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Report

City of Guelph

Hanlon Creek Business Park
Stormwater Management Report – Ponds 1, 2, 3 and 4

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Stormwater Management Report – Ponds 1, 2, 3 and 4

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1.0 INTRODUCTION

The Hanlon Creek Business Park (HCBP) is located in the south-western corner of the City of Guelph. The development received Draft Plan approval in 2005 and in 2006, received additional clearance conditions through the Ontario Municipal Board. The City of Guelph and Cooper Construction Ltd. retained the TSH and Earth Tech design team to prepare the final design for Phases 1 & 2. In the Fall of 2008, the two firms became part of Aecom Canada Ltd. Refer to Figure 1 for the location of the development and proposed phasing. This report summarizes the design and modeling for stormwater management Ponds 1, 2, 3, & 4 as shown in Figure 1.

This report expands on the preliminary modeling and design contained in the Hanlon Creek Business Park Servicing Report of November 2004. As part of the discussions leading to the OMB hearing, the proposed zoning for the development was revised to allow more building and parking coverage for the developable blocks. Consequently, the post development impervious percentage of 65% used in the 2004 modeling is no longer appropriate and a value of 85% has been used in the current modeling. In order to limit the land required for stormwater conveyance, some on-site quantity controls are included for the lands tributary to Pond 4. In order to avoid encroachment into the wetland adjacent Downey Road, the previously proposed conveyance channel to Pond 2 has been changed to a storm sewer. Some on-site quantity controls are therefore included for the lands tributary to Pond 2. Otherwise, the general design parameters used in 2004 have been maintained with the current modeling and design. The wetland setback and buffers established and agreed upon in 2004 have been maintained in the current design. Due to the increase in the post development impervious percentage, the SWM facilities have increased in size but are generally in the same location as shown in the 2004 Servicing Report, with the following minor exceptions. Pond 3 has been shifted from the Northwest side of Block 15 to the West side of the Block to accommodate the proposed building layout. Due to the close proximity of Pond 2 to the Kortright IV stormwater pond, it was decided to merge the two facilities during the detailed design phase.

2.0 STORM DRAINAGE SYSTEM

2.1.1 General Requirements

The proposed development is divided into 6 separate catchment areas and each catchment area drains to a SWM facility to provide quality and quantity control of runoff. The proposed system will consist of two main systems: a collection/conveyance system and a treatment system.

The majority of the Blocks will have a split lot grading design so that the direction of the stormwater runoff from the fronts of the lots is to the proposed road network while the back portion of the lots is drained toward rear lot swales. The flow is then directed to the storm sewer system or channel conveyance system which outlet to the proposed stormwater management facilities. The lands within the Pond 4 drainage area are now designed to generally drain from the back of the Blocks to the street. These Blocks will be required to provide on site storage of the runoff to limit post development flows to the storm sewer system to 180 l/s/ha. Similarly, development blocks tributary to Pond 2, with the exception of Blocks 2, 3 and 5, will also be required to limit post development flows to the storm sewer system to 180 l/s/ha. In order for the City to ensure that the quantity control devices for these Blocks are not tampered with, they will be located in a maintenance hole at the property line or fully within the road allowance. At the site plan approval stage, the site designer will be required to

document that sufficient surface storage volume is available within the parking lot or landscaped area to limit post development flows to the allowable level.

Drainage areas used in the modeling for Ponds 1, 2, 3 & 4 are shown in Figures 2.1 and 2.2. No drainage from the site is directed to the Hanlon Expressway drainage system.

2.1.2 Stream Protection Fluvial Geomorphology

The existing watercourses are predominantly a natural stream system, with some stream reaches modified through past agricultural practices. These modifications are primarily in the form of straightening and deepening to provide drainage. Through field reconnaissance the streams have been observed to be relatively stable with little evidence of erosion. There are some signs of aggradation through reach lengths that are relatively flat. Through the central portion of the site (downstream of Laird Road) the stream is located within the wetland system and shows signs of aggradation at some locations. The invert of the creek is stable and does not show signs of incision.

Based on current condition evaluation, the stream is relatively stable and not susceptible to erosion problems. In addition, the proposed stormwater management approach will provide the necessary protection from increased erosion. The proposed stormwater management works include infiltration measures, source control works, open conveyance channels and stormwater management ponds to enhanced level of treatment (including the associated extended detention).

2.1.3 Collection and Conveyance Systems

The collection and conveyance system designed for the Hanlon Creek Business Park is a major/minor system that consists of two main components:

- An urban roadway section that will include a minor system with catchbasins and storm sewers and a major system overland flow path, to collect storm runoff and convey it to the treatment facilities.
- A rear lot conveyance channel system to collect and convey stormwater runoff (major and minor storms) to the treatment facilities.

The following City of Guelph Engineering Design Standards were used in the design of the stormwater collection system for the Hanlon Creek Business Park.

- All storm sewers are designed using the Rational Method for the 5 year design storm using the City of Guelph Intensity-Duration Frequency Curves.
- The minimum storm sewer size is 300mm in diameter. The minimum acceptable velocity is 0.6 m/s in any pipe.
- Based on City of Guelph Standards and the allowable impervious coverage, an impervious percentage of 85% has been used for all development blocks.
- Minimum inlet time is 10 minutes.
- Rear yard conveyance channels are designed to capture and convey the 100 year design storm to the SWM ponds. Conveyance channels adjacent to the Hanlon Expressway are designed with a 0.5m minimum freeboard.
- Road culverts are designed to convey the 25 year design storm without surcharging and to carry the 100 year design storm with surcharging but with no overtopping of the roadway system.
- Development Block Areas tributary to Pond 4 will provide on site quantity controls to limit the 100 year design storm runoff to 180 l/s/ha.

- Development Block Areas tributary to Pond 2 (Except Blocks 2, 3 and 5) will provide on site quantity controls to limit the 100 year design storm runoff to 180 l/s/ha.

The rear yard drainage conveyance channels are intended to collect surplus rainfall from adjacent lots and direct the runoff to the stormwater management facilities. The channels have a minimum depth of 1.5m adjacent to developable blocks so that local lot storm sewers will have an outlet that provides adequate depth of cover for frost protection. The channel side slope is 3:1. An access roadway is provided for maintenance purposes along the top of backslope berm located between the channel and the adjacent protected wetland areas. This access road network also serves as a communal trail system.

In order to minimize interference with ground water flow, the invert of the rear yard conveyance channels and pond bottom elevations established in 2004 has been maintained in the final design. Clay seals will be provided on any sewer and watermain trenches that penetrate the groundwater elevation.

2.1.4 Stormwater Facilities

The treatment system for the Hanlon Creek Business Park includes the construction of six stormwater management facilities (SWM ponds) as shown in the 2004 Servicing Report. This report includes the design and modeling for Ponds 1, 2, 3 & 4. Ponds 5 and 6 are within Phase 3 of the development and will be designed to the same criteria in the future. All drainage from the developed Blocks and roadways is directed to the stormwater management ponds thus reducing the environmental impact of development on the central wetland core. The ponds have been designed to achieve *enhanced* quality protection with extended detention of 24 hours for 25mm (first flush) rainfall event and quantity control of post development peak flows to predevelopment levels for the 5 year to 100 year design storms. The pond designs have been performed in accordance with the Ontario Ministry of the Environment (MOE) *Stormwater Management Planning and Design Manual* (March 2003).

Subsequent to the preparation of the 2004 Servicing Report, comments were received regarding the potential use of the stormwater management facilities to protect the wetland core from an environmental disaster such as a chemical spill on the development blocks. Suggestions included providing valves on the discharge pipe from the ponds and lining the ponds and conveyance channels to make them impervious to infiltration. Further investigation of this was conducted through the design phase and discussed with the Design Team and City and Agency staff. The ponds are designed to protect the wetland core from impacts related to storm runoff and are not intended to control industrial spills. Lining of the conveyance channels and ponds and providing valves on the large discharge pipes would be both technically challenging and very expensive. These measures would require considerable maintenance to remain viable. MOE requires measures to protect against environmental disasters be included on the site where the potential spill would occur. Therefore, it was determined that valves on the outlet pipes and lining of the channels and pond would not be required.

2.1.4.1 Modelling Method

The MIDUSS model was used to design the stormwater management facilities, conveyance channels and culverts. Pre-development and post-development input parameters were established to reflect the existing and proposed site conditions and have been summarized in Appendix A. Pond volume calculations and discharge summaries are included in Appendix B. Appendix C contains a summary of MOE quality criteria calculations. The MIDUSS output summary is included in Appendix D.

Stormwater management techniques have been utilized within the proposed subdivision to lessen the impact of development on the downstream watercourses through both quality and quantity control of the discharge. The overall stormwater management system layout is presented in Figure 3 and design details for the ponds are shown on Figures 4 to 7. Figures 8 to 11 show the modeling schematics.

For Ponds 1, 2 and 4, the available outlet elevation of the receiving watercourse, combined with grading opportunities and constraints resulted in a maximum active storage depth within the ponds of 1.0m to 1.5m plus a 0.5m freeboard to the top of exterior berm. This relatively shallow depth available for active quantity control storage resulted in increased land area requirements to achieve the peak storage volumes required. The resulting available permanent pool area allowed the use of "Hybrid" ponds to achieve *enhanced* treatment criteria. As such, the permanent pool is composed of an approximate 50/50 split of deep pool sections (2.0m maximum depth) and wetland fringes to encourage emergent vegetative growth (0mm to 300mm maximum depth). The design of these ponds incorporates a forebay to encourage controlled settlement of the heavier suspended solids and interior berms as required to maximize the flow path through the facility. Due to the small contributing area for Pond 3, it has been designed as a "Wet" pond without a forebay. The upstream conveyance swales will provide passive quality enhancement.

Active storage is provided above the permanent pool elevation to provide 24 hour extended detention of all low flow events (i.e.25mm event or less) for quality control purposes and short term detention of major event runoff for quantity control of the discharge. The quantity control matches peak post development discharge rates to predevelopment discharge rates. The stored runoff is contained by the exterior berm and utilizes a two stage outlet design within the control structure for quantity and quality discharge by means of orifice flow restrictions. The design of the exterior berm utilizes 5:1 side slopes to the water edge and a 4.0m top of embankment width for maintenance access. Emergency overflow through the berm is typically provided at a maximum 1.4m active storage depth while maintaining a 600mm freeboard to the remaining top of berm elevation.

The outlet for Ponds 1, 2, 3 & 4 include a bottom draw feature to help reduce the thermal impacts to the receiving watercourse. In addition, landscape plantings along the exterior berm, pond outlets and watercourse will be designed to provide shading to help cool the pond discharge. Ponds 1, 3 and 4 include rock filled cooling trenches from the pond outlet to the watercourse. The existing infiltration gallery included on the outlet of Pond 2 has been maintained as part of the merged facility.

On site infiltration facilities for roof runoff will be provided on the developed Blocks to maintain the predevelopment groundwater recharge characteristics. Infiltration targets are established in the Environmental Implementation Report on a Block by Block basis. The design of the infiltration galleries will be at the Site Plan stage of the development. On site infiltration or through ditches and grassed channels was assumed in the MIDUSS modeling and water levels in ponds were assumed to remain at the permanent pool level over the time preceding the storm event.

To assess the impact of the stormwater management approach of the Hanlon Creek Business Park on temperatures of Hanlon Creek Tributary A, a temperature model of the stream was developed using HSP-F (Hydrologic Simulation Program – FORTRAN). The model was calibrated and verified using the in stream monitoring data from 2006 and 2007. The model was run to simulate continuous temperature conditions for a seven year period (2001-2007) under all flow regimes for both existing and future conditions to assess the magnitude, frequency, duration and spatial extent of any impacts. Mitigation measures including pond bottom draws, cooling trenches and increased riparian vegetation were also investigated.

A series of scenarios were selected for assessment, to illustrate the effects of various mitigation measures. The scenarios include:

- Existing conditions;
- Unmitigated future conditions;
- Unmitigated future conditions with the online pond removed; and
- Mitigated future conditions incorporating the removed online pond, bottom draw SWM ponds, cooling trenches and increased riparian cover.

The continuous simulation results for each model scenario give a complete depiction of the performance of the stormwater management and environmental mitigation system that is proposed for the Hanlon Creek Business Park. The seven years of meteorological data used in the simulation encompass a wide variety of precipitation, drought and extreme temperature events, allowing the system responses to such diverse conditions to be observed. When the unmitigated future condition results are compared to the existing results, increases in average and maximum temperatures are observed across all years and reaches. When the mitigation measures are enacted, the conditions in the stream actually become more favourable than existing conditions for cold water fish. Though more runoff will be entering the creek during precipitation events, the proposed mitigation measures have a significant positive effect on the temperature regime of the entire system by mitigating runoff discharge temperature, and by reducing baseflow temperatures between storm events, which are the times when the stream is most vulnerable to thermal effects.

The results of the modeling were compared to temperature conditions necessary for brook trout growth and reproduction for seasonal life stages based on an extensive literature review of brook trout life stage temperature needs. The following conclusions were established:

1. The modeled post-development summer temperature conditions with the mitigation measures implemented are suitable for coldwater streams containing brook trout.
2. The mitigation at the online pond (removal) and in the vicinity of Laird Road (shading due to riparian planting) will be effective in reducing temperatures according to modeling results.
3. The stormwater outflows are not expected to impact brook trout spawning in autumn.
4. The stormwater outflows are not expected to impact the suitability of winter stream temperatures for incubation of brook trout eggs.
5. The stormwater outflows are not expected to impact brook trout egg hatching or the early free-living stages.

Complete details of the thermal monitoring and modeling are included in a separate report “Hanlon Creek Business Park Stream Temperature Impact Report”, dated January 2009.

2.1.4.2 Pond Performance Summary

The following Tables 1 to 4 summarize the performance results of Ponds 1 through 4. Detailed output is included in Appendix C**.** It can be concluded that MOE criteria for detention pond design has been achieved in the design of these facilities.

TABLE 1 - Pond 1 Output Summary					
		25mm Event	5yr Storm	25yr Storm	100yr Storm
PRE DEVELOPMENT					
Peak Discharge	m^3/sec	0.058	0.336	0.969	1.794
Hydrograph Volume	m^3	889	4,860	9,909	15,446
POST DEVELOPMENT					
Peak In	m^3/sec	1.945	5.263	8.385	11.291
Hydrograph Volume	m^3	7,450	16,900	25,300	33,100
Peak Out	m^3/sec	0.060	0.337	0.438	1.084
Max Depth	mm	509	974	1,420	1,720
Max Storage	m^3	6,880	13,963	21,436	26,804
Storage Available	m^3	32,060	32,060	32,060	32,060

TABLE 2 - Pond 2 Output Summary					
		25mm Event	5yr Storm	25yr Storm	100yr Storm
PRE DEVELOPMENT					
Peak Discharge	m^3/sec	0.085	0.708	1.999	3.694
Hydrograph Volume	m^3	1,296	6,600	13,248	20,526
POST DEVELOPMENT					
Peak In	m^3/sec	1.956	5.741	8.384	10.782
Hydrograph Volume	m^3	7,450	18,200	28,400	38,800
Peak Out	m^3/sec	0.062	0.659	0.919	2.386
Max Depth	mm	554	1,004	1,498	1,843
Max Storage	m^3	6,647	13,056	21,082	27,172
Storage Available	m^3	30,060	30,060	30,060	30,060

TABLE 3 - Pond 3 Output Summary					
		25mm Event	5yr Storm	25yr Storm	100yr Storm
PRE DEVELOPMENT					
Peak Discharge	m^3/sec	0.036	0.129	0.198	0.334
Hydrograph Volume	m^3	182	730	1,389	2,099
POST DEVELOPMENT					
Peak In	m^3/sec	0.315	0.895	1.412	1.864
Hydrograph Volume	m^3	882	2,030	3,060	4,010
Peak Out	m^3/sec	0.016	0.052	0.107	0.289
Max Depth	mm	422	736	1,015	1,157
Max Storage	m^3	755	1,602	2,372	2,841
Storage Available	m^3	4,128	4,128	4,128	4,128

TABLE 4 - Pond 4 Output Summary					
		25mm Event	**5yr Storm**	**25yr Storm**	**100yr Storm**
PRE DEVELOPMENT					
Peak Discharge	m^3/sec	0.112	0.711	2.034	3.757
Hydrograph Volume	m^3	1,590	8,620	17,600	27,500
POST DEVELOPMENT					
Peak In	m^3/sec	3.432	9.626	12.122	12.990
Hydrograph Volume	m^3	11,700	27,100	39,700	53,700
Peak Out	m^3/sec	0.109	0.679	0.835	1.795
Max Depth	mm	503	960	1,378	1,763
Max Storage	m^3	10,642	21,448	32,361	43,104
Storage Available	m^3	50,085	50,085	50,085	50,085

2.1.5 Erosion and Sedimentation Controls

Erosion and sedimentation controls will be provided during the construction period to limit the impact of development on the adjacent properties and receiving watercourses. Continuous silt fencing, temporary storage areas, straw bale dykes, stone check dams, and catchbasins treatments are some of the controls that will be used. Controls shall be provided during construction to provide erosion and sedimentation storage volumes of 250 m^3/ha All disturbed landscaped areas not subject to construction activity will be topsoiled, fine graded and seeded immediately following the earthworks operation. Silt deposits in the forebay of the SWM facilities will be removed when 50% of the acceptable storage capacity is reached. Interim infiltration galleries, consisting of hickenbottom inlets within the temporary sedimentation areas and perforated pipe bedded in clear stone within the native subgrade are proposed to ensure that infiltration rates are maintained prior to final development of the Blocks. Permanent infiltration galleries to maintain the prescribed infiltration targets will be designed and approved at the site plan stage.

2.1.6 MonitoringRecommendations

To ensure that the stormwater management approach is delivering minimal impacts on water temperatures within the Hanlon Creek Tributary A system, an adaptive management approach should be implemented. As part of that approach, the following recommendations have been identified.

1. Temperature monitoring should be carried out during and after construction of the HCBP to ensure that post-development temperatures are suitable for brook trout. Monitoring should occur both within the stormwater ponds and the stream to identify the function of each mitigative element in the system (bottom draw, cooling trench, increased vegetative cover).
2. Flow monitoring should be carried out in conjunction with temperature monitoring to facilitate better analysis of temperature data. In particular, this will help isolate the causes of temperature impacts, should any occur.
3. Monitoring of fish and benthic invertebrates should be carried out to determine whether any changes occur in the suitability of the habitat for brook trout.

Current monitoring within the streams and in groundwater monitoring wells will be maintained by the City of Guelph during construction.

Additional temperature monitors to be installed in the SWM ponds are recommended as follows:

- Temperature and flow monitor at the inlet locations to each pond;
- 3 temperature monitors on a weighted line at varying depths within the permanent pool of each pond to document any temperature stratification;
- Temperature and flow monitor at the outlet location of each pond, upstream of the cooling trench;
- Temperature monitor at the outlet location of each cooling trench;
- Temperature and flow monitors in the receiving stream, upstream and just downstream of the pond discharge points.

This incorporates a total of 8 to 10 continuous temperature monitors and 4 to 6 continuous flow monitors to identify the temperature changes through each pond system and the impact on the receiving stream. Further, the existing seven temperature monitoring stations used for the predevelopment monitoring should be maintained. The frequency of sampling will depend on time of year with a higher frequency in summer and lower frequency in winter with a frequency not to exceed one measurement every 30 minutes (every 15 minutes in summer). Stream and pond monitoring equipment should be checked and downloaded at a minimum once each month.

The City of Guelph will be responsible for the monitoring of the ponds, streams and groundwater levels and temperatures along with biological parameters before and during and post-construction. The post-construction monitoring is recommended to be related to the time at which 50% of the development area is built (by area), after which the State of the Watershed monitoring would take over. Reporting of data will occur on a yearly basis to the City of Guelph with any extreme conditions reported immediately upon data collection.

If temperatures are not within the range outlined in the thermal impact report and/or fish and benthic invertebrates appear to be adversely affected due to temperature conditions, the adaptive management process should be implemented to identify the causes of the impacts and develop solutions. The solutions should be identified through the adaptive management process to maximize effectiveness but may include such measures as further increased plantings along the stream and/or grassed swales.

All of which is respectfully submitted:

R Clement

Richard F. Clement, P.Eng.

TEAL DRIVE

HANLON EXPRESSWAY

POND 1

POND 2

ROAD 'A'

Hanlon Creek Tributary 'A'

POND 3

PHASE 1

LAIRD ROAD

POND 4

CLAIR ROAD

POND 5

POND 6

ROAD 'D'

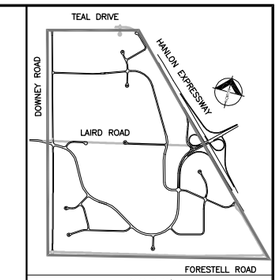
PHASE 3

DOWNEY ROAD

FORESTELL ROAD

PHASE 2

NORTH



KEY PLAN
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CITY OF GUELPH BM#204 - TABLET ON BASE OF HANLON INDUSTRIAL PARK SIGN LOCATED ON THE EAST SIDE OF THE HANLON EXPRESSWAY AT THE LAIRD ROAD INTERSECTION. GEODETIC ELEVATION = 332.685m

IT IS THE RESPONSIBILITY OF THE CONTRACTORS TO INFORM THEMSELVES OF THE EXACT LOCATION OF, AND ASSUME ALL LIABILITY FOR DAMAGE TO ALL UTILITIES, SERVICES AND STRUCTURES WHETHER ABOVE GROUND OR BELOW GRADE BEFORE COMMENCING THE WORK. SUCH INFORMATION IS NOT NECESSARILY SHOWN ON THE DRAWING, AND WHERE SHOWN THE ACCURACY CANNOT BE GUARANTEED.

WITH THE SOLE EXCEPTION OF THE BENCHMARK(S) SPECIFICALLY DESCRIBED FOR THIS PROJECT, NO ELEVATION INDICATED OR ASSUMED HEREON IS TO BE USED AS A REFERENCE ELEVATION FOR ANY PURPOSE.

ALL DIMENSIONS AND INFORMATION SHALL BE CHECKED AND VERIFIED ON THE JOB AND ANY DISCREPANCIES MUST BE REPORTED TO THE CONSULTANT BEFORE COMMENCING THE WORK. DRAWINGS ARE NOT TO BE SCALED.

No.	DATE	DESCRIPTION	BY:	CHKD.

ISSUES/REVISIONS

CORPORATION OF THE CITY OF GUELPH

ENGINEERING DEPARTMENT

AECOM

HANLON CREEK BUSINESS PARK

DETENTION FACILITIES
PHASE 1 & 2 - PONDS 1 to 4

DESIGNED BY:		APPROVED BY:	
SCALE: 1 : 4000		CONSULTANT DRAWING No. FIGURE 1	
DATE DRAWN: MAY 2008		CITY CONTRACT No. -	
DRAWN BY: -	CHECKED BY: -	CITY REFERENCE No. -	REV. -

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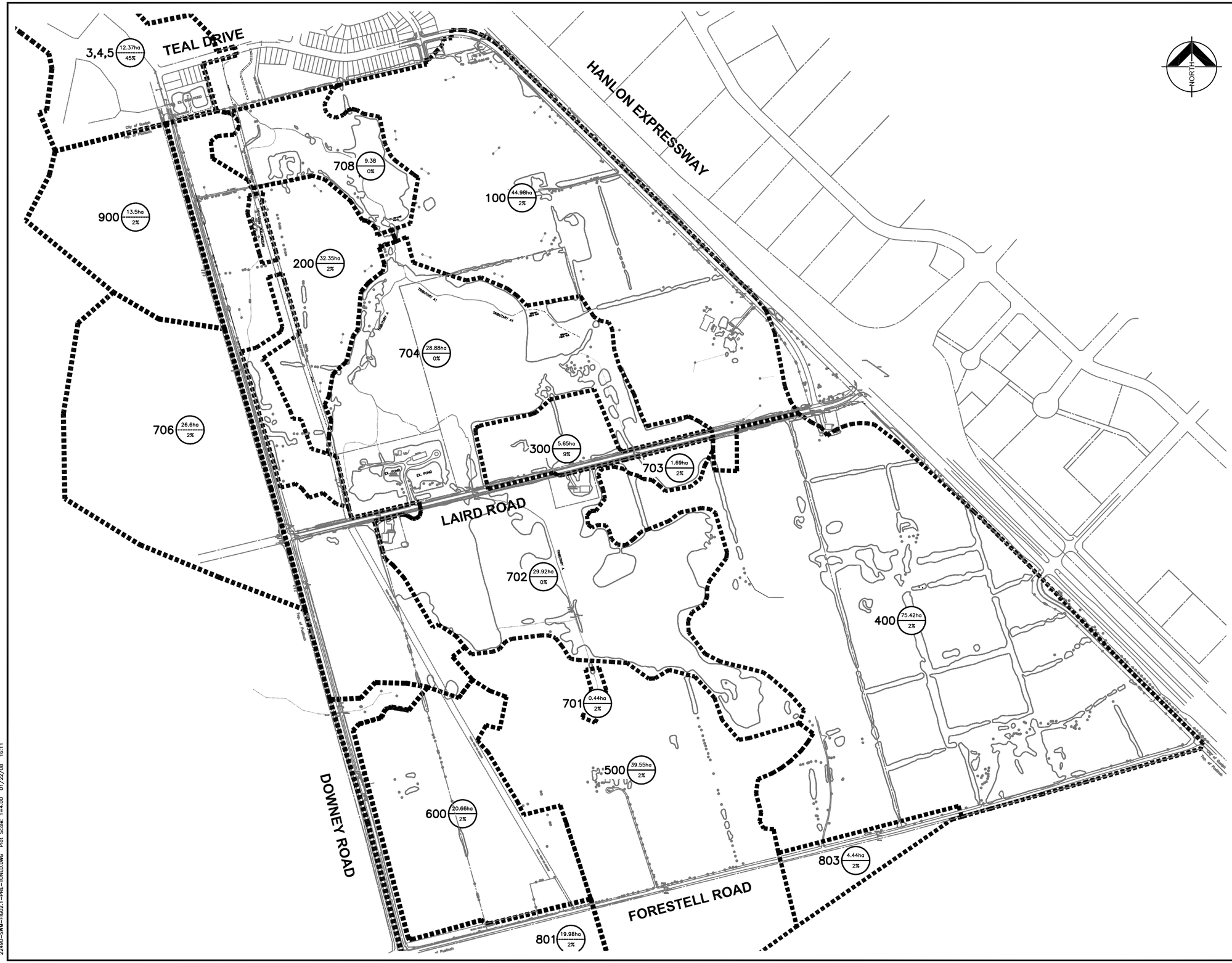

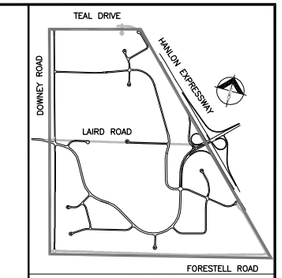

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GEODETIC ELEVATION = 332.685m

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ISSUES/REVISIONS

CORPORATION OF THE CITY OF GUELPH

ENGINEERING DEPARTMENT

AECOM

HANLON CREEK BUSINESS PARK

STORM DRAINAGE AREAS
PRE DEVELOPMENT

DESIGNED BY:	APPROVED BY:
SCALE: 1 : 4000	CONSULTANT DRAWING No. FIGURE 2.1
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DRAWN BY: - / CHECKED BY: -	CITY REFERENCE No. - / REV. -

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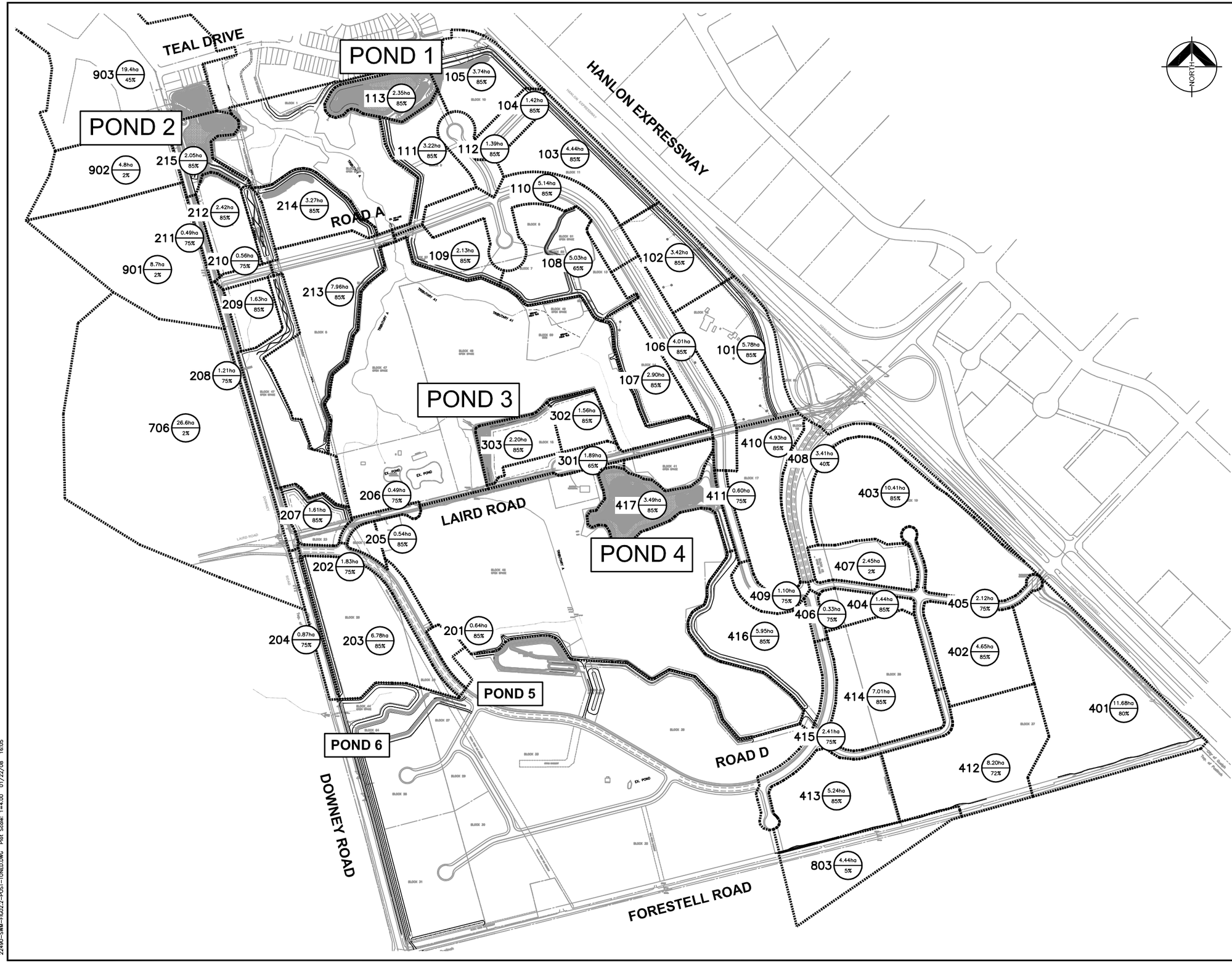

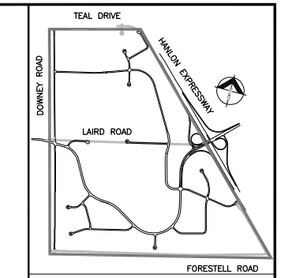

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No.	DATE	DESCRIPTION	BY:	CHKD.

ISSUES/REVISIONS

CORPORATION OF THE CITY OF GUELPH

ENGINEERING DEPARTMENT

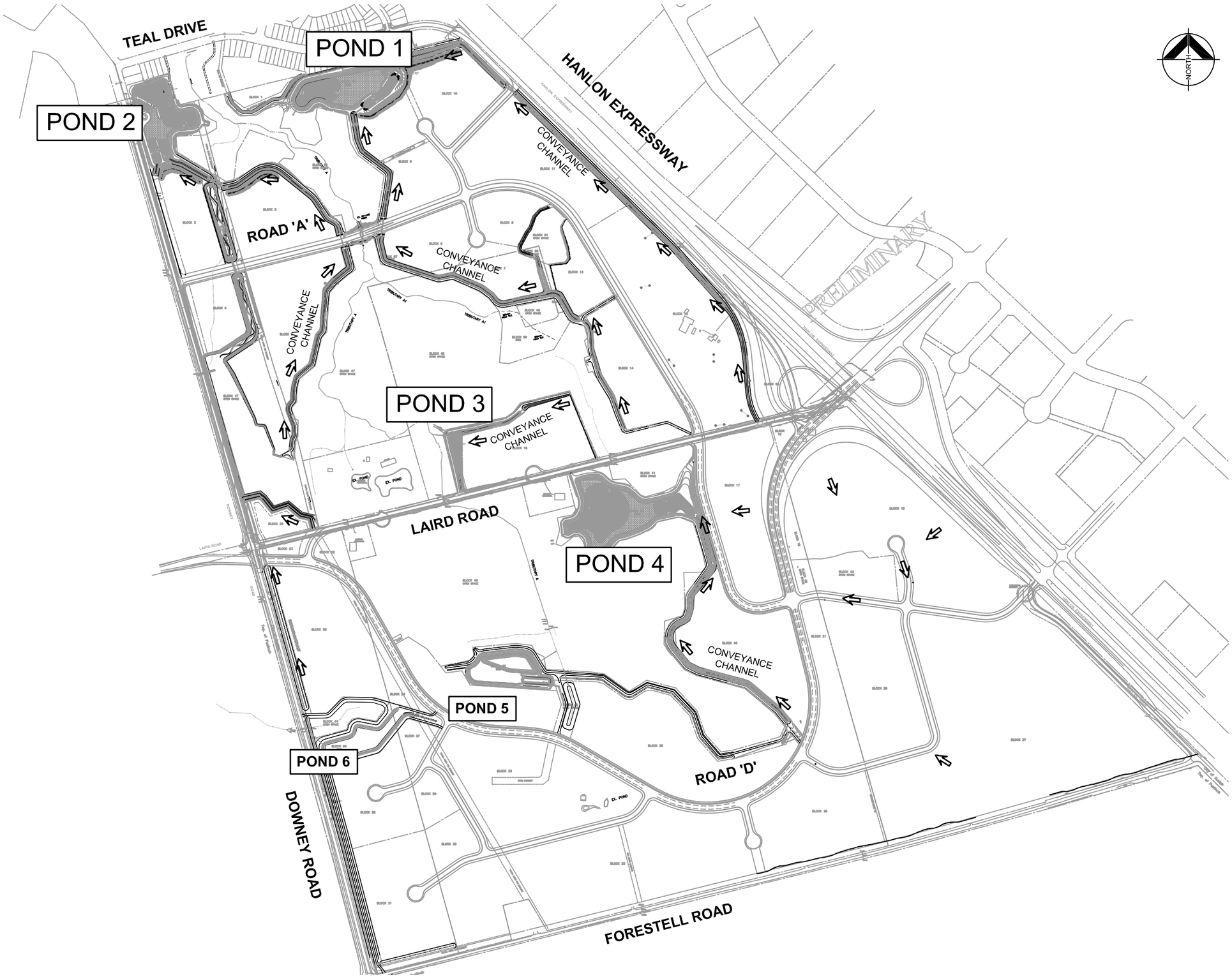
AECOM

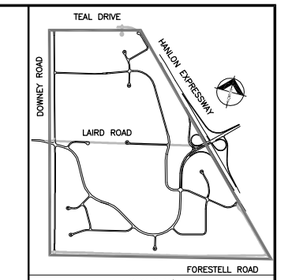
HANLON CREEK BUSINESS PARK

STORM DRAINAGE AREAS
POST DEVELOPMENT

DESIGNED BY:	APPROVED BY:
SCALE: 1 : 4000	CONSULTANT DRAWING No. FIGURE 2.2
DATE DRAWN: MAY 2008	CITY CONTRACT No. -
DRAWN BY: - / CHECKED BY: -	CITY REFERENCE No. - / REV. -

22490-SWM-FIG02.2-POST-TONED.DWG Plot Scale: 1=4.00 01/22/08 16:05





KEY PLAN
Scale : NOT TO SCALE

LEGEND:

BENCH MARK:

CITY OF GUELPH BM#204 - TABLET ON BASE OF HANLON INDUSTRIAL PARK SIGN LOCATED ON THE EAST SIDE OF THE HANLON EXPRESSWAY AT THE LAIRD ROAD INTERSECTION. GEODETIC ELEVATION = 332.685m

IT IS THE RESPONSIBILITY OF THE CONTRACTORS TO INFORM THEMSELVES OF THE EXACT LOCATION OF, AND ASSUME ALL LIABILITY FOR DAMAGE TO ALL UTILITIES, SERVICES AND STRUCTURES WHETHER ABOVE GROUND OR BELOW GRADE BEFORE COMMENCING THE WORK. SUCH INFORMATION IS NOT NECESSARILY SHOWN ON THE DRAWING, AND WHERE SHOWN THE ACCURACY CANNOT BE GUARANTEED.

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No.	DATE	DESCRIPTION	BY:	CHKD.

ISSUES/REVISIONS

CORPORATION OF THE CITY OF GUELPH

ENGINEERING DEPARTMENT

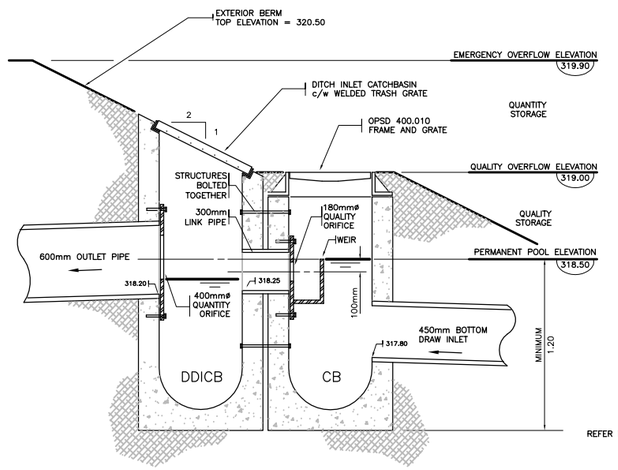
AECOM

HANLON CREEK BUSINESS PARK

PONDS and CONVEYANCE CHANNELS

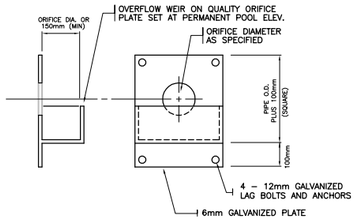
DESIGNED BY:		APPROVED BY:	
SCALE: 1 : 4000		CONSULTANT DRAWING No. FIGURE 3	
DATE DRAWN: MAY 2008		CITY CONTRACT No. -	
DRAWN BY: -	CHECKED BY: -	CITY REFERENCE No. -	REV. -

22490-SWM-FIG03-CONVEYANCE-TONED.DWG Plot Scale: 1=4.00 01/22/08 16:22



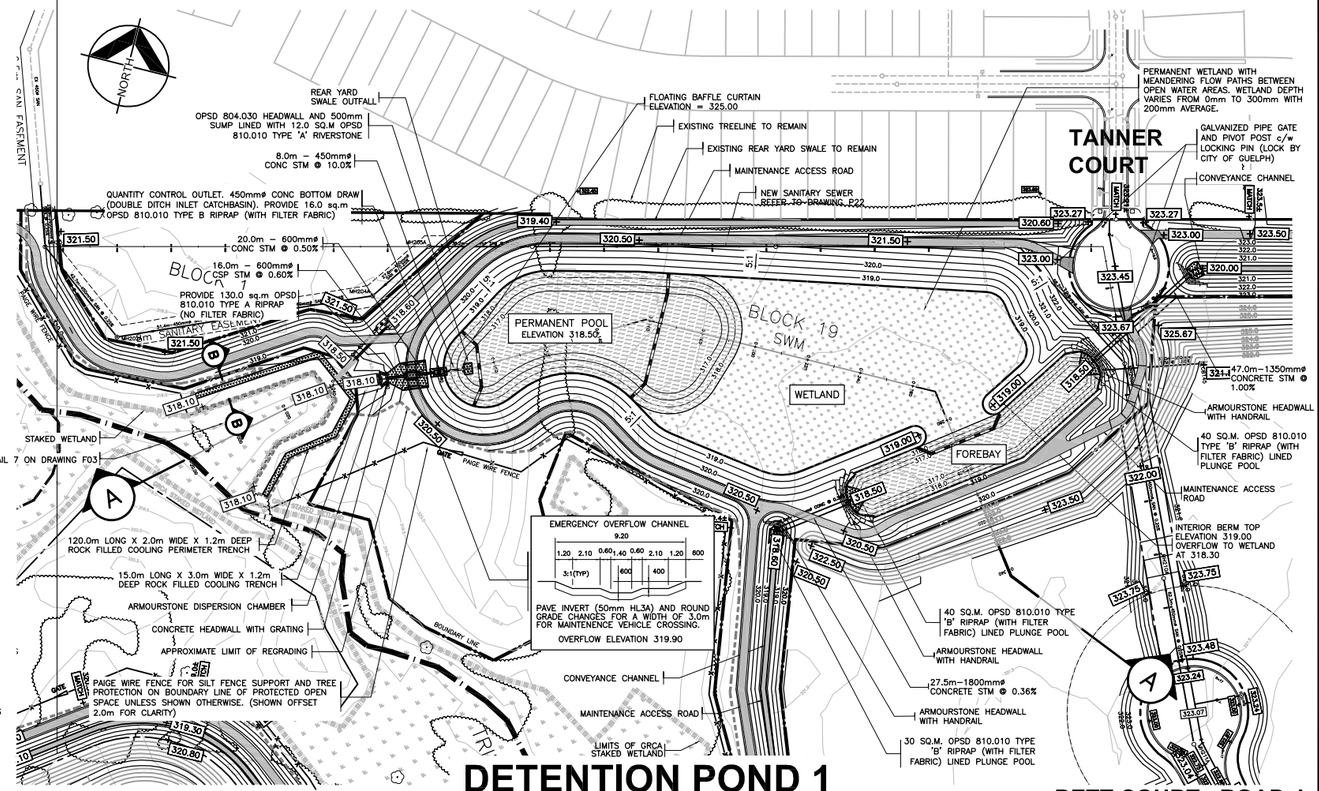
DDICB TO BE COMPLETE WITH WELDED TRASH GRATE, GALVANIZED AFTER FABRICATION. PROVIDE 60mmX6mm BARS VERTICALLY @ 50mmO.C. AND 10mmø STABILIZER BARS @ 75mm HORIZONTALLY. HORIZONTAL BARS TO BE PLACED TO CLEAR TONGS OF STANDARD GARDEN RAKE FOR DEBRIS CLEANING PURPOSES. FRAME TO BE 75mmx50mmx6mm c/w WELDED FLANGES FOR FASTENER BOLTS, SIMILAR TO OPSD-403.01

ORIFICE PLATE TO BE MADE FROM 6mm PLATE FORMED TO THE INSIDE FACE OF THE MANHOLE/CATCHBASIN WALL AND SHALL BE GALVANIZED AFTER FABRICATION. PROVIDE SILICONE SEALANT AND LAG TO STRUCTURE WALL TO PROVIDE WATER TIGHT CONNECTION.



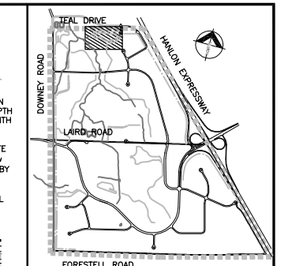
DETAIL BOTTOM DRAW OUTLET CONTROL STRUCTURE (1)

NOT TO SCALE



DETENTION POND 1

BETT COURT - ROAD J



KEY PLAN
Scale : NOT TO SCALE

LEGEND:

- EXISTING CONTOUR — 325.0
- PROPOSED CONTOUR — 325.0
- PROPOSED RIP RAP
- STAKED WETLAND BOUNDARY
- PAIGE WIRE FENCE
- FLOATING BAFFLE CURTAIN

BENCH MARK:

CITY OF GUELPH BM#204 - TABLET ON BASE OF HANLON INDUSTRIAL PARK SIGN LOCATED ON THE EAST SIDE OF THE HANLON EXPRESSWAY AT THE LAIRD ROAD INTERSECTION. GEODETIC ELEVATION = 332.685m

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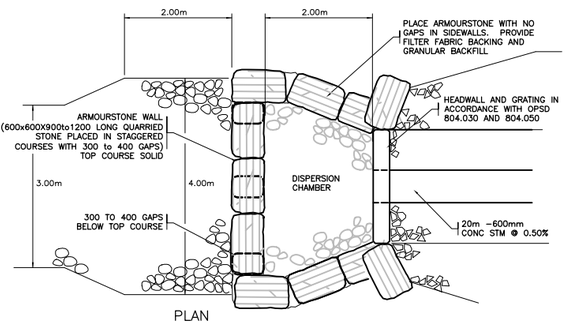
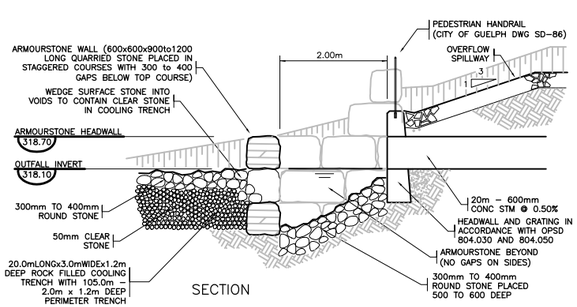
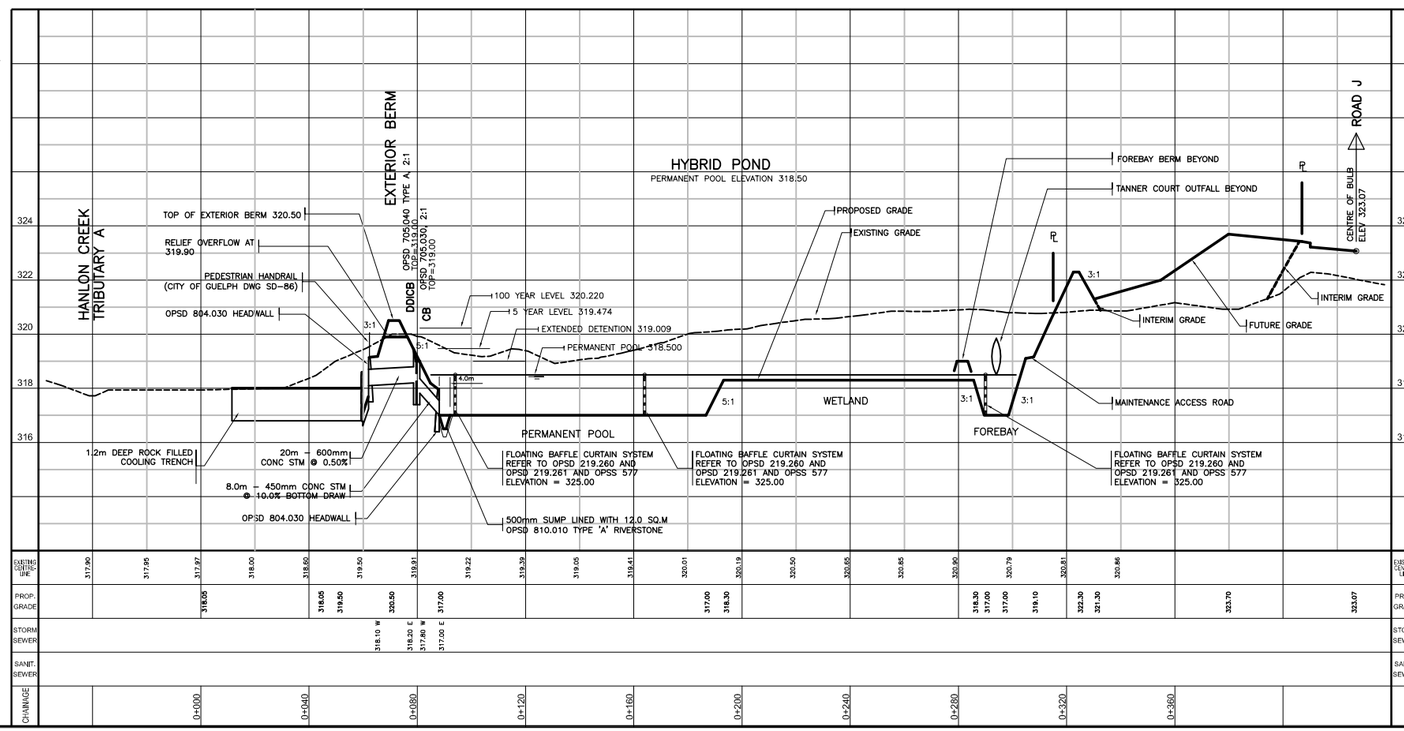




DETAIL ARMOURSTONE DISPERSION CHAMBER (2)

1:50



No.	DATE	DESCRIPTION	BY:	CHKD.
6	22/01/2009	REVISIONS FOR APPROVAL	AECOM	
5	25/08/2008	REVISED POND OUTLET CONFIGURATION	TSH	
4	03/07/2008	ISSUED FOR TENDER	TSH	
3	06/05/2008	ISSUED FOR APPROVAL	TSH	
2	18/04/2008	ISSUED FOR APPROVAL	TSH	
1	29/02/2008	ISSUED FOR APPROVAL	TSH	

ISSUES/REVISIONS

CORPORATION OF THE CITY OF GUELPH

ENGINEERING DEPARTMENT

AECOM

HANLON CREEK
BUSINESS PARK

DETENTION POND 1
PLAN, PROFILE AND DETAIL

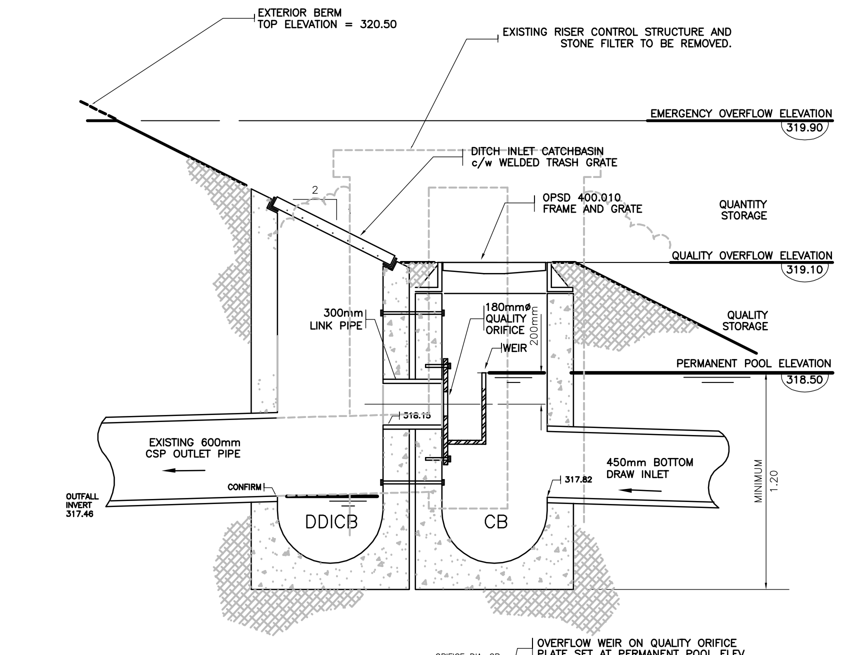
DESIGNED BY: REGISTERED PROFESSIONAL ENGINEER R. F. CLEMENT 22 Jan 2009 PROVINCE OF ONTARIO

APPROVED BY:

SCALE:	CONSULTANT DRAWING No.
1 : 1000	FIGURE 4
DATE DRAWN: JAN. 2009	CITY CONTRACT No. 2-0817

DRAWN BY:	CHECKED BY:	CITY REFERENCE No.	REV.
DM	-	-	-

22490-POND1.DWG Plot Scale: 1=1.00 08/27/08 14:29



DDICB TO BE COMPLETE WITH WELDED TRASH GRATE, GALVANIZED AFTER FABRICATION. PROVIDE 60mmX6mm BARS VERTICALLY @ 50mmO.C. AND 10mmø STABILIZER BARS @ 75mm HORIZONTALLY. HORIZONTAL BARS TO BE PLACED TO CLEAR TONGS OF STANDARD GARDEN RAKE FOR DEBRIS CLEANING PURPOSES. FRAME TO BE 75mmx50mmx6mm c/w WELDED FLANGES FOR FASTENER BOLTS, SIMILAR TO OPSD–403.01

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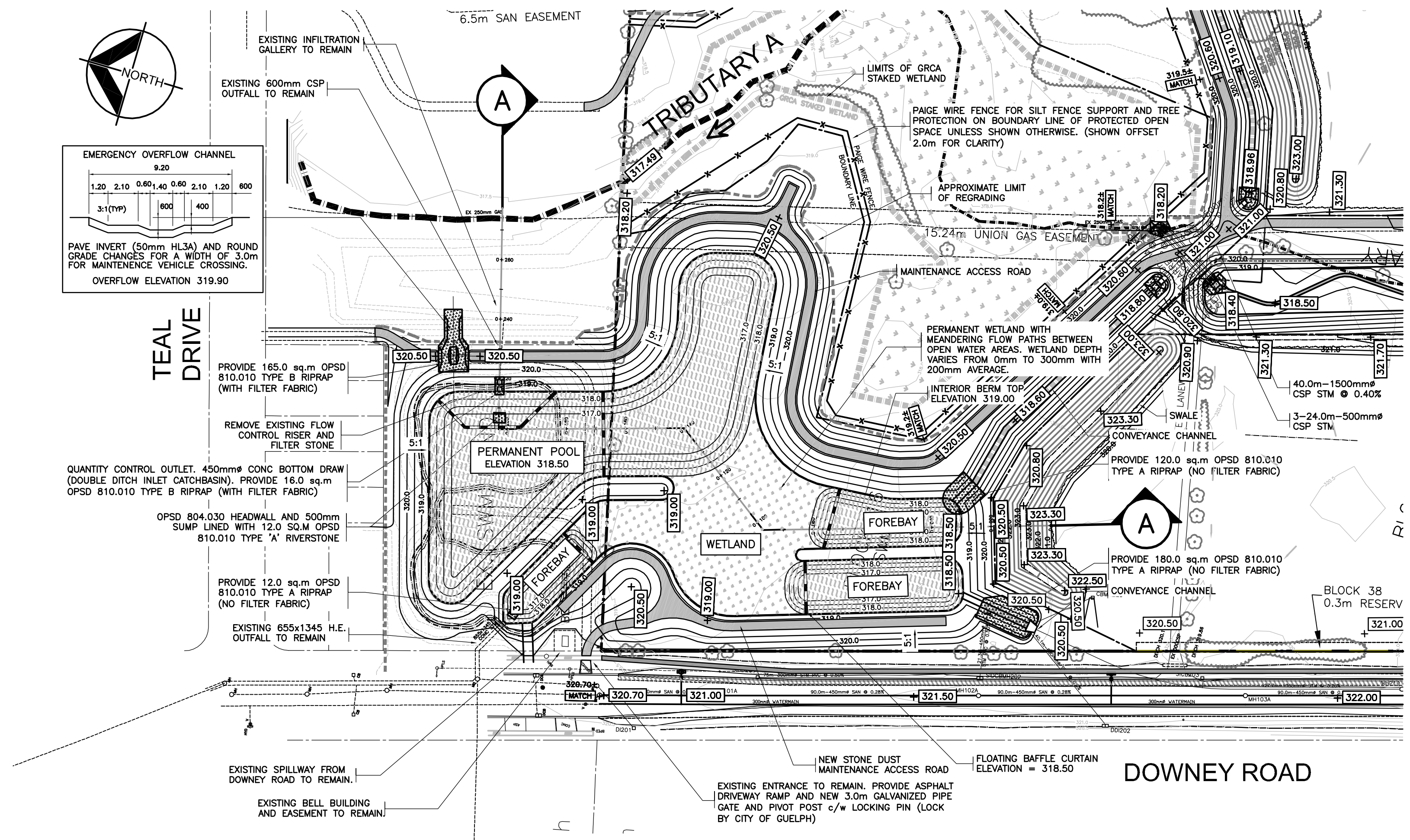
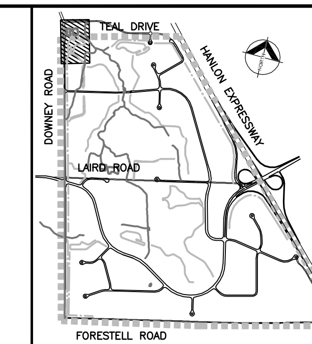
DETAIL OUTLET CONTROL STRUCTURE (1)
NOT TO SCALE



DETENTION POND 2



KEY PLAN
Scale / NOT TO SCALE

LEGEND:

EXISTING CONTOUR	325.0
PROPOSED CONTOUR	325.0
PROPOSED RIP RAP	
FLOATING BAFFLE CURTAIN	

CONSTRUCTION NOTES:

1. EXISTING FACILITY TO REMAIN IN SERVICE UNTIL NEW FACILITY IS EXCAVATED.
2. ONCE TWO NEW CONVEYANCE CHANNELL FOREBAYS AT SOUTHERN PART OF POND ARE CONSTRUCTED, NEW FOREBAY BERM AT DOWNEY OUTLET TO BE CONSTRUCTED AND FLOW DIRECTED TO NEW SOUTH PART OF POND.
3. CONSTRUCT NORTH PART OF POND AND CAREFULLY REMOVE REMAINING SOUTH BERM TO COMPLETE THE CONSTRUCTION.
4. REFER TO SPECIAL PROVISIONS FOR CONSTRUCTION STAGING AND EROSION AND SEDIMENT CONTROL NOTES.

BENCH MARK:

CITY OF GUELPH BM#204 - TABLET ON BASE OF HANLON INDUSTRIAL PARK SIGN LOCATED ON THE EAST SIDE OF THE HANLON EXPRESSWAY AT THE LAIRD ROAD INTERSECTION. GEODETIC ELEVATION = 332.685m

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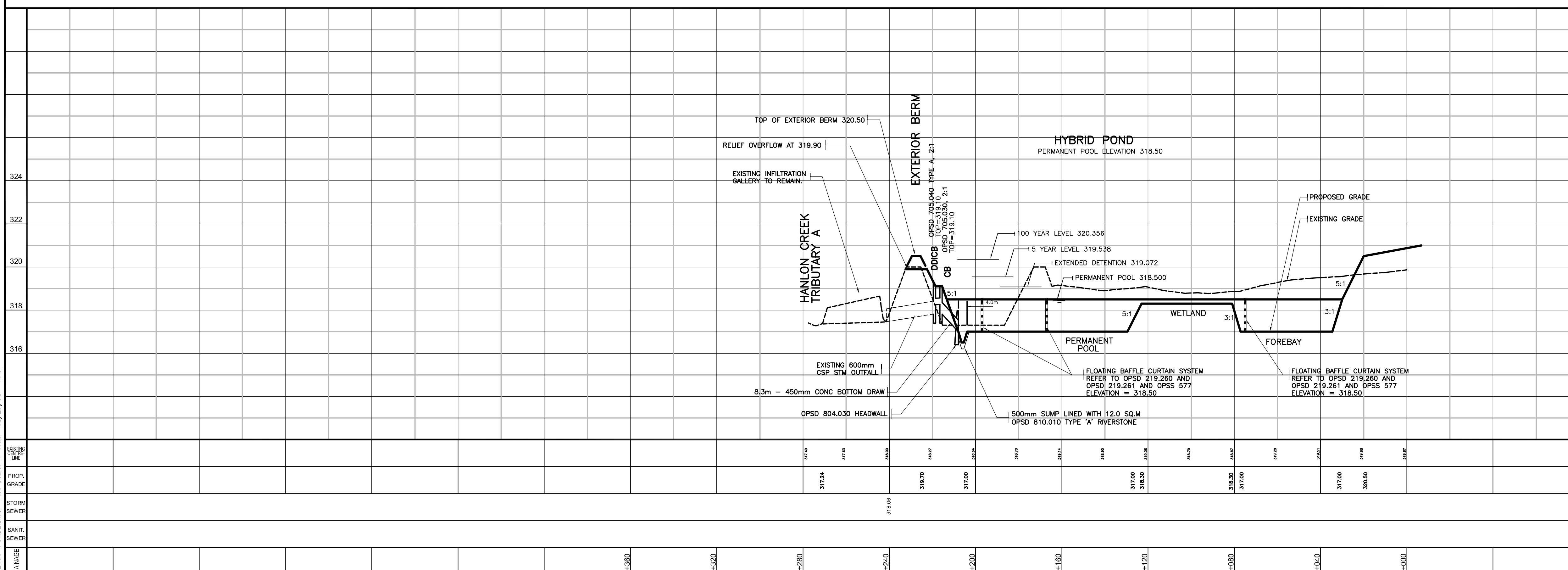

22490-POND2.DWG Plot Scale: 1=1.00 08/27/08 14:37

No.	DATE	DESCRIPTION	BY:	CHKD.
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4	03/07/2008	ISSUED FOR TENDER	TSH	
3	06/06/2008	ISSUED FOR APPROVAL	TSH	
2	18/04/2008	ISSUED FOR APPROVAL	TSH	
1	29/02/2008	ISSUED FOR APPROVAL	TSH	

ISSUES/REVISIONS

CORPORATION OF THE CITY OF GUELPH

ENGINEERING DEPARTMENT

AECOM

HANLON CREEK BUSINESS PARK

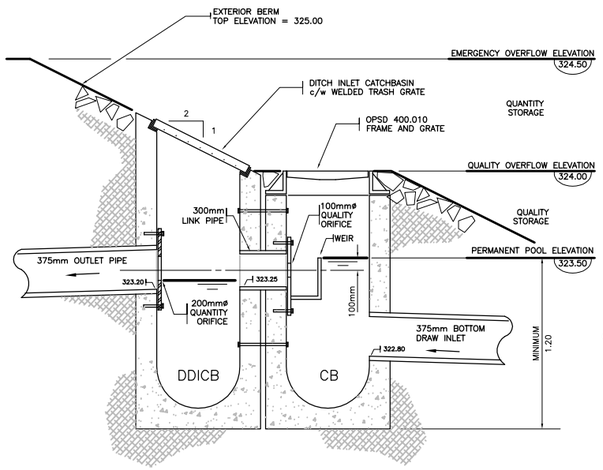
DETENTION POND 2
PLAN, ELEVATION AND DETAIL

DESIGNED BY: | APPROVED BY:

REGISTERED PROFESSIONAL ENGINEER R. F. CLEMENT PROVINCE OF ONTARIO

SCALE:	CONSULTANT DRAWING No.
1 : 1000	FIGURE 5
DATE DRAWN: JAN. 2009	CITY CONTRACT No. 2-0817

DRAWN BY:	CHECKED BY:	CITY REFERENCE No.	REV.
DM	-	-	-



DDICB1 AND DICB2 TO BE COMPLETE WITH WELDED TRASH GRATE, GALVANIZED AFTER FABRICATION. PROVIDE 60mmX6mm BARS VERTICALLY @ 50mmO.C. AND 10mmø STABILIZER BARS @ 75mm HORIZONTALLY. HORIZONTAL BARS TO BE PLACED TO CLEAR TONGS OF STANDARD GARDEN RAKE FOR DEBRIS CLEANING PURPOSES. FRAME TO BE 75mmx50mmx6mm c/w WELDED FLANGES FOR FASTENER BOLTS, SIMILAR TO OPSD-403.01

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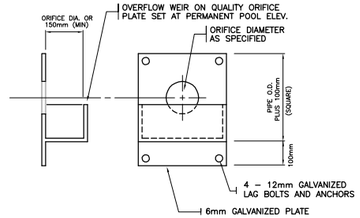
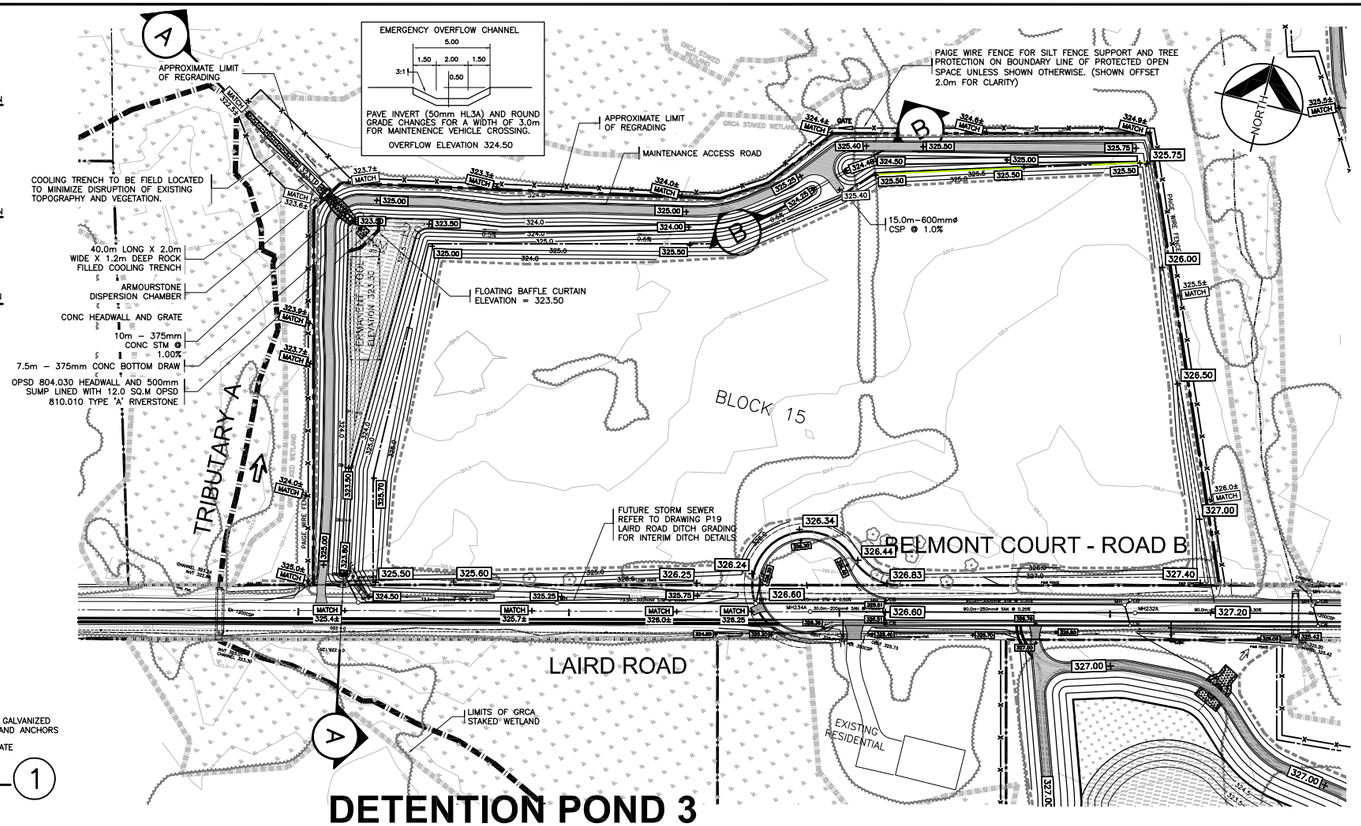
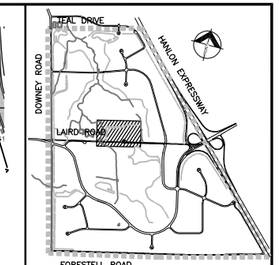


DETAIL BOTTOM DRAW OUTLET CONTROL STRUCTURE — 1

NOT TO SCALE



DETENTION POND 3



KEY PLAN
Scale : NOT TO SCALE

LEGEND:

- EXISTING CONTOUR — 325.0
- PROPOSED CONTOUR — 325.0
- PROPOSED RIP RAP
- STAKED WETLAND BOUNDARY
- PAIGE WIRE FENCE
- FLOATING BAFFLE CURTAIN

BENCH MARK:

CITY OF GUELPH BM#204 - TABLET ON BASE OF HANLON INDUSTRIAL PARK SIGN LOCATED ON THE EAST SIDE OF THE HANLON EXPRESSWAY AT THE LAIRD ROAD INTERSECTION. GEODETIC ELEVATION = 332.685m

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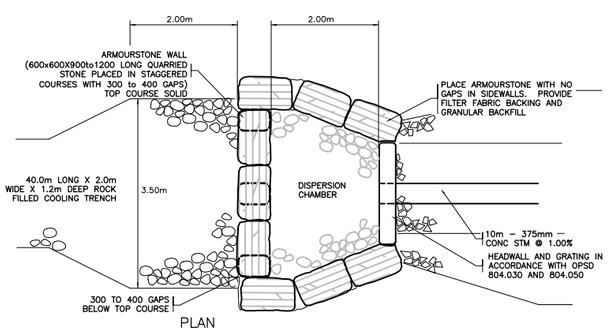
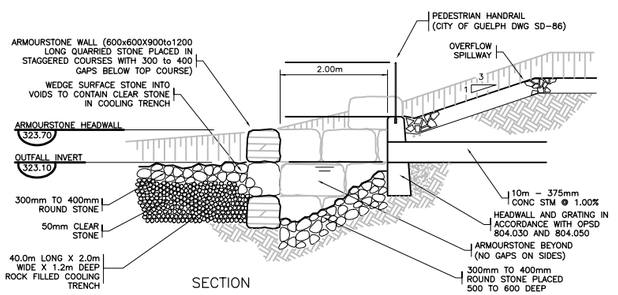
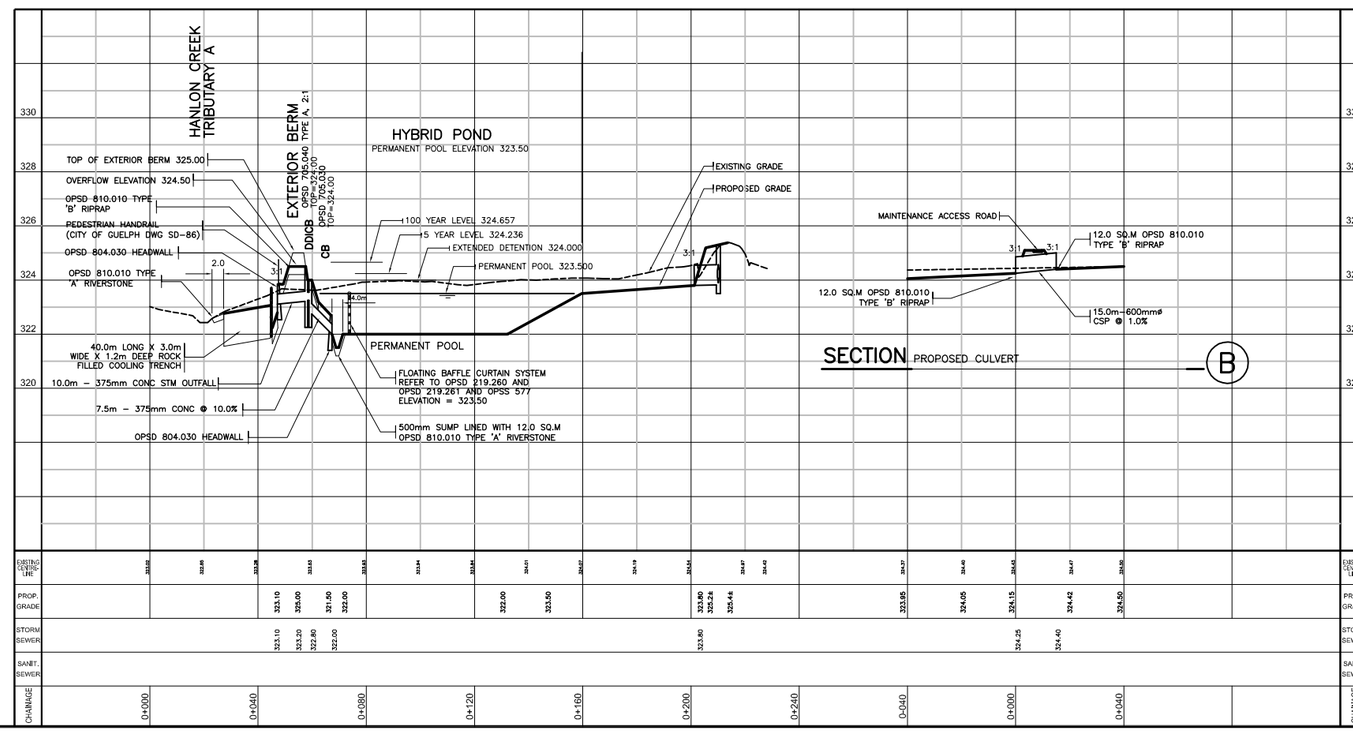




DETAIL ARMOURSTONE DISPERSION CHAMBER — 2

1:50



SECTION PROPOSED CULVERT — B

No.	DATE	DESCRIPTION	BY:	CHKD.
7	22/01/2009	REVISIONS FOR APPROVAL	AECOM	
6	25/08/2008	REVISED POND OUTLET CONFIGURATION	TSH	
5	03/07/2008	ISSUED FOR TENDER	TSH	
4	19/06/2008	TREE PROTECTION FENCING NOTE ADDED	TSH	
3	06/06/2008	ISSUED FOR APPROVAL	TSH	
2	18/04/2008	ISSUED FOR APPROVAL	TSH	
1	28/02/2008	ISSUED FOR APPROVAL	TSH	

ISSUES/REVISIONS

CORPORATION OF THE CITY OF GUELPH

ENGINEERING DEPARTMENT

AECOM

HANLON CREEK BUSINESS PARK

DETENTION POND 3
PLAN, PROFILE AND DETAIL

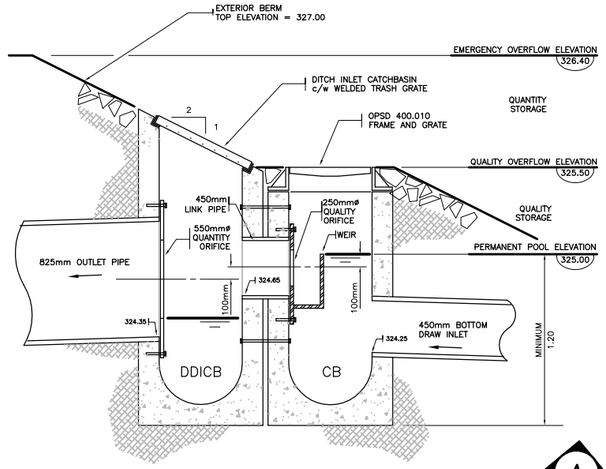
DESIGNED BY: R. F. CLEMENT — REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO — 22 JAN 09

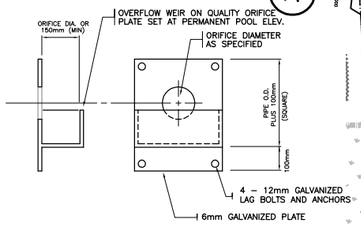
APPROVED BY:

SCALE: 1 : 1000	CONSULTANT DRAWING No. FIGURE 6
DATE DRAWN: JAN. 2009	CITY CONTRACT No. 2-0817

DRAWN BY:	CHECKED BY:	CITY REFERENCE No.	REV.
LRC/DM	-	-	-

22490-POND3.DWG Plot Scale: 1=1.00 08/25/08 16:49





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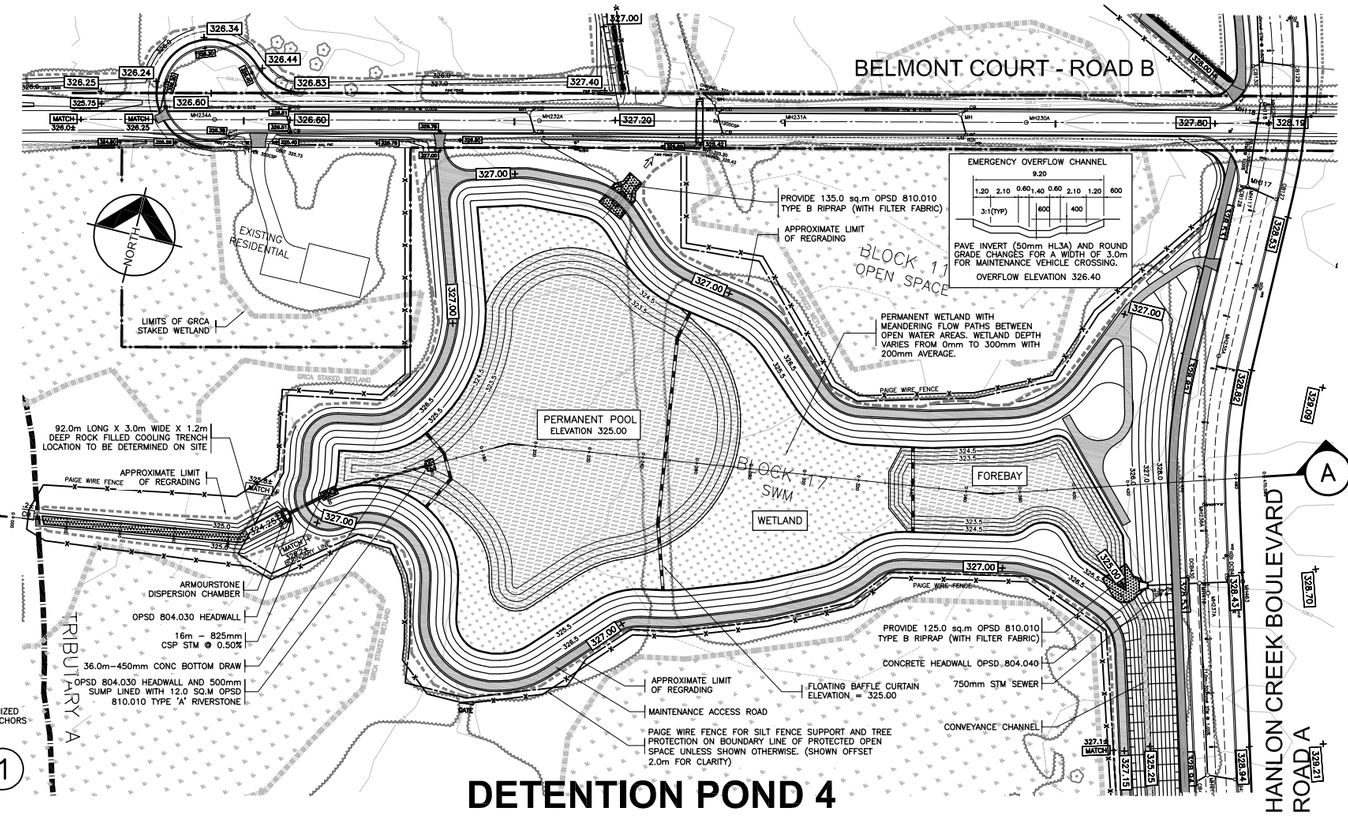
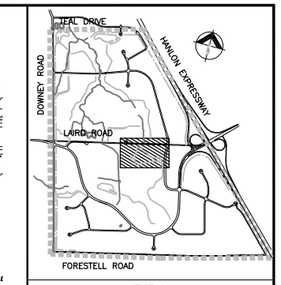
DETAIL BOTTOM DRAW OUTLET CONTROL STRUCTURE (1)

NOT TO SCALE



DETENTION POND 4



KEY PLAN
Scale : NOT TO SCALE

LEGEND:

- EXISTING CONTOUR
- PROPOSED CONTOUR
- PROPOSED RIP RAP
- STAKED WETLAND BOUNDARY
- PAIGE WIRE FENCE
- FLOATING BAFFLE CURTAIN

BENCH MARK:

BENCHMARK SHALL BE TAKEN FROM BM#204, BASE OF HANLON INDUSTRIAL PARK SIGN LOCATED ON THE EAST SIDE OF HANLON AT LAIRD INTERSECTION. ELEVATION = 332.685m

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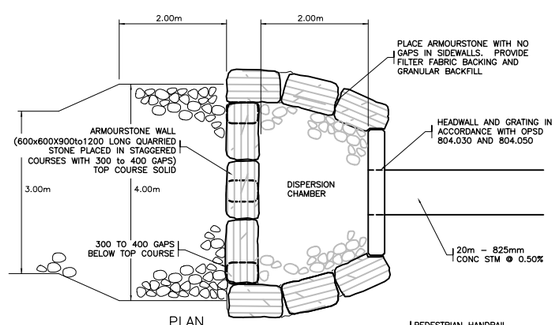
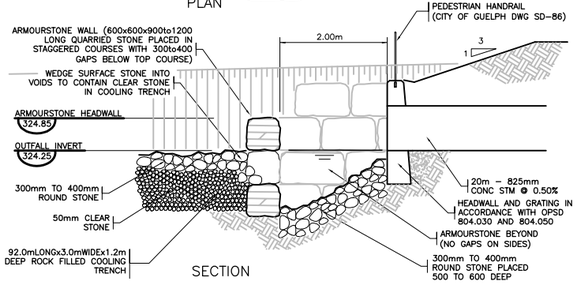
WITH THE SOLE EXCEPTION OF THE BENCHMARK(S) SPECIFICALLY DESCRIBED FOR THIS PROJECT, NO ELEVATION INDICATED OR ASSUMED HEREON IS TO BE USED AS A REFERENCE ELEVATION FOR ANY PURPOSE.

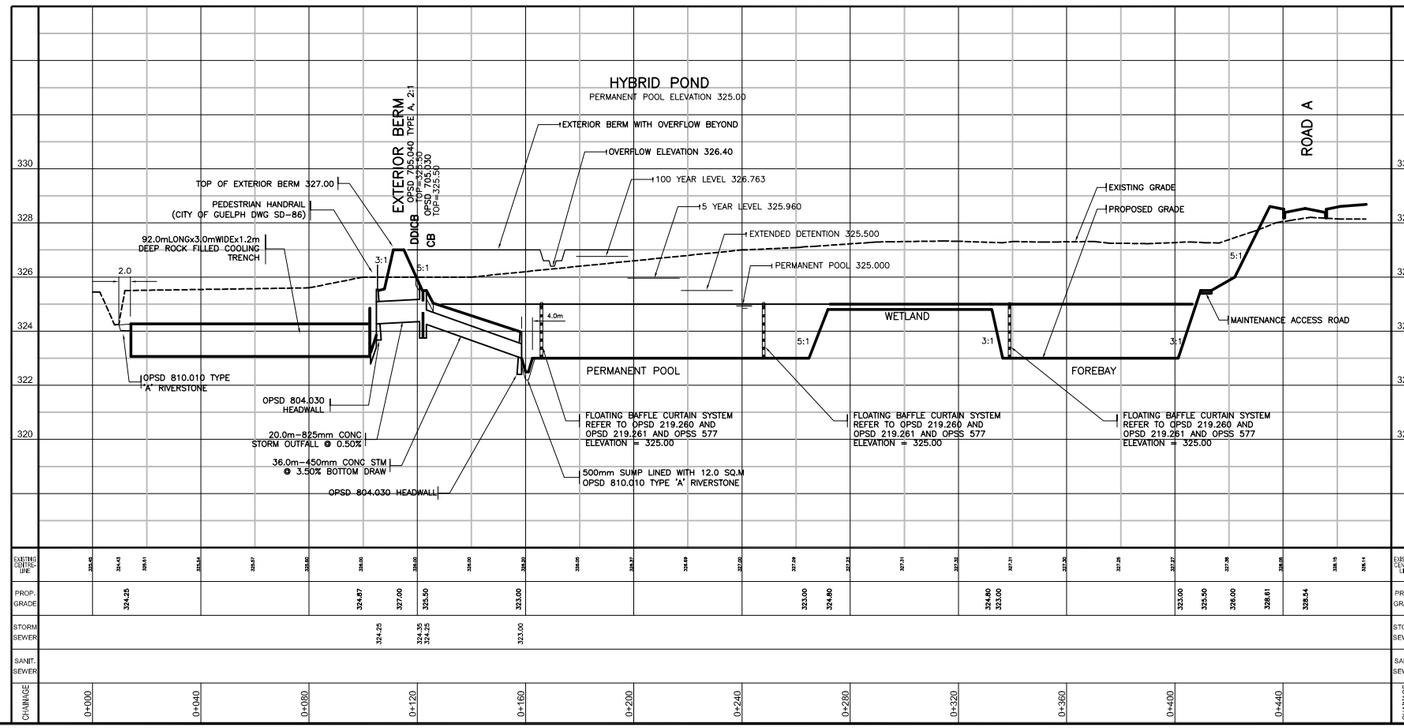
ALL DIMENSIONS AND INFORMATION SHALL BE CHECKED AND VERIFIED ON THE JOB AND ANY DISCREPANCIES MUST BE REPORTED TO THE CONSULTANT BEFORE COMMENCING THE WORK. DRAWINGS ARE NOT TO BE SCALED.





DETAIL ARMOURSTONE DISPERSION CHAMBER (2)

1:50



No.	DATE	DESCRIPTION	BY:	CHKD.
6	22/01/2009	REVISIONS FOR APPROVAL	AECOM	
5	03/07/2008	ISSUED FOR TENDER	TSH	
4	19/06/2008	TREE PROTECTION FENCING NOTE ADDED	TSH	
3	06/06/2008	ISSUED FOR APPROVAL	TSH	
2	18/04/2008	ISSUED FOR APPROVAL	TSH	
1	28/02/2008	ISSUED FOR APPROVAL	TSH	

ISSUES/REVISIONS

ENGINEERING DEPARTMENT

AECOM

HANLON CREEK BUSINESS PARK

DETENTION POND 4
PLAN, PROFILE AND DETAIL

DESIGNED BY: R. F. CLEMENT — REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO — 22 Jan 09

APPROVED BY:

SCALE: 1 : 1000

CONSULTANT DRAWING No. FIGURE 7

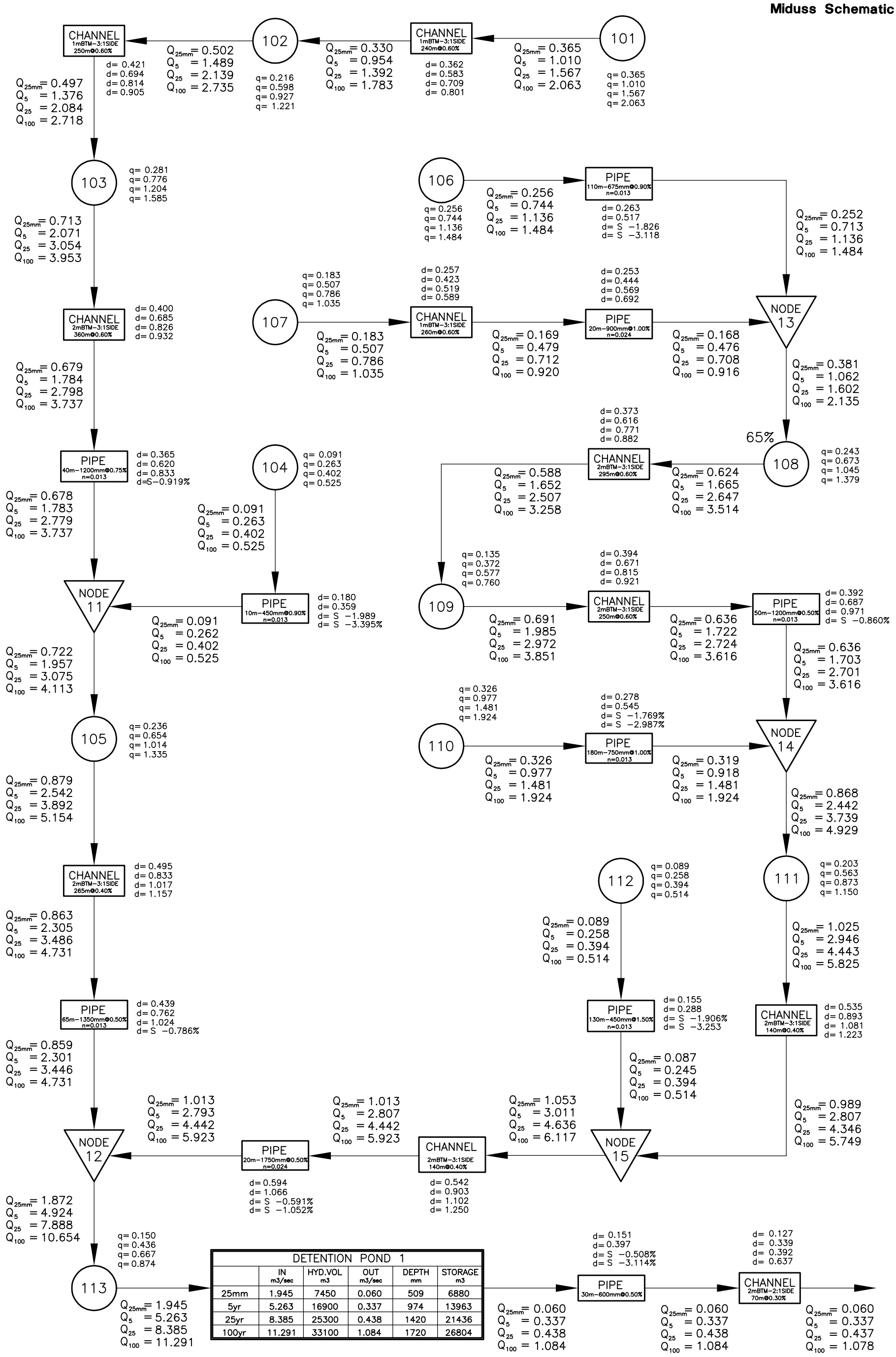
DATE DRAWN: JAN. 2009

CITY CONTRACT No. 2-0817

DRAWN BY: LRC/DM | CHECKED BY: - | CITY REFERENCE No. - | REV. -

22490–POND4.DWG Plot Scale: 1=0.46 08/26/08 14:56

Hanlon Creek Business Park
Pond 1
Miduss Schematic

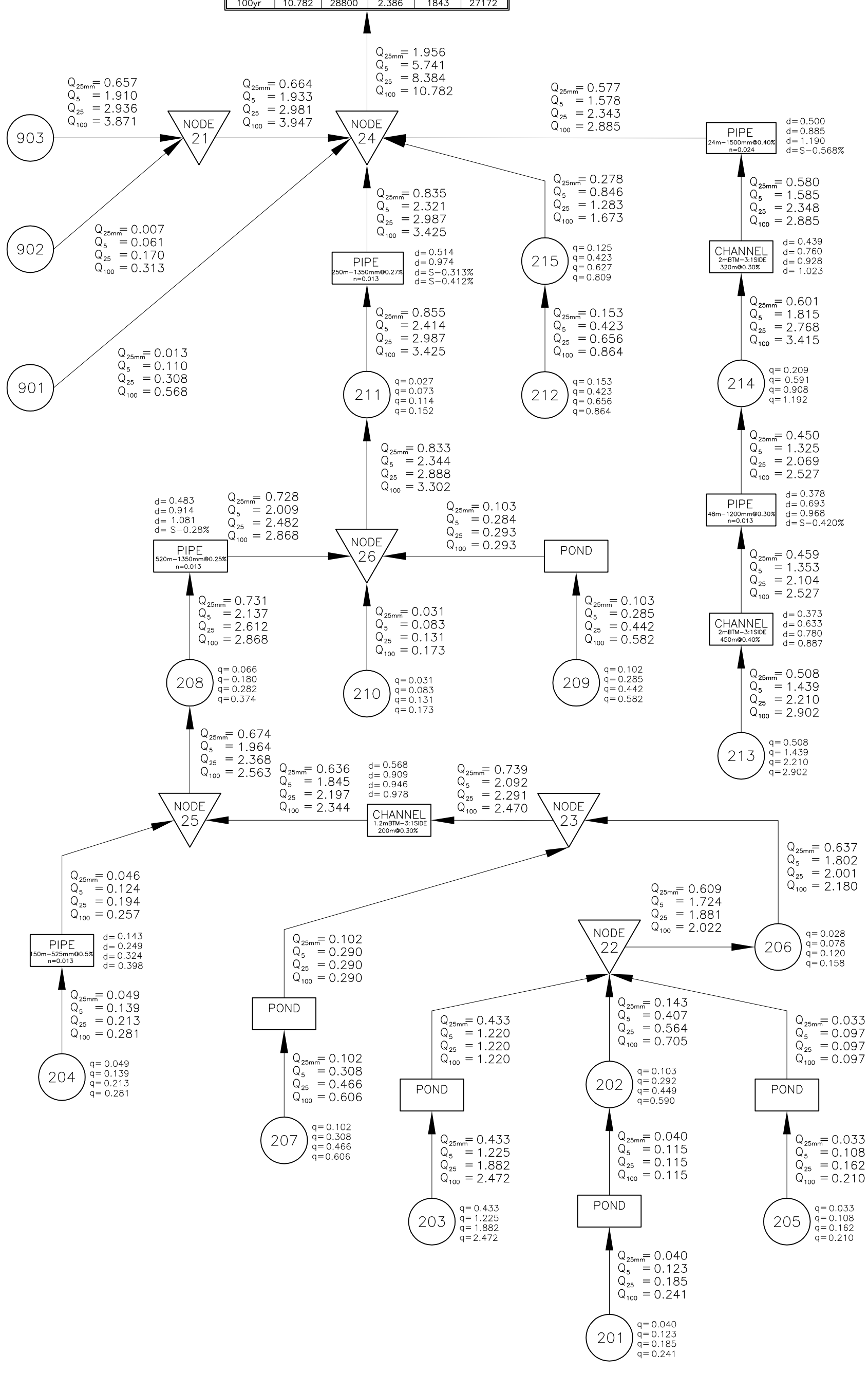


AECOM

FIGURE 8

Hanlon Creek Business Park
Pond 2
Miduss Schematic

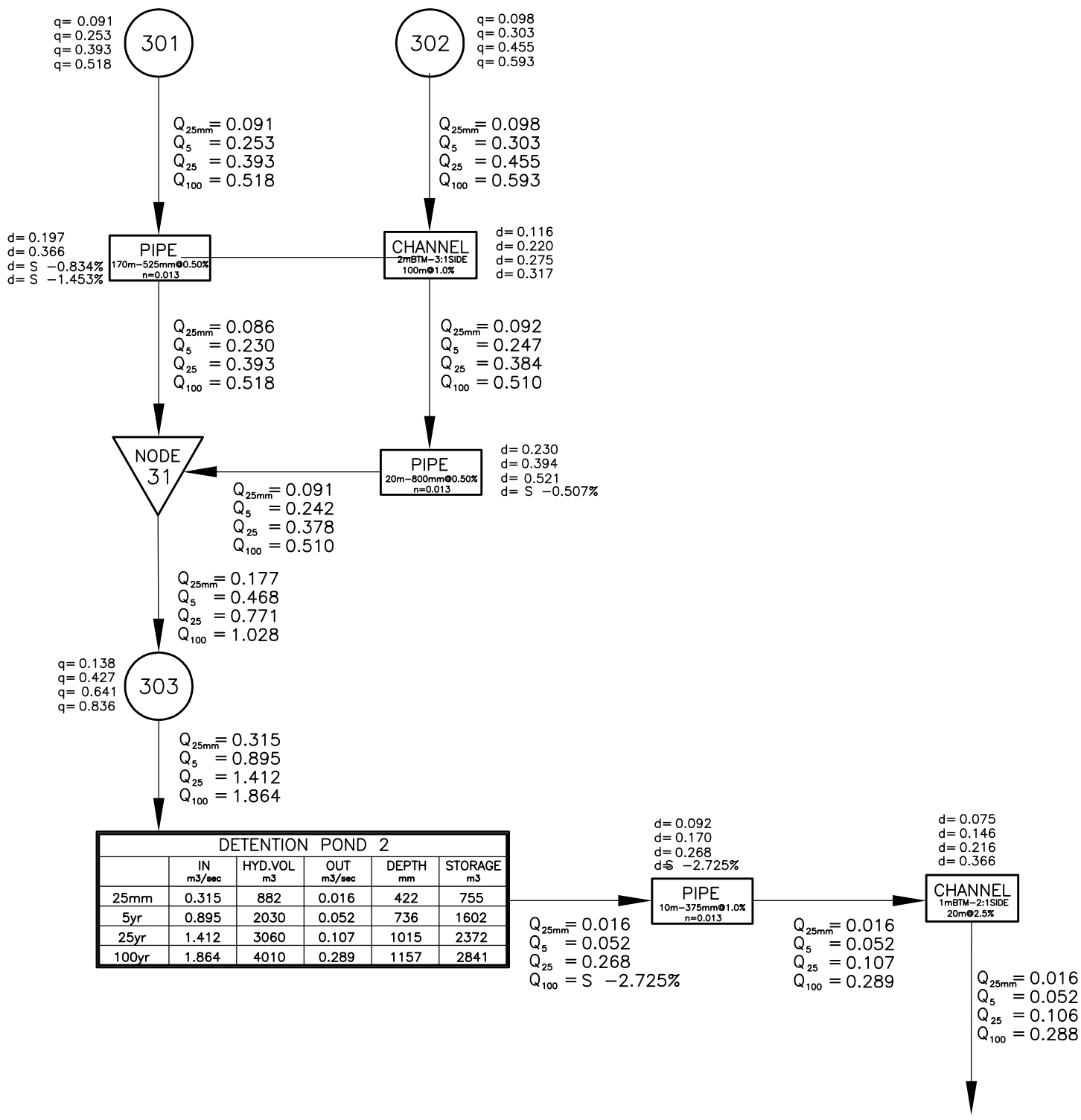
DETENTION POND 2					
	IN m3/sec	HYD.VOL m3	OUT m3/sec	DEPTH mm	STORAGE m3
25mm	1.956	7450	0.062	554	6647
5yr	5.741	18200	0.659	1004	13056
25yr	8.384	18400	0.919	1498	21082
100yr	10.782	28800	2.386	1843	27172



AECOM

FIGURE 9

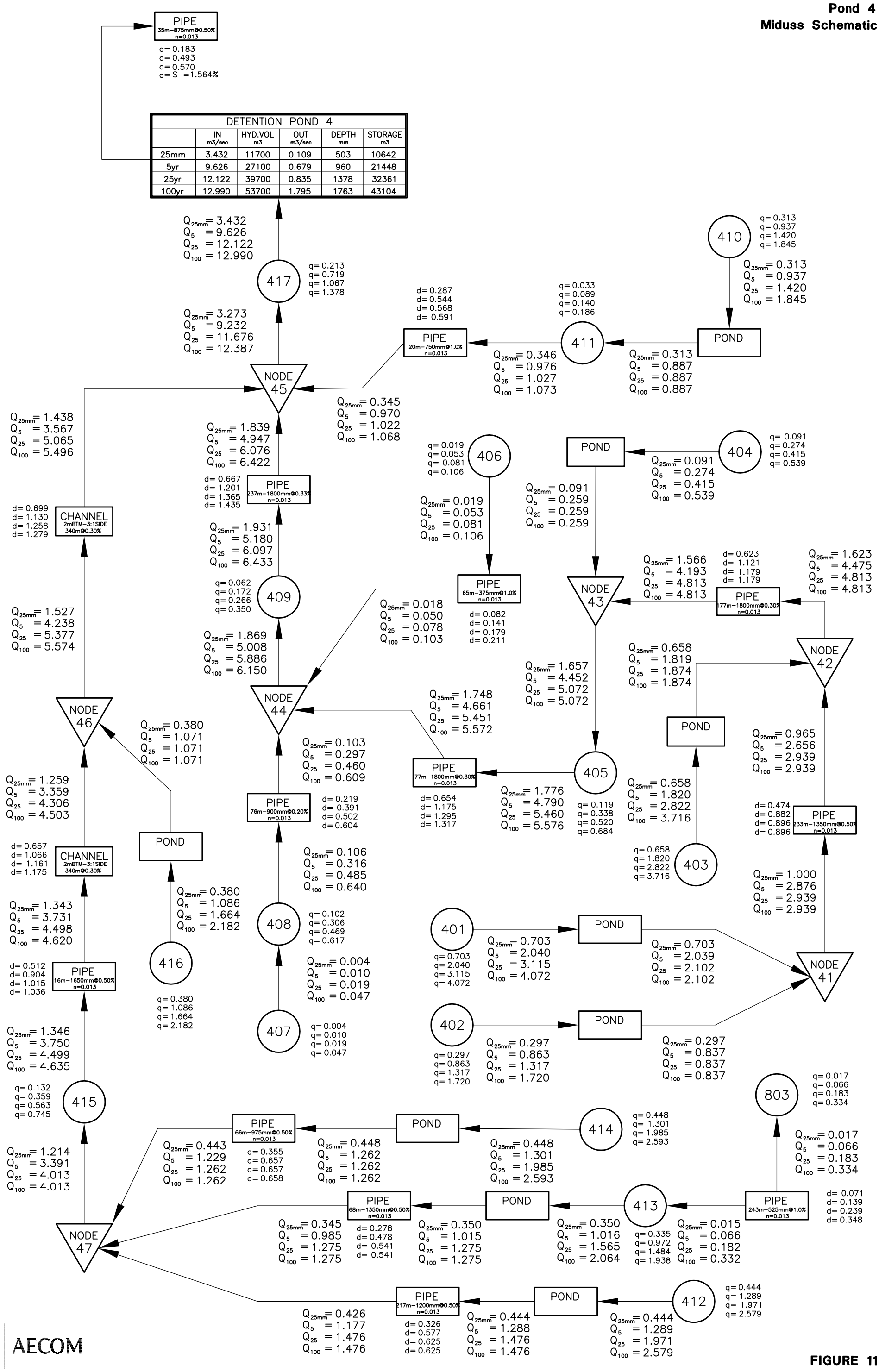
Hanlon Creek Business Park
Pond 3
Miduss Schematic



AECOM

FIGURE 10

Hanlon Creek Business Park
Pond 4
Miduss Schematic



AECOM

FIGURE 11

APPENDIX A
Miduss Input

Hanlon Creek Business Park

Rainfall Parameters

Region of Waterloo/City of Guelph Standards (January, 2004)

return period	**2**	**5**	**10**	**25**	**50**	**100**
a (mm)	743	1593	2221	3158	3886	4688
b	6	11	12	15	16	17
c	0.7989	0.8789	0.9080	0.9355	0.9495	0.9624
r	0.375	0.375	0.375	0.375	0.375	0.375
duration (min)	240	240	240	240	240	240
total depth (mm)		49.6		70.8		89.9

MIDUSS SETUP	**Quality**	**2-100**
Storm duration (min)	180	720
Hydrograph Length (min)	720	2880
Timestep (min)	10	10
Storm Type	25mm	Chicago

Impervious

n	0.015
CN (AMC II)	98
Ia/s	0.1

Predevelopment

Area	A	Total catchment area in hectares
Length	L	Average Distance from remote part of drainage area to internal watercourse Typically 100m to 400m
Gradient	G	Average slope of catchment along length above Typically 0% to 4%
Imp %	%	Percentage of drainage area surfaced with asphalt, compacted granular or roof Typically 0% to 5%
Miduss 'n'	n	Roughness Coefficient Typically 0.30 to 0.35
CN (AMC II)	CN	US Soil Conservation Curve Number for pervious portions of drainage area Typically 61 to 78 for pasture and cropland, Soil Type B-C -Use 70 Wetlands - Use 50 (MTO Drainage Manual)
Ia/s	0.1	Initial Abstraction Use Miduss Default

Postdevelopment

Area	A	Total catchment area in hectares
Length	L	Average Distance from remote part of drainage area to internal watercourse Typically 90m
Gradient	G	Average slope of catchment along length above Typically 1%
Imp %	%	Percentage of drainage area surfaced with asphalt, compacted granular or roof Typically 85% for Business Park
n	n	Roughness Coefficient Typically 0.30 t0 0.35
CN (AMC II)	CN	US Soil Conservation Curve Number for pervious portions of drainage area Typically 61 to 74 for maintained landscaped areas, Soil Type B-C -Use 65 Wetlands - Use 50 (MTO Drainage Manual)
Ia/s	0.1	Initial Abstraction Use Miduss Default

Channel Design

Base Width	W	Bottom Width of Channel Typically 2.0m minimum for rear lot swales, 0.6m for roadside ditches
Side Slope	horiz:vert	Slope of channel sidewalls Typically 3:1
Mannings 'n'	n	Mannings roughness coefficient Typically 0.040 to 0.080 for grass lined to cattail lined channels -Use 0.060
Depth	d	Overall Depth of Channel Varies from 0.6m to 2.0m

Culvert Design

Diameter	d	Sized by Miduss using Mannings Formula
Mannings 'n'	n	Roughness Coefficient 0.013 (Concrete Pipe with headwalls or Box culverts assumed) 0.024 (Corrugated Steel Pipes)

Rainfall Parameters
Obtained from City of Guelph Standards

Design Storm	**5yr**	**25yr**	**100yr**		**Quality**
a (mm)	1593	3158	4688	**Total Rain** (mm)	25
b	11	15	17	**Storm duration** (min)	180
c	0.8789	0.9355	0.9624	**Time to Peak** (min)	25
r	0.375	0.375	0.375	**Decay Factor**	6
duration (min)	240	240	240	**Storm Type**	Canadian 1Hr
total depth (mm)	49.6	70.8	89.9		

Miduss Setup Parameters

Storm duration(max) (min)	720
Hydrograph Length(max) (min)	1440
Timestep (min)	10
Storm Type	Chicago or Canadian 1hr

Impervious

n	0.015
CN (AMC II)	98
Ia/s	0.1

Predevelopment

Catchment	**100**
Area	44.97
Length	300
Gradient	1.0
Imp %	2
n	0.35
CN (AMC II)	70
Ia/s	0.1

Postdevelopment

Catchment	**101**	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**
Area	5.78	3.42	4.44	1.42	3.74	4.01	2.90	5.03	2.13
Length	90	90	90	90	90	75	90	90	90
Gradient	1	1.0	1.0	2.0	1.00	2.0	1.0	1.0	1.0
Imp %	85	85	85	85	85	85	85	65	85
n	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
CN (AMC II)	65	65	65	65	65	65	65	65	65
Ia/s	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Catchment	**110**	**111**	**112**	**113**
Area	5.14	3.22	1.39	2.35
Length	75	90	90	30
Gradient	2	1.0	2.0	2.0
Imp %	85	85	85	85
n	0.35	0.35	0.35	0.35
CN (AMC II)	65	65	65	65
Ia/s	0.1	0.1	0.1	0.1

Rainfall Parameters
Obtained from City of Guelph Standards

Design Storm	**5yr**	**25yr**	**100yr**		**Quality**
a (mm)	1593	3158	4688	**Total Rain** (mm)	25
b	11	15	17	**Storm duration** (min)	180
c	0.8789	0.9355	0.9624	**Time to Peak** (min)	25
r	0.375	0.375	0.375	**Decay Factor**	6
duration (min)	240	240	240	**Storm Type**	Canadian 1Hr
total depth (mm)	49.6	70.8	89.9		

Miduss Setup Parameters

Storm duration(max) (min)	720
Hydrograph Length(max) (min)	1440
Timestep (min)	10
Storm Type	Chicago or Canadian 1hr

Impervious

n	0.015
CN (AMC II)	98
Ia/s	0.1

Predevelopment

Catchment	**003**	**004**	**005**	**900**	**200**
Area	4.86	5.08	2.43	13.50	32.35
Length	300	200	100	100	100
Gradient	2.0	3.0	2.0	1.0	1.0
Imp %	2	2	2	2	2
n	0.35	0.35	0.35	0.35	0.35
CN (AMC II)	70	70	70	70	70
Ia/s	0.1	0.1	0.1	0.1	0.1

Postdevelopment

Catchment	**903**	**902**	**901**
Area	19.4	4.8	8.7
Length	90	100	100
Gradient	2.00	1.0	1.0
Imp %	45	2	2
n	0.35	0.35	0.35
CN (AMC II)	65	70	70
Ia/s	0.1	0.1	0.1

Catchment	**201**	**202**	**203**	**204**	**205**	**206**	**207**	**208**
Area	0.64	1.83	6.78	0.87	0.54	0.49	1.61	1.21
Length	50	75	75	75	30	75	50	75
Gradient	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5
Imp %	85	75	85	75	85	75	85	75
n	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
CN (AMC II)	65	65	65	65	65	65	65	65
Ia/s	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Catchment	**209**	**210**	**211**	**212**	**213**	**214**	**215**
Area	1.63	0.56	0.49	2.42	7.96	3.27	2.05
Length	90	75	75	90	75	75	30
Gradient	1.0	0.5	0.5	1.0	1.0	1.0	2.0
Imp %	85	75	75	85	85	85	85
n	0.35	0.35	0.35	0.35	0.35	0.35	0.35
CN (AMC II)	65	65	65	65	65	65	65
Ia/s	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Rainfall Parameters
Obtained from City of Guelph Standards

Design Storm	**5yr**	**25yr**	**100yr**		**Quality**
a (mm)	1593	3158	4688	**Total Rain** (mm)	25
b	11	15	17	**Storm duration** (min)	180
c	0.8789	0.9355	0.9624	**Time to Peak** (min)	25
r	0.375	0.375	0.375	**Decay Factor**	6
duration (min)	240	240	240	**Storm Type**	Canadian 1Hr
total depth (mm)	49.6	70.8	89.9		

Miduss Setup Parameters

Storm duration(max) (min)	720
Hydrograph Length(max) (min)	1440
Timestep (min)	10
Storm Type	Chicago or Canadian 1hr

Impervious

n	0.015
CN (AMC II)	98
Ia/s	0.1

Predevelopment

Catchment	**300**
Area	5.65
Length	120
Gradient	1.0
Imp %	9
n	0.35
CN (AMC II)	70
Ia/s	0.1

Postdevelopment

Catchment	**301**	**302**	**303**
Area	1.89	1.56	2.20
Length	20	45	45
Gradient	1.0	1.0	1.0
Imp %	65	85	85
n	0.35	0.35	0.35
CN (AMC II)	65	65	65
Ia/s	0.1	0.1	0.1

Rainfall Parameters
Obtained from City of Guelph Standards

Design Storm	**5yr**	**25yr**	**100yr**		**Quality**
a (mm)	1593	3158	4688	**Total Rain** (mm)	25
b	11	15	17	**Storm duration** (min)	180
c	0.8789	0.9355	0.9624	**Time to Peak** (min)	25
r	0.375	0.375	0.375	**Decay Factor**	6
duration (min)	240	240	240	**Storm Type**	Canadian 1Hr
total depth (mm)	49.6	70.8	89.9		

Miduss Setup Parameters

Storm duration(max) (min)	720
Hydrograph Length(max) (min)	1440
Timestep (min)	10
Storm Type	Chicago or Canadian 1hr

Impervious

n	0.015
CN (AMC II)	98
Ia/s	0.1

Predevelopment

Catchment	**803**	**400**
Area	4.44	75.42
Length	100	300
Gradient	2.0	2.0
Imp %	2	2
n	0.35	0.35
CN (AMC II)	70	70
Ia/s	0.1	0.1

Postdevelopment

Catchment	**803**	**401**	**402**	**403**	**404**	**405**	**406**	**407**	**408**	**409**
Area	4.44	11.68	4.65	10.41	1.44	2.12	0.33	2.45	3.41	1.10
Length	100	90	90	90	75	75	75	90	75	75
Gradient	2.0	2.0	2.0	1.0	2.0	1.0	1.0	1.0	2.0	0.8
Imp %	5	80	85	85	85	75	75	2	40	75
n	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
CN (AMC II)	70	70	65	65	65	65	65	50	65	65
Ia/s	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Catchment	**410**	**411**	**412**	**413**	**414**	**415**	**416**	**417**
Area	4.93	0.60	8.20	5.24	7.01	2.41	5.95	3.49
Length	75	75	90	90	90	75	100	30
Gradient	2.0	0.5	2.0	2.0	2.0	0.5	2.0	2.0
Imp %	85	75	72	85	85	75	85	85
n	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
CN (AMC II)	65	65	65	65	65	65	65	65
Ia/s	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

APPENDIX B
Pond Volume Calculations and Discharge Summary

Pond 1 Detention Facility

Depth (mm)	Contour (m)	Contour Area (sq.m)	Average Area (sq.m)	Average Depth (m)	Incremental Volume (cu.m)	**Total Volume (cu.m)**	180mm 0rifice	400mm Orifice	Relief Discharge	**Total Discharge (cms)**	Drawdown Time (hrs)	Comments
FOREBAY (Tanner Court)												
-1500	317.00	**428**				**-1006**						
			506	0.50	253							
-1000	317.50	**585**				**-753**						
			668	0.50	334							
-500	318.00	**751**				**-419**						
			839	0.50	419							
0	318.50	**927**				**0**						
FOREBAY (Conveyance Channel)												
-1500	317.00	**428**				**-1006**						
			506	0.50	253							
-1000	317.50	**585**				**-753**						
			668	0.50	334							
-500	318.00	**751**				**-419**						
			839	0.50	419							
0	318.50	**927**				**0**						
PERMANENT POOL												
-1500	317.00	**2416**				**-6668**						
			2720	0.50	1360							
-1000	317.50	**3024**				**-5308**						
			3348	0.50	1674							
-500	318.00	**3672**				**-3634**						
			7268	0.50	3634							
0	318.50	**10864**				**0**						
ACTIVE STORAGE												
0	318.50	**12719**				**0**	0.0000			**0.000**		Permanent Pool Surface
			12872	0.10	1287							
100	318.60	13026				**1287**	0.0320			**0.032**	22.3	
			13179	0.10	1318							
200	318.70	13333				**2605**	0.0390			**0.039**	32.7	
			13486	0.10	1349							
300	318.80	13639				**3954**	0.0450			**0.045**	41.6	
			13946	0.20	2789							
500	319.00	**14253**				**6743**	0.0550			**0.055**	57.1	Start Quality Overflow
			15227	0.50	7613							
1000	319.50	**16200**				**14356**	0.0000	0.352		**0.352**	67.5	
			16801	0.40	6720							
1400	319.90	17402				**21077**		0.416	0.000	**0.416**	72.3	Start Relief Overflow
			17552	0.10	1755							

1500	320.00	**17702**				**22832**	0.431	0.091	**0.522**	73.4	
			17853	0.10	1785						
1600	320.10	18004				**24617**	0.445	0.268	**0.713**	74.2	
			18154	0.10	1815						
1700	320.20	18305				**26432**	0.459	0.508	**0.967**	74.8	
			18456	0.10	1846						
1800	320.30	18607				**28278**	0.472	1.074	**1.546**	75.2	
			18758	0.10	1876						
1900	320.40	18908				**30154**	0.485	1.954	**2.439**	75.4	
			19059	0.10	1906						
2000	320.50	**19210**				**32060**	0.498	3.058	**3.556**	75.6	Top of Exterior Berm

Pond 2/Kortright Subdivision Detention Facility

Depth (mm)	Contour (m)	Contour Area (sq.m)	Average Area (sq.m)	Average Depth (m)	Incremental Volume (cu.m)	Total Volume (cu.m)	180mm 0rifice	600mm CSP Surcharge Capacity	Relief Discharge	Total Discharge (cms)	Drawdown Time (hrs)	Comments
FOREBAY (Kortright)												
-1500	317.00	**138**				**-463**						
			191	0.50	95							
-1000	317.50	**243**				**-368**						
			304	0.50	152							
-500	318.00	**364**				**-216**						
			432	0.50	216							
0	318.50	**499**				**0**						
FOREBAY (Downey Ditch)												
-1500	317.00	**454**				**-1106**						
			545	0.50	272							
-1000	317.50	**635**				**-834**						
			733	0.50	366							
-500	318.00	**830**				**-468**						
			935	0.50	468							
0	318.50	**1040**				**0**						
FOREBAY (Conveyance Channel)												
-1500	317.00	**339**				**-876**						
			417	0.50	208							
-1000	317.50	**494**				**-667**						
			579	0.50	290							
-500	318.00	**664**				**-378**						
			756	0.50	378							
0	318.50	**847**				**0**						
PERMANENT POOL												
-1500	317.00	**3009**				**-7870**						
			3459	0.50	1729							
-1000	317.50	**3908**				**-6141**						
			4376	0.50	2188							
-500	318.00	**4844**				**-3953**						
			7906	0.50	3953							
0	318.50	**5821**				**0**						
ACTIVE STORAGE												
0	318.50	**10967**				**0**	0.0000			**0.000**		Permanent Pool Surface
			11152	0.10	1115							
100	318.60	11336				**1115**	0.0390			**0.039**	7.9	
			11521	0.10	1152							
200	318.70	11705				**2267**	0.0450			**0.045**	15.1	

			11890	0.10	1189							
300	318.80	12074				**3456**	0.0500			**0.050**	21.7	
			12443	0.20	2489							
500	319.00	**12812**				**5945**	0.0600			**0.060**	33.2	
			13068	0.10	1307							
600	319.10	13325				**7252**	0.0640	0.000		**0.064**	38.9	Start Quality Overflow
			14350	0.40	5740							
1000	319.50	**15375**				**12992**	0.0000	0.658		**0.658**	41.3	
			15718	0.20	3144							
1200	319.70	16062				**16135**	0.0000	0.732		**0.732**	42.5	
			16234	0.10	1623							
1300	319.80	16405				**17759**	0.0000	0.766		**0.766**	43.1	
			16577	0.10	1658							
1400	319.90	16749				**19416**	0.0000	0.799	0.000	**0.799**	43.6	Start Relief Overflow
			16920	0.10	1692							
1500	320.00	**17092**				**21108**	0.0000	0.830	0.091	**0.921**	44.1	
			17254	0.10	1725							
1600	320.10	17416				**22834**		0.861	0.268	**1.129**	44.6	
			17578	0.10	1758							
1700	320.20	17740				**24591**		0.890	0.508	**1.398**	44.9	
			17903	0.10	1790							
1800	320.30	18065				**26382**		0.919	1.074	**1.993**	45.2	
			18227	0.10	1823							
1900	320.40	18389				**28204**		0.946	1.954	**2.900**	45.3	
			18551	0.10	1855							
2000	320.50	**18713**				**30060**		0.973	3.058	**4.031**	45.5	New Top of Exterior Berm

Appendix B
Volume Calculations and Discharge Summary
POND 3

Pond 3 Detention Facility

Depth (mm)	Contour (m)	Contour Area (sq.m)	Average Area (sq.m)	Average Depth (m)	Incremental Volume (cu.m)	**Total Volume (cu.m)**	100mm 0rifice	200mm Orifice	2.0m Relief Discharge	**Total Discharge (cms)**	Drawdown Time (hrs)	Comments
-1500	322.00	510				**-1348**						
			627	0.50	313							
-1000	322.50	743				**-1034**						
			884	0.50	442							
-500	323.00	1024				**-593**						
			1185	0.50	593							
0	323.50	1346				**0**	0.000	0.000	0.000	**0.000**		Permanent Water
			1440	0.10	144							
100	323.60	1533				**144**	0.010	0.000	0.000	**0.010**	8.0	
			1627	0.10	163							
200	323.70	1721				**307**	0.012	0.000	0.000	**0.012**	12.1	
			1815	0.10	181							
300	323.80	1908				**488**	0.014	0.000	0.000	**0.014**	16.0	
			2096	0.10	210							
400	323.90	2096				**698**	0.016	0.000	0.000	**0.016**	19.9	
			2628	0.10	263							
500	324.00	2283				**961**	0.017	0.000	0.000	**0.017**	24.3	Start Overflow to Quantity Outlet
			2722	0.50	1361							
1000	324.50	3161				**2322**	0.000	0.092	0.000	**0.092**	31.2	Start Emergency Overflow
			3251	0.10	325							
1100	324.60	3341				**2647**	0.000	0.096	0.091	**0.187**	31.9	
			3432	0.10	343							
1200	324.70	3522				**2990**	0.000	0.100	0.268	**0.368**	32.2	
			3612	0.10	361							
1300	324.80	3702				**3351**	0.000	0.104	0.508	**0.612**	32.4	
			3792	0.10	379							
1400	324.90	3883				**3730**	0.000	0.108	0.801	**0.909**	32.6	
			3973	0.10	397							
1500	325.00	4063				**4128**	0.000	0.111	1.151	**1.262**	32.7	Top of Exterior Berm

Pond 4 Detention Facility

Depth (mm)	Contour (m)	Contour Area (sq.m)	Average Area (sq.m)	Average Depth (m)	Incremental Volume (cu.m)	**Total Volume (cu.m)**	250mm 0rifice (cms)	550mm Oirifice (cms)	Relief Discharge	**Total Discharge (cms)**	Drawdown Time (hrs)	Comments
FOREBAY												
-2000	323.00	**1342**				**-3992**						
			1499	0.50	749							
-1500	323.50	**1655**				**-3243**						
			1821	0.50	910							
-1000	324.00	**1986**				**-2333**						
			2161	0.50	1081							
-500	324.50	**2336**				**-1252**						
			2505	0.50	1252							
0	325.00	**2673**				**0**						
PERMANENT POOL												
-2000	323.00	**7447**				**-20885**						
			7902	0.50	3951							
-1500	323.50	**8357**				**-16934**						
			8833	0.50	4417							
-1000	324.00	**9309**				**-12517**						
			9807	0.50	4903							
-500	324.50	**10304**				**-7614**						
			15228	0.50	7614							
0	325.00	**17477**				**0**						
ACTIVE STORAGE												
0	325.00	**20152**				**0**	0.0000			**0.000**		Permanent Pool Surface
			20354	0.10	2035							
100	325.10	20556				**2035**	0.0610			**0.061**	18.5	
			20757	0.10	2076							
200	325.20	20959				**4111**	0.0750			**0.075**	27.0	
			21161	0.10	2116							
300	325.30	21363				**6227**	0.0870			**0.087**	34.3	
			21766	0.20	4353							
500	325.50	**22170**				**10581**	0.1060	0.000		**0.106**	46.8	Start Quality Overflow
			23645	0.50	11823							
1000	326.00	**25120**				**22403**		0.729		**0.729**	54.7	
			26330	0.40	10532							
1400	326.40	27056				**32935**		0.841	0.000	**0.841**	58.4	Start Relief Overflow
			27548	0.10	2755							
1500	326.50	**27540**				**35690**		0.867	0.091	**0.958**	59.0	
			27790	0.10	2779							
1600	326.60	28040				**38469**		0.893	0.268	**1.161**	59.8	
			28291	0.10	2829							
1700	326.70	28541				**41298**		0.917	0.508	**1.425**	60.4	
			28791	0.10	2879							
1800	326.80	29041				**44177**		0.941	1.074	**2.015**	60.8	
			29291	0.10	2929							
1900	326.90	29542				**47106**		0.964	1.954	**2.918**	61.2	
			29792	0.10	2979							
2000	327.00	**30042**				**50085**		0.987	3.058	**4.045**	61.4	Top of Exterior Berm

APPENDIX C
MOE Quality Calculations

Hanlon Creek Business Park

MOE Quality Criteria

(Table 3.2 MOE Storm water Management Planning and Design Manual, March 2003)

Pond ID		1	
Contributing Area (Total)	(ha)	44.97	A
Contributing Area (Developed)	(ha)	43.63	
Impervious Percentage(Weighted Average-Developed Area)	(%)	85	
Protection Level		Enhanced	
SWMP Type		Hybrid	
Storage Required - Total	(m^3/ha)	195	
Storage Required - Permanent Pool	(m^3/ha)	155	Vp
Storage Required - Extended Detention	(m^3/ha)	40	Ve
Volume Required - Permanent Pool	(m^3)	6970	A*Vp
Volume Required - Extended Detention	(m^3)	1799	A*Ve
Volume Required - 25mm Design Storm Runoff	(m^3)	6880	

Pond Configuration

Pond ID		1	
Permanent pool Elevation	(m)	318.50	
Permanent Pool Volume - Tanner Forebay	(m^3)	1006	
Permanent Pool Volume - Conveyance Channel Forebay	(m^3)	1006	
Permanent Pool Volume - Main Cell	(m^3)	6668	
Total Permanent Pool Volume	(m^3)	8680	>6970 OK
Extended Detention Overflow Elevation	(m)	319.00	
Extended Detention Volume Available	(m^3)	6743	≈ 6880 OK
Top of Exterior Berm	(m)	320.50	

Extended Detention

MOE 40m3/ha Volume	(m)	1799	
Approx Elevation	(m)	318.64	
Volume Available at Detention Overflow	(m^3)	6743	
Quality Overflow Elevation	(m)	319.00	
Outlet Orifice Diameter	(mm)	180	>75 OK
Orifice Centreline Elevation	(m)	318.40	
Orifice Discharge at MOE 40m3/ha Volume (140mm depth)	(m^3/sec)	0.0350	
Orifice Discharge at Overflow Elevation (500mm depth)	(m^3/sec)	0.0550	
MOE Volume Drawdown Time (hrs)	(hrs)	26.5	>12 OK
Overflow Volume Drawdown Time	(hrs)	57.0	>24 OK

FOREBAY 1.1 - Tanner Court

Forebay Configuration

Approximate Length	(m)	53		
Approximate Width	(m)	18		
Overall Depth	(m)	1.5		
Average Forebay Bottom Width	(m)	9		
Length : Width Ratio		2.9:1	r	>2:1 OK
Percentage of Total Permanent Pool	(%)	7%		<33% OK

Required Settling Length

(recommended settling velocity of 0.0003m/sec to be used)

Qout	(m^3/sec)	0.055
Settling Velocity	(m/sec)	0.0003

Settling Distance Required	(m)	23.2	(rQ_p/V_s)^0.5	<53 OK

Required Dispersion Length (distance required to slow inlet velocity to 0.50m/sec)

Peak 5yr Pipe Inflow Rate	(m^3/sec)	2.301	Q	
Forebay Depth	(m)	1.5	d	
Desired Velocity at Forebay Berm	(m/sec)	0.5	V_f	
Distance Required	(m)	24.5	$D=8Q/dV_f$	<53 OK

Required Bottom Width (recommended bottom width = dispersion length/8)

Recommended Minimum Bottom Width	(m)	3.07	D/8	<9.0 OK

Average Velocity (average velocity through forebay should be less than 0.15m/sec)

Average End Area of Forebay	(m^2)	30.5		at extended det. elev
Peak 5yr Inflow Rate	(m^3/sec)	2.301	Q	
Average Peak Velocity through Facility	(m/sec)	0.08	V=Q/A	< 0.15 OK

Sediment Storage Capacity (maintenance cleanout period of 10 years suggested)

Impervious Percentage	(%)	85	
Annual Sediment Load	(m^3/ha/yr)	3.8	
Contributing Area	(ha)	18.8	Area 101-105
10 Year Storage Volume Required	(m^3)	714	<1006 OK

FOREBAY 1.2 - Conveyance Channel

Forebay Configuration

Approximate Length	(m)	53		
Approximate Width	(m)	18		
Overall Depth	(m)	1.5		
Average Forebay Bottom Width	(m)	9		
Length : Width Ratio		2.9:1	r	>2:1 OK
Percentage of Total Permanent Pool	(%)	7%		<33% OK

Required Settling Length (recommended settling velocity of 0.0003m/sec to be used)

Qout	(m^3/sec)	0.055		
Settling Velocity	(m/sec)	0.0003		
Settling Distance Required	(m)	23.2	(rQ_p/V_s)^0.5	<53 OK

Required Dispersion Length (distance required to slow inlet velocity to 0.50m/sec)

Peak 5yr Pipe Inflow Rate	(m^3/sec)	2.793	Q	
Forebay Depth	(m)	1.5	d	
Desired Velocity at Forebay Berm	(m/sec)	0.5	V_f	
Distance Required	(m)	29.8	$D=8Q/dV_f$	<53 OK

Required Bottom Width (recommended bottom width = dispersion length/8)

Recommended Minimum Bottom Width	(m)	3.72	D/8	<9 OK

Average Velocity (average velocity through forebay should be less than 0.15m/sec)

Average End Area of Facility	(m^2)	30.5		at extended det. elev
Peak 5yr Inflow Rate	(m^3/sec)	2.793	Q	
Average Peak Velocity through Facility	(m/sec)	0.09	V=Q/A	< 0.15 OK

Sediment Storage Capacity (maintenance cleanout period of 10 years suggested)

Impervious Percentage	(%)	85	
Annual Sediment Load	(m^3/ha/yr)	3.8	
Contributing Area	(ha)	26.17	Area 106-113
10 Year Storage Volume Required	(m^3)	994	<1006 OK

Hanlon Creek Business Park

MOE Quality Criteria

(Table 3.2 MOE Storm water Management Planning and Design Manual, March 2003)

Pond ID		2	
Contributing Area (Total)	(ha)	65.25	A
Contributing Area (Developed)	(ha)	51.75	
Impervious Percentage(Weighted Average-Developed Area)	(%)	70	
Protection Level		Enhanced	
SWMP Type		Hybrid	
Storage Required - Total	(m^3/ha)	175	
Storage Required - Permanent Pool	(m^3/ha)	135	Vp
Storage Required - Extended Detention	(m^3/ha)	40	Ve
Volume Required - Permanent Pool	(m^3)	8809	A*Vp
Volume Required - Extended Detention	(m^3)	2610	A*Ve
Volume Required - 25mm Design Storm Runoff	(m^3)	6647	

Pond Configuration

Pond ID		2	
Permanent pool Elevation	(m)	318.50	
Permanent Pool Volume - Kortright Forebay	(m^3)	463	
Permanent Pool Volume - Downey Forebay	(m^3)	1106	
Permanent Pool Volume - Conveyance Channel Forebay	(m^3)	876	
Permanent Pool Volume - Main Cell	(m^3)	7870	
Total Permanent Pool Volume	(m^3)	10315	>8809 OK
Extended Detention Overflow Elevation	(m)	319.10	
Extended Detention Volume Available	(m^3)	7252	>6647 OK
Top of Exterior Berm	(m)	320.50	

Extended Detention

MOE 40m3/ha Volume	(m)	2610	
Approx Elevation	(m)	318.72	
Volume Available at Detention Overflow	(m^3)	7252	
Overflow Elevation	(m)	319.10	
Outlet Orifice Diameter	(mm)	180	>75 OK
Orifice Centreline Elevation	(m)	318.30	
Orifice Discharge at MOE 40m3/ha Volume (220mm depth)	(m^3/sec)	0.0460	
Orifice Discharge at Overflow Elevation (600mm depth)	(m^3/sec)	0.0640	
MOE Volume Drawdown Time (hrs)	(hrs)	17.1	>12 OK
Overflow Volume Drawdown Time	(hrs)	38.9	>24 OK

FOREBAY 2.1 - Kortright

Forebay Configuration

Approximate Length	(m)	36		
Approximate Width	(m)	14		
Overall Depth	(m)	1.5		
Average Forebay Bottom Width	(m)	5		
Length : Width Ratio		2.6:1	r	>2:1 OK
Percentage of Total Permanent Pool	(%)	5%		<33% OK

Required Settling Length

(recommended settling velocity of 0.0003m/sec to be used)

Qout	(m^3/sec)	0.0620

Settling Velocity	(m/sec)	0.0003		
Settling Distance Required	(m)	23.1	(rQ_p/V_s)^0.5	<36 OK

Required Dispersion Length (distance required to slow inlet velocity to 0.50m/sec)

Peak 5yr Pipe Inflow Rate	(m^3/sec)	1.933	Q	
Forebay Depth	(m)	1.5	d	
Desired Velocity at Forebay Berm	(m/sec)	0.5	V_f	
Distance Required	(m)	20.6	$D=8Q/dV_f$	<36 OK

Required Bottom Width (recommended bottom width = dispersion length/8)

Recommended Minimum Bottom Width	(m)	2.58	D/8	<5.0 OK

Average Velocity (average velocity through forebay should be less than 0.15m/sec)

Average End Area of Facility	(m^2)	23.9		at extended det. elev
Peak 5yr Pipe Inflow Rate	(m^3/sec)	1.933	Q	
Average Peak Velocity through Facility	(m/sec)	0.08	V=Q/A	< 0.15 OK

Sediment Storage Capacity (maintenance cleanout period of 10 years suggested)

Impervious Percentage	(%)	45		
Annual Sediment Load	(m^3/ha/yr)	1.25		
Contributing Area	(ha)	19.4		
10 Year Storage Volume Required	(m^3)	243		<373 OK

FOREBAY 2.2 - Downey

Forebay Configuration

Approximate Length	(m)	60		
Approximate Width	(m)	18		
Overall Depth	(m)	1.5		
Average Forebay Bottom Width	(m)	9		
Length : Width Ratio		3.3:1	r	>2:1 OK
Percentage of Total Permanent Pool	(%)	9%		<33% OK

Required Settling Length (recommended settling velocity of 0.0003m/sec to be used)

Qout	(m^3/sec)	0.0620		
Settling Velocity	(m/sec)	0.0003		
Settling Distance Required	(m)	26.2	(rQ_p/V_s)^0.5	<60 OK

Required Dispersion Length (distance required to slow inlet velocity to 0.50m/sec)

Peak 5yr Pipe Inflow Rate	(m^3/sec)	2.321	Q	
Forebay Depth	(m)	1.5	d	
Desired Velocity at Forebay Berm	(m/sec)	0.5	V_f	
Distance Required	(m)	24.8	$D=8Q/dV_f$	<60 OK

Required Bottom Width (recommended bottom width = dispersion length/8)

Recommended Minimum Bottom Width	(m)	3.09	D/8	<9 OK

Average Velocity (average velocity through forebay should be less than 0.15m/sec)

Average End Area of Facility	(m^2)	32.2		at extended det. elev
Peak 5yr Pipe Inflow Rate	(m^3/sec)	2.321	Q	
Average Peak Velocity through Facility	(m/sec)	0.07	V=Q/A	< 0.15 OK

Sediment Storage Capacity (maintenance cleanout period of 10 years suggested)

Impervious Percentage	(%)	85		
Annual Sediment Load	(m^3/ha/yr)	3.8		
Contributing Area	(ha)	19.07		
10 Year Storage Volume Required	(m^3)	725		<1106 OK

FOREBAY 2.3 - Conveyance Channel

Forebay Configuration

Approximate Length	(m)	50		
Approximate Width	(m)	16		
Overall Depth	(m)	1.5		
Average Forebay Bottom Width	(m)	7		
Length : Width Ratio		3.1:1	r	>2:1 OK
Percentage of Total Permanent Pool	(%)	8%		<33% OK

Required Settling Length (recommended settling velocity of 0.0003m/sec to be used)

Qout	(m^3/sec)	0.0620		
Settling Velocity	(m/sec)	0.0003		
Settling Distance Required	(m)	25.4	(rQ_p/V_s)^0.5	<50 OK

Required Dispersion Length (distance required to slow inlet velocity to 0.50m/sec)

Peak 5yr Pipe Inflow Rate	(m^3/sec)	2.001	Q	
Forebay Depth	(m)	1.5	d	
Desired Velocity at Forebay Berm	(m/sec)	0.5	V_f	
Distance Required	(m)	21.3	$D=8Q/dV_f$	<50 OK

Required Bottom Width (recommended bottom width = dispersion length/8)

Recommended Minimum Bottom Width	(m)	2.67	D/8	<7 OK

Average Velocity (average velocity through forebay should be less than 0.15m/sec)

Average End Area of Facility	(m^2)	28.0		at extended det. elev
Peak 5yr Pipe Inflow Rate	(m^3/sec)	2.001	Q	
Average Peak Velocity through Facility	(m/sec)	0.07	V=Q/A	<0.15 OK

Sediment Storage Capacity (maintenance cleanout period of 10 years suggested)

Impervious Percentage	(%)	85		
Annual Sediment Load	(m^3/ha/yr)	3.8		
Contributing Area	(ha)	11.23		
10 Year Storage Volume Required	(m^3)	427		<876 OK

Hanlon Creek Business Park

MOE Quality Criteria

(Table 3.2 MOE Storm water Management Planning and Design Manual, March 2003)

Pond ID		2	
Contributing Area	(ha)	5.65	A
Impervious Percentage	(%)	85	
Protection Level		Enhanced	
SWMP Type		Wet Pond	
Storage Required - Total	(m^3/ha)	250	
Storage Required - Permanent Pool	(m^3/ha)	210	Vp
Storage Required - Extended Detention	(m^3/ha)	40	Ve
Volume Required - Permanent Pool	(m^3)	1187	A*Vp
Volume Required - Extended Detention	(m^3)	226	A*Ve
Volume Required - 25mm Design Storm Runoff	(m^3)	755	

Pond Configuration

Pond ID		3	
Permanent pool Elevation	(m)	323.50	
Permanent Pool Volume - Main Cell	(m^3)	1348	>1187 OK
Extended Detention Overflow Elevation	(m)	324.00	
Extended Detention Volume Available	(m^3)	961	> 755 OK
Top of Exterior Berm	(m)	325.00	

Extended Detention

MOE 40m3/ha Volume	(m)	226	
Approx Elevation	(m)	323.65	
Volume Available at Detention Overflow	(m^3)	961	
Overflow Elevation	(m)	324.00	
Outlet Orifice Diameter	(mm)	100	>75 OK
Orifice Centreline Elevation	(m)	323.40	
Orifice Discharge at MOE 40m3/ha Volume (150mm depth)	(m^3/sec)	0.0110	
Orifice Discharge at Overflow Elevation (500mm depth)	(m^3/sec)	0.0170	
MOE Volume Drawdown Time (hrs)	(hrs)	10.0	
Overflow Volume Drawdown Time	(hrs)	24.3	>24 OK

FOREBAY - Not provided in favour of passive channel treatment due to small contributing area

Anticipated Sediment Storage Volume

(maintenance cleanout period of 10 years suggested)

Impervious Percentage	(%)	85
Annual Sediment Load	(m^3/ha/yr)	3.8
Contributing Area	(ha)	5.65
10 Year Storage Volume Required	(m^3)	215

Hanlon Creek Business Park

MOE Quality Criteria

(Table 3.2 MOE Storm water Management Planning and Design Manual, March 2003)

Pond ID		4		
Contributing Area (Total)	(ha)	79.86	A	
Contributing Area (Developed)	(ha)	72.97		
Impervious Percentage	(%)	85		
Protection Level		Enhanced		
SWMP Type		Hybrid		
Storage Required - Total	(m^3/ha)	195		
Storage Required - Permanent Pool	(m^3/ha)	155	Vp	
Storage Required - Extended Detention	(m^3/ha)	40	Ve	
Volume Required - Permanent Pool	(m^3)	12378	A*Vp	
Volume Required - Extended Detention	(m^3)	3194	A*Ve	
Volume Required - 25mm Design Storm Runoff	(m^3)	10642		

Pond Configuration

Pond ID		4		
Permanent pool Elevation	(m)	325.00		
Permanent Pool Volume - Forebay	(m^3)	3992		
Permanent Pool Volume - Main Cell	(m^3)	20885		
Total Permanent Pool Volume	(m^3)	24877	V	>12378 OK
Extended Detention Overflow Elevation	(m)	325.50		
Extended Detention Volume Available	(m^3)	10581		≈10642 OK
Top of Exterior Berm	(m)	327.00		

Extended Detention

MOE 40m3/ha Volume	(m)	3194		
Approx Elevation	(m)	325.16		
Volume Available at Detention Overflow	(m^3)	10581		
Overflow Elevation	(m)	325.50		
Outlet Orifice Diameter	(mm)	250		>75 OK
Orifice Centreline Elevation	(m)	324.90		
Orifice Discharge at MOE 40m3/ha Volume (160mm depth)	(m^3/sec)	0.069		
Orifice Discharge at Overflow Elevation (500mm depth)	(m^3/sec)	0.106		
MOE Volume Drawdown Time (hrs)	(hrs)	23.5		>12 OK
Overflow Volume Drawdown Time	(hrs)	46.8		>24 OK

FOREBAY 4.1

Forebay Configuration

Approximate Length	(m)	105	L	
Approximate Width	(m)	32		
Overall Depth	(m)	2		
Average Forebay Bottom Width	(m)	23		
Length : Width Ratio		3.3:1	r	>2:1 OK
Percentage of Total Permanent Pool	(%)	13%		<33% OK

Required Settling Length

(recommended settling velocity of 0.0003m/sec to be used)

Qout	(m^3/sec)	0.1090		
Settling Velocity	(m/sec)	0.0003		
Settling Distance Required	(m)	34.5	(rQ_p/V_s)^0.5	<105 OK

Required Dispersion Length (distance required to slow inlet velocity to 0.50m/sec)

Peak 5yr Inflow Rate	(m^3/sec)	9.626	Q	
Forebay Depth	(m)	2	d	
Desired Velocity at Forebay Berm	(m/sec)	0.5	V_f	
Distance Required	(m)	77.0	$D=8Q/dV_f$	<105 OK

Required Bottom Width (recommended bottom width = dispersion length/8)

Recommended Minimum Bottom Width	(m)	9.63	D/8	<23 OK

Average Velocity (average velocity through forebay should be less than 0.15m/sec)

Average End Area of Facility	(m^2)	70.0		at extended det. elev
Peak 5yr Inflow Rate	(m^3/sec)	9.626	Q	
Average Peak Velocity through Facility	(m/sec)	0.14	V=Q/A	<0.15 OK

Sediment Storage Capacity (maintenance cleanout period of 10 years suggested)

Impervious Percentage	(%)	85		
Annual Sediment Load	(m^3/ha/yr)	3.8		
Contributing Area (Developed)	(ha)	72.97		
10 Year Storage Volume Required	(m^3)	2773		<3992 OK

APPENDIX D
Miduss Output

Pond 1
Predevelopment
25mm Storm

```
        Output File (4.7) HCBP1PRE.25M opened 2007-10-25  13:04
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            4     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
       25.000     Total depth of Rain
      180.000     Duration ó  720 min
       25.000     Time to peak  (min)
        6.000     Decay factor  K
                 25.000 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .015     Manning "n"
       98.000     SCS Curve No or C
         .100     Ia/S Coefficient
         .518     Initial Abstraction
 4      CATCHMENT
      100.000     ID No.ó 99999
       44.980     Area in hectares
      300.000     Length (PERV) metres
        1.000     Gradient (%)
        2.000     Per cent Impervious
      300.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       70.000     SCS Curve No or C
         .100     Ia/S Coefficient
       10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .058       .000       .000       .000 c.m/s
               .064       .804       .079     C perv/imperv/total
15      ADD RUNOFF
               .058       .058       .000       .000 c.m/s
20      MANUAL
```

Pond 1
Predevelopment
5 Year Storm

```
        Output File (4.7) HCBP1PRE.005 opened 2007-10-25  13:06
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    1593.000     Coefficient  a
      11.000     Constant  b    (min)
        .879     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                49.564 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     100.000     ID No.ó 99999
      44.980     Area in hectares
     300.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     300.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .336       .000       .000       .000 c.m/s
               .204       .893       .218     C perv/imperv/total
15      ADD RUNOFF
               .336       .336       .000       .000 c.m/s
20      MANUAL
```

Pond 1
Predevelopment
25 Year Storm

```
        Output File (4.7) HCBP1PRE.025 opened 2007-10-25  13:08
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    3158.000     Coefficient  a
      15.000     Constant  b    (min)
        .936     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                70.814 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     100.000     ID No.ó 99999
      44.980     Area in hectares
     300.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     300.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .969       .000       .000       .000 c.m/s
               .300       .916       .313     C perv/imperv/total
15      ADD RUNOFF
               .969       .969       .000       .000 c.m/s
20      MANUAL
```

Pond 1
Predevelopment
100 Year Storm

```
        Output File (4.7) HCBP1PRE.100 opened 2007-10-25  13:10
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    4688.000     Coefficient  a
      17.000     Constant  b    (min)
        .962     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                89.886 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     100.000     ID No.ó 99999
      44.980     Area in hectares
     300.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     300.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.794       .000       .000       .000 c.m/s
               .369       .925       .381     C perv/imperv/total
15      ADD RUNOFF
              1.794      1.794       .000       .000 c.m/s
20      MANUAL
```

Pond 1
Post Development
25mm Storm

```
        Output File (4.7) HCBP1PST.25M opened 2007-10-25  11:44
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            4     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
       25.000     Total depth of Rain
      180.000     Duration ó  720 min
       25.000     Time to peak  (min)
        6.000     Decay factor  K
                 25.000 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .015     Manning "n"
       98.000     SCS Curve No or C
         .100     Ia/S Coefficient
         .518     Initial Abstraction
 4      CATCHMENT
      101.000     ID No.ó 99999
        5.780     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .365       .000       .000       .000 c.m/s
               .035       .800       .685     C perv/imperv/total
15      ADD RUNOFF
               .365       .365       .000       .000 c.m/s
11      CHANNEL
        1.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.000     O/a Depth in metres
         .600     Select Grade in %
        Depth          =      .362 metres
        Velocity       =      .484 m/sec
        Flow Capacity  =     3.450 c.m/s
        Critical depth =      .195 metres
 9      ROUTE
      240.000     Conduit Length
         .439     Supply X-factor <.5
      371.968     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
               .365       .365       .330       .000 c.m/s
16      NEXT LINK
               .365       .330       .330       .000 c.m/s
 4      CATCHMENT
      102.000     ID No.ó 99999
        3.420     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .216       .330       .330       .000 c.m/s
               .035       .800       .685     C perv/imperv/total
15      ADD RUNOFF
```

```
              .216       .502       .330       .000 c.m/s
 11     CHANNEL
        1.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.000     O/a Depth in metres
         .600     Select Grade in %
        Depth          =      .421 metres
        Velocity       =      .526 m/sec
        Flow Capacity  =     3.450 c.m/s
        Critical depth =      .233 metres
  9     ROUTE
      250.000     Conduit Length
         .433     Supply X-factor <.5
      356.192     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
              .216       .502       .497       .000 c.m/s
 16     NEXT LINK
              .216       .497       .497       .000 c.m/s
  4     CATCHMENT
      103.000     ID No.ó 99999
        4.440     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .281       .497       .497       .000 c.m/s
              .035       .800       .685     C perv/imperv/total
 15     ADD RUNOFF
              .281       .713       .497       .000 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .600     Select Grade in %
        Depth          =      .400 metres
        Velocity       =      .556 m/sec
        Flow Capacity  =    11.284 c.m/s
        Critical depth =      .210 metres
  9     ROUTE
      360.000     Conduit Length
         .452     Supply X-factor <.5
      485.382     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
              .281       .713       .679       .000 c.m/s
 16     NEXT LINK
              .281       .679       .679       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.200     Diameter in metres
         .750     Select Grade in %
        Depth         =      .365 metres
        Velocity      =     2.333 m/sec
        Pipe Capacity =     3.376 c.m/s
        Critical depth=      .443 metres
  9     ROUTE
       40.000     Conduit Length
```

```
         .172     Supply X-factor <.5
       12.861     Supply K-lag (sec)
         .500     Beta weighting factor
       20.690     Routing timestep
           1      No. of sub-reaches
              .281       .679       .678       .000 c.m/s
17     COMBINE
     11     Junction Node No.
              .281       .679       .678       .678 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
     104.000     ID No.ó 99999
       1.420     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
      65.000     SCS Curve No or C
         .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .091       .000       .678       .678 c.m/s
              .035       .785       .672     C perv/imperv/total
15     ADD RUNOFF
              .091       .091       .678       .678 c.m/s
 8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .450     Diameter in metres
         .900     Select Grade in %
       Depth         =      .180 metres
       Velocity      =     1.533 m/sec
       Pipe Capacity =      .270 c.m/s
       Critical depth=      .209 metres
 9     ROUTE
      10.000     Conduit Length
         .000     Supply X-factor <.5
        4.893     Supply K-lag (sec)
         .528     Beta weighting factor
      10.345     Routing timestep
           1      No. of sub-reaches
              .091       .091       .091       .678 c.m/s
17     COMBINE
     11     Junction Node No.
              .091       .091       .091       .722 c.m/s
18     CONFLUENCE
     11     Junction Node No.
              .091       .722       .091       .000 c.m/s
 4     CATCHMENT
     105.000     ID No.ó 99999
       3.740     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
      65.000     SCS Curve No or C
         .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .236       .722       .091       .000 c.m/s
              .035       .800       .685     C perv/imperv/total
15     ADD RUNOFF
              .236       .879       .091       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
```

```
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .400     Select Grade in %
        Depth          =      .495 metres
        Velocity       =      .510 m/sec
        Flow Capacity  =     9.213 c.m/s
        Critical depth =      .238 metres
 9      ROUTE
      265.000     Conduit Length
         .381     Supply X-factor <.5
      389.954     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
              .236       .879       .863       .000 c.m/s
16      NEXT LINK
              .236       .863       .863       .000 c.m/s
 8      PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.350     Diameter in metres
         .500     Select Grade in %
        Depth         =      .439 metres
        Velocity      =     2.137 m/sec
        Pipe Capacity =     3.774 c.m/s
        Critical depth=      .484 metres
 9      ROUTE
       65.000     Conduit Length
         .132     Supply X-factor <.5
       22.813     Supply K-lag (sec)
         .500     Beta weighting factor
       37.500     Routing timestep
            1     No. of sub-reaches
              .236       .863       .859       .000 c.m/s
17      COMBINE
      12     Junction Node No.
              .236       .863       .859       .859 c.m/s
14      START
       1     1=Zero; 2=Define
 4      CATCHMENT
      106.000     ID No.ó 99999
        4.010     Area in hectares
       75.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .256       .000       .859       .859 c.m/s
              .035       .785       .672     C perv/imperv/total
15      ADD RUNOFF
              .256       .256       .859       .859 c.m/s
 8      PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .675     Diameter in metres
         .900     Select Grade in %
        Depth         =      .263 metres
        Velocity      =     1.985 m/sec
        Pipe Capacity =      .797 c.m/s
        Critical depth=      .317 metres
 9      ROUTE
      110.000     Conduit Length
         .426     Supply X-factor <.5
```

```
       41.561     Supply K-lag (sec)
         .500     Beta weighting factor
       46.154     Routing timestep
            1     No. of sub-reaches
              .256       .256       .252       .859 c.m/s
17     COMBINE
     13     Junction Node No.
              .256       .256       .252       .252 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     107.000     ID No.ó 99999
       2.900     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .183       .000       .252       .252 c.m/s
              .035       .800       .685     C perv/imperv/total
15     ADD RUNOFF
              .183       .183       .252       .252 c.m/s
11     CHANNEL
       1.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.000     O/a Depth in metres
        .600     Select Grade in %
       Depth          =      .257 metres
       Velocity       =      .402 m/sec
       Flow Capacity  =     3.450 c.m/s
       Critical depth =      .131 metres
 9     ROUTE
     260.000     Conduit Length
        .458     Supply X-factor <.5
     485.417     Supply K-lag (sec)
        .500     Beta weighting factor
     300.000     Routing timestep
            1     No. of sub-reaches
              .183       .183       .169       .252 c.m/s
16     NEXT LINK
              .183       .169       .169       .252 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .024     Pipe Manning's 'n'
        .900     Diameter in metres
       1.000     Select Grade in %
       Depth         =      .253 metres
       Velocity      =     1.153 m/sec
       Pipe Capacity =      .981 c.m/s
       Critical depth=      .235 metres
 9     ROUTE
      20.000     Conduit Length
        .164     Supply X-factor <.5
      13.008     Supply K-lag (sec)
        .500     Beta weighting factor
      21.429     Routing timestep
            1     No. of sub-reaches
              .183       .169       .168       .252 c.m/s
17     COMBINE
     13     Junction Node No.
              .183       .169       .168       .381 c.m/s
18     CONFLUENCE
     13     Junction Node No.
              .183       .381       .168       .000 c.m/s
```

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 4     CATCHMENT
     108.000     ID No.ó 99999
       5.030     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      65.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      15.568     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .243       .381       .168       .000 c.m/s
             .024       .800       .529     C perv/imperv/total
15     ADD RUNOFF
             .243       .624       .168       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .600     Select Grade in %
       Depth          =      .373 metres
       Velocity       =      .536 m/sec
       Flow Capacity  =    11.284 c.m/s
       Critical depth =      .194 metres
 9     ROUTE
     295.000     Conduit Length
        .445     Supply X-factor <.5
     413.157     Supply K-lag (sec)
        .500     Beta weighting factor
     300.000     Routing timestep
          1      No. of sub-reaches
             .243       .624       .588       .000 c.m/s
16     NEXT LINK
             .243       .588       .588       .000 c.m/s
 4     CATCHMENT
     109.000     ID No.ó 99999
       2.130     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .135       .588       .588       .000 c.m/s
             .035       .800       .685     C perv/imperv/total
15     ADD RUNOFF
             .135       .691       .588       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .600     Select Grade in %
       Depth          =      .394 metres
       Velocity       =      .551 m/sec
       Flow Capacity  =    11.284 c.m/s
       Critical depth =      .206 metres
 9     ROUTE
     250.000     Conduit Length
        .431     Supply X-factor <.5
     340.036     Supply K-lag (sec)
        .500     Beta weighting factor
```

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      300.000     Routing timestep
            1     No. of sub-reaches
              .135       .691       .636       .000 c.m/s
 16     NEXT LINK
              .135       .636       .636       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.200     Diameter in metres
         .500     Select Grade in %
        Depth         =      .392 metres
        Velocity      =     1.981 m/sec
        Pipe Capacity =     2.757 c.m/s
        Critical depth=      .428 metres
  9     ROUTE
       50.000     Conduit Length
         .072     Supply X-factor <.5
       18.934     Supply K-lag (sec)
         .500     Beta weighting factor
       33.333     Routing timestep
            1     No. of sub-reaches
              .135       .636       .636       .000 c.m/s
 17     COMBINE
      14     Junction Node No.
              .135       .636       .636       .636 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      110.000     ID No.ó 99999
        5.140     Area in hectares
       75.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .326       .000       .636       .636 c.m/s
              .035       .786       .673     C perv/imperv/total
 15     ADD RUNOFF
              .326       .326       .636       .636 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .750     Diameter in metres
        1.000     Select Grade in %
        Depth         =      .278 metres
        Velocity      =     2.189 m/sec
        Pipe Capacity =     1.113 c.m/s
        Critical depth=      .348 metres
  9     ROUTE
      180.000     Conduit Length
         .457     Supply X-factor <.5
       61.675     Supply K-lag (sec)
         .500     Beta weighting factor
       66.667     Routing timestep
            1     No. of sub-reaches
              .326       .326       .319       .636 c.m/s
 17     COMBINE
      14     Junction Node No.
              .326       .326       .319       .868 c.m/s
 18     CONFLUENCE
      14     Junction Node No.
              .326       .868       .319       .000 c.m/s
  4     CATCHMENT
      111.000     ID No.ó 99999
        3.220     Area in hectares
```

```
        90.000     Length (PERV) metres
         1.000     Gradient (%)
        85.000     Per cent Impervious
        90.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .350     Manning "n"
        65.000     SCS Curve No or C
          .100     Ia/S Coefficient
        13.677     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .203       .868       .319       .000 c.m/s
              .035       .800       .685     C perv/imperv/total
 15     ADD RUNOFF
              .203      1.025       .319       .000 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .400     Select Grade in %
        Depth          =      .535 metres
        Velocity       =      .532 m/sec
        Flow Capacity  =     9.213 c.m/s
        Critical depth =      .261 metres
  9     ROUTE
       140.000     Conduit Length
          .260     Supply X-factor <.5
       197.512     Supply K-lag (sec)
          .500     Beta weighting factor
       200.000     Routing timestep
            1      No. of sub-reaches
              .203      1.025       .989       .000 c.m/s
 17     COMBINE
       15     Junction Node No.
              .203      1.025       .989       .989 c.m/s
 14     START
        1     1=Zero; 2=Define
  4     CATCHMENT
       112.000     ID No.ó 99999
         1.390     Area in hectares
        90.000     Length (PERV) metres
         2.000     Gradient (%)
        85.000     Per cent Impervious
        90.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .350     Manning "n"
        65.000     SCS Curve No or C
          .100     Ia/S Coefficient
        13.677     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .089       .000       .989       .989 c.m/s
              .035       .785       .672     C perv/imperv/total
 15     ADD RUNOFF
              .089       .089       .989       .989 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .450     Diameter in metres
        1.500     Select Grade in %
        Depth          =      .155 metres
        Velocity       =     1.834 m/sec
        Pipe Capacity =      .349 c.m/s
        Critical depth=      .207 metres
  9     ROUTE
       130.000     Conduit Length
          .478     Supply X-factor <.5
        53.166     Supply K-lag (sec)
          .500     Beta weighting factor
        54.545     Routing timestep
```

```
            1     No. of sub-reaches
              .089       .089       .087       .989 c.m/s
 17     COMBINE
     15     Junction Node No.
              .089       .089       .087      1.053 c.m/s
 18     CONFLUENCE
     15     Junction Node No.
              .089      1.053       .087       .000 c.m/s
 11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .400     Select Grade in %
       Depth          =      .542 metres
       Velocity       =      .536 m/sec
       Flow Capacity  =     9.213 c.m/s
       Critical depth =      .265 metres
  9     ROUTE
     140.000     Conduit Length
        .257     Supply X-factor <.5
     196.055     Supply K-lag (sec)
        .500     Beta weighting factor
     200.000     Routing timestep
            1     No. of sub-reaches
              .089      1.053      1.013       .000 c.m/s
 16     NEXT LINK
              .089      1.013      1.013       .000 c.m/s
  8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .024     Pipe Manning's 'n'
       1.750     Diameter in metres
        .500     Select Grade in %
       Depth         =      .594 metres
       Velocity      =     1.408 m/sec
       Pipe Capacity =     4.084 c.m/s
       Critical depth=      .488 metres
  9     ROUTE
      20.000     Conduit Length
        .000     Supply X-factor <.5
      10.652     Supply K-lag (sec)
        .781     Beta weighting factor
      42.857     Routing timestep
            1     No. of sub-reaches
              .089      1.013      1.013       .000 c.m/s
 17     COMBINE
     12     Junction Node No.
              .089      1.013      1.013      1.872 c.m/s
 18     CONFLUENCE
     12     Junction Node No.
              .089      1.872      1.013       .000 c.m/s
  4     CATCHMENT
     113.000     ID No.ó 99999
       2.350     Area in hectares
      30.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .150      1.872      1.013       .000 c.m/s
              .035       .785       .672     C perv/imperv/total
 15     ADD RUNOFF
              .150      1.945      1.013       .000 c.m/s
 10     POND
     13 Depth - Discharge - Volume sets
```

```
          .000        .000          .0
          .100       .0320      1287.0
          .200       .0390      2605.0
          .300       .0450      3954.0
          .500       .0550      6743.0
         1.000        .352     14356.0
         1.400        .416     21077.0
         1.500        .522     22832.0
         1.600        .713     24617.0
         1.700        .967     26432.0
         1.800       1.546     28278.0
         1.900       2.439     30154.0
         2.000       3.556     32060.0
       Peak Outflow    =      .060 c.m/s
       Maximum Depth   =      .509 metres
       Maximum Storage =     6880. c.m
              .150      1.945       .060       .000 c.m/s
 16    NEXT LINK
              .150       .060       .060       .000 c.m/s
  8    PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .600     Diameter in metres
        .500     Select Grade in %
       Depth         =      .151 metres
       Velocity      =     1.080 m/sec
       Pipe Capacity =      .434 c.m/s
       Critical depth=      .155 metres
  9    ROUTE
      30.000     Conduit Length
        .238     Supply X-factor <.5
      20.826     Supply K-lag (sec)
        .500     Beta weighting factor
      31.579     Routing timestep
           1     No. of sub-reaches
              .150       .060       .060       .000 c.m/s
 16    NEXT LINK
              .150       .060       .060       .000 c.m/s
 11    CHANNEL
       2.000     Base Width     =
       2.000     Left  bank slope  1:
       2.000     Right bank slope  1:
        .060     Manning's "n"
       1.000     O/a Depth in metres
        .300     Select Grade in %
       Depth          =      .127 metres
       Velocity       =      .211 m/sec
       Flow Capacity  =     2.649 c.m/s
       Critical depth =      .045 metres
  9    ROUTE
      70.000     Conduit Length
        .323     Supply X-factor <.5
     248.571     Supply K-lag (sec)
        .500     Beta weighting factor
     300.000     Routing timestep
           1     No. of sub-reaches
              .150       .060       .060       .000 c.m/s
 16    NEXT LINK
              .150       .060       .060       .000 c.m/s
 22    FILE HYDROGRAPH
      2     1=READ: 2=WRITE
      8     490AREA1     .25M    is Filename
      3     1=Overland: 2=Inflow: 3=Outflow: 4=Temp'ary
            Area 1 - 25mm Discharge
              .150       .060       .060       .000 c.m/s
 20    MANUAL
```

Pond 1
Post Development
5 Year Storm

```
        Output File (4.7) HCBP1PST.005 opened 2007-10-25  11:38
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    1593.000     Coefficient  a
      11.000     Constant  b    (min)
        .879     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                49.564 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     101.000     ID No.ó 99999
       5.780     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.010       .000       .000       .000 c.m/s
               .150       .882       .772     C perv/imperv/total
15      ADD RUNOFF
              1.010      1.010       .000       .000 c.m/s
11      CHANNEL
        1.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.000     O/a Depth in metres
         .600     Select Grade in %
        Depth          =      .583 metres
        Velocity       =      .631 m/sec
        Flow Capacity  =     3.450 c.m/s
        Critical depth =      .338 metres
 9      ROUTE
     240.000     Conduit Length
        .408     Supply X-factor <.5
     285.235     Supply K-lag (sec)
        .500     Beta weighting factor
     300.000     Routing timestep
            1     No. of sub-reaches
              1.010      1.010       .954       .000 c.m/s
16      NEXT LINK
              1.010       .954       .954       .000 c.m/s
 4      CATCHMENT
     102.000     ID No.ó 99999
       3.420     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .598       .954       .954       .000 c.m/s
               .150       .882       .772     C perv/imperv/total
```

```
 15     ADD RUNOFF
               .598      1.489       .954       .000 c.m/s
 11     CHANNEL
        1.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.000     O/a Depth in metres
         .600     Select Grade in %
        Depth          =      .694 metres
        Velocity       =      .697 m/sec
        Flow Capacity  =     3.450 c.m/s
        Critical depth =      .412 metres
  9     ROUTE
      250.000     Conduit Length
         .397     Supply X-factor <.5
      269.036     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
               .598      1.489      1.376       .000 c.m/s
 16     NEXT LINK
               .598      1.376      1.376       .000 c.m/s
  4     CATCHMENT
      103.000     ID No.ó 99999
        4.440     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .776      1.376      1.376       .000 c.m/s
               .150       .882       .772     C perv/imperv/total
 15     ADD RUNOFF
               .776      2.071      1.376       .000 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .600     Select Grade in %
        Depth          =      .685 metres
        Velocity       =      .745 m/sec
        Flow Capacity  =    11.284 c.m/s
        Critical depth =      .390 metres
  9     ROUTE
      360.000     Conduit Length
         .423     Supply X-factor <.5
      362.248     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
               .776      2.071      1.784       .000 c.m/s
 16     NEXT LINK
               .776      1.784      1.784       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.200     Diameter in metres
         .750     Select Grade in %
        Depth         =      .620 metres
        Velocity      =     3.026 m/sec
        Pipe Capacity =     3.376 c.m/s
        Critical depth=      .733 metres
```

```
 9     ROUTE
      40.000     Conduit Length
        .000     Supply X-factor <.5
       9.913     Supply K-lag (sec)
        .553     Beta weighting factor
      21.429     Routing timestep
          1      No. of sub-reaches
              .776      1.784      1.783       .000 c.m/s
17     COMBINE
     11     Junction Node No.
              .776      1.784      1.783      1.783 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     104.000     ID No.ó 99999
       1.420     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .263       .000      1.783      1.783 c.m/s
              .150       .882       .772     C perv/imperv/total
15     ADD RUNOFF
              .263       .263      1.783      1.783 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .450     Diameter in metres
        .900     Select Grade in %
       Depth         =      .359 metres
       Velocity      =     1.938 m/sec
       Pipe Capacity =      .270 c.m/s
       Critical depth=      .360 metres
 9     ROUTE
      10.000     Conduit Length
        .000     Supply X-factor <.5
       3.870     Supply K-lag (sec)
        .788     Beta weighting factor
      17.647     Routing timestep
          1      No. of sub-reaches
              .263       .263       .262      1.783 c.m/s
17     COMBINE
     11     Junction Node No.
              .263       .263       .262      1.957 c.m/s
18     CONFLUENCE
     11     Junction Node No.
              .263      1.957       .262       .000 c.m/s
 4     CATCHMENT
     105.000     ID No.ó 99999
       3.740     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .654      1.957       .262       .000 c.m/s
              .150       .882       .772     C perv/imperv/total
15     ADD RUNOFF
              .654      2.542       .262       .000 c.m/s
```

```
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .400     Select Grade in %
        Depth          =      .833 metres
        Velocity       =      .678 m/sec
        Flow Capacity  =     9.213 c.m/s
        Critical depth =      .438 metres
  9     ROUTE
      265.000     Conduit Length
         .314     Supply X-factor <.5
      293.162     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
               .654      2.542      2.305       .000 c.m/s
 16     NEXT LINK
               .654      2.305      2.305       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.350     Diameter in metres
         .500     Select Grade in %
        Depth         =      .762 metres
        Velocity      =     2.767 m/sec
        Pipe Capacity =     3.774 c.m/s
        Critical depth=      .809 metres
  9     ROUTE
       65.000     Conduit Length
         .000     Supply X-factor <.5
       17.616     Supply K-lag (sec)
         .596     Beta weighting factor
       42.857     Routing timestep
            1     No. of sub-reaches
               .654      2.305      2.301       .000 c.m/s
 17     COMBINE
      12     Junction Node No.
               .654      2.305      2.301      2.301 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      106.000     ID No.ó 99999
        4.010     Area in hectares
       75.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .744       .000      2.301      2.301 c.m/s
               .150       .882       .772     C perv/imperv/total
 15     ADD RUNOFF
               .744       .744      2.301      2.301 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .675     Diameter in metres
         .900     Select Grade in %
        Depth         =      .517 metres
        Velocity      =     2.532 m/sec
        Pipe Capacity =      .797 c.m/s
        Critical depth=      .547 metres
```

```
 9     ROUTE
     110.000     Conduit Length
        .274     Supply X-factor <.5
      32.583     Supply K-lag (sec)
        .500     Beta weighting factor
      46.154     Routing timestep
          1      No. of sub-reaches
              .744       .744       .713      2.301 c.m/s
17     COMBINE
     13     Junction Node No.
              .744       .744       .713       .713 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     107.000     ID No.ó 99999
       2.900     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .507       .000       .713       .713 c.m/s
              .150       .882       .772     C perv/imperv/total
15     ADD RUNOFF
              .507       .507       .713       .713 c.m/s
11     CHANNEL
       1.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.000     O/a Depth in metres
        .600     Select Grade in %
       Depth          =      .423 metres
       Velocity       =      .528 m/sec
       Flow Capacity  =     3.450 c.m/s
       Critical depth =      .234 metres
 9     ROUTE
     260.000     Conduit Length
        .436     Supply X-factor <.5
     369.566     Supply K-lag (sec)
        .500     Beta weighting factor
     300.000     Routing timestep
          1      No. of sub-reaches
              .507       .507       .479       .713 c.m/s
16     NEXT LINK
              .507       .479       .479       .713 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .024     Pipe Manning's 'n'
        .900     Diameter in metres
       1.000     Select Grade in %
       Depth         =      .444 metres
       Velocity      =     1.532 m/sec
       Pipe Capacity =      .981 c.m/s
       Critical depth=      .403 metres
 9     ROUTE
      20.000     Conduit Length
        .000     Supply X-factor <.5
       9.788     Supply K-lag (sec)
        .566     Beta weighting factor
      22.222     Routing timestep
          1      No. of sub-reaches
              .507       .479       .476       .713 c.m/s
17     COMBINE
     13     Junction Node No.
              .507       .479       .476      1.062 c.m/s
```

```
18     CONFLUENCE
     13     Junction Node No.
              .507      1.062       .476       .000 c.m/s
 4     CATCHMENT
     108.000     ID No.ó 99999
       5.030     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      65.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      15.568     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .673      1.062       .476       .000 c.m/s
              .137       .882       .621     C perv/imperv/total
15     ADD RUNOFF
              .673      1.665       .476       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .600     Select Grade in %
       Depth          =      .616 metres
       Velocity       =      .703 m/sec
       Flow Capacity  =    11.284 c.m/s
       Critical depth =      .345 metres
 9     ROUTE
     295.000     Conduit Length
        .414     Supply X-factor <.5
     314.715     Supply K-lag (sec)
        .500     Beta weighting factor
     300.000     Routing timestep
          1      No. of sub-reaches
              .673      1.665      1.652       .000 c.m/s
16     NEXT LINK
              .673      1.652      1.652       .000 c.m/s
 4     CATCHMENT
     109.000     ID No.ó 99999
       2.130     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .372      1.652      1.652       .000 c.m/s
              .150       .882       .772     C perv/imperv/total
15     ADD RUNOFF
              .372      1.985      1.652       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .600     Select Grade in %
       Depth          =      .671 metres
       Velocity       =      .737 m/sec
       Flow Capacity  =    11.284 c.m/s
       Critical depth =      .381 metres
```

```
 9     ROUTE
     250.000     Conduit Length
        .391     Supply X-factor <.5
     254.413     Supply K-lag (sec)
        .500     Beta weighting factor
     300.000     Routing timestep
          1      No. of sub-reaches
              .372      1.985      1.722       .000 c.m/s
16     NEXT LINK
              .372      1.722      1.722       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.200     Diameter in metres
        .500     Select Grade in %
       Depth         =      .687 metres
       Velocity      =     2.572 m/sec
       Pipe Capacity =     2.757 c.m/s
       Critical depth=      .720 metres
 9     ROUTE
      50.000     Conduit Length
        .000     Supply X-factor <.5
      14.581     Supply K-lag (sec)
        .643     Beta weighting factor
      37.500     Routing timestep
          1      No. of sub-reaches
              .372      1.722      1.703       .000 c.m/s
17     COMBINE
     14     Junction Node No.
              .372      1.722      1.703      1.703 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     110.000     ID No.ó 99999
       5.140     Area in hectares
      75.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .977       .000      1.703      1.703 c.m/s
              .150       .883       .773     C perv/imperv/total
15     ADD RUNOFF
              .977       .977      1.703      1.703 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .750     Diameter in metres
       1.000     Select Grade in %
       Depth         =      .545 metres
       Velocity      =     2.843 m/sec
       Pipe Capacity =     1.113 c.m/s
       Critical depth=      .610 metres
 9     ROUTE
     180.000     Conduit Length
        .377     Supply X-factor <.5
      47.483     Supply K-lag (sec)
        .500     Beta weighting factor
      54.545     Routing timestep
          1      No. of sub-reaches
              .977       .977       .918      1.703 c.m/s
17     COMBINE
     14     Junction Node No.
              .977       .977       .918      2.442 c.m/s
```

```
18     CONFLUENCE
     14     Junction Node No.
              .977      2.442       .918       .000 c.m/s
 4     CATCHMENT
     111.000     ID No.ó 99999
       3.220     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .563      2.442       .918       .000 c.m/s
              .150       .882       .772     C perv/imperv/total
15     ADD RUNOFF
              .563      2.946       .918       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .400     Select Grade in %
       Depth          =      .893 metres
       Velocity       =      .705 m/sec
       Flow Capacity  =     9.213 c.m/s
       Critical depth =      .475 metres
 9     ROUTE
     140.000     Conduit Length
        .125     Supply X-factor <.5
     149.016     Supply K-lag (sec)
        .500     Beta weighting factor
     200.000     Routing timestep
          1      No. of sub-reaches
              .563      2.946      2.807       .000 c.m/s
17     COMBINE
     15     Junction Node No.
              .563      2.946      2.807      2.807 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     112.000     ID No.ó 99999
       1.390     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .258       .000      2.807      2.807 c.m/s
              .150       .882       .772     C perv/imperv/total
15     ADD RUNOFF
              .258       .258      2.807      2.807 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .450     Diameter in metres
       1.500     Select Grade in %
       Depth          =      .288 metres
       Velocity       =     2.402 m/sec
       Pipe Capacity =      .349 c.m/s
       Critical depth=      .357 metres
```

```
 9     ROUTE
     130.000     Conduit Length
        .449     Supply X-factor <.5
      40.590     Supply K-lag (sec)
        .500     Beta weighting factor
      42.857     Routing timestep
          1      No. of sub-reaches
             .258       .258       .245      2.807 c.m/s
17     COMBINE
     15     Junction Node No.
             .258       .258       .245      3.011 c.m/s
18     CONFLUENCE
     15     Junction Node No.
             .258      3.011       .245       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .400     Select Grade in %
       Depth          =      .903 metres
       Velocity       =      .709 m/sec
       Flow Capacity  =     9.213 c.m/s
       Critical depth =      .480 metres
 9     ROUTE
     140.000     Conduit Length
        .122     Supply X-factor <.5
     148.170     Supply K-lag (sec)
        .500     Beta weighting factor
     200.000     Routing timestep
          1      No. of sub-reaches
             .258      3.011      2.807       .000 c.m/s
16     NEXT LINK
             .258      2.807      2.807       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .024     Pipe Manning's 'n'
       1.750     Diameter in metres
        .500     Select Grade in %
       Depth         =     1.066 metres
       Velocity      =     1.829 m/sec
       Pipe Capacity =     4.084 c.m/s
       Critical depth=      .828 metres
 9     ROUTE
      20.000     Conduit Length
        .000     Supply X-factor <.5
       8.201     Supply K-lag (sec)
        .915     Beta weighting factor
      60.000     Routing timestep
          1      No. of sub-reaches
             .258      2.807      2.793       .000 c.m/s
17     COMBINE
     12     Junction Node No.
             .258      2.807      2.793      4.924 c.m/s
18     CONFLUENCE
     12     Junction Node No.
             .258      4.924      2.793       .000 c.m/s
 4     CATCHMENT
     113.000     ID No.ó 99999
       2.350     Area in hectares
      30.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
```

```
              .436      4.924      2.793       .000 c.m/s
              .150       .882       .772     C perv/imperv/total
 15     ADD RUNOFF
              .436      5.263      2.793       .000 c.m/s
 10     POND
      13 Depth - Discharge - Volume sets
          .000        .000          .0
          .100       .0320      1287.0
          .200       .0390      2605.0
          .300       .0450      3954.0
          .500       .0550      6743.0
         1.000        .352     14356.0
         1.400        .416     21077.0
         1.500        .522     22832.0
         1.600        .713     24617.0
         1.700        .967     26432.0
         1.800       1.546     28278.0
         1.900       2.439     30154.0
         2.000       3.556     32060.0
        Peak Outflow    =      .337 c.m/s
        Maximum Depth   =      .974 metres
        Maximum Storage =    13963. c.m
              .436      5.263       .337       .000 c.m/s
 16     NEXT LINK
              .436       .337       .337       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .600     Diameter in metres
         .500     Select Grade in %
        Depth         =      .397 metres
        Velocity      =     1.696 m/sec
        Pipe Capacity =      .434 c.m/s
        Critical depth=      .379 metres
  9     ROUTE
       30.000     Conduit Length
         .000     Supply X-factor <.5
       13.265     Supply K-lag (sec)
         .661     Beta weighting factor
       37.500     Routing timestep
           1      No. of sub-reaches
              .436       .337       .337       .000 c.m/s
 16     NEXT LINK
              .436       .337       .337       .000 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        2.000     Left  bank slope  1:
        2.000     Right bank slope  1:
         .060     Manning's "n"
        1.000     O/a Depth in metres
         .300     Select Grade in %
        Depth          =      .339 metres
        Velocity       =      .370 m/sec
        Flow Capacity  =     2.649 c.m/s
        Critical depth =      .136 metres
  9     ROUTE
       70.000     Conduit Length
         .051     Supply X-factor <.5
      141.752     Supply K-lag (sec)
         .500     Beta weighting factor
      200.000     Routing timestep
           1      No. of sub-reaches
              .436       .337       .337       .000 c.m/s
 16     NEXT LINK
              .436       .337       .337       .000 c.m/s
 22     FILE HYDROGRAPH
       2     1=READ: 2=WRITE
       8     490AREA1     .5YR    is Filename
       3     1=Overland: 2=Inflow: 3=Outflow: 4=Temp'ary
             Area 1 - 5Yr Discharge
              .436       .337       .337       .000 c.m/s
 20     MANUAL
```

Pond 1
Post Development
25 Year Storm

```
        Output File (4.7) HCBP1PST.025 opened 2007-10-25  11:51
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    3158.000     Coefficient  a
      15.000     Constant  b    (min)
        .936     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                70.814 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     101.000     ID No.ó 99999
       5.780     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.567       .000       .000       .000 c.m/s
               .237       .909       .808     C perv/imperv/total
15      ADD RUNOFF
              1.567      1.567       .000       .000 c.m/s
11      CHANNEL
        1.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.000     O/a Depth in metres
         .600     Select Grade in %
        Depth          =      .709 metres
        Velocity       =      .706 m/sec
        Flow Capacity  =     3.450 c.m/s
        Critical depth =      .423 metres
 9      ROUTE
     240.000     Conduit Length
        .391     Supply X-factor <.5
     254.932     Supply K-lag (sec)
        .500     Beta weighting factor
     300.000     Routing timestep
            1     No. of sub-reaches
              1.567      1.567      1.392       .000 c.m/s
16      NEXT LINK
              1.567      1.392      1.392       .000 c.m/s
 4      CATCHMENT
     102.000     ID No.ó 99999
       3.420     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .927      1.392      1.392       .000 c.m/s
               .237       .909       .808     C perv/imperv/total
```

```
 15     ADD RUNOFF
              .927      2.139      1.392       .000 c.m/s
 11     CHANNEL
        1.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.000     O/a Depth in metres
         .600     Select Grade in %
        Depth          =      .814 metres
        Velocity       =      .764 m/sec
        Flow Capacity  =     3.450 c.m/s
        Critical depth =      .494 metres
  9     ROUTE
      250.000     Conduit Length
         .382     Supply X-factor <.5
      245.341     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
              .927      2.139      2.084       .000 c.m/s
 16     NEXT LINK
              .927      2.084      2.084       .000 c.m/s
  4     CATCHMENT
      103.000     ID No.ó 99999
        4.440     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             1.204      2.084      2.084       .000 c.m/s
              .237       .909       .808     C perv/imperv/total
 15     ADD RUNOFF
             1.204      3.054      2.084       .000 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .600     Select Grade in %
        Depth          =      .826 metres
        Velocity       =      .826 m/sec
        Flow Capacity  =    11.284 c.m/s
        Critical depth =      .484 metres
  9     ROUTE
      360.000     Conduit Length
         .409     Supply X-factor <.5
      326.850     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
             1.204      3.054      2.798       .000 c.m/s
 16     NEXT LINK
             1.204      2.798      2.798       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.200     Diameter in metres
         .750     Select Grade in %
        Depth         =      .833 metres
        Velocity      =     3.337 m/sec
        Pipe Capacity =     3.376 c.m/s
        Critical depth=      .921 metres
```

```
 9     ROUTE
      40.000     Conduit Length
        .000     Supply X-factor <.5
       8.989     Supply K-lag (sec)
        .686     Beta weighting factor
      27.273     Routing timestep
          1      No. of sub-reaches
            1.204      2.798      2.779       .000 c.m/s
17     COMBINE
     11     Junction Node No.
            1.204      2.798      2.779      2.779 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     104.000     ID No.ó 99999
       1.420     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .402       .000      2.779      2.779 c.m/s
              .237       .913       .812     C perv/imperv/total
15     ADD RUNOFF
              .402       .402      2.779      2.779 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .450     Diameter in metres
        .900     Select Grade in %
       Surcharged HGL=     1.989 %
       Velocity      =     2.528 m/sec
       Pipe Capacity =      .270 c.m/s
       Critical depth=      .420 metres
 9     ROUTE
      10.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
              .402       .402       .402      2.779 c.m/s
17     COMBINE
     11     Junction Node No.
              .402       .402       .402      3.075 c.m/s
18     CONFLUENCE
     11     Junction Node No.
              .402      3.075       .402       .000 c.m/s
 4     CATCHMENT
     105.000     ID No.ó 99999
       3.740     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            1.014      3.075       .402       .000 c.m/s
              .237       .909       .808     C perv/imperv/total
15     ADD RUNOFF
            1.014      3.892       .402       .000 c.m/s
```

```
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .400     Select Grade in %
        Depth          =     1.017 metres
        Velocity       =      .758 m/sec
        Flow Capacity  =     9.213 c.m/s
        Critical depth =      .552 metres
  9     ROUTE
      265.000     Conduit Length
         .278     Supply X-factor <.5
      262.357     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
              1.014      3.892      3.486       .000 c.m/s
 16     NEXT LINK
              1.014      3.486      3.486       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.350     Diameter in metres
         .500     Select Grade in %
        Depth         =     1.024 metres
        Velocity      =     2.993 m/sec
        Pipe Capacity =     3.774 c.m/s
        Critical depth=      .999 metres
  9     ROUTE
       65.000     Conduit Length
         .000     Supply X-factor <.5
       16.289     Supply K-lag (sec)
         .731     Beta weighting factor
       60.000     Routing timestep
            1     No. of sub-reaches
              1.014      3.486      3.446       .000 c.m/s
 17     COMBINE
      12     Junction Node No.
              1.014      3.486      3.446      3.446 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      106.000     ID No.ó 99999
        4.010     Area in hectares
       75.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.136       .000      3.446      3.446 c.m/s
               .238       .913       .812     C perv/imperv/total
 15     ADD RUNOFF
              1.136      1.136      3.446      3.446 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .675     Diameter in metres
         .900     Select Grade in %
        Surcharged HGL=     1.826 %
        Velocity      =     3.174 m/sec
        Pipe Capacity =      .797 c.m/s
        Critical depth=      .634 metres
```

```
 9     ROUTE
     110.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
             1.136      1.136      1.136      3.446 c.m/s
17     COMBINE
     13     Junction Node No.
             1.136      1.136      1.136      1.136 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     107.000     ID No.ó 99999
       2.900     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .786       .000      1.136      1.136 c.m/s
              .237       .909       .808     C perv/imperv/total
15     ADD RUNOFF
              .786       .786      1.136      1.136 c.m/s
11     CHANNEL
       1.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.000     O/a Depth in metres
        .600     Select Grade in %
       Depth          =      .519 metres
       Velocity       =      .592 m/sec
       Flow Capacity  =     3.450 c.m/s
       Critical depth =      .296 metres
 9     ROUTE
     260.000     Conduit Length
        .423     Supply X-factor <.5
     329.666     Supply K-lag (sec)
        .500     Beta weighting factor
     300.000     Routing timestep
           1     No. of sub-reaches
              .786       .786       .712      1.136 c.m/s
16     NEXT LINK
              .786       .712       .712      1.136 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .024     Pipe Manning's 'n'
        .900     Diameter in metres
       1.000     Select Grade in %
       Depth         =      .569 metres
       Velocity      =     1.681 m/sec
       Pipe Capacity =      .981 c.m/s
       Critical depth=      .495 metres
 9     ROUTE
      20.000     Conduit Length
        .000     Supply X-factor <.5
       8.926     Supply K-lag (sec)
        .663     Beta weighting factor
      26.087     Routing timestep
           1     No. of sub-reaches
              .786       .712       .708      1.136 c.m/s
17     COMBINE
     13     Junction Node No.
              .786       .712       .708      1.602 c.m/s
```

```
18     CONFLUENCE
     13     Junction Node No.
              .786      1.602       .708       .000 c.m/s
 4     CATCHMENT
     108.000     ID No.ó 99999
       5.030     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      65.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      15.568     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            1.045      1.602       .708       .000 c.m/s
              .224       .909       .669     C perv/imperv/total
15     ADD RUNOFF
            1.045      2.647       .708       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .600     Select Grade in %
       Depth          =      .771 metres
       Velocity       =      .796 m/sec
       Flow Capacity  =    11.284 c.m/s
       Critical depth =      .447 metres
 9     ROUTE
     295.000     Conduit Length
        .396     Supply X-factor <.5
     278.119     Supply K-lag (sec)
        .500     Beta weighting factor
     300.000     Routing timestep
          1      No. of sub-reaches
            1.045      2.647      2.507       .000 c.m/s
16     NEXT LINK
            1.045      2.507      2.507       .000 c.m/s
 4     CATCHMENT
     109.000     ID No.ó 99999
       2.130     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .577      2.507      2.507       .000 c.m/s
              .237       .909       .808     C perv/imperv/total
15     ADD RUNOFF
              .577      2.972      2.507       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .600     Select Grade in %
       Depth          =      .815 metres
       Velocity       =      .820 m/sec
       Flow Capacity  =    11.284 c.m/s
       Critical depth =      .477 metres
```

```
 9     ROUTE
     250.000     Conduit Length
        .371     Supply X-factor <.5
     228.595     Supply K-lag (sec)
        .500     Beta weighting factor
     200.000     Routing timestep
          1      No. of sub-reaches
              .577      2.972      2.724       .000 c.m/s
16     NEXT LINK
              .577      2.724      2.724       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.200     Diameter in metres
        .500     Select Grade in %
       Depth         =      .971 metres
       Velocity      =     2.779 m/sec
       Pipe Capacity =     2.757 c.m/s
       Critical depth=      .909 metres
 9     ROUTE
      50.000     Conduit Length
        .000     Supply X-factor <.5
      13.494     Supply K-lag (sec)
        .792     Beta weighting factor
      60.000     Routing timestep
          1      No. of sub-reaches
              .577      2.724      2.701       .000 c.m/s
17     COMBINE
     14     Junction Node No.
              .577      2.724      2.701      2.701 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     110.000     ID No.ó 99999
       5.140     Area in hectares
      75.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             1.481       .000      2.701      2.701 c.m/s
              .238       .913       .812     C perv/imperv/total
15     ADD RUNOFF
             1.481      1.481      2.701      2.701 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .750     Diameter in metres
       1.000     Select Grade in %
       Surcharged HGL=     1.769 %
       Velocity      =     3.352 m/sec
       Pipe Capacity =     1.113 c.m/s
       Critical depth=      .705 metres
 9     ROUTE
     180.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
             1.481      1.481      1.481      2.701 c.m/s
17     COMBINE
     14     Junction Node No.
             1.481      1.481      1.481      3.739 c.m/s
```

```
18     CONFLUENCE
     14     Junction Node No.
             1.481      3.739      1.481       .000 c.m/s
 4     CATCHMENT
     111.000     ID No.ó 99999
       3.220     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .873      3.739      1.481       .000 c.m/s
              .237       .909       .808     C perv/imperv/total
15     ADD RUNOFF
              .873      4.443      1.481       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .400     Select Grade in %
       Depth          =     1.081 metres
       Velocity       =      .784 m/sec
       Flow Capacity  =     9.213 c.m/s
       Critical depth =      .592 metres
 9     ROUTE
     140.000     Conduit Length
        .058     Supply X-factor <.5
     133.943     Supply K-lag (sec)
        .500     Beta weighting factor
     200.000     Routing timestep
          1      No. of sub-reaches
              .873      4.443      4.346       .000 c.m/s
17     COMBINE
     15     Junction Node No.
              .873      4.443      4.346      4.346 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     112.000     ID No.ó 99999
       1.390     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .394       .000      4.346      4.346 c.m/s
              .237       .913       .812     C perv/imperv/total
15     ADD RUNOFF
              .394       .394      4.346      4.346 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .450     Diameter in metres
       1.500     Select Grade in %
       Surcharged HGL=     1.906 %
       Velocity      =     2.475 m/sec
       Pipe Capacity =      .349 c.m/s
       Critical depth=      .418 metres
```

```
 9     ROUTE
     130.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
              .394       .394       .394      4.346 c.m/s
17     COMBINE
     15     Junction Node No.
              .394       .394       .394      4.636 c.m/s
18     CONFLUENCE
     15     Junction Node No.
              .394      4.636       .394       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .400     Select Grade in %
       Depth          =     1.102 metres
       Velocity       =      .793 m/sec
       Flow Capacity  =     9.213 c.m/s
       Critical depth =      .606 metres
 9     ROUTE
     140.000     Conduit Length
        .050     Supply X-factor <.5
     132.478     Supply K-lag (sec)
        .500     Beta weighting factor
     200.000     Routing timestep
           1     No. of sub-reaches
              .394      4.636      4.442       .000 c.m/s
16     NEXT LINK
              .394      4.442      4.442       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .024     Pipe Manning's 'n'
       1.750     Diameter in metres
        .500     Select Grade in %
       Surcharged HGL=      .591 %
       Velocity      =     1.847 m/sec
       Pipe Capacity =     4.084 c.m/s
       Critical depth=     1.052 metres
 9     ROUTE
      20.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
              .394      4.442      4.442       .000 c.m/s
17     COMBINE
     12     Junction Node No.
              .394      4.442      4.442      7.888 c.m/s
18     CONFLUENCE
     12     Junction Node No.
              .394      7.888      4.442       .000 c.m/s
 4     CATCHMENT
     113.000     ID No.ó 99999
       2.350     Area in hectares
      30.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
```

```
              .667      7.888      4.442       .000 c.m/s
              .237       .913       .812     C perv/imperv/total
15     ADD RUNOFF
              .667      8.385      4.442       .000 c.m/s
10     POND
     13 Depth - Discharge - Volume sets
          .000        .000          .0
          .100       .0320      1287.0
          .200       .0390      2605.0
          .300       .0450      3954.0
          .500       .0550      6743.0
         1.000        .352     14356.0
         1.400        .416     21077.0
         1.500        .522     22832.0
         1.600        .713     24617.0
         1.700        .967     26432.0
         1.800       1.546     28278.0
         1.900       2.439     30154.0
         2.000       3.556     32060.0
       Peak Outflow    =      .438 c.m/s
       Maximum Depth   =     1.420 metres
       Maximum Storage =    21436. c.m
              .667      8.385       .438       .000 c.m/s
16     NEXT LINK
              .667       .438       .438       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .600     Diameter in metres
        .500     Select Grade in %
       Surcharged HGL=      .508 %
       Velocity      =     1.548 m/sec
       Pipe Capacity =      .434 c.m/s
       Critical depth=      .434 metres
 9     ROUTE
      30.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
              .667       .438       .438       .000 c.m/s
16     NEXT LINK
              .667       .438       .438       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       2.000     Left  bank slope  1:
       2.000     Right bank slope  1:
        .060     Manning's "n"
       1.000     O/a Depth in metres
        .300     Select Grade in %
       Depth          =      .392 metres
       Velocity       =      .401 m/sec
       Flow Capacity  =     2.649 c.m/s
       Critical depth =      .160 metres
 9     ROUTE
      70.000     Conduit Length
        .000     Supply X-factor <.5
     130.992     Supply K-lag (sec)
        .508     Beta weighting factor
     200.000     Routing timestep
          1      No. of sub-reaches
              .667       .438       .437       .000 c.m/s
16     NEXT LINK
              .667       .437       .437       .000 c.m/s
22     FILE HYDROGRAPH
      2     1=READ: 2=WRITE
      8     490AREA1     .25Y    is Filename
      3     1=Overland: 2=Inflow: 3=Outflow: 4=Temp'ary
            Area 1 - 5Yr Discharge
              .667       .437       .437       .000 c.m/s
20     MANUAL
```

Pond 1
Post Development
100 Year Storm

```
        Output File (4.7) HCBP1PST.100 opened 2007-10-25  11:52
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    4688.000     Coefficient  a
      17.000     Constant  b    (min)
        .962     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                89.886 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     101.000     ID No.ó 99999
       5.780     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              2.063       .000       .000       .000 c.m/s
               .303       .927       .834     C perv/imperv/total
15      ADD RUNOFF
              2.063      2.063       .000       .000 c.m/s
11      CHANNEL
        1.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
        .060     Manning's "n"
        1.000     O/a Depth in metres
        .600     Select Grade in %
        Depth          =      .801 metres
        Velocity       =      .757 m/sec
        Flow Capacity  =     3.450 c.m/s
        Critical depth =      .486 metres
 9      ROUTE
     240.000     Conduit Length
        .378     Supply X-factor <.5
     237.690     Supply K-lag (sec)
        .500     Beta weighting factor
     200.000     Routing timestep
            1     No. of sub-reaches
              2.063      2.063      1.783       .000 c.m/s
16      NEXT LINK
              2.063      1.783      1.783       .000 c.m/s
 4      CATCHMENT
     102.000     ID No.ó 99999
       3.420     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.221      1.783      1.783       .000 c.m/s
               .303       .927       .834     C perv/imperv/total
```

```
 15     ADD RUNOFF
              1.221      2.735      1.783       .000 c.m/s
 11     CHANNEL
        1.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.000     O/a Depth in metres
         .600     Select Grade in %
        Depth          =      .905 metres
        Velocity       =      .813 m/sec
        Flow Capacity  =     3.450 c.m/s
        Critical depth =      .558 metres
  9     ROUTE
      250.000     Conduit Length
         .370     Supply X-factor <.5
      230.525     Supply K-lag (sec)
         .500     Beta weighting factor
      200.000     Routing timestep
            1     No. of sub-reaches
              1.221      2.735      2.718       .000 c.m/s
 16     NEXT LINK
              1.221      2.718      2.718       .000 c.m/s
  4     CATCHMENT
      103.000     ID No.ó 99999
        4.440     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.585      2.718      2.718       .000 c.m/s
               .303       .927       .834     C perv/imperv/total
 15     ADD RUNOFF
              1.585      3.953      2.718       .000 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .600     Select Grade in %
        Depth          =      .932 metres
        Velocity       =      .884 m/sec
        Flow Capacity  =    11.284 c.m/s
        Critical depth =      .556 metres
  9     ROUTE
      360.000     Conduit Length
         .399     Supply X-factor <.5
      305.503     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
              1.585      3.953      3.737       .000 c.m/s
 16     NEXT LINK
              1.585      3.737      3.737       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.200     Diameter in metres
         .750     Select Grade in %
        Surcharged HGL=      .919 %
        Velocity      =     3.304 m/sec
        Pipe Capacity =     3.376 c.m/s
        Critical depth=     1.046 metres
```

```
 9     ROUTE
      40.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
             1.585      3.737      3.737       .000 c.m/s
17     COMBINE
     11     Junction Node No.
             1.585      3.737      3.737      3.737 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     104.000     ID No.ó 99999
       1.420     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .525       .000      3.737      3.737 c.m/s
               .303       .928       .834     C perv/imperv/total
15     ADD RUNOFF
               .525       .525      3.737      3.737 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .450     Diameter in metres
        .900     Select Grade in %
       Surcharged HGL=     3.395 %
       Velocity      =     3.303 m/sec
       Pipe Capacity =      .270 c.m/s
       Critical depth=      .439 metres
 9     ROUTE
      10.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
               .525       .525       .525      3.737 c.m/s
17     COMBINE
     11     Junction Node No.
               .525       .525       .525      4.113 c.m/s
18     CONFLUENCE
     11     Junction Node No.
               .525      4.113       .525       .000 c.m/s
 4     CATCHMENT
     105.000     ID No.ó 99999
       3.740     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             1.335      4.113       .525       .000 c.m/s
               .303       .927       .834     C perv/imperv/total
15     ADD RUNOFF
             1.335      5.154       .525       .000 c.m/s
```

```
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .400     Select Grade in %
        Depth          =     1.157 metres
        Velocity       =      .814 m/sec
        Flow Capacity  =     9.213 c.m/s
        Critical depth =      .640 metres
  9     ROUTE
      265.000     Conduit Length
         .252     Supply X-factor <.5
      244.015     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
              1.335      5.154      4.731       .000 c.m/s
 16     NEXT LINK
              1.335      4.731      4.731       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.350     Diameter in metres
         .500     Select Grade in %
        Surcharged HGL=      .786 %
        Velocity      =     3.305 m/sec
        Pipe Capacity =     3.774 c.m/s
        Critical depth=     1.150 metres
  9     ROUTE
       65.000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              1.335      4.731      4.731       .000 c.m/s
 17     COMBINE
      12     Junction Node No.
              1.335      4.731      4.731      4.731 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      106.000     ID No.ó 99999
        4.010     Area in hectares
       75.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.484       .000      4.731      4.731 c.m/s
               .302       .928       .834     C perv/imperv/total
 15     ADD RUNOFF
              1.484      1.484      4.731      4.731 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .675     Diameter in metres
         .900     Select Grade in %
        Surcharged HGL=     3.118 %
        Velocity      =     4.148 m/sec
        Pipe Capacity =      .797 c.m/s
        Critical depth=      .660 metres
```

```
 9     ROUTE
     110.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
             1.484      1.484      1.484      4.731 c.m/s
17     COMBINE
     13     Junction Node No.
             1.484      1.484      1.484      1.484 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     107.000     ID No.ó 99999
       2.900     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             1.035       .000      1.484      1.484 c.m/s
              .303       .927       .834     C perv/imperv/total
15     ADD RUNOFF
             1.035      1.035      1.484      1.484 c.m/s
11     CHANNEL
       1.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.000     O/a Depth in metres
        .600     Select Grade in %
       Depth          =      .589 metres
       Velocity       =      .635 m/sec
       Flow Capacity  =     3.450 c.m/s
       Critical depth =      .342 metres
 9     ROUTE
     260.000     Conduit Length
        .414     Supply X-factor <.5
     307.082     Supply K-lag (sec)
        .500     Beta weighting factor
     300.000     Routing timestep
           1     No. of sub-reaches
             1.035      1.035       .920      1.484 c.m/s
16     NEXT LINK
             1.035       .920       .920      1.484 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .024     Pipe Manning's 'n'
        .900     Diameter in metres
       1.000     Select Grade in %
       Depth         =      .692 metres
       Velocity      =     1.752 m/sec
       Pipe Capacity =      .981 c.m/s
       Critical depth=      .566 metres
 9     ROUTE
      20.000     Conduit Length
        .000     Supply X-factor <.5
       8.561     Supply K-lag (sec)
        .759     Beta weighting factor
      33.333     Routing timestep
           1     No. of sub-reaches
             1.035       .920       .916      1.484 c.m/s
17     COMBINE
     13     Junction Node No.
             1.035       .920       .916      2.135 c.m/s
```

```
18     CONFLUENCE
     13     Junction Node No.
             1.035      2.135       .916       .000 c.m/s
 4     CATCHMENT
     108.000     ID No.ó 99999
       5.030     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      65.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      15.568     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             1.379      2.135       .916       .000 c.m/s
              .291       .927       .704     C perv/imperv/total
15     ADD RUNOFF
             1.379      3.514       .916       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .600     Select Grade in %
       Depth          =      .882 metres
       Velocity       =      .857 m/sec
       Flow Capacity  =    11.284 c.m/s
       Critical depth =      .522 metres
 9     ROUTE
     295.000     Conduit Length
        .383     Supply X-factor <.5
     258.165     Supply K-lag (sec)
        .500     Beta weighting factor
     300.000     Routing timestep
          1      No. of sub-reaches
             1.379      3.514      3.258       .000 c.m/s
16     NEXT LINK
             1.379      3.258      3.258       .000 c.m/s
 4     CATCHMENT
     109.000     ID No.ó 99999
       2.130     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .760      3.258      3.258       .000 c.m/s
              .303       .927       .834     C perv/imperv/total
15     ADD RUNOFF
              .760      3.851      3.258       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .600     Select Grade in %
       Depth          =      .921 metres
       Velocity       =      .878 m/sec
       Flow Capacity  =    11.284 c.m/s
       Critical depth =      .549 metres
```

```
 9     ROUTE
     250.000     Conduit Length
        .356     Supply X-factor <.5
     213.605     Supply K-lag (sec)
        .500     Beta weighting factor
     200.000     Routing timestep
          1      No. of sub-reaches
            .760      3.851      3.616       .000 c.m/s
16     NEXT LINK
            .760      3.616      3.616       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.200     Diameter in metres
        .500     Select Grade in %
       Surcharged HGL=      .860 %
       Velocity      =     3.197 m/sec
       Pipe Capacity =     2.757 c.m/s
       Critical depth=     1.032 metres
 9     ROUTE
      50.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
            .760      3.616      3.616       .000 c.m/s
17     COMBINE
     14     Junction Node No.
            .760      3.616      3.616      3.616 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     110.000     ID No.ó 99999
       5.140     Area in hectares
      75.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           1.924       .000      3.616      3.616 c.m/s
            .302       .925       .832     C perv/imperv/total
15     ADD RUNOFF
           1.924      1.924      3.616      3.616 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .750     Diameter in metres
       1.000     Select Grade in %
       Surcharged HGL=     2.987 %
       Velocity      =     4.355 m/sec
       Pipe Capacity =     1.113 c.m/s
       Critical depth=      .733 metres
 9     ROUTE
     180.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
           1.924      1.924      1.924      3.616 c.m/s
17     COMBINE
     14     Junction Node No.
           1.924      1.924      1.924      4.929 c.m/s
```

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 18     CONFLUENCE
      14     Junction Node No.
              1.924      4.929      1.924       .000 c.m/s
  4     CATCHMENT
      111.000     ID No.ó 99999
        3.220     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.150      4.929      1.924       .000 c.m/s
               .303       .927       .834     C perv/imperv/total
 15     ADD RUNOFF
              1.150      5.825      1.924       .000 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .400     Select Grade in %
        Depth          =     1.223 metres
        Velocity       =      .841 m/sec
        Flow Capacity  =     9.213 c.m/s
        Critical depth =      .683 metres
  9     ROUTE
      140.000     Conduit Length
         .007     Supply X-factor <.5
      124.922     Supply K-lag (sec)
         .500     Beta weighting factor
      200.000     Routing timestep
           1      No. of sub-reaches
              1.150      5.825      5.749       .000 c.m/s
 17     COMBINE
      15     Junction Node No.
              1.150      5.825      5.749      5.749 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      112.000     ID No.ó 99999
        1.390     Area in hectares
       90.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .514       .000      5.749      5.749 c.m/s
               .303       .928       .834     C perv/imperv/total
 15     ADD RUNOFF
               .514       .514      5.749      5.749 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .450     Diameter in metres
        1.500     Select Grade in %
        Surcharged HGL=     3.253 %
        Velocity      =     3.233 m/sec
        Pipe Capacity =      .349 c.m/s
        Critical depth=      .438 metres
```

```
 9     ROUTE
     130.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
              .514       .514       .514      5.749 c.m/s
17     COMBINE
     15     Junction Node No.
              .514       .514       .514      6.117 c.m/s
18     CONFLUENCE
     15     Junction Node No.
              .514      6.117       .514       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.500     O/a Depth in metres
        .400     Select Grade in %
       Depth          =     1.250 metres
       Velocity       =      .851 m/sec
       Flow Capacity  =     9.213 c.m/s
       Critical depth =      .700 metres
 9     ROUTE
     140.000     Conduit Length
        .000     Supply X-factor <.5
     123.365     Supply K-lag (sec)
        .501     Beta weighting factor
     200.000     Routing timestep
           1     No. of sub-reaches
              .514      6.117      5.923       .000 c.m/s
16     NEXT LINK
              .514      5.923      5.923       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .024     Pipe Manning's 'n'
       1.750     Diameter in metres
        .500     Select Grade in %
       Surcharged HGL=     1.052 %
       Velocity      =     2.462 m/sec
       Pipe Capacity =     4.084 c.m/s
       Critical depth=     1.221 metres
 9     ROUTE
      20.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
              .514      5.923      5.923       .000 c.m/s
17     COMBINE
     12     Junction Node No.
              .514      5.923      5.923     10.654 c.m/s
18     CONFLUENCE
     12     Junction Node No.
              .514     10.654      5.923       .000 c.m/s
 4     CATCHMENT
     113.000     ID No.ó 99999
       2.350     Area in hectares
      30.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
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              .874     10.654      5.923       .000 c.m/s
              .302       .928       .834     C perv/imperv/total
 15     ADD RUNOFF
              .874     11.291      5.923       .000 c.m/s
 10     POND
      13 Depth - Discharge - Volume sets
          .000        .000          .0
          .100       .0320      1287.0
          .200       .0390      2605.0
          .300       .0450      3954.0
          .500       .0550      6743.0
         1.000        .352     14356.0
         1.400        .416     21077.0
         1.500        .522     22832.0
         1.600        .713     24617.0
         1.700        .967     26432.0
         1.800       1.546     28278.0
         1.900       2.439     30154.0
         2.000       3.556     32060.0
        Peak Outflow    =     1.084 c.m/s
        Maximum Depth   =     1.720 metres
        Maximum Storage =    26804. c.m
              .874     11.291      1.084       .000 c.m/s
 16     NEXT LINK
              .874      1.084      1.084       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .600     Diameter in metres
         .500     Select Grade in %
        Surcharged HGL=     3.114 %
        Velocity      =     3.832 m/sec
        Pipe Capacity =      .434 c.m/s
        Critical depth=      .585 metres
  9     ROUTE
       30.000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              .874      1.084      1.084       .000 c.m/s
 16     NEXT LINK
              .874      1.084      1.084       .000 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        2.000     Left  bank slope  1:
        2.000     Right bank slope  1:
         .060     Manning's "n"
        1.000     O/a Depth in metres
         .300     Select Grade in %
        Depth          =      .637 metres
        Velocity       =      .520 m/sec
        Flow Capacity  =     2.649 c.m/s
        Critical depth =      .281 metres
  9     ROUTE
       70.000     Conduit Length
         .000     Supply X-factor <.5
      100.963     Supply K-lag (sec)
         .645     Beta weighting factor
      200.000     Routing timestep
            1     No. of sub-reaches
              .874      1.084      1.078       .000 c.m/s
 16     NEXT LINK
              .874      1.078      1.078       .000 c.m/s
 22     FILE HYDROGRAPH
       2     1=READ: 2=WRITE
       8     490AREA1     .HYR    is Filename
       3     1=Overland: 2=Inflow: 3=Outflow: 4=Temp'ary
             Area 1 - 5Yr Discharge
              .874      1.078      1.078       .000 c.m/s
 20     MANUAL
```

Pond 2
Predevelopment
25mm Storm

```
        Output File (4.7) HCBP2PRE.25M opened 2008-06-05  13:34
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            4     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
       25.000     Total depth of Rain
      180.000     Duration ó  720 min
       25.000     Time to peak  (min)
        6.000     Decay factor  K
                 25.000 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .015     Manning "n"
       98.000     SCS Curve No or C
         .100     Ia/S Coefficient
         .518     Initial Abstraction
 4      CATCHMENT
        3.000     ID No.ó 99999
        4.860     Area in hectares
      300.000     Length (PERV) metres
        2.000     Gradient (%)
        2.000     Per cent Impervious
      300.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       70.000     SCS Curve No or C
         .100     Ia/S Coefficient
       10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .007       .000       .000       .000 c.m/s
               .065       .802       .079     C perv/imperv/total
15      ADD RUNOFF
               .007       .007       .000       .000 c.m/s
 9      ROUTE
         .000     Conduit Length
         .500     No Conduit defined
         .000     Zero lag
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
               .007       .007       .007       .000 c.m/s
16      NEXT LINK
               .007       .007       .007       .000 c.m/s
 4      CATCHMENT
        4.000     ID No.ó 99999
        5.080     Area in hectares
      200.000     Length (PERV) metres
        3.000     Gradient (%)
        2.000     Per cent Impervious
      200.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       70.000     SCS Curve No or C
         .100     Ia/S Coefficient
       10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .007       .007       .007       .000 c.m/s
               .065       .802       .079     C perv/imperv/total
15      ADD RUNOFF
               .007       .013       .007       .000 c.m/s
 9      ROUTE
         .000     Conduit Length
         .500     No Conduit defined
         .000     Zero lag
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
               .007       .013       .013       .000 c.m/s
16      NEXT LINK
               .007       .013       .013       .000 c.m/s
```

```
 4     CATCHMENT
       5.000     ID No.ó 99999
       2.430     Area in hectares
     100.000     Length (PERV) metres
       2.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .004       .013       .013       .000 c.m/s
             .065       .789       .079     C perv/imperv/total
15     ADD RUNOFF
             .004       .017       .013       .000 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
             .004       .017       .017       .000 c.m/s
17     COMBINE
      1     Junction Node No.
             .004       .017       .017       .017 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     900.000     ID No.ó 99999
      13.500     Area in hectares
     100.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .020       .000       .017       .017 c.m/s
             .065       .801       .079     C perv/imperv/total
15     ADD RUNOFF
             .020       .020       .017       .017 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
             .020       .020       .020       .017 c.m/s
17     COMBINE
      1     Junction Node No.
             .020       .020       .020       .037 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     200.000     ID No.ó 99999
      32.350     Area in hectares
     100.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
```

```
          .100     Ia/S Coefficient
        10.886     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .048       .000       .020       .037 c.m/s
               .065       .801       .079     C perv/imperv/total
 15     ADD RUNOFF
               .048       .048       .020       .037 c.m/s
  9     ROUTE
          .000     Conduit Length
          .500     No Conduit defined
          .000     Zero lag
          .500     Beta weighting factor
       600.000     Routing timestep
            1      No. of sub-reaches
               .048       .048       .048       .037 c.m/s
 17     COMBINE
        1     Junction Node No.
               .048       .048       .048       .085 c.m/s
 18     CONFLUENCE
        1     Junction Node No.
               .048       .085       .048       .000 c.m/s
  9     ROUTE
          .000     Conduit Length
          .500     No Conduit defined
          .000     Zero lag
          .500     Beta weighting factor
       600.000     Routing timestep
            1      No. of sub-reaches
               .048       .085       .085       .000 c.m/s
 20     MANUAL
```

Pond 2
Predevelopment
5 Year Storm

```
        Output File (4.7) HCBP2PRE.005 opened 2008-06-05  13:36
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    1593.000     Coefficient  a
      11.000     Constant  b    (min)
        .879     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                49.564 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
        3.000     ID No.ó 99999
        4.860     Area in hectares
     300.000     Length (PERV) metres
        2.000     Gradient (%)
        2.000     Per cent Impervious
     300.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .043       .000       .000       .000 c.m/s
               .205       .884       .218     C perv/imperv/total
15      ADD RUNOFF
               .043       .043       .000       .000 c.m/s
 9      ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
               .043       .043       .043       .000 c.m/s
16      NEXT LINK
               .043       .043       .043       .000 c.m/s
 4      CATCHMENT
        4.000     ID No.ó 99999
        5.080     Area in hectares
     200.000     Length (PERV) metres
        3.000     Gradient (%)
        2.000     Per cent Impervious
     200.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .059       .043       .043       .000 c.m/s
               .204       .882       .218     C perv/imperv/total
15      ADD RUNOFF
               .059       .100       .043       .000 c.m/s
 9      ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
               .059       .100       .100       .000 c.m/s
16      NEXT LINK
```

```
              .059       .100       .100       .000 c.m/s
 4     CATCHMENT
       5.000     ID No.ó 99999
       2.430     Area in hectares
     100.000     Length (PERV) metres
       2.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .036       .100       .100       .000 c.m/s
              .204       .881       .218     C perv/imperv/total
15     ADD RUNOFF
              .036       .131       .100       .000 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
              .036       .131       .131       .000 c.m/s
17     COMBINE
      1     Junction Node No.
              .036       .131       .131       .131 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     900.000     ID No.ó 99999
      13.500     Area in hectares
     100.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .171       .000       .131       .131 c.m/s
              .204       .883       .218     C perv/imperv/total
15     ADD RUNOFF
              .171       .171       .131       .131 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
              .171       .171       .171       .131 c.m/s
17     COMBINE
      1     Junction Node No.
              .171       .171       .171       .299 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     200.000     ID No.ó 99999
      32.350     Area in hectares
     100.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
```

```
        70.000     SCS Curve No or C
          .100     Ia/S Coefficient
        10.886     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .409       .000       .171       .299 c.m/s
              .204       .883       .218     C perv/imperv/total
 15     ADD RUNOFF
              .409       .409       .171       .299 c.m/s
  9     ROUTE
          .000     Conduit Length
          .500     No Conduit defined
          .000     Zero lag
          .500     Beta weighting factor
       600.000     Routing timestep
            1      No. of sub-reaches
              .409       .409       .409       .299 c.m/s
 17     COMBINE
        1     Junction Node No.
              .409       .409       .409       .708 c.m/s
 18     CONFLUENCE
        1     Junction Node No.
              .409       .708       .409       .000 c.m/s
  9     ROUTE
          .000     Conduit Length
          .500     No Conduit defined
          .000     Zero lag
          .500     Beta weighting factor
       600.000     Routing timestep
            1      No. of sub-reaches
              .409       .708       .708       .000 c.m/s
 20     MANUAL
```

Pond 2
Predevelopment
25 Year Storm

```
        Output File (4.7) HCBP2PRE.025 opened 2008-06-05  13:39
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    3158.000     Coefficient  a
      15.000     Constant  b    (min)
        .936     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                70.814 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
       3.000     ID No.ó 99999
       4.860     Area in hectares
     300.000     Length (PERV) metres
       2.000     Gradient (%)
       2.000     Per cent Impervious
     300.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .124       .000       .000       .000 c.m/s
               .300       .901       .312     C perv/imperv/total
15      ADD RUNOFF
               .124       .124       .000       .000 c.m/s
 9      ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
               .124       .124       .124       .000 c.m/s
16      NEXT LINK
               .124       .124       .124       .000 c.m/s
 4      CATCHMENT
       4.000     ID No.ó 99999
       5.080     Area in hectares
     200.000     Length (PERV) metres
       3.000     Gradient (%)
       2.000     Per cent Impervious
     200.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .171       .124       .124       .000 c.m/s
               .300       .908       .312     C perv/imperv/total
15      ADD RUNOFF
               .171       .291       .124       .000 c.m/s
 9      ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
               .171       .291       .291       .000 c.m/s
16      NEXT LINK
```

```
              .171       .291       .291       .000 c.m/s
 4     CATCHMENT
       5.000     ID No.ó 99999
       2.430     Area in hectares
     100.000     Length (PERV) metres
       2.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .100       .291       .291       .000 c.m/s
              .300       .912       .312     C perv/imperv/total
15     ADD RUNOFF
              .100       .380       .291       .000 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
              .100       .380       .380       .000 c.m/s
17     COMBINE
      1     Junction Node No.
              .100       .380       .380       .380 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     900.000     ID No.ó 99999
      13.500     Area in hectares
     100.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .477       .000       .380       .380 c.m/s
              .300       .909       .312     C perv/imperv/total
15     ADD RUNOFF
              .477       .477       .380       .380 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
              .477       .477       .477       .380 c.m/s
17     COMBINE
      1     Junction Node No.
              .477       .477       .477       .857 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     200.000     ID No.ó 99999
      32.350     Area in hectares
     100.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
```

```
        70.000     SCS Curve No or C
          .100     Ia/S Coefficient
        10.886     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.144       .000       .477       .857 c.m/s
               .300       .909       .312     C perv/imperv/total
15     ADD RUNOFF
              1.144      1.144       .477       .857 c.m/s
 9     ROUTE
          .000     Conduit Length
          .500     No Conduit defined
          .000     Zero lag
          .500     Beta weighting factor
       600.000     Routing timestep
            1      No. of sub-reaches
              1.144      1.144      1.144       .857 c.m/s
17     COMBINE
        1     Junction Node No.
              1.144      1.144      1.144      1.999 c.m/s
18     CONFLUENCE
        1     Junction Node No.
              1.144      1.999      1.144       .000 c.m/s
 9     ROUTE
          .000     Conduit Length
          .500     No Conduit defined
          .000     Zero lag
          .500     Beta weighting factor
       600.000     Routing timestep
            1      No. of sub-reaches
              1.144      1.999      1.999       .000 c.m/s
20     MANUAL
```

Pond 2
Predevelopment
100 Year Storm

```
        Output File (4.7) HCBP2PRE.100 opened 2008-06-05  13:40
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    4688.000     Coefficient  a
      17.000     Constant  b    (min)
        .962     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                89.886 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
       3.000     ID No.ó 99999
       4.860     Area in hectares
     300.000     Length (PERV) metres
       2.000     Gradient (%)
       2.000     Per cent Impervious
     300.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .229       .000       .000       .000 c.m/s
               .369       .920       .380     C perv/imperv/total
15      ADD RUNOFF
               .229       .229       .000       .000 c.m/s
 9      ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
               .229       .229       .229       .000 c.m/s
16      NEXT LINK
               .229       .229       .229       .000 c.m/s
 4      CATCHMENT
       4.000     ID No.ó 99999
       5.080     Area in hectares
     200.000     Length (PERV) metres
       3.000     Gradient (%)
       2.000     Per cent Impervious
     200.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .314       .229       .229       .000 c.m/s
               .369       .923       .380     C perv/imperv/total
15      ADD RUNOFF
               .314       .531       .229       .000 c.m/s
 9      ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
               .314       .531       .531       .000 c.m/s
16      NEXT LINK
```

```
              .314       .531       .531       .000 c.m/s
 4     CATCHMENT
       5.000     ID No.ó 99999
       2.430     Area in hectares
     100.000     Length (PERV) metres
       2.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .182       .531       .531       .000 c.m/s
              .370       .929       .381     C perv/imperv/total
15     ADD RUNOFF
              .182       .702       .531       .000 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
              .182       .702       .702       .000 c.m/s
17     COMBINE
      1     Junction Node No.
              .182       .702       .702       .702 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     900.000     ID No.ó 99999
      13.500     Area in hectares
     100.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .881       .000       .702       .702 c.m/s
              .369       .926       .380     C perv/imperv/total
15     ADD RUNOFF
              .881       .881       .702       .702 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
              .881       .881       .881       .702 c.m/s
17     COMBINE
      1     Junction Node No.
              .881       .881       .881      1.583 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     200.000     ID No.ó 99999
      32.350     Area in hectares
     100.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
```

```
        70.000     SCS Curve No or C
          .100     Ia/S Coefficient
        10.886     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             2.111       .000       .881      1.583 c.m/s
              .369       .926       .380     C perv/imperv/total
15     ADD RUNOFF
             2.111      2.111       .881      1.583 c.m/s
 9     ROUTE
          .000     Conduit Length
          .500     No Conduit defined
          .000     Zero lag
          .500     Beta weighting factor
       600.000     Routing timestep
            1      No. of sub-reaches
             2.111      2.111      2.111      1.583 c.m/s
17     COMBINE
        1     Junction Node No.
             2.111      2.111      2.111      3.694 c.m/s
18     CONFLUENCE
        1     Junction Node No.
             2.111      3.694      2.111       .000 c.m/s
 9     ROUTE
          .000     Conduit Length
          .500     No Conduit defined
          .000     Zero lag
          .500     Beta weighting factor
       600.000     Routing timestep
            1      No. of sub-reaches
             2.111      3.694      3.694       .000 c.m/s
20     MANUAL
```

Pond 2
Post Development
25mm Storm

```
        Output File (4.7) HCBP2PST.25M opened 2008-06-05  11:28
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            4     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
       25.000     Total depth of Rain
      180.000     Duration ó  720 min
       25.000     Time to peak  (min)
        6.000     Decay factor  K
                 25.000 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .015     Manning "n"
       98.000     SCS Curve No or C
         .100     Ia/S Coefficient
         .518     Initial Abstraction
 4      CATCHMENT
      902.000     ID No.ó 99999
        4.800     Area in hectares
      100.000     Length (PERV) metres
        1.000     Gradient (%)
        2.000     Per cent Impervious
      100.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       70.000     SCS Curve No or C
         .100     Ia/S Coefficient
       10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .007       .000       .000       .000 c.m/s
                .065       .801       .079     C perv/imperv/total
15      ADD RUNOFF
                .007       .007       .000       .000 c.m/s
 9      ROUTE
         .000     Conduit Length
         .500     No Conduit defined
         .000     Zero lag
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
                .007       .007       .007       .000 c.m/s
17      COMBINE
      21     Junction Node No.
                .007       .007       .007       .007 c.m/s
14      START
       1     1=Zero; 2=Define
 4      CATCHMENT
      903.000     ID No.ó 99999
       19.400     Area in hectares
       90.000     Length (PERV) metres
        2.000     Gradient (%)
       45.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .657       .000       .007       .007 c.m/s
                .035       .785       .372     C perv/imperv/total
15      ADD RUNOFF
                .657       .657       .007       .007 c.m/s
 9      ROUTE
         .000     Conduit Length
         .500     No Conduit defined
         .000     Zero lag
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
```

```
              .657       .657       .657       .007 c.m/s
 17     COMBINE
      21     Junction Node No.
              .657       .657       .657       .664 c.m/s
 18     CONFLUENCE
      21     Junction Node No.
              .657       .664       .657       .000 c.m/s
  9     ROUTE
         .000     Conduit Length
         .500     No Conduit defined
         .000     Zero lag
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              .657       .664       .664       .000 c.m/s
 17     COMBINE
      24     Junction Node No.
              .657       .664       .664       .664 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      201.000     ID No.ó 99999
         .640     Area in hectares
       50.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       50.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .040       .000       .664       .664 c.m/s
              .035       .786       .673     C perv/imperv/total
 15     ADD RUNOFF
              .040       .040       .664       .664 c.m/s
 10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010        .115         1.0
           .020        .116     10000.0
        Peak Outflow    =      .040 c.m/s
        Maximum Depth   =      .004 metres
        Maximum Storage =        0. c.m
              .040       .040       .040       .664 c.m/s
 16     NEXT LINK
              .040       .040       .040       .664 c.m/s
  4     CATCHMENT
      202.000     ID No.ó 99999
        1.830     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .103       .040       .040       .664 c.m/s
              .035       .793       .603     C perv/imperv/total
 15     ADD RUNOFF
              .103       .143       .040       .664 c.m/s
  9     ROUTE
         .000     Conduit Length
         .500     No Conduit defined
         .000     Zero lag
         .500     Beta weighting factor
      600.000     Routing timestep
```

```
            1     No. of sub-reaches
              .103       .143       .143       .664 c.m/s
17     COMBINE
     22     Junction Node No.
              .103       .143       .143       .143 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     203.000     ID No.ó 99999
       6.780     Area in hectares
      75.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .433       .000       .143       .143 c.m/s
              .035       .793       .679     C perv/imperv/total
15     ADD RUNOFF
              .433       .433       .143       .143 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       1.220         1.0
          .020       1.221     10000.0
       Peak Outflow    =      .433 c.m/s
       Maximum Depth   =      .004 metres
       Maximum Storage =        0. c.m
              .433       .433       .433       .143 c.m/s
17     COMBINE
     22     Junction Node No.
              .433       .433       .433       .576 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     205.000     ID No.ó 99999
        .540     Area in hectares
      30.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      30.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .033       .000       .433       .576 c.m/s
              .035       .796       .682     C perv/imperv/total
15     ADD RUNOFF
              .033       .033       .433       .576 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       .0970         1.0
          .020       .0971     10000.0
       Peak Outflow    =      .033 c.m/s
       Maximum Depth   =      .003 metres
       Maximum Storage =        0. c.m
              .033       .033       .033       .576 c.m/s
17     COMBINE
     22     Junction Node No.
              .033       .033       .033       .609 c.m/s
18     CONFLUENCE
     22     Junction Node No.
              .033       .609       .033       .000 c.m/s
 4     CATCHMENT
```

```
      206.000     ID No.ó 99999
         .490     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .028       .609       .033       .000 c.m/s
              .035       .793       .603     C perv/imperv/total
15     ADD RUNOFF
              .028       .637       .033       .000 c.m/s
 9     ROUTE
         .000     Conduit Length
         .500     No Conduit defined
         .000     Zero lag
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              .028       .637       .637       .000 c.m/s
17     COMBINE
      23     Junction Node No.
              .028       .637       .637       .637 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
      207.000     ID No.ó 99999
        1.610     Area in hectares
       50.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       50.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .102       .000       .637       .637 c.m/s
              .035       .786       .673     C perv/imperv/total
15     ADD RUNOFF
              .102       .102       .637       .637 c.m/s
10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010        .290         1.0
           .020        .291     10000.0
       Peak Outflow    =      .102 c.m/s
       Maximum Depth   =      .004 metres
       Maximum Storage =        0. c.m
              .102       .102       .102       .637 c.m/s
17     COMBINE
      23     Junction Node No.
              .102       .102       .102       .739 c.m/s
18     CONFLUENCE
      23     Junction Node No.
              .102       .739       .102       .000 c.m/s
11     CHANNEL
       1.200     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.200     O/a Depth in metres
        .300     Select Grade in %
       Depth          =      .568 metres
       Velocity       =      .448 m/sec
       Flow Capacity  =     3.967 c.m/s
```

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        Critical depth =      .269 metres
 9      ROUTE
      200.000     Conduit Length
         .279     Supply X-factor <.5
      334.630     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
              .102       .739       .636       .000 c.m/s
17      COMBINE
      25     Junction Node No.
              .102       .739       .636       .636 c.m/s
14      START
       1     1=Zero; 2=Define
 4      CATCHMENT
      204.000     ID No.ó 99999
         .870     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .049       .000       .636       .636 c.m/s
              .035       .793       .603     C perv/imperv/total
15      ADD RUNOFF
              .049       .049       .636       .636 c.m/s
 8      PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .525     Diameter in metres
         .500     Select Grade in %
        Depth         =      .143 metres
        Velocity      =     1.031 m/sec
        Pipe Capacity =      .304 c.m/s
        Critical depth=      .145 metres
 9      ROUTE
      150.000     Conduit Length
         .450     Supply X-factor <.5
      109.076     Supply K-lag (sec)
         .500     Beta weighting factor
      120.000     Routing timestep
            1     No. of sub-reaches
              .049       .049       .046       .636 c.m/s
17      COMBINE
      25     Junction Node No.
              .049       .049       .046       .674 c.m/s
18      CONFLUENCE
      25     Junction Node No.
              .049       .674       .046       .000 c.m/s
 4      CATCHMENT
      208.000     ID No.ó 99999
        1.210     Area in hectares
       75.000     Length (PERV) metres
         .500     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .066       .674       .046       .000 c.m/s
              .035       .801       .610     C perv/imperv/total
15      ADD RUNOFF
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              .066       .731       .046       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.350     Diameter in metres
        .250     Select Grade in %
       Depth         =      .483 metres
       Velocity      =     1.590 m/sec
       Pipe Capacity =     2.669 c.m/s
       Critical depth=      .444 metres
 9     ROUTE
     520.000     Conduit Length
        .397     Supply X-factor <.5
     245.346     Supply K-lag (sec)
        .500     Beta weighting factor
     200.000     Routing timestep
           1     No. of sub-reaches
              .066       .731       .728       .000 c.m/s
17     COMBINE
     26     Junction Node No.
              .066       .731       .728       .728 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     209.000     ID No.ó 99999
       1.630     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .103       .000       .728       .728 c.m/s
              .035       .800       .685     C perv/imperv/total
15     ADD RUNOFF
              .103       .103       .728       .728 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010        .293         1.0
          .020        .294     10000.0
       Peak Outflow    =      .103 c.m/s
       Maximum Depth   =      .004 metres
       Maximum Storage =        0. c.m
              .103       .103       .103       .728 c.m/s
17     COMBINE
     26     Junction Node No.
              .103       .103       .103       .808 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     210.000     ID No.ó 99999
        .560     Area in hectares
      75.000     Length (PERV) metres
        .500     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .031       .000       .103       .808 c.m/s
              .035       .801       .610     C perv/imperv/total
15     ADD RUNOFF
```

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              .031       .031       .103       .808 c.m/s
 9     ROUTE
        .000     Conduit Length
        .397     No Conduit defined
     245.346     Zero lag
        .500     Beta weighting factor
     200.000     Routing timestep
          1      No. of sub-reaches
              .031       .031       .031       .808 c.m/s
17     COMBINE
     26     Junction Node No.
              .031       .031       .031       .833 c.m/s
18     CONFLUENCE
     26     Junction Node No.
              .031       .833       .031       .000 c.m/s
 4     CATCHMENT
     211.000     ID No.ó 99999
        .490     Area in hectares
      75.000     Length (PERV) metres
        .500     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .027       .833       .031       .000 c.m/s
              .035       .801       .610     C perv/imperv/total
15     ADD RUNOFF
              .027       .855       .031       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.350     Diameter in metres
        .270     Select Grade in %
       Depth         =      .514 metres
       Velocity      =     1.706 m/sec
       Pipe Capacity =     2.773 c.m/s
       Critical depth=      .482 metres
 9     ROUTE
     250.000     Conduit Length
        .287     Supply X-factor <.5
     109.893     Supply K-lag (sec)
        .500     Beta weighting factor
     150.000     Routing timestep
          1      No. of sub-reaches
              .027       .855       .835       .000 c.m/s
17     COMBINE
     24     Junction Node No.
              .027       .855       .835      1.339 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     213.000     ID No.ó 99999
       7.960     Area in hectares
      75.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .508       .000       .835      1.339 c.m/s
              .035       .793       .679     C perv/imperv/total
15     ADD RUNOFF
```

```
              .508       .508       .835      1.339 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.200     O/a Depth in metres
         .400     Select Grade in %
        Depth          =      .373 metres
        Velocity       =      .437 m/sec
        Flow Capacity  =     5.589 c.m/s
        Critical depth =      .171 metres
  9     ROUTE
      450.000     Conduit Length
         .391     Supply X-factor <.5
      386.237     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            2     No. of sub-reaches
              .508       .508       .459      1.339 c.m/s
 16     NEXT LINK
              .508       .459       .459      1.339 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.200     Diameter in metres
         .300     Select Grade in %
        Depth         =      .378 metres
        Velocity      =     1.504 m/sec
        Pipe Capacity =     2.135 c.m/s
        Critical depth=      .362 metres
  9     ROUTE
       48.000     Conduit Length
         .000     Supply X-factor <.5
       23.937     Supply K-lag (sec)
         .593     Beta weighting factor
       54.545     Routing timestep
            1     No. of sub-reaches
              .508       .459       .450      1.339 c.m/s
 16     NEXT LINK
              .508       .450       .450      1.339 c.m/s
  4     CATCHMENT
      214.000     ID No.ó 99999
        3.270     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .209       .450       .450      1.339 c.m/s
              .035       .793       .679     C perv/imperv/total
 15     ADD RUNOFF
              .209       .601       .450      1.339 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .300     Select Grade in %
        Depth          =      .439 metres
        Velocity       =      .413 m/sec
        Flow Capacity  =     7.979 c.m/s
        Critical depth =      .190 metres
  9     ROUTE
      320.000     Conduit Length
```

```
          .382     Supply X-factor <.5
       580.743     Supply K-lag (sec)
          .500     Beta weighting factor
       600.000     Routing timestep
            1      No. of sub-reaches
                .209       .601       .580      1.339 c.m/s
16     NEXT LINK
                .209       .580       .580      1.339 c.m/s
 8     PIPE
          .500     Minimum velocity  m/sec
         4.000     Maximum velocity  m/sec
          .024     Pipe Manning's 'n'
         1.500     Diameter in metres
          .400     Select Grade in %
         Depth         =      .500 metres
         Velocity      =     1.125 m/sec
         Pipe Capacity =     2.422 c.m/s
         Critical depth=      .383 metres
 9       ROUTE
        24.000     Conduit Length
          .000     Supply X-factor <.5
        15.993     Supply K-lag (sec)
          .747     Beta weighting factor
        60.000     Routing timestep
            1      No. of sub-reaches
                .209       .580       .577      1.339 c.m/s
17     COMBINE
       24     Junction Node No.
                .209       .580       .577      1.734 c.m/s
14     START
        1     1=Zero; 2=Define
 4     CATCHMENT
       212.000     ID No.ó 99999
         2.420     Area in hectares
        90.000     Length (PERV) metres
         1.000     Gradient (%)
        85.000     Per cent Impervious
        90.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .350     Manning "n"
        65.000     SCS Curve No or C
          .100     Ia/S Coefficient
        13.677     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .153       .000       .577      1.734 c.m/s
                .035       .800       .685     C perv/imperv/total
15     ADD RUNOFF
                .153       .153       .577      1.734 c.m/s
 9     ROUTE
          .000     Conduit Length
          .500     Supply X-factor <.5
          .000     Supply K-lag (sec)
          .500     Beta weighting factor
       600.000     Routing timestep
            1      No. of sub-reaches
                .153       .153       .153      1.734 c.m/s
16     NEXT LINK
                .153       .153       .153      1.734 c.m/s
 4     CATCHMENT
       215.000     ID No.ó 99999
         2.050     Area in hectares
        30.000     Length (PERV) metres
         2.000     Gradient (%)
        85.000     Per cent Impervious
        30.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .350     Manning "n"
        65.000     SCS Curve No or C
          .100     Ia/S Coefficient
        13.677     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
```

```
              .125       .153       .153      1.734 c.m/s
              .035       .801       .686     C perv/imperv/total
15     ADD RUNOFF
              .125       .278       .153      1.734 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
              .125       .278       .278      1.734 c.m/s
17     COMBINE
     24     Junction Node No.
              .125       .278       .278      1.945 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     901.000     ID No.ó 99999
       8.700     Area in hectares
     100.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .013       .000       .278      1.945 c.m/s
              .065       .801       .079     C perv/imperv/total
15     ADD RUNOFF
              .013       .013       .278      1.945 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
              .013       .013       .013      1.945 c.m/s
17     COMBINE
     24     Junction Node No.
              .013       .013       .013      1.956 c.m/s
18     CONFLUENCE
     24     Junction Node No.
              .013      1.956       .013       .000 c.m/s
10     POND
     14 Depth - Discharge - Volume sets
          .000        .000          .0
          .100       .0390      1115.0
          .200       .0450      2267.0
          .300       .0500      3456.0
          .500       .0600      5945.0
          .600       .0640      7252.0
         1.000        .658     12992.0
         1.400        .799     19416.0
         1.500        .921     21108.0
         1.600       1.129     22834.0
         1.700       1.398     24591.0
         1.800       1.993     26382.0
         1.900       2.900     28204.0
         2.000       4.031     30060.0
       Peak Outflow    =      .062 c.m/s
       Maximum Depth   =      .554 metres
       Maximum Storage =     6647. c.m
              .013      1.956       .062       .000 c.m/s
20     MANUAL
```

Pond 2
Post Development
5 Year Storm

```
        Output File (4.7) HCBP2PST.005 opened 2008-06-05  11:14
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    1593.000     Coefficient  a
      11.000     Constant  b    (min)
        .879     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                49.564 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     902.000     ID No.ó 99999
       4.800     Area in hectares
     100.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .061       .000       .000       .000 c.m/s
               .204       .883       .218     C perv/imperv/total
15      ADD RUNOFF
               .061       .061       .000       .000 c.m/s
 9      ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
               .061       .061       .061       .000 c.m/s
17      COMBINE
     21     Junction Node No.
               .061       .061       .061       .061 c.m/s
14      START
      1     1=Zero; 2=Define
 4      CATCHMENT
     903.000     ID No.ó 99999
      19.400     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      45.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.910       .000       .061       .061 c.m/s
               .150       .882       .479     C perv/imperv/total
15      ADD RUNOFF
             1.910      1.910       .061       .061 c.m/s
 9      ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
```

```
            1     No. of sub-reaches
              1.910      1.910      1.910       .061 c.m/s
 17     COMBINE
      21     Junction Node No.
              1.910      1.910      1.910      1.933 c.m/s
 18     CONFLUENCE
      21     Junction Node No.
              1.910      1.933      1.910       .000 c.m/s
  9     ROUTE
         .000     Conduit Length
         .500     No Conduit defined
         .000     Zero lag
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              1.910      1.933      1.933       .000 c.m/s
 17     COMBINE
      24     Junction Node No.
              1.910      1.933      1.933      1.933 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      201.000     ID No.ó 99999
         .640     Area in hectares
       50.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       50.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .123       .000      1.933      1.933 c.m/s
               .150       .883       .773     C perv/imperv/total
 15     ADD RUNOFF
               .123       .123      1.933      1.933 c.m/s
 10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010        .115         1.0
           .020        .116     10000.0
        Peak Outflow    =      .115 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =        1. c.m
               .123       .123       .115      1.933 c.m/s
 16     NEXT LINK
               .123       .115       .115      1.933 c.m/s
  4     CATCHMENT
      202.000     ID No.ó 99999
        1.830     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .292       .115       .115      1.933 c.m/s
               .150       .881       .699     C perv/imperv/total
 15     ADD RUNOFF
               .292       .407       .115      1.933 c.m/s
  9     ROUTE
         .000     Conduit Length
         .500     No Conduit defined
         .000     Zero lag
         .500     Beta weighting factor
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      600.000     Routing timestep
            1     No. of sub-reaches
              .292       .407       .407      1.933 c.m/s
17     COMBINE
      22     Junction Node No.
              .292       .407       .407       .407 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
      203.000     ID No.ó 99999
        6.780     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             1.225       .000       .407       .407 c.m/s
              .150       .881       .772     C perv/imperv/total
15     ADD RUNOFF
             1.225      1.225       .407       .407 c.m/s
10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010       1.220         1.0
           .020       1.221     10000.0
        Peak Outflow    =     1.220 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =        1. c.m
             1.225      1.225      1.220       .407 c.m/s
17     COMBINE
      22     Junction Node No.
             1.225      1.225      1.220      1.627 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
      205.000     ID No.ó 99999
         .540     Area in hectares
       30.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       30.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .108       .000      1.220      1.627 c.m/s
              .150       .877       .768     C perv/imperv/total
15     ADD RUNOFF
              .108       .108      1.220      1.627 c.m/s
10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010       .0970         1.0
           .020       .0971     10000.0
        Peak Outflow    =      .097 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =        2. c.m
              .108       .108       .097      1.627 c.m/s
17     COMBINE
      22     Junction Node No.
              .108       .108       .097      1.724 c.m/s
18     CONFLUENCE
      22     Junction Node No.
              .108      1.724       .097       .000 c.m/s
```

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 4     CATCHMENT
     206.000     ID No.ó 99999
        .490     Area in hectares
      75.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .078      1.724       .097       .000 c.m/s
             .150       .881       .699     C perv/imperv/total
15     ADD RUNOFF
             .078      1.802       .097       .000 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
             .078      1.802      1.802       .000 c.m/s
17     COMBINE
     23     Junction Node No.
             .078      1.802      1.802      1.802 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     207.000     ID No.ó 99999
       1.610     Area in hectares
      50.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      50.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .308       .000      1.802      1.802 c.m/s
             .150       .883       .773     C perv/imperv/total
15     ADD RUNOFF
             .308       .308      1.802      1.802 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010        .290         1.0
          .020        .291     10000.0
       Peak Outflow    =      .290 c.m/s
       Maximum Depth   =      .010 metres
       Maximum Storage =        1. c.m
             .308       .308       .290      1.802 c.m/s
17     COMBINE
     23     Junction Node No.
             .308       .308       .290      2.092 c.m/s
18     CONFLUENCE
     23     Junction Node No.
             .308      2.092       .290       .000 c.m/s
11     CHANNEL
       1.200     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.200     O/a Depth in metres
        .300     Select Grade in %
       Depth          =      .909 metres
       Velocity       =      .586 m/sec
```

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        Flow Capacity  =     3.967 c.m/s
        Critical depth =      .467 metres
 9      ROUTE
      200.000     Conduit Length
         .167     Supply X-factor <.5
      256.122     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
               .308      2.092      1.845       .000 c.m/s
17      COMBINE
      25     Junction Node No.
               .308      2.092      1.845      1.845 c.m/s
14      START
       1     1=Zero; 2=Define
 4      CATCHMENT
      204.000     ID No.ó 99999
         .870     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .139       .000      1.845      1.845 c.m/s
               .150       .881       .699     C perv/imperv/total
15      ADD RUNOFF
               .139       .139      1.845      1.845 c.m/s
 8      PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .525     Diameter in metres
         .500     Select Grade in %
        Depth         =      .249 metres
        Velocity      =     1.373 m/sec
        Pipe Capacity =      .304 c.m/s
        Critical depth=      .249 metres
 9      ROUTE
      150.000     Conduit Length
         .404     Supply X-factor <.5
       81.955     Supply K-lag (sec)
         .500     Beta weighting factor
       85.714     Routing timestep
            1     No. of sub-reaches
               .139       .139       .124      1.845 c.m/s
17      COMBINE
      25     Junction Node No.
               .139       .139       .124      1.964 c.m/s
18      CONFLUENCE
      25     Junction Node No.
               .139      1.964       .124       .000 c.m/s
 4      CATCHMENT
      208.000     ID No.ó 99999
        1.210     Area in hectares
       75.000     Length (PERV) metres
         .500     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .180      1.964       .124       .000 c.m/s
               .150       .882       .699     C perv/imperv/total
```

```
 15     ADD RUNOFF
              .180      2.137       .124       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.350     Diameter in metres
         .250     Select Grade in %
        Depth         =      .914 metres
        Velocity      =     2.072 m/sec
        Pipe Capacity =     2.669 c.m/s
        Critical depth=      .777 metres
  9     ROUTE
      520.000     Conduit Length
         .239     Supply X-factor <.5
      188.237     Supply K-lag (sec)
         .500     Beta weighting factor
      200.000     Routing timestep
            1     No. of sub-reaches
              .180      2.137      2.009       .000 c.m/s
 17     COMBINE
      26     Junction Node No.
              .180      2.137      2.009      2.009 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      209.000     ID No.ó 99999
        1.630     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .285       .000      2.009      2.009 c.m/s
              .150       .882       .772     C perv/imperv/total
 15     ADD RUNOFF
              .285       .285      2.009      2.009 c.m/s
 10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010        .293         1.0
           .020        .294     10000.0
        Peak Outflow    =      .284 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =        1. c.m
              .285       .285       .284      2.009 c.m/s
 17     COMBINE
      26     Junction Node No.
              .285       .285       .284      2.264 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      210.000     ID No.ó 99999
         .560     Area in hectares
       75.000     Length (PERV) metres
         .500     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .083       .000       .284      2.264 c.m/s
              .150       .882       .699     C perv/imperv/total
```

```
15     ADD RUNOFF
              .083       .083       .284      2.264 c.m/s
 9     ROUTE
        .000     Conduit Length
        .239     No Conduit defined
     188.237     Zero lag
        .500     Beta weighting factor
     200.000     Routing timestep
           1     No. of sub-reaches
              .083       .083       .083      2.264 c.m/s
17     COMBINE
     26     Junction Node No.
              .083       .083       .083      2.344 c.m/s
18     CONFLUENCE
     26     Junction Node No.
              .083      2.344       .083       .000 c.m/s
 4     CATCHMENT
     211.000     ID No.ó 99999
        .490     Area in hectares
      75.000     Length (PERV) metres
        .500     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .073      2.344       .083       .000 c.m/s
              .150       .882       .699     C perv/imperv/total
15     ADD RUNOFF
              .073      2.414       .083       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.350     Diameter in metres
        .270     Select Grade in %
       Depth         =      .974 metres
       Velocity      =     2.183 m/sec
       Pipe Capacity =     2.773 c.m/s
       Critical depth=      .828 metres
 9     ROUTE
     250.000     Conduit Length
        .000     Supply X-factor <.5
      85.879     Supply K-lag (sec)
        .546     Beta weighting factor
     150.000     Routing timestep
           1     No. of sub-reaches
              .073      2.414      2.321       .000 c.m/s
17     COMBINE
     24     Junction Node No.
              .073      2.414      2.321      3.846 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     213.000     ID No.ó 99999
       7.960     Area in hectares
      75.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             1.439       .000      2.321      3.846 c.m/s
              .150       .881       .772     C perv/imperv/total
```

```
 15     ADD RUNOFF
              1.439      1.439      2.321      3.846 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.200     O/a Depth in metres
         .400     Select Grade in %
        Depth          =      .633 metres
        Velocity       =      .583 m/sec
        Flow Capacity  =     5.589 c.m/s
        Critical depth =      .318 metres
  9     ROUTE
      450.000     Conduit Length
         .414     Supply X-factor <.5
      579.071     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              1.439      1.439      1.353      3.846 c.m/s
 16     NEXT LINK
              1.439      1.353      1.353      3.846 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.200     Diameter in metres
         .300     Select Grade in %
        Depth         =      .693 metres
        Velocity      =     1.998 m/sec
        Pipe Capacity =     2.135 c.m/s
        Critical depth=      .634 metres
  9     ROUTE
       48.000     Conduit Length
         .000     Supply X-factor <.5
       18.014     Supply K-lag (sec)
         .778     Beta weighting factor
       66.667     Routing timestep
            1     No. of sub-reaches
              1.439      1.353      1.325      3.846 c.m/s
 16     NEXT LINK
              1.439      1.325      1.325      3.846 c.m/s
  4     CATCHMENT
      214.000     ID No.ó 99999
        3.270     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .591      1.325      1.325      3.846 c.m/s
             .150       .881       .772     C perv/imperv/total
 15     ADD RUNOFF
             .591      1.815      1.325      3.846 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .300     Select Grade in %
        Depth          =      .760 metres
        Velocity       =      .558 m/sec
        Flow Capacity  =     7.979 c.m/s
        Critical depth =      .363 metres
  9     ROUTE
```

```
      320.000     Conduit Length
         .310     Supply X-factor <.5
      430.105     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
              .591      1.815      1.585      3.846 c.m/s
16     NEXT LINK
              .591      1.585      1.585      3.846 c.m/s
 8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .024     Pipe Manning's 'n'
        1.500     Diameter in metres
         .400     Select Grade in %
        Depth         =      .885 metres
        Velocity      =     1.461 m/sec
        Pipe Capacity =     2.422 c.m/s
        Critical depth=      .644 metres
 9     ROUTE
       24.000     Conduit Length
         .000     Supply X-factor <.5
       12.319     Supply K-lag (sec)
         .906     Beta weighting factor
       75.000     Routing timestep
            1     No. of sub-reaches
              .591      1.585      1.578      3.846 c.m/s
17     COMBINE
      24     Junction Node No.
              .591      1.585      1.578      5.076 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
      212.000     ID No.ó 99999
        2.420     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .423       .000      1.578      5.076 c.m/s
              .150       .882       .772     C perv/imperv/total
15     ADD RUNOFF
              .423       .423      1.578      5.076 c.m/s
 9     ROUTE
         .000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              .423       .423       .423      5.076 c.m/s
16     NEXT LINK
              .423       .423       .423      5.076 c.m/s
 4     CATCHMENT
      215.000     ID No.ó 99999
        2.050     Area in hectares
       30.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       30.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
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            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .423       .423       .423      5.076 c.m/s
              .150       .867       .760     C perv/imperv/total
15     ADD RUNOFF
              .423       .846       .423      5.076 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
              .423       .846       .846      5.076 c.m/s
17     COMBINE
     24     Junction Node No.
              .423       .846       .846      5.686 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     901.000     ID No.ó 99999
       8.700     Area in hectares
     100.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .110       .000       .846      5.686 c.m/s
              .204       .883       .218     C perv/imperv/total
15     ADD RUNOFF
              .110       .110       .846      5.686 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
              .110       .110       .110      5.686 c.m/s
17     COMBINE
     24     Junction Node No.
              .110       .110       .110      5.741 c.m/s
18     CONFLUENCE
     24     Junction Node No.
              .110      5.741       .110       .000 c.m/s
10     POND
     14 Depth - Discharge - Volume sets
          .000        .000          .0
          .100       .0390      1115.0
          .200       .0450      2267.0
          .300       .0500      3456.0
          .500       .0600      5945.0
          .600       .0640      7252.0
         1.000        .658     12992.0
         1.400        .799     19416.0
         1.500        .921     21108.0
         1.600       1.129     22834.0
         1.700       1.398     24591.0
         1.800       1.993     26382.0
         1.900       2.900     28204.0
         2.000       4.031     30060.0
       Peak Outflow    =      .659 c.m/s
       Maximum Depth   =     1.004 metres
       Maximum Storage =    13056. c.m
              .110      5.741       .659       .000 c.m/s
20     MANUAL
```

Pond 2
Post Development
25 Year Storm

```
        Output File (4.7) HCBP2PST.25  opened 2008-06-05  10:07
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    3158.000     Coefficient  a
      15.000     Constant  b    (min)
        .936     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                70.814 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     902.000     ID No.ó 99999
       4.800     Area in hectares
     100.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .170       .000       .000       .000 c.m/s
               .300       .909       .312     C perv/imperv/total
15      ADD RUNOFF
               .170       .170       .000       .000 c.m/s
 9      ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
               .170       .170       .170       .000 c.m/s
17      COMBINE
     21     Junction Node No.
               .170       .170       .170       .170 c.m/s
14      START
      1     1=Zero; 2=Define
 4      CATCHMENT
     903.000     ID No.ó 99999
      19.400     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      45.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              2.936       .000       .170       .170 c.m/s
               .237       .913       .541     C perv/imperv/total
15      ADD RUNOFF
             2.936      2.936       .170       .170 c.m/s
 9      ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
```

```
            1     No. of sub-reaches
              2.936      2.936      2.936       .170 c.m/s
 17     COMBINE
      21     Junction Node No.
              2.936      2.936      2.936      2.981 c.m/s
 18     CONFLUENCE
      21     Junction Node No.
              2.936      2.981      2.936       .000 c.m/s
  9     ROUTE
         .000     Conduit Length
         .500     No Conduit defined
         .000     Zero lag
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              2.936      2.981      2.981       .000 c.m/s
 17     COMBINE
      24     Junction Node No.
              2.936      2.981      2.981      2.981 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      201.000     ID No.ó 99999
         .640     Area in hectares
       50.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       50.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .185       .000      2.981      2.981 c.m/s
               .237       .912       .810     C perv/imperv/total
 15     ADD RUNOFF
               .185       .185      2.981      2.981 c.m/s
 10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010        .115         1.0
           .020        .116     10000.0
        Peak Outflow    =      .115 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =       37. c.m
               .185       .185       .115      2.981 c.m/s
 16     NEXT LINK
               .185       .115       .115      2.981 c.m/s
  4     CATCHMENT
      202.000     ID No.ó 99999
        1.830     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .449       .115       .115      2.981 c.m/s
               .237       .912       .743     C perv/imperv/total
 15     ADD RUNOFF
               .449       .564       .115      2.981 c.m/s
  9     ROUTE
         .000     Conduit Length
         .500     No Conduit defined
         .000     Zero lag
         .500     Beta weighting factor
```

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      600.000     Routing timestep
            1     No. of sub-reaches
              .449       .564       .564      2.981 c.m/s
17     COMBINE
      22     Junction Node No.
              .449       .564       .564       .564 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
      203.000     ID No.ó 99999
        6.780     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             1.882       .000       .564       .564 c.m/s
              .237       .912       .811     C perv/imperv/total
15     ADD RUNOFF
             1.882      1.882       .564       .564 c.m/s
10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010       1.220         1.0
           .020       1.221     10000.0
        Peak Outflow    =     1.220 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =      363. c.m
             1.882      1.882      1.220       .564 c.m/s
17     COMBINE
      22     Junction Node No.
             1.882      1.882      1.220      1.784 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
      205.000     ID No.ó 99999
         .540     Area in hectares
       30.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       30.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .162       .000      1.220      1.784 c.m/s
              .237       .900       .801     C perv/imperv/total
15     ADD RUNOFF
              .162       .162      1.220      1.784 c.m/s
10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010       .0970         1.0
           .020       .0971     10000.0
        Peak Outflow    =      .097 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =       32. c.m
              .162       .162       .097      1.784 c.m/s
17     COMBINE
      22     Junction Node No.
              .162       .162       .097      1.881 c.m/s
18     CONFLUENCE
      22     Junction Node No.
              .162      1.881       .097       .000 c.m/s
```

```
 4     CATCHMENT
     206.000     ID No.ó 99999
        .490     Area in hectares
      75.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .120      1.881       .097       .000 c.m/s
             .237       .912       .743     C perv/imperv/total
15     ADD RUNOFF
             .120      2.001       .097       .000 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     No Conduit defined
        .000     Zero lag
        .500     Beta weighting factor
     600.000     Routing timestep
          1      No. of sub-reaches
             .120      2.001      2.001       .000 c.m/s
17     COMBINE
     23     Junction Node No.
             .120      2.001      2.001      2.001 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     207.000     ID No.ó 99999
       1.610     Area in hectares
      50.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      50.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .466       .000      2.001      2.001 c.m/s
             .237       .912       .810     C perv/imperv/total
15     ADD RUNOFF
             .466       .466      2.001      2.001 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010        .290         1.0
          .020        .291     10000.0
       Peak Outflow    =      .290 c.m/s
       Maximum Depth   =      .010 metres
       Maximum Storage =       91. c.m
             .466       .466       .290      2.001 c.m/s
17     COMBINE
     23     Junction Node No.
             .466       .466       .290      2.291 c.m/s
18     CONFLUENCE
     23     Junction Node No.
             .466      2.291       .290       .000 c.m/s
11     CHANNEL
       1.200     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.200     O/a Depth in metres
        .300     Select Grade in %
       Depth          =      .946 metres
       Velocity       =      .599 m/sec
```

```
        Flow Capacity  =     3.967 c.m/s
        Critical depth =      .489 metres
 9      ROUTE
      200.000     Conduit Length
         .155     Supply X-factor <.5
      250.274     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
              .466      2.291      2.197       .000 c.m/s
17      COMBINE
      25     Junction Node No.
              .466      2.291      2.197      2.197 c.m/s
14      START
       1     1=Zero; 2=Define
 4      CATCHMENT
      204.000     ID No.ó 99999
         .870     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .213       .000      2.197      2.197 c.m/s
              .237       .912       .743     C perv/imperv/total
15      ADD RUNOFF
              .213       .213      2.197      2.197 c.m/s
 8      PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .525     Diameter in metres
         .500     Select Grade in %
        Depth         =      .324 metres
        Velocity      =     1.521 m/sec
        Pipe Capacity =      .304 c.m/s
        Critical depth=      .311 metres
 9      ROUTE
      150.000     Conduit Length
         .355     Supply X-factor <.5
       73.975     Supply K-lag (sec)
         .500     Beta weighting factor
       85.714     Routing timestep
            1     No. of sub-reaches
              .213       .213       .194      2.197 c.m/s
17      COMBINE
      25     Junction Node No.
              .213       .213       .194      2.368 c.m/s
18      CONFLUENCE
      25     Junction Node No.
              .213      2.368       .194       .000 c.m/s
 4      CATCHMENT
      208.000     ID No.ó 99999
        1.210     Area in hectares
       75.000     Length (PERV) metres
         .500     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .282      2.368       .194       .000 c.m/s
              .238       .908       .740     C perv/imperv/total
```

```
 15     ADD RUNOFF
              .282      2.612       .194       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.350     Diameter in metres
         .250     Select Grade in %
        Depth         =     1.081 metres
        Velocity      =     2.125 m/sec
        Pipe Capacity =     2.669 c.m/s
        Critical depth=      .863 metres
  9     ROUTE
      520.000     Conduit Length
         .119     Supply X-factor <.5
      183.523     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
              .282      2.612      2.482       .000 c.m/s
 17     COMBINE
      26     Junction Node No.
              .282      2.612      2.482      2.482 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      209.000     ID No.ó 99999
        1.630     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .442       .000      2.482      2.482 c.m/s
              .237       .909       .808     C perv/imperv/total
 15     ADD RUNOFF
              .442       .442      2.482      2.482 c.m/s
 10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010        .293         1.0
           .020        .294     10000.0
        Peak Outflow    =      .293 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =       85. c.m
              .442       .442       .293      2.482 c.m/s
 17     COMBINE
      26     Junction Node No.
              .442       .442       .293      2.775 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      210.000     ID No.ó 99999
         .560     Area in hectares
       75.000     Length (PERV) metres
         .500     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .131       .000       .293      2.775 c.m/s
              .238       .908       .740     C perv/imperv/total
```

```
15     ADD RUNOFF
             .131       .131       .293      2.775 c.m/s
 9     ROUTE
        .000     Conduit Length
        .119     No Conduit defined
     183.523     Zero lag
        .500     Beta weighting factor
     300.000     Routing timestep
           1     No. of sub-reaches
             .131       .131       .131      2.775 c.m/s
17     COMBINE
     26     Junction Node No.
             .131       .131       .131      2.888 c.m/s
18     CONFLUENCE
     26     Junction Node No.
             .131      2.888       .131       .000 c.m/s
 4     CATCHMENT
     211.000     ID No.ó 99999
        .490     Area in hectares
      75.000     Length (PERV) metres
        .500     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .114      2.888       .131       .000 c.m/s
             .238       .908       .740     C perv/imperv/total
15     ADD RUNOFF
             .114      2.987       .131       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.350     Diameter in metres
        .270     Select Grade in %
       Surcharged HGL=      .313 %
       Velocity      =     2.087 m/sec
       Pipe Capacity =     2.773 c.m/s
       Critical depth=      .925 metres
 9     ROUTE
     250.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
             .114      2.987      2.987       .000 c.m/s
17     COMBINE
     24     Junction Node No.
             .114      2.987      2.987      5.306 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     213.000     ID No.ó 99999
       7.960     Area in hectares
      75.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
           2.210       .000      2.987      5.306 c.m/s
             .237       .912       .811     C perv/imperv/total
```

```
 15     ADD RUNOFF
              2.210      2.210      2.987      5.306 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.200     O/a Depth in metres
         .400     Select Grade in %
        Depth          =      .780 metres
        Velocity       =      .653 m/sec
        Flow Capacity  =     5.589 c.m/s
        Critical depth =      .405 metres
  9     ROUTE
      450.000     Conduit Length
         .396     Supply X-factor <.5
      516.520     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              2.210      2.210      2.104      5.306 c.m/s
 16     NEXT LINK
              2.210      2.104      2.104      5.306 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.200     Diameter in metres
         .300     Select Grade in %
        Depth         =      .968 metres
        Velocity      =     2.152 m/sec
        Pipe Capacity =     2.135 c.m/s
        Critical depth=      .799 metres
  9     ROUTE
       48.000     Conduit Length
         .000     Supply X-factor <.5
       16.725     Supply K-lag (sec)
         .862     Beta weighting factor
      120.000     Routing timestep
            1     No. of sub-reaches
              2.210      2.104      2.069      5.306 c.m/s
 16     NEXT LINK
              2.210      2.069      2.069      5.306 c.m/s
  4     CATCHMENT
      214.000     ID No.ó 99999
        3.270     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .908      2.069      2.069      5.306 c.m/s
                .237       .912       .811     C perv/imperv/total
 15     ADD RUNOFF
                .908      2.768      2.069      5.306 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .300     Select Grade in %
        Depth          =      .928 metres
        Velocity       =      .623 m/sec
        Flow Capacity  =     7.979 c.m/s
        Critical depth =      .459 metres
  9     ROUTE
```

```
      320.000     Conduit Length
         .274     Supply X-factor <.5
      385.036     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
              .908      2.768      2.348      5.306 c.m/s
16     NEXT LINK
              .908      2.348      2.348      5.306 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .024     Pipe Manning's 'n'
       1.500     Diameter in metres
        .400     Select Grade in %
       Depth         =     1.190 metres
       Velocity      =     1.561 m/sec
       Pipe Capacity =     2.422 c.m/s
       Critical depth=      .790 metres
 9     ROUTE
      24.000     Conduit Length
        .000     Supply X-factor <.5
      11.528     Supply K-lag (sec)
        .991     Beta weighting factor
      120.000     Routing timestep
            1     No. of sub-reaches
              .908      2.348      2.343      5.306 c.m/s
17     COMBINE
      24     Junction Node No.
              .908      2.348      2.343      7.379 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
      212.000     ID No.ó 99999
        2.420     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .656       .000      2.343      7.379 c.m/s
              .237       .909       .808     C perv/imperv/total
15     ADD RUNOFF
              .656       .656      2.343      7.379 c.m/s
 9     ROUTE
         .000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              .656       .656       .656      7.379 c.m/s
16     NEXT LINK
              .656       .656       .656      7.379 c.m/s
 4     CATCHMENT
      215.000     ID No.ó 99999
        2.050     Area in hectares
       30.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       30.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
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            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .627       .656       .656      7.379 c.m/s
              .237       .885       .788     C perv/imperv/total
15     ADD RUNOFF
              .627      1.283       .656      7.379 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
              .627      1.283      1.283      7.379 c.m/s
17     COMBINE
     24     Junction Node No.
              .627      1.283      1.283      8.242 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     901.000     ID No.ó 99999
       8.700     Area in hectares
     100.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .308       .000      1.283      8.242 c.m/s
              .300       .909       .312     C perv/imperv/total
15     ADD RUNOFF
              .308       .308      1.283      8.242 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
              .308       .308       .308      8.242 c.m/s
17     COMBINE
     24     Junction Node No.
              .308       .308       .308      8.384 c.m/s
18     CONFLUENCE
     24     Junction Node No.
              .308      8.384       .308       .000 c.m/s
10     POND
     14 Depth - Discharge - Volume sets
          .000        .000          .0
          .100       .0390      1115.0
          .200       .0450      2267.0
          .300       .0500      3456.0
          .500       .0600      5945.0
          .600       .0640      7252.0
         1.000        .658     12992.0
         1.400        .799     19416.0
         1.500        .921     21108.0
         1.600       1.129     22834.0
         1.700       1.398     24591.0
         1.800       1.993     26382.0
         1.900       2.900     28204.0
         2.000       4.031     30060.0
       Peak Outflow    =      .919 c.m/s
       Maximum Depth   =     1.498 metres
       Maximum Storage =    21082. c.m
              .308      8.384       .919       .000 c.m/s
20     MANUAL
```

Pond 2
Post Development
100 Year Storm

```
        Output File (4.7) HCBP2PST.100 opened 2008-06-05   9:20
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    4688.000     Coefficient  a
      17.000     Constant  b    (min)
        .962     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                89.886 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     902.000     ID No.ó 99999
       4.800     Area in hectares
     100.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .313       .000       .000       .000 c.m/s
               .369       .926       .380     C perv/imperv/total
15      ADD RUNOFF
               .313       .313       .000       .000 c.m/s
 9      ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
            0     No. of sub-reaches
               .313       .313       .313       .000 c.m/s
17      COMBINE
     21     Junction Node No.
               .313       .313       .313       .313 c.m/s
14      START
      1     1=Zero; 2=Define
 4      CATCHMENT
     903.000     ID No.ó 99999
      19.400     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      45.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              3.871       .000       .313       .313 c.m/s
               .303       .928       .584     C perv/imperv/total
15      ADD RUNOFF
             3.871      3.871       .313       .313 c.m/s
 9      ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
```

```
            0     No. of sub-reaches
              3.871      3.871      3.871       .313 c.m/s
 17     COMBINE
     21     Junction Node No.
              3.871      3.871      3.871      3.947 c.m/s
 18     CONFLUENCE
     21     Junction Node No.
              3.871      3.947      3.871       .000 c.m/s
  9     ROUTE
         .000     Conduit Length
         .000     No Conduit defined
         .000     Zero lag
         .000     Beta weighting factor
         .000     Routing timestep
            0     No. of sub-reaches
              3.871      3.947      3.947       .000 c.m/s
 17     COMBINE
     24     Junction Node No.
              3.871      3.947      3.947      3.947 c.m/s
 14     START
      1     1=Zero; 2=Define
  4     CATCHMENT
     201.000     ID No.ó 99999
        .640     Area in hectares
      50.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      50.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .241       .000      3.947      3.947 c.m/s
             .303       .924       .831     C perv/imperv/total
 15     ADD RUNOFF
             .241       .241      3.947      3.947 c.m/s
 10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010        .115         1.0
          .020        .116     10000.0
       Peak Outflow    =      .115 c.m/s
       Maximum Depth   =      .010 metres
       Maximum Storage =       86. c.m
             .241       .241       .115      3.947 c.m/s
 16     NEXT LINK
             .241       .115       .115      3.947 c.m/s
  4     CATCHMENT
     202.000     ID No.ó 99999
       1.830     Area in hectares
      75.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .590       .115       .115      3.947 c.m/s
             .303       .929       .772     C perv/imperv/total
 15     ADD RUNOFF
             .590       .705       .115      3.947 c.m/s
  9     ROUTE
         .000     Conduit Length
         .000     No Conduit defined
         .000     Zero lag
         .000     Beta weighting factor
```

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         .000     Routing timestep
            0     No. of sub-reaches
              .590       .705       .705      3.947 c.m/s
17     COMBINE
     22     Junction Node No.
              .590       .705       .705       .705 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     203.000     ID No.ó 99999
       6.780     Area in hectares
      75.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             2.472       .000       .705       .705 c.m/s
              .303       .929       .835     C perv/imperv/total
15     ADD RUNOFF
             2.472      2.472       .705       .705 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       1.220         1.0
          .020       1.221     10000.0
       Peak Outflow    =     1.220 c.m/s
       Maximum Depth   =      .011 metres
       Maximum Storage =      921. c.m
             2.472      2.472      1.220       .705 c.m/s
17     COMBINE
     22     Junction Node No.
             2.472      2.472      1.220      1.925 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     205.000     ID No.ó 99999
        .540     Area in hectares
      30.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      30.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .210       .000      1.220      1.925 c.m/s
              .303       .909       .818     C perv/imperv/total
15     ADD RUNOFF
              .210       .210      1.220      1.925 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       .0970         1.0
          .020       .0971     10000.0
       Peak Outflow    =      .097 c.m/s
       Maximum Depth   =      .010 metres
       Maximum Storage =       69. c.m
              .210       .210       .097      1.925 c.m/s
17     COMBINE
     22     Junction Node No.
              .210       .210       .097      2.022 c.m/s
18     CONFLUENCE
     22     Junction Node No.
              .210      2.022       .097       .000 c.m/s
```

```
 4     CATCHMENT
     206.000     ID No.ó 99999
        .490     Area in hectares
      75.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .158      2.022       .097       .000 c.m/s
             .303       .929       .772     C perv/imperv/total
15     ADD RUNOFF
             .158      2.180       .097       .000 c.m/s
 9     ROUTE
        .000     Conduit Length
        .000     No Conduit defined
        .000     Zero lag
        .000     Beta weighting factor
        .000     Routing timestep
          0      No. of sub-reaches
             .158      2.180      2.180       .000 c.m/s
17     COMBINE
     23     Junction Node No.
             .158      2.180      2.180      2.180 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     207.000     ID No.ó 99999
       1.610     Area in hectares
      50.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      50.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .606       .000      2.180      2.180 c.m/s
             .303       .924       .831     C perv/imperv/total
15     ADD RUNOFF
             .606       .606      2.180      2.180 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010        .290         1.0
          .020        .291     10000.0
       Peak Outflow    =      .290 c.m/s
       Maximum Depth   =      .010 metres
       Maximum Storage =      213. c.m
             .606       .606       .290      2.180 c.m/s
17     COMBINE
     23     Junction Node No.
             .606       .606       .290      2.470 c.m/s
18     CONFLUENCE
     23     Junction Node No.
             .606      2.470       .290       .000 c.m/s
11     CHANNEL
       1.200     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       1.200     O/a Depth in metres
        .300     Select Grade in %
       Depth          =      .978 metres
       Velocity       =      .611 m/sec
```

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        Flow Capacity  =     3.967 c.m/s
        Critical depth =      .508 metres
 9      ROUTE
      200.000     Conduit Length
         .144     Supply X-factor <.5
      245.539     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
               .606      2.470      2.344       .000 c.m/s
17      COMBINE
      25     Junction Node No.
               .606      2.470      2.344      2.344 c.m/s
14      START
       1     1=Zero; 2=Define
 4      CATCHMENT
      204.000     ID No.ó 99999
         .870     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .281       .000      2.344      2.344 c.m/s
               .303       .929       .772     C perv/imperv/total
15      ADD RUNOFF
               .281       .281      2.344      2.344 c.m/s
 8      PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .525     Diameter in metres
        .500     Select Grade in %
       Depth         =      .398 metres
       Velocity      =     1.594 m/sec
       Pipe Capacity =      .304 c.m/s
       Critical depth=      .359 metres
 9      ROUTE
      150.000     Conduit Length
         .273     Supply X-factor <.5
       70.563     Supply K-lag (sec)
         .500     Beta weighting factor
      100.000     Routing timestep
            1     No. of sub-reaches
               .281       .281       .257      2.344 c.m/s
17      COMBINE
      25     Junction Node No.
               .281       .281       .257      2.563 c.m/s
18      CONFLUENCE
      25     Junction Node No.
               .281      2.563       .257       .000 c.m/s
 4      CATCHMENT
      208.000     ID No.ó 99999
        1.210     Area in hectares
       75.000     Length (PERV) metres
         .500     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .374      2.563       .257       .000 c.m/s
               .303       .924       .769     C perv/imperv/total
```

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 15     ADD RUNOFF
              .374      2.868       .257       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.350     Diameter in metres
         .250     Select Grade in %
        Surcharged HGL=      .289 %
        Velocity      =     2.004 m/sec
        Pipe Capacity =     2.669 c.m/s
        Critical depth=      .906 metres
  9     ROUTE
      520.000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              .374      2.868      2.868       .000 c.m/s
 17     COMBINE
      26     Junction Node No.
              .374      2.868      2.868      2.868 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      209.000     ID No.ó 99999
        1.630     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .582       .000      2.868      2.868 c.m/s
              .303       .927       .834     C perv/imperv/total
 15     ADD RUNOFF
              .582       .582      2.868      2.868 c.m/s
 10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010        .293         1.0
           .020        .294     10000.0
        Peak Outflow    =      .293 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =      221. c.m
              .582       .582       .293      2.868 c.m/s
 17     COMBINE
      26     Junction Node No.
              .582       .582       .293      3.161 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      210.000     ID No.ó 99999
         .560     Area in hectares
       75.000     Length (PERV) metres
         .500     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .173       .000       .293      3.161 c.m/s
              .303       .924       .769     C perv/imperv/total
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 15     ADD RUNOFF
              .173       .173       .293      3.161 c.m/s
  9     ROUTE
         .000     Conduit Length
         .500     No Conduit defined
         .000     Zero lag
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              .173       .173       .173      3.161 c.m/s
 17     COMBINE
      26     Junction Node No.
              .173       .173       .173      3.302 c.m/s
 18     CONFLUENCE
      26     Junction Node No.
              .173      3.302       .173       .000 c.m/s
  4     CATCHMENT
      211.000     ID No.ó 99999
         .490     Area in hectares
       75.000     Length (PERV) metres
         .500     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .152      3.302       .173       .000 c.m/s
              .303       .924       .769     C perv/imperv/total
 15     ADD RUNOFF
              .152      3.425       .173       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.350     Diameter in metres
         .270     Select Grade in %
        Surcharged HGL=      .412 %
        Velocity      =     2.393 m/sec
        Pipe Capacity =     2.773 c.m/s
        Critical depth=      .991 metres
  9     ROUTE
      250.000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              .152      3.425      3.425       .000 c.m/s
 17     COMBINE
      24     Junction Node No.
              .152      3.425      3.425      7.164 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      213.000     ID No.ó 99999
        7.960     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             2.902       .000      3.425      7.164 c.m/s
              .303       .929       .835     C perv/imperv/total
```

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 15     ADD RUNOFF
              2.902      2.902      3.425      7.164 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.200     O/a Depth in metres
         .400     Select Grade in %
        Depth          =      .887 metres
        Velocity       =      .702 m/sec
        Flow Capacity  =     5.589 c.m/s
        Critical depth =      .471 metres
  9     ROUTE
      450.000     Conduit Length
         .384     Supply X-factor <.5
      480.868     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
              2.902      2.902      2.527      7.164 c.m/s
 16     NEXT LINK
              2.902      2.527      2.527      7.164 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.200     Diameter in metres
         .300     Select Grade in %
        Surcharged HGL=      .420 %
        Velocity      =     2.235 m/sec
        Pipe Capacity =     2.135 c.m/s
        Critical depth=      .877 metres
  9     ROUTE
       48.000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              2.902      2.527      2.527      7.164 c.m/s
 16     NEXT LINK
              2.902      2.527      2.527      7.164 c.m/s
  4     CATCHMENT
      214.000     ID No.ó 99999
        3.270     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.192      2.527      2.527      7.164 c.m/s
               .303       .929       .835     C perv/imperv/total
 15     ADD RUNOFF
              1.192      3.415      2.527      7.164 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .300     Select Grade in %
        Depth          =     1.023 metres
        Velocity       =      .658 m/sec
        Flow Capacity  =     7.979 c.m/s
        Critical depth =      .514 metres
  9     ROUTE
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      320.000     Conduit Length
         .254     Supply X-factor <.5
      364.581     Supply K-lag (sec)
         .500     Beta weighting factor
      300.000     Routing timestep
            1     No. of sub-reaches
              1.192      3.415      2.885      7.164 c.m/s
16     NEXT LINK
              1.192      2.885      2.885      7.164 c.m/s
 8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .024     Pipe Manning's 'n'
        1.500     Diameter in metres
         .400     Select Grade in %
        Surcharged HGL=      .568 %
        Velocity      =     1.633 m/sec
        Pipe Capacity =     2.422 c.m/s
        Critical depth=      .880 metres
 9     ROUTE
       24.000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              1.192      2.885      2.885      7.164 c.m/s
17     COMBINE
      24     Junction Node No.
              1.192      2.885      2.885      9.402 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
      212.000     ID No.ó 99999
        2.420     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .864       .000      2.885      9.402 c.m/s
                .303       .927       .834     C perv/imperv/total
15     ADD RUNOFF
                .864       .864      2.885      9.402 c.m/s
 9     ROUTE
         .000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
                .864       .864       .864      9.402 c.m/s
16     NEXT LINK
                .864       .864       .864      9.402 c.m/s
 4     CATCHMENT
      215.000     ID No.ó 99999
        2.050     Area in hectares
       30.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       30.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
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            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .809       .864       .864      9.402 c.m/s
              .302       .891       .803     C perv/imperv/total
15     ADD RUNOFF
              .809      1.673       .864      9.402 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
              .809      1.673      1.673      9.402 c.m/s
17     COMBINE
     24     Junction Node No.
              .809      1.673      1.673     10.501 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     901.000     ID No.ó 99999
       8.700     Area in hectares
     100.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .568       .000      1.673     10.501 c.m/s
              .369       .926       .380     C perv/imperv/total
15     ADD RUNOFF
              .568       .568      1.673     10.501 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
              .568       .568       .568     10.501 c.m/s
17     COMBINE
     24     Junction Node No.
              .568       .568       .568     10.782 c.m/s
18     CONFLUENCE
     24     Junction Node No.
              .568     10.782       .568       .000 c.m/s
10     POND
     14 Depth - Discharge - Volume sets
          .000        .000          .0
          .100       .0390      1115.0
          .200       .0450      2267.0
          .300       .0500      3456.0
          .500       .0600      5945.0
          .600       .0640      7252.0
         1.000        .658     12992.0
         1.400        .799     19416.0
         1.500        .921     21108.0
         1.600       1.129     22834.0
         1.700       1.398     24591.0
         1.800       1.993     26382.0
         1.900       2.900     28204.0
         2.000       4.031     30060.0
       Peak Outflow    =     2.386 c.m/s
       Maximum Depth   =     1.843 metres
       Maximum Storage =    27172. c.m
              .568     10.782      2.386       .000 c.m/s
20     MANUAL
```

Pond 3
Predevelopment
25mm Storm

```
        Output File (4.7) HCBP3PRE.25M opened 2007-10-26  13:42
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            4     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
       25.000     Total depth of Rain
      180.000     Duration ó  720 min
       25.000     Time to peak  (min)
        6.000     Decay factor  K
                 25.000 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .015     Manning "n"
       98.000     SCS Curve No or C
         .100     Ia/S Coefficient
         .518     Initial Abstraction
 4      CATCHMENT
      300.000     ID No.ó 99999
        5.650     Area in hectares
      125.000     Length (PERV) metres
        1.000     Gradient (%)
        9.000     Per cent Impervious
       10.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       70.000     SCS Curve No or C
         .100     Ia/S Coefficient
       10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .036       .000       .000       .000 c.m/s
                .065       .786       .130     C perv/imperv/total
15      ADD RUNOFF
                .036       .036       .000       .000 c.m/s
 9      ROUTE
         .000     Conduit Length
         .000     No Conduit defined
       33.380     Zero lag
         .661     Beta weighting factor
       85.714     Routing timestep
            1     No. of sub-reaches
                .036       .036       .036       .000 c.m/s
20      MANUAL
```

Pond 3
Predevelopment
5 Year Storm

```
        Output File (4.7) HCBP3PRE.005 opened 2007-10-26  13:45
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    1593.000     Coefficient  a
      11.000     Constant  b    (min)
        .879     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                49.564 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     300.000     ID No.ó 99999
       5.650     Area in hectares
     125.000     Length (PERV) metres
       1.000     Gradient (%)
       9.000     Per cent Impervious
      10.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .129       .000       .000       .000 c.m/s
               .205       .832       .261     C perv/imperv/total
15      ADD RUNOFF
               .129       .129       .000       .000 c.m/s
 9      ROUTE
        .000     Conduit Length
        .000     No Conduit defined
      33.380     Zero lag
        .661     Beta weighting factor
      85.714     Routing timestep
            1     No. of sub-reaches
               .129       .129       .129       .000 c.m/s
20      MANUAL
```

Pond 3
Predevelopment
25 Year Storm

```
        Output File (4.7) HCBP3PRE.025 opened 2007-10-26  13:48
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    3158.000     Coefficient  a
      15.000     Constant  b    (min)
        .936     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                70.814 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     300.000     ID No.ó 99999
       5.650     Area in hectares
     125.000     Length (PERV) metres
       1.000     Gradient (%)
       9.000     Per cent Impervious
      10.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .198       .000       .000       .000 c.m/s
               .300       .841       .349     C perv/imperv/total
15      ADD RUNOFF
               .198       .198       .000       .000 c.m/s
 9      ROUTE
        .000     Conduit Length
        .000     No Conduit defined
      33.380     Zero lag
        .661     Beta weighting factor
      85.714     Routing timestep
            1     No. of sub-reaches
               .198       .198       .198       .000 c.m/s
20      MANUAL
```

Pond 3
Predevelopment
100 Year Storm

```
        Output File (4.7) HCBP3PRE.100 opened 2007-10-26  13:51
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    4688.000     Coefficient  a
      17.000     Constant  b    (min)
        .962     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                89.886 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     300.000     ID No.ó 99999
       5.650     Area in hectares
     125.000     Length (PERV) metres
       1.000     Gradient (%)
       9.000     Per cent Impervious
      10.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .334       .000       .000       .000 c.m/s
               .369       .842       .412     C perv/imperv/total
15      ADD RUNOFF
               .334       .334       .000       .000 c.m/s
 9      ROUTE
        .000     Conduit Length
        .000     No Conduit defined
      33.380     Zero lag
        .661     Beta weighting factor
      85.714     Routing timestep
            1     No. of sub-reaches
               .334       .334       .334       .000 c.m/s
20      MANUAL
```

Pond 3
Post Development
25mm Storm

```
        Output File (4.7) HCBP3PST.25M opened 2007-10-26  15:38
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            4     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
       25.000     Total depth of Rain
      180.000     Duration ó  720 min
       25.000     Time to peak  (min)
        6.000     Decay factor  K
                 25.000 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .015     Manning "n"
       98.000     SCS Curve No or C
         .100     Ia/S Coefficient
         .518     Initial Abstraction
 4      CATCHMENT
      301.000     ID No.ó 99999
        1.890     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
       65.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .091       .000       .000       .000 c.m/s
               .035       .800       .532     C perv/imperv/total
15      ADD RUNOFF
               .091       .091       .000       .000 c.m/s
 8      PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .525     Diameter in metres
         .500     Select Grade in %
        Depth         =      .197 metres
        Velocity      =     1.228 m/sec
        Pipe Capacity =      .304 c.m/s
        Critical depth=      .200 metres
 9      ROUTE
      170.000     Conduit Length
         .435     Supply X-factor <.5
      103.805     Supply K-lag (sec)
         .500     Beta weighting factor
      100.000     Routing timestep
            1     No. of sub-reaches
               .091       .091       .086       .000 c.m/s
16      NEXT LINK
               .091       .086       .086       .000 c.m/s
17      COMBINE
      31     Junction Node No.
               .091       .086       .086       .086 c.m/s
14      START
       1     1=Zero; 2=Define
 4      CATCHMENT
      302.000     ID No.ó 99999
        1.560     Area in hectares
       45.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       45.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
```

```
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .098       .000       .086       .086 c.m/s
              .035       .787       .674     C perv/imperv/total
 15     ADD RUNOFF
              .098       .098       .086       .086 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
        1.000     Select Grade in %
        Depth          =      .116 metres
        Velocity       =      .358 m/sec
        Flow Capacity  =    14.568 c.m/s
        Critical depth =      .061 metres
  9     ROUTE
      100.000     Conduit Length
         .467     Supply X-factor <.5
      209.285     Supply K-lag (sec)
         .500     Beta weighting factor
      200.000     Routing timestep
            1     No. of sub-reaches
              .098       .098       .092       .086 c.m/s
 16     NEXT LINK
              .098       .092       .092       .086 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .024     Pipe Manning's 'n'
         .800     Diameter in metres
         .500     Select Grade in %
        Depth         =      .230 metres
        Velocity      =      .765 m/sec
        Pipe Capacity =      .506 c.m/s
        Critical depth=      .177 metres
  9     ROUTE
       20.000     Conduit Length
         .000     Supply X-factor <.5
       19.617     Supply K-lag (sec)
         .553     Beta weighting factor
       42.857     Routing timestep
            1     No. of sub-reaches
              .098       .092       .091       .086 c.m/s
 17     COMBINE
      31     Junction Node No.
              .098       .092       .091       .177 c.m/s
 18     CONFLUENCE
      31     Junction Node No.
              .098       .177       .091       .000 c.m/s
  4     CATCHMENT
      303.000     ID No.ó 99999
        2.200     Area in hectares
       45.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       45.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .138       .177       .091       .000 c.m/s
              .035       .787       .674     C perv/imperv/total
 15     ADD RUNOFF
              .138       .315       .091       .000 c.m/s
 10     POND
      12 Depth - Discharge - Volume sets
           .000        .000          .0
           .100      .01000       144.0
           .200       .0120       307.0
```

```
          .300       .0140       488.0
          .400       .0160       698.0
          .500       .0170       961.0
         1.000       .0920      2322.0
         1.100        .187      2647.0
         1.200        .368      2990.0
         1.300        .612      3351.0
         1.400        .909      3730.0
         1.500       1.262      4128.0
       Peak Outflow    =      .016 c.m/s
       Maximum Depth   =      .422 metres
       Maximum Storage =      755. c.m
              .138       .315       .016       .000 c.m/s
16     NEXT LINK
              .138       .016       .016       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .375     Diameter in metres
        .500     Select Grade in %
       Depth         =      .092 metres
       Velocity      =      .776 m/sec
       Pipe Capacity =      .124 c.m/s
       Critical depth=      .090 metres
 9     ROUTE
      10.000     Conduit Length
        .026     Supply X-factor <.5
       9.664     Supply K-lag (sec)
        .500     Beta weighting factor
      18.750     Routing timestep
           1     No. of sub-reaches
              .138       .016       .016       .000 c.m/s
16     NEXT LINK
              .138       .016       .016       .000 c.m/s
11     CHANNEL
       1.000     Base Width     =
       2.000     Left  bank slope  1:
       2.000     Right bank slope  1:
        .060     Manning's "n"
        .600     O/a Depth in metres
        .500     Select Grade in %
       Depth          =      .075 metres
       Velocity       =      .189 m/sec
       Flow Capacity  =      .785 c.m/s
       Critical depth =      .029 metres
 9     ROUTE
      20.000     Conduit Length
        .283     Supply X-factor <.5
      79.310     Supply K-lag (sec)
        .500     Beta weighting factor
     100.000     Routing timestep
           1     No. of sub-reaches
              .138       .016       .016       .000 c.m/s
16     NEXT LINK
              .138       .016       .016       .000 c.m/s
22     FILE HYDROGRAPH
      2     1=READ: 2=WRITE
      8     490AREA3     .25M    is Filename
      3     1=Overland: 2=Inflow: 3=Outflow: 4=Temp'ary
            Area 3 25mm Discharge
              .138       .016       .016       .000 c.m/s
20     MANUAL
```

Pond 3
Post Development
5 Year Storm

```
        Output File (4.7) HCBP3PST.005 opened 2007-10-26  15:28
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    1593.000     Coefficient  a
      11.000     Constant  b    (min)
        .879     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                49.564 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     301.000     ID No.ó 99999
       1.890     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      65.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .253       .000       .000       .000 c.m/s
               .150       .882       .626     C perv/imperv/total
15      ADD RUNOFF
               .253       .253       .000       .000 c.m/s
 8      PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .525     Diameter in metres
        .500     Select Grade in %
        Depth         =      .366 metres
        Velocity      =     1.571 m/sec
        Pipe Capacity =      .304 c.m/s
        Critical depth=      .340 metres
 9      ROUTE
     170.000     Conduit Length
        .335     Supply X-factor <.5
      81.142     Supply K-lag (sec)
        .500     Beta weighting factor
     100.000     Routing timestep
            1     No. of sub-reaches
               .253       .253       .230       .000 c.m/s
16      NEXT LINK
               .253       .230       .230       .000 c.m/s
17      COMBINE
     31     Junction Node No.
               .253       .230       .230       .230 c.m/s
14      START
      1     1=Zero; 2=Define
 4      CATCHMENT
     302.000     ID No.ó 99999
       1.560     Area in hectares
      45.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      45.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
```

```
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .303       .000       .230       .230 c.m/s
              .150       .883       .774     C perv/imperv/total
 15     ADD RUNOFF
              .303       .303       .230       .230 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
        1.000     Select Grade in %
        Depth          =      .220 metres
        Velocity       =      .517 m/sec
        Flow Capacity  =    14.568 c.m/s
        Critical depth =      .124 metres
  9     ROUTE
      100.000     Conduit Length
         .439     Supply X-factor <.5
      145.150     Supply K-lag (sec)
         .500     Beta weighting factor
      150.000     Routing timestep
            1     No. of sub-reaches
              .303       .303       .247       .230 c.m/s
 16     NEXT LINK
              .303       .247       .247       .230 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .024     Pipe Manning's 'n'
         .800     Diameter in metres
         .500     Select Grade in %
        Depth         =      .394 metres
        Velocity      =     1.001 m/sec
        Pipe Capacity =      .506 c.m/s
        Critical depth=      .296 metres
  9     ROUTE
       20.000     Conduit Length
         .000     Supply X-factor <.5
       14.983     Supply K-lag (sec)
         .712     Beta weighting factor
       46.154     Routing timestep
            1     No. of sub-reaches
              .303       .247       .242       .230 c.m/s
 17     COMBINE
      31     Junction Node No.
              .303       .247       .242       .468 c.m/s
 18     CONFLUENCE
      31     Junction Node No.
              .303       .468       .242       .000 c.m/s
  4     CATCHMENT
      303.000     ID No.ó 99999
        2.200     Area in hectares
       45.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       45.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .427       .468       .242       .000 c.m/s
              .150       .883       .774     C perv/imperv/total
 15     ADD RUNOFF
              .427       .895       .242       .000 c.m/s
 10     POND
      12 Depth - Discharge - Volume sets
           .000        .000          .0
           .100      .01000       144.0
```

```
          .200       .0120       307.0
          .300       .0140       488.0
          .400       .0160       698.0
          .500       .0170       961.0
         1.000       .0920      2322.0
         1.100        .187      2647.0
         1.200        .368      2990.0
         1.300        .612      3351.0
         1.400        .909      3730.0
         1.500       1.262      4128.0
       Peak Outflow    =      .052 c.m/s
       Maximum Depth   =      .736 metres
       Maximum Storage =     1602. c.m
              .427       .895       .052       .000 c.m/s
 16    NEXT LINK
              .427       .052       .052       .000 c.m/s
  8    PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .375     Diameter in metres
        .500     Select Grade in %
       Depth         =      .170 metres
       Velocity      =     1.075 m/sec
       Pipe Capacity =      .124 c.m/s
       Critical depth=      .166 metres
  9    ROUTE
      10.000     Conduit Length
        .000     Supply X-factor <.5
       6.979     Supply K-lag (sec)
        .665     Beta weighting factor
      20.000     Routing timestep
           1     No. of sub-reaches
              .427       .052       .052       .000 c.m/s
 16    NEXT LINK
              .427       .052       .052       .000 c.m/s
 11    CHANNEL
       1.000     Base Width     =
       2.000     Left  bank slope  1:
       2.000     Right bank slope  1:
        .060     Manning's "n"
        .600     O/a Depth in metres
        .500     Select Grade in %
       Depth          =      .146 metres
       Velocity       =      .277 m/sec
       Flow Capacity  =      .785 c.m/s
       Critical depth =      .063 metres
  9    ROUTE
      20.000     Conduit Length
        .090     Supply X-factor <.5
      54.085     Supply K-lag (sec)
        .500     Beta weighting factor
      85.714     Routing timestep
           1     No. of sub-reaches
              .427       .052       .052       .000 c.m/s
 16    NEXT LINK
              .427       .052       .052       .000 c.m/s
 22    FILE HYDROGRAPH
      2     1=READ: 2=WRITE
      8     490AREA3     .5YR    is Filename
      3     1=Overland: 2=Inflow: 3=Outflow: 4=Temp'ary
            Area 3 5Yr Discharge
              .427       .052       .052       .000 c.m/s
 20    MANUAL
```

Pond 3
Post Development
25 Year Storm

```
        Output File (4.7) HCBP3PST.025 opened 2007-10-26  15:41
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    3158.000     Coefficient  a
      15.000     Constant  b    (min)
        .936     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                70.814 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     301.000     ID No.ó 99999
       1.890     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      65.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .393       .000       .000       .000 c.m/s
               .237       .909       .674     C perv/imperv/total
15      ADD RUNOFF
               .393       .393       .000       .000 c.m/s
 8      PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .525     Diameter in metres
        .500     Select Grade in %
        Surcharged HGL=      .834 %
        Velocity      =     1.814 m/sec
        Pipe Capacity =      .304 c.m/s
        Critical depth=      .423 metres
 9      ROUTE
     170.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
               .393       .393       .393       .000 c.m/s
16      NEXT LINK
               .393       .393       .393       .000 c.m/s
17      COMBINE
     31     Junction Node No.
               .393       .393       .393       .393 c.m/s
14      START
      1     1=Zero; 2=Define
 4      CATCHMENT
     302.000     ID No.ó 99999
       1.560     Area in hectares
      45.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      45.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
```

```
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .455       .000       .393       .393 c.m/s
              .238       .910       .809     C perv/imperv/total
 15     ADD RUNOFF
              .455       .455       .393       .393 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
        1.000     Select Grade in %
        Depth          =      .275 metres
        Velocity       =      .585 m/sec
        Flow Capacity  =    14.568 c.m/s
        Critical depth =      .160 metres
  9     ROUTE
      100.000     Conduit Length
         .425     Supply X-factor <.5
      128.247     Supply K-lag (sec)
         .500     Beta weighting factor
      120.000     Routing timestep
            1     No. of sub-reaches
              .455       .455       .384       .393 c.m/s
 16     NEXT LINK
              .455       .384       .384       .393 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .024     Pipe Manning's 'n'
         .800     Diameter in metres
         .500     Select Grade in %
        Depth         =      .521 metres
        Velocity      =     1.108 m/sec
        Pipe Capacity =      .506 c.m/s
        Critical depth=      .372 metres
  9     ROUTE
       20.000     Conduit Length
         .000     Supply X-factor <.5
       13.533     Supply K-lag (sec)
         .805     Beta weighting factor
       60.000     Routing timestep
            1     No. of sub-reaches
              .455       .384       .378       .393 c.m/s
 17     COMBINE
      31     Junction Node No.
              .455       .384       .378       .771 c.m/s
 18     CONFLUENCE
      31     Junction Node No.
              .455       .771       .378       .000 c.m/s
  4     CATCHMENT
      303.000     ID No.ó 99999
        2.200     Area in hectares
       45.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       45.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .641       .771       .378       .000 c.m/s
              .238       .910       .809     C perv/imperv/total
 15     ADD RUNOFF
              .641      1.412       .378       .000 c.m/s
 10     POND
      12 Depth - Discharge - Volume sets
           .000        .000          .0
           .100      .01000       144.0
```

```
          .200       .0120       307.0
          .300       .0140       488.0
          .400       .0160       698.0
          .500       .0170       961.0
         1.000       .0920      2322.0
         1.100        .187      2647.0
         1.200        .368      2990.0
         1.300        .612      3351.0
         1.400        .909      3730.0
         1.500       1.262      4128.0
       Peak Outflow    =      .107 c.m/s
       Maximum Depth   =     1.015 metres
       Maximum Storage =     2372. c.m
              .641      1.412       .107       .000 c.m/s
 16    NEXT LINK
              .641       .107       .107       .000 c.m/s
  8    PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .375     Diameter in metres
        .500     Select Grade in %
       Depth         =      .268 metres
       Velocity      =     1.263 m/sec
       Pipe Capacity =      .124 c.m/s
       Critical depth=      .240 metres
  9    ROUTE
      10.000     Conduit Length
        .000     Supply X-factor <.5
       5.940     Supply K-lag (sec)
        .823     Beta weighting factor
      30.000     Routing timestep
           1     No. of sub-reaches
              .641       .107       .107       .000 c.m/s
 16    NEXT LINK
              .641       .107       .107       .000 c.m/s
 11    CHANNEL
       1.000     Base Width     =
       2.000     Left  bank slope  1:
       2.000     Right bank slope  1:
        .060     Manning's "n"
        .600     O/a Depth in metres
        .500     Select Grade in %
       Depth          =      .216 metres
       Velocity       =      .344 m/sec
       Flow Capacity  =      .785 c.m/s
       Critical depth =      .098 metres
  9    ROUTE
      20.000     Conduit Length
        .000     Supply X-factor <.5
      43.629     Supply K-lag (sec)
        .544     Beta weighting factor
      85.714     Routing timestep
           1     No. of sub-reaches
              .641       .107       .106       .000 c.m/s
 16    NEXT LINK
              .641       .106       .106       .000 c.m/s
 22    FILE HYDROGRAPH
      2     1=READ: 2=WRITE
      8     490AREA3     .25Y    is Filename
      3     1=Overland: 2=Inflow: 3=Outflow: 4=Temp'ary
            Area 3 25Yr Discharge
              .641       .106       .106       .000 c.m/s
 20    MANUAL
```

Pond 3
Post Development
100 Year Storm

```
        Output File (4.7) HCBP3PST.100 opened 2007-10-26  15:47
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    4688.000     Coefficient  a
      17.000     Constant  b    (min)
        .962     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                89.886 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     301.000     ID No.ó 99999
       1.890     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      65.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .518       .000       .000       .000 c.m/s
               .303       .927       .709     C perv/imperv/total
15      ADD RUNOFF
               .518       .518       .000       .000 c.m/s
 8      PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .525     Diameter in metres
        .500     Select Grade in %
        Surcharged HGL=     1.453 %
        Velocity      =     2.395 m/sec
        Pipe Capacity =      .304 c.m/s
        Critical depth=      .472 metres
 9      ROUTE
     170.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
               .518       .518       .518       .000 c.m/s
16      NEXT LINK
               .518       .518       .518       .000 c.m/s
17      COMBINE
      31     Junction Node No.
               .518       .518       .518       .518 c.m/s
14      START
       1     1=Zero; 2=Define
 4      CATCHMENT
     302.000     ID No.ó 99999
       1.560     Area in hectares
      45.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      45.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
```

```
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .593       .000       .518       .518 c.m/s
              .303       .922       .829     C perv/imperv/total
 15     ADD RUNOFF
              .593       .593       .518       .518 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
        1.000     Select Grade in %
        Depth          =      .317 metres
        Velocity       =      .633 m/sec
        Flow Capacity  =    14.568 c.m/s
        Critical depth =      .188 metres
  9     ROUTE
      100.000     Conduit Length
         .415     Supply X-factor <.5
      118.574     Supply K-lag (sec)
         .500     Beta weighting factor
      120.000     Routing timestep
            1     No. of sub-reaches
              .593       .593       .510       .518 c.m/s
 16     NEXT LINK
              .593       .510       .510       .518 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .024     Pipe Manning's 'n'
         .800     Diameter in metres
         .500     Select Grade in %
        Surcharged HGL=      .507 %
        Velocity      =     1.015 m/sec
        Pipe Capacity =      .506 c.m/s
        Critical depth=      .432 metres
  9     ROUTE
       20.000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              .593       .510       .510       .518 c.m/s
 17     COMBINE
      31     Junction Node No.
              .593       .510       .510      1.028 c.m/s
 18     CONFLUENCE
      31     Junction Node No.
              .593      1.028       .510       .000 c.m/s
  4     CATCHMENT
      303.000     ID No.ó 99999
        2.200     Area in hectares
       45.000     Length (PERV) metres
        1.000     Gradient (%)
       85.000     Per cent Impervious
       45.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .836      1.028       .510       .000 c.m/s
              .303       .922       .829     C perv/imperv/total
 15     ADD RUNOFF
              .836      1.864       .510       .000 c.m/s
 10     POND
      12 Depth - Discharge - Volume sets
           .000        .000          .0
           .100      .01000       144.0
```

```
          .200       .0120       307.0
          .300       .0140       488.0
          .400       .0160       698.0
          .500       .0170       961.0
         1.000       .0920      2322.0
         1.100        .187      2647.0
         1.200        .368      2990.0
         1.300        .612      3351.0
         1.400        .909      3730.0
         1.500       1.262      4128.0
       Peak Outflow    =      .289 c.m/s
       Maximum Depth   =     1.157 metres
       Maximum Storage =     2841. c.m
              .836      1.864       .289       .000 c.m/s
16     NEXT LINK
              .836       .289       .289       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .375     Diameter in metres
        .500     Select Grade in %
       Surcharged HGL=     2.725 %
       Velocity      =     2.621 m/sec
       Pipe Capacity =      .124 c.m/s
       Critical depth=      .359 metres
 9     ROUTE
      10.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
              .836       .289       .289       .000 c.m/s
16     NEXT LINK
              .836       .289       .289       .000 c.m/s
11     CHANNEL
       1.000     Base Width     =
       2.000     Left  bank slope  1:
       2.000     Right bank slope  1:
        .060     Manning's "n"
        .600     O/a Depth in metres
        .500     Select Grade in %
       Depth          =      .366 metres
       Velocity       =      .456 m/sec
       Flow Capacity  =      .785 c.m/s
       Critical depth =      .180 metres
 9     ROUTE
      20.000     Conduit Length
        .000     Supply X-factor <.5
      32.901     Supply K-lag (sec)
        .667     Beta weighting factor
      85.714     Routing timestep
           1     No. of sub-reaches
              .836       .289       .288       .000 c.m/s
16     NEXT LINK
              .836       .288       .288       .000 c.m/s
22     FILE HYDROGRAPH
      2     1=READ: 2=WRITE
      8     490AREA3     .HYR    is Filename
      3     1=Overland: 2=Inflow: 3=Outflow: 4=Temp'ary
            Area 3 100Y Discharge
              .836       .288       .288       .000 c.m/s
20     MANUAL
```

Pond 4
Predevelopment
25mm Storm

```
        Output File (4.7) HCBP4PRE.25M opened 2008-03-25  17:43
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            4     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
       25.000     Total depth of Rain
      180.000     Duration ó  720 min
       25.000     Time to peak  (min)
        6.000     Decay factor  K
                 25.000 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .015     Manning "n"
       98.000     SCS Curve No or C
         .100     Ia/S Coefficient
         .518     Initial Abstraction
 4      CATCHMENT
      803.000     ID No.ó 99999
        4.440     Area in hectares
      100.000     Length (PERV) metres
        2.000     Gradient (%)
        2.000     Per cent Impervious
      100.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       70.000     SCS Curve No or C
         .100     Ia/S Coefficient
       10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .007       .000       .000       .000 c.m/s
               .065       .789       .079     C perv/imperv/total
15      ADD RUNOFF
               .007       .007       .000       .000 c.m/s
 8      PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .024     Pipe Manning's 'n'
         .500     Diameter in metres
        1.000     Select Grade in %
        Depth         =      .062 metres
        Velocity      =      .479 m/sec
        Pipe Capacity =      .205 c.m/s
        Critical depth=      .053 metres
 9      ROUTE
       15.000     Conduit Length
         .398     Supply X-factor <.5
       23.492     Supply K-lag (sec)
         .500     Beta weighting factor
       27.273     Routing timestep
            1     No. of sub-reaches
               .007       .007       .007       .000 c.m/s
16      NEXT LINK
               .007       .007       .007       .000 c.m/s
 4      CATCHMENT
      400.000     ID No.ó 99999
       75.420     Area in hectares
      300.000     Length (PERV) metres
        2.000     Gradient (%)
        2.000     Per cent Impervious
      300.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       70.000     SCS Curve No or C
         .100     Ia/S Coefficient
       10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .107       .007       .007       .000 c.m/s
               .065       .802       .079     C perv/imperv/total
15      ADD RUNOFF
               .107       .112       .007       .000 c.m/s
```

```
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .500     Select Grade in %
        Depth          =      .153 metres
        Velocity       =      .298 m/sec
        Flow Capacity  =    10.301 c.m/s
        Critical depth =      .066 metres
  9     ROUTE
         .000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
               .107       .112       .112       .000 c.m/s
 16     NEXT LINK
               .107       .112       .112       .000 c.m/s
 20     MANUAL
```

Pond 4
Predevelopment
5 Year Storm

```
        Output File (4.7) HCBP4PRE.5   opened 2008-03-25  17:41
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    1593.000     Coefficient  a
      11.000     Constant  b    (min)
        .879     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                49.564 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     803.000     ID No.ó 99999
       4.440     Area in hectares
     100.000     Length (PERV) metres
       2.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .065       .000       .000       .000 c.m/s
               .204       .881       .218     C perv/imperv/total
15      ADD RUNOFF
               .065       .065       .000       .000 c.m/s
 8      PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .024     Pipe Manning's 'n'
        .500     Diameter in metres
       1.000     Select Grade in %
       Depth         =      .194 metres
       Velocity      =      .926 m/sec
       Pipe Capacity =      .205 c.m/s
       Critical depth=      .171 metres
 9      ROUTE
      15.000     Conduit Length
        .138     Supply X-factor <.5
      12.144     Supply K-lag (sec)
        .500     Beta weighting factor
      20.690     Routing timestep
            1     No. of sub-reaches
               .065       .065       .065       .000 c.m/s
16      NEXT LINK
               .065       .065       .065       .000 c.m/s
 4      CATCHMENT
     400.000     ID No.ó 99999
      75.420     Area in hectares
     300.000     Length (PERV) metres
       2.000     Gradient (%)
       2.000     Per cent Impervious
     300.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .667       .065       .065       .000 c.m/s
               .205       .884       .218     C perv/imperv/total
15      ADD RUNOFF
```

```
                .667       .711       .065       .000 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .500     Select Grade in %
        Depth          =      .419 metres
        Velocity       =      .521 m/sec
        Flow Capacity  =    10.301 c.m/s
        Critical depth =      .210 metres
  9     ROUTE
         .000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
                .667       .711       .711       .000 c.m/s
 16     NEXT LINK
                .667       .711       .711       .000 c.m/s
 20     MANUAL
```

Pond 4
Predevelopment
25 Year Storm

```
        O          Output File (4.7) HCBP4PRE.25  opened 2008-03-25  17:39
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    3158.000     Coefficient  a
      15.000     Constant  b    (min)
        .936     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                70.814 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     803.000     ID No.ó 99999
       4.440     Area in hectares
     100.000     Length (PERV) metres
       2.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .182       .000       .000       .000 c.m/s
               .300       .912       .312     C perv/imperv/total
15      ADD RUNOFF
               .182       .182       .000       .000 c.m/s
 8      PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .024     Pipe Manning's 'n'
        .500     Diameter in metres
       1.000     Select Grade in %
       Depth         =      .368 metres
       Velocity      =     1.177 m/sec
       Pipe Capacity =      .205 c.m/s
       Critical depth=      .291 metres
 9      ROUTE
      15.000     Conduit Length
        .000     Supply X-factor <.5
       9.556     Supply K-lag (sec)
        .671     Beta weighting factor
      28.571     Routing timestep
            1     No. of sub-reaches
               .182       .182       .182       .000 c.m/s
16      NEXT LINK
               .182       .182       .182       .000 c.m/s
 4      CATCHMENT
     400.000     ID No.ó 99999
      75.420     Area in hectares
     300.000     Length (PERV) metres
       2.000     Gradient (%)
       2.000     Per cent Impervious
     300.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             1.923       .182       .182       .000 c.m/s
               .300       .901       .312     C perv/imperv/total
15      ADD RUNOFF
```

```
              1.923      2.034       .182       .000 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .500     Select Grade in %
        Depth          =      .710 metres
        Velocity       =      .694 m/sec
        Flow Capacity  =    10.301 c.m/s
        Critical depth =      .386 metres
  9     ROUTE
         .000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              1.923      2.034      2.034       .000 c.m/s
 16     NEXT LINK
              1.923      2.034      2.034       .000 c.m/s
 20     MANUAL
```

Pond 4
Predevelopment
100 Year Storm

```
        Output File (4.7) HCBP4PRE.100 opened 2008-03-25  17:36
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    4688.000     Coefficient  a
      17.000     Constant  b    (min)
        .962     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                89.886 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     803.000     ID No.ó 99999
       4.440     Area in hectares
     100.000     Length (PERV) metres
       2.000     Gradient (%)
       2.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .333       .000       .000       .000 c.m/s
               .370       .929       .381     C perv/imperv/total
15      ADD RUNOFF
               .333       .333       .000       .000 c.m/s
 8      PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .024     Pipe Manning's 'n'
        .500     Diameter in metres
       1.000     Select Grade in %
       Surcharged HGL=     2.657 %
       Velocity      =     1.698 m/sec
       Pipe Capacity =      .205 c.m/s
       Critical depth=      .395 metres
 9      ROUTE
      15.000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
        .000     Routing timestep
            1     No. of sub-reaches
               .333       .333       .333       .000 c.m/s
16      NEXT LINK
               .333       .333       .333       .000 c.m/s
 4      CATCHMENT
     400.000     ID No.ó 99999
      75.420     Area in hectares
     300.000     Length (PERV) metres
       2.000     Gradient (%)
       2.000     Per cent Impervious
     300.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              3.557       .333       .333       .000 c.m/s
               .369       .920       .380     C perv/imperv/total
15      ADD RUNOFF
```

```
              3.557      3.757       .333       .000 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        1.500     O/a Depth in metres
         .500     Select Grade in %
        Depth          =      .950 metres
        Velocity       =      .815 m/sec
        Flow Capacity  =    10.301 c.m/s
        Critical depth =      .541 metres
  9     ROUTE
         .000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
         .000     Routing timestep
            1     No. of sub-reaches
              3.557      3.757      3.757       .000 c.m/s
 16     NEXT LINK
              3.557      3.757      3.757       .000 c.m/s
 20     MANUAL
```

Pond 4
Post Development
25mm Storm

```
        Output File (4.7) HCBP4PST.25M opened 2008-03-25  16:54
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            4     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
       25.000     Total depth of Rain
      180.000     Duration ó  720 min
       25.000     Time to peak  (min)
        6.000     Decay factor  K
                 25.000 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .015     Manning "n"
       98.000     SCS Curve No or C
         .100     Ia/S Coefficient
         .518     Initial Abstraction
 4      CATCHMENT
      803.000     ID No.ó 99999
        4.440     Area in hectares
      100.000     Length (PERV) metres
        2.000     Gradient (%)
        5.000     Per cent Impervious
      100.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       70.000     SCS Curve No or C
         .100     Ia/S Coefficient
       10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .017       .000       .000       .000 c.m/s
                .065       .789       .101     C perv/imperv/total
15      ADD RUNOFF
                .017       .017       .000       .000 c.m/s
 8      PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .525     Diameter in metres
        1.000     Select Grade in %
        Depth         =      .071 metres
        Velocity      =      .961 m/sec
        Pipe Capacity =      .430 c.m/s
        Critical depth=      .084 metres
 9      ROUTE
      243.000     Conduit Length
         .493     Supply X-factor <.5
      189.686     Supply K-lag (sec)
         .500     Beta weighting factor
      150.000     Routing timestep
            1     No. of sub-reaches
                .017       .017       .015       .000 c.m/s
16      NEXT LINK
                .017       .015       .015       .000 c.m/s
 4      CATCHMENT
      413.000     ID No.ó 99999
        5.240     Area in hectares
       90.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .335       .015       .015       .000 c.m/s
                .035       .785       .672     C perv/imperv/total
15      ADD RUNOFF
                .335       .350       .015       .000 c.m/s
```

```
 10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       1.275         1.0
          .020       1.276     10000.0
       Peak Outflow    =      .350 c.m/s
       Maximum Depth   =      .003 metres
       Maximum Storage =        0. c.m
              .335       .350       .350       .000 c.m/s
 16     NEXT LINK
              .335       .350       .350       .000 c.m/s
  8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.350     Diameter in metres
        .500     Select Grade in %
       Depth         =      .278 metres
       Velocity      =     1.649 m/sec
       Pipe Capacity =     3.774 c.m/s
       Critical depth=      .304 metres
  9     ROUTE
      68.000     Conduit Length
        .296     Supply X-factor <.5
      30.924     Supply K-lag (sec)
        .500     Beta weighting factor
      42.857     Routing timestep
           1     No. of sub-reaches
              .335       .350       .345       .000 c.m/s
 17     COMBINE
     47     Junction Node No.
              .335       .350       .345       .345 c.m/s
 14     START
      1     1=Zero; 2=Define
  4     CATCHMENT
     412.000     ID No.ó 99999
       8.200     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      72.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .444       .000       .345       .345 c.m/s
              .035       .785       .575     C perv/imperv/total
 15     ADD RUNOFF
              .444       .444       .345       .345 c.m/s
 10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       1.476         1.0
          .020       1.477     10000.0
       Peak Outflow    =      .444 c.m/s
       Maximum Depth   =      .003 metres
       Maximum Storage =        0. c.m
              .444       .444       .444       .345 c.m/s
 16     NEXT LINK
              .444       .444       .444       .345 c.m/s
  8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.200     Diameter in metres
        .500     Select Grade in %
       Depth         =      .326 metres
       Velocity      =     1.789 m/sec
       Pipe Capacity =     2.757 c.m/s
       Critical depth=      .355 metres
```

```
 9     ROUTE
     217.000     Conduit Length
        .421     Supply X-factor <.5
      90.956     Supply K-lag (sec)
        .500     Beta weighting factor
     100.000     Routing timestep
          1      No. of sub-reaches
              .444       .444       .426       .345 c.m/s
17     COMBINE
     47     Junction Node No.
              .444       .444       .426       .771 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     414.000     ID No.ó 99999
       7.010     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .448       .000       .426       .771 c.m/s
              .035       .785       .672     C perv/imperv/total
15     ADD RUNOFF
              .448       .448       .426       .771 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       1.262         1.0
          .020       1.263     10000.0
       Peak Outflow    =      .448 c.m/s
       Maximum Depth   =      .004 metres
       Maximum Storage =        0. c.m
              .448       .448       .448       .771 c.m/s
16     NEXT LINK
              .448       .448       .448       .771 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .975     Diameter in metres
        .500     Select Grade in %
       Depth         =      .355 metres
       Velocity      =     1.825 m/sec
       Pipe Capacity =     1.585 c.m/s
       Critical depth=      .380 metres
 9     ROUTE
      66.000     Conduit Length
        .202     Supply X-factor <.5
      27.119     Supply K-lag (sec)
        .500     Beta weighting factor
      42.857     Routing timestep
          1      No. of sub-reaches
              .448       .448       .443       .771 c.m/s
17     COMBINE
     47     Junction Node No.
              .448       .448       .443      1.214 c.m/s
18     CONFLUENCE
     47     Junction Node No.
              .448      1.214       .443       .000 c.m/s
 4     CATCHMENT
     415.000     ID No.ó 99999
       2.410     Area in hectares
      75.000     Length (PERV) metres
        .500     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
```

```
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .132      1.214       .443       .000 c.m/s
               .035       .801       .610     C perv/imperv/total
 15     ADD RUNOFF
               .132      1.346       .443       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.650     Diameter in metres
         .500     Select Grade in %
        Depth         =      .512 metres
        Velocity      =     2.381 m/sec
        Pipe Capacity =     6.445 c.m/s
        Critical depth=      .574 metres
  9     ROUTE
       16.000     Conduit Length
         .000     Supply X-factor <.5
        5.040     Supply K-lag (sec)
         .779     Beta weighting factor
       22.222     Routing timestep
            1     No. of sub-reaches
               .132      1.346      1.343       .000 c.m/s
 16     NEXT LINK
               .132      1.343      1.343       .000 c.m/s
 11     CHANNEL
        2.000     Base Width     =
        3.000     Left  bank slope  1:
        3.000     Right bank slope  1:
         .060     Manning's "n"
        2.000     O/a Depth in metres
         .300     Select Grade in %
        Depth          =      .657 metres
        Velocity       =      .515 m/sec
        Flow Capacity  =    15.491 c.m/s
        Critical depth =      .305 metres
  9     ROUTE
      340.000     Conduit Length
         .342     Supply X-factor <.5
      495.177     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
               .132      1.343      1.259       .000 c.m/s
 17     COMBINE
      46     Junction Node No.
               .132      1.343      1.259      1.259 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      416.000     ID No.ó 99999
        5.950     Area in hectares
      100.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
      100.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .380       .000      1.259      1.259 c.m/s
               .035       .789       .676     C perv/imperv/total
 15     ADD RUNOFF
               .380       .380      1.259      1.259 c.m/s
```

```
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       1.071         1.0
          .020       1.072     10000.0
       Peak Outflow    =      .380 c.m/s
       Maximum Depth   =      .004 metres
       Maximum Storage =        0. c.m
              .380       .380       .380      1.259 c.m/s
17     COMBINE
     46     Junction Node No.
              .380       .380       .380      1.527 c.m/s
18     CONFLUENCE
     46     Junction Node No.
              .380      1.527       .380       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       2.000     O/a Depth in metres
        .300     Select Grade in %
       Depth          =      .699 metres
       Velocity       =      .533 m/sec
       Flow Capacity  =    15.491 c.m/s
       Critical depth =      .329 metres
 9     ROUTE
     340.000     Conduit Length
        .334     Supply X-factor <.5
     478.443     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
           1     No. of sub-reaches
              .380      1.527      1.438       .000 c.m/s
17     COMBINE
     45     Junction Node No.
              .380      1.527      1.438      1.438 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     401.000     ID No.ó 99999
      11.680     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      80.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .703       .000      1.438      1.438 c.m/s
              .035       .785       .635     C perv/imperv/total
15     ADD RUNOFF
              .703       .703      1.438      1.438 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       2.102         1.0
          .020       2.103     10000.0
       Peak Outflow    =      .703 c.m/s
       Maximum Depth   =      .003 metres
       Maximum Storage =        0. c.m
              .703       .703       .703      1.438 c.m/s
17     COMBINE
     41     Junction Node No.
              .703       .703       .703       .703 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     402.000     ID No.ó 99999
```

```
         4.650     Area in hectares
        90.000     Length (PERV) metres
         2.000     Gradient (%)
        85.000     Per cent Impervious
        90.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .350     Manning "n"
        65.000     SCS Curve No or C
          .100     Ia/S Coefficient
        13.677     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .297       .000       .703       .703 c.m/s
               .035       .785       .672     C perv/imperv/total
15      ADD RUNOFF
               .297       .297       .703       .703 c.m/s
10      POND
        3 Depth - Discharge - Volume sets
            .000        .000          .0
            .010        .837         1.0
            .020        .838     10000.0
         Peak Outflow    =      .297 c.m/s
         Maximum Depth   =      .004 metres
         Maximum Storage =        0. c.m
               .297       .297       .297       .703 c.m/s
17      COMBINE
       41     Junction Node No.
               .297       .297       .297      1.000 c.m/s
18      CONFLUENCE
       41     Junction Node No.
               .297      1.000       .297       .000 c.m/s
 8      PIPE
          .500     Minimum velocity  m/sec
         4.000     Maximum velocity  m/sec
          .013     Pipe Manning's 'n'
         1.350     Diameter in metres
          .500     Select Grade in %
         Depth         =      .474 metres
         Velocity      =     2.227 m/sec
         Pipe Capacity =     3.774 c.m/s
         Critical depth=      .523 metres
 9      ROUTE
       233.000     Conduit Length
          .388     Supply X-factor <.5
        78.464     Supply K-lag (sec)
          .500     Beta weighting factor
        85.714     Routing timestep
            1      No. of sub-reaches
               .297      1.000       .965       .000 c.m/s
17      COMBINE
       42     Junction Node No.
               .297      1.000       .965       .965 c.m/s
14      START
        1     1=Zero; 2=Define
 4      CATCHMENT
       403.000     ID No.ó 99999
        10.410     Area in hectares
        90.000     Length (PERV) metres
         1.000     Gradient (%)
        85.000     Per cent Impervious
        90.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .350     Manning "n"
        65.000     SCS Curve No or C
          .100     Ia/S Coefficient
        13.677     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .658       .000       .965       .965 c.m/s
               .035       .800       .685     C perv/imperv/total
15      ADD RUNOFF
               .658       .658       .965       .965 c.m/s
10      POND
```

```
        3 Depth - Discharge - Volume sets
            .000        .000          .0
            .010       1.874         1.0
            .020       1.875     10000.0
        Peak Outflow    =      .658 c.m/s
        Maximum Depth   =      .004 metres
        Maximum Storage =        0. c.m
                .658       .658       .658       .965 c.m/s
 17     COMBINE
      42     Junction Node No.
                .658       .658       .658      1.623 c.m/s
 18     CONFLUENCE
      42     Junction Node No.
                .658      1.623       .658       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.800     Diameter in metres
         .300     Select Grade in %
        Depth         =      .623 metres
        Velocity      =     2.074 m/sec
        Pipe Capacity =     6.296 c.m/s
        Critical depth=      .617 metres
  9     ROUTE
      177.000     Conduit Length
         .177     Supply X-factor <.5
       64.009     Supply K-lag (sec)
         .500     Beta weighting factor
      100.000     Routing timestep
            1     No. of sub-reaches
                .658      1.623      1.566       .000 c.m/s
 17     COMBINE
      43     Junction Node No.
                .658      1.623      1.566      1.566 c.m/s
 14     START
       1     1=Zero; 2=Define


  4     CATCHMENT
      404.000     ID No.ó 99999
        1.440     Area in hectares
       75.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .091       .000      1.566      1.566 c.m/s
                .035       .786       .673     C perv/imperv/total
 15     ADD RUNOFF
                .091       .091      1.566      1.566 c.m/s
 10     POND
        3 Depth - Discharge - Volume sets
            .000        .000          .0
            .010        .259         1.0
            .020        .260     10000.0
        Peak Outflow    =      .091 c.m/s
        Maximum Depth   =      .004 metres
        Maximum Storage =        0. c.m
                .091       .091       .091      1.566 c.m/s
 17     COMBINE
      43     Junction Node No.
                .091       .091       .091      1.657 c.m/s
 18     CONFLUENCE
      43     Junction Node No.
                .091      1.657       .091       .000 c.m/s
  4     CATCHMENT
```

```
      405.000     ID No.ó 99999
        2.120     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .119      1.657       .091       .000 c.m/s
              .035       .793       .603     C perv/imperv/total
 15     ADD RUNOFF
              .119      1.776       .091       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.800     Diameter in metres
         .300     Select Grade in %
        Depth         =      .654 metres
        Velocity      =     2.127 m/sec
        Pipe Capacity =     6.296 c.m/s
        Critical depth=      .646 metres
  9     ROUTE
       77.000     Conduit Length
         .000     Supply X-factor <.5
       27.157     Supply K-lag (sec)
         .616     Beta weighting factor
       66.667     Routing timestep
           1      No. of sub-reaches
              .119      1.776      1.748       .000 c.m/s
 17     COMBINE
      44     Junction Node No.
              .119      1.776      1.748      1.748 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      406.000     ID No.ó 99999
         .330     Area in hectares
       75.000     Length (PERV) metres
        1.000     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .019       .000      1.748      1.748 c.m/s
              .035       .793       .603     C perv/imperv/total
 15     ADD RUNOFF
              .019       .019      1.748      1.748 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .375     Diameter in metres
        1.000     Select Grade in %
        Depth         =      .082 metres
        Velocity      =     1.033 m/sec
        Pipe Capacity =      .175 c.m/s
        Critical depth=      .097 metres
  9     ROUTE
       65.000     Conduit Length
         .468     Supply X-factor <.5
       47.214     Supply K-lag (sec)
         .500     Beta weighting factor
```

```
       50.000     Routing timestep
            1     No. of sub-reaches
              .019       .019       .018      1.748 c.m/s
17     COMBINE
     44     Junction Node No.
              .019       .019       .018      1.766 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     407.000     ID No.ó 99999
       2.450     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
       2.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      50.000     SCS Curve No or C
        .100     Ia/S Coefficient
      25.400     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .004       .000       .018      1.766 c.m/s
              .000       .800       .016     C perv/imperv/total
15     ADD RUNOFF
              .004       .004       .018      1.766 c.m/s
 9     ROUTE
        .000     Conduit Length
        .500     Supply X-factor <.5
        .000     Supply K-lag (sec)
        .500     Beta weighting factor
     600.000     Routing timestep
            1     No. of sub-reaches
              .004       .004       .004      1.766 c.m/s
16     NEXT LINK
              .004       .004       .004      1.766 c.m/s
 4     CATCHMENT
     408.000     ID No.ó 99999
       3.410     Area in hectares
      75.000     Length (PERV) metres
       2.000     Gradient (%)
      40.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .102       .004       .004      1.766 c.m/s
              .035       .786       .335     C perv/imperv/total
15     ADD RUNOFF
              .102       .106       .004      1.766 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .900     Diameter in metres
        .200     Select Grade in %
       Depth         =      .219 metres
       Velocity      =      .879 m/sec
       Pipe Capacity =      .810 c.m/s
       Critical depth=      .184 metres
 9     ROUTE
      76.000     Conduit Length
        .127     Supply X-factor <.5
      64.846     Supply K-lag (sec)
        .500     Beta weighting factor
     100.000     Routing timestep
            1     No. of sub-reaches
              .102       .106       .103      1.766 c.m/s
17     COMBINE
```

```
     44     Junction Node No.
              .102       .106       .103      1.869 c.m/s
18     CONFLUENCE
     44     Junction Node No.
              .102      1.869       .103       .000 c.m/s
 4     CATCHMENT
     409.000     ID No.ó 99999
       1.100     Area in hectares
      75.000     Length (PERV) metres
        .800     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .062      1.869       .103       .000 c.m/s
              .035       .798       .607     C perv/imperv/total
15     ADD RUNOFF
              .062      1.931       .103       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.800     Diameter in metres
        .330     Select Grade in %
       Depth         =      .667 metres
       Velocity      =     2.252 m/sec
       Pipe Capacity =     6.603 c.m/s
       Critical depth=      .675 metres
 9     ROUTE
     237.000     Conduit Length
        .263     Supply X-factor <.5
      78.920     Supply K-lag (sec)
        .500     Beta weighting factor
     100.000     Routing timestep
           1     No. of sub-reaches
              .062      1.931      1.839       .000 c.m/s
17     COMBINE
     45     Junction Node No.
              .062      1.931      1.839      3.021 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     410.000     ID No.ó 99999
       4.930     Area in hectares
      75.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .313       .000      1.839      3.021 c.m/s
              .035       .786       .673     C perv/imperv/total
15     ADD RUNOFF
              .313       .313      1.839      3.021 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010        .887         1.0
          .020        .888     10000.0
       Peak Outflow    =      .313 c.m/s
       Maximum Depth   =      .004 metres
       Maximum Storage =        0. c.m
              .313       .313       .313      3.021 c.m/s
```

```
16     NEXT LINK
              .313       .313       .313      3.021 c.m/s
 4     CATCHMENT
     411.000     ID No.ó 99999
        .600     Area in hectares
      75.000     Length (PERV) metres
        .500     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .033       .313       .313      3.021 c.m/s
              .035       .801       .610     C perv/imperv/total
15     ADD RUNOFF
              .033       .346       .313      3.021 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .750     Diameter in metres
       1.000     Select Grade in %
       Depth         =      .287 metres
       Velocity      =     2.224 m/sec
       Pipe Capacity =     1.113 c.m/s
       Critical depth=      .359 metres
 9     ROUTE
      20.000     Conduit Length
        .100     Supply X-factor <.5
       6.745     Supply K-lag (sec)
        .500     Beta weighting factor
      12.000     Routing timestep
           1     No. of sub-reaches
              .033       .346       .345      3.021 c.m/s
17     COMBINE
     45     Junction Node No.
              .033       .346       .345      3.273 c.m/s
18     CONFLUENCE
     45     Junction Node No.
              .033      3.273       .345       .000 c.m/s
 4     CATCHMENT
     417.000     ID No.ó 99999
       3.490     Area in hectares
      30.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      30.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .213      3.273       .345       .000 c.m/s
              .035       .801       .686     C perv/imperv/total
15     ADD RUNOFF
              .213      3.432       .345       .000 c.m/s
10     POND
     13 Depth - Discharge - Volume sets
          .000        .000          .0
          .100       .0610      2035.0
          .200       .0750      4111.0
          .300       .0870      6227.0
          .500        .106     10581.0
         1.000        .729     22403.0
         1.400        .841     32935.0
         1.500        .958     35960.0
         1.600       1.161     38469.0
```

```
          1.700       1.425     41298.0
          1.800       2.015     44177.0
          1.900       2.918     47106.0
          2.000       4.045     50085.0
        Peak Outflow    =      .109 c.m/s
        Maximum Depth   =      .503 metres
        Maximum Storage =    10642. c.m
               .213      3.432       .109       .000 c.m/s
 16     NEXT LINK
               .213       .109       .109       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .825     Diameter in metres
         .500     Select Grade in %
        Depth         =      .183 metres
        Velocity      =     1.240 m/sec
        Pipe Capacity =     1.015 c.m/s
        Critical depth=      .192 metres
  9     ROUTE
       35.000     Conduit Length
         .235     Supply X-factor <.5
       21.164     Supply K-lag (sec)
         .500     Beta weighting factor
       31.579     Routing timestep
            1     No. of sub-reaches
               .213       .109       .109       .000 c.m/s
 16     NEXT LINK
               .213       .109       .109       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .900     Diameter in metres
         .300     Select Grade in %
        Depth         =      .202 metres
        Velocity      =     1.025 m/sec
        Pipe Capacity =      .992 c.m/s
        Critical depth=      .188 metres
  9     ROUTE
      295.000     Conduit Length
         .442     Supply X-factor <.5
      215.854     Supply K-lag (sec)
         .500     Beta weighting factor
      200.000     Routing timestep
            1     No. of sub-reaches
               .213       .109       .109       .000 c.m/s
 20     MANUAL
```

Pond 4
Post Development
5 Year Storm

```
        Output File (4.7) HCBP4PST.5   opened 2008-03-25  16:37
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
   1593.000     Coefficient  a
     11.000     Constant  b    (min)
       .879     Exponent  c
       .375     Fraction to peak  r
    240.000     Duration ó  720 min
               49.564 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .015     Manning "n"
     98.000     SCS Curve No or C
       .100     Ia/S Coefficient
       .518     Initial Abstraction
 4      CATCHMENT
    803.000     ID No.ó 99999
      4.440     Area in hectares
    100.000     Length (PERV) metres
      2.000     Gradient (%)
      5.000     Per cent Impervious
    100.000     Length (IMPERV)
       .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .350     Manning "n"
     70.000     SCS Curve No or C
       .100     Ia/S Coefficient
     10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .066       .000       .000       .000 c.m/s
              .204       .881       .238     C perv/imperv/total
15      ADD RUNOFF
              .066       .066       .000       .000 c.m/s
 8      PIPE
       .500     Minimum velocity  m/sec
      4.000     Maximum velocity  m/sec
       .013     Pipe Manning's 'n'
       .525     Diameter in metres
      1.000     Select Grade in %
      Depth         =      .139 metres
      Velocity      =     1.441 m/sec
      Pipe Capacity =      .430 c.m/s
      Critical depth=      .169 metres
 9      ROUTE
    243.000     Conduit Length
       .485     Supply X-factor <.5
    126.494     Supply K-lag (sec)
       .500     Beta weighting factor
    120.000     Routing timestep
            1     No. of sub-reaches
              .066       .066       .066       .000 c.m/s
16      NEXT LINK
              .066       .066       .066       .000 c.m/s
 4      CATCHMENT
    413.000     ID No.ó 99999
      5.240     Area in hectares
     90.000     Length (PERV) metres
      2.000     Gradient (%)
     85.000     Per cent Impervious
     90.000     Length (IMPERV)
       .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
       .350     Manning "n"
     65.000     SCS Curve No or C
       .100     Ia/S Coefficient
     13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .972       .066       .066       .000 c.m/s
              .150       .882       .772     C perv/imperv/total
15      ADD RUNOFF
```

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                .972      1.016       .066       .000 c.m/s
   10     POND
         3 Depth - Discharge - Volume sets
             .000        .000          .0
             .010       1.275         1.0
             .020       1.276     10000.0
          Peak Outflow    =     1.015 c.m/s
          Maximum Depth   =      .008 metres
          Maximum Storage =        1. c.m
                .972      1.016      1.015       .000 c.m/s
   16     NEXT LINK
                .972      1.015      1.015       .000 c.m/s
    8     PIPE
           .500     Minimum velocity  m/sec
          4.000     Maximum velocity  m/sec
           .013     Pipe Manning's 'n'
          1.350     Diameter in metres
           .500     Select Grade in %
          Depth         =      .478 metres
          Velocity      =     2.236 m/sec
          Pipe Capacity =     3.774 c.m/s
          Critical depth=      .527 metres
    9     ROUTE
         68.000     Conduit Length
           .112     Supply X-factor <.5
         22.808     Supply K-lag (sec)
           .500     Beta weighting factor
         40.000     Routing timestep
              1     No. of sub-reaches
                .972      1.015       .985       .000 c.m/s
   17     COMBINE
        47     Junction Node No.
                .972      1.015       .985       .985 c.m/s
   14     START
         1     1=Zero; 2=Define
    4     CATCHMENT
        412.000     ID No.ó 99999
          8.200     Area in hectares
         90.000     Length (PERV) metres
          2.000     Gradient (%)
         72.000     Per cent Impervious
         90.000     Length (IMPERV)
           .000     %Imp. with Zero Dpth
              1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
           .350     Manning "n"
         65.000     SCS Curve No or C
           .100     Ia/S Coefficient
         13.677     Initial Abstraction
              1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               1.289       .000       .985       .985 c.m/s
                .150       .882       .677     C perv/imperv/total
   15     ADD RUNOFF
               1.289      1.289       .985       .985 c.m/s
   10     POND
         3 Depth - Discharge - Volume sets
             .000        .000          .0
             .010       1.476         1.0
             .020       1.477     10000.0
          Peak Outflow    =     1.288 c.m/s
          Maximum Depth   =      .009 metres
          Maximum Storage =        1. c.m
               1.289      1.289      1.288       .985 c.m/s

16     NEXT LINK
               1.289      1.288      1.288       .985 c.m/s
    8     PIPE
           .500     Minimum velocity  m/sec
          4.000     Maximum velocity  m/sec
           .013     Pipe Manning's 'n'
          1.200     Diameter in metres
           .500     Select Grade in %
          Depth         =      .577 metres
          Velocity      =     2.396 m/sec
```

```
        Pipe Capacity =     2.757 c.m/s
        Critical depth=      .618 metres
 9      ROUTE
      217.000     Conduit Length
         .346     Supply X-factor <.5
       67.918     Supply K-lag (sec)
         .500     Beta weighting factor
       85.714     Routing timestep
            1     No. of sub-reaches
              1.289      1.288      1.177       .985 c.m/s
17      COMBINE
      47     Junction Node No.
              1.289      1.288      1.177      2.162 c.m/s
14      START
       1     1=Zero; 2=Define
 4      CATCHMENT
      414.000     ID No.ó 99999
        7.010     Area in hectares
       90.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.301       .000      1.177      2.162 c.m/s
               .150       .882       .772     C perv/imperv/total
15      ADD RUNOFF
              1.301      1.301      1.177      2.162 c.m/s
10      POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010       1.262         1.0
           .020       1.263     10000.0
        Peak Outflow    =     1.262 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =        1. c.m
              1.301      1.301      1.262      2.162 c.m/s
16      NEXT LINK
              1.301      1.262      1.262      2.162 c.m/s
 8      PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .975     Diameter in metres
         .500     Select Grade in %
        Depth         =      .657 metres
        Velocity      =     2.356 m/sec
        Pipe Capacity =     1.585 c.m/s
        Critical depth=      .652 metres
 9      ROUTE
       66.000     Conduit Length
         .000     Supply X-factor <.5
       21.009     Supply K-lag (sec)
         .599     Beta weighting factor
       50.000     Routing timestep
            1     No. of sub-reaches
              1.301      1.262      1.229      2.162 c.m/s
17      COMBINE
      47     Junction Node No.
              1.301      1.262      1.229      3.391 c.m/s
18      CONFLUENCE
      47     Junction Node No.
              1.301      3.391      1.229       .000 c.m/s
 4      CATCHMENT
      415.000     ID No.ó 99999
        2.410     Area in hectares
       75.000     Length (PERV) metres
         .500     Gradient (%)
```

```
        75.000     Per cent Impervious
        75.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .350     Manning "n"
        65.000     SCS Curve No or C
          .100     Ia/S Coefficient
        13.677     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .359      3.391      1.229       .000 c.m/s
               .150       .882       .699     C perv/imperv/total
 15     ADD RUNOFF
               .359      3.750      1.229       .000 c.m/s
  8     PIPE
          .500     Minimum velocity  m/sec
         4.000     Maximum velocity  m/sec
          .013     Pipe Manning's 'n'
         1.650     Diameter in metres
          .500     Select Grade in %
        Depth         =      .904 metres
        Velocity      =     3.128 m/sec
        Pipe Capacity =     6.445 c.m/s
        Critical depth=      .981 metres
  9     ROUTE
        16.000     Conduit Length
          .000     Supply X-factor <.5
         3.837     Supply K-lag (sec)
          .879     Beta weighting factor
        30.000     Routing timestep
            1      No. of sub-reaches
               .359      3.750      3.731       .000 c.m/s
 16     NEXT LINK
               .359      3.731      3.731       .000 c.m/s
 11     CHANNEL
        2.000      Base Width     =
        3.000      Left  bank slope  1:
        3.000      Right bank slope  1:
         .060      Manning's "n"
        2.000      O/a Depth in metres
         .300      Select Grade in %
        Depth          =     1.066 metres
        Velocity       =      .674 m/sec
        Flow Capacity  =    15.491 c.m/s
        Critical depth =      .539 metres
  9     ROUTE
       340.000     Conduit Length
          .260     Supply X-factor <.5
       378.596     Supply K-lag (sec)
          .500     Beta weighting factor
       300.000     Routing timestep
            1      No. of sub-reaches
               .359      3.731      3.359       .000 c.m/s

 17     COMBINE
       46     Junction Node No.
               .359      3.731      3.359      3.359 c.m/s
 14     START
        1     1=Zero; 2=Define
  4     CATCHMENT
       416.000     ID No.ó 99999
         5.950     Area in hectares
       100.000     Length (PERV) metres
         2.000     Gradient (%)
        85.000     Per cent Impervious
       100.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .350     Manning "n"
        65.000     SCS Curve No or C
          .100     Ia/S Coefficient
        13.677     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.086       .000      3.359      3.359 c.m/s
```

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              .150       .881       .772     C perv/imperv/total
15     ADD RUNOFF
             1.086      1.086      3.359      3.359 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       1.071         1.0
          .020       1.072     10000.0
       Peak Outflow    =     1.071 c.m/s
       Maximum Depth   =      .010 metres
       Maximum Storage =        1. c.m
             1.086      1.086      1.071      3.359 c.m/s
17     COMBINE
     46     Junction Node No.
             1.086      1.086      1.071      4.238 c.m/s
18     CONFLUENCE
     46     Junction Node No.
             1.086      4.238      1.071       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       2.000     O/a Depth in metres
        .300     Select Grade in %
       Depth          =     1.130 metres
       Velocity       =      .696 m/sec
       Flow Capacity  =    15.491 c.m/s
       Critical depth =      .577 metres
 9     ROUTE
     340.000     Conduit Length
        .248     Supply X-factor <.5
     366.362     Supply K-lag (sec)
        .500     Beta weighting factor
     300.000     Routing timestep
           1     No. of sub-reaches
             1.086      4.238      3.567       .000 c.m/s
17     COMBINE
     45     Junction Node No.
             1.086      4.238      3.567      3.567 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     401.000     ID No.ó 99999
      11.680     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      80.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             2.040       .000      3.567      3.567 c.m/s
              .150       .882       .735     C perv/imperv/total
15     ADD RUNOFF
             2.040      2.040      3.567      3.567 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       2.102         1.0
          .020       2.103     10000.0
       Peak Outflow    =     2.039 c.m/s
       Maximum Depth   =      .010 metres
       Maximum Storage =        1. c.m
             2.040      2.040      2.039      3.567 c.m/s
17     COMBINE
     41     Junction Node No.
             2.040      2.040      2.039      2.039 c.m/s
14     START
```

```
       1     1=Zero; 2=Define
 4     CATCHMENT
     402.000     ID No.ó 99999
       4.650     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .863       .000      2.039      2.039 c.m/s
             .150       .882       .772     C perv/imperv/total
15     ADD RUNOFF
             .863       .863      2.039      2.039 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010        .837         1.0
          .020        .838     10000.0
       Peak Outflow    =      .837 c.m/s
       Maximum Depth   =      .010 metres
       Maximum Storage =        2. c.m
             .863       .863       .837      2.039 c.m/s
17     COMBINE
     41     Junction Node No.
             .863       .863       .837      2.876 c.m/s
18     CONFLUENCE
     41     Junction Node No.
             .863      2.876       .837       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.350     Diameter in metres
        .500     Select Grade in %
       Depth         =      .882 metres
       Velocity      =     2.903 m/sec
       Pipe Capacity =     3.774 c.m/s
       Critical depth=      .907 metres
 9     ROUTE
     233.000     Conduit Length
        .230     Supply X-factor <.5
      60.202     Supply K-lag (sec)
        .500     Beta weighting factor
      85.714     Routing timestep
          1      No. of sub-reaches
             .863      2.876      2.656       .000 c.m/s
17     COMBINE
     42     Junction Node No.
             .863      2.876      2.656      2.656 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
     403.000     ID No.ó 99999
      10.410     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            1.820       .000      2.656      2.656 c.m/s
             .150       .882       .772     C perv/imperv/total
```

```
 15     ADD RUNOFF
              1.820      1.820      2.656      2.656 c.m/s
 10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010       1.874         1.0
           .020       1.875     10000.0
        Peak Outflow    =     1.819 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =        1. c.m
              1.820      1.820      1.819      2.656 c.m/s
 17     COMBINE
      42     Junction Node No.
              1.820      1.820      1.819      4.475 c.m/s
 18     CONFLUENCE
      42     Junction Node No.
              1.820      4.475      1.819       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.800     Diameter in metres
         .300     Select Grade in %
        Depth         =     1.121 metres
        Velocity      =     2.687 m/sec
        Pipe Capacity =     6.296 c.m/s
        Critical depth=     1.047 metres
  9     ROUTE
      177.000     Conduit Length
         .000     Supply X-factor <.5
       49.410     Supply K-lag (sec)
         .589     Beta weighting factor
      120.000     Routing timestep
            1     No. of sub-reaches
              1.820      4.475      4.193       .000 c.m/s
 17     COMBINE
      43     Junction Node No.
              1.820      4.475      4.193      4.193 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      404.000     ID No.ó 99999
        1.440     Area in hectares
       75.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .274       .000      4.193      4.193 c.m/s
                .150       .883       .773     C perv/imperv/total
 15     ADD RUNOFF
                .274       .274      4.193      4.193 c.m/s
 10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010        .259         1.0
           .020        .260     10000.0
        Peak Outflow    =      .259 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =        1. c.m
                .274       .274       .259      4.193 c.m/s
 17     COMBINE
      43     Junction Node No.
                .274       .274       .259      4.452 c.m/s
 18     CONFLUENCE
      43     Junction Node No.
                .274      4.452       .259       .000 c.m/s
```

```
 4     CATCHMENT
     405.000     ID No.ó 99999
       2.120     Area in hectares
      75.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .338      4.452       .259       .000 c.m/s
             .150       .881       .699     C perv/imperv/total
15     ADD RUNOFF
             .338      4.790       .259       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.800     Diameter in metres
        .300     Select Grade in %
       Depth         =     1.175 metres
       Velocity      =     2.723 m/sec
       Pipe Capacity =     6.296 c.m/s
       Critical depth=     1.085 metres
 9     ROUTE
      77.000     Conduit Length
        .000     Supply X-factor <.5
      21.209     Supply K-lag (sec)
        .824     Beta weighting factor
      85.714     Routing timestep
          1      No. of sub-reaches
             .338      4.790      4.661       .000 c.m/s
17     COMBINE
     44     Junction Node No.
             .338      4.790      4.661      4.661 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     406.000     ID No.ó 99999
        .330     Area in hectares
      75.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .053       .000      4.661      4.661 c.m/s
             .150       .881       .699     C perv/imperv/total
15     ADD RUNOFF
             .053       .053      4.661      4.661 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .375     Diameter in metres
       1.000     Select Grade in %
       Depth         =      .141 metres
       Velocity      =     1.388 m/sec
       Pipe Capacity =      .175 c.m/s
       Critical depth=      .166 metres
 9     ROUTE
      65.000     Conduit Length
        .440     Supply X-factor <.5
      35.124     Supply K-lag (sec)
```

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         .500     Beta weighting factor
       37.500     Routing timestep
           1      No. of sub-reaches
              .053       .053       .050      4.661 c.m/s
17     COMBINE
      44     Junction Node No.
              .053       .053       .050      4.711 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
      407.000     ID No.ó 99999
        2.450     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
        2.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       50.000     SCS Curve No or C
         .100     Ia/S Coefficient
       25.400     Initial Abstraction
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .010       .000       .050      4.711 c.m/s
              .042       .882       .059     C perv/imperv/total
15     ADD RUNOFF
              .010       .010       .050      4.711 c.m/s

 9     ROUTE
         .000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
           1      No. of sub-reaches
              .010       .010       .010      4.711 c.m/s
16     NEXT LINK
              .010       .010       .010      4.711 c.m/s
 4     CATCHMENT
      408.000     ID No.ó 99999
        3.410     Area in hectares
       75.000     Length (PERV) metres
        2.000     Gradient (%)
       40.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .306       .010       .010      4.711 c.m/s
              .150       .883       .443     C perv/imperv/total
15     ADD RUNOFF
              .306       .316       .010      4.711 c.m/s
 8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .900     Diameter in metres
         .200     Select Grade in %
        Depth         =      .391 metres
        Velocity      =     1.194 m/sec
        Pipe Capacity =      .810 c.m/s
        Critical depth=      .324 metres
 9     ROUTE
       76.000     Conduit Length
         .000     Supply X-factor <.5
       47.727     Supply K-lag (sec)
         .610     Beta weighting factor
      100.000     Routing timestep
           1      No. of sub-reaches
```

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              .306       .316       .297      4.711 c.m/s
 17     COMBINE
     44     Junction Node No.
              .306       .316       .297      5.008 c.m/s
 18     CONFLUENCE
     44     Junction Node No.
              .306      5.008       .297       .000 c.m/s
  4     CATCHMENT
     409.000     ID No.ó 99999
       1.100     Area in hectares
      75.000     Length (PERV) metres
        .800     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .172      5.008       .297       .000 c.m/s
             .150       .880       .698     C perv/imperv/total
 15     ADD RUNOFF
             .172      5.180       .297       .000 c.m/s
  8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.800     Diameter in metres
        .330     Select Grade in %
       Depth         =     1.201 metres
       Velocity      =     2.873 m/sec
       Pipe Capacity =     6.603 c.m/s
       Critical depth=     1.130 metres
  9     ROUTE
     237.000     Conduit Length
        .000     Supply X-factor <.5
      61.877     Supply K-lag (sec)
        .531     Beta weighting factor
     120.000     Routing timestep
          1      No. of sub-reaches
             .172      5.180      4.947       .000 c.m/s
 17     COMBINE
     45     Junction Node No.
             .172      5.180      4.947      8.455 c.m/s
 14     START
      1     1=Zero; 2=Define
  4     CATCHMENT
     410.000     ID No.ó 99999
       4.930     Area in hectares
      75.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .937       .000      4.947      8.455 c.m/s
             .150       .883       .773     C perv/imperv/total
 15     ADD RUNOFF
             .937       .937      4.947      8.455 c.m/s
 10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010        .887         1.0
          .020        .888     10000.0
       Peak Outflow    =      .887 c.m/s
       Maximum Depth   =      .010 metres
```

```
        Maximum Storage =        2. c.m
               .937       .937       .887      8.455 c.m/s
16      NEXT LINK
               .937       .887       .887      8.455 c.m/s
 4      CATCHMENT
      411.000     ID No.ó 99999
         .600     Area in hectares
       75.000     Length (PERV) metres
         .500     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .089       .887       .887      8.455 c.m/s
               .150       .882       .699     C perv/imperv/total
15      ADD RUNOFF
               .089       .976       .887      8.455 c.m/s
 8      PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .750     Diameter in metres
        1.000     Select Grade in %
        Depth         =      .544 metres
        Velocity      =     2.843 m/sec
        Pipe Capacity =     1.113 c.m/s
        Critical depth=      .610 metres
 9      ROUTE
       20.000     Conduit Length
         .000     Supply X-factor <.5
        5.277     Supply K-lag (sec)
         .691     Beta weighting factor
       16.667     Routing timestep
            1     No. of sub-reaches
               .089       .976       .970      8.455 c.m/s
17      COMBINE
      45     Junction Node No.
               .089       .976       .970      9.232 c.m/s
18      CONFLUENCE
      45     Junction Node No.
               .089      9.232       .970       .000 c.m/s
 4      CATCHMENT
      417.000     ID No.ó 99999
        3.490     Area in hectares
       30.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       30.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .719      9.232       .970       .000 c.m/s
               .150       .867       .760     C perv/imperv/total
15      ADD RUNOFF
               .719      9.626       .970       .000 c.m/s
10      POND
      13 Depth - Discharge - Volume sets
           .000        .000          .0
           .100       .0610      2035.0
           .200       .0750      4111.0
           .300       .0870      6227.0
           .500        .106     10581.0
          1.000        .729     22403.0
          1.400        .841     32935.0
```

```
          1.500        .958     35960.0
          1.600       1.161     38469.0
          1.700       1.425     41298.0
          1.800       2.015     44177.0
          1.900       2.918     47106.0
          2.000       4.045     50085.0
        Peak Outflow    =      .679 c.m/s
        Maximum Depth   =      .960 metres
        Maximum Storage =    21448. c.m
               .719      9.626       .679       .000 c.m/s
 16     NEXT LINK
               .719       .679       .679       .000 c.m/s

  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .825     Diameter in metres
         .500     Select Grade in %
        Depth         =      .493 metres
        Velocity      =     2.034 m/sec
        Pipe Capacity =     1.015 c.m/s
        Critical depth=      .496 metres
  9     ROUTE
       35.000     Conduit Length
         .000     Supply X-factor <.5
       12.905     Supply K-lag (sec)
         .654     Beta weighting factor
       35.294     Routing timestep
            1     No. of sub-reaches
               .719       .679       .679       .000 c.m/s
 16     NEXT LINK
               .719       .679       .679       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .900     Diameter in metres
         .300     Select Grade in %
        Depth         =      .547 metres
        Velocity      =     1.678 m/sec
        Pipe Capacity =      .992 c.m/s
        Critical depth=      .483 metres
  9     ROUTE
      295.000     Conduit Length
         .296     Supply X-factor <.5
      131.832     Supply K-lag (sec)
         .500     Beta weighting factor
      150.000     Routing timestep
            1     No. of sub-reaches
               .719       .679       .678       .000 c.m/s
 20     MANUAL
```

Pond 4
Post Development
25 Year Storm

```
        Output File (4.7) HCBP4PST.25  opened 2008-03-25  15:46
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    3158.000     Coefficient  a
      15.000     Constant  b    (min)
        .936     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                70.814 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     803.000     ID No.ó 99999
       4.440     Area in hectares
     100.000     Length (PERV) metres
       2.000     Gradient (%)
       5.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .183       .000       .000       .000 c.m/s
               .300       .912       .331     C perv/imperv/total
15      ADD RUNOFF
               .183       .183       .000       .000 c.m/s
 8      PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .525     Diameter in metres
       1.000     Select Grade in %
       Depth         =      .239 metres
       Velocity      =     1.906 m/sec
       Pipe Capacity =      .430 c.m/s
       Critical depth=      .287 metres
 9      ROUTE
     243.000     Conduit Length
        .472     Supply X-factor <.5
      95.628     Supply K-lag (sec)
        .500     Beta weighting factor
     100.000     Routing timestep
            1     No. of sub-reaches
               .183       .183       .182       .000 c.m/s
16      NEXT LINK
               .183       .182       .182       .000 c.m/s
 4      CATCHMENT
     413.000     ID No.ó 99999
       5.240     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.484       .182       .182       .000 c.m/s
               .237       .913       .812     C perv/imperv/total
15      ADD RUNOFF
```

```
              1.484      1.565       .182       .000 c.m/s
 10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010       1.275         1.0
           .020       1.276     10000.0
        Peak Outflow    =     1.275 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =       90. c.m
              1.484      1.565      1.275       .000 c.m/s
 16     NEXT LINK
              1.484      1.275      1.275       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.350     Diameter in metres
         .500     Select Grade in %
        Depth         =      .541 metres
        Velocity      =     2.380 m/sec
        Pipe Capacity =     3.774 c.m/s
        Critical depth=      .593 metres
  9     ROUTE
       68.000     Conduit Length
         .054     Supply X-factor <.5
       21.426     Supply K-lag (sec)
         .500     Beta weighting factor
       40.000     Routing timestep
            1     No. of sub-reaches
              1.484      1.275      1.275       .000 c.m/s
 17     COMBINE
      47     Junction Node No.
              1.484      1.275      1.275      1.275 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      412.000     ID No.ó 99999
        8.200     Area in hectares
       90.000     Length (PERV) metres
        2.000     Gradient (%)
       72.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.971       .000      1.275      1.275 c.m/s
               .237       .913       .724     C perv/imperv/total
 15     ADD RUNOFF
              1.971      1.971      1.275      1.275 c.m/s
 10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010       1.476         1.0
           .020       1.477     10000.0
        Peak Outflow    =     1.476 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =      196. c.m
              1.971      1.971      1.476      1.275 c.m/s

 16     NEXT LINK
              1.971      1.476      1.476      1.275 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.200     Diameter in metres
         .500     Select Grade in %
        Depth         =      .625 metres
        Velocity      =     2.479 m/sec
```

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        Pipe Capacity =     2.757 c.m/s
        Critical depth=      .664 metres
 9      ROUTE
      217.000     Conduit Length
         .328     Supply X-factor <.5
       65.647     Supply K-lag (sec)
         .500     Beta weighting factor
       85.714     Routing timestep
            1     No. of sub-reaches
              1.971      1.476      1.476      1.275 c.m/s
17      COMBINE
      47     Junction Node No.
              1.971      1.476      1.476      2.751 c.m/s
14      START
       1     1=Zero; 2=Define
 4      CATCHMENT
      414.000     ID No.ó 99999
        7.010     Area in hectares
       90.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.985       .000      1.476      2.751 c.m/s
               .237       .913       .812     C perv/imperv/total
15      ADD RUNOFF
              1.985      1.985      1.476      2.751 c.m/s
10      POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010       1.262         1.0
           .020       1.263     10000.0
        Peak Outflow    =     1.262 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =      386. c.m
              1.985      1.985      1.262      2.751 c.m/s
16      NEXT LINK
              1.985      1.262      1.262      2.751 c.m/s
 8      PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .975     Diameter in metres
         .500     Select Grade in %
        Depth         =      .657 metres
        Velocity      =     2.356 m/sec
        Pipe Capacity =     1.585 c.m/s
        Critical depth=      .652 metres
 9      ROUTE
       66.000     Conduit Length
         .000     Supply X-factor <.5
       21.009     Supply K-lag (sec)
         .599     Beta weighting factor
       50.000     Routing timestep
            1     No. of sub-reaches
              1.985      1.262      1.262      2.751 c.m/s
17      COMBINE
      47     Junction Node No.
              1.985      1.262      1.262      4.013 c.m/s
18      CONFLUENCE
      47     Junction Node No.
              1.985      4.013      1.262       .000 c.m/s
 4      CATCHMENT
      415.000     ID No.ó 99999
        2.410     Area in hectares
       75.000     Length (PERV) metres
         .500     Gradient (%)
```

```
        75.000     Per cent Impervious
        75.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .350     Manning "n"
        65.000     SCS Curve No or C
          .100     Ia/S Coefficient
        13.677     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .563      4.013      1.262       .000 c.m/s
               .238       .908       .740     C perv/imperv/total
 15     ADD RUNOFF
               .563      4.499      1.262       .000 c.m/s
  8     PIPE
          .500     Minimum velocity  m/sec
         4.000     Maximum velocity  m/sec
          .013     Pipe Manning's 'n'
         1.650     Diameter in metres
          .500     Select Grade in %
        Depth         =     1.015 metres
        Velocity      =     3.259 m/sec
        Pipe Capacity =     6.445 c.m/s
        Critical depth=     1.078 metres
  9     ROUTE
        16.000     Conduit Length
          .000     Supply X-factor <.5
         3.682     Supply K-lag (sec)
          .914     Beta weighting factor
        33.333     Routing timestep
            1      No. of sub-reaches
               .563      4.499      4.498       .000 c.m/s
 16     NEXT LINK
               .563      4.498      4.498       .000 c.m/s
 11     CHANNEL
        2.000      Base Width     =
        3.000      Left  bank slope  1:
        3.000      Right bank slope  1:
         .060      Manning's "n"
        2.000      O/a Depth in metres
         .300      Select Grade in %
        Depth          =     1.161 metres
        Velocity       =      .707 m/sec
        Flow Capacity  =    15.491 c.m/s
        Critical depth =      .596 metres
  9     ROUTE
       340.000     Conduit Length
          .242     Supply X-factor <.5
       360.788     Supply K-lag (sec)
          .500     Beta weighting factor
       300.000     Routing timestep
            1      No. of sub-reaches
               .563      4.498      4.306       .000 c.m/s

 17     COMBINE
       46     Junction Node No.
               .563      4.498      4.306      4.306 c.m/s
 14     START
        1     1=Zero; 2=Define
  4     CATCHMENT
       416.000     ID No.ó 99999
         5.950     Area in hectares
       100.000     Length (PERV) metres
         2.000     Gradient (%)
        85.000     Per cent Impervious
       100.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .350     Manning "n"
        65.000     SCS Curve No or C
          .100     Ia/S Coefficient
        13.677     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.664       .000      4.306      4.306 c.m/s
```

```
              .238       .912       .811     C perv/imperv/total
15     ADD RUNOFF
             1.664      1.664      4.306      4.306 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       1.071         1.0
          .020       1.072     10000.0
       Peak Outflow    =     1.071 c.m/s
       Maximum Depth   =      .010 metres
       Maximum Storage =      323. c.m
             1.664      1.664      1.071      4.306 c.m/s
17     COMBINE
     46     Junction Node No.
             1.664      1.664      1.071      5.377 c.m/s
18     CONFLUENCE
     46     Junction Node No.
             1.664      5.377      1.071       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       2.000     O/a Depth in metres
        .300     Select Grade in %
       Depth          =     1.258 metres
       Velocity       =      .740 m/sec
       Flow Capacity  =    15.491 c.m/s
       Critical depth =      .655 metres
 9     ROUTE
     340.000     Conduit Length
        .223     Supply X-factor <.5
     344.632     Supply K-lag (sec)
        .500     Beta weighting factor
     300.000     Routing timestep
           1     No. of sub-reaches
             1.664      5.377      5.065       .000 c.m/s
17     COMBINE
     45     Junction Node No.
             1.664      5.377      5.065      5.065 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     401.000     ID No.ó 99999
      11.680     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      80.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             3.115       .000      5.065      5.065 c.m/s
              .237       .913       .778     C perv/imperv/total
15     ADD RUNOFF
             3.115      3.115      5.065      5.065 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       2.102         1.0
          .020       2.103     10000.0
       Peak Outflow    =     2.102 c.m/s
       Maximum Depth   =      .010 metres
       Maximum Storage =      499. c.m
             3.115      3.115      2.102      5.065 c.m/s
17     COMBINE
     41     Junction Node No.
             3.115      3.115      2.102      2.102 c.m/s
14     START
```

```
       1     1=Zero; 2=Define
 4     CATCHMENT
     402.000     ID No.ó 99999
       4.650     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            1.317       .000      2.102      2.102 c.m/s
             .237       .913       .812     C perv/imperv/total
15     ADD RUNOFF
            1.317      1.317      2.102      2.102 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010        .837         1.0
          .020        .838     10000.0
       Peak Outflow    =      .837 c.m/s
       Maximum Depth   =      .010 metres
       Maximum Storage =      257. c.m
            1.317      1.317       .837      2.102 c.m/s
17     COMBINE
     41     Junction Node No.
            1.317      1.317       .837      2.939 c.m/s
18     CONFLUENCE
     41     Junction Node No.
            1.317      2.939       .837       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.350     Diameter in metres
        .500     Select Grade in %
       Depth         =      .896 metres
       Velocity      =     2.915 m/sec
       Pipe Capacity =     3.774 c.m/s
       Critical depth=      .917 metres
 9     ROUTE
     233.000     Conduit Length
        .221     Supply X-factor <.5
      59.952     Supply K-lag (sec)
        .500     Beta weighting factor
      85.714     Routing timestep
          1      No. of sub-reaches
            1.317      2.939      2.939       .000 c.m/s
17     COMBINE
     42     Junction Node No.
            1.317      2.939      2.939      2.939 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
     403.000     ID No.ó 99999
      10.410     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            2.822       .000      2.939      2.939 c.m/s
             .237       .909       .808     C perv/imperv/total
```

```
15     ADD RUNOFF
             2.822      2.822      2.939      2.939 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       1.874         1.0
          .020       1.875     10000.0
       Peak Outflow    =     1.874 c.m/s
       Maximum Depth   =      .011 metres
       Maximum Storage =      535. c.m
             2.822      2.822      1.874      2.939 c.m/s
17     COMBINE
     42     Junction Node No.
             2.822      2.822      1.874      4.813 c.m/s
18     CONFLUENCE
     42     Junction Node No.
             2.822      4.813      1.874       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.800     Diameter in metres
        .300     Select Grade in %
       Depth         =     1.179 metres
       Velocity      =     2.725 m/sec
       Pipe Capacity =     6.296 c.m/s
       Critical depth=     1.088 metres
 9     ROUTE
     177.000     Conduit Length
        .000     Supply X-factor <.5
      48.707     Supply K-lag (sec)
        .619     Beta weighting factor
     120.000     Routing timestep
           1     No. of sub-reaches
             2.822      4.813      4.813       .000 c.m/s
17     COMBINE
     43     Junction Node No.
             2.822      4.813      4.813      4.813 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     404.000     ID No.ó 99999
       1.440     Area in hectares
      75.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .415       .000      4.813      4.813 c.m/s
               .238       .913       .812     C perv/imperv/total
15     ADD RUNOFF
               .415       .415      4.813      4.813 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010        .259         1.0
          .020        .260     10000.0
       Peak Outflow    =      .259 c.m/s
       Maximum Depth   =      .010 metres
       Maximum Storage =       81. c.m
               .415       .415       .259      4.813 c.m/s
17     COMBINE
     43     Junction Node No.
               .415       .415       .259      5.072 c.m/s
18     CONFLUENCE
     43     Junction Node No.
               .415      5.072       .259       .000 c.m/s
```

```
 4     CATCHMENT
     405.000     ID No.ó 99999
       2.120     Area in hectares
      75.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .520      5.072       .259       .000 c.m/s
             .237       .912       .743     C perv/imperv/total
15     ADD RUNOFF
             .520      5.460       .259       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.800     Diameter in metres
        .300     Select Grade in %
       Depth         =     1.295 metres
       Velocity      =     2.786 m/sec
       Pipe Capacity =     6.296 c.m/s
       Critical depth=     1.161 metres
 9     ROUTE
      77.000     Conduit Length
        .000     Supply X-factor <.5
      20.726     Supply K-lag (sec)
        .862     Beta weighting factor
     100.000     Routing timestep
          1      No. of sub-reaches
             .520      5.460      5.451       .000 c.m/s
17     COMBINE
     44     Junction Node No.
             .520      5.460      5.451      5.451 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     406.000     ID No.ó 99999
        .330     Area in hectares
      75.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .081       .000      5.451      5.451 c.m/s
             .237       .912       .743     C perv/imperv/total
15     ADD RUNOFF
             .081       .081      5.451      5.451 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .375     Diameter in metres
       1.000     Select Grade in %
       Depth         =      .179 metres
       Velocity      =     1.556 m/sec
       Pipe Capacity =      .175 c.m/s
       Critical depth=      .208 metres
 9     ROUTE
      65.000     Conduit Length
        .420     Supply X-factor <.5
      31.335     Supply K-lag (sec)
```

```
         .500     Beta weighting factor
       35.294     Routing timestep
           1      No. of sub-reaches
              .081       .081       .078      5.451 c.m/s
 17     COMBINE
      44     Junction Node No.
              .081       .081       .078      5.515 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      407.000     ID No.ó 99999
        2.450     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
        2.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       50.000     SCS Curve No or C
         .100     Ia/S Coefficient
       25.400     Initial Abstraction
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .019       .000       .078      5.515 c.m/s
              .097       .909       .113     C perv/imperv/total
 15     ADD RUNOFF
              .019       .019       .078      5.515 c.m/s

  9     ROUTE
         .000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
           1      No. of sub-reaches
              .019       .019       .019      5.515 c.m/s
 16     NEXT LINK
              .019       .019       .019      5.515 c.m/s
  4     CATCHMENT
      408.000     ID No.ó 99999
        3.410     Area in hectares
       75.000     Length (PERV) metres
        2.000     Gradient (%)
       40.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .469       .019       .019      5.515 c.m/s
              .238       .913       .508     C perv/imperv/total
 15     ADD RUNOFF
              .469       .485       .019      5.515 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .900     Diameter in metres
         .200     Select Grade in %
        Depth         =      .502 metres
        Velocity      =     1.330 m/sec
        Pipe Capacity =      .810 c.m/s
        Critical depth=      .405 metres
  9     ROUTE
       76.000     Conduit Length
         .000     Supply X-factor <.5
       42.872     Supply K-lag (sec)
         .687     Beta weighting factor
      120.000     Routing timestep
           1      No. of sub-reaches
```

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              .469       .485       .460      5.515 c.m/s
 17     COMBINE
     44     Junction Node No.
              .469       .485       .460      5.886 c.m/s
 18     CONFLUENCE
     44     Junction Node No.
              .469      5.886       .460       .000 c.m/s
  4     CATCHMENT
     409.000     ID No.ó 99999
       1.100     Area in hectares
      75.000     Length (PERV) metres
        .800     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .266      5.886       .460       .000 c.m/s
              .238       .911       .743     C perv/imperv/total
 15     ADD RUNOFF
              .266      6.097       .460       .000 c.m/s
  8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.800     Diameter in metres
        .330     Select Grade in %
       Depth         =     1.365 metres
       Velocity      =     2.945 m/sec
       Pipe Capacity =     6.603 c.m/s
       Critical depth=     1.229 metres
  9     ROUTE
     237.000     Conduit Length
        .000     Supply X-factor <.5
      60.350     Supply K-lag (sec)
        .600     Beta weighting factor
     150.000     Routing timestep
          1      No. of sub-reaches
              .266      6.097      6.076       .000 c.m/s
 17     COMBINE
     45     Junction Node No.
              .266      6.097      6.076     10.736 c.m/s
 14     START
      1     1=Zero; 2=Define
  4     CATCHMENT
     410.000     ID No.ó 99999
       4.930     Area in hectares
      75.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             1.420       .000      6.076     10.736 c.m/s
              .238       .913       .812     C perv/imperv/total
 15     ADD RUNOFF
             1.420      1.420      6.076     10.736 c.m/s
 10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010        .887         1.0
          .020        .888     10000.0
       Peak Outflow    =      .887 c.m/s
       Maximum Depth   =      .010 metres
```

```
        Maximum Storage =      276. c.m
              1.420      1.420       .887     10.736 c.m/s
 16     NEXT LINK
              1.420       .887       .887     10.736 c.m/s
  4     CATCHMENT
      411.000     ID No.ó 99999
         .600     Area in hectares
       75.000     Length (PERV) metres
         .500     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .140       .887       .887     10.736 c.m/s
               .238       .908       .740     C perv/imperv/total
 15     ADD RUNOFF
               .140      1.027       .887     10.736 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .750     Diameter in metres
        1.000     Select Grade in %
        Depth         =      .568 metres
        Velocity      =     2.860 m/sec
        Pipe Capacity =     1.113 c.m/s
        Critical depth=      .623 metres
  9     ROUTE
       20.000     Conduit Length
         .000     Supply X-factor <.5
        5.245     Supply K-lag (sec)
         .713     Beta weighting factor
       17.647     Routing timestep
            1     No. of sub-reaches
               .140      1.027      1.022     10.736 c.m/s
 17     COMBINE
      45     Junction Node No.
               .140      1.027      1.022     11.676 c.m/s
 18     CONFLUENCE
      45     Junction Node No.
               .140     11.676      1.022       .000 c.m/s
  4     CATCHMENT
      417.000     ID No.ó 99999
        3.490     Area in hectares
       30.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       30.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.067     11.676      1.022       .000 c.m/s
               .237       .885       .788     C perv/imperv/total
 15     ADD RUNOFF
              1.067     12.122      1.022       .000 c.m/s
 10     POND
      13 Depth - Discharge - Volume sets
           .000        .000          .0
           .100       .0610      2035.0
           .200       .0750      4111.0
           .300       .0870      6227.0
           .500        .106     10581.0
          1.000        .729     22403.0
          1.400        .841     32935.0
```

```
          1.500        .958     35960.0
          1.600       1.161     38469.0
          1.700       1.425     41298.0
          1.800       2.015     44177.0
          1.900       2.918     47106.0
          2.000       4.045     50085.0
        Peak Outflow    =      .835 c.m/s
        Maximum Depth   =     1.378 metres
        Maximum Storage =    32361. c.m
              1.067     12.122       .835       .000 c.m/s
 16     NEXT LINK
              1.067       .835       .835       .000 c.m/s

  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .825     Diameter in metres
         .500     Select Grade in %
        Depth         =      .570 metres
        Velocity      =     2.120 m/sec
        Pipe Capacity =     1.015 c.m/s
        Critical depth=      .553 metres
  9     ROUTE
       35.000     Conduit Length
         .000     Supply X-factor <.5
       12.382     Supply K-lag (sec)
         .713     Beta weighting factor
       42.857     Routing timestep
            1     No. of sub-reaches
              1.067       .835       .835       .000 c.m/s
 16     NEXT LINK
              1.067       .835       .835       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .900     Diameter in metres
         .300     Select Grade in %
        Depth         =      .633 metres
        Velocity      =     1.747 m/sec
        Pipe Capacity =      .992 c.m/s
        Critical depth=      .539 metres
  9     ROUTE
      295.000     Conduit Length
         .222     Supply X-factor <.5
      126.638     Supply K-lag (sec)
         .500     Beta weighting factor
      150.000     Routing timestep
            1     No. of sub-reaches
              1.067       .835       .835       .000 c.m/s
 20     MANUAL
```

Pond 4
Post Development
100 Year Storm

```
        Output File (4.7) HCBP4C.100   opened 2008-03-25  15:19
        Units used are defined by G =    9.810
            72   144    10.000        are MAXDT MAXHYD & DTMIN values
        Licensee: Totten Sims Hubicki Associates
 2      STORM
            1     1=Chicago;2=Huff;3=User;4=Cdn1hr;5=Historic
    4688.000     Coefficient  a
      17.000     Constant  b    (min)
        .962     Exponent  c
        .375     Fraction to peak  r
     240.000     Duration ó  720 min
                89.886 mm     Total depth
 3      IMPERVIOUS
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .015     Manning "n"
      98.000     SCS Curve No or C
        .100     Ia/S Coefficient
        .518     Initial Abstraction
 4      CATCHMENT
     803.000     ID No.ó 99999
       4.440     Area in hectares
     100.000     Length (PERV) metres
       2.000     Gradient (%)
       5.000     Per cent Impervious
     100.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      70.000     SCS Curve No or C
        .100     Ia/S Coefficient
      10.886     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .334       .000       .000       .000 c.m/s
               .370       .929       .397     C perv/imperv/total
15      ADD RUNOFF
               .334       .334       .000       .000 c.m/s
 8      PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .525     Diameter in metres
       1.000     Select Grade in %
       Depth         =      .348 metres
       Velocity      =     2.195 m/sec
       Pipe Capacity =      .430 c.m/s
       Critical depth=      .392 metres
 9      ROUTE
     243.000     Conduit Length
        .448     Supply X-factor <.5
      83.031     Supply K-lag (sec)
        .500     Beta weighting factor
      85.714     Routing timestep
            1     No. of sub-reaches
               .334       .334       .332       .000 c.m/s
16      NEXT LINK
               .334       .332       .332       .000 c.m/s
 4      CATCHMENT
     413.000     ID No.ó 99999
       5.240     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.938       .332       .332       .000 c.m/s
               .303       .928       .834     C perv/imperv/total
15      ADD RUNOFF
```

```
              1.938      2.064       .332       .000 c.m/s
 10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010       1.275         1.0
           .020       1.276     10000.0
        Peak Outflow    =     1.275 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =      478. c.m
              1.938      2.064      1.275       .000 c.m/s
 16     NEXT LINK
              1.938      1.275      1.275       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.350     Diameter in metres
         .500     Select Grade in %
        Depth         =      .541 metres
        Velocity      =     2.380 m/sec
        Pipe Capacity =     3.774 c.m/s
        Critical depth=      .593 metres
  9     ROUTE
       68.000     Conduit Length
         .054     Supply X-factor <.5
       21.426     Supply K-lag (sec)
         .500     Beta weighting factor
       40.000     Routing timestep
            1     No. of sub-reaches
              1.938      1.275      1.275       .000 c.m/s
 17     COMBINE
      47     Junction Node No.
              1.938      1.275      1.275      1.275 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      412.000     ID No.ó 99999
        8.200     Area in hectares
       90.000     Length (PERV) metres
        2.000     Gradient (%)
       72.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              2.579       .000      1.275      1.275 c.m/s
               .303       .928       .753     C perv/imperv/total
 15     ADD RUNOFF
              2.579      2.579      1.275      1.275 c.m/s
 10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010       1.476         1.0
           .020       1.477     10000.0
        Peak Outflow    =     1.476 c.m/s
        Maximum Depth   =      .011 metres
        Maximum Storage =      649. c.m
              2.579      2.579      1.476      1.275 c.m/s

 16     NEXT LINK
              2.579      1.476      1.476      1.275 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.200     Diameter in metres
         .500     Select Grade in %
        Depth         =      .625 metres
        Velocity      =     2.479 m/sec
```

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        Pipe Capacity =     2.757 c.m/s
        Critical depth=      .664 metres
 9      ROUTE
      217.000     Conduit Length
         .328     Supply X-factor <.5
       65.646     Supply K-lag (sec)
         .500     Beta weighting factor
       85.714     Routing timestep
            1     No. of sub-reaches
              2.579      1.476      1.476      1.275 c.m/s
17      COMBINE
      47     Junction Node No.
              2.579      1.476      1.476      2.751 c.m/s
14      START
       1     1=Zero; 2=Define
 4      CATCHMENT
      414.000     ID No.ó 99999
        7.010     Area in hectares
       90.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              2.593       .000      1.476      2.751 c.m/s
               .303       .928       .834     C perv/imperv/total
15      ADD RUNOFF
              2.593      2.593      1.476      2.751 c.m/s
10      POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010       1.262         1.0
           .020       1.263     10000.0
        Peak Outflow    =     1.262 c.m/s
        Maximum Depth   =      .011 metres
        Maximum Storage =      946. c.m
              2.593      2.593      1.262      2.751 c.m/s
16      NEXT LINK
              2.593      1.262      1.262      2.751 c.m/s
 8      PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .975     Diameter in metres
         .500     Select Grade in %
        Depth         =      .658 metres
        Velocity      =     2.356 m/sec
        Pipe Capacity =     1.585 c.m/s
        Critical depth=      .652 metres
 9      ROUTE
       66.000     Conduit Length
         .000     Supply X-factor <.5
       21.008     Supply K-lag (sec)
         .599     Beta weighting factor
       50.000     Routing timestep
            1     No. of sub-reaches
              2.593      1.262      1.262      2.751 c.m/s
17      COMBINE
      47     Junction Node No.
              2.593      1.262      1.262      4.013 c.m/s
18      CONFLUENCE
      47     Junction Node No.
              2.593      4.013      1.262       .000 c.m/s
 4      CATCHMENT
      415.000     ID No.ó 99999
        2.410     Area in hectares
       75.000     Length (PERV) metres
         .500     Gradient (%)
```

```
        75.000     Per cent Impervious
        75.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .350     Manning "n"
        65.000     SCS Curve No or C
          .100     Ia/S Coefficient
        13.677     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .745      4.013      1.262       .000 c.m/s
               .303       .924       .769     C perv/imperv/total
 15     ADD RUNOFF
               .745      4.635      1.262       .000 c.m/s
  8     PIPE
          .500     Minimum velocity  m/sec
         4.000     Maximum velocity  m/sec
          .013     Pipe Manning's 'n'
         1.650     Diameter in metres
          .500     Select Grade in %
        Depth         =     1.036 metres
        Velocity      =     3.280 m/sec
        Pipe Capacity =     6.445 c.m/s
        Critical depth=     1.095 metres
  9     ROUTE
        16.000     Conduit Length
          .000     Supply X-factor <.5
         3.659     Supply K-lag (sec)
          .906     Beta weighting factor
        35.294     Routing timestep
            1      No. of sub-reaches
               .745      4.635      4.620       .000 c.m/s
 16     NEXT LINK
               .745      4.620      4.620       .000 c.m/s
 11     CHANNEL
        2.000      Base Width     =
        3.000      Left  bank slope  1:
        3.000      Right bank slope  1:
         .060      Manning's "n"
        2.000      O/a Depth in metres
         .300      Select Grade in %
        Depth          =     1.175 metres
        Velocity       =      .712 m/sec
        Flow Capacity  =    15.491 c.m/s
        Critical depth =      .604 metres
  9     ROUTE
       340.000     Conduit Length
          .239     Supply X-factor <.5
       358.308     Supply K-lag (sec)
          .500     Beta weighting factor
       300.000     Routing timestep
            1      No. of sub-reaches
               .745      4.620      4.503       .000 c.m/s

 17     COMBINE
        46     Junction Node No.
               .745      4.620      4.503      4.503 c.m/s
 14     START
        1     1=Zero; 2=Define
  4     CATCHMENT
       416.000     ID No.ó 99999
         5.950     Area in hectares
       100.000     Length (PERV) metres
         2.000     Gradient (%)
        85.000     Per cent Impervious
       100.000     Length (IMPERV)
          .000     %Imp. with Zero Dpth
            1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
          .350     Manning "n"
        65.000     SCS Curve No or C
          .100     Ia/S Coefficient
        13.677     Initial Abstraction
            1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              2.182       .000      4.503      4.503 c.m/s
```

```
              .302       .929       .835     C perv/imperv/total
15     ADD RUNOFF
             2.182      2.182      4.503      4.503 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       1.071         1.0
          .020       1.072     10000.0
       Peak Outflow    =     1.071 c.m/s
       Maximum Depth   =      .011 metres
       Maximum Storage =      807. c.m
             2.182      2.182      1.071      4.503 c.m/s
17     COMBINE
     46     Junction Node No.
             2.182      2.182      1.071      5.574 c.m/s
18     CONFLUENCE
     46     Junction Node No.
             2.182      5.574      1.071       .000 c.m/s
11     CHANNEL
       2.000     Base Width     =
       3.000     Left  bank slope  1:
       3.000     Right bank slope  1:
        .060     Manning's "n"
       2.000     O/a Depth in metres
        .300     Select Grade in %
       Depth          =     1.279 metres
       Velocity       =      .747 m/sec
       Flow Capacity  =    15.491 c.m/s
       Critical depth =      .667 metres
 9     ROUTE
     340.000     Conduit Length
        .219     Supply X-factor <.5
     341.470     Supply K-lag (sec)
        .500     Beta weighting factor
     300.000     Routing timestep
           1     No. of sub-reaches
             2.182      5.574      5.496       .000 c.m/s
17     COMBINE
     45     Junction Node No.
             2.182      5.574      5.496      5.496 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     401.000     ID No.ó 99999
      11.680     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      80.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
           1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
           1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             4.072       .000      5.496      5.496 c.m/s
              .303       .928       .803     C perv/imperv/total
15     ADD RUNOFF
             4.072      4.072      5.496      5.496 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010       2.102         1.0
          .020       2.103     10000.0
       Peak Outflow    =     2.102 c.m/s
       Maximum Depth   =      .011 metres
       Maximum Storage =     1307. c.m
             4.072      4.072      2.102      5.496 c.m/s
17     COMBINE
     41     Junction Node No.
             4.072      4.072      2.102      2.102 c.m/s
14     START
```

```
       1     1=Zero; 2=Define
 4     CATCHMENT
     402.000     ID No.ó 99999
       4.650     Area in hectares
      90.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            1.720       .000      2.102      2.102 c.m/s
             .303       .928       .834     C perv/imperv/total
15     ADD RUNOFF
            1.720      1.720      2.102      2.102 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010        .837         1.0
          .020        .838     10000.0
       Peak Outflow    =      .837 c.m/s
       Maximum Depth   =      .011 metres
       Maximum Storage =      628. c.m
            1.720      1.720       .837      2.102 c.m/s
17     COMBINE
     41     Junction Node No.
            1.720      1.720       .837      2.939 c.m/s
18     CONFLUENCE
     41     Junction Node No.
            1.720      2.939       .837       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.350     Diameter in metres
        .500     Select Grade in %
       Depth         =      .896 metres
       Velocity      =     2.915 m/sec
       Pipe Capacity =     3.774 c.m/s
       Critical depth=      .917 metres
 9     ROUTE
     233.000     Conduit Length
        .221     Supply X-factor <.5
      59.952     Supply K-lag (sec)
        .500     Beta weighting factor
      85.714     Routing timestep
          1      No. of sub-reaches
            1.720      2.939      2.939       .000 c.m/s
17     COMBINE
     42     Junction Node No.
            1.720      2.939      2.939      2.939 c.m/s
14     START
       1     1=Zero; 2=Define
 4     CATCHMENT
     403.000     ID No.ó 99999
      10.410     Area in hectares
      90.000     Length (PERV) metres
       1.000     Gradient (%)
      85.000     Per cent Impervious
      90.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            3.716       .000      2.939      2.939 c.m/s
             .303       .927       .834     C perv/imperv/total
```

```
 15     ADD RUNOFF
              3.716      3.716      2.939      2.939 c.m/s
 10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010       1.874         1.0
           .020       1.875     10000.0
        Peak Outflow    =     1.874 c.m/s
        Maximum Depth   =      .011 metres
        Maximum Storage =     1403. c.m
              3.716      3.716      1.874      2.939 c.m/s
 17     COMBINE
      42     Junction Node No.
              3.716      3.716      1.874      4.813 c.m/s
 18     CONFLUENCE
      42     Junction Node No.
              3.716      4.813      1.874       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
        1.800     Diameter in metres
         .300     Select Grade in %
        Depth         =     1.179 metres
        Velocity      =     2.725 m/sec
        Pipe Capacity =     6.296 c.m/s
        Critical depth=     1.088 metres
  9     ROUTE
      177.000     Conduit Length
         .000     Supply X-factor <.5
       48.707     Supply K-lag (sec)
         .619     Beta weighting factor
      120.000     Routing timestep
            1     No. of sub-reaches
              3.716      4.813      4.813       .000 c.m/s
 17     COMBINE
      43     Junction Node No.
              3.716      4.813      4.813      4.813 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      404.000     ID No.ó 99999
        1.440     Area in hectares
       75.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
                .539       .000      4.813      4.813 c.m/s
                .302       .925       .832     C perv/imperv/total
 15     ADD RUNOFF
                .539       .539      4.813      4.813 c.m/s
 10     POND
       3 Depth - Discharge - Volume sets
           .000        .000          .0
           .010        .259         1.0
           .020        .260     10000.0
        Peak Outflow    =      .259 c.m/s
        Maximum Depth   =      .010 metres
        Maximum Storage =      192. c.m
                .539       .539       .259      4.813 c.m/s
 17     COMBINE
      43     Junction Node No.
                .539       .539       .259      5.072 c.m/s
 18     CONFLUENCE
      43     Junction Node No.
                .539      5.072       .259       .000 c.m/s
```

```
 4     CATCHMENT
     405.000     ID No.ó 99999
       2.120     Area in hectares
      75.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .684      5.072       .259       .000 c.m/s
             .303       .929       .772     C perv/imperv/total
15     ADD RUNOFF
             .684      5.576       .259       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.800     Diameter in metres
        .300     Select Grade in %
       Depth         =     1.317 metres
       Velocity      =     2.794 m/sec
       Pipe Capacity =     6.296 c.m/s
       Critical depth=     1.174 metres
 9     ROUTE
      77.000     Conduit Length
        .000     Supply X-factor <.5
      20.669     Supply K-lag (sec)
        .879     Beta weighting factor
     100.000     Routing timestep
          1      No. of sub-reaches
             .684      5.576      5.572       .000 c.m/s
17     COMBINE
     44     Junction Node No.
             .684      5.576      5.572      5.572 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     406.000     ID No.ó 99999
        .330     Area in hectares
      75.000     Length (PERV) metres
       1.000     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .106       .000      5.572      5.572 c.m/s
             .303       .929       .772     C perv/imperv/total
15     ADD RUNOFF
             .106       .106      5.572      5.572 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
        .375     Diameter in metres
       1.000     Select Grade in %
       Depth         =      .211 metres
       Velocity      =     1.664 m/sec
       Pipe Capacity =      .175 c.m/s
       Critical depth=      .240 metres
 9     ROUTE
      65.000     Conduit Length
        .399     Supply X-factor <.5
      29.302     Supply K-lag (sec)
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         .500     Beta weighting factor
       33.333     Routing timestep
           1      No. of sub-reaches
              .106       .106       .103      5.572 c.m/s
 17     COMBINE
      44     Junction Node No.
              .106       .106       .103      5.653 c.m/s
 14     START
       1     1=Zero; 2=Define
  4     CATCHMENT
      407.000     ID No.ó 99999
        2.450     Area in hectares
       90.000     Length (PERV) metres
        1.000     Gradient (%)
        2.000     Per cent Impervious
       90.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       50.000     SCS Curve No or C
         .100     Ia/S Coefficient
       25.400     Initial Abstraction
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .047       .000       .103      5.653 c.m/s
              .145       .927       .161     C perv/imperv/total
 15     ADD RUNOFF
              .047       .047       .103      5.653 c.m/s

  9     ROUTE
         .000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
           1      No. of sub-reaches
              .047       .047       .047      5.653 c.m/s
 16     NEXT LINK
              .047       .047       .047      5.653 c.m/s
  4     CATCHMENT
      408.000     ID No.ó 99999
        3.410     Area in hectares
       75.000     Length (PERV) metres
        2.000     Gradient (%)
       40.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
           1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
           1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              .617       .047       .047      5.653 c.m/s
              .302       .925       .551     C perv/imperv/total
 15     ADD RUNOFF
              .617       .640       .047      5.653 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .900     Diameter in metres
         .200     Select Grade in %
        Depth         =      .604 metres
        Velocity      =     1.411 m/sec
        Pipe Capacity =      .810 c.m/s
        Critical depth=      .469 metres
  9     ROUTE
       76.000     Conduit Length
         .000     Supply X-factor <.5
       40.402     Supply K-lag (sec)
         .758     Beta weighting factor
      150.000     Routing timestep
           1      No. of sub-reaches
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              .617       .640       .609      5.653 c.m/s
17     COMBINE
     44     Junction Node No.
              .617       .640       .609      6.150 c.m/s
18     CONFLUENCE
     44     Junction Node No.
              .617      6.150       .609       .000 c.m/s
 4     CATCHMENT
     409.000     ID No.ó 99999
       1.100     Area in hectares
      75.000     Length (PERV) metres
        .800     Gradient (%)
      75.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
             .350      6.150       .609       .000 c.m/s
             .303       .927       .771     C perv/imperv/total
15     ADD RUNOFF
             .350      6.433       .609       .000 c.m/s
 8     PIPE
        .500     Minimum velocity  m/sec
       4.000     Maximum velocity  m/sec
        .013     Pipe Manning's 'n'
       1.800     Diameter in metres
        .330     Select Grade in %
       Depth         =     1.435 metres
       Velocity      =     2.957 m/sec
       Pipe Capacity =     6.603 c.m/s
       Critical depth=     1.263 metres
 9     ROUTE
     237.000     Conduit Length
        .000     Supply X-factor <.5
      60.107     Supply K-lag (sec)
        .634     Beta weighting factor
     150.000     Routing timestep
          1      No. of sub-reaches
             .350      6.433      6.422       .000 c.m/s
17     COMBINE
     45     Junction Node No.
             .350      6.433      6.422     11.427 c.m/s
14     START
      1     1=Zero; 2=Define
 4     CATCHMENT
     410.000     ID No.ó 99999
       4.930     Area in hectares
      75.000     Length (PERV) metres
       2.000     Gradient (%)
      85.000     Per cent Impervious
      75.000     Length (IMPERV)
        .000     %Imp. with Zero Dpth
          1      Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
        .350     Manning "n"
      65.000     SCS Curve No or C
        .100     Ia/S Coefficient
      13.677     Initial Abstraction
          1      Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
            1.845       .000      6.422     11.427 c.m/s
             .302       .925       .832     C perv/imperv/total
15     ADD RUNOFF
            1.845      1.845      6.422     11.427 c.m/s
10     POND
      3 Depth - Discharge - Volume sets
          .000        .000          .0
          .010        .887         1.0
          .020        .888     10000.0
       Peak Outflow    =      .887 c.m/s
       Maximum Depth   =      .011 metres
```

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        Maximum Storage =      654. c.m
              1.845      1.845       .887     11.427 c.m/s
16      NEXT LINK
              1.845       .887       .887     11.427 c.m/s
 4      CATCHMENT
      411.000     ID No.ó 99999
         .600     Area in hectares
       75.000     Length (PERV) metres
         .500     Gradient (%)
       75.000     Per cent Impervious
       75.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
               .186       .887       .887     11.427 c.m/s
               .303       .924       .769     C perv/imperv/total
15      ADD RUNOFF
               .186      1.073       .887     11.427 c.m/s
 8      PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .750     Diameter in metres
        1.000     Select Grade in %
        Depth         =      .591 metres
        Velocity      =     2.870 m/sec
        Pipe Capacity =     1.113 c.m/s
        Critical depth=      .635 metres
 9      ROUTE
       20.000     Conduit Length
         .000     Supply X-factor <.5
        5.226     Supply K-lag (sec)
         .731     Beta weighting factor
       18.750     Routing timestep
            1     No. of sub-reaches
               .186      1.073      1.068     11.427 c.m/s
17      COMBINE
      45     Junction Node No.
               .186      1.073      1.068     12.387 c.m/s
18      CONFLUENCE
      45     Junction Node No.
               .186     12.387      1.068       .000 c.m/s
 4      CATCHMENT
      417.000     ID No.ó 99999
        3.490     Area in hectares
       30.000     Length (PERV) metres
        2.000     Gradient (%)
       85.000     Per cent Impervious
       30.000     Length (IMPERV)
         .000     %Imp. with Zero Dpth
            1     Option 1=SCS CN/C; 2=Horton; 3=Green-Ampt; 4=Repeat
         .350     Manning "n"
       65.000     SCS Curve No or C
         .100     Ia/S Coefficient
       13.677     Initial Abstraction
            1     Option 1=Trianglr; 2=Rectanglr; 3=SWM HYD; 4=Lin. Reserv
              1.378     12.387      1.068       .000 c.m/s
               .302       .891       .803     C perv/imperv/total
15      ADD RUNOFF
              1.378     12.990      1.068       .000 c.m/s
10      POND
      13 Depth - Discharge - Volume sets
           .000        .000          .0
           .100       .0610      2035.0
           .200       .0750      4111.0
           .300       .0870      6227.0
           .500        .106     10581.0
          1.000        .729     22403.0
          1.400        .841     32935.0
```

```
          1.500        .958     35960.0
          1.600       1.161     38469.0
          1.700       1.425     41298.0
          1.800       2.015     44177.0
          1.900       2.918     47106.0
          2.000       4.045     50085.0
        Peak Outflow    =     1.795 c.m/s
        Maximum Depth   =     1.763 metres
        Maximum Storage =    43104. c.m
              1.378     12.990      1.795       .000 c.m/s
 16     NEXT LINK
              1.378      1.795      1.795       .000 c.m/s

  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .825     Diameter in metres
         .500     Select Grade in %
        Surcharged HGL=     1.564 %
        Velocity      =     3.358 m/sec
        Pipe Capacity =     1.015 c.m/s
        Critical depth=      .767 metres
  9     ROUTE
       35.000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              1.378      1.795      1.795       .000 c.m/s
 16     NEXT LINK
              1.378      1.795      1.795       .000 c.m/s
  8     PIPE
         .500     Minimum velocity  m/sec
        4.000     Maximum velocity  m/sec
         .013     Pipe Manning's 'n'
         .900     Diameter in metres
         .300     Select Grade in %
        Surcharged HGL=      .983 %
        Velocity      =     2.822 m/sec
        Pipe Capacity =      .992 c.m/s
        Critical depth=      .780 metres
  9     ROUTE
      295.000     Conduit Length
         .500     Supply X-factor <.5
         .000     Supply K-lag (sec)
         .500     Beta weighting factor
      600.000     Routing timestep
            1     No. of sub-reaches
              1.378      1.795      1.795       .000 c.m/s
 20     MANUAL
```