TIME (min) 44.52 29.11 22.72 19.04 16.04 14.10 12.89 12.02 11.35 10.71 10.06 9.48 8.97 8.53 8.13 |



| | Distance 100.00 120.00 126.00 130.00 140.00 142.00 155.00 160.00 | Eleva 325 324 323 323 322 322 322 323 324 | eek Waters tion .40 .90 .00 .30 .0 .30 .0 .90 .60 .40 | Manning .0600 .0600 .0600 .0600 600 / .0 300 / .0 .0600 .0600 |) | n Channel n Channel | |
|------------------------------|---|--|---|---|--|--|--|
| 1.31 1.47 1.63 1.79 | ELEV (m) 322.46 322.63 322.79 322.95 323.12 323.28 323.44 323.61 323.77 323.93 324.09 | TRAVE VOLUME (cu.m.) .233E+03 .672E+03 .132E+04 .216E+04 .319E+04 .433E+04 .556E+04 .689E+04 .689E+04 .833E+04 .987E+04 .115E+05 .154E+05 .154E+05 .200E+05 .228E+05 .293E+05 .330E+05 | FLOW RAT (cms) .6 2.1 4.9 9.0 14.9 22.5 31.6 42.3 54.6 68.3 82.8 99.2 117.9 138.8 157.4 179.6 205.8 236.1 270.6 | E VEL | OCITY .96 1.26 1.48 1.66 1.87 2.08 2.27 2.45 2.62 2.77 2.87 2.96 3.15 3.14 3.15 3.14 3.15 3.23 3.28 | TRAV.TIME (min) 6.96 5.27 4.51 4.03 3.57 3.21 2.93 2.72 2.54 2.41 2.33 2.25 2.18 2.11 2.12 2.11 2.09 2.07 2.03 | |
| INFLOW : OUTFLOW: | ID= 2 (043 ID= 1 (044 | AREA (ha) 352.50 0) 352.50 | < hy QPEAK (cms) 11.35 11.32 | drograph TPEAK (hrs) 11.08 11.08 | R.V. (mm) 122.27 122.27 | <-pipe / c MAX DEPTH (m) .72 .71 | hannel-> MAX VEL (m/s) 1.73 1.73 |
| ID : | 3 = 1 (0440): = 2 (0475): = 3 (0485): | (ha) 352.50 | 16.120 | (hrs) 11.08 10.00 10.75 | (mm) 122.27 128.70 123.12 | | |
| ADD HYD ((1 + 2 = | 3 = 1 (0485): | AREA (ha) 406.15 43.10 | 5.222 | 10.00 ====== | R.V. (mm) 123.12 128.70 | | |
| | | | | - | | | |

Hadati Creek Watershed - Allowable ID = 3 (0490): 449.25 19.97310.67 123.66 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0491) | 1 + 2 = 3 | QPEAK (cms) TPEAK AREA R.V. (mm) 128.69 (ha) (cms) 29.60 3.550 (hrs) ------ID1= 1 (0482): + ID2= 2 (0490): 10.08 449.25 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) 7.0800 8.1000 9.7980 (cms) (ha.m.) _____ (ha.m.) .0000 .0000 2.4860 .2760 .0600 3.3240 4.6420 7.4397 .3400 .6182 1.1630 .3400 9.7980 .6182 10.4940 1.1630 11.6850 1.7070 12.3480 2.0400 2.6400 10.3000 3.1200 11.4000 QPEAK (cms) AREA TPEAK R.V. (hrs) 10 17 (hrs) 10.17 12.08 (na) 478.850 478.850 (ha) (mm) INFLOW : ID= 2 (0491) OUTFLOW: ID= 1 (0483) 23.211 123.97 11.874 123.97 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 (ha) (cms) 4.63 .636 TPEAK (hrs) 10.00 R.V. (mm) 182.64 ------ID1= 1 (0540): + 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) | 2 = 3|AREAQPEAKTPEAKID1= 1(0527):98.047.96810.08+ ID2= 2(0530):483.4812.00812.00 1 + 2 = 3 R.V. (mm) 138.49 124.53 ~~~~~~~~~~~~~~~~~~ ID = 3 (0545): 581.52 19.161 11.00 126.88

Hadati Creek Watershed - Allowable NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0546) | 1 + 2 = 3 | AREA QPEAK (ha) (cms) 25.25 3.443 AREA TPEAK R.V. -----. (hrs) (mm) 182.64 ID1= 1 (0542): + ID2= 2 (0545): 25.25 10.00 581.52 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 (ha) (cms) 14.99 2.054 TPEAK (hrs) R.V. (mm) 182.64 _____ ID1= 1 (0543): 10.00 + 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) | AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 1.13 .156 10.00 182.64 621.76 23.685 10.00 130.49 1 + 2 = 3 ID1= 1 (0544): + ID2= 2 (0547): ID = 3 (0548): 622.89 23.841 10.00 130.59 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. FINISH



Gamsby and Mannerow Limited OCT 23 2003 03027002.DWG

Hadati Creek Watershed - Post Development with Cityview Ridge _____ ______ SSSSS U U V V Ι Α L U ν V Ι SS U AA L V V Ι SS U U AAAAA L V V Ι SS U U Α Α L SSSSS VV Ι UUUUU Α Α LLLLL 000 TITT TTTTT Н Y Μ 000 н Y M 0 0 YY 0 Т Т H Н MM MM 0 Т 0 0 Т Н н Υ M Μ 0 0 000 Т Т Н H Υ М Μ 000 Developed and Distributed by Clarifica Inc. Copyright 1996, 2007 Clarifica Inc. All rights reserved. **** DETAILED OUTPUT ***** 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\Ci tyview Ridge\25mm4hr.stm Ptotal= 25.00 mm Comments: 25 mm - 4 hour - 10 Minute Time Step TIME RAIN TIME RAIN TIME RAIN TIME RAIN hrs mm/hr hrs mm/hr mm/hr hrs hrs mm/hr .17 2.17 .53 1.1717.57 2.95 3.17 .76 .71 61.55 .33 1.33 2.33 2.19 3.33 .65 .99 2.50 .50 1.50 24.02 1.69 3.50 .57 .67 1.51 1.67 11.16 1.34 3.67 .49 2.57 6.44 .44 .83 1.83 2.83 1.09 3.83 1.00 5.31 2.00 4.20 | 3.00 .90 4.00 .38 _____

| Hadati Creek Watershed - Post Development with Cityview Ridge |
|--|
| CALIB STANDHYD (0480) ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| $\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$ |
| NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP. |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ |
| 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 PEAK FLOW (cms)= 1.09 .23 1.142 (iii) TIME TO PEAK (hrs)= 1.42 1.83 1.42 |
| TIME TO PEAK (hrs) = 1.09 $.23$ 1.142 (111)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 = $.94$ $.09$ $.27$ |
| <pre>(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.</pre> |
| CALIB STANDHYD (0415) Area (ha)= 4.99 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ |

Hadati Creek Watershed - Post Development with Cityview Rido

Page 2

Hadati Creek Watershed - Post Development with Cityview Ridge Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 61.55 8.82 25.00 over (min) 5.00 3.27 5.00 5.00 3.27 (ii) Storage Coeff. (min)= 21.96 (ii) Unit Hyd. Tpeak (min)= 25.00 Unit Hyd. peak (cms)= .27 .05 ***TOTALS*** .17 PEAK FLOW TIME TO PEAK (cms) =.04 .179 (iii) 1.33 1.67 (hrs) =23.50 RUNOFF VOLUME 2.16 (mm) =6.64 TOTAL RAINFALL 25.00 25.00 (mm) =25.00 RUNOFF COEFFICIENT .94 .09 .27 _ ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALTB STANDHYD (0410) | |ID= 1 DT= 5.0 min | Area (ha)= 24.20 Total Imp(%)= 42.00 Dir. Conn.(%) = 21.00______ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =10.16 14.04 1.50 2.00 5.00 Dep. Storage (mm) =2.00 2.00 401.00 Average Slope (%)= Length (m)= 40.00 Mannings n .013 . 300 = Max.ETT.Inten.(mm/hr)=
over (min)61.55
5.00Storage Coeff. (min)=
Unit Hyd. Tpeak (min)=
Unit Hyd. peak (cms)=5.00
20 7.05 30.00 28.54 (ii) 30.00 .04 ***TOTALS*** .75 1.33 23.50 .14 PEAK FLOW (cms) =.770 (iii) 1.33 TIME TO PEAK (hrs)= 1.75 RUNOFF VOLUME (mm)= 2.16 6.64 25.00 TOTAL RAINFALL (mm)= 25.00 25.00 RUNOFF COEFFICIENT = .94 .09 .27 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00FO FC (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 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 ID= 1 DT= 5.0 min _____ IMPERVIOUS PERVIOUS (i) Page 3

| Hadati Creek Wa Surface Area (ha) Dep. Storage (mm) Average Slope (%) Length (m) Mannings n | tershed - Post Dev = 15.12 = 1.50 = 2.03 = 465.00 = .013 | 20.88 | view Ridge |
|---|---|---|---|
| Max.Eff.Inten.(mm/hr) over (min) Storage Coeff. (min) Unit Hyd. Tpeak (min) Unit Hyd. peak (cms) | | 7.05 30.00 28.95 (ii) 30.00 .04 | TALS* |
| PEAK FLOW (cms): TIME TO PEAK (hrs): RUNOFF VOLUME (mm): TOTAL RAINFALL (mm): RUNOFF COEFFICIENT | = 1.09 = 1.33 = 23.50 = 25.00 = .94 | .21 1. 1.75 2. 2.16 6 25.00 25 .09 | .117 (iii) L.33 5.64 5.00 .27 |
| (i) HORTONS EQUATIO Fo (mm/hr)= Fc (mm/hr)= (ii) TIME STEP (DT) THAN THE STORAGE (iii) PEAK FLOW DOES F | 75.00 K L2.50 Cum.Inf. SHOULD BE SMALLER C E COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 DR EQUAL | |
| CALIB STANDHYD (0455) Area ID= 1 DT= 5.0 min Tota | a (ha)= 12.70 al Imp(%)= 42.00 | Dir. Conn.(%)= 2 | 21.00 |
| Surface Area (ha) Dep. Storage (mm) Average Slope (%) Length (m) Mannings n | IMPERVIOUS F = 5.33 = 1.50 = 1.71 = 300.00 = .013 | PERVIOUS (i) 7.37 5.00 1.71 40.00 .300 | |
| Max.Eff.Inten.(mm/hr): over (min) Storage Coeff. (min): Unit Hyd. Tpeak (min): Unit Hyd. peak (cms): | = 61.55 5.00 = 5.11 (ii) = .21 | 7.05 30.00 28.94 (ii) 30.00 .04 | TALS* |
| PEAK FLOW (cms) TIME TO PEAK (hrs) RUNOFF VOLUME (mm) TOTAL RAINFALL (mm) RUNOFF COEFFICIENT | = .41 = 1.33 = 23.50 = 25.00 = .94 | .07 1.75 2.16 | .417 (iii) L.33 5.64 5.00 .27 |
| (i) HORTONS EQUATION Fo (mm/hr)= Fc (mm/hr)= (ii) TIME STEP (DT) THAN THE STORAGE (iii) PEAK FLOW DOES I | 75.00 K L2.50 Cum.Inf. SHOULD BE SMALLER C E COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 DR EQUAL | |
| CALIB STANDHYD (0395) Area | a (ha)= 51.20 Page 4 | , , | |

Hadati Creek Watershed - Post Development with Cityview Ridge |ID= 1 DT= 5.0 min | Total Imp(%)= 10.00 Dir. Conn.(%)= 5.00

| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 5.12 1.50 2.00 900.00 .013 | PERVIOUS (i) 46.08 5.00 2.00 40.00 .300 | |
|---|---|---|--|--|
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | mm/hr)= (min) (min)= (min)= (cms)= | 61.55 10.00 9.42 (ii) 10.00 .12 | .00 230.00 225.31 (ii) 230.00 .00 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .29 1.42 23.50 25.00 .94 | .00 .00 25.00 .00 | .292 (iii) 1.42 1.17 25.00 .05 |
| ***** WARNING:FOR AR YOU SH ***** WARNING: THE P | OULD CONS | SIDER SPLITTING | THE AREA. | |
| Fo (mm Fc (mm (ii) TIME STEP | /hr)= 75. /hr)= 12. (DT) SHC STORAGE (| OEFFICIENT. | (1/hr)= 4.1 (mm)= .(OR EQUAL | L4 D0 |
| CALIB STANDHYD (0360) ID= 1 DT= 5.0 min | Area Total | (ha)= 30.00 Imp(%)= 37.00 |) Dir. Conn.(| (%)= 19.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 11.10 1.50 2.00 447.00 .013 | PERVIOUS (i) 18.90 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(| mm/hr)= (min) (min)= | 61.55 | 2.81 40.00 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .83 1.33 23.50 25.00 .94 | .08 1.92 1.27 25.00 .05 | .834 (iii) 1.33 5.50 25.00 .22 |
| ***** WARNING:FOR AR YOU SH | | IMPERVIOUS RAT | | |
| | QUATION S /hr)= 75. | ELECTED FOR PE | RVIOUS LOSSES: (1/hr)= 4.1 | |

HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (mm/hr) = 12.50 Cum.Inf. (mm) = .00Page 5

Hadati Creek Watershed - Post Development with Cityview Ridge (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) ID= 1 DT= 5.0 min Area (ha)= 16.30 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 _____ IMPERVIOUS PERVIOUS (i) 6.85 Surface Area (ha) =9.45 $1.50 \\ 1.00$ Dep. Storage (mm) =5.00 (%)= 1.00 Average Slope 330.00 Length (m) =40.00 .300 Mannings n .013 = max.EIT.Inten.(mm/hr)=
over (min)61.55
5.00
40.00Storage Coeff. (min)=
Unit Hyd. Tpeak (min)=
Unit Hyd. peak (cms)=61.55
5.00
40.00 .49 1.33 23.50 *TOTALS* .07 1.92 2.16 25.00 PEAK FLOW (cms)= .499 (iii) TIME TO PEAK (hrs) =1.33 (mm)= (mm)= RUNOFF VOLUME 6.64 RUNOFF COEFFICIENT = 25.00 25.00 . 94 .09 .27 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 ID= 1 DT= 5.0 min | ------PERVIOUS (i) IMPERVIOUS 5.17 (ha)= Surface Area 7.13 Dep. Storage 1.501.60286.005.00 (mm)= Average Slope 1.60 (%)= Length (m) =40.00 Mannings n .013 .300 = 61.55 7.05 Max.Eff.Inten.(mm/hr)= 5.00 5.06 5.00 over (min) 30.00 Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 5.06 (ii) 29.38 (ii) 30.00 .04 .21 ***TOTALS*** (cms)= .40 (hrs)= 1.33 (mm)= 23.50 (mm)= 25.00 ENT = .94 .07 PEAK FLOW .405 (iii) 1.75 TIME TO PEAK 1.33 RUNOFF VOLUME 2.16 6.64 25.00 TOTAL RAINFALL 25.00 = RUNOFF COEFFICIENT .94 .09 .27

| (i) HORTONS E Fo (mm Fc (mm (ii) TIME STEP | QUATION SE /hr)= 75.0 /hr)= 12.5 (DT) SHOU STORAGE CO | LECTED FOR PE 00 K 00 Cum.Inf ULD BE SMALLER DEFFICIENT. | | tityview Ridge |
|---|---|--|--|---|
| CALIB STANDHYD (0365) ID= 1 DT= 5.0 min | Area Total I | (ha)= 117.50 mp(%)= 42.00 | Dir. Conn.(%) | = 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 49.35 1.50 2.00 885.00 .013 | PERVIOUS (i) 68.15 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | | | | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | 2.82 1.42 23.50 25.00 .94 | .62 1.83 2.16 25.00 .09 | 2.960 (iii) 1.42 6.64 25.00 .27 |
| Fo (mm, Fc (mm, (ii) TIME STEP | /hr)= 75.0 /hr)= 12.5 (DT) SHOU STORAGE CO | 0 K O Cum.Inf LD BE SMALLER EFFICIENT. | | |
| CALIB STANDHYD (0105) ID= 1 DT= 5.0 min | Area Total I | (ha)= 51.32 mp(%)= 42.00 | Dir. Conn.(%): | = 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 21.55 1.50 2.00 550.00 .013 | PERVIOUS (i) 29.77 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(r over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | (min) (min)= | 61.55 5.00 7.01 (ii) 5.00 .17 | 7.05 30.00 29.75 (ii) 30.00 .04 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL | (cms)= (hrs)= (mm)= (mm)= | 1.50 1.33 23.50 25.00 Page | .30 1.75 2.16 25.00 | 1.538 (iii) 1.33 6.64 25.00 |

| Hadati C RUNOFF COEFFIC | reek Watersh IENT = | ed - Post De .94 | evelopment with .09 | h Cityview Ridge .27 |
|--|--|---|---|--|
| Fo (m Fc (m (ii) TIME STE | m/hr)= 75.00 m/hr)= 12.50 P (DT) SHOULI STORAGE COE | K Cum.Inf D BE SMALLER FFICIENT. | - | .4 00 |
| CALIB STANDHYD (0102) ID= 1 DT= 5.0 min | - Area Total Im - | (ha)= 14.32 p(%)= 42.00 | Dir. Conn.(| ⁽ %)= 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | | | | |
| Max.Eff.Inten. ove Storage Coeff. Unit Hyd. Tpea Unit Hyd. peak | | | | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC | (cms)= (hrs)= (mm)= (mm)= IENT = | .47 1.33 23.50 25.00 .94 | .09 1.75 2.16 25.00 .09 | .479 (iii) 1.33 6.64 25.00 .27 |
| Fo (m Fc (m (ii) TIME STE | EQUATION SELI n/hr)= 75.00 n/hr)= 12.50 P (DT) SHOULI STORAGE COEI | ECTED FOR PE K Cum.Inf D BE SMALLER FFICIENT. | RVIOUS LOSSES: (1/hr)= 4.1 . (mm)= .0 OR EQUAL | .4 |
| CALIB STANDHYD (0101) ID= 1 DT= 5.0 min | | (ha)= 16.32 p(%)= 42.00 | | %)= 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | In (ha)= (mm)= (%)= (m)= = | MPERVIOUS 6.85 1.50 2.00 309.00 .013 | PERVIOUS (i) 9.47 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten. ove Storage Coeff. Unit Hyd. Tpeal Unit Hyd. peak | r (min) (min)= k (min)= | 61.55 5.00 4.96 (ii) 5.00 .22 | 30.00 | *TOTALS* |
| | | Page | 8 | |

Page 8

Hadati Creek Watershed - Post Development with Cityview Ridge .53 1.33 .540 (iii) .10 1.75 PEAK FLOW (cms) =TIME TO PEAK (hrs) =1.33 (mm)= 23.50 RUNOFF VOLUME 2.16 6.64 TOTAL RAINFALL 25.00 25.00 (mm) =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) = 4.1K (1/hr) = 4.14Cum.Inf. (mm) = .00 (mm/hr) = 12.50FC (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 Total Imp(%)= 42.00 ID= 1 DT= 5.0 min | Dir. Conn.(%) = 21.00------IMPERVIOUS PERVIOUS (i) (ha) =Surface Area 7.98 11.02 1.50 Dep. Storage (mm)= 5.00 Average Slope (%)= 2.00 2.00 Length 365.00 (m) =40.00 Mannings n .013 . 300 Max.Eff.Inten.(mm/hr)= 61.55 7.05 5.00 30.00 over (min) 5.48 (ii) 28.22 (ii) Storage Coeff. (min) =5.48 Unit Hyd. Tpeak (min)= 30.00 Unit Hyd. peak (cms)= .20 .04 *TOTALS* .601.33.111.752PEAK FLOW TIME TO PEAK (cms) =.614 (iii) (hrs) =1.33 RUNOFF VOLUME 23.50 (mm)= 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: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (mm/hr)= 12.50 Cum.Inf. (mm)= (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ _____ CALIB CALIB STANDHYD (0600) Area (ha)= 11.38 Total Imp(%)= 42.00 ID= 1 DT= 5.0 min Dir. Conn.(%) = 21.00_____ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =4.78 6.60 1.50 Dep. Storage (mm) =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 Page 9

Hadati Creek Watershed - Post Development with Cityview Ridge Storage Coeff. (min)= 7.96 (ii) 30.70 (ii) Unit Hyd. Tpeak (min)= 10.00 35.00 .13 .04 Unit Hyd. peak (cms)= ***TOTALS*** PEAK FLOW(cms)=.29TIME TO PEAK(hrs)=1.42RUNOFF VOLUME(mm)=23.50TOTAL RAINFALL(mm)=25.00RUNOFF COEFFICIENT=.94 .06 .301 (iii) .06 1.83 2.16 25.00 1.42 6.64 25.00 .09 .27 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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) |ID= 1 DT= 5.0 min | Area (ha)= 7.62 Total Imp(%)= 46.00 Dir. Conn.(%)= 21.00 ------IMPERVIOUS $\begin{array}{rcl} \text{IMPERVISES} \\ \text{(ha)} = & 3.51 \\ \text{(mm)} = & 1.50 \\ \text{(\%)} = & 2.00 \\ \text{(m)} = & 680.00 \\ - & .013 \end{array}$ PERVIOUS (i) Surface Area (ha) =4.11 Surface Area (ha)= Dep. Storage (mm)= Average Slope (%)= 5.00 2.00 Length 40.00 Mannings n .300 Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 10.00 10.00 10.00 10.00 10.00 30.00 10.00 30.00 10.00 30.00 10.00 30.00 10.00 30.00 10.00 30.00 10.00 3 .04 ***TOTALS***

 PEAK FLOW
 (cms)=
 .19
 .07

 TIME TO PEAK
 (hrs)=
 1.42
 1.75

 RUNOFF VOLUME
 (mm)=
 23.50
 3.18

 TOTAL RAINFALL
 (mm)=
 25.00
 25.00

 RUNOFF COEFFICIENT
 .94
 .13

 .212 (iii) 1.42 7.45 25.00 . 30 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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(%) = 42.00Dir. Conn.(%)= 2.50 _____ IMPERVIOUS PERVIOUS (i) Surface Area (ha)= Dep. Storage (mm)= 2.51 3.46 1.50 2.00 680.00 5.00 Average Slope (%)= 2.00 Length 80.00 .013 (m) =40.00 Mannings n = .300 Page 10

| Hadati Creek Wat | tershed - Post Dev | elopment with | Cityview Ridge |
|---|---|---|--|
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | 61.55 10.00 7.96 (ii) 10.00 .13 | 33.18 25.00 20.20 (ii) 25.00 .05 | *70741.5* |
| PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | .02 1.42 23.50 25.00 .94 | .13 1.67 4.97 25.00 .20 | *TOTALS* .141 (iii) 1.67 5.44 25.00 .22 |
| ***** WARNING:FOR AREAS WIT YOU SHOULD CO | H IMPERVIOUS RATIONSIDER SPLITTING | | |
| (i) HORTONS EQUATION Fo (mm/hr)= 7 Fc (mm/hr)= 1 (ii) TIME STEP (DT) S THAN THE STORAGE (iii) PEAK FLOW DOES N | 5.00 K 2.50 Cum.Inf. HOULD BE SMALLER (COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 DR EQUAL | |
| CALIB STANDHYD (0540) Area ID= 1 DT= 5.0 min Tota | | |)= 79.00 |
| Surface Area (ha)= Dep. Storage (mm)= Average Slope (%)= Length (m)= Mannings n = | IMPERVIOUS 3.70 1.50 55 150.00 .013 | PERVIOUS (i) .93 5.00 .55 40.00 .300 | |
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | 61.55 5.00 4.73 (ii) 5.00 .22 | .00 325.00 322.74 (ii) 325.00 .00 | *TOTALS* |
| PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | .57 1.33 23.50 25.00 .94 | .00 .00 .00 25.00 .00 | .569 (iii) 1.33 18.56 25.00 .74 |
| ***** WARNING: STORAGE COEF ***** WARNING: THE PERVIOUS | F. IS SMALLER THAN AREA HAS NO FLOW | N TIME STEP! | |
| (i) HORTONS EQUATION Fo (mm/hr)= 7 Fc (mm/hr)= 1 (ii) TIME STEP (DT) S THAN THE STORAGE (iii) PEAK FLOW DOES N | 5.00 K 2.50 Cum.Inf. HOULD BE SMALLER (COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 DR EQUAL | |
| CALIB STANDHYD (0500) Area ID= 1 DT= 5.0 min Tota | (ha)= 244.00 l Imp(%)= 46.00 Page 1 | Dir. Conn.(% 1 | ()= 26.00 |

Hadati Creek Watershed - Post Development with Cityview Ridge IMPERVIOUS PERVIOUS (i) Surface Area (ha) =112.24 131.76 1.50 .80 1275.00 Dep. Storage (mm) =5.00 .80 Average Slope (%)= 40.00 Length (m) =Mannings n = .013 .300 42.79 20.00 17.67 (ii) 20.00 Max.Eff.Inten.(mm/hr)= 5.28 55.00 over (min) Storage Coeff. 51.28 (ii) (min) =Unit Hyd. Tpeak (min)= 55.00 Unit Hýd. peak (cms)= .06 .02 ***TOTALS*** .82 2.17 2.27 5.07 1.58 PEAK FLOW (cms) =5.342 (iii) (hrs)= 1.58 (mm)= 23.50 (mm)= 25.00 ENT = .94 1.58 7.77 TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL 25.00 25.00 .94 RUNOFF COEFFICIENT = .31 .09 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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) CALIB Area (ha)= 16.00 ID= 1 DT= 5.0 min Total Imp(%) = 80.00Dir. Conn.(%) = 79.00IMPERVIOUS PERVIOUS (i) 12.80 $\begin{array}{rrrr} ha) = & 12.00 \\ mm) = & 1.50 \\ (\%) = & .50 \\ (m) = & 400.00 \\ - & .013 \end{array}$ Surface Area (ha) =3.20 Dep. Storage (mm)= 5.00 .20 Average Slope (%)= 40.00 Length Mannings n .300 61.55 .00 10.00 440.00 8.77 (ii) 439.54 (ii) 10.00 440.00 Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= .12 .00 ***TOTALS*** .00 .00 .00 PEAK FLOW (cms) =1.48 1.475 (iii) 1.42 TIME TO PEAK 1.42 (hrs) =23.50 RUNOFF VOLUME (mm)= 18.56 25.00 TOTAL RAINFALL (mm)= 25.00 25.00 .94 .00 RUNOFF COEFFICIENT = .74 ***** WARNING: THE PERVIOUS AREA HAS NO FLOW . (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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.

Hadati Creek Watershed - Post Development with Cityview Ridge CALIB STANDHYD (0542) (ha) = 25.25Area Total Imp(%) = 80.00|ID= 1 DT= 5.0 min | Dir. Conn.(%) = 79.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =20.20 5.05 Dep. Storage 1.50 5.00 (mm) =Average Slope (%)= .55 .55 Length (m) =350.00 Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 61.55 .00 330.00 over (min) 10.00 Storage Coeff. (min) =7.87 (ii) 325.88 (ii) Unit Hyd. Tpeak (min)= 10.00 330.00 Unit Hyd. peak (cms) =.13 .00 *TOTALS* .00 PEAK FLOW (cms) =2.41 2.408 (iii) TIME TO PEAK (hrs) =1.42 .00 1.42 RUNOFF VOLUME 23.50 18.56 (mm) =.00 25.00 25.00 TOTAL RAINFALL (mm) =25.00 RUNOFF COEFFICIENT .94 .00 .74 ***** WARNING: THE PERVIOUS AREA HAS NO FLOW . (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00FO K (1/hr) = 4.14Cum.Inf. FC (mm/hr) = 12.50.00 (mm) =(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 Total Imp(%)= 80.00 ID= 1 DT= 5.0 min | Dir. Conn.(%) = 79.00______ IMPERVIOUS PERVIOUS (i) (ha) =11.99 Surface Area 3.00 Dep. Storage (mm) =1.50 5.00 Average Slope (%)= . 55 . 55 Length 200.00 40.00 (m) =Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 61.55 .00 325.00 5.00 over (min) Storage Coeff. 323.64 (ii) (min) =5.63 (ii) Unit Hyd. Tpeak (min)= 5.00 325.00 Unit Hyd. peak (cms) =.20 .00 *TOTALS* .00 PEAK FLOW (cms) =1.77 1.767 (iii) TIME TO PEAK 1.33 (hrs) =.00 1.33 .00 25.00 RUNOFF VOLUME (mm) =23.50 18.56 TOTAL RAINFALL (mm) =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) = 75.00K (1/hr) = 4.14(mm)= FC (mm/hr) = 12.50Cum.Inf. .00

Page 13

Hadati Creek Watershed - Post Development with Cityview Ridge (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) | (ha)= 1.13 Area Total Imp(%) = 80.00ID= 1 DT= 5.0 min | Dir. Conn.(%)= 79.00 IMPERVIOUS PERVIOUS (i) (ha)= Surface Area . 90 .23 Dep. Storage 1.50 5.00 (mm) =.55 50.00 .013 .55 Average Slope (%)= Length 40.00 (m) =Mannings n . 300 = Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 61.55 5.00 2.45 (ii) 320.46 (ii) 325.00 300 300 .00 *TOTALS* .15 .00 PEAK FLOW (cms) =.151 (iii) 1.33 TIME TO PEAK (hrs)= 1.33 RUNOFF VOLUME (mm)= (mm)= 23.50 .00 18.56 TOTAL RAINFALL 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: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (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) | ID= 1 DT=****min | .00 AREA (ha)= .00 QPEAK (cms) =______ TPEAK (hrs) =.00 (mm)=****** VOLUME _____ _____ ADD HYD (0420) | 1 + 2 = 3QPEAK AREA TPEAK R.V. (cms) (ha) 4.99 (mm) (hrs) ID1= 1 (0415): + ID2= 2 (0410): 4.99.1791.3324.20.7701.33 6.64 6.64 _____ ____ _____ .948 ID = 3 (0420):29.19 1.33 6.64 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0465)

| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ |
|---|
| NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. |
| |
| |
| ROUTE CHN (0362) IN= 2> OUT= 1 Routing time step (min)'= 5.00 |
| <pre>< DATA FOR SECTION (1.1)> Distance Elevation Manning</pre> |
| 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 |
| 20.00 .40 .0300 Math channel |
| <> 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 |
| .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 |
| .20.20.140E+041.81.2713.13.22.22.166E+042.31.3612.24.24.24.194E+042.81.4411.58 |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ |
| .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 |
| <pre>< hydrograph> <-pipe / channel-></pre> |
| AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEI (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 Page 15 |

17

| Ha | dati Creek 5.51 10.00 14.49 14.50 20.00 | | .00 | .0150 | n Cityview Rid Main Channel Main Channel Main Channel Main Channel | ge |
|---|--|---|---|---|---|---|
| DEPTH (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | VOLUME (cu.m.) .929E+01 .372E+02 .836E+02 .149E+03 .232E+03 .334E+03 .454E+03 .576E+03 .699E+03 .822E+03 .944E+03 .108E+04 .123E+04 .123E+04 .159E+04 .203E+04 .254E+04 | FLOW RATE (cms) .0 .0 .1 .1 .2 .3 .4 .6 .8 1.0 1.2 1.4 1.7 2.0 2.3 2.6 3.0 3.4 | VELOCITY (m/s) .17 .27 .35 .42 .49 .55 .64 .74 .84 .94 1.03 1.11 1.03 1.11 1.21 1.25 1.28 1.31 1.33 1.34 | 99.56 62.72 47.86 39.51 34.05 30.15 26.24 22.41 19.75 17.76 16.22 15.07 14.28 13.72 13.31 13.01 12.76 12.57 12.41 | |
| INFLOW : OUTFLOW: | ID= 2 (03 ID= 1 (03 | AREA (ha) 50) 16.30 53) 16.30 | < hyd QPEAK (cms) .50 .22 | rograph TPEAK R.V (hrs) (mm 1.33 6.6 1.58 6.6 | > <-pipe / 6 MAX DEPTH) (m) 4 .12 0 .09 | channel-> MAX VEL (m/s) .78 .57 |
| ROUTE CHN (C IN= 2> OL |)358) JT= 1 | Routing t | ime step (m | in)'= 5.00 | | |
| | <pre>< Distance</pre> | Eleva | tion .26 .15 .03 .00 .09 .00 | .0300 00 / .0150 .0150 .0150 .0150 | Main Channel Main Channel Main Channel Main Channel Main Channel | |
| < DEPTH (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 | TRAVE VOLUME (cu.m.) .102E+02 .409E+02 .920E+02 .163E+03 .255E+03 .368E+03 .499E+03 .634E+03 .769E+03 | L TIME TABL FLOW RATE (cms) .0 .0 .1 .1 .1 .2 .3 .4 .6 Page 16 | VELOCITY (m/s) .17 .27 .35 .42 .49 .55 .64 .74 .84 | TRAV.TIME (min) 109.52 68.99 52.65 43.46 37.45 33.17 28.86 24.66 21.72 | |

| Hadati Creek Wat .14 .14 .90 .15 .15 .10 .16 .16 .11 .18 .18 .13 .19 .19 .15 .20 .20 .17 .22 .22 .19 .23 .23 .22 .25 .25 .25 .26 .26 .27 | 4E+03 | .8 1.0 1.2 1.4 1.7 2.0 | | 19.54 17.84 16.57 15.71 15.10 14.65 | 2 |
|--|---|--|--|--|---|
| INFLOW : ID= 2 (0355) OUTFLOW: ID= 1 (0358) | < AREA ((ha) (12.30 12.30 | hydrogra (PEAK TPE/ (cms) (hrs .40 1. .15 1. | aph> AK R.V. s) (mm) 33 6.64 58 6.59 | <-pipe / ch MAX DEPTH (m) .11 .08 | annel-> MAX VEL (m/s) .72 .52 |
| RESERVOIR (0106) IN= 2> OUT= 1 DT= 5.0 min OU (| .0100 . | ORAGE (1.m.) 0000 0100 2300 | DUTFLOW (cms) .5000 6.6000 .0000 | (ha.m.) .4000 .8000 | |
| INFLOW : ID= 2 (0105) OUTFLOW: ID= 1 (0106) PEAK F TIME SHI MAXIMUM | AREA (ha) 51.320 51.320 LOW REDUCT FT OF PEAK F STORAGE L | (cms) 1.538 .155 TON [Oout/0 | Din](%)= 10 | (mm) 6.64 6.63 | |
| | (ha) (c 14.32 .4 16.32 .5 | 79 1.3 40 1.3 | s) (mm) 3 6.64 3 6.64 ======= | | |
| NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. | | | | | |
| (| cms) (ha .0000 . .0100 . | .m.) 0000 | | STORAGE (ha.m.) 1.0000 1.1000 .0000 | |
| INFLOW : ID= 2 (0110) | AREA (ha) 19.000 | QPEAK (cms) .614 Page 17 | TPEAK (hrs) 1.33 | | |

Hadati Creek Watershed - Post Development with Cityview Ridge 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 ______ ADD HYD (0602) | 1 + 2 = 3 | AREA QPEAK TPEAK R.V. (ha) (cms) 11.38 .301 7.62 .212 _____ (mm) (hrs) ID1= 1 (0600): + ID2= 2 (0601): 1.42 1.42 6.64 7.45 ID = 3 (0602):1.42 19.00 .514 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 (ha) (cms) 244.00 5.34 TPEAK R.V. (hrs) (mm) 1.58 7.77 TOTAL HYD.(ID= 1): 244.00 5.34 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. _____ ADD HYD (0515) | 1 + 2 = 3_____ ID = 3 (0515): 260.00 6.307 1.588.44 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ DUHYD (0425) Inlet Cap.=1.980 #of Inlets= 1 | Total(cms)= 2.0 | AREA (ha) QPEAK TPEAK R.V. 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.

Page 18

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0470) | 1 + 2 = 3 | AREA QPEAK TPEAK R.V. (mm) .00 6.64 _______ _____ -----ID = 3 (0470): 48.70 1.534 1.33 6.64NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0359) | 1 + 2 = 3AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 16.30 .216 1.58 6.60 12.30 .153 1.58 6.59 (mm) 6.60 ID1= 1 (0353): + ID2= 2 (0358): ************************* ========== ID = 3 (0359): 28.60 .369 1.58 6.60NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. RESERVOIR (0104) IN= 2---> OUT= 1 | DT= 5.0 min | STORAGE OUTFLOW OUTFLOW STORAGE ha.m.) (cms) .0000 1.0000 .0100 10.0000 .1332 .0000 -----(cms) (ha.m.) (ha.m.) .0000 . 5000 .0000 .6000 .0100 .1332 .0150 .0000 QPEAK (na) (cms) 30.640 1.019 30.640 000 QPEAK TPEAK R.V. (mm) (hrs) INFLOW : ID= 2 (0103) OUTFLOW: ID= 1 (0104) 1.33 2.33 6.64 6.63 PEAK FLOW REDUCTION [Qout/Qin](%)= 9.52 TIME SHIFT OF PEAK FLOW (min) = 60.00MAXIMUM STORAGE USED (ha.m.)= .1639 ADD HYD (0114) 1 + 2 = 3AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 30.64 .097 2.33 6.63 19.00 .024 2.92 6.63 _____ (mm) ID1= 1 (0104): 6.63 + ID2= 2 (0111): 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·-----

| На | < [| DATA FOR SEC Elevat | TION (2.2 ion Ma 00 . 50 . 00 .0350 00 .0350 50 .0350 | unning 0350 0350)/0350 Mai | n Channel n Channel | ge |
|--|---|---|---|--|--|--|
| . 16 . 21 . 26 . 32 . 37 . 42 . 47 . 53 . 58 . 63 . 63 . 68 . 74 . 79 . 84 . 89 | ELEV (m) .05 .11 .26 .32 .37 .42 .47 .53 .58 .63 .68 .74 .79 .84 | VOLUME | | (m/s) .64 .96 | TRAV.TIME (min) 3.06 2.03 1.61 1.37 1.21 1.10 1.01 .94 .88 .83 .79 .75 .72 .69 .66 .64 .62 .60 .58 | |
| INFLOW : OUTFLOW: | ID= 2 (060 ID= 1 (050 | AREA (ha) 02) 19.00 03) 19.00 | < hydro QPEAK T (cms) (.51 .53 | graph> PEAK R.V. hrs) (mm) 1.42 6.96 1.42 6.96 | <-pipe / c MAX DEPTH (m) .20 .21 | hannel-> MAX VEL (m/s) 1.38 1.40 |
| ROUTE CHN ((IN= 2> OU | | Routing tir | ne step (min | a)'= 5.00 | | |
| | <pre>< [Distance</pre> | DATA FOR SEC Elevat 101. 100. 100. 99. 99. 100.0 101.4 | ion Ma 50 . 55 .0500 50 . 60 . 55 .0300 | | n Channel n Channel | |
| < DEPTH (m) .10 .19 .29 .38 .48 | ELEV (m) 99.60 99.69 99.79 | TRAVEL VOLUME (cu.m.) .353E+02 .112E+03 .195E+03 .285E+03 .381E+03 | TIME TABLE FLOW RATE (cms) .0 .1 .2 .3 .5 Page 20 | VELOCITY (m/s) .19 .37 .49 .59 .67 | TRAV.TIME (min) 43.69 22.76 17.03 14.23 12.51 | |

| Hadati Creek Watershed .57 100.07 .484E+03 .67 100.17 .594E+03 .76 100.26 .710E+03 .86 100.36 .832E+03 .95 100.45 .961E+03 1.05 100.55 .110E+04 1.16 100.66 .127E+04 1.28 100.78 .148E+04 1.39 100.89 .170E+04 1.50 101.00 .195E+04 1.61 101.11 .221E+04 1.72 101.22 .250E+04 1.84 101.34 .280E+04 1.95 101.45 .313E+04 | <pre>4 - Post Develop .7 .9 1.2 1.5 1.8 2.2 2.7 3.4 4.1 4.9 5.8 6.7 7.7 8.8</pre> | oment with Cit .74 .80 .86 .91 .96 1.00 1.07 1.14 1.20 1.25 1.30 1.34 1.38 1.41 | Eyview Ridge 11.32 10.43 9.74 9.18 8.72 8.32 7.80 7.31 6.94 6.65 6.41 6.22 6.04 5.90 |
|---|--|---|--|
| **** WARNING: INFLOW HYDROG | RAPH IS DRY!! | | |
| DUHYD (0520) Inlet Cap.=3.050 #of Inlets= 1 Total(cms)= 3.0 AREA (ha) TOTAL HYD.(ID= 1): 260.00 | 6.31 1. | 58 8.44 | |
| MAJOR SYS.(ID= 2): 59.59 MINOR SYS.(ID= 3): 200.41 | 3 26 1 | 58 8 4 4 | |
| NOTE: PEAK FLOWS DO NOT INC | LUDE BASEFLOWS | IF ANY. | |
| ROUTE CHN (0475) IN= 2> OUT= 1 Routing | time step (min) | '= 5.00 | |
| <pre>< DATA FOR St Distance Eleva 100.00 324 115.00 322 120.00 324 122.00 324 138.00 322 148.00 322 154.00 322</pre> | ECTION (1.1) ation Man 4.60 .0 1.60 .0 0.80 .0500 0.80 .0300 1.60 .0 2.30 .0 3.10 .0 | > ning 500 500 / .0300 Main / .0500 Main | Channel Channel |
| < TRAVI DEPTH ELEV VOLUME (m) (m) (cu.m.) .20 321.00 .398E+03 .40 321.20 .125E+04 .60 321.40 .255E+04 .80 321.60 .430E+04 1.00 321.80 .644E+04 1.20 322.00 .892E+04 1.40 322.20 .117E+05 1.60 322.40 .148E+05 1.80 322.60 .182E+05 2.00 322.80 .218E+05 2.20 323.00 .256E+05 2.40 323.20 .296E+05 | EL TIME TABLE - FLOW RATE (cms) .8 3.3 8.1 15.6 26.8 41.2 59.3 81.9 109.1 140.2 175.3 214.7 Page 21 | | RAV.TIME (min) 8.53 6.33 5.27 4.59 4.01 3.61 3.30 3.02 2.78 2.59 2.43 2.29 |

| Hadati Creek Water 2.60 323.40 .338E 2.80 323.60 .382E 3.00 323.80 .428E 3.20 324.00 .476E 3.40 324.20 .526E 3.60 324.40 .578E 3.80 324.60 .632E | +05 258.6 +05 306.7 +05 359.1 +05 416.0 +05 477.5 +05 543.5 +05 614.3 | 3.29 3.46 3.61 3.76 3.91 4.05 4.18 | 2.18 2.07 1.98 1.91 1.83 1.77 1.71 |
|---|---|--|--|
| INFLOW : ID= 2 (0470) OUTFLOW: ID= 1 (0475) | <pre>< hyc AREA QPEAK (ha) (cms) 48.70 1.53 48.70 1.10</pre> | Irograph> TPEAK R.V. (hrs) (mm) 1.33 6.64 1.42 6.64 | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) .26 .91 .23 .87 |
| ID1= 1 (0362): 3 + ID2= 2 (0359): 2 | | (hrs) (mm) 1.50 5.48 1.58 6.60 | |
| ID = 3 (0363): 5 NOTE: PEAK FLOWS DO NOT | | | |
| ADD HYD (0115) 1 + 2 = 3 | 0.96 .273 | 2.42 6.63 | |
| | 4.97 .596 | (hrs) (mm) 1.42 6.96 1.67 5.44 1.42 6.60 | |
| ID1= 1 (0525): | AREA QPEAK (ha) (cms) .00 .001 9.59 3.257 ======== Page 2 | .00 ******* 1.58 8.44 | |

Hadati Creek Watershed - Post Development with Cityview Ridge ID = 3 (0526): 59.59 3.257 1.58 8.44 8.44 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0380) | 1 + 2 = 3 | AREAQPEAKTPEAK(ha)(cms)(hrs)58.60.7691.50117.502.9601.42 R.V. -----(mm) ID1= 1 (0363): 6.03 + ID2= 2 (0365): 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 OUTFLOWSTORAGEOUTFLOW(cms)(ha.m.)(cms).0000.0000.2910.2590.0579.2970.2660.11801.6320.2720.18024.1680.2790.24457.5660.2850.3109.0000 STORAGE (ha.m.) .3795 . 3795 . 4503 . 5232 . 5983 . 6756 7.5660 .0000 AREA OPEAK TPEAK R.V. (cms) (hrs) (ha) (mm) INFLOW : ID= 2 (0492) OUTFLOW: ID= 1 (0482) 24.970 24.970 . 596 1.42 6.60 .260 2.00 6.60 PEAK FLOW REDUCTION [Qout/Qin](%)= 43.68 TIME SHIFT OF PEAK FLOW (min)= 35.00 (min)= 35.00 (ha.m.)= .0700 MAXIMUM STORAGE USED _____ ROUTE CHN (0527) | IN= 2---> OUT= 1 | Routing time step (min)'= 5.00 <---- DATA FOR SECTION (1.1) ----> Distance Elevation Manning 140.00312.40.0500140.50312.40.0500 / .0300Main Channel140.50310.80.0300Main Channel141.50310.80.0300Main Channel142.00312.40.0300 / .0500Main Channel160.00313.20.0500 ----- TRAVEL TIME TABLE ---------->
 DEPTH
 ELEV
 VOLUME
 FLOW RATE
 VELOCITY

 (m)
 (m)
 (cu.m.)
 (cms)
 (m/s)

 .12
 310.92
 .575E+02
 .1
 .40

 .25
 311.05
 .119E+03
 .2
 .57
 TRAV.TIME (cms) .1 .2 .3 .4 .6 .8 1.1 (min) 18.86 13.13 . 69 .37 311.17 .185E+03 10.87 .78 .86 .92 .49 311.29 .256E+03 9.61 8.77 .330E+03 .409E+03 .62 311.42 .74 311.54 8.17 .492E+03 .86 311.66 .97 7.70 Page 23

| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | 1 .671E+03 3 .767E+03 5 .867E+03 8 .971E+03 0 .108E+04 3 .149E+04 7 .248E+04 0 .405E+04 3 .620E+04 7 .893E+04 0 .122E+05 | 1.3 1.6 1.9 2.2 2.6 2.9 3.6 4.9 6.9 10.1 14.6 20.7 | 1.02 1.07 1.11 1.15 1.19 1.23 1.10 .88 .77 .73 .74 .76 | 7.32 7.01 6.74 6.50 6.29 6.11 6.85 8.52 9.74 10.21 10.17 9.85 | | |
|--|--|---|---|--|--|--|
| INFLOW : ID= 2 OUTFLOW: ID= 1 | AREA (ha) (0526) 59.59 (0527) 59.59 | < hydrogr QPEAK TPE (cms) (hr 3.26 1. 2.80 1. | raph> AK R.V. 's) (mm) 58 8.44 67 8.44 | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) 1.66 1.16 1.54 1.21 | | |
| RESERVOIR (0390) IN= 2> OUT= 1 DT= 5.0 min | - - OUTFLOW - (cms) .0000 | STORAGE (ha.m.) .0000 .2870 .9680 | OUTFLOW S (cms) (1.3100 1.8600 .0000 | TORAGE (ha.m.) 1.6000 23.2300 .0000 | | |
| OUTFLOW: ID= 1 | ARI (h: (0380) 176.10 (0390) 176.10 PEAK FLOW REI TIME SHIFT OF PE MAXIMUM STORAGE | a) (cms) 00 3.653 00 .982 DUCTION [Oout/ | 2.25 (0in](%)= 26. | (mm) 6.44 6.43 88 | | |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | | | | | | |
| NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. | | | | | | |
| Dista 100 110 131 | DATA FOR SEC ance Elevat 0.00 338. 0.00 336. 5.00 336. 2.00 335. | ion Manr 30 .05 80 .05 00 .03 | 00 00 00 Mair | n Channel | | |

| 148.00 156.00 165.00 | 335. 336. 338. | 30 00 30 | .0500 .0500 .0000 | Cityview Ridge |
|---|---|--|--|---|
| <pre></pre> | TRAVEL VOLUME (cu.m.) .231E+04 .563E+04 .997E+04 .153E+05 .218E+05 .299E+05 .396E+05 .510E+05 .641E+05 .787E+05 .110E+06 .126E+06 .160E+06 .196E+06 .215E+06 .234E+06 | TIME TABLE FLOW RATE (cms) .9 3.2 7.3 13.4 22.7 35.3 51.2 70.7 94.1 122.4 155.6 192.8 233.9 278.9 327.7 380.3 436.7 496.9 561.0 | VELOCITY (m/s) .71 1.09 1.39 1.66 1.97 2.25 2.46 2.63 2.79 2.96 3.15 3.34 3.53 3.71 3.89 4.07 4.23 4.40 4.56 | TRAV.TIME (min) 44.52 29.11 22.72 19.04 16.04 14.10 12.89 12.02 11.35 10.71 10.06 9.48 8.97 8.53 8.13 7.79 7.48 7.20 6.95 |
| INFLOW : ID= 2 (040 OUTFLOW: ID= 1 (040 | AREA (ha) 00) 227.30 03) 227.30 | < hydr QPEAK (cms) 1.02 .88 | rograph> TPEAK R.V. (hrs) (mm) 1.58 5.25 3.17 5.25 | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) .17 .73 .16 .71 |
| ADD HYD (0407) 1 + 2 = 3 ID1= 1 (0403) : + ID2= 2 (0115) : | AREA (ha) 227.30 100.96 | QPEAK (cms) .881 .273 | TPEAK R.V (hrs) (mm 3.17 5.25 2.42 6.63 | /.)) |
| ID = 3 (0407): NOTE: PEAK FLOWS D | 328.26 | 1.112 | 2.83 5.67 | |
| | | | | |
| RESERVOIR (0113) IN= 2> OUT= 1 DT= 5.0 min | (cms) .0000 | STORAGE (ha.m.) .0000 2.9000 4.3000 | OUTFLOW (cms) 1.6000 9.1000 12.0000 | |
| INFLOW : ID= 2 (040 OUTFLOW: ID= 1 (011 | | a) (cm 60 1.1 | EAK TPEA Is) (hrs 12 2.8 154 5.8 | 5) (mm) 53 5.67 |
| PEAK | FLOW RE | DUCTION [QC Page 25 | out/Qin](%)= 3 | 31.88 |

| На | adati Creek W TIME SH MAXIMUM | atershed HIFT OF PE 1 STORAGE | - Post Deve AK FLOW USED | elopment (mi (ha.m | with Ci in)=180 n.)= | tyview Ric .00 .9343 | lge |
|---|---|---|---|---|--|---|-----|
| ADD HYD (1 + 2 = ID1 + ID2 | (0430) 3 = 1 (0113): = 2 (0425): | (ha) 328.26 29.19 | QPEAK (cms) .354 .948 | (hrs) 5.83 1.33 | (mm) 5.67 6.64 | | |
| ID | = 3 (0430): PEAK FLOWS DO | 357.45 | .951 | 1.33 | 5.75 | | |
| ROUTE CHN (IN= 2> O | UT=1 R | | | | | | |
| | $130.00 \\ 140.00 \\ 142.00 \\ 150.00 \\ 155.00 \\ 160.00$ | | | | | n Channel n Channel | |
| < DEPTH (m) .16 .33 .49 .65 .82 .98 1.14 1.31 1.47 1.63 1.79 1.96 2.12 2.28 2.45 2.61 2.77 2.94 3.10 | $\begin{pmatrix} m \\ 322.46 \\ 22.63 \\ 322.79 \\ 322.95 \\ 2323.12 \\ 323.12 \\ 323.28 \\ 4323.44 \\ 5323.44 \\ 5323.61 \\ 61 \\ 323.77 \\ 823.93 \\ 9324.09 \\ 11 \\ 324.26 \\ 11 \\ 324.26 \\ 11 \\ 324.58 \\ 11 \\ 324.58 \\ 11 \\ 324.58 \\ 11 \\ 324.58 \\ 12 \\ 324.91 \\ 22 \\ 325.07 \\ 22 \\ 325.24 \\ 22 \\ 22 \\ 325.24 \\ 22 \\ 22 \\ 325.24 \\ 22 \\ 32 \\ 32 \\ 32 \\ 32 \\ 32 \\ 32 \\ $ | TRAVEL VOLUME cu.m.) 33E+03 572E+03 32E+04 16E+04 19E+04 33E+04 56E+04 56E+04 56E+04 89E+04 33E+04 56E+04 15E+05 54E+05 54E+05 54E+05 59E+05 59E+05 59E+05 30E+05 | (cms) .6 2.1 4.9 9.0 14.9 22.5 31.6 42.3 54.6 68.3 82.8 99.2 117.9 138.8 157.4 179.6 205.8 236.1 270.6 | (m) 1. 1. 1. 2. 2. 2. 2. 2. 2. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. | (s) .96 .26 .48 .66 .87 .08 .27 .45 .62 .77 .87 .96 .06 .15 .14 .15 .18 .23 .28 | (m1n) 6.96 5.27 4.51 4.03 3.57 2.93 2.72 2.54 2.11 2.12 2.11 2.09 2.07 2.03 | |
| INFLOW : OUTFLOW: | ID= 2 (0430) ID= 1 (0440) | AREA (ha) 357.45 357.45 | < hyc QPEAK (cms) .95 .72 | Irograph - TPEAK (hrs) 1.33 1.42 | R.V. (mm) 5.75 5.75 | <-pipe / MAX DEPTH (m) .20 .18 | |

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0485) | 1 + 2 = 3AREA QPEAK TPEAK R.V. (mm) 6.64 _____ 5.75 ____ _____ ID = 3 (0485):406.15 1.820 1.42 5.86 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ------ADD HYD (0490) | AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 43.10 1.142 1.42 6.64 406.15 1.820 1.42 5.86 1 + 2 = 3 | R.V. (mm) ID1= 1 (0480): + ID2= 2 (0485): _____ -----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 | AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)449.252.9621.425.9324.97.2602.006.60 ID1= 1 (0490): + ID2= 2 (0482): ========= _____ _____ ID = 3 (0491): 474.22 3.086 1.425.97 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ RESERVOIR (0483) IN= 2---> OUT= 1 OUTFLOWSTORAGEOUTFLOWSTORAGE(cms)(ha.m.)(cms)(ha.m.).0000.00007.08002.4860.2760.06008.10003.32401.2000.34009.79804.64202.0400.618210.49407.43972.64001.163011.685010.30003.12001.707012.348011.4000 | DT= 5.0 min | AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)474.2203.0861.425.9474.2201.3442.005.9 (mm) 5.97 5.07 INFLOW : ID= 2 (0491) OUTFLOW: ID= 1 (0483) PEAK FLOW REDUCTION [Qout/Qin](%)= 43.57 TIME SHIFT OF PEAK FLOW (min)= 35.00 (ha.m.)= .3886 MAXIMUM STORAGE USED _____

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0530) 1 + 2 = 3AREA QPEAK TPEAK R.V. (mm) 5.97 (ha) (cms) (hrs) ID1= 1 (0483): 474.22 1.344 2.00 + ID2= 2 (0540): . 569 1.33 18.56 4.63 _____ ID = 3 (0530): 478.85 1.391 2.00 6.09NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0545) | 1 + 2 = 3AREA OPEAK TPEAK R.V. (ha) (cms) 478.85 1.391 59.59 2.796 (hrs) (mm) ID1= 1 (0530): 2.00 6.09 + ID2= 2 (0527): 1.67 8.44 _____ ID = 3 (0545): 538.44 4.086 1.67 6.35NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0546) 1 + 2 = 3 R.V. (mm) 6.35 AREA QPEAK (cms) TPEAK (ha) ------(hrs) ID1= 1 (0545): 538.44 4.086 1.67 6.35 + ID2= 2 (0542): 1.42 25.25 2.408 18.56 ID = 3 (0546):563.69 5.474 1.58 6.90 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. -----ADD HYD (0547) | AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 563.69 5.474 1.58 6.90 1 + 2 = 3ID1= 1 (0546): 563.69 5.474 + ID2= 2 (0543): 14.99 1.767 _____ 1.58 6.90 1.33 18.56 ____ ____ ID = 3 (0547): 578.68 6.1591.50 7.20 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ______ ADD HYD (0548) | QPEAK (cms) 1 + 2 = 3AREA (ha) R.V. TPEAK (hrs) (mm) 7.20 ID1= 1 (0547): 578.68 6.159 + ID2= 2 (0544): 1.13 .151 1.50 7.20 1.33 18.56 ID = 3 (0548): 579.81 6.2201.50 7.22 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
Page 28
```

Hadati Creek Watershed - Post Development with Cityview Ridge

| READ STORM | | tyvie | w Ridae | OTTHYMO\C \5yrSCS12 ype II 12 | hr.stm | sian stor | - 193 |
|--|---|--|---|--|---|---|---|
| TIME hrs .25 .50 | RAIN mm/hr 1.34 1.34 | TIME hrs 3.25 | RAIN | TIME hrs 6.25 | RAIN | TIME hrs 9.25 | RAIN mm/hr 1.87 1.87 |
| .75 1.00 1.25 1.50 1.75 2.00 2.25 | 1.34 1.34 1.34 1.60 | 4.00 4.25 4.50 4.75 5.00 5.25 | 2.14 3.20 3.20 4.27 4.27 6.41 | 7.00 7.25 7.50 7.75 8.00 8.25 | 4.27 3.20 3.20 3.20 3.20 1.87 | 10.00 10.25 10.50 10.75 | 1.87 1.87 1.07 1.07 1.07 1.07 1.07 |
| 2.50 2.75 3.00 | 1.60 1.60 1.60 | 5.50 5.75 6.00 | 6.41 25.64 70.50 | 8.50 8.75 9.00 | 1.87 1.87 1.87 | $11.50 \\ 11.75 \\ 12.00$ | 1.07 1.07 1.07 |
| | | | | | | | |
| CALIB STANDHYD (0480) ID= 1 DT= 5.0 min | Area Total Im | (ha)= 4 p(%)= 4 | 3.10 2.00 c | Dir. Conn | . (%)= 2 | 21.00 | |
| Surface Area Dep. Storage Average Slope Length Mannings n | I (ha)= (mm)= (%)= (m)= = | MPERVIOU 18.10 1.50 2.00 680.00 .013 | IS PEF 2 | RVIOUS (i 25.00 5.00 2.00 40.00 .300 |) | | |
| NOTE: RAINFAL | LL WAS TR | ANSFORME | D TO | 5.0 MIN. | TIME STE | EP. | |
| .333 .417 .500 .583 .667 .750 .833 .917 1.000 1.083 | $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | TIME hrs 3.083 3.167 3.250 3.333 3.417 3.500 3.583 3.667 3.750 3.833 3.917 4.000 4.083 | RAIN mm/hr 2.14 2.14 2.14 2.14 2.14 2.14 2.14 2.14 | hrs 6.083 6.167 6.250 6.333 6.417 6.500 6.583 6.667 6.750 6.833 6.917 7.000 7.083 | RAIN mm/hr 9.61 9.61 9.61 9.61 9.61 4.27 4.27 4.27 4.27 4.27 4.27 3.20 | TIME hrs 9.08 9.17 9.25 9.33 9.42 9.50 9.58 9.67 9.75 9.83 9.92 10.00 10.08 | RAIN mm/hr 1.87 1.87 1.87 1.87 1.87 1.87 1.87 1.87 |
| 1.167 1.250 1.333 1.417 | 1.34 1.34 1.34 1.34 | 4.167 4.250 4.333 4.417 | 3.20 3.20 3.20 3.20 3.20 | 7.167 7.250 7.333 7.417 | 3.20 3.20 3.20 3.20 3.20 | 10.17 10.25 10.33 10.42 | 1.07 1.07 1.07 1.07 |

| Hadati Cr 1.50 1.58 1.66 1.75 1.83 1.91 2.00 2.08 2.16 2.25 2.33 2.41 2.50 2.58 2.66 2.75 2.83 2.91 3.00 | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | Development wi .20 7.500 .27 7.583 .27 7.667 .27 7.750 .27 7.917 .27 8.000 .41 8.083 .41 8.167 .41 8.250 .41 8.333 .41 8.417 .41 8.500 .64 8.583 .64 8.667 .64 8.750 .50 8.833 .50 8.917 .50 9.000 | th Cityview Ridg 3.20 10.50 3.20 10.58 3.20 10.67 3.20 10.75 3.20 10.83 3.20 10.92 3.20 11.00 1.87 11.08 1.87 11.08 1.87 11.25 1.87 11.33 1.87 11.42 1.87 11.50 1.87 11.58 1.87 11.58 1.87 11.67 1.87 11.75 1.87 11.83 1.87 11.92 1.87 12.00 | ge 1.07 1. |
|---|---|--|--|--|--|
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | nm/hr)= (min) (min)= (min)= (cms)= | 70.50 10.00 7.54 (ii 10.00 .13 | 81.70 20.00) 16.07 (ii) 20.00 .06 | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (mm)= | 1.52 6.00 51.91 53.41 .97 | 2.56 6.17 14.24 53.41 .27 | *TOTALS* 3.608 (iii 6.08 22.15 53.41 .41 |) |
| Fc (mm, (ii) TIME STEP | /hr)= 75.00 /hr)= 12.50 (DT) SHOU STORAGE CO | 0 O Cum.In LD BE SMALLE EFFICIENT. | K (1/hr)= 4. f. (mm)= R OR EQUAL | | |
| CALIB STANDHYD (0415) ID= 1 DT= 5.0 min | | (ha)= 4.9 np(%)= 42.0 | | .(%)= 21.00 | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 2.10 1.50 2.86 185.00 .013 | PERVIOUS (i) 2.89 5.00 2.86 40.00 .300 |) | |
| Max.Eff.Inten.(r over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | (min) (min)= (min)= | 70.50 5.00 3.10 (ii 5.00 .27 | 81.70 15.00) 10.77 (ii) 15.00 .09 | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL | (cms)= (hrs)= (mm)= (mm)= | .20 6.00 51.91 53.41 Page | .39 6.08 14.24 53.41 2 30 | *TOTALS* .532 (iii 6.00 22.15 53.41 |) |

Hadati Creek Watershed - Post Development with Cityview Ridge 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) = 4.14Fc (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)=24.20ID= 1 DT= 5.0 minTotal Imp(%)=42.00Dir. Conn.(%)=21.00 IMPERVIOUS PERVIOUS (i) Surface Area Dep. Storage (ha)= 10.16 14.04 1.50 2.00 5.00 (mm)= Average Slope (%)= 401.00 Length (m) =40.00 Mannings n .013 .300 -Max.Eff.Inten.(mm/hr) =70.50over (min)5.00Storage Coeff. (min) =5.49 (ii)Unit Hyd. Tpeak (min) =5.00Unit Hyd. peak (cms) =.20 81.70 15.00 14.03 (ii) 15.00 .20 Unit Hyd. peak (cms)= .08 *TOTALS* CLIIIS)=.95RUNOFF VOLUME(hrs)=TOTAL RAINFALL(mm)=S3.41RUNOFF COEFFICIENT.97 1.66 6.08 2.307 (iii) 6.00 14.25 53.41 .27 14.24 22.15 53.41 .41 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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) | ID= 1 DT= 5.0 min | Area (ha)= 36.00 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 -----------------PERVIOUS (i) IMPERVIOUS 15.12 Surface Area (ha) =20.88 1.50 2.03 465.00 5.00 2.03 Dep. Storage (mm) =Average Slope (%)= Length (m) =40.00 .300 Mannings n .013

 max.ETT.Inten.(mm/hr)=
 70.50

 over (min)
 5.00

 Storage Coeff. (min)=
 5.97 (ii)

 Unit Hyd. Tpeak (min)=
 5.00

 Unit Hyd. peak (cms)=
 .19

 81.70 15.00 14.47 (ii) 15.00 .08 *TOTALS*

Page 31

| Hadati Creek Watershed - Post Development with Cityview Ridge 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: |
|---|
| <pre>(1) HORTON'S EQUATION SELECTED FOR PERVIOUS LOSSES: F0 (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.</pre> |
| 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 |
| 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. |
| CALIB STANDHYD (0395) Area (ha)= 51.20 ID= 1 DT= 5.0 min Tota] Imp(%)= 10.00 Dir. Conn.(%)= 5.00 |
| IMPERVIOUSPERVIOUS (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 Page 32 |

| Hadati Creek Wat Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | ershed - Post Dev 8.92 (ii) 10.00 .12 | 18.68 (ii) 20.00 .06 | Cityview Ridge *TOTALS* |
|---|---|--|--|
| PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | .41 6.00 51.91 53.41 .97 | 2.36 6.25 9.64 53.41 .18 | 2.601 (iii) 6.17 11.75 53.41 .22 |
| ***** WARNING:FOR AREAS WITH YOU SHOULD CON | H IMPERVIOUS RATI NSIDER SPLITTING | | |
| (i) HORTONS EQUATION Fo (mm/hr)= 75 Fc (mm/hr)= 12 (ii) TIME STEP (DT) SH THAN THE STORAGE (iii) PEAK FLOW DOES NO | 5.00 K 2.50 Cum.Inf. HOULD BE SMALLER COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 OR EQUAL | |
| CALIB STANDHYD (0360) Area ID= 1 DT= 5.0 min Tota | (ha)= 30.00 Imp(%)= 37.00 | Dir. Conn.(%) | = 19.00 |
| Surface Area (ha)= Dep. Storage (mm)= Average Slope (%)= Length (m)= Mannings n = | IMPERVIOUS 11.10 1.50 2.00 447.00 .013 | PERVIOUS (i) 18.90 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | 70.50 5.00 5.86 (ii) 5.00 .20 | 15.00 14.65 (ii) 15.00 .08 | *TOTALS* |
| TIME TO PEAK (hrs)= | 51.91 53.41 | 1.94 | 2.582 (iii) 6.00 20.64 53.41 .39 |
| ***** WARNING:FOR AREAS WITH YOU SHOULD CON | I IMPERVIOUS RATI NSIDER SPLITTING | | |
| <pre>(i) HORTONS EQUATION Fo (mm/hr)= 75 Fc (mm/hr)= 12 (ii) TIME STEP (DT) SH THAN THE STORAGE (iii) PEAK FLOW DOES NO</pre> | 5.00 K 2.50 Cum.Inf. HOULD BE SMALLER COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 OR EQUAL | |
| CALIB STANDHYD (0350) Area ID= 1 DT= 5.0 min Tota | (ha)= 16.30 Imp(%)= 42.00 | Dir. Conn.(%) | = 21.00 |
| Surface Area (ha)= | IMPERVIOUS 6.85 Page 3 | 9.45 | |

| Hadati Cr Dep. Storage Average Slope Length Mannings n | <pre>eek Watershed (mm)= (%)= (m)= 3 =</pre> | - Post Deve 1.50 1.00 30.00 .013 | lopment with 5.00 1.00 40.00 .300 | Cityview Ridge |
|---|---|--|--|--|
| Max.Eff.Inten.(r over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | nm/hr)= (min) (min)= (min)= (cms)= | 70.50 5.00 6.01 (ii) 5.00 .19 | 77.46 20.00 16.75 (ii) 20.00 .06 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .63 6.00 51.91 53.41 .97 | .95 6.17 14.24 53.41 .27 | 1.186 (iii) 6.00 22.15 53.41 .41 |
| FC (mm, (ii) TIME STEP | /hr)= 75.00 /hr)= 12.50 (DT) SHOULD STORAGE COEFF: | K Cum.Inf. BE SMALLER O ICIENT. | (1/hr)= 4.14 (mm)= .00 R EQUAL | |
| CALIB STANDHYD (0355) ID= 1 DT= 5.0 min | Area (ha Total Imp(S | a)= 12.30 %)= 42.00 | Dir. Conn.(%) | = 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= 28 | 5.17 1.50 1.60 36.00 | ERVIOUS (i) 7.13 5.00 1.60 40.00 .300 | |
| Max.Eff.Inten.(n over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | nm/hr)= 7 (min) (min)= (min)= (cms)= | 70.50 5.00 4.79 (ii) 5.00 .22 | 81.70 15.00 13.92 (ii) 15.00 .08 | *TOTALS* |
| TIME TO PEAK | (hrs)= (mm)= (mm)= | 53.41 | .85 6.08 14.24 53.41 .27 | 1.183 (iii) 6.00 22.15 53.41 .41 |
| ***** WARNING: STORAG | GE COEFF. IS | SMALLER THAN | TIME STEP! | |
| (ii) TIME STEP | /hr)= 75.00 /hr)= 12.50 (DT) SHOULD (STORAGE COEFF: | K Cum.Inf. BE SMALLER OI ICIENT. | (1/hr)= 4.14 (mm)= .00 R EQUAL | |
| CALIB STANDHYD (0365) | Area (ha | a)= 117.50 Page 34 | | |

Hadati Creek Watershed - Post Development with Cityview Ridge |ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn. (%) = 21.00**IMPERVIOUS** PERVIOUS (i) 49.35 1.50 Surface Area (ha) =68.15 Dep. Storage (mm) =5.00 Average Slope (%)= 2.00 2.00 (m)= Length 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)= Unit Hyd. peak (cms)= 10.00 20.00 .12 .06 ***TOTALS*** PEAK FLOW (cms) =6.70 3.95 9.481 (iii) TIME TO PEAK (hrs) =6.00 6.17 6.08 51.91 53.41 RUNOFF VOLUME (mm) =14.24 22.15 53.41 TOTAL RAINFALL (mm)= 53.41 53.41 RUNOFF COEFFICIENT = .97 .41 .27 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.1K (1/hr)= 4.14 Cum.Inf. (mm)= .00 FC (mm/hr) = 12.50(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) (ha) = 51.32Area ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn. (%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =21.55 29.77 5.00 Dep. Storage (mm) =1.50 Average Slope (%)= 2.00 2.00 550.00 Length (m)= 40.00 Mannings n .013 .300 81.70 Max.Eff.Inten.(mm/hr)= 70.50 5.00 over (min) 20.00 Storage Coeff. (min)= 6.64 (ii) 15.17 (ii) Unit Hyd. Tpeak (min)= 5.00 20.00 Unit Hyd. peak (cms)= .07 .18 *TOTALS* 3.14 6.17 PEAK FLOW (cms) =1.96 3.870 (iii) TIME TO PEAK 6.00 (hrs) =6.08 RUNOFF VOLUME (mm) =51.91 14.24 22.15 53.41 53.41 TOTAL RAINFALL (mm) =53.41 .27 RUNOFF COEFFICIENT = .97 .41 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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.

Hadati Creek Watershed - Post Development with Cityview Ridge CALIB STANDHYD (0102) (ha) = 14.32Area ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =6.01 8.31 Dep. Storage (mm)= 1.50 5.00 Average Slope (%)= 2.00 2.00 287.00 Length (m) =40.00 Mannings n .013 .300 ____ Max.Eff.Inten.(mm/hr)= 70.50 81.70 15.00 over (min) 5.00 Storage Coeff. 4.49 (ii) (min) =13.03 (ii) Unit Hyd. Tpeak (min)= 5.00 15.00 Unit Hyd. peak (cms)= .23 .08 ***TOTALS*** .58 6.00 PEAK FLOW (cms) =1.02 1.415 (iii) TIME TO PEAK (hrs) =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! K (1/hr) = 4.14(mm/hr) = 12.50Cum.Inf. FC (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 (0101) | ID= 1 DT= 5.0 min | Area (ha)= 16.32 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 PERVIOUS (i) **IMPERVIOUS** Surface Area (ha) =9.47 6.85 5.00 Dep. Storage (mm) =1.50 2.00 Average Slope (%)= 2.00 309.00 Length (m) =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) 6.00 6.08 TIME TO PEAK (hrs) =RUNOFF VOLUME 51.91 (mm) =14.24 22.15 TOTAL RAINFALL (mm) =53.41 53.41 53.41 .27 RUNOFF COEFFICIENT = .97 .41 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00K (1/hr) = 4.14Cum.Inf. FC (mm/hr) = 12.50(mm) =.00 Page 36

Hadati Creek Watershed - Post Development with Cityview Ridge (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) (ha) = 19.00Area ID= 1 DT= 5.0 min Total Imp(%) = 42.00Dir. Conn.(%) = 21.00------IMPERVIOUS PERVIOUS (i) Surface Area (ha) =7.98 11.02 1.50 Dep. Storage (mm) =5.00 Average Slope (%)= 2.00 2.00 365.00 Length (m)= 40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 70.50 81.70 5.00 5.19 (ii) 5.00 .21 over (min) 15.00 Storage Coeff. 13.73 (ii) (min)= Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .08 *TOTALS* 1.32 6.08 1.831 (iii) 6.00 14.24 22.15 53.41 53.41 .27 41 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00FO FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALIB STANDHYD (0600) ID= 1 DT= 5.0 min Area (ha)= 11.38 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 IMPERVIOUS PERVIOUS (i) 6.60 Surface Area (ha) =4.78 1.50 5.00 Dep. Storage (mm)= 2.00 Average Slope (%)= 2.00 (m)= Length 680.00 40.00 Mannings n .300 .013 Max.Eff.Inten.(mm/hr)= 70.50 81.70 10.00 7.54 (ii) 10.00 over (min) 20.00 Storage Coeff. (min) =16.07 (ii) Unit Hyd. Tpeak (min)= 20.00 Unit Hyd. peak (cms)= .13 .06 *TOTALS* .40 6.00 51.91 53 41 .68 6.17 PEAK FLOW (cms) =.953 (iii) TIME TO PEAK (hrs) =6.08 14.24 (mm)= (mm)= RUNOFF VOLUME 22.15 TOTAL RAINFALL 53.41 53.41 RUNOFF COEFFICIENT = .97 .27 .41

Hadati Creek Watershed - Post Development with Cityview Ridge (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr)=75.00 K (1/hr)=4.14FC (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. _____ CAL TB STANDHYD (0601) |ID= 1 DT= 5.0 min | Area (ha)= 7.62 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 2.00 2.00 Average Slope (%)= 680.00 Length (m) =40.00 Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 70.50 over (min) 10.00 Storage Coeff. (min)= 7.54 (ii) Unit Hyd. Tpeak (min)= 10.00 Unit Hyd. peak (cms)= .13 89.23 20.00 15.78 (ii) 20.00 Unit Hyd. peak (cms)= .07 *TOTALS* (hrs)= .27 (hrs)= 6.00 (mm)= 51.91 (mm)= 53.41 NT = 07 .49 6.17 PEAK FLOW .679 (iii) TIME TO PEAK 6.08 RUNOFF VOLUME 15.62 23.24 TOTAL RAINFALL 53.41 53.41 RUNOFF COEFFICIENT = .29 .44 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC .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) (ha)= 5.97 Area ID= 1 DT= 5.0 min Total Imp(%) = 42.00Dir. Conn.(%)= 2.50 -----IMPERVIOUS PERVIOUS (i) 2.51 1.50 Surface Area (ha) =3.46 Dep. Storage (mm) =5.00 2.00 2.00 Average Slope (%)= Length (m)= 680.00 40.00 Mannings n .013 .300 $70.50 \\ 10.00 \\ 7.54 \\ 10.00 \\ 10.00$ Max.Eff.Inten.(mm/hr)= 105.29 over (min) 20.00 Storage Coeff. (min)= 7.54 (ii) 15.25 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 20.00 .13 .07 .03 6.00 51.0 ***TOTALS*** PEAK FLOW (cms) =.534 (iii) .52 6.17 6.17 TIME TO PEAK (hrs) =RUNOFF VOLUME 17.87 (mm) =18.72 TOTAL RAINFALL (mm) =53.41 53.41 Page 38

| Hadati Creek Water RUNOFF COEFFICIENT = | ershed - Post Development with Cityview Ridge .97 .33 .35 | |
|--|---|--|
| **** WARNING:FOR AREAS WITH YOU SHOULD CONS | IMPERVIOUS RATIOS BELOW 20% SIDER SPLITTING THE AREA. | |
| (i) HORTONS EQUATION S Fo (mm/hr)= 75. | SELECTED FOR PERVIOUS LOSSES: .00 K (1/hr)= 4.14 .50 Cum.Inf. (mm)= .00 | |
| (ii) TIME STEP (DT) SHO THAN THE STORAGE C | OULD BE SMALLER OR EQUAL COEFFICIENT. | |
| (111) PEAK FLOW DOES NOT | T INCLUDE BASEFLOW IF ANY. | |
| CALIB STANDHYD (0540) Area ID= 1 DT= 5.0 min Tota] | (ha)= 4.63 Imp(%)= 80.00 Dir. Conn.(%)= 79.00 | |
| Surface Area (ha)= | IMPERVIOUS PERVIOUS (i) 3.70 .93 | |
| Average Slope (%)= Length (m)= Mannings n = | IMPERVIOUS PERVIOUS (i) 3.70 .93 1.50 5.00 .55 .55 150.00 40.00 .013 .300 | |
| | | |
| Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | 70.50 30.06 5.00 25.00 4.48 (ii) 23.24 (ii) 5.00 25.00 .23 .05 *TOTALS* | |
| PEAK FLOW (CMS)= TIME TO PEAK (hrs)= RUNOFE VOLUME (mm)= | .70 .04 .713 (iii) 6.00 6.25 6.00 51.91 9.54 43.01 53.41 53.41 53.41 .97 .18 .81 | |
| TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | 53.41 53.41 53.41 .97 .18 .81 | |
| ***** WARNING: STORAGE COEFF. | | |
| (i) HORTONS EQUATION S Fo (mm/hr)= 75. Fc (mm/hr)- 12 | SELECTED FOR PERVIOUS LOSSES: .00 K (1/hr)= 4.14 .50 Cum.Inf. (mm)= .00 | |
| (ii) TIME STEP (DT) SHO THAN THE STORAGE C | OULD BE SMALLER OR EQUAL COEFFICIENT. | |
| (111) PEAK FLOW DOES NOT | T INCLUDE BASEFLOW IF ANY. | |
| CALIB STANDHYD (0500) Area ID= 1 DT= 5.0 min Tota] | (ha)= 244.00 Imp(%)= 46.00 Dir. Conn.(%)= 26.00 | |
| | IMPERVIOUS PERVIOUS (i) | |
| Dep. Storage (mm)= Average Slope (%)= | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | |
| Max.Eff.Inten.(mm/hr)= over (min) | 70.50 78.43 15.00 30.00 | |
| Storage Coeff. (min)= Unit Hyd. Tpeak (min)= | 14.47 (ii) 25.89 (ii) 15.00 30.00 Page 39 | |

Hadati Creek Watershed - Post Development with Cityview Ridge Unit Hyd. peak (cms)= .08 .04 ***TOTALS*** 9.34 PEAK FLOW (cms) =8.08 14.467 (iii) 6.33 6.25 24.12 14.36 53.41 53.41 .27 .45 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (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) | |ID= 1 DT= 5.0 min | Area (ha)= 16.00 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 _____ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =3.20 12.80 1.50 .50 Dep. Storage (mm) =5.00 .20 Average Slope (%)= 40.00 Length 400.00 (m) =Mannings n .300 = .013 Max.Eff.Inten.(mm/hr)= 70.50 20.04 10.00 8.31 (ii) 10.00 over (min) 40.00 Storage Coeff. (min) =38.19 (ii) Unit Hyd. Tpeak (min)= 40.00 Unit Hyd. peak (cms)= .13 .03 *TOTALS* PEAK FLOW(cms)=2.06TIME TO PEAK(hrs)=6.00RUNOFF VOLUME(mm)=51.91TOTAL RAINFALL(mm)=53.41 .09 6.50 9.54 2.080 (iii) 6.00 43.01 53.41 53.41 53.41 RUNOFF COEFFICIENT = .97 .18 .81 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00FO FC (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) ID= 1 DT= 5.0 min Area (ha)= 25.25 Total Imp(%) = 80.00Dir. Conn. (%) = 79.00______ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =20.20 5.05 1.50 5.00 Dep. Storage (mm) =.55 Average Slope .55 (%)= 40.00 Length (m) =Mannings n . 300 .013 = 70.50 Max.Eff.Inten.(mm/hr)= 30.06 Page 40

Hadati Creek Watershed - Post Development with Cityview Ridge 5.00 over (min) 30.00 7.45 (ii) Storage Coeff. (min)= 26.21 (ii) 5.00 Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 30.00 .17 .04 *TOTALS* (cms)= 3.56 (hrs)= 6.00 (mm)= 51.91 (mm)= 53.41 IENT = .97 .19 6.33 9.54 PEAK FLOW 3.608 (iii) TIME TO PEAK 6.00 RUNOFF VOLUME 43.01 TOTAL RAINFALL 53.41 53.41 RUNOFF COEFFICIENT = .18 .81 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (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) = 14.99ID= 1 DT= 5.0 min Total Imp(%) = 80.00Dir. Conn.(%)= 79.00 _____ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =11.99 3.00 1.50 .55 200.00 .013 Dep. Storage (mm) =5.00 55 Average Slope (%)= Length (m)= 40.00 Mannings n = .300 Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 70.50 5.00 5.00 25. *TOTALS* LAN FLUW(CMS)=2.23TIME TO PEAK(hrs)=6.00RUNOFF VOLUME(mm)=51.91TOTAL RAINFALL(mm)=53.41RUNOFF COEFFICIENT=.97 .12 6.33 9.54 2.271 (iii) 6.00 43.01 53.41 53.41 53.41 .18 .81 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00Fo FC (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) ID= 1 DT= 5.0 min Area (ha)= 1.13 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 IMPERVIOUS PERVIOUS (i) Surface Area Dep. Storage Average Slope Length Page 41

Hadati Creek Watershed - Post Development with Cityview Ridge Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)=

 Storage Coeff. (min)
 5.00

 Unit Hyd. Tpeak (min)=
 2.32 (ii)

 Unit Hyd. peak (cms)=
 .30

 PEAK FLOW

 70.50 30.06 25.00 21.08 (ii) 25.00 .05 *TOTALS* (cms)= .17 (hrs)= 6.00 (mm)= 51.91 (mm)= 53.41 .01 6.25 PEAK FLOW .178 (iii) TIME TO PEAK 6.00 RUNOFF VOLUME 9.54 43.01 TOTAL RAINFALL 53.41 53.41 RUNOFF COEFFICIENT = .97 .18 .81 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. .00 STORE HYD (0525) AREA (ha)= ID= 1 DT=****min | .00 QPEAK (cms) =TPEAK (hrs) =.00 (mm)=****** VOLUME ADD HYD (0420) | 1 + 2 = 3R.V. (mm) 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 (ha) (cms) 36.00 3.376 12.70 1.226 R.V. (mm) 22.15 TPEAK ------(hrs) ID1= 1 (0460): 6.00 + ID2= 2 (0455): 6.00 22.15 ID = 3 (0465): 48.70 4.602 6.0022.15 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 Page 42

| Ha | dati Creek .00 5.50 5.51 10.00 14.49 14.50 20.00 | | .09 . .00 . .15 .0150 | 0300 V 0150 ма | in Channel | ge |
|---|---|---|--|--|---|--|
| < DEPTH (m) .02 .04 .06 .08 .09 .11 .13 .15 .17 .20 .22 .24 .24 .26 .29 .31 .33 .35 .38 .40 | ELEV (m) .02 .04 .06 .08 .09 .11 .13 .15 .17 .20 .22 .24 .26 .29 .31 .33 .35 .38 | VOLUME (cu.m.) .176E+02 .702E+02 .158E+03 .281E+03 .438E+03 .607E+03 .776E+03 .944E+03 | L TIME TABLE FLOW RATE (cms) .0 .1 .1 .3 .5 .7 1.0 1.3 1.8 2.3 2.8 3.4 4.0 4.8 5.5 6.4 7.3 8.2 | VELOCITY (m/s) .21 .33 .43 .52 .62 .77 .90 1.03 1.16 1.27 1.36 1.44 1.51 1.57 1.62 1.67 1.72 1.76 | TRAV.TIME (min) 80.52 50.72 38.71 31.95 26.84 21.66 18.45 16.22 14.36 13.13 12.24 11.58 11.05 10.63 10.27 9.97 9.71 | |
| INFLOW : OUTFLOW: | ID= 2 (03) ID= 1 (03) | AREA (ha) 60) 30.00 62) 30.00 | < hydro QPEAK T (cms) (2.58 2.01 | graph> PEAK R.V. hrs) (mm) 6.00 20.64 6.17 20.63 | <-pipe / c MAX DEPTH (m) .23 .21 | hannel-> MAX VEL (m/s) 1.41 1.31 |
| ROUTE CHN (0 IN= 2> OU | IT= 1 | DATA FOR SE Eleva | tion Ma .26 . .15 .0300 .00 . .09 . .00 . .15 .0150 | .)> Inning 0300 0 / .0150 Ma 0150 Ma 0150 Ma 0150 Ma | in Channel in Channel in Channel in Channel in Channel | |
| < DEPTH (m) .01 .03 .04 .05 .07 .08 .10 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 | TRAVE VOLUME (cu.m.) .929E+01 .372E+02 .836E+02 .149E+03 .232E+03 .334E+03 .454E+03 | L TIME TABLE FLOW RATE (cms) .0 .0 .0 .1 .1 .1 .2 .3 Page 43 | VELOCITY (m/s) .17 .27 .35 .42 .49 .55 .64 | TRAV.TIME (min) 99.56 62.72 47.86 39.51 34.05 30.15 26.24 | |

| .11 .12 .14 .15 .16 .18 .19 .20 | .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .23 .25 | .576E+03 .699E+03 .822E+03 .944E+03 .108E+04 .123E+04 .140E+04 .159E+04 | . 4 | opment with C .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 | 22.41 19.75 17.76 16.22 15.07 14.28 13.72 13.31 13.01 | ge |
|--|--|--|---|--|--|--|
| INFLOW : OUTFLOW: | ID= 2 (035 ID= 1 (035 | AREA (ha) 0) 16.30 3) 16.30 | < hydrc QPEAK 1 (cms) (1.19 .95 | ograph> PEAK R.V. (hrs) (mm) 6.00 22.15 6.25 22.11 | <-pipe / c MAX DEPTH (m) .16 .15 | hannel-> MAX VEL (m/s) 1.10 1.02 |
| ROUTE CHN ((IN= 2> O | 0358) JT= 1 | Routing ti | me step (mir | a)'= 5.00 | | |
| | Distance .00 5.50 5.51 10.00 14.49 14.50 20.00 | Elevat | 09 00 15 26 | 0300 0300 0/.0150 Ma 0150 Ma 0150 Ma 0150 Ma 0150 Ma 0300 | in Channel | |
| < DEPTH (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 | TRAVEL VOLUME (cu.m.) .102E+02 .409E+02 .920E+02 .163E+03 .255E+03 .368E+03 .499E+03 .634E+03 .769E+03 .904E+03 .104E+04 .119E+04 .135E+04 .154E+04 .154E+04 .154E+04 .23E+04 .250E+04 .279E+04 | FLOW RATE (cms) .0 .0 .1 .1 .2 .3 .4 .6 .8 1.0 1.2 1.4 1.7 2.0 2.3 2.6 3.0 3.4 | .64 .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 | TRAV.TIME (min) 109.52 68.99 52.65 43.46 37.45 33.17 28.86 24.66 21.72 19.54 17.84 16.57 15.71 15.10 14.65 14.31 14.04 13.82 13.65 | |
| INFLOW : OUTFLOW: | ID= 2 (035 ID= 1 (035 | AREA (ha) 5) 12.30 8) 12.30 | | ograph> PEAK R.V. (hrs) (mm) 6.00 22.15 6.17 22.10 | <-pipe / c MAX DEPTH (m) .16 .13 | hannel-> MAX VEL (m/s) 1.10 .92 |

RESERVOIR (0106) | IN= 2---> OUT= 1DT= 5.0 min OUTFLOW STORAGE OUTFLOW STORAGE ha.m.) (cms) .0000 .5000 .0100 6.6000 .2300 .0000 -----(cms) (ha.m.) (ha.m.) .0000 .0000 .4000 .8000 .0100 .0260 .0000 AREA QPEAK TPEAK R.V. (cms) 3.870 (ha) (hrs) (mm) INFLOW : ID= 2 (0105) OUTFLOW: ID= 1 (0106) 51.320 51.320 6.08 22.15 2.731 22.14 6.33 PEAKFLOWREDUCTION[Qout/Qin](%)=70.57TIME SHIFT OF PEAKFLOW(min)=15.00MAXIMUMSTORAGEUSED(ha.m.)=.5507 _____ ------ADD HYD (0103) | 1 + 2 = 3 | QPEAK (cms) AREA AKL (ha) 32 TPEAK R.V. (mm) 22.15 -----(hrs) 14.32 1.415 16.32 1.601 ID1= 1 (0102): + ID2= 2 (0101): 1.415 6.00 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) 1.0000 20.0000 .0000 _____ (cms) (ha.m.) (ha.m.) .0000 1.0000 1.1000 .0000 .0100 .0100 .0120 .1000 .0000 TPEAK QPEAK (cms) 1.831 AREA R.V. (hrs) 6.00 6.58 (mm) (ha) 19.000 INFLOW : ID= 2 (0110) 22.15 OUTFLOW: ID= 1 (0111) .238 19.000 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 | TPEAK AREA QPEAK R.V. _____ (mm) ID = 3 (0602): 19.00 1.632 6.08 22.59Page 45

Hadati Creek Watershed - Post Development with Cityview Ridge

Hadati Creek Watershed - Post Development with Cityview Ridge NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

(0505) DUHYD Inlet Cap.=9.000 #of Inlets= 1 Total(cms)= 9.0 AREA QPEAK TPEAK R.V. TOTAL HYD.(ID= 1): 244.00 14.47 (hrs) (mm) 6.25 24.12 -----MAJOR SYS.(ID= 2): 33.53 5.47 6.25 MINOR SYS.(ID= 3): 210.47 9.00 6.00 24.12 24.12 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0515) | 1 + 2 = 3 |

 2 = 3
 |
 AREA
 QPEAK
 TPEAK
 R.V.

 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 25.46NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. DUHYD (0425) Inlet Cap.=1.980

 #of Inlets=
 1

 #of Inlets=
 1

 Total(cms)=
 2.0
 AREA
 QPEAK
 TPEAK
 R.V.

 TOTAL HYD.(ID=
 1):
 29.19
 2.84
 6.00
 22.15

 _____ MAJOR SYS.(ID= 2): 2.28 .86 6.00 MINOR SYS.(ID= 3): 26.91 1.98 6.00 22.15 22.15 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0470) 1 + 2 = 3 R.V. (mm) 22.15 22.15 50.98 5.461 6.00 ID = 3 (0470):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) Page 46

Hadati Creek Watershed - Post Development with Cityview Ridge ID1= 1 (0353): 16.30 .952 6.25 22.11 ID2= 2 (0358): 12.30 .744 6.17 22.10 + ID2= 2 (0358): ______ ID = 3 (0359): 28.60 1.680 6.2522.11 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ______ RESERVOIR (0104) IN= 2---> OUT= 1 DT= 5.0 min OUTFLOWSTORAGEOUTFLOW(cms)(ha.m.)(cms).0000.00001.0000.0100.010010.0000.0150.1332.0000 STORAGE (ha.m.) . 5000 .6000 .0000 AREA QPEAK (ha) (cms) 30.640 3.016 30.640 .801 TPEAK R.V. (hrs) 6.00 6.42 (mm) 22.15 INFLOW : ID= 2 (0103) OUTFLOW: ID= 1 (0104) 22.14 PEAKFLOWREDUCTION[Qout/Qin](%)=26.57TIMESHIFTOFPEAKFLOW(min)=25.00 (min) = 25.00(ha.m.)= .4263 MAXIMUM STORAGE USED ADD HYD (0114) AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)30.64.8016.4222.1419.00.2386.5822.14 1 + 2 = 3______ ID1= 1 (0104): + ID2= 2 (0111): ID = 3 (0114): 49.64 1.029 6.50 22.14NOTE: 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 .00 1.00 .0350 .50 .0350 .00 .0350 / .0350 Main Channel .00 .0350 Main Channel 2.00 4.00 4.50 .00 .0350 / .0350 Main Channel 5.00 .0350 7.00 .50 9.00 1.00 .0350 <---->
 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
 (cms) .0 .1 .3 .6 .9 1.3 Page 47

 .64
 3.06

 .96
 2.03

 1.21
 1.61

 1.42
 1.37

 1.61
 1.21

 1.77
 1.10

 Page 47

| . 37 | | .107E+03 | 1.8 | 2.22 2.35 2.48 | ityview Ridge 1.01 .94 .88 .83 .79 .75 .72 .69 .66 .64 .62 .60 .58 | ž |
|---------------------------|--|---|--|---|---|---|
| | | | | ograph> TPEAK R.V. (hrs) (mm) 6.08 22.59 6.08 22.59 | <-pipe / ch MAX DEPTH (m) .35 .35 | annel-> MAX VEL (m/s) 1.89 1.88 |
| ROUTE CHN (IN= 2> 0 | 0564) UT= 1 | Routing tim | ne step (mir | ı)'= 5.00 | | |
| | .00 1.00 1.50 2.00 3.50 4.50 6.00 | 101. 100. 100. 99. 99. 100. 101. | +J . | 0500 0500 0 / .0300 Mat 0300 Mat 0300 Mat 0 / .0500 Mat | | |
| DEPTH (m) .10 | 100.07 100.17 100.26 100.36 100.45 100.55 100.66 100.78 100.89 101.00 101.11 101.22 101.34 | TRAVEL VOLUME (cu.m.) .353E+02 .112E+03 .195E+03 .285E+03 .381E+03 .484E+03 .484E+03 .710E+03 .832E+03 .961E+03 .110E+04 .127E+04 .127E+04 .127E+04 .195E+04 .221E+04 .250E+04 .280E+04 .313E+04 | TIME TABLE FLOW RATE (cms) .0 .1 .2 .3 .5 .7 .9 1.2 1.5 1.8 2.2 2.7 3.4 4.1 4.9 5.8 6.7 7.7 8.8 | VELOCITY (m/s) .19 .37 .49 .59 .67 .74 .80 .86 .91 .96 1.00 1.07 1.14 1.20 1.25 1.30 1.34 1.38 1.41 | TRAV.TIME (min) 43.69 22.76 17.03 14.23 12.51 11.32 10.43 9.74 9.18 8.72 8.32 7.80 7.31 6.94 6.65 6.41 6.22 6.04 5.90 | |
| INFLOW : | ID= 2 (0505 | AREA (ha) 5) 33.53 | QPEAK 1 | ograph> TPEAK R.V. (hrs) (mm) 6.25 24.12 | <-pipe / ch MAX DEPTH (m) 1.58 | annel-> MAX VEL (m/s) 1.28 |

Hadati Creek Watershed - Post Development with Cityview Ridge OUTFLOW: ID= 1 (0564) 33.53 4.91 6.33 24.12 1.50 1.25 _____ | DUHYD (0520) | Inlet Cap.=3.050 MAJOR SYS.(ID= 2):88.858.036.0025.46MINOR SYS.(ID= 3):137.623.055.7525.46 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) ----> <----- 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 <----> 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

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0363) | 1 + 2 = 3 AREA QPEAK TPEAK R.V. (ha) (cms) _____ (hrs) (mm) 20.63 ID1= 1 (0362): 30.00 2.013 6.17 + ID2 = 2 (0352): 30.00 2.013 + ID2 = 2 (0359): 28.60 1.6806.25 22.11 ____ _____ ID = 3 (0363):3.649 6.17 21.35 58.60 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ _____ ADD HYD (0115) | 1 + 2 = 3 | AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)51.322.7316.3322.1449.641.0296.5022.14 AREA QPEAK TPEAK R.V. (mm) 22.14 ID1= 1 (0106): + ID2= 2 (0114): ____ ID = 3 (0115): 100.96 3.732 6.33 22.14 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0492) AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 19.00 1.610 6.08 22.59 5.97 .534 6.17 18.72 1 + 2 = 3 ID1= 1 (0563): + ID2= 2 (0607): 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) .00 .001 .00 ****** 88.85 8.030 6.00 25.46 _____ ID1= 1 (0525): + ID2= 2 (0520): ____ 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) 58.60 3.649 6.17 21.35 21.35 ID1 = 1 (0363):+ ID2= 2 (0365): 117.50 9.481 6.08 22.15 _____ ____ _____ ID = 3 (0380):176.10 12.674 6.17 21.88

| RESERVOIR (04 IN= 2> OUT DT= 5.0 min | | OUTFLOW (cms) .0000 .2590 .2660 .2720 .2790 .2850 | STORAGE (ha.m.) .0000 .0579 .1180 .1802 .2445 .3109 | OUTFLOW (cms) .2910 .2970 1.6320 4.1680 7.5660 .0000 | STORAGE (ha.m.) .3795 .4503 .5232 .5983 .6756 .0000 |
|--|--|---|--|---|---|
| INFLOW : I OUTFLOW: I | D= 1 (048) PEAK | FLOW RE | 70 .28 DUCTION FOOL | s) (hrs) 15 6.08 |) (mm) 8 21.66 3 21.66 3.60 |
| ROUTE CHN (05 IN= 2> OUT | = 1 | - | 80 80 40 .030(| 1)> anning .0500 0 / .0300 Ma .0300 Ma .0300 Ma | in Channel in Channel in Channel in Channel in Channel |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | ELEV (m) 10.92 11.05 11.17 11.29 11.42 11.54 11.66 11.78 11.91 12.03 12.15 12.28 12.40 12.53 12.67 12.80 12.93 13.07 13.20 | TRAVEL VOLUME (cu.m.) .575E+02 .119E+03 .185E+03 .256E+03 .330E+03 .409E+03 .409E+03 .492E+03 .579E+03 .671E+03 .767E+03 .867E+03 .971E+03 .108E+04 .149E+04 .149E+04 .405E+04 .620E+04 .893E+04 .122E+05 | TIME TABLE FLOW RATE (cms) .1 .2 .3 .4 .6 .8 1.1 1.3 1.6 1.9 2.2 2.6 2.9 3.6 4.9 6.9 10.1 14.6 20.7 | VELOCITY (m/s) .40 .57 .69 .78 .86 .92 .97 1.02 1.07 1.11 1.15 1.19 1.23 1.10 .88 .77 .73 .74 .76 | TRAV.TIME (min) 18.86 13.13 10.87 9.61 8.77 8.17 7.70 7.32 7.01 6.74 6.50 6.29 6.11 6.85 8.52 9.74 10.21 10.17 9.85 |
| | | AREA | | ograph> ГРЕАК R.V. | <-pipe / channel-> MAX DEPTH MAX VEL |

Hadati Creek Watershed - Post Development with Cityview Ridge NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Hadati Creek Watershed - Post Development with Cityview Ridge (ha) (cms) (hrs) (mm) (m) 88.85 8.03 6.00 25.46 2.05 88.85 6.50 6.42 25.46 1.97 (m/s)INFLOW : ID= 2 (0526) OUTFLOW: ID= 1 (0527) .76 88.85 .79 RESERVOIR (0390) | IN= 2---> OUT= 1 | OUTFLOWSTORAGEOUTFLOWSTORAGE(cms)(ha.m.)(cms)(ha.m.).0000.00001.31001.6000.7700.28701.860023.23001.2600.9680.0000.0000 DT= 5.0 min _____ AREA
(ha)QPEAK
(cms)TPEAK
(hrs)INFLOW : ID= 2 (0380)176.10012.6746.17OUTFLOW: ID= 1 (0390)176.1001.3337.08 R.V. (mm) 21.88 21.88 PEAKFLOWREDUCTION[Qout/Qin](%) = 10.52TIME SHIFT OF PEAK FLOW(min) = 55.00MAXIMUMSTORAGEUSED(ha.m.) =2.5065 | ADD HYD (0400) | | 1 + 2 = 3 | _____ ID = 3 (0400): 227.30 3.883 6.17 19.60NOTE: 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 .0500 .0500 .0300 .0500 .0500 100.00338.30110.00336.80135.00336.00142.00335.30148.00335.30156.00336.00165.00338.30 Main Channel .0500 .0000 <----> TRAVEL TIME TABLE -----------------> TRAV.TIME
 VELOCITY
 TRAV.TIN

 (m/s)
 (min)

 .71
 44.52

 1.09
 29.11

 1.39
 22.72

 1.66
 19.04

 1.97
 16.04

 2.25
 14.10

 2.46
 12.89

 2.63
 12.02
 Page 52

| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | 641E+05 787E+05 939E+05 110E+06 126E+06 143E+06 160E+06 178E+06 | 94.1 122.4 155.6 192.8 233.9 278.9 327.7 380.3 436.7 496.9 | 2 2 3 3 3 3 3 3 4 4 4 | .79 .96 .15 .34 | 11.35 10.71 10.06 9.48 8.97 8.53 8.13 7.79 7.48 7.20 | | |
|---|--|---|---|-------------------------------------|---|--|--|
| INFLOW : ID= 2 (0400) OUTFLOW: ID= 1 (0403) | AREA (ha) 227.30 227.30 | < hydr QPEAK (cms) 3.88 2.23 | ograph TPEAK (hrs) 6.17 6.42 | > R.V. (mm) 19.60 19.60 | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) .34 1.13 .25 .89 | | |
| ADD HYD (0407) 1 + 2 = 3 ID1= 1 (0403): + ID2= 2 (0115): | | (cms) 2.232 3.732 | (hrs) 6.42 6.33 ======= | (mm) 19.60 22.14 | | | |
| ID = $3 (0407)$: NOTE: PEAK FLOWS DO | | | 6.33 s te an | 20.38 | | | |
| | | | | | | | |
| RESERVOIR (0113) IN= 2> OUT= 1 DT= 5.0 min | (cms) (.0000 1.1000 | TORAGE (ha.m.) .0000 2.9000 4.3000 | 9.1 | s) 000 000 | STORAGE (ha.m.) 6.4000 10.0000 20.0000 | | |
| INFLOW : ID= 2 (0407) OUTFLOW: ID= 1 (0113) | ARE4 (ha) 328.260 328.260 |) (cm) 5.8 | | TPEAK (hrs) 6.33 12.67 | (mm) 20.38 | | |
| | FLOW REDU HIFT OF PEAH M STORAGE | JCTION [QO K FLOW USED | (m | (%)= 19 in)=380 m.)= 3 | .00 | | |
| ADD HYD (0430) 1 + 2 = 3 ID1= 1 (0113): + ID2= 2 (0425): | | (cms) L.137 1 | TPEAK (hrs) 2.67 6.00 | R.V. (mm) 20.38 22.15 | | | |
| $\frac{102}{102} = 2 (0423):$ ID = 3 (0430): | ============ | | | | | | |
| NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. Page 53 | | | | | | | |

| IN= 2> 0 | | ATA FOR SEC Elevat 325. | TION (1 tion 40 60 90 00 30 .06 30 .03 90 60 | 1) Manning .0600 .0600 | > | n Channel n Channel | |
|--|---|---|--|---------------------------------|--------------------------------|--|--|
| <pre> DEPTH (m) .16 .33 .49 .65 .82 .98 1.14 1.31 1.47 1.63 1.79 1.96 2.12 2.28 2.45 2.61 2.77 2.94 3.10</pre> | (m) 322.46 322.63 322.79 322.95 323.12 323.28 323.44 323.61 323.77 323.93 324.09 324.26 324.26 324.42 324.58 324.75 324.91 325.07 325.24 | VOLUME (cu.m.) .233E+03 .672E+03 .132E+04 .216E+04 .319E+04 .433E+04 .556E+04 .689E+04 .833E+04 .833E+04 .987E+04 .134E+05 .134E+05 .176E+05 .200E+05 .228E+05 .259E+05 .293E+05 | FLOW RATE | E VEL (| | TRAV.TIME | |
| INFLOW : OUTFLOW: | ID= 2 (0430 ID= 1 (0440 | AREA (ha))) 355.17)) 355.17 | (cms) 2.14 | (hrs) 6.17 | (mm) | <-pipe / c MAX DEPTH (m) .33 .32 | hannel-: MAX VEI (m/s) 1.26 1.26 |
| + ID2= | 3 = 1 (0475): = 2 (0440): | AREA (ha) 50.98 355.17 | QPEAK (cms) 4.600 2.113 | TPEAK (hrs) 6.08 6.17 | R.V. (mm) 22.15 20.51 | | |
| ID = | = 3 (0485): EAK FLOWS DO | 406.15 | | | 20.72 | : | |

Hadati Creek Watershed - Post Development with Cityview Ridge

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0490) | 1 + 2 = 3 | QPEAK AREA TPEAK R.V. (mm) (cms) (ha) (hrs) 43.10 ID1= 1 (0480): 43.10 3.608 6.08 + ID2= 2 (0485): 406.15 6.641 6.08 22.15 20.72 ____ ____ ID = 3 (0490): 449.25 10.249 6.08 20.86NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0491) | 1 + 2 = 3AREA QPEAK TPEAK (ha) (cms) (hrs) 449.25 10.249 6.08 24.97 .288 6.83 R.V. (mm) -----ID1= 1 (0490): 20.86 + ID2= 2 (0482): 21.66 ____ ID = 3 (0491): 474.22 10.516 6.08 20.90 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ RESERVOIR (0483) IN= 2---> OUT= 1 OUTFLOW STORAGE (ha.m.) | OUTFLOW DT= 5.0 min STORAGE (cms) 7.0800 8.1000 9.7980 (ha.m.) (cms) (ha.m.) _____ .0000 2.4860 3.3240 4.6420 7.4397 .0000 .0600 .3400 .6182 .2760 1.2000 .6182 | 10.4940 1.1630 | 11.6850 1.7070 | 12.3480 2.0400 2.6400 10.3000 3.1200 11.4000 AREAQPEAKTPEAK(ha)(cms)(hrs)474.22010.5166.08474.2202.9076.67 (hrs) 6.08 6.67 R.V. (mm) 20.90 INFLOW : ID= 2 (0491) OUTFLOW: ID= 1 (0483) 20.90 PEAK FLOW REDUCTION [Qout/Qin](%)= 27.65 TIME SHIFT OF PEAK FLOW (min)= 35.00 MAXIMUM STORAGE USED (ha.m.) = 1.4680ADD HYD (0530) | 1 + 2 = 3 R.V. _____ (mm) 20.90 43.01 ______ ID = 3 (0530): 478.85 3.002 6.5021.11 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0545)

Hadati Creek Watershed - Post Development with Cityview Ridge 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. ADD HYD (0546) 1 + 2 = 3AREA QPEAK TPEAK R.V. (cms) 9.482 (ha) (hrs) (mm) 21.79 567.70 ID1= 1 (0545): 6.50 25.25 3.608 + ID2= 2 (0542): 6.00 43.01 ____ -----ID = 3 (0546):592.95 10.345 6.00 22.70 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0547) 1 + 2 = 3 QPEAK (cms) AREA TPEAK R.V. (ha) (cms) 592.95 10.345 14.99 2.271 (mm) -----(hrs) 6.00 6.00 22.70 ID1= 1 (0546): + ID2= 2 (0543): 43.01 ID = 3 (0547):607.94 12.615 6.00 23.20 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0548) 1 + 2 = 3QPEAK (cms) AREA TPEAK R.V. (mm) 23.20 _ __ __ __ __ __ __ __ __ (ha) (hrs) ID1= 1 (0547): 607.94 12.615 6.00 + ID2 = 2 (0544):1.13.178 6.00 43.01 ____ _____ 609.07 12.793 ID = 3 (0548):6.00 23.23 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ******* ** SIMULATION NUMBER: 3 ** ****************** Filename: Y:\SPrimmer\OTTHYMO\Ci READ STORM tyview Ridge\25yrSCS12hr.stm Comments: 25 year SCS Type II 12hr design storm Ptotal= 73.56 mm | TIME RAIN | TIME RAIN TIME RAIN TIME RAIN mm/hr | hrs mm/hr | hrs hrs mm/hr | hrs mm/hr 2.94 6.25 2.94 6.50 .25 1.84 1.84 3.25 9.25 13.24 | 2.58 .50 3.50 13.24 | 9.50 2.58

```
Page 56
```

| Hadati Cre .75 1.00 1.25 1.50 1.75 2.00 2.25 2.50 2.75 3.00 | $1.84 \\ 1.84 \\ 1.84 \\ 1.84 \\ 1.84 \\ 1.84 \\ 2.21 \\ $ | 3.75 4.00 4.25 4.50 4.75 | 2.94 2.94 4.41 5.89 5.89 8.83 8.83 | 6.75 7.00 7.25 7.50 7.75 8.00 8.25 8.50 | 5.89 5.89 4.41 4.41 4.41 4.41 2.58 2.58 | 9.75 10.00 10.25 10.50 10.75 11.00 | ge 2.58 2.58 1.47 1.47 1.47 1.47 1.47 1.47 1.47 1.47 |
|---|--|--|---|--|--|--|--|
| CALIB STANDHYD (0480) ID= 1 DT= 5.0 min | Area Total In | (ha)= 4 np(%)= 4 | 3.10 2.00 [| Dir. Conr | n.(%)=) | 21.00 | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha) = | $1.50 \\ 2.00 \\ 680.00$ | | RVIOUS († 25.00 5.00 2.00 40.00 .300 | i) | | |
| NOTE: RAINFA | ALL WAS TH | RANSFORME | D TO | 5.0 MIN. | TIME ST | EP. | |
| TIME hrs .083 .167 .250 .333 .417 .500 .583 .667 .750 .833 .917 1.000 1.083 1.167 1.250 1.333 1.417 1.500 1.583 1.667 1.750 1.583 1.667 1.750 1.833 1.917 2.000 2.083 2.167 | $1.84 \\ $ | TIME hrs 3.083 3.167 3.250 3.333 3.417 3.500 3.583 3.667 3.750 | RAIN mm/hr 2.94 2.94 2.94 2.94 2.94 2.94 2.94 2.94 | hrs 6.083 6.167 6.250 6.333 6.417 6.500 6.583 6.667 6.750 6.833 6.917 | RAIN mm/hr 13.24 13.24 13.24 13.24 13.24 13.24 13.24 5.89 5.89 5.89 5.89 5.89 | TIME hrs 9.08 9.17 9.25 9.33 9.42 9.50 9.58 9.67 9.75 9.83 9.92 10.00 10.08 10.17 10.25 10.33 10.42 10.50 10.58 10.67 10.58 10.67 10.75 10.83 10.92 11.00 | RAIN mm/hr 2.58 2.58 2.58 2.58 2.58 2.58 2.58 2.58 |

5.167 5.250 5.333

5.417

5.500

5.667

2.21 2.21 2.21 2.21 2.21 2.21

2.21

2.21

2.58 2.58 2.58 2.58 2.58

2.58 2.58 2.58 2.58

8.167

8.250 8.333

8.417

8.500 8.583

8.667

8.83

8.83

8.83

8.83

8.83 35.31 35.31

Page 57

11.17

11.25 11.33

11.42

11.50 11.58

11.67

1.47

1.47

1.47

1.47

1.47 1.47

1.47

2.083 2.167 2.250 2.333

2.417

2.500 2.583 2.667

| Hadati Creek Watershed - Post Development with Cityview Ridge 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. |
| <pre></pre> |
| $\begin{array}{rcrcrcc} IMPERVIOUS & PERVIOUS (i)\\ Surface Area & (ha) = & 2.10 & 2.89\\ Dep. Storage & (mm) = & 1.50 & 5.00\\ Average Slope & (\%) = & 2.86 & 2.86\\ Length & (m) = & 185.00 & 40.00\\ Mannings n & = & .013 & .300\\ \end{array}$ |
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= Xertical distance of the second seco |
| 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. |
| CALIB STANDHYD (0410) Area (ha)= 24.20 Page 58 |

Hadati Creek Watershed - Post Development with Cityview Ridge |ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn. (%) = 21.00**IMPERVIOUS** PERVIOUS (i) Surface Area (ha) =10.16 14.04 (mm)= Dep. Storage 1.50 5.00 Average Slope (%)= 2.00 2.00 Length 401.00 (m) =40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 97.10 119.40 15.00 over (min) 5.00 Storage Coeff. (min) =4.83 (ii) 12.17 (ii) Unit Hyd. Tpeak (min)= 15.00 5.00 Unit Hýd. peak (cms)= .22 .09 ***TOTALS*** PEAK FLOW 1.33 2.92 3.938 (iii) (cms) =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 .49 .98 .36 = ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00K (1/hr) = 4.14Cum.Inf. (mm)= .00 FO (mm/hr) = 12.50FC (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(%) = 42.00Dir. Conn.(%) = 21.00**IMPERVIOUS** PERVIOUS (i) Surface Area (ha) =15.12 20.88 Dep. Storage 1.50 (mm) =5.00 (%)= Average Slope 2.03 2.03 Lenath (m) =465.00 40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 97.10 119.40 5.00 over (min) 15.00 Storage Coeff. (min)= 5.26 (ii) 12.56 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 5.00 15.00 .21 .08 ***TOTALS*** PEAK FLOW (cms) =1.96 4.29 5.772 (iii) 6.08 TIME TO PEAK (hrs) =6.00 6.00 72.06 RUNOFF VOLUME (mm) =26.53 36.09 73.56 TOTAL RAINFALL (mm)= 73.56 73.56 RUNOFF COEFFICIENT = .98 .36 .49 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00K (1/hr)= 4.14 Cum.Inf. (mm)= .00 Fo (mm/hr) = 12.50FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

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

Hadati Creek Watershed - Post Development with Cityview Ridge CALIB STANDHYD (0455) ID= 1 DT= 5.0 min Area (ha)= 12.70 Total Imp(%)= 42.00 Area Dir. Conn.(%) = 21.00-------------IMPERVIOUS PERVIOUS (i) 5.33 1.50 1.71 Surface Area (ha) =7.37 5.00 Dep. Storage (mm)= Average Slope (%)= 1.71 Length (m)= 300.00 40.00 Mannings n . 300 .013 = Max.Eff.Inten.(mm/hr)= 97.10 119.40 over (min) 15.00 5.00 5.00 4.25 (ii) 5.00 .23 Storage Coeff. 11.94 (ii) (min) =Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .09 *TOTALS* 1.55 .71 6.00 PEAK FLOW (cms)= 2.088 (iii) TIME TO PEAK (hrs) =6.08 6.00 RUNOFF VOLUME (mm)= 72.06 26.53 36.09 (mm)= TOTAL RAINFALL 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: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (mm/hr)= 12.50 Cum.Inf. (mm)= (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) | |ID= 1 DT= 5.0 min | Area (ha)= 51.20 Total Imp(%)= 10.00 Dir. Conn. (%) = 5.00______ IMPERVIOUS PERVIOUS (i) 5.12 Surface Area (ha) =46.08 (mm)= 5.00 Dep. Storage 1.50 2.00 (m)= = 2.00 Average Slope 900.00 40.00 Length Mannings n .013 . 300 97.10 10.00 7.85 (ii) 10.00 Max.Eff.Inten.(mm/hr)= 88.55 over (min) 20.00 Storage Coeff. 16.11 (ii) (min) =Unit Hyd. Tpeak (min)= 20.00 Unit Hyd. peak (cms)= .06 *TOTALS* .58 6.00 5.35 PEAK FLOW (cms) =5.668 (iii) (hrs) =TIME TO PEAK 6.17 6.17 (mm)= 23.89 72.06 RUNOFF VOLUME 21.36 (mm)= TOTAL RAINFALL 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:

Hadati Creek Watershed - Post Development with Cityview Ridge (mm/hr)= 75.00 K (mm/hr)= 12.50 Cum.Inf. Fo $K_{1/hr} = 4.14$.00 FC (mm)= (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) ID= 1 DT= 5.0 min (ha) = 30.00Area Total Imp(%) = 37.00Dir. Conn.(%)= 19.00 IMPERVIOUS PERVIOUS (i) 11.10 Surface Area (ha) =18.90 1.50 Dep. Storage (mm) =5.00 2.00 Average Slope (%)= 2.00 447.00 Length (m)= 40.00 Mannings n .013 -.300 Max.Eff.Inten.(mm/hr)= 97.10 111.81 Unit Hyd. Tpeak (min)= 5.00Unit Hyd. Tpeak (min)= 5.00Unit Hyd. peak (cms)= 215.00 5.16 (ii) 15.00 12.69 (ii) 15.00 .08 ***TOTALS*** (cms)= 1.48 (hrs)= 6.00 (mm)= 72.06 (mm)= 73.56 ENT = .98 3.58 6.08 PEAK FLOW 4.647 (iii) 6.00 TIME TO PEAK 6.00 RUNOFF VOLUME 72.06 25.57 34.40 TOTAL RAINFALL 73.56 73.56 RUNOFF COEFFICIENT = . 98 .47 .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) = 4.14Fc (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) | ID= 1 DT= 5.0 min | Area (ha)= 16.30 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 1.00 330.00 Length (m) =40.00 Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 97.10 119.40 5.00 5.29 (ii) over (min) 15.00 Storage Coeff. (min)= 14.32 (ii) Unit Hyd. Tpeak (min)= 5.00 15.00 Unit Hyd. peak (cms)= .21 .08 ***TOTALS*** .89 PEAK FLOW (cms) =1.82 2.485 (iii) .89 6.00 72.06 TIME TO PEAK (hrs)= 6.08 6.00 RUNOFF VOLUME (mm)= 26.53 36.09 Page 61

Hadati Creek Watershed - Post Development with Cityview Ridge
 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) = 4.14Fc (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) =5.17Dep. Storage(mm) =1.50Average Slope(%) =1.60Length(m) =286.00Mannings n=.013 7.13 5.00 1.60 40.00 Mannings n . 300 .013 Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 97.10 4.22 (ii) 12.06 (ii) 15.00 *TOTALS* LIME TO PEAK (hrs)=.68RUNOFF VOLUME (hrs)=6.00TOTAL RAINFALL (hrm)=72.06TOTAL RAINFALL (hrm)=73.56RUNOFF COEFFICIENT =.98 2.015 (iii) 1.49 6.00 6.08 36.09 26.53 73.56 73.56 .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) = 4.14Fc (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) 49.35 Surface Area Dep. Storage (ha) =68.15 $\begin{array}{cccc} (ma) = & -5.55 \\ (mm) = & 1.50 \\ (\%) = & 2.00 \\ (m) = & 885.00 \\ - & .013 \end{array}$ 5.00 2.00 (mm)= (%)= Average Slope Length 40.00 Mannings n .013 . 300 Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 97.10 10.00 7.77 (ii) 15.10 (ii) 10.00 20.00 20.00 10.00 20.00 20.00 10.00 20.00 Page 62

| Hadati Creek Watershed - Post Development with Cityview Ridge *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 (0105) Area (ha)= 51.32 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| $\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$ |
| 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 |
| 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. |
| CALIB STANDHYD (0102) Area (ha)= 14.32 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| IMPERVIOUSPERVIOUS (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 Page 63 |

Hadati Creek Watershed - Post Development with Cityview Ridge 3.95 (ii) 11.29 (ii) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 5.00 15.00 .24 .09 *TOTALS* .80 6.00 PEAK FLOW (cms) =1.79 2.406 (iii) TIME TO PEAK 6.00 (hrs)= 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 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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 (0101) Area (ha)= 16.32 ID= 1 DT= 5.0 min Total Imp(%) = 42.00Dir. 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 2.00
309.00 Length 40.00 (m)= Mannings n _ .013 .300 Max.Eff.Inten.(mm/hr)= 97.10 over (min) 5.00 Storage Coeff. (min)= 4.13 (ii) Unit Hyd. Tpeak (min)= 5.00 Unit Hyd. peak (cms)= .24 119.40 15.00 11.47 (ii) 15.00 .09 ***TOTALS*** 2.02 PEAK FLOW (cms) =.91 6.00 2.725 (iii) TIME TO PEAK 6.00 (hrs)= 72.06 RUNOFF VOLUME (mm)= 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) = 4.14Fc (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) | |ID= 1 DT= 5.0 min | Area (ha)= 19.00 Total Imp(%)= 42.00 Dir. Conn.(%) = 21.00------PERVIOUS (i) IMPERVIOUS Surface Area Dep. Storage (ha) =7.98 11.02 (mm)= 1.50 5.00 Average Slope (%)= 2.00 2.00 Page 64

Hadati Creek Watershed - Post Development with Cityview Ridge 365.00 Lenath (m)= 40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 97.10 119.40 5.00 4.57 (ii) 5.00 15.00 over (min) Storage Coeff. (min)= 11.90 (ii) Unit Hyd. Tpeak (min)= 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 26.53 RUNOFF VOLUME (mm) =72.06 36.09 TOTAL RAINFALL 73.56 73.56 (mm) =73.56 .98 RUNOFF COEFFICIENT .49 = .36 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALTB STANDHYD (0600) | |ID= 1 DT= 5.0 min | Area (ha)= 11.38 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 _____ IMPERVIOUS PERVIOUS (i) (ha)= Surface Area 4.78 6.60 Dep. Storage 1.50 5.00 (mm) =2.00 680.00 2.00 (%)= Average Slope 680.00 Length (m)= 40.00 Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 97.10 over (min) 5.00 Storage Coeff. (min)= 6.63 (ii) Unit Hyd. Tpeak (min)= 5.00 Unit Hyd. peak (cms)= 10 119.40 15.00 13.97 (ii) 15.00 Unit Hyd. peak (cms)= .18 .08 *TOTALS* (hrs)= .60 (hrs)= 6.00 (mm)= 72.06 (mm)= 73.56 NT = 00 1.29 PEAK FLOW 1.732 (iii) 6.00 TIME TO PEAK 6.08 RUNOFF VOLUME 26.53 36.09 TOTAL RAINFALL 73.56 73.56 RUNOFF COEFFICIENT = .36 .49 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00Fo FC .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) (ha) = 7.62Area ID= 1 DT= 5.0 min Total Imp(%) = 46.00Dir. Conn.(%)= 21.00

| | Watershed - Post De IMPERVIOUS a)= 3.51 m)= 1.50 | $\rho = \rho \sqrt{\tau} \rho \mu c \left(\frac{1}{2}\right)$ | Cityview Ridge |
|--|--|---|---|
| Surface Area (h Dep. Storage (m Average Slope (Length (Mannings n | %)= 2.00 m)= 680.00 = .013 | 2.00 40.00 .300 | |
| Max.Eff.Inten.(mm/h over (mi Storage Coeff. (mi Unit Hyd. Tpeak (mi Unit Hyd. peak (cm | r)= 97.10 n) 5.00 n)= 6.63 (ii) n)= 5.00 s)= .18 | 129.34 15.00 13.74 (ii) 15.00 .08 | *TOTALS* |
| PEAK FLOW (cm TIME TO PEAK (hr RUNOFF VOLUME (m TOTAL RAINFALL (m RUNOFF COEFFICIENT | s)= .40 s)= 6.00 n)= 72.06 n)= 73.56 = .98 | .89 6.08 27.57 73.56 .37 | 1.186 (iii) 6.00 36.92 73.56 .50 |
| Fo (mm/hr) Fc (mm/hr) (ii) TIME STEP (DT | = 12.50 Cum.Inf) SHOULD BE SMALLER AGE COEFFICIENT. | (1/hr)= 4.14 . (mm)= .00 OR EQUAL | |
| CALIB STANDHYD (0607) A ID= 1 DT= 5.0 min T | rea (ha)= 5.97 otal Imp(%)= 42.00 | Dir. Conn.(% |)= 2.50 |
| Surface Area (h Dep. Storage (m Average Slope (Length (Mannings n | IMPERVIOUS a)= 2.51 n)= 1.50 %)= 2.00 n)= 680.00 = .013 | PERVIOUS (i) 3.46 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(mm/h over (mi Storage Coeff. (mi Unit Hyd. Tpeak (mi Unit Hyd. peak (cm | n) 5.00 n)= 6.63 (ii) n)= 5.00 | 15.00 | **** |
| PEAK FLOW (cm TIME TO PEAK (hr RUNOFF VOLUME (m TOTAL RAINFALL (m RUNOFF COEFFICIENT | s)= 6.00 n)= 72.06 n)= 73.56 | .90 6.08 29.58 73.56 .40 | *TOTALS* .921 (iii) 6.08 30.64 73.56 .42 |
| ***** WARNING:FOR AREAS YOU SHOULD | WITH IMPERVIOUS RAT CONSIDER SPLITTING | | |
| Fo (mm/hr) Fc (mm/hr) | ION SELECTED FOR PE = 75.00 K = 12.50 Cum.Inf) SHOULD BE SMALLER | (1/hr) = 4.14 . (mm) = .00 | |
| (iii) PEAK FLOW DOE | AGE COEFFICIENT. | | |
| | Page | 66 | |

Hadati Creek Watershed - Post Development with Cityview Ridge CALIB STANDHYD (0540) Area (ha) =4.63 ID= 1 DT= 5.0 min Total Imp(%) = 80.00Dir. Conn.(%) = 79.00**IMPERVIOUS** PERVIOUS (i) Surface Area (ha) =3.70 .93 5.00 1.50 Dep. Storage (mm) =.55 Average Slope (%)= .55 Length 150.00 40.00 (m) =.300 Mannings n = .013 Max.Eff.Inten.(mm/hr)= 97.10 87.19 20.00 over (min) 5.00 Storage Coeff. (min) =3.94 (ii) 16.20 (ii) Unit Hyd. Tpeak (min)= 5.00 20.00 Unit Hyd. peak (cms)≃ .24 .06 ***TOTALS*** .97 PEAK FLOW (cms) =.11 6.17 1.036 (iii) 6.00 6.00 TIME TO PEAK (hrs) =RUNOFF VOLUME (mm) =72.06 21.22 61.38 TOTAL RAINFALL 73.56 (mm) =73.56 73.56 RUNOFF COEFFICIENT .29 = .98 .83 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00K (1/hr) = 4.14FO (mm/hr) = 12.50Cum.Inf. (mm)= .00 FC (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) = 244.00ID= 1 DT= 5.0 min | Total Imp(%) = 46.00Dir. Conn.(%) = 26.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =112.24 131.76 Dep. Storage (mm) =1.50 5.00 .80 .80 Average Slope (%)= 1275.00 40.00 Length (m) =Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 97.10 120.22 15.00 over (min) 25.00 22.36 (ii) Storage Coeff. 12.73 (ii) (min) =Unit Hyd. Tpeak (min)= 15.00 25.00 Unit Hyd. peak (cms) =.08 .05 ***TOTALS*** 18.11 PEAK FLOW (cms) =11.66 27.658 (iii) TIME TO PEAK (hrs) =6.08 6.25 6.17 (mm) =26.62 RUNOFF VOLUME 72.06 38.44 TOTAL RAINFALL 73.56 73.56 (mm) =73.56 RUNOFF COEFFICIENT .98 .36 .52 = (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00K (1/hr)= 4.14 FO (mm/hr) = 12.50Cum.Inf. FC (mm) =.00 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL Page 67

Hadati Creek Watershed - Post Development with Cityview Ridge THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. CALIB STANDHYD (0510) Area (ha) = 16.00ID= 1 DT= 5.0 min | Total Imp(%) = 80.00Dir. Conn.(%) = 79.00_____ IMPERVIOUS PERVIOUS (i) 12.00 1.50 .50 400.00 .013 12.80 Surface Area (ha) =3.20 5.00 Dep. Storage (mm) =Average Slope (%)= .20 Length 40.00 (m)= Mannings n .300 = Max.Eff.Inten.(mm/hr)= 97.10 65.53 5.00 7.31 (ii) 5.00 over (min) 30.00 Storage Coeff. (min)= 25.92 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 30.00 .17 .04 .25 6.33 21 - -***TOTALS*** PEAK FLOW(cms)=3.12TIME TO PEAK(hrs)=6.00RUNOFF VOLUME(mm)=72.06TOTAL RAINFALL(mm)=73.56RUNOFF COEFFICIENT=.98 3.209 (iii) 6.00 21.22 61.38 73.56 73.56 .29 .83 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr) = 75.00 K (1/hr) = 4.14FC (mm/hr) = 12.50 Cum.Inf. (mm) = .00.00 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ _____ CALIB CALIB STANDHYD (0542) Area (ha)= 25.25 |ID= 1 DT= 5.0 min | Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 _____ IMPERVIOUS PERVIOUS (i) (ha) =Surface Area 20.20 5.05 5.00 1.50 .55 350.00 .013 Dep. Storage (mm)= .55 Average Slope (%)= 40.00 Length (m)= Mannings n .013 = .300 Max.Eff.Inten.(mm/hr)= 97.10 87.19 5.00 6.56 (ii) 5.00 .18 over (min) 20.00 Storage Coeff. 18.81 (ii) (min)= Unit Hyd. Tpeak (min)= 20.00 Unit Hyd. peak (cms)= .06 (ms) = 5.02 (hrs) = 6.00 (mm) = 72.06 (mm) = 73.56 $IT = 0^{\circ}$ *TOTALS* .53 6.17 PEAK FLOW (cms) =5.333 (iii) TIME TO PEAK (hrs) =6.00 RUNOFF VOLUME 21.22 61.38 73.56 TOTAL RAINFALL 73.56 .29 RUNOFF COEFFICIENT .83

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Page 68

Hadati Creek Watershed - Post Development with Cityview Ridge (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CAL TR | STANDHYD (0543) | |ID= 1 DT= 5.0 min | Area (ha)= 14.99 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 IMPERVIOUS PERVIOUS (i) (ha) =11.99 Surface Area 3.00 1.50 Dep. Storage (mm) =5.00 .55 Average Slope (%)= . 55 200.00 40.00 Length (m) =Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 97.10 87.19 Storage Coeff. (min) 5.00 Unit Hyd. Tpeak (min)= 4.69 Unit Hyd. peak (cms)= 20.00 4.69 (ii) 16.94 (ii) 20.00 .06 ***TOTALS*** 3.11 .34 6.17 PEAK FLOW (cms) =3.310 (iii) TIME TO PEAK (hrs) =6.00 6.00 (mm)= RUNOFF VOLUME 72.06 21.22 61.38 (mm)= TOTAL RAINFALL 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: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (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) = 1.13ID= 1 DT= 5.0 min | Total Imp(%) = 80.00Dir. Conn.(%) = 79.00PERVIOUS (i) IMPERVIOUS Surface Area (ha) =.90 .23 Dep. Storage 1.50 5.00 (mm) =(%)= Average Slope .55 .55 50.00 40.00 Length (m)= Mannings n .013 .300 _ Max.Eff.Inten.(mm/hr)= 97.10 87.19 over (min) 5.00 15.00 2.04 (ii) Storage Coeff. (min) =14.29 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 5.00 15.00 .31 . 08 ***TOTALS*** .24 PEAK FLOW (cms) =.03 6.08 .266 (iii) 6.00 TIME TO PEAK 6.00 (hrs) =RUNOFF VOLUME 72.06 21.22 (mm)= 61.38 TOTAL RAINFALL (mm) =73.56 73.56 73.56 Page 69

Hadati Creek Watershed - Post Development with Cityview Ridge 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) = 4.14Fc (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) | ID= 1 DT=****min | AREA (ha)= .00 (cms)= QPEAK .00 TPEAK (hrs) =.00 (mm)=****** VOLUME ADD HYD (0420) 1 + 2 = 3 R.V. (mm) 36.09 AREA QPEAK QPEAK (cms) TPEAK (ha) (hrs) ID1= 1 (0415): + ID2= 2 (0410): 4.99 1.007 6.00 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. _____ ADD HYD (0465) | 1 + 2 = 3 | QPEA. (Cms) 772 QPEAK AREA TPEAK R.V. (ha) (cms) (hrs) 36.00 5.772 6.00 12.70 2.088 6.00 (mm) (hrs) ID1= 1 (0460): + ID2= 2 (0455): 36.09 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) ----> Manning Distance Elevation .00 .40 .0300 .0300 / .0150 Main Channel .0150 Main Channel .15 5.51 .00 .09 10.00 .0150 Main Channel 14.49 .00 .0150 Main Channel .0150 / .0300 Main Channel .0300 14.50 .15 20.00 .40 <--------- 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
 Page 70

| .04 .06 .08 .09 .11 .13 .15 .17 .20 .22 .24 .26 .29 .31 .33 .35 .38 .40 | .04 .06 .08 .09 .11 .13 .15 .17 .20 .22 .24 .26 .29 .31 .33 .35 .38 .40 | .702E+02 .158E+03 .281E+03 .438E+03 .607E+03 .776E+03 .944E+03 .116E+04 .140E+04 .166E+04 .194E+04 .255E+04 .258E+04 .293E+04 .331E+04 .371E+04 .413E+04 | .0 .1 .3 .5 .7 1.0 1.3 2.8 2.8 2.8 3.4 4.0 4.8 5.5 4.3 8.2 | opment with C .33 .43 .52 .62 .77 .90 1.03 1.16 1.27 1.36 1.44 1.51 1.57 1.62 1.67 1.72 1.76 1.80 | 50.72 38.71 31.95 26.84 21.66 18.45 16.22 14.36 13.13 12.24 11.58 11.05 10.63 10.27 9.97 9.71 9.48 9.28 | |
|---|--|---|--|---|---|---|
| INFLOW : OUTFLOW: | ID= 2 (03 ID= 1 (03 | AREA (ha) 60) 30.00 62) 30.00 | < hydr QPEAK (cms) 4.65 3.64 | ograph> TPEAK R.V. (hrs) (mm) 6.00 34.40 6.17 34.39 | <-pipe / c MAX DEPTH (m) .31 .27 | :hannel-> MAX VEL (m/s) 1.61 1.53 |
| ROUTE CHN (C IN= 2> OU | <pre>< Distance</pre> | DATA FOR SEC Elevat | CTION (1. cion M 26 .030 00 .030 09 .0015 15 .015 26 .015 | | | |
| DEPTH (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | VOLUME (cu.m.) .929E+01 .372E+02 .836E+02 .149E+03 .232E+03 .334E+03 .454E+03 .576E+03 .699E+03 .822E+03 .944E+03 .108E+04 .123E+04 .140E+04 .159E+04 .159E+04 .203E+04 .254E+04 | FLOW RATE (cms) .0 .0 .0 .0 .1 .1 .1 .2 .3 .4 .6 .8 1.0 1.2 1.4 1.7 2.0 2.3 2.6 3.0 3.4 Page 71 | VELOCITY (m/s) .17 .27 .35 .42 .49 .55 .64 .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 | TRAV.TIME (min) 99.56 62.72 47.86 39.51 34.05 30.15 26.24 22.41 19.75 17.76 16.22 15.07 14.28 13.72 13.31 13.01 12.76 12.57 12.41 | |

| Hadati Creek watershed - Post Development with Cityview Ridge | | | | | | |
|---|---|---|---|---|--|---|
| INFLOW : OUTFLOW: | ID= 2 (03 ID= 1 (03 | AREA (ha) 50) 16.30 53) 16.30 | OPEAK | drograph> TPEAK R.V. (hrs) (mm) 6.00 36.09 6.17 36.06 | MAX DEPTH | MAX VEL |
| ROUTE CHN ((IN= 2> OU |)358) JT= 1 | Routing t | ime step (r | nin)'= 5.00 | | |
| | | DATA FOR SEC Elevat | CTION (2 26 15 .03 00 09 | 1.1)> Manning .0300 300 / .0150 M .0150 M .0150 M .0150 M | lain Channel lain Channel lain Channel lain Channel lain Channel | |
| DEPTH (m) .01 .03 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 | VOLUME | | (m/s) .17 .27 .35 | TRAV.TIME (min) 109.52 68.99 52.65 43.46 | |
| | ID= 2 (03 ID= 1 (03 | | < hyd QPEAK (cms) 2.02 1.38 | drograph> TPEAK R.V. (hrs) (mm) 6.00 36.09 6.17 36.04 | MAX DEPTH (m) .21 | channel-> MAX VEL (m/s) 1.25 1.15 |
| RESERVOIR ((IN= 2> OL DT= 5.0 mir | JT= 1 | OUTFLOW (cms) .0000 .0100 .0260 | STORAGE (ha.m.) .0000 .0100 .2300 | OUTFLOW (cms) .5000 6.6000 .0000 | STORAGE (ha.m.) .4000 .8000 .0000 | |

Hadati Creek Watershed - Post Development with Cityview Ridge

Hadati Creek Watershed - Post Development with Cityview Ridge QPEAK AREA TPEAK R.V. (ha) (cms) (hrs) (mm) INFLOW : ID= 2 (0105) OUTFLOW: ID= 1 (0106) 51.320 51.320 8.044 6.00 36.09 5,545 6.17 36.09 PEAK FLOW REDUCTION [Qout/Qin](%)= 68.94 TIME SHIFT OF PEAK FLOW $(\min) = 10.00$ (ha.m.)= .7419 MAXIMUM STORAGE USED ADD HYD (0103) | 1 + 2 = 3 | AREA QPEAK (ha) (cms) 14.32 2.406 16.32 2.725 R.V. (mm) 36.09 TPEAK (hrs) ID1= 1 (0102): 6.00 6.00 + ID2= 2 (0101): 36.09 _____ ID = 3 (0103): 30.64 5.131 6.00 36.09NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. RESERVOIR (0111) | IN= 2---> OUT= 1 STORAGEOUTFLOWSTORAGE(ha.m.)(cms)(ha.m.).00001.00001.0000.010020.00001.1000.1000.0000.0000 | DT= 5.0 min | OUTFLOW (cms) -----.0000 .0100 .0120 (ha) (cms) 19.000 3.122 19.000 447 TPEAK R.V. (hrs) 6.00 6.58 (mm) 36.09 INFLOW : ID= 2 (0110) OUTFLOW: ID= 1 (0111) 36.08 PEAK FLOW REDUCTION [Qout/Qin](%)= 14.31 TIME SHIFT OF PEAK FLOW (min)= 35.00 (min) = 35.00MAXIMUM STORAGE USED (ha.m.) = .4965_____ ADD HYD (0602) | 1 + 2 = 3 | R.V. AREA QPEAK TPEAK (ha) (cms) (hrs) (mm) 11.38 1.732 6.00 36.09 7.62 1.186 6.00 36.92 (mm) ID1 = 1 (0600):36.09 + ID2 = 2 (0601):_______________________________ _____ 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 | QPEAK TPEAK R.V. (hrs) (mm) | Total(cms)= 9.0 | AREA (cms) (hrs) (mm) 27.66 6.17 38.44 -----(ha) TOTAL HYD. (ID= 1): 244.00

Hadati Creek Watershed - Post Development with Cityview Ridge MAJOR SYS.(ID= 2):81.1218.666.1738.44MINOR SYS.(ID= 3):162.889.005.9238.44 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0515) | 1 + 2 = 3 | ------____ 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

 tal(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 MINOR SYS.(ID= 3): 21.68 1.98 5.83 36.09 36.09 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0470) | 2 = 3AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)ID1=1(0425):7.512.9656.0036.09+ ID2=2(0465):48.707.8596.0036.09 1 + 2 = 3ID = 3 (0470): 56.21 10.824 6.00 36.09NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0359) | 1 + 2 = 3 | _____ 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 Page 74

| Hadati Cre | ek Watershed - (cms) .0000 .0100 .0150 | (ha.m.) .0000 .0100 | opment with C (cms) 1.0000 10.0000 .0000 | (ha.m.) .5000 .6000 |
|--|---|---|---|---|
| INFLOW : ID= 2 (0 OUTFLOW: ID= 1 (0 | ARI (ha 0103) 30.64 0104) 30.64 | EA QPEA a) (cms 40 5.13 40 4.55 | K TPEAK) (hrs) 1 6.00 0 6.17 | R.V. (mm) 36.09 36.08 |
| PE/ TIM MAک | NK FLOW REI NE SHIFT OF PE/ (IMUM STORAGE | DUCTION [Qou AK FLOW USED | t/Qin](%)= 88 (min)= 10 (ha.m.)= | 3.67 0.00 .5514 |
| + IDZ = Z (0II. | AREA (ha)): 30.64 .): 19.00 | .44/ 0 | .50 50.08 | |
| |): 49.64 | | | - |
| Distand .(2.(4.(4.5 5.(7.(9.(| Routing time DATA FOR SEC Ce Elevat 0 1.0 0 .0 0 .0 0 .0 0 .0 0 .0 0 .0 0 .0 0 .0 0 .0 0 .0 0 .0 0 .0 | me step (min TION (2.2 ion Ma 00 . 50 . 50 .0350 00 .0350 50 .0350 50 . |)'= 5.00)> nning 0350 0350 / .0350 Mai 0350 Mai 0350 Mai 0350 | n Channel n Channel |
| <pre> < DEPTH ELEV (m) (m) .05 .05 .11 .11 .16 .16 .21 .21 .26 .26 .32 .32 .37 .37 .42 .42 .47 .47 .53 .53 .58 .58 .63 .63 .68 .68 .74 .74 .79 .79 .84 .84 .89 .89 .95 .95 </pre> | <pre>TRAVEL VOLUME (cu.m.) .745E+01 .175E+02 .301E+02 .454E+02 .632E+02 .836E+02 .107E+03 .132E+03 .160E+03 .191E+03 .261E+03 .299E+03 .340E+03 .384E+03 .430E+03 .479E+03 .531E+03</pre> | TIME TABLE FLOW RATE (cms) .0 .1 .3 .6 .9 1.3 1.8 2.3 3.0 3.8 4.8 5.8 7.0 8.2 9.7 11.3 13.0 14.8 Page 75 | VELOCITY (m/s) .64 .96 1.21 1.42 1.61 1.77 1.93 2.08 2.22 2.35 2.48 2.60 2.72 2.84 2.95 3.06 3.17 3.27 | TRAV.TIME (min) 3.06 2.03 1.61 1.37 1.21 1.10 1.01 .94 .88 .83 .79 .75 .72 .69 .66 .64 .62 .60 |

Hadati Creek Watershed - Post Development with Cityview Ridge 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 tanceElevationMaining.00101.50.05001.00100.70.05001.50100.55.0500 / .03002.0099.50.03003.5099.60.03004.50100.65.0300 / .0500Main Channel6.00101.45.0500

 Construct
 TRAVEL
 TIME TABLE
 Construct
 <thConstruct</th>
 <thConstruct</th>
 <----> 101.45 **** WARNING: TRAVEL TIME TABLE EXCEEDED

 AREA
 QPEAK
 TPEAK
 R.V.
 MAX
 DEPTH
 MAX
 VEL

 (ha)
 (cms)
 (hrs)
 (mm)
 (m/s)
 81.12
 18.66
 6.17
 38.44
 1.72
 1.34

 81.12
 28.30
 6.50
 38.44
 1.95
 1.41

 INFLOW : ID= 2 (0505) OUTFLOW: ID = 1 (0564)81.12 **** 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)
 Page 76

Hadati Creek Watershed - Post Development with Cityview Ridge TOTAL HYD. (ID= 1): 178.88 12.21 6.00 40.49 MAJOR SYS.(ID= 2):74.769.166.0040.49MINOR SYS.(ID= 3):104.133.055.6740.49 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) ----> <----- 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

 Construction
 TRAVEL
 TIME
 TABLE
 TRAV.TIME

 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

 2.00
 322.80
 .218E+05
 140.2
 2.77
 2.59
 </ <----- TRAVEL TIME TABLE ------.218E+05 2.77 2.77 2.95 3.12 3.29 3.46 3.61 3.76 3.91 4.05 2.20 323.00 .256E+05 175.3 2.43 2.29 2.40 323.20 214.7 .296E+05 258.6 323.40 2.18 2.60 .338E+05 2.07 .3382E+05 .428E+05 .476E+05 .526E+05 .578E+05 .632E+05 306.7 359.1 2.80 323.60 3.00 323.80 1.98 3.20 324.00 1.91 416.0 3.40 324.20 477.5 1.83 4.18 4.18 4.18 4.18 4.18 4.17 4.18 4.17 4.18 4.17 4.18 4.17 4.18 4.17 4.18 4.17 4.18 4.17 4.18 4.71 3.60 324.40 3.80 324.60 INFLOW : ID= 2 (0470) OUTFLOW: ID = 1 (0475)_____ ADD HYD (0363) 1 + 2 = 3

 2 = 3
 AREA
 QPEAK
 TPEAK
 R.V.

 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 Page 77

Hadati Creek Watershed - Post Development with Cityview Ridge NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0115) | 1 + 2 = 3 | AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 51.32 5.545 6.17 36.09 49.64 4.877 6.17 36.08 ID1= 1 (0106): + ID2= 2 (0114): ____ ____ _____ ID = 3 (0115):100.96 10.422 6.17 36.08 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0492)
 QPEAK
 TPEAK
 R.V.

 (cms)
 (hrs)
 (mm)

 2.866
 6.08
 36.42

 .921
 6.08
 30.64
 AREA 1 + 2 = 3(ha) (cms) 19.00 2.866 5.97 .921 ID1= 1 (0563): + ID2= 2 (0607): -----_____ -----ID = 3 (0492): 24.97 3.787 6.0835.04 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ______ ADD HYD (0526) | 1 + 2 = 3AREA R.V. QPEAK TPEAK (ha) (ha) (cms) .00 .001 74.76 9.159 (hrs) (mm) .00 ****** ID1= 1 (0525): + ID2= 2 (0520): 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 | QPEAK (cms) R.V. AREA TPEAK (ha) (cms) 58.60 6.846 (hrs) (mm) 35.20 _____ ID1 = 1 (0363):6.17 6.08 + ID2= 2 (0365): 117.50 16.238 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 | STORAGE OUTFLOW OUTFLOW STORAGE (cms) (cms) (ha.m.) (ha.m.) .2910 .2970 .0000 .0000 .3795 .2590 .0579 | .4503 Page 78

| Hadati Creek Watershed - Post Development with Cityview Ridge .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 |
| <pre>< 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</pre> |
| < |
| <pre>< 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</pre> |
| RESERVOIR (0390) IN= 2> OUT= 1 DT= 5.0 min OUTFLOW STORAGE OUTFLOW STORAGE Page 79 |

Hadati Creek Watershed - Post Development with Cityview Ridge (cms) (ha.m.) (cms) (ha.m.) .0000 .0000 1.3100 1.6000 .2870 .7700 1.8600 23.2300 1.2600 i .9680 .0000 .0000 AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 176.100 176.100 INFLOW : ID= 2 (0380) 22.579 35.79 6.08 OUTFLOW: ID = 1 (0390) 1.387 7.17 35.79 PEAK FLOW REDUCTION [Qout/Qin](%)= 6.14 TIME SHIFT OF PEAK FLOW (min) = 65.00MAXIMUM STORAGE USED (ha.m.) = 4.6291_____ ADD HYD (0400) | AREA QPEAK TPEAK (ha) (cms) (hrs) 51.20 5.668 6.17 176.10 1.387 7.17 1 + 2 = 3 | R.V. (mm) ID1= 1 (0395): + ID2= 2 (0390): 23.89 35.79 _____ _____ ____ ID = 3 (0400): 227.30 6.995 6.1733.11 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 .0500 110.00 336.80 .0300 135.00 336.00 Main Channel 335.30 335.30 .0500 142.00 148.00 .0500 156.00 336.00 .0500 165.00 338.30 .0000 DEPTH ELEV VOLUME FLOW RATE VELOCITY TRAV.TIME (m) (cu.m.) 335.46 .231E+04 (m) (cms) (m/s) (min) .9 .71 .16 44.52 .563E+04 3.2 7.3 .32 335.62 1.09 29.11 .997E+04 .47 335.77 1.39 22.72 335.93 .63 .153E+05 13.4 1.66 19.04 .79 .218E+05 336.09 22.7 1.97 16.04 .95 .299E+05 336.25 35.3 2.25 14.10 .396E+05 1.11 336.41 51.2 2.46 12.89 336.56 .510E+05 1.26 70.7 2.63 12.02 336.72 .641E+05 94.1 1.42 2.79 11.35 .787E+05 1.58 122.4 336.88 2.96 10.71 .939E+05 155.6 1.74 337.04 3.15 10.06 3.34 3.53 1.89 337.19 .110E+06 192.8 9.48 337.35 .126E+06 233.9 2.05 8.97 337.51 278.9 3.71 2.21 .143E+06 8.53 .160E+06 2.37 337.67 327.7 3.89 8.13 .178E+06 2.53 337.83 380.3 4.07 7.79 337.98 .196E+06 2.68 436.7 4.23 7.48 2.84 338.14 .215E+06 496.9 4.40 7.20 Page 80

Hadati Creek Watershed - Post Development with Cityview Ridge 3.00 338.30 .234E+06 561.0 6.95 4.56 <---- hydrograph ----> <-pipe / channel->
QPEAK TPEAK R.V. MAX DEPTH MAX VEL
(cms) (hrs) (mm) (m) (m/s) (hrs) (mm) 6.17 33.11 6.33 22 75 AREA (ha) (cms) INFLOW : ID= 2 (0400) 227.30 7.00 OUTFLOW: ID= 1 (0403) 227.30 4.32 (m) (m/s) .46 1.36 .36 1.16 .36 1.16 ADD HYD (0407) | 1 + 2 = 3 | AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)227.304.3246.3333.11100.9610.4226.1736.08 _____ ID1= 1 (0403): + ID2= 2 (0115): _______ ID = 3 (0407): 328.26 13.657 6.17 34.03NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. RESERVOIR (0113) | IN= 2---> OUT= 1 | STORAGEOUTFLOWSTORAGE(ha.m.)(cms)(ha.m.).00001.60006.40002.90009.100010.00004.300012.000020.0000 DT= 5.0 min | OUTFLOW (cms) .0000 1.1000 1.3000 AREAQPEAKTPEAK(ha)(cms)(hrs)328.26013.6576.17328.2601.36715.17 R.V. (mm) INFLOW : ID= 2 (0407) OUTFLOW: ID= 1 (0113) 34.03 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 | _____ 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 (</pre> 1.1) ----> Distance Elevation 1 100.00 325.40 120.00 324.60 Manning . 0600 .0600 Page 81

| Had | dati Creek w 126.00 130.00 140.00 142.00 150.00 155.00 160.00 | 323 323 322 322 323 323 324 | .90 .00 .30 .06 .30 .03 .90 | 10pment .0600 .0600 00 / .0 00 / .0 .0600 .0600 .0600 | : with Ci 300 Mai 600 Mai | tyview Rid <u>o</u> n Channel n Channel | je |
|---|--|---|---|--|--------------------------------------|--|--|
| .05 .82 .98 1.14 1.31 1.47 | ELEV (m) 322.46 322.63 322.79 322.95 323.12 323.28 4 323.44 323.61 323.77 323.93 324.09 324.26 324.42 324.58 324.75 | VOLUME (cu.m.) 233E+03 572E+03 132E+04 216E+04 319E+04 433E+04 556E+04 556E+04 538E+04 338E+04 | 9.0 14.9 22.5 31.6 42.3 54.6 | VEL (| OCITY m/s) .96 1.26 1.48 | TRAV.TIME (min) 6.96 5.27 4.51 4.03 3.57 3.21 2.93 2.72 2.54 2.41 2.33 2.25 2.18 2.11 2.12 2.11 2.09 2.07 2.03 | |
| INFLOW : | ID= 2 (0430) ID= 1 (0440) | AREA (ha) 349.94 | < hyd QPEAK (cms) 2.49 | rograph TPEAK (hrs) 6.25 6.33 | > R.V. (mm) 34.15 34.15 | <-pipe / c MAX DEPTH (m) .35 .34 | hannel-> MAX VEL (m/s) 1.29 1.28 |
| ID1= + ID2= ==== ID = | | 56.21 349.94 406.15 | 9.543 2.403 11.718 | (hrs) 6.08 6.33 6.08 | 36.09 34.15 34.42 | | |
| + ID2= ==== ID = | | (ha) 43.10 406.15 449.25 | (cms) 6.559 11.718 | (hrs) 6.00 6.08 6.08 NS IF A | (mm) 36.09 34.42 34.58 | | |

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0491) | 1 + 2 = 3 | QPEAK (cms) 17.844 R.V. (mm) 34.58 AREA TPEAK (ha) -----(hrs) ID1= 1 (0490): 449.25 6.08 6.42 + ID2= 2 (0482): 24.97 1.351 35.04 ____ _____ -----_____ ID = 3 (0491):474.22 18.128 6.08 34.60 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. RESERVOIR (0483) IN= 2---> OUT= 1 | DT= 5.0 min | OUTFLOW STORAGE OUTFLOW STORAGE (cms) 7.0800 8.1000 9.7980 (ha.m.) (cms) (ha.m.) .0000 .0600 .3400 .6182 1.1630 1.7070 2.4860 3.3240 4.6420 7.4397 .0000 .2760 1.2000 .6182 | 10.4940 1.1630 | 11.6850 1.7070 | 12.3480 2.0400 2.6400 10.3000 3.1200 11.4000 QPEAK (cms) AREA TPEAK R.V. (ha) 474.220 474.220 (hrs) (mm) INFLOW : ID= 2 (0491) OUTFLOW: ID= 1 (0483) 18.128 6.08 34.60 6.839 34.60 PEAK FLOW REDUCTION [Qout/Qin](%)= 37.72 TIME SHIFT OF PEAK FLOW (min)= 25.00 (ha.m.) = 2.4478MAXIMUM STORAGE USED ADD HYD (0530) | 1 + 2 = 3 | AREA QPEAK TPEAK R.V. _____ (ha) (cms) (hrs) (mm) 474.22 6.50 34.60 ID1= 1 (0483): 6.839 + 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. _____ ADD HYD (0545) | AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)478.857.0146.5034.8674.767.0766.1740.49 1 + 2 = 3R.V. (mm) ID1= 1 (0530): + ID2= 2 (0527): _____ ____ ID = 3 (0545): 553.61 13.871 6.50 35.62 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0546) 1 + 2 = 3AREA (ha) OPEAK TPEAK R.V. (cms) (hrs) (mm) ID1= 1 (0545): 553.61 13.871 + ID2= 2 (0542): 25.25 5.333 35.62 6.50 61.38 6.00 _____ ID = 3 (0546):578.86 14.994 6.00 36.75 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0547) | QPEAK (cms) 1 + 2 = 3AREA TPEAK R.V. (ha) (hrs) _____ (mm) ID1= 1 (0546): 578.86 14.994 + ID2= 2 (0543): 14.99 3.310 6.00 36.75 6.00 61.38 ID = 3 (0547):593.85 18.304 6.00 37.37 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0548) | 1 + 2 = 3 | AREA QPEAK (cms) R.V. TPEAK _____ (ha) (hrs) (mm) 18.304 ID1= 1 (0547): 593.85 37.37 6.00 + ID2= 2 (0544): 1.13 6.00 61.38 .266 _____ ID = 3 (0548):594.98 18.570 6.00 37.41 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ***** ** SIMULATION NUMBER: 4 ** **** _____ Filename: Y:\SPrimmer\OTTHYMO\Ci READ STORM 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 3.25 .25 2.26 3.61 6.25 16.23 9.25 3.16 .50 9.50 2.26 3.50 3.61 6.50 16.23 | 3.16 .75 3.75 3.61 6.75 9.75 2.26 7.21 3.16 7.00 1.00 2.26 4.00 3.61 10.00 7.21 3.16 7.25 1.25 2.26 4.25 5.41 5.41 10.25 1.80 4.50 1.50 2.26 5.41 5.41 10.50 1.80 4.75 7.21 1.75 2.26 7.75 5.41 10.75 1.80 5.00 7.21 2.00 2.26 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 5.75 8.75 2.70 | 43.29 3.16 | 11.75 1.80 3.00 2.70 6.00 119.04 9.00 3.16 | 12.00 1.80 Page 84

Hadati Creek Watershed - Post Development with Cityview Ridge CALIB STANDHYD (0480) ID= 1 DT= 5.0 min (ha) = 43.10Area Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =18.1025.00 (mm)= Dep. Storage 1.50 5.00 (%)= 2.00 Average Slope 2.00 Lenath 680.00 40.00 (m) =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 3.083 3.61 3.61 9.08 3.16 .083 2.26 6.083 16.23 3.167 3.250 3.333 2.26 .167 | 6.167 16.23 9.17 3.16 .250 6.250 2.26 3.61 9.25 16.23 3.16 .333 2.26 3.61 6.333 16.23 9.33 3.16 | 3.417 .417 2.26 3.61 | 6.417 16.23 9.42 3.16 | 3.500 .500 9.50 2.26 3.61 6.500 16.23 3.16 3.583 .583 9.58 2.26 6.583 3.61 7.21 3.16 3.61 .667 9.67 2.26 6.667 7.21 3.16 3.750 3.833 3.917 .750 2.26 6.750 7.21 9.75 3.16 .833 2.26 3.61 6.833 7.21 9.83 3.16 .917 2.26 6.917 9.92 3.61 7.21 3.16 3.61 1.000 2.26 4.000 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 | 4.250 5.41 1.250 2.26 7.250 5.41 10.25 1.80 4.333 1.333 2.26 5.41 7.333 5.41 10.33 1.80 7.417 5.41 10.42 1.417 2.26 | 4.417 5.41 1.80 7.500 7.583 1.500 2.26 4.500 10.50 5.41 5.41 1.80 1.583 2.26 4.583 7.21 5.41 10.58 1.80 7.21 7.667 1.667 4.667 2.26 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 5.41 1.917 2.26 4.917 7.21 7.917 10.92 1.80 2.000 5.000 2.26 7.21 8.000 11.00 5.41 1.80 2.083 5.083 10.82 2.70 8.083 3.16 11.08 1.80 2.167 5.167 2.70 10.82 8.167 11.17 3.16 1.80 2.250 3.16 11.25 2.70 10.82 8.250 1.80 5.333 2.333 2.70 10.82 8.333 3.16 11.33 1.80 j 5.417 2.417 2.70 10.82 8.417 11.42 3.16 1.80 2.500 2.70 5.500 10.82 8.500 11.50 3.16 1.80 2.583 2.70 5.583 43.29 8.583 3.16 11.58 1.80 i 5.667 2.667 2.70 43.29 8.667 3.16 11.67 1.80 | 5.750 43.29 11.75 2.750 2.70 8.750 3.16 1.80 119.04 2.833 2.70 5.833 8.833 3.16 11.83 1.80 2.917 2.70 5.917 119.04 8.917 11.92 3.16 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 5.00 6.11 (ii) 5.00 over (min) 15.00 Storage Coeff. (min)= 12.82 (ii) Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .19 .08 Page 85

| Hadati Creek Watershed - Post Development with Cityview Ridge *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. |
| CALIB STANDHYD (0415) Area (ha)= 4.99 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| $\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$ |
| 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 |
| PEAK FLOW (cms)= .35 .96 1.304 (iii) TIME TO PEAK (hrs)= 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 |
| <pre>***** 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.</pre> |
| CALIB STANDHYD (0410) Area (ha)= 24.20 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| IMPERVIOUSPERVIOUS (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 Page 86 |

Hadati Creek Watershed - Post Development with Cityview Ridge 5.00 over (min) 15.00 (min)= Storage Coeff. 4.45 (ii) 11.16 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (min)= 5.00 15.00 .23 .09 ***TOTALS*** PEAK FLOW (cms) =3.90 1.64 5.204 (iii) TIME TO PEAK (hrs)= 6.00 6.08 6.00 RUNOFF VOLUME 47.17 (mm) =88.68 36.13 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: (mm/hr) = 75.00 K (1/hr) = 4.14FO (mm/hr) = 12.50Cum.Inf. .00 FC (mm) =(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) (ha) = 36.00Area ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn.(%)= 21.00 _____ IMPERVIOUS PERVIOUS (i) 15.12 Surface Area (ha) =20.88 Dep. Storage (mm)= 1.50 5.00 2.03 465.00 Average Slope (%)= 2.03 Length (m) =40.00 Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 119.04 149.56 5.00 over (min) 15.00 Storage Coeff. 4.84 (ii) (min) =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: K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 75.00FO (mm/hr) = 12.50FC (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) ID= 1 DT= 5.0 min Area (ha)= 12.70 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 PERVIOUS (i) IMPERVIOUS Surface Area (ha) =5.33 7.37 Dep. Storage (mm) =1.50 5.00 Page 87

Hadati Creek Watershed - Post Development with Cityview Ridge e Slope (%) = 1.71 1.71 Average Slope (%)= Length 300.00 (m) =40.00 Mannings n .013 -.300 Max.Eff.Inten.(mm/hr)= 119.04 149.56 5.00 3.92 5.00 over (min) 15.00 3.92 (ii) Storage Coeff. (min)= 10.95 (ii) Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .24 .09 *TOTALS* PEAK FLOW TIME TO PEAK .87 6.00 2.06 (cms) =2.756 (iii) 6.00 (hrs) =RUNOFF VOLUME 88.68 (mm) =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) = 4.14Fc (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 Area (ha)= 51.20 Total Imp(%)= 10.00 STANDHYD (0395) ID= 1 DT= 5.0 min Dir. Conn.(%)= 5.00 _____ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =5.12 46.08 1.50 5.00 Dep. Storage (mm) =2.00 Average Slope (%)= 2.00 Length (m)= 900.00 40.00 .013 Mannings n = .300 Max.Eff.Inten.(mm/hr)= 119.04 112.64 5.00 7.23 5.00 over (min) 15.00 5.00 14.74 (ii) Storage Coeff. (min)= 7.23 (ii) Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .17 .08 *TOTALS* .78 PEAK FLOW (cms) =8.19 8.631 (iii) TIME TO PEAK (hrs) =6.08 6.08 88.68 RUNOFF VOLUME (mm)= 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: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALIB Page 88

| Hadati Creek STANDHYD (0360) A ID= 1 DT= 5.0 min T | Watershed - Post De rea (ha)= 30.00 otal Imp(%)= 37.00 | evelopment with C [.] Dir. Conn.(%)= | ityview Ridge : 19.00 | | | |
|---|---|--|--|--|--|--|
| Surface Area (h Dep. Storage (m Average Slope (Length (Mannings n | IMPERVIOUS a)= 11.10 m)= 1.50 %)= 2.00 m)= 447.00 = .013 | PERVIOUS (i) 18.90 5.00 2.00 40.00 .300 | | | | |
| Max.Eff.Inten.(mm/h over (mi Storage Coeff. (mi Unit Hyd. Tpeak (mi Unit Hyd. peak (cm | n) 5.00 n)= 4.75 (ii) n)= 5.00 s)= .22 | 15.00 11.63 (ii) 15.00 .09 | TOTALS* | | | |
| PEAK FLOW (cm TIME TO PEAK (hr RUNOFF VOLUME (m TOTAL RAINFALL (m RUNOFF COEFFICIENT | s)= 1.83 s)= 6.00 m)= 88.68 m)= 90.18 = .98 | 4.81 6.08 35.04 90.18 .39 | 6.183 (iii) 6.00 45.23 90.18 .50 | | | |
| ***** WARNING: STORAGE C ***** WARNING:FOR AREAS YOU SHOULD | OEFF. IS SMALLER TH/ WITH IMPERVIOUS RAT CONSIDER SPLITTING | IOS BELOW 20% | | | | |
| Fo (mm/hr) Fc (mm/hr) (ii) TIME STEP (DT | ION SELECTED FOR PE = 75.00 K = 12.50 Cum.Inf) SHOULD BE SMALLER AGE COEFFICIENT. S NOT INCLUDE BASEF | (1/hr)= 4.14 . (mm)= .00 OR EQUAL | | | | |
| CALIB STANDHYD (0350) A ID= 1 DT= 5.0 min To | rea (ha)= 16.30 otal Imp(%)= 42.00 | Dir. Conn.(%)= | 21.00 | | | |
| | IMPERVIOUS a)= 6.85 m)= 1.50 %)= 1.00 m)= 330.00 = .013 | 9.45 | | | | |
| Max.Eff.Inten.(mm/h over (min Storage Coeff. (min Unit Hyd. Tpeak (min Unit Hyd. peak (cm | n) 5.00 n)= 4.88 (ii) n)= 5.00 | 149.56 15.00 13.13 (ii) 15.00 .08 | TOTALS* | | | |
| | | 2.45 6.08 36.13 90.18 .40 | 3.299 (iii) 6.00 47.17 90.18 .52 | | | |
| ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! | | | | | | |
| Fo (mm/hr) | ION SELECTED FOR PE = 75.00 K = 12.50 Cum.Inf Page | (1/hr) = 4.14 . (mm) = .00 | | | | |

Hadati Creek Watershed - Post Development with Cityview Ridge (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALTB STANDHYD (0355) Area (ha)= 12.30 ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn.(%)= 21.00 _____ IMPERVIOUS PERVIOUS (i) 5.17 1.50 7.13 (ha) =Surface Area Dep. Storage (mm) = $1.50 \\ 1.60 \\ 286.00 \\ .013$ Average Slope (%)= 1.60 Length 40.00 (m)= Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 119.04 over (min) 5.00 149.56 5.00 3.89 (ii) 5.00 .25 15.00 Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 11.05 (ii) 15.00 .09 *TOTALS* $1.99 \\ 6.08$ PEAK FLOW .84 6.00 (cms) =2.661 (iii) TIME TO PEAK (hrs) =6.00 RUNOFF VOLUME 88.68 36.13 (mm)= 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) = 4.14Fc (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) 49.35 (ha)= 68.15 Surface Area 1.50 5.00 Dep. Storage (mm)= 2.00 Average Slope (%)= 2.00 Length (m) =885.00 40.00 Mannings n .013 ____ . 300 Max.Eff.Inten.(mm/hr)= 119.04 149.56 5.00 7.16 (5.00 over (min) 15.00 7.16 (ii) Storage Coeff. (min)= 13.86 (ii) Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .17 .08 ***TOTALS*** 6.00 17.25 PEAK FLOW (cms) =22.881 (iii) (mm) = 88.68 (mm) = 90.18 ENT = 00 TIME TO PEAK 6.08 6.00 RUNOFF VOLUME 36.13 47.17 90.18 TOTAL RAINFALL 90.18 RUNOFF COEFFICIENT = .40 .52

Hadati Creek Watershed - Post Development with Cityview Ridge (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00K (1/hr)= 4.14 Cum.Inf. (mm)= .00 Fo (mm/hr) = 12.50FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. ______ _____ CAL TR Area (ha)= 51.32 Total Imp(%)= 42.00 | STANDHYD (0105) | |ID= 1 DT= 5.0 min | STANDHYD (0105) Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =21.55 29.77 1.50 Dep. Storage (mm) =5.00 2.00 Average Slope (%)= 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 5.38 (ii) Storage Coeff. 12.09 (ii) (min) =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) 6.00 TIME TO PEAK (hrs) =6.00 6.08 RUNOFF VOLUME (mm) =88.68 47.17 36.13 TOTAL RAINFALL (mm) =90.18 90.18 90.18 RUNOFF COEFFICIENT . 98 .40 = .52 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ _____ CALIB Area (ha)= 14.32 Total Imp(%)= 42.00 STANDHYD (0102) |ID= 1 DT= 5.0 min | Dir. Conn.(%)= 21.00 IMPERVIOUS PERVIOUS (i) Surface Area (ha) =6.01 8.31 Dep. Storage 1.50 5.00 (mm) =2.00 Average Slope (%)= 2.00 287.00 Length (m)= 40.00 Mannings n .013 .300 _ 119.04 Max.Eff.Inten.(mm/hr)= 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)= .09 .25 *TOTALS* PEAK FLOW (cms) =.98 3.171 (iii) 2.37 TIME TO PEAK 6.00 (hrs) =6.08 6.00 RUNOFF VOLUME (mm) =88.68 47.17 36.13 Page 91

Hadati Creek Watershed - Post Development with Cityview Ridge 90.18 TOTAL RAINFALL (mm)= 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 K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 12.50FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. CALIB STANDHYD (0101) (ha) = 16.32Area ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =6.85 9.47 5.00 Dep. Storage (mm) =1.50 Average Slope (%)= 2.00 2.00 309.00 Length (m) =40.00 Mannings n .013 = .300 149.56 Max.Eff.Inten.(mm/hr)= 119.04 over (min) 5.00 15.00 Storage Coeff. 3.81 (ii) (min) =10.51 (ii) 15.00 Unit Hyd. Tpeak (min)= 5.00 Unit Hyd. peak (cms)= .25 .09 *TOTALS* 2.69 PEAK FLOW (cms) =1.12 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: (mm/hr) = 75.00K (1/hr)= 4.14 Cum.Inf. (mm)= .00 FO (mm/hr) = 12.50FC (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) (ha) = 19.00Area |ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn. (%) = 21.00_____ **IMPERVIOUS** PERVIOUS (i) Surface Area (ha) =7.98 11.02 (mm) =1.50 Dep. Storage 5.00 2.00 Average Slope (%)= 2.00 Length 365.00 (m) =40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 119.04 149.56 5.00 over (min) 15.00 4.21 (ii) 10.91 (ii) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= 5.00 15.00

Page 92

Hadati Creek Watershed - Post Development with Cityview Ridge Unit Hyd. peak (cms)= .24 .09 ***TOTALS*** (cms)= PEAK FLOW 1.30 3.09 4.123 (iii) 6.00 TIME TO PEAK (hrs) =6.00 6.08 RUNOFF VOLUME (mm)= 88.68 36.13 47.17 TOTAL RAINFALL 90.18 (mm) =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) = 4.14Fc (mm/hr) = 12.50 Cum.Inf. (mm) = .00FC (mm/hr)= 12.50 Cum.Inf. (mm)= (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ | CALIB | | STANDHYD (0600) | |ID= 1 DT= 5.0 min | CALIB Area (ha)= 11.38 Total Imp(%)= 42.00 Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =4.78 6.60 Dep. Storage 1.50 (mm) =5.00 Average Slope (%)= 2.00 2.00 Length 680.00 (m) =40.00 Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 119.04 149.56 5.00 6.11 5.00 15.00 over (min) 12.82 (ii) Storage Coeff. 6.11 (ii) (min) =Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .19 .08 *TOTALS* .75 PEAK FLOW (cms) =1.73 2.303 (iii) 6.00 88.68 90.18 (hrs)= 6.08 TIME TO PEAK 6.00 (mm)= RUNOFF VOLUME 36.13 47.17 TOTAL RAINFALL (mm)= 90.18 90.18 RUNOFF COEFFICIENT = .98 .40 . 52 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 75.00FO FC (mm/hr) = 12.50(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) | ID= 1 DT= 5.0 min | Area (ha) = 7.62Total Imp(%) = 46.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) 3.51 1.50 Surface Area (ha) =4.11 Dep. Storage (mm) =5.00 2.00 Average Slope (%)= 2.00 (%) = 2.00(m) = 680.00 40.00 Lenath Mannings n .300 .013 =

| Hadati Creek Wate Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | 5.00 6.11 (ii) 5.00 .19 .50 6.00 88.68 90.18 | 161.60 15.00 12.61 (ii) 15.00 .08 | Cityview Ridge *TOTALS* 1.576 (iii) 6.00 48.29 90.18 .54 |
|---|---|---|--|
| (i) HORTONS EQUATION Fo (mm/hr)= 75 Fc (mm/hr)= 12 (ii) TIME STEP (DT) SH THAN THE STORAGE (iii) PEAK FLOW DOES NO | .00 K .50 Cum.Inf. OULD BE SMALLER C COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 DR EQUAL | |
| CALIB STANDHYD (0607) Area ID= 1 DT= 5.0 min Total | (ha)= 5.97 Imp(%)= 42.00 | Dir. Conn.(%) | = 2.50 |
| Surface Area (ha)= Dep. Storage (mm)= Average Slope (%)= Length (m)= Mannings n = | IMPERVIOUS F 2.51 1.50 2.00 680.00 .013 | PERVIOUS (i) 3.46 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | 119.04 5.00 6.11 (ii) 5.00 .19 | 187.59 15.00 12.24 (ii) 15.00 .09 | *TOTALS* |
| PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | 90.18 | 1.19 6.08 39.89 90.18 .44 | 1.215 (iii) 6.08 41.11 90.18 .46 |
| ***** WARNING:FOR AREAS WITH YOU SHOULD CON | IMPERVIOUS RATIONS SIDER SPLITTING T | | |
| (i) HORTONS EQUATION Fo (mm/hr)= 75 Fc (mm/hr)= 12 (ii) TIME STEP (DT) SH THAN THE STORAGE (iii) PEAK FLOW DOES NO | .00 K .50 Cum.Inf. OULD BE SMALLER C COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 DR EQUAL | |
| CALIB STANDHYD (0540) Area ID= 1 DT= 5.0 min Tota] | (ha)= 4.63 Imp(%)= 80.00 | Dir. Conn.(%) | = 79.00 |
| Surface Area (ha)= | IMPERVIOUS F 3.70 Page 9 | .93 | |

Hadati Creek Watershed - Post Development with Cityview Ridge 1.50 Dep. Storage (mm) =5.00 .55 Average Slope (%)= .55 40.00 150.00 Length (m) =Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 119.04 111.85 5.00 15.00 over (min) 3.64 (ii) Storage Coeff. (min) =14.73 (ii) Unit Hyd. Tpeak (min)= 5.00 15.00 Unit Hyd. peak (cms)= .25 .08 *TOTALS* PEAK FLOW (cms) =.16 6.08 1.20 1.339 (iii) (hrs)= TIME TO PEAK 6.00 6.00 RUNOFF VOLUME (mm) =88.68 31.37 76.65 TOTAL RAINFALL 90.18 90.18 (mm) =90.18 RUNOFF COEFFICIENT .98 .35 = .85 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (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) | |ID= 1 DT= 5.0 min | Area (ha)= 244.00 Total Imp(%)= 46.00 Dir. Conn.(%)= 26.00 _____ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =112.24 131.76 1.50 5.00 Dep. Storage (mm) =.80 1275.00 (%)= .80 Average Slope 40.00 Length (m)= .300 Mannings n .013 = 119.04 Max.Eff.Inten.(mm/hr)= 150.55 over (min) 10.00 25.00 Storage Coeff. (min)= 11.73 (ii) 20.53 (ii) Unit Hyd. Tpeak (min)= 10.0025.00 Unit Hvd. peak (cms)= .05 .10 *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: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00FO FC (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) | (ha) = 16.00Area Page 95

Hadati Creek Watershed - Post Development with Cityview Ridge ID= 1 DT= 5.0 min | Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 IMPERVIOUS PERVIOUS (i) (ha) =12.80 Surface Area 3.20 Dep. Storage (mm) =1.50 5.00 . 50 .20 Average Slope (%)= 400.00 40.00 Length (m) =Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 119.04 91.82 over (min) 5.00 25.00 22.99 (ii) Storage Coeff. (min)= 6.74 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 25.00 5.00 .18 .05 *TOTALS* PEAK FLOW 3.88 .40 (cms) =4.080 (iii) TIME TO PEAK 6.25 (hrs) =6.00 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: (mm/hr) = 75.00K (1/hr)= 4.14 Cum.Inf. (mm)= .00 FO (mm/hr) = 12.50FC .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) (ha) = 25.25Area ID= 1 DT= 5.0 min Total Imp(%) = 80.00Dir. Conn. (%) = 79.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =20.20 5.05 1.50 Dep. Storage (mm) =5.00 .55 Average Slope (%)= .55 Length (m) =350.00 40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 119.04 111.85 5.00 over (min) 20.00 6.05 (ii) Storage Coeff. (min) =17.13 (ii) Unit Hyd. Tpeak (min)= 5.00 20.00 Unit Hýd. peak (cms)= .19 .06 ***TOTALS*** .77 PEAK FLOW (cms) =6.23 6.749 (iii) TIME TO PEAK 6.17 6.00 (hrs) =6.00 RUNOFF VOLUME 88.68 31.37 (mm) =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) = 4.14Fc (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. _____

Hadati Creek Watershed - Post Development with Cityview Ridge CALIB STANDHYD (0543) (ha) = 14.99Area ID= 1 DT= 5.0 min | Total Imp(%) = 80.00Dir. Conn. (%) = 79.00**IMPERVIOUS** PERVIOUS (i) Surface Area (ha) =11.99 3.00 Dep. Storage (mm)= 1.50 5.00 .55 Average Slope (%)= .55 200.00 40.00 Length (m) =Mannings n = .013 .300 119.04 Max.Eff.Inten.(mm/hr)= 111.85 over (min) 5.00 20.00 Storage Coeff. 4.32 (ii) 15.41 (ii) (min) =Unit Hyd. Tpeak (min)= 5.00 20.00 Unit Hyd. peak (cms) =.23 .07 ***TOTALS*** .48 4.164 (iii) PEAK FLOW (cms) =3.84 TIME TO PEAK 6.00 6.17 6.00 (hrs) =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: K (1/hr) = 4.14(mm/hr) = 75.00FO Cum.Inf. FC (mm/hr) = 12.50(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(%) = 80.00Dir. Conn.(%) = 79.00**IMPERVIOUS** PERVIOUS (i) (ha) =Surface Area .90 .23 Dep. Storage 5.00 1.50 (mm) =Average Slope (%)= .55 .55 50.00 Lenath 40.00 (m) =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)= 15.00 5.00 Unit Hyd. peak (cms)= .08 . 32 ***TOTALS*** .04 .30 PEAK FLOW (cms) =.333 (iii) 6.08 TIME TO PEAK (hrs) =6.00 6.00 RUNOFF VOLUME 88.68 31.37 (mm) =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: K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 75.00Fo FC (mm/hr) = 12.50Page 97

Hadati Creek Watershed - Post Development with Cityview Ridge (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) | (ha)= .00 AREA | ID= 1 DT=****min | (cms) =QPEAK .00 (hrs)= ------TPEAK .00 (mm)=****** VOLUME _____ ADD HYD (0420) 1 + 2 = 3 AREA QPEAK TPEAK R.V.
 AREA
 QPEAK
 IPEAK
 R.V.

 (ha)
 (cms)
 (hrs)
 (mm)

 4.99
 1.304
 6.00
 47.17

 24.20
 5.204
 6.00
 47.17
 ID1= 1 (0415): + ID2= 2 (0410): ے نے بے بنان کے بی ج ج ج ج ج ج ج ج ج ج ج ج ج ک کا کا کا کا کا ہے ج ج ج ج ج ک ک ک ک ک ک ID = 3 (0420): 29.19 6.509 6.00 47.17NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ____ ADD HYD (0465) | 1 + 2 = 3 | AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)36.007.6396.0047.1712.702.7566.0047.17 -----ID1= 1 (0460): + ID2= 2 (0455): 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) ----> Elevation Manning Distance .00 5.50 .0300 .40 .0300 / .0150 Main Channel .0150 Main Channel .0150 Main Channel .0150 Main Channel .15 .00 5.51 10.00 .09 14.49 .00 .0150 Main Channel 14.50 .0150 / .0300 Main Channel .0300 .15 .40 20.00 <----->
 Comparison
 <thComparison</th>
 Comparison
 Comparis FLOW RATE VELOCITY TRAV.TIME (cms) (m/s) (min) .0 .21 80.52 .0 .33 50.72 .1 38.71 31.95 .43 .1 .52 .3 .5 .7 26.84 .62 .77 21.66 .90 18.45 1.0 1.03 16.22 Page 98

| .17 .20 .22 .24 .26 .29 .31 .33 .35 .38 | .17 .20 .22 .24 .26 | .116E+04 .140E+04 .166E+04 .225E+04 .258E+04 .293E+04 .331E+04 .371E+04 .413E+04 | 1.3 | 1.27 1.36 1.44 1.51 1.57 1.62 | 14.36 13.13 12.24 11.58 11.05 10.63 10.27 |
|--|---|--|---|--|--|
| INFLOW OUTFLO | : ID= 2 (036 N: ID= 1 (036 | AREA (ha) 50) 30.00 52) 30.00 | OPEAK | TPEAK R.V. | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) .35 1.71 .31 1.63 |
| ROUTE CHN IN= 2> | OUT= 1 | DATA FOR SEC Elevat | TION (1 26 15 .030 00 | .1)> Manning .0300 00 / .0150 Mai .0150 Mai | n Channel |
| < DEPTI (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | H ELEV (m) .01 .03 .04 .05 .07 .08 | | FLOW DATE | E VELOCITY (m/s) .17 .27 .35 .42 .49 .55 .64 .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 | |
| INFLOW OUTFLO | : ID= 2 (035 V: ID= 1 (035 | AREA (ha) 50) 16.30 53) 16.30 | < hyd QPEAK (cms) 3.30 2.44 | rograph> TPEAK R.V. (hrs) (mm) 6.00 47.17 6.17 47.13 | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) .26 1.34 .22 1.29 |

| ROUTE CHN (0358) IN= 2> OUT= 1 Routing time step (min)'= 5.00 | |
|--|--|
| < DATA FOR SECTION (| |
| < | |
| <pre>< hydrograph> <-pipe / channel-> AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEL</pre> | |
| RESERVOIR (0106) IN= 2> OUT= 1 DT= 5.0 min OUTFLOW STORAGE .0000 .0000 .0000 .0000 .0100 .0100 .0260 .2300 | |
| 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 Page 100 | |

Hadati Creek Watershed - Post Development with Cityview Ridge

Hadati Creek Watershed - Post Development with Cityview Ridge MAXIMUM STORAGE USED (ha.m.)= .8782 _____ ADD HYD (0103) | 1 + 2 = 3AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) 14.32 3.171 6.00 16.32 3.593 6.00 (cms) 3.171 (mm) 47.17 _____ ID1= 1 (0102): + ID2 = 2 (0101):47.17 ور بيد هم جه جه جه جه جه جه جه جه خو خو خو خو خو خو جو جو جو جو -----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
 STORAGE
 OUTFLOW
 STORAGE

 (ha.m.)
 (cms)
 (ha.m.)

 .0000
 1.0000
 1.0000

 .0100
 20.0000
 1.1000

 .1000
 .0000
 .0000
 OUTFLOW (cms) | DT= 5.0 min | _____ 1.0000 1.1000 .0000 .0100 .0120 .0000 AREAQPEAKTPEAK(ha)(cms)(hrs)19.0004.1236.0019.000.6136.5% R.V. (mm) INFLOW : ID= 2 (0110) OUTFLOW: ID= 1 (0111) 47.17 47.16 FLOW REDUCTION [Qout/Qin](%)= 14.87 PEAK 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) 11.38 2.303 6.00 47.17 7.62 1.576 6.00 48.29 R.V. (mm) 47.17 ID1= 1 (0600): + ID2= 2 (0601): _____ ID = 3 (0602): 19.00 3.878 6.00 47.62NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. (0505) DUHYD 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 49.88 ===== _____ MAJOR SYS.(ID= 2): 102.03 25.26 MINOR SYS.(ID= 3): 141.97 9.00 6.17 49.88 5.83 49.88 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0515) | 1 + 2 = 3 | AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 9.000 141.97 9.000 5.83 49.88 16.00 4.080 6.00 76.65 ID1= 1 (0505): + ID2= 2 (0510): ______ ____ 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 | tal(cms)= 2.0 | AREA QPEAK ----- (ha) (cms) TOTAL HYD.(ID= 1): 29.19 6.51 TPEAK R.V. (hrs) (mm) 6.00 47.17 _____ MAJOR SYS.(ID= 2): 10.15 MINOR SYS.(ID= 3): 19.04 4.53 6.00 47.17 1.98 5.83 47.17 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0470) | 1 + 2 = 3 | AREA QPEAK (ha) (cms) 10.15 4.529 R.V. TPEAK _____ (hrs) (mm) 47.17 10.15 ID1= 1 (0425): 6.00 + ID2= 2 (0465): 48.70 10.395 47.17 6.00 __________ 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 QPEAK TPEAK R.V. (cms) (hrs) (mm) AREA QPEAK 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 STORAGEOUTFLOW(ha.m.)(cms).00001.0000.010010.0000.1332.0000 STORAGE DT= 5.0 min | OUTFLOW STORAGE (cms) -----(ha.m.) .0000 . 5000 . 6000 . 0000 .0100 .0150 AREA QPEAK TPEAK R.V. (cms) (hrs) (mm) (ha) Page 102

Hadati Creek Watershed - Post Development with Cityview Ridge 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 (min)= 5.00 (ha.m.)= .5855 MAXIMUM STORAGE USED **** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED. CHECK OUTFLOW/STORAGE TABLE OR REDUCE DT. ADD HYD (0114) | 1 + 2 = 3 | 2 = 3AREAQPEAKTPEAKR.V.1D1=1(0104):30.647.0486.0847.16+ ID2=2(0111):19.00.6136.5847.16 _____ ID = 3 (0114): 49.64 7.421 6.0847.16 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) -----> <----- 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 <-----> 11.3 13.0 14.8 16.9 .95 .95 .531E+03 1.00 1.00 .585E+03 3.27 . 60 3.38 . 58 <---- hydrograph ----> <-pipe / channel->
QPEAK TPEAK R.V. MAX DEPTH MAX VEL
(cms) (hrs) (mm) (m) (m/s) AREA (ha) Page 103

| Ha INFLOW : OUTFLOW: | adati Creek ID= 2 (06 ID= 1 (05 | watershed 02) 19.00 63) 19.00 | - Post Dev 3.88 3.76 | velopment 6.00 6.08 | with C 47.62 47.62 | ityview Ridg .53 .52 | e 2.35 2.33 |
|---|--|--|---|--|----------------------------------|---|----------------------------------|
| ROUTE CHN (IN= 2> 0 | 0564) UT= 1 | Routing t | ime step (| min)'= 5 | 5.00 | | |
| | Distance .00 1.00 2.00 3.50 4.50 6.00 | DATA FOR SE Eleva 101 100 99 99 100 101 | tion .50 .70 .55 .0 .50 .60 .65 .0 .45 | Manning .0500 .0500 500 / .03 .0300 .0300 300 / .05 .0500 | 300 Mai Mai Mai 500 Mai | n Channel n Channel n Channel n Channel | |
| <pre> DEPTH (m) .10 .19 .29 .38 .48 .57 .67 .76 .86 .95 1.05 1.16 1.28 1.39 1.50 1.61 1.72 1.84 1.95 </pre> | ELEV (m) 99.60 99.69 99.79 99.88 99.98 100.07 100.17 100.26 100.36 100.45 100.55 100.66 100.78 100.89 101.00 101.11 101.22 101.34 101.45 | TRAVE VOLUME (cu.m.) .353E+02 .112E+03 .195E+03 .285E+03 .381E+03 .484E+03 .594E+03 .710E+03 .832E+03 .961E+03 .110E+04 .127E+04 .127E+04 .127E+04 .221E+04 .250E+04 .250E+04 .313E+04 | L TIME TAB FLOW RAT (cms) .0 .1 .2 .3 .5 .7 .9 1.2 1.5 1.8 2.2 2.7 3.4 4.1 4.9 5.8 6.7 7.7 8.8 | 1 1 1 | L.30 L.34 | TRAV.TIME (min) 43.69 22.76 17.03 14.23 12.51 11.32 10.43 9.74 9.18 8.72 8.32 7.80 7.31 6.94 6.65 6.41 6.22 6.04 5.90 | |
| INFLOW : OUTFLOW: | ID= 2 (05 ID= 1 (05 | VEL TIME TA AREA (ha) 05) 102.03 64) 102.03 PUTATIONS F | < hy QPEAK (cms) 25.26 39.67 | drograph TPEAK (hrs) 6.17 6.58 | R.V. (mm) | <-pipe / cł MAX DEPTH (m) 1.80 1.95 | MAX VEL (m/s) 1.37 1.41 |
| | | FUTATIONS F | | | | | |
| | 3.050 1 3.0 D.(ID= 1): | AREA (ha) 157.97 | (cms) 13.08 | (hrs) 6.00 | R.V. (mm) 52.60 | | |
| MAJOR SY | S.(ID= 2): S.(ID= 3): | 67.54 | 10.03 3.05 | 6.00 5.58 | 52.60 52.60 | | |

| ROUTE CHN (IN= 2> O | UT= 1 DA Distance 100.00 115.00 120.00 | ATA FOR SEC Elevat 324. 321. 320. 320. 321. 322. | TION (ion 60 60 80 80 60 30 10 | 1.1) Manning | > 300 Mai | n Channel n Channel | |
|---------------------------|---|---|--|--|--|--|--|
| | (m) 321.00 . 321.20 . 321.40 . 321.60 . 321.80 . 322.00 . 322.20 . 322.20 . 322.40 . 322.60 . 323.00 . 323.20 . 323.20 . 323.40 . 323.60 . 323.80 . 324.00 . 324.20 . 324.20 . | VOLUME (cu.m.) 398E+03 125E+04 255E+04 430E+04 644E+04 892E+04 117E+05 148E+05 182E+05 218E+05 256E+05 296E+05 338E+05 382E+05 428E+05 526E+05 526E+05 578E+05 | FLOW RATE (cms) .8 3.3 8.1 15.6 26.8 41.2 59.3 81.9 109.1 140.2 175.3 214.7 258.6 306.7 359.1 416.0 477.5 543.5 | E VEL (| OCITY m/s) .84 1.13 1.36 1.56 1.79 2.17 2.37 2.58 2.77 2.95 3.12 3.29 3.46 3.61 3.76 3.91 4.05 | TRAV.TIME (min) 8.53 6.33 5.27 4.59 4.01 3.61 3.30 3.02 2.78 2.59 2.43 2.29 2.18 2.29 2.18 2.07 1.98 1.91 1.83 1.77 | |
| INFLOW : OUTFLOW: | ID= 2 (0470 ID= 1 (0475 | AREA (ha)) 58.85) 58.85 | < hyd QPEAK (cms) 14.92 13.38 | drograph TPEAK (hrs) 6.00 6.08 | > R.V. (mm) 47.17 47.17 | 1./1 <-pipe / c MAX DEPTH (m) .78 .74 | hannel-> MAX VEL (m/s) 1.54 1.49 |
| | | AREA (ha) 30.00 28.60 | QPEAK (cms) 4.880 4.291 | ТРЕАК (hrs) 6.17 6.17 | R.V. (mm) 45.22 47.13 | | |
| | = 3 (0363): EAK FLOWS DO | 58.60 NOT INCLU | 9.171 DE BASEFLO | 6.17 DWS IF A | 46.15 NY. | | |

Hadati Creek Watershed - Post Development with Cityview Ridge NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0115) | 1 + 2 = 3 | AREA **OPEAK** TPEAK R.V. (cms) 7.689 (mm) 47.16 (ha) (hrs) ID1= 1 (0106): + ID2= 2 (0114): 51.32 6.17 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 = 3R.V. (mm) 47.62 AREA QPEAK TPEAK (ha) (cms) (hrs) ID1= 1 (0563): 19.00 3.758 6.08 + ID2= 2 (0607): 5.97 1.215 6.08 41.11 ____ ID = 3 (0492); 24.97 4.973 6.08 46.06NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0526) | 1 + 2 = 3 | AREAQPEAKTPEAKR.V(ha)(cms)(hrs)(mm).00.001.00*******67.5410.0306.0052.60 R.V. (mm) _____ ID1= 1 (0525): + ID2= 2 (0520): 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 (cms) ΤΡΕΑΚ R.V. (mm) 46.15 (ha) (cms) 58.60 9.171 (hrs) _ _ _ _ _ _ _ _ _ _ ID1= 1 (0363): 6.17 + 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 | STORAGE OUTFLOW OUTFLOW STORAGE (cms) (ha.m.) (cms) (ha.m.) .2910 . 3795 .0000 .0000 .0579 .2970 1.6320 .4503 .2590 .5232 .2660 .1180.2720 . 5983 .1802 4.1680 .2790 .2445 7.5660 .6756 .3109 .0000 .2850 .0000

Page 106

| Hadati Cree INFLOW : ID= 2 (0 OUTFLOW: ID= 1 (0 | AR | EA OPE | lopment with C EAK TPEA 1s) (hrs 073 6.0 025 6.2 | K R.V. |
|---|---|--|--|---|
| PEA TIM MAX | K FLOW RE E SHIFT OF PE IMUM STORAGE | DUCTION [QC AK FLOW USED | out/Qin](%)= 6 (min)= 1 (ha.m.)= | 0.83 0.00 .5657 |
| ROUTE CHN (0527) IN= 2> OUT= 1 | | | | |
| Distanc 100.0 140.0 140.5 141.5 142.0 | DATA FOR SEC e Elevat 0 313. 0 312. 0 310. 0 310. 0 310. 0 312. 0 313. | TION (1. ion M 20 40 .05(80 80 40 .03(20 | 1)> Manning .0500 00 / .0300 Ma .0300 Ma .0300 Ma .0500 Ma | in Channel in Channel in Channel in Channel |
| 1.11 311.91 1.23 312.03 1.35 312.15 1.48 312.28 1.60 312.40 1.73 312.53 1.87 312.67 | VOLUME (cu.m.) .575E+02 .119E+03 .185E+03 .256E+03 .330E+03 .409E+03 .492E+03 .579E+03 .671E+03 .671E+03 .867E+03 .971E+03 .108E+04 .149E+04 .248E+04 | TIME TABLE FLOW RATE (cms) .1 .2 .3 .4 .6 .8 1.1 1.3 1.6 1.9 2.2 2.6 2.9 3.6 4.9 6.9 10.1 14.6 20.7 | VELOCITY (m/s) .40 .57 .69 .78 .86 .92 .97 1.02 1.07 1.11 1.15 1.19 1.23 | TRAV.TIME (min) 18.86 13.13 10.87 9.61 8.77 8.17 7.70 7.32 7.01 6.74 6.50 6.29 6.11 6.85 8.52 9.74 10.21 10.17 9.85 |
| INFLOW : ID= 2 (0 OUTFLOW: ID= 1 (0 | | QPEAK (cms) | rograph> TPEAK R.V. (hrs) (mm) 6.00 52.60 6.08 52.59 | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) 2.13 .74 2.04 .76 |
| RESERVOIR (0390) IN= 2> OUT= 1 DT= 5.0 min | OUTFLOW (cms) .0000 .7700 1.2600 | STORAGE (ha.m.) .0000 .2870 .9680 | OUTFLOW (cms) 1.3100 1.8600 .0000 | STORAGE (ha.m.) 1.6000 23.2300 .0000 |

Hadati Creek Watershed - Post Development with Cityview Ridge AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 176.100 INFLOW : ID= 2 (0380) 30.231 6.08 46.83 OUTFLOW: ID = 1 (0390) 1.430 176.100 7.25 46.83 PEAK FLOW REDUCTION [Qout/Qin](%)= 4.73 TIME SHIFT OF PEAK FLOW (min)= 70.00 MAXIMUM STORAGE USED (ha.m.) = 6.3304ADD HYD (0400) Ŗ.V. 1 + 2 = 3AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 51.20 8.631 6.08 34.35 176.10 1.430 7.25 46.83 -----(mm) ID1= 1 (0395): + ID2 = 2 (0390):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 338.30 100.00 .0500 336.80 336.00 335.30 335.30 110.00 .0500 .0300 135.00 Main Channel .0500 142.00 148.00 .0500 156.00 336.00 .0500 165.00 338.30 .0000 <---->
 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
 .71 1.09 1.39 1.66 335.93 13.4 19.04 .63 .153E+05 .218E+05 .79 336.09 22.7 1.97 16.04 .95 .299E+05 2.25 35.3 336.25 14.10 1.11 .396E+05 51.2 70.7 336.41 2.46 12.89 .510E+05 2.63 1.26 336.56 12.02 2.79 .641E+05 1.42 336.72 94.1 11.35 1.58 1.74 .787E+05 122.4 336.88 2.96 10.71 155.6 337.04 .939E+05 3.15 10.06 1.89 337.19 .110E+06 192.8 3.34 9.48 337.35 .126E+06 233.9 2.05 3.53 8.97 .143E+06 3.71 2.21 337.51 278.9 8.53 .160E+06 2.37 327.7 3.89 337.67 8.13 .178E+06 2.53 337.83 380.3 4.07 7.79 .196E+06 436.7 4.23 2.68 337.98 7.48 .215E+06 7.20 2.84 338.14 496.9 4.40 3.00 338.30 .234E+06 561.0 4.56 6.95 <---- hydrograph ----> <-pipe / channel-> QPEAK TPEAK R.V. MAX DEPTH MAX VEL (cms) (hrs) (mm) (m) (m/s) AREA (ha) Page 108

Hadati Creek Watershed - Post Development with Cityview Ridge 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

 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

 R.V. ------(mm) 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 OUTFLOWSTORAGEOUTFLOWSTORAGE(cms)(ha.m.)(cms)(ha.m.).0000.00001.60006.40001.10002.90009.100010.00001.30004.300012.000020.0000 DT= 5.0 min | _____ AREA QPEAK TPEAK (ha) (cms) (hrs) INFLOW : ID= 2 (0407) 328.260 18.926 6.17 OUTFLOW: ID= 1 (0113) 328.260 1.552 12.52 R.V. (mm) 44.98 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 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) -----> Elevation Manning Distance 325.40 324.60 323.90 .0600 .0600 .0600 .0600 100.00 120.00 126.00
 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
 Page 109

| | $155.00 \\ 160.00$ | 324 | .60 .40 | .0600 .0600 | | ityview Rid | ge |
|--|---|--|---|--|--|--|--|
| <pre> DEPTH (m) .16 .33 .49 .65 .82 .98 1.14 1.31 1.47 1.63 1.79 1.96 2.12 2.28 2.45 2.61 2.77 2.94 3.10</pre> | ELEV (m) 322.46 322.63 322.79 322.95 323.12 323.28 323.44 323.61 323.77 323.93 324.09 324.26 324.42 324.58 324.75 324.91 325.07 325.24 | .154E+05 .176E+05 .200E+05 .228E+05 | | E VEL | OCITY m/s) .96 1.26 1.48 1.66 1.87 2.08 2.27 2.45 2.62 2.77 2.87 2.96 | TRAV.TIME (min) 6.96 5.27 4.51 4.03 3.57 3.21 2.93 2.72 2.54 2.41 2.33 2.25 2.18 2.11 2.12 | |
| INFLOW : OUTFLOW: | ID= 2 (04) ID= 1 (04) | AREA (ha) 30) 347.30 40) 347.30 | < hyc QPEAK (cms) 3.00 2.86 | Irograph TPEAK (hrs) 6.33 6.42 | R.V. (mm) 45.10 45.10 | <-pipe / c MAX DEPTH (m) .38 .37 | hannel-> MAX VEL (m/s) 1.33 1.31 |
| ADD HYD (1 + 2 = ID1 + TD2 | 3 | : 58.85 | QPEAK (cms) 13.381 2 860 | (hrs) | R.V. (mm) 47.17 45.10 | | |
| === | | | | | | | |
| | | DO NOT INCL | | | | | |
| | | | | | | | |
| ADD HYD (1 + 2 = ID1 + ID2 | 3 | (ha) : 43.10 | QPEAK (cms) 8.721 15.674 | TPEAK (hrs) 6.00 6.08 | R.V. (mm) 47.17 45.40 | | |
| | | : 449.25 | | 6.08 | 45.57 | | |
| ID | | | | | | | |

| ADD HYD (0491) |

Hadati Creek Watershed - Post Development with Cityview Ridge 1 + 2 = 3 | AREA QPEAK (ha) (cms) 449.25 23.705 24.97 3.025 R.V. (mm) 45.57 TPEAK (hrs) ID1= 1 (0490): + ID2= 2 (0482): 6.08 6.25 46.06 _____ ID = 3 (0491): 474.22 24.000 6.08 45.60NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. RESERVOIR (0483) IN= 2---> OUT= 1 DT= 5.0 min | OUTFLOW STORAGE | OUTFLOW STORAGE

 (ha.m.)
 (cms)

 .0000
 7.0800

 .0600
 8.1000

 .3400
 9.7980

 .6182
 10.4940

 1.1630
 11.6850

 1.7070
 12.3480

 -----(cms) (ha.m.) 2.4860 3.3240 4.6420 .0000 .2760 1.2000 7.4397 2.0400 2.6400 10.3000 3.1200 11.4000 AREA QPEAK (ha) (cms) 474.220 24.000 474.220 8.205 TPEAK (hrs) 6.08 6.58 R.V. (mm) 45.60 INFLOW : ID= 2 (0491) OUTFLOW: ID= 1 (0483) 45.60 PEAK FLOW REDUCTION [Qout/Qin](%)= 34.19 TIME SHIFT OF PEAK FLOW (min)= 30.00 MAXIMUM STORAGE USED (ha.m.) = 3.4099_____ ADD HYD (0530) R.V. (mm) 45.60 1 + 2 = 376.65 ______ ID = 3 (0530): 478.85 8.393 6.50 45.90NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0545) | 1 + 2 = 3QPEAK (cms) 8.393 AREA R.V. (mm) 45.90 TPEAK (ha) 478.85 (hrs) _____ ID1= 1 (0530): 6.50 + 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. ADD HYD (0546) | 1 + 2 = 3vreak (cms) AREA TPEAK R.V. _____ (ha) (hrs) (mm) Page 111

Hadati Creek Watershed - Post Development with Cityview Ridge ID1= 1 (0545): 546.39 15.614 6.33 + ID2= 2 (0542): 25.25 6.749 6.00 46.72 76.65 ______ ID = 3 (0546): 571.64 18.214 6.00 48.05NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0547) | 1 + 2 = 3 | AREA QPEAK TPEAK R.V (ha) (cms) (hrs) (mm) 571.64 18.214 6.00 48.05 14.99 4.164 6.00 76.65 R.V. (mm) 48.05 -----ID1= 1 (0546): + ID2= 2 (0543): _____ ______ ID = 3 (0547): 586.63 22.378 6.00 48.78 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0548) 1 + 2 = 3 | R.V. (mm) _____ 48.78 ID = 3 (0548): 587.76 22.711 6.0048.83 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 TIME TIME RAIN RAIN RAIN TIME RAIN hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr 6.35 6.35 6.35 6.35 6.35 3.25 3.50 3.75 .25 12.70 6.25 23.11 9.25 52.83 .50 .75 6.50 6.75 23.11 12.70 9.50 52.83 12.70 | 23.11 9.75 52.83 1.00 12.70 4.00 23.11 7.00 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 37.85 10.50 4.32 | 16.76 | 7.75 37.85 1.75 4.75 12.70 10.75 2.00 4.32 5.00 11.00 16.76 | 8.00 12.70 37.85

 6.35
 5.25

 6.35
 5.50

 6.35
 5.75

 6.35
 6.00

 2.25 12.70 | 8.25 12.70 11.25 12.70 12.708.5012.708.7512.709.00 12.70 | 11.50 12.70 | 11.75 12.70 | 12.00 2.50 12.70 2.75 12.70 3.00 12.70 _____ _____ CALIB

| Hadati Creek Waters STANDHYD (0480) Area ID= 1 DT= 5.0 min Total In | (ha)= 43.10 | elopment with Ci Dir. Conn.(%)= | • |
|--|--|---|--|
| Surface Area (ha)= Dep. Storage (mm)= Average Slope (%)= Length (m)= Mannings n = | IMPERVIOUS P 18.10 1.50 2.00 680.00 .013 | PERVIOUS (i) 25.00 5.00 2.00 40.00 .300 | |
| NOTE: RAINFALL WAS TR | RANSFORMED TO | 5.0 MIN. TIME S | STEP. |
| $\begin{array}{ccccccc} TIME & RAIN & hrs & mm/hr \\ .083 & 6.35 \\ .167 & 6.35 \\ .250 & 6.35 \\ .333 & 6.35 \\ .417 & 6.35 \\ .500 & 6.35 \\ .583 & 6.35 \\ .667 & 6.35 \\ .583 & 6.35 \\ .667 & 6.35 \\ .750 & 6.35 \\ .833 & 6.35 \\ .917 & 6.35 \\ 1.000 & 6.35 \\ 1.083 & 4.32 \\ 1.250 & 4.32 \\ 1.250 & 4.32 \\ 1.333 & 4.32 \\ 1.417 & 4.32 \\ 1.250 & 4.32 \\ 1.583 & 4.32 \\ 1.583 & 4.32 \\ 1.583 & 4.32 \\ 1.667 & 4.32 \\ 1.583 & 4.32 \\ 1.917 & 4.32 \\ 1.917 & 4.32 \\ 2.000 & 4.32 \\ 1.917 & 4.32 \\ 2.083 & 6.35 \\ 2.167 & 6.35 \\ 2.250 & 6.35 \\ 2.333 & 6.35 \\ 2.417 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.667 & 6.35 \\ 2.750 & 6.35 \\ 2.833 & 6.35 \\ 2.917 & 6.35 \\ 3.000 & 6.35 \\ \end{array}$ | TIMERAINhrsmm/hr3.08312.703.16712.703.25012.703.33312.703.41712.703.50012.703.58312.703.66712.703.75012.703.91712.704.00012.704.08316.764.16716.764.33316.764.58316.764.58316.764.58316.764.66716.764.66716.764.66716.764.66716.765.00016.765.08312.705.16712.705.25012.70 | hrs mm/hr 6.083 23.11 6.167 23.11 6.250 23.11 6.333 23.11 6.417 23.11 6.500 23.11 6.500 23.11 6.500 23.11 6.583 23.11 6.567 23.11 6.667 23.11 6.750 23.11 6.667 23.11 6.750 23.11 6.750 23.11 6.750 23.11 6.750 23.11 7.000 23.11 7.083 12.70 7.167 12.70 7.333 12.70 7.500 12.70 7.501 12.70 7.667 12.70 7.917 12.70 8.000 12.70 8.083 12.70 8.083 12.70 8.333 12.70 8.000 12.70 8.001 | TIME RAIN hrs mm/hr 9.08 52.83 9.17 52.83 9.25 52.83 9.33 52.83 9.42 52.83 9.50 52.83 9.50 52.83 9.51 52.83 9.52 52.83 9.53 52.83 9.54 52.83 9.55 52.83 9.67 52.83 9.75 52.83 9.75 52.83 9.75 52.83 9.75 52.83 9.75 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 </td |
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | 52.83 10.00 8.46 (ii) 10.00 .12 | 59.46 20.00 18.15 (ii) 20.00 .06 | , 12.00 12.70 |
| PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= | | 3.90 10.00 107.20 211.07 2 | OTALS* 5.222 (iii) 10.00 28.70 11.07 |

Page 113

| Hadati Cr RUNOFF COEFFICI | eek Water ENT = | rshed - Post D .99 | evelopment wit .51 | h Cityview Ridge .61 | |
|--|---|---|--|--|--|
| Fo (mm, Fc (mm, (ii) TIME STEP | /hr)= 75. /hr)= 12. (DT) SHO STORAGE C | 00 k 50 Cum.Inf ULD BE SMALLEF OEFFICIENT. | · | L4 00 | |
| CALIB STANDHYD (0415) ID= 1 DT= 5.0 min | Area Total | (ha)= 4.99 Imp(%)= 42.00 |)) Dir. Conn.(| (%)= 21.00 | |
| Surface Area Dep. Storage Average Slope Length Mannings n | | .015 | 2.89 5.00 2.86 40.00 .300 | | |
| Max.Eff.Inten.(r over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | nm/hr)= (min) (min)= (min)= (cms)= | 52.83 5.00 3.48 (ii) 5.00 .26 | 59.46 15.00 12.19 (ii) 15.00 .09 | *TOTALS* | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .15 9.92 209.57 211.07 .99 | .47 10.00 107.20 211.07 .51 | .626 (iii) 10.00 128.70 211.07 .61 | |
| <pre>**** 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.</pre> | | | | | |
| CALIB STANDHYD (0410) ID= 1 DT= 5.0 min | Area Total | (ha)= 24.20 Imp(%)= 42.00 | | (%)= 21.00 | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 10.16 1.50 2.00 401.00 .013 | PERVIOUS (i) 14.04 5.00 2.00 40.00 .300 | | |
| Max.Eff.Inten.(r over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | (min) (min)= | 52.83 5.00 6.16 (ii) 5.00 .19 | 59.46 20.00 15.86 (ii) 20.00 .07 | *TOTALS* | |

TOTALS

| Hadati Creek Watershed - Post Development with Cityview Ridge 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. |
| CALIB STANDHYD (0460) Area (ha)= 36.00 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| IMPERVIOUSPERVIOUS (i)Surface Area $(ha) =$ 15.1220.88Dep. Storage $(mm) =$ 1.505.00Average Slope $(\%) =$ 2.032.03Length $(m) =$ 465.0040.00Mannings 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 |
| 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. |
| CALIB STANDHYD (0455) Area (ha)= 12.70 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| $\begin{array}{rcrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$ |
| Max.Eff.Inten.(mm/hr)= 52.83 59.46 over (min) 5.00 20.00 Storage Coeff. (min)= 5.43 (ii) 15.59 (ii) Page 115 |

Hadati Creek Watershed - Post Development with Cityview Ridge 5.00 Unit Hyd. Tpeak (min)= 20.00 Unit Hyd. peak (cms)= .20 .07 ***TOTALS*** .39 10.00 209.57 PEAK FLOW (cms) =1.17 1.564 (iii) 10.00 TIME TO PEAK (hrs)= 10.00 (mm)= 209.57 RUNOFF VOLUME 107.20 128.70 211.07 TOTAL RAINFALL (mm) =211.07 211.07 = RUNOFF COEFFICIENT . 99 .51 .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: F0 (mm/hr)= 75.00 K (1/hr)= 4.14Fc (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. CALTB STANDHYD (0395) ID= 1 DT= 5.0 min Area (ha)= 51.20 Total Imp(%)= 10.00 Dir. Conn.(%)= 5.00 __________ IMPERVIOUS PERVIOUS (i) 5.12 Surface Area (ha) =46.08 1.50 Dep. Storage (mm) =5.00 (%)= 2.00 Average Slope 2.00 900.00 Length (m) =40.00 Mannings n . 300 .013 Max.Eff.Inten.(mm/hr)= 52.83 43.26 25.00 10.00 over (min) Storage Coeff. 10.01 (ii) 21.02 (ii) (min) =10.01 Unit Hyd. Tpeak (min)= 25.00 Unit Hyd. peak (cms)= .11 .05 *TOTALS* PEAK FLOW .37 10.00 (cms) =5.03 5.388 (iii) TIME TO PEAK (hrs) =10.08 10.08 RUNOFF VOLUME 209.57 (mm) =81.91 88.29 211.07 TOTAL RAINFALL (mm) =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) = 4.14FC (mm/hr) = 12.50Cum.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 Total Imp(%)= 37.00 ID= 1 DT= 5.0 min | Dir. Conn.(%) = 19.00-------PERVIOUS (i) IMPERVIOUS Surface Area (ha) =11.1018.90 1.50 5.00 Dep. Storage (mm) =2.00 2.00 Average Slope (%)= Length (m) =447.00 40.00 Page 116

Hadati Creek Watershed - Post Development with Cityview Ridge Mannings n = .013 .300 Max.Eff.Inten.(mm/hr)= 52.83 55.42

 over (min)
 5.00

 Storage Coeff. (min)=
 6.58 (ii)

 Unit Hyd. Tpeak (min)=
 5.00

 Unit Hyd. peak (cms)=
 .18

 20.00 16.55 (ii) 20.00 .06 *TOTALS* PEAK FLOW(cms)=.842.78TIME TO PEAK(hrs)=10.0010.00RUNOFF VOLUME(mm)=209.57101.80TOTAL RAINFALL(mm)=211.07211.07RUNOFF COEFFICIENT=.99.48 3.618 (iii) 10.00 122.28 211.07 . 58 ***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20% YOU SHOULD CONSIDER SPLITTING THE AREA. (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (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) Dep. Storage Average Slope Length (ha)= 0.05 (mm)= 1.50 (%)= 1.00 (m)= 330.00 .013 6.85 9.45 5.00 40.00 Length Mannings n .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 Unit Hyd. peak (cms)= .18 .06 *TOTALS* (cms)=.501.47(hrs)=10.0010.00(mm)=209.57107.20(mm)=211.07211.07LENT =.99.51 PEAK FLOW 1.968 (iii) TIME TO PEAK 10.00 128.70 211.07 RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIENT = . 99 .51 .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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 CALIB STANDHYD (0355) Area (ha)= 12.30 ID= 1 DT= 5.0 min | Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 _____ Page 117

Hadati Creek Watershed - Post Development with Cityview Ridge IMPERVIOUS PERVIOUS (i) Surface Area (ha) =5.17 7.13 Dep. Storage (mm) =1.50 5.00 (%)= 1.60 Average Slope 1.60 Length (m) =286.00 40.00 Mannings n ----.013 .300 Max.Eff.Inten.(mm/hr)= 52.83 59.46 5.00 over (min) 20.00 5.5c 5.00 .21 5.38 (ii) Storage Coeff. (min)= 15.74 (ii) Unit Hyd. Tpeak (min)= 20.00 Unit Hyd. peak (cms)= .07 ***TOTALS*** PEAK FLOW TIME TO PEAK .38 10.00 (cms) =1.13 1.513 (iii) 10.00 (hrs) =10.00 RUNOFF VOLUME 209.57 (mm) =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) = 4.14Fc (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) | |ID= 1 DT= 5.0 min | (ha) = 117.50Area Total Imp(%) = 42.00Dir. Conn. (%) = 21.00IMPERVIOUS PERVIOUS (i) 49.35 Surface Area (ha) =68.15 1.50 Dep. Storage (mm) =5.00 Average Slope (%)= 2.00 2.00 885.00 Length (m)= 40.00 .300 Mannings n .013 over (min) scorage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 52.83 59.46 10.00 20.00 9.91 (ii) 19.60 (ii) 10.00 20.00 .11 .06 *TOTALS* 10.49 14.089 (iii) 3.61 10.00 TIME TO PEAK (hrs) =10.08 10.00 209.57 RUNOFF VOLUME (mm) =107.20 128.70 TOTAL RAINFALL 211.07 211.07 (mm) =211.07 RUNOFF COEFFICIENT = .99 .51 .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00Fo FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALIB

Hadati Creek Watershed - Post Development with Cityview Ridge | STANDHYD (0105) | |ID= 1 DT= 5.0 min | Area (ha) = 51.32Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) 21.55 1.50 2.00 Surface Area (ha) =29.77 Dep. Storage (mm) =5.00 Average Slope (%)= 2.00 Length 550.00 (m) =40.00 .013 Mannings n = . 300 Max.Eff.Inten.(mm/hr)= 52.83 59.46 5.00 7.45 5.00 over (min) 20.00 7.45 (ii) 17.14 (ii) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 20.00 .17 .06 ***TOTALS*** PEAK FLOW (cms) =1.58 4.68 6.260 (iii) 10.00 10.00 TIME TO PEAK (hrs)= 10.00 (mm)= 107.20 209.57 RUNOFF VOLUME 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) = 4.14Fc (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) 6.01 (ha)= Surface Area 8.31 1.50 5.00 Dep. Storage (mm)= 2.00 287.00 Average Slope (%)= Length (m)= 40.00 Mannings n .013 . 300 Max.Eff.Inten.(mm/hr) =52.83over (min)5.00Storage Coeff. (min) =5.04 (ii)Unit Hyd. Tpeak (min) =5.00Unit Hyd. Tpeak (min) =21 59.46 15.00 14.74 (ii) 15.00 . 08 Unit Hyd. peak (cms)= .21 ***TOTALS*** PEAK FLOW (cms) =.44 1.34 1.780 (iii) 10.00 209.5, 211.07 .99 TIME TO PEAK 10.00 (hrs) =10.00 RUNOFF VOLUME (mm)= 107.20 128.70 TOTAL RAINFALL 211.07 (mm) =211.07 .51 RUNOFF COEFFICIENT = .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

Hadati Creek Watershed - Post Development with Cityview Ridge CALIB STANDHYD (0101) ID= 1 DT= 5.0 min Area (ha)= 16.32 Total Imp(%)= 42.00 Dir. Conn. (%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =6.85 9.47 Dep. Storage (mm) =1.50 5.00 Average Slope (%)= 2.00 2.00 Length 309.00 (m)= 40.00 Mannings n .013 . 300 Max.Eff.Inten.(mm/hr)= 52.83 59.46 5.00 5.27 (ii) 5.00 .21 over (min) 15.00 Storage Coeff. (min) =14.96 (ii) Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .08 *TOTALS* (hrs)= .50 (mm)= 209.57 (mm)= 211 ^7 PEAK FLOW TIME TO PEAK 1.52 2.027 (iii) 10.00 107.20 10.00 RUNOFF VOLUME 128.70 211.07 211.07 TOTAL RAINFALL 211.07 RUNOFF COEFFICIENT = .51 .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (mm/hr)= 12.50 Cum.Inf. (mm)= (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) ID= 1 DT= 5.0 min Area (ha)= 19.00 Total Imp(%)= 42.00 Dir. Conn.(%) = 21.00_____ IMPERVIOUS PERVIOUS (i) 7.98 (ha) =Surface Area 11.02 1.50 2.00 365.00 Dep. Storage (mm) =5.00 Average Slope (%)= 2.00 (m)= Length 40.00 Mannings n .013 . 300 = Max.Eff.Inten.(mm/hr)= 52.83 59.46 5.00 5.82 5.00 20 over (min) 20.00 Storage Coeff. (min)= 5.82 (ii) 15.52 (ii) Unit Hyd. Tpeak (min)= 20.00 .20 Unit Hyd. peak (cms)= .07 *TOTALS* .59 10.00 209 PEAK FLOW (cms) =1.75 2.340 (iii) 10.00 TIME TO PEAK (hrs) =10.00 (mm)= (mm)= 107.20 RUNOFF VOLUME 128.70 211.07 TOTAL RAINFALL 211.07 211.07 RUNOFF COEFFICIENT = . 99 .51 .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14Fo (mm/hr)= 12.50 Cum.Inf. (mm)= FC .00 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL Page 120

Hadati Creek Watershed - Post Development with Cityview Ridge THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. CALIB STANDHYD (0600) Area (ha)= 11.38 Total Imp(%)= 42.00 ID= 1 DT= 5.0 min Dir. Conn.(%)= 21.00 IMPERVIOUS PERVIOUS (i) Surface Area (ha) =4.78 6.60 1.50 Dep. Storage 5.00 2.00 (mm)= 2.00 (%)= Average Slope 680.00 Length (m)= 40.00 Mannings n .013 .300

 52.83
 59.46

 10.00
 20.00

 8.46 (ii)
 18.15 (ii)

 10.00
 20.00

 Max.Eff.Inten.(mm/hr)= over (min) (min)́= Storage Coeff. Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= .06 .12 ***TOTALS*** $\begin{array}{c} (cms) = & .35 & 1.03 \\ (hrs) = & 10.00 & 10.00 \\ (mm) = & 209.57 & 107.20 \\ (mm) = & 211.07 & 211.07 \end{array}$ PEAK FLOW 1.379 (iii) TIME TO PEAK 10.00 RUNOFF VOLUME 128.70 TOTAL RAINFALL 211.07 RUNOFF COEFFICIENT = . 99 .51 .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (mm/hr) = 12.50 Cum.Inf. (mm) = .00.00 (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) (ha)= 7.62 Area ID= 1 DT= 5.0 min | Total Imp(%) = 46.00Dir. Conn.(%)= 21.00 _____ IMPERVIOUS PERVIOUS (i) 3.51 1.50 Surface Area (ha) =4.11 5.00 Dep. Storage (mm) =2.00 680.00 013 Average Slope (%)= 2.00 Length (m) =40.00 Mannings n .013 . 300 ----Max.Eff.Inten.(mm/hr)= 52.83 64.79 10.00 8.46 (ii) 10.00 over (min) 20.00 Storage Coeff. (min)= 17.83 (ii) Unit Hyd. Tpeak (min)= 20.00 Unit Hyd. peak (cms)= .12 .06 ***TOTALS*** (cms)= .23 (hrs)= 10.00 (mm)= 209.57 (mm)= 211.07 PEAK FLOW .70 10.00 .936 (iii) (cms) =TIME TO PEAK 10.00 (hrs) =10.00 RUNOFF VOLUME 133.59 211.07 TOTAL RAINFALL 211.07 = . 54 RUNOFF COEFFICIENT . 99 . 63

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Page 121

Hadati Creek Watershed - Post Development with Cityview Ridge (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00Fo FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ _____ CALTR STANDHYD (0607) | |ID= 1 DT= 5.0 min | Area (ha)= 5.97 Total Imp(%) = 42.00Dir. Conn.(%)= 2.50 ------IMPERVIOUS PERVIOUS (i) (ha) =Surface Area 2.51 3.46 Dep. Storage (mm) =1.50 5.00 2.00 Average Slope (%)= 2.00 Length 680.00 (m)= 40.00
 over (min)
 52.83

 over (min)
 10.00

 storage Coeff. (min)=
 8.46 (ii)

 Unit Hyd. Tpeak (min)=
 10.00

 Unit Hyd. peak (cms)=
 12

 PEAK FLOW
 1

 TIME TO TO
 1
 Mannings n .013 .300 76.31 20.00 17.23 (ii) 20.00 .06 *TOTALS* .02 10.00 .70 10.00 .721 (iii) TIME TO PEAK (hrs) =10.00 209.57 (mm)= 124.06 RUNOFF VOLUME 126.19 211.07 TOTAL RAINFALL (mm) =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: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00FO FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. ------CALTB | STANDHYD (0540) | |ID= 1 DT= 5.0 min | Area (ha)= 4.63 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 _____ IMPERVIOUS PERVIOUS (i) (ha)= .93 Surface Area 3.70 Dep. Storage 1.50 5.00 (mm) =.55 .55 Average Slope (%)= 150.00 Length (m) =40.00 Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 52.83 42.97 5.00 25.00 over (min) Storage Coeff. (min)= 5.03 (ii) 21.29 (ii) 5.00 Unit Hyd. Tpeak (min)= 25.00 Unit Hyd. peak (cms)= .05 .21 *TOTALS* .54 .10 PEAK FLOW (cms) =.636 (iii) 10.00 10.08 TIME TO PEAK (hrs)= 10.00 RUNOFF VOLUME 209.57 (mm)= 81.35 182.64 Page 122

Hadati Creek Watershed - Post Development with Cityview Ridge 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) = 4.14Fc (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 CALIB STANDHYD (0500) Area (ha)= 244.00 ID= 1 DT= 5.0 min | Total Imp(%) = 46.00Dir. Conn.(%) = 26.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =112.24 112.23 1.50 .80 1275.00 013 131.76 5.00 Dep. Storage (mm) =Average Slope (%)= . 80 (m) =40.00 Length Mannings n .300 52.83 15.00 16.24 (ii) 15.00 Max.Eff.Inten.(mm/hr)= 59.90 over (min) 30.00 Storage Coeff. (min)= 28.96 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 30.00 .07 .04 *TOTALS* PEAK FLOW (cms) =9.05 18.51 27.108 (iii) (hrs) = 10.00 (mm) = 209.57 (mm) = 211.07 lT = .9910.00 10.25 10.08 TIME TO PEAK (hrs) =(mm)= RUNOFF VOLUME 107.75 134.22 TOTAL RAINFALL 211.07 211.07 RUNOFF COEFFICIENT = .64 .51 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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) ID= 1 DT= 5.0 min (ha) = 16.00Area Total Imp(%) = 80.00 Dir. Conn.(%) = 79.00 IMPERVIOUS PERVIOUS (i) 12.80 (ha)= Surface Area 3.20 1.50 Dep. Storage (mm) =5.00 .20 Average Slope (%)= . 50 400.00 Length 40.00 (m) =Mannings n .013 . 300 52.83 10.00 9.33 (ii) 10.00 .12 Max.Eff.Inten.(mm/hr)= 42.97 over (min) 35.00 Storage Coeff. (min)= 31.35 (ii) Unit Hyd. Tpeak (min)= 35.00 Unit Hyd. peak (cms)= .03

Page 123

TOTALS

Hadati Creek Watershed - Post Development with Cityview Ridge LOW (cms)= 1.85 .31 2.134 (iii) 10.00 PEAK FLOW .31 10.33 TIME TO PEAK (hrs)= 10.00 (mm)= 211.07 T = RUNOFF VOLUME 81.35 182.64 TOTAL RAINFALL 211.07 211.07 RUNOFF COEFFICIENT . 39 .87 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 ID= 1 DT= 5.0 min IMPERVIOUS PERVIOUS (i) Surface Area (ha) =20.20 5.05 5.00 1.50 .55 350.00 Dep. Storage (mm)= .55 Average Slope (%)= 40.00 Length (m)= Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 52.83 42.97 52.83 10.00 8.37 (ii) 10.00 over (min) 25.00 24.63 (ii) Storage Coeff. (min) =Unit Hyd. Tpeak (min)= 25.00 Unit Hyd. peak (cms)= .12 .05 *TOTALS* PEAK FLOW(cms)=2.92TIME TO PEAK(hrs)=10.00RUNOFF VOLUME(mm)=209.57TOTALRAINFALL(mm)=211.07 .53 10.17 81.35 3.443 (iii) 10.00 182.64 211.07 211.07 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) ID= 1 DT= 5.0 min Area (ha)= 14.99 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 IMPERVIOUS PERVIOUS (i) Surface Area (ha) =11.99 3.00 1.50 5.00 Dep. Storage (mm) =.55 (%) = .55(m) = 200.00 Average Slope (%)= 40.00 Length Mannings n .013 = .300 52.83 5.00 5.98 (ii) Max.Eff.Inten.(mm/hr)= 42.97 over (min) Storage Coeff. (min)= 25.00 22.24 (ii) Page 124

Hadati Creek Watershed - Post Development with Cityview Ridge Unit Hyd. Tpeak (min)= 5.00 25.00 Unit Hyd. peak (cms)= .19 .05 ***TOTALS*** PEAK FLOW(cms)=1.74.32TIME TO PEAK(hrs)=10.0010.08RUNOFF VOLUME(mm)=209.5781.35TOTAL RAINFALL(mm)=211.07211.07RUNOFF COEFFICIENT99.39 2.054 (iii) 10.00 182.64 211.07 . 99 .87 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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 _____ $\begin{array}{cccc} \text{IMPERVIOUS} & \text{PERVIOUS} & (i) \\ (ha) = & .90 & .23 \\ (mm) = & 1.50 & 5.00 \\ (\%) = & .55 & .55 \\ (m) = & 50.00 & 40.00 \\ = & .013 & .300 \end{array}$ Surface Area Dep. Storage (mm)= Average Slope Length Mannings n Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 52.83 5.00 20 *TOTALS* .13 .03 9.67 10.00 209.57 81.35 PEAK FLOW (cms) =.156 (iii) TIME TO PEAK 10.00 (hrs) =(mm)= 182.64 211.07 RUNOFF VOLUME 211.07 211.07 TOTAL RAINFALL (mm)= = 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) = 4.14Fc (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 (hrs)= .00 | ID= 1 DT=****min | QPEAK (cms)= ------TPEAK (mm)=****** VOLUME ADD HYD (0420) $\begin{vmatrix} 1 \\ 1 \\ 2 \\ 3 \end{vmatrix}$ AREA QPEAK TPEAK R.V. Page 125

Hadati Creek Watershed - Post Development with Cityview Ridge (ha) (cms) (hrs) (mm) ID1= 1 (0415): + ID2= 2 (0410): 4.99 128.70 10.00 .626 2.975 24.20 10.00 128.70 -----_____ ID = 3 (0420):29.19 3.602 10.00 128.70 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0465) 1 + 2 = 3AREA QPEAK TPEAK R.V. (cms) (ha) (hrs) (mm) ID1= 1 (0460): + ID2= 2 (0455): 128.70 36.00 4.413 10.00 12.70 1.564 10.00 128.70 ID = 3 (0465): 48.705.977 10.00 128.70 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 .15 .0300 / .0150 Main Channel .0150 Main Channel 5.51 .00 10.00 .09 .0150 Main Channel .00 14.49 .0150 Main Channel 14.50 .15 .0150 / .0300 Main Channel .0300 20.00 .40 ----- TRAVEL TIME TABLE ------*<---*-----DEPTH ELEV VOLUME FLOW RATE (m) (m) (cu.m.) (cms) VELOCITY TRAV.TIME (m) (m) .02 .02 .04 .04 .06 .06 .08 .08 .09 .09 (m/s) (min) .0 .21 .176E+02 80.52 .02 .04 .06 .08 .09 .11 .13 .0 .702E+02 .33 50.72 .158E+03 .1 .43 38.71 .281E+03 .1 .52 31.95 .09 .438E+03 .3 .62 26.84 .11 .5 .7 .77 .607E+03 21.66 .13 .90 .13 .776E+03 18.45 .15 .15 .944E+03 1.0 1.03 16.22 .17 .116E+04 .17 1.3 14.36 1.16.20 .20 .140E+04 1.8 1.27 13.13 . 22 .22 .166E+04 2.3 1.36 12.24 .24 .194E+04 .24 2.8 1.44 11.58 .26 .225E+04 .26 3.4 1.51 11.05 .29 .258E+04 .29 4.0 1.57 10.63 .31 .31 .293E+04 4.8 1.62 10.27 .331E+04 .33 .33 5.5 9.97 1.67 .35 .371E+04 .35 6.4 1.72 9.71 .38 .413E+04 1.76 7.3 .38 9.48 .40 .40 .457E+04 8.2 1.80 9.28 <---- hydrograph ----> <-pipe / channel-> QPEAK TPEAK R.V. AREA MAX DEPTH MAX VEL (cms) (ha) (hrs) (mm) (m) (m/s) 10.00 122.28 INFLOW : ID= 2 (0360) .27 30.00 3.62 1.53 Page 126

| н OUTFLOW: | ID= 1 (036 | 2) 30.00 | - Post Deve 3.50 | 10.08 122.26 | CITYVIEW Ridg | ge 1.52 |
|--|---|--------------------------------------|---|---|---|--|
| ROUTE CHN (IN= 2> C | 0353) DUT= 1 | Routing ti | ime step (mi | n)'= 5.00 | | |
| | <pre>< D. Distance .00 5.50 5.51 10.00 14.49 14.50 20.00</pre> | | rion M 26 15 .030 00 09 00 | .0150 M | lain Channel lain Channel lain Channel lain Channel lain Channel | |
| < DEPTH (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 | VOLUME | | VELOCITY (m/s) .17 .27 .35 .42 .49 .55 .64 .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 | TRAV.TIME (min) 99.56 62.72 47.86 39.51 34.05 30.15 26.24 22.41 19.75 17.76 16.22 15.07 14.28 13.72 13.31 13.01 12.76 12.57 12.41 | |
| INFLOW : OUTFLOW: | ID= 2 (035) ID= 1 (035) | AREA (ha) 0) 16.30 3) 16.30 | QPEAK (cms) | TPEAK R.V. (hrs) (mm) | | hannel-> MAX VEL (m/s) 1.25 1.24 |
| ROUTE CHN (IN= 2> 0 | 0358) UT= 1 | Routing ti | me step (mi | n)'= 5.00 | | |
| | <pre>< D/ Distance</pre> | | ion M 26 15 .030 00 09 00 | .0150 M .0150 M .0150 M | ain Channel ain Channel ain Channel ain Channel ain Channel | |

Hadati Creek Watershed - Post Development with Cityview Ridge UTFLOW: ID= 1 (0362) 30.00 3.50 10.08 122.26 .27 1.52

| Ha | adati Creek | Watershed - TRAVEL | - Post De | velopmen | t with C | ityview Rid | ge |
|---|--------------------------|---|-----------------------------|----------------|---------------------|--|---------|
| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | | TE VEL | | TRAV.TIME (min) | |
| .01 .03 | .01 | .102E+02 | .0 | , | .17 .27 | 109.52 68.99 | |
| .04 .05 | .04 | .409E+02 .920E+02 .163E+03 | .0 .1 | | .35 | 52.65 43.46 | |
| .07 | .07 | .255E+03 .368E+03 | .1 .2 | | .49 | 37.45 33.17 | |
| .10 .11 | | .499E+03 .634E+03 | .3 | | .64 .74 | 28.86 24.66 | |
| .12 .14 | .12 | .769E+03 .904E+03 | .6 .8 | | .84 .94 | 21.72 | |
| .15 .16 | .16 | .104E+04 .119E+04 | $1.0 \\ 1.2$ | | 1.03 1.11 | 17.84 16.57 | |
| .18 .19 | .19 | .135E+04 .154E+04 | 1.4 1.7 | | 1.17 1.21 | 15.71 15.10 | |
| .20 | .22 | .175E+04 .198E+04 | 1.7 2.0 2.3 | | 1.25 | 14.65 14.31 | |
| .23 | .23 | .223E+04 .250E+04 | 2.6 3.0 | | 1.31 1.33 | 14.04 13.82 | |
| .26 | | .279E+04 | 3.4 | ud no a no ok | 1.34 | 13.65 | |
| | | AREA | QPEAK | TPEAK | R.V. | <-pipe / c MAX DEPTH | MAX VEL |
| INFLOW : OUTFLOW: | ID= 2 (035 ID= 1 (035 | 5) 12.30 8) 12.30 | 1.51 | 10.00 | 128.70 | <-pipe / c MAX DEPTH (m) .18 .18 | 1.18 |
| | | | | | 220101 | 110 | 1.17 |
| | | | | | | | |
| RESERVOIR (IN= 2> 0 DT= 5.0 mi | UT= 1 | | CTOBACE | | | CTOBACE | |
| | | OUTFLOW (cms) .0000 | STORAGE (ha.m.) .0000 | (0 | FLOW ms) 5000 | STORAGE (ha.m.) | |
| | | .0100 | .0100 | 6. | 6000 0000 | .4000 .8000 .0000 | |
| | | AR | | QPEAK | TPEA | | |
| | ID= 2 (010 | (h 5) 51.3 | a) (20 (| (cms) 6.260 | (hrs) 10.0 |) (mm) | 0 |
| OUTFLOW: | ID= 1 (010 | | | 5.997 | 10.0 | | 9 |
| | TIME | FLOW RE | AK FLOW | (| (min)= | 5.00 | |
| | | UM STORAGE | | - | a.m.)= | .7608 | |
| | | | | | | | |
| ADD HYD ((1 + 2 = | 3 | AREA | QPEAK | TPEAK | R.V | · | |
| ID1: | = 1 (0102): | (ha) 14.32 16.32 | (cms) 1.780 | (hrs) 10.00 | (mm) 128.70 |) | |
| ====: | | 16.32 ==================================== | | | ======== | = | |
| | | 0 NOT INCLU | | | | | |
| | | | | | | | |
| | | | Page | 128 | | | |

Page 128

Hadati Creek Watershed - Post Development with Cityview Ridge RESERVOIR (0111) IN= 2---> OUT= 1 OUTFLOWSTORAGEOUTFLOWSTORAGE(cms)(ha.m.)(cms)(ha.m.).0000.00001.00001.0000.0100.010020.00001.1000.0120.1000.0000.0000 DT= 5.0 min AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)19.0002.34010.00128.7019.0002.06910.50128.68 INFLOW : ID= 2 (0110) OUTFLOW: ID= 1 (0111) PEAK FLOW REDUCTION [Qout/Qin](%)= 88.39 TIME SHIFT OF PEAK FLOW (min) = 30.00MAXIMUM STORAGE USED (ha.m.) = 1.0100_____ ADD HYD (0602)

 2 = 3
 AREA
 QPEAK
 TPEAK
 R.V.

 ID1= 1
 (0600):
 11.38
 1.379
 10.00
 128.70

 + ID2= 2
 (0601):
 7.62
 .936
 10.00
 133.59

 1 + 2 = 3 _____ ID = 3 (0602): 19.00 2.315 10.00130.66 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ------------DUHYD (0505) Inlet Cap.=9.000 #of Inlets= 1

 tal(cms)=
 9.0
 AREA
 QPEAK
 TPEAK
 R.V.

 tal(cms)=
 9.0
 (ha)
 (cms)
 (hrs)
 (mm)

 TOTAL
 HYD.(ID=
 1):
 244.00
 27.11
 10.08
 134.22

 Total(cms)= 9.0 -----______ 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 = 3ID = 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

Hadati Creek Watershed - Post Development with Cityview Ridge R.V. | Total(cms)= 2.0 | AREA QPEAK TPEAK _____ (ha) (hrs) (cms) (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) | 2 = 3AREAQPEAKTPEAKR.V.ID1= 1(0425):4.951.62210.00128.70+ ID2= 2(0465):48.705.97710.00128.70 1 + 2 = 3 | R.V. (mm) 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 | QPEAK TPEAK (cms) (hrs) 1.875 10.08 R.V. (mm) AREA

 ID1= 1 (0353):
 16.30
 1.875

 + ID2= 2 (0358):
 12.30
 1.436

 128.66 10.08 128.64 ______ ID = 3 (0359): 28.60 3.31110.08 128.65 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. RESERVOIR (0104) | IN= 2---> OUT= 1 | STORAGEOUTFLOWSTORAGE(ha.m.)(cms)(ha.m.).00001.0000.5000.010010.0000.6000.1332.0000.0000 OUTFLOW | DT= 5.0 min | ______ (cms) .0000 . 5000 .6000 .0100 .0150 .0000 (ha) (cms) 30.640 3.807 30.640 3.707 R.V. (mm) QPEAK TPEAK (hrs) 10.00 10.00 (mm) 128.70 INFLOW : ID= 2 (0103) 3.797 OUTFLOW: ID = 1 (0104)128.69 PEAK FLOW REDUCTION [Qout/Qin](%)= 99.73 TIME SHIFT OF PEAK FLOW (min)= .00 (min)= .00 MAXIMUM STORAGE USED (ha.m.) =.5312 ADD HYD (0114) | 1 + 2 = 3 | AREA QPEAK (ha) (cms) 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 ------

Page 130

| Hadati Creek Watershed - Post Development with Cityview Ridge 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 |
| C |
| <pre>< 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</pre> |
| ROUTE CHN (0564) IN= 2> OUT= 1 Routing time step (min)'= 5.00 |
| <pre>< 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 Page 131</pre> |

| Hadati Cre | ek Watershed | - | Post | Development | with | Cityview | Ridge | |
|------------|--------------|---|------|-------------|------|----------|-------|--|
| | | , | TTAF | | | | | |

| DEPTH (m) .10 .29 .38 .48 .57 .67 .76 .86 .95 1.05 1.16 1.28 1.39 1.50 1.61 1.72 1.84 1.95 | ELEV (m) 99.60 99.69 99.79 99.88 99.98 100.07 100.17 100.26 100.36 100.45 100.55 100.66 100.78 100.89 101.00 101.11 101.22 101.34 101.45 | TRAVEL VOLUME (cu.m.) .353E+02 .112E+03 .195E+03 .285E+03 .381E+03 .484E+03 .594E+03 .710E+03 .832E+03 .961E+03 .110E+04 .127E+04 .127E+04 .127E+04 .127E+04 .127E+04 .221E+04 .250E+04 .250E+04 .313E+04 | FLOW RATE (cms) .0 .1 .2 .3 .5 .7 .9 1.2 1.5 1.8 2.2 2.7 3.4 4.1 4.9 | VE | LOCITY (m/s) .19 .37 .49 .59 .67 .74 .80 .86 .91 .96 1.00 1.07 1.14 1.20 1.25 1.30 1.34 1.38 1.41 | TRAV.TIME (min) 43.69 22.76 17.03 14.23 12.51 11.32 10.43 9.74 9.18 8.72 8.32 7.80 7.31 6.94 6.65 6.41 6.22 6.04 | |
|---|--|---|--|---|---|---|----------------------------------|
| **** WARN | | VEL TIME TAB | <pre> bydr</pre> | oaranl | h> | <-pipe / d | -hannel-> |
| INFLOW : OUTFLOW: | ID= 2 (05 ID= 1 (05 | AREA (ha) 05) 78.53 64) 78.53 | QPEAK (cms) 18.11 17.83 | TPEAK (hrs) 10.08 10.25 | R.V. (mm) 134.22 134.22 | <-prpe / 6 MAX DEPTH (m) 1.92 1.95 | MAX VEL (m/s) 1.40 1.41 |
| | 3.050 1 3.0 D.(ID= 1): | AREA (ha) 181.47 | 11.13 1 | .0.00 | 138.49 | | |
| MAJOR SYS | S.(ID= 2): | 98.04 83.43 | 8.08 1 | 0.00 | 138.49 | | |
| | | 03.45 DO NOT INCLU | | | | | |
| NUIE. PE | | | DE DASEFLUM | / | | | |
| ROUTE CHN (C IN= 2> OU | | Routing ti | me step (mi | n)'= | 5.00 | 2 | |
| | Distance 100.00 115.00 120.00 122.00 138.00 148.00 | 324. 321. 320. 320. 321. 322. | ion M 60 60 80 .050 80 .030 60 30 | 1) lanning .0500 0 / .0 0 / .0 .0500 .0500 .0500 | д 0300 ма | in Channel in Channel | |
| | 154.00 164.00 | | | .0500 | | | |

| DEPTH (m) .20 .40 .60 .80 1.00 1.20 1.40 1.60 1.80 2.00 2.20 2.40 2.60 2.80 3.00 3.20 3.40 3.60 3.80 | ELEV (m) 321.00 321.20 321.40 321.60 322.00 322.20 322.40 322.60 322.60 323.00 323.20 323.40 323.60 323.60 323.80 324.00 324.20 324.60 | .256E+05 .296E+05 .338E+05 .382E+05 .428E+05 .476E+05 .526E+05 .578E+05 .632E+05 | FLOW RAT (cms) .8 3.3 8.1 15.6 26.8 41.2 59.3 81.9 109.1 140.2 175.3 214.7 258.6 306.7 359.1 416.0 477.5 543.5 614.3 | E VEL | OCITY .84 1.13 1.36 1.56 1.79 1.99 2.17 2.37 2.58 2.77 2.95 3.12 3.29 3.46 3.61 3.76 3.91 4.05 4.18 | TRAV.TIME (min) 8.53 6.33 5.27 4.59 4.01 3.61 3.30 3.02 2.78 2.59 2.43 2.29 2.18 2.07 1.98 1.91 1.83 1.77 1.71 | |
|--|---|--|--|--|--|--|--|
| INFLOW : OUTFLOW: | ID= 2 (047 ID= 1 (047 | AREA (ha) 70) 53.65 75) 53.65 | < hy QPEAK (cms) 7.60 7.51 | drograph TPEAK (hrs) 10.00 10.00 | R.V. (mm) 128.70 128.70 | <-pipe / c MAX DEPTH (m) .58 .58 | hannel-> MAX VEL (m/s) 1.33 1.33 |
| ID : | 3 = 1 (0362): = 2 (0359): = 3 (0363): | AREA (ha) 30.00 28.60 58.60 00 NOT INCLU | 6.814 | 10.08 | 125.38 | | |
| + ID2: ===: ID : | 3 = 1 (0106): = 2 (0114): = 3 (0115): | 51.32 | 4.896 10.540 | 10.08 10.50 10.08 | 128.69 128.69 ====== 128.69 | | |
| ADD HYD ((1 + 2 = ID1: + ID2: | 3 1 | (ha) 19.00 | QPEAK (cms) 2.311 .721 Page 1 | (hrs) 10.00 10.00 | R.V. (mm) 130.66 126.19 | | |

Hadati Creek Watershed - Post Development with Cityview Ridge 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 = 3AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) .00 .001 .00 ****** 98.04 8.084 10.00 138.49 (mm) ID1= 1 (0525): + ID2= 2 (0520): ID = 3 (0526): 98.04 8.084 10.00 138.49NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0380) | 1 + 2 = 3 | R.V. AREA QPEAK (ha) (cms) 58.60 6.814 117.50 14.089
 TPEAK
 R.V.

 (hrs)
 (mm)

 10.08
 125.38

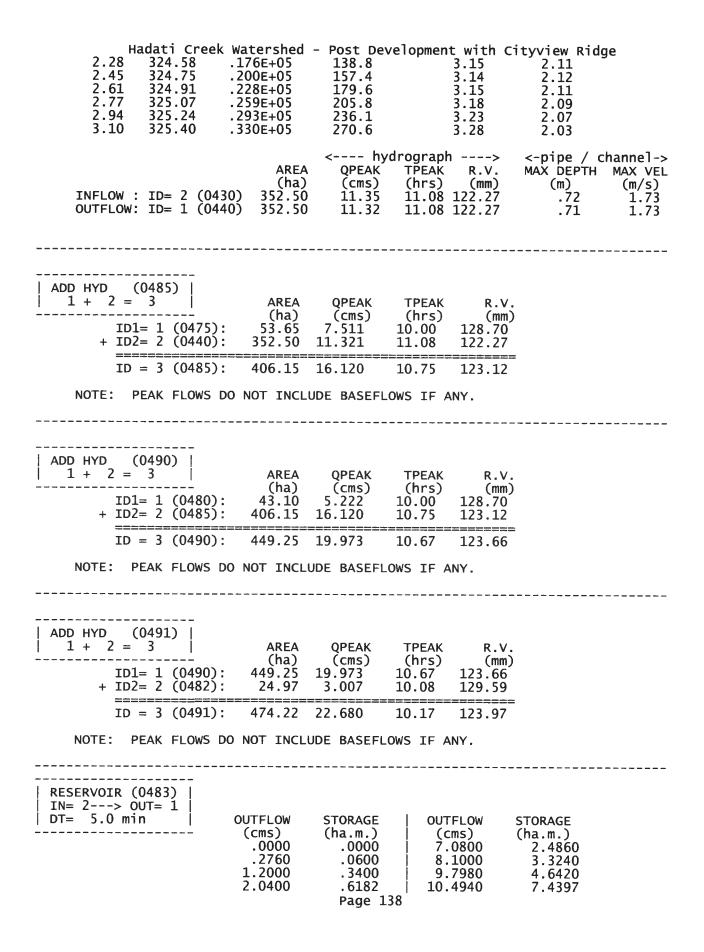
 10.00
 128.70
 TPEAK (mm) 125.38 ------ID1= 1 (0363): + ID2= 2 (0365): _____ ID = 3 (0380):176.10 20.834 10.00 127.59 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ RESERVOIR (0482) | IN= 2---> OUT= 1 | STORAGE (ha.m.) .0000 DT= 5.0 min | OUTFLOW OUTFLOW STORAGE (cms) .2910 .2970 1.6320 4.1680 _____ (cms) (ha.m.) .0000 . 3795 .2590 .0579 .4503 .1180 .1802 .2660 .5232 4.1680 7.5660 .0000 .2720 . 5983 .2445 .2790 .2445 | .3109 | .6756 .2850 .0000 AREA QPEAK (ha) (cms) 4.970 3.032 TPEAK R.V. (hrs) (mm) 24.970 INFLOW : ID= 2 (0492) OUTFLOW: ID= 1 (0482) 10.00 129.59 24.970 3.007 10.08 129.59 PEAKFLOWREDUCTION[Qout/Qin](%)=99.18TIME SHIFT OF PEAKFLOW(min)=5.00MAXIMUMSTORAGEUSED(ha.m.)=.5640 -----ROUTE CHN (0527) | IN= 2---> OUT= 1 | Routing time step (min)' = 5.00<----- DATA FOR SECTION (1.1) -----> Elevation Manning 313.20 .0500 312.40 .0500 / .0300 Main Channel 310.80 .0300 Main Channel Distance 100.00 140.00 140.50 Page 134

| Hadati Creek 141.50 142.00 160.00 | Watershed - 310. 312. 312. | 80 | ррмепt with 0300 ма /.0500 ма 0500 | Cityview Ridg ain Channel ain Channel | e |
|---|--|---|---|--|---------|
| <pre> DEPTH ELEV (m) (m) .12 310.92 .25 311.05 .37 311.17 .49 311.29 .62 311.42 .74 311.54 .86 311.66 .98 311.78 1.11 311.91 1.23 312.03 1.35 312.15 1.48 312.28 1.60 312.40 1.73 312.53 1.87 312.67 2.00 312.80 2.13 312.93 2.27 313.07 2.40 313.20 </pre> | VOLUME | FLOW RATE (cms) .1 .2 .3 .4 | VELOCITY (m/s) .40 .57 .69 .78 .86 .92 .97 1.02 1.07 1.11 1.15 1.19 1.23 1.10 .88 .77 .73 .74 .76 | TRAV.TIME (min) 18.86 | |
| INFLOW : ID= 2 (052 OUTFLOW: ID= 1 (052 | AREA (ha) 26) 98.04 27) 98.04 | OPEAK TI | PEAK R.V. | <-pipe / ch MAX DEPTH (m) 2.05 2.04 | MAX VEL |
| RESERVOIR (0390) IN= 2> OUT= 1 DT= 5.0 min | OUTFLOW (cms) .0000 .7700 1.2600 | STORAGE (ha.m.) .0000 .2870 .9680 | OUTFLOW (cms) 1.3100 1.8600 .0000 | STORAGE (ha.m.) 1.6000 23.2300 .0000 | |
| INFLOW : ID= 2 (038 OUTFLOW: ID= 1 (039 | | a) (cms) 00 20.834 |) (hrs 4 10.0 | 5) (mm) 00 127.59 | |
| PEAK TIME MAXIN | SHIFT OF PEA | | t/Qin](%)= (min)=14 (ha.m.)= 1 | 10.00 | |
| ADD HYD (0400) 1 + 2 = 3 ID1= 1 (0395): + ID2= 2 (0390): | | (cms) (ł 5.388 10 | PEAK R.V hrs) (mr .08 88.29 .33 127.59 | n)) | |
| ID = 3 (0400): | 227.30 | 6.909 10 Page 135 | .08 118.74 | } | |

| ROUTE CHN (IN= 2> O | 0403) UT= 1 | | | | | | |
|---|---|---|---|--|----------------------------------|--|--|
| | <pre>< D4 Distance 100.00 110.00 135.00 142.00 148.00 156.00 165.00</pre> | ATA FOR SEC Elevat 338 336 336 335 335 335 335 335 | CTION (tion .30 .80 .00 .30 .30 .30 .30 .30 | 1.1) Manning .0500 .0500 .0300 .0500 .0500 .0500 .0000 | > Mai | n Channel | |
| C DEPTH (m) .16 .32 .47 .63 .79 .95 1.11 1.26 1.42 1.58 1.74 1.89 2.05 2.21 2.37 2.53 2.68 2.84 3.00 | ELEV (m) 335.46 335.62 335.77 335.93 336.09 336.25 336.41 336.56 336.72 336.88 337.04 337.19 337.35 337.51 337.67 337.83 337.98 338.14 338.30 | 178E+06 196E+06 215E+06 234E+06 | 380.3 436.7 496.9 561.0 | | 4.07 4.23 4.40 4.56 | 7.79 7.48 7.20 6.95 | |
| | ID= 2 (0400 ID= 1 (0403 | AREA (ha)) 227.30) 227.30 | < hy QPEAK (cms) 6.91 6.38 | drograph TPEAK (hrs) 10.08 10.33 | R.V. (mm) 118.74 118.74 | <-pipe / c MAX DEPTH (m) .46 .44 | hannel-> MAX VEL (m/s) 1.36 1.30 |
| + ID2= | 3 = 1 (0403): = 2 (0115): | 100.96 | | TPEAK (hrs) 10.33 10.08 | (mm) | | |
| ID = | = 3 (0407): EAK FLOWS DO | 328.26 | 16.526 | 10.17 | | | |

Hadati Creek Watershed - Post Development with Cityview Ridge

| H RESERVOIR IN= 2> (DT= 5.0 m | (0113) DUT= 1 | OUTFLOW (cms) | | | FLOW (| tyview Ridge STORAGE (ha.m.) 6.4000 10.0000 20.0000 |
|---|---|---|--|--|----------------------|--|
| INFLOW OUTFLOW | PEAK | (h)7) 328.2 L3) 328.2 FLOW RE | DUCTION C | cms) .526 .456 Dout/Oin ⁻ | (%) = 57 | (mm) 121.80 121.80 |
| | TIME MAXIM | SHIFT OF PE NUM STORAGE | AK FLOW USED | (n (ha | nin)= 80 .m.)= 11 | .00 .2348 |
| + ID. | $\begin{array}{c c} 3 & \\ 1 = 1 & (0113) \\ 2 = 2 & (0425) \\ \end{array}$ | AREA (ha) 328.26 24.24 | 1.980 | 9.33 | 128.70 | |
| ID | = 3 (0430) | : 352.50 00 NOT INCLU | 11.349 | 11.08 | 122.27 | |
| ROUTE CHN (IN= 2> (| (0440) DUT= 1 | Routing ti | me step (n | nin)'= 5 | 5.00 | |
| | <pre>< [Distance 100.00 120.00 126.00 130.00 140.00 142.00 150.00 155.00 160.00</pre> | 325. 324. 323. 323. 322. 322. 322. | ion 40 60 90 00 30 .06 30 .03 90 60 | Manning .0600 .0600 .0600 .0600 .0600 500 / .03 | 800 Mair 500 Mair | n Channel n Channel |
| <pre>C DEPTH (m) .16 .33 .49 .65 .82 .98 1.14 1.31 1.47 1.63 1.79 1.96 2.12</pre> | ELEV (m) 322.46 322.63 322.79 322.95 323.12 323.28 323.44 323.61 323.77 323.93 324.09 324.26 324.42 | VOLUME (cu.m.) .233E+03 .672E+03 .132E+04 .216E+04 .319E+04 .433E+04 .433E+04 .689E+04 .833E+04 .833E+04 .987E+04 .115E+05 .134E+05 .154E+05 | TIME TABL FLOW RATE (cms) .6 2.1 4.9 9.0 14.9 22.5 31.6 42.3 54.6 68.3 82.8 99.2 117.9 Page 13 | E VELC (n]]]]]]]]]]]]]]]]]] | | TRAV.TIME (min) 6.96 5.27 4.51 4.03 3.57 3.21 2.93 2.72 2.54 2.41 2.33 2.25 2.18 |



Hadati Creek Watershed - Post Development with Cityview Ridge 1.1630 | 11.6850 1.7070 | 12.3480 2.6400 10.3000 3.1200 11.4000 QPEAK (cms) AREA TPEAK R.V. (ha) 474.220 (hrs) (mm) INFLOW : ID= 2 (0491) OUTFLOW: ID= 1 (0483) 22.680 10.17 123.97 474.220 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 | R.V. (mm) 123.97 AREA QPEAK (ha) (cms) TPEAK (hrs) ID1= 1 (0483): + ID2= 2 (0540): 474.22 11.709 12.08 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) | AREA QPEAK (ha) (cms) 478.85 11.843 98.04 7.968 1 + 2 = 3 | R.V. TPEAK (hrs) (mm) ID1= 1 (0530): + ID2= 2 (0527): 124.54 12.00 10.08 138.49 _____ _____ _____ ______ ID = 3 (0545):576.89 19.057 126.91 11.00 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0546) | 1 + 2 = 3 | QPEAK (cms) AREA TPEAK R.V. _____ (ha) (hrs) (mm) 126.91 ID1= 1 (0545): 576.89 19.057 11.00 + 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 = 3AREA QPEAK TPEAK R.V. (ha) (cms) 602.14 21.640 -----(hrs) (mm) ID1= 1 (0546): + ID2= 2 (0543): 129.24 10.08 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. Page 139

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0548) | AREA QPEAK TPEAK R.V. 1 + 2 = 3 (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.

FINISH

Hadati Creek Watershed - Post Development with Cityview Ridge _____ ______ SSSSS U U V V Ι Α L U ν V Ι SS U AA L V V Ι SS U U AAAAA L V V Ι SS U U Α Α L SSSSS VV Ι UUUUU Α Α LLLLL 000 TITT TTTTT Н Y М 000 н Υ M 0 0 YY 0 Т Т H Н MM MM 0 Т 0 0 Т Н н Υ M Μ 0 0 000 Т Т Н H Υ М Μ 000 Developed and Distributed by Clarifica Inc. Copyright 1996, 2007 Clarifica Inc. All rights reserved. **** DETAILED OUTPUT ***** 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\Ci tyview Ridge\25mm4hr.stm Ptotal= 25.00 mm Comments: 25 mm - 4 hour - 10 Minute Time Step TIME RAIN TIME RAIN TIME RAIN TIME RAIN hrs mm/hr hrs mm/hr mm/hr hrs hrs mm/hr .17 2.17 .53 1.1717.57 2.95 3.17 .76 .71 61.55 .33 1.33 2.33 2.19 3.33 .65 .99 2.50 .50 1.50 24.02 1.69 3.50 .57 .67 1.51 1.67 11.16 1.34 3.67 .49 2.57 6.44 .44 .83 1.83 2.83 1.09 3.83 1.00 5.31 2.00 4.20 | 3.00 .90 4.00 .38 _____

| Hadati Creek Watershed - Post Development with Cityview Ridge |
|--|
| CALIB STANDHYD (0480) ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| $\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$ |
| NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP. |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ |
| 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 PEAK FLOW (cms)= 1.09 .23 1.142 (iii) TIME TO PEAK (hrs)= 1.42 1.83 1.42 |
| TIME TO PEAK (hrs) = 1.09 $.23$ 1.142 (111)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 = $.94$ $.09$ $.27$ |
| <pre>(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.</pre> |
| CALIB STANDHYD (0415) Area (ha)= 4.99 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ |

Hadati Creek Watershed - Post Development with Cityview Rido

Page 2

Hadati Creek Watershed - Post Development with Cityview Ridge Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 61.55 8.82 25.00 over (min) 5.00 3.27 5.00 5.00 3.27 (ii) Storage Coeff. (min)= 21.96 (ii) Unit Hyd. Tpeak (min)= 25.00 Unit Hyd. peak (cms)= .27 .05 ***TOTALS*** .17 PEAK FLOW TIME TO PEAK (cms) =.04 .179 (iii) 1.33 1.67 (hrs) =23.50 RUNOFF VOLUME 2.16 (mm) =6.64 TOTAL RAINFALL 25.00 25.00 (mm) =25.00 RUNOFF COEFFICIENT .94 .09 .27 _ ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALTB STANDHYD (0410) | |ID= 1 DT= 5.0 min | Area (ha)= 24.20 Total Imp(%)= 42.00 Dir. Conn.(%) = 21.00______ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =10.16 14.04 1.50 2.00 5.00 Dep. Storage (mm) =2.00 2.00 401.00 Average Slope (%)= Length (m)= 40.00 Mannings n .013 . 300 = Max.ETT.Inten.(mm/hr)=
over (min)61.55
5.00Storage Coeff. (min)=
Unit Hyd. Tpeak (min)=
Unit Hyd. peak (cms)=5.00
20 7.05 30.00 28.54 (ii) 30.00 .04 ***TOTALS*** .75 1.33 23.50 .14 PEAK FLOW (cms) =.770 (iii) 1.33 TIME TO PEAK (hrs)= 1.75 RUNOFF VOLUME (mm)= 2.16 6.64 25.00 TOTAL RAINFALL (mm)= 25.00 25.00 RUNOFF COEFFICIENT = .94 .09 .27 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00FO FC (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 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 ID= 1 DT= 5.0 min _____ IMPERVIOUS PERVIOUS (i) Page 3

| Hadati Creek Wa Surface Area (ha) Dep. Storage (mm) Average Slope (%) Length (m) Mannings n | tershed - Post Dev = 15.12 = 1.50 = 2.03 = 465.00 = .013 | 20.88 | view Ridge |
|---|---|---|---|
| Max.Eff.Inten.(mm/hr) over (min) Storage Coeff. (min) Unit Hyd. Tpeak (min) Unit Hyd. peak (cms) | | 7.05 30.00 28.95 (ii) 30.00 .04 | TALS* |
| PEAK FLOW (cms): TIME TO PEAK (hrs): RUNOFF VOLUME (mm): TOTAL RAINFALL (mm): RUNOFF COEFFICIENT | = 1.09 = 1.33 = 23.50 = 25.00 = .94 | .21 1. 1.75 2. 2.16 6 25.00 25 .09 | .117 (iii) L.33 5.64 5.00 .27 |
| (i) HORTONS EQUATIO Fo (mm/hr)= Fc (mm/hr)= (ii) TIME STEP (DT) THAN THE STORAGE (iii) PEAK FLOW DOES F | 75.00 K L2.50 Cum.Inf. SHOULD BE SMALLER C E COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 DR EQUAL | |
| CALIB STANDHYD (0455) Area ID= 1 DT= 5.0 min Tota | a (ha)= 12.70 al Imp(%)= 42.00 | Dir. Conn.(%)= 2 | 21.00 |
| Surface Area (ha) Dep. Storage (mm) Average Slope (%) Length (m) Mannings n | IMPERVIOUS F = 5.33 = 1.50 = 1.71 = 300.00 = .013 | PERVIOUS (i) 7.37 5.00 1.71 40.00 .300 | |
| Max.Eff.Inten.(mm/hr): over (min) Storage Coeff. (min): Unit Hyd. Tpeak (min): Unit Hyd. peak (cms): | = 61.55 5.00 = 5.11 (ii) = .21 | 7.05 30.00 28.94 (ii) 30.00 .04 | TALS* |
| PEAK FLOW (cms) TIME TO PEAK (hrs) RUNOFF VOLUME (mm) TOTAL RAINFALL (mm) RUNOFF COEFFICIENT | = .41 = 1.33 = 23.50 = 25.00 = .94 | .07 1.75 2.16 | .417 (iii) L.33 5.64 5.00 .27 |
| (i) HORTONS EQUATION Fo (mm/hr)= Fc (mm/hr)= (ii) TIME STEP (DT) THAN THE STORAGE (iii) PEAK FLOW DOES I | 75.00 K L2.50 Cum.Inf. SHOULD BE SMALLER C E COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 DR EQUAL | |
| CALIB STANDHYD (0395) Area | a (ha)= 51.20 Page 4 | , , | |

Hadati Creek Watershed - Post Development with Cityview Ridge |ID= 1 DT= 5.0 min | Total Imp(%)= 10.00 Dir. Conn.(%)= 5.00

| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 5.12 1.50 2.00 900.00 .013 | PERVIOUS (i) 46.08 5.00 2.00 40.00 .300 | |
|---|---|---|--|--|
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | mm/hr)= (min) (min)= (min)= (cms)= | 61.55 10.00 9.42 (ii) 10.00 .12 | .00 230.00 225.31 (ii) 230.00 .00 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .29 1.42 23.50 25.00 .94 | .00 .00 25.00 .00 | .292 (iii) 1.42 1.17 25.00 .05 |
| ***** WARNING:FOR AR YOU SH ***** WARNING: THE P | OULD CONS | SIDER SPLITTING | THE AREA. | |
| Fo (mm Fc (mm (ii) TIME STEP | /hr)= 75. /hr)= 12. (DT) SHC STORAGE (| OEFFICIENT. | (1/hr)= 4.1 (mm)= .(OR EQUAL | L4 D0 |
| CALIB STANDHYD (0360) ID= 1 DT= 5.0 min | Area Total | (ha)= 30.00 Imp(%)= 37.00 |) Dir. Conn.(| (%)= 19.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 11.10 1.50 2.00 447.00 .013 | PERVIOUS (i) 18.90 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(| mm/hr)= (min) (min)= | 61.55 | 2.81 40.00 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .83 1.33 23.50 25.00 .94 | .08 1.92 1.27 25.00 .05 | .834 (iii) 1.33 5.50 25.00 .22 |
| ***** WARNING:FOR AR YOU SH | | IMPERVIOUS RAT | | |
| | QUATION S /hr)= 75. | ELECTED FOR PE | RVIOUS LOSSES: (1/hr)= 4.1 | |

HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (mm/hr) = 12.50 Cum.Inf. (mm) = .00Page 5

Hadati Creek Watershed - Post Development with Cityview Ridge (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) ID= 1 DT= 5.0 min Area (ha)= 16.30 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 _____ IMPERVIOUS PERVIOUS (i) 6.85 Surface Area (ha) =9.45 $1.50 \\ 1.00$ Dep. Storage (mm) =5.00 (%)= 1.00 Average Slope 330.00 Length (m) =40.00 .300 Mannings n .013 = max.EIT.Inten.(mm/hr)=
over (min)61.55
5.00
40.00Storage Coeff. (min)=
Unit Hyd. Tpeak (min)=
Unit Hyd. peak (cms)=61.55
5.00
40.00 .49 1.33 23.50 *TOTALS* .07 1.92 2.16 25.00 PEAK FLOW (cms)= .499 (iii) TIME TO PEAK (hrs) =1.33 (mm)= (mm)= RUNOFF VOLUME 6.64 RUNOFF COEFFICIENT = 25.00 25.00 . 94 .09 .27 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 ID= 1 DT= 5.0 min | ------PERVIOUS (i) IMPERVIOUS 5.17 (ha)= Surface Area 7.13 Dep. Storage $1.50 \\ 1.60 \\ 286.00$ 5.00 (mm)= Average Slope 1.60 (%)= Length (m)= 40.00 Mannings n .013 .300 = 61.55 7.05 Max.Eff.Inten.(mm/hr)= 5.00 5.06 5.00 over (min) 30.00 Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 5.06 (ii) 29.38 (ii) 30.00 .04 .21 ***TOTALS*** (cms)= .40 (hrs)= 1.33 (mm)= 23.50 (mm)= 25.00 ENT = .94 .07 PEAK FLOW .405 (iii) 1.75 TIME TO PEAK 1.33 RUNOFF VOLUME 2.16 6.64 25.00 TOTAL RAINFALL 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) ID= 1 DT= 5.0 min | Area Total I | (ha)= 117.50 mp(%)= 42.00 | Dir. Conn.(%) | = 21.00 | | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 49.35 1.50 2.00 885.00 .013 | PERVIOUS (i) 68.15 5.00 2.00 40.00 .300 | | | |
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | | | | *TOTALS* | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | 2.82 1.42 23.50 25.00 .94 | .62 1.83 2.16 25.00 .09 | 2.960 (iii) 1.42 6.64 25.00 .27 | | |
| Fo (mm, Fc (mm, (ii) TIME STEP | /hr)= 75.0 /hr)= 12.5 (DT) SHOU STORAGE CO | 0 K O Cum.Inf LD BE SMALLER EFFICIENT. | | | | |
| CALIB STANDHYD (0105) ID= 1 DT= 5.0 min | Area Total I | (ha)= 51.32 mp(%)= 42.00 | Dir. Conn.(%): | = 21.00 | | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 21.55 1.50 2.00 550.00 .013 | PERVIOUS (i) 29.77 5.00 2.00 40.00 .300 | | | |
| Max.Eff.Inten.(r over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | (min) (min)= | 61.55 5.00 7.01 (ii) 5.00 .17 | 7.05 30.00 29.75 (ii) 30.00 .04 | *TOTALS* | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL | (cms)= (hrs)= (mm)= (mm)= | 1.50 1.33 23.50 25.00 Page | .30 1.75 2.16 25.00 | 1.538 (iii) 1.33 6.64 25.00 | | |

| Hadati C RUNOFF COEFFIC | reek Watersh IENT = | ed - Post De .94 | evelopment with .09 | h Cityview Ridge .27 |
|--|--|---|---|--|
| Fo (m Fc (m (ii) TIME STE | m/hr)= 75.00 m/hr)= 12.50 P (DT) SHOULI STORAGE COE | K Cum.Inf D BE SMALLER FFICIENT. | - | .4 00 |
| CALIB STANDHYD (0102) ID= 1 DT= 5.0 min | - Area Total Im - | (ha)= 14.32 p(%)= 42.00 | Dir. Conn.(| ⁽ %)= 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | | | | |
| Max.Eff.Inten. ove Storage Coeff. Unit Hyd. Tpea Unit Hyd. peak | | | | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFIC | (cms)= (hrs)= (mm)= (mm)= IENT = | .47 1.33 23.50 25.00 .94 | .09 1.75 2.16 25.00 .09 | .479 (iii) 1.33 6.64 25.00 .27 |
| Fo (m Fc (m (ii) TIME STE | EQUATION SELI n/hr)= 75.00 n/hr)= 12.50 P (DT) SHOULI STORAGE COEI | ECTED FOR PE K Cum.Inf D BE SMALLER FFICIENT. | RVIOUS LOSSES: (1/hr)= 4.1 . (mm)= .0 OR EQUAL | .4 |
| CALIB STANDHYD (0101) ID= 1 DT= 5.0 min | | (ha)= 16.32 p(%)= 42.00 | | %)= 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | In (ha)= (mm)= (%)= (m)= = | MPERVIOUS 6.85 1.50 2.00 309.00 .013 | PERVIOUS (i) 9.47 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten. ove Storage Coeff. Unit Hyd. Tpeal Unit Hyd. peak | r (min) (min)= k (min)= | 61.55 5.00 4.96 (ii) 5.00 .22 | 30.00 | *TOTALS* |
| | | Page | 8 | |

Page 8

Hadati Creek Watershed - Post Development with Cityview Ridge .53 1.33 .540 (iii) .10 1.75 PEAK FLOW (cms) =TIME TO PEAK (hrs) =1.33 (mm)= 23.50 RUNOFF VOLUME 2.16 6.64 TOTAL RAINFALL 25.00 25.00 (mm) =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) = 4.1K (1/hr) = 4.14Cum.Inf. (mm) = .00 (mm/hr) = 12.50FC (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 Total Imp(%)= 42.00 ID= 1 DT= 5.0 min | Dir. Conn.(%) = 21.00------IMPERVIOUS PERVIOUS (i) (ha) =Surface Area 7.98 11.02 1.50 Dep. Storage (mm)= 5.00 Average Slope (%)= 2.00 2.00 Length 365.00 (m) =40.00 Mannings n .013 . 300 Max.Eff.Inten.(mm/hr)= 61.55 7.05 5.00 30.00 over (min) 5.48 (ii) 28.22 (ii) Storage Coeff. (min) =5.48 Unit Hyd. Tpeak (min)= 30.00 Unit Hyd. peak (cms)= .20 .04 *TOTALS* .601.33.111.752PEAK FLOW TIME TO PEAK (cms) =.614 (iii) (hrs) =1.33 RUNOFF VOLUME 23.50 (mm)= 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: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (mm/hr)= 12.50 Cum.Inf. (mm)= (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ _____ CALIB CALIB STANDHYD (0600) Area (ha)= 11.38 Total Imp(%)= 42.00 ID= 1 DT= 5.0 min Dir. Conn.(%) = 21.00_____ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =4.78 6.60 1.50 Dep. Storage (mm) =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 Page 9

Hadati Creek Watershed - Post Development with Cityview Ridge Storage Coeff. (min)= 7.96 (ii) 30.70 (ii) Unit Hyd. Tpeak (min)= 10.00 35.00 .13 .04 Unit Hyd. peak (cms)= ***TOTALS*** PEAK FLOW(cms)=.29TIME TO PEAK(hrs)=1.42RUNOFF VOLUME(mm)=23.50TOTAL RAINFALL(mm)=25.00RUNOFF COEFFICIENT=.94 .06 .301 (iii) .06 1.83 2.16 25.00 1.42 6.64 25.00 .09 .27 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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) |ID= 1 DT= 5.0 min | Area (ha)= 7.62 Total Imp(%)= 46.00 Dir. Conn.(%)= 21.00 ------IMPERVIOUS $\begin{array}{rcl} \text{IMPERVICES} \\ \text{(ha)} = & 3.51 \\ \text{(mm)} = & 1.50 \\ \text{(\%)} = & 2.00 \\ \text{(m)} = & 680.00 \\ - & .013 \end{array}$ PERVIOUS (i) Surface Area (ha) =4.11 Surface Area (ha)= Dep. Storage (mm)= Average Slope (%)= 5.00 2.00 Length 40.00 Mannings n .300 Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 10.00 10.00 10.00 10.00 10.00 30.00 10.00 30.00 10.00 30.00 10.00 30.00 10.00 30.00 10.00 30.00 10.00 3 .04 ***TOTALS***

 PEAK FLOW
 (cms)=
 .19
 .07

 TIME TO PEAK
 (hrs)=
 1.42
 1.75

 RUNOFF VOLUME
 (mm)=
 23.50
 3.18

 TOTAL RAINFALL
 (mm)=
 25.00
 25.00

 RUNOFF COEFFICIENT
 .94
 .13

 .212 (iii) 1.42 7.45 25.00 . 30 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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(%) = 42.00Dir. Conn.(%)= 2.50 _____ IMPERVIOUS PERVIOUS (i) Surface Area (ha)= Dep. Storage (mm)= 2.51 3.46 1.50 2.00 680.00 5.00 Average Slope (%)= 2.00 Length 80.00 .013 (m) =40.00 Mannings n = .300 Page 10

| Hadati Creek Wat | tershed - Post Dev | elopment with | Cityview Ridge |
|---|---|---|--|
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | 61.55 10.00 7.96 (ii) 10.00 .13 | 33.18 25.00 20.20 (ii) 25.00 .05 | *70741.5* |
| PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | .02 1.42 23.50 25.00 .94 | .13 1.67 4.97 25.00 .20 | *TOTALS* .141 (iii) 1.67 5.44 25.00 .22 |
| ***** WARNING:FOR AREAS WIT YOU SHOULD CO | H IMPERVIOUS RATIONSIDER SPLITTING | | |
| (i) HORTONS EQUATION Fo (mm/hr)= 7 Fc (mm/hr)= 1 (ii) TIME STEP (DT) S THAN THE STORAGE (iii) PEAK FLOW DOES N | 5.00 K 2.50 Cum.Inf. HOULD BE SMALLER (COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 DR EQUAL | |
| CALIB STANDHYD (0540) Area ID= 1 DT= 5.0 min Tota | | |)= 79.00 |
| Surface Area (ha)= Dep. Storage (mm)= Average Slope (%)= Length (m)= Mannings n = | IMPERVIOUS 3.70 1.50 55 150.00 .013 | PERVIOUS (i) .93 5.00 .55 40.00 .300 | |
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | 61.55 5.00 4.73 (ii) 5.00 .22 | .00 325.00 322.74 (ii) 325.00 .00 | *TOTALS* |
| PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | .57 1.33 23.50 25.00 .94 | .00 .00 .00 25.00 .00 | .569 (iii) 1.33 18.56 25.00 .74 |
| ***** WARNING: STORAGE COEF ***** WARNING: THE PERVIOUS | F. IS SMALLER THAN AREA HAS NO FLOW | N TIME STEP! | |
| (i) HORTONS EQUATION Fo (mm/hr)= 7 Fc (mm/hr)= 1 (ii) TIME STEP (DT) S THAN THE STORAGE (iii) PEAK FLOW DOES N | 5.00 K 2.50 Cum.Inf. HOULD BE SMALLER (COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 DR EQUAL | |
| CALIB STANDHYD (0500) Area ID= 1 DT= 5.0 min Tota | (ha)= 244.00 l Imp(%)= 46.00 Page 1 | Dir. Conn.(% 1 | ()= 26.00 |

Hadati Creek Watershed - Post Development with Cityview Ridge IMPERVIOUS PERVIOUS (i) Surface Area (ha) =112.24 131.76 1.50 .80 1275.00 Dep. Storage (mm) =5.00 .80 Average Slope (%)= 40.00 Length (m) =Mannings n = .013 .300 42.79 20.00 17.67 (ii) 20.00 Max.Eff.Inten.(mm/hr)= 5.28 55.00 over (min) Storage Coeff. 51.28 (ii) (min) =Unit Hyd. Tpeak (min)= 55.00 Unit Hýd. peak (cms)= .06 .02 ***TOTALS*** .82 2.17 2.35 5.07 1.58 PEAK FLOW (cms) =5.342 (iii) (hrs)= 1.58 (mm)= 23.50 (mm)= 25.00 ENT = .94 1.58 7.77 TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL 25.00 25.00 .94 RUNOFF COEFFICIENT = .31 .09 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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) CALIB Area (ha)= 16.00 ID= 1 DT= 5.0 min Total Imp(%) = 80.00Dir. Conn.(%) = 79.00IMPERVIOUS PERVIOUS (i) 12.80 ha)= 12.00 mm)= 1.50 (%)= .50 (m)= 400.00 - .013 Surface Area (ha) =3.20 Dep. Storage (mm)= 5.00 .20 Average Slope (%)= 40.00 Length Mannings n .300 61.55 .00 10.00 440.00 8.77 (ii) 439.54 (ii) 10.00 440.00 Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= .12 .00 ***TOTALS*** .00 .00 .00 PEAK FLOW (cms) =1.48 1.475 (iii) 1.42 TIME TO PEAK 1.42 (hrs) =23.50 RUNOFF VOLUME (mm)= 18.56 25.00 TOTAL RAINFALL (mm)= 25.00 25.00 .94 .00 RUNOFF COEFFICIENT = .74 ***** WARNING: THE PERVIOUS AREA HAS NO FLOW . (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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.

Hadati Creek Watershed - Post Development with Cityview Ridge CALIB STANDHYD (0542) (ha) = 25.25Area Total Imp(%) = 80.00|ID= 1 DT= 5.0 min | Dir. Conn.(%) = 79.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =20.20 5.05 Dep. Storage 1.50 5.00 (mm) =Average Slope (%)= .55 .55 Length (m) =350.00 Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 61.55 .00 330.00 over (min) 10.00 Storage Coeff. (min) =7.87 (ii) 325.88 (ii) Unit Hyd. Tpeak (min)= 10.00 330.00 Unit Hyd. peak (cms) =.13 .00 *TOTALS* .00 PEAK FLOW (cms) =2.41 2.408 (iii) TIME TO PEAK (hrs) =1.42 .00 1.42 RUNOFF VOLUME 23.50 18.56 (mm) =.00 25.00 25.00 TOTAL RAINFALL (mm) =25.00 RUNOFF COEFFICIENT .94 .00 .74 ***** WARNING: THE PERVIOUS AREA HAS NO FLOW . (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00FO K (1/hr) = 4.14Cum.Inf. FC (mm/hr) = 12.50.00 (mm) =(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 Total Imp(%)= 80.00 ID= 1 DT= 5.0 min | Dir. Conn.(%) = 79.00______ IMPERVIOUS PERVIOUS (i) (ha) =11.99 Surface Area 3.00 Dep. Storage (mm) =1.50 5.00 Average Slope (%)= . 55 . 55 Length 200.00 40.00 (m) =Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 61.55 .00 325.00 5.00 over (min) Storage Coeff. 323.64 (ii) (min) =5.63 (ii) Unit Hyd. Tpeak (min)= 5.00 325.00 Unit Hyd. peak (cms) =.20 .00 *TOTALS* .00 PEAK FLOW (cms) =1.77 1.767 (iii) TIME TO PEAK 1.33 (hrs) =.00 1.33 .00 25.00 RUNOFF VOLUME (mm) =23.50 18.56 TOTAL RAINFALL (mm) =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) = 75.00K (1/hr) = 4.14(mm)= FC (mm/hr) = 12.50Cum.Inf. .00

Page 13

Hadati Creek Watershed - Post Development with Cityview Ridge (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) | (ha)= 1.13 Area Total Imp(%) = 80.00ID= 1 DT= 5.0 min | Dir. Conn.(%)= 79.00 IMPERVIOUS PERVIOUS (i) (ha)= Surface Area . 90 .23 Dep. Storage 1.50 5.00 (mm) =.55 50.00 .013 .55 Average Slope (%)= Length 40.00 (m) =Mannings n . 300 = Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 61.55 5.00 2.45 (ii) 320.46 (ii) 325.00 300 300 .00 *TOTALS* .15 .00 PEAK FLOW (cms) =.151 (iii) 1.33 TIME TO PEAK (hrs)= 1.33 RUNOFF VOLUME (mm)= (mm)= 23.50 .00 18.56 TOTAL RAINFALL 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: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (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) | ID= 1 DT=****min | .00 AREA (ha)= .00 QPEAK (cms) =______ TPEAK (hrs) =.00 (mm)=****** VOLUME _____ _____ ADD HYD (0420) | 1 + 2 = 3QPEAK AREA TPEAK R.V. (cms) (ha) 4.99 (mm) (hrs) ID1= 1 (0415): + ID2= 2 (0410): 4.99.1791.3324.20.7701.33 6.64 6.64 _____ ____ _____ .948 ID = 3 (0420):29.19 1.33 6.64 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0465)

| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ |
|---|
| NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. |
| |
| |
| ROUTE CHN (0362) IN= 2> OUT= 1 Routing time step (min)'= 5.00 |
| <pre>< DATA FOR SECTION (1.1)> Distance Elevation Manning</pre> |
| 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 |
| 20.00 .40 .0300 Math channel |
| <> 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 |
| .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 |
| .20.20.140E+041.81.2713.13.22.22.166E+042.31.3612.24.24.24.194E+042.81.4411.58 |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ |
| .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 |
| <pre>< hydrograph> <-pipe / channel-></pre> |
| AREA QPEAK TPEAK R.V. MAX DEPTH MAX VEI (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 Page 15 |

17

| Ha | dati Creek 5.51 10.00 14.49 14.50 20.00 | | .00 | .0150 | n Cityview Rid Main Channel Main Channel Main Channel Main Channel | ge |
|---|--|---|---|---|---|---|
| DEPTH (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | VOLUME (cu.m.) .929E+01 .372E+02 .836E+02 .149E+03 .232E+03 .334E+03 .454E+03 .576E+03 .699E+03 .822E+03 .944E+03 .108E+04 .123E+04 .123E+04 .159E+04 .203E+04 .254E+04 | FLOW RATE (cms) .0 .0 .1 .1 .2 .3 .4 .6 .8 1.0 1.2 1.4 1.7 2.0 2.3 2.6 3.0 3.4 | VELOCITY (m/s) .17 .27 .35 .42 .49 .55 .64 .74 .84 .94 1.03 1.11 1.03 1.11 1.21 1.25 1.28 1.31 1.33 1.34 | 99.56 62.72 47.86 39.51 34.05 30.15 26.24 22.41 19.75 17.76 16.22 15.07 14.28 13.72 13.31 13.01 12.76 12.57 12.41 | |
| INFLOW : OUTFLOW: | ID= 2 (03 ID= 1 (03 | AREA (ha) 50) 16.30 53) 16.30 | < hyd QPEAK (cms) .50 .22 | rograph TPEAK R.V (hrs) (mm 1.33 6.6 1.58 6.6 | > <-pipe / 6 MAX DEPTH) (m) 4 .12 0 .09 | channel-> MAX VEL (m/s) .78 .57 |
| ROUTE CHN (C IN= 2> OL |)358) JT= 1 | Routing t | ime step (m | in)'= 5.00 | | |
| | <pre>< Distance</pre> | Eleva | tion .26 .15 .03 .00 .09 .00 | .0300 00 / .0150 .0150 .0150 .0150 | Main Channel Main Channel Main Channel Main Channel Main Channel | |
| < DEPTH (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 | TRAVE VOLUME (cu.m.) .102E+02 .409E+02 .920E+02 .163E+03 .255E+03 .368E+03 .499E+03 .634E+03 .769E+03 | L TIME TABL FLOW RATE (cms) .0 .0 .1 .1 .1 .2 .3 .4 .6 Page 16 | VELOCITY (m/s) .17 .27 .35 .42 .49 .55 .64 .74 .84 | TRAV.TIME (min) 109.52 68.99 52.65 43.46 37.45 33.17 28.86 24.66 21.72 | |

| Hadati Creek Wat .14 .14 .90 .15 .15 .10 .16 .16 .11 .18 .18 .13 .19 .19 .15 .20 .20 .17 .22 .22 .19 .23 .23 .22 .25 .25 .25 .26 .26 .27 | 4E+03 | .8 1.0 1.2 1.4 1.7 2.0 | | 19.54 17.84 16.57 15.71 15.10 14.65 | 2 |
|--|---|--|--|--|---|
| INFLOW : ID= 2 (0355) OUTFLOW: ID= 1 (0358) | < AREA ((ha) (12.30 12.30 | hydrogra (PEAK TPE/ (cms) (hrs .40 1. .15 1. | aph> AK R.V. s) (mm) 33 6.64 58 6.59 | <-pipe / ch MAX DEPTH (m) .11 .08 | annel-> MAX VEL (m/s) .72 .52 |
| RESERVOIR (0106) IN= 2> OUT= 1 DT= 5.0 min OU (| .0100 . | ORAGE (1.m.) 0000 0100 2300 | DUTFLOW (cms) .5000 6.6000 .0000 | (ha.m.) .4000 .8000 | |
| INFLOW : ID= 2 (0105) OUTFLOW: ID= 1 (0106) PEAK F TIME SHI MAXIMUM | AREA (ha) 51.320 51.320 LOW REDUCT FT OF PEAK F STORAGE L | (cms) 1.538 .155 TON [Oout/0 | Din](%)= 10 | (mm) 6.64 6.63 | |
| | (ha) (c 14.32 .4 16.32 .5 | 79 1.3 40 1.3 | s) (mm) 3 6.64 3 6.64 ======= | | |
| NOTE: PEAK FLOWS DO N | OT INCLUDE E | ASEFLOWS I | F ANY. | | |
| (| cms) (ha .0000 . .0100 . | .m.) 0000 | | STORAGE (ha.m.) 1.0000 1.1000 .0000 | |
| INFLOW : ID= 2 (0110) | AREA (ha) 19.000 | QPEAK (cms) .614 Page 17 | TPEAK (hrs) 1.33 | | |

Hadati Creek Watershed - Post Development with Cityview Ridge 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 ______ ADD HYD (0602) | 1 + 2 = 3 | AREA QPEAK TPEAK R.V. (ha) (cms) 11.38 .301 7.62 .212 _____ (mm) (hrs) ID1= 1 (0600): + ID2= 2 (0601): 1.42 1.42 6.64 7.45 ID = 3 (0602):1.42 19.00 .514 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 (ha) (cms) 244.00 5.34 TPEAK R.V. (hrs) (mm) 1.58 7.77 TOTAL HYD.(ID= 1): 244.00 5.34 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. _____ ADD HYD (0515) | 1 + 2 = 3_____ ID = 3 (0515): 260.00 6.307 1.588.44 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ DUHYD (0425) Inlet Cap.=1.980 #of Inlets= 1 | Total(cms)= 2.0 | AREA (ha) QPEAK TPEAK R.V. 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.

Page 18

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0470) | 1 + 2 = 3 | AREA QPEAK TPEAK R.V. (mm) .00 6.64 ______ _____ -----ID = 3 (0470): 48.70 1.534 1.33 6.64NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0359) | 1 + 2 = 3AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 16.30 .216 1.58 6.60 12.30 .153 1.58 6.59 (mm) 6.60 ID1= 1 (0353): + ID2= 2 (0358): ************************* ========== ID = 3 (0359): 28.60 .369 1.58 6.60NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. RESERVOIR (0104) IN= 2---> OUT= 1 | DT= 5.0 min | STORAGE OUTFLOW OUTFLOW STORAGE ha.m.) (cms) .0000 1.0000 .0100 10.0000 .1332 .0000 -----(cms) (ha.m.) (ha.m.) .0000 . 5000 .0000 .6000 .0100 .1332 .0150 .0000 QPEAK (na) (cms) 30.640 1.019 30.640 000 QPEAK TPEAK R.V. (mm) (hrs) INFLOW : ID= 2 (0103) OUTFLOW: ID= 1 (0104) 1.33 2.33 6.64 6.63 PEAK FLOW REDUCTION [Qout/Qin](%)= 9.52 TIME SHIFT OF PEAK FLOW (min) = 60.00MAXIMUM STORAGE USED (ha.m.) = .1639ADD HYD (0114) 1 + 2 = 3AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 30.64 .097 2.33 6.63 19.00 .024 2.92 6.63 _____ (mm) ID1= 1 (0104): 6.63 + ID2= 2 (0111): 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·-----

| На | < [| DATA FOR SEC Elevat | TION (2.2 ion Ma 00 . 50 . 00 .0350 00 .0350 50 .0350 | unning 0350 0350)/0350 Mai | n Channel n Channel | ge |
|--|---|---|---|--|--|--|
| . 16 . 21 . 26 . 32 . 37 . 42 . 47 . 53 . 58 . 63 . 63 . 68 . 74 . 79 . 84 . 89 | ELEV (m) .05 .11 .26 .32 .37 .42 .47 .53 .58 .63 .68 .74 .79 .84 | VOLUME | | (m/s) .64 .96 | TRAV.TIME (min) 3.06 2.03 1.61 1.37 1.21 1.10 1.01 .94 .88 .83 .79 .75 .72 .69 .66 .64 .62 .60 .58 | |
| INFLOW : OUTFLOW: | ID= 2 (060 ID= 1 (050 | AREA (ha) 02) 19.00 03) 19.00 | < hydro QPEAK T (cms) (.51 .53 | graph> PEAK R.V. hrs) (mm) 1.42 6.96 1.42 6.96 | <-pipe / c MAX DEPTH (m) .20 .21 | hannel-> MAX VEL (m/s) 1.38 1.40 |
| ROUTE CHN ((IN= 2> OU | | Routing tir | ne step (min |)'= 5.00 | | |
| | <pre>< [Distance</pre> | DATA FOR SEC Elevat 101. 100. 100. 99. 99. 100.0 101.4 | ion Ma 50 . 55 .0500 50 . 60 . 55 .0300 | | n Channel n Channel | |
| < DEPTH (m) .10 .19 .29 .38 .48 | ELEV (m) 99.60 99.69 99.79 | TRAVEL VOLUME (cu.m.) .353E+02 .112E+03 .195E+03 .285E+03 .381E+03 | TIME TABLE FLOW RATE (cms) .0 .1 .2 .3 .5 Page 20 | VELOCITY (m/s) .19 .37 .49 .59 .67 | TRAV.TIME (min) 43.69 22.76 17.03 14.23 12.51 | |

| Hadati Creek Watershed .57 100.07 .484E+03 .67 100.17 .594E+03 .76 100.26 .710E+03 .86 100.36 .832E+03 .95 100.45 .961E+03 1.05 100.55 .110E+04 1.16 100.66 .127E+04 1.28 100.78 .148E+04 1.39 100.89 .170E+04 1.50 101.00 .195E+04 1.61 101.11 .221E+04 1.72 101.22 .250E+04 1.84 101.34 .280E+04 1.95 101.45 .313E+04 | <pre>4 - Post Develop .7 .9 1.2 1.5 1.8 2.2 2.7 3.4 4.1 4.9 5.8 6.7 7.7 8.8</pre> | oment with Cit .74 .80 .86 .91 .96 1.00 1.07 1.14 1.20 1.25 1.30 1.34 1.38 1.41 | Eyview Ridge 11.32 10.43 9.74 9.18 8.72 8.32 7.80 7.31 6.94 6.65 6.41 6.22 6.04 5.90 |
|---|--|---|--|
| **** WARNING: INFLOW HYDROG | RAPH IS DRY!! | | |
| DUHYD (0520) Inlet Cap.=3.050 #of Inlets= 1 Total(cms)= 3.0 AREA (ha) TOTAL HYD.(ID= 1): 260.00 | 6.31 1. | 58 8.44 | |
| MAJOR SYS.(ID= 2): 59.59 MINOR SYS.(ID= 3): 200.41 | 3 26 1 | 58 8 4 4 | |
| NOTE: PEAK FLOWS DO NOT INC | LUDE BASEFLOWS | IF ANY. | |
| ROUTE CHN (0475) IN= 2> OUT= 1 Routing | time step (min) | '= 5.00 | |
| <pre>< DATA FOR St Distance Eleva 100.00 324 115.00 322 120.00 324 122.00 324 138.00 322 148.00 322 154.00 322</pre> | ECTION (1.1) ation Man 4.60 .0 1.60 .0 0.80 .0500 0.80 .0300 1.60 .0 2.30 .0 3.10 .0 | > ning 500 500 / .0300 Main / .0500 Main | Channel Channel |
| < TRAVI DEPTH ELEV VOLUME (m) (m) (cu.m.) .20 321.00 .398E+03 .40 321.20 .125E+04 .60 321.40 .255E+04 .80 321.60 .430E+04 1.00 321.80 .644E+04 1.20 322.00 .892E+04 1.40 322.20 .117E+05 1.60 322.40 .148E+05 1.80 322.60 .182E+05 2.00 322.80 .218E+05 2.20 323.00 .256E+05 2.40 323.20 .296E+05 | EL TIME TABLE - FLOW RATE (cms) .8 3.3 8.1 15.6 26.8 41.2 59.3 81.9 109.1 140.2 175.3 214.7 Page 21 | | RAV.TIME (min) 8.53 6.33 5.27 4.59 4.01 3.61 3.30 3.02 2.78 2.59 2.43 2.29 |

| Hadati Creek Watershed-Post Development with Cityview Ridge2.60323.40.338E+05258.63.292.182.80323.60.382E+05306.73.462.073.00323.80.428E+05359.13.611.983.20324.00.476E+05416.03.761.913.40324.20.526E+05477.53.911.833.60324.40.578E+05543.54.051.773.80324.60.632E+05614.34.181.71 | | | | | | | |
|--|--|--|--|--|--|--|--|
| INFLOW : ID= 2 (0470) OUTFLOW: ID= 1 (0475) | <pre>< hyc AREA QPEAK (ha) (cms) 48.70 1.53 48.70 1.10</pre> | Irograph> TPEAK R.V. (hrs) (mm) 1.33 6.64 1.42 6.64 | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) .26 .91 .23 .87 | | | | |
| ID1= 1 (0362): 3 + ID2= 2 (0359): 2 | | (hrs) (mm) 1.50 5.48 1.58 6.60 | | | | | |
| ID = 3 (0363): 5 NOTE: PEAK FLOWS DO NOT | | | | | | | |
| ADD HYD (0115) 1 + 2 = 3 | 0.96 .273 | 2.42 6.63 | | | | | |
| | 4.97 .596 | (hrs) (mm) 1.42 6.96 1.67 5.44 1.42 6.60 | | | | | |
| ID1= 1 (0525): | AREA QPEAK (ha) (cms) .00 .001 9.59 3.257 ======== Page 2 | .00 ******* 1.58 8.44 | | | | | |

Hadati Creek Watershed - Post Development with Cityview Ridge ID = 3 (0526): 59.59 3.257 1.58 8.44 8.44 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0380) | 1 + 2 = 3 | AREAQPEAKTPEAK(ha)(cms)(hrs)58.60.7691.50117.502.9601.42 R.V. _____ (mm) ID1= 1 (0363): 6.03 + ID2= 2 (0365): 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 OUTFLOWSTORAGEOUTFLOW(cms)(ha.m.)(cms).0000.0000.2910.2590.0579.2970.2660.11801.6320.2720.18024.1680.2790.24457.5660.2850.3109.0000 STORAGE (ha.m.) .3795 . 3795 . 4503 . 5232 . 5983 . 6756 7.5660 .0000 AREA OPEAK TPEAK R.V. (cms) (hrs) (ha) (mm) INFLOW : ID= 2 (0492) OUTFLOW: ID= 1 (0482) 24.970 24.970 . 596 1.42 6.60 .260 2.00 6.60 PEAK FLOW REDUCTION [Qout/Qin](%)= 43.68 TIME SHIFT OF PEAK FLOW (min)= 35.00 (min)= 35.00 (ha.m.)= .0700 MAXIMUM STORAGE USED _____ ROUTE CHN (0527) | IN= 2---> OUT= 1 | Routing time step (min)'= 5.00 <---- DATA FOR SECTION (1.1) ----> Distance Elevation Manning 140.00312.40.0500140.50312.40.0500 / .0300Main Channel140.50310.80.0300Main Channel141.50310.80.0300Main Channel142.00312.40.0300 / .0500Main Channel160.00313.20.0500 ----- TRAVEL TIME TABLE ---------->
 DEPTH
 ELEV
 VOLUME
 FLOW RATE
 VELOCITY

 (m)
 (m)
 (cu.m.)
 (cms)
 (m/s)

 .12
 310.92
 .575E+02
 .1
 .40

 .25
 311.05
 .119E+03
 .2
 .57
 TRAV.TIME (cms) .1 .2 .3 .4 .6 .8 1.1 (min) 18.86 13.13 . 69 .37 311.17 .185E+03 10.87 .78 .86 .92 .49 311.29 .256E+03 9.61 8.77 .330E+03 .409E+03 .62 311.42 .74 311.54 8.17 .492E+03 .86 311.66 .97 7.70 Page 23

| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | 8 .579E+03 1 .671E+03 3 .767E+03 5 .867E+03 8 .971E+03 0 .108E+04 3 .149E+04 7 .248E+04 0 .405E+04 3 .620E+04 7 .893E+04 0 .122E+05 | Post Development with C 1.3 1.02 1.6 1.07 1.9 1.11 2.2 1.15 2.6 1.19 2.9 1.23 3.6 1.10 4.9 .88 6.9 .77 10.1 .73 14.6 .74 20.7 .76 | | 7.32 7.01 6.74 6.50 6.29 6.11 6.85 8.52 9.74 10.21 10.17 9.85 | | | | |
|---|---|---|--|--|--|--|--|--|
| INFLOW : ID= 2 OUTFLOW: ID= 1 | AREA (ha) (0526) 59.59 (0527) 59.59 | < hydrogr QPEAK TPE (cms) (hr 3.26 1. 2.80 1. | raph> AK R.V. 's) (mm) 58 8.44 67 8.44 | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) 1.66 1.16 1.54 1.21 | | | | |
| RESERVOIR (0390) IN= 2> OUT= 1 DT= 5.0 min | - - OUTFLOW - (cms) .0000 | STORAGE (ha.m.) .0000 .2870 .9680 | OUTFLOW S (cms) (1.3100 1.8600 .0000 | TORAGE (ha.m.) 1.6000 23.2300 .0000 | | | | |
| OUTFLOW: ID= 1 | ARI (h: (0380) 176.10 (0390) 176.10 PEAK FLOW REI TIME SHIFT OF PE MAXIMUM STORAGE | a) (cms) 00 3.653 00 .982 DUCTION [Oout/ | 2.25 (0in](%)= 26. | (mm) 6.44 6.43 88 | | | | |
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | | | | | | | | |
| ID = 3 (0400): 227.30 1.022 1.58 5.25 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. | | | | | | | | |
| <pre>< 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 Page 24</pre> | | | | | | | | |

| 148.00 156.00 165.00 | 335. 336. 338. | 30 00 30 | .0500 .0500 .0000 | Cityview Ridge |
|---|---|--|--|---|
| <pre></pre> | TRAVEL VOLUME (cu.m.) .231E+04 .563E+04 .997E+04 .153E+05 .218E+05 .299E+05 .396E+05 .510E+05 .641E+05 .787E+05 .110E+06 .126E+06 .160E+06 .196E+06 .215E+06 .234E+06 | TIME TABLE FLOW RATE (cms) .9 3.2 7.3 13.4 22.7 35.3 51.2 70.7 94.1 122.4 155.6 192.8 233.9 278.9 327.7 380.3 436.7 496.9 561.0 | VELOCITY (m/s) .71 1.09 1.39 1.66 1.97 2.25 2.46 2.63 2.79 2.96 3.15 3.34 3.53 3.71 3.89 4.07 4.23 4.40 4.56 | TRAV.TIME (min) 44.52 29.11 22.72 19.04 16.04 14.10 12.89 12.02 11.35 10.71 10.06 9.48 8.97 8.53 8.13 7.79 7.48 7.20 6.95 |
| INFLOW : ID= 2 (040 OUTFLOW: ID= 1 (040 | AREA (ha) 00) 227.30 03) 227.30 | < hydr QPEAK (cms) 1.02 .88 | rograph> TPEAK R.V. (hrs) (mm) 1.58 5.25 3.17 5.25 | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) .17 .73 .16 .71 |
| ADD HYD (0407) 1 + 2 = 3 ID1= 1 (0403) : + ID2= 2 (0115) : | AREA (ha) 227.30 100.96 | QPEAK (cms) .881 .273 | TPEAK R.V (hrs) (mm 3.17 5.25 2.42 6.63 | /.)) |
| ID = 3 (0407): NOTE: PEAK FLOWS D | 328.26 | 1.112 | 2.83 5.67 | |
| | | | | |
| RESERVOIR (0113) IN= 2> OUT= 1 DT= 5.0 min | (cms) .0000 | STORAGE (ha.m.) .0000 2.9000 4.3000 | OUTFLOW (cms) 1.6000 9.1000 12.0000 | |
| INFLOW : ID= 2 (040 OUTFLOW: ID= 1 (011 | | a) (cm 60 1.1 | EAK TPEA Is) (hrs 12 2.8 154 5.8 | 5) (mm) 53 5.67 |
| PEAK | FLOW RE | DUCTION [QC Page 25 | out/Qin](%)= 3 | 31.88 |

| На | adati Creek W TIME SH MAXIMUN | atershed HIFT OF PE 1 STORAGE | - Post Deve AK FLOW USED | elopment (mi (ha.m | with Ci in)=180 n.)= | tyview Ric .00 .9343 | lge |
|---|--|---|---|---|--|---|-----|
| ADD HYD (1 + 2 = ID1 + ID2 | 0430) 3 = 1 (0113): = 2 (0425): | (ha) 328.26 29.19 | QPEAK (cms) .354 .948 | (hrs) 5.83 1.33 | (mm) 5.67 6.64 | | |
| ID | = 3 (0430): EAK FLOWS DO | 357.45 | .951 | 1.33 | 5.75 | | |
| ROUTE CHN (IN= 2> O | UT= 1 R | | | | | | |
| | $130.00 \\ 140.00 \\ 142.00 \\ 150.00 \\ 155.00 \\ 160.00$ | | | | | n Channel n Channel | |
| < DEPTH (m) .16 .33 .49 .65 .82 .98 1.14 1.31 1.47 1.63 1.79 1.96 2.12 2.28 2.45 2.61 2.77 2.94 3.10 | $\begin{pmatrix} m \\ 322.46 \\ 322.63 \\ 322.79 \\ 322.95 \\ 323.12 \\ 323.28 \\ 4323.28 \\ 4323.44 \\ 5323.44 \\ 5323.77 \\ 323.61 \\ 323.93 \\ 324.26 \\ 1324.26 \\ 1324.26 \\ 1324.26 \\ 1324.58 \\ 1324.58 \\ 1324.75 \\ 324.91 \\ 324.91 \\ 325.07 \\ 325.24 \\ 225$ | TRAVEL VOLUME cu.m.) 33E+03 572E+03 32E+04 16E+04 19E+04 33E+04 56E+04 56E+04 56E+04 89E+04 33E+04 56E+04 15E+05 54E+05 54E+05 54E+05 59E+05 59E+05 59E+05 30E+05 | (cms) .6 2.1 4.9 9.0 14.9 22.5 31.6 42.3 54.6 68.3 82.8 99.2 117.9 138.8 157.4 179.6 205.8 236.1 270.6 | (m) 1. 1. 1. 2. 2. 2. 2. 2. 2. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. 3. | (s) .96 .26 .48 .66 .87 .08 .27 .45 .62 .77 .87 .96 .06 .15 .14 .15 .18 .23 .28 | (m1n) 6.96 5.27 4.51 4.03 3.57 2.93 2.72 2.54 2.11 2.12 2.11 2.09 2.07 2.03 | |
| INFLOW : OUTFLOW: | ID= 2 (0430) ID= 1 (0440) | AREA (ha) 357.45 357.45 | < hyc QPEAK (cms) .95 .72 | Irograph - TPEAK (hrs) 1.33 1.42 | R.V. (mm) 5.75 5.75 | <-pipe / MAX DEPTH (m) .20 .18 | |

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0485) | 1 + 2 = 3AREA QPEAK TPEAK R.V. (mm) 6.64 _____ 5.75 ____ _____ ID = 3 (0485):406.15 1.820 1.42 5.86 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ------ADD HYD (0490) | AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 43.10 1.142 1.42 6.64 406.15 1.820 1.42 5.86 1 + 2 = 3 | R.V. (mm) ID1= 1 (0480): + ID2= 2 (0485): _____ -----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 | AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)449.252.9621.425.9324.97.2602.006.60 ID1= 1 (0490): + ID2= 2 (0482): ========= _____ _____ ID = 3 (0491): 474.22 3.086 1.425.97 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ RESERVOIR (0483) IN= 2---> OUT= 1 OUTFLOWSTORAGEOUTFLOWSTORAGE(cms)(ha.m.)(cms)(ha.m.).0000.00007.08002.4860.2760.06008.10003.32401.2000.34009.79804.64202.0400.618210.49407.43972.64001.163011.685010.30003.12001.707012.348011.4000 | DT= 5.0 min | AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)474.2203.0861.425.9474.2201.3442.005.9 (mm) 5.97 5.07 INFLOW : ID= 2 (0491) OUTFLOW: ID= 1 (0483) PEAK FLOW REDUCTION [Qout/Qin](%)= 43.57 TIME SHIFT OF PEAK FLOW (min)= 35.00 (ha.m.)= .3886 MAXIMUM STORAGE USED _____

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0530) 1 + 2 = 3AREA QPEAK TPEAK R.V. (mm) 5.97 (ha) (cms) (hrs) ID1= 1 (0483): 474.22 1.344 2.00 + ID2= 2 (0540): . 569 1.33 18.56 4.63 _____ ID = 3 (0530): 478.85 1.391 2.00 6.09NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0545) | 1 + 2 = 3AREA OPEAK TPEAK R.V. (ha) (cms) 478.85 1.391 59.59 2.796 (hrs) (mm) ID1= 1 (0530): 2.00 6.09 + ID2= 2 (0527): 1.67 8.44 _____ ID = 3 (0545): 538.44 4.086 1.67 6.35NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0546) 1 + 2 = 3 R.V. (mm) 6.35 AREA QPEAK (cms) TPEAK (ha) ------(hrs) ID1= 1 (0545): 538.44 4.086 1.67 6.35 + ID2= 2 (0542): 1.42 25.25 2.408 18.56 ID = 3 (0546):563.69 5.474 1.58 6.90 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. -----ADD HYD (0547) | AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 563.69 5.474 1.58 6.90 1 + 2 = 3ID1= 1 (0546): 563.69 5.474 + ID2= 2 (0543): 14.99 1.767 _____ 1.58 6.90 1.33 18.56 ____ ____ ID = 3 (0547): 578.68 6.1591.50 7.20 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ______ ADD HYD (0548) | QPEAK (cms) 1 + 2 = 3AREA (ha) R.V. TPEAK (hrs) (mm) 7.20 ID1= 1 (0547): 578.68 6.159 + ID2= 2 (0544): 1.13 .151 1.50 7.20 1.33 18.56 ID = 3 (0548): 579.81 6.220 1.50 7.22 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
Page 28
```

Hadati Creek Watershed - Post Development with Cityview Ridge

| READ STORM | | tyvie | w Ridae | OTTHYMO\C \5yrSCS12 ype II 12 | hr.stm | sian stor | - 193 |
|--|---|--|---|--|---|---|---|
| TIME hrs .25 .50 | RAIN mm/hr 1.34 1.34 | TIME hrs 3.25 | RAIN | TIME hrs 6.25 | RAIN | TIME hrs 9.25 | RAIN mm/hr 1.87 1.87 |
| .75 1.00 1.25 1.50 1.75 2.00 2.25 | 1.34 1.34 1.34 1.60 | 4.00 4.25 4.50 4.75 5.00 5.25 | 2.14 3.20 3.20 4.27 4.27 6.41 | 7.00 7.25 7.50 7.75 8.00 8.25 | 4.27 3.20 3.20 3.20 3.20 3.20 | 10.00 10.25 10.50 10.75 | 1.87 1.87 1.07 1.07 1.07 1.07 1.07 |
| 2.50 2.75 3.00 | 1.60 1.60 1.60 | 5.50 5.75 6.00 | 6.41 25.64 70.50 | 8.50 8.75 9.00 | 1.87 1.87 1.87 | $11.50 \\ 11.75 \\ 12.00$ | 1.07 1.07 1.07 |
| | | | | | | | |
| CALIB STANDHYD (0480) ID= 1 DT= 5.0 min | Area Total Im | (ha)= 4 p(%)= 4 | 3.10 2.00 c | Dir. Conn | . (%)= 2 | 21.00 | |
| Surface Area Dep. Storage Average Slope Length Mannings n | I (ha)= (mm)= (%)= (m)= = | MPERVIOU 18.10 1.50 2.00 680.00 .013 | IS PEF 2 | RVIOUS (i 25.00 5.00 2.00 40.00 .300 |) | | |
| NOTE: RAINFAI | LL WAS TR | ANSFORME | D TO | 5.0 MIN. | TIME STE | EP. | |
| .333 .417 .500 .583 .667 .750 .833 .917 1.000 1.083 | $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | TIME hrs 3.083 3.167 3.250 3.333 3.417 3.500 3.583 3.667 3.750 3.833 3.917 4.000 4.083 | RAIN mm/hr 2.14 2.14 2.14 2.14 2.14 2.14 2.14 2.14 | hrs 6.083 6.167 6.250 6.333 6.417 6.500 6.583 6.667 6.750 6.833 6.917 7.000 7.083 | RAIN mm/hr 9.61 9.61 9.61 9.61 9.61 4.27 4.27 4.27 4.27 4.27 4.27 3.20 | TIME hrs 9.08 9.17 9.25 9.33 9.42 9.50 9.58 9.67 9.75 9.83 9.92 10.00 10.08 | RAIN mm/hr 1.87 1.87 1.87 1.87 1.87 1.87 1.87 1.87 |
| 1.167 1.250 1.333 1.417 | 1.34 1.34 1.34 1.34 | 4.167 4.250 4.333 4.417 | 3.20 3.20 3.20 3.20 3.20 | 7.167 7.250 7.333 7.417 | 3.20 3.20 3.20 3.20 3.20 | 10.17 10.25 10.33 10.42 | 1.07 1.07 1.07 1.07 |

| Hadati Cr 1.50 1.58 1.66 1.75 1.83 1.91 2.00 2.08 2.16 2.25 2.33 2.41 2.50 2.58 2.66 2.75 2.83 2.91 3.00 | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$ | Development wi .20 7.500 .27 7.583 .27 7.667 .27 7.750 .27 7.917 .27 8.000 .41 8.083 .41 8.167 .41 8.250 .41 8.333 .41 8.417 .41 8.500 .64 8.583 .64 8.667 .64 8.750 .50 8.833 .50 8.917 .50 9.000 | th Cityview Ridg 3.20 10.50 3.20 10.58 3.20 10.67 3.20 10.75 3.20 10.83 3.20 10.92 3.20 11.00 1.87 11.08 1.87 11.08 1.87 11.25 1.87 11.33 1.87 11.42 1.87 11.50 1.87 11.58 1.87 11.58 1.87 11.67 1.87 11.75 1.87 11.83 1.87 11.92 1.87 12.00 | ge 1.07 1. |
|---|---|--|--|--|--|
| Max.Eff.Inten.(over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | nm/hr)= (min) (min)= (min)= (cms)= | 70.50 10.00 7.54 (ii 10.00 .13 | 81.70 20.00) 16.07 (ii) 20.00 .06 | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (mm)= | 1.52 6.00 51.91 53.41 .97 | 2.56 6.17 14.24 53.41 .27 | *TOTALS* 3.608 (iii 6.08 22.15 53.41 .41 |) |
| Fc (mm, (ii) TIME STEP | /hr)= 75.00 /hr)= 12.50 (DT) SHOU STORAGE CO | 0 O Cum.In LD BE SMALLE EFFICIENT. | K (1/hr)= 4. f. (mm)= R OR EQUAL | | |
| CALIB STANDHYD (0415) ID= 1 DT= 5.0 min | | (ha)= 4.9 np(%)= 42.0 | | .(%)= 21.00 | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 2.10 1.50 2.86 185.00 .013 | PERVIOUS (i) 2.89 5.00 2.86 40.00 .300 |) | |
| Max.Eff.Inten.(r over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | (min) (min)= (min)= | 70.50 5.00 3.10 (ii 5.00 .27 | 81.70 15.00) 10.77 (ii) 15.00 .09 | | |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL | (cms)= (hrs)= (mm)= (mm)= | .20 6.00 51.91 53.41 Page | .39 6.08 14.24 53.41 2 30 | *TOTALS* .532 (iii 6.00 22.15 53.41 |) |

Hadati Creek Watershed - Post Development with Cityview Ridge 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) = 4.14Fc (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)=24.20ID= 1 DT= 5.0 minTotal Imp(%)=42.00Dir. Conn.(%)=21.00 IMPERVIOUS PERVIOUS (i) Surface Area Dep. Storage (ha)= 10.16 14.04 1.50 2.00 5.00 (mm)= Average Slope (%)= 401.00 Length (m) =40.00 Mannings n .013 .300 -Max.Eff.Inten.(mm/hr) =70.50over (min)5.00Storage Coeff. (min) =5.49 (ii)Unit Hyd. Tpeak (min) =5.00Unit Hyd. peak (cms) =.20 81.70 15.00 14.03 (ii) 15.00 .20 Unit Hyd. peak (cms)= .08 *TOTALS* RUNOFF VOLUME(hrs)=.95RUNOFF VOLUME(mm)=51.91TOTAL RAINFALL(mm)=53.41RUNOFF COEFFICIENT=.97 1.66 6.08 2.307 (iii) 6.00 14.25 53.41 .27 14.24 22.15 53.41 .41 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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) | ID= 1 DT= 5.0 min | Area (ha)= 36.00 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 -----------------PERVIOUS (i) IMPERVIOUS 15.12 Surface Area (ha) =20.88 1.50 2.03 465.00 5.00 2.03 Dep. Storage (mm) =Average Slope (%)= Length (m) =40.00 .300 Mannings n .013

 max.ETT.Inten.(mm/hr)=
 70.50

 over (min)
 5.00

 Storage Coeff. (min)=
 5.97 (ii)

 Unit Hyd. Tpeak (min)=
 5.00

 Unit Hyd. peak (cms)=
 .19

 81.70 15.00 14.47 (ii) 15.00 .08 *TOTALS*

Page 31

| Hadati Creek Watershed - Post Development with Cityview Ridge 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: |
|---|
| <pre>(1) HORTON'S EQUATION SELECTED FOR PERVIOUS LOSSES: F0 (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.</pre> |
| 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 |
| 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. |
| CALIB STANDHYD (0395) Area (ha)= 51.20 ID= 1 DT= 5.0 min Tota] Imp(%)= 10.00 Dir. Conn.(%)= 5.00 |
| IMPERVIOUSPERVIOUS (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 Page 32 |

| Hadati Creek Wat Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | ershed - Post Dev 8.92 (ii) 10.00 .12 | 18.68 (ii) 20.00 .06 | Cityview Ridge *TOTALS* |
|---|---|--|--|
| PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | .41 6.00 51.91 53.41 .97 | 2.36 6.25 9.64 53.41 .18 | 2.601 (iii) 6.17 11.75 53.41 .22 |
| ***** WARNING:FOR AREAS WITH YOU SHOULD CON | H IMPERVIOUS RATI NSIDER SPLITTING | | |
| (i) HORTONS EQUATION Fo (mm/hr)= 75 Fc (mm/hr)= 12 (ii) TIME STEP (DT) SH THAN THE STORAGE (iii) PEAK FLOW DOES NO | 5.00 K 2.50 Cum.Inf. HOULD BE SMALLER COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 OR EQUAL | |
| CALIB STANDHYD (0360) Area ID= 1 DT= 5.0 min Tota | (ha)= 30.00 Imp(%)= 37.00 | Dir. Conn.(%) | = 19.00 |
| Surface Area (ha)= Dep. Storage (mm)= Average Slope (%)= Length (m)= Mannings n = | IMPERVIOUS 11.10 1.50 2.00 447.00 .013 | PERVIOUS (i) 18.90 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | 70.50 5.00 5.86 (ii) 5.00 .20 | 15.00 14.65 (ii) 15.00 .08 | *TOTALS* |
| TIME TO PEAK (hrs)= | 51.91 53.41 | 1.94 | 2.582 (iii) 6.00 20.64 53.41 .39 |
| ***** WARNING:FOR AREAS WITH YOU SHOULD CON | I IMPERVIOUS RATI NSIDER SPLITTING | | |
| <pre>(i) HORTONS EQUATION Fo (mm/hr)= 75 Fc (mm/hr)= 12 (ii) TIME STEP (DT) SH THAN THE STORAGE (iii) PEAK FLOW DOES NO</pre> | 5.00 K 2.50 Cum.Inf. HOULD BE SMALLER COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 OR EQUAL | |
| CALIB STANDHYD (0350) Area ID= 1 DT= 5.0 min Tota | (ha)= 16.30 Imp(%)= 42.00 | Dir. Conn.(%) | = 21.00 |
| Surface Area (ha)= | IMPERVIOUS 6.85 Page 3 | 9.45 | |

| Hadati Cr Dep. Storage Average Slope Length Mannings n | <pre>eek Watershed (mm)= (%)= (m)= 3 =</pre> | - Post Deve 1.50 1.00 30.00 .013 | lopment with 5.00 1.00 40.00 .300 | Cityview Ridge |
|---|---|--|--|--|
| Max.Eff.Inten.(r over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | nm/hr)= (min) (min)= (min)= (cms)= | 70.50 5.00 6.01 (ii) 5.00 .19 | 77.46 20.00 16.75 (ii) 20.00 .06 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .63 6.00 51.91 53.41 .97 | .95 6.17 14.24 53.41 .27 | 1.186 (iii) 6.00 22.15 53.41 .41 |
| FC (mm, (ii) TIME STEP | /hr)= 75.00 /hr)= 12.50 (DT) SHOULD STORAGE COEFF: | K Cum.Inf. BE SMALLER O ICIENT. | (1/hr)= 4.14 (mm)= .00 R EQUAL | |
| CALIB STANDHYD (0355) ID= 1 DT= 5.0 min | Area (ha Total Imp(S | a)= 12.30 %)= 42.00 | Dir. Conn.(%) | = 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= 28 | 5.17 1.50 1.60 36.00 | ERVIOUS (i) 7.13 5.00 1.60 40.00 .300 | |
| Max.Eff.Inten.(n over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | nm/hr)= 7 (min) (min)= (min)= (cms)= | 70.50 5.00 4.79 (ii) 5.00 .22 | 81.70 15.00 13.92 (ii) 15.00 .08 | *TOTALS* |
| TIME TO PEAK | (hrs)= (mm)= (mm)= | 53.41 | .85 6.08 14.24 53.41 .27 | 1.183 (iii) 6.00 22.15 53.41 .41 |
| ***** WARNING: STORAG | GE COEFF. IS | SMALLER THAN | TIME STEP! | |
| (ii) TIME STEP | /hr)= 75.00 /hr)= 12.50 (DT) SHOULD (STORAGE COEFF: | K Cum.Inf. BE SMALLER OI ICIENT. | (1/hr)= 4.14 (mm)= .00 R EQUAL | |
| CALIB STANDHYD (0365) | Area (ha | a)= 117.50 Page 34 | | |

Hadati Creek Watershed - Post Development with Cityview Ridge |ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn. (%) = 21.00**IMPERVIOUS** PERVIOUS (i) 49.35 1.50 Surface Area (ha) =68.15 Dep. Storage (mm) =5.00 Average Slope (%)= 2.00 2.00 (m)= Length 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)= Unit Hyd. peak (cms)= 10.00 20.00 .12 .06 ***TOTALS*** PEAK FLOW (cms) =6.70 3.95 9.481 (iii) TIME TO PEAK (hrs) =6.00 6.17 6.08 51.91 53.41 RUNOFF VOLUME (mm) =14.24 22.15 53.41 TOTAL RAINFALL (mm)= 53.41 53.41 RUNOFF COEFFICIENT = .97 .41 .27 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.1K (1/hr)= 4.14 Cum.Inf. (mm)= .00 FC (mm/hr) = 12.50(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) (ha) = 51.32Area ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn. (%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =21.55 29.77 5.00 Dep. Storage (mm) =1.50 Average Slope (%)= 2.00 2.00 550.00 Length (m)= 40.00 Mannings n .013 .300 81.70 Max.Eff.Inten.(mm/hr)= 70.50 5.00 over (min) 20.00 Storage Coeff. (min)= 6.64 (ii) 15.17 (ii) Unit Hyd. Tpeak (min)= 5.00 20.00 Unit Hyd. peak (cms)= .07 .18 *TOTALS* 3.14 6.17 PEAK FLOW (cms) =1.96 3.870 (iii) TIME TO PEAK 6.00 (hrs) =6.08 RUNOFF VOLUME (mm) =51.91 14.24 22.15 53.41 53.41 TOTAL RAINFALL (mm) =53.41 .27 RUNOFF COEFFICIENT = .97 .41 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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.

Hadati Creek Watershed - Post Development with Cityview Ridge CALIB STANDHYD (0102) (ha) = 14.32Area ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =6.01 8.31 Dep. Storage (mm)= 1.50 5.00 Average Slope (%)= 2.00 2.00 287.00 Length (m) =40.00 Mannings n .013 .300 ____ Max.Eff.Inten.(mm/hr)= 70.50 81.70 15.00 over (min) 5.00 Storage Coeff. 4.49 (ii) (min) =13.03 (ii) Unit Hyd. Tpeak (min)= 5.00 15.00 Unit Hyd. peak (cms)= .23 .08 ***TOTALS*** .58 6.00 PEAK FLOW (cms) =1.02 1.415 (iii) TIME TO PEAK (hrs) =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! K (1/hr) = 4.14(mm/hr) = 12.50Cum.Inf. FC (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 (0101) | ID= 1 DT= 5.0 min | Area (ha)= 16.32 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 PERVIOUS (i) **IMPERVIOUS** Surface Area (ha) =9.47 6.85 5.00 Dep. Storage (mm) =1.50 2.00 Average Slope (%)= 2.00 309.00 Length (m) =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) 6.00 6.08 TIME TO PEAK (hrs) =RUNOFF VOLUME 51.91 (mm) =14.24 22.15 TOTAL RAINFALL (mm) =53.41 53.41 53.41 .27 RUNOFF COEFFICIENT = .97 .41 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00K (1/hr) = 4.14Cum.Inf. FC (mm/hr) = 12.50(mm) =.00 Page 36

Hadati Creek Watershed - Post Development with Cityview Ridge (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) (ha) = 19.00Area ID= 1 DT= 5.0 min Total Imp(%) = 42.00Dir. Conn.(%) = 21.00------IMPERVIOUS PERVIOUS (i) Surface Area (ha) =7.98 11.02 1.50 Dep. Storage (mm) =5.00 Average Slope (%)= 2.00 2.00 365.00 Length (m)= 40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 70.50 81.70 5.00 5.19 (ii) 5.00 .21 over (min) 15.00 Storage Coeff. 13.73 (ii) (min)= Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .08 *TOTALS* 1.32 6.08 1.831 (iii) 6.00 14.24 22.15 53.41 53.41 .27 41 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00FO FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALIB STANDHYD (0600) ID= 1 DT= 5.0 min Area (ha)= 11.38 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 IMPERVIOUS PERVIOUS (i) 6.60 Surface Area (ha) =4.78 1.50 5.00 Dep. Storage (mm)= 2.00 Average Slope (%)= 2.00 (m)= Length 680.00 40.00 Mannings n .300 .013 Max.Eff.Inten.(mm/hr)= 70.50 81.70 10.00 7.54 (ii) 10.00 over (min) 20.00 Storage Coeff. (min) =16.07 (ii) Unit Hyd. Tpeak (min)= 20.00 Unit Hyd. peak (cms)= .13 .06 *TOTALS* .40 6.00 51.91 53 41 .68 6.17 PEAK FLOW (cms) =.953 (iii) TIME TO PEAK (hrs) =6.08 14.24 (mm)= (mm)= RUNOFF VOLUME 22.15 TOTAL RAINFALL 53.41 53.41 RUNOFF COEFFICIENT = .97 .27 .41

Hadati Creek Watershed - Post Development with Cityview Ridge (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr)=75.00 K (1/hr)=4.14FC (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. _____ CAL TB STANDHYD (0601) |ID= 1 DT= 5.0 min | Area (ha)= 7.62 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 2.00 2.00 Average Slope (%)= 680.00 Length (m) =40.00 Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 70.50 over (min) 10.00 Storage Coeff. (min)= 7.54 (ii) Unit Hyd. Tpeak (min)= 10.00 Unit Hyd. peak (cms)= .13 89.23 20.00 15.78 (ii) 20.00 Unit Hyd. peak (cms)= .07 *TOTALS* (hrs)= .27 (hrs)= 6.00 (mm)= 51.91 (mm)= 53.41 NT = 07 .49 6.17 PEAK FLOW .679 (iii) TIME TO PEAK 6.08 RUNOFF VOLUME 15.62 23.24 TOTAL RAINFALL 53.41 53.41 RUNOFF COEFFICIENT = .29 .44 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC .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) (ha)= 5.97 Area ID= 1 DT= 5.0 min Total Imp(%) = 42.00Dir. Conn.(%)= 2.50 -----IMPERVIOUS PERVIOUS (i) 2.51 1.50 Surface Area (ha) =3.46 Dep. Storage (mm) =5.00 2.00 2.00 Average Slope (%)= Length (m)= 680.00 40.00 Mannings n .013 .300 $70.50 \\ 10.00 \\ 7.54 \\ 10.00 \\ 10.00$ Max.Eff.Inten.(mm/hr)= 105.29 over (min) 20.00 Storage Coeff. (min)= 7.54 (ii) 15.25 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 20.00 .13 .07 .03 6.00 51.0 ***TOTALS*** PEAK FLOW (cms) =.534 (iii) .52 6.17 6.17 TIME TO PEAK (hrs) =RUNOFF VOLUME 17.87 (mm) =18.72 TOTAL RAINFALL (mm) =53.41 53.41 Page 38

| Hadati Creek Water RUNOFF COEFFICIENT = | ershed - Post Development with Cityview Ridge .97 .33 .35 | | | | | | | | | |
|--|---|--|--|--|--|--|--|--|--|--|
| **** WARNING:FOR AREAS WITH YOU SHOULD CONS | IMPERVIOUS RATIOS BELOW 20% SIDER SPLITTING THE AREA. | | | | | | | | | |
| (i) HORTONS EQUATION S Fo (mm/hr)= 75. | (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) SHO THAN THE STORAGE C | OULD BE SMALLER OR EQUAL COEFFICIENT. | | | | | | | | | |
| (111) PEAK FLOW DOES NOT | T INCLUDE BASEFLOW IF ANY. | | | | | | | | | |
| CALIB STANDHYD (0540) Area ID= 1 DT= 5.0 min Tota] | (ha)= 4.63 Imp(%)= 80.00 Dir. Conn.(%)= 79.00 | | | | | | | | | |
| Surface Area (ha)= | IMPERVIOUS PERVIOUS (i) 3.70 .93 | | | | | | | | | |
| Average Slope (%)= Length (m)= Mannings n = | IMPERVIOUS PERVIOUS (i) 3.70 .93 1.50 5.00 .55 .55 150.00 40.00 .013 .300 | | | | | | | | | |
| | | | | | | | | | | |
| Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | 70.50 30.06 5.00 25.00 4.48 (ii) 23.24 (ii) 5.00 25.00 .23 .05 *TOTALS* | | | | | | | | | |
| PEAK FLOW (CMS)= TIME TO PEAK (hrs)= RUNOFE VOLUME (MM)= | .70 .04 .713 (iii) 6.00 6.25 6.00 51.91 9.54 43.01 53.41 53.41 53.41 .97 .18 .81 | | | | | | | | | |
| TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | 53.41 53.41 53.41 .97 .18 .81 | | | | | | | | | |
| ***** WARNING: STORAGE COEFF. | | | | | | | | | | |
| (i) HORTONS EQUATION S Fo (mm/hr)= 75. Fc (mm/hr)- 12 | SELECTED FOR PERVIOUS LOSSES: .00 K (1/hr)= 4.14 .50 Cum.Inf. (mm)= .00 | | | | | | | | | |
| (ii) TIME STEP (DT) SHO THAN THE STORAGE C | OULD BE SMALLER OR EQUAL COEFFICIENT. | | | | | | | | | |
| (111) PEAK FLOW DOES NOT | T INCLUDE BASEFLOW IF ANY. | | | | | | | | | |
| CALIB STANDHYD (0500) Area ID= 1 DT= 5.0 min Tota] | (ha)= 244.00 Imp(%)= 46.00 Dir. Conn.(%)= 26.00 | | | | | | | | | |
| | IMPERVIOUS PERVIOUS (i) | | | | | | | | | |
| Dep. Storage (mm)= Average Slope (%)= | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | | | | | | | | | |
| Max.Eff.Inten.(mm/hr)= over (min) | 70.50 78.43 15.00 30.00 | | | | | | | | | |
| Storage Coeff. (min)= Unit Hyd. Tpeak (min)= | 14.47 (ii) 25.89 (ii) 15.00 30.00 Page 39 | | | | | | | | | |

Hadati Creek Watershed - Post Development with Cityview Ridge Unit Hyd. peak (cms)= .08 .04 ***TOTALS*** 9.34 PEAK FLOW (cms) =8.08 14.467 (iii) 6.33 6.25 24.12 14.36 53.41 53.41 .27 .45 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (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) | |ID= 1 DT= 5.0 min | Area (ha)= 16.00 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 _____ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =3.20 12.80 1.50 .50 Dep. Storage (mm) =5.00 .20 Average Slope (%)= 40.00 Length 400.00 (m) =Mannings n .300 = .013 Max.Eff.Inten.(mm/hr)= 70.50 20.04 10.00 8.31 (ii) 10.00 over (min) 40.00 Storage Coeff. (min) =38.19 (ii) Unit Hyd. Tpeak (min)= 40.00 Unit Hyd. peak (cms)= .13 .03 *TOTALS* PEAK FLOW(cms)=2.06TIME TO PEAK(hrs)=6.00RUNOFF VOLUME(mm)=51.91TOTAL RAINFALL(mm)=53.41 .09 6.50 9.54 2.080 (iii) 6.00 43.01 53.41 53.41 53.41 RUNOFF COEFFICIENT = .97 .18 .81 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00FO FC (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) ID= 1 DT= 5.0 min Area (ha)= 25.25 Total Imp(%) = 80.00Dir. Conn. (%) = 79.00______ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =20.20 5.05 1.50 5.00 Dep. Storage (mm) =.55 Average Slope .55 (%)= 40.00 Length (m) =Mannings n . 300 .013 = 70.50 Max.Eff.Inten.(mm/hr)= 30.06 Page 40

Hadati Creek Watershed - Post Development with Cityview Ridge 5.00 over (min) 30.00 7.45 (ii) Storage Coeff. (min)= 26.21 (ii) 5.00 Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 30.00 .17 .04 *TOTALS* (cms)= 3.56 (hrs)= 6.00 (mm)= 51.91 (mm)= 53.41 IENT = .97 .19 6.33 9.54 PEAK FLOW 3.608 (iii) TIME TO PEAK 6.00 RUNOFF VOLUME 43.01 TOTAL RAINFALL 53.41 53.41 RUNOFF COEFFICIENT = .18 .81 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (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) = 14.99ID= 1 DT= 5.0 min Total Imp(%) = 80.00Dir. Conn.(%)= 79.00 _____ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =11.99 3.00 1.50 .55 200.00 .013 Dep. Storage (mm) =5.00 55 Average Slope (%)= Length (m)= 40.00 Mannings n = .300 Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 70.50 5.00 5.00 25. *TOTALS* LAN FLUW(CMS)=2.23TIME TO PEAK(hrs)=6.00RUNOFF VOLUME(mm)=51.91TOTAL RAINFALL(mm)=53.41RUNOFF COEFFICIENT=.97 .12 6.33 9.54 2.271 (iii) 6.00 43.01 53.41 53.41 53.41 .18 .81 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00Fo FC (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) ID= 1 DT= 5.0 min Area (ha)= 1.13 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 IMPERVIOUS PERVIOUS (i) Surface Area Dep. Storage Average Slope Length Page 41

Hadati Creek Watershed - Post Development with Cityview Ridge Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)=

 Storage Coeff. (min)
 5.00

 Unit Hyd. Tpeak (min)=
 2.32 (ii)

 Unit Hyd. peak (cms)=
 .30

 PEAK FLOW

 70.50 30.06 25.00 21.08 (ii) 25.00 .05 *TOTALS* (cms)= .17 (hrs)= 6.00 (mm)= 51.91 (mm)= 53.41 .01 6.25 PEAK FLOW .178 (iii) TIME TO PEAK 6.00 RUNOFF VOLUME 9.54 43.01 TOTAL RAINFALL 53.41 53.41 RUNOFF COEFFICIENT = .97 .18 .81 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. .00 STORE HYD (0525) AREA (ha)= ID= 1 DT=****min | .00 QPEAK (cms) =TPEAK (hrs) =.00 (mm)=****** VOLUME ADD HYD (0420) | 1 + 2 = 3R.V. (mm) 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 (ha) (cms) 36.00 3.376 12.70 1.226 R.V. (mm) 22.15 TPEAK ------(hrs) ID1= 1 (0460): 6.00 + ID2= 2 (0455): 6.00 22.15 ID = 3 (0465): 48.70 4.602 6.0022.15 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 Page 42

| Ha | dati Creek .00 5.50 5.51 10.00 14.49 14.50 20.00 | | .09 . .00 . .15 .0150 | 0300 V 0150 ма | in Channel | ge |
|---|---|---|--|--|---|--|
| < DEPTH (m) .02 .04 .06 .08 .09 .11 .13 .15 .17 .20 .22 .24 .24 .26 .29 .31 .33 .35 .38 .40 | ELEV (m) .02 .04 .06 .08 .09 .11 .13 .15 .17 .20 .22 .24 .26 .29 .31 .33 .35 .38 | VOLUME (cu.m.) .176E+02 .702E+02 .158E+03 .281E+03 .438E+03 .607E+03 .776E+03 .944E+03 | L TIME TABLE FLOW RATE (cms) .0 .1 .1 .3 .5 .7 1.0 1.3 1.8 2.3 2.8 3.4 4.0 4.8 5.5 6.4 7.3 8.2 | VELOCITY (m/s) .21 .33 .43 .52 .62 .77 .90 1.03 1.16 1.27 1.36 1.44 1.51 1.57 1.62 1.67 1.72 1.76 | TRAV.TIME (min) 80.52 50.72 38.71 31.95 26.84 21.66 18.45 16.22 14.36 13.13 12.24 11.58 11.05 10.63 10.27 9.97 9.71 | |
| INFLOW : OUTFLOW: | ID= 2 (03) ID= 1 (03) | AREA (ha) 60) 30.00 62) 30.00 | < hydro QPEAK T (cms) (2.58 2.01 | graph> PEAK R.V. hrs) (mm) 6.00 20.64 6.17 20.63 | <-pipe / c MAX DEPTH (m) .23 .21 | hannel-> MAX VEL (m/s) 1.41 1.31 |
| ROUTE CHN (0 IN= 2> OU | IT= 1 | DATA FOR SE Eleva | tion Ma .26 . .15 .0300 .00 . .09 . .00 . .15 .0150 | .)> Inning 0300 0 / .0150 Ma 0150 Ma 0150 Ma 0150 Ma | in Channel in Channel in Channel in Channel in Channel | |
| < DEPTH (m) .01 .03 .04 .05 .07 .08 .10 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 | TRAVE VOLUME (cu.m.) .929E+01 .372E+02 .836E+02 .149E+03 .232E+03 .334E+03 .454E+03 | L TIME TABLE FLOW RATE (cms) .0 .0 .0 .1 .1 .1 .2 .3 Page 43 | VELOCITY (m/s) .17 .27 .35 .42 .49 .55 .64 | TRAV.TIME (min) 99.56 62.72 47.86 39.51 34.05 30.15 26.24 | |

| .11 .12 .14 .15 .16 .18 .19 .20 | .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .23 .25 | .576E+03 .699E+03 .822E+03 .944E+03 .108E+04 .123E+04 .140E+04 .159E+04 | . 4 | opment with C .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 | 22.41 19.75 17.76 16.22 15.07 14.28 13.72 13.31 13.01 | ge |
|--|--|--|---|--|--|--|
| INFLOW : OUTFLOW: | ID= 2 (035 ID= 1 (035 | AREA (ha) 0) 16.30 3) 16.30 | < hydrc QPEAK 1 (cms) (1.19 .95 | ograph> PEAK R.V. (hrs) (mm) 6.00 22.15 6.25 22.11 | <-pipe / c MAX DEPTH (m) .16 .15 | hannel-> MAX VEL (m/s) 1.10 1.02 |
| ROUTE CHN ((IN= 2> O | 0358) JT= 1 | Routing ti | me step (mir | a)'= 5.00 | | |
| | Distance .00 5.50 5.51 10.00 14.49 14.50 20.00 | Elevat | 09 00 15 26 | 0300 0300 0/.0150 Ma 0150 Ma 0150 Ma 0150 Ma 0150 Ma 0300 | in Channel | |
| < DEPTH (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 | TRAVEL VOLUME (cu.m.) .102E+02 .409E+02 .920E+02 .163E+03 .255E+03 .368E+03 .499E+03 .634E+03 .769E+03 .904E+03 .104E+04 .119E+04 .135E+04 .154E+04 .154E+04 .154E+04 .23E+04 .250E+04 .279E+04 | FLOW RATE (cms) .0 .0 .1 .1 .2 .3 .4 .6 .8 1.0 1.2 1.4 1.7 2.0 2.3 2.6 3.0 3.4 | .64 .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 | TRAV.TIME (min) 109.52 68.99 52.65 43.46 37.45 33.17 28.86 24.66 21.72 19.54 17.84 16.57 15.71 15.10 14.65 14.31 14.04 13.82 13.65 | |
| INFLOW : OUTFLOW: | ID= 2 (035 ID= 1 (035 | AREA (ha) 5) 12.30 8) 12.30 | | ograph> PEAK R.V. (hrs) (mm) 6.00 22.15 6.17 22.10 | <-pipe / c MAX DEPTH (m) .16 .13 | hannel-> MAX VEL (m/s) 1.10 .92 |

RESERVOIR (0106) | IN= 2---> OUT= 1DT= 5.0 min OUTFLOW STORAGE OUTFLOW STORAGE ha.m.) (cms) .0000 .5000 .0100 6.6000 .2300 .0000 -----(cms) (ha.m.) (ha.m.) .0000 .0000 .4000 .8000 .0100 .0260 .0000 AREA QPEAK TPEAK R.V. (cms) 3.870 (ha) (hrs) (mm) INFLOW : ID= 2 (0105) OUTFLOW: ID= 1 (0106) 51.320 51.320 6.08 22.15 2.731 22.14 6.33 PEAKFLOWREDUCTION[Qout/Qin](%)=70.57TIME SHIFT OF PEAKFLOW(min)=15.00MAXIMUMSTORAGEUSED(ha.m.)=.5507 _____ ------ADD HYD (0103) | 1 + 2 = 3 | QPEAK (cms) AREA AKL (ha) 32 TPEAK R.V. (mm) 22.15 -----(hrs) 14.32 1.415 16.32 1.601 ID1= 1 (0102): + ID2= 2 (0101): 1.415 6.00 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) 1.0000 20.0000 .0000 _____ (cms) (ha.m.) (ha.m.) .0000 1.0000 1.1000 .0000 .0100 .0100 .0120 .1000 .0000 TPEAK QPEAK (cms) 1.831 AREA R.V. (hrs) 6.00 6.58 (mm) (ha) 19.000 INFLOW : ID= 2 (0110) 22.15 OUTFLOW: ID= 1 (0111) .238 19.000 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 | TPEAK AREA QPEAK R.V. _____ (mm) ID = 3 (0602): 19.00 1.632 6.08 22.59Page 45

Hadati Creek Watershed - Post Development with Cityview Ridge

Hadati Creek Watershed - Post Development with Cityview Ridge NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

(0505) DUHYD Inlet Cap.=9.000 #of Inlets= 1 Total(cms)= 9.0 AREA QPEAK TPEAK R.V. TOTAL HYD.(ID= 1): 244.00 14.47 (hrs) (mm) 6.25 24.12 -----MAJOR SYS.(ID= 2): 33.53 5.47 6.25 MINOR SYS.(ID= 3): 210.47 9.00 6.00 24.12 24.12 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0515) | 1 + 2 = 3 |

 2 = 3
 |
 AREA
 QPEAK
 TPEAK
 R.V.

 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 25.46NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. DUHYD (0425) Inlet Cap.=1.980

 #of Inlets=
 1

 #of Inlets=
 1

 Total(cms)=
 2.0
 AREA
 QPEAK
 TPEAK
 R.V.

 TOTAL HYD.(ID=
 1):
 29.19
 2.84
 6.00
 22.15

 _____ MAJOR SYS.(ID= 2): 2.28 .86 6.00 MINOR SYS.(ID= 3): 26.91 1.98 6.00 22.15 22.15 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0470) 1 + 2 = 3 R.V. (mm) 22.15 22.15 50.98 5.461 6.00 ID = 3 (0470):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) Page 46

Hadati Creek Watershed - Post Development with Cityview Ridge ID1= 1 (0353): 16.30 .952 6.25 22.11 ID2= 2 (0358): 12.30 .744 6.17 22.10 + ID2= 2 (0358): ______ ID = 3 (0359): 28.60 1.680 6.2522.11 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ______ RESERVOIR (0104) IN= 2---> OUT= 1 DT= 5.0 min OUTFLOWSTORAGEOUTFLOW(cms)(ha.m.)(cms).0000.00001.0000.0100.010010.0000.0150.1332.0000 STORAGE (ha.m.) . 5000 .6000 .0000 AREA QPEAK (ha) (cms) 30.640 3.016 30.640 .801 ΤΡΕΑΚ R.V. (hrs) 6.00 6.42 (mm) 22.15 INFLOW : ID= 2 (0103) OUTFLOW: ID= 1 (0104) 22.14 PEAKFLOWREDUCTION[Qout/Qin](%)=26.57TIMESHIFTOFPEAKFLOW(min)=25.00 (min) = 25.00(ha.m.)= .4263 MAXIMUM STORAGE USED ADD HYD (0114) AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)30.64.8016.4222.1419.00.2386.5822.14 1 + 2 = 3______ ID1= 1 (0104): + ID2= 2 (0111): ID = 3 (0114): 49.64 1.029 6.50 22.14NOTE: 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 .00 1.00 .0350 .50 .0350 .00 .0350 / .0350 Main Channel .00 .0350 Main Channel 2.00 4.00 4.50 .00 .0350 / .0350 Main Channel 5.00 .0350 7.00 .50 9.00 1.00 .0350 <---->
 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
 (cms) .0 .1 .3 .6 .9 1.3 Page 47

 .64
 3.06

 .96
 2.03

 1.21
 1.61

 1.42
 1.37

 1.61
 1.21

 1.77
 1.10

 Page 47

| . 37 | | .107E+03 | 1.8 | 2.22 2.35 2.48 | ityview Ridge 1.01 .94 .88 .83 .79 .75 .72 .69 .66 .64 .62 .60 .58 | ž |
|---------------------------|--|---|--|---|---|---|
| | | | | ograph> TPEAK R.V. (hrs) (mm) 6.08 22.59 6.08 22.59 | <-pipe / ch MAX DEPTH (m) .35 .35 | annel-> MAX VEL (m/s) 1.89 1.88 |
| ROUTE CHN (IN= 2> 0 | 0564) UT= 1 | Routing tim | ne step (mir | ı)'= 5.00 | | |
| | .00 1.00 1.50 2.00 3.50 4.50 6.00 | 101. 100. 100. 99. 99. 100. 101. | +J . | 0500 0500 0 / .0300 Mat 0300 Mat 0300 Mat 0 / .0500 Mat | | |
| DEPTH (m) .10 | 100.07 100.17 100.26 100.36 100.45 100.55 100.66 100.78 100.89 101.00 101.11 101.22 101.34 | TRAVEL VOLUME (cu.m.) .353E+02 .112E+03 .195E+03 .285E+03 .381E+03 .484E+03 .594E+03 .710E+03 .832E+03 .961E+03 .110E+04 .127E+04 .127E+04 .127E+04 .195E+04 .221E+04 .250E+04 .280E+04 .313E+04 | TIME TABLE FLOW RATE (cms) .0 .1 .2 .3 .5 .7 .9 1.2 1.5 1.8 2.2 2.7 3.4 4.1 4.9 5.8 6.7 7.7 8.8 | VELOCITY (m/s) .19 .37 .49 .59 .67 .74 .80 .86 .91 .96 1.00 1.07 1.14 1.20 1.25 1.30 1.34 1.38 1.41 | TRAV.TIME (min) 43.69 22.76 17.03 14.23 12.51 11.32 10.43 9.74 9.18 8.72 8.32 7.80 7.31 6.94 6.65 6.41 6.22 6.04 5.90 | |
| INFLOW : | ID= 2 (0505 | AREA (ha) 5) 33.53 | QPEAK 1 | ograph> TPEAK R.V. (hrs) (mm) 6.25 24.12 | <-pipe / ch MAX DEPTH (m) 1.58 | annel-> MAX VEL (m/s) 1.28 |

Hadati Creek Watershed - Post Development with Cityview Ridge OUTFLOW: ID= 1 (0564) 33.53 4.91 6.33 24.12 1.50 1.25 _____ | DUHYD (0520) | Inlet Cap.=3.050 MAJOR SYS.(ID= 2):88.858.036.0025.46MINOR SYS.(ID= 3):137.623.055.7525.46 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) ----> <----- 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 <----> 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

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0363) | 1 + 2 = 3 AREA QPEAK TPEAK R.V. (ha) (cms) _____ (hrs) (mm) 20.63 ID1= 1 (0362): 30.00 2.013 6.17 + ID2 = 2 (0352): 30.00 2.013 + ID2 = 2 (0359): 28.60 1.6806.25 22.11 ____ _____ ID = 3 (0363):3.649 6.17 21.35 58.60 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ _____ ADD HYD (0115) | 1 + 2 = 3 | AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)51.322.7316.3322.1449.641.0296.5022.14 AREA QPEAK TPEAK R.V. (mm) 22.14 ID1= 1 (0106): + ID2= 2 (0114): ____ ID = 3 (0115): 100.96 3.732 6.33 22.14 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0492) AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 19.00 1.610 6.08 22.59 5.97 .534 6.17 18.72 1 + 2 = 3 ID1= 1 (0563): + ID2= 2 (0607): 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) .00 .001 .00 ****** 88.85 8.030 6.00 25.46 _____ ID1= 1 (0525): + ID2= 2 (0520): ____ 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) 58.60 3.649 6.17 21.35 21.35 ID1 = 1 (0363):+ ID2= 2 (0365): 117.50 9.481 6.08 22.15 _____ ____ _____ ID = 3 (0380):176.10 12.674 6.17 21.88

| RESERVOIR (04 IN= 2> OUT DT= 5.0 min | | OUTFLOW (cms) .0000 .2590 .2660 .2720 .2790 .2850 | STORAGE (ha.m.) .0000 .0579 .1180 .1802 .2445 .3109 | OUTFLOW (cms) .2910 .2970 1.6320 4.1680 7.5660 .0000 | STORAGE (ha.m.) .3795 .4503 .5232 .5983 .6756 .0000 |
|--|--|---|--|---|---|
| INFLOW : I OUTFLOW: I | D= 1 (048) PEAK | FLOW RE | 70 .28 DUCTION FOOL | s) (hrs) 15 6.08 |) (mm) 8 21.66 3 21.66 3.60 |
| ROUTE CHN (05 IN= 2> OUT | = 1 | - | 80 80 40 .030(| 1)> anning .0500 0 / .0300 Ma .0300 Ma .0300 Ma | in Channel in Channel in Channel in Channel in Channel |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | ELEV (m) 10.92 11.05 11.17 11.29 11.42 11.54 11.66 11.78 11.91 12.03 12.15 12.28 12.40 12.53 12.67 12.80 12.93 13.07 13.20 | TRAVEL VOLUME (cu.m.) .575E+02 .119E+03 .185E+03 .256E+03 .330E+03 .409E+03 .409E+03 .492E+03 .579E+03 .671E+03 .767E+03 .867E+03 .971E+03 .108E+04 .149E+04 .405E+04 .620E+04 .893E+04 .122E+05 | TIME TABLE FLOW RATE (cms) .1 .2 .3 .4 .6 .8 1.1 1.3 1.6 1.9 2.2 2.6 2.9 3.6 4.9 6.9 10.1 14.6 20.7 | VELOCITY (m/s) .40 .57 .69 .78 .86 .92 .97 1.02 1.07 1.11 1.15 1.19 1.23 1.10 .88 .77 .73 .74 .76 | TRAV.TIME (min) 18.86 13.13 10.87 9.61 8.77 8.17 7.70 7.32 7.01 6.74 6.50 6.29 6.11 6.85 8.52 9.74 10.21 10.17 9.85 |
| | | AREA | | ograph> ГРЕАК R.V. | <-pipe / channel-> MAX DEPTH MAX VEL |

Hadati Creek Watershed - Post Development with Cityview Ridge NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Hadati Creek Watershed - Post Development with Cityview Ridge (ha) (cms) (hrs) (mm) (m) 88.85 8.03 6.00 25.46 2.05 88.85 6.50 6.42 25.46 1.97 (m/s)INFLOW : ID= 2 (0526) OUTFLOW: ID= 1 (0527) .76 88.85 .79 RESERVOIR (0390) | IN= 2---> OUT= 1 | OUTFLOWSTORAGEOUTFLOWSTORAGE(cms)(ha.m.)(cms)(ha.m.).0000.00001.31001.6000.7700.28701.860023.23001.2600.9680.0000.0000 DT= 5.0 min _____ AREA
(ha)QPEAK
(cms)TPEAK
(hrs)INFLOW : ID= 2 (0380)176.10012.6746.17OUTFLOW: ID= 1 (0390)176.1001.3337.08 R.V. (mm) 21.88 21.88 PEAKFLOWREDUCTION[Qout/Qin](%) = 10.52TIME SHIFT OF PEAK FLOW(min) = 55.00MAXIMUMSTORAGEUSED(ha.m.) =2.5065 | ADD HYD (0400) | | 1 + 2 = 3 | _____ ID = 3 (0400): 227.30 3.883 6.17 19.60NOTE: 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 .0500 .0500 .0300 .0500 .0500 100.00338.30110.00336.80135.00336.00142.00335.30148.00335.30156.00336.00165.00338.30 Main Channel .0500 .0000 <----> TRAVEL TIME TABLE -----------------> TRAV.TIME
 VELOCITY
 TRAV.TIN

 (m/s)
 (min)

 .71
 44.52

 1.09
 29.11

 1.39
 22.72

 1.66
 19.04

 1.97
 16.04

 2.25
 14.10

 2.46
 12.89

 2.63
 12.02
 Page 52

| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | 641E+05 787E+05 939E+05 110E+06 126E+06 143E+06 160E+06 178E+06 | 94.1 122.4 155.6 192.8 233.9 278.9 327.7 380.3 436.7 496.9 | 2 2 3 3 3 3 3 3 4 4 4 | .79 .96 .15 .34 | 11.35 10.71 10.06 9.48 8.97 8.53 8.13 7.79 7.48 7.20 |
|---|--|---|---|-------------------------------------|---|
| INFLOW : ID= 2 (0400) OUTFLOW: ID= 1 (0403) | AREA (ha) 227.30 227.30 | < hydr QPEAK (cms) 3.88 2.23 | ograph TPEAK (hrs) 6.17 6.42 | > R.V. (mm) 19.60 19.60 | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) .34 1.13 .25 .89 |
| ADD HYD (0407) 1 + 2 = 3 ID1= 1 (0403): + ID2= 2 (0115): | | (cms) 2.232 3.732 | (hrs) 6.42 6.33 ======= | (mm) 19.60 22.14 | |
| ID = $3 (0407)$: NOTE: PEAK FLOWS DO | | | 6.33 s te an | 20.38 | |
| | | | | | |
| RESERVOIR (0113) IN= 2> OUT= 1 DT= 5.0 min | (cms) (.0000 1.1000 | TORAGE (ha.m.) .0000 2.9000 4.3000 | 9.1 | s) 000 000 | STORAGE (ha.m.) 6.4000 10.0000 20.0000 |
| INFLOW : ID= 2 (0407) OUTFLOW: ID= 1 (0113) | ARE4 (ha) 328.260 328.260 |) (cm) 5.8 | | TPEAK (hrs) 6.33 12.67 | (mm) 20.38 |
| | FLOW REDU HIFT OF PEAH M STORAGE | JCTION [QO K FLOW USED | (m | (%)= 19 in)=380 m.)= 3 | .00 |
| ADD HYD (0430) 1 + 2 = 3 ID1= 1 (0113): + ID2= 2 (0425): | | (cms) L.137 1 | TPEAK (hrs) 2.67 6.00 | R.V. (mm) 20.38 22.15 | |
| $\frac{102}{102} = 2 (0423):$ ID = 3 (0430): | ============ | | | | |
| NOTE: PEAK FLOWS DO | NOT INCLUDE | E BASEFLOW | S IF AN | Υ. | |

| IN= 2> 0 | | ATA FOR SEC Elevat 325. | TION (1 ion 40 60 90 00 30 .06 30 .03 90 60 | L.1) Manning .0600 .0600 | > | in Channel in Channel | |
|--|---|---|---|-----------------------------------|--------------------------------|--|--|
| <pre> DEPTH (m) .16 .33 .49 .65 .82 .98 1.14 1.31 1.47 1.63 1.79 1.96 2.12 2.28 2.45 2.61 2.77 2.94 3.10</pre> | (m) 322.46 322.63 322.79 322.95 323.12 323.28 323.44 323.61 323.77 323.93 324.09 324.26 324.26 324.42 324.58 324.75 324.91 325.07 325.24 | VOLUME (cu.m.) .233E+03 .672E+03 .132E+04 .216E+04 .319E+04 .433E+04 .556E+04 .689E+04 .833E+04 .833E+04 .134E+05 .134E+05 .154E+05 .200E+05 .228E+05 .293E+05 | FLOW RATE | E VEL (| | TRAV.TIME | |
| INFLOW : OUTFLOW: | ID= 2 (0430 ID= 1 (0440 | AREA (ha) 0) 355.17 0) 355.17 | (cms) 2.14 | (hrs) 6.17 | (mm) | <-pipe / c MAX DEPTH (m) .33 .32 | hannel-: MAX VEI (m/s) 1.26 1.26 |
| + ID2= | 3 = 1 (0475): = 2 (0440): | 355.17 | QPEAK (cms) 4.600 2.113 | TPEAK (hrs) 6.08 6.17 | R.V. (mm) 22.15 20.51 | · | |
| ID = | = 3 (0485): AK FLOWS DC | 406.15 | | | 20.72 | : | |

Hadati Creek Watershed - Post Development with Cityview Ridge

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0490) | 1 + 2 = 3 | QPEAK AREA TPEAK R.V. (mm) (cms) (ha) (hrs) 43.10 ID1= 1 (0480): 43.10 3.608 6.08 + ID2= 2 (0485): 406.15 6.641 6.08 22.15 20.72 ____ ____ ID = 3 (0490): 449.25 10.249 6.08 20.86NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0491) | 1 + 2 = 3AREA QPEAK TPEAK (ha) (cms) (hrs) 449.25 10.249 6.08 24.97 .288 6.83 R.V. (mm) -----ID1= 1 (0490): 20.86 + ID2= 2 (0482): 21.66 ____ ID = 3 (0491): 474.22 10.516 6.08 20.90 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ RESERVOIR (0483) IN= 2---> OUT= 1 OUTFLOW STORAGE (ha.m.) | OUTFLOW DT= 5.0 min STORAGE (cms) 7.0800 8.1000 9.7980 (ha.m.) (cms) (ha.m.) _____ .0000 2.4860 3.3240 4.6420 7.4397 .0000 .0600 .3400 .6182 .2760 1.2000 .6182 | 10.4940 1.1630 | 11.6850 1.7070 | 12.3480 2.0400 2.6400 10.3000 3.1200 11.4000 AREAQPEAKTPEAK(ha)(cms)(hrs)474.22010.5166.08474.2202.9076.67 (hrs) 6.08 6.67 R.V. (mm) 20.90 INFLOW : ID= 2 (0491) OUTFLOW: ID= 1 (0483) 20.90 PEAK FLOW REDUCTION [Qout/Qin](%)= 27.65 TIME SHIFT OF PEAK FLOW (min)= 35.00 MAXIMUM STORAGE USED (ha.m.) = 1.4680ADD HYD (0530) | 1 + 2 = 3R.V. _____ (mm) 20.90 43.01 ______ ID = 3 (0530): 478.85 3.002 6.5021.11 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0545)

Hadati Creek Watershed - Post Development with Cityview Ridge 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. ADD HYD (0546) 1 + 2 = 3AREA QPEAK TPEAK R.V. (cms) 9.482 (ha) (hrs) (mm) 21.79 567.70 ID1= 1 (0545): 6.50 25.25 3.608 + ID2= 2 (0542): 6.00 43.01 ____ -----ID = 3 (0546):592.95 10.345 6.00 22.70 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0547) 1 + 2 = 3 QPEAK (cms) AREA TPEAK R.V. (ha) (cms) 592.95 10.345 14.99 2.271 (mm) -----(hrs) 6.00 6.00 22.70 ID1= 1 (0546): + ID2= 2 (0543): 43.01 ID = 3 (0547):607.94 12.615 6.00 23.20 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0548) 1 + 2 = 3QPEAK (cms) AREA TPEAK R.V. (mm) 23.20 _ __ __ __ __ __ __ __ __ (ha) (hrs) ID1= 1 (0547): 607.94 12.615 6.00 + ID2 = 2 (0544):1.13.178 6.00 43.01 ____ _____ 609.07 12.793 ID = 3 (0548):6.00 23.23 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ******* ** SIMULATION NUMBER: 3 ** ***************** Filename: Y:\SPrimmer\OTTHYMO\Ci READ STORM tyview Ridge\25yrSCS12hr.stm Comments: 25 year SCS Type II 12hr design storm Ptotal= 73.56 mm | TIME RAIN | TIME RAIN TIME RAIN TIME RAIN mm/hr | hrs mm/hr | hrs hrs mm/hr | hrs mm/hr 2.94 6.25 2.94 6.50 .25 1.84 1.84 3.25 9.25 13.24 | 2.58 .50 3.50 13.24 | 9.50 2.58

```
Page 56
```

| Hadati Cre .75 1.00 1.25 1.50 1.75 2.00 2.25 2.50 2.75 3.00 | $1.84 \\ 1.84 \\ 1.84 \\ 1.84 \\ 1.84 \\ 1.84 \\ 2.21 \\ $ | 3.75 4.00 4.25 4.50 4.75 | 2.94 2.94 4.41 5.89 5.89 8.83 8.83 | 6.75 7.00 7.25 7.50 7.75 8.00 8.25 8.50 | 5.89 5.89 4.41 4.41 4.41 4.41 2.58 2.58 | 9.75 10.00 10.25 10.50 10.75 11.00 | ge 2.58 2.58 1.47 1.47 1.47 1.47 1.47 1.47 1.47 1.47 |
|---|--|--|---|--|--|--|--|
| CALIB STANDHYD (0480) ID= 1 DT= 5.0 min | Area Total In | (ha)= 4 np(%)= 4 | 3.10 2.00 [| Dir. Conr | n.(%)=) | 21.00 | |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha) = | $1.50 \\ 2.00 \\ 680.00$ | | RVIOUS († 25.00 5.00 2.00 40.00 .300 | i) | | |
| NOTE: RAINFA | ALL WAS TH | RANSFORME | D TO | 5.0 MIN. | TIME ST | EP. | |
| TIME hrs .083 .167 .250 .333 .417 .500 .583 .667 .750 .833 .917 1.000 1.083 1.167 1.250 1.333 1.417 1.500 1.583 1.667 1.750 1.583 1.667 1.750 1.833 1.917 2.000 2.083 2.167 | $1.84 \\ $ | TIME hrs 3.083 3.167 3.250 3.333 3.417 3.500 3.583 3.667 3.750 | RAIN mm/hr 2.94 2.94 2.94 2.94 2.94 2.94 2.94 2.94 | hrs 6.083 6.167 6.250 6.333 6.417 6.500 6.583 6.667 6.750 6.833 6.917 | RAIN mm/hr 13.24 13.24 13.24 13.24 13.24 13.24 13.24 5.89 5.89 5.89 5.89 5.89 | TIME hrs 9.08 9.17 9.25 9.33 9.42 9.50 9.58 9.67 9.75 9.83 9.92 10.00 10.08 10.17 10.25 10.33 10.42 10.50 10.58 10.67 10.58 10.67 10.75 10.83 10.92 11.00 | RAIN mm/hr 2.58 2.58 2.58 2.58 2.58 2.58 2.58 2.58 |

5.167 5.250 5.333

5.417

5.500

5.667

2.21 2.21 2.21 2.21 2.21 2.21

2.21

2.21

2.58 2.58 2.58 2.58 2.58

2.58 2.58 2.58 2.58

8.167

8.250 8.333

8.417

8.500 8.583

8.667

8.83

8.83

8.83

8.83

8.83 35.31 35.31

Page 57

11.17

11.25 11.33

11.42

11.50 11.58

11.67

1.47

1.47

1.47

1.47

1.47 1.47

1.47

2.083 2.167 2.250 2.333

2.417

2.500 2.583 2.667

| Hadati Creek Watershed - Post Development with Cityview Ridge 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. |
| CALIB STANDHYD (0415) Area (ha)= 4.99 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| $\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$ |
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= Xertical distance of the second seco |
| 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. |
| CALIB STANDHYD (0410) Area (ha)= 24.20 Page 58 |

Hadati Creek Watershed - Post Development with Cityview Ridge |ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn. (%) = 21.00**IMPERVIOUS** PERVIOUS (i) Surface Area (ha) =10.16 14.04 (mm)= Dep. Storage 1.50 5.00 Average Slope (%)= 2.00 2.00 Length 401.00 (m) =40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 97.10 119.40 15.00 over (min) 5.00 Storage Coeff. (min) =4.83 (ii) 12.17 (ii) Unit Hyd. Tpeak (min)= 15.00 5.00 Unit Hýd. peak (cms)= .22 .09 ***TOTALS*** PEAK FLOW 1.33 2.92 3.938 (iii) (cms) =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 .49 .98 .36 = ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00K (1/hr) = 4.14Cum.Inf. (mm)= .00 FO (mm/hr) = 12.50FC (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(%) = 42.00Dir. Conn.(%) = 21.00**IMPERVIOUS** PERVIOUS (i) Surface Area (ha) =15.12 20.88 Dep. Storage 1.50 (mm) =5.00 (%)= Average Slope 2.03 2.03 Lenath (m) =465.00 40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 97.10 119.40 5.00 over (min) 15.00 Storage Coeff. (min)= 5.26 (ii) 12.56 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 5.00 15.00 .21 .08 ***TOTALS*** PEAK FLOW (cms) =1.96 4.29 5.772 (iii) 6.08 TIME TO PEAK (hrs) =6.00 6.00 72.06 RUNOFF VOLUME (mm) =26.53 36.09 73.56 TOTAL RAINFALL (mm)= 73.56 73.56 RUNOFF COEFFICIENT = .98 .36 .49 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00K (1/hr)= 4.14 Cum.Inf. (mm)= .00 Fo (mm/hr) = 12.50FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

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

Hadati Creek Watershed - Post Development with Cityview Ridge CALIB STANDHYD (0455) ID= 1 DT= 5.0 min Area (ha)= 12.70 Total Imp(%)= 42.00 Area Dir. Conn.(%) = 21.00-------------IMPERVIOUS PERVIOUS (i) 5.33 1.50 1.71 Surface Area (ha) =7.37 5.00 Dep. Storage (mm)= Average Slope (%)= 1.71 Length (m)= 300.00 40.00 Mannings n . 300 .013 = Max.Eff.Inten.(mm/hr)= 97.10 119.40 over (min) 15.00 5.00 5.00 4.25 (ii) 5.00 .23 Storage Coeff. 11.94 (ii) (min) =Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .09 *TOTALS* 1.55 .71 6.00 PEAK FLOW (cms)= 2.088 (iii) TIME TO PEAK (hrs) =6.08 6.00 RUNOFF VOLUME (mm)= 72.06 26.53 36.09 (mm)= TOTAL RAINFALL 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: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (mm/hr)= 12.50 Cum.Inf. (mm)= (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) | |ID= 1 DT= 5.0 min | CALIB Area (ha)= 51.20 Total Imp(%)= 10.00 Dir. Conn. (%) = 5.00______ IMPERVIOUS PERVIOUS (i) 5.12 Surface Area (ha) =46.08 (mm)= 5.00 Dep. Storage 1.50 2.00 (m)= = 2.00 Average Slope 900.00 40.00 Length Mannings n .013 . 300 97.10 10.00 7.85 (ii) 10.00 Max.Eff.Inten.(mm/hr)= 88.55 over (min) 20.00 Storage Coeff. 16.11 (ii) (min) =Unit Hyd. Tpeak (min)= 20.00 Unit Hyd. peak (cms)= .06 *TOTALS* .58 6.00 5.35 PEAK FLOW (cms) =5.668 (iii) (hrs) =TIME TO PEAK 6.17 6.17 (mm)= 23.89 72.06 RUNOFF VOLUME 21.36 (mm)= TOTAL RAINFALL 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:

Hadati Creek Watershed - Post Development with Cityview Ridge (mm/hr)= 75.00 K (mm/hr)= 12.50 Cum.Inf. Fo $K_{1/hr} = 4.14$.00 FC (mm)= (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) ID= 1 DT= 5.0 min (ha) = 30.00Area Total Imp(%) = 37.00Dir. Conn.(%)= 19.00 IMPERVIOUS PERVIOUS (i) 11.10 Surface Area (ha) =18.90 1.50 Dep. Storage (mm) =5.00 2.00 Average Slope (%)= 2.00 447.00 Length (m)= 40.00 Mannings n .013 -.300 Max.Eff.Inten.(mm/hr)= 97.10 111.81 Unit Hyd. Tpeak (min)= 5.00Unit Hyd. Tpeak (min)= 5.00Unit Hyd. peak (cms)= 215.00 5.16 (ii) 15.00 12.69 (ii) 15.00 .08 ***TOTALS*** (cms)= 1.48 (hrs)= 6.00 (mm)= 72.06 (mm)= 73.56 ENT = .98 3.58 6.08 PEAK FLOW 4.647 (iii) 6.00 TIME TO PEAK 6.00 RUNOFF VOLUME 72.06 25.57 34.40 TOTAL RAINFALL 73.56 73.56 RUNOFF COEFFICIENT = . 98 .47 .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) = 4.14Fc (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) | ID= 1 DT= 5.0 min | Area (ha)= 16.30 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 1.00 330.00 Length (m) =40.00 Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 97.10 119.40 5.00 5.29 (ii) over (min) 15.00 Storage Coeff. (min)= 14.32 (ii) Unit Hyd. Tpeak (min)= 5.00 15.00 Unit Hyd. peak (cms)= .21 .08 ***TOTALS*** .89 PEAK FLOW (cms) =1.82 2.485 (iii) .89 6.00 72.06 TIME TO PEAK (hrs)= 6.08 6.00 RUNOFF VOLUME (mm)= 26.53 36.09 Page 61

Hadati Creek Watershed - Post Development with Cityview Ridge
 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) = 4.14Fc (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) =5.17Dep. Storage(mm) =1.50Average Slope(%) =1.60Length(m) =286.00Mannings n=.013 7.13 5.00 1.60 40.00 Mannings n . 300 .013 Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 97.10 4.22 (ii) 12.06 (ii) 15.00 *TOTALS* LIME TO PEAK (hrs)=.68RUNOFF VOLUME (hrs)=6.00TOTAL RAINFALL (hrm)=72.06TOTAL RAINFALL (hrm)=73.56RUNOFF COEFFICIENT =.98 2.015 (iii) 1.49 6.00 6.08 36.09 26.53 73.56 73.56 .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) = 4.14Fc (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) 49.35 Surface Area Dep. Storage (ha)= 68.15 $\begin{array}{cccc} (ma) = & -5.55 \\ (mm) = & 1.50 \\ (\%) = & 2.00 \\ (m) = & 885.00 \\ - & .013 \end{array}$ 5.00 2.00 (mm)= (%)= Average Slope Length 40.00 Mannings n .013 . 300 Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 97.10 10.00 7.77 (ii) 15.10 (ii) 10.00 20.00 20.00 10.00 20.00 20.00 10.00 20.00 Page 62

| Hadati Creek Watershed - Post Development with Cityview Ridge *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 (0105) Area (ha)= 51.32 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| $\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$ |
| 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 |
| 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. |
| CALIB STANDHYD (0102) Area (ha)= 14.32 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| IMPERVIOUSPERVIOUS (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 Page 63 |

Hadati Creek Watershed - Post Development with Cityview Ridge 3.95 (ii) 11.29 (ii) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 5.00 15.00 .24 .09 *TOTALS* .80 6.00 PEAK FLOW (cms) =1.79 2.406 (iii) TIME TO PEAK 6.00 (hrs)= 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 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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 (0101) Area (ha)= 16.32 ID= 1 DT= 5.0 min Total Imp(%) = 42.00Dir. 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 2.00
309.00 Length 40.00 (m)= Mannings n _ .013 .300 Max.Eff.Inten.(mm/hr)= 97.10 over (min) 5.00 Storage Coeff. (min)= 4.13 (ii) Unit Hyd. Tpeak (min)= 5.00 Unit Hyd. peak (cms)= .24 119.40 15.00 11.47 (ii) 15.00 .09 ***TOTALS*** 2.02 PEAK FLOW (cms) =.91 6.00 2.725 (iii) TIME TO PEAK 6.00 (hrs)= 72.06 RUNOFF VOLUME (mm)= 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) = 4.14Fc (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) | |ID= 1 DT= 5.0 min | Area (ha)= 19.00 Total Imp(%)= 42.00 Dir. Conn.(%) = 21.00------PERVIOUS (i) IMPERVIOUS Surface Area Dep. Storage (ha) =7.98 11.02 (mm)= 1.50 5.00 Average Slope (%)= 2.00 2.00 Page 64

Hadati Creek Watershed - Post Development with Cityview Ridge 365.00 Lenath (m)= 40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 97.10 119.40 5.00 4.57 (ii) 5.00 15.00 over (min) Storage Coeff. (min)= 11.90 (ii) Unit Hyd. Tpeak (min)= 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 26.53 RUNOFF VOLUME (mm) =72.06 36.09 TOTAL RAINFALL 73.56 73.56 (mm) =73.56 .98 RUNOFF COEFFICIENT .49 = .36 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALTB STANDHYD (0600) | |ID= 1 DT= 5.0 min | Area (ha)= 11.38 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 _____ IMPERVIOUS PERVIOUS (i) (ha)= Surface Area 4.78 6.60 Dep. Storage 1.50 5.00 (mm) =2.00 680.00 2.00 (%)= Average Slope 680.00 Length (m)= 40.00 Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 97.10 over (min) 5.00 Storage Coeff. (min)= 6.63 (ii) Unit Hyd. Tpeak (min)= 5.00 Unit Hyd. peak (cms)= 10 119.40 15.00 13.97 (ii) 15.00 Unit Hyd. peak (cms)= .18 .08 *TOTALS* (hrs)= .60 (hrs)= 6.00 (mm)= 72.06 (mm)= 73.56 NT = 00 1.29 PEAK FLOW 1.732 (iii) 6.00 TIME TO PEAK 6.08 RUNOFF VOLUME 26.53 36.09 TOTAL RAINFALL 73.56 73.56 RUNOFF COEFFICIENT = .36 .49 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00Fo FC .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) (ha) = 7.62Area ID= 1 DT= 5.0 min Total Imp(%) = 46.00Dir. Conn.(%)= 21.00

| | Watershed - Post De IMPERVIOUS a)= 3.51 m)= 1.50 | $\rho = \rho \sqrt{\tau} \rho \mu c \left(\frac{1}{2}\right)$ | Cityview Ridge |
|--|--|---|---|
| Surface Area (h Dep. Storage (m Average Slope (Length (Mannings n | %)= 2.00 m)= 680.00 = .013 | 2.00 40.00 .300 | |
| Max.Eff.Inten.(mm/h over (mi Storage Coeff. (mi Unit Hyd. Tpeak (mi Unit Hyd. peak (cm | r)= 97.10 n) 5.00 n)= 6.63 (ii) n)= 5.00 s)= .18 | 129.34 15.00 13.74 (ii) 15.00 .08 | *TOTALS* |
| PEAK FLOW (cm TIME TO PEAK (hr RUNOFF VOLUME (m TOTAL RAINFALL (m RUNOFF COEFFICIENT | s)= .40 s)= 6.00 n)= 72.06 n)= 73.56 = .98 | .89 6.08 27.57 73.56 .37 | 1.186 (iii) 6.00 36.92 73.56 .50 |
| Fo (mm/hr) Fc (mm/hr) (ii) TIME STEP (DT | = 12.50 Cum.Inf) SHOULD BE SMALLER AGE COEFFICIENT. | (1/hr)= 4.14 . (mm)= .00 OR EQUAL | |
| CALIB STANDHYD (0607) A ID= 1 DT= 5.0 min T | rea (ha)= 5.97 otal Imp(%)= 42.00 | Dir. Conn.(% |)= 2.50 |
| Surface Area (h Dep. Storage (m Average Slope (Length (Mannings n | IMPERVIOUS a)= 2.51 n)= 1.50 %)= 2.00 n)= 680.00 = .013 | PERVIOUS (i) 3.46 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(mm/h over (mi Storage Coeff. (mi Unit Hyd. Tpeak (mi Unit Hyd. peak (cm | n) 5.00 n)= 6.63 (ii) n)= 5.00 | 15.00 | **** |
| PEAK FLOW (cm TIME TO PEAK (hr RUNOFF VOLUME (m TOTAL RAINFALL (m RUNOFF COEFFICIENT | s)= 6.00 n)= 72.06 n)= 73.56 | .90 6.08 29.58 73.56 .40 | *TOTALS* .921 (iii) 6.08 30.64 73.56 .42 |
| ***** WARNING:FOR AREAS YOU SHOULD | WITH IMPERVIOUS RAT CONSIDER SPLITTING | | |
| Fo (mm/hr) Fc (mm/hr) | ION SELECTED FOR PE = 75.00 K = 12.50 Cum.Inf) SHOULD BE SMALLER | (1/hr) = 4.14 . (mm) = .00 | |
| (iii) PEAK FLOW DOE | AGE COEFFICIENT. | | |
| | Page | 66 | |

Hadati Creek Watershed - Post Development with Cityview Ridge CALIB STANDHYD (0540) Area (ha) =4.63 ID= 1 DT= 5.0 min Total Imp(%) = 80.00Dir. Conn.(%) = 79.00**IMPERVIOUS** PERVIOUS (i) Surface Area (ha) =3.70 .93 5.00 1.50 Dep. Storage (mm) =.55 Average Slope (%)= .55 Length 150.00 40.00 (m) =.300 Mannings n = .013 Max.Eff.Inten.(mm/hr)= 97.10 87.19 20.00 over (min) 5.00 Storage Coeff. (min) =3.94 (ii) 16.20 (ii) Unit Hyd. Tpeak (min)= 5.00 20.00 Unit Hyd. peak (cms)≃ .24 .06 ***TOTALS*** .97 PEAK FLOW (cms) =.11 6.17 1.036 (iii) 6.00 6.00 TIME TO PEAK (hrs) =RUNOFF VOLUME (mm) =72.06 21.22 61.38 TOTAL RAINFALL 73.56 (mm) =73.56 73.56 RUNOFF COEFFICIENT .29 = .98 .83 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00K (1/hr) = 4.14FO (mm/hr) = 12.50Cum.Inf. (mm)= .00 FC (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) = 244.00ID= 1 DT= 5.0 min | Total Imp(%) = 46.00Dir. Conn.(%)= 26.00 IMPERVIOUS PERVIOUS (i) Surface Area (ha) =112.24 131.76 Dep. Storage (mm) =1.50 5.00 .80 .80 Average Slope (%)= 1275.00 40.00 Length (m) =Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 97.10 120.22 15.00 over (min) 25.00 22.36 (ii) Storage Coeff. 12.73 (ii) (min) =Unit Hyd. Tpeak (min)= 15.00 25.00 Unit Hyd. peak (cms) =.08 .05 ***TOTALS*** 18.11 PEAK FLOW (cms) =11.66 27.658 (iii) TIME TO PEAK (hrs) =6.08 6.25 6.17 (mm) =26.62 RUNOFF VOLUME 72.06 38.44 TOTAL RAINFALL 73.56 73.56 (mm) =73.56 RUNOFF COEFFICIENT .98 .36 .52 = (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00K (1/hr)= 4.14 FO (mm/hr) = 12.50Cum.Inf. FC (mm) =.00 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL Page 67

Hadati Creek Watershed - Post Development with Cityview Ridge THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. CALIB STANDHYD (0510) Area (ha) = 16.00ID= 1 DT= 5.0 min | Total Imp(%) = 80.00Dir. Conn.(%) = 79.00_____ IMPERVIOUS PERVIOUS (i) 12.00 1.50 .50 400.00 .013 12.80 Surface Area (ha) =3.20 5.00 Dep. Storage (mm) =Average Slope (%)= .20 Length 40.00 (m)= Mannings n .300 = Max.Eff.Inten.(mm/hr)= 97.10 65.53 5.00 7.31 (ii) 5.00 over (min) 30.00 Storage Coeff. (min)= 25.92 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 30.00 .17 .04 .25 6.33 21 - -***TOTALS*** PEAK FLOW(cms)=3.12TIME TO PEAK(hrs)=6.00RUNOFF VOLUME(mm)=72.06TOTAL RAINFALL(mm)=73.56RUNOFF COEFFICIENT=.98 3.209 (iii) 6.00 21.22 61.38 73.56 73.56 .29 .83 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr) = 75.00 K (1/hr) = 4.14FC (mm/hr) = 12.50 Cum.Inf. (mm) = .00.00 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ _____ CALIB CALIB STANDHYD (0542) Area (ha)= 25.25 |ID= 1 DT= 5.0 min | Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 _____ IMPERVIOUS PERVIOUS (i) (ha) =Surface Area 20.20 5.05 5.00 1.50 .55 350.00 .013 Dep. Storage (mm)= .55 Average Slope (%)= 40.00 Length (m)= Mannings n .013 = .300 Max.Eff.Inten.(mm/hr)= 97.10 87.19 5.00 6.56 (ii) 5.00 .18 over (min) 20.00 Storage Coeff. 18.81 (ii) (min)= Unit Hyd. Tpeak (min)= 20.00 Unit Hyd. peak (cms)= .06 (ms) = 5.02 (hrs) = 6.00 (mm) = 72.06 (mm) = 73.56 $IT = 0^{\circ}$ *TOTALS* .53 6.17 PEAK FLOW (cms) =5.333 (iii) TIME TO PEAK (hrs) =6.00 RUNOFF VOLUME 21.22 61.38 73.56 TOTAL RAINFALL 73.56 .29 RUNOFF COEFFICIENT .83

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Page 68

Hadati Creek Watershed - Post Development with Cityview Ridge (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CAL TR | STANDHYD (0543) | |ID= 1 DT= 5.0 min | Area (ha)= 14.99 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 IMPERVIOUS PERVIOUS (i) (ha) =11.99 Surface Area 3.00 1.50 Dep. Storage (mm) =5.00 .55 Average Slope (%)= . 55 200.00 40.00 Length (m) =Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 97.10 87.19 Storage Coeff. (min) 5.00 Unit Hyd. Tpeak (min)= 4.69 Unit Hyd. peak (cms)= 20.00 4.69 (ii) 16.94 (ii) 20.00 .06 ***TOTALS*** 3.11 .34 6.17 PEAK FLOW (cms) =3.310 (iii) TIME TO PEAK (hrs) =6.00 6.00 (mm)= RUNOFF VOLUME 72.06 21.22 61.38 (mm)= TOTAL RAINFALL 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: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (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) = 1.13ID= 1 DT= 5.0 min | Total Imp(%) = 80.00Dir. Conn.(%) = 79.00PERVIOUS (i) IMPERVIOUS Surface Area (ha) =.90 .23 Dep. Storage 1.50 5.00 (mm) =(%)= Average Slope .55 .55 50.00 40.00 Length (m)= Mannings n .013 .300 _ Max.Eff.Inten.(mm/hr)= 97.10 87.19 over (min) 5.00 15.00 2.04 (ii) Storage Coeff. (min) =14.29 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 5.00 15.00 .31 . 08 ***TOTALS*** .24 PEAK FLOW (cms) =.03 6.08 .266 (iii) 6.00 TIME TO PEAK 6.00 (hrs) =RUNOFF VOLUME 72.06 21.22 (mm)= 61.38 TOTAL RAINFALL (mm) =73.56 73.56 73.56 Page 69

Hadati Creek Watershed - Post Development with Cityview Ridge 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) = 4.14Fc (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) | ID= 1 DT=****min | AREA (ha)= .00 (cms)= QPEAK .00 TPEAK (hrs) =.00 (mm)=****** VOLUME ADD HYD (0420) 1 + 2 = 3 R.V. (mm) 36.09 AREA QPEAK QPEAK (cms) TPEAK (ha) (hrs) ID1= 1 (0415): + ID2= 2 (0410): 4.99 1.007 6.00 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. _____ ADD HYD (0465) | 1 + 2 = 3 | QPEA. (Cms) 772 QPEAK AREA TPEAK R.V. (ha) (cms) (hrs) 36.00 5.772 6.00 12.70 2.088 6.00 (mm) (hrs) ID1= 1 (0460): + ID2= 2 (0455): 36.09 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) ----> Manning Distance Elevation .00 .40 .0300 .0300 / .0150 Main Channel .0150 Main Channel .15 5.51 .00 .09 10.00 .0150 Main Channel 14.49 .00 .0150 Main Channel .0150 / .0300 Main Channel .0300 14.50 .15 20.00 .40 <--------- 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
 Page 70

| .04 .06 .08 .09 .11 .13 .15 .17 .20 .22 .24 .26 .29 .31 .33 .35 .38 .40 | .04 .06 .08 .09 .11 .13 .15 .17 .20 .22 .24 .26 .29 .31 .33 .35 .38 .40 | .702E+02 .158E+03 .281E+03 .438E+03 .607E+03 .776E+03 .944E+03 .116E+04 .140E+04 .166E+04 .194E+04 .255E+04 .258E+04 .293E+04 .331E+04 .371E+04 .413E+04 | .0 .1 .3 .5 .7 1.0 1.3 2.8 2.8 2.8 3.4 4.0 4.8 5.5 4.3 8.2 | opment with C .33 .43 .52 .62 .77 .90 1.03 1.16 1.27 1.36 1.44 1.51 1.57 1.62 1.67 1.72 1.76 1.80 | 50.72 38.71 31.95 26.84 21.66 18.45 16.22 14.36 13.13 12.24 11.58 11.05 10.63 10.27 9.97 9.71 9.48 9.28 | |
|---|--|---|--|---|---|---|
| INFLOW : OUTFLOW: | ID= 2 (03 ID= 1 (03 | AREA (ha) 60) 30.00 62) 30.00 | < hydr QPEAK (cms) 4.65 3.64 | ograph> TPEAK R.V. (hrs) (mm) 6.00 34.40 6.17 34.39 | <-pipe / c MAX DEPTH (m) .31 .27 | :hannel-> MAX VEL (m/s) 1.61 1.53 |
| ROUTE CHN (C IN= 2> OU | <pre>< Distance</pre> | DATA FOR SEC Elevat | CTION (1. cion M 26 .030 00 .030 09 .0015 15 .015 26 .015 | | | |
| DEPTH (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | VOLUME (cu.m.) .929E+01 .372E+02 .836E+02 .149E+03 .232E+03 .334E+03 .454E+03 .576E+03 .699E+03 .822E+03 .944E+03 .108E+04 .123E+04 .140E+04 .159E+04 .159E+04 .203E+04 .254E+04 | FLOW RATE (cms) .0 .0 .0 .0 .1 .1 .1 .2 .3 .4 .6 .8 1.0 1.2 1.4 1.7 2.0 2.3 2.6 3.0 3.4 Page 71 | VELOCITY (m/s) .17 .27 .35 .42 .49 .55 .64 .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 | TRAV.TIME (min) 99.56 62.72 47.86 39.51 34.05 30.15 26.24 22.41 19.75 17.76 16.22 15.07 14.28 13.72 13.31 13.01 12.76 12.57 12.41 | |

| на | dati Creel | k watersned | - Post Dev | elopment with | Cityview Rid | lge |
|--|---|---|---|---|--|---|
| INFLOW : OUTFLOW: | ID= 2 (03 ID= 1 (03 | AREA (ha) 50) 16.30 53) 16.30 | OPEAK | drograph> TPEAK R.V. (hrs) (mm) 6.00 36.09 6.17 36.06 | MAX DEPTH | MAX VEL |
| ROUTE CHN ((IN= 2> OU |)358) JT= 1 | Routing t | ime step (r | nin)'= 5.00 | | |
| | | DATA FOR SEC Elevat | CTION (2 26 15 .03 00 09 | 1.1)> Manning .0300 300 / .0150 M .0150 M .0150 M .0150 M | lain Channel lain Channel lain Channel lain Channel lain Channel | |
| DEPTH (m) .01 .03 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 | VOLUME | | (m/s) .17 .27 .35 | TRAV.TIME (min) 109.52 68.99 52.65 43.46 | |
| | ID= 2 (03 ID= 1 (03 | | < hyd QPEAK (cms) 2.02 1.38 | drograph> TPEAK R.V. (hrs) (mm) 6.00 36.09 6.17 36.04 | MAX DEPTH (m) .21 | channel-> MAX VEL (m/s) 1.25 1.15 |
| RESERVOIR ((IN= 2> OL DT= 5.0 mir | JT= 1 | OUTFLOW (cms) .0000 .0100 .0260 | STORAGE (ha.m.) .0000 .0100 .2300 | OUTFLOW (cms) .5000 6.6000 .0000 | STORAGE (ha.m.) .4000 .8000 .0000 | |

Hadati Creek Watershed - Post Development with Cityview Ridge

Hadati Creek Watershed - Post Development with Cityview Ridge QPEAK AREA TPEAK R.V. (ha) (cms) (hrs) (mm) INFLOW : ID= 2 (0105) OUTFLOW: ID= 1 (0106) 51.320 51.320 8.044 6.00 36.09 5,545 6.17 36.09 PEAK FLOW REDUCTION [Qout/Qin](%)= 68.94 TIME SHIFT OF PEAK FLOW $(\min) = 10.00$ (ha.m.)= .7419 MAXIMUM STORAGE USED ADD HYD (0103) | 1 + 2 = 3 | AREA QPEAK (ha) (cms) 14.32 2.406 16.32 2.725 R.V. (mm) 36.09 TPEAK (hrs) ID1= 1 (0102): 6.00 6.00 + ID2= 2 (0101): 36.09 _____ ID = 3 (0103): 30.64 5.131 6.00 36.09NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. RESERVOIR (0111) | IN= 2---> OUT= 1 STORAGEOUTFLOWSTORAGE(ha.m.)(cms)(ha.m.).00001.00001.0000.010020.00001.1000.1000.0000.0000 | DT= 5.0 min | OUTFLOW (cms) -----.0000 .0100 .0120 (ha) (cms) 19.000 3.122 19.000 447 TPEAK R.V. (hrs) 6.00 6.58 (mm) 36.09 INFLOW : ID= 2 (0110) OUTFLOW: ID= 1 (0111) 36.08 PEAK FLOW REDUCTION [Qout/Qin](%)= 14.31 TIME SHIFT OF PEAK FLOW (min)= 35.00 (min) = 35.00MAXIMUM STORAGE USED (ha.m.) = .4965_____ ADD HYD (0602) | 1 + 2 = 3 | R.V. AREA QPEAK TPEAK (ha) (cms) (hrs) (mm) 11.38 1.732 6.00 36.09 7.62 1.186 6.00 36.92 (mm) ID1 = 1 (0600):36.09 + ID2 = 2 (0601):_______________________________ _____ 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 | QPEAK TPEAK R.V. (hrs) (mm) | Total(cms)= 9.0 | AREA (cms) (hrs) (mm) 27.66 6.17 38.44 -----(ha) TOTAL HYD. (ID= 1): 244.00

Hadati Creek Watershed - Post Development with Cityview Ridge MAJOR SYS.(ID= 2):81.1218.666.1738.44MINOR SYS.(ID= 3):162.889.005.9238.44 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0515) | 1 + 2 = 3 | ------____ 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

 tal(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 MINOR SYS.(ID= 3): 21.68 1.98 5.83 36.09 36.09 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0470) |

 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

 1 + 2 = 3ID = 3 (0470): 56.21 10.824 6.00 36.09NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0359) | 1 + 2 = 3 | _____ 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 Page 74

| Hadati Cre | ek Watershed - (cms) .0000 .0100 .0150 | (ha.m.) .0000 .0100 | opment with C (cms) 1.0000 10.0000 .0000 | (ha.m.) .5000 .6000 |
|--|---|---|---|---|
| INFLOW : ID= 2 (0 OUTFLOW: ID= 1 (0 | ARI (ha 0103) 30.64 0104) 30.64 | EA QPEA a) (cms 40 5.13 40 4.55 | K TPEAK) (hrs) 1 6.00 0 6.17 | R.V. (mm) 36.09 36.08 |
| PE/ TIM MAک | NK FLOW REI 1E SHIFT OF PE/ (IMUM STORAGE | DUCTION [Qou AK FLOW USED | t/Qin](%)= 88 (min)= 10 (ha.m.)= | 3.67 0.00 .5514 |
| + IDZ = Z (0II. | AREA (ha)): 30.64 .): 19.00 | .44/ 0 | .50 50.08 | |
| |): 49.64 | | | - |
| Distand .(2.(4.(4.5 5.(7.(9.(| Routing time DATA FOR SEC Ce Elevat 0 1.0 0 .0 0 .0 0 .0 0 .0 0 .0 0 .0 0 .0 0 .0 0 .0 0 .0 0 .0 0 .0 | me step (min TION (2.2 ion Ma 00 . 50 . 50 .0350 00 .0350 50 .0350 50 . |)'= 5.00)> nning 0350 0350 / .0350 Mai 0350 Mai 0350 Mai 0350 | n Channel n Channel |
| <pre> < DEPTH ELEV (m) (m) .05 .05 .11 .11 .16 .16 .21 .21 .26 .26 .32 .32 .37 .37 .42 .42 .47 .47 .53 .53 .58 .58 .63 .63 .68 .68 .74 .74 .79 .79 .84 .84 .89 .89 .95 .95 </pre> | <pre>TRAVEL VOLUME (cu.m.) .745E+01 .175E+02 .301E+02 .454E+02 .632E+02 .836E+02 .107E+03 .132E+03 .160E+03 .191E+03 .261E+03 .299E+03 .340E+03 .384E+03 .430E+03 .479E+03 .531E+03</pre> | TIME TABLE FLOW RATE (cms) .0 .1 .3 .6 .9 1.3 1.8 2.3 3.0 3.8 4.8 5.8 7.0 8.2 9.7 11.3 13.0 14.8 Page 75 | VELOCITY (m/s) .64 .96 1.21 1.42 1.61 1.77 1.93 2.08 2.22 2.35 2.48 2.60 2.72 2.84 2.95 3.06 3.17 3.27 | TRAV.TIME (min) 3.06 2.03 1.61 1.37 1.21 1.10 1.01 .94 .88 .83 .79 .75 .72 .69 .66 .64 .62 .60 |

Hadati Creek Watershed - Post Development with Cityview Ridge 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 tanceElevationMaining.00101.50.05001.00100.70.05001.50100.55.0500 / .03002.0099.50.03003.5099.60.03004.50100.65.0300 / .0500Main Channel6.00101.45.0500

 Construct
 TRAVEL
 TIME TABLE
 Construct
 <thConstruct</th>
 <thConstruct</th>
 <----> 101.45 **** WARNING: TRAVEL TIME TABLE EXCEEDED

 AREA
 QPEAK
 TPEAK
 R.V.
 MAX
 DEPTH
 MAX
 VEL

 (ha)
 (cms)
 (hrs)
 (mm)
 (m/s)
 81.12
 18.66
 6.17
 38.44
 1.72
 1.34

 81.12
 28.30
 6.50
 38.44
 1.95
 1.41

 INFLOW : ID= 2 (0505) OUTFLOW: ID = 1 (0564)81.12 **** 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)
 Page 76

Hadati Creek Watershed - Post Development with Cityview Ridge TOTAL HYD. (ID= 1): 178.88 12.21 6.00 40.49 MAJOR SYS.(ID= 2):74.769.166.0040.49MINOR SYS.(ID= 3):104.133.055.6740.49 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) ----> <----- 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

 Construction
 TRAVEL
 TIME
 TABLE
 TRAV.TIME

 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

 2.00
 322.80
 .218E+05
 140.2
 2.77
 2.59
 </ <----- TRAVEL TIME TABLE ------.218E+05 2.77 2.77 2.95 3.12 3.29 3.46 3.61 3.76 3.91 4.05 2.20 323.00 .256E+05 175.3 2.43 2.29 2.40 323.20 214.7 .296E+05 258.6 323.40 2.18 2.60 .338E+05 2.07 .3382E+05 .428E+05 .476E+05 .526E+05 .578E+05 .632E+05 306.7 359.1 2.80 323.60 3.00 323.80 1.98 3.20 324.00 1.91 416.0 3.40 324.20 477.5 1.83 4.18 4.18 4.18 4.18 4.18 4.17 4.18 4.17 4.18 4.17 4.18 4.17 4.18 4.17 4.18 4.17 4.18 4.17 4.18 4.71 3.60 324.40 3.80 324.60 INFLOW : ID= 2 (0470) OUTFLOW: ID = 1 (0475)_____ ADD HYD (0363) 1 + 2 = 32 = 3|AREAQPEAKTPEAKR.V.ID1= 1(0362):30.003.6426.1734.39+ ID2= 2(0359):28.603.2046.1736.05 ____ ===== ID = 3 (0363): 58.60 6.846 6.17 35.20 Page 77

Hadati Creek Watershed - Post Development with Cityview Ridge NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0115) | 1 + 2 = 3 | AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 51.32 5.545 6.17 36.09 49.64 4.877 6.17 36.08 ID1= 1 (0106): + ID2= 2 (0114): ____ ____ _____ ID = 3 (0115):100.96 10.422 6.17 36.08 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0492)
 QPEAK
 TPEAK
 R.V.

 (cms)
 (hrs)
 (mm)

 2.866
 6.08
 36.42

 .921
 6.08
 30.64
 AREA 1 + 2 = 3(ha) (cms) 19.00 2.866 5.97 .921 ID1= 1 (0563): + ID2= 2 (0607): -----_____ -----ID = 3 (0492): 24.97 3.787 6.0835.04 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ______ ADD HYD (0526) | 1 + 2 = 3AREA R.V. QPEAK TPEAK (ha) (ha) (cms) .00 .001 74.76 9.159 (hrs) (mm) .00 ****** ID1= 1 (0525): + ID2= 2 (0520): 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 | QPEAK (cms) R.V. AREA TPEAK (ha) (cms) 58.60 6.846 (hrs) (mm) 35.20 _____ ID1 = 1 (0363):6.17 6.08 + ID2= 2 (0365): 117.50 16.238 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 | STORAGE OUTFLOW OUTFLOW STORAGE (cms) (cms) (ha.m.) (ha.m.) .2910 .2970 .0000 .0000 .3795 .2590 .0579 | .4503 Page 78

| Hadati Creek Watershed - Post Development with Cityview Ridge .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 |
| <pre>< 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</pre> |
| < |
| <pre>< 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</pre> |
| RESERVOIR (0390) IN= 2> OUT= 1 DT= 5.0 min OUTFLOW STORAGE OUTFLOW STORAGE Page 79 |

Hadati Creek Watershed - Post Development with Cityview Ridge (cms) (ha.m.) (cms) (ha.m.) .0000 .0000 1.3100 1.6000 .2870 .7700 1.8600 23.2300 1.2600 i .9680 .0000 .0000 AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 176.100 176.100 INFLOW : ID= 2 (0380) 22.579 35.79 6.08 OUTFLOW: ID = 1 (0390) 1.387 7.17 35.79 PEAK FLOW REDUCTION [Qout/Qin] (%) = 6.14 TIME SHIFT OF PEAK FLOW (min) = 65.00MAXIMUM STORAGE USED (ha.m.) = 4.6291_____ ADD HYD (0400) | AREA QPEAK TPEAK (ha) (cms) (hrs) 51.20 5.668 6.17 176.10 1.387 7.17 1 + 2 = 3 | R.V. (mm) ID1= 1 (0395): + ID2= 2 (0390): 23.89 35.79 _____ _____ ____ ID = 3 (0400): 227.30 6.995 6.1733.11 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 .0500 110.00 336.80 .0300 135.00 336.00 Main Channel 335.30 335.30 .0500 142.00 148.00 .0500 156.00 336.00 .0500 165.00 338.30 .0000 DEPTH ELEV VOLUME FLOW RATE VELOCITY TRAV.TIME (m) (cu.m.) 335.46 .231E+04 (m) (cms) (m/s) (min) .9 .71 .16 44.52 .563E+04 3.2 7.3 .32 335.62 1.09 29.11 .997E+04 .47 335.77 1.39 22.72 335.93 .63 .153E+05 13.4 1.66 19.04 .79 .218E+05 336.09 22.7 1.97 16.04 .95 .299E+05 336.25 35.3 2.25 14.10 .396E+05 1.11 336.41 51.2 2.46 12.89 336.56 .510E+05 1.26 70.7 2.63 12.02 336.72 .641E+05 94.1 1.42 2.79 11.35 .787E+05 1.58 122.4 336.88 2.96 10.71 .939E+05 155.6 1.74 337.04 3.15 10.06 3.34 3.53 1.89 337.19 .110E+06 192.8 9.48 337.35 .126E+06 233.9 2.05 8.97 337.51 278.9 3.71 2.21 .143E+06 8.53 .160E+06 2.37 337.67 327.7 3.89 8.13 .178E+06 2.53 337.83 380.3 4.07 7.79 337.98 .196E+06 2.68 436.7 4.23 7.48 2.84 338.14 .215E+06 496.9 4.40 7.20 Page 80

Hadati Creek Watershed - Post Development with Cityview Ridge 3.00 338.30 .234E+06 561.0 6.95 4.56 <---- hydrograph ----> <-pipe / channel->
QPEAK TPEAK R.V. MAX DEPTH MAX VEL
(cms) (hrs) (mm) (m) (m/s) (hrs) (mm) 6.17 33.11 6.33 22 75 AREA (ha) (cms) INFLOW : ID= 2 (0400) 227.30 7.00 OUTFLOW: ID= 1 (0403) 227.30 4.32 (m) (m/s) .46 1.36 .36 1.16 .36 1.16 ADD HYD (0407) | 1 + 2 = 3 | AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)227.304.3246.3333.11100.9610.4226.1736.08 _____ ID1= 1 (0403): + ID2= 2 (0115): _______ ID = 3 (0407): 328.26 13.657 6.17 34.03NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. RESERVOIR (0113) | IN= 2---> OUT= 1 | STORAGEOUTFLOWSTORAGE(ha.m.)(cms)(ha.m.).00001.60006.40002.90009.100010.00004.300012.000020.0000 DT= 5.0 min | OUTFLOW (cms) .0000 1.1000 1.3000 AREAQPEAKTPEAK(ha)(cms)(hrs)328.26013.6576.17328.2601.36715.17 R.V. (mm) INFLOW : ID= 2 (0407) OUTFLOW: ID= 1 (0113) 34.03 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 | _____ 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 (</pre> 1.1) ----> Distance Elevation 1 100.00 325.40 120.00 324.60 Manning . 0600 .0600 Page 81

| Had | dati Creek w 126.00 130.00 140.00 142.00 150.00 155.00 160.00 | 323 323 322 322 323 323 324 | .90 .00 .30 .06 .30 .03 .90 | 10pment .0600 .0600 00 / .0 00 / .0 .0600 .0600 .0600 | : with Ci 300 Mai 600 Mai | tyview Rid <u>o</u> n Channel n Channel | je |
|---|--|---|---|--|--------------------------------------|--|--|
| .05 .82 .98 1.14 1.31 1.47 | ELEV (m) 322.46 322.63 322.79 322.95 323.12 323.28 4 323.44 323.61 323.77 323.93 324.09 324.26 324.42 324.58 324.75 | VOLUME (cu.m.) 233E+03 572E+03 132E+04 216E+04 319E+04 433E+04 556E+04 556E+04 538E+04 338E+04 | 9.0 14.9 22.5 31.6 42.3 54.6 | VEL (| OCITY m/s) .96 1.26 1.48 | TRAV.TIME (min) 6.96 5.27 4.51 4.03 3.57 3.21 2.93 2.72 2.54 2.41 2.33 2.25 2.18 2.11 2.12 2.11 2.09 2.07 2.03 | |
| INFLOW : | ID= 2 (0430) ID= 1 (0440) | AREA (ha) 349.94 | < hyd QPEAK (cms) 2.49 | rograph TPEAK (hrs) 6.25 6.33 | > R.V. (mm) 34.15 34.15 | <-pipe / c MAX DEPTH (m) .35 .34 | hannel-> MAX VEL (m/s) 1.29 1.28 |
| ID1= + ID2= ==== ID = | | 56.21 349.94 | 9.543 2.403 11.718 | (hrs) 6.08 6.33 6.08 | 36.09 34.15 34.42 | | |
| + ID2= ==== ID = | | (ha) 43.10 406.15 449.25 | (cms) 6.559 11.718 | (hrs) 6.00 6.08 6.08 NS IF A | (mm) 36.09 34.42 34.58 | | |

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0491) | 1 + 2 = 3 | QPEAK (cms) 17.844 R.V. (mm) 34.58 AREA TPEAK (ha) -----(hrs) ID1= 1 (0490): 449.25 6.08 6.42 + ID2= 2 (0482): 24.97 1.351 35.04 ____ _____ -----_____ ID = 3 (0491):474.22 18.128 6.08 34.60 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. RESERVOIR (0483) IN= 2---> OUT= 1 | DT= 5.0 min | OUTFLOW STORAGE OUTFLOW STORAGE (cms) 7.0800 8.1000 9.7980 (ha.m.) (cms) (ha.m.) .0000 .0600 .3400 .6182 1.1630 1.7070 2.4860 3.3240 4.6420 7.4397 .0000 .2760 1.2000 .6182 | 10.4940 1.1630 | 11.6850 1.7070 | 12.3480 2.0400 2.6400 10.3000 3.1200 11.4000 QPEAK (cms) AREA TPEAK R.V. (ha) 474.220 474.220 (hrs) (mm) INFLOW : ID= 2 (0491) OUTFLOW: ID= 1 (0483) 18.128 6.08 34.60 6.839 34.60 PEAK FLOW REDUCTION [Qout/Qin](%)= 37.72 TIME SHIFT OF PEAK FLOW (min)= 25.00 (ha.m.) = 2.4478MAXIMUM STORAGE USED ADD HYD (0530) | 1 + 2 = 3 | AREA QPEAK TPEAK R.V. _____ (ha) (cms) (hrs) (mm) 474.22 6.50 34.60 ID1= 1 (0483): 6.839 + 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. _____ ADD HYD (0545) | AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)478.857.0146.5034.8674.767.0766.1740.49 1 + 2 = 3R.V. (mm) ID1= 1 (0530): + ID2= 2 (0527): _____ ____ ID = 3 (0545): 553.61 13.871 6.50 35.62 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0546) 1 + 2 = 3AREA (ha) OPEAK TPEAK R.V. (cms) (hrs) (mm) ID1= 1 (0545): 553.61 13.871 + ID2= 2 (0542): 25.25 5.333 35.62 6.50 61.38 6.00 _____ ID = 3 (0546):578.86 14.994 6.00 36.75 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0547) | QPEAK (cms) 1 + 2 = 3AREA TPEAK R.V. (ha) (hrs) _____ (mm) ID1= 1 (0546): 578.86 14.994 + ID2= 2 (0543): 14.99 3.310 6.00 36.75 6.00 61.38 ID = 3 (0547):593.85 18.304 6.00 37.37 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0548) | 1 + 2 = 3 | AREA QPEAK (cms) R.V. TPEAK _____ (ha) (hrs) (mm) 18.304 ID1= 1 (0547): 593.85 37.37 6.00 + ID2= 2 (0544): 1.13 6.00 61.38 .266 _____ ID = 3 (0548):594.98 18.570 6.00 37.41 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ***** ** SIMULATION NUMBER: 4 ** **** _____ Filename: Y:\SPrimmer\OTTHYMO\Ci READ STORM 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 3.25 .25 2.26 3.61 6.25 16.23 9.25 3.16 .50 9.50 2.26 3.50 3.61 6.50 16.23 | 3.16 .75 3.75 3.61 6.75 9.75 2.26 7.21 3.16 7.00 1.00 2.26 4.00 3.61 10.00 7.21 3.16 7.25 1.25 2.26 4.25 5.41 5.41 10.25 1.80 4.50 1.50 2.26 5.41 5.41 10.50 1.80 4.75 7.21 1.75 2.26 7.75 5.41 10.75 1.80 5.00 7.21 2.00 2.26 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 5.75 8.75 2.70 | 43.29 3.16 | 11.75 1.80 3.00 2.70 6.00 119.04 9.00 3.16 | 12.00 1.80 Page 84

Hadati Creek Watershed - Post Development with Cityview Ridge CALIB STANDHYD (0480) ID= 1 DT= 5.0 min (ha) = 43.10Area Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =18.1025.00 (mm)= Dep. Storage 1.50 5.00 (%)= 2.00 Average Slope 2.00 Lenath 680.00 40.00 (m) =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 3.083 3.61 3.61 9.08 3.16 .083 2.26 6.083 16.23 3.167 3.250 3.333 2.26 .167 | 6.167 16.23 9.17 3.16 .250 6.250 2.26 3.61 9.25 16.23 3.16 .333 2.26 3.61 6.333 16.23 9.33 3.16 | 3.417 .417 2.26 3.61 | 6.417 16.23 9.42 3.16 | 3.500 .500 9.50 2.26 3.61 6.500 16.23 3.16 3.583 .583 9.58 2.26 6.583 3.61 7.21 3.16 3.61 .667 9.67 2.26 6.667 7.21 3.16 3.750 3.833 3.917 .750 2.26 6.750 7.21 9.75 3.16 .833 2.26 3.61 6.833 7.21 9.83 3.16 .917 2.26 6.917 9.92 3.61 7.21 3.16 3.61 1.000 2.26 4.000 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 | 4.250 5.41 1.250 2.26 7.250 5.41 10.25 1.80 4.333 1.333 2.26 5.41 7.333 5.41 10.33 1.80 7.417 5.41 10.42 1.417 2.26 | 4.417 5.41 1.80 7.500 7.583 1.500 2.26 4.500 10.50 5.41 5.41 1.80 1.583 2.26 4.583 7.21 5.41 10.58 1.80 7.21 7.667 1.667 4.667 2.26 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 5.41 1.917 2.26 4.917 7.21 7.917 10.92 1.80 2.000 5.000 2.26 7.21 8.000 11.00 5.41 1.80 2.083 5.083 10.82 2.70 8.083 3.16 11.08 1.80 2.167 5.167 2.70 10.82 8.167 11.17 3.16 1.80 2.250 3.16 11.25 2.70 10.82 8.250 1.80 5.333 2.333 2.70 10.82 8.333 3.16 11.33 1.80 j 5.417 2.417 2.70 10.82 8.417 11.42 3.16 1.80 2.500 2.70 5.500 10.82 8.500 11.50 3.16 1.80 2.583 2.70 5.583 43.29 8.583 3.16 11.58 1.80 i 5.667 2.667 2.70 43.29 8.667 3.16 11.67 1.80 | 5.750 43.29 11.75 2.750 2.70 8.750 3.16 1.80 119.04 2.833 2.70 5.833 8.833 3.16 11.83 1.80 2.917 2.70 5.917 119.04 8.917 11.92 3.16 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 5.00 6.11 (ii) 5.00 over (min) 15.00 Storage Coeff. (min)= 12.82 (ii) Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .19 .08 Page 85

| Hadati Creek Watershed - Post Development with Cityview Ridge *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. |
| CALIB STANDHYD (0415) Area (ha)= 4.99 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| $\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$ |
| 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 |
| PEAK FLOW (cms)= .35 .96 1.304 (iii) TIME TO PEAK (hrs)= 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 |
| <pre>***** 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.</pre> |
| CALIB STANDHYD (0410) Area (ha)= 24.20 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| IMPERVIOUSPERVIOUS (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 Page 86 |

Hadati Creek Watershed - Post Development with Cityview Ridge 5.00 over (min) 15.00 (min)= Storage Coeff. 4.45 (ii) 11.16 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (min)= 5.00 15.00 .23 .09 ***TOTALS*** PEAK FLOW (cms) =3.90 1.64 5.204 (iii) TIME TO PEAK (hrs)= 6.00 6.08 6.00 RUNOFF VOLUME 47.17 (mm) =88.68 36.13 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: (mm/hr) = 75.00 K (1/hr) = 4.14FO (mm/hr) = 12.50Cum.Inf. .00 FC (mm) =(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) (ha) = 36.00Area ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn.(%)= 21.00 _____ IMPERVIOUS PERVIOUS (i) 15.12 Surface Area (ha) =20.88 Dep. Storage (mm) =1.50 5.00 2.03 465.00 Average Slope (%)= 2.03 Length (m) =40.00 Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 119.04 149.56 5.00 over (min) 15.00 Storage Coeff. 4.84 (ii) (min) =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: K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 75.00FO (mm/hr) = 12.50FC (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) ID= 1 DT= 5.0 min Area (ha)= 12.70 Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 PERVIOUS (i) IMPERVIOUS Surface Area (ha) =5.33 7.37 Dep. Storage (mm) =1.50 5.00 Page 87

Hadati Creek Watershed - Post Development with Cityview Ridge e Slope (%) = 1.71 1.71 Average Slope (%)= Length 300.00 (m) =40.00 Mannings n .013 -.300 Max.Eff.Inten.(mm/hr)= 119.04 149.56 5.00 3.92 5.00 over (min) 15.00 3.92 (ii) Storage Coeff. (min)= 10.95 (ii) Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .24 .09 *TOTALS* PEAK FLOW TIME TO PEAK .87 6.00 2.06 (cms) =2.756 (iii) 6.00 (hrs) =RUNOFF VOLUME 88.68 (mm) =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) = 4.14Fc (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 Area (ha)= 51.20 Total Imp(%)= 10.00 STANDHYD (0395) ID= 1 DT= 5.0 min Dir. Conn.(%) = 5.00_____ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =5.12 46.08 1.50 5.00 Dep. Storage (mm) =2.00 Average Slope (%)= 2.00 Length (m)= 900.00 40.00 .013 Mannings n = .300 Max.Eff.Inten.(mm/hr)= 119.04 112.64 5.00 7.23 5.00 over (min) 15.00 5.00 14.74 (ii) Storage Coeff. (min)= 7.23 (ii) Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .17 .08 ***TOTALS*** .78 PEAK FLOW (cms) =8.19 8.631 (iii) TIME TO PEAK (hrs) =6.08 6.08 88.68 RUNOFF VOLUME (mm)= 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: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALIB Page 88

| Hadati Creek STANDHYD (0360) A ID= 1 DT= 5.0 min T | Watershed - Post De rea (ha)= 30.00 otal Imp(%)= 37.00 | evelopment with C [.] Dir. Conn.(%)= | ityview Ridge : 19.00 |
|---|---|--|--|
| Surface Area (h Dep. Storage (m Average Slope (Length (Mannings n | IMPERVIOUS a)= 11.10 m)= 1.50 %)= 2.00 m)= 447.00 = .013 | PERVIOUS (i) 18.90 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(mm/h over (mi Storage Coeff. (mi Unit Hyd. Tpeak (mi Unit Hyd. peak (cm | n) 5.00 n)= 4.75 (ii) n)= 5.00 s)= .22 | 15.00 11.63 (ii) 15.00 .09 | TOTALS* |
| PEAK FLOW (cm TIME TO PEAK (hr RUNOFF VOLUME (m TOTAL RAINFALL (m RUNOFF COEFFICIENT | s)= 1.83 s)= 6.00 m)= 88.68 m)= 90.18 = .98 | 4.81 6.08 35.04 90.18 .39 | 6.183 (iii) 6.00 45.23 90.18 .50 |
| ***** WARNING: STORAGE C ***** WARNING:FOR AREAS YOU SHOULD | OEFF. IS SMALLER TH/ WITH IMPERVIOUS RAT CONSIDER SPLITTING | IOS BELOW 20% | |
| Fo (mm/hr) Fc (mm/hr) (ii) TIME STEP (DT | ION SELECTED FOR PE = 75.00 K = 12.50 Cum.Inf) SHOULD BE SMALLER AGE COEFFICIENT. S NOT INCLUDE BASEF | (1/hr)= 4.14 . (mm)= .00 OR EQUAL | |
| CALIB STANDHYD (0350) A ID= 1 DT= 5.0 min To | rea (ha)= 16.30 otal Imp(%)= 42.00 | Dir. Conn.(%)= | 21.00 |
| | IMPERVIOUS a)= 6.85 m)= 1.50 %)= 1.00 m)= 330.00 = .013 | 9.45 | |
| Max.Eff.Inten.(mm/h over (min Storage Coeff. (min Unit Hyd. Tpeak (min Unit Hyd. peak (cm | n) 5.00 n)= 4.88 (ii) n)= 5.00 | 149.56 15.00 13.13 (ii) 15.00 .08 | TOTALS* |
| | | 2.45 6.08 36.13 90.18 .40 | 3.299 (iii) 6.00 47.17 90.18 .52 |
| ***** WARNING: STORAGE C | OEFF. IS SMALLER TH | AN TIME STEP! | |
| Fo (mm/hr) | ION SELECTED FOR PE = 75.00 K = 12.50 Cum.Inf Page | (1/hr) = 4.14 . (mm) = .00 | |

Hadati Creek Watershed - Post Development with Cityview Ridge (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALTB STANDHYD (0355) Area (ha)= 12.30 ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn.(%)= 21.00 _____ IMPERVIOUS PERVIOUS (i) 5.17 1.50 7.13 (ha) =Surface Area Dep. Storage (mm) = $1.50 \\ 1.60 \\ 286.00 \\ .013$ Average Slope (%)= 1.60 Length 40.00 (m)= Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 119.04 over (min) 5.00 149.56 5.00 3.89 (ii) 5.00 .25 15.00 Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 11.05 (ii) 15.00 .09 *TOTALS* $1.99 \\ 6.08$ PEAK FLOW .84 6.00 (cms) =2.661 (iii) TIME TO PEAK (hrs) =6.00 RUNOFF VOLUME 88.68 36.13 (mm)= 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) = 4.14Fc (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) 49.35 (ha)= 68.15 Surface Area 1.50 5.00 Dep. Storage (mm)= 2.00 Average Slope (%)= 2.00 Length (m) =885.00 40.00 Mannings n .013 ____ . 300 Max.Eff.Inten.(mm/hr)= 119.04 149.56 5.00 7.16 (5.00 over (min) 15.00 7.16 (ii) Storage Coeff. (min)= 13.86 (ii) Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .17 .08 ***TOTALS*** 6.00 17.25 PEAK FLOW (cms) =22.881 (iii) (mm) = 88.68 (mm) = 90.18 ENT = 00 TIME TO PEAK 6.08 6.00 RUNOFF VOLUME 36.13 47.17 90.18 TOTAL RAINFALL 90.18 RUNOFF COEFFICIENT = .40 .52

Hadati Creek Watershed - Post Development with Cityview Ridge (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00K (1/hr)= 4.14 Cum.Inf. (mm)= .00 Fo (mm/hr) = 12.50FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. ______ _____ CAL TR Area (ha)= 51.32 Total Imp(%)= 42.00 | STANDHYD (0105) | |ID= 1 DT= 5.0 min | STANDHYD (0105) Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =21.55 29.77 1.50 Dep. Storage (mm) =5.00 2.00 Average Slope (%)= 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 5.38 (ii) Storage Coeff. 12.09 (ii) (min) =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) 6.00 TIME TO PEAK (hrs) =6.00 6.08 RUNOFF VOLUME (mm) =88.68 47.17 36.13 TOTAL RAINFALL (mm)= 90.18 90.18 90.18 RUNOFF COEFFICIENT . 98 .40 = .52 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ _____ CALIB Area (ha)= 14.32 Total Imp(%)= 42.00 STANDHYD (0102) |ID= 1 DT= 5.0 min | Dir. Conn.(%)= 21.00 IMPERVIOUS PERVIOUS (i) Surface Area (ha) =6.01 8.31 Dep. Storage 1.50 5.00 (mm) =2.00 Average Slope (%)= 2.00 287.00 Length (m)= 40.00 Mannings n .013 .300 _ 119.04 Max.Eff.Inten.(mm/hr)= 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)= .09 .25 *TOTALS* PEAK FLOW (cms) =.98 3.171 (iii) 2.37 TIME TO PEAK 6.00 (hrs) =6.08 6.00 RUNOFF VOLUME (mm) =88.68 47.17 36.13 Page 91

Hadati Creek Watershed - Post Development with Cityview Ridge 90.18 TOTAL RAINFALL (mm)= 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 K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 12.50FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. CALIB STANDHYD (0101) (ha) = 16.32Area ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =6.85 9.47 5.00 Dep. Storage (mm) =1.50 Average Slope (%)= 2.00 2.00 309.00 Length (m) =40.00 Mannings n .013 = .300 149.56 Max.Eff.Inten.(mm/hr)= 119.04 over (min) 5.00 15.00 Storage Coeff. 3.81 (ii) (min) =10.51 (ii) 15.00 Unit Hyd. Tpeak (min)= 5.00 Unit Hyd. peak (cms)= .25 .09 *TOTALS* 2.69 PEAK FLOW (cms) =1.12 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: (mm/hr) = 75.00K (1/hr)= 4.14 Cum.Inf. (mm)= .00 FO (mm/hr) = 12.50FC (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) (ha) = 19.00Area |ID= 1 DT= 5.0 min | Total Imp(%) = 42.00Dir. Conn. (%) = 21.00_____ **IMPERVIOUS** PERVIOUS (i) Surface Area (ha) =7.98 11.02 (mm) =1.50 Dep. Storage 5.00 2.00 Average Slope (%)= 2.00 Length 365.00 (m) =40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 119.04 149.56 5.00 over (min) 15.00 4.21 (ii) 10.91 (ii) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= 5.00 15.00

Page 92

Hadati Creek Watershed - Post Development with Cityview Ridge Unit Hyd. peak (cms)= .24 .09 ***TOTALS*** (cms)= PEAK FLOW 1.30 3.09 4.123 (iii) 6.00 TIME TO PEAK (hrs) =6.00 6.08 RUNOFF VOLUME (mm)= 88.68 36.13 47.17 TOTAL RAINFALL 90.18 (mm) =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) = 4.14Fc (mm/hr) = 12.50 Cum.Inf. (mm) = .00FC (mm/hr)= 12.50 Cum.Inf. (mm)= (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ | CALIB | | STANDHYD (0600) | |ID= 1 DT= 5.0 min | CALIB Area (ha)= 11.38 Total Imp(%)= 42.00 Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =4.78 6.60 Dep. Storage 1.50 (mm) =5.00 Average Slope (%)= 2.00 2.00 Length 680.00 (m) =40.00 Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 119.04 149.56 5.00 6.11 5.00 15.00 over (min) 12.82 (ii) Storage Coeff. 6.11 (ii) (min) =Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .19 .08 *TOTALS* .75 PEAK FLOW (cms) =1.73 2.303 (iii) 6.00 88.68 90.18 (hrs)= 6.08 TIME TO PEAK 6.00 (mm)= RUNOFF VOLUME 36.13 47.17 TOTAL RAINFALL (mm)= 90.18 90.18 RUNOFF COEFFICIENT = .98 .40 .52 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 75.00FO FC (mm/hr) = 12.50(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) | ID= 1 DT= 5.0 min | Area (ha) = 7.62Total Imp(%) = 46.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) 3.51 1.50 Surface Area (ha) =4.11 Dep. Storage (mm) =5.00 2.00 Average Slope (%)= 2.00 (%) = 2.00(m) = 680.00 40.00 Lenath Mannings n .300 .013 =

| Hadati Creek Wate Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | 5.00 6.11 (ii) 5.00 .19 .50 6.00 88.68 90.18 | 161.60 15.00 12.61 (ii) 15.00 .08 | Cityview Ridge *TOTALS* 1.576 (iii) 6.00 48.29 90.18 .54 |
|---|---|---|--|
| (i) HORTONS EQUATION Fo (mm/hr)= 75 Fc (mm/hr)= 12 (ii) TIME STEP (DT) SH THAN THE STORAGE (iii) PEAK FLOW DOES NO | .00 K .50 Cum.Inf. OULD BE SMALLER C COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 DR EQUAL | |
| CALIB STANDHYD (0607) Area ID= 1 DT= 5.0 min Total | (ha)= 5.97 Imp(%)= 42.00 | Dir. Conn.(%) | = 2.50 |
| Surface Area (ha)= Dep. Storage (mm)= Average Slope (%)= Length (m)= Mannings n = | IMPERVIOUS F 2.51 1.50 2.00 680.00 .013 | PERVIOUS (i) 3.46 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | 119.04 5.00 6.11 (ii) 5.00 .19 | 187.59 15.00 12.24 (ii) 15.00 .09 | *TOTALS* |
| PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= RUNOFF COEFFICIENT = | 90.18 | 1.19 6.08 39.89 90.18 .44 | 1.215 (iii) 6.08 41.11 90.18 .46 |
| ***** WARNING:FOR AREAS WITH YOU SHOULD CON | IMPERVIOUS RATIONS SIDER SPLITTING T | | |
| (i) HORTONS EQUATION Fo (mm/hr)= 75 Fc (mm/hr)= 12 (ii) TIME STEP (DT) SH THAN THE STORAGE (iii) PEAK FLOW DOES NO | .00 K .50 Cum.Inf. OULD BE SMALLER C COEFFICIENT. | (1/hr)= 4.14 (mm)= .00 DR EQUAL | |
| CALIB STANDHYD (0540) Area ID= 1 DT= 5.0 min Tota] | (ha)= 4.63 Imp(%)= 80.00 | Dir. Conn.(%) | = 79.00 |
| Surface Area (ha)= | IMPERVIOUS F 3.70 Page 9 | .93 | |

Hadati Creek Watershed - Post Development with Cityview Ridge 1.50 Dep. Storage (mm) =5.00 .55 Average Slope (%)= .55 40.00 150.00 Length (m) =Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 119.04 111.85 5.00 15.00 over (min) 3.64 (ii) Storage Coeff. (min) =14.73 (ii) Unit Hyd. Tpeak (min)= 5.00 15.00 Unit Hyd. peak (cms)= .25 .08 *TOTALS* PEAK FLOW (cms) =.16 6.08 1.20 1.339 (iii) (hrs)= TIME TO PEAK 6.00 6.00 RUNOFF VOLUME (mm) =88.68 31.37 76.65 TOTAL RAINFALL 90.18 90.18 (mm) =90.18 RUNOFF COEFFICIENT .98 .35 = .85 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (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) | |ID= 1 DT= 5.0 min | Area (ha)= 244.00 Total Imp(%)= 46.00 Dir. Conn.(%)= 26.00 _____ IMPERVIOUS PERVIOUS (i) Surface Area (ha) =112.24 131.76 1.50 5.00 Dep. Storage (mm) =.80 1275.00 (%)= .80 Average Slope 40.00 Length (m)= .300 Mannings n .013 = 119.04 Max.Eff.Inten.(mm/hr)= 150.55 over (min) 10.00 25.00 Storage Coeff. (min)= 11.73 (ii) 20.53 (ii) Unit Hyd. Tpeak (min)= 10.0025.00 Unit Hvd. peak (cms)= .05 .10 *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: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00FO FC (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) | (ha) = 16.00Area Page 95

Hadati Creek Watershed - Post Development with Cityview Ridge ID= 1 DT= 5.0 min | Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 IMPERVIOUS PERVIOUS (i) (ha) =12.80 Surface Area 3.20 Dep. Storage (mm) =1.50 5.00 . 50 .20 Average Slope (%)= 400.00 40.00 Length (m) =Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 119.04 91.82 over (min) 5.00 25.00 22.99 (ii) Storage Coeff. (min)= 6.74 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 25.00 5.00 .18 .05 *TOTALS* PEAK FLOW 3.88 .40 (cms) =4.080 (iii) TIME TO PEAK 6.25 (hrs) =6.00 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: (mm/hr) = 75.00K (1/hr)= 4.14 Cum.Inf. (mm)= .00 FO (mm/hr) = 12.50FC .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) (ha) = 25.25Area ID= 1 DT= 5.0 min Total Imp(%) = 80.00Dir. Conn. (%) = 79.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =20.20 5.05 1.50 Dep. Storage (mm) =5.00 .55 Average Slope (%)= .55 Length (m) =350.00 40.00 Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 119.04 111.85 5.00 over (min) 20.00 6.05 (ii) Storage Coeff. (min) =17.13 (ii) Unit Hyd. Tpeak (min)= 5.00 20.00 Unit Hýd. peak (cms)= .19 .06 ***TOTALS*** .77 PEAK FLOW (cms) =6.23 6.749 (iii) TIME TO PEAK 6.17 6.00 (hrs) =6.00 RUNOFF VOLUME 88.68 31.37 (mm) =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) = 4.14Fc (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. _____

Hadati Creek Watershed - Post Development with Cityview Ridge CALIB STANDHYD (0543) (ha) = 14.99Area ID= 1 DT= 5.0 min | Total Imp(%) = 80.00Dir. Conn. (%) = 79.00**IMPERVIOUS** PERVIOUS (i) Surface Area (ha) =11.99 3.00 Dep. Storage (mm)= 1.50 5.00 .55 Average Slope (%)= .55 200.00 40.00 Length (m) =Mannings n = .013 .300 119.04 Max.Eff.Inten.(mm/hr)= 111.85 over (min) 5.00 20.00 Storage Coeff. 4.32 (ii) 15.41 (ii) (min) =Unit Hyd. Tpeak (min)= 5.00 20.00 Unit Hyd. peak (cms) =.23 .07 ***TOTALS*** .48 4.164 (iii) PEAK FLOW (cms) =3.84 TIME TO PEAK 6.00 6.17 6.00 (hrs) =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: K (1/hr) = 4.14(mm/hr) = 75.00FO Cum.Inf. FC (mm/hr) = 12.50(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(%) = 80.00Dir. Conn.(%) = 79.00**IMPERVIOUS** PERVIOUS (i) (ha) =Surface Area .90 .23 Dep. Storage 5.00 1.50 (mm) =Average Slope (%)= .55 .55 50.00 Lenath 40.00 (m) =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)= 15.00 5.00 Unit Hyd. peak (cms)= .08 . 32 ***TOTALS*** .04 .30 PEAK FLOW (cms) =.333 (iii) 6.08 TIME TO PEAK (hrs) =6.00 6.00 RUNOFF VOLUME 88.68 31.37 (mm) =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: K (1/hr)= 4.14 Cum.Inf. (mm)= .00 (mm/hr) = 75.00Fo FC (mm/hr) = 12.50Page 97

Hadati Creek Watershed - Post Development with Cityview Ridge (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) | (ha)= .00 AREA | ID= 1 DT=****min | (cms) =QPEAK .00 (hrs)= ------TPEAK .00 (mm)=****** VOLUME _____ ADD HYD (0420) 1 + 2 = 3 AREA QPEAK TPEAK R.V.
 AREA
 QPEAK
 IPEAK
 R.V.

 (ha)
 (cms)
 (hrs)
 (mm)

 4.99
 1.304
 6.00
 47.17

 24.20
 5.204
 6.00
 47.17
 ID1= 1 (0415): + ID2= 2 (0410): ے نے بے بنان کے بی ج ج ج ج ج ج ج ج ج ج ج ج ج ک کا کا کا کا کا ہے ج ج ک ک ک ک ک ک ID = 3 (0420): 29.19 6.509 6.00 47.17NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ____ ADD HYD (0465) | 1 + 2 = 3 | AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)36.007.6396.0047.1712.702.7566.0047.17 -----ID1= 1 (0460): + ID2= 2 (0455): 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) ----> Elevation Manning Distance .00 5.50 .0300 .40 .0300 / .0150 Main Channel .0150 Main Channel .0150 Main Channel .0150 Main Channel .15 .00 5.51 10.00 .09 14.49 .00 .0150 Main Channel 14.50 .0150 / .0300 Main Channel .0300 .15 .40 20.00 <----->
 Comparison
 <thComparison</th>
 Comparison
 Comparis FLOW RATE VELOCITY TRAV.TIME (cms) (m/s) (min) .0 .21 80.52 .0 .33 50.72 .1 38.71 31.95 .43 .1 .52 .3 .5 .7 26.84 .62 .77 21.66 .90 18.45 1.0 1.03 16.22 Page 98

| . 17 . 20 . 22 . 24 . 26 . 29 . 31 . 33 . 35 . 38 . 40 | .17 .20 .22 .24 .26 .29 | .116E+04 .140E+04 .166E+04 .225E+04 .258E+04 .293E+04 .331E+04 .371E+04 .413E+04 | 1.3 | 1.27 1.36 1.44 1.51 1.57 1.62 | 14.36 13.13 12.24 11.58 11.05 10.63 10.27 |
|---|--|--|---|---|--|
| INFLOW OUTFLO | : ID= 2 (03 W: ID= 1 (03 | AREA (ha) 60) 30.00 62) 30.00 | OPEAK | TPEAK R.V. | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) .35 1.71 .31 1.63 |
| ROUTE CHN IN= 2> | OUT= 1 | DATA FOR SEC Elevat | TION (1. ion N 26 15 .030 00 09 | 1)> Manning .0300 00 / .0150 Mai .0150 Mai | n Channel |
| < DEPT (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | H ELEV (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 | | FLOW DATE | VELOCITY (m/s) .17 .27 .35 .42 .49 .55 .64 .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 | |
| INFLOW OUTFLO | : ID= 2 (03 W: ID= 1 (03 | AREA (ha) 50) 16.30 53) 16.30 | | rograph> TPEAK R.V. (hrs) (mm) 6.00 47.17 6.17 47.13 | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) .26 1.34 .22 1.29 |

| ROUTE CHN (0358) IN= 2> OUT= 1 Routing time step (min)'= 5.00 | |
|--|--|
| < DATA FOR SECTION (| |
| < | |
| <pre>< 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</pre> | |
| RESERVOIR (0106) IN= 2> OUT= 1 DT= 5.0 min OUTFLOW STORAGE .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 Page 100 | |

Hadati Creek Watershed - Post Development with Cityview Ridge

Hadati Creek Watershed - Post Development with Cityview Ridge MAXIMUM STORAGE USED (ha.m.)= .8782 _____ ADD HYD (0103) | 1 + 2 = 3AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) 14.32 3.171 6.00 16.32 3.593 6.00 (cms) 3.171 (mm) 47.17 _____ ID1= 1 (0102): + ID2 = 2 (0101):47.17 ور بيد هم جه جه جه جه جه جه جه جه خو خو خو خو خو خو جو جو جو جو -----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
 STORAGE
 OUTFLOW
 STORAGE

 (ha.m.)
 (cms)
 (ha.m.)

 .0000
 1.0000
 1.0000

 .0100
 20.0000
 1.1000

 .1000
 .0000
 .0000
 OUTFLOW (cms) | DT= 5.0 min | _____ $1.0000 \\ 1.1000$.0000 .0100 .0120 .0000 AREAQPEAKTPEAK(ha)(cms)(hrs)19.0004.1236.0019.000.6136.5° R.V. (mm) INFLOW : ID= 2 (0110) OUTFLOW: ID= 1 (0111) 47.17 47.16 FLOW REDUCTION [Qout/Qin](%)= 14.87 PEAK 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) 11.38 2.303 6.00 47.17 7.62 1.576 6.00 48.29 R.V. (mm) 47.17 ID1= 1 (0600): + ID2= 2 (0601): _____ ID = 3 (0602): 19.00 3.878 6.00 47.62NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. (0505) DUHYD 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 49.88 ===== _____ MAJOR SYS.(ID= 2): 102.03 25.26 MINOR SYS.(ID= 3): 141.97 9.00 6.17 49.88 5.83 49.88 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0515) | 1 + 2 = 3 | AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 9.000 141.97 9.000 5.83 49.88 16.00 4.080 6.00 76.65 ID1= 1 (0505): + ID2= 2 (0510): _______ ____ 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 | tal(cms)= 2.0 | AREA QPEAK ----- (ha) (cms) TOTAL HYD.(ID= 1): 29.19 6.51 TPEAK R.V. (hrs) (mm) 6.00 47.17 _____ MAJOR SYS.(ID= 2): 10.15 MINOR SYS.(ID= 3): 19.04 4.53 6.00 47.17 1.98 5.83 47.17 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0470) | 1 + 2 = 3 | AREA QPEAK (ha) (cms) 10.15 4.529 R.V. TPEAK _____ (hrs) (mm) 47.17 10.15 ID1= 1 (0425): 6.00 + ID2= 2 (0465): 48.70 10.395 47.17 6.00 __________ 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 QPEAK TPEAK R.V. (cms) (hrs) (mm) AREA QPEAK 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 STORAGEOUTFLOW(ha.m.)(cms).00001.0000.010010.0000.1332.0000 STORAGE DT= 5.0 min | OUTFLOW STORAGE (cms) -----(ha.m.) .0000 . 5000 . 6000 . 0000 .0100 .0150 AREA QPEAK TPEAK R.V. (cms) (hrs) (mm) (ha) Page 102

Hadati Creek Watershed - Post Development with Cityview Ridge 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 (min)= 5.00 (ha.m.)= .5855 MAXIMUM STORAGE USED **** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED. CHECK OUTFLOW/STORAGE TABLE OR REDUCE DT. ADD HYD (0114) | 1 + 2 = 3 | 2 = 3AREAQPEAKTPEAKR.V.1D1=1(0104):30.647.0486.0847.16+ ID2=2(0111):19.00.6136.5847.16 _____ ID = 3 (0114): 49.64 7.421 6.0847.16 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) ----> <----- 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 <-----> 11.3 13.0 14.8 16.9 .95 .95 .531E+03 1.00 1.00 .585E+03 3.27 . 60 3.38 . 58 <---- hydrograph ----> <-pipe / channel->
QPEAK TPEAK R.V. MAX DEPTH MAX VEL
(cms) (hrs) (mm) (m) (m/s) AREA (ha) Page 103

| Ha INFLOW : OUTFLOW: | adati Creek ID= 2 (06 ID= 1 (05 | watershed 02) 19.00 63) 19.00 | - Post Dev 3.88 3.76 | velopment 6.00 6.08 | with C 47.62 47.62 | ityview Ridg .53 .52 | e 2.35 2.33 |
|---|--|--|---|--|----------------------------------|---|----------------------------------|
| ROUTE CHN (IN= 2> 0 | 0564) UT= 1 | Routing t | ime step (| min)'= 5 | 5.00 | | |
| | Distance .00 1.00 2.00 3.50 4.50 6.00 | DATA FOR SE Eleva 101 100 99 99 100 101 | tion .50 .70 .55 .0 .50 .60 .65 .0 .45 | Manning .0500 .0500 500 / .03 .0300 .0300 300 / .05 .0500 | 300 Mai Mai Mai 500 Mai | n Channel n Channel n Channel n Channel | |
| <pre> DEPTH (m) .10 .19 .29 .38 .48 .57 .67 .76 .86 .95 1.05 1.16 1.28 1.39 1.50 1.61 1.72 1.84 1.95 </pre> | ELEV (m) 99.60 99.69 99.79 99.88 99.98 100.07 100.17 100.26 100.36 100.45 100.55 100.66 100.78 100.89 101.00 101.11 101.22 101.34 101.45 | TRAVE VOLUME (cu.m.) .353E+02 .112E+03 .195E+03 .285E+03 .381E+03 .484E+03 .594E+03 .710E+03 .832E+03 .961E+03 .110E+04 .127E+04 .127E+04 .127E+04 .221E+04 .250E+04 .250E+04 .313E+04 | L TIME TAB FLOW RAT (cms) .0 .1 .2 .3 .5 .7 .9 1.2 1.5 1.8 2.2 2.7 3.4 4.1 4.9 5.8 6.7 7.7 8.8 | 1 1 1 | L.30 L.34 | TRAV.TIME (min) 43.69 22.76 17.03 14.23 12.51 11.32 10.43 9.74 9.18 8.72 8.32 7.80 7.31 6.94 6.65 6.41 6.22 6.04 5.90 | |
| INFLOW : OUTFLOW: | ID= 2 (05 ID= 1 (05 | VEL TIME TA AREA (ha) 05) 102.03 64) 102.03 PUTATIONS F | < hy QPEAK (cms) 25.26 39.67 | drograph TPEAK (hrs) 6.17 6.58 | R.V. (mm) | <-pipe / cł MAX DEPTH (m) 1.80 1.95 | MAX VEL (m/s) 1.37 1.41 |
| | | FUTATIONS F | | | | | |
| | 3.050 1 3.0 D.(ID= 1): | AREA (ha) 157.97 | (cms) 13.08 | (hrs) 6.00 | R.V. (mm) 52.60 | | |
| MAJOR SY | S.(ID= 2): S.(ID= 3): | 67.54 | 10.03 3.05 | 6.00 5.58 | 52.60 52.60 | | |

| ROUTE CHN (IN= 2> O | UT= 1 DA Distance 100.00 115.00 120.00 | ATA FOR SEC Elevat 324. 321. 320. 320. 321. 322. | TION (ion 60 60 80 80 60 30 10 | 1.1) Manning | > 300 Mai | n Channel n Channel | |
|---------------------------|---|---|--|--|--|--|--|
| | (m) 321.00 . 321.20 . 321.40 . 321.60 . 321.80 . 322.00 . 322.20 . 322.20 . 322.40 . 322.60 . 323.00 . 323.20 . 323.20 . 323.40 . 323.60 . 323.80 . 324.00 . 324.20 . 324.20 . | VOLUME (cu.m.) 398E+03 125E+04 255E+04 430E+04 644E+04 892E+04 117E+05 148E+05 182E+05 218E+05 256E+05 296E+05 338E+05 382E+05 428E+05 526E+05 526E+05 578E+05 | FLOW RATE (cms) .8 3.3 8.1 15.6 26.8 41.2 59.3 81.9 109.1 140.2 175.3 214.7 258.6 306.7 359.1 416.0 477.5 543.5 | E VEL (| OCITY m/s) .84 1.13 1.36 1.56 1.79 2.17 2.37 2.58 2.77 2.95 3.12 3.29 3.46 3.61 3.76 3.91 4.05 | TRAV.TIME (min) 8.53 6.33 5.27 4.59 4.01 3.61 3.30 3.02 2.78 2.59 2.43 2.29 2.18 2.29 2.18 2.07 1.98 1.91 1.83 1.77 | |
| INFLOW : OUTFLOW: | ID= 2 (0470 ID= 1 (0475 | AREA (ha)) 58.85) 58.85 | < hyd QPEAK (cms) 14.92 13.38 | drograph TPEAK (hrs) 6.00 6.08 | > R.V. (mm) 47.17 47.17 | 1./1 <-pipe / c MAX DEPTH (m) .78 .74 | hannel-> MAX VEL (m/s) 1.54 1.49 |
| | | AREA (ha) 30.00 28.60 | QPEAK (cms) 4.880 4.291 | ТРЕАК (hrs) 6.17 6.17 | R.V. (mm) 45.22 47.13 | | |
| | = 3 (0363): EAK FLOWS DO | 58.60 NOT INCLU | 9.171 DE BASEFLO | 6.17 DWS IF A | 46.15 NY. | | |

Hadati Creek Watershed - Post Development with Cityview Ridge NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0115) | 1 + 2 = 3 | AREA **OPEAK** TPEAK R.V. (cms) 7.689 (mm) 47.16 (ha) (hrs) ID1= 1 (0106): + ID2= 2 (0114): 51.32 6.17 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 = 3R.V. (mm) 47.62 AREA QPEAK TPEAK (ha) (cms) (hrs) ID1= 1 (0563): 19.00 3.758 6.08 + ID2= 2 (0607): 5.97 1.215 6.08 41.11 ____ ID = 3 (0492); 24.97 4.973 6.08 46.06NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0526) | 1 + 2 = 3 | AREAQPEAKTPEAKR.V(ha)(cms)(hrs)(mm).00.001.00*******67.5410.0306.0052.60 R.V. (mm) _____ ID1= 1 (0525): + ID2= 2 (0520): 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 (cms) ΤΡΕΑΚ R.V. (mm) 46.15 (ha) (cms) 58.60 9.171 (hrs) _ _ _ _ _ _ _ _ _ _ ID1= 1 (0363): 6.17 + 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 | STORAGE OUTFLOW OUTFLOW STORAGE (cms) (ha.m.) (cms) (ha.m.) .2910 . 3795 .0000 .0000 .0579 .2970 1.6320 .4503 .2590 .5232 .2660 .1180.2720 . 5983 .1802 4.1680 .2790 .2445 7.5660 .6756 .3109 .0000 .2850 .0000

Page 106

| Hadati Cree INFLOW : ID= 2 (0 OUTFLOW: ID= 1 (0 | AR | EA OPE | lopment with C EAK TPEA 1s) (hrs 073 6.0 025 6.2 | K R.V. |
|---|---|--|--|---|
| PEA TIM MAX | K FLOW RE E SHIFT OF PE IMUM STORAGE | DUCTION [QC AK FLOW USED | out/Qin](%)= 6 (min)= 1 (ha.m.)= | 0.83 0.00 .5657 |
| ROUTE CHN (0527) IN= 2> OUT= 1 | | | | |
| Distanc 100.0 140.0 140.5 141.5 142.0 | DATA FOR SEC e Elevat 0 313. 0 312. 0 310. 0 310. 0 310. 0 312. 0 313. | TION (1. ion M 20 40 .05(80 80 40 .03(20 | 1)> Manning .0500 00 / .0300 Ma .0300 Ma .0300 Ma .0500 Ma | in Channel in Channel in Channel in Channel |
| 1.11 311.91 1.23 312.03 1.35 312.15 1.48 312.28 1.60 312.40 1.73 312.53 1.87 312.67 | VOLUME (cu.m.) .575E+02 .119E+03 .185E+03 .256E+03 .330E+03 .409E+03 .492E+03 .579E+03 .671E+03 .671E+03 .867E+03 .971E+03 .108E+04 .149E+04 .248E+04 | TIME TABLE FLOW RATE (cms) .1 .2 .3 .4 .6 .8 1.1 1.3 1.6 1.9 2.2 2.6 2.9 3.6 4.9 6.9 10.1 14.6 20.7 | VELOCITY (m/s) .40 .57 .69 .78 .86 .92 .97 1.02 1.07 1.11 1.15 1.19 1.23 | TRAV.TIME (min) 18.86 13.13 10.87 9.61 8.77 8.17 7.70 7.32 7.01 6.74 6.50 6.29 6.11 6.85 8.52 9.74 10.21 10.17 9.85 |
| INFLOW : ID= 2 (0 OUTFLOW: ID= 1 (0 | | QPEAK (cms) | rograph> TPEAK R.V. (hrs) (mm) 6.00 52.60 6.08 52.59 | <-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) 2.13 .74 2.04 .76 |
| RESERVOIR (0390) IN= 2> OUT= 1 DT= 5.0 min | OUTFLOW (cms) .0000 .7700 1.2600 | STORAGE (ha.m.) .0000 .2870 .9680 | OUTFLOW (cms) 1.3100 1.8600 .0000 | STORAGE (ha.m.) 1.6000 23.2300 .0000 |

Hadati Creek Watershed - Post Development with Cityview Ridge AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 176.100 INFLOW : ID= 2 (0380) 30.231 6.08 46.83 OUTFLOW: ID = 1 (0390) 1.430 176.100 7.25 46.83 PEAK FLOW REDUCTION [Qout/Qin](%)= 4.73 TIME SHIFT OF PEAK FLOW (min)= 70.00 MAXIMUM STORAGE USED (ha.m.) = 6.3304ADD HYD (0400) Ŗ.V. 1 + 2 = 3AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) 51.20 8.631 6.08 34.35 176.10 1.430 7.25 46.83 _____ (mm) ID1= 1 (0395): + ID2 = 2 (0390):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 338.30 100.00 .0500 336.80 336.00 335.30 335.30 110.00 .0500 .0300 135.00 Main Channel .0500 142.00 148.00 .0500 156.00 336.00 .0500 165.00 338.30 .0000 <---->
 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
 .71 1.09 1.39 1.66 335.93 13.4 19.04 .63 .153E+05 .218E+05 .79 336.09 22.7 1.97 16.04 .95 .299E+05 2.25 35.3 336.25 14.10 1.11 .396E+05 51.2 70.7 336.41 2.46 12.89 .510E+05 2.63 1.26 336.56 12.02 2.79 .641E+05 1.42 336.72 94.1 11.35 1.58 1.74 .787E+05 122.4 336.88 2.96 10.71 155.6 337.04 .939E+05 3.15 10.06 1.89 337.19 .110E+06 192.8 3.34 9.48 337.35 .126E+06 233.9 2.05 3.53 8.97 .143E+06 3.71 2.21 337.51 278.9 8.53 .160E+06 2.37 327.7 3.89 337.67 8.13 .178E+06 2.53 337.83 380.3 4.07 7.79 .196E+06 436.7 4.23 2.68 337.98 7.48 .215E+06 7.20 2.84 338.14 496.9 4.40 3.00 338.30 .234E+06 561.0 4.56 6.95 <---- hydrograph ----> <-pipe / channel->
QPEAK TPEAK R.V. MAX DEPTH MAX VEL
(cms) (hrs) (mm) (m) (m/s) AREA (ha) Page 108

Hadati Creek Watershed - Post Development with Cityview Ridge 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

 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

 R.V. ------(mm) 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 OUTFLOWSTORAGEOUTFLOWSTORAGE(cms)(ha.m.)(cms)(ha.m.).0000.00001.60006.40001.10002.90009.100010.00001.30004.300012.000020.0000 DT= 5.0 min | _____ AREA QPEAK TPEAK (ha) (cms) (hrs) INFLOW : ID= 2 (0407) 328.260 18.926 6.17 OUTFLOW: ID= 1 (0113) 328.260 1.552 12.52 R.V. (mm) 44.98 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 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) -----> Elevation Manning Distance 325.40 324.60 323.90 .0600 .0600 .0600 .0600 100.00 120.00 126.00
 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
 Page 109

| | $155.00 \\ 160.00$ | 324 | .60 .40 | .0600 .0600 | | ityview Rid | ge |
|--|---|--|---|--|--|--|--|
| <pre> DEPTH (m) .16 .33 .49 .65 .82 .98 1.14 1.31 1.47 1.63 1.79 1.96 2.12 2.28 2.45 2.61 2.77 2.94 3.10</pre> | ELEV (m) 322.46 322.63 322.79 322.95 323.12 323.28 323.44 323.61 323.77 323.93 324.09 324.26 324.42 324.58 324.75 324.91 325.07 325.24 | .154E+05 .176E+05 .200E+05 .228E+05 | | E VEL | OCITY m/s) .96 1.26 1.48 1.66 1.87 2.08 2.27 2.45 2.62 2.77 2.87 2.96 | TRAV.TIME (min) 6.96 5.27 4.51 4.03 3.57 3.21 2.93 2.72 2.54 2.41 2.33 2.25 2.18 2.11 2.12 | |
| INFLOW : OUTFLOW: | ID= 2 (04) ID= 1 (04) | AREA (ha) 30) 347.30 40) 347.30 | < hyc QPEAK (cms) 3.00 2.86 | Irograph TPEAK (hrs) 6.33 6.42 | R.V. (mm) 45.10 45.10 | <-pipe / c MAX DEPTH (m) .38 .37 | hannel-> MAX VEL (m/s) 1.33 1.31 |
| ADD HYD (1 + 2 = ID1 + TD2 | 3 | : 58.85 | QPEAK (cms) 13.381 2 860 | (hrs) | R.V. (mm) 47.17 45.10 | | |
| === | | | | | | | |
| | | DO NOT INCL | | | | | |
| | | | | | | | |
| ADD HYD (1 + 2 = ID1 + ID2 | 3 | (ha) : 43.10 | QPEAK (cms) 8.721 15.674 | TPEAK (hrs) 6.00 6.08 | R.V. (mm) 47.17 45.40 | | |
| | | : 449.25 | | 6.08 | 45.57 | | |
| ID | | | | | | | |

| ADD HYD (0491) |

Hadati Creek Watershed - Post Development with Cityview Ridge 1 + 2 = 3 | AREA QPEAK (ha) (cms) 449.25 23.705 24.97 3.025 R.V. (mm) 45.57 TPEAK (hrs) ID1= 1 (0490): + ID2= 2 (0482): 6.08 6.25 46.06 _____ ID = 3 (0491): 474.22 24.000 6.08 45.60NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. RESERVOIR (0483) IN= 2---> OUT= 1 DT= 5.0 min | OUTFLOW STORAGE | OUTFLOW STORAGE

 (ha.m.)
 (cms)

 .0000
 7.0800

 .0600
 8.1000

 .3400
 9.7980

 .6182
 10.4940

 1.1630
 11.6850

 1.7070
 12.3480

 -----(cms) (ha.m.) 2.4860 3.3240 4.6420 .0000 .2760 1.2000 7.4397 2.0400 2.6400 10.3000 3.1200 11.4000 AREA QPEAK (ha) (cms) 474.220 24.000 474.220 8.205 TPEAK (hrs) 6.08 6.58 R.V. (mm) 45.60 INFLOW : ID= 2 (0491) OUTFLOW: ID= 1 (0483) 45.60 PEAK FLOW REDUCTION [Qout/Qin](%)= 34.19 TIME SHIFT OF PEAK FLOW (min)= 30.00 MAXIMUM STORAGE USED (ha.m.) = 3.4099_____ ADD HYD (0530) R.V. (mm) 45.60 1 + 2 = 376.65 ______ ID = 3 (0530): 478.85 8.393 6.50 45.90NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0545) | 1 + 2 = 3QPEAK (cms) 8.393 AREA R.V. (mm) 45.90 TPEAK (ha) 478.85 (hrs) _____ ID1= 1 (0530): 6.50 + 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. ADD HYD (0546) | 1 + 2 = 3vreak (cms) AREA TPEAK R.V. _____ (ha) (hrs) (mm) Page 111

Hadati Creek Watershed - Post Development with Cityview Ridge ID1= 1 (0545): 546.39 15.614 6.33 + ID2= 2 (0542): 25.25 6.749 6.00 46.72 76.65 ______ ID = 3 (0546): 571.64 18.214 6.00 48.05NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0547) | 1 + 2 = 3 | AREA QPEAK TPEAK R.V (ha) (cms) (hrs) (mm) 571.64 18.214 6.00 48.05 14.99 4.164 6.00 76.65 R.V. (mm) 48.05 -----ID1= 1 (0546): + ID2= 2 (0543): _____ ______ ID = 3 (0547): 586.63 22.378 6.00 48.78 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0548) 1 + 2 = 3 | R.V. (mm) _____ 48.78 ID = 3 (0548): 587.76 22.711 6.0048.83 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 TIME TIME RAIN RAIN RAIN TIME RAIN hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr 6.35 6.35 6.35 6.35 6.35 3.25 3.50 3.75 .25 12.70 6.25 23.11 9.25 52.83 .50 .75 6.50 6.75 23.11 12.70 9.50 52.83 12.70 | 23.11 9.75 52.83 1.00 12.70 4.00 23.11 7.00 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 37.85 10.50 4.32 | 16.76 | 7.75 37.85 1.75 4.75 12.70 10.75 2.00 4.32 5.00 11.00 16.76 | 8.00 12.70 37.85
 6.35
 5.25

 6.35
 5.50

 6.35
 5.75

 6.35
 6.00
 2.25 12.70 | 8.25 12.70 11.25 12.70 12.708.5012.708.7512.709.00 12.70 | 11.50 12.70 | 11.75 12.70 | 12.00 2.50 12.70 2.75 12.70 3.00 12.70 _____ _____ CALIB

| Hadati Creek Waters STANDHYD (0480) Area ID= 1 DT= 5.0 min Total In | (ha)= 43.10 | elopment with Ci Dir. Conn.(%)= | • |
|--|--|---|--|
| Surface Area (ha)= Dep. Storage (mm)= Average Slope (%)= Length (m)= Mannings n = | IMPERVIOUS P 18.10 1.50 2.00 680.00 .013 | PERVIOUS (i) 25.00 5.00 2.00 40.00 .300 | |
| NOTE: RAINFALL WAS TR | RANSFORMED TO | 5.0 MIN. TIME S | STEP. |
| $\begin{array}{ccccccc} TIME & RAIN & hrs & mm/hr \\ .083 & 6.35 \\ .167 & 6.35 \\ .250 & 6.35 \\ .333 & 6.35 \\ .417 & 6.35 \\ .500 & 6.35 \\ .583 & 6.35 \\ .667 & 6.35 \\ .583 & 6.35 \\ .667 & 6.35 \\ .750 & 6.35 \\ .833 & 6.35 \\ .917 & 6.35 \\ 1.000 & 6.35 \\ 1.083 & 4.32 \\ 1.250 & 4.32 \\ 1.250 & 4.32 \\ 1.333 & 4.32 \\ 1.417 & 4.32 \\ 1.250 & 4.32 \\ 1.583 & 4.32 \\ 1.583 & 4.32 \\ 1.583 & 4.32 \\ 1.667 & 4.32 \\ 1.583 & 4.32 \\ 1.917 & 4.32 \\ 1.917 & 4.32 \\ 2.000 & 4.32 \\ 1.917 & 4.32 \\ 2.083 & 6.35 \\ 2.167 & 6.35 \\ 2.250 & 6.35 \\ 2.333 & 6.35 \\ 2.417 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.583 & 6.35 \\ 2.917 & 6.35 \\ 2.917 & 6.35 \\ 3.000 & 6.35 \\ \end{array}$ | TIMERAINhrsmm/hr3.08312.703.16712.703.25012.703.33312.703.41712.703.50012.703.58312.703.66712.703.75012.703.91712.704.00012.704.08316.764.16716.764.33316.764.58316.764.58316.764.58316.764.66716.764.66716.764.91716.765.00016.765.08312.705.16712.705.25012.70 | hrs mm/hr 6.083 23.11 6.167 23.11 6.250 23.11 6.333 23.11 6.417 23.11 6.500 23.11 6.500 23.11 6.500 23.11 6.583 23.11 6.567 23.11 6.667 23.11 6.750 23.11 6.667 23.11 6.750 23.11 6.750 23.11 6.750 23.11 6.750 23.11 7.083 12.70 7.083 12.70 7.700 23.13 7.667 12.70 7.500 12.70 7.667 12.70 7.917 12.70 7.917 12.70 8.000 12.70 8.083 12.70 8.167 12.70 8.333 12.70 8.417 12.70 8.500 | TIME RAIN hrs mm/hr 9.08 52.83 9.17 52.83 9.25 52.83 9.33 52.83 9.42 52.83 9.50 52.83 9.50 52.83 9.51 52.83 9.52 52.83 9.53 52.83 9.54 52.83 9.55 52.83 9.67 52.83 9.75 52.83 9.75 52.83 9.75 52.83 9.75 52.83 9.75 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 9.92 52.83 </td |
| Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= | 52.83 10.00 8.46 (ii) 10.00 .12 | 59.46 20.00 18.15 (ii) 20.00 .06 | , 12.00 12.70 |
| PEAK FLOW (cms)= TIME TO PEAK (hrs)= RUNOFF VOLUME (mm)= TOTAL RAINFALL (mm)= | | 3.90 10.00 107.20 211.07 2 | OTALS* 5.222 (iii) 10.00 28.70 11.07 |

Page 113

| Hadati Cr RUNOFF COEFFICI | eek Water ENT = | rshed - Post D .99 | evelopment wit .51 | h Cityview Ridge .61 |
|---|--|---|--|--|
| Fo (mm, Fc (mm, (ii) TIME STEP | /hr)= 75. /hr)= 12. (DT) SHO STORAGE C | 00 k 50 Cum.Inf ULD BE SMALLEF OEFFICIENT. | · | L4 00 |
| CALIB STANDHYD (0415) ID= 1 DT= 5.0 min | Area Total | (ha)= 4.99 Imp(%)= 42.00 |)) Dir. Conn.(| (%)= 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | | .015 | 2.89 5.00 2.86 40.00 .300 | |
| Max.Eff.Inten.(r over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | nm/hr)= (min) (min)= (min)= (cms)= | 52.83 5.00 3.48 (ii) 5.00 .26 | 59.46 15.00 12.19 (ii) 15.00 .09 | *TOTALS* |
| PEAK FLOW TIME TO PEAK RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICI | (cms)= (hrs)= (mm)= (mm)= ENT = | .15 9.92 209.57 211.07 .99 | .47 10.00 107.20 211.07 .51 | .626 (iii) 10.00 128.70 211.07 .61 |
| Fo (mm, Fc (mm, (ii) TIME STEP | QUATION S /hr)= 75. /hr)= 12. (DT) SHO STORAGE C | ELECTED FOR PE 00 k 50 Cum.Inf ULD BE SMALLEF OEFFICIENT. | ERVIOUS LOSSES: ((1/hr)= 4.1 (mm)= .(R OR EQUAL | 14 |
| CALIB STANDHYD (0410) ID= 1 DT= 5.0 min | Area Total | (ha)= 24.20 Imp(%)= 42.00 | | (%)= 21.00 |
| Surface Area Dep. Storage Average Slope Length Mannings n | (ha)= (mm)= (%)= (m)= = | IMPERVIOUS 10.16 1.50 2.00 401.00 .013 | PERVIOUS (i) 14.04 5.00 2.00 40.00 .300 | |
| Max.Eff.Inten.(r over Storage Coeff. Unit Hyd. Tpeak Unit Hyd. peak | (min) (min)= | 52.83 5.00 6.16 (ii) 5.00 .19 | 59.46 20.00 15.86 (ii) 20.00 .07 | *TOTALS* |

TOTALS

| Hadati Creek Watershed - Post Development with Cityview Ridge 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. |
| CALIB STANDHYD (0460) Area (ha)= 36.00 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| IMPERVIOUSPERVIOUS (i)Surface Area $(ha) =$ 15.1220.88Dep. Storage $(mm) =$ 1.505.00Average Slope $(\%) =$ 2.032.03Length $(m) =$ 465.0040.00Mannings 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 |
| 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. |
| CALIB STANDHYD (0455) Area (ha)= 12.70 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 |
| $\begin{array}{rcrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$ |
| Max.Eff.Inten.(mm/hr)= 52.83 59.46 over (min) 5.00 20.00 Storage Coeff. (min)= 5.43 (ii) 15.59 (ii) Page 115 |

Hadati Creek Watershed - Post Development with Cityview Ridge 5.00 Unit Hyd. Tpeak (min)= 20.00 Unit Hyd. peak (cms)= .20 .07 ***TOTALS*** .39 10.00 209.57 PEAK FLOW (cms) =1.17 1.564 (iii) 10.00 TIME TO PEAK (hrs)= 10.00 (mm)= 209.57 RUNOFF VOLUME 107.20 128.70 211.07 TOTAL RAINFALL (mm) =211.07 211.07 = RUNOFF COEFFICIENT . 99 .51 .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: F0 (mm/hr)= 75.00 K (1/hr)= 4.14Fc (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. CALTB STANDHYD (0395) ID= 1 DT= 5.0 min Area (ha)= 51.20 Total Imp(%)= 10.00 Dir. Conn.(%)= 5.00 __________ IMPERVIOUS PERVIOUS (i) 5.12 Surface Area (ha) =46.08 1.50 Dep. Storage (mm) =5.00 (%)= 2.00 Average Slope 2.00 900.00 Length (m) =40.00 Mannings n . 300 .013 Max.Eff.Inten.(mm/hr)= 52.83 43.26 25.00 10.00 over (min) Storage Coeff. 10.01 (ii) 21.02 (ii) (min) =10.01 Unit Hyd. Tpeak (min)= 25.00 Unit Hyd. peak (cms)= .11 .05 *TOTALS* PEAK FLOW .37 10.00 (cms) =5.03 5.388 (iii) TIME TO PEAK (hrs) =10.08 10.08 RUNOFF VOLUME 209.57 (mm) =81.91 88.29 211.07 TOTAL RAINFALL (mm) =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) = 4.14FC (mm/hr) = 12.50Cum.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 Total Imp(%)= 37.00 ID= 1 DT= 5.0 min | Dir. Conn.(%) = 19.00-------PERVIOUS (i) IMPERVIOUS Surface Area (ha) =11.1018.90 1.50 5.00 Dep. Storage (mm) =2.00 2.00 Average Slope (%)= Length (m) =447.00 40.00 Page 116

Hadati Creek Watershed - Post Development with Cityview Ridge Mannings n = .013 .300 Max.Eff.Inten.(mm/hr)= 52.83 55.42

 over (min)
 5.00

 Storage Coeff. (min)=
 6.58 (ii)

 Unit Hyd. Tpeak (min)=
 5.00

 Unit Hyd. peak (cms)=
 .18

 20.00 16.55 (ii) 20.00 .06 *TOTALS* PEAK FLOW(cms)=.842.78TIME TO PEAK(hrs)=10.0010.00RUNOFF VOLUME(mm)=209.57101.80TOTAL RAINFALL(mm)=211.07211.07RUNOFF COEFFICIENT=.99.48 3.618 (iii) 10.00 122.28 211.07 . 58 ***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20% YOU SHOULD CONSIDER SPLITTING THE AREA. (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (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) Dep. Storage Average Slope Length (ha)= 0.05 (mm)= 1.50 (%)= 1.00 (m)= 330.00 .013 6.85 9.45 5.00 40.00 Length Mannings n .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 Unit Hyd. peak (cms)= .18 .06 *TOTALS* (cms)=.501.47(hrs)=10.0010.00(mm)=209.57107.20(mm)=211.07211.07LENT =.99.51 PEAK FLOW 1.968 (iii) TIME TO PEAK 10.00 128.70 211.07 RUNOFF VOLUME TOTAL RAINFALL RUNOFF COEFFICIENT = . 99 .51 .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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 CALIB STANDHYD (0355) Area (ha)= 12.30 ID= 1 DT= 5.0 min | Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00 _____ Page 117

Hadati Creek Watershed - Post Development with Cityview Ridge IMPERVIOUS PERVIOUS (i) Surface Area (ha) =5.17 7.13 Dep. Storage (mm) =1.50 5.00 (%)= 1.60 Average Slope 1.60 Length (m) =286.00 40.00 Mannings n ----.013 .300 Max.Eff.Inten.(mm/hr)= 52.83 59.46 5.00 over (min) 20.00 5.5c 5.00 .21 5.38 (ii) Storage Coeff. (min)= 15.74 (ii) Unit Hyd. Tpeak (min)= 20.00 Unit Hyd. peak (cms)= .07 ***TOTALS*** PEAK FLOW TIME TO PEAK .38 10.00 (cms) =1.13 1.513 (iii) 10.00 (hrs) =10.00 RUNOFF VOLUME 209.57 (mm) =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) = 4.14Fc (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) | |ID= 1 DT= 5.0 min | (ha) = 117.50Area Total Imp(%) = 42.00Dir. Conn. (%) = 21.00IMPERVIOUS PERVIOUS (i) 49.35 Surface Area (ha) =68.15 1.50 Dep. Storage (mm) =5.00 Average Slope (%)= 2.00 2.00 885.00 Length (m)= 40.00 .300 Mannings n .013 over (min) scorage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 52.83 59.46 10.00 20.00 9.91 (ii) 19.60 (ii) 10.00 20.00 .11 .06 *TOTALS* 10.49 14.089 (iii) 3.61 10.00 TIME TO PEAK (hrs) =10.08 10.00 209.57 RUNOFF VOLUME (mm) =107.20 128.70 TOTAL RAINFALL 211.07 211.07 (mm) =211.07 RUNOFF COEFFICIENT = .99 .51 .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00Fo FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ CALIB

Hadati Creek Watershed - Post Development with Cityview Ridge | STANDHYD (0105) | |ID= 1 DT= 5.0 min | Area (ha) = 51.32Total Imp(%) = 42.00Dir. Conn.(%) = 21.00IMPERVIOUS PERVIOUS (i) 21.55 1.50 2.00 Surface Area (ha) =29.77 Dep. Storage (mm) =5.00 Average Slope (%)= 2.00 Length 550.00 (m) =40.00 .013 Mannings n = . 300 Max.Eff.Inten.(mm/hr)= 52.83 59.46 5.00 7.45 5.00 over (min) 20.00 7.45 (ii) 17.14 (ii) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 20.00 .17 .06 ***TOTALS*** PEAK FLOW (cms) =1.58 4.68 6.260 (iii) 10.00 10.00 TIME TO PEAK (hrs)= 10.00 (mm)= 107.20 209.57 RUNOFF VOLUME 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) = 4.14Fc (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) 6.01 (ha)= Surface Area 8.31 1.50 5.00 Dep. Storage (mm)= 2.00 287.00 Average Slope (%)= Length (m)= 40.00 Mannings n .013 . 300 Max.Eff.Inten.(mm/hr) =52.83over (min)5.00Storage Coeff. (min) =5.04 (ii)Unit Hyd. Tpeak (min) =5.00Unit Hyd. Tpeak (min) =21 59.46 15.00 14.74 (ii) 15.00 .08 Unit Hyd. peak (cms)= .21 ***TOTALS*** PEAK FLOW (cms) =.44 1.34 1.780 (iii) 10.00 209.5, 211.07 .99 TIME TO PEAK 10.00 (hrs) =10.00 RUNOFF VOLUME (mm)= 107.20 128.70 TOTAL RAINFALL 211.07 (mm) =211.07 .51 RUNOFF COEFFICIENT = .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 Fo FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

Hadati Creek Watershed - Post Development with Cityview Ridge CALIB STANDHYD (0101) ID= 1 DT= 5.0 min Area (ha)= 16.32 Total Imp(%)= 42.00 Dir. Conn. (%) = 21.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =6.85 9.47 Dep. Storage (mm) =1.50 5.00 Average Slope (%)= 2.00 2.00 Length 309.00 (m)= 40.00 Mannings n .013 . 300 Max.Eff.Inten.(mm/hr)= 52.83 59.46 5.00 5.27 (ii) 5.00 .21 over (min) 15.00 Storage Coeff. (min) =14.96 (ii) Unit Hyd. Tpeak (min)= 15.00 Unit Hyd. peak (cms)= .08 *TOTALS* (hrs)= .50 (mm)= 209.57 (mm)= 211 ^7 PEAK FLOW TIME TO PEAK 1.52 2.027 (iii) 10.00 107.20 10.00 RUNOFF VOLUME 128.70 211.07 211.07 TOTAL RAINFALL 211.07 RUNOFF COEFFICIENT = .51 .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr)= 75.00 K (1/hr)= 4.14 (mm/hr)= 12.50 Cum.Inf. (mm)= .00 FO FC (mm/hr)= 12.50 Cum.Inf. (mm)= (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) ID= 1 DT= 5.0 min Area (ha)= 19.00 Total Imp(%)= 42.00 Dir. Conn.(%) = 21.00_____ IMPERVIOUS PERVIOUS (i) 7.98 (ha) =Surface Area 11.02 1.50 2.00 365.00 Dep. Storage (mm) =5.00 Average Slope (%)= 2.00 (m)= Length 40.00 Mannings n .013 . 300 = Max.Eff.Inten.(mm/hr)= 52.83 59.46 5.00 5.82 5.00 20 over (min) 20.00 Storage Coeff. (min)= 5.82 (ii) 15.52 (ii) Unit Hyd. Tpeak (min)= 20.00 .20 Unit Hyd. peak (cms)= .07 *TOTALS* .59 10.00 209 PEAK FLOW (cms) =1.75 2.340 (iii) 10.00 TIME TO PEAK (hrs) =10.00 (mm)= (mm)= 107.20 RUNOFF VOLUME 128.70 211.07 TOTAL RAINFALL 211.07 211.07 RUNOFF COEFFICIENT = . 99 .51 .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: (mm/hr) = 75.00 K (1/hr) = 4.14Fo (mm/hr)= 12.50 Cum.Inf. (mm)= FC .00 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL Page 120

Hadati Creek Watershed - Post Development with Cityview Ridge THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. CALIB STANDHYD (0600) Area (ha)= 11.38 Total Imp(%)= 42.00 ID= 1 DT= 5.0 min Dir. Conn.(%)= 21.00 IMPERVIOUS PERVIOUS (i) Surface Area (ha) =4.78 6.60 1.50 Dep. Storage 5.00 2.00 (mm)= 2.00 (%)= Average Slope 680.00 Length (m)= 40.00 Mannings n .013 .300

 52.83
 59.46

 10.00
 20.00

 8.46 (ii)
 18.15 (ii)

 10.00
 20.00

 Max.Eff.Inten.(mm/hr)= over (min) (min)́= Storage Coeff. Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= .06 .12 ***TOTALS*** $\begin{array}{c} (cms) = & .35 & 1.03 \\ (hrs) = & 10.00 & 10.00 \\ (mm) = & 209.57 & 107.20 \\ (mm) = & 211.07 & 211.07 \end{array}$ PEAK FLOW 1.379 (iii) TIME TO PEAK 10.00 RUNOFF VOLUME 128.70 TOTAL RAINFALL 211.07 RUNOFF COEFFICIENT = . 99 .51 .61 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (mm/hr) = 12.50 Cum.Inf. (mm) = .00.00 (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) (ha)= 7.62 Area ID= 1 DT= 5.0 min | Total Imp(%) = 46.00Dir. Conn.(%)= 21.00 _____ IMPERVIOUS PERVIOUS (i) 3.51 1.50 Surface Area (ha) =4.11 5.00 Dep. Storage (mm) =2.00 680.00 013 Average Slope (%)= 2.00 Length (m) =40.00 Mannings n .013 . 300 ----Max.Eff.Inten.(mm/hr)= 52.83 64.79 10.00 8.46 (ii) 10.00 over (min) 20.00 Storage Coeff. (min)= 17.83 (ii) Unit Hyd. Tpeak (min)= 20.00 Unit Hyd. peak (cms)= .12 .06 ***TOTALS*** (cms)= .23 (hrs)= 10.00 (mm)= 209.57 (mm)= 211.07 PEAK FLOW .70 10.00 .936 (iii) (cms) =TIME TO PEAK 10.00 (hrs) =10.00 RUNOFF VOLUME 133.59 211.07 TOTAL RAINFALL 211.07 = . 54 RUNOFF COEFFICIENT . 99 . 63

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Page 121

Hadati Creek Watershed - Post Development with Cityview Ridge (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00Fo FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. _____ _____ CALTR STANDHYD (0607) | |ID= 1 DT= 5.0 min | Area (ha)= 5.97 Total Imp(%) = 42.00Dir. Conn.(%)= 2.50 ------IMPERVIOUS PERVIOUS (i) (ha) =Surface Area 2.51 3.46 Dep. Storage (mm) =1.50 5.00 2.00 Average Slope (%)= 2.00 Length 680.00 (m)= 40.00
 over (min)
 52.83

 over (min)
 10.00

 storage Coeff. (min)=
 8.46 (ii)

 Unit Hyd. Tpeak (min)=
 10.00

 Unit Hyd. peak (cms)=
 12

 PEAK FLOW
 12
 Mannings n .013 .300 76.31 20.00 17.23 (ii) 20.00 .06 *TOTALS* .02 10.00 .70 10.00 .721 (iii) TIME TO PEAK (hrs) =10.00 209.57 (mm)= 124.06 RUNOFF VOLUME 126.19 211.07 TOTAL RAINFALL (mm) =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: (mm/hr) = 75.00 K (1/hr) = 4.14(mm/hr) = 12.50 Cum.Inf. (mm) = .00FO FC (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. ------CALTB | STANDHYD (0540) | |ID= 1 DT= 5.0 min | Area (ha)= 4.63 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 _____ IMPERVIOUS PERVIOUS (i) (ha)= .93 Surface Area 3.70 Dep. Storage 1.50 5.00 (mm) =.55 .55 Average Slope (%)= 150.00 Length (m) =40.00 Mannings n .013 .300 = Max.Eff.Inten.(mm/hr)= 52.83 42.97 5.00 25.00 over (min) Storage Coeff. (min)= 5.03 (ii) 21.29 (ii) 5.00 Unit Hyd. Tpeak (min)= 25.00 Unit Hyd. peak (cms)= .05 .21 *TOTALS* .54 .10 PEAK FLOW (cms) =.636 (iii) 10.00 10.08 TIME TO PEAK (hrs)= 10.00 RUNOFF VOLUME 209.57 (mm)= 81.35 182.64 Page 122

Hadati Creek Watershed - Post Development with Cityview Ridge 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) = 4.14Fc (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 CALIB STANDHYD (0500) Area (ha)= 244.00 ID= 1 DT= 5.0 min | Total Imp(%) = 46.00Dir. Conn.(%) = 26.00IMPERVIOUS PERVIOUS (i) Surface Area (ha) =112.24 112.23 1.50 .80 1275.00 013 131.76 5.00 Dep. Storage (mm)= Average Slope (%)= . 80 (m) =40.00 Length Mannings n .300 52.83 15.00 16.24 (ii) 15.00 Max.Eff.Inten.(mm/hr)= 59.90 over (min) 30.00 Storage Coeff. (min)= 28.96 (ii) Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 30.00 .07 .04 *TOTALS* PEAK FLOW (cms) =9.05 18.51 27.108 (iii) (hrs) = 10.00 (mm) = 209.57 (mm) = 211.07 lT = .9910.00 10.25 10.08 TIME TO PEAK (hrs) =(mm)= RUNOFF VOLUME 107.75 134.22 TOTAL RAINFALL 211.07 211.07 RUNOFF COEFFICIENT = .64 .51 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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) ID= 1 DT= 5.0 min (ha) = 16.00Area Total Imp(%) = 80.00 Dir. Conn.(%) = 79.00 IMPERVIOUS PERVIOUS (i) 12.80 (ha)= Surface Area 3.20 1.50 Dep. Storage (mm) =5.00 .20 Average Slope (%)= . 50 400.00 Length 40.00 (m) =Mannings n .013 . 300 52.83 10.00 9.33 (ii) 10.00 .12 Max.Eff.Inten.(mm/hr)= 42.97 over (min) 35.00 Storage Coeff. (min)= 31.35 (ii) Unit Hyd. Tpeak (min)= 35.00 Unit Hyd. peak (cms)= .03

Page 123

TOTALS

Hadati Creek Watershed - Post Development with Cityview Ridge LOW (cms)= 1.85 .31 2.134 (iii) 10.00 PEAK FLOW .31 10.33 TIME TO PEAK (hrs)= 10.00 (mm)= 211.07 T = RUNOFF VOLUME 81.35 182.64 TOTAL RAINFALL 211.07 211.07 RUNOFF COEFFICIENT . 39 .87 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 ID= 1 DT= 5.0 min IMPERVIOUS PERVIOUS (i) Surface Area (ha) =20.20 5.05 5.00 1.50 .55 350.00 Dep. Storage (mm)= .55 Average Slope (%)= 40.00 Length (m)= Mannings n .013 .300 Max.Eff.Inten.(mm/hr)= 52.83 42.97 52.83 10.00 8.37 (ii) 10.00 over (min) 25.00 24.63 (ii) Storage Coeff. (min) =Unit Hyd. Tpeak (min)= 25.00 Unit Hyd. peak (cms)= .12 .05 *TOTALS* PEAK FLOW(cms)=2.92TIME TO PEAK(hrs)=10.00RUNOFF VOLUME(mm)=209.57TOTALRAINFALL(mm)=211.07 .53 10.17 81.35 3.443 (iii) 10.00 182.64 211.07 211.07 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) ID= 1 DT= 5.0 min Area (ha)= 14.99 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 IMPERVIOUS PERVIOUS (i) Surface Area (ha) =11.99 3.00 1.50 5.00 Dep. Storage (mm) =.55 (%) = .55(m) = 200.00 Average Slope (%)= 40.00 Length Mannings n .013 = .300 52.83 5.00 5.98 (ii) Max.Eff.Inten.(mm/hr)= 42.97 over (min) Storage Coeff. (min)= 25.00 22.24 (ii) Page 124

Hadati Creek Watershed - Post Development with Cityview Ridge Unit Hyd. Tpeak (min)= 5.00 25.00 Unit Hyd. peak (cms)= .19 .05 ***TOTALS*** PEAK FLOW(cms)=1.74.32TIME TO PEAK(hrs)=10.0010.08RUNOFF VOLUME(mm)=209.5781.35TOTAL RAINFALL(mm)=211.07211.07RUNOFF COEFFICIENT99.39 2.054 (iii) 10.00 182.64 211.07 . 99 .87 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: Fo (mm/hr) = 75.00 K (1/hr) = 4.14Fc (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 _____ $\begin{array}{cccc} \text{IMPERVIOUS} & \text{PERVIOUS} & (i) \\ (ha) = & .90 & .23 \\ (mm) = & 1.50 & 5.00 \\ (\%) = & .55 & .55 \\ (m) = & 50.00 & 40.00 \\ = & .013 & .300 \end{array}$ Surface Area Dep. Storage (mm)= Average Slope Length Mannings n Max.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 52.83 5.00 20 *TOTALS* .13 .03 9.67 10.00 209.57 81.35 PEAK FLOW (cms) =.156 (iii) TIME TO PEAK 10.00 (hrs) =(mm)= 182.64 211.07 RUNOFF VOLUME 211.07 211.07 TOTAL RAINFALL (mm)= = 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) = 4.14Fc (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 (hrs)= .00 | ID= 1 DT=****min | QPEAK (cms)= ------TPEAK (mm)=****** VOLUME ADD HYD (0420) $\begin{vmatrix} 1 \\ 1 \\ 2 \\ 3 \end{vmatrix}$ AREA QPEAK TPEAK R.V. Page 125

Hadati Creek Watershed - Post Development with Cityview Ridge (ha) (cms) (hrs) (mm) ID1= 1 (0415): + ID2= 2 (0410): 4.99 128.70 10.00 .626 2.975 24.20 10.00 128.70 -----_____ ID = 3 (0420):29.19 3.602 10.00 128.70 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0465) 1 + 2 = 3AREA QPEAK TPEAK R.V. (cms) (ha) (hrs) (mm) ID1= 1 (0460): + ID2= 2 (0455): 128.70 36.00 4.413 10.00 12.70 1.564 10.00 128.70 ID = 3 (0465): 48.705.977 10.00 128.70 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 .15 .0300 / .0150 Main Channel .0150 Main Channel 5.51 .00 10.00 .09 .0150 Main Channel .00 14.49 .0150 Main Channel 14.50 .15 .0150 / .0300 Main Channel .0300 20.00 .40 ----- TRAVEL TIME TABLE ------*<---*-----DEPTH ELEV VOLUME FLOW RATE (m) (m) (cu.m.) (cms) VELOCITY TRAV.TIME (m) (m) .02 .02 .04 .04 .06 .06 .08 .08 .09 .09 (m/s) (min) .0 .21 .176E+02 80.52 .02 .04 .06 .08 .09 .11 .13 .0 .702E+02 .33 50.72 .158E+03 .1 .43 38.71 .281E+03 .1 .52 31.95 .09 .438E+03 .3 .62 26.84 .11 .5 .7 .77 .607E+03 21.66 .13 .90 .13 .776E+03 18.45 .15 .15 .944E+03 1.0 1.03 16.22 .17 .116E+04 .17 1.3 14.36 1.16.20 .20 .140E+04 1.8 1.27 13.13 . 22 .22 .166E+04 2.3 1.36 12.24 .24 .194E+04 .24 2.8 1.44 11.58 .26 .225E+04 .26 3.4 1.51 11.05 .29 .258E+04 .29 4.0 1.57 10.63 .31 .31 .293E+04 4.8 1.62 10.27 .331E+04 .33 .33 5.5 9.97 1.67 .35 .371E+04 .35 6.4 1.72 9.71 .38 .413E+04 1.76 7.3 .38 9.48 .40 .40 .457E+04 8.2 1.80 9.28 <---- hydrograph ----> <-pipe / channel-> QPEAK TPEAK R.V. AREA MAX DEPTH MAX VEL (cms) (ha) (hrs) (mm) (m) (m/s) 10.00 122.28 INFLOW : ID= 2 (0360) .27 30.00 3.62 1.53 Page 126

| н OUTFLOW: | ID= 1 (036 | 2) 30.00 | - Post Deve 3.50 | 10.08 122.26 | CITYVIEW Ridg | ge 1.52 |
|--|---|--------------------------------------|---|---|---|--|
| ROUTE CHN (IN= 2> C | 0353) DUT= 1 | Routing ti | ime step (mi | n)'= 5.00 | | |
| | <pre>< D. Distance .00 5.50 5.51 10.00 14.49 14.50 20.00</pre> | | rion M 26 15 .030 00 09 00 | .0150 M | lain Channel lain Channel lain Channel lain Channel lain Channel | |
| < DEPTH (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 .26 | ELEV (m) .01 .03 .04 .05 .07 .08 .10 .11 .12 .14 .15 .16 .18 .19 .20 .22 .23 .25 | VOLUME | | VELOCITY (m/s) .17 .27 .35 .42 .49 .55 .64 .74 .84 .94 1.03 1.11 1.17 1.21 1.25 1.28 1.31 1.33 1.34 | TRAV.TIME (min) 99.56 62.72 47.86 39.51 34.05 30.15 26.24 22.41 19.75 17.76 16.22 15.07 14.28 13.72 13.31 13.01 12.76 12.57 12.41 | |
| INFLOW : OUTFLOW: | ID= 2 (035) ID= 1 (035) | AREA (ha) 0) 16.30 3) 16.30 | QPEAK (cms) | TPEAK R.V. (hrs) (mm) | | hannel-> MAX VEL (m/s) 1.25 1.24 |
| ROUTE CHN (IN= 2> 0 | 0358) UT= 1 | Routing ti | me step (mi | n)'= 5.00 | | |
| | <pre>< D/ Distance</pre> | | ion M 26 15 .030 00 09 00 | .0150 M .0150 M .0150 M | ain Channel ain Channel ain Channel ain Channel ain Channel | |

Hadati Creek Watershed - Post Development with Cityview Ridge UTFLOW: ID= 1 (0362) 30.00 3.50 10.08 122.26 .27 1.52

| Ha | adati Creek | Watershed - TRAVEL | - Post De | velopmen | t with C | ityview Rid | ge |
|---|--------------------------|---|-----------------------------|----------------|---------------------|--|---------|
| DEPTH (m) | ELEV (m) | VOLUME (cu.m.) | | TE VEL | | TRAV.TIME (min) | |
| .01 .03 | .01 | .102E+02 | .0 | , | .17 .27 | 109.52 68.99 | |
| .04 .05 | .04 | .409E+02 .920E+02 .163E+03 | .0 .1 | | .35 | 52.65 43.46 | |
| .07 | .07 | .255E+03 .368E+03 | .1 .2 | | .49 | 37.45 33.17 | |
| .10 .11 | | .499E+03 .634E+03 | .3 | | .64 .74 | 28.86 24.66 | |
| .12 .14 | .12 | .769E+03 .904E+03 | .6 .8 | | .84 .94 | 21.72 | |
| .15 .16 | .16 | .104E+04 .119E+04 | $1.0 \\ 1.2$ | | 1.03 1.11 | 17.84 16.57 | |
| .18 .19 | .19 | .135E+04 .154E+04 | 1.4 1.7 | | 1.17 1.21 | 15.71 15.10 | |
| .20 | .22 | .175E+04 .198E+04 | 2.0 | | 1.25 | 14.65 14.31 | |
| .23 | .23 | .223E+04 .250E+04 | 2.6 3.0 | | 1.31 1.33 | 14.04 13.82 | |
| .26 | | .279E+04 | 3.4 | ud no a no ok | 1.34 | 13.65 | |
| | | AREA | QPEAK | TPEAK | R.V. | <-pipe / c MAX DEPTH | MAX VEL |
| INFLOW : OUTFLOW: | ID= 2 (035 ID= 1 (035 | 5) 12.30 8) 12.30 | 1.51 | 10.00 | 128.70 | <-pipe / c MAX DEPTH (m) .18 .18 | 1.18 |
| | | | | | 220101 | 110 | 1.17 |
| | | | | | | | |
| RESERVOIR (IN= 2> 0 DT= 5.0 mi | UT= 1 | | CTOBACE | | | CTOBACE | |
| | | OUTFLOW (cms) .0000 | STORAGE (ha.m.) .0000 | (0 | FLOW ms) 5000 | STORAGE (ha.m.) | |
| | | .0100 | .0100 | 6. | 6000 0000 | .4000 .8000 .0000 | |
| | | AR | | QPEAK | TPEA | | |
| | ID= 2 (010 | (h 5) 51.3 | a) (20 (| (cms) 6.260 | (hrs) 10.0 |) (mm) | 0 |
| OUTFLOW: | ID= 1 (010 | | | 5.997 | 10.0 | | 9 |
| | TIME | FLOW RE | AK FLOW | (| (min)= | 5.00 | |
| | | UM STORAGE | | - | a.m.)= | .7608 | |
| | | | | | | | |
| ADD HYD ((1 + 2 = | 3 | AREA | QPEAK | TPEAK | R.V | · | |
| ID1: | = 1 (0102): | (ha) 14.32 16.32 | (cms) 1.780 | (hrs) 10.00 | (mm) 128.70 |) | |
| ====: | | 16.32 ==================================== | | | ======== | = | |
| | | 0 NOT INCLU | | | | | |
| | | | | | | | |
| | | | Page | 128 | | | |

Page 128

Hadati Creek Watershed - Post Development with Cityview Ridge RESERVOIR (0111) IN= 2---> OUT= 1 OUTFLOWSTORAGEOUTFLOWSTORAGE(cms)(ha.m.)(cms)(ha.m.).0000.00001.00001.0000.0100.010020.00001.1000.0120.1000.0000.0000 DT= 5.0 min AREAQPEAKTPEAKR.V.(ha)(cms)(hrs)(mm)19.0002.34010.00128.7019.0002.06910.50128.68 INFLOW : ID= 2 (0110) OUTFLOW: ID= 1 (0111) PEAK FLOW REDUCTION [Qout/Qin](%)= 88.39 TIME SHIFT OF PEAK FLOW (min) = 30.00MAXIMUM STORAGE USED (ha.m.) = 1.0100_____ ADD HYD (0602)

 2 = 3
 AREA
 QPEAK
 TPEAK
 R.V.

 ID1= 1
 (0600):
 11.38
 1.379
 10.00
 128.70

 + ID2= 2
 (0601):
 7.62
 .936
 10.00
 133.59

 1 + 2 = 3 _____ ID = 3 (0602): 19.00 2.315 10.00130.66 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ------------DUHYD (0505) Inlet Cap.=9.000 #of Inlets= 1

 tal(cms)=
 9.0
 AREA
 QPEAK
 TPEAK
 R.V.

 tal(cms)=
 9.0
 (ha)
 (cms)
 (hrs)
 (mm)

 TOTAL
 HYD.(ID=
 1):
 244.00
 27.11
 10.08
 134.22

 Total(cms)= 9.0 -----______ 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 = 3ID = 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

Hadati Creek Watershed - Post Development with Cityview Ridge R.V. | Total(cms)= 2.0 | AREA QPEAK TPEAK _____ (ha) (hrs) (cms) (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) |

 2 = 3
 AREA
 QPEAK
 TPEAK
 R.V.

 ID1=1
 (0425):
 4.95
 1.622
 10.00
 128.70

 + ID2=2
 (0465):
 48.70
 5.977
 10.00
 128.70

 1 + 2 = 3 | R.V. (mm) 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 | QPEAK TPEAK (cms) (hrs) 1.875 10.08 R.V. (mm) AREA

 ID1= 1 (0353):
 16.30
 1.875

 + ID2= 2 (0358):
 12.30
 1.436

 128.66 10.08 128.64 ______ ID = 3 (0359): 28.60 3.31110.08 128.65 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. RESERVOIR (0104) | IN= 2---> OUT= 1 | STORAGEOUTFLOWSTORAGE(ha.m.)(cms)(ha.m.).00001.0000.5000.010010.0000.6000.1332.0000.0000 OUTFLOW | DT= 5.0 min | ______ (cms) .0000 . 5000 .6000 .0100 .0150 .0000 (ha) (cms) 30.640 3.807 30.640 3.707 R.V. (mm) QPEAK TPEAK (hrs) 10.00 10.00 (mm) 128.70 INFLOW : ID= 2 (0103) 3.797 OUTFLOW: ID = 1 (0104)128.69 PEAK FLOW REDUCTION [Qout/Qin](%)= 99.73 TIME SHIFT OF PEAK FLOW (min)= .00 (min)= .00 MAXIMUM STORAGE USED (ha.m.) =.5312 ADD HYD (0114) | 1 + 2 = 3 | AREA QPEAK (ha) (cms) 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 ------

Page 130

| Hadati Creek Watershed - Post Development with Cityview Ridge 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 |
| C |
| <pre>< 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</pre> |
| ROUTE CHN (0564) IN= 2> OUT= 1 Routing time step (min)'= 5.00 |
| <pre>< 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 Page 131</pre> |

| Hadati Cre | ek Watershed | - | Post | Development | with | Cityview | Ridge | |
|------------|--------------|---|------|-------------|------|----------|-------|--|
| | | , | TTAF | | | | | |

| DEPTH (m) .10 .19 .29 .38 .48 .57 .67 .76 .86 .95 1.05 1.16 1.28 1.39 1.50 1.61 1.72 1.84 1.95 | ELEV (m) 99.60 99.79 99.88 99.98 100.07 100.17 100.26 100.36 100.45 100.55 100.66 100.78 100.89 101.00 101.11 101.22 101.34 101.45 | <pre>TRAVEL VOLUME (cu.m.) .353E+02 .112E+03 .195E+03 .285E+03 .381E+03 .484E+03 .594E+03 .594E+03 .710E+03 .832E+03 .961E+03 .110E+04 .127E+04 .127E+04 .127E+04 .170E+04 .195E+04 .221E+04 .250E+04 .280E+04 .313E+04</pre> | FLOW RATE (cms) .0 .1 .2 .3 .5 .7 .9 1.2 1.5 1.8 2.2 2.7 3.4 4.1 4.9 5.8 6.7 7.7 | VE | LOCITY (m/s) .19 .37 .49 .59 .67 .74 .80 .86 .91 .96 1.00 1.07 1.14 1.20 1.25 1.30 1.34 1.38 | TRAV.TIME (min) 43.69 22.76 17.03 14.23 12.51 11.32 10.43 9.74 9.18 8.72 8.32 7.80 7.31 6.94 6.65 6.41 6.22 6.04 | |
|--|---|---|---|---|---|---|----------------------------------|
| **** WAR | | VEL TIME TAE | <pre> byd</pre> | roaran | h> | <-pipe / d | channel_s |
| INFLOW : OUTFLOW: | ID= 2 (05 ID= 1 (05 | AREA (ha) 505) 78.53 564) 78.53 | QPEAK (cms) 18.11 17.83 | TPEAK (hrs) 10.08 10.25 | R.V. (mm) 134.22 134.22 | <-prpe / 0 MAX DEPTH (m) 1.92 1.95 | MAX VEL (m/s) 1.40 1.41 |
| TOTAL HY | 3.050 1 3.0 D.(ID= 1): | AREA (ha) 181.47 | 11.13 | 10.00 | 138.49 | | |
| MAJOR SY | S.(ID= 2): | 98.04 83.43 | 8.08 | 10.00 | 138.49 | | |
| | | | | | | | |
| NULE: P | LAK FLUWS | DO NOT INCLU | DE BASEFLO | WS 1F | ANY. | | |
| ROUTE CHN (IN= 2> 0 | | Routing ti | me step (m | in)'= | 5.00 | 2 | |
| | <pre>< Distance 100.00 115.00 120.00</pre> | 324. 321. 320. | ion 1 60 60 80 .050 | .1) Mannin .0500 .0500 00 / . 00 / . | g 0300 ма | in Channel in Channel | |
| | 122.00 138.00 148.00 154.00 164.00 | 321. 322. 323. 324. | 60 30 10 | .0500 .0500 .0500 .0500 | | | |

| DEPTH (m) .20 .40 .60 .80 1.00 1.20 1.40 1.60 1.80 2.00 2.20 2.40 2.60 2.80 3.00 3.20 3.40 3.60 3.80 | ELEV (m) 321.00 321.20 321.40 321.60 322.00 322.20 322.40 322.60 322.60 323.00 323.20 323.40 323.60 323.60 323.80 324.00 324.20 324.60 | .256E+05 .296E+05 .338E+05 .382E+05 .428E+05 .476E+05 .526E+05 .578E+05 .632E+05 | FLOW RAT (cms) .8 3.3 8.1 15.6 26.8 41.2 59.3 81.9 109.1 140.2 175.3 214.7 258.6 306.7 359.1 416.0 477.5 543.5 614.3 | E VEL | OCITY .84 1.13 1.36 1.56 1.79 1.99 2.17 2.37 2.58 2.77 2.95 3.12 3.29 3.46 3.61 3.76 3.91 4.05 4.18 | TRAV.TIME (min) 8.53 6.33 5.27 4.59 4.01 3.61 3.30 3.02 2.78 2.59 2.43 2.29 2.18 2.07 1.98 1.91 1.83 1.77 1.71 | |
|--|---|--|--|--|--|--|--|
| INFLOW : OUTFLOW: | ID= 2 (047 ID= 1 (047 | AREA (ha) 70) 53.65 75) 53.65 | < hy QPEAK (cms) 7.60 7.51 | drograph TPEAK (hrs) 10.00 10.00 | R.V. (mm) 128.70 128.70 | <-pipe / c MAX DEPTH (m) .58 .58 | hannel-> MAX VEL (m/s) 1.33 1.33 |
| ID : | 3 = 1 (0362): = 2 (0359): = 3 (0363): | AREA (ha) 30.00 28.60 58.60 00 NOT INCLU | 6.814 | 10.08 | 125.38 | | |
| + ID2: ===: ID : | 3 = 1 (0106): = 2 (0114): = 3 (0115): | 51.32 | 4.896 10.540 | 10.08 10.50 10.08 | 128.69 128.69 ====== 128.69 | | |
| ADD HYD ((1 + 2 = ID1: + ID2: | 3 1 | (ha) 19.00 | QPEAK (cms) 2.311 .721 Page 1 | (hrs) 10.00 10.00 | R.V. (mm) 130.66 126.19 | | |

Hadati Creek Watershed - Post Development with Cityview Ridge 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 = 3AREA QPEAK TPEAK R.V. (ha) (cms) (hrs) (mm) .00 .001 .00 ****** 98.04 8.084 10.00 138.49 (mm) ID1= 1 (0525): + ID2= 2 (0520): ID = 3 (0526): 98.04 8.084 10.00 138.49NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ ADD HYD (0380) | 1 + 2 = 3 | R.V. AREA QPEAK (ha) (cms) 58.60 6.814 117.50 14.089
 TPEAK
 R.V.

 (hrs)
 (mm)

 10.08
 125.38

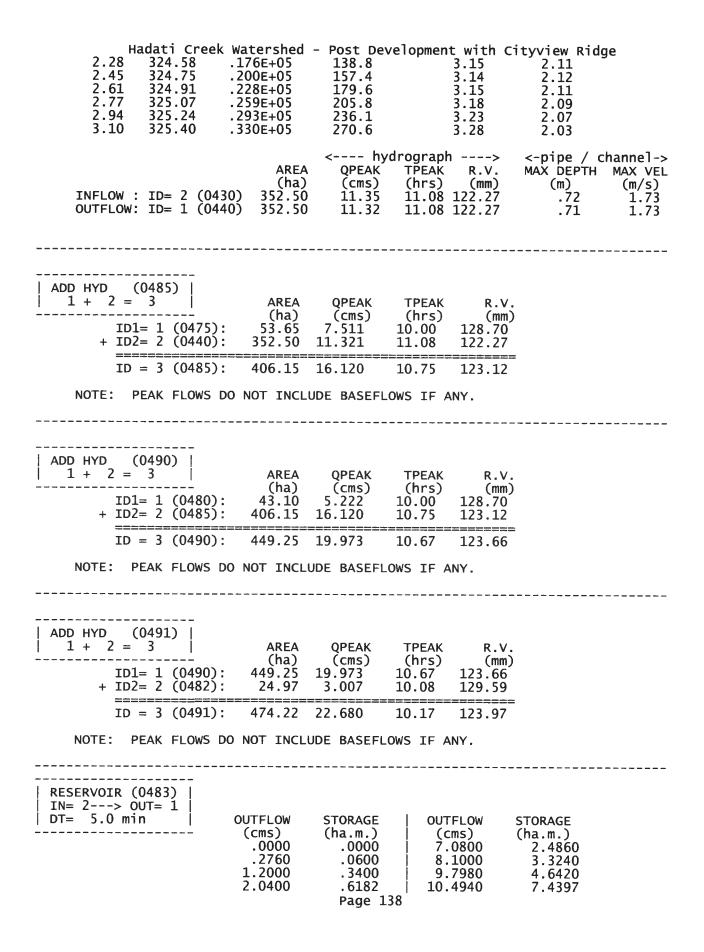
 10.00
 128.70
 TPEAK (mm) 125.38 ------ID1= 1 (0363): + ID2= 2 (0365): _____ ID = 3 (0380):176.10 20.834 10.00 127.59 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ RESERVOIR (0482) | IN= 2---> OUT= 1 | STORAGE (ha.m.) .0000 DT= 5.0 min | OUTFLOW OUTFLOW STORAGE (cms) .2910 .2970 1.6320 4.1680 _____ (cms) (ha.m.) .0000 . 3795 .2590 .0579 .4503 .1180 .1802 .2660 .5232 4.1680 7.5660 .0000 .2720 . 5983 .2445 .2790 .2445 | .3109 | .6756 .2850 .0000 AREA QPEAK (ha) (cms) 4.970 3.032 TPEAK R.V. (hrs) (mm) 24.970 INFLOW : ID= 2 (0492) OUTFLOW: ID= 1 (0482) 10.00 129.59 24.970 3.007 10.08 129.59 PEAKFLOWREDUCTION[Qout/Qin](%)=99.18TIME SHIFT OF PEAKFLOW(min)=5.00MAXIMUMSTORAGEUSED(ha.m.)=.5640 -----ROUTE CHN (0527) | IN= 2---> OUT= 1 | Routing time step (min)' = 5.00<----- DATA FOR SECTION (1.1) -----> Elevation Manning 313.20 .0500 312.40 .0500 / .0300 Main Channel 310.80 .0300 Main Channel Distance 100.00 140.00 140.50 Page 134

| Hadati Creek 141.50 142.00 160.00 | 310. 312. | 80 | ррмепt with 0300 ма /.0500 ма 0500 | Cityview Ridg ain Channel ain Channel | e |
|---|---|---|---|--|---------|
| <pre> DEPTH ELEV (m) (m) .12 310.92 .25 311.05 .37 311.17 .49 311.29 .62 311.42 .74 311.54 .86 311.66 .98 311.78 1.11 311.91 1.23 312.03 1.35 312.15 1.48 312.28 1.60 312.40 1.73 312.53 1.87 312.67 2.00 312.80 2.13 312.93 2.27 313.07 2.40 313.20 </pre> | VOLUME (cu.m.) .575E+02 .119E+03 .185E+03 .256E+03 .330E+03 .409E+03 .492E+03 .579E+03 .671E+03 .767E+03 .867E+03 .971E+03 .108E+04 .149E+04 .248E+04 .405E+04 | FLOW RATE (cms) .1 .2 .3 .4 | VELOCITY (m/s) .40 .57 .69 .78 .86 .92 .97 1.02 1.07 1.11 1.15 1.19 1.23 1.10 .88 .77 .73 .74 .76 | TRAV.TIME (min) 18.86 | |
| INFLOW : ID= 2 (052 OUTFLOW: ID= 1 (052 | AREA (ha) 26) 98.04 27) 98.04 | OPEAK T | PEAK R.V. | <-pipe / ch MAX DEPTH (m) 2.05 2.04 | MAX VEL |
| RESERVOIR (0390) IN= 2> OUT= 1 DT= 5.0 min | OUTFLOW (cms) .0000 .7700 1.2600 | STORAGE (ha.m.) .0000 .2870 .9680 | OUTFLOW (cms) 1.3100 1.8600 .0000 | STORAGE (ha.m.) 1.6000 23.2300 .0000 | |
| INFLOW : ID= 2 (038 OUTFLOW: ID= 1 (039 | | a) (cms) 00 20.834 |) (hrs 4 10.0 | 5) (mm) 00 127.59 | |
| PEAK TIME MAXIN | SHIFT OF PEA | | t/Qin](%)= (min)=14 (ha.m.)= 1 | 10.00 | |
| ADD HYD (0400) 1 + 2 = 3 ID1= 1 (0395): + ID2= 2 (0390): | | (cms) (l 5.388 10 | PEAK R.V hrs) (mr .08 88.29 .33 127.59 | n)) | |
| ID = 3 (0400): | 227.30 | 6.909 10 Page 135 | .08 118.74 | } | |

| ROUTE CHN (IN= 2> O | 0403) UT= 1 | | | | | | |
|--|---|--|---|--|----------------------------------|--|--|
| | < D/ Distance 100.00 110.00 135.00 142.00 148.00 156.00 165.00 | ATA FOR SEC Elevat 338 336 335 335 335 335 335 | CTION (tion .30 .80 .00 .30 .30 .30 .30 .30 | 1.1) Manning .0500 .0500 .0300 .0500 .0500 .0500 .0000 | > 9 Mai | n Channel | |
| CEPTH (m) .16 .32 .47 .63 .79 .95 1.11 1.26 1.42 1.58 1.74 1.89 2.05 2.21 2.37 2.53 2.68 2.84 3.00 | ELEV (m) 335.46 335.62 335.77 335.93 336.09 336.25 336.41 336.56 336.72 336.88 337.04 337.19 337.35 337.51 337.51 337.67 337.83 337.98 338.14 338.30 | .178E+06 .196E+06 .215E+06 .234E+06 | 380.3 436.7 496.9 561.0 | | 4.07 4.23 4.40 4.56 | 7.79 7.48 7.20 6.95 | |
| | ID= 2 (0400 ID= 1 (0403 | AREA (ha))) 227.30 3) 227.30 | < hy QPEAK (cms) 6.91 6.38 | drograph TPEAK (hrs) 10.08 10.33 | R.V. (mm) 118.74 118.74 | <-pipe / c MAX DEPTH (m) .46 .44 | hannel-> MAX VEL (m/s) 1.36 1.30 |
| + ID2= | 3 = 1 (0403): = 2 (0115): | 100.96 | | TPEAK (hrs) 10.33 10.08 | (mm) | | |
| ID = | = 3 (0407): EAK FLOWS DO | 328.26 | 16.526 | 10.17 | | | |

Hadati Creek Watershed - Post Development with Cityview Ridge

| RESERVOIR IN= 2> DT= 5.0 m | (0113) OUT= 1 | OUTFLOW (cms) | | OUTF | LOW S | tyview Ridge TORAGE ha.m.) 6.4000 10.0000 20.0000 | | |
|---|---|---|--|---|--------------------|---|--|--|
| INFLOW OUTFLOW | : ID= 2 (040 : ID= 1 (01: PEAK | (h)7) 328.2 L3) 328.2 FLOW RE | DUCTION TO | ms) 526 456 out/0in] | (%)= 57. | 121.80 121.80 22 | | |
| | TIME MAXIN | SHIFT OF PE NUM STORAGE | AK FLOW USED | (m (ha. | m.)= 80. | 00 2348 | | |
| + 10 | (0430) 3 1= 1 (0113) 2= 2 (0425) | 24.24 | 1.980 | 9.33 | 128.70 | | | |
| IC | 9 = 3 (0430) PEAK FLOWS [| 352.50 | 11.349 | 11.08 | 122.27 | | | |
| ROUTE CHN (0440) IN= 2> OUT= 1 Routing time step (min)'= 5.00 | | | | | | | | |
| | <pre>< [Distance 100.00 120.00 126.00 130.00 140.00 142.00 150.00 155.00 160.00</pre> | 325. 324. 323. 323. 322. 322. 322. | ion 1 40 60 90 00 30 .060 30 .030 90 60 | Manning .0600 .0600 .0600 .0600 00 / .03 | 00 Main 00 Main | Channel Channel | | |
| <pre>Contemport Conte</pre> | | VOLUME (cu.m.) .233E+03 .672E+03 .132E+04 .216E+04 .319E+04 .433E+04 .433E+04 .689E+04 .833E+04 .833E+04 .987E+04 .115E+05 .134E+05 .154E+05 | TIME TABLE FLOW RATE (cms) .6 2.1 4.9 9.0 14.9 22.5 31.6 42.3 54.6 68.3 82.8 99.2 117.9 Page 137 | VELO (m) 1 1 1 2 2 2 2 2 2 2 2 3 | | RAV.TIME (min) 6.96 5.27 4.51 4.03 3.57 3.21 2.93 2.72 2.54 2.41 2.33 2.25 2.18 | | |



Hadati Creek Watershed - Post Development with Cityview Ridge 1.1630 | 11.6850 1.7070 | 12.3480 2.6400 10.3000 3.1200 11.4000 QPEAK (cms) AREA TPEAK R.V. (ha) 474.220 (hrs) (mm) INFLOW : ID= 2 (0491) OUTFLOW: ID= 1 (0483) 22.680 10.17 123.97 474.220 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 | R.V. (mm) 123.97 AREA QPEAK (ha) (cms) TPEAK (hrs) ID1= 1 (0483): + ID2= 2 (0540): 474.22 11.709 12.08 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) | AREA QPEAK (ha) (cms) 478.85 11.843 98.04 7.968 1 + 2 = 3 | R.V. TPEAK (hrs) (mm) ID1= 1 (0530): + ID2= 2 (0527): 124.54 12.00 10.08 138.49 _____ _____ _____ ______ ID = 3 (0545):576.89 19.057 126.91 11.00 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. ADD HYD (0546) | 1 + 2 = 3 | QPEAK (cms) AREA TPEAK R.V. _____ (ha) (hrs) (mm) 126.91 ID1= 1 (0545): 576.89 19.057 11.00 + 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 = 3AREA QPEAK TPEAK R.V. (ha) (cms) 602.14 21.640 -----(hrs) (mm) ID1= 1 (0546): + ID2= 2 (0543): 129.24 10.08 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. Page 139

Hadati Creek Watershed - Post Development with Cityview Ridge ADD HYD (0548) | AREA QPEAK TPEAK R.V. 1 + 2 = 3 (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.

FINISH

Catchment 201 - Proposed Stormwater Management Facility

| - | | | | E VOLUME CAL | | | |
|---------------------|-------------------|-------------------|-------------------|-------------------|---------|-------|-----------|
| | Accum. | Incremental | Accumulated | Permanent | Surface | Depth | Elevation |
| | Inc. Storage | Storage | Perm. Pool | Pool | Area | | |
| | Volume | Volume | Volume | Volume | _ | | |
| _ | (m ³) | (m ³) | (m ³) | (m ³) | (m²) | (m) | (m) |
| Bottom of Pond | | | 0.0 | 0.0 | 1,561.9 | 0.00 | 339.35 |
| | | | 161.8 | 161.8 | 1,673.9 | 0.10 | 339.45 |
| | | | 334.7 | 172.9 | 1,785.0 | 0.20 | 339.55 |
| | | | 519.0 | 184.3 | 1,900.7 | 0.30 | 339.65 |
| Top of Permanent Po | 0.0 | 0.0 | 715.2 | 196.2 | 2,023.2 | 0.40 | 339.75 |
| | 208.8 | 208.8 | | | 2,152.1 | 0.50 | 339.85 |
| | 430.6 | 221.9 | | | 2,285.1 | 0.60 | 339.95 |
| | 666.0 | 235.3 | | | 2,421.5 | 0.70 | 340.05 |
| | 915.1 | 249.1 | | | 2,560.7 | 0.80 | 340.15 |
| CB Lip Elevation | 1,178.1 | 263.1 | | | 2,700.9 | 0.90 | 340.25 |
| | 1,455.3 | 277.2 | | | 2,842.9 | 1.00 | 340.35 |
| | 1,746.8 | 291.5 | | | 2,987.2 | 1.10 | 340.45 |
| | 2,052.9 | 306.0 | | | 3,133.4 | 1.20 | 340.55 |
| | 2,373.6 | 320.8 | | | 3,281.7 | 1.30 | 340.65 |
| | 2,709.3 | 335.7 | | | 3,432.1 | 1.40 | 340.75 |
| | 3,060.1 | 350.8 | | | 3,584.5 | 1.50 | 340.85 |
| Weir Elevation | 3,426.2 | 366.0 | | | 3,735.8 | 1.60 | 340.95 |
| | 3,807.4 | 381.2 | | | 3,888.2 | 1.70 | 341.05 |
| | 4,203.9 | 396.5 | | | 4,042.1 | 1.80 | 341.15 |
| | 4,615.8 | 411.9 | | | 4,196.2 | 1.90 | 341.25 |
| | 5,043.5 | 427.7 | | | 4,357.2 | 2.00 | 341.35 |
| Top of Bank | 5,487.8 | 444.3 | | | 4529.4 | 2.10 | 341.45 |

Catchment 201 - Proposed Stormwater Management Facility (continued)

| WEIR CALCULATIONS | | | 375 mm | ORIFICE CALCULATIONS 375 mm Diameter Outlet Pipe Invert Elevation = 338.20 m | | | ORIFICE CALCULATIONS 90 mm Diameter Knockout Invert Elevation = 339.75 m | | | |
|-------------------|--------|--------|--------|--|-------------------|------|--|-------------------|--|--|
| d1 = | 2.10 | m | Q = | 0.470 | m ³ /s | Q = | 0.011 | m ³ /s | | |
| h = | 1.60 | m | Cd = | 0.6 | | Cd = | 0.6 | | | |
| H = | 0.50 | m | H = | 2.763 | m | H = | 0.455 | m | | |
| 2g = | 19.62 | | 2g = | 19.62 | | 2g = | 19.62 | | | |
| L = | 10 | m | A = | 0.110 | m ² | A = | 0.006 | m^2 | | |
| | | | D = | 0.375 | m | D = | 0.090 | m | | |
| Q = | 5.1086 | cu m/s | D/2 | 0.188 | | D/2 | 0.045 | m | | |

STAGE/STORAGE/DISCHARGE TABLE

| | | • • • • • • • • • • | | | | | |
|-----------|-------|---------------------|-----------------|-----------------|--------|-----------|-----------------------|
| Elevation | Stage | Storage | Orifice Control | Orifice Control | Weir | Discharge | - |
| (m) | (m) | (m ³) | 90 mm | 375 mm | | (m³/s) | _ |
| 339.75 | 0.00 | 0.0 | 0.000 | 0.00 | 0.00 | 0.000 | Top of Permanent Pool |
| 339.85 | 0.10 | 208.8 | 0.004 | 0.00 | 0.00 | 0.004 | |
| 339.95 | 0.20 | 430.6 | 0.007 | 0.00 | 0.00 | 0.007 | |
| 340.05 | 0.30 | 666.0 | 0.009 | 0.00 | 0.00 | 0.009 | |
| 340.15 | 0.40 | 915.1 | 0.010 | 0.00 | 0.00 | 0.010 | |
| 340.25 | 0.50 | 1,178.1 | 0.011 | 0.00 | 0.00 | 0.011 | CB Lip Elevation |
| 340.35 | 0.60 | 1,455.3 | 0.000 | 0.411 | 0.00 | 0.411 | |
| 340.45 | 0.70 | 1,746.8 | 0.000 | 0.422 | 0.00 | 0.422 | |
| 340.55 | 0.80 | 2,052.9 | 0.000 | 0.432 | 0.00 | 0.432 | |
| 340.65 | 0.90 | 2,373.6 | 0.000 | 0.442 | 0.00 | 0.442 | |
| 340.75 | 1.00 | 2,709.3 | 0.000 | 0.451 | 0.00 | 0.451 | |
| 340.85 | 1.10 | 3,060.1 | 0.000 | 0.461 | 0.00 | 0.461 | |
| 340.95 | 1.20 | 3,426.2 | 0.000 | 0.470 | 0.00 | 0.470 | Weir Elevation |
| 341.05 | 1.30 | 3,807.4 | 0.000 | 0.479 | 0.4353 | 0.914 | |
| 341.15 | 1.40 | 4,203.9 | 0.000 | 0.488 | 1.2482 | 1.736 | |
| 341.25 | 1.50 | 4,615.8 | 0.000 | 0.497 | 2.3220 | 2.819 | |
| 341.35 | 1.60 | 5,043.5 | 0.000 | 0.505 | 3.6165 | 4.122 | |
| 341.45 | 1.70 | 5,487.8 | 0.000 | 0.514 | 5.1086 | 5.622 | Top of Bank |
| | | | | | | | |

Catchment 202 - Energy Dissipation/Dispersion Structure

| | | STORAGE V | OLUME TABLE | | | |
|------------------|--------------|---------------------------------|--------------------------------|----------------------------|--------------------------|--------------------------------------|
| Elevation (m) | Depth (m) | Surface Area - Stone (m²) | Surface Area - Pipe (m²) | Increm. Storage (m³) | Total Storage (m³) | |
| 337.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | Bottom of Stone |
| 337.15 | 0.10 | 16.67 | 0.00 | 1.67 | 1.67 | |
| 337.25 | 0.20 | 16.67 | 0.00 | 1.67 | 3.33 | Bottom of Dispersion Pipe |
| 337.35 | 0.30 | 16.63 | 0.03 | 2.46 | 5.79 | |
| 337.45 | 0.40 | 16.63 | 0.03 | 2.46 | 8.25 | |
| 337.55 | 0.50 | 16.63 | 0.03 | 2.46 | 10.71 | |
| 337.65 | 0.60 | 16.63 | 0.03 | 2.46 | 13.17 | |
| 337.70 | 0.65 | 16.63 | 0.03 | 1.63 | 14.80 | Overflow Pipe/Top of Dispersion Pipe |
| 337.75 | 0.70 | 16.67 | 0.00 | 0.83 | 15.63 | |
| 337.85 | 0.80 | 16.67 | 0.00 | 1.67 | 17.30 | |
| 337.95 | 0.90 | 16.67 | 0.00 | 1.67 | 18.96 | |
| 338.05 | 1.00 | 16.67 | 0.00 | 1.67 | 20.63 | Top of Stone |

Catchment 202 - Energy Dissipation/Dispersion Structure (continued)

| | BOTTOM | Λ | | SIDES | |
|--------------------------------|----------------------|----------------|---------|----------|------|
| L(dw) = W(dw) = | 25.00 2.00 | m m | L(dw) = | 25.00 | m |
| D(dw) = | 1.00 | m | D(dw) = | 1.00 | m |
| A(c) = VOL(dw)= VOL(st)= | 49.4 49.4 16.5 | m² m³ m³ | A(c) = | 50.0 | sq m |
| K = | 1.00E-04 | cm/s | K = | 1.00E-04 | cm/s |

| Elevation | Stage | Storage | Infiltration Discharge | Overflow Pipe Discharge | Total Discharge | _ |
|-----------|-------|-------------------|---------------------------|----------------------------|---------------------|--------------------------------------|
| (m) | (m) | (m ³) | (m ³ /s) | (m ³ /s) | (m ³ /s) | |
| 337.05 | 0.00 | 0.0 | 0.00000 | 0.000 | 0.00000 | Bottom of Stone |
| 337.15 | 0.10 | 1.7 | 0.00005 | 0.000 | 0.00005 | |
| 337.25 | 0.20 | 3.3 | 0.00005 | 0.000 | 0.00005 | Bottom of Dispersion Pipe |
| 337.35 | 0.30 | 5.8 | 0.00005 | 0.000 | 0.00005 | |
| 337.45 | 0.40 | 8.3 | 0.00005 | 0.000 | 0.00005 | |
| 337.55 | 0.50 | 10.7 | 0.00005 | 0.000 | 0.00005 | |
| 337.65 | 0.60 | 13.2 | 0.00005 | 0.000 | 0.00005 | |
| 337.70 | 0.65 | 14.8 | 0.00005 | 0.000 | 0.00005 | Overflow Pipe/Top of Dispersion Pipe |
| 337.75 | 0.70 | 15.6 | 0.00005 | 0.421 | 0.42105 | |
| 337.85 | 0.80 | 17.3 | 0.00005 | 0.421 | 0.42105 | |
| 337.95 | 0.90 | 19.0 | 0.00005 | 0.421 | 0.42105 | |
| 338.05 | 1.00 | 20.6 | 0.00005 | 0.421 | 0.42105 | Top of Stone |

Catchment B2a: Existing Stormwater Quality Pond No. 2

| Elevation | Stage | Surface Area | Incremental Storage Volume | Accumulated Storage Volume | _ |
|-----------|-------|-----------------|----------------------------------|----------------------------------|-------------|
| (m) | (m) | (m²) | (m ³) | (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 |

Catchment B2a: Existing Stormwater Quality Pond No. 2 (continued)

OUTLET #1

OVERFLOW WEIR

300 mm diameter orifice (pipe inv. = 319.55)

| Q = | 0.303 | m³/s | d1 = 1 | .00 n | n |
|------|-------|----------------|--------|--------|------|
| Cd = | 0.6 | | h = 0 |).70 n | n |
| H = | 2.60 | m | H = (|).30 n | n |
| 2g = | 19.62 | | 2g = 1 | 9.62 | |
| A = | 0.071 | m ² | L = 3 | | n |
| D = | 0.300 | m | Q = 7 | .251 r | n³/s |
| D/2 | 0.150 | | | | |

| | | Stage/Storag | e/Discharge Table | | | _ |
|-----------|-------|-------------------|-------------------|----------|-----------|-------------|
| Elevation | Stage | Storage | Outlet #1 | Overflow | Total | |
| | | | 1050 mm dia. | Weir | Discharge | |
| | | | pipe | | | |
| (m) | (m) | (m ³) | (m³/s) | (m³/s) | (m³/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 |

| | | | MTDUSS Output | >" |
|---|----|----------|---|---|
| | | | MIDUSS Version | Version 2.25 rev. 473" |
| | | | MIDUSS created | Sunday, February 07, 2010" |
| | | 10 | Units used: | ie METRIC" |
| | | 10 | Job folder: | C:\Users\pgrier\Documents\Work\105172\" |
| | | | | 2021-07-28" |
| | | | Output filename: | 105172_POST_2yr.out" |
| " | | | Licensee name: | gmbp" |
| " | | | Company | |
| " | | | Date & Time last used: | 7/28/2021 at 3:40:08 PM" |
| " | 31 | T | IME PARAMETERS" | |
| " | | 5.000 | Time Step" | |
| " | | 210.000 | Max. Storm length" | |
| " | | 1500.000 | Max. Hydrograph" | |
| " | 32 | S | FORM Chicago storm" | |
| " | | 1 | Chicago storm" | |
| " | | 743.000 | Coefficient A" | |
| " | | 6.000 | Constant B" | |
| " | | 0.799 | • | |
| | | 0.400 | Fraction R" | |
| " | | 170.000 | Duration" | |
| | | 1.000 | Time step multiplier" | |
| " | | | aximum intensity | 105.606 mm/hr" |
| " | | - | otal depth | 33.816 mm" |
| | ~~ | 6 | | ension used in this file" |
| | 33 | | ATCHMENT 201" | |
| | | 1 | Triangular SCS" | |
| | | 1 2 | Equal length" | |
| | | 201 | Horton equation" Catchment 201 - To Clyt | ha Chaoak" |
| | | 65.000 | % Impervious" | |
| | | 3.440 | Total Area" | |
| | | 30.000 | Flow length" | |
| | | 2.000 | Overland Slope" | |
| " | | 1.204 | Pervious Area" | |
| " | | 30.000 | Pervious length" | |
| " | | 2.000 | Pervious slope" | |
| " | | 2.236 | Impervious Area" | |
| " | | 30.000 | Impervious length" | |
| " | | 2.000 | Impervious slope" | |
| " | | 0.250 | Pervious Manning 'n'" | |
| " | | 75.000 | Pervious Max.infiltrati | on" |
| " | | 12.500 | Pervious Min.infiltrati | on" |
| | | 0.250 | Pervious Lag constant (| • |
| | | 5.000 | Pervious Depression sto | rage" |
| | | 0.015 | Impervious Manning 'n'" | |
| " | | 0.000 | Impervious Max.infiltra | |
| | | 0.000 | Impervious Min.infiltra | |
| | | 0.050 | Impervious Lag constant | |
| | | 1.500 | Impervious Depression s | LOLARE |

| | Q | .500 0.0 | 000 0.000 | 0 000 | c.m/sec" | |
|---|----------------------|--------------|---------------|------------|------------|----------|
| п | Catchment | | Pervious | | Total Area | |
| п | Surface A | | 1.204 | 2.236 | 3.440 | hectare" |
| | | oncentration | | 2.230 | 2.858 | minutes" |
| | Time to C | | 93.436 | 84.151 | 84.470 | minutes" |
| | | | | | | mm" |
| | Rainfall Rainfall | • | 33.816 | 33.816 | 33.816 | |
| | | | 407.14 | 756.13 | 1163.27 | c.m" |
| | Rainfall | | 31.713 | 1.985 | 12.390 | mm" |
| | Runoff de | • | 2.103 | 31.830 | 21.426 | mm" |
| | Runoff vo | | 25.32 | 711.73 | 737.05 | c.m" |
| | | efficient | 0.062 | 0.941 | 0.634 | |
| | Maximum f | | 0.017 | 0.500 | 0.500 | c.m/sec" |
| | | H Add Runoff | | | | |
| | 4 Add Ru | | | 0.000 | | |
| | | .500 0.5 | 0.000 | 0.000" | | |
| | 54 POND DESI | | <i>,</i> | | | |
| | | t peak flow | c.m/sec" | | | |
| | | | c.m/sec" | | | |
| | | raph volume | c.m" | | | |
| | | of stages" | | | | |
| " | | m water leve | | | | |
| | | m water leve | | | | |
| | | ng water lev | | | | |
| | • | • | 1 = True; 0 : | = False" | | |
| | | l Discharge | Volume" | | | |
| | 339.75 | | 0.000" | | | |
| | 339.85 | | 208.800" | | | |
| | 339.95 | | 430.600" | | | |
| | 340.05 | | 666.000" | | | |
| | 340.15 | | 915.100" | | | |
| | 340.25 | | 1178.100" | | | |
| | 340.35 | | 1455.300" | | | |
| | 340.45 | | 1746.800" | | | |
| | 340.55 | | 2052.900" | | | |
| | 340.65 | | 2373.600" | | | |
| | 340.75 | | 2709.300" | | | |
| | 340.85 | | 3060.100" | | | |
| | 340.95 | | 3426.200" | | | |
| | 341.05 | | 3807.400" | | | |
| | 341.15 | | 4203.900" | | | |
| | 341.25 | | 4615.800" | | | |
| | 341.35 | | 5043.500" | | | |
| | 341.45 | | 5487.800" | | | |
| | Peak outf | | 0.03 | | | |
| | Maximum 1 | | 339.99 | | | |
| | Maximum s | • | 535.20 | | | |
| | Centroida | 0 | 4.5 | | / II | |
| | 0.50 | | 0.039 | 0.000 c.m, | sec" | |
| | | H Next link | | | | |
| | 5 Next 1 | INK | | | | |

| " | | | 0.500 | 0.039 | 0.039 | 0.000" |
|---|----|--------|----------------------------|----------------|--------------------|---------------|
| | 51 | PI | IPE DESIGN" | | | |
| " | | 0.039 | | flow | c.m/sec" | |
| | | 0.013 | - | | | |
| " | | 0.450 | Diameter | metre" | | |
| | | 2.000 | Gradient % | / II) | | |
| " | | De | epth of flow | | 0.094 | metre" |
| " | | Ve | elocity | | 1.601 | m/sec" |
| " | | Pi | ipe capacity | | 0.403 | c.m/sec" |
| " | | Cr | ritical depth | | 0.134 | metre" |
| | 53 | RC | | oute 17" | | |
| " | | 16.50 | | | ch length (| metre)" |
| " | | 0.428 | | | | |
| | | 7.728 | U , | • | | |
| | | 0.000 | | | pec.(1) values | s used" |
| | | 0.500 | | | | |
| | | 30.000 | 0 (| • | | |
| | | 0.500 | • | - | | |
| | | 8.824 | • | - | (seconas) | |
| | | 1 | No. of sub-r ak outflow | eaches | 0.039 | c.m/sec" |
| | | Pt | 0.500 | 0.039 | | • |
| | 40 | н | /DROGRAPH Next | | 0.059 | 0.000 C.m/Sec |
| п | -0 | 5 | Next link " | | | |
| | | 5 | | 0.039 | 0.039 | 0.000" |
| | 54 | P | OND DESIGN" | 01055 | 01033 | 01000 |
| " | 2. | 0.039 | | flow | c.m/sec" | |
| " | | 0.171 | • | | | |
| " | | 737.1 | • | | c.m" | |
| " | | 12. | | | | |
| " | | 0.000 | Minimum wate | rlevel | metre" | |
| " | | 3.000 | Maximum wate | r level | metre" | |
| " | | 0.000 | Starting wat | | | |
| " | | 0 | | | = True; 0 = Fa | alse" |
| | | | Level Disc | - | | |
| " | | | | 0.000 | 0.000" | |
| | | | 337.150 4.9 | | 1.670" | |
| | | | 337.250 4.9 | | 3.330" | |
| | | | | 4E-05 | 5.790" | |
| | | | | 4E-05 | 8.250" | |
| | | | | 4E-05 | 10.710" | |
| | | | | 4E-05 4E-05 | 13.170" 14.800" | |
| | | | | .4210 | 15.630" | |
| | | | | .4210 | 17.300" | |
| | | | | .4210 | 18.960" | |
| | | | | .4210 | 20.630" | |
| | | Pe | eak outflow | | 0.039 | c.m/sec" |
| " | | | aximum level | | 337.705 | metre" |
| " | | | aximum storage | ! | 14.876 | c.m" |
| | | | 0 | | | |

| " | | Ce | ntroidal lag 6.244 hours" |
|---|----|-----------------|--|
| " | | | 0.500 0.039 0.039 0.000 c.m/sec" |
| " | 40 | | DROGRAPH Next link " |
| " | | 5 | Next link " |
| " | | | 0.500 0.039 0.039 0.000" |
| " | 52 | | ANNEL DESIGN" |
| " | | 0.039 | Current peak flow c.m/sec" |
| " | | 0.065 | Manning 'n'" |
| | | 0. | |
| | | | Basewidth metre" |
| | | | Left bank slope" |
| | | 0.000 | Right bank slope" |
| | | | Channel depth metre" |
| | | 0.500 | |
| | | | pth of flow 0.093 metre" |
| | | | locity 0.210 m/sec" |
| | | | annel capacity 1.371 c.m/sec" |
| | | | itical depth 0.034 metre" |
| | 53 | | UTE Channel Route 25" |
| | | 25.00 | Channel Route 25 Reach length (metre)" |
| | | | X-factor <= 0.5" |
| | | 89.219 | |
| | | | Default(0) or user spec.(1) values used" |
| | | | X-factor <= 0.5" |
| | | | K-lag (seconds)" |
| | | | Beta weighting factor" |
| | | 100.000 | |
| | | 1 | No. of sub-reaches" |
| | | Pe | ak outflow 0.039 c.m/sec" |
| | | | 0.500 0.039 0.039 0.000 c.m/sec" |
| | 40 | | DROGRAPH Next link " |
| | | 5 | Next link " |
| | 22 | <u> </u> | 0.500 0.039 0.039 0.000" |
| | 33 | | TCHMENT 202" |
| | | | Triangular SCS" |
| | | 1 | Equal length" |
| | | 2 | Horton equation" |
| | | 202 | Catchment 202" |
| | | 25.000 | % Impervious" |
| | | 0.980 | Total Area" |
| | | 30.000 | Flow length" |
| | | 2.000 | Overland Slope" |
| | | 0.735 | Pervious Area" Depuieus longth" |
| | | 30.000 | Pervious length" Reprious slope" |
| | | 2.000 | Pervious slope" Imponvious Apop" |
| | | 0.245 30.000 | Impervious Area" Impervious length" |
| | | 2.000 | Impervious length Impervious slope" |
| п | | 0.250 | Pervious Manning 'n'" |
| | | 75.000 | Pervious Max.infiltration" |
| | | 000 | רכו אדחתי וומצידוו דדרו מרדחו |

... Pervious Min.infiltration" 12.500 ... Pervious Lag constant (hours)" 0.250 н 5.000 Pervious Depression storage" ... Impervious Manning 'n'" 0.015 п 0.000 Impervious Max.infiltration" ... 0.000 Impervious Min.infiltration" ... Impervious Lag constant (hours)" 0.050 ... 1.500 Impervious Depression storage" ... 0.039 0.000 c.m/sec" 0.055 0.039 ... Catchment 202 Impervious Total Area " Pervious ... 0.245 Surface Area 0.735 0.980 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 248.55 82.85 331.40 c.m" ... mm" Rainfall losses 31.713 24.281 1.985 ... mm" Runoff depth 2.103 31.830 9.535 ... Runoff volume c.m" 15.46 77.98 93.44 Runoff coefficient 0.941 0.062 0.282 ... Maximum flow 0.011 0.055 0.055 c.m/sec" ... HYDROGRAPH Add Runoff " 40 ... Add Runoff " 4 ... 0.000" 0.039 0.055 0.071 ... CATCHMENT 300" 33 ... Triangular SCS" 1 н 1 Equal length" ... 2 Horton equation" ... 300 Catchment 300 - To Clythe Creek" 0.000 % Impervious" ... Total Area" 6.480 ... Flow length" 45.000 ... 2.000 Overland Slope" ... Pervious Area" 6.480 ... 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'" ... Pervious Max.infiltration" 75.000 ... 12.500 Pervious Min.infiltration" ... 0.250 Pervious Lag constant (hours)" ... 5.000 Pervious Depression storage" ... 0.015 Impervious Manning 'n'" ... Impervious Max.infiltration" 0.000 ... 0.000 Impervious Min.infiltration" ... 0.050 Impervious Lag constant (hours)" ... 1.500 Impervious Depression storage" ... 0.073 0.071 0.039 0.000 c.m/sec" ... Catchment 300 Pervious Impervious Total Area "

| н | 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 | 7 c.m" |
| н | Rainfall losses | 31.709 | 2.082 | 31.709 | mm" |
| н | Runoff depth | 2.107 | 31.734 | 2.107 | mm" |
| н | Runoff volume | 136.54 | 0.00 | 136.55 | c.m" |
| " | Runoff coefficient | 0.062 | 0.000 | 0.062 | п |
| " | Maximum flow | 0.073 | 0.000 | 0.073 | c.m/sec" |
| " 40 | HYDROGRAPH Add Runoff | п | | | |
| " | 4 Add Runoff " | | | | |
| | 0.073 0.12 | 6 0.039 | 0.000" | | |
| " 38 | START/RE-START TOTALS | 300" | | | |
| | 3 Runoff Totals on EX | IT" | | | |
| | Total Catchment area | | 32 | .700 | hectare" |
| | Total Impervious area | | 7 | .443 | hectare" |
| " | Total % impervious | | 22 | .762" | |
| " 19 | EXIT" | | | | |

| | | | MTDUSS Output | >" |
|---|----|----------|---|---|
| | | | MIDUSS version | Version 2.25 rev. 473" |
| | | | MIDUSS created | Sunday, February 07, 2010" |
| | | 10 | Units used: | ie METRIC" |
| | | | Job folder: | C:\Users\pgrier\Documents\Work\105172\" |
| " | | | | 2021-07-28" |
| | | | Output filename: | 105172_POST_5yr.out" |
| " | | | Licensee name: | gmbp" |
| " | | | Company | " |
| | | | Date & Time last used: | 7/28/2021 at 3:43:47 PM" |
| " | 31 | T | IME PARAMETERS" | |
| " | | 5.000 | Time Step" | |
| " | | 210.000 | Max. Storm length" | |
| | | 1500.000 | Max. Hydrograph" | |
| | 32 | S | TORM Chicago storm" | |
| " | | 1 | Chicago storm" | |
| " | | 1593.000 | Coefficient A" | |
| " | | 11.000 | | |
| | | 0.879 | • | |
| " | | 0.400 | Fraction R" | |
| | | 170.000 | Duration" | |
| | | 1.000 | Time step multiplier" | |
| | | | aximum intensity | 134.894 mm/hr" |
| | | | otal depth | 46.775 mm" |
| | | 6 | | ension used in this file" |
| | 33 | | ATCHMENT 201" | |
| | | 1 1 | Triangular SCS" | |
| | | 2 | Equal length" | |
| | | 201 | Horton equation" Catchment 201 - To Clyt | he Creeck" |
| | | 65.000 | % Impervious" | ine creeek |
| | | 3.440 | Total Area" | |
| | | 30.000 | Flow length" | |
| | | 2.000 | Overland Slope" | |
| | | 1.204 | Pervious Area" | |
| " | | 30.000 | Pervious length" | |
| " | | 2.000 | Pervious slope" | |
| | | 2.236 | Impervious Area" | |
| | | 30.000 | Impervious length" | |
| " | | 2.000 | Impervious slope" | |
| | | 0.250 | Pervious Manning 'n'" | |
| | | 75.000 | Pervious Max.infiltrati | .on" |
| " | | 12.500 | Pervious Min.infiltrati | |
| " | | 0.250 | Pervious Lag constant (| hours)" |
| " | | 5.000 | Pervious Depression sto | orage" |
| " | | 0.015 | Impervious Manning 'n'" | |
| " | | 0.000 | Impervious Max.infiltra | |
| " | | 0.000 | Impervious Min.infiltra | |
| " | | 0.050 | Impervious Lag constant | |
| " | | 1.500 | Impervious Depression s | torage" |
| | | | | |

| | 0.681 0. | 000 0.000 | 0 000 | c.m/sec" | |
|---|-----------------------------------|-----------|-----------------------|------------|----------|
| п | Catchment 201 | Pervious | | Total Area | н |
| п | Surface Area | 1.204 | 2.236 | 3.440 | hectare" |
| | Time of concentratio | | 1.968 | 3.517 | minutes" |
| | Time to Centroid | 88.710 | 82.363 | 83.097 | minutes" |
| | | | | | mm" |
| | Rainfall depth Rainfall volume | 46.775 | 46.775 | 46.775 | |
| | | 563.17 | 1045.89 | 1609.06 | c.m" |
| | Rainfall losses | 35.929 | 2.131 | 13.960 | mm" |
| | Runoff depth | 10.846 | 44.644 | 32.815 | mm" |
| | Runoff volume | 130.59 | 998.25 | 1128.83 | c.m" |
| | Runoff coefficient | 0.232 | 0.954 | 0.702 | |
| | Maximum flow | 0.099 | 0.671 | 0.681 | c.m/sec" |
| | 40 HYDROGRAPH Add Runof | T | | | |
| | 4 Add Runoff " | co1 0.000 | 0 000 | | |
| | | 681 0.000 | 0.000" | | |
| | 54 POND DESIGN" | / II | | | |
| | 0.681 Current peak flow | | | | |
| | 0.171 Target outflow | c.m/sec" | | | |
| | 1128.8 Hydrograph volume | | | | |
| | 18. Number of stages" | | | | |
| | 0.000 Minimum water lev | | | | |
| | 3.000 Maximum water lev | | | | |
| | 0.000 Starting water le | | F - 1 U | | |
| | 0 Keep Design Data: | - | = False" | | |
| | Level Discharge | | | | |
| | 339.750 0.000 | | | | |
| | 339.850 0.02500 | | | | |
| | 339.950 0.03200 | | | | |
| | 340.050 0.04700 | | | | |
| | 340.150 0.05900 | | | | |
| | 340.250 0.06900 | | | | |
| | 340.350 0.4110 | | | | |
| | 340.450 0.4220 | | | | |
| | 340.550 0.4320 | | | | |
| | 340.650 0.4420 | | | | |
| | 340.750 0.4510 | | | | |
| | 340.850 0.4610 | | | | |
| | 340.950 0.4700 | | | | |
| | 341.050 0.9140 | | | | |
| | 341.150 1.736 | | | | |
| | 341.250 2.819 | | | | |
| | 341.350 4.122 | | | | |
| | 341.450 5.622 | | | | |
| | Peak outflow | 0.0 | | | |
| | Maximum level | 340.12 | | | |
| | Maximum storage | 861.7 | | | |
| | Centroidal lag | 4.88 | | / " | |
| | 0.681 0.681 | | 0.000 c.m, | sec | |
| | 40 HYDROGRAPH Next link | | | | |
| | 5 Next link " | | | | |

| " | | | 0.681 | 0.056 | 0.056 | 0.000" |
|---|-----|--------|-----------------------------|-----------|---------------|----------------|
| " | 51 | PI | [PE DESIGN" | | | |
| " | | 0.056 | Current peal | k flow | c.m/sec" | |
| " | | 0.013 | Manning 'n' | II | | |
| " | | 0.450 | Diameter | metre" | | |
| | | 2.000 | Gradient 🤅 | %" | | |
| " | | De | epth of flow | | 0.114 | metre" |
| | | Ve | elocity | | 1.787 | m/sec" |
| " | | Pi | ipe capacity | | 0.403 | c.m/sec" |
| " | | Cr | ritical depth | | 0.163 | metre" |
| " | 53 | RC | • | Route 17" | | |
| " | | 16.50 | | | ch length (| (metre)" |
| " | | 0.410 | | | | |
| " | | 6.924 | U , | | | |
| | | 0.000 | | | pec.(1) value | es used" |
| | | 0.500 | | | | |
| " | | 30.000 | 0 (| | | |
| " | | 0.500 | - | - | | |
| | | 8.108 | 0 | - | (seconds)" | |
| | | 1 | No. of sub- | reaches" | | <i>,</i> |
| | | Pe | ak outflow | 0 050 | 0.056 | |
| | | | 0.681 | 0.056 | 0.056 | 0.000 c.m/sec" |
| | 40 | | DROGRAPH Next | t link " | | |
| | | 5 | Next link " | 0.056 | 0.056 | 0.000 |
| | F / | D | | 0.056 | 0.056 | 0.000" |
| | 54 | 0.056 | OND DESIGN" Current peal | flow | c.m/sec" | |
| | | 0.030 | - | | | |
| | | 1128.6 | Hydrograph | | c.m" | |
| п | | 1120.0 | Number of st | | C.111 | |
| | | 0.000 | Minimum wate | • | metre" | |
| | | 3.000 | Maximum wate | | | |
| | | 0.000 | Starting wa | | | |
| " | | 0 | | | = True; 0 = F | alse" |
| | | - | Level Disc | | | |
| " | | | 337.050 | 0.000 | 0.000" | |
| " | | | 337.150 4.9 | 94E-05 | 1.670" | |
| " | | | 337.250 4.9 | 94E-05 | 3.330" | |
| " | | | 337.350 4.9 | 94E-05 | 5.790" | |
| | | | 337.450 4.9 | 94E-05 | 8.250" | |
| " | | | 337.550 4.9 | 94E-05 | 10.710" | |
| " | | | 337.650 4.9 | 94E-05 | 13.170" | |
| | | | 337.700 4.9 | 94E-05 | 14.800" | |
| " | | | 337.750 | 0.4210 | 15.630" | |
| " | | | | 0.4210 | 17.300" | |
| " | | | | 0.4210 | 18.960" | |
| " | | | | 0.4210 | 20.630" | |
| | | | ak outflow | | 0.056 | c.m/sec" |
| | | | aximum level | | 337.707 | metre" |
| | | Ma | aximum storage | е | 14.911 | c.m" |
| | | | | | | |

| " | | Ce | ntroidal lag 4.939 hours" |
|---|------------|--------------|--|
| " | | | 0.681 0.056 0.056 0.000 c.m/sec" |
| " | 40 | | DROGRAPH Next link " |
| " | | 5 | Next link " |
| " | | | 0.681 0.056 0.056 0.000" |
| | 52 | | ANNEL DESIGN" |
| | | 0.056 | Current peak flow c.m/sec" |
| | | 0.065 | Manning 'n'" |
| | | 0. | |
| | | | Basewidth metre" |
| | | | Left bank slope" |
| | | 0.000 | Right bank slope" |
| | | | Channel depth metre" |
| | | 0.500 | |
| | | | pth of flow 0.116 metre" |
| | | | locity 0.241 m/sec" |
| | | | annel capacity 1.371 c.m/sec" |
| | F 2 | | itical depth 0.043 metre" |
| | 53 | | UTE Channel Route 25" |
| | | 25.00 | Channel Route 25 Reach length (metre)" |
| | | | X-factor <= 0.5" |
| | | 77.858 | |
| | | | Default(0) or user spec.(1) values used" X-factor <= 0.5" |
| | | | |
| | | | K-lag (seconds)" |
| | | | Beta weighting factor" |
| | | 100.000 1 | Routing time step (seconds)" No. of sub-reaches" |
| | | _ | ak outflow 0.056 c.m/sec" |
| | | re | 0.681 0.056 0.056 0.000 c.m/sec" |
| | 40 | нν | DROGRAPH Next link " |
| | 40 | 5 | Next link " |
| | | 2 | 0.681 0.056 0.056 0.000" |
| | 33 | ٢A | TCHMENT 202" |
| | 55 | | Triangular SCS" |
| | | - 1 | Equal length" |
| | | 2 | Horton equation" |
| | | 202 | Catchment 202" |
| | | 25.000 | % Impervious" |
| | | 0.980 | Total Area" |
| | | 30.000 | Flow length" |
| | | 2.000 | Overland Slope" |
| " | | 0.735 | Pervious Area" |
| " | | 30.000 | Pervious length" |
| " | | 2.000 | Pervious slope" |
| " | | 0.245 | Impervious Area" |
| " | | 30.000 | Impervious length" |
| " | | 2.000 | Impervious slope" |
| " | | 0.250 | Pervious Manning 'n'" |
| " | | 75.000 | Pervious Max.infiltration" |
| | | | |

... Pervious Min.infiltration" 12.500 ... 0.250 Pervious Lag constant (hours)" н 5.000 Pervious Depression storage" ... Impervious Manning 'n'" 0.015 п 0.000 Impervious Max.infiltration" ... 0.000 Impervious Min.infiltration" ... 0.050 Impervious Lag constant (hours)" ... 1.500 Impervious Depression storage" ... 0.091 0.056 0.000 c.m/sec" 0.056 ... Catchment 202 Impervious Total Area " Pervious ... Surface Area 0.735 0.245 0.980 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 343.80 114.60 458.40 c.m" ... mm" Rainfall losses 27.479 35.929 2.131 ... mm" Runoff depth 10.846 44.644 19.296 ... Runoff volume c.m" 79.72 109.38 189.10 Runoff coefficient 0.232 0.954 0.413 ... Maximum flow 0.061 0.073 0.091 c.m/sec" ... HYDROGRAPH Add Runoff " 40 ... Add Runoff " 4 ... 0.000" 0.091 0.132 0.056 ... CATCHMENT 300" 33 ... Triangular SCS" 1 н 1 Equal length" ... 2 Horton equation" ... 300 Catchment 300 - To Clythe Creek" 0.000 % Impervious" ... Total Area" 6.480 ... Flow length" 45.000 ... 2.000 Overland Slope" ... Pervious Area" 6.480 ... 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'" ... Pervious Max.infiltration" 75.000 ... 12.500 Pervious Min.infiltration" ... 0.250 Pervious Lag constant (hours)" ... 5.000 Pervious Depression storage" ... 0.015 Impervious Manning 'n'" ... Impervious Max.infiltration" 0.000 ... 0.000 Impervious Min.infiltration" ... 0.050 Impervious Lag constant (hours)" ... 1.500 Impervious Depression storage" ... 0.444 0.132 0.056 0.000 c.m/sec" ... Catchment 300 Pervious Impervious Total Area "

| II . | 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 | 3031.0 | 2 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 0.57 | 5 0.056 | 0.000" | | |
| " 38 | START/RE-START TOTALS | 300" | | | |
| п | 3 Runoff Totals on EX | IT" | | | |
| п | Total Catchment area | | 10 | .900 | hectare" |
| н | Total Impervious area | | 2 | .481 | hectare" |
| | Total % impervious | | 22 | .762" | |
| " 19 | EXIT" | | | | |

| <pre>MIDUSS version Version 2.25 rev. 473" MIDUSS version Version 2.25 rev. 473" MIDUSS created Sunday, February 07, 2010" 10 Units used: i eMETRIC" Job folder: C:\Users\pgrier\Documents\Work\105172\" 2021-07-28" Output filename: 105172_POST_25yr.out" Licensee name: gmbp" Company " Date & Time last used: 7/28/2021 at 3:46:56 PM" J1 TIME PARAMETERS" 5.000 Time Step" 210.000 Max. Hydrograph" 1500.000 Max. Hydrograph" 1 Chicago storm" 210.000 Dration" 220 STORM Chicago storm" 210.000 Time step multiplier" Maximum intensity 169.546 mm/hr" Total depth 69.476 mm" 6 025hyd Hydrograph extension used in this file" 2010 Catchment 201 - To Clythe Creeek" 65.000 % Impervious? 30.000 Flow length" 2.000 Dervious length" 2.000 Pervious length" 2.000 Pervious length" 2.000 Impervious length" 2.000 Impervious length" 2.000 Impervious length" 2.000 Impervious length" 2.000 Pervious Max.infiltration" 2.050 Pervious Max.infiltration" 2.050 Pervious Max.infiltration" 2.050 Pervious Lag constant (hours)" 3.0405 Fervious Lag constant (hour</pre> | | | | MIDUSS Output | »" |
|---|---|----|----------|-------------------------|---------------------------|
| MIDUSS created Sunday, February 07, 2010" 10 Units used: ie METRIC" Job folder: C:\Users\pgrier\Documents\Work\1085172. 2021-07-28" 2021-07-28" Output filename: 105172_POST_25yr.out" Company gmbp" Date 8 Time last used: 7/28/2021 at 3:46:56 PM" 31 TIME PARAMETERS" 3.000 Time Step" 210.000 Max. Storm length" 1500.000 Max. Hydrograph" 32 STORM Chicago storm" 1 Chicago storm" 3158.000 Coefficient A" 3158.000 Coefficient A" 3158.000 Coefficient A" 3158.000 Coefficient A" 210.000 Max. 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 Equal length" 2 Horton equation" 3.440 Total Area" 30.000 Filow langth" 2.000 Overland Slope" 3.444 Total Area" 3.444 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 Total Area" 3.440 | | | | • | |
| <pre>ie METRIC"</pre> | | | | | |
| Job folder: C:\Users\pgrier\Documents\Work\105172\" 2021-07-28" Output filename: 105172_POST_2Syr.out" Licensee name: gmbp" Company " Date & Time last used: 7/28/2021 at 3:46:56 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" * 1.6000 0.936 Exponent C" 0.400 Fraction R" 1.000 Duration" 1.000 Dimation" 1.000 Time step multiplier" Maximum intensity 169.546 mm/hr" * 6 0.25hyd Hydrograph extension used in this file" * 1 * 1 * 1 * 1 * 1 * 21 * 1 | | | 10 | | · · |
| 2021-07-28" Output filename: 105172_POST_25yr.out" Licensee name: gmbp" Date & Time last used: 7/28/2021 at 3:46:56 PM" "Date & Time last used: 7/28/2021 at 3:46:56 PM" "1500.000 Max. Storm length" 5.000 Time Step" 210.000 Max. Storm length" 5.000 Constant B" 32 STORM Chicago storm" 1 1 Chicago storm" 3158.000 Coefficient A" *0.936 Exponent C" 0.936 Exponent C" *0.400 Fraction R" *210.000 Duration" 1.0000 Time step multiplier" *Maximum intensity 169.546 mm/hr" *10000 Time step multiplier" *Maximum intensity 169.546 mm/hr" *10000 Time step multiplier" *33 CATCHMENT 201" *1 Triangular SCS" *1 Equal length" *201 Catchment 201 - To Clythe Creeek" *6.0000 % Impervious" *2.000 Vervious Area" *30.000 Florevious Area" *30.000 Florevious Area" *30.000 | | | | | |
| Utiput Filename: Ibs/1/2_POS1_2/S/.001 "Licensee name: gmbp" "Date & Time last used: 7/28/2021 at 3:46:56 PM" "31 TIME PARAMETERS" "5.000 Time Step" "210.000 Max. Hydrograph" "32 STORM Chicago storm" "1 Coefficient A" "3158.000 Coefficient A" "3158.000 Coefficient A" "3158.000 Coefficient A" "15.000 Duration" "10.000 Duration" "10.000 Duration" "210.000 Duration" "10.000 Time step multiplier" "11.000 Time step multiplier" "11.000 Time step multiplier" "11.000 Time step multiplier" "11.000 Time step multiplier" "12.0000 Duration" "10.000 Time step multiplier" "10.000 Time step multiplier" "10.000 Time step multiplier" "10.000 Time step multiplier" "10.000 Time step multipli | " | | | | |
| Licensee name: gmbp" Company " Date & Time last used: 7/28/2021 at 3:46:56 PM" 31 TIME PARAMETERS" 5.000 Time Step" 10.000 Max. Storm length" 1500.000 Max. Hydrograph" 32 STORM Chicago storm" 1 Chicago storm" 3158.000 Coefficient A" 1 Chicago storm" 3158.000 Coefficient A" 1 Chicago storm" 3158.000 Coefficient A" 9.36 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" 201 Catchment 201 - To Clythe Creeek" 60.000 Impervious" 3440 | " | | | Output filename: | |
| Company Date & Time last used: 7/28/2021 at 3:46:56 PM" 31 TIME PARAMETERS" 5.000 Time Step" 210.000 Max. Storm length" 1500.000 Max. Hydrograph" 32 STORM Chicago storm" 1 Chicago storm" 31 1 Chicago storm" 1 32 STORM Chicago storm" 1 Chicago storm" 33 STORM Chicago storm" 1 Chicago storm" 34 1 Chicago storm" 1 358.000 Coefficient A" 1 Storm Praction R" 10.936 Exponent C" 0.400 Fraction R" 210.000 Duration" 1.000 Time step multiplier" " Total depth 69.476 mm" 6 025hyd Hydrograph extension used in this file" 1 33 CATCHMENT 201" 1 Triangular SCS" 1 Equal length" 2 Horton equation" 201 Catchment 201 - To Clythe Creeek" 65.000 X Impervious" 30.000 | " | | | Licensee name: | gmbp" |
| 31 TIME PARAMETERS" * 5.000 110.000 Max. Storm length" 120.000 Max. Hydrograph" 32 STORM Chicago storm" * 1 3158.000 Coefficient A" * 1 * 1 0.936 Exponent C" * 0.936 * 1.000 Time step multiplier" * 1.000 * 1.000 Time step multiplier" * 1.000 * 1.000 * 1.000 * 1.000 * 1.000 * 1.000 * 1.000 * 1.000 * 1.000 * 1.000 * 1.000 * 1.000 * 1.000 * 1.000 * 2.000 * 1.000 * 2.001 * 1.001 * | " | | | Company | " |
| <pre>11 The FAMALELES 1 5.000 Time Step" 210.000 Max. Storm length" 1500.000 Max. Hydrograph" 32 STORM Chicago storm" 1 Chicago storm" 3158.000 Coefficient A" 3158.000 Coefficient A" 3158.000 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" 201 Catchment 201 - To Clythe Creeek" 30.000 Flow length" 202 Catchment 201 - To Clythe Creeek" 30.000 Flow length" 2.200 Overland Slope" 30.000 Pervious length" 2.236 Impervious Area" 30.000 Impervious length" 2.236 Impervious length" 30.000 Impervious length" 30.000 Impervious length" 30.000 Pervious slope" 32.236 Impervious Maning 'n'" 33.040 Pervious Maning 'n'" 34.055 Pervious Maninfiltration" 35.000 Pervious Lag constant (hours)" 36.000 Pervious Lag constant (hours)" 36.000 Pervious Depression storage" 36.000 Pervious Depression storage" 36.000 Pervious Depression storage" 36.000 Pervious Depresion storage</pre> | " | | | Date & Time last used: | 7/28/2021 at 3:46:56 PM" |
| 1.000 Time Step 210.000 Max. Storm length" 1500.000 Max. Hydrograph" 32 STORM Chicago storm" 1 Chicago storm" 3158.000 Coefficient A" 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" 201 Catchment 201 - To Clythe Creeek" 6.000 Flow length" 30.000 Flow length" 2.000 Overland Slope" 1.200 Overland Slope" 2.236 Impervious length" 2.000 Impervious length" 2.000 Impervious length" 2.000 Impervious length" 2.000 Impervious length" 33.000 Impervious length" 33.000 Pervious langtom 33.000 Pervious langtom 30.000 Pervious langtom 31.000 Pervious langtom 32.000 Pervious langtom 33.000 Pervious langtom 34.000 Pervious langtom 35.000 Pervious langtom 36.000 Pervious langtom 36.000 Pervious langtom 37.000 Pervious langtom 38.000 Pervious langtom 39.000 Pervious langtom 30.000 Pervious langtom | " | 31 | T: | IME PARAMETERS" | |
| <pre>120.000 Max. Hydrograph" 1500.000 Max. Hydrograph" 32 STORM Chicago storm" 1 Chicago storm" 3158.000 Coefficient A" 3158.000 Constant B" 0.936 Exponent C" 0.400 Fraction R" 210.000 Duration" 210.000 Duration" 1.000 Time step multiplier" Maximum intensity 169.546 mm/hr" Maximum intensity 169.546 mm/hr" Total depth 69.476 mm" 6 0.25hyd Hydrograph extension used in this file" 33 CATCHMENT 201" 1 Triangular SCS" 1 Equal length" 201 Catchment 201 - To Clythe Creeek" 65.000 % Impervious" 3.440 Total Area" 30.000 Flow length" 2.000 Overland Slope" 1.204 Pervious Area" 30.000 Pervious length" 2.236 Impervious length" 2.000 Impervious length" 2.000 Impervious length" 2.000 Impervious length" 2.000 Pervious Maning 'n'" 75.000 Pervious Max.infiltration" 6.250 Pervious Max.infiltration" 6.250 Pervious Lag constant (hours)" 6.000 Pervious Depression storage"</pre> | " | | 5.000 | Time Step" | |
| <pre>1500.000 Max. nyurograph 32 STORM Chicago storm" 1 Chicago storm" 3158.000 Coefficient A" 9.936 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" 30.000 Flow length" 2.000 Overland Slope" 1.204 Pervious Area" 30.000 Pervious length" 2.000 Pervious length" 30.000 Impervious length" 2.000 Pervious length" 30.000 Impervious length" 30.000 Impervious length" 30.000 Impervious length" 30.000 Impervious length" 30.000 Pervious slope" 3.236 Impervious slope" 3.236 Pervious Max.infiltration" 30.000 Pervious Lag constant (hours)" 5.000 Pervious Depression storage"</pre> | " | | 210.000 | Max. Storm length" | |
| I 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" 3.440 Total Area" 30.000 Flow length" 2.000 Overland Slope" 1.204 Pervious Area" 30.000 Pervious length" 2.000 Pervious length" 2.000 Impervious length" 2.000 Impervious length" 30.000 Flow length" 30.000 Pervious length" 2.000 Pervious slope" 3.250 Pervious Max.infiltration" 0.250 Pervious Max.infiltration" 0.250 Pervious Lag constant (hours)" 5.000 Pervious Depression storage" | " | | 1500.000 | Max. Hydrograph" | |
| 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" 3.440 Total Area" 30.000 Flow length" 2.000 Overland Slope" 1.204 Pervious Area" 30.000 Pervious length" 2.000 Pervious length" 2.000 Impervious length" 2.000 Impervious length" 2.000 Impervious length" 2.000 Impervious length" 2.000 Pervious Area" 30.000 Pervious Area" 30.000 Pervious length" 2.000 Pervious Length" 2.000 Pervious Length" 3.000 Pervious Slope" 3.000 Pervious Length" 3.000 Pervious Length" 3.000 Pervious Lag constant (hours)" 5.000 Pervious Depression storage" | | 32 | | | |
| <pre>' 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 CATCHENT 201" '' 1 Triangular SCS' '' 1 Equal length" '' 2 Horton equation" '' 2 Horton equation" '' 2 Horton equation" '' 2 Horton equation" '' 201 Catchment 201 - To Clythe Creeek" '' 65.000 % Impervious" '' 3.440 Total Area" '' 30.000 Flow length" '' 2.000 Overland Slope" '' 1.204 Pervious Area" '' 30.000 Pervious length" '' 2.000 Pervious slope" '' 2.236 Impervious Area" '' 30.000 Impervious slope" '' 2.236 Impervious Slope" '' 2.236 Pervious Manning 'n'" '' 75.000 Pervious Manning 'n'" '' 75.000 Pervious Manning 'n'" '' 75.000 Pervious Manning 'n'" '' 2.500 Pervious Manning 'n'" '' 75.000 Pervious Lag constant (hours)" '' 5.000 Pervious Depression storage"</pre> | | | 1 | - | |
| 13.000 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" 201 Catchment 201 - To Clythe Creeek" 65.000 % Impervious" 3.440 Total Area" 30.000 Flow length" 2.000 Overland Slope" 1.204 Pervious Area" 30.000 Pervious length" 2.236 Impervious length" 2.000 Impervious length" 2.000 Impervious slope" 3.0000 Flow Length" 2.000 Pervious length" 3.0000 Pervious length" 30.000 Pervious length 30.000 Perv | | | | | |
| 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" 201 Catchment 201 - To Clythe Creeek" 65.000 % Impervious" 3440 Total Area" 30.000 Flow length" 2.000 Overland Slope" 1.204 Pervious Area" 30.000 Flow length" 2.000 Pervious length" 2.000 Impervious length" 2.000 Impervious length" 30.000 Flow length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious length" 30.000 Pervious Pervious length" 30.000 Pervious Pervious length 30.000 Pervious Pervious length 30.000 Pervious Pervious Pervious length 30.000 Pervious Pervious Pervious Per | | | | | |
| <pre>0.400 Fraction K 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" 3.440 Total Area" 30.000 Flow length" 2.000 Overland Slope" 1.204 Pervious Area" 30.000 Pervious length" 2.000 Pervious length" 2.000 Pervious length" 2.000 Impervious length" 2.000 Pervious slope" 2.236 Impervious Area" 30.000 Impervious length" 2.000 Impervious length" 2.000 Pervious slope" 30.000 Impervious length" 30.000 Pervious slope" 30.000 Pervious slope" 30.000 Impervious length" 30.000 Pervious Manning 'n'" 30.000 Pervious Manning 'n'" 30.000 Pervious Man.infiltration" 30.500 Pervious Lag constant (hours)" 5.000 Pervious Depression storage"</pre> | | | | - | |
| <pre>" 1.000 Time step multiplier" " Maximum intensity 169.546 mm/hr" " Total depth 69.476 mm" " 6 025hyd Hydrograph extension used in this file" " 3 CATCHMENT 201" " 1 Equal length" " 2 Horton equation" " 201 Catchment 201 - To Clythe Creeek" " 65.000 % Impervious" " 3.440 Total Area" " 30.000 Flow length" " 2.000 Overland Slope" " 1.204 Pervious Area" " 30.000 Pervious slope" " 2.36 Impervious length" " 2.000 Impervious length" " 2.000 Impervious length" " 2.000 Pervious slope" " 33.000 Flow length" " 2.000 Pervious slope" " 30.000 Pervious length" " 2.000 Pervious length" " 2.000 Pervious length" " 2.000 Pervious length" " 30.000 P</pre> | | | | | |
| <pre>Maximum intensity 169.546 mm/hr" 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" 34.40 Total Area" 30.000 Flow length" 2.000 Overland Slope" 1.204 Pervious Area" 30.000 Pervious length" 2.000 Pervious length" 2.000 Pervious slope" 30.000 Impervious length" 2.000 Impervious length" 30.000 Pervious Manning 'n'" 30.000 Pervious Manning 'n'" 30.000 Pervious Max.infiltration" 30.500 Pervious Lag constant (hours)" 5.000 Pervious Depression storage"</pre> | | | | | |
| <pre>Total depth 69.476 mm" G 025hyd Hydrograph extension used in this file" GATCHMENT 201" GATCHMENT 201" GATCHMENT 201 GATCHME</pre> | | | | | |
| 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" 3.440 Total Area" 30.000 Flow length" 2.000 Overland Slope" 1.204 Pervious Area" 30.000 Pervious length" 2.36 Impervious slope" 2.36 Impervious length" 30.000 Impervious length" 30.000 Pervious slope" 30.000 Impervious slope" 30.000 Pervious length" | | | | - | |
| <pre>" 33 CATCHMENT 201" " 1 Triangular SCS" " 1 Equal length" " 201 Catchment 201 - To Clythe Creeek" " 65.000 % Impervious" " 3.440 Total Area" " 30.000 Flow length" " 2.000 Overland Slope" " 1.204 Pervious Area" " 30.000 Pervious length" " 2.000 Pervious length" " 2.000 Pervious slope" " 3.436 Impervious Area" " 30.000 Impervious length" " 2.000 Pervious Manning 'n'" " 0.250 Pervious Max.infiltration" " 0.250 Pervious Lag constant (hours)" " 5.000 Pervious Depression storage"</pre> | | | | | |
| <pre>" 1 Triangular SCS" " 1 Equal length" " 2 Horton equation" " 201 Catchment 201 - To Clythe Creeek" " 65.000 % Impervious" " 30.440 Total Area" " 30.000 Flow length" " 2.000 Overland Slope" " 1.204 Pervious Area" " 30.000 Pervious length" " 2.000 Pervious slope" " 2.236 Impervious Area" " 30.000 Impervious length" " 2.000 Impervious length" " 2.000 Impervious slope" " 0.250 Pervious Manning 'n'" " 75.000 Pervious Max.infiltration" " 0.250 Pervious Lag constant (hours)" " 5.000 Pervious Depression storage"</pre> | | | | | ension used in this file" |
| <pre>" 1 Equal length" " 2 Horton equation" " 201 Catchment 201 - To Clythe Creeek" " 65.000 % Impervious" " 3.440 Total Area" " 30.000 Flow length" " 2.000 Overland Slope" " 1.204 Pervious Area" " 30.000 Pervious length" " 2.000 Pervious length" " 2.000 Pervious slope" " 2.236 Impervious Area" " 30.000 Impervious length" " 2.000 Impervious length" " 2.000 Impervious slope" " 0.250 Pervious Manning 'n'" " 75.000 Pervious Max.infiltration" " 12.500 Pervious Max.infiltration" " 0.250 Pervious Lag constant (hours)" " 5.000 Pervious Depression storage"</pre> | | 33 | | | |
| <pre>"2 Horton equation" "201 Catchment 201 - To Clythe Creeek" "65.000 % Impervious" "3.440 Total Area" "30.000 Flow length" "2.000 Overland Slope" "1.204 Pervious Area" "30.000 Pervious length" "2.000 Pervious slope" "2.236 Impervious Area" "30.000 Impervious length" "2.000 Impervious length" "2.000 Impervious length" "2.000 Pervious slope" "30.000 Pervious slope" "30.000 Pervious slope" "30.000 Pervious length" "30.000 Pervious Manning 'n'" "30.000 Pervious Manning 'n'" "30.000 Pervious Lag constant (hours)" "30.000 Pervious Depression storage"</pre> | | | | • | |
| <pre>" 201 Catchment 201 - To Clythe Creeek" " 65.000 % Impervious" " 3.440 Total Area" " 30.000 Flow length" " 2.000 Overland Slope" " 1.204 Pervious Area" " 30.000 Pervious length" " 2.000 Pervious slope" " 2.236 Impervious Area" " 30.000 Impervious length" " 2.000 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"</pre> | | | | | |
| <pre>" 65.000 % Impervious" " 3.440 Total Area" " 30.000 Flow length" " 2.000 Overland Slope" " 1.204 Pervious Area" " 30.000 Pervious length" " 2.000 Pervious slope" " 2.236 Impervious Area" " 30.000 Impervious length" " 2.000 Impervious length" " 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"</pre> | | | | - | he Creeek" |
| <pre>" 3.440 Total Area" " 30.000 Flow length" " 2.000 Overland Slope" " 1.204 Pervious Area" " 30.000 Pervious length" " 2.000 Pervious slope" " 2.236 Impervious Area" " 30.000 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"</pre> | | | | - | |
| <pre>" 30.000 Flow length" " 2.000 Overland Slope" " 1.204 Pervious Area" " 30.000 Pervious length" " 2.000 Pervious slope" " 2.236 Impervious Area" " 30.000 Impervious length" " 2.000 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"</pre> | | | | - | |
| <pre>" 2.000 Overland Slope" " 1.204 Pervious Area" " 30.000 Pervious length" " 2.000 Pervious slope" " 2.236 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 Min.infiltration" " 0.250 Pervious Lag constant (hours)" " 5.000 Pervious Depression storage"</pre> | | | | | |
| <pre>" 1.204 Pervious Area" " 30.000 Pervious length" " 2.000 Pervious slope" " 2.236 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 Min.infiltration" " 0.250 Pervious Lag constant (hours)"</pre> | | | | • | |
| <pre>" 30.000 Pervious length" " 2.000 Pervious slope" " 2.236 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"</pre> | " | | | • | |
| <pre>" 2.000 Pervious slope" " 2.236 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"</pre> | | | | | |
| <pre>" 2.236 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"</pre> | " | | | • | |
| 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" | " | | 2.236 | • | |
| <pre>2.000 Impervious stope " 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"</pre> | | | 30.000 | Impervious length" | |
| 75.000 Pervious Max.infiltration" 12.500 Pervious Min.infiltration" 0.250 Pervious Lag constant (hours)" 5.000 Pervious Depression storage" | " | | 2.000 | Impervious slope" | |
| " 12.500 Pervious Min.infiltration" " 0.250 Pervious Lag constant (hours)" " 5.000 Pervious Depression storage" | " | | 0.250 | Pervious Manning 'n'" | |
| " 0.250 Pervious Lag constant (hours)" " 5.000 Pervious Depression storage" | " | | 75.000 | Pervious Max.infiltrati | on" |
| " 5.000 Pervious Depression storage" | " | | 12.500 | Pervious Min.infiltrati | on" |
| 5.000 Pervious Depression storage | " | | 0.250 | Pervious Lag constant (| hours)" |
| " 0.015 Impervious Manning 'n'" | " | | 5.000 | Pervious Depression sto | orage" |
| | | | | | |
| " 0.000 Impervious Max.infiltration" | | | | • | |
| " 0.000 Impervious Min.infiltration" | | | | - | |
| | | | | | |
| " 0.050 Impervious Lag constant (hours)" | | | 1.500 | Impervious Depression s | torage |
| " 0.050 Impervious Lag constant (hours)" | " | | 1.500 | | |
| 0.050 Impervious Lag constant (nours) | | | | | |

| | | 1 004 | 0 000 | 0.000 | 0 000 4 | | |
|---|------------|-------------------------------------|-----------|---------------------|------------|---------|----------|
| | | 1.084 | 0.000 | | | .m/sec" | |
| | | Catchment 201 | | Pervious | Impervious | | |
| | | Surface Area | | 1.204 | 2.236 | 3.440 | hectare" |
| | | Time of concentr | | 11.267 | 1.796 | 3.566 | minutes" |
| | | Time to Centroid | | | 98.258 | 99.099 | minutes" |
| | | Rainfall depth | | | 69.476 | 69.476 | mm" |
| | | Rainfall volume | | 836.50 | 1553.49 | 2389.99 | c.m" |
| | | Rainfall losses | | 40.822 | 2.348 | 15.814 | mm" |
| | | Runoff depth | | | 67.128 | 53.662 | mm" |
| | | Runoff volume | | 345.00 | 1500.99 | 1845.99 | c.m" |
| | | Runoff coefficie | | | 0.966 | 0.772 | |
| | 40 | Maximum flow | | | 0.920 | 1.084 | c.m/sec" |
| | 40 | HYDROGRAPH Add F | kunott " | | | | |
| | | 4 Add Runoff " | 1 004 | 0 000 | 0.000 | | |
| | F 4 | 1.084 | 1.084 | 0.000 | 0.000" | | |
| | 54 | POND DESIGN" | C1 | | | | |
| | 1.0 | | | c.m/sec" | | | |
| | 0.1 | 0 | | m/sec" | | | |
| | 1846 | , , | | c.m" | | | |
| | | 8. Number of sta | • | | | | |
| | 0.0 | | | metre" | | | |
| | 3.0 | | | metre" metre" | | | |
| | 0.0 | 00 Starting wate 0 Keep Design D | | | Epleo" | | |
| | | Level Disch | | Volume" | - Faise | | |
| | | | 0.000 | 0.000" | | | |
| | | | | 208.800" | | | |
| | | | | 430.600" | | | |
| | | | | 450.000 666.000" | | | |
| | | | | 915.100" | | | |
| п | | | | 178.100" | | | |
| | | | | 455.300" | | | |
| | | | | 746.800" | | | |
| | | | | 052.900" | | | |
| | | | | 373.600" | | | |
| | | | | 709.300" | | | |
| | | | | 060.100" | | | |
| " | | | | 426.200" | | | |
| | | | | 807.400" | | | |
| | | | | 203.900" | | | |
| " | | | | 615.800" | | | |
| " | | 341.350 4 | | 043.500" | | | |
| " | | | | 487.800" | | | |
| " | | Peak outflow | | 0.22 | 22 c.m/se | ec" | |
| " | | Maximum level | | 340.29 | | | |
| " | | Maximum storage | | 1303.93 | | | |
| " | | Centroidal lag | | 4.98 | | | |
| " | | • | L.084 | 0.222 | 0.000 c.m/ | 'sec" | |
| " | 40 | HYDROGRAPH Next | link " | | | | |
| " | | 5 Next link " | | | | | |
| | | | | | | | |

| " | | | 1.084 | 0.222 | 0.222 | 0.000" |
|---|----|--------|------------------------|------------|----------------|----------------|
| | 51 | PI | IPE DESIGN" | | •• | |
| " | | 0.222 | Current peak | flow | c.m/sec" | |
| " | | 0.013 | - | | | |
| " | | 0.450 | • | metre" | | |
| " | | 2.000 | | / II) | | |
| " | | De | epth of flow | | 0.238 | metre" |
| " | | | locity | | 2.596 | m/sec" |
| | | | ipe capacity | | 0.403 | c.m/sec" |
| | | | itical depth | | 0.332 | |
| " | 53 | RC | DUTE Pipe R | oute 17" | | |
| " | | 16.50 | Pipe Rout | e 17 Read | ch length (| metre)" |
| " | | 0.283 | - | | | · |
| " | | 4.767 | | conds)" | | |
| " | | 0.000 | Default(0) c | or user sp | pec.(1) values | s used" |
| | | 0.500 | X-factor <= | 0.5" | | |
| | | 30.000 | K-lag (se | conds)" | | |
| " | | 0.500 | Beta weighti | ng factor | , " | |
| " | | 6.818 | Routing time | step (| (seconds)" | |
| | | 1 | No. of sub-r | eaches" | | |
| " | | Pe | eak outflow | | 0.221 | c.m/sec" |
| | | | 1.084 | 0.222 | 0.221 | 0.000 c.m/sec" |
| " | 40 | H | /DROGRAPH Next | : link " | | |
| " | | 5 | Next link " | | | |
| | | | 1.084 | 0.221 | 0.221 | 0.000" |
| | 54 | | OND DESIGN" | | | |
| | | 0.221 | Current peak | | c.m/sec" | |
| | | 0.171 | 0 | | | |
| | | 1844.4 | Hydrograph v | | c.m" | |
| | | 12. | Number of st | - | | |
| | | 0.000 | Minimum wate | | | |
| | | 3.000 | Maximum wate | | | |
| | | 0.000 | Starting wat | | | - 1 " |
| | | 0 | | | = True; 0 = Fa | alse |
| | | | Level Disc | - | 0.000" | |
| | | | 337.050 337.150 4.9 | 0.000 | 1.670" | |
| | | | 337.250 4.9 | | 3.330" | |
| | | | | 4E-05 | 5.790" | |
| | | | | 4E-05 | 8.250" | |
| п | | | | 4E-05 | 10.710" | |
| п | | | | 4E-05 | 13.170" | |
| | | | | 4E-05 | 14.800" | |
| | | | | .4210 | 15.630" | |
| " | | | | .4210 | 17.300" | |
| " | | | | .4210 | 18.960" | |
| | | | | .4210 | 20.630" | |
| | | Pe | eak outflow | v | 0.221 | c.m/sec" |
| " | | | aximum level | | 337.726 | metre" |
| " | | | aximum storage | | 15.236 | c.m" |
| | | | | | | |

| | | Ce | ntroidal lag | 5.026 | hours" |
|---|----|---------|-----------------------|---|----------------|
| | | | 1.084 0.221 | 0.221 0. | 000 c.m/sec" |
| " | 40 | HY | DROGRAPH Next link " | | |
| " | | 5 | Next link " | | |
| " | | | | 0.221 | 0.000" |
| " | 52 | СН | ANNEL DESIGN" | | |
| | | 0.221 | Current peak flow | c.m/sec" | |
| " | | 0.065 | Manning 'n'" | | |
| " | | 0. | - | <pre>0=trapezoidal;</pre> | 1=general" |
| | | | Basewidth metre" | , , | 0 |
| " | | 0.000 | Left bank slope" | | |
| | | | Right bank slope" | | |
| | | 1.000 | Channel depth metr | re" | |
| | | 0.500 | | | |
| | | | pth of flow | 0.280 | metre" |
| | | | locity | 0.395 | |
| | | | annel capacity | 1.371 | c.m/sec" |
| " | | | itical depth | 0.108 | metre" |
| | 53 | | UTE Channel Route 2 | | |
| | | 25.00 | Channel Route 25 F | | (metre)" |
| | | | X-factor <= 0.5" | 0 | 、 |
| | | 47.487 | | | |
| | | | Default(0) or user sp | pec.(1) values | used" |
| | | | X-factor <= 0.5" | , | |
| | | | K-lag (seconds)" | | |
| | | | Beta weighting factor | , " | |
| | | 100.000 | | | |
| | | 1 | No. of sub-reaches" | , | |
| | | Pe | ak outflow | 0.220 | c.m/sec" |
| " | | | 1.084 0.221 | 0.220 | 0.000 c.m/sec" |
| " | 40 | HY | DROGRAPH Next link " | | |
| | | 5 | Next link " | | |
| | | | 1.084 0.220 | 0.220 | 0.000" |
| | 33 | CA | TCHMENT 202" | | |
| " | | 1 | Triangular SCS" | | |
| " | | 1 | Equal length" | | |
| " | | 2 | Horton equation" | | |
| " | | 202 | Catchment 202" | | |
| " | | 25.000 | % Impervious" | | |
| " | | 0.980 | Total Area" | | |
| " | | 30.000 | Flow length" | | |
| | | 2.000 | Overland Slope" | | |
| " | | 0.735 | Pervious Area" | | |
| " | | 30.000 | Pervious length" | | |
| " | | 2.000 | Pervious slope" | | |
| " | | 0.245 | Impervious Area" | | |
| " | | 30.000 | Impervious length" | | |
| " | | 2.000 | Impervious slope" | | |
| " | | 0.250 | Pervious Manning 'n'' | ı | |
| " | | 75.000 | Pervious Max.infiltra | | |
| | | | | | |

... Pervious Min.infiltration" 12.500 ... 0.250 Pervious Lag constant (hours)" н 5.000 Pervious Depression storage" ... Impervious Manning 'n'" 0.015 н 0.000 Impervious Max.infiltration" ... 0.000 Impervious Min.infiltration" ... 0.050 Impervious Lag constant (hours)" ... 1.500 Impervious Depression storage" ... 0.220 0.000 c.m/sec" 0.223 0.220 ... Catchment 202 Impervious Total Area " Pervious ... Surface Area 0.735 0.980 0.245 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 510.65 170.22 680.87 c.m" ... mm" Rainfall losses 31.204 40.822 2.348 ... mm" Runoff depth 28.654 67.128 38.273 ... Runoff volume c.m" 164.46 375.07 210.61 Runoff coefficient 0.412 0.966 0.551 ... Maximum flow 0.159 0.101 0.223 c.m/sec" ... HYDROGRAPH Add Runoff " 40 ... Add Runoff " 4 ... 0.000" 0.223 0.287 0.220 ... CATCHMENT 300" 33 ... Triangular SCS" 1 н 1 Equal length" ... 2 Horton equation" ... 300 Catchment 300 - To Clythe Creek" 0.000 % Impervious" ... Total Area" 6.480 ... Flow length" 45.000 ... 2.000 Overland Slope" ... Pervious Area" 6.480 ... 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'" ... Pervious Max.infiltration" 75.000 ... 12.500 Pervious Min.infiltration" ... 0.250 Pervious Lag constant (hours)" ... 5.000 Pervious Depression storage" ... 0.015 Impervious Manning 'n'" ... Impervious Max.infiltration" 0.000 ... 0.000 Impervious Min.infiltration" ... 0.050 Impervious Lag constant (hours)" ... 1.500 Impervious Depression storage" ... 1.261 0.287 0.220 0.000 c.m/sec" ... Catchment 300 Pervious Impervious Total Area "

| н | Surface Area | 6.480 | 0.000 | 6.480 | hectare" |
|------|-----------------------|---------|--------|---------|------------|
| п | Time of concentration | 14.371 | 2.291 | 14.371 | minutes" |
| н | Time to Centroid | 105.688 | 98.958 | 105.688 | 8 minutes" |
| н | Rainfall depth | 69.476 | 69.476 | 69.476 | mm" |
| | Rainfall volume | 4502.07 | 0.00 | 4502.07 | 7 c.m" |
| н | Rainfall losses | 40.830 | 2.498 | 40.830 | mm" |
| п | Runoff depth | 28.647 | 66.978 | 28.647 | mm" |
| п | Runoff volume | 1856.30 | 0.00 | 1856.30 | 0 c.m" |
| п | Runoff coefficient | 0.412 | 0.000 | 0.412 | н |
| п | Maximum flow | 1.261 | 0.000 | 1.261 | c.m/sec" |
| " 40 | HYDROGRAPH Add Runoff | | | | |
| п | 4 Add Runoff " | | | | |
| н | 1.261 1.51 | 1 0.220 | 0.000" | | |
| " 38 | START/RE-START TOTALS | 300" | | | |
| н | 3 Runoff Totals on EX | IT" | | | |
| н | Total Catchment area | | 10 | .900 | hectare" |
| п | Total Impervious area | | 2 | .481 | hectare" |
| п | Total % impervious | | 22 | .762" | |
| " 19 | EXIT" | | | | |

| | | | MTDUSS Output | >" |
|---|----|----------------|--|---|
| | | | MIDUSS version | Version 2.25 rev. 473" |
| | | | MIDUSS created | Sunday, February 07, 2010" |
| | | 10 | Units used: | ie METRIC" |
| | | 10 | Job folder: | C:\Users\pgrier\Documents\Work\105172\" |
| " | | | | 2021-07-28" |
| " | | | Output filename: | 105172_POST_100yr.out" |
| " | | | Licensee name: | gmbp" |
| " | | | Company | |
| " | | | Date & Time last used: | 7/28/2021 at 3:58:18 PM" |
| " | 31 | T | IME PARAMETERS" | |
| " | | 5.000 | Time Step" | |
| " | | 210.000 | Max. Storm length" | |
| " | | 1500.000 | Max. Hydrograph" | |
| " | 32 | S | TORM Chicago storm" | |
| " | | 1 | Chicago storm" | |
| " | | 4688.000 | Coefficient A" | |
| " | | 17.000 | | |
| | | 0.962 | • | |
| " | | | Fraction R" | |
| | | 210.000 | Duration" | |
| | | 1.000 | Time step multiplier" | |
| | | | aximum intensity | 213.574 mm/hr" |
| | | | otal depth | 88.830 mm" |
| | 33 | 6 | 100hyd Hydrograph ext ATCHMENT 201" | ension used in this file" |
| | 22 | 1 | Triangular SCS" | |
| | | 1 | Equal length" | |
| | | 2 | Horton equation" | |
| | | 201 | Catchment 201 - To Clyt | he Creeek" |
| | | 65.000 | % Impervious" | |
| " | | 3.440 | Total Area" | |
| " | | 30.000 | Flow length" | |
| " | | 2.000 | Overland Slope" | |
| " | | 1.204 | Pervious Area" | |
| " | | 30.000 | Pervious length" | |
| " | | 2.000 | Pervious slope" | |
| " | | 2.236 | Impervious Area" | |
| " | | 30.000 | Impervious length" | |
| " | | 2.000 | Impervious slope" | |
| | | 0.250 | Pervious Manning 'n'" | |
| " | | 75.000 | Pervious Max.infiltrati | |
| | | 12.500 | Pervious Min.infiltrati | |
| | | 0.250 | Pervious Lag constant (| |
| | | 5.000 | Pervious Depression sto | - |
| | | 0.015 | Impervious Manning 'n'" | |
| | | 0.000 | Impervious Max.infiltra | |
| | | 0.000 0.050 | Impervious Min.infiltra Impervious Lag constant | |
| | | 1.500 | Impervious Lag constant Impervious Depression s | |
| | | 1.000 | Tilber 11002 Debi 6221011 2 | |

| | 1 / | 482 0.0 | 00 0.000 | 0 000 0 | .m/sec" | |
|---|--------------------|------------------|------------------------|-------------------------------------|------------|----------|
| | Catchment 2 | | Pervious | | Total Area | |
| п | Surface Are | | 1.204 | 2.236 | 3.440 | hectare" |
| | | ncentration | | 1.638 | 3.326 | minutes" |
| | Time to Cer | | 102.153 | 97.460 | 98.493 | minutes" |
| | Rainfall de | | 88.830 | 88.830 | 88.830 | mm" |
| | Rainfall vo | • | 1069.51 | 1986.23 | 3055.75 | c.m" |
| | Rainfall lo | | 43.655 | 2.647 | 17.000 | mm" |
| п | Runoff dep | | 45.175 | 86.183 | 71.830 | mm'' |
| | Runoff volu | | 543.91 | 1927.04 | 2470.95 | c.m" |
| " | Runoff coe | | 0.509 | 0.970 | 0.809 | |
| " | Maximum flo | | 0.422 | 1.159 | 1.482 | c.m/sec" |
| | | Add Runoff | | | | |
| " | 4 Add Rund | | | | | |
| " | | 482 1.4 | 82 0.000 | 0.000" | | |
| " | 54 POND DESIG | ۷" | | | | |
| " | 1.482 Current | peak flow | c.m/sec" | | | |
| " | 0.171 Target o | | c.m/sec" | | | |
| " | 2471.0 Hydrogra | aph volume | c.m" | | | |
| " | 18. Number o | of stages" | | | | |
| " | 0.000 Minimum | water leve | 1 metre" | | | |
| " | 3.000 Maximum | water leve | 1 metre" | | | |
| " | 0.000 Starting | g water lev | el metre" | | | |
| " | 0 Keep Des | sign Data: | 1 = True; 0 = | = False" | | |
| " | Level | Discharge | Volume" | | | |
| " | 339.750 | 0.000 | 0.000" | | | |
| " | 339.850 | | 208.800" | | | |
| " | 339.950 | 0.03200 | 430.600" | | | |
| | 340.050 | 0.04700 | 666.000" | | | |
| | 340.150 | 0.05900 | 915.100" | | | |
| | 340.250 | | 1178.100" | | | |
| | 340.350 | | 1455.300" | | | |
| | 340.450 | | 1746.800" | | | |
| | 340.550 | 0.4320 | 2052.900" | | | |
| | 340.650 | 0.4420 | 2373.600" | | | |
| | 340.750 | 0.4510 | 2709.300" | | | |
| | 340.850 340.950 | 0.4610 0.4700 | 3060.100" 3426.200" | | | |
| | 341.050 | 0.9140 | 3807.400" | | | |
| | 341.150 | 1.736 | 4203.900" | | | |
| | 341.250 | 2.819 | 4615.800" | | | |
| | 341.350 | 4.122 | 5043.500" | | | |
| п | 341.450 | 5.622 | 5487.800" | | | |
| | Peak outflo | | 0.42 | 15 c.m/se | 2C" | |
| п | Maximum lev | | 340.38 | | | |
| | Maximum sto | | 1564.50 | | | |
| | Centroidal | • | 4.28 | | | |
| | 1.482 | 1.482 | 0.415 | 0.000 c.m | sec" | |
| " | | Next link | | · · · · · · · · · · · · · · · · · · | | |
| " | 5 Next li | | | | | |
| | | | | | | |

| " | | | 1.482 | 0.415 | 0.415 | 0.000" |
|---|----|--------|------------------------|----------------|---------------|----------------|
| | 51 | P | IPE DESIGN" | | | |
| " | | 0.415 | Current peak | flow | c.m/sec" | |
| " | | 0.013 | | | | |
| " | | 0.450 | • | metre" | | |
| " | | 2.000 | | | | |
| " | | Si | urcharged HGL | | 2.118 | %" |
| " | | | elocity | | 2.609 | m/sec" |
| | | | ipe capacity | | 0.403 | |
| | | | ritical depth | | 0.000 | |
| " | 53 | R | DUTE Pipe R | oute 17" | | |
| " | | 16.50 | Pipe Rout | e 17 Reac | h length (| metre)" |
| " | | 0.255 | X-factor <= | | C . | · |
| " | | 4.631 | K-lag (se | conds)" | | |
| " | | 0.000 | Default(0) o | r user sp | ec.(1) values | used" |
| | | 0.500 | X-factor <= | 0.5" | | |
| | | 30.000 | K-lag (se | conds)" | | |
| " | | 0.000 | Beta weighti | ng factor | " | |
| " | | 0.000 | Routing time | step (| seconds)" | |
| | | 0 | No. of sub-r | eaches" | | |
| " | | Pe | eak outflow | | 0.415 | c.m/sec" |
| " | | | 1.482 | 0.415 | 0.415 | 0.000 c.m/sec" |
| " | 40 | H | /DROGRAPH Next | link " | | |
| " | | 5 | Next link " | | | |
| | | | | 0.415 | 0.415 | 0.000" |
| " | 54 | | OND DESIGN" | | | |
| | | 0.415 | | | c.m/sec" | |
| | | 0.171 | • | | | |
| | | 2474.7 | , , | | c.m" | |
| | | 12. | Number of st | • | | |
| | | 0.000 | Minimum wate | | | |
| | | 3.000 | Maximum wate | | | |
| | | 0.000 | Starting wat | | | 1 |
| | | 0 | | | True; 0 = Fa | ise |
| | | | Level Disc | - | 0.000" | |
| | | | 337.050 337.150 4.9 | 0.000 45 05 | 1.670" | |
| | | | 337.250 4.9 | | 3.330" | |
| | | | | 4E-05 | 5.790" | |
| | | | | 4E-05 | 8.250" | |
| | | | | | 10.710" | |
| | | | | | 13.170" | |
| п | | | | | 14.800" | |
| | | | | | 15.630" | |
| | | | | | 17.300" | |
| | | | | | 18.960" | |
| " | | | | | 20.630" | |
| " | | Pe | eak outflow | | 0.415 | c.m/sec" |
| " | | | aximum level | | 337.749 | metre" |
| " | | | aximum storage | | 15.618 | c.m" |
| | | | | | | |

| " | | Ce | ntroidal lag | 4.307 | |
|---|----|---------|----------------------|----------------|----------------|
| | | | 1.482 0.415 | 0.415 0. | 000 c.m/sec" |
| | 40 | | DROGRAPH Next link " | | |
| | | 5 | Next link " | | |
| | | | | 0.415 | 0.000" |
| | 52 | | ANNEL DESIGN" | <i>,</i> | |
| | | 0.415 | • | c.m/sec" | |
| | | 0.065 | Manning 'n'" | - · · · - | |
| | | 0. | | 0=trapezoidal; | 1=general" |
| | | | Basewidth metre" | | |
| | | | Left bank slope" | | |
| " | | 0.000 | Right bank slope" | | |
| " | | | Channel depth met | re" | |
| | | 0.500 | | | |
| " | | | pth of flow | 0.427 | metre" |
| " | | | locity | 0.486 | |
| " | | | annel capacity | 1.371 | |
| " | | | itical depth | 0.164 | metre" |
| " | 53 | | UTE Channel Route | | |
| " | | 25.00 | Channel Route 25 | Reach length | (metre)" |
| " | | 0.000 | | | |
| " | | 38.545 | | | |
| " | | 0.000 | • • | pec.(1) values | used" |
| " | | 0.500 | | | |
| | | | K-lag (seconds)" | | |
| " | | | Beta weighting facto | | |
| " | | 100.000 | Routing time step | (seconds)" | |
| " | | 1 | No. of sub-reaches" | | |
| " | | Pe | ak outflow | 0.415 | c.m/sec" |
| " | | | 1.482 0.415 | 0.415 | 0.000 c.m/sec" |
| " | 40 | | DROGRAPH Next link " | | |
| " | | 5 | Next link " | | |
| " | | | 1.482 0.415 | 0.415 | 0.000" |
| | 33 | | TCHMENT 202" | | |
| " | | | Triangular SCS" | | |
| " | | 1 | Equal length" | | |
| | | 2 | Horton equation" | | |
| | | 202 | Catchment 202" | | |
| | | 25.000 | % Impervious" | | |
| | | 0.980 | Total Area" | | |
| " | | 30.000 | Flow length" | | |
| " | | 2.000 | Overland Slope" | | |
| " | | 0.735 | Pervious Area" | | |
| " | | 30.000 | Pervious length" | | |
| " | | 2.000 | Pervious slope" | | |
| " | | 0.245 | Impervious Area" | | |
| " | | 30.000 | Impervious length" | | |
| " | | 2.000 | Impervious slope" | | |
| " | | 0.250 | Pervious Manning 'n' | " | |
| " | | 75.000 | Pervious Max.infiltr | ation" | |
| | | | | | |

... Pervious Min.infiltration" 12.500 ... 0.250 Pervious Lag constant (hours)" н 5.000 Pervious Depression storage" ... Impervious Manning 'n'" 0.015 п 0.000 Impervious Max.infiltration" ... 0.000 Impervious Min.infiltration" ... 0.050 Impervious Lag constant (hours)" ... 1.500 Impervious Depression storage" ... 0.415 0.000 c.m/sec" 0.340 0.415 ... Catchment 202 Impervious Total Area " Pervious ... Surface Area 0.735 0.980 0.245 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 652.90 217.63 870.53 c.m" ... mm" Rainfall losses 43.655 2.647 33.403 ... mm" Runoff depth 45.175 86.183 55.427 ... Runoff volume c.m" 211.15 543.19 332.04 Runoff coefficient 0.509 0.970 0.624 ... Maximum flow 0.258 0.127 0.340 c.m/sec" ... HYDROGRAPH Add Runoff " 40 ... Add Runoff " 4 ... 0.000" 0.340 0.642 0.415 ... CATCHMENT 300" 33 ... Triangular SCS" 1 н 1 Equal length" ... 2 Horton equation" ... 300 Catchment 300 - To Clythe Creek" 0.000 % Impervious" ... Total Area" 6.480 ... Flow length" 45.000 ... 2.000 Overland Slope" ... Pervious Area" 6.480 ... 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'" ... Pervious Max.infiltration" 75.000 ... 12.500 Pervious Min.infiltration" ... 0.250 Pervious Lag constant (hours)" ... 5.000 Pervious Depression storage" ... 0.015 Impervious Manning 'n'" ... Impervious Max.infiltration" 0.000 ... 0.000 Impervious Min.infiltration" ... 0.050 Impervious Lag constant (hours)" ... 1.500 Impervious Depression storage" ... 1.971 0.642 0.415 0.000 c.m/sec" ... Catchment 300 Pervious Impervious Total Area "

| н | 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 | 104.82 | 8 minutes" |
| | Rainfall depth | 88.830 | 88.830 | 88.830 | mm" |
| | Rainfall volume | 5756.17 | 0.01 | 5756.1 | 7 c.m" |
| " | Rainfall losses | 43.360 | 2.670 | 43.360 | mm'' |
| " | Runoff depth | 45.470 | 86.160 | 45.470 | mm'' |
| н | Runoff volume | 2946.46 | 0.01 | 2946.4 | 6 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 | п | | | |
| | 4 Add Runoff " | | | | |
| | 1.971 2.53 | 5 0.415 | 0.000" | | |
| " 38 | START/RE-START TOTALS | 300" | | | |
| | 3 Runoff Totals on EX | IT" | | | |
| | Total Catchment area | | 10 | .900 | hectare" |
| | Total Impervious area | | 2 | .481 | hectare" |
| | Total % impervious | | 22 | .762" | |
| " 19 | EXIT" | | | | |

| | | | MIDUSS Out | - | | | | |
|---|----|----------|-----------------|------------------|-------------------|-----------------|--------------------|-----------------|
| | | | MIDUSS ver | | | | | 2.25 rev. 473" |
| | | | MIDUSS cre | | | - | sunday, Febi | ruary 07, 2010" |
| | | 10 | Units used | | | | | ie METRIC" |
| | | | Job folde | ·: | C:\Us | ers\pgrie | er\Documents | s\Work\105172\" |
| | | | | | | | | 2021-07-28" |
| | | | Output fi | | | | 105172 | 2_POST_REG.out" |
| | | | Licensee r | name: | | | | gmbp" |
| | | | Company | . . | | | = (| |
| | 24 | | Date & Tir | | ed: | | //28/2021 | at 3:51:10 PM" |
| | 31 | | ME PARAMETI | | | | | |
| | | 60.000 | Time Step | | | | | |
| | | 2880.000 | Max. Storr | - | | | | |
| | 22 | 3600.000 | Max. Hydro | | | | | |
| | 32 | | ORM Histor: | LC | | | | |
| | | 5 | Historic" | | | | | |
| | | 2880.000 | Duration" | | | | | |
| | | 48.000 | Rainfall : | - | | 2 0 2 0 | 2 020" | |
| | | | 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" | |
| п | | | 2.028 | 2.028 | | 2.028 | | |
| | | | 2.028 | 2.028 | | 2.028 | | |
| п | | | 2.028 | 2.028 | 2.028 | 2.028 | | |
| | | | 2.028 | 2.026 | 2.026 | 2.026 | | |
| | | | 2.026 17.000 | 6.000 | 4.000 23.000 | 6.000 13.000 | 13.000" 13.000" | |
| | | | 53.000 | 13.000 38.000 | 23.000 13.000" | 12.000 | 13.000 | |
| п | | М- | aximum inter | | 53. | 200 mr | n/hr" | |
| | | | otal depth | ISICY | 285. | | | |
| | | 6 | • | lydrogranh | | | " this file" | |
| п | 33 | | ATCHMENT 202 | | extension | uscu In | | |
| п | 55 | 1 | Triangula | | | | | |
| | | 1 | Equal leng | | | | | |
| | | 2 | Horton equ | | | | | |
| | | 201 | - | | Clythe Cre | eek" | | |
| | | 65.000 | % Impervio | | | | | |
| п | | 3.440 | Total Area | | | | | |
| п | | 30.000 | Flow lengt | | | | | |
| п | | 2.000 | Overland S | | | | | |
| " | | 1.204 | Pervious A | | | | | |
| п | | 30.000 | Pervious | | | | | |
| " | | 2.000 | Pervious s | • | | | | |
| " | | 2.236 | Impervious | • | | | | |
| | | 30.000 | Impervious | | | | | |
| " | | 2.000 | Impervious | • | | | | |
| " | | 0.250 | Pervious N | • | | | | |
| " | | 75.000 | Pervious N | - | | | | |
| " | | 12.500 | Pervious N | | | | | |
| " | | 0.250 | | | nt (hours) | п | | |
| | | | | - | . , | | | |

| | | 5.000 | Pervious I | Denression | storage" | | | |
|---|----|----------------|--------------------------|------------|---------------|-----------|------------|----------|
| п | | 0.015 | | s Manning | | | | |
| | | 0.000 | - | s Max.infi | | | | |
| | | 0.000 | Impervious | | | | | |
| | | 0.050 | • | | tant (hours) |)" | | |
| | | 1.500 | - | - | on storage" | / | | |
| " | | | 0.379 | - | | 0.000 | c.m/sec" | |
| " | | Ca | tchment 20 | | Pervious | | Total Area | н |
| " | | Su | irface Area | | 1.204 | 2.236 | 3.440 | hectare" |
| " | | Ti | me of conce | entration | 17.225 | 2.860 | 4.946 | minutes" |
| " | | Ti | me to Centi | roid | 2775.198 | 2251.465 | 2327.522 | minutes" |
| " | | Ra | infall dept | th | 285.000 | 285.000 | 285.000 | mm" |
| " | | Ra | infall volu | ume | 3431.40 | 6372.60 | 9804.00 | c.m" |
| " | | Ra | infall los | ses | 207.571 | 39.596 | 98.387 | mm" |
| " | | Ru | noff depth | | 77.429 | 245.404 | 186.613 | mm" |
| " | | Ru | noff volume | 2 | 932.25 | 5487.23 | 6419.48 | c.m" |
| " | | Ru | noff coeff: | icient | 0.272 | 0.861 | 0.655 | п |
| " | | | ximum flow | | 0.095 | 0.285 | 0.379 | c.m/sec" |
| " | 40 | HY | DROGRAPH A | | n | | | |
| " | | 4 | Add Runof | | | | | |
| " | | | 0.379 | 9 0.37 | 9 0.000 | 0.000" | | |
| | 54 | - | ND DESIGN" | | <i>,</i> " | | | |
| | | 0.379 | Current pe | | c.m/sec" | | | |
| | | 0.171 | Target out | | .m/sec" | | | |
| | | 6419.5 | Hydrograp | | c.m" | | | |
| | | 18. | Number of | • | | | | |
| | | 0.000 3.000 | Minimum wa Maximum wa | | | | | |
| | | 0.000 | Starting v | | | | | |
| | | 0.000 0 | • | | . = True; 0 = | - Falco" | | |
| | | 0 | | ischarge | Volume" | - 18136 | | |
| | | | 339.750 | 0.000 | 0.000" | | | |
| | | | 339.850 | 0.02500 | 208.800" | | | |
| | | | 339.950 | 0.03200 | 430.600" | | | |
| " | | | 340.050 | 0.04700 | 666.000" | | | |
| " | | | 340.150 | 0.05900 | 915.100" | | | |
| " | | | 340.250 | 0.06900 | 1178.100" | | | |
| " | | | 340.350 | 0.4110 | 1455.300" | | | |
| " | | | 340.450 | 0.4220 | 1746.800" | | | |
| " | | | 340.550 | 0.4320 | 2052.900" | | | |
| " | | | 340.650 | 0.4420 | 2373.600" | | | |
| " | | | 340.750 | 0.4510 | 2709.300" | | | |
| " | | | 340.850 | 0.4610 | 3060.100" | | | |
| " | | | 340.950 | 0.4700 | 3426.200" | | | |
| " | | | 341.050 | 0.9140 | 3807.400" | | | |
| " | | | 341.150 | 1.736 | 4203.900" | | | |
| | | | 341.250 | | 4615.800" | | | |
| " | | | 341.350 | 4.122 | 5043.500" | | | |
| | | _ | 341.450 | 5.622 | 5487.800" | | | |
| | | Pe | ak outflow | | 0.33 | 15 c.m/se | ec | |

| | | | aximum level | | 340.332 | |
|--------|----|-------|------------------------------|---------|--------------------|---------------|
| " | | Ma | aximum storage | | 1405.283 | c.m" |
| " | | Ce | entroidal lag | | 41.163 | hours" |
| " | | | 0.379 0 | .379 | 0.315 0 | .000 c.m/sec" |
| " | 40 | H١ | /DROGRAPH Next | link " | | |
| " | | 5 | Next link " | | | |
| п | | _ | | 0.315 | 0.315 | 0.000" |
| п | 51 | PI | IPE DESIGN" | 0.515 | 01515 | 01000 |
| | 51 | | Current peak | flow | c m/sec" | |
| | | | Manning 'n'" | TTOW | C.III/ SEC | |
| | | | • | o+no" | | |
| | | 0.450 | | etre" | | |
| | | 2.200 | | | | |
| | | | epth of flow | | 0.290 | |
| " | | | elocity | | 2.915 | |
| " | | Pi | lpe capacity | | 0.423 | c.m/sec" |
| " | | Cr | itical depth | | 0.389 | metre" |
| " | 53 | RC | OUTE Pipe Ro | ute 17" | | |
| " | | 16.50 | Pipe Route | 17 Rea | ch length (| metre)" |
| " | | 0.220 | X-factor <= 0 | .5" | | |
| " | | 4.245 | K-lag (sec | onds)" | | |
| " | | 0.000 | | | pec.(1) value | s used" |
| | | 0.500 | X-factor <= 0 | .5" | ···· | |
| | | | K-lag (sec | | | |
| | | | Beta weightin | | r" | |
| | | 6.618 | - | | | |
| | | 1 | No. of sub-real | | | |
| | | _ | eak outflow | acties | 0 215 | c.m/sec" |
| | | г¢ | | 0.315 | | |
| | 40 | | /DROGRAPH Next | | 0.515 | 0.000 C.m/Sec |
| | 40 | 5 | | TTUK | | |
| | | C | | 0 215 | 0.315 | 0.000" |
| | 54 | D | OND DESIGN" | 0.515 | 0.313 | 0.000 |
| | 54 | | | £1.01 | c m/coc" | |
| | | 0.315 | | | | |
| | | | Target outflo | | | |
| | | | Hydrograph vo | | C.M | |
| | | 12. | Number of sta | - | | |
| | | 0.000 | Minimum water | | metre" | |
| " | | 3.000 | Maximum water | | metre" | |
| " | | 0.000 | Starting wate | | | |
| " | | 0 | Keep Design D | ata: 1 | | alse" |
| " | | | Level Disch | arge | Volume" | |
| " | | | 337.050 0 | .000 | 0.000" | |
| " | | | 337.150 4.94 | E-05 | 1.670" | |
| " | | | 337.250 4.94 | E-05 | 3.330" | |
| " | | | 337.350 4.94 | | 5.790" | |
| " | | | 337.450 4.94 | | 8.250" | |
| " | | | | | | |
| | | | 337.550 4.94 | E-05 | 10./10 | |
| | | | 337.550 4.94 337.650 4.94 | | 10.710" 13.170" | |
| " " | | | 337.650 4.94 | E-05 | 13.170" | |
| | | | 337.650 4.94 337.700 4.94 | E-05 | | |

... 337.850 0.4210 17.300" ... 0.4210 18.960" 337.950 н 0.4210 20.630" 338.050 ... Peak outflow c.m/sec" 0.315 н Maximum level 337.737 metre" ... Maximum storage 15.422 c.m" ... hours" Centroidal lag 41.448 ... 0.000 c.m/sec" 0.379 0.315 0.315 .. HYDROGRAPH Next link " 40 ... 5 Next link " ... 0.000" 0.379 0.315 0.315 н 52 CHANNEL DESIGN" ... 0.315 c.m/sec" Current peak flow ... 0.065 Manning 'n'" ... 0. Cross-section type: 0=trapezoidal; 1=general" ... 2.000 metre" Basewidth ... Left bank slope" 0.000 ... 0.000 Right bank slope" ... 1.000 Channel depth metre" ... 0.500 Gradient %" ... Depth of flow 0.354 metre" ... Velocity 0.445 m/sec" ... Channel capacity 1.371 c.m/sec" ... Critical depth 0.136 metre" ... 53 ROUTE Channel Route 25" п 25.00 Channel Route 25 Reach length (metre)" п 0.000 X-factor <= 0.5" ... (seconds)" 42.150 K-lag ... 0.000 Default(0) or user spec.(1) values used" ... 0.500 X-factor <= 0.5" ... (seconds)" 30.000 K-lag ... Beta weighting factor" 0.658 ... (seconds)" 120.000 Routing time step ... No. of sub-reaches" 1 ... Peak outflow 0.315 c.m/sec" ... 0.379 0.315 0.315 0.000 c.m/sec" ... HYDROGRAPH Next link " 40 п Next link " 5 ... 0.315 0.315 0.000" 0.379 н 33 CATCHMENT 202" п 1 Triangular SCS" п 1 Equal length" ... 2 Horton equation" ... 202 Catchment 202" ... 25.000 % Impervious" ... Total Area" 0.980 ... 30.000 Flow length" ... 2.000 Overland Slope" ... 0.735 Pervious Area" ... 30.000 Pervious length"

| " " " | 2.000 0.245 30.000 2.000 | Pervious slope" Impervious Area" Impervious length" Impervious slope" | | | | |
|-------------|-----------------------------------|--|--------------|----------|------------|----------|
| " | 0.250 | Pervious Manning 'n | | | | |
| " | 75.000 | Pervious Max.infilt | | | | |
| | 12.500 | Pervious Min.infilt | | | | |
| | 0.250 | Pervious Lag consta | | | | |
| | 5.000 | Pervious Depression | - | | | |
| | 0.015 | Impervious Manning | | | | |
| | 0.000 0.000 | Impervious Max.infi Impervious Min.infi | | | | |
| | 0.050 | Impervious Lag cons | | \ " | | |
| | 1.500 | Impervious Depression | |) | | |
| | 1.500 | 0.089 0.31 | - | 0.000 | c.m/sec" | |
| | Ca | tchment 202 | Pervious | | Total Area | п |
| | | irface Area | 0.735 | 0.245 | 0.980 | hectare" |
| " | | me of concentration | 17.225 | 2.860 | 9.845 | minutes" |
| " | Ti | me to Centroid | 2775.197 | 2251.465 | 2506.141 | minutes" |
| " | Ra | infall depth | 285.000 | 285.000 | 285.000 | mm" |
| " | Ra | infall volume | 2094.75 | 698.25 | 2793.00 | c.m" |
| " | | infall losses | 207.571 | 39.596 | 165.577 | mm" |
| " | | noff depth | 77.429 | 245.404 | 119.423 | mm" |
| " | | noff volume | 569.10 | 601.24 | 1170.34 | c.m" |
| | | noff coefficient | 0.272 | 0.861 | 0.419 | " / " |
| | | ximum flow | 0.058 | 0.031 | 0.089 | c.m/sec" |
| | | DROGRAPH Add Runoff | | | | |
| | 4 | Add Runoff " 0.089 0.39 | 6 0.315 | 0.000" | | |
| | 33 CA | TCHMENT 300" | 0 0.515 | 0.000 | | |
| | 1 | Triangular SCS" | | | | |
| | 1 | Equal length" | | | | |
| | 2 | Horton equation" | | | | |
| | 300 | Catchment 300 - To | Clythe Creel | <" | | |
| " | 0.000 | % Impervious" | 2 | | | |
| " | 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 0.250 | Impervious slope" Pervious Manning 'n | | | | |
| | 75.000 | Pervious Max.infilt | | | | |
| " | 12.500 | Pervious Min.infilt | | | | |
| " | 0.250 | Pervious Lag consta | | | | |
| " | 5.000 | Pervious Depression | | | | |
| " | 0.015 | Impervious Manning | - | | | |
| | | | | | | |

| " | | 0.000 | Impervious / | Max.infi] | ltration" | | | | |
|---|----|-------|---------------------------|-----------|------------|---------|----------|---------|----------|
| " | | 0.000 | Impervious / | Min.infi] | ltration" | | | | |
| " | | 0.050 | Impervious | Lag const | tant (hour | rs)" | | | |
| | | 1.500 | Impervious I | Depressio | on storage | 2" | | | |
| | | | . 0.538 | . 0.396 | 5 0.31 | L5 0.0 | 000 c.m/ | sec" | |
| | | Cat | tchment 300 | | Pervious | Impervi | ious Tot | al Area | п |
| " | | Sur | rface Area | | 6.480 | 0.000 | 6.4 | 80 | hectare" |
| | | Tir | me of concen [.] | tration | 21.969 | 3.647 | 21. | 969 | minutes" |
| " | | Tir | me to Centro | id | 2780.244 | 2236.98 | 36 278 | 0.242 | minutes" |
| " | | Rat | infall depth | | 285.000 | 285.000 | 285 | .000 | mm" |
| " | | | infall volum | | 1.8468 | 0.0000 | 1.8 | 468 | ha-m" |
| " | | Ra | infall losse | s | 206.992 | 38.537 | 206 | .992 | mm" |
| " | | Rur | noff depth | | 78.008 | 246.463 | 3 78. | 008 | mm" |
| | | Rur | noff volume | | 5054.92 | 0.02 | 505 | 4.94 | c.m" |
| | | Rur | noff coeffic: | ient | 0.274 | 0.000 | 0.2 | 74 | н |
| | | Мах | ximum flow | | 0.538 | 0.000 | 0.5 | 38 | c.m/sec" |
| | 40 | HYE | DROGRAPH Add | Runoff ' | • | | | | |
| | | 4 | Add Runoff | | | | | | |
| " | | | 0.538 | 0.934 | 4 0.31 | L5 0.6 | 900" | | |
| " | 38 | STA | ART/RE-START | TOTALS 3 | 300" | | | | |
| " | | 3 | Runoff Tota | ls on EXI | [Т" | | | | |
| " | | Tot | tal Catchmen [.] | t area | | | 10.900 | hec | tare" |
| " | | Tot | tal Impervio | us area | | | 2.481 | hec | tare" |
| " | | Tot | tal % imperv: | ious | | | 22.762 | " | |
| " | 19 | EXI | IT" | | | | | | |
| | | | | | | | | | |

<u>105172 - Cityview Ridge Subdivision</u> <u>Cooling Trench Sizing Calculations (Energy Dissipation/Dispersion Structure)</u> Catchment 201

| | Assumptions: | |
|------------------------------|---|--|
| $0.009 \ m^3/s$ | Tin = | 36 °C |
| $0.010 \text{ m}^3/\text{s}$ | = | 309 K |
| 0.176 m ³ /s | Tout = | 24 °C |
| $0.412 \text{ m}^3/\text{s}$ | = | 297 K |
| $0.307 \text{ m}^3/\text{s}$ | Tavg = | 30 °C |
| 8.01E-07 | = | 303 K |
| 5.42 | Tstone = | 21 °C |
| 0.615 | = | 294 K |
| $0.43 m^2$ | | |
| | | |
| 996 kg/m ³ | | |
| 810 J/kg [*] K | $\Gamma =$ | 10 m |
| | W = | 2 m |
| | D = | 1 m |
| | 0.010 m ³ /s 0.176 m ³ /s 0.412 m ³ /s 0.307 m ³ /s 8.01E-07 5.42 0.615 0.43 m ² 996 kg/m ³ | $\begin{array}{cccccc} 0.009 \ m^3/s & Tin = \\ 0.010 \ m^3/s & = \\ 0.176 \ m^3/s & Tout = \\ 0.412 \ m^3/s & & \\ 0.307 \ m^3/s & Tavg = \\ 0.307 \ m^3/s & Tavg = \\ 8.01E-07 & = \\ 5.42 & Tstone = \\ 0.615 & = \\ 0.43 \ m^2 & \\ 996 \ kg/m^3 & \\ 810 \ J/kg \ K & L = \\ W = \end{array}$ |

Diam. = $0.02\ m$

| | V | Re | Nu | hs | As | qr | qa | SF |
|----------|-------|--------|------|----------------------|----------------|-----------|------------|--------|
| Storm | (m/s) | | | J/m ² K's | m ² | (J/s) | (J/s) | (%) |
| | | | | | | | | |
| 2 | 0.021 | 523 | 22.2 | 681.71 | 3,142 | 87,130 | 19,274,919 | 22022% |
| 5 | 0.023 | 581 | 23.3 | 716.02 | 3,142 | 96,811 | 20,244,896 | 20812% |
| 25 | 0.409 | 10,220 | 25.0 | 769.96 | 3,142 | 1,703,877 | 21,770,132 | 1178% |
| 100 | 0.958 | 23,924 | 37.2 | 1144.46 | 3,142 | 3,988,621 | 32,358,939 | 711% |
| Regional | 0.714 | 17,827 | 32.5 | 997.85 | 3,142 | 2,972,104 | 28,213,609 | 849% |

<u>105172 - Cityview Ridge Subdivision</u> <u>Cooling Trench Sizing Calculations (Energy Dissipation/Dispersion Structure)</u> Catchment 202

| Knowns: | | Assumptions: | |
|-------------------------------|------------------------------|-------------------|--------------------|
| Q 2yr = | $0.041 \text{ m}^3/\text{s}$ | Tin = | 36 °C |
| Q 5yr = | $0.069 \text{ m}^3/\text{s}$ | = | 309 K |
| Q 25yr = | 0.169 m ³ /s | Tout = | 24 °C |
| Q 100yr = | 0.256 m ³ /s | = | 297 K |
| Q Regional = | $0.067 \text{ m}^3/\text{s}$ | Tavg = | 30 °C |
| v= | 8.01E-07 | = | 303 K |
| Pr = | 5.42 | Tstone = | 21 °C |
| k= | 0.615 | = | 294 K |
| Cross Sectional Void Space | 0.43 m ² | | |
| Rho = | 996 kg/m ³ | | |
| Cp = | 810 J/kg ⁻ K | L = W = D = | 15 m 2 m 1 m |

Diam. = $0.02\ m$

| Storm | V (m/s) | Re | Nu | h _s J/m ^{2·} K [·] s | As m ² | qr (J/s) | qa (J/s) | SF (%) |
|----------|------------|--------|-------|--|----------------------|-------------|-------------|-----------|
| 2 | 0.095 | 2,381 | 44.9 | 1381.91 | 4,712 | 396,926 | 58,608,971 | 14666% |
| 5 | 0.160 | 4,007 | 57.3 | 1761.27 | 4,712 | 667,997 | 74,698,262 | 11082% |
| 25 | 0.393 | 9,813 | 87.0 | 2673.74 | 4,712 | 1,636,109 | 113,397,120 | 6831% |
| 100 | 0.595 | 14,865 | 105.5 | 3244.61 | 4,712 | 2,478,367 | 137,608,938 | 5452% |
| Regional | 0.156 | 3,890 | 56.5 | 1737.30 | 4,712 | 648,635 | 73,681,367 | 11259% |



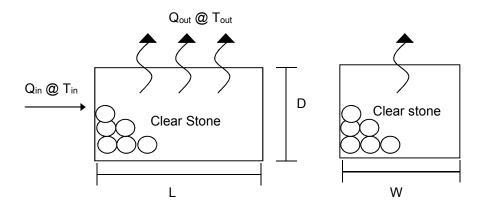
Cityview Ridge Subdivision City of Guelph File No.: 105172

Cooling Trench Sample Calculations

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) = 0.009m³/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)= 10 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:

- μ = dynamic viscosity = 0.798 x10⁻³ kg/m s water @ 303 K (Table A-9, p. 918, Çengal, Ghajar, 5th Edition)
- ρ = fluid density
 = 996.0 kg/m³ for water at 303K
 (Table A-9, p. 918, Çengal, Ghajar, 5th Edition)
- Pr = Prandtl number = 5.42 for water @ 303K (Table A-9, p. 918, Çengal, Ghajar, 5th Edition)
- k = Thermal Conductivity of Water
 = 0.615 W/m K for water at 303K
 (Table A-9, p. 918, Çengal, Ghajar, 5th Edition)
- C_p = Specific Heat (J/kg K) of limestone = 810 J/kg K (Table A.3, p. 838, Incropera, DeWitt, 4th Edition)



Analysis:

Calculate the Reynolds number using the following equation:

$$Re = \frac{VD}{v}$$
 Eq. 1

Where:

- V = velocity of water (m/s)
- D = stone diameter (m)
- v = kinematic viscosity (m²/s)

$$V = \frac{Q}{Av}$$
 Eq. 2

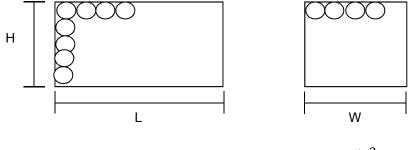
Where:

```
Q = Flow rate (m<sup>3</sup>/s)
```

Av = Void area in the cross section of the cooling trench (m^2)

Step 1: Estimate the total cross sectional area of the clear stone particles using the following equation:

$$As = (\pi x r^2) x \left(\frac{H}{D} x \frac{W}{D}\right)$$
Eq. 3



$$As = (\pi \ x \ 0.1^2) \ x \ \left(\frac{2}{0.02} \ x \ \frac{1}{0.02}\right)$$
$$A = 1.57m^2$$

Step 2: Estimate the void space by subtracting the cross sectional area of the stone from the total cross sectional area. $Av = (H \times W) - As$

$$Av = (H \ x \ W) - As$$

 $Av = (2 \ x \ 1) - 1.57$
 $Av = 0.43m^2$

Step 3: Calculate the velocity using equation 2.

$$V = \frac{0.009}{0.43}$$
$$V = 0.021 m/s$$



Eq. 4

Step 4: Calculate the kinematic viscosity using the following formula:

$$\nu = \frac{\mu}{\rho}$$

$$\nu = \frac{0.798 \times 10^{-3}}{996.0}$$

$$\nu = 8.01 \times 10^{-7} m^2 / s$$

Step 5: Calculate the Reynolds number using Equation 1:

$$Re = \frac{VD}{v}$$

$$Re = \frac{0.021 x \ 0.02}{8.01 x 10^{-7}}$$

$$Re = 523$$

Step 6: Calculate the Nusselt number

For 40<Re<4,000</th> $Nu = 0.683Re^{0.466}Pr^{1/3}$ Eq. 5For 4,000<Re<40,000</td> $Nu = 0.193Re^{0.466}Pr^{1/3}$ Eq. 6Note: The above formulas have been taken from Heat and Mass Transfer Fundamentals, 5th Edition, Çengal, Ghajar, p.441 Table 7-1.Eq. 6

As Re = 523, use Equation 5.

$$Nu = 0.683 Re^{0.466} Pr^{1/3}$$

$$Nu = 0.683 (523)^{0.466} (5.42)^{1/3}$$

$$Nu = 22.2$$

Step 7: Calculate the heat transfer coefficient.

$$hs = \frac{k}{D}Nu$$

Where:

k = Thermal Conductivity of water at 303K (W/m K)

D = stone diameter (m)

Nu = Nusselt Number

$$hs = \frac{0.615}{0.02} (22.2)$$
$$hs = 681.71 W/m^2 K$$

Step 8: Calculate the required heat transfer rate (qr) using the following equation:

$$q_r = Q\rho C_p(T_{in} - T_{out})$$
Eq. 7

$$q_r = 0.009(996)(810)(309 - 297)$$

$$q_r = 87,130 W$$

Step 9: Calculate the available heat transfer rate (q_a) using the following equation:

$$q_a = h_s A_s (T_{avg} - T_{stone})$$
 Eq. 8

Where:

h_s = Heat transfer coefficient (W/m K)

A = Surface area of clear stone particles (m²)

$$A = (\pi \ x \ D^2) \ x \ \left(\frac{L}{D} \ x \ \frac{H}{D} \ x \ \frac{W}{D}\right)$$



 $A = \pi x \left(\frac{LHW}{D}\right)$ $A = \pi x \left(\frac{10 x 2 x 1}{0.02}\right)$ $A = 3,142m^{2}$ $q_{a} = h_{s} A_{s} \left(T_{avg} - T_{stone}\right)$ $q_{a} = (681.71)(3,142)(303 - 294)$ $q_{a} = 19,274,919 W$

Therefore, the available heat transfer rate to reduce the temperature of water to 297 K (24°C) from 309K (36°C) is 19,274,919 W.

Step 10: Calculate the Safety Factor (SF) using the following equation:

$$SF = \frac{qa - qr}{qr}$$
Eq. 9
$$SF = \frac{19,274,919 - 87,130}{87,130}$$

$$SF = 22,022\%$$

Therefore the Safety Factor for the cooling trench is 22,022% based on the assumptions used in the calculations.

Therefore, since the available heat transfer rate (q_a) of 19,620,857 W is greater than the required heat transfer rate (q_r) of 87,130 W, we conclude that a cooling trench 10m long by 2m wide by 1m deep, constructed with 0.020m diameter clear stone, has the ability to reduce the temperature of the inflow from 309 K (36°C) to 297 K (24°C).



Stormceptor Design Summary

PCSWMM for Stormceptor

Project Information

| Date | 3/27/2015 |
|----------------|----------------------------|
| Project Name | Cityview Ridge Subdivision |
| Project Number | 105172 |
| Location | City of Guelph |

N/A

N/A

Designer Information

Company Contact

Notes

| N.I | 1.4 |
|-----|------------|
| IN | / 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.

Stormceptor Sizing Summary

Rainfall

| Name | TORONTO CENTRAL |
|------------------|-----------------|
| State | ON |
| D | 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 | Discharge |
|---------|-----------|
| (ha-m) | (L/s) |
| 0 | 0 |

| 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 |



.

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.

| Particle Size | Distribution % | Specific Gravity | Settling Velocity | Particle Size | | Specific Gravity | Settling Velocity |
|-----------------------|-------------------|---------------------|-----------------------------------|---------------|---|---------------------|----------------------|
| μm 20 60 150 | 20 20 20 | 1.3 1.8 2.2 | m/s 0.0004 0.0016 0.0108 | µm | % | | m/s |
| 400 2000 | 20 20 | 2.65 2.65 | 0.0647 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:

| 5 | nlet and | Outlet P | ipe | Invert | Elevations | Differences |
|---|----------|-----------------|-----|--------|------------|-------------|
| | | | | | | onitorended |

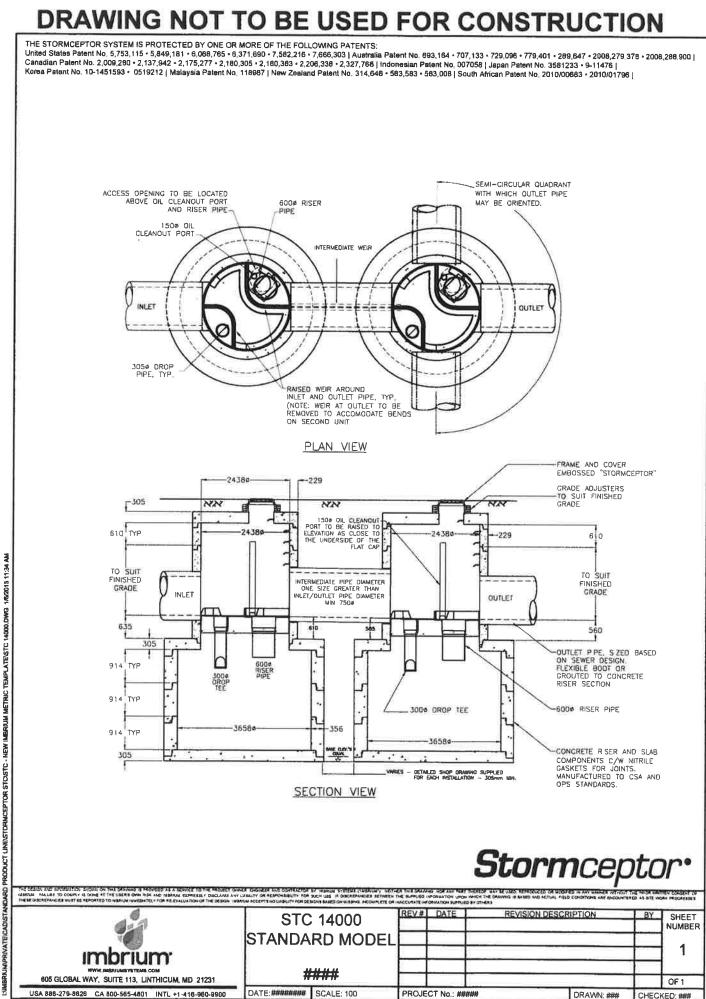
| Inlet Pipe Configuration | STC 300 | STC 750 to STC 6000 | STC 9000 to STC 14000 |
|--------------------------|---------|------------------------|--------------------------|
| Single inlet pipe | 75 mm | 25 mm | 75 mm |
| Multiple inlet pipes | 75 mm | 75 mm | Only one inlet pipe. |

• 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.



APPENDIX F:

FLOODPLAIN ANALYSIS COMPARISON OF PRE AND POST DEVELOPMENT FLOOD LEVELS

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 r | m/s) | W. | S. Elevati | on (m) | Т | ope Widt | h (m) |
|---------|--------------|---------------|------------|------------|--------|------------|------------|------------------|------------------|------------|
| | | POST | PRE | Difference | POST | PRE | Difference | POST | PRE | Difference |
| 1 | 5 Year | 3.99 | 3.99 | | | | | | | |
| i | 25 Year | 19.70 | | 0 | 316.29 | 316.29 | 0 | 34.52 | 34.52 | 0 |
| i | 100 Year | 34.10 | 19.70 | 0 | 316.51 | 316.51 | 0 | 41.05 | 41.05 | 0 |
| 4 | | | 34.10 | 0 | 316.66 | 316.66 | 0 | 45.22 | 45.22 | 0 |
| L . | 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 | ŏ |
| 2 | Regional | 38.60 | 38.60 | 0 | 318.76 | 318.76 | 0 | 52.31 | 52.31 | ŏ |
| 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 | ŏ | 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 | Ō | 320.43 | 320.43 | Ő | 154.38 | 154.38 | 0 |
| 4 | 5 Year | 3.99 | 3.99 | o | 317.51 | 317.51 | | 00.04 | | |
| 4 | 25 Year | 19.70 | 19.70 | 0 | 319.16 | 317.51 | 0 | 28.81 | 28.81 | 0 |
| 4 | 100 Year | 34.10 | 34.10 | 0 | 319.10 | 319.16 | 0 | 69.44 | 69.44 | 0 |
| 4 | Regional | 38.60 | 38.60 | 0 | 320.43 | 320.43 | 0 0 | 141.74 154.39 | 141.74 154.39 | 0 |
| 5 | 5 Year | 3.99 | 3.99 | | | | | | | |
| 5 | 25 Year | 3.99 19.70 | 19.70 | 0 | 317.51 | 317.51 | 0 | 28.83 | 28.83 | 0 |
| 5 | 100 Year | 34.10 | | 0 | 319.16 | 319.16 | 0 | 69.45 | 69.45 | 0 |
| 5 | | | 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 | 154.3 9 | 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 | o | 217.71 | 217.71 | 0 |
| 7 | 100 Year | 34.10 | 34.10 | 0 | 322.84 | 322.84 | ŏ | 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 | | 0.00 | 0.00 | |
| 7.1 | 25 Year | 19.10 | 19.10 | 0 | 321.90 | 321.90 | 0 | 9.93 | 9.93 | 0 |
| 7.1 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 87.25 | 87.25 | 0 |
| 7.1 | Regional | 37.50 | 37.50 | 0 | 322.84 | 322.84 | 0 | 108.01 108.76 | 108.01 108.76 | 0 |

| Page 2 of |
|-----------|
| |
| |

| Sec No. | Design Storm | | Flow (cu i | n/s) | W. | S. Elevati | on (m) | Т | ope Widt | h (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 | Ō | 321.90 | 321.90 | ŏ | 115.51 | 115.51 | 0 0 |
| 7.4 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | ŏ | 164.21 | 164.21 | 0 |
| 7.4 | Regional | 37.50 | 37.50 | Ō | 322.92 | 322.92 | 0 0 | 167.36 | 167.36 | 0 0 |
| 7.6 | 5 Year | 3.88 | 3.88 | o | 318.50 | 318.50 | 0 | 23.07 | 00.07 | |
| 7.6 | 25 Year | 19.10 | 19.10 | 0 | 321.90 | 318.50 | 0 | | 23.07 | 0 |
| 7.6 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 135.91 | 135.91 | 0 |
| 7.6 | Regional | 37.50 | 37.50 | o | | | | 171.13 | 171.13 | 0 |
| 7.0 | negional | 57.50 | 37.30 | Ŭ | 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 | Ō |
| 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 | o | 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 | ŏ | 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 | 06.00 | ~ |
| 8.4 | 25 Year | 19.10 | 19.10 | ŏ | 321.90 | 321.90 | 0 | 67.40 | 26.08 67.40 | 0 |
| 8.4 | 100 Year | 33.20 | 33.20 | ŏ | 322.84 | 322.84 | 0 | | 5 | 0 |
| 8.4 | Regional | 37.50 | 37.50 | ŏ | 322.92 | 322.84 | 0 | 79.88 81.30 | 79.88 81.30 | 0 0 |
| 8.6 | 5 Year | 3.88 | 2 00 | | 010.00 | | | | | |
| 8.6 | 25 Year | 19.10 | 3.88 19.10 | 0 | 318.68 | 318.68 | 0 | 18.51 | 18.51 | 0 |
| 8.6 | 100 Year | 33.20 | | 0 | 321.90 | 321.90 | 0 | 72.10 | 72.10 | 0 |
| 8.6 | Regional | 37.50 | 33.20 37.50 | 0 0 | 322.84 322.92 | 322.84 322.92 | 0 | 83.91 85.08 | 83.91 85.08 | 0 0 |
| | - | | | | | | | | | U U |
| 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 | o | 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 | ŏ |
| 9 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | 93.77 | 93.77 | 0 |
| 9 | | | | | | | | | | 0 |
| 9 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | 0 | 95.54 | 95.54 | |

| Sec No. | Design Storm | | Flow (cu r | n/s) | W. | S. Elevati | on (m) | Т | ope Widt | h (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 | 07.00 | |
| 9.2 | 25 Year | 19.10 | 19.10 | 0 | 321.91 | 321.91 | 0 | 80.39 | 27.90 | 0 |
| 9.2 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | 0 | | 80.39 | |
| 9.2 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.04 | 0 | 98.70 | 98.70 | 0 |
| 0.2 | riegional | 07.50 | 07.50 | U | 322.92 | 322.92 | U | 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 | |
| 9.6 | 25 Year | 19.10 | 19.10 | Ō | 321.91 | 321.91 | ŏ | 99.68 | 99.68 | 0 |
| 9.6 | 100 Year | 33.20 | 33.20 | ō | 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 |
| | gran | | 07.00 | Ŭ | 022.02 | 022.52 | U | 119.01 | 119.01 | U |
| 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 | ŏ |
| 9.8 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 322.84 | ō | 127.80 | 136.09 | 8.29 |
| 9.8 | Regional | 37.50 | 37.50 | 0 | 322.92 | 322.92 | ō | 128.37 | 139.38 | 11.01 |
| 9.9 | 5 Year | 3.88 | 3.88 | 0 | 320.09 | 320.09 | | 00.00 | 00.00 | _ |
| 9.9 | 25 Year | 19.10 | 19.10 | 0 | 320.09 | | 0 | 30.93 | 30.93 | 0 |
| 9.9 | 100 Year | 33.20 | 33.20 | 0 | 322.84 | 321.90 | 0 | 81.14 | 81.14 | 0 |
| 9.9 | Regional | 37.50 | 37.50 | 0 | 322.84 | 322.84 322.92 | 0 | 99.50 101.27 | 99.50 101.27 | 0 0 |
| | - | | | | | | Ŭ | 101.27 | 101.27 | Ū |
| 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 | o | 321.11 | 321.11 | 0 | 40.43 | 40.43 | 0 |
| 11 | 25 Year | 19.10 | 19.10 | o | 322.72 | 322.72 | 0 | 87.53 | 87.53 | 0 |
| 11 | 100 Year | 33.20 | 33.20 | ō | 323.08 | 323.08 | o | 97.09 | 97.09 | 0 |
| 11 | Regional | 37.50 | 37.50 | 0 | 323.15 | 323.15 | 0 | 98.83 | 98.83 | 0 0 |
| | | | | | | | | | | - |
| 12 12 | 5 Year 25 Year | 3.88 | 3.88 | 0 | 321.14 | 321.14 | 0 | 47.28 | 47.28 | 0 |
| 12 | | 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 | o | 58.71 | 58.71 | 0 |
| 13 | 100 Year | 33.20 | 33.20 | | 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 |
| | - | | | | | | Ŭ | | 10,1 | U |

| Sec No. | Design Storm | | Flow (cu ı | n/s) | w. | S. Elevati | on (m) | Tope Width (m) | | |
|---------|--------------|-------|------------|------------|------------------|------------------|------------|------------------|------------------|------------|
| | | POST | PRE | Difference | POST | PRE | Difference | POST | PRE | Difference |
| 14 | 5 Year | 3.88 | 3.88 | 0 | 321.80 | 201.00 | | | | |
| 14 | 25 Year | 19.10 | 19.10 | 0 0 | 322.72 | 321.80 | 0 | 10.32 | 10.32 | 0 |
| 14 | 100 Year | 33.20 | 33.20 | 0 | | 322.72 | 0 | 64.91 | 64.91 | 0 |
| 14 | Regional | 37.50 | 37.50 | 0 | 323.14 323.22 | 323.14 | 0 | 117.03 | 117.03 | 0 |
| 15 | 5.4 | | | | | | Ĵ | 110.70 | 110.75 | |
| 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 | o |
| 16 | 100 Year | 31.60 | 31.60 | 0 | 323.70 | 323.70 | Ő | 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 | | | | |
| 17 | 25 Year | 18.20 | 18.20 | 0 | 325.82 | | 0 | 328.35 | 328.35 | 0 |
| 17 | 100 Year | 31.60 | 31.60 | o | 325.82 | 325.82 | 0 | 383.09 | 383.09 | 0 |
| 17 | Regional | 35.80 | 35.80 | 0 | 325.90 | 325.90 325.92 | 0 0 | 387.87 389.45 | 387.87 389.45 | 0 0 |
| 18 | 5 Year | 0.00 | 0.00 | | | | | | | U |
| 18 | 25 Year | 6.09 | 6.09 | 0 | 325.06 | 325.06 | 0 | 229.43 | 229.43 | 0 |
| 18 | 100 Year | 19.30 | 19.30 | 0 | 325.82 | 325.82 | 0 | 279.50 | 279.50 | 0 |
| 18 | | 32.10 | 32.10 | 0 | 325.90 | 325.90 | 0 | 284.38 | 284.38 | 0 |
| | 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 | o | 108.08 | 108.08 | |
| 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 | o | 109.49 | 109.14 | 0 |
| 21 | 5 Year | 5.78 | 5.78 | | 205 00 | 205 00 | | | | |
| 21 | 25 Year | 18.30 | 18.30 | | 325.06 | 325.06 | 0 | 122.56 | 122.56 | 0 |
| 21 | 100 Year | 30.10 | 30.10 | 0 | 325.83 | 325.83 | 0 | 140.66 | 140.66 | 0 |
| 21 | Regional | 33.10 | 33.10 | | 325.90 325.93 | 325.90 325.93 | 0 | 142.72 143.40 | 142.72 143.40 | 0 0 |
| | - | | | - | | 520.30 | v I | 140.40 | 143.40 | U |

APPENDIX G:

INSITU PERMEAMETER TESTING (CMT ENGINEERING INC., OCTOBER 23, 2020) MONTHLY WATER BALANCE MONTHLY ENHANCED INFILTRATION



CMT Engineering Inc. 1011 Industrial Crescent, Unit 1 St. Clements, Ontario NOB 2M0 Tel: 519-699-5775 Fax: 519-699-4664 www.cmtinc.net

October 23, 2020

20-513.R01

GM BluePlan Engineering Limited 330 Trillium Drive, Unit D Kitchener, Ontario N2E 3J2

Attention: Mr. Patrick Grier, P.Eng.

Dear Sir:

Re: Insitu Permeability Testing Cityview Ridge Subdivision Cityview Drive North Guelph, Ontario

The services of CMT Engineering Inc. (CMT Inc.) were retained by Mr. Patrick Grier, P.Eng. of GM BluePlan Engineering Limited to conduct insitu permeability testing for infiltration galleries for the proposed residential development to be constructed at a site near Cityview Drive North in Guelph, Ontario. The location of the site is shown on Drawing 1.

It is understood that the owner is proposing to construct a new residential subdivision. Currently, infiltration of individual lot stormwater is proposed through the installation of on-site infiltration galleries. As such, CMT Engineering Inc. conducted insitu permeability testing at the locations of the proposed infiltration galleries using the Guelph Permeameter Testing method conducted as per Appendix C of the Low Impact Development Stormwater Management Planning and Design Guide (LIDSWMP).

The subject site is currently vacant. It is apparent that the site has been utilized as a borrow pit since the topographic survey was completed in 2009 (based on the date on the Preliminary Grading and Drainage Plan). A review of historical aerial photography indicates that the earth borrow took place sometime between 2009 and 2013. There is currently a berm throughout the site. There are various areas of undisturbed soils with large trees throughout the site as well as areas of ponded water and cattails. A geotechnical investigation was completed at this site in 2006 by Naylor Engineering Associates Ltd. (NEAL). The information provided in the geotechnical report indicates that the site of the proposed development comprises predominantly

| CMT Engineering Inc. | Page 2 |
|----------------------|------------|
| October 23, 2020 | 20-513.R01 |

compact to very dense silt till overlying presumed bedrock. The silt till was evident in the exposed slopes throughout the borrow areas of the site.

Field Work

CMT Engineering Inc. conducted a field investigation to determine the estimated infiltration rates at the proposed infiltration gallery locations. The investigation was conducted on September 30 and October 1, 2020 and was comprised of eighteen (18) insitu Guelph Permeameter Constant Head borehole infiltration tests (in accordance with ASTM D5126 Section 4.1.6) conducted by employees of CMT Engineering Inc. A minimum of two (2) boreholes were advanced at the test locations to allow for one exploration borehole and lower test and one borehole for the upper permeameter testing, utilizing a Geoprobe 7822DT drillrig operated by CMT Drilling Inc. staff. Three (3) boreholes were advanced at the Permeameter test location #2 due to saturated soils being encountered at an elevation higher than the second test elevation. The boreholes were advanced utilizing the macro core (MC5) direct push continuous soil sampling methodology. At Permeameter test location #9, the 6.1 m (20.0 ft) borehole was advanced utilizing hollow stem augers to achieve the required testing depth.

The layout of the testing locations and ground surface elevations at the test locations was completed by others prior to the field investigation. The locations and ground surface elevations of the permeameter tests are shown on Drawing 2.

Appendix C of the LIDSWMP recommends that at least one infiltration test should be conducted at the bottom elevation of the proposed infiltration gallery, plus one additional test at every soil horizon encountered within 1.5 m below the bottom elevation (a minimum of two tests per infiltration gallery). The infiltration galleries require a minimum of 1.2 m depth of cover for frost protection and it is understood that the infiltration galleries are not to exceed 0.6 m (2.0 ft) in thickness; therefore, one insitu permeability test will be required at a depth of approximately 1.8 m (6.0 ft) below the design finished grade elevation and a second insitu permeability test will be required at a depth of approximately 3.3 m (10.8 ft) below the design finished grade elevation.

Appendix C of the LIDSWMP also recommends that one test pit should be advanced for an infiltration gallery with a footprint of less than 50 m², two test pits for infiltration galleries with footprints between 50 m² and 900 m², a minimum of one additional test pit for each additional 450 m² of infiltration gallery footprint, and two soil borings may be conducted for every test pit. The additional borings/test pits are to ensure the same soil units that were tested in the infiltration testing extend to the extents of the infiltration gallery.

Subsoil Conditions

The soils encountered in the boreholes are described briefly below and a more detailed stratigraphic description is provided on the borehole logs attached. The following paragraphs have been simplified into terms of major soil strata. The soil boundaries indicated have been inferred from non-continuous samples and observations of sampling and drilling resistance and typically represent transitions from one soil type to another rather than exact planes of geological change. Further, the subsurface conditions are anticipated to vary between and beyond the borehole locations.

<u>Topsoil</u>

Loose, dark brown topsoil was encountered at the ground surface in all boreholes with the exception of Borehole 6. The thickness of the topsoil at the borehole locations was observed to range from approximately 150 mm to 910 mm (average 265 mm). The topsoil was generally considered to be in a moist state. Materials designated as topsoil in this report were classified based solely on visual and textural evidence. Testing of organic content or for other nutrients was not carried out.

<u>Peat</u>

Very loose, dark brown peat was encountered at the surface of Borehole 6. The peat was observed to be approximately 50 mm in thickness and was considered to be in a moist state. Materials designated as topsoil in this report were classified based solely on visual and textural evidence.

Silty Sand

Loose, brown silty sand, was encountered underlying the topsoil in Borehole 1. The silty sand was observed to be approximately 310 mm in thickness and was considered to be in a moist state.

Silt Till

Loose to dense, brown to grey silt till with occasional large gravel was encountered underlying the silty sand in Borehole 1; underlying the topsoil in Boreholes 2, 3, 4, 5, 7, 8 and 9; and underlying the peat in Borehole 6. The silt till was considered to be moist to wet, with moisture contents ranging from about 3.1% to 9.5% (average 7.5%).

Groundwater

No accumulated groundwater was encountered upon completion of the boreholes. Groundwater conditions are generally dependent on the weather conditions, amount of precipitation, site grading and other measures in place to control surface water drainage, as well as the time of year, and can fluctuate significantly in elevation over time.

Testing and Results

The test holes varied in diameter from between approximately 5.7 cm (2.25 in, used at 17 test locations) to approximately 8.3 cm (3.25 in, used at 1 test location) and extended to depths between 0.46 m (1.5 ft) to 6.1 m (20.0 ft) below the existing ground surface elevations at the test

| CMT Engineering Inc. | Page 4 |
|----------------------|------------|
| October 23, 2020 | 20-513.R01 |

locations. Constant head permeability testing was conducted using a constant head setting of 10 cm.

Based on information gathered from the permeameter testing and borehole data, the following table presents the estimated field saturated hydraulic conductivity, estimated infiltration rates with no safety factors applied, test locations, permeameter test location number, and approximate elevations of the tests:

| Test Location | Permeameter Test Location Number | Approximate Elevation of Upper Test [m] | Approximate Elevation of Lower Test [m] | Top Test Estimated Field Saturated Hydraulic Conductivity Kfs [cm/sec] | Bottom Test Estimated Field Saturated Hydraulic Conductivity Kfs [cm/sec] | Top Test Estimated Infiltration Rate - No Safety Factor Applied [mm/hour] | Bottom Test Estimated Infiltration Rate - No Safety Factor Applied [mm/hour] |
|-----------------|---|---|---|--|---|--|---|
| Lot 20 | 1 | 331.01 | 329.49 | 8.1 x 10 ⁻⁰⁶ | 4.0 x 10 ⁻⁰⁶ | 26 | 18 |
| Lot 6 | 2 | 336.49** | 335.27** | 1.0 x 10 ⁻⁰⁴ | 2.8 x 10 ⁻⁰⁷ | 50 | 2 |
| Lot 36, 44, 45 | 3 | 331.59 | 330.06 | 2.8 x 10 ⁻⁰⁶ | 8.1 x 10 ⁻⁰⁶ | 15 | 26 |
| Lot 109,110 | 4 | 337.01 | 335.41 | 1.3 x 10 ⁻⁰⁵ | 6.9 x 10 ⁻⁰⁶ | 30 | 23 |
| Lot 105 | 5 | 341.91 | 340.34 | <1.3 x 10 ⁻⁰⁷ | 1.2 x 10 ⁻⁰⁵ | <0.5 | 30 |
| Lot 85,86,95,96 | 6 | 342.54 | 340.86 | <1.6 x 10 ⁻⁰⁷ | 3.2 x 10 ⁻⁰⁶ | <0.8 | 16 |
| Lot 78 | 7 | 338.68* | 337.31* | 8.1 x 10 ⁻⁰⁶ | 1.6 x 10 ⁻⁰⁶ | 26 | 13 |
| Lot 66 | 8 | 343.30* | 341.93* | 7.3 x 10 ⁻⁰⁶ | 1.6 x 10 ⁻⁰⁶ | 24 | 13 |
| Lot 54 | 9 | 337.76 | 336.18 | 7.8 x 10 ⁻⁰⁶ | 4.6 x 10 ⁻⁰⁵ | 25 | 38 |

*Note: Testing elevations lowered due to the bottom of infiltration gallery being above the existing ground surface elevations.

**Note: Testing elevations raised due to wet and/or swelling or caving soil conditions encountered in the borehole.

In order to determine the design infiltration rate, the ratio of the infiltration rates at the proposed bottom of the infiltration gallery and the infiltration rate of the least permeable soil horizon within 1.5 m below the proposed bottom elevation of the BMP is calculated. As per LIDSWMP, the applicable safety factor from Table C2 is applied to the infiltration rate at the proposed base of the infiltration gallery.

The following table provides the ratio of infiltration rates, safety correction factor, and design infiltration rate for each proposed infiltration gallery location:

| Test Location | Permeameter Number | Ratio of Top/Bottom Test Infiltration Rates | Safety Factor | Design Infiltration Rate [mm/hour] |
|----------------|-----------------------|---|------------------|---|
| Lot 20 | 1 | 1.44 | 3.5 | 7 |
| Lot 6 | 2 | 20.83 | 8.5 | 5 |
| Lot 36, 44, 45 | 3 | 0.60 | 2.5 | 6 |
| Lot 109,110 | 4 | 1.28 | 3.5 | 8 |
| Lot 105 | 5 | < 0.02 | 2.5 | < 0.2 |

| Test Location | Permeameter Number | Ratio of Top/Bottom Test Infiltration Rates | Safety Factor | Design Infiltration Rate [mm/hour] |
|---------------------|-----------------------|---|------------------|---|
| Lots 85, 86, 95, 96 | 6 | < 0.05 | 2.5 | <0.3 |
| Lot 78 | 7 | 1.96 | 3.5 | 7 |
| Lot 66 | 8 | 1.85 | 3.5 | 7 |
| Lot 54 | 9 | 0.67 | 2.5 | 10 |

It is required that inspections of the infiltration gallery bases be conducted prior to backfilling to confirm that the soils encountered within the excavation are consistent with the soils encountered in the boreholes.

CMT Inc. recommends that each infiltration gallery be designed with an overflow that has positive drainage to a storm sewer or other suitable outlet and that each downspout entering the infiltration gallery have a strainer/leaf deflector as well as a rainwater leader overflow outlet just above grade that is equipped with a splash pad to direct water away from the foundation. Regular maintenance of the downspout strainer/leaf deflector is required to ensure continuous operation and reduce the potential for the accumulation of sediment that can impede the functionality of the infiltration gallery.

It is important to emphasize that a soil investigation is, in fact, a random sampling of a site and the comments are based on the results obtained at the test locations only. It is therefore assumed that these results are representative of the subsoil conditions across the site. Should any conditions at the site be encountered which differ from those found at the test locations, we request that we be notified immediately in order to permit a reassessment of our recommendations.

We trust that this information meets your present requirements and we thank you for allowing us to undertake this project for you. Should you have any questions, please do not hesitate to contact our office at your convenience.

Yours truly,

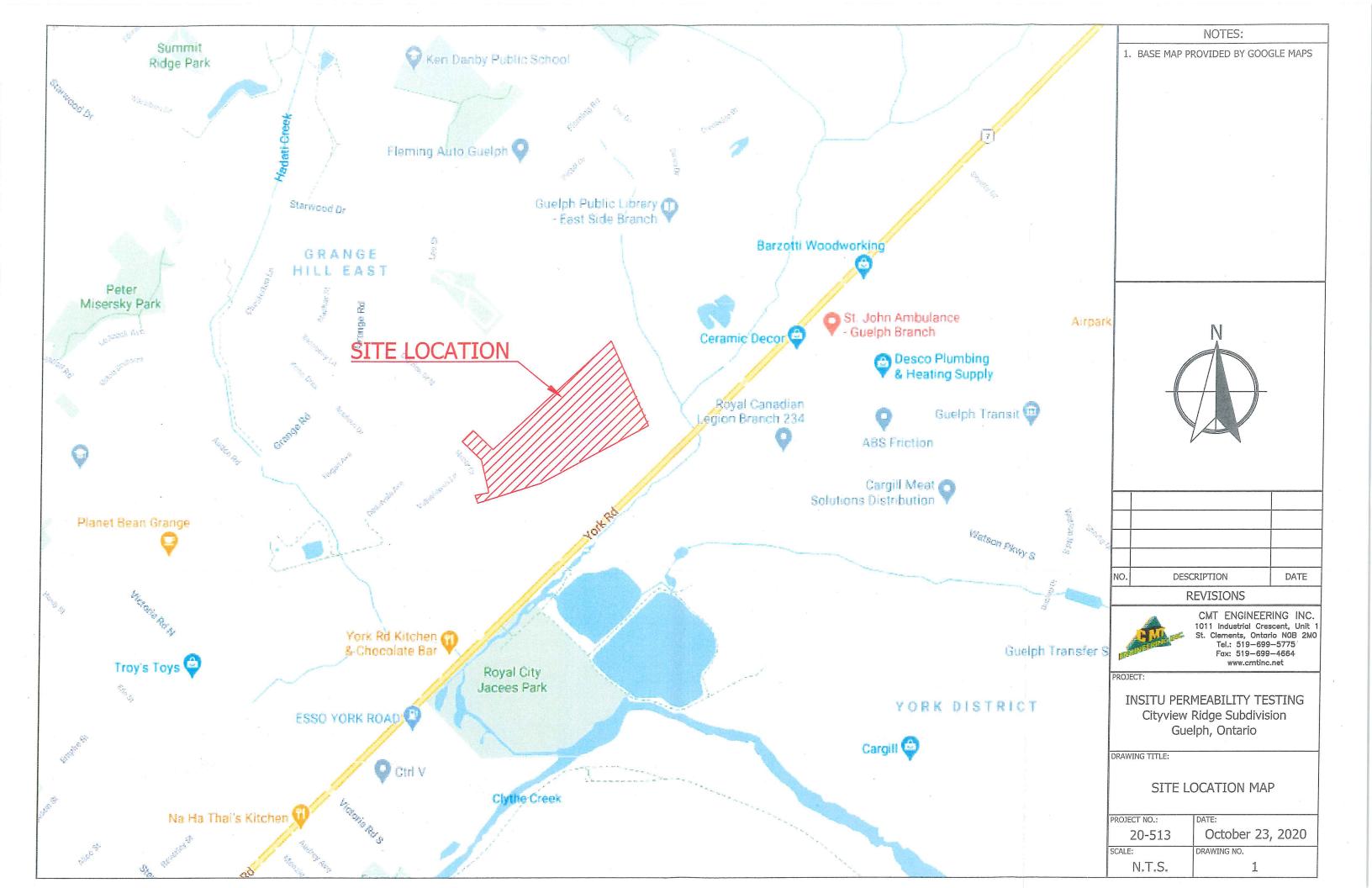
Weston Morlock, M.Eng., EIT

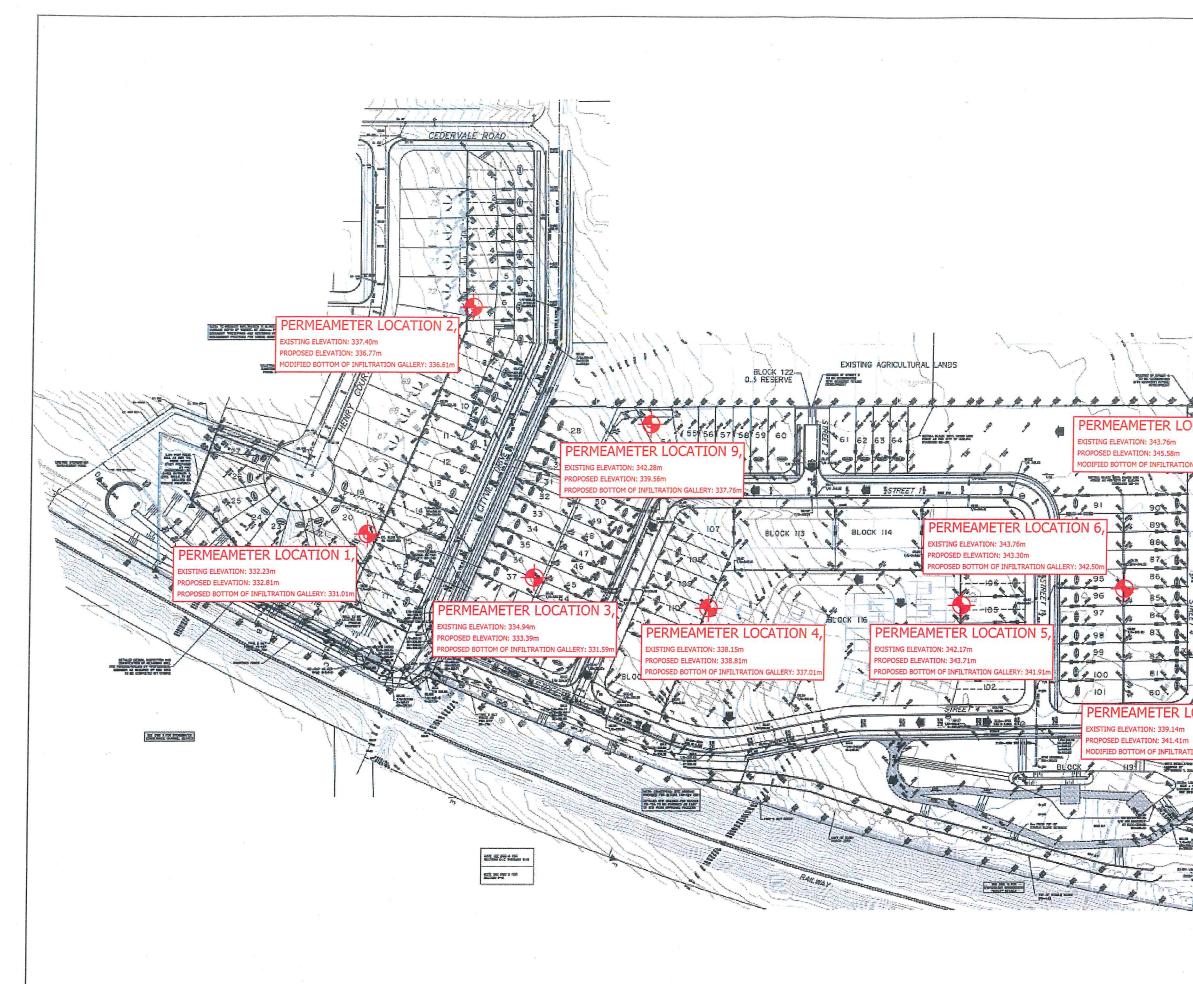
ks

Natha

Nathan Chortos, P.Eng.

Attachments: Drawing 1 - Site Location Map Drawing 2 - Site Plan Showing Permeameter Test Locations Borehole Logs





| | o p | nly. Locations roposed featur hould not be u | NOTES: is for information and sizes of existi res are approximation sed for construction <u>LEGEND</u> | ng and e only, and n. |
|----------------------------|--------|--|---|---|
| BLOCK 121 0.3 RESERVE | | | | |
| | NO. | | CRIPTION | DATE |
| LOCATION 7, | | R | EVISIONS | |
| n NTON GALLERY: 338.64m | PROJ | | CMT ENGINEER 1011 Industrial Cres St. Clements, Ontar Tel.: 519-699 Fax: 519-699 www.cmtinc. | scent, Unit 1 io NOB 2M0 -5775 -4664 .net |
| | 4 | Cityview | Ridge Subdivis Iph, Ontario | AND IN ACCOUNT AN ADDRESS |
| | DRAW | ING TITLE: | | |
| | PI | | IEW SHOWING ER TEST LOCA | |
| | | ст NO.: 20-513 | DATE: October 23, | 2020 |
| | SCALE | N.T.S | DRAWING NO. | |

| | | 1 | CMT Engineering Inc. | BOREHOLE NUMBER PERME | | | | | | | | METE | ER 1 |
|--------------|----------------|-----------------------|--|-------------------------|----------------------------|----------|--------------------------|----------|--------|----------|------------------|-----------------------|------|
| | EL | ANE | 1011 Industrial Crescent, Unit 1 St. Clements, Ontario, N0B 2M0 | | | | | | | | | PAGE 1 | OF 1 |
| | INCER | | Telephone: 519 699 5775 Fax: 519 699 4664 | PROJECT: Insitu | Permea | ability | / Testing | | | | | | |
| | | | | PROJECT ADDRES | SS: _Ci | tyvie | w Ridge | Subdivis | ion | | | | |
| PROJ | ECT N | UMBER: 2 | 0-513 | PROJECT LOCATIO | DN: _G | uelpł | n, Ontari | 0 | | | | | |
| DRILL | ING D | ATE: 20-10 |)-1 | GROUND ELEVATI | GROUND ELEVATION: 332.23 m | | | | | | | | |
| 1 | | | R: CMT Drilling Inc. | LOGGED BY: W. Morlock | | | | | | | | | |
| | | | Geoprobe 7822DT | SAMPLING METHOD: MC5 | | | | | | | | | |
| | | | | | 111 | | S | | | A SPT N | VALUE 🛕 | | |
| - | U | | | | SAMPLE TYPE NUMBER | % 人? | BLOW COUNTS (N VALUE) | | 10 | 20 | 30 | 40 | |
| DEPTH (m) | HH DO | | MATERIAL DESCRIPTION | Depth, Elevation (m) | | VER | COL | | 8 POCK | ET PENET | ROMETER (| (kPa) 😣 | |
| | GRAPHIC LOG | | | Elevation (m) | NUN | RECOVERY | N ² | | 90 | 180 | 270 ONTENT (% | 360 | |
| | | | | | SA | R | BLG | | 12 | 24 | 36 | ⁶⁾ • 48 | |
| _ | $\sim\sim$ | | lark brown, gravelly topsoil, moist | 0.00, 332.23 | | | | | | 1 | | : | |
| = | | Loose, b | prown, silty sand, moist | 0.15, 332.08 | | | | | ÷ | | į | į | |
| _ | | Compac | t, brown, silt till, moist | 0.46, 331.77 | | | | | ÷ | | ÷ | | |
| | | | | | MC: | 100 | 2 | | ÷ | | ÷ | | |
| 1 - | HA | | | | | | | | | | | | |
| _ | | | | | | | 3 | 1 | | | i | | |
| - | 11D | Approxin elevatior | nate proposed bottom of infiltration g | allery 1.22, 331.01 | | | | | | ÷ | | - | |
| _ | | elevation | I | | | | | | | ÷ | | | |
| _ | 11D | | | | | | | | | | | ÷ | |
| 2 - | | | | | | | | | | | | | |
| - | MA | | | | MC5 | 100 | | | | - | | : | |
| - | | | | | | | | 8.5 | | | | - | |
| - | HJ) | | | | | | | | : | ÷ | ÷ | | |
| | ON/X71 | Bottom c | f borehole at 2.72 m, Elevation 329.8 | 51 m. | | | | | | | | | |
| | | No accur | nulated groundwater or caving | , | | | | | | | | | |
| | | | red upon borehole completion | | | | | | | | | | |

| CM | CMT Engineering Inc. 1011 Industrial Crescent, Unit 1 St. Clements, Ontario, NOB 2M0 Telephone: 519 699 5775 | | В | | AETER 2 PAGE 1 OF | | | | | | |
|--|---|--|-------------------------|----------------------------|----------------------|--------------------------|-----------|----|-------------------|-------------------|-----|
| NGNEER | | Telephone: 519 699 5775 Fax: 519 699 4664 | PROJECT: Insitu | Permea | bility | / Testing | | | | | |
| | | | PROJECT ADDRES | s: _Cit | yvie | w Ridge | Subdivisi | on | | | |
| PROJECT NUN | MBER: _20 | -513 | PROJECT LOCATIO | DN: _Gu | lelpł | n, Ontario | 0 | | | | |
| DRILLING DAT | TE: <u>20-10</u> | -1 | GROUND ELEVATI | GROUND ELEVATION: 337.40 m | | | | | | | |
| DRILLING CONTRACTOR: CMT Drilling Inc. | | | LOGGED BY: W. | LOGGED BY: W. Morlock | | | | | | | |
| DRILLING EQUIPMENT: _ Geoprobe 7822DT | | | SAMPLING METHO | SAMPLING METHOD: MC5 | | | | | | | |
| | | an an an an an an an an an an an an an a | | ш | 0 | လ | | | A SPT N | VALUE 🔺 | |
| д Ц | | | | Ϋ́Ϋ́Υ | 37 % | LNU LNU | | 10 | 20 | 30 | 40 |
| DEPTH (m) GRAPHIC LOG | | MATERIAL DESCRIPTION | Depth, Elevation (m) | MBB | VEI | CO /ALI | | | | ROMETER (k | |
| GR | | | Lieration (iii) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | | 90 | 180 IOISTURE C | 270 ONTENT (%) | 360 |
| | | | | Ś | R | BL | | 12 | 24 | 36 | 48 |
| | Approxim | ark brown, topsoil, moist ate modified proposed bottom of gallery elevation own, silt till, moist | 0.00, 337.40 | MC5 1 | 100 | | 8.6 | | | | |
| 2 | becoming | wet | 2.43, 334.97 | MC5 2 | 100 | | 9● | | | | |

Dry cave encountered at about 2.44 m (8 ft.) below , the ground surface (approximate elevation 334.96 m).

| DRILL DRILL | ING D | | | PROJECT: <u>Insitu</u> PROJECT ADDRES PROJECT LOCATIO GROUND ELEVATIO LOGGED BY: <u>W.</u> SAMPLING METHO | Permea S: _Cit DN: _G ON: _3 Morlock | bility yviev uelph 34.94 | / Testing w Ridge : n, Ontaric | Subdivisio | 1010 | PERM | | GE 1 OF | |
|---|----------------|-----------------------|--|--|--|-----------------------------------|--------------------------------------|------------|---------------------|---|-------------------------|-----------------------|--|
| DEPTH (m) | GRAPHIC LOG | | MATERIAL DESCRIPTION | Depth, Elevation (m) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | | 10 8 POCKE 90 | SPT N VALI 20 F PENETROM 180 STURE CONT 24 | 30 IETER (kPa 270 | 40)⊗ 360 48 | |
| 1 | | | lark brown, topsoil, moist t, brown, silt till, moist | 0.00, 334.94 0.15, 334.79 | MC5 1 | 100 | | 8.4 | | | | | |
| 2 | | | | - | MC5 2 | 100 | | 8.5● | | | | | |
| 4 4 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 | | Approxim elevation | nate proposed bottom of infiltration gal | lery 3.35, 331.59 | MC5 3 | 100 | | 9.5● | | | | | |
| | <u>111271</u> | No accun | f borehole at 4.88 m, Elevation 330.06 nulated groundwater or caving red upon borehole completion. | 5 m. | | 1 | I | | | | | | |

BOREHOLE LOG2 20-513-LOGS.GPJ CMT_TEMPLATE_2020-05-15.GDT 20-10-26

BOREHOLE NUMBER PERMEAMETER 4 CMT Engineering Inc. 1011 Industrial Crescent, Unit 1 PAGE 1 OF 1 St. Clements, Ontario, N0B 2M0 Telephone: 519 699 5775 PROJECT: Insitu Permeability Testing Fax: 519 699 4664 PROJECT ADDRESS: Cityview Ridge Subdivision PROJECT LOCATION: Guelph, Ontario PROJECT NUMBER: 20-513 GROUND ELEVATION: 338.15 m DRILLING DATE: 20-9-30 LOGGED BY: W. Morlock DRILLING CONTRACTOR: CMT Drilling Inc. SAMPLING METHOD: MC5 DRILLING EQUIPMENT: _ Geoprobe 7822DT BLOW COUNTS (N VALUE) A SPT N VALUE ш % SAMPLE TYPE NUMBER GRAPHIC LOG 20 30 40 10 RECOVERY DEPTH (m) ⊗ POCKET PENETROMETER (kPa)⊗ Depth, MATERIAL DESCRIPTION Elevation (m) 90 180 270 360 MOISTURE CONTENT (%) 36 48 24 12 0.00, 338.15 Loose, dark brown, topsoil, moist Dense, brown, silt till with some large gravel, moist 0.15, 338.00 MC5 100 1 4.70 Approximate proposed bottom of infiltration gallery 1.14, 337.01 elevation MC5 100 2 8.2 Bottom of borehole at 2.74 m, Elevation 335.41 m. No accumulated groundwater or caving encountered upon borehole completion.

| | E | CMT Engineering Inc. 1011 Industrial Crescent, Unit 1 St. Clements, Ontario, N0B 2M0 | B | ORE | H | OLEI | NUMBER PERMEAMETER 5 PAGE 1 OF 1 | | | | |
|--------------|-------------|--|--|------------------|----------|------------------------|-------------------------------------|--|--|--|--|
| | MEE | Telephone: 519 699 5775 Fax: 519 699 4664 | PROJECT: <u>Insitu</u> PROJECT ADDRES | | | | Subdivision | | | | |
| PROJ | IECT N | JMBER: 20-513 | PROJECT LOCATIO | N: _Gu | elph | , Ontario | | | | | |
| DRILL | ING D | ATE: _ 20-9-30 | GROUND ELEVATION: 342.17 m | | | | | | | | |
| DRILL | ING C | ONTRACTOR: CMT Drilling Inc. | LOGGED BY: _W. | Vorlock | | | | | | | |
| DRILL | ING E | QUIPMENT:Geoprobe 7822DT | SAMPLING METHO | D: _MC | 5 | | | | | | |
| | | | | ш | % | လ | SPT N VALUE | | | | |
| _ | U | | | ER | 1 | LN LN | 10 20 30 40 | | | | |
| DEPTH (m) | PHIC | MATERIAL DESCRIPTION | Depth, | 181 | EH/ | LOW COUNT (N VALUE) | 8 POCKET PENETROMETER (kPa) | | | | |
| Щ÷ | GRAP LOC | MATERIAL DESCRIPTION | Elevation (m) | AMPLE 7 NUMBE | õ | N O | 90 180 270 360 | | | | |
| | G | | | SAN | RECOVERY | ρĘ | MOISTURE CONTENT (%) | | | | |
| | | | | 0) | L' | ā | 12 24 36 48 | | | | |

0.00, 342.17

1.52, 340.65

,

MC5 1 100

MC5 2 100 5.7

8.4

Bottom of borehole at 1.83 m, Elevation 340.34 m.

No accumulated groundwater or caving encountered upon borehole completion.

becoming grey with some larger gravel

Loose, dark brown, topsoil, moist

| | | CMT Engineering Inc. | | | | | | | | | | |
|-------------|-------------|--|---|-----------------------|----------|-----------------------|--------|------------|-----------|-------------|---|--|
| 2 | ER | 1011 Industrial Crescent, Unit 1 St. Clements, Ontario, NOB 2M0 | | | | | | | | PAGE 1 OF 1 | | |
| ENG | INFER | Telephone: 519 699 5775 Fax: 519 699 4664 | PROJECT: Insitu | Permeat | oility | Testing | | | | | | |
| | | | PROJECT ADDRESS: Cityview Ridge Subdivision | | | | | | | | | |
| PROJ | ECT N | UMBER: | PROJECT LOCATIO | ON: Gu | elph | , Ontario | 1 | | | | | |
| DRILL | ING D | ATE: | GROUND ELEVATI | ON: 34 | 3.76 | 6 m | | | | | | |
| DRILL | ING CO | ONTRACTOR: | LOGGED BY: W. | LOGGED BY: W. Morlock | | | | | | | | |
| DRILL | ING EC | QUIPMENT:Geoprobe 7822DT | SAMPLING METHO | D: _MC | 5 | | | | | | | |
| | | | | ш | 0 | လ | | 🛦 SPT N V | /ALUE 🛆 | | 1 | |
| - | U | | | ER | ~ ~ | OW COUNT (N VALUE) | 10 | 20 | 30 | 40 | | |
| Ц Ц С | PHIC | MATERIAL DESCRIPTION | Depth, | 191 | RECOVERY | ALU | 😣 POCH | ET PENETF | ROMETER (| kPa) 😣 | | |
| (m) | GRAP LOC | WATERIAE DECORT HOR | Elevation (m) | AMPLE - NUMBE | õ | W O | 90 | 180 | 270 | 360 | | |
| - | U | | | NNN | E E | | M | DISTURE CO | ONTENT (% |) | | |
| | | | | 0, | - | m | 40 | 24 | 26 | 40 | | |

0.00, 343.76

0.05, 343.71

0.46, 343.30

1.52, 342.24

2.77, 340.99

MC5 1 100

MC5 1 100

Very loose, dark brown, peat, moist

becoming moist with occasional large gravels

Bottom of borehole at 2.90 m, Elevation 340.86 m.

No accumulated groundwater or caving encountered upon borehole completion.

Approximate proposed bottom of infiltration gallery 1.26, 342.50 elevation

Compact, brown, silt till, wet

encountered

becoming very dense

becoming grey

36

48

24

7.5

6.2

BOREHOLE NUMBER PERMEAMETER 7

PAGE 1 OF 1

CMT Engineering Inc. 1011 Industrial Crescent, Unit 1 St. Clements, Ontario, N0B 2M0 Telephone: 519 699 5775 Fax: 519 699 4664

PROJECT: Insitu Permeability Testing

PROJECT ADDRESS: Cityview Ridge Subdivision

PROJECT LOCATION: _ Guelph, Ontario

GROUND ELEVATION: _339.14 m

DRILLING CONTRACTOR: <u>CMT Drilling Inc.</u> DRILLING EQUIPMENT: <u>Geoprobe 7822DT</u>

PROJECT NUMBER: 20-513

DRILLING DATE: 20-9-30

SAMPLING METHOD: MC5

LOGGED BY: W. Morlock

| | | | | Ш | % | | | | VALUE | |
|--------------------|--------|--|---------------|----------------------|----------|------------------------|-----|-------------|------------|--------|
| T | 0HC | | | 「下訳 | 2 | 1 3 4 | 10 | 20 | 30 | 40 |
| L C | 논앙 | MATERIAL DESCRIPTION | Depth, | ШШ | N N | ALO | 8 P | OCKET PENET | ROMETER (I | kPa) 😣 |
| DEPTH (m) | GRA | | Elevation (m) | I PL | 0 | OW COUNTS (N VALUE) | 90 | 180 | 270 | 360 |
| - | U | | | SAMPLE TYF NUMBER | RECOVERY | | | MOISTURE (| CONTENT (% |) 🗢 |
| | | | | 0) | L. | B | 12 | 24 | 36 | 48 |
| - | \sim | Loose, dark brown, topsoil, moist | 0.00, 339.14 | | | | | i | ÷ | |
| | | Compact, brown, silt till with occasional large gravel, moist | 0.20, 338.94 | | | | | | ÷ | |
| - - - 1 - | | Approximate modified proposed bottom of infiltration gallery elevation | 0.50, 338.64 | MC 1 | 5 66 | | | | | |
| | | | | | | | 8.6 | | | |
| | | | | MC: 2 | 100 | | 8.9 | | 1 | |

Bottom of borehole at 1.83 m, Elevation 337.31 m.

No accumulated groundwater or caving encountered upon borehole completion.

| | | | CARACHURAL CHURCH MICHING AN AN AN AN AN AN AN AN AN AN AN AN AN | | | 10000 million and 10000 | and the second second second second second second second second second second second second second second second | | | | |
|--|-------------|---|--|----------------------|----------|-------------------------|--|------------|------------|-------------|--|
| | // | CMT Engineering Inc. | B | ORE | H | OLE I | NUMBER | PERI | MEAN | IETER 8 | |
| | EL | 1011 Industrial Crescent, Unit 1 St. Clements, Ontario, N0B 2M0 | | | | | | | | PAGE 1 OF 1 | |
| I DE | AN CER | Telephone: 519 699 5775 Fax: 519 699 4664 | PROJECT: Insitu I | Permeat | oility | Testing | | | | | |
| - | | | PROJECT ADDRES | | | | | | | | |
| PROJ | ECT N | UMBER: _20-513 | PROJECT LOCATION: Guelph, Ontario | | | | | | | | |
| DRILL | ING D | ATE: _20-9-30 | GROUND ELEVATION:343.76 m | | | | | | | | |
| DRILL | ING C | ONTRACTOR: CMT Drilling Inc. | LOGGED BY: W. Morlock | | | | | | | | |
| DRILLING EQUIPMENT: Geoprobe 7822DT SAMPLING METHOD: MC5 | | | | | | | | | | | |
| | | · · · · · · · · · · · · · · · · · · · | | 111 | | S | | A SPT N V | /ALUE 🛆 | | |
| | 0 | | | ЧР | % λ | Ы Ц Ц | 10 | 20 | 30 | 40 | |
| H C | APHIC OG | | Depth, | ШШ | ÊR | -OW COUNTS (N VALUE) | 8 POC | KET PENET | ROMETER (k | Pa) 😣 | |
| (m) | GRAPI | MATERIAL DESCRIPTION | Elevation (m) | UM | 0 | N C | 90 | 180 | 270 | 360 | |
| | ΰ | | | SAMPLE TYF NUMBER | RECOVERY | | 🔵 N | IOISTURE C | ONTENT (%) | • | |
| | | | | 0, | - | В | 12 | 24 | 36 | 48 | |
| - | $\sim\sim$ | Loose, dark brown, gravelly topsoil, moist | 0.00, 343.76 | | | | ÷ | | | | |
| - | | Compact, brown, silt till with some large grave moist | el, 0.23, 343.53 | | | | | | | | |
| - | | Approximate modified proposed bottom of infiltration gallery elevation | | | | | | | | | |

,

MC5 1 85

MC5 2 100 7.10

9

Bottom of borehole at 1.83 m, Elevation 341.93 m.

No accumulated groundwater or caving encountered upon borehole completion.

| C Monte Bang one | CMT Engineering Inc. 1011 Industrial Crescent, Unit 1 St. Clements, Ontario, N0B 2M0 Telephone: 519 699 5775 Fax: 519 699 4664 | PROJECT: <u>Insitu</u> PROJECT ADDRES | Permea S: _Cit | bility yviev | / Testing w Ridge | Subdivisi | Š. | PERM | | ETER Ge 1 OF |
|--------------------------------|--|--|-----------------------|-----------------|--------------------------|-----------|----|-------------------|---|-----------------|
| PROJECT NUMBER: | 20-513 | PROJECT LOCATIO | | | | 0 | | - | | |
| DRILLING DATE: _20 |)-10-1 | GROUND ELEVATION | ON: _34 | 42.2 | 8 m | - | | | | |
| DRILLING CONTRAC | TOR: CMT Drilling Inc. | LOGGED BY: W. | Morlock | : | | - | | | | |
| DRILLING EQUIPMEN | IT:Geoprobe 7822DT | SAMPLING METHO | D: _Au | ger/l | MC5 | - | | | | |
| | | | ш | % | က | | | SPT N VAL | UE 🔺 | |
| _ 일 | | | SAMPLE TYPE NUMBER | 37 % | BLOW COUNTS (N VALUE) | | 10 | 20 | 30 | 40 |
| DEPTH (m) GRAPHIC LOG | MATERIAL DESCRIPTION | Depth, Elevation (m) | MBE | RECOVERY | CO | | | T PENETRON | | |
| | | Elevation (m) | NUN | | N/N | | 90 | 180 STURE CONT | 270 | 360 |
| | | | SP | R | BLO | | 12 | 24 | 36 | 48 |
| Loos | e, dark brown, topsoil, moist | 0.00, 342.28 | | | | | : | : | : | : |
| | pact, brown, silt till, moist | 0.18, 342.10 | | | | | | | - | ÷ |
| | | | | | | | | | | |
| | | | | | | | | | 1 | : |
| | | | MC5 | 100 | | | ÷ | | 1 | |
| | | | | | | | ÷ | | 1 | |
| | | | | | | 5.4 | • | | : | |
| | | | | | | | : | | : | ÷ |
| | | | N. | | | | - | | ÷ | ÷ |
| | | F | | | | | 1 | : | 1 | į |
| | | | 1 | | | | 1 | : | : | 1 |
| | | | | | | | - | ÷ | ÷ | : |
| | | | | | | | | | ••••••••••••••••••••••••••••••••••••••• | • |
| | | | MC5 | | | | | | | 1 |
| | | | 2 | 49 | | | ÷ | i | 1 | : |
| | | | | | | 0.40 | 1 | | - | 1 |
| | | | L.C. BURK | | | 9.4 | 1 | | | : |
| | | | | | | | 1 | | 1 | : |
| 3 - 6 8 | | | | | | | ÷ | ÷ | | |
| | | | | | | | ÷ | ÷ | : | |
| | | | 1 | | | | 1 | 1 | : | - |
| | | | | | | | : | | : | 1 |
| | | | | | | | 1 | | 1 | 1 |
| | | | MC5 3 | 100 | | | - | ÷ | | |
| 4 | | | 3 | | | | | | | |
| | | | | | | 7.5 | | 1 | ÷ | |
| | | | | | | | : | : | l l | 1 |
| | | | | | | | i | i | - | ÷ |
| Appro | ximate proposed bottom of infiltration ga | allery 4.52, 337.76 | | | | | ł | 1 | | ÷ |
| elevat | ion | | | | | | ÷ | į | | : |
| 5 | | | | | | | | | ÷ | : |
| | | | | | | | | | | |
| | | | MC5 | | | | | | | 1 |
| | | | MC5 | 100 | | | | | - | |
| | | | | | | 5.9 | | | | 1 |
| | | | | | | 0.3 | | | | i |
| 6 HAR | | 1 | | | | | | | | : |
| | | | | | | | | | | <u>.</u> |
| Botton | n of borehole at 6.10 m, Elevation 336.1 | ö m. | | | | | | | | |
| No acc | cumulated groundwater or caving | 500 3 | | | | | | | | |
| encou | ntered upon borehole completion. | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

| EXISTING CONDITIONS | | | | | | Percent of Total Area |
|--------------------------|-------------|--|----------------------|-------|----|-----------------------|
| Contributing Catchments: | 10, 20 & 30 | Soil Type: Guelph Loam - 76% Till; 24% Sand and Gravel | Impervous Area = | 0.56 | ha | 3% |
| Contributing Area = | 18.28 ha | Vegetation: Shallow-rooted unkept vegetation | Pervious Till Area = | 13.34 | ha | 73% |
| Percent Impervious = | 3.0% | Root Zone Depth = 0.50 m | Pervious S&G Area = | 4.38 | ha | 24% |
| | | Soil Moisture Retention Capacity = 75mm | Total Area = | 18.28 | ha | 100% |

| Mont | 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 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 | -6.0 | 0.0 | 0.0 | 24.3 | 0.0 | 66.5 | 66.5 | | 211.2 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 10.5 | 0.0 | 10.5 | 4.6 | 834 | 1,085 |
| Feb | -5.0 | 0.0 | 0.0 | 24.6 | 0.0 | 57.6 | 57.6 | | 268.8 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 5.2 | 0.0 | 5.2 | 2.3 | 417 | 542 |
| Mar | -0.5 | 0.0 | 0.0 | 30.6 | 0.0 | 61.1 | 61.1 | | 329.9 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 2.6 | 0.0 | 2.6 | 1.1 | 208 | 271 |
| Apr | 6.5 | 1.3 | 0.9 | 33.6 | 30.2 | 76.6 | 46.4 | | 75.0 | 0.0 | 30.2 | 29.7 | 0.6 | 0.6 | 46.9 | 24.7 | 25.5 | 50.2 | 21.8 | 3,985 | 5,184 |
| May | 12.9 | 3.9 | 2.0 | 37.8 | 75.6 | 85.8 | 10.2 | | 75.0 | 0.0 | 75.6 | 74.1 | 1.5 | 1.5 | 11.7 | 18.2 | 114.7 | 132.9 | 57.7 | 10,556 | 13,732 |
| Jun | 18.2 | 6.3 | 2.8 | 38.4 | 107.5 | 78.0 | -29.5 | -29.5 | 48.0 | -27.0 | 105.0 | 103.0 | 2.0 | 4.5 | 2.0 | 10.1 | 57.4 | 67.4 | 29.3 | 5,358 | 6,970 |
| Jul | 20.8 | 8.0 | 3.3 | 38.7 | 127.7 | 89.8 | -37.9 | -67.4 | 28.0 | -20.0 | 109.8 | 107.7 | 2.1 | 20.0 | 2.1 | 6.1 | 28.7 | 34.8 | 15.1 | 2,763 | 3,594 |
| Aug | 19.8 | 7.3 | 3.1 | 36.0 | 111.6 | 86.7 | -24.9 | -92.3 | 23.0 | -5.0 | 91.7 | 89.9 | 1.8 | 21.7 | 1.8 | 3.9 | 14.3 | 18.3 | 7.9 | 1,451 | 1,888 |
| Sep | 15.4 | 4.8 | 2.3 | 31.2 | 71.8 | 87.5 | 15.7 | | 38.7 | 15.7 | 71.8 | 70.4 | 1.4 | 1.4 | 1.4 | 2.7 | 7.5 | 10.2 | 4.4 | 807 | 1,049 |
| Oct | 9.0 | 2.0 | 1.3 | 28.5 | 37.1 | 74.3 | 37.3 | | 75.0 | 36.3 | 37.1 | 36.3 | 0.7 | 0.7 | 1.7 | 2.2 | 3.9 | 6.1 | 2.6 | 483 | 628 |
| Nov | 3.1 | 0.3 | 0.4 | 24.3 | 9.7 | 91.3 | 81.6 | | 75.0 | 0.0 | 9.7 | 9.5 | 0.2 | 0.2 | 81.8 | 42.0 | 2.0 | 44.0 | 19.1 | 3,493 | 4,545 |
| Dec | -2.7 | 0.0 | 0.0 | 23.1 | 0.0 | 69.7 | 69.7 | | 144.7 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 21.0 | 1.1 | 22.1 | 9.6 | 1,755 | 2,283 |
| Tota | | 33.9 | | | | 924.9 | 353.7 | | | | | 520.7 | 10.2 | 50.5 | 149.3 | 149.1 | 255.1 | 404.2 | 175.6 | 32,109 | 41,772 |

POST-DEVELOPMENT CONDITIONS

| Contributing Catchments: | B2c, 201, 202 & 300 | Soil Type: Guelph Loam - 76% Till; 24% Sand and Gravel | Impervous Area = | 5.91 | ha | 34% |
|--------------------------|---------------------|--|----------------------|------|----|------|
| Contributing Area = | 17.60 ha | Vegetation: Urban lawns | Pervious Till Area = | 7.99 | ha | 45% |
| Percent Impervious = | 32.0% | Root Zone Depth = $0.5m$ | Pervious S&G Area = | 3.7 | ha | 21% |
| | | Soil Moisture Retention Capacity = 75mm | Total Area = | 17.6 | ha | 100% |

| Mo | nth | Daily Average Temperature | Monthly Heat Index | Unadjusted Daily Potential Evapotranspiration | Correction Factors | Adjusted Potential Evapotranspiration | Average Precipitation | P-PE | Accum. Pot. Water Loss | Storage | $\Delta \mathbf{S}$ | 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) |
| Ja | an | -6.0 | 0.0 | 0.0 | 24.3 | 0.0 | 66.5 | 66.5 | | 211.2 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 12.2 | 0.0 | 12.2 | 8.7 | 1,586 | 624 | 302 |
| F | eb | -5.0 | 0.0 | 0.0 | 24.6 | 0.0 | 57.6 | 57.6 | | 268.8 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 6.1 | 0.0 | 6.1 | 4.3 | 793 | 312 | 151 |
| Μ | [ar | -0.5 | 0.0 | 0.0 | 30.6 | 0.0 | 61.1 | 61.1 | | 329.9 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 3.1 | 0.0 | 3.1 | 2.2 | 396 | 156 | 75 |
| А | pr | 6.5 | 1.3 | 0.9 | 33.6 | 30.2 | 76.6 | 46.4 | | 75.0 | 0.0 | 30.2 | 20.9 | 9.4 | 9.4 | 55.7 | 29.3 | 25.5 | 54.8 | 38.9 | 7,112 | 2,797 | 1,208 |
| Μ | ay | 12.9 | 3.9 | 2.0 | 37.8 | 75.6 | 85.8 | 10.2 | | 75.0 | 0.0 | 75.6 | 52.2 | 23.4 | 23.4 | 33.6 | 31.4 | 114.7 | 146.1 | 103.8 | 18,968 | 7,459 | 2,884 |
| Jı | ın | 18.2 | 6.3 | 2.8 | 38.4 | 107.5 | 78.0 | -29.5 | -29.5 | 48.0 | -27.0 | 105.0 | 103.0 | 2.0 | 4.5 | 2.0 | 16.7 | 57.4 | 74.1 | 52.6 | 9,615 | 3,781 | 1,661 |
| J | ul | 20.8 | 8.0 | 3.3 | 38.7 | 127.7 | 89.8 | -37.9 | -67.4 | 28.0 | -20.0 | 109.8 | 107.7 | 2.1 | 20.0 | 2.1 | 9.4 | 28.7 | 38.1 | 27.0 | 4,944 | 1,944 | 850 |
| Α | ug | 19.8 | 7.3 | 3.1 | 36.0 | 111.6 | 86.7 | -24.9 | -92.3 | 23.0 | -5.0 | 91.7 | 89.9 | 1.8 | 21.7 | 1.8 | 5.6 | 14.3 | 19.9 | 14.1 | 2,586 | 1,017 | 441 |
| S | ep | 15.4 | 4.8 | 2.3 | 31.2 | 71.8 | 87.5 | 15.7 | | 38.7 | 15.7 | 71.8 | 49.6 | 22.2 | 22.2 | 22.2 | 13.9 | 7.5 | 21.4 | 15.2 | 2,776 | 1,092 | 885 |
| C | ct | 9.0 | 2.0 | 1.3 | 28.5 | 37.1 | 74.3 | 37.3 | | 75.0 | 36.3 | 37.1 | 25.6 | 11.5 | 11.5 | 12.4 | 13.2 | 3.9 | 17.1 | 12.1 | 2,215 | 871 | 795 |
| Ν | ov | 3.1 | 0.3 | 0.4 | 24.3 | 9.7 | 91.3 | 81.6 | | 75.0 | 0.0 | 9.7 | 6.7 | 3.0 | 3.0 | 84.6 | 48.9 | 2.0 | 50.9 | 36.1 | 6,603 | 2,597 | 1,244 |
| D | ec | -2.7 | 0.0 | 0.0 | 23.1 | 0.0 | 69.7 | 69.7 | | 144.7 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 24.4 | 1.1 | 25.5 | 18.1 | 3,315 | 1,303 | 624 |
| Τα | tal | | 33.9 | | | | 924.9 | 353.7 | | | | | 455.6 | 75.3 | 115.6 | 214.4 | 214.2 | 255.1 | 469.3 | 333.2 | 60,909 | 23,953 | 11,121 35,074 -16% |

Percent of Total Area

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 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

Cityview Ridge Subdivision City of Guelph Monthly Water Balance (Thornthwaite and Mather Method) Date: December 15, 2020

| Runoff Factor = | 0.43 |
|-----------------------|------|
| Evapotranspiration | |
| Factor for Impervious | |
| Surfaces = | 0.36 |

Runoff Factor = 0.71 Evapotranspiration Factor for Impervious 0.36 Surfaces =

Enhanced Infiltration Structures - Lots 1-11

| Structure Length = Structure Width = Structure Depth = | 125.00 m 2.00 0.50 | | | | | |
|--|--|---|---|----------------------------|--------------------------|----------------------|
| Area of Stone = | 1.00 sq m | | Volume of S Stone Poros Storage Vo | | 125.00 0.33333 ə = | |
| A = contact area of structure = V = runoff volume to be infiltra P = percolation rate of native s n = porosity of storage media T = retention time = | | 250.00 41.67 5 0.33 Solve for T | sq m cu m mm/hr | | | |
| T = (1000 x V) / (P x n x A) = | | | 101.01 | hours or | 4.2 | day draindown period |
| Contributing Area Recharge Time Recharge Volume Potential | 0.270 ha 101.01 hours 41.67 m ³ | Ι | • | ltration Gallery 1 days |) | |

| Month | Total Recharge & Runoff | No. of days | Max Potential Recharge | Available Recharge | Enhanced Recharge |
|-------|----------------------------|----------------|------------------------------|-----------------------|----------------------|
| | (mm) | | (m ³) | (m ³) | (m ³) |
| Jan | 16.3 | 31 | 307 | 44 | 44 |
| Feb | 8.1 | 28 | 277 | 22 | 22 |
| Mar | 4.1 | 31 | 307 | 11 | 11 |
| Apr | 65.1 | 30 | 297 | 175 | 175 |
| May | 177.0 | 31 | 307 | 477 | 307 |
| Jun | 89.5 | 30 | 297 | 241 | 241 |
| Jul | 45.8 | 31 | 307 | 123 | 123 |
| Aug | 23.8 | 31 | 307 | 64 | 64 |
| Sep | 47.7 | 30 | 297 | 129 | 129 |
| Oct | 42.8 | 31 | 307 | 115 | 115 |
| Nov | 67.1 | 30 | 297 | 181 | 181 |
| Dec | 33.6 | 31 | 307 | 91 | 91 |
| Total | 620.9 | 365 | 3,614 | 1,674 | 1,504 |

Enhanced Infiltration Structures - Lots 12-26

| Structure Length = Structure Width = Structure Depth = | 168.00 m 2.00 0.50 | | |
|--|---|---|---|
| Area of Stone = | 1.00 sq m | Volume of Stone = 168.00 cu m Stone Porosity = 0.33333 Storage Volume of Stone = 56.00 cu | m |
| A = contact area of structure = V = runoff volume to be infiltra P = percolation rate of native s n = porosity of storage media T = retention time = | ted = soils = | 336.00 sq m 56.00 cu m 7 mm/hr 0.33 Solve for T | |
| T = (1000 x V) / (P x n x A) = | | 72.15 hours or 3.0 day draindown period | |
| Contributing Area Recharge Time Recharge Volume Potential | 0.386 ha 72.15 hours 56.00 m ³ | (Area to Infiltration Gallery) / 3.01 days | |

| Month | Total Recharge & Runoff | No. of days | Max Potential Recharge | Available Recharge | Enhanced Recharge |
|-------|----------------------------|----------------|------------------------------|-----------------------|----------------------|
| | (mm) | | (m ³) | (m ³) | (m ³) |
| Jan | 16.3 | 31 | 577 | 63 | 63 |
| Feb | 8.1 | 28 | 522 | 31 | 31 |
| Mar | 4.1 | 31 | 577 | 16 | 16 |
| Apr | 65.1 | 30 | 559 | 251 | 251 |
| May | 177.0 | 31 | 577 | 682 | 577 |
| Jun | 89.5 | 30 | 559 | 345 | 345 |
| Jul | 45.8 | 31 | 577 | 177 | 177 |
| Aug | 23.8 | 31 | 577 | 92 | 92 |
| Sep | 47.7 | 30 | 559 | 184 | 184 |
| Oct | 42.8 | 31 | 577 | 165 | 165 |
| Nov | 67.1 | 30 | 559 | 259 | 259 |
| Dec | 33.6 | 31 | 577 | 130 | 130 |
| Total | 620.9 | 365 | 6,799 | 2,394 | 2,289 |

Enhanced Infiltration Structures - Lots 28-32, 49-64

| Structure Length = Structure Width = Structure Depth = | 123.00 m 2.00 0.50 | | | | | |
|--|---|--|---|----------------------------|------------------------|----------------------|
| Area of Stone = | 1.00 sq i | n | Volume of S Stone Poros Storage Vo | | 123.00 0.33333 = | |
| A = contact area of structure = V = runoff volume to be infiltrate P = percolation rate of native so n = porosity of storage media (v T = retention time = | | 246.00 41.00 10 0.33 Solve for T | sq m cu m mm/hr | | | |
| T = (1000 x V) / (P x n x A) = | | | 50.51 | hours or | 2.1 | day draindown period |
| Contributing Area Recharge Time Recharge Volume Potential | 0.335 ha 50.51 hou 41.00 m ³ | rs / | | tration Gallery) 0 days |) | |

| Month | Total Recharge & Runoff | No. of days | Max Potential Recharge | Available Recharge | Enhanced Recharge |
|-------|----------------------------|----------------|------------------------------|-----------------------|----------------------|
| | (mm) | | (m ³) | (m ³) | (m ³) |
| Jan | 16.3 | 31 | 604 | 55 | 55 |
| Feb | 8.1 | 28 | 546 | 27 | 27 |
| Mar | 4.1 | 31 | 604 | 14 | 14 |
| Apr | 65.1 | 30 | 584 | 218 | 218 |
| May | 177.0 | 31 | 604 | 593 | 593 |
| Jun | 89.5 | 30 | 584 | 300 | 300 |
| Jul | 45.8 | 31 | 604 | 154 | 154 |
| Aug | 23.8 | 31 | 604 | 80 | 80 |
| Sep | 47.7 | 30 | 584 | 160 | 160 |
| Oct | 42.8 | 31 | 604 | 144 | 144 |
| Nov | 67.1 | 30 | 584 | 225 | 225 |
| Dec | 33.6 | 31 | 604 | 113 | 113 |
| Total | 620.9 | 365 | 7,111 | 2,081 | 2,081 |

Enhanced Infiltration Structures - Lots 33-48

| Structure Length = Structure Width = Structure Depth = | 116.00 m 2.00 0.50 | | | | | |
|---|---|---|---|----------------------------|--------------------------|----------------------|
| Area of Stone = | 1.00 sq m | | Volume of S Stone Poros Storage Vo | | 116.00 0.33333 • = | |
| A = contact area of structure = V = runoff volume to be infiltrat P = percolation rate of native s n = porosity of storage media (T = retention time = | oils = | | 232.00 38.67 6 0.33 Solve for T | sq m cu m mm/hr | | |
| T = (1000 x V) / (P x n x A) = | | | 84.18 | hours or | 3.5 | day draindown period |
| Contributing Area Recharge Time Recharge Volume Potential | 0.250 ha 84.18 hours 38.67 m ³ | I | | ltration Gallery 1 days |) | |

| Month | Total Recharge & Runoff | No. of days | Max Potential Recharge | Available Recharge | Enhanced Recharge |
|-------|----------------------------|----------------|------------------------------|-----------------------|----------------------|
| | (mm) | | (m ³) | (m ³) | (m ³) |
| Jan | 16.3 | 31 | 342 | 41 | 41 |
| Feb | 8.1 | 28 | 309 | 20 | 20 |
| Mar | 4.1 | 31 | 342 | 10 | 10 |
| Apr | 65.1 | 30 | 331 | 162 | 162 |
| May | 177.0 | 31 | 342 | 442 | 342 |
| Jun | 89.5 | 30 | 331 | 223 | 223 |
| Jul | 45.8 | 31 | 342 | 114 | 114 |
| Aug | 23.8 | 31 | 342 | 59 | 59 |
| Sep | 47.7 | 30 | 331 | 119 | 119 |
| Oct | 42.8 | 31 | 342 | 107 | 107 |
| Nov | 67.1 | 30 | 331 | 167 | 167 |
| Dec | 33.6 | 31 | 342 | 84 | 84 |
| Total | 620.9 | 365 | 4,024 | 1,550 | 1,450 |

Enhanced Infiltration Structures - Lots 65-79

| Structure Length = Structure Width = Structure Depth = | 135.00 m 2.00 0.50 | | | | | |
|--|---|---|---|-----------------------------|------------------------|----------------------|
| Area of Stone = | 1.00 sq m | | Volume of S Stone Poros Storage Vo | | 135.00 0.33333 = | |
| A = contact area of structure = V = runoff volume to be infiltrated = P = percolation rate of native soils = n = porosity of storage media (weighted) = T = retention time = | | | 270.00 45.00 7 0.33 Solve for T | sq m cu m mm/hr | | |
| T = (1000 x V) / (P x n x A) = | | | 72.15 | hours or | 3.0 | day draindown period |
| Contributing Area Recharge Time Recharge Volume Potential | 0.276 ha 72.15 hours 45.00 m ³ | I | • | ltration Gallery) 1 days | | |

| Month | Total Recharge & Runoff | No. of days | Max Potential Recharge | Available Recharge | Enhanced Recharge |
|-------|----------------------------|----------------|------------------------------|-----------------------|----------------------|
| | (mm) | | (m ³) | (m ³) | (m ³) |
| Jan | 16.3 | 31 | 464 | 45 | 45 |
| Feb | 8.1 | 28 | 419 | 22 | 22 |
| Mar | 4.1 | 31 | 464 | 11 | 11 |
| Apr | 65.1 | 30 | 449 | 180 | 180 |
| May | 177.0 | 31 | 464 | 488 | 464 |
| Jun | 89.5 | 30 | 449 | 247 | 247 |
| Jul | 45.8 | 31 | 464 | 126 | 126 |
| Aug | 23.8 | 31 | 464 | 66 | 66 |
| Sep | 47.7 | 30 | 449 | 132 | 132 |
| Oct | 42.8 | 31 | 464 | 118 | 118 |
| Nov | 67.1 | 30 | 449 | 185 | 185 |
| Dec | 33.6 | 31 | 464 | 93 | 93 |
| Total | 620.9 | 365 | 5,464 | 1,714 | 1,689 |

Enhanced Infiltration Structures - Lots 102-106, Blocks 114 and 115

| Structure Length = Structure Width = Structure Depth = | 0.00 m 2.00 0.50 | | | | | |
|--|--|--|--------------------------|------------------------|----------------------|------|
| Area of Stone = | 1.00 sq m | Volume of S Stone Poro Storage Vo | | 0.00 0.33333 e = | | cu m |
| A = contact area of structure = V = runoff volume to be infiltrated = P = percolation rate of native soils = n = porosity of storage media (weighted) = T = retention time = | | 0.00 0.00 0.2 0.33 Solve for T | sq m cu m mm/hr | | | |
| T = (1000 x V) / (P x n x A) = | | #DIV/0! | hours or | #DIV/0! | day draindown period | |
| Contributing Area Recharge Time Recharge Volume Potential | 0.256 ha #DIV/0! hours 0.00 m ³ | (Area to Inf #DIV/0! | ltration Gallery days | y) | | |

| Month | Total Recharge & Runoff | No. of days | Max Potential Recharge | Available Recharge | Enhanced Recharge |
|-------|----------------------------|----------------|------------------------------|-----------------------|----------------------|
| | (mm) | | (m ³) | (m ³) | (m ³) |
| Jan | 16.3 | 31 | #DIV/0! | 42 | #DIV/0! |
| Feb | 8.1 | 28 | #DIV/0! | 21 | #DIV/0! |
| Mar | 4.1 | 31 | #DIV/0! | 10 | #DIV/0! |
| Apr | 65.1 | 30 | #DIV/0! | 167 | #DIV/0! |
| May | 177.0 | 31 | #DIV/0! | 454 | #DIV/0! |
| Jun | 89.5 | 30 | #DIV/0! | 229 | #DIV/0! |
| Jul | 45.8 | 31 | #DIV/0! | 117 | #DIV/0! |
| Aug | 23.8 | 31 | #DIV/0! | 61 | #DIV/0! |
| Sep | 47.7 | 30 | #DIV/0! | 122 | #DIV/0! |
| Oct | 42.8 | 31 | #DIV/0! | 110 | #DIV/0! |
| Nov | 67.1 | 30 | #DIV/0! | 172 | #DIV/0! |
| Dec | 33.6 | 31 | #DIV/0! | 86 | #DIV/0! |
| Total | 620.9 | 365 | #DIV/0! | 1,592 | #DIV/0! |

Enhanced Infiltration Structures - Lots 107 - 112, Block 113

| Structure Length = Structure Width = Structure Depth = | 105.00 m 2.00 0.50 | | | | | |
|---|---|---|---|-----------------------------|-------------------|----------------------|
| Area of Stone = | 1.00 sq m | | Volume of S Stone Poros | | 105.00 0.33333 | |
| | | | Storage Vo | lume of Stone |) = | 35.00 cu m |
| A = contact area of structure = V = runoff volume to be infiltrat P = percolation rate of native s n = porosity of storage media (T = retention time = | oils = | | 210.00 35.00 8 0.33 Solve for T | sq m cu m mm/hr | | |
| T = (1000 x V) / (P x n x A) = | | | 63.13 | hours or | 2.6 | day draindown period |
| Contributing Area Recharge Time Recharge Volume Potential | 0.230 ha 63.13 hours 35.00 m ³ | I | | ltration Gallery) 3 days |) | |

| Month | Total Recharge & Runoff | No. of days | Max Potential Recharge | Available Recharge | Enhanced Recharge |
|-------|----------------------------|----------------|------------------------------|-----------------------|----------------------|
| | (mm) | | (m ³) | (m ³) | (m ³) |
| Jan | 16.3 | 31 | 412 | 37 | 37 |
| Feb | 8.1 | 28 | 373 | 19 | 19 |
| Mar | 4.1 | 31 | 412 | 9 | 9 |
| Apr | 65.1 | 30 | 399 | 149 | 149 |
| May | 177.0 | 31 | 412 | 406 | 406 |
| Jun | 89.5 | 30 | 399 | 205 | 205 |
| Jul | 45.8 | 31 | 412 | 105 | 105 |
| Aug | 23.8 | 31 | 412 | 55 | 55 |
| Sep | 47.7 | 30 | 399 | 110 | 110 |
| Oct | 42.8 | 31 | 412 | 98 | 98 |
| Nov | 67.1 | 30 | 399 | 154 | 154 |
| Dec | 33.6 | 31 | 412 | 77 | 77 |
| Total | 620.9 | 365 | 4,857 | 1,425 | 1,425 |

Enhanced Infiltration Structures - Block 116

| Structure Length = Structure Width = Structure Depth = | 51.00 2.00 0.50 | m | | | | | |
|--|-------------------------|---------|---|---|----------------------------|-----------------------|------------------------------|
| Area of Stone = | 1.00 | sq m | | Volume of S Stone Poros Storage Vo l | | 51.00 0.33333 = | cum 3 17.00 cum |
| A = contact area of structure = V = runoff volume to be infiltrated = P = percolation rate of native soils = n = porosity of storage media (weighted) = T = retention time = | | | 102.00 17.00 8.0 0.33 Solve for T | sq m cu m mm/hr | | | |
| T = (1000 x V) / (P x n x A) = | | | | 63.13 | hours or | 2.6 | day draindown period |
| Contributing Area Recharge Time Recharge Volume Potential | 0.110 63.13 17.00 | 3 hours | 1 | | tration Gallery) 3 days | | |

| Month | Total Recharge & Runoff | No. of days | Max Potential Recharge | Available Recharge | Enhanced Recharge |
|-------|----------------------------|----------------|------------------------------|-----------------------|----------------------|
| | (mm) | | (m ³) | (m ³) | (m ³) |
| Jan | 16.3 | 31 | 200 | 18 | 18 |
| Feb | 8.1 | 28 | 181 | 9 | 9 |
| Mar | 4.1 | 31 | 200 | 4 | 4 |
| Apr | 65.1 | 30 | 194 | 72 | 72 |
| May | 177.0 | 31 | 200 | 195 | 195 |
| Jun | 89.5 | 30 | 194 | 98 | 98 |
| Jul | 45.8 | 31 | 200 | 50 | 50 |
| Aug | 23.8 | 31 | 200 | 26 | 26 |
| Sep | 47.7 | 30 | 194 | 52 | 52 |
| Oct | 42.8 | 31 | 200 | 47 | 47 |
| Nov | 67.1 | 30 | 194 | 74 | 74 |
| Dec | 33.6 | 31 | 200 | 37 | 37 |
| Total | 620.9 | 365 | 2,359 | 683 | 683 |

Lot Infiltration Criteria

| Lot/Block | Rooftop Area | Infiltration Gallery Size | | | | |
|-----------|-----------------|---------------------------|-------|-------|--|--|
| | (m^2) | L (m) | W (m) | D (m) | | |
| 1 | 356 | 15.0 | 2.0 | 0.5 | | |
| 2 | 234 | 11.0 | 2.0 | 0.5 | | |
| 3 | 234 | 11.0 | 2.0 | 0.5 | | |
| 4 | 234 | 11.0 | 2.0 | 0.5 | | |
| 5 | 234 | 11.0 | 2.0 | 0.5 | | |
| 6 | 234 | 11.0 | 2.0 | 0.5 | | |
| 7 | 234 | 11.0 | 2.0 | 0.5 | | |
| 8 | 234 | 11.0 | 2.0 | 0.5 | | |
| 9 | 234 | 11.0 | 2.0 | 0.5 | | |
| 10 | 234 | 11.0 | 2.0 | 0.5 | | |
| 11 | 234 | 11.0 | 2.0 | 0.5 | | |
| 12 | 264 | 12.0 | 2.0 | 0.5 | | |
| 13 | 264 | 12.0 | 2.0 | 0.5 | | |
| 14 | 264 | 12.0 | 2.0 | 0.5 | | |
| 15 | 264 | 12.0 | 2.0 | 0.5 | | |
| 16 | 264 | 12.0 | 2.0 | 0.5 | | |
| 17 | 264 | 12.0 | 2.0 | 0.5 | | |
| 19 | 284 | 12.0 | 2.0 | 0.5 | | |
| 20 | 284 | 12.0 | 2.0 | 0.5 | | |
| 21 | 284 | 12.0 | 2.0 | 0.5 | | |
| 22 | 284 | 12.0 | 2.0 | 0.5 | | |
| 23 | 284 | 12.0 | 2.0 | 0.5 | | |
| 24 | 284 | 12.0 | 2.0 | 0.5 | | |
| 25 | 284 | 12.0 | 2.0 | 0.5 | | |
| 26 | 284 | 12.0 | 2.0 | 0.5 | | |
| 28 | 284 | 12.0 | 2.0 | 0.5 | | |
| 29 | 144 | 5.0 | 2.0 | 0.5 | | |
| 30 | 144 | 5.0 | 2.0 | 0.5 | | |
| 31 | 144 | 5.0 | 2.0 | 0.5 | | |
| 32 | 144 | 5.0 | 2.0 | 0.5 | | |
| 33 | 144 | 7.0 | 2.0 | 0.5 | | |
| 34 | 144 | 7.0 | 2.0 | 0.5 | | |
| 35 | 144 | 7.0 | 2.0 | 0.5 | | |
| 36 | 144 | 7.0 | 2.0 | 0.5 | | |
| 37 | 144 | 7.0 | 2.0 | 0.5 | | |
| 38 | 240 | 9.0 | 2.0 | 0.5 | | |
| 39 | 144 | 7.0 | 2.0 | 0.5 | | |
| 40 | 144 | 7.0 | 2.0 | 0.5 | | |
| 41 | 144 | 7.0 | 2.0 | 0.5 | | |
| 42 | 144 | 7.0 | 2.0 | 0.5 | | |
| 43 | 240 | 9.0 | 2.0 | 0.5 | | |
| 44 | 144 | 7.0 | 2.0 | 0.5 | | |
| 45 | 144 | 7.0 | 2.0 | 0.5 | | |
| 46 | 144 | 7.0 | 2.0 | 0.5 | | |
| 47 | 144 | 7.0 | 2.0 | 0.5 | | |
| 48 | 144 | 7.0 | 2.0 | 0.5 | | |

| Lot/Block | Rooftop Area | Infiltration Gallery Size | | | | |
|-----------|-------------------|---------------------------|-------|-------|--|--|
| | (m ²) | L (m) | W (m) | D (m) | | |
| 49 | 144 | 5.0 | 2.0 | 0.5 | | |
| 50 | 144 | 5.0 | 2.0 | 0.5 | | |
| 51 | 144 | 7.0 | 2.0 | 0.5 | | |
| 52 | 151 | 8.0 | 2.0 | 0.5 | | |
| 53 | 158 | 8.0 | 2.0 | 0.5 | | |
| 54 | 158 | 8.0 | 2.0 | 0.5 | | |
| 55 | 144 | 5.0 | 2.0 | 0.5 | | |
| 56 | 144 | 5.0 | 2.0 | 0.5 | | |
| 57 | 144 | 5.0 | 2.0 | 0.5 | | |
| 58 | 144 | 5.0 | 2.0 | 0.5 | | |
| 59 | 144 | 5.0 | 2.0 | 0.5 | | |
| 60 | 220 | 5.0 | 2.0 | 0.5 | | |
| 61 | 220 | 5.0 | 2.0 | 0.5 | | |
| 62 | 144 | 5.0 | 2.0 | 0.5 | | |
| 63 | 144 | 5.0 | 2.0 | 0.5 | | |
| 64 | 144 | 5.0 | 2.0 | 0.5 | | |
| 65 | 144 | 7.0 | 2.0 | 0.5 | | |
| 66 | 144 | 7.0 | 2.0 | 0.5 | | |
| 67 | 144 | 7.0 | 2.0 | 0.5 | | |
| 68 | 144 | 7.0 | 2.0 | 0.5 | | |
| 69 | 144 | 7.0 | 2.0 | 0.5 | | |
| 70 | 204 | 10.0 | 2.0 | 0.5 | | |
| 71 | 204 | 10.0 | 2.0 | 0.5 | | |
| 72 | 204 | 10.0 | 2.0 | 0.5 | | |
| 73 | 204 | 10.0 | 2.0 | 0.5 | | |
| 74 | 204 | 10.0 | 2.0 | 0.5 | | |
| 75 | 204 | 10.0 | 2.0 | 0.5 | | |
| 76 | 204 | 10.0 | 2.0 | 0.5 | | |
| 77 | 204 | 10.0 | 2.0 | 0.5 | | |
| 78 | 204 | 10.0 | 2.0 | 0.5 | | |
| 79 | 204 | 10.0 | 2.0 | 0.5 | | |
| 107 | 280 | 13.0 | 2.0 | 0.5 | | |
| 108 | 234 | 11.0 | 2.0 | 0.5 | | |
| 109 | 234 | 11.0 | 2.0 | 0.5 | | |
| 110 | 234 | 11.0 | 2.0 | 0.5 | | |
| 111 | 234 | 11.0 | 2.0 | 0.5 | | |
| 112 | 360 | 15.0 | 2.0 | 0.5 | | |
| 113 | 720 | 33.0 | 2.0 | 0.5 | | |
| Block 116 | 413 | 19.0 | 2.0 | 0.5 | | |
| Block 116 | 413 | 19.0 | 2.0 | 0.5 | | |
| Block 116 | 275 | 13.0 | 2.0 | 0.5 | | |