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Revised Stormwater Management Report

For

Nonset Path

Acton, MA

January 11, 2011
Rev.: June 28, 2011

Applicant: Hawthorne Homes, LLC
530 Great Road
Acton, MA 01720

Owner : June A. Peters
1474 Butterfield Court
Marco Island, FL 34145

SM-4627 File: 4627StormwaterReportCover.doc

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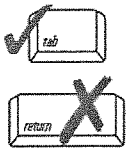
Checklist for Stormwater Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

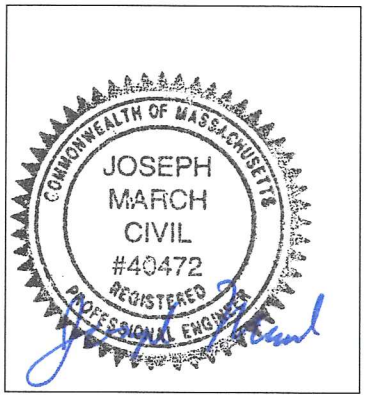
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



Signature and Date 6/30/11

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☐ No disturbance to any Wetland Resource Areas
- ☒ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☒ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☒ Grass Channel
- ☐ Green Roof
- ☒ Other (describe): Decentralized drainage system provided outside of Buffer Zone

Standard 1: No New Untreated Discharges

- ☐ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

☒ Site is comprised solely of C and D soils and/or bedrock at the land surface

☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000

☐ Solid Waste Landfill pursuant to 310 CMR 19.000

☒ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☐ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☒ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☒ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Narrative

Stormwater Management

The proposed project is for the construction of a limited project driveway crossing to provide access to upland dwelling units. The proposed private driveway will improve the existing common driveway within a 20' wide right of way and utility easement serving #107, #109, and #111 Nonset Path. The proposed driveway will extend off of the end of the existing drive within the easement into Lot 17 then turn upland. The driveway has been designed to minimize impervious areas and filling of Bordering Vegetated Wetlands.

The Natural Resources Conservation Service (N.R.C.S.) soil survey indicated the presences of Woodbridge-Urban Land Complex, Paxton Fine Sandy Loam, Canton-Charlton Urban Land Complex, and Udorthents. These soil groups rate as Hydrologic Groups C, C, C, and un-rated respectively.

Pre-Development

Lot 17 is generally wooded except for an area that has been cleared with a gravel road with utilities between a condominium parking area to the south to the private road Pheasant Hill of the condominium development to the north. The existing site can be divided into three subcatchments. The first, Subcatchment 1, is the wooded area draining uncontrolled to the wetland area on the east end of the lot. The second subcatchment is the area draining into the gravel driveway which connects to catch basins of the drainage system under Pheasant Hill that discharges from a headwall into the same wetland system onsite. The remaining third subcatchment is wooded area draining uncontrolled to the west onto the abutting condominium properties. All subcatchments have been analyzed as part of this revised Stormwater Management Report for the site. Subcatchments 1 and 2 have also been combined as total runoff reaching the eastern wetland area.

Post-Development

Twelve single family dwellings are proposed along a private driveway. The site has been graded to direct from the new impervious areas into a combination of hooded catch basins, swales, infiltration basins, and constructed stormwater wetland basins. Subcatchment 1A is the area collected by the proposed catch basins and overland runoff reaching the proposed Infiltration Basin 1A. Subcatchment 1B includes areas draining into the proposed Infiltration Basin 1B along with the outlet flow from Basin 1A. Subcatchment 1C is the direct overland runoff caught by the constructed stormwater wetland Basin 1C as well as the outlet flow from Basin 1B. Subcatchment 1D is the remaining wooded area draining uncontrolled into the wetland. Subcatchment 2A is the area directed into the constructed stormwater wetland 2A with an outlet into the existing catch basin. Subcatchment 2B is the area draining directly into the existing catch basin connected to the drainage system under Pheasant Hill that ultimately reaching the same wetland as Subcatchments 1A, 1B, 1C, and 1D. Subcatchments 2A and 2B have been combined to compare runoff from the site into the existing catch basin. Subcatchment 3A is the area with runoff going to western property line. With the proposed stormwater

management system, the Post-Development peak rates of runoff will not be increased for runoff into the wetland or to the abutting property to the west.

Compliance with MA DEP Stormwater Management Standards

Compliance with the Stormwater Management Standards, with consideration to the limited driveway crossing proposed in the Notice of Intent, is as follows:

Standard 1: No Untreated Discharges
Deep sump and hooded catch basins will direct runoff into either infiltration basins with a sediment forebays, or a constructed stormwater wetland with a sediment forebay to treat runoff from the new impervious areas in Subcatchments 1A, 1B, 1C, and 2A. Where the existing common driveway will be expanded, per direction of the Fire Chief, runoff will continue to drain in the existing manner. The site topography and constraints of the right of way and utility easement prevent the utilization of additional BMPs. For the limited project, water quality issues have been addressed with Standard 4.

Standard 2: Peak Rate Attenuation
Post-Development runoff into the wetlands and the west property line complies with Standard 2 as the peak rate of runoff will be controlled for the 2, 10, 25, and 100-year storm events. The peak rates of runoff have been summarized in the following table:

Discharge Summary Tables

Subcatchment 1 & 2: To Wetland

2-Year		10-Year		25-Year		100-Year	
Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)
2.956	1.114	6.697	2.499	9.095	3.418	12.58	4.609

Subcatchment 2: To Existing Catch Basin

2-Year		10-Year		25-Year		100-Year	
Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)
1.575	0.870	3.449	1.684	4.637	2.158	6.352	2.825

Subcatchment 3: To West Property Line

2-Year		10-Year		25-Year		100-Year	
Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)
0.413	0.409	0.978	0.944	1.343	1.290	1.880	1.792

Standard 3: Stormwater Recharge
As the project is a limited driveway crossing on a site consisting of C soils, the recharge requirements of Standard 3 have been met as shown in the attached calculations. Infiltration Basins 1A and 1B will provide adequate recharge volume and will be drawn down within 72 hours.

Standard 4: Water Quality
All runoff from impervious areas on site reaching the wetlands from Subcatchment 1 will be treated to meet the 80% TSS removal requirement of Standard 4. The infiltration basins and constructed stormwater wetland, all with pretreatment, have been sized to treat 0.5" off runoff over all impervious areas draining to it. Calculations showing treatment levels are attached. Where the existing common driveway will be expanded, runoff will continue to drain untreated as existing. The site topography and constraints of the right of way and utility easement prevent the utilization of additional BMPs. Attached *De Miniumis* stormwater discharge calculations have been attached to show treatment to the extent practical for the limit project.

Standard 5: Land Uses with Higher Potential Pollutant Loads
The site is will not contain "land uses with higher potential pollutant loads."

Standard 6: Critical Areas
The site does not discharge runoff to critical areas.

Standard 7: Redevelopment
The proposed project is not redevelopment.

Standard 8: Construction Period Controls
A Stormwater Pollution Prevention Plan will be submitted prior to construction. The project will require coverage under the NPDES Construction General Permit.

Standard 9: Operation and Maintenance Plan
An Operation and Maintenance Plan is not attached to this report but will be submitted prior to and land disturbance.

Standard 10: Illicit Discharges to Drainage System
An Illicit Discharge Compliance will be provided prior to the discharge of stormwater runoff to the post-construction stormwater BMP's.

Design Basis

1. The United States Department of Agriculture Natural Resource Conservation Service (N.R.C.S.) TR55 methodology was used to determine offsite rates of runoff.
2. The twenty-four hour rainfall, taken from N.R.C.S. publications, is 6.4 inches for the 100-year storm,5.3 inches for the 25-year storm, 4.5 inches for the 10-year storm, and 3.1 inches for the 2-year storm event.
3. The hydrologic calculations were performed using the computer program: "Hydraflow Hydrographs 2007" by Intelisolve.
4. The soil types of the site were taken from the N.R.C.S. Soil Survey Map for Acton.
5. Soil conditions and estimated seasonal high groundwater table were based on NRCS Soil Maps.

Pre-Development Hydrology

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	1.398	2	740	7,476	----	------	------	PRE Sub. 1
2	SCS Runoff	1.575	2	744	8,894	----	------	------	PRE Sub. 2
3	Combine	2.956	2	742	16,371	1, 2	------	------	PRE Wetlands TOTAL
4	SCS Runoff	0.413	2	744	2,433	----	------	------	PRE Sub. 3
6	SCS Runoff	0.936	2	736	4,523	----	------	------	POST Sub. 1A
7	Reservoir	0.727	2	748	3,222	6	254.03	1,024	Basin 1A
8	Diversion1	0.000	2	n/a	0	7	------	------	Basin 1A Overflow
9	Diversion2	0.727	2	748	3,222	7	------	------	Basin 1A Outlet
11	SCS Runoff	0.836	2	732	3,498	----	------	------	POST Sub. 1B
12	Combine	1.306	2	740	6,719	8, 9, 11	------	------	TOTAL to Basin 1B
13	Reservoir	0.177	2	804	1,917	12	242.22	3,131	Basin 1B
14	Diversion1	0.000	2	n/a	0	13	------	------	Basin 1B Overflow
15	Diversion2	0.177	2	804	1,917	13	------	------	Basin 1B Outlet
17	SCS Runoff	1.267	2	732	5,428	----	------	------	POST Sub. 1C
18	Combine	1.267	2	732	7,345	14, 15, 17	------	------	TOTAL To Basin 1C
19	Reservoir	0.440	2	758	7,334	18	232.50	1,743	Basin 1C
20	Diversion1	0.000	2	n/a	0	19	------	------	Basin 1C Overflow
21	Diversion2	0.440	2	758	7,334	19	------	------	Basin 1C Outlet
23	SCS Runoff	0.055	2	732	252	----	------	------	POST Sub. 1D
25	SCS Runoff	2.118	2	728	8,129	----	------	------	POST Sub. 2A
26	Reservoir	0.318	2	772	8,106	25	255.89	3,739	Basin 2A
27	Diversion1	0.000	2	n/a	0	26	------	------	Basin 2A Overflow
28	Diversion2	0.318	2	772	8,106	26	------	------	Basin 2A Outlet
30	SCS Runoff	0.651	2	730	2,617	----	------	------	POST Sub. 2B
31	Combine	0.870	2	730	10,723	27, 28, 30	------	------	POST Sub. 2 TOTAL
33	Combine	1.114	2	736	18,309	20, 21, 23, 31,	------	------	POST Wetlands TOTAL
35	SCS Runoff	0.409	2	742	2,239	----	------	------	POST Sub. 3A

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	3.312	2	736	16,210	----	------	------	PRE Sub. 1
2	SCS Runoff	3.449	2	742	18,368	----	------	------	PRE Sub. 2
3	Combine	6.697	2	740	34,578	1, 2	------	------	PRE Wetlands TOTAL
4	SCS Runoff	0.978	2	742	5,286	----	------	------	PRE Sub. 3
6	SCS Runoff	1.799	2	736	8,517	----	------	------	POST Sub. 1A
7	Reservoir	1.322	2	748	7,054	6	254.45	1,660	Basin 1A
8	Diversion1	0.000	2	n/a	0	7	------	------	Basin 1A Overflow
9	Diversion2	1.322	2	748	7,054	7	------	------	Basin 1A Outlet
11	SCS Runoff	1.643	2	730	6,718	----	------	------	POST Sub. 1B
12	Combine	2.631	2	734	13,772	8, 9, 11	------	------	TOTAL to Basin 1B
13	Reservoir	1.092	2	770	8,033	12	242.75	5,185	Basin 1B
14	Diversion1	0.000	2	n/a	0	13	------	------	Basin 1B Overflow
15	Diversion2	1.092	2	770	8,033	13	------	------	Basin 1B Outlet
17	SCS Runoff	2.642	2	732	10,874	----	------	------	POST Sub. 1C
18	Combine	2.670	2	732	18,906	14, 15, 17	------	------	TOTAL To Basin 1C
19	Reservoir	1.469	2	778	18,895	18	233.13	4,133	Basin 1C
20	Diversion1	0.000	2	n/a	0	19	------	------	Basin 1C Overflow
21	Diversion2	1.469	2	778	18,895	19	------	------	Basin 1C Outlet
23	SCS Runoff	0.130	2	732	542	----	------	------	POST Sub. 1D
25	SCS Runoff	3.686	2	728	14,175	----	------	------	POST Sub. 2A
26	Reservoir	0.446	2	782	14,152	25	256.51	6,962	Basin 2A
27	Diversion1	0.000	2	n/a	0	26	------	------	Basin 2A Overflow
28	Diversion2	0.446	2	782	14,152	26	------	------	Basin 2A Outlet
30	SCS Runoff	1.342	2	728	5,202	----	------	------	POST Sub. 2B
31	Combine	1.684	2	730	19,354	27, 28, 30	------	------	POST Sub. 2 TOTAL
33	Combine	2.499	2	734	38,791	20, 21, 23, 31,	------	------	POST Wetlands TOTAL
35	SCS Runoff	0.944	2	738	4,785	----	------	------	POST Sub. 3A

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	4.557	2	736	21,889	----	------	------	PRE Sub. 1
2	SCS Runoff	4.637	2	740	24,412	----	------	------	PRE Sub. 2
3	Combine	9.095	2	738	46,300	1, 2	------	------	PRE Wetlands TOTAL
4	SCS Runoff	1.343	2	742	7,142	----	------	------	PRE Sub. 3
6	SCS Runoff	2.320	2	736	10,973	----	------	------	POST Sub. 1A
7	Reservoir	1.617	2	750	9,420	6	254.76	2,116	Basin 1A
8	Diversion1	0.000	2	n/a	0	7	------	------	Basin 1A Overflow
9	Diversion2	1.617	2	750	9,420	7	------	------	Basin 1A Outlet
11	SCS Runoff	2.140	2	730	8,714	----	------	------	POST Sub. 1B
12	Combine	3.324	2	734	18,135	8, 9, 11	------	------	TOTAL to Basin 1B
13	Reservoir	1.670	2	764	12,048	12	243.00	6,146	Basin 1B
14	Diversion1	0.000	2	n/a	0	13	------	------	Basin 1B Overflow
15	Diversion2	1.670	2	764	12,048	13	------	------	Basin 1B Outlet
17	SCS Runoff	3.501	2	730	14,306	----	------	------	POST Sub. 1C
18	Combine	3.851	2	734	26,354	14, 15, 17	------	------	TOTAL To Basin 1C
19	Reservoir	2.152	2	776	26,342	18	233.51	5,977	Basin 1C
20	Diversion1	0.000	2	n/a	0	19	------	------	Basin 1C Overflow
21	Diversion2	2.152	2	776	26,342	19	------	------	Basin 1C Outlet
23	SCS Runoff	0.177	2	732	731	----	------	------	POST Sub. 1D
25	SCS Runoff	4.598	2	728	17,782	----	------	------	POST Sub. 2A
26	Reservoir	0.508	2	786	17,760	25	256.88	8,938	Basin 2A
27	Diversion1	0.000	2	n/a	0	26	------	------	Basin 2A Overflow
28	Diversion2	0.508	2	786	17,760	26	------	------	Basin 2A Outlet
30	SCS Runoff	1.776	2	728	6,826	----	------	------	POST Sub. 2B
31	Combine	2.158	2	730	24,586	27, 28, 30	------	------	POST Sub. 2 TOTAL
33	Combine	3.418	2	734	51,659	20, 21, 23, 31,	------	------	POST Wetlands TOTAL
35	SCS Runoff	1.290	2	738	6,431	----	------	------	POST Sub. 3A

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	6.368	2	736	30,239	----	-------	------	PRE Sub. 1
2	SCS Runoff	6.352	2	740	33,206	----	-------	------	PRE Sub. 2
3	Combine	12.58	2	738	63,445	1, 2	-------	------	PRE Wetlands TOTAL
4	SCS Runoff	1.880	2	740	9,872	----	-------	------	PRE Sub. 3
6	SCS Runoff	3.050	2	736	14,475	----	-------	------	POST Sub. 1A
7	Reservoir	2.213	2	748	12,812	6	255.15	2,772	Basin 1A
8	Diversion1	0.288	2	748	135	7	-------	------	Basin 1A Overflow
9	Diversion2	1.925	2	748	12,678	7	-------	------	Basin 1A Outlet
11	SCS Runoff	2.841	2	730	11,573	----	-------	------	POST Sub. 1B
12	Combine	4.276	2	732	24,385	8, 9, 11	-------	------	TOTAL to Basin 1B
13	Reservoir	2.444	2	758	17,890	12	243.24	7,520	Basin 1B
14	Diversion1	0.000	2	n/a	0	13	-------	------	Basin 1B Overflow
15	Diversion2	2.444	2	758	17,890	13	-------	------	Basin 1B Outlet
17	SCS Runoff	4.733	2	730	19,267	----	-------	------	POST Sub. 1C
18	Combine	5.783	2	734	37,157	14, 15, 17	-------	------	TOTAL To Basin 1C
19	Reservoir	3.242	2	766	37,146	18	233.96	8,178	Basin 1C
20	Diversion1	0.000	2	n/a	0	19	-------	------	Basin 1C Overflow
21	Diversion2	3.242	2	766	37,146	19	-------	------	Basin 1C Outlet
23	SCS Runoff	0.246	2	730	1,008	----	-------	------	POST Sub. 1D
25	SCS Runoff	5.857	2	728	22,848	----	-------	------	POST Sub. 2A
26	Reservoir	0.585	2	792	22,825	25	257.40	11,771	Basin 2A
27	Diversion1	0.000	2	n/a	0	26	-------	------	Basin 2A Overflow
28	Diversion2	0.585	2	792	22,825	26	-------	------	Basin 2A Outlet
30	SCS Runoff	2.393	2	728	9,170	----	-------	------	POST Sub. 2B
31	Combine	2.825	2	728	31,995	27, 28, 30	-------	------	POST Sub. 2 TOTAL
33	Combine	4.609	2	732	70,149	20, 21, 23, 31,	-------	------	POST Wetlands TOTAL
35	SCS Runoff	1.792	2	738	8,844	----	-------	------	POST Sub. 3A

Worksheet 2: Runoff curve number and runoff **SM-4627**

Project: Nonset Path By ECS Date 12/28/10

Location: Acton, MA Checked _____ Date _____

Circle one: [Present] Developed Subcatchment 1

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
623C C	Woods- Good Condition	70			1.12	78.40
623C C	Open Space- Good Condition	74			0.04	2.96
307B C	Woods- Good Condition	70			1.45	101.50
Totals =					2.61	182.86

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{182.86}{2.61} = 70.06$; Use CN = [70.1]

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.77	1.68	3.13
Runoff, Q.....	cf	7328	15899	29673

(210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) **SM-4627**

Project: Nonset Path By ECS Date 12/28/10

Location: Acton, MA Checked _____ Date _____

Circle one: Present / Developed
Circle one: Tc / Tt through subarea: Subcatchment 1

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Woods			
2. Mannings roughness coeff., n (table 3-1)			0.8			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.03			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.31			0.31
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	443			
9. Watercourse slope, s		ft/ft	0.05			
10. Average Velocity, V (figure 3-1)		ft/s	3.61			
11. Tt = L / 3600V	Compute Tt	hr	0.03			0.03
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.34
	min	20.6

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 1

PRE Sub. 1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.398 cfs
Storm frequency	= 2 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 7,476 cuft
Drainage area	= 2.610 ac	Curve number	= 70.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 20.6 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
738	1.398
740	1.398 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 1

PRE Sub. 1

Hydrograph type	= SCS Runoff	Peak discharge	= 3.312 cfs
Storm frequency	= 10 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 7,476 cuft
Drainage area	= 2.610 ac	Curve number	= 70.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 20.6 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
736	3.312 <<
738	3.306

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Tuesday, Jun 28, 2011

Hyd. No. 1

PRE Sub. 1

Hydrograph type	= SCS Runoff	Peak discharge	= 4.557 cfs
Storm frequency	= 25 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 7,476 cuft
Drainage area	= 2.610 ac	Curve number	= 70.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 20.6 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
736	4.557 <<
738	4.528

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 1

PRE Sub. 1

Hydrograph type	= SCS Runoff	Peak discharge	= 6.368 cfs
Storm frequency	= 100 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 7,476 cuft
Drainage area	= 2.610 ac	Curve number	= 70.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 20.6 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
736	6.368 <<

...End

Worksheet 2: Runoff curve number and runoff SM-4627

Project: Nonset path By ECS Date 12/28/10

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed Subcatchment 2

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
—	Impervious	98			0.08	7.84
623C C	Woods- Good Condition	70			2.30	161.00
623C C	Open Space- Good Condition	74			0.02	1.48
623C C	Gravel Road	89			0.28	24.92
Totals =					2.68	195.24

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{195.24}{2.68} = 72.85$; Use CN = 72.9

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.91	1.88	3.41
Runoff, Q.....	cf	8869	18332	33158

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) **SM-4627**

Project: Nonset path By ECS Date 12/28/10

Location: Acton, MA Checked _____ Date _____

Circle one: Present / Developed
Circle one: Tc / Tt through subarea: Subcatchment 2

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Woods			
2. Mannings roughness coeff., n (table 3-1)			0.8			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.01			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.48			0.48
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	176			
9. Watercourse slope, s		ft/ft	0.03			
10. Average Velocity, V (figure 3-1)		ft/s	2.79			
11. Tt = L / 3600V	Compute Tt	hr	0.02			0.02
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.50
	min	29.8

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 2

PRE Sub. 2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.575 cfs
Storm frequency	= 2 yrs	Time to peak	= 744 min
Time interval	= 2 min	Hyd. volume	= 8,894 cuft
Drainage area	= 2.680 ac	Curve number	= 72.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 29.8 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
742	1.574
744	1.575 <<
746	1.562

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 2

PRE Sub. 2

Hydrograph type	= SCS Runoff	Peak discharge	= 3.449 cfs
Storm frequency	= 10 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 8,894 cuft
Drainage area	= 2.680 ac	Curve number	= 72.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 29.8 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time -- Outflow (min	cfs)
740	3.445
742	3.449 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 2

PRE Sub. 2

Hydrograph type	= SCS Runoff	Peak discharge	= 4.637 cfs
Storm frequency	= 25 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 8,894 cuft
Drainage area	= 2.680 ac	Curve number	= 72.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 29.8 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
740	4.637 <<
742	4.627

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 2

PRE Sub. 2

Hydrograph type	= SCS Runoff	Peak discharge	= 6.352 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 8,894 cuft
Drainage area	= 2.680 ac	Curve number	= 72.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 29.8 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
740	6.352 <<
742	6.318

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 3

PRE Wetlands TOTAL

Hydrograph type	= Combine	Peak discharge	= 2.956 cfs
Storm frequency	= 2 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 16,371 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 5.290 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 1 + (cfs)	Hyd. 2 = (cfs)	Outflow (cfs)
740	1.398 <<	1.552	2.950
742	1.382	1.574	2.956 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 3

PRE Wetlands TOTAL

Hydrograph type	= Combine	Peak discharge	= 6.697 cfs
Storm frequency	= 10 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 16,371 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 5.290 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 1 + (cfs)	Hyd. 2 = (cfs)	Outflow (cfs)
738	3.306	3.380	6.686
740	3.252	3.445	6.697 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 3

PRE Wetlands TOTAL

Hydrograph type	= Combine	Peak discharge	= 9.095 cfs
Storm frequency	= 25 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 16,371 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 5.290 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 1 + (cfs)	Hyd. 2 = (cfs)	Outflow (cfs)
738	4.528	4.567	9.095 <<
740	4.434	4.637 <<	9.071

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Tuesday, Jun 28, 2011

Hyd. No. 3

PRE Wetlands TOTAL

Hydrograph type	= Combine	Peak discharge	= 12.58 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 16,371 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 5.290 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 1 + (cfs)	Hyd. 2 = (cfs)	Outflow (cfs)
738	6.300	6.278	12.58 <<
740	6.144	6.352 <<	12.50

...End

Worksheet 2: Runoff curve number and runoff **SM-4627**

Project: Nonset Path By ECS Date 12/28/10

Location: Acton, MA Checked _____ Date _____

Circle one: [Present] Developed Subcatchment 3

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
623C C	Woods- Good Condition	70			0.87	60.90
Totals =					0.87	60.90

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{60.90}{0.87} = 70.00$; Use CN = 70.0

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.77	1.67	3.13
Runoff, Q.....	cf	2433	5286	9872

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) **SM-4627**

Project: Nonset Path By ECS Date 12/28/10

Location: Acton, MA Checked _____ Date _____

Circle one: Present / Developed
Circle one: Tc / Tt through subarea: Subcatchment 3

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Woods			
2. Mannings roughness coeff., n (table 3-1)			0.8			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.01			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.48			0.48
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	86			
9. Watercourse slope, s		ft/ft	0.02			
10. Average Velocity, V (figure 3-1)		ft/s	2.28			
11. Tt = L / 3600V	Compute Tt	hr	0.01			0.01
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.49 / min 29.4

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 4

PRE Sub. 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.413 cfs
Storm frequency	= 2 yrs	Time to peak	= 744 min
Time interval	= 2 min	Hyd. volume	= 2,433 cuft
Drainage area	= 0.870 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 29.4 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
742	0.409
744	0.413 <<
746	0.412

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 4

PRE Sub. 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.978 cfs
Storm frequency	= 10 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 2,433 cuft
Drainage area	= 0.870 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 29.4 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
740	0.973
742	0.978 <<
744	0.972

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 4

PRE Sub. 3

Hydrograph type	= SCS Runoff	Peak discharge	= 1.343 cfs
Storm frequency	= 25 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 2,433 cuft
Drainage area	= 0.870 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 29.4 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
740	1.342
742	1.343 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 4

PRE Sub. 3

Hydrograph type	= SCS Runoff	Peak discharge	= 1.880 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 2,433 cuft
Drainage area	= 0.870 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 29.4 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
740	1.880 <<
742	1.874

...End

Post-Development Hydrology

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	1.398	2	740	7,476	----	------	------	PRE Sub. 1
2	SCS Runoff	1.575	2	744	8,894	----	------	------	PRE Sub. 2
3	Combine	2.956	2	742	16,371	1, 2	------	------	PRE Wetlands TOTAL
4	SCS Runoff	0.413	2	744	2,433	----	------	------	PRE Sub. 3
6	SCS Runoff	0.936	2	736	4,523	----	------	------	POST Sub. 1A
7	Reservoir	0.727	2	748	3,222	6	254.03	1,024	Basin 1A
8	Diversion1	0.000	2	n/a	0	7	------	------	Basin 1A Overflow
9	Diversion2	0.727	2	748	3,222	7	------	------	Basin 1A Outlet
11	SCS Runoff	0.836	2	732	3,498	----	------	------	POST Sub. 1B
12	Combine	1.306	2	740	6,719	8, 9, 11	------	------	TOTAL to Basin 1B
13	Reservoir	0.177	2	804	1,917	12	242.22	3,131	Basin 1B
14	Diversion1	0.000	2	n/a	0	13	------	------	Basin 1B Overflow
15	Diversion2	0.177	2	804	1,917	13	------	------	Basin 1B Outlet
17	SCS Runoff	1.267	2	732	5,428	----	------	------	POST Sub. 1C
18	Combine	1.267	2	732	7,345	14, 15, 17	------	------	TOTAL To Basin 1C
19	Reservoir	0.440	2	758	7,334	18	232.50	1,743	Basin 1C
20	Diversion1	0.000	2	n/a	0	19	------	------	Basin 1C Overflow
21	Diversion2	0.440	2	758	7,334	19	------	------	Basin 1C Outlet
23	SCS Runoff	0.055	2	732	252	----	------	------	POST Sub. 1D
25	SCS Runoff	2.118	2	728	8,129	----	------	------	POST Sub. 2A
26	Reservoir	0.318	2	772	8,106	25	255.89	3,739	Basin 2A
27	Diversion1	0.000	2	n/a	0	26	------	------	Basin 2A Overflow
28	Diversion2	0.318	2	772	8,106	26	------	------	Basin 2A Outlet
30	SCS Runoff	0.651	2	730	2,617	----	------	------	POST Sub. 2B
31	Combine	0.870	2	730	10,723	27, 28, 30	------	------	POST Sub. 2 TOTAL
33	Combine	1.114	2	736	18,309	20, 21, 23, 31,	------	------	POST Wetlands TOTAL
35	SCS Runoff	0.409	2	742	2,239	----	------	------	POST Sub. 3A

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	3.312	2	736	16,210	----	------	------	PRE Sub. 1
2	SCS Runoff	3.449	2	742	18,368	----	------	------	PRE Sub. 2
3	Combine	6.697	2	740	34,578	1, 2	------	------	PRE Wetlands TOTAL
4	SCS Runoff	0.978	2	742	5,286	----	------	------	PRE Sub. 3
6	SCS Runoff	1.799	2	736	8,517	----	------	------	POST Sub. 1A
7	Reservoir	1.322	2	748	7,054	6	254.45	1,660	Basin 1A
8	Diversion1	0.000	2	n/a	0	7	------	------	Basin 1A Overflow
9	Diversion2	1.322	2	748	7,054	7	------	------	Basin 1A Outlet
11	SCS Runoff	1.643	2	730	6,718	----	------	------	POST Sub. 1B
12	Combine	2.631	2	734	13,772	8, 9, 11	------	------	TOTAL to Basin 1B
13	Reservoir	1.092	2	770	8,033	12	242.75	5,185	Basin 1B
14	Diversion1	0.000	2	n/a	0	13	------	------	Basin 1B Overflow
15	Diversion2	1.092	2	770	8,033	13	------	------	Basin 1B Outlet
17	SCS Runoff	2.642	2	732	10,874	----	------	------	POST Sub. 1C
18	Combine	2.670	2	732	18,906	14, 15, 17	------	------	TOTAL To Basin 1C
19	Reservoir	1.469	2	778	18,895	18	233.13	4,133	Basin 1C
20	Diversion1	0.000	2	n/a	0	19	------	------	Basin 1C Overflow
21	Diversion2	1.469	2	778	18,895	19	------	------	Basin 1C Outlet
23	SCS Runoff	0.130	2	732	542	----	------	------	POST Sub. 1D
25	SCS Runoff	3.686	2	728	14,175	----	------	------	POST Sub. 2A
26	Reservoir	0.446	2	782	14,152	25	256.51	6,962	Basin 2A
27	Diversion1	0.000	2	n/a	0	26	------	------	Basin 2A Overflow
28	Diversion2	0.446	2	782	14,152	26	------	------	Basin 2A Outlet
30	SCS Runoff	1.342	2	728	5,202	----	------	------	POST Sub. 2B
31	Combine	1.684	2	730	19,354	27, 28, 30	------	------	POST Sub. 2 TOTAL
33	Combine	2.499	2	734	38,791	20, 21, 23, 31,	------	------	POST Wetlands TOTAL
35	SCS Runoff	0.944	2	738	4,785	----	------	------	POST Sub. 3A

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	4.557	2	736	21,889	----	------	------	PRE Sub. 1
2	SCS Runoff	4.637	2	740	24,412	----	------	------	PRE Sub. 2
3	Combine	9.095	2	738	46,300	1, 2	------	------	PRE Wetlands TOTAL
4	SCS Runoff	1.343	2	742	7,142	----	------	------	PRE Sub. 3
6	SCS Runoff	2.320	2	736	10,973	----	------	------	POST Sub. 1A
7	Reservoir	1.617	2	750	9,420	6	254.76	2,116	Basin 1A
8	Diversion1	0.000	2	n/a	0	7	------	------	Basin 1A Overflow
9	Diversion2	1.617	2	750	9,420	7	------	------	Basin 1A Outlet
11	SCS Runoff	2.140	2	730	8,714	----	------	------	POST Sub. 1B
12	Combine	3.324	2	734	18,135	8, 9, 11	------	------	TOTAL to Basin 1B
13	Reservoir	1.670	2	764	12,048	12	243.00	6,146	Basin 1B
14	Diversion1	0.000	2	n/a	0	13	------	------	Basin 1B Overflow
15	Diversion2	1.670	2	764	12,048	13	------	------	Basin 1B Outlet
17	SCS Runoff	3.501	2	730	14,306	----	------	------	POST Sub. 1C
18	Combine	3.851	2	734	26,354	14, 15, 17	------	------	TOTAL To Basin 1C
19	Reservoir	2.152	2	776	26,342	18	233.51	5,977	Basin 1C
20	Diversion1	0.000	2	n/a	0	19	------	------	Basin 1C Overflow
21	Diversion2	2.152	2	776	26,342	19	------	------	Basin 1C Outlet
23	SCS Runoff	0.177	2	732	731	----	------	------	POST Sub. 1D
25	SCS Runoff	4.598	2	728	17,782	----	------	------	POST Sub. 2A
26	Reservoir	0.508	2	786	17,760	25	256.88	8,938	Basin 2A
27	Diversion1	0.000	2	n/a	0	26	------	------	Basin 2A Overflow
28	Diversion2	0.508	2	786	17,760	26	------	------	Basin 2A Outlet
30	SCS Runoff	1.776	2	728	6,826	----	------	------	POST Sub. 2B
31	Combine	2.158	2	730	24,586	27, 28, 30	------	------	POST Sub. 2 TOTAL
33	Combine	3.418	2	734	51,659	20, 21, 23, 31,	------	------	POST Wetlands TOTAL
35	SCS Runoff	1.290	2	738	6,431	----	------	------	POST Sub. 3A

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	6.368	2	736	30,239	----	------	------	PRE Sub. 1
2	SCS Runoff	6.352	2	740	33,206	----	------	------	PRE Sub. 2
3	Combine	12.58	2	738	63,445	1, 2	------	------	PRE Wetlands TOTAL
4	SCS Runoff	1.880	2	740	9,872	----	------	------	PRE Sub. 3
6	SCS Runoff	3.050	2	736	14,475	----	------	------	POST Sub. 1A
7	Reservoir	2.213	2	748	12,812	6	255.15	2,772	Basin 1A
8	Diversion1	0.288	2	748	135	7	------	------	Basin 1A Overflow
9	Diversion2	1.925	2	748	12,678	7	------	------	Basin 1A Outlet
11	SCS Runoff	2.841	2	730	11,573	----	------	------	POST Sub. 1B
12	Combine	4.276	2	732	24,385	8, 9, 11	------	------	TOTAL to Basin 1B
13	Reservoir	2.444	2	758	17,890	12	243.24	7,520	Basin 1B
14	Diversion1	0.000	2	n/a	0	13	------	------	Basin 1B Overflow
15	Diversion2	2.444	2	758	17,890	13	------	------	Basin 1B Outlet
17	SCS Runoff	4.733	2	730	19,267	----	------	------	POST Sub. 1C
18	Combine	5.783	2	734	37,157	14, 15, 17	------	------	TOTAL To Basin 1C
19	Reservoir	3.242	2	766	37,146	18	233.96	8,178	Basin 1C
20	Diversion1	0.000	2	n/a	0	19	------	------	Basin 1C Overflow
21	Diversion2	3.242	2	766	37,146	19	------	------	Basin 1C Outlet
23	SCS Runoff	0.246	2	730	1,008	----	------	------	POST Sub. 1D
25	SCS Runoff	5.857	2	728	22,848	----	------	------	POST Sub. 2A
26	Reservoir	0.585	2	792	22,825	25	257.40	11,771	Basin 2A
27	Diversion1	0.000	2	n/a	0	26	------	------	Basin 2A Overflow
28	Diversion2	0.585	2	792	22,825	26	------	------	Basin 2A Outlet
30	SCS Runoff	2.393	2	728	9,170	----	------	------	POST Sub. 2B
31	Combine	2.825	2	728	31,995	27, 28, 30	------	------	POST Sub. 2 TOTAL
33	Combine	4.609	2	732	70,149	20, 21, 23, 31,	------	------	POST Wetlands TOTAL
35	SCS Runoff	1.792	2	738	8,844	----	------	------	POST Sub. 3A

Worksheet 2: Runoff curve number and runoff **SM-4627**

Project: Nonset Path By ECS Date 6/24/11

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] Subcatchment 1A

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
—	Impervious	98			0.24	23.52
C	Woods- Good Condition	70			0.14	9.80
C	Open Space- Good Condition	74			0.51	37.74
C	Brush- Good Condition	70			0.08	5.60

1/ Use only one CN source per line. Totals = 0.97 76.66

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{76.66}{0.97} = 79.03$; Use CN = [79.0]

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	1.26	2.38	4.04
Runoff, Q.....	cf	4451	8377	14233

(210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4627

Project: Nonset Path By ECS Date 6/24/11

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed Subcatchment 1A

Circle one: Tc Tt through subarea _____

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Woods			
2. Mannings roughness coeff., n (table 3-1)			0.8			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.02			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.36			0.36
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	88			
9. Watercourse slope, s		ft/ft	0.03			
10. Average Velocity, V (figure 3-1)		ft/s	2.79			
11. Tt = L / 3600V	Compute Tt	hr	0.01			0.01
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.37

min 22.3

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 6

POST Sub. 1A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.936 cfs
Storm frequency	= 2 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 4,523 cuft
Drainage area	= 0.970 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 22.3 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
736	0.936 <<
738	0.932

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 6

POST Sub. 1A

Hydrograph type	= SCS Runoff	Peak discharge	= 1.799 cfs
Storm frequency	= 10 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 4,523 cuft
Drainage area	= 0.970 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 22.3 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
734	1.783
736	1.799 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 6

POST Sub. 1A

Hydrograph type	= SCS Runoff	Peak discharge	= 2.320 cfs
Storm frequency	= 25 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 4,523 cuft
Drainage area	= 0.970 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 22.3 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
734	2.305
736	2.320 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 6

POST Sub. 1A

Hydrograph type	= SCS Runoff	Peak discharge	= 3.050 cfs
Storm frequency	= 100 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 4,523 cuft
Drainage area	= 0.970 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 22.3 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
734	3.039
736	3.050 <<

...End

Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Pond No. 7 - Basin 1A

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 253.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	253.00	756	0	0
1.00	254.00	1,235	986	986
2.00	255.00	1,759	1,489	2,475
3.00	256.00	2,337	2,041	4,516

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	0.00	0.00	0.00
Span (in)	= 8.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 253.50	0.00	0.00	0.00
Length (ft)	= 30.00	0.00	0.00	0.00
Slope (%)	= 3.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.00	0.00	0.00	0.00
Crest El. (ft)	= 255.10	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Ciplti	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 1.020 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	253.00	0.00	---	---	---	0.00	---	---	---	0.000	---	0.000
1.00	986	254.00	0.68 ic	---	---	---	0.00	---	---	---	0.029	---	0.706
2.00	2,475	255.00	1.82 ic	---	---	---	0.00	---	---	---	0.042	---	1.857
3.00	4,516	256.00	2.47 ic	---	---	---	17.06	---	---	---	0.055	---	19.59

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 7

Basin 1A

Hydrograph type	= Reservoir	Peak discharge	= 0.727 cfs
Storm frequency	= 2 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 3,222 cuft
Inflow hyd. No.	= 6 - POST Sub. 1A	Reservoir name	= Basin 1A
Max. Elevation	= 254.03 ft	Max. Storage	= 1,024 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
746	0.809	254.02	0.723	-----	-----	-----	-----	-----	-----	-----	0.029	0.723
748	0.759	254.03 <<	0.727	-----	-----	-----	-----	-----	-----	-----	0.029	0.727 <<
750	0.702	254.02	0.723	-----	-----	-----	-----	-----	-----	-----	0.029	0.723

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 7

Basin 1A

Hydrograph type	= Reservoir	Peak discharge	= 1.322 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 3,222 cuft
Inflow hyd. No.	= 6 - POST Sub. 1A	Reservoir name	= Basin 1A
Max. Elevation	= 254.45 ft	Max. Storage	= 1,660 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
746	1.498	254.45	1.313	-----	-----	-----	-----	-----	-----	-----	0.035	1.313
748	1.395	254.45 <<	1.322	-----	-----	-----	-----	-----	-----	-----	0.035	1.322 <<
750	1.283	254.45	1.320	-----	-----	-----	-----	-----	-----	-----	0.035	1.320
752	1.162	254.44	1.309	-----	-----	-----	-----	-----	-----	-----	0.035	1.309

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 7

Basin 1A

Hydrograph type	= Reservoir	Peak discharge	= 1.617 cfs
Storm frequency	= 25 yrs	Time to peak	= 750 min
Time interval	= 2 min	Hyd. volume	= 3,222 cuft
Inflow hyd. No.	= 6 - POST Sub. 1A	Reservoir name	= Basin 1A
Max. Elevation	= 254.76 ft	Max. Storage	= 2,116 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
748	1.773	254.76	1.613	-----	-----	-----	-----	-----	-----	-----	0.039	1.613
750	1.627	254.76 <<	1.617	-----	-----	-----	-----	-----	-----	-----	0.039	1.617 <<
752	1.470	254.75	1.609	-----	-----	-----	-----	-----	-----	-----	0.038	1.609

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 7

Basin 1A

Hydrograph type	= Reservoir	Peak discharge	= 2.213 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 3,222 cuft
Inflow hyd. No.	= 6 - POST Sub. 1A	Reservoir name	= Basin 1A
Max. Elevation	= 255.15 ft	Max. Storage	= 2,772 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
748	2.299	255.15 <<	1.925	-----	-----	-----	0.288	-----	-----	-----	0.044	2.213 <<
750	2.104	255.14	1.923	-----	-----	-----	0.271	-----	-----	-----	0.043	2.194

...End

Hydrograph Report

Hyd. No. 8

Basin 1A Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 7 - Basin 1A	2nd diverted hyd.	= 9
Diversion method	= Pond -	Pond structure	= Weir A

...End

Hydrograph Report

Hyd. No. 8

Basin 1A Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 7 - Basin 1A	2nd diverted hyd.	= 9
Diversion method	= Pond -	Pond structure	= Weir A

...End

Hydrograph Report

Hyd. No. 8

Basin 1A Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 7 - Basin 1A	2nd diverted hyd.	= 9
Diversion method	= Pond -	Pond structure	= Weir A

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 8

Basin 1A Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.288 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 7 - Basin 1A	2nd diverted hyd.	= 9
Diversion method	= Pond -	Pond structure	= Weir A

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
748	2.213 <<	1.925 <<	0.288 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 9

Basin 1A Outlet

Hydrograph type	= Diversion2	Peak discharge	= 0.727 cfs
Storm frequency	= 2 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 3,222 cuft
Inflow hydrograph	= 7 - Basin 1A	2nd diverted hyd.	= 8
Diversion method	= Pond -	Pond structure	= Weir A

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
746	0.723	0.000 <<	0.723
748	0.727 <<	0.000 <<	0.727 <<
750	0.723	0.000 <<	0.723

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 9

Basin 1A Outlet

Hydrograph type	= Diversion2	Peak discharge	= 1.322 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 3,222 cuft
Inflow hydrograph	= 7 - Basin 1A	2nd diverted hyd.	= 8
Diversion method	= Pond -	Pond structure	= Weir A

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
746	1.313	0.000 <<	1.313
748	1.322 <<	0.000 <<	1.322 <<
750	1.320	0.000 <<	1.320
752	1.309	0.000 <<	1.309

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 9

Basin 1A Outlet

Hydrograph type	= Diversion2	Peak discharge	= 1.617 cfs
Storm frequency	= 25 yrs	Time to peak	= 750 min
Time interval	= 2 min	Hyd. volume	= 3,222 cuft
Inflow hydrograph	= 7 - Basin 1A	2nd diverted hyd.	= 8
Diversion method	= Pond -	Pond structure	= Weir A

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
748	1.613	0.000 <<	1.613
750	1.617 <<	0.000 <<	1.617 <<
752	1.609	0.000 <<	1.609

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 9

Basin 1A Outlet

Hydrograph type	= Diversion2	Peak discharge	= 1.925 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 3,222 cuft
Inflow hydrograph	= 7 - Basin 1A	2nd diverted hyd.	= 8
Diversion method	= Pond -	Pond structure	= Weir A

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
746	2.143	0.226	1.918
748	2.213 <<	0.288 <<	1.925 <<
750	2.194	0.271	1.923
752	2.113	0.198	1.914

...End

Worksheet 2: Runoff curve number and runoff **SM-4627**

Project: Nonset Path By ECS Date 6/24/11

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed Subcatchment 1B

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
—	Impervious	98			0.19	18.62
C	Woods- Good Condition	70			0.17	11.90
C	Open Space- Good Condition	74			0.26	19.24
C	Brush- Good Condition	70			0.22	15.40

1/ Use only one CN source per line. Totals = 0.84 65.16

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{65.16}{0.84} = 77.57$; Use CN = 77.6

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	1.17	2.26	3.89
Runoff, Q.....	cf	3582	6883	11861

(210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) **SM-4627**

Project: Nonset Path By ECS Date 6/24/11

Location: Acton, MA Checked _____ Date _____

Circle one: Present | Developed

Circle one: Tc | Tt through subarea Subcatchment 1B

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Woods			
2. Mannings roughness coeff., n (table 3-1)			0.8			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.06			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.23			0.23
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	208			
9. Watercourse slope, s		ft/ft	0.06			
10. Average Velocity, V (figure 3-1)		ft/s	3.95			
11. Tt = L / 3600V	Compute Tt	hr	0.01			0.01
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.25
	min	14.9

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 11

POST Sub. 1B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.836 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 3,498 cuft
Drainage area	= 0.840 ac	Curve number	= 77.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.9 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
730	0.828
732	0.836 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 11

POST Sub. 1B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.643 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 3,498 cuft
Drainage area	= 0.840 ac	Curve number	= 77.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.9 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
730	1.643 <<
732	1.640

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 11

POST Sub. 1B

Hydrograph type	= SCS Runoff	Peak discharge	= 2.140 cfs
Storm frequency	= 25 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 3,498 cuft
Drainage area	= 0.840 ac	Curve number	= 77.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.9 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
730	2.140 <<
732	2.128

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 11

POST Sub. 1B

Hydrograph type	= SCS Runoff	Peak discharge	= 2.841 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 3,498 cuft
Drainage area	= 0.840 ac	Curve number	= 77.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.9 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
730	2.841 <<
732	2.815

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 12

TOTAL to Basin 1B

Hydrograph type	= Combine	Peak discharge	= 1.306 cfs
Storm frequency	= 2 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 6,719 cuft
Inflow hyds.	= 8, 9, 11	Contrib. drain. area	= 0.840 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 8 + (cfs)	Hyd. 9 + (cfs)	Hyd. 11 = (cfs)	Outflow (cfs)
740	0.000 <<	0.641	0.665	1.306 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 12

TOTAL to Basin 1B

Hydrograph type	= Combine	Peak discharge	= 2.631 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 6,719 cuft
Inflow hyds.	= 8, 9, 11	Contrib. drain. area	= 0.840 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 8 + (cfs)	Hyd. 9 + (cfs)	Hyd. 11 = (cfs)	Outflow (cfs)
732	0.000 <<	0.974	1.640	2.614
734	0.000 <<	1.052	1.579	2.631 <<
736	0.000 <<	1.123	1.486	2.609

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 12

TOTAL to Basin 1B

Hydrograph type	= Combine	Peak discharge	= 3.324 cfs
Storm frequency	= 25 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 6,719 cuft
Inflow hyds.	= 8, 9, 11	Contrib. drain. area	= 0.840 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 8 + (cfs)	Hyd. 9 + (cfs)	Hyd. 11 = (cfs)	Outflow (cfs)
732	0.000 <<	1.190	2.128	3.318
734	0.000 <<	1.282	2.042	3.324 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 12

TOTAL to Basin 1B

Hydrograph type	= Combine	Peak discharge	= 4.276 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 6,719 cuft
Inflow hyds.	= 8, 9, 11	Contrib. drain. area	= 0.840 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 8 + (cfs)	Hyd. 9 + (cfs)	Hyd. 11 = (cfs)	Outflow (cfs)
732	0.000	1.461	2.815	4.276 <<
734	0.000	1.569	2.692	4.261

...End

Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Pond No. 5 - Basin 1B

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 240.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	240.50	163	0	0
0.50	241.00	1,160	293	293
1.50	242.00	2,936	1,980	2,273
2.50	243.00	4,867	3,861	6,134
3.50	244.00	6,933	5,869	12,003

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 238.50	0.00	0.00	0.00
Length (ft)	= 30.00	0.00	0.00	0.00
Slope (%)	= 12.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 11.50	0.50	6.00	0.00
Crest El. (ft)	= 243.25	242.00	243.50	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	Rect	Ciplti	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 1.020 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	240.50	0.00	---	---	---	0.00	0.00	0.00	---	0.000	---	0.000
0.50	293	241.00	4.63 ic	---	---	---	0.00	0.00	0.00	---	0.027	---	0.027
1.50	2,273	242.00	4.63 ic	---	---	---	0.00	0.00	0.00	---	0.069	---	0.069
2.50	6,134	243.00	4.63 ic	---	---	---	0.00	1.67	0.00	---	0.115	---	1.780
3.50	12,003	244.00	8.44 ic	---	---	---	7.47 s	0.97 s	7.06	---	0.164	---	15.66

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 13

Basin 1B

Hydrograph type	= Reservoir	Peak discharge	= 0.177 cfs
Storm frequency	= 2 yrs	Time to peak	= 804 min
Time interval	= 2 min	Hyd. volume	= 1,917 cuft
Inflow hyd. No.	= 12 - TOTAL to Basin 1B	Reservoir name	= Basin 1B
Max. Elevation	= 242.22 ft	Max. Storage	= 3,131 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
798	0.275	242.22	4.631	-----	-----	-----	-----	0.176	-----	-----	0.079	0.176
800	0.267	242.22	4.631	-----	-----	-----	-----	0.176	-----	-----	0.079	0.176
802	0.260	242.22	4.631	-----	-----	-----	-----	0.177	-----	-----	0.079	0.177
804	0.254	242.22 <<	4.631	-----	-----	-----	-----	0.177	-----	-----	0.079	0.177 <<
806	0.249	242.22	4.631	-----	-----	-----	-----	0.176	-----	-----	0.079	0.176
808	0.244	242.22	4.631	-----	-----	-----	-----	0.176	-----	-----	0.079	0.176
810	0.239	242.22	4.631	-----	-----	-----	-----	0.176	-----	-----	0.079	0.176
812	0.236	242.22	4.631	-----	-----	-----	-----	0.175	-----	-----	0.079	0.175

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 13

Basin 1B

Hydrograph type	= Reservoir	Peak discharge	= 1.092 cfs
Storm frequency	= 10 yrs	Time to peak	= 770 min
Time interval	= 2 min	Hyd. volume	= 1,917 cuft
Inflow hyd. No.	= 12 - TOTAL to Basin 1B	Reservoir name	= Basin 1B
Max. Elevation	= 242.75 ft	Max. Storage	= 5,185 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
766	1.343	242.75	4.631	-----	-----	-----	-----	1.082	-----	-----	0.103	1.082
768	1.266	242.75	4.631	-----	-----	-----	-----	1.090	-----	-----	0.104	1.090
770	1.196	242.75 <<	4.631	-----	-----	-----	-----	1.092	-----	-----	0.104	1.092 <<
772	1.124	242.75	4.631	-----	-----	-----	-----	1.090	-----	-----	0.104	1.090
774	1.047	242.75	4.631	-----	-----	-----	-----	1.083	-----	-----	0.104	1.083

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 13

Basin 1B

Hydrograph type	= Reservoir	Peak discharge	= 1.670 cfs
Storm frequency	= 25 yrs	Time to peak	= 764 min
Time interval	= 2 min	Hyd. volume	= 1,917 cuft
Inflow hyd. No.	= 12 - TOTAL to Basin 1B	Reservoir name	= Basin 1B
Max. Elevation	= 243.00 ft	Max. Storage	= 6,146 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
762	1.909	243.00	4.631	-----	-----	-----	-----	1.666	-----	-----	0.115	1.666
764	1.816	243.00 <<	4.631	-----	-----	-----	-----	1.670	-----	-----	0.115	1.670 <<
766	1.728	243.00	4.631	-----	-----	-----	-----	1.670	-----	-----	0.115	1.670
768	1.647	243.00	4.631	-----	-----	-----	-----	1.664	-----	-----	0.115	1.664

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 13

Basin 1B

Hydrograph type	= Reservoir	Peak discharge	= 2.444 cfs
Storm frequency	= 100 yrs	Time to peak	= 758 min
Time interval	= 2 min	Hyd. volume	= 1,917 cuft
Inflow hyd. No.	= 12 - TOTAL to Basin 1B	Reservoir name	= Basin 1B
Max. Elevation	= 243.24 ft	Max. Storage	= 7,520 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
756	2.734	243.23	4.631	-----	-----	-----	0.145	2.283	-----	-----	0.126	2.428
758	2.615	243.24 <<	4.631	-----	-----	-----	0.155	2.290	-----	-----	0.126	2.444 <<
760	2.505	243.24	4.631	-----	-----	-----	0.154	2.289	-----	-----	0.126	2.443
762	2.401	243.23	4.631	-----	-----	-----	0.144	2.283	-----	-----	0.126	2.427

...End

Hydrograph Report

Hyd. No. 14

Basin 1B Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 13 - Basin 1B	2nd diverted hyd.	= 15
Diversion method	= Pond -	Pond structure	= Weir C

...End

Hydrograph Report

Hyd. No. 14

Basin 1B Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 13 - Basin 1B	2nd diverted hyd.	= 15
Diversion method	= Pond -	Pond structure	= Weir C

...End

Hydrograph Report

Hyd. No. 14

Basin 1B Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 13 - Basin 1B	2nd diverted hyd.	= 15
Diversion method	= Pond -	Pond structure	= Weir C

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 14

Basin 1B Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 13 - Basin 1B	2nd diverted hyd.	= 15
Diversion method	= Pond -	Pond structure	= Weir C

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Tuesday, Jun 28, 2011

Hyd. No. 15

Basin 1B Outlet

Hydrograph type	= Diversion2	Peak discharge	= 0.177 cfs
Storm frequency	= 2 yrs	Time to peak	= 804 min
Time interval	= 2 min	Hyd. volume	= 1,917 cuft
Inflow hydrograph	= 13 - Basin 1B	2nd diverted hyd.	= 14
Diversion method	= Pond -	Pond structure	= Weir C

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
798	0.176	0.000 <<	0.176
800	0.176	0.000 <<	0.176
802	0.177	0.000 <<	0.177
804	0.177 <<	0.000 <<	0.177 <<
806	0.176	0.000 <<	0.176
808	0.176	0.000 <<	0.176
810	0.176	0.000 <<	0.176
812	0.175	0.000 <<	0.175

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 15

Basin 1B Outlet

Hydrograph type	= Diversion2	Peak discharge	= 1.092 cfs
Storm frequency	= 10 yrs	Time to peak	= 770 min
Time interval	= 2 min	Hyd. volume	= 1,917 cuft
Inflow hydrograph	= 13 - Basin 1B	2nd diverted hyd.	= 14
Diversion method	= Pond -	Pond structure	= Weir C

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
766	1.082	0.000 <<	1.082
768	1.090	0.000 <<	1.090
770	1.092 <<	0.000 <<	1.092 <<
772	1.090	0.000 <<	1.090
774	1.083	0.000 <<	1.083

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 15

Basin 1B Outlet

Hydrograph type	= Diversion2	Peak discharge	= 1.670 cfs
Storm frequency	= 25 yrs	Time to peak	= 764 min
Time interval	= 2 min	Hyd. volume	= 1,917 cuft
Inflow hydrograph	= 13 - Basin 1B	2nd diverted hyd.	= 14
Diversion method	= Pond -	Pond structure	= Weir C

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
762	1.666	0.000 <<	1.666
764	1.670 <<	0.000 <<	1.670 <<
766	1.670	0.000 <<	1.670
768	1.664	0.000 <<	1.664

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 15

Basin 1B Outlet

Hydrograph type	= Diversion2	Peak discharge	= 2.444 cfs
Storm frequency	= 100 yrs	Time to peak	= 758 min
Time interval	= 2 min	Hyd. volume	= 1,917 cuft
Inflow hydrograph	= 13 - Basin 1B	2nd diverted hyd.	= 14
Diversion method	= Pond -	Pond structure	= Weir C

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
756	2.428	0.000 <<	2.428
758	2.444 <<	0.000 <<	2.444 <<
760	2.443	0.000 <<	2.443
762	2.427	0.000 <<	2.427

...End

Worksheet 2: Runoff curve number and runoff SM-4627

Project: Nonset Path By ECS Date 6/24/11

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed Subcatchment 1C

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
—	Impervious	98			0.23	22.54
C	Woods- Good Condition	70			0.57	39.90
C	Open Space- Good Condition	74			0.19	14.06
C	Brush- Good Condition	70			0.52	36.40
Totals =					1.51	112.90

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{112.90}{1.51} = 74.77$; Use CN = 74.8

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	1.01	2.03	3.60
Runoff, Q.....	cf	5558	11139	19743

(210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) **SM-4627**

Project: Nonset Path By ECS Date 6/24/11

Location: Acton, MA Checked _____ Date _____

Circle one: Present | Developed

Circle one: Tc | Tt through subarea Subcatchment 1C

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Woods			
2. Mannings roughness coeff., n (table 3-1)			0.8			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.06			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.23			0.23
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	305			
9. Watercourse slope, s		ft/ft	0.05			
10. Average Velocity, V (figure 3-1)		ft/s	3.61			
11. Tt = L / 3600V	Compute Tt	hr	0.02			0.02
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.26

min 15.5

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 17

POST Sub. 1C

Hydrograph type	= SCS Runoff	Peak discharge	= 1.267 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 5,428 cuft
Drainage area	= 1.510 ac	Curve number	= 74.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 15.5 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
732	1.267 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 17

POST Sub. 1C

Hydrograph type	= SCS Runoff	Peak discharge	= 2.642 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 5,428 cuft
Drainage area	= 1.510 ac	Curve number	= 74.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 15.5 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
730	2.637
732	2.642 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 17

POST Sub. 1C

Hydrograph type	= SCS Runoff	Peak discharge	= 3.501 cfs
Storm frequency	= 25 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 5,428 cuft
Drainage area	= 1.510 ac	Curve number	= 74.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 15.5 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
730	3.501 <<
732	3.493

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 17

POST Sub. 1C

Hydrograph type	= SCS Runoff	Peak discharge	= 4.733 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 5,428 cuft
Drainage area	= 1.510 ac	Curve number	= 74.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 15.5 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
730	4.733 <<
732	4.703

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 18

TOTAL To Basin 1C

Hydrograph type	= Combine	Peak discharge	= 1.267 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 7,345 cuft
Inflow hyds.	= 14, 15, 17	Contrib. drain. area	= 1.510 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 14 + (cfs)	Hyd. 15 + (cfs)	Hyd. 17 = (cfs)	Outflow (cfs)
732	0.000 <<	0.000	1.267 <<	1.267 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Tuesday, Jun 28, 2011

Hyd. No. 18

TOTAL To Basin 1C

Hydrograph type	= Combine	Peak discharge	= 2.670 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 7,345 cuft
Inflow hyds.	= 14, 15, 17	Contrib. drain. area	= 1.510 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 14 + (cfs)	Hyd. 15 + (cfs)	Hyd. 17 = (cfs)	Outflow (cfs)
732	0.000 <<	0.028	2.642 <<	2.670 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 18

TOTAL To Basin 1C

Hydrograph type	= Combine	Peak discharge	= 3.851 cfs
Storm frequency	= 25 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 7,345 cuft
Inflow hyds.	= 14, 15, 17	Contrib. drain. area	= 1.510 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 14 + (cfs)	Hyd. 15 + (cfs)	Hyd. 17 = (cfs)	Outflow (cfs)
732	0.000 <<	0.353	3.493	3.845
734	0.000 <<	0.490	3.361	3.851 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Tuesday, Jun 28, 2011

Hyd. No. 18

TOTAL To Basin 1C

Hydrograph type	= Combine	Peak discharge	= 5.783 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 7,345 cuft
Inflow hyds.	= 14, 15, 17	Contrib. drain. area	= 1.510 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 14 + (cfs)	Hyd. 15 + (cfs)	Hyd. 17 = (cfs)	Outflow (cfs)
732	0.000 <<	1.067	4.703	5.770
734	0.000 <<	1.273	4.509	5.783 <<

...End

Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Pond No. 4 - Basin 1C

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	232.00	n/a	0	0
1.00	233.00	n/a	3,492	3,492
2.00	234.00	n/a	4,901	8,393
3.00	235.00	n/a	5,757	14,150

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 232.00	0.00	0.00	0.00
Length (ft)	= 15.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 9.70	0.50	12.00	0.00
Crest El. (ft)	= 234.00	232.00	234.20	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	Rect	Ciplti	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	232.00	0.00	---	---	---	0.00	0.00	0.00	---	---	---	0.000
1.00	3,492	233.00	1.25 oc	---	---	---	0.00	1.25 s	0.00	---	---	---	1.245
2.00	8,393	234.00	3.35 oc	---	---	---	0.00	3.35 s	0.00	---	---	---	3.346
3.00	14,150	235.00	5.97 ic	---	---	---	5.05 s	0.89 s	28.59	---	---	---	34.53

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 19

Basin 1C

Hydrograph type	= Reservoir	Peak discharge	= 0.440 cfs
Storm frequency	= 2 yrs	Time to peak	= 758 min
Time interval	= 2 min	Hyd. volume	= 7,334 cuft
Inflow hyd. No.	= 18 - TOTAL To Basin 1C	Reservoir name	= Basin 1C
Max. Elevation	= 232.50 ft	Max. Storage	= 1,743 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
754	0.520	232.50	0.436	-----	-----	-----	-----	0.436	-----	-----	-----	0.436
756	0.480	232.50	0.439	-----	-----	-----	-----	0.439	-----	-----	-----	0.439
758	0.444	232.50 <<	0.440	-----	-----	-----	-----	0.440	-----	-----	-----	0.440 <<
760	0.413	232.50	0.439	-----	-----	-----	-----	0.439	-----	-----	-----	0.439
762	0.390	232.50	0.438	-----	-----	-----	-----	0.438	-----	-----	-----	0.438

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 19

Basin 1C

Hydrograph type	= Reservoir	Peak discharge	= 1.469 cfs
Storm frequency	= 10 yrs	Time to peak	= 778 min
Time interval	= 2 min	Hyd. volume	= 7,334 cuft
Inflow hyd. No.	= 18 - TOTAL To Basin 1C	Reservoir name	= Basin 1C
Max. Elevation	= 233.13 ft	Max. Storage	= 4,133 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
770	1.574	233.12	1.462	-----	-----	-----	-----	1.458	-----	-----	-----	1.458
772	1.554	233.13	1.466	-----	-----	-----	-----	1.462	-----	-----	-----	1.462
774	1.533	233.13	1.469	-----	-----	-----	-----	1.465	-----	-----	-----	1.465
776	1.509	233.13	1.472	-----	-----	-----	-----	1.468	-----	-----	-----	1.468
778	1.481	233.13 <<	1.473	-----	-----	-----	-----	1.469	-----	-----	-----	1.469 <<
780	1.448	233.13	1.473	-----	-----	-----	-----	1.468	-----	-----	-----	1.468
782	1.412	233.13	1.471	-----	-----	-----	-----	1.467	-----	-----	-----	1.467
784	1.374	233.13	1.468	-----	-----	-----	-----	1.464	-----	-----	-----	1.464
786	1.336	233.13	1.464	-----	-----	-----	-----	1.460	-----	-----	-----	1.460
788	1.299	233.12	1.458	-----	-----	-----	-----	1.454	-----	-----	-----	1.454

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 19

Basin 1C

Hydrograph type	= Reservoir	Peak discharge	= 2.152 cfs
Storm frequency	= 25 yrs	Time to peak	= 776 min
Time interval	= 2 min	Hyd. volume	= 7,334 cuft
Inflow hyd. No.	= 18 - TOTAL To Basin 1C	Reservoir name	= Basin 1C
Max. Elevation	= 233.51 ft	Max. Storage	= 5,977 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
768	2.306	233.50	2.134	-----	-----	-----	-----	2.133	-----	-----	-----	2.133
770	2.264	233.50	2.143	-----	-----	-----	-----	2.142	-----	-----	-----	2.142
772	2.225	233.51	2.149	-----	-----	-----	-----	2.148	-----	-----	-----	2.148
774	2.185	233.51	2.152	-----	-----	-----	-----	2.152	-----	-----	-----	2.152
776	2.143	233.51 <<	2.153	-----	-----	-----	-----	2.152	-----	-----	-----	2.152 <<
778	2.097	233.51	2.151	-----	-----	-----	-----	2.150	-----	-----	-----	2.150
780	2.048	233.50	2.146	-----	-----	-----	-----	2.146	-----	-----	-----	2.146
782	1.996	233.50	2.139	-----	-----	-----	-----	2.139	-----	-----	-----	2.139

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 19

Basin 1C

Hydrograph type	= Reservoir	Peak discharge	= 3.242 cfs
Storm frequency	= 100 yrs	Time to peak	= 766 min
Time interval	= 2 min	Hyd. volume	= 7,334 cuft
Inflow hyd. No.	= 18 - TOTAL To Basin 1C	Reservoir name	= Basin 1C
Max. Elevation	= 233.96 ft	Max. Storage	= 8,178 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
760	3.593	233.94	3.211	-----	-----	-----	-----	3.211	-----	-----	-----	3.211
762	3.466	233.95	3.229	-----	-----	-----	-----	3.229	-----	-----	-----	3.229
764	3.352	233.95	3.239	-----	-----	-----	-----	3.239	-----	-----	-----	3.239
766	3.247	233.96 <<	3.243	-----	-----	-----	-----	3.242	-----	-----	-----	3.242 <<
768	3.151	233.96	3.240	-----	-----	-----	-----	3.240	-----	-----	-----	3.240
770	3.063	233.95	3.233	-----	-----	-----	-----	3.232	-----	-----	-----	3.232
772	2.979	233.95	3.221	-----	-----	-----	-----	3.221	-----	-----	-----	3.221

...End

Hydrograph Report

Hyd. No. 20

Basin 1C Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 19 - Basin 1C	2nd diverted hyd.	= 21
Diversion method	= Pond -	Pond structure	= Weir C

...End

Hydrograph Report

Hyd. No. 20

Basin 1C Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 19 - Basin 1C	2nd diverted hyd.	= 21
Diversion method	= Pond -	Pond structure	= Weir C

...End

Hydrograph Report

Hyd. No. 20

Basin 1C Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 19 - Basin 1C	2nd diverted hyd.	= 21
Diversion method	= Pond -	Pond structure	= Weir C

...End

Hydrograph Report

Hyd. No. 20

Basin 1C Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 19 - Basin 1C	2nd diverted hyd.	= 21
Diversion method	= Pond -	Pond structure	= Weir C

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 21

Basin 1C Outlet

Hydrograph type	= Diversion2	Peak discharge	= 0.440 cfs
Storm frequency	= 2 yrs	Time to peak	= 758 min
Time interval	= 2 min	Hyd. volume	= 7,334 cuft
Inflow hydrograph	= 19 - Basin 1C	2nd diverted hyd.	= 20
Diversion method	= Pond -	Pond structure	= Weir C

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
754	0.436	0.000 <<	0.436
756	0.439	0.000 <<	0.439
758	0.440 <<	0.000 <<	0.440 <<
760	0.439	0.000 <<	0.439
762	0.438	0.000 <<	0.438

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 21

Basin 1C Outlet

Hydrograph type	= Diversion2	Peak discharge	= 1.469 cfs
Storm frequency	= 10 yrs	Time to peak	= 778 min
Time interval	= 2 min	Hyd. volume	= 7,334 cuft
Inflow hydrograph	= 19 - Basin 1C	2nd diverted hyd.	= 20
Diversion method	= Pond -	Pond structure	= Weir C

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
770	1.458	0.000 <<	1.458
772	1.462	0.000 <<	1.462
774	1.465	0.000 <<	1.465
776	1.468	0.000 <<	1.468
778	1.469 <<	0.000 <<	1.469 <<
780	1.468	0.000 <<	1.468
782	1.467	0.000 <<	1.467
784	1.464	0.000 <<	1.464
786	1.460	0.000 <<	1.460
788	1.454	0.000 <<	1.454

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 21

Basin 1C Outlet

Hydrograph type	= Diversion2	Peak discharge	= 2.152 cfs
Storm frequency	= 25 yrs	Time to peak	= 776 min
Time interval	= 2 min	Hyd. volume	= 7,334 cuft
Inflow hydrograph	= 19 - Basin 1C	2nd diverted hyd.	= 20
Diversion method	= Pond -	Pond structure	= Weir C

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
768	2.133	0.000 <<	2.133
770	2.142	0.000 <<	2.142
772	2.148	0.000 <<	2.148
774	2.152	0.000 <<	2.152
776	2.152 <<	0.000 <<	2.152 <<
778	2.150	0.000 <<	2.150
780	2.146	0.000 <<	2.146
782	2.139	0.000 <<	2.139

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 21

Basin 1C Outlet

Hydrograph type	= Diversion2	Peak discharge	= 3.242 cfs
Storm frequency	= 100 yrs	Time to peak	= 766 min
Time interval	= 2 min	Hyd. volume	= 7,334 cuft
Inflow hydrograph	= 19 - Basin 1C	2nd diverted hyd.	= 20
Diversion method	= Pond -	Pond structure	= Weir C

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
760	3.211	0.000 <<	3.211
762	3.229	0.000 <<	3.229
764	3.239	0.000 <<	3.239
766	3.242 <<	0.000 <<	3.242 <<
768	3.240	0.000 <<	3.240
770	3.232	0.000 <<	3.232
772	3.221	0.000 <<	3.221

...End

Worksheet 2: Runoff curve number and runoff **SM-4627**

Project: Nonset Path By ECS Date 6/24/11

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] Subcatchment 1D

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
—	Impervious	98			0.00	
C	Woods- Good Condition	70			0.07	4.90
C	Open Space- Good Condition	74			0.01	0.74
C	Brush- Good Condition	70			0.01	0.70
Totals =					0.09	6.34

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{6.34}{0.09} = 70.44$; Use CN = [70.4]

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.79	1.71	3.17
Runoff, Q.....	cf	259	557	1035

(210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) **SM-4627**

Project: Nonset Path By ECS Date 6/24/11

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed Subcatchment 1D
Circle one: Tc Tt through subarea _____

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Woods			
2. Mannings roughness coeff., n (table 3-1)			0.8			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.06			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.23			0.23
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	2			
9. Watercourse slope, s		ft/ft	0.05			
10. Average Velocity, V (figure 3-1)		ft/s	3.61			
11. Tt = L / 3600V	Compute Tt	hr	0.00			0.00
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.23
min 14.1

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 23

POST Sub. 1D

Hydrograph type	= SCS Runoff	Peak discharge	= 0.055 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 252 cuft
Drainage area	= 0.090 ac	Curve number	= 70.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.1 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
732	0.055 <<
734	0.055

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 23

POST Sub. 1D

Hydrograph type	= SCS Runoff	Peak discharge	= 0.130 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 252 cuft
Drainage area	= 0.090 ac	Curve number	= 70.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.1 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
730	0.128
732	0.130 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 23

POST Sub. 1D

Hydrograph type	= SCS Runoff	Peak discharge	= 0.177 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 252 cuft
Drainage area	= 0.090 ac	Curve number	= 70.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.1 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
730	0.176
732	0.177 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 23

POST Sub. 1D

Hydrograph type	= SCS Runoff	Peak discharge	= 0.246 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 252 cuft
Drainage area	= 0.090 ac	Curve number	= 70.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.1 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
730	0.246 <<
732	0.246

...End

Worksheet 2: Runoff curve number and runoff **SM-4627**

Project: Nonset Path By ECS Date 6/24/11

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] Subcatchment 2A

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
—	Impervious	98			0.62	60.76
C	Woods- Good Condition	70			0.00	
C	Open Space- Good Condition	74			0.52	38.48
C	Brush- Good Condition	70			0.17	11.90
Totals =					1.31	111.14

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{111.14}{1.31} = 84.84$; Use CN = [84.8]

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	1.66	2.89	4.66
Runoff, Q.....	cf	7897	13763	22176

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) **SM-04627**

Project: Nonset Path By ECS Date 6/24/11

Location: Acton, MA Checked _____ Date _____

Circle one: Present | Developed
Circle one: Tc | Tt through subarea Subcatchment 2A

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Grass			
2. Mannings roughness coeff., n (table 3-1)			0.24			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.01			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.18			0.18
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	59			
9. Watercourse slope, s		ft/ft	0.01			
10. Average Velocity, V (figure 3-1)		ft/s	1.61			
11. Tt = L / 3600V	Compute Tt	hr	0.01			0.01
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.19
min 11.6

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 25

POST Sub. 2A

Hydrograph type	= SCS Runoff	Peak discharge	= 2.118 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 8,129 cuft
Drainage area	= 1.310 ac	Curve number	= 84.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.6 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
728	2.118 <<
730	2.104

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 25

POST Sub. 2A

Hydrograph type	= SCS Runoff	Peak discharge	= 3.686 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 8,129 cuft
Drainage area	= 1.310 ac	Curve number	= 84.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.6 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
728	3.686 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 25

POST Sub. 2A

Hydrograph type	= SCS Runoff	Peak discharge	= 4.598 cfs
Storm frequency	= 25 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 8,129 cuft
Drainage area	= 1.310 ac	Curve number	= 84.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.6 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
728	4.598 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 25

POST Sub. 2A

Hydrograph type	= SCS Runoff	Peak discharge	= 5.857 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 8,129 cuft
Drainage area	= 1.310 ac	Curve number	= 84.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.6 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
728	5.857 <<

...End

Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Pond No. 6 - Basin 2A

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 255.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	255.00	3,221	0	0
1.00	256.00	5,288	4,212	4,212
2.00	257.00	5,444	5,365	9,577
3.00	258.00	5,588	5,515	15,092
4.00	259.00	5,949	5,767	20,859

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	4.00	0.00	0.00
Span (in)	= 8.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 255.00	255.00	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 16.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	6.00	0.00	0.00
Crest El. (ft)	= 257.50	258.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	Ciplti	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	255.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.00	4,212	256.00	0.35 ic	0.34 ic	---	---	0.00	0.00	---	---	---	---	0.343
2.00	9,577	257.00	0.53 ic	0.53 ic	---	---	0.00	0.00	---	---	---	---	0.527
3.00	15,092	258.00	2.74 ic	0.03 ic	---	---	2.70 s	0.00	---	---	---	---	2.727
4.00	20,859	259.00	3.22 ic	0.01 ic	---	---	2.99 s	19.98	---	---	---	---	22.98

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 26

Basin 2A

Hydrograph type	= Reservoir	Peak discharge	= 0.318 cfs
Storm frequency	= 2 yrs	Time to peak	= 772 min
Time interval	= 2 min	Hyd. volume	= 8,106 cuft
Inflow hyd. No.	= 25 - POST Sub. 2A	Reservoir name	= Basin 2A
Max. Elevation	= 255.89 ft	Max. Storage	= 3,739 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
758	0.480	255.88	0.315	0.315	-----	-----	-----	-----	-----	-----	-----	0.315
760	0.433	255.88	0.316	0.316	-----	-----	-----	-----	-----	-----	-----	0.316
762	0.397	255.88	0.317	0.316	-----	-----	-----	-----	-----	-----	-----	0.316
764	0.371	255.89	0.318	0.317	-----	-----	-----	-----	-----	-----	-----	0.317
766	0.352	255.89	0.318	0.317	-----	-----	-----	-----	-----	-----	-----	0.317
768	0.339	255.89	0.318	0.317	-----	-----	-----	-----	-----	-----	-----	0.317
770	0.328	255.89	0.318	0.318	-----	-----	-----	-----	-----	-----	-----	0.318
772	0.319	255.89 <<	0.318	0.318	-----	-----	-----	-----	-----	-----	-----	0.318 <<
774	0.310	255.89	0.318	0.318	-----	-----	-----	-----	-----	-----	-----	0.318
776	0.300	255.89	0.318	0.317	-----	-----	-----	-----	-----	-----	-----	0.317
778	0.291	255.89	0.318	0.317	-----	-----	-----	-----	-----	-----	-----	0.317
780	0.281	255.89	0.318	0.317	-----	-----	-----	-----	-----	-----	-----	0.317
782	0.272	255.88	0.318	0.317	-----	-----	-----	-----	-----	-----	-----	0.317
784	0.263	255.88	0.317	0.316	-----	-----	-----	-----	-----	-----	-----	0.316
786	0.255	255.88	0.317	0.316	-----	-----	-----	-----	-----	-----	-----	0.316
788	0.248	255.88	0.316	0.316	-----	-----	-----	-----	-----	-----	-----	0.316
790	0.242	255.88	0.316	0.315	-----	-----	-----	-----	-----	-----	-----	0.315
792	0.237	255.88	0.315	0.315	-----	-----	-----	-----	-----	-----	-----	0.315

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 26

Basin 2A

Hydrograph type	= Reservoir	Peak discharge	= 0.446 cfs
Storm frequency	= 10 yrs	Time to peak	= 782 min
Time interval	= 2 min	Hyd. volume	= 8,106 cuft
Inflow hyd. No.	= 25 - POST Sub. 2A	Reservoir name	= Basin 2A
Max. Elevation	= 256.51 ft	Max. Storage	= 6,962 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
760	0.707	256.49	0.447	0.442	-----	-----	-----	-----	-----	-----	-----	0.442
762	0.648	256.49	0.448	0.443	-----	-----	-----	-----	-----	-----	-----	0.443
764	0.605	256.50	0.449	0.443	-----	-----	-----	-----	-----	-----	-----	0.443
766	0.574	256.50	0.450	0.444	-----	-----	-----	-----	-----	-----	-----	0.444
768	0.551	256.50	0.450	0.444	-----	-----	-----	-----	-----	-----	-----	0.444
770	0.534	256.51	0.450	0.445	-----	-----	-----	-----	-----	-----	-----	0.445
772	0.519	256.51	0.450	0.445	-----	-----	-----	-----	-----	-----	-----	0.445
774	0.503	256.51	0.451	0.445	-----	-----	-----	-----	-----	-----	-----	0.445
776	0.488	256.51	0.451	0.446	-----	-----	-----	-----	-----	-----	-----	0.446
778	0.472	256.51	0.451	0.446	-----	-----	-----	-----	-----	-----	-----	0.446
780	0.456	256.51	0.451	0.446	-----	-----	-----	-----	-----	-----	-----	0.446
782	0.441	256.51 <<	0.451	0.446	-----	-----	-----	-----	-----	-----	-----	0.446 <<
784	0.426	256.51	0.451	0.446	-----	-----	-----	-----	-----	-----	-----	0.446
786	0.413	256.51	0.451	0.446	-----	-----	-----	-----	-----	-----	-----	0.446
788	0.401	256.51	0.451	0.445	-----	-----	-----	-----	-----	-----	-----	0.445
790	0.392	256.51	0.451	0.445	-----	-----	-----	-----	-----	-----	-----	0.445
792	0.384	256.51	0.450	0.445	-----	-----	-----	-----	-----	-----	-----	0.445
794	0.378	256.51	0.450	0.445	-----	-----	-----	-----	-----	-----	-----	0.445
796	0.372	256.51	0.450	0.445	-----	-----	-----	-----	-----	-----	-----	0.445
798	0.368	256.50	0.450	0.444	-----	-----	-----	-----	-----	-----	-----	0.444
800	0.363	256.50	0.450	0.444	-----	-----	-----	-----	-----	-----	-----	0.444
802	0.359	256.50	0.449	0.444	-----	-----	-----	-----	-----	-----	-----	0.444
804	0.355	256.50	0.449	0.443	-----	-----	-----	-----	-----	-----	-----	0.443
806	0.351	256.50	0.449	0.443	-----	-----	-----	-----	-----	-----	-----	0.443
808	0.347	256.49	0.448	0.442	-----	-----	-----	-----	-----	-----	-----	0.442
810	0.343	256.49	0.448	0.442	-----	-----	-----	-----	-----	-----	-----	0.442
812	0.339	256.49	0.447	0.442	-----	-----	-----	-----	-----	-----	-----	0.442

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 26

Basin 2A

Hydrograph type	= Reservoir	Peak discharge	= 0.508 cfs
Storm frequency	= 25 yrs	Time to peak	= 786 min
Time interval	= 2 min	Hyd. volume	= 8,106 cuft
Inflow hyd. No.	= 25 - POST Sub. 2A	Reservoir name	= Basin 2A
Max. Elevation	= 256.88 ft	Max. Storage	= 8,938 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
762	0.792	256.85	0.506	0.503	-----	-----	-----	-----	-----	-----	-----	0.503
764	0.738	256.86	0.507	0.504	-----	-----	-----	-----	-----	-----	-----	0.504
766	0.700	256.86	0.507	0.505	-----	-----	-----	-----	-----	-----	-----	0.505
768	0.673	256.87	0.508	0.506	-----	-----	-----	-----	-----	-----	-----	0.506
770	0.652	256.87	0.508	0.506	-----	-----	-----	-----	-----	-----	-----	0.506
772	0.633	256.87	0.508	0.507	-----	-----	-----	-----	-----	-----	-----	0.507
774	0.614	256.87	0.509	0.507	-----	-----	-----	-----	-----	-----	-----	0.507
776	0.594	256.88	0.509	0.508	-----	-----	-----	-----	-----	-----	-----	0.508
778	0.575	256.88	0.509	0.508	-----	-----	-----	-----	-----	-----	-----	0.508
780	0.556	256.88	0.509	0.508	-----	-----	-----	-----	-----	-----	-----	0.508
782	0.537	256.88	0.509	0.508	-----	-----	-----	-----	-----	-----	-----	0.508
784	0.519	256.88	0.509	0.508	-----	-----	-----	-----	-----	-----	-----	0.508
786	0.503	256.88 <<	0.509	0.508	-----	-----	-----	-----	-----	-----	-----	0.508 <<
788	0.489	256.88	0.509	0.508	-----	-----	-----	-----	-----	-----	-----	0.508
790	0.477	256.88	0.509	0.508	-----	-----	-----	-----	-----	-----	-----	0.508
792	0.467	256.88	0.509	0.508	-----	-----	-----	-----	-----	-----	-----	0.508
794	0.460	256.88	0.509	0.508	-----	-----	-----	-----	-----	-----	-----	0.508
796	0.453	256.88	0.509	0.508	-----	-----	-----	-----	-----	-----	-----	0.508
798	0.447	256.88	0.509	0.508	-----	-----	-----	-----	-----	-----	-----	0.508
800	0.442	256.87	0.509	0.507	-----	-----	-----	-----	-----	-----	-----	0.507
802	0.437	256.87	0.509	0.507	-----	-----	-----	-----	-----	-----	-----	0.507
804	0.432	256.87	0.508	0.507	-----	-----	-----	-----	-----	-----	-----	0.507
806	0.427	256.87	0.508	0.507	-----	-----	-----	-----	-----	-----	-----	0.507
808	0.422	256.87	0.508	0.506	-----	-----	-----	-----	-----	-----	-----	0.506
810	0.417	256.87	0.508	0.506	-----	-----	-----	-----	-----	-----	-----	0.506
812	0.413	256.86	0.508	0.506	-----	-----	-----	-----	-----	-----	-----	0.506
814	0.408	256.86	0.507	0.505	-----	-----	-----	-----	-----	-----	-----	0.505
816	0.403	256.86	0.507	0.505	-----	-----	-----	-----	-----	-----	-----	0.505
818	0.398	256.86	0.507	0.504	-----	-----	-----	-----	-----	-----	-----	0.504
820	0.393	256.85	0.507	0.504	-----	-----	-----	-----	-----	-----	-----	0.504
822	0.388	256.85	0.506	0.504	-----	-----	-----	-----	-----	-----	-----	0.504

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 26

Basin 2A

Hydrograph type	= Reservoir	Peak discharge	= 0.585 cfs
Storm frequency	= 100 yrs	Time to peak	= 792 min
Time interval	= 2 min	Hyd. volume	= 8,106 cuft
Inflow hyd. No.	= 25 - POST Sub. 2A	Reservoir name	= Basin 2A
Max. Elevation	= 257.40 ft	Max. Storage	= 11,771 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
764	0.921	257.36	0.583	0.580	-----	-----	-----	-----	-----	-----	-----	0.580
766	0.873	257.36	0.584	0.581	-----	-----	-----	-----	-----	-----	-----	0.581
768	0.839	257.37	0.586	0.581	-----	-----	-----	-----	-----	-----	-----	0.581
770	0.812	257.37	0.587	0.582	-----	-----	-----	-----	-----	-----	-----	0.582
772	0.788	257.38	0.588	0.583	-----	-----	-----	-----	-----	-----	-----	0.583
774	0.765	257.38	0.588	0.583	-----	-----	-----	-----	-----	-----	-----	0.583
776	0.741	257.39	0.589	0.584	-----	-----	-----	-----	-----	-----	-----	0.584
778	0.717	257.39	0.590	0.584	-----	-----	-----	-----	-----	-----	-----	0.584
780	0.692	257.39	0.590	0.585	-----	-----	-----	-----	-----	-----	-----	0.585
782	0.669	257.39	0.591	0.585	-----	-----	-----	-----	-----	-----	-----	0.585
784	0.646	257.40	0.591	0.585	-----	-----	-----	-----	-----	-----	-----	0.585
786	0.626	257.40	0.591	0.585	-----	-----	-----	-----	-----	-----	-----	0.585
788	0.608	257.40	0.591	0.585	-----	-----	-----	-----	-----	-----	-----	0.585
790	0.594	257.40	0.591	0.585	-----	-----	-----	-----	-----	-----	-----	0.585
792	0.582	257.40 <<	0.591	0.585	-----	-----	-----	-----	-----	-----	-----	0.585 <<
794	0.572	257.40	0.591	0.585	-----	-----	-----	-----	-----	-----	-----	0.585
796	0.563	257.40	0.591	0.585	-----	-----	-----	-----	-----	-----	-----	0.585
798	0.556	257.40	0.591	0.585	-----	-----	-----	-----	-----	-----	-----	0.585
800	0.550	257.40	0.591	0.585	-----	-----	-----	-----	-----	-----	-----	0.585
802	0.544	257.40	0.591	0.585	-----	-----	-----	-----	-----	-----	-----	0.585
804	0.537	257.39	0.591	0.585	-----	-----	-----	-----	-----	-----	-----	0.585
806	0.531	257.39	0.591	0.585	-----	-----	-----	-----	-----	-----	-----	0.585
808	0.525	257.39	0.590	0.585	-----	-----	-----	-----	-----	-----	-----	0.585
810	0.519	257.39	0.590	0.584	-----	-----	-----	-----	-----	-----	-----	0.584
812	0.513	257.39	0.590	0.584	-----	-----	-----	-----	-----	-----	-----	0.584
814	0.506	257.39	0.589	0.584	-----	-----	-----	-----	-----	-----	-----	0.584
816	0.500	257.39	0.589	0.584	-----	-----	-----	-----	-----	-----	-----	0.584
818	0.494	257.38	0.589	0.584	-----	-----	-----	-----	-----	-----	-----	0.584
820	0.488	257.38	0.588	0.583	-----	-----	-----	-----	-----	-----	-----	0.583
822	0.481	257.38	0.588	0.583	-----	-----	-----	-----	-----	-----	-----	0.583
824	0.475	257.38	0.587	0.583	-----	-----	-----	-----	-----	-----	-----	0.583
826	0.469	257.37	0.587	0.582	-----	-----	-----	-----	-----	-----	-----	0.582
828	0.462	257.37	0.586	0.582	-----	-----	-----	-----	-----	-----	-----	0.582
830	0.456	257.37	0.586	0.582	-----	-----	-----	-----	-----	-----	-----	0.582
832	0.450	257.37	0.585	0.581	-----	-----	-----	-----	-----	-----	-----	0.581
834	0.443	257.36	0.585	0.581	-----	-----	-----	-----	-----	-----	-----	0.581
836	0.437	257.36	0.584	0.580	-----	-----	-----	-----	-----	-----	-----	0.580
838	0.431	257.36	0.584	0.580	-----	-----	-----	-----	-----	-----	-----	0.580

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 27

Basin 2A Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 26 - Basin 2A	2nd diverted hyd.	= 28
Diversion method	= Pond -	Pond structure	= Weir B

...End

Hydrograph Report

Hyd. No. 27

Basin 2A Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 26 - Basin 2A	2nd diverted hyd.	= 28
Diversion method	= Pond -	Pond structure	= Weir B

...End

Hydrograph Report

Hyd. No. 27

Basin 2A Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 26 - Basin 2A	2nd diverted hyd.	= 28
Diversion method	= Pond -	Pond structure	= Weir B

...End

Hydrograph Report

Hyd. No. 27

Basin 2A Overflow

Hydrograph type	= Diversion1	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 26 - Basin 2A	2nd diverted hyd.	= 28
Diversion method	= Pond -	Pond structure	= Weir B

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 28

Basin 2A Outlet

Hydrograph type	= Diversion2	Peak discharge	= 0.318 cfs
Storm frequency	= 2 yrs	Time to peak	= 772 min
Time interval	= 2 min	Hyd. volume	= 8,106 cuft
Inflow hydrograph	= 26 - Basin 2A	2nd diverted hyd.	= 27
Diversion method	= Pond -	Pond structure	= Weir B

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
758	0.315	0.000 <<	0.315
760	0.316	0.000 <<	0.316
762	0.316	0.000 <<	0.316
764	0.317	0.000 <<	0.317
766	0.317	0.000 <<	0.317
768	0.317	0.000 <<	0.317
770	0.318	0.000 <<	0.318
772	0.318 <<	0.000 <<	0.318 <<
774	0.318	0.000 <<	0.318
776	0.317	0.000 <<	0.317
778	0.317	0.000 <<	0.317
780	0.317	0.000 <<	0.317
782	0.317	0.000 <<	0.317
784	0.316	0.000 <<	0.316
786	0.316	0.000 <<	0.316
788	0.316	0.000 <<	0.316
790	0.315	0.000 <<	0.315
792	0.315	0.000 <<	0.315

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 28

Basin 2A Outlet

Hydrograph type	= Diversion2	Peak discharge	= 0.446 cfs
Storm frequency	= 10 yrs	Time to peak	= 782 min
Time interval	= 2 min	Hyd. volume	= 8,106 cuft
Inflow hydrograph	= 26 - Basin 2A	2nd diverted hyd.	= 27
Diversion method	= Pond -	Pond structure	= Weir B

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
760	0.442	0.000 <<	0.442
762	0.443	0.000 <<	0.443
764	0.443	0.000 <<	0.443
766	0.444	0.000 <<	0.444
768	0.444	0.000 <<	0.444
770	0.445	0.000 <<	0.445
772	0.445	0.000 <<	0.445
774	0.445	0.000 <<	0.445
776	0.446	0.000 <<	0.446
778	0.446	0.000 <<	0.446
780	0.446	0.000 <<	0.446
782	0.446 <<	0.000 <<	0.446 <<
784	0.446	0.000 <<	0.446
786	0.446	0.000 <<	0.446
788	0.445	0.000 <<	0.445
790	0.445	0.000 <<	0.445
792	0.445	0.000 <<	0.445
794	0.445	0.000 <<	0.445
796	0.445	0.000 <<	0.445
798	0.444	0.000 <<	0.444
800	0.444	0.000 <<	0.444
802	0.444	0.000 <<	0.444
804	0.443	0.000 <<	0.443
806	0.443	0.000 <<	0.443
808	0.442	0.000 <<	0.442
810	0.442	0.000 <<	0.442
812	0.442	0.000 <<	0.442

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 28

Basin 2A Outlet

Hydrograph type	= Diversion2	Peak discharge	= 0.508 cfs
Storm frequency	= 25 yrs	Time to peak	= 786 min
Time interval	= 2 min	Hyd. volume	= 8,106 cuft
Inflow hydrograph	= 26 - Basin 2A	2nd diverted hyd.	= 27
Diversion method	= Pond -	Pond structure	= Weir B

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
762	0.503	0.000 <<	0.503
764	0.504	0.000 <<	0.504
766	0.505	0.000 <<	0.505
768	0.506	0.000 <<	0.506
770	0.506	0.000 <<	0.506
772	0.507	0.000 <<	0.507
774	0.507	0.000 <<	0.507
776	0.508	0.000 <<	0.508
778	0.508	0.000 <<	0.508
780	0.508	0.000 <<	0.508
782	0.508	0.000 <<	0.508
784	0.508	0.000 <<	0.508
786	0.508 <<	0.000 <<	0.508 <<
788	0.508	0.000 <<	0.508
790	0.508	0.000 <<	0.508
792	0.508	0.000 <<	0.508
794	0.508	0.000 <<	0.508
796	0.508	0.000 <<	0.508
798	0.508	0.000 <<	0.508
800	0.507	0.000 <<	0.507
802	0.507	0.000 <<	0.507
804	0.507	0.000 <<	0.507
806	0.507	0.000 <<	0.507
808	0.506	0.000 <<	0.506
810	0.506	0.000 <<	0.506
812	0.506	0.000 <<	0.506
814	0.505	0.000 <<	0.505
816	0.505	0.000 <<	0.505
818	0.504	0.000 <<	0.504
820	0.504	0.000 <<	0.504
822	0.504	0.000 <<	0.504

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 28

Basin 2A Outlet

Hydrograph type	= Diversion2	Peak discharge	= 0.585 cfs
Storm frequency	= 100 yrs	Time to peak	= 792 min
Time interval	= 2 min	Hyd. volume	= 8,106 cuft
Inflow hydrograph	= 26 - Basin 2A	2nd diverted hyd.	= 27
Diversion method	= Pond -	Pond structure	= Weir B

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
764	0.580	0.000 <<	0.580
766	0.581	0.000 <<	0.581
768	0.581	0.000 <<	0.581
770	0.582	0.000 <<	0.582
772	0.583	0.000 <<	0.583
774	0.583	0.000 <<	0.583
776	0.584	0.000 <<	0.584
778	0.584	0.000 <<	0.584
780	0.585	0.000 <<	0.585
782	0.585	0.000 <<	0.585
784	0.585	0.000 <<	0.585
786	0.585	0.000 <<	0.585
788	0.585	0.000 <<	0.585
790	0.585	0.000 <<	0.585
792	0.585 <<	0.000 <<	0.585 <<
794	0.585	0.000 <<	0.585
796	0.585	0.000 <<	0.585
798	0.585	0.000 <<	0.585
800	0.585	0.000 <<	0.585
802	0.585	0.000 <<	0.585
804	0.585	0.000 <<	0.585
806	0.585	0.000 <<	0.585
808	0.585	0.000 <<	0.585
810	0.584	0.000 <<	0.584
812	0.584	0.000 <<	0.584
814	0.584	0.000 <<	0.584
816	0.584	0.000 <<	0.584
818	0.584	0.000 <<	0.584
820	0.583	0.000 <<	0.583
822	0.583	0.000 <<	0.583
824	0.583	0.000 <<	0.583
826	0.582	0.000 <<	0.582
828	0.582	0.000 <<	0.582
830	0.582	0.000 <<	0.582
832	0.581	0.000 <<	0.581
834	0.581	0.000 <<	0.581
836	0.580	0.000 <<	0.580
838	0.580	0.000 <<	0.580

...End

Worksheet 2: Runoff curve number and runoff **SM-4627**

Project: Nonset Path By ECS Date 6/24/11

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] Subcatchment 2B

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
—	Impervious	98			0.10	9.80
C	Woods- Good Condition	70			0.34	23.80
C	Open Space- Good Condition	74			0.19	14.06
C	Brush- Good Condition	70			0.04	2.80
Totals =					0.67	50.46

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{50.46}{0.67} = 75.31$; Use CN = 75.3

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	1.04	2.08	3.66
Runoff, Q.....	cf	2540	5047	8895

(210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) **SM-04627**

Project: Nonset Path By ECS Date 6/24/11

Location: Acton, MA Checked _____ Date _____

Circle one: Present | Developed
Circle one: Tc | Tt through subarea Subcatchment 2B

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Grass			
2. Mannings roughness coeff., n (table 3-1)			0.24			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.01			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.18			0.18
Shallow concentrated Flow		Segment ID	B-C	C-D		
7. Surface Description (paved or unpaved)			UNPAVED	PAVED		
8. Flow Length, L		ft	146	101		
9. Watercourse slope, s		ft/ft	0.02	0.02		
10. Average Velocity, V (figure 3-1)		ft/s	2.28	2.87		
11. Tt = L / 3600V	Compute Tt	hr	0.02	0.01		0.03
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.21
min 12.6

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 30

POST Sub. 2B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.651 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 2,617 cuft
Drainage area	= 0.670 ac	Curve number	= 75.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 12.6 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
730	0.651 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 30

POST Sub. 2B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.342 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 2,617 cuft
Drainage area	= 0.670 ac	Curve number	= 75.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 12.6 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
728	1.342 <<
730	1.341

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 30

POST Sub. 2B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.776 cfs
Storm frequency	= 25 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 2,617 cuft
Drainage area	= 0.670 ac	Curve number	= 75.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 12.6 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
728	1.776 <<
730	1.766

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 30

POST Sub. 2B

Hydrograph type	= SCS Runoff	Peak discharge	= 2.393 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 2,617 cuft
Drainage area	= 0.670 ac	Curve number	= 75.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 12.6 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
728	2.393 <<
730	2.370

...End

Hydrograph Report

Hyd. No. 31

POST Sub. 2 TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.870 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 10,723 cuft
Inflow hyds.	= 27, 28, 30	Contrib. drain. area	= 0.670 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 27 + (cfs)	Hyd. 28 + (cfs)	Hyd. 30 = (cfs)	Outflow (cfs)
730	0.000 <<	0.218	0.651 <<	0.870 <<
732	0.000 <<	0.235	0.630	0.864

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 31

POST Sub. 2 TOTAL

Hydrograph type	= Combine	Peak discharge	= 1.684 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 10,723 cuft
Inflow hyds.	= 27, 28, 30	Contrib. drain. area	= 0.670 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 27 + (cfs)	Hyd. 28 + (cfs)	Hyd. 30 = (cfs)	Outflow (cfs)
730	0.000 <<	0.343	1.341	1.684 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 31

POST Sub. 2 TOTAL

Hydrograph type	= Combine	Peak discharge	= 2.158 cfs
Storm frequency	= 25 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 10,723 cuft
Inflow hyds.	= 27, 28, 30	Contrib. drain. area	= 0.670 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 27 + (cfs)	Hyd. 28 + (cfs)	Hyd. 30 = (cfs)	Outflow (cfs)
728	0.000 <<	0.373	1.776 <<	2.148
730	0.000 <<	0.392	1.766	2.158 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 31

POST Sub. 2 TOTAL

Hydrograph type	= Combine	Peak discharge	= 2.825 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 10,723 cuft
Inflow hyds.	= 27, 28, 30	Contrib. drain. area	= 0.670 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 27 + (cfs)	Hyd. 28 + (cfs)	Hyd. 30 = (cfs)	Outflow (cfs)
728	0.000 <<	0.432	2.393 <<	2.825 <<
730	0.000 <<	0.454	2.370	2.823

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 33

POST Wetlands TOTAL

Hydrograph type	= Combine	Peak discharge	= 1.114 cfs
Storm frequency	= 2 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 18,309 cuft
Inflow hyds.	= 20, 21, 23, 31	Contrib. drain. area	= 0.090 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 20 + (cfs)	Hyd. 21 + (cfs)	Hyd. 23 + (cfs)	Hyd. 31 + (cfs)	Outflow (cfs)
734	0.000 <<	0.218	0.055	0.840	1.112
736	0.000 <<	0.256	0.053	0.805	1.114 <<
738	0.000 <<	0.291	0.050	0.764	1.105

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 33

POST Wetlands TOTAL

Hydrograph type	= Combine	Peak discharge	= 2.499 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 18,309 cuft
Inflow hyds.	= 20, 21, 23, 31	Contrib. drain. area	= 0.090 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 20 + (cfs)	Hyd. 21 + (cfs)	Hyd. 23 + (cfs)	Hyd. 31 + (cfs)	Outflow (cfs)
732	0.000 <<	0.708	0.130 <<	1.639	2.476
734	0.000 <<	0.814	0.126	1.560	2.499 <<
736	0.000 <<	0.913	0.120	1.464	2.497

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 33

POST Wetlands TOTAL

Hydrograph type	= Combine	Peak discharge	= 3.418 cfs
Storm frequency	= 25 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 18,309 cuft
Inflow hyds.	= 20, 21, 23, 31	Contrib. drain. area	= 0.090 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 20 + (cfs)	Hyd. 21 + (cfs)	Hyd. 23 + (cfs)	Hyd. 31 + (cfs)	Outflow (cfs)
732	0.000 <<	1.126	0.177 <<	2.088	3.391
734	0.000 <<	1.271	0.171	1.975	3.418 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 33

POST Wetlands TOTAL

Hydrograph type	= Combine	Peak discharge	= 4.609 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 18,309 cuft
Inflow hyds.	= 20, 21, 23, 31	Contrib. drain. area	= 0.090 ac

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Hyd. 20 + (cfs)	Hyd. 21 + (cfs)	Hyd. 23 + (cfs)	Hyd. 31 + (cfs)	Outflow (cfs)
732	0.000 <<	1.647	0.246	2.716	4.609 <<
734	0.000 <<	1.797	0.237	2.555	4.589
736	0.000 <<	1.982	0.223	2.369	4.574
738	0.000 <<	2.197	0.207	2.169	4.573

...End

Worksheet 2: Runoff curve number and runoff SM-4627

Project: Nonset Path By ECS Date 6/24/11

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed Subcatchment 3A

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
—	Impervious	98			0.00	
C	Woods- Good Condition	70			0.60	42.00
C	Open Space- Good Condition	74			0.17	12.58
C	Brush- Good Condition	70			0.00	
Totals =					0.77	54.58

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{54.58}{0.77} = 70.88$; Use CN = 70.9

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.81	1.74	3.21
Runoff, Q.....	cf	2272	4857	8980

(210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) **SM-4627**

Project: Nonset Path By ECS Date 6/24/11

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed Subcatchment 3A
Circle one: Tc Tt through subarea _____

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Woods			
2. Mannings roughness coeff., n (table 3-1)			0.8			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.01			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.41			0.41
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	118			
9. Watercourse slope, s		ft/ft	0.02			
10. Average Velocity, V (figure 3-1)		ft/s	2.28			
11. Tt = L / 3600V	Compute Tt	hr	0.01			0.01
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.43
	min	25.7

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 35

POST Sub. 3A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.409 cfs
Storm frequency	= 2 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 2,239 cuft
Drainage area	= 0.770 ac	Curve number	= 70.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 25.7 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
740	0.408
742	0.409 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 35

POST Sub. 3A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.944 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 2,239 cuft
Drainage area	= 0.770 ac	Curve number	= 70.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 25.7 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
738	0.944 <<
740	0.943

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 35

POST Sub. 3A

Hydrograph type	= SCS Runoff	Peak discharge	= 1.290 cfs
Storm frequency	= 25 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 2,239 cuft
Drainage area	= 0.770 ac	Curve number	= 70.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 25.7 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
738	1.290 <<
740	1.283

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Tuesday, Jun 28, 2011

Hyd. No. 35

POST Sub. 3A

Hydrograph type	= SCS Runoff	Peak discharge	= 1.792 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 2,239 cuft
Drainage area	= 0.770 ac	Curve number	= 70.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 25.7 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Outflow (cfs)
738	1.792 <<
740	1.775

...End

Required Recharge Volume Calculations

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MASSACHUSETTS 01720
TEL (978) 263-8585
FAX (978) 263-9883

JOB 4627
SHEET NO. _____ OF _____
CALCULATED BY ECS DATE 6/28/11
CHECKED BY _____ DATE _____
SCALE _____

REQUIRED RECHARGE VOLUME:

$R_v = F \times$ IMP. AREA

$= \frac{0.25}{12} \times (1.3 \times 43560 \text{ SF/AC})$

$R_v = 1180$ CF REQUIRED

BASIN 1A DEAD STORAGE = 493 CF

BASIN 1B DEAD STORAGE = 2,273 CF

TOTAL V = 2,966 CF

2,966 CF > 1180 CF OK ✓

DRAWDOWN:

$T = \frac{V}{K \cdot \text{AREA}}$

BASIN 1A:

$T = \frac{493}{(\frac{1.02}{12})(9986)}$

$T = 5.9$ HR

5.9 HR < 72 HR OK ✓

BASIN 1B:

$T = \frac{2273}{(\frac{1.02}{12})(19800)}$

$T = 13.5$ HR

13.5 HR < 72 HR OK ✓

PRODUCT 804.1 (Single Sheets) 805.1 (Bedded)

Water Quality Volume Calculations

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MASSACHUSETTS 01720
TEL (978) 263-8585
FAX (978) 263-9883

JOB 4627
SHEET NO. _____ OF _____
CALCULATED BY EG DATE 6/28/11
CHECKED BY _____ DATE _____
SCALE _____

WATER QUALITY VOLUME:

$$V_{WQ} = \frac{D_{WQ}}{12\ in/ft} \times A_{IMP} \times 43560\ SF/AC$$

$D_{WQ} = 0.5"$
$A_{IMP} = 1.3\ AC$

$$V_{WQ} = \frac{0.5}{12} \times 1.3 \times 43560$$

$V_{WQ} = 2,360\ CF$ REQUIRED

BASIN 1A DEAD STORAGE = 493 CF
BASIN 1B DEAD STORAGE = 2,273 CF

TOTAL V = 2,966 CF

2,966 CF > 2,360 CF OK ✓

PRODUCT 204-1 (Single Sheets) 205-1 (Padded)

TSS Removal Calculations

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: NONSET PATH, BASIN, PRETREATMENT

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
DEEP SUMP & HOODED CATCH BASIN	25%	1.00	0.25	0.75
SEDIMENT FOREBAY	25%	0.75	0.19	0.56

Total TSS Removal = 44%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: NONSET PATH

Prepared By: ECS

Date: 6/28/11

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: NONSET PATH, BASIN

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
DEEP SUMP & HOODED CATCH BASIN	25%	1.00	0.25	0.75
INFILTRATION BASIN WITH SEDIMENT FOREBAY	80%	0.75	0.60	0.15

Total TSS Removal = 85%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: NONSET PATH

Prepared By: FCS

Date: 6/25/11

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: NONSET PATH CONSTRUCTED STORMWATER WETLAND

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
DEEP SUMP & HOODED CATCH BASIN	25%	1.00	0.25	0.75
CONSTRUCTED STORMWATER WETLAND WITH SEDIMENT FOREBAY	80%	0.75	0.60	0.15

Total TSS Removal = 85%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: NONSET PATH

Prepared By: ECS

Date: 6/13/11

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

De Minimus Stormwater Discharge Calculations

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MASSACHUSETTS 01720
TEL (978) 263-8585
FAX (978) 263-9883

JOB 4627
SHEET NO. _____ OF _____
CALCULATED BY ECG DATE 6/24/11
CHECKED BY _____ DATE _____
SCALE _____

DE MINIMUS STORMWATER DISCHARGES:

$$\text{WEIGHTED AVERAGE} = \frac{(A_1)(TSS_1) + (A_2)(TSS_2)}{(A_1 + A_2)}$$

A_1 = 56,626 SF TO BASINS & CONSTRUCTED STORMWATER WETLANDS

TSS_1 = 45%

A_2 = 2,375 SF NEW IMPERVIOUS TO EXISTING CB'S WITHIN ROW & UTILITY EASEMENT

TSS_2 = 0%

$$\text{AVERAGE} = \frac{(56,626)(0.45) + (2,375)(0)}{(56,626 + 2,375)}$$

$$= 82\%$$

PRODUCT 204-1 (Single Sheets) 205-1 (Pads of)

Operation and Maintenance Plan

(to be submitted prior to land disturbances)

Soil Logs

101 Nonset Path

In

Acton, MA

Locus
Map B4 Parcel 12
Nonset Path

Binder #1

Soil Observation Logs

Soil Suitability Assessment for
Stormwater Drainage

Soil Testing Date:

4/7/2011 (TP D-1 thru D-15)

Prepared For:
Hawthorne Homes, LLC
530 Great Road
Acton, MA 01720

Prepared By:
Stamski And McNary, Inc.
1000 Main Street
Acton, MA 01720
(978) 263-8585

Engineering - Planning - Surveying

SM-4627

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MA 01720
Engineering • Planning • Surveying

C. On-Site Review

(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: D-1 | 4/7/2011 (Date) | _____ (Time) | Sm 65° (Weather)

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) 101 NONSET PATH; MAP 84, PARCEL 12

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) | _____ (Surface Stones) | _____ (Slope (%))

   TREES, BRUSH (Vegetation) | _____ (Landform) | _____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body – feet | Drainage Way _____ feet | Possible Wet Area _____ feet

   Property Line _____ feet | Drinking Water Well _____ feet | Other _____

4. Parent Material: GLACIAL TILL Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

   If Yes: Depth Weeping from Pit 13 Depth Standing Water in Hole 17

   Estimated Depth to High Groundwater: 13" _____

Deep Observation Hole Number: D-1 AT STAKE # 321

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
11	A	10YR 3/2				SL	–	2	M	F	Coarse
13	B	10YR 5/8				SL	–		M	F	
18	C	2.5Y 6/2	13	5YR 5/8	>5	SL		5	M	F	

Additional Notes TEST HOLES DUG BY HAND WITH SHOVEL TO DETERMINE GROUNDWATER DEPTH, REDOX FEATURES & SOIL TYPE

Commonwealth of Massachusetts
City/Town of

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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: D-2 4/7/2011 (Date) _____ (Time) Sun 65° (Weather)

1. Location

Ground Elevation at Surface of Hole _____

Location (Identify on Plan) 101 NONSET PATH, MAP 15H, PARCEL 12

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) _____ Surface Stones _____ Slope (%)

TREES, BRUSH Vegetation _____ Landform _____ Position on landscape (attach sheet)

3. Distances from: Open Water Body – feet Drainage Way _____ feet Possible Wet Area _____ feet

Property Line _____ feet Drinking Water Well _____ feet Other _____

4. Parent Material: GLACIAL TILL Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit 10 Depth Standing Water in Hole 12

Estimated Depth to High Groundwater: 10 _____

Deep Observation Hole Number: D-2 AT SURVEY STAKE # 304

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
7	A	10YR 3/2				SL	–	2	M	F	
10	B	10YR 5/6				SL	–	–	M	F	
16	C	2.5Y 6/2	10"	5YR 5/8	>5	SL		2	M	F	

Additional Notes TEST HOLES DUG BY HAND WITH SHOVEL TO DETERMINE GROUNDWATER DEPTH, REDOX FEATURES & SOIL TYPE

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Deep Observation Hole Number: D-3 4/7/2011 (Date) _____ (Time) Sm 65° (Weather)

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) 101 NONSET PATH; MAP B4, PARCEL 12

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) _____ Surface Stones _____ Slope (%) _____

   TREES, BRUSH (Vegetation) _____ Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body – feet Drainage Way _____ feet Possible Wet Area _____ feet

   Property Line _____ feet Drinking Water Well _____ feet Other _____

4. Parent Material: GLACIAL TILL Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

   If Yes: Depth Weeping from Pit 6 Depth Standing Water in Hole 8

   Estimated Depth to High Groundwater: 6

Deep Observation Hole Number: D-3 17' OFF STATE 318

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
6	A	10YR 3/2				SL	–	2	M	F	
8	B	10YR 5/8				SL	–		M	F	
14	C	2.5Y 6/2		5YR 5/8	>5	SL			M	F	

Additional Notes TEST HOLES DUG BY HAND WITH SHOVEL TO DETERMINE GROUNDWATER DEPTH, REDOX FEATURES & SOIL TYPE

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Deep Observation Hole Number: D-4 4/7/2011 (Date) _____ (Time) Sm 65° (Weather)

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) 101 NONSET PATH; MAP B4, PARCEL 12

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) _____ Surface Stones _____ Slope (%) _____

   TREES, BRUSH Vegetation _____ Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area _____ feet

   Property Line _____ feet Drinking Water Well _____ feet Other _____

4. Parent Material: GLACIAL TILL Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

   If Yes: Depth Weeping from Pit 15 Depth Standing Water in Hole 16

   Estimated Depth to High Groundwater: 15

Deep Observation Hole Number: D-4 15' FROM STAKE 319 TOWARDS 306

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
8	A	10YR 3/2				SL	—	5	M	F	
11	B	10YR 5/8				SL	—		M	F	
16	C	2.5Y 6/2	15	5YR 5/8	>5	SL			M	F	

Additional Notes TEST HOLES DUG BY HAND WITH SHOVEL TO DETERMINE GROUNDWATER DEPTH, REDOX FEATURES & SOIL TYPE

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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: D-5 4/7/2011 (Date) _____ (Time) Sm 65° (Weather)

1. Location

Ground Elevation at Surface of Hole _____

Location (Identify on Plan) 101 NONSET PATH, MAP 15H, PARCEL 12

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) _____ (Surface Stones) _____ (Slope (%))

TREES, BRUSH (Vegetation) _____ (Landform) _____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body – feet Drainage Way _____ feet Possible Wet Area _____ feet

Property Line _____ feet Drinking Water Well _____ feet Other _____

4. Parent Material: GLACIAL TILL Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit 24 Depth Standing Water in Hole 27

Estimated Depth to High Groundwater: 24

Distance _____ Elevation _____ 4' OFF STONE BOUND

Deep Observation Hole Number: D-5

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
7	A	10YR 3/2				SL	–	5	M	F	
12	B	10YR 5/6				SL	–		M	F	
28	C	2.5Y 6/2	24	5YR 5/8	>5	SL			M	F	

Additional Notes TEST HOLES DUG BY HAND WITH SHOVEL TO DETERMINE GROUNDWATER DEPTH, REDOX FEATURES & SOIL TYPE

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Deep Observation Hole Number: D-6 | 4/7/2011 (Date) | _____ (Time) | Sm 65° (Weather)

1. Location

Ground Elevation at Surface of Hole _____

Location (Identify on Plan) 101 NONSET PATH; MAP 84, PARCEL 12

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) | _____ (Surface Stones) | _____ (Slope (%))

TREES, BRUSH (Vegetation) | _____ (Landform) | _____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body – feet | Drainage Way _____ feet | Possible Wet Area _____ feet

Property Line _____ feet | Drinking Water Well _____ feet | Other _____

4. Parent Material: GLACIAL TILL | Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit 19 | Depth Standing Water in Hole 21

Estimated Depth to High Groundwater: 19 | _____

Deep Observation Hole Number: D-6

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
8	A	10YR 3/2				SL	–	5	M	F	SURFACE STONES
11	B	10YR 5/8				SL	–		M	F	
24	C	2.5Y 6/2	19	5YR 5/8	X	SL			M	F	

Additional Notes TEST HOLES DUG BY HAND WITH SHOVEL TO DETERMINE GROUNDWATER DEPTH, REDOX FEATURES & SOIL TYPE

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Deep Observation Hole Number: D-7 4/7/2011 (Date) _____ (Time) Sm 65° (Weather)

1. Location

Ground Elevation at Surface of Hole _____

Location (Identify on Plan) 101 NONSET PATH; MAP 84, PARCEL 12

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) _____ Surface Stones _____ Slope (%)

TREES, BRUSH (Vegetation) _____ Landform _____ Position on landscape (attach sheet)

3. Distances from: Open Water Body – feet Drainage Way _____ feet Possible Wet Area _____ feet

Property Line _____ feet Drinking Water Well _____ feet Other _____

4. Parent Material: GLACIAL TILL Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit 22 Depth Standing Water in Hole 24

Estimated Depth to High Groundwater: 22 _____

Deep Observation Hole Number: D-7

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
8	A	10YR 3/2				SL	–	5	M	F	SURFACE STONES
12	B	10YR 5/8				SL	–		M	F	
26	C	2.5Y 6/2	22	5YR 5/8	>5	SL	–	2	M	F	

Additional Notes TEST HOLES DUG BY HAND WITH SHOVEL TO DETERMINE GROUNDWATER DEPTH, REDOX FEATURES & SOIL TYPE

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C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole Number: D-8 4/7/2011 (Date) _____ (Time) Sun 65° (Weather)

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) 101 NONSET PATH; MAP B4, PARCEL 12

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) _____ Surface Stones _____ Slope (%) _____

   TREES, BRUSH (Vegetation) _____ Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way _____ feet Possible Wet Area _____ feet

   Property Line _____ feet Drinking Water Well _____ feet Other _____

4. Parent Material: GLACIAL TILL Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

   If Yes: Depth Weeping from Pit 30 Depth Standing Water in Hole 31

   Estimated Depth to High Groundwater: 30

Deep Observation Hole Number: D-8

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
8	A	10YR 3/2	—	—	—	SL	—	5	M	F	
12	B	10YR 5/8	—	—	—	SL	—		M	F	
32	C	2.5Y 6/2		Reuc		SL			M	F	
			Influenced by road drainage								
			SUBDRAIN IN		CB	ABOVE					

Additional Notes TEST HOLES DUG BY HAND WITH SHOVEL TO DETERMINE GROUNDWATER DEPTH, REDOX FEATURES & SOIL TYPE

SUBD

Commonwealth of Massachusetts
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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: D-9 | 4/7/2011 (Date) | _____ (Time) | Sm 65° (Weather)

1. Location

Ground Elevation at Surface of Hole _____

Location (Identify on Plan) 101 NONSET PATH; MAP 84, PARCEL 12

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) | _____ (Surface Stones) | _____ (Slope (%))

TREES, BRUSH (Vegetation) | _____ (Landform) | _____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body – feet | Drainage Way _____ feet | Possible Wet Area _____ feet

Property Line _____ feet | Drinking Water Well _____ feet | Other _____

4. Parent Material: GLACIAL TILL | Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit 11 | Depth Standing Water in Hole 16

Estimated Depth to High Groundwater: 11

Deep Observation Hole Number: D-9

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
7	A	10YR 3/2				SL	–	–	M	F	
10	B	10YR 5/8				SL	–	–	M	F	
20	C	2.5Y 6/2	11"	5YR 5/8	>5	SL	–	–	M	F	

Additional Notes TEST HOLES DUG BY HAND WITH SHOVEL TO DETERMINE GROUNDWATER DEPTH, REDOX FEATURES & SOIL TYPE

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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: D-10 | 4/7/2011 (Date) | _____ (Time) | Sm 65° (Weather)

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) 101 NONSET PATH, MAP 84, PARCEL 12

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) | Surface Stones _____ | Slope (%) _____

   Vegetation: TREES, BRUSH | Landform _____ | Position on landscape (attach sheet) _____

3. Distances from: Open Water Body – feet | Drainage Way _____ feet | Possible Wet Area _____ feet

   Property Line _____ feet | Drinking Water Well _____ feet | Other _____

4. Parent Material: GLACIAL TILL | Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

   If Yes: Depth Weeping from Pit 16 | Depth Standing Water in Hole 19

   Estimated Depth to High Groundwater: 16

Deep Observation Hole Number: D-10 50' off parking lot corner

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
6	A	10YR 3/2				SL	–		M	F	
8	B	10YR 5/8				SL	–		M	F	
22	C	2.5Y 6/2	16	5YR 5/8	X5	SL			M	F	

Additional Notes: TEST HOLES DUG BY HAND WITH SHOVEL TO DETERMINE GROUNDWATER DEPTH, REDOX FEATURES & SOIL TYPE

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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: D-11 | 4/7/2011 (Date) | _____ (Time) | Sm 65° (Weather)

1. Location

Ground Elevation at Surface of Hole _____

Location (Identify on Plan) 101 NONSET PATH, MAP 84, PARCEL 12

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) | Surface Stones _____ | Slope (%) _____

Vegetation: TREES, BRUSH | Landform _____ | Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet | Drainage Way _____ feet | Possible Wet Area _____ feet

Property Line _____ feet | Drinking Water Well _____ feet | Other _____

4. Parent Material: GLACIAL TILL | Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit 12 | Depth Standing Water in Hole 16

Estimated Depth to High Groundwater: 12

Deep Observation Hole Number: D-11

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
7	A	10YR 3/2				SL	—		M	F	
10	B	10YR 5/8				SL	—		M	F	
22	C	2.5Y 6/2	12	5YR 5/8	>5	SL			M	F	

Additional Notes: TEST HOLES DUG BY HAND WITH SHOVEL TO DETERMINE GROUNDWATER DEPTH, REDOX FEATURES & SOIL TYPE

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Deep Observation Hole Number: D-12 4/7/2011 (Date) _____ (Time) 5m 65° (Weather)

1. Location

Ground Elevation at Surface of Hole _____

Location (Identify on Plan) 101 NONSET PATH, MAP 134, PARCEL 12

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) _____ Surface Stones _____ Slope (%)

TREES, BRUSH Vegetation _____ Landform _____ Position on landscape (attach sheet)

3. Distances from: Open Water Body – feet Drainage Way _____ feet Possible Wet Area _____ feet

Property Line _____ feet Drinking Water Well _____ feet Other _____

4. Parent Material: GLACIAL TILL Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit 14 Depth Standing Water in Hole 18

Estimated Depth to High Groundwater: 14 _____

Deep Observation Hole Number: D-12

Depth (In:)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
6	A	10YR 3/2				SL	–	–	M	F	
10	B	10YR 5/8				SL	–	–	M	F	
25	C	2.5Y 6/2	–	–	–	SL	–	–	M	F	

Additional Notes TEST HOLES DUG BY HAND WITH SHOVEL TO DETERMINE GROUNDWATER DEPTH, REDOX FEATURES & SOIL TYPE

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Deep Observation Hole Number: D-13 4/7/2011 _____ Sm 65°
Date Time Weather

1. Location

Ground Elevation at Surface of Hole _____

Location (Identify on Plan) 101 NONSET PATH; MAP 134, PARCEL 12

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) _____ Surface Stones _____ Slope (%)

TREES, BRUSH Vegetation _____ Landform _____ Position on landscape (attach sheet)

3. Distances from: Open Water Body - feet Drainage Way _____ feet Possible Wet Area _____ feet

Property Line _____ feet Drinking Water Well _____ feet Other _____

4. Parent Material: GLACIAL TILL Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit _____ Depth Standing Water in Hole 33" EXISTING TEST PIT

Estimated Depth to High Groundwater: 33" _____

Deep Observation Hole Number: D-13 EXISTING WHITE PVC OBS PIPE IN OLD TEST PIT

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
	A	10YR 3/2				SL	–		M	F	
	B	10YR 5/6				SL	–		M	F	
	C	2.5Y 6/2				SL			M	F	

Additional Notes TEST HOLES DUG BY HAND WITH SHOVEL TO DETERMINE GROUNDWATER DEPTH, REDOX FEATURES & SOIL TYPE

EXIST PIPE IN OLD TEST PIT

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(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: D-14 | 4/7/2011 (Date) | _____ (Time) | Sm 65° (Weather)

1. Location

Ground Elevation at Surface of Hole _____

Location (Identify on Plan) 101 NONSET PATH; MAP 84, PARCEL 12

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) | _____ (Surface Stones) | _____ (Slope (%))

TREES, BRUSH (Vegetation) | _____ (Landform) | _____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body — feet | Drainage Way _____ feet | Possible Wet Area _____ feet

Property Line _____ feet | Drinking Water Well _____ feet | Other _____

4. Parent Material: GLACIAL TILL Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit _____ Depth Standing Water in Hole 18" EXISTING TEST PIT

Estimated Depth to High Groundwater: 18" _____

Deep Observation Hole Number: D-14 EXISTING WHITE PVC OBS. PIPE IN OLD TEST PIT

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
	A	10YR 3/2				SL	—		M	F	
	B	10YR 5/6				SL	—		M	F	
	C	2.5Y 6/2				SL			M	F	

Additional Notes ~~TEST HOLES DUG BY HAND WITH SHOVEL~~
~~TO DETERMINE GROUNDWATER DEPTH, REDOX FEATURES~~
~~& SOIL TYPE~~
EXIST PIPE IN OLD TEST PIT

City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MA 01720
Engineering • Planning • Surveying

C. On-Site Review

(minimum of two holes required at every proposed disposal area)

Deep Observation Hole Number: D-15 | 4/7/2011 (Date) | _____ (Time) | Sun 65° (Weather)

1. Location

   Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) 101 NONSET PATH; MAP 84, PARCEL 12

2. Land Use: WOODLAND (e.g. woodland, agricultural field, vacant lot, etc.) | _____ (Surface Stones) | _____ (Slope (%))

   TREES, BRUSH (Vegetation) | _____ (Landform) | _____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body – feet | Drainage Way _____ feet | Possible Wet Area _____ feet

   Property Line _____ feet | Drinking Water Well _____ feet | Other _____

4. Parent Material: GLACIAL TILL | Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

   If Yes: Depth Weeping from Pit _____ | Depth Standing Water in Hole 15 | EXISTING TEST PIT

   Estimated Depth to High Groundwater: 15

Deep Observation Hole Number: D-15 EXISTING BLACK ABS OBS. PIPE IN OLD TEST PIT

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
	A	10YR 3/2				SL	–		M	FR	
	B	10YR 5/6				SL	–		M	FR	
	C	2.5Y 6/2				SL			M	FR	

Additional Notes ~~TEST HOLES DUG BY HAND WITH SHOVEL TO DETERMINE GROUNDWATER DEPTH, REDOX FEATURES & SOIL TYPE~~

EXIST PIPE IN OLD TEST PIT

STAMSKI AND McNARY, INC.
80 Harris Street
ACTON, MA 01720
Engineering • Planning • Surveying

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method used:
   - ☒ Depth observed standing water in observation hole — A. _____ inches B. _____ inches
   - ☒ Depth weeping from side of observation hole — A. _____ inches B. _____ inches
   - ☒ Depth to soil redoximorphic features (mottles) — A. _____ inches B. _____ inches
   - ☐ Groundwater adjustment (USGS methodology) — A. _____ inches B. _____ inches

   SEE ENGINEERS LOGS TP D-1 ⇒ D-12 SHEET D-6 D-13, D-14 + D-15 OBS. ARE CLOSED

2. Index Well Number _____ Reading Date _____ Index Well Level _____

   Adjustment Factor _____ Adjusted Groundwater Level _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

   a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? Yes ☐ No ☐ N/A

   b. If yes, at what depth was it observed? Upper boundary: _____ inches Lower boundary: _____ inches

F. Certification

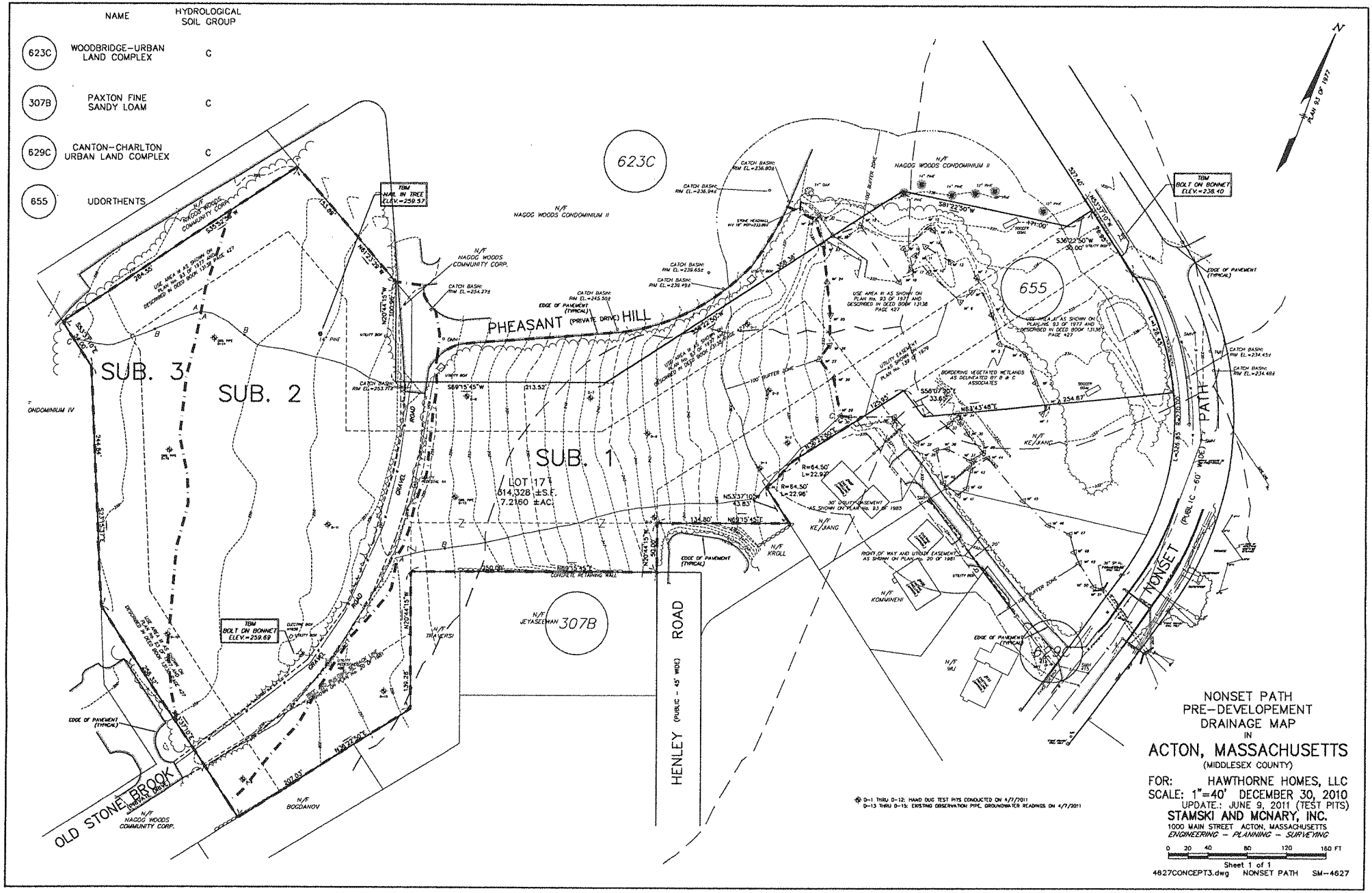
I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator — Date: 4/7/2011

RICHARD J. HARRINGTON SE1012
Typed or Printed Name of Soil Evaluator/License Number — *Date of Soil Evaluator Exam: 10/25/1994

Name of Board of Health Witness — Board of Health: NOT WITNESSED (DRAINAGE ANALYSIS)

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.



NONSET PATH
PRE-DEVELOPEMENT
DRAINAGE MAP
IN
ACTON, MASSACHUSETTS
(MIDDLESEX COUNTY)

FOR: HAWTHORNE HOMES, LLC
SCALE: 1"=40' DECEMBER 30, 2010
UPDATE.: JUNE 9, 2011 (TEST PITS)

STAMSKI AND MCNARY, INC.
1000 MAIN STREET ACTON, MASSACHUSETTS
ENGINEERING – PLANNING – SURVEYING

0 20 40 80 120 160 FT

Sheet 1 of 1
4627CONCEPT3.dwg NONSET PATH SM--4627

Drainage Maps