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

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

> Revised: June 2017 Our File: 105-172

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1.0 INTRODUCTION

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

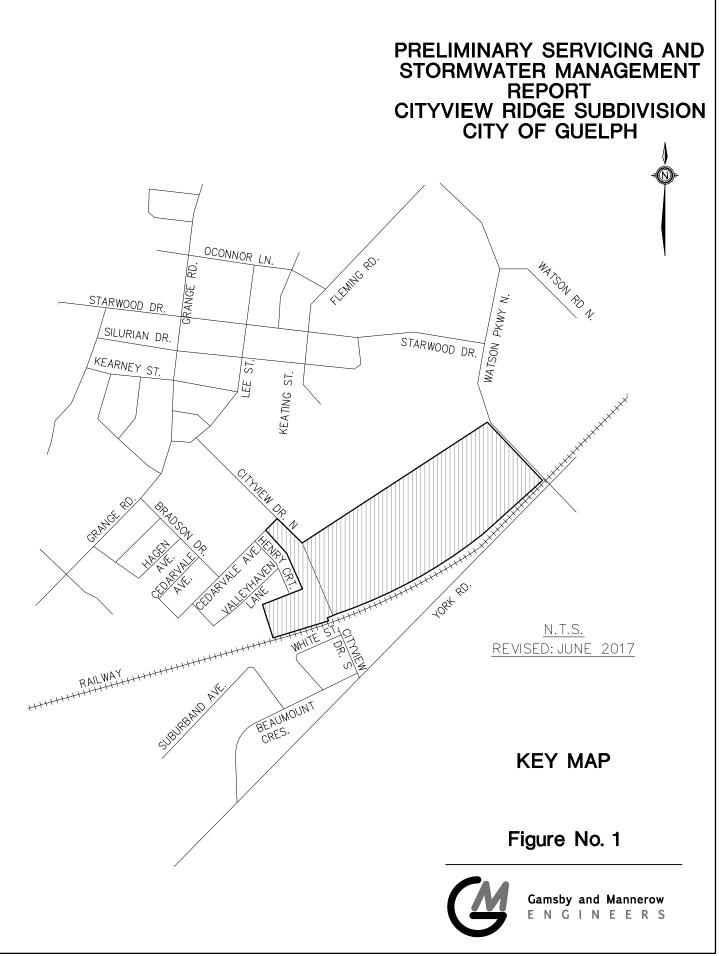
The servicing and stormwater management techniques for the Cityview Ridge Subdivision were derived from the recommendations presented in the following reports:

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

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

2.0 LOCATION

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



3.0 EXISTING CONDITIONS

3.1 LAND USE

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

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

3.2 TOPOGRAPHY

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

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

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

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

3.3 Soils

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

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

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

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

4.0 PROPOSED DEVELOPMENT

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

4.1 SITE GRADING

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

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

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

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

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

4.2 STREETS

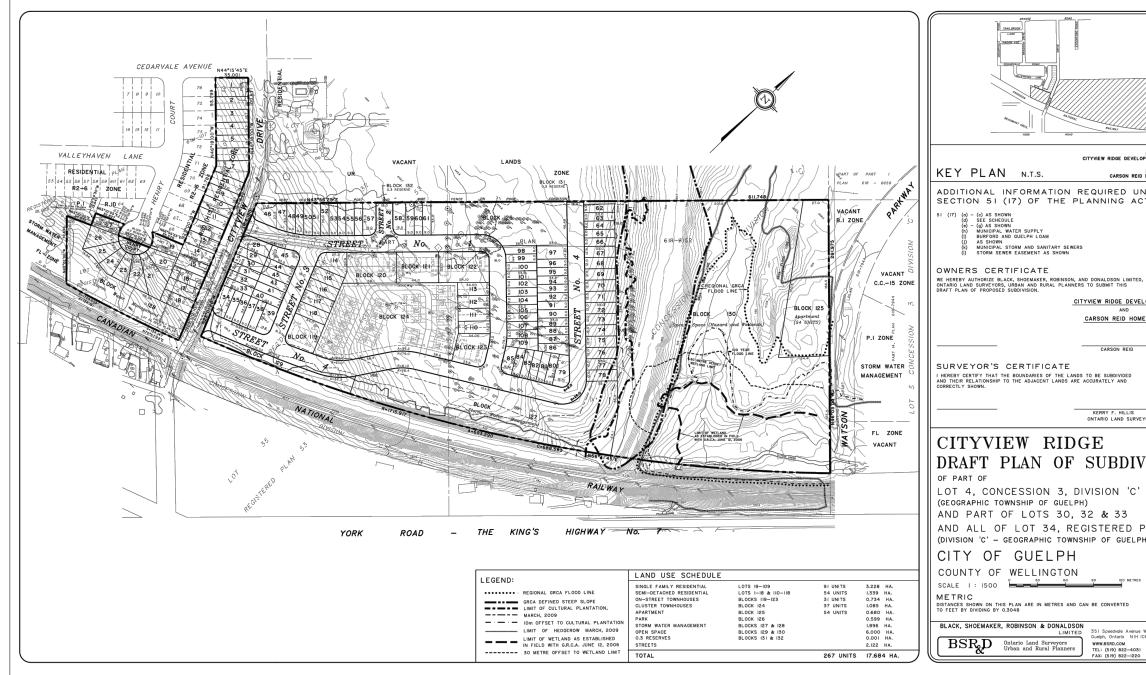
All streets will be constructed with a minimum slope of 0.5% to a maximum slope of 6.0%. An urban road cross-section with concrete curb and gutter will be used along all streets.

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

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

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

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



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Vest DATE: DATE: DRAWN SY' KS PROJECT 05-6590-44-3	SUBDIVISION Figure No. 2
	Gamsby and Mannerow ENGINEERS

4.3 WATER SUPPLY

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

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

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

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

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

4.4 SANITARY SEWER

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

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

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

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

4.5 STORM SEWER

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

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

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

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

4.6 STORMWATER MANAGEMENT

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

4.7 SALT MANAGEMENT PLAN

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

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

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

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

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

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

4.8 WATER BUDGET

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

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

Therefore, based on the annual infiltration rates, as shown on the Monthly Water Balance calculations attached in Appendix 'G', the existing annual average groundwater recharge occurring within the 18.28-hectare site is estimated to be 41,003 m³. Under post-development conditions, the annual natural groundwater recharge occurring on-site is estimated to be 23,573 m³. Due to the high silt content in the native soils and the seasonably high groundwater level, infiltration structures cannot be constructed and still achieve the MOECC's recommended 24 hour draindown and 1 metre separation from the seasonally high groundwater levels.

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

Enhanced infiltration can be provided in Block 125 to reduce the difference between existing and post-development condition infiltration volumes. An additional water balance has been provided where existing runoff volumes to the wetland are matched, and the remaining portion of the site which is not needed to discharge to the wetland is infiltrated. This results in an additional 2,161 m³ in runoff volume, bringing the post-development total to 25,734 m³.

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

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

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

Table No. 1:	Summary of Recharge and Runoff Volume
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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 postdevelopment flows to the pre-development level. In addition, discharge from the proposed stormwater management facility will be dispersed over a large broad surface, ultimately sheetflowing overland towards Clythe Creek.

5.0 STORMWATER MANAGEMENT PLAN

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

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

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

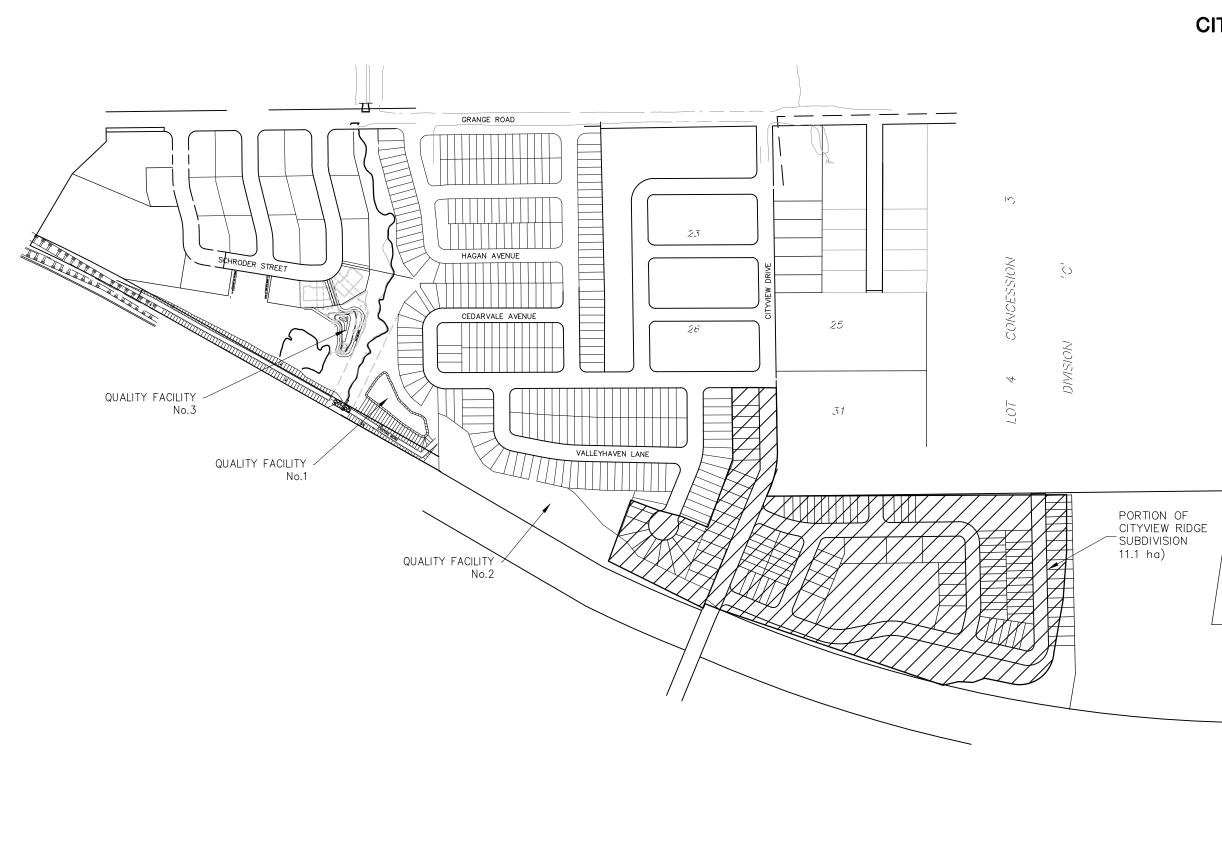
End-of-pipe controls will be provided by an existing stormwater management facility constructed as part of the Valleyhaven Subdivision Phase 3 (Stormwater Quality Facility No. 2 and Stormwater Quantity Control Facility) and a proposed stormwater management facility.

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

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

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

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



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LEGEND

<u>N.T.S.</u> REVISED: JUNE 2017

OVERALL DRAINAGE AREAS

Figure No. 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 development will be directed to the proposed stormwater management facility. The proposed stormwater management facility will attenuate stormwater runoff to the existing condition level prior to discharge to Clythe Creek.

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

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

5.1 STORMWATER MANAGEMENT CRITERIA

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

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

The objectives of the stormwater management plan are as follows:

- a) Provide enhanced (80% TSS) quality control by pre-treating the runoff prior to discharge to the receiving outlet.
- b) Provide quantity control for a range of design storms.
- c) Route the major storm to minimize flood damage to public and private lands.
- d) In order to minimize sediment discharge to the wetland and/or lands adjacent to the working area, erosion and sediment control measures shall be incorporated for the entire duration of the contract.
- e) Complete a Water Balance Analysis in order to evaluate total system water loss and identify measures to reduce those losses.

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

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

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

Table No. 2: Chicago Rainfall Parameters

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

 Table No. 3:
 Horton Infiltration Parameters

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

5.2 STORMWATER MANAGEMENT DESIGN

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

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

5.2.1 LOT LEVEL CONTROLS

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

a) Roof Drainage to Ground Surface

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

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

b) Rear Yard Swales

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

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

c) Lot Level Infiltration Systems

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

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

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

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

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

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

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

5.2.2 CONVEYANCE CONTROLS

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

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

5.2.3 END-OF-PIPE CONTROLS

a) Existing Conditions

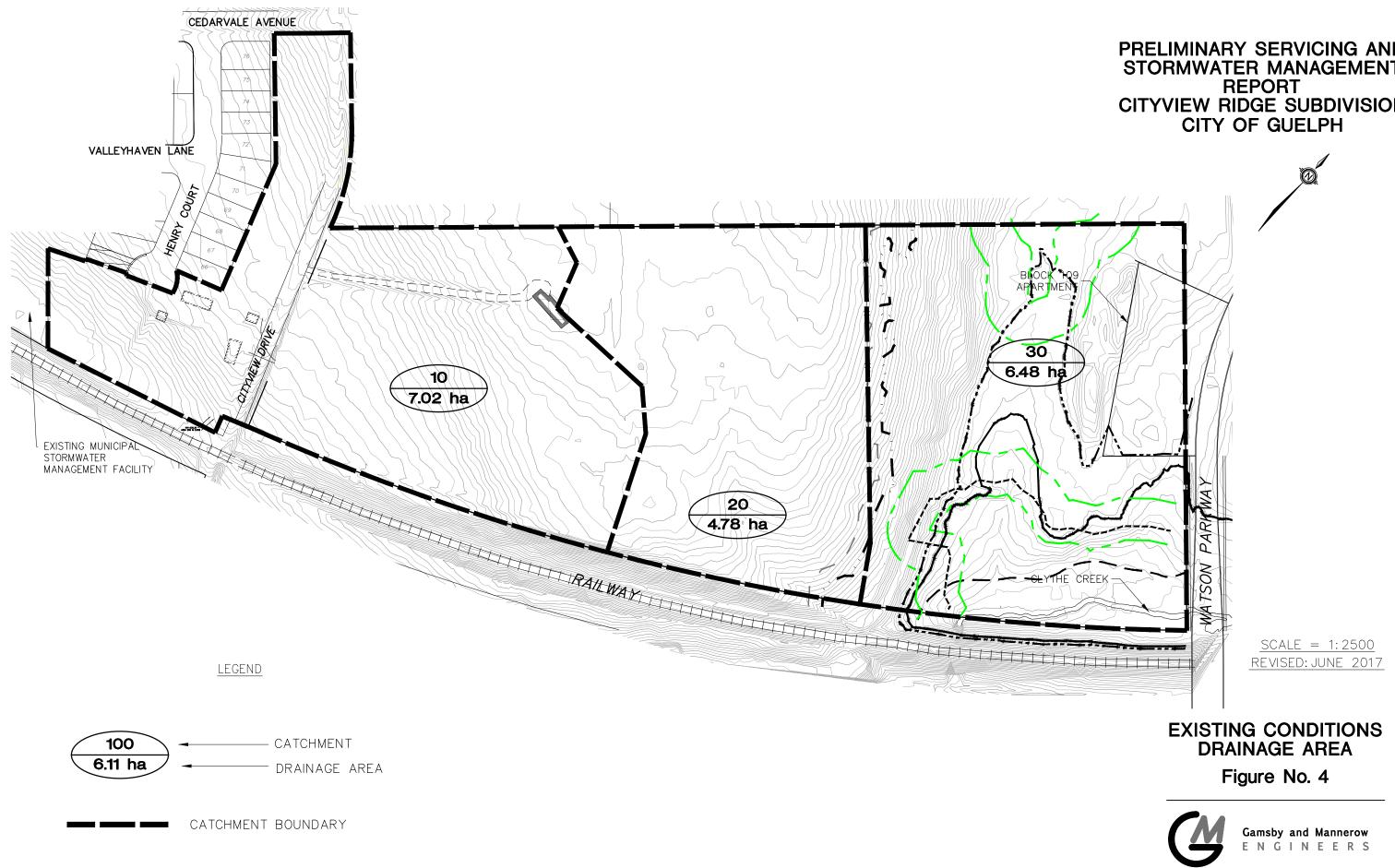
Under existing conditions, the site consists of two (2) existing buildings and various other buildings, with the remainder of the site being open space. For hydrologic modelling purposes, the site was modelled as three (3) catchments. These catchments, which include the Cityview Drive right-of-way, are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

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

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

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

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



PRELIMINARY SERVICING AND STORMWATER MANAGEMENT **CITYVIEW RIDGE SUBDIVISION**

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.

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

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 m ³ /s
5 Year	0.929 m ³ /s
25 Year	1.689 m ³ /s
100 Year	2.246 m ³ /s

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

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

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

	Allowable Release Rate
2 Year	0.127 m ³ /s
5 Year	0.772 m ³ /s
25 Year	2.192 m ³ /s
100 Year	3.425 m ³ /s

c) Post-Development Conditions

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

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

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

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

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

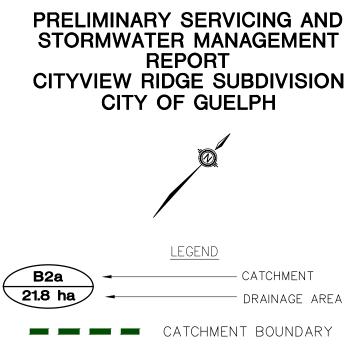
Catchment B2b (5.97 hectares, 42% impervious) represents the existing Valleyhaven Subdivision Phase 3. Stormwater runoff generated from Catchment B2b discharges to the existing Stormwater Quality Facility No. 2 constructed as part of the Valleyhaven Subdivision Phase 3.

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

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

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







POST-DEVELOPMENT DRAINAGE AREAS WESTERN PORTION OF SUBDIVISION

Figure No. 5



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

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

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

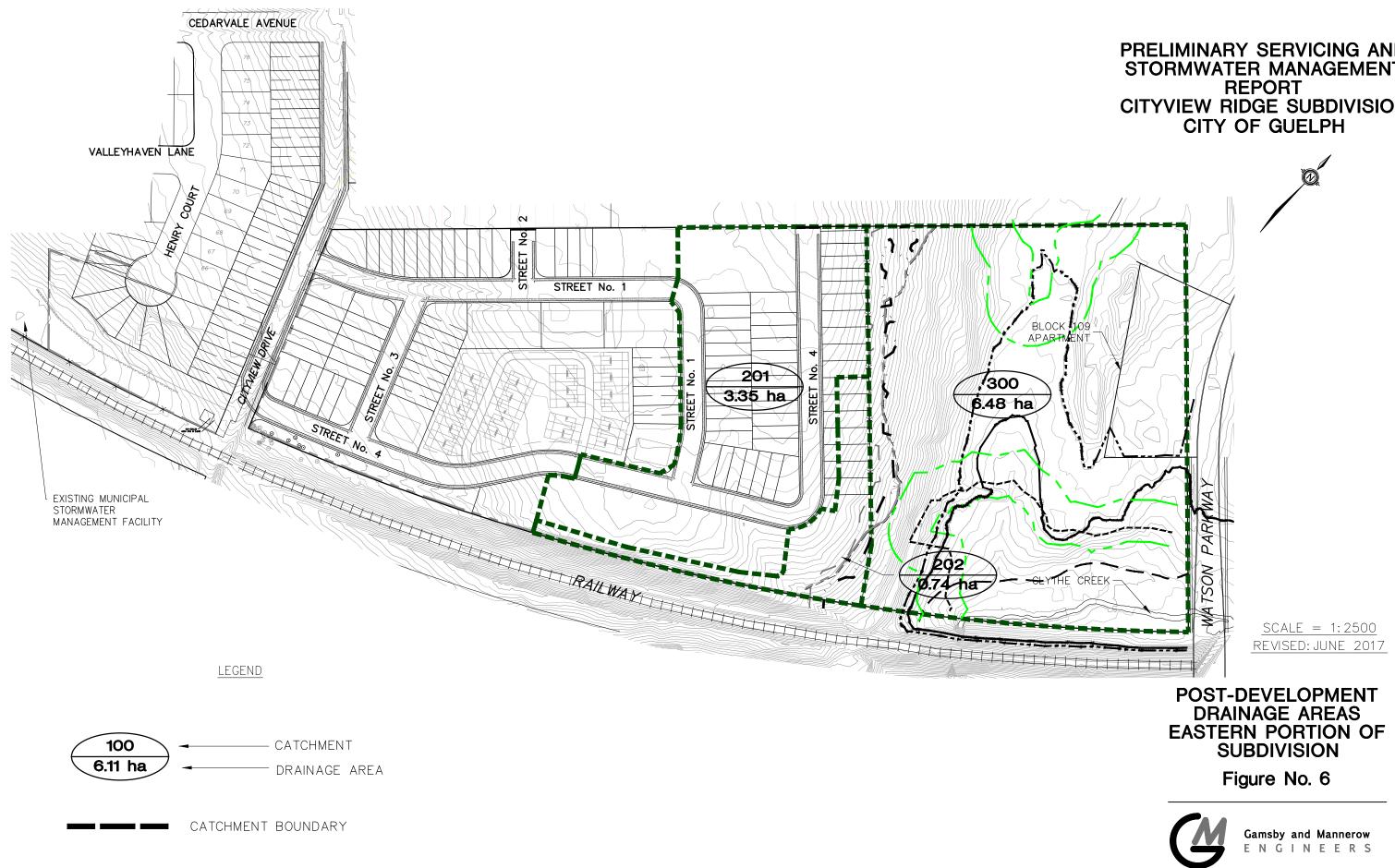
Catchment 201 (3.35 hectares, 65% impervious, c=0.65) represents the central portion of the proposed development.

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

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

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

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



PRELIMINARY SERVICING AND STORMWATER MANAGEMENT **CITYVIEW RIDGE SUBDIVISION**

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

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

In addition, the proposed stormwater management facility has been designed as a wetland type facility with a 0.40 metre deep permanent pool to provide the required water quality control storage volume. The total contributing area discharging to the facility is 3.41-hectares, with an average imperviousness of 65%. From Table 3.2 of the Stormwater Management Planning and Design Manual (2003), a wetland type facility designed for enhanced treatment (80% total suspended solids removal) requires 115 m³/ha of storage volume for a contributing drainage area that is approximately 65% impervious. 40 m³/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, 255 m³ of permanent pool storage is required. The permanent pool has been designed with approximately 714 m³ of storage.

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

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

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

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

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

The on-site stormwater management controls will be designed, reviewed and approved as part of the site plan approval process for the apartment block. The on-site stormwater management controls which may be utilized include, but are not limited to, stormwater management facility (i.e. SWM pond), rooftop storage, parking lot ponding (to a maximum depth of 0.3 m), below grade storage (i.e. clear stone storage, super pipe storage, etc.) and oil/grit separator structure. Table No. 7 lists the uncontrolled post-development flow rates and runoff volumes for each catchment area shown on Figure No. 5 and Figure No. 6, for the 2, 5, 25 and 100-year design storm events and the Regional Storm.

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

 Table 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.

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

	Available			Actual		
Overland Flow Swale	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
25-Year				2.856	2.18	0.46
100-Year				3.746	2.33	0.52
Top of Bank	16.90	3.38	1.00			

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

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

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

Table No. 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.

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

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

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

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

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

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

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

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

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

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

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

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

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

5.2.4 MINOR / MAJOR DRAINAGE SYSTEM

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

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

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

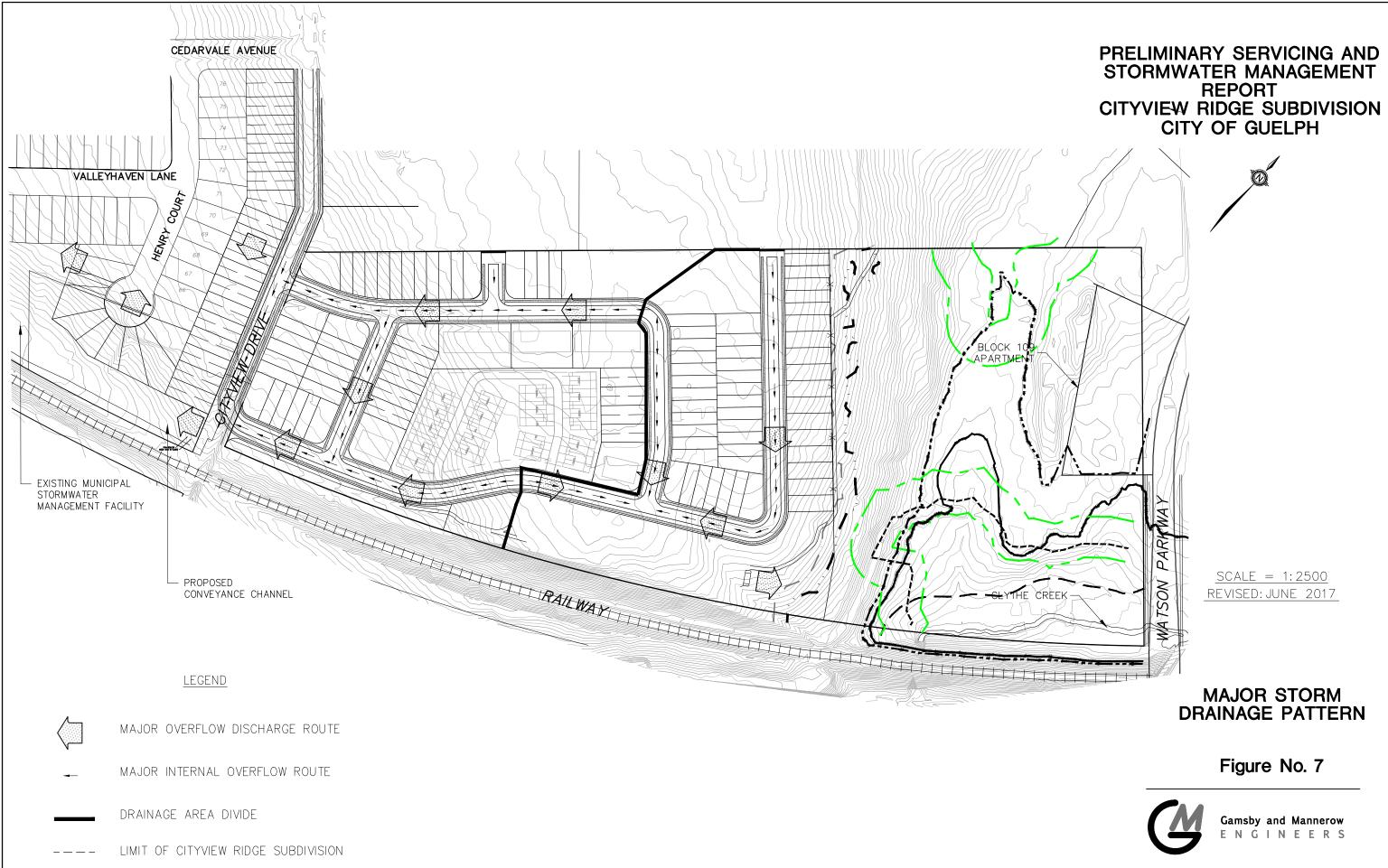
5.2.5 FLOODPLAIN ANALYSIS

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

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

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

The HEC-RAS analysis is attached in Appendix 'F'.



6.0 SEDIMENT AND EROSION CONTROL PLAN

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

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

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

The proposed stormwater management facility will be rough graded and used as a temporary sediment pond for the central portion of the site during the servicing and house building construction. The storage capacity of this pond exceeds the combined 250 m³/hectare of active and dead storage required. A heavy duty silt fence will be placed around the proposed stormwater management facility during construction.

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

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

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

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

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

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

7.0 MAINTENANCE PLAN

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

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

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

8.0 CONCLUSIONS

From the foregoing analysis, the following conclusions are drawn:

- 1. Water supply for the proposed Cityview Ridge Subdivision will be provided by:
 - a. the extension of the existing 150 mm diameter watermain on Henry Court,
 - b. the extension of the existing 200 mm diameter watermain southerly on Cityview Drive,
 - c. the extension of the existing 150 mm diameter watermain from the existing municipal stormwater management facility to the Cityview Drive right-of-way, and
 - d. via a connection to the existing 300 mm diameter watermain on Watson Parkway.
- 2. Sanitary service for the Cityview Ridge Subdivision will be provided by:
 - a. the extension of the existing 200 mm diameter sanitary sewer on Henry Court,
 - b. the extension of a 200 mm diameter sanitary sewer from the 200 mm diameter sanitary sewer stub in the existing municipal stormwater management facility to the Cityview Drive right-of-way, and
 - c. via a connection to the existing 525 mm diameter sanitary sewer on Watson Parkway.
- 3. All storm sewers within the Cityview Ridge Subdivision will be sized to accommodate the 5-year design storm event.
- 4. The topography of the site will generally allow for sufficient cover on the storm sewer to connect house foundation drains. Where a storm service connection is not possible, foundation drainage will be provided by sump pumps discharging to the grassed side and rear yard surfaces.
- 5. Quality and quantity control for runoff generated from the westerly portion of the development will be provided by the existing Stormwater Quality Facility No. 2 and the existing Stormwater Quantity Control Facility, constructed as part of the Valleyhaven Subdivision Phase 3.

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

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

- 6. Installation of infiltration systems in the rear yard areas is not feasible due to the low hydraulic conductivity of the native underlying silty tills and the presence of high groundwater levels.
- 7. The floodplain storage volume has been maintained under post-development conditions to ensure that the hazard to the public is minimized.
- 8. The stormwater management systems meet the current Provincial and Municipal guidelines.
- 9. During the construction phase, the proposed stormwater management facility will be used as part of the erosion and sediment control plan. This in conjunction, with the other erosion control measures, will minimize the transport of sediment off-site during the construction period.

All of which is respectfully submitted.

GAMSBY AND MANNEROW LIMITED Per:

Angela Kroetsch, P.Eng.

AK/pg Encl.



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

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

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0353G4.R01_Rev.

February 17, 2012

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

Attention: Mr. Carson Reid

Dear Sir:

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

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

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

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

Yours very truly,

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

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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

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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.

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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.

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

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

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

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

Respectfully submitted,

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

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LIST OF ABBREVIATIONS

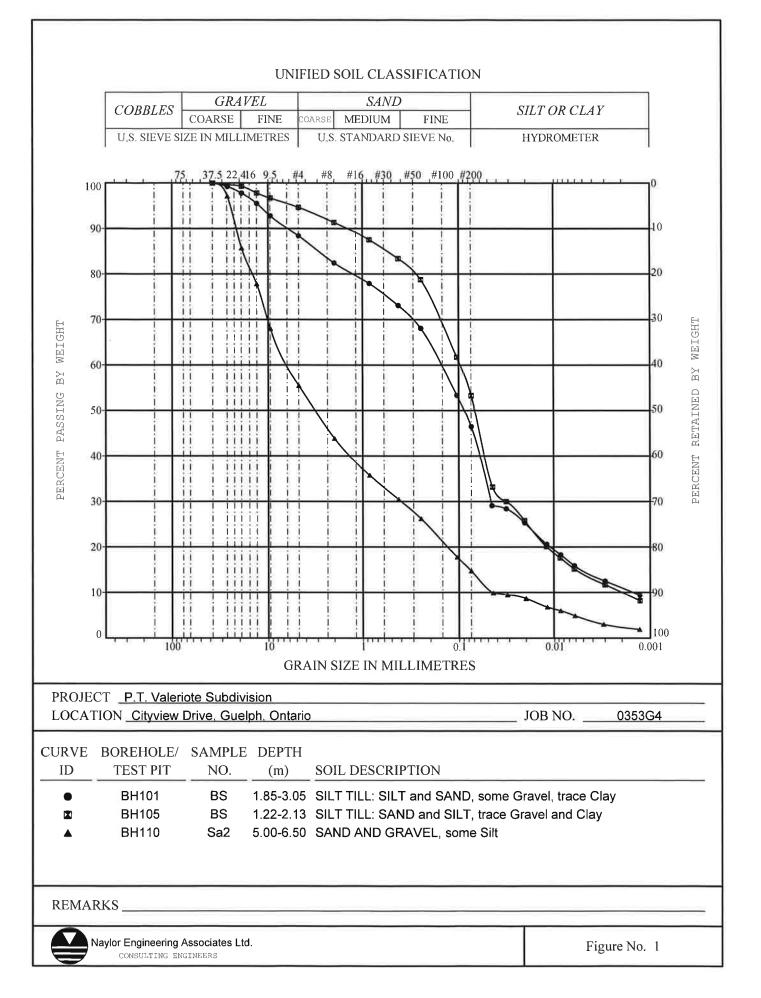
The abbreviations commonly employed on the borehole logs, on the figures, and in the text of the report, are as follows:

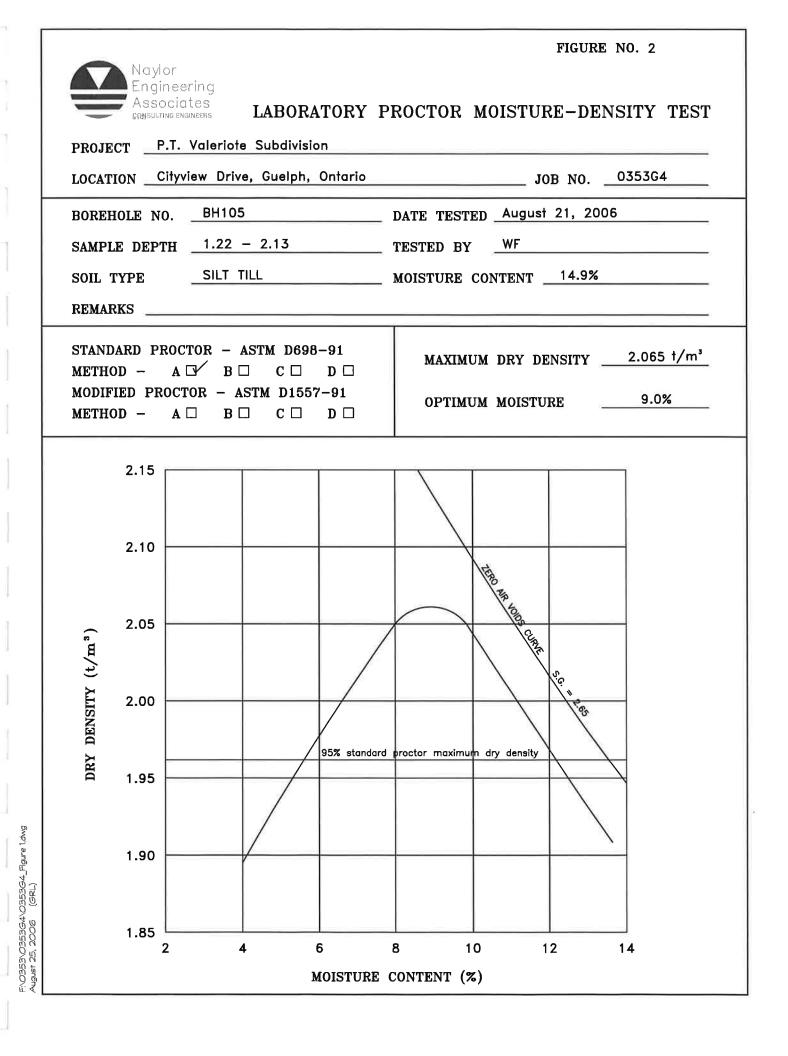
	Sample Types		Soil Tests and Properties					
AS CS RC SS TW WS	auger sample chunk sample rock core split spoon thin-walled, open wash sample	SPT UC FV Ø γ w _p W	Standard Penetration Test unconfined compression field vane test angle of internal friction unit weight plastic limit water content					
	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

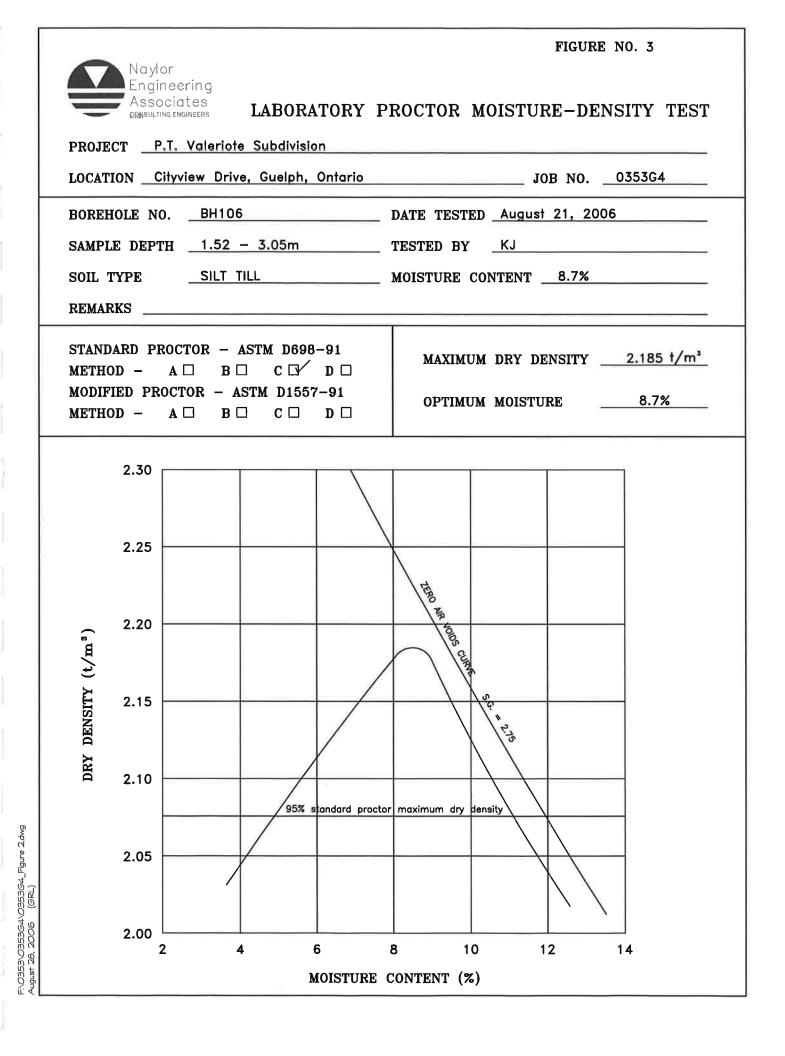
Penetration Resistances								
The number of blows by a 63.5 kg (140 lb.) hammer dropped 0.76 m (30 in.) required to drive a 50 mm (2 in.) diameter 60 ° cone a distance 0.30 m (12 in.). The cone is attached to 'A' size drill rods and casing is not used.								
The number of blows by a 63.5 kg (140 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 Shear Strength (C_u)							
Consistency	kPa	psf						
Very Soft	less than 12	less than 250						
Soft	12 to 25	250 to 500						
Firm	25 to 50	500 to 1000						
Stiff	50 to 100	1000 to 2000						
Very Stiff	100 to 200	2000 to 4000						
Hard	over 200	over 4000						
DTPL	Drier than plastic limit							
APL	About plastic limit							
WTPL	Wetter than plastic limit							

Naylor Engineering Associates Ltd.









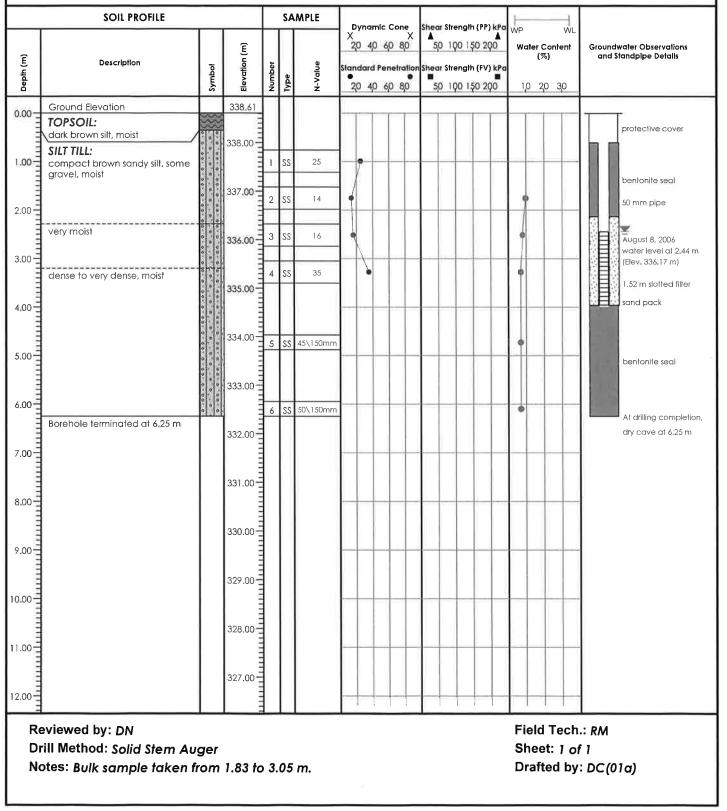
Location: Cityview Drive, Guelph, Ontario

Borehole Number: 101

Ground Elevation: 338.61 m

Job No.: 0353G4

Drill Date: August 2, 2006





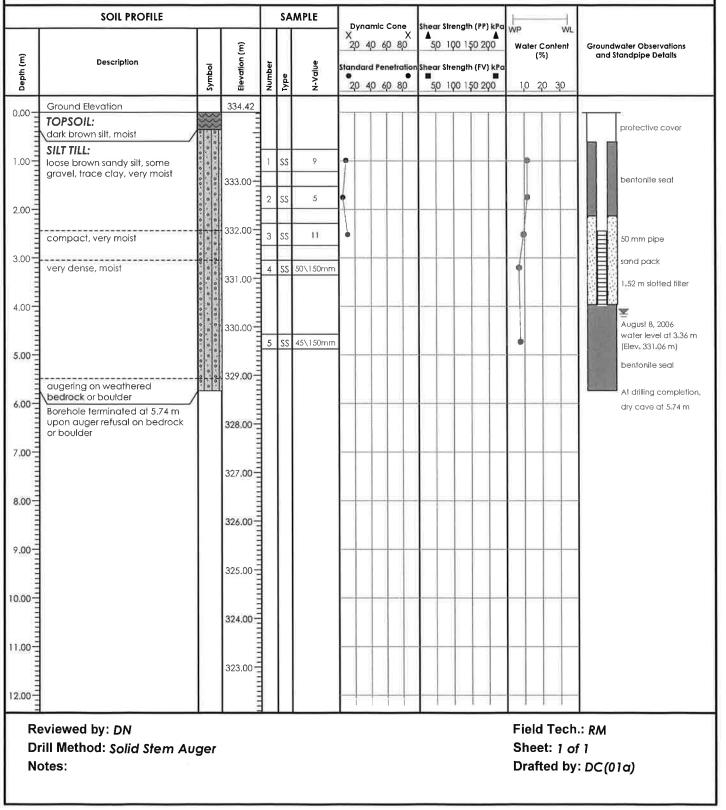
Location: Cityview Drive, Guelph, Ontario

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		SAMPLE			Dynamic Cone			Cone		Shear Strength (PP) kPa	 WP WL				
Depth (m)	Description	Symbol	Elevation (m)	Number	Type	N-Value	Star	20 Inde	40 d ard Pe	60 80	X) tion	50 100 150 200 Shear Strength (FV) kPa 50 100 150 200	WP WL 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				Ĩ			•		sand pack 1.52 m slotted filter
8.00	Possibale tempineted at 7.00 m	0 0 0 0 0 0 0 0 0	337.00	7	SS	75\150mm							•		At drilling
	Borehole terminated at 7.92 m		336.00-												completion, dry cave at 7.62 m
9.00			335.00												
10.00			334.00											3	
11.00			333.00-												
12.00							-								
Dr	eviewed by: DN ill Method: Solid Stem Au otes: * Sampler driving on		vel.										Field Tech Sheet: 1 o Drafted by	f 1	



Naylor Engineering Associates of contactor according

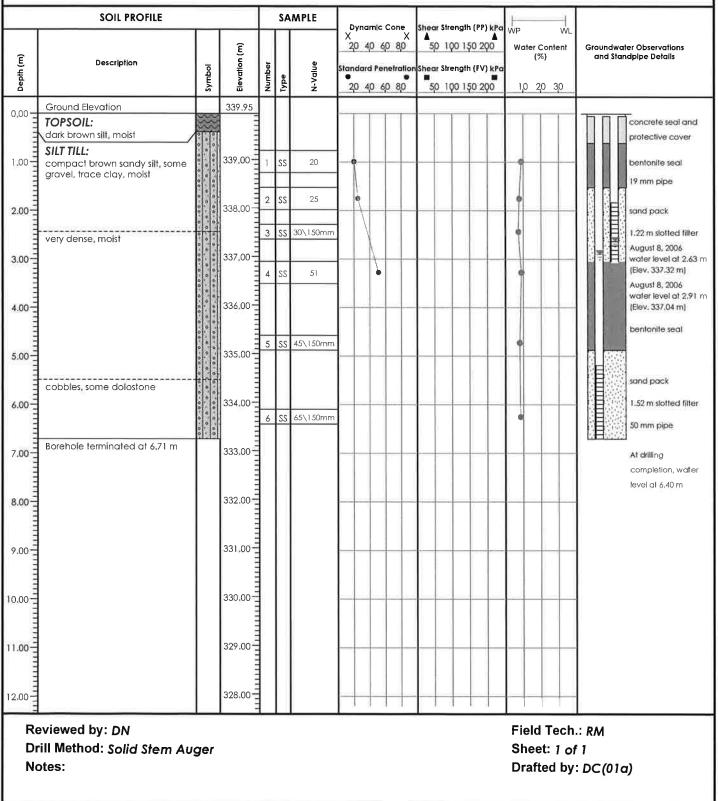
Project: P.T. Valeriote Subdivision

Location: Cityview Drive, Guelph, Ontario

Borehole Number: 104

Ground Elevation: 339.95 m

Job No.: 0353G4



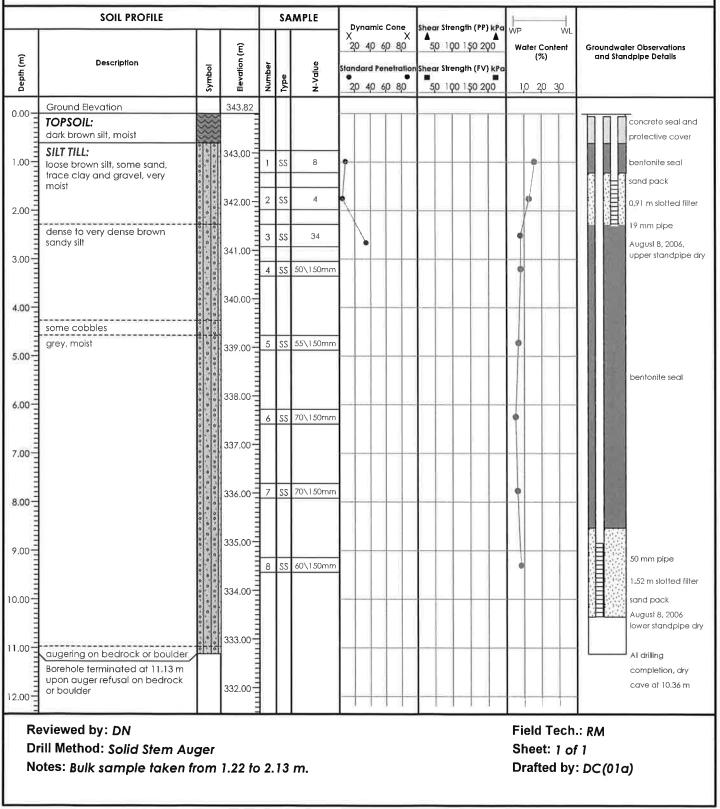


Location: Cityview Drive, Guelph, Ontario

Borehole Number: 105

Ground Elevation: 343.82 m

Job No.: 0353G4





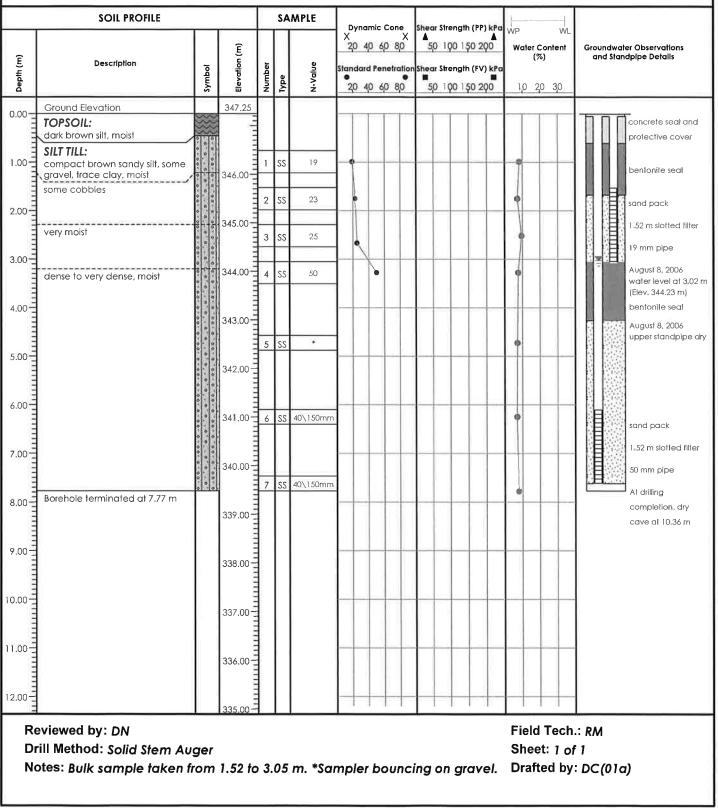
Location: Cityview Drive, Guelph, Ontario

Borehole Number: 106

Ground Elevation: 347.25 m

Job No.: 0353G4

Drill Date: August 2, 2006



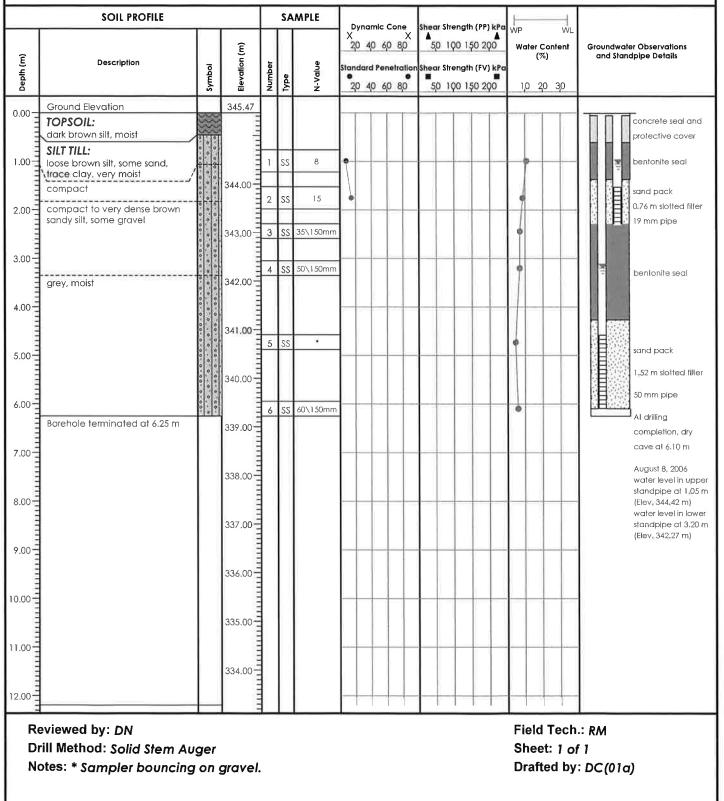


Location: Cityview Drive, Guelph, Ontario

Borehole Number: 107

Ground Elevation: 345.47 m

Job No.: 0353G4





Engineering Associates

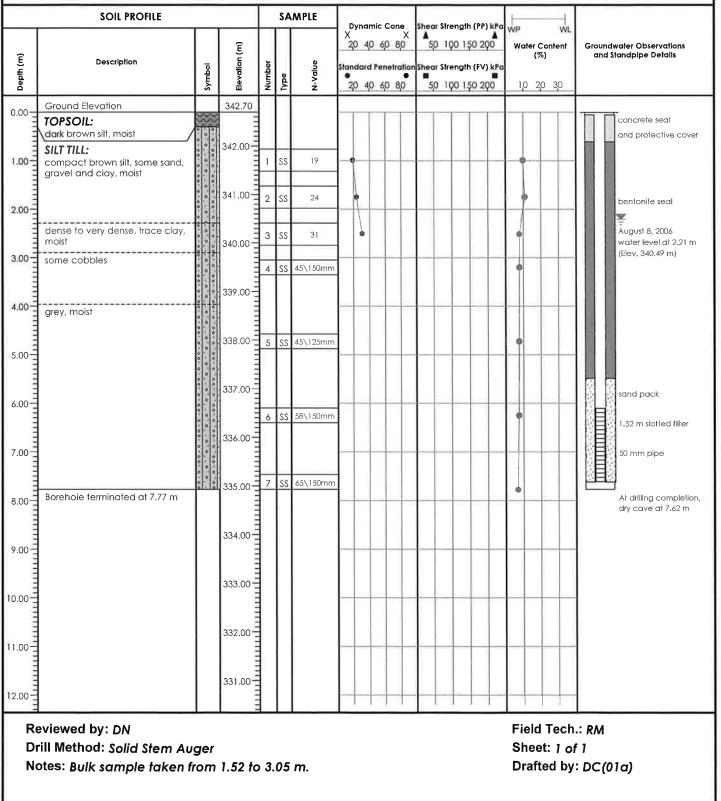
Project: P.T. Valeriote Subdivision

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	C	Dynamic Cone Shear Strength (PP) kPa V		H	W WL				
			Ē				X	X XIA		50 100 150 200	0 200 Water Content			water Observations	
Depth (m)	Description	ष	Elevation (m)	ber		N-Value	Star	ndard	Pene	tration	Shear Strength (FV) kPa		(%)	and S	tandpipe Details
Dep		Symbol	Elev	Number	Type	ž-z	2	0 4	0 60	80	50 100 150 200		1,0 2,0 3,0		
0.00-	Ground Elevation TOPSOIL:		326.19				_		T	-1-		_	1 1 1		concrete seal
	dark brown silt, moist	0.0													and protective cover
1.00-	SAND AND GRAVEL: very dense brown sand and	0.00		1	SS	55						ę			
	gravel, frequent cobbles and boulders, some silt, damp	0.00	325.00												
2.00		0.00 8.98	Ē	2	SS	30\150mm						•			
		0.0	324.00	3	SS	•									bentonite seal
3.00		0.0	=												50 mm pipe
3.00		0.0	323.00	4	SS	•						•			
	saturated	0.0	1											8 8	sand pack
4.00	saloralea	0.00	322.00									1			1.52 m slotled filler
		0.0		5	SS	•									August 8, 2006 water level at 4.44 m
5.00	augering on possible bedrock	2000 2000 2000 2000 2000	321.00									Γ			(Elev. 321.75 m)
	Borehole terminated at 5.64 m	8 9 6													At drilling completion,
6.00			320.00									F			wet cave al 3.96 m
100															
7.00			319.00							-		-			
8.00-			318.00				-	-	-	+-		╞			
9.00			317.00				-		_	_		-		ł	
			517.00												
10.00							-		-	-		┢			
			316.00												
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	viewed by Bt	L	314.00	1	L_		L	1					ield Tech		
	eviewed by: DN ill Method: Solid Stem Au	aer											Sheet: 7 of		
	otes: * Sampler bouncing		gravel.										Drafted by		1a)



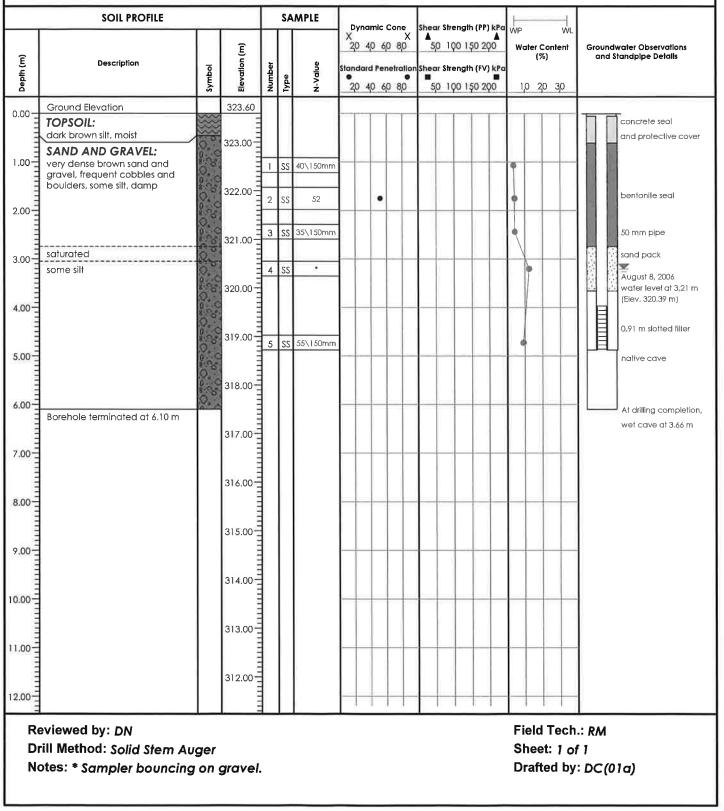
Location: Cityview Drive, Guelph, Ontario

Borehole Number: 110

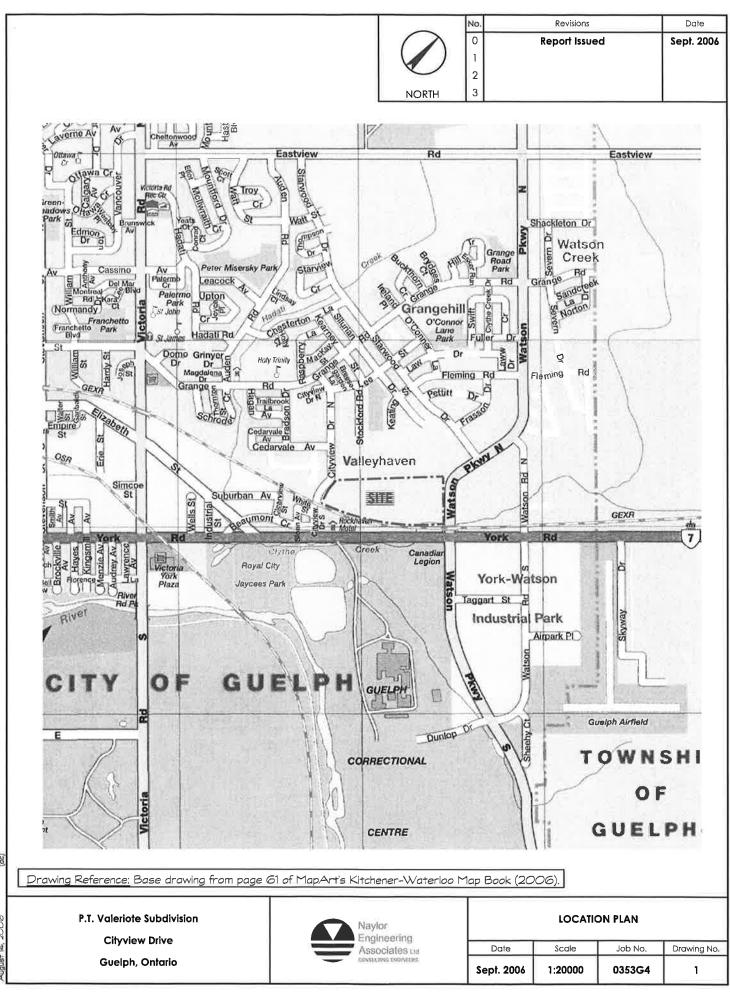
Ground Elevation: 323.60 m

Job No.: 0353G4

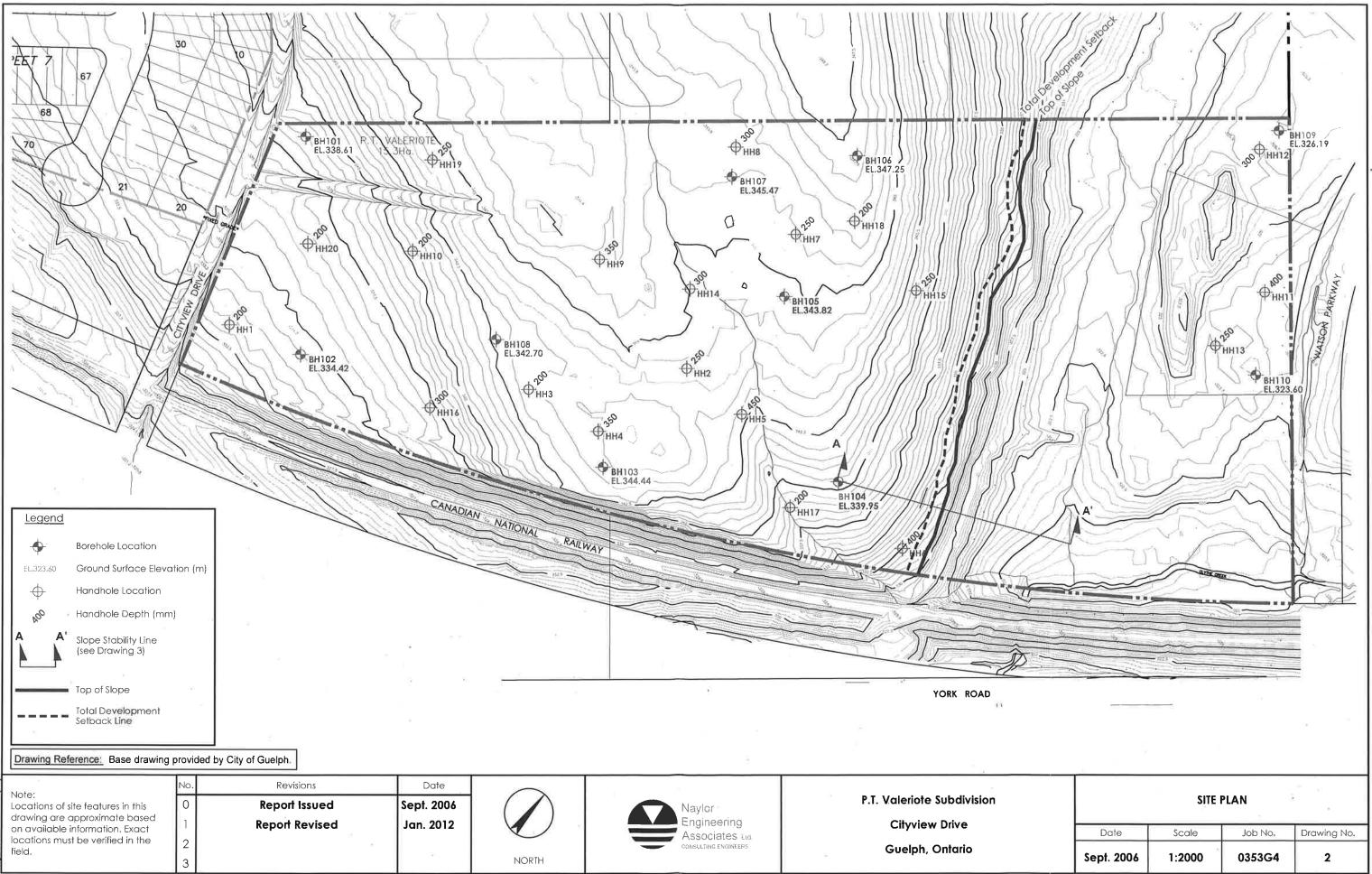
Drill Date: August 1, 2006



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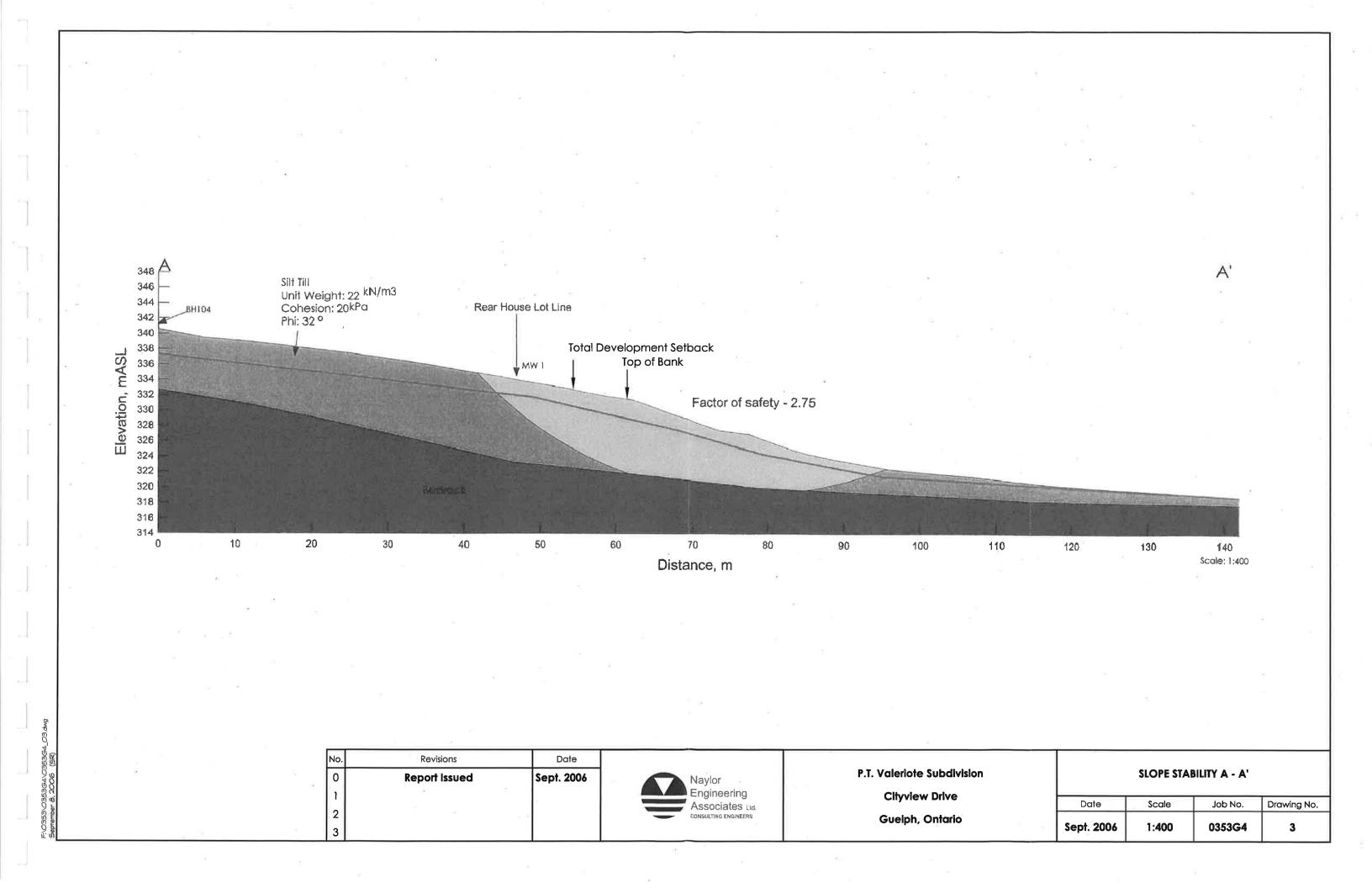


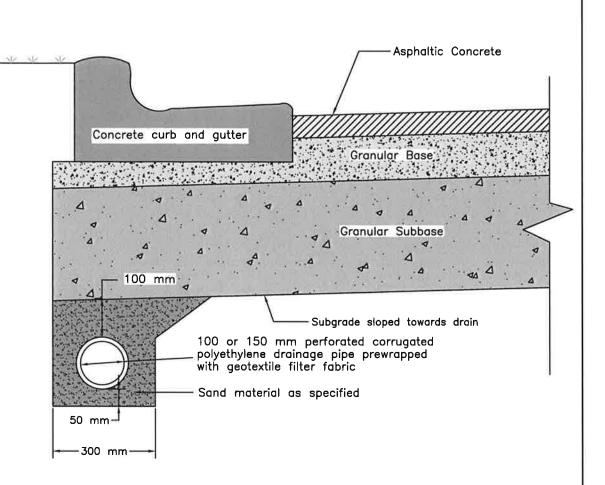
F:\0353\0353G4\0353G4_01,dwg August 14, 2006 (dc)



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

ii.



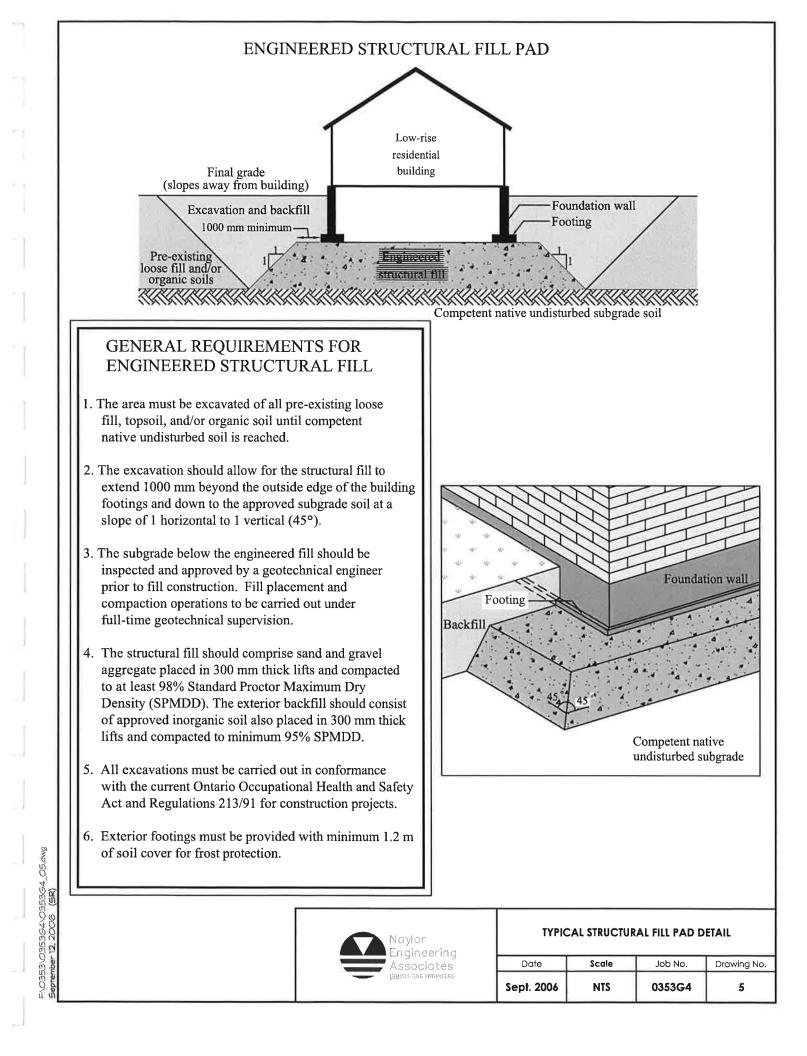


GENERAL REQUIREMENTS FOR PAVEMENT SUBDRAINS

- 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 Engineering	TYPIC	AL PAVEMEI	NT SUBDRAIN (DETAIL
Associates	Date	Scale	Job No.	Drawing No.
CONSULTING ENGINEERS	Sept. 2006	NTS	0353G4	4

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



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

APPENDIX "B"

Slope Stability Assessment Englobe Corp. (February 2016)



February 17, 2016

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

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

Dear Ms. Kroetsch:

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

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

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

General Information

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

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

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

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.

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

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

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

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

Retaining Wall Design and Construction

The design of the retaining walls should be done by a licensed structural engineer. The retaining wall must be designed to resist the lateral earth pressures. For calculating the lateral earth pressure for walls restrained at the bottom only, an active earth pressure coefficient (Ka) of 0.36 and soil unit weight of 20 kN/m³ may be used. An appropriate safety factor should be employed (Section 24.3.3.3 Canadian Foundation Engineering Manual).

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

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

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

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

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

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

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

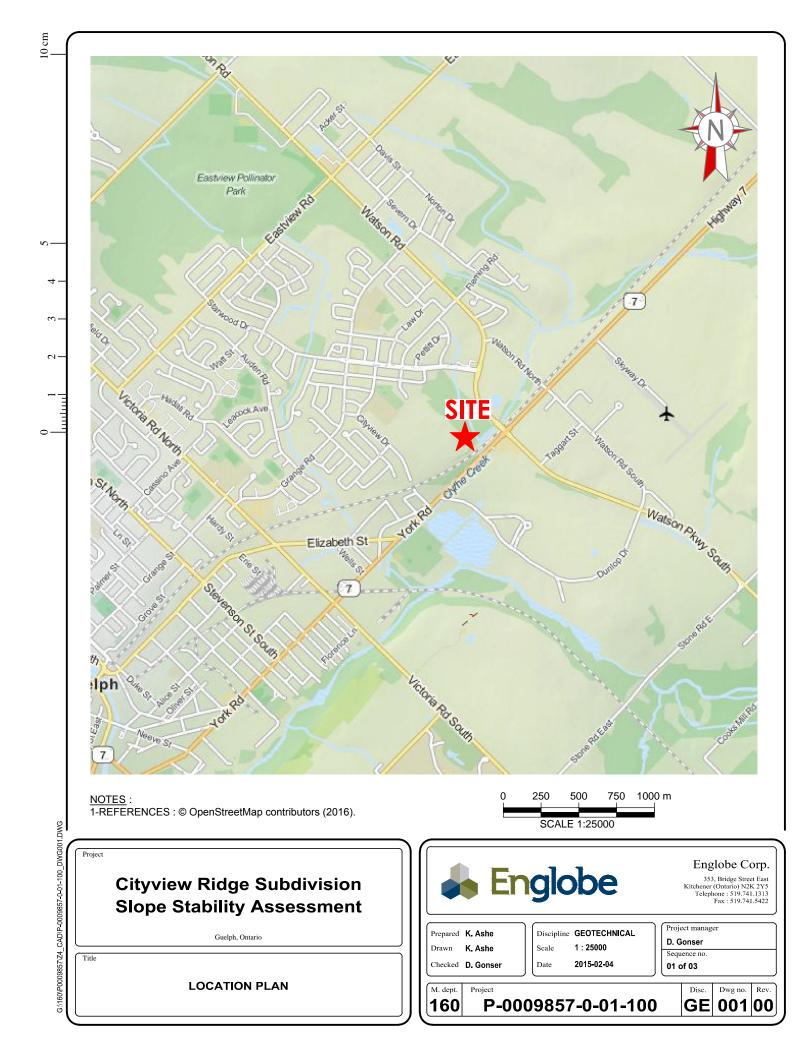
Yours very truly,

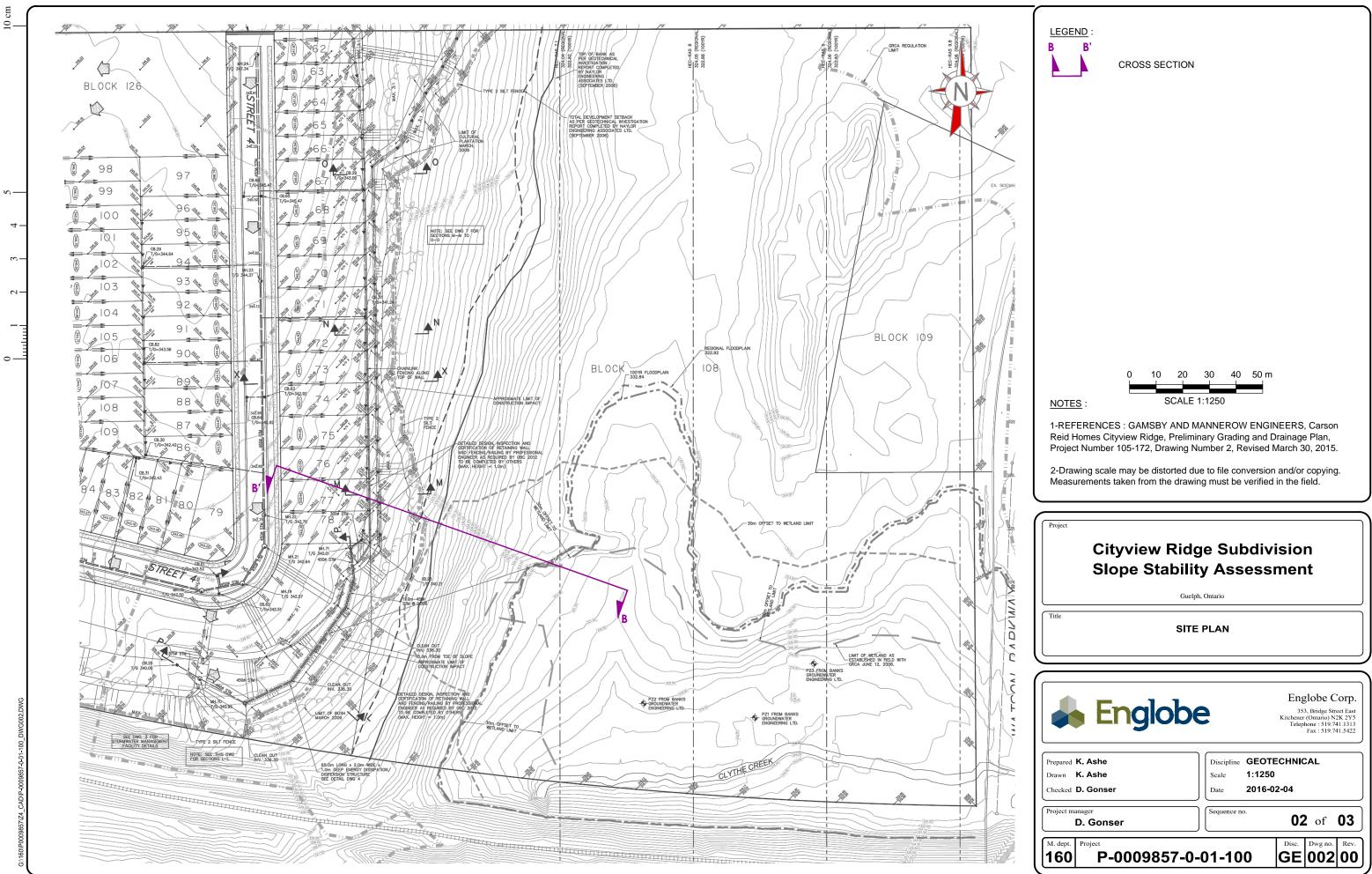
Dan Gonser EIT Geotechnical Department

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

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



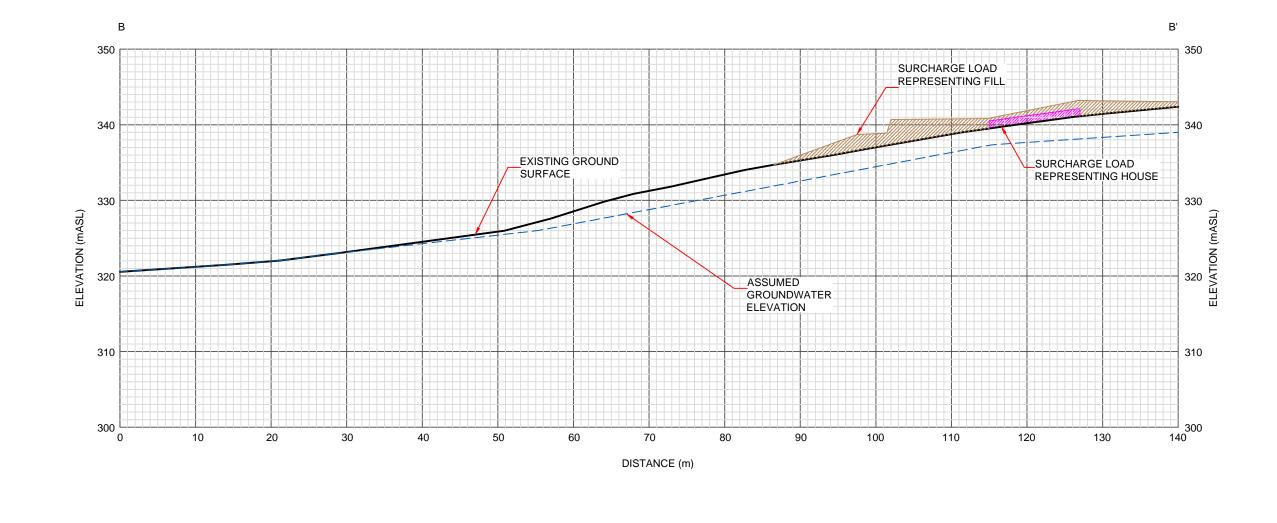


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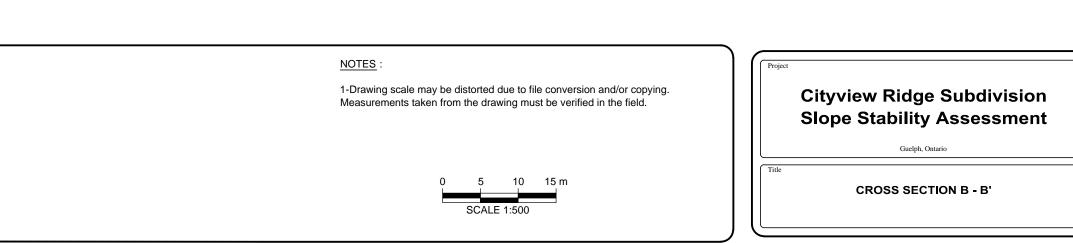
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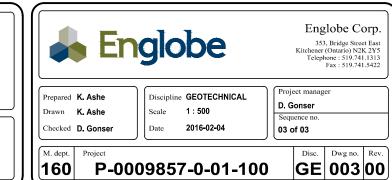
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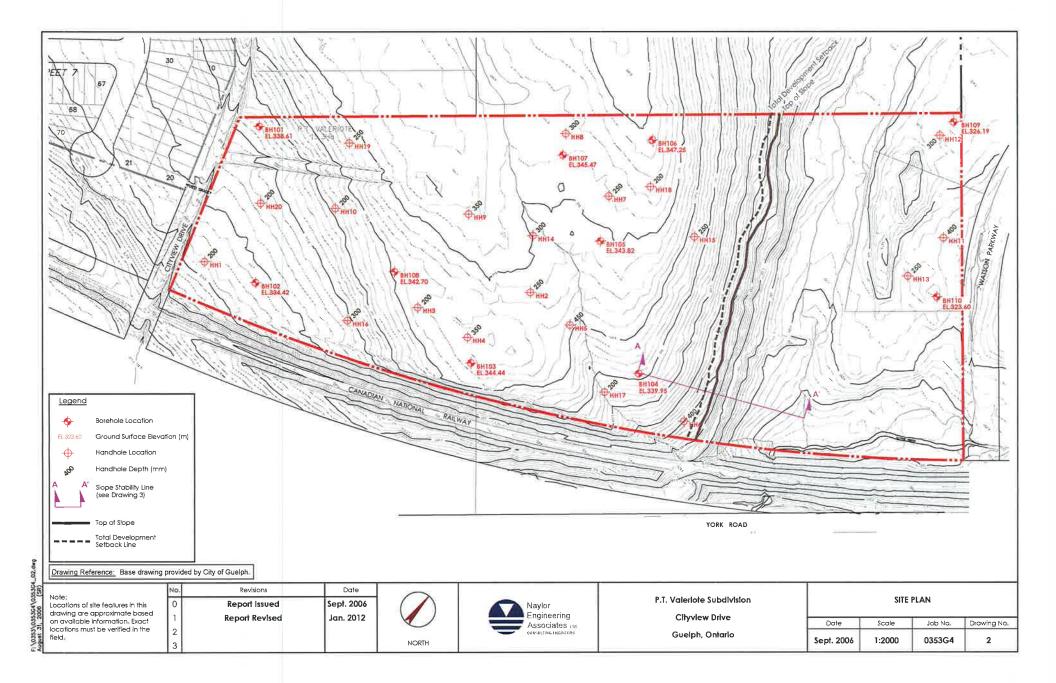
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Project: P.T. Valeriote Subdivision

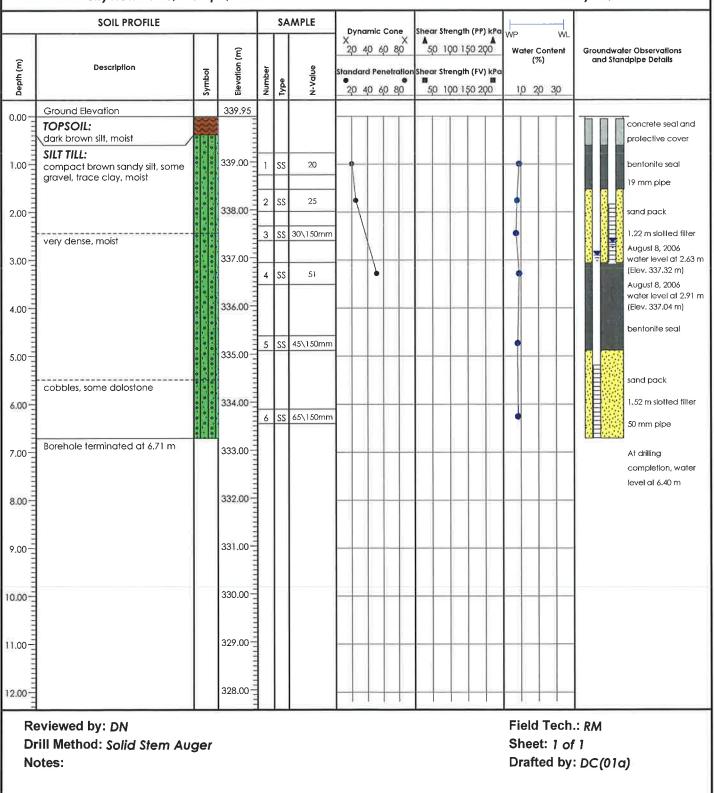
Borehole Number: 104

Ground Elevation: 339.95 m

Job No.: 0353G4

Drill Date: July 31, 2006

Location: Cityview Drive, Guelph, Ontario





Project: P.T. Valeriote Subdivision

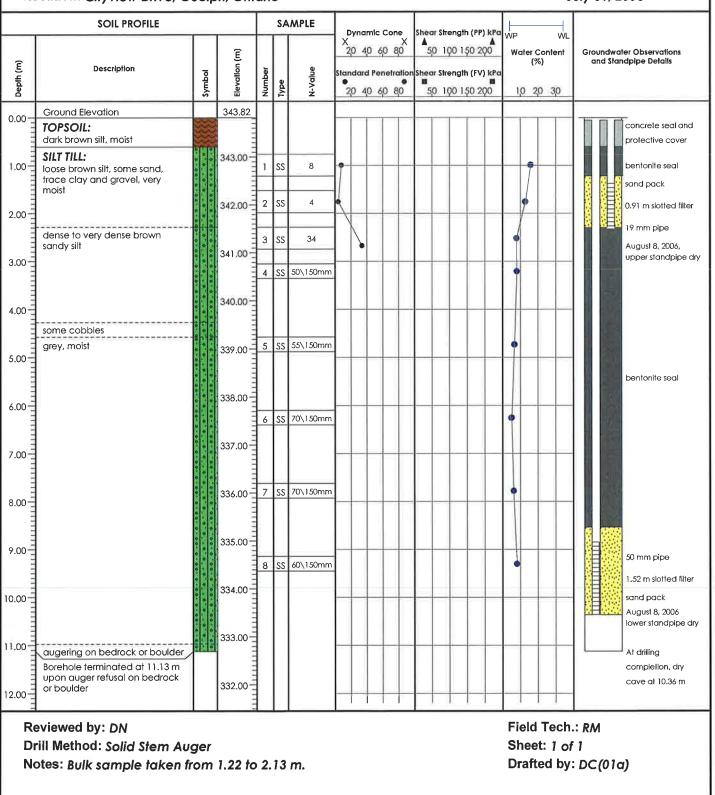
Borehole Number: 105

Ground Elevation: 343.82 m

Job No.: 0353G4

Drill Date: July 31, 2006

Location: Cityview Drive, Guelph, Ontario





Project: P.T. Valeriote Subdivision

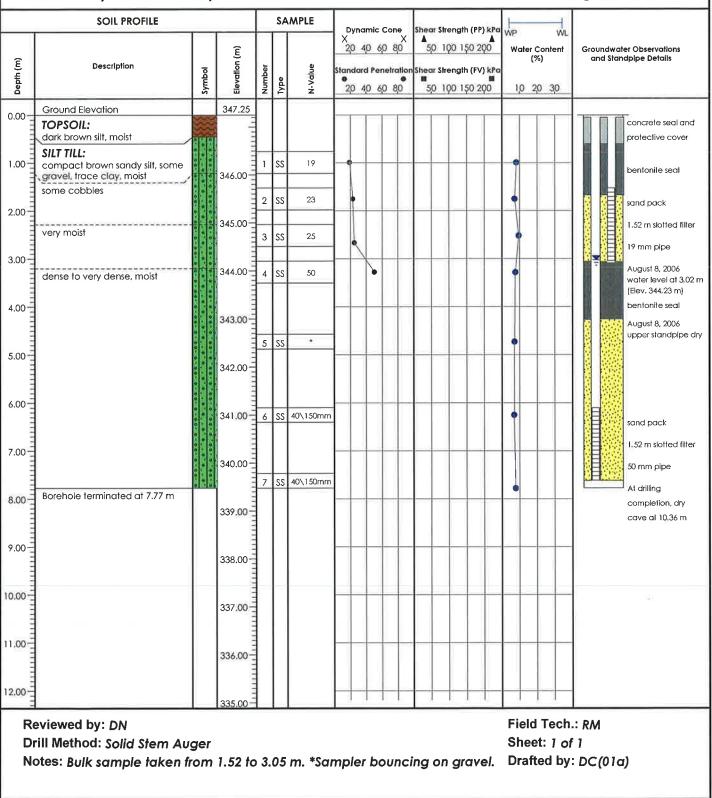
Borehole Number: 106

Ground Elevation: 347.25 m

Job No.: 0353G4

Drill Date: August 2, 2006

Location: Cityview Drive, Guelph, Ontario



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

APPENDIX "C"

GROUNDWATER ELEVATION MEASUREMENTS

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

GROUNDWATER ELEVATIONS (m)

INSTALLED AUGUST 2006

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

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

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

INSTALLED AUGUST 2006

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

INSTALLED AUGUST 2006

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

INSTALLED AUGUST 2006

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

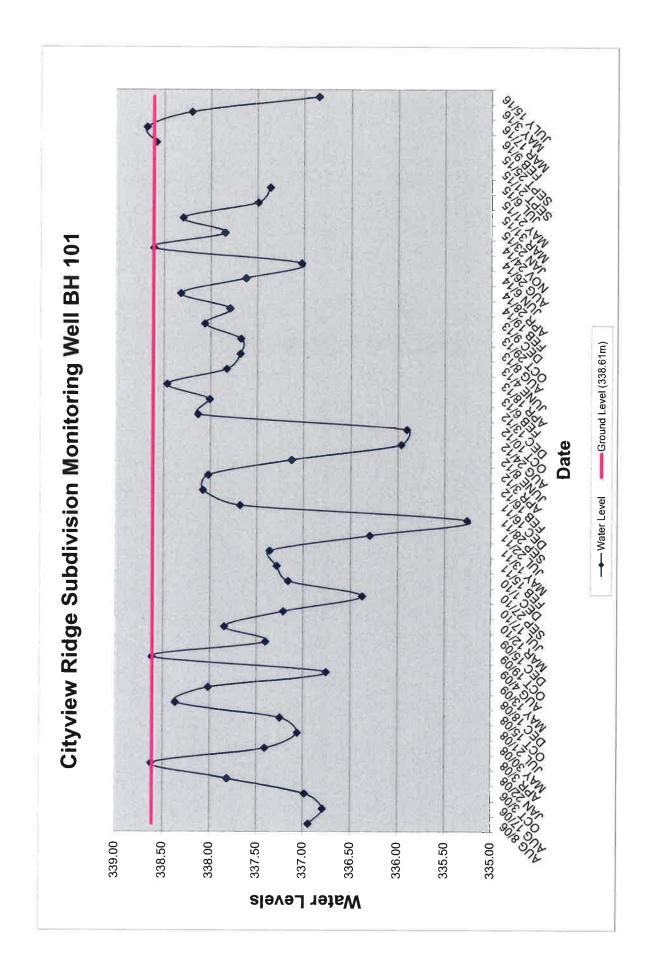
	MAY 21/15	337.496	332.443	343.112	342.194	337.539	336.846	342.484	336.302	344.708	344 654
	MAR 31/15	338.302	333.400	343.595	342.662	338.286	337.619	342.512	335.276	345.061	345 043
	NOV 24/14 JAN 23/15	337.846	332.687	343.070	342.204	337.713	337.206	342.243	336.011	344.633	344 612
		338.610	333.183	342.978	342.046	337.421	337.260	342.321	335.766	345.362	345 412
	AUG 26/14	337.026			340.666		335.534		334.894		343 153
	DATE>> JUN 6/14	337.622	332.640	343.252	342.362	338.064	337.471	342.466	336.664	344.703	344 690
006	TOP OF CASING ELEVATION (m)	339.38	335.22	345.74	345.70	340.66	340.59	344.49	344.41	347.98	347.92
INSTALLED AUGUST 2006	GROUND WELL ID. ELEVATION (m)	338.61	334.42	344.44	344.44	339.95	339.95	343.82	343.82	347.25	347.25
INSTALLE	WELL ID.	BH 101	BH 102	BH 103 U	BH 103 L	BH 104 U	BH 104 L	BH 105 U	BH 105 L	BH 106 U	BH 106 L

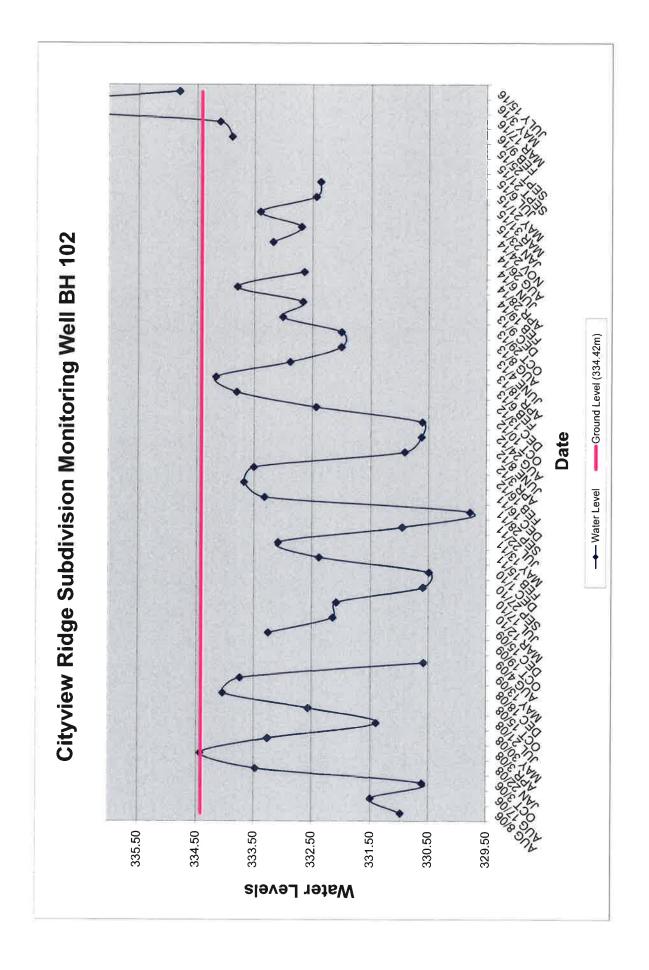
SEPT 21/15				339.666										322.233		
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MAY 21/15	337.496	332.443	343.112	342.194	337.539	336.846	342.484	336.302	344.708	344.654	344.466	344.320		322.785	321.389	
JAN 23/15 MAR 31/15	338.302	333.400	343.595	342.662	338.286	337.619	342.512	335.276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

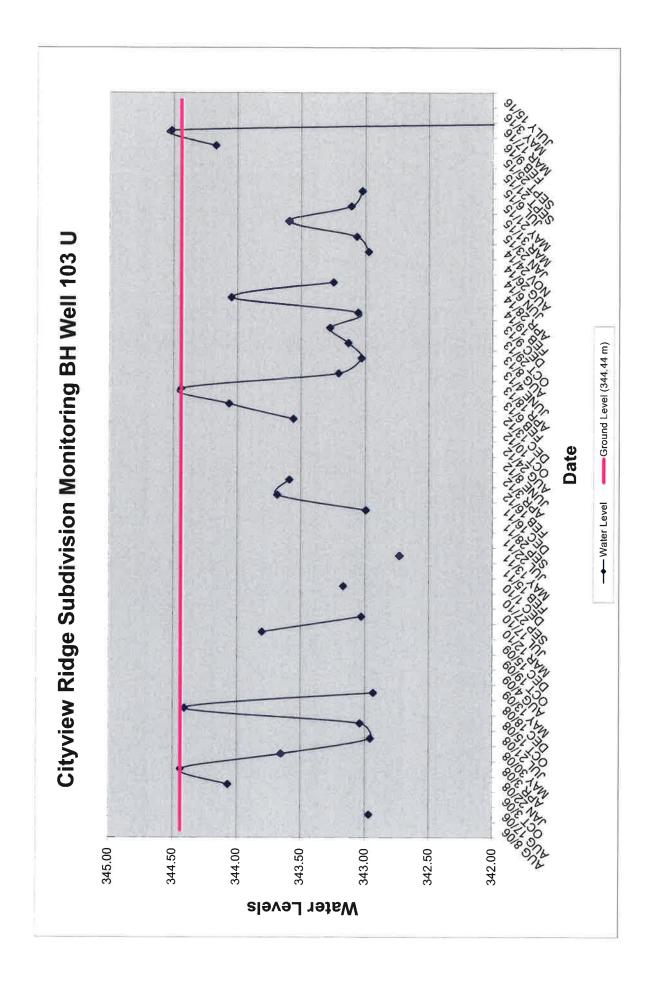
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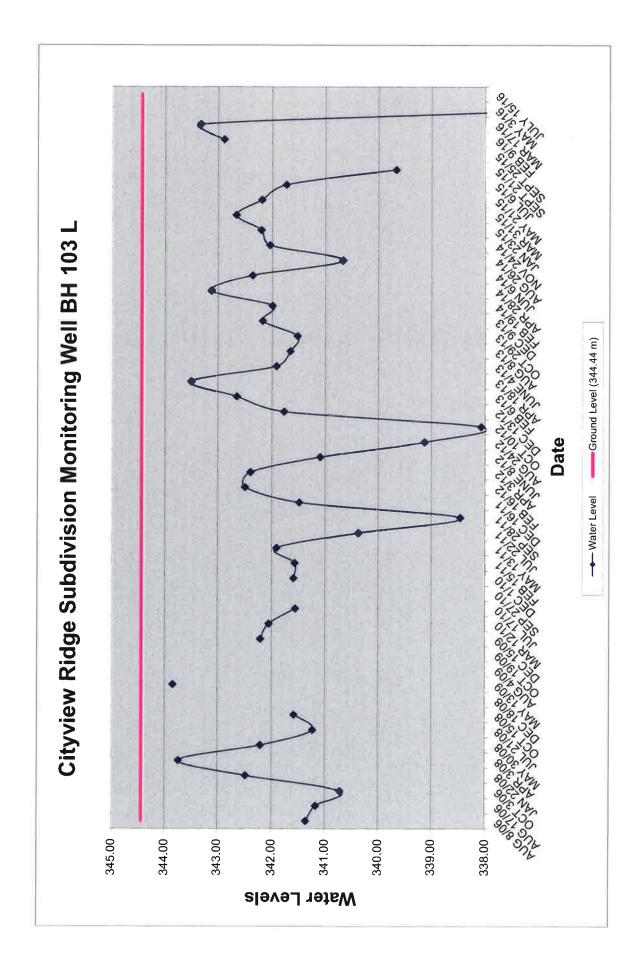
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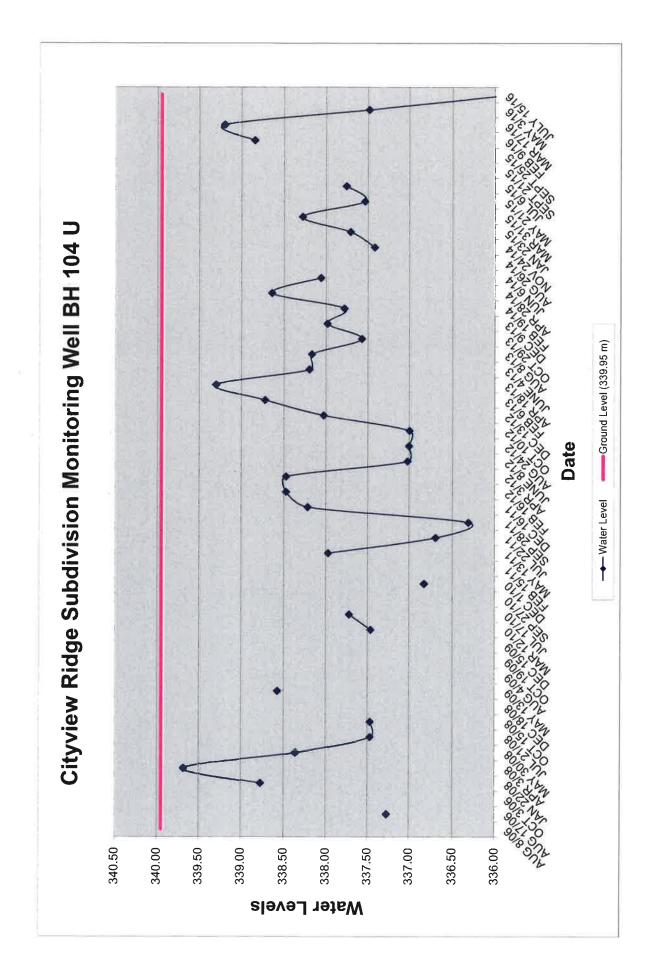
JULY 15/16	336.846	334.806	336.536	334.486	335.776	336.106	337.106	332.106	335.686	332.106	336.566			335.356	337.006
MAY 3/16	338.209	337.911	337.741	336.691	337.486	336.526	338.176	332.116	336.726	336.776	338.266			335.753	336.931
MAR 17/16	338.681	334.103	344.52	343.329	339.196	338.248	343.618	336.283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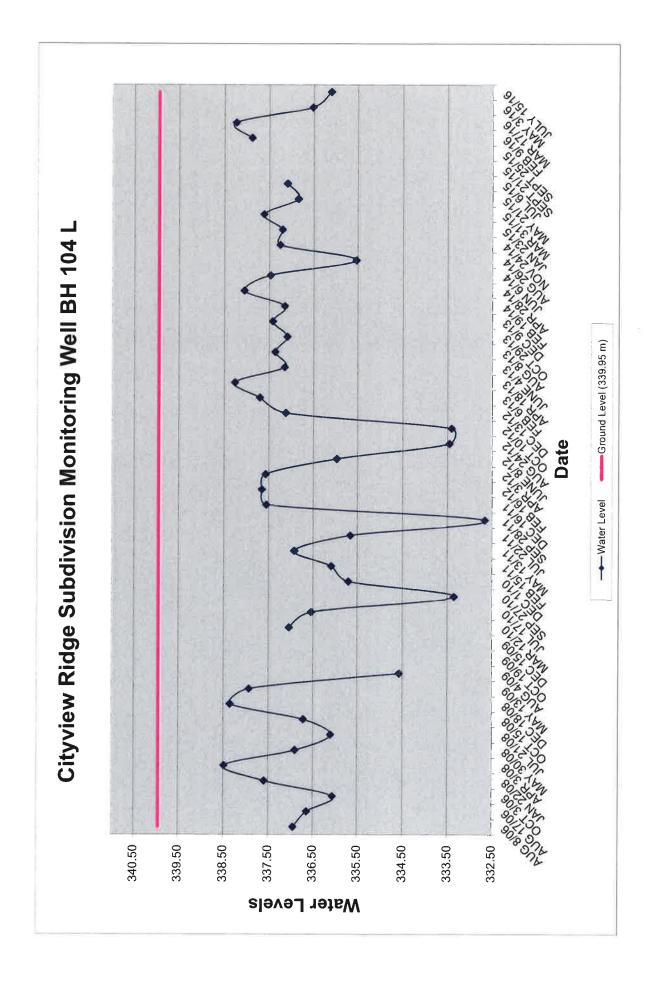


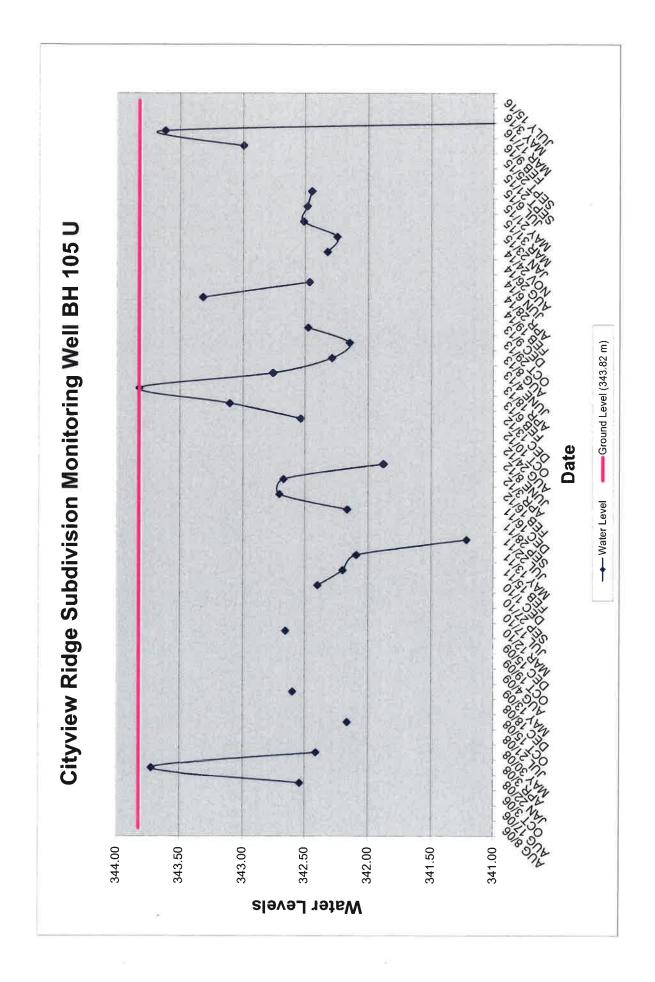


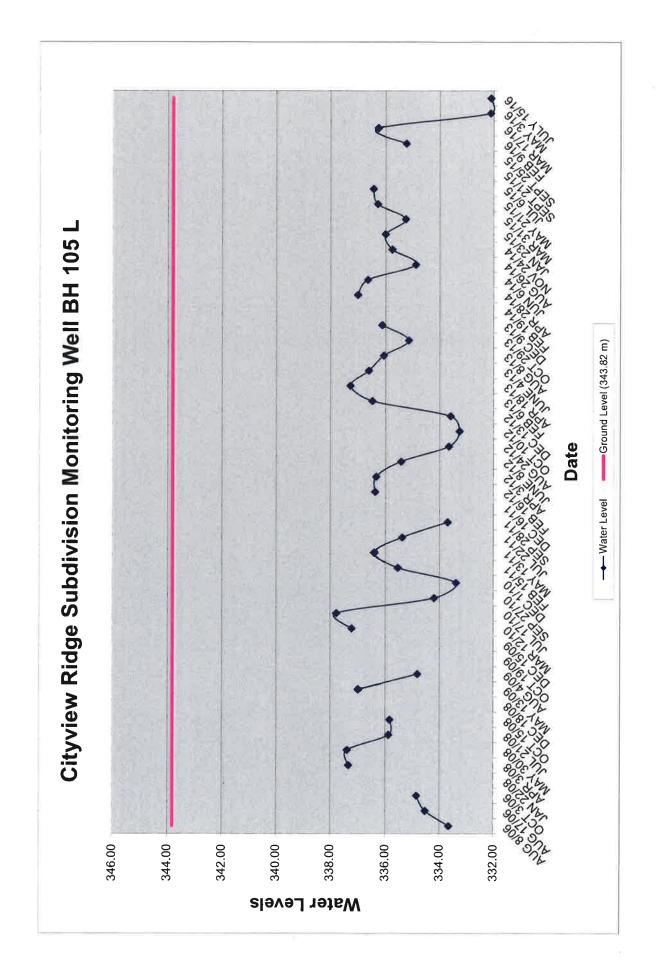


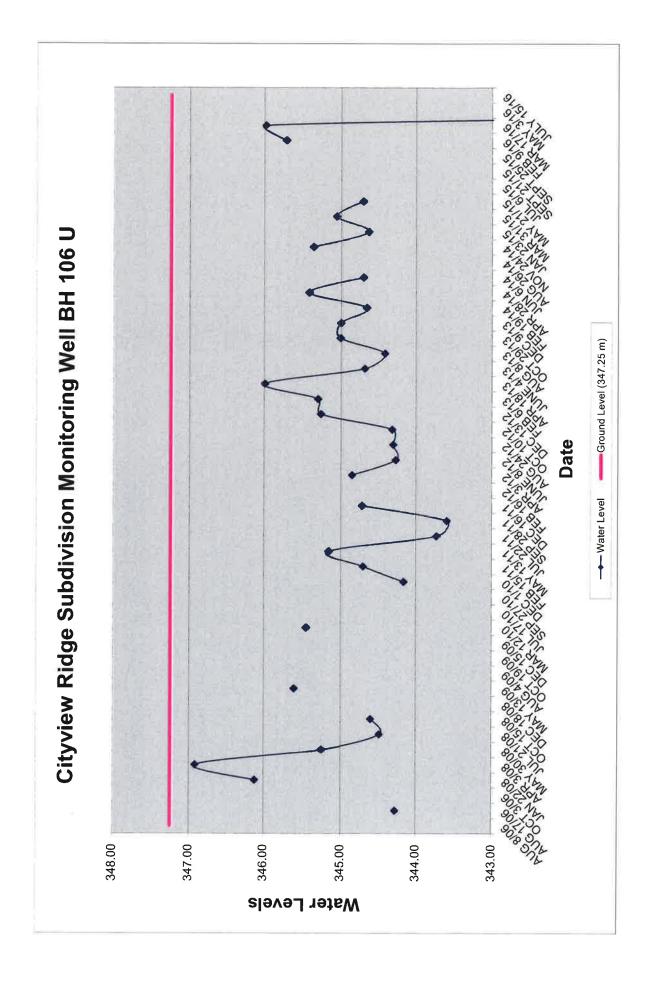


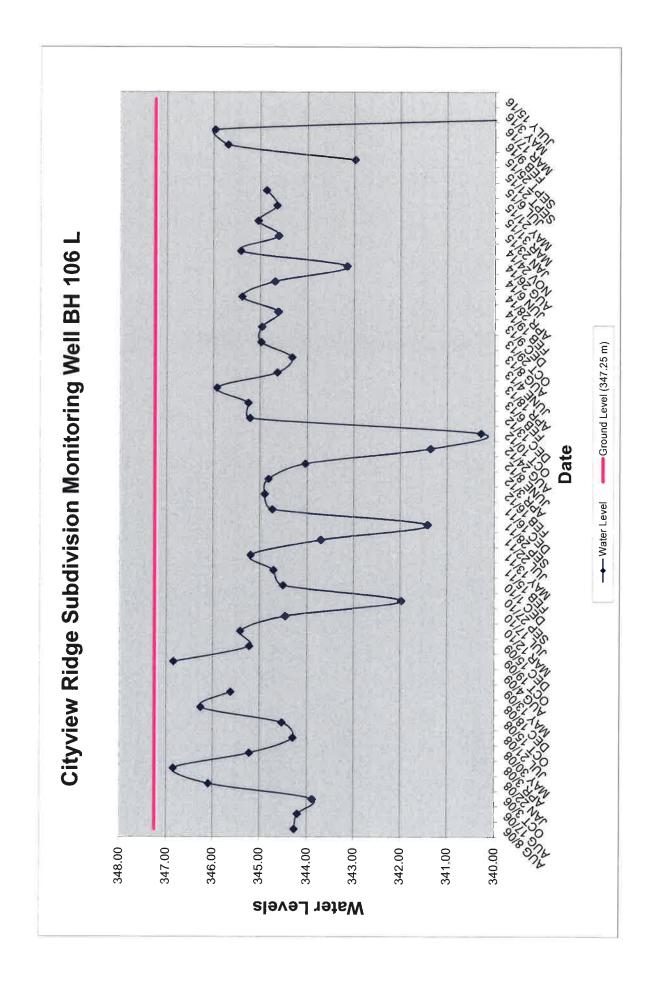


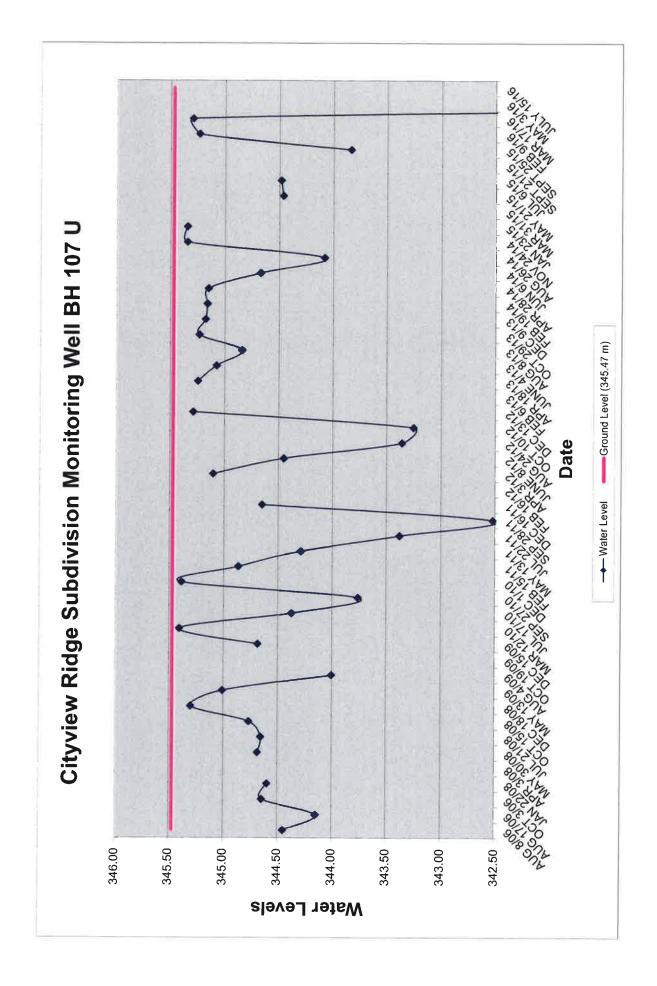


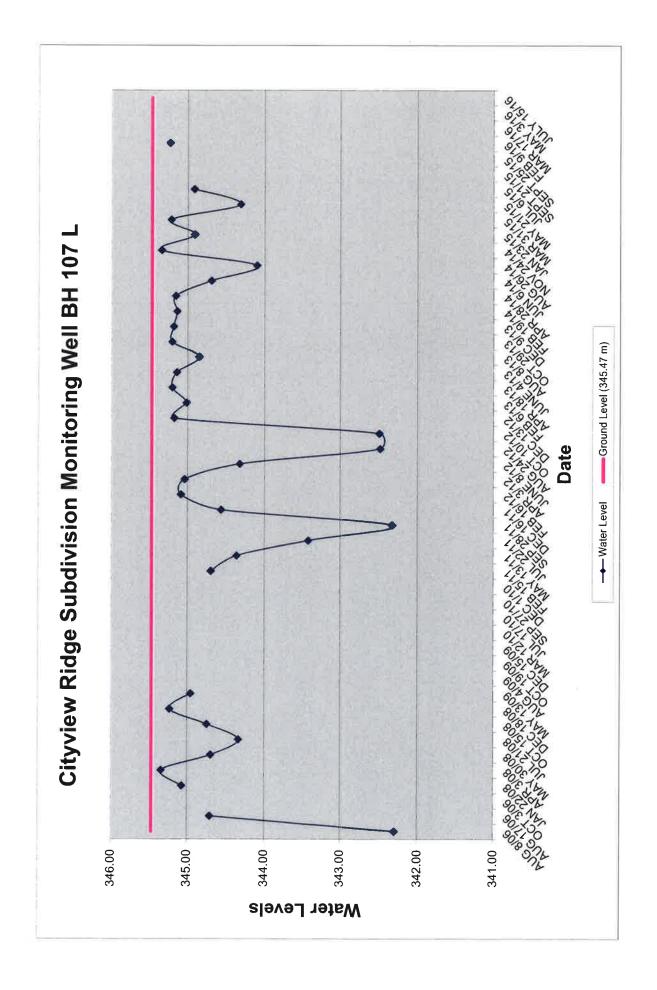


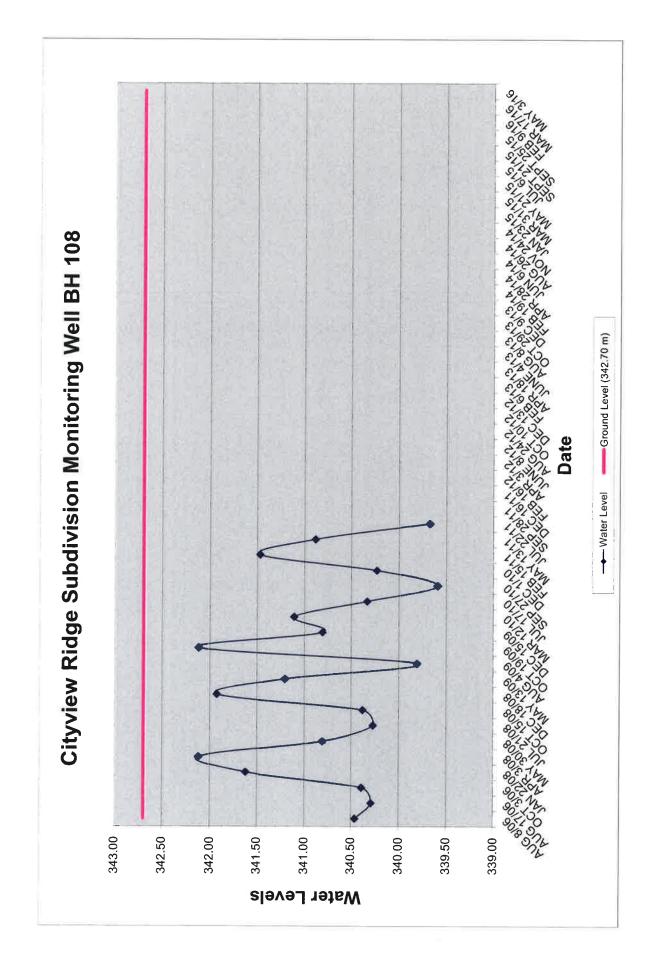


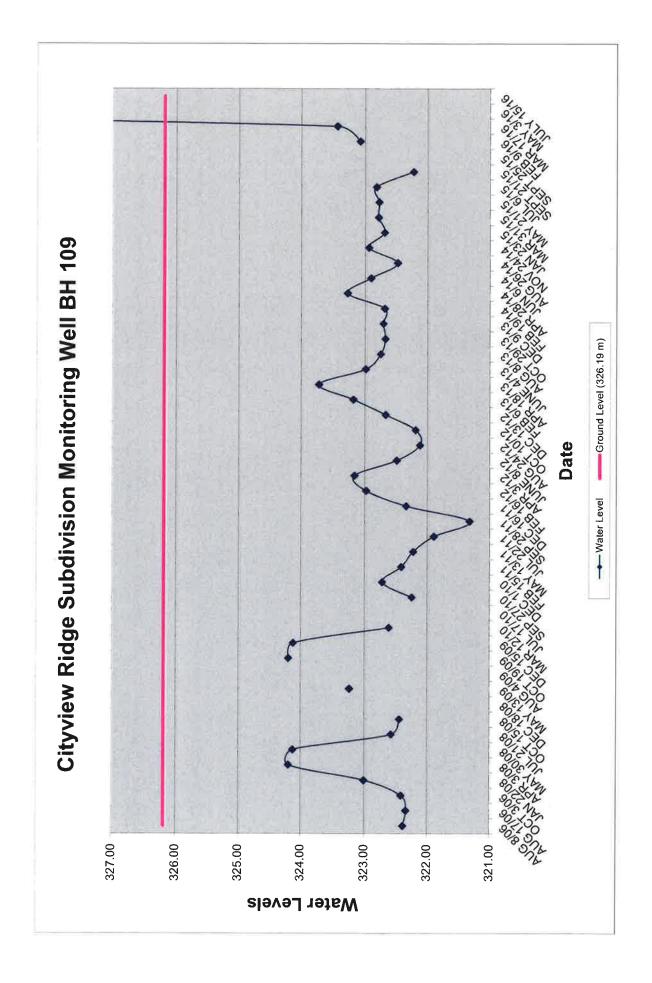


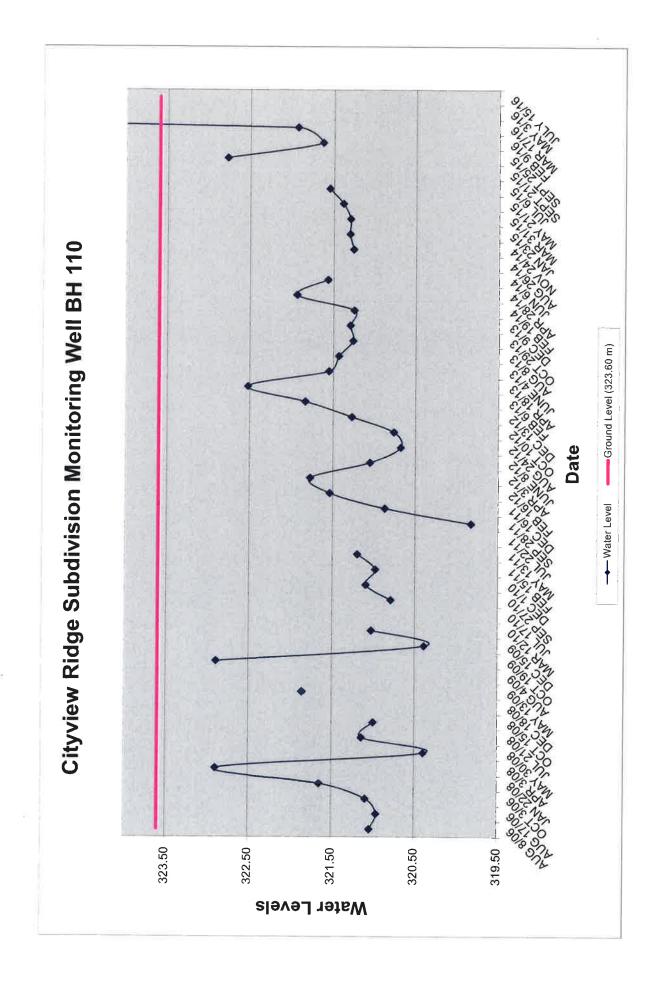












PRELIMINARY SERVICING & STORMWATER MANAGEMENT REPORT CITYVIEW RIDGE SUBDIVISION CITY OF GUELPH Revised: June 2017

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

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Respectfully submitted, Banks Groundwater Engineering Limited

final version to be signed by:

William D. Banks, P.Eng. Principal Hydrogeologist



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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

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

APPENDIX "E"

STORMWATER MANAGEMENT ANALYSIS

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

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**		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"
п		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"
17	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	ty 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"				
		0.250 Pervious Manning 'n'"				
н		75.000 Pervious Max.infiltrat	tion"			
11		12.500 Pervious Min.infiltrat				
**		0.250 Pervious Lag constant				
п		5.000 Pervious Depression st	(nours)			
		0.015 Impervious Manning 'n'	u age			
11		0.000 Impervious Max.infiltr	ation"			
**		0.000 Impervious Min.infiltr				
		0.050 Impervious Lag constar	t (hours	<u>۱</u>		
		1.500 Impervious Depression	storade")		
11		1.971 1.454	2.160	2 160 /	c.m/sec'	1
11			ervious	Impervious	Total A	lrop "
**		- 6	480	0.000	6.480	hectare"
			.869	2.089	11.869	minutes"
11			4.828	98.071	104.828	
**			8.830	88.830	88.830	mm"
**			56.17	0.01	5756.17	
			3.360	2.670	43.360	mm''
11			.470	86.160	45.470	mm''
11			46.46	0.01	2946.46	
**			000	0.000	0.000	11
		Maximum flow 1.	971	0.000	1.971	c.m/sec"
	40	HYDROGRAPH Add Runoff "				erniy see
**		4 Add Runoff "				
**		1.971 3.425	2.160	2.160"		
**	40	HYDROGRAPH Copy to Outflo	w''			
		8 Copy to Outflow"				
		1.971 3.425	3.425	2.160"		
11	40		."			
		6 Combine "				
		1 Node_#"				
		Total Discharge"				
**		Maximum flow	5.58		ec"	
		Hydrograph volume	8540.44			
	40	1.971 3.425	3.425	5.585"		
	40	HYDROGRAPH Confluence	1"			
		7 Confluence "				
**		1 Node #"				
		Total Discharge"		-		
п		Maximum flow	5.58	35 c.m/se	ec"	
		Hydrograph volume	8540.44			
**	38	1.971 5.585	3.425	0.000"		
**	20	START/RE-START TOTALS 1" 3 Runoff Totals on EXIT"				
				10	200	
		Total Catchment area				hectare"
		Total Impervious area		<u>0</u> .	562	hectare"
11	19	Total % impervious EXIT"		5.	072"	
	±-2					

	105172 EX CO	nd Regional
11 11 11	MIDUSS Output MIDUSS version MIDUSS created 10 Units used:	Version 2.07 rev. 379" April 25, 2005" ie METRIC"
77 77 78	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" STORM Historic"	
11 11 11	5 Historic" 2880.000 Duration" 48.000 Rainfall intensity values 2.028 2.028 2.02	
11 11 11	2.028 2.028 2.02 2.028 2.028 2.02 2.028 2.028 2.02 2.028 2.028 2.02 2.028 2.028 2.02	28 2.028 2.028" 28 2.028 2.028" 28 2.028 2.028"
11 11 11	2.028 2.028 2.02 2.028 2.026 2.02 2.026 6.000 4.00	28 2.028 2.028" 26 2.206 2.028" 00 6.000 13.000"
11 11 11	17.000 13.000 23.00 53.000 38.000 13.00 Maximum intensity Total depth 2	
" 33 "	6 001hyd Hydrograph extens CATCHMENT 10" 1 Triangular SCS"	ion used in this file"
11 11	1 Equal length" 2 Horton equation" 10 Catchment 10 - To Hadati C 8.000 % Impervious"	reek"
77 77 77 87	7.020 Total Area" 45.000 Flow length" 2.000 Overland Slope"	
11 11 11	6.458 Pervious Area" 45.000 Pervious length" 2.000 Pervious slope" 0.562 Impervious Area"	
•• •• ••	45.000 Impervious length" 2.000 Impervious slope" 0.250 Pervious Manning 'n'" 75.000 Pervious Max.infiltration"	
** ** **	12.500 Pervious Min.infiltration" 0.250 Pervious Lag constant (hou 5.000 Pervious Depression storag	rs)"
11 17 17	0.000 Impervious Max.infiltratio 0.000 Impervious Min.infiltratio 0.050 Impervious Lag constant (h	n" ours)"
11 11 11	Catchment 10 Pervio Surface Area 6.458	.ŎOO 0.000 c.m/sec"
11 11 11	Time of concentration 21.969 Time to Centroid 2780.2 Rainfall depth 285.18 Rainfall volume 1.8418	3.647 18.018 minutes" 45 2236.863 2663.074 minutes" 0 285.180 285.180 mm"
**	Rainfall losses 207.17 Page	2 38.558 193.683 mm"

		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 cm/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"	
11		1 Node #" Total Discharge"	
**		Total Discharge" Maximum flow 0.587 c.m/sec"	
		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"	
		4.780 Total Area"	
		45.000 Flow length"	
		2.000 Overland Slope"	
		4.780 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"	
		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 "	
н			
11			
**			
11		Time to Centroid 2780.245 2236.863 2780.243 minutes" Rainfall depth 285.180 285.180 285.180 mm"	
н		Rainfall volume 1.3632 0.0000 1.3632 ha-m"	
		Rainfall losses 207.172 38.558 207.172 mm"	
н		Runoff depth 78.008 246.622 78.008 mm"	
11		Runoff volume 3728.78 0.01 3728.80 c.m"	
**		Runoff coefficient 0.000 0.000 0.000 "	
**		Maximum flow 0.397 0.000 0.397 c.m/sec"	
	40	HYDROGRAPH Add Runoff "	
		4 Add Runoff "	
	22	0.397 0.397 0.587 0.587"	
	33	CATCHMENT 30"	
		1 Triangular SCS" 1 Egual length"	
		Page 2	

		1051	72 Ex Cond Re	lenoi		
		2 Horton equation"		eyronar		
		30 Catchment 30 - To	Clythe Creek	. 97		
11		0.000 % Impervious"	eryche ereen	•		
**		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"				
11		45.000 Impervious length"				
11		2.000 Impervious slope"				
**		0.250 Pervious Manning '	n'"			
		75.000 Pervious Max.infil	tration"			
		12.500 Pervious Min.infil				
		0.250 Pervious Lag const				
11		5.000 Pervious Depressio	n storage"			
**		0.015 Impervious Manning	'n'"			
11		0.000 Impervious Max.inf	iltration"			
		0.000 Impervious Min.inf				
		0.050 Impervious Lag con)"		
11		1.500 Impervious Depress	ion storage"	-		
**		0.538 0.3		0.587	c.m/sec"	
**		Catchment 30	Pervious		Total Area	11
		Surface Area	6.480	0.000	6.480	hectare"
		Time of concentration	21.969	3.647	21.969	minutes"
**		Time to Centroid	2780.244	2236.863	2780.243	minutes"
**		Rainfall depth	285.180	285.180	285.180	mm''
		Rainfall volume	1.8480	0.0000	1.8480	ha-m"
		Rainfall losses	207.172	38.558	207.172	mm''
		Runoff depth	78.008	246.622	78.008	mm''
		Runoff volume	5054.92	0.02	5054.94	c.m"
		Runoff coefficient	0.000	0.000	0.000	
	40	Maximum flow	.0.538	0.000	0.538	c.m/sec"
	40	HYDROGRAPH Add Runoff				
11		4 Add Runoff "				
	40	0.538 0.9	36 0.587	0.587"		
**	40	HYDROGRAPH Copy to Ou	TTIOW"			
		8 Copy to Outflow"		0 5071		
н	40	0.538 0.9	36 0.936	0.587"		
н	40	HYDROGRAPH Combine	1"			
		6 Combine " 1 Node #"				
11		Total Discharge"				
		Maximum flow	1 5)) ()	o.e."	
н		Hydrograph volume	1.5 15206.8		ec	
11		0.538 0.9		1.522"		
**	40	HYDROGRAPH Confluence	ce 1"	1.322		
**		7 Confluence "				
11		1 Node #"				
п		Total Discharge"				
н		Maximum flow	1.5	22 c.m/s	ec"	
11		Hydrograph volume	15206.84	41 c.m"		
**		0.538 1.52				
11	38	START/RE-START TOTALS		0.000		
		3 Runoff Totals on EX				
		Total Catchment area	· _ •	18	.280 hec	tare"
11		Total Impervious area				tare"
**		Total % impervious		3 3	.072"	
**	19	EXIT"		5		

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 Υ 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 $
$\begin{array}{rcl} \text{Max.Eff.Inten.}(\text{mm/hr}) = & 61.55 & .00 & \\ & \text{over} (\text{min}) & 5.00 & 325.00 & \\ & \text{Storage Coeff.} (\text{min}) = & 2.45 (\text{ii}) & 320.46 (\text{ii}) & \\ & \text{Unit Hyd. Tpeak} (\text{min}) = & 5.00 & 325.00 & \\ & \text{Unit Hyd. peak} (\text{cms}) = & .30 & .00 & \\ & \text{TOTALS*} & \\ & \text{PEAK FLOW} & (\text{cms}) = & .15 & .00 & 1.51 (\text{iii}) & \\ & \text{TIME TO PEAK} & (\text{hrs}) = & 1.33 & .00 & 1.33 & \\ & \text{RUNOFF VOLUME} & (\text{mm}) = & 23.50 & .00 & 18.56 & \\ & \text{TOTAL RAINFALL} & (\text{mm}) = & 25.00 & 25.00 & 25.00 & \\ & \text{RUNOFF COEFFICIENT} & = & .94 & .00 & .74 & \\ & ***** & \text{WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP! & \\ & ***** & \text{WARNING: THE PERVIOUS AREA HAS NO FLOW . & \\ & (\text{i}) & \text{HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: & F0 & (mm/hr) = 75.00 & K & (1/hr) = 4.14 & \\ & \text{Fc} & (mm/hr) = 12.50 & \text{Cum.Inf.} & (\text{mm}) = & .00 & \\ & (\text{ii}) & \text{TIME STEP} & (\text{DT}) & \text{SHOULD BE SMALLER OR EQUAL & \\ & \text{THAN THE STORAGE COEFFICIENT.} & \\ & (\text{iii}) & \text{PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.} & \\ \end{array}$
<pre>CALIB CALIB STANDHYD (0543) ID= 1 DT= 5.0 min Surface Area Dep. Storage CALIB Area (ha)= 14.99 Total Imp(%)= 80.00 Dir. Conn.(%)= 79.00 IMPERVIOUS PERVIOUS (i) Surface Area (ha)= 11.99 Dep. Storage (mm)= 1.50 Page 2</pre>

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	ERVIOUS	AREA HAS NO FLOW	v .				
<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>							
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)= 4.14 Page 5

Hadati Creek Watershed - Allowable Fc (mm/hr)= 12.50 Cum.Inf. (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 (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							
 (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. 							
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)= .0 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.Eff.Inten.(mm/hr)= over (min) Storage Coeff. (min)= Unit Hyd. Tpeak (min)= Unit Hyd. peak (cms)= 61.55 5.00 6.31 (ii) 5.00 30.00 30.00 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 (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 30.70 (ii) 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 10.00 35.00 10.00 10.00 35.00 10.00 .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)5) 51.3)6) 51.3 FLOW RE	EA QE a) (0 20 1. 20 . DUCTION [0	PEAK cms) .538 .155 Dout/Oir	TPEAK (hrs) 1.3 2.42	0.08	54 53
	TIME MAXIN	SHIFT OF PE NUM STORAGE	AK FLOW USED) (ha	(min)= 69 a.m.)=	5.00 .2763	
ROUTE CHN (0 IN= 2> OL)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	9	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	(Cd.m.) .102E+02 .409E+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	channel-> MAX VEL (m/s) .72 .52
ROUTE CHN (C IN= 2> OL		Routing ti	me step (m	nin)'=	5.00		
	< [Distance .00 5.50		zion 26	Manning .0300 300 / .(9	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</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	

.24	.20 .	194E+04	ek Watersh 1.8 2.3 2.8 3.4 4.0 4.8 5.5 6.4 7.3 8.2	1 1 1 1 1 1 1 1	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 : II OUTFLOW: II	D= 2 (0360) D= 1 (0362)	AREA (ha)) 30.00) 30.00	< hyc QPEAK (cms) .83 .41	irograph 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
	L (0455): 2 (0460): 3 (0465):	48.70	1.534	1.33	6.64		
	 L (0510): 2 (0505): 3 (0515):	260.00	(cms) 1.475 5.342 	(hrs) 1.42 1.58 1.58	(mm) 18.56 7.77 		
с DEPTH	= 1 DA Distance .00 1.00 1.50 2.00 3.50 4.50 6.00 ELEV	Elevat 101. 100. 99. 99. 100. 101. TRAVEL VOLUME	TION (1 ion 50 70 55 .05 50 60 65 .03 45 TIME TABL FLOW RATE	L.1) Manning .0500 .0500 500 / .03 .0300 .0300 .0300 .0500 .0500	00 Mai Mai Mai 00 Mai	TRAV.TIME	
DEPTH (m)	ELEV (m)			E VELC (m			

			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. 1. 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 .56 .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.

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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

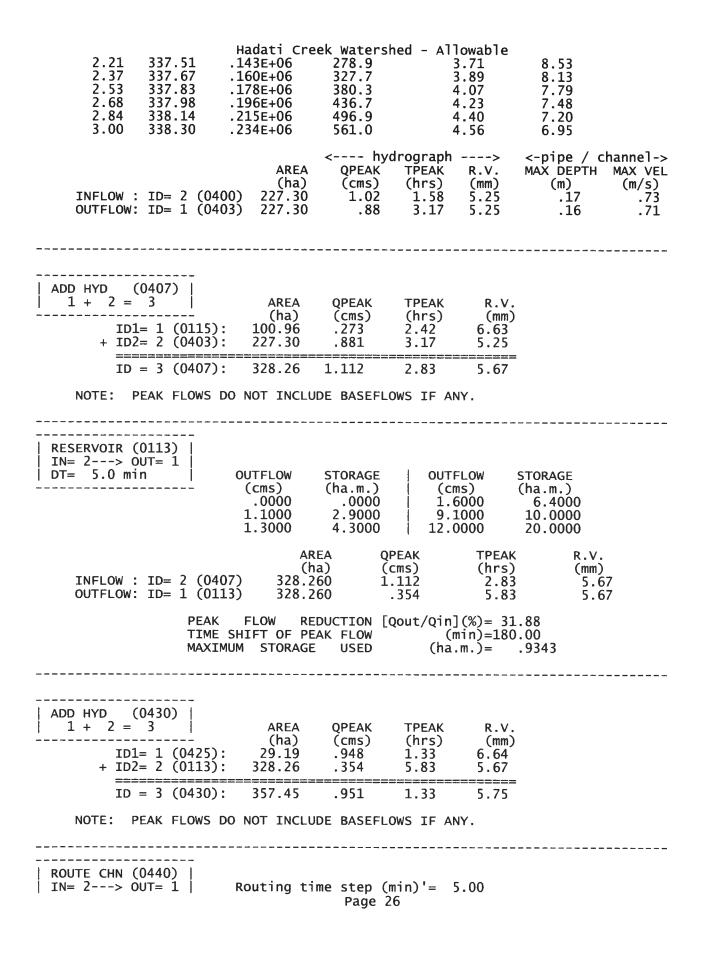
 .32
 .32
 .357E+02
 1.5
 .202
 .43
 <----> .7 1.0 1.5 2.0 2.6 3.4 4.2 5.1 6.2 7.3 8.6 10.0 Page 2 .32 2.08 .32 .357E+02 .40 .32 .35/E+U2 .37 .456E+02 .42 .565E+02 .47 .686E+02 .53 .817E+02 .58 .960E+02 .63 .111E+03 .68 .128E+03 .74 .145E+03 .79 .164E+03 2.22 .37 .38 2.34 .42 .36 2.34 2.46 2.57 2.68 2.78 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 1.136.33 321.40 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 3.02 109.1 140.2 .182E+05 322.60 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 Cre	ek Watersh	ned - All	owable		
	<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 .155E+05 .134E+05 .134E+05 .154E+05 .200E+05 .200E+05 .293E+05 .293E+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 2 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		
		406.15 NOT INCLU					
ADD HYD (0 1 + 2 = ID1=	3	AREA (ha) 406.15	QPEAK (cms) 1.820 Page 2	1.42	R.V. (mm) 5.86		

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
Fo (mn Fc (mn (ii) TIME STEF	/hr)= 75.(/hr)= 12.5 / (DT) SHOL STORAGE CO	00 Cum.I 50 Cum.I JLD BE SMALL DEFFICIENT. INCLUDE BAS	ER OR EQUAL	

-----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 2.00 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

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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		
 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr)= 75.00 K (1/hr)= 4.14 FC (mm/hr)= 12.50 Cum.Inf. (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) 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 WITH IMPERVIOUS RATIOS BELOW 20% YOU SHOULD CONSIDER SPLITTING THE AREA.					
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
Fo (mm Fc (mm (ii) TIME STEP	/hr)= 75.00 /hr)= 12.50 (DT) SHOULE STORAGE COEF	K Cum.Inf BE SMALLER FICIENT.	. (mm)= .00 OR EQUAL LOW IF ANY.	

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 / cha MAX DEPTH M (m) .16 .13	nnel-> AX 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 / cha MAX DEPTH M (m) .16 .15	Innel-> IAX 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 2.57 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		

ROUTE CHN (IN= 2> O	UT= 1 Distance 100.00 115.00 120.00 122.00 138.00 148.00 154.00 164.00	320 321 322 323 323 324	CTION (50 60 60 80 80 60 30 10 60	Manning .0500 .0500 .0500 .0500 .0500 .0500 .0500 .0500	> 800 Mai 500 Mai	n Channe] n Channe]	
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) 321.00 321.20 321.40 321.60 321.80 322.00 322.20 322.40 322.60 322.60 323.20 323.20 323.40 323.60 323.80 323.80 324.00 324.20	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 RATE (cms) .8 3.3 8.1 15.6 26.8 41.2 59.3 81.9 109.1 140.2 175.3 214.7 258.6 306.7 359.1 416.0 477.5 543.5 614.3		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	< hyc QPEAK (cms) 5.46 4.60	irograph 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		₩.		

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

Hadati Creek Watershed - Allowable

.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		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 6.33 20.38 WS IF ANY.)) ;; ;=	
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

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<---- 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= 1 + ID2= 1	1 (0544) 2 (0547)		13 . 57 12.	178 640	6.00 6.00	43.01 23.21		
		: 613.				23.25		
NOTE: PEAI	< 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	1
	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 4.41	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 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 (054 ID= 1 DT= 5.0 r	 14) nin	Area Total Im	(ha)= p(%)=	1.13 80.00	Dir. Con	nn.(%)= 7	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)		X
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

Had .833 1.8 .917 1.8 1.000 1.8 1.083 1.8 1.167 1.8 1.250 1.8 1.333 1.8 1.417 1.8 1.500 1.8 1.583 1.8 1.667 1.8 1.750 1.8 1.750 1.8 1.833 1.8 1.917 1.8 2.000 1.8 2.083 2.2 2.167 2.2 2.250 2.2 2.333 2.2 2.417 2.2 2.583 2.2 2.583 2.2 2.583 2.2 2.583 2.2 2.667 2.2 2.583 2.2 2.917 2.2 3.000 2.2	34 3.917 2.94 34 4.000 2.94 34 4.000 2.94 34 4.083 4.41 34 4.250 4.41 34 4.250 4.41 34 4.333 4.41 34 4.417 4.41 34 4.583 5.88 34 4.667 5.89 34 4.667 5.89 34 4.917 5.89 34 4.917 5.89 34 5.000 5.89 34 5.167 8.83 21 5.250 8.83 21 5.583 35.31 21 5.667 35.31 21 5.750 35.31 21 5.833 97.10 21 5.917 97.10	- 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 8.333 2.58 8.417 2.58 8.583	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 Total Surface Area (ha)=	Imp(%)= 80.00 [IMPERVIOUS PER	Dir. Conn.(%)= RVIOUS (i) 3.00	79.00			
Dep. Storage (mm)= Average Slope (%)=	1.50 .55 200.00 .013 97.10 8	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) Surface Area (ha) =112.24 131.76 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.7.100 =3.94 (ii)0 =3.94 (ii)0 =3.9487.19 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)= 51.32 Area |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

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 =	73.56	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
Fo (mm/hr) Fc (mm/hr) (ii) TIME STEP (D)= 75.00)= 12.50 Cum. T) SHOULD BE SMAL RAGE COEFFICIENT.	LER OR EQUAL	

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

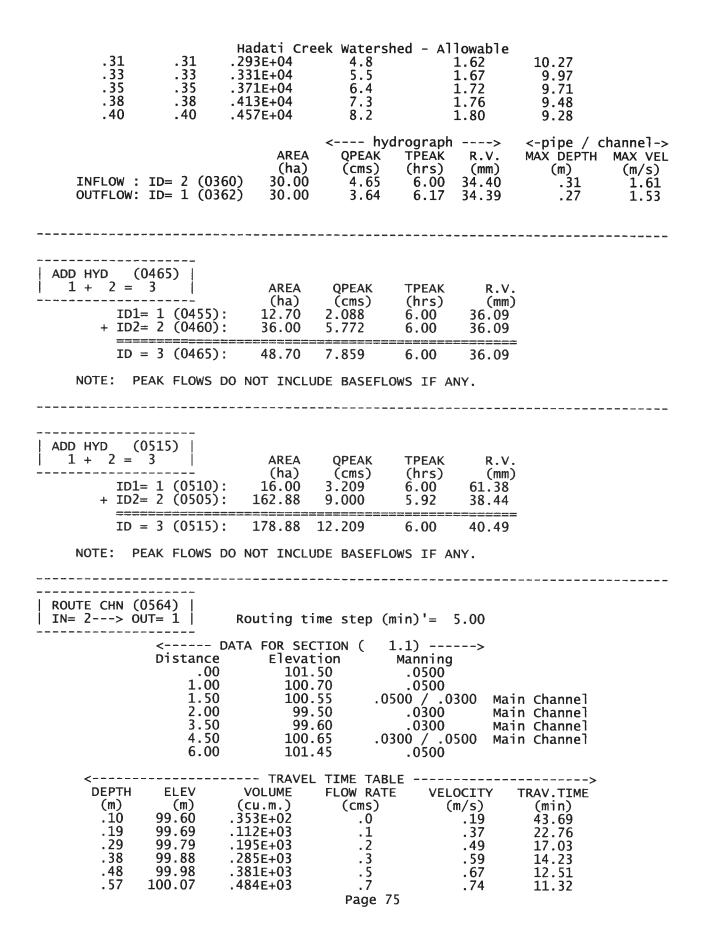
NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

_____ 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 PEAKFLOWREDUCTION[Qout/Qin](%)=14.31TIMESHIFTOFPEAKFLOW(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

< 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 .944E+03 .116E+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	

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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 35.20NOTE: 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

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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 -----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 TPE/ (cms) (hrs) 4.410 6.0 2.218 6.3	5) (mm))8 36.09					
TIME	FLOW REDUCTIO SHIFT OF PEAK FLO MUM STORAGE USE	w (min)= 1	L5.00					
+ ID2 = 2 (0395)	(ha) (cms) : 176.10 1.387	6.17 23.89	1))					
	227.30 6.995	6.17 33.11	L					
ROUTE CHN (0403) IN= 2> OUT= 1 Routing time step (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. Page	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 .066 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 2.28 324.26 2.12 324.42 2.28 324.26 2.12 324.42 2.28 324.26 2.12 324.42 2.28 324.26 2.12 324.42 2.28 324.58 2.45 324.75 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 - Allowabl	
Surface Area Dep. Storage Average Slope Length Mannings n	(ha)= (mm)= (%)= (m)= =	1PERVIOUS 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. Tpeal 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 COEFFIC:	(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
Fo (mr Fc (mr (ii) TIME STEF THAN THE (iii) PEAK FLOW	n/hr)= 75.00 n/hr)= 12.50 P (DT) SHOULE STORAGE COEF DOES NOT IN	K Cum.Inf D BE SMALLER FFICIENT. NCLUDE BASEF	LOW IF ANY.	
STANDHYD (0565) ID= 1 DT= 5.0 min	Area (Total Imp	(ha)= 11.10 (%)= 42.00	Dir. Conn.(%))= 21.00
Surface Area Dep. Storage Average Slope Length Mannings n	IN (ha)= (mm)= (%)= (m)= =	4.66 4.50 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
	QUATION SELE	ECTED FOR PE	RVIOUS LOSSES: (1/hr)= 4.14	

(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) 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)= 75.00 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 1.50 Dep. Storage (mm) =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 (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>	SELECTED FOR PER .00 K .50 Cum.Inf. OULD BE SMALLER COEFFICIENT.	VIOUS LOSSES: (1/hr)= 4.14 (mm)= .00 OR EQUAL	4)
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 =	1.836.0088.6890.18.98	4.81 6.08 35.04 90.18 .39	6.183 (iii) 6.00 45.23 90.18 .50
***** WARNING: STORAGE COEFF ***** WARNING:FOR AREAS WITH YOU SHOULD CON	. IS SMALLER THA I IMPERVIOUS RATI ISIDER SPLITTING	OS BELOW 20%	
(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 COEFFICIENT.	(1/hr)= 4.14 (mm)= .00 OR EQUAL	4)
CALIB STANDHYD (0395) Area ID= 1 DT= 5.0 min Tota]	(ha)= 51.20 Imp(%)= 10.00 Page		%)= 5.00

	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

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.

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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 .25 .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 159E+04 159E+04 180E+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	.INE¥ .		

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

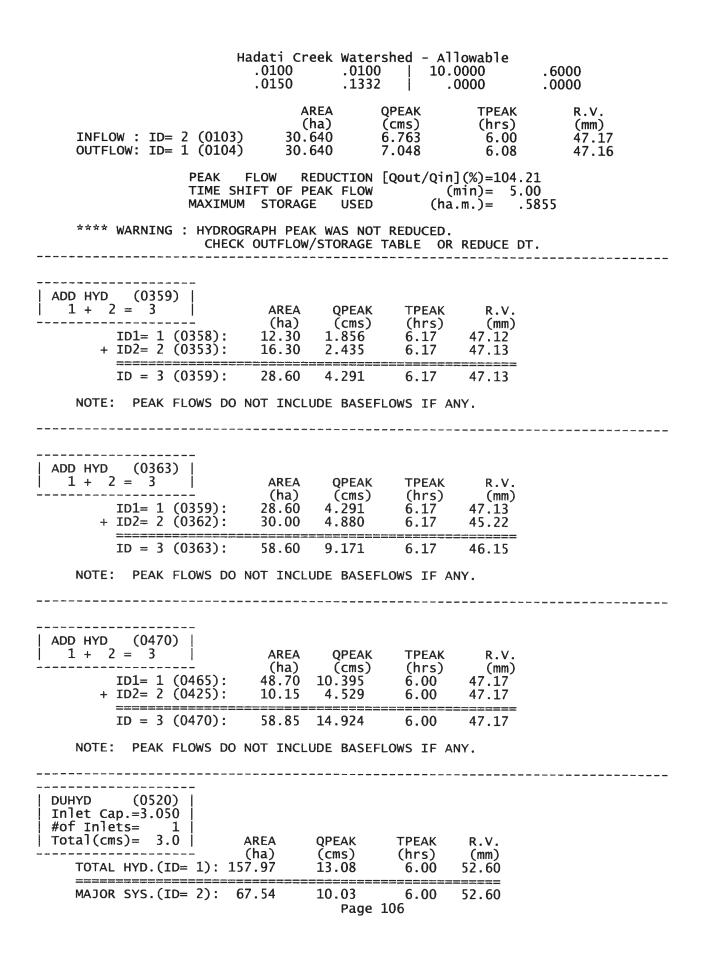
 .48
 00
 .231E+02
 .5
 .67
 12.51
 .3 .48 99.98 .381E+03 .67 12.51 100.07 .74 .57 11.32 .80 10.43 .67 100.17 100.26 .86 9.74 9.18 .76 .86 100.36 .91 8.72 .95 100.45 .96 1.00 1.05 100.55 8.32 1.16 100.66 1.07 7.80 1.28 100.78 7.31 1.141.39 100.89 1.20 6.94 1.50 101.00 1.25 6.65 1.30 1.34 1.38 1.61 101.11 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) |

Page 104

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		STORAGE (ha.m.)	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	ARE (ha)7) 328.26 L3) 328.26	A QPEAN) (cms) 0 18.926 0 1.552	C TPEA (hrs 5 6.1 2 12.5	s) (mm)
	PEAK TIME MAXIM	FLOW RED SHIFT OF PEA IUM STORAGE	UCTION [Qou1 K FLOW USED	:/Qin](%)= (min)=38 (ha.m.)=	8.20 80.00 6.0640
ADD HYD (0430)				
1 + 2 = ID1: + ID2:	= 1 (0425) = 2 (0113)	(ha) : 19.04 : 328.26	QPEAK TF (cms) (ł 1.980 5. 1.552 12.	nrs) (mn 83 47.17 50 44.98	
		347.30		33 45.10	
		DO NOT INCLUD			
ROUTE CHN (0 IN= 2> O	0440)	Routing tim	e step (min))'= 5.00	
	< [Distance 100.00 120.00 126.00 130.00 140.00 142.00 150.00 155.00 160.00	325.4 324.6 323.9 323.0 322.3 322.3 322.3 323.9 324.6 325.4	on Mar 0 .(0 .(0 .0600 0 .0600 0 .0300 0 .(0 .(0 .(nning 0600 0600 0600 / .0300 Ma / .0600 Ma 0600 0600	in Channel in Channel
< DEPTH (m) .16 .33 .49 .65 .82 .98 1.14 1.31 1.47 1.63	ELEV (m) 322.46 322.63 322.79 322.95 323.12 323.28 323.44 323.61 323.77 323.93	<pre>TRAVEL VOLUME (cu.m.) .233E+03 .672E+03 .132E+04 .216E+04 .319E+04 .433E+04 .556E+04 .689E+04 .833E+04 .987E+04</pre>	TIME TABLE - FLOW RATE (cms) 2.1 4.9 9.0 14.9 22.5 31.6 42.3 54.6 68.3	VELOCITY (m/s) .96 1.26 1.48 1.66 1.87 2.08 2.27 2.45 2.62 2.77	TRAV.TIME (min) 6.96 5.27 4.51 4.03 3.57 3.21 2.93 2.72 2.54 2.41

Hadati Creek Watershed - Allowable

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

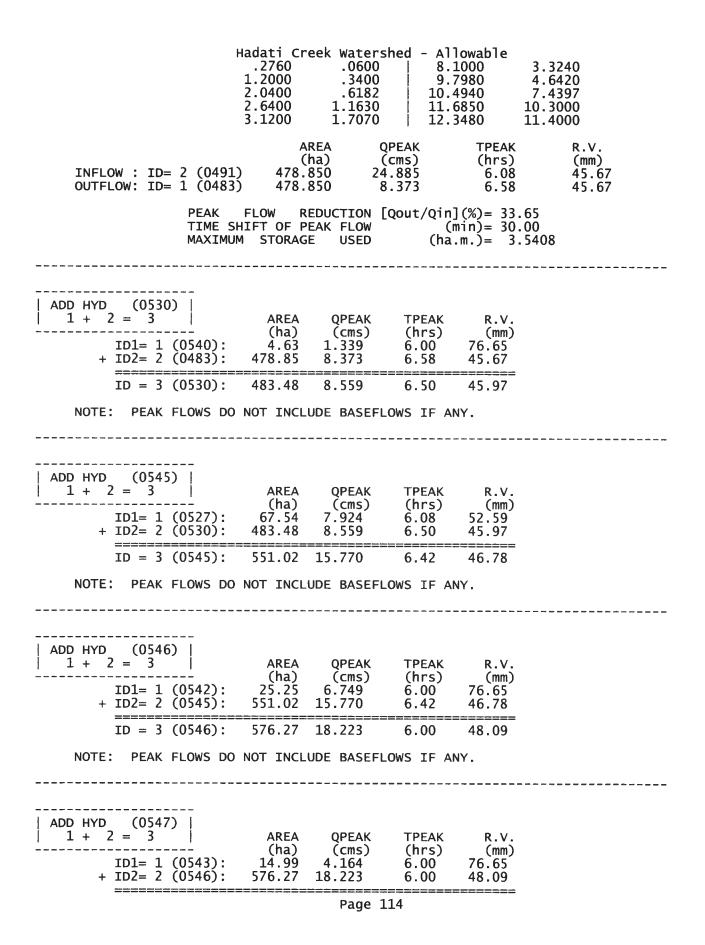
 ______ ID = 3 (0491): 478.85 24.885 6.08 45.67NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. --------------| RESERVOIR (0483) | IN= 2---> OUT= 1

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

 DT= 5.0 min
 OUTFLOW
 STORAGE
 OUTFLOW
 STORAGE

 .0000
 .0000
 .0000
 7.0800
 2.4860

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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 48.86NOTE: 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} & \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	i Creek Waters 3.083 12.70 3.167 12.70 3.250 12.70 3.250 12.70 3.333 12.70 3.333 12.70 3.333 12.70 3.417 12.70 3.583 12.70 3.583 12.70 3.583 12.70 3.583 12.70 3.583 12.70 3.667 12.70 3.667 12.70 3.750 12.70 3.667 12.70 3.750 12.70 3.667 12.70 3.917 12.70 4.000 12.70 4.000 12.70 4.083 16.70 4.500 16.70 4.667 16.70 4.667 16.70 4.833 16.70 4.917 16.70 5.083 12.70 5.083 12.70 5.500 12.70 5.583 12.70 <td< th=""><th>$\begin{array}{c ccccccccccccccccccccccccccccccccccc$</th><th>vable 23.11 23.11 23.11 23.11 23.11 23.11 23.11 23.11 23.11 23.11 23.11 23.11 12.70</th><th>$\begin{array}{c ccccccccccccccccccccccccccccccccccc$</th><th>52.83 57.85 537.70 12.70 12.70</th></td<>	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	vable 23.11 23.11 23.11 23.11 23.11 23.11 23.11 23.11 23.11 23.11 23.11 23.11 12.70	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	52.83 57.85 537.70 12.70 12.70	
Max.Eff.Inten.(mm/hr)= 52.83 42.97 over (min) 5.00 20.00 Storage Coeff. (min)= 2.60 (ii) 18.86 (ii) Unit Hyd. Tpeak (min)= 5.00 20.00 Unit Hyd. peak (cms)= .29 .06						
PEAK FLOW (cms)= .13 .03 .156 (iii) TIME TO PEAK (hrs)= 9.67 10.00 10.00 RUNOFF VOLUME (mm)= 209.57 81.35 182.64 TOTAL RAINFALL (mm)= 211.07 211.07 211.07 RUNOFF COEFFICIENT = .99 .39 .87						
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!						
 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr)= 75.00 K (1/hr)= 4.14 FC (mm/hr)= 12.50 Cum.Inf. (mm)= .00 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. 						
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 - Allowabl	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	mm/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	*T0TALS*	
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) SH(STORAGE (OULD BE SMALLER	(1/hr)= 4.14 . (mm)= .00 OR EQUAL))	
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	mm/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	
 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr)= 75.00 K (1/hr)= 4.14 FC (mm/hr)= 12.50 Cum.Inf. (mm)= .00 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. 					

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CALIB	Hadat	i Creek Wateı	rshed - Allowable	2		
STANDHYD (0510) ID= 1 DT= 5.0 min	Area Total II	(ha)= 16.00 mp(%)= 80.00)) Dir. Conn.(%)	9= 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		
 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr)= 75.00 K (1/hr)= 4.14 FC (mm/hr)= 12.50 Cum.Inf. (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) ID= 1 DT= 5.0 min	Area Total In	(ha)= 244.00 mp(%)= 46.00)) Dir. Conn.(%)	= 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	r (min) (min)= k (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		
 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr)= 75.00 K (1/hr)= 4.14 FC (mm/hr)= 12.50 Cum.Inf. (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 118 						

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

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)= .75 2.23 (hrs)= 10.00 10.00 (mm)= 209.57 107.20 (mm)= 211.07 211.07 FNT = .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) TIME TO PEAK 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
$\begin{array}{rcrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$
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
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$
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	ble	
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 F O Cum.Inf LD BE SMALLEF EFFICIENT.		L4 D0	
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	*TOTALS*	
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	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		

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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	
 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr)= 75.00 K (1/hr)= 4.14 FC (mm/hr)= 12.50 Cum.Inf. (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 (0480) ID= 1 DT= 5.0 min	- Area Total I	(ha)= 43. mp(%)= 42.	10 00 Dir. C	conn.(%)=	21.00
Surface Area Dep. Storage Average Slope Length Mannings n	(ha)= (mm)= (%)= (m)= =	IMPERVIOUS 18.10 1.50 2.00 680.00 .013	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)= k (min)= (cms)=	52.83 10.00 8.46 (i 10.00 .12	59.46 20.00 i) 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
 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr)= 75.00 K (1/hr)= 4.14 FC (mm/hr)= 12.50 Cum.Inf. (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 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	(cms) 27.11		R.V. (mm) 134.22	
MAJOR SYS.(ID= MINOR SYS.(ID=	2): 78.53	18.11 9.00	10.08	134.22 134.22	
NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.					
ADD HYD (0566) 1 + 2 = 3 ID1= 1 (04 + ID2= 2 (05)	(484): 12	REA QPEA ha) (cms .60 1.527 .10 1.345) (hrs) 10.00 10.00	R.V. (mm) 128.70 128.70	
	یہ ہے ہو جو بی جو خذ خذ خن خن ہے ۔		<u>======</u> ==============================		

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) 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

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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	(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	
 ROUTE CHN (0	362)			ograph> PEAK R.V. (hrs) (mm) 0.00 128.70 0.08 128.66	<-pipe / c MAX DEPTH (m) .20 .20	hannel-> MAX VEL (m/s) 1.25 1.24
IN= 2> OL	JT= 1 [Distance .00 5.50 5.51 10.00 14.49 14.50 20.00	DATA FOR SEC Elevat	CTION (1.1 40 . 40 . 15 .0300 00 . 00 . 15 .0150 40 . 40 .	L)> 0300 0 / .0150 Ma 0150 Ma 0150 Ma 0150 Ma 0150 Ma 0 / .0300 Ma 0300	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

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

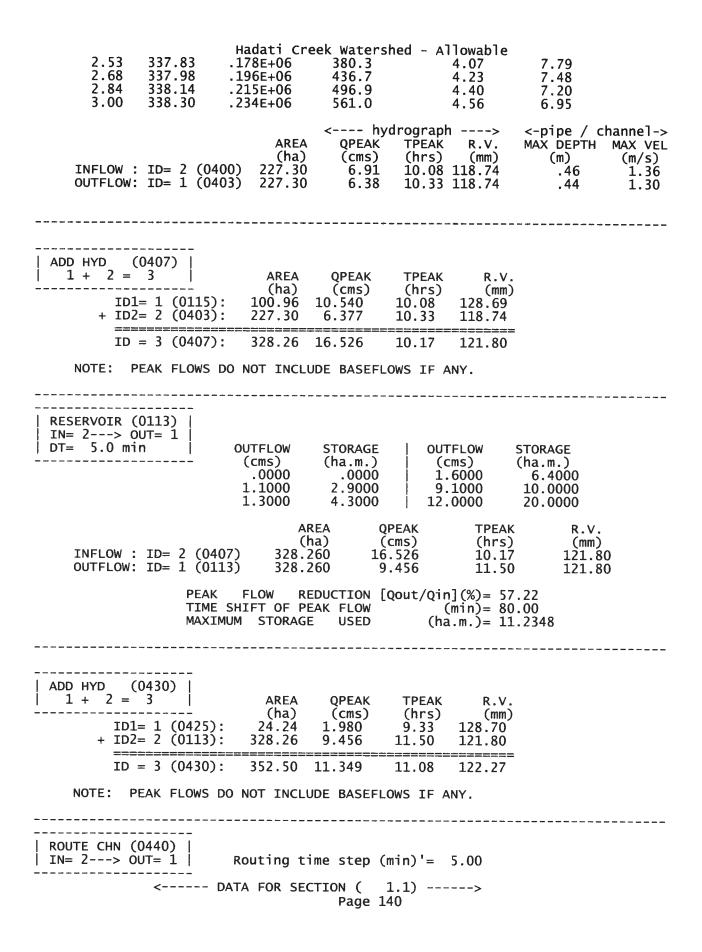
 2.37
 3.02

 .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 ====================================	.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

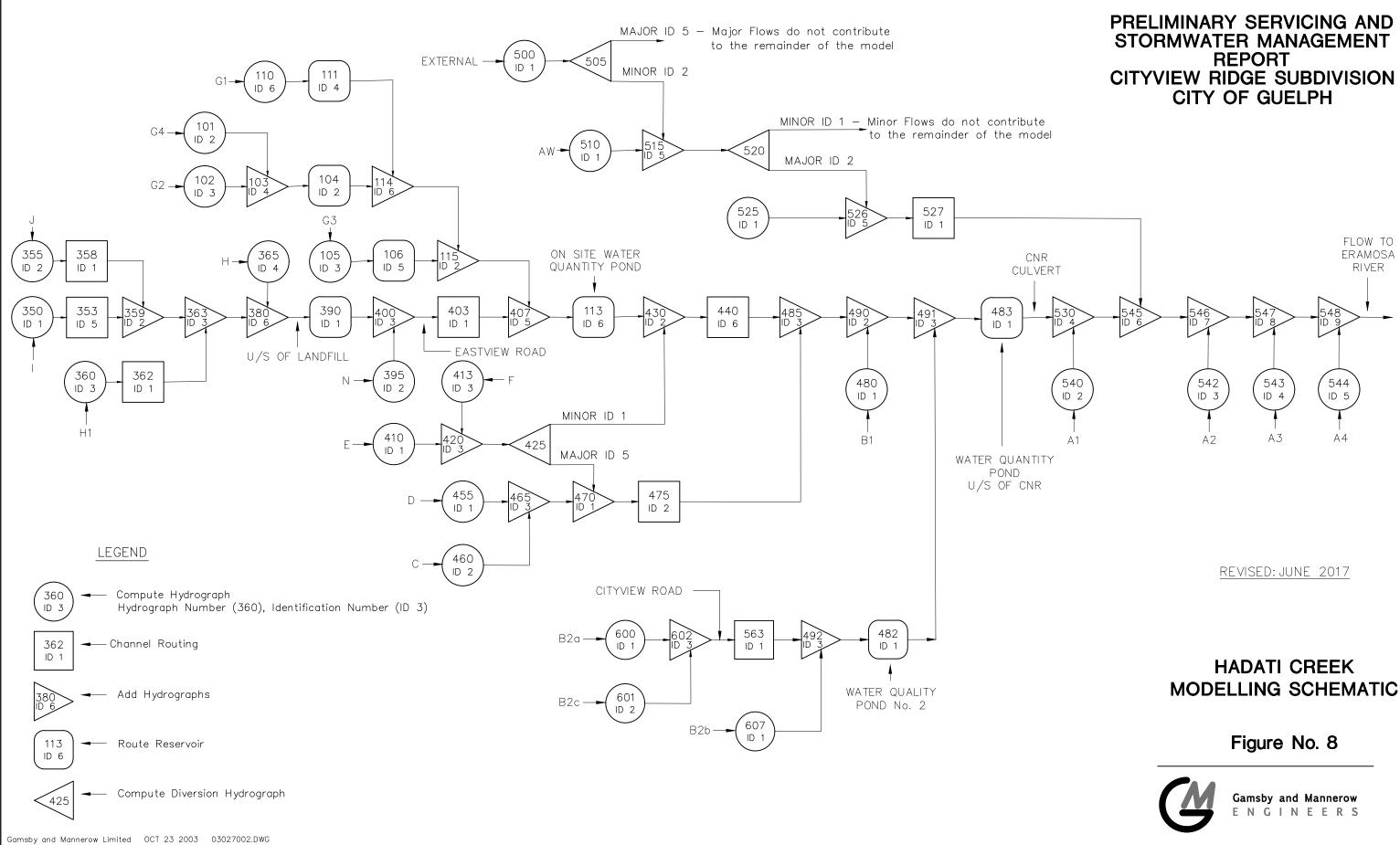
	Hadati Creek Wate (cms) (ha.m. .0000 .000 .2590 .057 .2660 .118 .2720 .180 .2790 .244 .2850 .310) (cms) 0 .2910 9 .2970 0 1.6320 2 4.1680 5 7.5660	ole (ha.m.) .3795 .4503 .5232 .5983 .6756 .0000
INFLOW : ID= 2 (049) OUTFLOW: ID= 1 (048)	AREA (ha) 2) 29.600 2) 29.600	(cms) (ł	PEAK R.V. hrs) (mm) 0.00 128.70 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 3.15 3.15 3.15 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



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 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) Area (ha)= 43.10 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 .25 1.142 (TTT) TIME TO PEAK (hrs)= 1.42 1.83 1.42 RUNOFF VOLUME (mm)= 23.50 2.16 6.64 TOTAL RAINFALL (mm)= 25.00 25.00 25.00 RUNOFF COEFFICIENT = .94 .09 .27					
 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr)= 75.00 K (1/hr)= 4.14 FC (mm/hr)= 12.50 Cum.Inf. (mm)= .00 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. 					
CALIB STANDHYD (0415) Area (ha)= 4.99 ID= 1 DT= 5.0 min Total Imp(%)= 42.00 Dir. Conn.(%)= 21.00					
$\begin{array}{c ccccc} & \text{IMPERVIOUS} & \text{PERVIOUS} & (i) \\ \text{Surface Area} & (ha) = & 2.10 & 2.89 \\ \text{Dep. Storage} & (mm) = & 1.50 & 5.00 \\ \text{Average Slope} & (\%) = & 2.86 & 2.86 \\ \text{Length} & (m) = & 185.00 & 40.00 \\ \end{array}$					

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	yview 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	OTALS*
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 1.75 2.16 25.00 .09	1.117 (iii) 1.33 6.64 25.00 .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.(%)=	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) = 5.00 = .21	7.05 30.00 28.94 (ii) 30.00 .04	OTALS*
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) 1.33 6.64 25.00 .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 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 $(1/hr) = 4.14$				

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	n Cityview Ridge .27	
 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr)= 75.00 K (1/hr)= 4.14 FC (mm/hr)= 12.50 Cum.Inf. (mm)= .00 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. 					
CALIB STANDHYD (0102) 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	II (ha)= (mm)= (%)= (m)= =				
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	
<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 (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	*TOTALS*		
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	.141 (iii) 1.67 5.44 25.00 .22		
***** WARNING:FOR AREAS WIT YOU SHOULD CO	H IMPERVIOUS RATIONS RATIONSIDER SPLITTING				
 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr)= 75.00 K (1/hr)= 4.14 FC (mm/hr)= 12.50 Cum.Inf. (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 ID= 1 DT= 5.0 min Tota)= 79.00		
Surface Area (ha)= Dep. Storage (mm)= Average Slope (%)= Length (m)= Mannings n =	IMPERVIOUS F 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 COEFF. IS SMALLER THAN TIME STEP! ***** WARNING: THE PERVIOUS AREA HAS NO FLOW .					
 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr)= 75.00 K (1/hr)= 4.14 FC (mm/hr)= 12.50 Cum.Inf. (mm)= .00 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY. 					
CALIB STANDHYD (0500) Area (ha)= 244.00 ID= 1 DT= 5.0 min Total Imp(%)= 46.00 Dir. Conn.(%)= 26.00 Page 11					

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 $\begin{array}{rrrr} ha) = & 12.00 \\ mm) = & 1.50 \\ (\%) = & .50 \\ (m) = & 400.00 \\ - & .013 \end{array}$ 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

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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

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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 الی اور این میں میں مارچ مارچ میں ایک ایک میں ایک ایک ایک ایک ایک ایک ایک ا 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.

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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	nning 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 (056	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		
	< [Distance .00 1.00 2.00 3.50 4.50 6.00	DATA FOR SEC Elevat 101. 100. 99. 99. 100. 101.	ion Ma 50 . 55 .0500 50 . 60 . 55 .0300		n Channel n Channel	
<pre>< DEPTH (m) .10 .19 .29 .38 .48</pre>	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 Develog .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 44	
NOTE: PEAK FLOWS DO NOT INC	LUDE BASEFLOWS	IF ANY.	
ROUTE CHN (0475) IN= 2> OUT= 1 Routing 1	time step (min)	'= 5.00	
148.00 322 154.00 323	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
<pre>< 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</pre>	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

2.80 323.60 .382 3.00 323.80 .423 3.20 324.00 .470 3.40 324.20 .520 3.60 324.40 .573 3.80 324.60 .633	3E+05 2E+05 3E+05 5E+05 5E+05 3E+05 3E+05 2E+05	258.6 306.7 359.1 416.0 477.5 543.5 614.3	3 3 3 3 3 3 3 3 4 4 4	29 .46 .61 .76 .91 .05 .18	2.18 2.07 1.98 1.91 1.83 1.77 1.71
INFLOW : ID= 2 (0470) OUTFLOW: ID= 1 (0475)	AREA (ha) 48.70 48.70	< hyd QPEAK (cms) 1.53 1.10	rograph TPEAK (hrs) 1.33 1.42	> R.V. (mm) 6.64 6.64	<-pipe / channel-> MAX DEPTH MAX VEL (m) (m/s) .26 .91 .23 .87
ID1= 1 (0362): + ID2= 2 (0359):	(ha) 30.00 28.60		(hrs) 1.50 1.58 =======	(mm) 5.48 6.60	
ID = 3 (0363): NOTE: PEAK FLOWS DO NO					
ADD HYD (0115) 1 + 2 = 3 ID1= 1 (0106): + ID2= 2 (0114): ID = 3 (0115): 1 NOTE: PEAK FLOWS DO NO	LOO.96	.273	2.42	6.63	
	(ha) 19.00 5.97 24.97	. 596	(hrs) 1.42 1.67 	(mm) 6.96 5.44 6.60	
ADD HYD (0526) 1 + 2 = 3 ID1= 1 (0525): + ID2= 2 (0520): ====================================	AREA (ha) .00 59.59	QPEAK (cms) .001 3.257 Page 22	.00 * 1.58 ======	R.V. (mm) ***** 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

.98 1.11 1.23 1.35 1.48 1.60 1.73 1.87 2.00 2.13 2.27 2.40	311.78 311.91 312.03 312.15 312.28 312.40 312.53 312.67 312.80 312.93 313.07 313.20	.579E+03 .671E+03 .767E+03 .867E+03 .971E+03 .108E+04 .149E+04 .248E+04 .405E+04 .620E+04 .893E+04 .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	1.15 1 19		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 : OUTFLOW:	ID= 2 (052) ID= 1 (052)	AREA (ha) 6) 59.59 7) 59.59	< hy QPEAK (cms) 3.26 2.80	drograph TPEAK (hrs) 1.58 1.67	R.V. (mm) 8.44 8.44	<-pipe / ch MAX DEPTH (m) 1.66 1.54	annel-> MAX VEL (m/s) 1.16 1.21
RESERVOIR (0 IN= 2> OU DT= 5.0 min	390) T= 1	OUTFLOW (cms) .0000 .7700 1.2600	(ha.m.) .0000 .2870	(cm 1.3 1.8	LOW 5 5) 100 600 000	STORAGE (ha.m.) 1.6000 23.2300 .0000	
INFLOW : : OUTFLOW: :	ID= 1 (039) PEAK	ARI (ha 0) 176.10 0) 176.10 FLOW REI SHIFT OF PEA UM STORAGE	а) (DO 3 DO 50 DUCTION [cms) .653 .982 Oout/Oin]	(hrs) 1.42 2.25 (%)= 26	6.44 6.43	
+ ID2=	3 1 (0395): 2 (0390):	(ha) 51.20 176.10	QPEAK (cms) .292 .982 1.022	TPEAK (hrs) 1.42 2.25 	R.V. (mm) 1.17 6.43 5.25		
	AK FLOWS DO	D NOT INCLU	DE BASEFL	OWS IF AN	Y.		
	< D, Distance 100.00 110.00 135.00 142.00	ATA FOR SEC Elevat 338. 336.0 335.	i on 30 30 30 00	1.1) Manning .0500 .0500 .0300 .0500		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 [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)7) 328.2	a) (cn 60 1.1	EAK TPEA Is) (hrs 12 2.8 54 5.8	5) (mm) 53 5.67
PEAK	FLOW REI	DUCTION [QC Page 25	out/Qin](%)= 3	1.88

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 56E+04 33E+04 56E+04 33E+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 = 3 ID1= 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.

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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* 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*

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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 De 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 SELECTED FOR PERVIOUS LOSSES: FO (mm/hr)= 75.00 K (1/hr)= 4.14 FC (mm/hr)= 12.50 Cum.Inf. (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 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 COM	H IMPERVIOUS RATI NSIDER SPLITTING				
 (i) HORTONS EQUATION FO (mm/hr)= 79 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 (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	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 Watershed - RUNOFF COEFFICIENT =	Post Development with Cityview Ridge					
**** WARNING:FOR AREAS WITH IMPERVI YOU SHOULD CONSIDER SF						
<pre>(i) HORTONS EQUATION SELECTED Fo (mm/hr)= 75.00 Fc (mm/hr)= 12.50</pre>	D FOR PERVIOUS LOSSES: K (1/hr) = 4.14					
(ii) TIME STEP (DT) SHOULD BE THAN THE STORAGE COEFFICI	SMALLER OR EQUAL IENT.					
(iii) PEAK FLOW DOES NOT INCLUE	DE BASEFLOW IF ANY.					
CALIB STANDHYD (0540) Area (ha)= ID= 1 DT= 5.0 min Tota] Imp(%)=	= 4.63 = 80.00 Dir. Conn.(%)= 79.00					
IMPERV Surface Area (ha)= 3.	VIOUS PERVIOUS (i) .70 .93					
IMPERV Surface Area (ha)= 3. Dep. Storage (mm)= 1. Average Slope (%)= . Length (m)= 150. Mannings n = .(.50 5.00 .55 .55 .00 40.00 013 .300					
Max.Eff.Inten.(mm/hr)= 70. over (min) 5. Storage Coeff. (min)= 4. Unit Hyd. Tpeak (min)= 5. Unit Hyd. peak (cms)= .	.48 (11) 23.24 (11) .00 25.00 .23 .05 *TOTALS*					
PEAK FLOW (cms)= . TIME TO PEAK (hrs)= 6. RUNOEE VOLUME (mm)= 51	.70 .04 .713 (iii) .00 6.25 6.00 .91 9.54 43.01 .41 53.41 53.41 .97 .18 .81					
TOTAL RAINFALL (mm)= 53. RUNOFF COEFFICIENT =	.41 53.41 53.41 .97 .18 .81					
***** WARNING: STORAGE COEFF. IS SMA						
<pre>(i) HORTONS EQUATION SELECTED Fo (mm/hr)= 75.00 Fc (mm/hr)= 12.50</pre>	D FOR PERVIOUS LOSSES: K (1/hr) = 4.14 Cum Inf (mm) = 00					
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.						
(iii) PEAK FLOW DOES NOT INCLUE	DE BASEFLOW IF ANY.					
CALIB STANDHYD (0500) Area (ha)= ID= 1 DT= 5.0 min Total Imp(%)=	= 244.00 = 46.00					
IMPERV	VIOUS PERVIOUS (i)					
	.00 40.00					
Max.Eff.Inten.(mm/hr)= 70. over (min) 15.	.50 78.43 .00 30.00 .47 (iii) 35.80 (iii)					
Storage Coeff. (min)= 14. Unit Hyd. Tpeak (min)= 15.	.47 (ii) 25.89 (ii) .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	je
< 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 T (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 .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	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 = 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

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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

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8.83 35.31 35.31

Page 57

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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)= 97.10 119.40 over (min) 5.00 10.00 Storage Coeff. (min)= 2.73 (ii) 9.32 (ii) Unit Hyd. Tpeak (min)= 5.00 10.00 Unit Hyd. peak (cms)= .29 .12 *TOTALS*
PEAK FLOW (cms)= .28 .73 1.007 (iii) TIME TO PEAK (hrs)= 6.00 6.00 6.00 RUNOFF VOLUME (mm)= 72.06 26.53 36.09 TOTAL RAINFALL (mm)= 73.56 73.56 73.56 RUNOFF COEFFICIENT = .98 .36 .49
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
 (i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES: FO (mm/hr)= 75.00 K (1/hr)= 4.14 FC (mm/hr)= 12.50 Cum.Inf. (mm)= .00 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT. (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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) =97.10over (min)5.00Storage Coeff. (min) =6.63 (ii)Unit Hyd. Tpeak (min) =5.00Unit 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 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 (0 IN= 2> OU	<pre>< Distance</pre>	DATA FOR SEC Elevat	CTION (1. cion M 26 .030 00 .030 09 .001 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 .123E+04 .159E+04 .203E+04 .227E+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 (n	nin)'= 5.00		
	<pre>< Distance .00 5.50 5.51 10.00 14.49 14.50 20.00</pre>		tion .26 .15 .03 .00 .09 .00	Manning .0300 300 / .0150 M .0150 M .0150 M .0150 M	ain Channel ain Channel ain Channel ain Channel ain 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 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	
	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 (0 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 Cree	k Watershed - (cms) .0000 .0100 .0150	(ha.m.) .0000 .0100	pment with Ci (cms) 1.0000 10.0000 .0000	(ha.m.) .5000 .6000
INFLOW : ID= 2 (0) OUTFLOW: ID= 1 (0)	ARE (ha 103) 30.64 104) 30.64	A QPEA 1) (cms) 0 5.13 0 4.550	 TPEAK (hrs) 6.00 6.17 	R.V. (mm) 36.09 36.08
PEAI TIMI MAX:	C FLOW RED SHIFT OF PEA MUM STORAGE	DUCTION [Qout K FLOW USED	t/Qin](%)= 88 (min)= 10 (ha.m.)=	.67 .00 .5514
+ IDZ = Z (UIII)	AREA (ha) : 30.64 : 19.00	.44/ 0	. 30 . 30 . 00	
	: 49.64			
Distance .00 2.00 4.00 4.50 5.00 7.00 9.00	Routing tim DATA FOR SECT Elevati 1.0 .5 .0 .0 .0 .0 .0 .0 .0 .0	ne step (min) On Mar On Mar O .(O .0350 O .0350 O .0350 O .0350 O .0)'= 5.00)> nning)350)350 / .0350 Main)350 Main)350 Main)350	n Channel n Channel
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	<pre>TRAVEL VOLUME (cu.m.) .745E+01 .175E+02 .301E+02 .454E+02 .632E+02 .632E+02 .836E+02 .107E+03 .132E+03 .160E+03 .191E+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		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>	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
	VEL
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 Ta	Watershed - Post De rea (ha)= 30.00 otal Imp(%)= 37.00	velopment with C [.] Dir. Conn.(%)=	tyview Ridge 19.00
Surface Area (ha Dep. Storage (m Average Slope (% Length (a 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 (min Storage Coeff. (min Unit Hyd. Tpeak (min 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 (mr TOTAL RAINFALL (mr 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 CO ***** WARNING:FOR AREAS V YOU SHOULD	DEFF. IS SMALLER TH/ WITH IMPERVIOUS RAT: CONSIDER SPLITTING	IOS BELOW 20%	
Fo (mm/hr): Fc (mm/hr): (ii) TIME STEP (DT)	ION SELECTED FOR PER = 75.00 K = 12.50 Cum.Inf) SHOULD BE SMALLER AGE COEFFICIENT. S NOT INCLUDE BASEFI	(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 CO	DEFF. IS SMALLER THA	AN TIME STEP!	
(i) HORTONS EQUAT: Fo (mm/hr)= Fc (mm/hr)=		(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

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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	<pre>Totals* 1.576 (iii) 6.00 48.29 90.18 .54</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	.00 K .50 Cum.Inf. OULD BE SMALLER O 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 P 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 RATIO		
(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 O 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 P 3.70 Page 94	.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	.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	VOLUME	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 . 322.40 . 322.60 . 322.60 . 323.00 . 323.20 . 323.20 . 323.40 . 323.60 . 323.80 . 324.00 . 324.20 . 324.40 .	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

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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/hr3.08312.703.16712.703.25012.703.33312.703.41712.703.50012.703.58312.703.66712.703.75012.703.91712.704.00012.704.08316.764.16716.764.33316.764.58316.764.58316.764.58316.764.66716.764.66716.764.66716.764.91716.765.00016.765.08312.705.16712.705.25012.70	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 7.000 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

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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 Max.Eff.Inten.(mm/hr)= 52.83 59.46 10.00 over (min) 20.00 Storage Coeff. (min)= 9.91 (ii) 19.60 (ii) Unit Hyd. Tpeak (min)= 10.00 20.00 Unit Hyd. peak (cms)= .11 .06 *TOTALS* PEAK FLOW (cms) =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 52.8359.4610.0020.008.46 (ii)18.15 (ii)10.0020.00 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

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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			

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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|AREAQPEAKTPEAKR.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 ------

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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 = 	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

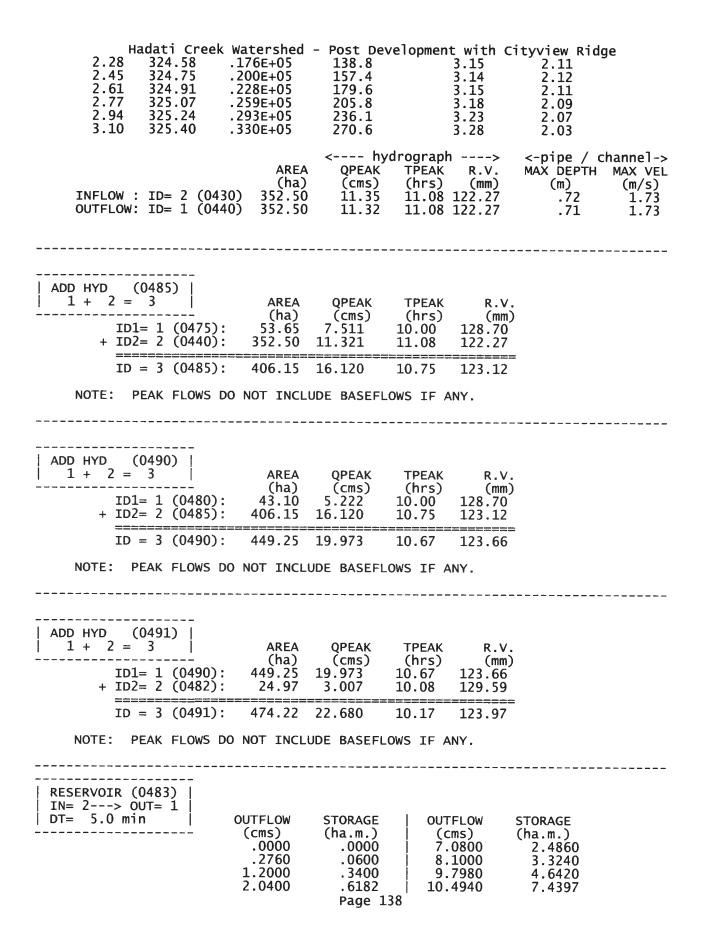
 10.00
 128.70
 TPEAK (mm) 125.38 ------ID1= 1 (0363): + ID2= 2 (0365): _____ ID = 3 (0380):176.10 20.834 10.00 127.59 NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY. _____ RESERVOIR (0482) | IN= 2---> OUT= 1 | STORAGE (ha.m.) .0000 DT= 5.0 min | OUTFLOW OUTFLOW STORAGE (cms) .2910 .2970 1.6320 4.1680 _____ (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 MAXIN	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

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			MIDUSS created			Su		ry 07, 2010"
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			Company				Hewlett-Pack	ard Company"
11	31	т.	Date & Time last ו IME PARAMETERS"	isea:			6/2/2016 at	3:21:13 PM"
	<u> </u>	5.000	Time Step"					
		170.000	Max. Storm length'	1				
	32	1500.000	Max. Hydrograph"					
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"		743.000	Coefficient A"					
		6.000	Constant B"					
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		170.000	Duration"					
"		1.000	Time step multipli	ier"				
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		3.410	Total Area"					
		30.000 2.000	Flow length" Overland Slope"					
"		1.194	Pervious Area"					
11 11		30.000	Pervious length"					
		2.000	Pervious slope"					
		2.217 30.000	Impervious Area" Impervious length"					
		2.000	Impervious slope"					
		0.250	Pervious Manning					
		75.000 12.500	Pervious Max.infil Pervious Min.infil					
π		0.250	Pervious Lag const	ant (ho	urs)"			
11 11		5.000	Pervious Depressio	n stora	ige"			
		0.015	Impervious Manning		o!!			
"		$0.000 \\ 0.000$	Impervious Max.inf Impervious Min.inf					
		0.050	Impervious Lag con	istant ((hours)			
11		1.500	Impervious Depress	ion sto	rage"			
		6	0.496 0.0 tchment 201		0.000) c.m/sec"	
п			irface Area	Pervi 1.194		2.217	us Total Area 3.410	hectare"
		Τi	me of concentration	22.18	9	2.170	2.858	minutes"
			me to Centroid	93.43		84.151	84.470	minutes"
			infall depth	33.81 403.5		33.816 749.53	33.816 1153.12	mm'' C.m''
		Ra	infall losses	31.71	.3	1.985	12.390	mm"
			noff depth	2.103		31.830	21.426	mm''
			noff volume noff coefficient	25.10 0.062		705.52 0.941	730.63	ç.m"
п		Ма	ximum flow	0.017		0.496	0.634 0.496	c.m/sec"
11	40	HY	DROGRAPH Add Runoff				0.1.00	
				Pag	e 1			

		105172_POST_2yr UC
		4 Add Runoff "
	33	0.496 0.496 0.000 0.000" CATCHMENT 202"
		1 Triangular SCS"
9		1 Equal length" 2 Horton equation"
		202 Catchment 202 - To Clythe Creeek"
		25.000 % Impervious"
0		0.740 Total Area" 30.000 Flow length"
n		2.000 Overland Slope"
		0.555 Pervious Area"
U		30.000 Pervious length" 2.000 Pervious slope"
		0.185 Impervious Area"
		30.000 Impervious length" 2.000 Impervious slope"
		0.250 Pervious Manning 'n'"
		75.000 Pervious Max.infiltration"
		12.500 Pervious Min.infiltration" 0.250 Pervious Lag constant (hours)"
"		5.000 Pervious Depression storage"
at a		0.015 Impervious Manning 'n'" 0.000 Impervious Max.infiltration"
		0.000 Impervious Min.infiltration"
		0.050 Impervious Lag constant (hours)"
u.		1.500 Impervious Depression storage" 0.041 0.496 0.000 0.000 c.m/sec"
		Catchment 202 Pervious Impervious Total Area "
ar.		Surface Area 0.555 0.185 0.740 hectare" Time of concentration 22.189 2.170 5.482 minutes"
		Time to Centroid 93.436 84.151 85.688 minutes"
		Rainfall depth 33.816 33.816 mm" Rainfall volume 187.68 62.56 250.24 c.m"
		Rainfall volume
		Runoff depth 2.103 31.830 9.535 mm"
		Runoff volume 11.67 58.89 70.56 c.m" Runoff coefficient 0.062 0.941 0.282 "
		Maximum flow 0.008 0.041 0.041 c.m/sec"
n	40	HYDROGRAPH Add Runoff " 4 Add Runoff "
		0.041 0.537 0.000 0.000"
	33	CATCHMENT 300"
		1 Triangular SCS" 1 Equal length"
		2 Horton equation"
		300 Catchment 300 - To Clythe Creek" 0.000 % Impervious"
313 333		6.480 Total Area"
		45.000 Flow length" 2.000 Overland Slope"
н		2.000 Overland [®] slope" 6.480 Pervious Area"
		45.000 Pervious length"
		2.000 Pervious slope" 0.000 Impervious Area"
		45.000 Impervious length"
		2.000 Impervious slope" 0.250 Pervious Manning 'n'"
п		75.000 Pervious Max.infiltration"
		12.500 Pervious Min.infiltration"
п.		0.250 Pervious Lag constant (hours)" 5.000 Pervious Depression storage"
		0.015 Impervious Manning 'n'"
		Page 2

" " " " " "	105172_POST_2yr UC 0.000 Impervious Max.infiltration" 0.000 Impervious Lag constant (hours)" 1.500 Impervious Depression storage" 0.073 0.537 0.000 0.000 c.m/sec" Catchment 300 Pervious Impervious Total Area " Surface Area 6.480 0.000 6.480 hectare" Time of concentration 28.300 2.768 28.300 minutes" Time to Centroid 98.613 85.041 98.613 minutes" Rainfall depth 33.816 33.816 33.816 mm" Rainfall losses 31.709 2.082 31.709 mm" Runoff depth 2.107 31.734 2.107 mm" Runoff coefficient 0.062 0.000 0.062 " Maximum flow 0.073 0.000 0.073 c.m/sec"
	4 Add Runoff "
	0.073 0.538 0.000 0.000" SHOW TABLE"
" 38 " 19	2Flow hydrograph"4Inflow Hydrograph"Maximum flow0.538Hydrograph volume937.732START/RE-START TOTALS 300"3Runoff Totals on EXIT"Total Catchment area10.630Total Impervious area2.402Total % impervious22.592"EXIT"

				5172_POS	T_5yr U	С		
п			MIDUSS Output MIDUSS version			V	arsion 2 25	rev. 473"
н			MIDUSS created					y 07, 2010"
		10	Units used:	1.1.4) cu a luab			ie METRIC"
			Job folder:	W:	\Gueipn Modellin	105-200 a Files\	5\105172\De MTDUSS\2016	sign Data\" Revisions"
			Output filename:	1.	oucifin	1	05172_POST_	5yr UC.out"
11			Licensee name:					gmbp"
			Company	- od		Hei	wlett-Packa	rd Company"
••	31	ТТ	Date & Time last us ME PARAMETERS"	seu.		0	/2/2010 at	3:28:36 PM"
		5.000	Time Step"					
		170.000	Max. Storm length"					
11	32	1500.000 ST	Max. Hydrograph" "ORM Chicago storm"					
	92	1	Chicago storm"					
		1593.000	Coefficient A"					
		$11.000 \\ 0.879$	Constant B" Exponent C"					
		0.400	Fraction R"					
		170.000	Duration"					
		1.000	Time step multiplie Iximum intensity		24 004	mm/hr		
			otal depth		.34.894 46.775	mm"		
		6	005hyd Hydrograph				s file"	
	33		TCHMENT 201"					
		1 1	Triangular SCS" Egual length"					
		2	Horton equation"					
		201	Catchment 201 - To	Clythe	Creeek"			
11		65.000 3.410	% Impervious" Total Area"					
"		30.000	Flow length"					
		2.000	Overland Slope"					
		$1.194 \\ 30.000$	Pervious Area" Pervious length"					
"		2.000	Pervious slope"					
•••		2.217	Impervious Area"					
		30.000 2.000	Impervious length" Impervious slope"					
11		0.250	Pervious Manning 'r	10				
		75.000	Pervious Max.infilt	ration"				
		12.500	Pervious Min.infilt	ration"	me) !!			
		0.250 5.000	Pervious Lag consta Pervious Depression	int (nou Estorad	rs) e"			
		0.015	Impervious Manning	'n'" -				
		0.000	Impervious Max.infi					
11		0.000 0.050	Impervious Min.infi Impervious Lag cons	tant (h	n ours)"			
11		1.500	Impervious Depressi	on stor	age"			
			0.675 0.00		.000		c.m/sec"	
			tchment 201 rface Area	Pervio 1.194		pervious 217	Total Area 3.410	 hectare"
			me of concentration	15.360		968	3.517	minutes"
		ті	me to Centroid	88.710	82	.363	83.097	minutes"
••			infall depth	46.775		.775	46.775	mm''
			infall volume infall losses	558.26 35.929		36.77 131	1595.03 13.960	c.m" mm"
		Ru	noff depth	10.846	44	.644	32.815	mm''
,, ,,			noff volume	129.45		9.54	1118.99	ç.m"
			noff coefficient ximum flow	0.232 0.099		954 665	0.702 0.675	c.m/sec"
11	40	HY	DROGRAPH Add Runoff	"				erny see

				105172_	_POST_5y	r UC		
л 11		4	Add Runoff " 0.675	0.675	0.000	0.000"		
	33		TCHMENT 202"		0.000	01000		
		1 1	Triangular SCS" Equal length"					
		2	Horton equation	17				
		202 25.000	Catchment 202 - % Impervious"	To Cly1	the Cree	ek''		
"		0.740	Total Area"					
		30.000 2.000	Flow length" Overland Slope"					
316		0.555	Pervious Area"					
		30.000 2.000	Pervious length Pervious slope"	11				
п		0.185	Impervious Area					
		30.000	Impervious leng	th"				
		2.000 0.250	Impervious slop Pervious Mannin	a 'n'"				
		75.000	Pervious Max.in	filtrati				
		12.500 0.250	Pervious Min.in Pervious Lag co	nstant (hours)"			
		5.000	Pervious Depres	sion sto	orage"			
n		$0.015 \\ 0.000$	Impervious Mann Impervious Max.	infiltra	ition"			
		0.000	Impervious Min.	infiltra	ition"			
116 116		0.050 1.500	Impervious Lag Impervious Depr)''		
			0.069	0.675	0.000		c.m/sec"	
			tchment 202 rface Area	Per 0.5	vious	Impervious 0.185	⊤otal Area 0.740	" hectare"
		Tir	me of concentrat	ion 15.	360	1.968	7.614	minutes"
		Tir Rat	ne to Centroid infall depth		710 775	82.363 46.775	85.039 46.775	minutes" mm"
"		Ra	infall volume	259	0.60	86.53	346.14	c.m"
н 11			infall losses noff depth		929 846	2.131 44.644	27.479 19.296	mm'' mm''
		Rui	noff volume	60.		82.59	142.79	c.m"
11 11			noff coefficient kimum flow	0.2		0.954 0.055	0.413	"
	40	HY[DROGRAPH Add Run	off "	140	0.033	0.069	c.m/sec"
и 11		4	Add Runoff "		0 000	0.000"		
	33	CA⁻	CHMENT 300"	0.735	0.000	0.000"		
		1	Triangular SCS"					
		1 2	Equal length" Horton equation					
0		300	Catchment 300 -	To Clyt	he Creek	<"		
		0.000 6.480	% Impervious" Total Area"					
		45.000	Flow length"					
10		2.000 6.480	Overland Slope" Pervious Area"					
		45.000	Pervious length					
		2.000 0.000	Pervious slope" Impervious Area					
		45.000	Impervious leng	th"				
		2.000 0.250	Impervious slop Pervious Mannin	e" a 'n'"				
		75.000	Pervious Max.in	filtrati				
0		12.500 0.250	Pervious Min.in Pervious Lag co					
0		5.000	Pervious Depres	sion sto	rage"			
57		0.015	Impervious Mann	-	age 2			
				r	uye z			

11 11 11 11		0.000 0.000 0.050 1.500	Impervious M Impervious M Impervious L Impervious E 0.444	Max.infi Min.infi _ag cons	ltration" tant (hours on storage'	;)"	.000 c	m/sec	. 14	
11		Cat	tchment 300	017.5	Pervious		vious			17
			face Area		6.480	0.000		6.480	/ii cu	hectare"
			ne of concent		19.590	2.510		19.590	1	minutes"
			ne to Centroi	id	92.382	83.16	1 9	92.382		minutes"
		Rai	infall depth		46.775	46.77		46.775		mm''
п			infall volume infall losses		3031.02	0.00		3031.0		c.m"
		Rdi	noff depth		35.903 10.872	2.312		35.903		mm''
н		Run	noff volume		704.50	44.46 0.00		10.872		mm''
		Rur	off coeffici	ent	0.232	0.000		0.232		c .m"
			cimum flow		0.444	0.000		0.444		c.m/sec"
	40	HYD	DROGRAPH Add	Runoff '	,					cilly see
17		4	Add Runoff "							
	C A		0.444	0.868	3 0.000	0	.000"			
	64		W TABLE"	a na ha U						
			Flow hydrogr Inflow Hydro							
11		Мах	imum flow	graph	0.8	68	c.m/sec	~!!		
"			lrograph volu	ıme	1966.2		c.m"	-		
	38	STA	RT/RE-START	TOTALS 3	300''					
		3	Runoff Total	s on EXI	T"					
			al Catchment				10.6			tare"
			al Imperviou	is area				102	hect	tare"
	19	EXI	al % impervi T"	ous			22.5	i92"		

		105172_PC	DST_25yr UC
		MIDUSS Output MIDUSS version	>" Version 2.25 rev. 473"
		MIDUSS created 10 Units used:	Sunday, February 07, 2010"
			ie METRIC" W:\Guelph\105-2005\105172\Design Data\"
			Modelling Files\MIDUSS\2016 Revisions"
n		Output filename: Licensee name:	105172_POST_25yr UC.out" gmbp"
n n		Company	Hewlett-Packard Company"
	31	Date & Time last used: TIME PARAMETERS"	6/2/2016 at 3:30:00 PM"
11		5.000 Time Step"	
		210.000 Max. Storm length" 1500.000 Max. Hydrograph"	
	32	STORM Chicago storm"	
н п		1 Chicago storm" 3158.000 Coefficient A"	
0		15.000 Constant B"	
		0.936 Exponent C"	
		0.400 Fraction R" 210.000 Duration"	
n		1.000 Time step multiplier"	
11 11		Maximum intensity	169.546 mm/hr" 69.476 mm"
		Total depth 6 025hyd Hydrograph exte	69.476 mm ["] nsion used in this file"
	33	CATCHMENT 201"	
11		1 Triangular SCS" 1 Equal length"	
		2 Horton equation"	
		201 Catchment 201 - To Clyth	e Creeek"
п		65.000 % Impervious" 3.410 Total Area"	
"		30.000 Flow_length"	
		2.000 Overland Slope" 1.194 Pervious Area"	
		30.000 Pervious length"	
11		2.000 Pervious slope"	
		2.217 Impervious Area" 30.000 Impervious length"	
		2.000 Impervious slope"	
		0.250 Pervious Manning 'n'" 75.000 Pervious Max.infiltratio	•"
17		12.500 Pervious Min.infiltratio	
•••		0.250 Pervious Lag constant (h	ours)"
		5.000 Pervious Depression stor 0.015 Impervious Manning 'n'"	age
		0.000 Impervious Max.infiltrat	ion"
11 17		0.000 Impervious Min.infiltrat	ion"
		0.050 Impervious Lag constant 1.500 Impervious Depression st	(nours) prage"
		1.074 0.000	0.000 0.000 c.m/sec"
		Catchment 201 Perv Surface Area 1.19	
11		Surface Area 1.19 Time of concentration 11.2	
		Time to Centroid 102.	758 98.258 99.099 minutes"
		Rainfall depth 69.4 Rainfall volume 829.	
		Rainfall losses 40.8	22 2.348 15.814 mm"
11		Runoff depth 28.6 Runoff volume 341.	
"		Runoff volume 341. Runoff coefficient 0.41	
"	40	Maximum flow 0.25	8 0.912 1.074 c.m/sec"
	40	HYDROGRAPH Add Runoff "	aa 1

				1051	72_POST_25y	r UC		
ŋ		4	Add Runoff " 1.074	1.074	0.000	0.000"		
0 11	33		TCHMENT 202"		01000	01000		
Ū		1 1	Triangular SCS Equal length"					
0 2		2	Horton equation	n''				
		202 25.000	Catchment 202	- то с	lythe Creee	ek"		
Ū		0.740	% Impervious" Total Area"					
		30.000	Flow length"					
U		2.000 0.555	Overland Slope Pervious Area"					
		30.000	Pervious lengt					
		2.000 0.185	Pervious slope					
an.		30.000	Impervious Area Impervious len	a ath"				
		2.000	Impervious slo	be"				
		0.250 75.000	Pervious Manni Pervious Max.i					
		12.500	Pervious Min.i	nfiltr	ation"			
"		0.250	Pervious Lag co	onstan	t (hours)"			
		$5.000 \\ 0.015$	Pervious Depres	ssion ina '	storage" n'"			
"		0.000	Impervious Max	.infil	tration"			
		0.000 0.050	Impervious Min Impervious Lag	. 1nti l	tration"			
n		1.500	Impervious Dep	ressio	n storage"	,		
		63	0.169	1.074			.m/sec"	п
u			tchment 202 rface Area		Pervious 0.555	0.185	Total Area 0.740	hectare"
			me of concentrat	tion	11.267	1.796	7.114	minutes"
н			me to Centroid infall depth		102.758 69.476	98.258 69.476	100.785 69.476	minutes" mm"
		Ra	infall volume		385.59	128.53	514.13	c.m"
U			infall losses noff depth		40.822 28.654	2.348 67.128	31.204 38.273	mm'' mm''
"		Ru	noff volume		159.03	124.19	283.22	c.m"
			noff coefficien ximum flow			0.966	0.551	"
	40	HY	DROGRAPH Add Rur	noff "	0.120	0.076	0.169	c.m/sec"
		4	Add Runoff "			0.000		
п	33	CA	0.169 TCHMENT 300"	1.226	0.000	0.000"		
"		1	Triangular SCS	•				
U		1 2	Equal length" Horton equation	יי ר				
		300	Catchment 300 -		lythe Creek	C ^{TT}		
		0.000 6.480	% Impervious" Total Area"					
н		45.000	Flow length"					
		2.000	Overland Slope'	•				
n:		6.480 45.000	Pervious Area" Pervious length	n''				
н п		2.000	Pervious slope'	•				
н. Н		0.000 45.000	Impervious Area Impervious leng	1″ 1+6″				
		2.000	Impervious slop	be"				
		0.250	Pervious Mannir	ng 'n'	11 a m i a m 11			
		75.000 12.500	Pervious Max.ir Pervious Min.ir					
		0.250	Pervious Lag co	onstan	t (hours)"			
		5.000 0.015	Pervious Depres Impervious Manr	ing '	storage" n'"			
		0.013	Impervious main	nig	Page 2			

Page 2

048		×		1051	72_P	OST_25y	r UC				
н		0.000	Impervious M	lax.infi	ltrat	ion"					
		0.000	Impervious M	lin.infi	ltrat	ion"					
н		0.050	Impervious L)"				
"		1.500	Impervious D	peoressio	on st	orage"					
			1.261	1.226		0.000	(0.000	.m/sec	"	
		Cat	tchment 300		Perv	ious			Total /		
			rface Area		6.48		0.000		6.480	ai cu	hectare"
п			me of concent	ration	14.3		2.29		14.371		minutes"
			ne to Centroi		105.		98.9		105.68		minutes"
эн			infall depth	u	69.4		69.47		69.476		mm"
			infall volume		4502		0.00	0	4502.0		
			infall losses					0			c.m"
		Ka	iniaii iosses		40.8		2.498		40.830		mm''
		Rur	noff depth		28.6		66.97	6	28.647		mm''
11		Rur	noff volume		1856		0.00	•	1856.30	0	c.m"
u.			noff coeffici	ent	0.41		0.000		0.412		
	4.0		kimum flow		1.26	L L	0.000	J	1.261		c.m/sec"
	40		DROGRAPH Add	Runott	•						
		4	Add Runoff "		_						
			1.261	2.156	5	0.000	(0.000"			
	64		OW_TABLE"								
		2	Flow hydrogr	'aph''							
		4	Inflow Hydro	graph"							
u		Max	kimum flow			2.15		c.m/se	ec"		
		Hyd	drograph volu	Ime		3969.41	12	c .m"			
	38	SŤA	ART/RE-START	TOTALS 3	300"						
		3	Runoff Total	s on EXI	CT"						
		Tot	tal Catchment					10.	630	hect	tare"
			tal Imperviou						402		tare"
			tal % impervi					22	592"		
ан. Т	19	EXI	LT"								

			1(05172_P	NCT 100			
u			MIDUSS Output					>"
			MIDUSS version				Version 2.2	5 rev. 473"
		10	MIDUSS created			Su	unday, Februa	ry 07, 2010"
		10	Units used: Job folder:		w-\cuo	lph\ 105 3	2005\105172\D	ie METRIC"
			Job Torder.		Model	lina File	es\MIDUSS\201	6 Revisions"
"			Output filename:		nouci	1	L05172_POST_1	00yr UC.out"
			Licensee name:					gmbp"
			Company	u a a d a			Hewlett-Pack	ard Company"
	31	тт	Date & Time last IE PARAMETERS"	usea:			6/2/2016 at	3:31:23 PM"
	<u> </u>	5.000	Time Step"					
		210.000	Max. Storm length	า"				
	22	1500.000	Max. Hydrograph"					
	32	STC 1	ORM Chicago storm'					
11		4688.000	Chicago storm" Coefficient A"					
		17.000	Constant B"					
		0.962	Exponent C"					
11 11			Fraction R"					
		$210.000 \\ 1.000$	Duration"	lion"				
н			Time step multip kimum intensity	rier	213.57	74 mm /	/hr"	
			al depth		88.8	30 mm'	, , , , , , , , , , , , , , , , , , , ,	
	~ ~	6		aph exte	ension u		his file"	
	33		CHMENT 201"					
		1 1	Triangular SCS" Equal length"					
		2	Horton equation"					
		201	Catchment 201 - 1	ro clytł	ne Creee	ek''		
		65.000	% Impervious"					
		3.410 30.000	Total Area" Flow length"					
		2.000	Overland Slope"					
3 10 2		1.194	Pervious Area"					
9 11		30.000	Pervious length"					
		2.000 2.217	Pervious slope"					
		30.000	Impervious Area" Impervious length	יי ר				
		2.000	Impervious slope'	I				
		0.250	Pervious Manning	'n'"				
		75.000	Pervious Max.infi					
		12.500 0.250	Pervious Min.infi Pervious Lag cons	tant (k	ours)"			
.0.		5.000	Pervious Depressi	ion stor	age"			
		0.015	Impervious Mannir	ıg 'n'"	-			
н п		0.000	Impervious Max.ir					
		0.000 0.050	Impervious Min.ir Impervious Lag co	iti itrat nstant	(hours)	\ ¹¹		
		1.500	Impervious Depres	sion st	orage")		
			1.469 0.	000	0.000	0.00	0 c.m/sec"	
" "			chment 201		ious	Impervio	ous Total Are	
11			face Area	1.19		2.217	3.410	hectare"
			ne of concentratio Ne to Centroid	on 9.30 102.		1.638 97.460	3.326 98.493	minutes" minutes"
			nfall depth	88.8		88.830	88.830	mm"
		Rai	nfall volume	1060).18	1968.91	3029.10	c.m"
и 11			nfall losses	43.6		2.647	17.000	mm''
u			off depth	45.1		86.183	71.830	mm''
			off volume off coefficient	539. 0.50		1910.24 0.970	2449.40 0.809	ç.m"
11		Мах	imum flow	0.41		1.149	1.469	c.m/sec"
н.	40	HYD	ROGRAPH Add Runof	f "				,
				Pa	ıge 1			

				105172	2_POS⊤_100	/r UC		
		4	Add Runoff " 1.469	1.469	0.000	0.000"		
	33		CHMENT 202"			0.000		
			Triangular SCS"					
			Equal length" Horton equation	"				
11 17		202	Catchment 202 -		lythe Creee	ek"		
		25.000	% Impervious"					
			Total Area" Flow length"					
		2.000	Overland Slope"					
		0.555	Pervious Area"					
			Pervious length Pervious slope"					
		0.185	Impervious Area					
		30.000	Impervious leng	th"				
п		2.000 0.250	Impervious slop Pervious Mannin	e" a 'n''	,			
		75.000	Pervious Mannin Pervious Max.in	filtra	ation"			
		12.500	Pervious Min.in	filtra	ition"			
11		0.250 5.000	Pervious Lag co Pervious Depres	nstant	(hours)"			
17			Impervious Mann	ina 'r	'''			
		0.000	Impervious Max.	infilt	ration"			
		0.000	Impervious Min. Impervious Lag	infilt	ration"			
11			Impervious Lag	ession	i storage"			
			0.256	1.469	0.000		c.m/sec"	
			chment 202 face Area		Pervious	Impervious 0.185	Total Area	"
			e of concentrat	ion g	.306	1.638	0.740 6.325	hectare" minutes"
		Tim	e to Centroid	1	.02.153	97.460	100.328	minutes"
			nfall depth nfall volume			88.830 164.34	88.830	mm''
11			nfall losses		93.01 3.655	2.647	657.34 33.403	c.m" mm"
11		Run	off depth	4	5.175	86.183	55.427	mm''
			off volume off coefficient	2		159.44	410.16	ç.m"
		Max	imum flow	C		0.970 0.096	0.624 0.256	c.m/sec"
11 11	40	HYDI	ROGRAPH Add Run	off "			0.1200	01111/0000
		4 /	Add Runoff " 0.256	1 714	0.000	0.000"		
	33	CAT	CHMENT 300"	1.714	0.000	0.000"		
		1 -	Triangular SCS"					
		1 1	Equal length"					
			Horton equation Catchment 300 -		vthe Creek	. 17		
		0.000 9	% Impervious"		,			
			Total Area"					
			Flow length" Overland Slope"					
**		6.480 i	Pervious Area"					
			Pervious length					
			Pervious slope" Impervious Area					
		45.000	Impervious leng	th"				
		2.000	Impervious slop	e''				
			Pervious Mannin Pervious Max.in					
		12.500 F	Pervious Min.in	filtra	tion"			
		0.250 F	Pervious Lag con	nstant	(hours)"			
"		5.000 F 0.015 I	Pervious Depres Empervious Mann	ina 'n	turage			
					Page 2			

		0.000 0.000 0.050 1.500	Impervious / Impervious / Impervious / Impervious /	Max.infi Min.infi Lag cons Depressi	ltra ltra tant on s	tion" (hours) torage")"				
110		6-	1.971	1.71		0.000	(0.000	c.m/sec		
			tchment 300			vious	Impe	rvious	Total	Area	
			rface Area me of concent	tration	6.4		0.00		6.480		hectare"
н			me to Centro		11.8	.828	2.089		11.869		minutes"
		Ra	infall depth	i u	88.8		88.8		88.830		minutes" mm"
11 		Ra	infall volume	2		6.17	0.01		5756.1		c.m''
		Ra	infall losses	5	43		2.67)	43.360		mm''
8		Ru	noff depth		45.4	470	86.10		45.470		mm''
U U		Ru	noff volume			6.46	0.01		2946.4	6	c.m"
		Ru	noff coeffic	ient	0.5		0.000		0.512		n
	40	ма	ximum flow	D	1.97	/1	0.000)	1.971		c.m/sec"
	ŧŪ	4	DROGRAPH Add Add Runoff '	, KUNOTT							
		4	1.971	3.38	6	0.000		0.000"			
" 6	54	SH	OW TABLE"	5.50	0	0.000	,	1.000			
н		2	Flow hydrog	aph"							
		4	Inflow Hydro								
"			ximum flow			3.38		c.m/se	ec"		
		Ну	drograph volu	ıme		5806.02	26	c.m"			
 	88	_ST/	ART/RE-START	TOTALS	300"						
		3	Runoff Total	IS ON EX	[T''			10	630		
			tal Catchment tal Imperviou	area					630		tare"
11		TO	tal % impervi	ai ea					. 402 . 592''	nec	tare"
" 1	9	EX	IT"	003				22.	172		

ŭ		105172_POST_Regional UC
0 0 0 0 0	10	MIDUSS Output>" MIDUSS version Version 2.25 rev. 473" MIDUSS created Sunday, February 07, 2010" Units used: ie METRIC" Job folder: W:\Gue]ph\105-2005\105172\Design Data\"
" " " 31	TI 60.000	Output filename:Modelling Files\MIDUSS\2016 Révisions"Output filename:105172_POST_Regional UC.out"Licensee name:gmbp"CompanyHewlett-Packard Company"Date & Time last used:6/2/2016 at 3:36:32 PM"CIME PARAMETERS"Time Step"
" " 32 "	2880.000 3600.000 ST 5 2880.000 48.000	Max. Storm length" Max. Hydrograph" FORM Historic" Historic" Duration" Rainfall intensity values"
0 0 0 0 0 0 0 0 0 0 0 0 0		2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028" 2.028 2.028 2.028 2.028" 2.028" 2.028 2.028 2.028 2.028" 2.028" 2.028 2.028 2.028 2.028" 2.028" 2.028 2.028 2.028 2.028" 2.028" 2.028 2.028 2.028 2.028" 2.028" 2.028 2.028 2.028 2.028" 2.028" 2.028 2.026 2.026 2.028" 2.028" 2.028 2.026 2.026 2.028" 2.028" 2.026 6.000 4.000 6.000 13.000"
11 11 11	Ma	53.000 38.000 13.000" aximum intensity 53.000 mm/hr"
" " 33 "	6	otal depth 285.000 mm" OOOhyd Hydrograph extension used in this file" NTCHMENT 201" Triangular SCS" Equal length"
п п п п п п	2 201 65.000 3.410 30.000 2.000 1.194	Horton equation" Catchment 201 - To Clythe Creeek" % Impervious" Total Area" Flow length" Overland Slope" Pervious Area"
	30.000 2.000 2.217 30.000 2.000 0.250	Pervious length" Pervious slope" Impervious Area" Impervious length" Impervious slope" Pervious Manning 'n'"
0 0 11 11 11 11 11 11	75.000 12.500 0.250 5.000 0.015 0.000 0.000 0.000 0.050	Pervious Max.infiltration" Pervious Min.infiltration" Pervious Lag constant (hours)" Pervious Depression storage" Impervious Manning 'n'" Impervious Max.infiltration" Impervious Min.infiltration" Impervious Lag constant (hours)"
	1.500 Ca Su Ti Ti Ra	Impervious Depression storage" 0.376 0.000 0.000 c.m/sec" tchment 201 Pervious Impervious Total Area " inface Area 1.194 2.217 3.410 hectare" me of concentration 17.225 2.860 4.946 minutes" me to Centroid 2775.198 2251.465 2327.523 minutes" infall depth 285.000 285.000 mm" infall volume 3401.48 6317.02 9718.50 c.m"
		i uye I

	10	E172 DOCT Danie			
11		5172_POST_Regio		00 207	mm''
11	Rainfall losses Runoff depth	207.571	39.596	98.387	mm''
11	Runoff volume	77.429 924.12	245.404 5439.38	186.613 6363.50	
11	Runoff coefficient	0.272	0.861	0.655	C.III
	Maximum flow	0.094	0.282	0.376	c.m/sec"
" 40		0.094 vff "	0.202	0.370	C.III/ SEC
" "	4 Add Runoff "				
н		0.000	0.000"		
" 33		0.000	0.000		
	1 Triangular SCS"				
11	1 Equal length"				
	2 Horton equation'	•			
	202 Catchment 202 -		ek"		
	25.000 % Impervious"	to cryche cree	en		
	0.740 Total Area"				
	30.000 Flow length"				
п	2.000 Overland Slope"				
	0.555 Pervious Area"				
п	30.000 Pervious length'	1			
11	2.000 Pervious slope"				
74	0.185 Impervious Area'	T			
	30.000 Impervious lengt	:h"			
	2.000 Impervious slope	è			
	0.250 Pervious Manning	j 'n'"			
	75.000 Pervious Max.inf				
11 11	12.500 Pervious Min.inf	iltration"			
	0.250 Pervious Lag cor	istant (hours)"			
	5.000 Pervious Depress	sion storage"			
	0.015 Impervious Manni	ng 'n'			
	0.000 Impervious Max.i				
н	0.000 Impervious Min.i	Infiltration	N !!		
п	0.050 Impervious Lag o 1.500 Impervious Depre	onstant (nours))		
).376 0.000	0 000 /	.m/sec"	
		-			
11		Pervious	Tmnervious	Total Area	
**	Catchment 202	Pervious 0 555		Total Area	
	Catchment 202 Surface Area	0.555	0.185	0.740	hectare"
**	Catchment 202 Surface Area Time of concentrati	0.555 on 17.225	0.185 2.860	0.740 9.845	hectare" minutes"
	Catchment 202 Surface Area Time of concentrati Time to Centroid	0.555 on 17.225 2775.197	0.185 2.860 2251.465	0.740 9.845 2506.141	hectare" minutes" minutes"
11 11 11 11	Catchment 202 Surface Area Time of concentrati	0.555 on 17.225 2775.197 285.000	0.185 2.860	0.740 9.845 2506.141 285.000	hectare" minutes" minutes" mm"
11 11 11 11 11	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses	0.555 on 17.225 2775.197 285.000 1581.75	0.185 2.860 2251.465 285.000 527.25	0.740 9.845 2506.141	hectare" minutes" minutes" mm" c.m" mm"
11 11 11 11 11 11 11	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume	0.555 on 17.225 2775.197 285.000	0.185 2.860 2251.465 285.000	0.740 9.845 2506.141 285.000 2109.00	hectare" minutes" mm" c.m" mm" mm"
11 11 11 11 11 11 11 11 11	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume	0.555 on 17.225 2775.197 285.000 1581.75 207.571 77.429 429.73	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00	0.740 9.845 2506.141 285.000 2109.00 165.577	hectare" minutes" mm" c.m" mm" mm"
11 11 11 11 11 11 11 11	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient	0.555 on 17.225 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
11 11 11 11 11 11 11 11 11 11	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow	0.555 on 17.225 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73	hectare" minutes" mm" c.m" mm" mm"
" " " " " 40	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runc	0.555 on 17.225 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
" " " 40	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runc 4 Add Runoff "	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
" " " 40	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runo 4 Add Runoff " 0.067 0	0.555 on 17.225 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
" " " 40	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runo 4 Add Runoff " 0.067 C CATCHMENT 300"	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
" " " 40 " 33	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runo 4 Add Runoff " 0.067 C CATCHMENT 300" 1 Triangular SCS"	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
" " 40 " 33	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runo 4 Add Runoff " 0.067 C CATCHMENT 300" 1 Triangular SCS" 1 Equal length"	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044 0ff " 0.443 0.000	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
" " 40 " 33	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runo 4 Add Runoff " 0.067 C CATCHMENT 300" 1 Triangular SCS" 1 Equal length" 2 Horton equation"	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044 0.443 0.000	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024 0.000"	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
" " 40 " 33	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runo 4 Add Runoff " 0.067 C CATCHMENT 300" 1 Triangular SCS" 1 Equal length" 2 Horton equation"	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044 0.443 0.000	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024 0.000"	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
" " 40 " 33	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runof 4 Add Runoff " 0.067 C CATCHMENT 300" 1 Triangular SCS" 1 Equal length" 2 Horton equation" 300 Catchment 300 - 0.000 % Impervious"	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044 0.443 0.000	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024 0.000"	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
40 33	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runof 4 Add Runoff " 0.067 C CATCHMENT 300" 1 Triangular SCS" 1 Equal length" 2 Horton equation" 300 Catchment 300 - 0.000 % Impervious" 6.480 Total Area"	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044 0.443 0.000	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024 0.000"	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
40 33	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runof 4 Add Runoff " 0.067 C CATCHMENT 300" 1 Triangular SCS" 1 Equal length" 2 Horton equation" 300 Catchment 300 - 0.000 % Impervious" 6.480 Total Area"	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044 0.443 0.000	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024 0.000"	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
40 33	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runof 4 Add Runoff " 0.067 C CATCHMENT 300" 1 Triangular SCS" 1 Equal length" 2 Horton equation" 300 Catchment 300 - 0.000 % Impervious" 6.480 Total Area" 45.000 Flow length"	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044 0.443 0.000	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024 0.000"	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
40 33	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runof 4 Add Runoff " 0.067 C CATCHMENT 300" 1 Triangular SCS" 1 Equal length" 2 Horton equation" 300 Catchment 300 - 0.000 % Impervious" 6.480 Total Area" 45.000 Flow length" 2.000 Overland Slope" 6.480 Pervious Area"	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044 0.443 0.000	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024 0.000"	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
40 33	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runof 4 Add Runoff " 0.067 C CATCHMENT 300" 1 Triangular SCS" 1 Equal length" 2 Horton equation" 300 Catchment 300 - 0.000 % Impervious" 6.480 Total Area" 45.000 Flow length" 2.000 Overland Slope" 6.480 Pervious Area"	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044 0.443 0.000	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024 0.000"	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
40	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runof 4 Add Runoff " 0.067 C CATCHMENT 300" 1 Triangular SCS" 1 Equal length" 2 Horton equation" 300 Catchment 300 - 0.000 % Impervious" 6.480 Total Area" 45.000 Flow length" 2.000 Overland Slope" 6.480 Pervious Area"	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044 off " 0.443 0.000	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024 0.000"	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
40	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runof 4 Add Runoff" 0.067 C CATCHMENT 300" 1 Triangular SCS" 1 Equal length" 2 Horton equation" 300 Catchment 300 - 0.000 % Impervious" 6.480 Total Area" 45.000 Flow length" 2.000 Overland Slope" 6.480 Pervious Area" 45.000 Pervious length"	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044 off " 0.443 0.000	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024 0.000"	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
40	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runof 4 Add Runoff" 0.067 C CATCHMENT 300" 1 Triangular SCS" 1 Equal length" 2 Horton equation" 300 Catchment 300 - 0.000 % Impervious" 6.480 Total Area" 45.000 Flow length" 2.000 Overland Slope" 6.480 Pervious Area" 45.000 Pervious length"	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044 off " 0.443 0.000 To Clythe Creek	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024 0.000"	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"
40 33	Catchment 202 Surface Area Time of concentrati Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow HYDROGRAPH Add Runo 4 Add Runoff" 0.067 C CATCHMENT 300" 1 Triangular SCS" 1 Equal length" 2 Horton equation" 300 Catchment 300 - 0.000 % Impervious" 6.480 Total Area" 45.000 Flow length" 2.000 Overland Slope" 6.480 Pervious Area" 45.000 Impervious length"	0.555 2775.197 285.000 1581.75 207.571 77.429 429.73 0.272 0.044 off " 0.443 0.000 To Clythe Creek	0.185 2.860 2251.465 285.000 527.25 39.596 245.404 454.00 0.861 0.024 0.000"	0.740 9.845 2506.141 285.000 2109.00 165.577 119.423 883.73 0.419	hectare" minutes" mm" c.m" mm" mm" c.m"

	<pre>105172_POST_Regional UC 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 Max.infiltration" 0.000 Impervious Max.infiltration" 0.000 Impervious Lag constant (hours)" 1.500 Impervious Lag constant (hours)" 1.500 Impervious Depression storage" 0.538 0.443 0.000 0.000 c.m/sec" Catchment 300 Pervious Impervious Total Area " Surface Area 6.480 0.000 6.480 hectare" Time of concentration 21.969 3.647 21.969 minutes" Time to Centroid 2780.244 2236.986 2780.242 minutes" Rainfall depth 285.000 285.000 mm" Rainfall losses 206.992 38.537 206.992 mm" Runoff depth 78.008 246.463 78.008 mm" Runoff depth 78.008 246.463 78.008 mm" Runoff coefficient 0.274 0.000 0.274 " Maximum flow 0.538 0.000 0.538 c.m/sec" 4 Add Runoff " 4 Add Runoff "</pre>
	4 Add Runoff " 0.538 0.911 0.000 0.000"
<u></u> 64	SHOW TABLE"
	2 Flow hydrograph"
Ξ π	4 Inflow Hydrograph" Maximum flow 0.911 c.m/sec"
	Maximum flow 0.911 c.m/sec" Hydrograph volume 12302.162 c.m"
" 38	START/RE-START TOTALS 300"
	3 Runoff Totals on EXIT" Total Catchment area 10.630 hectare"
эт	Total Catchment area 10.630 hectare" Total Impervious area 2.402 hectare"
	Total % impervious 22.592"
" 19	EXIT"

Catchment 201 - Proposed Stormwater Management Facility

		ATIONS	ockout	9.75 m	s/ ^s m		m		m ²	m	ш		ľ		Top of Permanent Pool					CB Lip Elevation							Weir Elevation		Top of Bank
		ORIFICE CALCULATIONS	90 mm Diameter Knockout	Invert Elevation = 339.75 m	0.011	0.6	0.455	19.62	0.006	060'0	0.045		Discharge	(m ³ /s)	0.000	0.004	0.007	0.009	0.010	0.011	0.411	0.422	0.432	0.442	0.451	0.461	0.470	0.914	1.736
te Property)		ORIFIC	90 mm	Invert E	= Q	Cd =	= H	2g =	$\mathbf{A} =$	D =	D/2		Weir		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.4353	1.2482
Cityview Ridge Subdivision (Formerely P.T. Valeriote Property) City of Guelph Our File: 105-172 June 2016	(pənt	SNOI	t Pipe	20 m	m ³ /s		ш		m ²	ш		RGE TABLE	Orifice Control	375 mm	0.00	00.0	0.00	0.00	0.00	00.0	0.411	0.422	0.432	0.442	0.451	0.461	0.470	0.479	0.488
odivision (Formerely F City of Guelph Our File: 105-172 June 2016	Management Facility (continued)	ORIFICE CALCULATIONS	375 mm Diameter Outlet Pipe	Invert Elevation = 338.20 m	0.470	0.6	2.763	19.62	0.110	0.375	0.188	STAGE/STORAGE/DISCHARGE TABLE	Orifice Control	90 mm	0.000	0.004	0.007	0.009	0.010	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ityview Ridge Sul	nwater Managemen	ORIFIC	375 mn	Invert	Q =	Cd =	H=	2g =	$\mathbf{A} =$	D =	D/2	STAGE/STO	Storage ((m ³)	0.0	217.3	450.8	700.8	967.3	1250.7	1551.1	1869.0	2204.4	2557.7	2929.1	3318.9	3727.4	4153.0	4594.6
C	Catchment 201 - Proposed Stormwater	SNOI			ш	m	ш		ш		cu m/s		Stage	(m)	0.00	0.10	0.20	0.30	0.40	0.50	09.0	0.70	0.80	06'0	1.00	1.10	1.20	1.30	1.40
	ntchment 201	WEIR CALCULATIONS			1.80	1.60	0.20	19.62	10		1.2482		Elevation	(m)	339.75	339.85	339.95	340.05	340.15	340.25	340.35	340.45	340.55	340.65	340.75	340.85	340.95	341.05	341.15
	ũ	WEIR (d1 =	h =	= H	2g =	$\mathbf{L} =$		= 0			ļ															

Catchment 202 - Energy Dissipation/Dispersion Structure

1	1			Bottom of Stone										Top of Stone / Weir	Overflow
	Total	Storage	(m ³)	0.00	4.33	8.67	13.00	17.33	21.67	26.00	30.33	34.67	41.87	50.07	59.27
TABLE	Increm.	Storage	(m ³)	0.00	4.33	4.33	4.33	4.33	4.33	4.33	4.33	4.33	7.20	8.20	9.20
STORAGE VOLUME TABLE	Surface	Area	(m ²)	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00	130.00
ST01		Depth	(m)	0.00	0.10	0.20	0.30	0.40	0.50	09.0	0.70	0.80	06.0	1.00	1.10
		Elevation	(m)	336.00	336.10	336.20	336.30	336.40	336.50	336.60	336.70	336.80	336.90	337.00	337.10

June 2016

Catchment 202 - Energy Dissipation/Dispersion Structure (continued)

W WEIR	88	B	ш	s/ ⁸ /m
DVERFLOW WEIR	1.10 1.00	0.10	48.50	2.1290
0	d1 = h =	$H = 2 \sigma \sigma$	<i>و</i> م ل =	= Ŏ
	B	ш	m ps	cm/s
SIDES	65.00	1.00	130.0	1.00E-04
	L(dw) =	D(dw) =	A(c) =	K =
М	88	ш	m ²	m ³ cm/s
BOTTOM	65.00 2.00	1.00	130.0	43.3 1.00E-04
	L(dw) = W(dw) =	D(dw) =	A(c) = VOI (dw)=	VOL(st)= K =

Top of Stone / Weir Bottom of Stone Overflow Discharge 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 0.0003 2.1292 (m³/s) 0.0000 Total 0.0001 Discharge 0.0000 0.0000 0.0000 (m³/s) 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 2.1290 Weir STORAGE VOLUME TABLE Infiltration Discharge 0.0001 0.0002 0.0002 0.0002 0.0002 0.0002 0.0002 (m³/s) 0.0000 0.0002 0.0002 0.0003 0.0003 Storage (E) 13.0 17.3 21.7 26.0 30.3 41.9 34.7 50.1 59.3 8.7 0.0 4.3 Stage 0.20 0.30 0.40 0.50 0.60 0.70 0.00 0.10 0.80 0.90 1.00 1.10 ₫ Elevation 336.10 336.70 336.80 336.90 337.00 337.10 336.00 336.20 336.30 336.40 336.50 336.60 €

Catchment B2a: Existing Stormwater Quality Pond No. 2

Elevation	Stage	Surface Area	Incremental Storage Volume	Accumulated Storage Volume	
(m)	(m)	(m ²)	(m ³)	(m ³)	Ĩ
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	06.0	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)

300 mm diamete	OUTLET #1 er orifice (pip	OUTLET #1 300 mm diameter orifice (pipe inv. = 319.55)		Ö	OVERFLOW WEIR	VEIR
Q =	0.303	m ³ /s		d1 =	1.00	Ш
Cd =	0.6			h =		ш
= H	2.60	ш		= H	0.30	ш
2g =	19.62			2g =	19.62	
$\mathbf{A} =$	0.071	m ²		L =	30.00	Ш
D =	0.300	ш		= 0	7.251	m ³ /s
D/2	0.150			,		
		Stage/Storag	Stage/Storage/Discharge Table			
Elevation	Stage	Storage	Outlet #1	Overflow	Total	ſ
			1050 mm dia.	Weir	Discharge	

Elevation	Stage	Storage	Outlet #1	Overflow	Total	Ĩ
			1050 mm dia. nine	Weir	Discharge	
	(m)	(m ³)	(m ³ /s)	(m ³ /s)	(m ³ /s)	
	0.00	0.00	0.000	0.00	0.000	Pond Bottom
	0.10	579.40	0.259	0.000	0.259	
	0.20	1, 179.90	0.266	0.000	0.266	
	0.30	1,801.55	0.272	0.000	0.272	
	0.40	2,444.55	0.279	0.000	0.279	
	0.50	3,109.00	0.285	0.000	0.285	
	0.60	3,794.95	0.291	0.000	0.291	
	0.70	4,502.50	0.297	0.000	0.297	Weir
	0.80	5,231.75	0.303	1.329	1.632	
	0.90	5,982.75	0.309	3.860	4.168	
	1.00	6,755.65	0.314	7.251	7.566	Overflow

			1	.05172	_POST_2	2vr		
() fit			MIDUSS Output					>"
			MIDUSS version					5 rev. 473"
л		10	MIDUSS created Units used:			Sun	day, Februai	ry 07, 2010"
н		IO	Job folder:			10h 105 - 200	م \105172 \05	ie METRIC" esign Data\"
п								5 Revisions"
			Output filename:			y ee		OST_2yr.out"
**			Licensee name:					gmbp"
			Company	a a d a		H	ewlett-Packa	ard Company"
יי ק	1	т	Date & Time last us IME PARAMETERS"	seu:			6/2/2016 at	4:05:28 PM"
	-	5.000	Time Step"					
n		170.000	Max. Storm length"					
	-	1500.000	Max. Hydrograph"					
<u></u> 3	2	ST	ORM Chicago storm"					
		1 743.000	Chicago storm" Coefficient A"					
н		6.000	Constant B"					
		0.799	Exponent C"					
н		0.400	Fraction R"					
0		170.000	Duration"					
-		1.000	Time step multiplie	er	105 6	0.6 mm /b		
			ximum intensity otal depth		105.6 33.8		r.	
11		6		ı exte		used in th	is file"	
	3	CA	TCHMENT 201"					
		1	Triangular SCS"					
		1 2	Equal length"					
n		201	Horton equation" Catchment 201 - To	Clyth	e Cree	ek"		
л.		65.000	% Impervious"	crycn		CK		
		3.410	Total Area"					
		30.000	Flow length"					
11		2.000 1.194	Overland Slope"					
11 =		30.000	Pervious Area" Pervious length"					
		2.000	Pervious slope"					
311		2.217	Impervious Area"					
"		30.000	Impervious length"					
		2.000	Impervious slope"					
		0.250	Pervious Manning 'r Pervious Max.infilt	ratio	n''			
310		12.500	Pervious Min.infili					
		0.250	Pervious Lag consta	ant (h	ours)"			
		5.000	Pervious Depression	n stor	age"			
		$0.015 \\ 0.000$	Impervious Manning	'n'"	!!			
11		0.000	Impervious Max.infi Impervious Min.infi					
11		0.050	Impervious Lag cons	stant	(hours)"		
		1.500	Impervious Depressi	ion st	orage"	·		
**		_	0.496 0.00		0.000		c.m/sec"	
			tchment 201	Perv			s Total Area	
			me of concentration	1.19 22.1		2.217 2.170	3.410 2.858	hectare"
11			me to Centroid	93.4		84.151	84.470	minutes" minutes"
			infall depth	33.8		33.816	33.816	mm''
**		Ra	infall volume	403.	59	749.53	1153.12	c.m"
			infall losses	31.7		1.985	12.390	mm''
			noff depth noff volume	2.10 25.1		31.830 705.52	21.426 730.63	mm"
			noff coefficient	0.06		0.941	0.634	c .m"
11		Ма	ximum flow	0.01		0.496	0.496	c.m/sec"
" 4	0	HY	DROGRAPH Add Runoff	11	ao 1			-

	105172 DOST 200	
н	105172_POST_2yr 4 Add Runoff "	
0 54	0.496 0.496 0.000 0.000"	
<u></u> 54	4 POND DESIGN" 0.496 Current peak flow c.m/sec"	
0	0.171 Target outflow c.m/sec"	
ii ii	730.6 Hydrograph volume c.m" 15. Number of stages"	
н	0.000 Minimum water level metre"	
0	3.000 Maximum water level metre"	
0	0.000 Starting water level metre" 0 Keep Design Data: 1 = True; 0 = False"	
п	Level Discharge Volume"	
	339.750 0.000 0.000"	
	339.850 0.00400 217.300" 339.950 0.00700 450.800"	
	340.050 0.00900 700.800"	
	340.150 0.01000 967.300" 340.250 0.01100 1250.700"	
	340 350 0 4110 1551 100"	
	340.450 0.4220 1869.000"	
	340.550 0.4320 2204.400" 340.650 0.4420 2557.700"	
000 525	340.750 0.4510 2929.100"	
	340.850 0.4610 3318.900" 340.950 0.4700 3727.400"	
л	340.950 0.4700 3727.400" 341.050 0.9140 4153.000"	
	341.150 1.736 4594.600"	
	Peak outflow 0.009 c.m/sec" Maximum level 340.039 metre"	
11	Maximum storage 673.523 c.m"	
	Centroidal lag 17.512 hours"	~!!
" 40	0.496 0.496 0.009 0.000 c.m/se 0 HYDROGRAPH Next link "	Ĺ
11 11	5 Next link "	
" 51	0.496 0.009 0.009 0.000" 1 PIPE DESIGN"	
0	0.009 Current peak flow c.m/sec"	
	0.013 Manning 'n'" 0.450 Diameter metre"	
<u>n</u>	4.420 Gradient %"	
и 0	Depth of flow 0.038 metre"	
п	Velocity 1.359 m/sec" Pipe capacity 0.599 c.m/sec"	
"	Critical depth 0.063 metre"	
" 53	3 ROUTE Pipe Route 19" 19.20 Pipe Route 19 Reach length (metre)"	
	0.488 X-factor <= 0.5"	
	10.600 к-lag (seconds)"	
	0.000 Default(0) or user spec.(1) values used" 0.500 X-factor <= 0.5"	
0	30.000 к-lag (seconds)"	
	0.500 Beta weighting factor" 10.714 Routing time step (seconds)"	
	1 No. of sub-reaches"	
н н	Peak outflow 0.009 c.m/sec"	<i>,</i> , , , ,
" 40	0.496 0.009 0.009 0.000 c.m, D HYDROGRAPH Next link "	/sec"
n	5 Next link "	
" 54	0.496 0.009 0.009 0.000" 4 POND DESIGN"	
n.	0.009 Current peak flow c.m/sec"	
	0.171 Target outflow c.m/sec"	
	540.4 Hydrograph volume c.m" Page 2	

			105172_post_2yr
		12.	Number of stages"
		0.000	Minimum water level metre"
		3.000	Maximum water level metre"
		0.000	Starting water level metre"
6545. 2010		0	Keep Design Data: 1 = True; 0 = False"
			Level Discharge Volume"
			336.000 0.000 0.000"
			336.100 1.00E-05 4.300" 336.200 2.00E-05 8.700"
			336.200 2.00E-05 8.700"
			336.300 3.00E-05 13.000"
			336.400 4.00E-05 17.300" 336.500 5.00E-05 21.700"
			336.500 5.00E-05 21.700" 336.600 6.00E-05 26.000"
			336.700 7.00E-05 30.300"
			336.800 8.00E-05 34.700"
			336.900 9.00E-05 41.900"
			337.000 1.00E-04 50.100"
			336.900 9.00E-05 41.900" 337.000 1.00E-04 50.100" 337.100 2.129 59.300"
		Pe	eak outflow0.009 c.m/sec"
			aximum level 337.000 metre"
н			aximum storage 50.138 c.m"
			entroidal lag 13.761 hours"
"			0.496 0.009 0.009 0.000 c.m/sec"
	40	НЛ	/DROGRAPH Next link "
		5	Next link "
			0.496 0.009 0.009 0.000"
	52	CH	ANNEL DESIGN"
		0.009	
		0.065	Manning 'n'"
		0.	Cross-section type: O=trapezoidal; 1=general"
		65.000	Basewidth metre"
n		3.000	Left bank slope"
11		3.000	Right bank slope"
		$0.100 \\ 18.000$	Channel depth metre" Gradient %"
			epth of flow 0.002 metre"
		Ve	elocity 0.088 m/sec"
			nannel capacity 9.152 c.m/sec"
11		Cr Cr	ritical depth 0.001 metre"
	53		DUTE Channel Route 50"
10		50.00	Channel Route 50 Reach length (metre)"
			X-factor <= 0.5"
		212.649	K-lag (seconds)"
		0.000	Default(0) or user spec.(1) values used"
		0.500	X-factor <= 0.5"
0		30.000	K-lag (seconds)"
		0.500	Beta weighting factor"
ii ii		300.000	Routing time step (seconds)"
		2_	No. of sub-reaches"
		Pe	eak outflow 0.009 c.m/sec" ("
0	40		0.496 0.009 0.009 0.000 c.m/sec"
	40		DROGRAPH Next link "
D		5	Next link "
	33	C^	0.496 0.009 0.009 0.000"
	22		TCHMENT 202" Triangular SCS"
		1 1	Equal length"
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		2	Horton equation"
IJ		202	Catchment 202 - To Clythe Creeek"
		25.000	% Impervious"
0		0.740	Total Area"
		30.000	Flow length"
		2.000	Overland Slope"
			Page 3

			105172_POST_2yr	
	"		0.555 Pervious Area"	
			30.000 Pervious length"	
			2.000 Pervious slope"	
	n		0.185 Impervious Area"	
			30.000 Impervious length"	
			2.000 Impervious slope" 0.250 Pervious Manning 'n'"	
			0.250 Pervious Manning 'n'" 75.000 Pervious Max.infiltration"	
	u.		12.500 Pervious Min.infiltration"	
			0.250 Pervious Lag constant (hours)"	
			5.000 Pervious Depression storage"	
2			0.015 Impervious Manning 'n'"	
			0.000 Impervious Max.infiltration"	
			0.000 Impervious Min.infiltration"	
			0.050 Impervious Lag constant (hours)"	
			1.500 Impervious Depression storage"	
			0.041 0.009 0.009 0.000 c.m/sec"	
			Catchinent 202 Pervious Impervious Total Area	
	••		Surface Area 0.555 0.185 0.740 hectare" Time of concentration 22.189 2.170 5.482 minutes"	
	31		Time to Centroid 93.436 84.151 85.688 minutes"	
			Rainfall depth 33.816 33.816 33.816 mm"	
			Rainfall volume 187.68 62.56 250.24 c.m"	
	н		Rainfall losses 31.713 1.985 24.281 mm"	
			Runoff depth 2.103 31.830 9.535 mm"	
			Runoff volume 11.67 58.89 70.56 c.m"	
			Runoff Coefficient 0.062 0.941 0.262	
		40	Maximum flow 0.008 0.041 0.041 c.m/sec" HYDROGRAPH Add Runoff "	
		40	4 Add Runoff "	
	n		0.041 0.041 0.009 0.000"	
	н. н	33	CATCHMENT 300"	
			1 Triangular SCS"	
			1 Equallength" 2 Horton equation"	
	н		2 Horton equation" 300 Catchment 300 - To Clythe Creek"	
			0.000 % Impervious"	
			6.480 Total Area"	
			45.000 Flow length"	
			2.000 Overland Slope"	
	н. 11		6.480 Pervious Area"	
			45.000 Pervious length"	
			2.000 Pervious slope"	
			0.000 Impervious Area" 45.000 Impervious length"	
	u:		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 Max.infiltration" 0.000 Impervious Min.infiltration"	
			0.050 Impervious Lag constant (hours)"	
			1.500 Impervious Depression storage"	
			0.073 0.041 0.009 0.000 c.m/sec"	
			Catchment 300 Pervious Impervious Total Area "	
	0 0		Surface Area 6.480 0.000 6.480 hectare"	
	e U		Time of concentration 28.300 2.768 28.300 minutes"	
	U.		Time to Centroid 98.613 85.041 98.613 minutes" Rainfall depth 33.816 33.816 33.816 mm"	
	<b>17</b>		Rainfall volume 2191.27 0.00 2191.27 c.m"	
			Page 4	

11 11 11 11	40	Rainfall losses Runoff depth Runoff volume Runoff coefficien Maximum flow HYDROGRAPH Add Ru	0.07	09 7 54 2	yr 2.082 31.734 0.00 0.000 0.000	31.709 4 2.107 136.55 0.062 0.073	mm''
	64 38	<ul> <li>4 Add Runoff " 0.073</li> <li>SHOW TABLE"</li> <li>2 Flow hydrograp</li> <li>4 Inflow Hydrogr</li> <li>Maximum flow</li> <li>Hydrograph volume</li> <li>START/RE-START TO</li> </ul>	aph" TALS 300"	0.009 0.08 695.17		.000" c.m/sec" c.m"	
11 11 11	19	3 Runoff Totals Total Catchment a Total Impervious Total % imperviou EXIT"	rea area			10.630 2.402 22.592"	hectare" hectare"

п		105172_POST_5yr
		MIDUSS Output>" MIDUSS version Version 2.25 rev. 473"
"		MIDUSS created Sunday, February 07, 2010"
	10	Units used: ie METRIC"
n.		Job folder: W:\Guelph\105-2005\105172\Design Data\" Modelling Files\MIDUSS\2016 Revisions"
		Output filename: 105172_POST_5yr.out"
		Licensee name: gmbp"
		Company Hewlett-Packard Company" Date & Time last used: 6/2/2016 at 4:08:30 PM"
" 31	ТІ	IME PARAMETERS"
	5.000	Time Step"
35. 30	170.000	Max. Storm length"
" 32	1500.000 ST	Max. Hydrograph" TORM Chicago storm"
200 2002	1	Chicago storm"
	1593.000	Coefficient A"
	$\begin{array}{r} 11.000\\ 0.879\end{array}$	Constant B" Exponent C"
	0.400	Fraction R"
	170.000	Duration"
n	1.000 Ma	Time step multiplier" aximum intensity 134.894 mm/hr"
.0.		otal depth 46.775 mm"
" "22	6	005hyd Hydrograph extension used in this file"
" 33	1	ATCHMENT 201" Triangular SCS"
"	1	Equal length"
	2	Horton equation"
310	201 65.000	Catchment 201 - To Clythe Creeek" % Impervious"
	3.410	Total Area"
	30.000	Flow length"
	2.000 1.194	Overland Slope" Pervious Area"
<b>11</b> 9 4944	30.000	Pervious length"
	2.000	Pervious slope"
	2.217 30.000	Impervious Area" Impervious length"
	2.000	Impervious slope"
	0.250	Pervious Manning 'n'"
<b>1</b>	75.000 12.500	Pervious Max.infiltration" Pervious Min.infiltration"
	0.250	Pervious Lag constant (hours)"
	5.000	Pervious Depression storage"
	$0.015 \\ 0.000$	Impervious Manning 'n'" Impervious Max.infiltration"
	0.000	Impervious Min.infiltration"
	0.050	Impervious Lag constant (hours)"
п	1.500	Impervious Depression storage" 0.675 0.000 0.000 0.000 c.m/sec"
	Ca	atchment 201 Pervious Impervious Total Area "
	Su	urface Area 1.194 2.217 3.410 hectare"
		ime of concentration 15.360 1.968 3.517 minutes" ime to Centroid 88.710 82.363 83.097 minutes"
п		ainfall depth 46.775 46.775 mm"
n n	Ra	ainfall volume 558.26 1036.77 1595.03 c.m"
		ainfall losses 35.929 2.131 13.960 mm" unoff depth 10.846 44.644 32.815 mm"
	Ru	unoff depth 10.846 44.644 32.815 mm" unoff volume 129.45 989.54 1118.99 c.m"
п	Ru	unoff coefficient 0.232 0.954 0.702 "
" 40	Ма	aximum flow 0.099 0.665 0.675 c.m/sec"
40	нү	/DROGRAPH Add Runoff "

ne.		105172_POST_5yr
		4 Add Runoff " 0.675 0.675 0.000 0.000"
	54	POND DESIGN" 0.675 Current peak flow c.m/sec"
9		0.171 Target outflow c.m/sec"
u.		1119.0 Hydrograph volume c.m" 15. Number of stages"
0		0.000 Minimum water level metre" 3.000 Maximum water level metre"
9		0.000 Starting water level metre"
		0 Keep Design Data: 1 = True; 0 = False" Level Discharge Volume"
		339.750 0.000 0.000" 339.850 0.00400 217.300"
		339.950 0.00700 450.800" 340.050 0.00900 700.800"
и п		340.150 0.01000 967.300"
n		340.250 0.01100 1250.700" 340.350 0.4110 1551.100"
		340.450 0.4220 1869.000" 340.550 0.4320 2204.400"
и л		340.650 0.4420 2557.700"
		340.750 0.4510 2929.100" 340.850 0.4610 3318.900"
n N		340.950 0.4700 3727.400" 341.050 0.9140 4153.000"
н 11		341.150 1.736 4594.600"
		Peak outflow 0.010 c.m/sec" Maximum level 340.179 metre"
"		Maximum storage 1049.820 c.m" Centroidal lag 20.307 hours"
11 11	40	0.675 0.675 0.010 0.000 c.m/sec" HYDROGRAPH Next link "
н 11	40	5 Next link "
	51	0.675 0.010 0.010 0.000" PIPE DESIGN"
11 11		0.010 Current peak flow c.m/sec" 0.013 Manning 'n'"
		0.450 Diameter metre"
0		4.420 Gradient %" Depth of flow 0.041 metre"
н 11		Velocity 1.425 m/sec" Pipe_capacity 0.599 c.m/sec"
и 11	53	Critical depth 0.068 metre"
н 11	22	ROUTE Pipe Route 19" 19.20 Pipe Route 19 Reach length (metre)"
		0.487 X-factor <= 0.5" 10.104 K-lag (seconds)"
л П		0.000 Default(0) or user spec.(1) values used" 0.500 X-factor <= 0.5"
н н		30.000 к-lag (seconds)"
11		0.500 Beta weighting factor" 10.345 Routing time step (seconds)"
и п		1 No. of sub-reaches" Peak outflow 0.010 c.m/sec"
н П	40	0.675 0.010 0.010 0.000 c.m/sec"
ш	40	HYDROGRAPH Next link " 5 Next link "
и п	54	0.675 0.010 0.010 0.000" POND DESIGN"
11 11		0.010 Current peak flow c.m/sec"
3920 1995		0.171 Target outflow c.m/sec" 743.2 Hydrograph volume c.m"
		Page 2

				105	5172_POST_5yr	
		12.	Number of sta	qes" 🚺	, <u>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</u>	
		0.000	Minimum water Maximum water	level	metre"	
		3.000	Maximum water	level	metre"	
		0.000	Starting wate	r level	metre"	
		0			= True; 0 = Fa Volume"	Ise
			Level Disch 336.000 0	.000	0.000"	
			336,100 1.00	F-05	4.300"	
			336.100 1.00 336.200 2.00	E-05	8.700"	
			336.300 3.00	E-05	13.000"	
			336.400 4.00	E-05	17.300"	
			336.500 5.00		21.700"	
			336.600 6.00	E-05	26.000"	
			336.700 7.00 336.800 8.00		30.300" 34.700"	
30			336.900 9.00		41.900"	
			337.000 1.00	F-04	50.100"	
				.129	59.300"	
			eak outflow		0.010	c.m/sec"
			aximum level		337.000	metre"
			aximum storage		50.144	c.m"
		Ce	entroidal lag 0.675 0	.010	13.776	hours"
	40	ЦЛ	DROGRAPH Next	.UIU link "	0.010 0.	000 c.m/sec"
	10	5	Next link "	THIK		
		5	0.675	0.010	0.010	0.000"
	52	CH	ANNEL DESIGN"			
		0.010	Current peak	flow	c.m/sec"	
		0.065	Manning 'n'"			4 74
		0. 65.000	Cross-section	type: (	0=trapezoidal;	1=general"
		65.000 3.000	Basewidth I Left bank slo	metre"		
$\mathbf{n}$		3.000	Right bank slo	pe one"		
		0.100	Channel depth	met	re"	
		18.000	Gradient %"		÷	
.U.		De	epth of flow		0.002	metre"
		Ve	elocity		0.092	m/sec"
		Cr	annel capacity		9.152	c.m/sec"
	53		vitical depth DUTE Channel	Pouto "	0.001	metre"
н	,,		Channel Roi	ute 50 P	Reach length	( metre)"
н		0.500	X-factor <= 0	.5"	teach rengen	Cincerey
316		203.874	K-lag (sec	onds)"		
11 11			Default(0) or	user sp	pec.(1) values	used"
		0.500	X-factor <= 0			
		30.000	K-lag (sec	onds)"	-"	
an:		0.500 300.000	Beta weighting Routing time	y Tactor	(seconds)"	
		2	No. of sub-rea	aches"	( seconds)	
			ak outflow	actico	0.010	c.m/sec"
			0.675	0.010	0.010	0.000 c.m/sec"
л п	40		DROGRAPH Next	link "		
		5	Next link "	0 010	0.010	0.000
	<b>,</b> ,,	<b>C</b> A	0.675	0.010	0.010	0.000"
	33	1	TCHMENT 202" Triangular SC	s"		
		1	Equal length"	J		
<b>.11</b>		2	Horton equation	on"		
		202	Catchment 202	- TO C	lythe Creeek"	
п.		25.000	% Impervious"			
		0.740	Total Area"			
m		30.000	Flow length"			
		2.000	Overland Slope	2	Page 3	

Page 3

			105172_post_5	ivr		
	0.555	Pervious Area"	100112_0001_0	, <b>, , , , , , , , , , , , , , , , , , </b>		
	30.000	Pervious length"	1			
	2.000	Pervious slope"				
н 11	0.185					
	30.000					
	2.000	Impervious slope	<u>,</u>			
	0.250		1 'n'"			
	75.000 12.500		iltration"			
	0.250		stant (hours)"			
	5.000	Pervious Depress				
	0.015		na 'n'"			
	0.000	Impervious Max.i				
н	0.000	Impervious Min.i				
	0.050		constant (hours)	)"		
116 (20)	1.500	Impervious Depre	ession storage"	-		
			0.010 0.010	0.000 0	c.m/sec"	
<u>u</u> 11		Catchment 202	Pervious		Total Area	
		Surface Area	0.555	0.185	0.740	hectare"
115		Time of concentrati		1.968	7.614	minutes"
		Time to Centroid	88.710	82.363	85.039	minutes"
		Rainfall depth Rainfall volume	46.775 259.60	46.775 86.53	46.775	mm'' c.m''
		Rainfall losses	35.929	2.131	346.14 27.479	mm"
		Runoff depth	10.846	44.644	19.296	mm''
		Runoff volume	60.20	82.59	142.79	c.m"
		Runoff coefficient	0.232	0.954	0.413	ii ii
		Maximum flow	0.046	0.055	0.069	c.m/sec"
	40	HYDROGRAPH Add Runo	off "			
и. и	4	Add Runoff "				
	<b>~</b> ~	0.069 0	0.069 0.010	0.000"		
n		CATCHMENT 300"				
	1	Triangular SCS"				
	1 2	Equal length"	I			
115	300		To Clythe Creek	."		
	0.000		to crythe cree	<b>`</b>		
11	6.480					
	45.000					
	2.000	Overland Slope"				
	6.480					
	45.000					
	2.000	Pervious slope"	1			
11	0.000	Impervious Area"	.L.11			
	45.000 2.000	Impervious lengt Impervious slope	.[] \''			
0	0.250	Pervious Manning	'n''			
11 ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) (	75.000	Pervious Max.inf	iltration"			
	12.500	Pervious Min.inf				
	0.250	Pervious Lag con				
2 2	5.000	Pervious Depress	ion storage"			
	0.015	Impervious Manni	ng 'n'"			
	0.000	Impervious Max.i	ntiltration"			
	0.000	Impervious Min.i	ntiltration"	. 11		
	0.050	Impervious Lag c	onstant (hours)	)		
U	1.500	Impervious Depre		0 000	- m/caa"	
0		0.444 0 Catchment 300	0.069 0.010 Pervious		.m/sec"	
u -		Surface Area	6.480	0.000	Total Area 6.480	hectare"
		Time of concentrati		2.510	19.590	minutes"
		Time to Centroid	92.382	83.161	92.382	minutes"
	1	Rainfall depth	46.775	46.775	46.775	mm''
<u>ŭ</u>	I	Rainfall volume	3031.02	0.00	3031.02	c.m"
			Page 4			

0		Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow	105172_P0 35.903 10.872 704.50 0.232 0.444	ST_5yr 2.33 44.4 0.00 0.00	463 10.8 0 704. 00 0.23	372 mm" 50 c.m" 32 "
u	40	HYDROGRAPH Add Runoff		0.00	0.44	4 c.m/sec"
		4 Add Runoff "				
100		0.444 0.5	<b>07 0</b>	.010	0.000"	
	64	SHOW_TABLE"				
н		2 Flow hydrograph"				
		4 Inflow Hydrograph"	I			
		Maximum flow		0.507	c.m/sec"	
п		Hydrograph volume	15	38.107	c.m/sec" c.m"	
**	38	START/RE-START TOTALS	300"	,0110/	C.I.III	
п		3 Runoff Totals on E	YTT"			
		Total Catchment area			10 620	bostono"
п		Total Impervious area			10.630	hectare"
		Total % impervious			2.402	hectare"
	19				22.592"	
	ТЭ	EXIT"				

				05172_post_2	5yr		
			MIDUSS Output MIDUSS version			ersion 2 25	rev. 473"
			MIDUSS created				y 07, 2010"
		10	Units used: Job folder:		1 nh 105 200	S 105173 D	ie METRIC"
0			Job Totuer:				sign Data\" Revisions"
			Output filename:		<b>y</b>	105172_POS	T_25yr.out"
			Licensee name:			wlatt Dacks	gmbp"
н			Company Date & Time last us	sed:	6	5/2/2016 at	rd Company" 4:10:20 PM"
"	31		ME PARAMETERS"		-	, _,	
		5.000 210.000	Time Step" Max. Storm length"				
"		1500.000	Max. Hydrograph"				
	32	ST	'ORM Chicago storm"				
		1 3158.000	Chicago storm" Coefficient A"				
н		15.000	Constant B"				
		0.936	Exponent C"				
		0.400 210.000	Fraction R" Duration"				
		1.000	Time step multiplie	er"			
			ximum intensity	169.5	46 mm/hr	, 17	
11		6	otal depth 025hyd Hydrograph	69.4 n extension		s filo"	
	33		TCHMENT 201"	r excension	useu m em	5 1116	
		1	Triangular SCS"				
		1 2	Equal length" Horton equation"				
		201	Catchment 201 - To	Clythe Cree	ek"		
		65.000 3.410	% Impervious" Total Area"				
		30.000	Flow length"				
н н		2.000	Overland Slope"				
		$1.194 \\ 30.000$	Pervious Area" Pervious length"				
		2.000	Pervious slope"				
11 11		2.217	Impervious Area"				
Ц		30.000 2.000	Impervious length" Impervious slope"				
"		0.250	Pervious Manning 'r	1"			
H H		75.000	Pervious Max.infilt	ration"			
9		12.500 0.250	Pervious Min.infilt Pervious Lag consta	ration" int (bours)"			
		5.000	Pervious Depression	n storage"			
		0.015	Impervious Manning				
		$0.000 \\ 0.000$	Impervious Max.infi Impervious Min.infi	Itration"			
"		0.050	Impervious Lag cons	stant (hours	)"		
		1.500	Impervious Depressi	on storage"			
		Ca	1.074 0.00 tchment 201	0000 0.000 Pervious		c.m/sec" Total Area	
			rface Area	1.194	2.217	3.410	hectare"
н п			me of concentration	11.267	1.796	3.566	minutes"
"			me to Centroid infall depth	102.758 69.476	98.258 69.476	99.099 69.476	minutes" mm"
		Ra	infall volume	829.20	1539.94	2369.15	c.m"
			infall losses noff depth	40.822	2.348	15.814	mm''
эц			noff volume	28.654 341.99	67.128 1487.90	53.663 1829.89	mm" c.m"
		Ru	noff coefficient	0.412	0.966	0.772	
	40	Ma	ximum flow DROGRAPH Add Runoff	"0.258	0.912	1.074	c.m/sec"
	τU	H I	DRUGRAPH AUU KUNOTI	Page 1			

		105172 25
	Π	105172_POST_25yr 4 Add Runoff "
	" " 54	1.074 1.074 0.000 0.000"
	" 54	POND DESIGN" 1.074 Current peak flow c.m/sec"
	11 11	0.171 Target outflow c.m/sec"
	11	1829.9 Hydrograph volume c.m" 15. Number of stages"
		0.000 Minimum water level metre"
		3.000 Maximum water level metre" 0.000 Starting water level metre"
	п	0 Keep Design Data: $1 = True; 0 = False''$
	11 11	Level Discharge Volume" 339.750 0.000 0.000"
		339.850 0.00400 217.300"
		339.950 0.00700 450.800"
	"	340.050 0.00900 700.800" 340.150 0.01000 967.300"
	н П	340.250 0.01100 1250.700"
	u -	340.350 0.4110 1551.100" 340.450 0.4220 1869.000"
	11 11	340.550 0.4320 2204.400"
		340.650 0.4420 2557.700" 340.750 0.4510 2929.100"
		340.850 0.4610 3318.900"
	11 11	340.950 0.4700 3727.400" 341.050 0.9140 4153.000"
		341.050 0.9140 4153.000" 341.150 1.736 4594.600"
		Peak outflow 0.196 c.m/sec"
	11	Maximum level 340.296 metre" Maximum storage 1390.030 c.m"
	" "	Centroidal lag 17.013 hours"
	" 40	1.074 1.074 0.196 0.000 c.m/sec" HYDROGRAPH Next link "
	11 11	5 Next link "
	" 51	1.074 0.196 0.196 0.000" PIPE DESIGN"
	11 11	0.196 Current peak flow c.m/sec"
	11	0.013 Manning 'n'" 0.450 Diameter metre"
	•• ••	4.420 Gradient %"
		Depth of flow 0.177 metre" Velocity 3.375 m/sec"
		Pipe capacity 0.599 c.m/sec"
	" 53	Critical depth 0.312 metre" ROUTE Pipe Route 19"
		19.20 Pipe Route 19 Reach length (metre)"
	" "	0.441 X-factor <= 0.5" 4.267 K-lag (seconds)"
	TT	4.267  K-lag  ( seconds)" 0.000  Default(0) or user spec.(1) values used"
	u: 	0.500 X-factor <= 0.5"
		30.000 K-lag (seconds)" 0.500 Beta weighting factor"
		4.762 Routing time step ( seconds)"
		1 No. of sub-reaches" Peak outflow 0.196 c.m/sec"
	" "	1.074 0.196 0.196 0.000 c.m/sec"
	" 40 "	HYDROGRAPH Next link "
		1.074 0.196 0.196 0.000"
	" 54 "	POND DESIGN" 0.196 Current peak flow c.m/sec"
		0.171 Target outflow c.m/sec"
·		1306.6 Hydrograph volume c.m"
		Page 2

			1	L05172_POST_25yr	
		12.	Number of stages"	-	
		0.000	Minimum water leve	e] metre"	
U.		3.000 0.000	Maximum water leve		
TT I		0.000	Starting water lev Keep Design Data:	$1 = True \cdot 0 = Fa$	امد"
		Ŭ	Level Discharge	Volume"	LI SC
н			336.000 0.000	0.000"	
			336.100 1.00E-05	4.300"	
199			336.200 2.00E-05	8.700"	
			336.300 3.00E-05 336.400 4.00E-05	13.000" 17.300"	
			336.500 5.00E-05	21.700"	
ાર			336.600 6.00E-05	26.000"	
			336.700 7.00E-05	30.300"	
			336.800 8.00E-05	34.700"	
			336.900 9.00E-05	41.900"	
			336.900 9.00E-05 337.000 1.00E-04 337.100 2.129	50.100" 59.300"	
		Pe	eak outflow	0.196	c.m/sec"
ан. Соор			aximum level	337.009	metre"
		Ma	aximum storage	50.948	c.m"
		Ce	entroidal lag	9.663	
	40		1.074 0.196 DROGRAPH Next link	" 0.196 0.	000 c.m/sec"
ж	40	5	Next link "		
		2	1.074 0.1	.96 0.196	0.000"
	52	CH	ANNEL DESIGN"		
		0.196	Current peak flow	c.m/sec"	
316		0.065	Manning 'n'"		1
		0. 65.000	Cross-section type Basewidth metre	: U=trapezoidai; ."	I=general
		3.000	Left bank slope"		
U		3.000	Right bank slope"		
		0.100	Channel depth m	letre"	
		18.000	Gradient %"	0.010	waters II
			epth of flow clocity	0.010 0.302	metre" m/sec"
н		cł	nannel capacity	9.152	c.m/sec"
		Cr	itical depth	0.010	metre"
30 30	53		OUTE Channel Rout		
		50.00		0 Reach length	( metre)"
		0.500 124.059	X-factor <= 0.5" K-lag (seconds)		
		0.000			used"
11		0.500	X-factor <= 0.5"		
		30.000	K-lag (seconds)		
u.		0.500	Beta weighting fac		
		100.000	Routing time step No. of sub-reaches	" ( seconds)	
311			ak outflow	0.192	c.m/sec"
"			1.074 0.1	.96 0.192	0.000 c.m/sec"
	40		DROGRAPH Next link	H 2	,
		5	Next link "	0.2 0 102	0.000"
	33	CA.	1.074 0.1 TCHMENT 202"	.92 0.192	0.000"
		1	Triangular SCS"		
		1	Equal length"		
н п		2	Horton equation"		
n.		202	Catchment 202 - To	Clythe Creeek"	
		25.000 0.740	% Impervious" Total Area"		
		30.000	Flow length"		
U.		2.000	Overland Slope"		
			-	Page 3	

				10				
n		0.555	Pervious Area"	10	5172_POST_25	byr		
		30.000	Pervious length	า''				
		2.000	Pervious slope	T				
10 10		0.185	Impervious Area	1"				
- 10		30.000 2.000	Impervious leng					
		0.250	Impervious slo Pervious Manni	na 'n	• **			
		75.000	Pervious Max.ir	ifilt	ration"			
		12.500	Pervious Min.ir	nfilt	ration"			
		0.250	Pervious Lag co	onștai	nt (hours)"			
		5.000 0.015	Pervious Depres Impervious Mann	ssing	storage"			
		0.000	Impervious Man	.infi	ltration"		8	
		0.000	Impervious Min.	.infi	ltration"			
		0.050	Impervious Lag	cons	tant (hours)	) ''		
		1.500	Impervious Depr			0.000		
		C	0.169 atchment 202	0.19	2 0.192 Pervious		.m/sec" Total Area	н
			urface Area		0.555	0.185	0.740	hectare"
			ime of concentrat	tion	11.267	1.796	7.114	minutes"
a n			ime to Centroid		102.758	98.258	100.785	minutes"
00			ainfall depth ainfall volume		69.476 385.59	69.476 128.53	69.476	mm''
			ainfall losses		40.822	2.348	514.13 31.204	c.m" mm"
"			unoff depth		28.654	67.128	38.273	mm''
			unoff volume		159.03	124.19	283.22	c.m"
ан П			unoff coefficient	2	0.412	0.966	0.551	
	40	Mc HN	aximum flow /DROGRAPH Add Rur	off '		0.076	0.169	c.m/sec"
"	40	4	Add Runoff "					
н			0.169	0.22	9 0.192	0.000"		
	33		ATCHMENT 300"					
Ū.		1 1	Triangular SCS' Equal length"	•				
		2	Horton equation	יי				
11		300	Catchment 300 -	- то (	clythe Creek	<"		
		0.000	% Impervious"		-			
		6.480 45.000	Total Area" Flow length"					
200		2.000	Overland Slope'	,				
		6.480	Pervious Area"					
		45.000	Pervious length	?"				
		2.000	Pervious slope'	. 11				
		0.000 45.000	Impervious Area Impervious leng	ι ith"				
11		2.000	Impervious slop	be"				
н н		0.250	Pervious Mannir	ng 'n'				
		75.000	Pervious Max in					
		12.500 0.250	Pervious Min.ir Pervious Lag co					
		5.000	Pervious Depres					
		0.015	Impervious Manr	ning	'n'"			
		0.000	Impervious Max.	infi	ltration"			
		0.000 0.050	Impervious Min.	1011	Itration"	. **		
n		1.500	Impervious Lag Impervious Depr					
			1.261	0.229		0.000 0	.m/sec"	
н п			itchment 300		Pervious	Impervious	Total Area	
			Irface Area	ion	6.480	0.000	6.480	hectare"
н			me of concentrat me to Centroid	. 1011	14.371 105.688	2.291 98.958	14.371 105.688	minutes" minutes"
			infall depth		69.476	69.476	69.476	mm''
п			infall volume		4502.07	0.00	4502.07	c.m"
					Page 4			

	40	Rainfall losses Runoff depth Runoff volume Runoff coefficien Maximum flow HYDROGRAPH Add Ru	40. 28. 185 t 0.4 1.2	647 6.30 12	5yr 2.498 66.978 0.00 0.000 0.000	40.830 28.647 1856.3 0.412 1.261	' mm'' -
	64 38	<ul> <li>4 Add Runoff " <ul> <li>1.261</li> </ul> </li> <li>SHOW TABLE"</li> <li>2 Flow hydrograp</li> <li>4 Inflow Hydrogr</li> <li>Maximum flow</li> <li>Hydrograph volume</li> <li>START/RE-START TO</li> </ul>	aph" TALS 300"	0.192 1.40 3394.23	00 с	000" .m/sec" .m"	
н п п	19	3 Runoff Totals Total Catchment a Total Impervious Total % imperviou EXIT"	on EXIT" rea area			10.630 2.402 22.592"	hectare" hectare"

				=			
π			10	5172_POST_	100yr		
			MIDUSS Output MIDUSS version			/ersion 2.25	5 rev. 473"
			MIDUSS created				ry 07, 2010"
		10	Units used:				ie METRIC"
			Job folder:	W:\Gu Mode	uelph\105-200 elling Files\	05\1051/2\De	esign Data\" S Bovisions"
"			Output filename:	MOUR	erring Fries	105172 POST	F_100yr.out"
			Licensee name:				gmbp''
			Company	ad.	He	wlett-Packa	ard Company"
"	31	TI	Date & Time last us ME PARAMETERS"	seu.	t t	0/2/2016 at	4:14:14 PM"
		5.000	Time Step"				
11		210.000	Max. Storm length"				
	32	1500.000 ST	Max. Hydrograph" ORM Chicago storm"				
"	52	1	Chicago storm"				
		4688.000	Coefficient A"				
11 71		17.000	Constant B"				
		0.962 0.400	Exponent C" Fraction R"				
п		210.000	Duration"				
		1.000	Time step multiplie				
			ximum intensity tal depth	213.	574 mm/hr 830 mm''		
		6			used in thi	s file"	
	33		TCHMENT 201"				
		$1 \\ 1$	Triangular SCS"				
		2	Equal length" Horton equation"				
		201	Catchment 201 - To	Clythe Cre	eek"		
		65.000	% Impervious"				
		3.410 30.000	Total Area" Flow length"				
		2.000	Overland Slope"				
		1.194	Pervious Area"				
		30.000	Pervious length"				
		2.000 2.217	Pervious slope" Impervious Area"				
"		30.000	Impervious length"				
		2.000	Impervious slope"				
		0.250 75.000	Pervious Manning 'n Pervious Max.infilt				
"		12.500	Pervious Min.infilt	ration"			
11 11		0.250	Pervious Lag consta	ınt (hours)	11		
		5.000 0.015	Pervious Depression Impervious Manning	storage"			
		0.000	Impervious Max.infi				
		0.000	Impervious Min.infi	ltration"			
		0.050	Impervious Lag cons	tant (hour	's)"		
		1.500	Impervious Depressi 1.469 0.00			c.m/sec"	
••		Ca	tchment 201	Pervious		Total Area	ι "
			rface Area	1.194	2.217	3.410	hectare"
п			me of concentration me to Centroid	9.306 102.153	1.638 97.460	3.326 98.493	minutes" minutes"
17			infall depth	88.830	88.830	88.830	mm"
••		Ra	infall volume	1060.18	1968.91	3029.10	c.m"
			infall losses	43.655	2.647	17.000	mm''
			noff depth noff volume	45.175 539.17	86.183 1910.24	71.830 2449.40	mm" c.m"
		Rui	noff coefficient	0.509	0.970	0.809	**
11 11	40	Max	ximum flow	"0.418	1.149	1.469	c.m/sec"
	40	HYI	DROGRAPH Add Runoff				
				Page 1			

	105172 2057 100
н	105172_POST_100yr 4 Add Runoff "
	1.469 $1.469$ $0.000$ $0.000''$
" 54	
н	1.469 Current peak flow c.m/sec" 0.171 Target outflow c.m/sec"
	2449.4 Hydrograph volume c.m"
	15. Number of stages"
0	0.000 Minimum water level metre" 3.000 Maximum water level metre"
11 11	0.000 Starting water level metre"
n	0 Keep Design Data: 1 = True; 0 = False" Level Discharge Volume"
11	339.750 0.000 0.000''
	339.850 0.00400 217.300"
	339.950 0.00700 450.800" 340.050 0.00900 700.800"
	340.150 0.01000 967.300"
n n	340.250 0.01100 1250.700"
316	340.350 0.4110 1551.100" 340.450 0.4220 1869.000"
0 0	340.550 0.4320 2204.400"
	340.650 0.4420 2557.700" 340.750 0.4510 2929.100"
"	340.850 0.4610 3318.900"
	340.950 0.4700 3727.400"
115	341.050 0.9140 4153.000" 341.150 1.736 4594.600"
п	Peak outflow 0.413 c.m/sec"
	Maximum level 340.373 metre"
	Maximum storage 1624.434 c.m" Centroidal lag 13.176 hours"
"	1.469 1.469 0.413 0.000 c.m/sec"
" 40	HYDROGRAPH Next link " 5 Next link "
н	1.469 0.413 0.413 0.000"
" 51	PIPE DESIGN"
n.	0.413 Current peak flow c.m/sec" 0.013 Manning 'n'"
	0.450 Diameter metre"
н н	4.420 Gradient %"
n	Depth of flow 0.275 metre" Velocity 4.065 m/sec"
" "	Pipe capacity 0.599 c.m/sec"
" 53	Critical depth 0.423 metre" ROUTE Pipe Route 19"
	19.20 Pipe Route 19 Reach length (metre)"
	0.392 X-factor <= 0.5"
	3.543 к-lag (seconds)" 0.000 Default(0) or user spec.(1) values used"
0	0.500 X-factor <= 0.5"
н) 11	30.000 K-lag (seconds)" 0.500 Beta weighting factor"
0	0.500 Beta weighting factor" 4.286 Routing time step (seconds)"
0 0	1 No. of sub-reaches"
	Peak outflow 0.413 c.m/sec"
" 40	1.469 0.413 0.413 0.000 c.m/sec" HYDROGRAPH Next link "
	5 Next link "
	1.469 0.413 0.413 0.000" POND DESIGN"
<u> </u>	0.413 Current peak flow c.m/sec"
e ë	0.171 Target outflow c.m/sec"
	1927.7 Hydrograph volume c.m" Page 2

				1051	172_POST_100yr	
11		12.	Number of sta	ages"		
		0.000	Minimum wate	rlevel	metre"	
		3.000	Maximum wate		metre""	
п		0.000	Starting wate			7 !!
		0	Level Disch	Jata: I :	= True; 0 = Fa Volume"	lise
				0.000	0.000"	
				DE-05	4.300"	
11			336.200 2.00		8.700"	
*1			336.300 3.00	DE-05	13.000"	
				DE-05	17.300"	
11			336.500 5.00		21.700"	
				DE-05	26.000"	
			336.700 7.00 336.800 8.00		30.300" 34.700"	
			336.900 9.00		41.900"	
п			337.000 1.00		50.100"	
11				2.129	59 300"	
			ak outflow		0.413	c.m/sec"
			ximum level		337.019	metre"
11			iximum storage		51.886	c.m"
11		Ce	ntroidal lag 1.469 (	).413	7.142	hours"
	40	НУ	DROGRAPH Next	link "	0.413 0.	000 c.m/sec"
	.0	5	Next link "	TTIK		
11		-	1.469	0.413	0.413	0.000"
	52	CH	ANNEL DESIGN			
		0.413	Current peak	flow	c.m/sec"	
		0.065	Manning 'n'"			4 70
н		0. 65.000	Cross-section Recowidth	metre"	0=trapezoidal;	I=general"
		65.000 3.000	Basewidth Left bank slo			
н		3.000	Right bank s	lone"		
11		0.100	Channel depth	n meti	re''	
		18.000	Gradient %'	•		
		De	pth of flow		0.016	metre"
		Ve	locity		0.407	m/sec"
**		Cn	annel capacity	/	9.152	c.m/sec"
	53		UTE Channel	Route S	0.016	metre"
	55	50.00			Reach length	(metre)"
11			X-factor <= (	).5"	teach rengen	
		92.097	K-lag (sec	conds)"		
		0.000	Default(0) or	<u>us</u> er sp	pec.(1) values	used"
		0.500	X-factor <= (			
н		30.000 0.500	K-lag (sec Beta weightir	conds)"		
11		75.000	Routing time	sten (	( seconds)"	
п		1	No. of sub-re	eaches"	( Seconds)	
н		-	ak outflow		0.413	c.m/sec"
			1.469	0.413	0.413	0.000 c.m/sec"
11 11	40	_HY	DROGRAPH Next	link "		
		5	Next link "	0 41 7	0 412	0.000
0.	33	<b>C</b> A	1.469 TCUMENT 202"	0.413	0.413	0.000"
		1	TCHMENT 202" Triangular SC	·s"		
"		1	Equal length"	ĩ		
"		2	Horton equati	on"		
		202	Catchment 202	2 - TO Cl	lythe Creeek"	
		25.000	% Impervious"			
		0.740	Total Area"			
п		30.000 2.000	Flow length" Overland Slop	0"		
		2.000	over rand STOP		Page 3	

Page	3
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			1	05172_post_10	)0vr		
		0.555	Pervious Area"	05172_7057_10	Joyi		
		30.000	Pervious length"				
		2.000	Pervious slope"				
		0.185	Impervious Area"				
п		30.000	Impervious length"				
		2.000 0.250	Impervious slope" Pervious Manning	n ^T			
0		75.000	Pervious Max.infil	tration"			
**		12.500	Pervious Min.infil				
"		0.250	Pervious Lag const	ant (hours)"			
и П		5.000	Pervious Depressio	on storage"			
		0.015	Impervious Manning				
		0.000 0.000	Impervious Max.inf Impervious Min.inf				
n		0.050	Impervious Lag con	stant (hours)	יי (		
		1.500	Impervious Depress	ion storage"			
			0.256 0.4		0.000	c.m/sec"	
			tchment 202	Pervious		Total Area	
n			rface Area	0.555	0.185	0.740	hectare"
			me of concentration me to Centroid	9.306 102.153	1.638	6.325 100.328	minutes"
			infall depth	88.830	97.460 88.830	88.830	minutes" mm"
		Ra	infall volume	493.01	164.34	657.34	c.m"
		Ra	infall losses	43.655	2.647	33.403	mm''
		Rur	noff depth	45.175	86.183	55.427	mm''
			noff volume	250.72	159.44	410.16	ç.m"
			noff coefficient ximum flow	0.509 0.195	0.970 0.096	0.624 0.256	c.m/sec"
	40	HY	DROGRAPH Add Runoff	: "	0.090	0.230	C. 117 Sec
		4	Add Runoff "				
			0.256 0.5	27 0.413	0.000"		
	33		TCHMENT 300"				
		1 1	Triangular SCS" Equal length"				
${\rm su}{\rm s}$		2	Horton equation"				
		300	Catchment 300 - To	Clvthe Cree	k''		
"		0.000	% Impervious"				
л 11		6.480	Total Area"				
310		45.000	Flow length"				
		2.000 6.480	Overland Slope" Pervious Area"				
		45.000	Pervious length"				
н		2.000	Pervious slope"				
		0.000	Impervious Area"				
		45.000	Impervious length"				
		2.000 0.250	Impervious slope"				
		75.000	Pervious Manning ' Pervious Max.infil	n tration"			
		12.500	Pervious Min.infil				
		0.250	Pervious Lag const				
		5.000	Pervious Depressio	n storage"			
		0.015	Impervious Manning	'n'"			
		0.000 0.000	Impervious Max.inf				
n		0.050	Impervious Min.inf Impervious Lag con	stant (hours)	) ''		
щ		1.500	Impervious Depress	ion storage"	/		
"			1.971 0.5		0.000 0	c.m/sec"	
			chment 300	Pervious	Impervious	Total Area	11
- ne			face Area	6.480	0.000	6.480	hectare"
			ne of concentration ne to Centroid	11.869 104.828	2.089 98.071	11.869 104.828	minutes" minutes"
u.		Rai	infall depth	88.830	88.830	88.830	mm"
<b></b>		Rai	infall volume	5756.17	0.01	5756.17	c.m"
				Page 4			

" " " 40	Rainfall losses 43. Runoff depth 45.	470 6.46 12	Dyr 2.670 86.160 0.01 0.000 0.000	43.360 45.470 2946.46 0.512 1.971	mm" mm" c.m" c.m/sec"
" 64 "	1.971 2.362 SHOW TABLE" 2 Flow hydrograph" 4 Inflow Hydrograph" Maximum flow	0.413 2.36	0.000" 2 c.m/se	ec"	
" 38 " " 19	Hydrograph volume START/RE-START TOTALS 300" 3 Runoff Totals on EXIT" Total Catchment area Total Impervious area Total % impervious EXIT"	5236.13	3 c.m" 10. 2.	630 h	ectare" ectare"

MIDUSS OUTPUT				105172_POST_Regional	
MIDUSS created         Sunday, February 07, 2010"           10         Units used: Job folder:         w:\Guelph\105-2005\105172\Design Data\". Modelling Fles\MUDS\2016 Revisions"           0utput filename:         ID3172_POST_Regional.out"           11         Incerse name:         Hewlett-Packard company"           0ate d'rime last used:         6/2/2016 at 4:15:52 PM"           3500.000         Max. Storm length"           3600.000         Max. Storm length"           2880.000         Duration"           48.000         Rainfall intensity values"           2.028         2.028         2.028           2.028         2.028         2.028           2.028         2.028         2.028           2.028         2.028         2.028           2.028         2.028         2.028           2.028         2.028         2.028           2.028         2.028         2.028           2.028         2.028         2.028           2.028         2.028         2.028           2.028 <td></td> <td></td> <td></td> <td>MIDUSS Output Version 2 25 rev 4</td> <td>&gt;" 473"</td>				MIDUSS Output Version 2 25 rev 4	>" 473"
10 Units used: ''''''''''''''''''''''''''''''''''''				MIDUSS created Sunday, February 07, 20	
Dutput filename: Licensee name: Licensee name: Licensee name: Licensee name: Licensee name: Licensee name: Licensee name: Date & Time last used: 6/2/2016 at 4:15:52 PM" 31 TIME PARAMETERS" 60.000 Time Step" 280.000 Max. Storn length" 3600.000 Max. Hydrograph 2 STORM Historic" 2 STORM Historic" 2 Storn Historic" 2 Loze 2.022 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028" 2.028 2.020 13.000 13.000" 17.026 13.000 13.000" Maximum intensity values" 6 000hyd Hydrograph extension used in this file" 3.410 Total Area" 30.000 Flow length" 2.000 Verland Slope" 1.194 Pervious Area" 30.000 Flow length" 2.000 Verland Slope" 2.217 Impervious length" 2.000 Verland Slope" 2.217 Impervious length" 2.000 Pervious length" 2.000 Pervious length" 2.001 Impervious Maximing n"" 7.000 Flow length" 2.000 Pervious Slope" 3.011 Impervious Maximing 1"" 0.000 Impervious Maximing 1"" 0.000 Impervious Maximing 1"" 0.001 Impervious Maximing 1"" 0.000 Impervious Maximing 1"" 0.000 Pervious Maximing 1"" 0.000 Impervious Maximing 1"" 0.000 Imper				10 Units used: ie METH	RIC"
Output filename:         105172_POST_Regional.out"           License name:         gmbp"           Company         Hewlett-Packard Company"           Date & Time last used:         6/2/2016 at 4:15:52 PM"           31         TIME PARAMETERS"           2880.000         Max. Storm length"           32         STORM Historic"           2880.000         Max. Hydrograph"           32         STORM Historic"           2028         2.028         2.028         2.028           2.028         2.028         2.028         2.028           2.028         2.028         2.028         2.028           2.028         2.028         2.028         2.028           2.028         2.028         2.028         2.028           2.028         2.026         2.028         2.028           2.028         2.026         2.028         2.028           2.028         2.026         2.028         2.028           2.028         2.026         2.028         2.028           2.028         2.026         2.028         2.028           2.028         2.026         2.028         2.028           2.000         13.000         13.000	01			Job folder: W:\Guelph\105-2005\105172\Design Dat	ta\"
Licensee name: Company Date & Time last used: 60.000 Time Step" 2880.000 Max. Storm length" 3600.000 Max. Storm length" 3700 38.000 13.000 38.000 13.000 Max. Storm length" 3600.000 Max. Storm length" 3600.000 Max. Storm length" 3700 3700 3700 3700 3700 3700 3700 3700 3700 3700 3700 3700 3700 3700 3700 3700 3700 3700 37500 37500 37500 37500 37500 37500 37500 37500 37500 375000 37500 37500 37500 37500 37500 37500 37500 37500 37500 37500 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 3750000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 375000 37500		п			
Company Hewlett-Packard Company" 501 TIME PARAMETERS" 502 000 Max. Storm length" 502 000 Max. Storm length" 502 000 Max. Hydrograph" 522 STORM Historic" 5280.000 Duration" 48.000 Rainfall intensity values" 52028 2.028 2.028 2.028 2.028 52028 2.028 2.028 2.028 2.028 53000 38.000 13.000 mm/hr" Total depth 38.000 13.000 mm/hr" Total depth 38.000 mm/hr" 7 total depth 38.000 mm/hr" 7 total depth 38.000 mm/hr" 7 total depth 39.000 mm/hr" 7 total depth 39.000 mm/hr" 7 total depth 39.000 mm/hr" 7 total depth 30.000 mm/hr" 7 total Area" 30.000 Flow length" 2.000 Overland Slope" 2.17 Impervious Area" 30.000 Pervious Slope" 2.17 Impervious Area" 30.000 Pervious Slope" 2.17 Impervious Max.infiltration" 7 total Area " 30.000 Pervious Max.infiltration" 0.550 Pervious Manning 'n" 7 total Area " 30.000 Impervious Max.infiltration" 0.500 Pervious Max.infiltration" 0.510 Impervious Max.infiltration" 0.520 Pervious Manning 'n" 7 time to centroid 17.225 2.860 4.9465 minutes" 7 time to centroid					nbp''
The PARAMETRS:         0/2/2016 at 4:13:32 PM           31         The PARAMETRS:         0/2/2016 at 4:13:32 PM           360.000         Max. Hydrograph"         3600.000           32         STORM Historic"         2028           2880.000         Duration"         48.000           2.028         2.028         2.028           2.028         2.028         2.028           2.028         2.028         2.028           2.028         2.028         2.028           2.028         2.028         2.028           2.028         2.028         2.028           2.028         2.028         2.028           2.028         2.028         2.028           2.028         2.028         2.028           2.028         2.026         2.026           2.028         2.026         2.028           2.026         2.026         2.028           2.027         2.026         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           3.000         13.000 </td <td></td> <td></td> <td></td> <td>Company Hewlett-Packard Compa</td> <td>any"</td>				Company Hewlett-Packard Compa	any"
<pre>60.000 Time Step" 2880.000 Max. Storm length" 3600.000 Max. Hydrograph" 32 STORM Historic" 280.000 Duration" 48.000 Rainfall intensity values" 2.028 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.026 2.026 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028 2.028" 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028 2.028</pre>			21	Date & Time last used: 6/2/2016 at 4:15:52	PM''
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<ul> <li>0.250 Pervious Lag constant (hours)"</li> <li>5.000 Pervious Depression storage"</li> <li>0.015 Impervious Manning 'n'"</li> <li>0.000 Impervious Max.infiltration"</li> <li>0.000 Impervious Min.infiltration"</li> <li>0.050 Impervious Lag constant (hours)"</li> <li>1.500 Impervious Depression storage"</li> <li>0.376 0.000 0.000 0.000 c.m/sec"</li> <li>Catchment 201 Pervious Impervious Total Area "</li> <li>Surface Area 1.194 2.217 3.410 hectare"</li> <li>Time of concentration 17.225 2.860 4.946 minutes"</li> <li>Time to Centroid 2775.198 2251.465 2327.523 minutes"</li> <li>Rainfall depth 285.000 285.000 mm"</li> <li>Rainfall volume 3401.48 6317.02 9718.50 c.m"</li> </ul>					
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"       0.050       Impervious Lag constant (hours)"         "       1.500       Impervious Depression storage"         "       0.376       0.000       0.000       c.m/sec"         "       Catchment 201       Pervious Impervious Total Area "         "       Surface Area       1.194       2.217       3.410       hectare"         "       Time of concentration       17.225       2.860       4.946       minutes"         "       Time to Centroid       2775.198       2251.465       2327.523       minutes"         "       Rainfall depth       285.000       285.000       mm"         "       Rainfall volume       3401.48       6317.02       9718.50       c.m"		11			
"       1.500       Impervious Depression storage"         "       0.376       0.000       0.000       c.m/sec"         "       Catchment 201       Pervious       Impervious Total Area         "       Surface Area       1.194       2.217       3.410       hectare"         "       Surface Area       1.194       2.217       3.410       hectare"         "       Time of concentration       17.225       2.860       4.946       minutes"         "       Time to Centroid       2775.198       2251.465       2327.523       minutes"         "       Rainfall depth       285.000       285.000       285.000       mm"         "       Rainfall volume       3401.48       6317.02       9718.50       c.m"		"			
"       0.376       0.000       0.000       0.000 c.m/sec"         "       Catchment 201       Pervious       Impervious Total Area         "       Surface Area       1.194       2.217       3.410       hectare"         "       Time of concentration       17.225       2.860       4.946       minutes"         "       Time to Centroid       2775.198       2251.465       2327.523       minutes"         "       Rainfall depth       285.000       285.000       285.000       mm"         "       Rainfall volume       3401.48       6317.02       9718.50       c.m"				1.500 Impervious Depression storage"	
"       Surface Area       1.194       2.217       3.410       hectare"         "       Time of concentration       17.225       2.860       4.946       minutes"         "       Time to Centroid       2775.198       2251.465       2327.523       minutes"         "       Rainfall depth       285.000       285.000       285.000       mm"         "       Rainfall volume       3401.48       6317.02       9718.50       c.m"				0.376 0.000 0.000 0.000 c.m/sec"	
" Time of concentration 17.225 2.860 4.946 minutes" Time to Centroid 2775.198 2251.465 2327.523 minutes" Rainfall depth 285.000 285.000 285.000 mm" Rainfall volume 3401.48 6317.02 9718.50 c.m"				Calchinent ZOI Pervious Impervious Iolai Area	
" Time to Centroid 2775.198 2251.465 2327.523 minutes" " Rainfall depth 285.000 285.000 285.000 mm" " Rainfall volume 3401.48 6317.02 9718.50 c.m"					
" Rainfall depth 285.000 285.000 285.000 mm" " Rainfall volume 3401.48 6317.02 9718.50 c.m"					5''
" Rainfall volume 3401.48 6317.02 9718.50 c.m"				Rainfall depth 285.000 285.000 285.000 mm"	-
Page 1				Rainfall volume 3401.48 6317.02 9718.50 c.m"	
				Page 1	

		10517	2_POST_Reg	ional		
		Rainfall losses	207.571	39.596	98.387	mm''
			77.429	245.404	186.613	mm''
п			924.12 0.272	5439.38	6363.50	ç.m"
			0.094	0.861 0.282	0.655 0.376	c.m/sec"
11	40	HYDROGRAPH Add Runoff "		0.202	0.570	citity See
		4 Add Runoff "				
ातनः संबद्ध	54	0.376 0.376 POND DESIGN"	0.000	0.000"		
	J4	0.376 Current peak flow	c.m/sec"			
			n/sec"			
		6363.5 Hydrograph volume	c.m"			
		15. Number of stages" 0.000 Minimum water level	motionall			
п		0.000 Minimum water level 3.000 Maximum water level	metre" metre"			
"		0.000 Starting water level	metre"			
		0 Keep Design Data: 1 =	= True; 0 =	= False"		
		Level Discharge 339.750 0.000	Volume"			
			0.000" 217.300"			
"		339.950 0.00700 4	450.800"			
- n - n			700.800"			
п			967.300" 250.700"			
			551.100"			
		340.450 0.4220 18	369.000"			
			204.400"			
п			557.700" 929.100"			
"			318.900"			
		340.950 0.4700 37	27.400"			
			L53.000"			
		341.150 1.736 45 Peak outflow	594.600" 0.31	L2 c.m/se	<u>م</u> د"	
		Maximum level	340.33	35 metre		
		Maximum storage	1507.01	L6 c.m"		
		Centroidal lag 0.376 0.376	47.72 0.312	28 hours" 0.000 c.m,	/coc"	
ш	40	HYDROGRAPH Next link "	0.312	0.000 C.m,	Sec	
		5 Next link "				
	<b>F</b> 1	0.376 0.312	0.312	0.000"		
	51	PIPE DESIGN" 0.312 Current peak flow	c.m/sec"			
10		0.013 Manning 'n'"	criny Sec			
<u>н</u> п		0.450 Diameter metre"				
		4.420 Gradient %" Depth of flow	0.23	20 motro		
		Velocity	3.80			
11		Pipe capacity	0.59	9 c.m/se	ec"	
	5.2	Critical depth	0.38	37 metre'	1	
n	53	ROUTE Pipe Route 19" 19.20 Pipe Route 19 Reac	h length	( metre)"		
		0.419 X-factor <= 0.5"	in rengen	( metre)		
		3.783 K-lag (seconds)"				
		0.000 Default(0) or user sp	ec.(1) val	ues used"		
		0.500 X-factor <= 0.5" 30.000 K-lag (seconds)"				
		0.500 Beta weighting factor				
		4.390 Routing time step (		•		
		1 No. of sub-reaches" Peak outflow	0 21	7 ~ ~ /~		
		0.376 0.312	0.31 0.312		ec c.m/sec"	
"	40	HYDROGRAPH Next link "	0.01L		,	
			Page 2			

		105172_POST_Regional
		5 Next link " 0.376 0.312 0.312 0.000"
11 11	54	POND DESIGN"
		0.312  Current peak flow   c.m/sec" 0.171  Target outflow   c.m/sec"
		0.171 Target outflow c.m/sec" 5475.3 Hydrograph volume c.m"
		12. Number of stages"
н 11		0.000 Minimum water level metre"
,,		3.000 Maximum water level metre" 0.000 Starting water level metre"
		0 Keep Design Data: $1 = True; 0 = False''$
		Level Discharge Volume"
11		336.000 0.000 0.000" 336.100 1.00E-05 4.300"
11		336.200 2.00E-05 8.700"
11		336.300 3.00E-05 13.000"
		336.400 4.00E-05 17.300" 336.500 5.00E-05 21.700"
n.		336.600 6.00E-05 26.000"
11		336.700 7.00E-05 30.300"
		336.800 8.00E-05 34.700" 336.900 9.00E-05 41.900"
		337.000 1.00E-04 50.100"
		337.100 2.129 59.300"
		Peak outflow 0.312 c.m/sec" Maximum level 337.015 metre"
"		Maximum level 337.015 metre" Maximum storage 51.448 c.m"
		Centroidal lag 43.394 hours"
	40	0.376 0.312 0.312 0.000 c.m/sec" HYDROGRAPH Next link "
Π	40	5 Next link "
		0.376 0.312 0.312 0.000"
	52	CHANNEL DESIGN" 0.312 Current peak flow c.m/sec"
"		0.065 Manning 'n'"
11 11		0. Cross-section type: 0=trapezoidal; 1=general"
		65.000 Basewidth metre" 3.000 Left bank slope"
		3.000 Right bank slope"
		0.100 Channel depth metre"
		18.000 Gradient %"
"		Depth of flow 0.013 metre" Velocity 0.364 m/sec"
		Channel capacity 9.152 c.m/sec"
	5.2	Critical depth 0.013 metre"
	53	ROUTE Channel Route 50" 50.00 Channel Route 50 Reach length (metre)"
11		0.500 X-factor <= 0.5"
17 17		103.020 K-lag (seconds)"
17		0.000   Default(0) or user spec.(1) values used" 0.500   X-factor <= 0.5"
"		30.000 к-lag (seconds)"
		0.500 Beta weighting factor"
н		102.857 Routing time step ( seconds)" 1 No. of sub-reaches"
11		l No. of sub-reaches" Peak outflow 0.312 c.m/sec"
		0.376 0.312 0.312 0.000 c.m/sec"
	40	HYDROGRAPH Next link "
		5 Next link " 0.376 0.312 0.312 0.000"
	33	CATCHMENT 202"
0		1 Triangular SCS"
		1 Equal length" Page 3
		Tage 5

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	105172_POST_Regional
н н	2 Horton equation" 202 Catchment 202 - To Clythe Creeek"
	25.000 % Impervious"
	0.740 Total Area" 30.000 Flow length"
u	2.000 Overland Slope"
	0.555 Pervious Area" 30.000 Pervious length"
u	2.000 Pervious slope"
	0.185 Impervious Area" 30.000 Impervious length"
л	2.000 Impervious slope"
	0.250 Pervious Manning 'n'" 75.000 Pervious Max.infiltration"
	12.500 Pervious Min.infiltration"
н н	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"
н	0.050 Impervious Lag constant (hours)"
"	1.500 Impervious Depression storage" 0.067 0.312 0.312 0.000 c.m/sec"
	Catchment 202 Pervious Impervious Total Area "
а п	Surface Area 0.555 0.185 0.740 hectare" Time of concentration 17.225 2.860 9.845 minutes"
11	Time to Centroid 2775.197 2251.465 2506.141 minutes"
300 200	Rainfall depth 285.000 285.000 285.000 mm" Rainfall volume 1581.75 527.25 2109.00 c.m"
**	Rainfall losses 207.571 39.596 165.577 mm"
н П	Runoff depth 77.429 245.404 119.423 mm" Runoff volume 429.73 454.00 883.73 c.m"
и 11	Runoff coefficient 0.272 0.861 0.419 "
 	Maximum flow 0.044 0.024 0.067 c.m/sec" HYDROGRAPH Add Runoff "
	4 Add Runoff "
" 33	0.067 0.373 0.312 0.000" CATCHMENT 300"
	1 Triangular SCS"
	1 Equal length" 2 Horton equation"
.0 .0	300 Catchment 300 - To Clythe Creek"
11	0.000 % Impervious" 6.480 Total Area"
и п	45.000 Flow length"
n	2.000 Overland ⁻ slope" 6.480 Pervious Area"
n 11	45.000 Pervious length"
IT	2.000 Pervious slope" 0.000 Impervious Area"
н н	45.000 Impervious length"
	2.000 Impervious slope" 0.250 Pervious Manning 'n'"
н н	75.000 Pervious Max.infiltration"
11	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"
995) 111	0.000 Impervious Min.infiltration" 0.050 Impervious Lag constant (hours)"
	1.500 Impervious Depression storage"
	0.538 0.373 0.312 0.000 c.m/sec" Page 4
	raye T

		Catchment 300 Surface Area Time of concentrat Time to Centroid Rainfall depth Rainfall volume Rainfall losses Runoff depth Runoff volume Runoff coefficient Maximum flow	tion	72_POST_Reg Pervious 6.480 21.969 2780.244 285.000 1.8468 206.992 78.008 5054.92 0.274 0.538	ional Imperviou 0.000 3.647 2236.986 285.000 0.0000 38.537 246.463 0.02 0.000 0.000	s Total 6.480 21.969 2780.2 285.00 1.8468 206.99 78.008 5054.9 0.274 0.538	hectare" minutes" 42 minutes" 00 mm" 6 ha-m" 92 mm" 6 mm"
.н Ю	40	HYDROGRAPH Add Rur 4 Add Runoff "	off '		01000	0.550	
н П	64	0.538 SHOW TABLE" 2 Flow hydrograph 4 Inflow Hydrogra	0.911 " aph"	1 0.312	0.000		
11 11 11 11	38	Maximum flow Hydrograph volume START/RE-START TOT 3 Runoff Totals of Total Catchment ar Total Impervious a Total % impervious EXIT"	TALS 3 On EX3 rea area	0.9 11368.9 300" LT"	14 c.m ["] 1	sec" 0.630 2.402 2.592"	hectare" hectare"

**3**0

Assumptions:		Knowns:	
Tin =	36 °C	Rho =	998 kg/m ³
=	309 K	Cp = Prf =	4181 J/kg K 6.62
Tout =	24 °C	Gamma =	$1.04E-06 m^3/s$
=	297 K	kf=	2.79 J/m [°] K s
Tavg =	30 °C	Q 2yr =	$0.009 \text{ m}^3/\text{s}$
=	303 K	Q 5yr =	$0.010 \text{ m}^3/\text{s}$
		Q 25yr =	$0.176 \text{ m}^3/\text{s}$
Tstone =	21 °C	Q 100yr =	$0.412 m^3/s$
=	294 K	Q Regional =	$0.307 \text{ m}^3/\text{s}$
$\mathbf{L} =$	65 m	8	
$\mathbf{W} =$	2 m		
D =	1 m		
Diam. =	0.02 m		

## <u>105172 - Cityview Ridge Subdivision</u> <u>Cooling Trench Sizing Calculations (Energy Dissipation/Dispersion Structure)</u>

Storm	qr (J/s)	As m ²	Af m ²	Vf (m/s)	hs J/m ^{2·} K [·] s	qa (J/s)	SF (%)
2	450,645	20420	27.9	0.0003	655	120,399,575	26617%
5	500,717	20420	27.9	0.0004	678	124,540,667	24772%
25	8,812,611	20420	27.9	0.0063	2,081	382,385,866	4239%
100	20,629,522	20420	27.9	0.0148	3,057	561,814,119	2623%
Regional	15,371,998	20420	27.9	0.0110	2,671	490,965,210	3094%

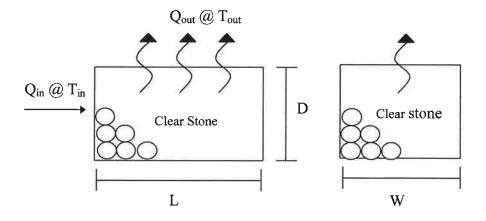
### Cityview Ridge Subdivision City of Guelph G&M File: 105-172

### Cooling Trench Details Sample Calculation

### **Assumptions:**

- Cooling trench is treated as a "black box", therefore the specific design of the trench is ignored.
- Solid media (clear stone) in trench is isothermal (ie. at a constant temperature).
- Temperature of fluid moving through trench is assumed to be constant.
- Temperature of fluid moving through trench is approximated as the average inlet and outlet temperature.
- Each trench section is rectangular with spherical particles.
- Thermal conductivity of granite is approximate to the thermal conductivity of clear stone.

### Schematic:



### **Design Variables:**

- Q = flowrate through trench (m³/s) = 0.009 m³/s for 2 year design storm event.
- $T_{in}$  = temperature of fluid at inlet (K) = 36°C = 309 K
- $T_{out}$  = temperature of fluid at outlet (K) = 24°C = 297 K
- T_{avg} = average temperature of inflow and outflow (K) = 30°C = 303 K
- $T_{stone}$  = average temperature of clear stone (K) = 21°C = 294 K
- L =length of trench (m) = 65 m
- W = width of trench (m) = 2.0 m
- D = depth of trench (m)= 1.0 m
- Dia. = diameter of clear stone (m) = 0.020 m

### **Physical Properties:**

- $\rho$  = fluid density = 998 kg/m³ for water at 295 K (Incropera, DeWitt, p. 846)
- $C_p$  = specific heat of fluid = 4181 J/kg.K for water at 295 K (Incropera, DeWitt, p. 846)
- P_{rf} = Prandt number of fluid = 6.62 for water (dimensionless) (Incropera, DeWitt, p. 846)
- $\gamma_f$  = kinetic viscosity of fluid = 1.04 x 10⁻⁶ m³/s for water at 295 K (Roberson, Crowe, p. A-24)
- k_f = thermal conductivity of solid = 2.79 W/m.K for granite (Incropera, DeWitt, p.838)

Note: temperature measured in Kelvins (K) is calculated as follows:

K = (°C + 273.15) i.e. 295K = 21.85°C

### Analysis:

Calculate the required heat transfer rate  $(q_r)$  using the following equation:

$$q_{r} = \dot{m}C_{p}\Delta T$$
 Eq. 1  
$$q_{r} = Q\rho C_{p} (Tin - Tout)$$

Where:

 $\dot{m}$  = mass flow rate (kg/s)  $\rho$  = fluid density (kg/m³)  $C_p$  = fluid specific heat (J/kg.K)

$$q_{r} = \left(0.007 \frac{m^{3}}{s}\right) \left(998 \frac{kg}{m^{3}}\right) \left(4181 \frac{J}{kg \cdot K}\right) (309K - 297K)$$
$$q_{r} = 450,645 \text{ J/s}$$
$$q_{r} = 450,645 \text{ W}$$

Therefore the heat transfer rate required to reduce the temperature of water to 297 K (24°C) from 309 K (36°C) is 350,502 W.

Calculate the available heat transfer rate  $(q_a)$  using the following equation:

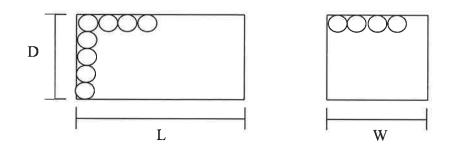
$$q_a = h_s A_s (T_{avg} - T_{stone})$$
 Eq. 2

Where:

$$h_s = \text{convective heat transfer coefficient}\left(\frac{W}{m^3 \cdot K}\right)$$
 for clear stone  
 $A_s = \text{surface area of clear stone particles (m^2)}$ 

Step 1: Estimate the available surface area of the clear stone particles using the following equation:

$$A = (\pi \times Dia.^{2}) \times \left(\frac{L}{Dia.} \times \frac{W}{Dia.} \times \frac{H}{Dia.}\right)$$
Eq. 3  
$$A = \pi \times \frac{L \times W \times D}{Dia.}$$



Where:

Dia: = diameter of spherical particles (m)  
= diameter of "clear stone" particles (m)  
A = available surface area (m²)  
= (area of one "clear stone" particle) * (Estimate of the total  
number of clear stone particles)  

$$A = \pi \times \left(\frac{65m \times 2m \times 1.0m}{0.020m}\right)$$

$$A = 20,420 \text{ m}^2$$

Therefore the available surface area of the clear stone particles is estimated to be 20,420 m².

Step 2: Estimate the heat transfer coefficient of the clear stone particles using the equation:

$$h_{s} = \left(0.97 + 0.68 \left(\frac{\nu_{f} Dia}{\gamma_{f}}\right)^{0.5}\right) \frac{k_{f} P_{rf}^{0.3}}{Dia}.$$
 Eq. 4

Note: The equation used to estimate the heat transfer coefficient  $(h_g)$  utilizes Kramer's correlation for flow of liquids past spheres, for which (1 < Re_{Dia} < 2000). The scenario under analysis is very close to the lower limit acceptable for use with Kramer's correlation for the convective heat transfer coefficient.

Where:

 $v_f$  = velocity of fluid through trench (m/s)  $\gamma_f$  = kinematic viscosity of fluid (m³/s)

 $k_f$  = thermal conductivity of solid  $\left(\frac{W}{m \cdot K}\right)$ 

 $P_{rf}$  = Prandt number (dimensionless)

Calculate  $v_f$  using the following equation:

$$\nu_f = \frac{Q}{A_{flow}}$$
 Eq. 5

Where:

Q = flow rate through trench (m³/s)  $A_{flow}$  = available flow area through trench (m²)

Calculate A_{flow} using the following equation:

 $A_{flow} = Cross-sectional$  area of trench - Cross-sectional area of particles

$$A_{\text{flow}} = (L \times W) - \left(\frac{\pi \times Dia.^2}{4}\right) \times \left(\frac{L}{D} \times \frac{W}{D}\right)$$
  
Overall Cross-sectional Estimate of number of section Estimate of number of spheres in section

$$\mathbf{A}_{\mathrm{flow}} = \mathrm{LxW}\left(1 - \frac{\pi}{4}\right)$$

.

Substitute equation for  $A_{flow}$  (Eq. 6) into the equation for  $v_f$  (Eq. 5) and solve

$$v_{f} = \frac{Q}{L \times W \left(1 - \frac{\pi}{4}\right)}$$
Eq. 7  
$$v_{f} = \frac{0.009 \frac{m^{3}}{s}}{(65m \times 2m) \times \left(1 - \frac{\pi}{4}\right)}$$
$$v_{f} = 0.0003 \frac{m}{s}$$

Therefore the velocity of fluid through the trench is  $0.0003 \frac{m}{s}$ .

Calculate the heat transfer coefficient  $(h_s)$  using the following equation:

$$h_{s} = \left(0.97 + 0.68 \left(\frac{v_{f} Dia.}{\gamma_{f}}\right)^{0.5}\right) \frac{k_{f} P_{rf}^{0.3}}{Dia.}$$
Eq. 4  
$$h_{s} = \left(0.97 + 0.68 \left(\frac{0.0003 \frac{m^{2}}{s} \times 0.020m}{1.04 \times 10^{-6} \frac{m^{3}}{s}}\right)^{0.5}\right) \frac{2.79 \frac{W}{m \cdot K} \times 6.62^{0.3}}{0.020m}$$
$$h_{s} = 655 \frac{W}{m^{2} \cdot K}$$

Therefore the heat transfer coefficient ( $h_s$ ) for clear stone particles is  $655 \frac{W}{m^2 \cdot K}$ 

Calculate the available heat transfer rate  $(q_a)$  using the following equation:

$$q_{a} = h_{s}A_{s}(T_{avg} - T_{stone})$$
Eq. 2  
$$q_{a} = \left(655\frac{W}{m^{2} \cdot K}\right) (20,420m^{2}) (303K - 294K)$$
$$q_{a} = 120,399,575 \text{ W}$$

Therefore the available heat transfer rate to reduce the temperature of water to 297 K (24°C) from 309 K (36°C) is 120,399,575 W.

Calculate the Safety Factor (SF) using the following equation:

$$SF = \frac{q_a - q_r}{q_r} \times 100\%$$

$$SF = \frac{120,399,575 \ W - 450,645 W}{450,645 W} \times 100\%$$

$$SF = 26,617\%$$
Eq. 8

Therefore the Safety Factor for the cooling trench is 26,617% based on the assumptions used in the calculations.

Therefore since the available heat transfer rate  $(q_a)$  of 120,399.575 W is greater than the required heat transfer rate  $(q_r)$  of 450,645 W, we conclude that in our opinion a cooling trench 65 m long by 2 m wide by 1 m deep, constructed with 0.020 m diameter clear stone, has the ability to reduce the temperature of the inflow from 309 K (36°C) to 297 K (24°C).

#### Cityview Ridge Subdivision City of Guelph G&M File: 105-172 Revised: June 2016

## Stormwater Management Facility - Forebay (Catchment 201)

Forebay Length = Forebay Width = Forebay Depth = Forebay Bottom Width =	42.0 7.0 1.0 1.0	m m	(Dist) (d)
Approximate Permanent Forebay Pool Volume =	168.0	cu m	
Length Width Ratio =	6	:1	(r)
2 Year Storm Peak Flowrate =	0.086	cu m/s	(Qp)
5 Year Storm Inflow Rate =	0.663	cu m/s	(Q5)
Desired Forebay Velocity =	0.500	m/s	(Vf)
Desired Settling Velocity (recommended) =	0.0003	m/s	(Vs)
Settling Length			
$Dist = ((r x Qp)/Vs)^{.5} =$	41.5	m	
Forebay length (42m) exceeds the settling length (41.5).			
Dispersion Length			
Dist = $(8 \times Q5)/(d \times Vf) =$	10.6	m	

Forebay length (45m) exceeds dispersion length (10.6m).

### Flow Velocity in Forebay

Cross-sectional Area = Q5 =	4 sq m 0.663 cu m/s
Velocity = $Q5/A =$	0.17 m/s

The average flow velocity through the forebay is less than the allowable velocity of 0.5 m/s.



# **Stormceptor 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	/ <b>A</b>

#### **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	



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#### **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	<b>Outlet P</b>	ipe	Invert	Elevations	Differences
						onitorended

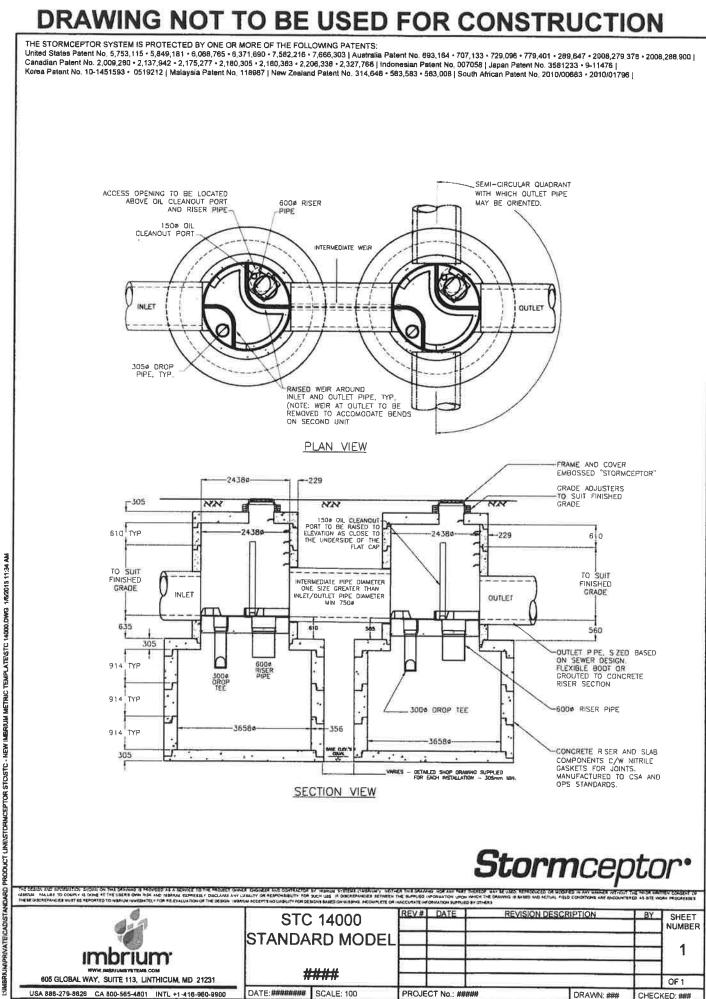
Inlet Pipe Configuration	STC 300	STC 750 to STC 6000	STC 9000 to STC 14000
Single inlet pipe	75 mm	25 mm	75 mm
Multiple inlet pipes	75 mm	75 mm	Only one inlet pipe.

• 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.



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

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
ь.	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				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 <b>9</b>	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	Ū	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		321.90	321.90	0	68.91	68.91	0
8.2	100 Year	33.20	33.20	0	322.84	322.84		80.54 81.53	80.54	0
8.2	Regional	37.50	37.50	0	322.92	322.92	0		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	riegionar	07.50	07.50	U	322.92	322.92	0	102.83	102.83	0
9.4	5 Year	3.88	3.88	0	319.29	319.29	0	26.48	26.48	0
9.4	25 Year	19.10	19.10	0	321.91	321.91	0	90.30	90.30	0
9.4	100 Year	33.20	33.20	0	322.84	322.84	0	114.82	114.82	0
9.4	Regional	37.50	37.50	0	322.92	322.92	0	116.91	116.91	0
9.6	5 Year	3.88	3.88	0	319.33	319.33	0	22.08	22.08	
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		

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

# **APPENDIX "G"**

Rip Rap Protection Calculations, Monthly Water Balance, Monthly Enhanced Infiltration for Block 125

#### <u>105172 - 600mm Outlet</u> <u>Riprap Outlet Protection Design Calculations</u>

#### Assumptions:

<ul> <li>pipe discharges onto a relatively flat surface</li> </ul>
--------------------------------------------------------------------

- there is no well defined channel immediately downstream
- minimum tailwater conditions apply
- outlet pipe is flowing full

#### Given:

pipe diameter (D _o ) =	0.6	m
=	24	inches
pipe slope =	0.5	%
maximum flow =	1.61	m³/s
=	56.86	ft ³ /s
outlet slope =	2.9	%

#### From Figure 7.45 (Erosion and Sediment Control Handbook, 1986)

Rip Rap Depth (d) =	30	in
=	0.76	m
Apron Length (L _a ) =	22.00	ft
=	6.71	m
Median Stone Size (d ₅₀ ) =	0.75	ft
=	0.23	m
=	229	mm
Upstream Apron Width (W _u ) = = =	3 x D _o 70.87 1.80	inches m
Downstream Apron Width (W _d ) = = =	D _o + L _a 23.97 7.31	ft m

Definition of Median Stone Size  $(d_{50})$ :

50 percent by weight of a rock mixture is greater than or less than the  $d_{50}$  size.

#### **Conclusions:**

The actual depth of rip-rap (0.76m) is equal to the required rip-rap depth (0.76m)

The median stone size required for the rip rap of 229 mm is less than the specified mean size of 250 mm.

The required Upstream and Downstream Apron Width ( $W_u$  and  $W_d$ ) of 1.80 m and 7.31 m, respectively are less than the specified width of 8.0m.

The required Apron Length  $(L_a)$  of 6.71m, is less than the specified length of 7.0m.

#### **References:**

Goldman, Steven J., Jackson, Katharine, and Bursztynsky, Taras A., 1986. Erosion andSediment Control Handbook. New York: McGraw-Hill Incorporated.

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%

Month	Daily Average Temperature	Monthly Heat Index (I)	Unadjusted Daily Potential Evapotranspiration	Correction Factors	Adjusted Potential Evapotranspiration (PE)	Average Precipitation (P)	P-PE	Accum. Pot. Water Loss	Storage (ST)	ΔS	Pervious ET	Actual Evapotrans- piration (AE)	Pervious ET - Actual ET		Moisture Surplus (S)	Water Runoff (RO)
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)		(mm)		(mm)	(mm)	(mm)
Jan	-7.6	0.0	0.0	24.3	0.0	56.4	56.4		209.1	0.0		0.0	0.0	0.0	0.0	9.8
Feb	-6.9	0.0	0.0	24.6	0.0	50.8	50.8		259.9	0.0		0.0	0.0	0.0	0.0	4.9
Mar	-1.3	0.0	0.0	30.6	0.0	72.1	72.1		332.0	0.0		0.0	0.0	0.0	0.0	2.5
Apr	5.9	1.3	0.9	33.6	30.2	78.3	48.1		75.0	0.0	30.2	29.7	0.6	0.6	48.6	25.5
May	12.3	3.9	2.0	37.8	75.6	79.9	4.3		75.0	0.0	75.6	74.1	1.5	1.5	5.8	15.6
Jun	16.9	6.3	2.8	38.4	107.5	76.0	-31.5	-31.5	48.0	-27.0	103.0	101.0	2.0	6.5	2.0	8.8
Jul	19.7	8.0	3.3	38.7	127.7	88.5	-39.2	-70.7	28.0	-20.0	108.5	106.4	2.1	21.3	2.1	5.4
Aug	18.6	7.3	3.1	36.0	111.6	95.9	-15.7	-86.4	23.0	-5.0	100.9	99.0	1.9	12.6	1.9	3.7
Sep	14.1	4.8	2.3	31.2	71.8	92.1	20.3		43.3	20.3	71.8	70.4	1.4	1.4	1.4	2.5
Oct	7.9	2.0	1.3	28.5	37.1	69.2	32.2		75.0	31.7	37.1	36.3	0.7	0.7	1.2	1.9
Nov	2.4	0.3	0.4	24.3	9.7	86.3	76.6		75.0	0.0	9.7	9.5	0.2	0.2	76.8	39.3
Dec	-4.0	0.0	0.0	23.1	0.0	77.7	77.7		152.7	0.0		0.0	0.0	0.0	0.0	19.7
Total	S.	33.9				923.2	352.0					526.5	10.3	44.7	139.7	139.7

<b>POST-DEVELOPMENT</b>	CONDITIONS				Percent of Total Area
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%

Month	Daily Average Temperature	Monthly Heat Index	Unadjusted Daily Potential Evapotranspiration	Correction Factors	Adjusted Potential Evapotranspiration	Average Precipitation	P-PE	Accum. Pot. Water Loss	Storage	ΔS	Pervious ET	Actual Evapotrans- piration	Pervious ET - Actual ET	Moisture Deficit	Moisture Surplus	Water Runoff	Snow Melt Runoff	Total Recharge & Runoff	Actual Runoff	Runoff Volume	Recharge Volume	Enhanced Recharge
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(m ³ )	(m ³ )	(m ³ )
Jan	-7.6	0.0	0.0	24.3	0.0	56.4	56.4		209.1	0.0		0.0	0.0	0.0	0.0	11.6	0.0	11.6	8.2	1,500	590	55
Feb	-6.9	0.0	0.0	24.6	0.0	50.8	50.8		259.9	0.0		0.0	0.0	0.0	0.0	5.8	0.0	5.8	4.1	750	295	28
Mar	-1.3	0.0	0.0	30.6	0.0	72.1	72.1		332.0	0.0		0.0	0.0	0.0	0.0	2.9	0.0	2.9	2.1	375	147	14
Apr	5.9	1.3	0.9	33.6	30.2	78.3	48.1		75.0	0.0	30.2	20.9	9.4	9.4	57.4	30.2	25.7	55.9	39.7	7,249	2,851	246
May	12.3	3.9	2.0	37.8	75.6	79.9	4.3		75.0	0.0	75.6	52.2	23.4	23.4	27.7	28.9	115.7	144.6	102.6	18,763	7,379	646
Jun	16.9	6.3	2.8	38.4	107.5	76.0	-31.5	-31.5	48.0	-27.0	103.0	101.0	2.0	6.5	2.0	15.4	57.8	73.3	52.0	9,510	3,740	323
Jul	19.7	8.0	3.3	38.7	127.7	88.5	-39.2	-70.7	28.0	-20.0	108.5	106.4	2.1	21.3	2.1	8.8	28.9	37.7	26.8	4,890	1,923	161
Aug	18.6	7.3	3.1	36.0	111.6	95.9	-15.7	-86.4	23.0	-5.0	100.9	99.0	1.9	12.6	1.9	5.4	14.5	19.8	14.1	2,571	1,011	81
Sep	14.1	4.8	2.3	31.2	71.8	92.1	20.3		43.3	20.3	71.8	49.6	22.2	22.2	22.2	13.8	7.5	21.3	15.1	2,761	1,086	141
Oct	7.9	2.0	1.3	28.5	37.1	69.2	32.2		75.0	31.7	37.1	25.6	11.5	11.5	11.9	12.9	3.9	16.8	11.9	2,175	855	124
Nov	2.4	0.3	0.4	24.3	9.7	86.3	76.6		75.0	0.0	9.7	6.7	3.0	3.0	79.6	46.2	2.0	48.2	34.2	6,259	2,461	228
Dec	-4.0	0.0	0.0	23.1	0.0	77.7	77.7		152.7	0.0	2.0	0.0	0.0	0.0	0.0	23.1	1.1	24.2	17.2	3,142	1,236	
Total		33.9				923.3	352.0			010		461.4	75.4	109.8	204.8	204.8	257.0	461.9	327.9		<b>23,573</b>	114
												FILLE	1014	107.0	204.0	404.0	<i>431.</i> 0	401.7		59,944	,	2,161
																				Total Recha	irge	25,734

Notes: Precipitation and Temperature data from Environment Canada Climate Normals 1971-200 for the Guelph Arboretum

Monthly water balance strategy as outlined in the document Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance (Thornthwaite and Mather, 1957)

Evaporation Factor for Impervious Surfaces = Average Annual Evapotranspiration for Impervious Surfaces (200mm/year) / Average Annual Evapotranspiration for Pervious Till Surfaces (555mm/year) = 0.36

Runoff Factor = [(Impervious Percentage of Site x Average Annual Runoff for Pervious 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: June 21, 2017

Runoff Factor =	0.43
Evapotranspiration	
Factor for Impervious	
Surfaces =	0.36

Snow Melt Runoff	Total Recharge and Runoff	Actual Runoff	Runoff Volume	Recharge Volume
(mm)	(mm)	(mm)	(m ³ )	(m ³ )
0.0	9.8	4.3	781	1,016
0.0	4.9	2.1	390	508
0.0	2.5	1.1	195	254
25.7	51.2	22.3	4,069	5,294
115.7	131.3	57.1	10,430	13,569
57.8	66.6	29.0	5,294	6,887
28.9	34.4	14.9	2,730	3,551
14.5	18.1	7.9	1,442	1,876
7.5	10.0	4.4	797	1,037
3.9	5.8	2.5	458	596
2.0	41.3	18.0	3,282	4,270
1.1	20.8	9.0	1,649	2,146
257.0	396.7	172.4	31,518	41,003

Runoff Factor = 0.71 Evapotranspiration Factor for Impervious Surfaces = 0.36

EXISTING CONDITIONS				Percent of Total Area
Contributing Catchments:	Block 125	Soil Type: 100% Sand and Gravel	Impervous Area = $0$ ha	0%
Contributing Area =	0.65 ha	Vegetation: Shallow-rooted unkept vegetation	Pervious Till Area = $0.00$ ha	0%
Percent Impervious =	0.0%	Root Zone Depth = $0.50$ m	Pervious S&G Area = $0.65$ ha	100%
		Soil Moisture Retention Capacity = 75mm	Total Area = $0.65$ ha	100%

Month	Daily Average Temperature	Monthly Heat Index (I)	Unadjusted Daily Potential Evapotranspiration	Correction Factors	Adjusted Potential Evapotranspiration (PE)	Average Precipitation (P)	P-PE	Accum. Pot. Water Loss	Storage (ST)	$\Delta S$	Pervious ET	Actual Evapotrans- piration (AE)	Pervious ET - Actual ET		Moisture Surplus (S)	Water Runoff (RO)
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)		(mm)		(mm)	(mm)	(mm)
Jan	-7.6	0.0	0.0	24.3	0.0	56.4	56.4		209.1	0.0		0.0	0.0	0.0	0.0	9.7
Feb	-6.9	0.0	0.0	24.6	0.0	50.8	50.8		259.9	0.0		0.0	0.0	0.0	0.0	4.8
Mar	-1.3	0.0	0.0	30.6	0.0	72.1	72.1		332.0	0.0		0.0	0.0	0.0	0.0	2.4
Apr	5.9	1.3	0.9	33.6	30.2	78.3	48.1		75.0	0.0	30.2	30.2	0.0	0.0	48.1	25.2
May	12.3	3.9	2.0	37.8	75.6	79.9	4.3		75.0	0.0	75.6	75.6	0.0	0.0	4.3	14.8
Jun	16.9	6.3	2.8	38.4	107.5	76.0	-31.5	-31.5	48.0	-27.0	103.0	103.0	0.0	4.5	0.0	7.4
Jul	19.7	8.0	3.3	38.7	127.7	88.5	-39.2	-70.7	28.0	-20.0	108.5	108.5	0.0	19.2	0.0	3.7
Aug	18.6	7.3	3.1	36.0	111.6	95.9	-15.7	-86.4	23.0	-5.0	100.9	100.9	0.0	10.7	0.0	1.8
Sep	14.1	4.8	2.3	31.2	71.8	92.1	20.3		43.3	20.3	71.8	71.8	0.0	0.0	0.0	0.9
Oct	7.9	2.0	1.3	28.5	37.1	69.2	32.2		75.0	31.7	37.1	37.1	0.0	0.0	0.5	0.7
Nov	2.4	0.3	0.4	24.3	9.7	86.3	76.6		75.0	0.0	9.7	9.7	0.0	0.0	76.6	38.6
Dec	-4.0	0.0	0.0	23.1	0.0	77.7	77.7		152.7	0.0		0.0	0.0	0.0	0.0	19.3
Total		33.9				923.2	352.0					536.8	0.0	34.4	129.4	129.4

POST-DEVELOPMENT CO	ONDITIONS					Percent of Total Area
Contributing Catchments:	Block 125	Soil Type: 100% Sand and Gravel	Impervous Area =	0.46	ha	70%
Contributing Area =	0.65 ha	Vegetation: Urban lawns	Pervious Till Area =	0.00	ha	0%
Percent Impervious =	70.0%	Root Zone Depth = $0.5m$	Pervious S&G Area =	0.20	ha	30%
		Soil Moisture Retention Capacity = 75mm	Total Area =	0.65	ha	100%

Month	Daily Average Temperature	Monthly Heat Index	Unadjusted Daily Potential Evapotranspiration	Correction Factors	Adjusted Potential Evapotranspiration	Average Precipitation	P-PE	Accum. Pot. Water Loss	Storage	Δ\$	Pervious ET	Actual Evapotrans- piration	Pervious ET - Actual ET	Moisture Deficit	Moisture Surplus	Water Runoff
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)		(mm)		(mm)	(mm)	(mm)
Jan	-7.6	0.0	0.0	24.3	0.0	56.4	56.4		209.1	0.0		0.0	0.0	0.0	0.0	13.8
Feb	-6.9	0.0	0.0	24.6	0.0	50.8	50.8		259.9	0.0		0.0	0.0	0.0	0.0	6.9
Mar	-1.3	0.0	0.0	30.6	0.0	72.1	72.1		332.0	0.0		0.0	0.0	0.0	0.0	3.5
Apr	5.9	1.3	0.9	33.6	30.2	78.3	48.1		75.0	0.0	30.2	9.1	21.2	21.2	69.2	36.1
May	12.3	3.9	2.0	37.8	75.6	79.9	4.3		75.0	0.0	75.6	22.7	52.9	52.9	57.2	46.6
Jun	16.9	6.3	2.8	38.4	107.5	76.0	-31.5	-31.5	48.0	-27.0	103.0	103.0	0.0	4.5	0.0	23.3
Jul	19.7	8.0	3.3	38.7	127.7	88.5	-39.2	-70.7	28.0	-20.0	108.5	108.5	0.0	19.2	0.0	11.7
Aug	18.6	7.3	3.1	36.0	111.6	95.9	-15.7	-86.4	23.0	-5.0	100.9	100.9	0.0	10.7	0.0	5.8
Sep	14.1	4.8	2.3	31.2	71.8	92.1	20.3		43.3	20.3	71.8	21.5	50.2	50.2	50.2	28.0
Oct	7.9	2.0	1.3	28.5	37.1	69.2	32.2		75.0	31.7	37.1	11.1	25.9	25.9	26.4	27.2
Nov	2.4	0.3	0.4	24.3	9.7	86.3	76.6		75.0	0.0	9.7	2.9	6.8	6.8	83.4	55.3
Dec	-4.0	0.0	0.0	23.1	0.0	77.7	77.7		152.7	0.0		0.0	0.0	0.0	0.0	27.7
Total		33.9				923.3	352.0					379.7	157.1	191.5	286.5	285.9

Notes: Precipitation and Temperature data from Environment Canada Climate Normals 1971-200 for the Guelph Arboretum

Monthly water balance strategy as outlined in the document Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance (Thornthwaite and Mather, 1957)

Evaporation Factor for Impervious Surfaces = Average Annual Evapotranspiration for Impervious Surfaces (200mm/year) / Average Annual Evapotranspiration for Pervious Till Surfaces (555mm/year) = 0.36

Runoff Factor = 1-[(Pervious Sand & Gravel Percentage of Site x Average Annual Infiltration for Pervious S & G Surfaces (380 mm/year)] / Total Annual Recharge & Runoff

#### Cityview Ridge Subdivision City of Guelph Monthly Water Balance (Thornthwaite and Mather Method) Date: June 21, 2017

Runoff Factor =	0.12

Evapotranspiration Factor	
for Impervious Surfaces =	0.36

Snow Melt Runoff	Total Recharge and Runoff	Actual Runoff	Runoff Volume	Recharge Volume
(mm)	(mm)	(mm)	(m ³ )	(m ³ )
0.0	9.7	1.2	8	55
0.0	4.8	0.6	4	28
0.0	2.4	0.3	2	14
25.7	50.9	6.1	40	291
115.7	130.4	15.6	102	746
57.8	65.2	7.8	51	373
28.9	32.6	3.9	25	186
14.5	16.3	2.0	13	93
7.5	8.4	1.0	7	48
3.9	4.6	0.6	4	26
2.0	40.6	4.9	32	232
1.1	20.4	2.5	16	117
257.0	386.5	46.4	301	2,211

Runoff Factor = 0.74

Evapotranspiration Factor for Impervious Surfaces = 0.36

Snow Melt Runoff	Total Recharge & Runoff	Actual Runoff	Runoff Volume	Recharge Volume	Enhanced Recharge Volume
(mm)	(mm)	(mm)	(m ³ )	(m ³ )	(m ³ )
0.0	13.8	10.2	66	24	55
0.0	6.9	5.1	33	12	28
0.0	3.5	2.5	17	6	14
25.7	61.8	45.5	295	106	246
115.7	162.3	119.4	776	278	646
57.8	81.1	59.7	388	139	323
28.9	40.6	29.9	194	70	161
14.5	20.3	14.9	97	35	81
7.5	35.5	26.2	170	61	141
3.9	31.1	22.9	149	53	124
2.0	57.3	42.2	274	98	228
1.1	28.8	21.2	138	49	114
257.0	543.0	399.6	2,598	932	2,161
			Total Recha	rge Volume	3,093
		Runoff Volu	ume After E	nhancement	437
		Р	-135		

# Cityview Ridge Subdivision City of Guelph Monthly Enhanced Infiltration at Block 125

## Enhanced Infiltration Structure - Catchment 100

Structure Length = Structure Width = Structure Depth =	20.00 9.00 1.00	m					
Area of Stone =	9.00	sq m		Volume of St Stone Porosi <b>Storage Vol</b>		180.00 0.33333 =	
A = contact area of structure = V = runoff volume to be infiltrate P = percolation rate of native so n = porosity of storage media (w T = retention time =	ils =	) =		180.00 60.00 15.00000 0.33 Solve for T	sq m cu m mm/hr		
T = (1000 x V) / (P x n x A) =				67.34	hours or	2.8	day draindown period
Contributing Area Recharge Time Recharge Volume Potential	0.398 67.34 60.00	l hours	1	•	ration Gallery) I days		

Month	Total Recharge & Runoff	No. of days	Max Potential Recharge	Available Recharge	Enhanced Recharge
	(mm)		(m ³ )	(m ³ )	(m ³ )
Jan	13.8	31	663	55	55
Feb	6.9	28	599	28	28
Mar	3.5	31	663	14	14
Apr	61.8	30	642	246	246
May	162.3	31	663	646	646
Jun	81.1	30	642	323	323
Jul	40.6	31	663	161	161
Aug	20.3	31	663	81	81
Sep	35.5	30	642	141	141
Oct	31.1	31	663	124	124
Nov	57.3	30	642	228	228
Dec	28.8	31	663	114	114
Total	543.0	365	7,805	2,161	2,161