Stillwater Villas Condominium

in the River's Crossing Addition #3 residential subdivision
City of Waukesha
Waukesha County, WI

Storm Water Management Plan

Prepared By:

DESIGN • LAND SURVEYING
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Submittal Date:
March 11, 2016

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Introduction

Stillwater Villas is a proposed 18-unit condominium development comprised of nine (9) 2-family homes situated on a proposed private drive extending off the northeast corner of Stillwater Circle. **The subject property is a 4.18 acre lot that was created as part of the River's Crossing Addition No. 3 subdivision and all storm water runoff from the proposed site was accounted for in the wet storm water detention basin located further south, behind the homes on the east side of Stillwater Circle.**

The original master plan for the proposed site envisioned 20 single family condominium homes on a private drive. Bielinski Homes is now proposing 18-units of duplex condominiums, 9 buildings total, which allows for a more efficient and consolidated development footprint as compared to the original master plan, while still meeting the intent of the master plan. However, after conducting a survey and analysis of the existing storm water management facility it was found that it was either not constructed per original plan or settling has occurred since original construction. From the information present at the time of this study, the existing offsite storm water management facility functions without any negative impacts to the residence of the development. As a result of these findings it was decided that without the redesign and reconstruction of the existing storm water management facility, the proposed development would potentially have a negative effect on the existing development. Since the existing site currently drains east to the Fox River, the proposed plan is to maintain these drainage patterns in the post construction phase, and to provide all volume control and water quality control onsite.

The subject site is bordered by the Rivers Crossing Park along the west and north perimeter, the Fox River wetland and park area along the eastern border, and the River's Crossing Add. No. 3 subdivision to the south. This setting affords the development a tranquil theme where nature and open space abound. Taking advantage of this, the development footprint situates the 9 condominium buildings radially around a 330-foot long private cul-de-sac, offering each unit a back yard that opens up to park and natural open space.

The property has a generally uniform existing topography with a typical 3% slope from west to east, towards the Fox River wetland area. An 18" RCP storm sewer was extended in to the southern corner of the site from Stillwater Circle to convey storm water runoff from this site to the subdivision's wet detention basin further south. This storm sewer will be removed and capped at the property line in the construction process. The emergency overflow route to the existing basin for extreme storm events will be routed through the proposed site. The central part of the site will drain to the proposed road and be collected in a proposed bio-retention basin at the southeast corner of the project. The condominium back yards will drain to varies rain gardens around the perimeter of the site, which cannot drain to the existing storm sewer system; therefore, a series of four (4) rain gardens are proposed around the northeast and east perimeter of the site to enhance the water quality and infiltration aspects of this development. A rain garden is proposed at the southwest corner of the site to pick up buildings 1 and 2, and will route the runoff to the proposed bio-retention facility. The rain gardens are designed to have a maximum 1-foot ponding depth, are discharged by PVC pipe and emergency spillways, and will be planted with wet prairie vegetation that is suitable for rain gardens and will also offer a variety of flowers throughout the year.

Owner

The owner and responsible entity for installation and maintenance of the storm water management practices is:

Bielinski Homes, Inc.
1830 Meadow Lane, Suite A
Pewaukee, WI 53072
Contact: Nancy Washburn
(262) 542-9494

Design Requirements

The following design standards have been used to develop the storm water management plan for the *Stillwater Villas* condominium:

- City of Waukesha Stormwater Management Ordinance – Chapter 32
- Wisconsin Department of Natural Resources (WDNR) Technical Standards, NR 151 and NR 216.
- Summary of design requirements:
    - Peak Discharge: Peak flow rates from the post-development site shall be reduced to less than the corresponding event under existing conditions for the 2, 10, and 100-year storm events.
    - Water Quality (Total Suspended Solids): Reduce, to the maximum extent practicable, the total suspended solids load by 80%, based on an average annual rainfall, as compared to no runoff management controls.
    - Infiltration: Infiltration requirements were not in place at the time this property was developed, which is why the storm water management plan, dated December 20, 2001, does not include provisions for infiltration. Per Ch. 32 and NR 151, infiltration requirements are not applicable since this site was part of a storm water permit issued in 2002. However, this project proposes to provide infiltration to the maximum extent practicable through the use of rain gardens in rear yard areas.

Analysis Overview

Existing and post development stormwater runoff conditions for Stillwater Villas have been analyzed for**:** runoff volume, peak volume, discharge, pond storage capacity required, outlet structures and storm sewer system requirements. The software package used for modeling and analysis was Hydraflow© 2007 Version 9.23 by Intelisolve. Hydraflow uses NRCS methods to generate runoff and pond routing hydrographs. Hydraflow's capabilities include: modeling simple or complex drainage basins, combining hydrographs to determine runoff and storage requirements, analyzing interconnected detention basins and detention basin and outlet structure sizing.

The computer model analyzed the two, ten, one hundred-year storm events. TR-55 Type II rainfall distribution is used. The necessary hydrographs were generated to determine the stormwater runoff rates, depths and volumes for pre and post development conditions. This information is used to calculate detention basin size and outlet requirements.

The rainfall depths for the 24-hour duration storm are:

Rainfall Depths for 24-Hour Storm Duration			
(per Chapter 32)			
1-year	2-year	10-year	100-year
2.3"	2.7"	4.0"	5.6"

Run-off curve numbers for the onsite areas were determined using the requirements outlined in the NRCS TR-55 Manual and City and WDNR standards. The existing soils on the site are well drained, classified and hydrologic soil group B, and include the following:

Soil Types		
Identifier	**Soil Description**	**Hyd. Soil Group**
WeA	Warsaw loam	B
LyB2	Lorenzo loam	B

The following describes the curve numbers assigned for composite calculations:

Curve Numbers: Impervious Area (Pavement, Sidewalk, Etc.), CN = 98
Impervious Rooftop, CN = 98
Grass/Open Space in Good Condition: Type "B" Soil, CN = 61
Original Existing Site: CN = 72 (per River's Crossing Add. No. 3 SWMP).
Existing Site: CN = 70 (per current standards)

Existing Site Description & Drainage Summary

Description

Per the original approved storm water management plan dated December 20, 2001, the site has historically been farmed. The subject Stillwater Villas site is part of Area 2 in the existing storm water management plan, and is referenced within it as the "future multi family development." The existing site has a generally uniform topography with a typical 3% slope to the east, towards the Fox River wetland area.

Currently, the site is vacant property bordered by the Rivers Crossing Park to the north and west, the Fox River wetland and park to the east, and the River's Crossing Add. No. 3 subdivision to the south. A portion of the soccer field and open space in the Rivers Crossing Park slopes east to this site; this park area is accounted for both in this plan and in the overall existing plan for the development.

The existing conditions in this plan were assigned a curve number of 70, reflective of current code requirements.

The following is a summary of the existing conditions analysis:

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	-------	-------	1.944	-------	-------	5.470	-------	-------	10.67	E-1

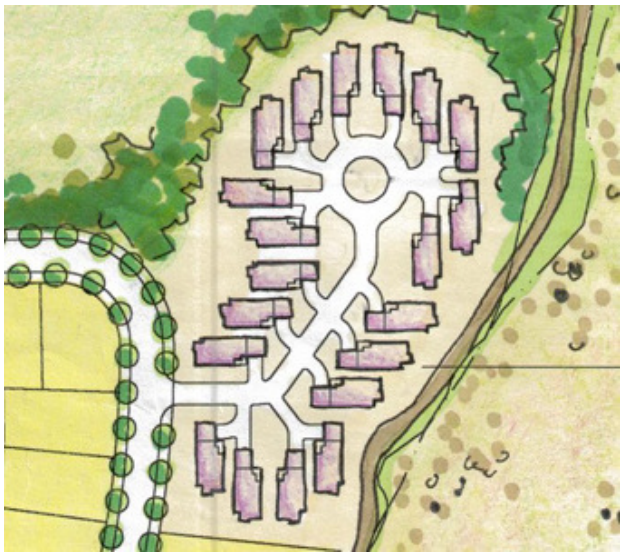
Post-Development Site Description & Drainage Summary

Description

The proposed development is nine (9) two-family condominium buildings (18 units) situated around a 330' long private cul-de-sac. This 4.18 acre parcel was created as part of the River's Crossing subdivision and storm water management from this entire parcel was included in the December 20, 2001 storm water plan for Addition No. 3; this site was identified as "future multi family" within "Area 2." Please refer to the attached narrative, excerpts and drainage map from the River's Crossing Addition. No. 3 storm water management plan for additional information. As mentioned previously, the analysis of the existing storm water management system found that sending the proposed developments storm water these facilities may impact the existing development negatively. As a result all storm water management will be handled onsite.

The following is a comparison of the Neighborhood Development Plan approved by the Common Council on 3-3-1998, which shows the original multi family development plan, and the Proposed Stillwater Villas Condominium Plan.

Neighborhood Plan approved 3/3/1998



Proposed Stillwater Villas Condominium Plan

As illustrated by this comparison, the proposed Stillwater Villas plan provides similar impervious area coverage as the original single family condominium plan on the whole.

The following sections describe the proposed drainage areas for this development.

Proposed Drainage Areas

- Area P-1A encompasses the south western majority of the site that drains to a proposed rain garden which has been designed to reduce volume (through infiltration) and minimize the discharge rate to the proposed bio-retention pond in area P-1. This area mainly collects the roof runoff and back yards of the condominiums located along Stillwater Circle and the western property line.
- Area P-1 encompasses the western and central majority of the site that drains to a proposed bio-retention basin which has been designed to reduce volume (through infiltration) and minimize the discharge rate off the site. The private road and driveways are included in this area. An existing 18" RCP storm sewer was stubbed in to this property to collect this runoff as part of the existing development plan. This storm sewer will be removed and capped at the property line and discharge from this basin will instead be discharge to the southeast corner of the property line through a level spreader.
- Area P-2 includes the rear yard and rear roof areas in the northwest corner of the site that surface drain to Rain Garden 2 on the north perimeter of the site.
- Area P-3 is a small rear yard area in the northeast corner that drains to Rain Garden 3.
- Area P-4 is a small rear yard area in the middle of the east perimeter that drains to Rain Garden 4.
- Area P-5 encompasses the southeast area that drains to Rain Garden 5.

Detailed Description of Proposed Drainage Areas

	Proposed Rain Gardens					
Lot Coverage	**P-1 (acres)**	**P-1A (acres)**	**P-2 (acres)**	**P-3 (acres)**	**P-4 (acres)**	**P-5 (acres)**
Roof	*0.00*	0.19	0.28	*0.09*	*0.09*	0.19
Private Street	*0.36*	0.00	0.00	*0.00*	*0.00*	0.00
Sidewalk	*0.05*	*0.01*	*0.01*	*0.00*	*0.00*	*0.01*
Driveway	*0.33*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Offsite Field	*0.00*	0.20	0.25	*0.00*	*0.00*	0.00
Open Space	*0.74*	0.39	0.63	*0.14*	*0.11*	0.40
Sub-Total (ac)	***1.47***	***0.79***	***1.17***	***0.24***	***0.20***	***0.60***
Composite CN	*79*	*70*	*70*	*76*	*79*	*73*

Proposed Drainage Summary

The following provides a summary of the peak discharge rates for the proposed drainage areas and rain gardens. Please refer to the attachments for additional information.

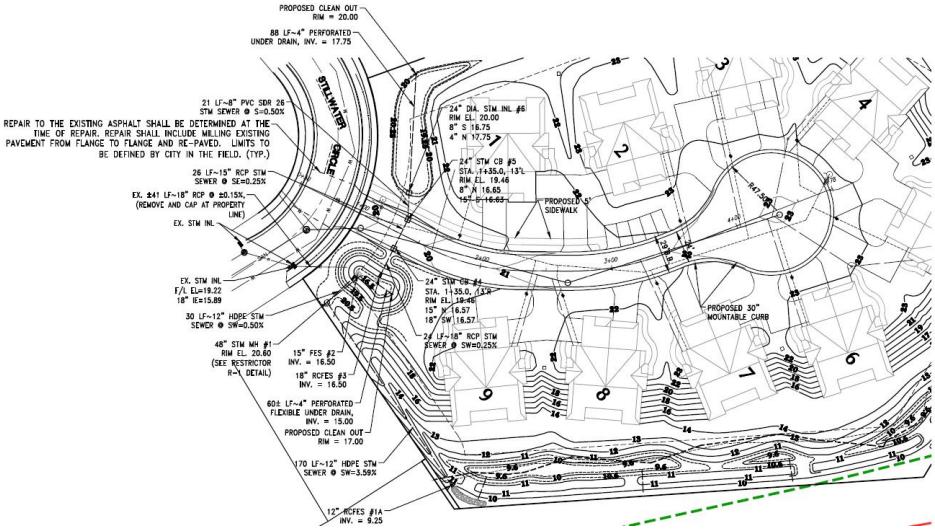
Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)							Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
3	SCS Runoff	-------	-------	1.605	-------	-------	3.337	-------	-------	5.670	P-1
4	SCS Runoff	-------	-------	0.551	-------	-------	1.475	-------	-------	2.823	P-1A
5	SCS Runoff	-------	-------	0.509	-------	-------	1.432	-------	-------	2.793	P-2
6	SCS Runoff	-------	-------	0.332	-------	-------	0.707	-------	-------	1.225	P-3
7	SCS Runoff	-------	-------	0.331	-------	-------	0.662	-------	-------	1.110	P-4
8	SCS Runoff	-------	-------	0.618	-------	-------	1.451	-------	-------	2.627	P-5
10	Reservoir	4	-------	0.070	-------	-------	0.197	-------	-------	2.038	RAIN GARDEN RG-1A
11	Combine	3, 10	-------	1.650	-------	-------	3.469	-------	-------	7.620	RG-1A + P-1
12	Reservoir	11	-------	1.404	-------	-------	3.165	-------	-------	5.243	Dry Pond P-1
13	Reservoir	5	-------	0.255	-------	-------	1.199	-------	-------	1.853	RAIN GARDEN 2
14	Combine	6, 13	-------	0.332	-------	-------	1.290	-------	-------	2.140	P-3 + RG-2
15	Reservoir	14	-------	0.275	-------	-------	1.136	-------	-------	1.994	RAIN GARDEN 3
16	Reservoir	7	-------	0.285	-------	-------	0.523	-------	-------	0.927	RAIN GARDEN 4
17	Reservoir	8	-------	0.233	-------	-------	0.646	-------	-------	1.270	RAIN GARDEN 5
18	Combine	12, 15, 16, 17	-------	1.923	-------	-------	4.762	-------	-------	8.484	P-TOTAL

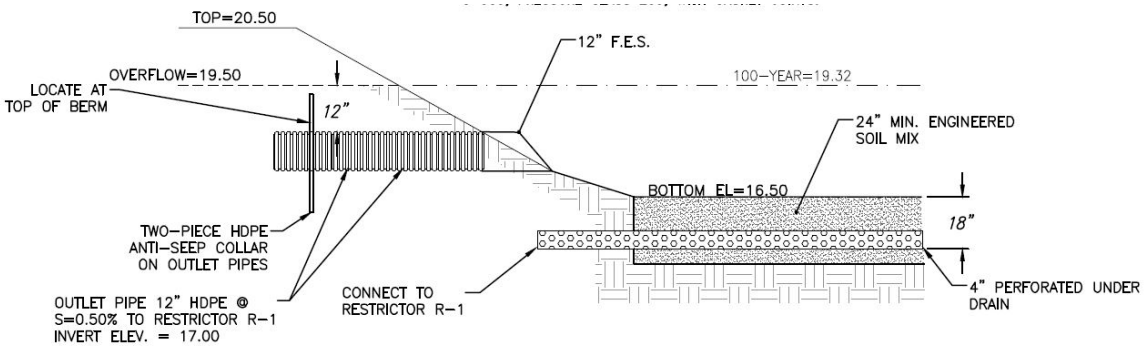
Descriptions & Summaries of Storm Water Practices

Drainage Area P-1

Drainage area P-1 drains to the proposed curb inlets and field inlet from Rain Garden 1A, near the entrance to the proposed development. This storm sewer system discharges to a proposed Bio-retention Basin, which discharges to a level spreader at the southeast property corner.

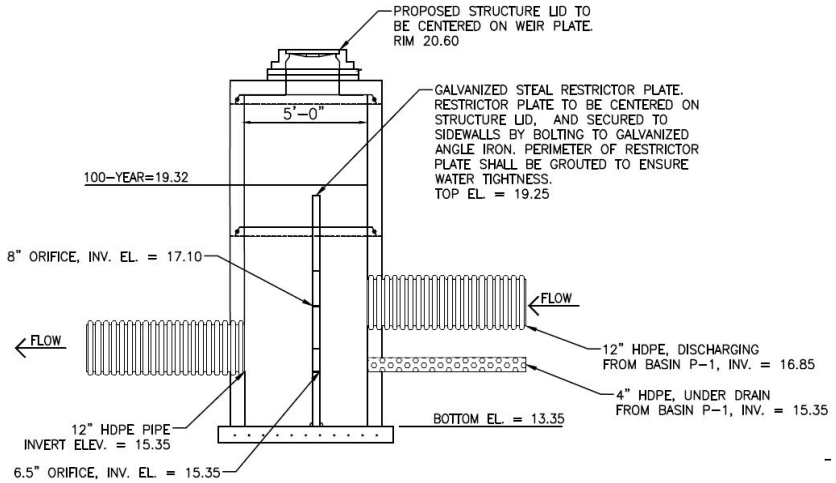
- Top of Berm = 20.50
- Overflow = 19.50
- 100-year = 19.31
- 10-year = 17.96
- 2-year = 17.17
- 12” culvert = 17.00
- Bottom of basin = 16.50
- Under Drain Invert = 15.00
- 6.5” Orifice = 15.35
- 9” Orifice = 17.10
- Top of Restrictor Plate = 19.25





BIO-RETENTION POND P-1

NOT TO SCALE



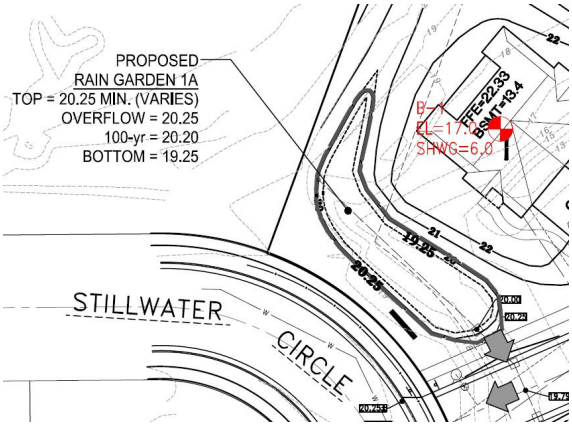
RESTRICTOR STRUCTURE R-1

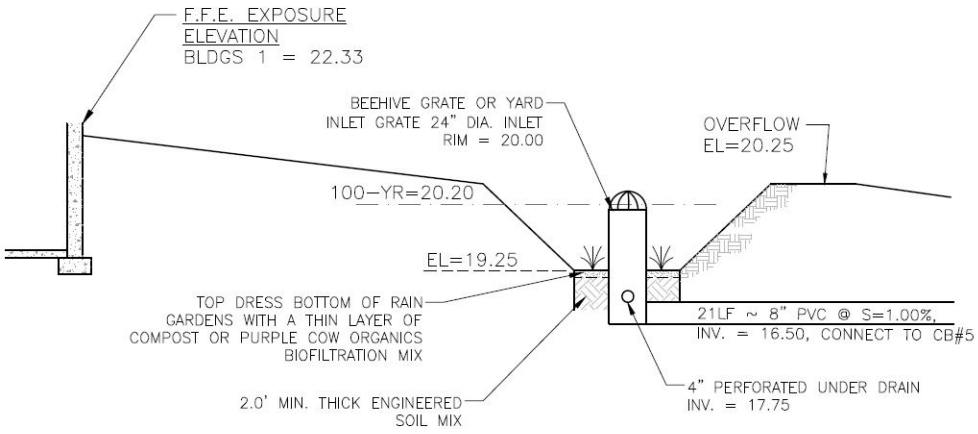
NO SCALE

Rain Garden 1A

Rain Garden 1A is located at the southwest property corner, providing water quality, infiltration and limited peak rate control benefits to the rear yard, roofs and patio areas around the southwest corner of the site. This rain garden is designed to have a maximum 100-year temporary ponding depth of 0.95 feet. A field inlet will drain this area under large flows that will discharge to the Bio-retention basin. Low flows will be infiltrated into the soil and picked up via a 4" perforated under drain, which connects to the field inlet. The field inlet is set 0.75 feet above the bottom of the rain garden to promote infiltration of the first flush of rainfall.

- Top of Berm = Varies (20.25 min.)
- Overflow = 20.25
- 100-year = 20.20
- Field Inlet = 20.00
- 4" under Drain = 17.75
- Bottom = 19.25



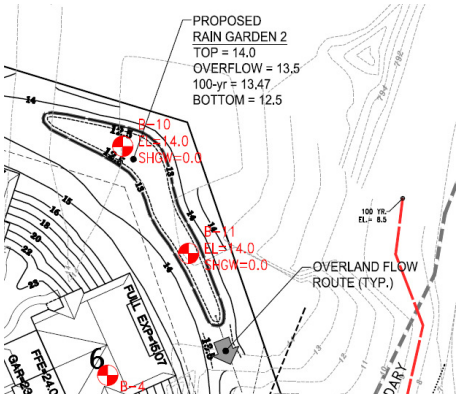


RAIN GARDEN 1A TYPICAL SECTION

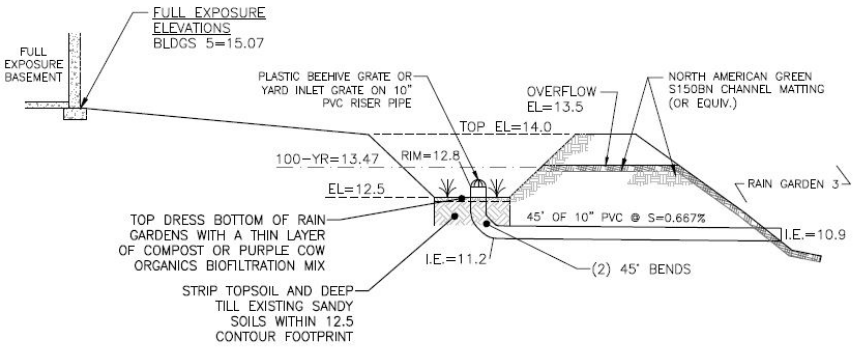
NOT TO SCALE

Rain Garden 2

Rain Garden 2 is the largest of the 4 rain gardens, providing water quality, infiltration and limited peak rate control benefits to the rear yard, rear roof and patio areas around the northwest corner of the site. This rain garden is designed to have a maximum 100-year temporary ponding depth of 0.86 feet. A 10" PVC riser pipe is set 0.3 feet above the bottom of the rain garden to promote infiltration of the first flush of rainfall. The 10" PVC outfall pipe discharges in to Rain Garden 3.



- Top of Berm = 14.0
- Overflow = 13.5
- 100-year = 13.47
- 10" riser = 12.8
- 10" PVC outfall pipe = 11.2
- Bottom = 12.5



RAIN GARDEN 2 TYPICAL SECTION

NOT TO SCALE

Rain Gardens 3, 4 & 5

Rain Gardens 3, 4 and 5 are situated along the east perimeter of the site and provide water quality improvements and limited infiltration and peak rate controls for the adjacent rear yard, roof and patio areas. All 3 rain gardens have a uniform cross section but unique footprints and PVC outfall pipe sizes and configurations. All rain gardens have been designed to have a maximum 100-year temporary ponding depth of less than 1-foot. The following provides information and schematics specific to each of these rain gardens.

<u>Rain Gardens 3, 4 & 5</u>

- Top of Berm = 11.1
- Overflow = 10.6
- PVC outlet pipe = 9.7
- Bottom = 9.6

<u>Rain Garden 3:</u>

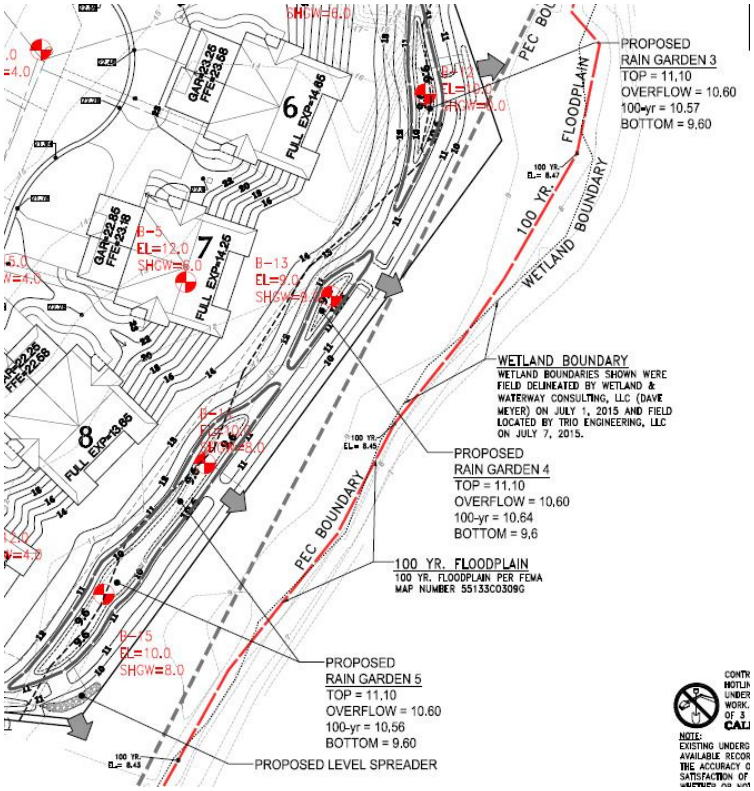
- 100-year = 10.57
- (2) 8" PVC outfall pipes = 9.7
- *Receives runoff from Rain Garden 2 and building 7 rear yard area.*

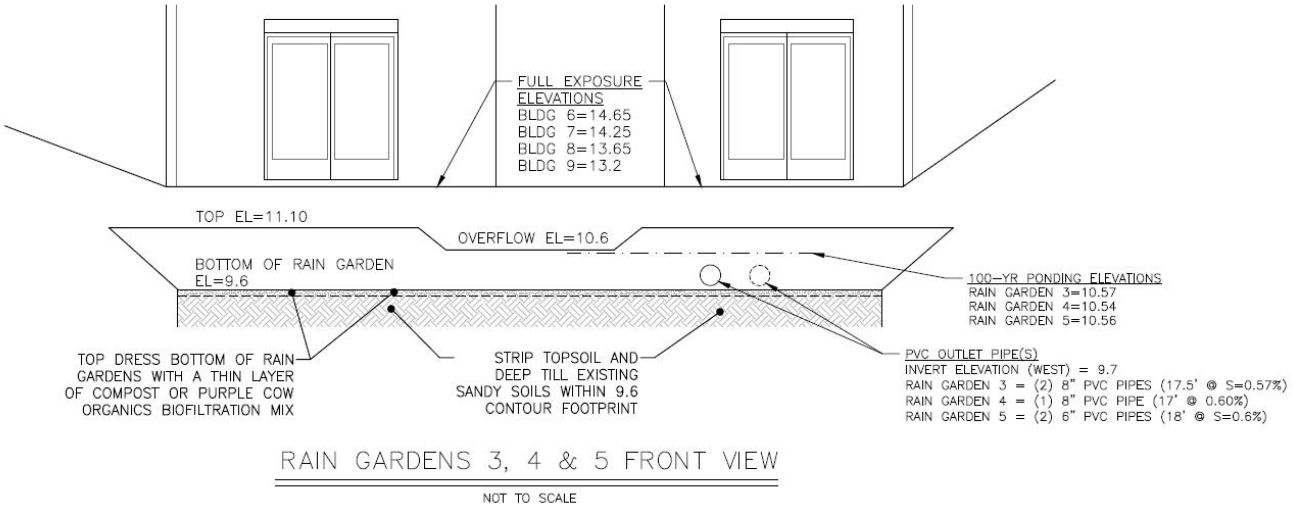
<u>Rain Garden 4:</u>

- 100-year = 10.54
- (1) 8" PVC outfall pipes = 9.7

<u>Rain Garden 5:</u>

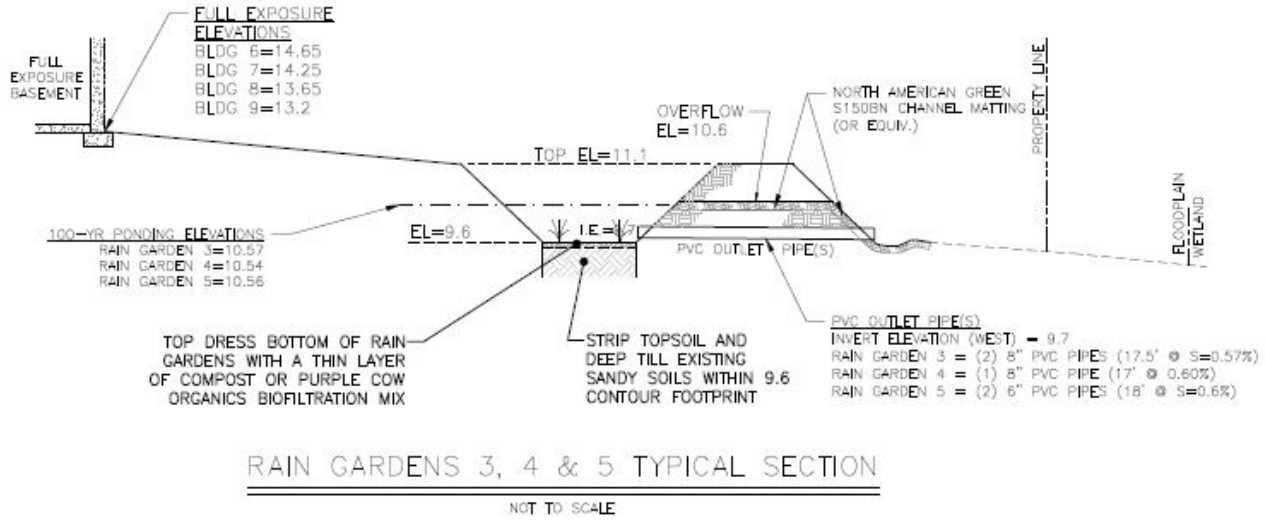
- 100-year = 10.56
- (2) 6" PVC outfall pipes = 9.7





RAIN GARDENS 3, 4 & 5 FRONT VIEW

NOT TO SCALE



RAIN GARDENS 3, 4 & 5 TYPICAL SECTION

NOT TO SCALE

Infiltration Considerations

The objective is to meet current City of Waukesha and WDNR NR151.12(5)(c)1. Infiltrate sufficient runoff volume so that the post-development infiltration volume shall be at least 90% of the pre-development infiltration volume, based on an average annual rainfall. However, when designing appropriate infiltration systems to meet this requirement, no more than 1% of the project site is required as an effective infiltration area. The soils information for this area indicate an abundance of sand and gravel, which the expectation for infiltration rates of 1.63 in./hr – 3.6 in/hr or higher. This preliminary WinSLAMM analysis and infiltration calculations conservatively used 0.5 in/hr as the infiltration rate for native soils. This rate will be confirmed through in-situ testing during excavation of the rain gardens. The proposed development contains (five) rain gardens providing infiltration to rear roof, patio and rear yard areas around the perimeter of the site. The central drainage area P-1 will enter a proposed bio-retention basin area where infiltration will be promoted.

The following is the supporting calculations in accordance with current City of Waukesha and WDNR NR151.12(5)(c)1 infiltration requirements:

Total Project Area = 4.18 acres
Proposed Infiltration Area = 0.253 acres
Percentage of site allocated to Infiltration = 0.253 ac. / 4.18 ac. = 0.0605 or 6.05% **OK**

Total Site Release Rates

The table below summarizes the storm water release rates associated with the development. The Allowable Release Rate is defined as the pre-development release rate, which is the existing/pre-development drainage area. The Total Proposed Release Rate is calculated as the addition of the:

- Bio-Retention Basin release rate at the peak time
- Discharge from Rain Gardens 3, 4, & 5, at the peak time

The table verifies that the Storm Water Management Plan reduces the post-developed flow rates to equal to or less than the corresponding pre-developed (existing) flow rates. Note that the Hydraflow calculations were manipulated by neglecting the storage volume between the bottom of the basin and the 12" outlet pipe to the restrictor. As a result, the actual design basin will be more conservative than the modelled basin.

Site Discharge*

Storm Event	**Total Proposed Release Rate**	**Allowable Release Rate**
(Year)	***(cfs)***	***(cfs)***
2	**1.923**	**1.944**
10	**4.762**	**5.470**
100	**8.484**	**10.67**

* Total Peak Runoff Rates are based on the addition of the peak discharge rates from the associated hydrographs at the peak time for the site; due to varying peak times, the total discharge rates are not a direct summation of the peak rates for each. Refer to the attached calculations for additional information.

Water Quality – TSS Reduction

WinSLAMM © version 10.0 was utilized to calculate the total suspended solids loadings for the rain garden drainage areas and reductions produced by the rain gardens. WinSLAMM version 10.0 allows the combining of areas and practices to produce a complete analysis in one design file. The following table provides a summary of the results of the WinSLAMM © analysis:

SLAMM Results - Stillwater Villas
February 16, 2016

Rain file: Milwaukee WI 1969.RAN Model Run Start Date: 03/28/69 Model Run End Date: 12/06/69	Runoff Volume (cu ft)	Particulate Solids Concentration (mg/L)	Particulate Solids yield (lbs)
Total Without Controls:			
P-1 & Rain Gardens 1A, 2, 3, 4 & 5	53,303	176.0	585.6
Total Site	**53,303**	**-**	**585.6**
Total After Outlet Controls:			
Rain Gardens 2, 3, 4 & 5	6,433	166.3	66.79
Total Site	**6,433**	**-**	**66.79**
Percent Reduction: **Total Rear Yard/Rain Garden Site**	N/A	N/A	**88.59%**

Note that the WinSLAMM model calculations have been manipulated by moving the lower 6.5" orifice up to equal the outlet culvert elevation. By manipulating the model in this way it accounts for the 6 inches of storage between the bottom of the basin and the outlet culvert.

Conclusion

The proposed development plan for the Stillwater Villas condominium meets and exceeds the storm water management requirements of the City of Waukesha and WDNR NR 151. The inclusion of five (5) rear yard rain gardens in to this proposed plan enhances the storm water management for this development site, introduces an extra level of infiltration, and provides compliance with current City and WDNR requirements for all areas.

APPENDIX 1

Soils Map

PRELIMINARY GEOTECHNICAL EXPLORATION REPORT

For the

Proposed Stillwater Villas Development
NEC of Stillwater Circle and Rivers Crossing Drive
Waukesha, Wisconsin

Prepared for:

Bielinski Homes
1830 Meadow Lane, Suite A
Pewaukee, WI 53072

Prepared by:

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, Wisconsin 53189
Phone (262) 521-2125
Fax (262) 521-2471

PSI Report Number: 00521315-1

August 12, 2015

psi Information To Build On
Engineering • Consulting • Testing

Riley D. Thoss, E.I.T.
Staff Engineer
Geotechnical Services

Ted A. Cera, P.E.
Project Engineer
Geotechnical Services

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Information To Build On

Information To Build On
Engineering • Consulting • Testing

August 12, 2015

Bielinski Homes
1830 Meadow Lane, Suite A
Pewaukee, WI 53072

Attn: Ms. Nancy Washburn
Acquisitions and Development Manager

Re: Preliminary Geotechnical Exploration Report
Proposed Stillwater Villas Development
Stillwater Circle
Waukesha, Wisconsin
PSI Report No. 00521315-1

Dear Ms. Washburn:

Professional Service Industries, Inc. (PSI) is pleased to transmit our Geotechnical Exploration Report for the proposed Stillwater Villas Development to be located northeast of the intersection of Stillwater Circle and Rivers Crossing Drive in Waukesha, Wisconsin. This report includes the results of field and laboratory testing, as well as recommendations for footings, floor slabs, pavements and storm water areas for the planned project.

PSI appreciates the opportunity to perform this Geotechnical Study and looks forward to continuing our participation during the design and construction phases of this project. If you have questions pertaining to this report, or if PSI may be of further service, please contact us at your convenience.

Respectfully submitted,
PROFESSIONAL SERVICE INDUSTRIES, INC.

Riley D. Thoss, E.I.T.
Staff Engineer
Geotechnical Services

Ted A. Cera, P.E.
Project Engineer
Geotechnical Services

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PROJECT INFORMATION

Project Authorization

The following Table summarizes, in chronological order, the Project Authorization History for the services performed and represented in this report by Professional Service Industries, Inc. (PSI):

DOCUMENT AND REFERENCE NUMBER	DATE	SOURCE OF REQUEST	AUTHOR OR AGENT & TITLE
PSI Proposal Number: 156162R1	7/13/2015	PSI	Mr. Paul J. Koszarek, P.E. Mr. Ted A. Cera, P.E.
Notice to Proceed	7/13/2015	Bielinski Homes	Ms. Nancy Washburn

Project Description

PSI understands that the project consists of 10 single story duplex condominiums, some of which will contain lookout or walkout style basements, installation of roadway and associated utilities and four rain gardens for stormwater management. Grades for the first floor of the condominiums and roadways will range from EL. 22.13 to EL. 24. The basement elevations will range from EL 13.2 to EL 15.1. Existing site grades range from about EL. 23 to EL. 10. Therefore, fills of up to about 12 feet will be required. The rain gardens are anticipated to be at or near existing grades with bottom elevations ranging from about EL. 9.6 to EL. 12.5 along the north and east sides of the site. Sanitary sewer invert elevations will be approximately 11 to 12 feet lower than proposed road grade. The following Table lists the material and information provided for this project:

DESCRIPTION OF MATERIAL	PROVIDER/SOURCE	DATE
Revised Civil Plans	Mr. Josh Pudelko, M.S., P.E. Trio Engineering	5/8/2015

The geotechnical recommendations presented in this report are based on the available project information and the materials described in this report. If the noted information is incorrect, please inform PSI in writing so that we may amend the recommendations presented in this report if appropriate and if desired by the client. PSI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

Purpose and Scope of Services

The purpose of this study was to explore the subsurface conditions at the site and develop preliminary geotechnical design criteria regarding foundations, floor slabs, pavements and storm water areas (for rain garden borings) for the proposed residential duplex development project. Subgrade preparation recommendations and construction considerations are also provided. PSI's scope of services included drilling a total of 15 soil test borings, select laboratory testing, and preparation of this geotechnical report.

The scope of services did not include an environmental assessment for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, surface water, groundwater, or air on or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes.

SITE AND SUBSURFACE CONDITIONS

Site Location and Description

The project site is located on a vacant parcel to the northeast of the intersection of Stillwater Circle and Rivers Crossing Drive in Waukesha, Wisconsin. The parcel measures approximately 4.18 acres in size and is currently zoned for Residential Single Unit District purposes (RS-3). The site is a grass and weed covered open field with some trees along the south and east boundaries. Residential properties are to the west and north and the Fox River is to the east. The site is bounded on the southwest corner by Stillwater Circle. The site slopes gradually from the west to the east with a relief of approximately 13 feet within the property. The Latitude and Longitude for the site is approximately 42.957848°N and 88.282199°W, respectively.

Subsurface Conditions

The subsurface conditions were explored with 15 soil test borings (B-1 through B-15). The borings were completed within the proposed development area and were scheduled to be completed to depths in the range of 5 to 15 feet beneath existing grade. Building and roadway borings extended to 15 feet and the stormwater borings to 5 feet.

The borings were field located by Trio Engineering prior to PSI's mobilization to the site. The boring elevations were determined by plotting the boring locations over the Master Grading plan, utilizing the topographic information, provided by Trio Engineering. The boring elevations should be considered accurate to within about 1± feet. The attached Boring Location Plan shows the approximate locations of the borings. The borings were advanced utilizing hollow-stem auger drilling methods and soil samples were routinely obtained during the drilling process. Drilling and sampling techniques were accomplished generally in accordance with ASTM procedures.

Representative soil samples were obtained from the soil borings and were returned to PSI's laboratory where they were visually classified using the Unified Soil Classification System (USCS) as a guideline. Further, PSI conducted limited laboratory testing on select soil samples to aid in identifying and describing the physical characteristics of the soils and to aid in defining the site soil stratigraphy. The results of the field exploration and laboratory tests were used in PSI's engineering analysis and in the formulation of our engineering recommendations.

Based on the soil boring data, the subsurface soil profile generally consisted of a surficial layer of topsoil varying in thickness from 2 to 18 inches, but most typically in the

range of 7 to 15 inches. Topsoil was not apparent at B-1. Below the topsoil at B-1, B-2, B-4, B-5, B-7, B-10, B-11 and B-12 were fill and possible fill soils, consisting of silty sand and gravel, sandy lean clay, organic lean clay and lean clay. The fill soils extended to varying depths between 3 and 13 feet below ground surface, but more typically between 3 and 5½ feet. It should be noted that the deeper fill encountered at B-2 was observed to contain intermittent organic matter (roots) and construction debris (concrete fragments). Fill was not observed in the remaining borings. It should be noted that the fill extended to the termination depths in two of the shallow stormwater borings (B-11 and B-12). The table below indicates a more detailed breakdown of fill depths and approximate elevations of suitable soils for the building borings.

BORING NO.	BUILDING NO.	BORING GROUND EL. (feet local)	DEPTH TO SUITABLE NATURAL SOILS (feet)	SUITABLE SOILS EL. (feet local)
B-1	1	17	5.5	11.5 ±
B-2	3	20	13	7 ±
B-3	5	17	1	16 ±
B-4	6	14	5.5	8.5 ±
B-5	8	12	3	9 ±
B-6	10	12	1	11 ±

Poorly and well graded sand, clayey sand and silty sand was generally observed beneath the surficial topsoil and/or fill soils and extended to the termination depths of most of the borings except B-10 through B-12 where the fill extended to the termination depths. The moisture contents of the native poorly and well graded sands ranged from 2% to 24%, indicating a moist to wet soil condition. The “N-Values” within these soils were observed in the range of 8 to 71 blows per foot (bpf), indicating a loose to very dense relative soil density.

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs included in the appendix should be reviewed for specific information at individual boring locations. These records include soil descriptions, stratifications, penetration resistances, locations of the samples and laboratory test data. The stratifications shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual. Water level information obtained during field operations is also shown on these boring logs. The samples that were not discarded during classification or altered by laboratory testing will be retained for 60 days from the date of this report and then will be discarded.

Groundwater Information

Groundwater was observed during drilling operations within 12 of the 15 borings at

depths ranging from 2 to 15½ feet (EL. 3 to EL. 8) beneath existing ground surface. No water was encountered within the depths of the borings at B-10, B-11 and B-12 during or upon completion of drilling. The following table depicts the highest observed water level at each of the borings where groundwater was observed.

BORING NO:	BORING GROUND EL. (feet local)	DEPTH OF HIGHEST GROUNDWATER LEVEL OBSERVED (feet)	WATER LEVEL EL. (feet local)
B-1	17	11	6
B-2	20	15.5	4.5
B-3	17	12	5
B-4	14	8	6
B-5	12	6	6
B-6	12	8	4
B-7	15	12	3
B-8	15	11	4
B-9	16	12	4
B-10	14	Not Observed	-
B-11	14	Not Observed	-
B-12	10	Not Observed	-
B-13	9	3	6
B-14	10	2	8
B-15	10	2	8

Due to the mostly granular nature of the native soils in which the groundwater was observed, it is likely that the observed groundwater level is indicative of the long-term groundwater table for this site. Seasonal high levels in the stormwater borings (B-10 through B-15) were not observed, with the exception of B-13 where it is considered to be at a depth of about 1 foot (EL. 8 ±).

Fluctuations in the groundwater level should be anticipated throughout the year depending on variations in climatological conditions and other factors not apparent at the time the borings were performed. The possibility of groundwater level fluctuation and perched water conditions should be considered when developing the design and construction plans for the project.

EVALUATION AND RECOMMENDATIONS

Geotechnical Discussion

There is one primary geotechnical related concern at this site, which will mainly affect foundation and floor slab support as well as related earthwork operations for this project.

The following summarizes this concern:

1) ***Existing undocumented fill and possible fill materials were encountered within 4 out of the 6 building borings and several of the remaining borings extending to depths of approximately 3 to 13 feet (EL. 5 feet to EL. 17 feet) below existing grades. The depth of fill encountered across the site varied significantly and it should be anticipated that the depth and consistency of the existing fill materials will change between boring locations.***

Fill and possible fill soils were observed within many of the test borings to depths of 3 to 13± feet below existing grade. Due to the potential for excessive overall or differential settlement, the fill soils are not considered suitable for support of the planned shallow foundation systems. The underlying fill soils were underlain by natural loose to very dense sand with varying gravel content. The natural soils exhibited moderate to high strength characteristics and would be suitable for support of a conventional shallow continuous wall and column foundation system. **PSI does not recommend that the new foundations or foundation supporting fill bear upon the existing undocumented fill or organic material. Therefore, full removal of the undocumented fill material to expose suitable underlying natural soils is recommended for the preparation of the foundation system.**

Due to the relatively deep undercuts below basement grade in areas (4 ½ to 7± feet at B-2, B-4 and B-5) estimated to be necessary, and the variable fill soils present, substantial excavation instability, resulting in significant sidewall sloughing and caving, may occur. Widened excavations may result and/or may be required to establish stable sidewalls. Additionally, based on the foregoing, it may be more feasible to remove the fill on a mass overexcavation basis from within the affected buildings, rather than on an individual basis. Replacement of the fill soils could then be performed on a mass grading basis from within the footings and floor slabs, with proper placement and compaction being performed. However, several borings (B-1, B-3 and B-6) indicate only up to about 1 to 2± feet of estimated removal below basement grades. As such, the most feasible alternative from a development standpoint must be carefully considered based upon overall cost, level of risk that can be accepted, and feasibility of the available construction approaches (i.e. individual soil correction on a per building basis versus soil correction on a mass grading basis).

Construction of floor slabs upon the undocumented fill material poses a construction risk of experiencing greater total and/or differential settlements. To greatly reduce the risk of experiencing future settlement associated with bearing upon the existing fill would require over-excavation of the fill soils and replacement with a compacted engineered fill.

The planned pavements could be placed directly upon the existing fill, provided that the site preparation recommendations included herein are followed and that some risk of consolidation/settlement of the fill soils and reduced pavement performance can be accepted. Design of a conventional flexible (asphalt) pavement on the existing subgrade soils will generally require a somewhat thicker pavement section and an increased maintenance program throughout the pavement design life. The adherence

to the initial site preparation recommendations is considered critical to verify a suitable subgrade exists, prior to the placement of new fills required to obtain project grades. Depending upon the moisture conditions at the time of construction, some surficial instability may be encountered across the site due to the moisture sensitive nature of the soils. During earthwork operations, a representative of the geotechnical engineer should be present on-site on a full time basis to verify the subgrade conditions and placement and compaction of new fills.

The following geotechnical related recommendations have been developed on the basis of the subsurface conditions encountered and PSI's understanding of the proposed development. Should changes in the project criteria occur, a review must be made by PSI to determine if modifications to our recommendations will be required.

Preliminary Site Preparation

Prior to the placement of new fill or preparation of the construction area subgrade, PSI recommends that the existing surficial organic matter, trees including root bulbs, frozen soils and topsoil be removed from within and a minimum of 5 feet beyond the building pads and pavement areas. Unsuitable soils encountered should be selectively undercut and/or stabilized in place. A representative of a qualified geotechnical engineer should determine the need for and depth of removal or stabilization at the time of construction.

Based upon results of the test borings, selective undercutting of the soils may be required depending upon the moisture conditions at the time of construction. If unstable soils are observed in an area, they should be stripped from that area until more stable soils are observed or stabilized in place. If allowed to dry these soils could be used as engineered fill provided they are placed and compacted as outlined below. A representative of a qualified geotechnical engineer should determine the need for and actual stabilization technique at the time of construction.

After stripping the surficial materials and excavating to the proposed subgrade level, the building and pavement subgrades should be proofrolled. The proofroll should be conducted prior to placement of new fill to raise site grades. The subgrade should be proofrolled with a fully-loaded tandem axle dump truck or rubber tired vehicle of similar size and weight, typically a 9 tons/axle truck where cohesive soils are present and a large vibratory steel drummed roller where granular soils are present. Soils that are observed to rut or deflect excessively under the moving load (typically > 1"), should be undercut and replaced with properly compacted engineered fill. The proofrolling and undercutting activities should be documented by a representative of a qualified geotechnical engineer and should be performed during a period of dry weather. The subgrade soils should be scarified and compacted to at least 95 percent of the maximum dry density and within 3 percent of the optimum moisture content as obtained by the modified Proctor test ASTM D1557. The depth of scarification should not be less than 6 inches below the surface. Drying or wetting of the subgrade soils, typically to within 3% of the optimum moisture content, may be advised to facilitate compaction.

Where the removal of unsuitable bearing material is performed beneath proposed footings, the excavation must extend laterally beyond the perimeter of the foundation

for a distance at least equal to the thickness of the fill below the footing bottom. This general guideline also applies to instances where a raised structural fill pad is constructed to achieve a bearing elevation greater than existing grades. The influence zone of footing stresses can be represented as an imaginary 45° line extending downward and outward from the footing bottom. All fill placed within this zone after cutting to firm soil must be properly engineered, from the bottom of the cut, up to the floor slab subgrade elevation.

After subgrade preparation and observation have been completed, placement of new fill required to obtain proposed site grades may begin. The first layer of fill should be placed in a relatively uniform horizontal lift and be adequately keyed into the stripped and scarified subgrade soils. Engineered fill materials should be free of organic or other deleterious materials, have a maximum particle size less than 3 inches. Clay fills should have a liquid limit less than 45 and plasticity index less than 25 and greater than 11. If a fill soil has Atterberg limits outside of those recommended then the fill properties should be reviewed by the geotechnical engineer prior to use as an engineered fill. Engineered fill should be compacted to at least 95 percent of modified Proctor maximum dry density as determined by ASTM Designation D 1557.

Engineered fill must be placed in maximum lifts of eight inches of loose material and should be compacted to within 3% of the optimum moisture content value as determined by the modified Proctor test (ASTM D1557). If water is to be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying. Each lift of compacted engineered fill should be observed and tested by a representative of PSI prior to placement of subsequent lifts. The lateral extent of the overexcavation of any poor soil and subsequent placement and compaction of engineered fill should be equal to or greater than the depth of overexcavation below finished floor elevation.

Preliminary Foundation Recommendations

The following is a general overview of the subsurface conditions for the site, as it relates to foundation analysis, and can be used in site planning. It is recommended that a more in-depth investigation including each building be conducted prior to construction when the design details are known in order to provide specific design recommendations for each structure. The following table represents the depth to suitable bearing soils at the building borings:

BORING NO:	RELATED BLDG NO:	EX. GRADE AT BORING EL. (feet local)	BASEMENT FLOOR EL. (feet local)	BASEMENT FTNG EL. (feet local)	EL. OF SUITABLE SOILS (feet local)	EST. UNDERCUT DEPTH BELOW BASEMENT GRADE (feet)
B-1	1	17	13.40	12.40	11.5 ±	1 ±
B-2	3	20	14.80	13.80	7 ±	7 ±
B-3	5	17	15.07	14.07	16 ±	-
B-4	6	14	15.07	14.07	8.5 ±	6 ±
B-5	8	12	14.25	13.25	9 ±	4 ½ ±
B-6	10	12	13.20	12.20	11 ±	1 ½ ±

The granular subgrade soils that are anticipated are very easily loosened during excavation, and will require proper re-compaction to achieve the strengths necessary for the allowable bearing capacity recommended and the recommended subgrade modulus.

Based on the overall preliminary study on this site, buildings at the proposed site could be supported upon a conventional shallow column and continuous wall foundation system bearing upon newly placed engineered fill that is used to replace the existing fills either during individual lot construction or, if elected, during a mass removal and replacement operation during site grading. For design considerations, foundations for individual buildings could be designed for maximum net allowable soil bearing pressures ranging from 3,000 pounds per square foot (psf) to 4,000 psf, depending upon location and depth.

The suitability of the existing soils for support of the proposed foundation must be determined by testing by a qualified geotechnical engineer during construction, utilizing static cone penetrometer tests or dynamic cone penetrometer tests for cohesive and granular soils, respectively. Soft, loose, or otherwise unsuitable materials not disclosed by the borings, may be encountered in the foundation excavations at the bearing elevation. If unsuitable existing soil is present, it must be removed throughout a zone extending one foot laterally for each foot removed below the foundation, on either side of the planned footing. The over-excavated area must be backfilled with structural compacted fill. As an alternate, the excavation could extend 4 inches beyond the plan footing width to suitable bearing soil and then backfilled with lean (500 to 1000 psi) concrete mix to planned footing grade to reduce lateral over-excavation.

Footings in unheated areas should be located at a depth of at least 48 inches below the final exterior grade to provide adequate frost protection. If the buildings are to be constructed during the winter months or if footings will likely be subjected to freezing temperatures after foundation construction, then the footings and concrete should be adequately protected from freezing.

Minimum dimensions of 24 inches for continuous footings and 30 inches for any column

footings should be used in foundation design to minimize the possibility of a local bearing capacity failure, even if the allowable bearing pressure recommended herein is not fully utilized.

In general, the performance of the foundation system on this site is dependent on the various factors discussed herein. The excavation, preparation, and concreting of foundations should be monitored and tested by a representative of the soils engineer.

Preliminary Floor Slab Recommendations

The following is a general overview of the subsurface conditions for the site, as it relates to floor slab analysis, and can be used in preliminary site planning. It is recommended that a more in-depth investigation, including each structure to be constructed, be conducted prior to construction when the design details are known in order to provide site specific design recommendations.

Based on the building pads being prepared as recommended within the Site Preparation Section of this report, the building floor slabs are recommended to be supported upon properly compacted engineered fill used to replace existing undocumented fill. If floor slabs are placed upon undocumented fill, the risk of settlement/distress of the floor slabs must be accepted. PSI recommends that a subgrade modulus (k) of 150 pounds per cubic inch (pci) be used for design considerations, based on a 12 inch diameter plate load test. However, depending on how the slab loads are applied, the value will have to be geometrically modified. The value should be adjusted for larger areas using the following expression for cohesive and cohesionless soil:

Modulus of Subgrade Reaction, $k_s = (\frac{k}{B})$ for cohesive soil and

$k_s = k\,(\frac{B+1}{2B})^2$ for cohesionless soil

where: k_s= coefficient of vertical subgrade reaction for loaded area,
k= coefficient of vertical subgrade reaction for 113 square inches area
B= width of area loaded, in feet

PSI recommends that a minimum four-inch thick free draining granular mat be placed beneath the floor slab to enhance drainage. Polyethylene sheeting should be placed to act as a vapor retarder where the floor will be in contact with tile, wood, carpet, or other moisture sensitive products or equipment, as directed by the design engineer. The decision to locate the vapor retarder in direct contact with the slab or beneath the layer of granular fill must be made by the design engineer after considering the moisture sensitivity of subsequent floor finishes, anticipated project conditions and the potential effects of slab curling and cracking. The floor slabs must have an adequate number of joints to reduce cracking resulting from differential movement and shrinkage. In addition, where the slab will be supporting live loads, such as from moving vehicles like fork lifts, joints must be keyed, dowelled, or otherwise prepared to permit proper load transfer.

Basement Walls and Drainage

It is recommended that an underdrain system and drainage course be placed beneath the basement floor slabs and alongside the basement walls (if conventional construction is used) to alleviate hydrostatic uplift pressure beneath the slabs and excessive lateral pressure on the walls. The drain system should be connected to adequate sumps for drainage, and be properly discharged in accordance with all state and local discharge requirements. Drain tile should have a minimum diameter of four (4) inches and should be wrapped with an appropriate filter fabric. Drainage pipes should be surrounded by clean gravel and extend up to the near ground surface. At least six (6) inches of clean ¾ inch stone should be utilized for the free draining layer beneath the floor areas.

The below grade walls must be backfilled for a lateral distance of 3 to 4 feet with a well-graded, free draining granular material. This should be placed in lifts not exceeding 12 inches in thickness and be compacted to at least 90 percent of the Standard Proctor density, except where it is placed beneath adjacent floor slabs or pavements, where the compaction percentage should be increased to 95 percent. Based upon the use of a clean, crushed stone fill, and a drained condition, an equivalent fluid pressure of 65 psf may be used as the horizontal component of earth pressure at rest. However, when a proposed fill material has been selected, a representative sample must be submitted to PSI for testing for verification of the above recommendations. Silt and clay soils, organic soils, and wet granular materials, are not suitable for use as backfill alongside basement walls.

Seismic Site Class

The 2009 International Building Code requires a site class for the calculation of earthquake design forces. This class is a function of soils type (i.e. depth of soil and strata types). Based on the estimated density of the soils observed within the boring locations, **Site Class "D"** is recommended.

Preliminary Pavement Recommendations

PSI understands that a new private drive is planned for the proposed project. Based upon the soils observed on site, PSI anticipates that the subgrade soils within the pavement areas will consist of either existing fill or native sand and gravel. PSI recommends that the subgrade soils for the pavements be prepared in accordance with the Site Preparation section of this report.

In proposed pavement areas where undercuts are performed, the edges of the overexcavations should be feathered into the surrounding suitable soil grade so that edge failure of the overexcavated area will not occur. If undercuts occur within the pavement areas and they are backfilled with granular soils, the bottom of the overexcavation should be sloped to a draintile that is sloped toward the nearest storm sewer. Minimum slopes of gravity type draintiles should be ½%. If drains are not inserted in undercuts, water will accumulate and likely lead to premature subgrade failure and pavement heave. The proofrolling and undercutting activities should be documented by a representative of a qualified geotechnical engineer and should be performed during a period of dry weather.

A detailed traffic analysis was not performed as part of this exploration; however, based upon the proposed construction, the light and heavy duty pavement sections shown below are based on a 20 year design life of 30,000 and 60,000 equivalent 18,000 pound single axle loads (ESAL), respectively (If these traffic loads are not indicative of the actual loads, PSI must be contacted immediately to review this data). The existing soils encountered below the existing grade are determined to have an approximate CBR value of 3. Engineered fill material used to raise existing grades within parking and drive areas should meet or exceed this CBR value. The following design factors were used in developing the recommended pavement sections:

- Design Life: - 20 years
- Terminal Serviceability: - 2.0
- Reliability: - 85%
- Initial Serviceability: - 4.2
- Standard Deviation: - 0.45

If during the final design phase these values are determined to be incorrect, PSI must be contacted to provide revised pavement recommendations. Based upon the soil Borings, laboratory data and provided the subgrade soils are prepared as outlined in this report, the following flexible pavement section is recommended for parking stalls (light duty) and drive lanes for heavy garbage trucks (heavy duty).

Light Duty Asphalt Pavement Section

Granular Base Course Thickness	8 inches
HMA Thickness	3 ½ * inches

*If a front end loader is used for snow removal, this should be increased to 4 inches.

Heavy Duty Asphalt Pavement Section

Granular Base Course Thickness	10 inches
HMA Thickness	4 inches

The granular base course should consist of well-graded crushed stone meeting the requirements from Section 305 of the State of Wisconsin Standard Specifications for Construction for a 1¼" dense graded base. The granular base course material should be placed and compacted to a minimum of 95% of maximum density as determined by ASTM D 1557 (modified Proctor) and within +/-3% of the optimum moisture content value. Also, a representative of a qualified geotechnical engineer must test the base course material prior to, and during, placement.

The pavements should be sloped adequately to provide positive surface drainage. It should be noted that the natural clay soils at this site are moisture sensitive and severe decreases in subgrade strength will occur if these soils become wet or saturated. Water should not be allowed to pond on or adjacent to the pavement as this could saturate the subgrade and cause premature pavement deterioration. The granular base course should be protected from water inflow along drainage paths. Additionally, the granular base course should extend at least two feet beyond the edges of the pavement or curb, if present, to allow water that enters the base stone a path for exit.

Because the pavement at this site will be subjected to freeze-thaw cycles, PSI recommends that an air entrainment admixture be added to the concrete mix to achieve an air content in the range of 5% to 7% to provide freeze-thaw durability in the concrete. Concrete should have a minimum flexural strength of 600 psi and a minimum compressive strength of 4,000 psi at 28 days. A mixture with a maximum slump of 4 inches is acceptable. If a water reducing admixture is specified, the slump can be higher. It is recommended that admixtures are submitted in advance of use in the concrete.

Infiltration Characteristics of Subsurface Soils and Stormwater Device Recommendations

Generally, the subsurface soil conditions within the borings performed for the rain gardens B-10 through B-15 consisted of Clay (C), Sandy Clay Loam (SCL) and Sandy Loam (SL) which extended to the termination depth of the borings. Field infiltration testing was not requested at the time of field exploration. However, for preliminary design purposes the following table provides estimates of design infiltration rates for different soil textures and is based on Table 2, Design Infiltration Rates for Soil Textures Receiving Storm Water, from the Site Evaluation for Storm Water Infiltration, DNR Code 1002. The infiltration rates published by the Natural Resources Conservation Service (NRCS) which are used by the DNR to determine if the soils are exempt from infiltration are also listed.

SOIL TEXTURE	DNR 1002 TABLE 2, DESIGN INFILTRATION RATE WITHOUT MEASUREMENT (IN/HOUR)	NRCS INFILTRATION RATES (IN/HOUR)
Coarse sand or coarser (COS)	3.60	>20
Loamy coarse sand (LCOS)	3.60	>20
Sand (S)	3.60	>20
Loamy sand (LS)	1.63	6.3-20.0
Sandy loam (SL)	**0.50**	**2.0-6.3**
Loam (L)	0.24	0.63-2.0
Silt loam (SIL)	0.13	0.63-2.0
Sandy clay loam (SCL)	**0.11**	**0.63-2.0**
Clay loam (CL)	0.03	0.63-2.0
Silty Clay loam (SICL)	0.04	0.63-2.0
Sandy clay (SC)	0.04	0.63-2.0
Silty clay (SIC)	0.07	0.06-0.20
Clay (C)	**0.07**	**0.06-0.20**

According to Table 2 of DNR Code 1002 the Sandy Clay Loam and Clay soils observed on this site have infiltration rates below 0.6 inch/hour and therefore are **exempt** from infiltration according to NR 151 due to the infiltration rate of the soil being less than 0.6 inches per hour. According to Table 2 of the DNR Code 1002, the design infiltration rate without measurement for a Clay, Sandy Clay Loam and Sandy Loam are 0.07, 0.11 and 0.50 inches/hour, respectively.

The Sandy Loam soils encountered in borings B-14 and B-15, have an estimated infiltration rate of 0.50 inches per hour, based on Table 2 above. This infiltration rate is

also less than 0.6 inches per hour. However, **field verification testing** of the actual in-situ infiltration rate for these materials is required under Step C5 of the Site Evaluation for Stormwater Infiltration document, to confirm they are exempt from the infiltration requirements

The seasonal high groundwater level is indicated by soil colorization and mottling in the clay soil. For this site, soil colorization was observed in Boring B-13 at approximately 15 inches beneath existing grade (elevation 8± feet (local)) indicating the estimated seasonal high level at that location. The groundwater levels observed in Borings B-14 and B-15 at 2 feet below ground surface (EL. 8±) are also considered the seasonal high groundwater levels at these locations. Groundwater was not observed in B-10, B-11 and B-12. Therefore, the seasonal high groundwater is considered to be below the depth of the borings. It must be recognized that areas of the site may also be exempt or excluded from the infiltration requirements of NR151.12(5)(c) under other provisions (dependent upon the final bottom elevation), such as NR151.12(5)(c)5e or 5i, due to groundwater or the lack of a layer of sufficient thickness containing soils with sufficient fines content.

According to NR 151, 12(5)(c)5i, a minimum of a 3-foot thick layer of material that contains more than 20% fines or a minimum of a 5-foot thick layer that contains more than 10% fines must be in place between the bottom of the infiltration device and seasonal high groundwater for the basin to be designed as an infiltration basin. If less than 3 feet or 5 feet of the material described above is between the bottom of the pond and the seasonal high groundwater level and top of bedrock, the pond must be designed as a wet detention basin, and a liner must be installed as described in the following paragraph. The soils observed within the borings on this project have been bolded in the table. It should be noted that more accurate and possibly somewhat higher, design infiltration rates can be obtained by performing in-situ tests such as a double-ring infiltrometer test. PSI recommends that the bottom of the infiltration system be observed by a representative of a qualified geotechnical engineer at the time of construction to verify soil types.

If stormwater basins are designed to be detention basins, they will require a full liner in order for it to effectively hold water for an extended period of time. If a natural clay liner is used, PSI recommends that it be placed at a minimum of 2 feet in thickness and have a minimum liquid limit of 25 and plasticity index above 12. An additional 1 foot of soil should be used on top of the compacted clay liner to protect it from desiccation and plant intrusion. The fill should be placed in loose lifts not to exceed 8 inches in thickness and compacted to a minimum of 95% of the material's maximum laboratory dry density determined in accordance with ASTM D698 standard Proctor. The materials should be placed and compacted at moisture contents varying from 0 to 3% above the material's optimum moisture content determined in accordance with the above ASTM procedure.

It is understood that a stormwater management basin is planned to be constructed within the development. It must be recognized that some local building codes or municipal regulations require that basement floor elevations be a specified distance above the water level of nearby basins. It is therefore recommended that the subdivision design engineer (or other appropriate representative) review applicable city or town requirements, and if necessary, verify the design normal and design high water

elevations of stormwater basins with respect to planned basement slab elevations. If raising of slabs is then required, the corresponding effect on final yard grades (and resulting changes in surface drainage patterns), for nearby lots must be considered. Care must be exercised in construction of basements in the vicinity of stormwater management basins. If basement floors are below the elevation of basin bottoms, lateral migration of water may result in increased sump pump activity. Granular backfill in utility trenches in the vicinity of stormwater management basins can act as drains, and carry water from basins into nearby basements. Consideration should be given to construction of clay collars around utility lines to prevent movement of water through the free draining backfill. In addition, stormwater lines entering the basin should be provided with impermeable clay collars to prevent water from traveling away from the basin toward the residences in the granular utility line backfill.

Concerning embankment slopes, it is PSI's opinion that properly constructed slopes as steep as 2 horizontal to 1 vertical would generally be stable, but would be susceptible to erosion and difficult to maintain or construct with rubber tired mowing or grading equipment. Therefore, embankment slopes of 3 horizontal to 1 vertical or flatter are recommended.

CONSTRUCTION CONSIDERATIONS

PSI should be retained to provide observation and testing of construction activities involved in the foundation, earthwork, and related activities of this project. PSI will not accept responsibility for conditions that deviated from those described in this report, nor for the performance of the foundation or pavement if we are not engaged to also provide construction observation and testing for this project.

Moisture Sensitive Soils/Weather Related Concerns

The soils encountered at this site are expected to be sensitive to disturbances caused by construction traffic and changes in moisture content. Increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. In addition, soils that become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather.

Water should not be allowed to collect in the foundation excavation, on floor slab areas, or on prepared subgrades during or after construction. Areas should be sloped to facilitate removal of collected rainwater, groundwater, or surface runoff. Positive site drainage should be provided to reduce infiltration of surface water around the perimeter of buildings, and beneath floor slabs. The grades should be sloped away from buildings and surface drainage should be collected and discharged such that water is not permitted to infiltrate the backfill and floor slab areas of the building.

Drainage and Groundwater Concerns

Groundwater was observed during drilling operations within twelve borings at depths ranging from 2 to 15½ feet beneath existing ground surface. Due to the mostly granular nature of the native soils in which the groundwater was observed, it is likely that the observed groundwater level is indicative of the long-term groundwater table for this site. Based upon these observations, together with the proposed development grades, groundwater-related problems are generally not anticipated for the proposed construction provided excavations remain above the observed groundwater levels. If minor groundwater seepage is encountered during excavation, it is anticipated that it can be handled by simple means such as pumping from sumps or the use of perimeter trenches to collect and discharge the water away from the work area. Fluctuations in the groundwater level should be anticipated throughout the year depending on variations in climatological conditions and other factors not apparent at the time the borings were performed. The possibility of groundwater level fluctuation and perched water conditions should be considered when developing the design and construction plans for the project.

Excavations

It is mandated that excavations, whether they be for utility trenches, basement excavations or footing excavations, be constructed in accordance with current Occupational Safety and Health Administration (OSHA) guidelines to protect workers and others during construction. PSI recommends that these regulations be strictly enforced; otherwise, workers could be in danger and the owner(s) and the contractor(s) could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

PSI is providing this information solely as a service to our client. PSI does not assume responsibility for construction site safety or the contractor's or other parties' compliance with local, state, and federal safety or other regulations.

Utilities Trenching

Excavation for utility trenches shall be performed in accordance with OSHA regulations as stated in 29 CFR Part 1926. It should be noted that utility trench excavations have the potential to degrade the properties of the adjacent fill materials. Utility trench walls that are allowed to move laterally can lead to reduced bearing capacity and increased settlement of adjacent structural elements and overlying slabs.

Backfill for utility trenches is as important as the original subgrade preparation or engineered fill placed to support either a foundation or slab. Therefore, it is imperative

that the backfill for utility trenches be placed to meet the project specifications for the engineered fill of this project. Unless otherwise specified, the backfill for the utility trenches should be placed in 4 to 6 inch loose lifts and compacted to a minimum of 95 percent of the maximum dry density achieved by the modified Proctor test. The backfill soil should be moisture conditioned to be within 3± percent of the optimum moisture content as determined by the modified Proctor test. Up to 4 inches of bedding material placed directly under the pipes or conduits placed in the utility trench can be compacted to the 90 percent compaction criteria with respect to the modified Proctor.

Compaction testing should be performed for every 200 cubic yards of backfill placed or each lift within 200 linear feet of trench, whichever is less. Backfill of utility trenches should not be performed with water standing in the trench. If granular material is used for the backfill of the utility trench, the granular material should have a gradation that will filter protect the backfill material from the adjacent soils. If this gradation is not available, a geosynthetic non-woven filter fabric should be used to reduce the potential for the migration of fines into the backfill material. Granular backfill material shall be compacted to meet the above compaction criteria. The geotechnical engineer can also specify a relative density specification for clean granular materials. The granular backfill material should be compacted to achieve a relative density greater than 75 percent or as specified by the geotechnical engineer for the specific material used.

GEOTECHNICAL RISK

The concept of risk is an important aspect of the geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. The analytical tools that geotechnical engineers use are generally empirical and must be used in conjunction with engineering judgment and experience. Therefore, the solutions and recommendations presented in the geotechnical evaluation should not be considered risk-free, and more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The engineering recommendations, presented in the preceding section, constitute PSI's professional estimate of the necessary measures for the proposed structure to perform according to the proposed design based on the information generated and reference during this evaluation, and PSI's experience in working with these conditions.

REPORT LIMITATIONS

The recommendations submitted are based on the available subsurface information obtained by PSI and design details furnished by others. If there are revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the foundation recommendations are required. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the project.

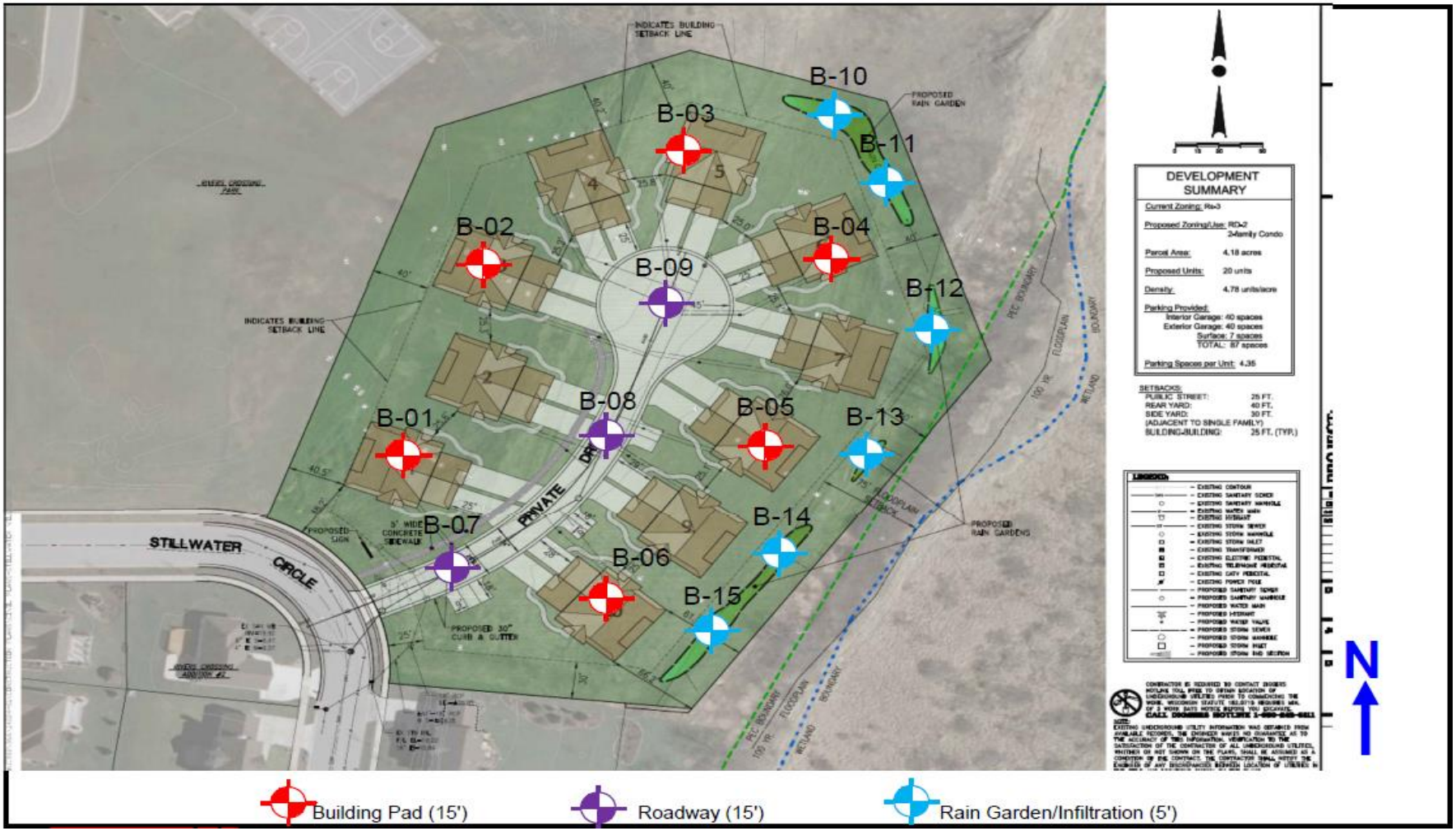
The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other

warranties are implied or expressed.

After the plans and specifications are more complete, the geotechnical engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of Bielinski Homes for the proposed Stillwater Villas Development in Waukesha, Wisconsin.

APPENDIX

BORING LOCATION PLAN
LOG OF BORINGS
LABORATORY TEST RESULTS
SOIL EVALUATION - STORM FORMS
USDA CLASSIFICATION CHARTS
GENERAL NOTES



psi Information To Build On
Engineering • Consulting • Testing
821 Corporate Court
Waukesha, WI 53189

Project Name:	Proposed Stillwater Villas Development
Project Location:	Waukesha, WI
PSI Project #	00521315-1

Boring Location Plan

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF BORING B-01

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

Drilling Method: Hollow Stem Auger
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location: Building Pad Boring

WATER LEVELS
While Drilling 11 feet
Upon Completion Not Obvd.
Delay N/A

Station: N/A
Offset: N/A

Surface Elev.: 17 ft

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					Fill, Black Organic Lean Clay, Mixed Coarse Gravel, Trace Sand, Moist	FILL		9	
15				1	6	Fill, Dark Grayish Brown Silty Sand with Gravel, Moist		3-4-7 N=11	12	
							FILL			
				2	8			4-4-4 N=8	6	
	5									
10				3	12	Brown Poorly Graded Sand with Gravel, Trace Silt, Moist to Wet, Medium Dense to Dense		7-7-14 N=21	3	
				4	12			12-15-16 N=31	3	
	10						SP			
5										
				5	12			6-4-6 N=10	12	
	15					End of Boring at 15'				
						Cave In at 7'				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50

STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Completion Depth: 15.0 ft
Date Boring Started: 7/17/15
Date Boring Completed: 7/17/15
Logged By: SB
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 42.958238°
Longitude: 88.281680°
Drill Rig: CME ATV
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF BORING B-02

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

Drilling Method: Hollow Stem Auger
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location: Building Pad Boring

WATER LEVELS
While Drilling 15.5 feet
Upon Completion Not Obvd.
Delay N/A

Station: N/A
Offset: N/A

Surface Elev.: 20 ft

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %
	0			Topsoil (8"± Thick)	OL		13
		1	10	Fill, Dark Brown Sandy Lean Clay, Trace Gravel, Moist	FILL	6-5-3 N=8	11
		2	6	Fill, Gray Mixed Brown Sandy Lean Clay, Trace Gravel, Moist	FILL	4-2-2 N=4	14
15	5	3	4	Fill, Dark Gray Sandy Lean Clay, Some Gravel, Trace Roots and Concrete Pieces, Moist		15-8-7 N=15	6
		4	0		FILL	3-1-3 N=4	
10	10	5	6			6-4-4 N=8	15
		6	2	Brown Poorly Graded Sand with Gravel, Trace Silt, Moist to Wet, Medium Dense		3-3-9 N=12	2
5	15	7	6		SP	5-5-5 N=10	8
		8	4			5-6-8 N=14	24
0	20			End of Boring at 20' Cave In at 13'			

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Additional Remarks

Completion Depth: 20.0 ft
Date Boring Started: 7/17/15
Date Boring Completed: 7/17/15
Logged By: SB
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 42.958238°
Longitude: 88.281680°
Drill Rig: CME ATV
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF BORING B-03

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

Drilling Method: Hollow Stem Auger
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location: Building Pad Boring

WATER LEVELS
While Drilling 12 feet
Upon Completion Not Obvd.
Delay N/A

Station: N/A
Offset: N/A

Surface Elev.: 17 ft

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0			Topsoil (12"± Thick)	OL			
15		1	0	Brown Poorly Graded Sand with Gravel, Trace Silt, Moist to Wet, Very Dense to Loose		23-33-38 N=71	5	>>
	5	2	10			18-23-28 N=51	2	>>
10		3	8		SP	13-26-28 N=54	3	>>
	10	4	10			10-26-27 N=53	3	>>
5								
	15	5	12	End of Boring at 15'		3-5-4 N=9	9	
				Cave In at 4'				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50

STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Completion Depth: 15.0 ft
Date Boring Started: 7/17/15
Date Boring Completed: 7/17/15
Logged By: SB
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 42.958238°
Longitude: 88.281680°
Drill Rig: CME ATV
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF BORING B-04

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

Drilling Method: Hollow Stem Auger
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location: Building Pad Boring

WATER LEVELS
While Drilling 8 feet
Upon Completion Not Obvd.
Delay N/A

Station: N/A
Offset: N/A

Surface Elev.: 14 ft

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					Topsoil (14"± Thick)	OL		22	
				1	0	Fill, Dark Grayish Brown/Black Sandy Organic Lean Clay, Trace Gravel, Moist	FILL	4-4-4 N=8	18	
10				2	8	Fill, Dark Brown Sandy Lean Clay, Trace Gravel, Moist	FILL	5-4-6 N=10	20	LOI = 5.0%
	5			3	10	Brown Poorly Graded Sand with Gravel, Trace Silt, Moist to Wet, Medium Dense to Dense		7-9-10 N=19	7	
5				4	10		SP	9-15-21 N=36	6	
	10									
0				5	10			10-14-19 N=33	6	
	15					End of Boring at 15' Cave In at 8'				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50

STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Completion Depth: 15.0 ft
Date Boring Started: 7/17/15
Date Boring Completed: 7/17/15
Logged By: MB
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 42.958238°
Longitude: 88.281680°
Drill Rig: Rental
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF BORING B-05

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

Drilling Method: Hollow Stem Auger
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location: Building Pad Boring

WATER LEVELS
While Drilling 6 feet
Upon Completion Not Obvd.
Delay N/A

Station: N/A
Offset: N/A

Surface Elev.: 12 ft

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					Topsoil (10"± Thick)	OL		19	
10				1	6	Possible Fill, Brown Sandy Lean Clay, Trace Gravel, Moist	PFILL	4-4-6 N=10	18	
	5			2	3	Light Brown Poorly Graded Sand with Gravel, Moist, Medium Dense	SP	4-5-9 N=14	5	
5				3	10	Brown Poorly Graded Sand with Gravel, Trace Silt, Wet, Medium Dense		8-12-13 N=25	6	
	10			4	10		SP	8-14-12 N=26	7	
0				5	14			5-6-11 N=17	8	
	15					End of Boring at 15' Cave In at 8'				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Completion Depth: 15.0 ft
Date Boring Started: 7/17/15
Date Boring Completed: 7/17/15
Logged By: MB
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 42.958238°
Longitude: 88.281680°
Drill Rig: Rental
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
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Waukesha, WI 53189
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LOG OF BORING B-06

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

Drilling Method: Hollow Stem Auger
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location: Building Pad Boring

WATER LEVELS
While Drilling 8 feet
Upon Completion Not Obvd.
Delay N/A

Station: N/A
Offset: N/A

Surface Elev.: 12 ft

Elevation (feet)	Depth, (feet)	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %
	0			Topsoil (12"± Thick)	OL		23
10		1	10	Brown Well Graded Sand with Coarse Gravel, Moist, Dense to Very Dense		15-15-17 N=32	3
		2	12		SWG	15-15-16 N=31	3
5							
		3	0			N=50/4"	4
5				Brown Poorly Graded Sand with Gravel, Wet, Medium Dense			
		4	12		SP	8-9-10 N=19	11
10							
0				Brown Poorly Graded Sand, Trace Silt, Wet, Medium Dense			
		5	10		SP	5-6-10 N=16	23
15				End of Boring at 15'			
				Cave In at 5.5'			

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50

STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Additional Remarks

Completion Depth: 15.0 ft
Date Boring Started: 7/17/15
Date Boring Completed: 7/17/15
Logged By: MB
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 42.958238°
Longitude: 88.281680°
Drill Rig: Rental
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF BORING B-07

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

Drilling Method: Hollow Stem Auger
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location: Roadway Boring

WATER LEVELS
While Drilling 12 feet
Upon Completion Not Obvd.
Delay N/A

Station: N/A
Offset: N/A

Surface Elev.: 15 ft

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					Topsoil (2"± Thick)	OL		20	
						Fill, Black Organic Lean Clay, Trace Sand, Gravel and Rocks, Moist				
				1	10		FILL	20-26-23 N=49	17	LOI = 5.9%
						Brown Well Graded Gravelly Sand, Trace Silt, Moist to Wet, Dense to Medium Dense				
10	5			2	8			17-14-16 N=30	3	
				3	10			17-25-27 N=52	2	>>
				4	12		SWG	7-23-23 N=46	2	
5	10									
				5	2			2-5-7 N=12	9	
0	15					End of Boring at 15'				
						Cave In at 2.5'				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Completion Depth:	15.0 ft
Date Boring Started:	7/17/15
Date Boring Completed:	7/17/15
Logged By:	SB
Drilling Contractor:	PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 42.958238°
Longitude: 88.281680°
Drill Rig: CME ATV
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF BORING B-08

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

Drilling Method: Hollow Stem Auger
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location: Roadway Boring

WATER LEVELS
While Drilling 11 feet
Upon Completion Not Obvd.
Delay N/A

Station: N/A
Offset: N/A

Surface Elev.: 15 ft

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					Topsoil (12"± Thick)	OL		31	
				1	10	Brown Well Graded Sand with Gravel, Trace Silt, Moist to Wet, Medium Dense to Very Dense		9-12-12 N=24	5	
				2	0			N=84/5"	4	
10	5			3	12			7-15-23 N=38	3	
							SW			
				4	10			6-14-15 N=29	3	
5	10									
				5	10			3-4-6 N=10	10	
0	15					End of Boring at 15'				
						Cave In at 3.5'				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50

STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Completion Depth: 15.0 ft
Date Boring Started: 7/17/15
Date Boring Completed: 7/17/15
Logged By: SB
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 42.958238°
Longitude: 88.281680°
Drill Rig: CME ATV
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF BORING B-09

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

Drilling Method: Hollow Stem Auger
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location: Roadway Boring

WATER LEVELS
While Drilling 12 feet
Upon Completion Not Obvd.
Delay N/A

Station: N/A
Offset: N/A

Surface Elev.: 16 ft

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					Topsoil (7"± Thick)	OL		29	
15				1	12	Brown Well Graded Sand with Gravel, Trace Silt, Moist to Wet, Medium Dense to Very Dense		7-12-15 N=27	3	
				2	12			9-19-21 N=40	3	
10	5			3	12			14-28-33 N=61	3	>>
							SW			
	10			4	12			17-23-18 N=41	3	
5										
	15			5	12			5-7-7 N=14	10	
						End of Boring at 15'				
						Cave In at 2'				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50

STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Completion Depth: 15.0 ft
Date Boring Started: 7/17/15
Date Boring Completed: 7/17/15
Logged By: SB
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 42.958238°
Longitude: 88.281680°
Drill Rig: CME ATV
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF BORING B-10

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

Drilling Method: Hollow Stem Auger
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location: Storm Water Boring

WATER LEVELS
While Drilling Not Obvd.
Upon Completion Not Obvd.
Delay N/A

Station: N/A
Offset: N/A

Surface Elev.: 14 ft

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					Topsoil (18"± Thick)	OL		12	
				1	16	Possible Fill, Dark Brown Lean Clay, Trace Sand and Gravel, Very Moist	PFILL	9-7-10 N=17	22	
10				2	6	Brown Lean Clay, Trace Sand and Gravel, Very Moist, Medium Stiff to Stiff	CL	4-4-4 N=8	22	LL = 35 PL = 20
	5					End of Boring at 5'				
						Cave In at 2'				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50

STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Completion Depth: 5.0 ft
Date Boring Started: 7/17/15
Date Boring Completed: 7/17/15
Logged By: MB
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 42.958238°
Longitude: 88.281680°
Drill Rig: CME ATV
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF BORING B-11

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

Drilling Method: Hollow Stem Auger
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location: Storm Water Boring

WATER LEVELS
While Drilling Not Obvd.
Upon Completion Not Obvd.
Delay N/A

Station: N/A
Offset: N/A

Surface Elev.: 14 ft

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ / STRENGTH, tsf	Additional Remarks
	0					Topsoil (12"± Thick)	OL				
				1	8	Fill, Dark Gray/Black Sandy Organic Lean Clay, Trace Gravel, Moist	FILL	5-9-7 N=16	18		LOI = 8.0%
10				2	8			4-5-6 N=11	17		LOI = 7.6%
	5					End of Boring at 5'					
						Cave In at 2'					

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

Completion Depth: 5.0 ft
Date Boring Started: 7/17/15
Date Boring Completed: 7/17/15
Logged By: MB
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 42.958238°
Longitude: 88.281680°
Drill Rig: Rental
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF BORING B-12

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

Drilling Method: Hollow Stem Auger
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location: Storm Water Boring

WATER LEVELS
While Drilling Not Obvd.
Upon Completion Not Obvd.
Delay N/A

Station: N/A
Offset: N/A

Surface Elev.: 10 ft

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					Topsoil (12"± Thick)	OL				
				1	8	Fill, Dark Brown Mixed Black Sandy Organic Lean Clay, Trace Sand and Gravel, Moist	FILL	7-7-4 N=11	15	◎×	LOI = 5.9%
				2	4			6-6-8 N=14	19	◎×	LOI = 9.0%
5	5					End of Boring at 5'					
						Cave In at 2'					

Completion Depth: 5.0 ft
Date Boring Started: 7/17/15
Date Boring Completed: 7/17/15
Logged By: MB
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 42.958238°
Longitude: 88.281680°
Drill Rig: CME ATV
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF BORING B-13

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

Drilling Method: Hollow Stem Auger
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location: Storm Water Boring

WATER LEVELS
While Drilling 3 feet
Upon Completion Not Obvd.
Delay N/A

Station: N/A
Offset: N/A

Surface Elev.: 9 ft

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					Topsoil (15"± Thick)	OL		21	×	
				1	10	Grayish Brown Mottled Rust Clayey Sand, Trace Gravel, Moist, Loose	SC	6-4-4 N=8	16	◎ ×	
						Brown Silty Sand, Wet, Loose					
5				2	10		SM	4-3-5 N=8	21	◎ ×	
	5					End of Boring at 5'					

Completion Depth: 5.0 ft
Date Boring Started: 7/17/15
Date Boring Completed: 7/17/15
Logged By: MB
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 42.958238°
Longitude: 88.281680°
Drill Rig: Rental
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF BORING B-14

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

Drilling Method: Hollow Stem Auger
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location: Storm Water Boring

WATER LEVELS
While Drilling 2 feet
Upon Completion Not Obvd.
Delay N/A

Station: N/A
Offset: N/A

Surface Elev.: 10 ft

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50); STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					Topsoil (14"± Thick)	OL		22	×	
				1	8	Brown Silty Sand, Very Moist to Wet, Loose to Medium Dense		4-4-5 N=9	19	◎ ×	
							SM				
				2	8			3-4-6 N=10	20	◎ ×	
5	5					End of Boring at 5'					
						Cave In at 1.5'					

Completion Depth: 5.0 ft
Date Boring Started: 7/17/15
Date Boring Completed: 7/17/15
Logged By: MB
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 42.958238°
Longitude: 88.281680°
Drill Rig: Rental
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

LOG OF BORING B-15

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

Drilling Method: Hollow Stem Auger
Sampling Method: 2-in SS
Hammer Type: Automatic
Boring Location: Storm Water Boring

WATER LEVELS
While Drilling 2 feet
Upon Completion Not Obvd.
Delay N/A

Station: N/A
Offset: N/A

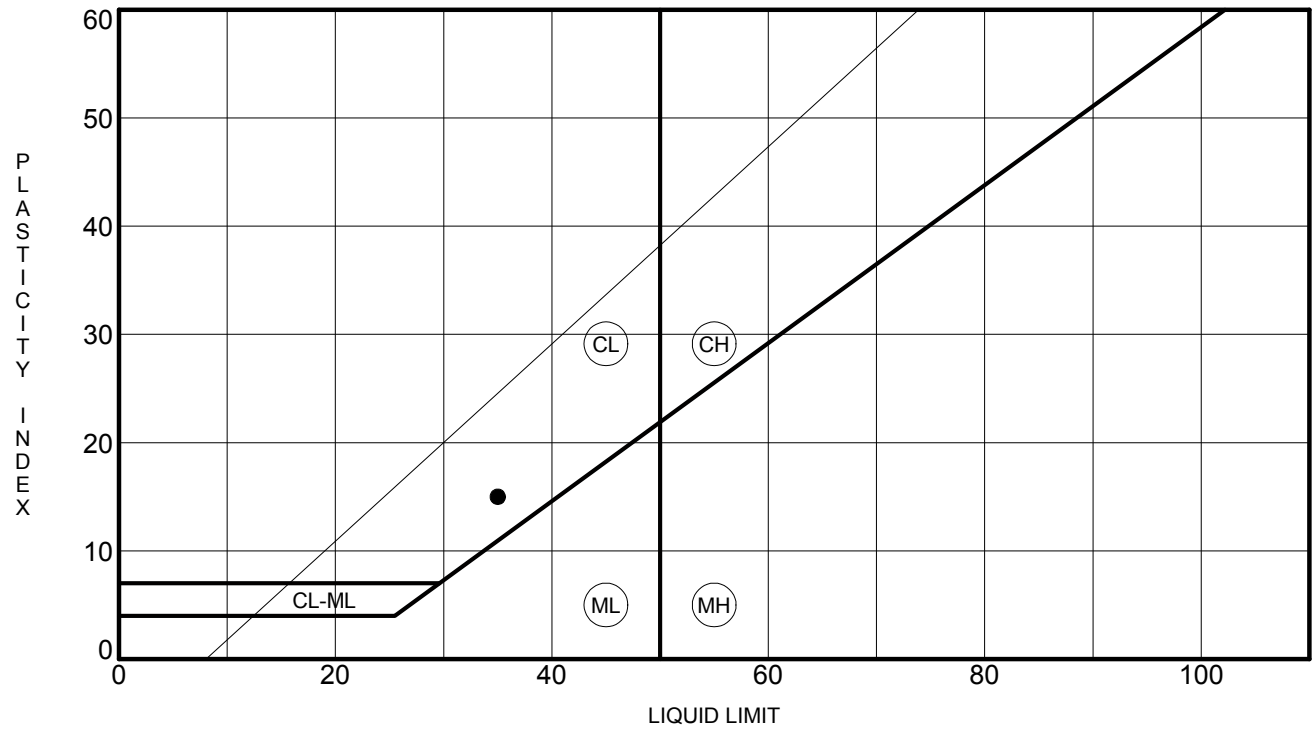
Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ × Moisture ◪ PL ✚ LL (0, 25, 50) STRENGTH, tsf ▲ Qu ✳ Qp (0, 2.0, 4.0)	Additional Remarks
	0					**Surface Elev.:** 10 ft Topsoil (12"± Thick)	OL		16	×	
				1	0	Brown Clayey Sand, Trace Gravel, Wet, Medium Dense	SC	7-9-11 N=20	18	×◎	
						Brown Silty Sand, Trace Gravel, Wet, Dense					
				2	4		SM	10-11-28 N=39	21	× ◎	
5	5					End of Boring at 5'					
						Cave In at 3'					

Completion Depth: 5.0 ft
Date Boring Started: 7/17/15
Date Boring Completed: 7/17/15
Logged By: MB
Drilling Contractor: PSI, Inc.

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude: 42.958238°
Longitude: 88.281680°
Drill Rig: CME ATV
Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.



	Boring	Depth (ft)	LL	PL	PI	Fines	Classification (*Visual)
●	**B-10**	**4.3**	**35**	**20**	**15**		

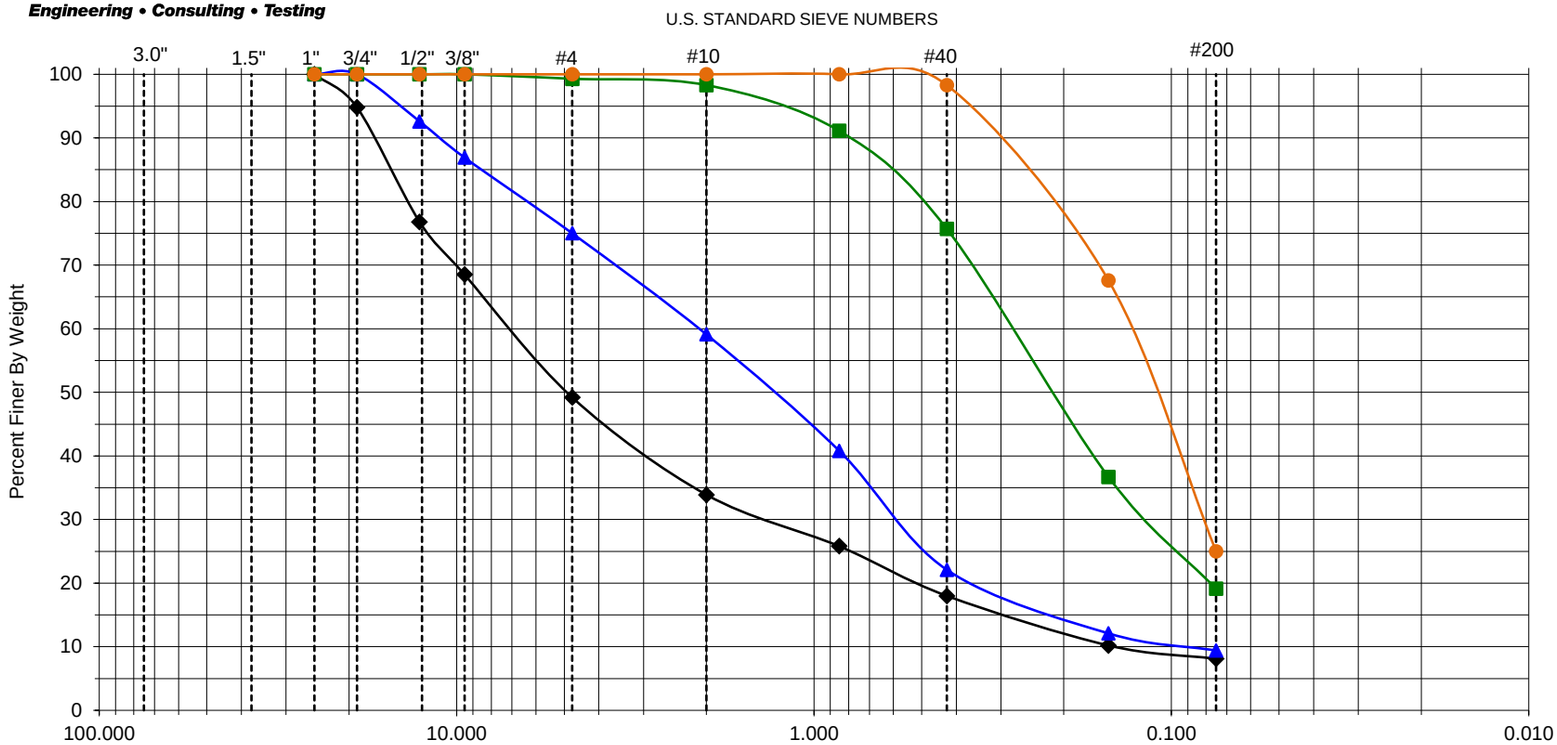
Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
Telephone: (262) 521-2125
Fax: (262) 521-2471

ATTERBERG LIMIT RESULTS

PSI Job No.: 00521315
Project: Proposed Stillwater Villas Development
Location: Stillwater Circle
Waukesha, WI

psi Information To Build On
Engineering • Consulting • Testing

REPORT OF PARTICLE-SIZE ANALYSIS OF SOIL



ASTM Classification		
Gravel	Sand	Fines (Silt and Clay)

Key	Boring No.	Depth	Classification	%Gravel	%Sand	%Fines
◆	B-07	3.5-5'	Well Graded Gravelly Sand, Trace Silt	50.8	41.1	8.1
▲	B-09	1-2.5'	Well Graded Sand with Gravel, Trace Silt	25.0	65.6	9.4
■	B-13	1-2.5'	Silty Sand	0.7	80.2	19.1
✹	B-14	3.5-5'	Silty Sand	0.0	75.0	25.0

Proposed Stillwater Villas Development | File No. **00521315**

Professional Service Industries ● 821 Corporate Court ● Waukesha, WI 53189 ● 262-521-2125 ● 262-521-2471 (Fax)

Wis. Dept. of Safety and Professional Services
Division of Safety and Buildings

SOIL EVALUATION - STORM

In accordance with SPS 382.365 and 385, Wis. Adm. Code

Attach complete site plan on paper not less than 8 ½ x 11 inches in size. Plan must include, but not be limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and BM referenced to nearest road.

Please print all information

Personal information you provide may be used for secondary purposes (Privacy Law, s. 15.04 (1) (m).

County Waukesha	
Parcel I.D.	
Reviewed by	Date

Property Owner	Property Location ____ 1/4 S ____ T ____ N R ____ E		
Property Owner's Mailing Address	Lot #	Block #	Subd. Name or CSM#
City / State / Zip Code / Phone Number ( )	☒ City ☐ Village ☐ Town Waukesha		Nearest Road Stillwater Circle

Drainage area _____ ☐ sq. ft. ☐ acres
Optional:
Test Site Suitable for (check all that apply)

☐ Irrigation ☐ Bioretention trench ☐ Trench(es)
☐ Rain garden ☐ Infiltration Pond ☐ Reuse
☐ infiltration trench ☐ Retention Pond ☐ Other _____

Hydraulic Application Test Method:

☒ Morphological Evaluation
☐ Double-Ring Infiltrometer
☐ Other (specify) _____

B-10 Obs. # ☒ Boring ☐ Pit Ground surface elev. 14 Depth to limiting factor ___ in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	0-18	10YR2/2	NONE	C	1,F,BK	MFR	A	---	0.07
B	18-48	10YR3/3	NONE	C	2,F,BK	MFI	G	---	0.07
B	48-60	10YR4/3	NONE	C	2,F,BK	MFI	G	---	0.07

B-11 Obs. # ☒ Boring ☐ Pit Ground surface elev. 14 Depth to limiting factor ___ in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	0-12	10YR2/2	NONE	C	1,F,BK	MFR	A	---	0.07
B	12-60	10YR3/2	NONE	C	2,F,BK	MFI	G	---	0.07

B-12 Obs. # ☒ Boring ☐ Pit Ground surface elev. 10 Depth to limiting factor ___ in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	0-12	10YR2/2	NONE	C	1,F,BK	MFR	A	---	0.07
B	12-60	10YR3/3	NONE	C	2,F,BK	MFI	G	---	0.07

CST/PSS Name (Please Print)	Signature	CST/PSS Number
Timothy M. Leonard, P.E.		1263311
Address	Date Evaluation Conducted	Telephone Number
821 Corporate Court, Waukesha, Wisconsin 53189	8/4/2015	262-521-2125

Wis. Dept. of Safety and Professional Services
Division of Safety and Buildings

SOIL EVALUATION - STORM

In accordance with SPS 382.365 and 385, Wis. Adm. Code

Attach complete site plan on paper not less than 8 ½ x 11 inches in size. Plan must include, but not be limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and BM referenced to nearest road.

Please print all information

Personal information you provide may be used for secondary purposes (Privacy Law, s. 15.04 (1) (m).

County	
Waukesha	
Parcel I.D.	
Reviewed by	Date

Property Owner	Property Location ____ 1/4 S ____ T ____ N R ____ E		
Property Owner's Mailing Address	Lot #	Block #	Subd. Name or CSM#
City / State / Zip Code / Phone Number ( )	☒ City ☐ Village ☐ Town Waukesha		Nearest Road Stillwater Circle

Drainage area _____ ☐ sq. ft. ☐ acres
Optional:
Test Site Suitable for (check all that apply)

☐ Irrigation ☐ Bioretention trench ☐ Trench(es)
☐ Rain garden ☐ Infiltration Pond ☐ Reuse
☐ infiltration trench ☐ Retention Pond ☐ Other _____

Hydraulic Application Test Method:

☒ Morphological Evaluation
☐ Double-Ring Infiltrometer
☐ Other (specify) _____

B-13 Obs. # ☒ Boring ☐ Pit Ground surface elev. 9 Depth to limiting factor ___ in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	0-15	10YR2/2	NONE	C	2,F,BK	MFR	A	---	0.07
C	15-36	10YR5/2	F,1,D,10YR4/6	SCL	1,M,GR	ML	G	---	
C	36-60	10YR4/4	NONE	SL	0,M,SG	ML	G	---	

B-14 Obs. # ☒ Boring ☐ Pit Ground surface elev. 10 Depth to limiting factor ___ in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	0-14	10YR2/1	NONE	C	2,F,BK	MFR	A	---	0.07
C	14-60	10YR4/4	NONE	SL	0,M,SG	ML	G	---	

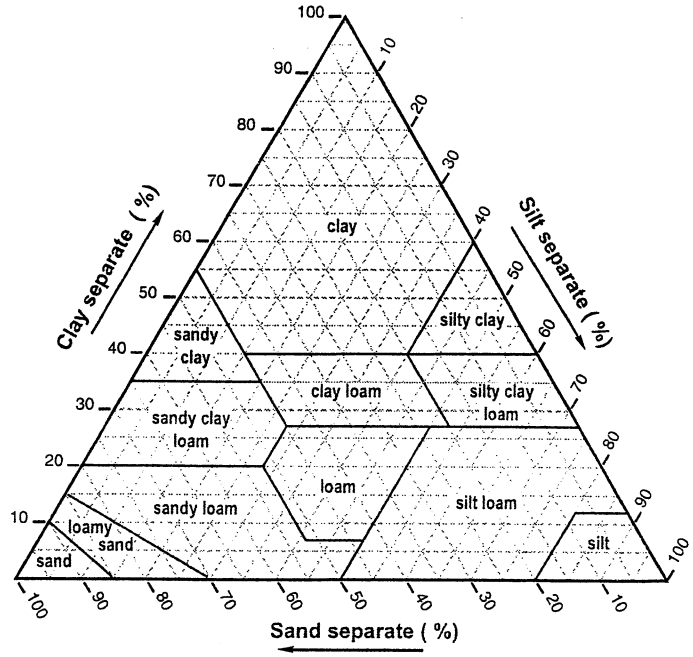
B-15 Obs. # ☒ Boring ☐ Pit Ground surface elev. 10 Depth to limiting factor ___ in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
A	0-12	10YR2/1	NONE	C	2,F,BK	MFR	A	---	0.07
C	12-36	10YR3/4	NONE	SCL	1,M,GR	ML	G	---	
C	36-60	10YR4/4	NONE	SL	0,M,SG	ML	G	---	

CST/PSS Name (Please Print)	Signature	CST/PSS Number
Timothy M. Leonard, P.E.		1263311
Address	Date Evaluation Conducted	Telephone Number
821 Corporate Court, Waukesha, Wisconsin 53189	8/4/2015	262-521-2125

Texture Triangle:

Fine Earth Texture Classes (——)



TEXTURE MODIFIERS - Conventions for using "Rock Fragment Texture Modifiers" and for using textural adjectives that convey the "% volume" ranges for **Rock Fragments - Size and Quantity**.

Fragment Content % By Volume	Rock Fragment Modifier Usage
< 15	No texture adjective is used (noun only; e.g., *loam*).
15 to < 35	Use adjective for appropriate size; e.g., *gravelly.*
35 to < 60	Use "very" with the appropriate size adjective; e.g., *very gravelly.*
60 to < 90	Use "extremely" with the appropriate size adjective; e.g., *extremely gravelly.*
≥ 90	No adjective or modifier. If ≤ 10% fine earth, use the appropriate noun for the dominant size class; e.g., *gravel.* Use **Terms in Lieu of Texture.**

(SOIL) TEXTURE

This is the numerical proportion (percent by weight) of sand, silt, and clay in a soil. Sand, silt, and clay content is estimated in the field by hand (or quantitatively measured in the office/lab by hydrometer or pipette) and then placed within the texture triangle to determine **Texture Class**. Estimate the **Texture Class**; e.g., *sandy loam*; or **Subclass**; e.g., *fine sandy loam* of the fine earth (≤ 2 mm) fraction, or choose a **Term in Lieu of Texture**; e.g., *gravel.* If appropriate, use a **Textural Class Modifier**; e.g., *gravelly silt loam.*

NOTE: **Soil Texture** encompasses only the fine earth fraction (≤ 2 mm). **Particle Size Distribution** (PSD) encompasses the whole soil, including both the fine earth fraction (≤ 2 mm; weight %) and rock fragments (> 2 mm; volume %).

TEXTURE CLASS

Texture Class or Subclass	Code	
	Conv.	NASIS
Coarse Sand	cos	COS
Sand	s	S
Fine Sand	fs	FS
Very Fine Sand	vfs	VFS
Loamy Coarse Sand	lcos	LCOS
Loamy Sand	ls	LS
Loamy Fine Sand	lfs	LFS
Loamy Very Fine Sand	lvfs	LVFS
Coarse Sandy Loam	cosl	COSL
Sandy Loam	sl	SL
Fine Sandy Loam	fsl	FSL
Very Fine Sandy Loam	vfsl	VFSL
Loam	l	L
Silt Loam	sil	SIL
Silt	si	SI
Sandy Clay Loam	scl	SCL
Clay Loam	cl	CL
Silty Clay Loam	sicl	SICL
Sandy Clay	sc	SC
Silty Clay	sic	SIC
Clay	c	C

TEXTURE MODIFIERS - *(adjectives)*

ROCK FRAGMENTS: Size & Quantity [1]	Code		Criteria: Percent (By Volume) of Total Rock Fragments and Dominated By (*name size*): [1]
	Conv.	PDP/ NASIS	
ROCK FRAGMENTS (> 2 mm; ≥ Strongly Cemented)			
Gravelly	GR	GR	≥ 15% but < 35% gravel
Fine Gravelly	FGR	GRF	≥15% but < 35% fine gravel
Medium Gravelly	MGR	GRM	≥15% but < 35% med. gravel
Coarse Gravelly	CGR	GRC	≥ 15% but < 35% coarse gravel
Very Gravelly	VGR	GRV	≥ 35% but < 60% gravel
Extremely Gravelly	XGR	GRX	≥ 60% but < 90% gravel
Cobbly	CB	CB	≥ 15% but < 35% cobbles
Very Cobbly	VCB	CBV	≥ 35% but < 60% cobbles
Extremely Cobbly	XCB	CBX	≥ 60% but < 90% cobbles
Stony	ST	ST	≥ 15% but < 35% stones
Very Stony	VST	STV	≥ 35% but < 60% stones
Extremely Stony	XST	STX	≥ 60% but < 90% stones
Bouldery	BY	BY	≥ 15% but < 35% boulders
Very Bouldery	VBY	BYV	≥ 35% but < 60% boulders
Extremely Bouldery	XBY	BYX	≥ 60% but < 90% boulders
Channery	CN	CN	≥ 15% but < 35% channers
Very Channery	VCN	CNV	≥ 35% but < 60% channers
Extremely Channery	XCN	CNX	≥ 60% but < 90% channers
Flaggy	FL	FL	≥ 15% but < 35% flagstones
Very Flaggy	VFL	FLV	≥ 35% but < 60% flagstones
Extremely Flaggy	XFL	FLX	≥ 60% but < 90% flagstones
PARAROCK FRAGMENTS (> 2 mm; < Strongly Cemented) [2, 3]			
Parabouldery	PBY	PBY	(same criteria as bouldery)
Very Parabouldery	VPBY	PBYV	(same criteria as very bouldery)
Extr. Parabouldery	XPBY	PBYX	(same criteria as ext. bouldery)
etc.	etc.	etc.	(same criteria as non-para)

[1] The "Quantity" modifier (e.g., *very*) is based on the total rock fragment content. The "Size" modifier (e.g., *cobbly*) is independently based on the largest, dominant fragment size. For a mixture of sizes (e.g., *gravel and stones*), a smaller size–class is named only if its quantity (%) sufficiently exceeds that of a larger size–class. For field texture determination, a smaller size-class must exceed 2 times the quantity (vol. %) of a larger size class before it is named (e.g., 30% gravel and 14% stones = *very gravelly*, but 20% gravel and 14% stones = *stony*). For more explicit naming criteria see NSSH-Part 618, Exhibit 618.11(Soil Survey Staff, 2001b).

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System (USCS), AASHTO 1988 and ASTM designations D2487 and D-2488 are used to identify the encountered materials unless otherwise noted. Coarse-grained soils are defined as having more than 50% of their dry weight retained on a #200 sieve (0.075mm); they are described as: boulders, cobbles, gravel or sand. Fine-grained soils have less than 50% of their dry weight retained on a #200 sieve; they are defined as silts or clay depending on their Atterberg Limit attributes. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size.

DRILLING AND SAMPLING SYMBOLS

SFA: Solid Flight Auger - typically 4" diameter flights, except where noted.
HSA: Hollow Stem Auger - typically 3¼" or 4¼ I.D. openings, except where noted.
M.R.: Mud Rotary - Uses a rotary head with Bentonite or Polymer Slurry
R.C.: Diamond Bit Core Sampler
H.A.: Hand Auger
P.A.: Power Auger - Handheld motorized auger

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
RC: Rock Core
TC: Texas Cone
BS: Bulk Sample
PM: Pressuremeter
CPT-U: Cone Penetrometer Testing with Pore-Pressure Readings

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2-inch O.D. Split-Spoon.
N_{60}: A "N" penetration value corrected to an equivalent 60% hammer energy transfer efficiency (ETR)
Q_u: Unconfined compressive strength, TSF
Q_p: Pocket penetrometer value, unconfined compressive strength, TSF
w%: Moisture/water content, %
LL: Liquid Limit, %
PL: Plastic Limit, %
PI: Plasticity Index = (LL-PL),%
DD: Dry unit weight, pcf
▼,▽,⧩ Apparent groundwater level at time noted

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	N - Blows/foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	50 - 80
Extremely Dense	80+

ANGULARITY OF COARSE-GRAINED PARTICLES

Description	Criteria
Angular:	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular:	Particles are similar to angular description, but have rounded edges
Subrounded:	Particles have nearly plane sides, but have well-rounded corners and edges
Rounded:	Particles have smoothly curved sides and no edges

GRAIN-SIZE TERMINOLOGY

Component	Size Range
Boulders:	Over 300 mm (>12 in.)
Cobbles:	75 mm to 300 mm (3 in. to 12 in.)
Coarse-Grained Gravel:	19 mm to 75 mm (¾ in. to 3 in.)
Fine-Grained Gravel:	4.75 mm to 19 mm (No.4 to ¾ in.)
Coarse-Grained Sand:	2 mm to 4.75 mm (No.10 to No.4)
Medium-Grained Sand:	0.42 mm to 2 mm (No.40 to No.10)
Fine-Grained Sand:	0.075 mm to 0.42 mm (No. 200 to No.40)
Silt:	0.005 mm to 0.075 mm
Clay:	<0.005 mm

PARTICLE SHAPE

Description	Criteria
Flat:	Particles with width/thickness ratio > 3
Elongated:	Particles with length/width ratio > 3
Flat & Elongated:	Particles meet criteria for both flat and elongated

RELATIVE PROPORTIONS OF FINES

Descriptive Term	% Dry Weight
Trace:	< 5%
With:	5% to 12%
Modifier:	>12%

GENERAL NOTES

(Continued)

CONSISTENCY OF FINE-GRAINED SOILS

Q_U - TSF	N - Blows/foot	Consistency
0 - 0.25	0 - 2	Very Soft
0.25 - 0.50	2 - 4	Soft
0.50 - 1.00	4 - 8	Firm (Medium Stiff)
1.00 - 2.00	8 - 15	Stiff
2.00 - 4.00	15 - 30	Very Stiff
4.00 - 8.00	30 - 50	Hard
8.00+	50+	Very Hard

MOISTURE CONDITION DESCRIPTION

Description	Criteria
Dry:	Absence of moisture, dusty, dry to the touch
Moist:	Damp but no visible water
Wet:	Visible free water, usually soil is below water table

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term	% Dry Weight
Trace:	< 15%
With:	15% to 30%
Modifier:	>30%

STRUCTURE DESCRIPTION

Description	Criteria
Stratified:	Alternating layers of varying material or color with layers at least ¼-inch (6 mm) thick
Laminated:	Alternating layers of varying material or color with layers less than ¼-inch (6 mm) thick
Fissured:	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided:	Fracture planes appear polished or glossy, sometimes striated
Blocky:	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed:	Inclusion of small pockets of different soils
Layer:	Inclusion greater than 3 inches thick (75 mm)
Seam:	Inclusion 1/8-inch to 3 inches (3 to 75 mm) thick extending through the sample
Parting:	Inclusion less than 1/8-inch (3 mm) thick

SCALE OF RELATIVE ROCK HARDNESS

Q_U - TSF	Consistency
2.5 - 10	Extremely Soft
10 - 50	Very Soft
50 - 250	Soft
250 - 525	Medium Hard
525 - 1,050	Moderately Hard
1,050 - 2,600	Hard
>2,600	Very Hard

ROCK BEDDING THICKNESSES

Description	Criteria
Very Thick Bedded	Greater than 3-foot (>1.0 m)
Thick Bedded	1-foot to 3-foot (0.3 m to 1.0 m)
Medium Bedded	4-inch to 1-foot (0.1 m to 0.3 m)
Thin Bedded	1¼-inch to 4-inch (30 mm to 100 mm)
Very Thin Bedded	½-inch to 1¼-inch (10 mm to 30 mm)
Thickly Laminated	1/8-inch to ½-inch (3 mm to 10 mm)
Thinly Laminated	1/8-inch or less "paper thin" (<3 mm)

ROCK VOIDS

Voids	Void Diameter
Pit	<6 mm (<0.25 in)
Vug	6 mm to 50 mm (0.25 in to 2 in)
Cavity	50 mm to 600 mm (2 in to 24 in)
Cave	>600 mm (>24 in)

GRAIN-SIZED TERMINOLOGY

(Typically Sedimentary Rock)

Component	Size Range
Very Coarse Grained	>4.76 mm
Coarse Grained	2.0 mm - 4.76 mm
Medium Grained	0.42 mm - 2.0 mm
Fine Grained	0.075 mm - 0.42 mm
Very Fine Grained	<0.075 mm

ROCK QUALITY DESCRIPTION

Rock Mass Description	RQD Value
Excellent	90 -100
Good	75 - 90
Fair	50 - 75
Poor	25 -50
Very Poor	Less than 25

DEGREE OF WEATHERING

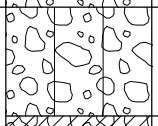
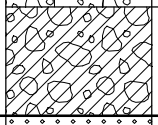
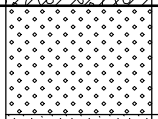
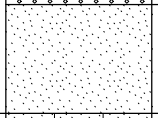
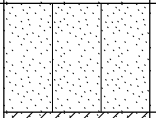
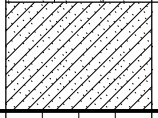
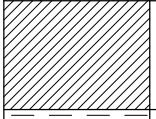
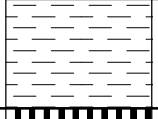
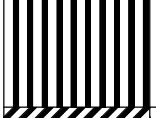
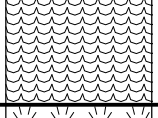
Slightly Weathered: Rock generally fresh, joints stained and discoloration extends into rock up to 25 mm (1 in), open joints may contain clay, core rings under hammer impact.

Weathered: Rock mass is decomposed 50% or less, significant portions of the rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.

Highly Weathered: Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

MAJOR DIVISIONS			SYMBOLS: GRAPH	SYMBOLS: LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

psi

LAND INFORMATION SYSTEMS DIVISION

Waukesha County GIS Map

Legend

- Soils
- Plats
  - Assessor Plat
  - CSM
  - Condo Plat
  - Subdivision Plat

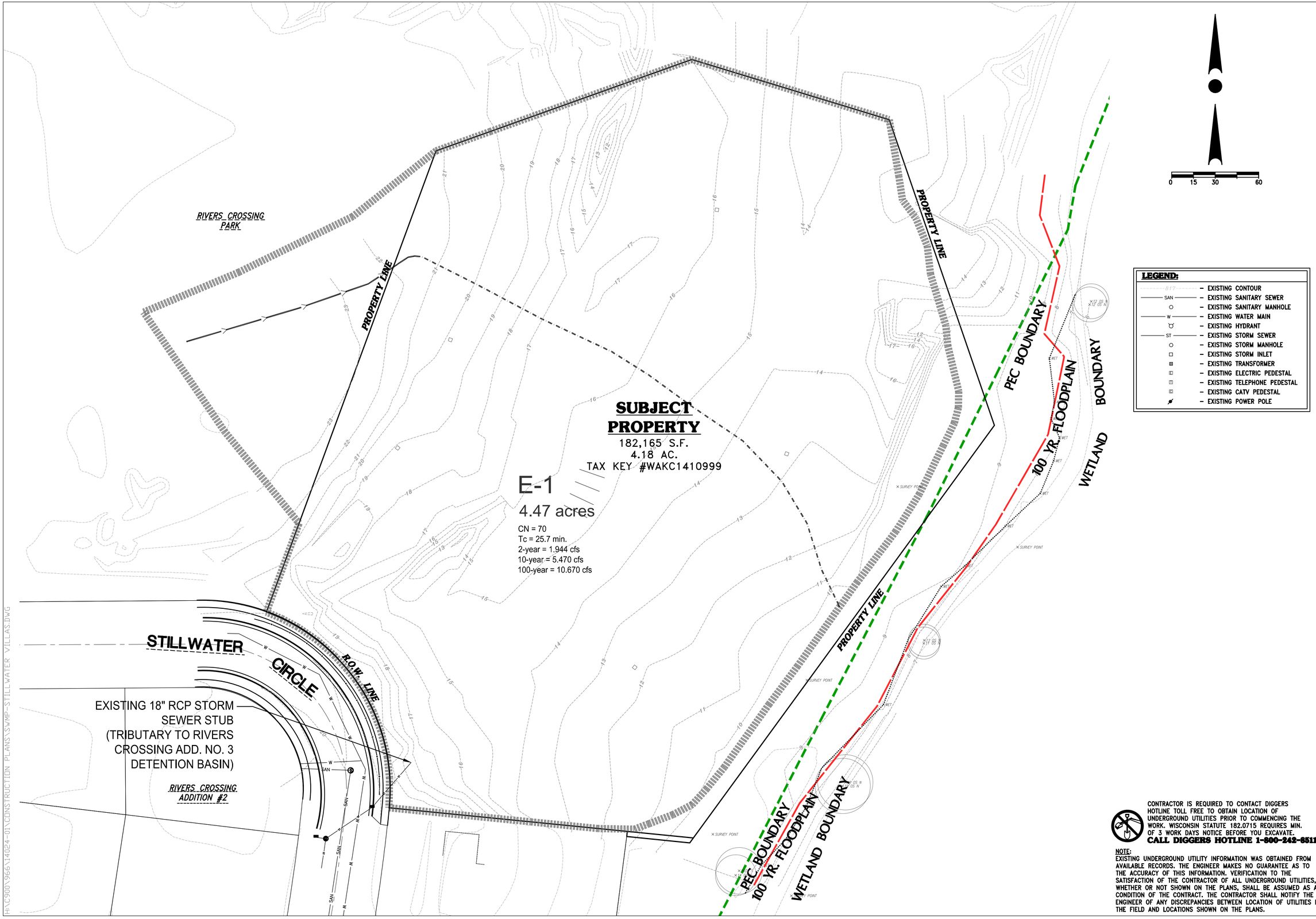
Notes:

0 100.00 Feet

Printed 3/31/2015

APPENDIX 2

Existing & Proposed Drainage Area Maps
Rain Garden Details



LEGEND:

- 817 — EXISTING CONTOUR
- SAN — EXISTING SANITARY SEWER
- EXISTING SANITARY MANHOLE
- W — EXISTING WATER MAIN
- EXISTING HYDRANT
- ST — EXISTING STORM SEWER
- EXISTING STORM MANHOLE
- EXISTING STORM INLET
- EXISTING TRANSFORMER
- EXISTING ELECTRIC PEDESTAL
- EXISTING TELEPHONE PEDESTAL
- EXISTING CATV PEDESTAL
- EXISTING POWER POLE

CONTRACTOR IS REQUIRED TO CONTACT DIGGERS HOTLINE TOLL FREE TO OBTAIN LOCATION OF UNDERGROUND UTILITIES PRIOR TO COMMENCING THE WORK. WISCONSIN STATUTE 182.0715 REQUIRES MIN. OF 3 WORK DAYS NOTICE BEFORE YOU EXCAVATE.
CALL DIGGERS HOTLINE 1-800-242-8511

NOTE:
EXISTING UNDERGROUND UTILITY INFORMATION WAS OBTAINED FROM AVAILABLE RECORDS. THE ENGINEER MAKES NO GUARANTEE AS TO THE ACCURACY OF THIS INFORMATION. VERIFICATION TO THE SATISFACTION OF THE CONTRACTOR OF ALL UNDERGROUND UTILITIES, WHETHER OR NOT SHOWN ON THE PLANS, SHALL BE ASSUMED AS A CONDITION OF THE CONTRACT. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES BETWEEN LOCATION OF UTILITIES IN THE FIELD AND LOCATIONS SHOWN ON THE PLANS.

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PROJECT:
STILLWATER VILLAS
CITY OF WAUKESHA, WISCONSIN
BY: BIELINSKI COMMERCIAL, LLC.
1830 MEADOW LN., SUITE A
PEWAUKEE, WI 53072

REVISION HISTORY

DATE	DESCRIPTION
02/16/16	SWMP REVISIONS
12/17/15	CIVIL REVISIONS
08/24/15	CIVIL REVISIONS
04/03/15	CIVIL PLANS
05/08/15	UPDATED BUILDINGS

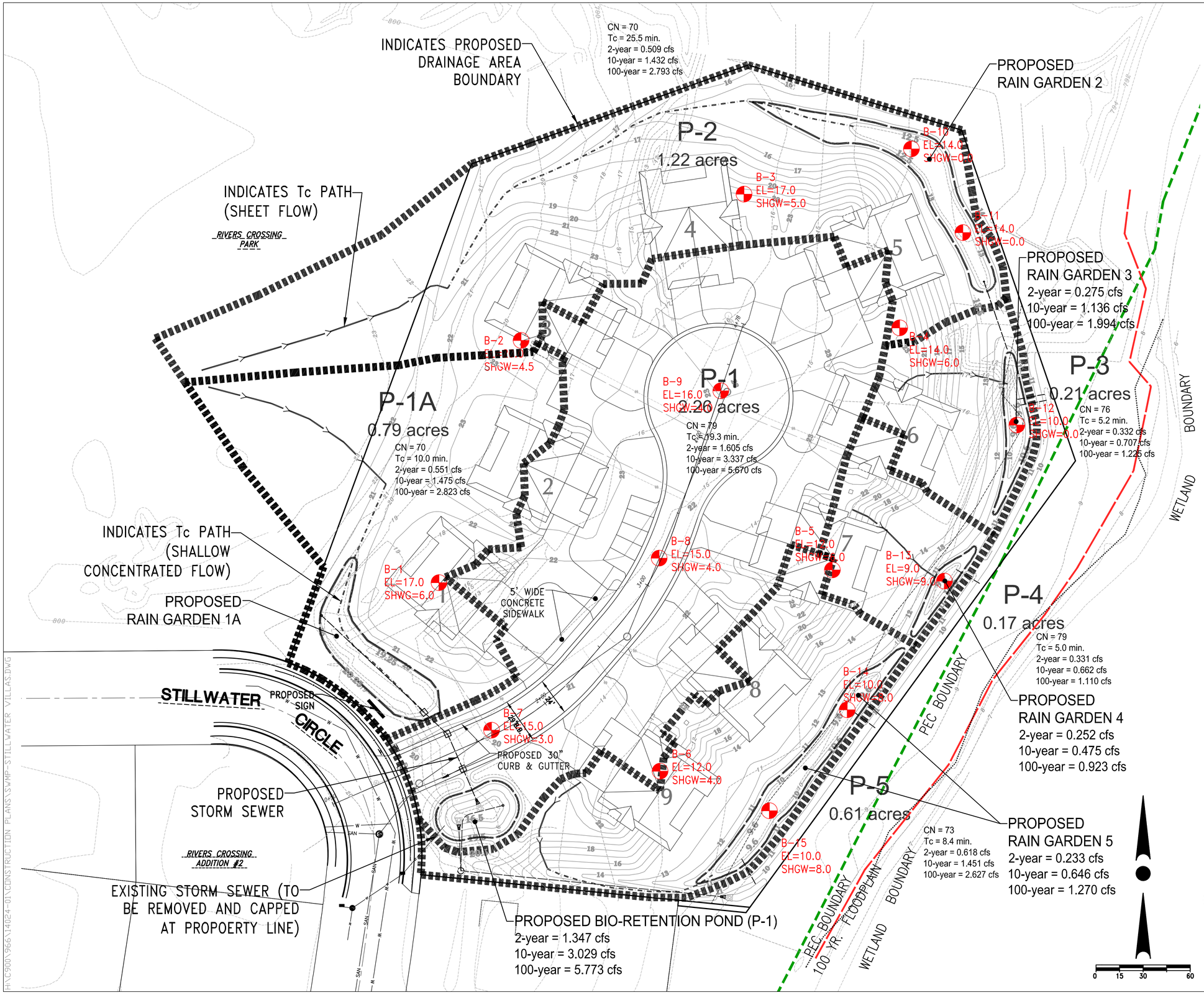
DATE:
FEBRUARY 16, 2016

JOB NUMBER:
14024

DESCRIPTION:
EXISTING DRAINAGE MAP

SHEET
D1.0

H:\C900\966\14024-01\CONSTRUCTION PLANS\SWMP-STILLWATER VILLAS.DWG



DEVELOPMENT SUMMARY

Current Zoning: Rs-3

Proposed Zoning/Use: RD-2
2-family Condo

Parcel Area: 4.18 acres

Proposed Units: 20 units

Density: 4.78 units/acre

Parking Provided:
Interior Garage: 40 spaces
Exterior Garage: 40 spaces
Surface: 7 spaces
TOTAL: 87 spaces

Parking Spaces per Unit: 4.35

Discharge Summary:
Existing Discharge:
2-year = 1.944 cfs
10-year = 5.470 cfs
100-year = 10.67 cfs

Proposed Discharge:
2-year = 1.863 cfs
10-year = 4.729 cfs
100-year = 9.039 cfs

LEGEND:

- EXISTING CONTOUR
- EXISTING SANITARY SEWER
- EXISTING SANITARY MANHOLE
- EXISTING WATER MAIN
- EXISTING HYDRANT
- EXISTING STORM SEWER
- EXISTING STORM MANHOLE
- EXISTING STORM INLET
- EXISTING TRANSFORMER
- EXISTING ELECTRIC PEDESTAL
- EXISTING TELEPHONE PEDESTAL
- EXISTING CATV PEDESTAL
- EXISTING POWER POLE
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY MANHOLE
- PROPOSED WATER MAIN
- PROPOSED HYDRANT
- PROPOSED WATER VALVE
- PROPOSED STORM SEWER
- PROPOSED STORM MANHOLE
- PROPOSED STORM INLET
- PROPOSED STORM END SECTION

CONTRACTOR IS REQUIRED TO CONTACT DIGGERS HOTLINE TOLL FREE TO OBTAIN LOCATION OF UNDERGROUND UTILITIES PRIOR TO COMMENCING THE WORK. WISCONSIN STATUTE 182.0715 REQUIRES MIN. OF 3 WORK DAYS NOTICE BEFORE YOU EXCAVATE.
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DATE: FEBRUARY 16, 2016

JOB NUMBER: 14024

DESCRIPTION: PROPOSED DRAINAGE MAP

SHEET D1.1

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APPENDIX 3

River's Crossing Addition No. 3 Drainage Calculations (Storm Water Management Plan) & Drainage Map
Revision Date: December 20, 2001

November 9, 2001
Project No. 12750
Revised December 20, 2001

DRAINAGE CALCULATIONS SUMMARY

The River's Crossing Addition #3 being developed by Bielinski Development is a residential subdivision located south of the River's Crossing Addition #2 and north from Fox River in the City of Waukesha.

The storm water from the site will be managed by a "wet" detention basin, which will meet or exceed the City of Waukesha storm water management standards for both storm water quantity and quality.

EXISTING CONDITIONS

The site has historically been farmed. The site has been divided into three drainage areas.

Area 1, this area at the NW corner of the site drains northwesterly to unplatted lands.

Area 2, this large area, which includes future multi family development drains easterly to unplated lands and Fox River drains easterly to unplated lands.

Areas 3A and 3B. This area at the SW corner of the site drains westerly to unplated lands.

The existing storm water flows are summarized in the following table.

Watershed	T_c	Area	CN	Q-2 year	Q-10 year	Q-100 year
1	39 min	11.50 Ac	72	4.62 cfs	12.02 cfs	22.72 cfs
2	50 min	33.50 Ac	72	11.83 cfs	31.23cfs	59.59 cfs
3A	44 min	5.00 Ac	72	1.69 cfs	4.40 cfs	8.33 cfs
3B	45 min	3.80 Ac	72	1.28 cfs	3.35 cfs	6.33 cfs

PROPOSED CONDITIONS

1) Area 1 has been reduced in size, flows will be lower. Runoff from the area will be directed to the temporary sedimentation basin.

2) Area 2 will drain to southeast to the water quality, detention basin.

3) Areas 3A and 3B have been reduced in size and flows will be lower.

Sedimentation Basin Sizing Calculations

Project: RIVER'S CROSSING III / Bielinski Development
Location: City of Waukesha
Date: 12/17/01

Basin B

Drainage Area	6.50	acres	
Min. Basin Area:	**4063**	**sq.ft.**	
Emerg Spillway elev	15.50		
Riser elev	15.00		
Invert elev	12.00		
Head above Outlet	3.00		
De-Watering Time	72	hrs	
Outlet Size:	0.0113	sq.ft.	
	1.62	sq.in.	
Diameter:	**1.4**	**Inches**	use 2 orifices 1" dia each

Outlet Structure	Q=CIA	
C=	0.40	
time of concentration=	20.0	minutes
I=	3.78	iph
A=	6.50	acres
Q=	**9.8**	**cfs**

use 24" RCP

Hydrograph Return Period Recap

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	-------	-------	4.62	-------	-------	12.02	-------	-------	22.72	AREA 1 EXISTING
	SCS Runoff	-------	-------	1.69	-------	-------	4.40	-------	-------	8.33	AREA 3A EXISTING
	SCS Runoff	-------	-------	1.28	-------	-------	3.35	-------	-------	6.33	AREA 3B EXISTING
4	SCS Runoff	-------	-------	11.83	-------	-------	31.23	-------	-------	59.59	AREA 2 EXISTING
	SCS Runoff	-------	-------	4.10	-------	-------	9.44	-------	-------	16.99	AREA 1 PROPOSED
6	SCS Runoff	-------	-------	37.71	-------	-------	84.33	-------	-------	150.08	AREA 2 PROPOSED
	SCS Runoff	-------	-------	1.51	-------	-------	3.48	-------	-------	6.27	AREA 3 PROPOSED
8	Reservoir	6	-------	7.28	-------	-------	13.65	-------	-------	33.60	ROUTE 1
	Reservoir	5	-------	1.19	-------	-------	3.63	-------	-------	7.09	ROUTE 2
10	Combine	2, 3,	-------	2.97	-------	-------	7.75	-------	-------	14.67	Area 3A+3B

Hydrograph Summary Report

yd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	4.62	6	738	27,373	----	------	------	AREA 1 EXISTING
	SCS Runoff	1.69	6	744	11,252	----	------	------	AREA 3A EXISTING
3	SCS Runoff	1.28	6	744	8,552	----	------	------	AREA 3B EXISTING
4	SCS Runoff	11.83	6	756	105,719	----	------	------	AREA 2 EXISTING
	SCS Runoff	4.10	6	732	18,177	----	------	------	AREA 1 PROPOSED
6	SCS Runoff	37.71	6	732	164,923	----	------	------	AREA 2 PROPOSED
	SCS Runoff	1.51	6	732	6,712	----	------	------	AREA 3 PROPOSED
8	Reservoir	7.28	6	774	164,882	6	7.77	66,098	ROUTE 1
	Reservoir	1.19	6	762	18,177	5	12.29	6,039	ROUTE 2
10	Combine	2.97	6	744	19,804	2, 3,	------	------	Area 3A+3B

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

AREA 1 EXISTING

Hydrograph type	= SCS Runoff	Peak discharge	= 4.62 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Drainage area	= 11.50 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 39.1 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 27,373 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
11.70	0.05	15.10	0.50	18.50	0.30	21.90	0.21
11.80	0.24	15.20	0.49	18.60	0.30	22.00	0.21
11.90	0.90	15.30	0.48	18.70	0.29	22.10	0.21
12.00	2.03	15.40	0.47	18.80	0.29	22.20	0.21
12.10	3.21	15.50	0.46	18.90	0.28	22.30	0.21
12.20	4.25	15.60	0.45	19.00	0.28	22.40	0.21
12.30	4.62 <<	15.70	0.44	19.10	0.28	22.50	0.21
12.40	4.33	15.80	0.44	19.20	0.27	22.60	0.21
12.50	3.93	15.90	0.43	19.30	0.27	22.70	0.21
12.60	3.43	16.00	0.42	19.40	0.26	22.80	0.21
12.70	2.86	16.10	0.41	19.50	0.26	22.90	0.21
12.80	2.24	16.20	0.40	19.60	0.26	23.00	0.21
12.90	1.65	16.30	0.39	19.70	0.25	23.10	0.21
13.00	1.29	16.40	0.38	19.80	0.25	23.20	0.21
13.10	1.17	16.50	0.37	19.90	0.25	23.30	0.20
13.20	1.07	16.60	0.37	20.00	0.24	23.40	0.20
13.30	0.98	16.70	0.36	20.10	0.24	23.50	0.20
13.40	0.92	16.80	0.36	20.20	0.23	23.60	0.20
13.50	0.87	16.90	0.36	20.30	0.23	23.70	0.20
13.60	0.83	17.00	0.35	20.40	0.23	23.80	0.20
13.70	0.79	17.10	0.35	20.50	0.23	23.90	0.20
13.80	0.75	17.20	0.34	20.60	0.22	24.00	0.20
13.90	0.72	17.30	0.34	20.70	0.22	24.10	0.19
14.00	0.68	17.40	0.34	20.80	0.22	24.20	0.17
14.10	0.66	17.50	0.33	20.90	0.22	24.30	0.14
14.20	0.63	17.60	0.33	21.00	0.22	24.40	0.11
14.30	0.60	17.70	0.33	21.10	0.22	24.50	0.08
14.40	0.58	17.80	0.32	21.20	0.22	24.60	0.05
14.50	0.57	17.90	0.32	21.30	0.22		
14.60	0.55	18.00	0.32	21.40	0.22		
14.70	0.54	18.10	0.31	21.50	0.22	...End	
14.80	0.53	18.20	0.31	21.60	0.22		
14.90	0.52	18.30	0.31	21.70	0.22		
15.00	0.51	18.40	0.30	21.80	0.21		

TR55 Tc Worksheet

Hyd. No. 4

AREA 2 EXISTING
Storm frequency = 2 yrs

Sheet Flow

Manning's n-value	= 0.240
Flow length	= 300.0 ft
Two-year 24-hr precip.	= 2.70 in
Land slope	= 0.8 %

Travel Time ..... **= 54.0 min**

Shallow Concentrated Flow

Flow length	= 917 ft
Watercourse slope	= 1.5 %
Surface description	= Unpaved
Average velocity	= 1.98 ft/s

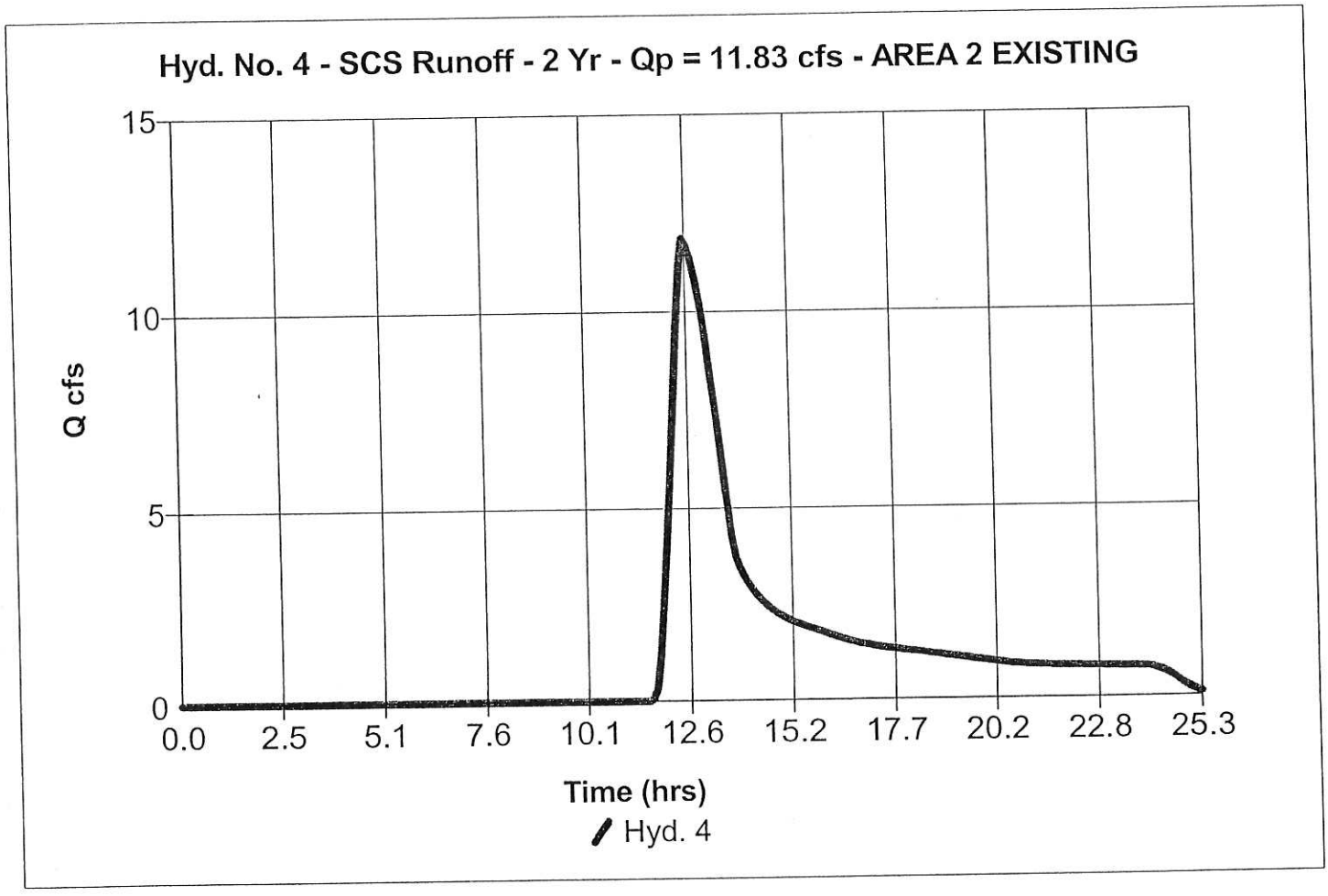
Travel Time ..... **= 7.7 min**

Channel Flow

Cross section flow area	= 0.0 sqft
Wetted perimeter	= 0.0 ft
Channel slope	= 0.0 %
Manning's n-value	= 0.015
Velocity	= 0.00 ft/s
Flow length	= 0.0 ft

Travel Time ..... **= min**

Total Travel Time, Tc ..... **= 61.7 min**


Hyd. No. 4 - SCS Runoff - 2 Yr - Qp = 11.83 cfs - AREA 2 EXISTING
Q cfs
15
10
5
0
0.0
2.5
5.1
7.6
10.1
12.6
15.2
17.7
20.2
22.8
25.3
Time (hrs)
Hyd. 4

TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

AREA 3A EXISTING
Storm frequency = 2 yrs

Sheet Flow

Manning's n-value	= 0.240
Flow length	= 300.0 ft
Two-year 24-hr precip.	= 2.70 in
Land slope	= 1.7 %

Travel Time ..... **= 40.2 min**

Shallow Concentrated Flow

Flow length	= 416 ft
Watercourse slope	= 1.4 %
Surface description	= Unpaved
Average velocity	= 1.94 ft/s

Travel Time ..... **= 3.6 min**

Channel Flow

Cross section flow area	= 0.0 sqft
Wetted perimeter	= 0.0 ft
Channel slope	= 0.0 %
Manning's n-value	= 0.015
Velocity	= 0.00 ft/s
Flow length	= 0.0 ft

Travel Time ..... **= min**

Total Travel Time, Tc ..... **= 43.8 min**

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

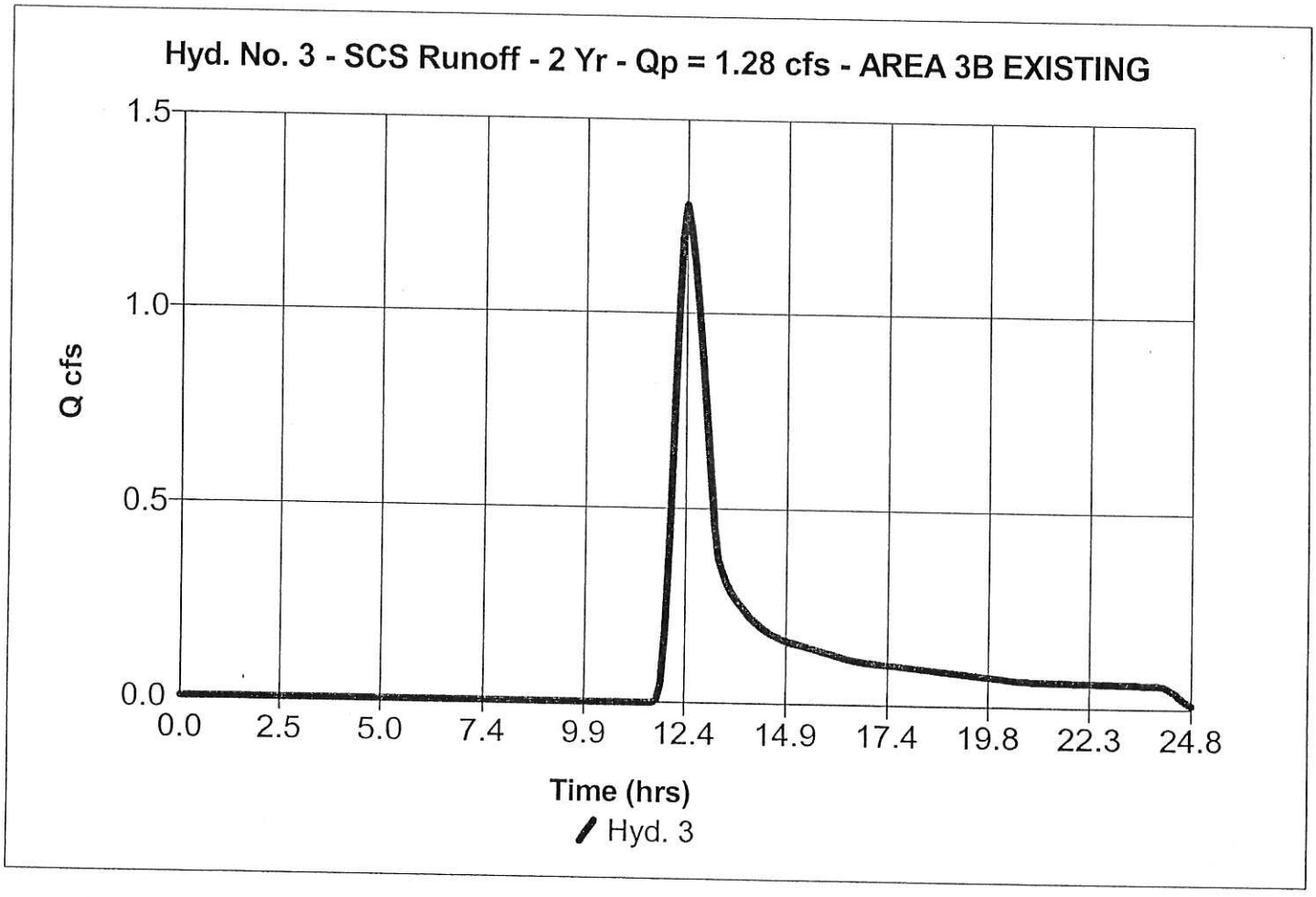
AREA 3B EXISTING

Hydrograph type	= SCS Runoff	Peak discharge	= 1.28 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Drainage area	= 3.80 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 45.1 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 8,552 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
11.80	0.05	15.20	0.16	18.60	0.09	22.00	0.07
11.90	0.19	15.30	0.15	18.70	0.09	22.10	0.07
12.00	0.43	15.40	0.15	18.80	0.09	22.20	0.07
12.10	0.69	15.50	0.15	18.90	0.09	22.30	0.07
12.20	0.96	15.60	0.14	19.00	0.09	22.40	0.07
12.30	1.20	15.70	0.14	19.10	0.09	22.50	0.07
12.40	1.28 <<	15.80	0.14	19.20	0.09	22.60	0.07
12.50	1.22	15.90	0.14	19.30	0.09	22.70	0.07
12.60	1.13	16.00	0.13	19.40	0.08	22.80	0.07
12.70	1.02	16.10	0.13	19.50	0.08	22.90	0.06
12.80	0.90	16.20	0.13	19.60	0.08	23.00	0.06
12.90	0.75	16.30	0.12	19.70	0.08	23.10	0.06
13.00	0.60	16.40	0.12	19.80	0.08	23.20	0.06
13.10	0.46	16.50	0.12	19.90	0.08	23.30	0.06
13.20	0.37	16.60	0.12	20.00	0.08	23.40	0.06
13.30	0.34	16.70	0.12	20.10	0.08	23.50	0.06
13.40	0.31	16.80	0.11	20.20	0.07	23.60	0.06
13.50	0.29	16.90	0.11	20.30	0.07	23.70	0.06
13.60	0.27	17.00	0.11	20.40	0.07	23.80	0.06
13.70	0.26	17.10	0.11	20.50	0.07	23.90	0.06
13.80	0.25	17.20	0.11	20.60	0.07	24.00	0.06
13.90	0.24	17.30	0.11	20.70	0.07	24.10	0.06
14.00	0.22	17.40	0.11	20.80	0.07	24.20	0.06
14.10	0.21	17.50	0.11	20.90	0.07	24.30	0.05
14.20	0.21	17.60	0.10	21.00	0.07	24.40	0.04
14.30	0.20	17.70	0.10	21.10	0.07	24.50	0.03
14.40	0.19	17.80	0.10	21.20	0.07	24.60	0.02
14.50	0.18	17.90	0.10	21.30	0.07	24.70	0.02
14.60	0.18	18.00	0.10	21.40	0.07		
14.70	0.17	18.10	0.10	21.50	0.07		
14.80	0.17	18.20	0.10	21.60	0.07	*...End*	
14.90	0.17	18.30	0.10	21.70	0.07		
15.00	0.16	18.40	0.10	21.80	0.07		
15.10	0.16	18.50	0.09	21.90	0.07		


Hyd. No. 3 - SCS Runoff - 2 Yr - Qp = 1.28 cfs - AREA 3B EXISTING
Q cfs
1.5
1.0
0.5
0.0
0.0
2.5
5.0
7.4
9.9
12.4
14.9
17.4
19.8
22.3
24.8
Time (hrs)
Hyd. 3

Hydrograph Discharge Table

Time (hrs)	Hyd. 2 + (cfs)	Hyd. 3 + (cfs)	Outflow (cfs)
15.60	0.19	0.14	0.34
15.70	0.19	0.14	0.33
15.80	0.18	0.14	0.32
15.90	0.18	0.14	0.31
16.00	0.17	0.13	0.31
16.10	0.17	0.13	0.30
16.20	0.17	0.13	0.29
16.30	0.16	0.12	0.29
16.40	0.16	0.12	0.28
16.50	0.16	0.12	0.28
16.60	0.15	0.12	0.27
16.70	0.15	0.12	0.27
16.80	0.15	0.11	0.26
16.90	0.15	0.11	0.26
17.00	0.15	0.11	0.26
17.10	0.14	0.11	0.25
17.20	0.14	0.11	0.25
17.30	0.14	0.11	0.25
17.40	0.14	0.11	0.25
17.50	0.14	0.11	0.24
17.60	0.14	0.10	0.24
17.70	0.14	0.10	0.24
17.80	0.13	0.10	0.24
17.90	0.13	0.10	0.23
18.00	0.13	0.10	0.23
18.10	0.13	0.10	0.23
18.20	0.13	0.10	0.23
18.30	0.13	0.10	0.22
18.40	0.13	0.10	0.22
18.50	0.12	0.09	0.22
18.60	0.12	0.09	0.22
18.70	0.12	0.09	0.21
18.80	0.12	0.09	0.21
18.90	0.12	0.09	0.21
19.00	0.12	0.09	0.21
19.10	0.12	0.09	0.20
19.20	0.11	0.09	0.20
19.30	0.11	0.09	0.20
19.40	0.11	0.08	0.19
19.50	0.11	0.08	0.19
19.60	0.11	0.08	0.19
19.70	0.11	0.08	0.19
19.80	0.10	0.08	0.18
19.90	0.10	0.08	0.18
20.00	0.10	0.08	0.18
20.10	0.10	0.08	0.17
20.20	0.10	0.07	0.17
20.30	0.10	0.07	0.17
20.40	0.09	0.07	0.17
20.50	0.09	0.07	0.16
20.60	0.09	0.07	0.16

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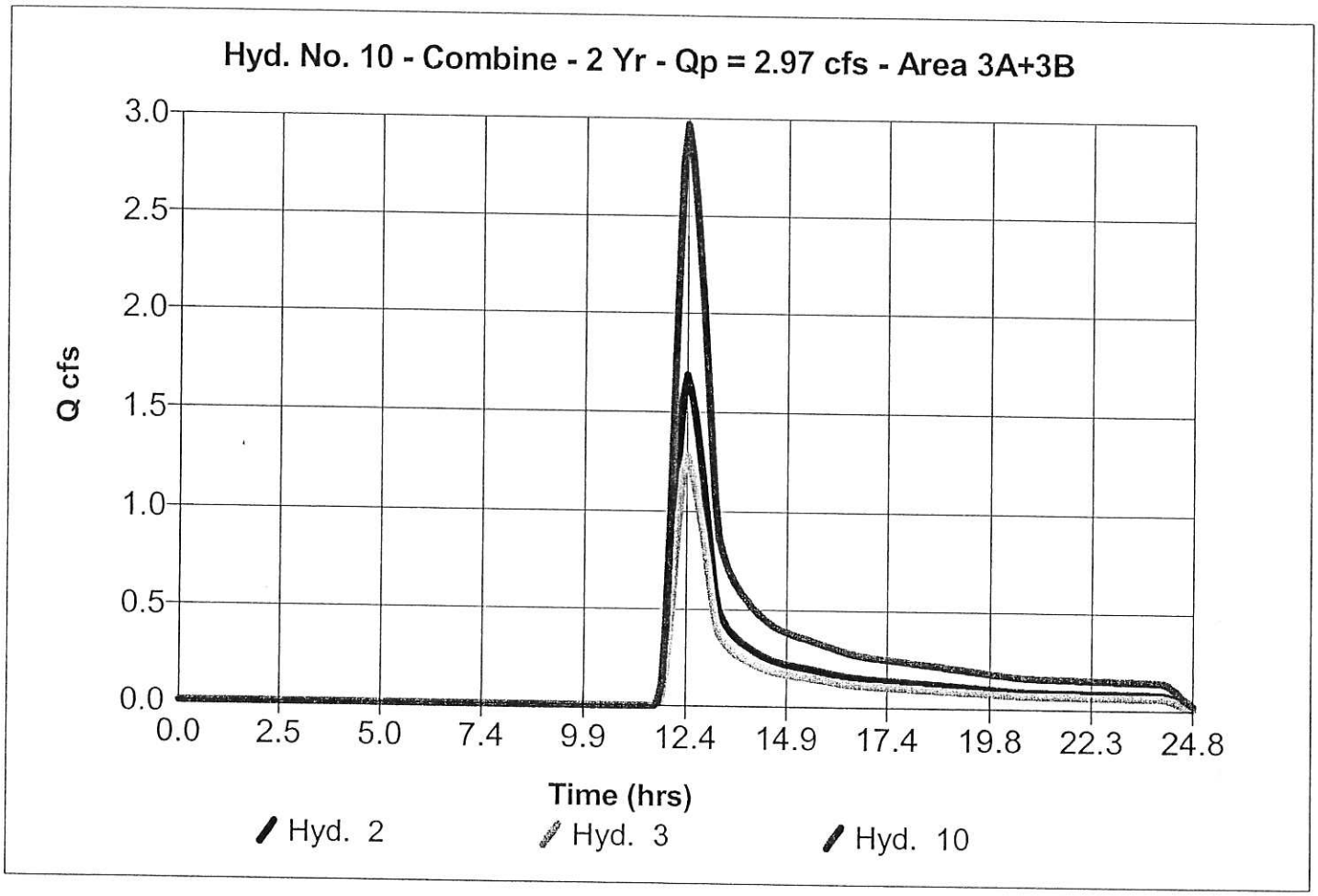
Hyd. No. 10 - Combine - 2 Yr - Qp = 2.97 cfs - Area 3A+3B
Q cfs
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
2.5
5.0
7.4
9.9
12.4
14.9
17.4
19.8
22.3
24.8
Time (hrs)
Hyd. 2
Hyd. 3
Hyd. 10

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 5

AREA 1 PROPOSED

Hydrograph type	= SCS Runoff	Peak discharge	= 4.10 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Drainage area	= 6.50 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 20 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 18,177 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
11.60	0.06	15.00	0.31	18.40	0.18	21.80	0.13
11.70	0.18	15.10	0.31	18.50	0.18	21.90	0.13
11.80	0.51	15.20	0.30	18.60	0.18	22.00	0.13
11.90	1.42	15.30	0.29	18.70	0.18	22.10	0.13
12.00	2.76	15.40	0.29	18.80	0.17	22.20	0.13
12.10	3.87	15.50	0.28	18.90	0.17	22.30	0.13
12.20	4.10 <<	15.60	0.27	19.00	0.17	22.40	0.13
12.30	3.51	15.70	0.27	19.10	0.17	22.50	0.13
12.40	2.83	15.80	0.26	19.20	0.16	22.60	0.13
12.50	2.09	15.90	0.26	19.30	0.16	22.70	0.13
12.60	1.39	16.00	0.25	19.40	0.16	22.80	0.13
12.70	0.98	16.10	0.24	19.50	0.16	22.90	0.13
12.80	0.86	16.20	0.24	19.60	0.15	23.00	0.13
12.90	0.77	16.30	0.23	19.70	0.15	23.10	0.13
13.00	0.70	16.40	0.23	19.80	0.15	23.20	0.12
13.10	0.64	16.50	0.23	19.90	0.15	23.30	0.12
13.20	0.60	16.60	0.22	20.00	0.14	23.40	0.12
13.30	0.57	16.70	0.22	20.10	0.14	23.50	0.12
13.40	0.54	16.80	0.22	20.20	0.14	23.60	0.12
13.50	0.51	16.90	0.22	20.30	0.14	23.70	0.12
13.60	0.49	17.00	0.21	20.40	0.14	23.80	0.12
13.70	0.46	17.10	0.21	20.50	0.14	23.90	0.12
13.80	0.44	17.20	0.21	20.60	0.14	24.00	0.12
13.90	0.42	17.30	0.21	20.70	0.14	24.10	0.11
14.00	0.40	17.40	0.21	20.80	0.13	24.20	0.09
14.10	0.39	17.50	0.20	20.90	0.13	24.30	0.06
14.20	0.37	17.60	0.20	21.00	0.13		
14.30	0.36	17.70	0.20	21.10	0.13		
14.40	0.35	17.80	0.20	21.20	0.13	*...End*	
14.50	0.34	17.90	0.19	21.30	0.13		
14.60	0.33	18.00	0.19	21.40	0.13		
14.70	0.33	18.10	0.19	21.50	0.13		
14.80	0.32	18.20	0.19	21.60	0.13		
14.90	0.32	18.30	0.19	21.70	0.13		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 6

AREA 2 PROPOSED

Hydrograph type	= SCS Runoff	Peak discharge	= 37.71 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Drainage area	= 55.50 ac	Curve number	= 76
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 25 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 164,923 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
11.50	0.43	14.90	2.82	18.30	1.64	21.70	1.16
11.60	0.85	15.00	2.76	18.40	1.62	21.80	1.16
11.70	2.05	15.10	2.71	18.50	1.60	21.90	1.15
11.80	5.23	15.20	2.66	18.60	1.58	22.00	1.15
11.90	13.71	15.30	2.60	18.70	1.56	22.10	1.14
12.00	25.96	15.40	2.55	18.80	1.54	22.20	1.14
12.10	35.92	15.50	2.50	18.90	1.52	22.30	1.14
12.20	37.71 <<	15.60	2.44	19.00	1.50	22.40	1.13
12.30	32.18	15.70	2.38	19.10	1.48	22.50	1.13
12.40	25.80	15.80	2.33	19.20	1.45	22.60	1.12
12.50	18.95	15.90	2.27	19.30	1.43	22.70	1.12
12.60	12.51	16.00	2.22	19.40	1.41	22.80	1.12
12.70	8.82	16.10	2.16	19.50	1.39	22.90	1.11
12.80	7.71	16.20	2.11	19.60	1.37	23.00	1.11
12.90	6.86	16.30	2.07	19.70	1.35	23.10	1.10
13.00	6.22	16.40	2.03	19.80	1.32	23.20	1.10
13.10	5.74	16.50	2.00	19.90	1.30	23.30	1.10
13.20	5.37	16.60	1.98	20.00	1.28	23.40	1.09
13.30	5.06	16.70	1.96	20.10	1.26	23.50	1.09
13.40	4.79	16.80	1.94	20.20	1.24	23.60	1.08
13.50	4.55	16.90	1.92	20.30	1.22	23.70	1.08
13.60	4.33	17.00	1.90	20.40	1.21	23.80	1.08
13.70	4.13	17.10	1.88	20.50	1.21	23.90	1.07
13.80	3.94	17.20	1.87	20.60	1.20	24.00	1.07
13.90	3.77	17.30	1.85	20.70	1.20	24.10	0.98
14.00	3.60	17.40	1.83	20.80	1.19	24.20	0.80
14.10	3.45	17.50	1.81	20.90	1.19	24.30	0.53
14.20	3.31	17.60	1.79	21.00	1.19		
14.30	3.20	17.70	1.77	21.10	1.18		
14.40	3.11	17.80	1.75	21.20	1.18	*...End*	
14.50	3.03	17.90	1.73	21.30	1.17		
14.60	2.97	18.00	1.71	21.40	1.17		
14.70	2.92	18.10	1.68	21.50	1.17		
14.80	2.87	18.20	1.66	21.60	1.16		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 7

AREA 3 PROPOSED

Hydrograph type	= SCS Runoff	Peak discharge	= 1.51 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Drainage area	= 2.40 ac	Curve number	= 75
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 20 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 6,712 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
11.60	0.02	15.00	0.11	18.40	0.07	21.80	0.05
11.70	0.07	15.10	0.11	18.50	0.07	21.90	0.05
11.80	0.19	15.20	0.11	18.60	0.07	22.00	0.05
11.90	0.52	15.30	0.11	18.70	0.07	22.10	0.05
12.00	1.02	15.40	0.11	18.80	0.06	22.20	0.05
12.10	1.43	15.50	0.10	18.90	0.06	22.30	0.05
12.20	1.51 <<	15.60	0.10	19.00	0.06	22.40	0.05
12.30	1.30	15.70	0.10	19.10	0.06	22.50	0.05
12.40	1.05	15.80	0.10	19.20	0.06	22.60	0.05
12.50	0.77	15.90	0.09	19.30	0.06	22.70	0.05
12.60	0.51	16.00	0.09	19.40	0.06	22.80	0.05
12.70	0.36	16.10	0.09	19.50	0.06	22.90	0.05
12.80	0.32	16.20	0.09	19.60	0.06	23.00	0.05
12.90	0.28	16.30	0.09	19.70	0.06	23.10	0.05
13.00	0.26	16.40	0.08	19.80	0.06	23.20	0.05
13.10	0.24	16.50	0.08	19.90	0.05	23.30	0.05
13.20	0.22	16.60	0.08	20.00	0.05	23.40	0.05
13.30	0.21	16.70	0.08	20.10	0.05	23.50	0.05
13.40	0.20	16.80	0.08	20.20	0.05	23.60	0.05
13.50	0.19	16.90	0.08	20.30	0.05	23.70	0.05
13.60	0.18	17.00	0.08	20.40	0.05	23.80	0.05
13.70	0.17	17.10	0.08	20.50	0.05	23.90	0.04
13.80	0.16	17.20	0.08	20.60	0.05	24.00	0.04
13.90	0.16	17.30	0.08	20.70	0.05	24.10	0.04
14.00	0.15	17.40	0.08	20.80	0.05	24.20	0.03
14.10	0.14	17.50	0.08	20.90	0.05	24.30	0.02
14.20	0.14	17.60	0.07	21.00	0.05		
14.30	0.13	17.70	0.07	21.10	0.05		
14.40	0.13	17.80	0.07	21.20	0.05	*...End*	
14.50	0.13	17.90	0.07	21.30	0.05		
14.60	0.12	18.00	0.07	21.40	0.05		
14.70	0.12	18.10	0.07	21.50	0.05		
14.80	0.12	18.20	0.07	21.60	0.05		
14.90	0.12	18.30	0.07	21.70	0.05		

Reservoir Report

Reservoir No. 1 - Detention Basin 1

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	6.50	37,520	0	0
0.50	7.00	47,460	21,245	21,245
1.50	8.00	69,055	58,258	79,503
3.50	10.00	110,000	179,055	258,558
5.00	11.50	130,000	180,000	438,558

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 30.0	0.0	0.0	0.0
Span in	= 30.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 6.50	0.00	0.00	0.00
Length ft	= 47.0	0.0	0.0	0.0
Slope %	= 0.50	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
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.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	6.50	0.00	---	---	---	---	---	---	---	---	0.00
0.50	21,245	7.00	1.76	---	---	---	---	---	---	---	---	1.76
1.50	79,503	8.00	9.04	---	---	---	---	---	---	---	---	9.04
3.50	258,558	10.00	31.50	---	---	---	---	---	---	---	---	31.50
5.00	438,558	11.50	45.76	---	---	---	---	---	---	---	---	45.76

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 8

ROUTE 1

Hydrograph type	= Reservoir	Peak discharge	= 7.28 cfs
Storm frequency	= 2 yrs	Time interval	= 6 min
Inflow hyd. No.	= 6	Reservoir name	= Detention Basin 1
Max. Elevation	= 7.77 ft	Max. Storage	= 66,098 cuft

Storage Indication method used.

Outflow hydrograph volume = 164,882 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
11.90	13.71	6.63	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
12.00	25.96	6.80	0.71	-----	-----	-----	-----	-----	-----	-----	-----	0.71
12.10	35.92	7.03	2.02	-----	-----	-----	-----	-----	-----	-----	-----	2.02
12.20	37.71 <<	7.25	3.37	-----	-----	-----	-----	-----	-----	-----	-----	3.37
12.30	32.18	7.44	4.62	-----	-----	-----	-----	-----	-----	-----	-----	4.62
12.40	25.80	7.58	5.66	-----	-----	-----	-----	-----	-----	-----	-----	5.66
12.50	18.95	7.69	6.40	-----	-----	-----	-----	-----	-----	-----	-----	6.40
12.60	12.51	7.74	6.96	-----	-----	-----	-----	-----	-----	-----	-----	6.96
12.70	8.82	7.76	7.21	-----	-----	-----	-----	-----	-----	-----	-----	7.21
12.80	7.71	7.77	7.28	-----	-----	-----	-----	-----	-----	-----	-----	7.28
12.90	6.86	7.77 <<	7.28	-----	-----	-----	-----	-----	-----	-----	-----	7.28 <<
13.00	6.22	7.77	7.23	-----	-----	-----	-----	-----	-----	-----	-----	7.23
13.10	5.74	7.76	7.15	-----	-----	-----	-----	-----	-----	-----	-----	7.15
13.20	5.37	7.75	7.04	-----	-----	-----	-----	-----	-----	-----	-----	7.04
13.30	5.06	7.74	6.92	-----	-----	-----	-----	-----	-----	-----	-----	6.92
13.40	4.79	7.73	6.79	-----	-----	-----	-----	-----	-----	-----	-----	6.79
13.50	4.55	7.71	6.65	-----	-----	-----	-----	-----	-----	-----	-----	6.65
13.60	4.33	7.70	6.50	-----	-----	-----	-----	-----	-----	-----	-----	6.50
13.70	4.13	7.69	6.40	-----	-----	-----	-----	-----	-----	-----	-----	6.40
13.80	3.94	7.67	6.30	-----	-----	-----	-----	-----	-----	-----	-----	6.30
13.90	3.77	7.66	6.19	-----	-----	-----	-----	-----	-----	-----	-----	6.19
14.00	3.60	7.64	6.08	-----	-----	-----	-----	-----	-----	-----	-----	6.08
14.10	3.45	7.63	5.97	-----	-----	-----	-----	-----	-----	-----	-----	5.97
14.20	3.31	7.61	5.85	-----	-----	-----	-----	-----	-----	-----	-----	5.85
14.30	3.20	7.60	5.74	-----	-----	-----	-----	-----	-----	-----	-----	5.74
14.40	3.11	7.58	5.62	-----	-----	-----	-----	-----	-----	-----	-----	5.62
14.50	3.03	7.56	5.51	-----	-----	-----	-----	-----	-----	-----	-----	5.51
14.60	2.97	7.55	5.40	-----	-----	-----	-----	-----	-----	-----	-----	5.40
14.70	2.92	7.53	5.30	-----	-----	-----	-----	-----	-----	-----	-----	5.30
14.80	2.87	7.52	5.19	-----	-----	-----	-----	-----	-----	-----	-----	5.19
14.90	2.82	7.51	5.09	-----	-----	-----	-----	-----	-----	-----	-----	5.09
15.00	2.76	7.49	4.99	-----	-----	-----	-----	-----	-----	-----	-----	4.99
15.10	2.71	7.48	4.90	-----	-----	-----	-----	-----	-----	-----	-----	4.90
15.20	2.66	7.46	4.81	-----	-----	-----	-----	-----	-----	-----	-----	4.81
15.30	2.60	7.45	4.72	-----	-----	-----	-----	-----	-----	-----	-----	4.72
15.40	2.55	7.44	4.63	-----	-----	-----	-----	-----	-----	-----	-----	4.63
15.50	2.50	7.43	4.54	-----	-----	-----	-----	-----	-----	-----	-----	4.54
15.60	2.44	7.41	4.45	-----	-----	-----	-----	-----	-----	-----	-----	4.45

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
20.80	1.19	7.01	1.83	-----	-----	-----	-----	-----	-----	-----	-----	1.83
20.90	1.19	7.01	1.80	-----	-----	-----	-----	-----	-----	-----	-----	1.80
21.00	1.19	7.00	1.77	-----	-----	-----	-----	-----	-----	-----	-----	1.77
21.10	1.18	7.00	1.75	-----	-----	-----	-----	-----	-----	-----	-----	1.75
21.20	1.18	6.99	1.72	-----	-----	-----	-----	-----	-----	-----	-----	1.72
21.30	1.17	6.99	1.70	-----	-----	-----	-----	-----	-----	-----	-----	1.70
21.40	1.17	6.98	1.67	-----	-----	-----	-----	-----	-----	-----	-----	1.67
21.50	1.17	6.98	1.65	-----	-----	-----	-----	-----	-----	-----	-----	1.65
21.60	1.16	6.98	1.63	-----	-----	-----	-----	-----	-----	-----	-----	1.63
21.70	1.16	6.97	1.61	-----	-----	-----	-----	-----	-----	-----	-----	1.61
21.80	1.16	6.97	1.59	-----	-----	-----	-----	-----	-----	-----	-----	1.59
21.90	1.15	6.97	1.57	-----	-----	-----	-----	-----	-----	-----	-----	1.57
22.00	1.15	6.96	1.55	-----	-----	-----	-----	-----	-----	-----	-----	1.55
22.10	1.14	6.96	1.53	-----	-----	-----	-----	-----	-----	-----	-----	1.53
22.20	1.14	6.96	1.52	-----	-----	-----	-----	-----	-----	-----	-----	1.52
22.30	1.14	6.95	1.50	-----	-----	-----	-----	-----	-----	-----	-----	1.50
22.40	1.13	6.95	1.48	-----	-----	-----	-----	-----	-----	-----	-----	1.48
22.50	1.13	6.95	1.46	-----	-----	-----	-----	-----	-----	-----	-----	1.46
22.60	1.12	6.94	1.44	-----	-----	-----	-----	-----	-----	-----	-----	1.44
22.70	1.12	6.94	1.42	-----	-----	-----	-----	-----	-----	-----	-----	1.42
22.80	1.12	6.94	1.40	-----	-----	-----	-----	-----	-----	-----	-----	1.40
22.90	1.11	6.94	1.38	-----	-----	-----	-----	-----	-----	-----	-----	1.38
23.00	1.11	6.93	1.36	-----	-----	-----	-----	-----	-----	-----	-----	1.36
23.10	1.10	6.93	1.35	-----	-----	-----	-----	-----	-----	-----	-----	1.35
23.20	1.10	6.93	1.33	-----	-----	-----	-----	-----	-----	-----	-----	1.33
23.30	1.10	6.93	1.31	-----	-----	-----	-----	-----	-----	-----	-----	1.31
23.40	1.09	6.93	1.30	-----	-----	-----	-----	-----	-----	-----	-----	1.30
23.50	1.09	6.92	1.29	-----	-----	-----	-----	-----	-----	-----	-----	1.29
23.60	1.08	6.92	1.27	-----	-----	-----	-----	-----	-----	-----	-----	1.27
23.70	1.08	6.92	1.26	-----	-----	-----	-----	-----	-----	-----	-----	1.26
23.80	1.08	6.92	1.25	-----	-----	-----	-----	-----	-----	-----	-----	1.25
23.90	1.07	6.92	1.24	-----	-----	-----	-----	-----	-----	-----	-----	1.24
24.00	1.07	6.92	1.23	-----	-----	-----	-----	-----	-----	-----	-----	1.23
24.10	0.98	6.92	1.22	-----	-----	-----	-----	-----	-----	-----	-----	1.22
24.20	0.80	6.91	1.19	-----	-----	-----	-----	-----	-----	-----	-----	1.19
24.30	0.53	6.91	1.16	-----	-----	-----	-----	-----	-----	-----	-----	1.16
24.40	0.32	6.90	1.11	-----	-----	-----	-----	-----	-----	-----	-----	1.11
24.50	0.16	6.89	1.08	-----	-----	-----	-----	-----	-----	-----	-----	1.08
24.60	0.05	6.89	1.04	-----	-----	-----	-----	-----	-----	-----	-----	1.04
24.70	0.00	6.88	1.01	-----	-----	-----	-----	-----	-----	-----	-----	1.01
24.80	0.00	6.87	0.98	-----	-----	-----	-----	-----	-----	-----	-----	0.98
24.90	0.00	6.86	0.94	-----	-----	-----	-----	-----	-----	-----	-----	0.94
25.00	0.00	6.85	0.91	-----	-----	-----	-----	-----	-----	-----	-----	0.91
25.10	0.00	6.85	0.88	-----	-----	-----	-----	-----	-----	-----	-----	0.88
25.20	0.00	6.84	0.86	-----	-----	-----	-----	-----	-----	-----	-----	0.86
25.30	0.00	6.83	0.83	-----	-----	-----	-----	-----	-----	-----	-----	0.83
25.40	0.00	6.82	0.81	-----	-----	-----	-----	-----	-----	-----	-----	0.81
25.50	0.00	6.82	0.78	-----	-----	-----	-----	-----	-----	-----	-----	0.78
25.60	0.00	6.81	0.76	-----	-----	-----	-----	-----	-----	-----	-----	0.76
25.70	0.00	6.80	0.74	-----	-----	-----	-----	-----	-----	-----	-----	0.74
25.80	0.00	6.80	0.72	-----	-----	-----	-----	-----	-----	-----	-----	0.72

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
31.00	0.00	6.65	0.17	-----	-----	-----	-----	-----	-----	-----	-----	0.17
31.10	0.00	6.65	0.17	-----	-----	-----	-----	-----	-----	-----	-----	0.17
31.20	0.00	6.64	0.16	-----	-----	-----	-----	-----	-----	-----	-----	0.16
31.30	0.00	6.64	0.16	-----	-----	-----	-----	-----	-----	-----	-----	0.16
31.40	0.00	6.64	0.16	-----	-----	-----	-----	-----	-----	-----	-----	0.16
31.50	0.00	6.64	0.16	-----	-----	-----	-----	-----	-----	-----	-----	0.16
31.60	0.00	6.64	0.16	-----	-----	-----	-----	-----	-----	-----	-----	0.16
31.70	0.00	6.64	0.15	-----	-----	-----	-----	-----	-----	-----	-----	0.15
31.80	0.00	6.64	0.15	-----	-----	-----	-----	-----	-----	-----	-----	0.15
31.90	0.00	6.64	0.15	-----	-----	-----	-----	-----	-----	-----	-----	0.15
32.00	0.00	6.63	0.15	-----	-----	-----	-----	-----	-----	-----	-----	0.15
32.10	0.00	6.63	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
32.20	0.00	6.63	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
32.30	0.00	6.63	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
32.40	0.00	6.63	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
32.50	0.00	6.63	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
32.60	0.00	6.63	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
32.70	0.00	6.63	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
32.80	0.00	6.63	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
32.90	0.00	6.62	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
33.00	0.00	6.62	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
33.10	0.00	6.62	0.12	-----	-----	-----	-----	-----	-----	-----	-----	0.12
33.20	0.00	6.62	0.12	-----	-----	-----	-----	-----	-----	-----	-----	0.12
33.30	0.00	6.62	0.12	-----	-----	-----	-----	-----	-----	-----	-----	0.12
33.40	0.00	6.62	0.12	-----	-----	-----	-----	-----	-----	-----	-----	0.12
33.50	0.00	6.62	0.12	-----	-----	-----	-----	-----	-----	-----	-----	0.12
33.60	0.00	6.62	0.12	-----	-----	-----	-----	-----	-----	-----	-----	0.12
33.70	0.00	6.62	0.11	-----	-----	-----	-----	-----	-----	-----	-----	0.11
33.80	0.00	6.61	0.11	-----	-----	-----	-----	-----	-----	-----	-----	0.11
33.90	0.00	6.61	0.11	-----	-----	-----	-----	-----	-----	-----	-----	0.11
34.00	0.00	6.61	0.11	-----	-----	-----	-----	-----	-----	-----	-----	0.11
34.10	0.00	6.61	0.11	-----	-----	-----	-----	-----	-----	-----	-----	0.11
34.20	0.00	6.61	0.11	-----	-----	-----	-----	-----	-----	-----	-----	0.11
34.30	0.00	6.61	0.10	-----	-----	-----	-----	-----	-----	-----	-----	0.10
34.40	0.00	6.61	0.10	-----	-----	-----	-----	-----	-----	-----	-----	0.10
34.50	0.00	6.61	0.10	-----	-----	-----	-----	-----	-----	-----	-----	0.10
34.60	0.00	6.61	0.10	-----	-----	-----	-----	-----	-----	-----	-----	0.10
34.70	0.00	6.61	0.10	-----	-----	-----	-----	-----	-----	-----	-----	0.10
34.80	0.00	6.61	0.10	-----	-----	-----	-----	-----	-----	-----	-----	0.10
34.90	0.00	6.61	0.10	-----	-----	-----	-----	-----	-----	-----	-----	0.10
35.00	0.00	6.60	0.09	-----	-----	-----	-----	-----	-----	-----	-----	0.09
35.10	0.00	6.60	0.09	-----	-----	-----	-----	-----	-----	-----	-----	0.09
35.20	0.00	6.60	0.09	-----	-----	-----	-----	-----	-----	-----	-----	0.09
35.30	0.00	6.60	0.09	-----	-----	-----	-----	-----	-----	-----	-----	0.09
35.40	0.00	6.60	0.09	-----	-----	-----	-----	-----	-----	-----	-----	0.09
35.50	0.00	6.60	0.09	-----	-----	-----	-----	-----	-----	-----	-----	0.09
35.60	0.00	6.60	0.09	-----	-----	-----	-----	-----	-----	-----	-----	0.09
35.70	0.00	6.60	0.09	-----	-----	-----	-----	-----	-----	-----	-----	0.09
35.80	0.00	6.60	0.08	-----	-----	-----	-----	-----	-----	-----	-----	0.08
35.90	0.00	6.60	0.08	-----	-----	-----	-----	-----	-----	-----	-----	0.08
36.00	0.00	6.60	0.08	-----	-----	-----	-----	-----	-----	-----	-----	0.08

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Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 3 - TEMP SEDIMENT BASIN

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	11.50	4,185	0	0
0.50	12.00	6,540	2,681	2,681
2.50	14.00	16,750	23,290	25,971
4.70	16.20	12,000	31,625	57,596

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 15.0	0.0	0.0	0.0
Span in	= 15.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 11.50	0.00	0.00	0.00
Length ft	= 34.0	0.0	0.0	0.0
Slope %	= 0.20	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
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.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	11.50	0.00	---	---	---	---	---	---	---	---	0.00
0.50	2,681	12.00	0.62	---	---	---	---	---	---	---	---	0.62
2.50	25,971	14.00	7.48	---	---	---	---	---	---	---	---	7.48
4.70	57,596	16.20	11.93	---	---	---	---	---	---	---	---	11.93

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 9

ROUTE 2

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Inflow hyd. No. = 5
Max. Elevation = 12.29 ft

Peak discharge = 1.19 cfs
Time interval = 6 min
Reservoir name = TEMP SEDIMENT BAS
Max. Storage = 6,039 cuft

Storage Indication method used.

Outflow hydrograph volume = 18,177 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
11.90	1.42	11.60	0.04	-----	-----	-----	-----	-----	-----	-----	-----	0.04
12.00	2.76	11.73	0.18	-----	-----	-----	-----	-----	-----	-----	-----	0.18
12.10	3.87	11.93	0.50	-----	-----	-----	-----	-----	-----	-----	-----	0.50
12.20	4.10 <<	12.07	0.77	-----	-----	-----	-----	-----	-----	-----	-----	0.77
12.30	3.51	12.16	0.96	-----	-----	-----	-----	-----	-----	-----	-----	0.96
12.40	2.83	12.23	1.09	-----	-----	-----	-----	-----	-----	-----	-----	1.09
12.50	2.09	12.27	1.16	-----	-----	-----	-----	-----	-----	-----	-----	1.16
12.60	1.39	12.29	1.19	-----	-----	-----	-----	-----	-----	-----	-----	1.19
12.70	0.98	12.29	1.19	-----	-----	-----	-----	-----	-----	-----	-----	1.19 <<
12.80	0.86	12.28	1.17	-----	-----	-----	-----	-----	-----	-----	-----	1.17
12.90	0.77	12.27	1.16	-----	-----	-----	-----	-----	-----	-----	-----	1.16
13.00	0.70	12.26	1.13	-----	-----	-----	-----	-----	-----	-----	-----	1.13
13.10	0.64	12.24	1.11	-----	-----	-----	-----	-----	-----	-----	-----	1.11
13.20	0.60	12.23	1.09	-----	-----	-----	-----	-----	-----	-----	-----	1.09
13.30	0.57	12.21	1.06	-----	-----	-----	-----	-----	-----	-----	-----	1.06
13.40	0.54	12.20	1.03	-----	-----	-----	-----	-----	-----	-----	-----	1.03
13.50	0.51	12.18	1.00	-----	-----	-----	-----	-----	-----	-----	-----	1.00
13.60	0.49	12.17	0.97	-----	-----	-----	-----	-----	-----	-----	-----	0.97
13.70	0.46	12.15	0.94	-----	-----	-----	-----	-----	-----	-----	-----	0.94
13.80	0.44	12.14	0.91	-----	-----	-----	-----	-----	-----	-----	-----	0.91
13.90	0.42	12.12	0.88	-----	-----	-----	-----	-----	-----	-----	-----	0.88
14.00	0.40	12.11	0.85	-----	-----	-----	-----	-----	-----	-----	-----	0.85
14.10	0.39	12.10	0.82	-----	-----	-----	-----	-----	-----	-----	-----	0.82
14.20	0.37	12.08	0.79	-----	-----	-----	-----	-----	-----	-----	-----	0.79
14.30	0.36	12.07	0.77	-----	-----	-----	-----	-----	-----	-----	-----	0.77
14.40	0.35	12.06	0.74	-----	-----	-----	-----	-----	-----	-----	-----	0.74
14.50	0.34	12.05	0.71	-----	-----	-----	-----	-----	-----	-----	-----	0.71
14.60	0.33	12.03	0.69	-----	-----	-----	-----	-----	-----	-----	-----	0.69
14.70	0.33	12.02	0.67	-----	-----	-----	-----	-----	-----	-----	-----	0.67
14.80	0.32	12.01	0.65	-----	-----	-----	-----	-----	-----	-----	-----	0.65
14.90	0.32	12.00	0.63	-----	-----	-----	-----	-----	-----	-----	-----	0.63
15.00	0.31	11.99	0.60	-----	-----	-----	-----	-----	-----	-----	-----	0.60
15.10	0.31	11.97	0.57	-----	-----	-----	-----	-----	-----	-----	-----	0.57
15.20	0.30	11.95	0.54	-----	-----	-----	-----	-----	-----	-----	-----	0.54
15.30	0.29	11.94	0.51	-----	-----	-----	-----	-----	-----	-----	-----	0.51
15.40	0.29	11.92	0.49	-----	-----	-----	-----	-----	-----	-----	-----	0.49
15.50	0.28	11.91	0.47	-----	-----	-----	-----	-----	-----	-----	-----	0.47
15.60	0.27	11.90	0.45	-----	-----	-----	-----	-----	-----	-----	-----	0.45

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
20.80	0.13	11.71	0.15	-----	-----	-----	-----	-----	-----	-----	-----	0.15
20.90	0.13	11.71	0.15	-----	-----	-----	-----	-----	-----	-----	-----	0.15
21.00	0.13	11.71	0.15	-----	-----	-----	-----	-----	-----	-----	-----	0.15
21.10	0.13	11.71	0.15	-----	-----	-----	-----	-----	-----	-----	-----	0.15
21.20	0.13	11.71	0.15	-----	-----	-----	-----	-----	-----	-----	-----	0.15
21.30	0.13	11.71	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
21.40	0.13	11.71	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
21.50	0.13	11.71	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
21.60	0.13	11.71	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
21.70	0.13	11.71	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
21.80	0.13	11.71	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
21.90	0.13	11.71	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
22.00	0.13	11.71	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
22.10	0.13	11.70	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
22.20	0.13	11.70	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
22.30	0.13	11.70	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
22.40	0.13	11.70	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
22.50	0.13	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
22.60	0.13	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
22.70	0.13	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
22.80	0.13	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
22.90	0.13	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
23.00	0.13	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
23.10	0.13	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
23.20	0.12	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
23.30	0.12	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
23.40	0.12	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
23.50	0.12	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
23.60	0.12	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
23.70	0.12	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
23.80	0.12	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
23.90	0.12	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
24.00	0.12	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
24.10	0.11	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
24.20	0.09	11.69	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
24.30	0.06	11.69	0.12	-----	-----	-----	-----	-----	-----	-----	-----	0.12
24.40	0.04	11.69	0.12	-----	-----	-----	-----	-----	-----	-----	-----	0.12
24.50	0.02	11.68	0.11	-----	-----	-----	-----	-----	-----	-----	-----	0.11
24.60	0.01	11.67	0.11	-----	-----	-----	-----	-----	-----	-----	-----	0.11
24.70	0.00	11.67	0.10	-----	-----	-----	-----	-----	-----	-----	-----	0.10
24.80	0.00	11.66	0.10	-----	-----	-----	-----	-----	-----	-----	-----	0.10
24.90	0.00	11.65	0.09	-----	-----	-----	-----	-----	-----	-----	-----	0.09
25.00	0.00	11.65	0.09	-----	-----	-----	-----	-----	-----	-----	-----	0.09
25.10	0.00	11.64	0.08	-----	-----	-----	-----	-----	-----	-----	-----	0.08
25.20	0.00	11.64	0.08	-----	-----	-----	-----	-----	-----	-----	-----	0.08
25.30	0.00	11.63	0.07	-----	-----	-----	-----	-----	-----	-----	-----	0.07
25.40	0.00	11.63	0.07	-----	-----	-----	-----	-----	-----	-----	-----	0.07
25.50	0.00	11.62	0.06	-----	-----	-----	-----	-----	-----	-----	-----	0.06
25.60	0.00	11.62	0.06	-----	-----	-----	-----	-----	-----	-----	-----	0.06
25.70	0.00	11.61	0.05	-----	-----	-----	-----	-----	-----	-----	-----	0.05
25.80	0.00	11.61	0.05	-----	-----	-----	-----	-----	-----	-----	-----	0.05

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Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	12.02	6	738	62,855	----	------	------	AREA 1 EXISTING
2	SCS Runoff	4.40	6	744	25,838	----	------	------	AREA 3A EXISTING
3	SCS Runoff	3.35	6	744	19,637	----	------	------	AREA 3B EXISTING
4	SCS Runoff	31.23	6	756	242,761	----	------	------	AREA 2 EXISTING
5	SCS Runoff	9.44	6	732	39,325	----	------	------	AREA 1 PROPOSED
6	SCS Runoff	84.33	6	732	350,255	----	------	------	AREA 2 PROPOSED
7	SCS Runoff	3.48	6	732	14,520	----	------	------	AREA 3 PROPOSED
8	Reservoir	13.65	6	774	350,212	6	8.89	158,835	ROUTE 1
9	Reservoir	3.63	6	750	39,325	5	12.99	14,253	ROUTE 2
10	Combine	7.75	6	744	45,474	2, 3,	------	------	Area 3A+3B

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

AREA 1 EXISTING

Hydrograph type	= SCS Runoff	Peak discharge	= 12.02 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Drainage area	= 11.50 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 39.1 min
Total precip.	= 4.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 62,855 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
11.20	0.15	14.60	1.10	18.00	0.61	21.40	0.41
11.30	0.21	14.70	1.08	18.10	0.60	21.50	0.41
11.40	0.27	14.80	1.05	18.20	0.60	21.60	0.41
11.50	0.35	14.90	1.03	18.30	0.59	21.70	0.41
11.60	0.50	15.00	1.01	18.40	0.58	21.80	0.41
11.70	0.86	15.10	0.99	18.50	0.58	21.90	0.41
11.80	1.68	15.20	0.97	18.60	0.57	22.00	0.40
11.90	3.69	15.30	0.95	18.70	0.56	22.10	0.40
12.00	6.62	15.40	0.93	18.80	0.55	22.20	0.40
12.10	9.41	15.50	0.92	18.90	0.55	22.30	0.40
12.20	11.60	15.60	0.90	19.00	0.54	22.40	0.40
12.30	12.02 <<	15.70	0.88	19.10	0.53	22.50	0.40
12.40	10.94	15.80	0.86	19.20	0.52	22.60	0.40
12.50	9.65	15.90	0.83	19.30	0.51	22.70	0.39
12.60	8.16	16.00	0.81	19.40	0.51	22.80	0.39
12.70	6.55	16.10	0.79	19.50	0.50	22.90	0.39
12.80	4.94	16.20	0.78	19.60	0.49	23.00	0.39
12.90	3.51	16.30	0.76	19.70	0.48	23.10	0.39
13.00	2.71	16.40	0.74	19.80	0.48	23.20	0.39
13.10	2.43	16.50	0.73	19.90	0.47	23.30	0.39
13.20	2.20	16.60	0.72	20.00	0.46	23.40	0.38
13.30	2.03	16.70	0.71	20.10	0.45	23.50	0.38
13.40	1.89	16.80	0.70	20.20	0.45	23.60	0.38
13.50	1.78	16.90	0.69	20.30	0.44	23.70	0.38
13.60	1.68	17.00	0.68	20.40	0.43	23.80	0.38
13.70	1.60	17.10	0.68	20.50	0.43	23.90	0.38
13.80	1.52	17.20	0.67	20.60	0.43	24.00	0.38
13.90	1.45	17.30	0.66	20.70	0.42	24.10	0.36
14.00	1.38	17.40	0.66	20.80	0.42	24.20	0.32
14.10	1.32	17.50	0.65	20.90	0.42	24.30	0.27
14.20	1.26	17.60	0.64	21.00	0.42	24.40	0.20
14.30	1.21	17.70	0.63	21.10	0.42	24.50	0.14
14.40	1.17	17.80	0.63	21.20	0.42		
14.50	1.13	17.90	0.62	21.30	0.41		

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 4

AREA 2 EXISTING

Hydrograph type	= SCS Runoff	Peak discharge	= 31.23 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Drainage area	= 45.00 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 61.7 min
Total precip.	= 4.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 242,761 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)
11.30	0.36	14.70	4.74	18.10	2.44	21.50	1.61
11.40	0.50	14.80	4.58	18.20	2.41	21.60	1.60
11.50	0.67	14.90	4.44	18.30	2.38	21.70	1.60
11.60	0.94	15.00	4.31	18.40	2.35	21.80	1.59
11.70	1.50	15.10	4.19	18.50	2.33	21.90	1.59
11.80	2.68	15.20	4.09	18.60	2.30	22.00	1.58
11.90	5.43	15.30	3.99	18.70	2.27	22.10	1.58
12.00	9.48	15.40	3.90	18.80	2.24	22.20	1.57
12.10	13.76	15.50	3.82	18.90	2.21	22.30	1.56
12.20	18.23	15.60	3.74	19.00	2.18	22.40	1.56
12.30	22.72	15.70	3.66	19.10	2.15	22.50	1.55
12.40	26.94	15.80	3.58	19.20	2.12	22.60	1.55
12.50	30.28	15.90	3.51	19.30	2.10	22.70	1.54
12.60	31.23 <<	16.00	3.43	19.40	2.07	22.80	1.54
12.70	30.17	16.10	3.35	19.50	2.04	22.90	1.53
12.80	28.79	16.20	3.28	19.60	2.01	23.00	1.53
12.90	27.11	16.30	3.20	19.70	1.98	23.10	1.52
13.00	25.19	16.40	3.13	19.80	1.95	23.20	1.52
13.10	23.08	16.50	3.06	19.90	1.92	23.30	1.51
13.20	20.83	16.60	3.00	20.00	1.89	23.40	1.50
13.30	18.47	16.70	2.94	20.10	1.86	23.50	1.50
13.40	16.02	16.80	2.88	20.20	1.83	23.60	1.49
13.50	13.53	16.90	2.83	20.30	1.80	23.70	1.49
13.60	11.12	17.00	2.79	20.40	1.77	23.80	1.48
13.70	9.00	17.10	2.74	20.50	1.75	23.90	1.48
13.80	7.72	17.20	2.71	20.60	1.73	24.00	1.47
13.90	7.14	17.30	2.67	20.70	1.70	24.10	1.44
14.00	6.66	17.40	2.64	20.80	1.69	24.20	1.40
14.10	6.26	17.50	2.61	20.90	1.67	24.30	1.33
14.20	5.91	17.60	2.58	21.00	1.66	24.40	1.24
14.30	5.62	17.70	2.55	21.10	1.64	24.50	1.12
14.40	5.37	17.80	2.52	21.20	1.63	24.60	0.99
14.50	5.13	17.90	2.49	21.30	1.62	24.70	0.84
14.60	4.93	18.00	2.47	21.40	1.62	24.80	0.70

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Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

AREA 3A EXISTING

Hydrograph type	= SCS Runoff	Peak discharge	= 4.40 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Drainage area	= 5.00 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 43.8 min
Total precip.	= 4.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 25,838 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
11.20	0.05	14.60	0.47	18.00	0.25	21.40	0.17
11.30	0.07	14.70	0.46	18.10	0.25	21.50	0.17
11.40	0.09	14.80	0.44	18.20	0.25	21.60	0.17
11.50	0.12	14.90	0.43	18.30	0.25	21.70	0.17
11.60	0.17	15.00	0.42	18.40	0.24	21.80	0.17
11.70	0.27	15.10	0.42	18.50	0.24	21.90	0.17
11.80	0.51	15.20	0.41	18.60	0.24	22.00	0.17
11.90	1.09	15.30	0.40	18.70	0.23	22.10	0.17
12.00	1.94	15.40	0.39	18.80	0.23	22.20	0.17
12.10	2.81	15.50	0.38	18.90	0.23	22.30	0.16
12.20	3.64	15.60	0.38	19.00	0.22	22.40	0.16
12.30	4.28	15.70	0.37	19.10	0.22	22.50	0.16
12.40	4.40 <<	15.80	0.36	19.20	0.22	22.60	0.16
12.50	4.08	15.90	0.35	19.30	0.21	22.70	0.16
12.60	3.70	16.00	0.34	19.40	0.21	22.80	0.16
12.70	3.25	16.10	0.33	19.50	0.21	22.90	0.16
12.80	2.76	16.20	0.33	19.60	0.21	23.00	0.16
12.90	2.24	16.30	0.32	19.70	0.20	23.10	0.16
13.00	1.73	16.40	0.31	19.80	0.20	23.20	0.16
13.10	1.28	16.50	0.31	19.90	0.20	23.30	0.16
13.20	1.02	16.60	0.30	20.00	0.19	23.40	0.16
13.30	0.93	16.70	0.30	20.10	0.19	23.50	0.16
13.40	0.85	16.80	0.29	20.20	0.19	23.60	0.16
13.50	0.79	16.90	0.29	20.30	0.18	23.70	0.16
13.60	0.74	17.00	0.28	20.40	0.18	23.80	0.16
13.70	0.70	17.10	0.28	20.50	0.18	23.90	0.16
13.80	0.66	17.20	0.28	20.60	0.18	24.00	0.15
13.90	0.63	17.30	0.28	20.70	0.18	24.10	0.15
14.00	0.60	17.40	0.27	20.80	0.17	24.20	0.14
14.10	0.57	17.50	0.27	20.90	0.17	24.30	0.13
14.20	0.54	17.60	0.27	21.00	0.17	24.40	0.11
14.30	0.52	17.70	0.26	21.10	0.17	24.50	0.08
14.40	0.50	17.80	0.26	21.20	0.17	24.60	0.06
14.50	0.48	17.90	0.26	21.30	0.17	24.70	0.04

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Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

AREA 3B EXISTING

Hydrograph type	= SCS Runoff	Peak discharge	= 3.35 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Drainage area	= 3.80 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 45.1 min
Total precip.	= 4.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 19,637 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)	Time (hrs)	Outflow cfs)
11.20	0.04	14.60	0.36	18.00	0.19	21.40	0.13
11.30	0.05	14.70	0.35	18.10	0.19	21.50	0.13
11.40	0.07	14.80	0.34	18.20	0.19	21.60	0.13
11.50	0.09	14.90	0.33	18.30	0.19	21.70	0.13
11.60	0.13	15.00	0.32	18.40	0.18	21.80	0.13
11.70	0.21	15.10	0.32	18.50	0.18	21.90	0.13
11.80	0.39	15.20	0.31	18.60	0.18	22.00	0.13
11.90	0.83	15.30	0.30	18.70	0.18	22.10	0.13
12.00	1.47	15.40	0.30	18.80	0.18	22.20	0.13
12.10	2.14	15.50	0.29	18.90	0.17	22.30	0.13
12.20	2.76	15.60	0.29	19.00	0.17	22.40	0.12
12.30	3.25	15.70	0.28	19.10	0.17	22.50	0.12
12.40	3.35 <<	15.80	0.27	19.20	0.17	22.60	0.12
12.50	3.10	15.90	0.27	19.30	0.16	22.70	0.12
12.60	2.81	16.00	0.26	19.40	0.16	22.80	0.12
12.70	2.47	16.10	0.25	19.50	0.16	22.90	0.12
12.80	2.10	16.20	0.25	19.60	0.16	23.00	0.12
12.90	1.70	16.30	0.24	19.70	0.15	23.10	0.12
13.00	1.32	16.40	0.24	19.80	0.15	23.20	0.12
13.10	0.97	16.50	0.23	19.90	0.15	23.30	0.12
13.20	0.78	16.60	0.23	20.00	0.15	23.40	0.12
13.30	0.71	16.70	0.22	20.10	0.14	23.50	0.12
13.40	0.65	16.80	0.22	20.20	0.14	23.60	0.12
13.50	0.60	16.90	0.22	20.30	0.14	23.70	0.12
13.60	0.56	17.00	0.22	20.40	0.14	23.80	0.12
13.70	0.53	17.10	0.21	20.50	0.14	23.90	0.12
13.80	0.50	17.20	0.21	20.60	0.13	24.00	0.12
13.90	0.48	17.30	0.21	20.70	0.13	24.10	0.11
14.00	0.45	17.40	0.21	20.80	0.13	24.20	0.11
14.10	0.43	17.50	0.20	20.90	0.13	24.30	0.10
14.20	0.41	17.60	0.20	21.00	0.13	24.40	0.08
14.30	0.40	17.70	0.20	21.10	0.13	24.50	0.06
14.40	0.38	17.80	0.20	21.20	0.13	24.60	0.05
14.50	0.37	17.90	0.20	21.30	0.13	24.70	0.03

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Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 10

Area 3A+3B

Hydrograph type	= Combine	Peak discharge	= 7.75 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Inflow hyds.	= 2, 3		

Hydrograph Volume = 45,474 cuft

Hydrograph Discharge Table

Time (hrs)	Hyd. 2 + (cfs)	Hyd. 3 + (cfs)	Outflow (cfs)
11.20	0.05	0.04	0.09
11.30	0.07	0.05	0.12
11.40	0.09	0.07	0.16
11.50	0.12	0.09	0.21
11.60	0.17	0.13	0.29
11.70	0.27	0.21	0.48
11.80	0.51	0.39	0.90
11.90	1.09	0.83	1.91
12.00	1.94	1.47	3.41
12.10	2.81	2.14	4.95
12.20	3.64	2.76	6.40
12.30	4.28	3.25	7.53
12.40	4.40 <<	3.35 <<	7.75 <<
12.50	4.08	3.10	7.19
12.60	3.70	2.81	6.51
12.70	3.25	2.47	5.73
12.80	2.76	2.10	4.86
12.90	2.24	1.70	3.95
13.00	1.73	1.32	3.05
13.10	1.28	0.97	2.26
13.20	1.02	0.78	1.80
13.30	0.93	0.71	1.63
13.40	0.85	0.65	1.50
13.50	0.79	0.60	1.38
13.60	0.74	0.56	1.30
13.70	0.70	0.53	1.22
13.80	0.66	0.50	1.16
13.90	0.63	0.48	1.10
14.00	0.60	0.45	1.05
14.10	0.57	0.43	1.00
14.20	0.54	0.41	0.96
14.30	0.52	0.40	0.92
14.40	0.50	0.38	0.88
14.50	0.48	0.37	0.85
14.60	0.47	0.36	0.82
14.70	0.46	0.35	0.80
14.80	0.44	0.34	0.78
14.90	0.43	0.33	0.76

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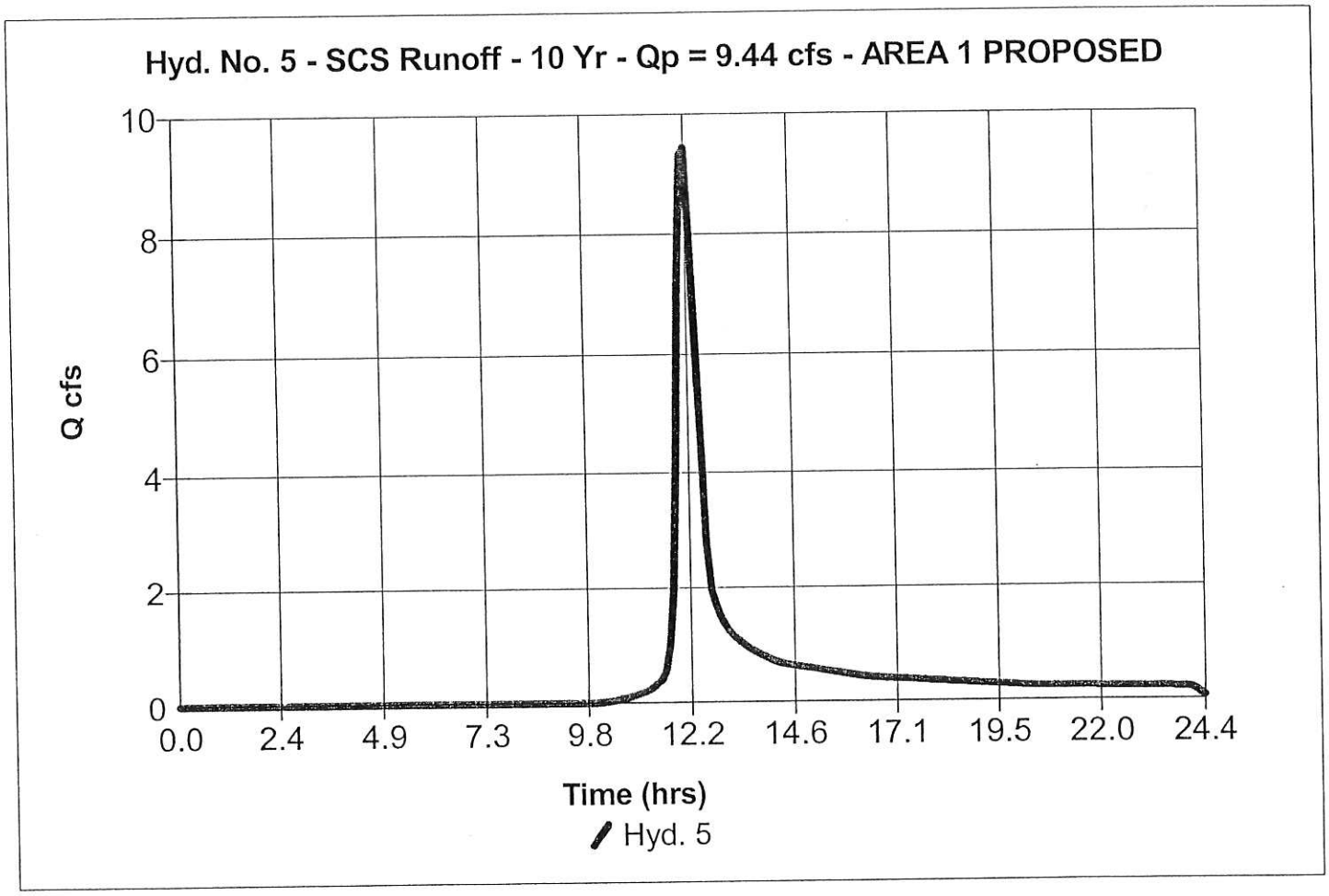
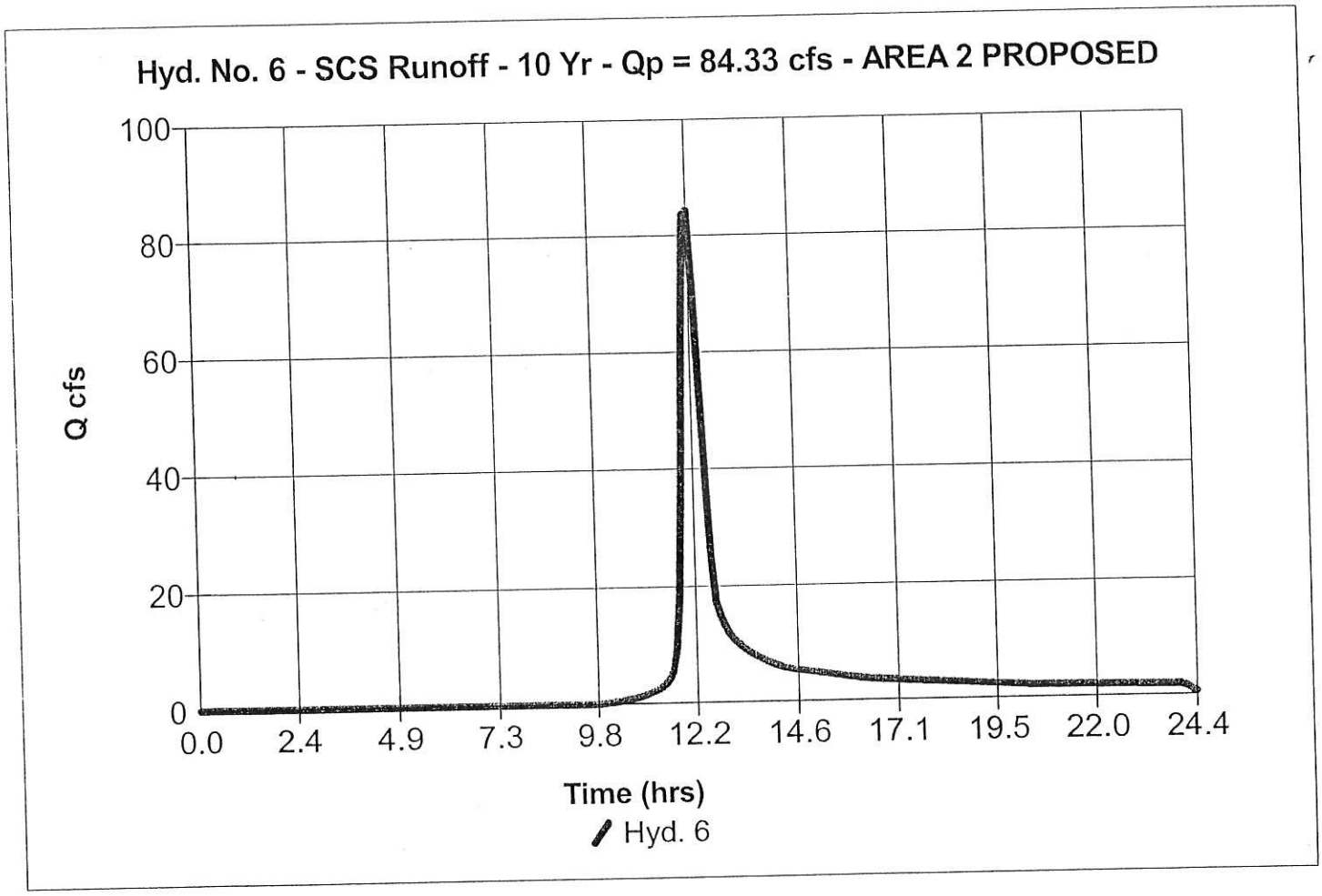
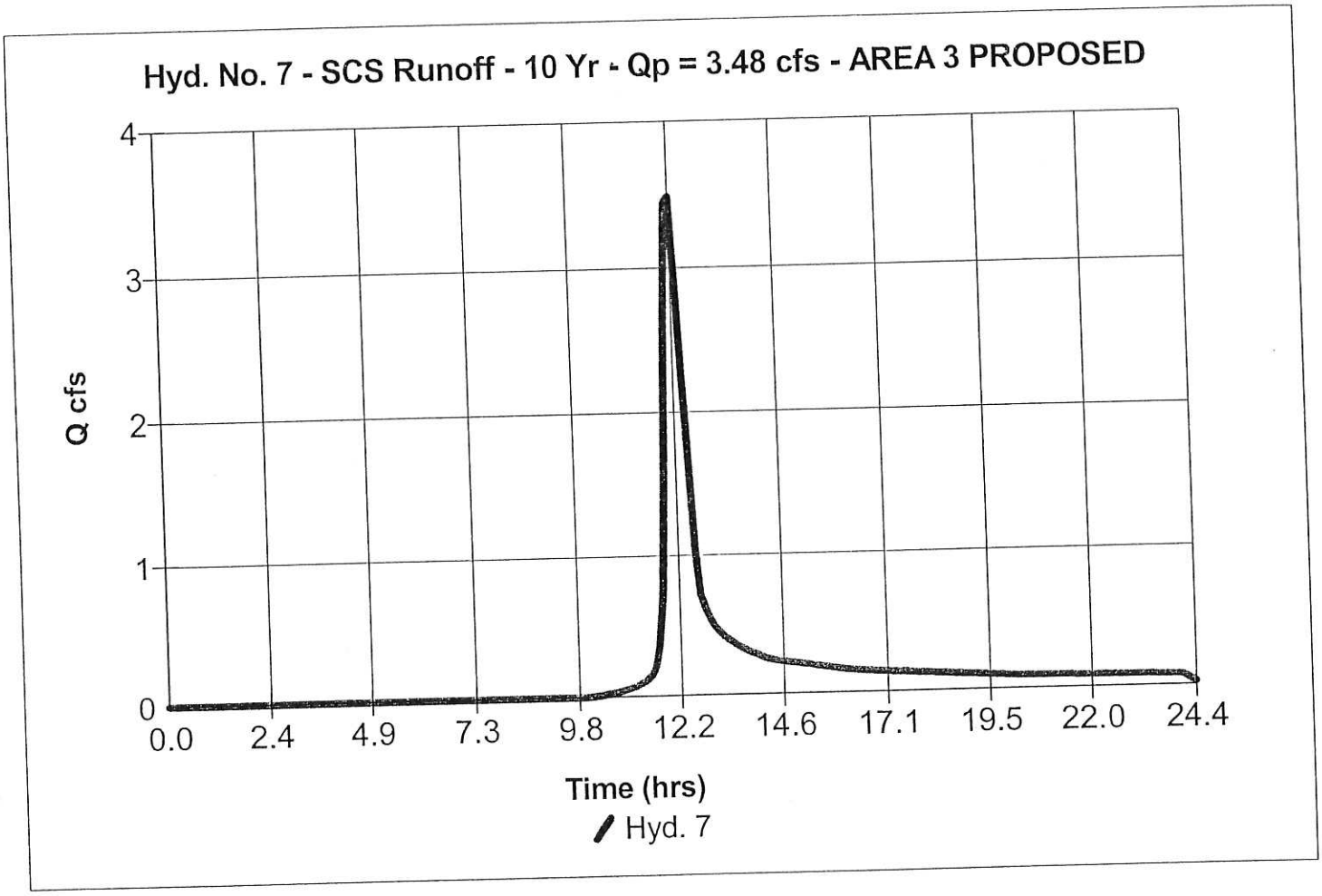
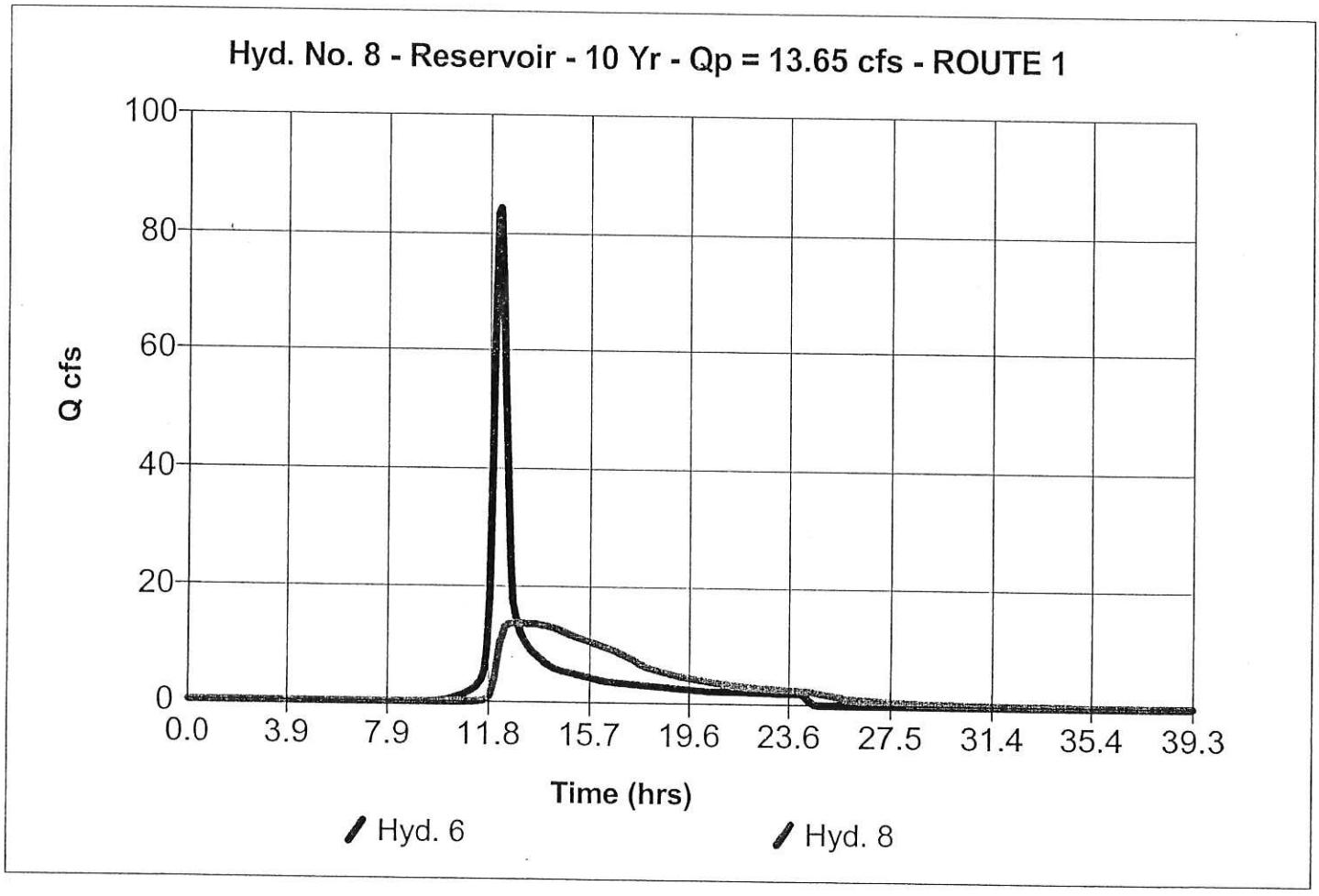
DEVELOPED CONDITIONS

10-YEAR STORM


Hyd. No. 5 - SCS Runoff - 10 Yr - Qp = 9.44 cfs - AREA 1 PROPOSED
Q cfs
10
8
6
4
2
0
0.0
2.4
4.9
7.3
9.8
12.2
14.6
17.1
19.5
22.0
24.4
Time (hrs)
Hyd. 5


Hyd. No. 6 - SCS Runoff - 10 Yr - Qp = 84.33 cfs - AREA 2 PROPOSED
Q cfs
100
80
60
40
20
0
0.0
2.4
4.9
7.3
9.8
12.2
14.6
17.1
19.5
22.0
24.4
Time (hrs)
Hyd. 6


Hyd. No. 7 - SCS Runoff - 10 Yr - Qp = 3.48 cfs - AREA 3 PROPOSED
Q cfs
0
1
2
3
4
0.0
2.4
4.9
7.3
9.8
12.2
14.6
17.1
19.5
22.0
24.4
Time (hrs)
Hyd. 7


Hyd. No. 8 - Reservoir - 10 Yr - Qp = 13.65 cfs - ROUTE 1
Q cfs
100
80
60
40
20
0
0.0
3.9
7.9
11.8
15.7
19.6
23.6
27.5
31.4
35.4
39.3
Time (hrs)
Hyd. 6
Hyd. 8

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
15.20	4.94	8.37	11.36	-----	-----	-----	-----	-----	-----	-----	-----	11.36
15.30	4.83	8.35	11.21	-----	-----	-----	-----	-----	-----	-----	-----	11.21
15.40	4.73	8.32	11.06	-----	-----	-----	-----	-----	-----	-----	-----	11.06
15.50	4.62	8.30	10.92	-----	-----	-----	-----	-----	-----	-----	-----	10.92
15.60	4.52	8.27	10.77	-----	-----	-----	-----	-----	-----	-----	-----	10.77
15.70	4.41	8.25	10.63	-----	-----	-----	-----	-----	-----	-----	-----	10.63
15.80	4.30	8.22	10.49	-----	-----	-----	-----	-----	-----	-----	-----	10.49
15.90	4.20	8.20	10.34	-----	-----	-----	-----	-----	-----	-----	-----	10.34
16.00	4.09	8.17	10.18	-----	-----	-----	-----	-----	-----	-----	-----	10.18
16.10	3.98	8.15	10.02	-----	-----	-----	-----	-----	-----	-----	-----	10.02
16.20	3.89	8.12	9.86	-----	-----	-----	-----	-----	-----	-----	-----	9.86
16.30	3.80	8.10	9.70	-----	-----	-----	-----	-----	-----	-----	-----	9.70
16.40	3.74	8.08	9.54	-----	-----	-----	-----	-----	-----	-----	-----	9.54
16.50	3.69	8.05	9.39	-----	-----	-----	-----	-----	-----	-----	-----	9.39
16.60	3.64	8.03	9.24	-----	-----	-----	-----	-----	-----	-----	-----	9.24
16.70	3.60	8.01	9.09	-----	-----	-----	-----	-----	-----	-----	-----	9.09
16.80	3.57	7.98	8.89	-----	-----	-----	-----	-----	-----	-----	-----	8.89
16.90	3.53	7.95	8.66	-----	-----	-----	-----	-----	-----	-----	-----	8.66
17.00	3.49	7.91	8.44	-----	-----	-----	-----	-----	-----	-----	-----	8.44
17.10	3.45	7.88	8.22	-----	-----	-----	-----	-----	-----	-----	-----	8.22
17.20	3.42	7.86	8.01	-----	-----	-----	-----	-----	-----	-----	-----	8.01
17.30	3.38	7.83	7.81	-----	-----	-----	-----	-----	-----	-----	-----	7.81
17.40	3.34	7.80	7.61	-----	-----	-----	-----	-----	-----	-----	-----	7.61
17.50	3.30	7.77	7.33	-----	-----	-----	-----	-----	-----	-----	-----	7.33
17.60	3.26	7.75	7.06	-----	-----	-----	-----	-----	-----	-----	-----	7.06
17.70	3.23	7.73	6.81	-----	-----	-----	-----	-----	-----	-----	-----	6.81
17.80	3.19	7.71	6.57	-----	-----	-----	-----	-----	-----	-----	-----	6.57
17.90	3.15	7.69	6.40	-----	-----	-----	-----	-----	-----	-----	-----	6.40
18.00	3.11	7.67	6.25	-----	-----	-----	-----	-----	-----	-----	-----	6.25
18.10	3.07	7.65	6.11	-----	-----	-----	-----	-----	-----	-----	-----	6.11
18.20	3.03	7.63	5.98	-----	-----	-----	-----	-----	-----	-----	-----	5.98
18.30	2.99	7.61	5.85	-----	-----	-----	-----	-----	-----	-----	-----	5.85
18.40	2.95	7.59	5.72	-----	-----	-----	-----	-----	-----	-----	-----	5.72
18.50	2.92	7.58	5.60	-----	-----	-----	-----	-----	-----	-----	-----	5.60
18.60	2.88	7.56	5.48	-----	-----	-----	-----	-----	-----	-----	-----	5.48
18.70	2.84	7.54	5.37	-----	-----	-----	-----	-----	-----	-----	-----	5.37
18.80	2.80	7.53	5.26	-----	-----	-----	-----	-----	-----	-----	-----	5.26
18.90	2.76	7.51	5.15	-----	-----	-----	-----	-----	-----	-----	-----	5.15
19.00	2.72	7.50	5.05	-----	-----	-----	-----	-----	-----	-----	-----	5.05
19.10	2.68	7.48	4.95	-----	-----	-----	-----	-----	-----	-----	-----	4.95
19.20	2.64	7.47	4.85	-----	-----	-----	-----	-----	-----	-----	-----	4.85
19.30	2.60	7.46	4.76	-----	-----	-----	-----	-----	-----	-----	-----	4.76
19.40	2.56	7.44	4.67	-----	-----	-----	-----	-----	-----	-----	-----	4.67
19.50	2.52	7.43	4.58	-----	-----	-----	-----	-----	-----	-----	-----	4.58
19.60	2.48	7.42	4.49	-----	-----	-----	-----	-----	-----	-----	-----	4.49
19.70	2.44	7.41	4.41	-----	-----	-----	-----	-----	-----	-----	-----	4.41
19.80	2.40	7.39	4.32	-----	-----	-----	-----	-----	-----	-----	-----	4.32
19.90	2.36	7.38	4.25	-----	-----	-----	-----	-----	-----	-----	-----	4.25
20.00	2.32	7.37	4.17	-----	-----	-----	-----	-----	-----	-----	-----	4.17
20.10	2.28	7.36	4.09	-----	-----	-----	-----	-----	-----	-----	-----	4.09
20.20	2.24	7.35	4.02	-----	-----	-----	-----	-----	-----	-----	-----	4.02

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
25.40	0.00	6.95	1.47	-----	-----	-----	-----	-----	-----	-----	-----	1.47
25.50	0.00	6.94	1.38	-----	-----	-----	-----	-----	-----	-----	-----	1.38
25.60	0.00	6.92	1.29	-----	-----	-----	-----	-----	-----	-----	-----	1.29
25.70	0.00	6.91	1.21	-----	-----	-----	-----	-----	-----	-----	-----	1.21
25.80	0.00	6.90	1.13	-----	-----	-----	-----	-----	-----	-----	-----	1.13
25.90	0.00	6.89	1.08	-----	-----	-----	-----	-----	-----	-----	-----	1.08
26.00	0.00	6.89	1.04	-----	-----	-----	-----	-----	-----	-----	-----	1.04
26.10	0.00	6.88	1.01	-----	-----	-----	-----	-----	-----	-----	-----	1.01
26.20	0.00	6.87	0.97	-----	-----	-----	-----	-----	-----	-----	-----	0.97
26.30	0.00	6.86	0.94	-----	-----	-----	-----	-----	-----	-----	-----	0.94
26.40	0.00	6.85	0.91	-----	-----	-----	-----	-----	-----	-----	-----	0.91
26.50	0.00	6.85	0.88	-----	-----	-----	-----	-----	-----	-----	-----	0.88
26.60	0.00	6.84	0.86	-----	-----	-----	-----	-----	-----	-----	-----	0.86
26.70	0.00	6.83	0.83	-----	-----	-----	-----	-----	-----	-----	-----	0.83
26.80	0.00	6.82	0.81	-----	-----	-----	-----	-----	-----	-----	-----	0.81
26.90	0.00	6.82	0.78	-----	-----	-----	-----	-----	-----	-----	-----	0.78
27.00	0.00	6.81	0.76	-----	-----	-----	-----	-----	-----	-----	-----	0.76
27.10	0.00	6.80	0.74	-----	-----	-----	-----	-----	-----	-----	-----	0.74
27.20	0.00	6.80	0.71	-----	-----	-----	-----	-----	-----	-----	-----	0.71
27.30	0.00	6.79	0.68	-----	-----	-----	-----	-----	-----	-----	-----	0.68
27.40	0.00	6.79	0.66	-----	-----	-----	-----	-----	-----	-----	-----	0.66
27.50	0.00	6.78	0.63	-----	-----	-----	-----	-----	-----	-----	-----	0.63
27.60	0.00	6.78	0.61	-----	-----	-----	-----	-----	-----	-----	-----	0.61
27.70	0.00	6.77	0.58	-----	-----	-----	-----	-----	-----	-----	-----	0.58
27.80	0.00	6.77	0.56	-----	-----	-----	-----	-----	-----	-----	-----	0.56
27.90	0.00	6.76	0.54	-----	-----	-----	-----	-----	-----	-----	-----	0.54
28.00	0.00	6.76	0.52	-----	-----	-----	-----	-----	-----	-----	-----	0.52
28.10	0.00	6.75	0.49	-----	-----	-----	-----	-----	-----	-----	-----	0.49
28.20	0.00	6.75	0.48	-----	-----	-----	-----	-----	-----	-----	-----	0.48
28.30	0.00	6.74	0.46	-----	-----	-----	-----	-----	-----	-----	-----	0.46
28.40	0.00	6.74	0.45	-----	-----	-----	-----	-----	-----	-----	-----	0.45
28.50	0.00	6.74	0.44	-----	-----	-----	-----	-----	-----	-----	-----	0.44
28.60	0.00	6.73	0.42	-----	-----	-----	-----	-----	-----	-----	-----	0.42
28.70	0.00	6.73	0.41	-----	-----	-----	-----	-----	-----	-----	-----	0.41
28.80	0.00	6.73	0.40	-----	-----	-----	-----	-----	-----	-----	-----	0.40
28.90	0.00	6.72	0.39	-----	-----	-----	-----	-----	-----	-----	-----	0.39
29.00	0.00	6.72	0.37	-----	-----	-----	-----	-----	-----	-----	-----	0.37
29.10	0.00	6.72	0.36	-----	-----	-----	-----	-----	-----	-----	-----	0.36
29.20	0.00	6.71	0.35	-----	-----	-----	-----	-----	-----	-----	-----	0.35
29.30	0.00	6.71	0.34	-----	-----	-----	-----	-----	-----	-----	-----	0.34
29.40	0.00	6.71	0.33	-----	-----	-----	-----	-----	-----	-----	-----	0.33
29.50	0.00	6.71	0.32	-----	-----	-----	-----	-----	-----	-----	-----	0.32
29.60	0.00	6.70	0.31	-----	-----	-----	-----	-----	-----	-----	-----	0.31
29.70	0.00	6.70	0.30	-----	-----	-----	-----	-----	-----	-----	-----	0.30
29.80	0.00	6.70	0.30	-----	-----	-----	-----	-----	-----	-----	-----	0.30
29.90	0.00	6.69	0.29	-----	-----	-----	-----	-----	-----	-----	-----	0.29
30.00	0.00	6.69	0.28	-----	-----	-----	-----	-----	-----	-----	-----	0.28
30.10	0.00	6.69	0.28	-----	-----	-----	-----	-----	-----	-----	-----	0.28
30.20	0.00	6.69	0.27	-----	-----	-----	-----	-----	-----	-----	-----	0.27
30.30	0.00	6.69	0.26	-----	-----	-----	-----	-----	-----	-----	-----	0.26
30.40	0.00	6.68	0.26	-----	-----	-----	-----	-----	-----	-----	-----	0.26

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Reservoir Report

Reservoir No. 3 - TEMP SEDIMENT BASIN

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	11.50	4,185	0	0
0.50	12.00	6,540	2,681	2,681
2.50	14.00	16,750	23,290	25,971
4.70	16.20	12,000	31,625	57,596

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 15.0	0.0	0.0	0.0
Span in	= 15.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 11.50	0.00	0.00	0.00
Length ft	= 34.0	0.0	0.0	0.0
Slope %	= 0.20	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
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.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Stage / Storage / Discharge Table

Note: All outflows have been analyzed under inlet and outlet control.

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	11.50	0.00	---	---	---	---	---	---	---	---	0.00
0.50	2,681	12.00	0.62	---	---	---	---	---	---	---	---	0.62
2.50	25,971	14.00	7.48	---	---	---	---	---	---	---	---	7.48
4.70	57,596	16.20	11.93	---	---	---	---	---	---	---	---	11.93

Hydrograph Report

Hyd. No. 9

ROUTE 2

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 5
Max. Elevation = 12.99 ft

Peak discharge = 3.63 cfs
Time interval = 6 min
Reservoir name = TEMP SEDIMENT BAS
Max. Storage = 14,253 cuft

Storage Indication method used.

Outflow hydrograph volume = 39,325 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
11.40	0.34	11.60	0.04	-----	-----	-----	-----	-----	-----	-----	-----	0.04
11.50	0.41	11.63	0.07	-----	-----	-----	-----	-----	-----	-----	-----	0.07
11.60	0.57	11.65	0.09	-----	-----	-----	-----	-----	-----	-----	-----	0.09
11.70	0.98	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
11.80	1.94	11.78	0.26	-----	-----	-----	-----	-----	-----	-----	-----	0.26
11.90	4.17	11.96	0.55	-----	-----	-----	-----	-----	-----	-----	-----	0.55
12.00	7.11	12.13	0.90	-----	-----	-----	-----	-----	-----	-----	-----	0.90
12.10	9.31	12.35	1.30	-----	-----	-----	-----	-----	-----	-----	-----	1.30
12.20	9.44 <<	12.60	1.64	-----	-----	-----	-----	-----	-----	-----	-----	1.64
12.30	7.87	12.80	2.27	-----	-----	-----	-----	-----	-----	-----	-----	2.27
12.40	6.15	12.94	3.22	-----	-----	-----	-----	-----	-----	-----	-----	3.22
12.50	4.39	12.99	3.63	-----	-----	-----	-----	-----	-----	-----	-----	3.63 <<
12.60	2.81	12.99	3.62	-----	-----	-----	-----	-----	-----	-----	-----	3.62
12.70	1.96	12.96	3.38	-----	-----	-----	-----	-----	-----	-----	-----	3.38
12.80	1.70	12.92	3.07	-----	-----	-----	-----	-----	-----	-----	-----	3.07
12.90	1.51	12.87	2.77	-----	-----	-----	-----	-----	-----	-----	-----	2.77
13.00	1.36	12.84	2.51	-----	-----	-----	-----	-----	-----	-----	-----	2.51
13.10	1.25	12.80	2.27	-----	-----	-----	-----	-----	-----	-----	-----	2.27
13.20	1.17	12.77	2.16	-----	-----	-----	-----	-----	-----	-----	-----	2.16
13.30	1.10	12.74	2.07	-----	-----	-----	-----	-----	-----	-----	-----	2.07
13.40	1.04	12.71	1.98	-----	-----	-----	-----	-----	-----	-----	-----	1.98
13.50	0.98	12.68	1.90	-----	-----	-----	-----	-----	-----	-----	-----	1.90
13.60	0.94	12.66	1.82	-----	-----	-----	-----	-----	-----	-----	-----	1.82
13.70	0.89	12.63	1.74	-----	-----	-----	-----	-----	-----	-----	-----	1.74
13.80	0.85	12.60	1.66	-----	-----	-----	-----	-----	-----	-----	-----	1.66
13.90	0.81	12.58	1.62	-----	-----	-----	-----	-----	-----	-----	-----	1.62
14.00	0.77	12.55	1.59	-----	-----	-----	-----	-----	-----	-----	-----	1.59
14.10	0.74	12.53	1.55	-----	-----	-----	-----	-----	-----	-----	-----	1.55
14.20	0.71	12.50	1.52	-----	-----	-----	-----	-----	-----	-----	-----	1.52
14.30	0.68	12.48	1.48	-----	-----	-----	-----	-----	-----	-----	-----	1.48
14.40	0.66	12.46	1.45	-----	-----	-----	-----	-----	-----	-----	-----	1.45
14.50	0.65	12.43	1.42	-----	-----	-----	-----	-----	-----	-----	-----	1.42
14.60	0.63	12.41	1.39	-----	-----	-----	-----	-----	-----	-----	-----	1.39
14.70	0.62	12.38	1.35	-----	-----	-----	-----	-----	-----	-----	-----	1.35
14.80	0.61	12.36	1.31	-----	-----	-----	-----	-----	-----	-----	-----	1.31
14.90	0.60	12.34	1.28	-----	-----	-----	-----	-----	-----	-----	-----	1.28
15.00	0.59	12.32	1.24	-----	-----	-----	-----	-----	-----	-----	-----	1.24
15.10	0.58	12.30	1.21	-----	-----	-----	-----	-----	-----	-----	-----	1.21

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
20.30	0.25	11.81	0.31	-----	-----	-----	-----	-----	-----	-----	-----	0.31
20.40	0.25	11.80	0.30	-----	-----	-----	-----	-----	-----	-----	-----	0.30
20.50	0.25	11.80	0.30	-----	-----	-----	-----	-----	-----	-----	-----	0.30
20.60	0.25	11.80	0.29	-----	-----	-----	-----	-----	-----	-----	-----	0.29
20.70	0.25	11.79	0.29	-----	-----	-----	-----	-----	-----	-----	-----	0.29
20.80	0.25	11.79	0.28	-----	-----	-----	-----	-----	-----	-----	-----	0.28
20.90	0.25	11.79	0.28	-----	-----	-----	-----	-----	-----	-----	-----	0.28
21.00	0.24	11.79	0.27	-----	-----	-----	-----	-----	-----	-----	-----	0.27
21.10	0.24	11.79	0.27	-----	-----	-----	-----	-----	-----	-----	-----	0.27
21.20	0.24	11.78	0.27	-----	-----	-----	-----	-----	-----	-----	-----	0.27
21.30	0.24	11.78	0.26	-----	-----	-----	-----	-----	-----	-----	-----	0.26
21.40	0.24	11.78	0.26	-----	-----	-----	-----	-----	-----	-----	-----	0.26
21.50	0.24	11.78	0.26	-----	-----	-----	-----	-----	-----	-----	-----	0.26
21.60	0.24	11.78	0.26	-----	-----	-----	-----	-----	-----	-----	-----	0.26
21.70	0.24	11.78	0.26	-----	-----	-----	-----	-----	-----	-----	-----	0.26
21.80	0.24	11.78	0.25	-----	-----	-----	-----	-----	-----	-----	-----	0.25
21.90	0.24	11.78	0.25	-----	-----	-----	-----	-----	-----	-----	-----	0.25
22.00	0.24	11.77	0.25	-----	-----	-----	-----	-----	-----	-----	-----	0.25
22.10	0.24	11.77	0.25	-----	-----	-----	-----	-----	-----	-----	-----	0.25
22.20	0.23	11.77	0.25	-----	-----	-----	-----	-----	-----	-----	-----	0.25
22.30	0.23	11.77	0.25	-----	-----	-----	-----	-----	-----	-----	-----	0.25
22.40	0.23	11.77	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
22.50	0.23	11.77	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
22.60	0.23	11.77	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
22.70	0.23	11.77	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
22.80	0.23	11.77	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
22.90	0.23	11.77	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
23.00	0.23	11.77	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
23.10	0.23	11.77	0.24	-----	-----	-----	-----	-----	-----	-----	-----	0.24
23.20	0.23	11.77	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
23.30	0.23	11.77	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
23.40	0.22	11.77	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
23.50	0.22	11.76	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
23.60	0.22	11.76	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
23.70	0.22	11.76	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
23.80	0.22	11.76	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
23.90	0.22	11.76	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
24.00	0.22	11.76	0.23	-----	-----	-----	-----	-----	-----	-----	-----	0.23
24.10	0.20	11.76	0.22	-----	-----	-----	-----	-----	-----	-----	-----	0.22
24.20	0.16	11.76	0.22	-----	-----	-----	-----	-----	-----	-----	-----	0.22
24.30	0.11	11.75	0.21	-----	-----	-----	-----	-----	-----	-----	-----	0.21
24.40	0.07	11.75	0.20	-----	-----	-----	-----	-----	-----	-----	-----	0.20
24.50	0.03	11.74	0.18	-----	-----	-----	-----	-----	-----	-----	-----	0.18
24.60	0.01	11.73	0.17	-----	-----	-----	-----	-----	-----	-----	-----	0.17
24.70	0.00	11.72	0.15	-----	-----	-----	-----	-----	-----	-----	-----	0.15
24.80	0.00	11.71	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
24.90	0.00	11.70	0.13	-----	-----	-----	-----	-----	-----	-----	-----	0.13
25.00	0.00	11.69	0.12	-----	-----	-----	-----	-----	-----	-----	-----	0.12
25.10	0.00	11.68	0.11	-----	-----	-----	-----	-----	-----	-----	-----	0.11
25.20	0.00	11.67	0.11	-----	-----	-----	-----	-----	-----	-----	-----	0.11
25.30	0.00	11.67	0.10	-----	-----	-----	-----	-----	-----	-----	-----	0.10

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Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	22.72	6	738	114,918	----	------	------	AREA 1 EXISTING
2	SCS Runoff	8.33	6	744	47,239	----	------	------	AREA 3A EXISTING
3	SCS Runoff	6.33	6	744	35,902	----	------	------	AREA 3B EXISTING
4	SCS Runoff	59.59	6	756	443,840	----	------	------	AREA 2 EXISTING
5	SCS Runoff	16.99	6	726	69,466	----	------	------	AREA 1 PROPOSED
6	SCS Runoff	150.08	6	726	611,988	----	------	------	AREA 2 PROPOSED
7	SCS Runoff	6.27	6	726	25,649	----	------	------	AREA 3 PROPOSED
8	Reservoir	33.60	6	762	611,941	6	10.17	278,997	ROUTE 1
9	Reservoir	7.09	6	750	69,466	5	13.87	24,440	ROUTE 2
10	Combine	14.67	6	744	83,141	2, 3,	------	------	Area 3A+3B

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

AREA 1 EXISTING

Hydrograph type	= SCS Runoff	Peak discharge	= 22.72 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 11.50 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 39.1 min
Total precip.	= 5.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 114,918 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
10.30	0.25	13.70	2.67	17.10	1.10	20.50	0.69
10.40	0.29	13.80	2.53	17.20	1.09	20.60	0.69
10.50	0.33	13.90	2.41	17.30	1.08	20.70	0.68
10.60	0.38	14.00	2.30	17.40	1.07	20.80	0.68
10.70	0.43	14.10	2.19	17.50	1.05	20.90	0.68
10.80	0.50	14.20	2.10	17.60	1.04	21.00	0.67
10.90	0.57	14.30	2.01	17.70	1.03	21.10	0.67
11.00	0.65	14.40	1.94	17.80	1.02	21.20	0.67
11.10	0.73	14.50	1.88	17.90	1.01	21.30	0.67
11.20	0.83	14.60	1.82	18.00	0.99	21.40	0.66
11.30	0.95	14.70	1.78	18.10	0.98	21.50	0.66
11.40	1.10	14.80	1.74	18.20	0.97	21.60	0.66
11.50	1.29	14.90	1.70	18.30	0.96	21.70	0.66
11.60	1.65	15.00	1.67	18.40	0.94	21.80	0.65
11.70	2.46	15.10	1.64	18.50	0.93	21.90	0.65
11.80	4.21	15.20	1.60	18.60	0.92	22.00	0.65
11.90	8.18	15.30	1.57	18.70	0.91	22.10	0.65
12.00	13.66	15.40	1.54	18.80	0.90	22.20	0.64
12.10	18.67	15.50	1.50	18.90	0.88	22.30	0.64
12.20	22.38	15.60	1.47	19.00	0.87	22.40	0.64
12.30	22.72 <<	15.70	1.44	19.10	0.86	22.50	0.64
12.40	20.42	15.80	1.40	19.20	0.84	22.60	0.63
12.50	17.77	15.90	1.37	19.30	0.83	22.70	0.63
12.60	14.81	16.00	1.33	19.40	0.82	22.80	0.63
12.70	11.68	16.10	1.30	19.50	0.81	22.90	0.63
12.80	8.63	16.20	1.27	19.60	0.79	23.00	0.63
12.90	6.01	16.30	1.24	19.70	0.78	23.10	0.62
13.00	4.59	16.40	1.21	19.80	0.77	23.20	0.62
13.10	4.11	16.50	1.19	19.90	0.76	23.30	0.62
13.20	3.72	16.60	1.17	20.00	0.74	23.40	0.62
13.30	3.41	16.70	1.15	20.10	0.73	23.50	0.61
13.40	3.17	16.80	1.14	20.20	0.72	23.60	0.61
13.50	2.98	16.90	1.13	20.30	0.71	23.70	0.61
13.60	2.82	17.00	1.11	20.40	0.70	23.80	0.61

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Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 4

AREA 2 EXISTING

Hydrograph type	= SCS Runoff	Peak discharge	= 59.59 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 45.00 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 61.7 min
Total precip.	= 5.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 443,840 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
10.30	0.61	13.70	15.25	17.10	4.48	20.50	2.82
10.40	0.71	13.80	13.00	17.20	4.42	20.60	2.78
10.50	0.83	13.90	12.00	17.30	4.36	20.70	2.75
10.60	0.96	14.00	11.17	17.40	4.30	20.80	2.72
10.70	1.11	14.10	10.47	17.50	4.25	20.90	2.69
10.80	1.27	14.20	9.88	17.60	4.20	21.00	2.67
10.90	1.46	14.30	9.38	17.70	4.15	21.10	2.65
11.00	1.66	14.40	8.94	17.80	4.10	21.20	2.63
11.10	1.89	14.50	8.54	17.90	4.06	21.30	2.62
11.20	2.16	14.60	8.19	18.00	4.01	21.40	2.60
11.30	2.47	14.70	7.87	18.10	3.96	21.50	2.59
11.40	2.84	14.80	7.60	18.20	3.92	21.60	2.58
11.50	3.27	14.90	7.35	18.30	3.87	21.70	2.57
11.60	3.95	15.00	7.13	18.40	3.82	21.80	2.56
11.70	5.25	15.10	6.93	18.50	3.78	21.90	2.55
11.80	7.84	15.20	6.75	18.60	3.73	22.00	2.54
11.90	13.32	15.30	6.59	18.70	3.68	22.10	2.53
12.00	21.04	15.40	6.43	18.80	3.63	22.20	2.52
12.10	29.10	15.50	6.29	18.90	3.58	22.30	2.51
12.20	37.40	15.60	6.15	19.00	3.54	22.40	2.50
12.30	45.60	15.70	6.02	19.10	3.49	22.50	2.50
12.40	53.02	15.80	5.89	19.20	3.44	22.60	2.49
12.50	58.56	15.90	5.76	19.30	3.39	22.70	2.48
12.60	59.59 <<	16.00	5.63	19.40	3.34	22.80	2.47
12.70	57.07	16.10	5.50	19.50	3.30	22.90	2.46
12.80	54.00	16.20	5.37	19.60	3.25	23.00	2.45
12.90	50.44	16.30	5.25	19.70	3.20	23.10	2.44
13.00	46.48	16.40	5.13	19.80	3.15	23.20	2.43
13.10	42.22	16.50	5.01	19.90	3.10	23.30	2.42
13.20	37.74	16.60	4.90	20.00	3.05	23.40	2.41
13.30	33.12	16.70	4.80	20.10	3.00	23.50	2.40
13.40	28.37	16.80	4.71	20.20	2.95	23.60	2.39
13.50	23.62	16.90	4.63	20.30	2.91	23.70	2.38
13.60	19.11	17.00	4.55	20.40	2.86	23.80	2.37

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Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

AREA 3A EXISTING

Hydrograph type	= SCS Runoff	Peak discharge	= 8.33 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 5.00 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 43.8 min
Total precip.	= 5.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 47,239 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
10.30	0.09	13.70	1.17	17.10	0.46	20.50	0.29
10.40	0.11	13.80	1.10	17.20	0.45	20.60	0.29
10.50	0.12	13.90	1.05	17.30	0.45	20.70	0.28
10.60	0.14	14.00	1.00	17.40	0.44	20.80	0.28
10.70	0.16	14.10	0.95	17.50	0.44	20.90	0.28
10.80	0.18	14.20	0.91	17.60	0.43	21.00	0.28
10.90	0.21	14.30	0.87	17.70	0.43	21.10	0.28
11.00	0.24	14.40	0.83	17.80	0.42	21.20	0.28
11.10	0.27	14.50	0.80	17.90	0.42	21.30	0.27
11.20	0.30	14.60	0.78	18.00	0.41	21.40	0.27
11.30	0.35	14.70	0.75	18.10	0.41	21.50	0.27
11.40	0.40	14.80	0.73	18.20	0.40	21.60	0.27
11.50	0.47	14.90	0.72	18.30	0.40	21.70	0.27
11.60	0.58	15.00	0.70	18.40	0.39	21.80	0.27
11.70	0.83	15.10	0.69	18.50	0.39	21.90	0.27
11.80	1.34	15.20	0.67	18.60	0.38	22.00	0.27
11.90	2.48	15.30	0.66	18.70	0.38	22.10	0.27
12.00	4.09	15.40	0.65	18.80	0.37	22.20	0.27
12.10	5.70	15.50	0.63	18.90	0.37	22.30	0.26
12.20	7.17	15.60	0.62	19.00	0.36	22.40	0.26
12.30	8.24	15.70	0.60	19.10	0.36	22.50	0.26
12.40	8.33 <<	15.80	0.59	19.20	0.35	22.60	0.26
12.50	7.64	15.90	0.58	19.30	0.35	22.70	0.26
12.60	6.84	16.00	0.56	19.40	0.34	22.80	0.26
12.70	5.95	16.10	0.55	19.50	0.34	22.90	0.26
12.80	4.98	16.20	0.54	19.60	0.33	23.00	0.26
12.90	3.97	16.30	0.52	19.70	0.33	23.10	0.26
13.00	3.01	16.40	0.51	19.80	0.32	23.20	0.26
13.10	2.19	16.50	0.50	19.90	0.32	23.30	0.26
13.20	1.73	16.60	0.49	20.00	0.31	23.40	0.25
13.30	1.57	16.70	0.48	20.10	0.31	23.50	0.25
13.40	1.43	16.80	0.48	20.20	0.30	23.60	0.25
13.50	1.32	16.90	0.47	20.30	0.30	23.70	0.25
13.60	1.24	17.00	0.46	20.40	0.29	23.80	0.25

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Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

AREA 3B EXISTING

Hydrograph type	= SCS Runoff	Peak discharge	= 6.33 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 3.80 ac	Curve number	= 72
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 45.1 min
Total precip.	= 5.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 35,902 cuft

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
10.30	0.07	13.70	0.89	17.10	0.35	20.50	0.22
10.40	0.08	13.80	0.84	17.20	0.34	20.60	0.22
10.50	0.09	13.90	0.80	17.30	0.34	20.70	0.21
10.60	0.11	14.00	0.76	17.40	0.34	20.80	0.21
10.70	0.12	14.10	0.72	17.50	0.33	20.90	0.21
10.80	0.14	14.20	0.69	17.60	0.33	21.00	0.21
10.90	0.16	14.30	0.66	17.70	0.33	21.10	0.21
11.00	0.18	14.40	0.63	17.80	0.32	21.20	0.21
11.10	0.20	14.50	0.61	17.90	0.32	21.30	0.21
11.20	0.23	14.60	0.59	18.00	0.31	21.40	0.21
11.30	0.27	14.70	0.57	18.10	0.31	21.50	0.21
11.40	0.31	14.80	0.56	18.20	0.31	21.60	0.21
11.50	0.35	14.90	0.54	18.30	0.30	21.70	0.21
11.60	0.44	15.00	0.53	18.40	0.30	21.80	0.21
11.70	0.63	15.10	0.52	18.50	0.30	21.90	0.20
11.80	1.02	15.20	0.51	18.60	0.29	22.00	0.20
11.90	1.88	15.30	0.50	18.70	0.29	22.10	0.20
12.00	3.11	15.40	0.49	18.80	0.28	22.20	0.20
12.10	4.33	15.50	0.48	18.90	0.28	22.30	0.20
12.20	5.45	15.60	0.47	19.00	0.28	22.40	0.20
12.30	6.27	15.70	0.46	19.10	0.27	22.50	0.20
12.40	6.33 <<	15.80	0.45	19.20	0.27	22.60	0.20
12.50	5.81	15.90	0.44	19.30	0.26	22.70	0.20
12.60	5.20	16.00	0.43	19.40	0.26	22.80	0.20
12.70	4.52	16.10	0.42	19.50	0.26	22.90	0.20
12.80	3.78	16.20	0.41	19.60	0.25	23.00	0.20
12.90	3.02	16.30	0.40	19.70	0.25	23.10	0.20
13.00	2.29	16.40	0.39	19.80	0.24	23.20	0.19
13.10	1.66	16.50	0.38	19.90	0.24	23.30	0.19
13.20	1.32	16.60	0.37	20.00	0.24	23.40	0.19
13.30	1.19	16.70	0.37	20.10	0.23	23.50	0.19
13.40	1.09	16.80	0.36	20.20	0.23	23.60	0.19
13.50	1.01	16.90	0.36	20.30	0.22	23.70	0.19
13.60	0.94	17.00	0.35	20.40	0.22	23.80	0.19

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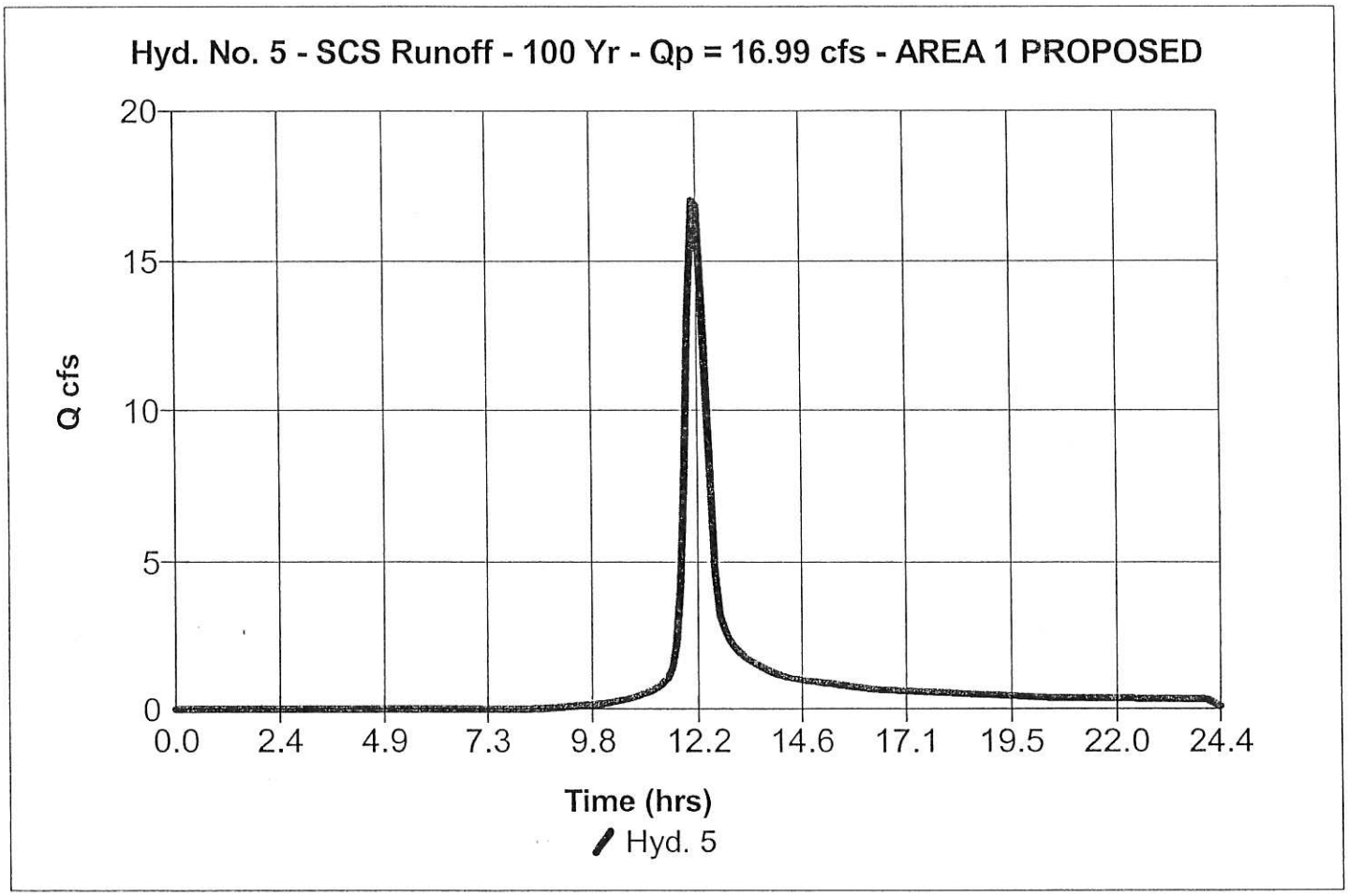
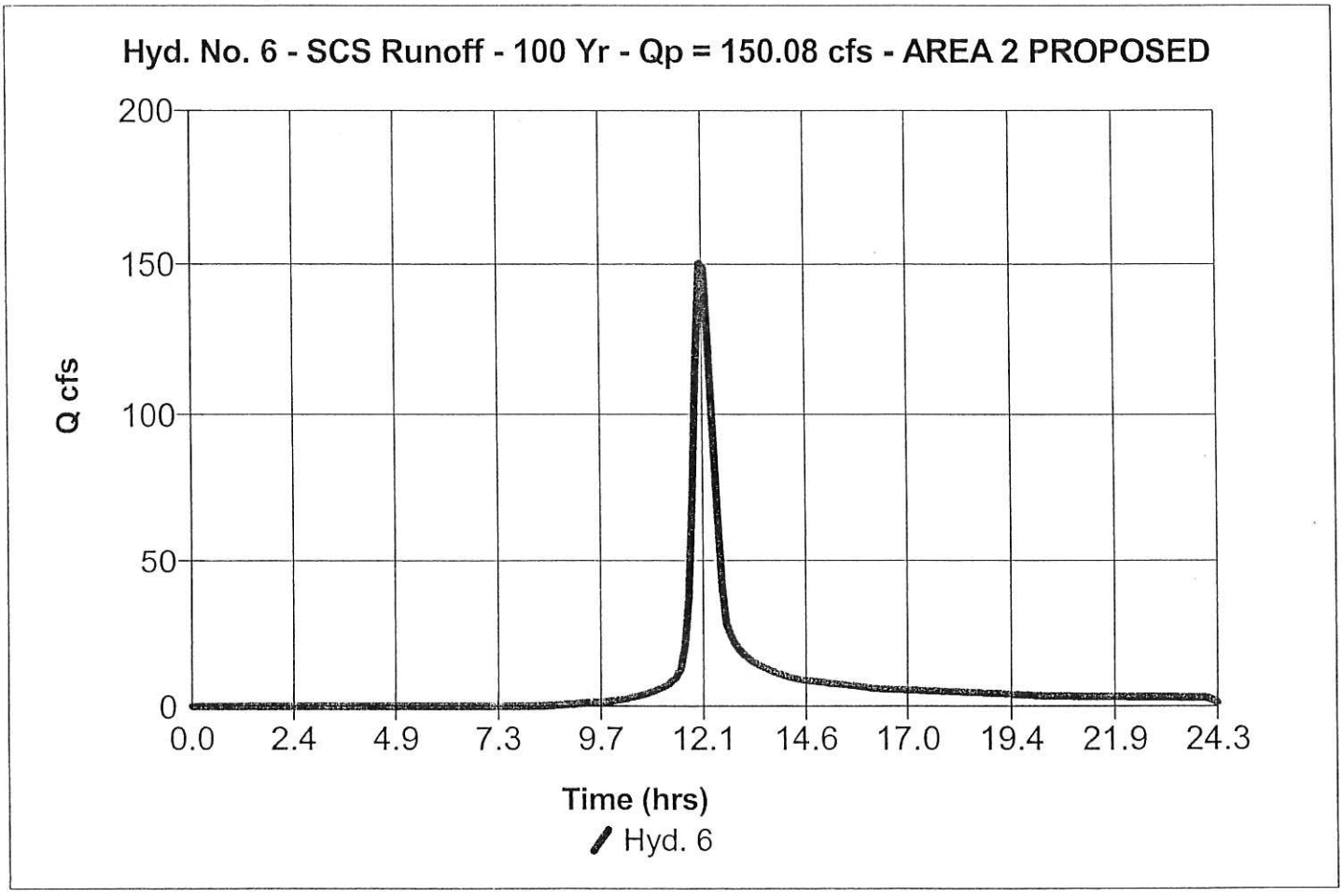
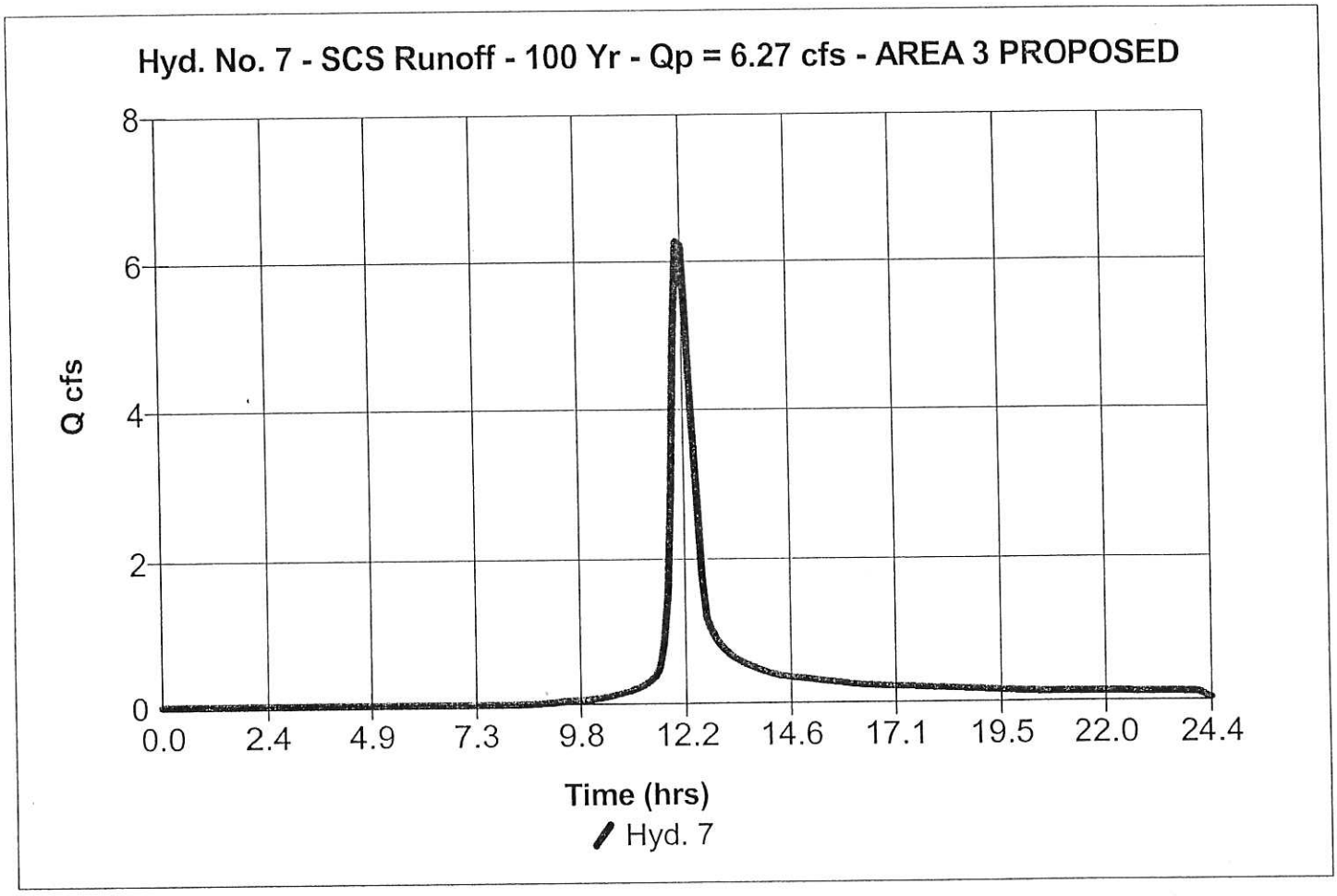
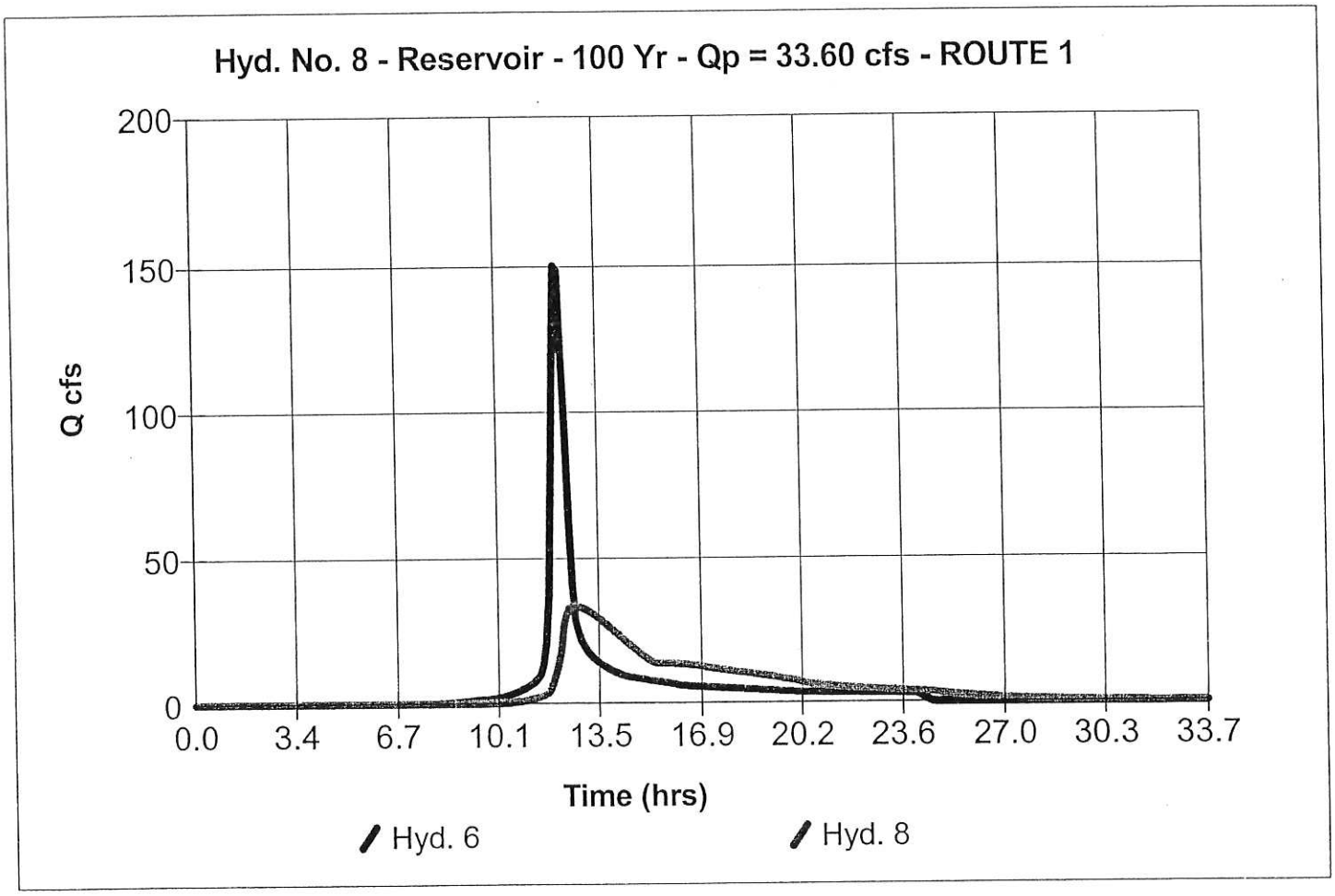
DEVELOPED CONDITIONS

100-YEAR STORM


Hyd. No. 5 - SCS Runoff - 100 Yr - Qp = 16.99 cfs - AREA 1 PROPOSED
Q cfs
20
15
10
5
0
0.0
2.4
4.9
7.3
9.8
12.2
14.6
17.1
19.5
22.0
24.4
Time (hrs)
Hyd. 5


Hyd. No. 6 - SCS Runoff - 100 Yr - Qp = 150.08 cfs - AREA 2 PROPOSED
200
150
100
50
0
Q cfs
0.0
2.4
4.9
7.3
9.7
12.1
14.6
17.0
19.4
21.9
24.3
Time (hrs)
Hyd. 6


Hyd. No. 7 - SCS Runoff - 100 Yr - Qp = 6.27 cfs - AREA 3 PROPOSED
Q cfs
8
6
4
2
0
0.0
2.4
4.9
7.3
9.8
12.2
14.6
17.1
19.5
22.0
24.4
Time (hrs)
Hyd. 7


Hyd. No. 8 - Reservoir - 100 Yr - Qp = 33.60 cfs - ROUTE 1
200
150
100
50
0
Q cfs
0.0
3.4
6.7
10.1
13.5
16.9
20.2
23.6
27.0
30.3
33.7
Time (hrs)
Hyd. 6
Hyd. 8

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
14.30	9.58	9.36	21.89	-----	-----	-----	-----	-----	-----	-----	-----	21.89
14.40	9.29	9.32	20.96	-----	-----	-----	-----	-----	-----	-----	-----	20.96
14.50	9.05	9.27	20.07	-----	-----	-----	-----	-----	-----	-----	-----	20.07
14.60	8.86	9.23	19.23	-----	-----	-----	-----	-----	-----	-----	-----	19.23
14.70	8.68	9.19	18.38	-----	-----	-----	-----	-----	-----	-----	-----	18.38
14.80	8.52	9.15	17.45	-----	-----	-----	-----	-----	-----	-----	-----	17.45
14.90	8.35	9.12	16.59	-----	-----	-----	-----	-----	-----	-----	-----	16.59
15.00	8.18	9.08	15.80	-----	-----	-----	-----	-----	-----	-----	-----	15.80
15.10	8.01	9.05	15.07	-----	-----	-----	-----	-----	-----	-----	-----	15.07
15.20	7.84	9.03	14.39	-----	-----	-----	-----	-----	-----	-----	-----	14.39
15.30	7.67	9.00	13.77	-----	-----	-----	-----	-----	-----	-----	-----	13.77
15.40	7.50	8.98	13.72	-----	-----	-----	-----	-----	-----	-----	-----	13.72
15.50	7.33	8.95	13.70	-----	-----	-----	-----	-----	-----	-----	-----	13.70
15.60	7.16	8.92	13.68	-----	-----	-----	-----	-----	-----	-----	-----	13.68
15.70	6.99	8.90	13.66	-----	-----	-----	-----	-----	-----	-----	-----	13.66
15.80	6.81	8.87	13.64	-----	-----	-----	-----	-----	-----	-----	-----	13.64
15.90	6.64	8.84	13.62	-----	-----	-----	-----	-----	-----	-----	-----	13.62
16.00	6.47	8.82	13.59	-----	-----	-----	-----	-----	-----	-----	-----	13.59
16.10	6.30	8.79	13.53	-----	-----	-----	-----	-----	-----	-----	-----	13.53
16.20	6.14	8.76	13.42	-----	-----	-----	-----	-----	-----	-----	-----	13.42
16.30	6.01	8.73	13.31	-----	-----	-----	-----	-----	-----	-----	-----	13.31
16.40	5.90	8.70	13.20	-----	-----	-----	-----	-----	-----	-----	-----	13.20
16.50	5.82	8.67	13.08	-----	-----	-----	-----	-----	-----	-----	-----	13.08
16.60	5.75	8.64	12.97	-----	-----	-----	-----	-----	-----	-----	-----	12.97
16.70	5.68	8.61	12.86	-----	-----	-----	-----	-----	-----	-----	-----	12.86
16.80	5.62	8.58	12.71	-----	-----	-----	-----	-----	-----	-----	-----	12.71
16.90	5.56	8.55	12.52	-----	-----	-----	-----	-----	-----	-----	-----	12.52
17.00	5.50	8.53	12.34	-----	-----	-----	-----	-----	-----	-----	-----	12.34
17.10	5.44	8.50	12.16	-----	-----	-----	-----	-----	-----	-----	-----	12.16
17.20	5.38	8.47	11.99	-----	-----	-----	-----	-----	-----	-----	-----	11.99
17.30	5.32	8.45	11.82	-----	-----	-----	-----	-----	-----	-----	-----	11.82
17.40	5.26	8.42	11.65	-----	-----	-----	-----	-----	-----	-----	-----	11.65
17.50	5.20	8.39	11.49	-----	-----	-----	-----	-----	-----	-----	-----	11.49
17.60	5.13	8.37	11.34	-----	-----	-----	-----	-----	-----	-----	-----	11.34
17.70	5.07	8.34	11.20	-----	-----	-----	-----	-----	-----	-----	-----	11.20
17.80	5.01	8.32	11.06	-----	-----	-----	-----	-----	-----	-----	-----	11.06
17.90	4.95	8.30	10.92	-----	-----	-----	-----	-----	-----	-----	-----	10.92
18.00	4.89	8.27	10.78	-----	-----	-----	-----	-----	-----	-----	-----	10.78
18.10	4.82	8.25	10.65	-----	-----	-----	-----	-----	-----	-----	-----	10.65
18.20	4.76	8.23	10.51	-----	-----	-----	-----	-----	-----	-----	-----	10.51
18.30	4.70	8.20	10.38	-----	-----	-----	-----	-----	-----	-----	-----	10.38
18.40	4.64	8.18	10.23	-----	-----	-----	-----	-----	-----	-----	-----	10.23
18.50	4.57	8.16	10.09	-----	-----	-----	-----	-----	-----	-----	-----	10.09
18.60	4.51	8.14	9.94	-----	-----	-----	-----	-----	-----	-----	-----	9.94
18.70	4.45	8.11	9.80	-----	-----	-----	-----	-----	-----	-----	-----	9.80
18.80	4.38	8.09	9.65	-----	-----	-----	-----	-----	-----	-----	-----	9.65
18.90	4.32	8.07	9.52	-----	-----	-----	-----	-----	-----	-----	-----	9.52
19.00	4.26	8.05	9.38	-----	-----	-----	-----	-----	-----	-----	-----	9.38
19.10	4.19	8.03	9.24	-----	-----	-----	-----	-----	-----	-----	-----	9.24
19.20	4.13	8.01	9.11	-----	-----	-----	-----	-----	-----	-----	-----	9.11
19.30	4.07	7.98	8.94	-----	-----	-----	-----	-----	-----	-----	-----	8.94

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
24.50	0.44	7.27	3.49	-----	-----	-----	-----	-----	-----	-----	-----	3.49
24.60	0.15	7.25	3.37	-----	-----	-----	-----	-----	-----	-----	-----	3.37
24.70	0.00	7.23	3.25	-----	-----	-----	-----	-----	-----	-----	-----	3.25
24.80	0.00	7.21	3.12	-----	-----	-----	-----	-----	-----	-----	-----	3.12
24.90	0.00	7.19	3.01	-----	-----	-----	-----	-----	-----	-----	-----	3.01
25.00	0.00	7.17	2.91	-----	-----	-----	-----	-----	-----	-----	-----	2.91
25.10	0.00	7.15	2.81	-----	-----	-----	-----	-----	-----	-----	-----	2.81
25.20	0.00	7.13	2.71	-----	-----	-----	-----	-----	-----	-----	-----	2.71
25.30	0.00	7.12	2.62	-----	-----	-----	-----	-----	-----	-----	-----	2.62
25.40	0.00	7.10	2.53	-----	-----	-----	-----	-----	-----	-----	-----	2.53
25.50	0.00	7.09	2.42	-----	-----	-----	-----	-----	-----	-----	-----	2.42
25.60	0.00	7.07	2.31	-----	-----	-----	-----	-----	-----	-----	-----	2.31
25.70	0.00	7.06	2.20	-----	-----	-----	-----	-----	-----	-----	-----	2.20
25.80	0.00	7.05	2.10	-----	-----	-----	-----	-----	-----	-----	-----	2.10
25.90	0.00	7.03	2.00	-----	-----	-----	-----	-----	-----	-----	-----	2.00
26.00	0.00	7.02	1.91	-----	-----	-----	-----	-----	-----	-----	-----	1.91
26.10	0.00	7.01	1.83	-----	-----	-----	-----	-----	-----	-----	-----	1.83
26.20	0.00	7.00	1.74	-----	-----	-----	-----	-----	-----	-----	-----	1.74
26.30	0.00	6.98	1.67	-----	-----	-----	-----	-----	-----	-----	-----	1.67
26.40	0.00	6.97	1.59	-----	-----	-----	-----	-----	-----	-----	-----	1.59
26.50	0.00	6.96	1.52	-----	-----	-----	-----	-----	-----	-----	-----	1.52
26.60	0.00	6.94	1.44	-----	-----	-----	-----	-----	-----	-----	-----	1.44
26.70	0.00	6.93	1.35	-----	-----	-----	-----	-----	-----	-----	-----	1.35
26.80	0.00	6.92	1.26	-----	-----	-----	-----	-----	-----	-----	-----	1.26
26.90	0.00	6.91	1.18	-----	-----	-----	-----	-----	-----	-----	-----	1.18
27.00	0.00	6.90	1.10	-----	-----	-----	-----	-----	-----	-----	-----	1.10
27.10	0.00	6.89	1.06	-----	-----	-----	-----	-----	-----	-----	-----	1.06
27.20	0.00	6.88	1.03	-----	-----	-----	-----	-----	-----	-----	-----	1.03
27.30	0.00	6.87	0.99	-----	-----	-----	-----	-----	-----	-----	-----	0.99
27.40	0.00	6.87	0.96	-----	-----	-----	-----	-----	-----	-----	-----	0.96
27.50	0.00	6.86	0.93	-----	-----	-----	-----	-----	-----	-----	-----	0.93
27.60	0.00	6.85	0.90	-----	-----	-----	-----	-----	-----	-----	-----	0.90
27.70	0.00	6.84	0.87	-----	-----	-----	-----	-----	-----	-----	-----	0.87
27.80	0.00	6.84	0.85	-----	-----	-----	-----	-----	-----	-----	-----	0.85
27.90	0.00	6.83	0.82	-----	-----	-----	-----	-----	-----	-----	-----	0.82
28.00	0.00	6.82	0.80	-----	-----	-----	-----	-----	-----	-----	-----	0.80
28.10	0.00	6.81	0.77	-----	-----	-----	-----	-----	-----	-----	-----	0.77
28.20	0.00	6.81	0.75	-----	-----	-----	-----	-----	-----	-----	-----	0.75
28.30	0.00	6.80	0.73	-----	-----	-----	-----	-----	-----	-----	-----	0.73
28.40	0.00	6.80	0.70	-----	-----	-----	-----	-----	-----	-----	-----	0.70
28.50	0.00	6.79	0.67	-----	-----	-----	-----	-----	-----	-----	-----	0.67
28.60	0.00	6.78	0.65	-----	-----	-----	-----	-----	-----	-----	-----	0.65
28.70	0.00	6.78	0.62	-----	-----	-----	-----	-----	-----	-----	-----	0.62
28.80	0.00	6.77	0.60	-----	-----	-----	-----	-----	-----	-----	-----	0.60
28.90	0.00	6.77	0.57	-----	-----	-----	-----	-----	-----	-----	-----	0.57
29.00	0.00	6.76	0.55	-----	-----	-----	-----	-----	-----	-----	-----	0.55
29.10	0.00	6.76	0.53	-----	-----	-----	-----	-----	-----	-----	-----	0.53
29.20	0.00	6.76	0.51	-----	-----	-----	-----	-----	-----	-----	-----	0.51
29.30	0.00	6.75	0.49	-----	-----	-----	-----	-----	-----	-----	-----	0.49
29.40	0.00	6.75	0.47	-----	-----	-----	-----	-----	-----	-----	-----	0.47
29.50	0.00	6.74	0.46	-----	-----	-----	-----	-----	-----	-----	-----	0.46

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Reservoir Report

Hydraflow Hydrographs by Intelisolve

Reservoir No. 3 - TEMP SEDIMENT BASIN

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	11.50	4,185	0	0
0.50	12.00	6,540	2,681	2,681
2.50	14.00	16,750	23,290	25,971
4.70	16.20	12,000	31,625	57,596

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise in	= 15.0	0.0	0.0	0.0
Span in	= 15.0	0.0	0.0	0.0
No. Barrels	= 1	0	0	0
Invert El. ft	= 11.50	0.00	0.00	0.00
Length ft	= 34.0	0.0	0.0	0.0
Slope %	= 0.20	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
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.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration Rate = 0.00 in/hr/sqft Tailwater Elev. = 0.00 ft

Note: All outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	11.50	0.00	---	---	---	---	---	---	---	---	0.00
0.50	2,681	12.00	0.62	---	---	---	---	---	---	---	---	0.62
2.50	25,971	14.00	7.48	---	---	---	---	---	---	---	---	7.48
4.70	57,596	16.20	11.93	---	---	---	---	---	---	---	---	11.93

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Hyd. No. 9

ROUTE 2

Hydrograph type	= Reservoir	Peak discharge	= 7.09 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Inflow hyd. No.	= 5	Reservoir name	= TEMP SEDIMENT BAŚ
Max. Elevation	= 13.87 ft	Max. Storage	= 24,440 cuft

Storage Indication method used.

Outflow hydrograph volume = 69,466 cuft

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
10.40	0.29	11.64	0.08	-----	-----	-----	-----	-----	-----	-----	-----	0.08
10.50	0.33	11.65	0.09	-----	-----	-----	-----	-----	-----	-----	-----	0.09
10.60	0.36	11.67	0.11	-----	-----	-----	-----	-----	-----	-----	-----	0.11
10.70	0.41	11.69	0.12	-----	-----	-----	-----	-----	-----	-----	-----	0.12
10.80	0.45	11.71	0.14	-----	-----	-----	-----	-----	-----	-----	-----	0.14
10.90	0.51	11.73	0.17	-----	-----	-----	-----	-----	-----	-----	-----	0.17
11.00	0.57	11.75	0.21	-----	-----	-----	-----	-----	-----	-----	-----	0.21
11.10	0.63	11.78	0.26	-----	-----	-----	-----	-----	-----	-----	-----	0.26
11.20	0.70	11.80	0.30	-----	-----	-----	-----	-----	-----	-----	-----	0.30
11.30	0.80	11.83	0.34	-----	-----	-----	-----	-----	-----	-----	-----	0.34
11.40	0.93	11.87	0.39	-----	-----	-----	-----	-----	-----	-----	-----	0.39
11.50	1.08	11.90	0.45	-----	-----	-----	-----	-----	-----	-----	-----	0.45
11.60	1.42	11.96	0.54	-----	-----	-----	-----	-----	-----	-----	-----	0.54
11.70	2.26	12.02	0.65	-----	-----	-----	-----	-----	-----	-----	-----	0.65
11.80	4.17	12.09	0.82	-----	-----	-----	-----	-----	-----	-----	-----	0.82
11.90	8.25	12.26	1.13	-----	-----	-----	-----	-----	-----	-----	-----	1.13
12.00	13.37	12.55	1.58	-----	-----	-----	-----	-----	-----	-----	-----	1.58
12.10	16.99 <<	12.94	3.27	-----	-----	-----	-----	-----	-----	-----	-----	3.27
12.20	16.86	13.33	5.25	-----	-----	-----	-----	-----	-----	-----	-----	5.25
12.30	13.87	13.63	6.34	-----	-----	-----	-----	-----	-----	-----	-----	6.34
12.40	10.66	13.80	6.91	-----	-----	-----	-----	-----	-----	-----	-----	6.91
12.50	7.47	13.87	7.09	-----	-----	-----	-----	-----	-----	-----	-----	7.09 <<
12.60	4.69	13.84	7.00	-----	-----	-----	-----	-----	-----	-----	-----	7.00
12.70	3.23	13.75	6.73	-----	-----	-----	-----	-----	-----	-----	-----	6.73
12.80	2.80	13.64	6.37	-----	-----	-----	-----	-----	-----	-----	-----	6.37
12.90	2.48	13.53	5.99	-----	-----	-----	-----	-----	-----	-----	-----	5.99
13.00	2.23	13.42	5.61	-----	-----	-----	-----	-----	-----	-----	-----	5.61
13.10	2.05	13.32	5.20	-----	-----	-----	-----	-----	-----	-----	-----	5.20
13.20	1.91	13.23	4.81	-----	-----	-----	-----	-----	-----	-----	-----	4.81
13.30	1.79	13.14	4.40	-----	-----	-----	-----	-----	-----	-----	-----	4.40
13.40	1.69	13.07	4.02	-----	-----	-----	-----	-----	-----	-----	-----	4.02
13.50	1.60	13.00	3.67	-----	-----	-----	-----	-----	-----	-----	-----	3.67
13.60	1.52	12.94	3.25	-----	-----	-----	-----	-----	-----	-----	-----	3.25
13.70	1.44	12.89	2.90	-----	-----	-----	-----	-----	-----	-----	-----	2.90
13.80	1.37	12.85	2.60	-----	-----	-----	-----	-----	-----	-----	-----	2.60
13.90	1.31	12.82	2.35	-----	-----	-----	-----	-----	-----	-----	-----	2.35
14.00	1.25	12.78	2.19	-----	-----	-----	-----	-----	-----	-----	-----	2.19
14.10	1.19	12.76	2.11	-----	-----	-----	-----	-----	-----	-----	-----	2.11

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Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
19.30	0.47	12.02	0.65	-----	-----	-----	-----	-----	-----	-----	-----	0.65
19.40	0.46	12.01	0.64	-----	-----	-----	-----	-----	-----	-----	-----	0.64
19.50	0.45	12.00	0.63	-----	-----	-----	-----	-----	-----	-----	-----	0.63
19.60	0.45	12.00	0.61	-----	-----	-----	-----	-----	-----	-----	-----	0.61
19.70	0.44	11.99	0.60	-----	-----	-----	-----	-----	-----	-----	-----	0.60
19.80	0.43	11.98	0.58	-----	-----	-----	-----	-----	-----	-----	-----	0.58
19.90	0.43	11.97	0.56	-----	-----	-----	-----	-----	-----	-----	-----	0.56
20.00	0.42	11.96	0.55	-----	-----	-----	-----	-----	-----	-----	-----	0.55
20.10	0.41	11.95	0.53	-----	-----	-----	-----	-----	-----	-----	-----	0.53
20.20	0.40	11.94	0.52	-----	-----	-----	-----	-----	-----	-----	-----	0.52
20.30	0.40	11.94	0.51	-----	-----	-----	-----	-----	-----	-----	-----	0.51
20.40	0.40	11.93	0.49	-----	-----	-----	-----	-----	-----	-----	-----	0.49
20.50	0.39	11.92	0.48	-----	-----	-----	-----	-----	-----	-----	-----	0.48
20.60	0.39	11.92	0.47	-----	-----	-----	-----	-----	-----	-----	-----	0.47
20.70	0.39	11.91	0.46	-----	-----	-----	-----	-----	-----	-----	-----	0.46
20.80	0.39	11.91	0.46	-----	-----	-----	-----	-----	-----	-----	-----	0.46
20.90	0.39	11.90	0.45	-----	-----	-----	-----	-----	-----	-----	-----	0.45
21.00	0.38	11.90	0.44	-----	-----	-----	-----	-----	-----	-----	-----	0.44
21.10	0.38	11.89	0.44	-----	-----	-----	-----	-----	-----	-----	-----	0.44
21.20	0.38	11.89	0.43	-----	-----	-----	-----	-----	-----	-----	-----	0.43
21.30	0.38	11.89	0.43	-----	-----	-----	-----	-----	-----	-----	-----	0.43
21.40	0.38	11.88	0.42	-----	-----	-----	-----	-----	-----	-----	-----	0.42
21.50	0.38	11.88	0.42	-----	-----	-----	-----	-----	-----	-----	-----	0.42
21.60	0.38	11.88	0.41	-----	-----	-----	-----	-----	-----	-----	-----	0.41
21.70	0.38	11.88	0.41	-----	-----	-----	-----	-----	-----	-----	-----	0.41
21.80	0.37	11.87	0.41	-----	-----	-----	-----	-----	-----	-----	-----	0.41
21.90	0.37	11.87	0.40	-----	-----	-----	-----	-----	-----	-----	-----	0.40
22.00	0.37	11.87	0.40	-----	-----	-----	-----	-----	-----	-----	-----	0.40
22.10	0.37	11.87	0.40	-----	-----	-----	-----	-----	-----	-----	-----	0.40
22.20	0.37	11.87	0.39	-----	-----	-----	-----	-----	-----	-----	-----	0.39
22.30	0.37	11.87	0.39	-----	-----	-----	-----	-----	-----	-----	-----	0.39
22.40	0.37	11.86	0.39	-----	-----	-----	-----	-----	-----	-----	-----	0.39
22.50	0.36	11.86	0.39	-----	-----	-----	-----	-----	-----	-----	-----	0.39
22.60	0.36	11.86	0.38	-----	-----	-----	-----	-----	-----	-----	-----	0.38
22.70	0.36	11.86	0.38	-----	-----	-----	-----	-----	-----	-----	-----	0.38
22.80	0.36	11.86	0.38	-----	-----	-----	-----	-----	-----	-----	-----	0.38
22.90	0.36	11.86	0.38	-----	-----	-----	-----	-----	-----	-----	-----	0.38
23.00	0.36	11.86	0.38	-----	-----	-----	-----	-----	-----	-----	-----	0.38
23.10	0.36	11.85	0.37	-----	-----	-----	-----	-----	-----	-----	-----	0.37
23.20	0.35	11.85	0.37	-----	-----	-----	-----	-----	-----	-----	-----	0.37
23.30	0.35	11.85	0.37	-----	-----	-----	-----	-----	-----	-----	-----	0.37
23.40	0.35	11.85	0.37	-----	-----	-----	-----	-----	-----	-----	-----	0.37
23.50	0.35	11.85	0.37	-----	-----	-----	-----	-----	-----	-----	-----	0.37
23.60	0.35	11.85	0.37	-----	-----	-----	-----	-----	-----	-----	-----	0.37
23.70	0.35	11.85	0.36	-----	-----	-----	-----	-----	-----	-----	-----	0.36
23.80	0.35	11.85	0.36	-----	-----	-----	-----	-----	-----	-----	-----	0.36
23.90	0.34	11.84	0.36	-----	-----	-----	-----	-----	-----	-----	-----	0.36
24.00	0.34	11.84	0.36	-----	-----	-----	-----	-----	-----	-----	-----	0.36
24.10	0.31	11.84	0.36	-----	-----	-----	-----	-----	-----	-----	-----	0.36
24.20	0.26	11.84	0.35	-----	-----	-----	-----	-----	-----	-----	-----	0.35
24.30	0.17	11.83	0.34	-----	-----	-----	-----	-----	-----	-----	-----	0.34

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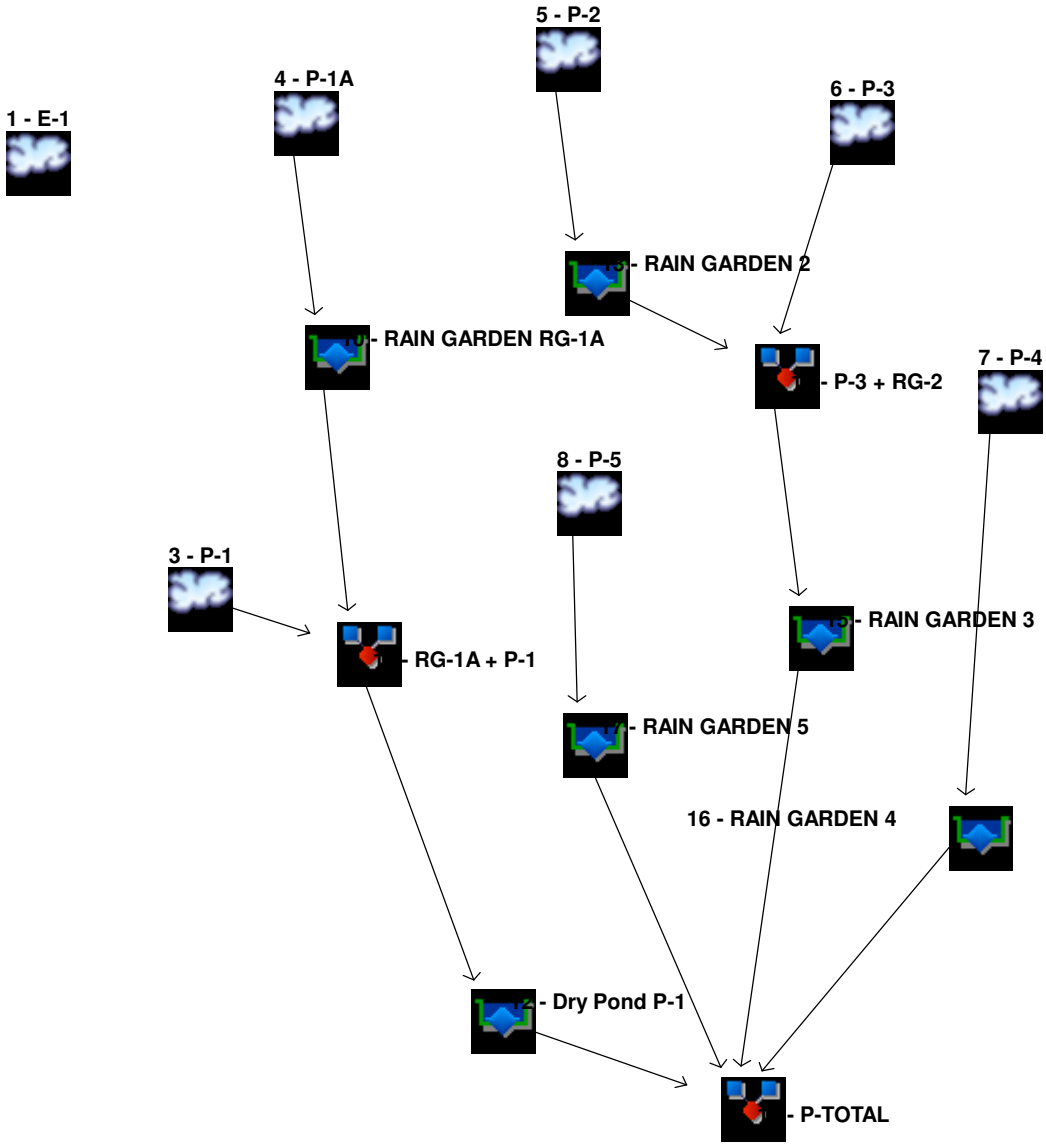
10-YEAR STORM

APPENDIX 4

Hydraflow Calculations

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	E-1
3	SCS Runoff	P-1
4	SCS Runoff	P-1A
5	SCS Runoff	P-2
6	SCS Runoff	P-3
7	SCS Runoff	P-4
8	SCS Runoff	P-5
10	Reservoir	RAIN GARDEN RG-1A
11	Combine	RG-1A + P-1
12	Reservoir	Dry Pond P-1
13	Reservoir	RAIN GARDEN 2
14	Combine	P-3 + RG-2
15	Reservoir	RAIN GARDEN 3
16	Reservoir	RAIN GARDEN 4
17	Reservoir	RAIN GARDEN 5
18	Combine	P-TOTAL

Hydrograph Return Period Recap

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	-------	-------	1.944	-------	-------	5.470	-------	-------	10.67	E-1
3	SCS Runoff	-------	-------	1.605	-------	-------	3.337	-------	-------	5.670	P-1
4	SCS Runoff	-------	-------	0.551	-------	-------	1.475	-------	-------	2.823	P-1A
5	SCS Runoff	-------	-------	0.509	-------	-------	1.432	-------	-------	2.793	P-2
6	SCS Runoff	-------	-------	0.332	-------	-------	0.707	-------	-------	1.225	P-3
7	SCS Runoff	-------	-------	0.331	-------	-------	0.662	-------	-------	1.110	P-4
8	SCS Runoff	-------	-------	0.618	-------	-------	1.451	-------	-------	2.627	P-5
10	Reservoir	4	-------	0.070	-------	-------	0.197	-------	-------	2.038	RAIN GARDEN RG-1A
11	Combine	3, 10	-------	1.650	-------	-------	3.469	-------	-------	7.620	RG-1A + P-1
12	Reservoir	11	-------	1.404	-------	-------	3.165	-------	-------	5.243	Dry Pond P-1
13	Reservoir	5	-------	0.255	-------	-------	1.199	-------	-------	1.853	RAIN GARDEN 2
14	Combine	6, 13	-------	0.332	-------	-------	1.290	-------	-------	2.140	P-3 + RG-2
15	Reservoir	14	-------	0.275	-------	-------	1.136	-------	-------	1.994	RAIN GARDEN 3
16	Reservoir	7	-------	0.285	-------	-------	0.523	-------	-------	0.927	RAIN GARDEN 4
17	Reservoir	8	-------	0.233	-------	-------	0.646	-------	-------	1.270	RAIN GARDEN 5
18	Combine	12, 15, 16, 17	-------	1.923	-------	-------	4.762	-------	-------	8.484	P-TOTAL

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

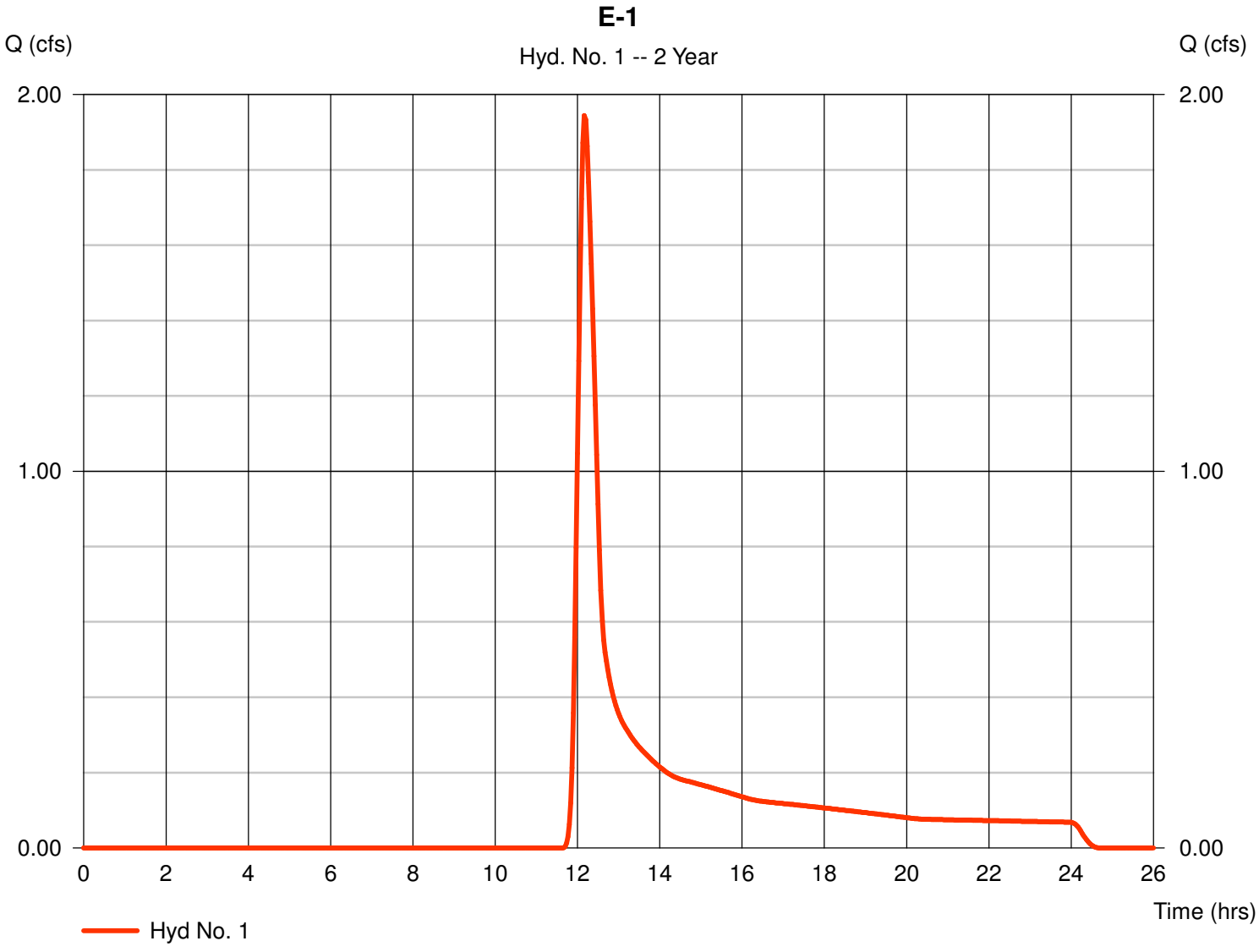
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	1.944	2	730	8,851	----	------	------	E-1
3	SCS Runoff	1.605	2	726	5,198	----	------	------	P-1
4	SCS Runoff	0.551	2	722	1,639	----	------	------	P-1A
5	SCS Runoff	0.509	2	730	2,317	----	------	------	P-2
6	SCS Runoff	0.332	2	718	669	----	------	------	P-3
7	SCS Runoff	0.331	2	718	663	----	------	------	P-4
8	SCS Runoff	0.618	2	720	1,479	----	------	------	P-5
10	Reservoir	0.070	2	764	1,631	4	19.50	550	RAIN GARDEN RG-1A
11	Combine	1.650	2	726	6,829	3, 10	------	------	RG-1A + P-1
12	Reservoir	1.404	2	730	6,792	11	17.17	153	Dry Pond P-1
13	Reservoir	0.255	2	748	1,723	5	12.90	658	RAIN GARDEN 2
14	Combine	0.332	2	718	2,392	6, 13	------	------	P-3 + RG-2
15	Reservoir	0.275	2	720	2,337	14	9.91	122	RAIN GARDEN 3
16	Reservoir	0.285	2	720	641	7	10.03	72.9	RAIN GARDEN 4
17	Reservoir	0.233	2	728	1,302	8	9.91	409	RAIN GARDEN 5
18	Combine	1.923	2	722	11,073	12, 15, 16, 17	------	------	P-TOTAL

Hydrograph Report

Hyd. No. 1

E-1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.944 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	8,851 cuft
Drainage area	=	4.470 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	25.70 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 1

E-1

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.240	0.011	0.011	
Flow length (ft)	= 167.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 2.70	0.00	0.00	
Land slope (%)	= 2.00	0.00	0.00	
Travel Time (min)	**= 23.42**	**+ 0.00**	**+ 0.00**	**= 23.42**
Shallow Concentrated Flow				
Flow length (ft)	= 395.00	0.00	0.00	
Watercourse slope (%)	= 3.10	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 2.84	0.00	0.00	
Travel Time (min)	**= 2.32**	**+ 0.00**	**+ 0.00**	**= 2.32**
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 ..... 25.70 min

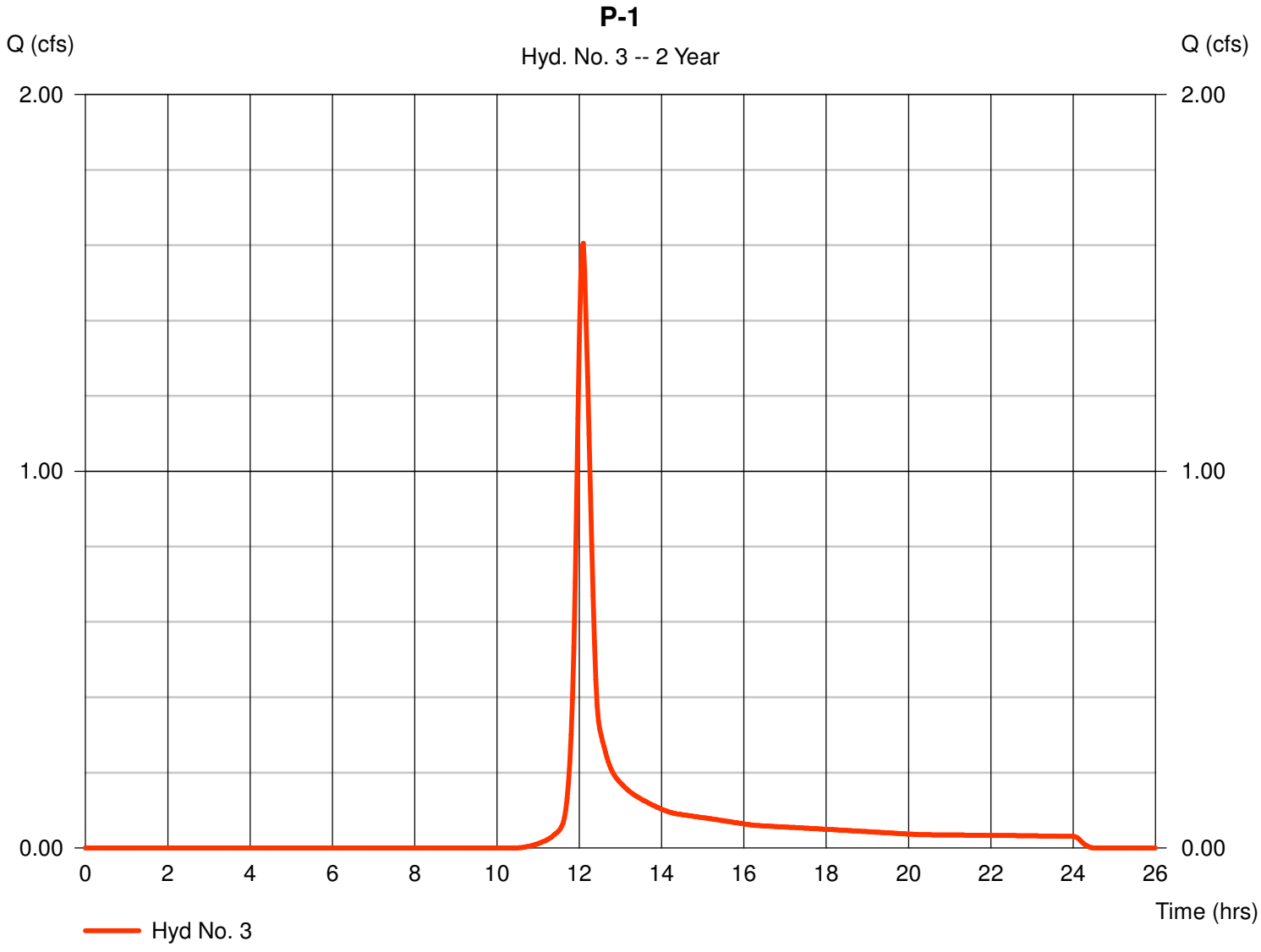
Hydrograph Report

Hyd. No. 3

P-1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.605 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	5,198 cuft
Drainage area	=	1.470 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	19.30 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.741 x 98) + (0.460 x 61)] / 1.470



TR55 Tc Worksheet

Hyd. No. 3

P-1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 132.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.70		0.00		0.00		
Land slope (%)	= 2.50		0.00		0.00		
Travel Time (min)	**= 17.74**	**+**	**0.00**	**+**	**0.00**	**=**	**17.74**
Shallow Concentrated Flow							
Flow length (ft)	= 160.00		0.00		0.00		
Watercourse slope (%)	= 1.20		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	= 1.77		0.00		0.00		
Travel Time (min)	**= 1.51**	**+**	**0.00**	**+**	**0.00**	**=**	**1.51**
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 ..... 19.30 min

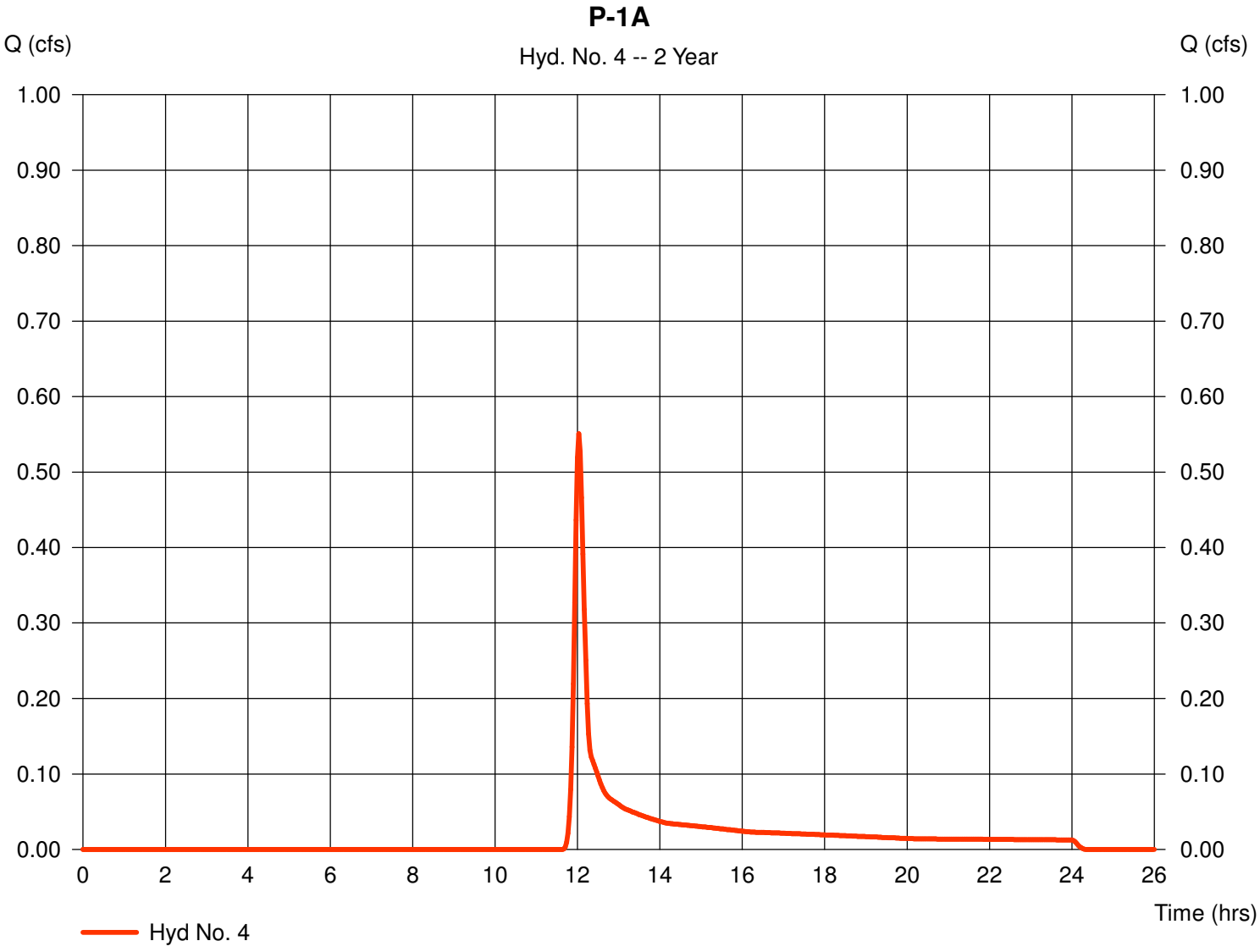
Hydrograph Report

Hyd. No. 4

P-1A

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.551 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	1,639 cuft
Drainage area	=	0.790 ac	Curve number	=	70*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	10.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.680 x 61) + (0.190 x 98)] / 0.790

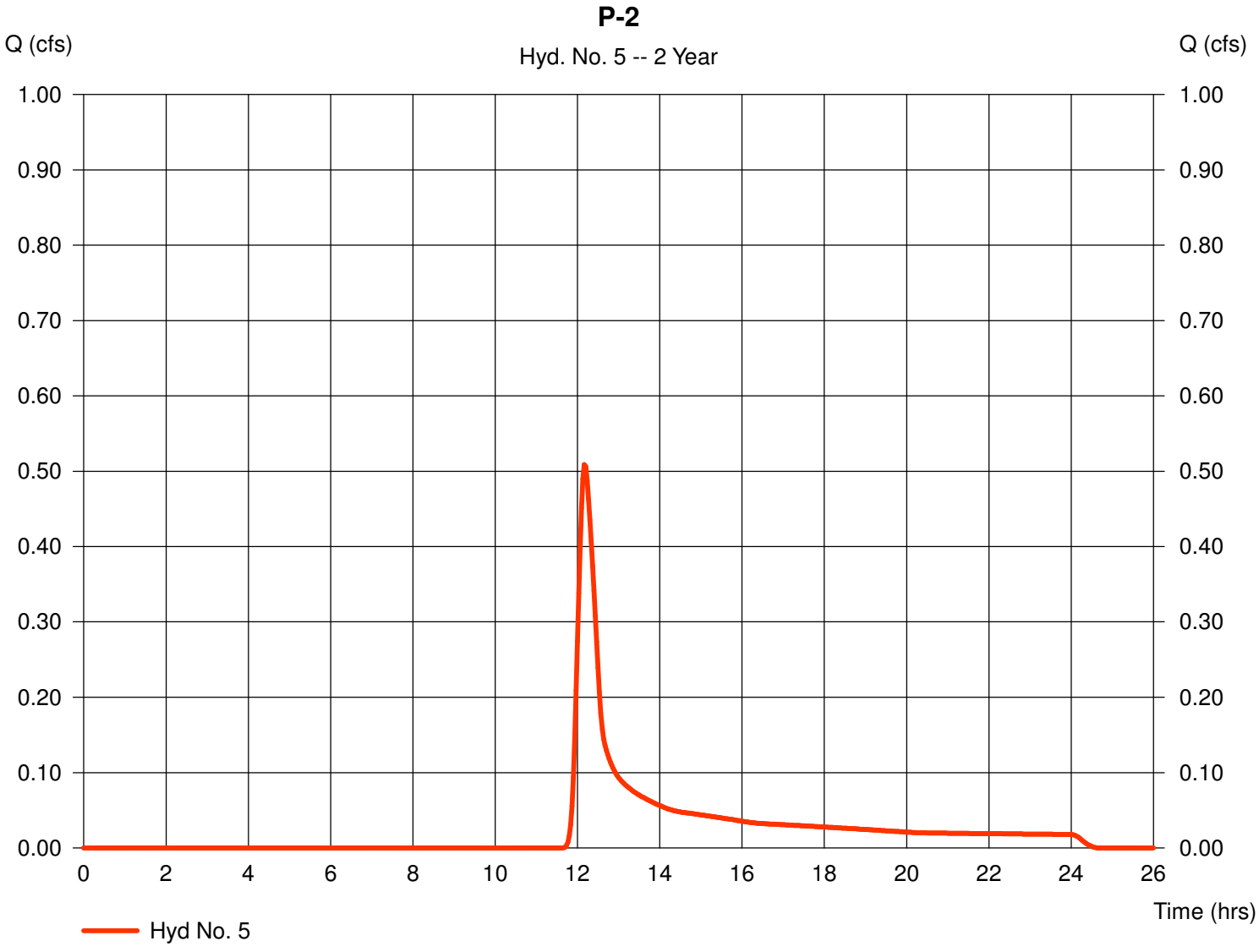


Hydrograph Report

Hyd. No. 5

P-2

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.509 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	2,317 cuft
Drainage area	=	1.170 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	25.50 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 5

P-2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 167.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.70		0.00		0.00		
Land slope (%)	= 2.00		0.00		0.00		
Travel Time (min)	**= 23.42**	**+**	**0.00**	**+**	**0.00**	**=**	**23.42**
Shallow Concentrated Flow							
Flow length (ft)	= 310.00		0.00		0.00		
Watercourse slope (%)	= 2.40		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	= 2.50		0.00		0.00		
Travel Time (min)	**= 2.07**	**+**	**0.00**	**+**	**0.00**	**=**	**2.07**
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**

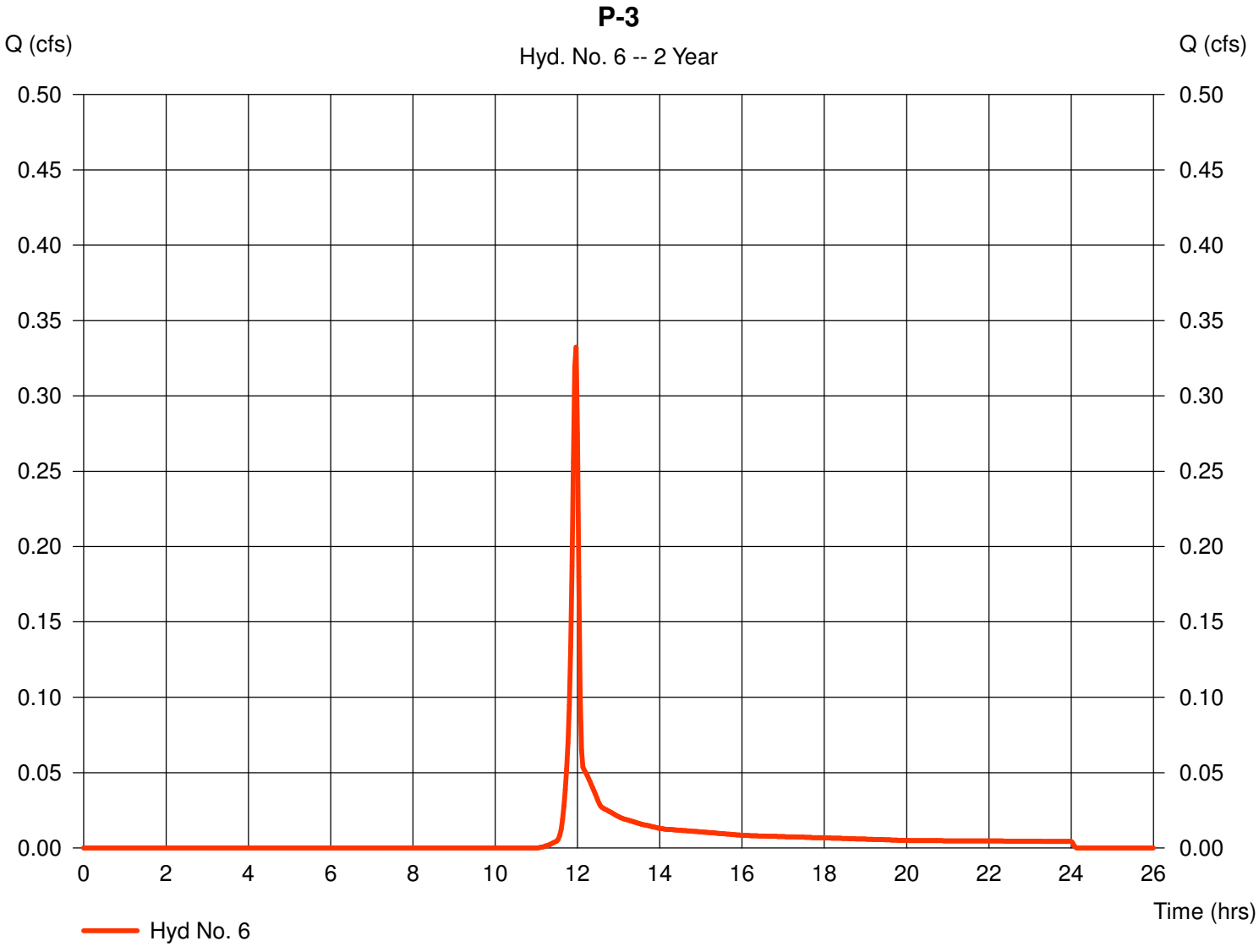
Total Travel Time, Tc ..... 25.50 min

Hydrograph Report

Hyd. No. 6

P-3

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.332 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	669 cuft
Drainage area	=	0.240 ac	Curve number	=	76
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.20 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 6

P-3

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 75.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.70		0.00		0.00		
Land slope (%)	= 17.00		0.00		0.00		
Travel Time (min)	**= 5.24**	**+**	**0.00**	**+**	**0.00**	**=**	**5.24**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
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**

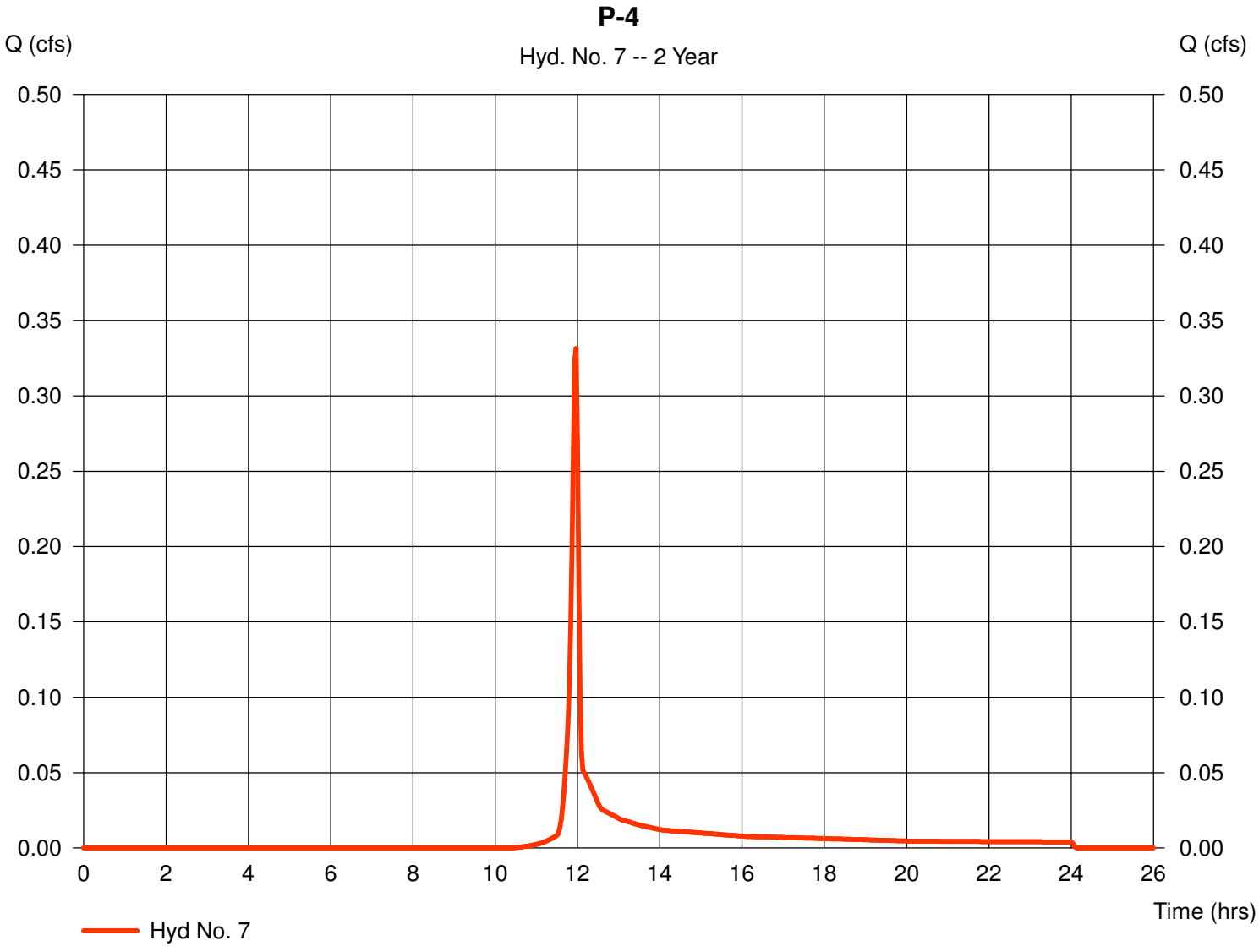
Total Travel Time, Tc ..... 5.20 min

Hydrograph Report

Hyd. No. 7

P-4

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.331 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	663 cuft
Drainage area	=	0.200 ac	Curve number	=	79
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 7

P-4

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.240	0.011	0.011	
Flow length (ft)	= 70.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 2.70	0.00	0.00	
Land slope (%)	= 17.00	0.00	0.00	
Travel Time (min)	**= 4.96**	**+ 0.00**	**+ 0.00**	**= 4.96**
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	0.00	0.00	
Watercourse slope (%)	= 0.00	0.00	0.00	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	= 0.00	0.00	0.00	
Travel Time (min)	**= 0.00**	**+ 0.00**	**+ 0.00**	**= 0.00**
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**

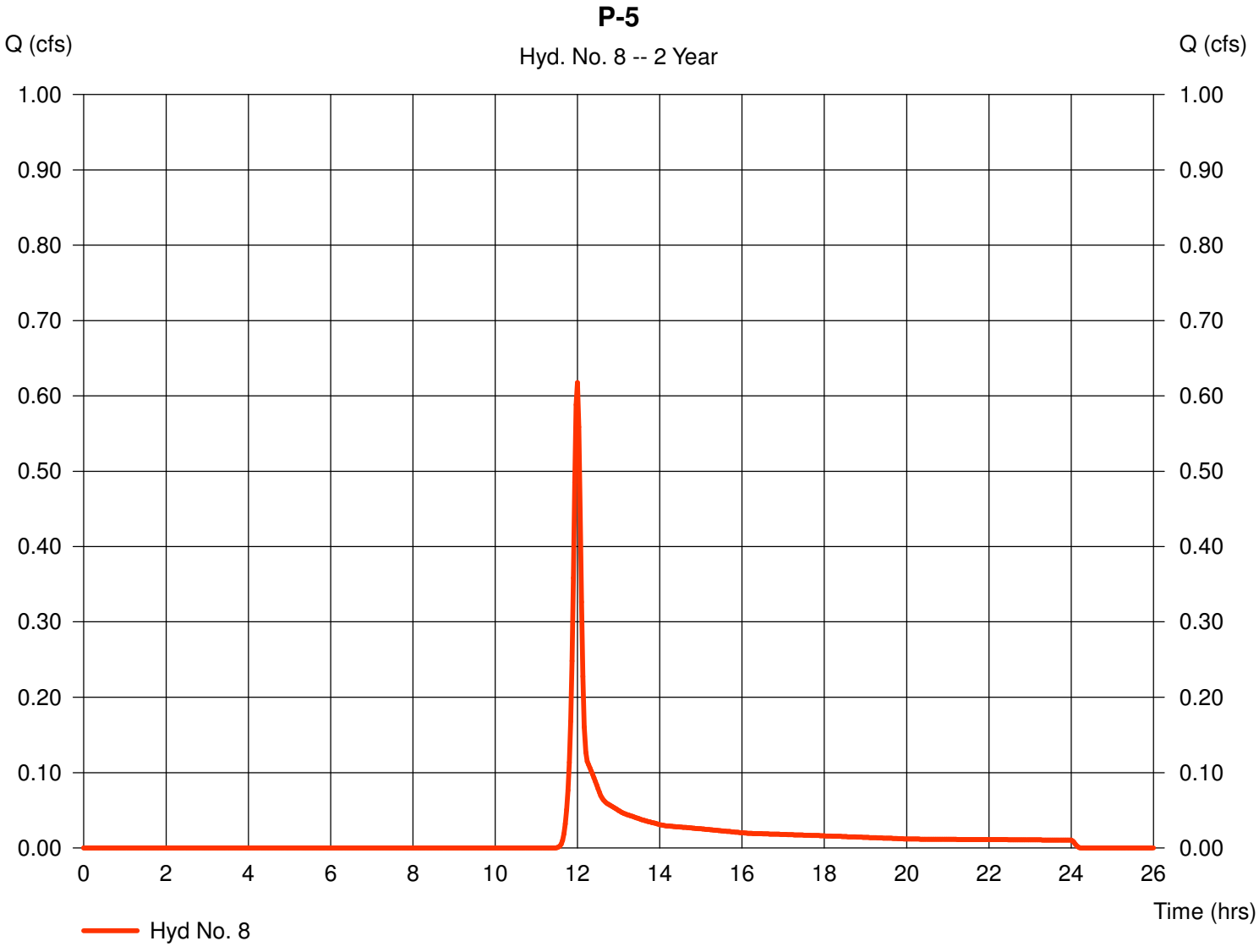
Total Travel Time, Tc ..... 5.00 min

Hydrograph Report

Hyd. No. 8

P-5

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.618 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	1,479 cuft
Drainage area	=	0.600 ac	Curve number	=	73
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.40 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 8

P-5

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.240		0.011		
Flow length (ft)	= 42.0		24.0		0.0		
Two-year 24-hr precip. (in)	= 2.70		2.70		0.00		
Land slope (%)	= 4.00		20.00		0.00		
Travel Time (min)	**= 5.88**	**+**	**1.97**	**+**	**0.00**	**=**	**7.86**
Shallow Concentrated Flow							
Flow length (ft)	= 110.00		0.00		0.00		
Watercourse slope (%)	= 4.20		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	= 3.31		0.00		0.00		
Travel Time (min)	**= 0.55**	**+**	**0.00**	**+**	**0.00**	**=**	**0.55**
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 ..... 8.40 min

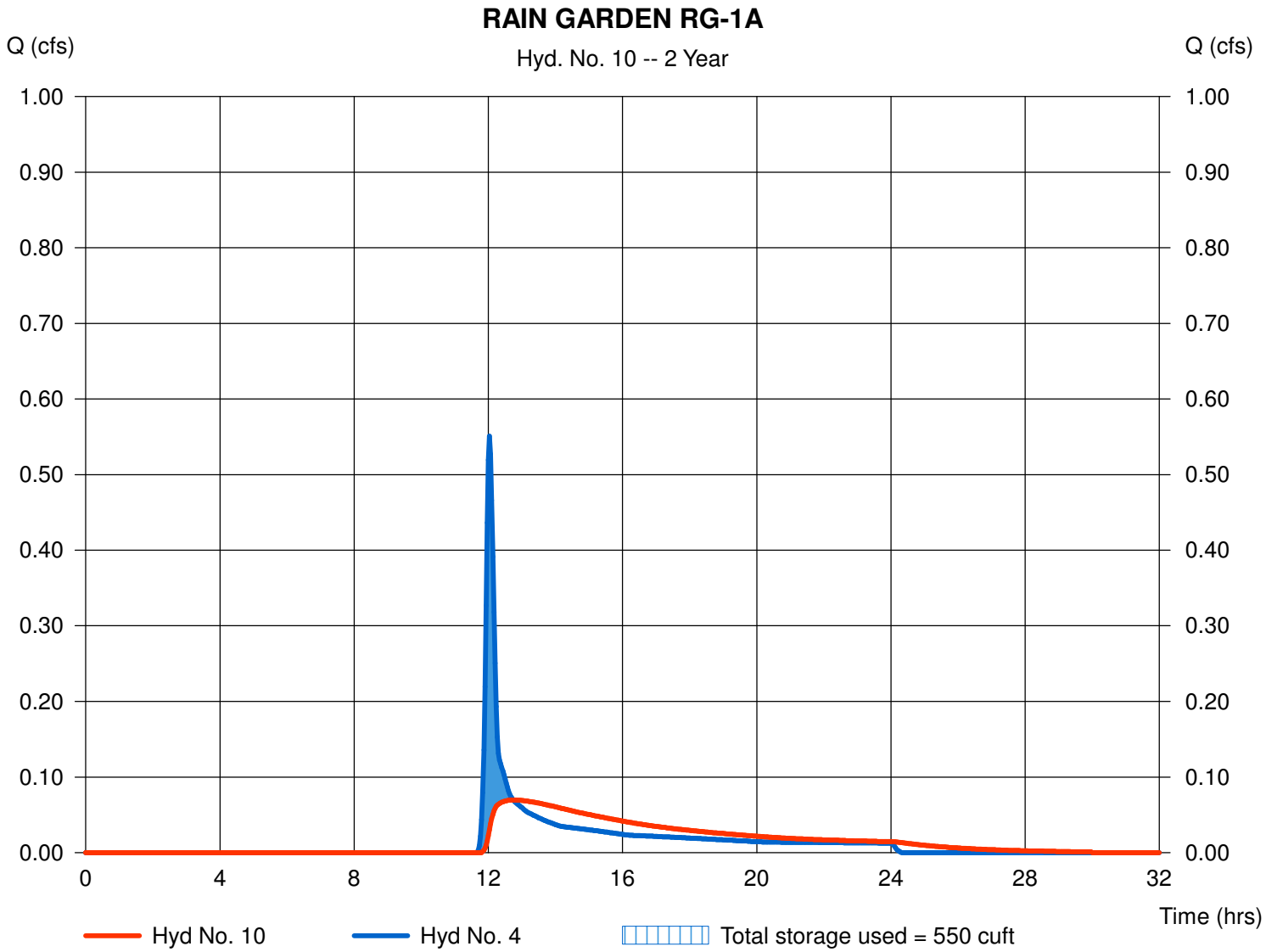
Hydrograph Report

Hyd. No. 10

RAIN GARDEN RG-1A

Hydrograph type	=	Reservoir	Peak discharge	=	0.070 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.73 hrs
Time interval	=	2 min	Hyd. volume	=	1,631 cuft
Inflow hyd. No.	=	4 - P-1A	Max. Elevation	=	19.50 ft
Reservoir name	=	RAIN GARDEN RG-1A	Max. Storage	=	550 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Pond No. 7 - RAIN GARDEN RG-1A

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 19.25 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	19.25	1,905	0	0
0.75	20.00	2,508	1,650	1,650
1.25	20.25	2,795	1,325	2,975
1.75	21.00	4,075	1,707	4,682

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	0.00	0.00	0.00
Span (in)	= 8.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 16.50	0.00	0.00	0.00
Length (ft)	= 21.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

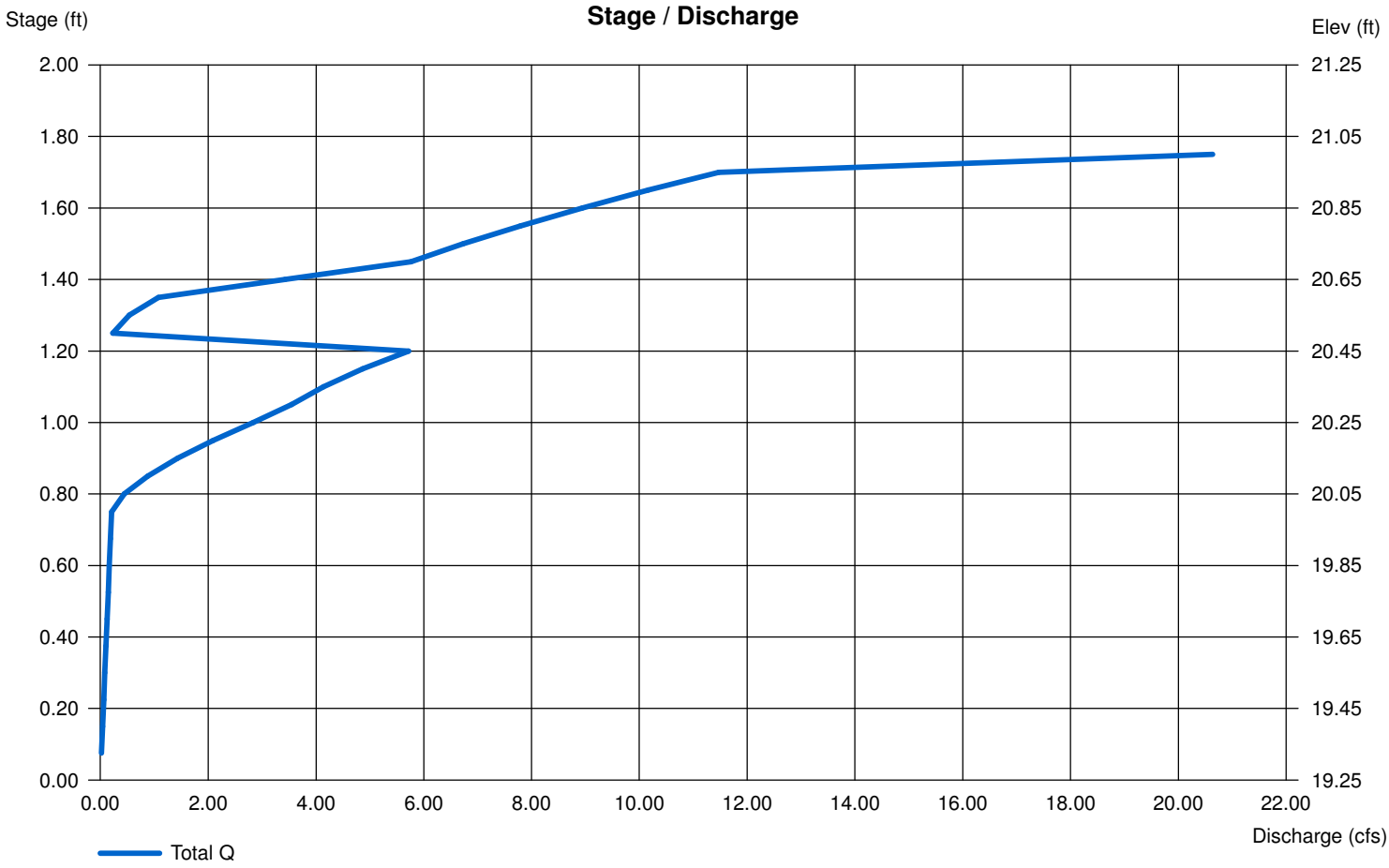
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.28	10.00	0.00	0.00
Crest El. (ft)	= 20.00	20.25	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 3.600 (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).

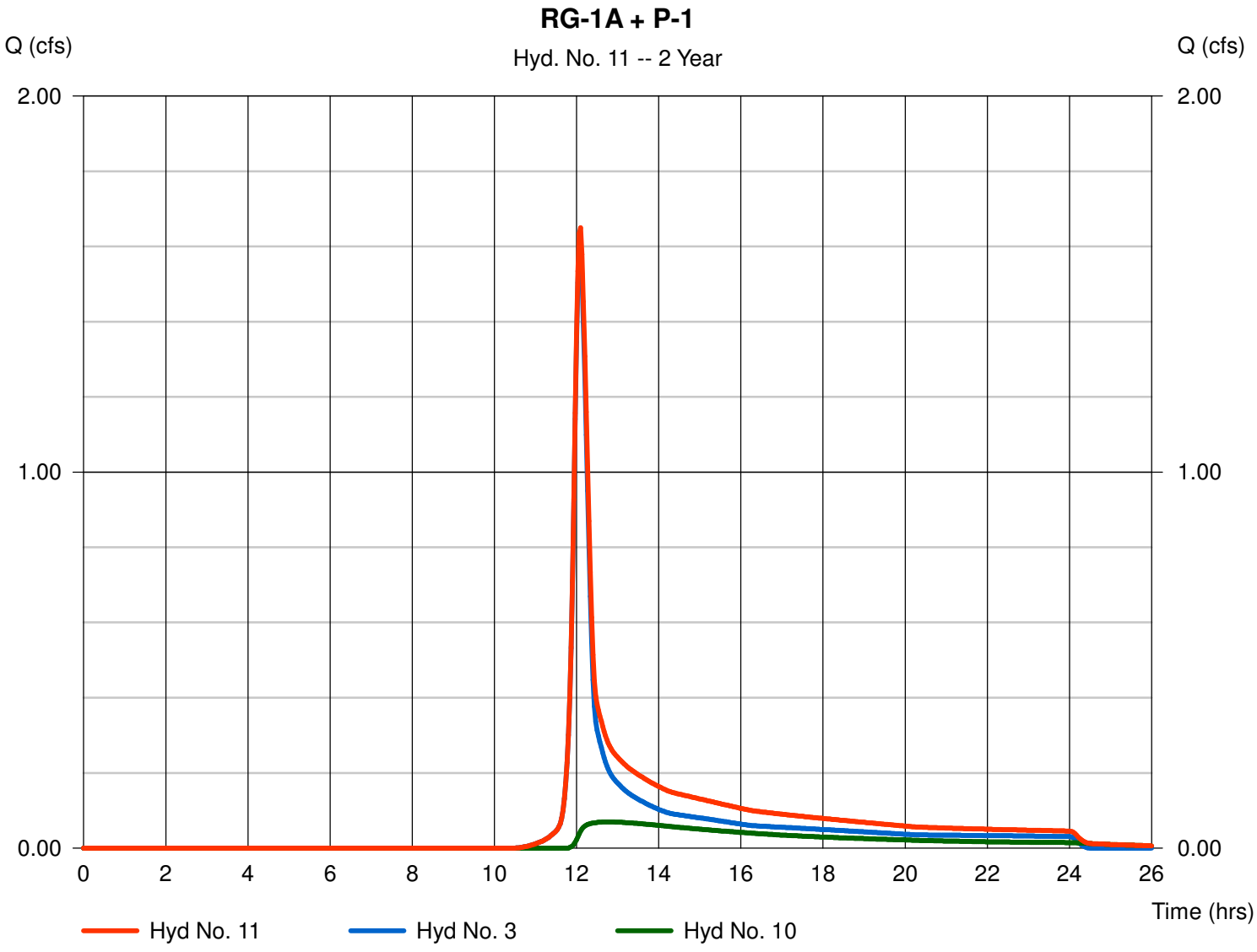


Hydrograph Report

Hyd. No. 11

RG-1A + P-1

Hydrograph type	=	Combine	Peak discharge	=	1.650 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	6,829 cuft
Inflow hyds.	=	3, 10	Contrib. drain. area	=	1.470 ac



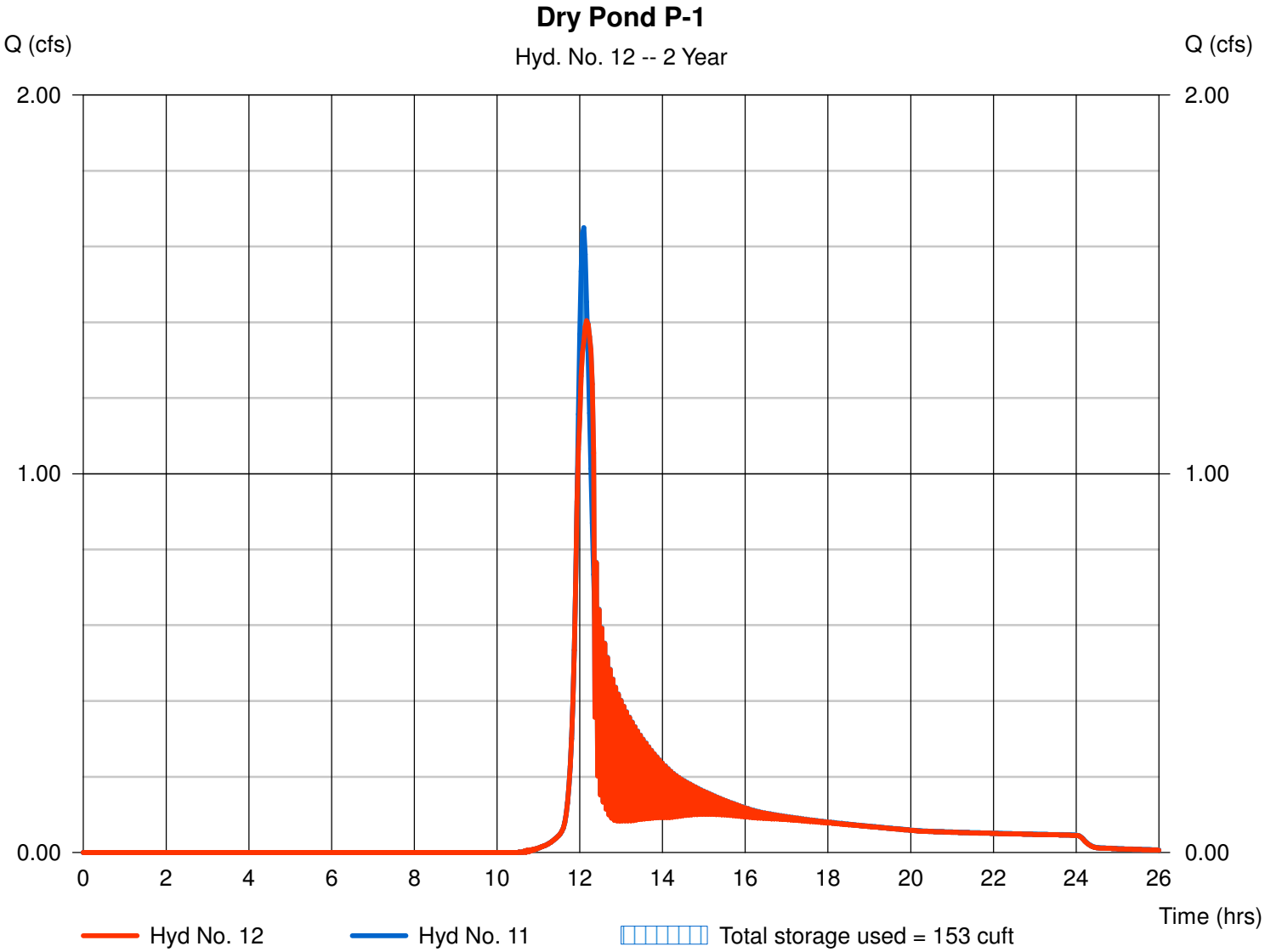
Hydrograph Report

Hyd. No. 12

Dry Pond P-1

Hydrograph type	=	Reservoir	Peak discharge	=	1.404 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	6,792 cuft
Inflow hyd. No.	=	11 - RG-1A + P-1	Max. Elevation	=	17.17 ft
Reservoir name	=	Dry Pond 1	Max. Storage	=	153 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 6 - Dry Pond 1

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 15.35 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	15.35	01	0	0
0.65	16.00	01	1	1
1.15	16.50	01	0	1
1.65	17.00	359	63	64
2.65	18.00	739	538	602
3.15	18.50	967	425	1,027
3.65	19.00	1,549	623	1,650
4.15	19.50	2,663	1,040	2,691
4.65	20.00	4,309	1,726	4,417
5.15	20.50	5,201	2,374	6,791

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	6.50	9.00	0.00
Span (in)	= 12.00	6.50	9.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 13.35	15.35	17.10	0.00
Length (ft)	= 35.00	0.25	0.25	0.00
Slope (%)	= 5.00	0.50	0.50	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

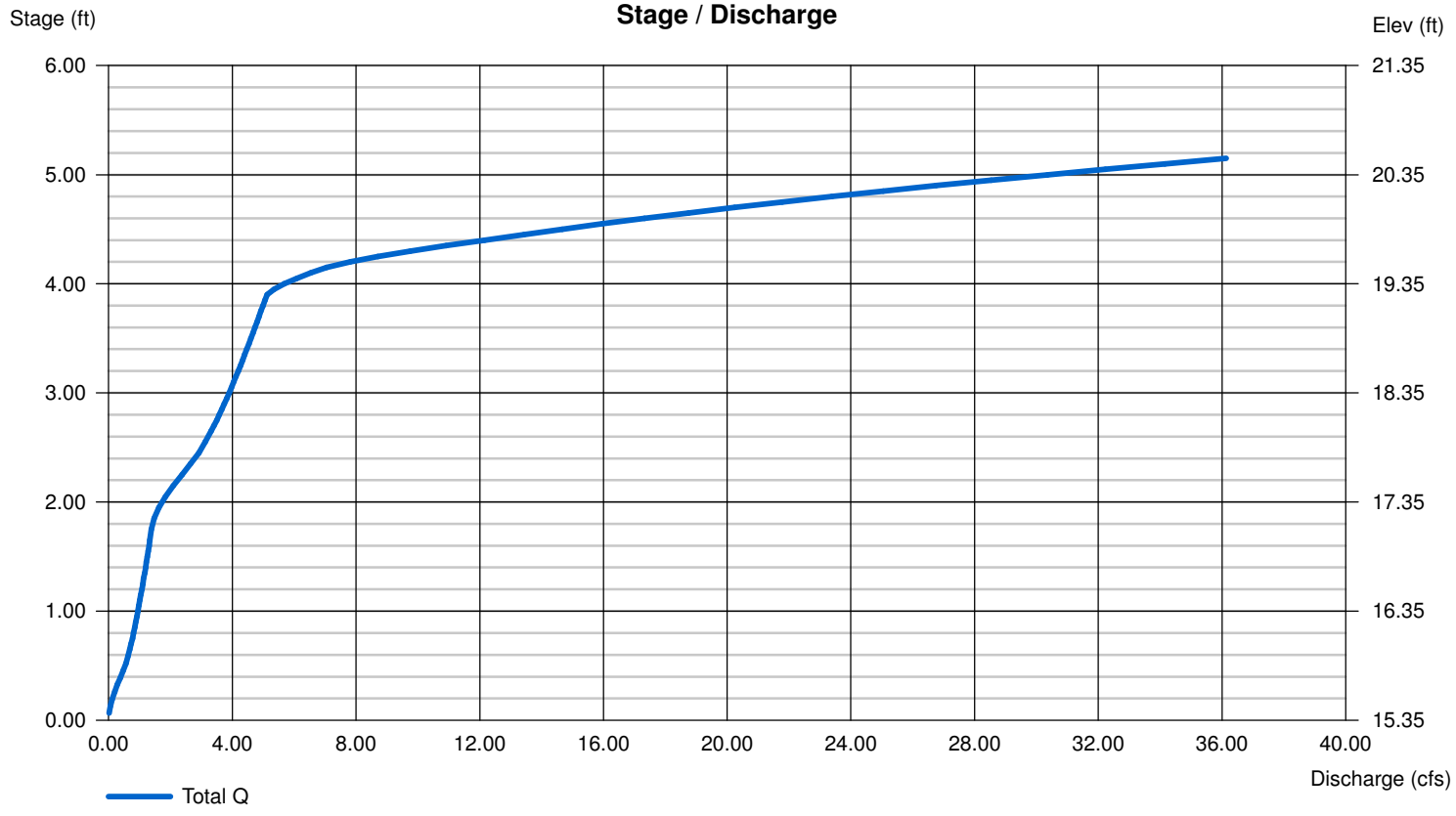
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 5.00	10.00	0.00	0.00
Crest El. (ft)	= 19.25	19.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 3.600 (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).



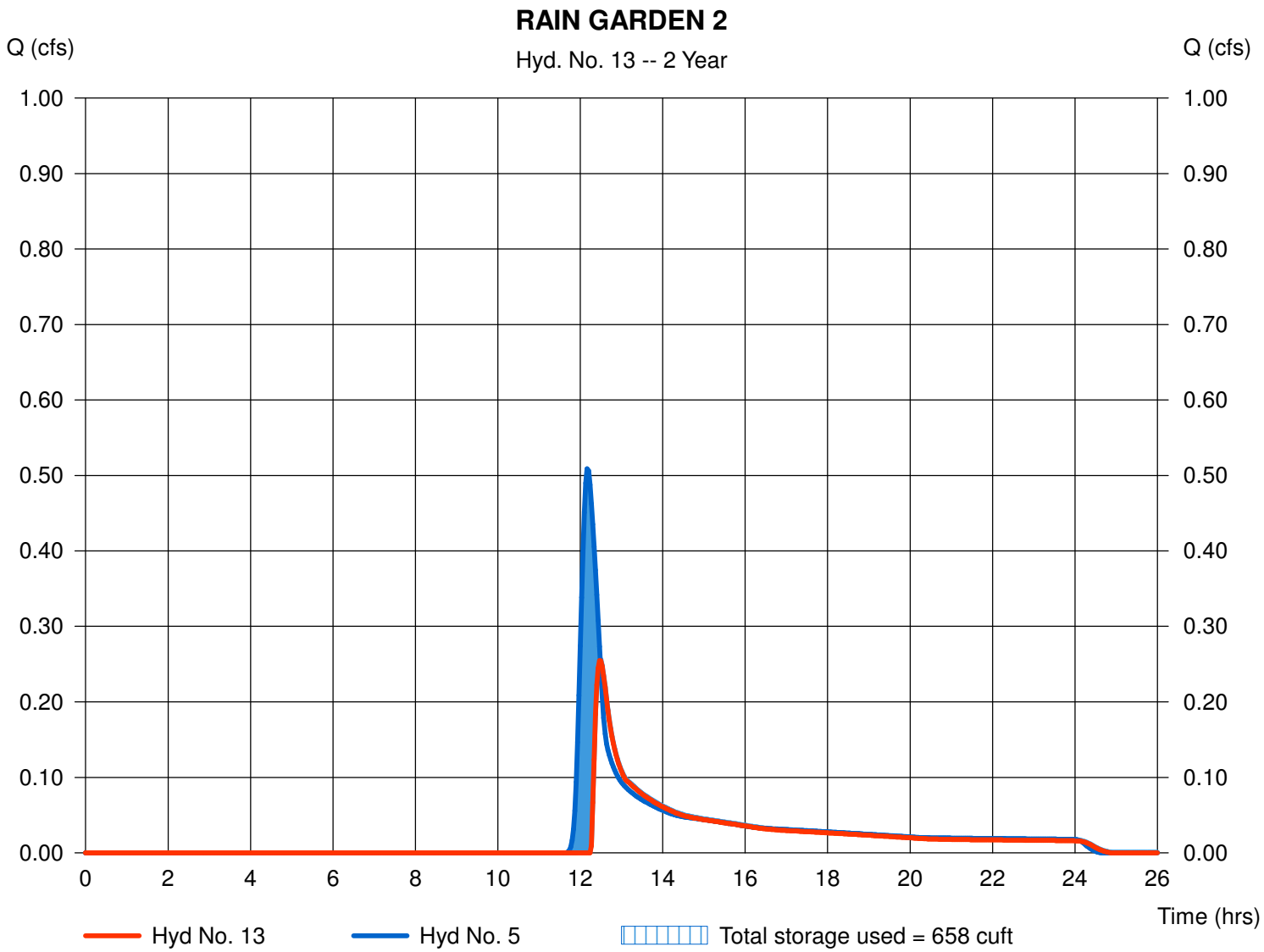
Hydrograph Report

Hyd. No. 13

RAIN GARDEN 2

Hydrograph type	=	Reservoir	Peak discharge	=	0.255 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.47 hrs
Time interval	=	2 min	Hyd. volume	=	1,723 cuft
Inflow hyd. No.	=	5 - P-2	Max. Elevation	=	12.90 ft
Reservoir name	=	RAIN GARDEN 2	Max. Storage	=	658 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 2 - RAIN GARDEN 2

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 12.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	12.50	1,384	0	0
0.50	13.00	1,971	834	834
1.00	13.50	3,233	1,288	2,122
1.50	14.00	5,270	2,105	4,227

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 10.00	0.00	0.00	0.00
Span (in)	= 10.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 11.20	0.00	0.00	0.00
Length (ft)	= 45.00	0.00	0.00	0.00
Slope (%)	= 0.67	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

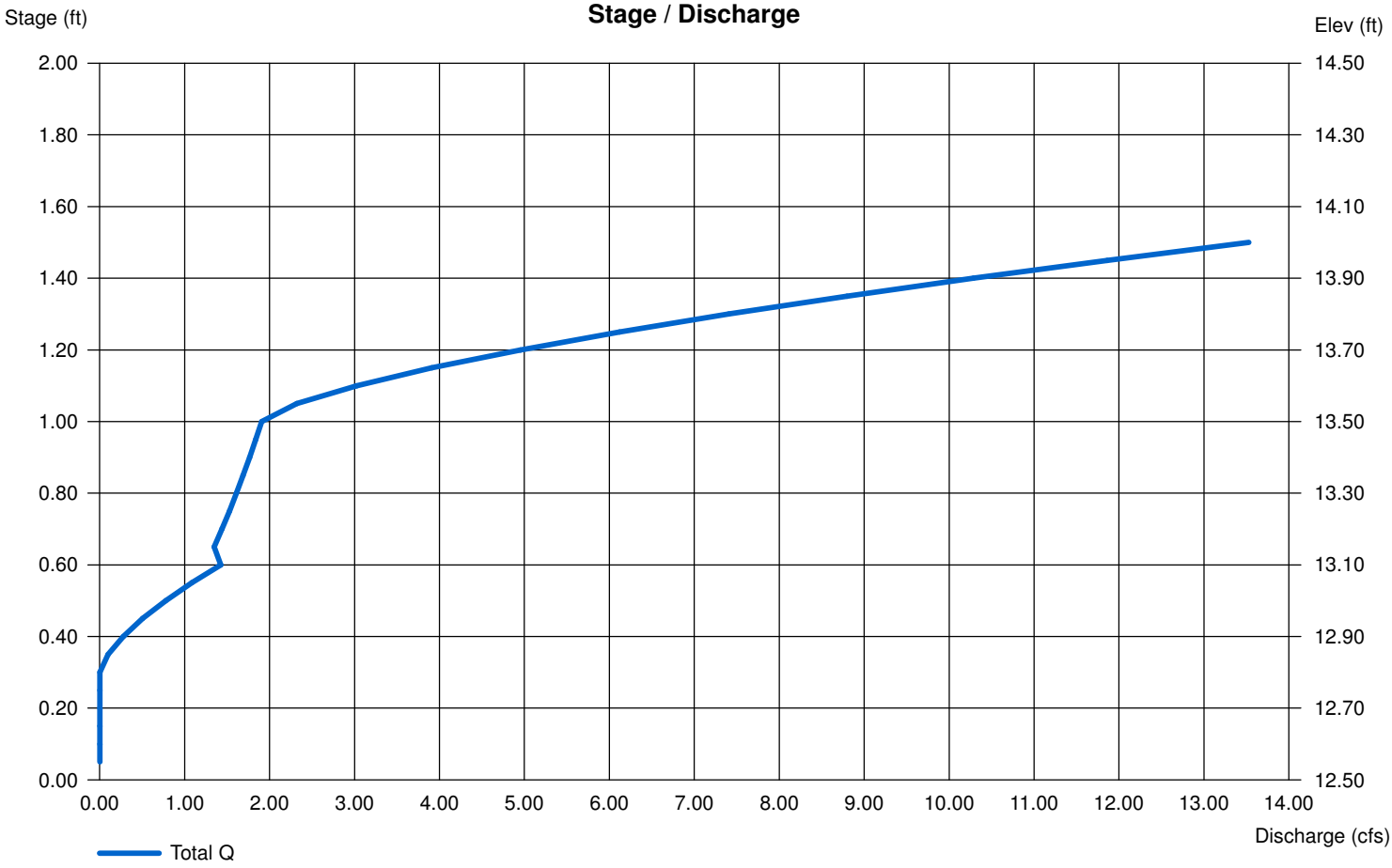
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.60	12.00	0.00	0.00
Crest El. (ft)	= 12.80	13.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.070 (by Contour)

TW Elev. (ft) = 0.00

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

Stage / Discharge

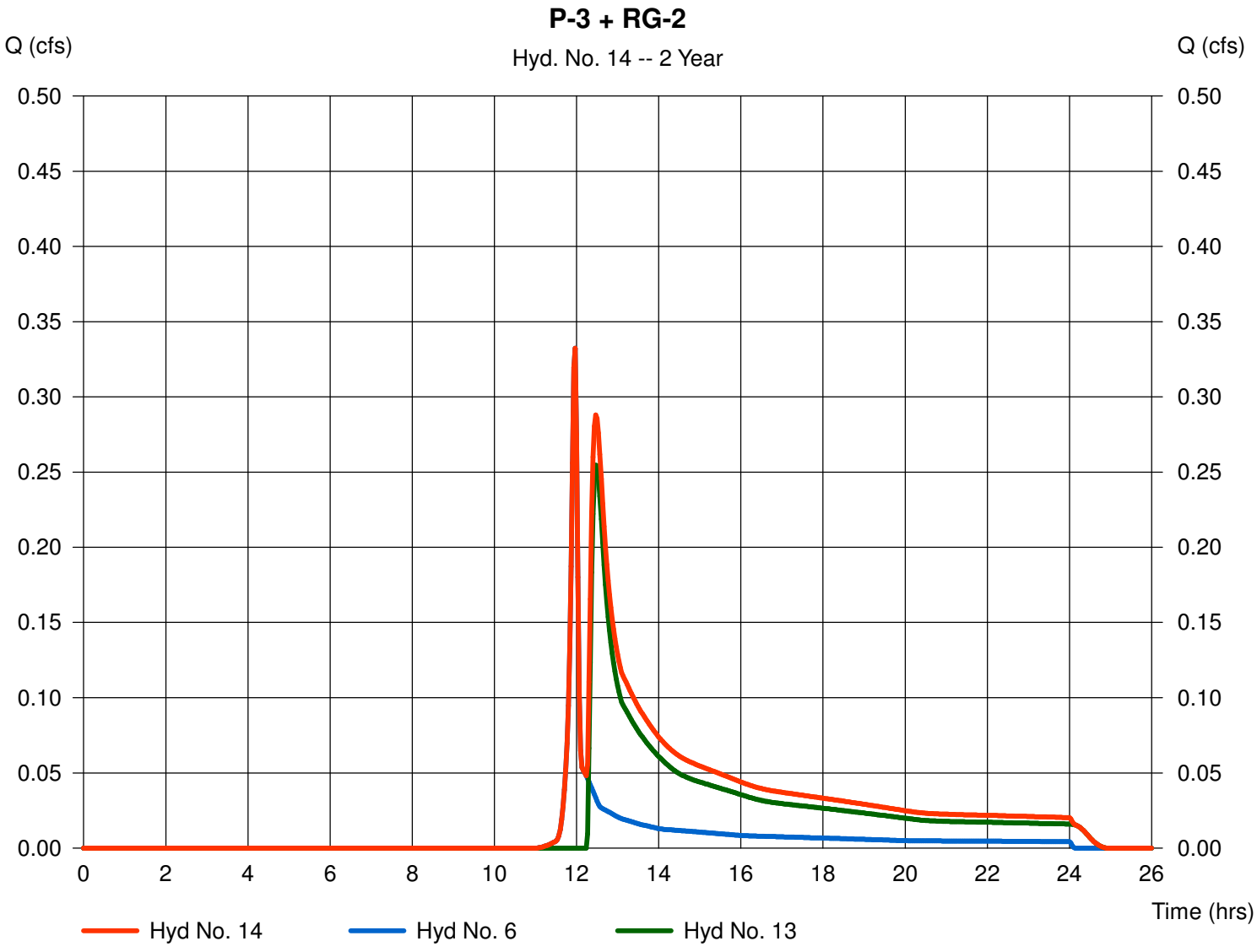


Hydrograph Report

Hyd. No. 14

P-3 + RG-2

Hydrograph type	= Combine	Peak discharge	= 0.332 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 2,392 cuft
Inflow hyds.	= 6, 13	Contrib. drain. area	= 0.240 ac



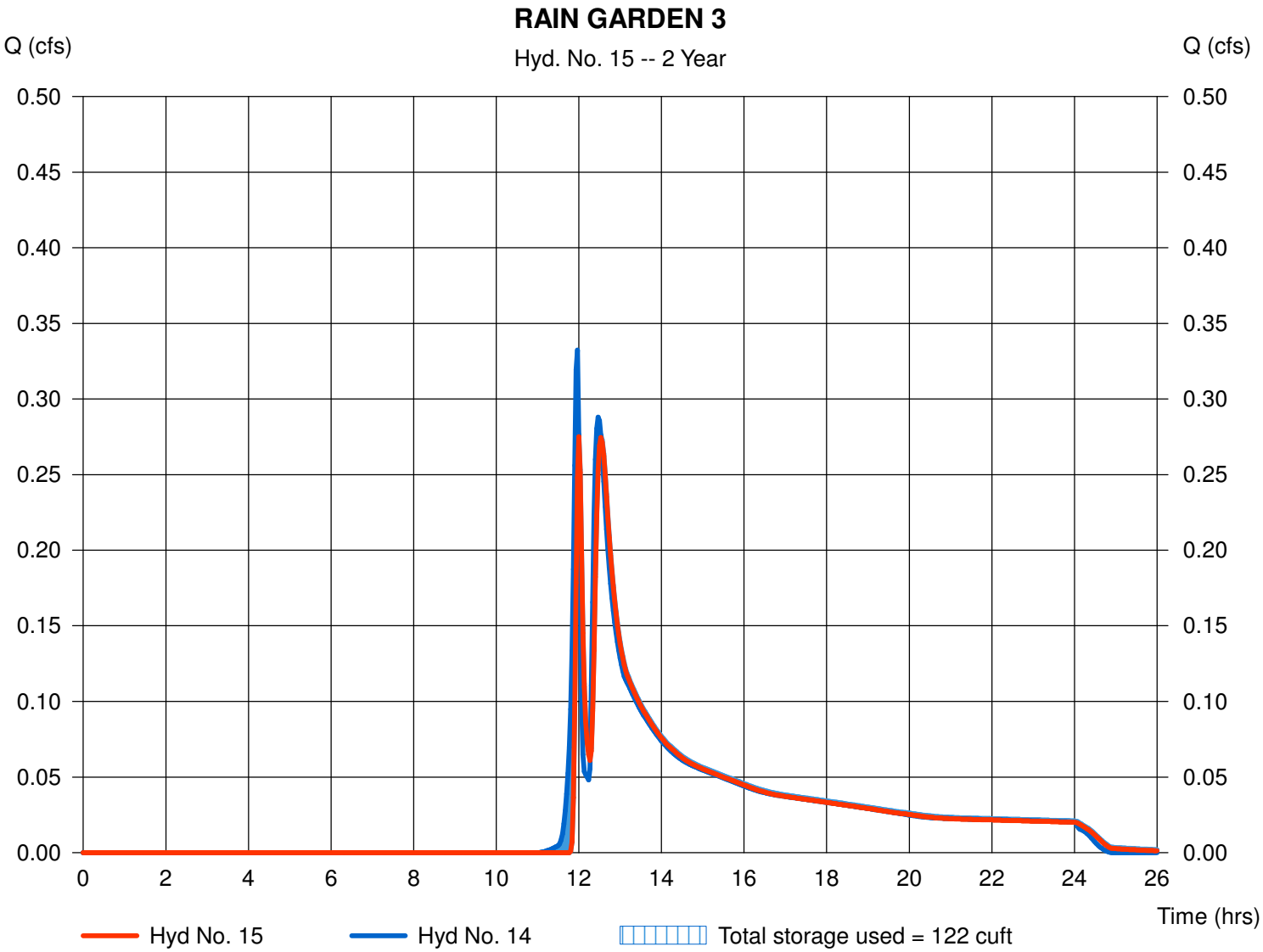
Hydrograph Report

Hyd. No. 15

RAIN GARDEN 3

Hydrograph type	=	Reservoir	Peak discharge	=	0.275 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	2,337 cuft
Inflow hyd. No.	=	14 - P-3 + RG-2	Max. Elevation	=	9.91 ft
Reservoir name	=	RAIN GARDEN 3	Max. Storage	=	122 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 3 - RAIN GARDEN 3

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 9.60 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	9.60	286	0	0
0.40	10.00	516	158	158
1.00	10.70	1,075	467	625
1.50	11.10	1,700	688	1,313

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	0.00	0.00	0.00
Span (in)	= 8.00	0.00	0.00	0.00
No. Barrels	= 2	0	0	0
Invert El. (ft)	= 9.70	0.00	0.00	0.00
Length (ft)	= 17.50	0.00	0.00	0.00
Slope (%)	= 0.57	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

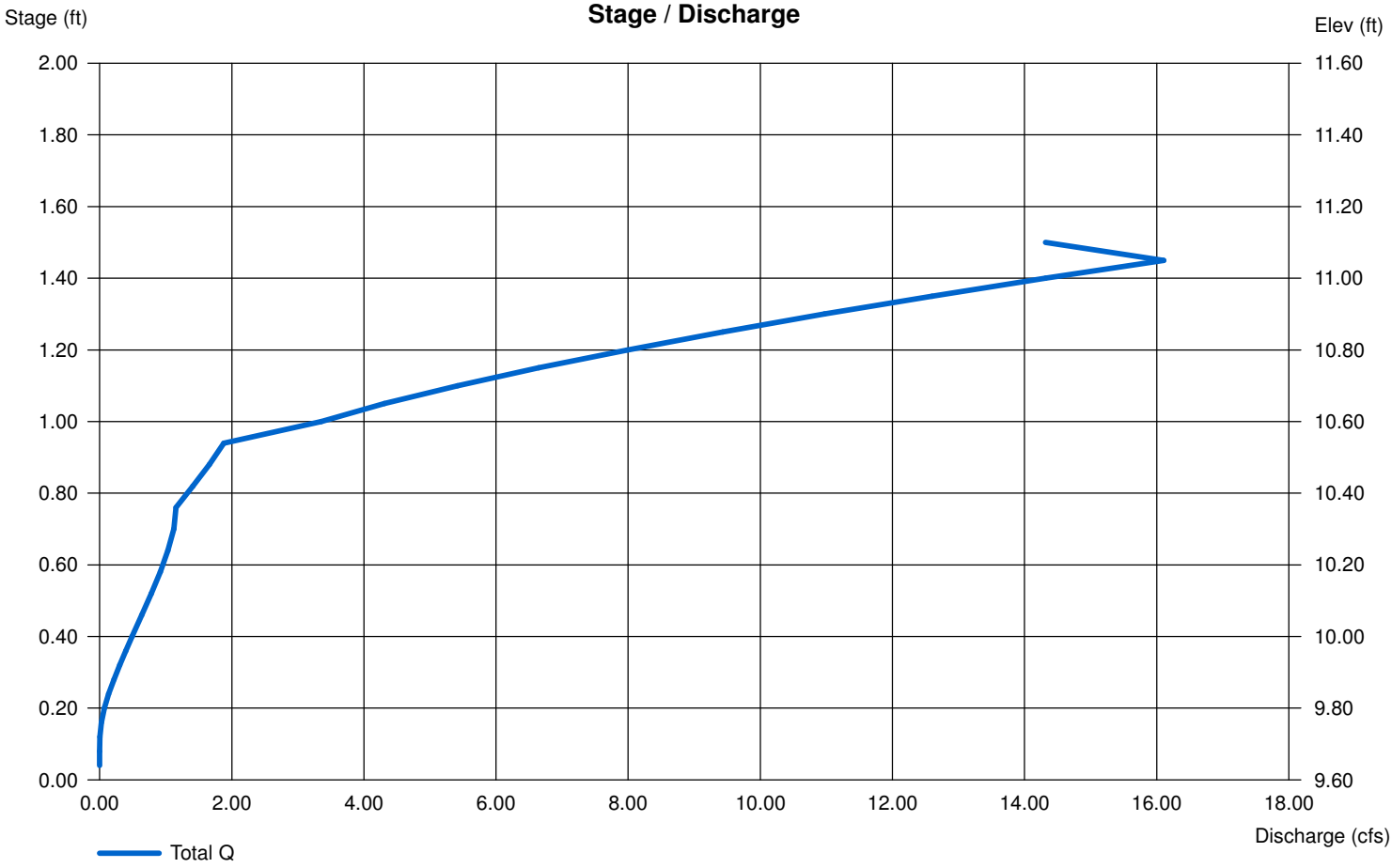
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	0.00	0.00
Crest El. (ft)	= 10.60	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.070 (by Contour)

TW Elev. (ft) = 0.00

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

Stage / Discharge



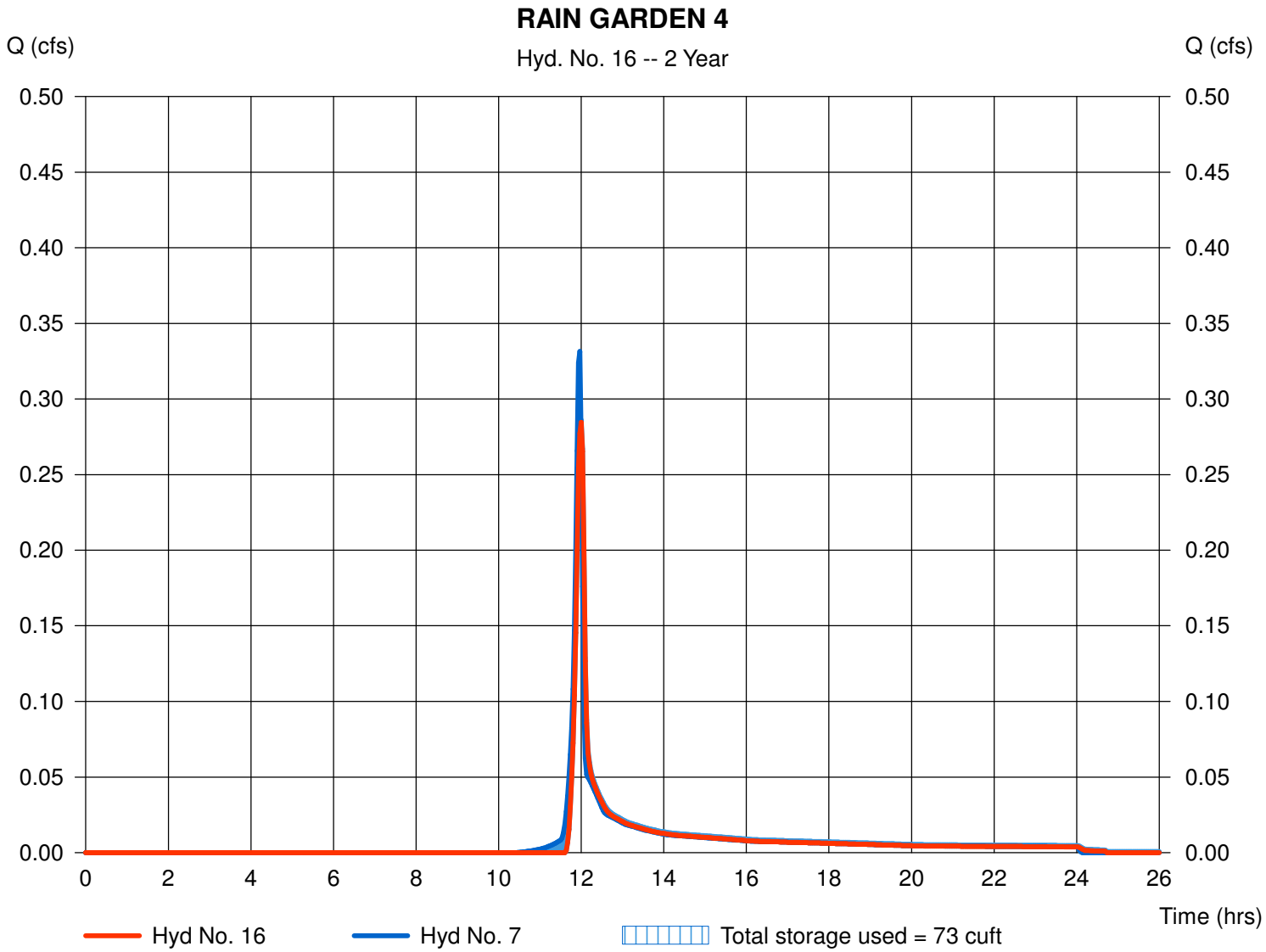
Hydrograph Report

Hyd. No. 16

RAIN GARDEN 4

Hydrograph type	=	Reservoir	Peak discharge	=	0.285 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	641 cuft
Inflow hyd. No.	=	7 - P-4	Max. Elevation	=	10.03 ft
Reservoir name	=	RAIN GARDEN 4	Max. Storage	=	73 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 4 - RAIN GARDEN 4

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 9.60 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	9.60	100	0	0
0.40	10.00	212	61	61
1.00	10.60	617	238	299
1.50	11.10	1,085	420	719

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	0.00	0.00	0.00
Span (in)	= 8.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 9.70	0.00	0.00	0.00
Length (ft)	= 17.00	0.00	0.00	0.00
Slope (%)	= 0.60	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

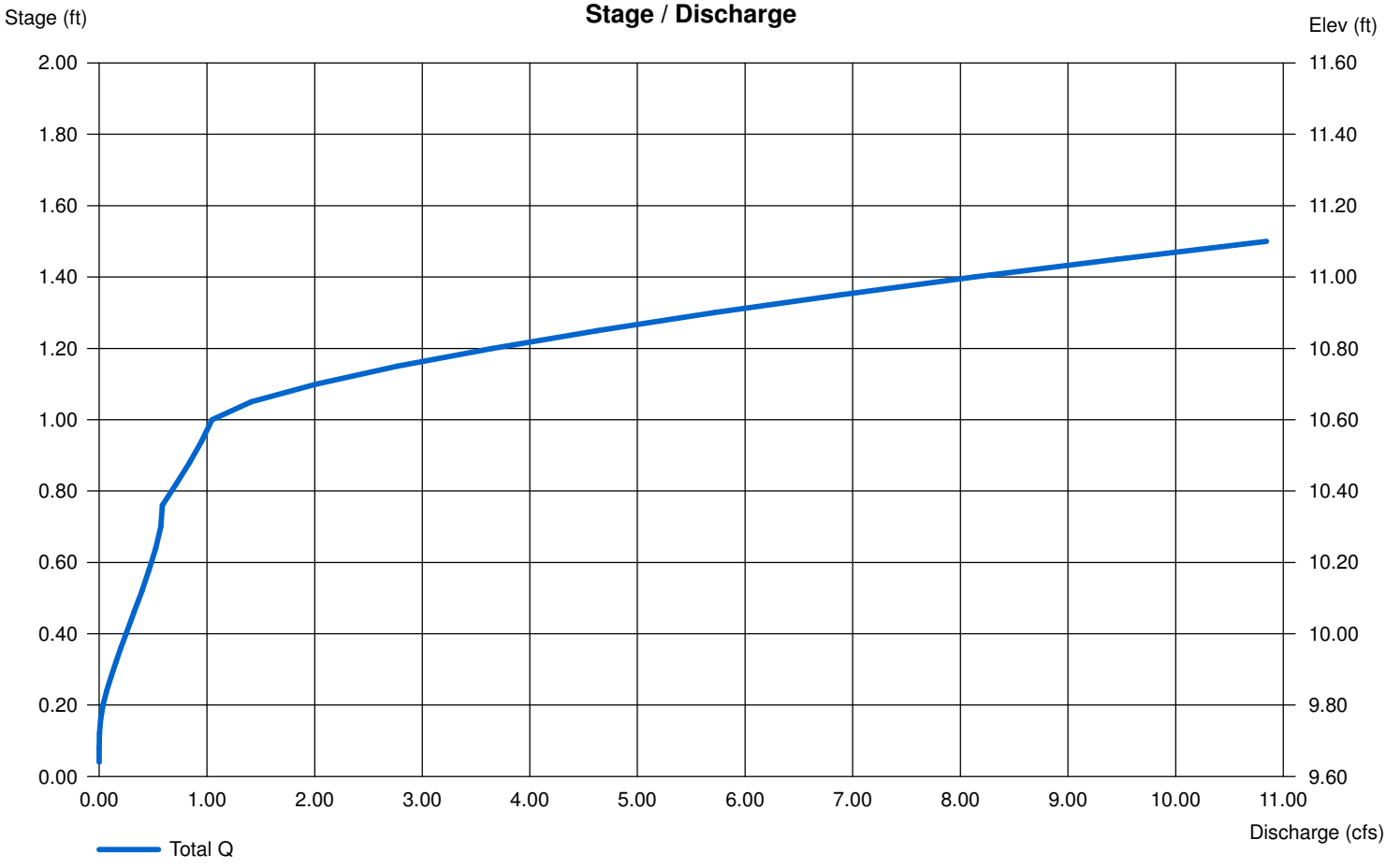
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 10.60	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.070 (by Contour)

TW Elev. (ft) = 0.00

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

Stage / Discharge



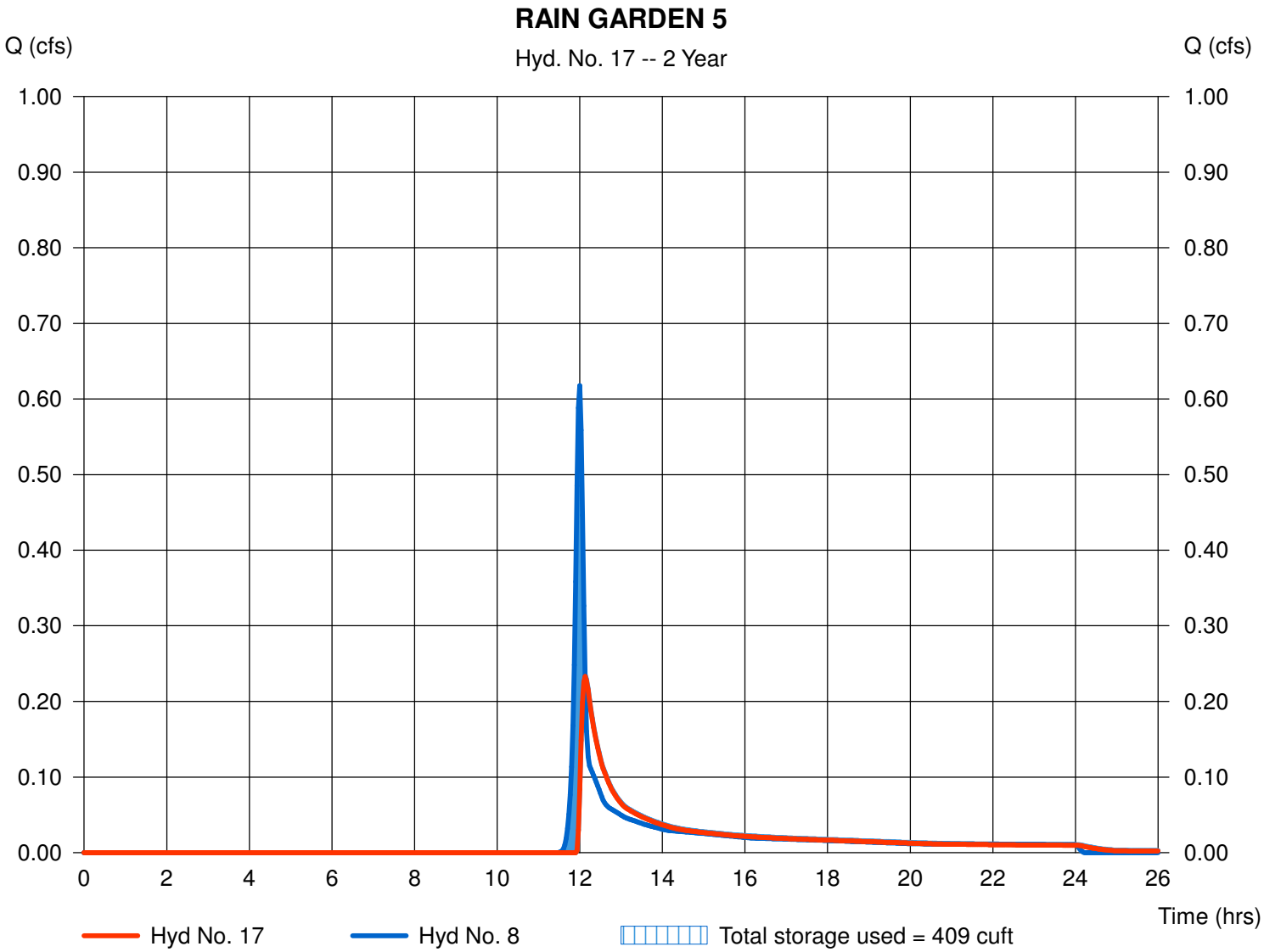
Hydrograph Report

Hyd. No. 17

RAIN GARDEN 5

Hydrograph type	=	Reservoir	Peak discharge	=	0.233 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.13 hrs
Time interval	=	2 min	Hyd. volume	=	1,302 cuft
Inflow hyd. No.	=	8 - P-5	Max. Elevation	=	9.91 ft
Reservoir name	=	RAIN GARDEN 5	Max. Storage	=	409 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 5 - RAIN GARDEN 5

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 9.60 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	9.60	1,063	0	0
0.40	10.00	1,595	528	528
1.00	10.60	2,480	1,213	1,741
1.50	11.10	3,240	1,426	3,166

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	0.00	0.00	0.00
Span (in)	= 6.00	0.00	0.00	0.00
No. Barrels	= 2	0	0	0
Invert El. (ft)	= 9.70	0.00	0.00	0.00
Length (ft)	= 18.00	0.00	0.00	0.00
Slope (%)	= 0.60	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

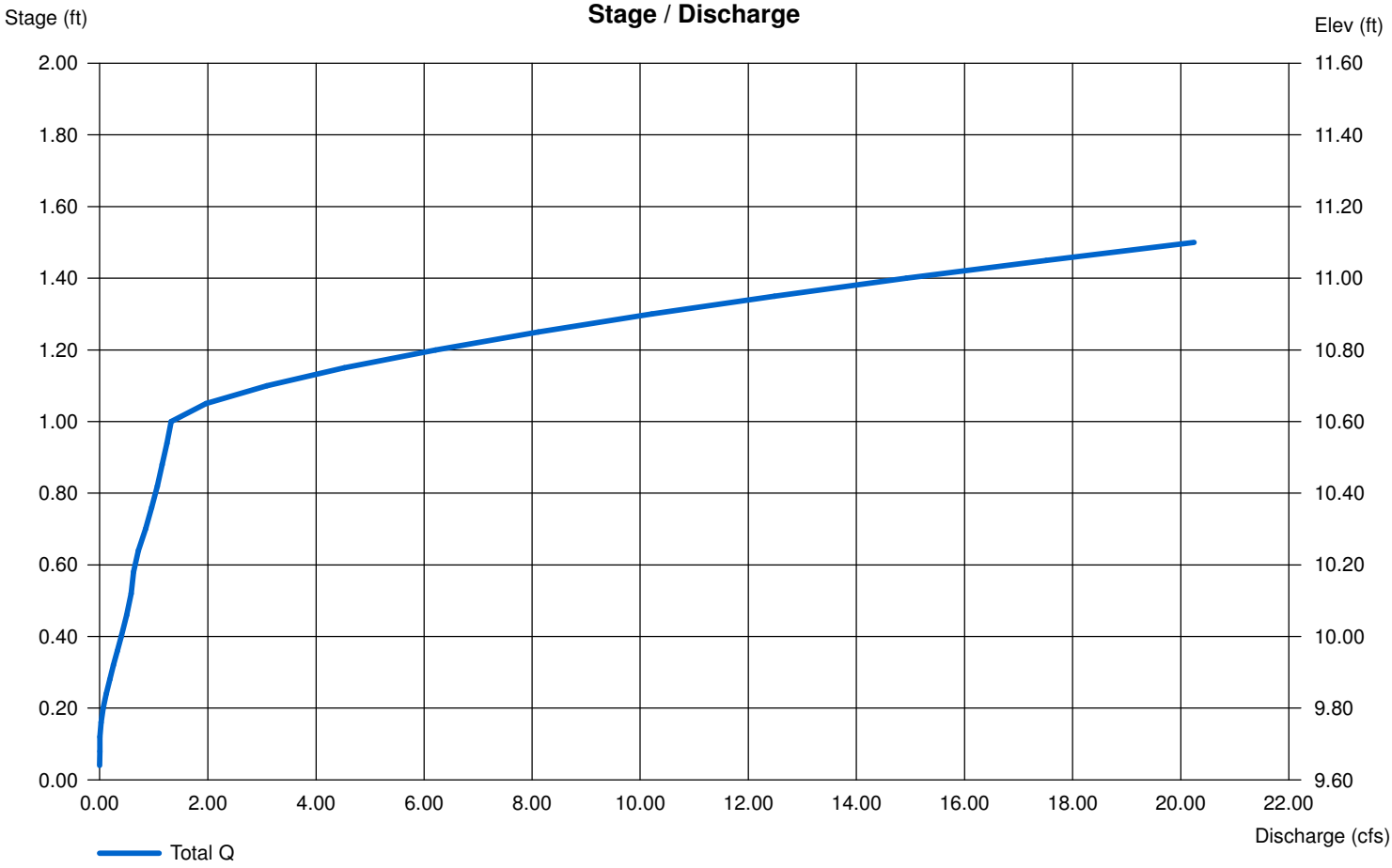
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	10.00	0.00	0.00
Crest El. (ft)	= 10.60	10.60	0.00	0.00
Weir Coeff.	= 2.60	2.60	3.33	3.33
Weir Type	= Broad	Broad	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.070 (by Contour)

TW Elev. (ft) = 0.00

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

Stage / Discharge

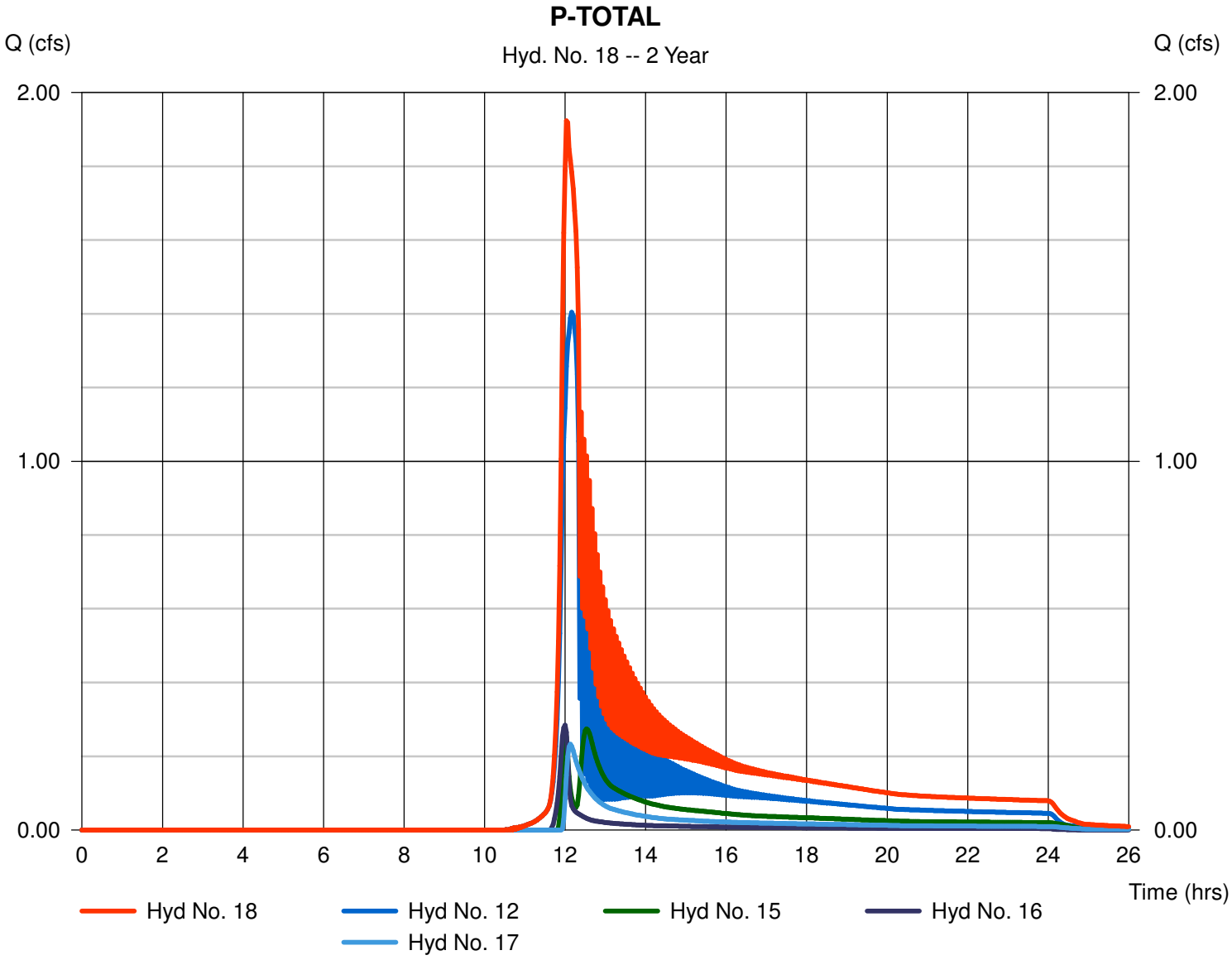


Hydrograph Report

Hyd. No. 18

P-TOTAL

Hydrograph type	=	Combine	Peak discharge	=	1.923 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	11,073 cuft
Inflow hyds.	=	12, 15, 16, 17	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

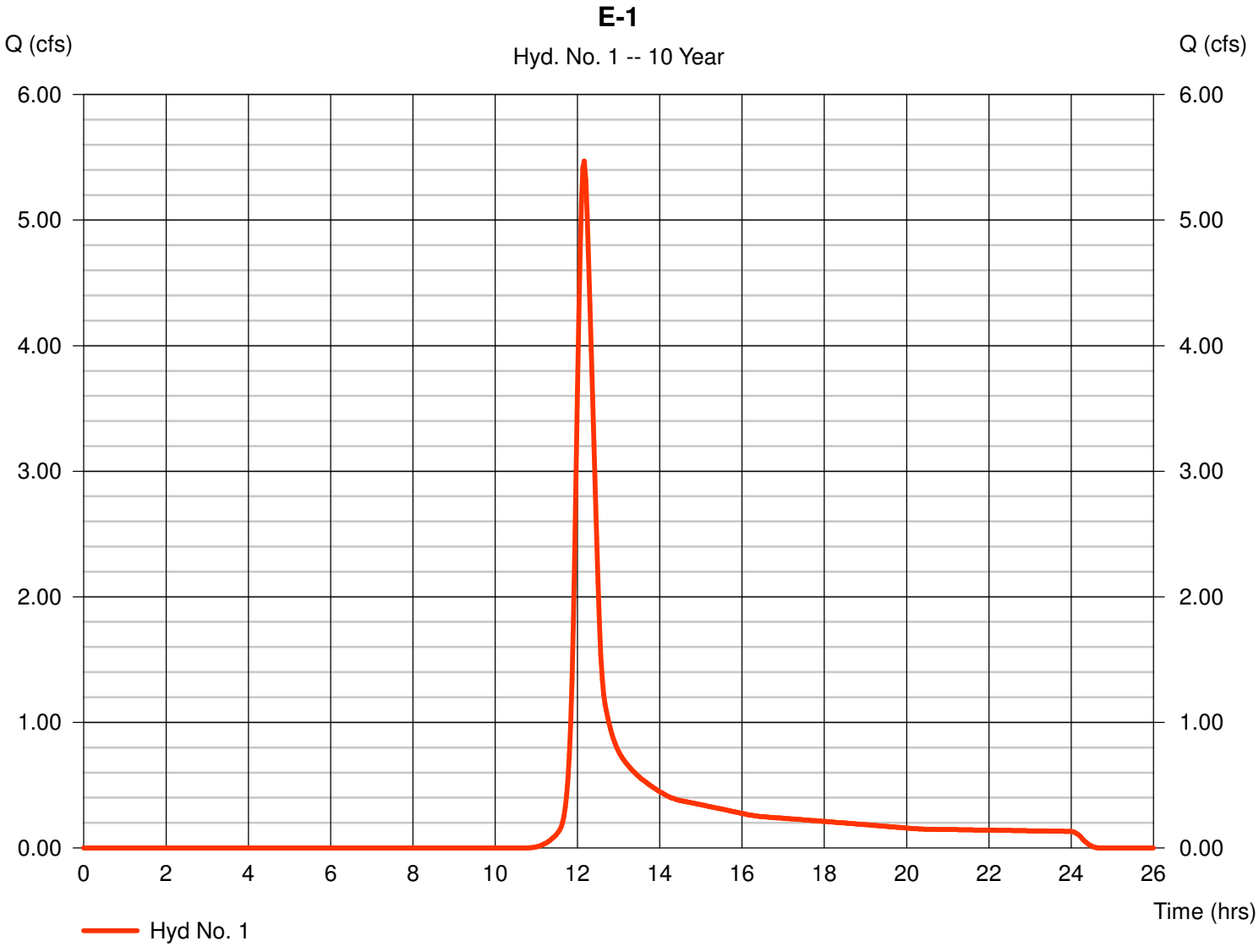
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	5.470	2	730	21,238	----	------	------	E-1
3	SCS Runoff	3.337	2	724	10,477	----	------	------	P-1
4	SCS Runoff	1.475	2	722	3,932	----	------	------	P-1A
5	SCS Runoff	1.432	2	730	5,559	----	------	------	P-2
6	SCS Runoff	0.707	2	718	1,420	----	------	------	P-3
7	SCS Runoff	0.662	2	716	1,336	----	------	------	P-4
8	SCS Runoff	1.451	2	720	3,327	----	------	------	P-5
10	Reservoir	0.197	2	752	3,924	4	19.96	1,555	RAIN GARDEN RG-1A
11	Combine	3.469	2	724	14,402	3, 10	------	------	RG-1A + P-1
12	Reservoir	3.165	2	728	14,299	11	17.96	577	Dry Pond P-1
13	Reservoir	1.199	2	736	4,956	5	13.07	1,007	RAIN GARDEN 2
14	Combine	1.290	2	736	6,376	6, 13	------	------	P-3 + RG-2
15	Reservoir	1.136	2	744	6,316	14	10.33	414	RAIN GARDEN 3
16	Reservoir	0.523	2	720	1,313	7	10.24	156	RAIN GARDEN 4
17	Reservoir	0.646	2	726	3,138	8	10.20	923	RAIN GARDEN 5
18	Combine	4.762	2	728	25,066	12, 15, 16, 17	------	------	P-TOTAL

Hydrograph Report

Hyd. No. 1

E-1

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.470 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	21,238 cuft
Drainage area	=	4.470 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	25.70 min
Total precip.	=	4.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



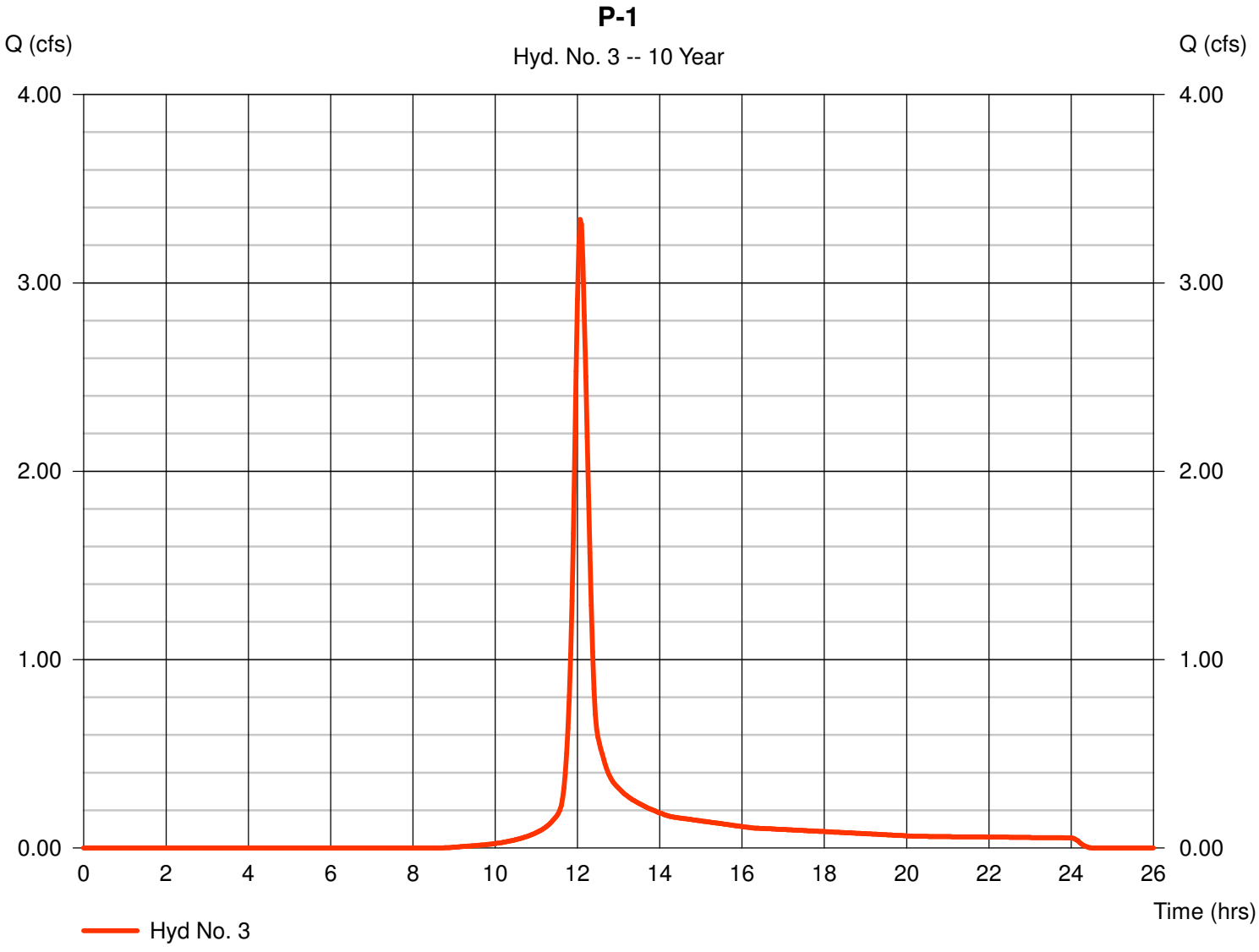
Hydrograph Report

Hyd. No. 3

P-1

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.337 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	10,477 cuft
Drainage area	=	1.470 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	19.30 min
Total precip.	=	4.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.741 x 98) + (0.460 x 61)] / 1.470



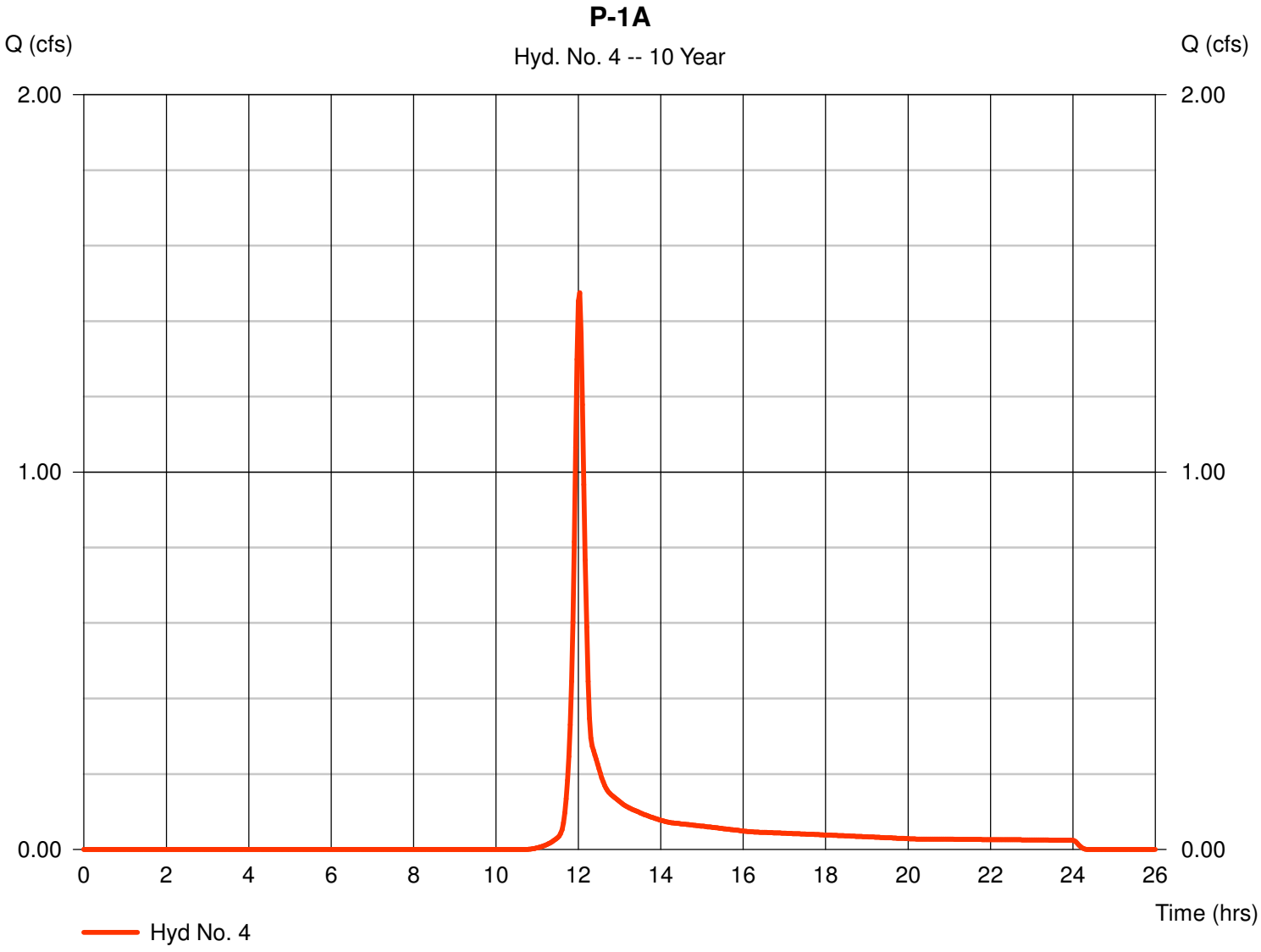
Hydrograph Report

Hyd. No. 4

P-1A

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.475 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	3,932 cuft
Drainage area	=	0.790 ac	Curve number	=	70*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	10.00 min
Total precip.	=	4.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.680 x 61) + (0.190 x 98)] / 0.790

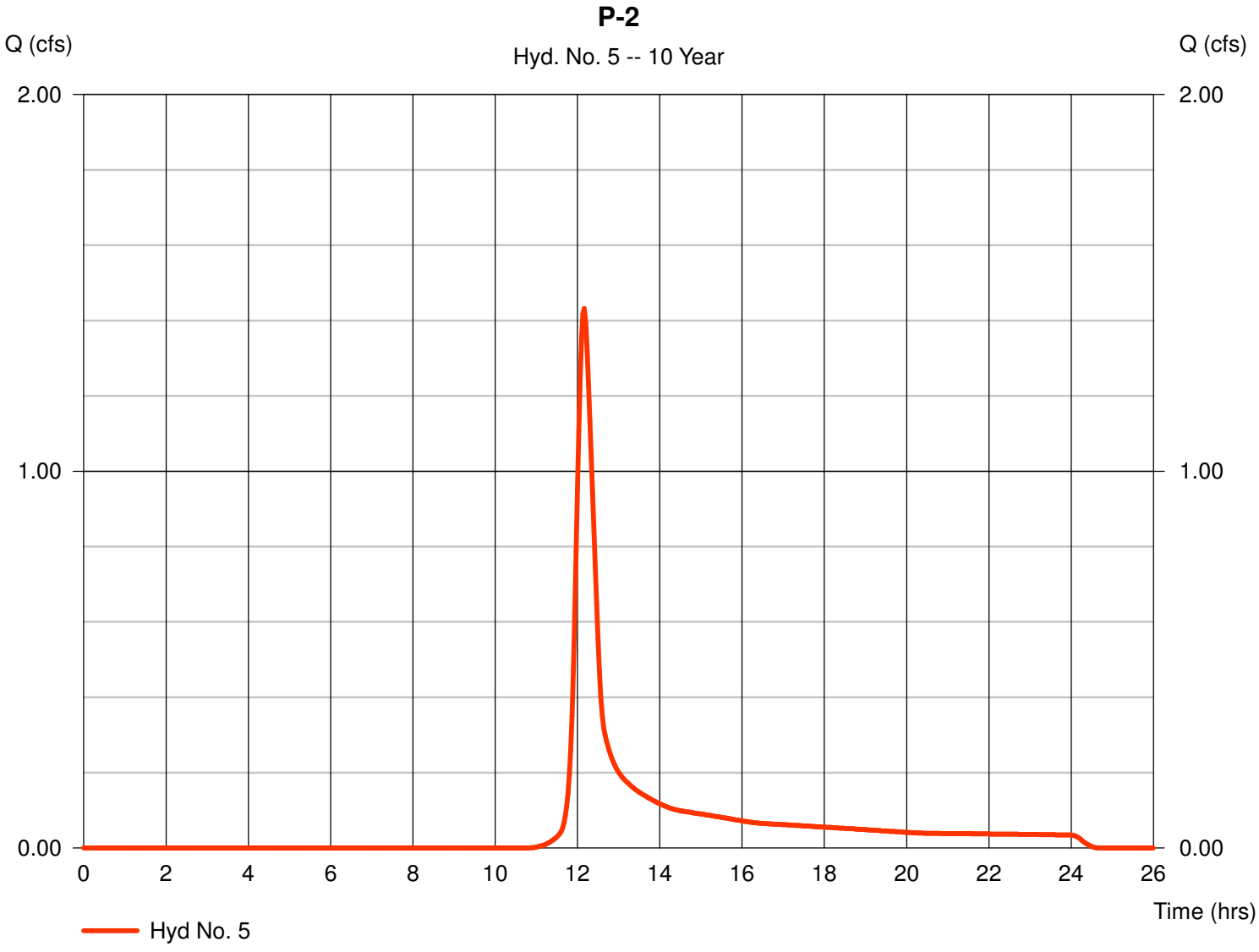


Hydrograph Report

Hyd. No. 5

P-2

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.432 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	5,559 cuft
Drainage area	=	1.170 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	25.50 min
Total precip.	=	4.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

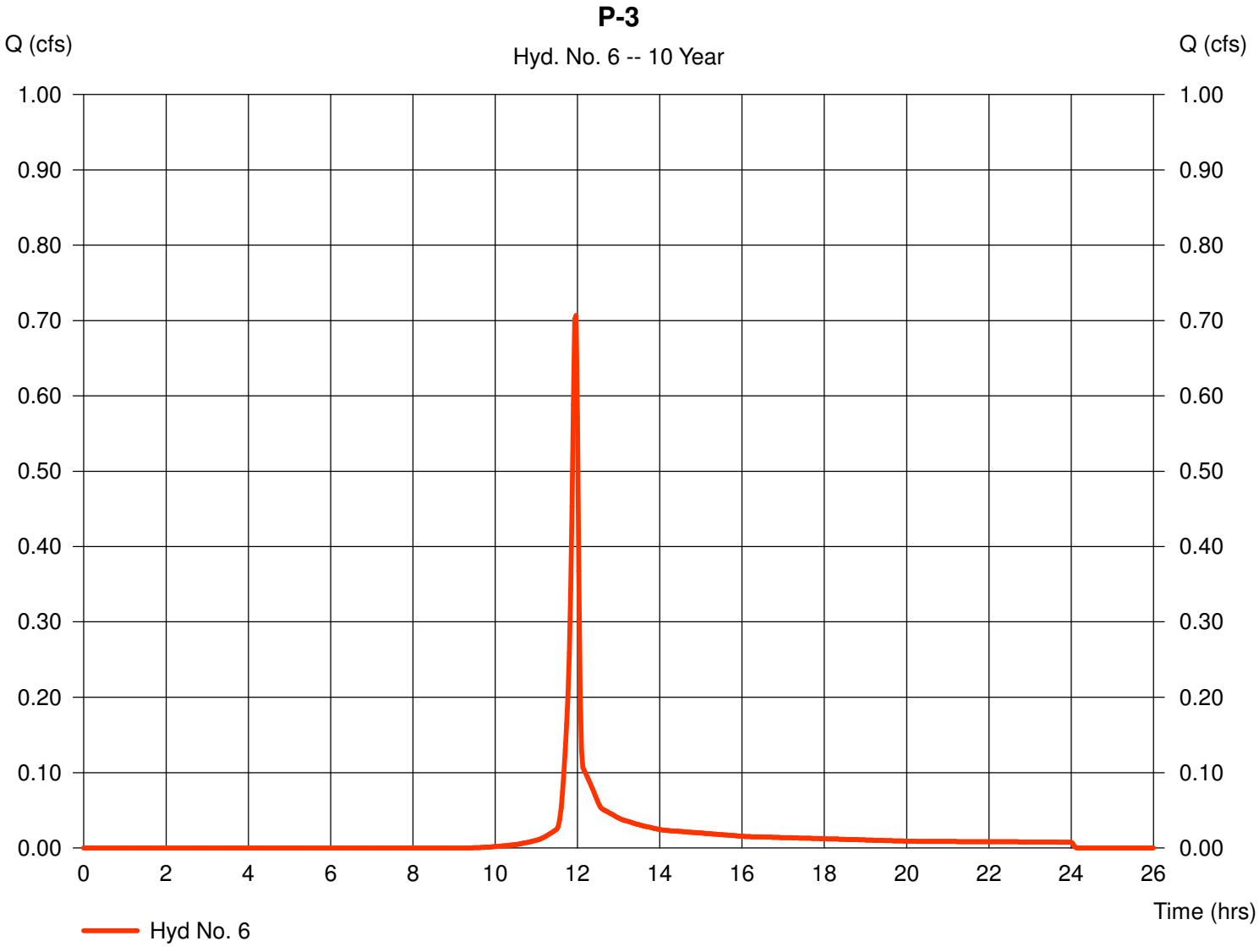


Hydrograph Report

Hyd. No. 6

P-3

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.707 cfs
Storm frequency	=	10 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	1,420 cuft
Drainage area	=	0.240 ac	Curve number	=	76
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.20 min
Total precip.	=	4.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

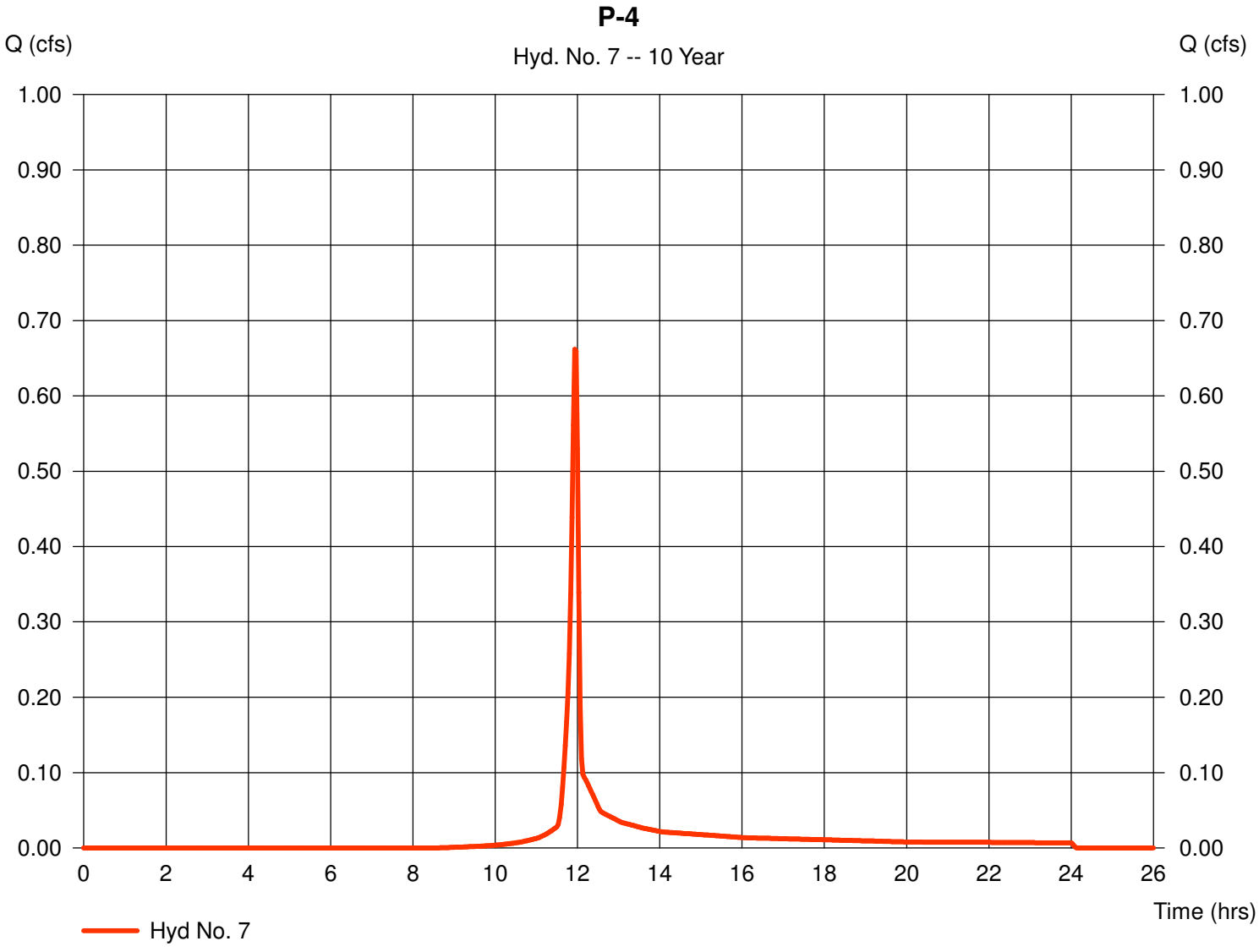


Hydrograph Report

Hyd. No. 7

P-4

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.662 cfs
Storm frequency	=	10 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	1,336 cuft
Drainage area	=	0.200 ac	Curve number	=	79
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

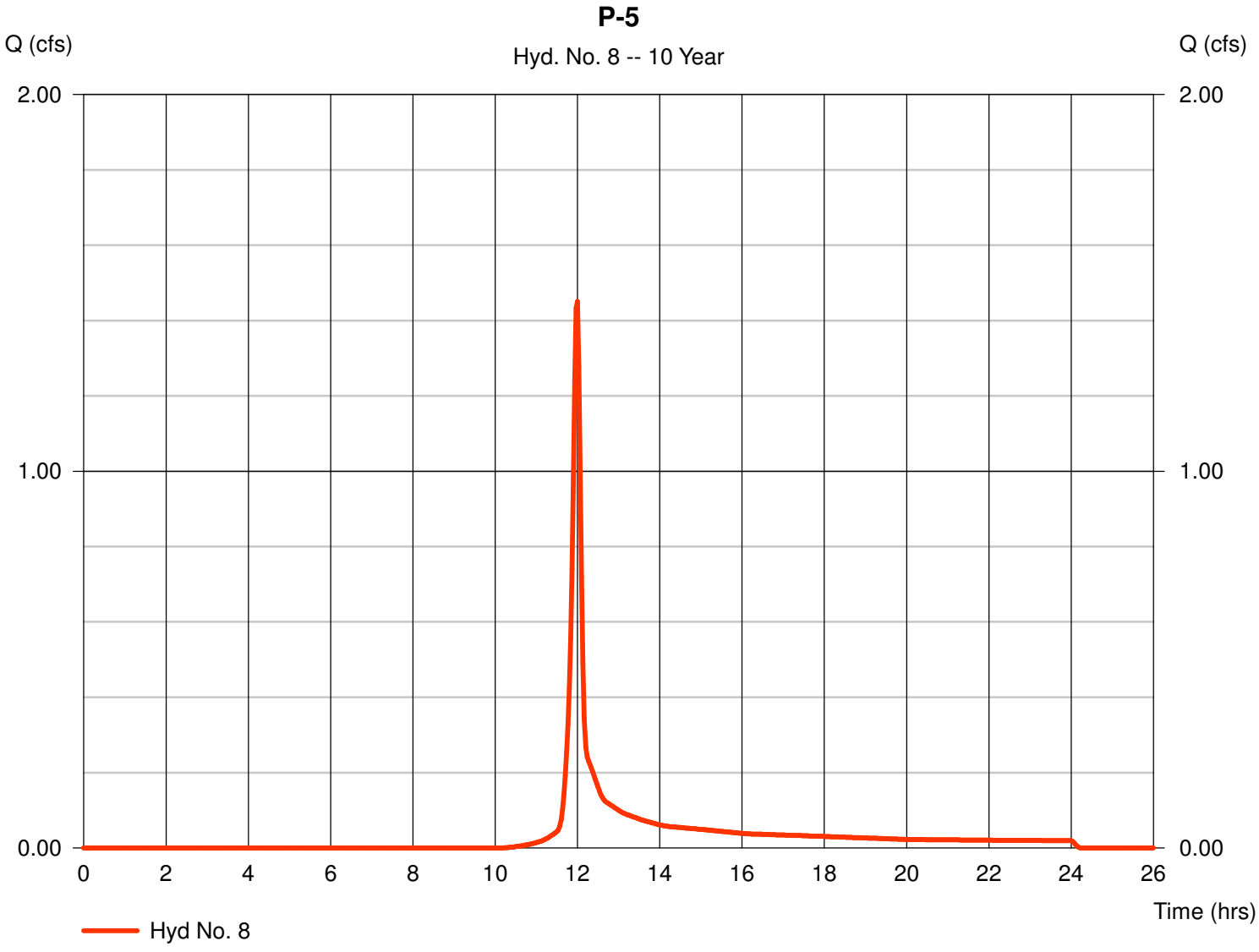


Hydrograph Report

Hyd. No. 8

P-5

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.451 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	3,327 cuft
Drainage area	=	0.600 ac	Curve number	=	73
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.40 min
Total precip.	=	4.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



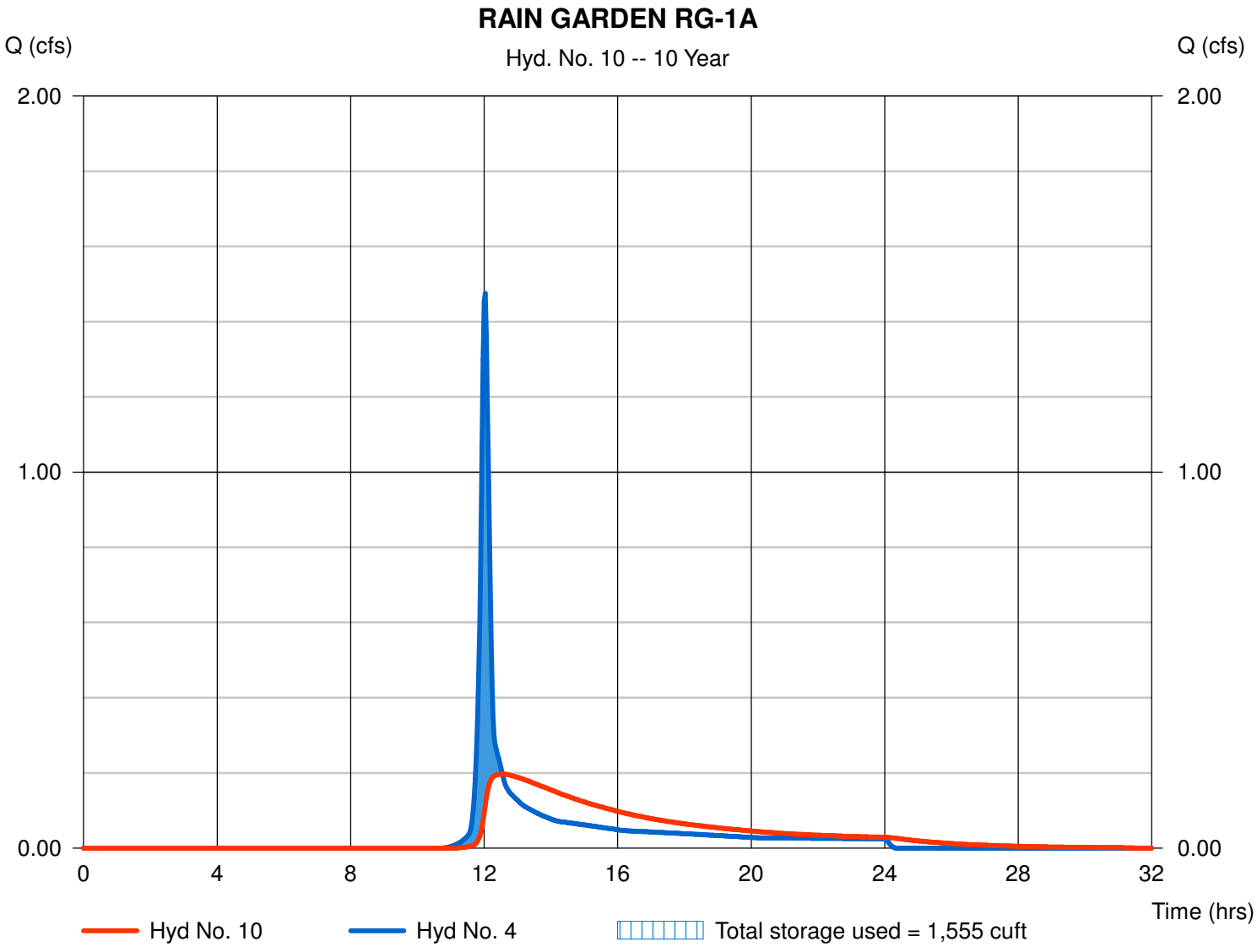
Hydrograph Report

Hyd. No. 10

RAIN GARDEN RG-1A

Hydrograph type	=	Reservoir	Peak discharge	=	0.197 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.53 hrs
Time interval	=	2 min	Hyd. volume	=	3,924 cuft
Inflow hyd. No.	=	4 - P-1A	Max. Elevation	=	19.96 ft
Reservoir name	=	RAIN GARDEN RG-1A	Max. Storage	=	1,555 cuft

Storage Indication method used. Outflow includes exfiltration.

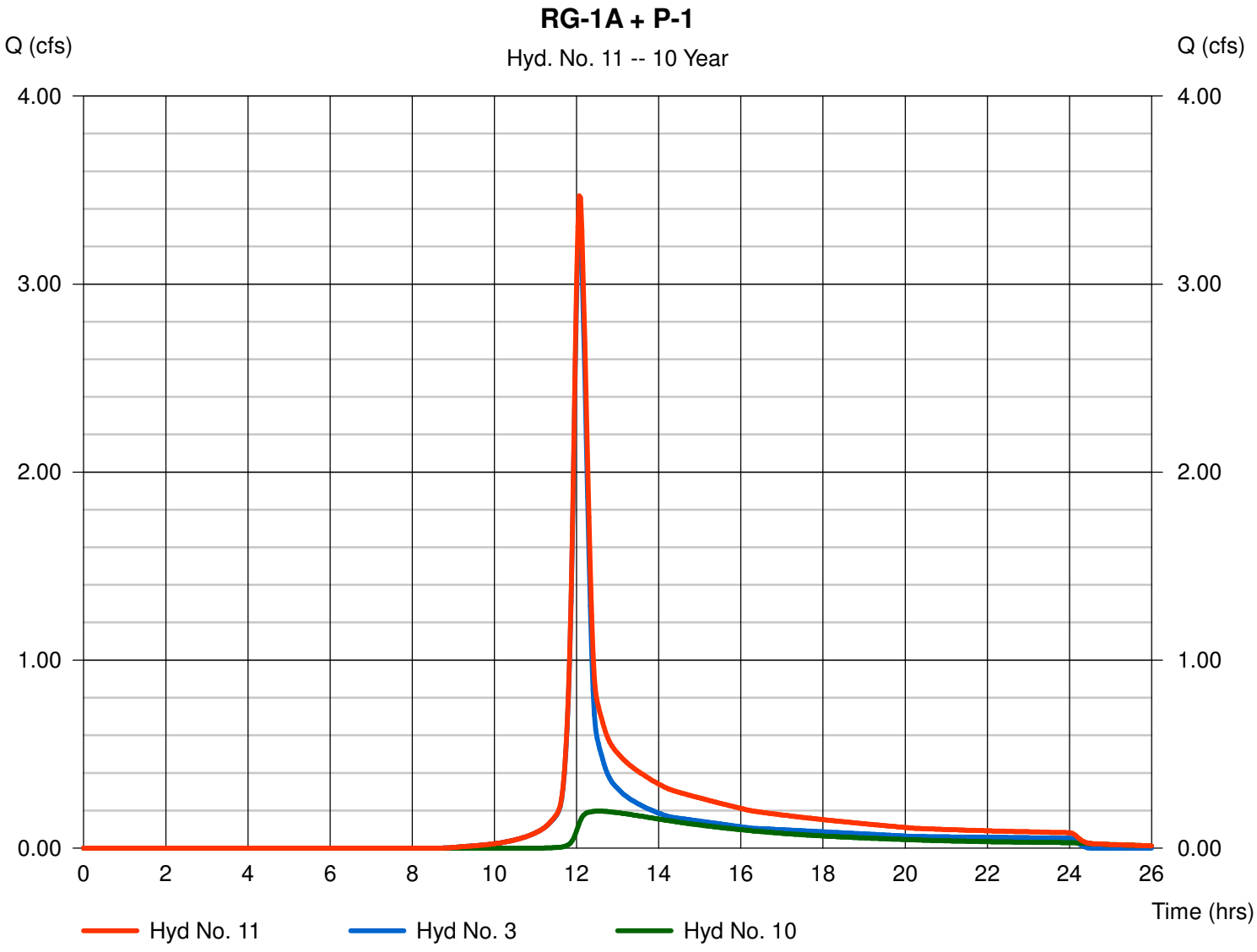


Hydrograph Report

Hyd. No. 11

RG-1A + P-1

Hydrograph type	=	Combine	Peak discharge	=	3.469 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	14,402 cuft
Inflow hyds.	=	3, 10	Contrib. drain. area	=	1.470 ac



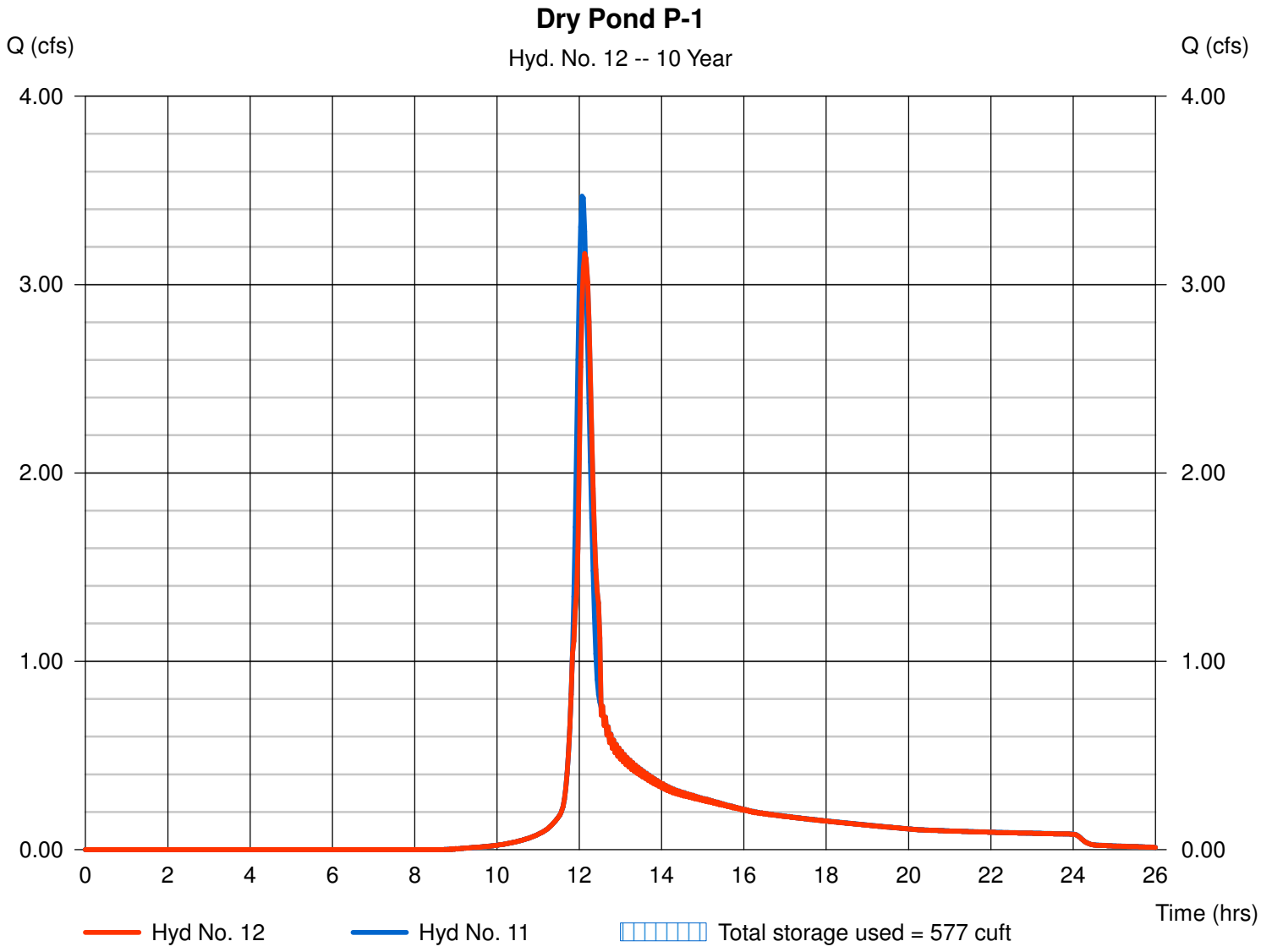
Hydrograph Report

Hyd. No. 12

Dry Pond P-1

Hydrograph type	=	Reservoir	Peak discharge	=	3.165 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.13 hrs
Time interval	=	2 min	Hyd. volume	=	14,299 cuft
Inflow hyd. No.	=	11 - RG-1A + P-1	Max. Elevation	=	17.96 ft
Reservoir name	=	Dry Pond 1	Max. Storage	=	577 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



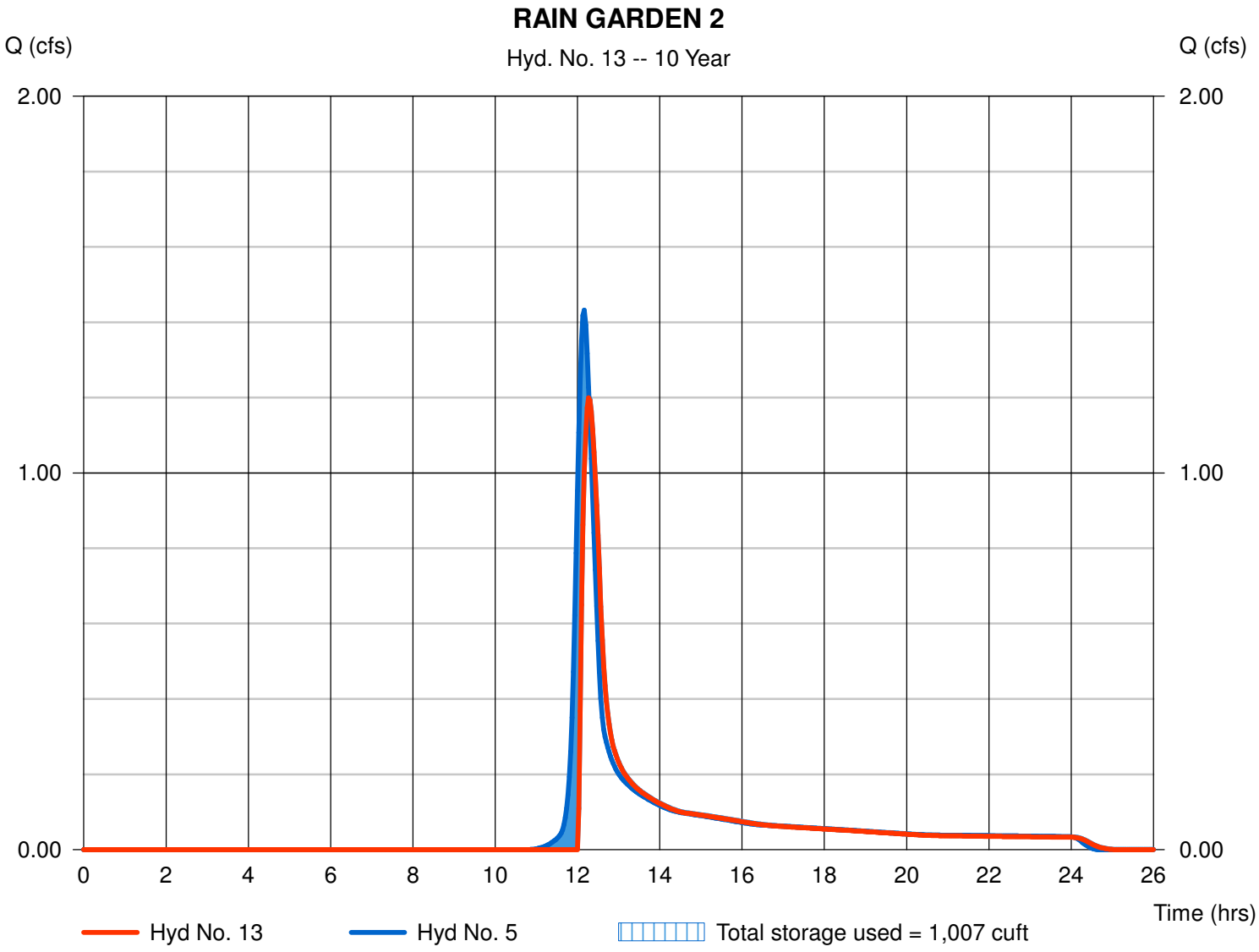
Hydrograph Report

Hyd. No. 13

RAIN GARDEN 2

Hydrograph type	=	Reservoir	Peak discharge	=	1.199 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	4,956 cuft
Inflow hyd. No.	=	5 - P-2	Max. Elevation	=	13.07 ft
Reservoir name	=	RAIN GARDEN 2	Max. Storage	=	1,007 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

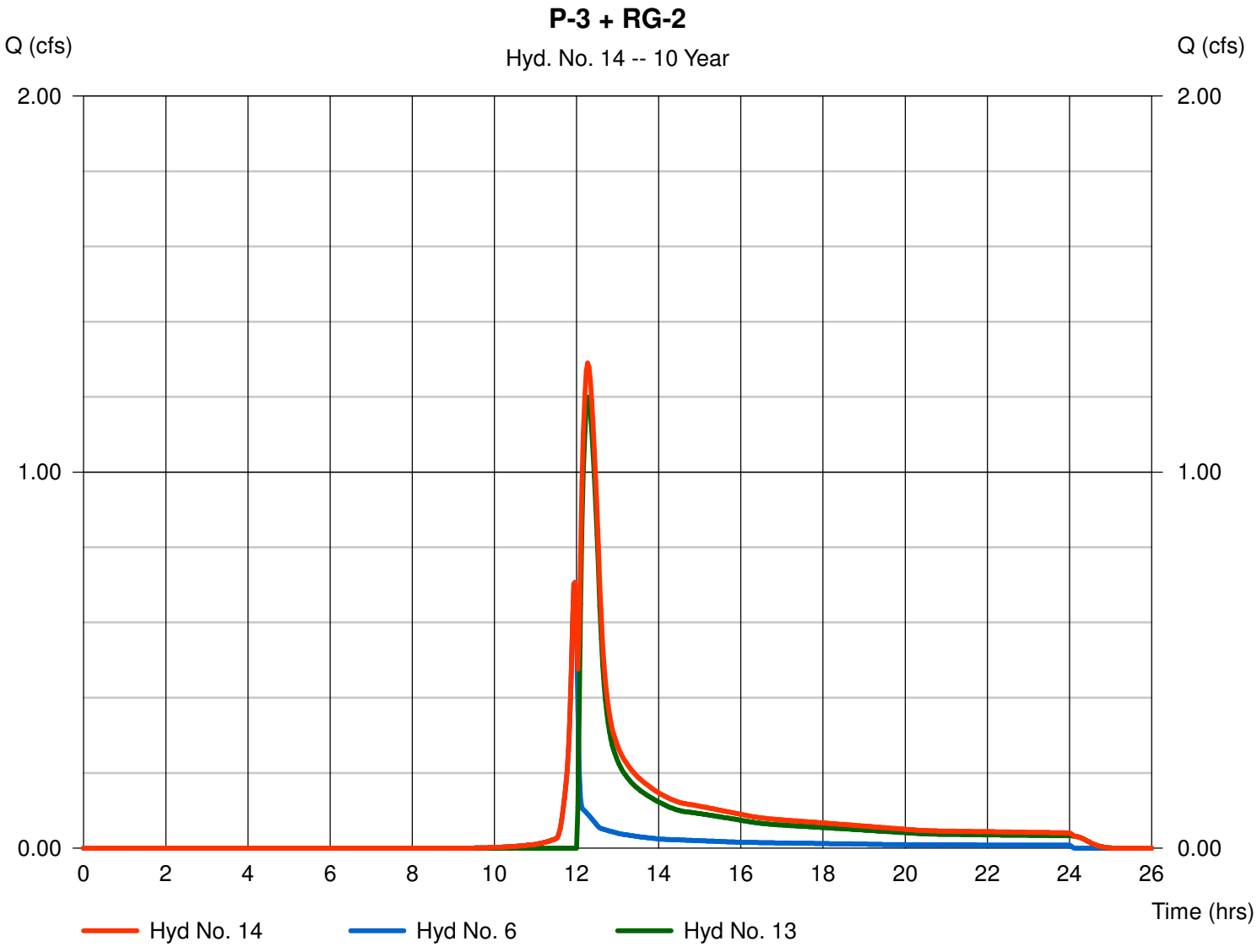


Hydrograph Report

Hyd. No. 14

P-3 + RG-2

Hydrograph type	= Combine	Peak discharge	= 1.290 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 6,376 cuft
Inflow hyds.	= 6, 13	Contrib. drain. area	= 0.240 ac



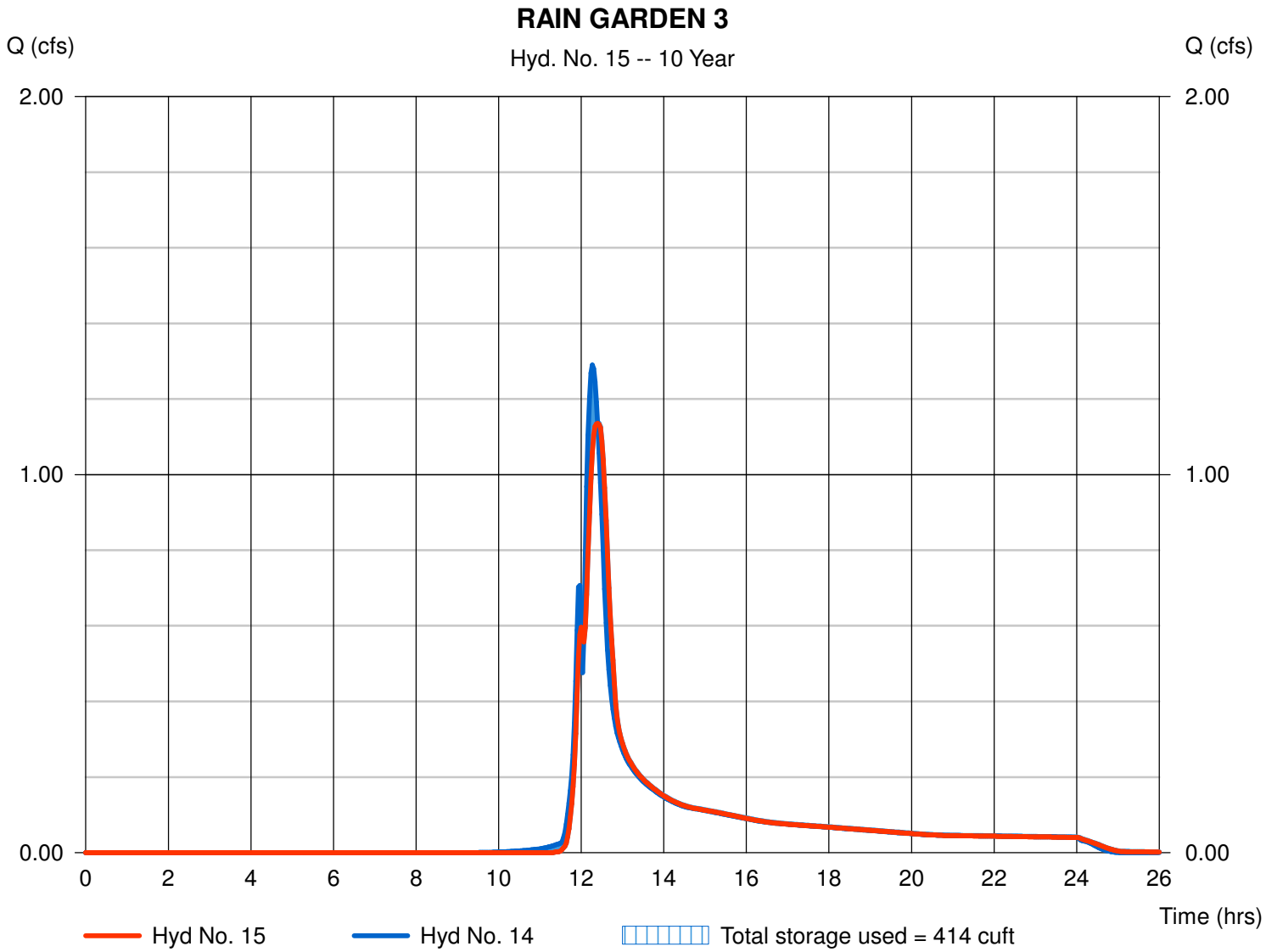
Hydrograph Report

Hyd. No. 15

RAIN GARDEN 3

Hydrograph type	=	Reservoir	Peak discharge	=	1.136 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.40 hrs
Time interval	=	2 min	Hyd. volume	=	6,316 cuft
Inflow hyd. No.	=	14 - P-3 + RG-2	Max. Elevation	=	10.33 ft
Reservoir name	=	RAIN GARDEN 3	Max. Storage	=	414 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



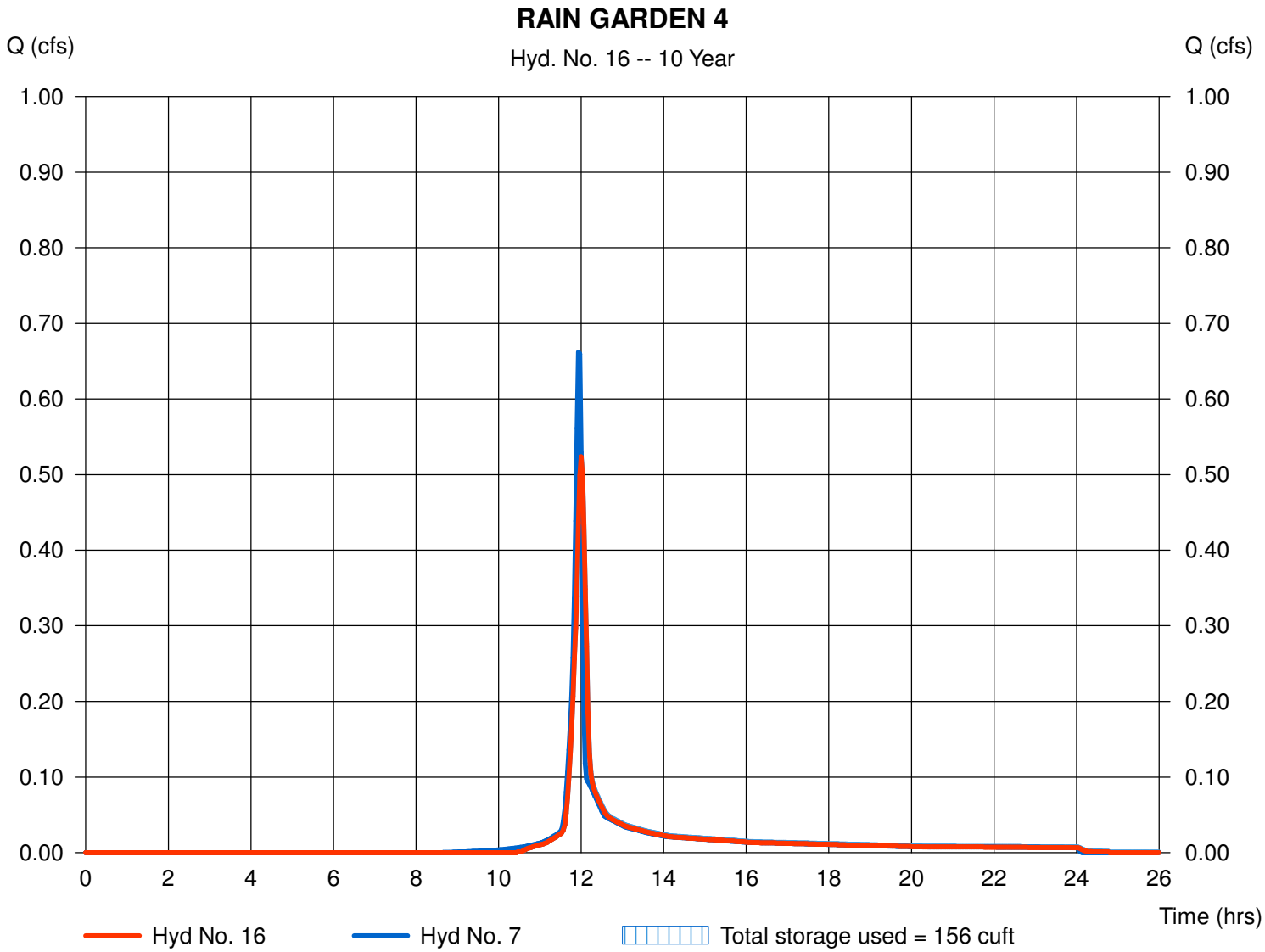
Hydrograph Report

Hyd. No. 16

RAIN GARDEN 4

Hydrograph type	=	Reservoir	Peak discharge	=	0.523 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	1,313 cuft
Inflow hyd. No.	=	7 - P-4	Max. Elevation	=	10.24 ft
Reservoir name	=	RAIN GARDEN 4	Max. Storage	=	156 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



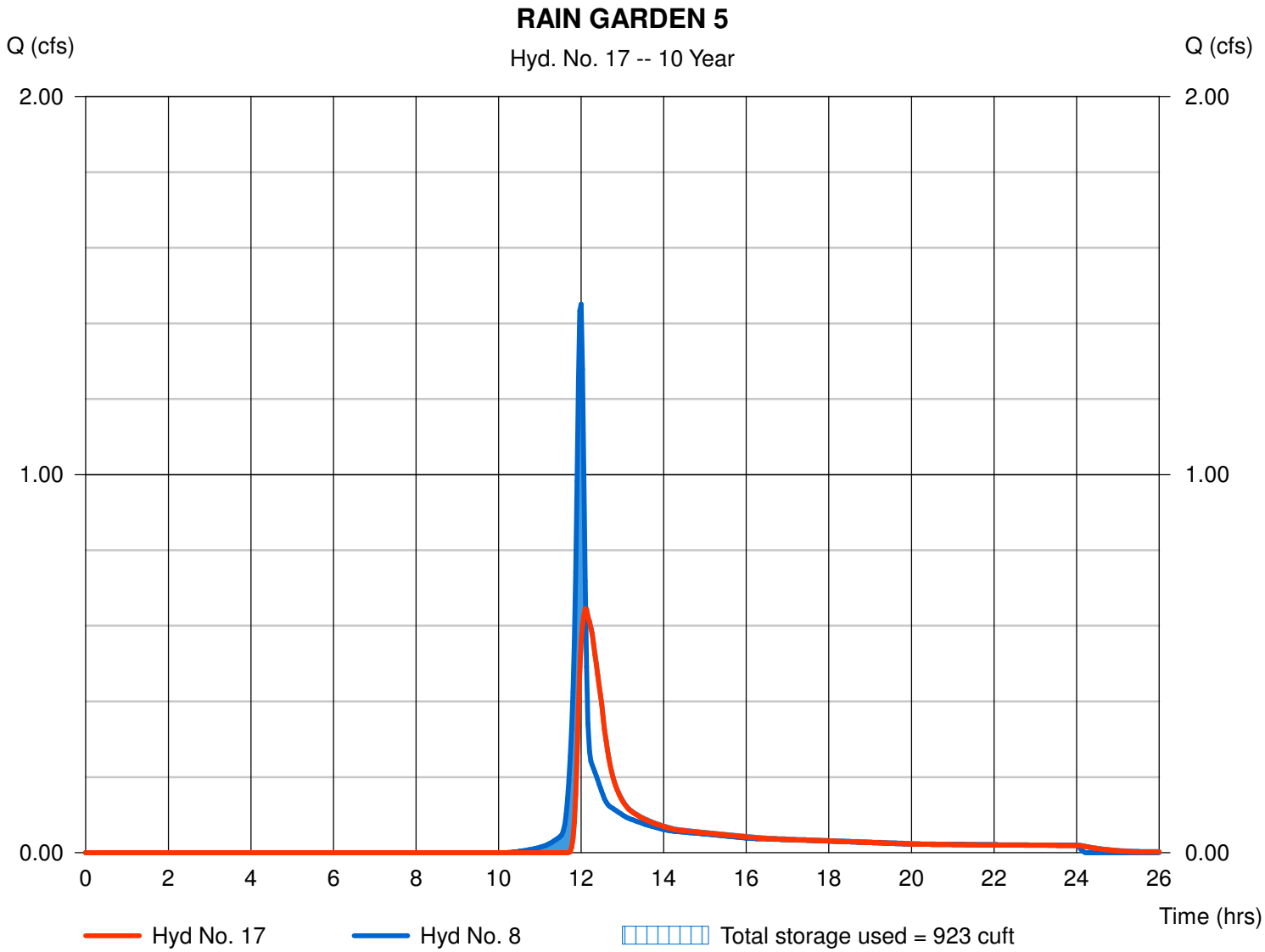
Hydrograph Report

Hyd. No. 17

RAIN GARDEN 5

Hydrograph type	=	Reservoir	Peak discharge	=	0.646 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	3,138 cuft
Inflow hyd. No.	=	8 - P-5	Max. Elevation	=	10.20 ft
Reservoir name	=	RAIN GARDEN 5	Max. Storage	=	923 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

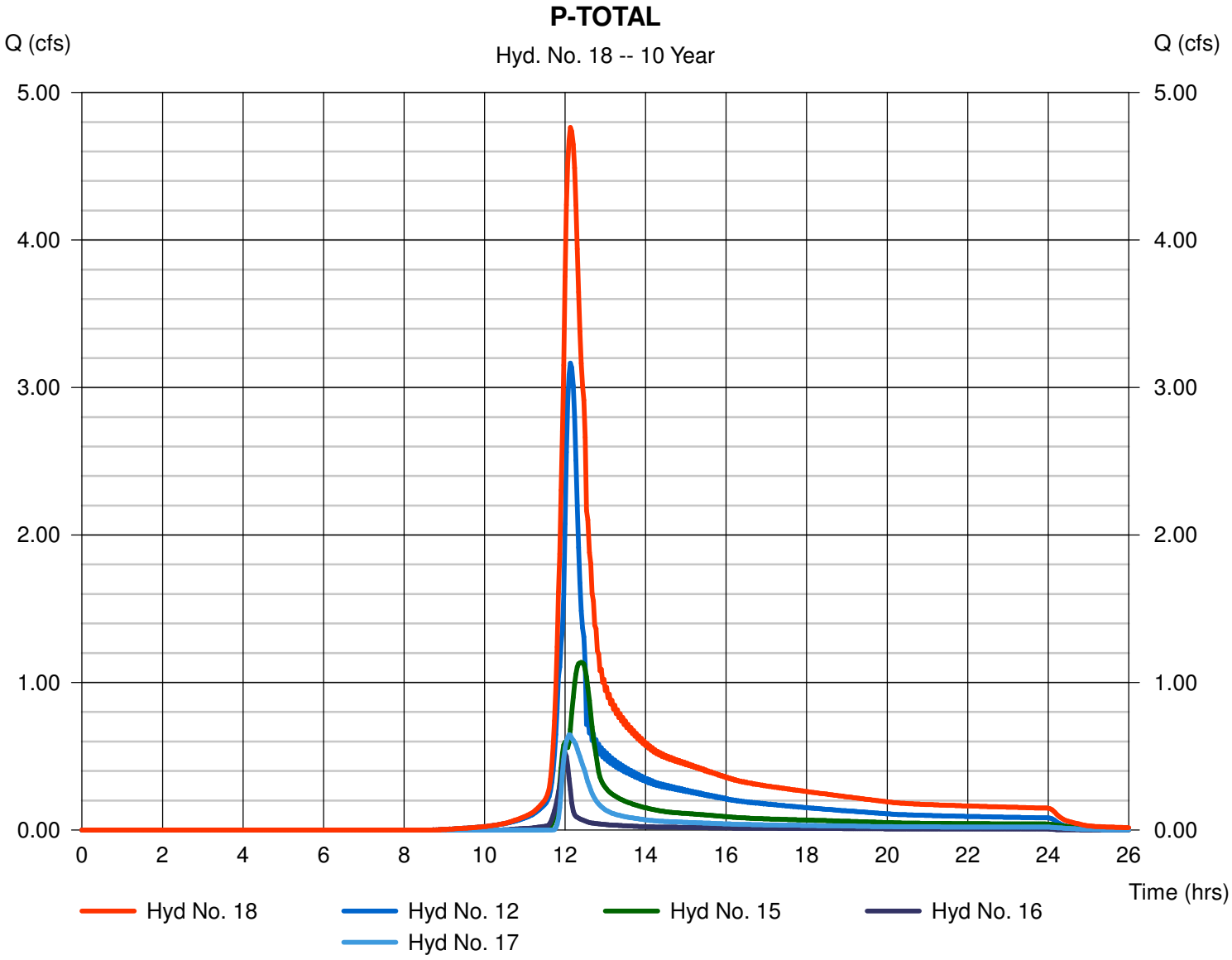


Hydrograph Report

Hyd. No. 18

P-TOTAL

Hydrograph type	=	Combine	Peak discharge	=	4.762 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.13 hrs
Time interval	=	2 min	Hyd. volume	=	25,066 cuft
Inflow hyds.	=	12, 15, 16, 17	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

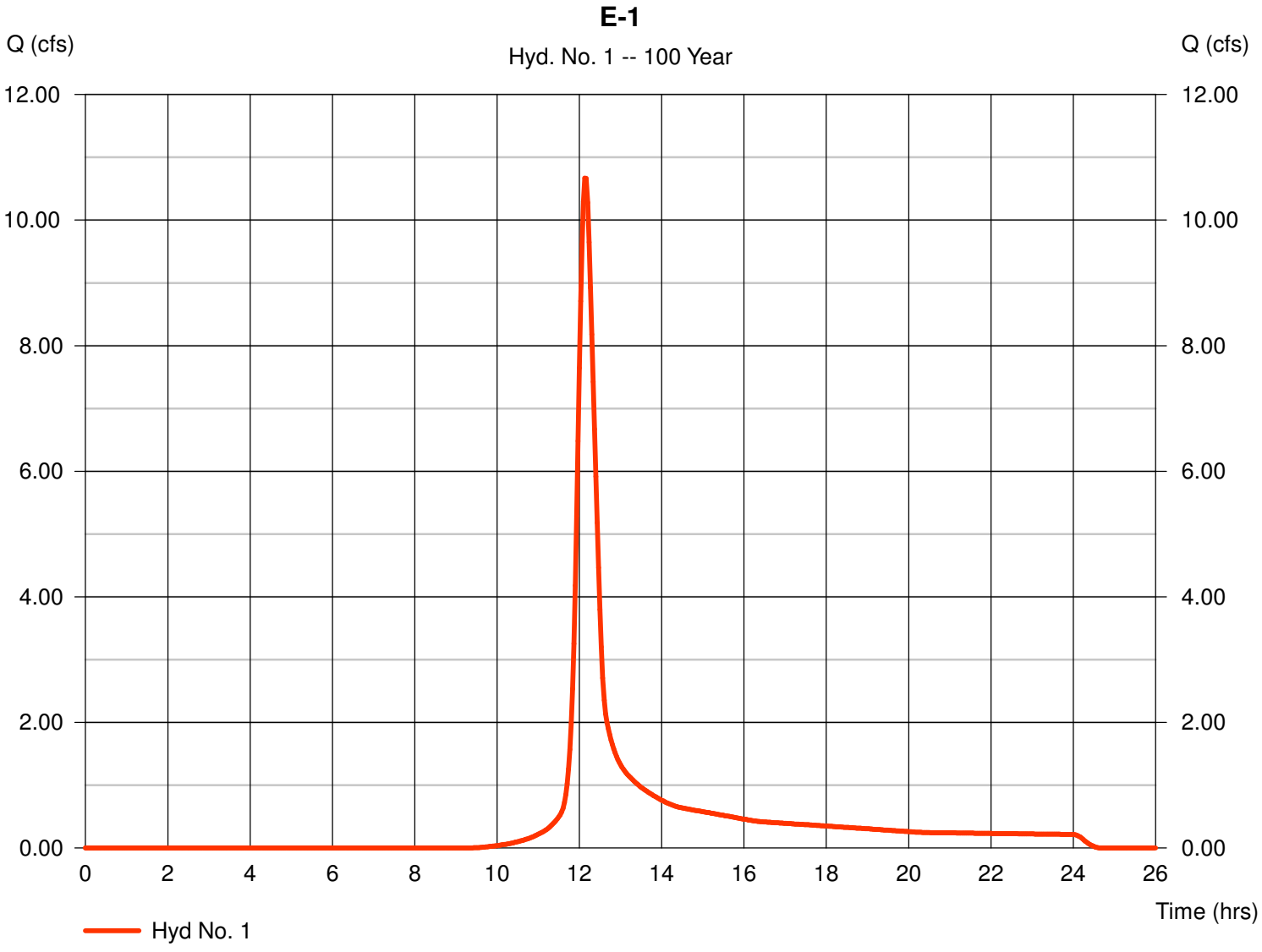
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	10.67	2	728	39,796	----	------	------	E-1
3	SCS Runoff	5.670	2	724	17,741	----	------	------	P-1
4	SCS Runoff	2.823	2	720	7,368	----	------	------	P-1A
5	SCS Runoff	2.793	2	728	10,416	----	------	------	P-2
6	SCS Runoff	1.225	2	716	2,481	----	------	------	P-3
7	SCS Runoff	1.110	2	716	2,263	----	------	------	P-4
8	SCS Runoff	2.627	2	718	6,011	----	------	------	P-5
10	Reservoir	2.038	2	726	7,360	4	20.20	2,169	RAIN GARDEN RG-1A
11	Combine	7.620	2	726	25,101	3, 10	------	------	RG-1A + P-1
12	Reservoir	5.243	2	732	24,797	11	19.32	2,301	Dry Pond P-1
13	Reservoir	1.853	2	740	9,801	5	13.47	2,033	RAIN GARDEN 2
14	Combine	2.140	2	718	12,282	6, 13	------	------	P-3 + RG-2
15	Reservoir	1.994	2	738	12,215	14	10.57	582	RAIN GARDEN 3
16	Reservoir	0.927	2	720	2,238	7	10.54	271	RAIN GARDEN 4
17	Reservoir	1.270	2	726	5,810	8	10.56	1,668	RAIN GARDEN 5
18	Combine	8.484	2	732	45,059	12, 15, 16, 17	------	------	P-TOTAL

Hydrograph Report

Hyd. No. 1

E-1

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.67 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.13 hrs
Time interval	=	2 min	Hyd. volume	=	39,796 cuft
Drainage area	=	4.470 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	25.70 min
Total precip.	=	5.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



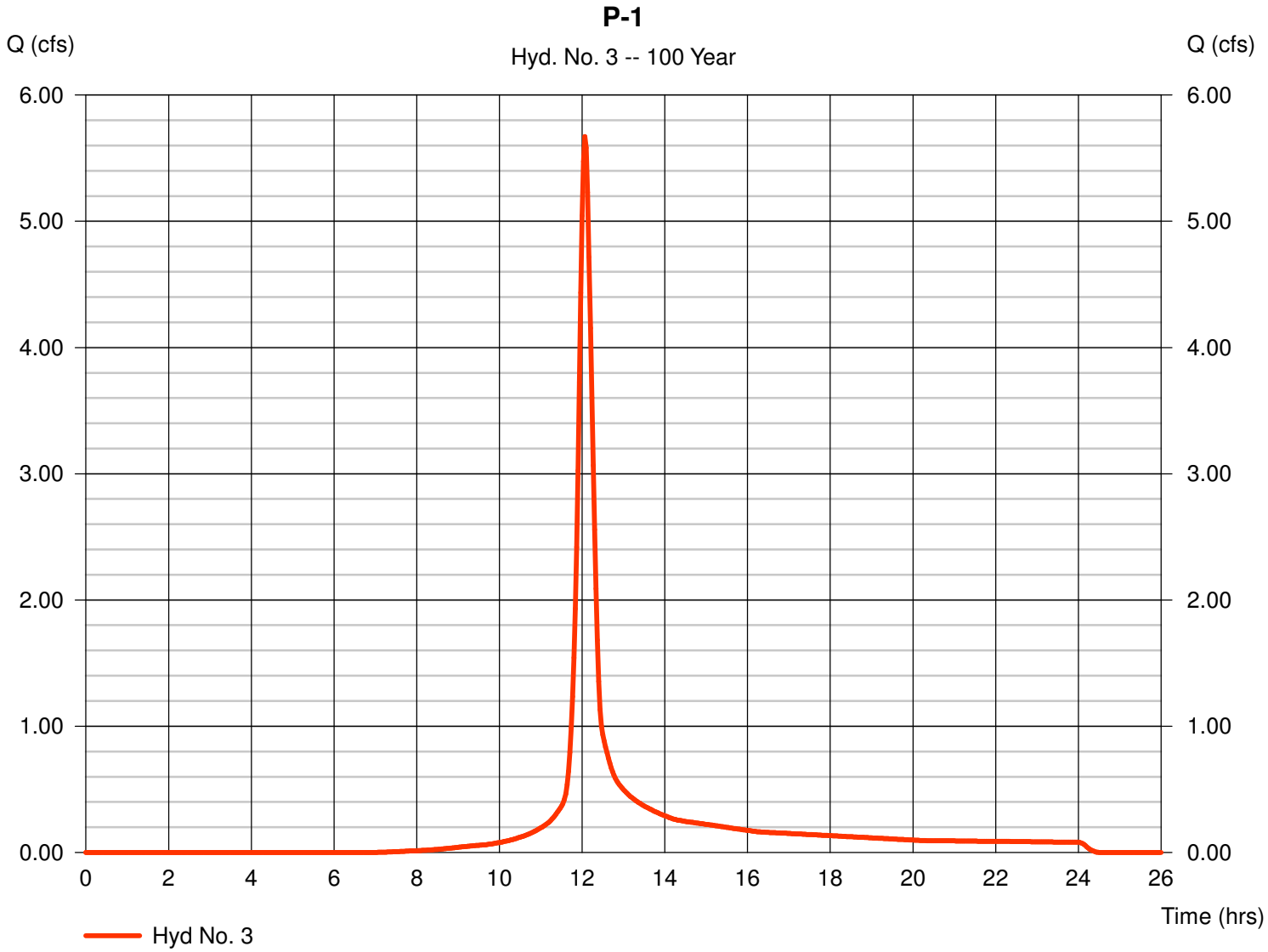
Hydrograph Report

Hyd. No. 3

P-1

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.670 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	17,741 cuft
Drainage area	=	1.470 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	19.30 min
Total precip.	=	5.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.741 x 98) + (0.460 x 61)] / 1.470



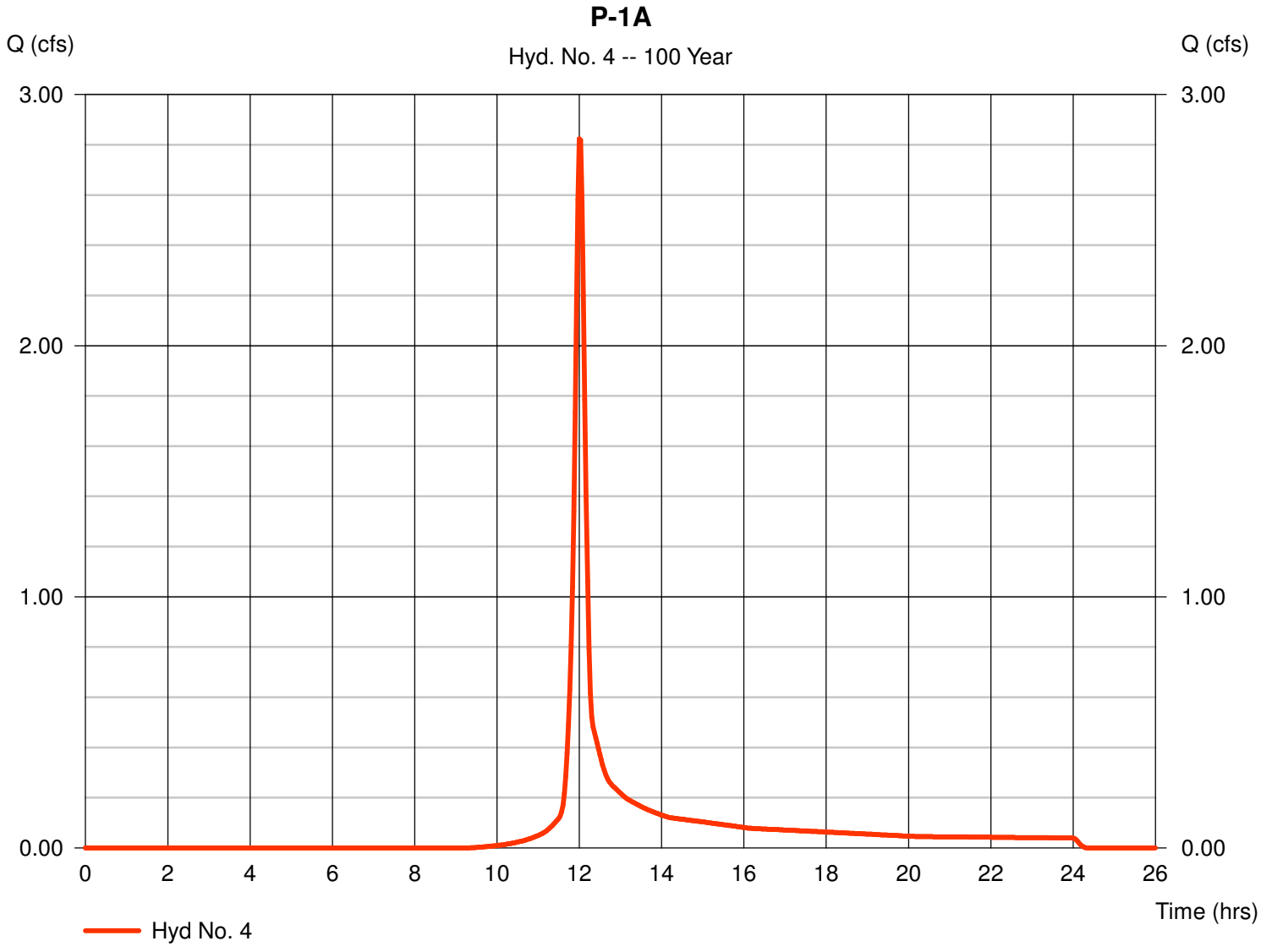
Hydrograph Report

Hyd. No. 4

P-1A

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.823 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	7,368 cuft
Drainage area	=	0.790 ac	Curve number	=	70*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	10.00 min
Total precip.	=	5.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.680 x 61) + (0.190 x 98)] / 0.790

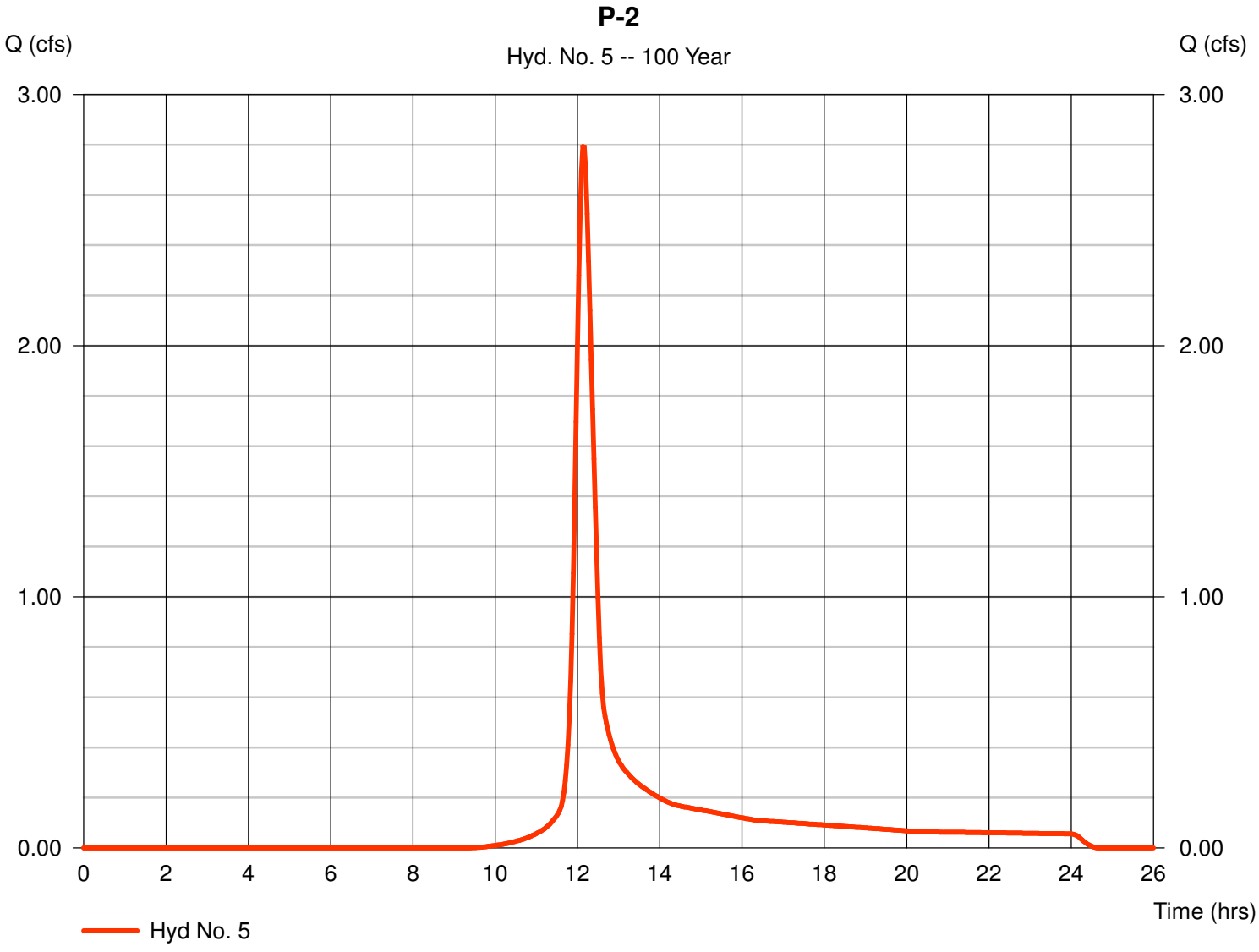


Hydrograph Report

Hyd. No. 5

P-2

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.793 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.13 hrs
Time interval	=	2 min	Hyd. volume	=	10,416 cuft
Drainage area	=	1.170 ac	Curve number	=	70
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	25.50 min
Total precip.	=	5.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

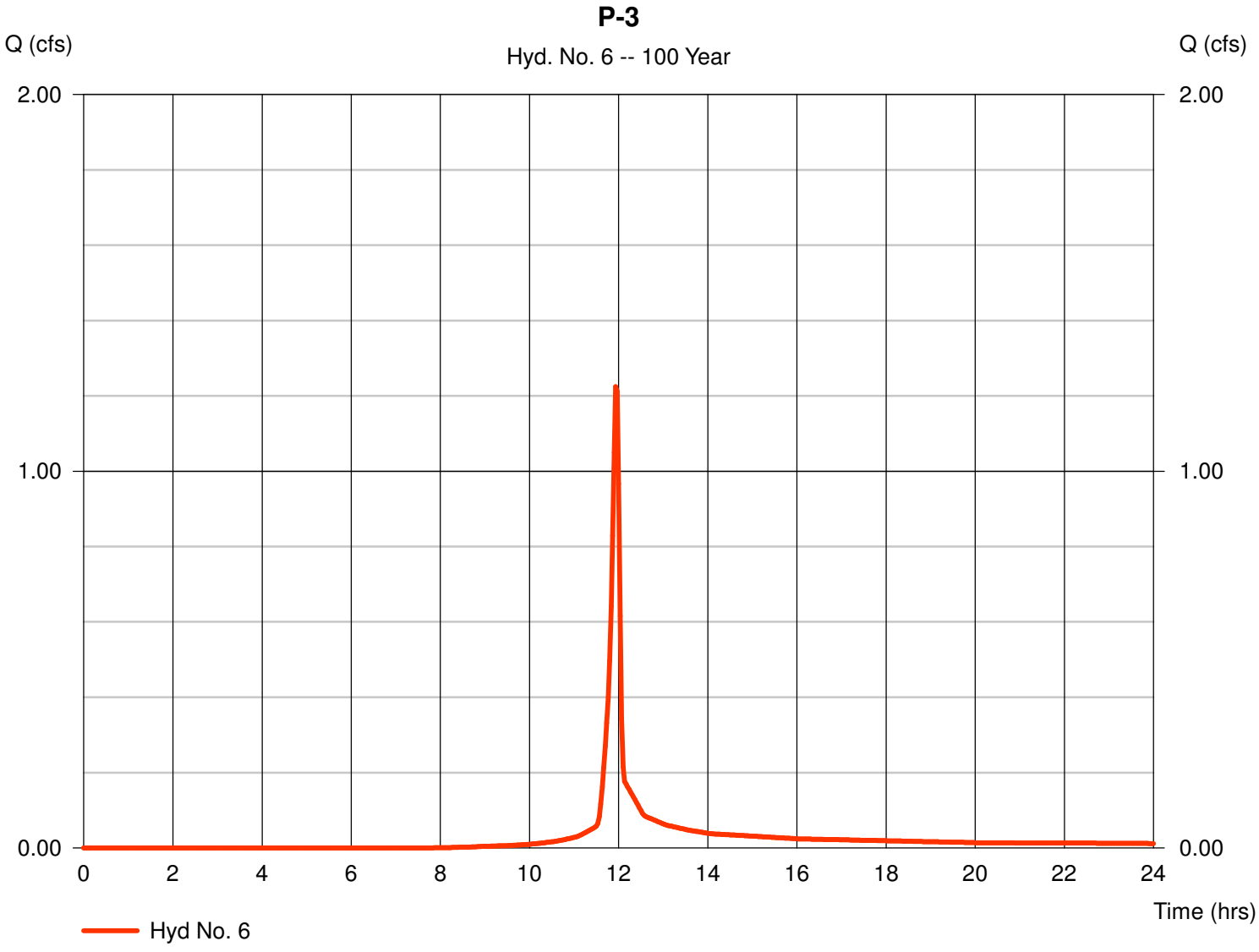


Hydrograph Report

Hyd. No. 6

P-3

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.225 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	2,481 cuft
Drainage area	=	0.240 ac	Curve number	=	76
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.20 min
Total precip.	=	5.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

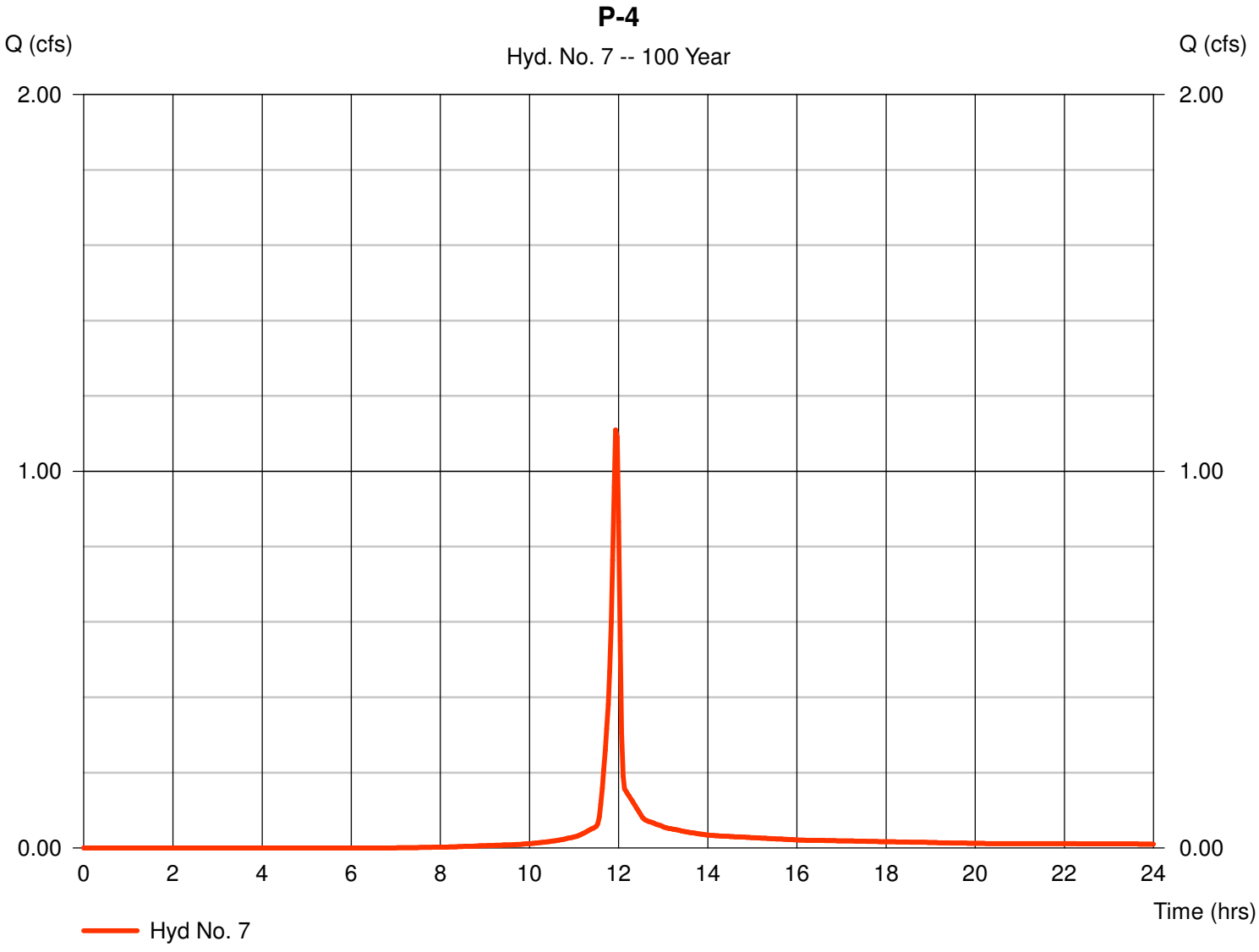


Hydrograph Report

Hyd. No. 7

P-4

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.110 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	2,263 cuft
Drainage area	=	0.200 ac	Curve number	=	79
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

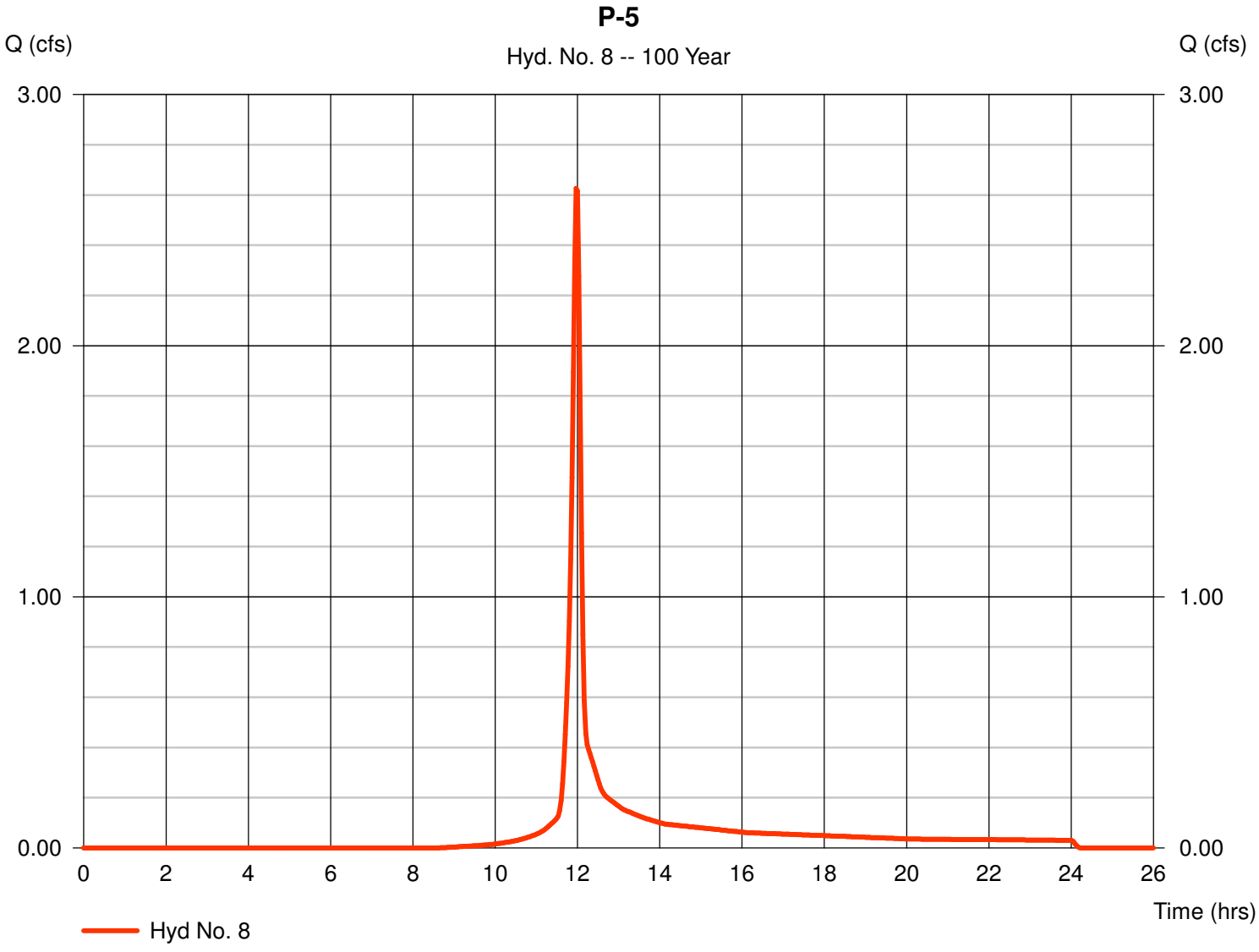


Hydrograph Report

Hyd. No. 8

P-5

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.627 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	6,011 cuft
Drainage area	=	0.600 ac	Curve number	=	73
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.40 min
Total precip.	=	5.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



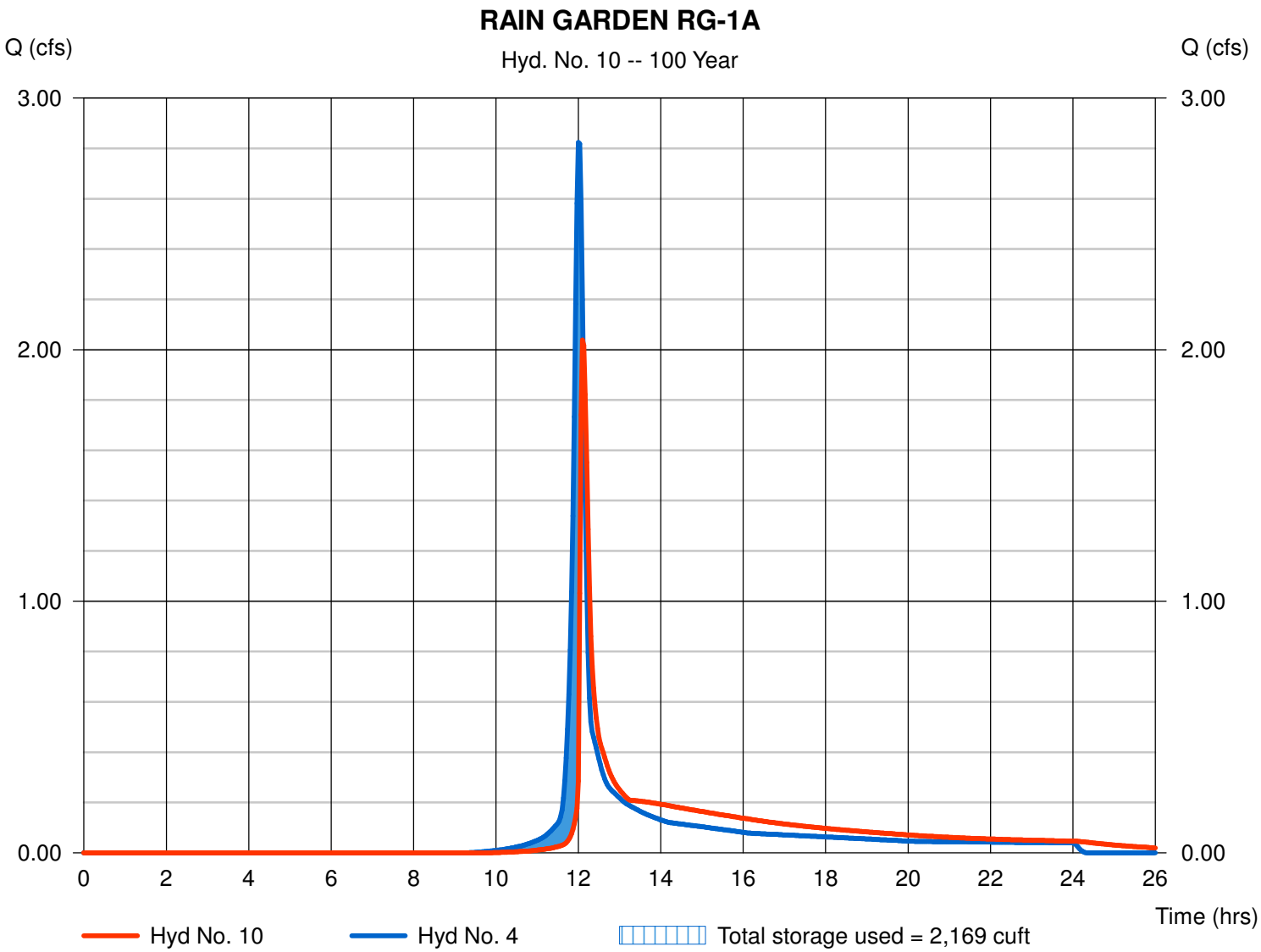
Hydrograph Report

Hyd. No. 10

RAIN GARDEN RG-1A

Hydrograph type	=	Reservoir	Peak discharge	=	2.038 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	7,360 cuft
Inflow hyd. No.	=	4 - P-1A	Max. Elevation	=	20.20 ft
Reservoir name	=	RAIN GARDEN RG-1A	Max. Storage	=	2,169 cuft

Storage Indication method used. Outflow includes exfiltration.

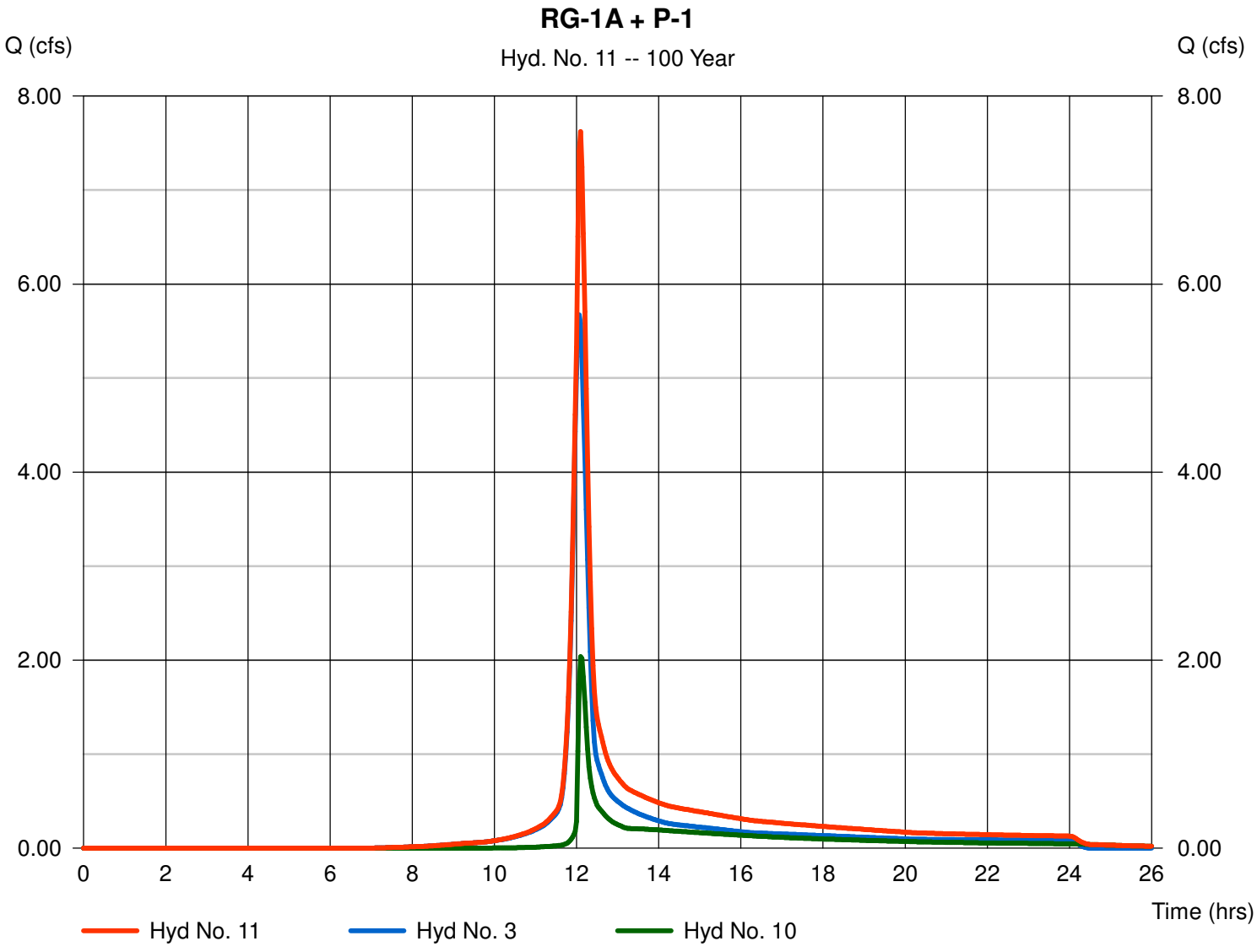


Hydrograph Report

Hyd. No. 11

RG-1A + P-1

Hydrograph type	= Combine	Peak discharge	= 7.620 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 25,101 cuft
Inflow hyds.	= 3, 10	Contrib. drain. area	= 1.470 ac



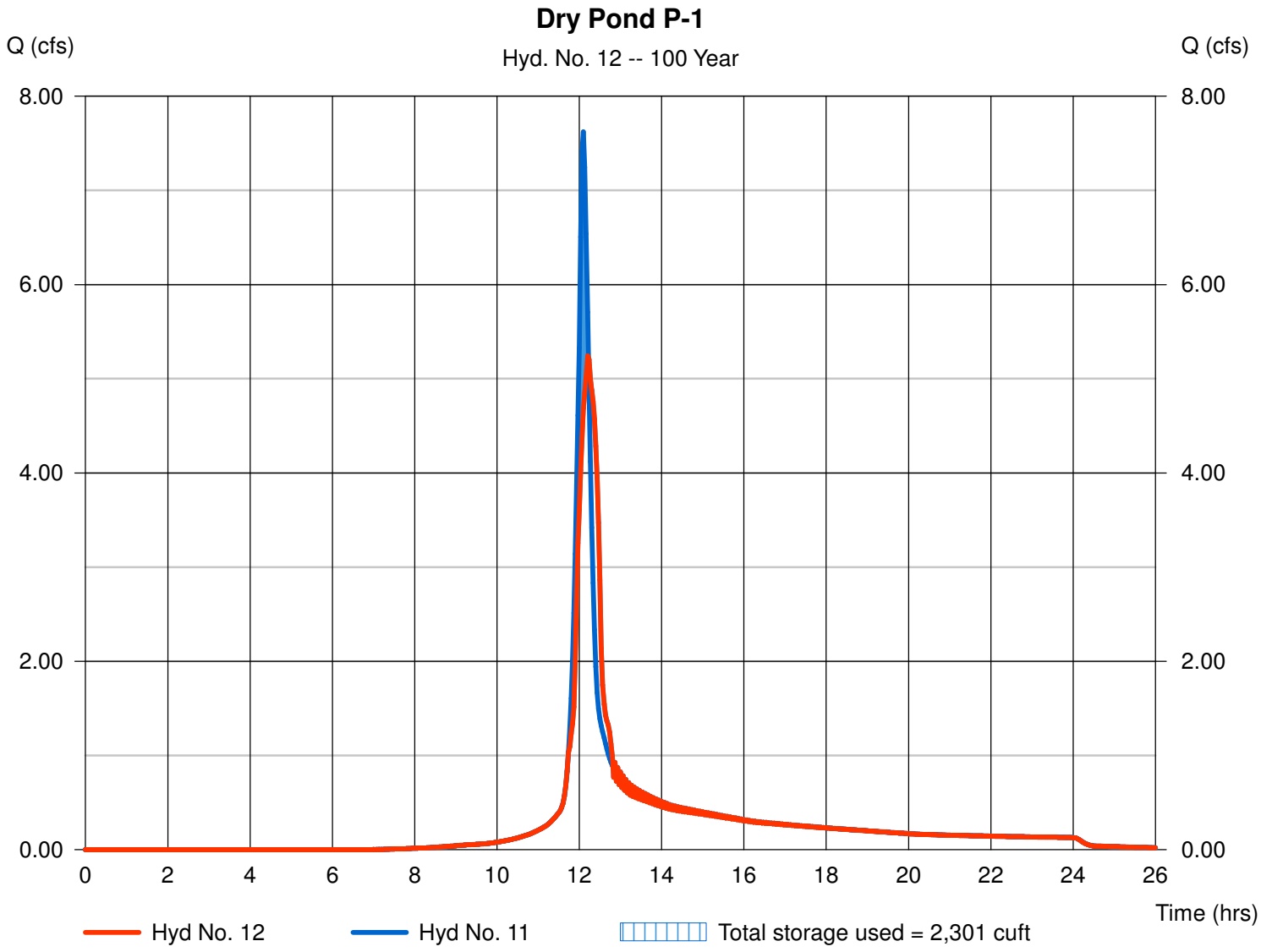
Hydrograph Report

Hyd. No. 12

Dry Pond P-1

Hydrograph type	=	Reservoir	Peak discharge	=	5.243 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.20 hrs
Time interval	=	2 min	Hyd. volume	=	24,797 cuft
Inflow hyd. No.	=	11 - RG-1A + P-1	Max. Elevation	=	19.32 ft
Reservoir name	=	Dry Pond 1	Max. Storage	=	2,301 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



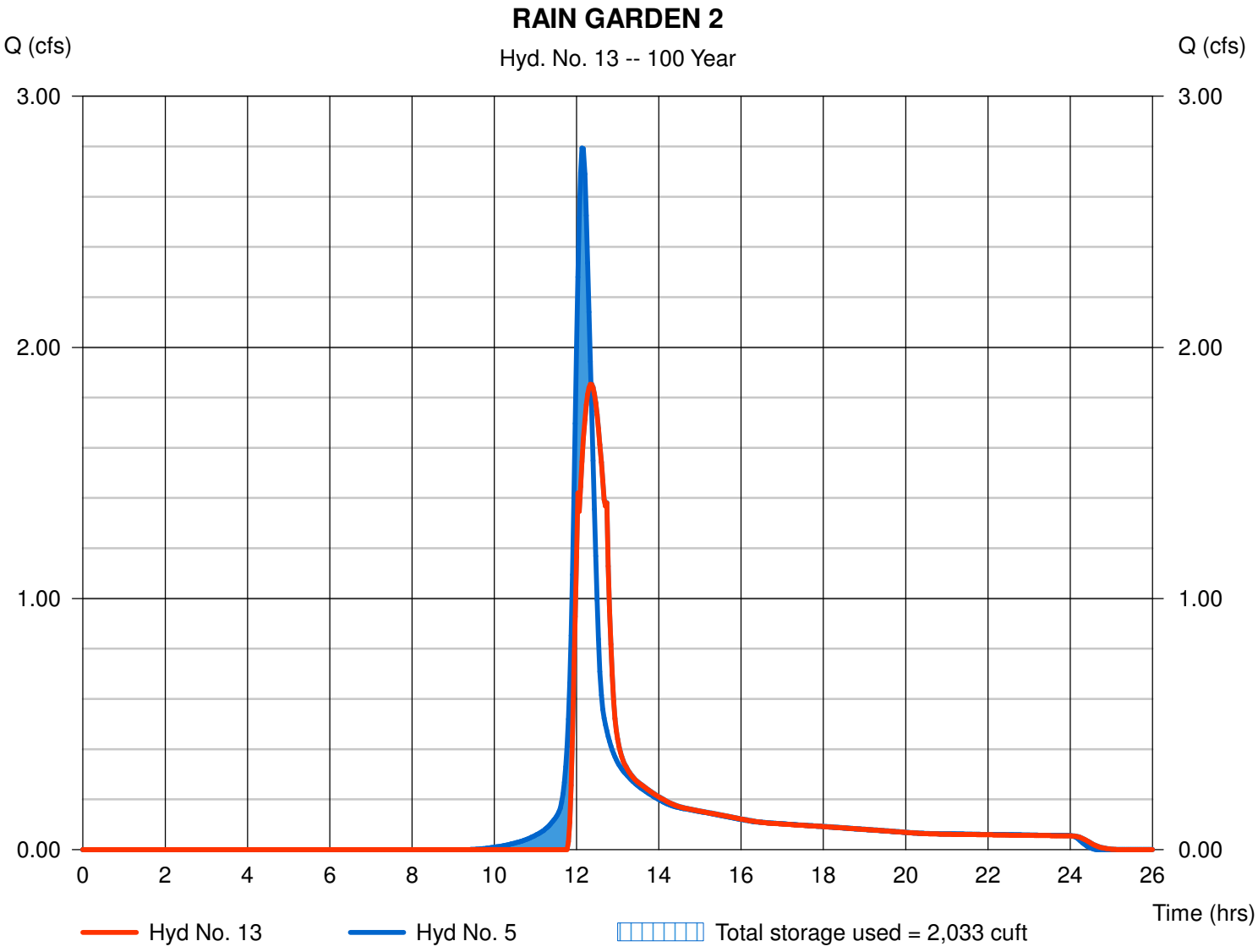
Hydrograph Report

Hyd. No. 13

RAIN GARDEN 2

Hydrograph type	=	Reservoir	Peak discharge	=	1.853 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.33 hrs
Time interval	=	2 min	Hyd. volume	=	9,801 cuft
Inflow hyd. No.	=	5 - P-2	Max. Elevation	=	13.47 ft
Reservoir name	=	RAIN GARDEN 2	Max. Storage	=	2,033 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

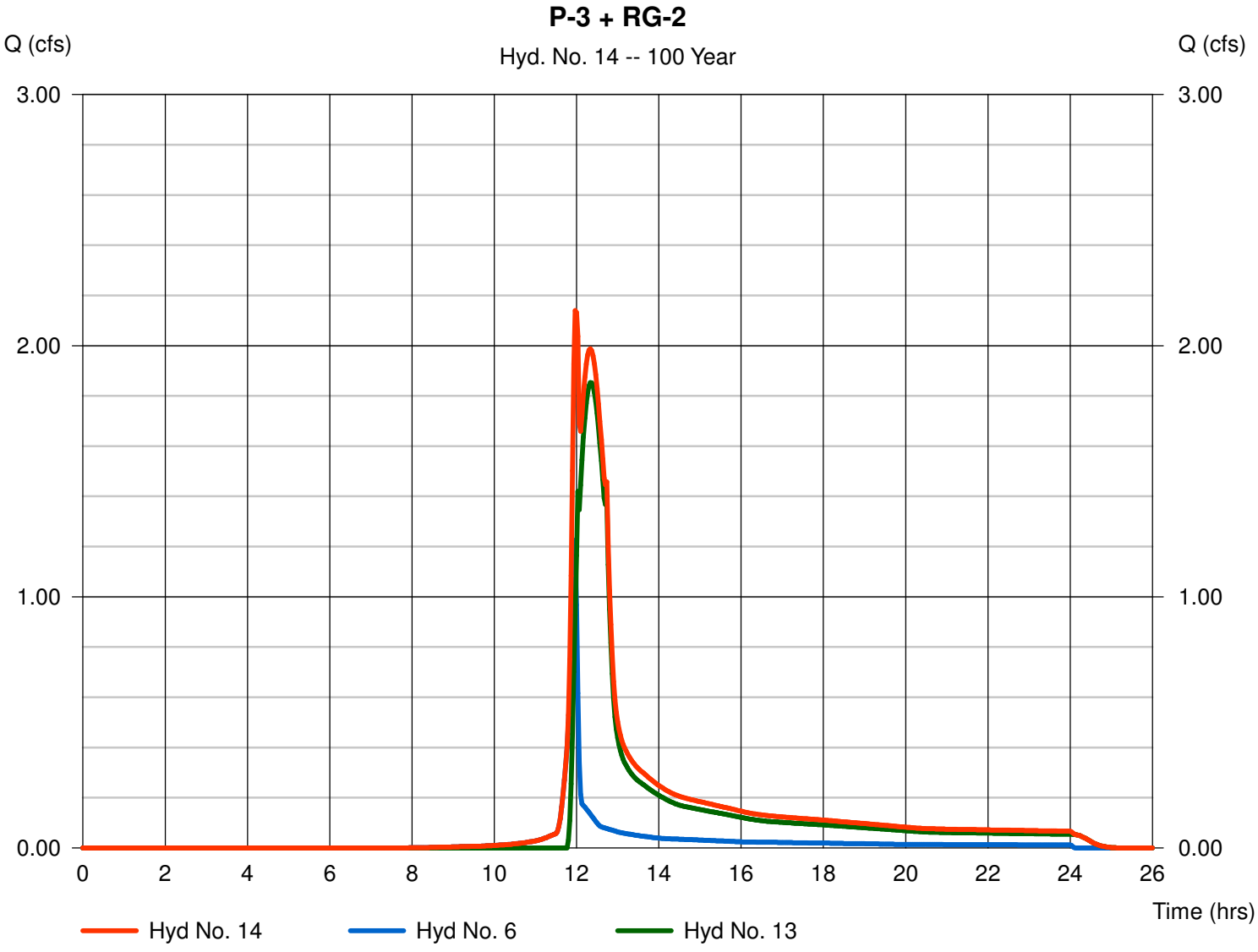


Hydrograph Report

Hyd. No. 14

P-3 + RG-2

Hydrograph type	= Combine	Peak discharge	= 2.140 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 12,282 cuft
Inflow hyds.	= 6, 13	Contrib. drain. area	= 0.240 ac



Hydrograph Report

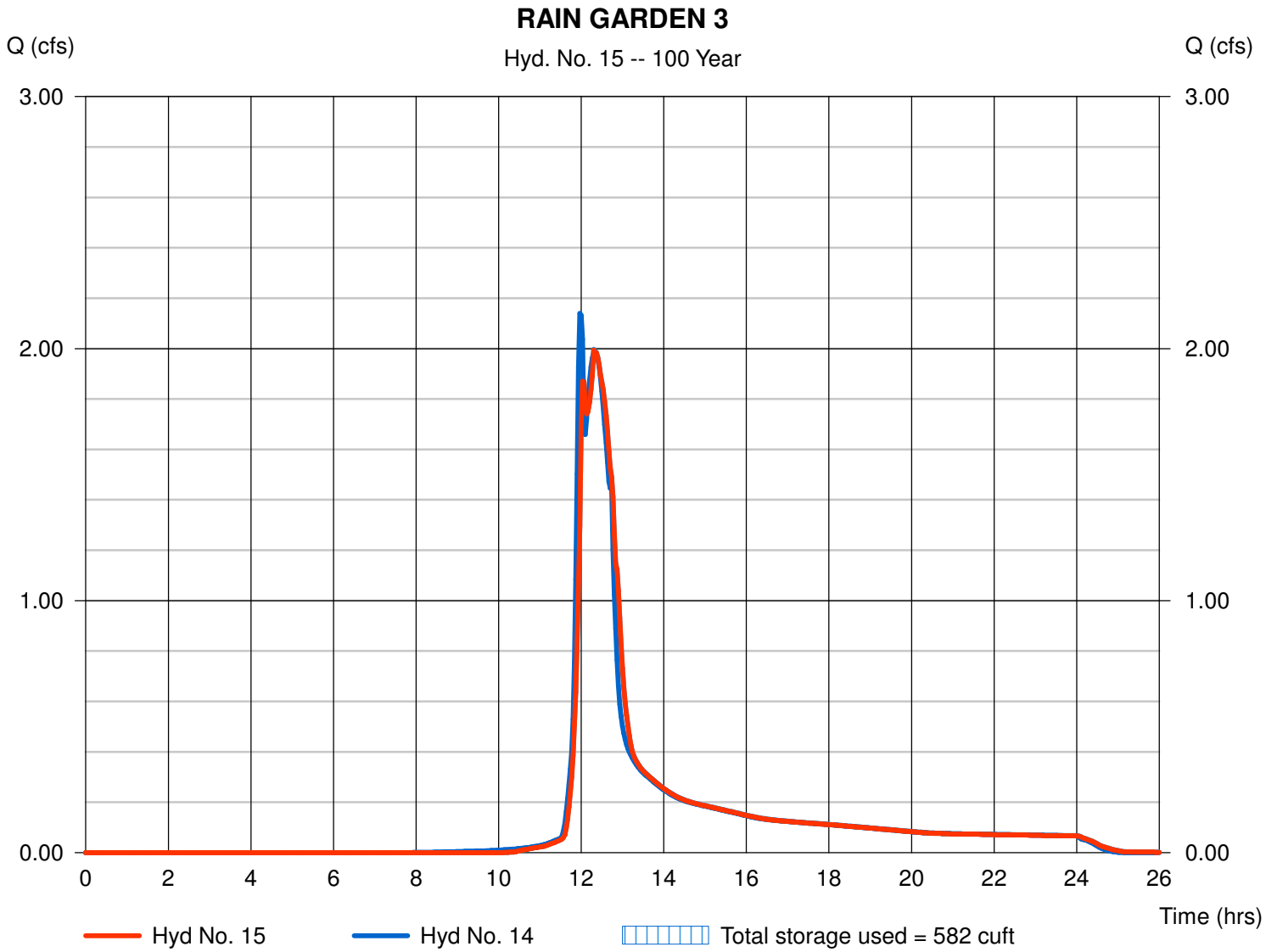
Hydraflow Hydrographs by Intelisolve v9.22 — Tuesday, Feb 16, 2016

Hyd. No. 15

RAIN GARDEN 3

Hydrograph type	=	Reservoir	Peak discharge	=	1.994 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.30 hrs
Time interval	=	2 min	Hyd. volume	=	12,215 cuft
Inflow hyd. No.	=	14 - P-3 + RG-2	Max. Elevation	=	10.57 ft
Reservoir name	=	RAIN GARDEN 3	Max. Storage	=	582 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

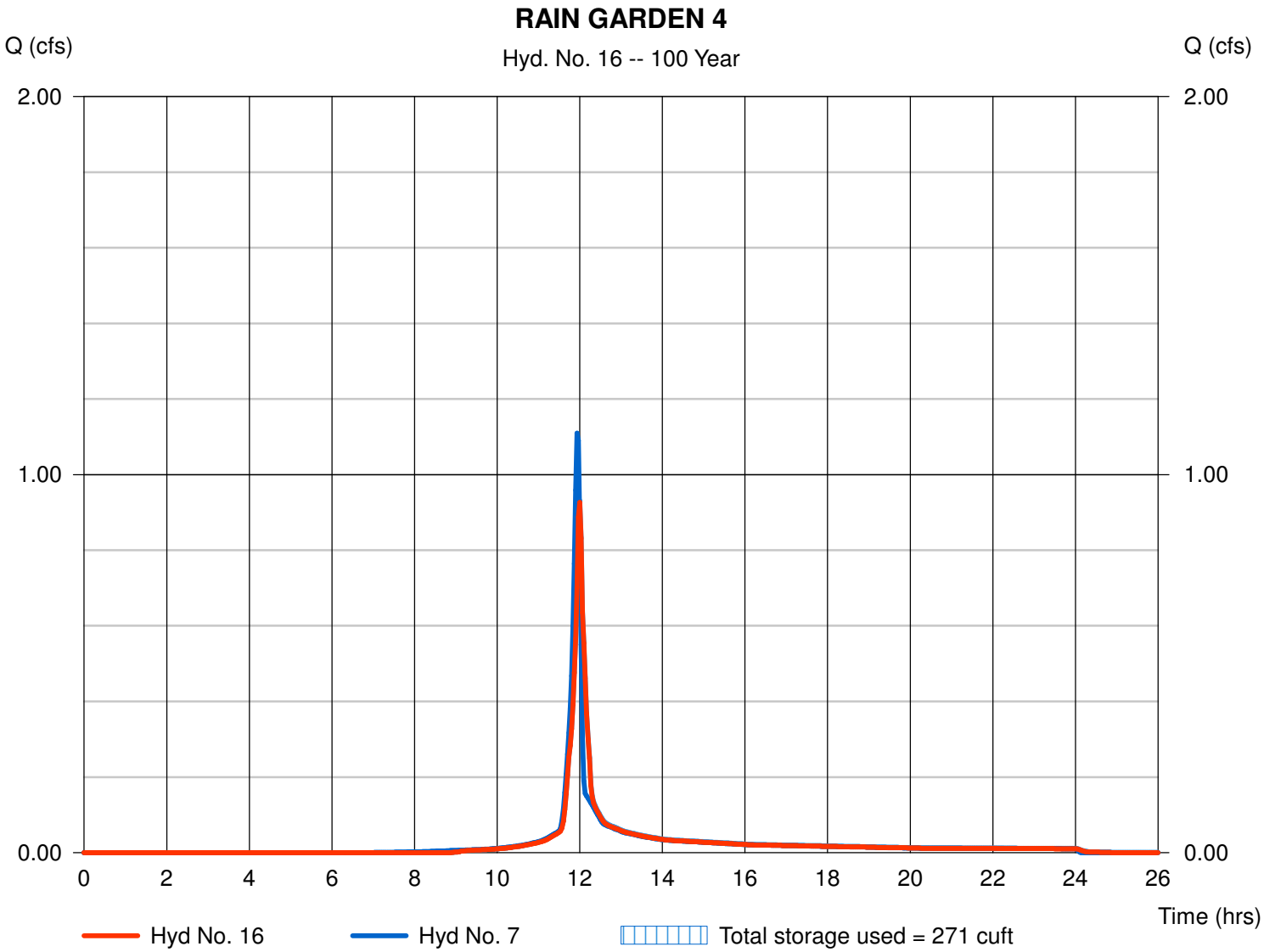
Hydraflow Hydrographs by Intelisolve v9.22 — Tuesday, Feb 16, 2016

Hyd. No. 16

RAIN GARDEN 4

Hydrograph type	=	Reservoir	Peak discharge	=	0.927 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	2,238 cuft
Inflow hyd. No.	=	7 - P-4	Max. Elevation	=	10.54 ft
Reservoir name	=	RAIN GARDEN 4	Max. Storage	=	271 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

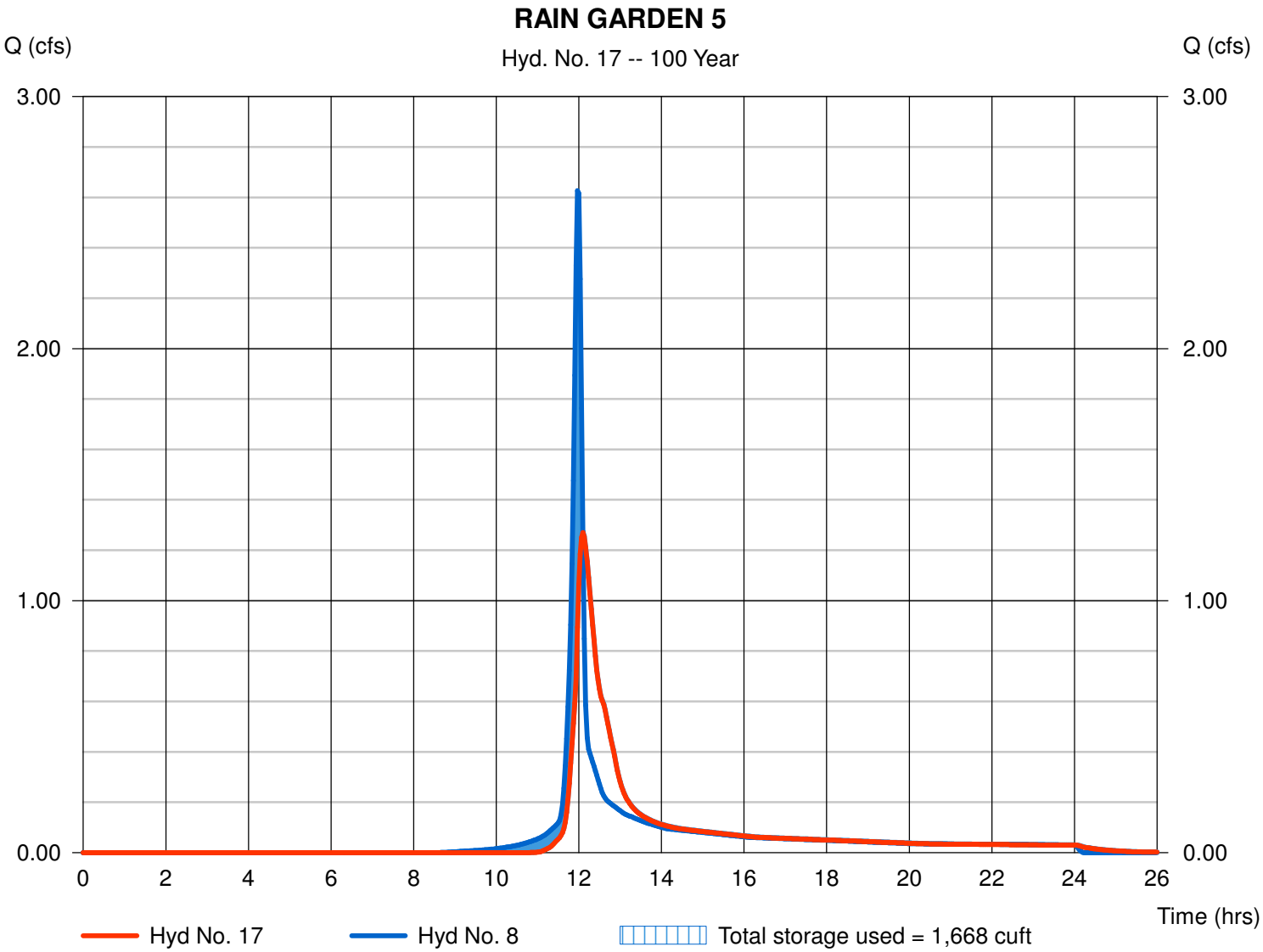
Hydraflow Hydrographs by Intelisolve v9.22 — Tuesday, Feb 16, 2016

Hyd. No. 17

RAIN GARDEN 5

Hydrograph type	=	Reservoir	Peak discharge	=	1.270 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	5,810 cuft
Inflow hyd. No.	=	8 - P-5	Max. Elevation	=	10.56 ft
Reservoir name	=	RAIN GARDEN 5	Max. Storage	=	1,668 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

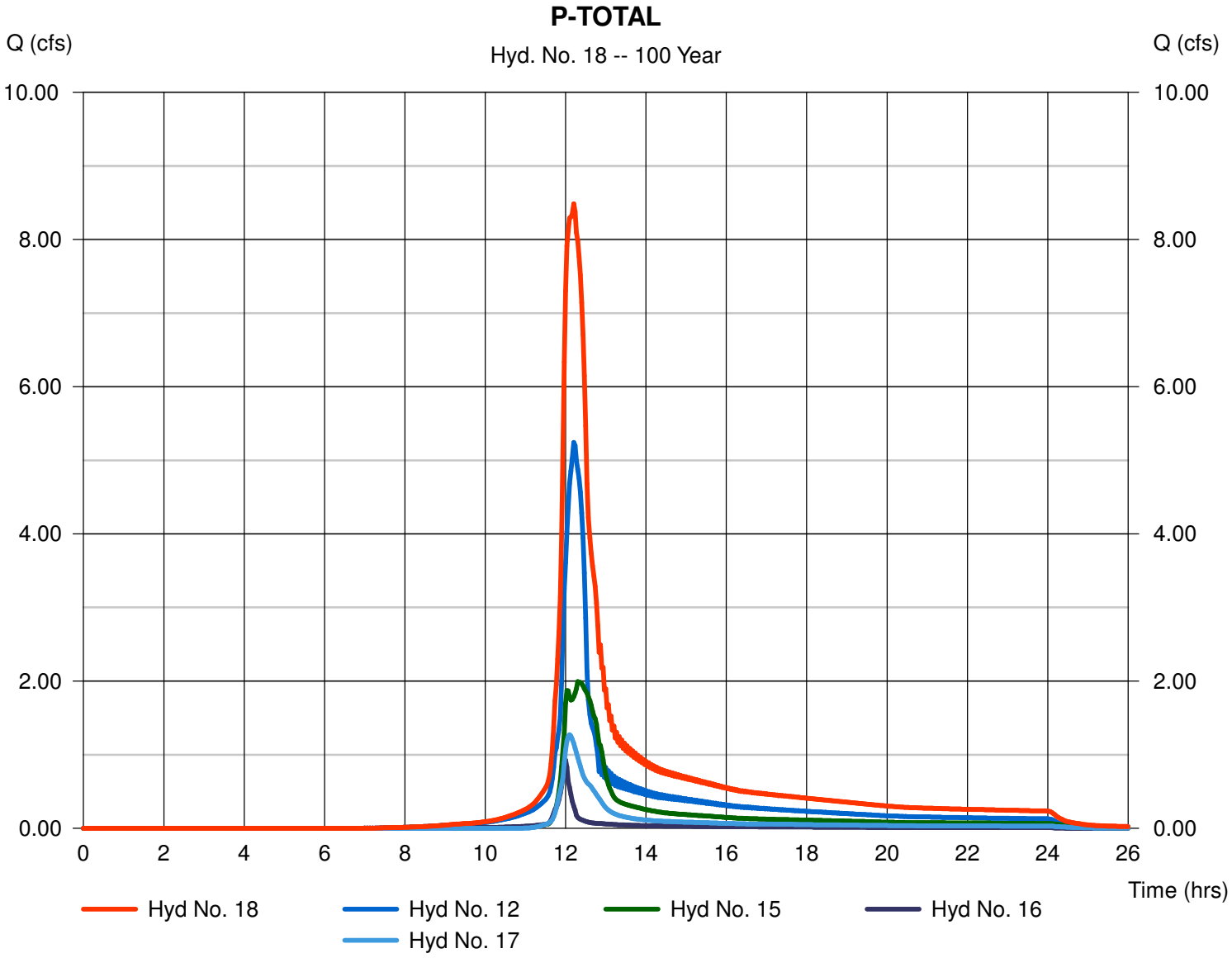


Hydrograph Report

Hyd. No. 18

P-TOTAL

Hydrograph type	=	Combine	Peak discharge	=	8.484 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.20 hrs
Time interval	=	2 min	Hyd. volume	=	45,059 cuft
Inflow hyds.	=	12, 15, 16, 17	Contrib. drain. area	=	0.000 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.8700	13.1000	0.8660	--------
3	0.0000	0.0000	0.0000	--------
5	79.2600	14.6000	0.8370	--------
10	26.5320	5.1998	0.6070	--------
25	102.6070	16.5000	0.8220	--------
50	114.8190	17.2000	0.8200	--------
100	127.1600	17.8000	0.8190	--------

File name: SEWRPC-modified-8-25-09.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.37	2.99	2.68	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	6.48	5.09	4.28	3.74	3.35	3.06	2.82	2.62	2.46	2.32	2.21	2.10
25	8.24	6.94	6.02	5.33	4.80	4.37	4.02	3.72	3.47	3.26	3.07	2.90
50	9.04	7.65	6.66	5.92	5.34	4.87	4.48	4.16	3.88	3.64	3.44	3.25
100	9.82	8.35	7.29	6.49	5.86	5.36	4.94	4.58	4.28	4.02	3.80	3.59

Tc = time in minutes. Values may exceed 60.

Precip. file name: SEwisconsin-swrpc.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	2.70	0.00	3.14	4.00	4.41	5.11	5.60
SCS 6-Hr	0.00	1.95	0.00	2.40	2.79	3.44	4.03	4.70
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10

Hydraflow Table of Contents

SWM_Stillwater Villas_2016-02-10.gpw

Hydraflow Hydrographs by Intelisolve v9.22

Tuesday, Feb 16, 2016

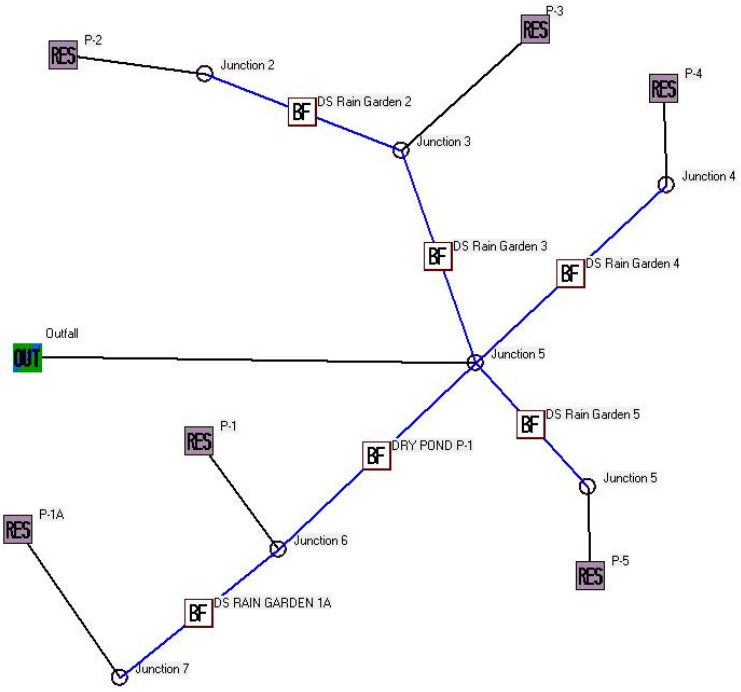
APPENDIX 5

WinSLAMM Data

Modeling of Proposed Wet Ponds & Dry Pond

INPUT DATA

Data file name: L:\LOBBYS\WPDOCS\DOCUMENT\966\14024-01 Stillwater Villas\284-Storm Water Management Plan\WinSLAMM\2016-02-16_Stillwater Villas.mdb



WinSLAMM Version 10.0.0
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee WI 1969.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\v10 WI_SL06 Dec06.rsv
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO02.ppdx
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 03/28/69 Study period ending date: 12/06/69
Date: 02-16-2016 Time: 08:48:05
Site information:

LU# 1 - Residential: P-2 Total area (ac): 1.170
1 - Roofs 1: 0.280 ac. Pitched Disconnected Silty
31 - Sidewalks 1: 0.010 ac. Disconnected Silty
45 - Large Landscaped Areas 1: 0.630 ac. Silty
46 - Large Landscaped Areas 2: 0.250 ac. Silty

LU# 2 - Residential: P-3 Total area (ac): 0.236
1 - Roofs 1: 0.094 ac. Pitched Disconnected Silty
31 - Sidewalks 1: 0.002 ac. Disconnected Silty
45 - Large Landscaped Areas 1: 0.140 ac. Silty

LU# 3 - Residential: P-4 Total area (ac): 0.206

1 - Roofs 1: 0.094 ac. Pitched Disconnected Silty
31 - Sidewalks 1: 0.002 ac. Disconnected Silty
45 - Large Landscaped Areas 1: 0.110 ac. Silty

LU# 4 - Residential: P-5 Total area (ac): 0.599
1 - Roofs 1: 0.190 ac. Pitched Disconnected Silty
31 - Sidewalks 1: 0.009 ac. Disconnected Silty
45 - Large Landscaped Areas 1: 0.400 ac. Silty

LU# 5 - Residential: P-1 Total area (ac): 1.481
25 - Driveways 1: 0.330 ac. Disconnected Silty
31 - Sidewalks 1: 0.051 ac. Disconnected Silty
37 - Streets 1: 0.360 ac. Smooth Street Length = 0.248 curb-mi Default St. Dirt Accum. Default Initial St. Dirt Loading
45 - Large Landscaped Areas 1: 0.740 ac. Silty

LU# 6 - Residential: P-1A Total area (ac): 0.786
1 - Roofs 1: 0.190 ac. Pitched Disconnected Silty
31 - Sidewalks 1: 0.006 ac. Disconnected Silty
45 - Large Landscaped Areas 1: 0.200 ac. Silty
46 - Large Landscaped Areas 2: 0.390 ac. Silty

Control Practice 1: Biofilter CP# 1 (DS)
1. Top area (square feet) = 1700
2. Bottom aea (square feet) = 286
3. Depth (ft): 1.5
4. Biofilter width (ft) - for Cost Purposes Only: 15
5. Infiltration rate (in/hr) = 0.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 1
8. Infiltration rate fraction (bottom): 1
9. Depth of biofilter that is rock filled (ft) 0
10. Fraction of rock filled volume as voids = 0
11. Engineered soil infiltration rate: 0.5
12. Engineered soil depth (ft) = 0
13. Engineered soil void ratio = 0
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: C:\WinSLAMM Files\NURP.CPZ
18. Initial water surface elevation (ft): 0

Soil Data Soil Type Fraction in Eng. Soil

Biofilter Outlet/Discharge Characteristics:

Outlet type: Broad Crested Weir
1. Weir crest length (ft): 12
2. Weir crest width (ft): 12
3. Height of datum to bottom of weir opening: 1

Outlet type: Surface Discharge Pipe
1. Surface discharge pipe outlet diameter (ft): 0.67
2. Pipe invert elevation above datum (ft): 0.1
3. Number of surface pipe outlets: 2

Control Practice 2: Biofilter CP# 2 (DS)

1. Top area (square feet) = 1085
2. Bottom aea (square feet) = 100
3. Depth (ft): 1.5
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 0.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 1
8. Infiltration rate fraction (bottom): 1
9. Depth of biofilter that is rock filled (ft) 0
10. Fraction of rock filled volume as voids = 0
11. Engineered soil infiltration rate: 0.5
12. Engineered soil depth (ft) = 0
13. Engineered soil void ratio = 0
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: C:\WinSLAMM Files\NURP.CPZ
18. Initial water surface elevation (ft): 0

Soil Data Soil Type Fraction in Eng. Soil

Biofilter Outlet/Discharge Characteristics:

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 10
2. Weir crest width (ft): 10
3. Height of datum to bottom of weir opening: 1

Outlet type: Surface Discharge Pipe

1. Surface discharge pipe outlet diameter (ft): 0.5
2. Pipe invert elevation above datum (ft): 0.1
3. Number of surface pipe outlets: 1

Control Practice 3: Biofilter CP# 3 (DS)

1. Top area (square feet) = 5270
2. Bottom aea (square feet) = 1384
3. Depth (ft): 1.5
4. Biofilter width (ft) - for Cost Purposes Only: 20
5. Infiltration rate (in/hr) = 0.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 1
8. Infiltration rate fraction (bottom): 1
9. Depth of biofilter that is rock filled (ft) 0
10. Fraction of rock filled volume as voids = 0
11. Engineered soil infiltration rate: 0.5
12. Engineered soil depth (ft) = 0
13. Engineered soil void ratio = 0
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: C:\WinSLAMM Files\NURP.CPZ
18. Initial water surface elevation (ft): 0

Soil Data Soil Type Fraction in Eng. Soil
Biofilter Outlet/Discharge Characteristics:
Outlet type: Broad Crested Weir
1. Weir crest length (ft): 12
2. Weir crest width (ft): 12
3. Height of datum to bottom of weir opening: 1
Outlet type: Vertical Stand Pipe
1. Stand pipe diameter (ft): 0.83
2. Stand pipe height above datum (ft): 0.3

Control Practice 4: Biofilter CP# 4 (DS)
1. Top area (square feet) = 3240
2. Bottom aea (square feet) = 1063
3. Depth (ft): 1.5
4. Biofilter width (ft) - for Cost Purposes Only: 15
5. Infiltration rate (in/hr) = 0.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 1
8. Infiltration rate fraction (bottom): 1
9. Depth of biofilter that is rock filled (ft) 0
10. Fraction of rock filled volume as voids = 0
11. Engineered soil infiltration rate: 0.5
12. Engineered soil depth (ft) = 0
13. Engineered soil void ratio = 0
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: C:\WinSLAMM Files\NURP.CPZ
18. Initial water surface elevation (ft): 0
Soil Data Soil Type Fraction in Eng. Soil
Biofilter Outlet/Discharge Characteristics:
Outlet type: Broad Crested Weir
1. Weir crest length (ft): 20
2. Weir crest width (ft): 10
3. Height of datum to bottom of weir opening: 0.9
Outlet type: Surface Discharge Pipe
1. Surface discharge pipe outlet diameter (ft): 0.67
2. Pipe invert elevation above datum (ft): 0.1
3. Number of surface pipe outlets: 4

Control Practice 5: Biofilter CP# 5 (DS)
1. Top area (square feet) = 2130
2. Bottom aea (square feet) = 206
3. Depth (ft): 6
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 0.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 1
8. Infiltration rate fraction (bottom): 1
9. Depth of biofilter that is rock filled (ft) 0
10. Fraction of rock filled volume as voids = 0

11. Engineered soil infiltration rate: 3.6
12. Engineered soil depth (ft) = 2
13. Engineered soil void ratio = 0.25
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: C:\WinSLAMM Files\NURP.CPZ
18. Initial water surface elevation (ft): 0

Soil Data Soil Type Fraction in Eng. Soil

Biofilter Outlet/Discharge Characteristics:

Outlet type: Sharp Crested Weir
1. Weir length (ft): 0.75
2. Invert elevation above datum (ft): 2.6

Outlet type: Broad Crested Weir
1. Weir crest length (ft): 10
2. Weir crest width (ft): 10
3. Height of datum to bottom of weir opening: 5

Outlet type: Vertical Stand Pipe
1. Stand pipe diameter (ft): 3
2. Stand pipe height above datum (ft): 4.75

Outlet type: Surface Discharge Pipe
1. Surface discharge pipe outlet diameter (ft): 0.54
2. Pipe invert elevation above datum (ft): 2.5
3. Number of surface pipe outlets: 1

Outlet type: Drain Tile/Underdrain
1. Underdrain outlet diameter (ft): 0.33
2. Invert elevation above datum (ft): 0.5
3. Number of underdrain outlets: 2

Control Practice 6: Biofilter CP# 6 (DS)

1. Top area (square feet) = 2716
2. Bottom aea (square feet) = 1712
3. Depth (ft): 3.5
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 0.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 1
8. Infiltration rate fraction (bottom): 1
9. Depth of biofilter that is rock filled (ft) 0
10. Fraction of rock filled volume as voids = 0
11. Engineered soil infiltration rate: 3.6
12. Engineered soil depth (ft) = 2
13. Engineered soil void ratio = 0.25
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: C:\WinSLAMM Files\NURP.CPZ
18. Initial water surface elevation (ft): 0

Soil Data Soil Type Fraction in Eng. Soil

Biofilter Outlet/Discharge Characteristics:

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 10
2. Weir crest width (ft): 10
3. Height of datum to bottom of weir opening: 3

Outlet type: Vertical Stand Pipe

1. Stand pipe diameter (ft): 2
2. Stand pipe height above datum (ft): 2.75

Outlet type: Drain Tile/Underdrain

1. Underdrain outlet diameter (ft): 0.33
2. Invert elevation above datum (ft): 0.5
3. Number of underdrain outlets: 1

OUTPUT SUMMARYSLAMM for Windows Version 10.0.0

SLAMM for Windows Version 10.0.0
(c) Copyright Robert Pitt and John Voorhees 2012
All Rights Reserved

Data file name: L:\LOBBYS\WPDOCS\DOCUMENT\966\14024-01 Stillwater Villas\284-Storm Water Management Plan\WinSLAMM\2016-02-15_Stillwater Villas.mdb
Data file description:
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee WI 1969.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\v10 WI_SL06 Dec06.rsv
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO02.ppdx
Model Run Start Date: 03/28/69 Model Run End Date: 12/06/69
Date of run: 02-16-2016 Time of run: 08:44:52
Total Area Modeled (acres): 4.478
Years in Model Run: 0.67

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	53303	-	176.0	585.6	-
Outfall Total with Controls:	6433	87.93%	166.3	66.79	88.59%
Annualized Total After Outfall Controls:	9663			100.3	

APPENDIX 6

Storm Water Practice Maintenance Requirements

Document Number

Storm Water Management Practice Maintenance Agreement

Bielinski Commercial, L.L.C., as "Owner" of the property described below, in accordance with Chapter 32 City of Waukesha Storm Water Management and Erosion Control, agrees to install and maintain storm water management practice(s) on the subject property in accordance with approved plans and Storm Water Management Plan conditions. The owner further agrees to the terms stated in this document to ensure that the storm water management practice(s) continues serving the intended functions in perpetuity. This Agreement includes the following exhibits:

Exhibit A: Legal Description of the real estate for which this Agreement applies ("Property").
Exhibit B: Location Map(s) – shows an accurate location of each storm water management practice affected by this Agreement.
Exhibit C: Maintenance Plan – prescribes those activities that must be carried out to maintain compliance with this Agreement.

Note: After construction verification has been accepted by the City of Waukesha, for all planned storm water management practices, an addendum(s) to this agreement shall be recorded by the Owner showing design and construction details. The addendum(s) may contain several additional exhibits, including certification by City of Waukesha of Storm Water and Erosion Control Permit termination, as described below.

Name and Return Address

City of Waukesha
130 Delafield Street
Waukesha, WI 53188

Through this Agreement, the Owner hereby subjects the Property to the following covenants, conditions and restrictions:

1. The Owner shall be responsible for the routine and extraordinary maintenance and repair of the storm water management practice(s) and drainage easements identified in Exhibit B until Storm Water and Erosion Control Permit termination by the City of Waukesha in accordance with Chapter 32 of the County Code of Ordinances.
2. After development is completed, the Owners of the residential Lots within this Subdivision and any future additions to this Subdivision shall each be liable for an equal undividable fractional share of the cost to repair, maintain or restore said Storm water Detention Facilities and Storm water Infiltration Facilities. Said repairs, maintenance and restoration shall be performed by the homeowners association of this Subdivision.
3. After Storm Water and Erosion Control Permit termination under 1., the current Owner(s) shall be solely responsible for maintenance and repair of the storm water management practices and drainage easements in accordance with the maintenance plan contained in Exhibit C.
4. Upon written notification by City of Waukesha or their designee, the Owner(s) shall, at their own cost and within a reasonable time period determined by the City of Waukesha, have an inspection of the storm water management practice conducted by a qualified professional, file a report with the City of Waukesha and complete any maintenance or repair work recommended in the report. The Owner(s) shall be liable for the failure to undertake any maintenance or repairs.
5. In addition, and independent of the requirements under paragraph 3 above, the City of Waukesha, or its designee, is authorized to access the property as necessary to conduct inspections of the storm water management practices or drainage easements to ascertain compliance with the intent of this Agreement and the activities prescribed in Exhibit C. The City of Waukesha may require work to be done which differs from the report described in paragraph 3 above, if the City of Waukesha reasonably concludes that such work is necessary and consistent with the intent of this agreement. Upon notification by the City of Waukesha of required maintenance or repairs, the Owner(s) shall complete the specified maintenance or repairs within a reasonable time frame determined by the City of Waukesha.
6. If the Owner(s) do not complete an inspection under 3. above or required maintenance or repairs under 4. above within the specified time period, the City of Waukesha is authorized, but not required, to perform the specified inspections, maintenance or repairs. In the case of an emergency situation, as determined by the City of Waukesha, no notice shall be required prior to the City of Waukesha performing emergency maintenance or repairs. The City of Waukesha may levy the costs and expenses of such inspections, maintenance or repair related actions as a special charge against the Property and collected as such in accordance with the procedures under s. 66.0627 Wis. Stats. or subch. VII of ch. 66 Wis. Stats.

7. This Agreement shall run with the Property and be binding upon all heirs, successors and assigns. After the Owner records the addendum noted above, the City of Waukesha shall have the sole authority to modify this agreement upon a 30-day notice to the current Owner(s).

Dated this ___ day of _____, 2013.

Owner: Bielinski Commercial, LLC

_____
(Owners Signature)

_____
(Owners Typed Name)

Acknowledgements

State of Wisconsin:
County of Waukesha

Personally came before me this ____ day of _____, 201___, the above named _____, as the authorized Representative of _____ for the purpose of signing this document, to me known to be the person who executed the foregoing instrument and acknowledged the same.

_____
[Name]
Notary Public, Waukesha County, WI

_____.

Notary Public, Waukesha County, WI
My commission expires:_____.

This document was drafted by:

Joshua D. Pudelko, M.S., P.E.
Trio Engineering, LLC
17700 West Capitol Drive
Brookfield, WI 53045

For Certification Stamp

Exhibit A – Legal Description

The following description and reduced copy map identifies the land parcels affected by this Agreement. For a larger scale view of the referenced document, contact the Waukesha County Register of Deeds office.

Project Identifier: **Stillwater Villas**
Date of Recording:
Map Produced By: **Trio Engineering, LLC**
12660 West North Avenue
Brookfield, WI 53005

Legal Description:

All that part of the Northwest Yi of the Northwest X and the North Yi of the South Yi of the Northwest X of Section 29, Township 6 North, Range 19 East, in the City of Waukesha , Waukesha County, Wisconsin now being more particularly described as follows:

Commencing at the Northwest corner of the Northwest X of said Section 29; Thence North 88°42'47" East, along the North line of said X Section, 1165.15 to the Southeast corner of River's Crossing Addition

#1, the Northeast corner of River's Crossing Addition #2 and the East right of way line of River's Crossing Drive; Thence South 00°23'30" East along said East right of line and East line of River's Crossing

Addition #2, 461.81 feet to a point of curvature; Thence Southeasterly along said East lines 31.42 feet along the arc of a curve, whose center lies to the Northeast, whose radius is 20 .00 feet, whose chord bears South 45°23'30" East, 28.28 feet to a point of tangency on the North line of River's Crossing Drive and the North line of River's Crossing Addition #2; Thence North 89°36'30" East along said North lines,

143.36 feet to a point of curvature; Thence Southeasterly along said North lines 46.75 feet along the arc of a curve, whose center lies to the Southwest, whose radius is 130.00 feet, whose chord bears South 80°05'25" East, 46.50 feet to the place of beginning of lands hereinafter described;

Thence North 20°11'27" East, 338.70 feet, Thence North 70°19'57" East, 187.15 feet, Thence South 73°02'18" East, 142.31 feet; Thence South 18°59'46" East, 222.79 feet; Thence South 36°06'58" West,

356.22 feet; Thence North 84°11'47" West, 43.84 feet to a point on the East line of Lot 352 of River's Crossing Addition #2; Thence North 07°21'42" East, along said East line, 3.52 feet to the North line of said Lot 352 of River's Crossing Addition #2; Thence North 84°20'00" West along said North line, 165.00 feet to a point on the East line of Stillwater Circle and the East line of River's Crossing Addit ion #2 to a point of curvature; Thence Northwesterly along said East lines 171.20 feet along the arc of a curve, whose center lies Southwest, whose radius is 130.00 feet, whose chord bears North 32°03'35" West, 159.10 feet to the point of beginning

Said Parcel contains 182,326 Square Feet, (or 4.186 Acres) of land more or less.

No Buildings or Fences shall be constructed in Storm Sewer and Storm water Drainage Easements. No Trees or Bushes which would grow to more than 4 feet in height shall be planted within said Easements without approval of the City of Waukesha Engineering Department and the Waukesha Water Utility. See exhibit C for specific maintenance requirements within theses areas. See subdivision final plat for details on location.

Exhibit B – Location Map

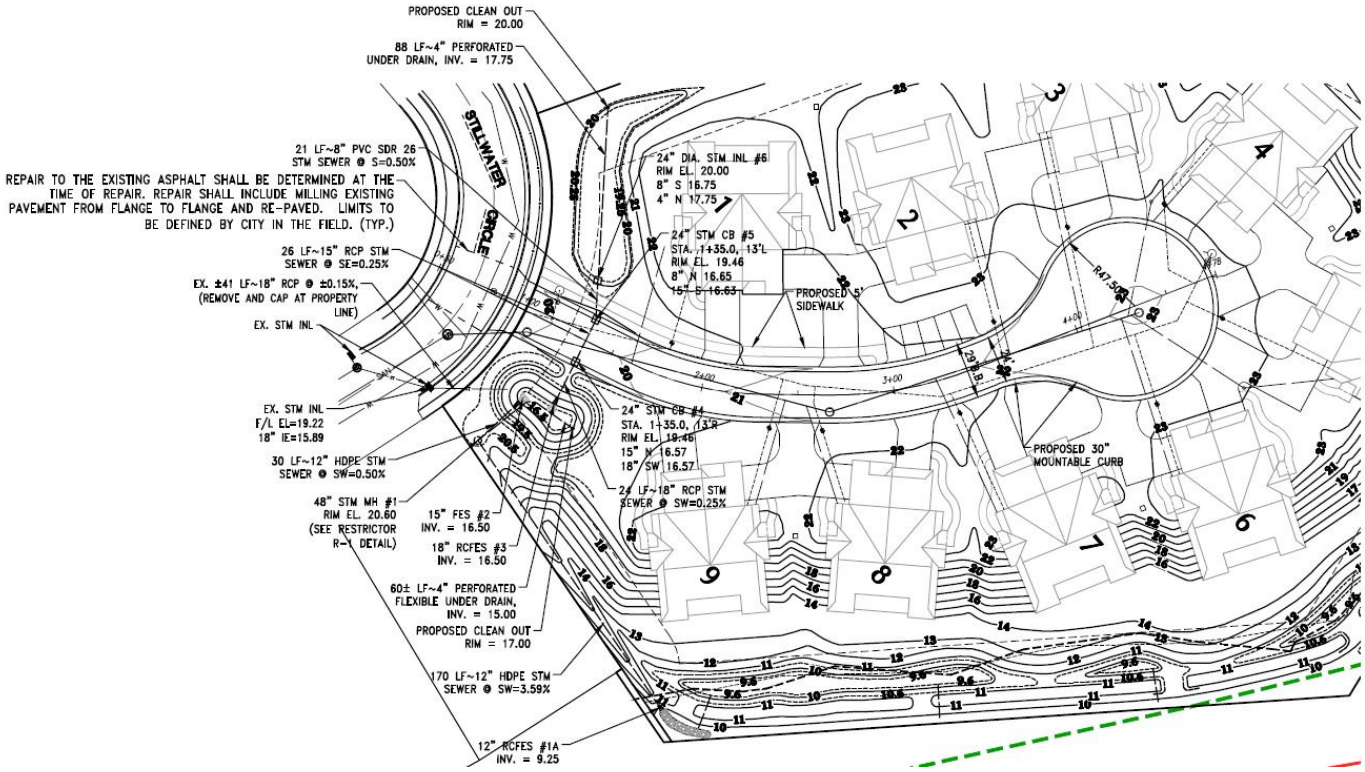
The stormwater management practices covered by this Agreement are depicted in the reduced copy of the construction plans, as shown in Figure 1. The practices include two wet detention basins, one infiltration basin, and all associated pipes, earthen berms, overflow spillway, rock rip rap and other components of these practices. All of the noted storm water management practices are located within drainage easements or in Outlot 1 and Outlot 2 of the Howell Oaks subdivision plat, as noted in Exhibit A. Refer to the approved construction plans for additional details on the stormwater management practices.

Development Name(s):	**Stillwater Villas**
Storm water Practices:	**Bio-retention Basin, Rain Gadens, Grassed Swales.**
Location of Practices:	**South and east perimeter of subject property as noted within Condominium Plat.**
Owner:	**The Owner of the property, shall be responsible for the cost to repair, maintain or restore said Storm water Management Facilities and Storm water Infiltration Facilities. Said repairs, maintenance and restoration shall be performed by the Owner of this property.**

Figure 1

Plan View of Stormwater Practices

Rain Gardens 1A, 2 & Pond P-1



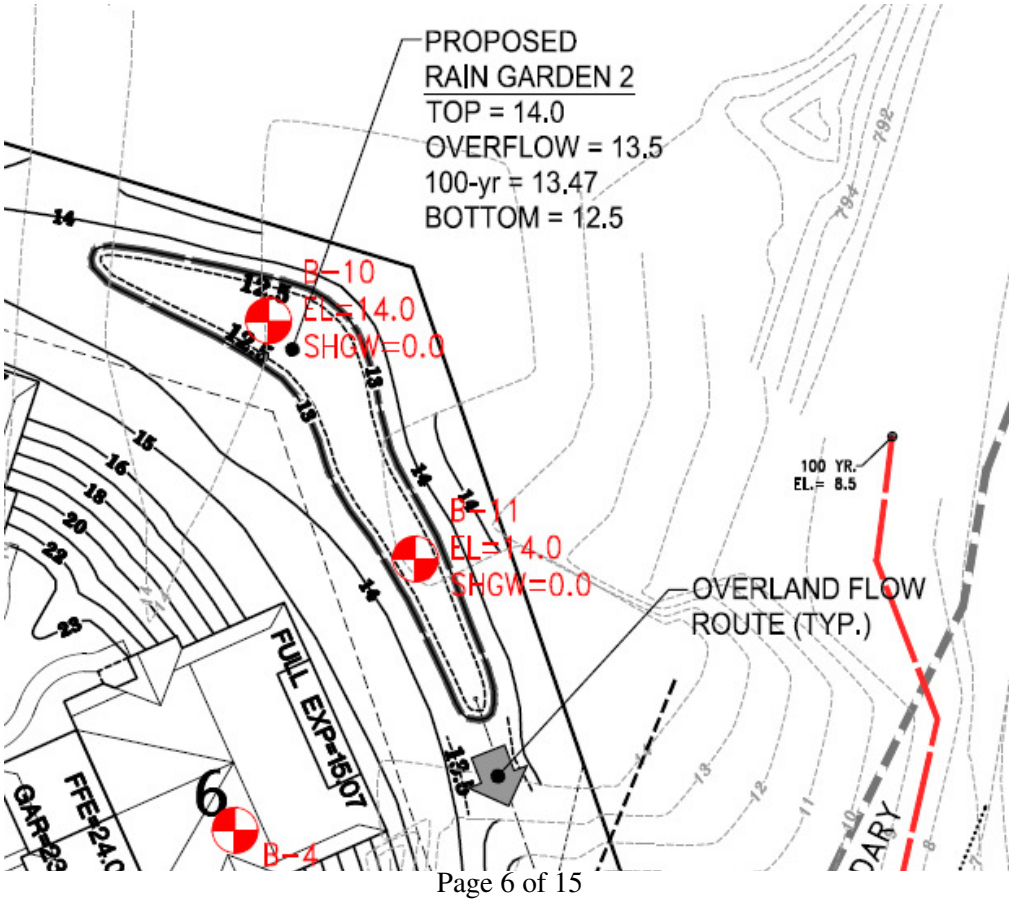


Figure 1

Plan View of Stormwater Practices (continued)

Rain Garden 3, 4, & 5

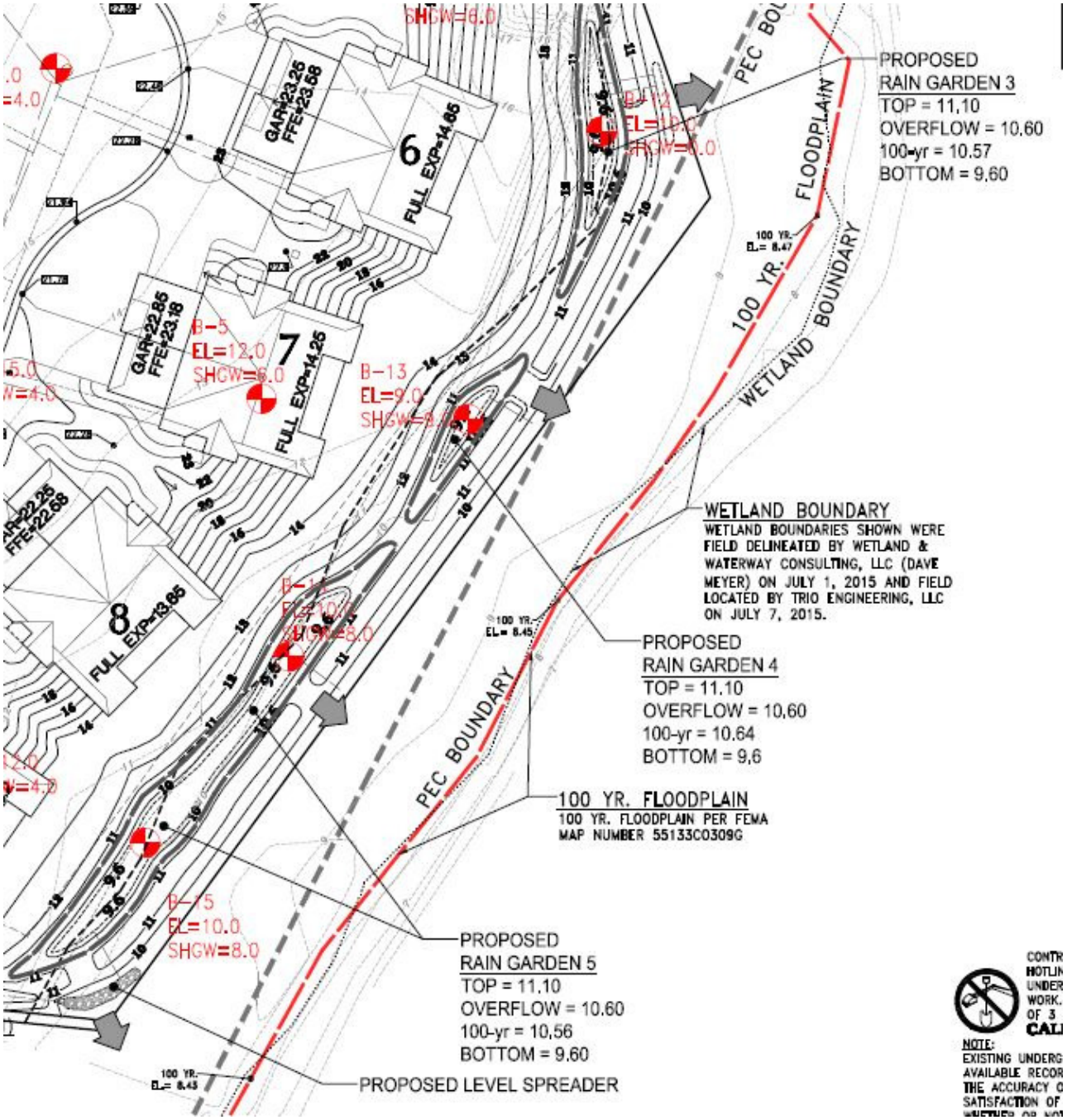


Exhibit C
Minimum Storm Water Practice Maintenance Requirements

This exhibit explains the basic function of each of the stormwater practices listed in Exhibit B and prescribes the minimum maintenance requirements to remain compliant with this Agreement. The maintenance activities listed below are aimed to ensure these practices continue serving their intended functions in perpetuity. The list of activities is not all inclusive, but rather indicates the minimum type of maintenance that can be expected for this particular site. Access to the stormwater practices for maintenance vehicles is shown in Exhibit B. Any failure of a stormwater practice that is caused by lack of maintenance will subject the Responsible Party to enforcement of the provisions listed on Page 1 of this Agreement by the City of Waukesha.

"As-built" construction drawings of the basin, showing actual dimensions, elevations, outlet structures, etc. will be recorded as an addendum(s) to this agreement within 60 days after the City of Waukesha accepts verification of construction from the project engineer.

INFILTRATION/BIO-RETENTION BASIN OPERATIONS AND MAINTENANCE

To ensure the proper function of the storm water infiltration basins, the following list of maintenance activities are recommended:

1. A minimum of 70% soil cover made up of native grasses should be maintained on the bottom of the infiltration basin area to promote the desired infiltration rates. Periodic mowing is recommended to enhance establishment of the prairie grasses (which may take 2-3 years) and maintain the minimum native cover. To reduce competition from cool season grasses (bluegrass, fescues, quack, etc.) and other weeds:
    - For the first year, cut to a 6" height three times – once each in June, July and early August. To prevent damage to the native grasses, do not mow below a 6" height. Remove excessive accumulation of clippings to avoid smothering next year's seedlings.
    - After the first year, mowing may only be needed in early June each year to help control the spread of cool season plants. The mowing should also be raised to 10-12" to avoid damage to the warm season plants.
    - Any major bare areas or areas taken over by non-native species must be reseeded. To clear area of weeds and cool season grasses, treat with an herbicide that contains glysophosphate in accordance with manufacturer's instructions. Ensure a firm seedbed is prepared to a depth of 3 inches (a roller is recommended). Seeding should occur in early-mid June. Seed with Big Bluestem, Indian Grass, Little Blue Stem or Switchgrass (preferably an equal mix of all four types). A companion crop of oats is recommended. Seed must be placed at a depth of 1/4 – 1/2" and a minimum rate of 1/4 pound per 100 square feet. If broadcast seeding by hand, drag leaf rake over soil surface after seeding. Then roll it again and cover with a light layer of mulch and staked erosion control netting to hold it in place until germination. For other planting details, see NRCS standard 342 (Critical Area Planting).
2. The basin and all components (grass swales, inlets, outlets, etc.) should be inspected after each heavy rain, but at a minimum of once per year. If the basin is not draining properly (within 72 hours), further inspection may be required by persons with expertise in storm water management and/or soils.
    - If soil testing shows that the soil surface has become crusted, sealed or compacted, some tillage of the soil layer at the bottom of the basin should be performed – note the location of the perforated underdrain before tilling to avoid damage to the underdrain. Types of tillage equipment that can be used include a subsoiler or straight, narrow-shanked chisel plow.
    - If sedimentation is determined to be causing the failure, the accumulated sediment must be removed and the area reseeded in accordance with the notes above.
    - If inspection of the basin shows that groundwater is regularly near the surface, additional design features may need to be considered, such as additional subsurface drainage or conversion to a wetland treatment system.

3. All outlet pipes, soil layers and other flow control devices must be kept free of debris. Any blockage must be removed immediately.
4. Any eroding areas must be repaired immediately to prevent premature sediment build-up in the system. Erosion matting is recommended for repairing grassed areas.
5. Heavy equipment and vehicles must be kept off of the bottom and side slopes of the engineered soil area to prevent soil compaction. Soil compaction will reduce infiltration rates and may cause failure of the basin, resulting in ponding and possible growth of wetland plants.
6. No trees are to be planted or allowed to grow in the bottom of the basin, as trees may shade out the native grasses. The basin must be inspected annually and any woody vegetation removed.
7. Grass swales leading to the basin shall be preserved to allow free flowing of surface runoff in accordance with approved grading plans.
8. No grading or filling of the basin or berms other than for sediment removal is allowed.
9. Any other repair or maintenance needed to ensure the continued function of the infiltration basin as ordered by the Village of Hartland under the provisions listed in this Agreement.

RAIN GARDEN
OPERATIONS AND MAINTENANCE

I. ROUTINE MAINTENANCE

A. Inspection

1. Performance of the rain garden should be inspected monthly and after every major storm event, following the initial construction to evaluate if the basin is draining within the design time limits.

   a. Water plants should be watered as necessary the first year to establish plants.

2. If performance does not meet the design goals, complete repairs to the facility to meet the design requirements.

3. Following the initial growing season of monthly inspections, quarterly inspections of the facility should be made. Inspect the facility for:

   a. Differential settlement

   b. Cracking

   c. Erosion

   d. Leakage

   e. Tree and woody plant growth on the embankments and plant health

   f. Condition of the inlets and outlets

   g. Sediment accumulation

   h. Vigor and density of vegetation on the floor of the basin and buffer strips

   i. pH testing of the soil (if plants growth issues exist)

j. Observation wells and/or under drains

B. Mowing – Native Vegetation

1. During establishment of vegetation, the first mowing shall occur once it reaches a height of 10 to 12 inches.

2. Control woody plant invasion by mowing once a year. The vegetation height shall be 5 to 6 inches after mowing.

3. Mow once per year in the fall after November 1st.

4. Remove trash and debris at the time of mowing.

C. Erosion Control

1. Inspect seasonally for erosion. Inspection after major storm events for erosion problems is also recommended if practical.

2. Repair all eroded areas immediately. Temporary erosion controls may be necessary to facilitate repairs.

D. Tilling

1. If the basin is located on marginally permeable soils, annual or semi- annual tilling may be needed to maintain infiltration capacity. NOTE THE LOCATION OF DRAIN TILE and avoid disturbing during tilling.

2. Tilled areas should be immediately re-vegetated to prevent erosion.

II. NON-ROUTINE MAINTENANCE

A. Structural Maintenance

1. Inspect pipe systems quarterly.

2. Remove and replace pipe systems that have eroded or rusted.

3. Earthen structures should be inspected annually. Erosion should be repaired immediately upon discovery.

B. Restoration of Infiltration Capacity

1. Over time the original infiltration capacity of the basin will be diminished.

2. Deep tilling can be done to restore the infiltration capacity of the basin. The basin will be drained and the soils dried to a depth of 8 inches. NOTE THE LOCATION OF DRAIN TILE BEFORE TILLING.

3. The top 2 to 3 inches of topsoil, chisel plowing, and adding topsoil and compost can be done.

4. The basin must be restored with native plantings.

C. Watering

1. Water plants need to be watered as necessary during the first growing season.

2. After the first growing season, water as necessary during dry periods.

STORM SEWER SYSTEM
OPERATIONS AND MAINTENANCE

I. INSPECTION

A. Frequency

a. Inspect catch basins, inlets and manholes at least once per year.

b. Inspect storm sewer end sections at least twice per year and after major rainfall events.

B. Inspection

a. Catch Basins, Inlets and Manholes

i. Inspect for sediment deposition in the bottom of structures.

ii. Check frames and lids for cracks and wear such as rocking lids or lids moved by traffic and for shifted frames.

iii. Check chimneys for cracked mortar, cracked lift rings and spalling.

iv. Check for leaks at joints.

v. Check surrounding areas for pollutants such as leaks from dumpsters, minor spills and oil dumping.

b. Storm Sewer End sections

i. Observe for obstructions, accumulation of sediment and trash, undermining and joint separation.

ii. Inspect end treatment for settlement, scour and displaced armoring.

II. STANDARD MAINTENANCE

A. Catch Basins, Inlets and Manholes

a. Repair any deterioration threatening structural integrity immediately.

b. Replace worn or cracked frames and lids. Frames that have shifted should be re-centered and re-set on the structure.

c. Repair any spalled or cracked mortar. Cracked rings should be repaired or replaced.

d. Repair leaking joints.

e. Clean manhole and storm inlet inverts of deposited material. Catch basins should be cleaned before the sump is 40 percent full.

f. Remove potential sources of contamination away from catch basins, inlets and manholes.

B. Storm Sewer End sections

a. End sections should be free flowing; trash, debris and obstructions should be removed to prevent backups.

b. End sections which have separated from the storm sewer pipe shall be reset on firm bedding and reconnected to the existing storm sewer pipe. Restrain joints if necessary.

c. Scour areas shall be repaired immediately. Replace missing soil with clean fill and replace/install end treatment. Missing armoring will require additional stone, typically one class larger.

d. Excessive material deposited at the storm sewer outfall is indicative of: a disturbed area upstream draining to the system or a potential failure of a system component. Disturbed areas draining to the system should be stabilized immediately or diverted to drain to a BMP. Potential system failures require non-standard maintenance.

III. NON-STANDARD MAINTENANCE

A. Non-standard maintenance includes inspection, repair or replacement of buried structures.

a. Televising of buried structures (pipes) should occur when excessive material is found within the system or at an outfall with no apparent source area visible at the surface, or the system experiences frequent backups.

b. Follow the recommendations for the repair and/or replacement of system components televised by a firm specializing in this work.

CULVERTS
OPERATION AND MAINTENANCE

I. INSPECTION

A. Culverts should be inspected twice a year and after heavy rainfall.

B. Inspect for sediment deposition, scour at the ends of pipe, accumulations of trash and obstructions.

II. MAINTENANCE

A. Scour areas should be repaired with clean fill and replacement of end treatment (rip rap, TRM, etc.). Scour areas with no end treatment should be stabilized with topsoil, seed and erosion control mat at a minimum.

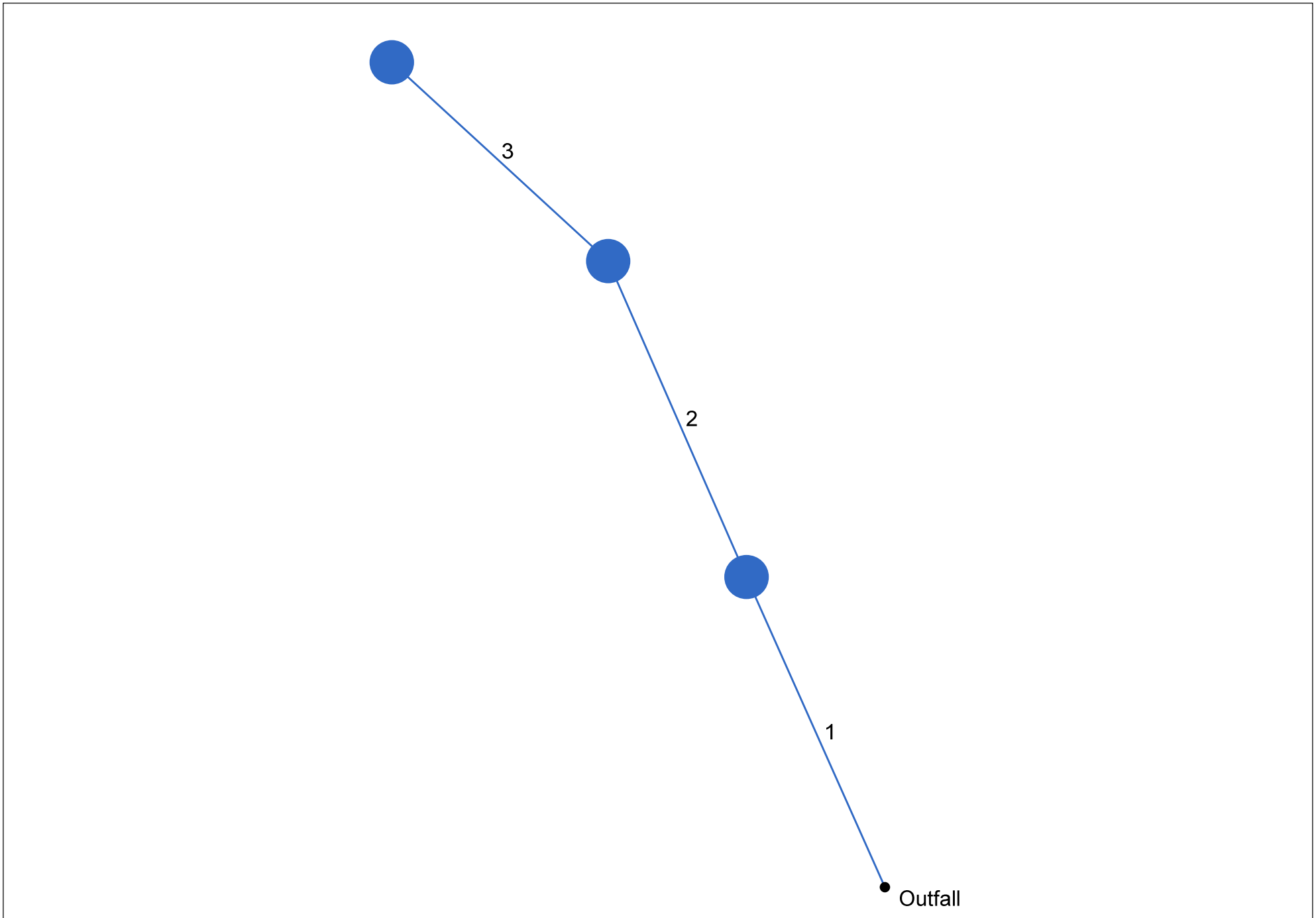
B. Sediment deposits, trash and obstructions should be removed from the pipe ends.

C. Material deposited within the pipe should be promptly removed to maintain the conveyance capacity of the pipe.

APPENDIX 7

Storm Water Sewer Calculations

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: STORM SYSTEM_STILLWATER VILLAS_2016-03-02.stm	Number of lines: 3	Date: 3/8/2016

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	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.	Junction Type
1	2	5.02	12	Cir	23.995	16.50	16.58	0.333	17.96*	18.44*	0.32	18.76	End	Combination
2	3	3.11	12	Cir	24.506	16.58	16.67	0.367	18.76*	18.94*	0.16	19.11	1	Combination
3	4	1.43	12	Cir	20.740	16.67	16.75	0.386	19.11*	19.14*	0.05	19.19	2	Combination

Project File: STORM SYSTEM_STILLWATER VILLAS_2016-03-02.stm | Number of lines: 3 | Run Date: 3/8/2016

NOTES: Return period = 10 Yrs. ; *Surcharged (HGL above crown).