STORMWATER REPORT

READING WOODS

READING, MASSACHUSETTS

Prepared for;

PULTE HOMES OF NEW ENGLAND, L.L.C.

Prepared by;

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REGISTERED PROFESSIONAL ENGINEER

January 4, 2011

TABLE OF CONTENTS

- STORMWATER REPORT CHECKLIST & ENGINEERS CERTIFICATE
- NARRATIVE
- STORMWATER MANAGEMENT STANDARDS COMPLIANCE
- FIGURES
- APPENDIX

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

COMMONWEALTH OF MASSACHUSETTS
JOHN A. BARROWS
CIVIL
NO. 40052
REGISTERED PROFESSIONAL ENGINEER

J A Barrows 1/4/11

Signature and Date

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): _____

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 ***(Riprap aprons provided to dissipate energy)***
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included. ***(TSS calculations provided)***

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. ***(Part of attached O&M Plan)***

☐ 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.
(some information to be included with SWPPP to be prepared for NPDES permit)

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. ***(will be covered)***

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; ***(n/a - underground system)***
- ☐ 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. ***(owner responsible for submitting)***

Narrative

Introduction and Background

The following report provides information regarding the storm water characteristics of a residential housing development proposed on a property located on Jacob Way in Reading, Massachusetts (refer to Figure 1). The property is referred to as 1 Jacob Way and is shown as Lots 57, 69, 74, 77, 84, 86, and 87 on the town assessor's map 4. The report will also provide information on the implementation of storm water mitigation measures, Best Management Practices, and compliance with Town of Reading Wetland Protection Regulations and the Massachusetts Stormwater Management Policy and Standards.

For additional information regarding the site's existing conditions and the project's stormwater management system reference is made to the following plans;

- *Site Plans – Reading Woods*
  Prepared for; Pulte Homes of New England, LLC
  Prepared by; Marchionda & Associates, L.P.
  Dated; January 4, 2011

Existing Conditions

The project site is located at a previously developed and vacated commercial use property. It was last used as an administrative and manufacturing facility by the Addison Wellesley publishing company. The total land area of the property is approximately 24.8 acres with road frontage on public ways Jacob Way, South St. and Massachusetts Highway Rte 128. Vehicle access to the property is through Jacob Way with only limited access to South Street. Jacob Way is a variable width right of way providing frontage to both the north and south areas of the site. The roadway has an average pavement width of 28 feet and runs approximately 1300 feet into the middle of the property. The site also has a gated auxiliary driveway that accesses South Street. This driveway has a bituminous concrete surface with an average width of approximately 17 feet. Almost the entire southern and eastern boundary of the site fronts on the state highway and Jacob Way. The northern and western boundaries of the property abut single family properties located on South and Curtis Street. Elevations on the site drop by approximately 60 feet sloping from the highest elevations at the northeast corner at the intersection of Jacob Way and South Street to the lowest elevations located at the southeast corner of the site. Slopes on the property vary with large flat areas of slopes approximately 1 percent in the west portions of the property to steeper cut and fill slopes created to construct parking areas in the eastern portions of the property.

There are presently five primary buildings located on the property. These buildings vary from a single story plant building to a multi-story office building. The existing total

footprint area of these buildings is approximately 2.8 acres. Supporting these buildings is a series of bituminous concrete access drives and parking areas. The existing drives and parking areas cover approximately 8.6 acres of the site. Stormwater from these access drives and parking areas is managed through traditional catch basin collection drainage systems. These systems convey stormwater in two directions from the site. The larger main system terminates at the southeast corner of the property and a smaller system connects into the municipal drainage system located in South Street.

The remaining areas of the site are made up of mostly overgrown open space landscape and recreational areas which include a baseball field and tennis courts. There is a small amount of undisturbed wooded areas with some mature trees and dense undergrowth on the site. For the most part these areas are located along the perimeter of the property with the largest areas located at the northeast and southeast corners of the site. There is also a small amount of bordering vegetated wetlands (BVW) located at the northwest corner of the property. This BVW is located within an existing stormwater control structure that was constructed as part of the stormwater management system of the previous development. This structure includes a 4 foot high concrete wall approximately 160 feet long with 18" and 24" orifices. Stormwater that flows through these openings enters a 36" culvert located just outside the property within the state highway right of way. After entering the state drainage system stormwater flows west to wetland areas that make up the Aberjona River watershed.

Due to the existing developed urban condition of the site, the Natural Resource Conservation Service (NRCS) soil survey has mapped the site as Udorthents. The mapped areas surrounding the site are for the most part made up of underlying soils typical of the Charlton, Canton, and Hollis soil complexes. These soils are predominately well drained sandy loams and loamy sands formed in areas of hill slopes. These soils are considered to be in the hydrologic soil group "B". An on-site soil evaluation completed in November of 2010 supports the soil survey mapping. Information from the NCRS Soil Survey and the results of the on-site soil evaluation are included in Appendix "A" of this report.

Project Description

The proposed project consists of the construction of a residential housing development. The existing buildings will be demolished and thirteen new multi-family buildings and a community club house will be constructed. Four of these buildings will be town house style buildings housing 4 units per building each with two car parking garages. The other 9 buildings will be garden style buildings containing either 36 or 50 units in each building. Each of the garden style buildings will have parking garages located in their lower levels.

A number of bituminous concrete access drives and parking areas are proposed to support the new development. 895 parking spaces and approximately 4000 feet of drives and access aisles will be created when the project is completed. Of these parking spaces, 426

will be located in parking garages below the garden style buildings. This design will help to reduce the amount of pavement surfaces necessary to meet parking requirements. Access to the site will continue to be from Jacob Way. Jacob Way will renovated and upgraded with a narrower width of 26 feet while maintaining a similar layout and longitudinal grades. The intersection of Jacob Way with South Street will be re-aligned to improve vehicle access to and from the site. The buildings, drives, and parking areas have been orientated to utilize the existing site grading so to minimize earth work and reduce the limit of work. Work will be limited to areas that have been previously disturbed. No construction will take place with in a wetlands resource area however a small portion of the construction will take place with in the buffer zone to a Bordering Vegetated Wetland (BVW).

As a result of all the site improvements there will be net reduction of approximately 1 acre of impervious surfaces. In the post construction condition the project will have approximately 10 ½ acres of impervious surfaces. Of this area approximately 4.2 acres will be building footprints and 6.3 acres will be bituminous drives, parking areas, and walks. This represents a significant reduction from the 9.1 acres of bituminous drives, parking areas, and walks that presently exist on the site. A stormwater management system has been designed to manage and treat the stormwater that will be generated by the proposed bituminous parking areas and drives.

The proposed stormwater management system will mimic the site's existing outfall points and drainage patterns. Stormwater generated from the northeast portion of site will be conveyed to the municipal stormwater system in South Street through an existing drain line located between homes (# 337 & #343) on South Street. The subcatchment contributing to this point will be limited lawn areas from the development and paved areas of Jacob Way and South Street. This subcatchment will realize a reduction in impervious surfaces with the removal of a large amount of the parking area that previously drained to this system. A small portion of the northeast corner of the site in the area of the emergency access drive will also drain to the municipal system. No changes are proposed to the characteristics of this subcatchment and therefore there will be no changes to stormwater flows to this part of the system.

The remaining northeast portion of the site flows to a topographic depression at the north east corner of the property. This depression appears to have been formed as the results of previous borrow excavations. The area has been overgrown for some time with brush and some mature trees well established. No changes are proposed to the characteristics of this subcatchment and therefore there will be no changes to stormwater flows to this area.

Stormwater from the southwest portion of the development will be managed through new stormwater management systems. This area represents the majority of the newly developed site areas. Flows from this system will terminate in the southeast corner of the site in the same location as the existing system. By implementing B.M.P.'s such as Deep Sump Catch Basins, Inflitration Chambers, and Water Quality Units, the system will mitigate peak flows, remove suspended solids, and provide ground water recharge.

Project Type:

The project represents a change from the pre-developed commercial use and therefore for purposes of stormwater management standards the project has been considered a "re-development" project.

LID Measures:

A number of environmental sensitive site design and Low Impact Development (LID) techniques have been used in the planning of the project. As previously mentioned the development will reduce the overall amount of existing impervious surfaces, reduce the amount suspended solid generating pavement areas, and limit work to areas previously disturbed. No construction will be required to take place within a wetland resource area.

The project also includes a number of BMP's to manage stormwater generated from the development. The BMP's include a number of groundwater recharge systems that have been located throughout the site in effort to decentralize and minimize impacts. These systems have been located under proposed parking areas and areas adjacent to building sites to reduce the overall impact of the construction. The project will also provide construction period erosion and sediment controls and a long term pollution prevention plan.

Compliance with Stormwater Management Standards

The stormwater management system has been designed to meet or exceed the applicable stormwater standards. The following is a brief summary of how the proposed project will meet each standard.

1.0 Untreated Stormwater

The proposed site development will not create untreated stormwater discharges. Proposed point sources will include rip rap aprons to prevent soil erosion and scour.

2.0 Post-Development Peak Flow Runoff Rates

Peak flow runoff rates were studied for the proposed conditions for the 2, 10, 25, and 100 year, 24-hour Type III storm events. Points of comparison ("Study Points") (Table 1 and as shown on Figures 3 & 5) were developed and studied in an effort to micro-analyze runoff rates to the abutting properties and wetland areas. The Study Points were consistent with the pre-development condition and post development condition.

TABLE 1: DESIGN POINTS OF COMPARISON

Study Points	Description
1	Flows to the wetland located in the existing S.W.M.A. located at the southwest corner of the property.
2	Flows from the northeast corner of the site to areas of South Street that slope toward Main Street.
3	Flows to depression located at the northwest corner of the property.
4	Flows from the northeast corner of the site to the municipal stormwater system in South Street.
5	Flows north to South Street at the intersection with the emergency access drive.

CNs and TCs obtained using TR-55 methodology were input into the *Hydraflow*® Hydrographs software package, which utilizes the National Resources Conservation Service (NRCS) (formerly "SCS") methods to generate and route hydrographs. Information on the CN's and TC's has been included in appendix "B".

Storm water peak flows will be mitigated by the creation of a subsurface detention/infiltration system. Information on the performance of this stormwater structure is included in the hydrologic analysis. The resulting hydrographs and supporting calculations have been included in the hydrologic analysis in the report's appendix "C".

The hydrologic analysis determined that the peak runoff rates to the Study Points in the post-development condition do not exceed the pre-development peak runoff rates for the design storms. Table 2 (below) summarizes the attached *Hydraflow*® Hydrographs analysis.

TABLE 2: PEAK RUNOFF RATE COMPARISON

Design Point		Peak Flows (CFS) Storm Events			
		2 YR	10 YR	25 YR	100 YR
1	Existing	20.4	41.9	55.1	81.1
	Proposed	20.3	41.6	54.9	80.7
2	Existing	1.1	2.3	3.0	4.3
	Proposed	0.3	0.6	0.7	1.0
3	Existing	0.5	2.0	3.1	5.5
	Proposed	0.5	2.0	3.1	5.5
4	Existing	7.7	12.6	15.4	20.6
	Proposed	1.3	3.3	4.6	7.2
5	Existing	0.4	0.9	1.3	2.1
	Proposed	0.4	0.9	1.3	2.1

3.0 Recharge to Groundwater

Due to the fact that the project will reduce the amount of impervious surface that presently exists the annual recharge from the site will be increased without the implementation of recharge BMP's. The proposed storm management system does however include recharge components that will provide volumes to meet the recharge standard as if the project was proposed on undeveloped lands. The recharge volume requirement is based on the amount of impervious surfaces created and criteria outlined in the *Stormwater Management Handbook.* The hydrologic soil groups were determined based on a comparison of published soils data and actual site conditions. The soil evaluation (Appendix "A") determined that the entire site has well drained underlying soils considered to be in the Hydrologic Soil Group "B". All of the proposed impervious surfaces will therefore cover "B" soils. The required groundwater recharge volume will be captured and infiltrated through the use of subsurface recharge systems proposed throughout the site. These systems are connected to both the building's roof drainage systems and the project's storm sewer collection system. Appendix "D" includes calculations and a summary of the recharge volume provided by the stormwater management system. The "static" method was used to determine the infiltration storage volume provided for the project.

4.0 T.S.S. Removal

The stormwater management system will include BMP treatment trains that will provide at least 80% removal of the Total Suspended Soils (T.S.S.) generated from the proposed development. The BMP's include Street Sweeping, Deep Sump Hooded Catch Basins, and a Propriety Water Quality Structure (Stormceptor). Appendix "E" includes a removal rate worksheet for the proposed treatment trains.

5.0 Higher Pollutant Loads

The project does not propose any uses that could potentially generate higher pollutant loads.

6.0 Protection of Critical Areas

The project does not propose stormwater discharges to critical areas.

7.0 Redevelopment Project

As previously mentioned the property had been the site of a corporate campus for a large publishing company. Almost the entire site has been previously disturbed or developed and can be considered a "redevelopment" project. As a redevelopment project the storm management system is required to meet certain standards to the extent practical. This report will however demonstrate that the proposed development has been designed to meet all of the applicable stormwater management standards.

8.0 Erosion and Sediment Control

The project will include appropriate erosion and sediment controls to insure that exposed soils will remain stabile and sediment will not be released from the proposed limit of work. An erosion control plan has been prepared for the project and has been included as part of the latest site development plans. The project will require a NPDES General Construction Permit from the EPA prior to construction. A Stormwater Pollution Prevention Plan (SWPPP) will be compiled and kept on site as part of NPDES permit.

9.0 Operation & Maintenance Plan

An Operation and Maintenance Plan has been included in Appendix "G" of the report. The O & M Plan states the parties responsible for the operation and maintenance of the proposed BMP's as well the maintenance requirements and schedule.

10.0 Prohibition of Illicit Discharges

DEP does not permit illicit discharges, defined by 310 CMR 10.04 as follows, to the stormwater management system:

"Illicit discharge means a discharge that is not entirely comprised of stormwater. Notwithstanding the foregoing, an illicit discharge does not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated ground water, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents."

Prior to the discharge of stormwater runoff to the post-construction stormwater BMPs, it shall be the project owner's responsibility to prepare an Illicit Discharge Compliance Statement in accordance with Standard 10 certifying that no illicit discharges exist on the site.

FIGURES

1. U.S.G.S. LOCUS MAP

2. PRE-DEVELOPMENT HYDROLOGIC MODEL FLOW CHART

3. EXISTING CONDITIONS SUBCATCHMENT PLAN

4. POST DEVELOPMENT HYDROLOGIC MODEL FLOW CHART

5. PROPOSED CONDITIONS SUBCATCHMENT PLAN

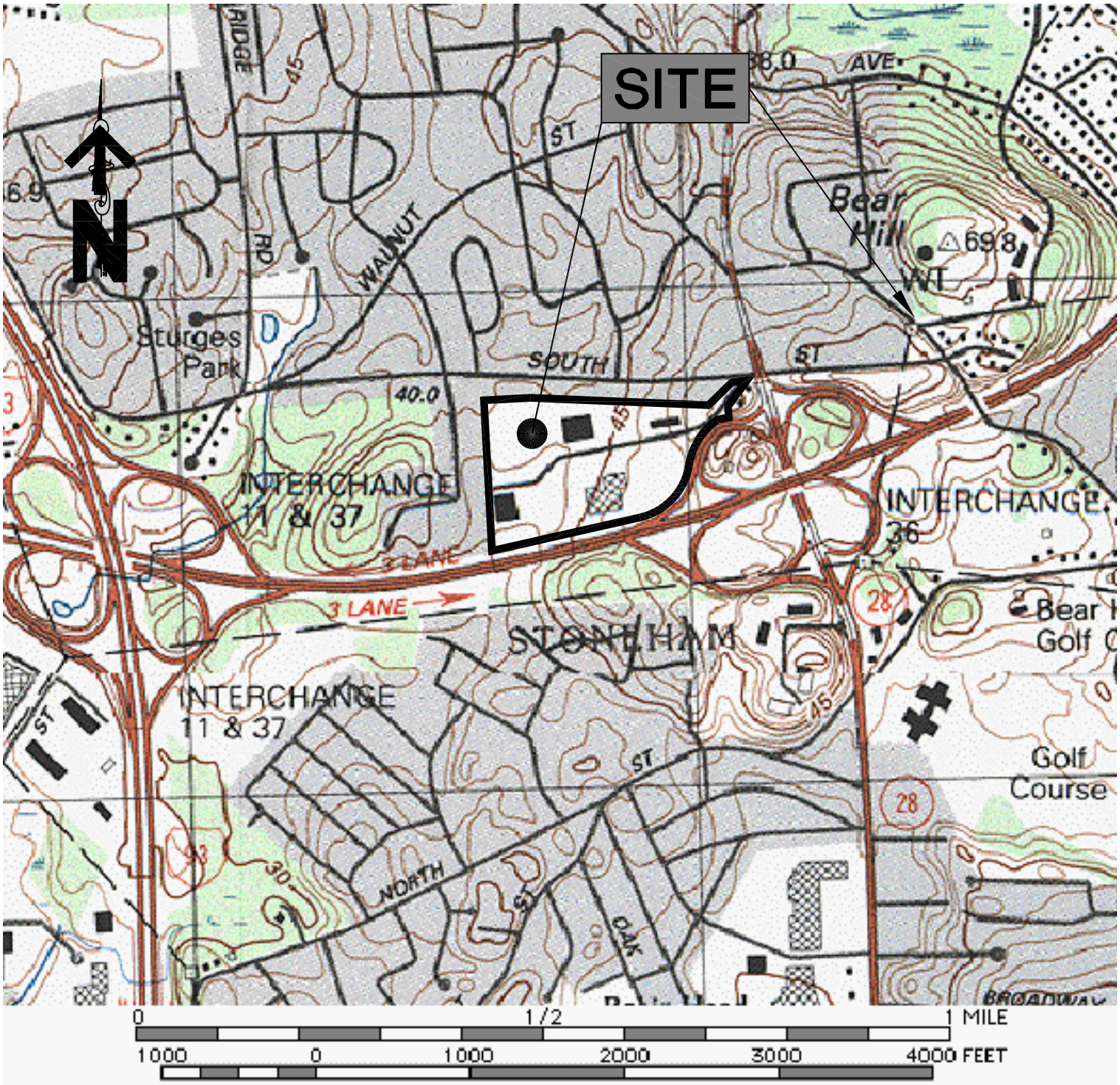

FIGURE 1 - USGS LOCUS MAP

READING WOODS

READING, MASSACHUSETTS

PREPARED FOR:

PULTE HOMES OF NEW ENGLAND, L.L.C.

115 FLANDERS ROAD

WESTBOROUGH, MA 01581

DECEMBER 2010

SCALE: 1"=1000'±

Marchionda & Associates, L.P.

Engineering and Planning Consultants

62 Montvale Avenue
Suite I
Stoneham, MA 02180

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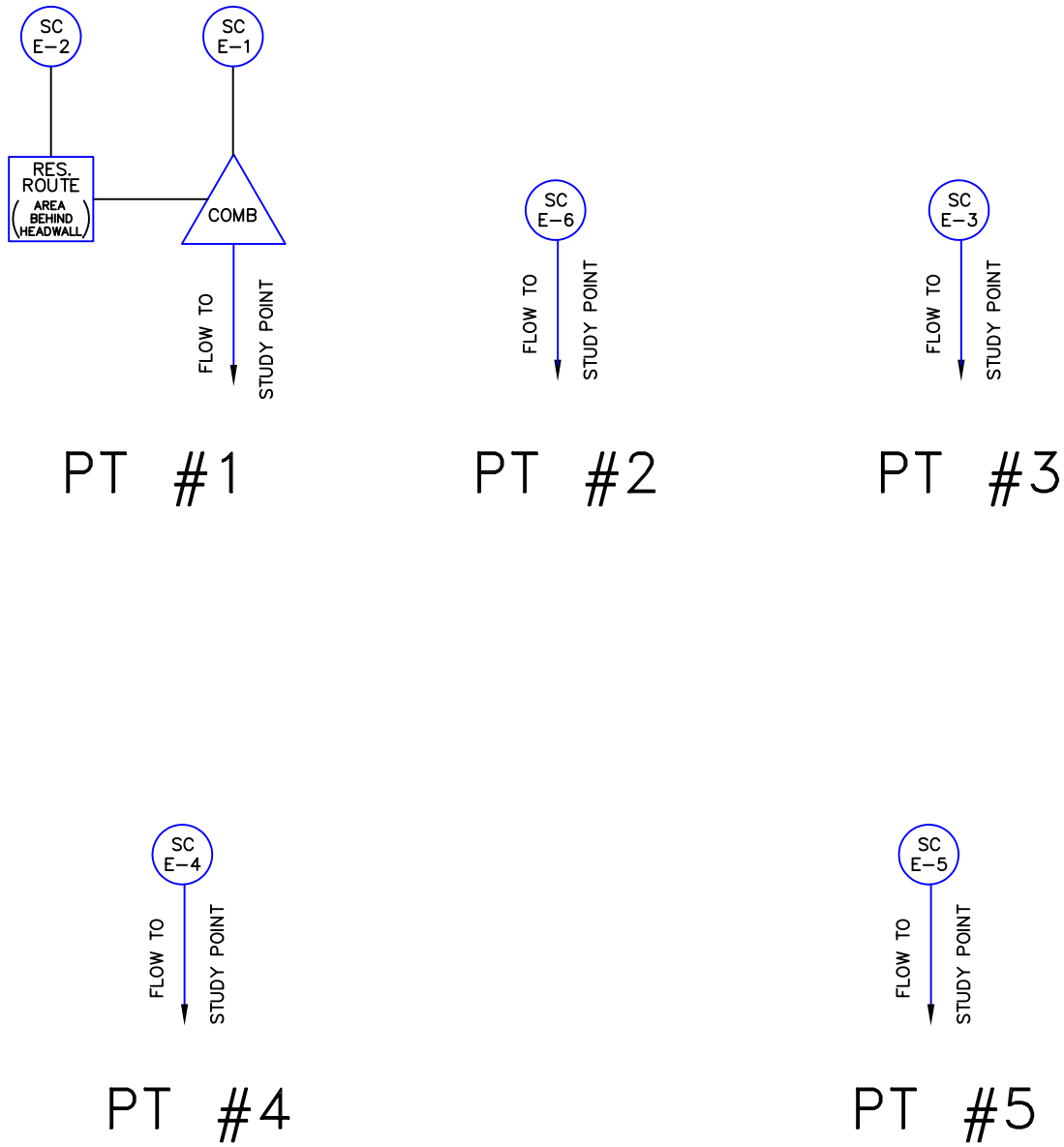


PRE-DEVELOPMENT SEQUENCING

MARCHIONDA & ASSOC.,L.P.
ENGINEERING AND PLANNING CONSULTANTS

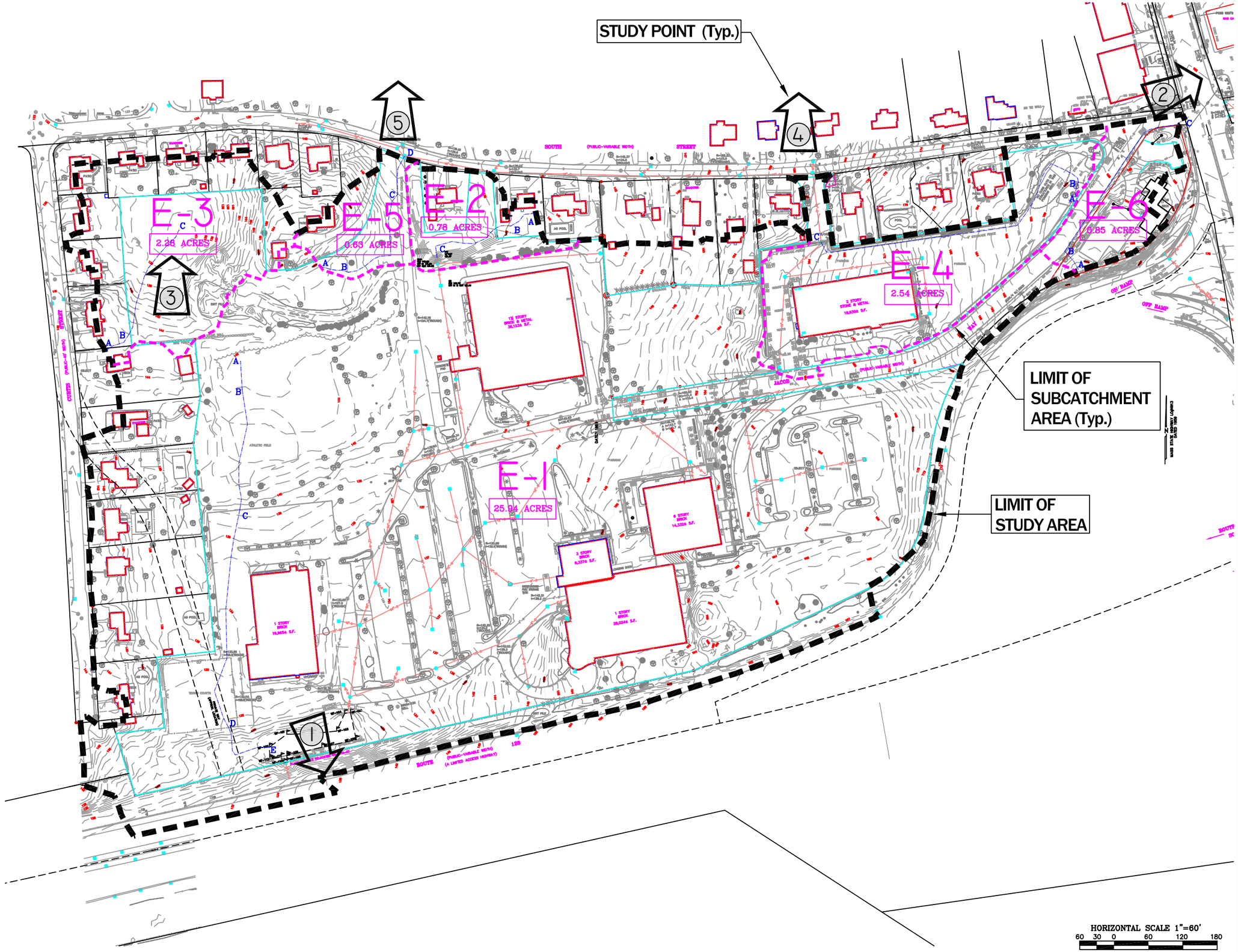
62 MONTVALE AVE. SUITE I
STONEHAM, MA. 02180
(617) 438-6121

HYDROLOGY SEQUENCING

READING WOODS

READING, MA

SCALE: NONE	DATE: 12/29/10	**FIG. 2**



PRE-DEVELOPMENT DRAINAGE AREAS

HYDROLOGY

READING WOODS

JACOB WAY
BRAINTREE, MA

Prepared For
PULTE HOMES OF NEW ENGLAND, LLC
115 FLANDERS ROAD
WESTBOROUGH, MA 01581

Marchionda & Associates, L.P.
Engineering and Planning Consultants
62 Montvale Avenue
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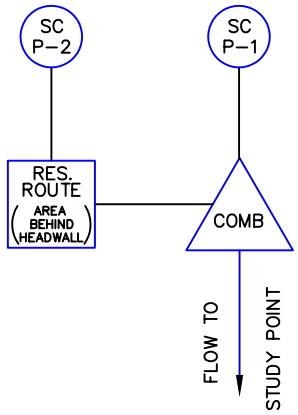
TEL: (781) 438-6121
FAX: (781) 438-9654
Email: engineering@marchionda.com
Website: www.marchionda.com

DATE: 12/29/10

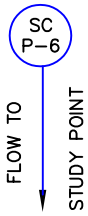
..487-187 READING\DRAINAGE\PRE-DEV WATERSHED PLAN.DWG

M. & A. NO.: 487-187 | SCALE: 1"=60'

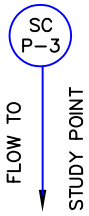
FIGURE 3



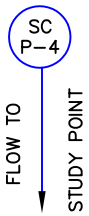
PT #1



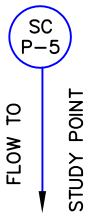
PT #2



PT #3



PT #4



PT #5

POST-DEVELOPMENT SEQUENCING

MARCHIONDA & ASSOC.,L.P.
ENGINEERING AND PLANNING CONSULTANTS

62 MONTVALE AVE. SUITE I
STONEHAM, MA. 02180
(617) 438-6121

HYDROLOGY SEQUENCING

READING WOODS

READING, MA

SCALE: NONE	DATE: 12/29/10	**FIG. 4**

POST DEVELOPMENT DRAINAGE AREAS

HYDROLOGY

READING WOODS

JACOB WAY
BRAINTREE, MA

Prepared For
PULTE HOMES OF NEW ENGLAND, LLC
115 FLANDERS ROAD
WESTBOROUGH, MA 01581

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Website: www.marchionda.com

DATE: 12/29/10

..487-187 READING\DRAINAGE\PRE-DEV WATERSHED PLAN.DWG

M. & A. NO.: 487-187 | SCALE: 1"=60'

FIGURE 5

APPENDICES

APPENDIX

A. SITE SOIL INFORMATION

B. CURVE NUMBER COMPUTATIONS

C. HYDROGRAPH REPORTS

D. GROUNDWATER RECHARGE CALCULATIONS (STANDARD 3)

E. T.S.S. REMOVAL RATE WORKSHEETS (STANDARD 4)

F. LONG TERM POLLUTION PREVENTION PLAN (STANDARD 4-6)

G. OPERATION & MAINTANANCE PLAN (STANDARD 9)

H. STORMWATER COLLECTION SYSTEM CALCULATIONS

APPENDIX A

Site Soil Information

Map Scale: 1:7,670 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 400 800 1,600 2,400

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Gully

Short Steep Slope

Other

Political Features

Cities

Water Features

Oceans

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:7,670 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:25,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 19N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 12, Feb 26, 2010

Date(s) aerial images were photographed: 7/10/2003; 7/7/2003

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Middlesex County, Massachusetts (MA017)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
73B	Whitman fine sandy loam, 0 to 5 percent slopes, extremely stony	4.3	1.7%
103B	Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes	30.7	12.4%
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	4.8	2.0%
103D	Charlton-Hollis-Rock outcrop complex, 15 to 25 percent slopes	0.0	0.0%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	1.3	0.5%
622C	Paxton-Urban land complex, 3 to 15 percent slopes	4.7	1.9%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	1.9	0.8%
629C	Canton-Charlton-Urban land complex, 3 to 15 percent slopes	37.5	15.1%
631C	Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky	40.0	16.1%
654	Udorthents, loamy	6.8	2.8%
655	Udorthents, wet substratum	4.7	1.9%
656	Udorthents-Urban land complex	111.0	44.8%
Totals for Area of Interest		**247.8**	**100.0%**

Middlesex County, Massachusetts

631C—Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky

Map Unit Setting

Elevation: 0 to 1,000 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 110 to 240 days

Map Unit Composition

Urban land: 40 percent
Charlton and similar soils: 40 percent
Hollis and similar soils: 10 percent
Minor components: 10 percent

Description of Charlton

Setting

Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable loamy eolian deposits over friable loamy basal till derived from granite and gneiss

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.3 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 5 inches: Fine sandy loam
5 to 22 inches: Sandy loam
22 to 65 inches: Gravelly sandy loam

Description of Urban Land

Setting

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Excavated and filled land

Description of Hollis

Setting

Landform: Ridges, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable, shallow loamy basal till over granite and gneiss

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.0 inches)

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 2 inches: Fine sandy loam
2 to 14 inches: Fine sandy loam
14 to 18 inches: Unweathered bedrock

Minor Components

Canton

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Toeslope, backslope
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Linear
Across-slope shape: Convex

Udorthents, loamy

Percent of map unit: 2 percent

Rock outcrop

Percent of map unit: 2 percent
Landform: Ledges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave

Scituate

Percent of map unit: 1 percent

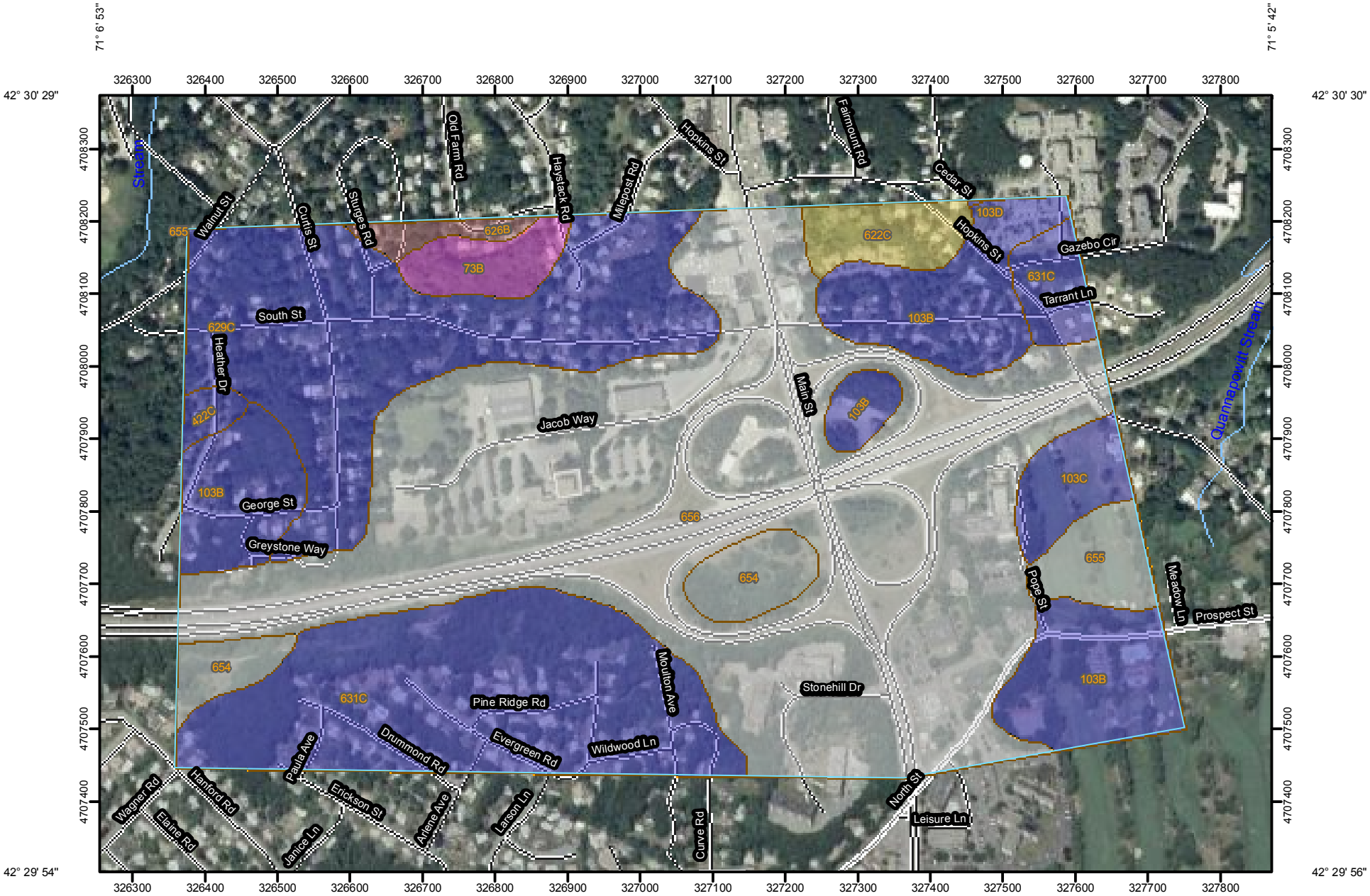
Landform: Depressions, hillslopes
Landform position (two-dimensional): Toeslope, summit
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Linear
Across-slope shape: Concave

Montauk

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Nose slope, head slope
Down-slope shape: Convex
Across-slope shape: Convex

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 12, Feb 26, 2010



Map Scale: 1:7,670 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 400 800 1,600 2,400

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Political Features

Cities

Water Features

Oceans

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:7,670 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:25,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 12, Feb 26, 2010

Date(s) aerial images were photographed: 7/7/2003

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Middlesex County, Massachusetts				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
73B	Whitman fine sandy loam, 0 to 5 percent slopes, extremely stony	D	4.3	1.7%
103B	Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes	B	30.7	12.4%
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	B	4.8	2.0%
103D	Charlton-Hollis-Rock outcrop complex, 15 to 25 percent slopes	B	0.0	0.0%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	B	1.3	0.5%
622C	Paxton-Urban land complex, 3 to 15 percent slopes	C	4.7	1.9%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	A	1.9	0.8%
629C	Canton-Charlton-Urban land complex, 3 to 15 percent slopes	B	37.5	15.1%
631C	Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky	B	40.0	16.1%
654	Udorthents, loamy		6.8	2.8%
655	Udorthents, wet substratum		4.7	1.9%
656	Udorthents-Urban land complex		111.0	44.8%
Totals for Area of Interest			**247.8**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

NO.	REVISION	DATE

SOIL TESTING PLAN

READING WOODS
for
PULTE HOMES
115 FLANDERS ROAD
WESTBOROUGH, MA

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Email: engineering@marchionda.com
Website: www.marchionda.com

DATE: 12/29/10

..\487-187 READING\CONCEPT6 EXCOND.DWG

M. & A. NO.: 487-187 | SCALE: 1"=60'

SHEET 1 OF 1

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Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 1-1-10

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	10YR4/3				S.L.	<10	<10	Cr	VF	
18	B	7.5YR5/4				S.L.	<10	<10	Cr	VF	
40	C1	2.5Y6/4	30"			LS	10	<10	SG	Loose	F/M
124	C2	2.5Y6/2				SL	10	<10	Bl	VF	F/M

Additional Notes:
- G. water weeping @ bottom of hole.

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 1-2-10

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	10YR4/3				S.L.	<10	<10	Cr	VF	
18	B	7.5YR5/4				S.L.	<10	<10	Cr	VF	
40	C1	2.5Y6/4				LS	10	<10	SG	Loose	
108	C2	2.5Y6/2	52"			SL	15	10	SG	Loose	F/M

Additional Notes:

- Bands of gravels located in C2 layer
- Standing water up to 96"

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 2-1-10

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			
28	FILL										
38	B	7.5YR6/8				SL	<10	<10	Cr	VF	
50	C	2.5Y6/4	30			Gr. S	20	10	SG	Loose	Refusal

Additional Notes:

- Fill layer a mix of sands & gravels
- No obsv. g.w.
- C horizon has some silts present

Commonwealth of Massachusetts
City/Town of Reading
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: 3-1-10

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	FILL										
76	C	2.5Y6/4	46			SL	10	10	SG	Loose	Refusal

Additional Notes:
- Fill layer made up of gravel sub base for parking area
- C layer tight "in-place"
- Refusal / ledge rising @ north end
- No obs. g.water

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 3-2-10

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	FILL										
100	C	2.5Y6/4	50			SL	10	10	SG	Loose	Refusal

Additional Notes:
- Fill made up gravel sub-base of parking area
- No obs H_2O
- C horizon tight "in-place"

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 3-3-10

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	FILL										
32	C	2.5Y5/3	N/A			SL	10	10	SG	Loose	Refusal

Additional Notes:
- Fill made up of gravel sub base of parking area
- No obs. mottling or g. water

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 4-1-10

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			
4	A	10YR3/2				SL	<10	<10	Cr	VF	
22	B	7.5YR5/8				SL	<10	<10	Cr	VF	
76	C1	2.5Y6/3				Gr.S	20	10	Sg	Loose	M/C
144	C2	2.5Y5/3				Gr.S	20	20	Sg	Loose	Coarse
158	C3	2.5Y6/3	N/A			F/M S	10	<10	Sg	Loose	Stratif.

Additional Notes:

- No obsv. mottling or obsv. G.W.
- C-1 horizon is "firm in the hole."

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 5-1-10 (date 12/1/10)

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			
12	FILL										
18	A	10YR4/3				SL	<10	<10	Cr	VF	
24	B	7.5YR5/8				SL	<10	<10	Cr	VF	
124	C1	2.5Y6/3-5/3				Gr.S	25	15	Sg	Loose	
166	C2	2.5Y6/3	154			F/M S	10	<10	Sg	Loose	Stratif.

Additional Notes:

- Coarse sands obs. in C1 horizon, pockets of fine sands on North side
- C1 horizon "firm in hole"
- No obsv. G.W.
- Hole located in parking area. Fills made up of gravels & subbase.

Commonwealth of Massachusetts
City/Town of Reading
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: 5-2-10

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			
12	FILL										
16	A	10YR4/3				SL	<10	<10	Cr	VF	
28	B	7.5YR5/8				SL	<10	<10	Cr	VF	
44	C1	2.5Y6/3				Gr.S	20	10	Sg	Loose	
122	C2	2.5Y5/3				Gr.S	20	20	Sg	Loose	
158	C3	2.5Y6/3	N/A			F/M S	10	<10	Sg	Loose	Stratif.

Additional Notes:
- Hole located in bit. conc. parking area
- 4" water line exposed on West side of hole
- No obs mottling or G.W.
- C2 horizon predom. Med & Coarse Sands
- Fill layer a mix of gravel sub base & some organics.

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 6-1-10

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			
36	FILL										
60	B	7.5YR5/8				SL	<10	<10	Cr	VF	
132	C	10YR6/4	N/A			LS	<10	<10	SG	Loose	

Additional Notes:
- No obs. mottling or G.W.
- Very loose soils, Excavation caving in.

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 6-2-10

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			
60	FILL										
78	B	7.5YR5/8				SL	<10	<10	Cr	VF	
136	C	10YR6/3	N/A			LS	15	10	SG	Loose	

Additional Notes:

- No obs. Mottling or G.W.
- Hole located in bit. conc. parking area
- Fill layer made up of S.L. soils.

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City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 8-1-10

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			
4	A	10YR3/3				S.L.	<10	<10	Cr	VF	
15	B	7.5YR5/6				S.L.	<10	<10	Cr	VF	
66	C	2.5Y6/3	N/A			F.S.	15	20	SG	Loose	Refusal

Additional Notes:

- no observed ground water
- perc performed in south side of pit
- some boulders present

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 8-2-10

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			
12	FILL										
20	B	7.5YR5/6				L.S.	<10	<10	Cr	VF	
149	C	2.5Y6/3	N/A			F.S.	15	20	SG	Loose	Refusal

Additional Notes:
- Ledge or Boulder @ North side of pit.
- Fill made up of primarily sands & gravels
- No observed ground water
- test pit in bit. conc, parking area

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City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 9-1-10

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			
80	FILL										
84	A	10YR3/2				SL			Cr	VF	
92	B	7.5YR6/8				SL			Cr	VF	
110	C	2.5Y6/3				LS	10	10	Sg	Loose	Refusal

Additional Notes:

- Test pit in bit. conc. parking area
- No Obs H_2O or ESHWT.
- Refusal @ bottom of pit.

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City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 9-2-10

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			
98	FILL										
106	B	7.5YR6/8				SL	<10	<10	Cr	VF	
118	C	2.5Y6/3	N/A			LS	10	10	SG	Loose	Refusal

Additional Notes:
-Test pit in bit conc. parking area
-No obs. H_2O or SHWT

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 10-1-10

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			
42	FILL										
54	B	7.5YR5/8				SL	<10	<10	Cr	VF	
64	B/C	10YR5/6				S	<10	<10	Cr	VF	
156	C	2.5Y6/2				Gr. S	20	15	Sg	Loose	

Additional Notes:

- No Obs G.W. or Mottling
- Some large boulders obsv.
- Very loose in place. Excavation side walls falling in.
- Test hole dug in bit conc. parking area

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 10-2-10

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			
14	FILL										
26	B	10YR6/8				SL	<10	<10	Cr	VF	
36	B/C	7.5YR6/8				S	10	10	Sg	Loose	
59	C	2.5Y6/3				Gr. S	20	15	Sg	Loose	Refusal

Additional Notes:
- No obs G.W. or Mottling
- Hole located in bit. conc. parking area.

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 11-1-10

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			
50	FILL										
175	C	2.5Y6/3	126			L.S.	10	15	SG	Loose	

Additional Notes:
- Fill: 0-12" sands & gravels, remaining layer made up of a mix topsoil & original soils. Fill depths range from 50" @ east end to 108" @ west end
- Groundwater weeping @ bottom of hole
- Some boulders present

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 11-2-10

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			
50	FILL										
64	A	10YR3/2				SL			Cr	VF	
82	B	7.5YR6/8				SL			Cr	VF	
156	C	2.5Y6/3	104			LS	10	15	Sg	Loose	

Additional Notes:
- H_2O weep @ 140"
- Very loose consistence excavation falling in.
- Pit dug in pavement area. Top 12" of fill gravel and subbase.

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 12-1-10

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			
40	A	10YR3/2				S.L.	<10	<10	Cr	VF	
56	B	7.5YR6/6				S.L.	<10	<10	Cr	VF	
88	C	2.5Y5/2	N/A			Gr. S	15	10	SG	Loose	Refusal

Additional Notes:
- No Obs H_2O or Mottling

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 12-2-10

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			
36	A	10YR3/2				S.L.	<10	<10	Cr	VF	
50	B	7.5YR6/6				S.L.	<10	<10	Cr	VF	
96	C	2.5Y6/3	N/A			Gr. S	15	15	SG	Loose	Refusal

Additional Notes:
No obs. mottling or g. water

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 12-3-10

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			
0	A	10YR3/2				S.L.	<10	<10	Cr	VF	
36	B	7.5YR6/6				S.L.	<10	<10	Cr	VF	Refusal

Additional Notes:
- Mix of A & B horizon on top of ledge
- no "C" horizon observed.

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 13-1-10

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			
12	FILL										
72	C	2.5Y6/2	N/A			LS	15	15	SG	Loose	Refusal

Additional Notes:

- No obs. mottling or g. water
- Fill layer = mix of gravel sub-base and old "B" horizon
- C horizon sands predom. med & coarse size

Commonwealth of Massachusetts
City/Town of Reading

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

C. On-Site Review (continued)

Deep Observation Hole Number: 13-2-10

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			
24	FILL										
118	C	2.5Y6/2				LS	15	15	SG	Loose	Refusal

Additional Notes:
- No obs mottling or g. water
- Some large stones and boulders present
- faint mottling high in C layer. Not consistent throughout

Commonwealth of Massachusetts
City/Town of Reading
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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

A. Site Information

Pulte Homes of New England LLC
Owner Name

Jacob Way
Street Address or Lot #

Reading	MA	01867
City/Town	State	Zip Code

John Barrows, P.E. , SE#84	781-438-6121
Contact Person (if different from Owner)	Telephone Number

B. Test Results

	12/1/10	AM	12/1/10	AM
	Date	Time	Date	Time
Observation Hole #	1-1		2-1	
Depth of Perc	48"/18"		30"/18"	
Start Pre-Soak	12:16		10:56	
End Pre-Soak	12:31		10:56	
Time at 12"	12:31		11:11	
Time at 9"	1:00		12:13	
Time at 6"	1:37		(@ 7")12:42	
Time (9"-6")	37 min.		See comments	
Rate (Min./Inch)	13		15	
	Test Passed: ☐ Test Failed: ☐		Test Passed: ☐ Test Failed: ☐	

John Barrows, P.E. , SE#84
Test Performed By:

Chris Cole, Engineer, Town of Reading
Witnessed By:

Comments:

Perc test #2-1 collapsed and filled in just below the 7" mark.

Commonwealth of Massachusetts
City/Town of Reading
Percolation Test
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A. Site Information

Pulte Homes of New England LLC
Owner Name

Jacob Way
Street Address or Lot #

Reading	MA	01867
City/Town	State	Zip Code

John Barrows, P.E. , SE#84	781-438-6121
Contact Person (if different from Owner)	Telephone Number

B. Test Results

	12/1/10 AM	12/1/10 AM
	Date / Time	Date / Time
Observation Hole #	3-1	4-1
Depth of Perc	42"/18"	44"/18"
Start Pre-Soak	10:24	8:24
End Pre-Soak	10:39	8:39
Time at 12"	10:39	8:39
Time at 9"	(@ 10")12:42	8:54
Time at 6"		9:17
Time (9"-6")	See comments	23
Rate (Min./Inch)	>50	8
	Test Passed: ☐ Test Failed: ☐	Test Passed: ☐ Test Failed: ☐

John Barrows, P.E. , SE#84
Test Performed By:

Chris Cole, Engineer, Town of Reading
Witnessed By:

Comments:

Unable to finish Perc test #3-1 because of time. Assume Rawl's Loam rate.

Commonwealth of Massachusetts
City/Town of Reading
Percolation Test
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A. Site Information

Pulte Homes of New England LLC
Owner Name

Jacob Way
Street Address or Lot #

Reading	MA	01867
City/Town	State	Zip Code

John Barrows, P.E. , SE#84	781-438-6121
Contact Person (if different from Owner)	Telephone Number

B. Test Results

	12/1/10 Date / AM Time	11/30/10 Date / PM Time
Observation Hole #	5-1	6-1
Depth of Perc	46"/18"	36"/18"
Start Pre-Soak	9:10	12:52
End Pre-Soak	9:25	1:07
Time at 12"	9:25	1:07
Time at 9"	9:28	1:17
Time at 6"	9:34	1:41
Time (9"-6")	6	24
Rate (Min./Inch)	2	8
	Test Passed: ☐ Test Failed: ☐	Test Passed: ☐ Test Failed: ☐

John Barrows, P.E. , SE#84
Test Performed By:

Chris Cole, Engineer, Town of Reading
Witnessed By:

Comments:

Commonwealth of Massachusetts
City/Town of Reading
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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A. Site Information

Pulte Homes of New England LLC
Owner Name

Jacob Way
Street Address or Lot #

Reading	MA	01867
City/Town	State	Zip Code

John Barrows, P.E. , SE#84	781-438-6121
Contact Person (if different from Owner)	Telephone Number

B. Test Results

	11/30/10 Date / AM Time	11/30/10 Date / AM Time
Observation Hole #	8-1	9-1
Depth of Perc	32"/18"	40"/18"
Start Pre-Soak	9:34	10:42
End Pre-Soak	9:53	10:58
Time at 12"	9:53	10:58
Time at 9"	10:12	11:20
Time at 6"	10:35	11:44
Time (9"-6")	24	24
Rate (Min./Inch)	8	8
	Test Passed: ☐ Test Failed: ☐	Test Passed: ☐ Test Failed: ☐

John Barrows, P.E. , SE#84
Test Performed By:

Chris Cole, Engineer, Town of Reading
Witnessed By:

Comments:

Commonwealth of Massachusetts
City/Town of Reading

Percolation Test

Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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A. Site Information

Pulte Homes of New England LLC
Owner Name

Jacob Way
Street Address or Lot #

Reading	MA	01867
City/Town	State	Zip Code

John Barrows, P.E. , SE#84	781-438-6121
Contact Person (if different from Owner)	Telephone Number

B. Test Results

	11/30/10 Date / PM Time	11/30/10 Date / AM Time
Observation Hole #	10-1	11-1
Depth of Perc	56"/18"	55"/18"
Start Pre-Soak	12:16	10:40
End Pre-Soak	12:16	10:40
Time at 12"	12:31	10:55
Time at 9"	12:38	11:22
Time at 6"	12:48	11:59
Time (9"-6")	10	37
Rate (Min./Inch)	4	13
	Test Passed: ☐ Test Failed: ☐	Test Passed: ☐ Test Failed: ☐

John Barrows, P.E. , SE#84
Test Performed By:

Chris Cole, Engineer, Town of Reading
Witnessed By:

Comments:

Commonwealth of Massachusetts
City/Town of Reading
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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A. Site Information

Pulte Homes of New England LLC
Owner Name

Jacob Way
Street Address or Lot #

Reading	MA	01867
City/Town	State	Zip Code

John Barrows, P.E. , SE#84	781-438-6121
Contact Person (if different from Owner)	Telephone Number

B. Test Results

	11/30/10 Date	AM Time	12/1/10 Date	AM Time
Observation Hole #	12-1		13-1	
Depth of Perc	34"/16"		28"/18"	
Start Pre-Soak	11:06		11:33	
End Pre-Soak	11:06		11:33	
Time at 12"	11:21		11:48	
Time at 9"	11:30		(@8")12:00	
Time at 6"	11:41		12:08	
Time (9"-6")	11			
Rate (Min./Inch)	4		4	
	Test Passed: ☐ Test Failed: ☐		Test Passed: ☐ Test Failed: ☐	

John Barrows, P.E. , SE#84
Test Performed By:

Chris Cole, Engineer, Town of Reading
Witnessed By:

Comments:

APPENDIX B

Curve Number & Time of Concentration Computations

Worksheet 2: Runoff curve number and runoff

Project	By	Date
READING WOODS	J.B.	12-15-10
Location	**Checked**	**Date**
READING, MA		

Check one: ☑ Present ☐ Developed "E-1"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1/] Table 2-2	CN [1/] Figure 2-3	CN [1/] Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
	IMPERVIOUS	98			10.93	1071.1
B	WOODS (GOOD)	55			1.99	109.5
B	MEADOW	58			3.66	212.3
B	OPEN SPACE (GOOD)	61			9.36	571.0

[1/] Use only one CN source per line

Totals ➡ 25.94 | 1963.9

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{1963.9}{25.94} = 75.7$; Use CN ➡ 76

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall, P (24-hour)	in			
Runoff, Q	in			

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project READING WOODS	By J.B.	Date 12-15-10
Location READING, MA	Checked	Date

Check one: ☑ Present ☐ Developed "E-Z"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1/] Table 2-2	CN Figure 2-3	CN Figure 2-4	Area ☑ acres ☐ mi^2 ☐ %	Product of CN x area
	IMPERVIOUS	98			0.07	6.9
B	WOODS (GOOD)	55			0.49	27.0
B	OPEN SPACE (GOOD)	61			0.22	13.4
				Totals ➡	0.78	47.3

[1/] Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{47.3}{0.78} = 60.6$; Use CN ➡ 61

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall, P (24-hour)	in			
Runoff, Q (Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)	in			

Worksheet 2: Runoff curve number and runoff

Project	By	Date
READING WOODS	J.B.	12-15-10
Location	**Checked**	**Date**
READING, MA		

Check one: ☑ Present ☐ Developed "E-3"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
	IMPERVIOUS	98			0.17	16.7
B	WOODS (GOOD)	55			1.28	70.4
B	OPEN SPACE (GOOD)	61			0.83	50.6
				Totals ➡	2.28	137.7

1/ Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{137.7}{2.28} = 60.4$; Use CN ➡ 60

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall, P (24-hour)	in			
Runoff, Q	in			

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
READING WOODS	J.B.	12-15-10
Location	**Checked**	**Date**
READING, MA		

Check one: ☑ Present ☐ Developed "E-4"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
	IMPERVIOUS	98			1.88	184.2
B	WOODS (GOOD)	55			0.15	8.3
B	OPEN SPACE (GOOD)	61			0.51	31.1
					Totals ➡ 2.54	223.6

1/ Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{223.6}{2.54} = 88.0$ Use CN ➡ 88

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall, P (24-hour)	in			
Runoff, Q	in			

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
READING WOODS	J.B.	12-15-10
Location	**Checked**	**Date**
READING, MA		

Check one: ☑ Present ☐ Developed "E-5"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
	IMPERVIOUS	98			0.16	15.7
B	WOOD (GOOD)	55			0.31	17.1
B	OPEN SPACE (GOOD)	61			0.16	9.8
					Totals ➡ 0.63	42.6

1/ Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{42.6}{0.63} = 67.6$; Use CN ➡ 68

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall, P (24-hour)	in			
Runoff, Q	in			

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
READING WOODS	J.B.	12-15-10
Location	**Checked**	**Date**
READING, MA		

Check one: ☑ Present ☐ Developed "E-6"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
	IMPERVIOUS	98			0.36	35.3
B	OPEN-SPACE (GOOD)	61			0.49	29.9
					Totals ➡ 0.85	65.2

1/ Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{65.2}{0.85} = 76.7$; Use CN ➡ 77

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall, P (24-hour)	in			
Runoff, Q	in			

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
READING WOODS	J.B.	12-21-10
Location	**Checked**	**Date**
READING, MA		

Check one: ☐ Present ☑ Developed "P-1"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
	IMPERVIOUS	98			11.24	1101.5
B	WOODS (GOOD)	55			1.99	109.5
B	OPEN SPACE (GOOD)	61			10.09	615.5
B	MEADOW	58			2.50	145.0
					Totals ➡	25.81 / 1971.5

1/ Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{1971.5}{25.81} = 76.4$; **Use CN** ➡ 76

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall, P (24-hour)	in			
Runoff, Q	in			

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
READING WOODS	J.B.	12-16-10
Location	**Checked**	**Date**
READING, MA		

Check one: ☐ Present ☑ Developed "P-2"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
	IMPERVIOUS	98			0.07	6.9
	WOODS (GOOD)	55			0.49	27.0
	OPEN SPACE (GOOD)	61			0.22	13.4
					Totals ➡ 0.78	47.3

1/ Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{47.3}{0.78} = 60.6$; Use CN ➡ 61

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall, P (24-hour)	in			
Runoff, Q	in			

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
READING WOODS	J.B.	12-16-10
Location	**Checked**	**Date**
READING, MA		

Check one: ☐ Present ☑ Developed "P-3"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
	IMPERVIOUS	98			0.17	16.7
B	WOODS (GOOD)	55			1.28	70.4
B	OPEN SPACE (GOOD)	61			0.83	50.6
					Totals ➡ 2.28	137.7

1/ Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{137.7}{2.28} = 60.4$ Use CN ➡ 60

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall, P (24-hour)	in			
Runoff, Q	in			

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
READING WOODS	J.B.	12-21-10
Location	**Checked**	**Date**
READING, MA		

Check one: ☐ Present ☑ Developed "P-4"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
	IMPERVIOUS	98			0.48	47.0
B	WOODS (GOOD)	55			0.15	8.3
B	OPEN SPACE (GOOD)	61			1.49	90.9
					Totals ➡ 2.12	146.2

1/ Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{146.2}{2.12} = 69.0$; Use CN ➡ 69

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall, P (24-hour)	in			
Runoff, Q	in			

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
READING WOODS	J.B.	12-16-10
Location	**Checked**	**Date**
READING, MA		

Check one: ☐ Present ☑ Developed "P-5"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
	IMPERVIOUS	98			0.16	15.7
B	WOOD (GOOD)	55			0.31	17.1
B	OPEN SPACE (GOOD)	61			0.16	9.8
					Totals ➡ 0.63	42.6

1/ Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{42.6}{0.63} = 67.6$; Use CN ➡ 68

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall, P (24-hour)	in			
Runoff, Q	in			

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
READING WOODS	J.B.	12-21-10
Location	**Checked**	**Date**
READING, MA		

Check one: ☐ Present ☑ Developed "P-6"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
	IMPERVIOUS	98			0.13	12.74
	OPEN SPACE (GOOD)	61			0.11	6.71
					Totals ➡ 0.24	19.45

1/ Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{19.45}{0.24} = 81.0$; Use CN ➡ 81

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall, P (24-hour)	in			
Runoff, Q	in			

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
READING WOODS	J.B.	12-20-10
Location	**Checked**	**Date**
READING, MA		

Check one: ☐ Present ☑ Developed "P-7"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1/] Table 2-2	CN [1/] Figure 2-3	CN [1/] Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
	IMPERVIOUS	98			0.42	41.2
B	WOODS (GOOD)	55			0.06	3.30
B	OPEN SPACE (GOOD)	61			0.66	40.3
					Totals ➡ 1.14	84.8

[1/] Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{84.8}{1.14} = 74.4$; Use CN ➡ 74

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall, P (24-hour)	in			
Runoff, Q	in			

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

TR55 Tc Worksheet

Hyd. No. 1

E-1

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.410		0.011		0.011		
Flow length (ft)	=	50.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	0.80		0.00		0.00		
Travel Time (min)	=	**18.44**	+	**0.00**	+	**0.00**	=	**18.44**
Shallow Concentrated Flow								
Flow length (ft)	=	600.00		140.00		112.00		
Watercourse slope (%)	=	2.10		1.00		5.70		
Surface description	=	Unpaved		Paved		Unpaved		
Average velocity (ft/s)	=	2.34		2.03		3.85		
Travel Time (min)	=	**4.28**	+	**1.15**	+	**0.48**	=	**5.91**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	=	**0.00**	+	**0.00**	+	**0.00**	=	**0.00**

Total Travel Time, Tc ..... 24.35 min

TR55 Tc Worksheet

Hyd. No. 2

E-2

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.410		0.011		0.011		
Flow length (ft)	=	50.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	1.60		0.00		0.00		
Travel Time (min)	**=**	**13.97**	**+**	**0.00**	**+**	**0.00**	**=**	**13.97**
Shallow Concentrated Flow								
Flow length (ft)	=	163.00		0.00		0.00		
Watercourse slope (%)	=	5.20		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	3.68		0.00		0.00		
Travel Time (min)	**=**	**0.74**	**+**	**0.00**	**+**	**0.00**	**=**	**0.74**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 14.71 min

TR55 Tc Worksheet

Hyd. No. 3

E-3

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	50.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	3.00		0.00		0.00		
Travel Time (min)	=	**10.65**	+	**0.00**	+	**0.00**	=	**10.65**
Shallow Concentrated Flow								
Flow length (ft)	=	207.00		0.00		0.00		
Watercourse slope (%)	=	5.60		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	3.82		0.00		0.00		
Travel Time (min)	=	**0.90**	+	**0.00**	+	**0.00**	=	**0.90**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	=	**0.00**	+	**0.00**	+	**0.00**	=	**0.00**

Total Travel Time, Tc ..... 11.56 min

TR55 Tc Worksheet

Hyd. No. 4

E-4

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.410		0.011		0.011		
Flow length (ft)	=	37.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	4.20		0.00		0.00		
Travel Time (min)	**=**	**7.47**	**+**	**0.00**	**+**	**0.00**	**=**	**7.47**
Shallow Concentrated Flow								
Flow length (ft)	=	540.00		0.00		0.00		
Watercourse slope (%)	=	4.80		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	4.45		0.00		0.00		
Travel Time (min)	**=**	**2.02**	**+**	**0.00**	**+**	**0.00**	**=**	**2.02**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 9.49 min

TR55 Tc Worksheet

Hyd. No. 5

E-5

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	50.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	4.00		0.00		0.00		
Travel Time (min)	=	**9.50**	+	**0.00**	+	**0.00**	=	**9.50**
Shallow Concentrated Flow								
Flow length (ft)	=	194.00		68.00		0.00		
Watercourse slope (%)	=	4.10		4.10		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	3.27		4.12		0.00		
Travel Time (min)	=	**0.99**	+	**0.28**	+	**0.00**	=	**1.27**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	=	**0.00**	+	**0.00**	+	**0.00**	=	**0.00**

Total Travel Time, Tc ..... 10.76 min

TR55 Tc Worksheet

Hyd. No. 6

E-6

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.410		0.011		0.011		
Flow length (ft)	=	40.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	20.00		0.00		0.00		
Travel Time (min)	=	**4.26**	+	**0.00**	+	**0.00**	=	**4.26**
Shallow Concentrated Flow								
Flow length (ft)	=	311.00		0.00		0.00		
Watercourse slope (%)	=	3.60		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	3.86		0.00		0.00		
Travel Time (min)	=	**1.34**	+	**0.00**	+	**0.00**	=	**1.34**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	=	**0.00**	+	**0.00**	+	**0.00**	=	**0.00**

Total Travel Time, Tc ..... 5.60 min

TR55 Tc Worksheet

Hyd. No. 9

P-1

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.410		0.011		0.011		
Flow length (ft)	=	50.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	0.80		0.00		0.00		
Travel Time (min)	=	**18.44**	+	**0.00**	+	**0.00**	=	**18.44**
Shallow Concentrated Flow								
Flow length (ft)	=	600.00		140.00		112.00		
Watercourse slope (%)	=	2.10		1.00		5.70		
Surface description	=	Unpaved		Paved		Unpaved		
Average velocity (ft/s)	=	2.34		2.03		3.85		
Travel Time (min)	=	**4.28**	+	**1.15**	+	**0.48**	=	**5.91**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	=	**0.00**	+	**0.00**	+	**0.00**	=	**0.00**

Total Travel Time, Tc ..... 24.35 min

TR55 Tc Worksheet

Hyd. No. 10

P-2

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.410		0.011		0.011		
Flow length (ft)	=	50.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	1.60		0.00		0.00		
Travel Time (min)	=	**13.97**	+	**0.00**	+	**0.00**	=	**13.97**
Shallow Concentrated Flow								
Flow length (ft)	=	163.00		0.00		0.00		
Watercourse slope (%)	=	5.20		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	3.68		0.00		0.00		
Travel Time (min)	=	**0.74**	+	**0.00**	+	**0.00**	=	**0.74**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	=	**0.00**	+	**0.00**	+	**0.00**	=	**0.00**

Total Travel Time, Tc ..... 14.71 min

TR55 Tc Worksheet

Hyd. No. 11

P-3

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	50.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	3.00		0.00		0.00		
Travel Time (min)	=	**10.65**	+	**0.00**	+	**0.00**	=	**10.65**
Shallow Concentrated Flow								
Flow length (ft)	=	207.00		0.00		0.00		
Watercourse slope (%)	=	5.60		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	3.82		0.00		0.00		
Travel Time (min)	=	**0.90**	+	**0.00**	+	**0.00**	=	**0.90**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	=	**0.00**	+	**0.00**	+	**0.00**	=	**0.00**

Total Travel Time, Tc ..... 11.56 min

TR55 Tc Worksheet

Hyd. No. 12

P-4

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.410		0.011		0.011		
Flow length (ft)	=	50.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	0.50		0.00		0.00		
Travel Time (min)	=	**22.25**	+	**0.00**	+	**0.00**	=	**22.25**
Shallow Concentrated Flow								
Flow length (ft)	=	480.00		0.00		0.00		
Watercourse slope (%)	=	5.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	3.61		0.00		0.00		
Travel Time (min)	=	**2.22**	+	**0.00**	+	**0.00**	=	**2.22**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	=	**0.00**	+	**0.00**	+	**0.00**	=	**0.00**

Total Travel Time, Tc ..... **24.47 min**

TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No. 13

P-5

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	50.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	4.00		0.00		0.00		
Travel Time (min)	=	**9.50**	+	**0.00**	+	**0.00**	=	**9.50**
Shallow Concentrated Flow								
Flow length (ft)	=	194.00		68.00		0.00		
Watercourse slope (%)	=	4.10		4.10		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	3.27		4.12		0.00		
Travel Time (min)	=	**0.99**	+	**0.28**	+	**0.00**	=	**1.27**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	=	**0.00**	+	**0.00**	+	**0.00**	=	**0.00**

Total Travel Time, Tc ..... 10.76 min

TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No. 14

P-6

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.410		0.011		0.011		
Flow length (ft)	=	50.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	2.00		0.00		0.00		
Travel Time (min)	=	**12.78**	+	**0.00**	+	**0.00**	=	**12.78**
Shallow Concentrated Flow								
Flow length (ft)	=	72.00		0.00		0.00		
Watercourse slope (%)	=	2.70		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	3.34		0.00		0.00		
Travel Time (min)	=	**0.36**	+	**0.00**	+	**0.00**	=	**0.36**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	=	**0.00**	+	**0.00**	+	**0.00**	=	**0.00**

Total Travel Time, Tc ..... 13.14 min

TR55 Tc Worksheet

Hyd. No. 15

P-7

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.410		0.011		0.011		
Flow length (ft)	=	50.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.10		0.00		0.00		
Land slope (%)	=	1.00		0.00		0.00		
Travel Time (min)	=	**16.86**	+	**0.00**	+	**0.00**	=	**16.86**
Shallow Concentrated Flow								
Flow length (ft)	=	208.00		0.00		0.00		
Watercourse slope (%)	=	1.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.61		0.00		0.00		
Travel Time (min)	=	**2.15**	+	**0.00**	+	**0.00**	=	**2.15**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	=	0.0		0.0		0.0		
Travel Time (min)	=	**0.00**	+	**0.00**	+	**0.00**	=	**0.00**

Total Travel Time, Tc ..... 19.01 min

APPENDIX C

Hydrograph Reports
&
Detention Area Characteristics

Pre-Development

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	20.22	-------	-------	41.24	54.23	-------	79.53	E-1
2	SCS Runoff	-------	-------	0.182	-------	-------	0.675	1.028	-------	1.780	E-2
3	SCS Runoff	-------	-------	0.487	-------	-------	2.018	3.139	-------	5.510	E-3
4	SCS Runoff	-------	-------	7.681	-------	-------	12.58	15.39	-------	20.62	E-4
5	SCS Runoff	-------	-------	0.367	-------	-------	0.938	1.312	-------	2.073	E-5
6	SCS Runoff	-------	-------	1.146	-------	-------	2.280	2.971	-------	4.304	E-6
7	Reservoir	2	-------	0.182	-------	-------	0.675	1.029	-------	1.780	Headwall Area Outflow
8	Combine	1, 7	-------	20.40	-------	-------	41.85	55.15	-------	81.08	Flow to SP-1 (Pre)

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	20.22	1	739	101,974	----	------	------	E-1
2	SCS Runoff	0.182	1	737	1,143	----	------	------	E-2
3	SCS Runoff	0.487	1	734	3,117	----	------	------	E-3
4	SCS Runoff	7.681	1	719	17,586	----	------	------	E-4
5	SCS Runoff	0.367	1	730	1,580	----	------	------	E-5
6	SCS Runoff	1.146	1	725	3,630	----	------	------	E-6
7	Reservoir	0.182	1	738	1,131	2	132.17	18.3	Headwall Area Outflow
8	Combine	20.40	1	739	103,105	1, 7	------	------	Flow to SP-1 (Pre)

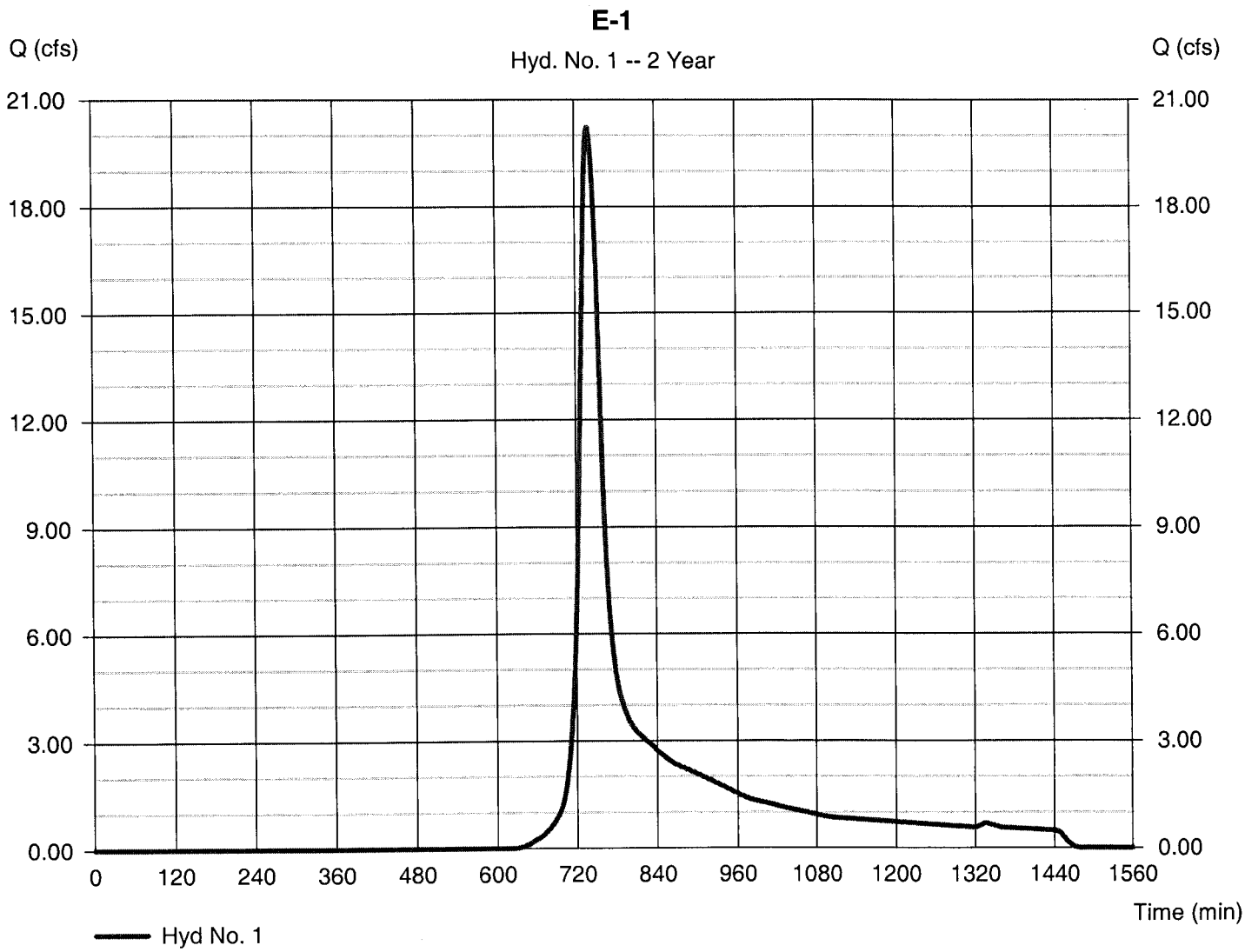
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 1

E-1

Hydrograph type	= SCS Runoff	Peak discharge	= 20.22 cfs
Storm frequency	= 2 yrs	Time to peak	= 739 min
Time interval	= 1 min	Hyd. volume	= 101,974 cuft
Drainage area	= 25.940 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.30 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



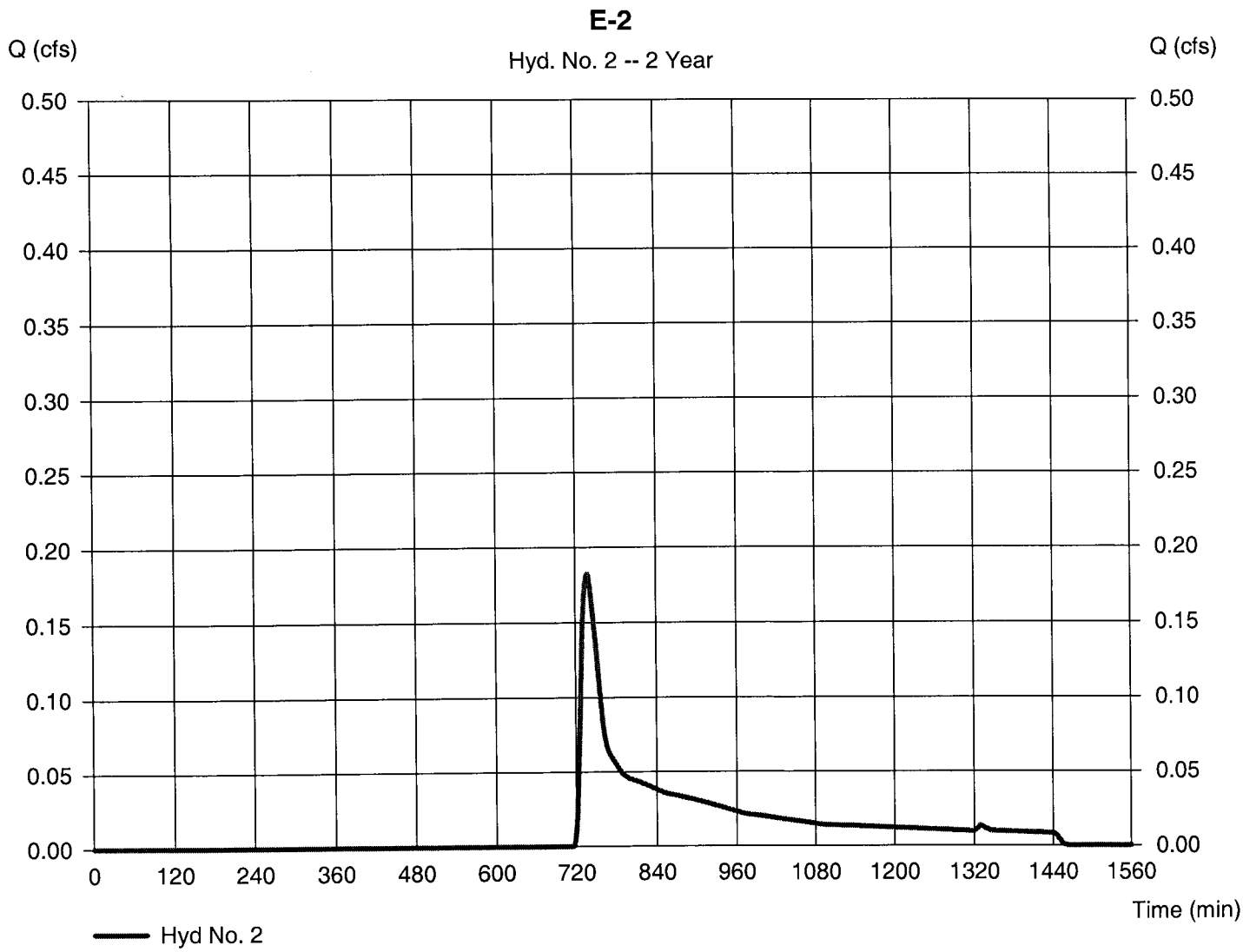
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 2

E-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.182 cfs
Storm frequency	= 2 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 1,143 cuft
Drainage area	= 0.780 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.70 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



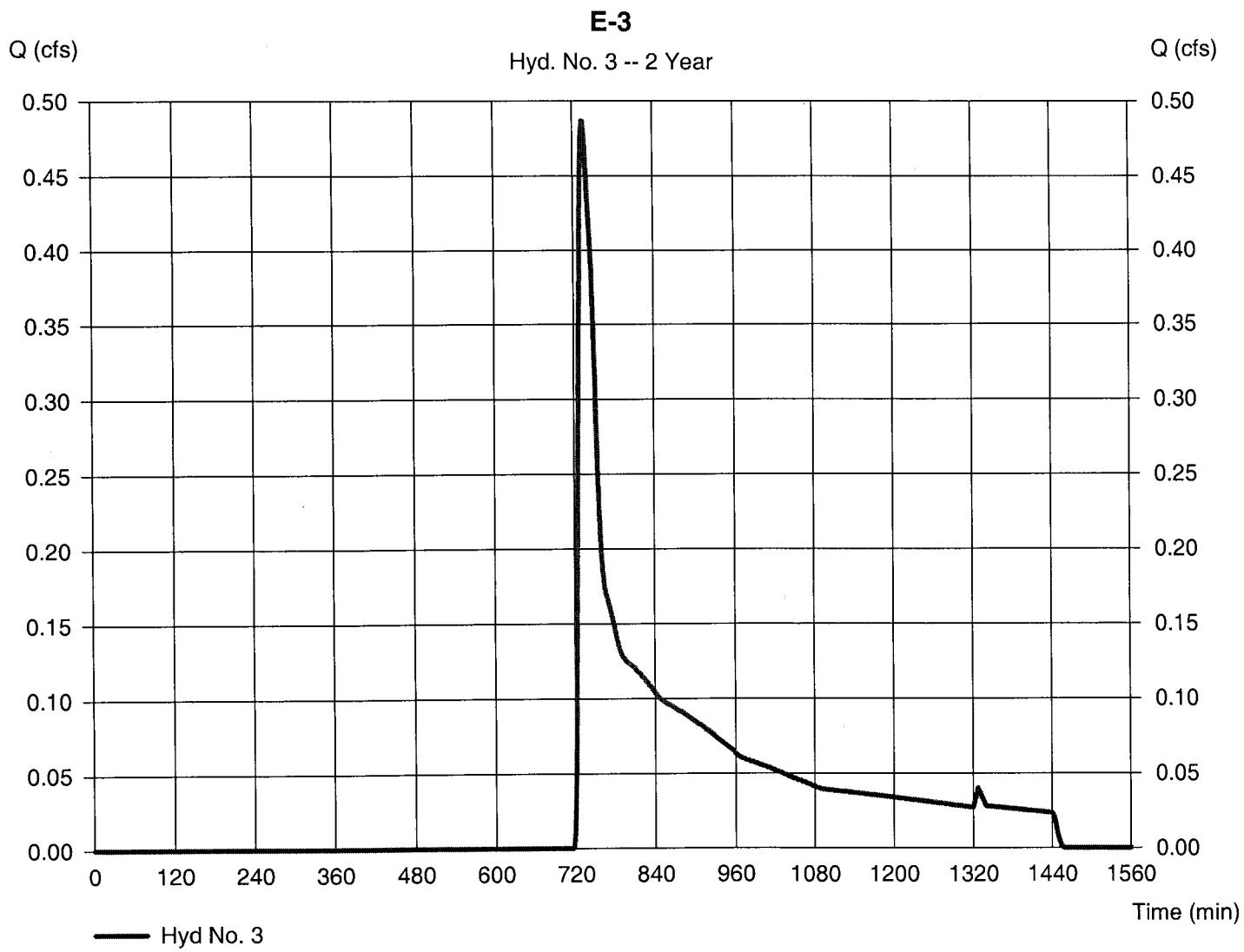
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 3

E-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.487 cfs
Storm frequency	= 2 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 3,117 cuft
Drainage area	= 2.280 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.60 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



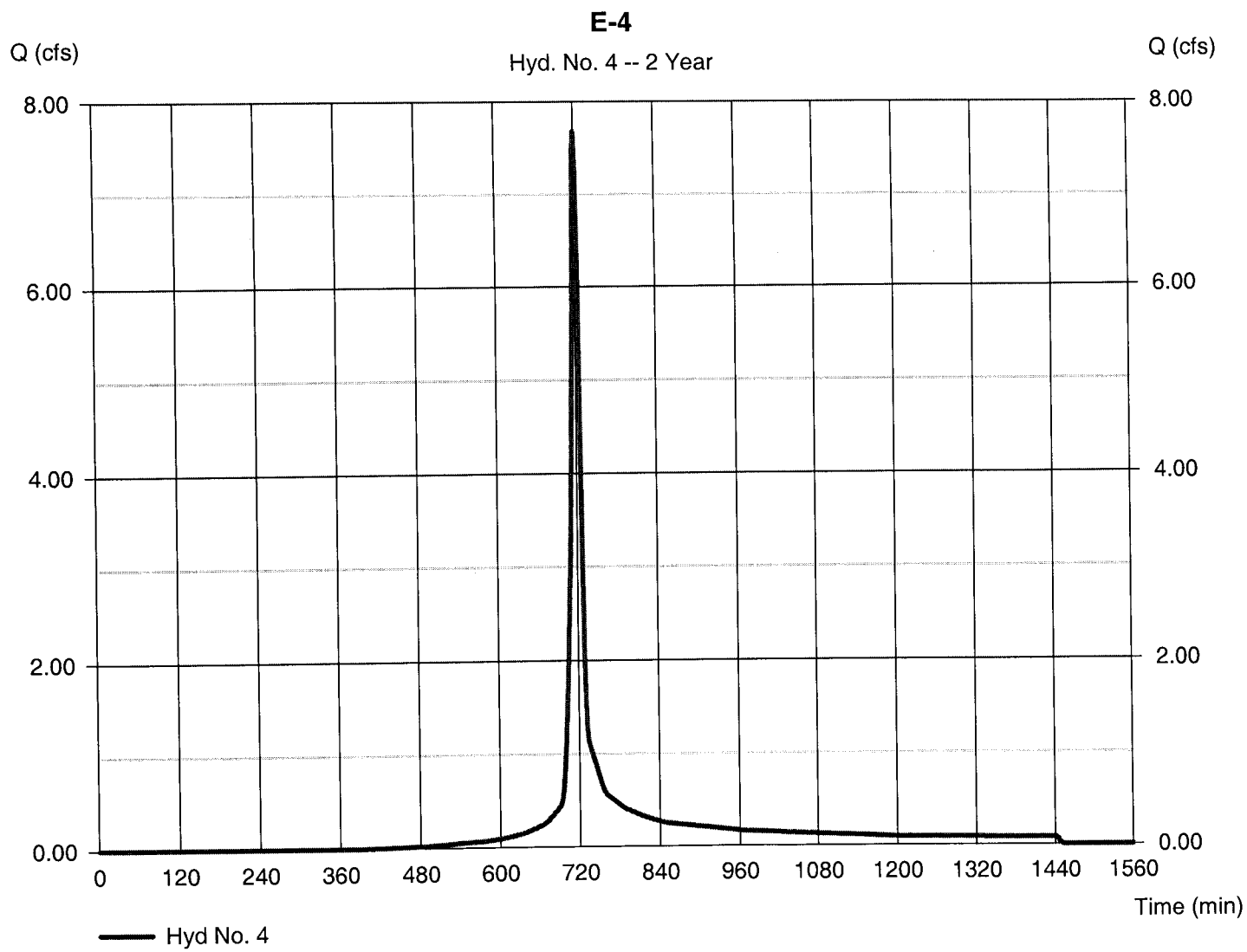
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 4

E-4

Hydrograph type	= SCS Runoff	Peak discharge	= 7.681 cfs
Storm frequency	= 2 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 17,586 cuft
Drainage area	= 2.540 ac	Curve number	= 88
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.50 min
Total precip.	= 3.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



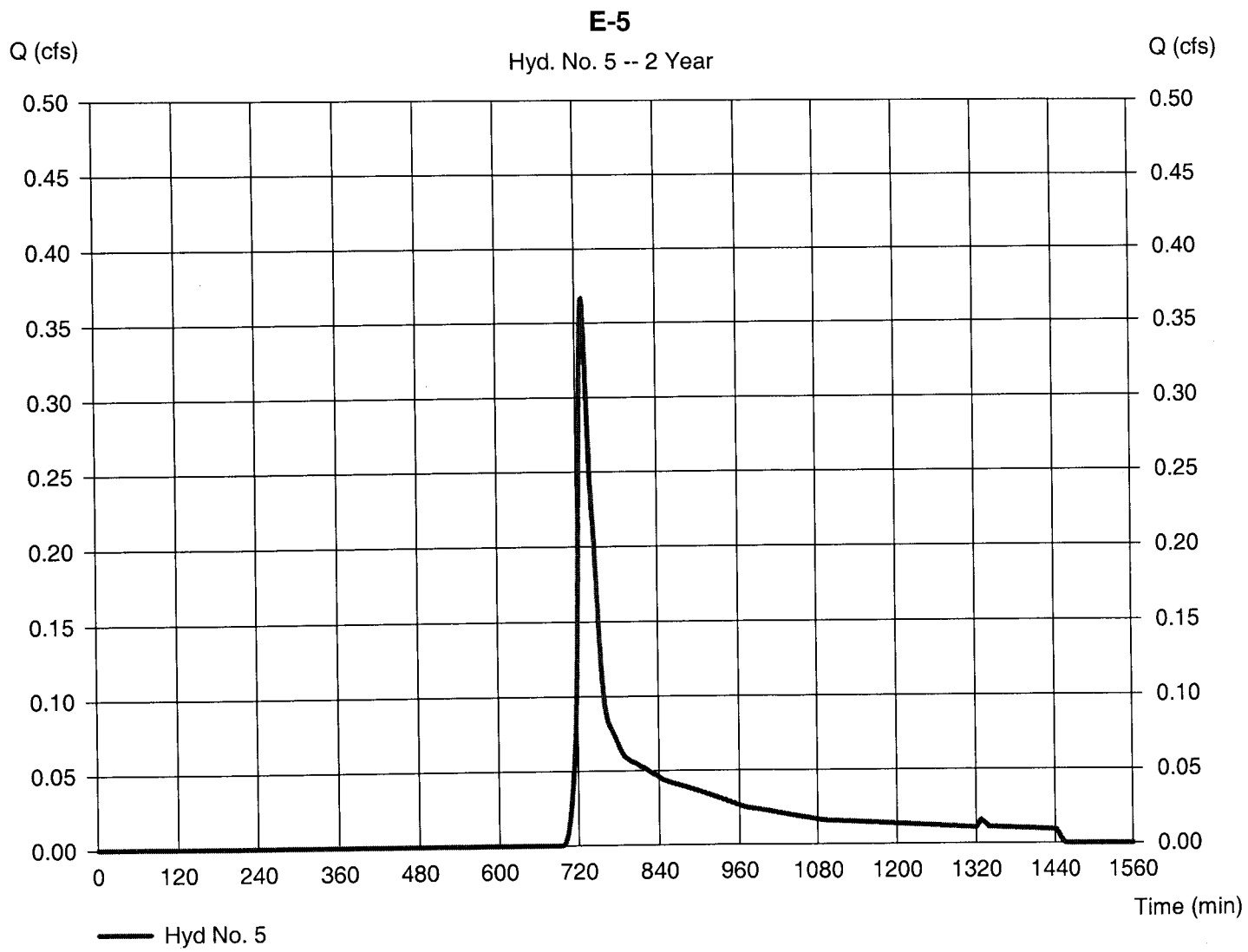
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Thursday, Dec 23, 2010

Hyd. No. 5

E-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.367 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 1,580 cuft
Drainage area	= 0.630 ac	Curve number	= 68
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.80 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



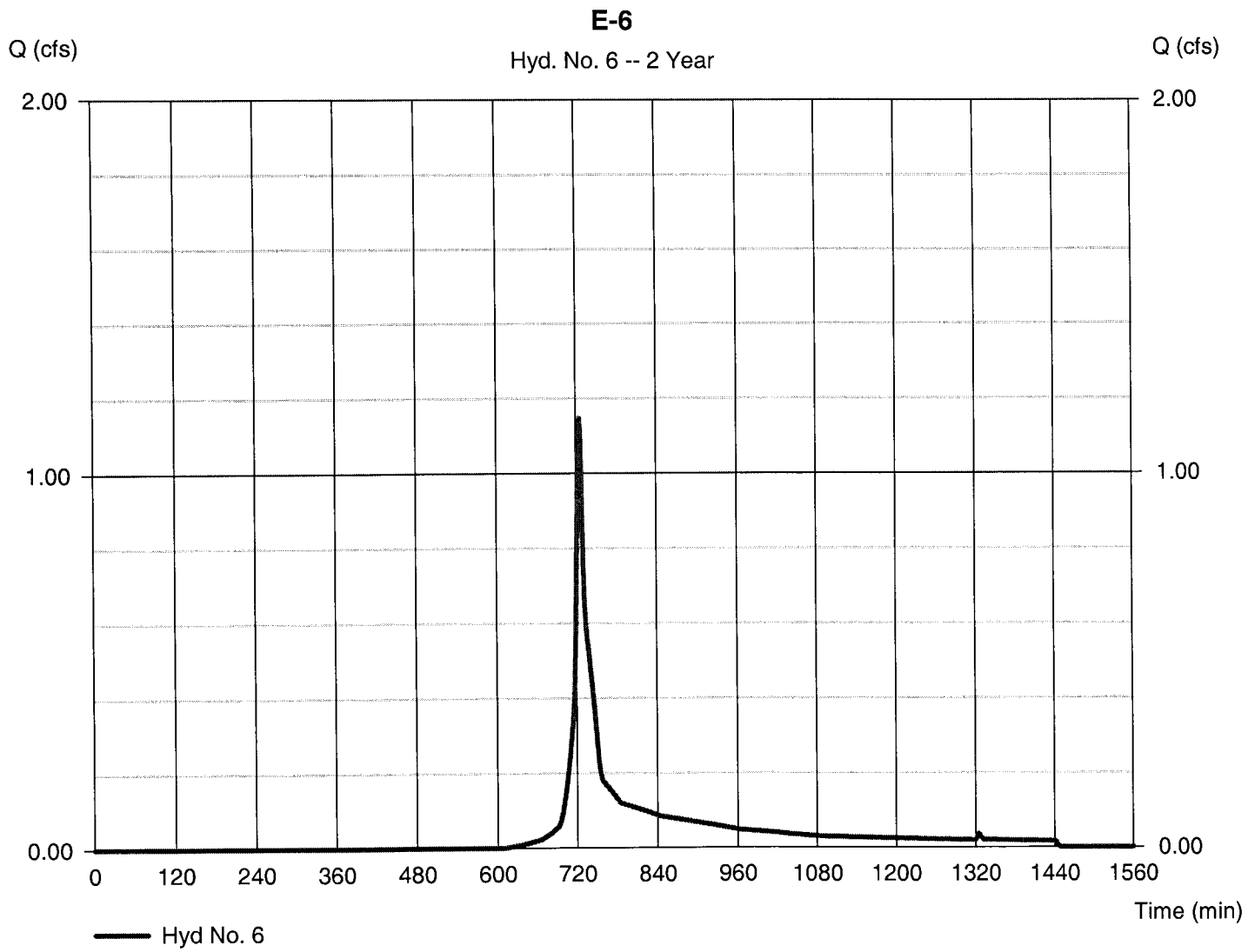
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Thursday, Dec 23, 2010

Hyd. No. 6

E-6

Hydrograph type	= SCS Runoff	Peak discharge	= 1.146 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 3,630 cuft
Drainage area	= 0.850 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.60 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

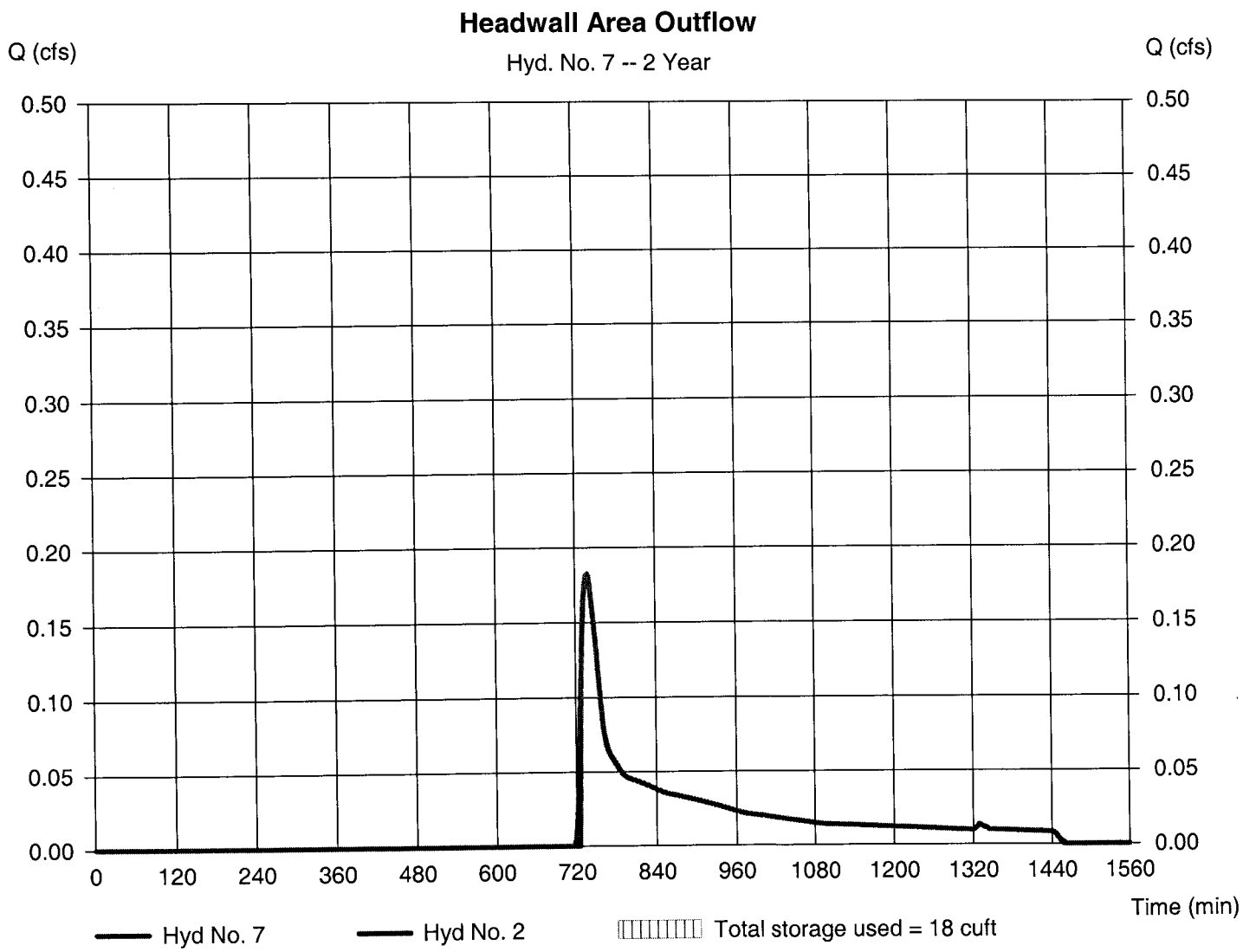
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 7

Headwall Area Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.182 cfs
Storm frequency	= 2 yrs	Time to peak	= 738 min
Time interval	= 1 min	Hyd. volume	= 1,131 cuft
Inflow hyd. No.	= 2 - E-2	Max. Elevation	= 132.17 ft
Reservoir name	= Storage behind exist headwall	Max. Storage	= 18 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Pond No. 1 - Storage behind exist headwall

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 131.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	131.50	10	0	0
1.50	133.00	50	41	41
2.50	134.00	1,760	702	743
3.50	135.00	4,450	3,003	3,746
4.50	136.00	8,220	6,239	9,985
5.50	137.00	10,000	9,095	19,079

Culvert / Orifice Structures

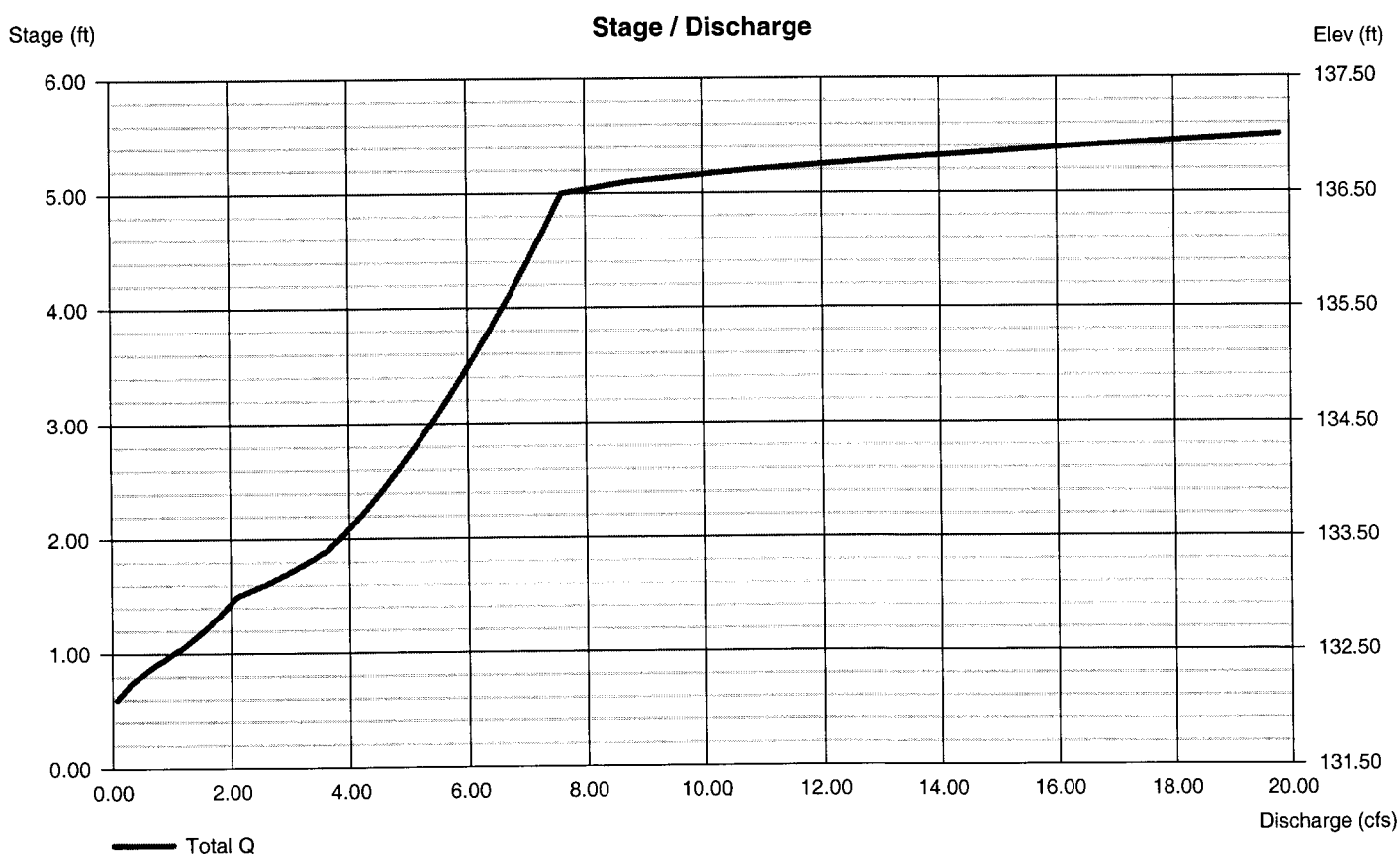
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 131.97	0.00	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.70	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 136.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (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).



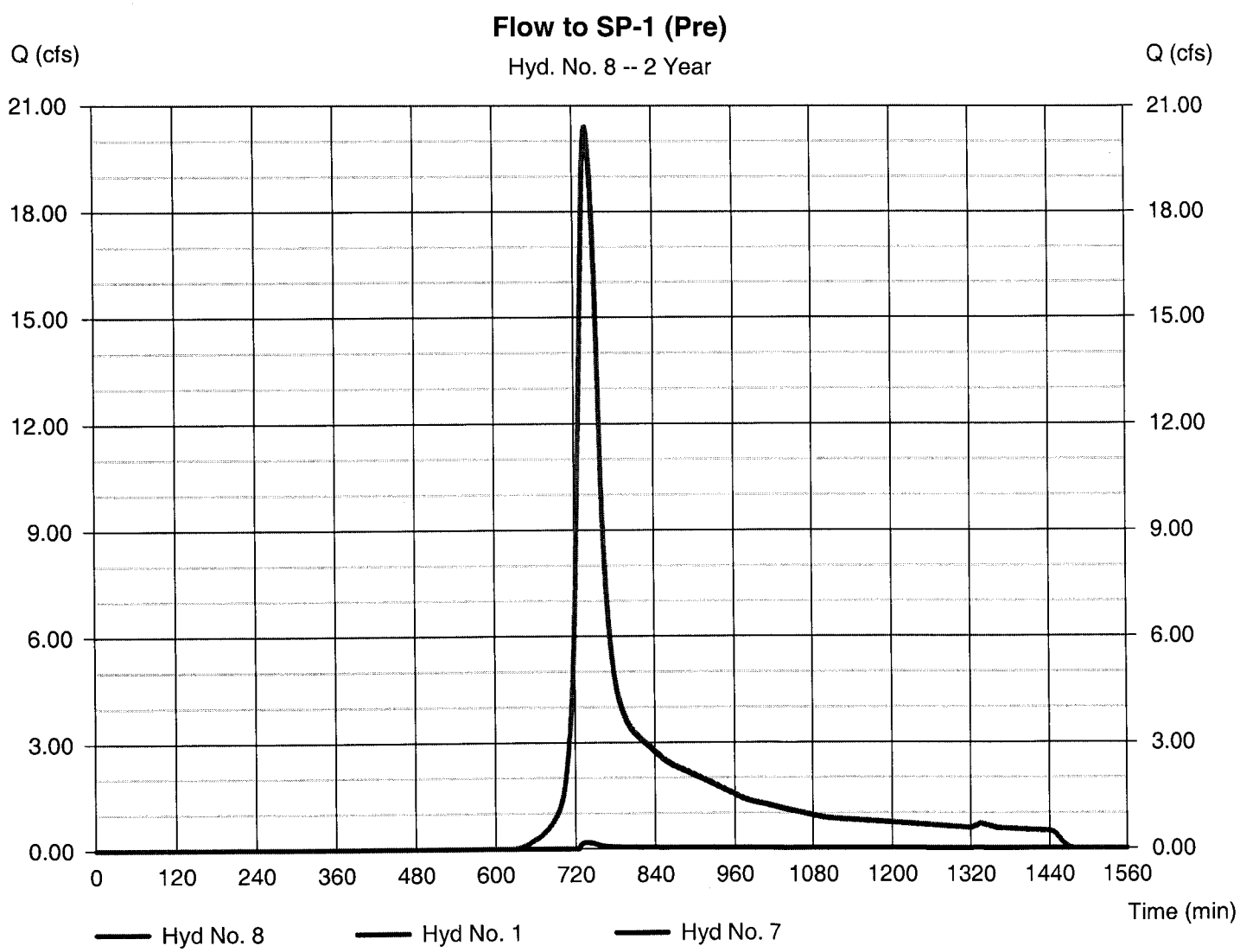
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 8

Flow to SP-1 (Pre)

Hydrograph type	= Combine	Peak discharge	= 20.40 cfs
Storm frequency	= 2 yrs	Time to peak	= 739 min
Time interval	= 1 min	Hyd. volume	= 103,105 cuft
Inflow hyds.	= 1, 7	Contrib. drain. area	= 25.940 ac



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	41.24	1	738	200,547	----	------	------	E-1
2	SCS Runoff	0.675	1	732	3,056	----	------	------	E-2
3	SCS Runoff	2.018	1	730	8,591	----	------	------	E-3
4	SCS Runoff	12.58	1	719	29,470	----	------	------	E-4
5	SCS Runoff	0.938	1	729	3,567	----	------	------	E-5
6	SCS Runoff	2.280	1	725	7,034	----	------	------	E-6
7	Reservoir	0.675	1	732	3,043	2	132.38	24.2	Headwall Area Outflow
8	Combine	41.85	1	738	203,591	1, 7	------	------	Flow to SP-1 (Pre)

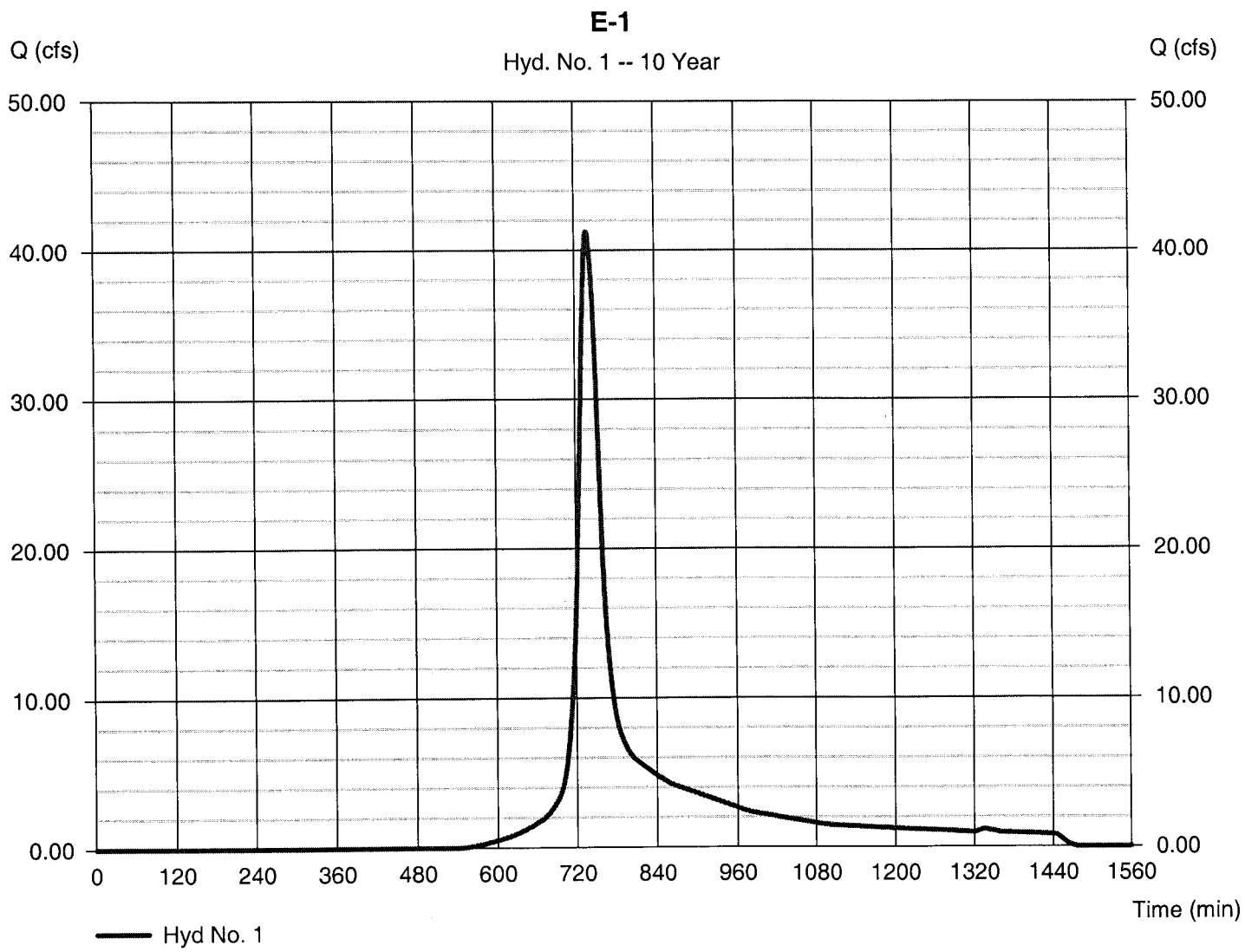
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 1

E-1

Hydrograph type	= SCS Runoff	Peak discharge	= 41.24 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 1 min	Hyd. volume	= 200,547 cuft
Drainage area	= 25.940 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.30 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



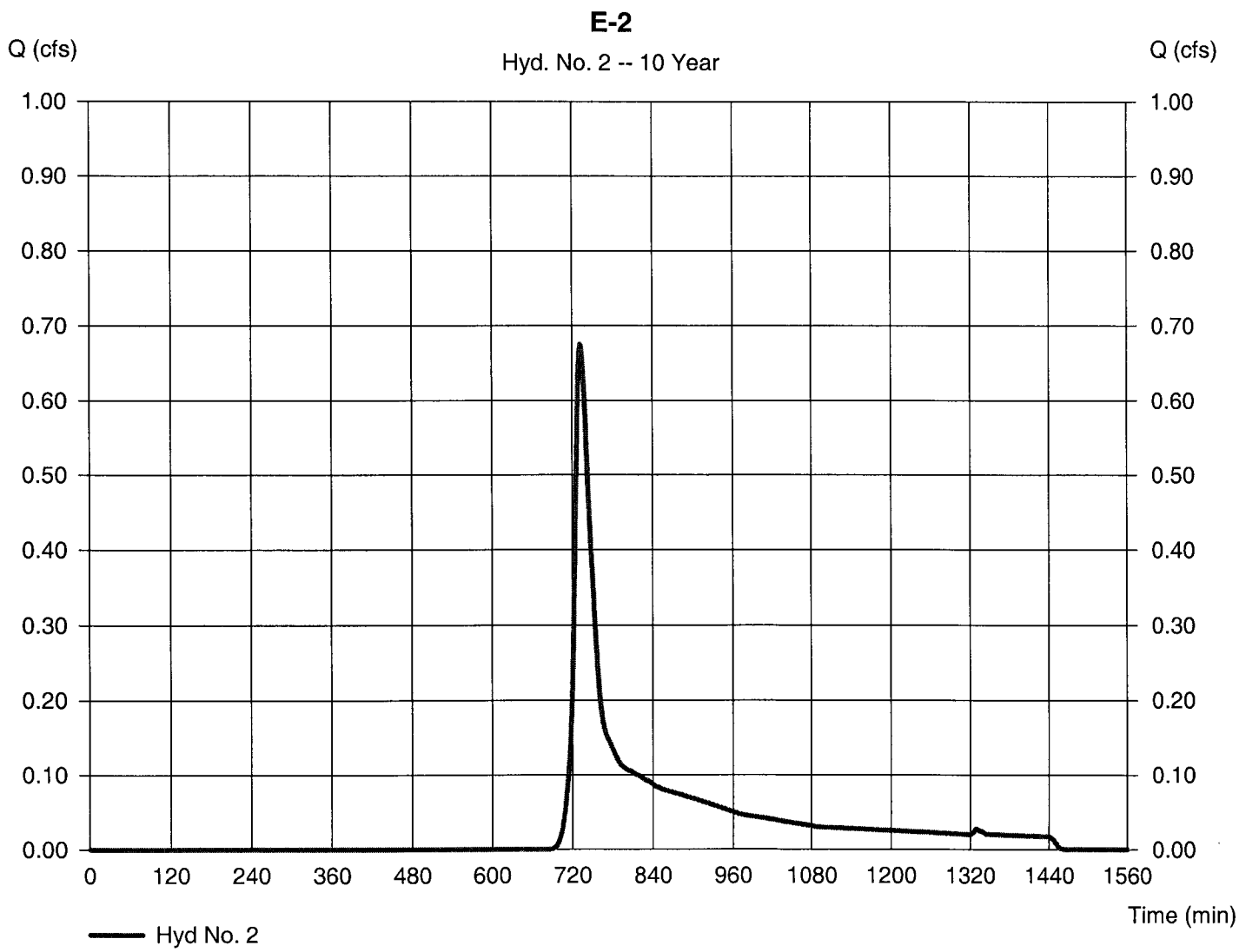
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 2

E-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.675 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 3,056 cuft
Drainage area	= 0.780 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.70 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



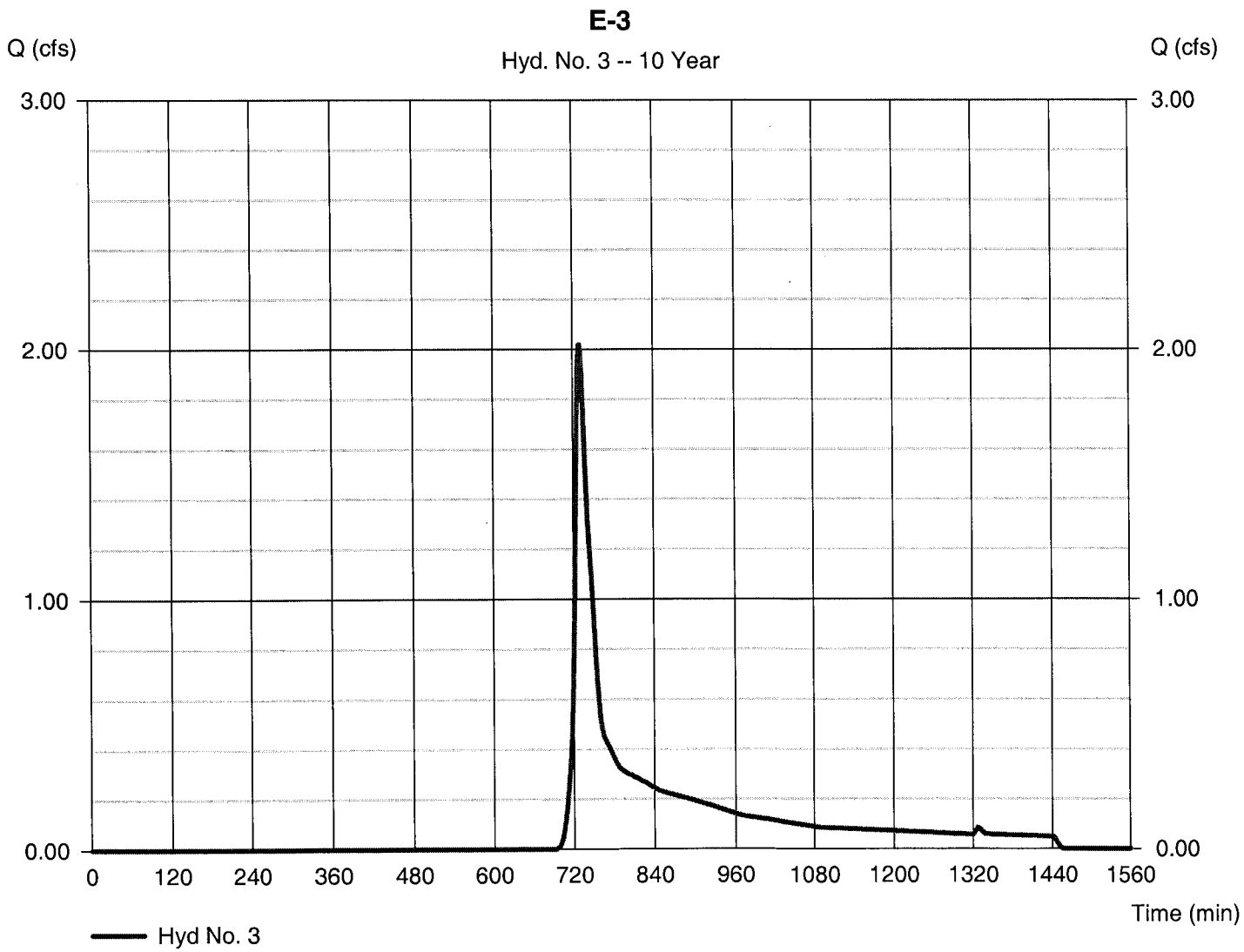
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Thursday, Dec 23, 2010

Hyd. No. 3

E-3

Hydrograph type	= SCS Runoff	Peak discharge	= 2.018 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 8,591 cuft
Drainage area	= 2.280 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.60 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



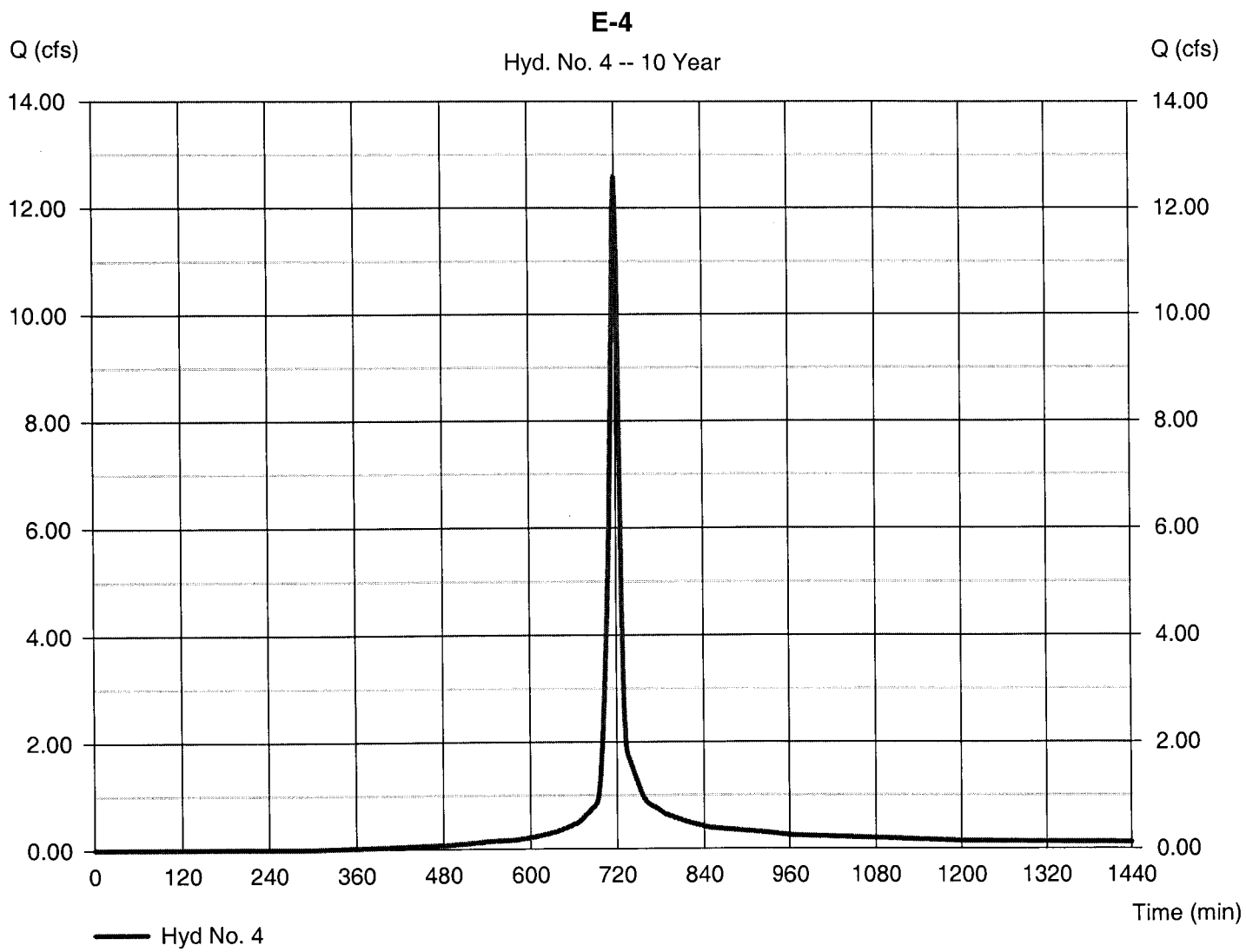
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 4

E-4

Hydrograph type	= SCS Runoff	Peak discharge	= 12.58 cfs
Storm frequency	= 10 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 29,470 cuft
Drainage area	= 2.540 ac	Curve number	= 88
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.50 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



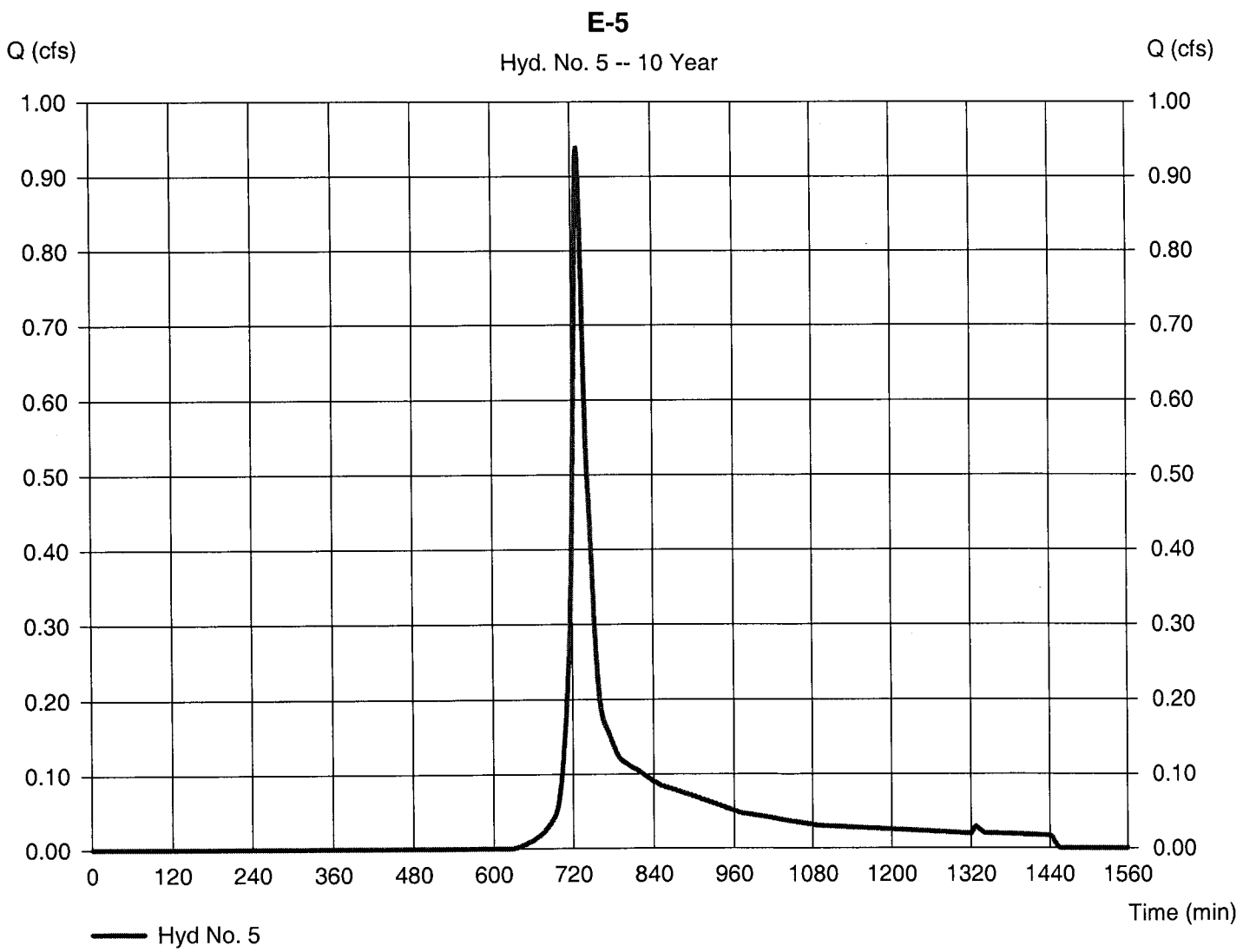
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 5

E-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.938 cfs
Storm frequency	= 10 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 3,567 cuft
Drainage area	= 0.630 ac	Curve number	= 68
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.80 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



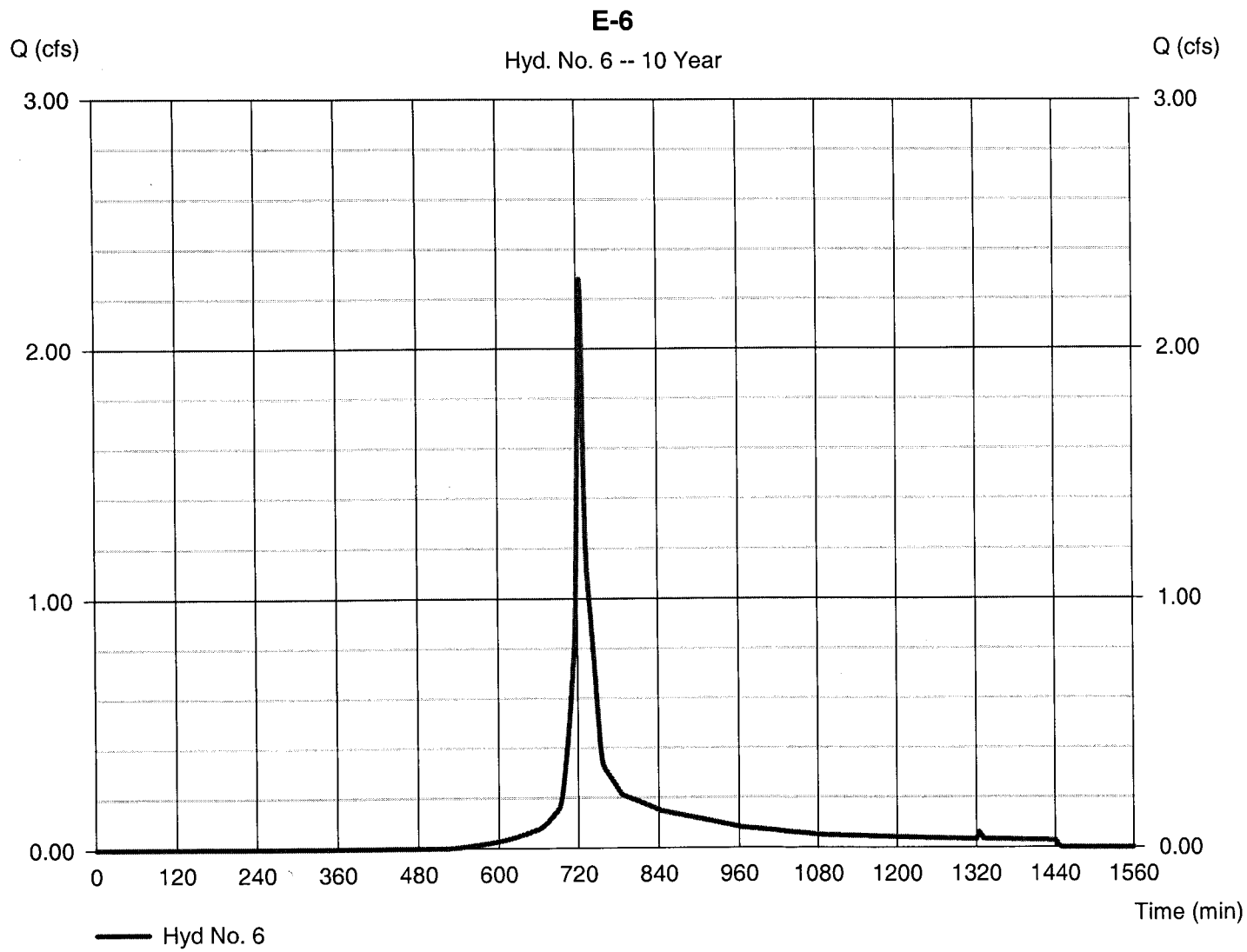
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 6

E-6

Hydrograph type	= SCS Runoff	Peak discharge	= 2.280 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 7,034 cuft
Drainage area	= 0.850 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.60 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

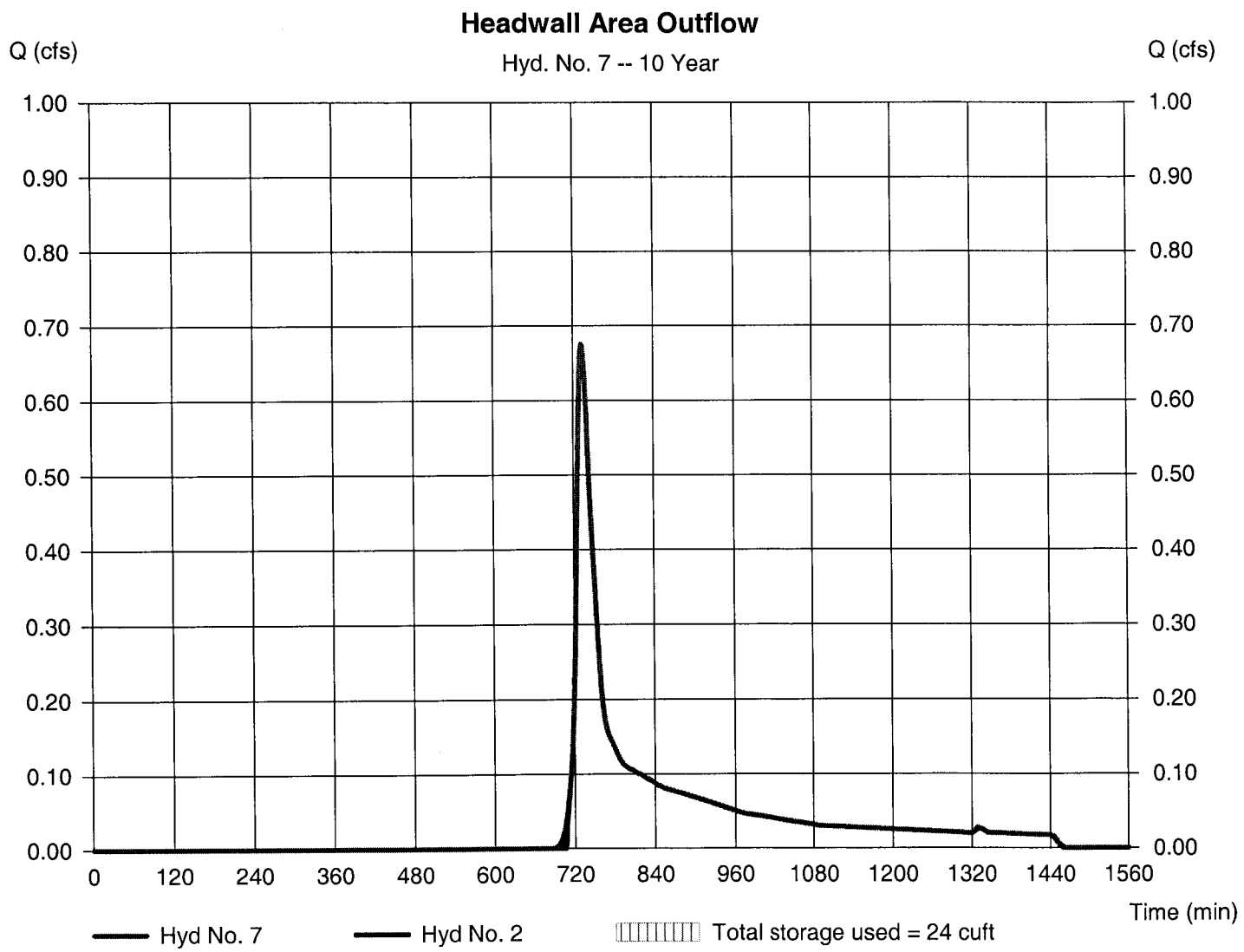
Hydraflow Hydrographs by Intelisolve v9.2 | Thursday, Dec 23, 2010

Hyd. No. 7

Headwall Area Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.675 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 3,043 cuft
Inflow hyd. No.	= 2 - E-2	Max. Elevation	= 132.38 ft
Reservoir name	= Storage behind exist headwall	Max. Storage	= 24 cuft

Storage Indication method used.



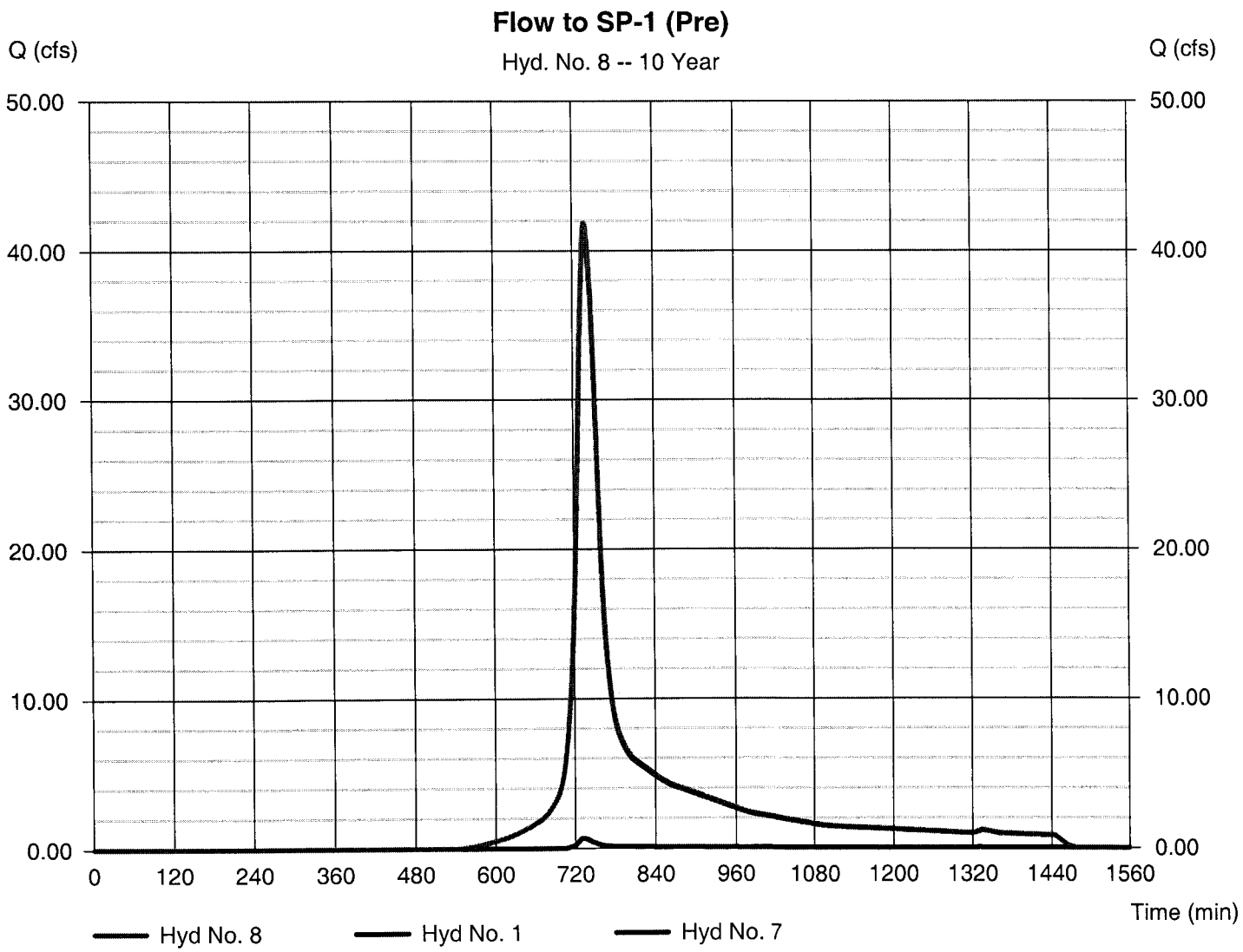
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 8

Flow to SP-1 (Pre)

Hydrograph type	= Combine	Peak discharge	= 41.85 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 1 min	Hyd. volume	= 203,591 cuft
Inflow hyds.	= 1, 7	Contrib. drain. area	= 25.940 ac



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	54.23	1	737	262,216	----	------	------	E-1
2	SCS Runoff	1.028	1	731	4,396	----	------	------	E-2
3	SCS Runoff	3.139	1	729	12,466	----	------	------	E-3
4	SCS Runoff	15.39	1	719	36,462	----	------	------	E-4
5	SCS Runoff	1.312	1	728	4,879	----	------	------	E-5
6	SCS Runoff	2.971	1	725	9,151	----	------	------	E-6
7	Reservoir	1.029	1	732	4,384	2	132.50	27.5	Headwall Area Outflow
8	Combine	55.15	1	737	266,600	1, 7	------	------	Flow to SP-1 (Pre)

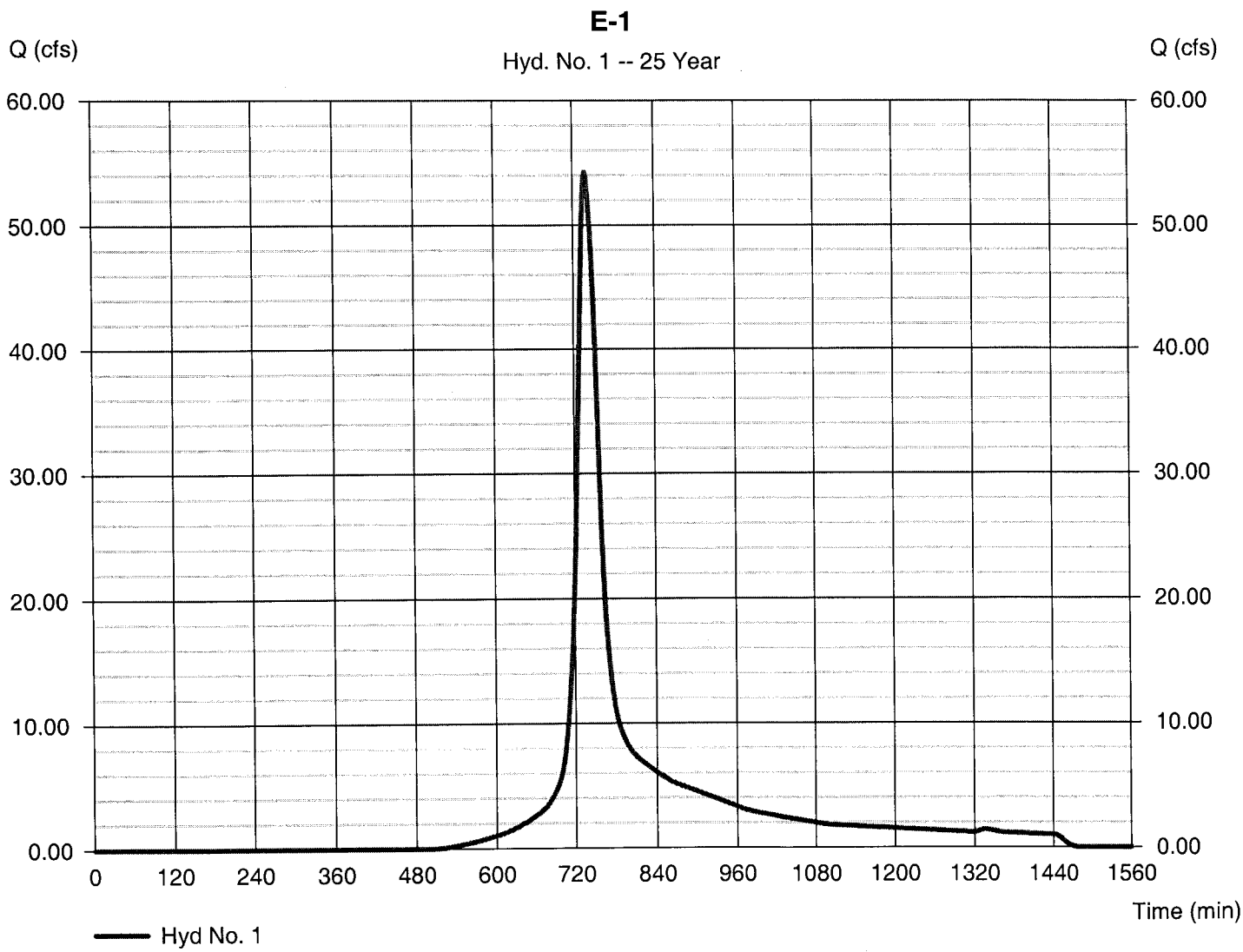
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 1

E-1

Hydrograph type	= SCS Runoff	Peak discharge	= 54.23 cfs
Storm frequency	= 25 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 262,216 cuft
Drainage area	= 25.940 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.30 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



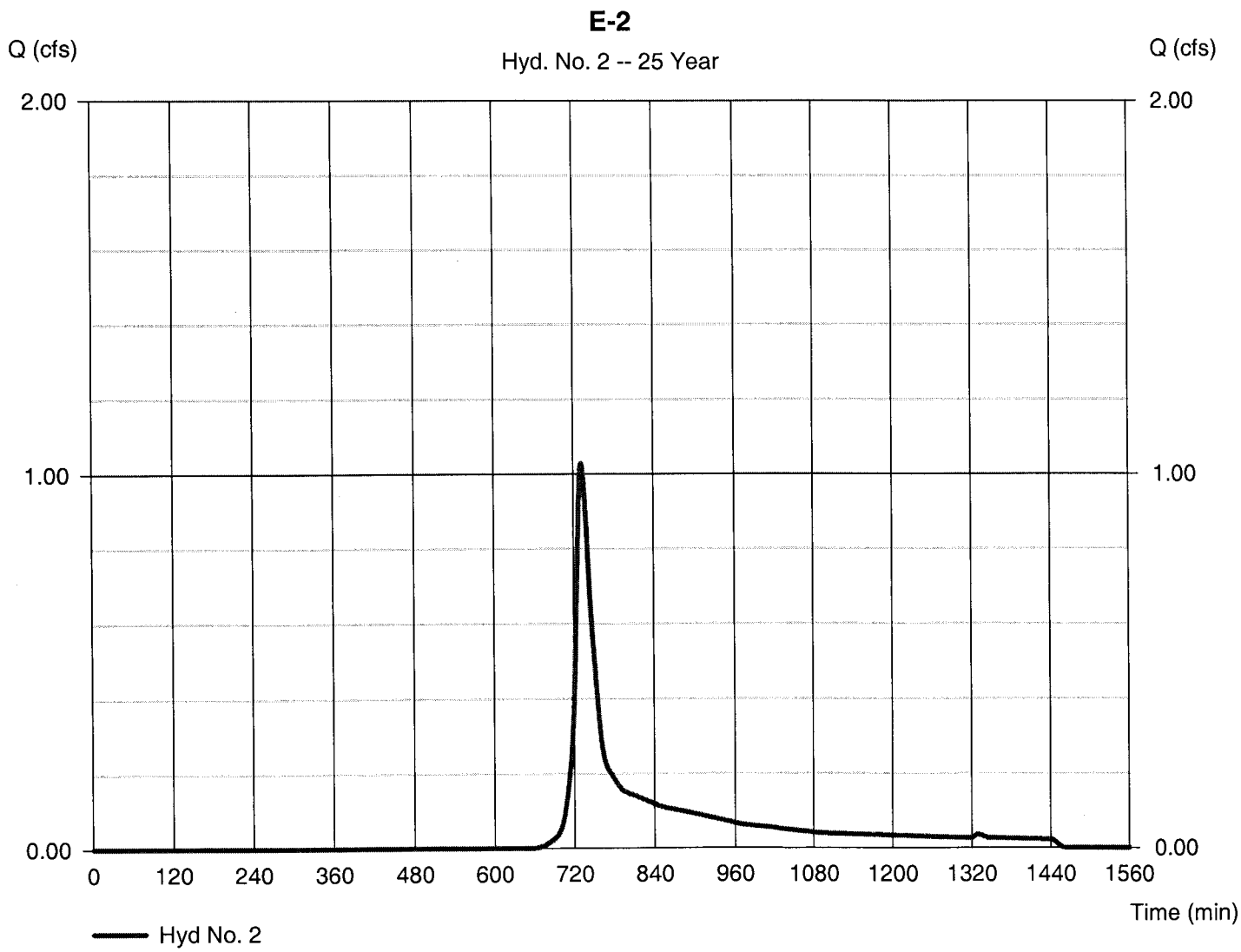
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 2

E-2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.028 cfs
Storm frequency	= 25 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 4,396 cuft
Drainage area	= 0.780 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.70 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



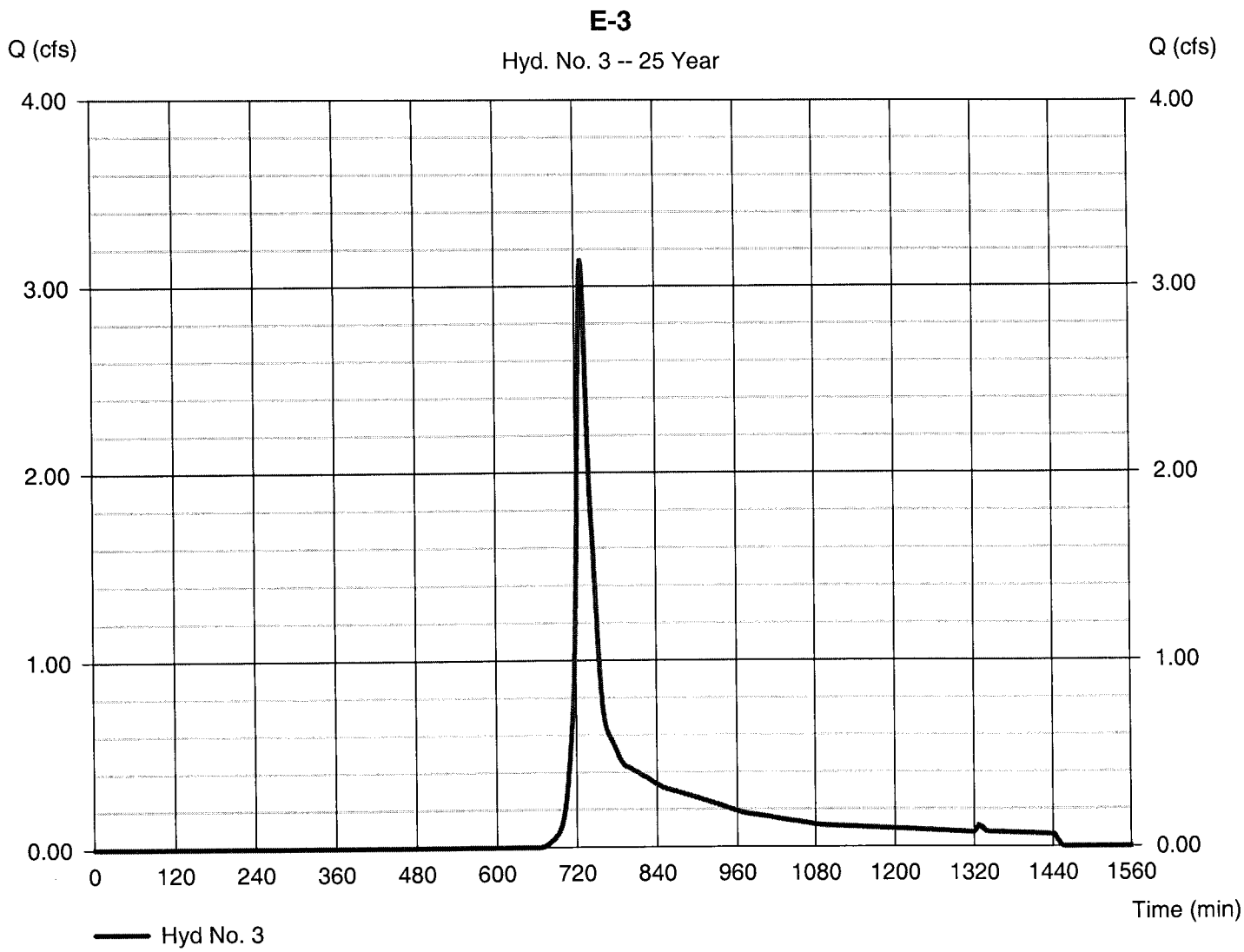
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Thursday, Dec 23, 2010

Hyd. No. 3

E-3

Hydrograph type	= SCS Runoff	Peak discharge	= 3.139 cfs
Storm frequency	= 25 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 12,466 cuft
Drainage area	= 2.280 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.60 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



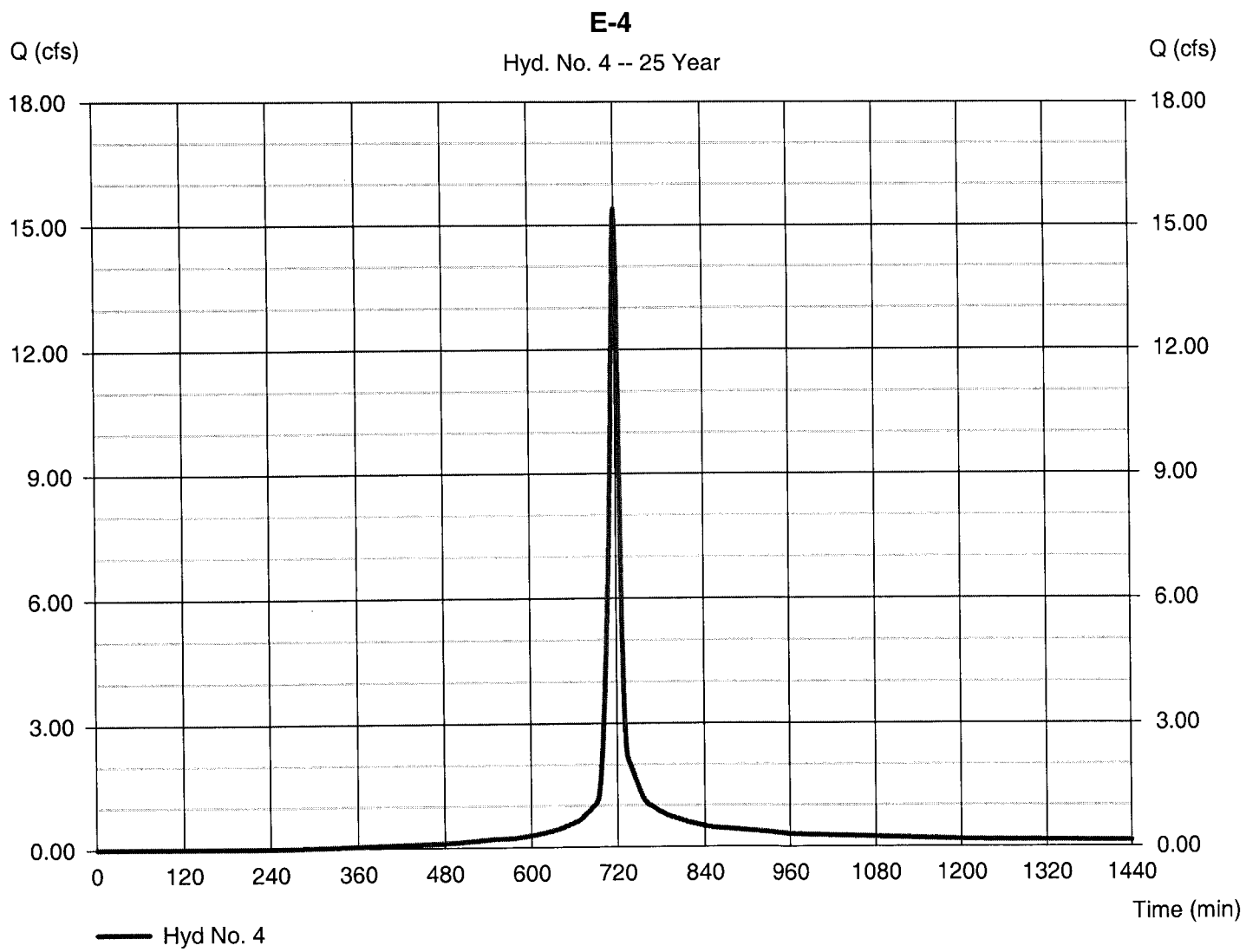
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 4

E-4

Hydrograph type	= SCS Runoff	Peak discharge	= 15.39 cfs
Storm frequency	= 25 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 36,462 cuft
Drainage area	= 2.540 ac	Curve number	= 88
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.50 min
Total precip.	= 5.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



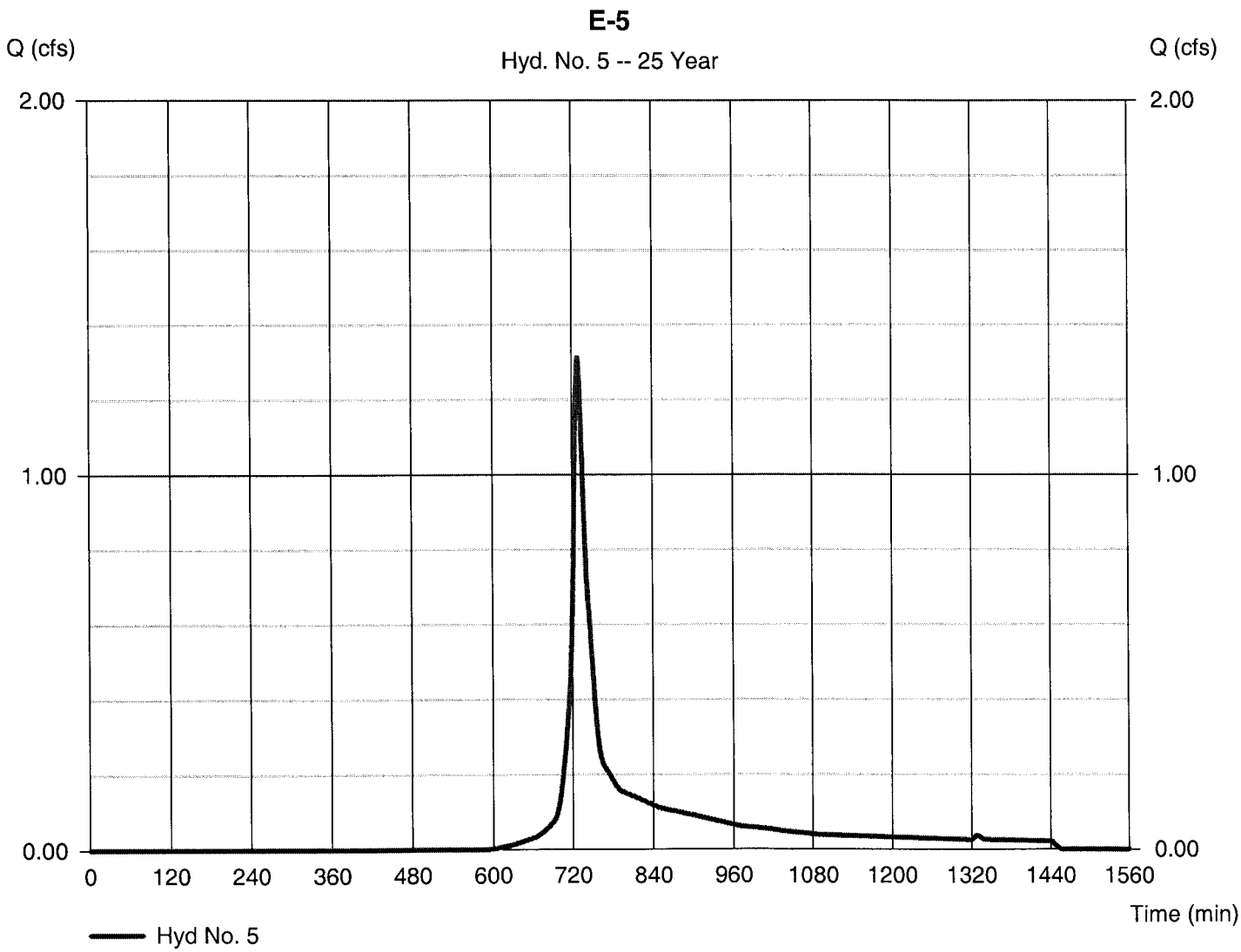
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 5

E-5

Hydrograph type	= SCS Runoff	Peak discharge	= 1.312 cfs
Storm frequency	= 25 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 4,879 cuft
Drainage area	= 0.630 ac	Curve number	= 68
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.80 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



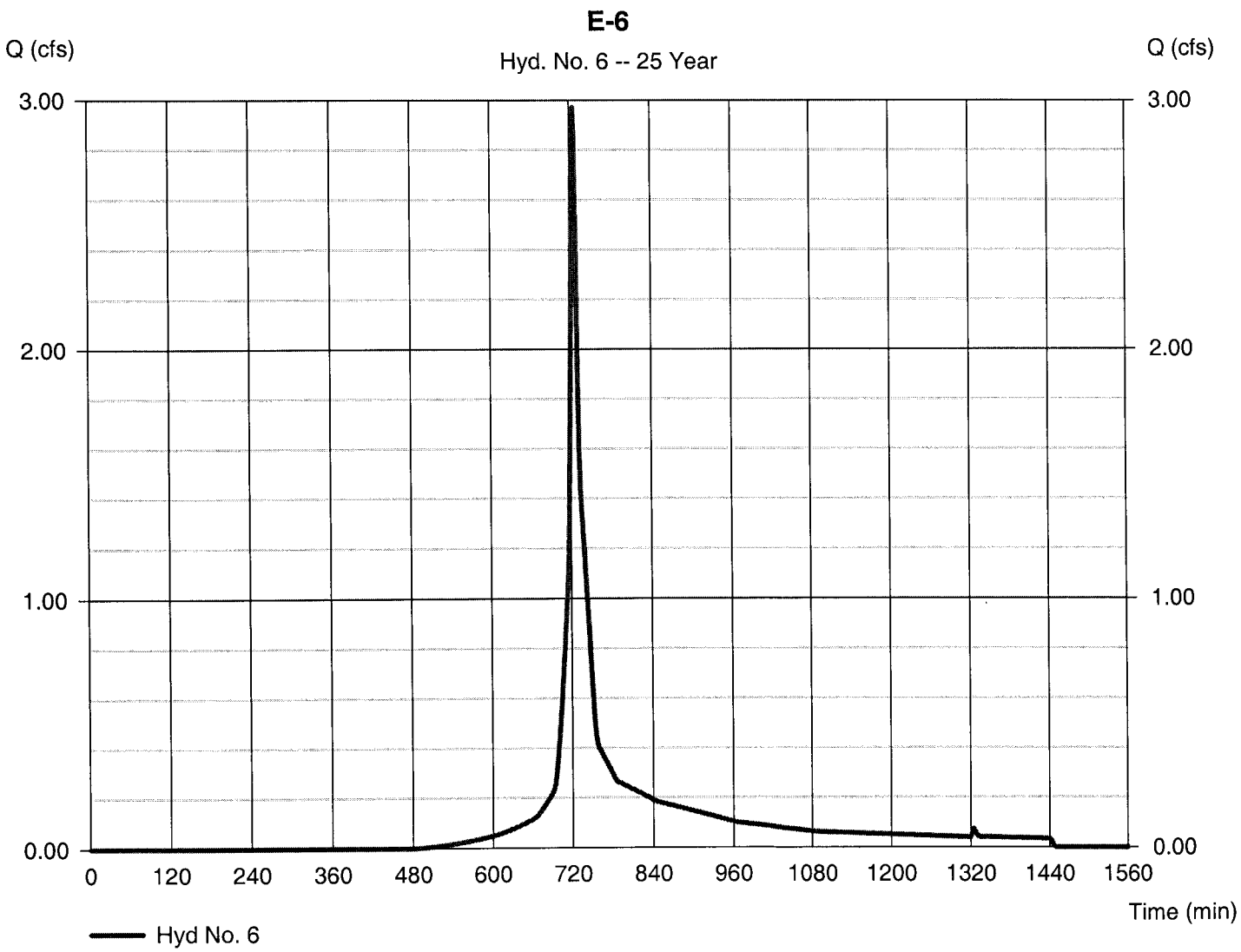
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 6

E-6

Hydrograph type	= SCS Runoff	Peak discharge	= 2.971 cfs
Storm frequency	= 25 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 9,151 cuft
Drainage area	= 0.850 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.60 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

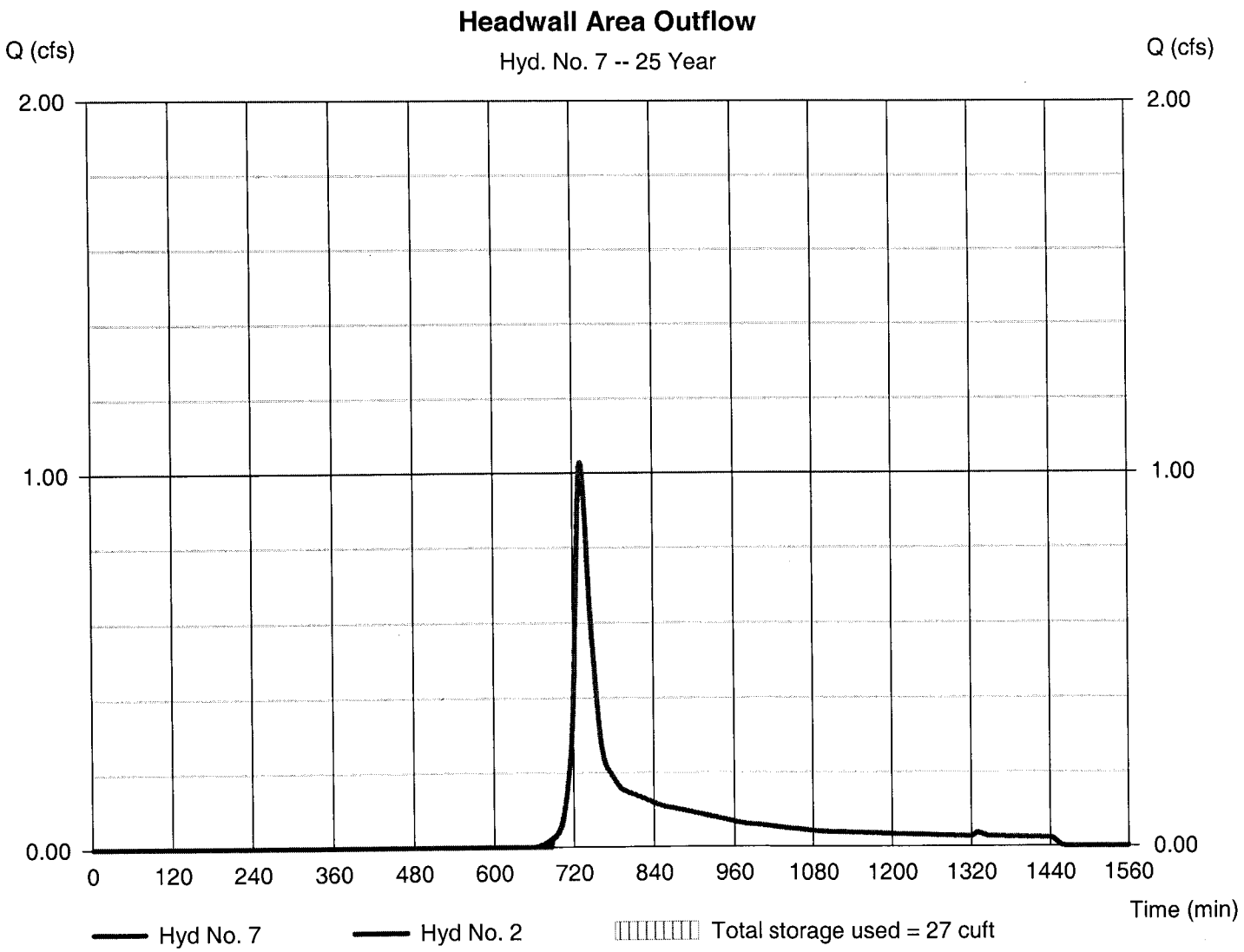
Hydraflow Hydrographs by Intelisolve v9.2 | Thursday, Dec 23, 2010

Hyd. No. 7

Headwall Area Outflow

Hydrograph type	= Reservoir	Peak discharge	= 1.029 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 4,384 cuft
Inflow hyd. No.	= 2 - E-2	Max. Elevation	= 132.50 ft
Reservoir name	= Storage behind exist headwall	Max. Storage	= 27 cuft

Storage Indication method used.



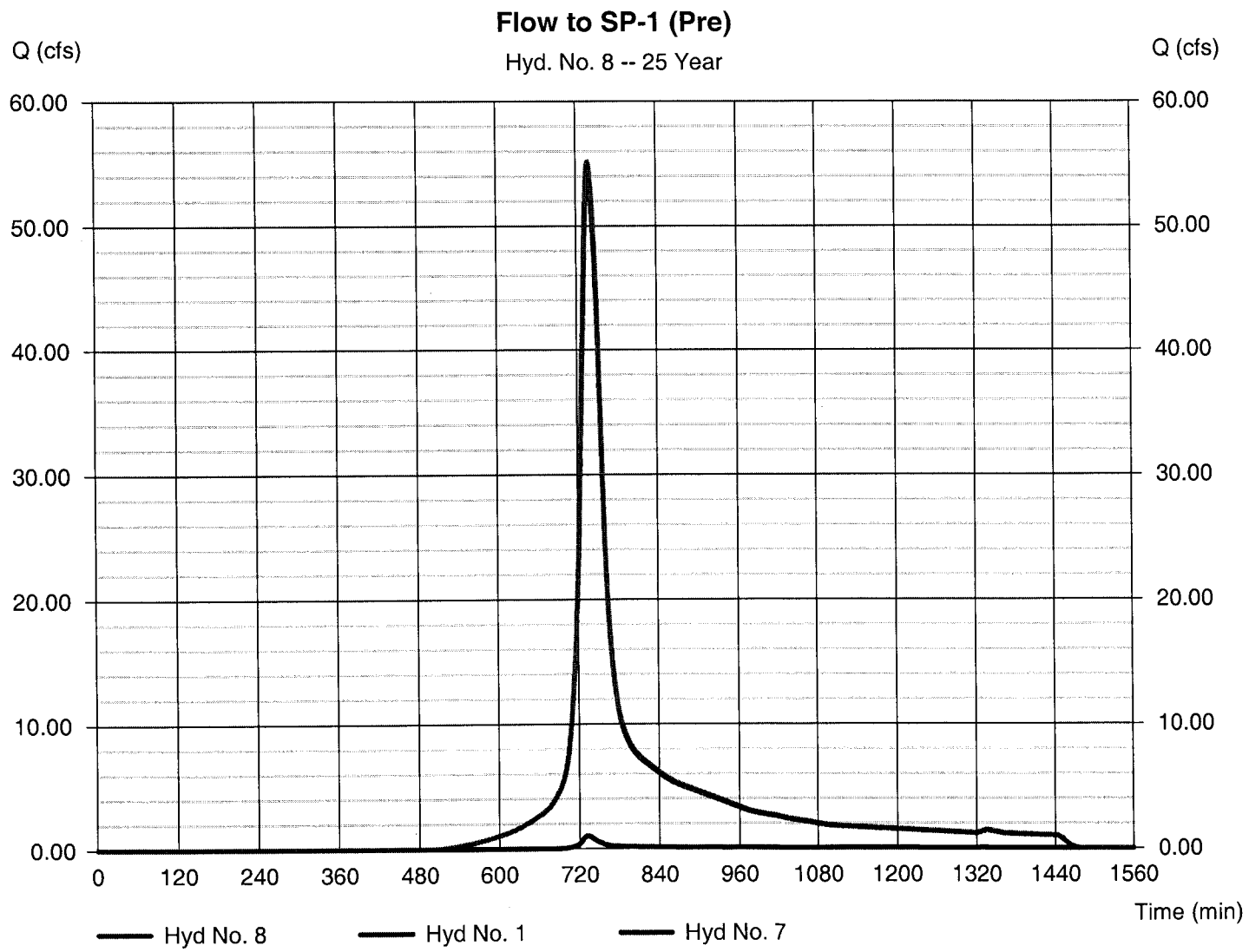
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 8

Flow to SP-1 (Pre)

Hydrograph type	= Combine	Peak discharge	= 55.15 cfs
Storm frequency	= 25 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 266,600 cuft
Inflow hyds.	= 1, 7	Contrib. drain. area	= 25.940 ac



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	79.53	1	737	384,162	----	------	------	E-1
2	SCS Runoff	1.780	1	731	7,244	----	------	------	E-2
3	SCS Runoff	5.510	1	729	20,749	----	------	------	E-3
4	SCS Runoff	20.62	1	719	49,783	----	------	------	E-4
5	SCS Runoff	2.073	1	728	7,563	----	------	------	E-5
6	SCS Runoff	4.304	1	725	13,321	----	------	------	E-6
7	Reservoir	1.780	1	731	7,232	2	132.82	36.3	Headwall Area Outflow
8	Combine	81.08	1	737	391,394	1, 7	------	------	Flow to SP-1 (Pre)

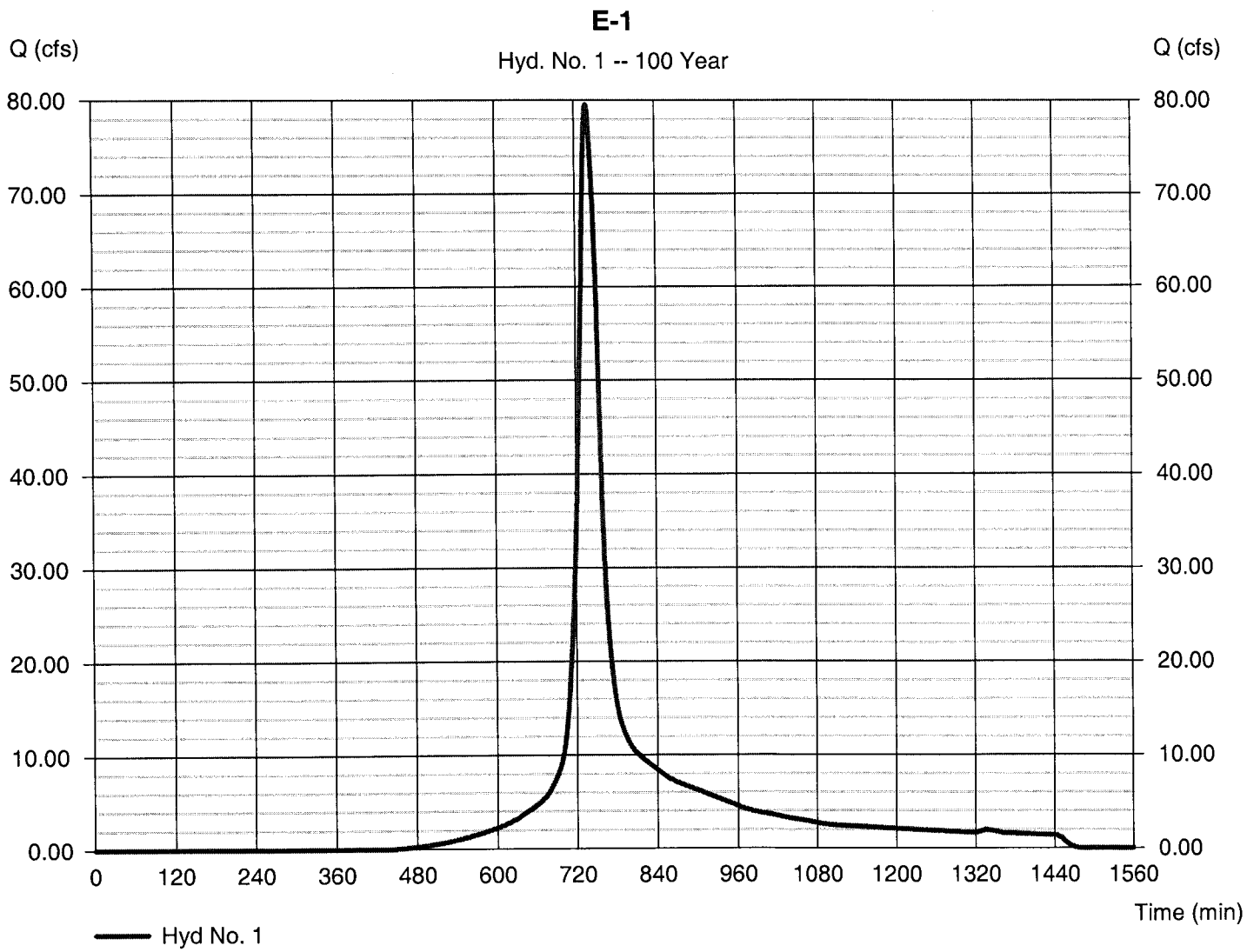
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 1

E-1

Hydrograph type	= SCS Runoff	Peak discharge	= 79.53 cfs
Storm frequency	= 100 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 384,162 cuft
Drainage area	= 25.940 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.30 min
Total precip.	= 6.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



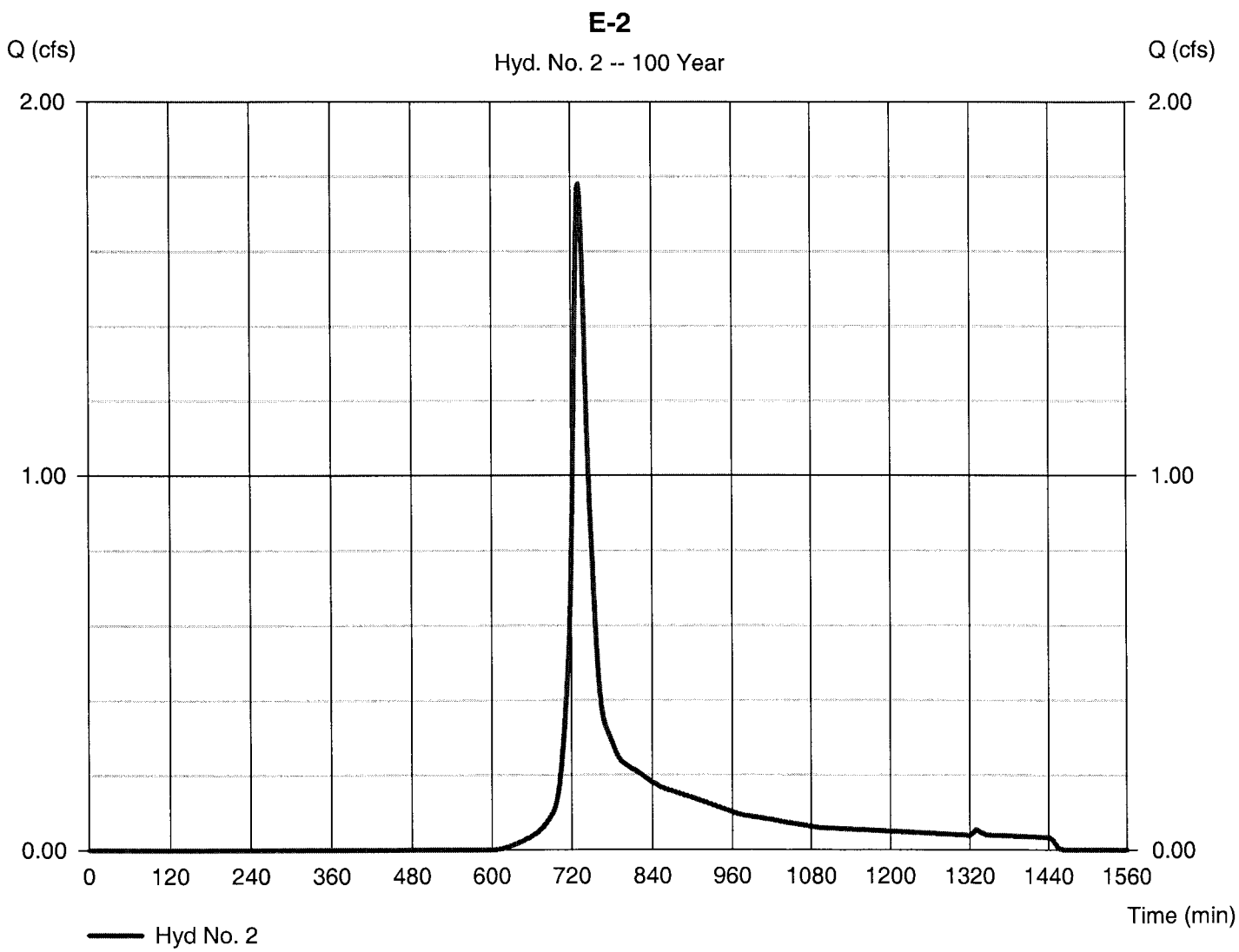
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 2

E-2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.780 cfs
Storm frequency	= 100 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 7,244 cuft
Drainage area	= 0.780 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.70 min
Total precip.	= 6.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



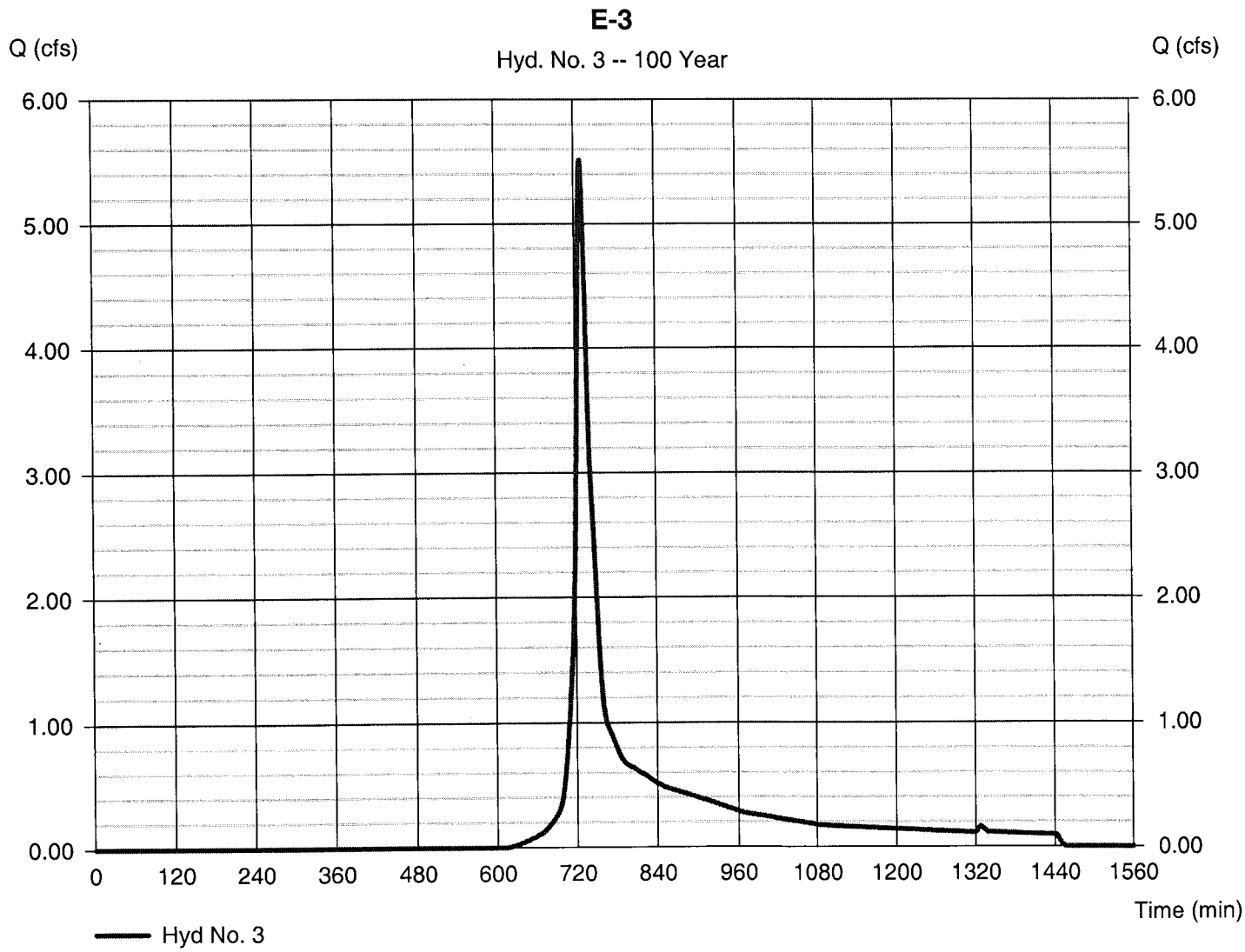
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 3

E-3

Hydrograph type	= SCS Runoff	Peak discharge	= 5.510 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 20,749 cuft
Drainage area	= 2.280 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.60 min
Total precip.	= 6.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



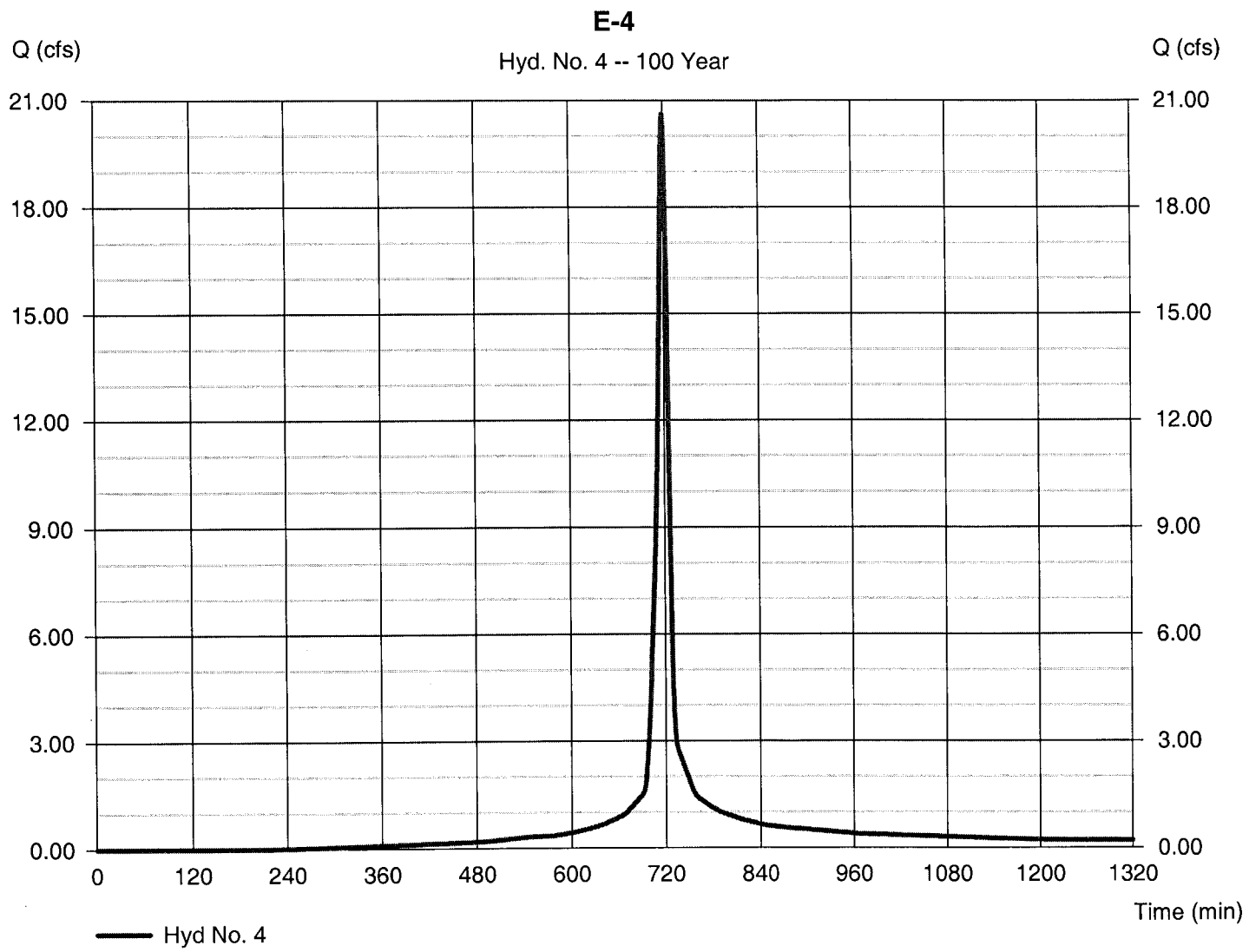
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 4

E-4

Hydrograph type	= SCS Runoff	Peak discharge	= 20.62 cfs
Storm frequency	= 100 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 49,783 cuft
Drainage area	= 2.540 ac	Curve number	= 88
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.50 min
Total precip.	= 6.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



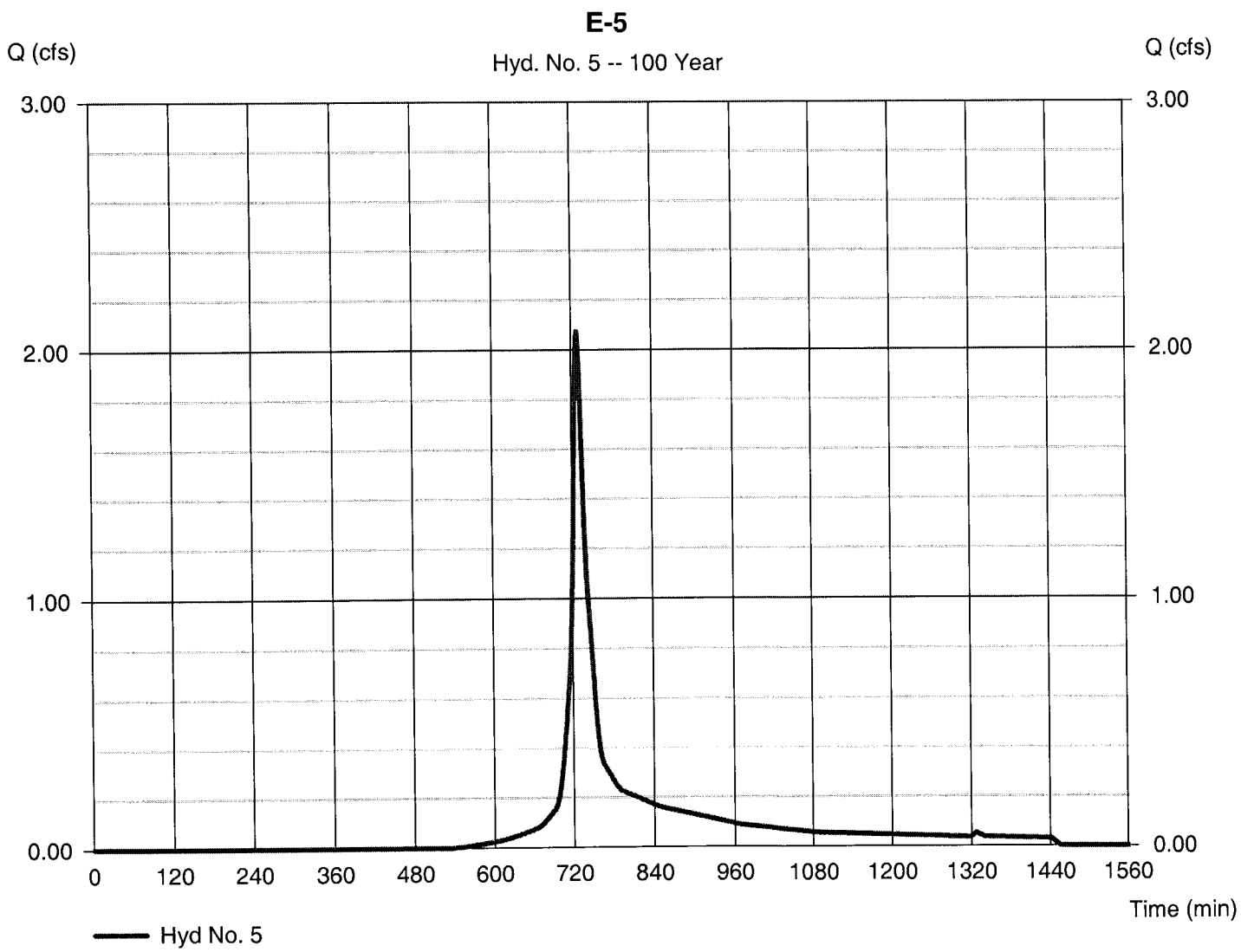
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Thursday, Dec 23, 2010

Hyd. No. 5

E-5

Hydrograph type	= SCS Runoff	Peak discharge	= 2.073 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 7,563 cuft
Drainage area	= 0.630 ac	Curve number	= 68
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.80 min
Total precip.	= 6.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



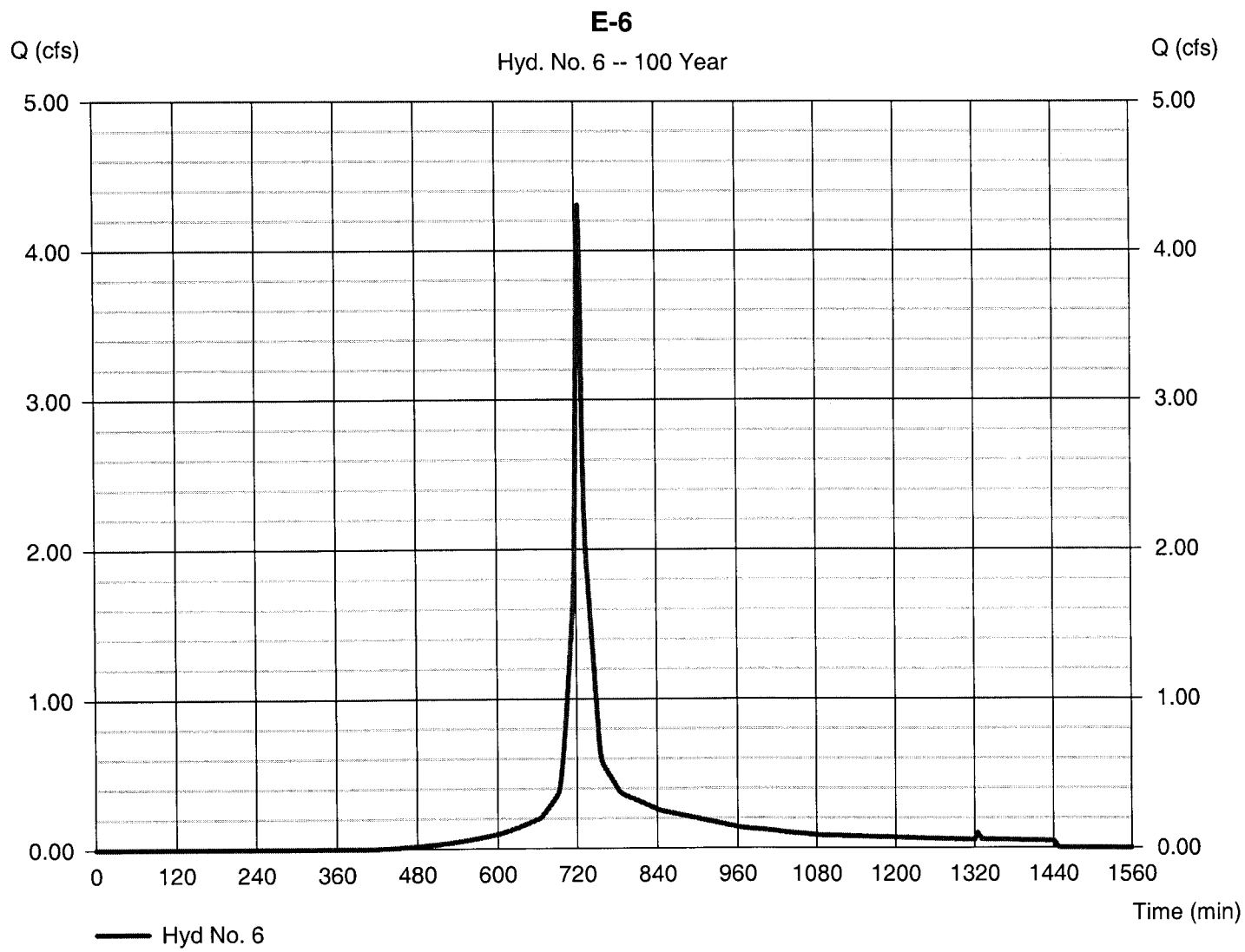
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Thursday, Dec 23, 2010

Hyd. No. 6

E-6

Hydrograph type	= SCS Runoff	Peak discharge	= 4.304 cfs
Storm frequency	= 100 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 13,321 cuft
Drainage area	= 0.850 ac	Curve number	= 77
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.60 min
Total precip.	= 6.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

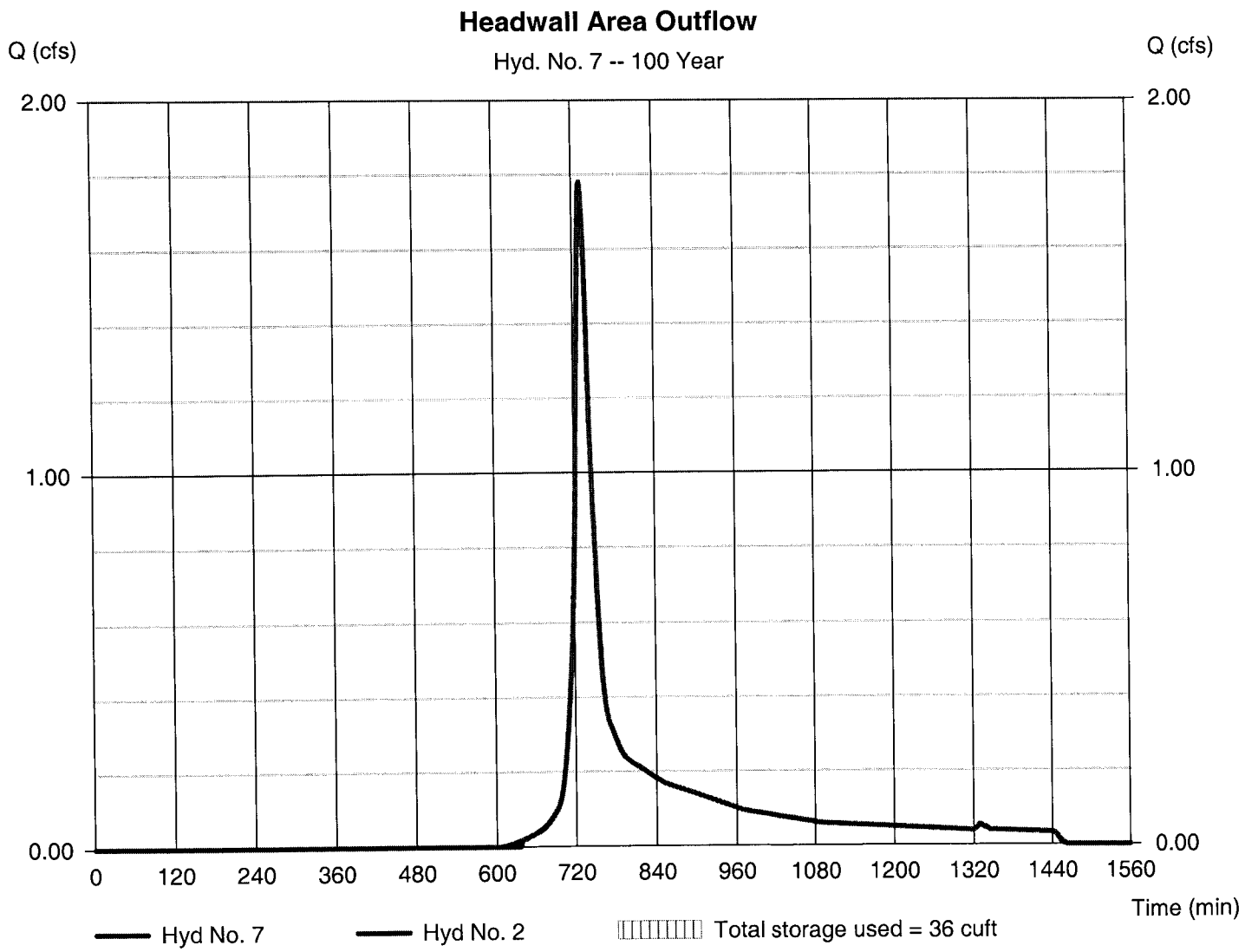
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 7

Headwall Area Outflow

Hydrograph type	= Reservoir	Peak discharge	= 1.780 cfs
Storm frequency	= 100 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 7,232 cuft
Inflow hyd. No.	= 2 - E-2	Max. Elevation	= 132.82 ft
Reservoir name	= Storage behind exist headwall	Max. Storage	= 36 cuft

Storage Indication method used.



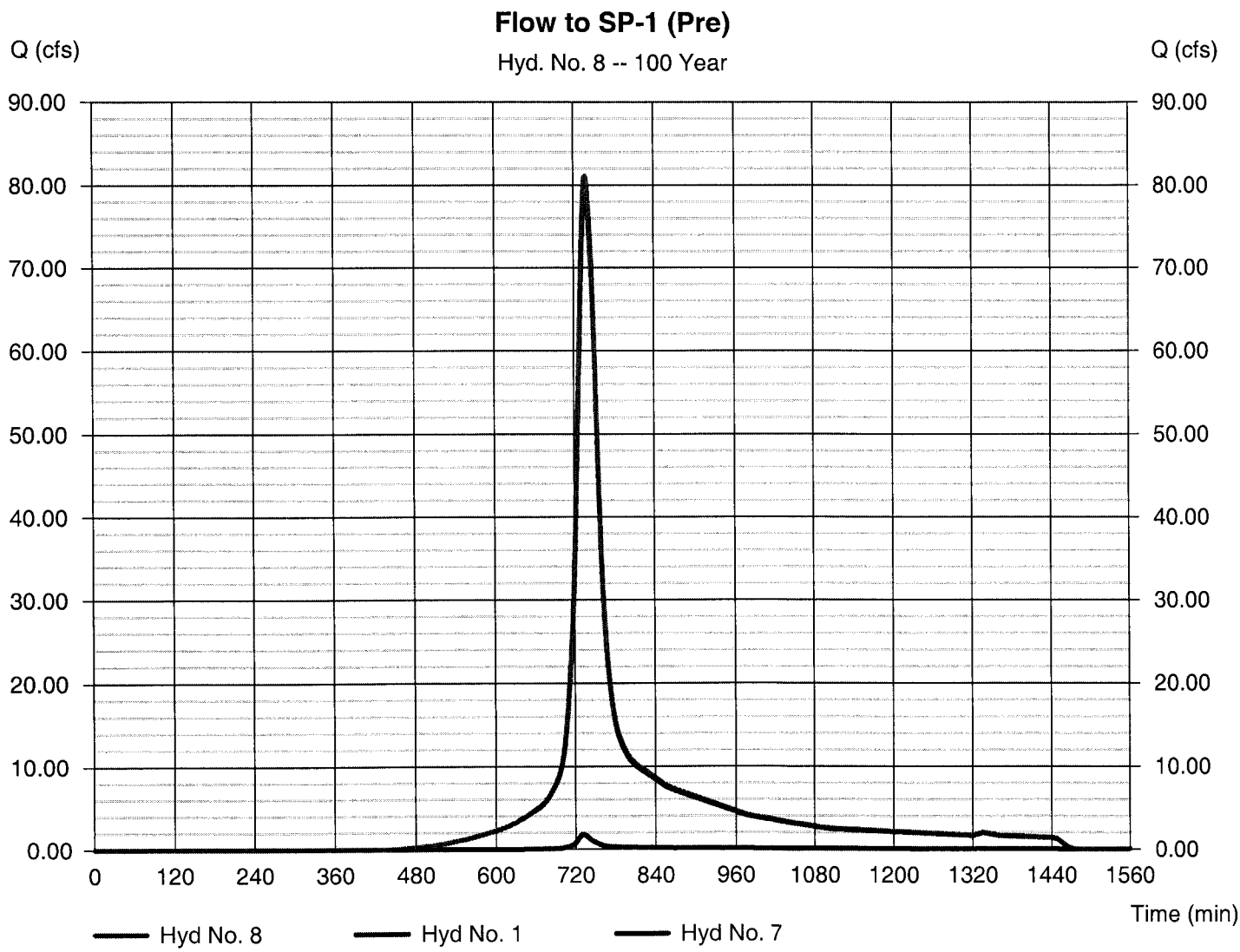
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 8

Flow to SP-1 (Pre)

Hydrograph type	= Combine	Peak discharge	= 81.08 cfs
Storm frequency	= 100 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 391,394 cuft
Inflow hyds.	= 1, 7	Contrib. drain. area	= 25.940 ac



Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Pond No. 1 - Storage behind exist headwall

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 131.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	131.50	10	0	0
1.50	133.00	50	41	41
2.50	134.00	1,760	702	743
3.50	135.00	4,450	3,003	3,746
4.50	136.00	8,220	6,239	9,985
5.50	137.00	10,000	9,095	19,079

Culvert / Orifice Structures

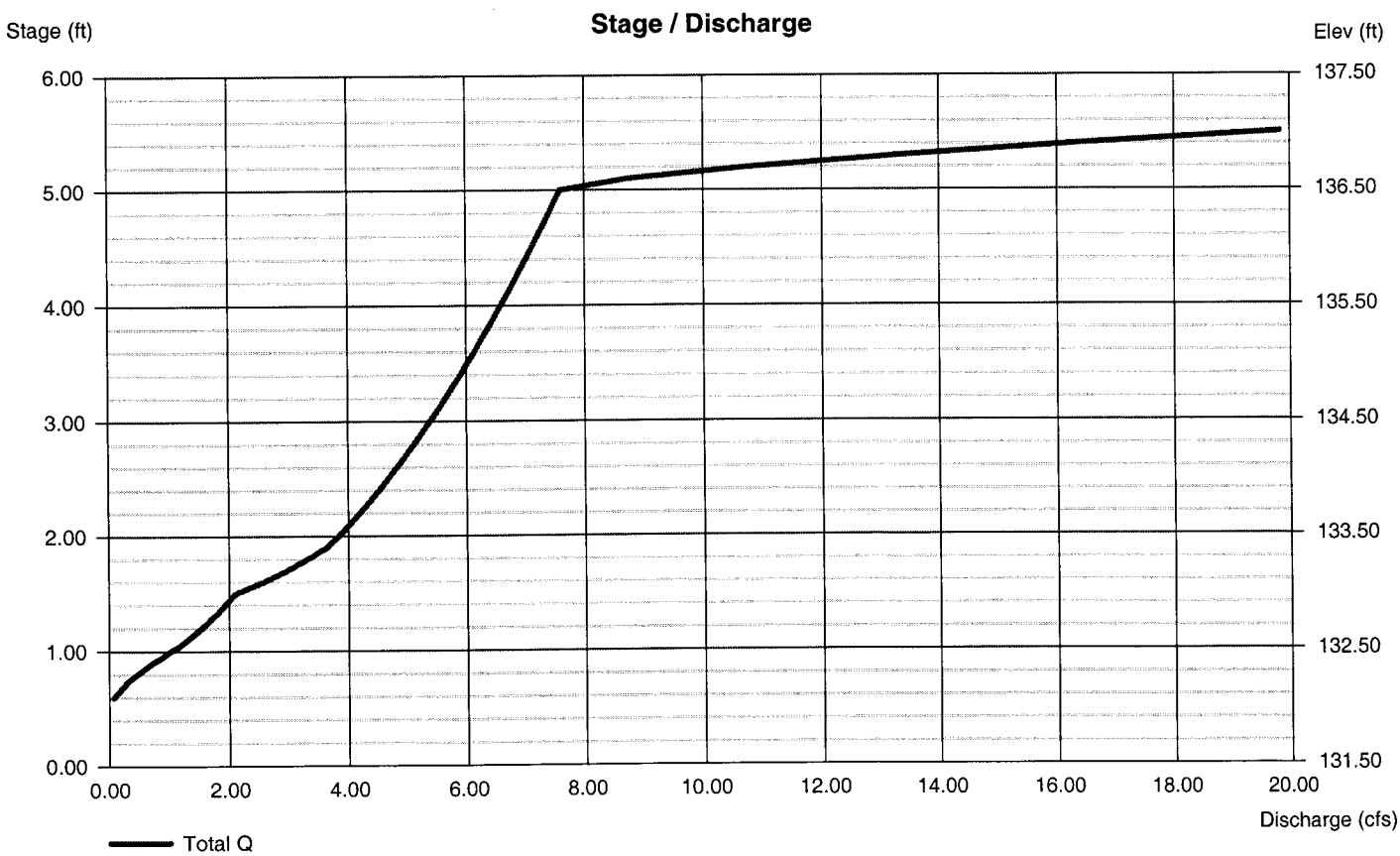
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 131.97	0.00	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.70	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 136.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (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).



Post-Development

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	20.12	-------	-------	41.04	53.96	-------	79.13	P-1
2	SCS Runoff	-------	-------	0.182	-------	-------	0.675	1.028	-------	1.780	P-2
3	SCS Runoff	-------	-------	0.487	-------	-------	2.018	3.139	-------	5.510	P-3
4	SCS Runoff	-------	-------	1.337	-------	-------	3.324	4.611	-------	7.213	P-4
5	SCS Runoff	-------	-------	0.367	-------	-------	0.938	1.312	-------	2.073	P-5
6	SCS Runoff	-------	-------	0.314	-------	-------	0.581	0.740	-------	1.042	P-6
7	SCS Runoff	-------	-------	0.856	-------	-------	1.827	2.436	-------	3.629	P-7
8	Reservoir	7	-------	0.000	-------	-------	0.000	0.000	-------	0.519	Recharge Area Outflow
9	Reservoir	2	-------	0.182	-------	-------	0.675	1.029	-------	1.780	Headwall Out (post)
10	Combine	1, 8, 9	-------	20.30	-------	-------	41.64	54.88	-------	80.69	Flow to SP-1 (Post)

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	20.12	1	739	101,463	----	------	------	P-1
2	SCS Runoff	0.182	1	737	1,143	----	------	------	P-2
3	SCS Runoff	0.487	1	734	3,117	----	------	------	P-3
4	SCS Runoff	1.337	1	730	5,571	----	------	------	P-4
5	SCS Runoff	0.367	1	730	1,580	----	------	------	P-5
6	SCS Runoff	0.314	1	729	1,193	----	------	------	P-6
7	SCS Runoff	0.856	1	735	4,024	----	------	------	P-7
8	Reservoir	0.000	1	1055	0	7	136.19	1,266	Recharge Area Outflow
9	Reservoir	0.182	1	738	1,131	2	132.17	18.3	Headwall Out (post)
10	Combine	20.30	1	739	102,594	1, 8, 9	------	------	Flow to SP-1 (Post)

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	41.04	1	738	199,542	----	------	------	P-1
2	SCS Runoff	0.675	1	732	3,056	----	------	------	P-2
3	SCS Runoff	2.018	1	730	8,591	----	------	------	P-3
4	SCS Runoff	3.324	1	729	12,332	----	------	------	P-4
5	SCS Runoff	0.938	1	729	3,567	----	------	------	P-5
6	SCS Runoff	0.581	1	729	2,185	----	------	------	P-6
7	SCS Runoff	1.827	1	734	8,162	----	------	------	P-7
8	Reservoir	0.000	1	685	0	7	137.30	3,403	Recharge Area Outflow
9	Reservoir	0.675	1	732	3,043	2	132.38	24.2	Headwall Out (post)
10	Combine	41.64	1	738	202,586	1, 8, 9	------	------	Flow to SP-1 (Post)

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	53.96	1	737	260,902	----	------	------	P-1
2	SCS Runoff	1.028	1	731	4,396	----	------	------	P-2
3	SCS Runoff	3.139	1	729	12,466	----	------	------	P-3
4	SCS Runoff	4.611	1	729	16,762	----	------	------	P-4
5	SCS Runoff	1.312	1	728	4,879	----	------	------	P-5
6	SCS Runoff	0.740	1	729	2,789	----	------	------	P-6
7	SCS Runoff	2.436	1	734	10,783	----	------	------	P-7
8	Reservoir	0.000	1	649	0	7	138.17	4,839	Recharge Area Outflow
9	Reservoir	1.029	1	732	4,384	2	132.50	27.5	Headwall Out (post)
10	Combine	54.88	1	737	265,286	1, 8, 9	------	------	Flow to SP-1 (Post)

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	79.13	1	737	382,237	----	------	------	P-1
2	SCS Runoff	1.780	1	731	7,244	----	------	------	P-2
3	SCS Runoff	5.510	1	729	20,749	----	------	------	P-3
4	SCS Runoff	7.213	1	728	25,785	----	------	------	P-4
5	SCS Runoff	2.073	1	728	7,563	----	------	------	P-5
6	SCS Runoff	1.042	1	729	3,961	----	------	------	P-6
7	SCS Runoff	3.629	1	734	16,008	----	------	------	P-7
8	Reservoir	0.519	1	766	1,040	7	140.36	6,923	Recharge Area Outflow
9	Reservoir	1.780	1	731	7,232	2	132.82	36.3	Headwall Out (post)
10	Combine	80.69	1	737	390,509	1, 8, 9	------	------	Flow to SP-1 (Post)

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	20.12	-------	-------	41.04	53.96	-------	79.13	P-1
2	SCS Runoff	-------	-------	0.182	-------	-------	0.675	1.028	-------	1.780	P-2
3	SCS Runoff	-------	-------	0.487	-------	-------	2.018	3.139	-------	5.510	P-3
4	SCS Runoff	-------	-------	1.337	-------	-------	3.324	4.611	-------	7.213	P-4
5	SCS Runoff	-------	-------	0.367	-------	-------	0.938	1.312	-------	2.073	P-5
6	SCS Runoff	-------	-------	0.314	-------	-------	0.581	0.740	-------	1.042	P-6
7	SCS Runoff	-------	-------	0.856	-------	-------	1.827	2.436	-------	3.629	P-7
8	Reservoir	7	-------	0.000	-------	-------	0.000	0.000	-------	0.519	Recharge Area Outflow
9	Reservoir	2	-------	0.182	-------	-------	0.675	1.029	-------	1.780	Headwall Out (post)
10	Combine	1, 8, 9	-------	20.30	-------	-------	41.64	54.88	-------	80.69	Flow to SP-1 (Post)

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	20.12	1	739	101,463	----	------	------	P-1
2	SCS Runoff	0.182	1	737	1,143	----	------	------	P-2
3	SCS Runoff	0.487	1	734	3,117	----	------	------	P-3
4	SCS Runoff	1.337	1	730	5,571	----	------	------	P-4
5	SCS Runoff	0.367	1	730	1,580	----	------	------	P-5
6	SCS Runoff	0.314	1	729	1,193	----	------	------	P-6
7	SCS Runoff	0.856	1	735	4,024	----	------	------	P-7
8	Reservoir	0.000	1	1055	0	7	136.19	1,266	Recharge Area Outflow
9	Reservoir	0.182	1	738	1,131	2	132.17	18.3	Headwall Out (post)
10	Combine	20.30	1	739	102,594	1, 8, 9	------	------	Flow to SP-1 (Post)

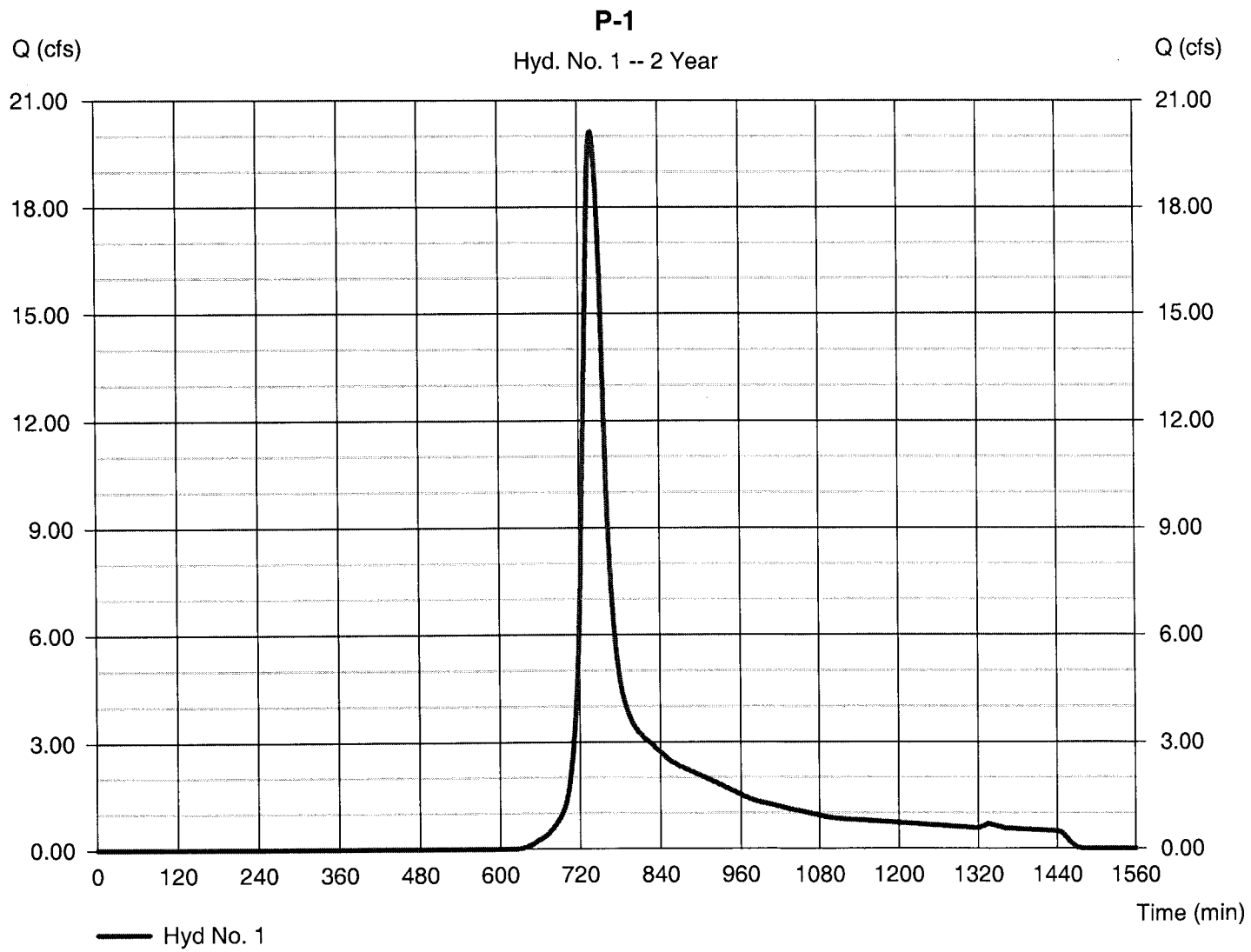
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 1

P-1

Hydrograph type	= SCS Runoff	Peak discharge	= 20.12 cfs
Storm frequency	= 2 yrs	Time to peak	= 739 min
Time interval	= 1 min	Hyd. volume	= 101,463 cuft
Drainage area	= 25.810 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.30 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



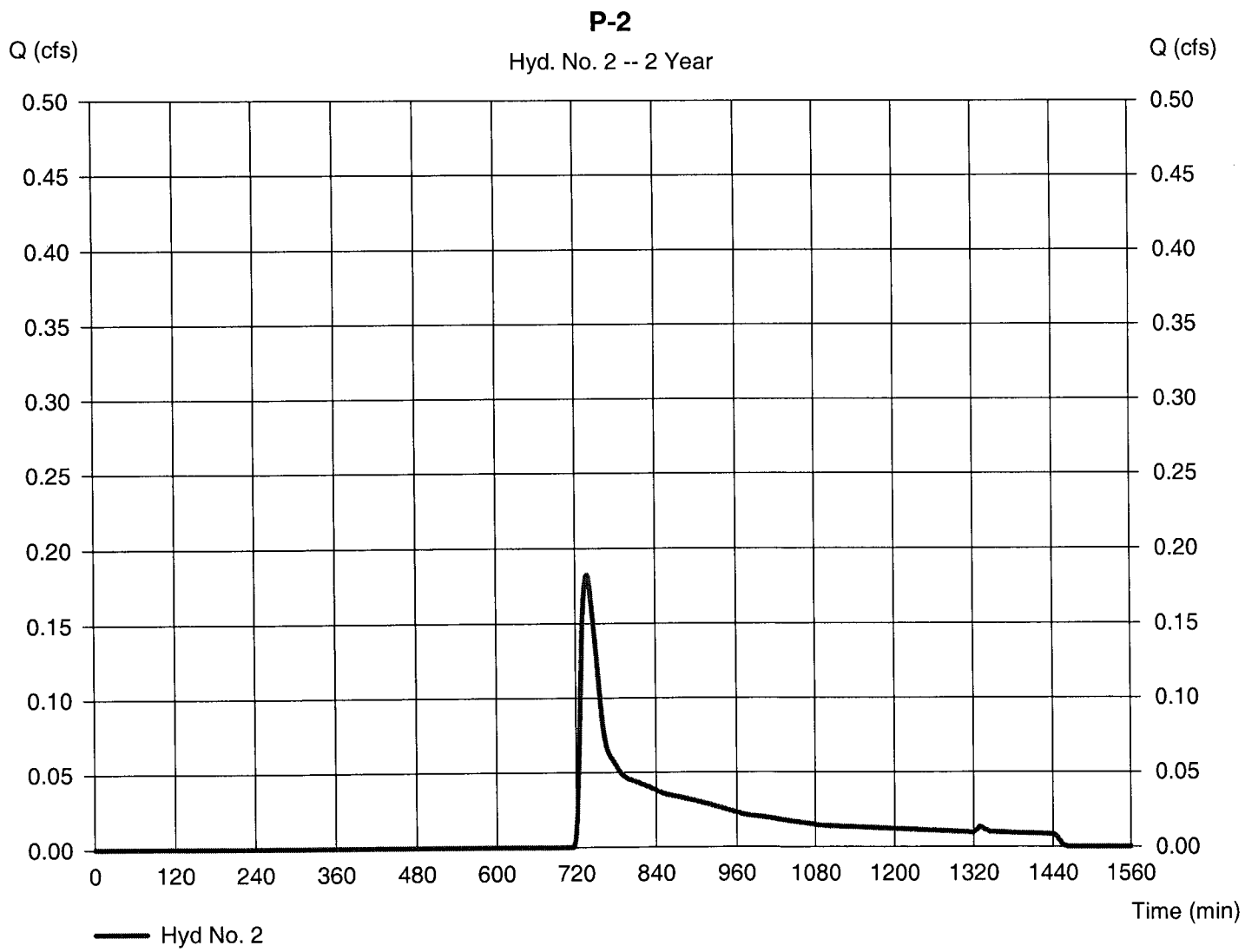
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 2

P-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.182 cfs
Storm frequency	= 2 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 1,143 cuft
Drainage area	= 0.780 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.70 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



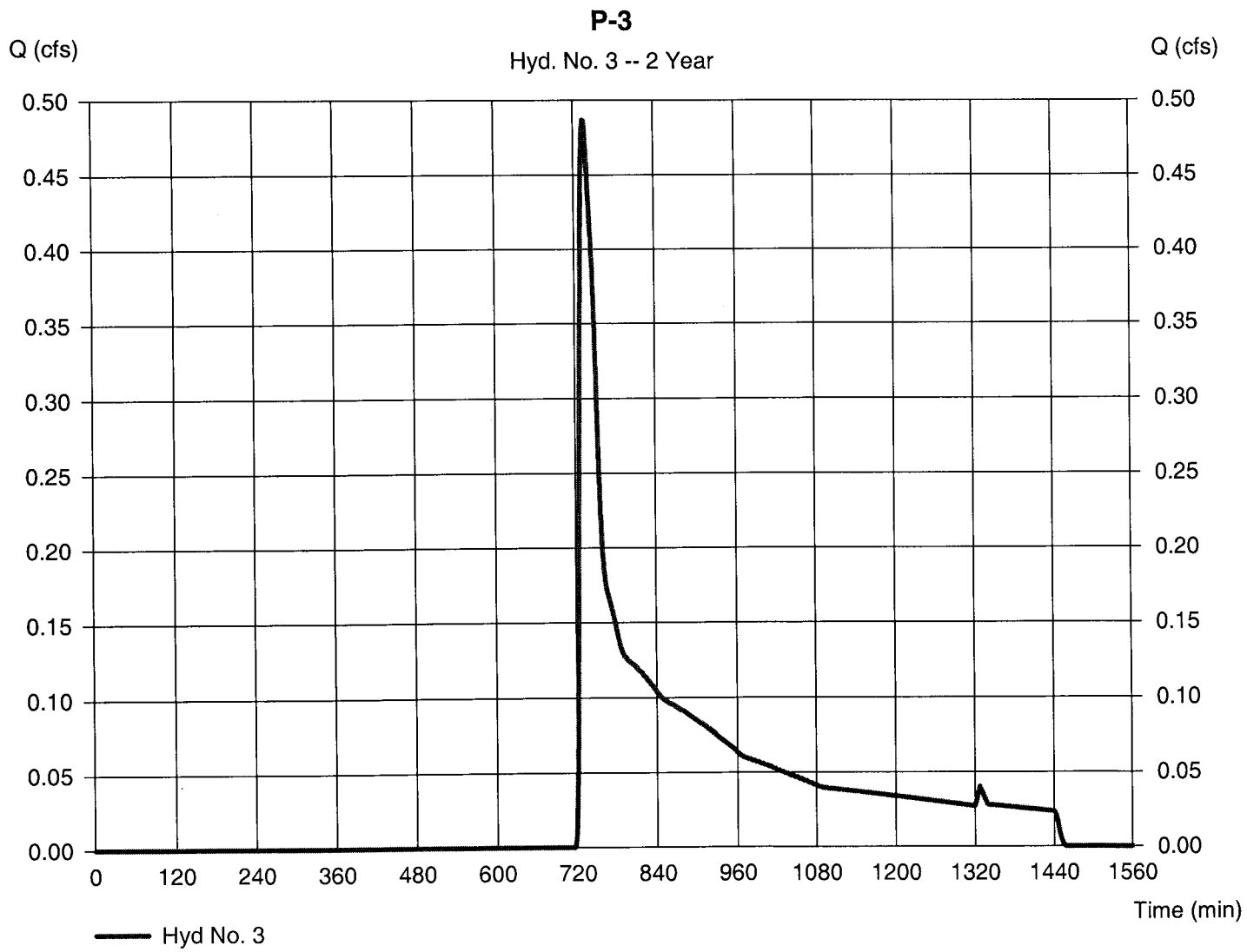
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 3

P-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.487 cfs
Storm frequency	= 2 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 3,117 cuft
Drainage area	= 2.280 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.56 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



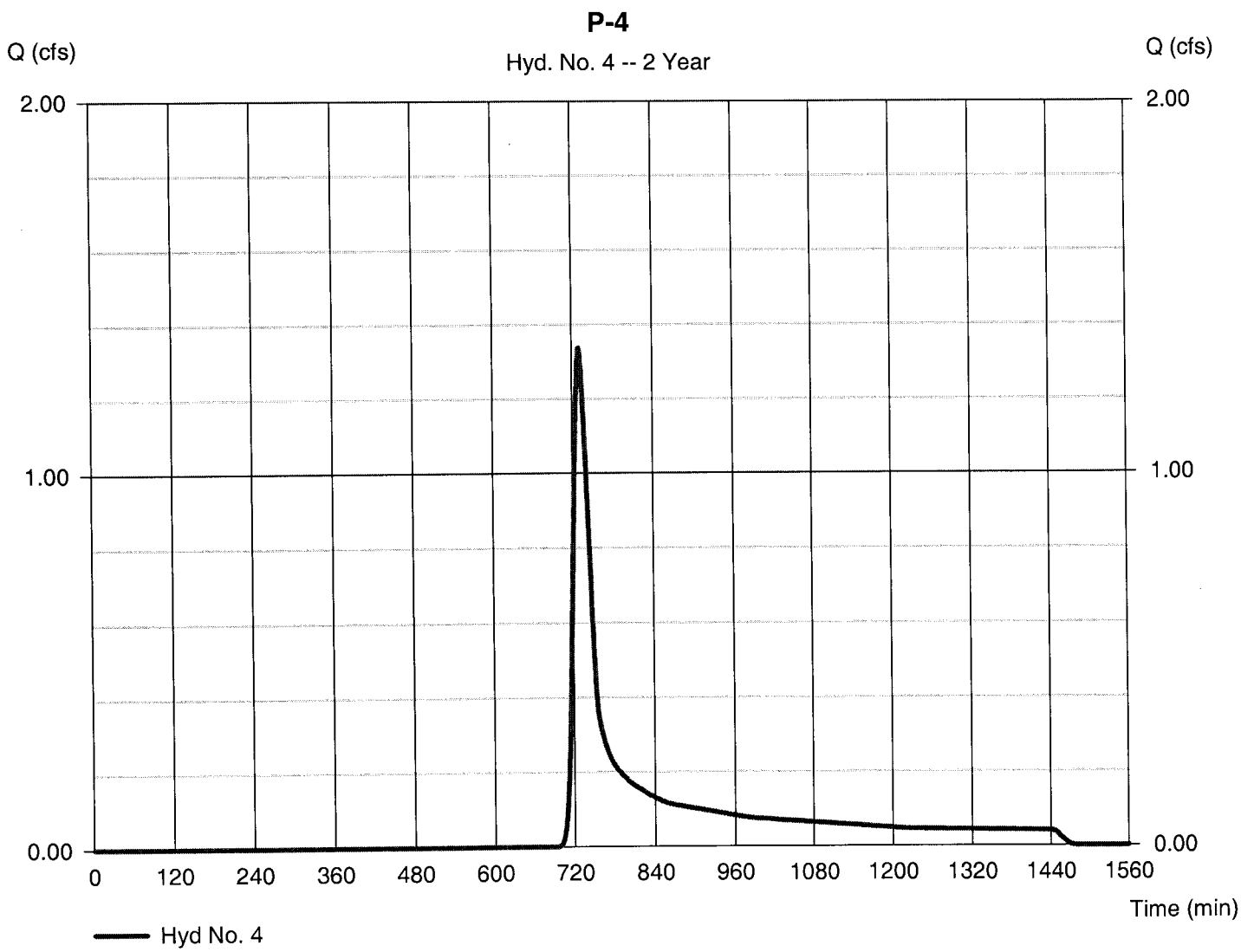
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 4

P-4

Hydrograph type	= SCS Runoff	Peak discharge	= 1.337 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 5,571 cuft
Drainage area	= 2.120 ac	Curve number	= 69
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.50 min
Total precip.	= 3.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



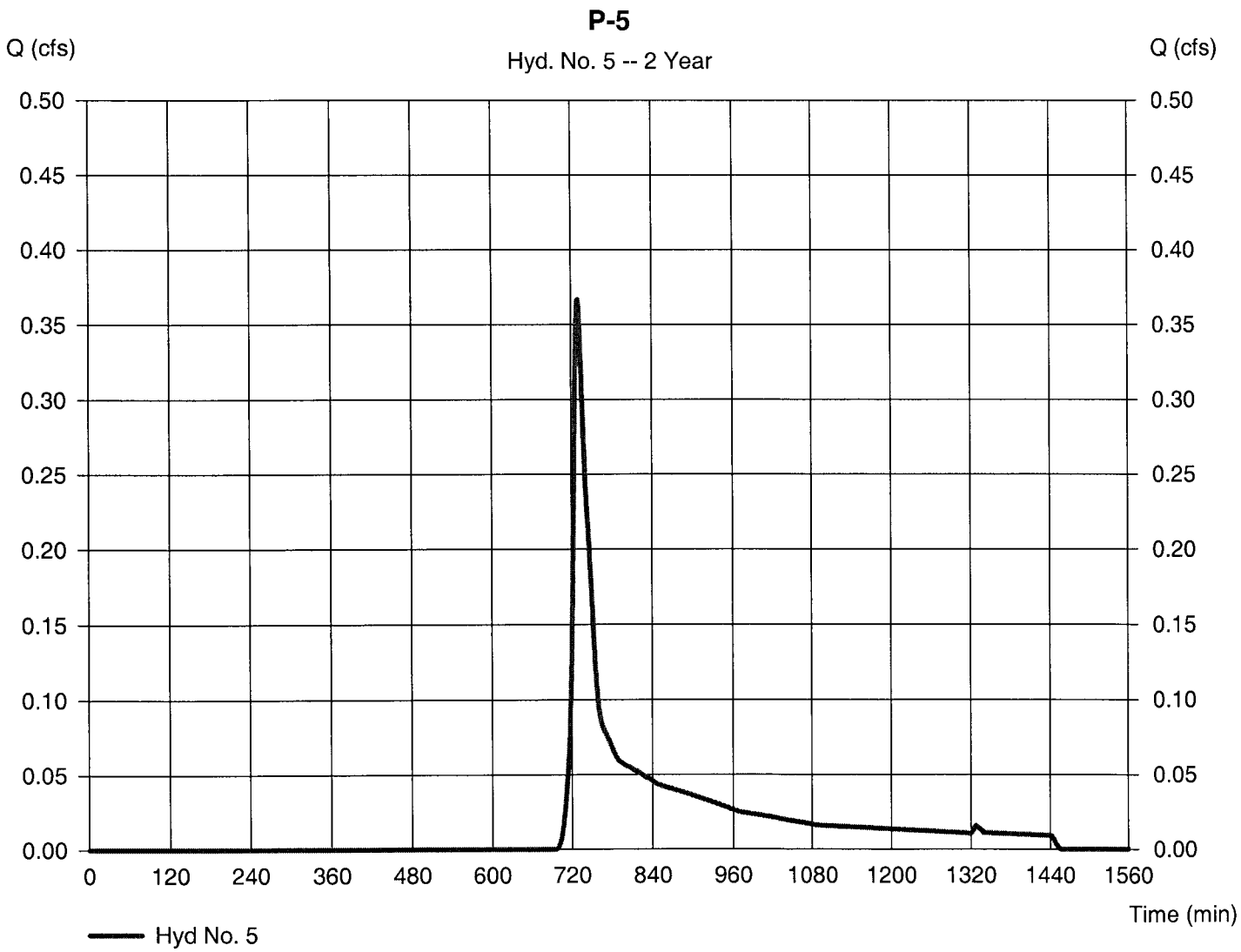
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 5

P-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.367 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 1,580 cuft
Drainage area	= 0.630 ac	Curve number	= 68
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.76 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



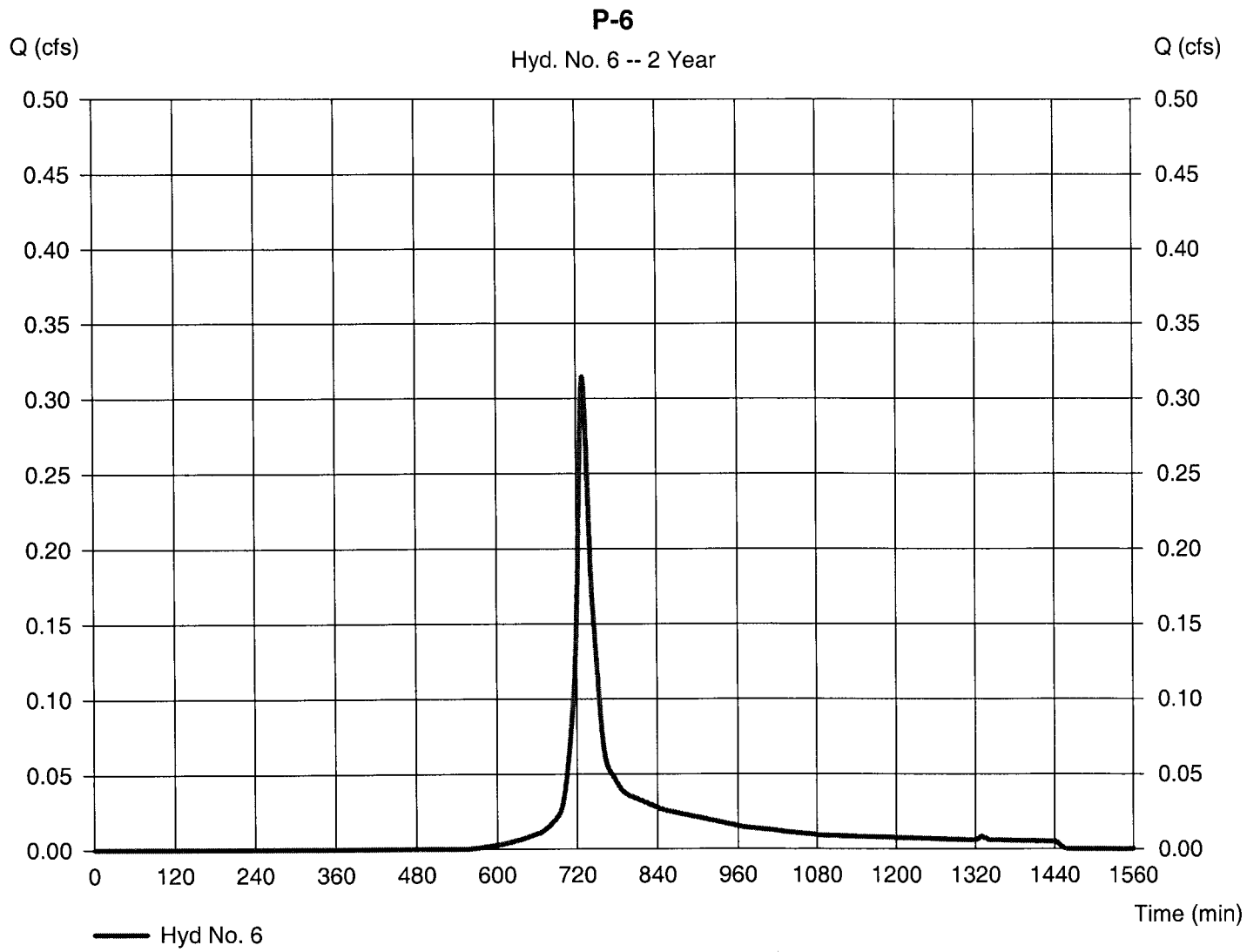
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 6

P-6

Hydrograph type	= SCS Runoff	Peak discharge	= 0.314 cfs
Storm frequency	= 2 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 1,193 cuft
Drainage area	= 0.240 ac	Curve number	= 81
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 13.14 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



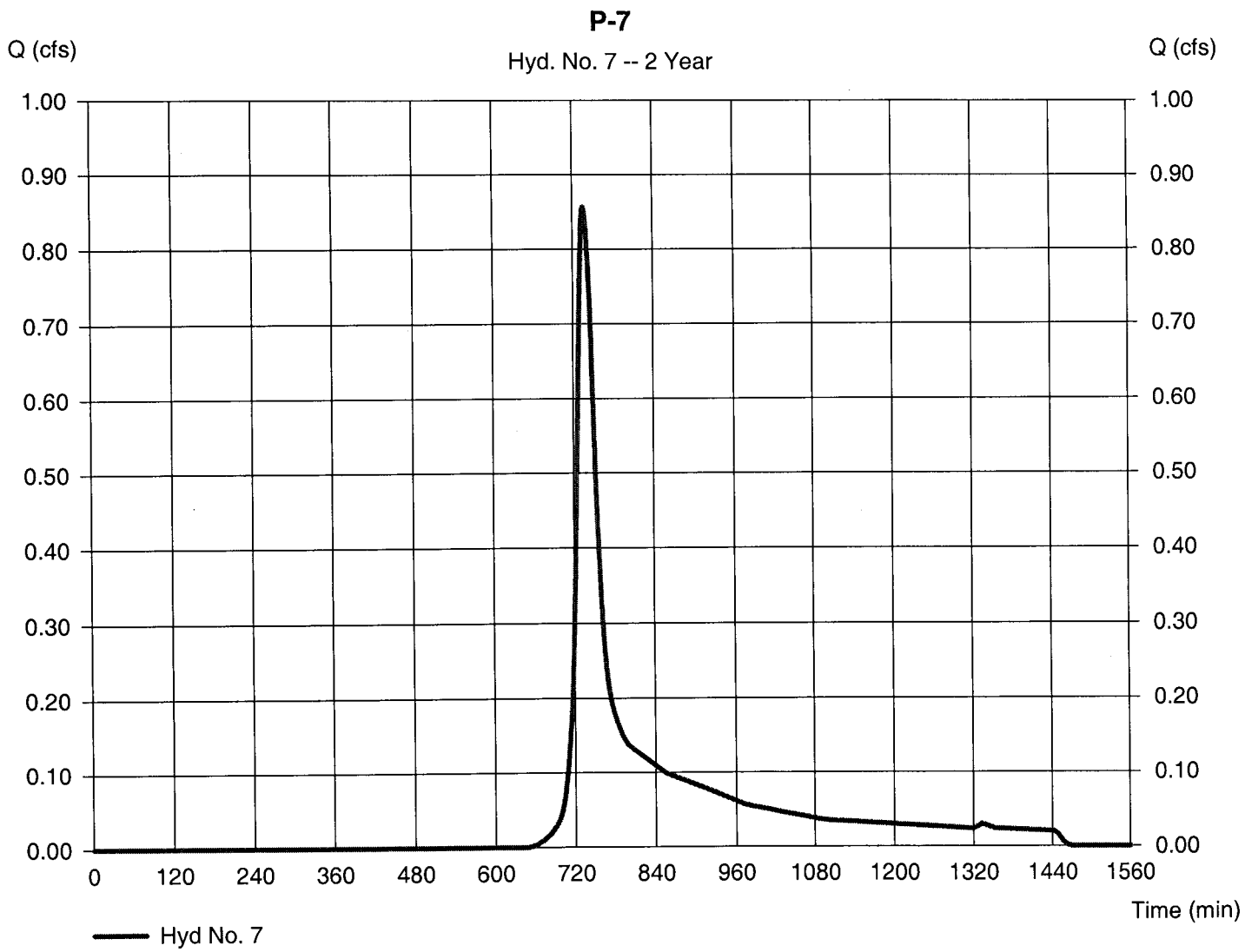
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 7

P-7

Hydrograph type	= SCS Runoff	Peak discharge	= 0.856 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 1 min	Hyd. volume	= 4,024 cuft
Drainage area	= 1.140 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.00 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

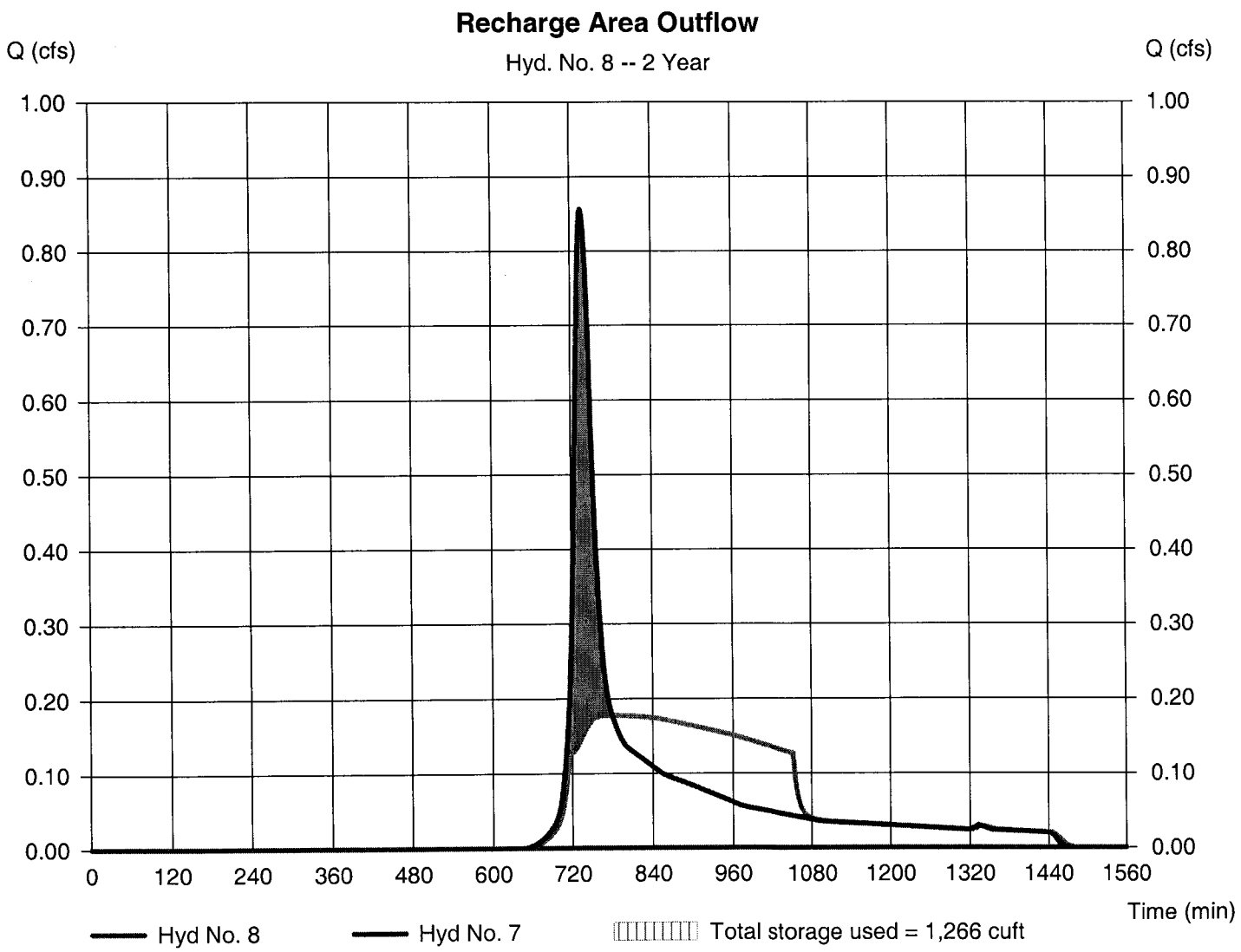
Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 8

Recharge Area Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 1055 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 7 - P-7	Max. Elevation	= 136.19 ft
Reservoir name	= Recharge System	Max. Storage	= 1,266 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

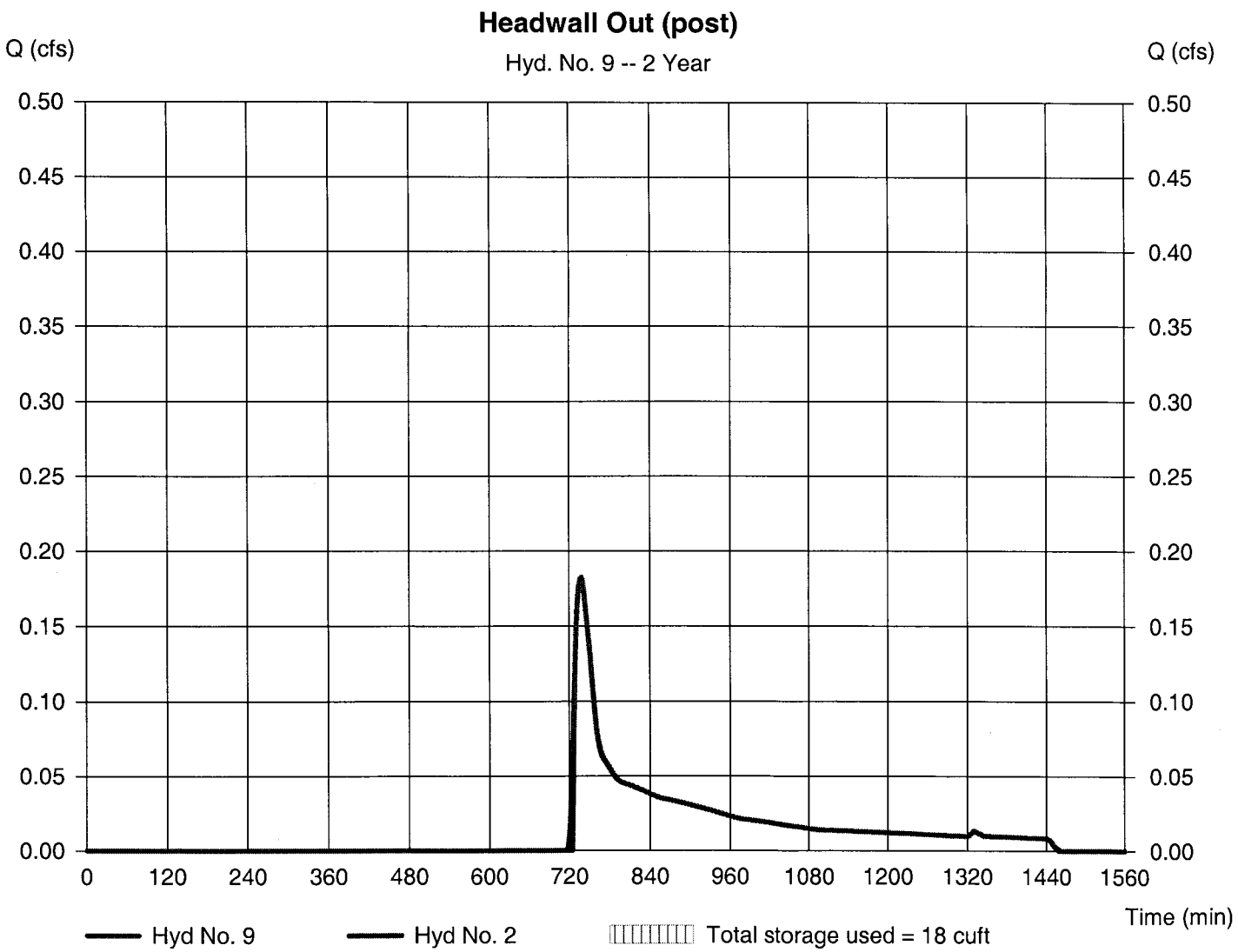
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 9

Headwall Out (post)

Hydrograph type	= Reservoir	Peak discharge	= 0.182 cfs
Storm frequency	= 2 yrs	Time to peak	= 738 min
Time interval	= 1 min	Hyd. volume	= 1,131 cuft
Inflow hyd. No.	= 2 - P-2	Max. Elevation	= 132.17 ft
Reservoir name	= Storage behind exist headwall	Max. Storage	= 18 cuft

Storage Indication method used.



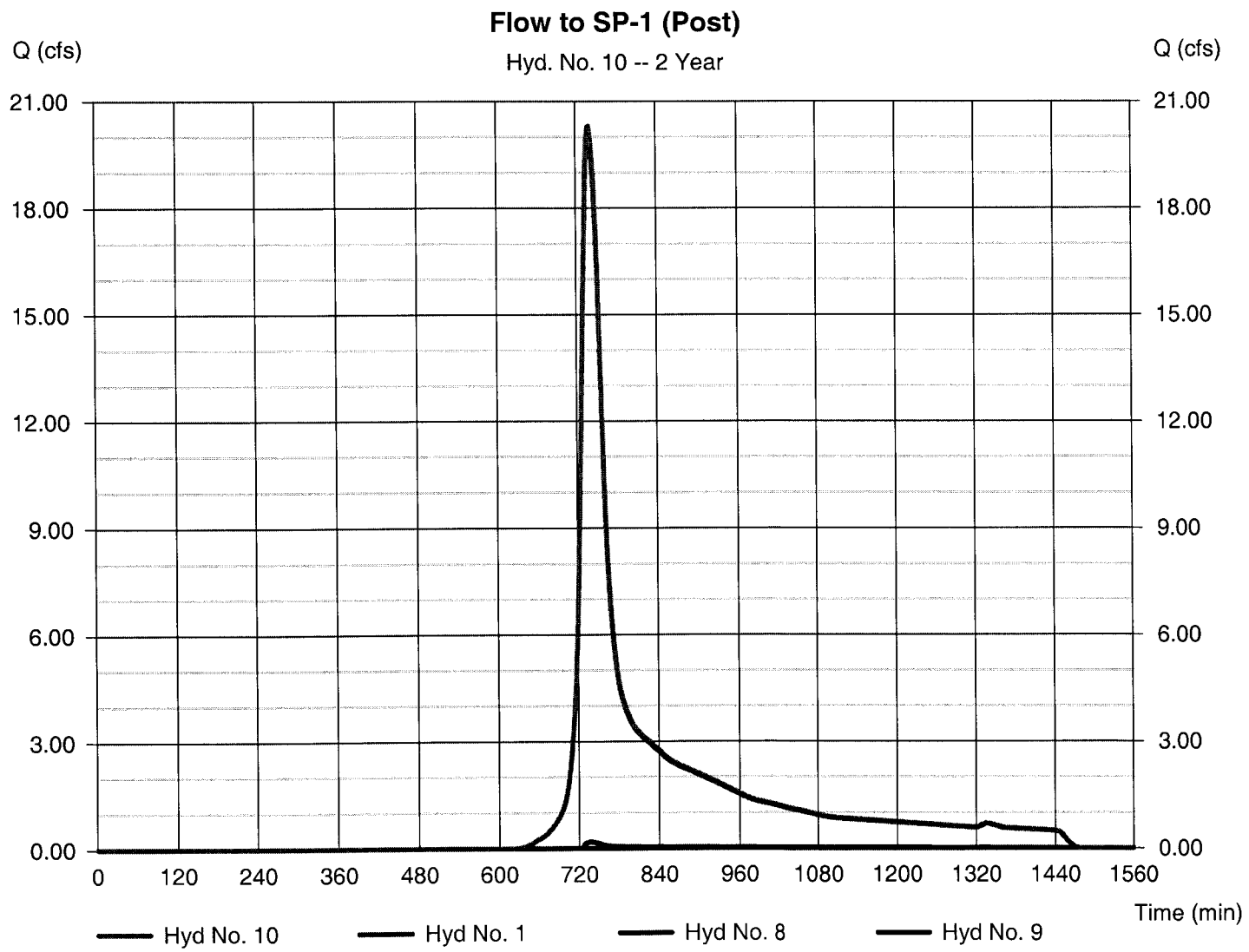
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 10

Flow to SP-1 (Post)

Hydrograph type	= Combine	Peak discharge	= 20.30 cfs
Storm frequency	= 2 yrs	Time to peak	= 739 min
Time interval	= 1 min	Hyd. volume	= 102,594 cuft
Inflow hyds.	= 1, 8, 9	Contrib. drain. area	= 25.810 ac



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	41.04	1	738	199,542	----	------	------	P-1
2	SCS Runoff	0.675	1	732	3,056	----	------	------	P-2
3	SCS Runoff	2.018	1	730	8,591	----	------	------	P-3
4	SCS Runoff	3.324	1	729	12,332	----	------	------	P-4
5	SCS Runoff	0.938	1	729	3,567	----	------	------	P-5
6	SCS Runoff	0.581	1	729	2,185	----	------	------	P-6
7	SCS Runoff	1.827	1	734	8,162	----	------	------	P-7
8	Reservoir	0.000	1	685	0	7	137.30	3,403	Recharge Area Outflow
9	Reservoir	0.675	1	732	3,043	2	132.38	24.2	Headwall Out (post)
10	Combine	41.64	1	738	202,586	1, 8, 9	------	------	Flow to SP-1 (Post)

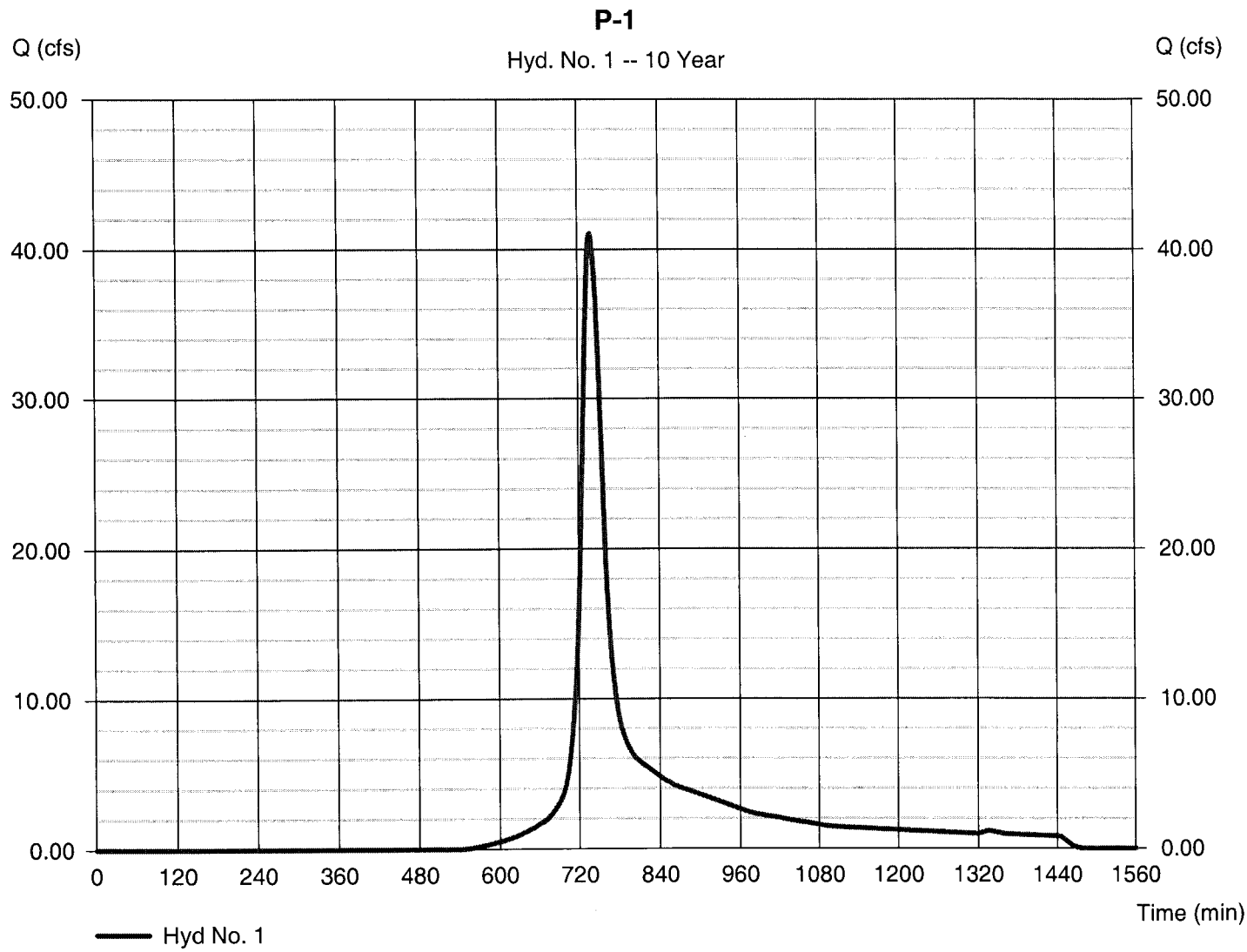
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 1

P-1

Hydrograph type	= SCS Runoff	Peak discharge	= 41.04 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 1 min	Hyd. volume	= 199,542 cuft
Drainage area	= 25.810 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.30 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



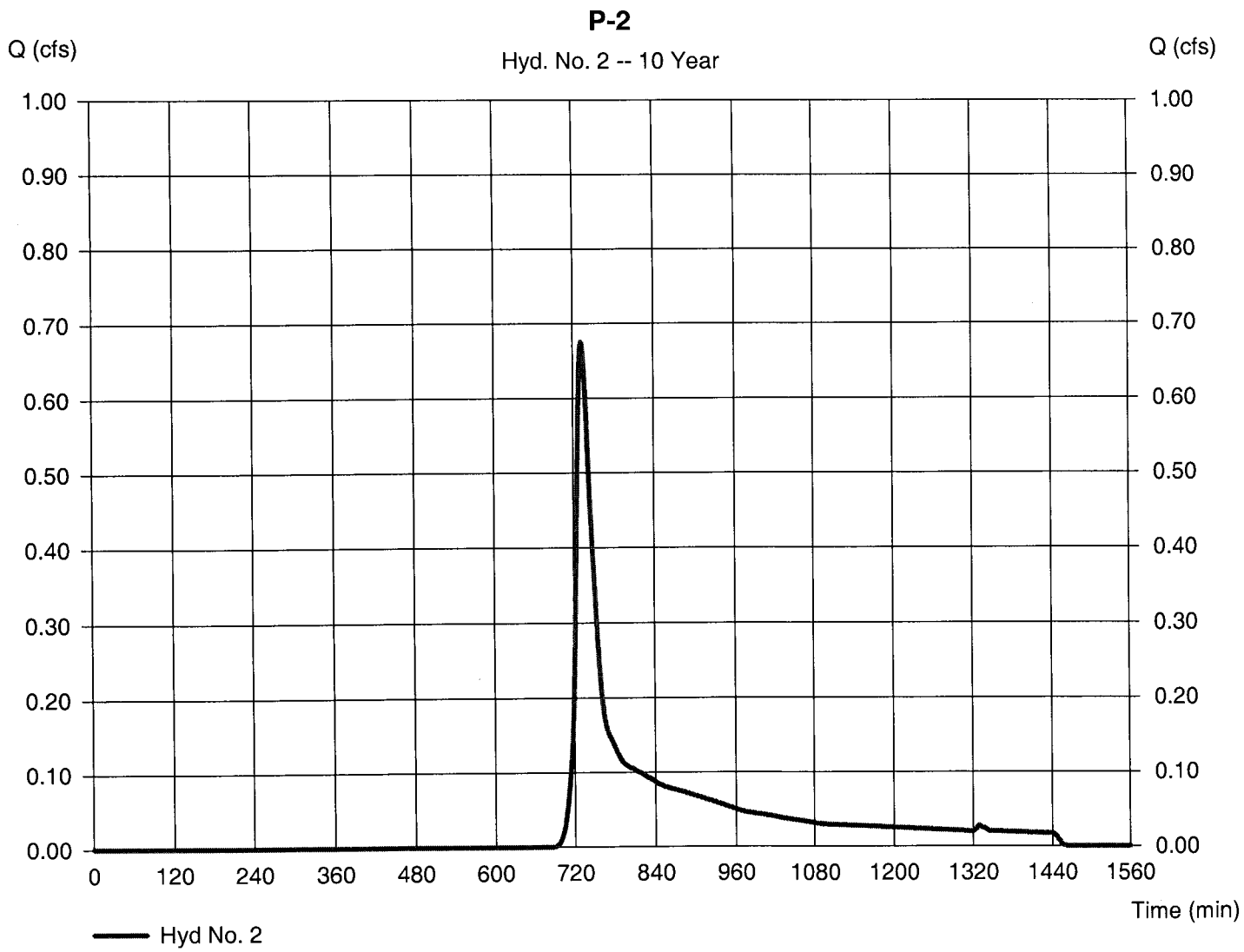
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Thursday, Dec 23, 2010

Hyd. No. 2

P-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.675 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 3,056 cuft
Drainage area	= 0.780 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.70 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



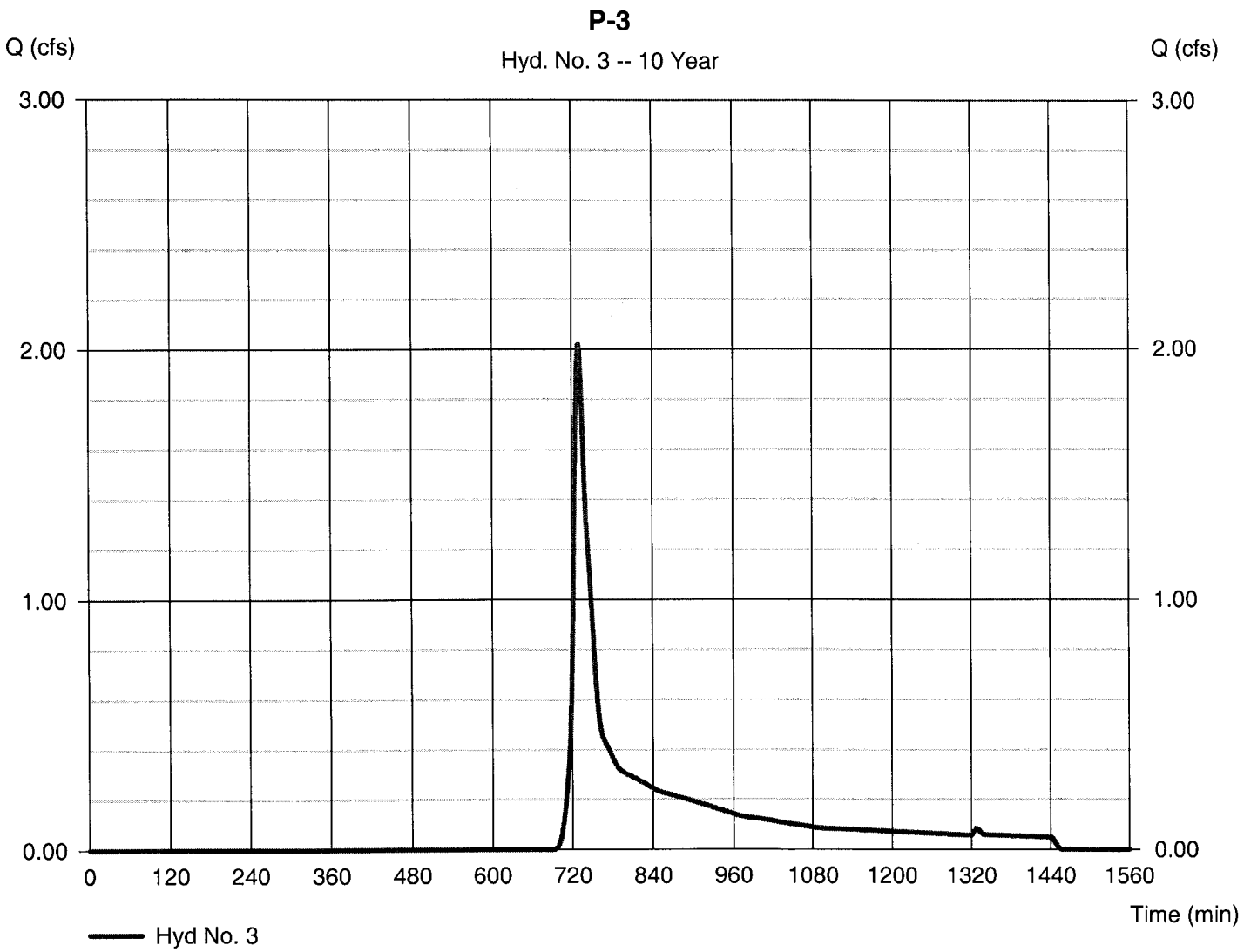
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 3

P-3

Hydrograph type	= SCS Runoff	Peak discharge	= 2.018 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 8,591 cuft
Drainage area	= 2.280 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.56 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



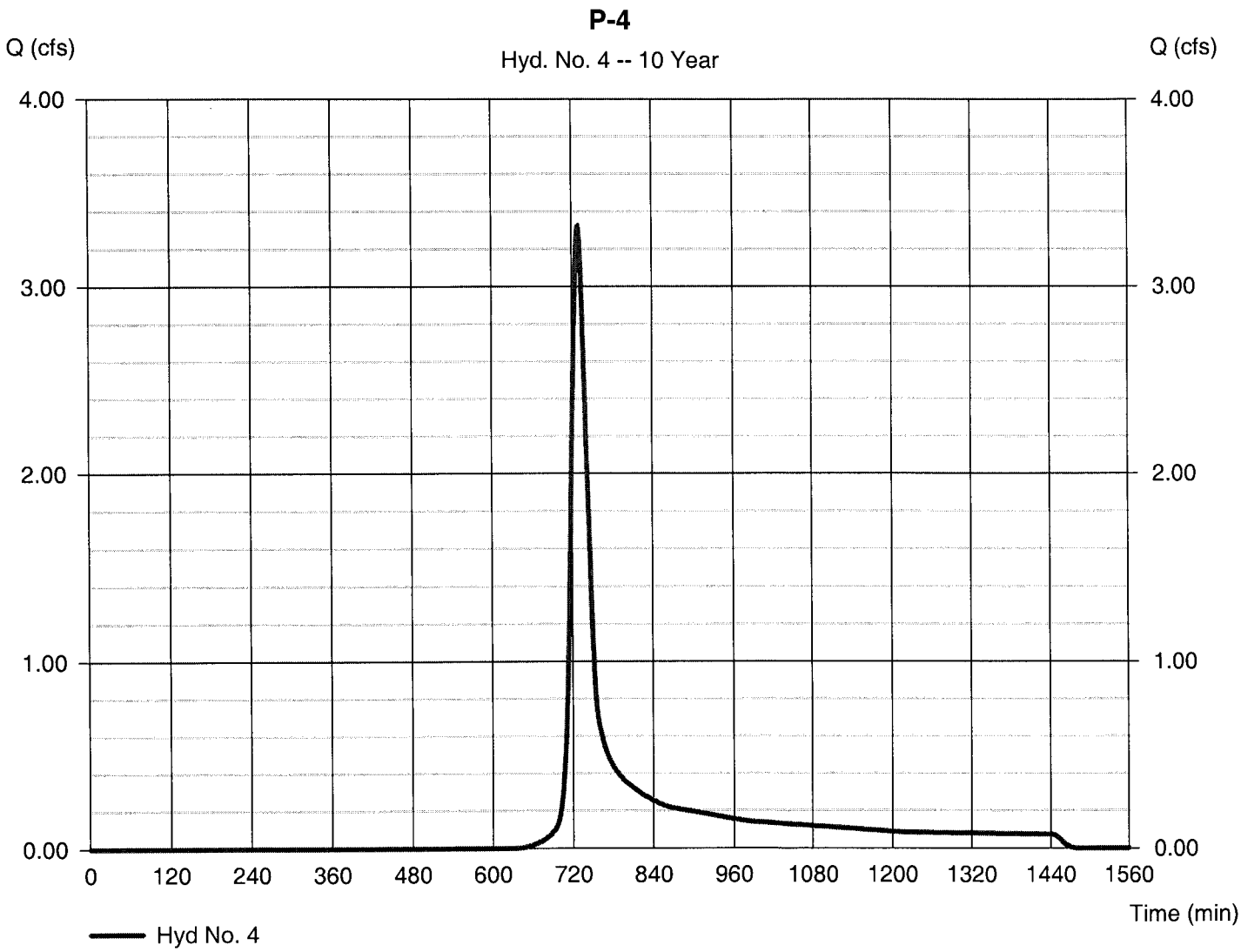
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 4

P-4

Hydrograph type	= SCS Runoff	Peak discharge	= 3.324 cfs
Storm frequency	= 10 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 12,332 cuft
Drainage area	= 2.120 ac	Curve number	= 69
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.50 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



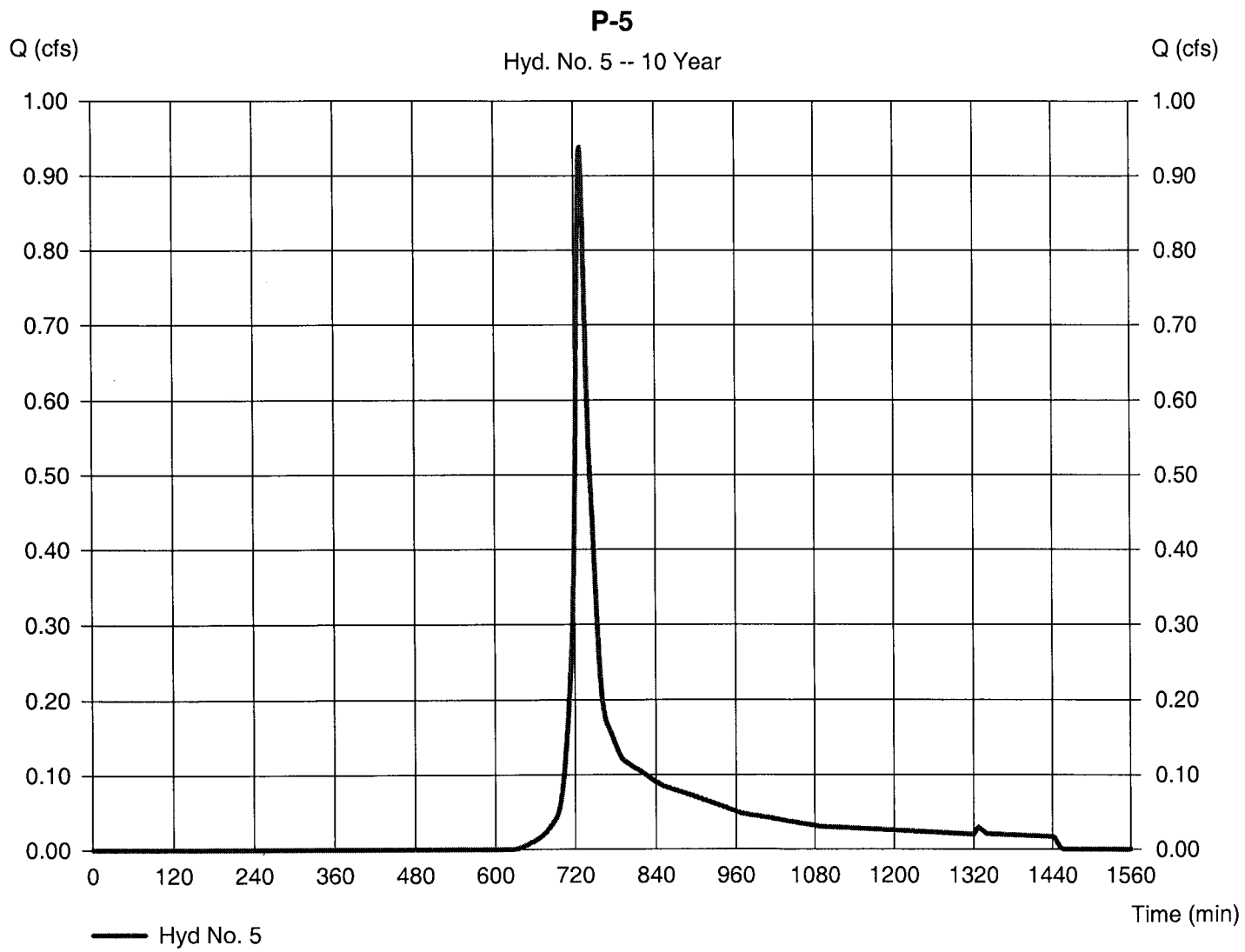
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 5

P-5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.938 cfs
Storm frequency	= 10 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 3,567 cuft
Drainage area	= 0.630 ac	Curve number	= 68
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.76 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

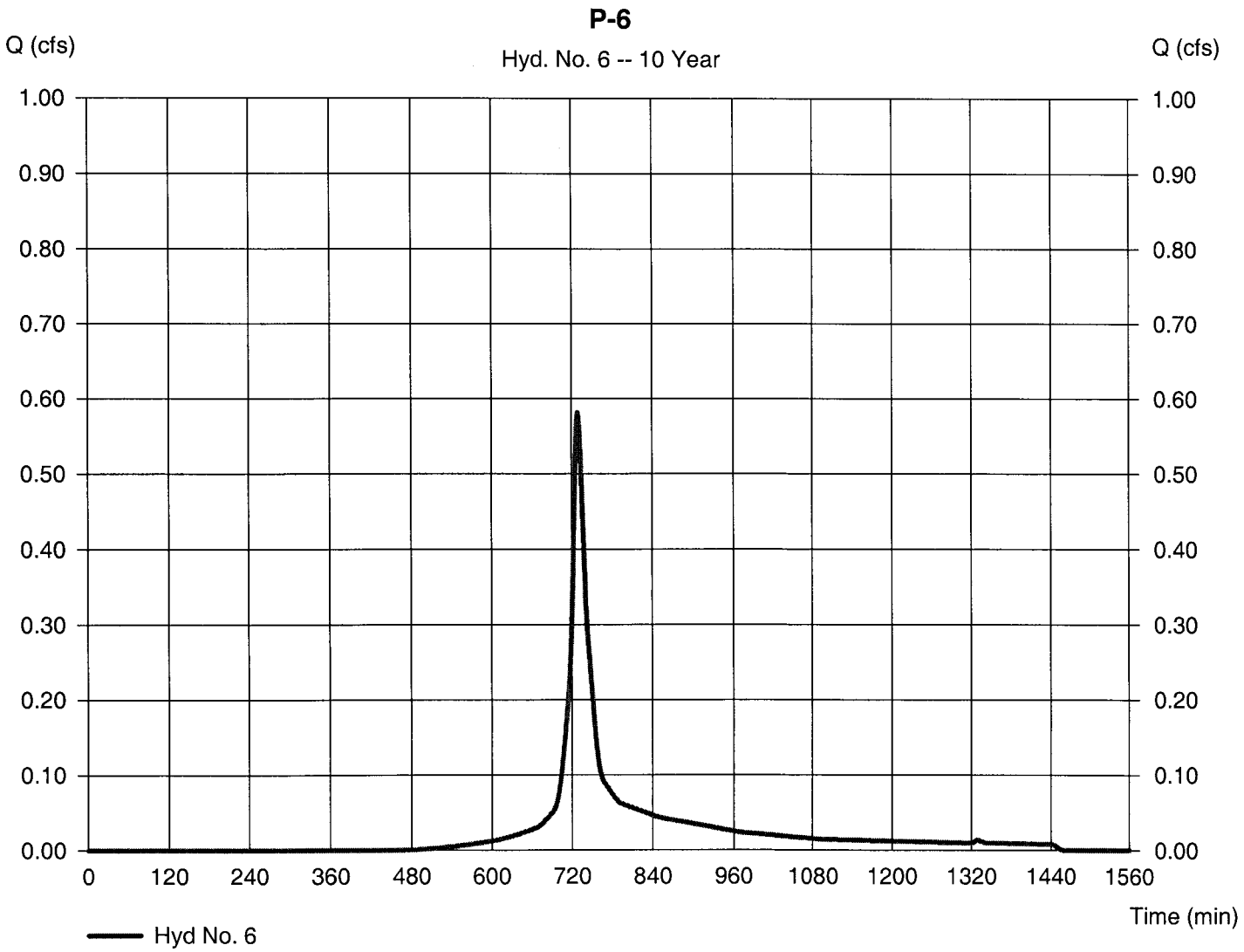
Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Dec 23, 2010

Hyd. No. 6

P-6

Hydrograph type	= SCS Runoff	Peak discharge	= 0.581 cfs
Storm frequency	= 10 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 2,185 cuft
Drainage area	= 0.240 ac	Curve number	= 81
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 13.14 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



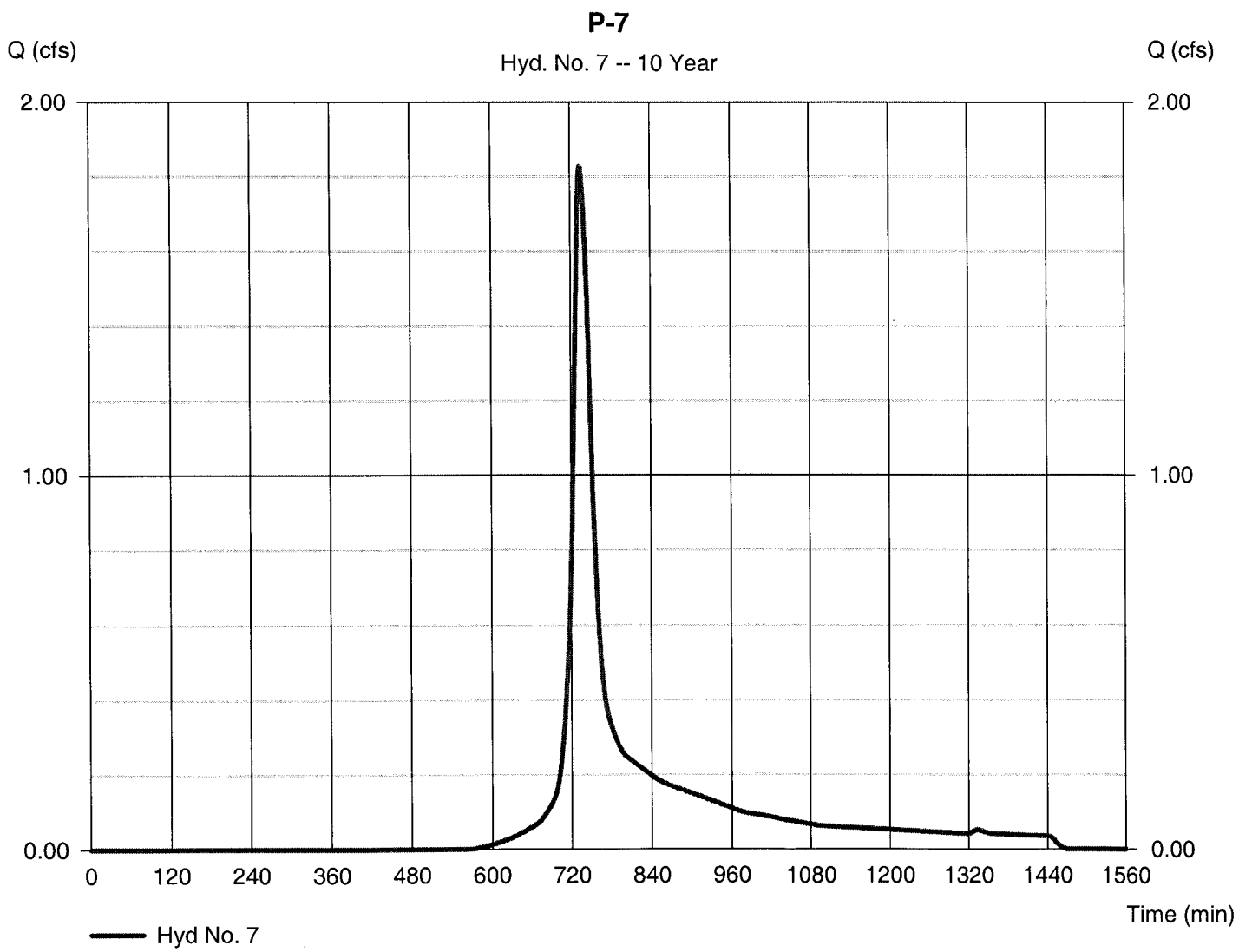
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 7

P-7

Hydrograph type	= SCS Runoff	Peak discharge	= 1.827 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 8,162 cuft
Drainage area	= 1.140 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.00 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

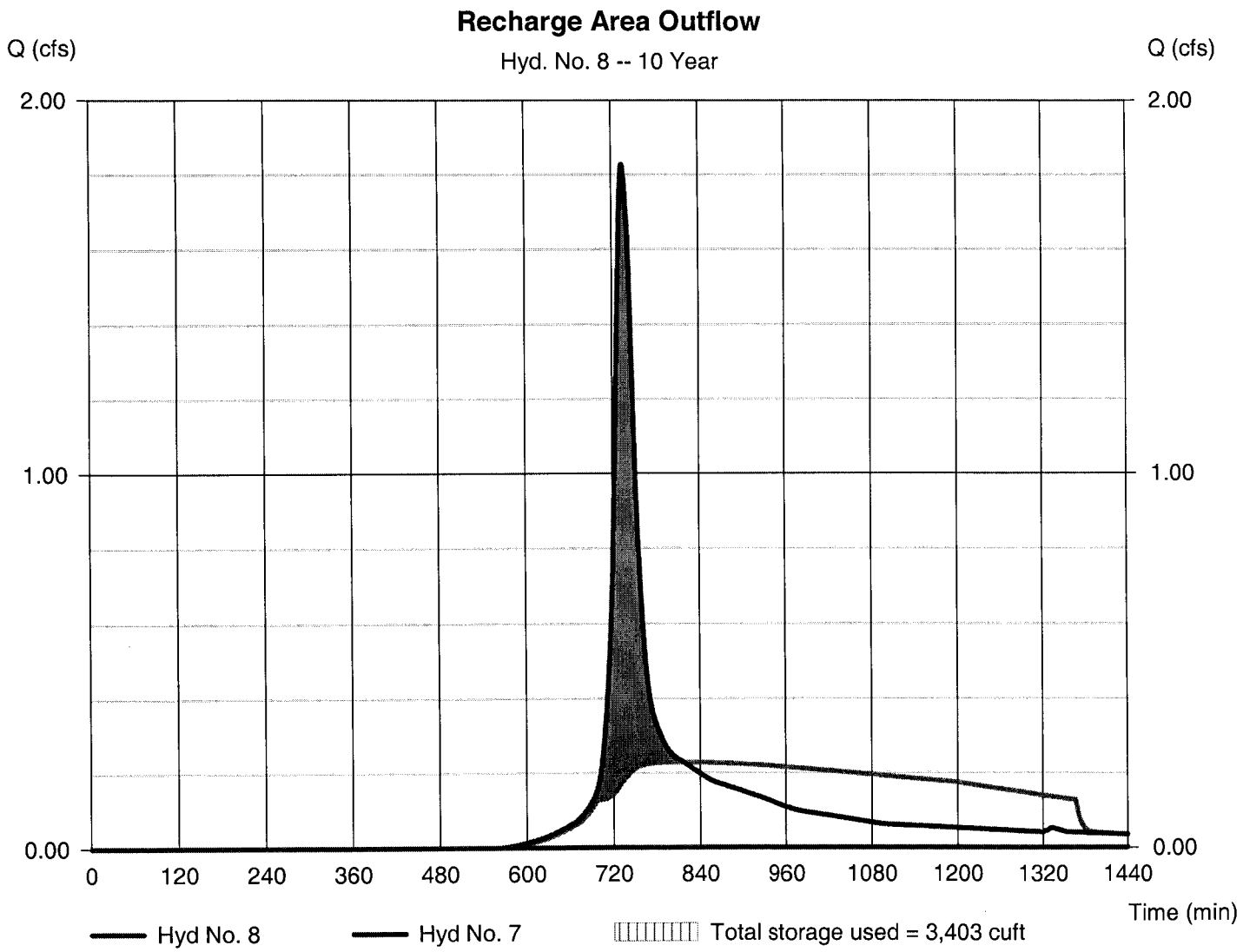
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 8

Recharge Area Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 685 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 7 - P-7	Max. Elevation	= 137.30 ft
Reservoir name	= Recharge System	Max. Storage	= 3,403 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

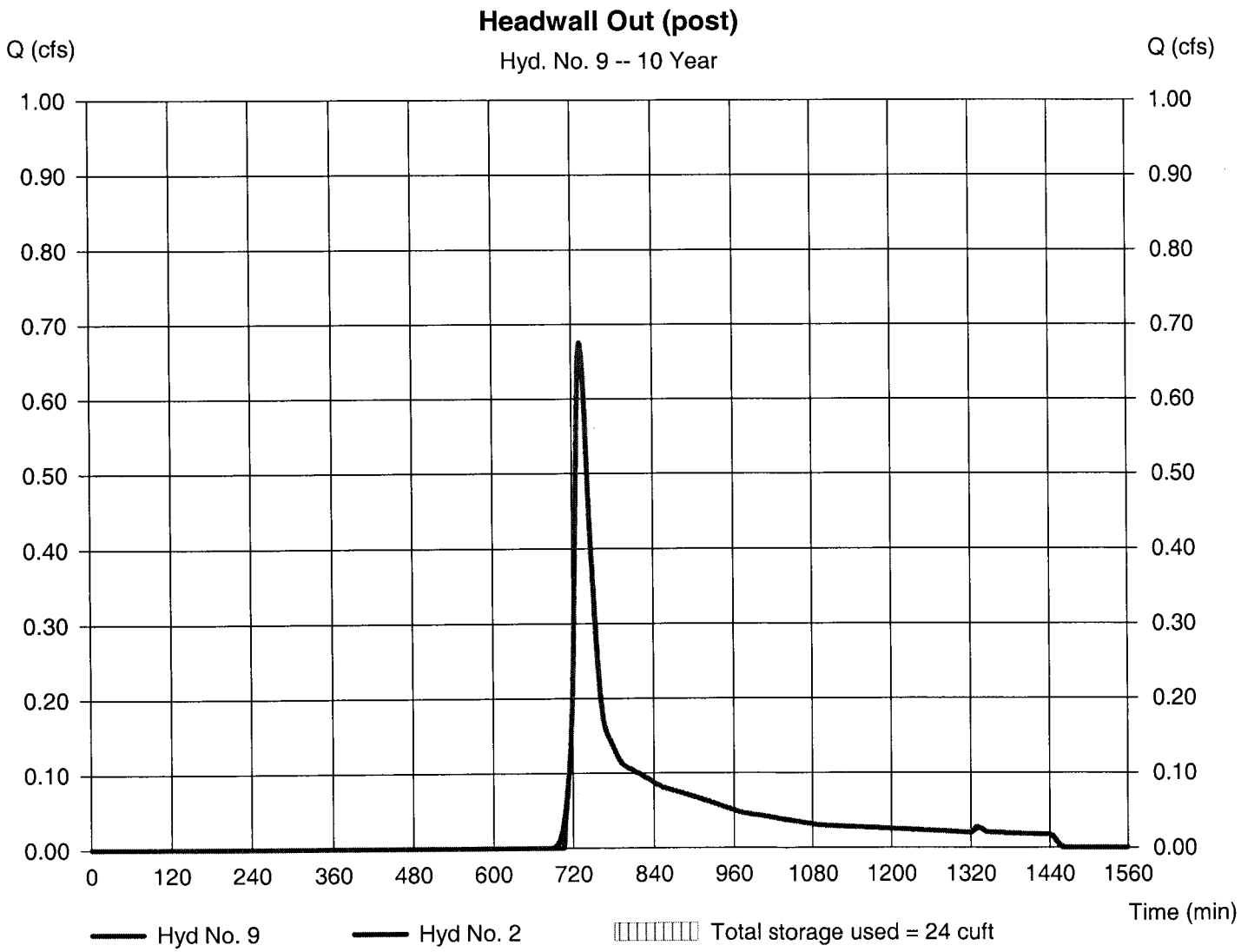
Hydraflow Hydrographs by Intelisolve v9.2 | Thursday, Dec 23, 2010

Hyd. No. 9

Headwall Out (post)

Hydrograph type	= Reservoir	Peak discharge	= 0.675 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 3,043 cuft
Inflow hyd. No.	= 2 - P-2	Max. Elevation	= 132.38 ft
Reservoir name	= Storage behind exist headwall	Max. Storage	= 24 cuft

Storage Indication method used.



Hydrograph Report

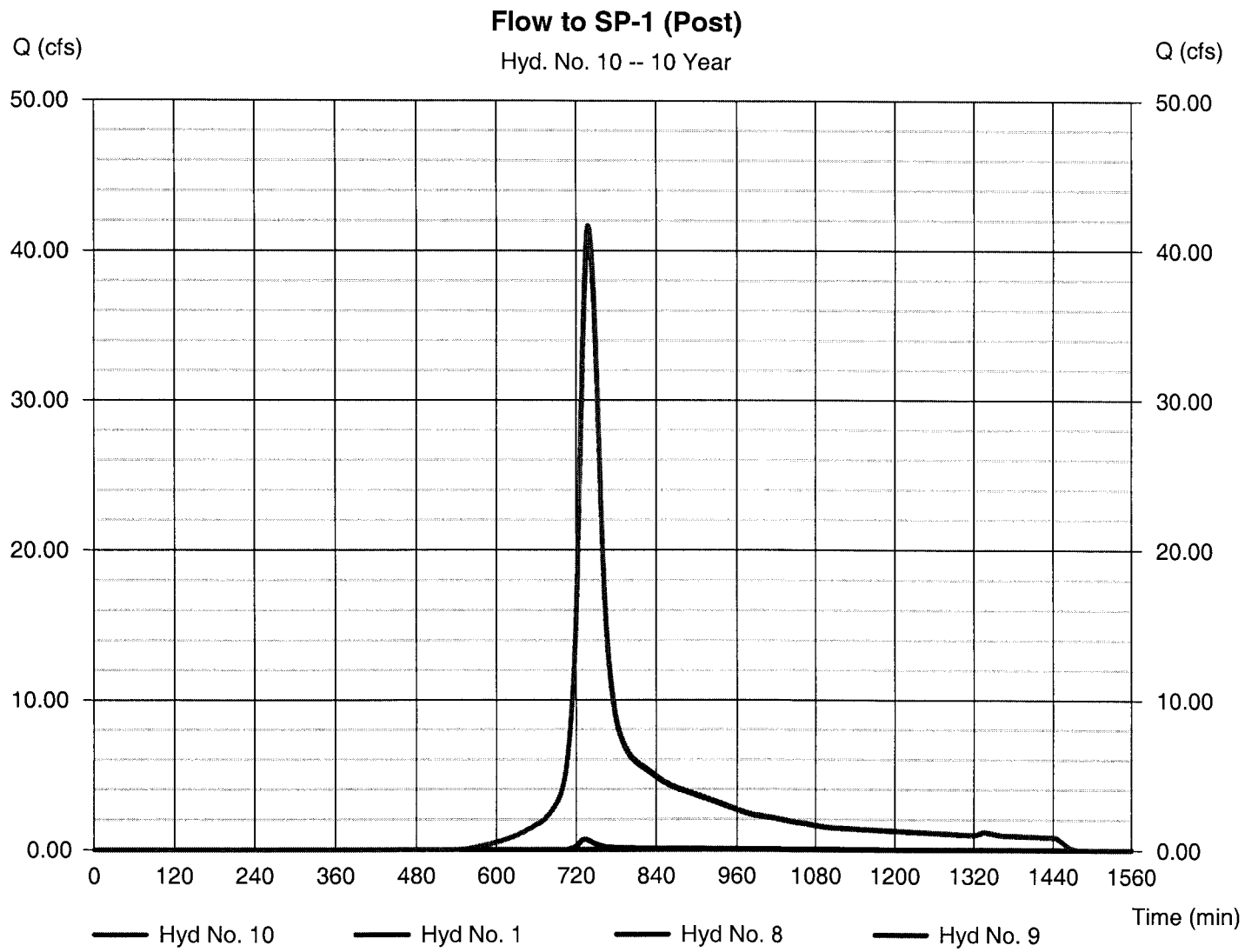
Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Dec 23, 2010

Hyd. No. 10

Flow to SP-1 (Post)

Hydrograph type	= Combine	Peak discharge	= 41.64 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 1 min	Hyd. volume	= 202,586 cuft
Inflow hyds.	= 1, 8, 9	Contrib. drain. area	= 25.810 ac



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	53.96	1	737	260,902	----	------	------	P-1
2	SCS Runoff	1.028	1	731	4,396	----	------	------	P-2
3	SCS Runoff	3.139	1	729	12,466	----	------	------	P-3
4	SCS Runoff	4.611	1	729	16,762	----	------	------	P-4
5	SCS Runoff	1.312	1	728	4,879	----	------	------	P-5
6	SCS Runoff	0.740	1	729	2,789	----	------	------	P-6
7	SCS Runoff	2.436	1	734	10,783	----	------	------	P-7
8	Reservoir	0.000	1	649	0	7	138.17	4,839	Recharge Area Outflow
9	Reservoir	1.029	1	732	4,384	2	132.50	27.5	Headwall Out (post)
10	Combine	54.88	1	737	265,286	1, 8, 9	------	------	Flow to SP-1 (Post)

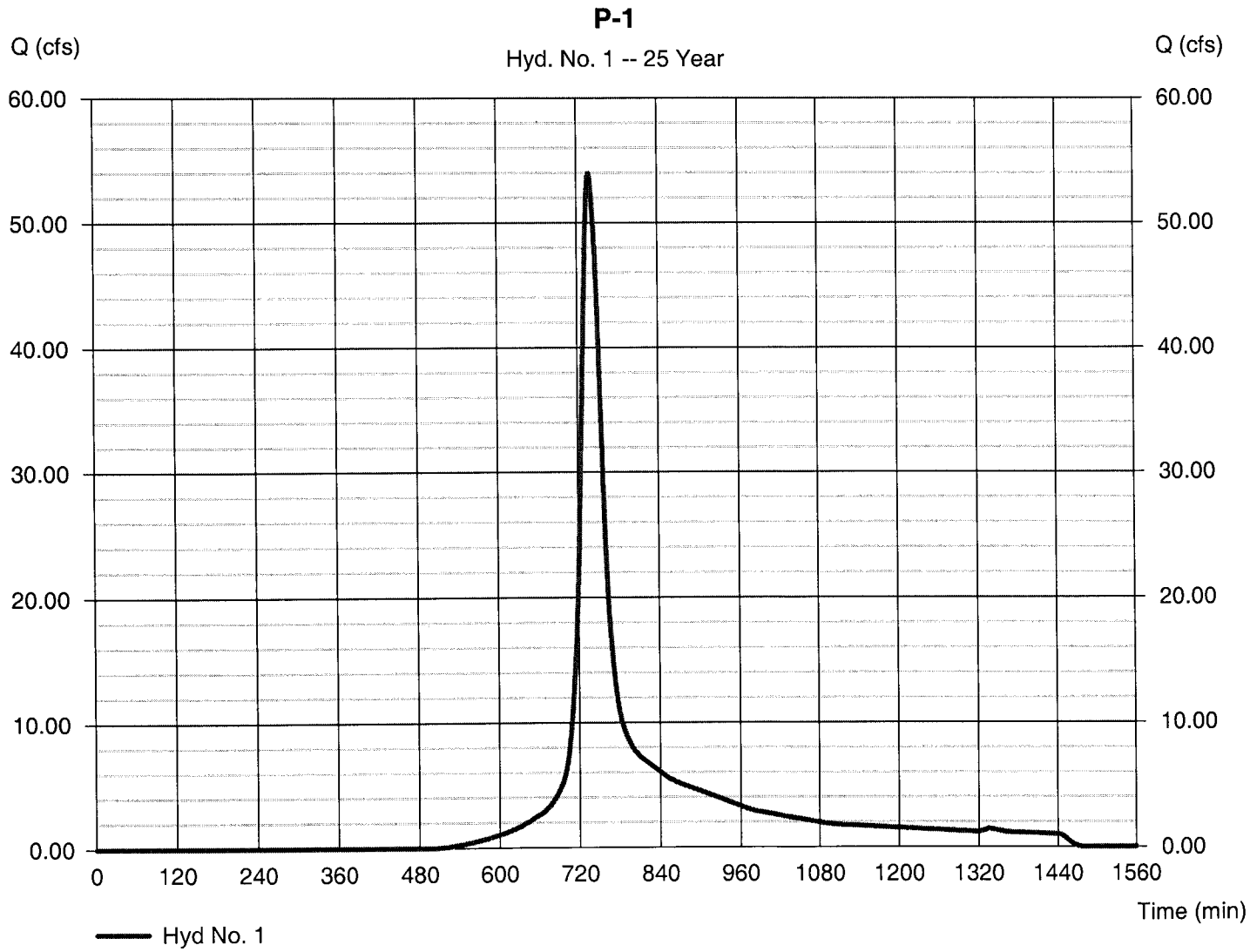
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 1

P-1

Hydrograph type	= SCS Runoff	Peak discharge	= 53.96 cfs
Storm frequency	= 25 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 260,902 cuft
Drainage area	= 25.810 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.30 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

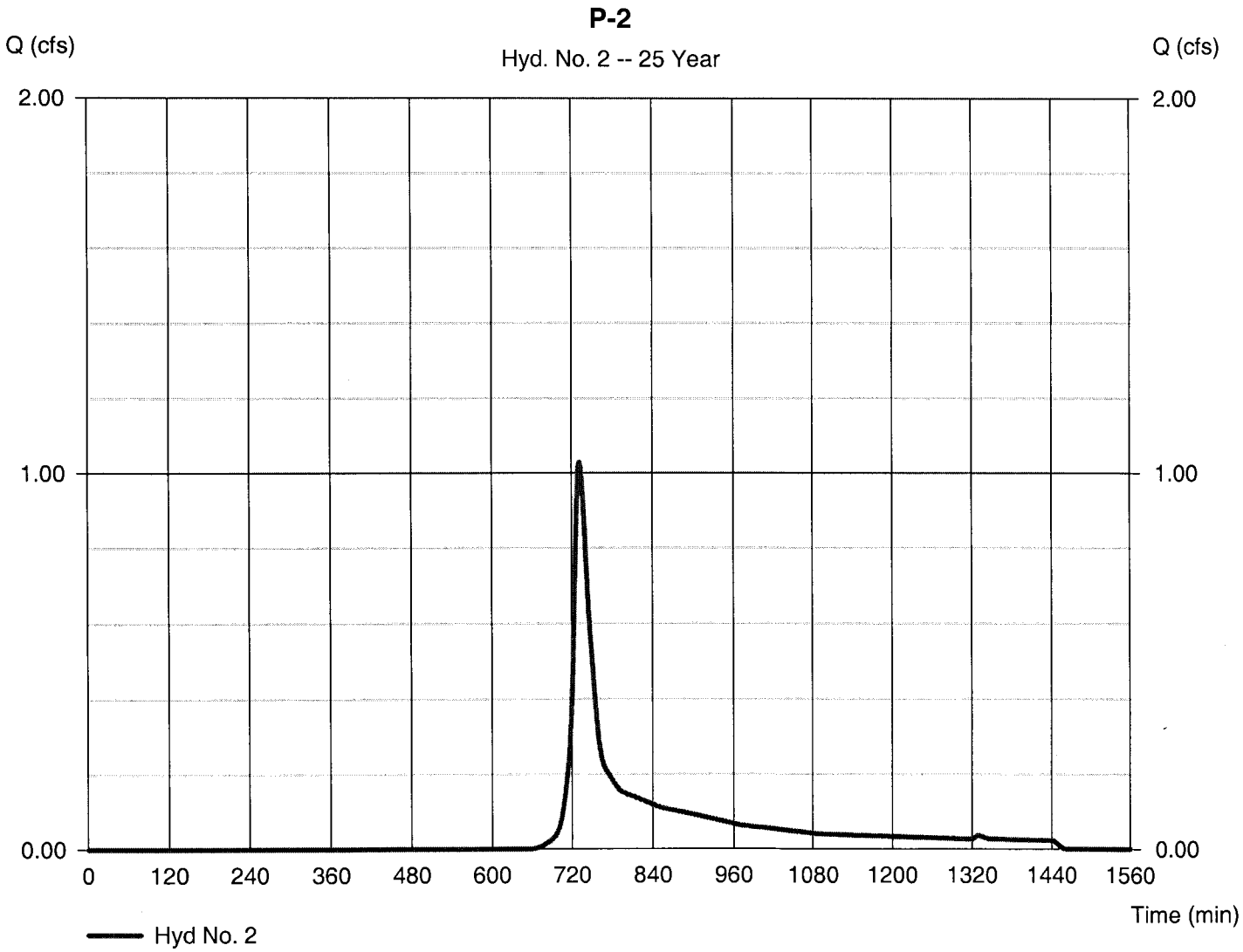
Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Dec 23, 2010

Hyd. No. 2

P-2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.028 cfs
Storm frequency	= 25 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 4,396 cuft
Drainage area	= 0.780 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.70 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



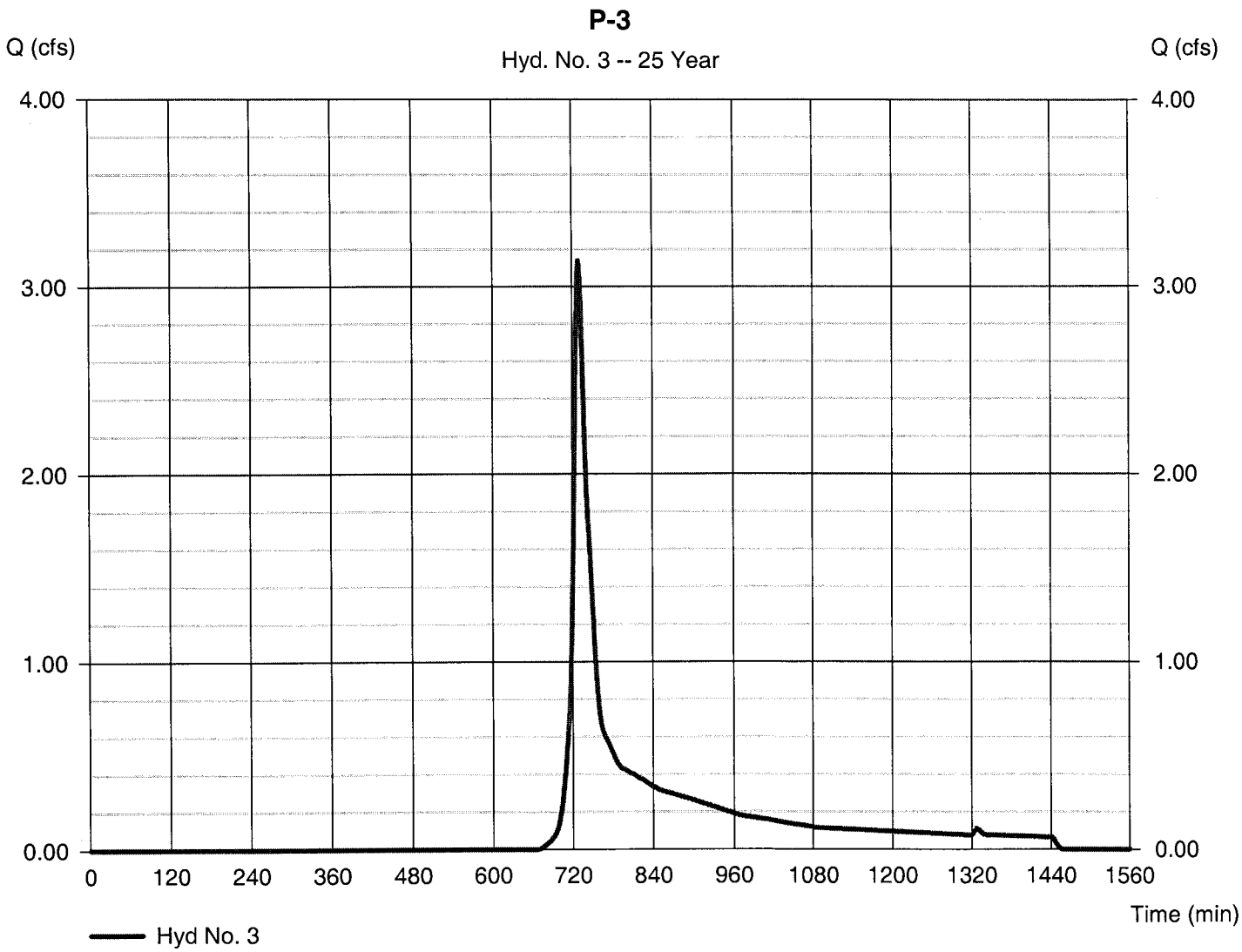
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 3

P-3

Hydrograph type	= SCS Runoff	Peak discharge	= 3.139 cfs
Storm frequency	= 25 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 12,466 cuft
Drainage area	= 2.280 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.56 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

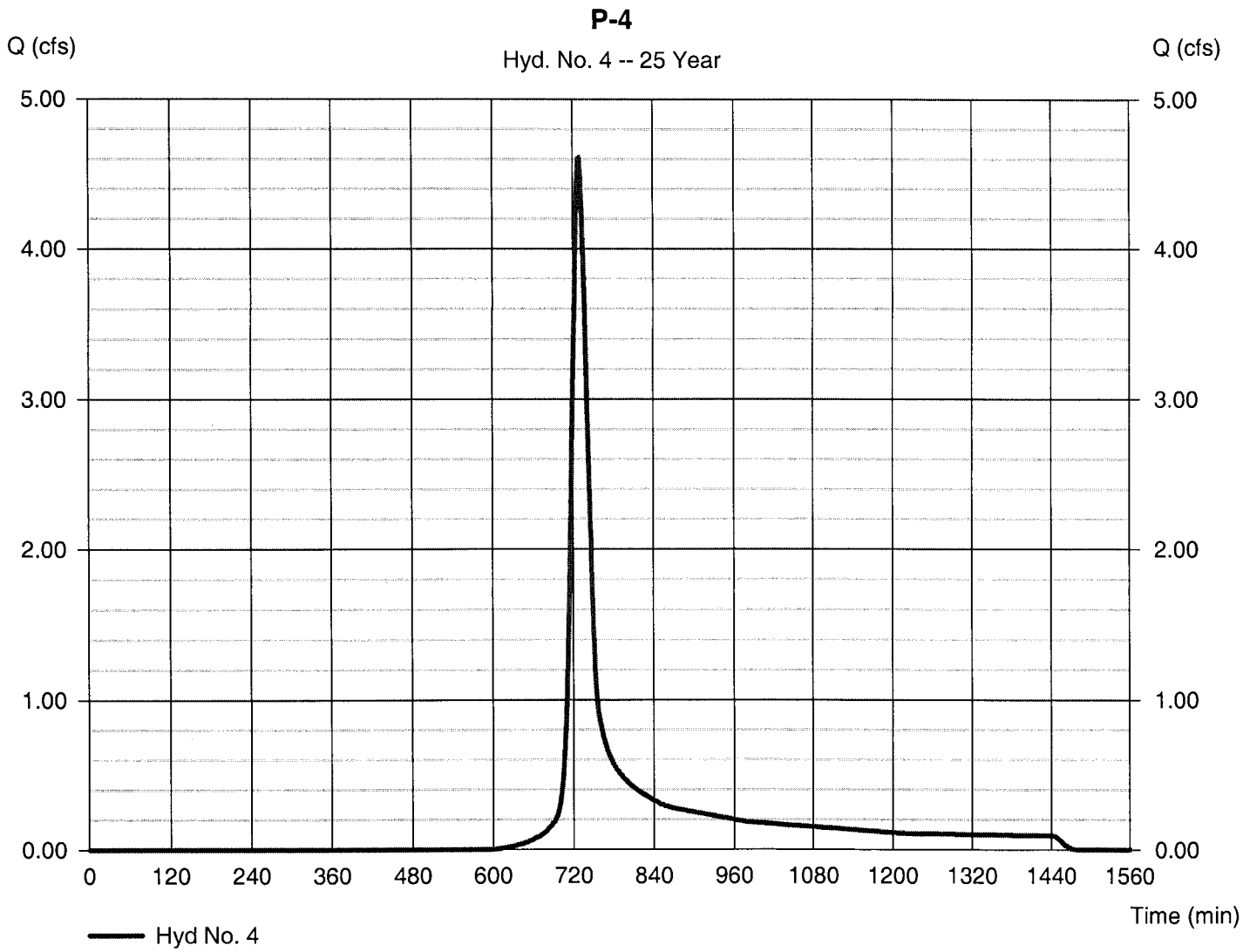
Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Dec 23, 2010

Hyd. No. 4

P-4

Hydrograph type	= SCS Runoff	Peak discharge	= 4.611 cfs
Storm frequency	= 25 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 16,762 cuft
Drainage area	= 2.120 ac	Curve number	= 69
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.50 min
Total precip.	= 5.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

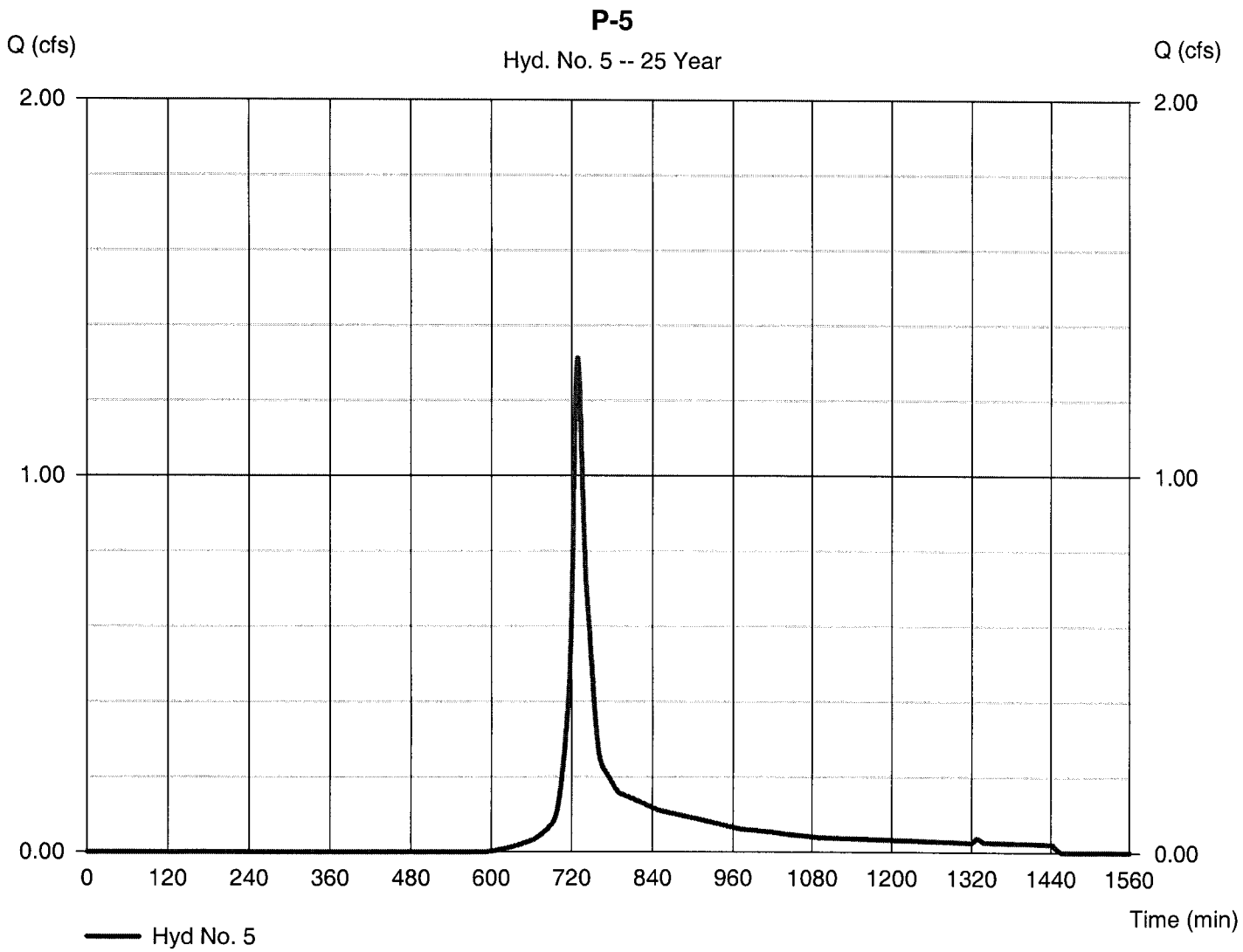
Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Dec 23, 2010

Hyd. No. 5

P-5

Hydrograph type	= SCS Runoff	Peak discharge	= 1.312 cfs
Storm frequency	= 25 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 4,879 cuft
Drainage area	= 0.630 ac	Curve number	= 68
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.76 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



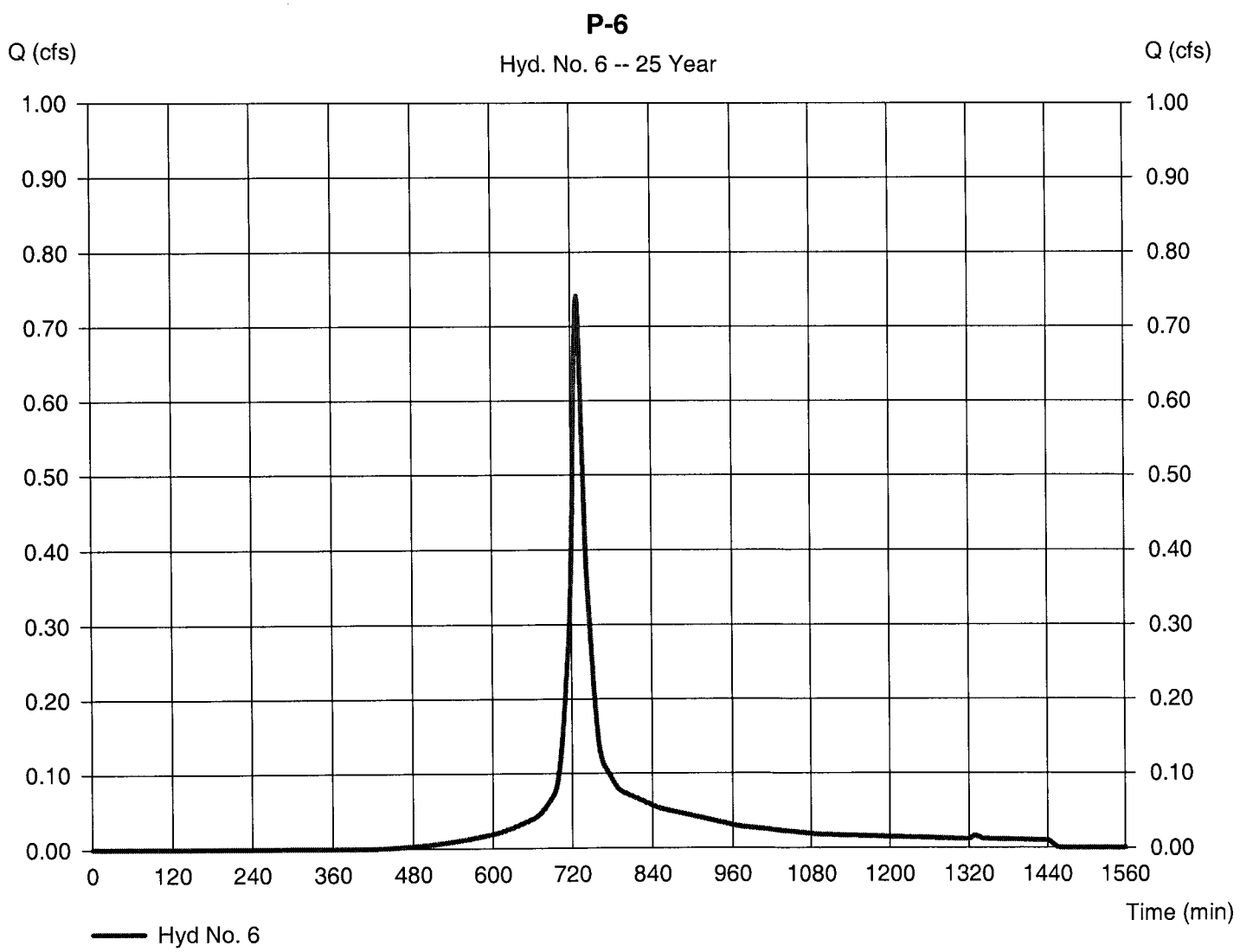
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 6

P-6

Hydrograph type	= SCS Runoff	Peak discharge	= 0.740 cfs
Storm frequency	= 25 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 2,789 cuft
Drainage area	= 0.240 ac	Curve number	= 81
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 13.14 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

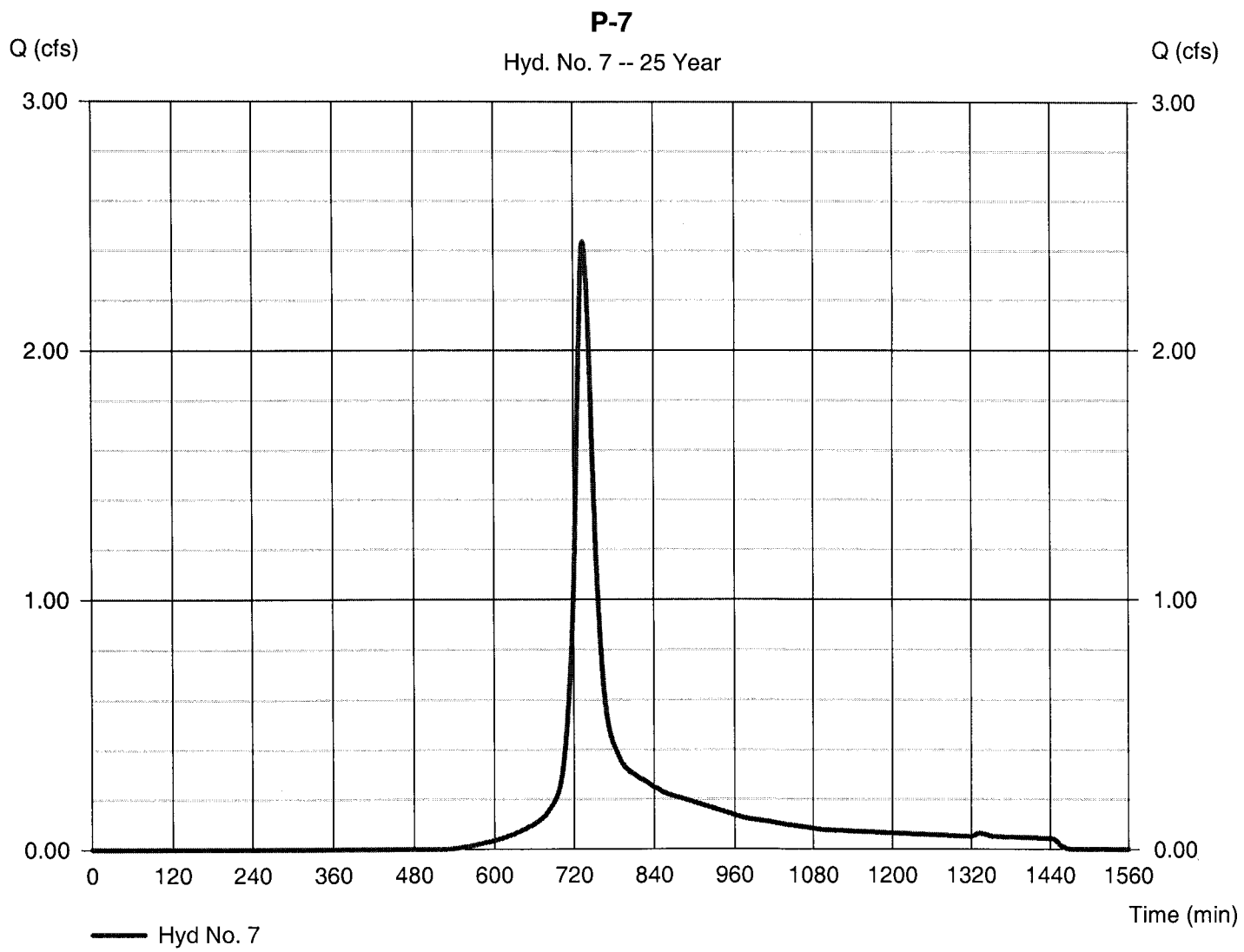
Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Dec 23, 2010

Hyd. No. 7

P-7

Hydrograph type	= SCS Runoff	Peak discharge	= 2.436 cfs
Storm frequency	= 25 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 10,783 cuft
Drainage area	= 1.140 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.00 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

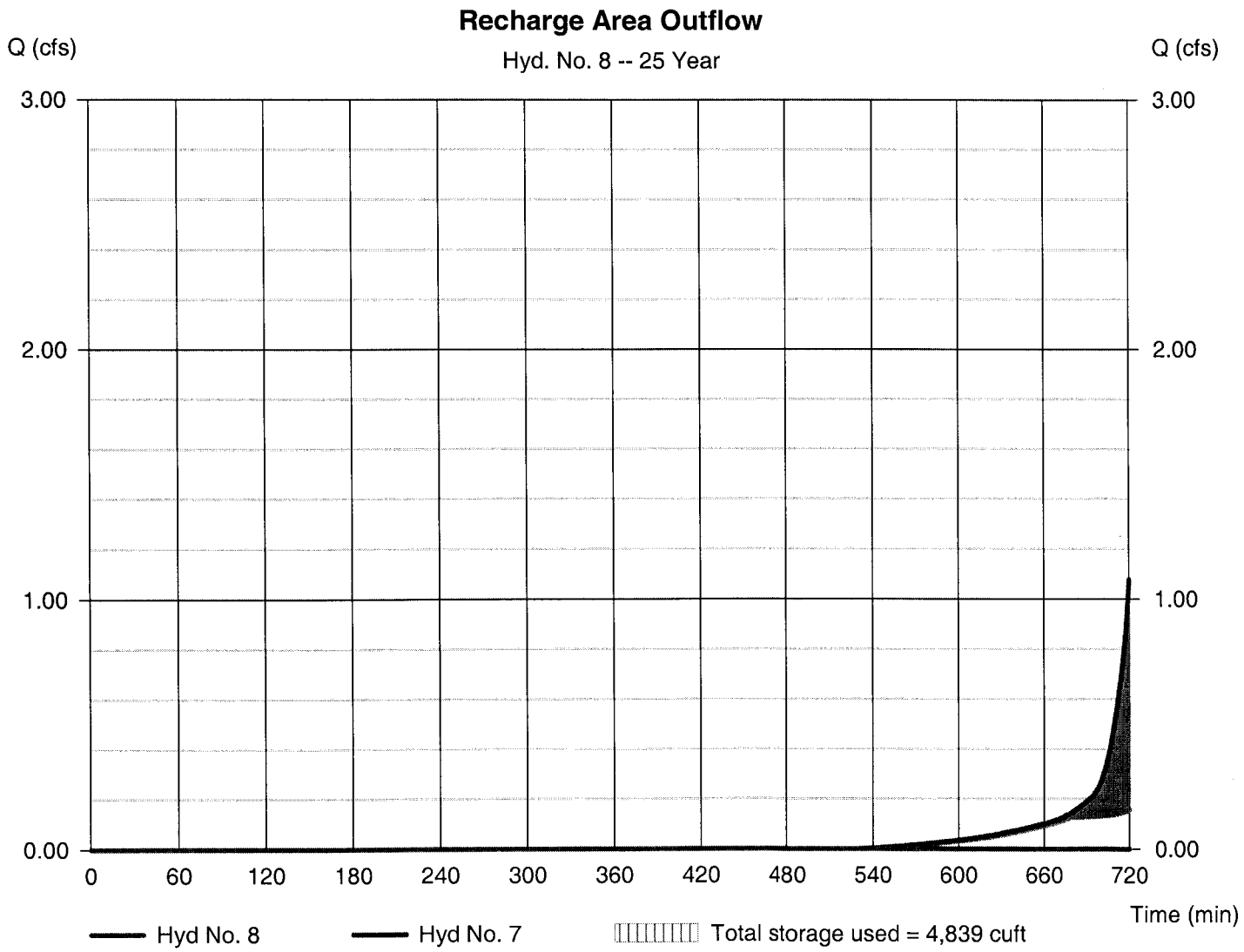
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 8

Recharge Area Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= 649 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 7 - P-7	Max. Elevation	= 138.17 ft
Reservoir name	= Recharge System	Max. Storage	= 4,839 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

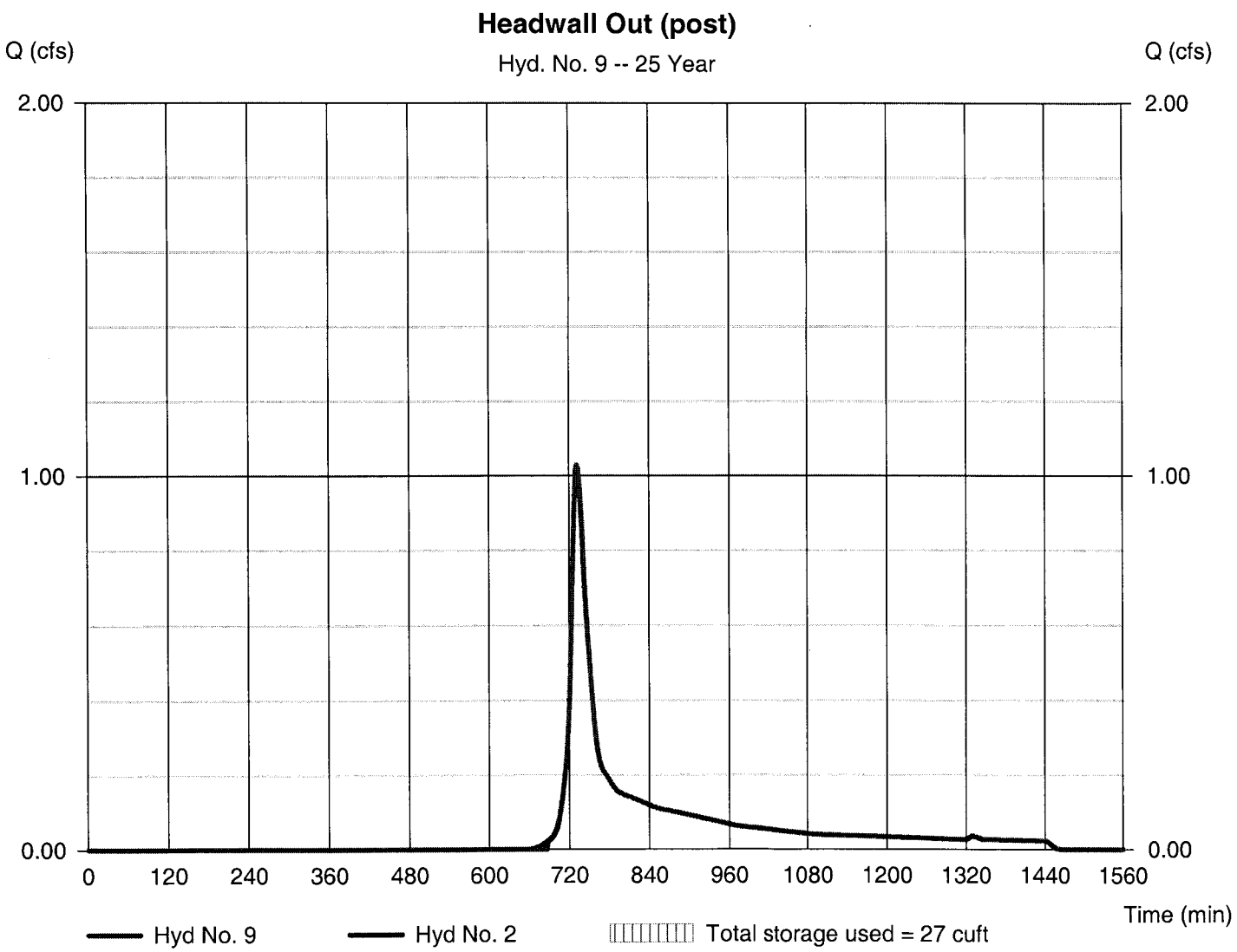
Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 9

Headwall Out (post)

Hydrograph type	= Reservoir	Peak discharge	= 1.029 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 4,384 cuft
Inflow hyd. No.	= 2 - P-2	Max. Elevation	= 132.50 ft
Reservoir name	= Storage behind exist headwall	Max. Storage	= 27 cuft

Storage Indication method used.



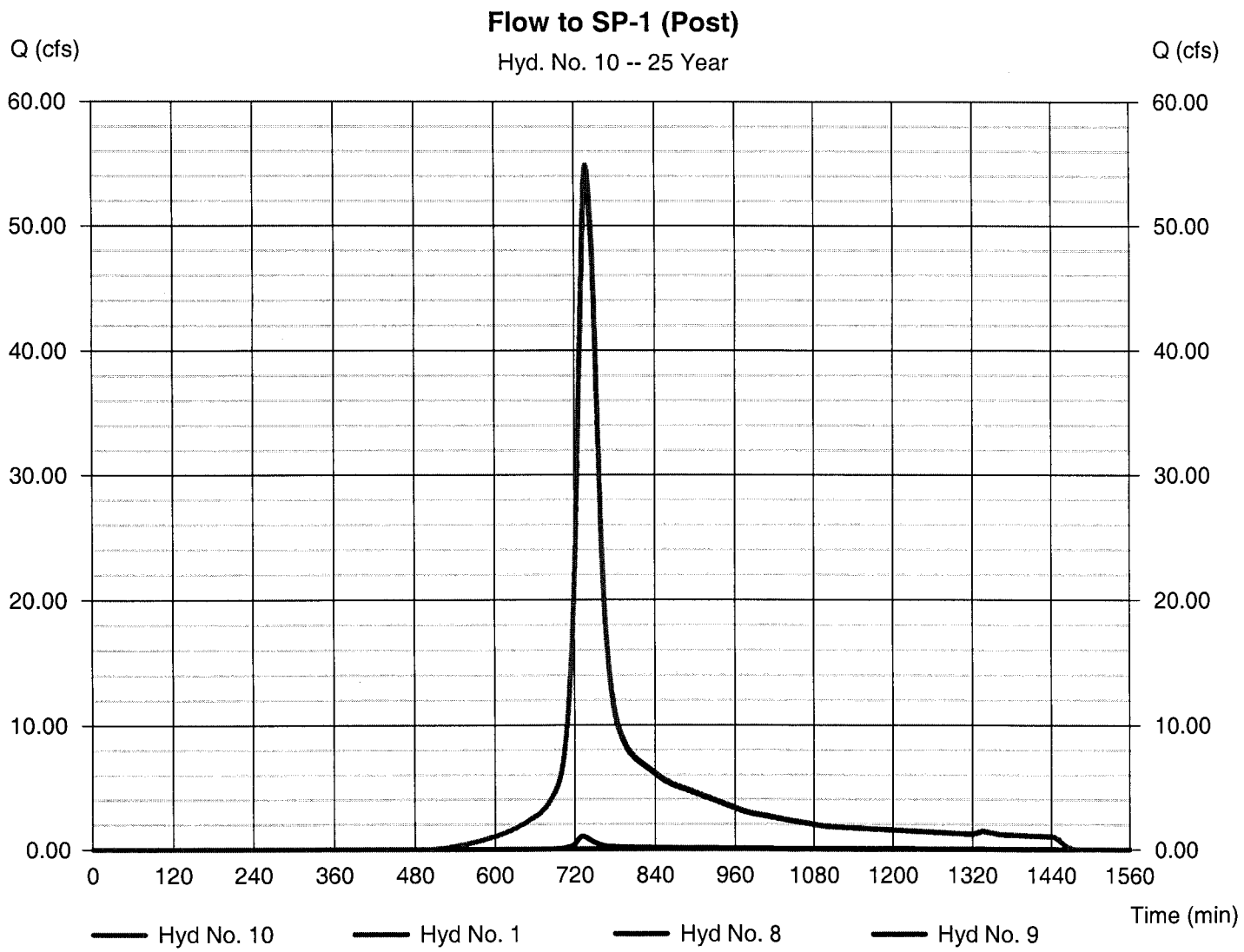
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Dec 23, 2010

Hyd. No. 10

Flow to SP-1 (Post)

Hydrograph type	= Combine	Peak discharge	= 54.88 cfs
Storm frequency	= 25 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 265,286 cuft
Inflow hyds.	= 1, 8, 9	Contrib. drain. area	= 25.810 ac



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	79.13	1	737	382,237	----	------	------	P-1
2	SCS Runoff	1.780	1	731	7,244	----	------	------	P-2
3	SCS Runoff	5.510	1	729	20,749	----	------	------	P-3
4	SCS Runoff	7.213	1	728	25,785	----	------	------	P-4
5	SCS Runoff	2.073	1	728	7,563	----	------	------	P-5
6	SCS Runoff	1.042	1	729	3,961	----	------	------	P-6
7	SCS Runoff	3.629	1	734	16,008	----	------	------	P-7
8	Reservoir	0.519	1	766	1,040	7	140.36	6,923	Recharge Area Outflow
9	Reservoir	1.780	1	731	7,232	2	132.82	36.3	Headwall Out (post)
10	Combine	80.69	1	737	390,509	1, 8, 9	------	------	Flow to SP-1 (Post)

Hydrograph Report

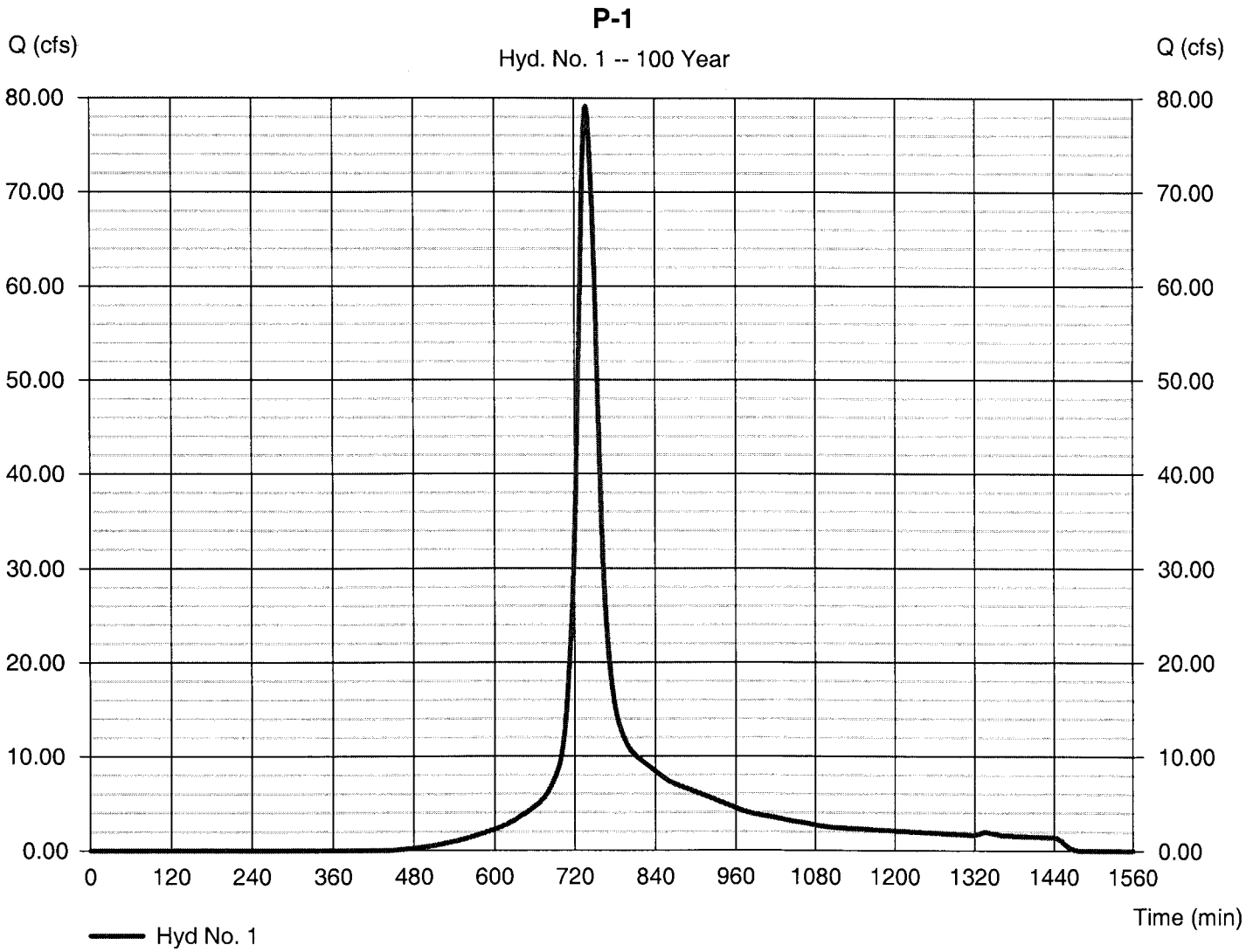
Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Dec 23, 2010

Hyd. No. 1

P-1

Hydrograph type	= SCS Runoff	Peak discharge	= 79.13 cfs
Storm frequency	= 100 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 382,237 cuft
Drainage area	= 25.810 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.30 min
Total precip.	= 6.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

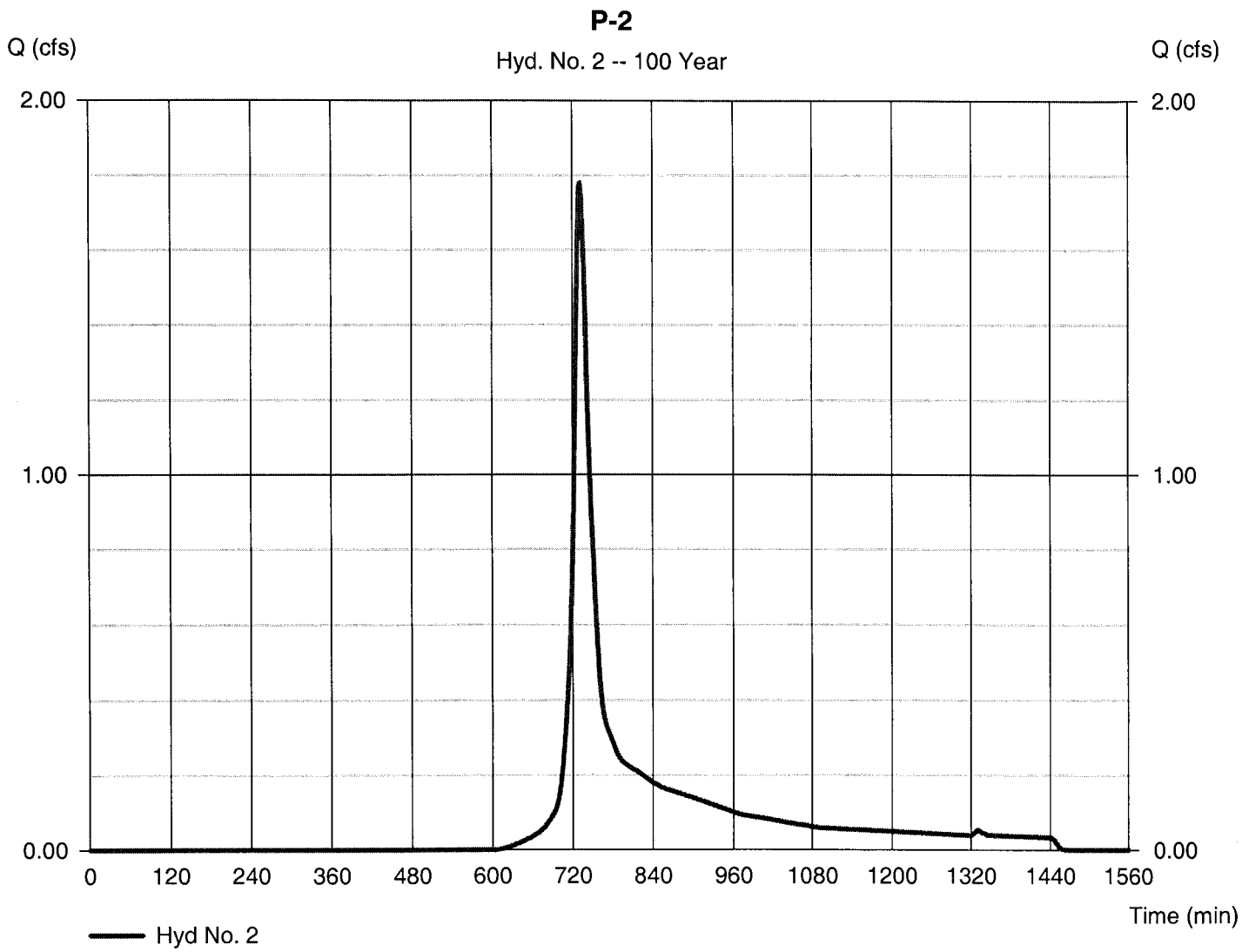
Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Dec 23, 2010

Hyd. No. 2

P-2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.780 cfs
Storm frequency	= 100 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 7,244 cuft
Drainage area	= 0.780 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.70 min
Total precip.	= 6.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

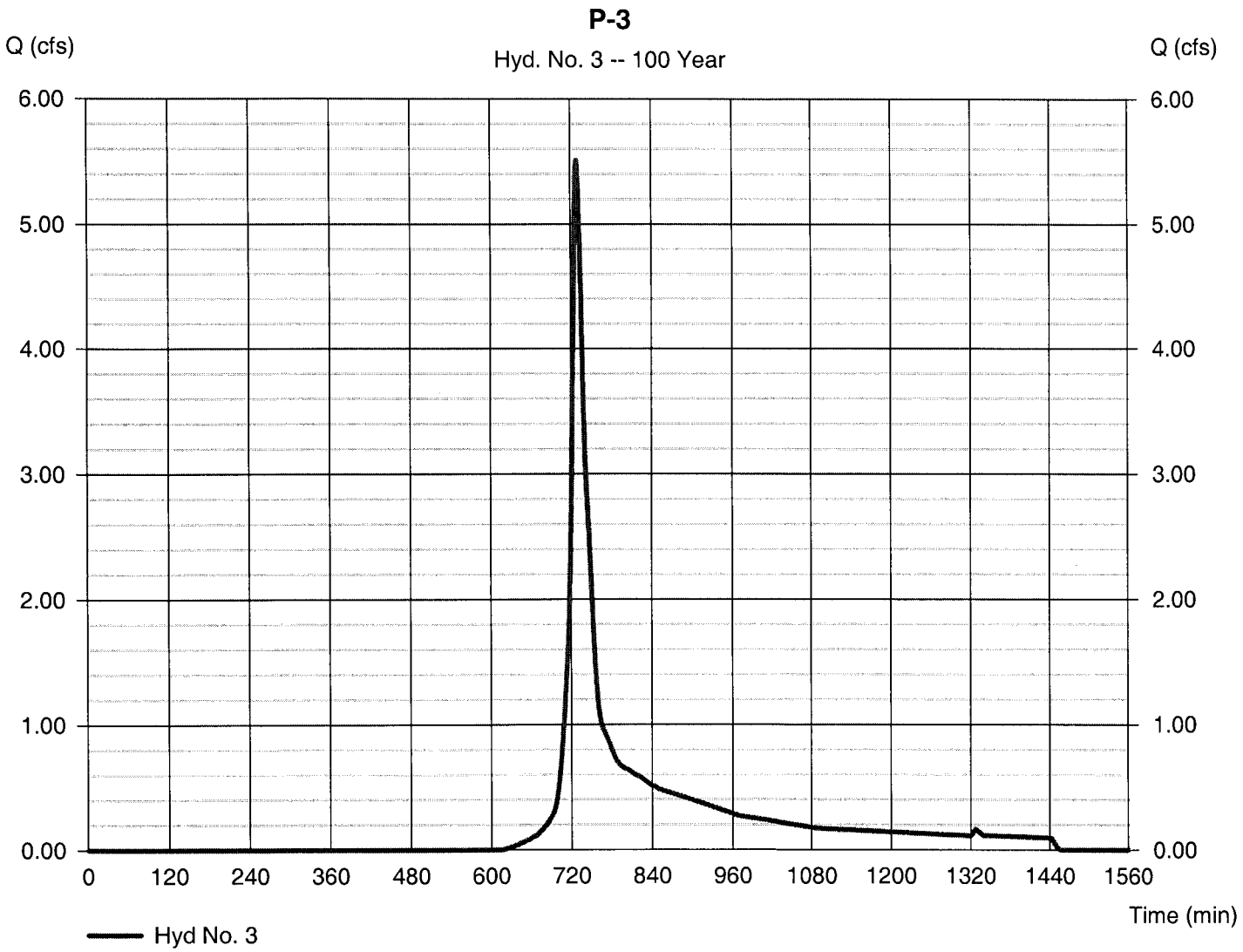
Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Dec 23, 2010

Hyd. No. 3

P-3

Hydrograph type	= SCS Runoff	Peak discharge	= 5.510 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 20,749 cuft
Drainage area	= 2.280 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.56 min
Total precip.	= 6.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



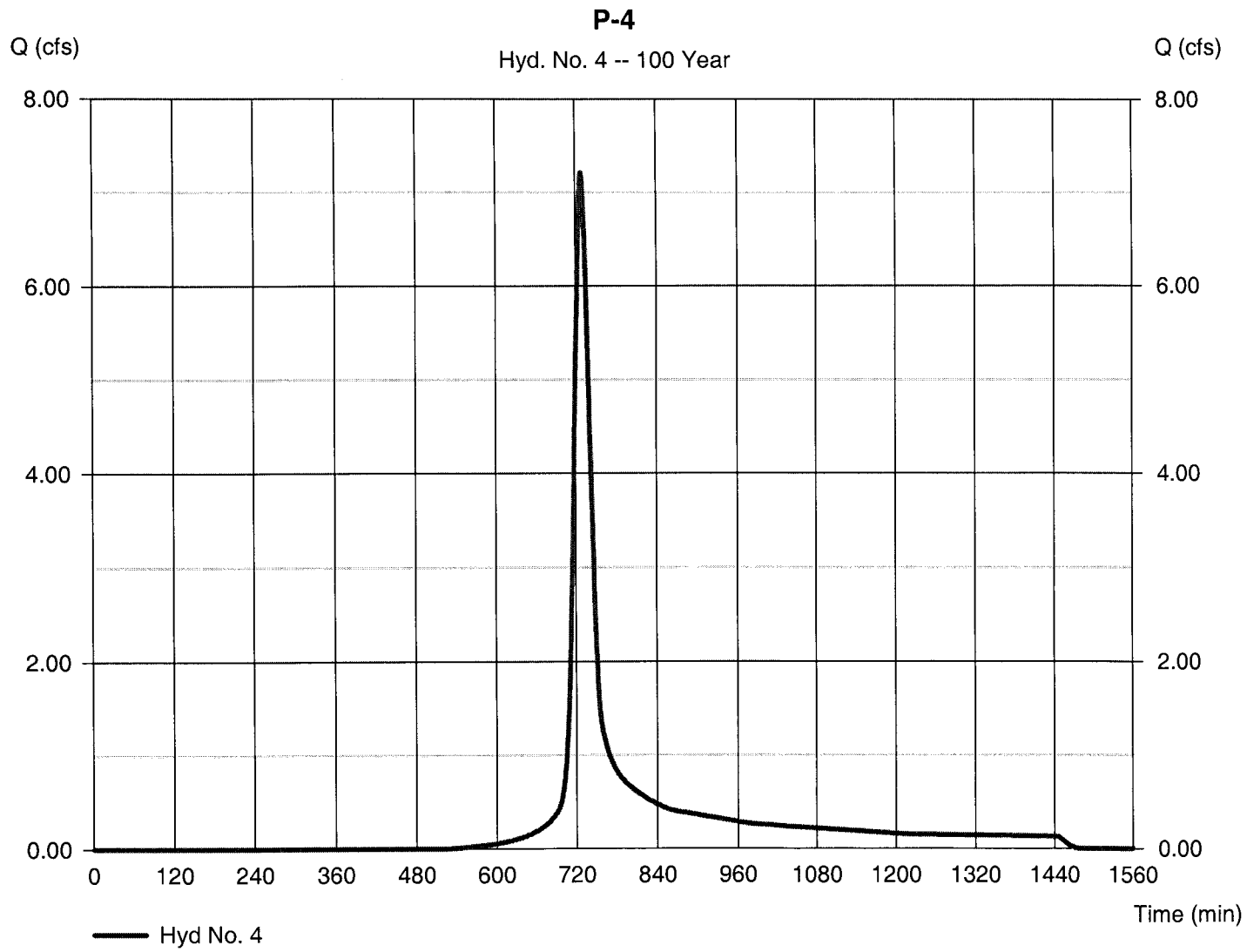
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 4

P-4

Hydrograph type	= SCS Runoff	Peak discharge	= 7.213 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 25,785 cuft
Drainage area	= 2.120 ac	Curve number	= 69
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.50 min
Total precip.	= 6.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



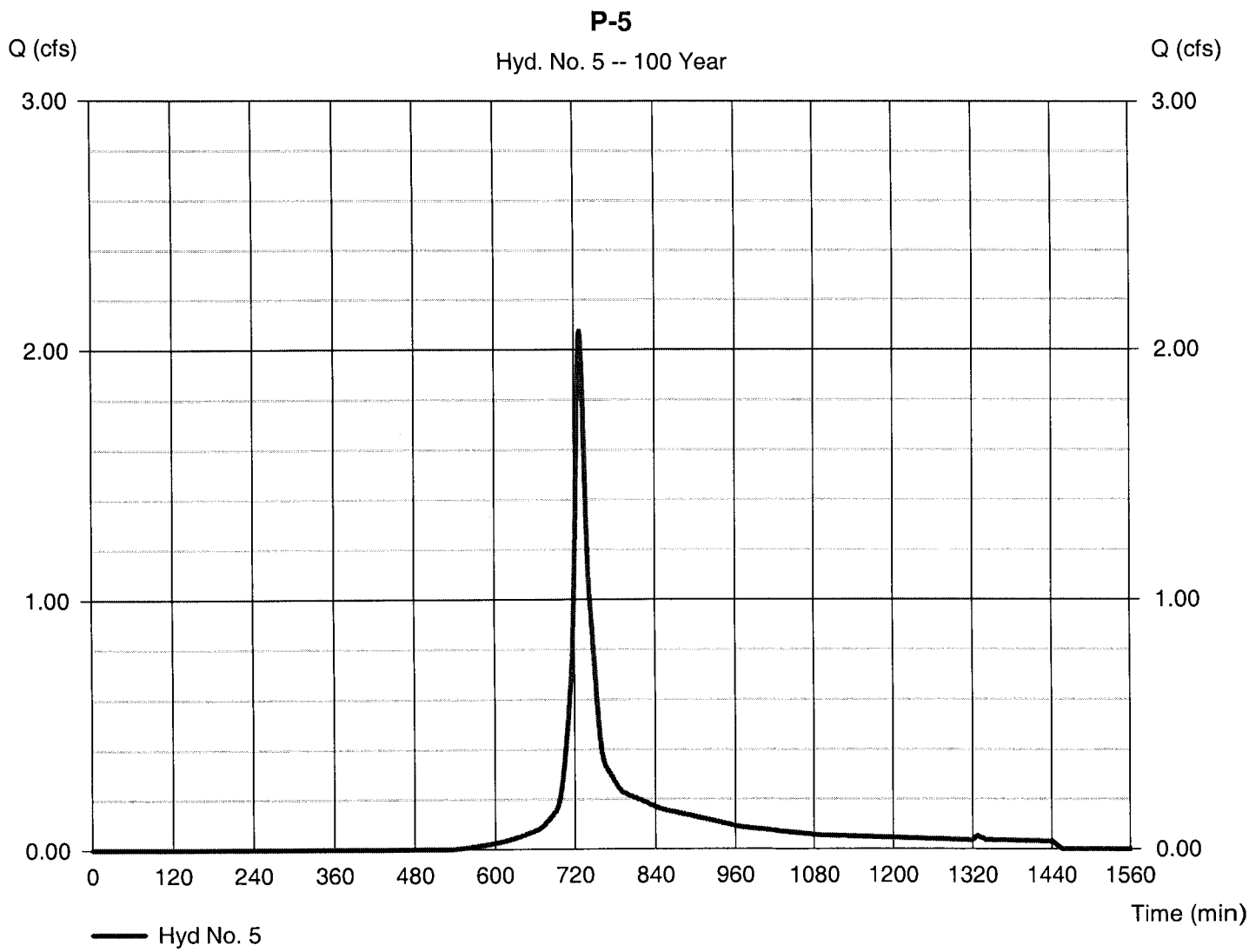
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Hyd. No. 5

P-5

Hydrograph type	= SCS Runoff	Peak discharge	= 2.073 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 7,563 cuft
Drainage area	= 0.630 ac	Curve number	= 68
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.76 min
Total precip.	= 6.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

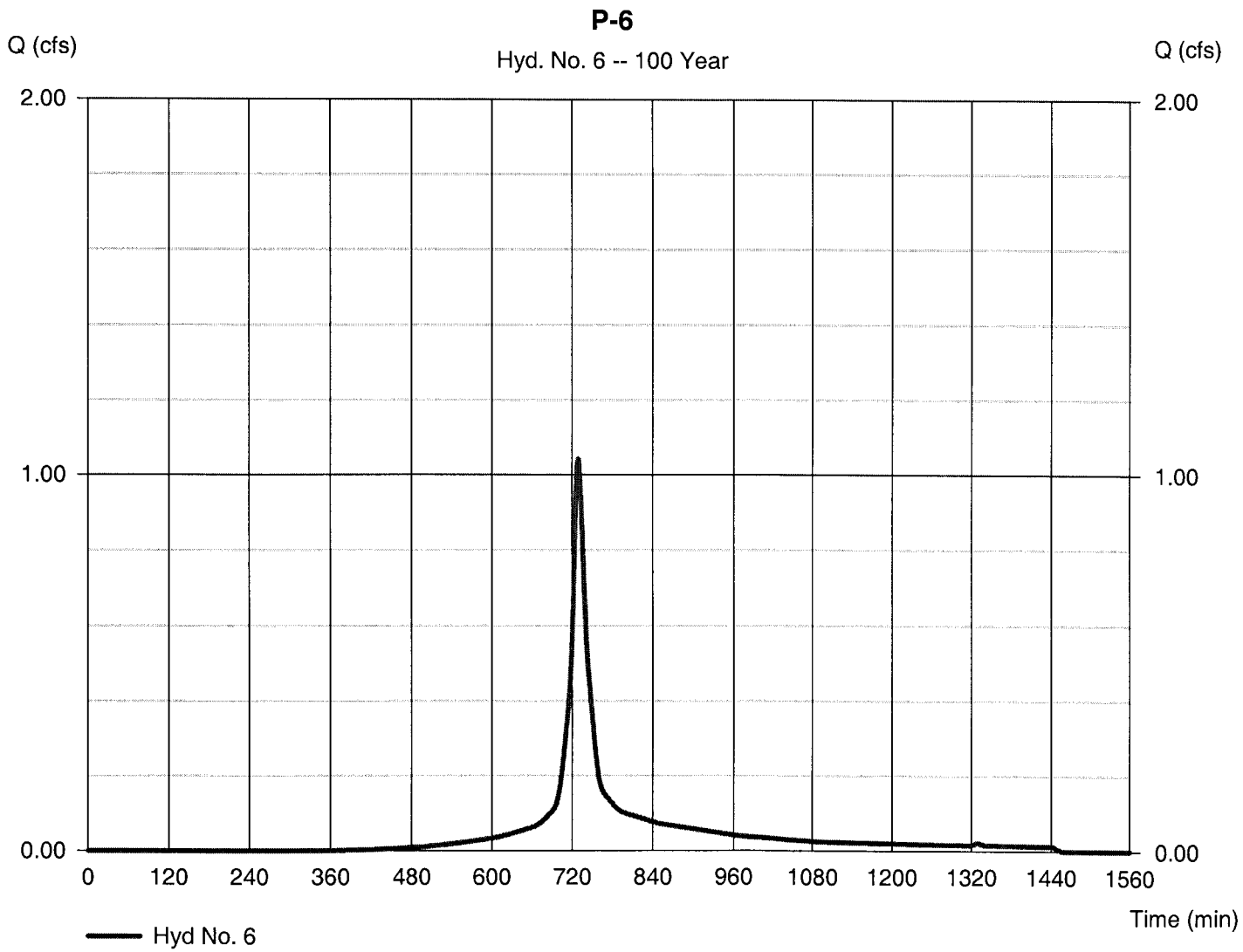
Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Dec 23, 2010

Hyd. No. 6

P-6

Hydrograph type	= SCS Runoff	Peak discharge	= 1.042 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 3,961 cuft
Drainage area	= 0.240 ac	Curve number	= 81
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 13.14 min
Total precip.	= 6.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

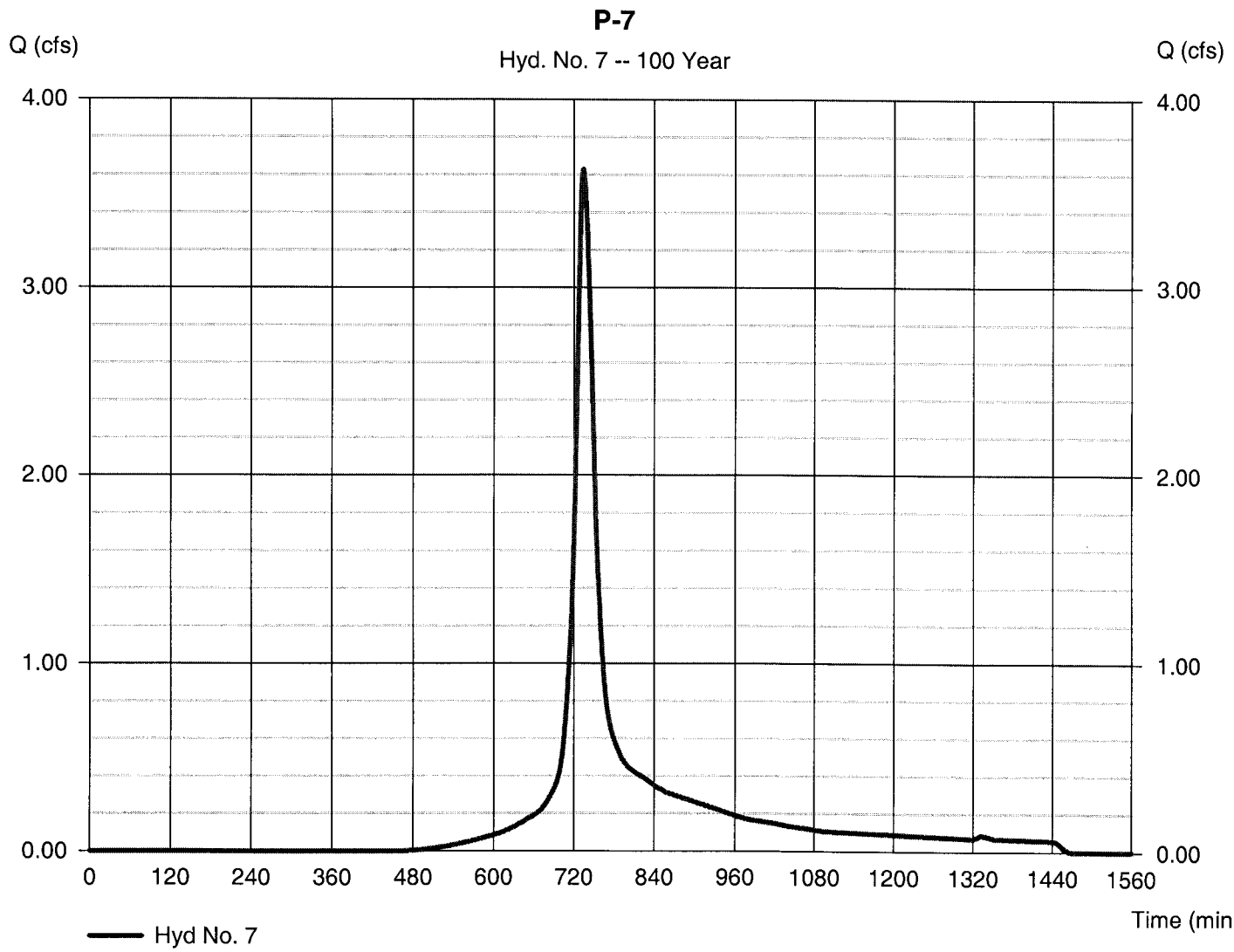
Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Dec 23, 2010

Hyd. No. 7

P-7

Hydrograph type	= SCS Runoff	Peak discharge	= 3.629 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 16,008 cuft
Drainage area	= 1.140 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.00 min
Total precip.	= 6.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

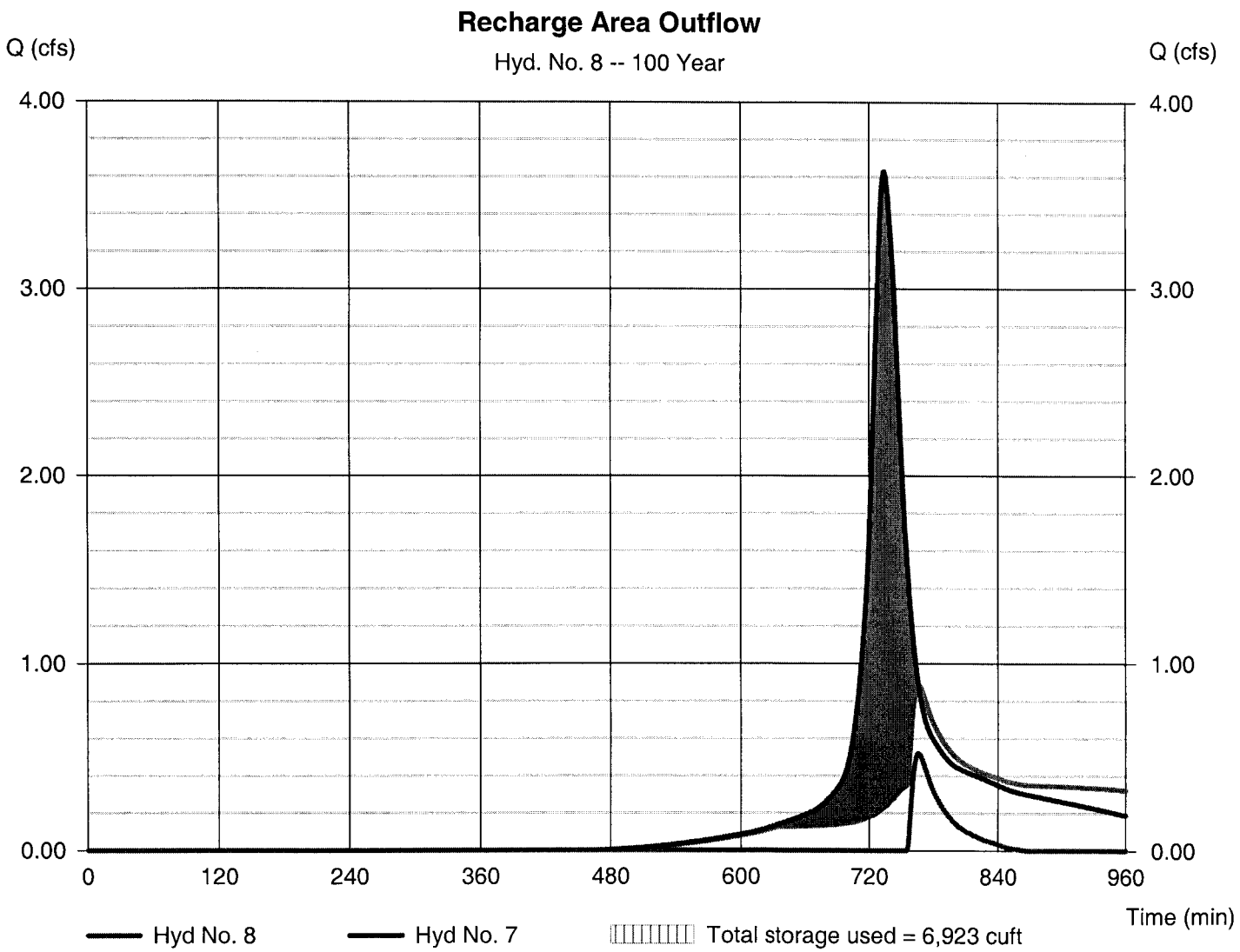
Thursday, Dec 23, 2010

Hyd. No. 8

Recharge Area Outflow

Hydrograph type	= Reservoir	Peak discharge	= 0.519 cfs
Storm frequency	= 100 yrs	Time to peak	= 766 min
Time interval	= 1 min	Hyd. volume	= 1,040 cuft
Inflow hyd. No.	= 7 - P-7	Max. Elevation	= 140.36 ft
Reservoir name	= Recharge System	Max. Storage	= 6,923 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

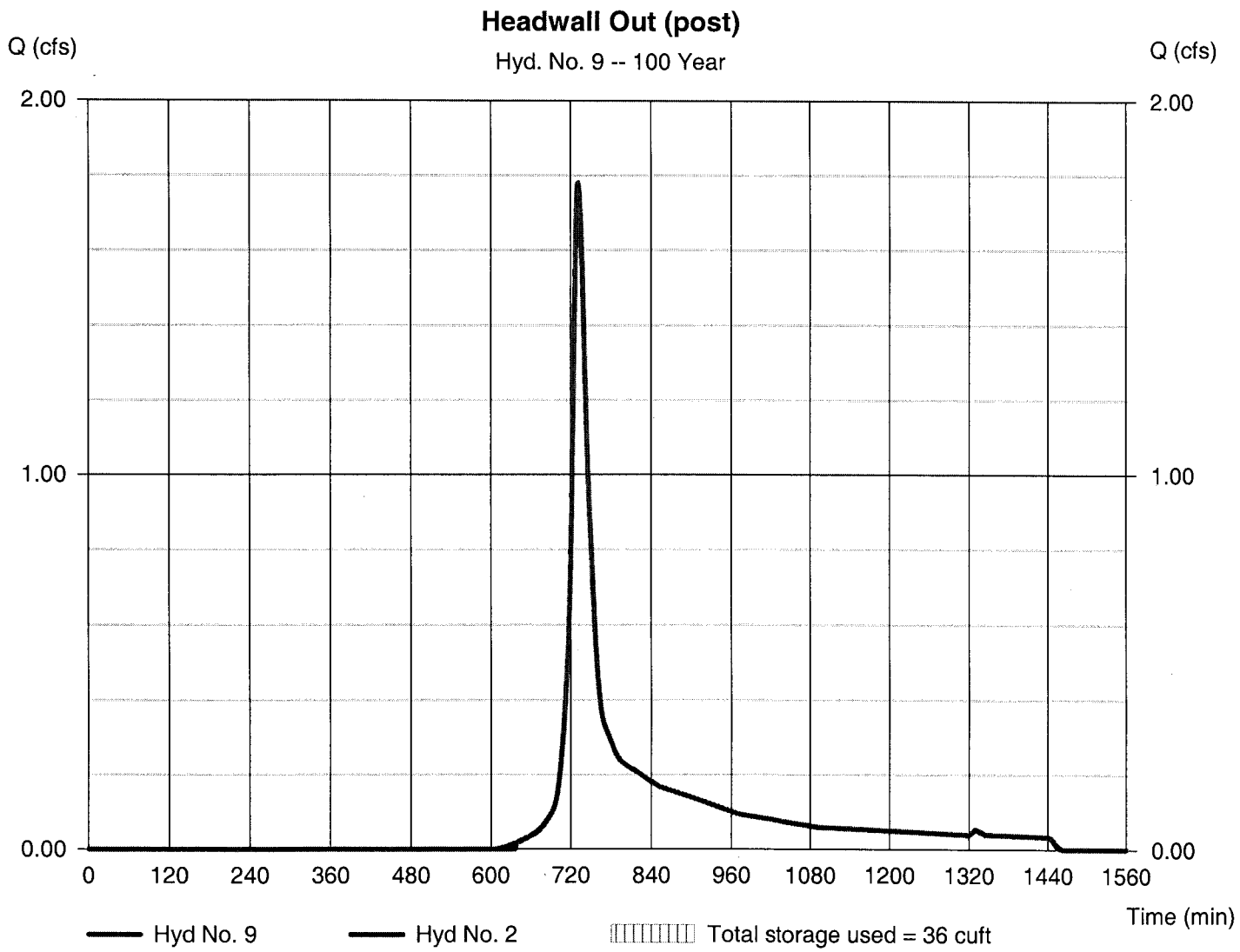
Thursday, Dec 23, 2010

Hyd. No. 9

Headwall Out (post)

Hydrograph type	= Reservoir	Peak discharge	= 1.780 cfs
Storm frequency	= 100 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 7,232 cuft
Inflow hyd. No.	= 2 - P-2	Max. Elevation	= 132.82 ft
Reservoir name	= Storage behind exist headwall	Max. Storage	= 36 cuft

Storage Indication method used.



Hydrograph Report

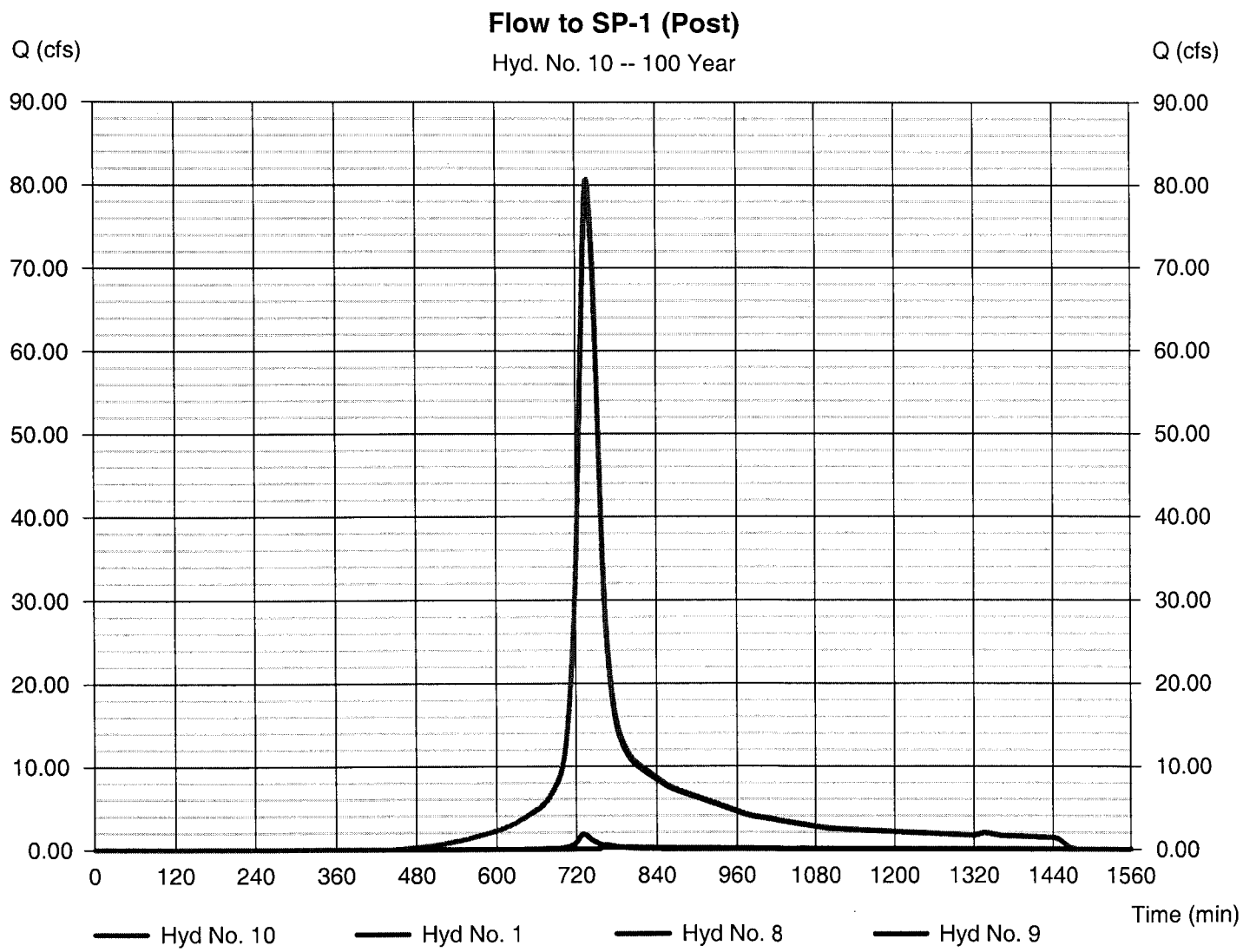
Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Dec 23, 2010

Hyd. No. 10

Flow to SP-1 (Post)

Hydrograph type	= Combine	Peak discharge	= 80.69 cfs
Storm frequency	= 100 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 390,509 cuft
Inflow hyds.	= 1, 8, 9	Contrib. drain. area	= 25.810 ac



Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Pond No. 1 - Storage behind exist headwall

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 131.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	131.50	10	0	0
1.50	133.00	50	41	41
2.50	134.00	1,760	702	743
3.50	135.00	4,450	3,003	3,746
4.50	136.00	8,220	6,239	9,985
5.50	137.00	10,000	9,095	19,079

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)	= 131.97	0.00	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.70	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

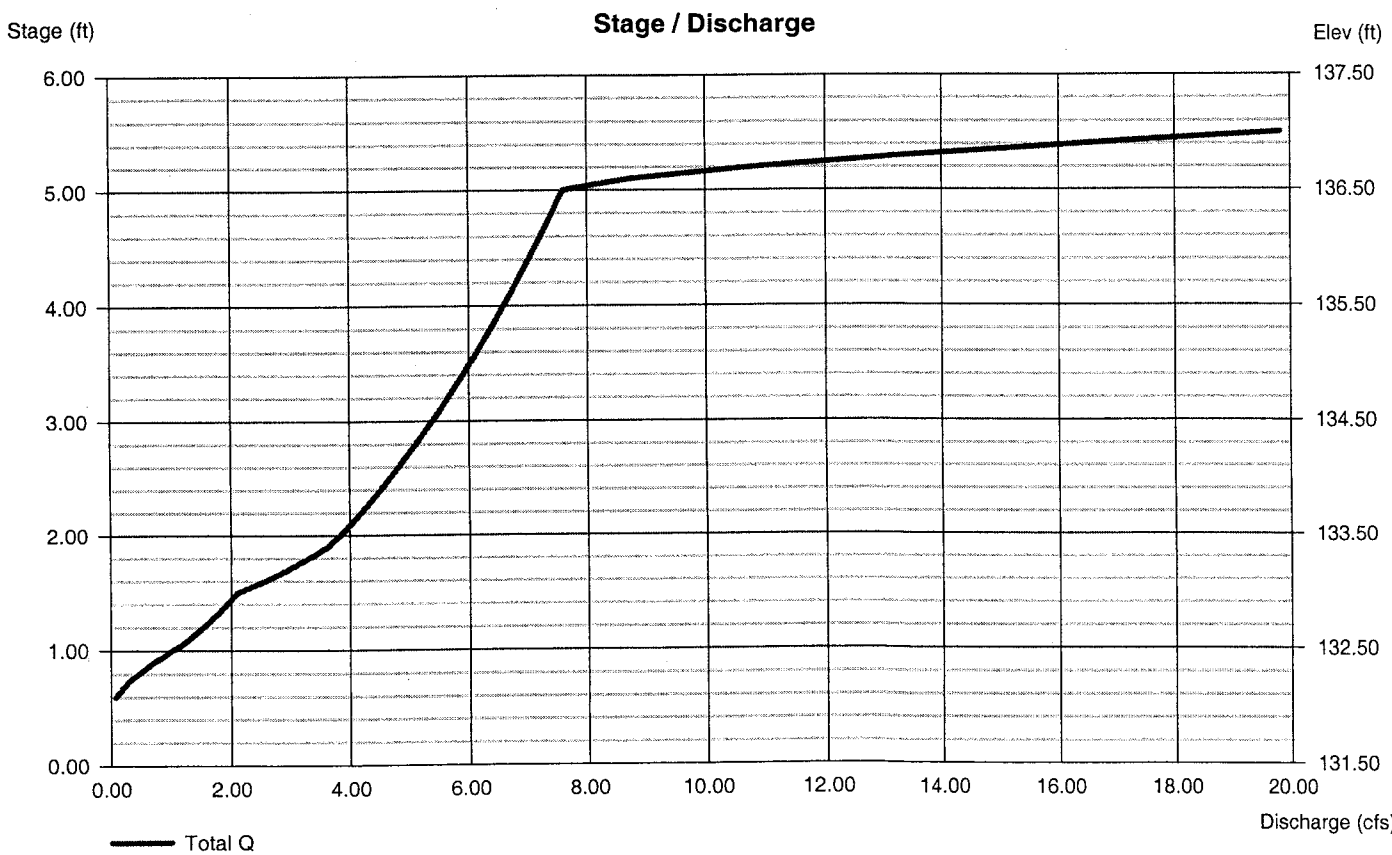
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 136.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (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).



Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Dec 23, 2010

Pond No. 2 - Recharge System

Pond Data

UG Chambers - Invert elev. = 136.00 ft, Rise x Span = 2.50 x 4.50 ft, Barrel Len = 67.50 ft, No. Barrels = 6, Slope = 0.00%, Headers = No
Encasement - Invert elev. = 135.00 ft, Width = 5.50 ft, Height = 5.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	135.00	n/a	0	0
0.55	135.55	n/a	490	490
1.10	136.10	n/a	599	1,090
1.65	136.65	n/a	1,084	2,173
2.20	137.20	n/a	1,047	3,221
2.75	137.75	n/a	974	4,194
3.30	138.30	n/a	837	5,031
3.85	138.85	n/a	548	5,579
4.40	139.40	n/a	490	6,069
4.95	139.95	n/a	490	6,559
5.50	140.50	n/a	490	7,049

Culvert / Orifice Structures

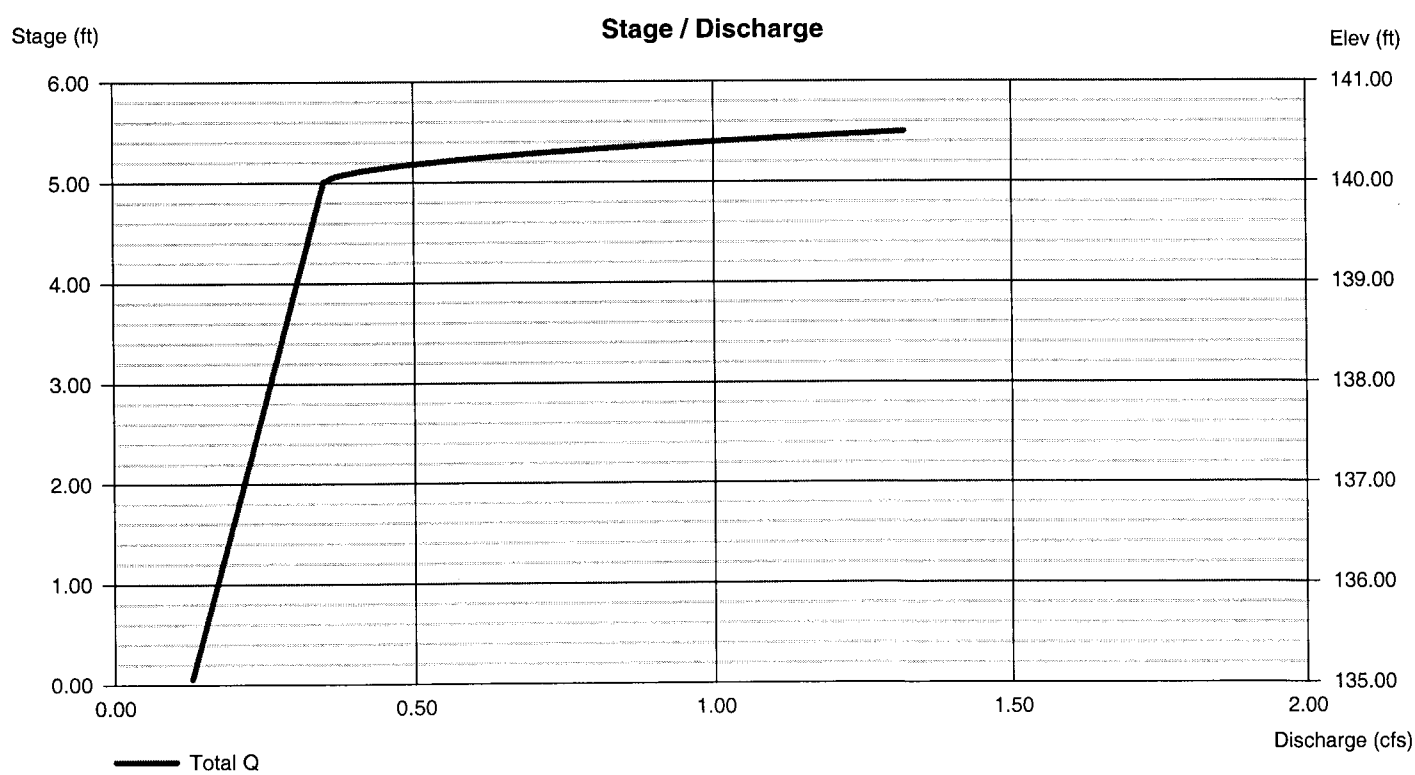
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 140.00	0.00	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 2.410 (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).



APPENDIX D

Groundwater Recharge Calculations (Standard 4)

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JOB READING WOODS
SHEET NO. 1 OF 1
CALCULATED BY MTR DATE 12/22/10
CHECKED BY JAB DATE
SCALE

RECHARGE

TOTAL IMPERVIOUS = 10.5 AC = 457,380 SF

HYDROL SOIL TYPE - "B" TARGET FACTOR = 0.35"

USING THE STATIC METHOD:

THE REQUIRED RECHARGE VOLUME (RV) =

$$RV = F \times IMP\ AREA$$

$$RV = 0.35/12 \times 457{,}380\ SF$$

$$RV = 13{,}340\ CF$$

ADJUSTMENT FOR CAPTURE AREA:

TOTAL IMP = 10.5 AC
CONTRIBUTING AREA = 7 AC
TO RECHARGE

$$ADJ\ RATIO = \frac{10.5}{7} = 1.5$$

$$RV_{ADJ} = 13{,}340\ CF \times 1.5 = 20{,}010\ CF$$
REQUIRED

TOTAL RECHARGE VOLUME FOR 411
8 SYSTEMS =

20,292 CF

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JOB READING WOODS
SHEET NO. 1 OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE

RECHARGE AREA #1 - CONTRIBUTING AREA

ROOF FROM BLDG #1

AREA = 15,400 SF × 0.35"/12 = 450 CF MIN OF STORAGE NEEDED

USE CULTEC "RECHARGER 18HD" WITH 6" OF STONE ABOVE & BELOW

USE 3 ROWS OF 4 CHAMBERS (12 TOTAL)

6 (END/STARTER UNITS) + 6 (INTERMEDIATE UNITS)

6 (60.84 FT³) + 6 (99.56 FT³) =

365 CF + 597 CF

= 962 CF PROVIDED

EXIST TP EL = 163.5
LEDGE @ 6.3 FT = 157.2
BOTTOM OF STONE EL = 159.50
BOTTOM OF CHAMBER = 160.0 (INV IN)
TOP OF RECHARGE BED = 163.2 MIN
OVERFLOW PIPE INV = 163.20

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JOB READING WOODS
SHEET NO. 2 OF
CALCULATED BY DATE
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SCALE

RECHARGE AREA #2 - CONTRIBUTING AREA -

BLDGS 2-3, FRONT OF TOWNS, JACOB WAY (PORTION IN FRONT OF TOWNS) & PLOT IN FRONT OF BLDG #3

CONTRIBUTING AREA = 101,600 SF x 0.35/12 =

2963 CF OF STORAGE NEEDED

USE CULTEC "RECHARGER 180HD" WITH 12" OF STONE ABOVE & BELOW

USE 6 ROWS OF 8 CHAMBERS (48 TOT)

12 (ENDS) + 36 (INTERMEDIATE UNITS)

12(65.88 FT³) + 36(107.81 FT³) =

790 + 3882 =

4672 CF PROVIDED

EX. GRADE = 146.0
BOTTOM OF TEST PIT = 133.0
BOTTOM OF STONE = 139.50
BOTTOM OF CHAMBER = 140.50
TOP OF RECHARGE AREA = 144.2 MIN.
OVERFLOW PIPE INV = 144.20

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JOB ROADING WOODS
SHEET NO. 3 OF
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RECHARGE AREA #3 - CONTRIBUTING AREA

PLOT BEHIND TOWNS, REAR OF TOWNS CLUB HOUSE

AREA = 25,000 SF × 0.35"/12 =

730 CF OF STORAGE NEEDED

USE CULTEC "RECHARGER 78HD" WITH 12" OF STONE ABOVE & BELOW

USE 2 ROWS OF 7 CHAMBERS (14 TOTAL)

4 (ENDS) + 10 (INTERMEDIATE UNITS)

4(65.88 FT³) + 10(107.81 FT³) =

263 FT³ + 1078 FT³

1342 FT³ PROVIDED

EX GRADE = 150.0
BOTTOM OF TEST PIT = 137.0
BOTTOM OF STONE = 141.50
BOTTOM OF CHAMBERS = 142.50
TOP OF RECHARGE AREA = 146.20 MIN
OVERFLOW PIPE INV = 146.20

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RECHARGE AREA #4 - CONTRIBUTING AREA

BLDGS #4 & #5

AREA = 33600 SF x 0.35"/12 =

980 CF OF STORAGE NEEDED

USE CULTEC "RECHARGER 78HD" WITH 12" OF STONE ABOVE & BELOW

USE 3 ROWS OF 6 CHAMBERS (18 TOTAL)

6 (ENDS) + 12 (INTERMEDIATE UNITS)

6(65.88) + 12(107.81) =

395 CF + 1294 CF =

1689 CF PROVIDED

EX GRADE = 144.0
BOTTOM OF TEST PIT = 130.0
BOTTOM OF STONE = 134.50
BOTTOM OF CHAMBERS = 135.50
TOP OF CHAMBERS = 139.20 MIN
OVER FLOW PIPE INV = 139.20

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SCALE

RECHARGE AREA #5 - CONTRIBUTING AREA

AREA BEHIND BLDGS #4 & 5

60,000 SF x 0.35"/12 = 1750 CF

OF STORAGE NEEDED

USE CULTEC "RECHARGER 330HD" w/12"

OF STONE ABOVE & BELOW

USE 6 ROWS OF 9 CHAMBERS (54 TOTAL)

12(END OS) + 42(INTERMEDIATE UNITS) =

12(65.88) + 42(107.81) =

790 CF + 4528 CF =

5318 CF PROVIDED

EXIST GRADE = 143.0
BOTTOM OF TEST PIT = 132.0
BOTTOM OF STONE = 135.0
BOTTOM OF CHAMBERS = 136.0
TOP OF RECHARGE AREA = 139.7
OVER FLOW PIPE INV = 139.70

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SCALE

RECHARGE AREA # 6 - CONTRIBUTING AREA

BLDG #6 (FRONT) & PLOT IN FRONT OF BLDGS # 5 & 6

AREA = 70,000 SF x 0.35/12 =

2042 CF OF STORAGE NEEDED

USE ADITEC "RECHARGER V8HD" WITH 12" OF STONE ABOVE & BELOW

USE 3 ROWS OF 12 CHAMBERS (36 TOTAL)

6 (ENDS) + 30 (INTERMEDIATE UNITS)

6(65.88) + 30(107.81) =

395 CF + 3234 CF =

3630 CF PROVIDED

EXIST GRADE = 137.5
BOTTOM OF TEST PIT = 125.0
BOTTOM OF STONE = 132.0
BOTTOM OF CHAMBER = 133.0
TOP OF RECHARGE AREA = 136.7
OVERFLOW PIPE INV = 137.0

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CALCULATED BY DATE
CHECKED BY DATE
SCALE

RECHARGE AREA #7 – CONTRIBUTING AREA

FRONT OF BLDGS 7 & 8, REAR OF BLDG #6 & BLDG #9

AREA = 45,500 SF × 0.35'/12 =

1327 CF OF STORAGE REQ

USE CULTEC "RECHARGER 330HD" WITH 12" OF STONE ABOVE & BELOW

USE 3 ROWS OF 7 CHAMBERS (21 TOTAL)

6 (ENDS) + 15 (INTERMEDIATE UNITS)

6(65.88) + 15(107.81) =

395 + 1617 CF =

2012 CF PROVIDED

EXIST GRADE = 139.0
BOTTOM OF TEST PIT = 129.0
BOTTOM OF STONE = 132.50
BOTTOM OF CHAMBER = 133.50
TOP OF RECHARGE = 137.20
OVERFLOW PIPE INV = 137.20

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SCALE

RECHARGE AREA #8 - CONTRIBUTING AREA -

REAR OF BLDG #7 & 8

18,200 SF x 0.35'/12 =

531 CF OF STORAGE REQ.

USE CULTEC "RECHARGER VAULT" WITH 6"

OF STONE ABOVE & BELOW

USE 2 ROWS OF 5 CHAMBERS (10 TOTAL)

4 (ENDS) + 6 (INTERMEDIATE UNITS)

4(60.84 CF) + 6(99.56 CF) =

243 + 597 CF =

840 CF PROVIDED

EXIST GRADE = 134.0
BOTTOM OF TEST PIT = 127.0
BOTTOM OF STONE = 129.0
BOTTOM OF CHAMBER = 129.50
TOP OF RECHARGE AREA = 132.70
OVERFLOW PIPE INV = 132.70

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JOB READING WOODS (487-187)
SHEET NO. 1 OF 3
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SCALE _____

RECHARGE AREA "DRAW-DOWN" TIME CALCULATIONS

SYSTEM #1

TOTAL VOLUME = 962 FT^3
BOTTOM AREA = 16.3' x 32' = 522 FT^2
SOIL TEXTURE = SANDY LOAM (TP 3-1-10)
RAWLS RATE = 1.02"/HR

TIME REQ = 962 FT^3 / (1.02"/HR/12)(522 FT^2) = 21.7 HRS

21.7 HRS < 72 HRS ∴ OK ✓

SYSTEM #2

TOTAL VOLUME = 4,672 FT^3
BOTTOM AREA = 31.2' x 62' = 1,934 FT^2
SOIL TEXTURE = SAND (TP 10-1-10)
RAWLS RATE = 8.27"/HR

TIME REQ. = 4,672 FT^3 / (8.27"/HR/12)(1,934 FT^2) = 3.5 HRS

3.5 HRS < 72 HRS ∴ OK ✓

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SYSTEM #3

TOTAL VOLUME = 1,342 FT³
BOTTOM AREA = 11.4' x 54.5' = 621 FT²
SOIL TEXTURE = SAND (TP 4-1-10)
RAWLS RATE = 8.27"/HR

TIME REQ. = 1,342 FT² / (8.27"/HR/12)(621 FT²) = 3.1 HRS

3.1 HRS < 72 HRS ∴ OK ✓

SYSTEM #4

TOTAL VOLUME = 1,680 FT³
BOT. AREA. = 16.3' x 47' = 766 FT²
SOIL TEXTURE = SAND (TP 5-1-10)
RAWLS RATE = 8.27"/HR

TIME REQ. = 1,680 FT³ / (8.27"/HR/12)(766 FT²) = 3.2 HRS

3.2 HRS < 72 HRS ∴ OK ✓

SYSTEM #5

TOTAL VOLUME = 5,318 FT³
BOT. AREA = 31.2' x 69.5' = 2,168 FT²
SOIL TEXTURE = LOAMY SAND (TP 6-1-10)
RAWLS RATE = 2.41"/HR

TIME REQ. = 5,318 FT³ / (2.41"/HR/12)(2,168 FT²) = 12.2 HR

12.2 HRS < 72 HRS ∴ OK ✓

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JOB READING WOODS (457-187)
SHEET NO. 3 OF 3
CALCULATED BY JE DATE 12-29-10
CHECKED BY _____ DATE _____
SCALE _____

SYSTEM #6

TOTAL VOLUME = 3,630 FT³
BOT. AREA = 16.3' x 92' = 1500 FT²
SOIL TEXTURE = SAND (TP 8-2-10)
RAWLS RATE = 8.27"/HR

TIME REQ. = 3630 FT³ / (8.27"/HR/12)(1500 FT²) = 3.5 HRS

3.5 HRS < 72 HRS ∴ OK ✓

SYSTEM #7

TOTAL VOLUME = 2,012 FT³
BOT. AREA = 16.3' x 54.5' = 888 FT²
SOIL TEXTURE = LOAMY SAND (TP 9-2-10)
RAWLS RATE = 2.41"/HR

TIME REQ. = 2,012 FT³ / (2.41"/HR/12)(888 FT²) = 11.3 HRS

11.3 HR < 72 HRS ∴ OK ✓

SYSTEM #8

TOTAL VOLUME = 840 FT³
BOT. AREA = 11.4' x 39.5' = 450 FT²
SOIL TEXTURE = SAND (TP 12-1-10)
RAWLS RATE = 8.27 IN/HR

TIME REQ. = 840 FT³ / (8.27"/HR/12)(450 FT²) = 2.7 HRS

2.7 HRS < 72 HR ∴ OK ✓

APPENDIX E

T.S.S. Removal Rate Worksheets (Standard 4)

TSS Removal Calculation Worksheet

Location: COLLECTION SYSTEMS 1 & 2

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (BxC)	E Remaining Load (C-D)
DEEP SUMP HOODED C. BASINS	25%	1.00*	0.25	0.75
STORMCEPTOR WATER QUALITY UNIT	75%	0.75	0.56	0.19

Total TSS Removal = 0.81 = 81%

Project: READING WOODS
Prepared By: JB
Date: 12/28/10

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

* NO CREDIT TAKEN FOR PROPOSED STREET SWEEPING

Performance Evaluation

Back to Profile

Stormceptor :: A product from STORMCEPTOR **::**

Performance information: (This product was evaluated in at least one third-party study. See MASTEP Evaluation Summary.)

MASTEP rating is primarily based on the 2005 NJCAT Technology Verification study. In general, this was a well-conducted test, which in large part followed NJDEP test guidelines for laboratory studies. Issues of concern: the study measured suspended sediment concentration (SSC) rather than total suspended solids (TSS). The test was conducted with higher influent sediment concentrations than is preferred, but results were fairly consistent across all ranges studied. The particle size distribution also appears to be higher than the target test range. There are additional field studies that in general support the results obtained in this laboratory studies. These studies do not satisfy TARP protocols, but they do not contradict results obtained in the NJCAT study. The Stormceptor system has received a General Use Level Determination for Pretreatment of TSS by the Washington State Department of Ecology (September 2007).

Pollutants addressed	Manufacturer's Removal Efficiency claim	Minimum particle size	Tested removal efficiency (*)	Test Data Status (**)	Notes
Suspended sediment concentration	50-80%	20	75 %	2	75% found in NJCAT lab study
Oil and grease	0-90%	-	-	3	Evaluated in Coventry U. study
Zinc	0-80%	-	-	0	-
Copper	0-80%	-	-	0	-
Lead	0-80%	-	-	0	-
Iron	0-80%	-	-	0	-
Chromium	0-80%	-	-	0	-
Mercury	0-80%	-	-	0	-
Cadmium	0-80%	-	-	0	-
Total suspended solids	50-80%	20	-	2	-
Ammonium	0-80%	-	-	0	-
Hydrocarbons	0-98%	-	-	0	-
Total Keldhal Nitrogen	0-65%	-	-	0	-
Total Phosphorus	0-60%	-	-	0	-

* - Pollution removal efficiency evaluated by MASTEP staff based on review of available performance evaluation reports.

** - **1** = sufficient credible data to be able to evaluate pollution removal efficiency claims. **2** = sound field or laboratory performance studies exist for this technology. Some caveats exist regarding use of the study information. **3** = performance studies with some scientific merit exist for this technology. Significant caveats exist regarding use of the study information. **4** = There is insufficient reliable data available to evaluate the performance of this technology. **0** = data review not yet conducted.

Test reports: (click on link to view a summary of a test, click on disk icon to download the full report)

APPENDIX F

Long-Term Operation and Maintenance & Pollution Prevention Plan (Standard 4-6)

LONG-TERM STORMWATER OPERATION AND MAINTENANCE PLAN & POLLUTION PREVENTION PLAN

Reading Woods

December 2010

1. OPERATIONS AND MAINTENANCE:

This Long-Term Stormwater Operation and Maintenance Plan & Pollution Prevention Plan (hereinafter the "O&M Plan") covers the post-construction[1] operation and maintenance of the stormwater management system and post-construction pollution prevention practices for the *Reading Woods* in Reading, Massachusetts.

The procedures, practices, and schedule outlined in this plan are intended to be ongoing requirements and are an important factor in ensuring the continued proper functioning of the stormwater management system and integrity of the discharged stormwater.

The following is description of the components of the stormwater management system for the *Reading Woods* along with the maintenance requirements. For locations and specifications of the components reference is made to the Site Plans prepared by; Marchionda & Associates, L.P., dated; December 29, 2010.

STREET SWEEPING:

Access drives and parking lots shall be swept according to the table below. All street sweepings shall be handled and disposed of in accordance with applicable local, state and federal guidelines and regulations.

High Efficiency Vacuum Sweeper – Frequency of Sweeping	Regenerative Air Sweeper – Frequency of Sweeping	Mechanical Sweeper (Rotary Broom) – Frequency of Sweeping
Quarterly average, with sweeping scheduled primarily in spring and fall.	Quarterly average, with sweeping scheduled primarily in spring and fall.	Monthly average, with sweeping scheduled primarily in spring and fall.

From 2008 DEP *Stormwater Management Handbook*, Volume 2, Chapter 1 – for 5% Total Suspending Solids (TSS) Removal Rate

[1] Operations and maintenance of temporary erosion and sedimentation controls utilized during construction will be covered by a *Stormwater Pollution Prevention Plan* as required by the National Pollutant Discharge Elimination System program of the Environmental Protection Agency, and is not part of the O&M Plan.

DEEP SUMP CATCH BASINS:

The stormwater management system includes forty one (41) deep-sump hooded catch basins. The catch basins shall be inspected four times per year for build-up of sediment, oil, and/or other debris which could decrease the effectiveness of the sumps.

Typically a dipstick tube equipped with a ball valve, such as a Sludge Judge®, is used to measure the approximate oil and sediment depth, and a clamshell bucket or vacuum truck is used to clean out the catch basin. Catch basins shall be cleaned twice per year or whenever the depth of sediment is greater than or equal to half the depth from the bottom of the sump to the invert of the lowest pipe (whichever is sooner). Cleaning shall coincide with the end of foliage and snow removal seasons. Any material removed shall be disposed of in accordance with applicable local, state and federal guidelines and regulations.

As part of the inspection, the catch basin hoods and associated hardware should be inspected to ensure that they are functioning properly. Hoods shall be repaired or replaced as necessary to ensure proper operation.

WATER QUALITY UNIT:

The stormwater management system includes two proprietary water quality unit to provide additional stormwater treatment prior to discharging from the site (refer to Figure 1, attached, for location). The project design specifies a Stormceptor® unit, and as such the inspection and maintenance schedule provided herein is based on this specific unit. Occasionally a different but "equivalent" type of unit is substituted during the construction process, and if this is the case, the applicable manufacturer's inspection and maintenance recommendations shall override those contained herein. The water quality unit shall be inspected four times per year in conjunction with the catch basin inspections and cleaned once per year or when oil and sediment levels reach recommended maintenance levels (eight inches of oil and eight inches of sediment), whichever is sooner. The water quality unit should also be inspected after any spill event and cleaned accordingly. A dipstick tube equipped with a ball valve, such as a Sludge Judge®, can be used to measure the approximate oil and sediment depth in the unit. The following procedure should be used to inspect the unit:

- Determine the length of sampler required; consult the owner's manual or contact the local manufacturing representative for this information.
- Assemble the sampler sections (top, middles, and bottom) to the correct length.
- Lower the sampler to the bottom of the unit. The float valve opens allowing materials to flow in. When the bottom has been reached and the pipe has been filled to the surface level, tug slightly on the rope as the Sludge Judge® is raised.
- This sets the check valve trapping the mixture inside.
- When the sampler has been raised the amount of oil and sediment can be read.

- To release the material in the sampler touch the pin extending from the bottom section against a hard surface such as a pail. This will open the check valve to drain the sample.

A vacuum truck should be utilized to perform any necessary cleaning of the water quality unit. Any material removed shall be disposed of in accordance with applicable local, state and federal guidelines and regulations.

UNDERGROUND RECHARGE SYSTEMS:

The stormwater management system includes an eight (8) underground recharge systems comprised of a series HDPE chambers set in crushed stone. Inspection ports will be installed to allow for inspection and maintenance of the system.

The detention system shall be inspected twice per year in conjunction with every other catch basin inspection. To accomplish this, the inspection ports shall be opened and the depth of any standing water or sediment shall be measured. Note that the system is designed to drain dry within 72 hours of the end of any storm event. Should the depth of sediment exceed six inches, the system should be cleaned.

RIPRAP AREAS:

The stormwater management system includes three riprap aprons. These areas shall be inspected twice per year for erosion, accumulated sediment, and debris that could affect the capacity of the swale or the effectiveness of the aprons at dissipating energy and spreading out the flow. Any concerns shall be addressed as soon as practicable to ensure that these components of the stormwater management system continue to function as designed.

SUMMARY OF MAINTENANCE REQUIREMENTS:

BMP	MIN. FREQUENCY	RESPONSIBLE PARTY
Street Sweeping	Up to monthly (dependent on style of sweeper)	Project Owner
Catch Basins	Inspect 4x/year Clean 2x/year (or @½ the sump capacity)	Project Owner
Water Quality Unit	Inspect 4x/year Clean 1x/year (or @8" sediment/sludge)	Project Owner
Detention and Recharge System	Inspect 2x/year Clean at 6" sediment	Project Owner
Riprap Areas	Inspect 2x/year Clean as necessary	Project Owner

MAINTENANCE LOGS:

Maintenance logs shall be maintained for the past three years and shall include inspections, repairs, replacement, and disposal (type of material and disposal location).

2. POLLUTION PREVENTION:

WINTER MAINTENANCE OF DRIVEWAYS AND PARKING LOTS:

The proposed use of the site should not require the need for snow removal and maintenance of the driveways and parking areas during winter months. In the case that maintenance is required snow storage shall take place on pervious surfaces to the extent practicable to allow the snowmelt to filter through the soil, leaving behind sand and debris that can be removed in the springtime. Snow shall not be stored in drainage collection areas or conveyance channels as this may block the system causing flooding. Furthermore, snow shall not be stored in or within 25 feet of a wetland resource area. No road salt, sodium chloride, or other deicing chemicals shall be used on paved surfaces within 100 feet of a wetland resource area.

STORAGE OF WASTE PRODUCTS:

Any outdoor storage of waste products shall be covered to prevent rainfall from picking up contaminants from the waste. This requirement shall include any dumpster(s) which shall have the lid(s) closed when not being loaded or unloaded. Dumpsters should not be located with in 100 feet of a wetland resource area.

ILLICIT DISCHARGES:

There shall be no illicit discharges to the stormwater management system. Illicit discharges are defined by 310 CMR 10.04 as follows:

"Illicit discharge means a discharge that is not entirely comprised of stormwater. Notwithstanding the foregoing, an illicit discharge does not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated ground water, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents."

Prior to the discharge of stormwater runoff to the post-construction stormwater best management practices, an Illicit Discharge Compliance Statement shall be submitted to the Reading Conservation Commission verifying that no illicit discharges exist on the site.

EMERGENCY SPILLS:

The project owner shall maintain a list of emergency contact phone numbers to use in the event of a spill. At a minimum the list should include the DEP Emergency Response Section, an environmental cleanup contractor such as Clean Harbors, Inc., the Reading Fire Department, and the Reading Conservation Department:

- DEP Emergency Response **1(888)304-1133**
- Clean Harbors, Inc. **1(800)645-8265**
- Reading Fire Department **911 or (781)944-3132**
- Reading Conservation Department **(781)942-6616**

While the above-listed phone numbers are current as of the writing of the O&M Plan, the property owner shall verify these numbers and periodically check/update the list.

ORDER OF CONDITIONS – MASSACHUSETTS WETLANDS PROTECTION ACT:

The *Reading Woods* project is subject to an Order of Conditions under the Massachusetts Wetlands Protection Act and the Reading Wetlands Protection Bylaw. Orders of Conditions often times include conditions relating to stormwater pollution prevention that run in perpetuity. Therefore, the project owner shall be familiar with and shall operate and maintain the site in accordance with any such conditions of the Order of Conditions.

3. RESPONSIBILITY TO ADMINISTER THE PLAN:

It shall be the responsibility of the property owner to operate and maintain the stormwater management system and practice the pollution prevention measures in accordance with the O&M Plan. The property owner upon the commencement of the O&M Plan is expected to be:

Pulte Homes of New England, LLC
115 Flanders Road
Westborough, MA 01581

Upon any future changes in property ownership, the responsibility to administer the O&M Plan shall be transferred entirely to the new owner.

APPENDIX G

Operation and Maintenance Plan (Standard 9)

OPERATION AND MAINTENANCE PLAN FOR STORM WATER CONTROLS

READING WOODS
READING, MASSACHUSETTS

Prepared For:
Pulte Homes of New England , LLC

Prepared By:
Marchionda & Associates, L.P.

December 2010

OPERATION AND MAINTENANCE PLAN FOR POST-CONSTRUCTION STORM WATER CONTROLS

READING WOODS
READING, MASSACHUSETTS

DECEMBER 2010

GENERAL

The Best Management Practices (BMPs) used in the design of the Reading Woods project were chosen for their effectiveness at reducing peak discharge, treating the required Water Quality Volume for total suspended solids (TSS), and infiltrating groundwater. Routine maintenance is required for the BMPs, as proper maintenance is essential in achieving the desired result of improved water quality. The project's general contractor is responsible This Operations and Maintenance (O&M) Plan is intended to cover the post-construction maintenance of the permanent BMPs proposed for this project[1].

RESPONSIBILITY TO ADMINISTER O&M PLAN

During construction, the General Contractor will be responsible for maintaining the stormwater management system in accordance with this O&M Plan until such time that ownership of the project or phases thereof are turned over to "Owner". The "Owner" is then responsible for maintaining the stormwater management system in accordance with this O&M Plan.

INSPECTION & MAINTENANCE REQUIREMENTS

As outlined below, a qualified personnel shall inspect and maintain all components of the stormwater management system. The following is a list of the proposed BMPs and corresponding O&M requirements:

[1] Operations and maintenance of temporary erosion and sedimentation controls utilized during construction will be covered by a *Stormwater Pollution Prevention Plan* as required by the National Pollutant Discharge Elimination System program of the Environmental Protection Agency, and is not part of this O&M Plan.

STREET SWEEPING:

Street sweeping of access drives and parking lots shall be conducted once per quarter. All street sweepings shall be handled and disposed of in accordance with applicable local, state and federal guidelines and regulations.

DEEP SUMP CATCH BASINS:

The catch basins proposed for the project include four-foot deep sumps and oil separator hoods. The catch basins shall be inspected twice per year for build-up of sediment, oil, and/or other debris which could decrease the effectiveness of the sumps. A qualified company specializing in the cleaning of catch basins shall perform the inspection of catch basins.

Typically a dipstick tube equipped with a ball valve, such as a Sludge Judge®, is used to measure the approximate oil and sediment depth, and a vacuum truck is used to clean out the catch basin. Catch basins shall be cleaned once per year, or sooner if the depth of sediment is found to reach 12 inches or the thickness of the oil layer is found to reach six inches upon inspection. Any material removed shall be disposed of in accordance with applicable local, state and federal guidelines and regulations.

As part of the inspection, the catch basin hoods and associated hardware should be inspected to ensure that they are functioning properly. Hoods shall be repaired or replaced as necessary to ensure proper operation.

WATER QUALITY UNIT:

The stormwater management system includes a proprietary water quality unit to provide additional stormwater treatment prior to discharging the groundwater recharge system. The project design specifies a Stormceptor® unit, and as such the inspection and maintenance schedule provided herein is based on this specific unit. Occasionally a different but "equivalent" type of unit is substituted during the construction process, and if this is the case, the applicable manufacturer's inspection and maintenance recommendations shall override those contained herein. The water quality unit shall be inspected four times per year in conjunction with the catch basin inspections and cleaned once per year or when oil and sediment levels reach recommended maintenance levels (eight inches of oil and eight inches of sediment), whichever is sooner. The water quality unit should also be inspected after any spill event and cleaned accordingly. A dipstick tube equipped with a ball valve, such as a Sludge Judge®, can be used to measure the approximate oil and sediment depth in the unit. The following procedure should be used to inspect the unit:

- Determine the length of sampler required; consult the owner's manual or contact the local manufacturing representative for this information.
- Assemble the sampler sections (top, middles, and bottom) to the correct length.
- Lower the sampler to the bottom of the unit. The float valve opens allowing materials to flow in. When the bottom has been reached and the pipe has been filled to the surface level, tug slightly on the rope as the Sludge Judge® is raised.
- This sets the check valve trapping the mixture inside.
- When the sampler has been raised the amount of oil and sediment can be read.
- To release the material in the sampler touch the pin extending from the bottom section against a hard surface such as a pail. This will open the check valve to drain the sample.

A vacuum truck should be utilized to perform any necessary cleaning of the water quality unit. Any material removed shall be disposed of in accordance with applicable local, state and federal guidelines and regulations.

GROUNDWATER RECHARGE SYSTEM:

The groundwater recharge systems consist of a series of underground HDPE chambers set in a bed of stone. The purpose of the recharge system is to infiltrate stormwater runoff from building roof tops, parking areas, and access drives back into the groundwater table.

It is important to occasionally inspect the system to ensure that it remains clear of any debris and sediment, which will help to ensure that they continue to function efficiently for the long term.

To accomplish this, the recharge systems should be inspected once every year. The recharge systems include inspection ports made up of vertical pipes that extend from the recharge chamber to the ground surface. A small valve box located flush with the ground surface protects each of the inspection ports. In order to access the inspection ports, the lid must be removed from the valve box and a threaded end cap must be removed from the inspection port. A dipstick tube equipped with a ball valve, such as a Sludge Judge®, or a stadia rod should be used to measure the depth of sediment in the chamber. Should the depth of sediment exceed six inches, which is not expected to occur during the life of the system, the chamber(s) should be cleaned of the sediment. In the event that the system would need to be cleaned, a culvert cleaning nozzle such as a JetVac® is recommended.

EMERGENCY SPILLS

During construction, the general contractor will be responsible for monitoring the site and reporting spills of any unsafe substances until such time that ownership of the project or phases thereof are turned over to the Owner.

- DEP Emergency Response **1(888)304-1133**
- Clean Harbors, Inc. **1(800)645-8265**
- Reading Fire Department **911 or (781)944-3132**
- Reading Public Works **(781)942-9077**

STORMWATER MANAGEMENT SYSTEM
INSPECTION/MAINTENANCE LOG
READING WOODS

Date: _____

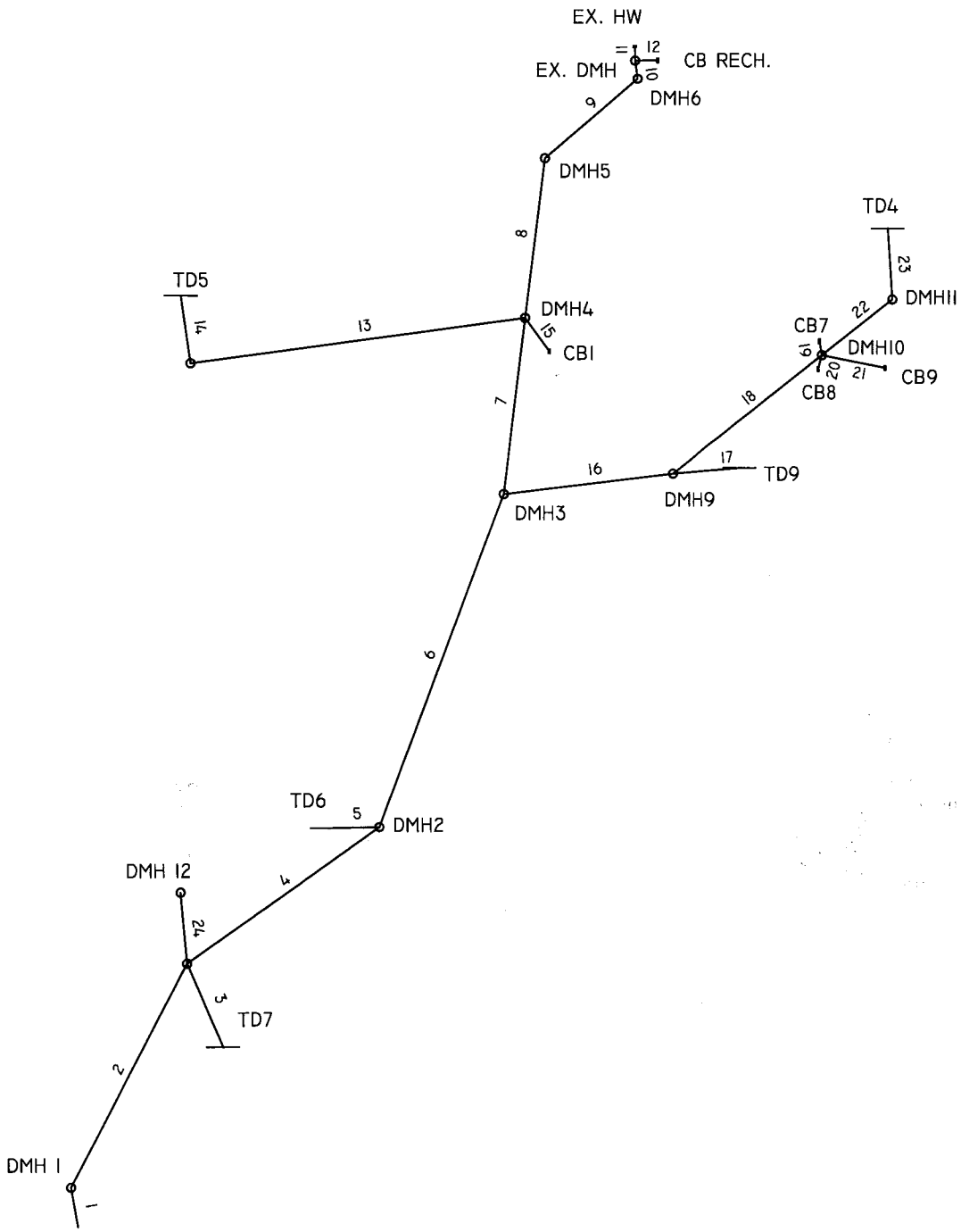
Name: _____

Supervisor Sign off: _____

STRUCTURAL COMPONENT	SPECIFIC MAINTENANCE OR INSPECTION TASK	REPAIR NEEDED?	RECOMMENDED ADDITIONAL MAINTENANCE AND COMMENTS

APPENDIX H

Stormwater Collection System Calculations



MARCHIONDA & ASSOC., L.P.
ENGINEERING AND PLANNING CONSULTANTS

62 MONTVALE AVE. SUITE 1
STONEHAM, MA. 02180
(617) 438-6121

STORM SEWER SYSTEM #1

READING WOODS
READING, MA

SCALE: NONE	DATE: 1/4/11	**S-1**

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	SC1-FES	18.30	24 c	28.0	126.00	126.15	0.536	127.68	127.83	0.00	127.83	End
2	DMH-SC1	18.33	24 c	177.0	126.20	127.10	0.508	127.96	128.85	0.00	128.85	1
3	TD7-DMH1	0.64	8 c	64.0	130.00	131.50	2.344	130.26	131.88	0.00	131.88	2
4	DMH2-DMH1	4.08	24 c	166.0	127.15	128.00	0.512	129.41	129.45	0.00	129.45	2
5	TD6-DMH2	0.31	8 c	37.0	131.50	132.30	2.162	131.68	132.56	n/a	132.56	4
6	DMH3-DMH2	4.05	24 c	251.0	128.05	129.30	0.498	129.46	130.01	n/a	130.01 j	4
7	DMH4-DMH3	1.62	15 c	125.0	129.65	130.28	0.504	130.24	130.79	n/a	130.79 j	6
8	DMH5-DMH4	0.95	15 c	113.0	130.33	130.90	0.504	130.96	131.29	n/a	131.29 j	7
9	DMH6-DMH5	0.96	15 c	86.0	130.95	131.38	0.500	131.41	131.77	0.00	131.77	8
10	EX. DMH-DMH6	0.97	12 c	13.0	131.43	131.58	1.154	131.88	132.00	n/a	132.00 j	9
11	HW-EX. DMH	1.65	12 c	10.0	131.80	131.97	1.700	132.21	132.63	0.00	132.63	10
12	CB RECHARGE-D	0.01	12 c	16.0	140.34	140.50	1.000	140.38	140.54	0.00	140.54	10
13	DMH7-DMH4	0.62	12 c	239.0	130.38	131.58	0.502	130.96	131.92	n/a	131.92 j	7
14	TD5-DMH5	0.63	8 c	48.0	133.00	133.30	0.625	133.38	133.68	0.00	133.68	13
15	CB1-DMH4	0.62	12 c	29.0	138.95	139.25	1.034	139.22	139.58	0.00	139.58	7
16	DMH9-DMH3	4.21	15 c	120.0	130.25	130.85	0.500	131.14	131.74	0.00	131.74	6
17	TD9-DMH9	0.40	8 c	48.0	132.90	135.00	4.375	133.07	135.30	0.00	135.30	16
18	DMH10-DMH9	3.93	15 c	136.0	130.95	131.70	0.551	131.89	132.49	n/a	132.49 j	16
19	CB7-DMH10	2.44	12 c	10.0	138.90	139.07	1.700	139.39	139.95	0.00	139.95	18
20	CB8-DMH10	0.67	12 c	10.0	138.90	139.07	1.700	139.15	139.47	0.00	139.47	18
21	CB9-DMH10	0.47	12 c	46.0	138.90	139.40	1.087	139.13	139.69	0.00	139.69	18
22	DMH11-DMH10	0.53	8 c	64.0	132.28	132.66	0.594	132.81	133.01	0.00	133.01	18
23	TD4-DMH11	0.54	8 c	50.0	132.76	133.10	0.680	133.10	133.45	0.00	133.45	22
24	DMH 12-DMH 1	14.00	15 c	50.0	134.60	136.80	4.400	135.58*	138.53*	0.00	138.53	2

Reading Woods - System 1 | Number of lines: 24 | Run Date: 01-03-2011

NOTES: c = cir; e = ellip; b = box; Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	28.0	0.00	2.52	0.00	0.00	1.38	0.0	33.2	3.1	18.30	17.93	6.50	24	0.54	126.15	126.00	127.83	127.68	132.30	132.30	SC1-FES
2	1	177.0	0.00	2.52	0.00	0.00	1.38	0.0	32.7	3.1	18.33	17.47	6.28	24	0.51	127.10	126.20	128.85	127.96	139.00	132.30	DMH-SC1
3	2	64.0	0.17	0.17	0.62	0.11	0.11	5.0	5.0	6.0	0.64	2.00	4.12	8	2.34	131.50	130.00	131.88	130.26	132.70	139.00	TD7-DMH1
4	2	166.0	0.00	2.35	0.00	0.00	1.28	0.0	31.4	3.2	4.08	17.53	1.49	24	0.51	128.00	127.15	129.45	129.41	136.00	139.00	DMH2-DMH1
5	4	37.0	0.11	0.11	0.46	0.05	0.05	5.0	5.0	6.0	0.31	1.92	3.22	8	2.16	132.30	131.50	132.56	131.68	133.50	136.00	TD6-DMH2
6	4	251.0	0.00	2.24	0.00	0.00	1.23	0.0	29.5	3.3	4.05	17.29	2.87	24	0.50	129.30	128.05	130.01	129.46	139.50	136.00	DMH3-DMH2
7	6	125.0	0.00	1.07	0.00	0.00	0.48	0.0	28.5	3.3	1.62	4.97	3.14	15	0.50	130.28	129.65	130.79	130.24	143.93	139.50	DMH4-DMH3
8	7	113.0	0.00	0.78	0.00	0.00	0.27	0.0	27.1	3.4	0.95	4.97	2.21	15	0.50	130.90	130.33	131.29	130.96	144.00	143.93	DMH5-DMH4
9	8	86.0	0.00	0.78	0.00	0.00	0.27	0.0	26.0	3.5	0.96	4.95	2.63	15	0.50	131.38	130.95	131.77	131.41	143.50	144.00	DMH6-DMH5
10	9	13.0	0.00	0.78	0.00	0.00	0.27	0.0	25.9	3.5	0.97	3.83	2.96	12	1.15	131.58	131.43	132.00	131.88	143.20	143.50	EX. DMH-DMH6
11	10	10.0	0.78	0.78	0.35	0.27	0.27	5.0	5.0	6.0	1.65	4.64	4.20	12	1.70	131.97	131.80	132.63	132.21	133.00	143.20	HW-EX. DMH
12	10	16.0	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	0.01	3.86	0.94	12	1.00	140.50	140.34	140.54	140.38	142.50	143.20	CB RECHARGE-
13	7	239.0	0.00	0.15	0.00	0.00	0.11	0.0	5.4	5.9	0.62	2.73	2.01	12	0.50	131.58	130.38	131.92	130.96	145.00	143.93	DMH7-DMH4
14	13	48.0	0.15	0.15	0.70	0.11	0.11	5.0	5.0	6.0	0.63	1.03	3.12	8	0.63	133.30	133.00	133.68	133.38	134.50	145.00	TD5-DMH5
15	7	29.0	0.14	0.14	0.73	0.10	0.10	5.0	5.0	6.0	0.62	3.92	3.17	12	1.03	139.25	138.95	139.58	139.22	143.25	143.93	CB1-DMH4
16	6	120.0	0.00	1.17	0.00	0.00	0.75	0.0	7.0	5.6	4.21	4.95	4.53	15	0.50	130.85	130.25	131.74	131.14	140.00	139.50	DMH9-DMH3
17	16	48.0	0.14	0.14	0.47	0.07	0.07	5.0	5.0	6.0	0.40	2.74	4.11	8	4.38	135.00	132.90	135.30	133.07	136.20	140.00	TD9-DMH9
18	16	136.0	0.00	1.03	0.00	0.00	0.68	0.0	6.3	5.8	3.93	5.19	4.37	15	0.55	131.70	130.95	132.49	131.89	143.45	140.00	DMH10-DMH9
19	18	10.0	0.56	0.56	0.72	0.40	0.40	5.0	5.0	6.0	2.44	5.03	4.84	12	1.70	139.07	138.90	139.95	139.39	143.07	143.45	CB7-DMH10
20	18	10.0	0.15	0.15	0.74	0.11	0.11	5.0	5.0	6.0	0.67	5.03	3.36	12	1.70	139.07	138.90	139.47	139.15	143.07	143.45	CB8-DMH10
21	18	46.0	0.14	0.14	0.56	0.08	0.08	5.0	5.0	6.0	0.47	4.02	2.96	12	1.09	139.40	138.90	139.69	139.13	143.40	143.45	CB9-DMH10

Reading Woods - System 1

Number of lines: 24

Run Date: 01-03-2011

NOTES: Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
22	18	64.0	0.00	0.18	0.00	0.00	0.09	0.0	5.5	5.9	0.53	1.01	2.35	8	0.59	132.66	132.28	133.01	132.81	145.00	143.45	DMH11-DMH10
23	22	50.0	0.18	0.18	0.50	0.09	0.09	5.0	5.0	6.0	0.54	1.08	2.99	8	0.68	133.10	132.76	133.45	133.10	134.30	145.00	TD4-DMH11
24	2	50.0	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	14.00	14.67	12.51	15	4.40	136.80	134.60	138.53	135.58	140.63	139.00	DMH 12-DMH 1

Reading Woods - System 1 | Number of lines: 24 | Run Date: 01-03-2011

NOTES: Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet Ht (in)	Curb Inlet L (ft)	Grate Inlet area (sqft)	Grate Inlet L (ft)	Grate Inlet W (ft)	Gutter So (ft/ft)	Gutter W (ft)	Gutter Sw (ft/ft)	Gutter Sx (ft/ft)	Gutter n	Gutter Depth (ft)	Gutter Spread (ft)	Inlet Depth (ft)	Inlet Spread (ft)	Inlet Depr (in)	Byp line No
1	DMH1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
2		0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	2.00	1
3	TD7	0.64	0.00	0.64	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.031	0.012	0.04	0.52	0.04	0.52	0.00	Off
4	DMH2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
5	TD6	0.31	0.00	0.31	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.031	0.012	-0.04	-0.54	0.03	0.22	2.00	Off
6	DMH3	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
7	DMH4	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	6
8	DMH5	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	7
9	DMH6	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	8
10	EX. DMH	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	9
11	EX. HW	1.65	0.00	1.65	0.00	Hdwl	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	10
12	CB RECH.	0.52*	0.00	0.52	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.03	0.34	0.09	0.83	2.00	11
13		0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	2.00	12
14	TD5	0.63	0.00	0.63	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.031	0.012	-0.03	-0.34	0.04	0.36	2.00	Off
15	CB1	0.62	0.00	0.62	0.00	Grate	6.0	6.00	4.00	2.00	2.00	2.000	2.00	0.080	0.030	0.012	0.07	0.85	0.08	0.68	2.00	Off
16	DMH9	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
17	TD9	0.40	0.00	0.40	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.031	0.012	0.03	0.38	0.03	0.38	0.00	Off
18	DMH10	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
19	CB7	2.44	0.00	2.44	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.20	3.23	0.26	3.23	2.00	18
20	CB8	0.67	0.00	0.67	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.04	0.56	0.11	0.98	2.00	19
21	CB9	0.47	0.00	0.47	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.02	0.27	0.09	0.78	2.00	20
22	DMH11	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off

Reading Woods - System 1

Number of lines: 24

Run Date: 01-04-2011

NOTES: Inlet N-Values = 0.016 ; Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs. ; * Indicates Known Q added

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet Ht (in)	Curb Inlet L (ft)	Grate Inlet area (sqft)	Grate Inlet L (ft)	Grate Inlet W (ft)	Gutter So (ft/ft)	Gutter W (ft)	Gutter Sw (ft/ft)	Gutter Sx (ft/ft)	Gutter n	Gutter Depth (ft)	Gutter Spread (ft)	Inlet Depth (ft)	Inlet Spread (ft)	Inlet Depr (in)	Byp line No
23	TD4	0.54	0.00	0.54	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.031	0.012	-0.03	-0.39	0.04	0.33	2.00	Off
24	DMH 12	14.00*	0.00	0.00	14.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off

Number of lines: 24

Run Date: 01-04-2011

Reading Woods - System 1

NOTES: Inlet N-Values = 0.016 ; Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs. ; * Indicates Known Q added

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	SC1-FES	22.39	24 c	28.0	126.00	126.15	0.536	128.00*	128.23*	0.00	128.23	End
2	DMH-SC1	22.47	24 c	177.0	126.20	127.10	0.508	128.23*	129.72*	0.00	129.72	1
3	TD7-DMH1	0.76	8 c	64.0	130.00	131.50	2.344	130.44	131.91	n/a	131.91 j	2
4	DMH2-DMH1	8.06	24 c	166.0	127.15	128.00	0.512	130.42*	130.60*	0.00	130.60	2
5	TD6-DMH2	0.36	8 c	37.0	131.50	132.30	2.162	131.70	132.58	0.00	132.58	4
6	DMH3-DMH2	8.06	24 c	251.0	128.05	129.30	0.498	130.60	130.84	0.00	130.84	4
7	DMH4-DMH3	3.52	15 c	125.0	129.65	130.28	0.504	130.86	131.13	0.00	131.13	6
8	DMH5-DMH4	2.41	15 c	113.0	130.33	130.90	0.504	131.31	131.52	0.00	131.52	7
9	DMH6-DMH5	2.45	15 c	86.0	130.95	131.38	0.500	131.70	132.01	n/a	132.01 j	8
10	EX. DMH-DMH6	2.46	12 c	13.0	131.43	131.58	1.154	132.10	132.25	n/a	132.25 j	9
11	HW-EX. DMH	1.96	12 c	10.0	131.80	131.97	1.700	132.45	132.56	n/a	132.56 j	10
12	CB RECHARGE-D	0.52	12 c	16.0	140.34	140.50	1.000	140.59	140.81	0.00	140.81	10
13	DMH7-DMH4	0.75	12 c	239.0	130.38	131.58	0.502	131.36	131.95	n/a	131.95	7
14	TD5-DMH5	0.76	8 c	48.0	133.00	133.30	0.625	133.42	133.72	0.00	133.72	13
15	CB1-DMH4	0.74	12 c	29.0	138.95	139.25	1.034	139.24	139.61	0.00	139.61	7
16	DMH9-DMH3	5.10	15 c	120.0	130.25	130.85	0.500	131.31	131.91	0.00	131.91	6
17	TD9-DMH9	0.47	8 c	48.0	132.90	135.00	4.375	133.09	135.32	0.00	135.32	16
18	DMH10-DMH9	4.74	15 c	136.0	130.95	131.70	0.551	132.01	132.61	0.00	132.61	16
19	CB7-DMH10	2.90	12 c	10.0	138.90	139.07	1.700	139.45	140.02	0.00	140.02	18
20	CB8-DMH10	0.80	12 c	10.0	138.90	139.07	1.700	139.17	139.52	0.00	139.52	18
21	CB9-DMH10	0.56	12 c	46.0	138.90	139.40	1.087	139.15	139.72	n/a	139.72	18
22	DMH11-DMH10	0.64	8 c	64.0	132.28	132.66	0.594	132.94	133.09	0.00	133.09	18
23	TD4-DMH11	0.65	8 c	50.0	132.76	133.10	0.680	133.15	133.48	0.00	133.48	22
24	DMH 12-DMH 1	14.00	15 c	50.0	134.60	136.80	4.400	135.58*	138.53*	0.00	138.53	2

Reading Woods - System 1 | Number of lines: 24 | Run Date: 01-03-2011

NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	28.0	0.00	2.52	0.00	0.00	1.38	0.0	13.2	5.7	22.39	17.93	7.13	24	0.54	126.15	126.00	128.23	128.00	132.30	132.30	SC1-FES
2	1	177.0	0.00	2.52	0.00	0.00	1.38	0.0	12.8	5.7	22.47	17.47	7.15	24	0.51	127.10	126.20	129.72	128.23	139.00	132.30	DMH-SC1
3	2	64.0	0.17	0.17	0.62	0.11	0.11	5.0	5.0	7.2	0.76	2.00	3.22	8	2.34	131.50	130.00	131.91	130.44	132.70	139.00	TD7-DMH1
4	2	166.0	0.00	2.35	0.00	0.00	1.28	0.0	11.8	5.9	8.06	17.53	2.56	24	0.51	128.00	127.15	130.60	130.42	136.00	139.00	DMH2-DMH1
5	4	37.0	0.11	0.11	0.46	0.05	0.05	5.0	5.0	7.2	0.36	1.92	3.40	8	2.16	132.30	131.50	132.58	131.70	133.50	136.00	TD6-DMH2
6	4	251.0	0.00	2.24	0.00	0.00	1.23	0.0	10.2	6.1	8.06	17.29	2.84	24	0.50	129.30	128.05	130.84	130.60	139.50	136.00	DMH3-DMH2
7	6	125.0	0.00	1.07	0.00	0.00	0.48	0.0	9.6	6.3	3.52	4.97	3.44	15	0.50	130.28	129.65	131.13	130.86	143.93	139.50	DMH4-DMH3
8	7	113.0	0.00	0.78	0.00	0.00	0.27	0.0	6.2	6.9	2.41	4.97	3.13	15	0.50	130.90	130.33	131.52	131.31	144.00	143.93	DMH5-DMH4
9	8	86.0	0.00	0.78	0.00	0.00	0.27	0.0	5.5	7.1	2.45	4.95	3.58	15	0.50	131.38	130.95	132.01	131.70	143.50	144.00	DMH6-DMH5
10	9	13.0	0.00	0.78	0.00	0.00	0.27	0.0	5.4	7.1	2.46	3.83	4.41	12	1.15	131.58	131.43	132.25	132.10	143.20	143.50	EX. DMH-DMH6
11	10	10.0	0.78	0.78	0.35	0.27	0.27	5.0	5.0	7.2	1.96	4.64	3.83	12	1.70	131.97	131.80	132.56	132.45	133.00	143.20	HW-EX. DMH
12	10	16.0	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	0.52	3.86	2.98	12	1.00	140.50	140.34	140.81	140.59	142.50	143.20	CB RECHARGE-
13	7	239.0	0.00	0.15	0.00	0.00	0.11	0.0	5.4	7.1	0.75	2.73	1.91	12	0.50	131.58	130.38	131.95	131.36	145.00	143.93	DMH7-DMH4
14	13	48.0	0.15	0.15	0.70	0.11	0.11	5.0	5.0	7.2	0.76	1.03	3.24	8	0.63	133.30	133.00	133.72	133.42	134.50	145.00	TD5-DMH5
15	7	29.0	0.14	0.14	0.73	0.10	0.10	5.0	5.0	7.2	0.74	3.92	3.34	12	1.03	139.25	138.95	139.61	139.24	143.25	143.93	CB1-DMH4
16	6	120.0	0.00	1.17	0.00	0.00	0.75	0.0	6.6	6.8	5.10	4.95	4.59	15	0.50	130.85	130.25	131.91	131.31	140.00	139.50	DMH9-DMH3
17	16	48.0	0.14	0.14	0.47	0.07	0.07	5.0	5.0	7.2	0.47	2.74	4.34	8	4.38	135.00	132.90	135.32	133.09	136.20	140.00	TD9-DMH9
18	16	136.0	0.00	1.03	0.00	0.00	0.68	0.0	6.1	6.9	4.74	5.19	4.61	15	0.55	131.70	130.95	132.61	132.01	143.45	140.00	DMH10-DMH9
19	18	10.0	0.56	0.56	0.72	0.40	0.40	5.0	5.0	7.2	2.90	5.03	5.20	12	1.70	139.07	138.90	140.02	139.45	143.07	143.45	CB7-DMH10
20	18	10.0	0.15	0.15	0.74	0.11	0.11	5.0	5.0	7.2	0.80	5.03	3.49	12	1.70	139.07	138.90	139.52	139.17	143.07	143.45	CB8-DMH10
21	18	46.0	0.14	0.14	0.56	0.08	0.08	5.0	5.0	7.2	0.56	4.02	3.12	12	1.09	139.40	138.90	139.72	139.15	143.40	143.45	CB9-DMH10

Reading Woods - System 1 | Number of lines: 24 | Run Date: 01-03-2011

NOTES: Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
22	18	64.0	0.00	0.18	0.00	0.00	0.09	0.0	5.4	7.1	0.64	1.01	2.27	8	0.59	132.66	132.28	133.09	132.94	145.00	143.45	DMH11-DMH10
23	22	50.0	0.18	0.18	0.50	0.09	0.09	5.0	5.0	7.2	0.65	1.08	3.11	8	0.68	133.10	132.76	133.48	133.15	134.30	145.00	TD4-DMH11
24	2	50.0	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	14.00	14.67	12.51	15	4.40	136.80	134.60	138.53	135.58	140.63	139.00	DMH 12-DMH 1

Reading Woods - System 1 | Number of lines: 24 | Run Date: 01-03-2011

NOTES: Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet Ht (in)	Curb Inlet L (ft)	Grate Inlet area (sqft)	Grate Inlet L (ft)	Grate Inlet W (ft)	Gutter So (ft/ft)	Gutter W (ft)	Gutter Sw (ft/ft)	Gutter Sx (ft/ft)	Gutter n	Gutter Depth (ft)	Gutter Spread (ft)	Inlet Depth (ft)	Inlet Spread (ft)	Inlet Depr (in)	Byp line No
1	DMH1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
2		0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	2.00	1
3	TD7	0.76	0.00	0.76	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.031	0.012	0.05	0.58	0.05	0.58	0.00	Off
4	DMH2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
5	TD6	0.36	0.00	0.36	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.031	0.012	-0.04	-0.50	0.03	0.25	2.00	Off
6	DMH3	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
7	DMH4	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	6
8	DMH5	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	7
9	DMH6	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	8
10	EX. DMH	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	9
11	EX. HW	1.96	0.00	1.96	0.00	Hdwl	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	10
12	CB RECH.	0.52*	0.00	0.52	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.03	0.34	0.09	0.83	2.00	11
13		0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	2.00	12
14	TD5	0.76	0.00	0.76	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.031	0.012	-0.02	-0.28	0.05	0.41	2.00	Off
15	CB1	0.74	0.00	0.74	0.00	Grate	6.0	6.00	4.00	2.00	2.00	2.000	2.00	0.080	0.030	0.012	0.07	0.91	0.08	0.73	2.00	Off
16	DMH9	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
17	TD9	0.47	0.00	0.47	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.031	0.012	0.03	0.43	0.03	0.43	0.00	Off
18	DMH10	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
19	CB7	2.90	0.00	2.90	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.23	4.31	0.30	4.31	2.00	18
20	CB8	0.80	0.00	0.80	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.06	0.73	0.13	1.10	2.00	19
21	CB9	0.56	0.00	0.56	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.03	0.41	0.10	0.88	2.00	20
22	DMH11	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off

Reading Woods - System 1 | Number of lines: 24 | Run Date: 01-04-2011

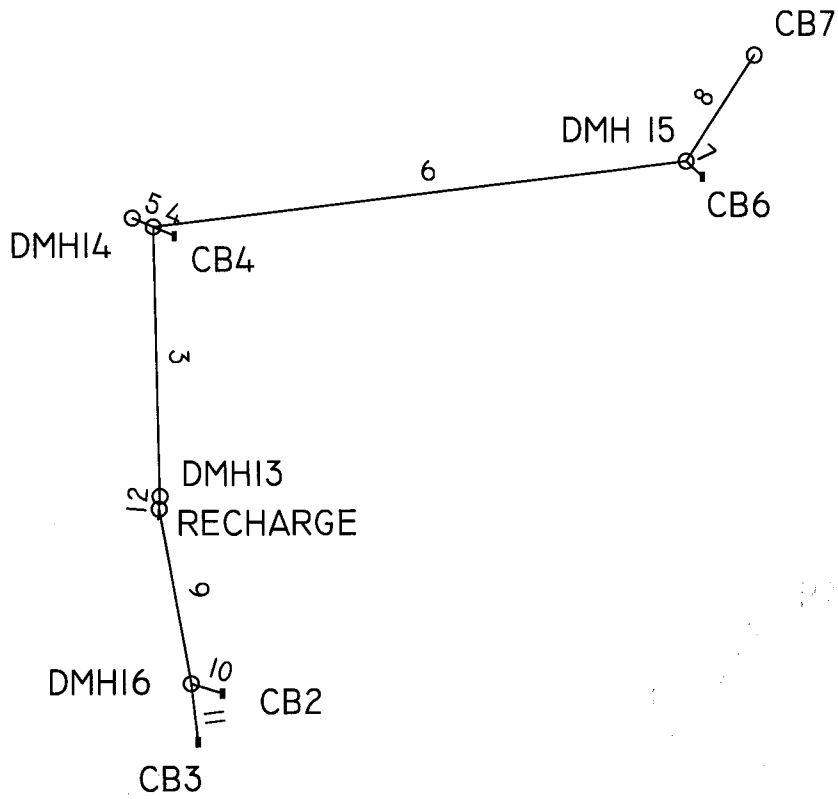
NOTES: Inlet N-Values = 0.016 ; Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs. ; * Indicates Known Q added

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
23	TD4	0.65	0.00	0.65	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.031	0.012	-0.03	-0.33	0.04	0.37	2.00	Off
24	DMH 12	14.00*	0.00	0.00	14.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off

Reading Woods - System 1 | Number of lines: 24 | Run Date: 01-04-2011

NOTES: Inlet N-Values = 0.016 ; Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs. ; * Indicates Known Q added



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62 MONTVALE AVE. SUITE I
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STORM SEWER SYSTEM #1-R

READING WOODS
READING, MA

SCALE: NONE	DATE: 1/4/11	**S-1-R**

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	4.0	0.00	2.53	0.00	0.00	2.02	0.0	6.3	5.8	11.64	11.06	9.49	15	2.50	132.90	132.80	134.15	134.05	140.63	139.00	RECH-DMH12
2	1	5.0	0.00	1.25	0.00	0.00	0.96	0.0	6.3	5.8	5.54	9.89	4.51	15	2.00	133.10	133.00	135.26	135.23	142.75	140.63	DMH13-RECHAR
3	2	106.0	0.00	1.25	0.00	0.00	0.96	0.0	5.9	5.8	5.62	10.08	5.34	15	2.08	136.40	134.20	137.35	135.26	143.23	142.75	DMH14-DMH13
4	3	9.0	0.18	0.18	0.80	0.14	0.14	5.0	5.0	6.0	0.87	4.07	3.40	12	1.11	139.00	138.90	139.43	139.21	143.00	143.23	CB4-DMH14
5	3	9.0	0.18	0.18	0.77	0.14	0.14	5.0	5.0	6.0	0.84	4.07	3.37	12	1.11	139.00	138.90	139.42	139.21	143.00	143.23	CB5-DMH14
6	3	214.0	0.00	0.89	0.00	0.00	0.68	0.0	5.2	6.0	4.07	3.73	5.19	12	0.93	138.65	136.65	140.03	137.65	143.22	143.23	DMH15-DMH14
7	6	9.0	0.24	0.24	0.80	0.19	0.19	5.0	5.0	6.0	1.16	5.14	1.48	12	1.78	138.91	138.75	140.43	140.42	142.91	143.22	CB6-DMH15
8	6	50.0	0.65	0.65	0.75	0.49	0.49	5.0	5.0	6.0	2.95	2.18	3.75	12	0.32	138.91	138.75	140.53	140.23	143.22	143.22	CB7-DMH15
9	1	70.0	0.00	1.28	0.00	0.00	1.06	0.0	5.1	6.0	6.39	6.36	8.14	12	2.71	134.90	133.00	136.44	134.52	139.39	140.63	DMH 16-RECHA
10	9	13.0	0.60	0.60	0.84	0.50	0.50	5.0	5.0	6.0	3.05	5.02	3.88	12	1.69	135.22	135.00	137.32	137.24	139.22	139.39	CB2-DMH16
11	9	23.0	0.68	0.68	0.82	0.56	0.56	5.0	5.0	6.0	3.37	3.77	4.29	12	0.96	135.22	135.00	137.36	137.19	139.22	139.39	CB3-DMH16

Reading Woods - Sys1 to Rech | Number of lines: 11 | Run Date: 12-23-2010

NOTES: Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	RECHARGE	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
2	DMH13	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
3	DMH14	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
4	CB4	0.87	0.00	0.87	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.07	0.82	0.13	1.17	2.00	Off
5		0.84	0.00	0.00	0.84	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
6	DMH15	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
7	CB6	1.16	0.00	1.16	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.09	1.17	0.16	1.42	2.00	Off
8	CB7	2.95	0.00	0.00	2.95	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
9	DMH16	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
10	CB2	3.05	0.00	3.05	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.24	4.64	0.31	4.64	2.00	Off
11	CB3	3.37	0.00	3.37	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.33	7.57	0.33	7.57	0.00	Off

Reading Woods - Sys1 to Rech | Number of lines: 11 | Run Date: 12-23-2010

NOTES: Inlet N-Values = 0.016 ; Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs. ; * Indicates Known Q added

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	4.0	0.00	2.53	0.00	0.00	2.02	0.0	6.1	6.9	14.04	11.06	11.44	15	2.50	132.90	132.80	134.21	134.05	140.63	139.00	RECH-DMH12
2	1	5.0	0.00	1.25	0.00	0.00	0.96	0.0	6.1	6.9	6.68	9.89	5.44	15	2.00	133.10	133.00	135.83	135.79	142.75	140.63	DMH13-RECHAR
3	2	106.0	0.00	1.25	0.00	0.00	0.96	0.0	5.8	7.0	6.75	10.08	5.84	15	2.08	136.40	134.20	137.44	135.83	143.23	142.75	DMH14-DMH13
4	3	9.0	0.18	0.18	0.80	0.14	0.14	5.0	5.0	7.2	1.04	4.07	3.56	12	1.11	139.00	138.90	139.48	139.24	143.00	143.23	CB4-DMH14
5	3	9.0	0.18	0.18	0.77	0.14	0.14	5.0	5.0	7.2	1.00	4.07	3.52	12	1.11	139.00	138.90	139.47	139.24	143.00	143.23	CB5-DMH14
6	3	214.0	0.00	0.89	0.00	0.00	0.68	0.0	5.2	7.2	4.86	3.73	6.19	12	0.93	138.65	136.65	141.05	137.65	143.22	143.23	DMH15-DMH14
7	6	9.0	0.24	0.24	0.80	0.19	0.19	5.0	5.0	7.2	1.38	5.14	1.76	12	1.78	138.91	138.75	141.61	141.59	142.91	143.22	CB6-DMH15
8	6	50.0	0.65	0.65	0.75	0.49	0.49	5.0	5.0	7.2	3.51	2.18	4.47	12	0.32	138.91	138.75	141.75	141.33	143.22	143.22	CB7-DMH15
9	1	70.0	0.00	1.28	0.00	0.00	1.06	0.0	5.1	7.2	7.62	6.36	9.70	12	2.71	134.90	133.00	137.51	134.78	139.39	140.63	DMH 16-RECHA
10	9	13.0	0.60	0.60	0.84	0.50	0.50	5.0	5.0	7.2	3.63	5.02	4.62	12	1.69	135.22	135.00	138.76	138.65	139.22	139.39	CB2-DMH16
11	9	23.0	0.68	0.68	0.82	0.56	0.56	5.0	5.0	7.2	4.01	3.77	5.11	12	0.96	135.22	135.00	138.82	138.57	139.22	139.39	CB3-DMH16

Reading Woods - Sys1 to Rech | Number of lines: 11 | Run Date: 12-23-2010

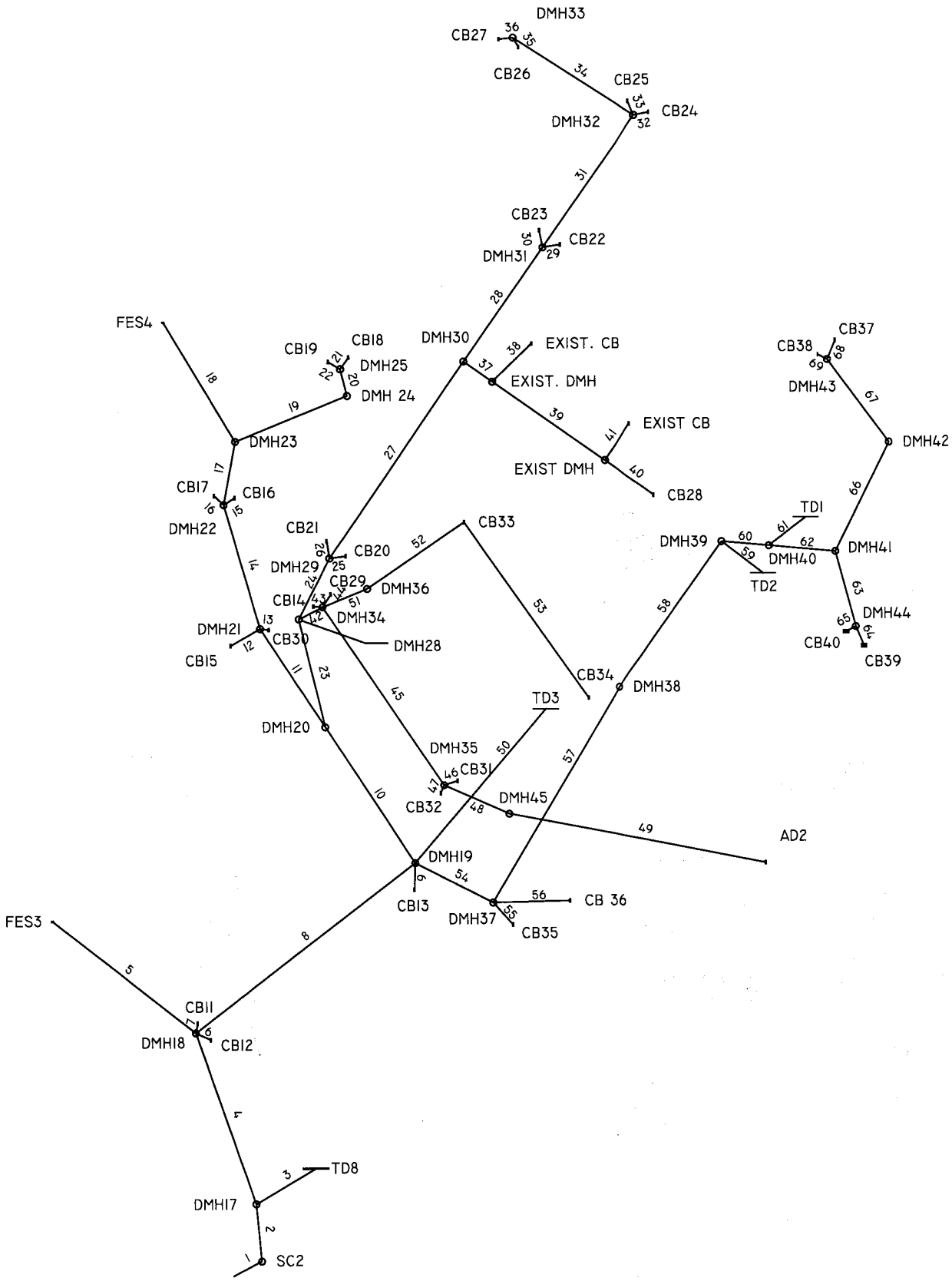
NOTES: Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	RECHARGE	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
2	DMH13	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
3	DMH14	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
4	CB4	1.04	0.00	1.04	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.08	1.03	0.15	1.31	2.00	Off
5		1.00	0.00	0.00	1.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
6	DMH15	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
7	CB6	1.38	0.00	1.38	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.11	1.42	0.18	1.59	2.00	Off
8	CB7	3.51	0.00	0.00	3.51	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
9	DMH16	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
10	CB2	3.63	0.00	3.63	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.28	5.90	0.34	5.90	2.00	Off
11	CB3	4.01	0.00	4.01	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.37	8.92	0.37	8.92	0.00	Off

Reading Woods - Sys1 to Rech | Number of lines: 11 | Run Date: 12-23-2010

NOTES: Inlet N-Values = 0.016 ; Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs. ; * Indicates Known Q added



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STORM SEWER SYSTEM #2

READING WOODS
READING, MA

SCALE: NONE	DATE: 1/4/11	**S-2**

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	SC2-FES2	42.37	36 c	29.0	129.00	129.23	0.793	131.07	131.30	n/a	131.30	End
2	DMH17-SC2	42.55	36 c	52.0	129.33	129.75	0.808	131.77	131.83	n/a	131.83 j	1
3	TD8-DMH17	0.51	8 c	63.0	132.18	136.80	7.333	132.83	137.14	n/a	137.14 j	2
4	DMH18-DMH17	42.70	36 c	164.0	129.85	131.00	0.701	132.29	133.08	n/a	133.08 j	2
5	FES3-DMH18	6.29	15 c	151.0	132.85	135.00	1.424	133.71	136.00	0.00	136.00	4
6	CB12-DMH18	2.60	12 c	15.0	139.85	140.00	1.000	140.45	140.71	0.00	140.71	4
7	CB11-DMH18	1.26	12 c	9.0	139.85	140.00	1.667	140.19	140.61	0.00	140.61	4
8	DMH19-DMH18	35.02	36 c	252.0	131.10	133.12	0.802	133.73	135.01	n/a	135.01 j	4
9	CB13-DMH19	0.17	12 c	24.0	144.06	144.30	1.000	144.21	144.48	n/a	144.48	8
10	DMH20-DMH19	26.81	24 c	148.0	134.12	135.60	1.000	136.12*	137.89*	0.00	137.89	8
11	DMH21-DMH20	11.25	24 c	106.0	135.70	136.76	1.000	138.83*	139.05*	0.00	139.05	10
12	CB15-DMH21	2.56	12 c	31.0	139.60	140.14	1.742	140.10	140.82	0.00	140.82	11
13	CB14-DMH21	2.50	12 c	8.0	139.60	139.81	2.625	140.04*	140.88*	0.00	140.88	11
14	DMH22-DMH21	6.50	18 c	117.0	137.26	138.43	1.000	139.05	139.40	n/a	139.40 j	11
15	CB16-DMH22	0.96	12 c	12.0	139.79	139.98	1.583	140.09	140.46	0.00	140.46	14
16	CB17-DMH22	0.51	12 c	12.0	139.79	139.98	1.583	140.01	140.28	0.00	140.28	14
17	DMH23-DMH22	5.12	18 c	58.0	138.53	139.11	1.000	139.72	139.97	n/a	139.97 j	14
18	FES4-DMH23	2.08	15 c	126.0	139.35	140.50	0.913	140.30	141.08	n/a	141.08 j	17
19	DMH24-DMH23	3.09	12 c	110.0	140.00	146.20	5.636	140.40	146.95	n/a	146.95	17
20	DMH25-DMH24	2.96	12 c	25.0	147.00	147.20	0.800	147.71	147.93	0.00	147.93	19
21	CB18-DMH25	2.14	12 c	13.0	147.30	147.82	4.000	148.18	148.44	n/a	148.44 j	20
22	CB19-DMH25	0.82	12 c	13.0	147.30	147.82	4.000	148.27	148.21	0.00	148.21	20
23	DMH28-DMH20	16.69	18 c	100.0	136.20	138.70	2.500	137.89	140.14	n/a	140.14 j	10
24	DMH29-DMH28	10.61	15 c	62.0	140.85	141.35	0.806	142.10*	143.53*	0.00	143.53	23
25	CB20-DMH29	1.12	12 c	15.0	142.30	142.50	1.333	144.66*	144.67*	0.00	144.67	24
26	CB21-DMH29	1.98	12 c	16.0	142.30	142.50	1.250	144.59*	144.63*	0.00	144.63	24
27	DMH30-DMH29	7.77	12 c	217.0	141.45	149.90	3.894	143.53*	152.32*	0.00	152.32	24
28	DMH31-DMH30	4.81	12 c	127.0	151.90	159.57	6.039	153.26	160.48	n/a	160.48 j	27
29	CB22-DMH30	0.44	12 c	16.0	160.57	160.73	1.000	161.04	161.01	n/a	161.01 j	28
30	CB23-DMH30	0.82	12 c	16.0	160.57	160.73	1.000	161.10	161.12	n/a	161.12 j	28
31	DMH32-DMH31	3.66	12 c	146.0	159.67	168.94	6.349	160.78	169.75	n/a	169.75 j	28
32	CB24-DMH32	0.72	12 c	14.0	169.44	169.80	2.571	170.18	170.16	n/a	170.16 j	31

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: c = cir; e = ellip; b = box; Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
33	CB25-DMH32	1.28	12 c	14.0	169.44	169.80	2.571	170.16	170.28	n/a	170.28 j	31
34	DMH33-DMH32	1.70	12 c	131.0	169.44	171.70	1.725	170.13	172.25	n/a	172.25 j	31
35	CB26-DMH33	1.14	12 c	10.0	171.80	172.12	3.200	172.45	172.57	n/a	172.57 j	34
36	CB27-DMH33	0.56	12 c	13.0	171.80	172.12	2.461	172.47	172.44	n/a	172.44 j	34
37	EXIST DMH-DMH1	3.09	12 c	32.0	150.00	153.30	10.313	153.60	154.05	0.00	154.05	27
38	EXIST. CB-EXIST.D	0.58	12 c	50.0	154.00	159.60	11.200	154.41	159.92	n/a	159.92 j	37
39	EXIST DMH-EXIST	2.56	12 c	124.0	153.80	156.40	2.097	154.30	157.08	n/a	157.08	37
40	CB28-EXIST DMH	0.81	12 c	55.0	156.40	157.50	2.000	157.38	157.88	n/a	157.88 j	39
41	EXIST.CB-EXIST D	1.76	12 c	40.0	156.40	158.00	4.000	157.32	158.56	n/a	158.56 j	39
42	DMH34-DMH28	6.88	12 c	24.0	142.00	142.38	1.583	143.00*	143.76*	0.00	143.76	23
43	CB30-DMH34	0.47	12 c	8.0	142.80	142.95	1.875	144.95*	144.95*	0.00	144.95	42
44	CB29-DMH34	1.37	12 c	14.0	142.80	142.95	1.071	144.91*	144.93*	0.00	144.93	42
45	DMH35-DMH34	2.67	12 c	195.0	142.48	146.20	1.908	144.78	146.89	n/a	146.89 j	42
46	CB31-DMH35	1.30	12 c	13.0	146.30	146.45	1.154	147.13	147.12	0.00	147.12	45
47	CB32-DMH35	0.54	12 c	8.0	146.30	146.45	1.875	147.20	147.20	0.00	147.20	45
48	DMH45- DMH 35	1.00	12 c	65.0	146.30	147.40	1.692	147.20	147.82	n/a	147.82 j	45
49	AD2-DMH45	1.00	12 c	240.0	147.50	159.80	5.125	147.95	160.22	n/a	160.22 j	48
50	TD3-DMH19	0.45	8 c	185.0	136.10	139.00	1.568	136.34	139.32	n/a	139.32	8
51	DMH36-DMH34	2.81	12 c	44.0	142.48	142.70	0.500	144.76*	144.99*	0.00	144.99	42
52	CB33-DMH36	2.86	12 c	108.0	142.80	143.90	1.019	144.99*	145.58*	0.00	145.58	51
53	CB34-CB33	1.02	12 c	195.0	144.00	145.00	0.513	145.76	145.89	0.00	145.89	52
54	DMH37-DMH19	8.51	18 c	80.0	134.62	141.50	8.600	135.52	142.61	n/a	142.61	8
55	CB35-DMH37	0.88	12 c	27.0	147.10	147.70	2.222	147.37	148.10	n/a	148.10	54
56	CB36-DMH37	1.56	12 c	70.0	147.10	149.30	3.143	147.43	149.83	0.00	149.83	54
57	DMH38-DMH37	6.46	18 c	228.0	141.60	143.60	0.877	142.97	144.57	n/a	144.57 j	54
58	DMH39-DMH38	6.58	15 c	163.0	143.95	150.40	3.957	144.57	151.43	n/a	151.43	57
59	TD2-DMH39	0.38	8 c	48.0	150.98	151.45	0.979	151.97	152.00	0.00	152.00	58
60	DMH40-DMH39	6.23	12 c	44.0	150.75	152.00	2.841	151.53*	153.14*	0.00	153.14	58
61	TD1-DMH40	0.26	8 c	43.0	156.00	157.00	2.326	156.16	157.24	n/a	157.24	60
62	DMH41-DMH40	6.00	12 c	62.0	152.10	156.00	6.290	153.21	156.96	n/a	156.96 j	60
63	DMH44-DMH41	3.28	12 c	71.0	156.10	157.90	2.535	157.62	158.67	n/a	158.67 j	62
64	CB39-DMH44	1.07	12 c	19.0	158.00	158.85	4.474	159.04	159.29	n/a	159.29 j	63

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: c = cir; e = ellip; b = box; Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
65	CB40-DMH44	2.22	12 c	10.0	158.00	158.85	8.500	158.94	159.48	n/a	159.48 j	63
66	DMH42-DMH41	2.76	12 c	111.0	156.10	161.90	5.225	157.70	162.60	n/a	162.60 j	62
67	DMH43-DMH42	2.76	12 c	94.0	162.00	163.90	2.021	162.75	164.60	n/a	164.60 j	66
68	CB37-DMH43	1.15	12 c	19.0	164.00	164.50	2.632	164.91	164.96	n/a	164.96 j	67
69	CB38-DMH43	1.60	12 c	10.0	164.00	164.50	5.000	164.88	165.04	n/a	165.04 j	67

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: c = cir; e = ellip; b = box; Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	29.0	0.00	14.77	0.00	0.00	8.57	0.0	11.9	4.8	42.37	64.34	8.12	36	0.79	129.23	129.00	131.30	131.07	134.00	134.00	SC2-FES2
2	1	52.0	0.00	14.77	0.00	0.00	8.57	0.0	11.8	4.8	42.55	64.93	7.53	36	0.81	129.75	129.33	131.83	131.77	135.40	134.00	DMH17-SC2
3	2	63.0	0.13	0.13	0.67	0.09	0.09	5.0	5.0	5.8	0.51	3.54	2.17	8	7.33	136.80	132.18	137.14	132.83	138.00	135.40	TD8-DMH17
4	2	164.0	0.00	14.64	0.00	0.00	8.48	0.0	11.3	4.9	42.70	60.50	7.54	36	0.70	131.00	129.85	133.08	132.29	144.20	135.40	DMH18-DMH17
5	4	151.0	2.77	2.77	0.39	1.08	1.08	5.0	5.0	5.8	6.29	8.35	6.48	15	1.42	135.00	132.85	136.00	133.71	137.00	144.20	FES3-DMH18
6	4	15.0	0.58	0.58	0.77	0.45	0.45	5.0	5.0	5.8	2.60	3.86	4.82	12	1.00	140.00	139.85	140.71	140.45	144.00	144.20	CB12-DMH18
7	4	9.0	0.26	0.26	0.83	0.22	0.22	5.0	5.0	5.8	1.26	4.98	3.88	12	1.67	140.00	139.85	140.61	140.19	144.00	144.20	CB11-DMH18
8	4	252.0	0.00	11.03	0.00	0.00	6.74	0.0	10.4	5.0	35.02	64.69	6.40	36	0.80	133.12	131.10	135.01	133.73	148.60	144.20	DMH19-DMH18
9	8	24.0	0.04	0.04	0.75	0.03	0.03	5.0	5.0	5.8	0.17	3.86	2.17	12	1.00	144.30	144.06	144.48	144.21	148.30	148.60	CB13-DMH19
10	8	148.0	0.00	8.37	0.00	0.00	5.06	0.0	10.1	5.1	26.81	24.50	8.53	24	1.00	135.60	134.12	137.89	136.12	147.10	148.60	DMH20-DMH19
11	10	106.0	0.00	3.35	0.00	0.00	1.99	0.0	7.1	5.6	11.25	24.50	3.58	24	1.00	136.76	135.70	139.05	138.83	144.20	147.10	DMH21-DMH20
12	11	31.0	0.53	0.53	0.83	0.44	0.44	5.0	5.0	5.8	2.56	5.09	5.49	12	1.74	140.14	139.60	140.82	140.10	144.14	144.20	CB15-DMH21
13	11	8.0	0.74	0.74	0.58	0.43	0.43	5.0	5.0	5.8	2.50	6.25	5.35	12	2.62	139.81	139.60	140.88	140.04	143.81	144.20	CB14-DMH21
14	11	117.0	0.00	2.08	0.00	0.00	1.12	0.0	6.6	5.7	6.50	11.38	4.52	18	1.00	138.43	137.26	139.40	139.05	144.23	144.20	DMH22-DMH21
15	14	12.0	0.25	0.25	0.66	0.17	0.17	5.0	5.0	5.8	0.96	4.85	3.69	12	1.58	139.98	139.79	140.46	140.09	143.98	144.23	CB16-DMH22
16	14	12.0	0.15	0.15	0.58	0.09	0.09	5.0	5.0	5.8	0.51	4.85	3.25	12	1.58	139.98	139.79	140.28	140.01	143.98	144.23	CB17-DMH22
17	14	58.0	0.00	1.68	0.00	0.00	0.87	0.0	6.2	5.8	5.12	11.38	4.14	18	1.00	139.11	138.53	139.97	139.72	145.00	144.23	DMH23-DMH22
18	17	126.0	1.02	1.02	0.35	0.36	0.36	5.0	5.0	5.8	2.08	6.68	2.92	15	0.91	140.50	139.35	141.08	140.30	142.50	145.00	FES4-DMH23
19	17	110.0	0.00	0.66	0.00	0.00	0.51	5.0	5.3	5.8	3.09	9.16	7.72	12	5.64	146.20	140.00	146.95	140.40	150.00	145.00	DMH24-DMH23
20	19	25.0	0.00	0.66	0.00	0.00	0.51	0.0	5.2	5.8	2.96	3.45	4.87	12	0.80	147.20	147.00	147.93	147.71	151.30	150.00	DMH25-DMH24
21	20	13.0	0.49	0.49	0.75	0.37	0.37	5.0	5.0	5.8	2.14	7.72	3.56	12	4.00	147.82	147.30	148.44	148.18	151.82	151.30	CB18-DMH25

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
22	20	13.0	0.17	0.17	0.83	0.14	0.14	5.0	5.0	5.8	0.82	7.72	1.99	12	4.00	147.82	147.30	148.21	148.27	151.82	151.30	CB19-DMH25
23	10	100.0	0.00	5.02	0.00	0.00	3.08	0.0	10.0	5.1	16.69	17.99	9.51	18	2.50	138.70	136.20	140.14	137.89	146.00	147.10	DMH28-DMH20
24	23	62.0	0.00	3.18	0.00	0.00	1.92	0.0	7.6	5.5	10.61	6.28	8.64	15	0.81	141.35	140.85	143.53	142.10	146.59	146.00	DMH29-DMH28
25	24	15.0	0.28	0.28	0.69	0.19	0.19	5.0	5.0	5.8	1.12	4.45	1.43	12	1.33	142.50	142.30	144.67	144.66	146.50	146.59	CB20-DMH29
26	24	16.0	0.50	0.50	0.68	0.34	0.34	5.0	5.0	5.8	1.98	4.31	2.52	12	1.25	142.50	142.30	144.63	144.59	146.50	146.59	CB21-DMH29
27	24	217.0	0.00	2.40	0.00	0.00	1.39	0.0	7.2	5.6	7.77	7.61	9.89	12	3.89	149.90	141.45	152.32	143.53	158.08	146.59	DMH30-DMH29
28	27	127.0	0.00	1.35	0.00	0.00	0.85	0.0	6.8	5.6	4.81	9.48	6.27	12	6.04	159.57	151.90	160.48	153.26	164.59	158.08	DMH31-DMH30
29	28	16.0	0.13	0.13	0.58	0.08	0.08	5.0	5.0	5.8	0.44	3.86	1.81	12	1.00	160.73	160.57	161.01	161.04	164.73	164.59	CB22-DMH30
30	28	16.0	0.23	0.23	0.61	0.14	0.14	5.0	5.0	5.8	0.82	3.86	2.42	12	1.00	160.73	160.57	161.12	161.10	164.73	164.59	CB23-DMH30
31	28	146.0	0.00	0.99	0.00	0.00	0.64	0.0	6.3	5.8	3.66	9.72	5.01	12	6.35	168.94	159.67	169.75	160.78	173.44	164.59	DMH32-DMH31
32	31	14.0	0.21	0.21	0.59	0.12	0.12	5.0	5.0	5.8	0.72	6.19	1.98	12	2.57	169.80	169.44	170.16	170.18	173.88	173.44	CB24-DMH32
33	31	14.0	0.35	0.35	0.63	0.22	0.22	5.0	5.0	5.8	1.28	6.19	2.79	12	2.57	169.80	169.44	170.28	170.16	173.88	173.44	CB25-DMH32
34	31	131.0	0.00	0.43	0.00	0.00	0.29	0.0	5.3	5.8	1.70	5.07	3.38	12	1.73	171.70	169.44	172.25	170.13	176.90	173.44	DMH33-DMH32
35	34	10.0	0.31	0.31	0.63	0.20	0.20	5.0	5.0	5.8	1.14	6.90	2.71	12	3.20	172.12	171.80	172.57	172.45	176.12	176.90	CB26-DMH33
36	34	13.0	0.12	0.12	0.80	0.10	0.10	5.0	5.0	5.8	0.56	6.05	1.79	12	2.46	172.12	171.80	172.44	172.47	176.12	176.90	CB27-DMH33
37	27	32.0	0.00	1.05	0.00	0.00	0.54	0.0	6.5	5.7	3.09	11.44	4.42	12	10.31	153.30	150.00	154.05	153.60	159.53	158.08	EXIST DMH-DM
38	37	50.0	0.25	0.25	0.40	0.10	0.10	5.0	5.0	5.8	0.58	11.92	2.28	12	11.20	159.60	154.00	159.92	154.41	163.50	159.53	EXIST. CB-EXIS
39	37	124.0	0.00	0.80	0.00	0.00	0.44	0.0	5.9	5.8	2.56	5.16	5.53	12	2.10	156.40	153.80	157.08	154.30	162.79	159.53	EXIST DMH-EXI
40	39	55.0	0.22	0.22	0.63	0.14	0.14	5.0	5.0	5.8	0.81	5.04	1.98	12	2.00	157.50	156.40	157.88	157.38	161.50	162.79	CB28-EXIST DM
41	39	40.0	0.58	0.58	0.52	0.30	0.30	5.0	5.0	5.8	1.76	7.12	3.09	12	4.00	158.00	156.40	158.56	157.32	161.91	162.79	EXIST.CB-EXIST
42	23	24.0	0.00	1.84	0.00	0.00	1.15	0.0	9.9	5.1	6.88	4.85	8.76	12	1.58	142.38	142.00	143.76	143.00	147.30	146.00	DMH34-DMH28

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
43	42	8.0	0.09	0.09	0.90	0.08	0.08	5.0	5.0	5.8	0.47	5.28	0.60	12	1.87	142.95	142.80	144.95	144.95	146.95	147.30	CB30-DMH34
44	42	14.0	0.28	0.28	0.84	0.24	0.24	5.0	5.0	5.8	1.37	3.99	1.74	12	1.07	142.95	142.80	144.93	144.91	146.95	147.30	CB29-DMH34
45	42	195.0	0.00	0.46	0.00	0.00	0.32	0.0	9.0	5.3	2.67	5.33	4.00	12	1.91	146.20	142.48	146.89	144.78	150.60	147.30	DMH35-DMH34
46	45	13.0	0.35	0.35	0.64	0.22	0.22	5.0	5.0	5.8	1.30	4.14	2.10	12	1.15	146.45	146.30	147.12	147.13	150.45	150.60	CB31-DMH35
47	45	8.0	0.11	0.11	0.85	0.09	0.09	5.0	5.0	5.8	0.54	5.28	0.80	12	1.87	146.45	146.30	147.20	147.20	150.45	150.60	CB32-DMH35
48	45	65.0	0.00	0.00	0.00	0.00	0.00	0.0	8.1	0.0	1.00	5.02	2.25	12	1.69	147.40	146.30	147.82	147.20	151.50	150.60	DMH45- DMH 35
49	48	240.0	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.00	8.73	3.02	12	5.13	159.80	147.50	160.22	147.95	163.80	151.50	AD2-DMH45
50	8	185.0	0.12	0.12	0.65	0.08	0.08	5.0	5.0	5.8	0.45	1.64	3.39	8	1.57	139.00	136.10	139.32	136.34	140.20	148.60	TD3-DMH19
51	42	44.0	0.00	1.01	0.00	0.00	0.52	0.0	8.0	5.4	2.81	2.73	3.58	12	0.50	142.70	142.48	144.99	144.76	150.00	147.30	DMH36-DMH34
52	51	108.0	0.61	1.01	0.56	0.34	0.52	5.0	7.5	5.5	2.86	3.89	3.64	12	1.02	143.90	142.80	145.58	144.99	149.00	150.00	CB33-DMH36
53	52	195.0	0.40	0.40	0.44	0.18	0.18	5.0	5.0	5.8	1.02	2.76	1.35	12	0.51	145.00	144.00	145.89	145.76	149.00	149.00	CB34-CB33
54	8	80.0	0.00	2.50	0.00	0.00	1.57	0.0	8.0	5.4	8.51	33.36	6.89	18	8.60	141.50	134.62	142.61	135.52	151.10	148.60	DMH37-DMH19
55	54	27.0	0.33	0.33	0.46	0.15	0.15	5.0	5.0	5.8	0.88	5.75	4.16	12	2.22	147.70	147.10	148.10	147.37	151.70	151.10	CB35-DMH37
56	54	70.0	0.32	0.32	0.84	0.27	0.27	5.0	5.0	5.8	1.56	6.84	5.38	12	3.14	149.30	147.10	149.83	147.43	153.30	151.10	CB36-DMH37
57	54	228.0	0.00	1.85	0.00	0.00	1.15	0.0	6.9	5.6	6.46	10.65	4.58	18	0.88	143.60	141.60	144.57	142.97	152.50	151.10	DMH38-DMH37
58	57	163.0	0.00	1.85	0.00	0.00	1.15	0.0	6.4	5.7	6.58	13.92	8.47	15	3.96	150.40	143.95	151.43	144.57	163.50	152.50	DMH39-DMH38
59	58	48.0	0.12	0.12	0.55	0.07	0.07	5.0	5.0	5.8	0.38	1.29	1.17	8	0.98	151.45	150.98	152.00	151.97	152.65	163.50	TD2-DMH39
60	58	44.0	0.00	1.73	0.00	0.00	1.08	0.0	6.3	5.8	6.23	6.50	8.68	12	2.84	152.00	150.75	153.14	151.53	160.00	163.50	DMH40-DMH39
61	60	43.0	0.09	0.09	0.50	0.05	0.05	5.0	5.0	5.8	0.26	2.00	3.13	8	2.33	157.00	156.00	157.24	156.16	158.30	160.00	TD1-DMH40
62	60	62.0	0.00	1.64	0.00	0.00	1.04	0.0	6.2	5.8	6.00	9.68	7.70	12	6.29	156.00	152.10	156.96	153.21	161.15	160.00	DMH41-DMH40
63	62	71.0	0.00	0.86	0.00	0.00	0.56	0.0	5.2	5.8	3.28	6.14	4.63	12	2.54	157.90	156.10	158.67	157.62	163.03	161.15	DMH44-DMH41

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
64	63	19.0	0.39	0.39	0.47	0.18	0.18	5.0	5.0	5.8	1.07	8.16	2.29	12	4.47	158.85	158.00	159.29	159.04	162.85	163.03	CB39-DMH44
65	63	10.0	0.47	0.47	0.81	0.38	0.38	5.0	5.0	5.8	2.22	11.25	3.56	12	8.50	158.85	158.00	159.48	158.94	162.85	163.03	CB40-DMH44
66	62	111.0	0.00	0.78	0.00	0.00	0.47	0.0	5.7	5.8	2.76	8.82	4.09	12	5.23	161.90	156.10	162.60	157.70	169.00	161.15	DMH42-DMH41
67	66	94.0	0.00	0.78	0.00	0.00	0.47	0.0	5.2	5.8	2.76	5.49	4.51	12	2.02	163.90	162.00	164.60	162.75	168.93	169.00	DMH43-DMH42
68	67	19.0	0.44	0.44	0.45	0.20	0.20	5.0	5.0	5.8	1.15	6.26	2.42	12	2.63	164.50	164.00	164.96	164.91	168.70	168.93	CB37-DMH43
69	67	10.0	0.34	0.34	0.81	0.28	0.28	5.0	5.0	5.8	1.60	8.63	2.96	12	5.00	164.50	164.00	165.04	164.88	168.70	168.93	CB38-DMH43

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SC2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
2	DMH17	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
3	TD8	0.51	0.00	0.51	0.00	Grate	0.0	0.00	24.00	24.00	1.00	Sag	2.00	0.080	0.030	0.012	-0.03	-0.40	0.03	0.31	2.00	Off
4	DMH18	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	3
5	FES3	6.29	0.00	6.29	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
6	CB12	2.60	0.00	2.60	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.21	3.61	0.28	3.61	2.00	5
7	CB11	1.26	0.00	1.26	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.10	1.28	0.17	1.49	2.00	6
8	DMH19	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
9	CB13	0.17	0.00	0.17	0.00	Grate	0.0	0.00	4.00	2.00	2.00	0.040	2.00	0.080	0.030	0.012	0.09	1.10	0.10	0.88	2.00	6
10	DMH20	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
11	DMH21	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	23
12	CB15	2.56	0.48	2.33	0.71	Grate	0.0	0.00	0.00	2.00	2.00	0.015	2.00	0.080	0.030	0.012	0.29	6.27	0.33	5.58	2.00	Off
13	CB14	2.50	0.00	2.02	0.48	Grate	0.0	0.00	0.00	2.00	2.00	0.015	2.00	0.080	0.030	0.012	0.27	5.70	0.31	4.94	2.00	12
14	DMH22	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
15	CB16	0.96	0.00	0.96	0.00	Grate	0.0	0.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.07	0.94	0.14	1.25	2.00	Off
16	CB17	0.51	0.00	0.51	0.00	Grate	0.0	0.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.09	1.15	0.09	1.15	0.00	Off
17	DMH23	0.00	0.13	0.00	0.13	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
18	FES4	2.08	0.00	2.08	0.00	Hdwl	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
19	DMH 24	0.13*	0.00	0.00	0.13	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	17
20	DMH25	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
21	CB18	2.14	0.00	2.14	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.24	4.72	0.24	4.72	0.00	15
22	CB19	0.82	0.00	0.82	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.06	0.76	0.13	1.13	2.00	Off

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: Inlet N-Values = 0.016 ; Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs. ; * Indicates Known Q added

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
23	DMH 28	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	10
24	DMH29	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
25	CB20	1.12	0.00	1.12	0.00	Grate	0.0	0.00	0.00	2.00	2.00	0.036	2.00	0.080	0.030	0.012	0.18	2.67	0.18	2.67	0.00	13
26	CB21	1.98	0.00	1.85	0.13	Grate	0.0	0.00	0.00	2.00	2.00	0.036	2.00	0.080	0.030	0.012	0.22	3.93	0.25	2.84	2.00	Off
27	DMH30	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	26
28	DMH31	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
29	CB22	0.44	0.00	0.44	0.00	Grate	0.0	0.00	0.00	2.00	2.00	0.048	2.00	0.080	0.030	0.012	0.12	1.50	0.14	1.21	2.00	25
30	CB23	0.82	0.00	0.82	0.00	Grate	0.0	0.00	0.00	2.00	2.00	0.048	2.00	0.080	0.030	0.012	0.15	1.89	0.15	1.89	0.00	27
31	DMH32	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
32	CB24	0.72	0.00	0.72	0.00	Grate	0.0	0.00	0.00	2.00	2.00	0.086	2.00	0.080	0.030	0.012	0.13	1.61	0.15	1.30	2.00	29
33	CB25	1.28	0.00	1.28	0.00	Grate	0.0	0.00	0.00	2.00	2.00	0.086	2.00	0.080	0.030	0.012	0.16	2.03	0.18	1.61	2.00	30
34	DMH33	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
35	CB26	1.14	0.00	1.14	0.00	Grate	6.0	6.00	4.00	2.00	2.00	0.080	2.00	0.080	0.030	0.012	0.16	1.95	0.16	1.95	0.00	21
36	CB27	0.56	0.00	0.56	0.00	Grate	6.0	6.00	4.00	2.00	2.00	0.080	2.00	0.080	0.030	0.012	0.12	1.49	0.14	1.20	2.00	22
37	EXIST. DMH	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
38	EXIST. CB	0.58	0.00	0.58	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.03	0.43	0.10	0.89	2.00	Off
39	EXIST DMH	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
40	CB28	0.81	0.00	0.81	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.13	1.58	0.13	1.58	0.00	Off
41	EXIST CB	1.76	0.00	1.76	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.15	1.81	0.21	1.87	2.00	Off
42	DMH34	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	50
43	CB30	0.47	0.00	0.47	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.02	0.27	0.09	0.78	2.00	44
44	CB29	1.37	0.00	1.37	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.11	1.41	0.18	1.58	2.00	42

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: Inlet N-Values = 0.016 ; Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs. ; * Indicates Known Q added

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet Ht (in)	Curb Inlet L (ft)	Grate Inlet area (sqft)	Grate Inlet L (ft)	Grate Inlet W (ft)	Gutter So (ft/ft)	Gutter W (ft)	Gutter Sw (ft/ft)	Gutter Sx (ft/ft)	Gutter n	Gutter Depth (ft)	Gutter Spread (ft)	Inlet Depth (ft)	Inlet Spread (ft)	Inlet Depr (in)	Byp line No
45	DMH35	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	43
46	CB31	1.30	0.00	1.30	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.11	1.34	0.17	1.53	2.00	45
47	CB32	0.54	0.00	0.54	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.03	0.38	0.10	0.86	2.00	46
48	DMH45	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
49	AD2	1.00*	0.00	1.00	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.08	0.98	0.15	1.28	2.00	Off
50	TD3	0.45	0.00	0.45	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.030	0.012	-0.03	-0.42	0.03	0.29	2.00	Off
51	DMH36	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	18
52	CB33	1.99	0.00	1.99	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.23	4.34	0.23	4.34	0.00	Off
53	CB34	1.02	0.00	1.02	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.08	1.01	0.15	1.30	2.00	Off
54	DMH37	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
55	CB35	0.88	0.00	0.88	0.00	Grate	0.0	0.00	0.00	2.00	2.00	0.030	2.00	0.080	0.030	0.012	0.17	2.33	0.19	1.71	2.00	9
56	CB 36	1.56	0.00	1.50	0.07	Grate	0.0	0.00	0.00	2.00	2.00	0.030	2.00	0.080	0.030	0.012	0.21	3.60	0.24	2.44	2.00	Off
57	DMH38	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
58	DMH39	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
59	TD2	0.38	0.00	0.38	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.030	0.012	-0.04	-0.46	0.03	0.26	2.00	Off
60	DMH40	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
61	TD1	0.26	0.00	0.26	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.030	0.012	-0.04	-0.55	0.02	0.20	2.00	Off
62	DMH41	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
63	DMH44	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
64	CB39	1.07	0.00	1.07	0.00	Curb	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.030	0.012	0.23	4.38	0.30	4.38	2.00	Off
65	CB40	2.22	0.00	2.22	0.00	Curb	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.030	0.012	0.31	7.14	0.38	7.14	2.00	Off
66	DMH42	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: Inlet N-Values = 0.016 ; Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs. ; * Indicates Known Q added

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
67	DMH43	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
68	CB37	1.15	0.00	1.15	0.00	Grate	0.0	0.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.09	1.17	0.16	1.41	2.00	Off
69	CB38	1.60	0.00	1.60	0.00	Grate	6.0	6.00	0.65	1.00	2.00	Sag	2.00	0.080	0.030	0.012	0.16	1.98	0.23	1.99	2.00	Off

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: Inlet N-Values = 0.016 ; Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs. ; * Indicates Known Q added

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	SC2-FES2	52.01	36 c	29.0	129.00	129.23	0.793	131.30	131.53	0.00	131.53	End
2	DMH17-SC2	52.18	36 c	52.0	129.33	129.75	0.808	131.93	132.05	n/a	132.05	1
3	TD8-DMH17	0.61	8 c	63.0	132.18	136.80	7.333	133.25	137.17	n/a	137.17 j	2
4	DMH18-DMH17	52.18	36 c	164.0	129.85	131.00	0.701	132.45	133.30	n/a	133.30	2
5	FES3-DMH18	7.52	15 c	151.0	132.85	135.00	1.424	133.97	136.09	n/a	136.09 j	4
6	CB12-DMH18	3.11	12 c	15.0	139.85	140.00	1.000	140.53	140.76	0.00	140.76	4
7	CB11-DMH18	1.50	12 c	9.0	139.85	140.00	1.667	140.23	140.68	0.00	140.68	4
8	DMH19-DMH18	42.49	36 c	252.0	131.10	133.12	0.802	133.99	135.20	n/a	135.20 j	4
9	CB13-DMH19	0.21	12 c	24.0	144.06	144.30	1.000	144.22	144.49	n/a	144.49	8
10	DMH20-DMH19	32.41	24 c	148.0	134.12	135.60	1.000	136.12*	138.71*	0.00	138.71	8
11	DMH21-DMH20	13.63	24 c	106.0	135.70	136.76	1.000	140.07*	140.40*	0.00	140.40	10
12	CB15-DMH21	3.06	12 c	31.0	139.60	140.14	1.742	140.46	140.88	n/a	140.88 j	11
13	CB14-DMH21	2.99	12 c	8.0	139.60	139.81	2.625	140.47	140.54	n/a	140.54 j	11
14	DMH22-DMH21	7.83	18 c	117.0	137.26	138.43	1.000	140.40*	140.96*	0.00	140.96	11
15	CB16-DMH22	1.15	12 c	12.0	139.79	139.98	1.583	141.23*	141.24*	0.00	141.24	14
16	CB17-DMH22	0.61	12 c	12.0	139.79	139.98	1.583	141.25*	141.25*	0.00	141.25	14
17	DMH23-DMH22	6.15	18 c	58.0	138.53	139.11	1.000	141.07*	141.24*	0.00	141.24	14
18	FES4-DMH23	2.49	15 c	126.0	139.35	140.50	0.913	141.37	141.51	0.00	141.51	17
19	DMH24-DMH23	3.67	12 c	110.0	140.00	146.20	5.636	141.24	147.01	n/a	147.01 j	17
20	DMH25-DMH24	3.54	12 c	25.0	147.00	147.20	0.800	147.85	148.05	0.00	148.05	19
21	CB18-DMH25	2.56	12 c	13.0	147.30	147.82	4.000	148.27	148.50	n/a	148.50 j	20
22	CB19-DMH25	0.98	12 c	13.0	147.30	147.82	4.000	148.34	148.25	0.00	148.25	20
23	DMH28-DMH20	20.08	18 c	100.0	136.20	138.70	2.500	138.71*	141.83*	0.00	141.83	10
24	DMH29-DMH28	12.93	15 c	62.0	140.85	141.35	0.806	142.11*	144.23*	0.00	144.23	23
25	CB20-DMH29	1.35	12 c	15.0	142.30	142.50	1.333	145.91*	145.93*	0.00	145.93	24
26	CB21-DMH29	2.37	12 c	16.0	142.30	142.50	1.250	145.81*	145.87*	0.00	145.87	24
27	DMH30-DMH29	9.44	12 c	217.0	141.45	149.90	3.894	144.23*	157.22*	0.00	157.22	24
28	DMH31-DMH30	5.83	12 c	127.0	151.90	159.57	6.039	158.61*	161.51*	0.00	161.51	27
29	CB22-DMH30	0.52	12 c	16.0	160.57	160.73	1.000	162.36*	162.36*	0.00	162.36	28
30	CB23-DMH30	0.98	12 c	16.0	160.57	160.73	1.000	162.34*	162.35*	0.00	162.35	28
31	DMH32-DMH31	4.41	12 c	146.0	159.67	168.94	6.349	161.88	169.82	n/a	169.82 j	28
32	CB24-DMH32	0.86	12 c	14.0	169.44	169.80	2.571	170.30	170.25	0.00	170.25	31

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
33	CB25-DMH32	1.54	12 c	14.0	169.44	169.80	2.571	170.33	170.33	n/a	170.33 j	31
34	DMH33-DMH32	2.03	12 c	131.0	169.44	171.70	1.725	170.28	172.30	n/a	172.30 j	31
35	CB26-DMH33	1.36	12 c	10.0	171.80	172.12	3.200	172.52	172.61	n/a	172.61 j	34
36	CB27-DMH33	0.67	12 c	13.0	171.80	172.12	2.461	172.55	172.50	0.00	172.50	34
37	EXIST DMH-DMH1	3.73	12 c	32.0	150.00	153.30	10.313	159.12*	159.47*	0.00	159.47	27
38	EXIST. CB-EXIST.D	0.70	12 c	50.0	154.00	159.60	11.200	159.81	159.95	n/a	159.95	37
39	EXIST DMH-EXIST	3.06	12 c	124.0	153.80	156.40	2.097	159.58*	160.50*	0.00	160.50	37
40	CB28-EXIST DMH	0.97	12 c	55.0	156.40	157.50	2.000	160.71*	160.75*	0.00	160.75	39
41	EXIST.CB-EXIST D	2.10	12 c	40.0	156.40	158.00	4.000	160.63*	160.77*	0.00	160.77	39
42	DMH34-DMH28	8.15	12 c	24.0	142.00	142.38	1.583	143.00*	144.07*	0.00	144.07	23
43	CB30-DMH34	0.56	12 c	8.0	142.80	142.95	1.875	145.74*	145.74*	0.00	145.74	42
44	CB29-DMH34	1.64	12 c	14.0	142.80	142.95	1.071	145.68*	145.70*	0.00	145.70	42
45	DMH35-DMH34	3.02	12 c	195.0	142.48	146.20	1.908	145.52	146.94	n/a	146.94 j	42
46	CB31-DMH35	1.56	12 c	13.0	146.30	146.45	1.154	147.20	147.19	0.00	147.19	45
47	CB32-DMH35	0.65	12 c	8.0	146.30	146.45	1.875	147.28	147.28	0.00	147.28	45
48	DMH45- DMH 35	1.00	12 c	65.0	146.30	147.40	1.692	147.28	147.82	n/a	147.82 j	45
49	AD2-DMH45	1.00	12 c	240.0	147.50	159.80	5.125	147.95	160.22	n/a	160.22 j	48
50	TD3-DMH19	0.54	8 c	185.0	136.10	139.00	1.568	136.36	139.35	0.00	139.35	8
51	DMH36-DMH34	3.44	12 c	44.0	142.48	142.70	0.500	145.45*	145.80*	0.00	145.80	42
52	CB33-DMH36	3.48	12 c	108.0	142.80	143.90	1.019	145.80*	146.68*	0.00	146.68	51
53	CB34-CB33	1.23	12 c	195.0	144.00	145.00	0.513	146.95*	147.14*	0.00	147.14	52
54	DMH37-DMH19	10.41	18 c	80.0	134.62	141.50	8.600	135.69	142.73	0.00	142.73	8
55	CB35-DMH37	1.06	12 c	27.0	147.10	147.70	2.222	147.39	148.14	0.00	148.14	54
56	CB36-DMH37	1.87	12 c	70.0	147.10	149.30	3.143	147.46	149.88	n/a	149.88	54
57	DMH38-DMH37	7.84	18 c	228.0	141.60	143.60	0.877	143.13	144.67	n/a	144.67 j	54
58	DMH39-DMH38	7.95	15 c	163.0	143.95	150.40	3.957	144.67	151.51	n/a	151.51	57
59	TD2-DMH39	0.46	8 c	48.0	150.98	151.45	0.979	152.22*	152.28*	0.00	152.28	58
60	DMH40-DMH39	7.51	12 c	44.0	150.75	152.00	2.841	151.75*	153.42*	0.00	153.42	58
61	TD1-DMH40	0.31	8 c	43.0	156.00	157.00	2.326	156.18	157.26	n/a	157.26	60
62	DMH41-DMH40	7.22	12 c	62.0	152.10	156.00	6.290	153.52	156.98	n/a	156.98 j	60
63	DMH44-DMH41	3.93	12 c	71.0	156.10	157.90	2.535	157.92	158.74	n/a	158.74 j	62
64	CB39-DMH44	1.28	12 c	19.0	158.00	158.85	4.474	159.18	159.33	n/a	159.33 j	63

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
65	CB40-DMH44	2.65	12 c	10.0	158.00	158.85	8.500	159.05	159.54	n/a	159.54 j	63
66	DMH42-DMH41	3.30	12 c	111.0	156.10	161.90	5.225	158.03	162.67	n/a	162.67 j	62
67	DMH43-DMH42	3.30	12 c	94.0	162.00	163.90	2.021	162.80	164.67	n/a	164.67 j	66
68	CB37-DMH43	1.38	12 c	19.0	164.00	164.50	2.632	165.02	165.00	n/a	165.00 j	67
69	CB38-DMH43	1.92	12 c	10.0	164.00	164.50	5.000	164.98	165.09	n/a	165.09 j	67

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	29.0	0.00	14.77	0.00	0.00	8.57	0.0	11.5	5.9	52.01	64.34	8.95	36	0.79	129.23	129.00	131.53	131.30	134.00	134.00	SC2-FES2
2	1	52.0	0.00	14.77	0.00	0.00	8.57	0.0	11.3	6.0	52.18	64.93	8.49	36	0.81	129.75	129.33	132.05	131.93	135.40	134.00	DMH17-SC2
3	2	63.0	0.13	0.13	0.67	0.09	0.09	5.0	5.0	7.0	0.61	3.54	2.41	8	7.33	136.80	132.18	137.17	133.25	138.00	135.40	TD8-DMH17
4	2	164.0	0.00	14.64	0.00	0.00	8.48	0.0	10.9	6.0	52.18	60.50	8.49	36	0.70	131.00	129.85	133.30	132.45	144.20	135.40	DMH18-DMH17
5	4	151.0	2.77	2.77	0.39	1.08	1.08	5.0	5.0	7.0	7.52	8.35	6.56	15	1.42	135.00	132.85	136.09	133.97	137.00	144.20	FES3-DMH18
6	4	15.0	0.58	0.58	0.77	0.45	0.45	5.0	5.0	7.0	3.11	3.86	5.16	12	1.00	140.00	139.85	140.76	140.53	144.00	144.20	CB12-DMH18
7	4	9.0	0.26	0.26	0.83	0.22	0.22	5.0	5.0	7.0	1.50	4.98	4.09	12	1.67	140.00	139.85	140.68	140.23	144.00	144.20	CB11-DMH18
8	4	252.0	0.00	11.03	0.00	0.00	6.74	0.0	10.2	6.1	42.49	64.69	7.11	36	0.80	133.12	131.10	135.20	133.99	148.60	144.20	DMH19-DMH18
9	8	24.0	0.04	0.04	0.75	0.03	0.03	5.0	5.0	7.0	0.21	3.86	2.29	12	1.00	144.30	144.06	144.49	144.22	148.30	148.60	CB13-DMH19
10	8	148.0	0.00	8.37	0.00	0.00	5.06	0.0	10.0	6.2	32.41	24.50	10.32	24	1.00	135.60	134.12	138.71	136.12	147.10	148.60	DMH20-DMH19
11	10	106.0	0.00	3.35	0.00	0.00	1.99	0.0	6.8	6.8	13.63	24.50	4.34	24	1.00	136.76	135.70	140.40	140.07	144.20	147.10	DMH21-DMH20
12	11	31.0	0.53	0.53	0.83	0.44	0.44	5.0	5.0	7.0	3.06	5.09	4.59	12	1.74	140.14	139.60	140.88	140.46	144.14	144.20	CB15-DMH21
13	11	8.0	0.74	0.74	0.58	0.43	0.43	5.0	5.0	7.0	2.99	6.25	4.48	12	2.62	139.81	139.60	140.54	140.47	143.81	144.20	CB14-DMH21
14	11	117.0	0.00	2.08	0.00	0.00	1.12	0.0	6.3	6.9	7.83	11.38	4.43	18	1.00	138.43	137.26	140.96	140.40	144.23	144.20	DMH22-DMH21
15	14	12.0	0.25	0.25	0.66	0.17	0.17	5.0	5.0	7.0	1.15	4.85	1.46	12	1.58	139.98	139.79	141.24	141.23	143.98	144.23	CB16-DMH22
16	14	12.0	0.15	0.15	0.58	0.09	0.09	5.0	5.0	7.0	0.61	4.85	0.77	12	1.58	139.98	139.79	141.25	141.25	143.98	144.23	CB17-DMH22
17	14	58.0	0.00	1.68	0.00	0.00	0.87	0.0	6.0	7.0	6.15	11.38	3.48	18	1.00	139.11	138.53	141.24	141.07	145.00	144.23	DMH23-DMH22
18	17	126.0	1.02	1.02	0.35	0.36	0.36	5.0	5.0	7.0	2.49	6.68	2.18	15	0.91	140.50	139.35	141.51	141.37	142.50	145.00	FES4-DMH23
19	17	110.0	0.00	0.66	0.00	0.00	0.51	5.0	5.3	7.0	3.67	9.16	5.02	12	5.64	146.20	140.00	147.01	141.24	150.00	145.00	DMH24-DMH23
20	19	25.0	0.00	0.66	0.00	0.00	0.51	0.0	5.2	7.0	3.54	3.45	5.00	12	0.80	147.20	147.00	148.05	147.85	151.30	150.00	DMH25-DMH24
21	20	13.0	0.49	0.49	0.75	0.37	0.37	5.0	5.0	7.0	2.56	7.72	3.90	12	4.00	147.82	147.30	148.50	148.27	151.82	151.30	CB18-DMH25

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
22	20	13.0	0.17	0.17	0.83	0.14	0.14	5.0	5.0	7.0	0.98	7.72	2.17	12	4.00	147.82	147.30	148.25	148.34	151.82	151.30	CB19-DMH25
23	10	100.0	0.00	5.02	0.00	0.00	3.08	0.0	9.8	6.2	20.08	17.99	11.37	18	2.50	138.70	136.20	141.83	138.71	146.00	147.10	DMH28-DMH20
24	23	62.0	0.00	3.18	0.00	0.00	1.92	0.0	7.1	6.7	12.93	6.28	10.54	15	0.81	141.35	140.85	144.23	142.11	146.59	146.00	DMH29-DMH28
25	24	15.0	0.28	0.28	0.69	0.19	0.19	5.0	5.0	7.0	1.35	4.45	1.71	12	1.33	142.50	142.30	145.93	145.91	146.50	146.59	CB20-DMH29
26	24	16.0	0.50	0.50	0.68	0.34	0.34	5.0	5.0	7.0	2.37	4.31	3.01	12	1.25	142.50	142.30	145.87	145.81	146.50	146.59	CB21-DMH29
27	24	217.0	0.00	2.40	0.00	0.00	1.39	0.0	6.8	6.8	9.44	7.61	12.02	12	3.89	149.90	141.45	157.22	144.23	158.08	146.59	DMH30-DMH29
28	27	127.0	0.00	1.35	0.00	0.00	0.85	0.0	6.5	6.8	5.83	9.48	7.42	12	6.04	159.57	151.90	161.51	158.61	164.59	158.08	DMH31-DMH30
29	28	16.0	0.13	0.13	0.58	0.08	0.08	5.0	5.0	7.0	0.52	3.86	0.67	12	1.00	160.73	160.57	162.36	162.36	164.73	164.59	CB22-DMH30
30	28	16.0	0.23	0.23	0.61	0.14	0.14	5.0	5.0	7.0	0.98	3.86	1.24	12	1.00	160.73	160.57	162.35	162.34	164.73	164.59	CB23-DMH30
31	28	146.0	0.00	0.99	0.00	0.00	0.64	0.0	6.1	6.9	4.41	9.72	5.82	12	6.35	168.94	159.67	169.82	161.88	173.44	164.59	DMH32-DMH31
32	31	14.0	0.21	0.21	0.59	0.12	0.12	5.0	5.0	7.0	0.86	6.19	1.87	12	2.57	169.80	169.44	170.25	170.30	173.88	173.44	CB24-DMH32
33	31	14.0	0.35	0.35	0.63	0.22	0.22	5.0	5.0	7.0	1.54	6.19	2.88	12	2.57	169.80	169.44	170.33	170.33	173.88	173.44	CB25-DMH32
34	31	131.0	0.00	0.43	0.00	0.00	0.29	0.0	5.3	7.0	2.03	5.07	3.48	12	1.73	171.70	169.44	172.30	170.28	176.90	173.44	DMH33-DMH32
35	34	10.0	0.31	0.31	0.63	0.20	0.20	5.0	5.0	7.0	1.36	6.90	2.88	12	3.20	172.12	171.80	172.61	172.52	176.12	176.90	CB26-DMH33
36	34	13.0	0.12	0.12	0.80	0.10	0.10	5.0	5.0	7.0	0.67	6.05	1.75	12	2.46	172.12	171.80	172.50	172.55	176.12	176.90	CB27-DMH33
37	27	32.0	0.00	1.05	0.00	0.00	0.54	0.0	6.3	6.9	3.73	11.44	4.75	12	10.31	153.30	150.00	159.47	159.12	159.53	158.08	EXIST DMH-DM
38	37	50.0	0.25	0.25	0.40	0.10	0.10	5.0	5.0	7.0	0.70	11.92	1.84	12	11.20	159.60	154.00	159.95	159.81	163.50	159.53	EXIST. CB-EXIS
39	37	124.0	0.00	0.80	0.00	0.00	0.44	0.0	5.7	7.0	3.06	5.16	3.90	12	2.10	156.40	153.80	160.50	159.58	162.79	159.53	EXIST DMH-EXI
40	39	55.0	0.22	0.22	0.63	0.14	0.14	5.0	5.0	7.0	0.97	5.04	1.23	12	2.00	157.50	156.40	160.75	160.71	161.50	162.79	CB28-EXIST DM
41	39	40.0	0.58	0.58	0.52	0.30	0.30	5.0	5.0	7.0	2.10	7.12	2.67	12	4.00	158.00	156.40	160.77	160.63	161.91	162.79	EXIST.CB-EXIST
42	23	24.0	0.00	1.84	0.00	0.00	1.15	0.0	9.8	6.2	8.15	4.85	10.38	12	1.58	142.38	142.00	144.07	143.00	147.30	146.00	DMH34-DMH28

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
43	42	8.0	0.09	0.09	0.90	0.08	0.08	5.0	5.0	7.0	0.56	5.28	0.72	12	1.87	142.95	142.80	145.74	145.74	146.95	147.30	CB30-DMH34
44	42	14.0	0.28	0.28	0.84	0.24	0.24	5.0	5.0	7.0	1.64	3.99	2.09	12	1.07	142.95	142.80	145.70	145.68	146.95	147.30	CB29-DMH34
45	42	195.0	0.00	0.46	0.00	0.00	0.32	0.0	9.0	6.4	3.02	5.33	4.35	12	1.91	146.20	142.48	146.94	145.52	150.60	147.30	DMH35-DMH34
46	45	13.0	0.35	0.35	0.64	0.22	0.22	5.0	5.0	7.0	1.56	4.14	2.29	12	1.15	146.45	146.30	147.19	147.20	150.45	150.60	CB31-DMH35
47	45	8.0	0.11	0.11	0.85	0.09	0.09	5.0	5.0	7.0	0.65	5.28	0.88	12	1.87	146.45	146.30	147.28	147.28	150.45	150.60	CB32-DMH35
48	45	65.0	0.00	0.00	0.00	0.00	0.00	0.0	8.1	0.0	1.00	5.02	2.22	12	1.69	147.40	146.30	147.82	147.28	151.50	150.60	DMH45- DMH 35
49	48	240.0	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	1.00	8.73	3.02	12	5.13	159.80	147.50	160.22	147.95	163.80	151.50	AD2-DMH45
50	8	185.0	0.12	0.12	0.65	0.08	0.08	5.0	5.0	7.0	0.54	1.64	3.58	8	1.57	139.00	136.10	139.35	136.36	140.20	148.60	TD3-DMH19
51	42	44.0	0.00	1.01	0.00	0.00	0.52	0.0	7.5	6.6	3.44	2.73	4.38	12	0.50	142.70	142.48	145.80	145.45	150.00	147.30	DMH36-DMH34
52	51	108.0	0.61	1.01	0.56	0.34	0.52	5.0	7.1	6.7	3.48	3.89	4.43	12	1.02	143.90	142.80	146.68	145.80	149.00	150.00	CB33-DMH36
53	52	195.0	0.40	0.40	0.44	0.18	0.18	5.0	5.0	7.0	1.23	2.76	1.56	12	0.51	145.00	144.00	147.14	146.95	149.00	149.00	CB34-CB33
54	8	80.0	0.00	2.50	0.00	0.00	1.57	0.0	7.5	6.6	10.41	33.36	7.23	18	8.60	141.50	134.62	142.73	135.69	151.10	148.60	DMH37-DMH19
55	54	27.0	0.33	0.33	0.46	0.15	0.15	5.0	5.0	7.0	1.06	5.75	4.40	12	2.22	147.70	147.10	148.14	147.39	151.70	151.10	CB35-DMH37
56	54	70.0	0.32	0.32	0.84	0.27	0.27	5.0	5.0	7.0	1.87	6.84	5.69	12	3.14	149.30	147.10	149.88	147.46	153.30	151.10	CB36-DMH37
57	54	228.0	0.00	1.85	0.00	0.00	1.15	0.0	6.6	6.8	7.84	10.65	5.13	18	0.88	143.60	141.60	144.67	143.13	152.50	151.10	DMH38-DMH37
58	57	163.0	0.00	1.85	0.00	0.00	1.15	0.0	6.2	6.9	7.95	13.92	8.88	15	3.96	150.40	143.95	151.51	144.67	163.50	152.50	DMH39-DMH38
59	58	48.0	0.12	0.12	0.55	0.07	0.07	5.0	5.0	7.0	0.46	1.29	1.32	8	0.98	151.45	150.98	152.28	152.22	152.65	163.50	TD2-DMH39
60	58	44.0	0.00	1.73	0.00	0.00	1.08	0.0	6.1	6.9	7.51	6.50	9.56	12	2.84	152.00	150.75	153.42	151.75	160.00	163.50	DMH40-DMH39
61	60	43.0	0.09	0.09	0.50	0.05	0.05	5.0	5.0	7.0	0.31	2.00	3.30	8	2.33	157.00	156.00	157.26	156.18	158.30	160.00	TD1-DMH40
62	60	62.0	0.00	1.64	0.00	0.00	1.04	0.0	6.0	7.0	7.22	9.68	9.22	12	6.29	156.00	152.10	156.98	153.52	161.15	160.00	DMH41-DMH40
63	62	71.0	0.00	0.86	0.00	0.00	0.56	0.0	5.2	7.0	3.93	6.14	5.29	12	2.54	157.90	156.10	158.74	157.92	163.03	161.15	DMH44-DMH41

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
64	63	19.0	0.39	0.39	0.47	0.18	0.18	5.0	5.0	7.0	1.28	8.16	2.53	12	4.47	158.85	158.00	159.33	159.18	162.85	163.03	CB39-DMH44
65	63	10.0	0.47	0.47	0.81	0.38	0.38	5.0	5.0	7.0	2.65	11.25	3.98	12	8.50	158.85	158.00	159.54	159.05	162.85	163.03	CB40-DMH44
66	62	111.0	0.00	0.78	0.00	0.00	0.47	0.0	5.6	7.0	3.30	8.82	4.64	12	5.23	161.90	156.10	162.67	158.03	169.00	161.15	DMH42-DMH41
67	66	94.0	0.00	0.78	0.00	0.00	0.47	0.0	5.2	7.0	3.30	5.49	4.99	12	2.02	163.90	162.00	164.67	162.80	168.93	169.00	DMH43-DMH42
68	67	19.0	0.44	0.44	0.45	0.20	0.20	5.0	5.0	7.0	1.38	6.26	2.64	12	2.63	164.50	164.00	165.00	165.02	168.70	168.93	CB37-DMH43
69	67	10.0	0.34	0.34	0.81	0.28	0.28	5.0	5.0	7.0	1.92	8.63	3.23	12	5.00	164.50	164.00	165.09	164.98	168.70	168.93	CB38-DMH43

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	SC2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
2	DMH17	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
3	TD8	0.61	0.00	0.61	0.00	Grate	0.0	0.00	24.00	24.00	1.00	Sag	2.00	0.080	0.030	0.012	-0.03	-0.34	0.04	0.35	2.00	Off
4	DMH18	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	3
5	FES3	7.52	0.00	7.52	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
6	CB12	3.11	0.00	3.11	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.24	4.78	0.31	4.78	2.00	5
7	CB11	1.50	0.00	1.50	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.12	1.55	0.19	1.68	2.00	6
8	DMH19	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
9	CB13	0.21	0.01	0.22	0.00	Grate	0.0	0.00	4.00	2.00	2.00	0.040	2.00	0.080	0.030	0.012	0.10	1.19	0.11	0.95	2.00	6
10	DMH20	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
11	DMH21	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	23
12	CB15	3.06	0.70	2.71	1.05	Grate	0.0	0.00	0.00	2.00	2.00	0.015	2.00	0.080	0.030	0.012	0.31	6.93	0.36	6.31	2.00	Off
13	CB14	2.99	0.02	2.31	0.70	Grate	0.0	0.00	0.00	2.00	2.00	0.015	2.00	0.080	0.030	0.012	0.29	6.23	0.33	5.54	2.00	12
14	DMH22	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
15	CB16	1.15	0.00	1.15	0.00	Grate	0.0	0.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.09	1.16	0.16	1.41	2.00	Off
16	CB17	0.61	0.00	0.61	0.00	Grate	0.0	0.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.10	1.30	0.10	1.30	0.00	Off
17	DMH23	0.00	0.13	0.00	0.13	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
18	FES4	2.49	0.00	2.49	0.00	Hdwl	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
19	DMH 24	0.13*	0.00	0.00	0.13	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	17
20	DMH25	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
21	CB18	2.56	0.00	2.56	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.27	5.74	0.27	5.74	0.00	15
22	CB19	0.98	0.00	0.98	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.08	0.96	0.14	1.27	2.00	Off

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: Inlet N-Values = 0.016 ; Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs. ; * Indicates Known Q added

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
23	DMH 28	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	10
24	DMH29	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
25	CB20	1.35	0.00	1.32	0.02	Grate	0.0	0.00	0.00	2.00	2.00	0.036	2.00	0.080	0.030	0.012	0.19	3.03	0.19	3.03	0.00	13
26	CB21	2.37	0.00	2.13	0.24	Grate	0.0	0.00	0.00	2.00	2.00	0.036	2.00	0.080	0.030	0.012	0.23	4.37	0.27	3.41	2.00	Off
27	DMH30	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	26
28	DMH31	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
29	CB22	0.52	0.00	0.52	0.00	Grate	0.0	0.00	0.00	2.00	2.00	0.048	2.00	0.080	0.030	0.012	0.13	1.60	0.15	1.29	2.00	25
30	CB23	0.98	0.00	0.98	0.00	Grate	0.0	0.00	0.00	2.00	2.00	0.048	2.00	0.080	0.030	0.012	0.16	2.07	0.16	2.07	0.00	27
31	DMH32	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
32	CB24	0.86	0.00	0.86	0.00	Grate	0.0	0.00	0.00	2.00	2.00	0.086	2.00	0.080	0.030	0.012	0.14	1.73	0.16	1.39	2.00	29
33	CB25	1.54	0.00	1.54	0.00	Grate	0.0	0.00	0.00	2.00	2.00	0.086	2.00	0.080	0.030	0.012	0.17	2.40	0.20	1.72	2.00	30
34	DMH33	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
35	CB26	1.36	0.00	1.36	0.00	Grate	6.0	6.00	4.00	2.00	2.00	0.080	2.00	0.080	0.030	0.012	0.17	2.20	0.17	2.20	0.00	21
36	CB27	0.67	0.00	0.67	0.00	Grate	6.0	6.00	4.00	2.00	2.00	0.080	2.00	0.080	0.030	0.012	0.13	1.60	0.15	1.28	2.00	22
37	EXIST. DMH	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
38	EXIST. CB	0.70	0.00	0.70	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.05	0.59	0.11	1.01	2.00	Off
39	EXIST DMH	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
40	CB28	0.97	0.00	0.97	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.14	1.78	0.14	1.78	0.00	Off
41	EXIST CB	2.10	0.00	2.10	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.17	2.40	0.24	2.40	2.00	Off
42	DMH34	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	50
43	CB30	0.56	0.00	0.56	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.03	0.41	0.10	0.88	2.00	44
44	CB29	1.64	0.00	1.64	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.14	1.69	0.20	1.78	2.00	42

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: Inlet N-Values = 0.016 ; Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs. ; * Indicates Known Q added

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
45	DMH35	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	43
46	CB31	1.56	0.00	1.56	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.13	1.61	0.20	1.73	2.00	45
47	CB32	0.65	0.00	0.65	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.04	0.53	0.11	0.96	2.00	46
48	DMH45	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
49	AD2	1.00*	0.00	1.00	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.08	0.98	0.15	1.28	2.00	Off
50	TD3	0.54	0.00	0.54	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.030	0.012	-0.03	-0.37	0.04	0.33	2.00	Off
51	DMH36	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	18
52	CB33	2.38	0.00	2.38	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.26	5.31	0.26	5.31	0.00	Off
53	CB34	1.23	0.00	1.23	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.10	1.25	0.17	1.47	2.00	Off
54	DMH37	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
55	CB35	1.06	0.00	1.05	0.01	Grate	0.0	0.00	0.00	2.00	2.00	0.030	2.00	0.080	0.030	0.012	0.18	2.70	0.21	1.83	2.00	9
56	CB 36	1.87	0.00	1.74	0.13	Grate	0.0	0.00	0.00	2.00	2.00	0.030	2.00	0.080	0.030	0.012	0.22	4.03	0.26	2.98	2.00	Off
57	DMH38	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
58	DMH39	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
59	TD2	0.46	0.00	0.46	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.030	0.012	-0.03	-0.42	0.03	0.29	2.00	Off
60	DMH40	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
61	TD1	0.31	0.00	0.31	0.00	Grate	0.0	0.00	12.00	24.00	0.50	Sag	2.00	0.080	0.030	0.012	-0.04	-0.51	0.03	0.23	2.00	Off
62	DMH41	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
63	DMH44	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
64	CB39	1.28	0.00	1.28	0.00	Curb	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.030	0.012	0.25	4.94	0.31	4.94	2.00	Off
65	CB40	2.65	0.00	2.65	0.00	Curb	6.0	6.00	0.00	0.00	0.00	Sag	2.00	0.080	0.030	0.012	0.34	8.05	0.41	8.05	2.00	Off
66	DMH42	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

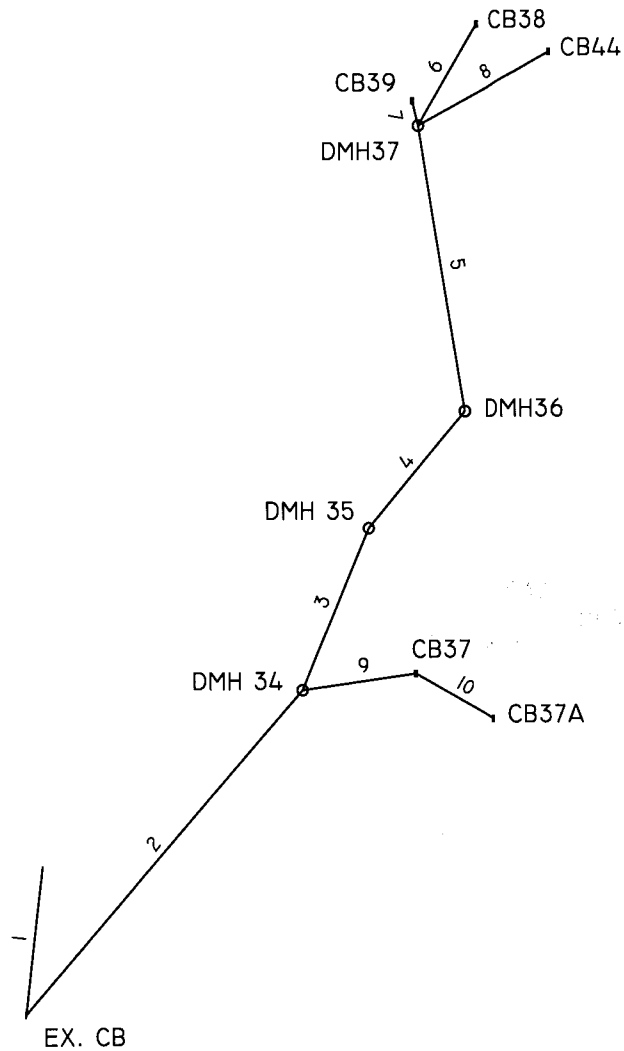
NOTES: Inlet N-Values = 0.016 ; Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs. ; * Indicates Known Q added

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
67	DMH43	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.012	0.00	0.00	0.00	0.00	0.00	Off
68	CB37	1.38	0.00	1.38	0.00	Grate	0.0	0.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.11	1.42	0.18	1.59	2.00	Off
69	CB38	1.92	0.00	1.92	0.00	Grate	6.0	6.00	0.65	1.00	2.00	Sag	2.00	0.080	0.030	0.012	0.23	4.49	0.30	4.49	2.00	Off

Reading Woods - System 2 | Number of lines: 69 | Run Date: 12-23-2010

NOTES: Inlet N-Values = 0.016 ; Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs. ; * Indicates Known Q added



MARCHIONDA & ASSOC.,L.P.
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STONEHAM, MA. 02180
(617) 438-6121

STORM SEWER SYSTEM #3

READING WOODS
READING, MA

SCALE: NONE	DATE: 1/4/11	**S-3**

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	EX. CB-EX. CB	2.50	12 c	82.0	157.50	158.90	1.707	158.17	159.57	n/a	159.57	End
2	DMH 46-EX. CB	1.51	12 c	236.0	159.30	172.30	5.508	159.82	172.82	n/a	172.82 j	1
3	DMH47-DMH46	1.47	12 c	97.0	177.00	178.42	1.464	177.39	178.93	0.00	178.93	2
4	DMH48-DMH47	1.50	12 c	84.0	178.52	179.36	1.000	179.08	179.88	n/a	179.88 j	3
5	DMH49-DMH48	1.56	12 c	160.0	179.46	181.06	1.000	180.02	181.59	n/a	181.59 j	4
6	CB43-DMH49	0.64	12 c	65.0	181.16	182.79	2.508	181.79	183.13	n/a	183.13 j	5
7	CB42-DMH49	0.69	12 c	14.0	181.16	182.20	7.429	181.79	182.55	n/a	182.55 j	5
8	CB44-DMH49	0.40	12 c	84.0	181.16	182.00	1.000	181.80	182.27	n/a	182.27 j	5
9	CB40-DMH46	0.21	12 c	64.0	177.00	179.60	4.063	177.11	179.80	0.00	179.80	2
10	CB41-CB46	0.13	12 c	50.0	179.70	180.20	1.000	179.86	180.35	n/a	180.35 j	9

Reading Woods - System 3 | Number of lines: 10 | Run Date: 12-23-2010

NOTES: c = cir; e = ellip; b = box; Return period = 25 Yrs. ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	82.0	0.80	1.37	0.30	0.24	0.57	5.0	15.2	4.4	2.50	4.65	4.46	12	1.71	158.90	157.50	159.57	158.17	161.77	163.45	EX. CB-EX. CB
2	1	236.0	0.00	0.57	0.00	0.00	0.33	0.0	13.5	4.6	1.51	8.36	3.64	12	5.51	172.30	159.30	172.82	159.82	181.00	161.77	DMH 46-EX. CB
3	2	97.0	0.00	0.43	0.00	0.00	0.29	0.0	9.7	5.1	1.47	4.67	4.43	12	1.46	178.42	177.00	178.93	177.39	184.00	181.00	DMH47-DMH46
4	3	84.0	0.00	0.43	0.00	0.00	0.29	0.0	9.0	5.3	1.50	3.86	3.48	12	1.00	179.36	178.52	179.88	179.08	187.50	184.00	DMH48-DMH47
5	4	160.0	0.00	0.43	0.00	0.00	0.29	0.0	7.8	5.5	1.56	3.86	3.56	12	1.00	181.06	179.46	181.59	180.02	187.50	187.50	DMH49-DMH48
6	5	65.0	0.17	0.17	0.62	0.11	0.11	5.0	5.0	6.0	0.64	6.11	1.97	12	2.51	182.79	181.16	183.13	181.79	186.99	187.50	CB43-DMH49
7	5	14.0	0.16	0.16	0.71	0.11	0.11	5.0	5.0	6.0	0.69	10.52	2.05	12	7.43	182.20	181.16	182.55	181.79	186.20	187.50	CB42-DMH49
8	5	84.0	0.10	0.10	0.66	0.07	0.07	5.0	5.0	6.0	0.40	3.86	1.56	12	1.00	182.00	181.16	182.27	181.80	186.00	187.50	CB44-DMH49
9	2	64.0	0.07	0.14	0.30	0.02	0.04	5.0	10.2	5.1	0.21	7.78	3.13	12	4.06	179.60	177.00	179.80	177.11	184.20	181.00	CB40-DMH46
10	9	50.0	0.07	0.07	0.30	0.02	0.02	5.0	5.0	6.0	0.13	3.86	1.67	12	1.00	180.20	179.70	180.35	179.86	184.20	184.20	CB41-CB46

Reading Woods - System 3 | Number of lines: 10 | Run Date: 12-23-2010

NOTES: Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	EX. CB	1.45	0.00	1.45	0.00	Grate	0.0	0.00	0.59	1.00	2.00	Sag	2.00	0.080	0.030	0.012	0.21	3.72	0.21	3.72	0.00	Off
2	DMH 34	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
3	DMH 35	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
4	DMH36	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
5	DMH37	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
6	CB38	0.64	0.00	0.64	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.04	0.51	0.11	0.95	2.00	Off
7	CB39	0.69	0.00	0.69	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.05	0.58	0.11	1.00	2.00	Off
8	CB44	0.40	0.00	0.40	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.01	0.15	0.08	0.70	2.00	7
9	CB37	0.13	0.00	0.13	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.04	0.46	0.04	0.46	0.00	Off
10	CB37A	0.13	0.00	0.13	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	-0.03	-0.37	0.04	0.32	2.00	Off

Reading Woods - System 3 | Number of lines: 10 | Run Date: 12-23-2010

NOTES: Inlet N-Values = 0.016 ; Intensity = 53.17 / (Inlet time + 14.10) ^ 0.74; Return period = 25 Yrs. ; * Indicates Known Q added

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.
1	EX. CB-EX. CB	3.19	12 c	82.0	157.50	158.90	1.707	158.26	159.66	0.00	159.66	End
2	DMH 46-EX. CB	1.91	12 c	236.0	159.30	172.30	5.508	159.95	172.89	n/a	172.89 j	1
3	DMH47-DMH46	1.81	12 c	97.0	177.00	178.42	1.464	177.43	178.99	0.00	178.99	2
4	DMH48-DMH47	1.85	12 c	84.0	178.52	179.36	1.000	179.14	179.94	n/a	179.94 j	3
5	DMH49-DMH48	1.90	12 c	160.0	179.46	181.06	1.000	180.09	181.65	n/a	181.65 j	4
6	CB43-DMH49	0.76	12 c	65.0	181.16	182.79	2.508	181.88	183.16	n/a	183.16 j	5
7	CB42-DMH49	0.82	12 c	14.0	181.16	182.20	7.429	181.88	182.58	n/a	182.58 j	5
8	CB44-DMH49	0.48	12 c	84.0	181.16	182.00	1.000	181.89	182.29	n/a	182.29 j	5
9	CB40-DMH46	0.26	12 c	64.0	177.00	179.60	4.063	177.13	179.82	n/a	179.82	2
10	CB41-CB46	0.15	12 c	50.0	179.70	180.20	1.000	179.89	180.36	n/a	180.36 j	9

Reading Woods - System 3 | Number of lines: 10 | Run Date: 12-23-2010

NOTES: c = cir; e = ellip; b = box; Return period = 100 Yrs. ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	82.0	0.80	1.37	0.30	0.24	0.57	5.0	13.6	5.6	3.19	4.65	5.00	12	1.71	158.90	157.50	159.66	158.26	161.77	163.45	EX. CB-EX. CB
2	1	236.0	0.00	0.57	0.00	0.00	0.33	0.0	12.1	5.8	1.91	8.36	3.75	12	5.51	172.30	159.30	172.89	159.95	181.00	161.77	DMH 46-EX. CB
3	2	97.0	0.00	0.43	0.00	0.00	0.29	0.0	8.9	6.4	1.81	4.67	4.74	12	1.46	178.42	177.00	178.99	177.43	184.00	181.00	DMH47-DMH46
4	3	84.0	0.00	0.43	0.00	0.00	0.29	0.0	8.4	6.5	1.85	3.86	3.76	12	1.00	179.36	178.52	179.94	179.14	187.50	184.00	DMH48-DMH47
5	4	160.0	0.00	0.43	0.00	0.00	0.29	0.0	7.3	6.7	1.90	3.86	3.83	12	1.00	181.06	179.46	181.65	180.09	187.50	187.50	DMH49-DMH48
6	5	65.0	0.17	0.17	0.62	0.11	0.11	5.0	5.0	7.2	0.76	6.11	2.07	12	2.51	182.79	181.16	183.16	181.88	186.99	187.50	CB43-DMH49
7	5	14.0	0.16	0.16	0.71	0.11	0.11	5.0	5.0	7.2	0.82	10.52	2.15	12	7.43	182.20	181.16	182.58	181.88	186.20	187.50	CB42-DMH49
8	5	84.0	0.10	0.10	0.66	0.07	0.07	5.0	5.0	7.2	0.48	3.86	1.63	12	1.00	182.00	181.16	182.29	181.89	186.00	187.50	CB44-DMH49
9	2	64.0	0.07	0.14	0.30	0.02	0.04	5.0	9.3	6.3	0.26	7.78	3.34	12	4.06	179.60	177.00	179.82	177.13	184.20	181.00	CB40-DMH46
10	9	50.0	0.07	0.07	0.30	0.02	0.02	5.0	5.0	7.2	0.15	3.86	1.65	12	1.00	180.20	179.70	180.36	179.89	184.20	184.20	CB41-CB46

Reading Woods - System 3 | Number of lines: 10 | Run Date: 12-23-2010

NOTES: Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	EX. CB	1.73	0.00	1.73	0.00	Grate	0.0	0.00	0.59	1.00	2.00	Sag	2.00	0.080	0.030	0.012	0.30	6.67	0.30	6.67	0.00	Off
2	DMH 34	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
3	DMH 35	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
4	DMH36	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
5	DMH37	0.00	0.00	0.00	0.00	MH	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.00	0.00	0.00	0.00	0.00	Off
6	CB38	0.76	0.00	0.76	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.05	0.68	0.12	1.07	2.00	Off
7	CB39	0.82	0.00	0.82	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.06	0.76	0.13	1.12	2.00	Off
8	CB44	0.48	0.00	0.48	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.02	0.27	0.09	0.78	2.00	7
9	CB37	0.15	0.00	0.15	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	0.04	0.52	0.04	0.52	0.00	Off
10	CB37A	0.15	0.00	0.15	0.00	Grate	6.0	6.00	4.00	2.00	2.00	Sag	2.00	0.080	0.030	0.012	-0.03	-0.32	0.04	0.36	2.00	Off

Reading Woods - System 3 | Number of lines: 10 | Run Date: 12-23-2010

NOTES: Inlet N-Values = 0.016 ; Intensity = 78.24 / (Inlet time + 17.60) ^ 0.77; Return period = 100 Yrs. ; * Indicates Known Q added