Johnson Woods Phase II Lighting Information

The proposed Phase II lighting will be consistent with the lighting currently installed in the Phase I portion of the site. The attached product information outlines the specific pole and fixture details along with the Isofootcandle lines. The closest home outside the development in Phase II is over 200 feet away.

The Isofootcandle lines indicate that at a distance of 48 feet from the base of the light that the footcandle level is only .07. Therefore since there is no close homes to the proposed installations it is expected that there will be no perceptible light cast to off site areas.

The wall mount fixtures noted are located on the carriage garages and are motion activated and will not be on at all times.

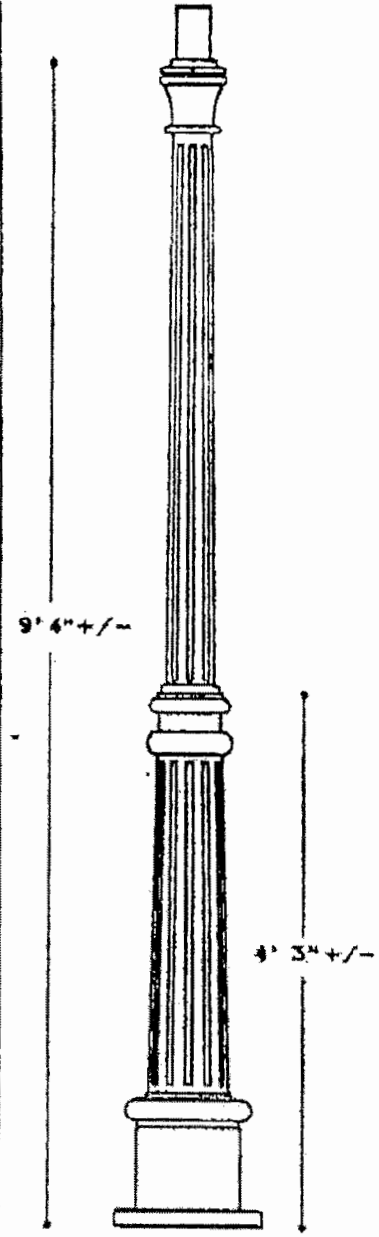
Streetlight Pole

From: ALLOY CASTINGS CO., INC.
Quality Aluminum Castings Since 1948

151 West Union Street • East Bridgewater, MA 02333
Telephone: (508) 378-2541 • FAX: (508) 378-1240
www.alloycastings.com

Plymouth Style Decorative Pole

ACDP-P-9'4"

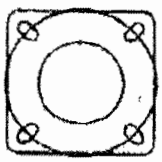


SCALE: 3/4" = 1 FOOT

LAMP POST SPECIFICATIONS

Style:	*Plymouth*
Height:	*9'4" ± and 11" ±*
Base:	*13-1/2 ± Square*
Tenon:	*4 3/4" x 2 7/8" Diameter Optional Tenon Heights and diameters available*
Material:	*Heavy Wall Cast - Aluminum 356 Alloy*
Finish:	*Primed and Finish Painted to your Specifications*
Access Door:	*Located in Base*
Anchor Bolts:	*(4) 3/4" x 24" plus 3" Hook including 1 lock washer 2 flat washers and two nuts. Fully Galvanized.*
Bolt Projection:	*3" Above Foundation*
Bolt Circle:	*14-1/8 ± Diameter*
Features:	*Post Heights Available as 9'4" ± 11' 3" ± in Cast Aluminum Variety of Heights Are Available Using Spun Aluminum Shafts.*
Luminaire Options:	*There is a wide variety of luminaires available. Consult factory for options.*
Finish Options:	*A wide variety of colors are available using the finest quality paints. Thermostat powder coating is available upon request.*
Accessory Options:	*Ladder rest, decorative brackets available.*

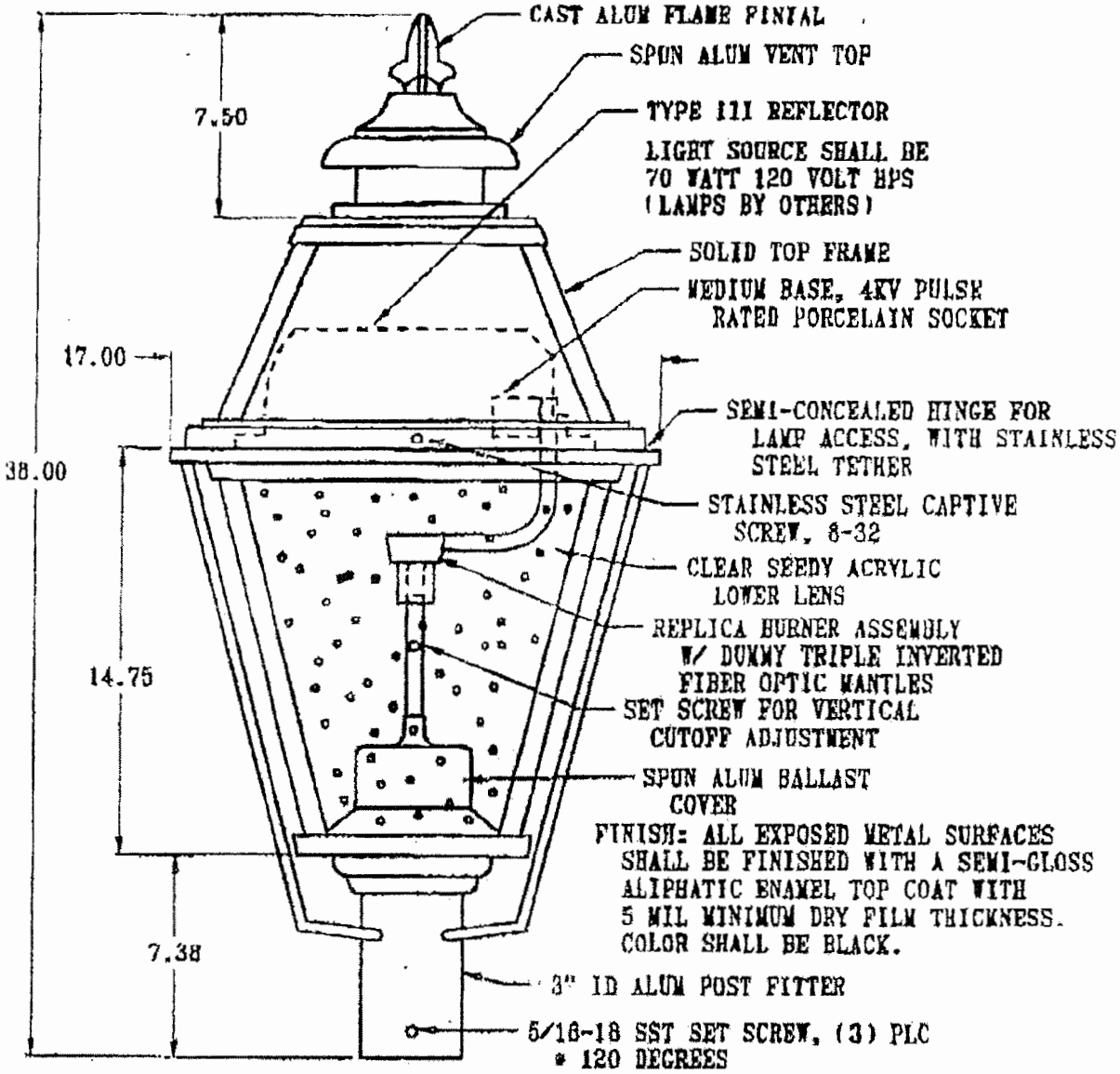
ANCHOR BOLT DETAIL



14 1/8" DIA. BOLT CIRCLE FOR 3/4" ANCHOR BOLTS

5/98

Streetlight Fixture



FIXTURE TO BE EQUIPPED WITH 70W HIGH PRESSURE SODIUM, 120 VOLT HIGH POWER FACTOR POSTLINE BALLAST BY MAGNATEK (CAT#1253-142-500). INSTALLATION BY OTHERS.

THE PENNSYLVANIA GLOBE GASLIGHT CO
300 SHAW ROAD • NORTH BRANFORD, CT 06471
TEL (203) 484-7749 • FAX (203) 484-7758

Madison "B" Lantern
Marblehead, MA

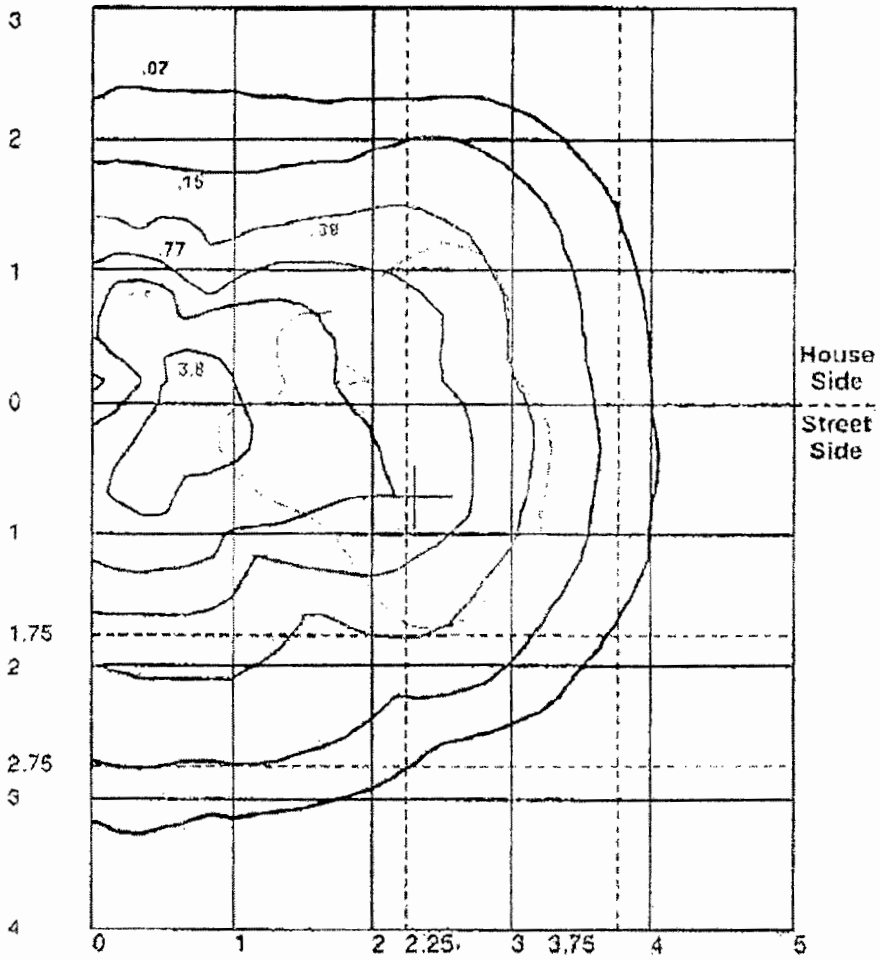
DATE | NO

Streetlight Photometrics

Photometric Test Reports

File # ITL 51327

IES ROAD REPORT PHOTOMETRIC FILE
ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINANCE



Distance In Units Of Mounting Height
Values Based On 12 Foot Mounting Height
1/2 Maximum Candela Trace Shown As Dashed Curve
(+) = Maximum Candela Point

CHARACTERISTICS : 70 - WATT MH

IES Classification	Type II
Longitudinal Classification	Medium
Cutoff Classification	Cutoff
Total Rated Lamp Lumens	9000
Maximum Candela	3660
Maximum Candela Angle	73H 67.5V
Maximum Candela At 90 Degrees Vertical	163 (1.81% Lamp Lms)
Maximum Candela At 80 Degrees Vertical	455 (5.06% Lamp Lms)
Downward Total Efficiency	56.8%

IES
CUT OFF

PENN GLOBE

THE PENNSYLVANIA GLOBE GASLIGHT CO
300 Show Road, North Branford, CT 06471
TEL: 203-484-7749 FAX: 203-484-7758

Product:
#F4Y1-LX294-PG989

Description:
MADISON "B" 1000 LUMINAIRE

Project:
LEXINGTON COURTYARD

Configuration:
PENNTROL ® CUTOFF OPTICS - MEDIUM BASE HORIZONTAL

Date: 5.11.10

Typical Unit Exterior Light Fixture

PROGRESS LIGHTING

Incandescent | **Polycarbonate - Oval** | **Outdoor**

Wall or Ceiling Mount

Type _____

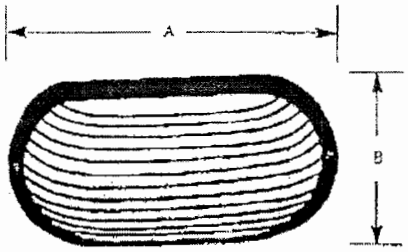
-30

P5704 ☐

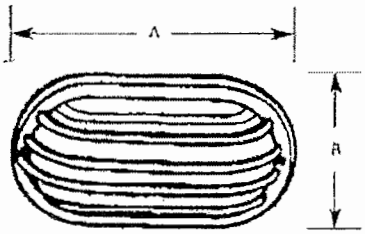
P5705 ☐

P5706 ☐

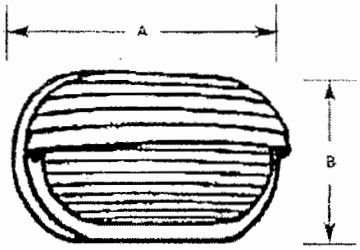
Catalog No.	Finish White	Lamping	Dimensions (Inches) A	B	Depth
P5704	-30	1-60w A19	10-1/4	5-5/8	3-3/4
P5705	-30	1-60w A19	10-1/2	5-7/8	4
P5706	-30	1-60w A19	10-1/2	5-7/8	4



P5704



P5705



P5706

Specifications:

General

- Polycarbonate oval UV stabilized ribbed frosted lens

  P5704, P5705 & P5706: 10-1/4" L x 5-5/8" W x 2-13/16" D
- Polycarbonate frame (grid or hood) and back plate
- Lamp replacement - Remove stainless steel screws holding the frame
- Units can be used for shower light applications
- Complies with "Americans with Disabilities Act" - ADA

Mounting

- Wall mount only
- Covers standard junction box
- Mounting strap for outlet box
- Keyhole slots in back plate provide quick mounting of unit

Options

- Open diffuser - specify P5704
- Grill diffuser - specify P5705
- Hooded diffuser - specify P5706

Electrical

- White medium base ceramic socket nickel plated brass screw shell

Labeling

- UL-CUL wet location listed

Progress Lighting
701 Millennium Blvd.
Greenville, South Carolina
29607

Rev. 10/09

Owner: Johnson Woods Realty Corp.
c/o Glover Property Management, Inc.
8 Doaks Lane
Marblehead, MA 01945

Mitigative Drainage Study

Johnson Woods Condominiums Phase II
Reading, Massachusetts

October 7, 2011

Hayes Engineering, Inc.
Civil Engineers & Land Surveyors
603 Salem Street
Wakefield, MA 01880

MITIGATIVE DRAINAGE STUDY
JOHNSON WOODS CONDOMINIUMS - PHASE II
READING, MASSACHUSETTS

October 7, 2011

INTRODUCTION

This report presents a comparative analysis of the hydrologic character of the subject property and its tributary watersheds. The study presents a comparative analysis of the existing and proposed land use conditions of the site and their tributary watersheds to the five selected primary comparison locations, as identified on the existing and proposed watershed maps.

For the comparative purposes of this study, the edge boundaries of comparison from the subject site were selected as identified, and are summarized below and shown on the existing condition watershed map.

COMPARATIVE DRAINAGE LOCATIONS

Comparative Location	Description
1	Enos Circle Comparative Edge to North Spur of the Aberjona River
2	Longwood Road Comparative Edge
3	Toward Woburn / Reading, Northwesterly Comparative Edge, North Spur of the Aberjona River
4	Toward Woburn (Inwood Drive), Westerly Comparative Edge
5	Toward Woburn (Inwood Drive), Westerly Comparative Edge

Proposed land use changes of the property include the construction of a multi-family condominium complex, together with driveways, landscaping and other similar improvements. Proposed topographic changes have been incorporated into the site development design to provide appropriate grading, as well as to provide for mitigation of drainage effects, from the fully developed project site.

METHODOLOGY - GENERAL

The methodology of runoff analysis contained in this study was to develop watershed parameters and to use those parameters to generate hydrographs throughout the project watershed. Watershed parameters are based on the Urban Hydrology for Small Watersheds method described in Technical Release No. 55 of the United States Department of Agriculture, Soil Conservation Service. Hydrograph generation is accomplished using the above-described watershed parameters and a 24-hour rainfall event with a Type III distribution, as specified in Technical Release No. 20 (TR-20) by the Natural Resources Soil Conservation Service, (NRCS). The underlying soils of this largely wooded site were identified by reference to the NRCS Soil Survey of Middlesex County, Fourth Edition.

The calculations were generated using HydroCAD Stormwater Modeling System, Version 10.0, by HydroCAD Software Solutions. This program models the hydrology and hydraulics of stormwater runoff based upon the hydrology techniques developed by the Soil Conservation HydroCAD program and combines and expands on the most used capabilities of TR-55 and TR-20.

A 24-hour rainfall event with a Type III distribution, using the procedures specified in Technical Release No. 20 by the NRSC, is utilized, in conjunction with the rainfall amounts interpolated and "Return Frequency Atlas of the United States for Durations from 30 minutes to 24 Hours and Return Periods from 1 to 100 years (1961)".

EXISTING CONDITION METHODOLOGY

A mathematical model of the existing condition watershed hydrology to the comparison locations under consideration was developed using the general methodology discussed above. As a conservative assumption, the existing wooded condition sections were modeled assuming the entire tributary woods area was split between fair and good hydrologic condition.

An existing condition watershed map, which also depicts the hydrologic soil group type areas, has been prepared and is included in this report.

A watershed schematic has been provided in this analysis which illustrates the section numbers used in the existing condition calculations to the comparison locations. The results of the analysis have been presented in the peak flow rate summary table which follows.

PROPOSED CONDITION METHODOLOGY

The proposed construction for the complete build out of the Johnson Woods Condominiums Phase II site will involve the alteration of the existing site topography and an increase in the amount of impervious areas. Therefore, the proposed design will incorporate measures to mitigate potential drainage impacts from this project.

The goal of the project drainage design is three-fold: to mitigate peak rates of runoff that would otherwise result from the proposed site development, to provide appropriately-sized stormwater management areas, and to mitigate water quality as mandated by the DEP Stormwater Management Policy.

Throughout the design process for the entire Johnson Woods Condominiums complex, the proponent has committed to the selection of a development alternative that provides mitigation of these drainage impacts. In order to accomplish this goal, the proponent has committed to three basic design directives regarding this area of subject matter jurisdiction:

1. Avoid any direct alteration of wetland resource area,

2. No net increase in peak rate of runoff for the selected design storms at the effective comparison locations,

3. Provide for mitigation of water quality consistent with the requirements of the DEP Stormwater Management Policy, and

4. Provide for on-site groundwater recharge to mimic or improve existing conditions.

Stormwater runoff has been managed according to the standards established by the Massachusetts Department of Environmental Protection (DEP), and the work, as proposed, will not impair groundwater or surface water quality by incorporating erosion and sedimentation controls and other structural stormwater treatment measures to attenuate non-point source pollution.

The proposed condition watershed parameters and analysis were determined in a manner similar to that described in the existing condition description. A watershed schematic that describes the interrelationship of the various sub-areas and their respective location in and around the project site has been included in this study. This schematic identifies the section numbers and reservoir numbers for the upland stormwater management areas used in the proposed condition calculations.

This proposed condition analysis was designed to analyze the effects of the proposal and mitigate increases in peak flow rate to downstream areas for the design storms analyzed, as shown on the following Peak Flow Rate Summary, **TABLE I**. It must be pointed out that comparison locations 1 and 3 are tributary to the same section of the north spur of the Aberjona River. Therefore, the slight increase in the peak rates of runoff from comparison location 3 is, in reality, offset by the reductions in comparison location 1. It must also be pointed out that comparison locations 4 and 5 are tributary to Inwood Drive in Woburn. Therefore, the slight increase in the peak rates of runoff from comparison location 4 is, in reality, offset by reductions in comparison location 5. The net impact of the combined effect for the three actual comparison locations results in reductions in post development peak rates of discharge for the 2-year to the 100-year design storms from of the existing conditions.

TABLE I

PEAK FLOW RATE SUMMARY

Comparison Location	Storm	Existing cfs	Proposed cfs
1 *	2 yr. 10 yr. 25 yr. 100 yr.	10.5 22.7 29.9 44.9	7.3 15.6 20.3 30.1
2	2 yr. 10 yr. 25 yr. 100 yr.	6.15 18.47 26.58 40.74	5.75 16.47 24.02 37.41
3	2 yr. 10 yr. 25 yr. 100 yr.	0.28 1.47 2.29 3.97	0.48 1.75 2.51 4.14
4	2 yr. 10 yr. 25 yr. 100 yr.	1.07 5.90 10.37 19.64	0.33 5.67 9.41 20.54
5	2 yr. 10 yr. 25 yr. 100 yr.	1.25 2.94 3.94 6.05	0.33 2.82 3.47 4.85

* Control Point 1 from Phase I Mitigative Drainage Study, Johnson Woods Condominium, Revised April 27, 2004.

Water quality enhancements that will be included with the project will include the use of a combination of the following mitigating measures.

* Catch basins with 4-foot sumps and gas traps.

* Structural stormwater treatment measures (such as Stormceptor or equivalent devices) which are designed to improve water quality.

* Subsurface pipe detention-recharge systems.

* Extended detention stormwater management areas with constructed bottom zones that will serve to provide infiltration opportunity.

* Hydraulic control structures to limit peak rates of runoff equal to or less than that of existing conditions at the comparison locations.

* Placement of the stormwater management BMPs in areas that will allow groundwater recharge in accordance with the DEP Policy concerning stormwater management.

* During the construction period, water quality degradation and wetland disturbance will be avoided and contained by the use of the proposed staked hay bale / filter fabric siltation barrier to be placed at the limits of work, and the adoption of USDA Soil Conservation Service measures for erosion and sedimentation control.

* For the post-construction period, water quality degradation will be minimized through the restricted use of road salts, the regular program of street and parking area sweeping to remove sediments and sediment-associated contaminants, the regular inspection and cleaning of the catch basin sumps, and the discharge of roadway runoff to the above structured water quality enhancement drainage systems for further pollution attenuation prior to reaching the wetland areas.

The Department of Environmental Protection (DEP) implemented a new computation procedure for the water quality flow, which went into effect on February 1, 2011, for the sizing of manufactured propriety stormwater treatment practices. Based upon this new procedure, we have contacted Rinker Materials, the manufacturer of Stormceptor treatment systems, to confirm that the existing Model 450i and Model 900 will provide an 80% removal rate on a net annual basis for flows of up to 1.3 cubic feet per second for the 450i Model, and 3.4 cubic feet per second for the 900 Model. The DEP has recently removed this requirement and it is no longer used. In addition, the Massachusetts Strategic Envirotechnology Partnership (STEP) program has been eliminated. Therefore, the Stormceptor design has been done using the flow method and the manufacture design program. The results of these two independent methods of analysis indicate that the proposed Stormceptor units selected for this site result in the same model in all cases. Therefore, the provided design will provide for a TSS removal rate that exceeds the desired 80% removal rate.

The proposed stormwater management plan will incorporate the use of a number of pipes under portions of the site to function as a subsurface detention basin that will also provide recharge to the groundwater. The subsurface system will be used to detain surface runoff and regulate the rate of discharge to downstream areas. Prior to discharge to this subsurface system, the flow from roadway pavements will first be directed to a Stormceptor manhole. Therefore, the specific TSS removal rate required by the DEP Policy will be obtained prior to the infiltration practice.

The existing constructed and approved open stormwater management BMPs have the basin floor vegetated with a dense herbaceous cover composed of various sedges (Carex species), wool grass (Scirpus cyperinus) and forbs such as boneset (Eupatorium perfoliatum) and Joe-pyeweed (Eupadoriadelphus maculaltus). The wetland seed mixture used, New England Environmental Wet Mix, is suitable for accomplishing growth within the proposed bottom areas.

All of the proposed BMP areas are sited in areas where the soil types, according to on-site soil testing, provide an opportunity for groundwater recharge. This is particularly true of the subsurface recharge systems proposed for this site.

The project design is such that no outfalls or discharges of untreated water, except for clean roof runoff, will discharge towards any wetland or water of the Commonwealth. The water quality treatment volumes required for each of the comparison locations, as well as the volumes provided, are shown on **TABLE II**, the Watershed Quality Volume summary table.

TABLE II

WATER QUALITY VOLUME

Water Quality Volume	Required	Provided
RES 03	2,536 cu.ft.	2,862 cu.ft. (from as-built)
RES 04	8,153 cu.ft.	8,242 cu.ft. (from as-built)
RES 05	4,952 cu.ft.	8,883 cu.ft. (dead storage)
RES 06	744 cu.ft.	9,502 cu.ft. (dead storage)
RES 07	Roof Area Only	Not Required
RES 08	1,782 cu.ft.	2,666 cu.ft. (dead storage)

Compliance with the groundwater recharge standard is aimed at ensuring that loss of annual recharge to groundwater will be minimized through the use of infiltration measures to the maximum extent practicable. The annual recharge from the post-development site will exceed the annual recharge from the pre-development or existing site conditions, based on soil types as identified by the U.S. Natural Resource Conservation Service (NRCS).

The prescribed stormwater runoff volume to be recharged to groundwater was determined using the existing site (pre-development) soil conditions based on the U.S. Natural Resource Conservation Service (NRCS, formerly SCS), Middlesex County, Soils Survey Map, as shown on the watershed maps, and the rates contained in the Stormwater Management Policy. The required volume of groundwater recharge for the Johnson Woods Condominiums Phase II site, as well as the volumes provided, are shown on **TABLE III**, the Provided Recharge Volume summary table.

TABLE III

PROVIDED RECHARGE VOLUME

	Required	Provided
RES 03	2,038 cu.ft.	1,915 cu.ft.*
RES 04	2,510 cu.ft.	6,201 cu.ft.*
RES 05	> 2,100 cu.ft.	3,503 cu.ft.
RES 06		3,725 cu.ft.
RES 07	1,117 cu.ft.	1,218 cu.ft.
RES 08	927 cu.ft.	1,378 cu.ft.

* From Phase I Study

Standard 4 of the Policy is, perhaps, the focal point of the Stormwater Management Policy. It requires, basically, that, for a project such as the Johnson Woods Condominiums complex, stormwater management systems be designed to remove 80% of the average annual load (post-development conditions) of Total Suspended Solids (TSS). It is presumed that this standard is met when:

(a) suitable non-structural practices for source control and pollution prevention are implemented;

(b) stormwater structural practices, such as deep sump catch basins with gas traps and more refined structures such as Stormceptors, are sized to treat the prescribed impervious areas; and

(c) stormwater management BMPs are maintained as designed.

Total suspended solids was selected as the target pollutant constituent for a removal standard because of its widespread contribution to water quality and aquatic habitat degradation, because many other pollutant constituents, including heavy metals, bacteria and organic chemicals, sorb to sediment particles, and because the available data sets for BMP removal efficiency reveal that TSS has been the most frequently and consistently sampled constituent.

The stormwater drainage system at the Johnson Woods Condominiums has several BMPs through which stormwater will be conveyed to control flow rates and retain contaminants. In this BMP "process chain", more than one BMP will be removing TSS. The goal is to ensure that all the BMPs together will remove a total of 80% of the annual average TSS load at the downgradient comparative locations. The TSS removal rates provided through each of the stormwater management areas are shown on the Provided TSS Removal summary, **TABLE IV**.

TABLE IV

PROVIDED TSS REMOVAL

RES No.	Total TSS Removal Provided
01	83.1%
02	82.8%
03	83.9%
04	83.9%
05	85.0%
06	85.0%
07	Clean roof only
08	85.0%

The balance of the comprehensive sub-areas that do not flow directly to one of the stormwater management areas contains comparatively little development, and the impervious areas in these locations consist mostly of rooftops. Given the presumptively clean runoff from rooftops in these areas, there is no associated Water Quality Treatment Volume associated with these comparison locations. The portion of the site that does not flow to one of the stormwater management areas on the westerly portion of the site will have roof recharge systems to further encourage groundwater recharge.

Stormwater Management Policies 5 through 9, as they relate to Johnson Woods, are discussed below.

- Standard 5 - Higher Potential Pollutant Loads

The project will not result in a land use with higher potential pollutant loads. Consequently, the requirement to select BMPs designed to prevent infiltration without pre-treatment is not applicable.

- Standard 6 - Protection of Critical Areas

The project site and its environs, as they are currently understood, do not contain off-site critical area as defined in the Policy, such as Outstanding Resource Waters (ORWs), shellfish beds, swimming beaches, cold water fisheries and recharge areas for public water supplies.

- Standard 7 - Redevelopment Projects

Not applicable to this project.

- Standard 8 - Erosion / Sediment Control

Examples of BMPs for erosion and sedimentation control are staked hay bales, filter fences and limit of work, as shown on the plans and as more fully explained in the attached Operation and Maintenance Plan and Long-Term Pollution Prevention Plan for Johnson Woods Condominium Phase II, dated October 4, 2011.

- Standard 9 - Operation and Maintenance Plan

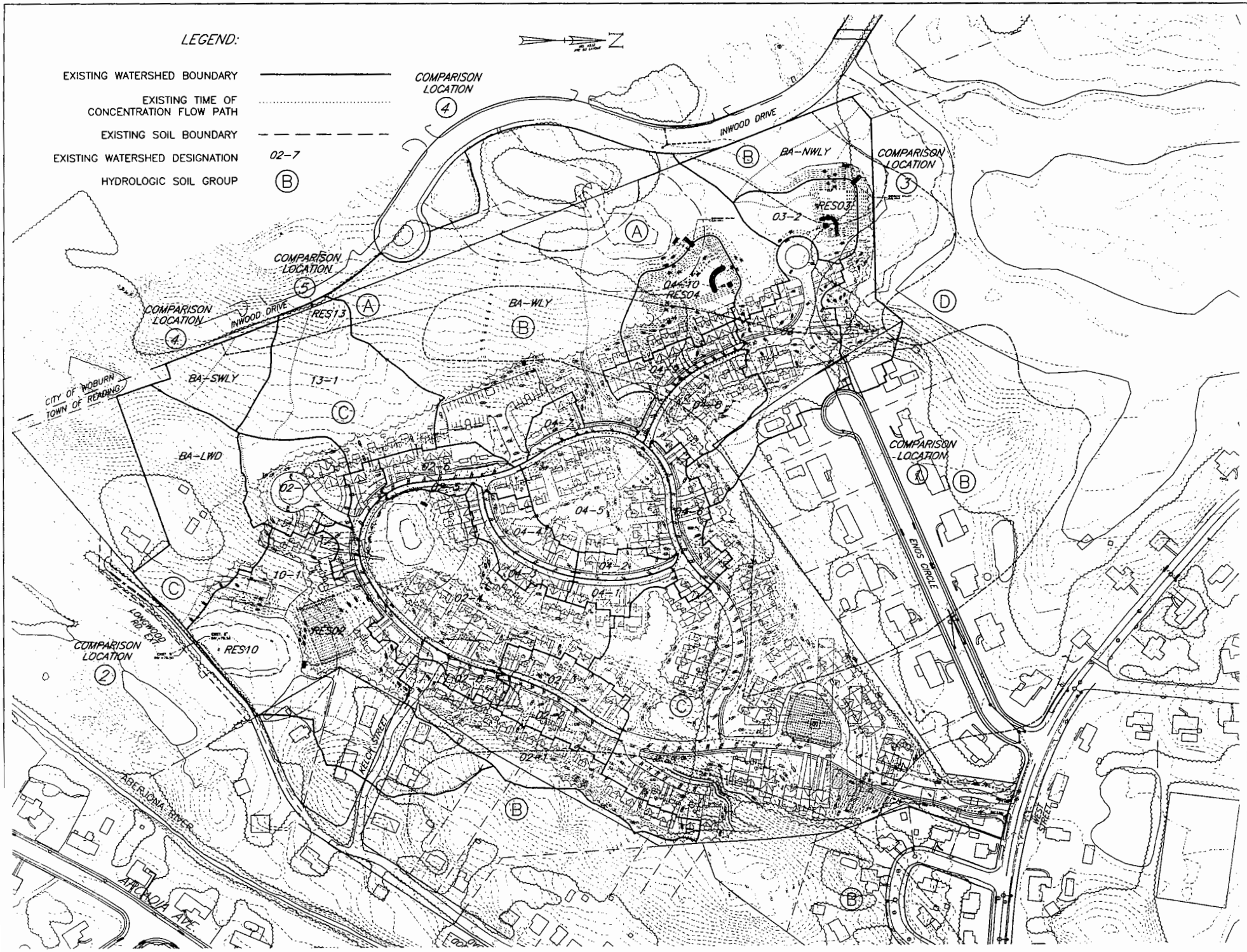
The water quality of stormwater runoff from the proposed roadway impervious areas will be improved by a combination of three or more of the following chain of structural Best Management Practices:

1. Deep Sump Catch Basins with Hoods
2. Constructed Stormwater Management Areas Designed to Infiltrate
3. Rip Rap Level Spreaders at Discharge Locations
4. Stormceptor
5. Street and Parking Lot Sweeping

Each of these facilities has unique characteristics, uses, planning considerations and maintenance requirements. These requirements are explained in more detail in the attached Operation and Maintenance Plan and Long-Term Pollution Prevention Plan for Johnson Woods Condominium Phase II, dated October 4, 2011.

CONCLUSION

A series of summary tables has been provided in this study which summarizes the existing and proposed condition peak rates of runoff to the five (5) comparison locations. Summary tables of the performance characteristics of the stormwater management areas have also been included in this study. As can be seen by examining the summary tables, the project design is effective in providing for proper peak flow stormwater management of runoff from the project site and its surrounding watersheds to the selected effective three comparison locations.



Prepared For

Owner / Applicant

Prepared By

Seal

Drawn By
Checked By
Approved By
Project No.
Issued For Permit
Issued For Review
Issued For Bid
Issued For Construction
Not For Construction

Scale 1" = 60'
0 30' 60' 120'
Date October 6, 2011

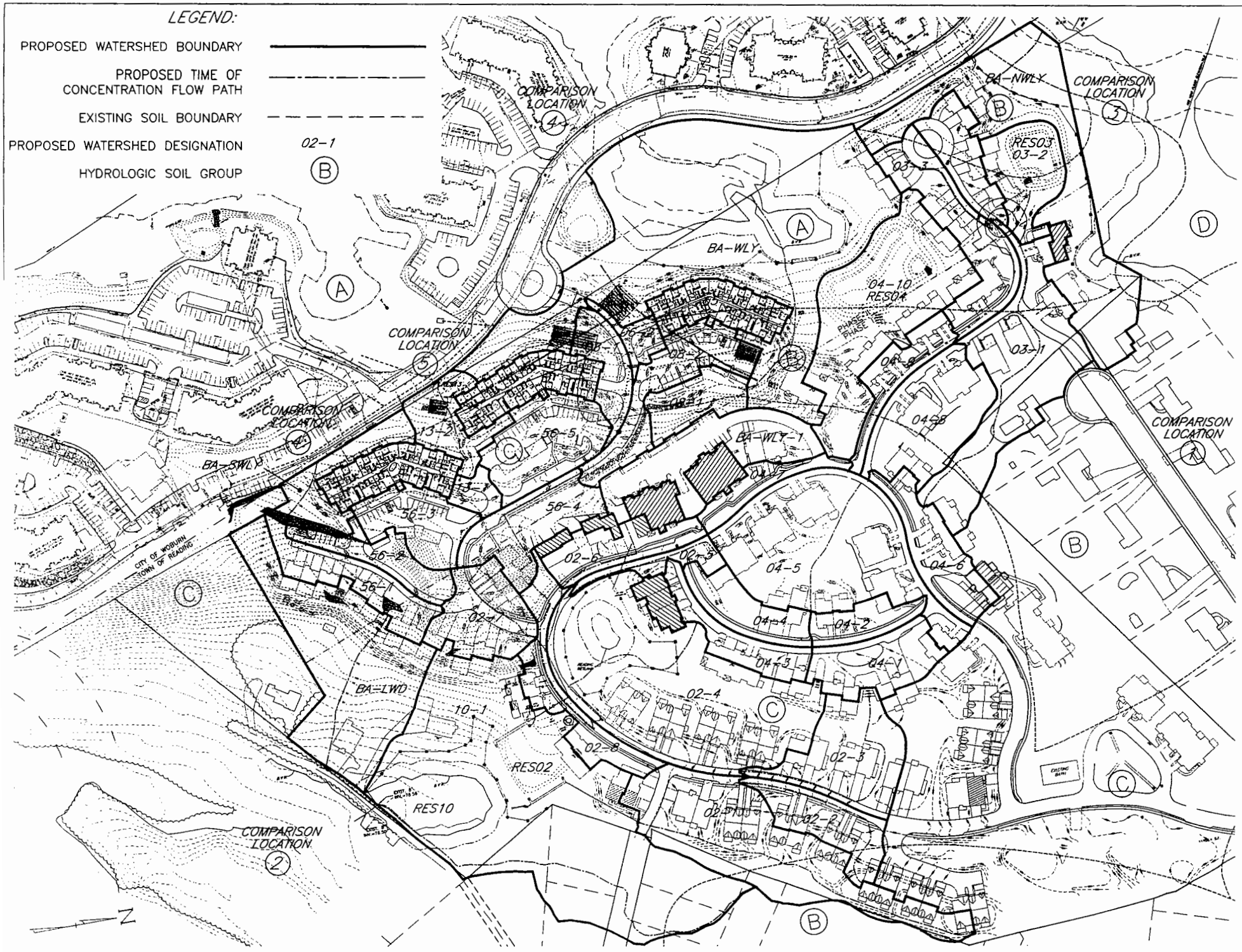
Drawing Title

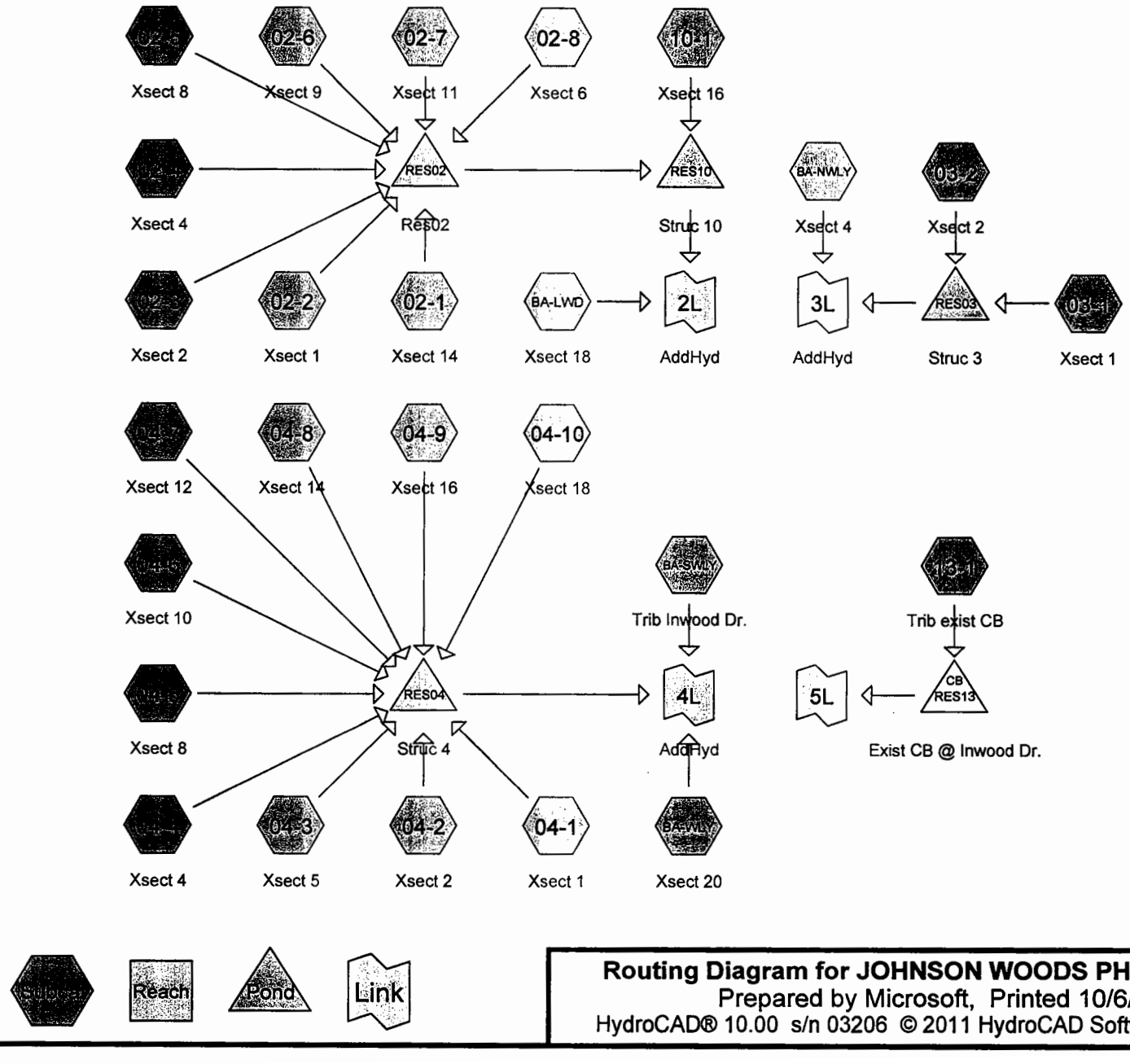
EXISTING CONDITION WATERSHED MAP
JOHNSON WOODS
PLANNED UNIT DEVELOPMENT
READING, MASS.

Drawing No.

W1

SHEET 1 OF 1


LEGEND:
PROPOSED WATERSHED BOUNDARY
PROPOSED TIME OF CONCENTRATION FLOW PATH
EXISTING SOIL BOUNDARY
PROPOSED WATERSHED DESIGNATION
HYDROLOGIC SOIL GROUP
02-1
B
COMPARISON LOCATION
4
BA-NWLY
COMPARISON LOCATION
3
RES03
03-2
03-3
A
D
BA-WLY
04-10
RES04
PHASE I
PHASE II
03-11
COMPARISON LOCATION
5
COMPARISON LOCATION
6
COMPARISON LOCATION
1
BA-SWLY
56-5
56-4
56-3
56-2
56-1
BA-WLY-1
02-6
02-5
04-5
04-6
04-4
04-2
04-3
04-1
02-4
BA-LWD
10-1
RES02
02-8
02-3
02-2
RES10
EXISTING BARN
CITY OF WOBURN
TOWN OF READING
C
COMPARISON LOCATION
2
N
Scale: 1" = 50'
0 25 50 100'
Date: October 6, 2011
PROPOSED CONDITION WATERSHED MAP
JOHNSON WOODS
PLANNED UNIT DEVELOPMENT
READING, MASS.
W2
SHEET 1 OF 1



Routing Diagram for JOHNSON WOODS PHASE 2 EXISTING
Prepared by Microsoft, Printed 10/6/2011
HydroCAD® 10.00 s/n 03206 © 2011 HydroCAD Software Solutions LLC

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	RES13	93.81	93.47	53.6	0.0063	0.012	18.0	0.0	0.0

Time span=0.00-50.00 hrs, dt=0.05 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment02-1: Xsect 14 Runoff Area=63,402 sf 0.00% Impervious Runoff Depth=1.08"
Tc=0.132 hrs CN=76 Runoff=1.32 cfs 5,722 cf

Subcatchment02-2: Xsect 1 Runoff Area=21,665 sf 0.00% Impervious Runoff Depth=1.99"
Tc=0.100 hrs CN=89 Runoff=0.79 cfs 3,594 cf

Subcatchment02-3: Xsect 2 Runoff Area=23,247 sf 0.00% Impervious Runoff Depth=1.91"
Tc=0.100 hrs CN=88 Runoff=0.82 cfs 3,695 cf

Subcatchment02-4: Xsect 4 Runoff Area=116,049 sf 0.00% Impervious Runoff Depth=1.33"
Tc=0.105 hrs CN=80 Runoff=2.99 cfs 12,818 cf

Subcatchment02-5: Xsect 8 Runoff Area=9,668 sf 0.00% Impervious Runoff Depth=2.08"
Tc=0.100 hrs CN=90 Runoff=0.36 cfs 1,673 cf

Subcatchment02-6: Xsect 9 Runoff Area=18,048 sf 0.00% Impervious Runoff Depth=2.26"
Tc=0.100 hrs CN=92 Runoff=0.72 cfs 3,393 cf

Subcatchment02-7: Xsect 11 Runoff Area=43,375 sf 0.00% Impervious Runoff Depth=1.53"
Tc=0.154 hrs CN=83 Runoff=1.23 cfs 5,521 cf

Subcatchment02-8: Xsect 6 Runoff Area=33,932 sf 0.00% Impervious Runoff Depth=1.99"
Tc=0.110 hrs CN=89 Runoff=1.23 cfs 5,628 cf

Subcatchment03-1: Xsect 1 Runoff Area=77,360 sf 0.00% Impervious Runoff Depth=0.97"
Tc=0.115 hrs CN=74 Runoff=1.47 cfs 6,268 cf

Subcatchment03-2: Xsect 2 Runoff Area=31,936 sf 0.00% Impervious Runoff Depth=0.09"
Tc=0.207 hrs CN=49 Runoff=0.01 cfs 242 cf

Subcatchment04-1: Xsect 1 Runoff Area=12,044 sf 0.00% Impervious Runoff Depth=1.46"
Tc=0.100 hrs CN=82 Runoff=0.34 cfs 1,463 cf

Subcatchment04-10: Xsect 18 Runoff Area=42,745 sf 0.00% Impervious Runoff Depth=0.64"
Tc=0.100 hrs CN=67 Runoff=0.53 cfs 2,263 cf

Subcatchment04-2: Xsect 2 Runoff Area=11,320 sf 0.00% Impervious Runoff Depth=1.91"
Tc=0.103 hrs CN=88 Runoff=0.40 cfs 1,799 cf

Subcatchment04-3: Xsect 5 Runoff Area=13,982 sf 0.00% Impervious Runoff Depth=1.99"
Tc=0.105 hrs CN=89 Runoff=0.51 cfs 2,319 cf

Subcatchment04-4: Xsect 4 Runoff Area=18,234 sf 0.00% Impervious Runoff Depth=1.33"
Tc=0.186 hrs CN=80 Runoff=0.45 cfs 2,014 cf

Subcatchment04-5: Xsect 8 Runoff Area=74,336 sf 0.00% Impervious Runoff Depth=1.60"
Tc=0.177 hrs CN=84 Runoff=2.20 cfs 9,905 cf

Subcatchment04-6: Xsect 10 Runoff Area=19,955 sf 0.00% Impervious Runoff Depth=1.99"
Tc=0.100 hrs CN=89 Runoff=0.73 cfs 3,310 cf

Subcatchment04-7: Xsect 12 Runoff Area=12,699 sf 0.00% Impervious Runoff Depth=2.35"
Tc=0.176 hrs CN=93 Runoff=0.51 cfs 2,487 cf

Subcatchment04-8: Xsect 14 Runoff Area=35,314 sf 0.00% Impervious Runoff Depth=1.26"
Tc=0.100 hrs CN=79 Runoff=0.87 cfs 3,714 cf

Subcatchment04-9: Xsect 16 Runoff Area=23,724 sf 0.00% Impervious Runoff Depth=1.83"
Tc=0.100 hrs CN=87 Runoff=0.81 cfs 3,611 cf

Subcatchment10-1: Xsect 16 Runoff Area=172,824 sf 0.00% Impervious Runoff Depth=1.08"
Tc=0.162 hrs CN=76 Runoff=3.59 cfs 15,597 cf

Subcatchment13-1: Trib exist CB Runoff Area=92,451 sf 4.93% Impervious Runoff Depth=0.72"
Flow Length=316' Tc=0.174 hrs CN=69 Runoff=1.25 cfs 5,578 cf

SubcatchmentBA-LWD: Xsect 18 Runoff Area=94,545 sf 0.26% Impervious Runoff Depth=0.97"
Tc=0.100 hrs CN=74 Runoff=1.82 cfs 7,660 cf

SubcatchmentBA-NWLY: Xsect 4 Runoff Area=86,032 sf 0.00% Impervious Runoff Depth=0.25"
Tc=0.120 hrs CN=56 Runoff=0.28 cfs 1,785 cf

SubcatchmentBA-SWLY: Trib Inwood Dr. Runoff Area=32,938 sf 0.00% Impervious Runoff Depth=0.59"
Flow Length=183' Tc=0.109 hrs CN=66 Runoff=0.37 cfs 1,628 cf

SubcatchmentBA-WLY: Xsect 20 Runoff Area=357,461 sf 0.00% Impervious Runoff Depth=0.17"
Tc=0.100 hrs CN=53 Runoff=0.51 cfs 5,141 cf

Pond RES02: Res02 Peak Elev=89.75' Storage=11,325 cf Inflow=9.43 cfs 42,044 cf
Discarded=1.32 cfs 32,332 cf Primary=2.92 cfs 9,712 cf Outflow=4.24 cfs 42,044 cf

Pond RES03: Struc 3 Peak Elev=80.04' Storage=4,884 cf Inflow=1.47 cfs 6,510 cf
Outflow=0.06 cfs 2,555 cf

Pond RES04: Struc 4 Peak Elev=85.93' Storage=23,518 cf Inflow=7.26 cfs 32,886 cf
Outflow=0.28 cfs 26,760 cf

Pond RES10: Struc 10 Peak Elev=80.06' Storage=0.116 af Inflow=6.21 cfs 25,308 cf
Outflow=5.45 cfs 25,308 cf

Pond RES13: Exist CB @ Inwood Dr. Peak Elev=94.36' Inflow=1.25 cfs 5,578 cf
18.0" Round Culvert n=0.012 L=53.6' S=0.0063 '/' Outflow=1.25 cfs 5,578 cf

Link 2L: AddHyd Inflow=6.15 cfs 32,969 cf
Primary=6.15 cfs 32,969 cf

Link 3L: AddHyd Inflow=0.28 cfs 4,340 cf
Primary=0.28 cfs 4,340 cf

Link 4L: AddHyd

Inflow=1.07 cfs 33,529 cf
Primary=1.07 cfs 33,529 cf

Link 5L:

Inflow=1.25 cfs 5,578 cf
Primary=1.25 cfs 5,578 cf

Total Runoff Area = 1,539,286 sf Runoff Volume = 118,829 cf Average Runoff Depth = 0.93"
99.69% Pervious = 1,534,481 sf 0.31% Impervious = 4,805 sf

Summary for Subcatchment 02-1: Xsect 14

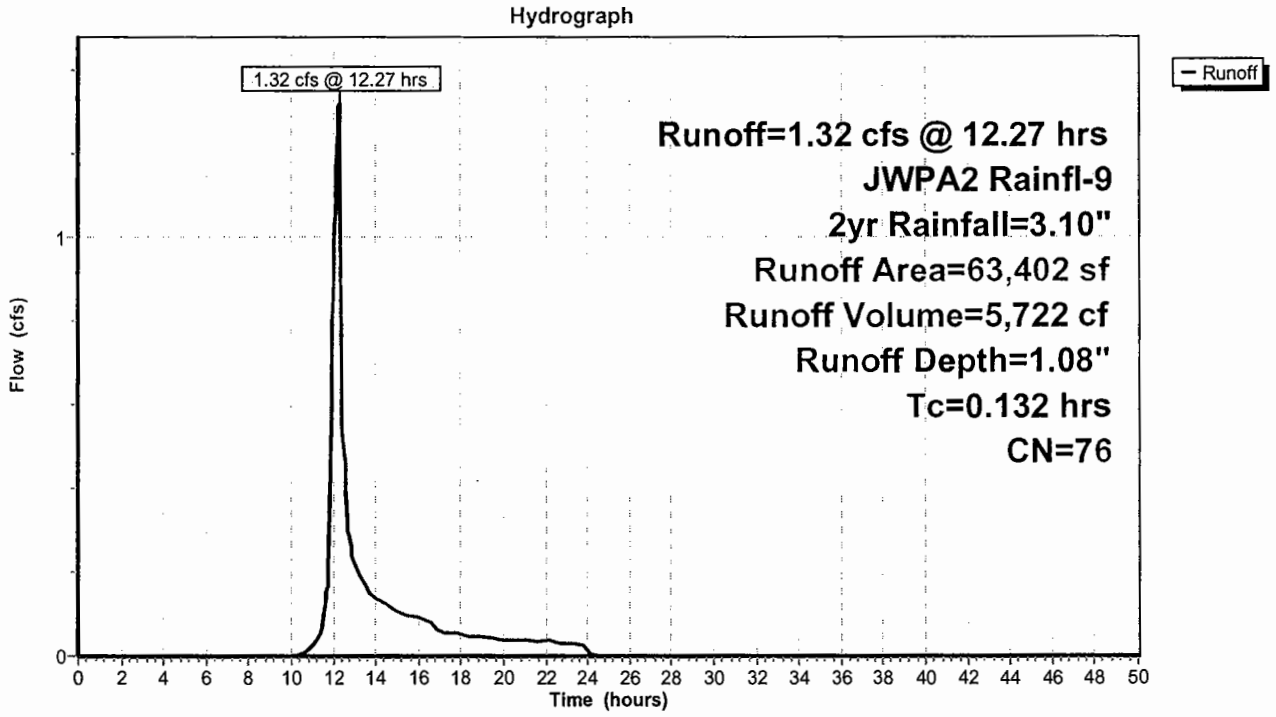
Runoff = 1.32 cfs @ 12.27 hrs, Volume= 5,722 cf, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	63,402	76	
	63,402	76	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.132					**Direct Entry,**

Subcatchment 02-1: Xsect 14



Summary for Subcatchment 02-2: Xsect 1

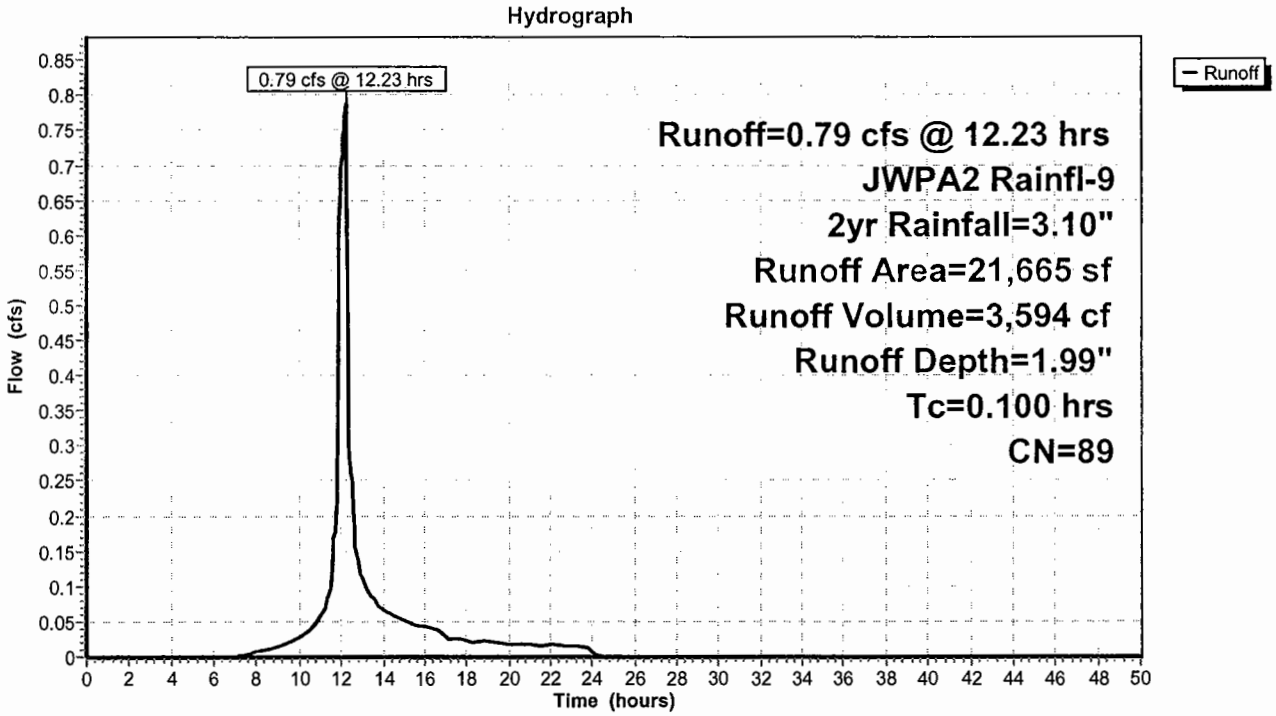
Runoff = 0.79 cfs @ 12.23 hrs, Volume= 3,594 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	21,665	89	
	21,665	89	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.100					**Direct Entry,**

Subcatchment 02-2: Xsect 1



Summary for Subcatchment 02-3: Xsect 2

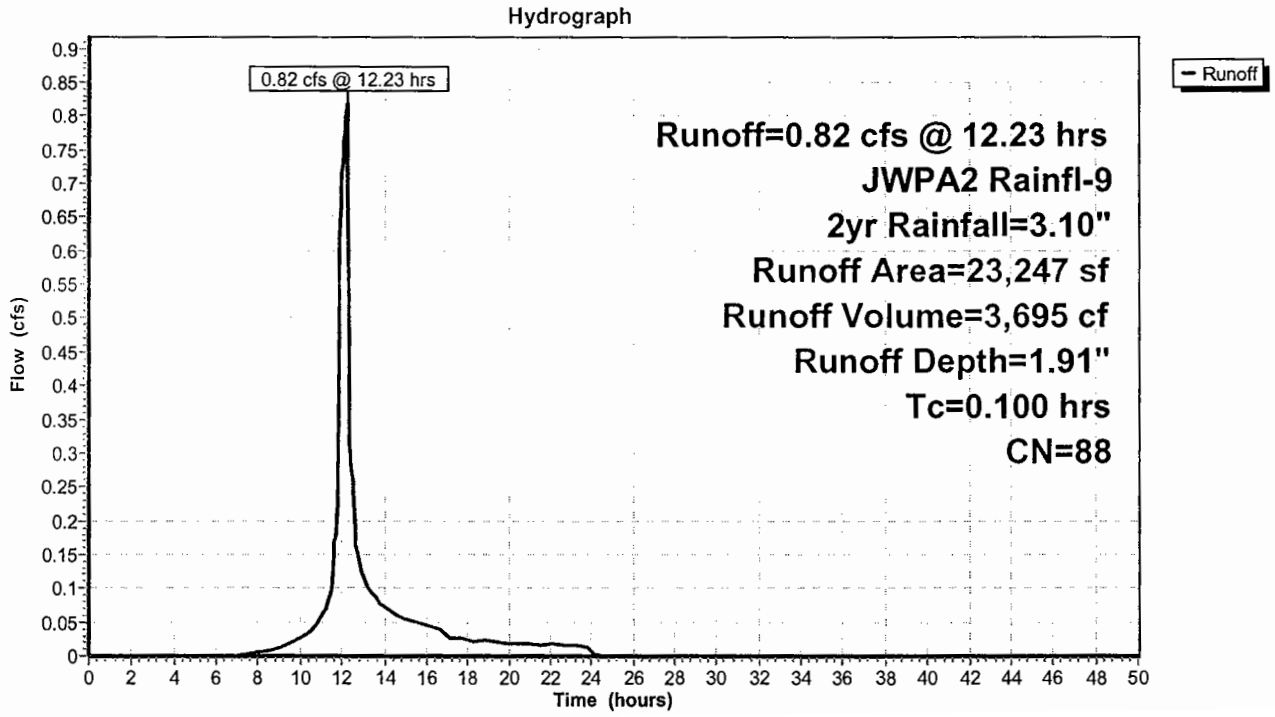
Runoff = 0.82 cfs @ 12.23 hrs, Volume= 3,695 cf, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	23,247	88	
	23,247	88	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.100					**Direct Entry,**

Subcatchment 02-3: Xsect 2



Summary for Subcatchment 02-4: Xsect 4

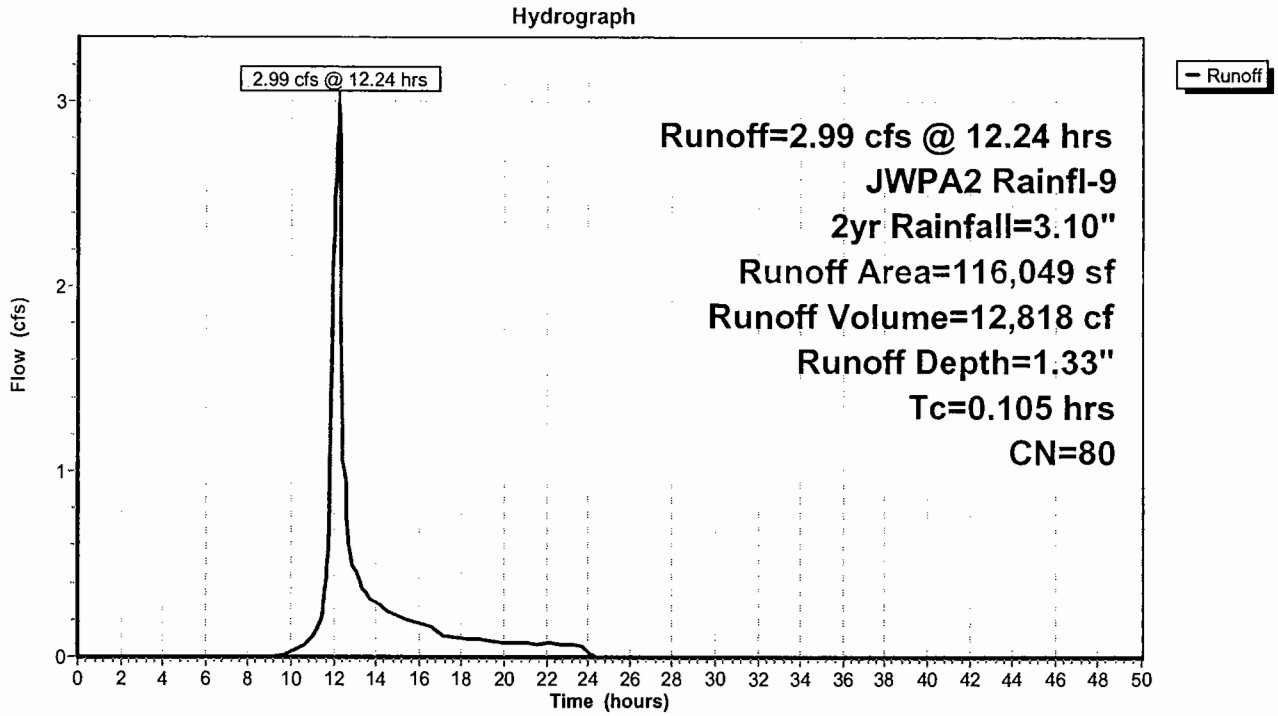
Runoff = 2.99 cfs @ 12.24 hrs, Volume= 12,818 cf, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	116,049	80	
	116,049	80	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.105					**Direct Entry,**

Subcatchment 02-4: Xsect 4



Summary for Subcatchment 02-5: Xsect 8

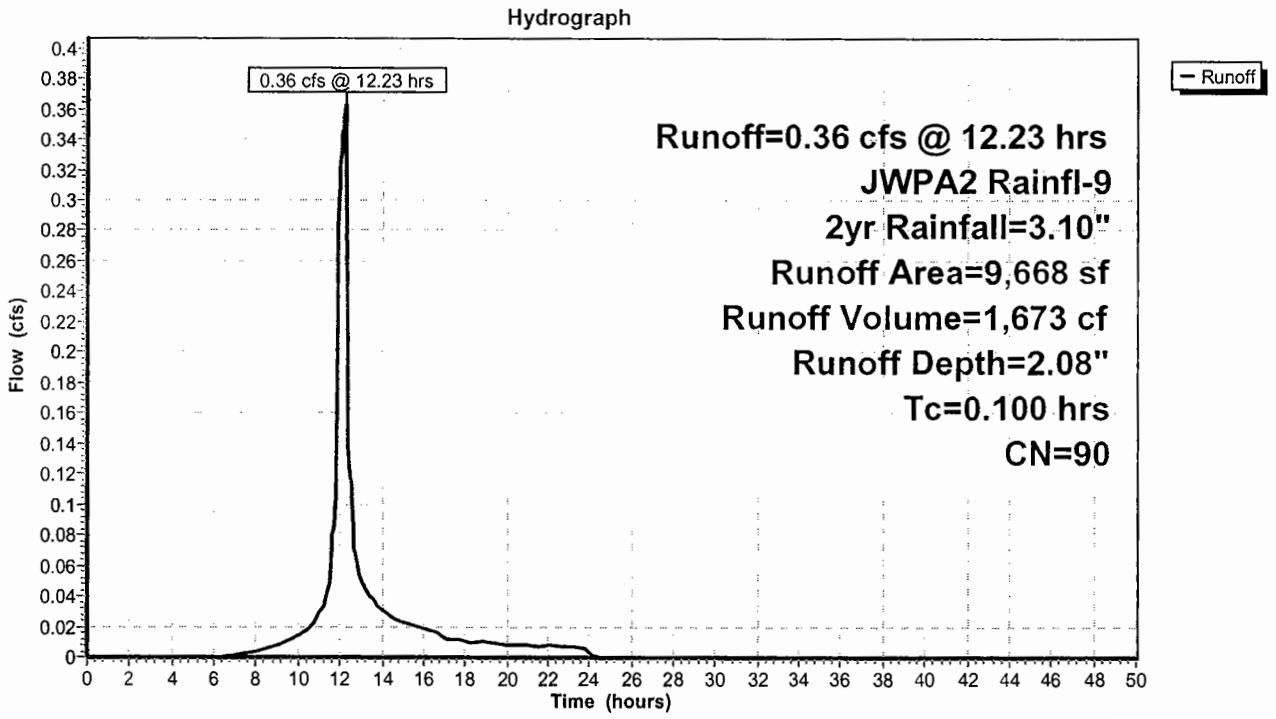
Runoff = 0.36 cfs @ 12.23 hrs, Volume= 1,673 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	9,668	90	
	9,668	90	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.100					**Direct Entry,**

Subcatchment 02-5: Xsect 8



Summary for Subcatchment 02-6: Xsect 9

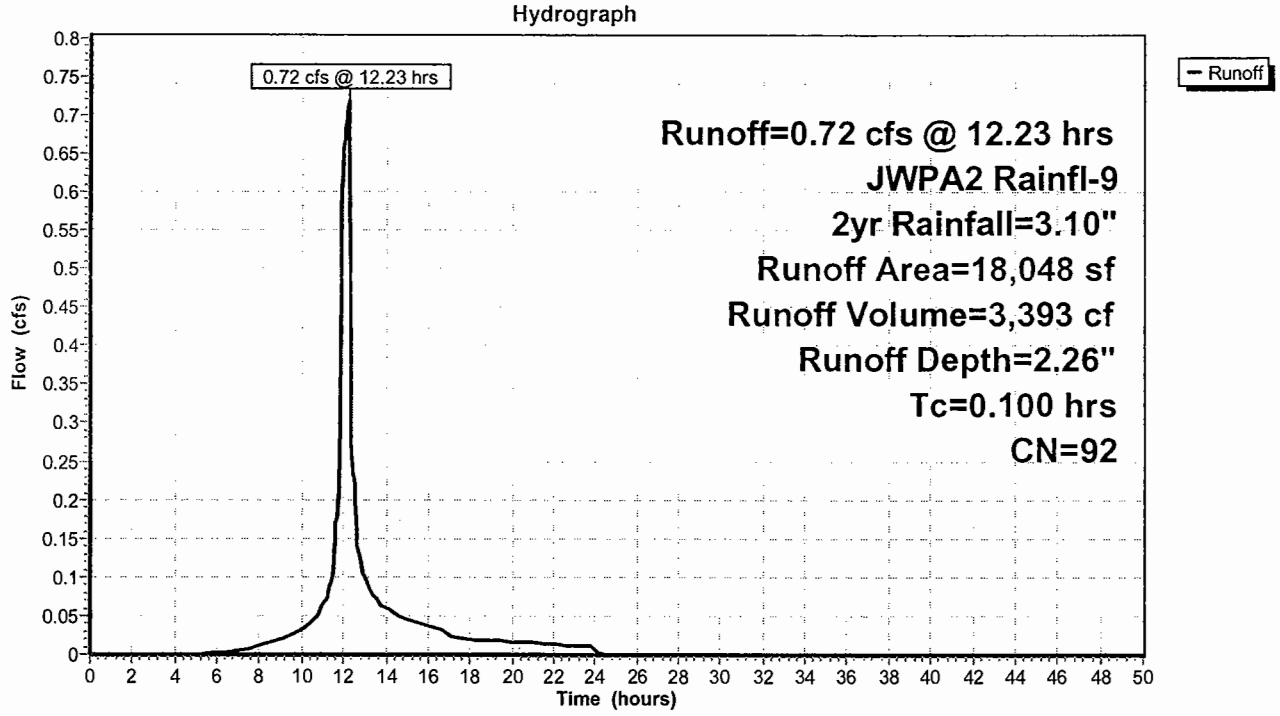
Runoff = 0.72 cfs @ 12.23 hrs, Volume= 3,393 cf, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	18,048	92	
	18,048	92	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.100					**Direct Entry,**

Subcatchment 02-6: Xsect 9



Summary for Subcatchment 02-7: Xsect 11

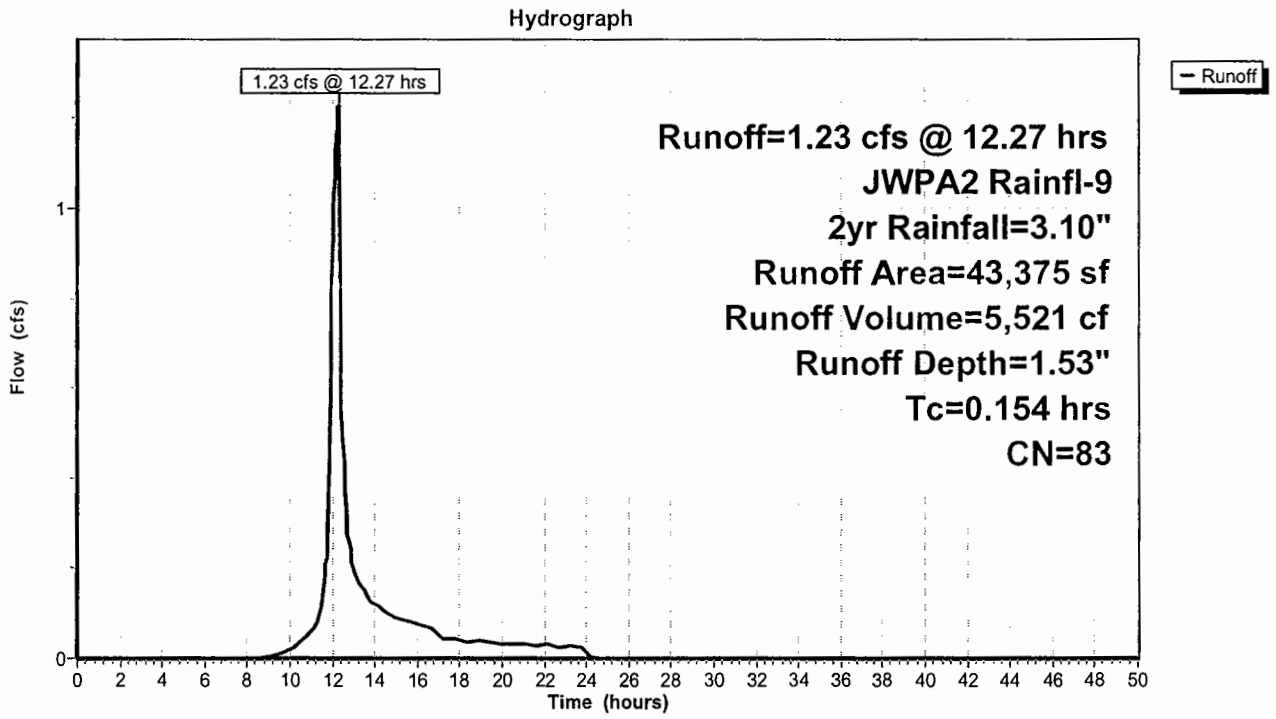
Runoff = 1.23 cfs @ 12.27 hrs, Volume= 5,521 cf, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	43,375	83	
	43,375	83	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.154					**Direct Entry,**

Subcatchment 02-7: Xsect 11



Summary for Subcatchment 02-8: Xsect 6

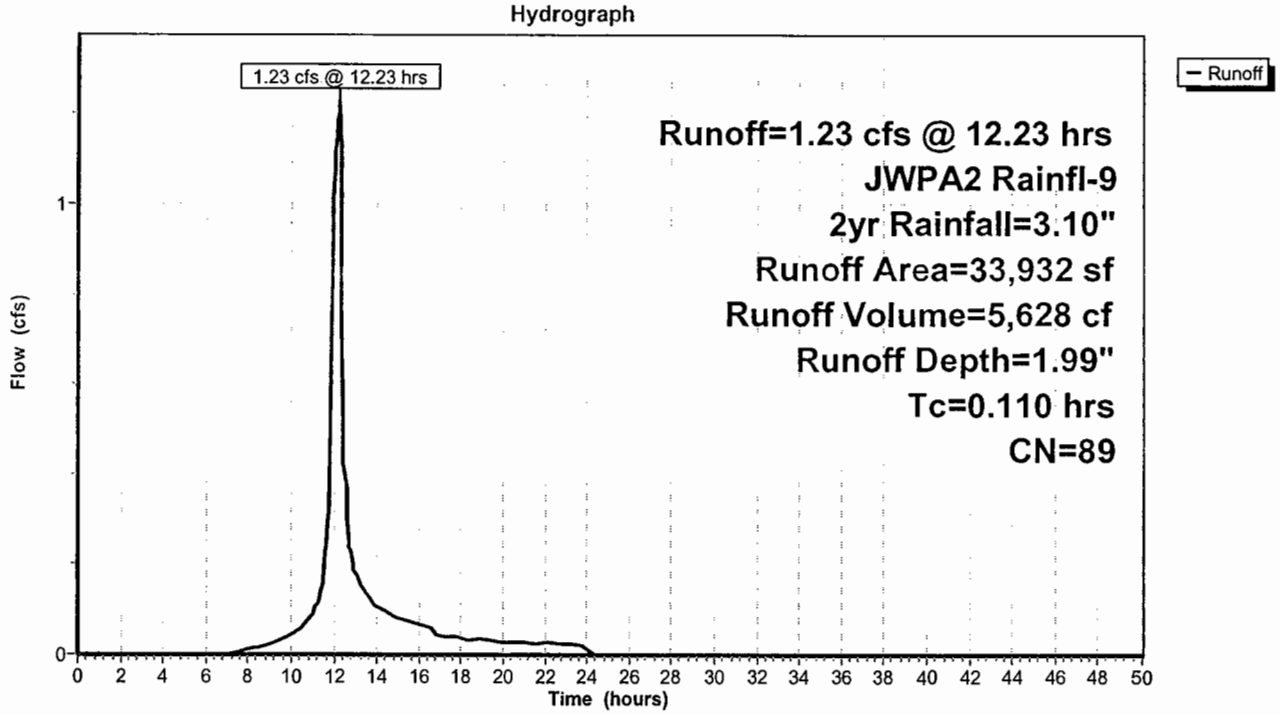
Runoff = 1.23 cfs @ 12.23 hrs, Volume= 5,628 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	33,932	89	
	33,932	89	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.110					**Direct Entry,**

Subcatchment 02-8: Xsect 6



Summary for Subcatchment 03-1: Xsect 1

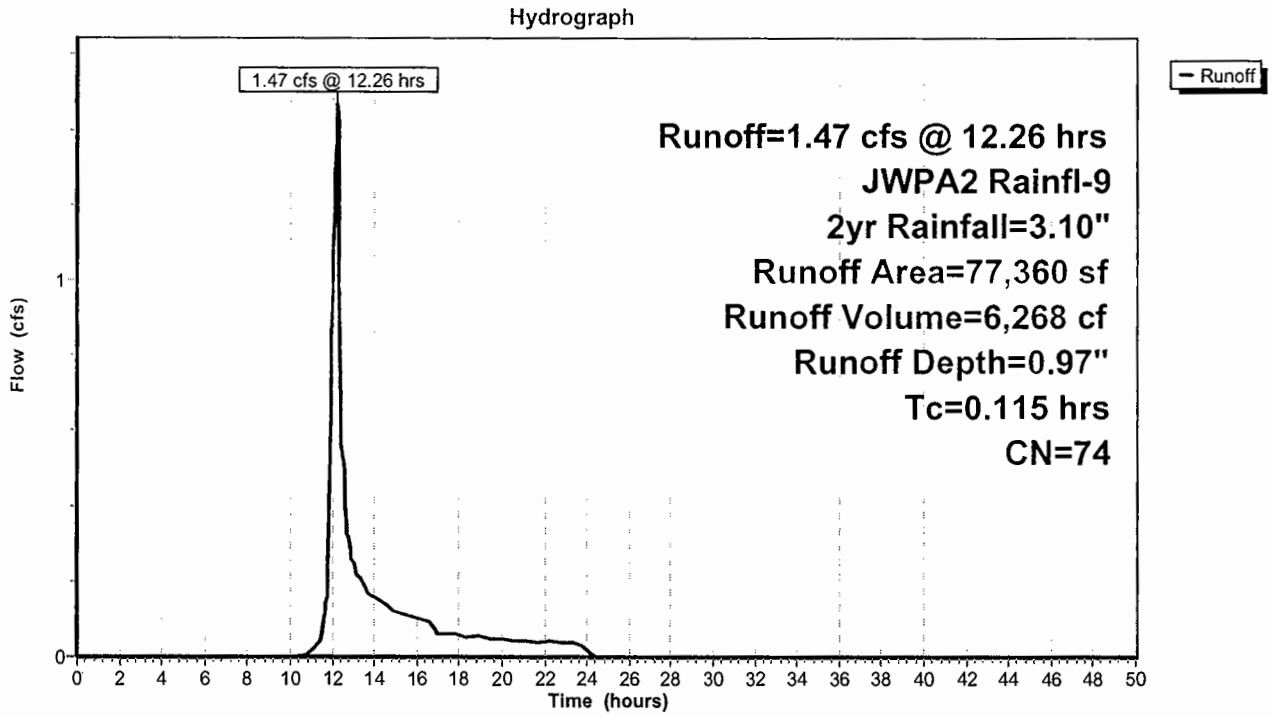
Runoff = 1.47 cfs @ 12.26 hrs, Volume= 6,268 cf, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	77,360	74	
	77,360	74	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.115					**Direct Entry,**

Subcatchment 03-1: Xsect 1



Summary for Subcatchment 03-2: Xsect 2

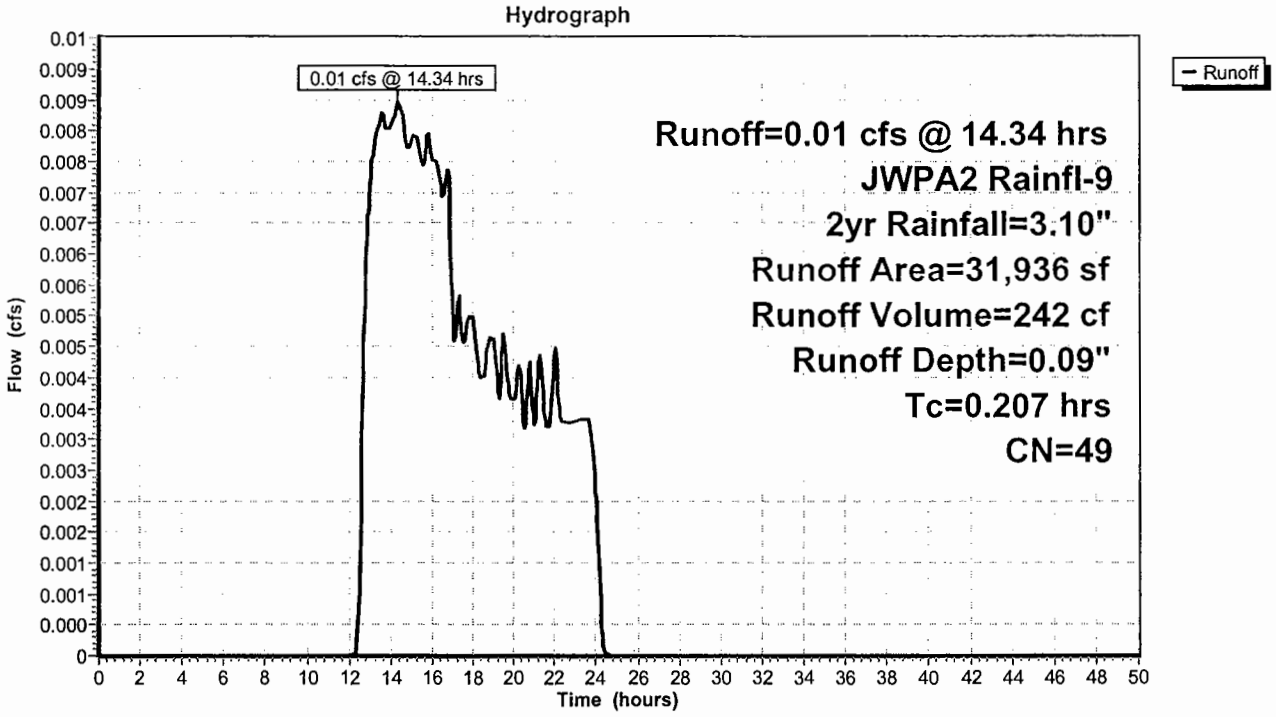
Runoff = 0.01 cfs @ 14.34 hrs, Volume= 242 cf, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	31,936	49	
	31,936	49	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.207					**Direct Entry,**

Subcatchment 03-2: Xsect 2



Summary for Subcatchment 04-1: Xsect 1

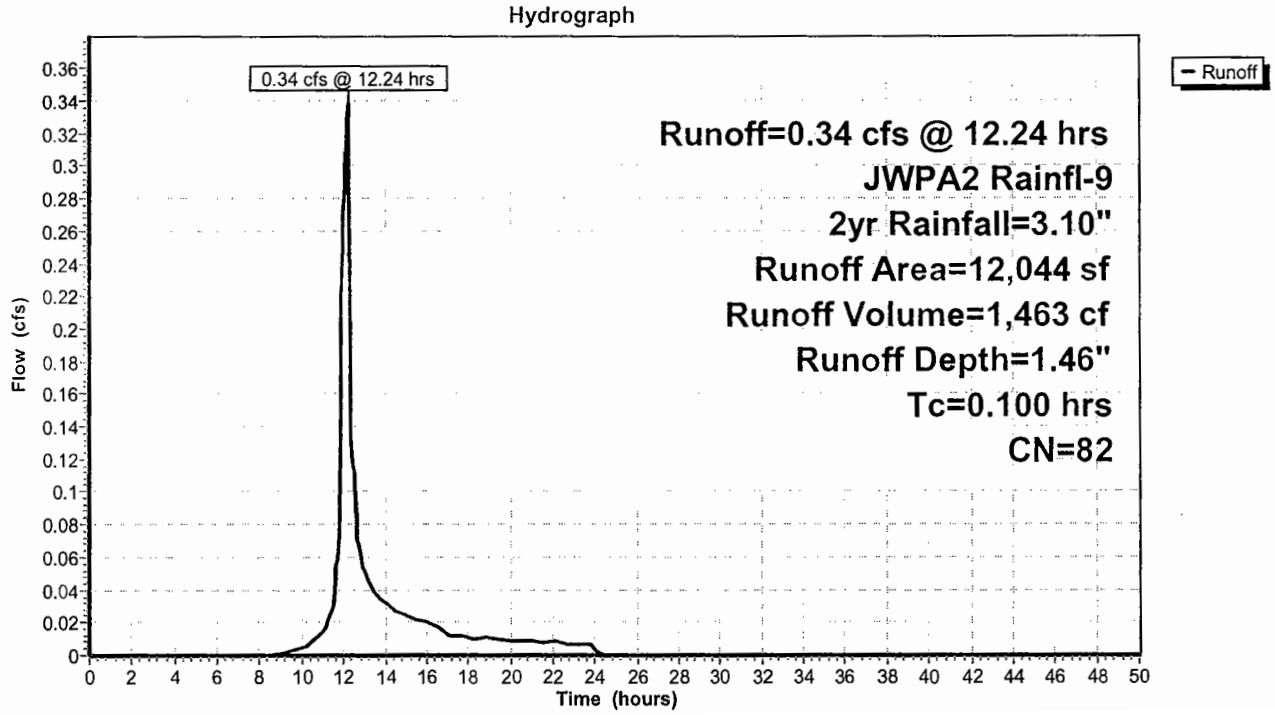
Runoff = 0.34 cfs @ 12.24 hrs, Volume= 1,463 cf, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	12,044	82	
	12,044	82	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.100					**Direct Entry,**

Subcatchment 04-1: Xsect 1



Summary for Subcatchment 04-10: Xsect 18

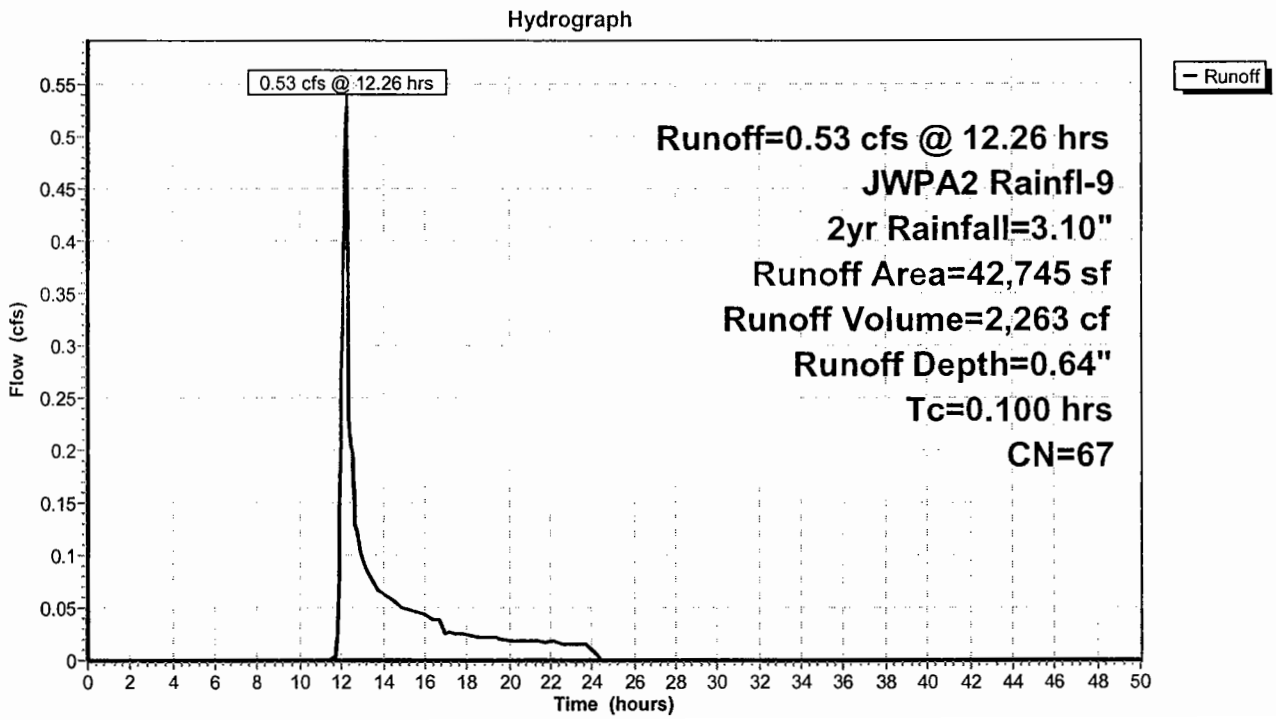
Runoff = 0.53 cfs @ 12.26 hrs, Volume= 2,263 cf, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	42,745	67	
	42,745	67	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.100					**Direct Entry,**

Subcatchment 04-10: Xsect 18



Summary for Subcatchment 04-2: Xsect 2

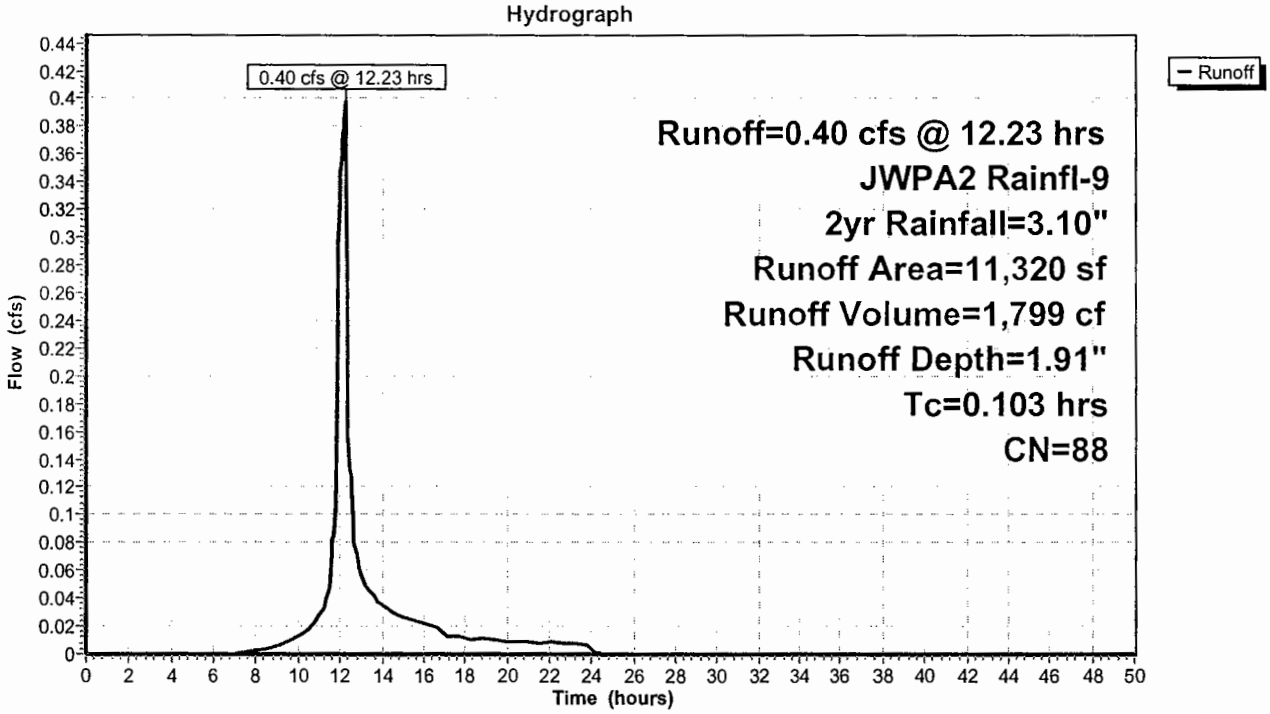
Runoff = 0.40 cfs @ 12.23 hrs, Volume= 1,799 cf, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	11,320	88	
	11,320	88	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.103					**Direct Entry,**

Subcatchment 04-2: Xsect 2



Summary for Subcatchment 04-3: Xsect 5

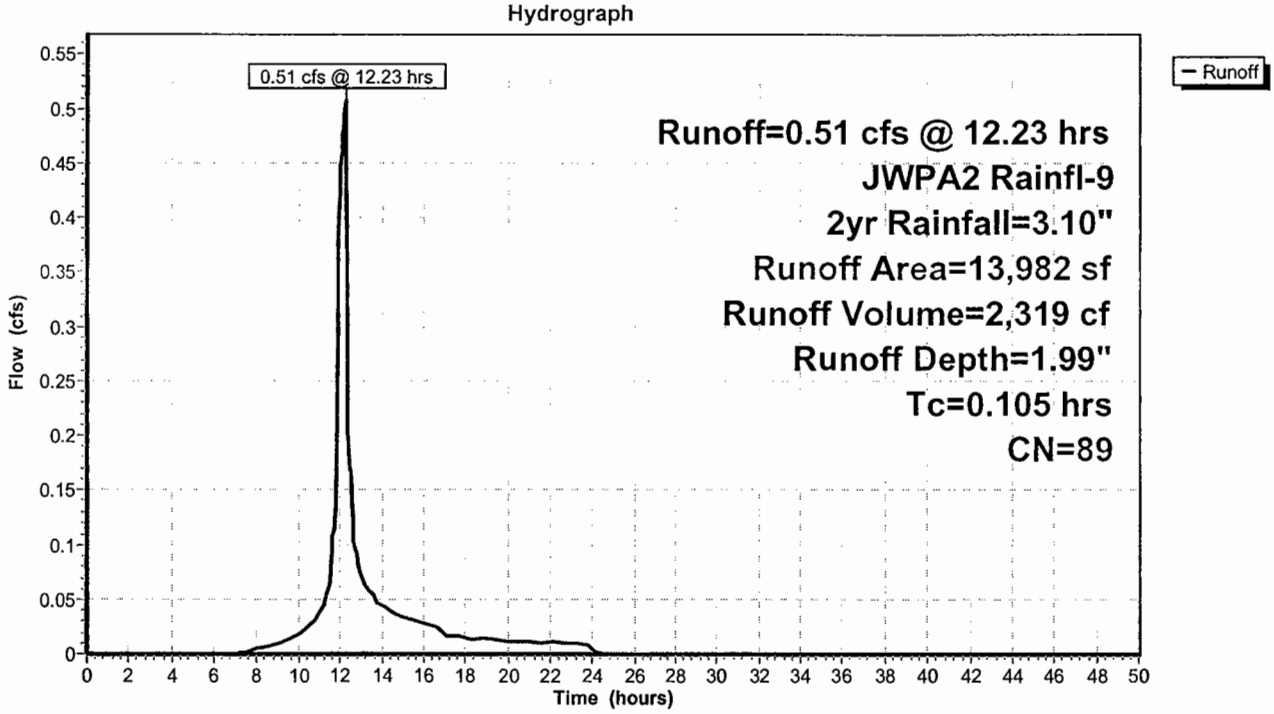
Runoff = 0.51 cfs @ 12.23 hrs, Volume= 2,319 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	13,982	89	
	13,982	89	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.105					**Direct Entry,**

Subcatchment 04-3: Xsect 5



Summary for Subcatchment 04-4: Xsect 4

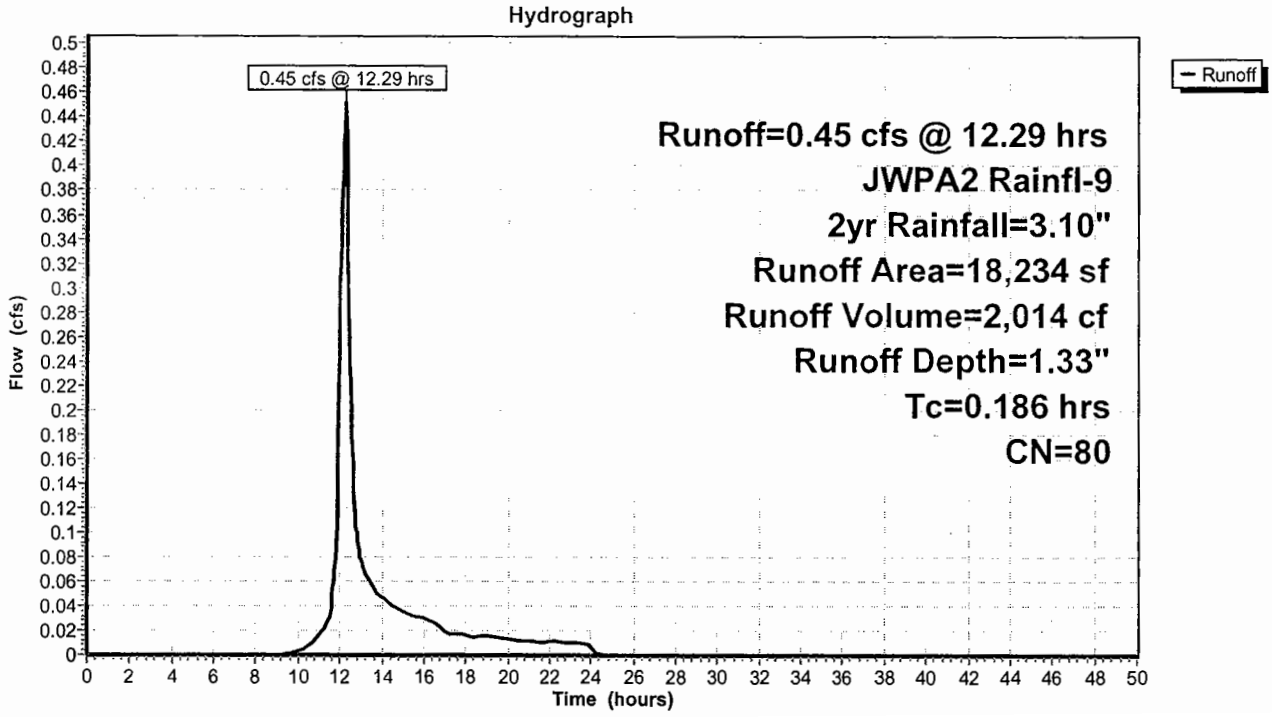
Runoff = 0.45 cfs @ 12.29 hrs, Volume= 2,014 cf, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	18,234	80	
	18,234	80	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.186					**Direct Entry,**

Subcatchment 04-4: Xsect 4



Summary for Subcatchment 04-5: Xsect 8

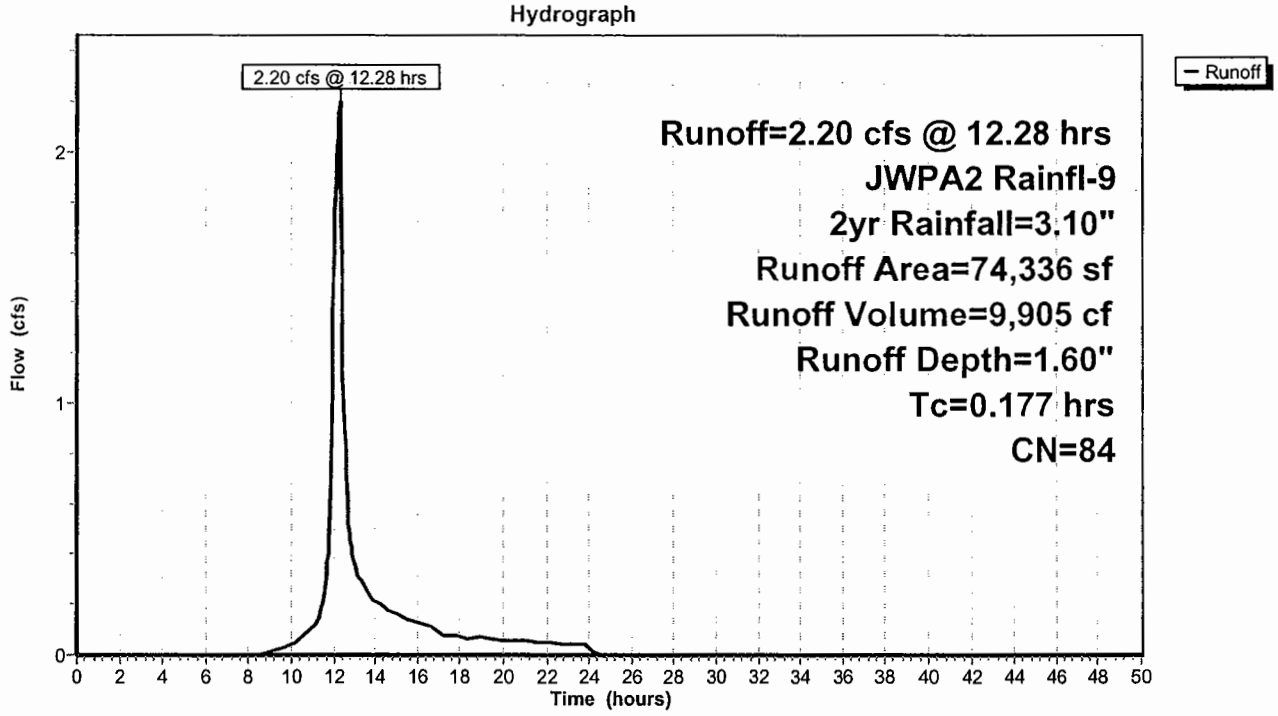
Runoff = 2.20 cfs @ 12.28 hrs, Volume= 9,905 cf, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	74,336	84	
	74,336	84	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.177					**Direct Entry,**

Subcatchment 04-5: Xsect 8



Summary for Subcatchment 04-6: Xsect 10

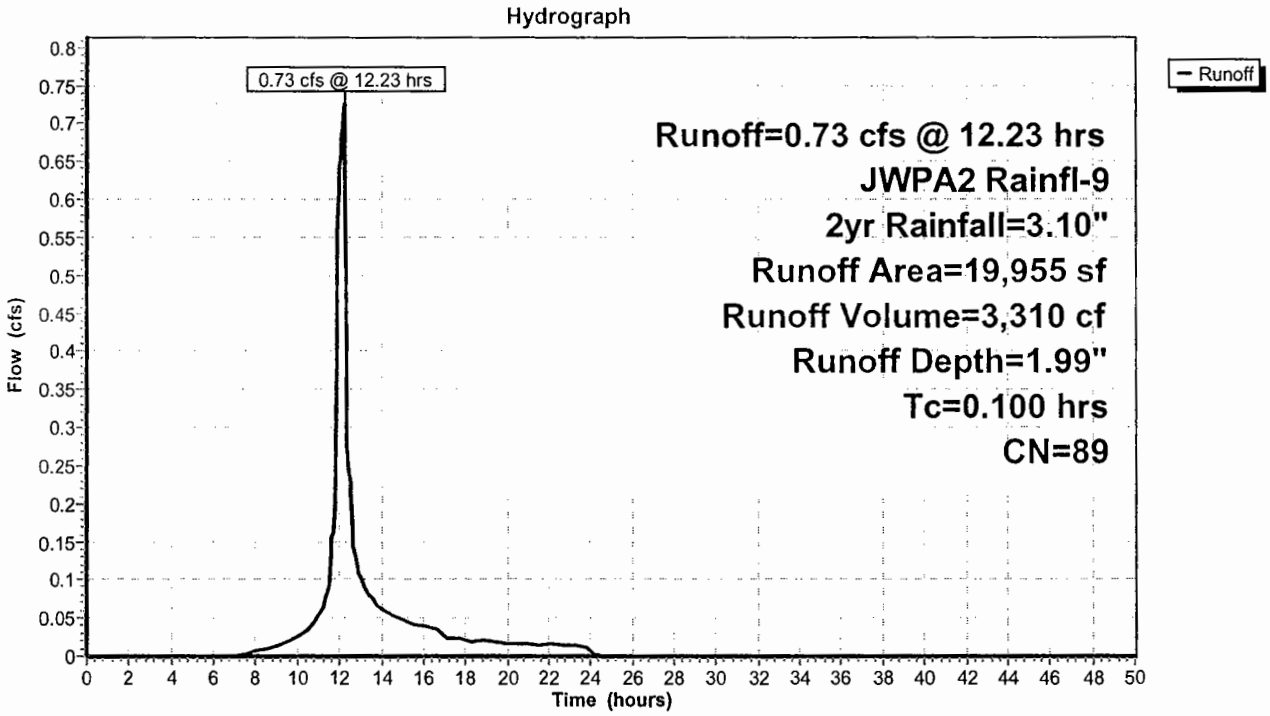
Runoff = 0.73 cfs @ 12.23 hrs, Volume= 3,310 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	19,955	89	
	19,955	89	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.100					**Direct Entry,**

Subcatchment 04-6: Xsect 10



Summary for Subcatchment 04-7: Xsect 12

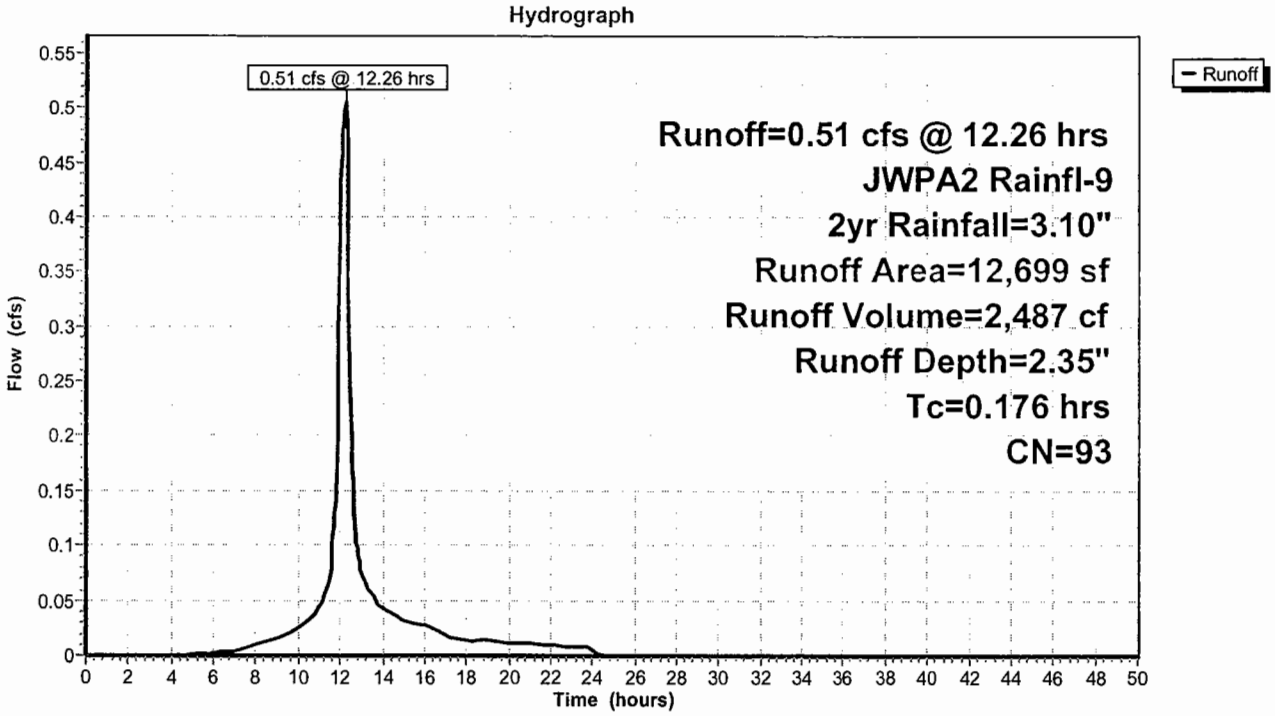
Runoff = 0.51 cfs @ 12.26 hrs, Volume= 2,487 cf, Depth= 2.35"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	12,699	93	
	12,699	93	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.176					**Direct Entry,**

Subcatchment 04-7: Xsect 12



Summary for Subcatchment 04-8: Xsect 14

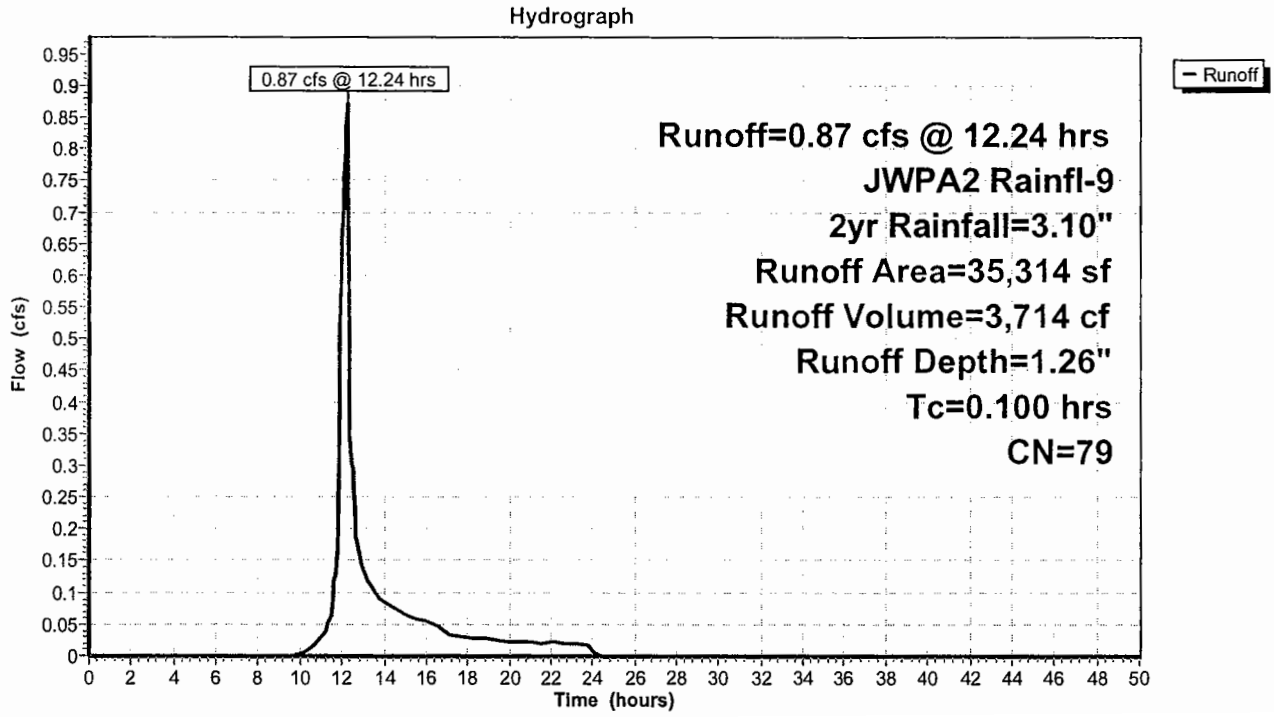
Runoff = 0.87 cfs @ 12.24 hrs, Volume= 3,714 cf, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	35,314	79	
	35,314	79	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.100					**Direct Entry,**

Subcatchment 04-8: Xsect 14



Summary for Subcatchment 04-9: Xsect 16

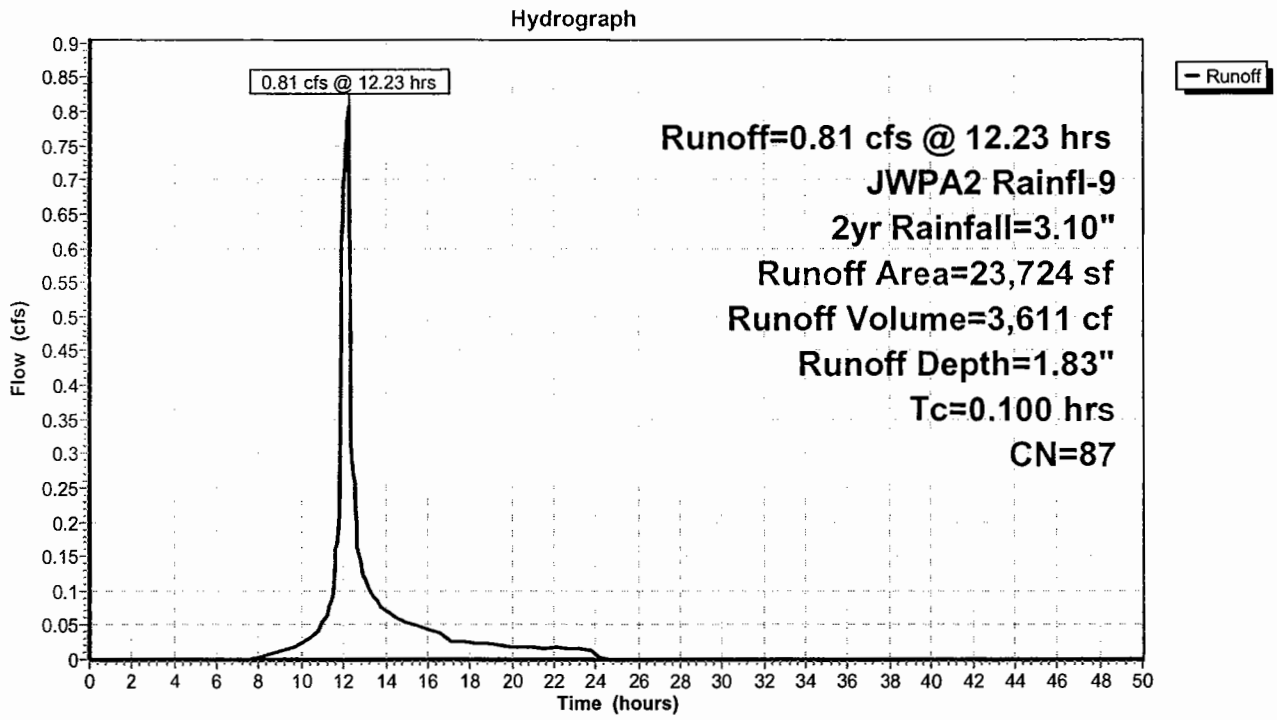
Runoff = 0.81 cfs @ 12.23 hrs, Volume= 3,611 cf, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	23,724	87	
	23,724	87	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.100					**Direct Entry,**

Subcatchment 04-9: Xsect 16



Summary for Subcatchment 10-1: Xsect 16

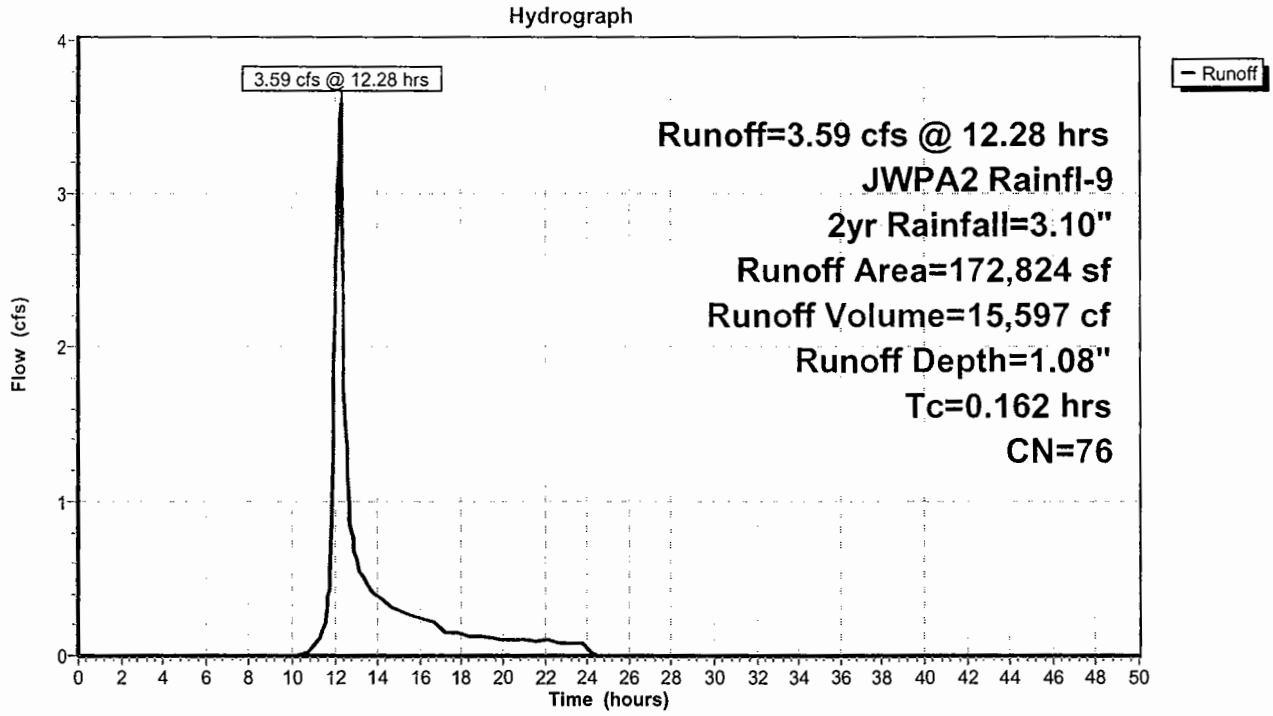
Runoff = 3.59 cfs @ 12.28 hrs, Volume= 15,597 cf, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	172,824	76	
	172,824	76	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.162					**Direct Entry,**

Subcatchment 10-1: Xsect 16



Summary for Subcatchment 13-1: Trib exist CB

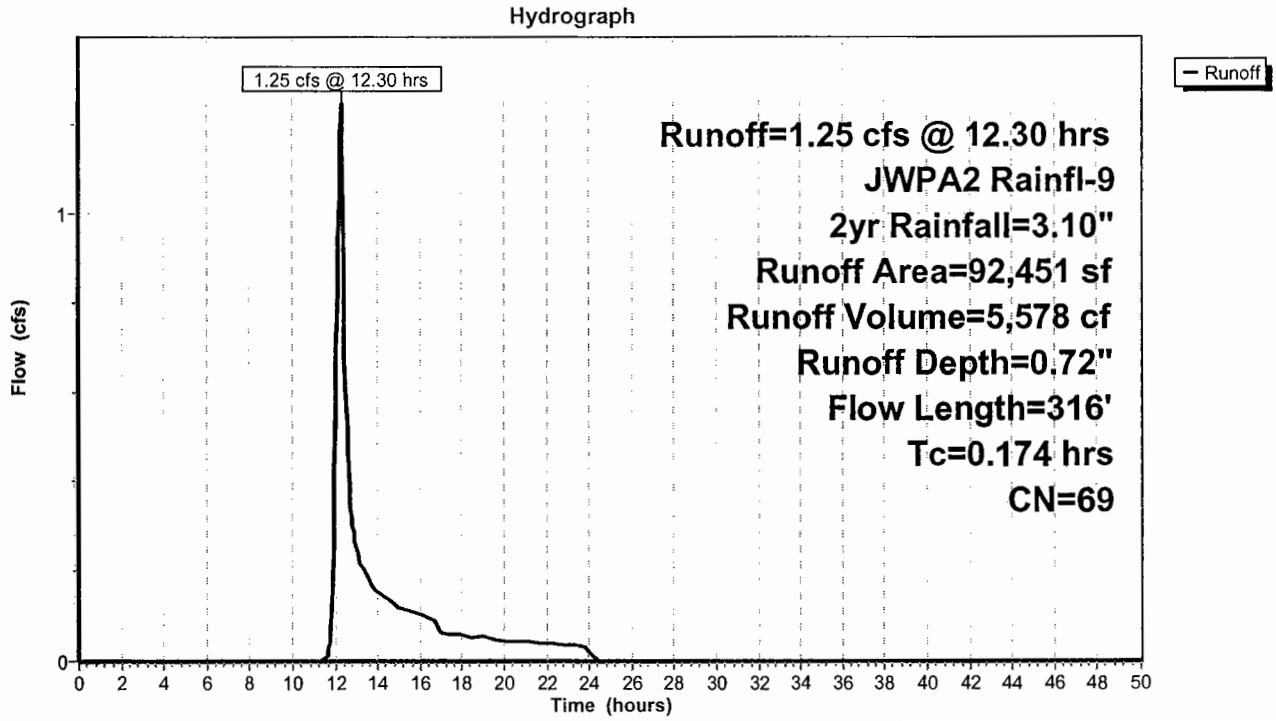
Runoff = 1.25 cfs @ 12.30 hrs, Volume= 5,578 cf, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
516	39	>75% Grass cover, Good, HSG A
5,119	36	Woods, Fair, HSG A
5,119	30	Woods, Good, HSG A
34,360	73	Woods, Fair, HSG C
34,360	70	Woods, Good, HSG C
8,420	74	>75% Grass cover, Good, HSG C
4,557	98	Roofs, HSG C
92,451	69	Weighted Average
87,894	67	95.07% Pervious Area
4,557	98	4.93% Impervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.158	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.016	266	0.0860	4.72		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.174	316	Total			

Subcatchment 13-1: Trib exist CB



Summary for Subcatchment BA-LWD: Xsect 18

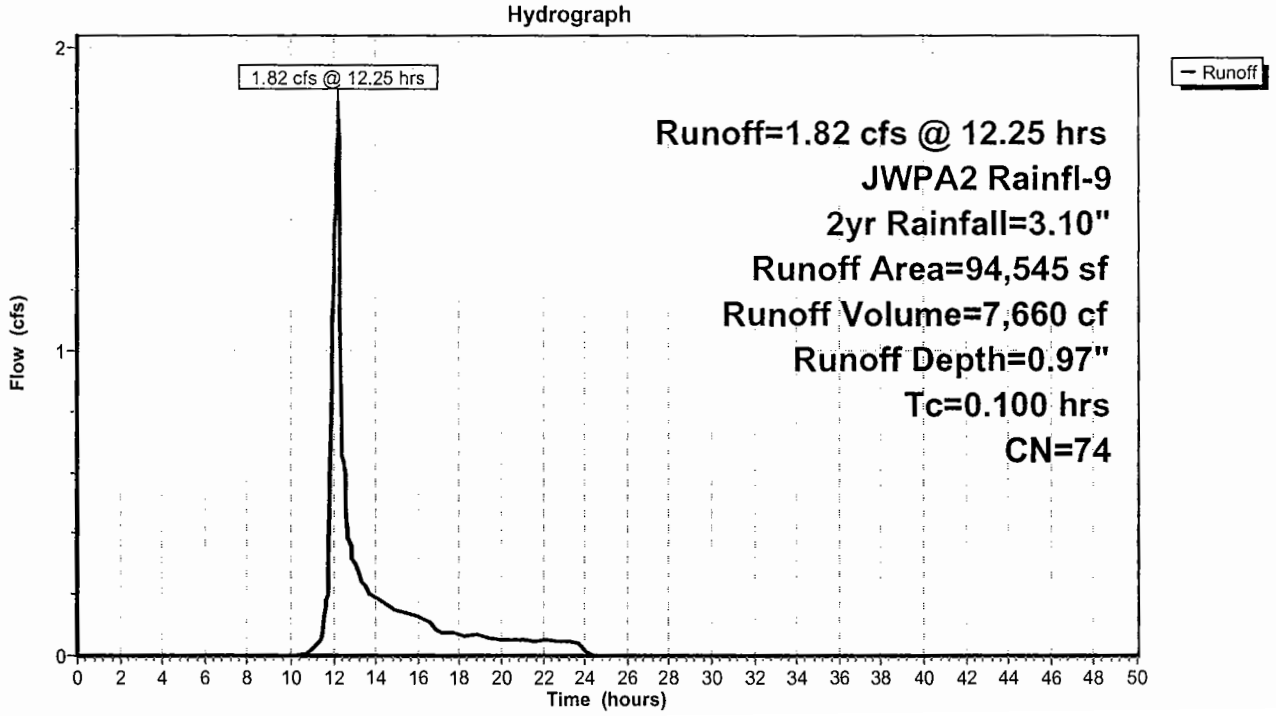
Runoff = 1.82 cfs @ 12.25 hrs, Volume= 7,660 cf, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	44,366	77	
	248	98	Roofs, HSG C
	10,007	74	>75% Grass cover, Good, HSG C
	19,962	73	Woods, Fair, HSG C
	19,962	70	Woods, Good, HSG C
	94,545	74	Weighted Average
	94,297	74	99.74% Pervious Area
	248	98	0.26% Impervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.100					**Direct Entry,**

Subcatchment BA-LWD: Xsect 18



Summary for Subcatchment BA-NWLY: Xsect 4

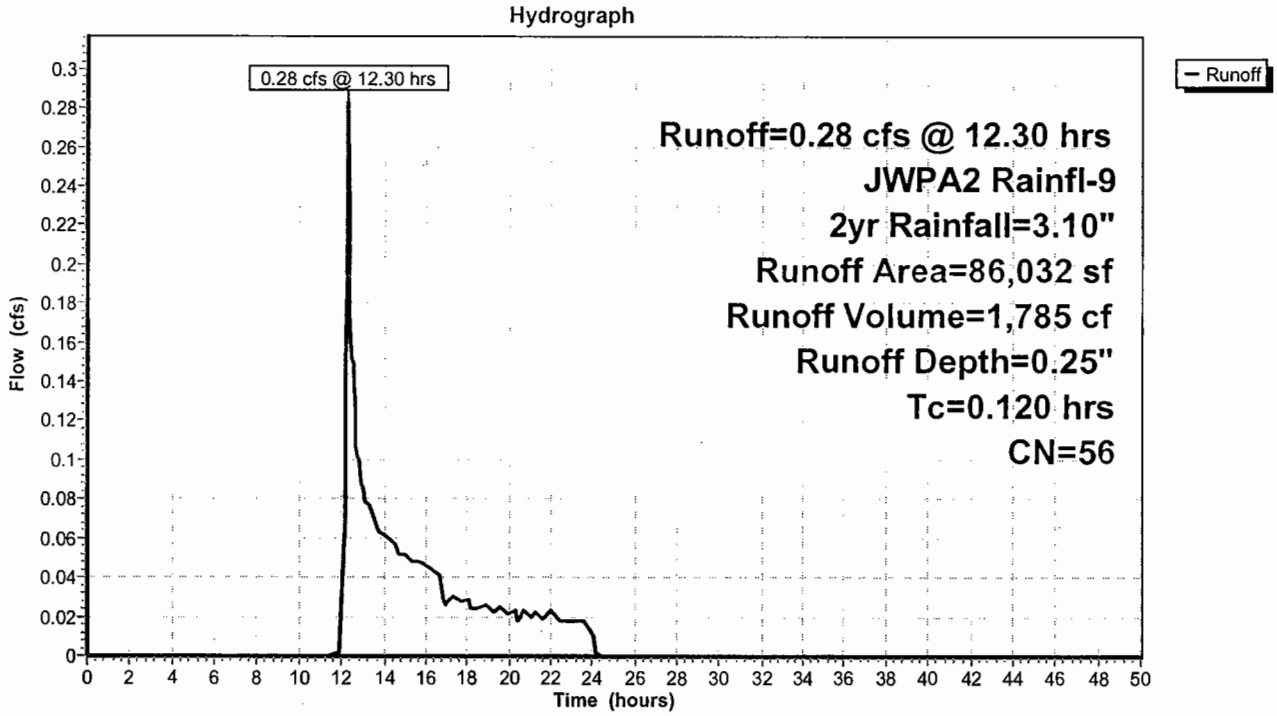
Runoff = 0.28 cfs @ 12.30 hrs, Volume= 1,785 cf, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	86,032	56	
	86,032	56	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.120					**Direct Entry,**

Subcatchment BA-NWLY: Xsect 4



Summary for Subcatchment BA-SWLY: Trib Inwood Dr.

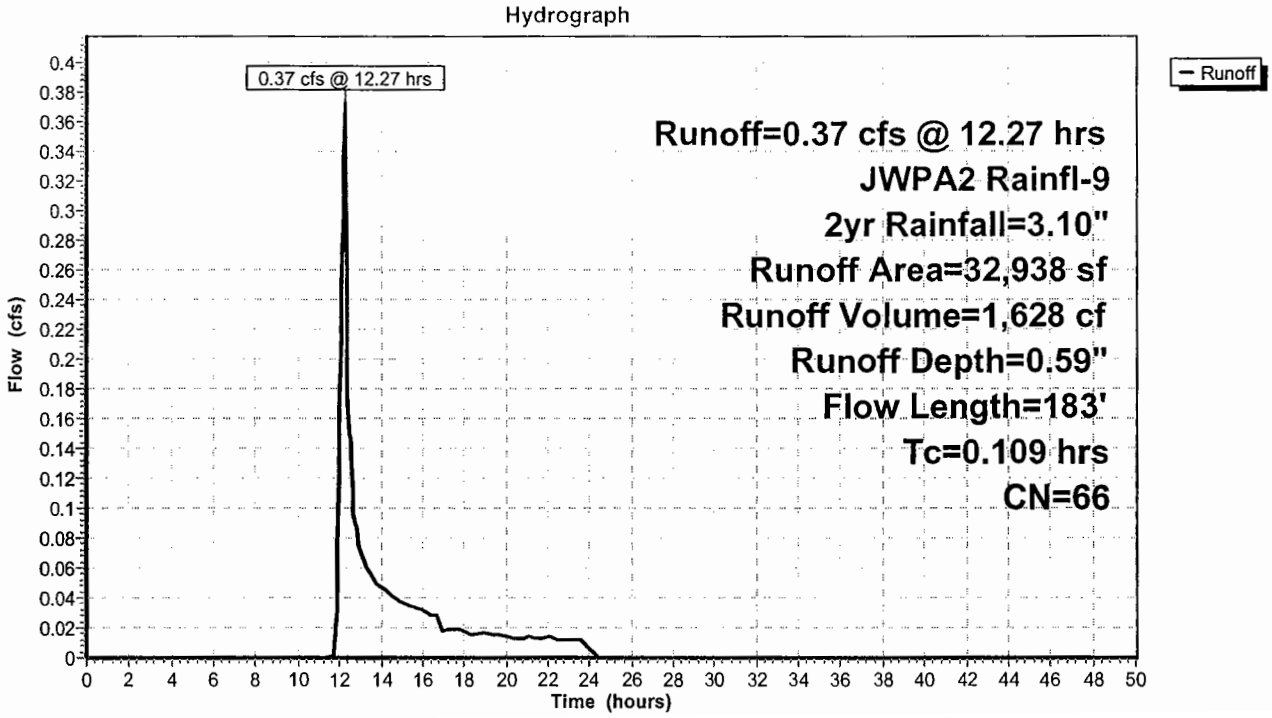
Runoff = 0.37 cfs @ 12.27 hrs, Volume= 1,628 cf, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
2,279	36	Woods, Fair, HSG A
2,279	30	Woods, Good, HSG A
14,190	73	Woods, Fair, HSG C
14,190	70	Woods, Good, HSG C
32,938	66	Weighted Average
32,938	66	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.102	50	0.1200	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.007	133	0.0980	5.04		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.109	183	Total			

Subcatchment BA-SWLY: Trib Inwood Dr.



Summary for Subcatchment BA-WLY: Xsect 20

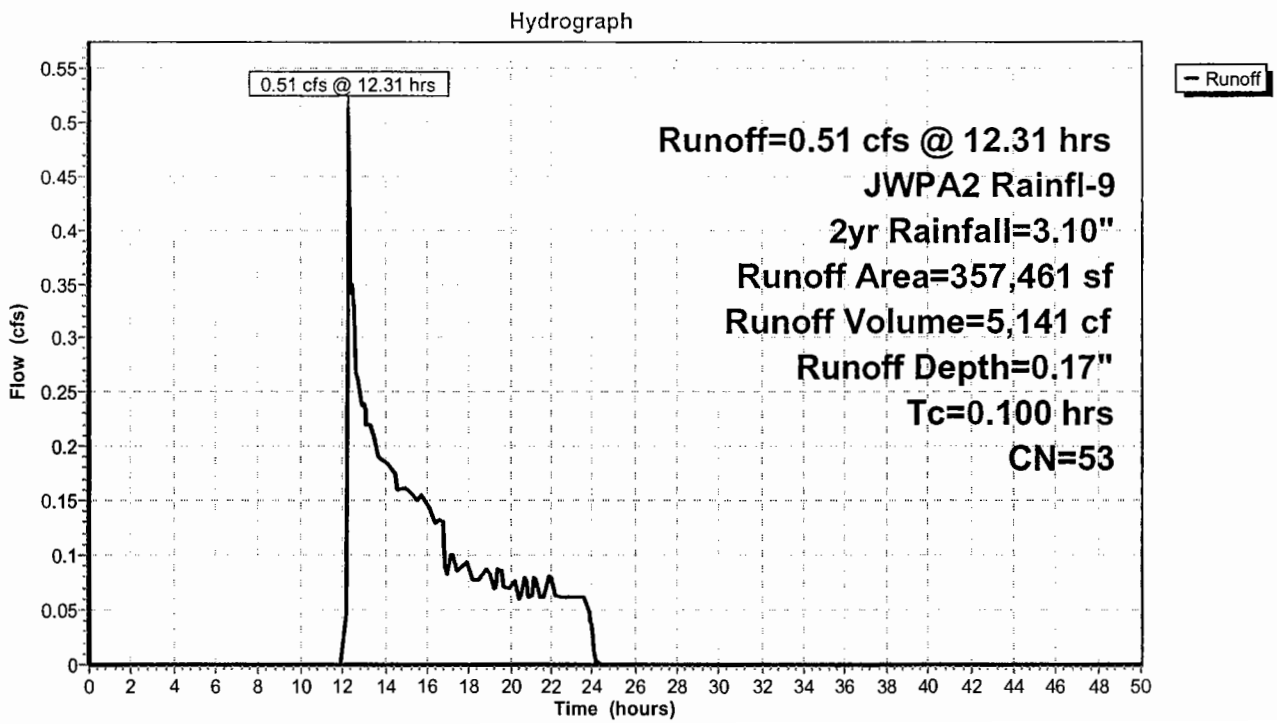
Runoff = 0.51 cfs @ 12.31 hrs, Volume= 5,141 cf, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	281,006	54	
	1,167	39	>75% Grass cover, Good, HSG A
	18,561	36	Woods, Fair, HSG A
	18,561	30	Woods, Good, HSG A
	7,110	60	Woods, Fair, HSG B
	7,110	55	Woods, Good, HSG B
	11,973	73	Woods, Fair, HSG C
	11,973	70	Woods, Good, HSG C
	357,461	53	Weighted Average
	357,461	53	100.00% Pervious Area

Tc (hours)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.100					**Direct Entry,**

Subcatchment BA-WLY: Xsect 20



Summary for Pond RES02: Res02

Inflow Area =	329,386 sf,	0.00% Impervious,	Inflow Depth =	1.53"	for 2yr event
Inflow =	9.43 cfs @	12.24 hrs,	Volume=	42,044 cf	
Outflow =	4.24 cfs @	12.41 hrs,	Volume=	42,044 cf,	Atten= 55%, Lag= 10.1 min
Discarded =	1.32 cfs @	12.41 hrs,	Volume=	32,332 cf	
Primary =	2.92 cfs @	12.41 hrs,	Volume=	9,712 cf	

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 89.75' @ 12.41 hrs Surf.Area= 10,452 sf Storage= 11,325 cf

Plug-Flow detention time=34.0 min calculated for 42,002 cf (100% of inflow)
Center-of-Mass det. time=33.9 min (864.7 - 830.8)

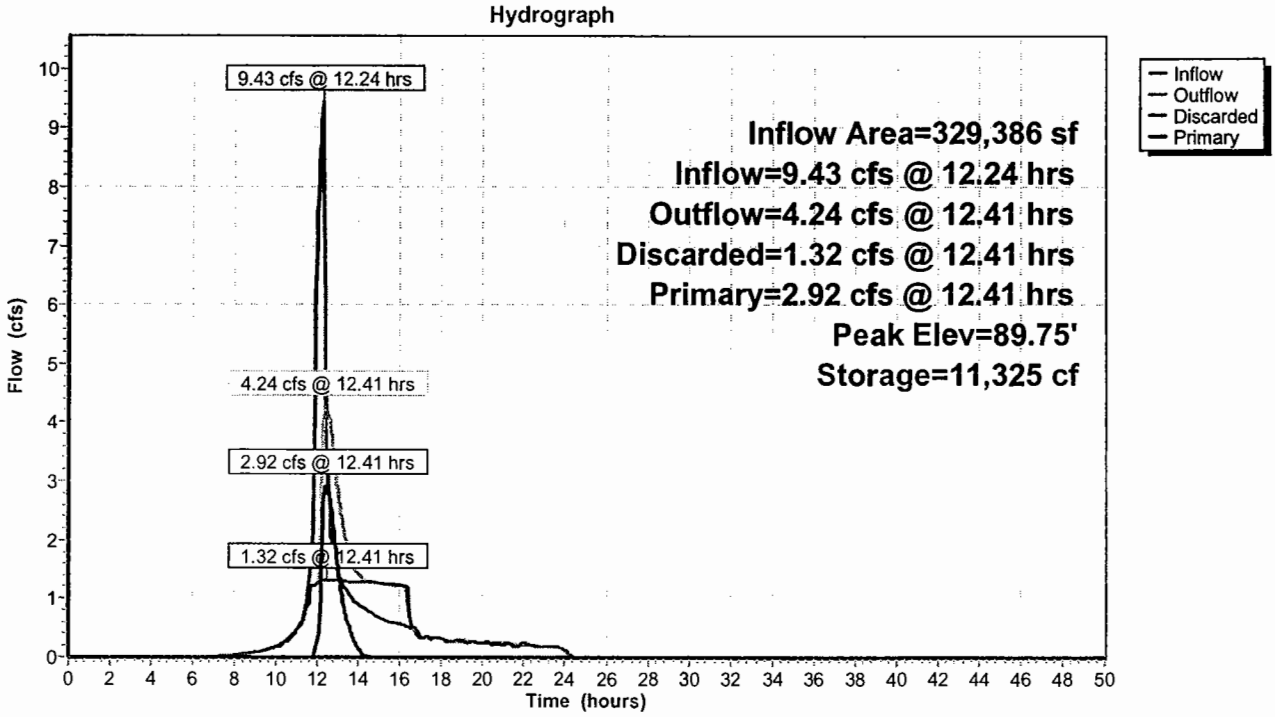
Volume	Invert	Avail.Storage	Storage Description
#1	87.50'	13,831 cf	**134.00'W x 78.00'L x 5.50'H Prismatoid**
			57,486 cf Overall - 17,970 cf Embedded = 39,516 cf x 35.0% Voids
#2	88.50'	17,970 cf	**48.0" D x 130.0'L Pipe Storage**x 11 Inside #1
		31,801 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	88.65'	**12.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	90.08'	**20.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	87.50'	**5.000 in/hr Exfiltration over Wetted area** Phase-In= 0.02'

Discarded OutFlow Max=1.32 cfs @ 12.41 hrs HW=89.74' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 1.32 cfs)

Primary OutFlow Max=2.91 cfs @ 12.41 hrs HW=89.74' (Free Discharge)
├─**1=Orifice/Grate** (Orifice Controls 2.91 cfs @ 3.71 fps)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond RES02: Res02



Summary for Pond RES03: Struc 3

Inflow Area = 109,296 sf, 0.00% Impervious, Inflow Depth = 0.71" for 2yr event
Inflow = 1.47 cfs @ 12.26 hrs, Volume= 6,510 cf
Outflow = 0.06 cfs @ 18.07 hrs, Volume= 2,555 cf, Atten= 96%, Lag= 348.9 min
Primary = 0.06 cfs @ 18.07 hrs, Volume= 2,555 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 80.04' @ 18.07 hrs Surf.Area= 5,240 sf Storage= 4,884 cf

Plug-Flow detention time=618.7 min calculated for 2,555 cf (39% of inflow)
Center-of-Mass det. time=474.4 min (1,345.7 - 871.3)

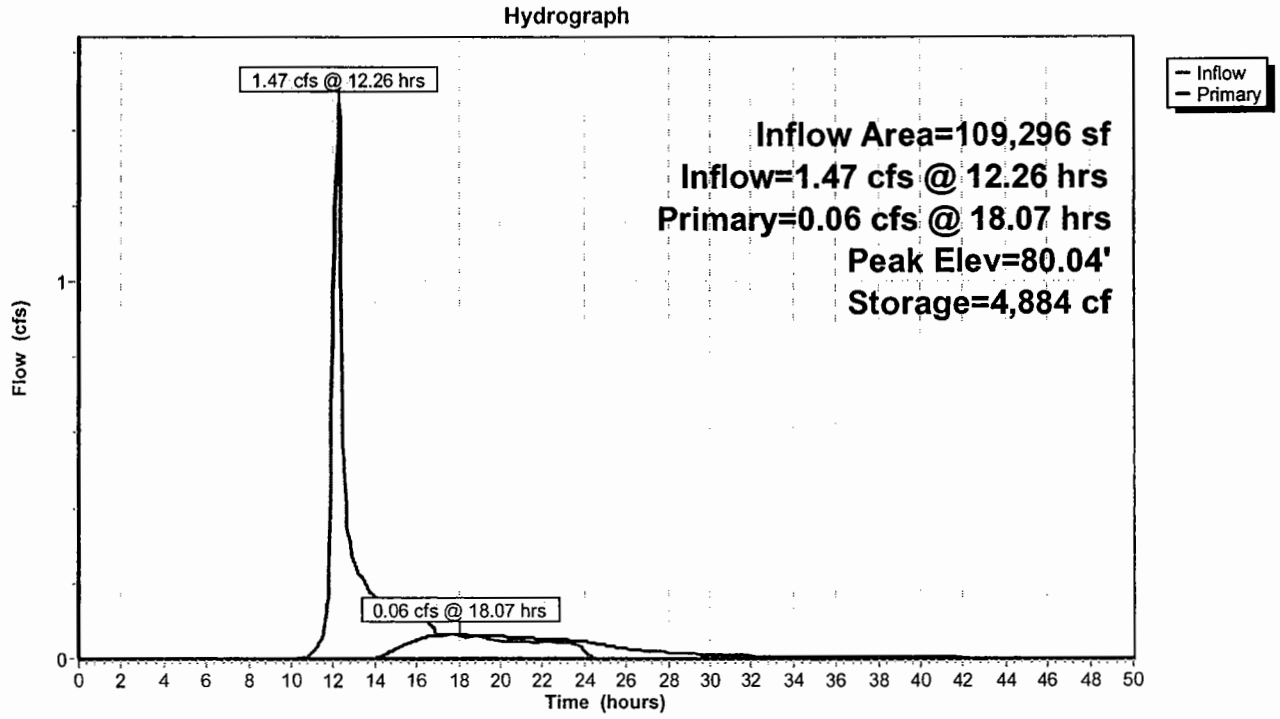
Volume	Invert	Avail.Storage	Storage Description
#1	79.00'	32,133 cf	**Struc 3 (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
79.00	4,168	0	0
80.00	5,198	4,683	4,683
81.00	6,291	5,745	10,428
82.00	8,390	7,341	17,768
83.00	9,854	9,122	26,890
83.50	11,118	5,243	32,133

Device	Routing	Invert	Outlet Devices
#1	Primary	79.84'	**3.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	83.00'	**8.0' long x 12.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.06 cfs @ 18.07 hrs HW=80.04' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.06 cfs @ 1.52 fps)
└─**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond RES03: Struc 3



Summary for Pond RES04: Struc 4

Inflow Area = 264,353 sf, 0.00% Impervious, Inflow Depth = 1.49" for 2yr event
Inflow = 7.26 cfs @ 12.25 hrs, Volume= 32,886 cf
Outflow = 0.28 cfs @ 16.91 hrs, Volume= 26,760 cf, Atten= 96%, Lag= 279.8 min
Primary = 0.28 cfs @ 16.91 hrs, Volume= 26,760 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 85.93' @ 16.91 hrs Surf.Area= 15,534 sf Storage= 23,518 cf

Plug-Flow detention time= 883.6 min calculated for 26,733 cf (81% of inflow)
Center-of-Mass det. time= 809.6 min (1,641.3 - 831.7)

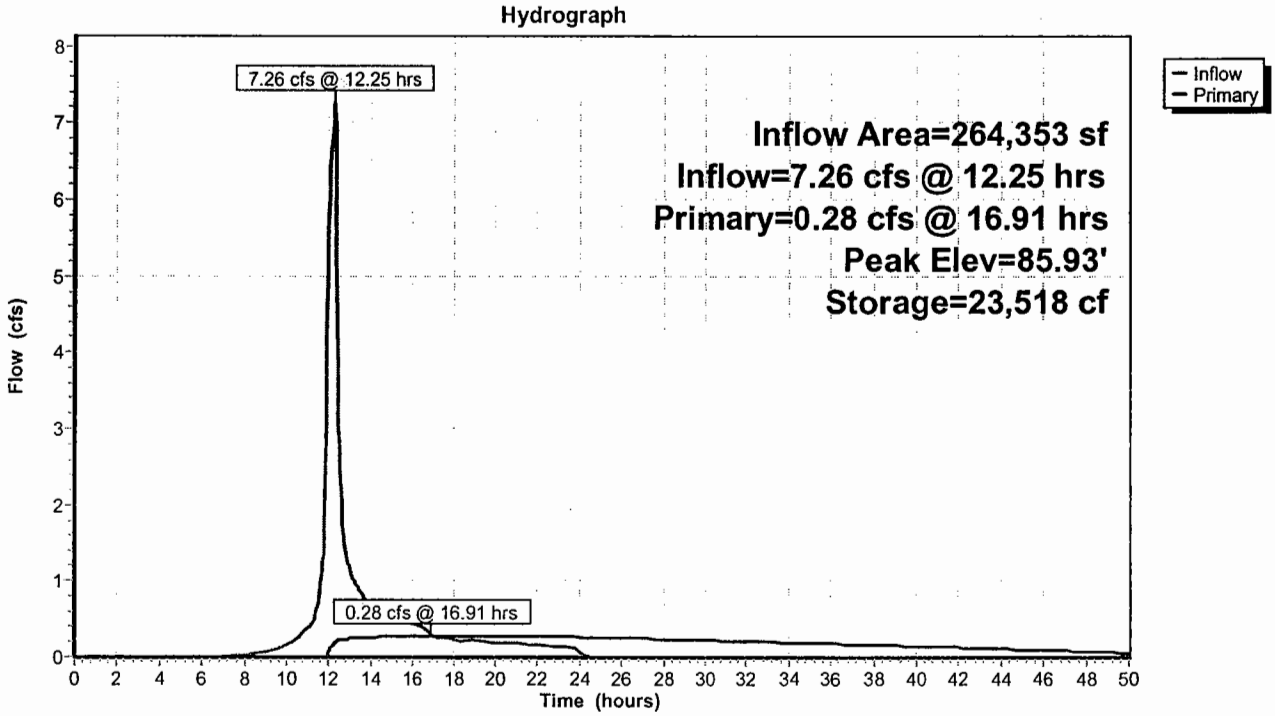
Volume	Invert	Avail.Storage	Storage Description
#1	84.00'	70,668 cf	**Struc 4 (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
84.00	9,200	0	0
85.00	12,161	10,681	10,681
86.00	15,800	13,981	24,661
87.00	17,835	16,818	41,479
88.00	19,946	18,891	60,369
88.50	21,250	10,299	70,668

Device	Routing	Invert	Outlet Devices
#1	Primary	84.43'	**3.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	85.93'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	88.20'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.28 cfs @ 16.91 hrs HW=85.93' (Free Discharge)
- **1=Orifice/Grate** (Orifice Controls 0.28 cfs @ 5.64 fps)
- **2=Orifice/Grate** (Controls 0.00 cfs)
- **3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond RES04: Struc 4



Summary for Pond RES10: Struc 10

Inflow Area = 502,210 sf, 0.00% Impervious, Inflow Depth = 0.60" for 2yr event
Inflow = 6.21 cfs @ 12.31 hrs, Volume= 25,308 cf
Outflow = 5.45 cfs @ 12.42 hrs, Volume= 25,308 cf, Atten= 12%, Lag= 6.4 min
Primary = 5.45 cfs @ 12.42 hrs, Volume= 25,308 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 80.06' @ 12.42 hrs Surf.Area= 0.0000 sm Storage= 0.116 af

Plug-Flow detention time=27.4 min calculated for 25,283 cf (100% of inflow)
Center-of-Mass det. time=27.4 min (851.4 - 824.0)

Volume	Invert	Avail.Storage	Storage Description
#1	78.60'	0.166 af	**Struc 10** Listed below (Recalc)

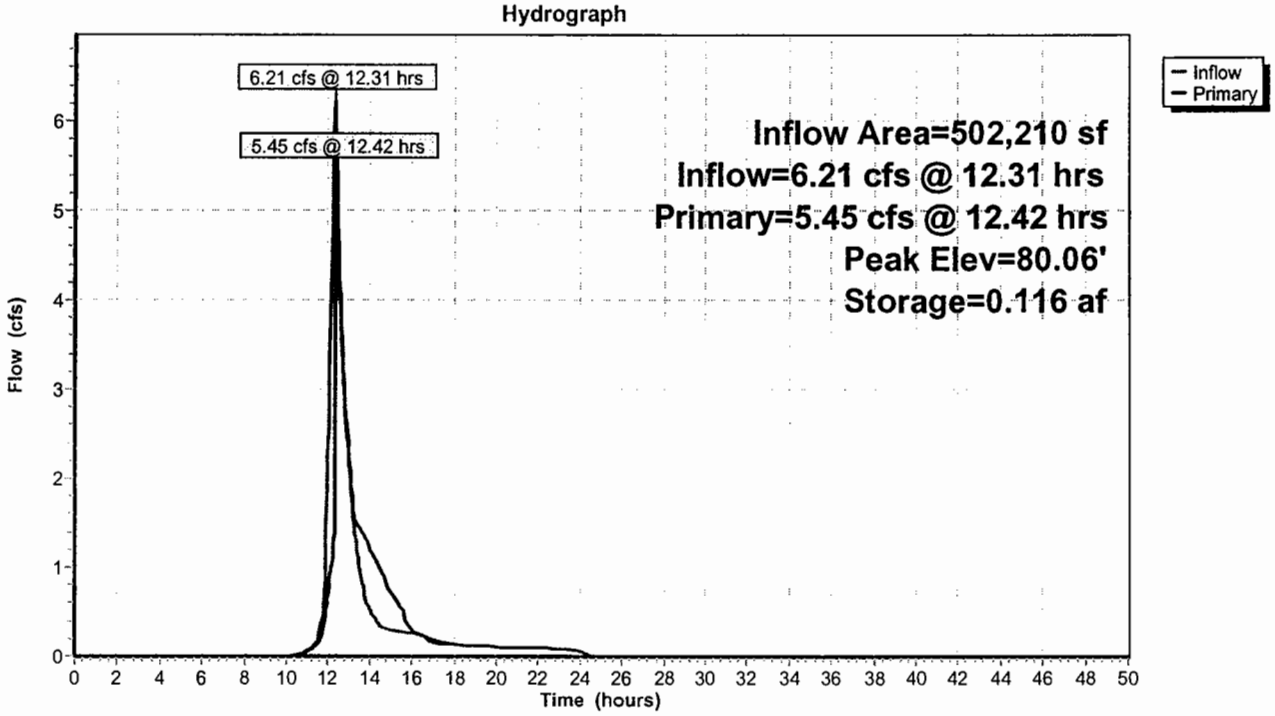
Elevation (feet)	Cum.Store (acre-feet)
78.60	0.000
79.00	0.007
79.50	0.038
80.00	0.105
80.10	0.123
80.20	0.144
80.30	0.166

Device	Routing	Invert	Outlet Devices
#1	Primary	78.60'	**Struc 10**

Elev. (feet)	78.60	79.00	79.50	80.00	80.10	80.20	80.30
Disch. (cfs)	0.000	0.500	0.900	1.500	8.200	23.000	48.000

Primary OutFlow Max=5.22 cfs @ 12.42 hrs HW=80.06' (Free Discharge)
└─**1=Struc 10** (Custom Controls 5.22 cfs)

Pond RES10: Struc 10



Summary for Pond RES13: Exist CB @ Inwood Dr.

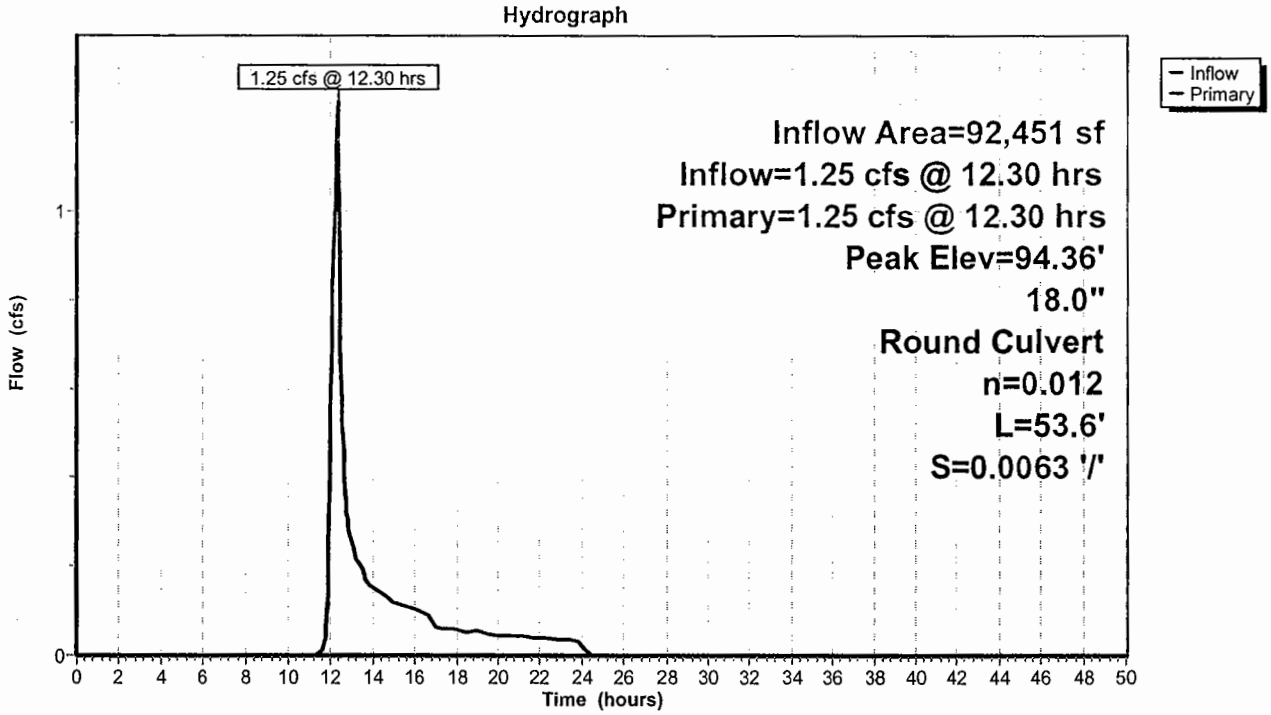
Inflow Area = 92,451 sf, 4.93% Impervious, Inflow Depth = 0.72" for 2yr event
Inflow = 1.25 cfs @ 12.30 hrs, Volume= 5,578 cf
Outflow = 1.25 cfs @ 12.30 hrs, Volume= 5,578 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.25 cfs @ 12.30 hrs, Volume= 5,578 cf

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Peak Elev= 94.36' @ 12.30 hrs
Flood Elev= 97.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	93.81'	**18.0" Round Culvert** L= 53.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 93.81' / 93.47' S= 0.0063 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=1.24 cfs @ 12.30 hrs HW=94.36' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.24 cfs @ 3.18 fps)

Pond RES13: Exist CB @ Inwood Dr.

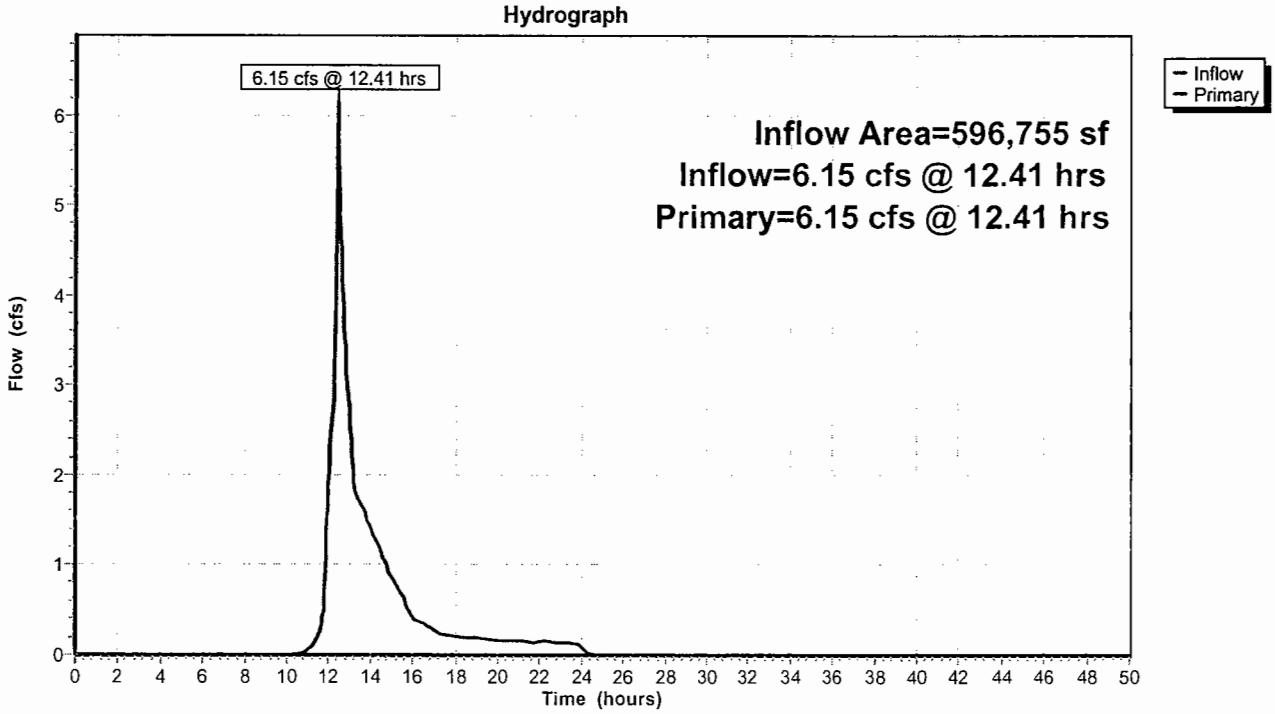


Summary for Link 2L: AddHyd

Inflow Area = 596,755 sf, 0.04% Impervious, Inflow Depth = 0.66" for 2yr event
Inflow = 6.15 cfs @ 12.41 hrs, Volume= 32,969 cf
Primary = 6.15 cfs @ 12.41 hrs, Volume= 32,969 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

Link 2L: AddHyd

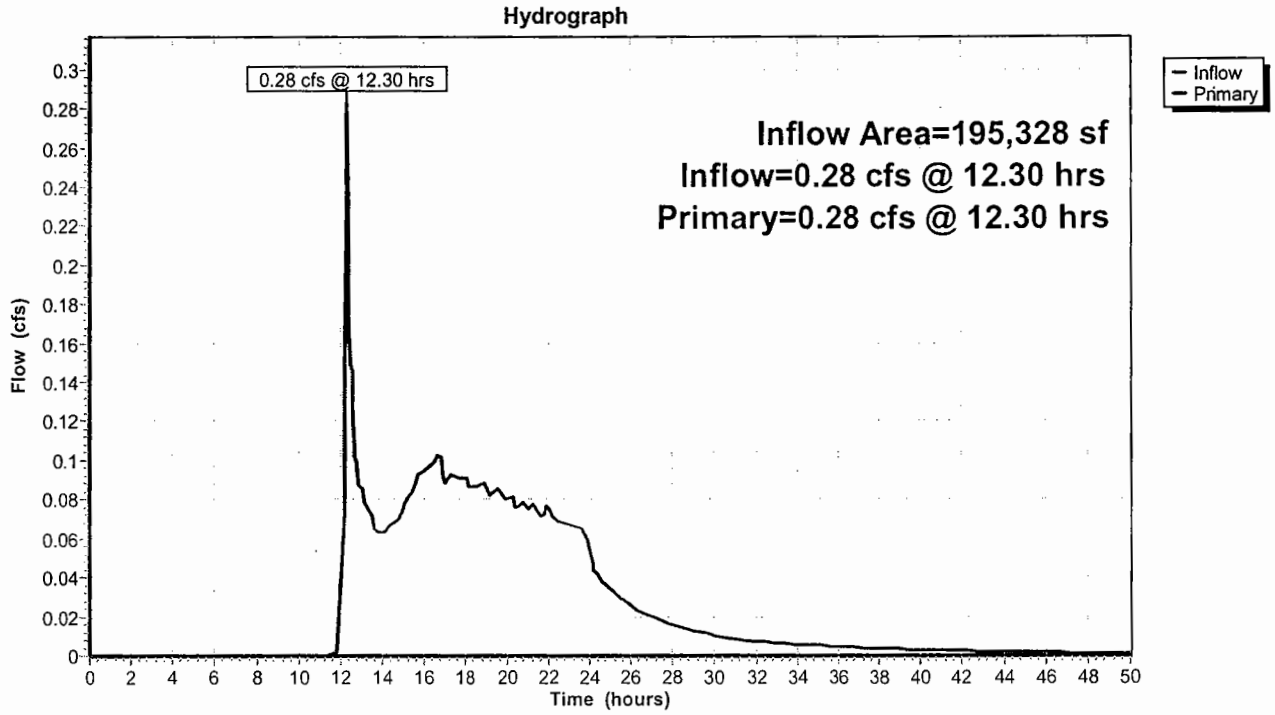


Summary for Link 3L: AddHyd

Inflow Area = 195,328 sf, 0.00% Impervious, Inflow Depth > 0.27" for 2yr event
Inflow = 0.28 cfs @ 12.30 hrs, Volume= 4,340 cf
Primary = 0.28 cfs @ 12.30 hrs, Volume= 4,340 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

Link 3L: AddHyd

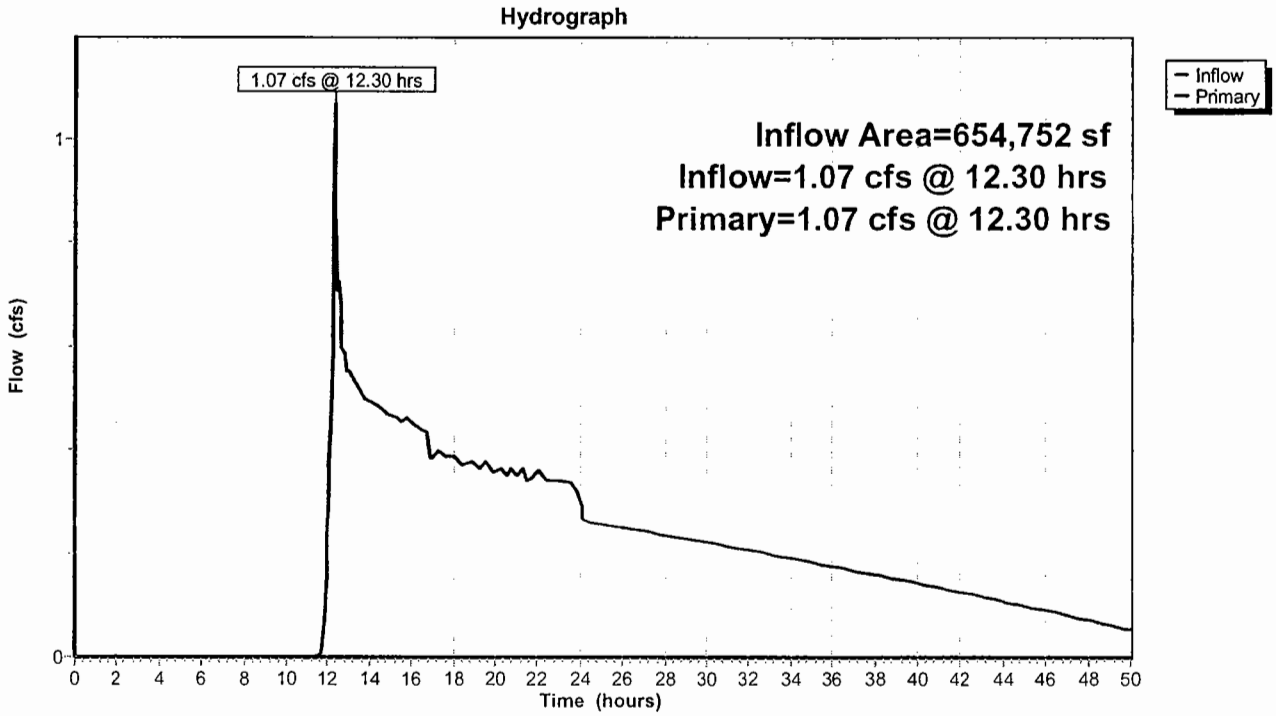


Summary for Link 4L: AddHyd

Inflow Area =	654,752 sf,	0.00% Impervious,	Inflow Depth >	0.61"	for 2yr event
Inflow =	1.07 cfs @	12.30 hrs, Volume=	33,529 cf		
Primary =	1.07 cfs @	12.30 hrs, Volume=	33,529 cf,	Atten= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

Link 4L: AddHyd

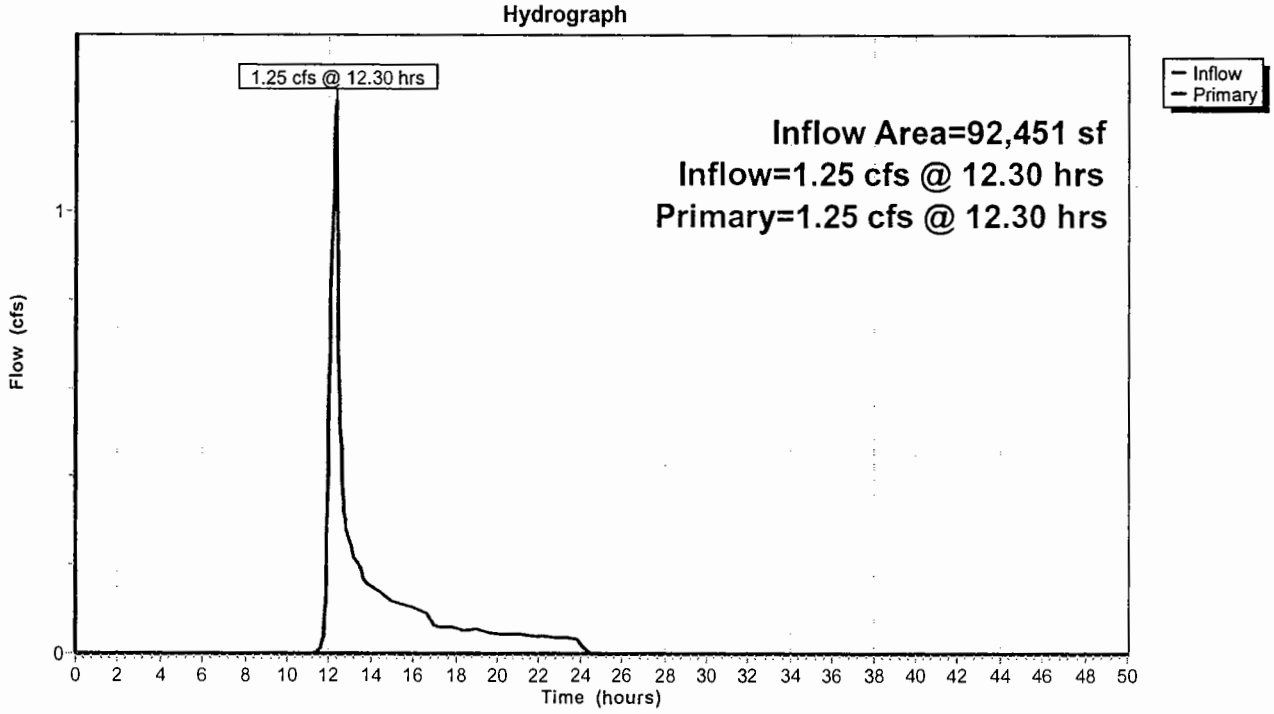


Summary for Link 5L:

Inflow Area = 92,451 sf, 4.93% Impervious, Inflow Depth = 0.72" for 2yr event
Inflow = 1.25 cfs @ 12.30 hrs, Volume= 5,578 cf
Primary = 1.25 cfs @ 12.30 hrs, Volume= 5,578 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

Link 5L:



Time span=0.00-50.00 hrs, dt=0.05 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment02-1: Xsect 14 Runoff Area=63,402 sf 0.00% Impervious Runoff Depth=2.21"
Tc=0.132 hrs CN=76 Runoff=2.64 cfs 11,676 cf

Subcatchment02-2: Xsect 1 Runoff Area=21,665 sf 0.00% Impervious Runoff Depth=3.39"
Tc=0.100 hrs CN=89 Runoff=1.28 cfs 6,121 cf

Subcatchment02-3: Xsect 2 Runoff Area=23,247 sf 0.00% Impervious Runoff Depth=3.29"
Tc=0.100 hrs CN=88 Runoff=1.36 cfs 6,374 cf

Subcatchment02-4: Xsect 4 Runoff Area=116,049 sf 0.00% Impervious Runoff Depth=2.55"
Tc=0.105 hrs CN=80 Runoff=5.56 cfs 24,631 cf

Subcatchment02-5: Xsect 8 Runoff Area=9,668 sf 0.00% Impervious Runoff Depth=3.49"
Tc=0.100 hrs CN=90 Runoff=0.58 cfs 2,813 cf

Subcatchment02-6: Xsect 9 Runoff Area=18,048 sf 0.00% Impervious Runoff Depth=3.70"
Tc=0.100 hrs CN=92 Runoff=1.12 cfs 5,564 cf

Subcatchment02-7: Xsect 11 Runoff Area=43,375 sf 0.00% Impervious Runoff Depth=2.81"
Tc=0.154 hrs CN=83 Runoff=2.20 cfs 10,174 cf

Subcatchment02-8: Xsect 6 Runoff Area=33,932 sf 0.00% Impervious Runoff Depth=3.39"
Tc=0.110 hrs CN=89 Runoff=2.01 cfs 9,586 cf

Subcatchment03-1: Xsect 1 Runoff Area=77,360 sf 0.00% Impervious Runoff Depth=2.05"
Tc=0.115 hrs CN=74 Runoff=3.04 cfs 13,213 cf

Subcatchment03-2: Xsect 2 Runoff Area=31,936 sf 0.00% Impervious Runoff Depth=0.49"
Tc=0.207 hrs CN=49 Runoff=0.21 cfs 1,306 cf

Subcatchment04-1: Xsect 1 Runoff Area=12,044 sf 0.00% Impervious Runoff Depth=2.72"
Tc=0.100 hrs CN=82 Runoff=0.61 cfs 2,734 cf

Subcatchment04-10: Xsect 18 Runoff Area=42,745 sf 0.00% Impervious Runoff Depth=1.53"
Tc=0.100 hrs CN=67 Runoff=1.29 cfs 5,450 cf

Subcatchment04-2: Xsect 2 Runoff Area=11,320 sf 0.00% Impervious Runoff Depth=3.29"
Tc=0.103 hrs CN=88 Runoff=0.66 cfs 3,104 cf

Subcatchment04-3: Xsect 5 Runoff Area=13,982 sf 0.00% Impervious Runoff Depth=3.39"
Tc=0.105 hrs CN=89 Runoff=0.83 cfs 3,950 cf

Subcatchment04-4: Xsect 4 Runoff Area=18,234 sf 0.00% Impervious Runoff Depth=2.55"
Tc=0.186 hrs CN=80 Runoff=0.85 cfs 3,870 cf

Subcatchment04-5: Xsect 8 Runoff Area=74,336 sf 0.00% Impervious Runoff Depth=2.91"
Tc=0.177 hrs CN=84 Runoff=3.88 cfs 18,006 cf

Subcatchment04-6: Xsect 10 Runoff Area=19,955 sf 0.00% Impervious Runoff Depth=3.39"
Tc=0.100 hrs CN=89 Runoff=1.17 cfs 5,638 cf

Subcatchment04-7: Xsect 12 Runoff Area=12,699 sf 0.00% Impervious Runoff Depth=3.81"
Tc=0.176 hrs CN=93 Runoff=0.79 cfs 4,027 cf

Subcatchment04-8: Xsect 14 Runoff Area=35,314 sf 0.00% Impervious Runoff Depth=2.46"
Tc=0.100 hrs CN=79 Runoff=1.65 cfs 7,241 cf

Subcatchment04-9: Xsect 16 Runoff Area=23,724 sf 0.00% Impervious Runoff Depth=3.19"
Tc=0.100 hrs CN=87 Runoff=1.36 cfs 6,311 cf

Subcatchment10-1: Xsect 16 Runoff Area=172,824 sf 0.00% Impervious Runoff Depth=2.21"
Tc=0.162 hrs CN=76 Runoff=7.20 cfs 31,827 cf

Subcatchment13-1: Trib exist CB Runoff Area=92,451 sf 4.93% Impervious Runoff Depth=1.67"
Flow Length=316' Tc=0.174 hrs CN=69 Runoff=2.94 cfs 12,882 cf

SubcatchmentBA-LWD: Xsect 18 Runoff Area=94,545 sf 0.26% Impervious Runoff Depth=2.05"
Tc=0.100 hrs CN=74 Runoff=3.76 cfs 16,148 cf

SubcatchmentBA-NWLY: Xsect 4 Runoff Area=86,032 sf 0.00% Impervious Runoff Depth=0.84"
Tc=0.120 hrs CN=56 Runoff=1.39 cfs 6,041 cf

SubcatchmentBA-SWLY: Trib Inwood Dr. Runoff Area=32,938 sf 0.00% Impervious Runoff Depth=1.46"
Flow Length=183' Tc=0.109 hrs CN=66 Runoff=0.94 cfs 4,011 cf

SubcatchmentBA-WLY: Xsect 20 Runoff Area=357,461 sf 0.00% Impervious Runoff Depth=0.68"
Tc=0.100 hrs CN=53 Runoff=4.49 cfs 20,349 cf

Pond RES02: Res02 Peak Elev=90.99' Storage=20,421 cf Inflow=16.74 cfs 76,939 cf
Discarded=1.38 cfs 45,792 cf Primary=9.10 cfs 31,147 cf Outflow=10.48 cfs 76,939 cf

Pond RES03: Struc 3 Peak Elev=80.74' Storage=8,850 cf Inflow=3.20 cfs 14,519 cf
Outflow=0.21 cfs 10,538 cf

Pond RES04: Struc 4 Peak Elev=86.57' Storage=34,056 cf Inflow=13.00 cfs 60,332 cf
Outflow=1.79 cfs 53,310 cf

Pond RES10: Struc 10 Peak Elev=80.15' Storage=0.133 af Inflow=15.60 cfs 62,973 cf
Outflow=15.48 cfs 62,973 cf

Pond RES13: Exist CB @ Inwood Dr. Peak Elev=94.70' Inflow=2.94 cfs 12,882 cf
18.0" Round Culvert n=0.012 L=53.6' S=0.0063 '/' Outflow=2.94 cfs 12,882 cf

Link 2L: AddHyd Inflow=18.47 cfs 79,121 cf
Primary=18.47 cfs 79,121 cf

Link 3L: AddHyd Inflow=1.47 cfs 16,579 cf
Primary=1.47 cfs 16,579 cf

Link 4L: AddHyd Inflow=5.95 cfs 77,669 cf
Primary=5.95 cfs 77,669 cf

Link 5L: Inflow=2.94 cfs 12,882 cf
Primary=2.94 cfs 12,882 cf

Total Runoff Area = 1,539,286 sf Runoff Volume = 243,046 cf Average Runoff Depth = 1.89"
99.69% Pervious = 1,534,481 sf 0.31% Impervious = 4,805 sf

Time span=0.00-50.00 hrs, dt=0.05 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment02-1: Xsect 14 Runoff Area=63,402 sf 0.00% Impervious Runoff Depth=2.87"
Tc=0.132 hrs CN=76 Runoff=3.38 cfs 15,157 cf

Subcatchment02-2: Xsect 1 Runoff Area=21,665 sf 0.00% Impervious Runoff Depth=4.16"
Tc=0.100 hrs CN=89 Runoff=1.54 cfs 7,503 cf

Subcatchment02-3: Xsect 2 Runoff Area=23,247 sf 0.00% Impervious Runoff Depth=4.05"
Tc=0.100 hrs CN=88 Runoff=1.62 cfs 7,846 cf

Subcatchment02-4: Xsect 4 Runoff Area=116,049 sf 0.00% Impervious Runoff Depth=3.24"
Tc=0.105 hrs CN=80 Runoff=6.97 cfs 31,378 cf

Subcatchment02-5: Xsect 8 Runoff Area=9,668 sf 0.00% Impervious Runoff Depth=4.26"
Tc=0.100 hrs CN=90 Runoff=0.70 cfs 3,435 cf

Subcatchment02-6: Xsect 9 Runoff Area=18,048 sf 0.00% Impervious Runoff Depth=4.48"
Tc=0.100 hrs CN=92 Runoff=1.33 cfs 6,739 cf

Subcatchment02-7: Xsect 11 Runoff Area=43,375 sf 0.00% Impervious Runoff Depth=3.54"
Tc=0.154 hrs CN=83 Runoff=2.72 cfs 12,789 cf

Subcatchment02-8: Xsect 6 Runoff Area=33,932 sf 0.00% Impervious Runoff Depth=4.16"
Tc=0.110 hrs CN=89 Runoff=2.40 cfs 11,752 cf

Subcatchment03-1: Xsect 1 Runoff Area=77,360 sf 0.00% Impervious Runoff Depth=2.69"
Tc=0.115 hrs CN=74 Runoff=3.94 cfs 17,324 cf

Subcatchment03-2: Xsect 2 Runoff Area=31,936 sf 0.00% Impervious Runoff Depth=0.80"
Tc=0.207 hrs CN=49 Runoff=0.41 cfs 2,135 cf

Subcatchment04-1: Xsect 1 Runoff Area=12,044 sf 0.00% Impervious Runoff Depth=3.44"
Tc=0.100 hrs CN=82 Runoff=0.76 cfs 3,452 cf

Subcatchment04-10: Xsect 18 Runoff Area=42,745 sf 0.00% Impervious Runoff Depth=2.09"
Tc=0.100 hrs CN=67 Runoff=1.75 cfs 7,433 cf

Subcatchment04-2: Xsect 2 Runoff Area=11,320 sf 0.00% Impervious Runoff Depth=4.05"
Tc=0.103 hrs CN=88 Runoff=0.79 cfs 3,821 cf

Subcatchment04-3: Xsect 5 Runoff Area=13,982 sf 0.00% Impervious Runoff Depth=4.16"
Tc=0.105 hrs CN=89 Runoff=0.99 cfs 4,842 cf

Subcatchment04-4: Xsect 4 Runoff Area=18,234 sf 0.00% Impervious Runoff Depth=3.24"
Tc=0.186 hrs CN=80 Runoff=1.07 cfs 4,930 cf

Subcatchment04-5: Xsect 8 Runoff Area=74,336 sf 0.00% Impervious Runoff Depth=3.64"
Tc=0.177 hrs CN=84 Runoff=4.73 cfs 22,538 cf

Subcatchment04-6: Xsect 10 Runoff Area=19,955 sf 0.00% Impervious Runoff Depth=4.16"
Tc=0.100 hrs CN=89 Runoff=1.42 cfs 6,911 cf

Subcatchment04-7: Xsect 12 Runoff Area=12,699 sf 0.00% Impervious Runoff Depth=4.59"
Tc=0.176 hrs CN=93 Runoff=0.94 cfs 4,859 cf

Subcatchment04-8: Xsect 14 Runoff Area=35,314 sf 0.00% Impervious Runoff Depth=3.15"
Tc=0.100 hrs CN=79 Runoff=2.08 cfs 9,267 cf

Subcatchment04-9: Xsect 16 Runoff Area=23,724 sf 0.00% Impervious Runoff Depth=3.95"
Tc=0.100 hrs CN=87 Runoff=1.63 cfs 7,800 cf

Subcatchment10-1: Xsect 16 Runoff Area=172,824 sf 0.00% Impervious Runoff Depth=2.87"
Tc=0.162 hrs CN=76 Runoff=9.23 cfs 41,314 cf

Subcatchment13-1: Trib exist CB Runoff Area=92,451 sf 4.93% Impervious Runoff Depth=2.25"
Flow Length=316' Tc=0.174 hrs CN=69 Runoff=3.94 cfs 17,357 cf

SubcatchmentBA-LWD: Xsect 18 Runoff Area=94,545 sf 0.26% Impervious Runoff Depth=2.69"
Tc=0.100 hrs CN=74 Runoff=4.87 cfs 21,172 cf

SubcatchmentBA-NWLY: Xsect 4 Runoff Area=86,032 sf 0.00% Impervious Runoff Depth=1.25"
Tc=0.120 hrs CN=56 Runoff=2.08 cfs 8,993 cf

SubcatchmentBA-SWLY: Trib Inwood Dr. Runoff Area=32,938 sf 0.00% Impervious Runoff Depth=2.01"
Flow Length=183' Tc=0.109 hrs CN=66 Runoff=1.29 cfs 5,505 cf

SubcatchmentBA-WLY: Xsect 20 Runoff Area=357,461 sf 0.00% Impervious Runoff Depth=1.05"
Tc=0.100 hrs CN=53 Runoff=7.27 cfs 31,354 cf

Pond RES02: Res02 Peak Elev=91.50' Storage=24,021 cf Inflow=20.72 cfs 96,598 cf
Discarded=1.41 cfs 51,746 cf Primary=13.82 cfs 44,852 cf Outflow=15.23 cfs 96,598 cf

Pond RES03: Struc 3 Peak Elev=81.25' Storage=12,052 cf Inflow=4.28 cfs 19,459 cf
Outflow=0.27 cfs 15,451 cf

Pond RES04: Struc 4 Peak Elev=86.95' Storage=40,584 cf Inflow=16.15 cfs 75,853 cf
Outflow=3.09 cfs 68,668 cf

Pond RES10: Struc 10 Peak Elev=80.20' Storage=0.143 af Inflow=22.59 cfs 86,166 cf
Outflow=22.34 cfs 86,166 cf

Pond RES13: Exist CB @ Inwood Dr. Peak Elev=94.87' Inflow=3.94 cfs 17,357 cf
18.0" Round Culvert n=0.012 L=53.6' S=0.0063 '/' Outflow=3.94 cfs 17,357 cf

Link 2L: AddHyd Inflow=26.58 cfs 107,338 cf
Primary=26.58 cfs 107,338 cf

Link 3L: AddHyd Inflow=2.29 cfs 24,444 cf
Primary=2.29 cfs 24,444 cf

Link 4L: AddHyd Inflow=10.37 cfs 105,527 cf
Primary=10.37 cfs 105,527 cf

Link 5L: Inflow=3.94 cfs 17,357 cf
Primary=3.94 cfs 17,357 cf

Total Runoff Area = 1,539,286 sf Runoff Volume = 317,604 cf Average Runoff Depth = 2.48"
99.69% Pervious = 1,534,481 sf 0.31% Impervious = 4,805 sf

Time span=0.00-50.00 hrs, dt=0.05 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment02-1: Xsect 14 Runoff Area=63,402 sf 0.00% Impervious Runoff Depth=4.26"
Tc=0.132 hrs CN=76 Runoff=4.91 cfs 22,494 cf

Subcatchment02-2: Xsect 1 Runoff Area=21,665 sf 0.00% Impervious Runoff Depth=5.71"
Tc=0.100 hrs CN=89 Runoff=2.06 cfs 10,305 cf

Subcatchment02-3: Xsect 2 Runoff Area=23,247 sf 0.00% Impervious Runoff Depth=5.59"
Tc=0.100 hrs CN=88 Runoff=2.18 cfs 10,836 cf

Subcatchment02-4: Xsect 4 Runoff Area=116,049 sf 0.00% Impervious Runoff Depth=4.69"
Tc=0.105 hrs CN=80 Runoff=9.82 cfs 45,399 cf

Subcatchment02-5: Xsect 8 Runoff Area=9,668 sf 0.00% Impervious Runoff Depth=5.82"
Tc=0.100 hrs CN=90 Runoff=0.93 cfs 4,692 cf

Subcatchment02-6: Xsect 9 Runoff Area=18,048 sf 0.00% Impervious Runoff Depth=6.05"
Tc=0.100 hrs CN=92 Runoff=1.76 cfs 9,106 cf

Subcatchment02-7: Xsect 11 Runoff Area=43,375 sf 0.00% Impervious Runoff Depth=5.03"
Tc=0.154 hrs CN=83 Runoff=3.78 cfs 18,173 cf

Subcatchment02-8: Xsect 6 Runoff Area=33,932 sf 0.00% Impervious Runoff Depth=5.71"
Tc=0.110 hrs CN=89 Runoff=3.22 cfs 16,141 cf

Subcatchment03-1: Xsect 1 Runoff Area=77,360 sf 0.00% Impervious Runoff Depth=4.04"
Tc=0.115 hrs CN=74 Runoff=5.80 cfs 26,058 cf

Subcatchment03-2: Xsect 2 Runoff Area=31,936 sf 0.00% Impervious Runoff Depth=1.58"
Tc=0.207 hrs CN=49 Runoff=0.90 cfs 4,200 cf

Subcatchment04-1: Xsect 1 Runoff Area=12,044 sf 0.00% Impervious Runoff Depth=4.92"
Tc=0.100 hrs CN=82 Runoff=1.06 cfs 4,934 cf

Subcatchment04-10: Xsect 18 Runoff Area=42,745 sf 0.00% Impervious Runoff Depth=3.31"
Tc=0.100 hrs CN=67 Runoff=2.73 cfs 11,780 cf

Subcatchment04-2: Xsect 2 Runoff Area=11,320 sf 0.00% Impervious Runoff Depth=5.59"
Tc=0.103 hrs CN=88 Runoff=1.06 cfs 5,276 cf

Subcatchment04-3: Xsect 5 Runoff Area=13,982 sf 0.00% Impervious Runoff Depth=5.71"
Tc=0.105 hrs CN=89 Runoff=1.33 cfs 6,651 cf

Subcatchment04-4: Xsect 4 Runoff Area=18,234 sf 0.00% Impervious Runoff Depth=4.69"
Tc=0.186 hrs CN=80 Runoff=1.51 cfs 7,133 cf

Subcatchment04-5: Xsect 8 Runoff Area=74,336 sf 0.00% Impervious Runoff Depth=5.14"
Tc=0.177 hrs CN=84 Runoff=6.53 cfs 31,840 cf

Subcatchment04-6: Xsect 10 Runoff Area=19,955 sf 0.00% Impervious Runoff Depth=5.71"
Tc=0.100 hrs CN=89 Runoff=1.89 cfs 9,492 cf

Subcatchment04-7: Xsect 12 Runoff Area=12,699 sf 0.00% Impervious Runoff Depth=6.17"
Tc=0.176 hrs CN=93 Runoff=1.24 cfs 6,531 cf

Subcatchment04-8: Xsect 14 Runoff Area=35,314 sf 0.00% Impervious Runoff Depth=4.58"
Tc=0.100 hrs CN=79 Runoff=2.94 cfs 13,491 cf

Subcatchment04-9: Xsect 16 Runoff Area=23,724 sf 0.00% Impervious Runoff Depth=5.48"
Tc=0.100 hrs CN=87 Runoff=2.20 cfs 10,833 cf

Subcatchment10-1: Xsect 16 Runoff Area=172,824 sf 0.00% Impervious Runoff Depth=4.26"
Tc=0.162 hrs CN=76 Runoff=13.23 cfs 61,314 cf

Subcatchment13-1: Trib exist CB Runoff Area=92,451 sf 4.93% Impervious Runoff Depth=3.51"
Flow Length=316' Tc=0.174 hrs CN=69 Runoff=6.05 cfs 27,072 cf

SubcatchmentBA-LWD: Xsect 18 Runoff Area=94,545 sf 0.26% Impervious Runoff Depth=4.04"
Tc=0.100 hrs CN=74 Runoff=7.15 cfs 31,846 cf

SubcatchmentBA-NWLY: Xsect 4 Runoff Area=86,032 sf 0.00% Impervious Runoff Depth=2.22"
Tc=0.120 hrs CN=56 Runoff=3.71 cfs 15,902 cf

SubcatchmentBA-SWLY: Trib Inwood Dr. Runoff Area=32,938 sf 0.00% Impervious Runoff Depth=3.20"
Flow Length=183' Tc=0.109 hrs CN=66 Runoff=2.03 cfs 8,796 cf

SubcatchmentBA-WLY: Xsect 20 Runoff Area=357,461 sf 0.00% Impervious Runoff Depth=1.94"
Tc=0.100 hrs CN=53 Runoff=13.71 cfs 57,731 cf

Pond RES02: Res02 Peak Elev=92.74' Storage=30,836 cf Inflow=28.74 cfs 137,146 cf
Discarded=1.47 cfs 61,838 cf Primary=21.35 cfs 75,308 cf Outflow=22.82 cfs 137,146 cf

Pond RES03: Struc 3 Peak Elev=82.24' Storage=19,808 cf Inflow=6.60 cfs 30,258 cf
Outflow=0.36 cfs 26,151 cf

Pond RES04: Struc 4 Peak Elev=87.80' Storage=56,393 cf Inflow=22.51 cfs 107,961 cf
Outflow=4.85 cfs 100,544 cf

Pond RES10: Struc 10 Peak Elev=80.24' Storage=0.154 af Inflow=34.35 cfs 136,622 cf
Outflow=34.11 cfs 136,622 cf

Pond RES13: Exist CB @ Inwood Dr. Peak Elev=95.22' Inflow=6.05 cfs 27,072 cf
18.0" Round Culvert n=0.012 L=53.6' S=0.0063 '/' Outflow=6.05 cfs 27,072 cf

Link 2L: AddHyd Inflow=40.74 cfs 168,468 cf
Primary=40.74 cfs 168,468 cf

Link 3L: AddHyd Inflow=3.97 cfs 42,053 cf
Primary=3.97 cfs 42,053 cf

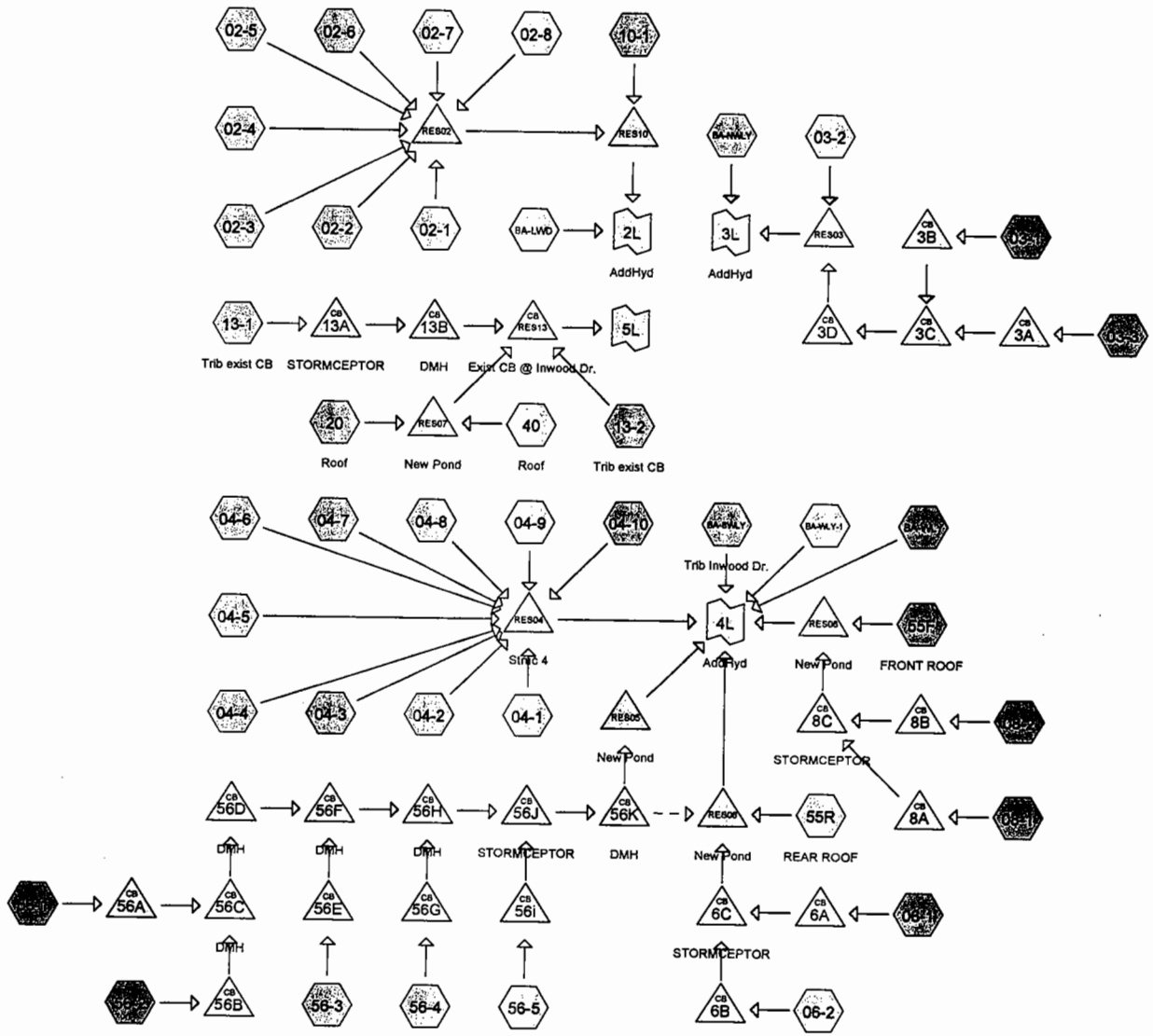
Link 4L: AddHyd

Inflow=19.64 cfs 167,071 cf
Primary=19.64 cfs 167,071 cf

Link 5L:

Inflow=6.05 cfs 27,072 cf
Primary=6.05 cfs 27,072 cf

Total Runoff Area = 1,539,286 sf Runoff Volume = 478,028 cf Average Runoff Depth = 3.73"
99.69% Pervious = 1,534,481 sf 0.31% Impervious = 4,805 sf



Subcat Reach Pond Link

Routing Diagram for JOHNSON WOODS PHASE 2 PROPOSED
Prepared by Microsoft, Printed 10/6/2011
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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	3A	83.70	83.55	15.0	0.0100	0.012	12.0	0.0	0.0
2	3B	83.70	83.55	4.0	0.0375	0.012	12.0	0.0	0.0
3	3C	83.05	80.50	62.0	0.0411	0.012	18.0	0.0	0.0
4	3D	80.50	79.51	24.0	0.0412	0.012	18.0	0.0	0.0
5	6A	86.08	85.97	11.0	0.0100	0.012	12.0	0.0	0.0
6	6B	86.08	85.97	11.0	0.0100	0.012	12.0	0.0	0.0
7	6C	85.72	85.50	14.0	0.0157	0.012	12.0	0.0	0.0
8	8A	99.10	96.17	44.0	0.0666	0.012	12.0	0.0	0.0
9	8B	96.35	96.17	16.0	0.0112	0.012	12.0	0.0	0.0
10	8C	95.92	94.50	155.0	0.0092	0.012	12.0	0.0	0.0
11	13A	109.83	109.42	41.0	0.0100	0.012	8.0	0.0	0.0
12	13B	109.32	109.00	42.0	0.0076	0.012	8.0	0.0	0.0
13	56A	114.85	114.66	18.6	0.0102	0.012	12.0	0.0	0.0
14	56B	114.85	114.66	6.0	0.0317	0.012	12.0	0.0	0.0
15	56C	114.66	113.41	125.0	0.0100	0.012	12.0	0.0	0.0
16	56D	113.41	112.85	56.0	0.0100	0.012	12.0	0.0	0.0
17	56E	115.72	115.56	16.0	0.0100	0.012	12.0	0.0	0.0
18	56F	112.60	110.73	187.0	0.0100	0.012	15.0	0.0	0.0
19	56G	112.46	112.27	11.0	0.0173	0.012	12.0	0.0	0.0
20	56H	110.73	105.00	79.0	0.0725	0.012	15.0	0.0	0.0
21	56i	105.68	105.00	10.0	0.0680	0.012	12.0	0.0	0.0
22	56J	104.75	95.35	113.0	0.0832	0.012	18.0	0.0	0.0
23	56K	95.35	94.70	65.0	0.0100	0.012	12.0	0.0	0.0
24	56K	95.35	88.13	93.0	0.0776	0.012	10.0	0.0	0.0
25	RES05	94.50	94.50	10.0	0.0000	0.012	18.0	0.0	0.0
26	RES06	86.50	86.25	7.0	0.0357	0.012	18.0	0.0	0.0
27	RES07	98.31	98.31	31.0	0.0000	0.012	18.0	0.0	0.0
28	RES08	96.20	94.00	106.0	0.0208	0.012	12.0	0.0	0.0
29	RES13	93.81	93.47	53.6	0.0063	0.012	18.0	0.0	0.0

Time span=0.00-50.00 hrs, dt=0.05 hrs, 1001 points x 2
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment02-1: Runoff Area=68,500 sf 37.47% Impervious Runoff Depth=1.26"
Flow Length=650' Tc=10.5 min CN=79 Runoff=1.64 cfs 7,204 cf

Subcatchment02-2: Runoff Area=20,902 sf 53.36% Impervious Runoff Depth=1.67"
Flow Length=366' Tc=6.0 min CN=85 Runoff=0.66 cfs 2,913 cf

Subcatchment02-3: Runoff Area=34,235 sf 53.74% Impervious Runoff Depth=1.83"
Flow Length=451' Tc=8.1 min CN=87 Runoff=1.14 cfs 5,211 cf

Subcatchment02-4: Runoff Area=110,031 sf 27.37% Impervious Runoff Depth=1.33"
Flow Length=386' Tc=6.3 min CN=80 Runoff=2.83 cfs 12,154 cf

Subcatchment02-5: Runoff Area=7,828 sf 72.37% Impervious Runoff Depth=2.16"
Flow Length=292' Tc=6.0 min CN=91 Runoff=0.30 cfs 1,412 cf

Subcatchment02-6: Runoff Area=18,018 sf 60.52% Impervious Runoff Depth=1.99"
Flow Length=211' Tc=7.1 min CN=89 Runoff=0.65 cfs 2,989 cf

Subcatchment02-7: Runoff Area=24,116 sf 62.78% Impervious Runoff Depth=1.99"
Flow Length=205' Tc=6.0 min CN=89 Runoff=0.88 cfs 4,000 cf

Subcatchment02-8: Runoff Area=22,600 sf 56.42% Impervious Runoff Depth=1.91"
Flow Length=315' Tc=6.0 min CN=88 Runoff=0.80 cfs 3,592 cf

Subcatchment03-1: Runoff Area=74,751 sf 41.70% Impervious Runoff Depth=1.03"
Flow Length=642' Tc=6.3 min CN=75 Runoff=1.51 cfs 6,396 cf

Subcatchment03-2: Runoff Area=21,836 sf 34.92% Impervious Runoff Depth=0.59"
Flow Length=81' Tc=6.8 min CN=66 Runoff=0.25 cfs 1,079 cf

Subcatchment03-3: Runoff Area=32,306 sf 61.14% Impervious Runoff Depth=1.08"
Flow Length=250' Tc=6.0 min CN=76 Runoff=0.69 cfs 2,916 cf

Subcatchment04-1: Runoff Area=22,302 sf 60.82% Impervious Runoff Depth=1.99"
Tc=6.0 min CN=89 Runoff=0.81 cfs 3,699 cf

Subcatchment04-10: Runoff Area=66,564 sf 32.20% Impervious Runoff Depth=0.64"
Tc=6.0 min CN=67 Runoff=0.82 cfs 3,524 cf

Subcatchment04-2: Runoff Area=11,580 sf 56.49% Impervious Runoff Depth=1.91"
Tc=6.2 min CN=88 Runoff=0.41 cfs 1,841 cf

Subcatchment04-3: Runoff Area=15,740 sf 68.94% Impervious Runoff Depth=2.16"
Tc=11.2 min CN=91 Runoff=0.59 cfs 2,839 cf

Subcatchment04-4: Runoff Area=16,784 sf 51.44% Impervious Runoff Depth=1.75"
Tc=6.3 min CN=86 Runoff=0.55 cfs 2,446 cf

Subcatchment04-5: Runoff Area=76,990 sf 41.07% Impervious Runoff Depth=1.53"
Tc=10.6 min CN=83 Runoff=2.19 cfs 9,800 cf

Subcatchment04-6: Runoff Area=22,782 sf 65.02% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=90 Runoff=0.86 cfs 3,942 cf

Subcatchment04-7: Runoff Area=10,479 sf 61.34% Impervious Runoff Depth=1.99"
Tc=10.6 min CN=89 Runoff=0.37 cfs 1,738 cf

Subcatchment04-8: Runoff Area=35,971 sf 43.02% Impervious Runoff Depth=1.26"
Tc=6.0 min CN=79 Runoff=0.89 cfs 3,783 cf

Subcatchment04-9: Runoff Area=14,267 sf 79.15% Impervious Runoff Depth=2.16"
Tc=6.0 min CN=91 Runoff=0.55 cfs 2,573 cf

Subcatchment06-1: Runoff Area=13,688 sf 37.13% Impervious Runoff Depth=0.72"
Tc=6.0 min CN=69 Runoff=0.19 cfs 826 cf

Subcatchment06-2: Runoff Area=6,154 sf 62.63% Impervious Runoff Depth=1.60"
Tc=6.0 min CN=84 Runoff=0.19 cfs 820 cf

Subcatchment08-1: Runoff Area=14,699 sf 18.26% Impervious Runoff Depth=0.87"
Tc=6.0 min CN=72 Runoff=0.25 cfs 1,064 cf

Subcatchment08-2: Runoff Area=26,399 sf 70.82% Impervious Runoff Depth=1.99"
Tc=6.0 min CN=89 Runoff=0.96 cfs 4,379 cf

Subcatchment10-1: Runoff Area=172,344 sf 13.37% Impervious Runoff Depth=1.08"
Tc=9.7 min CN=76 Runoff=3.58 cfs 15,554 cf

Subcatchment13-1: Trib exist CB Runoff Area=5,717 sf 56.03% Impervious Runoff Depth=1.83"
Tc=6.0 min CN=87 Runoff=0.19 cfs 870 cf

Subcatchment13-2: Trib exist CB Runoff Area=16,205 sf 6.26% Impervious Runoff Depth=0.31"
Flow Length=146' Tc=6.0 min CN=58 Runoff=0.08 cfs 414 cf

Subcatchment20: Roof Runoff Area=18,172 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.80 cfs 4,343 cf

Subcatchment40: Roof Runoff Area=20,047 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.88 cfs 4,791 cf

Subcatchment55F: FRONT ROOF Runoff Area=8,459 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.37 cfs 2,022 cf

Subcatchment55R: REAR ROOF Runoff Area=9,706 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.43 cfs 2,320 cf

Subcatchment56-1: Runoff Area=20,755 sf 64.45% Impervious Runoff Depth=1.99"
Tc=6.0 min CN=89 Runoff=0.76 cfs 3,443 cf

Subcatchment56-2: Runoff Area=15,499 sf 38.31% Impervious Runoff Depth=1.53"
Tc=6.0 min CN=83 Runoff=0.45 cfs 1,973 cf

Subcatchment56-3: Runoff Area=20,741 sf 59.18% Impervious Runoff Depth=1.91"
Tc=6.0 min CN=88 Runoff=0.73 cfs 3,297 cf

Subcatchment56-4: Runoff Area=26,305 sf 30.84% Impervious Runoff Depth=1.39"
Flow Length=284' Tc=9.3 min CN=81 Runoff=0.70 cfs 3,049 cf

Subcatchment56-5: Runoff Area=29,273 sf 66.13% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=90 Runoff=1.10 cfs 5,065 cf

SubcatchmentBA-LWD: Runoff Area=70,905 sf 13.17% Impervious Runoff Depth=1.14"
Flow Length=300' Tc=6.0 min CN=77 Runoff=1.59 cfs 6,741 cf

SubcatchmentBA-NWLY: Runoff Area=74,137 sf 8.07% Impervious Runoff Depth=0.37"
Flow Length=163' Tc=6.0 min CN=60 Runoff=0.48 cfs 2,286 cf

SubcatchmentBA-SWLY: Trib Inwood Dr. Runoff Area=17,449 sf 14.49% Impervious Runoff Depth=0.59"
Flow Length=110' Tc=6.1 min CN=66 Runoff=0.20 cfs 863 cf

SubcatchmentBA-WLY: Runoff Area=187,173 sf 4.79% Impervious Runoff Depth=0.01"
Flow Length=405' Tc=8.8 min CN=43 Runoff=0.01 cfs 229 cf

SubcatchmentBA-WLY-1: Runoff Area=33,391 sf 66.78% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=90 Runoff=1.25 cfs 5,777 cf

Pond 3A: Peak Elev=84.16' Inflow=0.69 cfs 2,916 cf
12.0" Round Culvert n=0.012 L=15.0' S=0.0100 '/' Outflow=0.69 cfs 2,916 cf

Pond 3B: Peak Elev=84.40' Inflow=1.51 cfs 6,396 cf
12.0" Round Culvert n=0.012 L=4.0' S=0.0375 '/' Outflow=1.51 cfs 6,396 cf

Pond 3C: Peak Elev=83.73' Inflow=2.20 cfs 9,312 cf
18.0" Round Culvert n=0.012 L=62.0' S=0.0411 '/' Outflow=2.20 cfs 9,312 cf

Pond 3D: Peak Elev=81.18' Inflow=2.20 cfs 9,312 cf
18.0" Round Culvert n=0.012 L=24.0' S=0.0412 '/' Outflow=2.20 cfs 9,312 cf

Pond 6A: Peak Elev=86.31' Inflow=0.19 cfs 826 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0100 '/' Outflow=0.19 cfs 826 cf

Pond 6B: Peak Elev=86.31' Inflow=0.19 cfs 820 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0100 '/' Outflow=0.19 cfs 820 cf

Pond 6C: STORMCEPTOR Peak Elev=86.03' Inflow=0.38 cfs 1,646 cf
12.0" Round Culvert n=0.012 L=14.0' S=0.0157 '/' Outflow=0.38 cfs 1,646 cf

Pond 8A: Peak Elev=99.35' Inflow=0.25 cfs 1,064 cf
12.0" Round Culvert n=0.012 L=44.0' S=0.0666 '/' Outflow=0.25 cfs 1,064 cf

Pond 8B: Peak Elev=96.90' Inflow=0.96 cfs 4,379 cf
12.0" Round Culvert n=0.012 L=16.0' S=0.0112 '/' Outflow=0.96 cfs 4,379 cf

Pond 8C: STORMCEPTOR Peak Elev=96.69' Inflow=1.21 cfs 5,442 cf
12.0" Round Culvert n=0.012 L=155.0' S=0.0092 '/' Outflow=1.21 cfs 5,442 cf

Pond 13A: STORMCEPTOR Peak Elev=110.08' Inflow=0.19 cfs 870 cf
8.0" Round Culvert n=0.012 L=41.0' S=0.0100 '/' Outflow=0.19 cfs 870 cf

Pond 13B: DMH Peak Elev=109.58' Inflow=0.19 cfs 870 cf
8.0" Round Culvert n=0.012 L=42.0' S=0.0076 '/' Outflow=0.19 cfs 870 cf

Pond 56A: Peak Elev=115.42' Inflow=0.76 cfs 3,443 cf
12.0" Round Culvert n=0.012 L=18.6' S=0.0102 '/' Outflow=0.76 cfs 3,443 cf

Pond 56B: Peak Elev=115.32' Inflow=0.45 cfs 1,973 cf
12.0" Round Culvert n=0.012 L=6.0' S=0.0317 '/' Outflow=0.45 cfs 1,973 cf

Pond 56C: DMH Peak Elev=115.24' Inflow=1.21 cfs 5,416 cf
12.0" Round Culvert n=0.012 L=125.0' S=0.0100 '/' Outflow=1.21 cfs 5,416 cf

Pond 56D: DMH Peak Elev=113.99' Inflow=1.21 cfs 5,416 cf
12.0" Round Culvert n=0.012 L=56.0' S=0.0100 '/' Outflow=1.21 cfs 5,416 cf

Pond 56E: Peak Elev=116.19' Inflow=0.73 cfs 3,297 cf
12.0" Round Culvert n=0.012 L=16.0' S=0.0100 '/' Outflow=0.73 cfs 3,297 cf

Pond 56F: DMH Peak Elev=113.29' Inflow=1.94 cfs 8,712 cf
15.0" Round Culvert n=0.012 L=187.0' S=0.0100 '/' Outflow=1.94 cfs 8,712 cf

Pond 56G: Peak Elev=112.89' Inflow=0.70 cfs 3,049 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0173 '/' Outflow=0.70 cfs 3,049 cf

Pond 56H: DMH Peak Elev=111.55' Inflow=2.62 cfs 11,761 cf
15.0" Round Culvert n=0.012 L=79.0' S=0.0725 '/' Outflow=2.62 cfs 11,761 cf

Pond 56i: Peak Elev=106.22' Inflow=1.10 cfs 5,065 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0680 '/' Outflow=1.10 cfs 5,065 cf

Pond 56J: STORMCEPTOR Peak Elev=105.67' Inflow=3.71 cfs 16,826 cf
18.0" Round Culvert n=0.012 L=113.0' S=0.0832 '/' Outflow=3.71 cfs 16,826 cf

Pond 56K: DMH Peak Elev=96.15' Inflow=3.71 cfs 16,826 cf
Primary=2.07 cfs 8,971 cf Secondary=1.65 cfs 7,855 cf Outflow=3.71 cfs 16,826 cf

Pond RES02: Peak Elev=89.64' Storage=10,557 cf Inflow=8.83 cfs 39,476 cf
Discarded=1.31 cfs 31,194 cf Primary=2.65 cfs 8,282 cf Outflow=3.97 cfs 39,476 cf

Pond RES03: Peak Elev=80.34' Storage=6,515 cf Inflow=2.44 cfs 10,391 cf
Outflow=0.14 cfs 6,404 cf

Pond RES04: Struc 4 Peak Elev=86.06' Storage=25,666 cf Inflow=7.96 cfs 36,185 cf
Outflow=0.37 cfs 29,682 cf

Pond RES05: New Pond Peak Elev=93.63' Storage=1,421 cf Inflow=2.07 cfs 8,971 cf
Discarded=1.06 cfs 8,971 cf Primary=0.00 cfs 0 cf Outflow=1.06 cfs 8,971 cf

Pond RES06: New Pond Peak Elev=85.66' Storage=2,022 cf Inflow=2.46 cfs 11,820 cf
Discarded=1.13 cfs 11,820 cf Primary=0.00 cfs 0 cf Outflow=1.13 cfs 11,820 cf

Pond RES07: New Pond Peak Elev=98.31' Storage=2,382 cf Inflow=1.69 cfs 9,134 cf
Discarded=0.51 cfs 9,134 cf Primary=0.00 cfs 0 cf Outflow=0.51 cfs 9,134 cf

Pond RES08: New Pond Peak Elev=96.41' Storage=1,749 cf Inflow=1.59 cfs 7,464 cf
Discarded=0.51 cfs 7,332 cf Primary=0.18 cfs 132 cf Outflow=0.69 cfs 7,464 cf

Pond RES10: Peak Elev=80.05' Storage=0.115 af Inflow=5.86 cfs 23,835 cf
Outflow=5.17 cfs 23,835 cf

Pond RES13: Exist CB @ Inwood Dr. Peak Elev=94.05' Inflow=0.27 cfs 1,285 cf
18.0" Round Culvert n=0.012 L=53.6' S=0.0063 '/' Outflow=0.27 cfs 1,285 cf

Link 2L: AddHyd Inflow=5.75 cfs 30,576 cf
Primary=5.75 cfs 30,576 cf

Link 3L: AddHyd Inflow=0.48 cfs 8,690 cf
Primary=0.48 cfs 8,690 cf

Link 4L: AddHyd Inflow=1.64 cfs 36,683 cf
Primary=1.64 cfs 36,683 cf

Link 5L: Inflow=0.27 cfs 1,285 cf
Primary=0.27 cfs 1,285 cf

Total Runoff Area = 1,535,800 sf Runoff Volume = 156,176 cf Average Runoff Depth = 1.22"
64.11% Pervious = 984,663 sf 35.89% Impervious = 551,137 sf

Summary for Subcatchment 02-1:

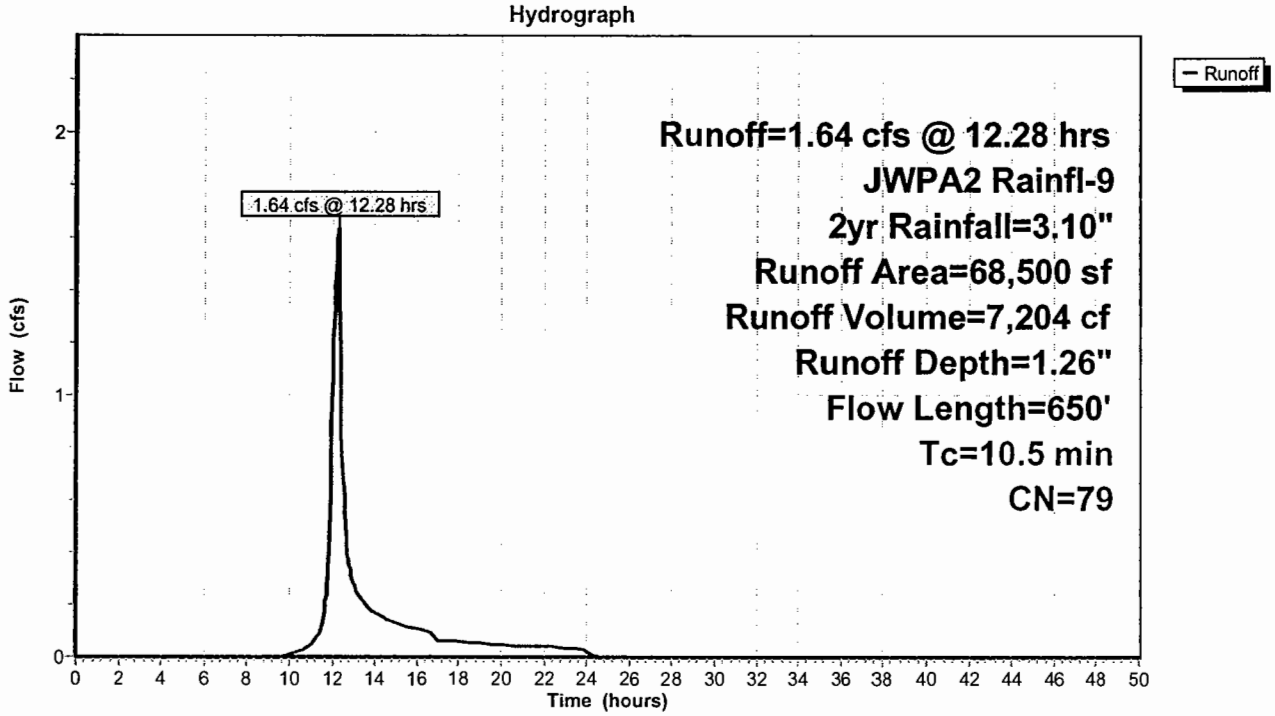
Runoff = 1.64 cfs @ 12.28 hrs, Volume= 7,204 cf, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
3,329	60	Woods, Fair, HSG B
3,329	55	Woods, Good, HSG B
1,939	73	Woods, Fair, HSG C
1,939	70	Woods, Good, HSG C
5,812	98	Paved parking, HSG B
19,857	98	Paved parking, HSG C
12,038	61	>75% Grass cover, Good, HSG B
20,257	74	>75% Grass cover, Good, HSG C
68,500	79	Weighted Average
42,831	68	62.53% Pervious Area
25,669	98	37.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
2.1	578	0.0800	4.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	22	0.0450	4.31		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.5	650	Total			

Subcatchment 02-1:



Summary for Subcatchment 02-2:

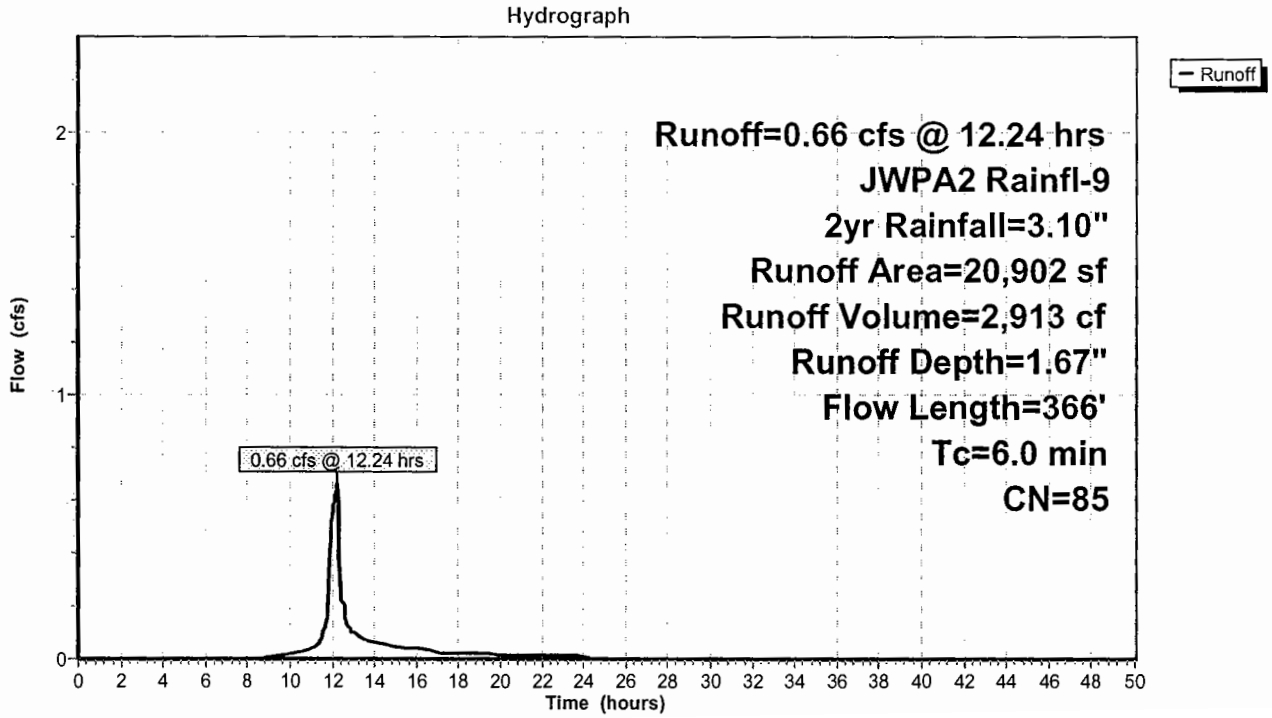
Runoff = 0.66 cfs @ 12.24 hrs, Volume= 2,913 cf, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
843	98	Paved parking, HSG B
10,311	98	Paved parking, HSG C
2,774	61	>75% Grass cover, Good, HSG B
6,974	74	>75% Grass cover, Good, HSG C
20,902	85	Weighted Average
9,748	70	46.64% Pervious Area
11,154	98	53.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	50	0.2000	0.25		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.1	33	0.1440	6.11		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	283	0.0620	5.05		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.3	366	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 02-2:



Summary for Subcatchment 02-3:

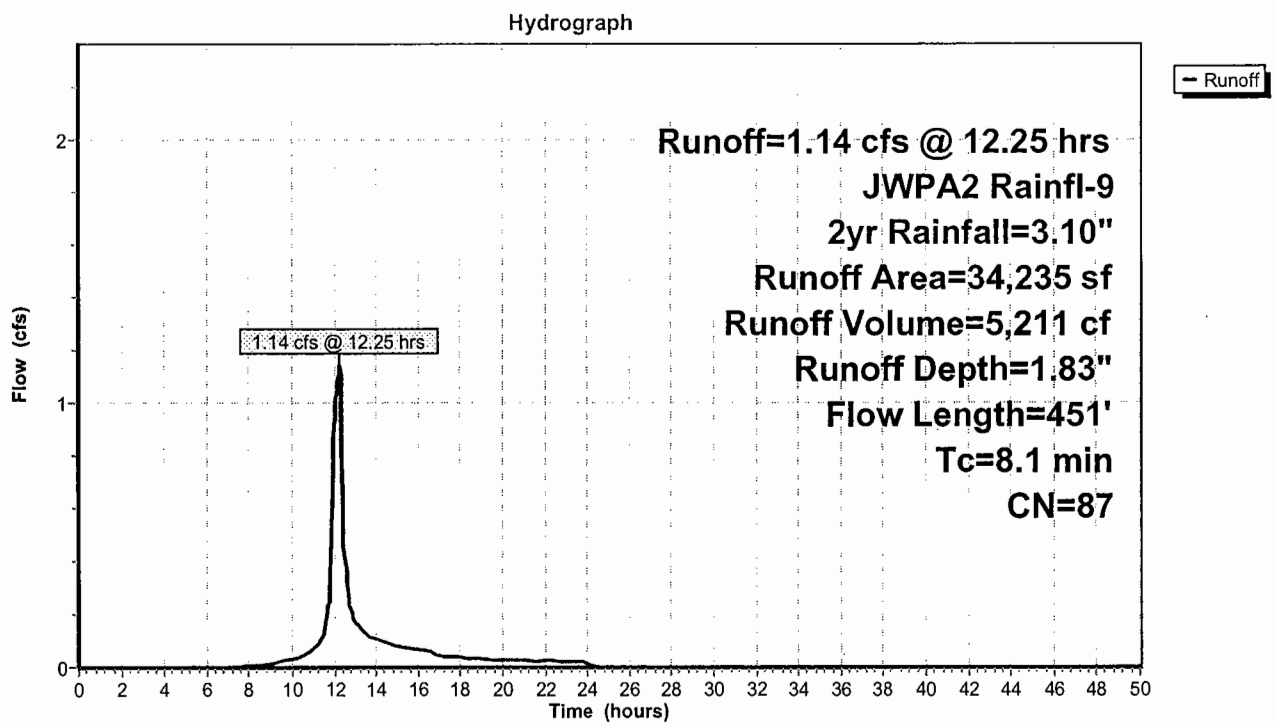
Runoff = 1.14 cfs @ 12.25 hrs, Volume= 5,211 cf, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
18,399	98	Paved parking, HSG C
12,212	74	>75% Grass cover, Good, HSG C
1,812	73	Woods, Fair, HSG C
1,812	72	Woods/grass comb., Good, HSG C
34,235	87	Weighted Average
15,836	74	46.26% Pervious Area
18,399	98	53.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
1.1	189	0.0310	2.83		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.7	212	0.0680	5.29		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.1	451	Total			

Subcatchment 02-3:



Summary for Subcatchment 02-4:

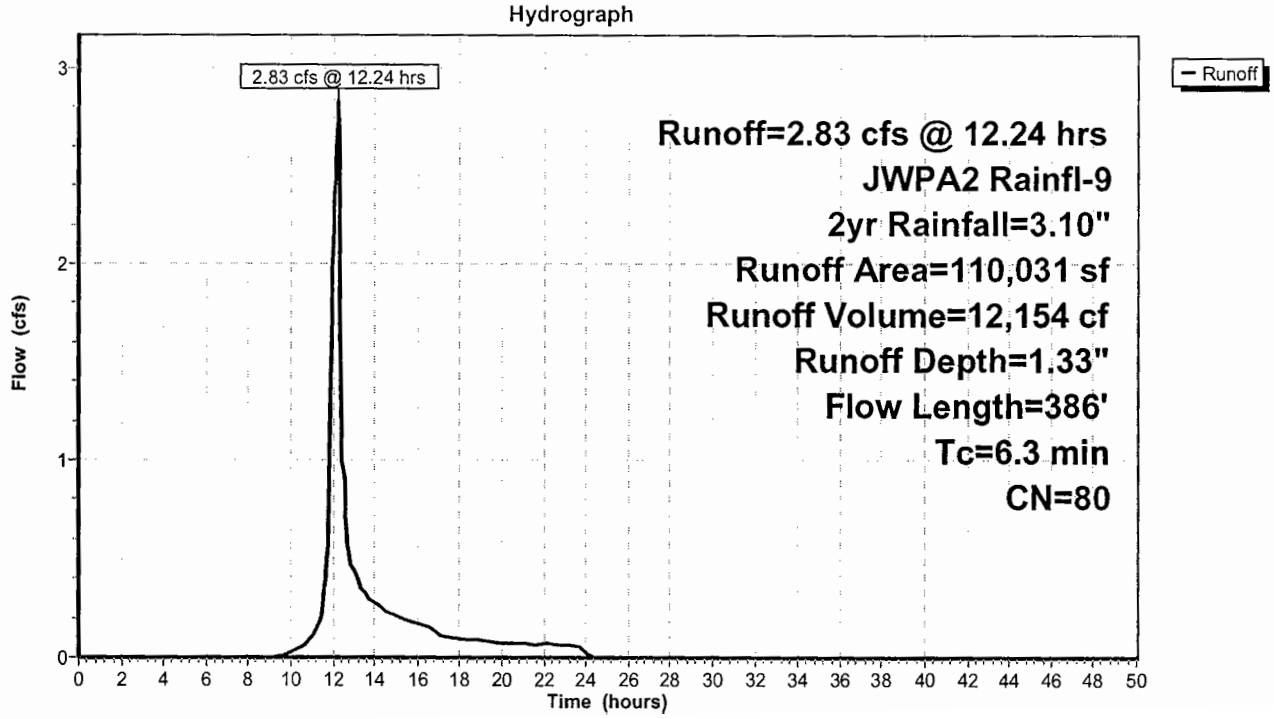
Runoff = 2.83 cfs @ 12.24 hrs, Volume= 12,154 cf, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	18,856	73	Woods, Fair, HSG C
	18,856	70	Woods, Good, HSG C
*	30,119	98	Paved parking, HSG C
	42,200	74	>75% Grass cover, Good, HSG C
	110,031	80	Weighted Average
	79,912	73	72.63% Pervious Area
	30,119	98	27.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.2000	0.17		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.9	254	0.0800	4.55		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	82	0.0240	3.14		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.3	386	Total			

Subcatchment 02-4:



Summary for Subcatchment 02-5:

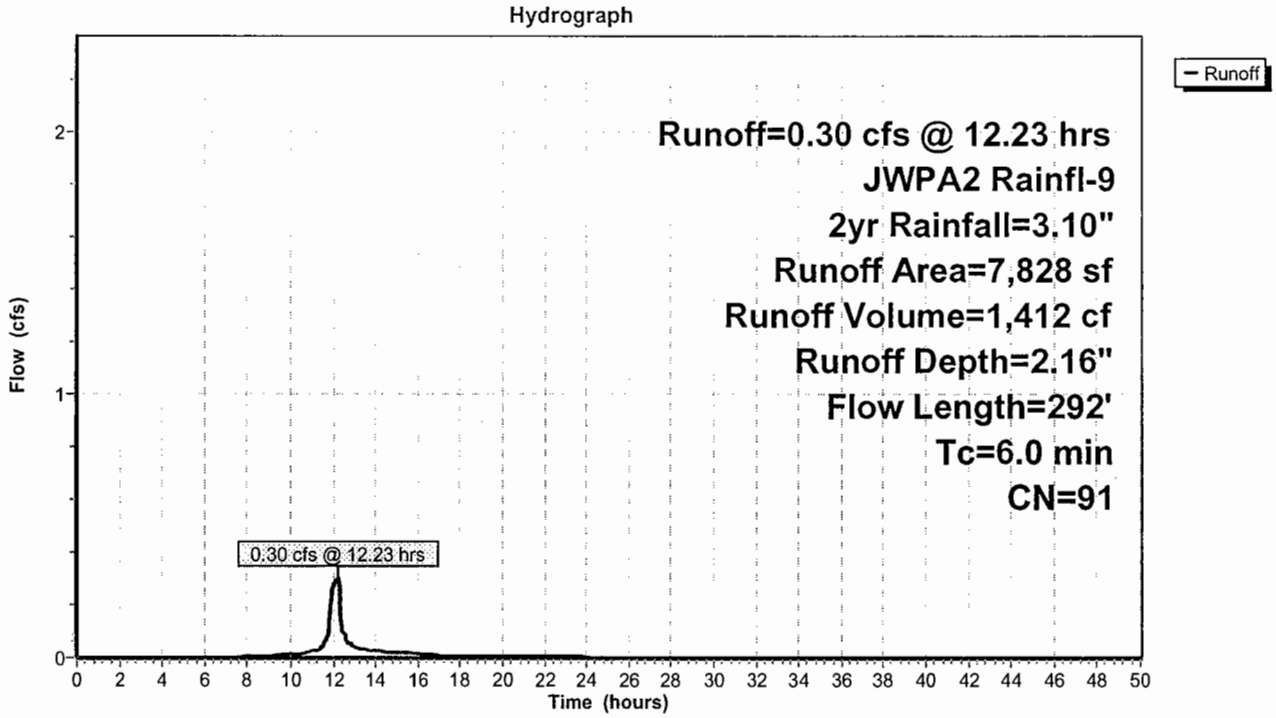
Runoff = 0.30 cfs @ 12.23 hrs, Volume= 1,412 cf, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
5,665	98	Paved parking, HSG C
2,163	74	>75% Grass cover, Good, HSG C
7,828	91	Weighted Average
2,163	74	27.63% Pervious Area
5,665	98	72.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	50	0.0280	1.35		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
0.9	242	0.0540	4.72		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	292	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 02-5:



Summary for Subcatchment 02-6:

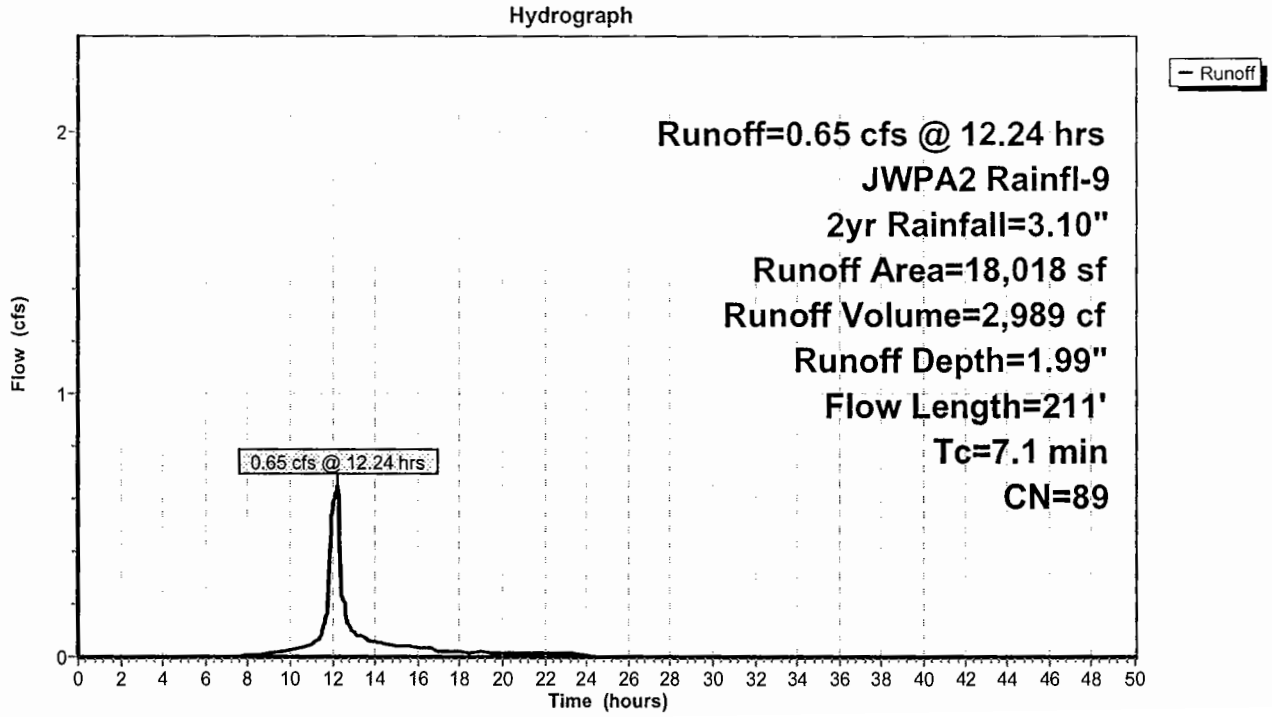
Runoff = 0.65 cfs @ 12.24 hrs, Volume= 2,989 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
10,905	98	Paved parking, HSG C
7,113	74	>75% Grass cover, Good, HSG C
18,018	89	Weighted Average
7,113	74	39.48% Pervious Area
10,905	98	60.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	62	0.0560	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.5	149	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
7.1	211	Total			

Subcatchment 02-6:



Summary for Subcatchment 02-7:

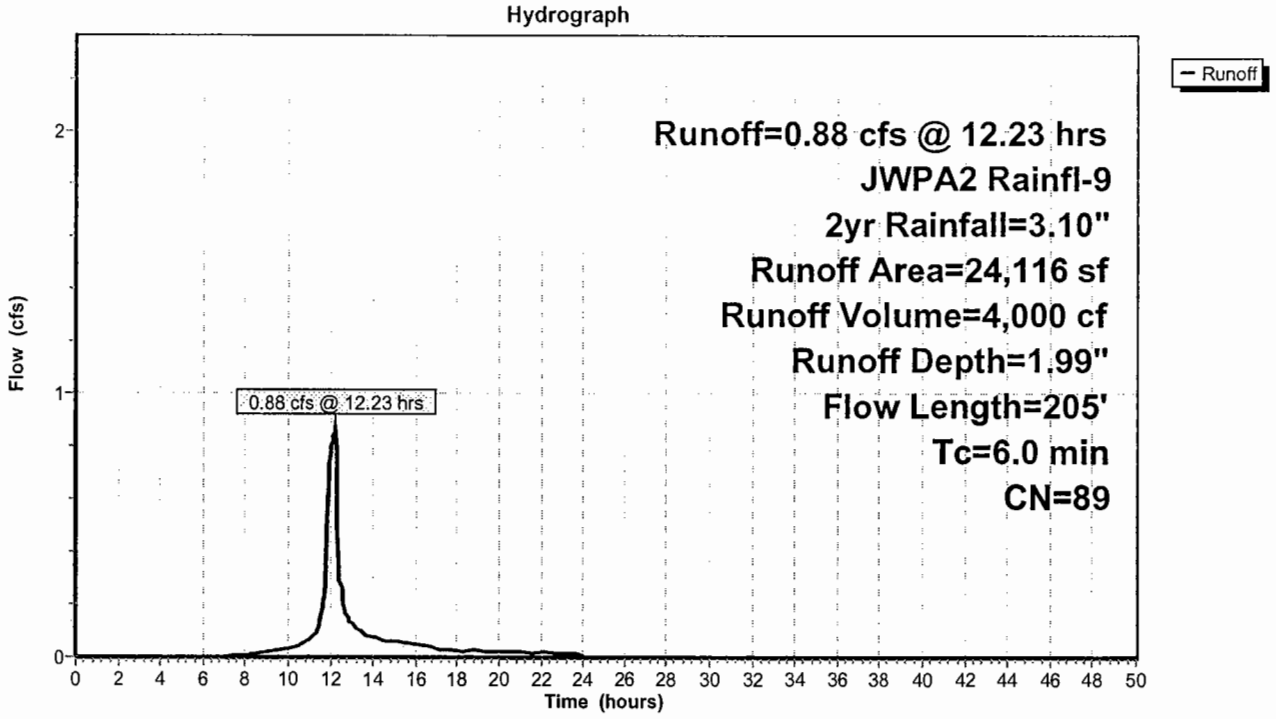
Runoff = 0.88 cfs @ 12.23 hrs, Volume= 4,000 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
15,141	98	Paved parking, HSG C
8,975	74	>75% Grass cover, Good, HSG C
24,116	89	Weighted Average
8,975	74	37.22% Pervious Area
15,141	98	62.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	40	0.0430	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.6	165	0.0460	4.35		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.7	205	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 02-7:



Summary for Subcatchment 02-8:

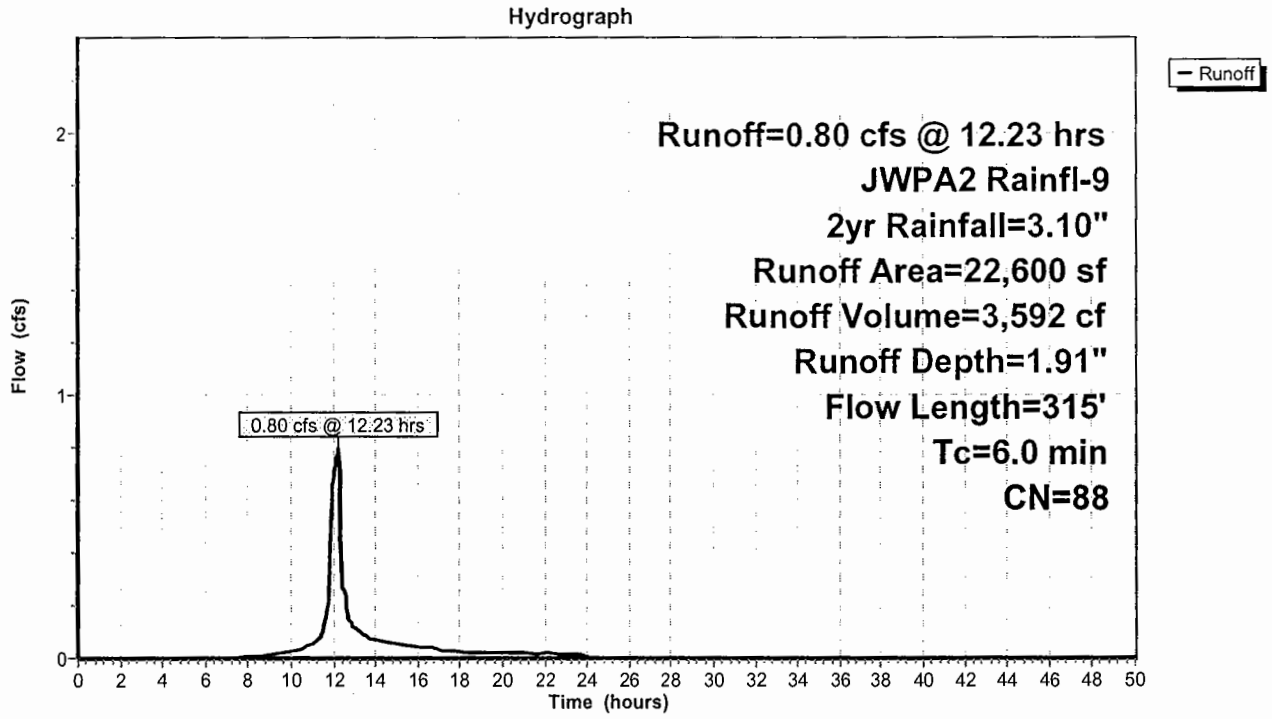
Runoff = 0.80 cfs @ 12.23 hrs, Volume= 3,592 cf, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
12,750	98	Paved parking, HSG C
9,850	74	>75% Grass cover, Good, HSG C
22,600	88	Weighted Average
9,850	74	43.58% Pervious Area
12,750	98	56.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	45	0.1500	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
1.3	270	0.0430	3.34		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
4.7	315	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 02-8:



Summary for Subcatchment 03-1:

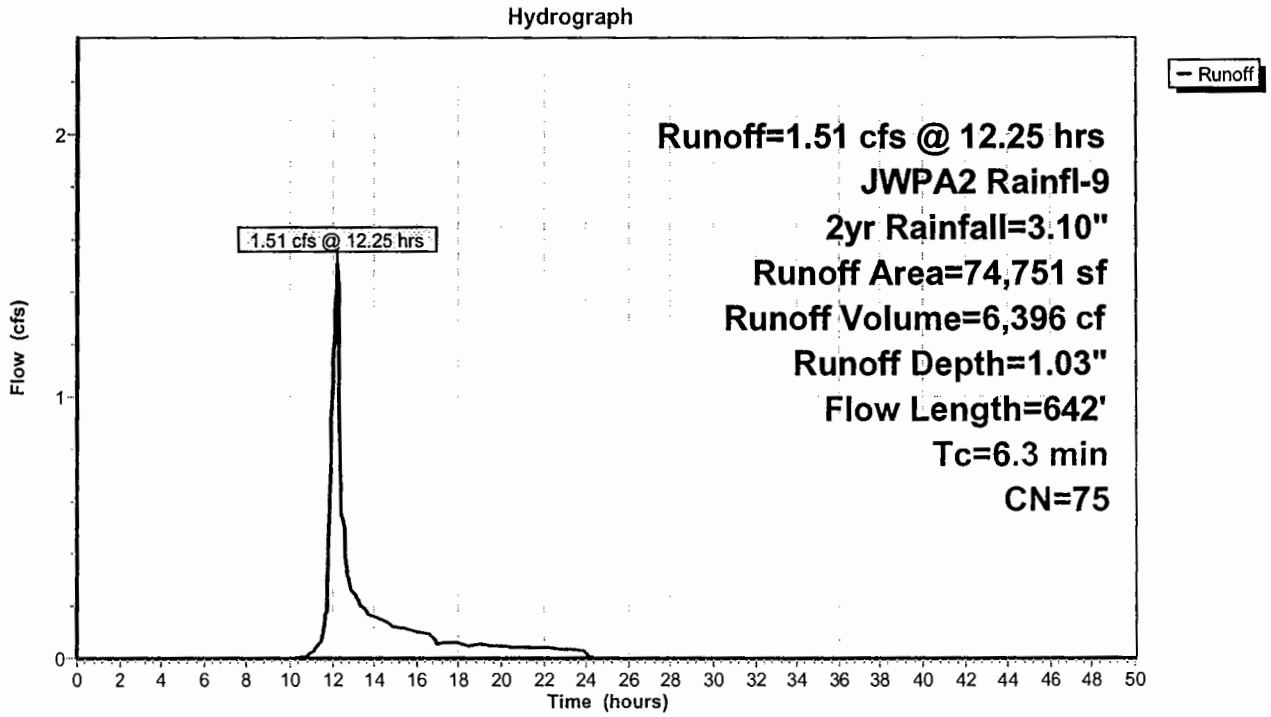
Runoff = 1.51 cfs @ 12.25 hrs, Volume= 6,396 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
11,033	98	Paved parking, HSG A
5,382	39	>75% Grass cover, Good, HSG A
18,028	98	Paved parking, HSG B
7,601	60	Woods, Fair, HSG B
7,601	55	Woods, Good, HSG B
16,657	61	>75% Grass cover, Good, HSG B
2,110	98	Paved parking, HSG C
1,597	73	Woods, Fair, HSG C
1,597	70	Woods, Good, HSG C
3,145	74	>75% Grass cover, Good, HSG C
74,751	75	Weighted Average
43,580	59	58.30% Pervious Area
31,171	98	41.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.1500	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
1.6	381	0.0600	3.94		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.0	211	0.0290	3.46		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.3	642	Total			

Subcatchment 03-1:



Summary for Subcatchment 03-2:

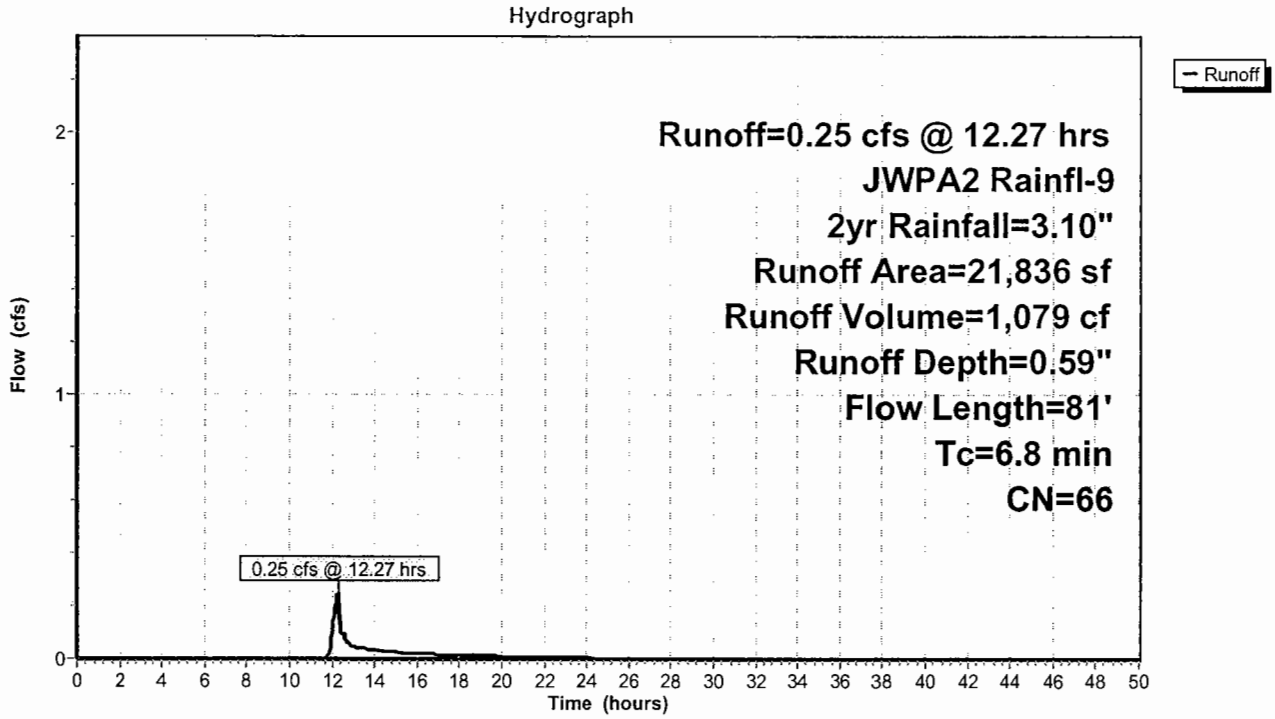
Runoff = 0.25 cfs @ 12.27 hrs, Volume= 1,079 cf, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
1,984	98	Paved parking, HSG A
5,641	98	Paved parking, HSG B
7,963	39	>75% Grass cover, Good, HSG A
6,248	61	>75% Grass cover, Good, HSG B
21,836	66	Weighted Average
14,211	49	65.08% Pervious Area
7,625	98	34.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	50	0.0340	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.1	31	0.0970	5.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.8	81	Total			

Subcatchment 03-2:



Summary for Subcatchment 03-3:

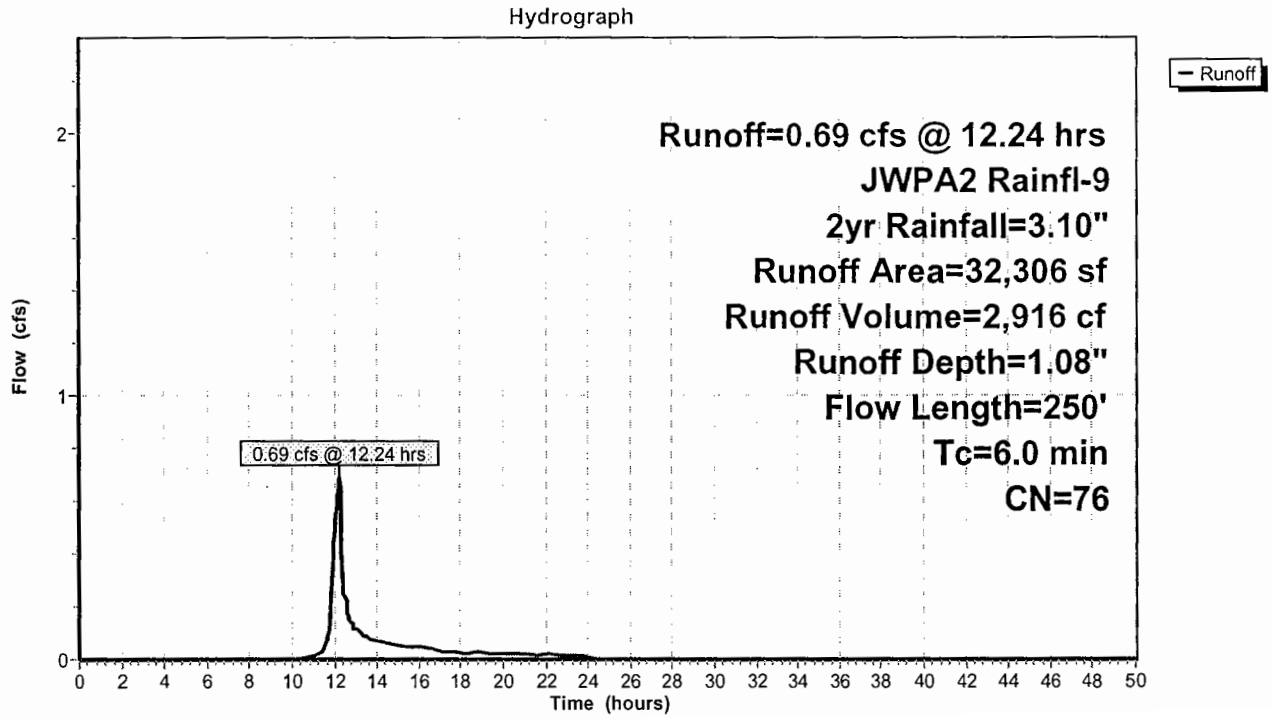
Runoff = 0.69 cfs @ 12.24 hrs, Volume= 2,916 cf, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
17,504	98	Paved parking, HSG A
11,122	39	>75% Grass cover, Good, HSG A
2,247	98	Paved parking, HSG B
1,433	61	>75% Grass cover, Good, HSG B
32,306	76	Weighted Average
12,555	42	38.86% Pervious Area
19,751	98	61.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0240	1.27		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.10"
1.3	200	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.0	250	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 03-3:



Summary for Subcatchment 04-1:

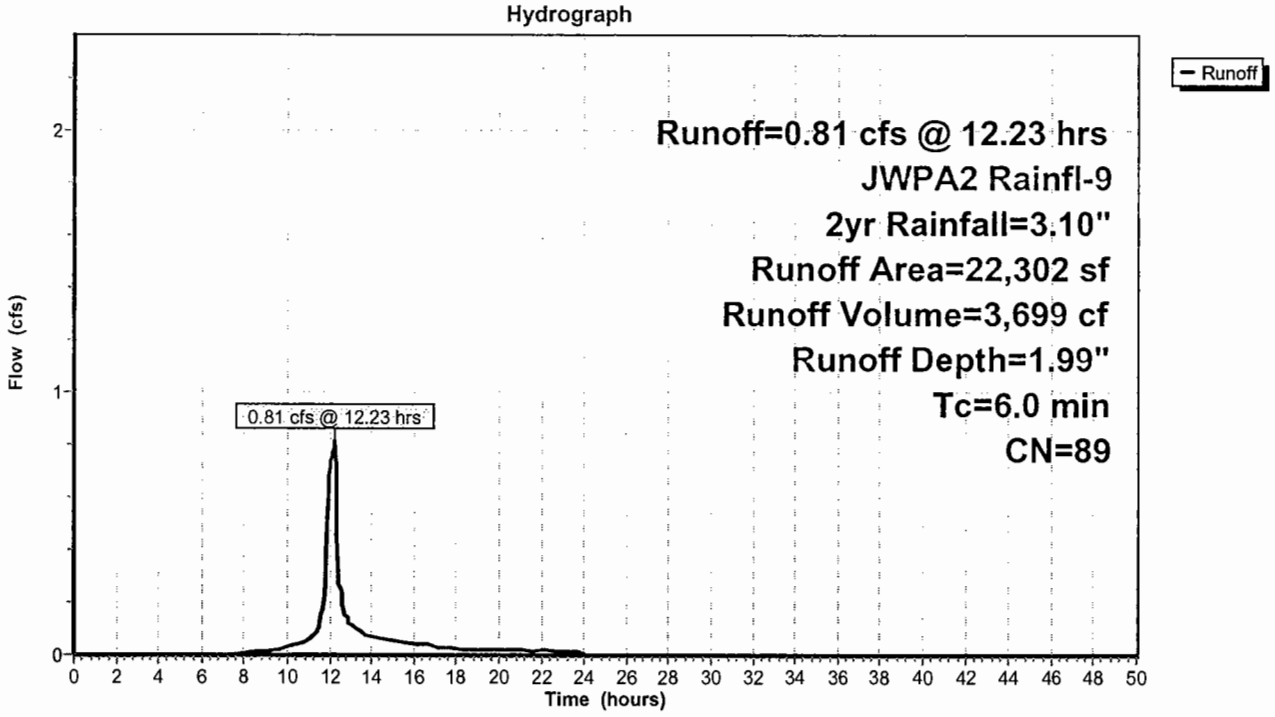
Runoff = 0.81 cfs @ 12.23 hrs, Volume= 3,699 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
13,563	98	Paved parking, HSG C
8,739	74	>75% Grass cover, Good, HSG C
22,302	89	Weighted Average
8,739	74	39.18% Pervious Area
13,563	98	60.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 04-1:



Summary for Subcatchment 04-10:

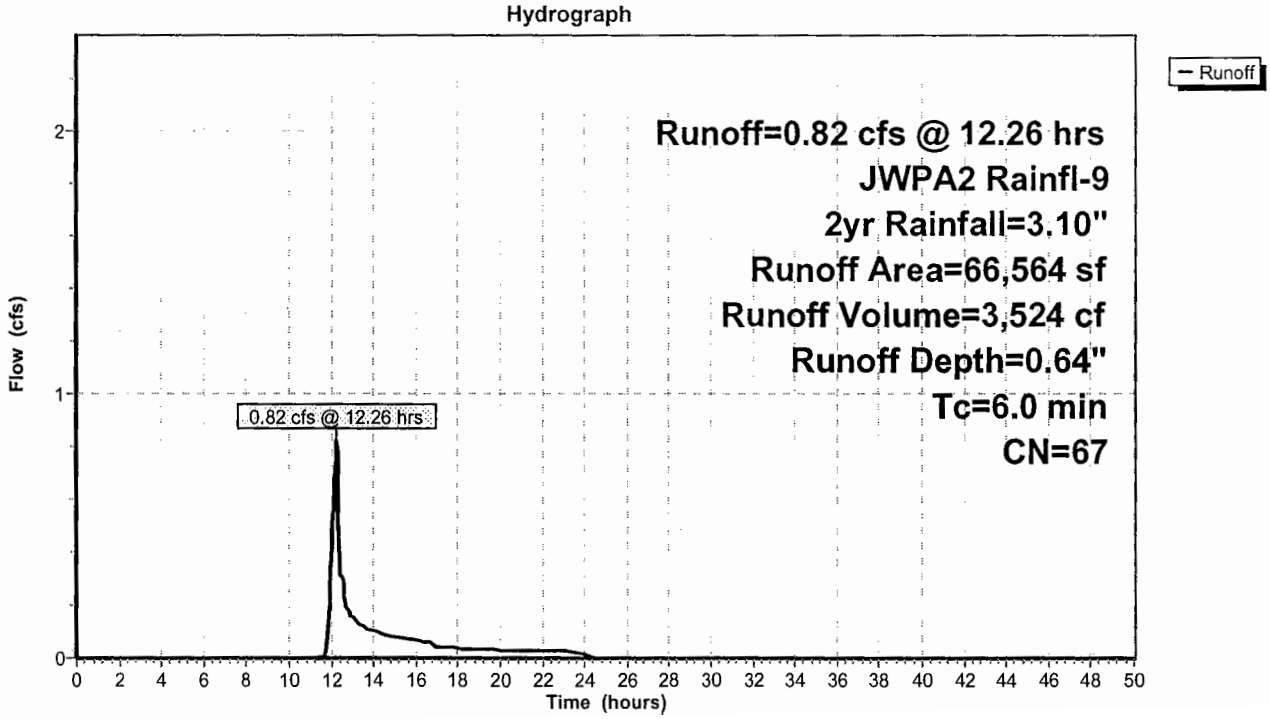
Runoff = 0.82 cfs @ 12.26 hrs, Volume= 3,524 cf, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
	9,183	98	Water Surface, HSG A
*	5,022	98	Paved parking, HSG A
	510	36	Woods, Fair, HSG A
	510	30	Woods, Good, HSG A
	20,411	39	>75% Grass cover, Good, HSG A
	7,119	98	Paved parking, HSG B
	3,676	60	Woods, Fair, HSG B
	3,676	55	Woods, Good, HSG B
	10,059	61	>75% Grass cover, Good, HSG B
	109	98	Paved parking, HSG C
	6,289	74	>75% Grass cover, Good, HSG C
	66,564	67	Weighted Average
	45,131	52	67.80% Pervious Area
	21,433	98	32.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment 04-10:



Summary for Subcatchment 04-2:

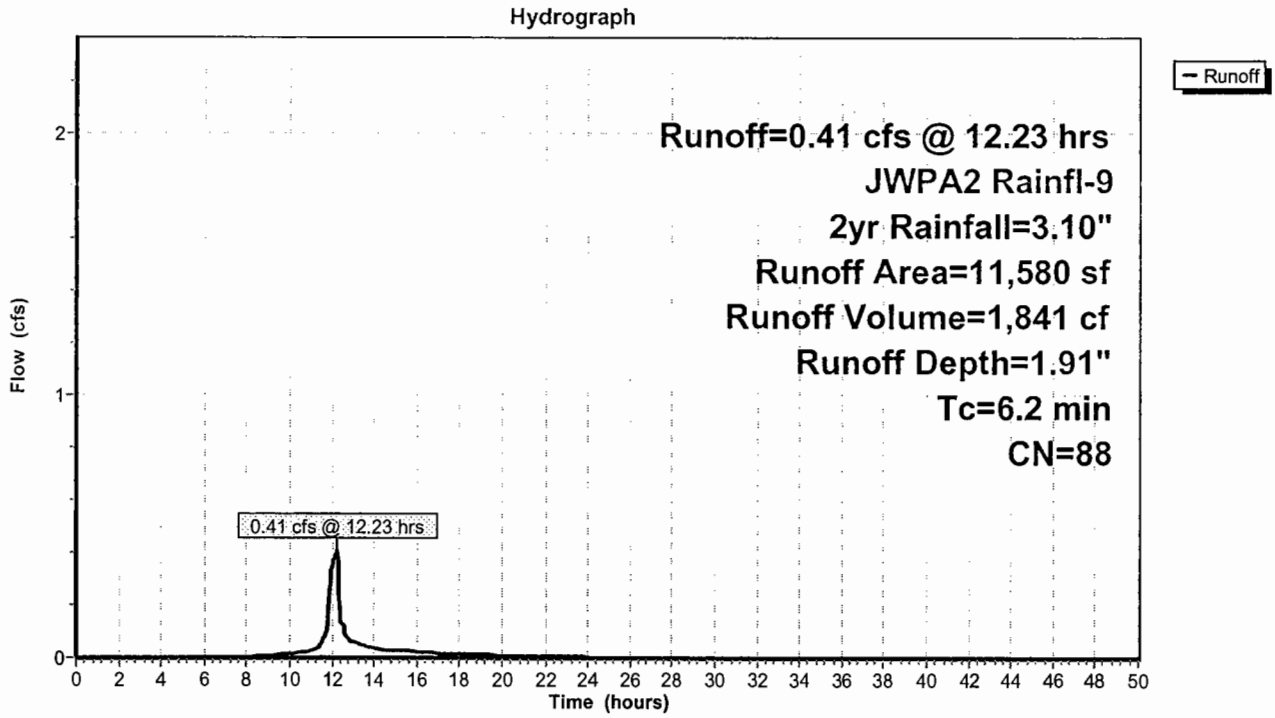
Runoff = 0.41 cfs @ 12.23 hrs, Volume= 1,841 cf, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
6,541	98	Paved parking, HSG C
5,039	74	>75% Grass cover, Good, HSG C
11,580	88	Weighted Average
5,039	74	43.51% Pervious Area
6,541	98	56.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2					**Direct Entry,**

Subcatchment 04-2:



Summary for Subcatchment 04-3:

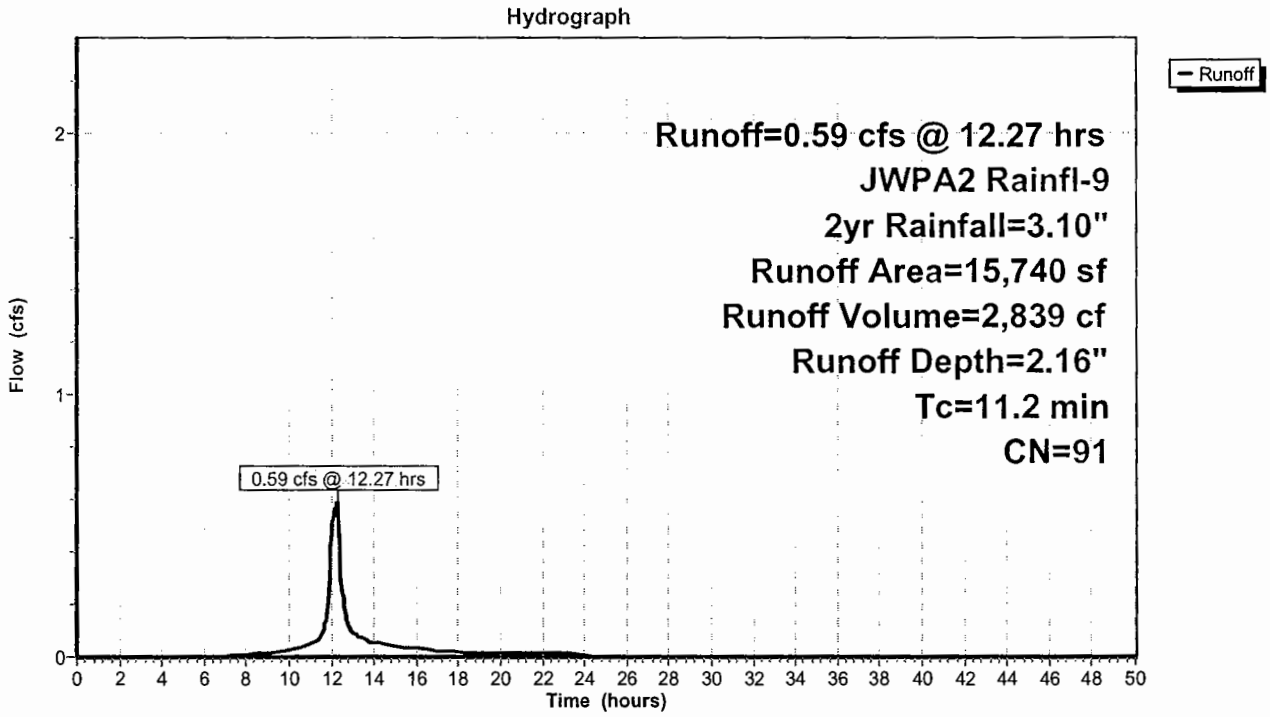
Runoff = 0.59 cfs @ 12.27 hrs, Volume= 2,839 cf, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
10,851	98	Paved parking, HSG C
4,889	74	>75% Grass cover, Good, HSG C
15,740	91	Weighted Average
4,889	74	31.06% Pervious Area
10,851	98	68.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2					**Direct Entry,**

Subcatchment 04-3:



Summary for Subcatchment 04-4:

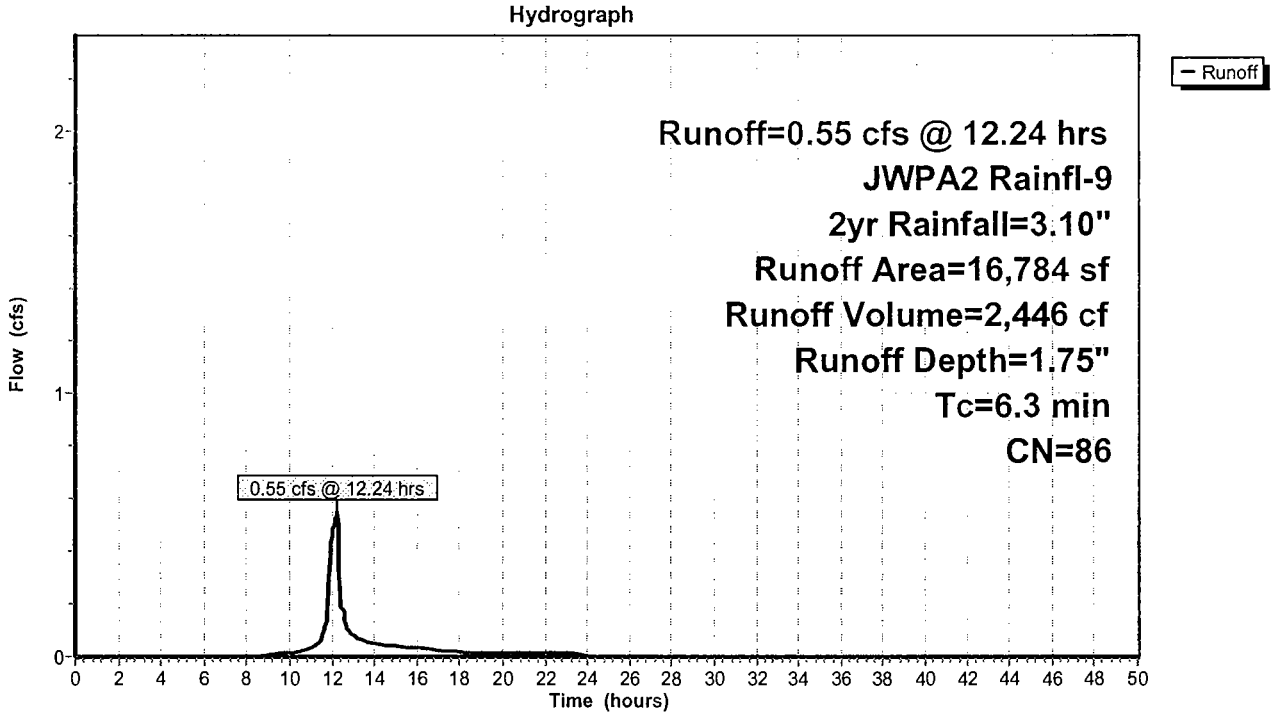
Runoff = 0.55 cfs @ 12.24 hrs, Volume= 2,446 cf, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
8,633	98	Paved parking, HSG C
1,229	73	Woods, Fair, HSG C
1,229	70	Woods, Good, HSG C
5,693	74	>75% Grass cover, Good, HSG C
16,784	86	Weighted Average
8,151	73	48.56% Pervious Area
8,633	98	51.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3					**Direct Entry,**

Subcatchment 04-4:



Summary for Subcatchment 04-5:

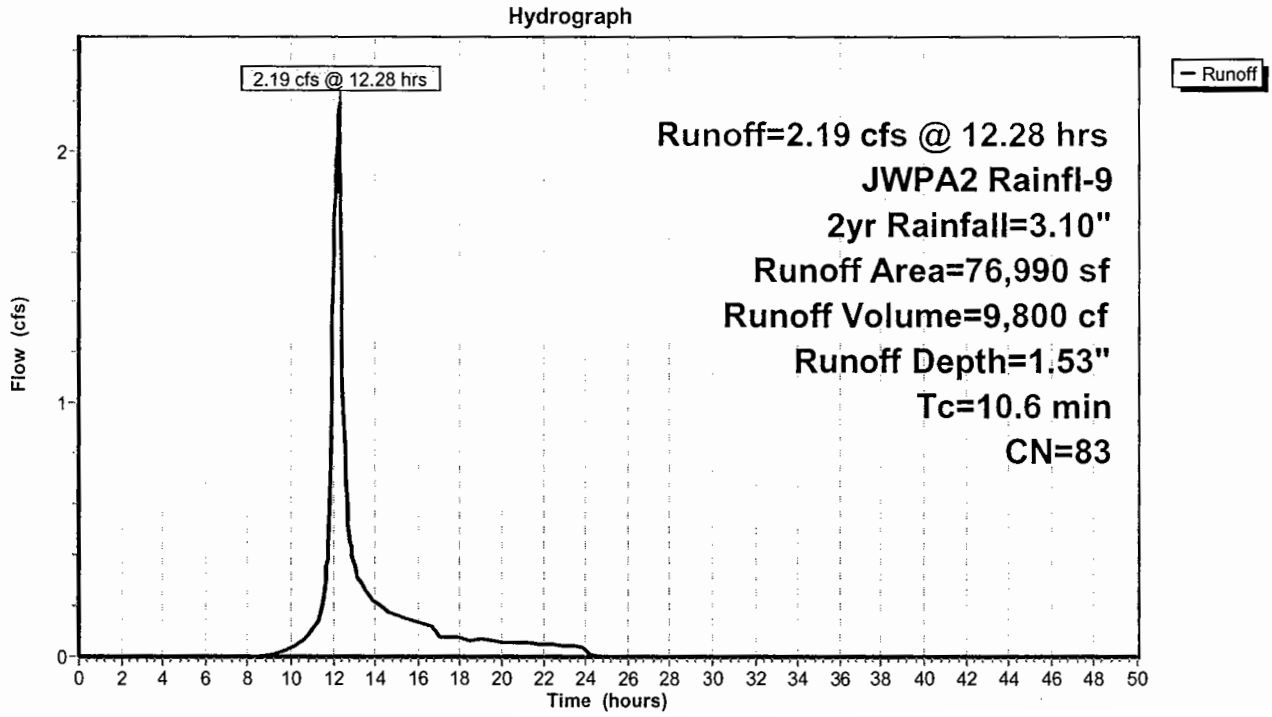
Runoff = 2.19 cfs @ 12.28 hrs, Volume= 9,800 cf, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
31,621	98	Paved parking, HSG C
6,074	73	Woods, Fair, HSG C
6,074	70	Woods, Good, HSG C
33,221	74	>75% Grass cover, Good, HSG C
76,990	83	Weighted Average
45,369	73	58.93% Pervious Area
31,621	98	41.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6					**Direct Entry,**

Subcatchment 04-5:



Summary for Subcatchment 04-6:

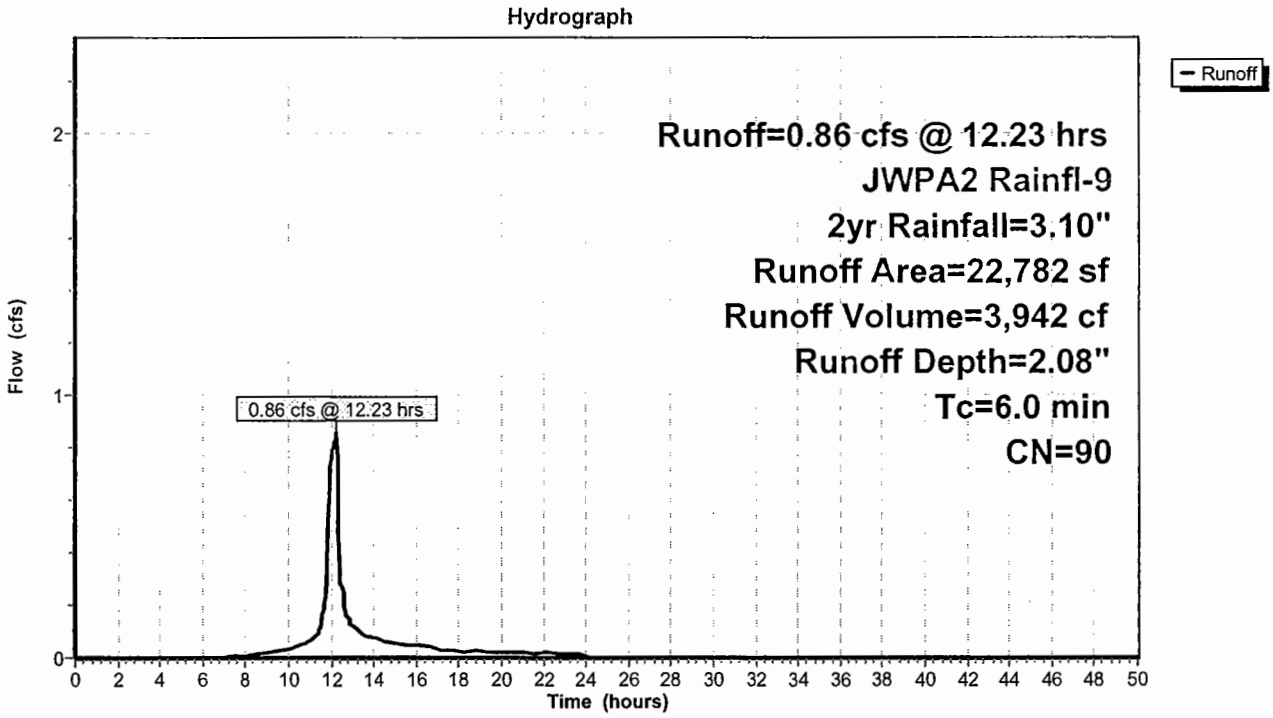
Runoff = 0.86 cfs @ 12.23 hrs, Volume= 3,942 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
14,812	98	Paved parking, HSG C
7,970	74	>75% Grass cover, Good, HSG C
22,782	90	Weighted Average
7,970	74	34.98% Pervious Area
14,812	98	65.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 04-6:



Summary for Subcatchment 04-7:

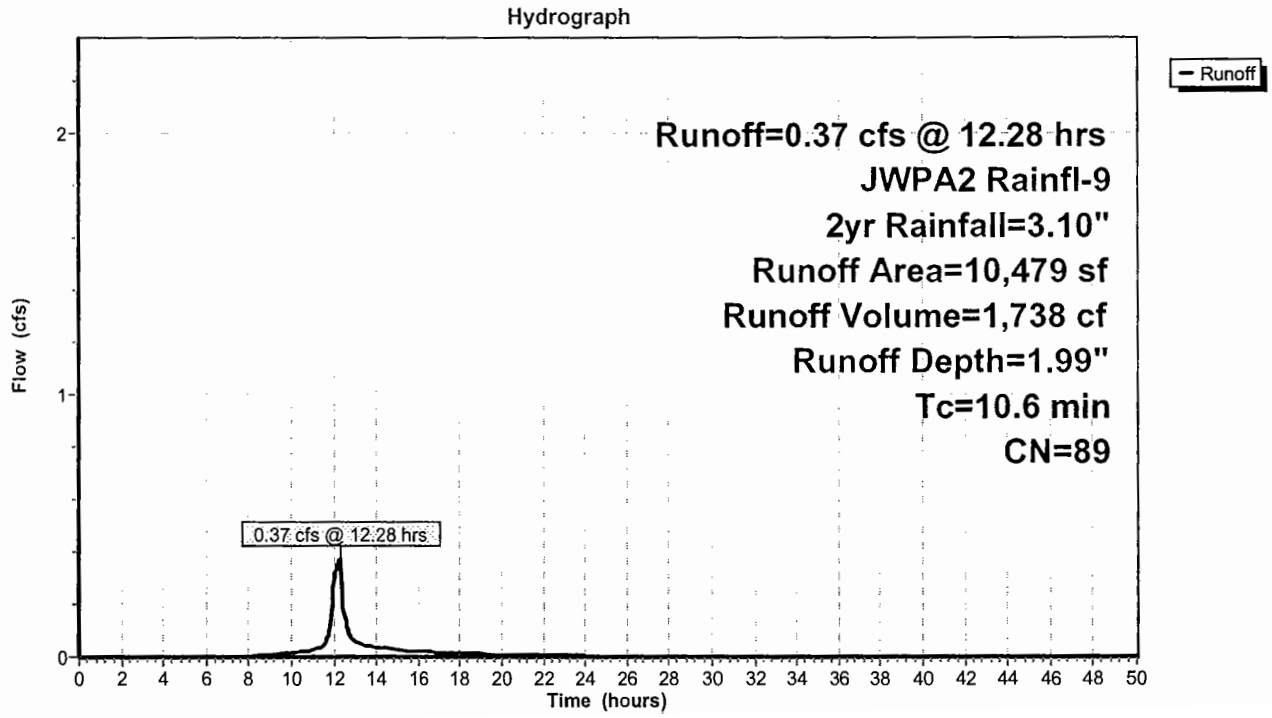
Runoff = 0.37 cfs @ 12.28 hrs, Volume= 1,738 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
6,428	98	Paved parking, HSG C
4,051	74	>75% Grass cover, Good, HSG C
10,479	89	Weighted Average
4,051	74	38.66% Pervious Area
6,428	98	61.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6					**Direct Entry,**

Subcatchment 04-7:



Summary for Subcatchment 04-8:

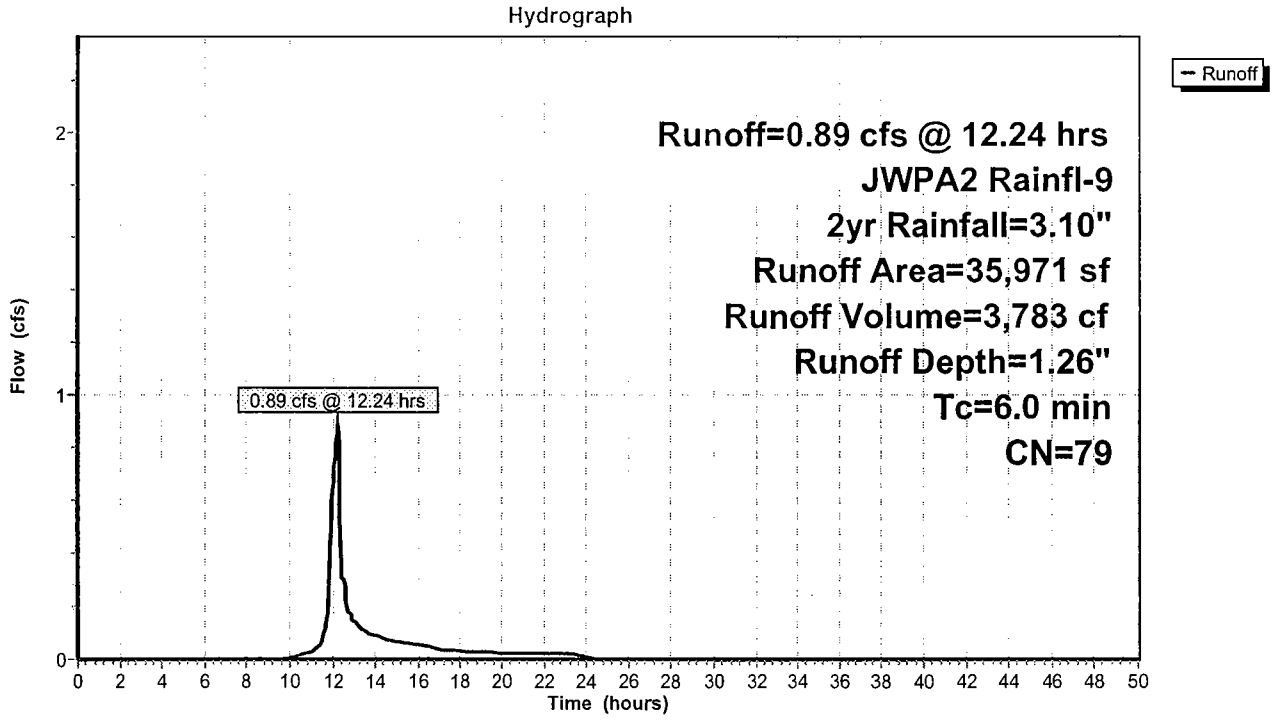
Runoff = 0.89 cfs @ 12.24 hrs, Volume= 3,783 cf, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
10,881	98	Paved parking, HSG B
2,873	60	Woods, Fair, HSG B
2,873	55	Woods, Good, HSG B
7,494	61	>75% Grass cover, Good, HSG B
4,594	98	Paved parking, HSG C
482	73	Woods, Fair, HSG C
482	70	Woods, Good, HSG C
6,292	74	>75% Grass cover, Good, HSG C
35,971	79	Weighted Average
20,496	65	56.98% Pervious Area
15,475	98	43.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 04-8:



Summary for Subcatchment 04-9:

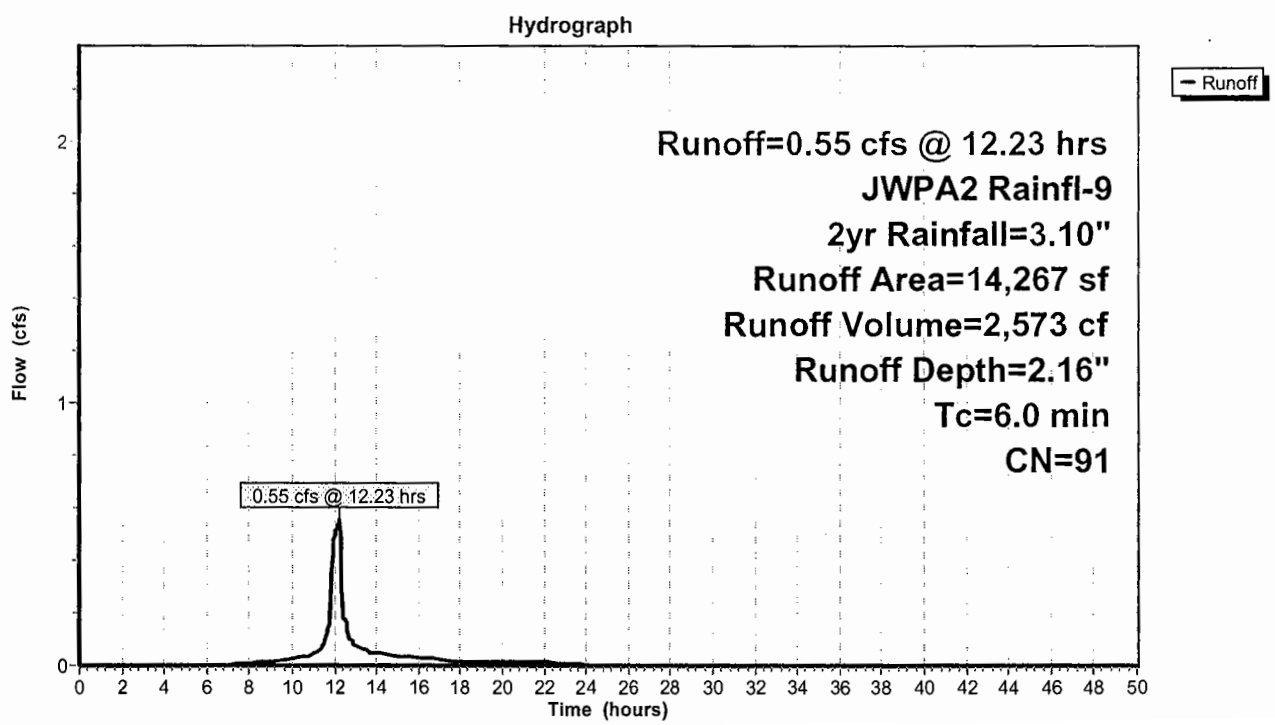
Runoff = 0.55 cfs @ 12.23 hrs, Volume= 2,573 cf, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
9,363	98	Paved parking, HSG C
2,713	61	>75% Grass cover, Good, HSG B
1,930	98	Paved parking, HSG C
261	74	>75% Grass cover, Good, HSG C
14,267	91	Weighted Average
2,974	62	20.85% Pervious Area
11,293	98	79.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 04-9:



Summary for Subcatchment 06-1:

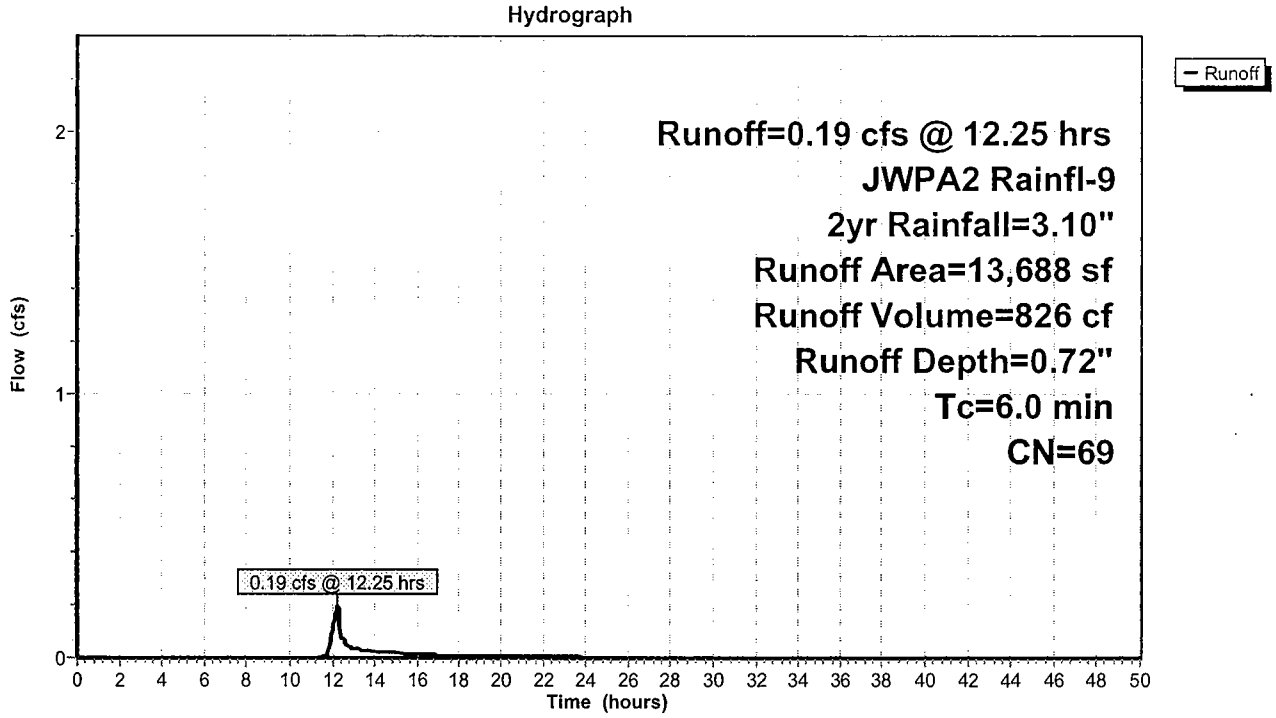
Runoff = 0.19 cfs @ 12.25 hrs, Volume= 826 cf, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
981	98	Paved parking, HSG A
3,635	39	>75% Grass cover, Good, HSG A
3,397	98	Paved parking, HSG B
4,827	61	>75% Grass cover, Good, HSG B
705	98	Paved parking, HSG C
143	74	>75% Grass cover, Good, HSG C
13,688	69	Weighted Average
8,605	52	62.87% Pervious Area
5,083	98	37.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 06-1:



Summary for Subcatchment 06-2:

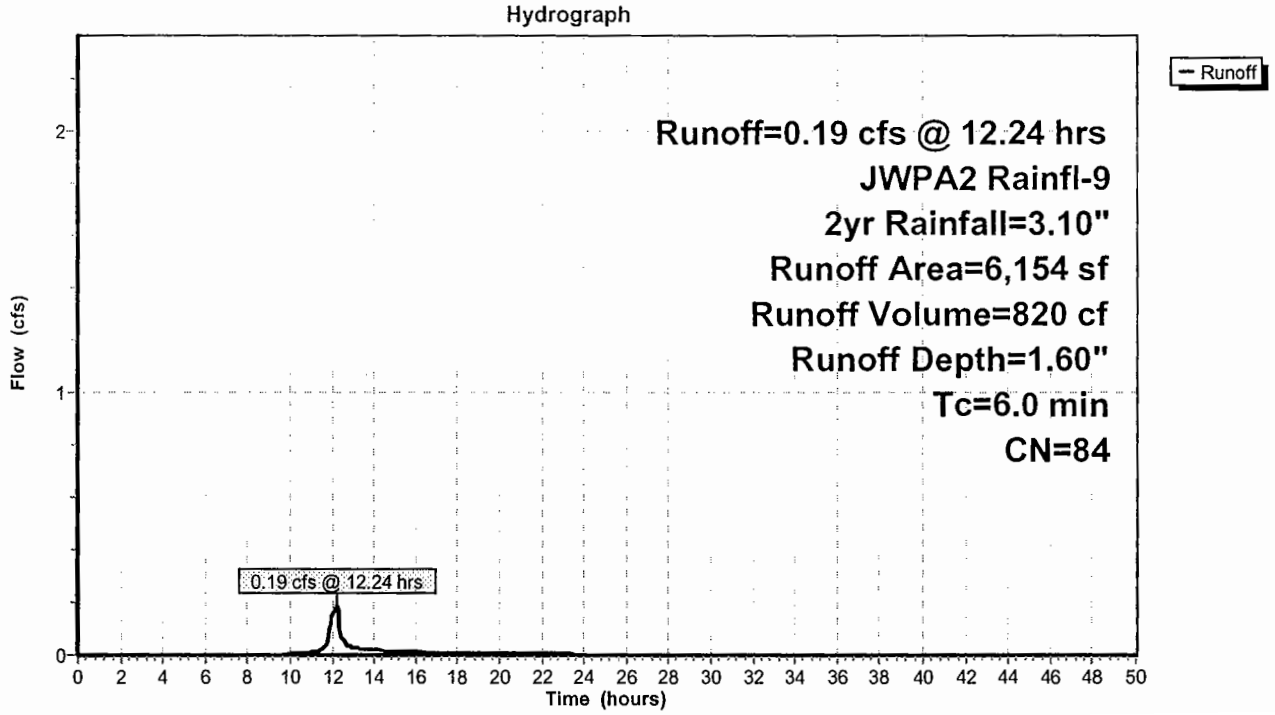
Runoff = 0.19 cfs @ 12.24 hrs, Volume= 820 cf, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
1,669	98	Paved parking, HSG A
2,185	98	Paved parking, HSG B
2,300	61	>75% Grass cover, Good, HSG B
6,154	84	Weighted Average
2,300	61	37.37% Pervious Area
3,854	98	62.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 06-2:



Summary for Subcatchment 08-1:

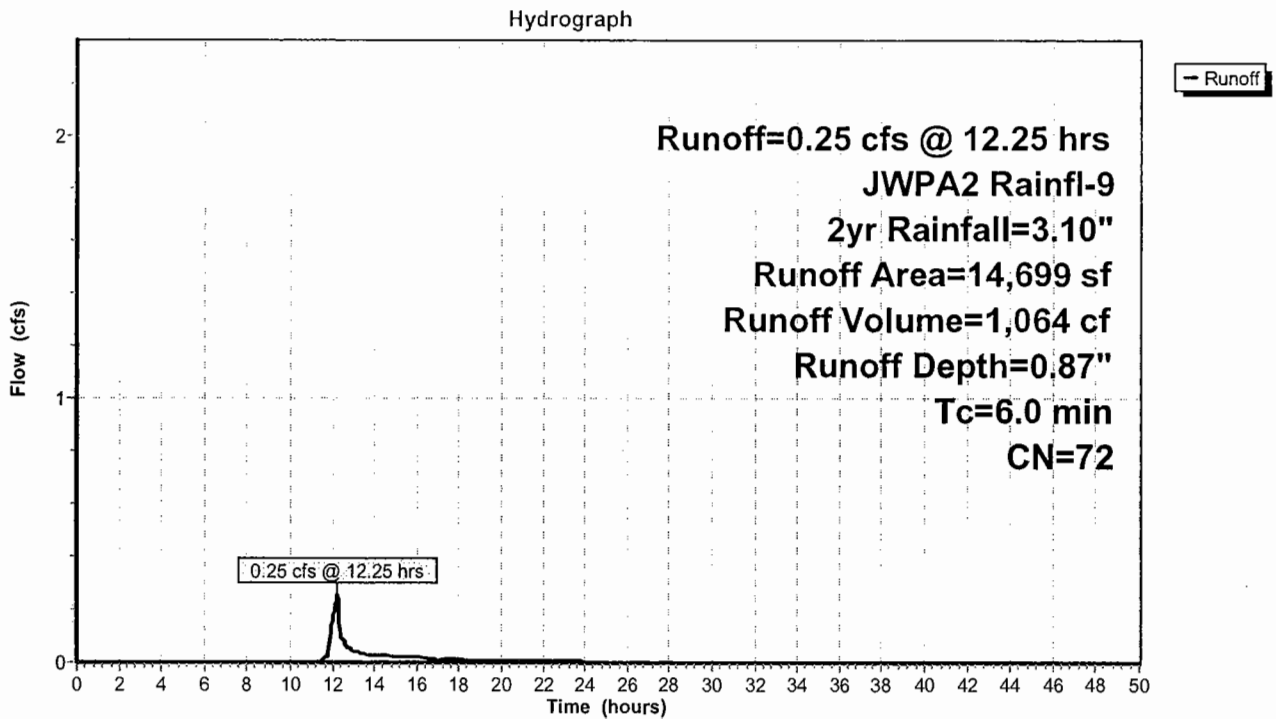
Runoff = 0.25 cfs @ 12.25 hrs, Volume= 1,064 cf, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
2,005	98	Paved parking, HSG B
273	60	Woods, Fair, HSG B
273	55	Woods, Good, HSG B
5,976	61	>75% Grass cover, Good, HSG B
679	98	Paved parking, HSG C
1,212	73	Woods, Fair, HSG C
1,212	70	Woods, Good, HSG C
3,069	74	>75% Grass cover, Good, HSG C
14,699	72	Weighted Average
12,015	66	81.74% Pervious Area
2,684	98	18.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 08-1:



Summary for Subcatchment 08-2:

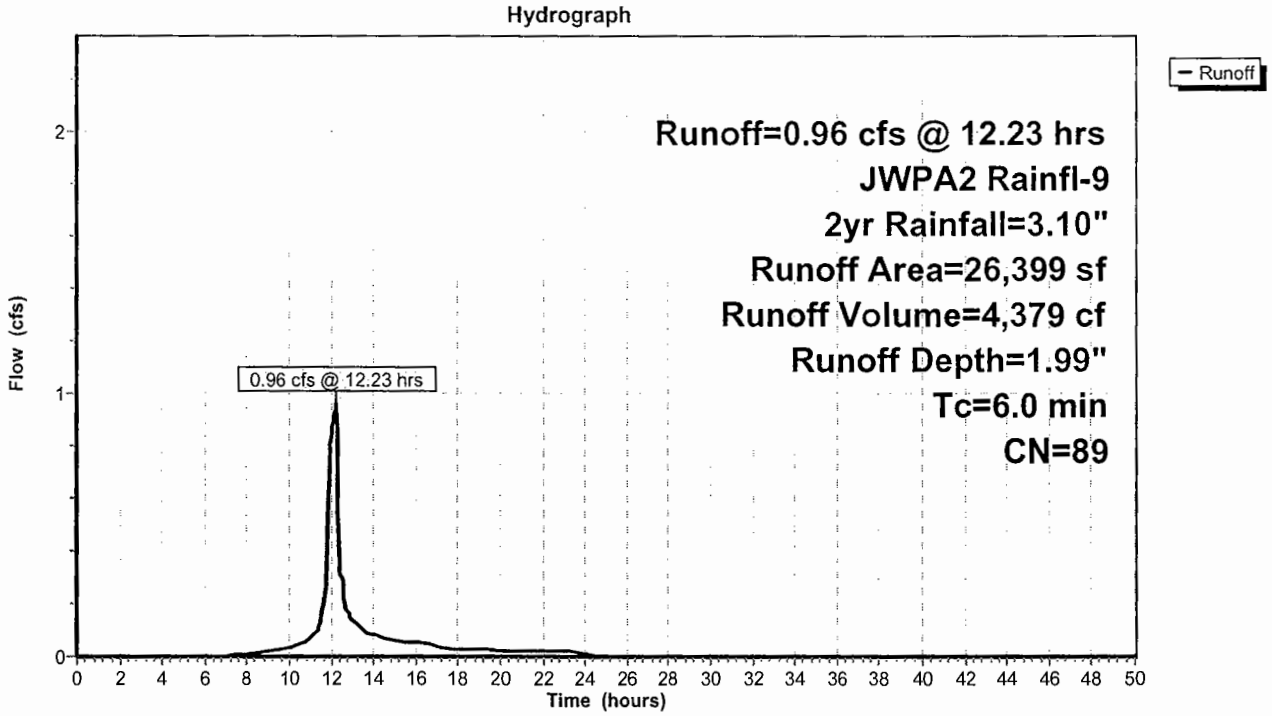
Runoff = 0.96 cfs @ 12.23 hrs, Volume= 4,379 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
14,458	98	Paved parking, HSG B
3,921	61	>75% Grass cover, Good, HSG B
4,239	98	Paved parking, HSG C
350	73	Woods, Fair, HSG C
350	70	Woods, Good, HSG C
3,081	74	>75% Grass cover, Good, HSG C
26,399	89	Weighted Average
7,702	67	29.18% Pervious Area
18,697	98	70.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 08-2:



Summary for Subcatchment 10-1:

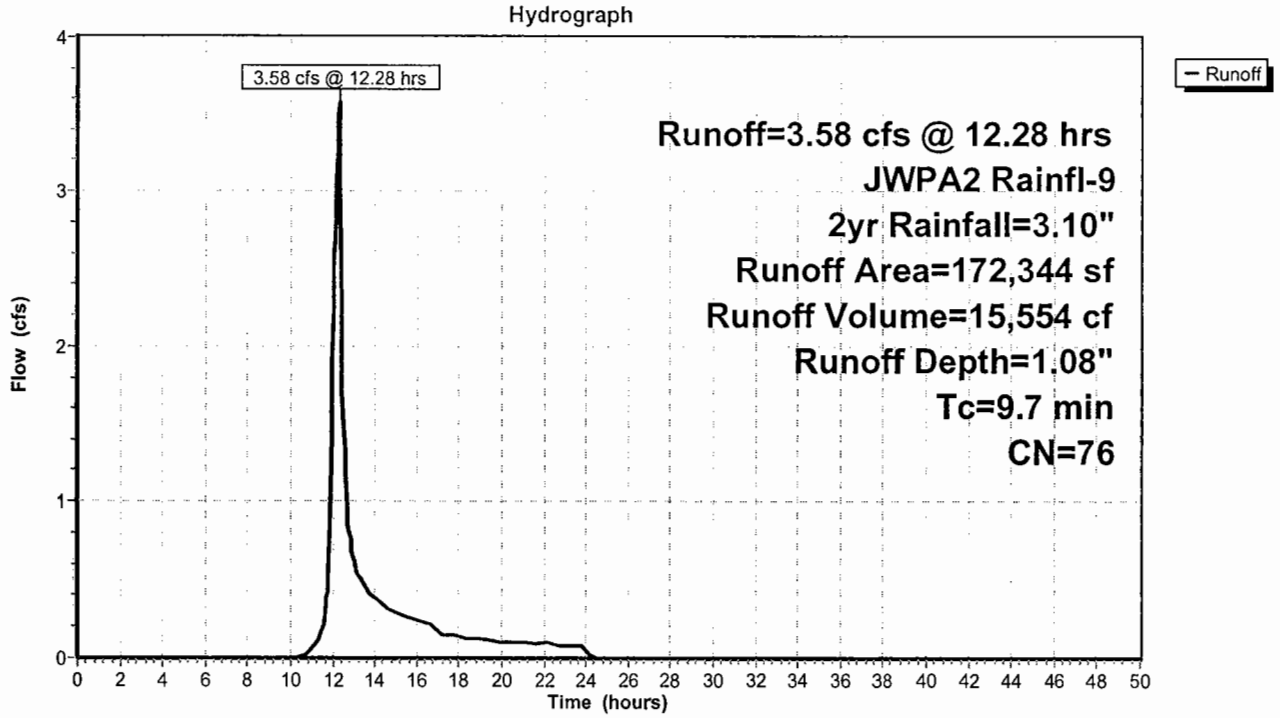
Runoff = 3.58 cfs @ 12.28 hrs, Volume= 15,554 cf, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
	4,312	60	Woods, Fair, HSG B
	4,312	55	Woods, Good, HSG B
	26,223	73	Woods, Fair, HSG C
	26,223	70	Woods, Good, HSG C
*	17,424	78	Wetlands
	23,043	98	Paved parking, HSG C
	741	61	>75% Grass cover, Good, HSG B
	70,066	74	>75% Grass cover, Good, HSG C
	172,344	76	Weighted Average
	149,301	73	86.63% Pervious Area
	23,043	98	13.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7					**Direct Entry,**

Subcatchment 10-1:



Summary for Subcatchment 13-1: Trib exist CB

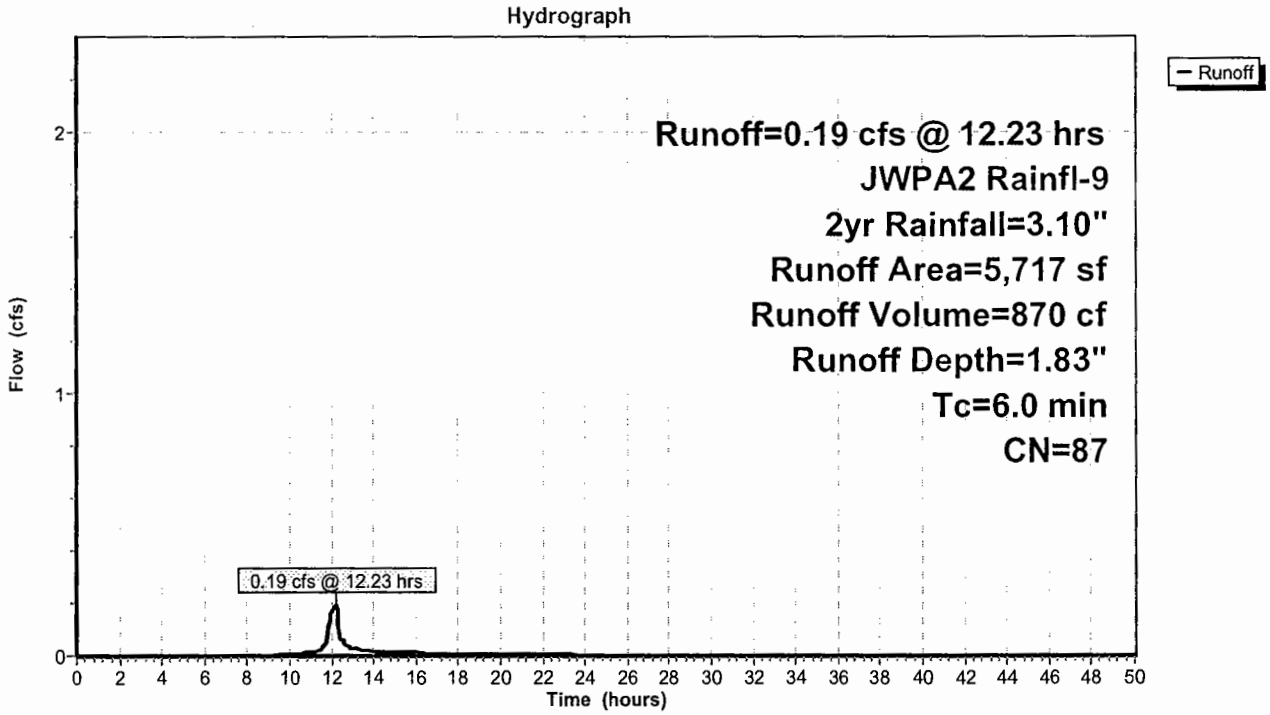
Runoff = 0.19 cfs @ 12.23 hrs, Volume= 870 cf, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
3,203	98	Paved parking, HSG C
2,514	74	>75% Grass cover, Good, HSG C
5,717	87	Weighted Average
2,514	74	43.97% Pervious Area
3,203	98	56.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 13-1: Trib exist CB



Summary for Subcatchment 13-2: Trib exist CB

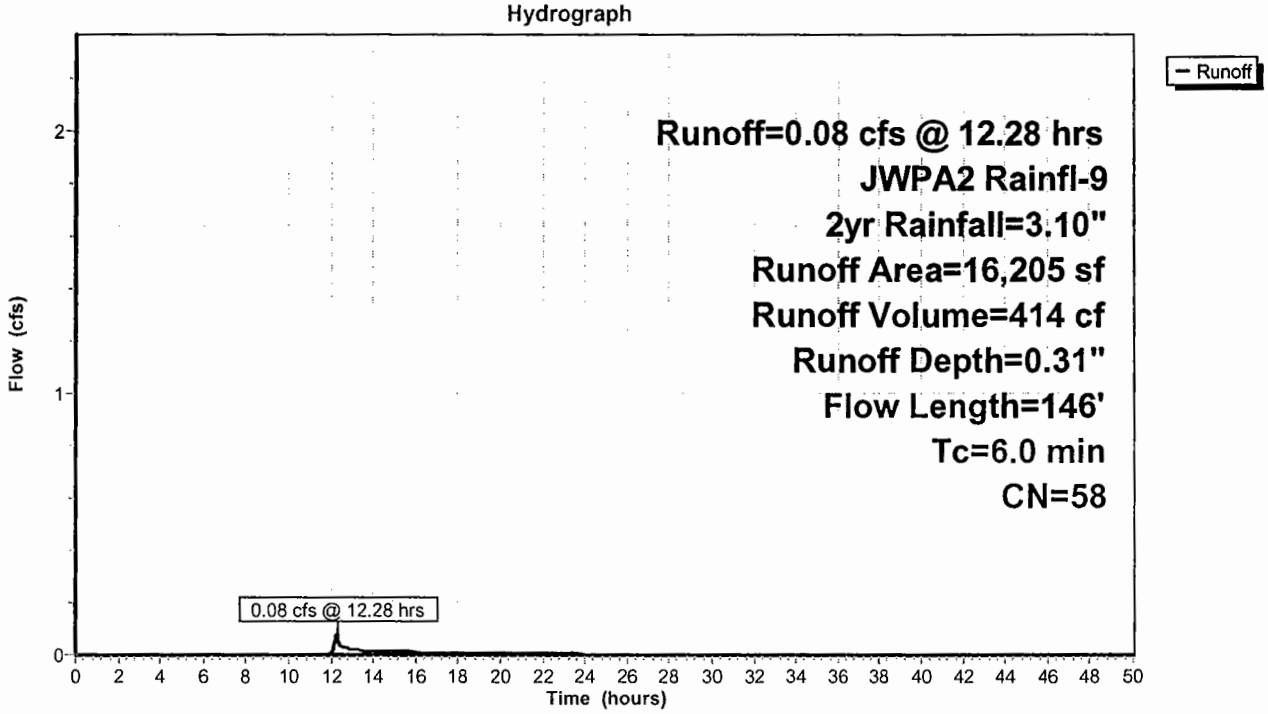
Runoff = 0.08 cfs @ 12.28 hrs, Volume= 414 cf, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
129	98	Paved parking, HSG A
1,199	36	Woods, Fair, HSG A
1,199	30	Woods, Good, HSG A
5,329	39	>75% Grass cover, Good, HSG A
885	98	Paved parking, HSG C
470	73	Woods, Fair, HSG C
470	70	Woods, Good, HSG C
6,524	74	>75% Grass cover, Good, HSG C
16,205	58	Weighted Average
15,191	55	93.74% Pervious Area
1,014	98	6.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.3	96	0.1250	5.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.1	146	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 13-2: Trib exist CB



Summary for Subcatchment 20: Roof

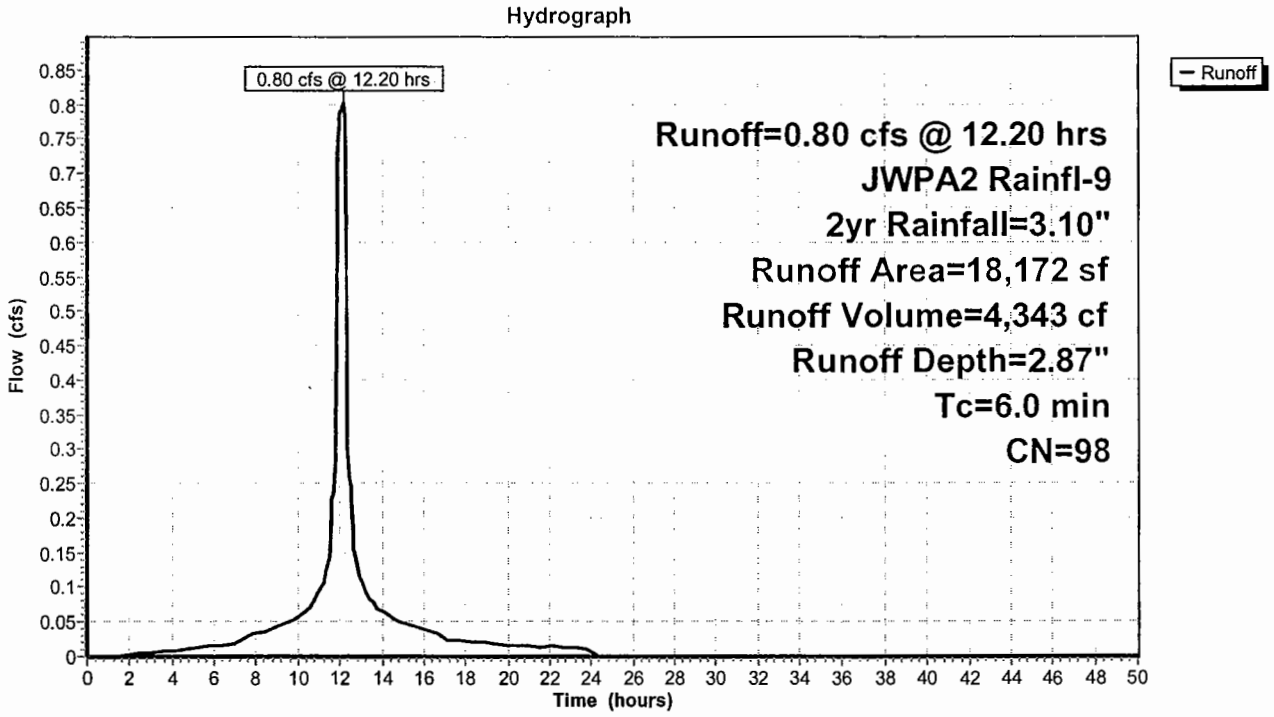
Runoff = 0.80 cfs @ 12.20 hrs, Volume= 4,343 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	18,172	98	Roof
	18,172	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 20: Roof



Summary for Subcatchment 40: Roof

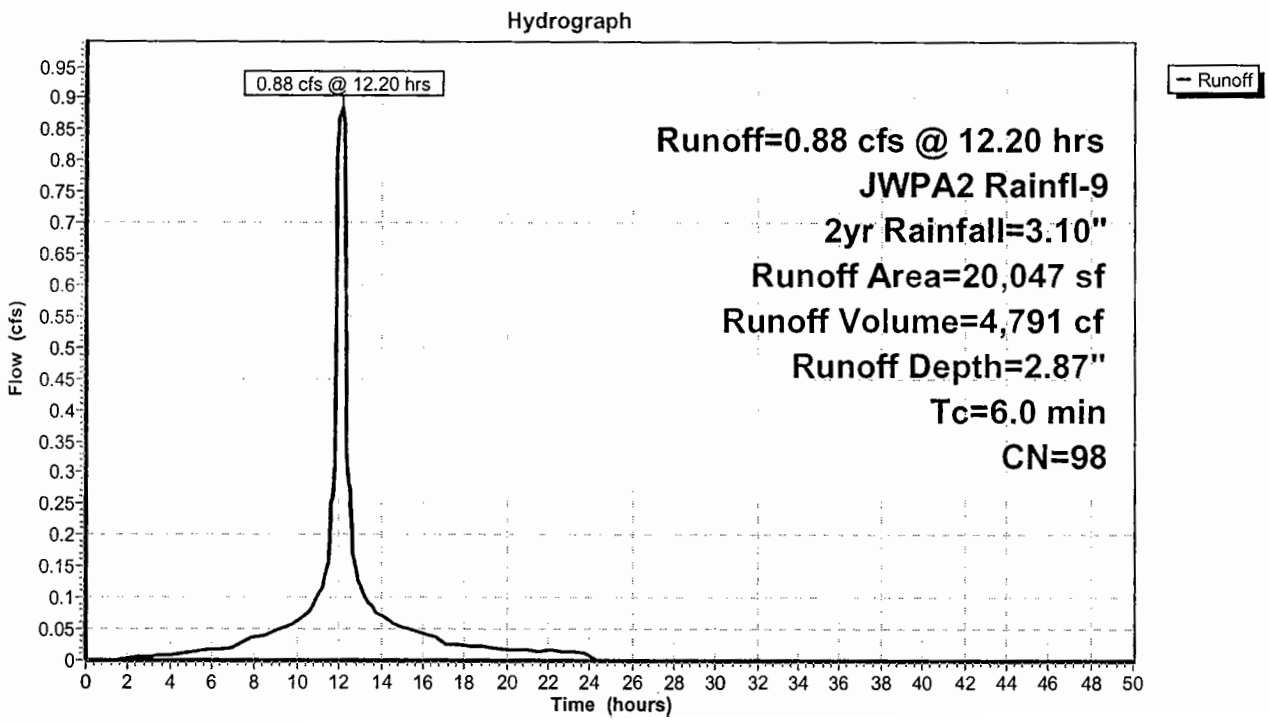
Runoff = 0.88 cfs @ 12.20 hrs, Volume= 4,791 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	20,047	98	Roof
	20,047	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 40: Roof



Summary for Subcatchment 55F: FRONT ROOF

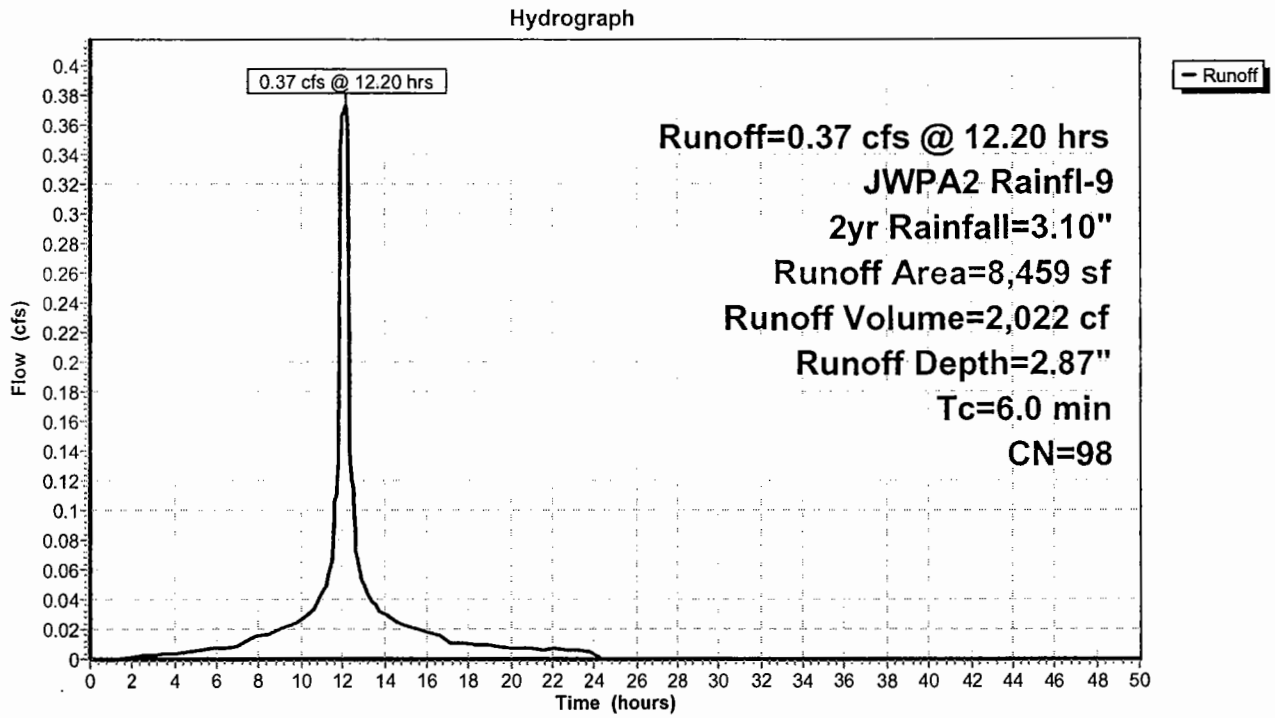
Runoff = 0.37 cfs @ 12.20 hrs, Volume= 2,022 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	8,459	98	Roof
	8,459	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 55F: FRONT ROOF



Summary for Subcatchment 55R: REAR ROOF

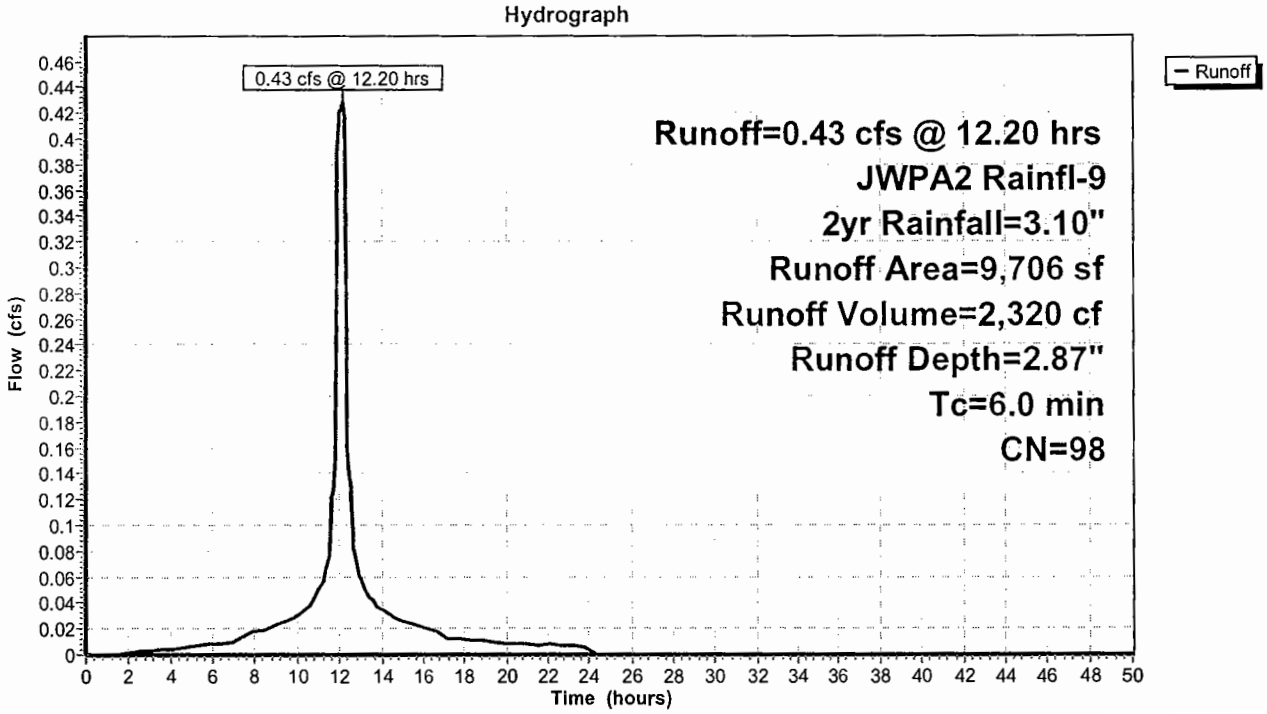
Runoff = 0.43 cfs @ 12.20 hrs, Volume= 2,320 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
*	9,706	98	Roof
	9,706	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 55R: REAR ROOF



Summary for Subcatchment 56-1:

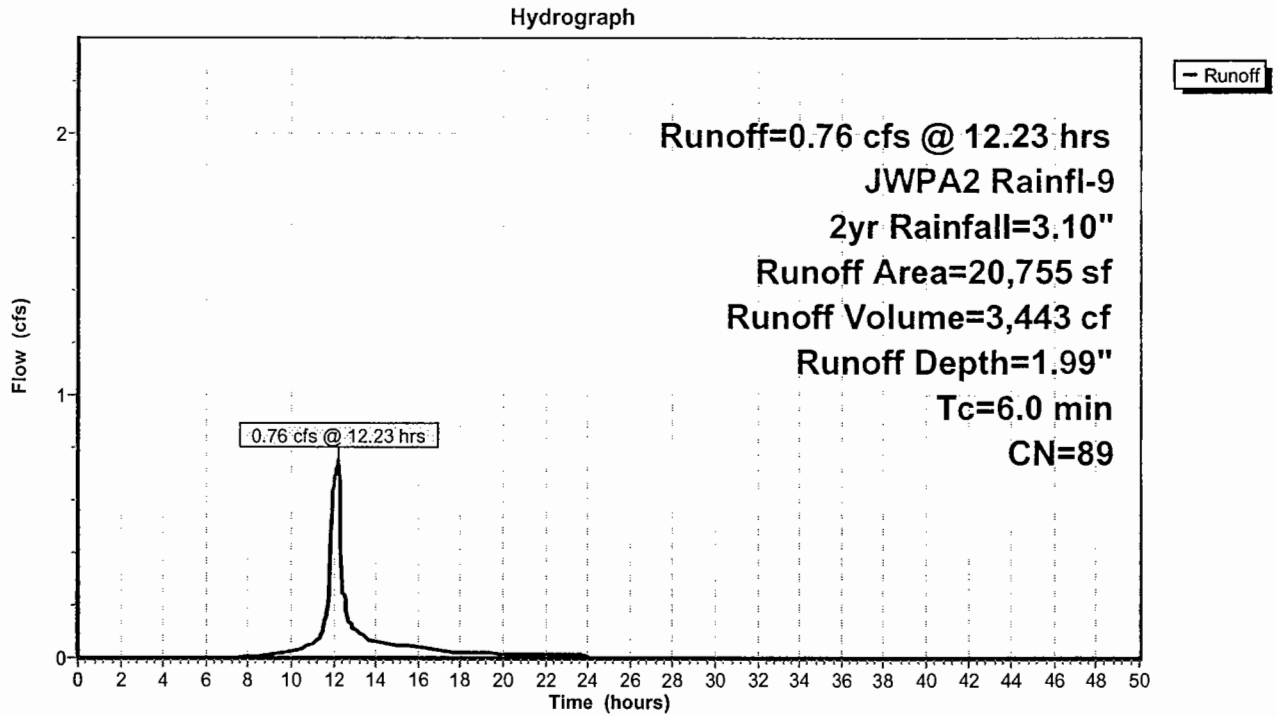
Runoff = 0.76 cfs @ 12.23 hrs, Volume= 3,443 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
13,376	98	Paved parking, HSG C
7,379	74	>75% Grass cover, Good, HSG C
20,755	89	Weighted Average
7,379	74	35.55% Pervious Area
13,376	98	64.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 56-1:



Summary for Subcatchment 56-2:

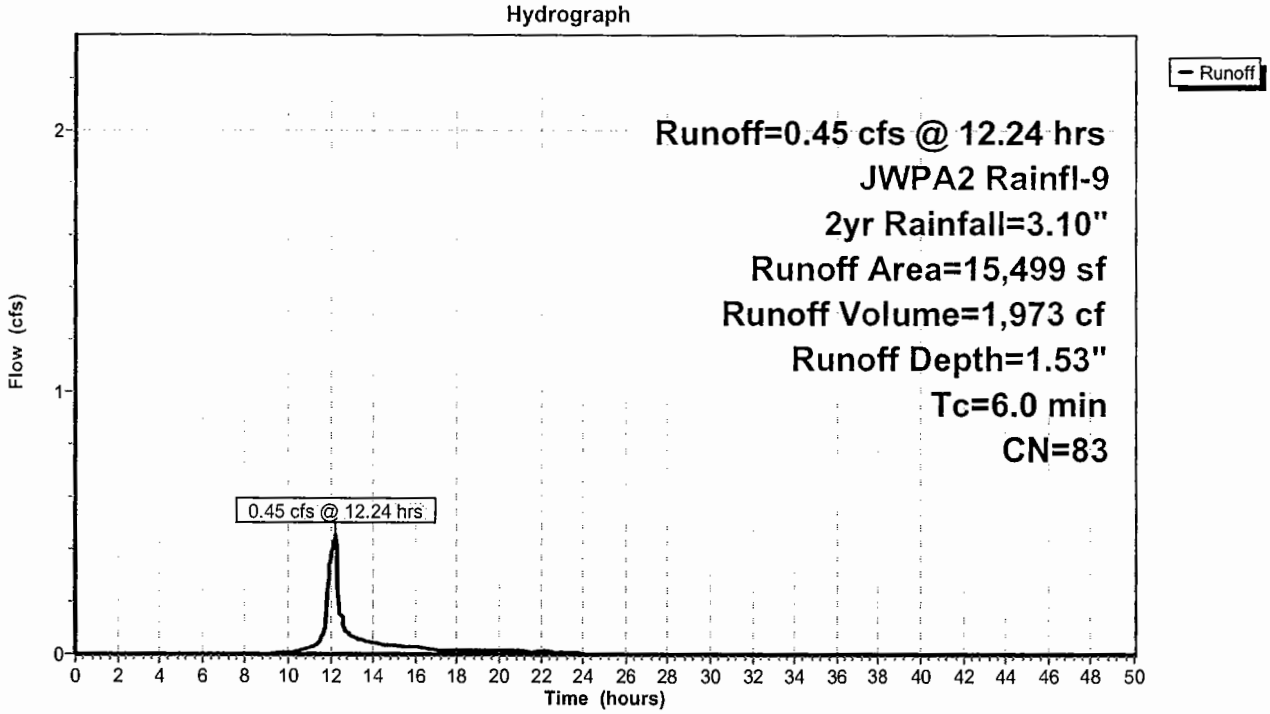
Runoff = 0.45 cfs @ 12.24 hrs, Volume= 1,973 cf, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
5,938	98	Paved parking, HSG C
9,561	74	>75% Grass cover, Good, HSG C
15,499	83	Weighted Average
9,561	74	61.69% Pervious Area
5,938	98	38.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 56-2:



Summary for Subcatchment 56-3:

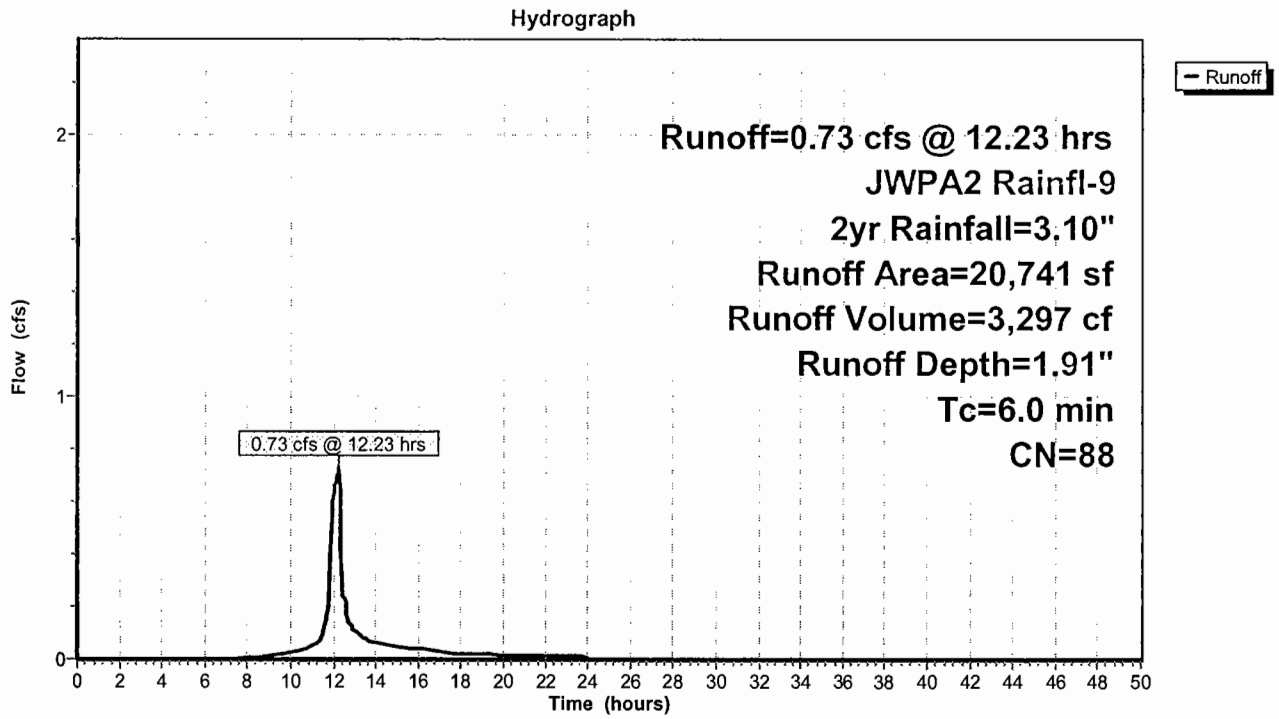
Runoff = 0.73 cfs @ 12.23 hrs, Volume= 3,297 cf, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
12,275	98	Paved parking, HSG C
8,466	74	>75% Grass cover, Good, HSG C
20,741	88	Weighted Average
8,466	74	40.82% Pervious Area
12,275	98	59.18% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 56-3:



Summary for Subcatchment 56-4:

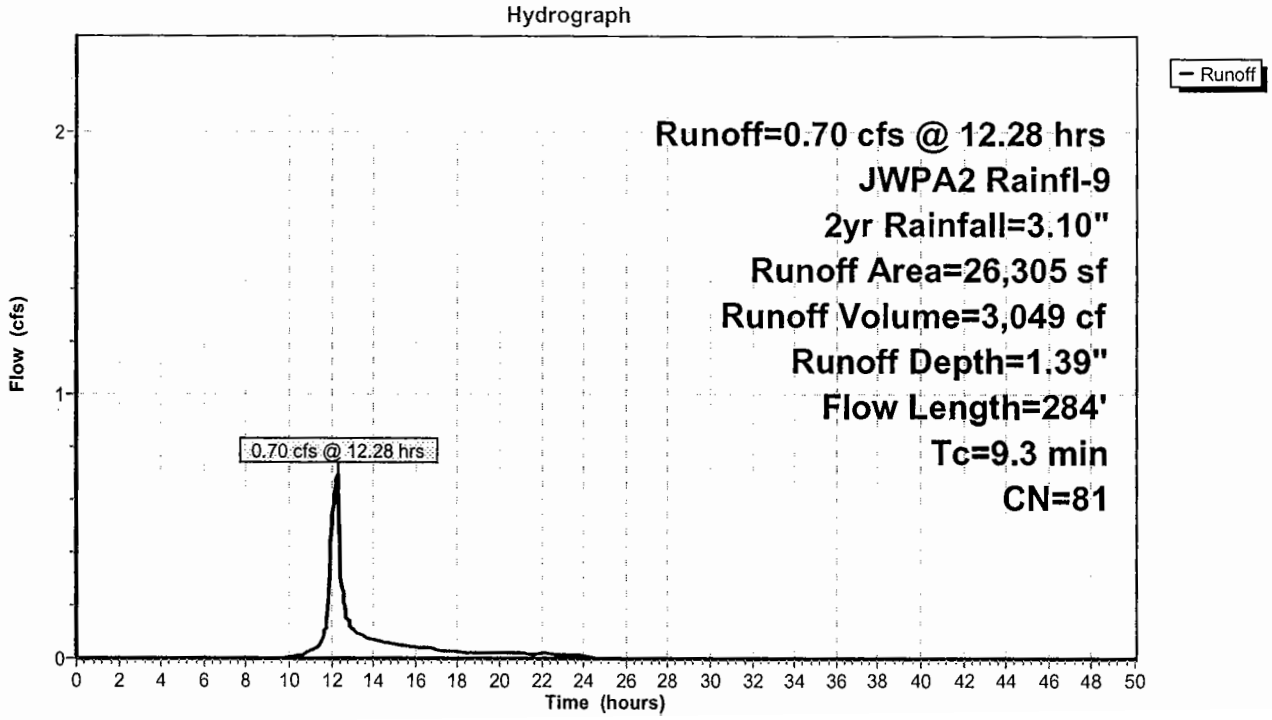
Runoff = 0.70 cfs @ 12.28 hrs, Volume= 3,049 cf, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
8,113	98	Paved parking, HSG C
1,768	73	Woods, Fair, HSG C
1,768	70	Woods, Good, HSG C
14,656	74	>75% Grass cover, Good, HSG C
26,305	81	Weighted Average
18,192	74	69.16% Pervious Area
8,113	98	30.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0230	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.4	76	0.0390	3.18		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.0	158	0.0170	2.65		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.3	284	Total			

Subcatchment 56-4:



Summary for Subcatchment 56-5:

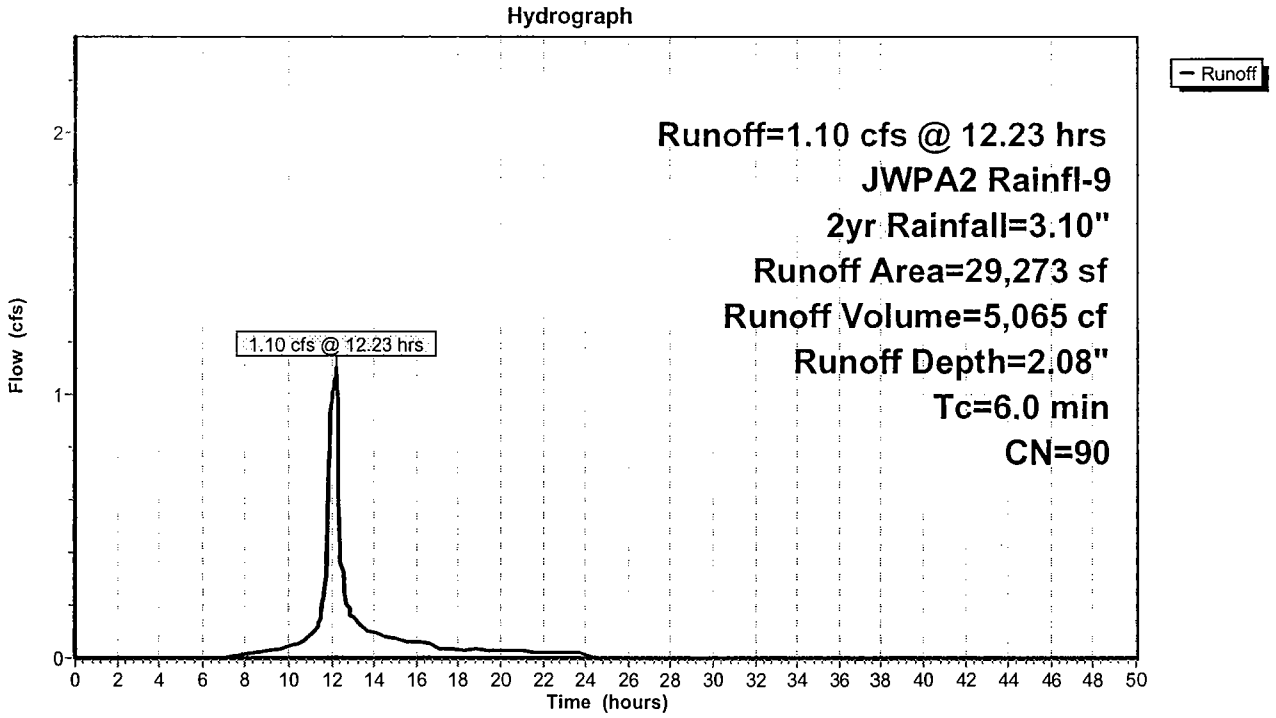
Runoff = 1.10 cfs @ 12.23 hrs, Volume= 5,065 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
697	98	Paved parking, HSG B
764	61	>75% Grass cover, Good, HSG B
18,662	98	Paved parking, HSG C
9,150	74	>75% Grass cover, Good, HSG C
29,273	90	Weighted Average
9,914	73	33.87% Pervious Area
19,359	98	66.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 56-5:



Summary for Subcatchment BA-LWD:

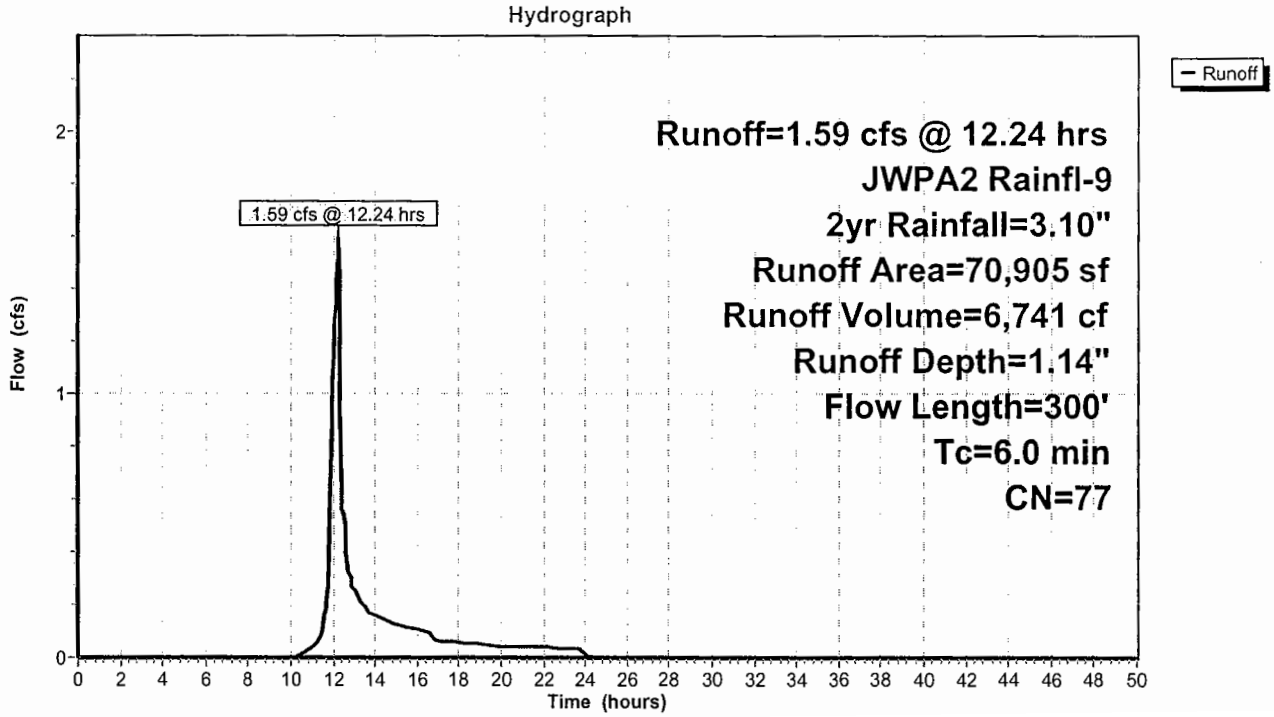
Runoff = 1.59 cfs @ 12.24 hrs, Volume= 6,741 cf, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
9,338	98	Roofs, HSG C
46,301	74	>75% Grass cover, Good, HSG C
7,633	73	Woods, Fair, HSG C
7,633	70	Woods, Good, HSG C
70,905	77	Weighted Average
61,567	73	86.83% Pervious Area
9,338	98	13.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	50	0.1760	0.24		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.7	250	0.1320	5.85		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
4.2	300	Total, Increased to minimum Tc = 6.0 min			

Subcatchment BA-LWD:



Summary for Subcatchment BA-NWLY:

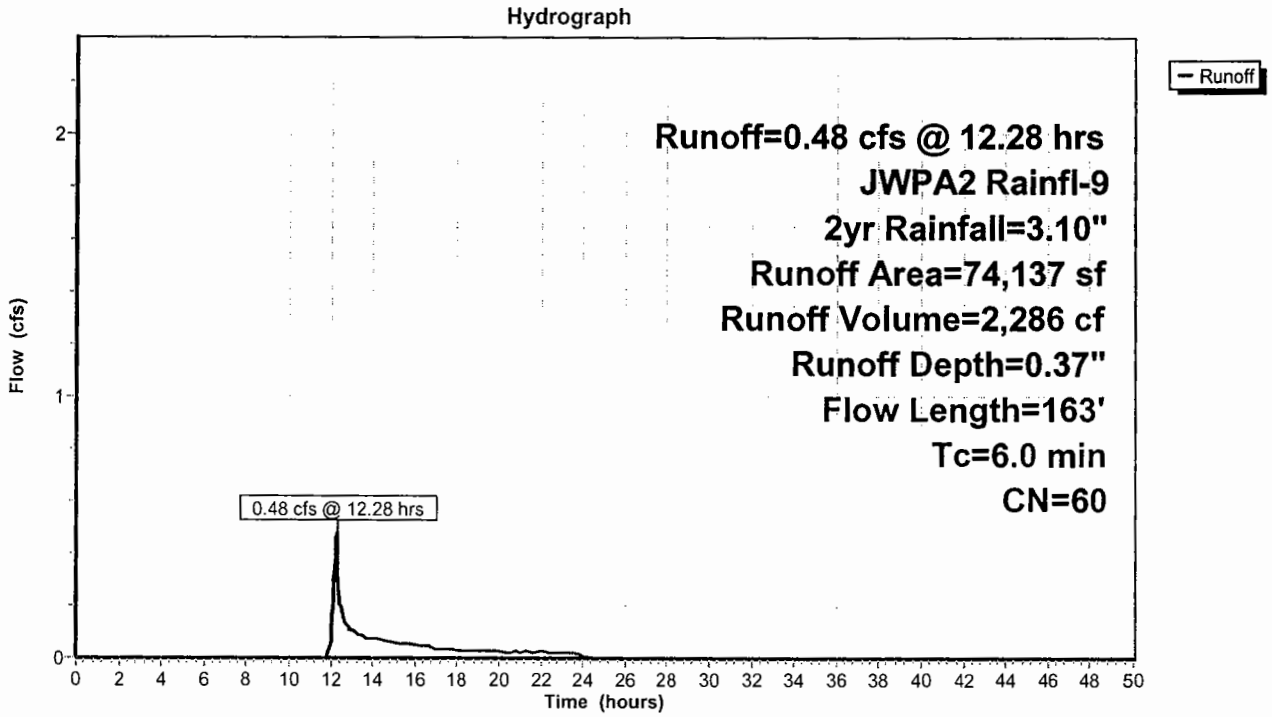
Runoff = 0.48 cfs @ 12.28 hrs, Volume= 2,286 cf, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
3,797	30	Woods, Good, HSG A
3,797	36	Woods, Fair, HSG A
2,003	55	Woods, Good, HSG B
2,003	60	Woods, Fair, HSG B
1,909	77	Woods, Good, HSG D
1,909	79	Woods, Fair, HSG D
2,356	98	Paved parking, HSG A
3,626	98	Paved parking, HSG B
11,549	39	>75% Grass cover, Good, HSG A
34,018	61	>75% Grass cover, Good, HSG B
7,170	80	>75% Grass cover, Good, HSG D
74,137	60	Weighted Average
68,155	57	91.93% Pervious Area
5,982	98	8.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0700	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.7	113	0.0260	2.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.7	163	Total, Increased to minimum Tc = 6.0 min			

Subcatchment BA-NWLY:



Summary for Subcatchment BA-SWLY: Trib Inwood Dr.

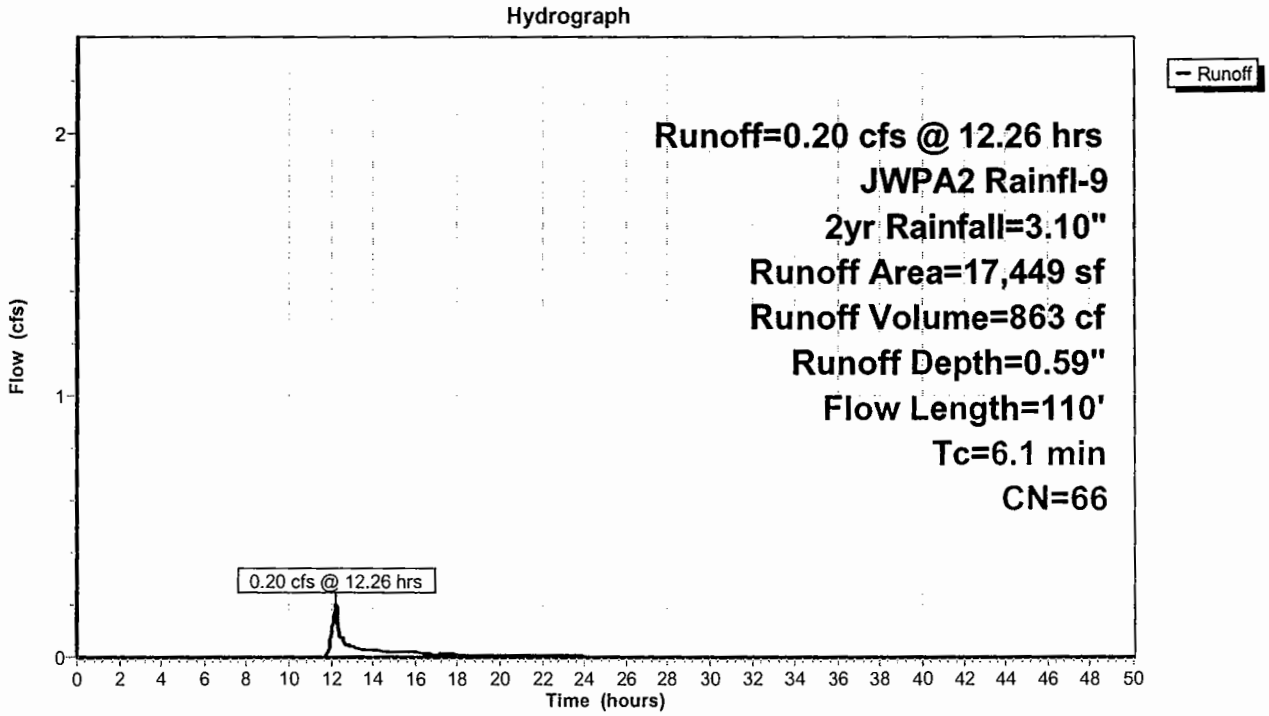
Runoff = 0.20 cfs @ 12.26 hrs, Volume= 863 cf, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
204	98	Paved parking, HSG A
1,393	36	Woods, Fair, HSG A
1,393	30	Woods, Good, HSG A
2,205	39	>75% Grass cover, Good, HSG A
2,325	98	Paved parking, HSG C
1,787	73	Woods, Fair, HSG C
1,787	70	Woods, Good, HSG C
6,355	74	>75% Grass cover, Good, HSG C
17,449	66	Weighted Average
14,920	61	85.51% Pervious Area
2,529	98	14.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.1300	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	60	0.1420	6.07		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.1	110	Total			

Subcatchment BA-SWLY: Trib Inwood Dr.



Summary for Subcatchment BA-WLY:

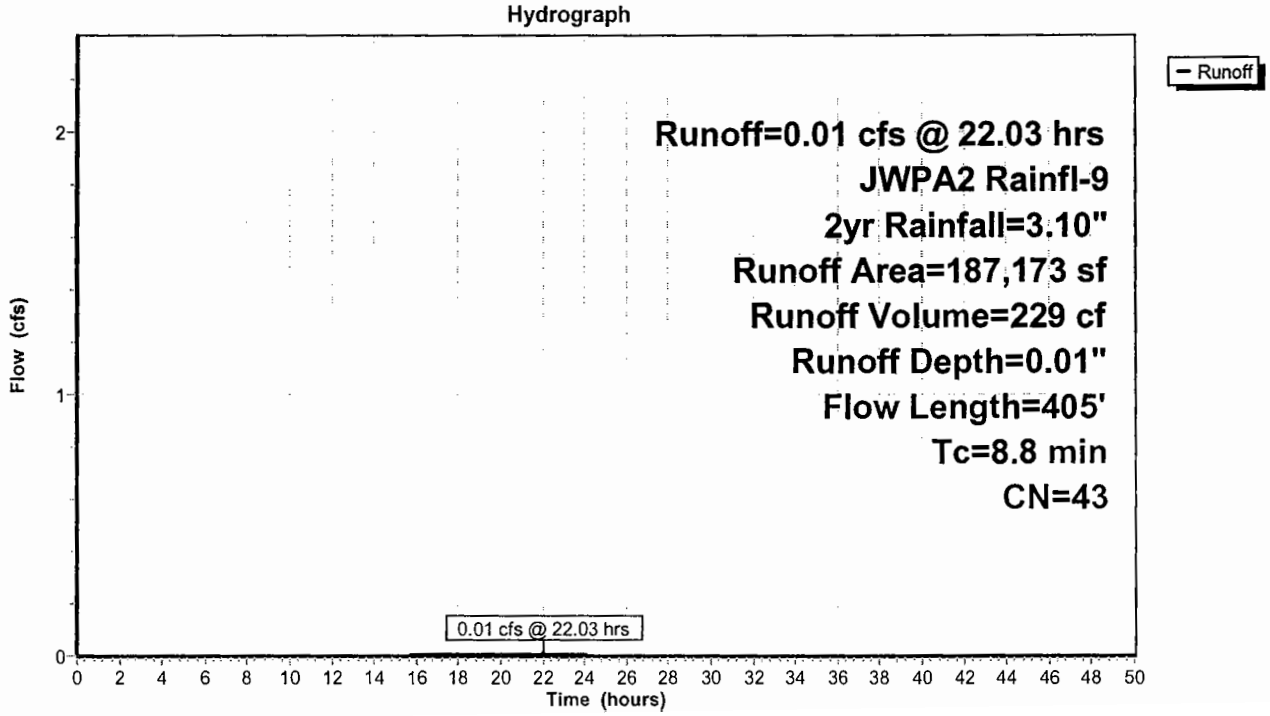
Runoff = 0.01 cfs @ 22.03 hrs, Volume= 229 cf, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

	Area (sf)	CN	Description
	4,734	98	Paved parking, HSG A
	37,104	36	Woods, Fair, HSG A
	37,104	30	Woods, Good, HSG A
	82,327	39	>75% Grass cover, Good, HSG A
*	6,228	78	Wetlands HSG A
	3,246	98	Paved parking, HSG B
	1,294	60	Woods, Fair, HSG B
	1,294	55	Woods, Good, HSG B
	10,815	61	>75% Grass cover, Good, HSG B
	988	98	Paved parking, HSG C
	2,039	74	>75% Grass cover, Good, HSG C
	187,173	43	Weighted Average
	178,205	40	95.21% Pervious Area
	8,968	98	4.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	50	0.0280	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.7	219	0.1030	5.17		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	136	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.8	405	Total			

Subcatchment BA-WLY:



Summary for Subcatchment BA-WLY-1:

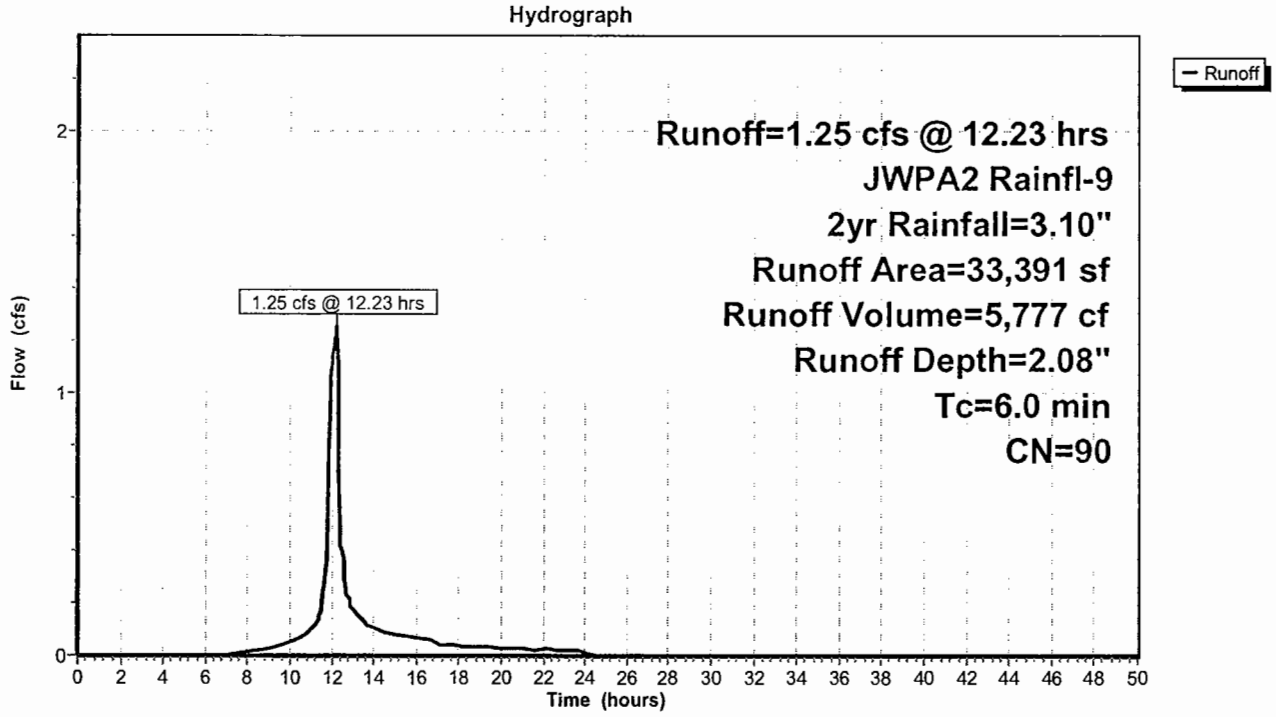
Runoff = 1.25 cfs @ 12.23 hrs, Volume= 5,777 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
22,298	98	Paved parking, HSG C
11,093	74	>75% Grass cover, Good, HSG C
33,391	90	Weighted Average
11,093	74	33.22% Pervious Area
22,298	98	66.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment BA-WLY-1:



Summary for Pond 3A:

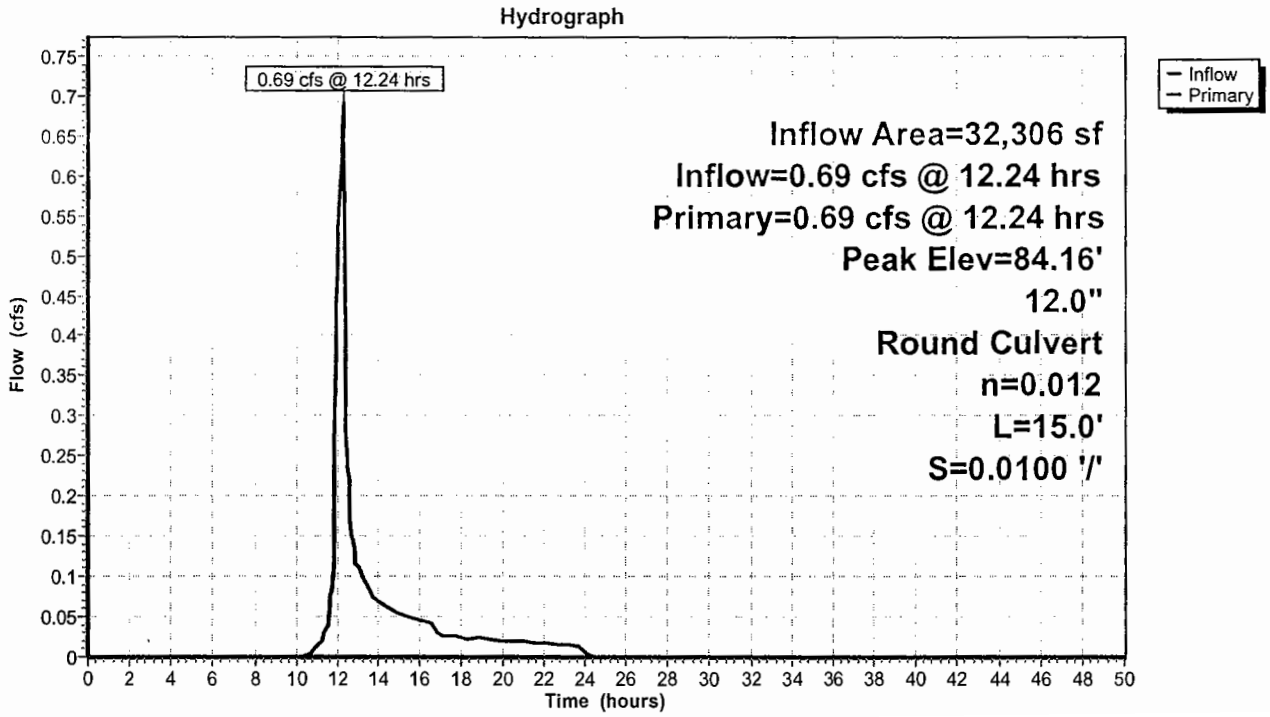
Inflow Area =	32,306 sf, 61.14% Impervious, Inflow Depth = 1.08" for 2yr event				
Inflow =	0.69 cfs @ 12.24 hrs, Volume=	2,916 cf			
Outflow =	0.69 cfs @ 12.24 hrs, Volume=	2,916 cf, Atten= 0%, Lag= 0.0 min			
Primary =	0.69 cfs @ 12.24 hrs, Volume=	2,916 cf			

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 84.16' @ 12.24 hrs
Flood Elev= 87.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	83.70'	**12.0" Round Culvert** L= 15.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.70' / 83.55' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.69 cfs @ 12.24 hrs HW=84.16' TW=83.73' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.69 cfs @ 2.87 fps)

Pond 3A:



Summary for Pond 3B:

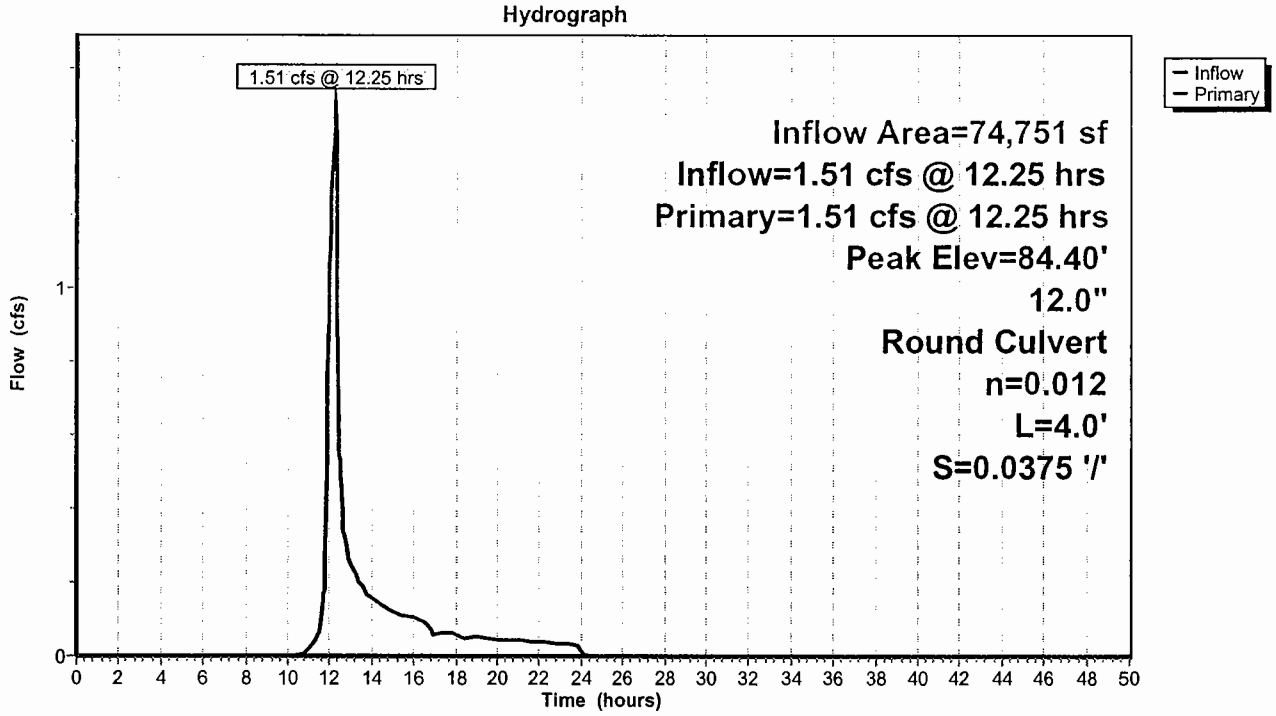
Inflow Area = 74,751 sf, 41.70% Impervious, Inflow Depth = 1.03" for 2yr event
Inflow = 1.51 cfs @ 12.25 hrs, Volume= 6,396 cf
Outflow = 1.51 cfs @ 12.25 hrs, Volume= 6,396 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.51 cfs @ 12.25 hrs, Volume= 6,396 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 84.40' @ 12.25 hrs
Flood Elev= 87.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	83.70'	**12.0" Round Culvert** L= 4.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.70' / 83.55' S= 0.0375 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.51 cfs @ 12.25 hrs HW=84.40' TW=83.73' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 1.51 cfs @ 3.61 fps)

Pond 3B:



Summary for Pond 3C:

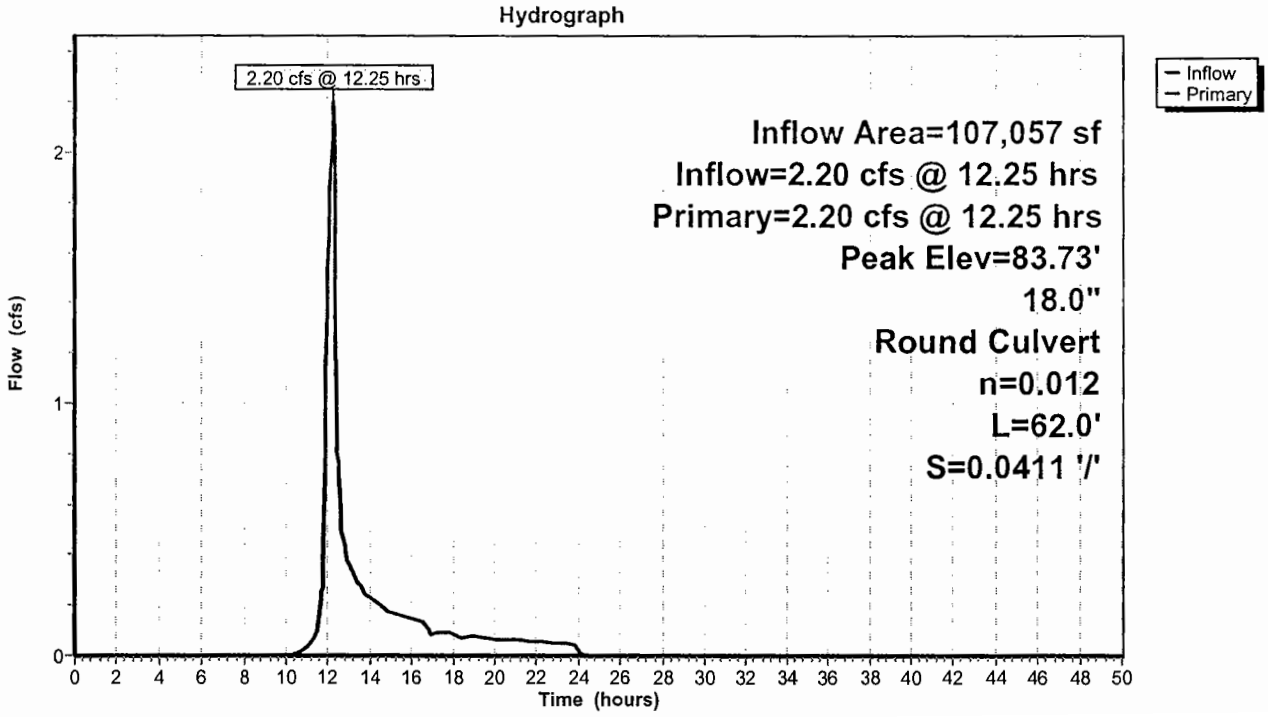
Inflow Area =	107,057 sf, 47.57% Impervious, Inflow Depth = 1.04" for 2yr event				
Inflow =	2.20 cfs @ 12.25 hrs, Volume=	9,312 cf			
Outflow =	2.20 cfs @ 12.25 hrs, Volume=	9,312 cf, Atten= 0%, Lag= 0.0 min			
Primary =	2.20 cfs @ 12.25 hrs, Volume=	9,312 cf			

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 83.73' @ 12.25 hrs
Flood Elev= 87.97'

Device	Routing	Invert	Outlet Devices
#1	Primary	83.05'	**18.0" Round Culvert** L= 62.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 83.05' / 80.50' S= 0.0411 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=2.20 cfs @ 12.25 hrs HW=83.73' TW=81.18' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.20 cfs @ 2.81 fps)

Pond 3C:



Summary for Pond 3D:

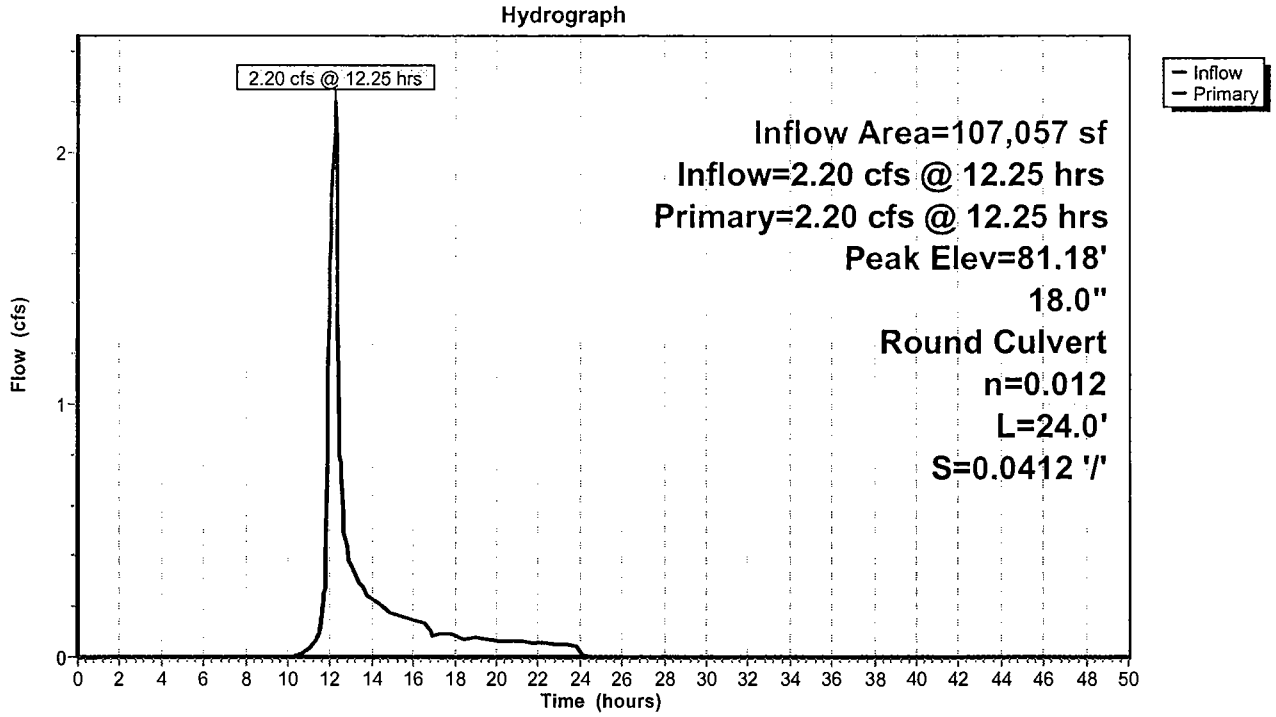
Inflow Area =	107,057 sf, 47.57% Impervious, Inflow Depth = 1.04" for 2yr event				
Inflow =	2.20 cfs @ 12.25 hrs, Volume=	9,312 cf			
Outflow =	2.20 cfs @ 12.25 hrs, Volume=	9,312 cf, Atten= 0%, Lag= 0.0 min			
Primary =	2.20 cfs @ 12.25 hrs, Volume=	9,312 cf			

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 81.18' @ 12.25 hrs
Flood Elev= 86.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	80.50'	**18.0" Round Culvert** L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 80.50' / 79.51' S= 0.0412 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=2.20 cfs @ 12.25 hrs HW=81.18' TW=79.67' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.20 cfs @ 2.81 fps)

Pond 3D:



Summary for Pond 6A:

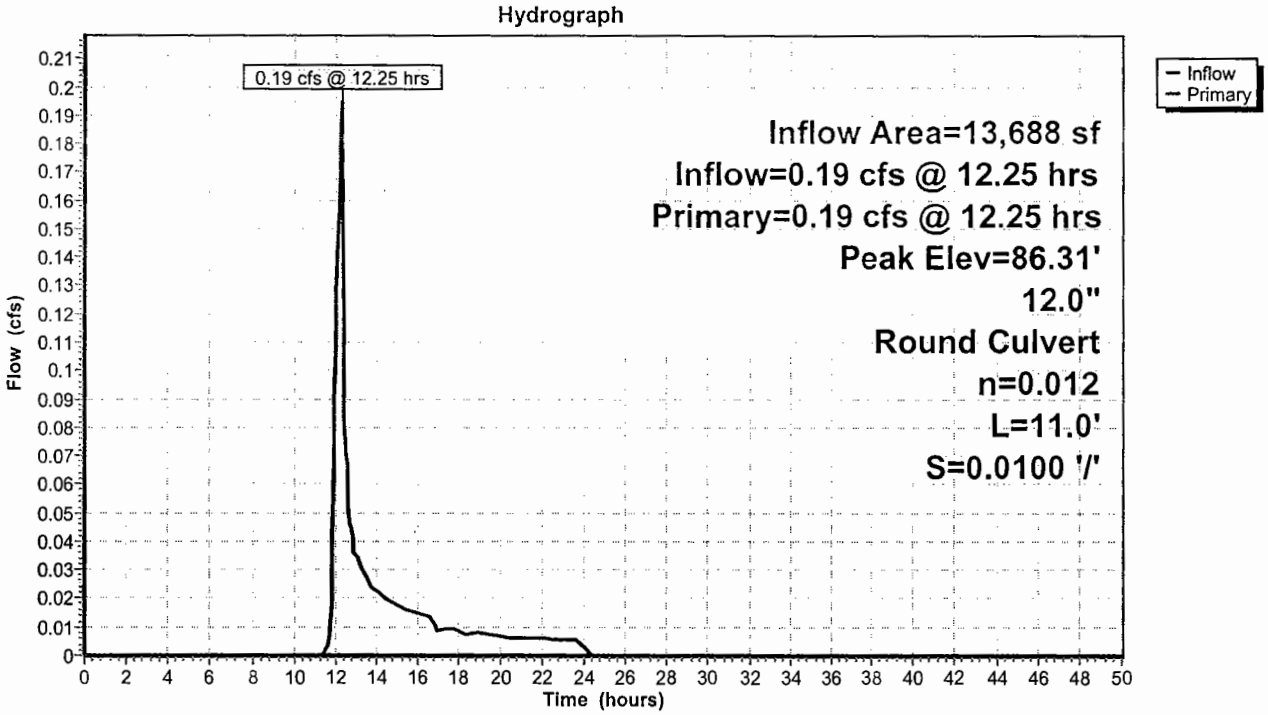
Inflow Area =	13,688 sf, 37.13% Impervious, Inflow Depth = 0.72" for 2yr event				
Inflow =	0.19 cfs @	12.25 hrs, Volume=	826 cf		
Outflow =	0.19 cfs @	12.25 hrs, Volume=	826 cf, Atten= 0%, Lag= 0.0 min		
Primary =	0.19 cfs @	12.25 hrs, Volume=	826 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 86.31' @ 12.25 hrs
Flood Elev= 90.23'

Device	Routing	Invert	Outlet Devices
#1	Primary	86.08'	**12.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 86.08' / 85.97' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.19 cfs @ 12.25 hrs HW=86.31' TW=86.02' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.19 cfs @ 2.12 fps)

Pond 6A:



Summary for Pond 6B:

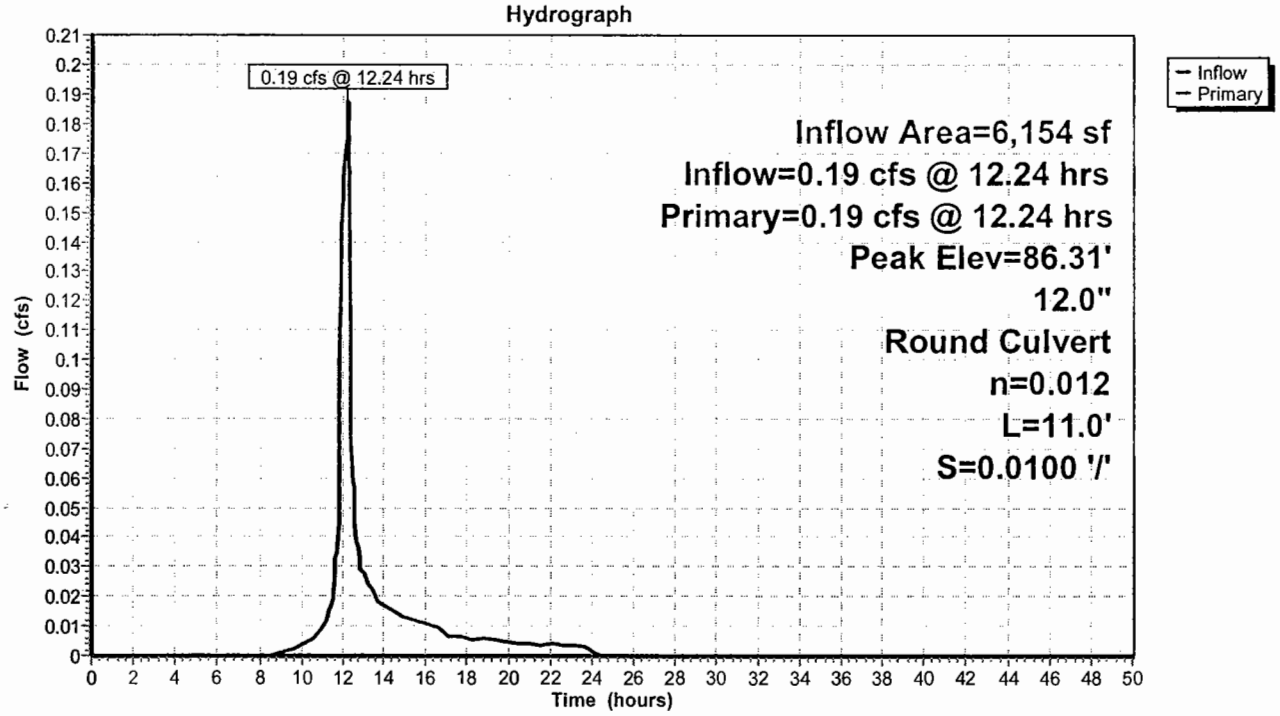
Inflow Area = 6,154 sf, 62.63% Impervious, Inflow Depth = 1.60" for 2yr event
Inflow = 0.19 cfs @ 12.24 hrs, Volume= 820 cf
Outflow = 0.19 cfs @ 12.24 hrs, Volume= 820 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.19 cfs @ 12.24 hrs, Volume= 820 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 86.31' @ 12.24 hrs
Flood Elev= 90.23'

Device	Routing	Invert	Outlet Devices
#1	Primary	86.08'	**12.0" Round Culvert** L= 11.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 86.08' / 85.97' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.19 cfs @ 12.24 hrs HW=86.31' TW=86.02' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.19 cfs @ 2.09 fps)

Pond 6B:



Summary for Pond 6C: STORMCEPTOR

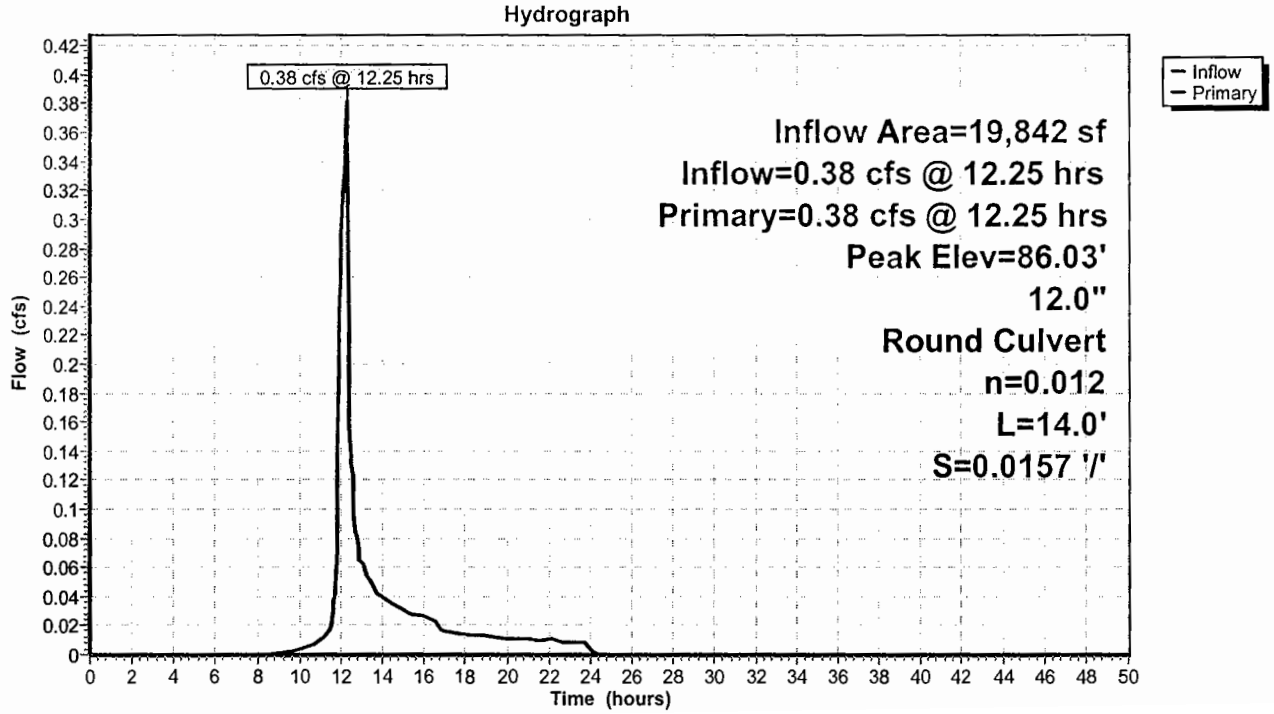
Inflow Area = 19,842 sf, 45.04% Impervious, Inflow Depth = 1.00" for 2yr event
Inflow = 0.38 cfs @ 12.25 hrs, Volume= 1,646 cf
Outflow = 0.38 cfs @ 12.25 hrs, Volume= 1,646 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.38 cfs @ 12.25 hrs, Volume= 1,646 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 86.03' @ 12.25 hrs
Flood Elev= 91.16'

Device	Routing	Invert	Outlet Devices
#1	Primary	85.72'	**12.0" Round Culvert** L= 14.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 85.72' / 85.50' S= 0.0157 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.38 cfs @ 12.25 hrs HW=86.02' TW=85.44' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.38 cfs @ 1.88 fps)

Pond 6C: STORMCEPTOR



Summary for Pond 8A:

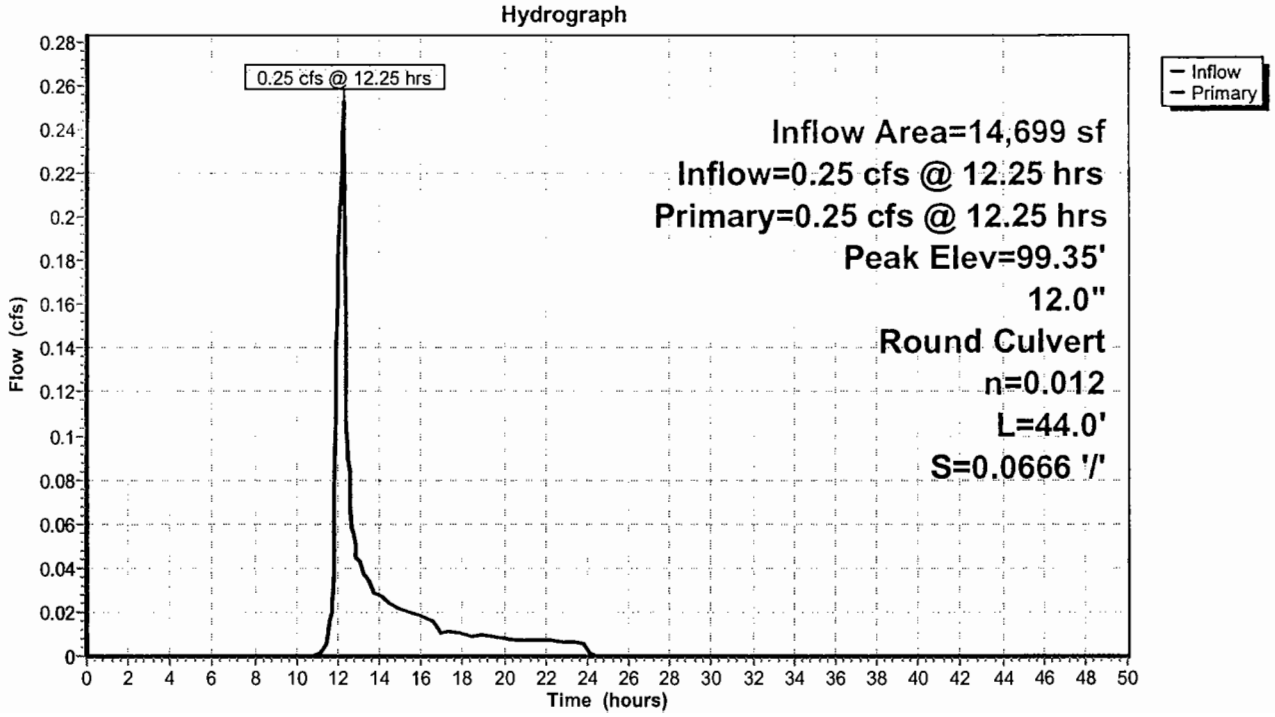
Inflow Area =	14,699 sf, 18.26% Impervious, Inflow Depth = 0.87" for 2yr event				
Inflow =	0.25 cfs @	12.25 hrs, Volume=	1,064 cf		
Outflow =	0.25 cfs @	12.25 hrs, Volume=	1,064 cf, Atten= 0%, Lag= 0.0 min		
Primary =	0.25 cfs @	12.25 hrs, Volume=	1,064 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 99.35' @ 12.25 hrs
Flood Elev= 103.25'

Device	Routing	Invert	Outlet Devices
#1	Primary	99.10'	**12.0" Round Culvert** L= 44.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 99.10' / 96.17' S= 0.0666 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.25 cfs @ 12.25 hrs HW=99.35' TW=96.65' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.25 cfs @ 1.69 fps)

Pond 8A:



Summary for Pond 8B:

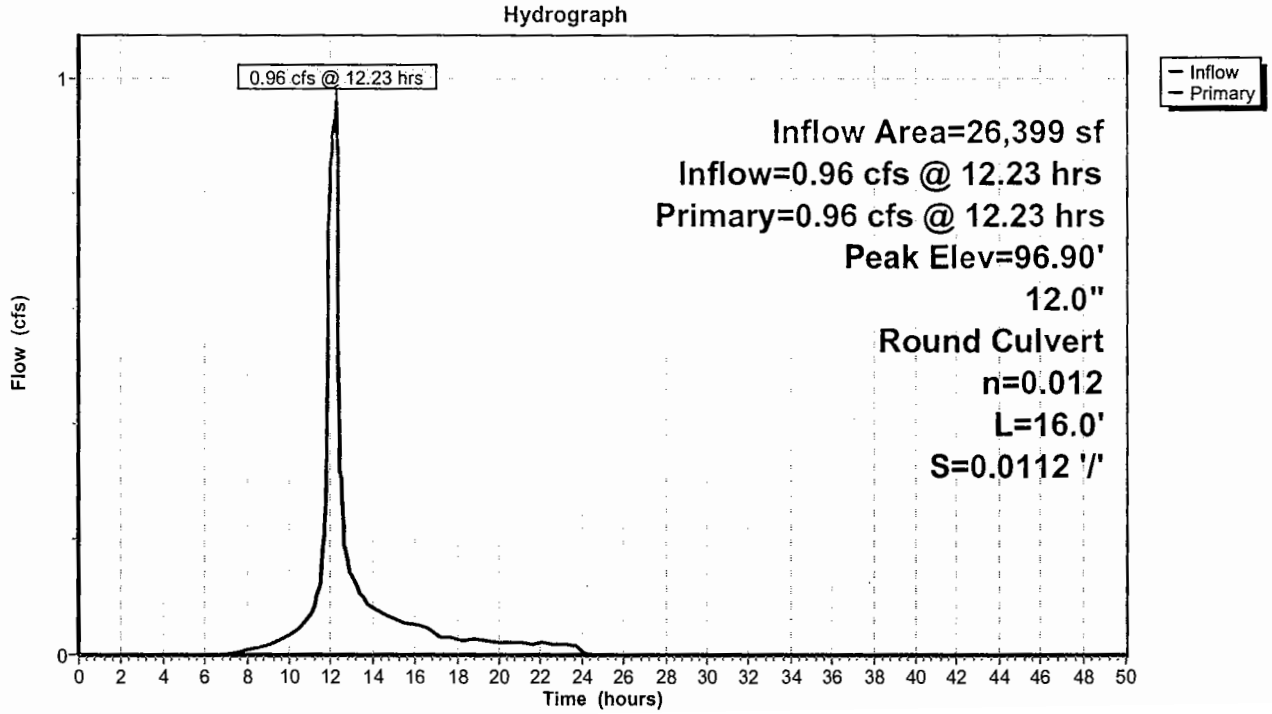
Inflow Area = 26,399 sf, 70.82% Impervious, Inflow Depth = 1.99" for 2yr event
Inflow = 0.96 cfs @ 12.23 hrs, Volume= 4,379 cf
Outflow = 0.96 cfs @ 12.23 hrs, Volume= 4,379 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.96 cfs @ 12.23 hrs, Volume= 4,379 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 96.90' @ 12.25 hrs
Flood Elev= 100.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.35'	**12.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.35' / 96.17' S= 0.0112 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.88 cfs @ 12.23 hrs HW=96.90' TW=96.63' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.88 cfs @ 2.92 fps)

Pond 8B:



Summary for Pond 8C: STORMCEPTOR

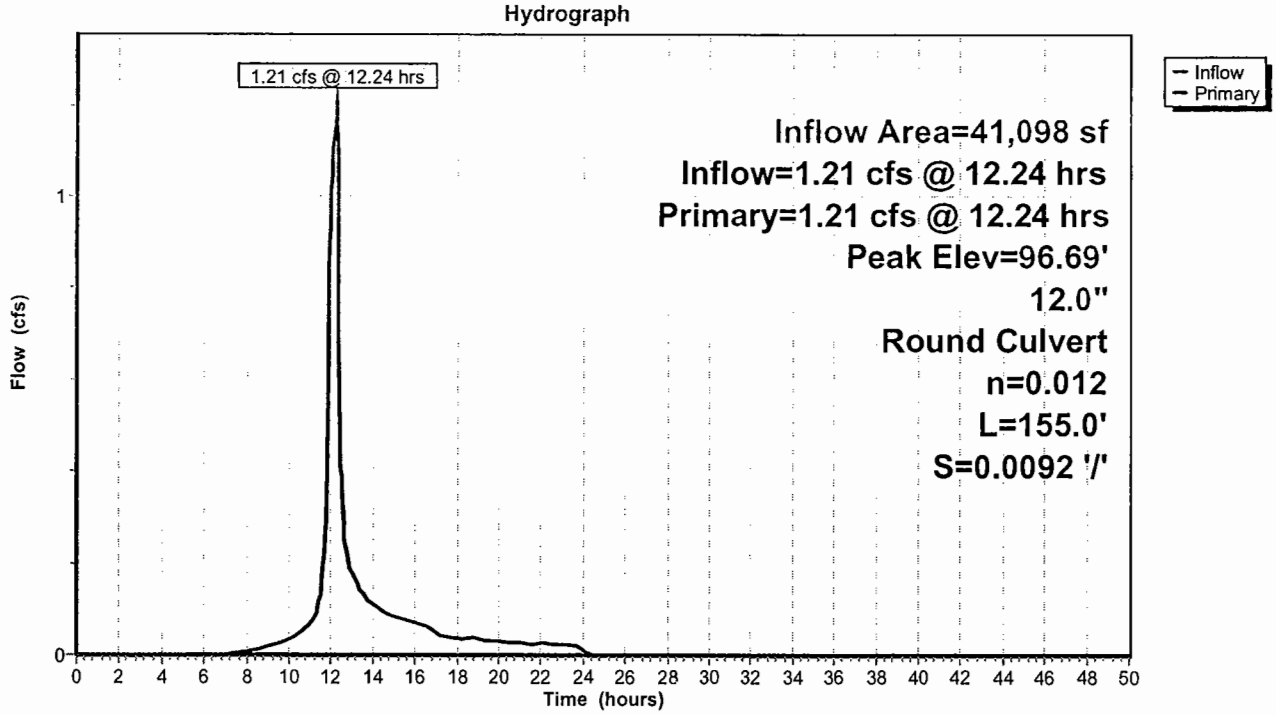
Inflow Area = 41,098 sf, 52.02% Impervious, Inflow Depth = 1.59" for 2yr event
Inflow = 1.21 cfs @ 12.24 hrs, Volume= 5,442 cf
Outflow = 1.21 cfs @ 12.24 hrs, Volume= 5,442 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.21 cfs @ 12.24 hrs, Volume= 5,442 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 96.69' @ 12.29 hrs
Flood Elev= 102.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	95.92'	**12.0" Round Culvert** L= 155.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.92' / 94.50' S= 0.0092 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.20 cfs @ 12.24 hrs HW=96.63' TW=95.97' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 1.20 cfs @ 2.81 fps)

Pond 8C: STORMCEPTOR



Summary for Pond 13A: STORMCEPTOR

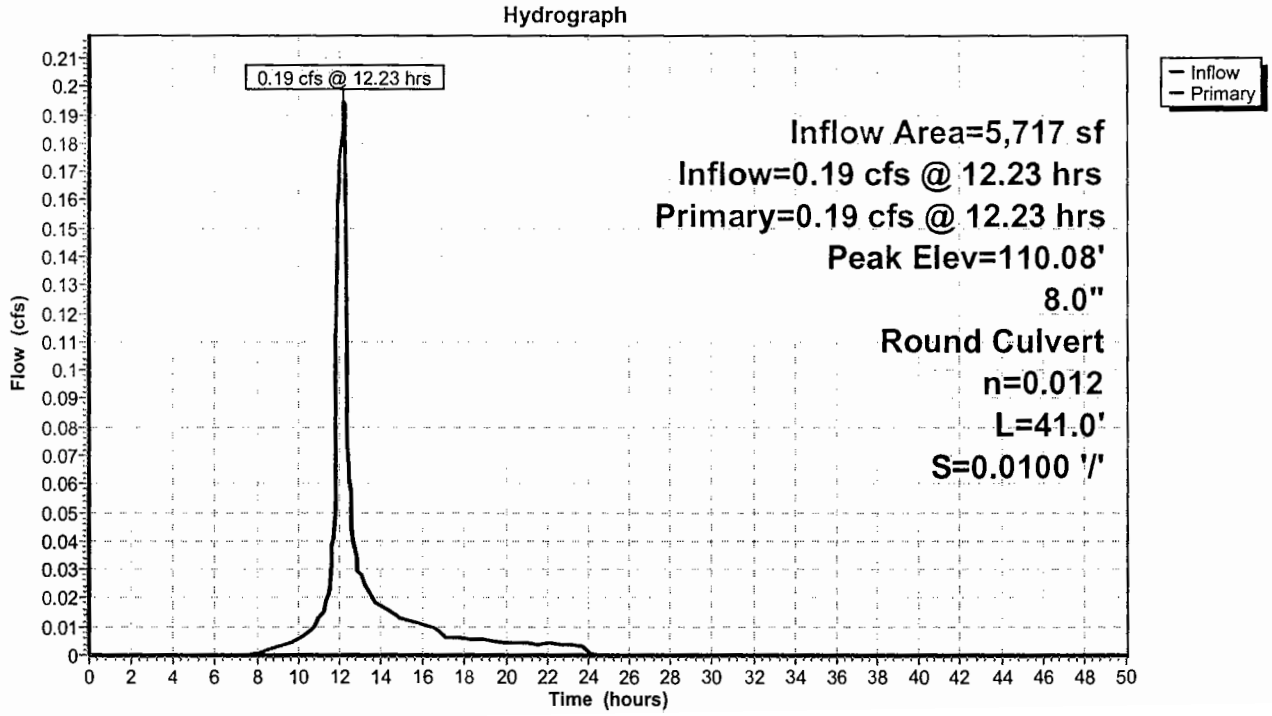
Inflow Area = 5,717 sf, 56.03% Impervious, Inflow Depth = 1.83" for 2yr event
Inflow = 0.19 cfs @ 12.23 hrs, Volume= 870 cf
Outflow = 0.19 cfs @ 12.23 hrs, Volume= 870 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.19 cfs @ 12.23 hrs, Volume= 870 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 110.08' @ 12.23 hrs
Flood Elev= 112.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	109.83'	**8.0" Round Culvert** L= 41.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 109.83' / 109.42' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.19 cfs @ 12.23 hrs HW=110.07' TW=109.58' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.19 cfs @ 2.47 fps)

Pond 13A: STORMCEPTOR



Summary for Pond 13B: DMH

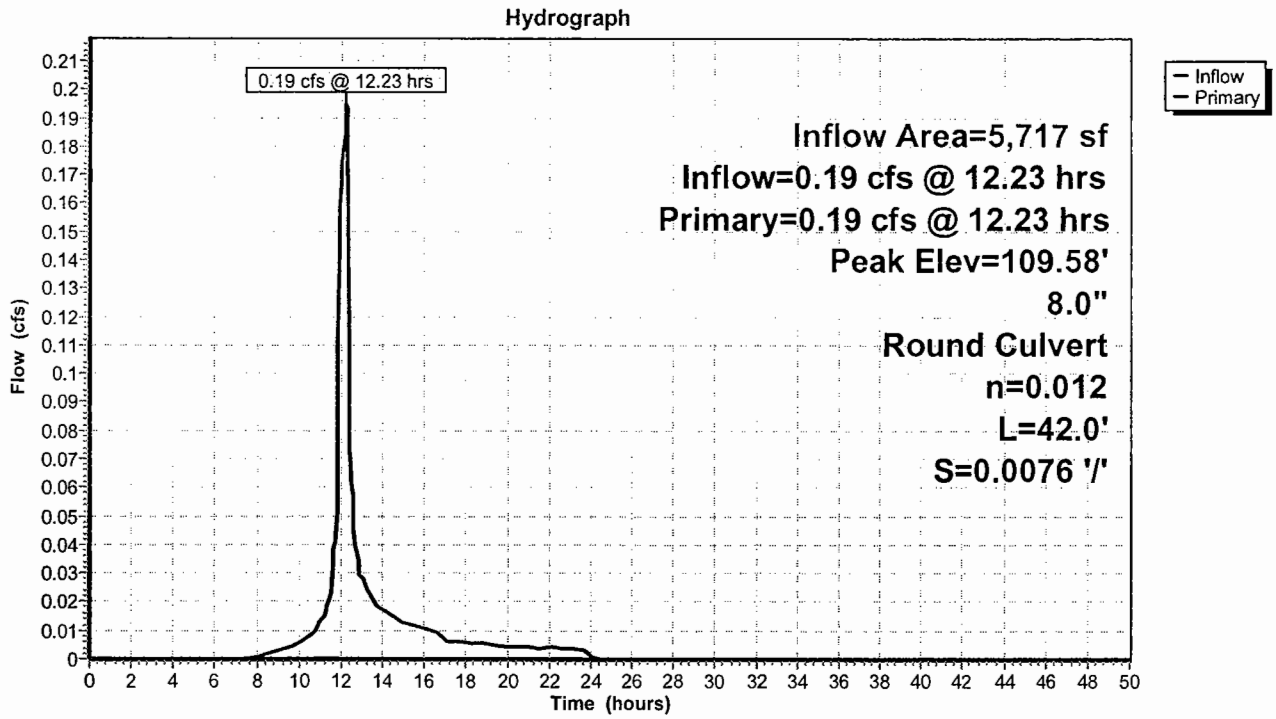
Inflow Area =	5,717 sf, 56.03% Impervious, Inflow Depth = 1.83" for 2yr event				
Inflow =	0.19 cfs @ 12.23 hrs, Volume=	870 cf			
Outflow =	0.19 cfs @ 12.23 hrs, Volume=	870 cf, Atten= 0%, Lag= 0.0 min			
Primary =	0.19 cfs @ 12.23 hrs, Volume=	870 cf			

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 109.58' @ 12.23 hrs
Flood Elev= 114.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	109.32'	**8.0" Round Culvert** L= 42.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 109.32' / 109.00' S= 0.0076 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Primary OutFlow Max=0.19 cfs @ 12.23 hrs HW=109.58' TW=94.05' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.19 cfs @ 2.27 fps)

Pond 13B: DMH



Summary for Pond 56A:

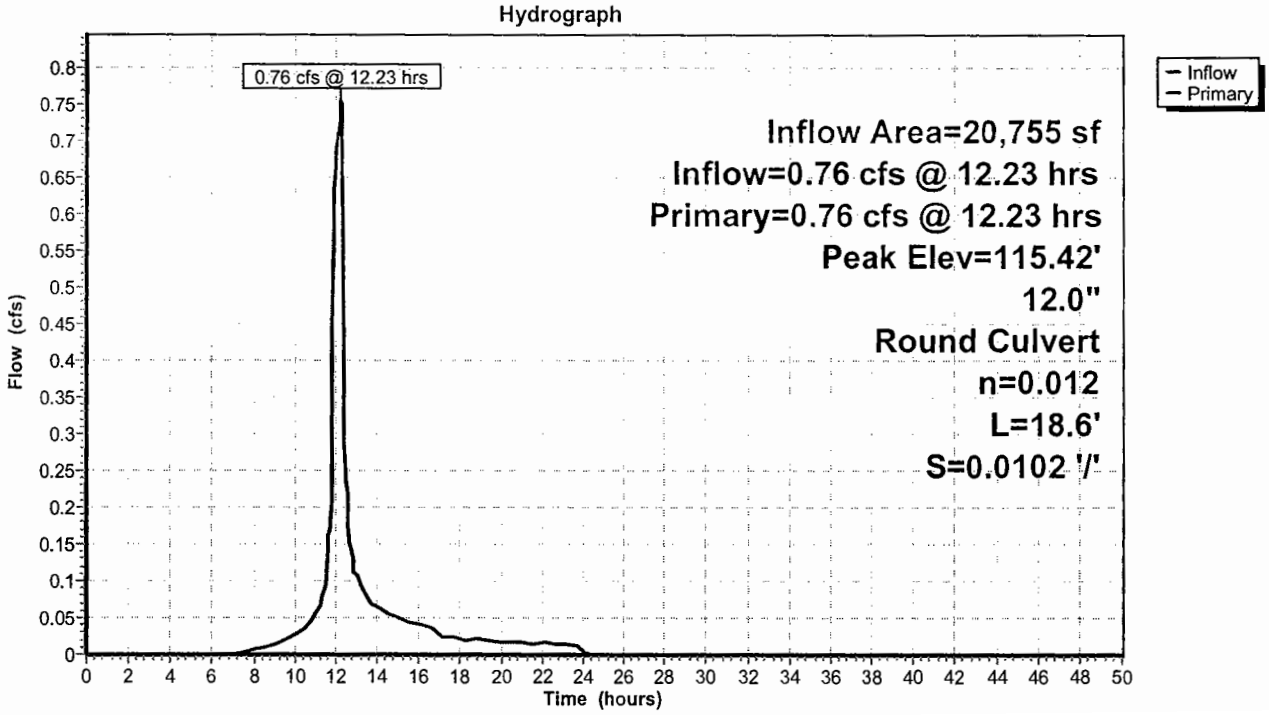
Inflow Area =	20,755 sf, 64.45% Impervious, Inflow Depth = 1.99" for 2yr event				
Inflow =	0.76 cfs @ 12.23 hrs, Volume=	3,443 cf			
Outflow =	0.76 cfs @ 12.23 hrs, Volume=	3,443 cf, Atten= 0%, Lag= 0.0 min			
Primary =	0.76 cfs @ 12.23 hrs, Volume=	3,443 cf			

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 115.42' @ 12.23 hrs
Flood Elev= 119.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	114.85'	**12.0" Round Culvert** L= 18.6' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 114.85' / 114.66' S= 0.0102 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.75 cfs @ 12.23 hrs HW=115.41' TW=115.23' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.75 cfs @ 2.37 fps)

Pond 56A:



Summary for Pond 56B:

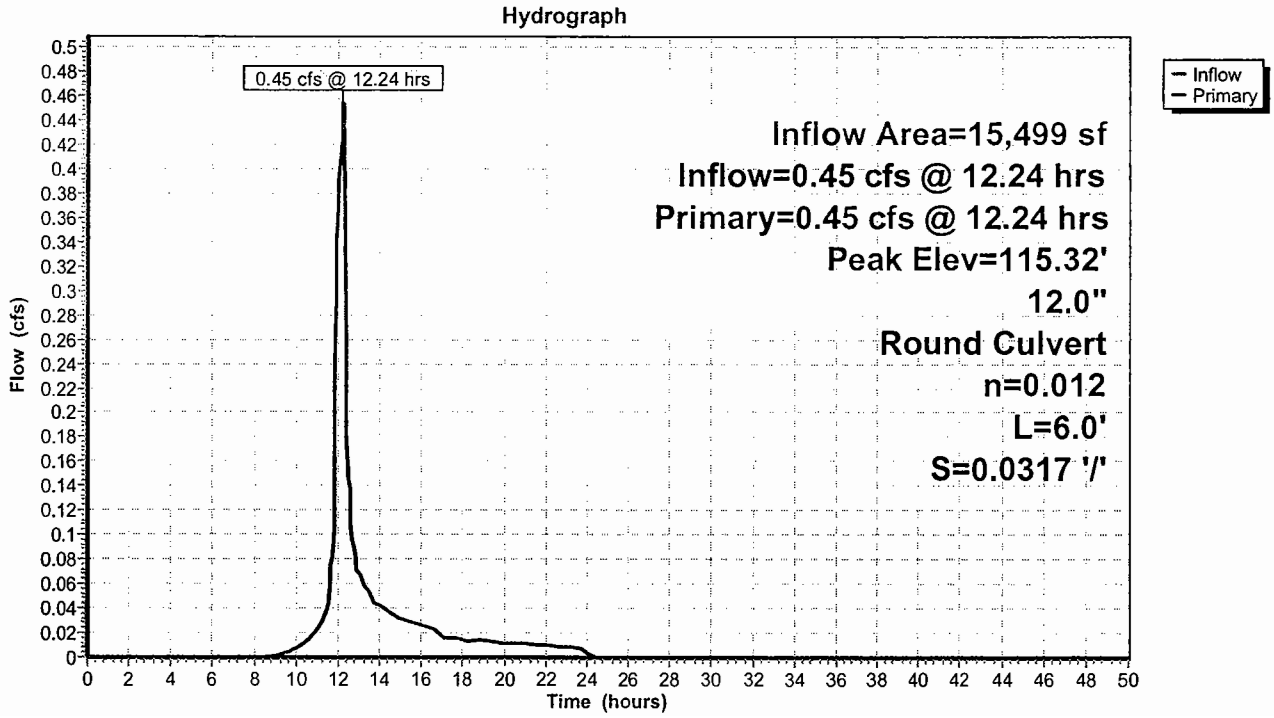
Inflow Area =	15,499 sf, 38.31% Impervious, Inflow Depth = 1.53" for 2yr event				
Inflow =	0.45 cfs @ 12.24 hrs, Volume=	1,973 cf			
Outflow =	0.45 cfs @ 12.24 hrs, Volume=	1,973 cf, Atten= 0%, Lag= 0.0 min			
Primary =	0.45 cfs @ 12.24 hrs, Volume=	1,973 cf			

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 115.32' @ 12.24 hrs
Flood Elev= 119.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	114.85'	**12.0" Round Culvert** L= 6.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 114.85' / 114.66' S= 0.0317 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.45 cfs @ 12.24 hrs HW=115.32' TW=115.23' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.45 cfs @ 1.82 fps)

Pond 56B:



Summary for Pond 56C: DMH

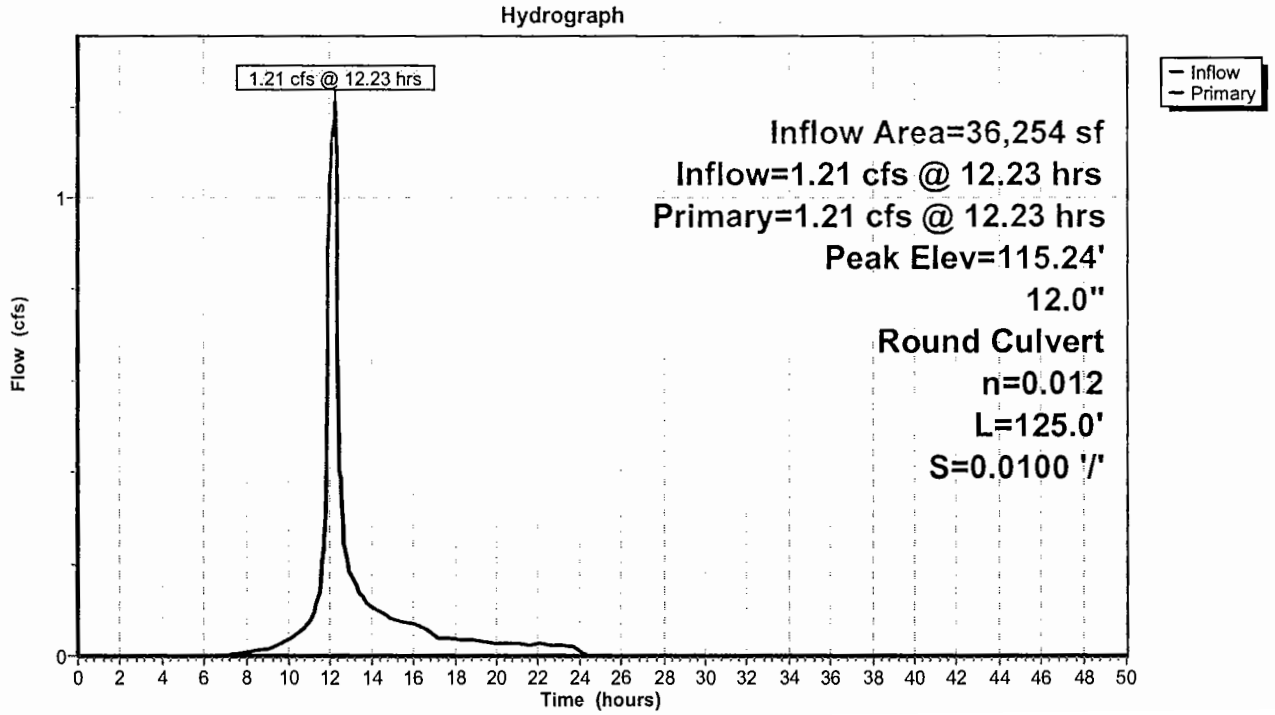
Inflow Area =	36,254 sf, 53.27% Impervious, Inflow Depth = 1.79" for 2yr event				
Inflow =	1.21 cfs @ 12.23 hrs, Volume=	5,416 cf			
Outflow =	1.21 cfs @ 12.23 hrs, Volume=	5,416 cf, Atten= 0%, Lag= 0.0 min			
Primary =	1.21 cfs @ 12.23 hrs, Volume=	5,416 cf			

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 115.24' @ 12.23 hrs
Flood Elev= 119.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	114.66'	**12.0" Round Culvert** L= 125.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 114.66' / 113.41' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.19 cfs @ 12.23 hrs HW=115.23' TW=113.98' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.19 cfs @ 2.57 fps)

Pond 56C: DMH



Summary for Pond 56D: DMH

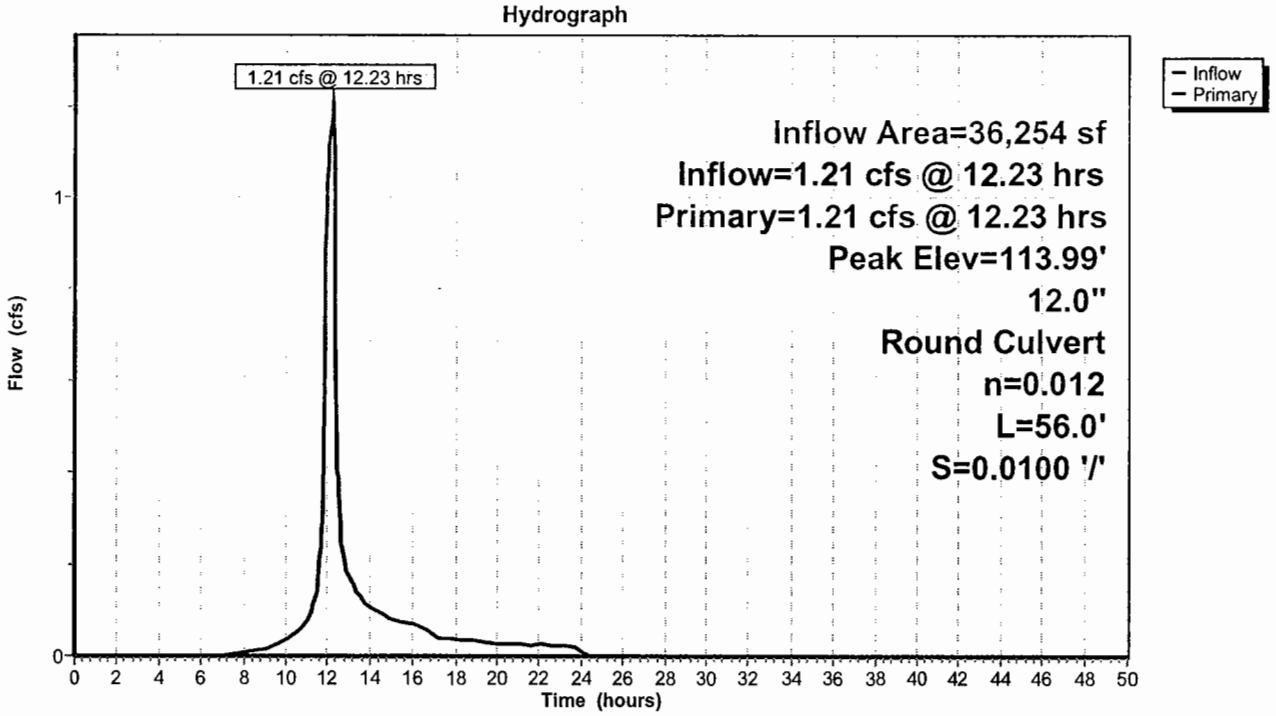
Inflow Area =	36,254 sf, 53.27% Impervious, Inflow Depth = 1.79" for 2yr event				
Inflow =	1.21 cfs @ 12.23 hrs, Volume=	5,416 cf			
Outflow =	1.21 cfs @ 12.23 hrs, Volume=	5,416 cf, Atten= 0%, Lag= 0.0 min			
Primary =	1.21 cfs @ 12.23 hrs, Volume=	5,416 cf			

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 113.99' @ 12.23 hrs
Flood Elev= 120.53'

Device	Routing	Invert	Outlet Devices
#1	Primary	113.41'	**12.0" Round Culvert** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 113.41' / 112.85' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.19 cfs @ 12.23 hrs HW=113.98' TW=113.28' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.19 cfs @ 2.57 fps)

Pond 56D: DMH



Summary for Pond 56E:

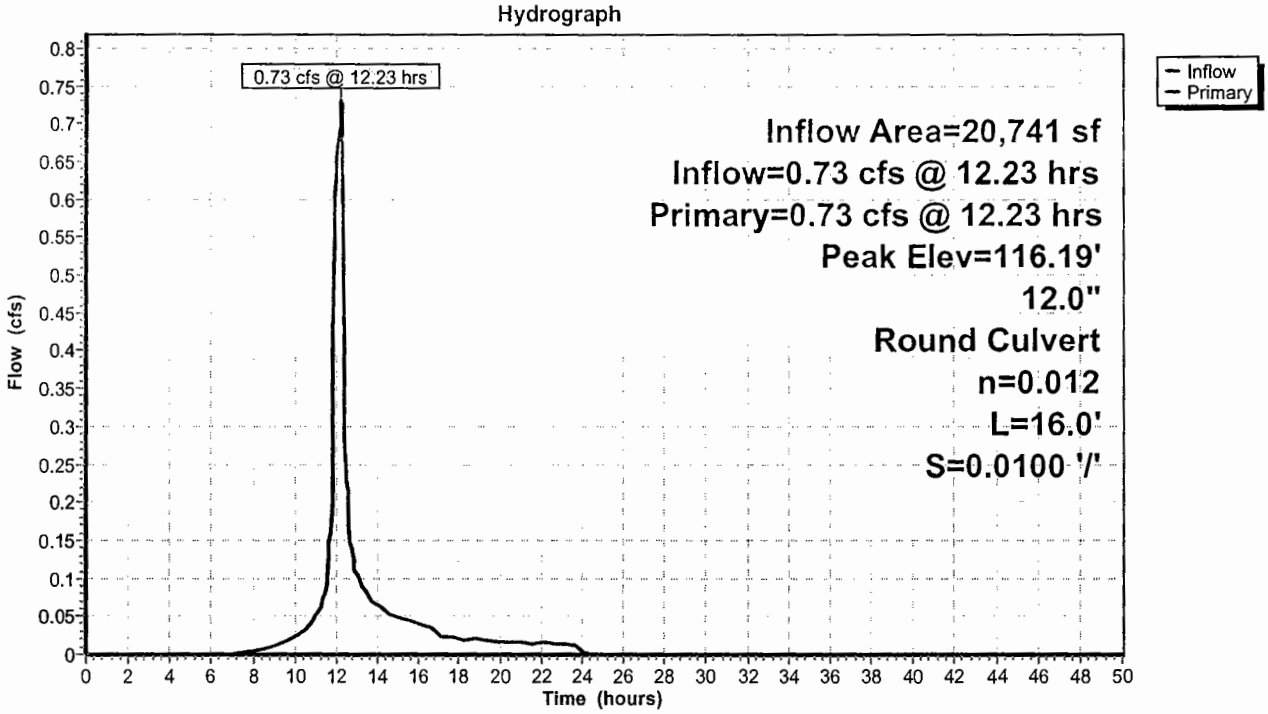
Inflow Area = 20,741 sf, 59.18% Impervious, Inflow Depth = 1.91" for 2yr event
Inflow = 0.73 cfs @ 12.23 hrs, Volume= 3,297 cf
Outflow = 0.73 cfs @ 12.23 hrs, Volume= 3,297 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.73 cfs @ 12.23 hrs, Volume= 3,297 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 116.19' @ 12.23 hrs
Flood Elev= 119.87'

Device	Routing	Invert	Outlet Devices
#1	Primary	115.72'	**12.0" Round Culvert** L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 115.72' / 115.56' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.72 cfs @ 12.23 hrs HW=116.19' TW=113.28' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.72 cfs @ 2.92 fps)

Pond 56E:



Summary for Pond 56F: DMH

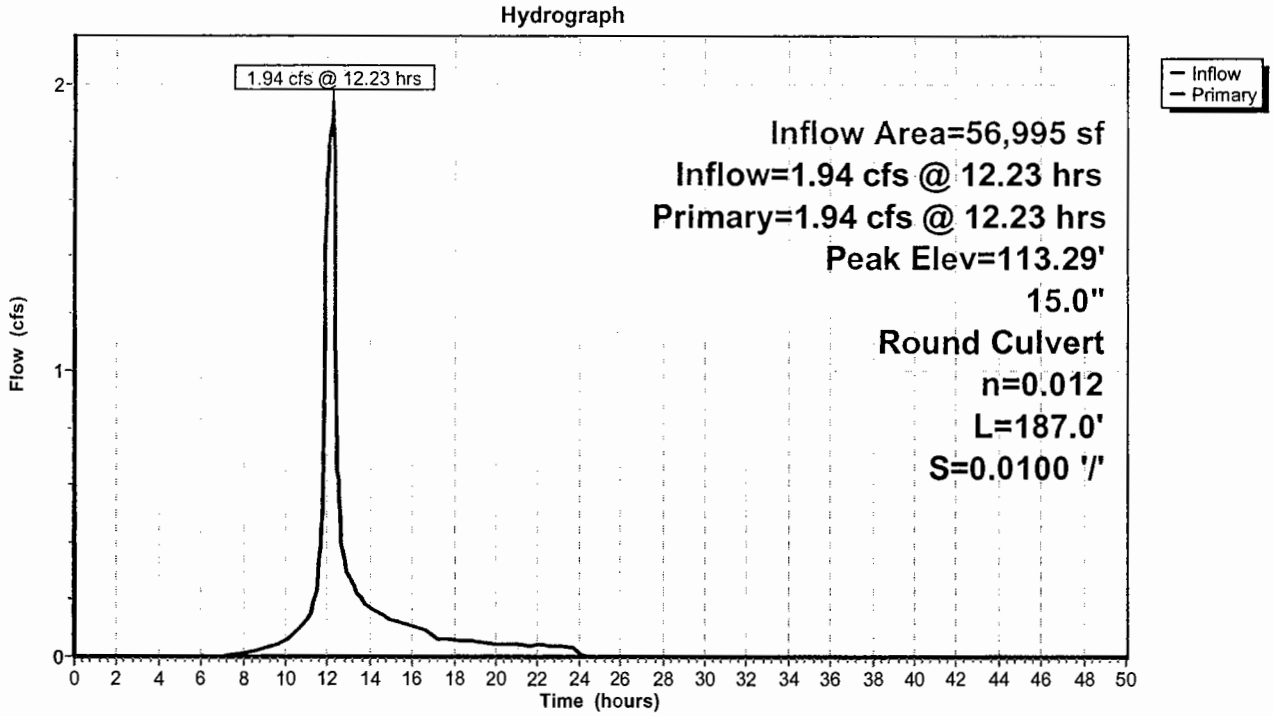
Inflow Area =	56,995 sf, 55.42% Impervious, Inflow Depth = 1.83" for 2yr event				
Inflow =	1.94 cfs @ 12.23 hrs, Volume=	8,712 cf			
Outflow =	1.94 cfs @ 12.23 hrs, Volume=	8,712 cf, Atten= 0%, Lag= 0.0 min			
Primary =	1.94 cfs @ 12.23 hrs, Volume=	8,712 cf			

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 113.29' @ 12.23 hrs
Flood Elev= 119.84'

Device	Routing	Invert	Outlet Devices
#1	Primary	112.60'	**15.0" Round Culvert** L= 187.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 112.60' / 110.73' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.92 cfs @ 12.23 hrs HW=113.28' TW=111.54' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.92 cfs @ 2.81 fps)

Pond 56F: DMH



Summary for Pond 56G:

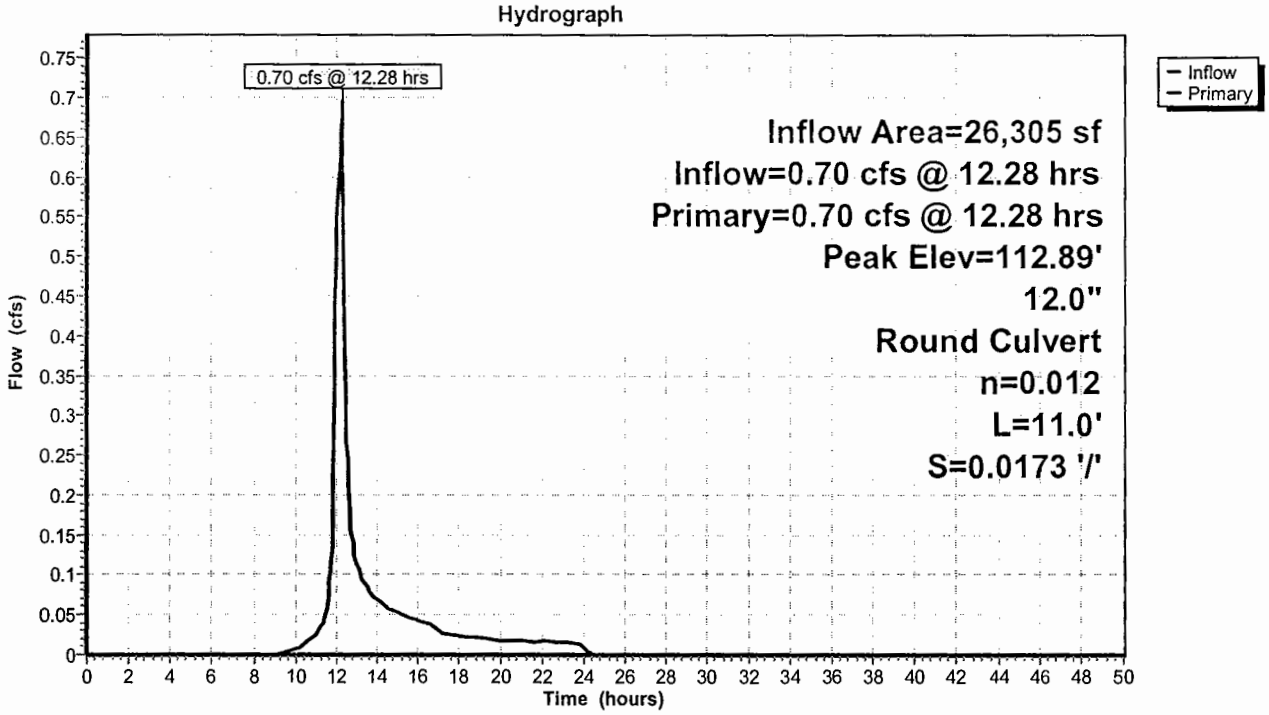
Inflow Area = 26,305 sf, 30.84% Impervious, Inflow Depth = 1.39" for 2yr event
Inflow = 0.70 cfs @ 12.28 hrs, Volume= 3,049 cf
Outflow = 0.70 cfs @ 12.28 hrs, Volume= 3,049 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.70 cfs @ 12.28 hrs, Volume= 3,049 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 112.89' @ 12.28 hrs
Flood Elev= 116.61'

Device	Routing	Invert	Outlet Devices
#1	Primary	112.46'	**12.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 112.46' / 112.27' S= 0.0173 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.68 cfs @ 12.28 hrs HW=112.89' TW=111.53' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.68 cfs @ 3.13 fps)

Pond 56G:



Summary for Pond 56H: DMH

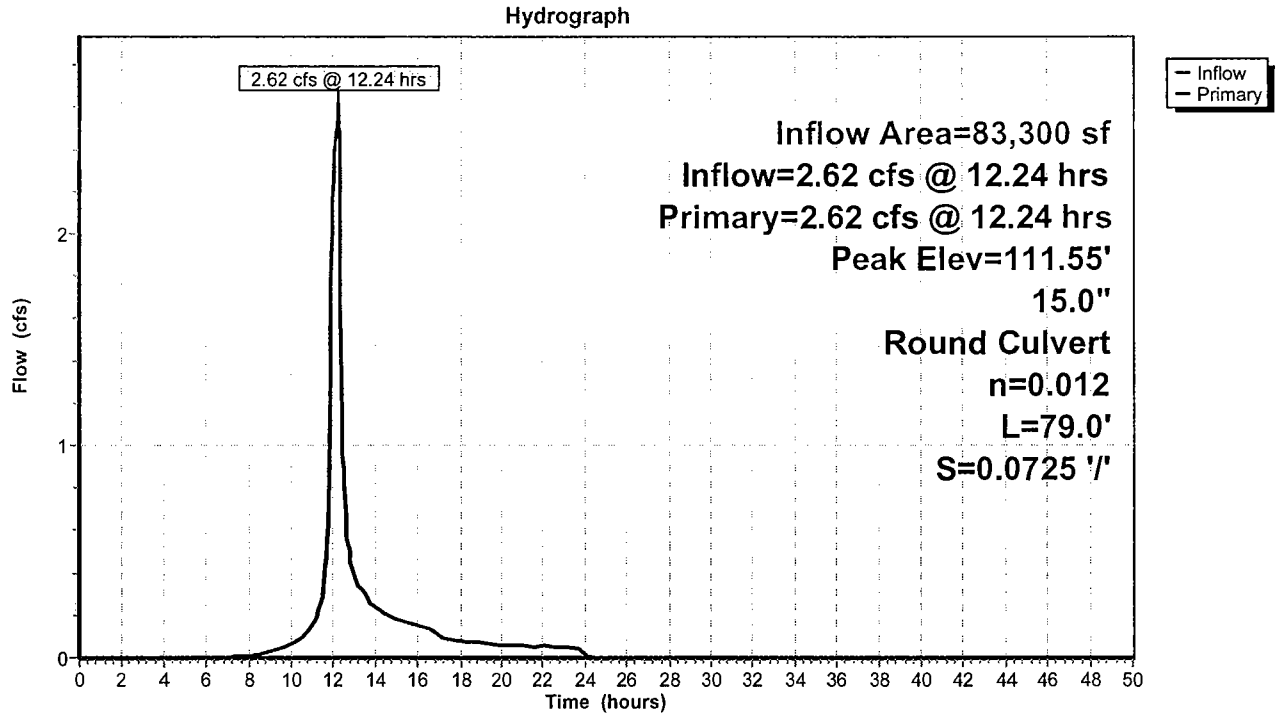
Inflow Area =	83,300 sf, 47.66% Impervious,	Inflow Depth =	1.69"	for 2yr event	
Inflow =	2.62 cfs @ 12.24 hrs,	Volume=	11,761 cf		
Outflow =	2.62 cfs @ 12.24 hrs,	Volume=	11,761 cf,	Atten= 0%,	Lag= 0.0 min
Primary =	2.62 cfs @ 12.24 hrs,	Volume=	11,761 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 111.55' @ 12.24 hrs
Flood Elev= 116.42'

Device	Routing	Invert	Outlet Devices
#1	Primary	110.73'	**15.0" Round Culvert** L= 79.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 110.73' / 105.00' S= 0.0725 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=2.59 cfs @ 12.24 hrs HW=111.54' TW=105.67' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.59 cfs @ 3.07 fps)

Pond 56H: DMH



Summary for Pond 56i:

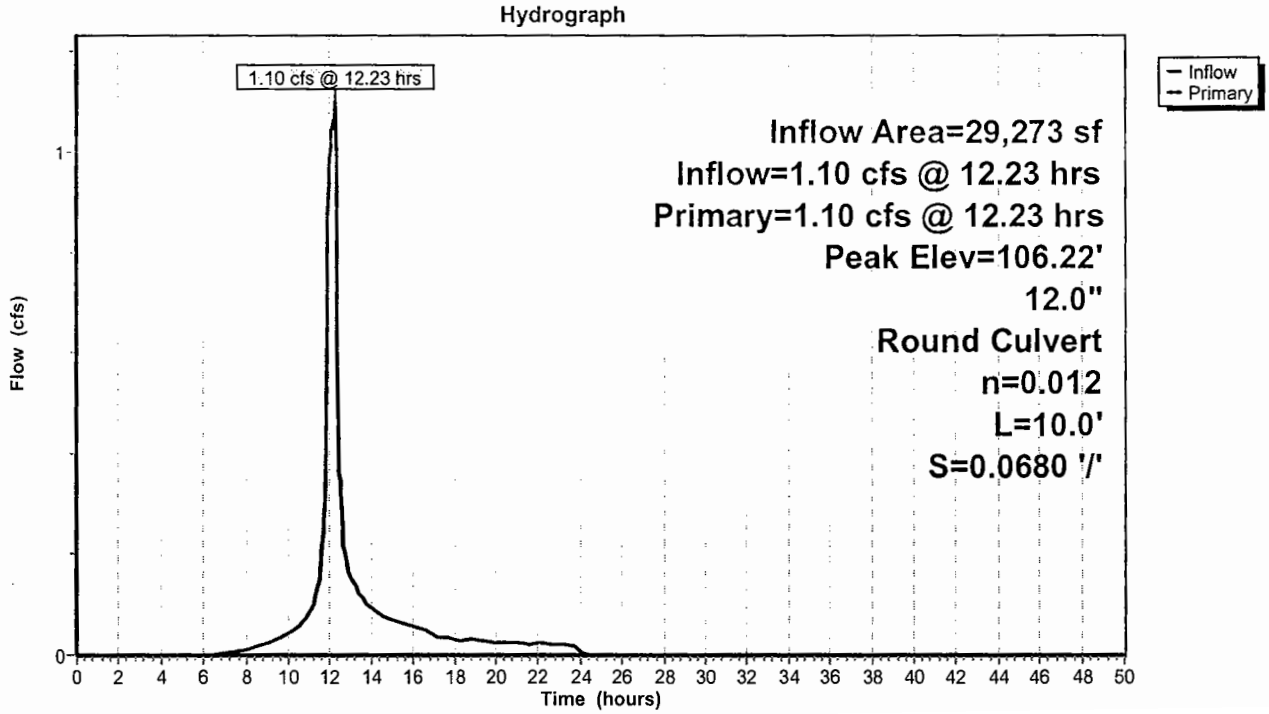
Inflow Area =	29,273 sf, 66.13% Impervious, Inflow Depth = 2.08" for 2yr event				
Inflow =	1.10 cfs @ 12.23 hrs, Volume=	5,065 cf			
Outflow =	1.10 cfs @ 12.23 hrs, Volume=	5,065 cf, Atten= 0%, Lag= 0.0 min			
Primary =	1.10 cfs @ 12.23 hrs, Volume=	5,065 cf			

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 106.22' @ 12.23 hrs
Flood Elev= 109.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	105.68'	**12.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 105.68' / 105.00' S= 0.0680 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.08 cfs @ 12.23 hrs HW=106.22' TW=105.66' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.08 cfs @ 2.50 fps)

Pond 56i:



Summary for Pond 56J: STORMCEPTOR

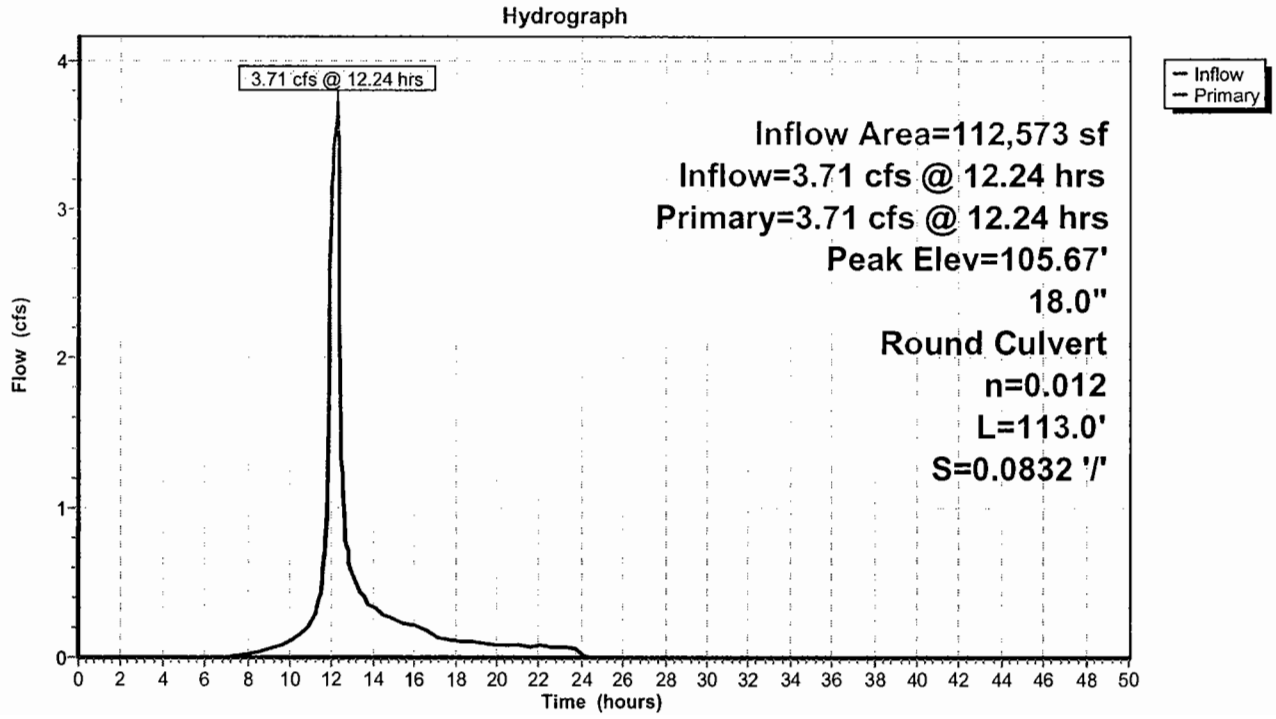
Inflow Area = 112,573 sf, 52.46% Impervious, Inflow Depth = 1.79" for 2yr event
Inflow = 3.71 cfs @ 12.24 hrs, Volume= 16,826 cf
Outflow = 3.71 cfs @ 12.24 hrs, Volume= 16,826 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.71 cfs @ 12.24 hrs, Volume= 16,826 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 105.67' @ 12.24 hrs
Flood Elev= 109.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	104.75'	**18.0" Round 95.35** L= 113.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 104.75' / 95.35' S= 0.0832 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Primary OutFlow Max=3.68 cfs @ 12.24 hrs HW=105.66' TW=96.15' (Dynamic Tailwater)
└**1=95.35** (Inlet Controls 3.68 cfs @ 3.26 fps)

Pond 56J: STORMCEPTOR



Summary for Pond 56K: DMH

Inflow Area =	112,573 sf, 52.46% Impervious, Inflow Depth = 1.79" for 2yr event				
Inflow =	3.71 cfs @	12.24 hrs,	Volume=	16,826 cf	
Outflow =	3.71 cfs @	12.24 hrs,	Volume=	16,826 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.07 cfs @	12.24 hrs,	Volume=	8,971 cf	
Secondary =	1.65 cfs @	12.24 hrs,	Volume=	7,855 cf	

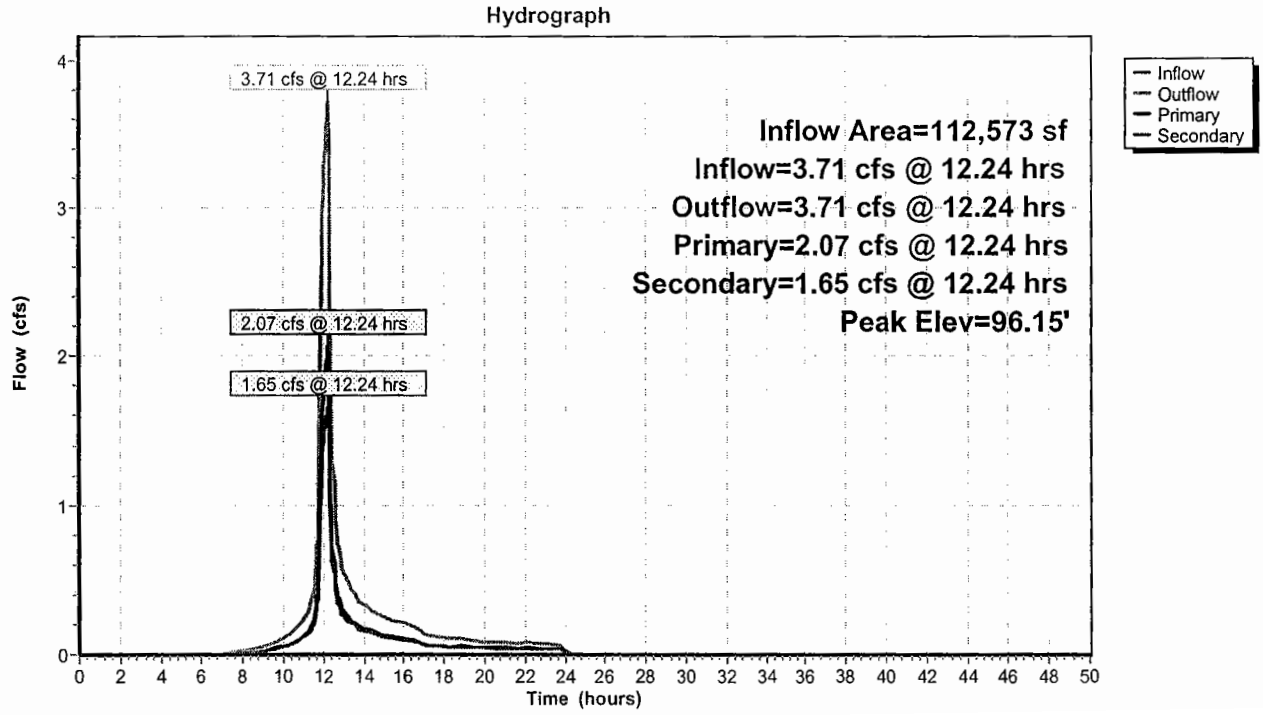
Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 96.15' @ 12.24 hrs
Flood Elev= 100.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	95.35'	**12.0" Round Culvert** L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.35' / 94.70' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Secondary	95.35'	**10.0" Round Culvert** L= 93.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.35' / 88.13' S= 0.0776 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

Primary OutFlow Max=2.04 cfs @ 12.24 hrs HW=96.15' TW=93.43' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 2.04 cfs @ 3.04 fps)

Secondary OutFlow Max=1.63 cfs @ 12.24 hrs HW=96.15' TW=85.41' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 1.63 cfs @ 3.04 fps)

Pond 56K: DMH



Summary for Pond RES02:

Inflow Area =	306,230 sf, 42.39% Impervious,	Inflow Depth = 1.55"	for 2yr event		
Inflow =	8.83 cfs @ 12.24 hrs, Volume=	39,476 cf			
Outflow =	3.97 cfs @ 12.42 hrs, Volume=	39,476 cf,	Atten= 55%,	Lag= 10.6 min	
Discarded =	1.31 cfs @ 12.42 hrs, Volume=	31,194 cf			
Primary =	2.65 cfs @ 12.42 hrs, Volume=	8,282 cf			

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 89.64' @ 12.42 hrs Surf.Area= 10,452 sf Storage= 10,557 cf

Plug-Flow detention time=33.0 min calculated for 39,437 cf (100% of inflow)
Center-of-Mass det. time=33.0 min (864.8 - 831.8)

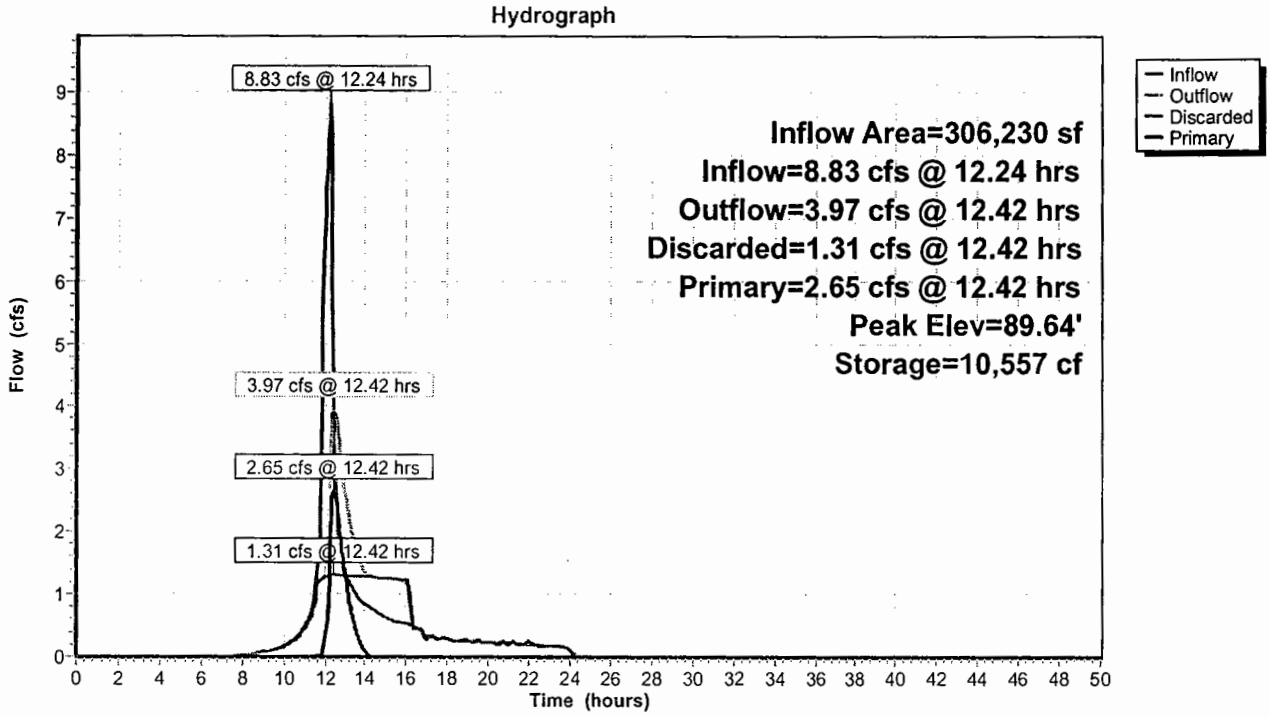
Volume	Invert	Avail.Storage	Storage Description
#1	87.50'	13,831 cf	**134.00'W x 78.00'L x 5.50'H Prismatoid**
			57,486 cf Overall - 17,970 cf Embedded = 39,516 cf x 35.0% Voids
#2	88.50'	17,970 cf	**48.0" D x 130.0'L Pipe Storage**x 11 Inside #1
		31,801 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	88.65'	**12.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	90.08'	**20.0" Vert. Orifice/Grate** C= 0.600
#3	Discarded	87.50'	**5.000 in/hr Exfiltration over Wetted area** Phase-In= 0.02'

Discarded OutFlow Max=1.31 cfs @ 12.42 hrs HW=89.63' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 1.31 cfs)

Primary OutFlow Max=2.64 cfs @ 12.42 hrs HW=89.63' TW=80.05' (Dynamic Tailwater)
├─**1=Orifice/Grate** (Orifice Controls 2.64 cfs @ 3.38 fps)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond RES02:


Hydrograph
8.83 cfs @ 12.24 hrs
3.97 cfs @ 12.42 hrs
2.65 cfs @ 12.42 hrs
1.31 cfs @ 12.42 hrs
Inflow Area=306,230 sf
Inflow=8.83 cfs @ 12.24 hrs
Outflow=3.97 cfs @ 12.42 hrs
Discarded=1.31 cfs @ 12.42 hrs
Primary=2.65 cfs @ 12.42 hrs
Peak Elev=89.64'
Storage=10,557 cf
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)

Summary for Pond RES03:

Inflow Area = 128,893 sf, 45.42% Impervious, Inflow Depth = 0.97" for 2yr event
Inflow = 2.44 cfs @ 12.25 hrs, Volume= 10,391 cf
Outflow = 0.14 cfs @ 16.79 hrs, Volume= 6,404 cf, Atten= 94%, Lag= 272.5 min
Primary = 0.14 cfs @ 16.79 hrs, Volume= 6,404 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 80.34' @ 16.79 hrs Surf.Area= 5,570 sf Storage= 6,515 cf

Plug-Flow detention time= 477.0 min calculated for 6,404 cf (62% of inflow)
Center-of-Mass det. time= 358.4 min (1,221.7 - 863.3)

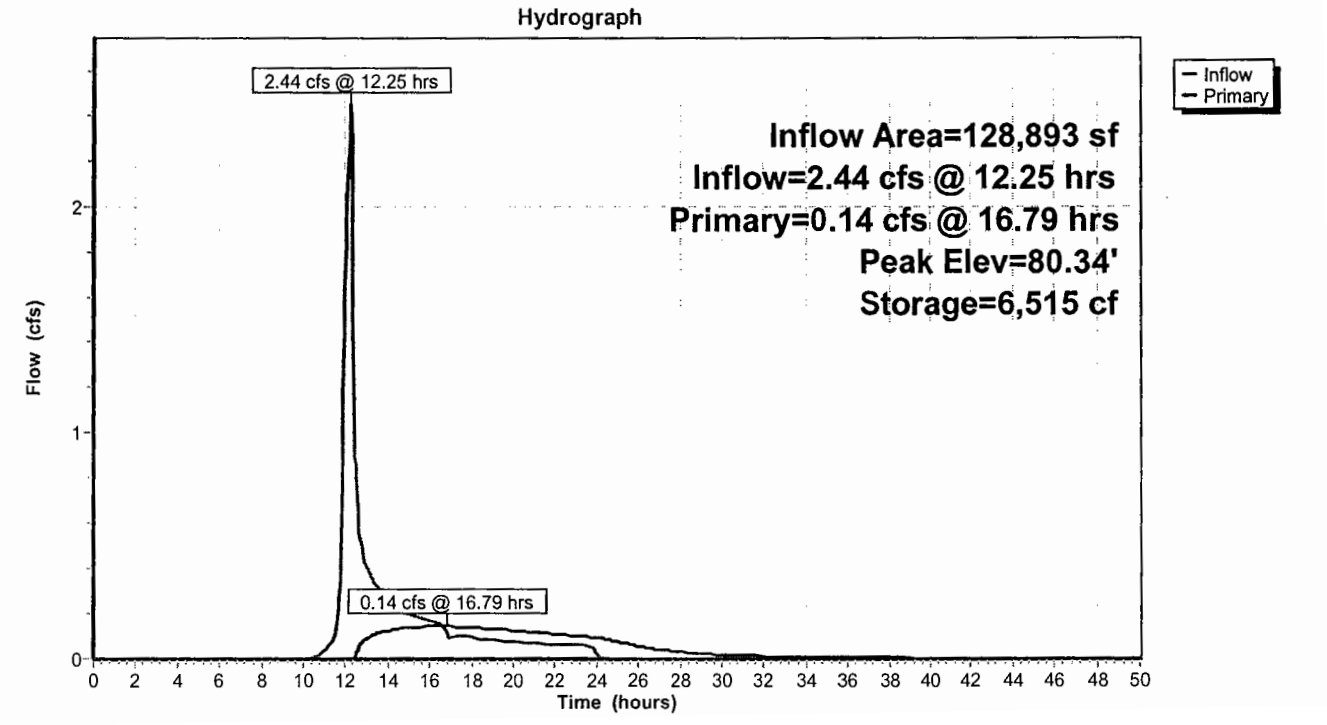
Volume	Invert	Avail.Storage	Storage Description
#1	79.00'	32,133 cf	**Struc 3 (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
79.00	4,168	0	0
80.00	5,198	4,683	4,683
81.00	6,291	5,745	10,428
82.00	8,390	7,341	17,768
83.00	9,854	9,122	26,890
83.50	11,118	5,243	32,133

Device	Routing	Invert	Outlet Devices
#1	Primary	79.84'	**3.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	83.00'	**8.0' long x 12.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.14 cfs @ 16.79 hrs HW=80.34' TW=0.00' (Dynamic Tailwater)
└─**1=Orifice/Grate** (Orifice Controls 0.14 cfs @ 2.95 fps)
└─**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond RES03:


Hydrograph
2.44 cfs @ 12.25 hrs
0.14 cfs @ 16.79 hrs
Inflow
Primary
Inflow Area=128,893 sf
Inflow=2.44 cfs @ 12.25 hrs
Primary=0.14 cfs @ 16.79 hrs
Peak Elev=80.34'
Storage=6,515 cf
Flow (cfs)
Time (hours)
0
1
2
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50

Summary for Pond RES04: Struc 4

Inflow Area = 293,459 sf, 47.93% Impervious, Inflow Depth = 1.48" for 2yr event
Inflow = 7.96 cfs @ 12.25 hrs, Volume= 36,185 cf
Outflow = 0.37 cfs @ 16.84 hrs, Volume= 29,682 cf, Atten= 95%, Lag= 275.8 min
Primary = 0.37 cfs @ 16.84 hrs, Volume= 29,682 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 86.06' @ 16.84 hrs Surf.Area= 15,929 sf Storage= 25,666 cf

Plug-Flow detention time= 880.0 min calculated for 29,682 cf (82% of inflow)
Center-of-Mass det. time= 806.5 min (1,636.7 - 830.3)

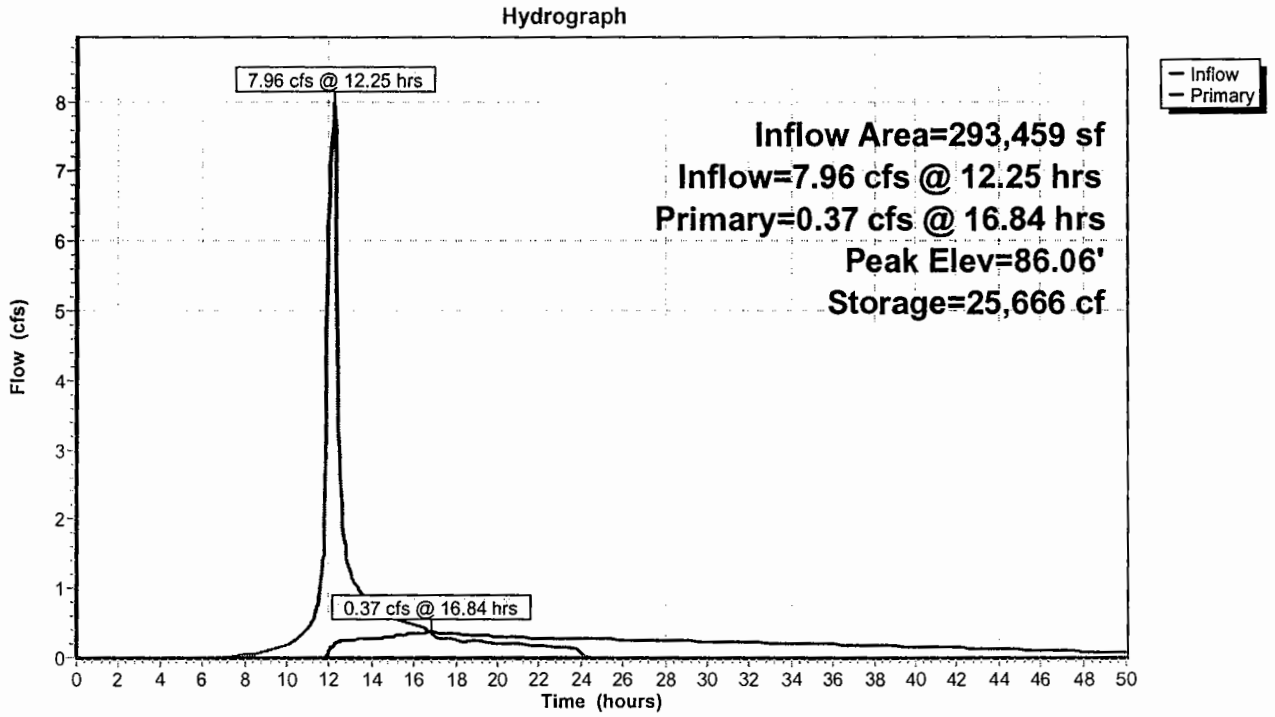
Volume	Invert	Avail.Storage	Storage Description
#1	84.00'	70,668 cf	**Struc 4 (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
84.00	9,200	0	0
85.00	12,161	10,681	10,681
86.00	15,800	13,981	24,661
87.00	17,835	16,818	41,479
88.00	19,946	18,891	60,369
88.50	21,250	10,299	70,668

Device	Routing	Invert	Outlet Devices
#1	Primary	84.43'	**3.0" Vert. Orifice/Grate** C= 0.600
#2	Primary	85.93'	**12.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	88.20'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.37 cfs @ 16.84 hrs HW=86.06' TW=0.00' (Dynamic Tailwater)
- **1=Orifice/Grate** (Orifice Controls 0.29 cfs @ 5.91 fps)
- **2=Orifice/Grate** (Orifice Controls 0.08 cfs @ 1.24 fps)
- **3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond RES04: Struc 4



Summary for Pond RES05: New Pond

Inflow Area =	112,573 sf, 52.46% Impervious,	Inflow Depth = 0.96"	for 2yr event		
Inflow =	2.07 cfs @ 12.24 hrs,	Volume=	8,971 cf		
Outflow =	1.06 cfs @ 12.37 hrs,	Volume=	8,971 cf,	Atten= 49%,	Lag= 8.3 min
Discarded =	1.06 cfs @ 12.37 hrs,	Volume=	8,971 cf		
Primary =	0.00 cfs @ 0.00 hrs,	Volume=	0 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 93.63' @ 12.37 hrs Surf.Area= 2,542 sf Storage= 1,421 cf
Flood Elev= 97.88' Surf.Area= 2,542 sf Storage= 8,883 cf

Plug-Flow detention time= 7.0 min calculated for 8,962 cf (100% of inflow)
Center-of-Mass det. time= 7.0 min (824.8 - 817.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	92.25'	2,745 cf	**31.00'W x 82.00'L x 5.50'H Field A** 13,981 cf Overall - 6,138 cf Embedded = 7,843 cf x 35.0% Voids
#2A	93.25'	6,138 cf	**CMP_Round 48** x 6 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf Overall Size= 48.0"W x 48.0"H x 20.00'L Row Length Adjustment= +52.00' x 12.53 sf x 6 rows 29.00' Header x 12.53 sf x 2 = 726.5 cf
		8,883 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	92.25'	**16.000 in/hr Exfiltration over Wetted area** Phase-In= 0.08'
#2	Primary	96.88'	**30.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 2	94.50'	**18.0" Round Culvert** L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 94.50' / 94.50' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=1.06 cfs @ 12.37 hrs HW=93.63' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 1.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=92.25' TW=0.00' (Dynamic Tailwater)
└─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Culvert** (Controls 0.00 cfs)

Pond RES05: New Pond - Chamber Wizard Field A

Chamber Model = CMP_Round 48
Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf
Overall Size= 48.0"W x 48.0"H x 20.00'L
Row Length Adjustment= +52.00' x 12.53 sf x 6 rows

48.0" Wide + 12.0" Spacing = 60.0" C-C Row Spacing

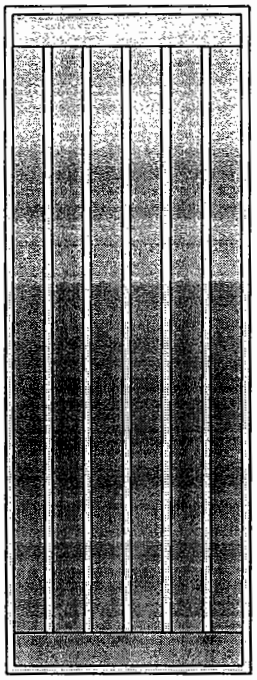
1 Chambers/Row x 20.00' Long +52.00' Row Adjustment +4.00' Header x 2 = 80.00' Row Length +12.0" End Stone x 2 = 82.00' Base Length
6 Rows x 48.0" Wide + 12.0" Spacing x 5 + 12.0" Side Stone x 2 = 31.00' Base Width
12.0" Base + 48.0" Chamber Height + 6.0" Cover = 5.50' Field Height

6 Chambers x 250.5 cf +52.00' Row Adjustment x 12.53 sf x 6 Rows + 29.00' Header x 12.53 sf x 2 = 6,138.1 cf Chamber Storage

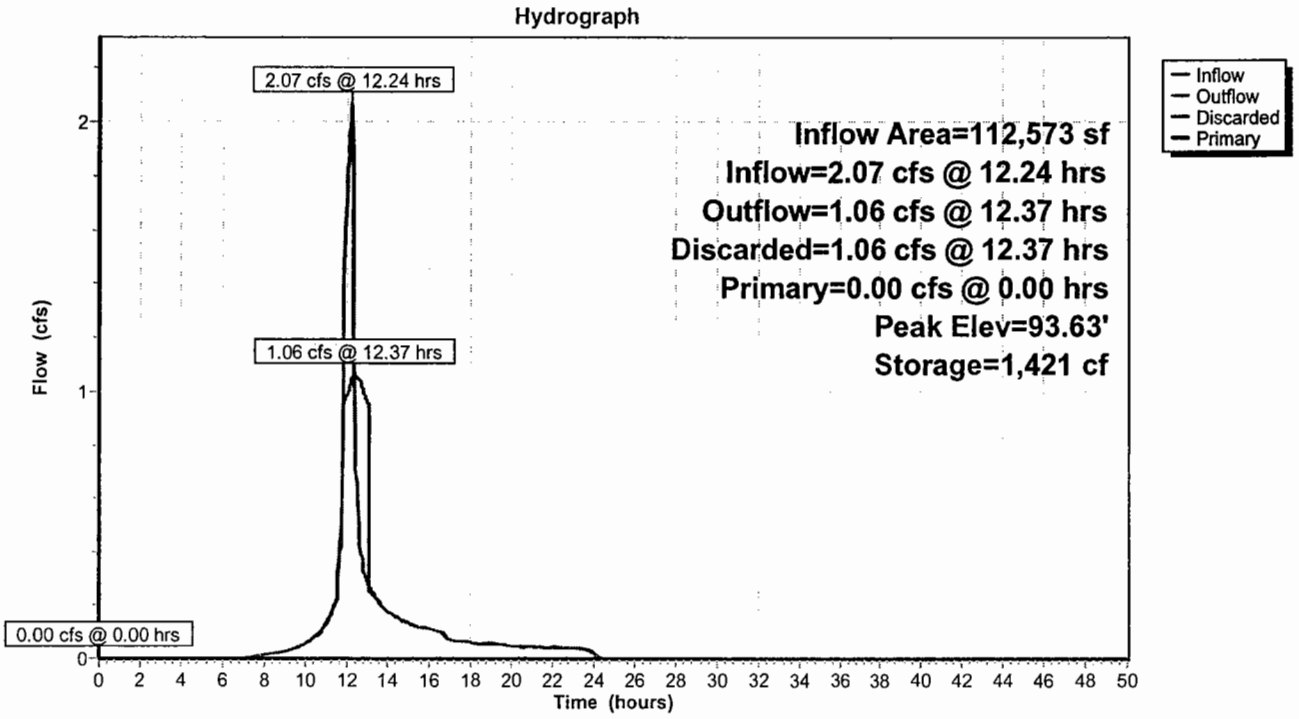
13,981.0 cf Field - 6,138.1 cf Chambers = 7,842.9 cf Stone x 35.0% Voids = 2,745.0 cf Stone Storage

Stone + Chamber Storage = 8,883.1 cf = 0.204 af
Overall Storage Efficiency = 63.5%

6 Chambers
517.8 cy Field
290.5 cy Stone



Pond RES05: New Pond



Summary for Pond RES06: New Pond

Inflow Area =	29,548 sf, 63.09% Impervious,	Inflow Depth =	4.80"	for 2yr event	
Inflow =	2.46 cfs @ 12.24 hrs,	Volume=	11,820 cf		
Outflow =	1.13 cfs @ 12.40 hrs,	Volume=	11,820 cf,	Atten= 54%,	Lag= 9.9 min
Discarded =	1.13 cfs @ 12.40 hrs,	Volume=	11,820 cf		
Primary =	0.00 cfs @ 0.00 hrs,	Volume=	0 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 85.66' @ 12.40 hrs Surf.Area= 2,703 sf Storage= 2,022 cf
Flood Elev= 89.63' Surf.Area= 2,703 sf Storage= 9,502 cf

Plug-Flow detention time=9.2 min calculated for 11,809 cf (100% of inflow)
Center-of-Mass det. time=9.2 min (823.4 - 814.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	84.00'	2,888 cf	**51.00'W x 53.00'L x 5.50'H Field A** 14,867 cf Overall - 6,614 cf Embedded = 8,252 cf x 35.0% Voids
#2A	85.00'	6,614 cf	**CMP_Round 48** x 10 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf Overall Size= 48.0"W x 48.0"H x 20.00'L Row Length Adjustment= +23.00' x 12.53 sf x 10 rows 49.00' Header x 12.53 sf x 2 = 1,227.6 cf
		9,502 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	84.00'	**16.000 in/hr Exfiltration over Wetted area** Phase-In= 0.08'
#2	Primary	88.63'	**30.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 2	86.50'	**18.0" Round Culvert** L= 7.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 86.50' / 86.25' S= 0.0357 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=1.13 cfs @ 12.40 hrs HW=85.66' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 1.13 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=84.00' TW=0.00' (Dynamic Tailwater)
└─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Culvert** (Controls 0.00 cfs)

Pond RES06: New Pond - Chamber Wizard Field A

Chamber Model = CMP_Round 48
Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf
Overall Size= 48.0"W x 48.0"H x 20.00'L
Row Length Adjustment= +23.00' x 12.53 sf x 10 rows

48.0" Wide + 12.0" Spacing = 60.0" C-C Row Spacing

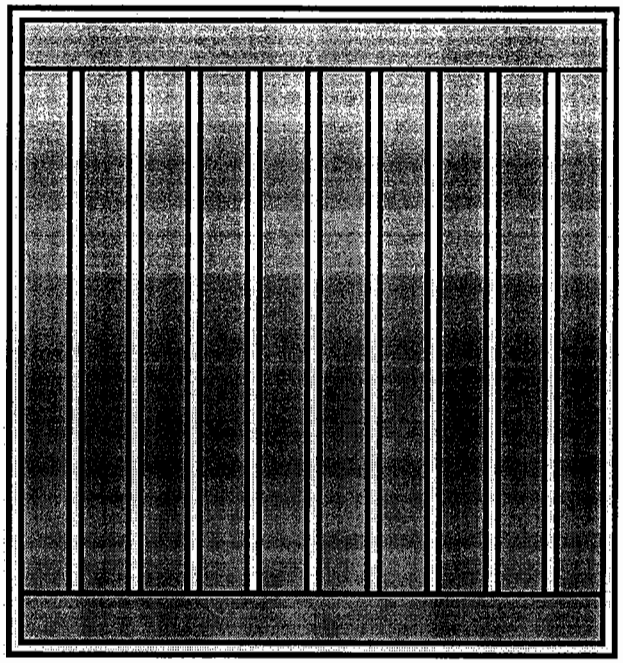
1 Chambers/Row x 20.00' Long +23.00' Row Adjustment +4.00' Header x 2 = 51.00' Row Length +12.0" End Stone x 2 = 53.00' Base Length
10 Rows x 48.0" Wide + 12.0" Spacing x 9 + 12.0" Side Stone x 2 = 51.00' Base Width
12.0" Base + 48.0" Chamber Height + 6.0" Cover = 5.50' Field Height

10 Chambers x 250.5 cf +23.00' Row Adjustment x 12.53 sf x 10 Rows + 49.00' Header x 12.53 sf x 2 = 6,614.1 cf Chamber Storage

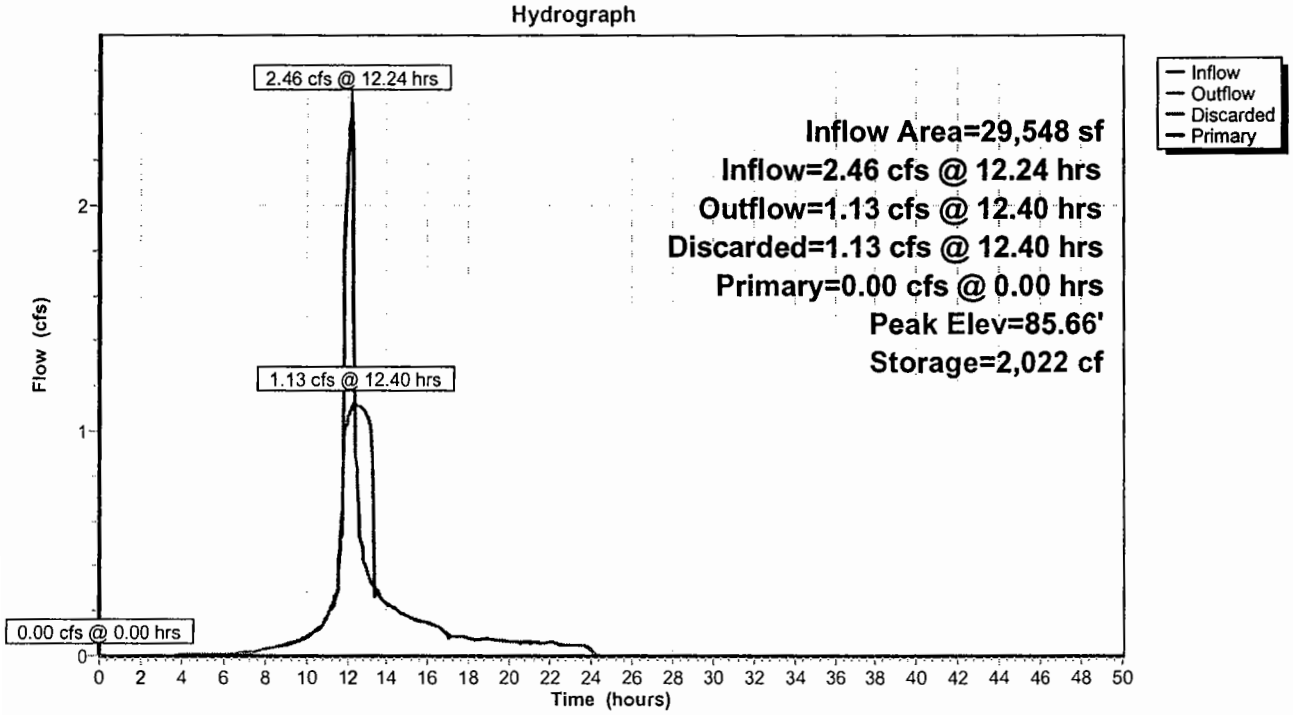
14,866.5 cf Field - 6,614.1 cf Chambers = 8,252.4 cf Stone x 35.0% Voids = 2,888.3 cf Stone Storage

Stone + Chamber Storage = 9,502.4 cf = 0.218 af
Overall Storage Efficiency = 63.9%

10 Chambers
550.6 cy Field
305.6 cy Stone



Pond RES06: New Pond



Summary for Pond RES07: New Pond

Inflow Area =	38,219 sf,100.00% Impervious,	Inflow Depth =	2.87"	for 2yr event	
Inflow =	1.69 cfs @	12.20 hrs,	Volume=	9,134 cf	
Outflow =	0.51 cfs @	12.51 hrs,	Volume=	9,134 cf,	Atten= 70%, Lag= 18.3 min
Discarded =	0.51 cfs @	12.51 hrs,	Volume=	9,134 cf	
Primary =	0.00 cfs @	12.50 hrs,	Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 98.31' @ 12.51 hrs Surf.Area= 884 sf Storage= 2,382 cf
Flood Elev= 99.63' Surf.Area= 884 sf Storage= 3,032 cf

Plug-Flow detention time= 28.5 min calculated for 9,125 cf (100% of inflow)
Center-of-Mass det. time= 28.5 min (785.2 - 756.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	94.25'	965 cf	**26.00'W x 34.00'L x 5.50'H Field A** 4,862 cf Overall - 2,104 cf Embedded = 2,758 cf x 35.0% Voids
#2A	95.25'	2,104 cf	**CMP_Round 48** x 5 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf Overall Size= 48.0"W x 48.0"H x 20.00'L Row Length Adjustment= +4.00' x 12.53 sf x 5 rows 24.00' Header x 12.53 sf x 2 = 601.3 cf
		3,070 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	94.25'	**16.000 in/hr Exfiltration over Wetted area** Phase-In= 0.08'
#2	Primary	98.31'	**18.0" Round Culvert** L= 31.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 98.31' / 98.31' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

Discarded OutFlow Max=0.51 cfs @ 12.51 hrs HW=98.31' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.51 cfs)

Primary OutFlow Max=0.00 cfs @ 12.50 hrs HW=98.31' TW=93.96' (Dynamic Tailwater)
└**2=Culvert** (Barrel Controls 0.00 cfs @ 0.01 fps)

Pond RES07: New Pond - Chamber Wizard Field A

Chamber Model = CMP_Round 48
Effective Size= 48.0"W x 48.0"H => 12.53 sf x 20.00'L = 250.5 cf
Overall Size= 48.0"W x 48.0"H x 20.00'L
Row Length Adjustment= +4.00' x 12.53 sf x 5 rows

48.0" Wide + 12.0" Spacing = 60.0" C-C Row Spacing

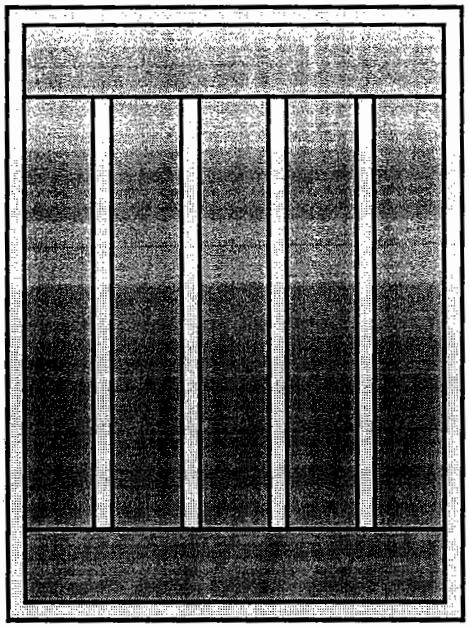
1 Chambers/Row x 20.00' Long +4.00' Row Adjustment +4.00' Header x 2 = 32.00' Row Length +12.0" End Stone x 2 = 34.00' Base Length
5 Rows x 48.0" Wide + 12.0" Spacing x 4 + 12.0" Side Stone x 2 = 26.00' Base Width
12.0" Base + 48.0" Chamber Height + 6.0" Cover = 5.50' Field Height

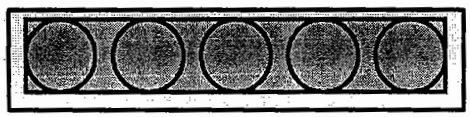
5 Chambers x 250.5 cf +4.00' Row Adjustment x 12.53 sf x 5 Rows + 24.00' Header x 12.53 sf x 2 = 2,104.5 cf Chamber Storage

4,862.0 cf Field - 2,104.5 cf Chambers = 2,757.5 cf Stone x 35.0% Voids = 965.1 cf Stone Storage

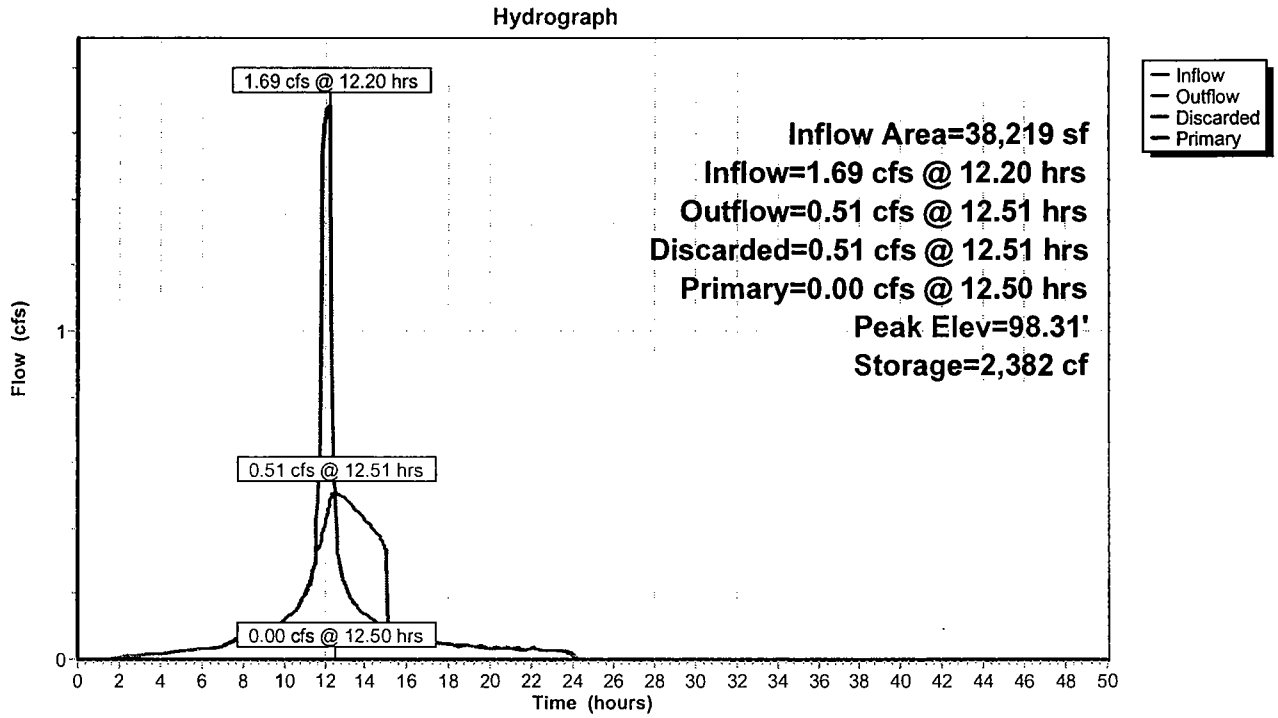
Stone + Chamber Storage = 3,069.6 cf = 0.070 af
Overall Storage Efficiency = 63.1%

5 Chambers
180.1 cy Field
102.1 cy Stone





Pond RES07: New Pond



Summary for Pond RES08: New Pond

Inflow Area =	49,557 sf, 60.21% Impervious,	Inflow Depth =	1.81"	for 2yr event	
Inflow =	1.59 cfs @	12.23 hrs, Volume=	7,464 cf		
Outflow =	0.69 cfs @	12.40 hrs, Volume=	7,464 cf,	Atten= 57%,	Lag= 9.9 min
Discarded =	0.51 cfs @	12.40 hrs, Volume=	7,332 cf		
Primary =	0.18 cfs @	12.40 hrs, Volume=	132 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 96.41' @ 12.40 hrs Surf.Area= 1,000 sf Storage= 1,749 cf
Flood Elev= 98.09' Surf.Area= 1,000 sf Storage= 2,667 cf

Plug-Flow detention time= 19.9 min calculated for 7,457 cf (100% of inflow)
Center-of-Mass det. time= 19.9 min (825.3 - 805.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.50'	987 cf	**25.00'W x 40.00'L x 4.50'H Field A** 4,500 cf Overall - 1,679 cf Embedded = 2,821 cf x 35.0% Voids
#2A	94.50'	1,679 cf	**CMP_Round 36** x 6 Inside #1 Effective Size= 36.0"W x 36.0"H => 7.06 sf x 20.00'L = 141.1 cf Overall Size= 36.0"W x 36.0"H x 20.00'L Row Length Adjustment= +12.00' x 7.06 sf x 6 rows 23.00' Header x 7.06 sf x 2 = 324.6 cf
		2,667 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	93.50'	**16.000 in/hr Exfiltration over Wetted area** Phase-In= 0.08'
#2	Primary	96.20'	**12.0" Round Culvert** L= 106.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.20' / 94.00' S= 0.0208 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Discarded OutFlow Max=0.51 cfs @ 12.40 hrs HW=96.41' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.51 cfs)

Primary OutFlow Max=0.18 cfs @ 12.40 hrs HW=96.41' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Inlet Controls 0.18 cfs @ 1.54 fps)

Pond RES08: New Pond - Chamber Wizard Field A

Chamber Model = CMP_Round 36
Effective Size= 36.0"W x 36.0"H => 7.06 sf x 20.00'L = 141.1 cf
Overall Size= 36.0"W x 36.0"H x 20.00'L
Row Length Adjustment= +12.00' x 7.06 sf x 6 rows

36.0" Wide + 12.0" Spacing = 48.0" C-C Row Spacing

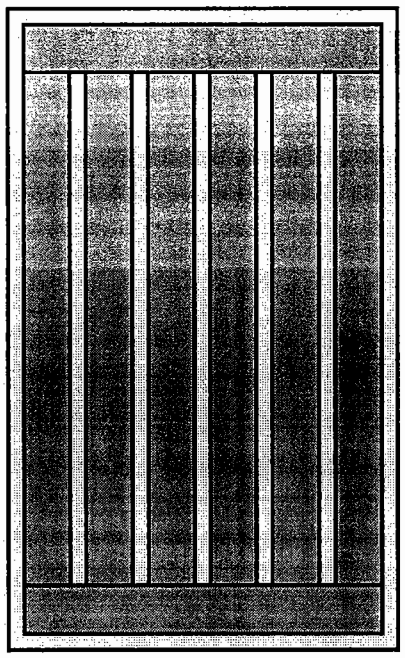
1 Chambers/Row x 20.00' Long +12.00' Row Adjustment +3.00' Header x 2 = 38.00' Row Length +12.0" End Stone x 2 = 40.00' Base Length
6 Rows x 36.0" Wide + 12.0" Spacing x 5 + 12.0" Side Stone x 2 = 25.00' Base Width
12.0" Base + 36.0" Chamber Height + 6.0" Cover = 4.50' Field Height

6 Chambers x 141.1 cf +12.00' Row Adjustment x 7.06 sf x 6 Rows + 23.00' Header x 7.06 sf x 2 = 1,679.5 cf Chamber Storage

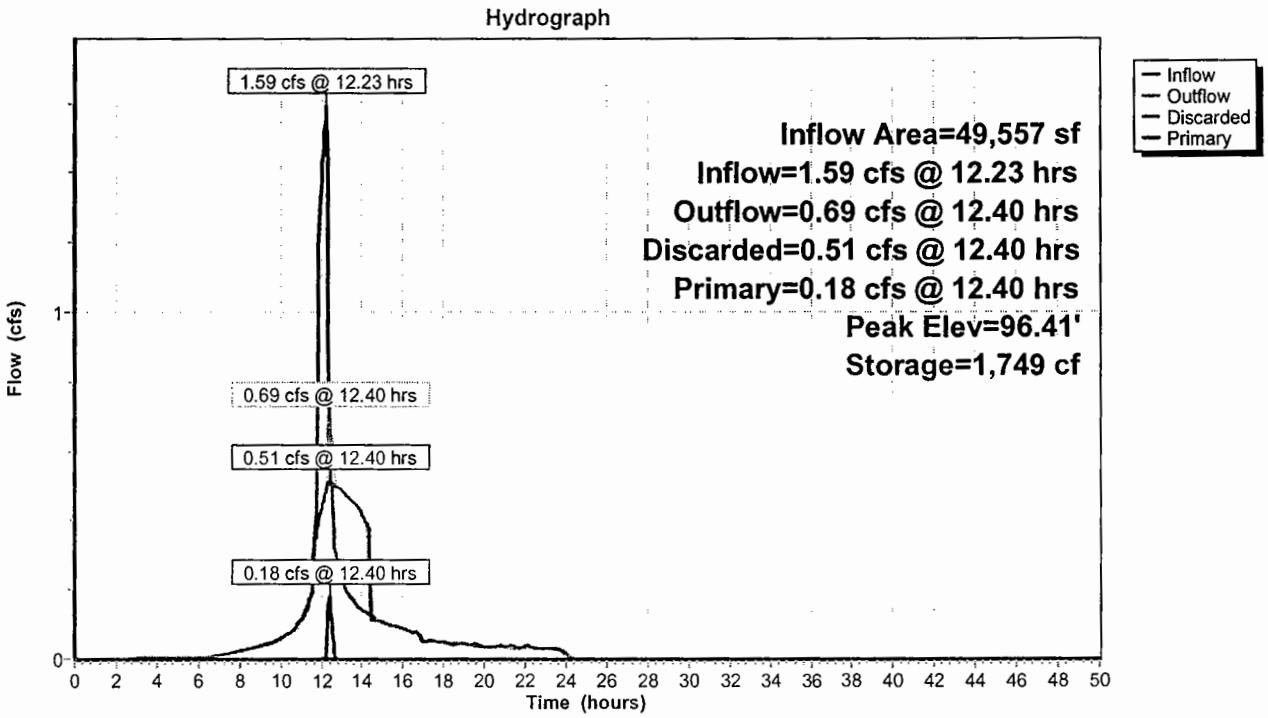
4,500.0 cf Field - 1,679.5 cf Chambers = 2,820.5 cf Stone x 35.0% Voids = 987.2 cf Stone Storage

Stone + Chamber Storage = 2,666.7 cf = 0.061 af
Overall Storage Efficiency = 59.3%

6 Chambers
166.7 cy Field
104.5 cy Stone



Pond RES08: New Pond



Summary for Pond RES10:

Inflow Area = 478,574 sf, 31.94% Impervious, Inflow Depth = 0.60" for 2yr event
Inflow = 5.86 cfs @ 12.31 hrs, Volume= 23,835 cf
Outflow = 5.17 cfs @ 12.42 hrs, Volume= 23,835 cf, Atten= 12%, Lag= 6.5 min
Primary = 5.17 cfs @ 12.42 hrs, Volume= 23,835 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 80.05' @ 12.42 hrs Surf.Area= 0.000 ac Storage= 0.115 af

Plug-Flow detention time= 28.0 min calculated for 23,811 cf (100% of inflow)
Center-of-Mass det. time= 28.0 min (855.3 - 827.3)

Volume	Invert	Avail.Storage	Storage Description
#1	78.60'	0.166 af	**Struc 10** Listed below (Recalc)

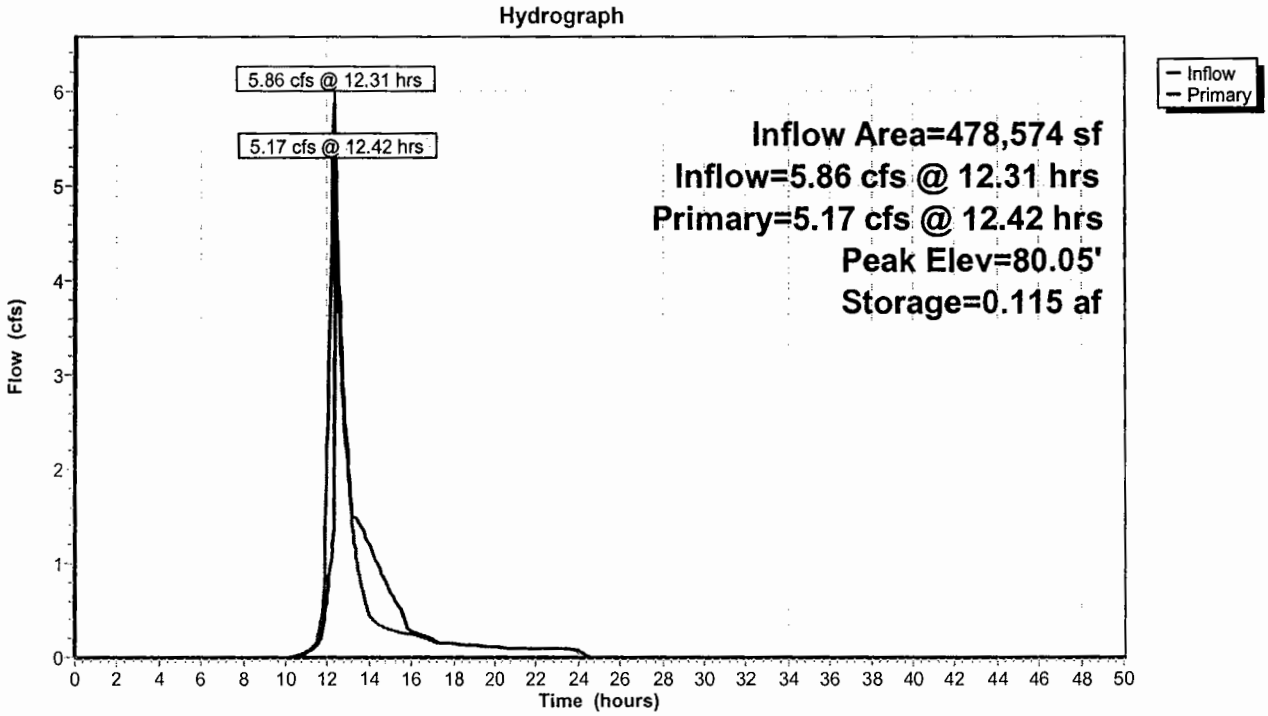
Elevation (feet)	Cum.Store (acre-feet)
78.60	0.000
79.00	0.007
79.50	0.038
80.00	0.105
80.10	0.123
80.20	0.144
80.30	0.166

Device	Routing	Invert	Outlet Devices
#1	Primary	78.60'	**Struc 10**

Elev. (feet)	78.60	79.00	79.50	80.00	80.10	80.20	80.30
Disch. (cfs)	0.000	0.500	0.900	1.500	8.200	23.000	48.000

Primary OutFlow Max=4.79 cfs @ 12.42 hrs HW=80.05' TW=0.00' (Dynamic Tailwater)
↑—**1=Struc 10** (Custom Controls 4.79 cfs)

Pond RES10:


Hydrograph
5.86 cfs @ 12.31 hrs
5.17 cfs @ 12.42 hrs
Inflow
Primary
Inflow Area=478,574 sf
Inflow=5.86 cfs @ 12.31 hrs
Primary=5.17 cfs @ 12.42 hrs
Peak Elev=80.05'
Storage=0.115 af
Flow (cfs)
Time (hours)

Summary for Pond RES13: Exist CB @ Inwood Dr.

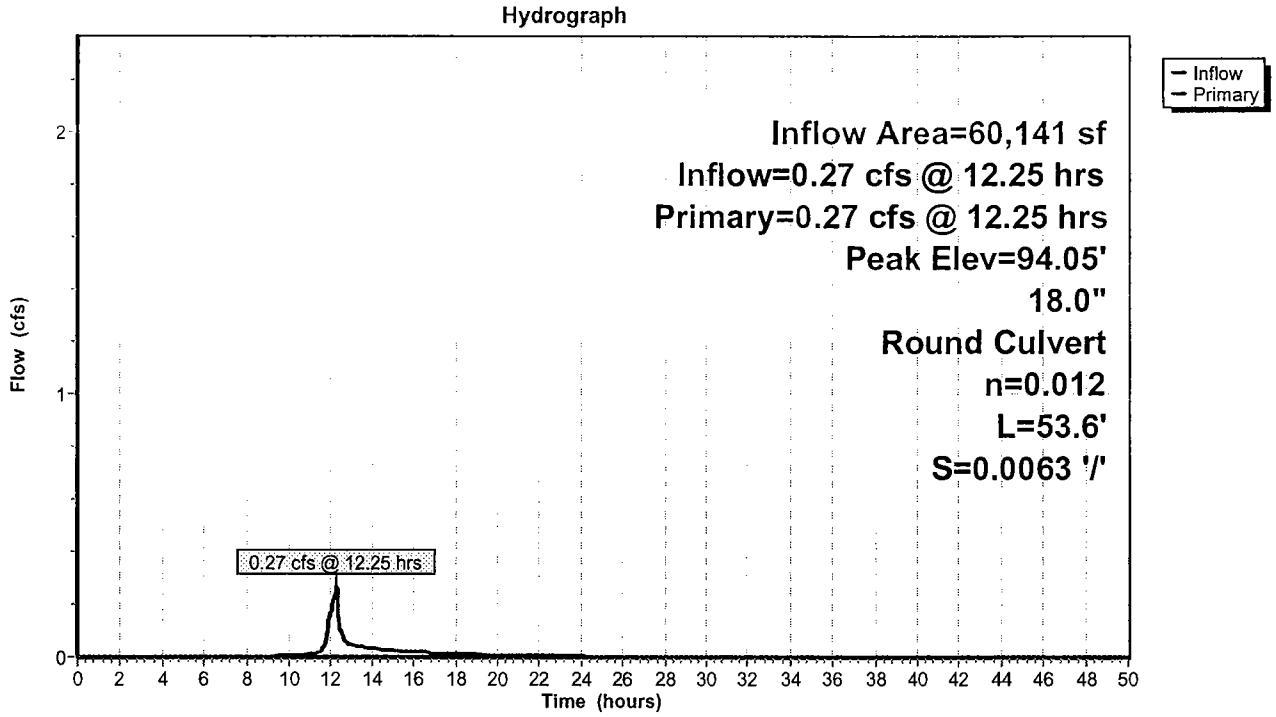
Inflow Area =	60,141 sf, 70.56% Impervious,	Inflow Depth = 0.26"	for 2yr event		
Inflow =	0.27 cfs @ 12.25 hrs,	Volume=	1,285 cf		
Outflow =	0.27 cfs @ 12.25 hrs,	Volume=	1,285 cf,	Atten= 0%,	Lag= 0.0 min
Primary =	0.27 cfs @ 12.25 hrs,	Volume=	1,285 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 94.05' @ 12.25 hrs
Flood Elev= 100.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	93.81'	**18.0" Round Culvert** L= 53.6' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 93.81' / 93.47' S= 0.0063 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=0.27 cfs @ 12.25 hrs HW=94.05' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.27 cfs @ 2.16 fps)

Pond RES13: Exist CB @ Inwood Dr.

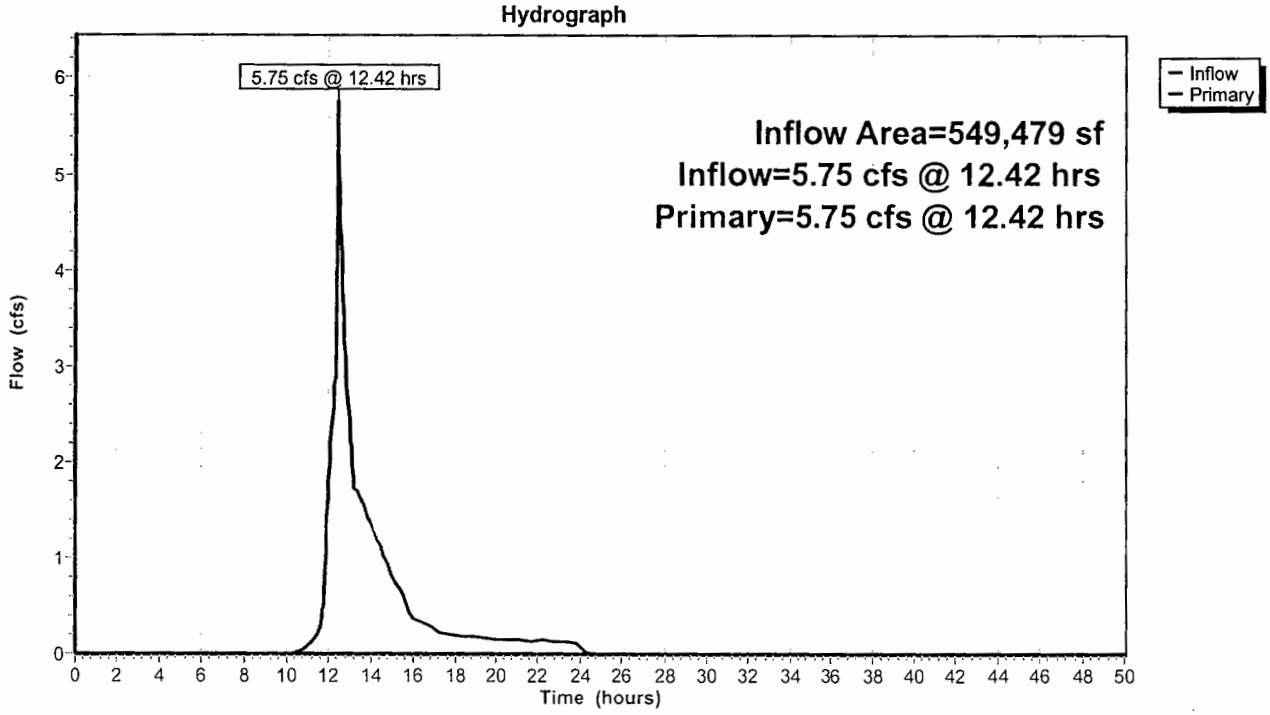


Summary for Link 2L: AddHyd

Inflow Area = 549,479 sf, 29.52% Impervious, Inflow Depth = 0.67" for 2yr event
Inflow = 5.75 cfs @ 12.42 hrs, Volume= 30,576 cf
Primary = 5.75 cfs @ 12.42 hrs, Volume= 30,576 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

Link 2L: AddHyd

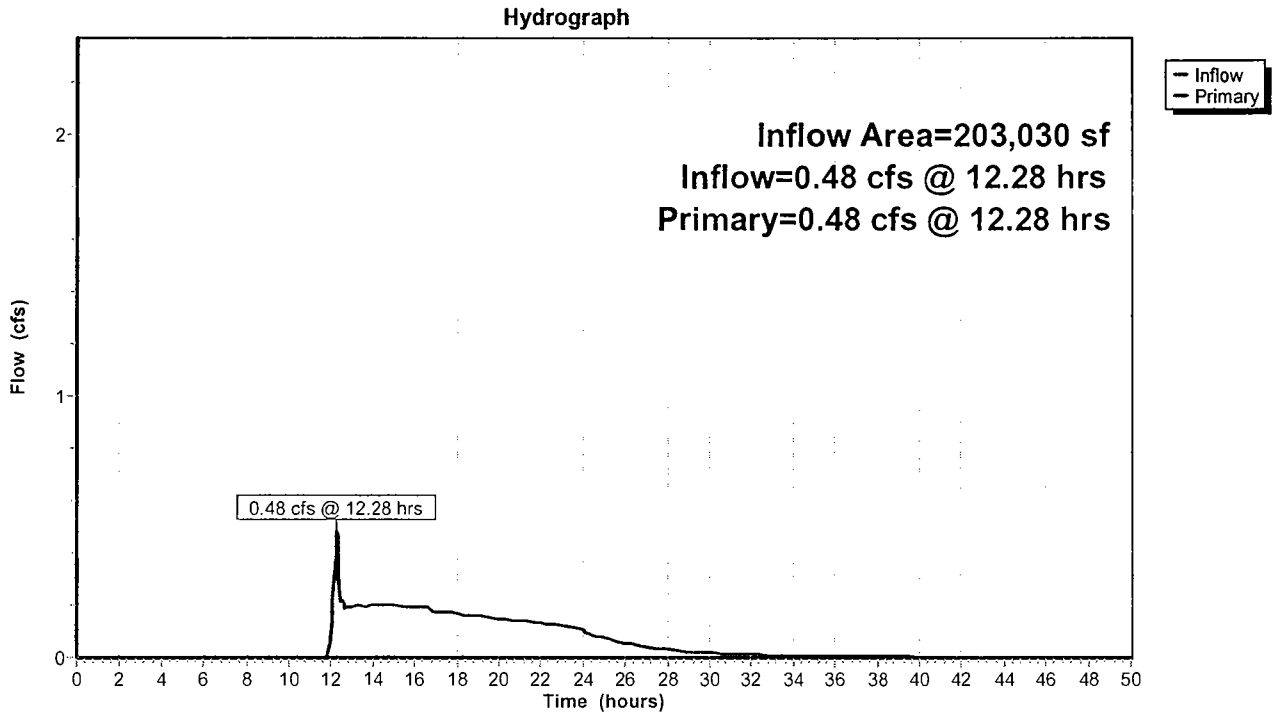


Summary for Link 3L: AddHyd

Inflow Area =	203,030 sf, 31.78% Impervious,	Inflow Depth > 0.51"	for 2yr event		
Inflow =	0.48 cfs @ 12.28 hrs,	Volume=	8,690 cf		
Primary =	0.48 cfs @ 12.28 hrs,	Volume=	8,690 cf,	Atten= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

Link 3L: AddHyd

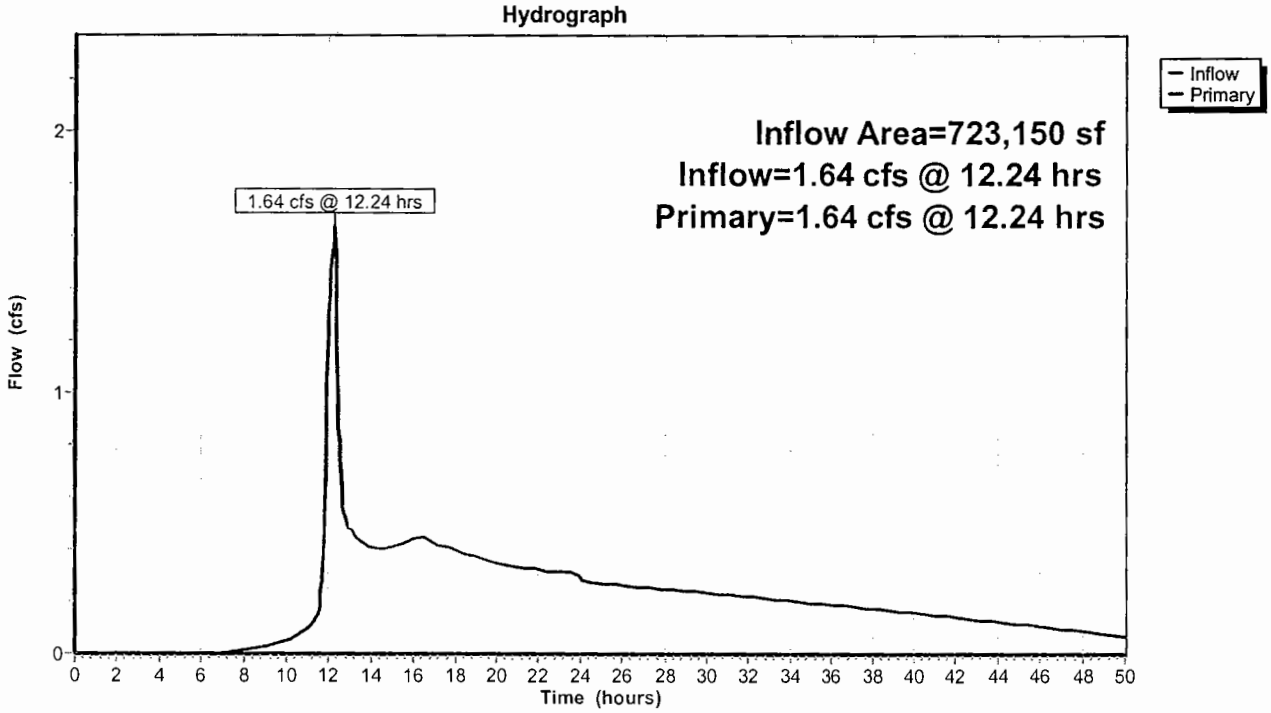


Summary for Link 4L: AddHyd

Inflow Area = 723,150 sf, 38.99% Impervious, Inflow Depth > 0.61" for 2yr event
Inflow = 1.64 cfs @ 12.24 hrs, Volume= 36,683 cf
Primary = 1.64 cfs @ 12.24 hrs, Volume= 36,683 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

Link 4L: AddHyd

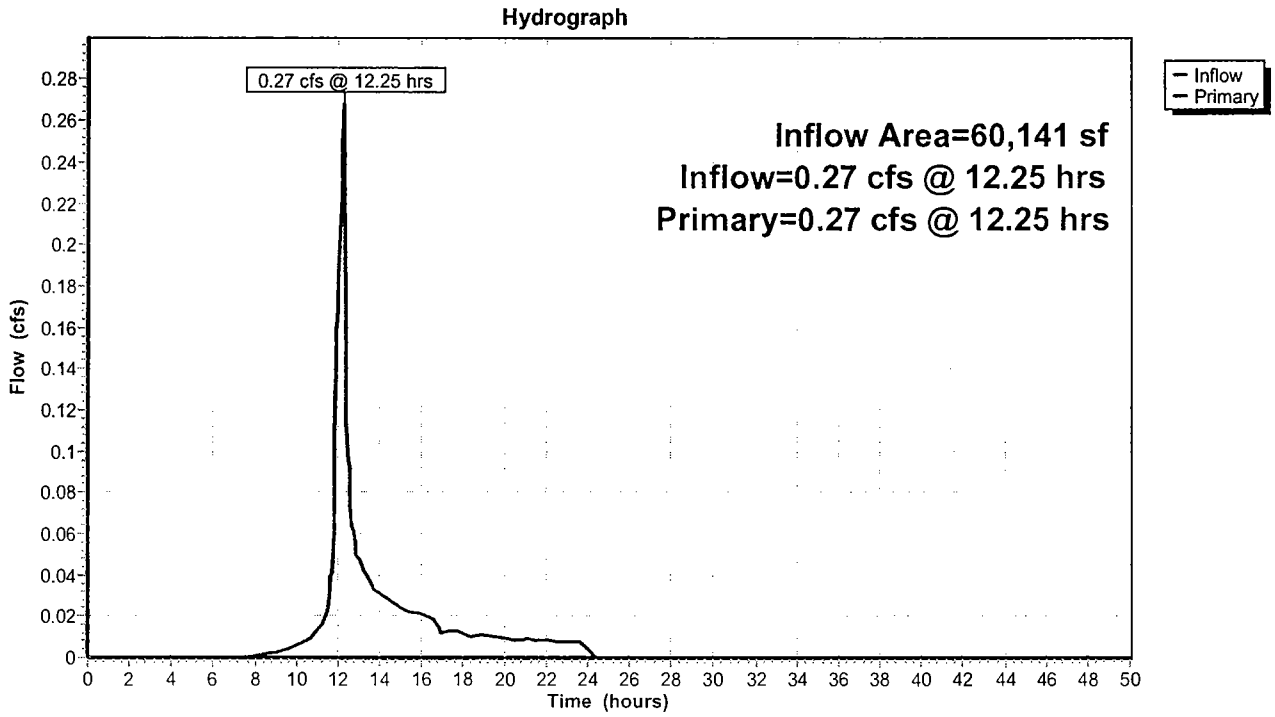


Summary for Link 5L:

Inflow Area = 60,141 sf, 70.56% Impervious, Inflow Depth = 0.26" for 2yr event
Inflow = 0.27 cfs @ 12.25 hrs, Volume= 1,285 cf
Primary = 0.27 cfs @ 12.25 hrs, Volume= 1,285 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

Link 5L:



Time span=0.00-50.00 hrs, dt=0.05 hrs, 1001 points x 2
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment02-1: Runoff Area=68,500 sf 37.47% Impervious Runoff Depth=2.46"
Flow Length=650' Tc=10.5 min CN=79 Runoff=3.12 cfs 14,046 cf

Subcatchment02-2: Runoff Area=20,902 sf 53.36% Impervious Runoff Depth=3.00"
Flow Length=366' Tc=6.0 min CN=85 Runoff=1.14 cfs 5,226 cf

Subcatchment02-3: Runoff Area=34,235 sf 53.74% Impervious Runoff Depth=3.19"
Flow Length=451' Tc=8.1 min CN=87 Runoff=1.92 cfs 9,107 cf

Subcatchment02-4: Runoff Area=110,031 sf 27.37% Impervious Runoff Depth=2.55"
Flow Length=386' Tc=6.3 min CN=80 Runoff=5.27 cfs 23,354 cf

Subcatchment02-5: Runoff Area=7,828 sf 72.37% Impervious Runoff Depth=3.59"
Flow Length=292' Tc=6.0 min CN=91 Runoff=0.48 cfs 2,345 cf

Subcatchment02-6: Runoff Area=18,018 sf 60.52% Impervious Runoff Depth=3.39"
Flow Length=211' Tc=7.1 min CN=89 Runoff=1.06 cfs 5,090 cf

Subcatchment02-7: Runoff Area=24,116 sf 62.78% Impervious Runoff Depth=3.39"
Flow Length=205' Tc=6.0 min CN=89 Runoff=1.42 cfs 6,813 cf

Subcatchment02-8: Runoff Area=22,600 sf 56.42% Impervious Runoff Depth=3.29"
Flow Length=315' Tc=6.0 min CN=88 Runoff=1.32 cfs 6,197 cf

Subcatchment03-1: Runoff Area=74,751 sf 41.70% Impervious Runoff Depth=2.13"
Flow Length=642' Tc=6.3 min CN=75 Runoff=3.07 cfs 13,262 cf

Subcatchment03-2: Runoff Area=21,836 sf 34.92% Impervious Runoff Depth=1.46"
Flow Length=81' Tc=6.8 min CN=66 Runoff=0.62 cfs 2,659 cf

Subcatchment03-3: Runoff Area=32,306 sf 61.14% Impervious Runoff Depth=2.21"
Flow Length=250' Tc=6.0 min CN=76 Runoff=1.37 cfs 5,949 cf

Subcatchment04-1: Runoff Area=22,302 sf 60.82% Impervious Runoff Depth=3.39"
Tc=6.0 min CN=89 Runoff=1.31 cfs 6,301 cf

Subcatchment04-10: Runoff Area=66,564 sf 32.20% Impervious Runoff Depth=1.53"
Tc=6.0 min CN=67 Runoff=2.01 cfs 8,488 cf

Subcatchment04-2: Runoff Area=11,580 sf 56.49% Impervious Runoff Depth=3.29"
Tc=6.2 min CN=88 Runoff=0.67 cfs 3,175 cf

Subcatchment04-3: Runoff Area=15,740 sf 68.94% Impervious Runoff Depth=3.59"
Tc=11.2 min CN=91 Runoff=0.94 cfs 4,715 cf

Subcatchment04-4: Runoff Area=16,784 sf 51.44% Impervious Runoff Depth=3.10"
Tc=6.3 min CN=86 Runoff=0.94 cfs 4,330 cf

Subcatchment04-5: Runoff Area=76,990 sf 41.07% Impervious Runoff Depth=2.81"
Tc=10.6 min CN=83 Runoff=3.92 cfs 18,058 cf

Subcatchment04-6: Runoff Area=22,782 sf 65.02% Impervious Runoff Depth=3.49"
Tc=6.0 min CN=90 Runoff=1.37 cfs 6,629 cf

Subcatchment04-7: Runoff Area=10,479 sf 61.34% Impervious Runoff Depth=3.39"
Tc=10.6 min CN=89 Runoff=0.61 cfs 2,960 cf

Subcatchment04-8: Runoff Area=35,971 sf 43.02% Impervious Runoff Depth=2.46"
Tc=6.0 min CN=79 Runoff=1.68 cfs 7,376 cf

Subcatchment04-9: Runoff Area=14,267 sf 79.15% Impervious Runoff Depth=3.59"
Tc=6.0 min CN=91 Runoff=0.87 cfs 4,274 cf

Subcatchment06-1: Runoff Area=13,688 sf 37.13% Impervious Runoff Depth=1.67"
Tc=6.0 min CN=69 Runoff=0.45 cfs 1,907 cf

Subcatchment06-2: Runoff Area=6,154 sf 62.63% Impervious Runoff Depth=2.91"
Tc=6.0 min CN=84 Runoff=0.33 cfs 1,491 cf

Subcatchment08-1: Runoff Area=14,699 sf 18.26% Impervious Runoff Depth=1.89"
Tc=6.0 min CN=72 Runoff=0.54 cfs 2,321 cf

Subcatchment08-2: Runoff Area=26,399 sf 70.82% Impervious Runoff Depth=3.39"
Tc=6.0 min CN=89 Runoff=1.55 cfs 7,458 cf

Subcatchment10-1: Runoff Area=172,344 sf 13.37% Impervious Runoff Depth=2.21"
Tc=9.7 min CN=76 Runoff=7.17 cfs 31,738 cf

Subcatchment13-1: Trib exist CB Runoff Area=5,717 sf 56.03% Impervious Runoff Depth=3.19"
Tc=6.0 min CN=87 Runoff=0.33 cfs 1,521 cf

Subcatchment13-2: Trib exist CB Runoff Area=16,205 sf 6.26% Impervious Runoff Depth=0.96"
Flow Length=146' Tc=6.0 min CN=58 Runoff=0.30 cfs 1,291 cf

Subcatchment20: Roof Runoff Area=18,172 sf 100.00% Impervious Runoff Depth=4.36"
Tc=6.0 min CN=98 Runoff=1.20 cfs 6,608 cf

Subcatchment40: Roof Runoff Area=20,047 sf 100.00% Impervious Runoff Depth=4.36"
Tc=6.0 min CN=98 Runoff=1.32 cfs 7,290 cf

Subcatchment55F: FRONT ROOF Runoff Area=8,459 sf 100.00% Impervious Runoff Depth=4.36"
Tc=6.0 min CN=98 Runoff=0.56 cfs 3,076 cf

Subcatchment55R: REAR ROOF Runoff Area=9,706 sf 100.00% Impervious Runoff Depth=4.36"
Tc=6.0 min CN=98 Runoff=0.64 cfs 3,530 cf

Subcatchment56-1: Runoff Area=20,755 sf 64.45% Impervious Runoff Depth=3.39"
Tc=6.0 min CN=89 Runoff=1.22 cfs 5,864 cf

Subcatchment56-2: Runoff Area=15,499 sf 38.31% Impervious Runoff Depth=2.81"
Tc=6.0 min CN=83 Runoff=0.81 cfs 3,635 cf

Subcatchment56-3: Runoff Area=20,741 sf 59.18% Impervious Runoff Depth=3.29"
Tc=6.0 min CN=88 Runoff=1.21 cfs 5,687 cf

Subcatchment56-4: Runoff Area=26,305 sf 30.84% Impervious Runoff Depth=2.63"
Flow Length=284' Tc=9.3 min CN=81 Runoff=1.26 cfs 5,776 cf

Subcatchment56-5: Runoff Area=29,273 sf 66.13% Impervious Runoff Depth=3.49"
Tc=6.0 min CN=90 Runoff=1.75 cfs 8,517 cf

SubcatchmentBA-LWD: Runoff Area=70,905 sf 13.17% Impervious Runoff Depth=2.29"
Flow Length=300' Tc=6.0 min CN=77 Runoff=3.11 cfs 13,543 cf

SubcatchmentBA-NWLY: Runoff Area=74,137 sf 8.07% Impervious Runoff Depth=1.07"
Flow Length=163' Tc=6.0 min CN=60 Runoff=1.57 cfs 6,637 cf

SubcatchmentBA-SWLY: Trib Inwood Dr. Runoff Area=17,449 sf 14.49% Impervious Runoff Depth=1.46"
Flow Length=110' Tc=6.1 min CN=66 Runoff=0.50 cfs 2,125 cf

SubcatchmentBA-WLY: Runoff Area=187,173 sf 4.79% Impervious Runoff Depth=0.25"
Flow Length=405' Tc=8.8 min CN=43 Runoff=0.31 cfs 3,896 cf

SubcatchmentBA-WLY-1: Runoff Area=33,391 sf 66.78% Impervious Runoff Depth=3.49"
Tc=6.0 min CN=90 Runoff=2.00 cfs 9,716 cf

Pond 3A: Peak Elev=84.40' Inflow=1.37 cfs 5,949 cf
12.0" Round Culvert n=0.012 L=15.0' S=0.0100 '/' Outflow=1.37 cfs 5,949 cf

Pond 3B: Peak Elev=84.86' Inflow=3.07 cfs 13,262 cf
12.0" Round Culvert n=0.012 L=4.0' S=0.0375 '/' Outflow=3.07 cfs 13,262 cf

Pond 3C: Peak Elev=84.08' Inflow=4.44 cfs 19,212 cf
18.0" Round Culvert n=0.012 L=62.0' S=0.0411 '/' Outflow=4.44 cfs 19,212 cf

Pond 3D: Peak Elev=81.53' Inflow=4.44 cfs 19,212 cf
18.0" Round Culvert n=0.012 L=24.0' S=0.0412 '/' Outflow=4.44 cfs 19,212 cf

Pond 6A: Peak Elev=87.00' Inflow=0.45 cfs 1,907 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0100 '/' Outflow=0.45 cfs 1,907 cf

Pond 6B: Peak Elev=87.00' Inflow=0.33 cfs 1,491 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0100 '/' Outflow=0.33 cfs 1,491 cf

Pond 6C: STORMCEPTOR Peak Elev=87.00' Inflow=0.78 cfs 3,398 cf
12.0" Round Culvert n=0.012 L=14.0' S=0.0157 '/' Outflow=0.78 cfs 3,398 cf

Pond 8A: Peak Elev=99.47' Inflow=0.54 cfs 2,321 cf
12.0" Round Culvert n=0.012 L=44.0' S=0.0666 '/' Outflow=0.54 cfs 2,321 cf

Pond 8B: Peak Elev=97.75' Inflow=1.55 cfs 7,458 cf
12.0" Round Culvert n=0.012 L=16.0' S=0.0112 '/' Outflow=1.55 cfs 7,458 cf

Pond 8C: STORMCEPTOR Peak Elev=97.62' Inflow=2.11 cfs 9,779 cf
12.0" Round Culvert n=0.012 L=155.0' S=0.0092 '/' Outflow=2.11 cfs 9,779 cf

Pond 13A: STORMCEPTOR Peak Elev=110.16' Inflow=0.33 cfs 1,521 cf
8.0" Round Culvert n=0.012 L=41.0' S=0.0100 '/' Outflow=0.33 cfs 1,521 cf

Pond 13B: DMH Peak Elev=109.67' Inflow=0.33 cfs 1,521 cf
8.0" Round Culvert n=0.012 L=42.0' S=0.0076 '/' Outflow=0.33 cfs 1,521 cf

Pond 56A: Peak Elev=115.65' Inflow=1.22 cfs 5,864 cf
12.0" Round Culvert n=0.012 L=18.6' S=0.0102 '/' Outflow=1.22 cfs 5,864 cf

Pond 56B: Peak Elev=115.55' Inflow=0.81 cfs 3,635 cf
12.0" Round Culvert n=0.012 L=6.0' S=0.0317 '/' Outflow=0.81 cfs 3,635 cf

Pond 56C: DMH Peak Elev=115.46' Inflow=2.04 cfs 9,499 cf
12.0" Round Culvert n=0.012 L=125.0' S=0.0100 '/' Outflow=2.04 cfs 9,499 cf

Pond 56D: DMH Peak Elev=114.23' Inflow=2.04 cfs 9,499 cf
12.0" Round Culvert n=0.012 L=56.0' S=0.0100 '/' Outflow=2.04 cfs 9,499 cf

Pond 56E: Peak Elev=116.36' Inflow=1.21 cfs 5,687 cf
12.0" Round Culvert n=0.012 L=16.0' S=0.0100 '/' Outflow=1.21 cfs 5,687 cf

Pond 56F: DMH Peak Elev=113.54' Inflow=3.25 cfs 15,186 cf
15.0" Round Culvert n=0.012 L=187.0' S=0.0100 '/' Outflow=3.25 cfs 15,186 cf

Pond 56G: Peak Elev=113.08' Inflow=1.26 cfs 5,776 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0173 '/' Outflow=1.26 cfs 5,776 cf

Pond 56H: DMH Peak Elev=111.93' Inflow=4.50 cfs 20,962 cf
15.0" Round Culvert n=0.012 L=79.0' S=0.0725 '/' Outflow=4.50 cfs 20,962 cf

Pond 56i: Peak Elev=106.44' Inflow=1.75 cfs 8,517 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0680 '/' Outflow=1.75 cfs 8,517 cf

Pond 56J: STORMCEPTOR Peak Elev=106.04' Inflow=6.28 cfs 29,479 cf
18.0" Round Culvert n=0.012 L=113.0' S=0.0832 '/' Outflow=6.28 cfs 29,479 cf

Pond 56K: DMH Peak Elev=96.78' Inflow=6.28 cfs 29,479 cf
Primary=3.64 cfs 16,061 cf Secondary=2.64 cfs 13,418 cf Outflow=6.28 cfs 29,479 cf

Pond RES02: Peak Elev=90.85' Storage=19,355 cf Inflow=15.66 cfs 72,178 cf
Discarded=1.37 cfs 44,295 cf Primary=7.83 cfs 27,883 cf Outflow=9.21 cfs 72,178 cf

Pond RES03: Peak Elev=81.48' Storage=13,719 cf Inflow=5.06 cfs 21,871 cf
Outflow=0.29 cfs 17,828 cf

Pond RES04: Struc 4 Peak Elev=86.70' Storage=36,254 cf Inflow=14.27 cfs 66,305 cf
Outflow=2.29 cfs 59,200 cf

Pond RES05: New Pond Peak Elev=95.00' Storage=4,119 cf Inflow=3.64 cfs 16,061 cf
Discarded=1.17 cfs 16,061 cf Primary=0.00 cfs 0 cf Outflow=1.17 cfs 16,061 cf

Pond RES06: New Pond Peak Elev=87.00' Storage=4,979 cf Inflow=4.06 cfs 20,346 cf
Discarded=1.23 cfs 20,346 cf Primary=0.00 cfs 0 cf Outflow=1.23 cfs 20,346 cf

Pond RES07: New Pond Peak Elev=99.19' Storage=2,892 cf Inflow=2.52 cfs 13,898 cf
Discarded=0.55 cfs 12,136 cf Primary=1.95 cfs 1,763 cf Outflow=2.50 cfs 13,898 cf

Pond RES08: New Pond Peak Elev=96.99' Storage=2,194 cf Inflow=2.68 cfs 12,855 cf
Discarded=0.54 cfs 10,418 cf Primary=2.03 cfs 2,437 cf Outflow=2.57 cfs 12,855 cf

Pond RES10: Peak Elev=80.14' Storage=0.131 af Inflow=14.16 cfs 59,622 cf
Outflow=14.07 cfs 59,622 cf

Pond RES13: Exist CB @ Inwood Dr. Peak Elev=94.63' Inflow=2.57 cfs 4,574 cf
18.0" Round Culvert n=0.012 L=53.6' S=0.0063 '/' Outflow=2.57 cfs 4,574 cf

Link 2L: AddHyd Inflow=16.47 cfs 73,165 cf
Primary=16.47 cfs 73,165 cf

Link 3L: AddHyd Inflow=1.75 cfs 24,465 cf
Primary=1.75 cfs 24,465 cf

Link 4L: AddHyd Inflow=5.50 cfs 77,373 cf
Primary=5.50 cfs 77,373 cf

Link 5L: Inflow=2.57 cfs 4,574 cf
Primary=2.57 cfs 4,574 cf

Total Runoff Area = 1,535,800 sf Runoff Volume = 293,980 cf Average Runoff Depth = 2.30"
64.11% Pervious = 984,663 sf 35.89% Impervious = 551,137 sf

Time span=0.00-50.00 hrs, dt=0.05 hrs, 1001 points x 2
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment02-1: Runoff Area=68,500 sf 37.47% Impervious Runoff Depth=3.15"
Flow Length=650' Tc=10.5 min CN=79 Runoff=3.94 cfs 17,975 cf

Subcatchment02-2: Runoff Area=20,902 sf 53.36% Impervious Runoff Depth=3.74"
Flow Length=366' Tc=6.0 min CN=85 Runoff=1.40 cfs 6,514 cf

Subcatchment02-3: Runoff Area=34,235 sf 53.74% Impervious Runoff Depth=3.95"
Flow Length=451' Tc=8.1 min CN=87 Runoff=2.34 cfs 11,256 cf

Subcatchment02-4: Runoff Area=110,031 sf 27.37% Impervious Runoff Depth=3.24"
Flow Length=386' Tc=6.3 min CN=80 Runoff=6.61 cfs 29,750 cf

Subcatchment02-5: Runoff Area=7,828 sf 72.37% Impervious Runoff Depth=4.37"
Flow Length=292' Tc=6.0 min CN=91 Runoff=0.57 cfs 2,851 cf

Subcatchment02-6: Runoff Area=18,018 sf 60.52% Impervious Runoff Depth=4.16"
Flow Length=211' Tc=7.1 min CN=89 Runoff=1.28 cfs 6,240 cf

Subcatchment02-7: Runoff Area=24,116 sf 62.78% Impervious Runoff Depth=4.16"
Flow Length=205' Tc=6.0 min CN=89 Runoff=1.71 cfs 8,352 cf

Subcatchment02-8: Runoff Area=22,600 sf 56.42% Impervious Runoff Depth=4.05"
Flow Length=315' Tc=6.0 min CN=88 Runoff=1.58 cfs 7,628 cf

Subcatchment03-1: Runoff Area=74,751 sf 41.70% Impervious Runoff Depth=2.78"
Flow Length=642' Tc=6.3 min CN=75 Runoff=3.95 cfs 17,301 cf

Subcatchment03-2: Runoff Area=21,836 sf 34.92% Impervious Runoff Depth=2.01"
Flow Length=81' Tc=6.8 min CN=66 Runoff=0.85 cfs 3,649 cf

Subcatchment03-3: Runoff Area=32,306 sf 61.14% Impervious Runoff Depth=2.87"
Flow Length=250' Tc=6.0 min CN=76 Runoff=1.76 cfs 7,723 cf

Subcatchment04-1: Runoff Area=22,302 sf 60.82% Impervious Runoff Depth=4.16"
Tc=6.0 min CN=89 Runoff=1.58 cfs 7,724 cf

Subcatchment04-10: Runoff Area=66,564 sf 32.20% Impervious Runoff Depth=2.09"
Tc=6.0 min CN=67 Runoff=2.73 cfs 11,576 cf

Subcatchment04-2: Runoff Area=11,580 sf 56.49% Impervious Runoff Depth=4.05"
Tc=6.2 min CN=88 Runoff=0.81 cfs 3,908 cf

Subcatchment04-3: Runoff Area=15,740 sf 68.94% Impervious Runoff Depth=4.37"
Tc=11.2 min CN=91 Runoff=1.13 cfs 5,734 cf

Subcatchment04-4: Runoff Area=16,784 sf 51.44% Impervious Runoff Depth=3.84"
Tc=6.3 min CN=86 Runoff=1.14 cfs 5,374 cf

Subcatchment04-5: Runoff Area=76,990 sf 41.07% Impervious Runoff Depth=3.54"
Tc=10.6 min CN=83 Runoff=4.80 cfs 22,700 cf

Subcatchment04-6: Runoff Area=22,782 sf 65.02% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=90 Runoff=1.64 cfs 8,093 cf

Subcatchment04-7: Runoff Area=10,479 sf 61.34% Impervious Runoff Depth=4.16"
Tc=10.6 min CN=89 Runoff=0.73 cfs 3,629 cf

Subcatchment04-8: Runoff Area=35,971 sf 43.02% Impervious Runoff Depth=3.15"
Tc=6.0 min CN=79 Runoff=2.12 cfs 9,439 cf

Subcatchment04-9: Runoff Area=14,267 sf 79.15% Impervious Runoff Depth=4.37"
Tc=6.0 min CN=91 Runoff=1.04 cfs 5,197 cf

Subcatchment06-1: Runoff Area=13,688 sf 37.13% Impervious Runoff Depth=2.25"
Tc=6.0 min CN=69 Runoff=0.60 cfs 2,570 cf

Subcatchment06-2: Runoff Area=6,154 sf 62.63% Impervious Runoff Depth=3.64"
Tc=6.0 min CN=84 Runoff=0.40 cfs 1,866 cf

Subcatchment08-1: Runoff Area=14,699 sf 18.26% Impervious Runoff Depth=2.51"
Tc=6.0 min CN=72 Runoff=0.71 cfs 3,075 cf

Subcatchment08-2: Runoff Area=26,399 sf 70.82% Impervious Runoff Depth=4.16"
Tc=6.0 min CN=89 Runoff=1.87 cfs 9,143 cf

Subcatchment10-1: Runoff Area=172,344 sf 13.37% Impervious Runoff Depth=2.87"
Tc=9.7 min CN=76 Runoff=9.08 cfs 41,200 cf

Subcatchment13-1: Trib exist CB Runoff Area=5,717 sf 56.03% Impervious Runoff Depth=3.95"
Tc=6.0 min CN=87 Runoff=0.39 cfs 1,880 cf

Subcatchment13-2: Trib exist CB Runoff Area=16,205 sf 6.26% Impervious Runoff Depth=1.40"
Flow Length=146' Tc=6.0 min CN=58 Runoff=0.45 cfs 1,884 cf

Subcatchment20: Roof Runoff Area=18,172 sf 100.00% Impervious Runoff Depth=5.16"
Tc=6.0 min CN=98 Runoff=1.41 cfs 7,818 cf

Subcatchment40: Roof Runoff Area=20,047 sf 100.00% Impervious Runoff Depth=5.16"
Tc=6.0 min CN=98 Runoff=1.55 cfs 8,625 cf

Subcatchment55F: FRONT ROOF Runoff Area=8,459 sf 100.00% Impervious Runoff Depth=5.16"
Tc=6.0 min CN=98 Runoff=0.65 cfs 3,639 cf

Subcatchment55R: REAR ROOF Runoff Area=9,706 sf 100.00% Impervious Runoff Depth=5.16"
Tc=6.0 min CN=98 Runoff=0.75 cfs 4,176 cf

Subcatchment56-1: Runoff Area=20,755 sf 64.45% Impervious Runoff Depth=4.16"
Tc=6.0 min CN=89 Runoff=1.47 cfs 7,188 cf

Subcatchment56-2: Runoff Area=15,499 sf 38.31% Impervious Runoff Depth=3.54"
Tc=6.0 min CN=83 Runoff=1.00 cfs 4,570 cf

Subcatchment56-3: Runoff Area=20,741 sf 59.18% Impervious Runoff Depth=4.05"
Tc=6.0 min CN=88 Runoff=1.45 cfs 7,000 cf

Subcatchment56-4: Runoff Area=26,305 sf 30.84% Impervious Runoff Depth=3.34"
Flow Length=284' Tc=9.3 min CN=81 Runoff=1.58 cfs 7,325 cf

Subcatchment56-5: Runoff Area=29,273 sf 66.13% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=90 Runoff=2.11 cfs 10,399 cf

SubcatchmentBA-LWD: Runoff Area=70,905 sf 13.17% Impervious Runoff Depth=2.96"
Flow Length=300' Tc=6.0 min CN=77 Runoff=3.97 cfs 17,496 cf

SubcatchmentBA-NWLY: Runoff Area=74,137 sf 8.07% Impervious Runoff Depth=1.54"
Flow Length=163' Tc=6.0 min CN=60 Runoff=2.26 cfs 9,519 cf

SubcatchmentBA-SWLY: Trib Inwood Dr. Runoff Area=17,449 sf 14.49% Impervious Runoff Depth=2.01"
Flow Length=110' Tc=6.1 min CN=66 Runoff=0.69 cfs 2,916 cf

SubcatchmentBA-WLY: Runoff Area=187,173 sf 4.79% Impervious Runoff Depth=0.47"
Flow Length=405' Tc=8.8 min CN=43 Runoff=1.17 cfs 7,364 cf

SubcatchmentBA-WLY-1: Runoff Area=33,391 sf 66.78% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=90 Runoff=2.40 cfs 11,862 cf

Pond 3A: Peak Elev=84.56' Inflow=1.76 cfs 7,723 cf
12.0" Round Culvert n=0.012 L=15.0' S=0.0100 '/' Outflow=1.76 cfs 7,723 cf

Pond 3B: Peak Elev=85.35' Inflow=3.95 cfs 17,301 cf
12.0" Round Culvert n=0.012 L=4.0' S=0.0375 '/' Outflow=3.95 cfs 17,301 cf

Pond 3C: Peak Elev=84.26' Inflow=5.71 cfs 25,024 cf
18.0" Round Culvert n=0.012 L=62.0' S=0.0411 '/' Outflow=5.71 cfs 25,024 cf

Pond 3D: Peak Elev=82.11' Inflow=5.71 cfs 25,024 cf
18.0" Round Culvert n=0.012 L=24.0' S=0.0412 '/' Outflow=5.71 cfs 25,024 cf

Pond 6A: Peak Elev=87.92' Inflow=0.60 cfs 2,570 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0100 '/' Outflow=0.60 cfs 2,570 cf

Pond 6B: Peak Elev=87.92' Inflow=0.40 cfs 1,866 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0100 '/' Outflow=0.40 cfs 1,866 cf

Pond 6C: STORMCEPTOR Peak Elev=87.92' Inflow=1.01 cfs 4,436 cf
12.0" Round Culvert n=0.012 L=14.0' S=0.0157 '/' Outflow=1.01 cfs 4,436 cf

Pond 8A: Peak Elev=99.53' Inflow=0.71 cfs 3,075 cf
12.0" Round Culvert n=0.012 L=44.0' S=0.0666 '/' Outflow=0.71 cfs 3,075 cf

Pond 8B: Peak Elev=98.35' Inflow=1.87 cfs 9,143 cf
12.0" Round Culvert n=0.012 L=16.0' S=0.0112 '/' Outflow=1.87 cfs 9,143 cf

Pond 8C: STORMCEPTOR Peak Elev=98.13' Inflow=2.61 cfs 12,218 cf
12.0" Round Culvert n=0.012 L=155.0' S=0.0092 '/' Outflow=2.61 cfs 12,218 cf

Pond 13A: STORMCEPTOR Peak Elev=110.20' Inflow=0.39 cfs 1,880 cf
8.0" Round Culvert n=0.012 L=41.0' S=0.0100 '/' Outflow=0.39 cfs 1,880 cf

Pond 13B: DMH Peak Elev=109.71' Inflow=0.39 cfs 1,880 cf
8.0" Round Culvert n=0.012 L=42.0' S=0.0076 '/' Outflow=0.39 cfs 1,880 cf

Pond 56A: Peak Elev=115.78' Inflow=1.47 cfs 7,188 cf
12.0" Round Culvert n=0.012 L=18.6' S=0.0102 '/' Outflow=1.47 cfs 7,188 cf

Pond 56B: Peak Elev=115.68' Inflow=1.00 cfs 4,570 cf
12.0" Round Culvert n=0.012 L=6.0' S=0.0317 '/' Outflow=1.00 cfs 4,570 cf

Pond 56C: DMH Peak Elev=115.58' Inflow=2.49 cfs 11,758 cf
12.0" Round Culvert n=0.012 L=125.0' S=0.0100 '/' Outflow=2.49 cfs 11,758 cf

Pond 56D: DMH Peak Elev=114.38' Inflow=2.49 cfs 11,758 cf
12.0" Round Culvert n=0.012 L=56.0' S=0.0100 '/' Outflow=2.49 cfs 11,758 cf

Pond 56E: Peak Elev=116.43' Inflow=1.45 cfs 7,000 cf
12.0" Round Culvert n=0.012 L=16.0' S=0.0100 '/' Outflow=1.45 cfs 7,000 cf

Pond 56F: DMH Peak Elev=113.70' Inflow=3.91 cfs 18,758 cf
15.0" Round Culvert n=0.012 L=187.0' S=0.0100 '/' Outflow=3.91 cfs 18,758 cf

Pond 56G: Peak Elev=113.18' Inflow=1.58 cfs 7,325 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0173 '/' Outflow=1.58 cfs 7,325 cf

Pond 56H: DMH Peak Elev=112.23' Inflow=5.52 cfs 26,083 cf
15.0" Round Culvert n=0.012 L=79.0' S=0.0725 '/' Outflow=5.52 cfs 26,083 cf

Pond 56i: Peak Elev=106.64' Inflow=2.11 cfs 10,399 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0680 '/' Outflow=2.11 cfs 10,399 cf

Pond 56J: STORMCEPTOR Peak Elev=106.31' Inflow=7.65 cfs 36,482 cf
18.0" Round Culvert n=0.012 L=113.0' S=0.0832 '/' Outflow=7.65 cfs 36,482 cf

Pond 56K: DMH Peak Elev=97.29' Inflow=7.65 cfs 36,482 cf
Primary=4.41 cfs 19,588 cf Secondary=3.24 cfs 16,894 cf Outflow=7.65 cfs 36,482 cf

Pond RES02: Peak Elev=91.34' Storage=22,910 cf Inflow=19.38 cfs 90,567 cf
Discarded=1.40 cfs 50,140 cf Primary=12.35 cfs 40,427 cf Outflow=13.75 cfs 90,567 cf

Pond RES03: Peak Elev=82.10' Storage=18,653 cf Inflow=6.56 cfs 28,673 cf
Outflow=0.35 cfs 24,576 cf

Pond RES04: Struc 4 Peak Elev=87.13' Storage=43,888 cf Inflow=17.74 cfs 83,374 cf
Outflow=3.55 cfs 76,111 cf

Pond RES05: New Pond Peak Elev=95.67' Storage=5,577 cf Inflow=4.41 cfs 19,588 cf
Discarded=1.23 cfs 19,588 cf Primary=0.00 cfs 0 cf Outflow=1.23 cfs 19,588 cf

Pond RES06: New Pond Peak Elev=87.92' Storage=7,070 cf Inflow=5.00 cfs 25,505 cf
Discarded=1.30 cfs 25,505 cf Primary=0.00 cfs 0 cf Outflow=1.30 cfs 25,505 cf

Pond RES07: New Pond Peak Elev=99.29' Storage=2,927 cf Inflow=2.96 cfs 16,442 cf
Discarded=0.55 cfs 13,541 cf Primary=2.42 cfs 2,901 cf Outflow=2.97 cfs 16,442 cf

Pond RES08: New Pond Peak Elev=97.17' Storage=2,313 cf Inflow=3.27 cfs 15,857 cf
Discarded=0.55 cfs 11,981 cf Primary=2.62 cfs 3,875 cf Outflow=3.16 cfs 15,857 cf

Pond RES10: Peak Elev=80.18' Storage=0.141 af Inflow=20.93 cfs 81,626 cf
Outflow=20.75 cfs 81,626 cf

Pond RES13: Exist CB @ Inwood Dr. Peak Elev=94.76' Inflow=3.27 cfs 6,665 cf
18.0" Round Culvert n=0.012 L=53.6' S=0.0063 '/' Outflow=3.27 cfs 6,665 cf

Link 2L: AddHyd Inflow=24.02 cfs 99,122 cf
Primary=24.02 cfs 99,122 cf

Link 3L: AddHyd Inflow=2.51 cfs 34,095 cf
Primary=2.51 cfs 34,095 cf

Link 4L: AddHyd Inflow=9.24 cfs 102,129 cf
Primary=9.24 cfs 102,129 cf

Link 5L: Inflow=3.27 cfs 6,665 cf
Primary=3.27 cfs 6,665 cf

Total Runoff Area = 1,535,800 sf Runoff Volume = 374,127 cf Average Runoff Depth = 2.92"
64.11% Pervious = 984,663 sf 35.89% Impervious = 551,137 sf

Time span=0.00-50.00 hrs, dt=0.05 hrs, 1001 points x 2
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment02-1: Runoff Area=68,500 sf 37.47% Impervious Runoff Depth=4.58"
Flow Length=650' Tc=10.5 min CN=79 Runoff=5.54 cfs 26,169 cf

Subcatchment02-2: Runoff Area=20,902 sf 53.36% Impervious Runoff Depth=5.25"
Flow Length=366' Tc=6.0 min CN=85 Runoff=1.89 cfs 9,149 cf

Subcatchment02-3: Runoff Area=34,235 sf 53.74% Impervious Runoff Depth=5.48"
Flow Length=451' Tc=8.1 min CN=87 Runoff=3.17 cfs 15,632 cf

Subcatchment02-4: Runoff Area=110,031 sf 27.37% Impervious Runoff Depth=4.69"
Flow Length=386' Tc=6.3 min CN=80 Runoff=9.31 cfs 43,045 cf

Subcatchment02-5: Runoff Area=7,828 sf 72.37% Impervious Runoff Depth=5.94"
Flow Length=292' Tc=6.0 min CN=91 Runoff=0.76 cfs 3,874 cf

Subcatchment02-6: Runoff Area=18,018 sf 60.52% Impervious Runoff Depth=5.71"
Flow Length=211' Tc=7.1 min CN=89 Runoff=1.71 cfs 8,571 cf

Subcatchment02-7: Runoff Area=24,116 sf 62.78% Impervious Runoff Depth=5.71"
Flow Length=205' Tc=6.0 min CN=89 Runoff=2.29 cfs 11,471 cf

Subcatchment02-8: Runoff Area=22,600 sf 56.42% Impervious Runoff Depth=5.59"
Flow Length=315' Tc=6.0 min CN=88 Runoff=2.12 cfs 10,534 cf

Subcatchment03-1: Runoff Area=74,751 sf 41.70% Impervious Runoff Depth=4.15"
Flow Length=642' Tc=6.3 min CN=75 Runoff=5.76 cfs 25,848 cf

Subcatchment03-2: Runoff Area=21,836 sf 34.92% Impervious Runoff Depth=3.20"
Flow Length=81' Tc=6.8 min CN=66 Runoff=1.34 cfs 5,831 cf

Subcatchment03-3: Runoff Area=32,306 sf 61.14% Impervious Runoff Depth=4.26"
Flow Length=250' Tc=6.0 min CN=76 Runoff=2.55 cfs 11,461 cf

Subcatchment04-1: Runoff Area=22,302 sf 60.82% Impervious Runoff Depth=5.71"
Tc=6.0 min CN=89 Runoff=2.12 cfs 10,608 cf

Subcatchment04-10: Runoff Area=66,564 sf 32.20% Impervious Runoff Depth=3.31"
Tc=6.0 min CN=67 Runoff=4.25 cfs 18,344 cf

Subcatchment04-2: Runoff Area=11,580 sf 56.49% Impervious Runoff Depth=5.59"
Tc=6.2 min CN=88 Runoff=1.09 cfs 5,398 cf

Subcatchment04-3: Runoff Area=15,740 sf 68.94% Impervious Runoff Depth=5.94"
Tc=11.2 min CN=91 Runoff=1.51 cfs 7,790 cf

Subcatchment04-4: Runoff Area=16,784 sf 51.44% Impervious Runoff Depth=5.37"
Tc=6.3 min CN=86 Runoff=1.54 cfs 7,505 cf

Subcatchment04-5: Runoff Area=76,990 sf 41.07% Impervious Runoff Depth=5.03"
Tc=10.6 min CN=83 Runoff=6.66 cfs 32,257 cf

Subcatchment04-6: Runoff Area=22,782 sf 65.02% Impervious Runoff Depth=5.82"
Tc=6.0 min CN=90 Runoff=2.18 cfs 11,055 cf

Subcatchment04-7: Runoff Area=10,479 sf 61.34% Impervious Runoff Depth=5.71"
Tc=10.6 min CN=89 Runoff=0.98 cfs 4,985 cf

Subcatchment04-8: Runoff Area=35,971 sf 43.02% Impervious Runoff Depth=4.58"
Tc=6.0 min CN=79 Runoff=3.00 cfs 13,742 cf

Subcatchment04-9: Runoff Area=14,267 sf 79.15% Impervious Runoff Depth=5.94"
Tc=6.0 min CN=91 Runoff=1.38 cfs 7,061 cf

Subcatchment06-1: Runoff Area=13,688 sf 37.13% Impervious Runoff Depth=3.51"
Tc=6.0 min CN=69 Runoff=0.92 cfs 4,008 cf

Subcatchment06-2: Runoff Area=6,154 sf 62.63% Impervious Runoff Depth=5.14"
Tc=6.0 min CN=84 Runoff=0.55 cfs 2,636 cf

Subcatchment08-1: Runoff Area=14,699 sf 18.26% Impervious Runoff Depth=3.83"
Tc=6.0 min CN=72 Runoff=1.06 cfs 4,690 cf

Subcatchment08-2: Runoff Area=26,399 sf 70.82% Impervious Runoff Depth=5.71"
Tc=6.0 min CN=89 Runoff=2.50 cfs 12,557 cf

Subcatchment10-1: Runoff Area=172,344 sf 13.37% Impervious Runoff Depth=4.26"
Tc=9.7 min CN=76 Runoff=13.19 cfs 61,144 cf

Subcatchment13-1: Trib exist CB Runoff Area=5,717 sf 56.03% Impervious Runoff Depth=5.48"
Tc=6.0 min CN=87 Runoff=0.53 cfs 2,610 cf

Subcatchment13-2: Trib exist CB Runoff Area=16,205 sf 6.26% Impervious Runoff Depth=2.41"
Flow Length=146' Tc=6.0 min CN=58 Runoff=0.77 cfs 3,253 cf

Subcatchment20: Roof Runoff Area=18,172 sf 100.00% Impervious Runoff Depth=6.76"
Tc=6.0 min CN=98 Runoff=1.83 cfs 10,238 cf

Subcatchment40: Roof Runoff Area=20,047 sf 100.00% Impervious Runoff Depth=6.76"
Tc=6.0 min CN=98 Runoff=2.02 cfs 11,295 cf

Subcatchment55F: FRONT ROOF Runoff Area=8,459 sf 100.00% Impervious Runoff Depth=6.76"
Tc=6.0 min CN=98 Runoff=0.85 cfs 4,766 cf

Subcatchment55R: REAR ROOF Runoff Area=9,706 sf 100.00% Impervious Runoff Depth=6.76"
Tc=6.0 min CN=98 Runoff=0.98 cfs 5,468 cf

Subcatchment56-1: Runoff Area=20,755 sf 64.45% Impervious Runoff Depth=5.71"
Tc=6.0 min CN=89 Runoff=1.97 cfs 9,873 cf

Subcatchment56-2: Runoff Area=15,499 sf 38.31% Impervious Runoff Depth=5.03"
Tc=6.0 min CN=83 Runoff=1.38 cfs 6,494 cf

Subcatchment56-3: Runoff Area=20,741 sf 59.18% Impervious Runoff Depth=5.59"
Tc=6.0 min CN=88 Runoff=1.95 cfs 9,668 cf

Subcatchment56-4: Runoff Area=26,305 sf 30.84% Impervious Runoff Depth=4.81"
Flow Length=284' Tc=9.3 min CN=81 Runoff=2.22 cfs 10,533 cf

Subcatchment56-5: Runoff Area=29,273 sf 66.13% Impervious Runoff Depth=5.82"
Tc=6.0 min CN=90 Runoff=2.80 cfs 14,205 cf

SubcatchmentBA-LWD: Runoff Area=70,905 sf 13.17% Impervious Runoff Depth=4.37"
Flow Length=300' Tc=6.0 min CN=77 Runoff=5.70 cfs 25,796 cf

SubcatchmentBA-NWLY: Runoff Area=74,137 sf 8.07% Impervious Runoff Depth=2.60"
Flow Length=163' Tc=6.0 min CN=60 Runoff=3.80 cfs 16,085 cf

SubcatchmentBA-SWLY: Trib Inwood Dr. Runoff Area=17,449 sf 14.49% Impervious Runoff Depth=3.20"
Flow Length=110' Tc=6.1 min CN=66 Runoff=1.08 cfs 4,660 cf

SubcatchmentBA-WLY: Runoff Area=187,173 sf 4.79% Impervious Runoff Depth=1.07"
Flow Length=405' Tc=8.8 min CN=43 Runoff=3.58 cfs 16,756 cf

SubcatchmentBA-WLY-1: Runoff Area=33,391 sf 66.78% Impervious Runoff Depth=5.82"
Tc=6.0 min CN=90 Runoff=3.20 cfs 16,203 cf

Pond 3A: Peak Elev=85.20' Inflow=2.55 cfs 11,461 cf
12.0" Round Culvert n=0.012 L=15.0' S=0.0100 '/' Outflow=2.55 cfs 11,461 cf

Pond 3B: Peak Elev=87.07' Inflow=5.76 cfs 25,848 cf
12.0" Round Culvert n=0.012 L=4.0' S=0.0375 '/' Outflow=5.76 cfs 25,848 cf

Pond 3C: Peak Elev=84.75' Inflow=8.30 cfs 37,309 cf
18.0" Round Culvert n=0.012 L=62.0' S=0.0411 '/' Outflow=8.30 cfs 37,309 cf

Pond 3D: Peak Elev=83.08' Inflow=8.30 cfs 37,309 cf
18.0" Round Culvert n=0.012 L=24.0' S=0.0412 '/' Outflow=8.30 cfs 37,309 cf

Pond 6A: Peak Elev=89.36' Inflow=0.92 cfs 4,008 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0100 '/' Outflow=0.92 cfs 4,008 cf

Pond 6B: Peak Elev=89.35' Inflow=0.55 cfs 2,636 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0100 '/' Outflow=0.55 cfs 2,636 cf

Pond 6C: STORMCEPTOR Peak Elev=89.36' Inflow=1.48 cfs 6,644 cf
12.0" Round Culvert n=0.012 L=14.0' S=0.0157 '/' Outflow=1.48 cfs 6,644 cf

Pond 8A: Peak Elev=99.78' Inflow=1.06 cfs 4,690 cf
12.0" Round Culvert n=0.012 L=44.0' S=0.0666 '/' Outflow=1.06 cfs 4,690 cf

Pond 8B: Peak Elev=99.95' Inflow=2.50 cfs 12,557 cf
12.0" Round Culvert n=0.012 L=16.0' S=0.0112 '/' Outflow=2.50 cfs 12,557 cf

Pond 8C: STORMCEPTOR Peak Elev=99.54' Inflow=3.60 cfs 17,248 cf
12.0" Round Culvert n=0.012 L=155.0' S=0.0092 '/' Outflow=3.60 cfs 17,248 cf

Pond 13A: STORMCEPTOR Peak Elev=110.27' Inflow=0.53 cfs 2,610 cf
8.0" Round Culvert n=0.012 L=41.0' S=0.0100 '/' Outflow=0.53 cfs 2,610 cf

Pond 13B: DMH Peak Elev=109.78' Inflow=0.53 cfs 2,610 cf
8.0" Round Culvert n=0.012 L=42.0' S=0.0076 '/' Outflow=0.53 cfs 2,610 cf

Pond 56A: Peak Elev=116.84' Inflow=1.97 cfs 9,873 cf
12.0" Round Culvert n=0.012 L=18.6' S=0.0102 '/' Outflow=1.97 cfs 9,873 cf

Pond 56B: Peak Elev=116.70' Inflow=1.38 cfs 6,494 cf
12.0" Round Culvert n=0.012 L=6.0' S=0.0317 '/' Outflow=1.38 cfs 6,494 cf

Pond 56C: DMH Peak Elev=116.64' Inflow=3.34 cfs 16,366 cf
12.0" Round Culvert n=0.012 L=125.0' S=0.0100 '/' Outflow=3.34 cfs 16,366 cf

Pond 56D: DMH Peak Elev=115.32' Inflow=3.34 cfs 16,366 cf
12.0" Round Culvert n=0.012 L=56.0' S=0.0100 '/' Outflow=3.34 cfs 16,366 cf

Pond 56E: Peak Elev=116.58' Inflow=1.95 cfs 9,668 cf
12.0" Round Culvert n=0.012 L=16.0' S=0.0100 '/' Outflow=1.95 cfs 9,668 cf

Pond 56F: DMH Peak Elev=114.51' Inflow=5.28 cfs 26,034 cf
15.0" Round Culvert n=0.012 L=187.0' S=0.0100 '/' Outflow=5.28 cfs 26,034 cf

Pond 56G: Peak Elev=113.37' Inflow=2.22 cfs 10,533 cf
12.0" Round Culvert n=0.012 L=11.0' S=0.0173 '/' Outflow=2.22 cfs 10,533 cf

Pond 56H: DMH Peak Elev=112.99' Inflow=7.55 cfs 36,567 cf
15.0" Round Culvert n=0.012 L=79.0' S=0.0725 '/' Outflow=7.55 cfs 36,567 cf

Pond 56i: Peak Elev=107.55' Inflow=2.80 cfs 14,205 cf
12.0" Round Culvert n=0.012 L=10.0' S=0.0680 '/' Outflow=2.80 cfs 14,205 cf

Pond 56J: STORMCEPTOR Peak Elev=106.99' Inflow=10.30 cfs 50,772 cf
18.0" Round Culvert n=0.012 L=113.0' S=0.0832 '/' Outflow=10.30 cfs 50,772 cf

Pond 56K: DMH Peak Elev=98.92' Inflow=10.30 cfs 50,772 cf
Primary=5.81 cfs 24,973 cf Secondary=4.66 cfs 25,799 cf Outflow=10.30 cfs 50,772 cf

Pond RES02: Peak Elev=92.36' Storage=29,319 cf Inflow=26.84 cfs 128,445 cf
Discarded=1.45 cfs 60,043 cf Primary=19.40 cfs 68,402 cf Outflow=20.85 cfs 128,445 cf

Pond RES03: Peak Elev=83.07' Storage=27,586 cf Inflow=9.64 cfs 43,140 cf
Outflow=0.80 cfs 38,847 cf

Pond RES04: Struc 4 Peak Elev=88.06' Storage=61,592 cf Inflow=24.76 cfs 118,744 cf
Outflow=5.27 cfs 111,255 cf

Pond RES05: New Pond Peak Elev=97.01' Storage=8,139 cf Inflow=5.81 cfs 24,973 cf
Discarded=1.34 cfs 24,844 cf Primary=0.39 cfs 129 cf Outflow=1.73 cfs 24,973 cf

Pond RES06: New Pond Peak Elev=89.33' Storage=9,338 cf Inflow=7.11 cfs 37,912 cf
Discarded=1.41 cfs 33,183 cf Primary=3.97 cfs 4,729 cf Outflow=5.39 cfs 37,912 cf

Pond RES07: New Pond Peak Elev=99.50' Storage=2,991 cf Inflow=3.84 cfs 21,533 cf
Discarded=0.56 cfs 16,157 cf Primary=3.44 cfs 5,376 cf Outflow=4.00 cfs 21,533 cf

Pond RES08: New Pond Peak Elev=97.71' Storage=2,565 cf Inflow=4.41 cfs 22,013 cf
Discarded=0.57 cfs 14,912 cf Primary=3.80 cfs 7,102 cf Outflow=4.37 cfs 22,013 cf

Pond RES10: Peak Elev=80.24' Storage=0.152 af Inflow=32.30 cfs 129,546 cf
Outflow=32.12 cfs 129,546 cf

Pond RES13: Exist CB @ Inwood Dr. Peak Elev=94.98' Inflow=4.58 cfs 11,239 cf
18.0" Round Culvert n=0.012 L=53.6' S=0.0063 '/' Outflow=4.58 cfs 11,239 cf

Link 2L: AddHyd Inflow=37.41 cfs 155,342 cf
Primary=37.41 cfs 155,342 cf

Link 3L: AddHyd Inflow=4.14 cfs 54,932 cf
Primary=4.14 cfs 54,932 cf

Link 4L: AddHyd Inflow=18.73 cfs 160,834 cf
Primary=18.73 cfs 160,834 cf

Link 5L: Inflow=4.58 cfs 11,239 cf
Primary=4.58 cfs 11,239 cf

Total Runoff Area = 1,535,800 sf Runoff Volume = 543,270 cf Average Runoff Depth = 4.24"
64.11% Pervious = 984,663 sf 35.89% Impervious = 551,137 sf

ATTACHMENTS

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (Johnson Woods Phase II)

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

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

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

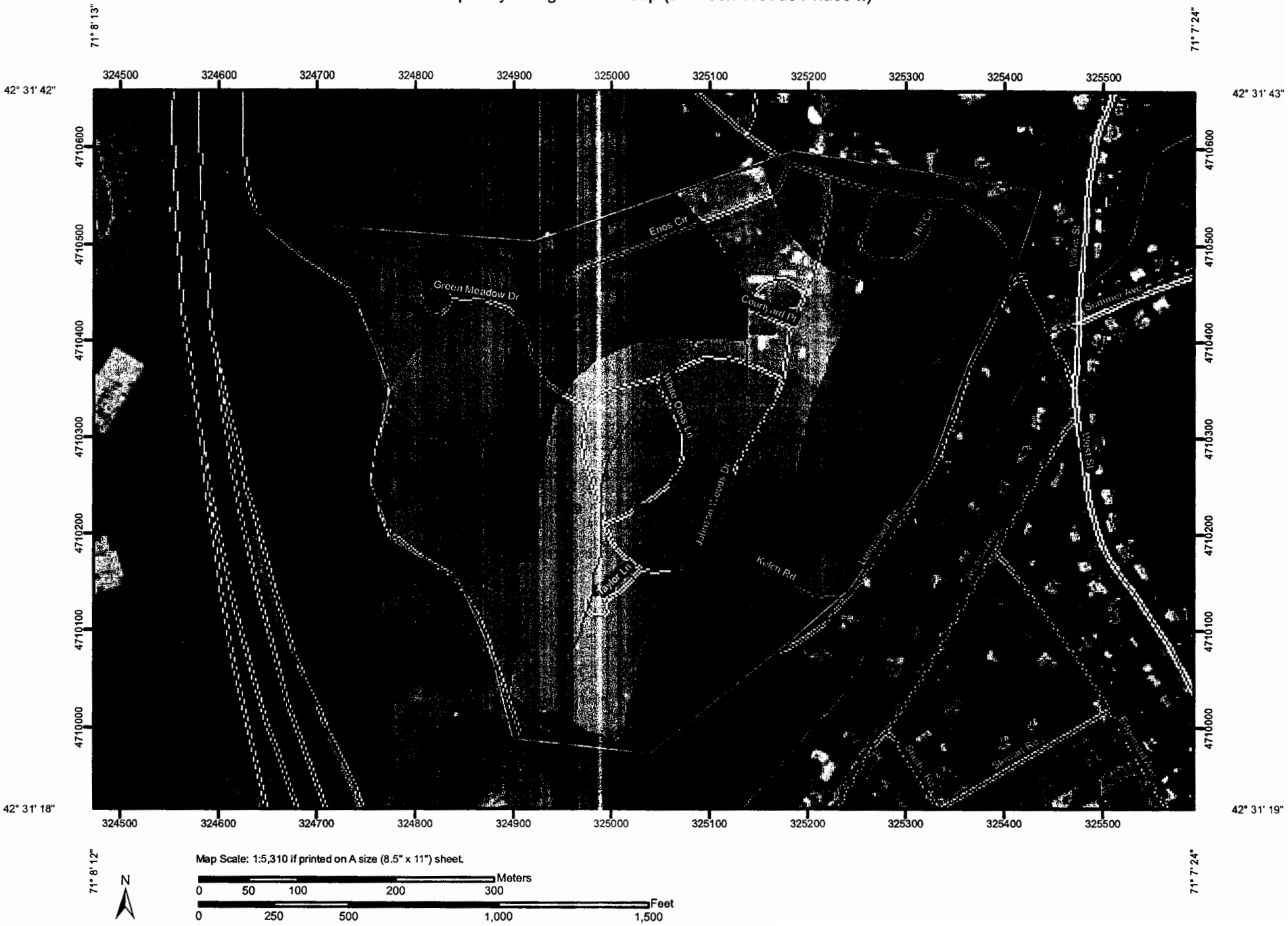
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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

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

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

Custom Soil Resource Report
Map—Hydrologic Soil Group (Johnson Woods Phase II)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:5,310 if printed on A size (8.5" × 11") sheet.

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

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

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

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

Date(s) aerial images were photographed: 8/14/2003; 7/7/2003

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

Table—Hydrologic Soil Group (Johnson Woods Phase II)

Hydrologic Soil Group— Summary by Map Unit — Middlesex County, Massachusetts (MA017)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
52A	Freetown muck, 0 to 1 percent slopes	D	2.1	3.0%
103B	Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes	B	8.2	11.7%
104D	Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes	D	12.6	17.9%
255A	Windsor loamy sand, 0 to 3 percent slopes	A	8.9	12.7%
256A	Deerfield loamy sand, 0 to 3 percent slopes	B	0.3	0.5%
302B	Montauk fine sandy loam, 3 to 8 percent slopes, extremely stony	C	9.3	13.1%
302C	Montauk fine sandy loam, 8 to 15 percent slopes, extremely stony	C	6.5	9.2%
317B	Scituate fine sandy loam, 3 to 8 percent slopes, extremely stony	C	6.7	9.5%
420B	Canton fine sandy loam, 3 to 8 percent slopes	B	15.7	22.3%
422B	Canton fine sandy loam, 3 to 8 percent slopes, extremely stony	B	0.0	0.0%
624B	Haven-Urban land complex, 0 to 8 percent slopes	B	0.1	0.2%
Totals for Area of Interest			**70.6**	**100.0%**

Rating Options—Hydrologic Soil Group (Johnson Woods Phase II)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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JOB FILE #: RED-0316
NAME: Johnson Woods Phase II
DATE: 10/10/11
MADE BY: WRB

☑ MEMO
☐ CALCULATION

Recharge Calculations

RES 05 and RES 06 Combined adjusted recharge volume is 2,100 Ft3

RES05 Req'd = 1,119 Ft^3 RES06 Req'd = 981 Ft^3

RES 05 Bottom Area Provided 31'x82' = 2,542^2

Based upon conservative Rawls Rate and Simple Dynamic Method.

Use 8.27 in/hr based upon site testing

Recharge Provided = (8.27in/hr /12"/Ft)(2hrs)(2,542Ft^2)

= 3,503.7 Ft^3 > 1,119 Ft^3 Req'd

RES06 Bottom Area Provided 51'x53' = 2,703Ft^2

Recharge Provided = (8.27in/hr /12"/Ft)(2hrs)(2,703Ft^2)

= 3,725.6Ft^3 > 981 Ft^3 Req'd

RES 07 Bottom Area Provided 26'x34' = 884Ft^2

Required Recharge = 1,117 Ft^3

Recharge Provided = (8.27in/hr/12"/Ft)(2hrs)(884Ft^2)

= 1,218 Ft^3 > 1,117 Ft^3 Req'd

RES 08 Bottom Area Provided 25'x40' = 1,000Ft^2

Required Recharge = 927 Ft^3

Recharge Provided = (8.27in/hr/12"/Ft)(2hrs)(1,000Ft^2)

= 1,378.3 Ft^3 > 927Ft^3 Req'd

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JOB FILE #: RED-6316
NAME: Johnson Woods Phase II
DATE: 9.28.11
MADE BY: MAEM

☐ MEMO
☑ CALCULATION

SEE VOL 3 CHAP 1 PG 25

DRAWDOWN TIMES: $T_{DRAWDOWN} = \frac{R_V}{K(\text{BOT AREA})(n)}$ ← VOLUME OF STRUCTURE ← DIDNT USE

$$\text{RES 05} = \frac{8883\ \text{FT}^3}{\left(\frac{16\ \text{IN}}{\text{HR}}\right)\left(\frac{1\ \text{FT}}{12\ \text{IN}}\right)(31\ \text{FT} \times 82\ \text{FT})} = 2.62\ \text{HRS}$$

$$\text{RES 06} = \frac{9502}{(16)(1/12)(51)(53)} = 2.64\ \text{HRS}$$

$$\text{RES 07} = \frac{3070}{(16)(1/12)(26)(34)} = 2.60\ \text{HRS}$$

$$\text{RES 08} = \frac{2667}{(16)(1/12)(25)(40)} = 2.00\ \text{HRS}$$

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JOB FILE #: REA-0316
NAME: Johnson Woods Phase II
DATE: 9.28.11
MADE BY: MEM

☐ MEMO
☑ CALCULATION

RES Ø5 & Ø6 REQUIRED RECHARGE VOLUME = 2100 FT³
SINCE Ø5 & Ø6 ARE NOT CONNECTED, DISTRIBUTE REQUIRED RECHARGE VOLUME BASED UPON VOLUME PERCENTAGES EACH RES TAKES IN 2YR STORM.

RES 05 IN 2YR TAKES 53.3% = 1119 FT³

RES 06 IN 2YR TAKES 46.7% = 981 FT³

Σ = 2100 FT³

USE SAME PERCENTAGES (53.3/46.7) FOR DETERMINING IMPERVIOUS AREA NEEDED TO GENERATE TRUNCATED HYDROGRAPH. (NOTE, YOU CAN'T NECESSARILY USE 50/50 FOR IMPERVIOUS AREAS BECAUSE IF THERE IS A LARGE DISPARITY BETWEEN THE SIZES OF THE TWO RES'S, THE SMALLER ONE MAY NOT MEET THE SIZING CRITERIA)

RES Ø5 77698 (53.3%) = 41413 FT² (GENERATE 1119 FT³)

RES Ø6 77698 (46.7%) = 36285 FT² (GENERATE 981 FT³)

RES Ø7 = 38219 FT² (GENERATE 1117 FT³)

RES Ø8 = 29838 FT² (GENERATE 927 FT³)

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JOB FILE #: RED-0316
NAME: Johnson Woods Phase II
DATE: 5:28:11
MADE BY: MEM

☐ MEMO
☑ CALCULATION

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RES 08 REQUIRED RECHARGE VOLUME

A SOIL	B SOIL	C SOIL
2582 (ROOF 55)	2005 (08-1)	679 (08-1)
	14458 (08-2)	4239 (08-2)
	5872 (ROOF 55)	Σ = 4918
	Σ = 22340	

∴ (2582)(0.6) = 129 FT³

(22340)(0.35) = 6512 FT³

(4918)(0.25) = 102 FT³

Σ = 883 FT³ REQUIRED

CAPTURE AREA ADJUSTMENT FOR RECHARGE
VOL 3, CHAP 1, Pg 28

152874 (TOT. IMP. AREA TO RES 05→08) / 145760 (IMP AREA TRIB TO RES 05→08) = 1.05

∴ FOR PORTION OF SITE TRIB TO RES 05 → 08

ADJUSTED REQUIRED MIN. RECHARGE VOLUME:

(2000 + 1064 + 883)(1.05) = 4144 FT³ REQ. RECHARGE VOLUME (TOTAL 05→08)

BREAKDOWN PER RES: (2000)(1.05) + (1064)(1.05) + (883)(1.05)

= 2100 + 1117 + 927 (ASSUMES EQUAL DIVISION OF CAPTURE AREA ADJUSTMENT)
(05/06) (07) (08)

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NAME: Johnson Woods Phase II
DATE: 9.28.2011
MADE BY: MEA

☐ MEMO
☑ CALCULATION

RES 5&6 REQUIRED RECHARGE VOLUME

A SOIL	B SOIL	C SOIL
987 (06-1)	697 (S6-5)	122776 (S6-1)
1069 (06-2)	3397 (06-1)	59938 (S6-2)
8193 (ROOF S5)	2185 (06-2)	12275 (S6-3)
Σ = 10843	1513 (ROOF S5)	8113 (S6-4)
	Σ = 7792	18602 (S6-5)
		705 (06-1)
		Σ = 59069

∴ (10843)(0.60) = 542 FT³

(7792)(0.35) = 227 FT³

(59069)(0.25) = 1231 FT³

Σ = 2000 FT³ REQUIRED

RES 07 REQUIRED RECHARGE VOLUME

A SOIL	B SOIL	C SOIL
131 (ROOF 20)	2387 (ROOF 40)	18041 (ROOF 20)
8351 (ROOF 40)		9309 (ROOF 40)
Σ = 8482		Σ = 27350

∴ (8482)(0.6) = 424 FT³

(2387)(0.35) = 70 FT³

(27350)(0.25) = 570 FT³

Σ = 1064 FT³ REQUIRED

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NAME: Johnson Woods Phase II
DATE: 9.28.2011
MADE BY: MEM

☐ MEMO
☑ CALCULATION

SINCE THESE AREAS OUTSIDE THE CAPTURE AREA ADJUSTMENT ARE ACCOUNTED FOR BY WAY OF EXFILTRATION THROUGH RES Ø2, RES Ø3 & RES Ø4, ~~NO CAPTURE AREA ADJUSTMENT CALCULATION IS NECESSARY.~~ ALL REMAINING IMPERVIOUS WILL BE INFILTRATED (OR AT A MINIMUM THE REQUIRED RECHARGE VOLUMES) THROUGH RES Ø5 → RES Ø8. (LESS ANY PATIO AREAS @ BLDGS 20, 40 & 55)

TOTAL IMPERVIOUS LESS THE ROOF AREAS BEING EXFILTRATED VIA RES Ø2, RES Ø3 & RES Ø4 ~~AND REAR ROOFS OF GARAGES IN WATERSHEDS Ø8-1 & Ø8-2 AND PATIOS @ REAR BLDGS 20, 40 & 55~~

RES Ø5 TRIB. IMPERVIOUS AREA } (112513)(0.5246)
RES Ø6 TRIB. IMPERVIOUS AREA } (29548)(0.6309)
77698

RES Ø7 TRIB. IMPERVIOUS AREA = (38219)(1) = 38219 FT² (EX. CWOES B-1)

RES Ø8 TRIB. IMPERVIOUS AREA = (49557)(0.6021) = 29838 FT²

TOTAL IMPERVIOUS AREA =
77698
38219
29838
3203 (FROM B-1)
1014 (FROM B-2)
531 (BA-SWLY)
2366 (BA-WLY)
} NOT CAPTURED

Σ = 152869 FT²

CAPTURED AREA = (77698 + 38219 + 29838) = 145755

∴ $\frac{145755}{152869}$ = 95.3% CAPTURED > 65% MIN. REQ.

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☑ CALCULATION

8

RECHARGE RES #2 [TOTAL WATERSHED AREA TO RES#2 IS SMALLER IN PROPOSED THAN EXISTING. 306230 PROP. VS 329386 EXIST.]

ASSUME WATERSHED 02-7 IS EQUAL IN EXISTING & PROPOSED CONDITION, THIS IS CONSERVATIVE SINCE 02-7 IN PROPOSED IS 15431 FT² OF IMP & 16771 FT² OF IMPERVIOUS IN EXISTING.

SINCE RES #2 IS A SUBSURFACE STRUCTURAL BMP ASSUME VOLUMES ARE SAME AS DESIGN.

ROOF AREAS IN BA-4&D & 10-1:

+ 8390 C

$\therefore (8390\ FT^2)\left(\frac{0.25\ IN}{12\ \frac{IN}{FT}}\right) = 175\ FT^3$

ASSUME THIS IS ADDITIONAL IMPERVIOUS, VERY CONSERVATIVE

ORIGINAL REQUIRED = 1433 FT³

ORIGINAL PROVIDED = 1829 FT³

$\therefore$ 1829 − 1433 = 396 FT³ EXTRA

396 > 175 FT³ $\therefore$ OK

ADDITIONAL NEW IMPERVIOUS AREAS EXISTING OUTSIDE OF THE RECHARGE CAPTURE AREA (ROOFS) ARE ACCOUNTED FOR THROUGH EXFILTRATION OF RES#2, RES #3 & RES #4. THIS CONSIDERS A VOLUMETRIC ANALYSIS ONLY, IE, THE NEW TRUNCATED HYDROGRAPH METHOD WAS NOT PERFORMED.

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JOB FILE #: REA-0316
NAME: Johnson Woods Phase II
DATE: 9.13.11
MADE BY: MEM

☐ MEMO
☑ CALCULATION

RECHARGE INCREASE RES #4

ADD. IMP $+12925\,C$ $+4860\,A$
$-6986\,C$
$\Sigma = 5939$

∴ ADDITIONAL RECHARGE:

$$(5939\ FT^2)\left(\frac{0.25\ IN}{12\ \frac{IN}{FT}}\right) = 124\ FT^3$$

$$(4860)\left(\frac{0.6\ IN}{12\ \frac{IN}{FT}}\right) = 243\ FT^3$$

"FROM RES #3"

∴ $\Sigma = 124 + 243 + 123 = 490\ FT^3$ ADDITIONAL RECHARGE

ORIGINAL REQUIRED = 2020 FT^3

FROM AS BUILT 8.16.2005 = 6201 FT^3 PROVIDED
(FROM EL 83 TO 84)

∴ 6201 − 2510 = 3,691 FT^3 EXTRA

3,691 > 123 (Res 03) ∴ OK

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JOB FILE #: REA-0316
NAME: Johnson Woods Phase II
DATE: 9.13.11
MADE BY: MEM

☐ MEMO
☑ CALCULATION

6

RECHARGE INCREASE RES Φ3

ADD. IMP + 16463 A + 10600 B
− 2139 A
− 880 A
Σ = 13444 A

∴ ADDITIONAL RECHARGE:

$$(13444\ FT^2)\left(\frac{0.6\ IN}{12\ \frac{IN}{FT}}\right) = 672\ FT^3$$

$$(10600\ FT^2)\left(\frac{0.35\ IN}{12\ \frac{IN}{FT}}\right) = 309\ FT^3$$

∴ Σ = 672 + 309 = 981 FT³ ADDITIONAL RECHARGE

ORIGINAL REQUIRED = 1057 FT³

FROM AS BUILT 8.16.2005 = 1915 FT³ PROVIDED
(FROM EL 78.5 TO 79)

∴ 1915 − 1057 = 858 FT³ EXTRA

981 − 858 = 123 FT³ DEFICIENT, ASSUME REMAINING RECHARGE THRU RES Φ4

HAYES ENGINEERING, INC.
603 SALEM STREET
WAKEFIELD, MA 01880
TEL: (781) 246-2800
FAX: (781) 246-7596

JOB FILE #: RED-0316
NAME: Johnson Woods Phase II
DATE: 9.13.11
MADE BY: MEM

☐ MEMO
☑ CALCULATION

WQV B-1 (TRIB TO PES #7)

USE 450i

WQV PES #8

TRIBUTARY DRAINAGE AREA = 41098

% IMPERVIOUS = 52.02

∴ IMPERVIOUS SURFACE = 21379 (INCLUDES ROOF)

WQF = (774)(21379/43560)(0.0015625)(1) = 0.59 FT³/s

∴ USE 450i

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☑ CALCULATION

WQV RES Φ5 & RES Φ6 (FOR UPSTREAM LOADING)

TRIBUTARY DRAINAGE AREA = 112573 (SEE DRAINAGE STUDY)

% IMPERVIOUS = 52.79

∴ IMPERVIOUS SURFACE = 59427 (INCLUDES ROOFS)

$$WQF = (q_u)(A)(WQV) \quad (\text{USE } T_c = 6\text{ MIN})$$

$$= \left(774 \frac{CSM}{IN}\right)\left(\frac{59427\ FT^2}{43560\ \frac{FT^2}{AC}}\right)\left(0.0015625 \frac{mi^2}{AC}\right)(1\ IN)$$

$$= \left(\frac{FT^3}{S \cdot mi^2 \cdot IN}\right)\left(\frac{AC \cdot FT^2}{FT^2}\right)\left(\frac{mi^2}{AC}\right)(IN) = \frac{FT^3}{S}$$

$$WQF = 1.65 \frac{FT^3}{S}$$

∴ USE STC 900

WQV RES Φ6 (FOR DOWNSTREAM LOADING)

TRIBUTARY DRAINAGE AREA = 19842 FT²

% IMPERVIOUS = 45.04

∴ IMPERVIOUS SURFACE = 8937 (INCLUDES ROOF)

$$WQF = (774)\left(\frac{8937}{43560}\right)(0.0015625)(1\ IN) = 0.25\ FT^3/S$$

∴ USE STC 450i

HAYES ENGINEERING, INC.
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JOB FILE #: REA-0316
NAME: Johnson Woods Phase II
DATE: 9.13.11
MADE BY: MEM

☐ MEMO
☑ CALCULATION

WQV RES #2

SINCE FLOW AREA TO RES #2 IS REDUCED, ASSUME WQV IS ALSO REDUCED AND NO CALCULATION IS NECESSARY.

FROM EXISTING CONDITION DRAINAGE STUDY:

INFLOW AREA = 329386 FT²

FROM PROPOSED CONDITION DRAINAGE STUDY:

INFLOW AREA = 306,230 FT²

THIS ASSUMES A REDUCTION IN IMPERVIOUS AREA & THAT NO UNACCOUNTED IMPERVIOUS AREAS EXIST.

HAYES ENGINEERING, INC.
603 SALEM STREET
WAKEFIELD, MA 01880
TEL: (781) 246-2800
FAX: (781) 246-7596

JOB FILE #: BEN-0316
NAME: Johnson Woods Phase II
DATE: 9.13.11
MADE BY: MEM

☐ MEMO
☑ CALCULATION

2

WQV INCREASE RES 04

ΔD IMP: +8469
−4322

Σ = 4147 FT² (DOES NOT INCLUDE ROOFS)

ADD. WQV = (4147 FT²)(0.5 IN)(12 IN/FT) = 173 FT³

FROM 4.30.2004 JWOODS DRAINAGE STUDY:

ORIGINAL REQ WQV = 6650 + 1330 = 7980 FT³

∴ 7980 + 173 = 8153 FT³ REQUIRED (TOTAL)

FROM ASBUILT 8.16.2005

WATER QUALITY PROVIDED = 2041 + 6201 = 8242

∴ 8242 > 8153 OK

HAYES ENGINEERING, INC.
603 SALEM STREET
WAKEFIELD, MA 01880
TEL: (781) 246-2800
FAX: (781) 246-7596

JOB FILE #: RES-0818
NAME: Johnson Woods Phase II
DATE: 9.13.2011
MADE BY: MEM

☐ MEMO
☑ CALCULATION

1

WQV INCREASE RES #3

ADD. IMP:

+5648
+7231
+123
+1086
−879
−2139

Σ = 10906 (DOES NOT INCLUDE ROOFS)

ADD WQV = (10906 FT²)(0.5 IN)(12 IN / FT) = 454 FT³

FROM 4.30.2004 JWOOD DRAINAGE STUDY:

ORIGINAL REQ WQV = 1735 + 347 = 2082 FT³

∴ 2082 + 454 = 2536 FT³ REQUIRED (TOTAL)

FROM AS BUILT 8.16.2005

FOREBAY BASIN

WATER QUALITY PROVIDED = 947 + 1915 = 2862 FT³

∴ 2862 > 2536 OK

Stormceptor®

The calm *during* the storm

When it rains, oils, sediments and other contaminants are washed from paved surfaces directly into our storm drains and waterways. Non-point source pollution associated with stormwater runoff accounts for approximately 80% of water pollution in North America. In and effort to protect our water resources, regulatory agencies are responding with new and evolving regulations.

Evolving with regulatory standards

Stormceptor continues to meet regional requirements

- As regulatory requirements shift focus to flow, Stormceptor sizing methods also shift focus to flow.
- Patented technology captures and treats water quality flowrate while eliminating concerns of scour or resuspension.

Remaining a leader in stormwater quality

Stormceptor performance achieves industry leading accolades

- Stormceptor achieves first on-line stormwater treatment device approval from the New Jersey Department of Environmental Protection.
- Performance testing verifies a high degree of TSS capture and retention without scour at high flows.
- Maintains continuous positive treatment of total suspended solids (TSS) year-round, regardless of flowrate.

Available Models

	Stormceptor Model	Internal Manhole Diameter or Equivalent ID[1] (ft)	Typical Depth[2] Below Pipe Invert (in)	Design Flow Rate[3] (cfs)	Typical Hydrocarbon Capacity (US Gal)	Maximum Sediment Capacity ft^3
Stormceptor STC	STC 450i	4	68	1.3	86	46
	STC 900	6	63	3.4	251	89
	STC 1200	6	79	3.4	251	127
	STC 1800	6	113	3.4	251	207
	STC 2400	8	104	5.4	840	205
	STC 3600	8	144	5.7	840	373
	STC 4800	10	140	8.8	909	543
	STC 6000	10	162	9.1	909	687
	STC 7200	12	148	12.1	1,079	839
	STC 11000	2 x 10	140	19.4	2,792	1,089
	STC 13000	2 x 10	162	20.6	2,792	1,374
	STC 16000	2 x 12	148	27.8	3,055	1,677

1. Structure diameter represents the typical inside diameter of the concrete structure.
2. Depth Below Pipe and Maximum Sediment Capacity for certain models can vary to accommodate specific site designs. Call your local Stormceptor representative.
3. Design Flow Rate is based on capture, treatment, and retention of d50 ~ 100 micron particle size. Stormceptor STC has been independently verified not to scour or resuspend TSS.

For more information, visit our website or contact: **Lawrence H Galkowski, PE, Regional Engineer**

New England Area email: lgalkowski@cemexusa.com cell: 413-246-7144

www.rinkerstormceptor.com (800) 909-7763

Rinker MATERIALS

DOUBLE RING INFILTROMETER TEST
ASTM D3385

HAYES ENGINEERING, INC.
603 Salem Street, Wakefield, MA 01880
TEL (781) 246-2800 FAX (781) 246-7596

Project Identification __**REA-0316**____	Constants	Area ( )	Depth of Liquid (**4"**)	Liquid Containers No.	Vol./DH( )
Test Location _**Johnson Woods**	____Inner Ring	_____	_____	_____	_____
Liquid Used ___**H2O**_____ pH _____	Annular Space _____		_____	_____	_____

Tested By ___GR_____ _____ Liquid level maintained using: ☐ flow valve; ☐ float value; ☐ mariotte tube

Depth to water table: _____ (_____) Penetration of rings: Inner _5"___ (_____); Outer _**5"**____ (_____)

Ground Temp. = _**60**____°( ) @ depth of **9 "**___ ( )

Trial DRI A		Date 2011 7-19	Time hr:min AM	Elapsed Time Δ/(total) min.	Flow Readings: Inner Ring Reading ( )	Inner Ring Flow ( )	Outer Ring Reading ( )	Outer Ring Flow ( )	Liquid Temp. (**70**)	Increase in Infiltration: Inner ( )	Annular ( )	Remarks:. weather conditions, etc Sunny 80 degrees
			10:36									
			10:36	**3**	**6**		**28**					
			10:41									
			10:43	**2**	**2**		**16**					
			10:45									Coarse gravel layer
			10:47	2	2		16					
			10:50									Trouble keeping water
			10:52	**2**	**2**		**16**					

Johnson Woods, Phase II, Reading, MA

Test Location: DRI A

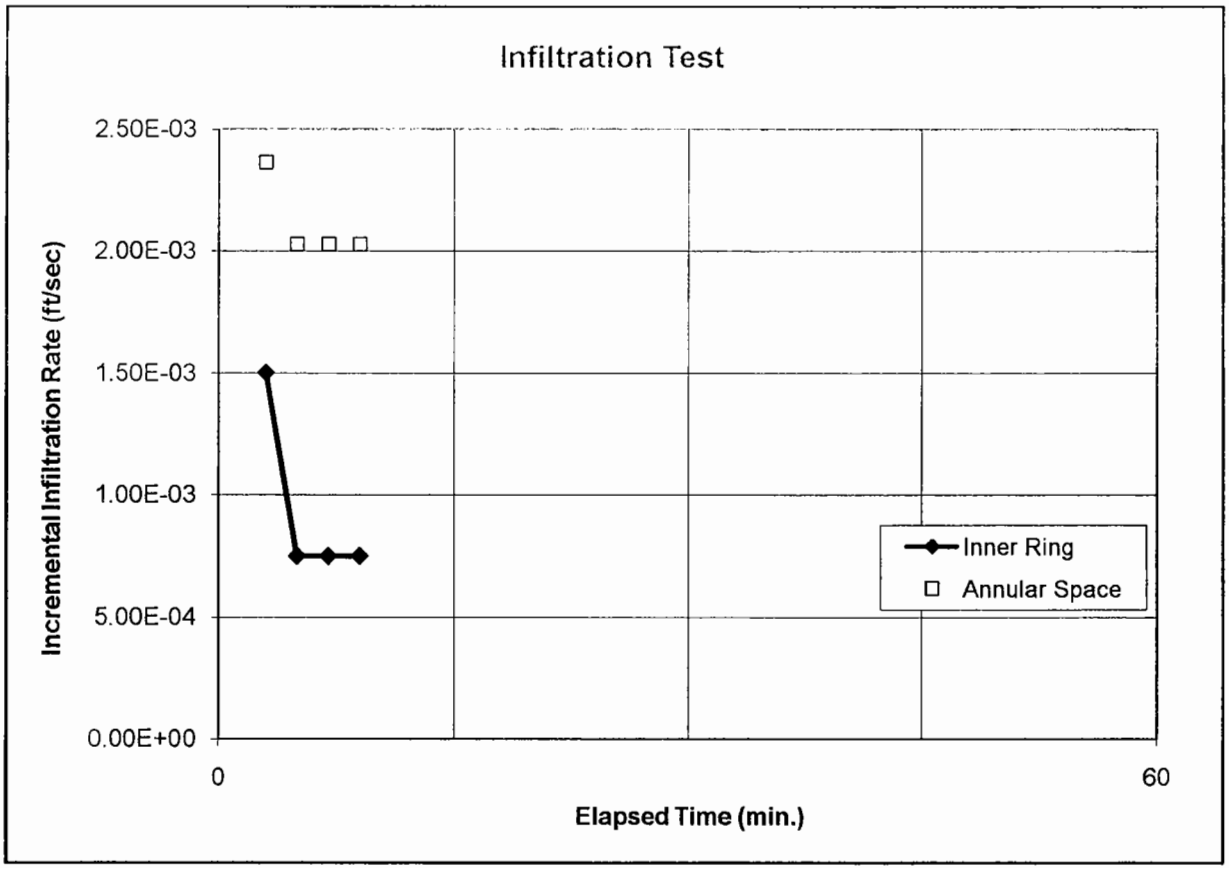
CONSTANT HEAD = 4 (in.)

Inner Ring Area (s.f.)	0.785
Annular Space Area (s.f.)	2.323

DOUBLE RING INFILTROMETER TEST ASTM D3385

Trial No.	Δ Time (min)	Inner Ring Flow (liters)	Annular Space Flow (liters)	Elapsed Time (min)	Incr. Infilt. Rate Inner (ft/s)	Incr. Infilt. Rate Annular (ft/s)
1	3	6	28	3	1.50E-03	2.36E-03
2	2	2	16	5	7.50E-04	2.03E-03
3	2	2	16	7	7.50E-04	2.03E-03
4	2	2	16	9	7.50E-04	2.03E-03

Calc'd Rate (in/hr)	32.39



DOUBLE RING INFILTROMETER TEST
ASTM D3385

HAYES ENGINEERING, INC.
603 Salem Street, Wakefield, MA 01880
TEL (781) 246-2800 FAX (781) 246-7596

Project Identification __**REA-0316**____ Constants Area ( ) Depth of Liquid (**4"**) Liquid Containers No. Vol./DH( )

Test Location _**Johnson Woods** ____Inner Ring _____ _____ _____ _____

Liquid Used ___**H2O**_____ pH _____ Annular Space _____ _____ _____ _____

Tested By ___GR_____ _____ Liquid level maintained using: ☐ flow valve; ☐ float value; ☐ mariotte tube

Depth to water table: _____ (_____) Penetration of rings: Inner _5"___ (_____); Outer _**5"**____ (_____)

Ground Temp. = _**60**____°( ) @ depth of ___ ( )

Trial DRI B		Date 2011 7-19	Time hr:min AM	Elapsed Time Δ/(total) min.	Flow Readings Inner Ring Reading ( )	Inner Ring Flow ( )	Outer Ring Reading ( )	Outer Ring Flow ( )	Liquid Temp. (70)	Increase in Infiltration Inner ( )	Increase in Infiltration Annular ( )	Remarks:. weather conditions, etc Sunny 85 degrees
		`	**11:35**									
			11:40	**5**	**1**		**5**					
			11:42									
			11:47	**5**	**1/2**		**2**					
;			**11:48**									
			11:53	5	1/2		2					
			11:54									
			11:59	**5**	**1/2**		**1-1/2**					
			12:00									
			12:05	**5**	**1/2**		**1-1/2**					
			12:06									
			12:11	**5**	**1/2**		**1-1/2**					
			12:12									
			12:17	**5**	**1/2**		**1-1/2**					
			12:18									
			12:23	**5**	**1/2**		**1-1/2**					

Johnson Woods, Phase II, Reading, MA

Test Location: DRI B

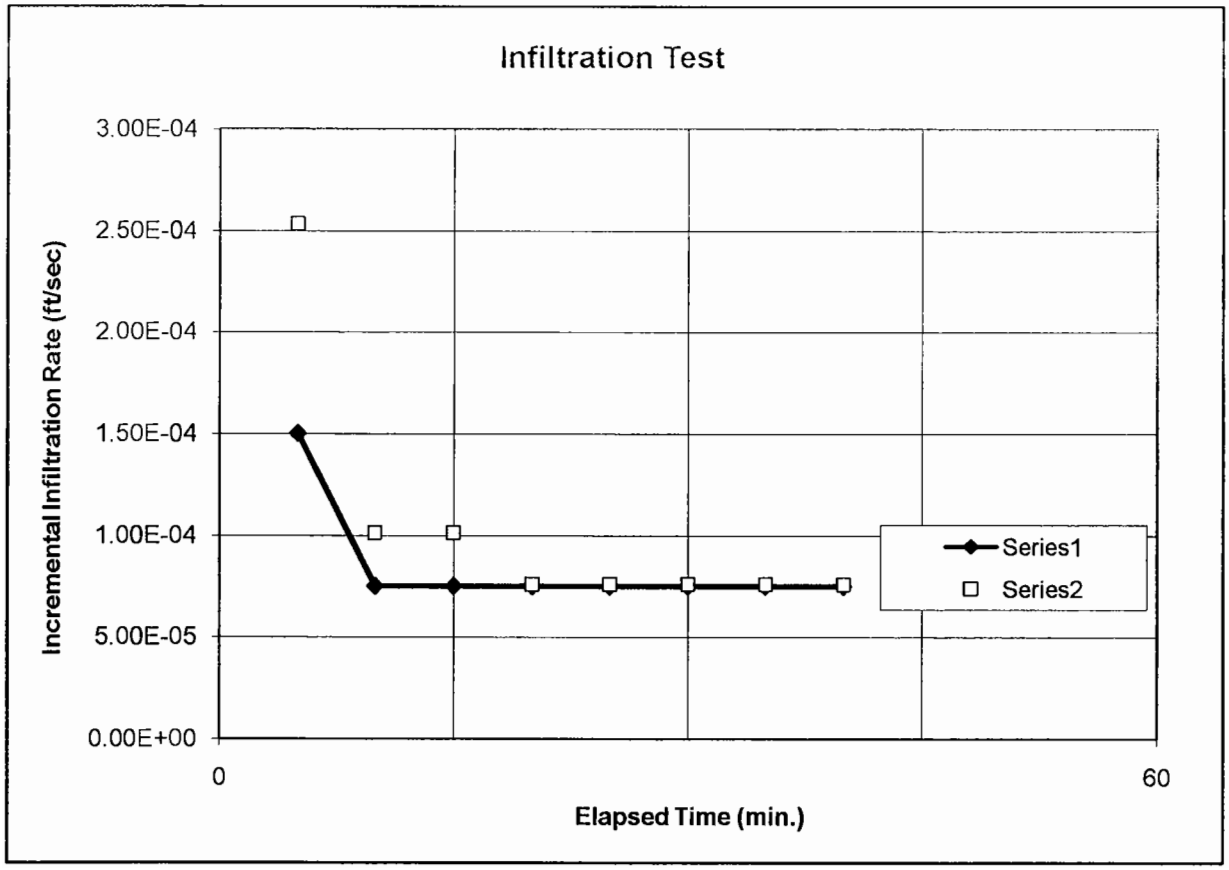
CONSTANT HEAD = 4 (in.)

Inner Ring Area (s.f.)	0.785
Annular Space Area (s.f.)	2.323

DOUBLE RING INFILTROMETER TEST ASTM D3385

Trial No.	Δ Time (min)	Inner Ring Flow (liters)	Annular Space Flow (liters)	Elapsed Time (min)	Incr. Infilt. Rate Inner (ft/s)	Incr. Infilt. Rate Annular (ft/s)
1	5	1	5	5	1.50E-04	2.53E-04
2	5	0.5	2	10	7.50E-05	1.01E-04
3	5	0.5	2	15	7.50E-05	1.01E-04
4	5	0.5	1.5	20	7.50E-05	7.60E-05
5	5	0.5	1.5	25	7.50E-05	7.60E-05
6	5	0.5	1.5	30	7.50E-05	7.60E-05
7	5	0.5	1.5	35	7.50E-05	7.60E-05
8	5	0.5	1.5	40	7.50E-05	7.60E-05

Calc'd Rate (in/hr)	3.24



DOUBLE RING INFILTROMETER TEST
ASTM D3385

HAYES ENGINEERING, INC.
603 Salem Street, Wakefield, MA 01880
TEL (781) 246-2800 FAX (781) 246-7596

Project Identification __**REA-0316**____ Constants Area ( ) Depth of Liquid (**4"**) Liquid Containers No. Vol./DH( )

Test Location _**Johnson Woods** ____Inner Ring _____ _____ _____ _____

Liquid Used ___**H2O**_____ pH _____ Annular Space _____ _____ _____ _____

Tested By ___**GR**_____ _____ Liquid level maintained using: ☐ flow valve; ☐ float value; ☐ mariotte tube

Depth to water table: _____ (_____) Penetration of rings: Inner _**4"**___ (_____); Outer _**4"**____ (_____)

Ground Temp. = _**60**____°( ) @ depth of ___ ( )

Trial DRI C		Date 2011 7-19	Time hr:min AM	Elapsed Time Δ/(total) min.	Flow Readings Inner Ring Reading ( )	Inner Ring Flow ( )	Outer Ring Reading ( )	Outer Ring Flow ( )	Liquid Temp. (70)	Increase in Infiltration Inner ( )	Increase in Infiltration Annular ( )	Remarks:. weather conditions, etc Sunny 85 degrees
			2:11									
			2:16	**5**	**1/2**		**3-1/2**					
			2:18									
			2:23	**5**	**1/2**		**2-1/2**					
			2:26									
			2:31	5	1/2		2					
			2:32									
			2:37	**5**	**1/2**		**2**					
			2:38									
			2:43	**5**	**1/2**		**2**					
			2:44									
			2:49	**5**	**1/2**		**2**					
			2:51									
			2:56	**5**	**1/2**		**2**					
			2:57									
			3:02	**5**	**1/2**		**2**					

Johnson Woods, Phase II, Reading, MA

Test Location: DRI C

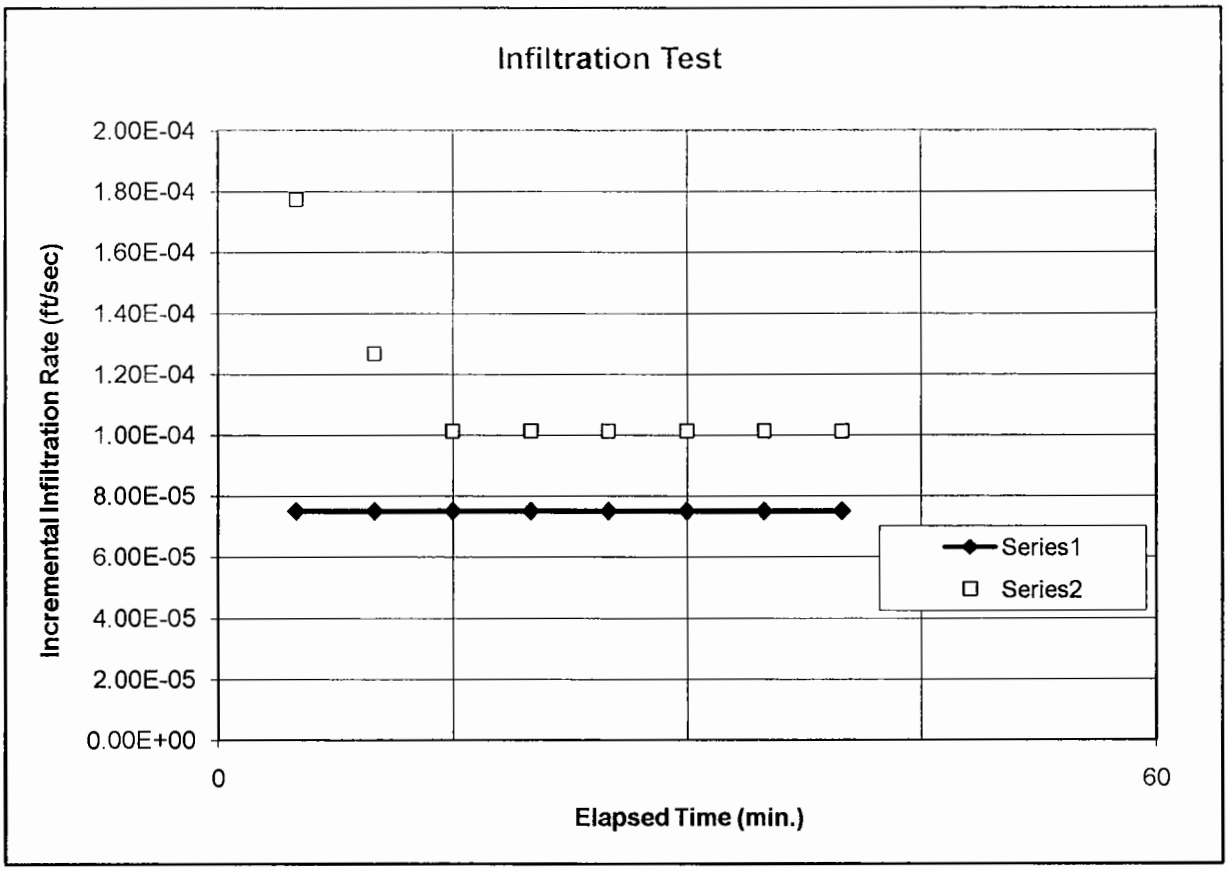
CONSTANT HEAD = 4 (in.)

Inner Ring Area (s.f.)	0.785
Annular Space Area (s.f.)	2.323

DOUBLE RING INFILTROMETER TEST ASTM D3385

Trial No.	Δ Time (min)	Inner Ring Flow (liters)	Annular Space Flow (liters)	Elapsed Time (min)	Incr. Infilt. Rate Inner (ft/s)	Incr. Infilt. Rate Annular (ft/s)
1	5	0.5	3.5	5	7.50E-05	1.77E-04
2	5	0.5	2.5	10	7.50E-05	1.27E-04
3	5	0.5	2	15	7.50E-05	1.01E-04
4	5	0.5	2	20	7.50E-05	1.01E-04
5	5	0.5	2	25	7.50E-05	1.01E-04
6	5	0.5	2	30	7.50E-05	1.01E-04
7	5	0.5	2	35	7.50E-05	1.01E-04
8	5	0.5	2	40	7.50E-05	1.01E-04

Calc'd Rate (in/hr)	3.24



DOUBLE RING INFILTROMETER TEST
ASTM D3385

HAYES ENGINEERING, INC.
603 Salem Street, Wakefield, MA 01880
TEL (781) 246-2800 FAX (781) 246-7596

Project Identification __**REA-0316**____ Constants Area ( ) Depth of Liquid (**3"**) Liquid Containers No. Vol./DH( )

Test Location _**Johnson Woods** ____Inner Ring _____ _____ _____ _____

Liquid Used ___**H2O**_____ pH _____ Annular Space _____ _____ _____ _____

Tested By ___**GR**_____ _____ Liquid level maintained using: ☐ flow valve; ☐ float value; ☐ mariotte tube

Depth to water table: _____ (_____) Penetration of rings: Inner _**4"**___ (_____); Outer _**4"**____ (_____)

Ground Temp. = _**60**____°( ) @ depth of ___ ( )

Trial DRID		Date 2011 7-20	Time hr:min AM	Elapsed Time Δ/(total) min.	Flow Readings Inner Ring Reading ( )	Inner Ring Flow ( )	Outer Ring Reading ( )	Outer Ring Flow ( )	Liquid Temp. (70)	Increase in Infiltration Inner ( )	Increase in Infiltration Annular ( )	Remarks:. weather conditions, etc Sunny 75 degrees
			9:36									
			9:39	**3**	**6-1/2**		**17**					
			9:45									
			9:48	**3**	**6-1/2**		**14**					
			9:52									
			9:55	3	6-1/2		13					
			10:00									
			10:03	**3**	**6-1/2**		**12**					
			10:07									
			10:10	**3**	**6-1/2**		**12**					
			10:15									
			10:18	**3**	**6-1/2**		**10**					
			10:22									
			10:25	**3**	**6-1/2**		**10**					
			10:29									
			10:32	**3**	**6-1/2**		**10**					
			10:36									
			10:39	**3**	**6-1/2**		**10**					

Johnson Woods, Phase II, Reading, MA

Test Location: DRI D

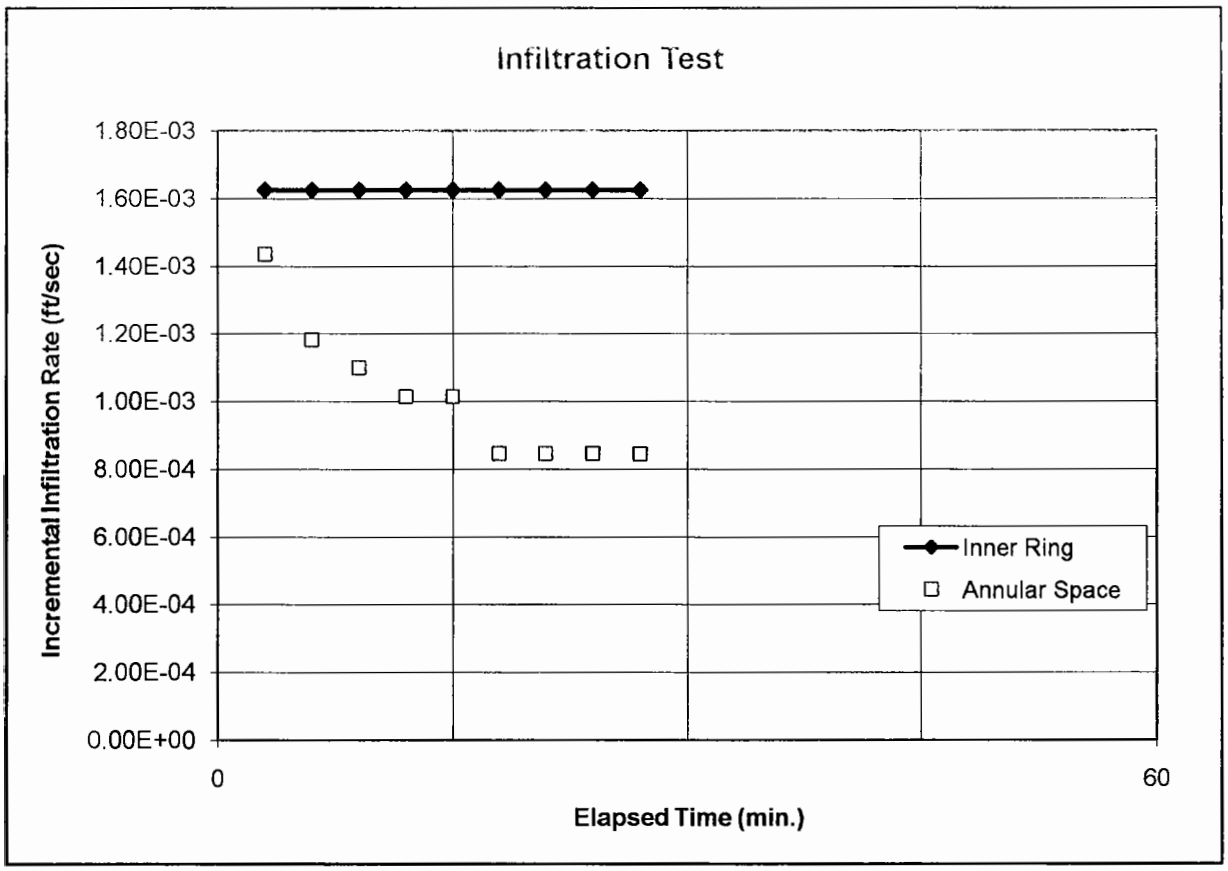
CONSTANT HEAD = 3 (in.)

Inner Ring Area (s.f.)	0.785
Annular Space Area (s.f.)	2.323

DOUBLE RING INFILTROMETER TEST ASTM D3385

Trial No.	Δ Time (min)	Inner Ring Flow (liters)	Annular Space Flow (liters)	Elapsed Time (min)	Incr. Infilt. Rate Inner (ft/s)	Incr. Infilt. Rate Annular (ft/s)
1	3	6.5	17	3	1.62E-03	1.44E-03
2	3	6.5	14	6	1.62E-03	1.18E-03
3	3	6.5	13	9	1.62E-03	1.10E-03
4	3	6.5	12	12	1.62E-03	1.01E-03
5	3	6.5	12	15	1.62E-03	1.01E-03
6	3	6.5	10	18	1.62E-03	8.45E-04
7	3	6.5	10	21	1.62E-03	8.45E-04
8	3	6.5	10	24	1.62E-03	8.45E-04
9	3	6.5	10	27	1.62E-03	8.45E-04

Calc'd Rate (in/hr)	70.18



DOUBLE RING INFILTROMETER TEST
ASTM D3385

HAYES ENGINEERING, INC.
603 Salem Street, Wakefield, MA 01880
TEL (781) 246-2800 FAX (781) 246-7596

	Constants	Area ( )	Depth of Liquid (3")	Liquid Containers No.	Vol./DH( )
Project Identification __REA-0316____					
Test Location _Johnson Woods	____Inner Ring	_____	_____	_____	_____
Liquid Used ___H2O_____ pH _____	Annular Space _____		_____	_____	_____

Tested By ___GR_____ _____

Liquid level maintained using: ☐ flow valve; ☐ float value; ☐ mariotte tube

Depth to water table: _____ (_____)

Penetration of rings: Inner _5"___ (_____); Outer _5"____ (_____)

Ground Temp. = _60____°( ) @ depth of ___ ( )

Trial DRIE		Date 2011 7-20	Time hr:min AM	Elapsed Time Δ/(total) min.	Flow Readings Inner Ring Reading ( )	Inner Ring Flow ( )	Outer Ring Reading ( )	Outer Ring Flow ( )	Liquid Temp. (70)	Increase in Infiltration Inner ( )	Increase in Infiltration Annular ( )	Remarks:. weather conditions, etc Sunny 85 degrees
			12:28									
			12:33	5	2		5					
			12:35									
			12:40	5	1/2		3					
			12:41									
			12:46	5	1/8		1-3/4					
			12:47									
			12:52	5	1/8		1-3/4					
			12:53									
			12:58	5	1/8		1-3/4					
			12:59									
			1:04	5	1/8		1-3/4					
			1:05									
			1:10	5	1/8		1-3/4					
			1:11									
			1:16	5	1/8		1-3/4					

Johnson Woods, Phase II, Reading, MA

Test Location: DRI E

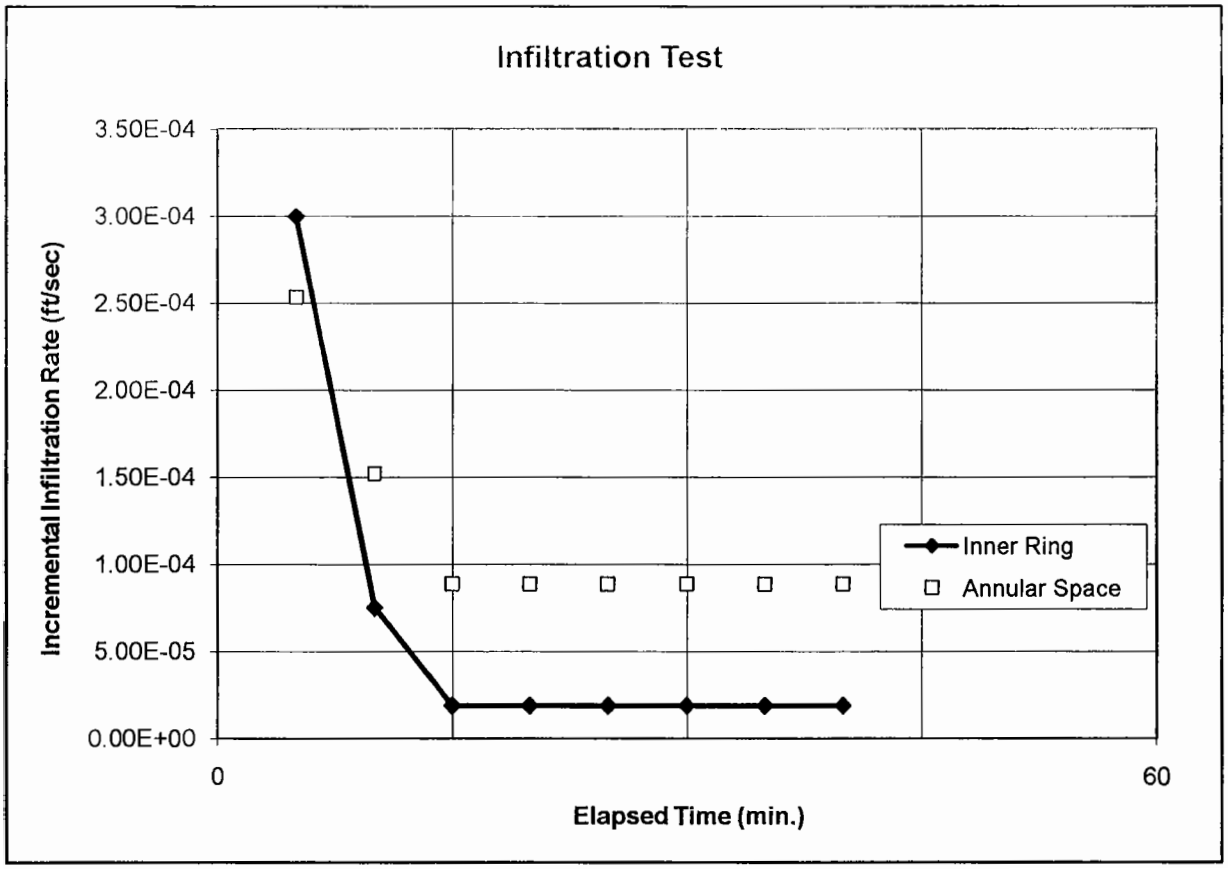
CONSTANT HEAD = 3 (in.)

Inner Ring Area (s.f.)	0.785
Annular Space Area (s.f.)	2.323

DOUBLE RING INFILTROMETER TEST ASTM D3385

Trial No.	Δ Time (min)	Inner Ring Flow (liters)	Annular Space Flow (liters)	Elapsed Time (min)	Incr. Infilt. Rate Inner (ft/s)	Incr. Infilt. Rate Annular (ft/s)
1	5	2	5	5	3.00E-04	2.53E-04
2	5	0.5	3	10	7.50E-05	1.52E-04
3	5	0.125	1.75	15	1.87E-05	8.87E-05
4	5	0.125	1.75	20	1.87E-05	8.87E-05
5	5	0.125	1.75	25	1.87E-05	8.87E-05
6	5	0.125	1.75	30	1.87E-05	8.87E-05
7	5	0.125	1.75	35	1.87E-05	8.87E-05
8	5	0.125	1.75	40	1.87E-05	8.87E-05

Calc'd Rate (in/hr)	0.81



DOUBLE RING INFILTROMETER TEST
ASTM D3385

HAYES ENGINEERING, INC.
603 Salem Street, Wakefield, MA 01880
TEL (781) 246-2800 FAX (781) 246-7596

			Depth of	Liquid Containers	
Project Identification __**REA-0316**____	Constants	Area (___)	Liquid (**7"**)	No.	Vol./DH(____)
Test Location _**Johnson Woods**	____Inner Ring	_____	_____	_____	_____
Liquid Used ___**H2O**_____ pH _____	Annular Space _____		_____	_____	_____

Tested By ___**GR**_____ _____ Liquid level maintained using: ☐ flow valve; ☐ float value; ☐ mariotte tube

Depth to water table: _____ (_____) Penetration of rings: Inner _4"___ (_____); Outer _**4"**____ (_____)

Ground Temp. = _**60**____°( ) @ depth of ___ ( )

Trial DRI G		Date 2011 7-21	Time hr:min AM	Elapsed Time Δ/(total) min.	Flow Readings: Inner Ring Reading ( )	Inner Ring Flow ( )	Outer Ring Reading ( )	Outer Ring Flow ( )	Liquid Temp. (70)	Increase in Infiltration: Inner ( )	Annular ( )	Remarks:. weather conditions, etc Sunny **75** degrees
		`	**8:35**									
			8:45	**10**	**1/8**		**3**					
			8:45									
			8:55	**10**	**1/8**		**3**					
:			8:56									Dense very fine
			9:06	10	1/8		2-1/2					
			9:08									Loamy sand with
			9:18	**10**	**0**		**2-1/2**					
			9:18									Platy structure
			9:28	**10**	**0**		**2-1/2**					
			9:28									
			9:38	**10**	**0**		**2-1/2**					

Johnson Woods, Phase II, Reading, MA

Test Location: DRI G

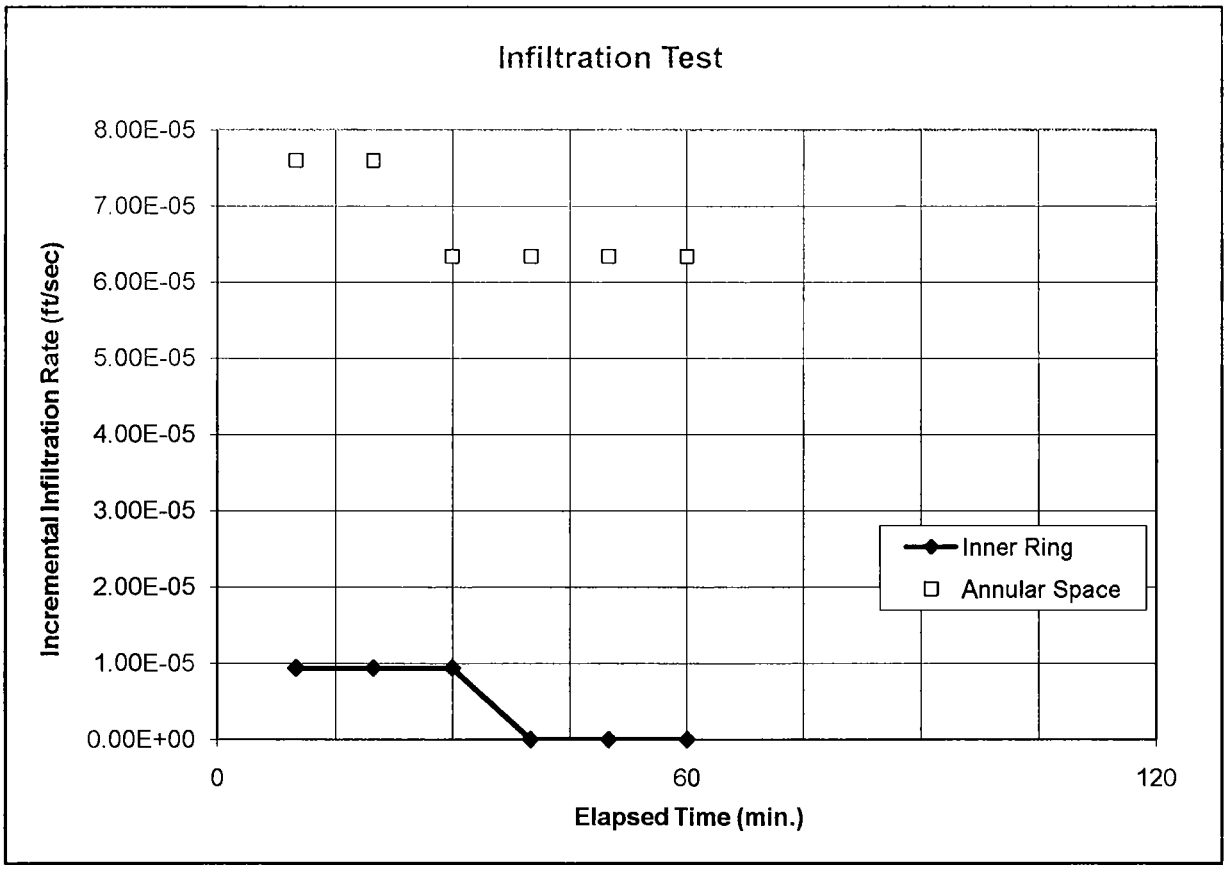
CONSTANT HEAD = 7 (in.)

Inner Ring Area (s.f.)	0.785
Annular Space Area (s.f.)	2.323

DOUBLE RING INFILTROMETER TEST ASTM D3385

Trial No.	Δ Time (min)	Inner Ring Flow (liters)	Annular Space Flow (liters)	Elapsed Time (min)	Incr. Infilt. Rate Inner (ft/s)	Incr. Infilt. Rate Annular (ft/s)
1	10	0.125	3	10	9.37E-06	7.60E-05
2	10	0.125	3	20	9.37E-06	7.60E-05
3	10	0.125	2.5	30	9.37E-06	6.33E-05
4	10	0	2.5	40	0.00E+00	6.33E-05
5	10	0	2.5	50	0.00E+00	6.33E-05
6	10	0	2.5	60	0.00E+00	6.33E-05

Calc'd Rate (in/hr)	0.00



DOUBLE RING INFILTROMETER TEST
ASTM D3385

HAYES ENGINEERING, INC.
603 Salem Street, Wakefield, MA 01880
TEL (781) 246-2800 FAX (781) 246-7596

Project Identification __**REA-0316**____ Constants Area ( ) Depth of Liquid (**4"**) Liquid Containers No. Vol./DH( )

Test Location _**Johnson Woods** ____Inner Ring _____ _____ _____ _____

Liquid Used ___**H2O**_____ pH _____ Annular Space _____ _____ _____ _____

Tested By ___**GR**_____ _____ Liquid level maintained using: ☐ flow valve; ☐ float value; ☐ mariotte tube

Depth to water table: _____ (_____) Penetration of rings: Inner _**4"**___ (_____); Outer _**4"**____ (_____)

Ground Temp. = _**60**____°( ) @ depth of ___ ( )

Trial DRI I		Date 2011 7-21	Time hr:min AM	Elapsed Time Δ/(total) min.	Flow Readings Inner Ring Reading ( )	Inner Ring Flow ( )	Outer Ring Reading ( )	Outer Ring Flow ( )	Liquid Temp. (70)	Increase in Infiltration Inner ( )	Increase in Infiltration Annular ( )	Remarks:. weather conditions, etc Sunny **95** degrees
		`	**12:49**									
			12:59	**10**	**1/4**		**3-1/2**					
			12:59									
			1:09	**10**	**1/4**		**2-1/2**					
:			**1:10**									Dense very fine
			1:20	**10**	**1/4**		**2-1/2**					
			1:21									Loamy sand with
			1:31	**10**	**1/4**		**2-1/2**					
			1:31									Platy structure
			1:41	**10**	**1/4**		**2-1/2**					
			1:42									
			1:52	**10**	**1/4**		**2-1/2**					

Johnson Woods, Phase II, Reading, MA

Test Location: DRI I

CONSTANT HEAD = 4 (in.)

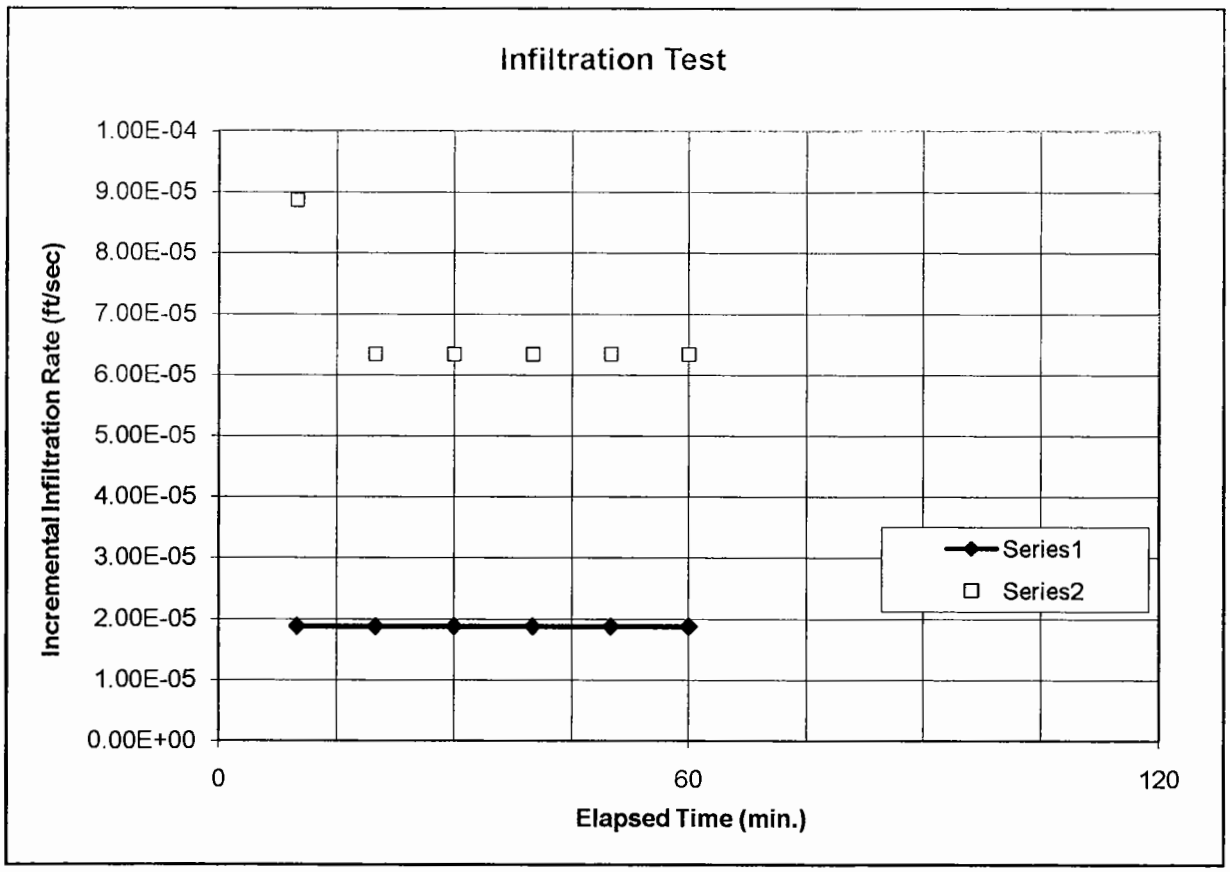
Inner Ring Area (s.f.) 0.785

Annular Space Area (s.f.) 2.323

DOUBLE RING INFILTROMETER TEST ASTM D3385

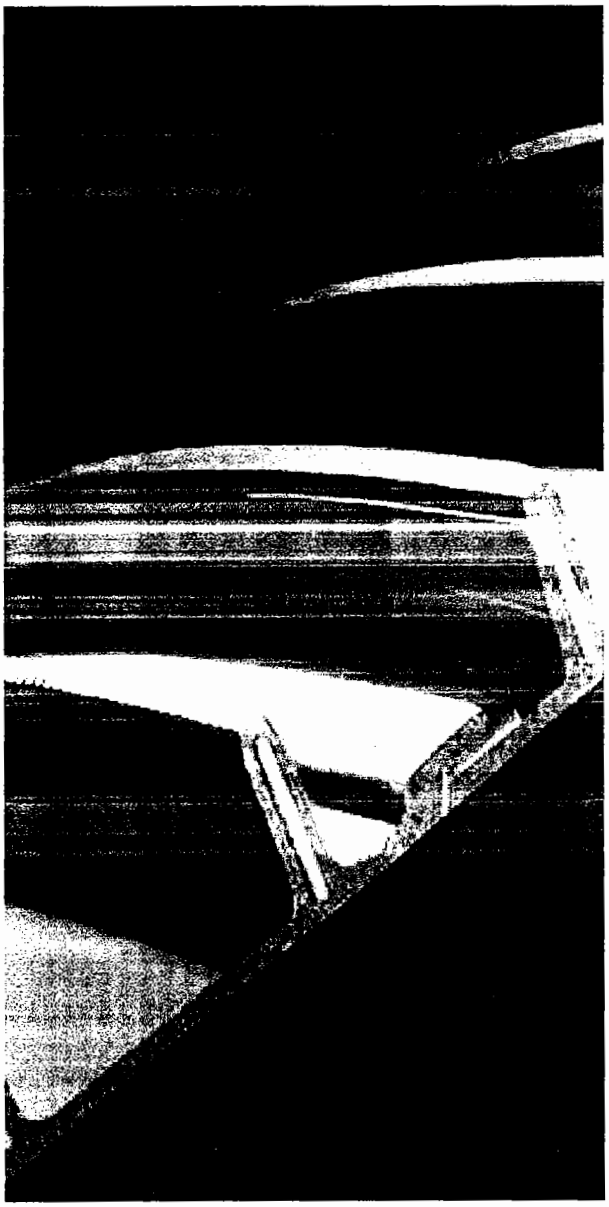
Trial No.	Δ Time (min)	Inner Ring Flow (liters)	Annular Space Flow (liters)	Elapsed Time (min)	Incr. Infilt. Rate Inner (ft/s)	Incr. Infilt. Rate Annular (ft/s)
1	10	0.25	3.5	10	1.87E-05	8.87E-05
2	10	0.25	2.5	20	1.87E-05	6.33E-05
3	10	0.25	2.5	30	1.87E-05	6.33E-05
4	10	0.25	2.5	40	1.87E-05	6.33E-05
5	10	0.25	2.5	50	1.87E-05	6.33E-05
6	10	0.25	2.5	60	1.87E-05	6.33E-05

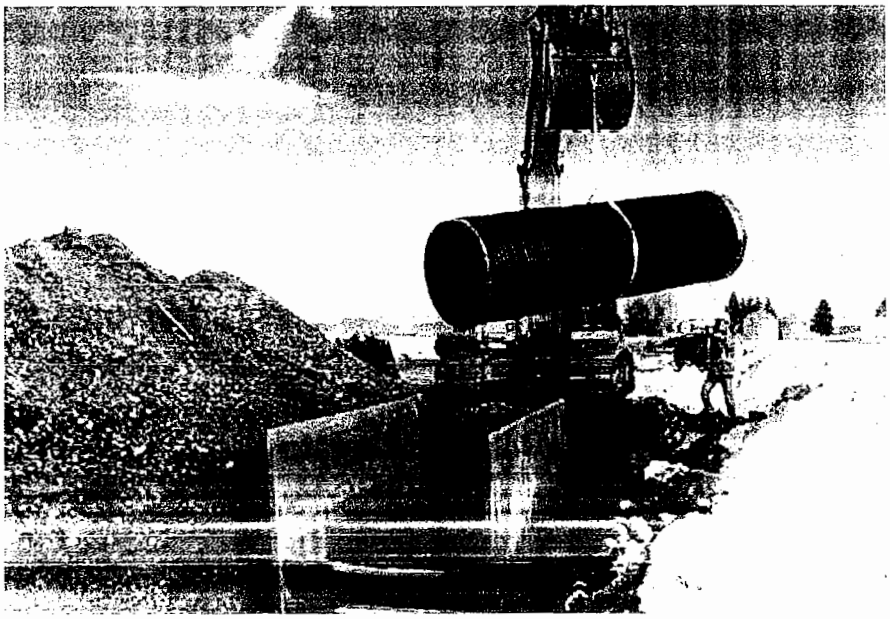
Calc'd Rate (in/hr)	0.81

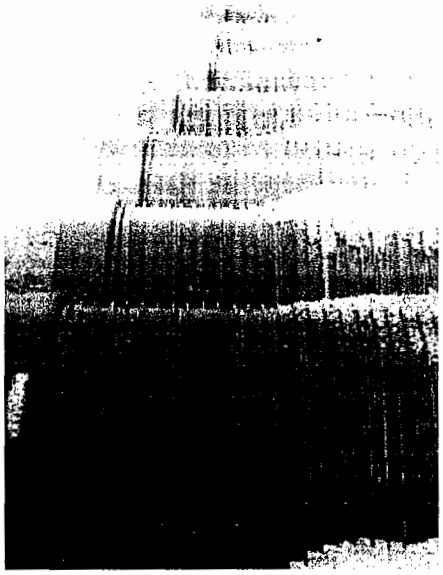


CONTECH®
CONSTRUCTION PRODUCTS INC.

DuroMaxx® – Steel Reinforced Polyethylene Pipe







DuroMaxx®
A STEEL REINFORCED POLYETHYLENE PIPE

Sanitary | Irrigation | Storm Sewer | Detention

Key Performance Advantages

The Strength of Steel. The Durability of Plastic.

It's the ideal combination of materials that makes DuroMaxx an exceptional pipe. 80 ksi steel reinforcing ribs provide the strength, and pressure rated Polyethylene Resin (PE) provides the durability. This combination of materials results in an extraordinarily strong and durable pipe. DuroMaxx is designed with a smooth inner wall for outstanding hydraulic capacity and provides the properties you can count on for long-term service and performance in the most demanding environments.

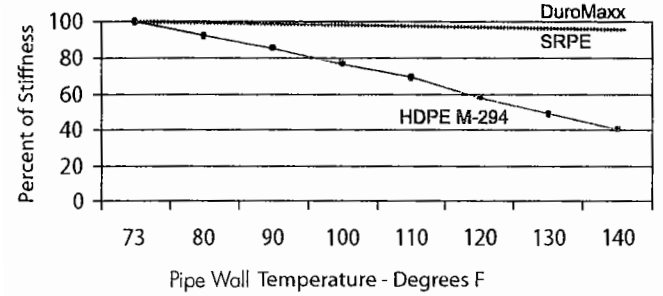
Lifelong Performance

DuroMaxx steel reinforced ribbed profile wall construction will not creep or buckle. The built-in capacity of the high strength steel eliminates concerns that have long plagued profile wall HDPE pipe. Today, it is possible to design with confidence to meet the long-term structural demands of the most difficult **sanitary, irrigation, storm sewer** and **detention** projects.

Temperature Effects on Strength

All flexible pipes must be designed to have adequate pipe stiffness to resist handling, installation and construction loads and to minimize deflection, ensuring a successful installation. Published pipe stiffness levels are measured at 73°F in a laboratory. The actual or apparent field pipe stiffness due to the effects of sunlight and a modest 80° temperature will produce results that are very different in the field – where it counts. A pipe wall temperature in excess of 110°results in a loss of pipe stiffness greater than 30% for a non-reinforced profile wall polyethylene pipe. Steel-reinforced DuroMaxx pipe loses less than 1% of its stiffness under the same conditions because the steel provides the pipe stiffness, not the PE plastic. As a result, DuroMaxx can be twice as stiff as non-steel reinforced HDPE pipe.

Effective Pipe Stiffness vs. Temperature*



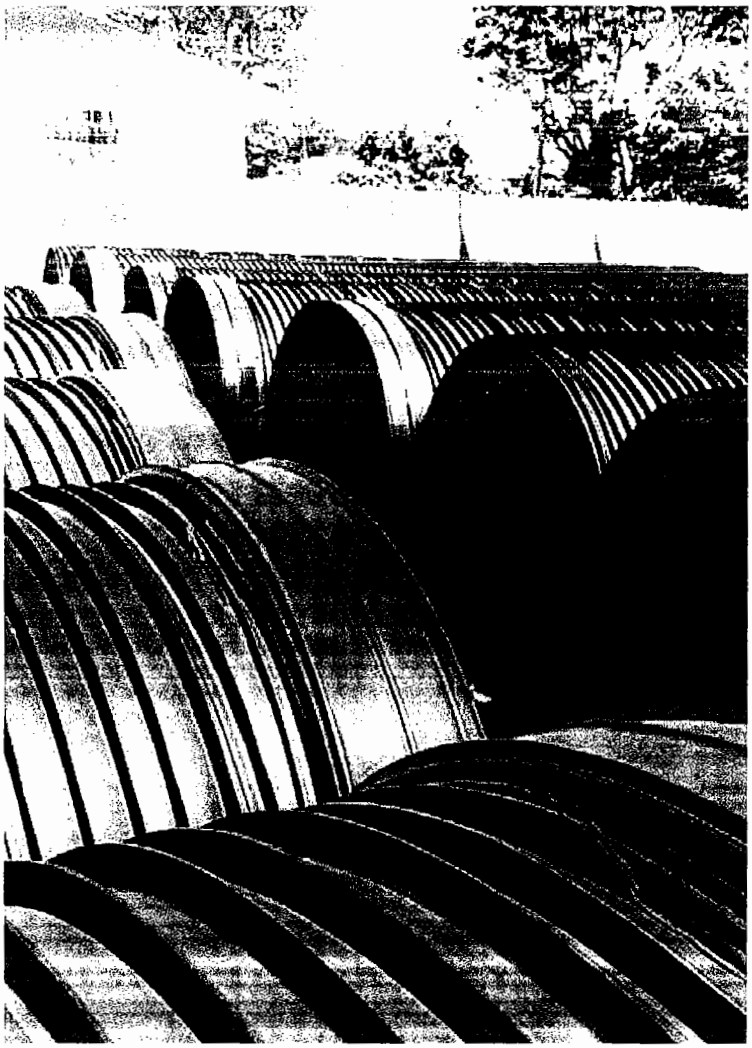
* The information in this graph is an average stiffness loss observed over several diameters of one AASHTO M-294 HDPE profile wall product.

High Performance Pressure Rated Resins

Predictable service life demands predictable material properties. DuroMaxx uses only high quality pressure rated PE resin that provides predictable engineering properties including crack resistance, tensile strength and modulus of elasticity. Hydrostatic Design Basis (HDB) testing verifies and documents important 50 and 100 year design properties that aid the professional engineer when designing piping systems.

Steel Reinforced Watertight Joints

DuroMaxx's steel reinforced bell and spigot achieves a level of watertight joint performance that sets it apart from conventional pipe products. The DuroMaxx joint is designed to meet, *exceed and maintain* the highest standards of performance when tested in accordance with ASTM D3212. Tested to 15 psi, DuroMaxx steel reinforced High Performance (HP) joints greatly exceed ASTM's 10.8 psi requirement. For lower performance applications, 3 psi low head (LH) or soil tight (ST) joints are available. Leak-free ElectroFusion (EF) joints are also an option.



Savings

High flow rates are achieved with a smooth polyethylene waterway wall for optimal savings. Target flow rates can be assured with DuroMaxx by contacting your local CONTECH sales engineer for the appropriate information. Manning's "n" values will range between 0.011 to 0.013, depending on velocity and flow rate.

DuroMaxx pipe is **lightweight** and can be easily handled and quickly installed, often eliminating the need to use heavy construction equipment. The outside diameter (OD) of DuroMaxx is smaller than other conventional pipe materials, resulting in less trench excavation. As the two main cost drivers to install water conveyance products are manpower and machinery, DuroMaxx provides the opportunity to save in both, resulting in less overall spending. The longer lengths and easy joint assembly are just some of the DuroMaxx installation advantages. DuroMaxx should be installed in accordance with nationally accepted ASTM D2321 installation practices. Contact your local CONTECH representative for the DuroMaxx installation guide.

Fittings

DuroMaxx pipe is available with a full range of fabricated fittings such as elbows, tees, wyes, slope junctions and reducers. Both standard and custom fittings can be readily fabricated, which can result in fewer concrete structures and lower project costs.

Available in diameters from 24 to 120 inches and manufactured in standard lengths of 14 or 22 feet with bell and spigot joints, DuroMaxx has fewer joints to assemble on site, resulting in faster installation rates for the contractor. If your project requires custom lengths, contact your CONTECH representative for details and availability.

Pipe Dimensions

Nom. Pipe Dia.(in)	Pipe OD (in)	Pipe ID (in)	Bell OD (in)	Min. Cover (ft)	Max. Cover (ft)
24	24.9	23.6	26.2	1.0	50
30	30.9	29.5	34.0	1.0	50
36	37.1	35.4	39.9	1.0	50
42	43.2	41.3	45.8	1.0	50
48	49.5	47.2	52.3	1.0	30
54	55.5	53.2	58.2	1.0	30
60	61.4	59.1	64.1	1.0	30
66	67.8	65.0	NA	1.5	30
72	73.7	70.9	77.6	1.5	30
84	85.9	82.7	NA***	1.5	30
96	97.8	94.5	NA***	2.0	30
120**	121.9	118.1	NA	3	25

* Minimum Pipe Stiffness Per ASTM F2562/F2562 M, Class 1
** Call for availability.
*** Currently available with PolyFusion® [illegible] couplers or plain ended with steel external band

Environmental Benefits

CONTECH is an environmentally conscious company committed to shaping the future of green building and design. CONTECH offers a wide range of site solutions that respond to green building and construction needs and can contribute towards LEED® and NAHB green credits. DuroMaxx has the potential to contribute to a variety of LEED credits in the categories for sustainable sites, water efficiency, materials and resources, innovation in design and regional priority. DuroMaxx consumes 35% less of the natural resources required to produce AASHTO M294 pipe. The steel reinforcing ribs in the profile wall that provide the structural integrity for the pipe are made out of steel with recycled content levels ranging from 55-80%.

About LEED

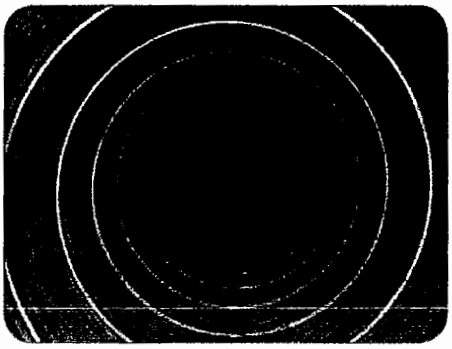
A nationally recognized [illegible] Green Building Rating System™ is based on points [illegible] the materials and systems used in aggregate.

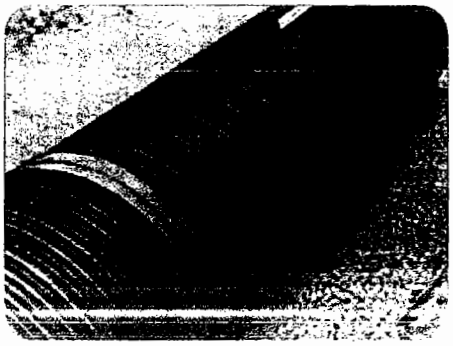
Sanitary Applications (42" +)

Large diameter sanitary sewer projects can be tough to deal with for many agencies. These long interceptors or trunk lines can run for miles, from manhole to manhole, eating away at an already constrained budget. Much of the costs can be contributed to installation realities for large quantities of very large diameters. These costs can include:

- Freight and number of trucks needed
- Number of picks and weight of those picks
- Number of joints and procedure to meet watertight standard
- Other material costs

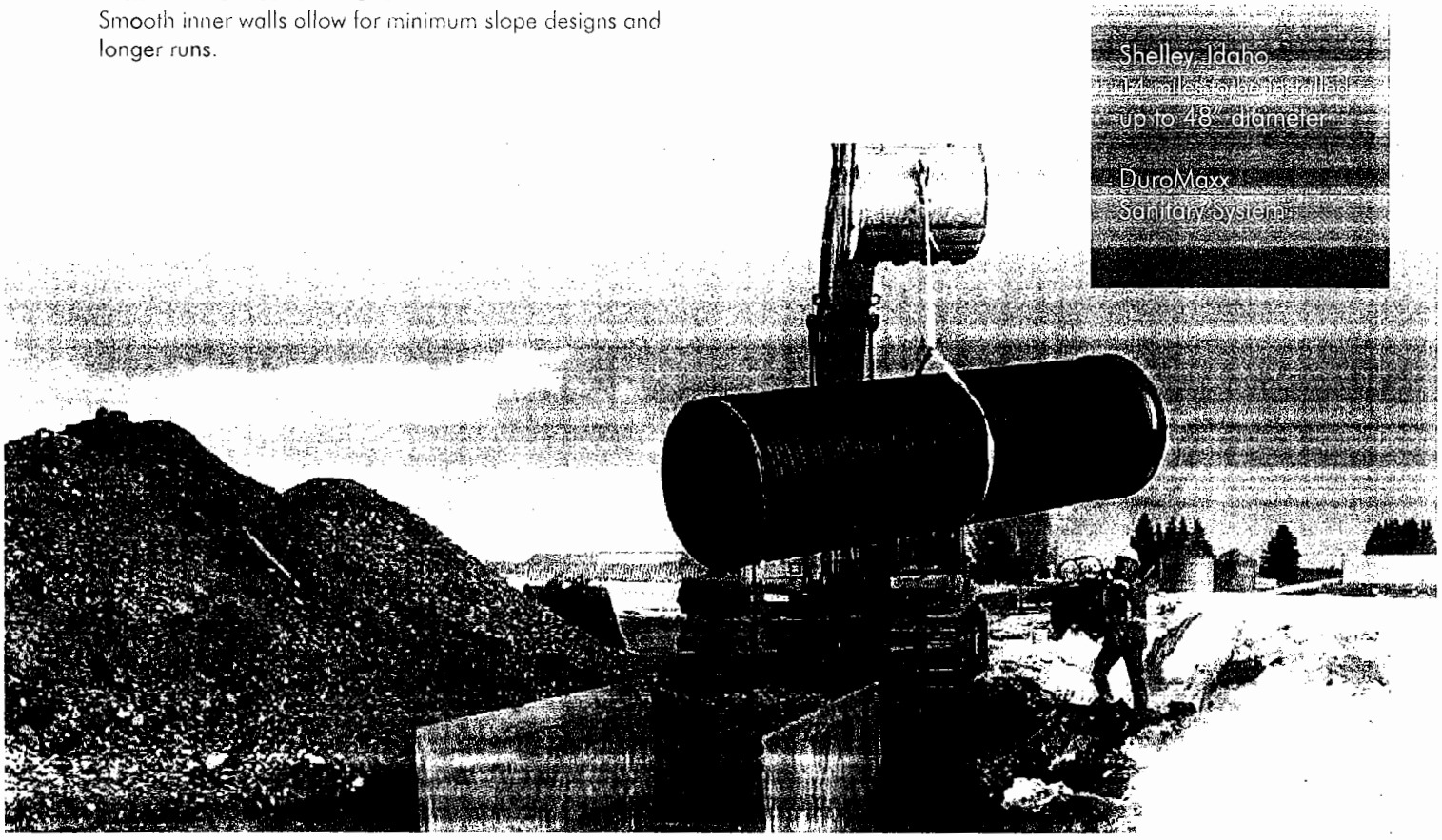
DuroMaxx provides real answers that help make the agency's and engineer's job easier. Outstanding performance and value are clearly evident when comparing DuroMaxx to a wide variety of other products such as RCP, HDPE, Polypropylene, PVC and fiberglass pipe.





Benefits

- For 42" and larger diameters
- Predictable, high strength for deep covers, shape and deflection control.
  Joint tightness that meets initial testing requirements and long-term infiltration/exfiltration needs.
- Resistant to corrosive effluent.
  Smooth inner walls allow for minimum slope designs and longer runs.



Barker Ranch,
Washington
3 miles
54" & 60" diameter

DuroMaxx
Irrigation System

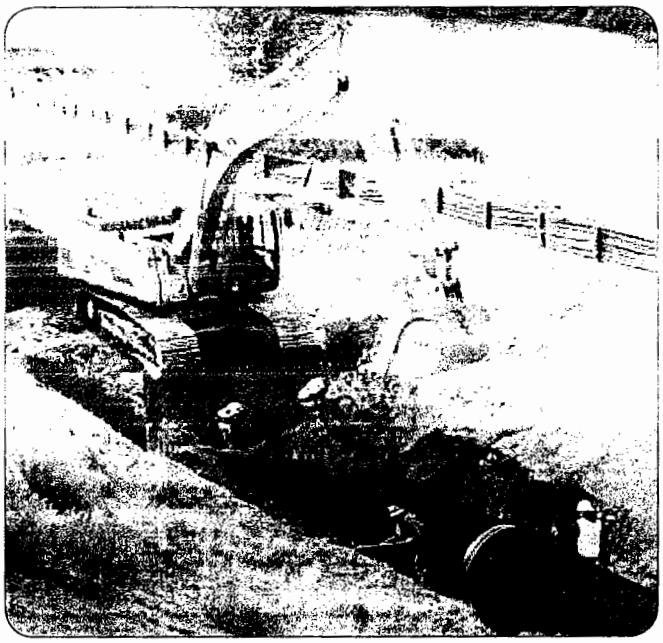
Irrigation Applications

Agriculture and irrigation agencies are in need of more dependable and cost effective solutions to conserve their most valuable resource, water. Many are enclosing ditches and canals with pipe conveyance systems in remote areas of the country. These projects can be challenging to any engineer or project manager, especially when hydraulic parameters require larger diameter pipe sizes. DuroMaxx has proven solutions to these problems.

Benefits

HDB pressure rated PE resins provide superior corrosion resistance.

- A variety of joint configurations and joint tightness levels are available to meet your specific project needs. See page 2 for more details.
- Installation cost advantages important for remote locations.
- Versatile fabrication supports unique fittings and components.
- Excels in short and long-term cost analysis for irrigation applications.



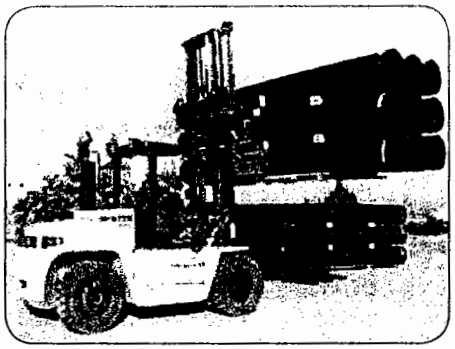
100-Year Gravity Flow Capabilities
50-Year Pressurized Service Period

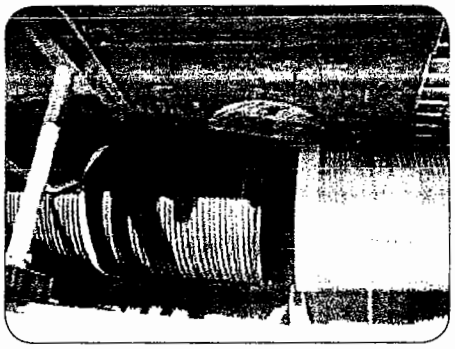
Diameters (in)	9 Months	Continuous (50 years)
36-42	9.5 psi	6.75 psi
48-60	12.0 psi	8.5 psi
66-120	15.0 psi*	15.0 psi

* The use of ElectroFusion welded joints may allow for higher pressure.

Storm Sewer Applications

DuroMaxx drainage pipe is ideally suited for the collection and removal of stormwater from highway, urban, industrial and residential projects. Its unique combination of steel reinforcement and pressure rated PE resin allows it to perform like no other drainage pipe on the market.

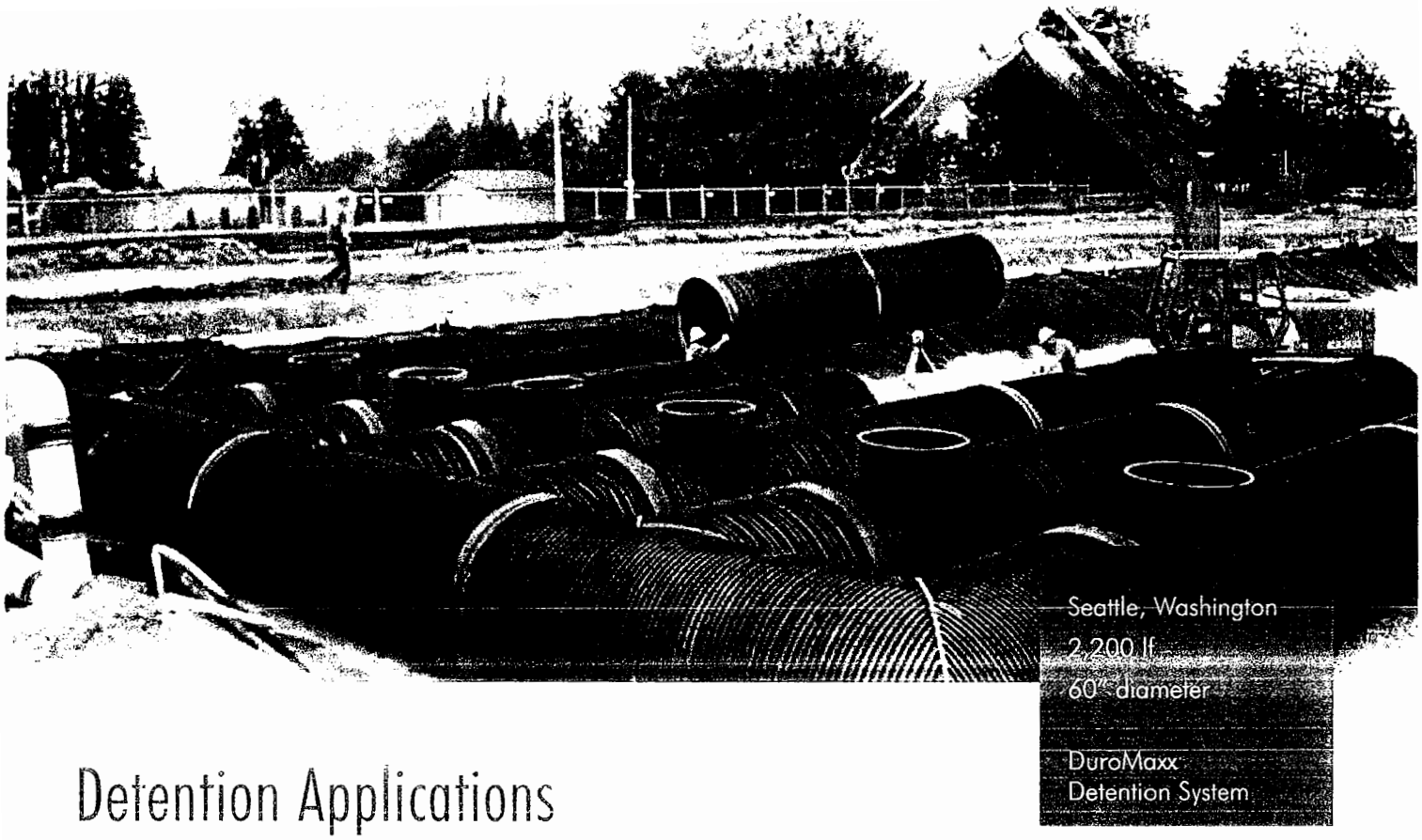




Benefits

- 80 ksi high strength steel provides maximum load carrying capabilities with allowable cover limits ranging from 30 to 50 feet.
- High strength steel provides exceptional shape and deflection control even on warm, sunny days where typical corrugated HDPE drainage pipes fall short.
- Pressure rated PE resin provides unmatched durability.
- Abrasion and chemical resistance is unaffected by water pH levels unlike reinforced concrete pipe, where abrasion resistance varies with water pH levels.
- Available with steel reinforced 15 psi watertight, 3 psi low head, soil tight and ElectroFusion joining options. If your project requires extreme joint tightness for the life of the system, then rely on DuroMaxx's steel reinforced watertight or ElectroFusion joints.

While DuroMaxx may not be the least expensive storm sewer pipe on the market, it outperforms when other products fall short. Long-term, DuroMaxx's outstanding performance and durability generates value.



Detention Applications

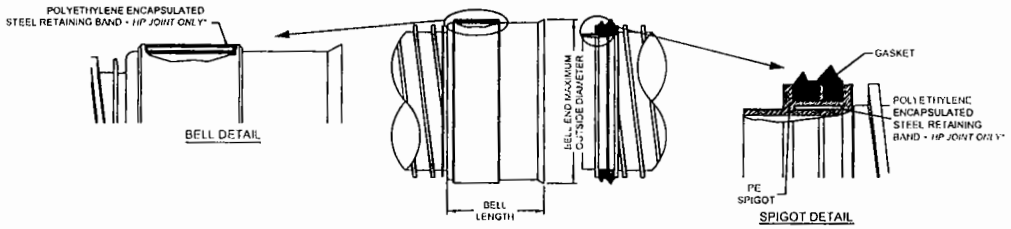
Detention systems are used to regulate stormwater flow through main pipelines by acting as a buffer during peak loads. DuroMaxx systems are designed to contain the water and slowly release it into the main system over a period of time. These systems are often custom made to watertight specifications in order to suit the project requirements.

DuroMaxx detention systems can incorporate a wide range of fittings such as bends, risers, bulk headed ends and inlet/outlet pipes. The systems can be custom manufactured to individual lengths in sizes and configurations that can be economically transported and assembled on site.

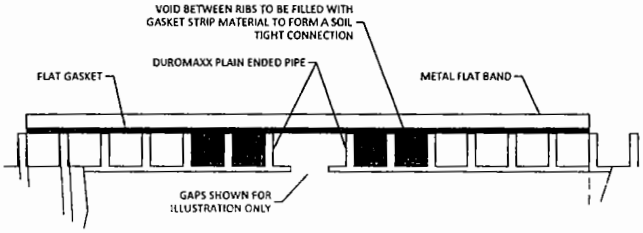
Benefits

- Utilizing larger diameters whenever possible reduces storage cost per gallon. DuroMaxx is available up to 96 inches.
- Steel reinforcing results in smaller outside diameter dimensions when compared to corrugated HDPE pipe or reinforced concrete pipe. When maximum diameter selection is limited by minimal cover, DuroMaxx can typically be upsized by 6 inches or more, resulting in reduced overall water storage cost.
- Reinforced steel fittings create a stronger and more reliable system when compared to non-reinforced HDPE pipe materials.
- Available with perforations for retention and recharge applications.
- A variety of joint configurations and joint tightness levels are available to meet your specific project needs. See page 2 for more details.

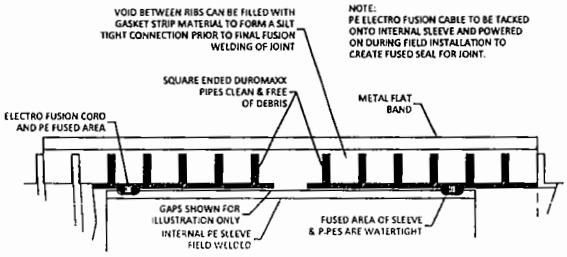
High Performance and Low Head Joint Details – The Design Behind the Performance



Soil Tight Joint Detail



ElectroFusion Joint Detail



CONTECH Construction Products Inc. provides site solutions for the civil engineering industry. CONTECH's portfolio includes bridges, drainage, retaining walls, sanitary sewer, stormwater, erosion control and soil stabilization products.

For more information, call one of CONTECH's Regional Offices located in the following cities:

Colorado (Denver)	720.587.2700
Florida (Palm Bay)	877.533.8688
Georgia (Atlanta)	770.409.0812
Maine (Scarborough)	207.885.9830
Maryland (Baltimore)	410.740.8420
Oregon (Portland)	503.598.8788
Texas (Dallas)	972.590.2000

Visit our web site: www.contech-cpi.com
800.338.1122

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DuroMaxx is supported by Plastreom technology.

DuroMaxxBro 10M 2/11 MC

STEEL

RECYCLED PAPER

CONTECH CONSTRUCTION PRODUCTS INC.

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DuroMaxx
A STEEL REINFORCED POLYETHYLENE PIPE

DuroMaxx® Specification Sheet

Scope
This specification describes DuroMaxx® pipe for use such as storm sewers, sanitary sewers, industrial waste applications, drainage pipes, underground detention, infiltration, cistern or rainwater harvesting systems in 24" (600 mm) through 120" (2400 mm) nominal diameters.

Description
DuroMaxx is a reinforced polyethylene pipe with a smooth waterway wall and exterior profile that is reinforced with high strength galvanized steel ribs. The continuous reinforcing ribs are completely encased within the polyethylene profile. DuroMaxx is manufactured using a helical winding process that results in a continuously fusion welded lap seam. The pipe profile is manufactured using a high quality stress-rated thermoplastic meeting the requirements of ASTM F2562 "Standard Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage" or AASHTO Designation MP-20. For the purpose of hydraulic design, the recommended Manning's "n" value shall be 0.012 for pipe diameters included within this specification.

Material Properties
Virgin high density polyethylene stress-rated resins are used to manufacture DuroMaxx pipe and complimentary fabricated fittings. Resins shall conform to the minimum requirements of cell classification 345464C as defined and described in the latest version of ASTM D3350 "Standard Specification for Polyethylene Plastics Pipe and Fittings Materials".

Joint Performance
Pipe lengths shall be joined on site using coupling bands, bell & spigots or ElectroFusion couplers especially designed for DuroMaxx pipe. Joints shall meet one of the performance levels as required and specified:

- **Soil Tight Joints** (24" – 96") shall be plain ended DuroMaxx pipe with Aluminized Type 2 (or optional Polymeric coated) CMP coupling bands and elastomeric gaskets (see Standard Drawings 1012802).

- **Low Head (LH) Joints** (24" – 72") shall be gasketed, stress-rated high density polyethylene bell and spigot joints (meeting the requirements set forth in the above Material Properties paragraph) that have been laboratory tested to 3 psi when tested in accordance with ASTM D3212 "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals" (see Standard Drawing 1012803).

- **High Performance (HP) Joints** (24" – 72") shall be gasketed, bell and spigot joints where both the bell and spigot are reinforced with steel that is fully encased in stress-rated high density polyethylene (meeting the requirements set forth in the above Material Properties paragraph) and that have been laboratory tested to 15 psi when tested in accordance with ASTM D3212 "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals" (see Standard Drawing 1012804).

- **ElectroFusion (EF) Joints** (36" – 120") shall utilize plain ended DuroMaxx pipe welded together utilizing exclusive pressure testable ElectroFusion couplers. The welded connections provide a true in-field watertight system assured by the pressure testable welded sleeves at each welded connection. The field installed ElectroFusion joints shall remain watertight with a "zero" leakage rate up to a test pressure of 30 psi (see Standard Drawing 1012805).

Fittings
All fabricated fittings and couplings supplied by the manufacturer shall be constructed to ensure no loss of structural integrity or joint tightness at welded seams and joints. Only those fittings supplied by or recommended by the manufacturer shall be used.

Installation

Installation shall be in accordance with ASTM D2321 "Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications" along with product-specific recommendations contained in Contech Installation Guidelines for DuroMaxx pipe, available from local Contech representatives or from www.contech-cpi.com.

Pipe Dimensions and Cover Limits

Nominal Pipe Size	Minimum Pipe Stiffness (Class 1)	Outside Diameter	Unit Weight**	Minimum Waterway Wall Thickness (t_1)		Minimum Cover***		Maximum Cover	
inch	lb/in/in	in. [mm]	lbs./ft	in.	[mm]	ft.	[m]	ft.	[m]
24	34	24.9 [632]	11.3	.068	[1.70]	1	[.305]	50	[15.2]
30	28	30.9 [785]	15.5	.082	[2.08]	1	[.305]	50	[15.2]
36	22	37.1 [942]	20.8	.082	[2.08]	1	[.305]	50	[15.2]
42	20	43.2 [1097]	26.5	.082	[2.08]	1	[.305]	50	[15.2]
48	18	49.5 [1257]	29.1	.130	[3.30]	1	[.305]	30	[9.1]
54	16	55.5 [1410]	34.7	.130	[3.30]	1	[.305]	30	[9.1]
60	14	61.4 [1560]	41.6	.130	[3.30]	1	[.305]	30	[9.1]
72	14	74.1[1882]	65.6	.220	[5.58]	1.5	[.457]	30	[9.1]
84	14*	85.9 [2182]	76.3	.220	[5.58]	2	[.610]	30	[9.1]
96	10*	98.3 [2497]	87.0	.220	[5.58]	2	[.610]	30	[9.1]
120	5*	121.9 [3097]	109.0	.220	[5.58]	3	[.914]	25	[7.6]

* 84", 96" and 120" min. pipe stiffness is not currently defined in ASTM Specification F2562 for Class 1 pipe. Contech has developed the required minimum pipe stiffness for these pipe diameters.

** Approximate weights. Actual weight will vary with length and joint type.

***Minimum and maximum cover limits are for H20/HS25 loading.

The CONTECH Environmental Commitment

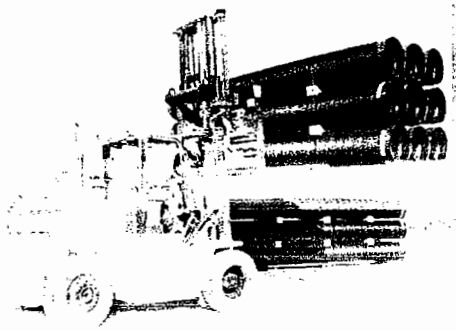
CONTECH is an environmentally conscious company committed to shaping the future of green building and design. DuroMaxx is CONTECH's newest contribution to our ecofriendly portfolio of civil engineering solutions. Starting with the manufacturing process, DuroMaxx consumes less than 35% of natural resources to produce AASHTO M294 HDPE pipe. The green design continues with DuroMaxx's steel reinforced ribs which are made of recycled steel in content levels ranging from 55-80%. Plus, when utilized appropriately, it can contribute to a variety of the U.S. Green Building Council's LEED credits in the categories for sustainable sites, water efficiency and landscaping, and materials and resources.

CONTECH® CONSTRUCTION PRODUCTS INC.

CONTECH® Construction Products Inc. • 9025 Centre Pointe Drive, Suite 400 West Chester, OH 45069 • 1-800-338-1122

CONTECH
CONSTRUCTION PRODUCTS INC.

Installation, Safety, Unloading & Handling Instructions for CONTECH DuroMaxx® Pipe



DuroMaxx®
A STEEL REINFORCED POLYETHYLENE PIPE

Preface

This instruction book is for your crews. Distribute it to help them unload, handle and install CONTECH DuroMaxx pipe safely. DuroMaxx is a flexible pipe that can be installed following the trench construction, bedding, haunching, initial backfill, and other requirements of ASTM D2321, "Standard Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe."

Don't assume that experienced workers know all the answers. Review these instructions with your supervisors and crews. It can mean a safer and better job for you and your customer.

We suggest that, if performance testing of the joints is required, testing the first few manhole runs should be done in the early stages to ensure that jointing procedures are correct. It will give you an early check that installation procedures are correct.

If you have any questions about these instructions, call your CONTECH Dealer or your CONTECH Sales Engineer, or carefully review the installation guide or ASTM D2321.

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Safety instructions for unloading & handling.....3
Handling weights.....5
Assembly and installation references..... 10
Heavy construction loads..... 18
Cutting Instructions..... 20

This safety alert symbol indicates important safety messages. When you see this symbol, it will alert you to hazards or unsafe practices that CAN result in severe personal injury (including death) or property damage. Be sure you understand the message that follows.

Safety instructions

Failure to follow these instructions can result in serious injury or death and/or damage to pipe.

1. Only trained and authorized equipment operators are to be permitted to unload the trailer.
2. Wear approved safety hat, shoes, gloves and eye protection.
3. Park the truck and trailer on level ground before you start unloading.
4. Keep all unauthorized persons clear of the area when the driver releases the binders from the trailer and during unloading.
5. Do not release strapping around the wood frame until the pallets or bundles have been placed on level ground and will not be moved again as a unit.
6. Know the capabilities and rated load capacities of your lifting equipment. Never exceed them.
7. Do not stand or ride on the load of pipe while it is being unloaded.
8. If unloading at multiple points, secure pallets between drop off points. Always unload the top pallets first. (See diagram at right)

9. Never attach chains or wire rope to the pipe. They could damage the pipe.

10. Do not push pallets off the trailer or permit pipe to drop to the ground.

11 Do not stack DuroMaxx pipe over two pallets high. Stacks of three or more pallets can damage bottom pipes and can become unstable.

12 Only use authorized unloading poles to lift pipe. Unauthorized unloading pole can lead to unsafe practices and damaged pipe.

WARNING

Falling or rolling pipe can cause severe personal injury or death. Notwithstanding the instructions contained in this booklet, it is the responsibility of the consignee or consignee's agent to devise safe unloading and handling procedures.

Handling Weights

Approximate weight (pounds/lineal foot). These are estimated average weights and are not for specification use.

DuroMaxx Dimensions and Handling Weights	
Nominal Pipe Size (inch)	**Unit Weight (lbs/ft)**
24	11.3
30	18.8
36	23.6
42	27.0
48	30.0
54	36.1
60	42.9
66	56.9
72	65.6
84	76.3
96	87.0
120	109.0

Unloading and Handling

Read and follow all safety instructions before unloading pipe.

1. Use a forklift with full-length forks or fork extensions (typically 8 feet), front-end loader or backhoe with fork adapters at full length to engage entire pallet width.
2. Use Nylon lifting slings of sufficient strength, length and specifically intended to safely handle entire pallet or individual pipe, whichever is being lifted.
3. For 24" and 30" diameter pipe, one sling point located at mid-length is generally sufficient.
4. Use two (2) sling points for lifting sizes greater than 30" diameter. Sling spacing equal to 1/3rd of the pipe length is generally sufficient.
5. An approved unloading pole can be used inside the pipe to unload and handle individual pipe sections. Using forks or unapproved poles inside the pipe will result in damage.
6. Do not use steel cables, chains and/or hooks to unload or handle pipe.
7. Do not stand or ride on the pipe load during unloading or handling.
8. Do not scoop the pipe or strike with forks.
9. Do not drag or drop the pipe.

Trench Dimensions

Trenching practices shall be in accordance with OSHA.

1. The trench needs to be wide enough for a person to work safely.
2. Where trench walls are unstable, the contractor may elect to use tight sheeting, stay bracing, or a trench box for stabilization during pipe laying. If the conditions are severe, sheeting may be left in place.
3. Refer to ASTM D2321, Paragraph 6.4.2, for proper placement and movement of trench boxes. Improper use of trench boxes can affect pipe performance.

Groundwater

1. Excessive groundwater may necessitate dewatering. Dewatering techniques must meet all OSHA and local requirements and codes.
2. In areas of saturated trench conditions or in dewatered trenches, refer to page 9, "Foundation and Bedding," and ASTM D2321 for proper selection of bedding and backfill materials.
3. Flotation of the pipe and erosion or wash-out of previously placed soil support must be prevented to ensure that the structure maintains its load carrying capacity.
4. Contact the Engineer of Record, hereinafter referred to as "engineer," for proper cover to prevent flotation.

Foundation and Bedding

1. An unstable trench bottom must be stabilized at the engineer's direction. In such cases, install special foundation and bedding materials in 6 inch layers and compact.
2. Excavation from 6 inches to 12 inches below the pipe should be filled with acceptable bedding material and compacted to a minimum 90% Standard Proctor Density. Fill areas of over excavation beyond 12 inches with processed stone or gravel following standard bedding practices.
3. The bedding material provides uniform support to hold the pipe on line and grade. A relatively loose 4-inch to 6-inch thick bedding layer is usually adequate. Before installing the pipe, bring bedding material to grade along the entire length of the pipe. A flat shovel can be used to level the surface to grade. Bedding materials can be Class I, II, III (ASTM D2321)
4. When excavating in Class IV materials (silts, silty clays and clays), provide a uniform, undisturbed foundation.
5. Class IA materials if used for bedding, must be used as haunching material to the spring line in a dry trench. To minimize the potential for migration, Class IA materials should be used to the top of the pipe in wet trenches or in trenches that will fall below the water table.

Assembly of Pipe (Joining)

1. DuroMaxx features a bell and spigot to connect the pipe and unless otherwise directed by the Engineer, should be placed with the spigot end facing downstream.
2. Remove the protective film from the gasket prior to applying the lubricant or joining the pipe.
3. The double sealing surface of DuroMaxx WT gasket is fitted into the spigot valleys as shown in the drawing below. If the gasket is removed, make sure the gasket seat is clean and then reinstall properly.
4. Make sure the bell and spigot is thoroughly clean and free of soil of any type.

Bell & Spigot Joint

Typical details of a reinforced bell and spigot joint for DuroMaxx WT. Steel reinforcement is in the bell only for silt tight (ST) joints.

5. Use a Johnny mop or brush to apply a liberal amount of gasket lube to the gasket and to swab the inside of the bell.
6. Dig out a "bell hole" along the bell end's edge with a shovel or boot heel in order to keep the spigot free of bedding material and to prevent materials from being pulled into the bell by the spigot. Materials pulled in can impair gasket sealing and cause leaks.
7. Align the spigot end of the pipe into the bell's leading edge during joining process - being careful not to allow soil or debris into the connection.
8. **Do not** push on the bell end of the pipe! **Do not** use a cable or chain wrapped around the pipe to join the pipe. Use of a nylon strap to pull the pipe is strongly advised.

9. The spigot end of the pipe features a "homing mark" that will align with the end of bell when the spigot has been fully inserted into the bell.
10. Once the pipe has been fully placed in the trench and prior to backfilling, it is recommended that the Engineer or a qualified representative of the Engineer approve the trench, bedding and placement of the pipe.
11. Cold Weather Note: Rubber gaskets become harder as the ambient temperature decreases. Gaskets tend to compress less, and when combined with bells, jointing becomes less forgiving. Proper bell-spigot alignment, adequate bell and spigot lubrication and recommended joining procedures all become more essential as temperatures decreases.
12. After proper assembly, take precautions to prevent the pipe from movement prior to haunching and backfilling.

Haunching

1. Proper haunching provides a major portion of the pipe's load-carrying capability. Poor workmanship will lead to excessive pipe deflection and grade and alignment problems. Haunching materials can be Class I, II, or III per ASTM D2321.
2. Work enough material under the haunch of the pipe by hand to provide proper compaction and side support. Material shall meet the minimum compaction requirements of ASTM D2321.
3. When trench walls are unstable, sloughing must be prevented so that haunching material can be placed and compacted adequately. The proper use of a trench box or overexacvation can assist in these cases.
4. Don't let the pipe move when placing material under the haunch of the pipe.

5. Take care not to damage the pipe with shovels, or other construction/tamping equipment.
6. Haunch material extends from the bedding/ foundation material to the springline elevation.

Backfill and Compaction

1. Initial backfill materials extend from the springline to 6 inches to 12 inches above the pipe to provide the remainder of the pipe support and protect the pipe from stones or cobbles in the final backfill. Backfill materials that generally follow the requirements of ASTM D2321, such as Class I, II, or III (or approved equal) may be used.
2. Native materials meeting the acceptable materials on page 16 can be used as backfill, but should be approved by the Engineer.
3. Materials must be free from large stones, frozen lumps or other debris.
4. Typical trench/backfill details can be found on pages 14 and 15; and acceptable backfill materials and compaction requirements on page 16 in this document.
5. Select fill should be placed and compacted to the minimum thickness referenced in the applicable installation detail before transitioning to native or non-select fill material over the pipe or to pavement.
6. Fill above the select fill should be fully compacted.
7. As backfill is place around the pipe, care should be taken to avoid damage to the pipe.

Acceptable Backfill Materials and Compaction Requirements

Description	Soil Classifications			AASHTO M145	Minimum Standard Proctor Density %
	ASTM D2321	ASTM D2487	AASHTO M43		
Graded or crushed, crushed stone, gravel	Class I	-	5 56	A-1-a	85%
Well-graded sand, gravels and gravel/sand mixtures;poorly graded sand, gravels and [illegible] mixtures, little or no fines	Class II	GW GP SW SP	57 6	A-1-b A-3	85%
Silty or clayey gravels, gravel/sand/silt or gravel and clay mixtures; silty or clayey sands, sand/clay or sand/silt mixtures	Class III	GM GC SM SC	Gravel and sand (<10% fines)	A-2-4 A-2-5	90%

Use of cementatious or flowable backfills is compatible with DuroMaxx. Proper precautions should be taken to preclude flotation of the pipe. Contact your CONTECH representative for further guidance.

Commonwealth of Massachusetts
City/Town of READING

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

Hayes
Hayes Engineering, Inc.
603 Salem Stree
Wakefield, MA 01880
T: (781) 246-2800
F: (781) 246-7396
Nantucket: (508) 228-7801

A. Facility Information

Owner Name: Johnson Woods

Street Address:

Map/Lot #:

City: READING

State: MA

Zip Code: 01867

TH-A TH-B TH-C TH-D

B. Site Information

1. (Check one) ☑ New Construction ☐ Upgrade ☐ Repair

2. Published Soil Survey Available? ☐ Yes ☐ No If yes: Year Published ____ Publication Scale ____ Soil Map Unit ____

   Soil Name ____ Soil Limitations ____

3. Surficial Geological Report Available? ☐ Yes ☐ No If yes: Year Published ____ Publication Scale ____ Map Unit ____

   Geologic Material ____ Landform ____

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☐ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☐ No

   Within the 500-year flood boundary? ☐ Yes ☐ No Within a velocity zone? ☐ Yes ☐ No

5. Wetland Area: National Wetland Inventory Map — Map Unit ____ Name ____

   Wetlands Conservancy Program Map — Map Unit ____ Name ____

6. Current Water Resource Conditions (USGS): ____ Month/Year Range: ☐ Above Normal ☐ Normal ☐ Below Normal

7. Other references reviewed: ____

Commonwealth of Massachusetts
City/Town of READING

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

D. Determination of High Groundwater Elevation

1. Method Used:

	TH-A	TH-B	TH-C	TH-D
☐ Depth observed standing water in observation hole	A. inches	B. inches	A. inches	B. inches
☐ Depth weeping from side of observation hole	A. inches	B. inches	A. inches	B. inches
☐ Depth to soil redoximorphic features (mottles)	A. 7138 inches	B. 7137 inches	A. 7120 inches	B. 7132 inches
☐ Groundwater adjustment (USGS methodology)	A. inches	B. inches	A. inches	B. inches

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

Adjustment Factor _____ Adjusted Groundwater Level _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

   a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

   ☐ Yes ☐ No

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

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-A | Date: 7-19-11 | Time: | Weather: Sunny 80°

1. Location

Ground Elevation at Surface of Hole: | Location (identify on plan): Johnson Woods

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

Vegetation | Landform | Position on Landscape (attach sheet)

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

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

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No | If yes: Depth Weeping from Pit: No | Depth Standing Water in Hole: No

Estimated Depth to High Groundwater: >138 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-A

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
6-19	Bw	10YR 6/6				fsl	0	0/0	gr	mfr	
19-36	C1	2.5Y 5/4				ls	0	0/0	m	mvfr	
36-96	C2	2.5Y 5/4				grcs	40	30/0/5	sg	mvfr	
96-138	C3	2.5Y 6/3	>138			grls	20	0/0	sg	mvfr	

Additional Notes:

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

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

Deep Observation Hole Number: TH-B | Date: 7-19-11 | Time: | Weather: SUNNY 85°

1. Location

Ground Elevation at Surface of Hole: | Location (identify on plan): Johnson Woods

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

Vegetation | Landform | Position on Landscape (attach sheet)

3. Distances from:

Open Water Body	feet	Drainage Way	feet	Possible Wet Area	feet
Property Line	feet	Drinking Water Well	feet	Other	feet

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No | If yes: Depth Weeping from Pit: NO | Depth Standing Water in Hole: NO

Estimated Depth to High Groundwater: >137 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-B

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
6-18	Bw	10YR 5/6				fsl	0	0/0	gr	mfr	
18-98	C1	2.5Y 6/4				fls	0	0/0	m	mvfr	
98-137	C2	2.5Y 5/4	>137			grCS	30	20/5/5	sg	mvfr	

Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-C | Date: 7-19-11 | Time: | Weather: SUNNY 85°

1. Location

Ground Elevation at Surface of Hole: | Location (identify on plan): Johnson Woods

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

Vegetation | Landform | Position on Landscape (attach sheet)

3. Distances from:

Open Water Body	feet	Drainage Way	feet	Possible Wet Area	feet
Property Line	feet	Drinking Water Well	feet	Other	feet

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☑ No

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

5. Groundwater Observed: ☐ Yes ☑ No | If yes: Depth Weeping from Pit: NO | Depth Standing Water in Hole: NO

Estimated Depth to High Groundwater: >120 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-C

Depth (in.)	Soil Horizon/ Layer	Soil Matric Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0 - 6	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
6 - 24	Bw	10YR 5/6				fsl	0	0/0	gr	mfr	
24-72	C1	2.5Y 6/3				ls	0	0/0	m	mfr	
72 ~~120~~-120	C2	2.5Y 5/4	>120			grls	20	5/5/5	sg	mvfr	

Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-D 7-20-11 (Date) _____ (Time) Sunny 75° (Weather)

1. Location

Ground Elevation at Surface of Hole: _____ Location (identify on plan): Johnson Woods

2. Land Use Woods (e.g., woodland, agricultural field, vacant lot, etc.) Few (Surface Stones) B (Slope (%))

Vegetation _____ Landform _____ Position on Landscape (attach sheet) _____

3. Distances from: Open Water Body ____ feet; Drainage Way ____ feet; Possible Wet Area ____ feet

Property Line ____ feet; Drinking Water Well ____ feet; Other ____ feet

4. Parent Material: Glacial till Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No If yes: No (Depth Weeping from Pit) No (Depth Standing Water in Hole)

Estimated Depth to High Groundwater: >132 inches _____ elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-D

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
6-24	Bw	10YR 6/6				fsl	0	0/0	gr	mfr	
24-60	C1	2.5Y 6/3				grls	20	0/0	m	mvfr	
60-132	C2	10YR 4/4	>132			CS	40	20/0	sg	mvfr	

Additional Notes:

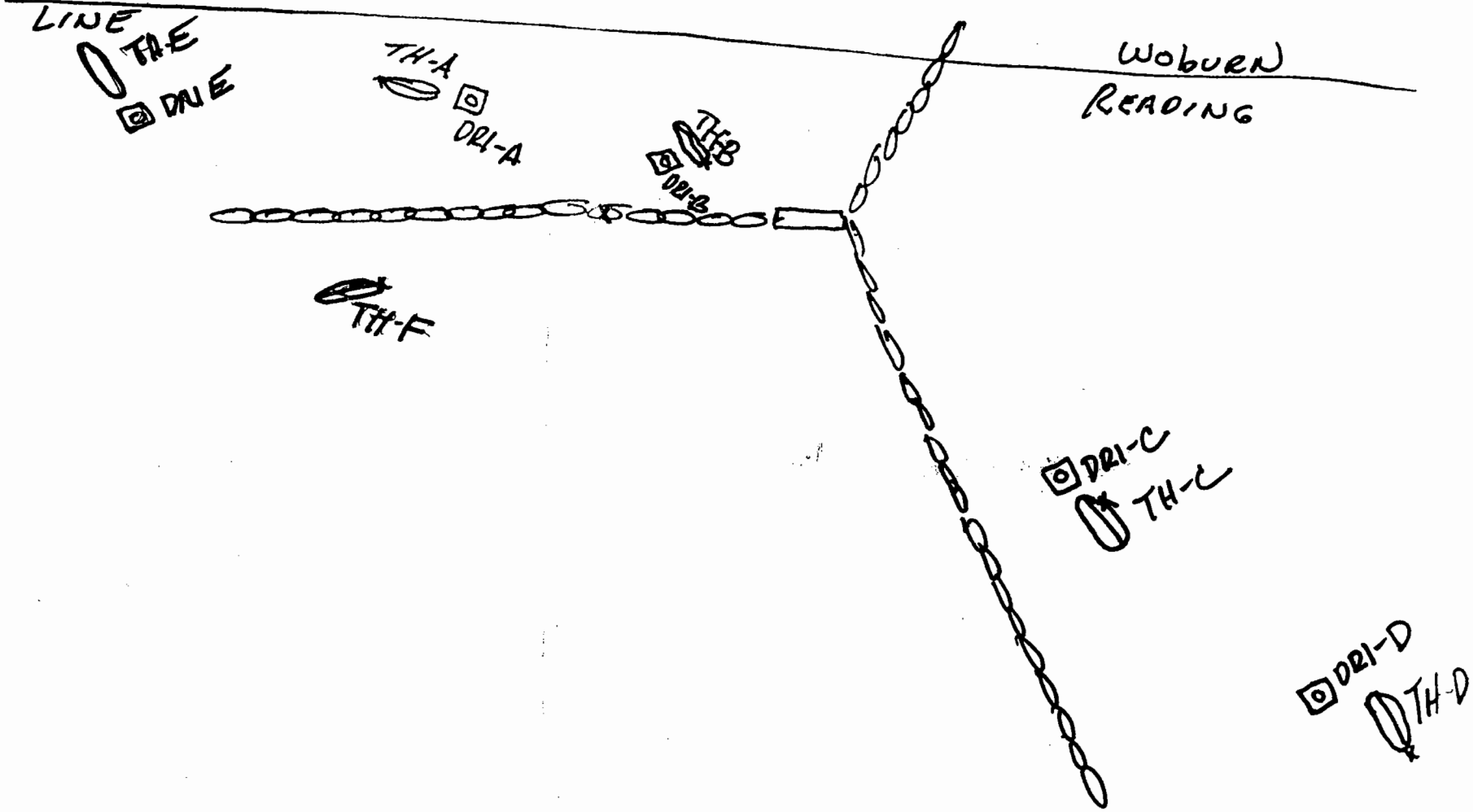
Commonwealth of Massachusetts
City/Town of READING

INWOOD DR

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

Field Diagrams

Use this sheet for field diagrams:



Commonwealth of Massachusetts
City/Town of READING

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

F. Certification

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

Signature of Soil Evaluator	Date June 20, 2011
Gordon Rogerson SE2074 Typed or Printed Name of Soil Evaluator / License #	Nov. 1994 Date of Soil Evaluator Exam
Chris Cole Name of Board of Health Witness	READING ENGINEERING Board of Health

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

Commonwealth of Massachusetts
City/Town of READING

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

Hayes Engineering, Inc.
603 Salem Street
Wakefield, MA 01888
T: (781) 246-2900
F: (781) 246-7394
Nantucket: (508) 228-7801

JOB FILE

A. Facility Information

Owner Name: Johnson Woods

Street Address:

Map/Lot #:

City: READING

State: MA

Zip Code:

TH-E TH-F TH-G TH-H

B. Site Information

1. (Check one) ☑ New Construction ☐ Upgrade ☐ Repair

2. Published Soil Survey Available? ☐ Yes ☐ No If yes: Year Published ____ Publication Scale ____ Soil Map Unit ____

   Soil Name ____ Soil Limitations ____

3. Surficial Geological Report Available? ☐ Yes ☐ No If yes: Year Published ____ Publication Scale ____ Map Unit ____

   Geologic Material ____ Landform ____

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☐ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☐ No

   Within the 500-year flood boundary? ☐ Yes ☐ No Within a velocity zone? ☐ Yes ☐ No

5. Wetland Area: National Wetland Inventory Map — Map Unit ____ Name ____

   Wetlands Conservancy Program Map — Map Unit ____ Name ____

6. Current Water Resource Conditions (USGS): ____ Month/Year Range: ☐ Above Normal ☐ Normal ☐ Below Normal

7. Other references reviewed: ____

Commonwealth of Massachusetts
City/Town of READING

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

D. Determination of High Groundwater Elevation

1. Method Used:

	TH-E	TH-F	TH-G	TH-H
☐ Depth observed standing water in observation hole	A. inches	B. inches	A. inches	B. inches
☐ Depth weeping from side of observation hole	A. inches	B. inches	A. inches	B. inches
☐ Depth to soil redoximorphic features (mottles)	A. 7128 inches	B. 7132 inches	A. 7156 inches	B. 7108 inches
☐ Groundwater adjustment (USGS methodology)	A. inches	B. inches	A. inches	B. inches

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

_____ Adjustment Factor _____ Adjusted Groundwater Level

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

   a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

   ☐ Yes ☐ No

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

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-E | Date: 7-20-11 | Time: | Weather: SUNNY 80°

1. Location

Ground Elevation at Surface of Hole: | Location (identify on plan): Johnson Woods

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

Vegetation | Landform | Position on Landscape (attach sheet)

3. Distances from:

Open Water Body	feet	Drainage Way	feet	Possible Wet Area	feet
Property Line	feet	Drinking Water Well	feet	Other	feet

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☒ No | If yes: Depth Weeping from Pit: NO | Depth Standing Water in Hole: NO

Estimated Depth to High Groundwater: 7128 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-E

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-5	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
5-18	Bw	10YR 5/6				fsl	0	0/0	gr	mfr	
18-48	C1	2.5Y 5/4				grls	20	20/10/0	sg	mvfr	
48-88	C2	2.5Y 6/4				lfs	0	0/0	m	mfr	
88-128	C3	2.5Y 4/4	>128			cs	40	10/0/0	sg	mvfr	

Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-F | Date: 7-20-11 | Time: | Weather: SUNNY 80°

1. Location

Ground Elevation at Surface of Hole: | Location (identify on plan): Johnson Woods

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

Vegetation | Landform | Position on Landscape (attach sheet)

3. Distances from:

Open Water Body	feet	Drainage Way	feet	Possible Wet Area	feet
Property Line	feet	Drinking Water Well	feet	Other	feet

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No | If yes: Depth Weeping from Pit: NO | Depth Standing Water in Hole: NO

Estimated Depth to High Groundwater: >132 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-F

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0 - 4	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
4-18	Bw	10YR 5/6				fsl	0	0/0	gr	mfr	
18-108	C1	2.5Y 5/4				lfs	0	0/0	m	mfr	
108-132	C2	2.5Y 4/4	>132			grls	20	10/10/0	sg	mvfr	

Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-G | 7-21-11 (Date) | _____ (Time) | SUNNY 80° (Weather)

1. Location

Ground Elevation at Surface of Hole: _____ Location (identify on plan): Johnson Woods

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

Vegetation _____ | Landform _____ | Position on Landscape (attach sheet) _____

3. Distances from:

Open Water Body	_____ feet	Drainage Way	_____ feet	Possible Wet Area	_____ feet
Property Line	_____ feet	Drinking Water Well	_____ feet	Other	_____ feet

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No | If yes: NO (Depth Weeping from Pit) | NO (Depth Standing Water in Hole)

Estimated Depth to High Groundwater: >156 inches | _____ elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TF-G

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
6-21	Bw	10YR 6/6				fsl	0	0/0	gr	mfr	
21-120	C1	2.5Y 5/4				lfs	0	0/0	m	mfr	
120-156	C2	2.5Y 4/4	>156			CS	40	5/0/0	sg	mvfr	

Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-H | Date: 7-21-11 | Time: | Weather: Sunny 80°

1. Location

Ground Elevation at Surface of Hole: | Location (identify on plan):

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

Vegetation | Landform | Position on Landscape (attach sheet)

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

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

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No | If yes: Depth Weeping from Pit: NO | Depth Standing Water in Hole: NO

Estimated Depth to High Groundwater: 7108 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-H

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
6-20	Bw	10YR 6/6				fsl	0	0/0	gr	mfr	
20-80	Cd	2.5Y 6/4				vyfls	0	0/0	pl	mfr	
80-108	Cz	2.5Y 6/4	>108			grls	20	10/10/10	m	mfr	dense packed

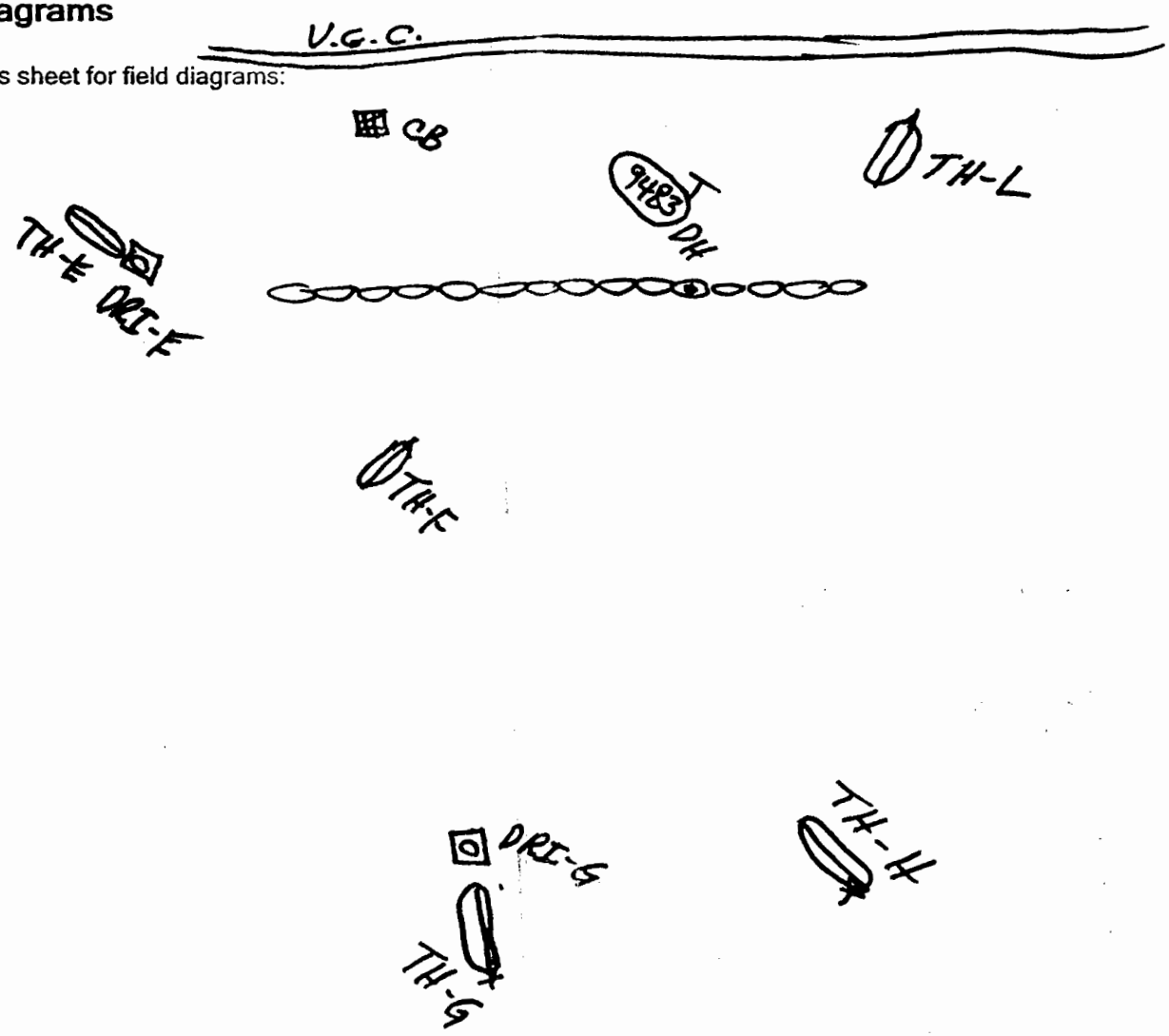
Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

Field Diagrams

Use this sheet for field diagrams:



Commonwealth of Massachusetts
City/Town of READING

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

F. Certification

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

Signature of Soil Evaluator

Date: July 21, 2011

Gordon Rogerson SE2074
Typed or Printed Name of Soil Evaluator / License #

Date of Soil Evaluator Exam: Nov. 1994

Chris Cole
Name of Board of Health Witness

Board of Health: Reading Engineering

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

Commonwealth of Massachusetts
City/Town of READING

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

Hayes
Hayes Engineering, Inc.
603 Salem Street
Wakefield, MA 01880
T: (781) 246-2300
F: (781) 246-7396
Nantucket: (508) 228-7301

A. Facility Information

Owner Name: Johnson Woods

Street Address:

City: READING | State: MA | Zip Code: 01867 | Map/Lot #: TH-I TH-J TH-K TH-L

B. Site Information

1. (Check one) ☑ New Construction ☐ Upgrade ☐ Repair
2. Published Soil Survey Available? ☐ Yes ☐ No If yes: Year Published ____ Publication Scale ____ Soil Map Unit ____
   Soil Name ____ Soil Limitations ____
3. Surficial Geological Report Available? ☐ Yes ☐ No If yes: Year Published ____ Publication Scale ____ Map Unit ____
   Geologic Material ____ Landform ____
4. Flood Rate Insurance Map
   Above the 500-year flood boundary? ☐ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☐ No
   Within the 500-year flood boundary? ☐ Yes ☐ No Within a velocity zone? ☐ Yes ☐ No
5. Wetland Area: National Wetland Inventory Map — Map Unit ____ Name ____
   Wetlands Conservancy Program Map — Map Unit ____ Name ____
6. Current Water Resource Conditions (USGS): ____ Month/Year Range: ☐ Above Normal ☐ Normal ☐ Below Normal
7. Other references reviewed: ____

Commonwealth of Massachusetts
City/Town of READING

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

D. Determination of High Groundwater Elevation

1. Method Used:

	TH-I	TH-J	TH-K	TH-L
☐ Depth observed standing water in observation hole	A. inches	B. inches	A. inches	B. inches
☐ Depth weeping from side of observation hole	A. inches	B. inches	A. inches	B. inches
☐ Depth to soil redoximorphic features (mottles)	A. 36 inches	B. 42 inches	A. >163 inches	B. >144 inches
☐ Groundwater adjustment (USGS methodology)	A. inches	B. inches	A. inches	B. inches

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

_____ Adjustment Factor _____ Adjusted Groundwater Level

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

   a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

   ☐ Yes ☐ No

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

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

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

Deep Observation Hole Number: TH-I | Date: 7-21-11 | Time: | Weather: SUNNY 95°

1. Location

Ground Elevation at Surface of Hole: | Location (identify on plan): Johnson Woods

2. Land Use: FIELD (e.g., woodland, agricultural field, vacant lot, etc.) | Surface Stones: NO | Slope (%): A

Vegetation: grass | Landform: | Position on Landscape (attach sheet):

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

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

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☒ No | If yes: Depth Weeping from Pit: NO | Depth Standing Water in Hole: NO

Estimated Depth to High Groundwater: 36 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-I

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-3	Ap	10YR 3/3				fsl	0	0%	gr	mfr	
3-20	Bw	10YR 4/6				fsl	0	0%	gr	mfr	
20-32	C1	2.5Y 5/6				fs	0	0%	m	mvfr	
32-96	C2	2.5Y 6/3	36"			vyfls	10	10/5%	m	mfr	

Additional Notes:

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

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

Deep Observation Hole Number: TH-J | Date: 7-21-11 | Time: | Weather: SUNNY 95°

1. Location

Ground Elevation at Surface of Hole: | Location (identify on plan): Johnson Woods

2. Land Use: FIELD (e.g., woodland, agricultural field, vacant lot, etc.) | Surface Stones: NO | Slope (%): A

Vegetation: grass | Landform: | Position on Landscape (attach sheet):

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

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

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No | If yes: Depth Weeping from Pit: NO | Depth Standing Water in Hole: NO

Estimated Depth to High Groundwater: 42 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-J

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-3	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
3-20	Bw	10YR 6/6				fsl	0	0/0	gr	mfr	
20-42	C1	2.5Y 5/6				fs	0	0/0	m	mfr	
42-84	C2	2.5Y 6/3	42"	10YR 6/8 5Y 7/1		vy fls	10	5/5/0	m	mfr	

Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-K 7-21-11 (Date) _____ (Time) Sunny 85° (Weather)

1. Location

Ground Elevation at Surface of Hole: _____ Location (identify on plan): Johnson Woods

2. Land Use Woods (e.g., woodland, agricultural field, vacant lot, etc.) Few (Surface Stones) B (Slope (%))

Vegetation _____ Landform _____ Position on Landscape (attach sheet) _____

3. Distances from: Open Water Body ____ feet; Drainage Way ____ feet; Possible Wet Area ____ feet

Property Line ____ feet; Drinking Water Well ____ feet; Other ____ feet

4. Parent Material: Glacial till Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No If yes: Nd (Depth Weeping from Pit) Nd (Depth Standing Water in Hole)

Estimated Depth to High Groundwater: 163 inches _____ elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-K

Depth (in.)	Soil Horizon/ Layer	Soil Matric Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
6-24	Bw	10YR 6/6				fsl	0	0/0	gr	mfr	
24-129	Cd	2.5Y 6/3				vyfls	0	0/0	Pl	mlfr	
129-163	C2	2.5Y 4/4	>163			CS	30	10/10/0	sg	mvfr	

Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-L | Date: 7-21-11 | Time: | Weather: SUNNY 80°

1. Location

Ground Elevation at Surface of Hole: | Location (identify on plan): Johnson Woods

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

Vegetation | Landform | Position on Landscape (attach sheet)

3. Distances from:

Open Water Body	feet	Drainage Way	feet	Possible Wet Area	feet
Property Line	feet	Drinking Water Well	feet	Other	feet

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No | If yes: Depth Weeping from Pit: NO | Depth Standing Water in Hole: NO

Estimated Depth to High Groundwater: >144 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-L

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
6-20	Bw	10YR 6/6				fsl	0	0/0	gr	mfr	
20-66	Cd	2.5Y 6/3				vyfls	0	0/0	Pl	mfr	
66-144	C2	2.5Y 4/4	>144			grcs	30	20/10/10	sg	msfr	

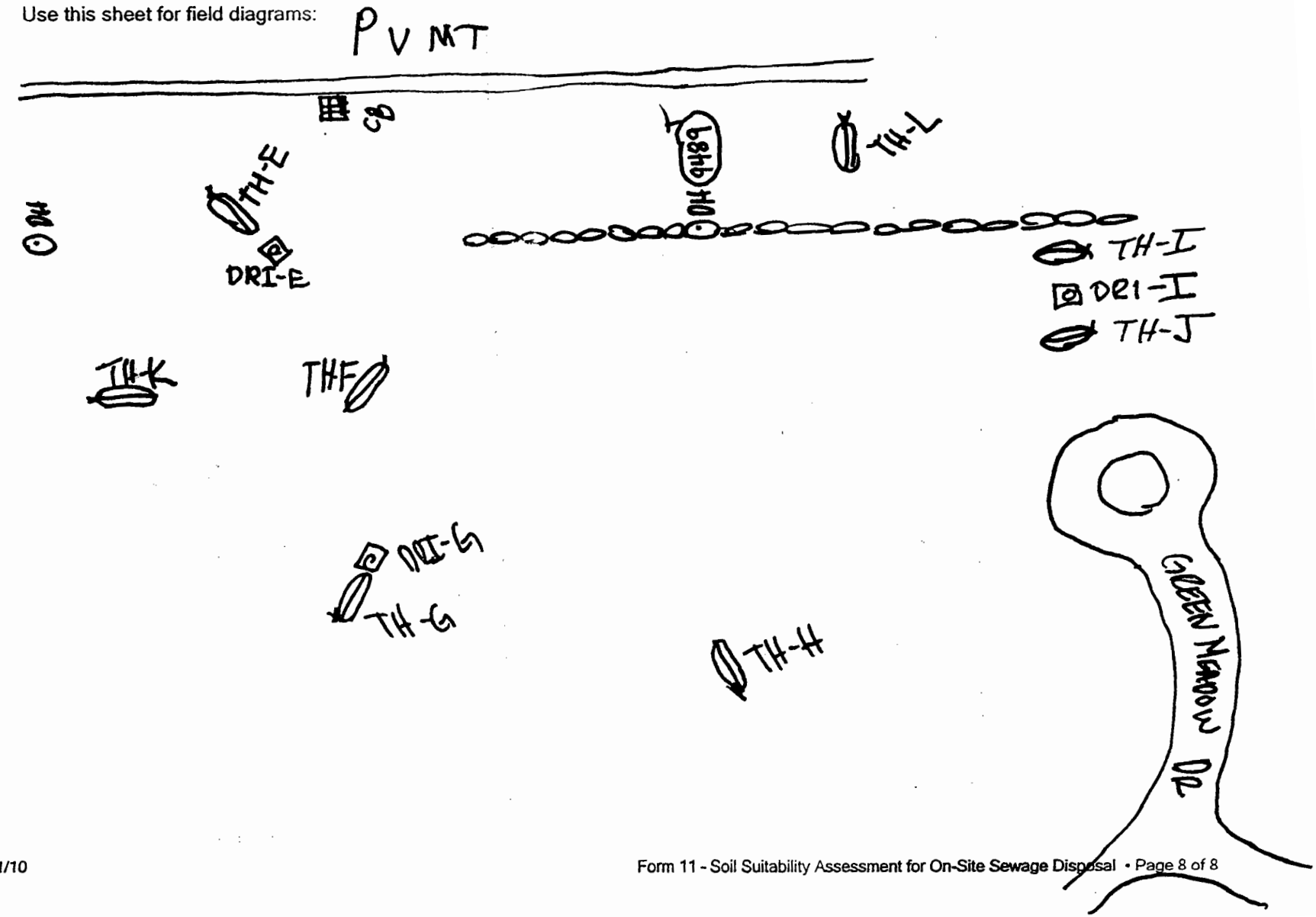
Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

Field Diagrams

Use this sheet for field diagrams:



Commonwealth of Massachusetts
City/Town of READING

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

F. Certification

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

Signature of Soil Evaluator	Date July 21, 2010 (2011)
Gordon Rogerson SE2074 Typed or Printed Name of Soil Evaluator / License #	Nov. 1994 Date of Soil Evaluator Exam
Chris Cole Name of Board of Health Witness	Reading Engineering Board of Health

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

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-F | 7-20-11 (Date) | Time | SUNNY 80° (Weather)

1. Location

Ground Elevation at Surface of Hole: ____ Location (identify on plan): Johnson Woods

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

Vegetation | Landform | Position on Landscape (attach sheet)

3. Distances from:

Open Water Body	feet	Drainage Way	feet	Possible Wet Area	feet
Property Line	feet	Drinking Water Well	feet	Other	feet

4. Parent Material: Glacial till Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No If yes: NO (Depth Weeping from Pit) | NO (Depth Standing Water in Hole)

Estimated Depth to High Groundwater: >132 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-F

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0 - 4	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
4-18	Bw	10YR 5/6				fsl	0	0/0	gr	mfr	
18-108	C1	2.5Y 5/4				lfs	0	0/0	m	mfr	
108-132	C2	2.5Y 4/4	>132			grls	20	10/10/0	sg	mvfr	

Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-G | Date: 7-21-11 | Time: | Weather: SUNNY 80°

1. Location

Ground Elevation at Surface of Hole: ____ Location (identify on plan): Johnson Woods

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

Vegetation: | Landform: | Position on Landscape (attach sheet):

3. Distances from:

Open Water Body	feet	Drainage Way	feet	Possible Wet Area	feet
Property Line	feet	Drinking Water Well	feet	Other	feet

4. Parent Material: Glacial till Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No If yes: Depth Weeping from Pit: NO | Depth Standing Water in Hole: NO

Estimated Depth to High Groundwater: >156 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TF-G

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/3				fsl	0	0%	gr	mfr	
6-21	Bw	10YR 6/6				fsl	0	0%	gr	mfr	
21-120	C1	2.5Y 5/4				lfs	0	0%	m	mfr	
120-156	C2	2.5Y 4/4	>156			CS	40	5-10%	sg	mvfr	

Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-H | Date: 7-21-11 | Time: | Weather: Sunny 80°

1. Location

Ground Elevation at Surface of Hole: _____ Location (identify on plan): _____

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

Vegetation: _____ Landform: _____ Position on Landscape (attach sheet): _____

3. Distances from:

Open Water Body	feet	Drainage Way	feet	Possible Wet Area	feet
Property Line	feet	Drinking Water Well	feet	Other	feet

4. Parent Material: Glacial till Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No If yes: Depth Weeping from Pit: NO | Depth Standing Water in Hole: NO

Estimated Depth to High Groundwater: >108 inches | elevation: _____

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-H

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
6-20	Bw	10YR 6/6				fsl	0	0/0	gr	mfr	
20-80	Cd	2.5Y 6/4				vyfls	0	0/0	pl	mfr	
80-108	Cz	2.5Y 6/4	>108			grls	20	10/10/10	m	mfr	dense packed

Additional Notes:

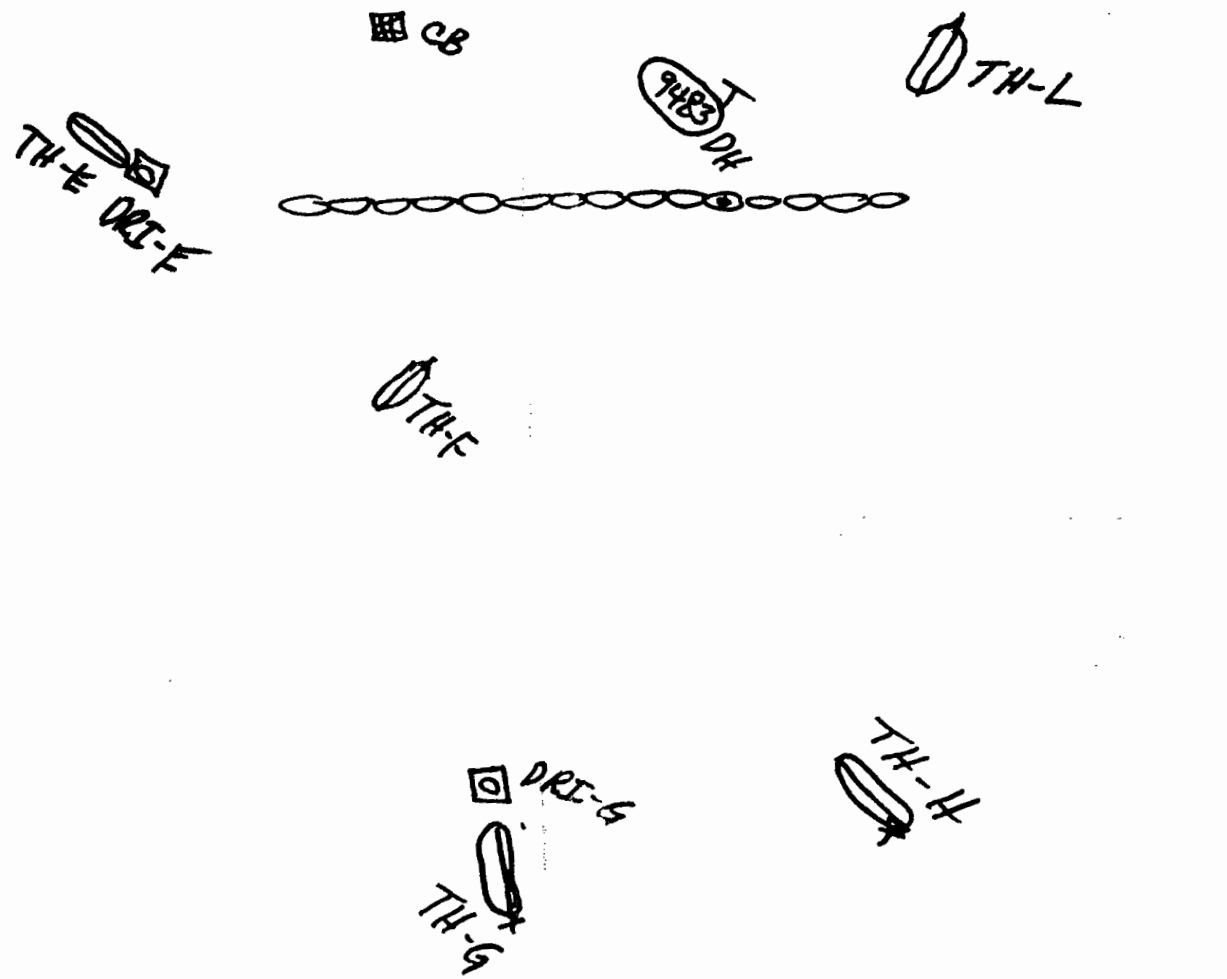
Commonwealth of Massachusetts
City/Town of READING

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

Field Diagrams

V.G.C.

Use this sheet for field diagrams:



Commonwealth of Massachusetts
City/Town of READING

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

F. Certification

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

Signature of Soil Evaluator	Date: July 21, 2011
Gordon Rogerson SE2074 Typed or Printed Name of Soil Evaluator / License #	Nov. 1994 Date of Soil Evaluator Exam
Chris Cole Name of Board of Health Witness	Reading Engineering Board of Health

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

Commonwealth of Massachusetts
City/Town of READING

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

Hayes
Hayes Engineering Inc.
603 Salem Street
Wakefield, MA 01880
T: (781) 246-7800
F: (781) 246-7594
Nantucket: (508) 228-7805

JOB FILE

A. Facility Information

Owner Name: Johnson Woods

Street Address:

City: READING | State: MA | Map/Lot #: 01867 Zip Code

	TH-I	TH-J	TH-K	TH-L
	84.31	84.90	110.78	104.93

B. Site Information

1. (Check one) ☑ New Construction ☐ Upgrade ☐ Repair

2. Published Soil Survey Available? ☐ Yes ☐ No If yes: Year Published ____ Publication Scale ____ Soil Map Unit ____
   Soil Name ____ Soil Limitations ____

3. Surficial Geological Report Available? ☐ Yes ☐ No If yes: Year Published ____ Publication Scale ____ Map Unit ____
   Geologic Material ____ Landform ____

4. Flood Rate Insurance Map
   Above the 500-year flood boundary? ☐ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☐ No
   Within the 500-year flood boundary? ☐ Yes ☐ No Within a velocity zone? ☐ Yes ☐ No

5. Wetland Area: National Wetland Inventory Map — Map Unit ____ Name ____
   Wetlands Conservancy Program Map — Map Unit ____ Name ____

6. Current Water Resource Conditions (USGS): ____ Month/Year Range: ☐ Above Normal ☐ Normal ☐ Below Normal

7. Other references reviewed: ____

Commonwealth of Massachusetts
City/Town of READING

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

D. Determination of High Groundwater Elevation

1. Method Used:

	TH-I	TH-J	TH-K	TH-L
☐ Depth observed standing water in observation hole	A. inches	B. inches	A. inches	B. inches
☐ Depth weeping from side of observation hole	A. inches	B. inches	A. inches	B. inches
☐ Depth to soil redoximorphic features (mottles)	A. 36 inches	B. 42 inches	A. >163 inches	B. >144 inches
☐ Groundwater adjustment (USGS methodology)	A. inches	B. inches	A. inches	B. inches

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

_____ Adjustment Factor _____ Adjusted Groundwater Level

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

   a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

   ☐ Yes ☐ No

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

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

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

Deep Observation Hole Number: TH-I | Date: 7-21-11 | Time: | Weather: SUNNY 95°

1. Location

Ground Elevation at Surface of Hole: ____ Location (identify on plan): Johnson Woods

2. Land Use: FIELD (e.g., woodland, agricultural field, vacant lot, etc.) | Surface Stones: NO | Slope (%): A

Vegetation: grass | Landform: | Position on Landscape (attach sheet):

3. Distances from:

Open Water Body	feet	Drainage Way	feet	Possible Wet Area	feet
Property Line	feet	Drinking Water Well	feet	Other	feet

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☒ No | If yes: Depth Weeping from Pit: NO | Depth Standing Water in Hole: NO

Estimated Depth to High Groundwater: 36 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-I

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-3	Ap	10YR 3/3				fsl	0	0%	gr	mfr	
3-20	Bw	10YR 4/6				fsl	0	0%	gr	mfr	
20-32	C1	2.5Y 5/6				fs	0	0%	m	mvfr	
32-96	C2	2.5Y 6/3	36"			vyfls	10	10/5%	m	mfr	

Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-J Date: 7-21-11 Time: _____ Weather: SUNNY 95°

1. Location

Ground Elevation at Surface of Hole: _____ Location (identify on plan): Johnson Woods

2. Land Use: FIELD (e.g., woodland, agricultural field, vacant lot, etc.)

Surface Stones: NO Slope (%): A

Vegetation: grass Landform: _____ Position on Landscape (attach sheet): _____

3. Distances from:

Open Water Body	feet	Drainage Way	feet	Possible Wet Area	feet
Property Line	feet	Drinking Water Well	feet	Other	feet

4. Parent Material: Glacial till

Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No

If yes: Depth Weeping from Pit: NO Depth Standing Water in Hole: NO

Estimated Depth to High Groundwater: 42 inches _____ elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-J

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-3	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
3-20	Bw	10YR 6/6				fsl	0	0/0	gr	mfr	
20-42	C1	2.5Y 5/6				ls	0	0/0	m	mfr	
42-84	C2	2.5Y 6/3	42"	10YR 6/8 5Y 7/1		vy fls	10	5/5/0	m	mfr	

Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-K 7-21-11 (Date) _____ (Time) Sunny 85° (Weather)

1. Location

Ground Elevation at Surface of Hole: _____ Location (identify on plan): Johnson Woods

2. Land Use Woods (e.g., woodland, agricultural field, vacant lot, etc.) Few (Surface Stones) B (Slope (%))

Vegetation _____ Landform _____ Position on Landscape (attach sheet) _____

3. Distances from: Open Water Body ____ feet; Drainage Way ____ feet; Possible Wet Area ____ feet

Property Line ____ feet; Drinking Water Well ____ feet; Other ____ feet

4. Parent Material: Glacial till Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No If yes: Nd (Depth Weeping from Pit) Nd (Depth Standing Water in Hole)

Estimated Depth to High Groundwater: 76 inches 3 elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-K

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
6-24	Bw	10YR 6/6				fsl	0	0/0	gr	mfr	
24-129	Cd	2.5Y 6/3				vyfls	0	0/0	Pl	mlfr	
129-163	C2	2.5Y 4/4	>163			CS	30	10/10/0	sg	mvfr	

Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-L | Date: 7-21-11 | Time: | Weather: SUNNY 80°

1. Location

Ground Elevation at Surface of Hole: | Location (identify on plan): Johnson Woods

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

Vegetation | Landform | Position on Landscape (attach sheet)

3. **Distances from:**

Open Water Body	feet	Drainage Way	feet	Possible Wet Area	feet
Property Line	feet	Drinking Water Well	feet	Other	feet

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No | If yes: Depth Weeping from Pit: NO | Depth Standing Water in Hole: NO

Estimated Depth to High Groundwater: >144 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-L

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
6-20	Bw	10YR 6/6				fsl	0	0/0	gr	mfr	
20-66	Cd	2.5Y 6/3				vyfls	0	0/0	Pl	mfr	
66-144	C2	2.5Y 4/4	>144			grcs	30	20/10/10	sg	mvfr	

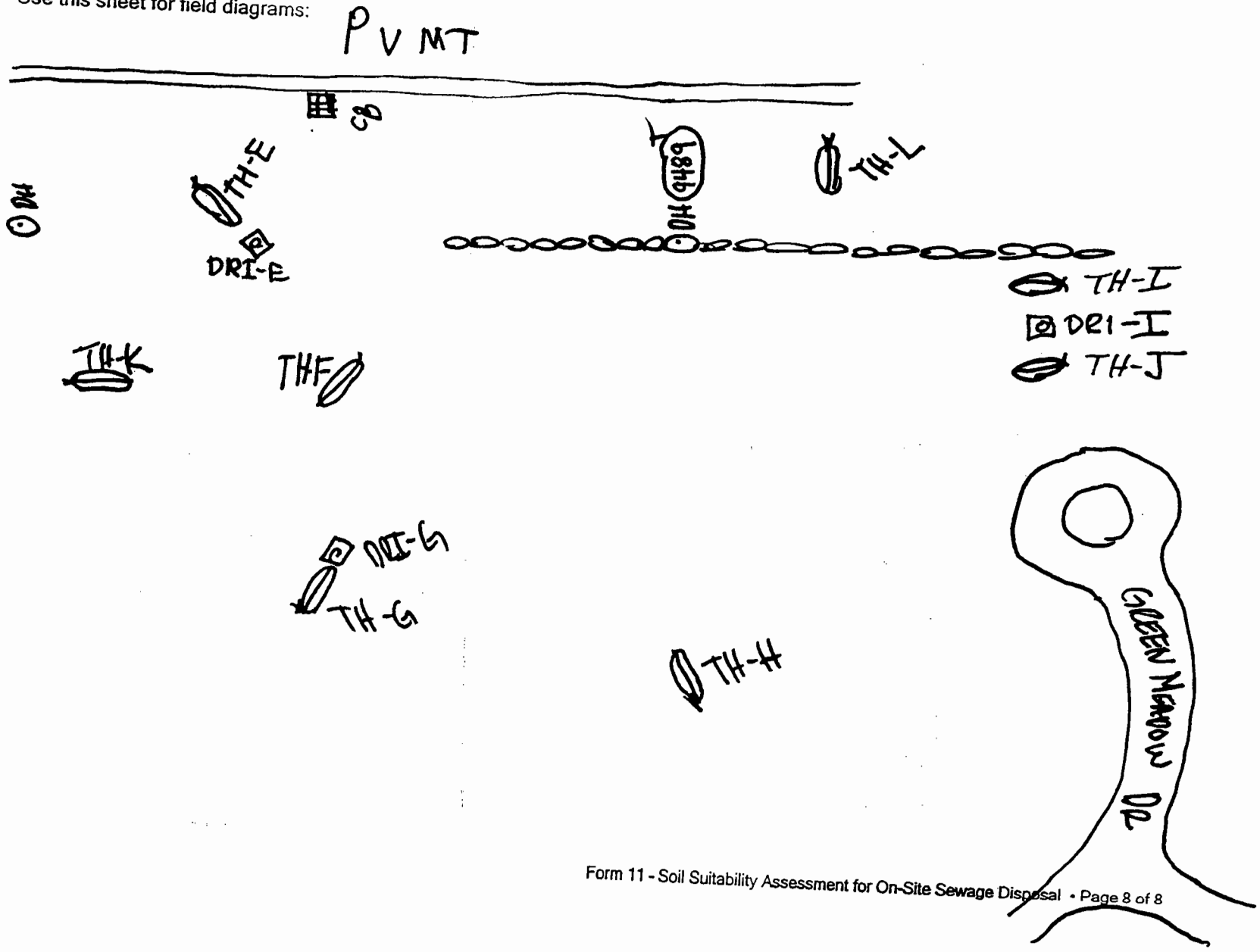
Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

Field Diagrams

Use this sheet for field diagrams:



Commonwealth of Massachusetts
City/Town of READING

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

F. Certification

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

Signature of Soil Evaluator	Date: July 21, 2010
Gordon Rogerson SE2074 Typed or Printed Name of Soil Evaluator / License #	Nov. 1994 Date of Soil Evaluator Exam
Chris Cole Name of Board of Health Witness	Reading Engineering Board of Health

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

REA-0316

Commonwealth of Massachusetts
City/Town of READING

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

Hayes
Hayes Engineering, Inc.
603 Salem Street
Wakefield, MA 01880
T: (781) 246-2800
F: (781) 246-7596
Nantucket: (508) 228-7801

A. Facility Information

Johnson Woods
Owner Name

Street Address

Map/Lot #

READING
City

MA
State

01867
Zip Code

	TH-A	TH-B	TH-C	TH-D
	98.23	92.39	98.18	100.85

B. Site Information

1. (Check one) ☑ New Construction ☐ Upgrade ☐ Repair

2. Published Soil Survey Available? ☐ Yes ☐ No If yes: Year Published / Publication Scale / Soil Map Unit

   Soil Name / Soil Limitations

3. Surficial Geological Report Available? ☐ Yes ☐ No If yes: Year Published / Publication Scale / Map Unit

   Geologic Material / Landform

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☐ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☐ No

   Within the 500-year flood boundary? ☐ Yes ☐ No Within a velocity zone? ☐ Yes ☐ No

5. Wetland Area: National Wetland Inventory Map — Map Unit / Name

   Wetlands Conservancy Program Map — Map Unit / Name

6. Current Water Resource Conditions (USGS): Month/Year Range: ☐ Above Normal ☐ Normal ☐ Below Normal

7. Other references reviewed:

Commonwealth of Massachusetts
City/Town of READING

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

D. Determination of High Groundwater Elevation

1. Method Used:

	TH-A	TH-B	TH-C	TH-D
☐ Depth observed standing water in observation hole	A. inches	B. inches	A. inches	B. inches
☐ Depth weeping from side of observation hole	A. inches	B. inches	A. inches	B. inches
☐ Depth to soil redoximorphic features (mottles)	A. 7138 inches	B. 7137 inches	A. 7120 inches	B. 7132 inches
☐ Groundwater adjustment (USGS methodology)	A. inches	B. inches	A. inches	B. inches

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

_____ Adjustment Factor _____ Adjusted Groundwater Level

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

   a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

   ☐ Yes ☐ No

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

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-A | Date: 7-19-11 | Time: | Weather: Sunny 80°

1. Location

Ground Elevation at Surface of Hole: | Location (identify on plan): Johnson Woods

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

Vegetation | Landform | Position on Landscape (attach sheet)

3. Distances from:

Open Water Body	feet	Drainage Way	feet	Possible Wet Area	feet
Property Line	feet	Drinking Water Well	feet	Other	feet

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No | If yes: Depth Weeping from Pit: No | Depth Standing Water in Hole: No

Estimated Depth to High Groundwater: >138 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-A

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
6-19	Bw	10YR 6/6				fsl	0	0/0	gr	mfr	
19-36	C1	2.5Y 5/4				ls	0	0/0	m	mvfr	
36-96	C2	2.5Y 5/4				grcs	40	30/0/5	sg	mvfr	
96-138	C3	2.5Y 6/3	>138			grls	20	0/0	sg	mvfr	

Additional Notes:

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

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

Deep Observation Hole Number: TH-B | Date: 7-19-11 | Time: | Weather: SUNNY 85°

1. Location

Ground Elevation at Surface of Hole: | Location (identify on plan): Johnson Woods

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

Vegetation | Landform | Position on Landscape (attach sheet)

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

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

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No | If yes: Depth Weeping from Pit: NO | Depth Standing Water in Hole: NO

Estimated Depth to High Groundwater: >137 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-B

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
6-18	Bw	10YR 5/6				fsl	0	0/0	gr	mfr	
18-98	C1	2.5Y 6/4				fls	0	0/0	m	mvfr	
98-137	C2	2.5Y 5/4	>137			grCS	30	20/5/5	sg	mvfr	

Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-C | Date: 7-19-11 | Time: | Weather: SUNNY 85°

1. Location

Ground Elevation at Surface of Hole: | Location (identify on plan): Johnson Woods

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

Vegetation | Landform | Position on Landscape (attach sheet)

3. Distances from:

Open Water Body	feet	Drainage Way	feet	Possible Wet Area	feet
Property Line	feet	Drinking Water Well	feet	Other	feet

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☑ No

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

5. Groundwater Observed: ☐ Yes ☑ No | If yes: Depth Weeping from Pit: No | Depth Standing Water in Hole: No

Estimated Depth to High Groundwater: >120 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-C

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
6-24	Bw	10YR 5/6				fsl	0	0/0	gr	mfr	
24-72	C1	2.5Y 6/3				ls	0	0/0	m	mfr	
120-120	C2	2.5Y 5/4	>120			grls	20	5/5/5	sg	mvfr	

Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-D | Date: 7-20-11 | Time: | Weather: SUNNY 75°

1. Location

Ground Elevation at Surface of Hole: | Location (identify on plan): Johnson Woods

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

Vegetation | Landform | Position on Landscape (attach sheet)

3. Distances from:

Open Water Body	feet	Drainage Way	feet	Possible Wet Area	feet
Property Line	feet	Drinking Water Well	feet	Other	feet

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☑ No | If yes: Depth Weeping from Pit: No | Depth Standing Water in Hole: No

Estimated Depth to High Groundwater: >132 inches | elevation

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-D

Depth (in.)	Soil Horizon/ Layer	Soil Matrix Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
6-24	Bw	10YR 6/6				fsl	0	0/0	gr	mfr	
24-60	C1	2.5Y 6/3				grls	20	0/0	m	mvfr	
60-132	C2	10YR 4/4	>132			CS	40	20/0	sg	mvfr	

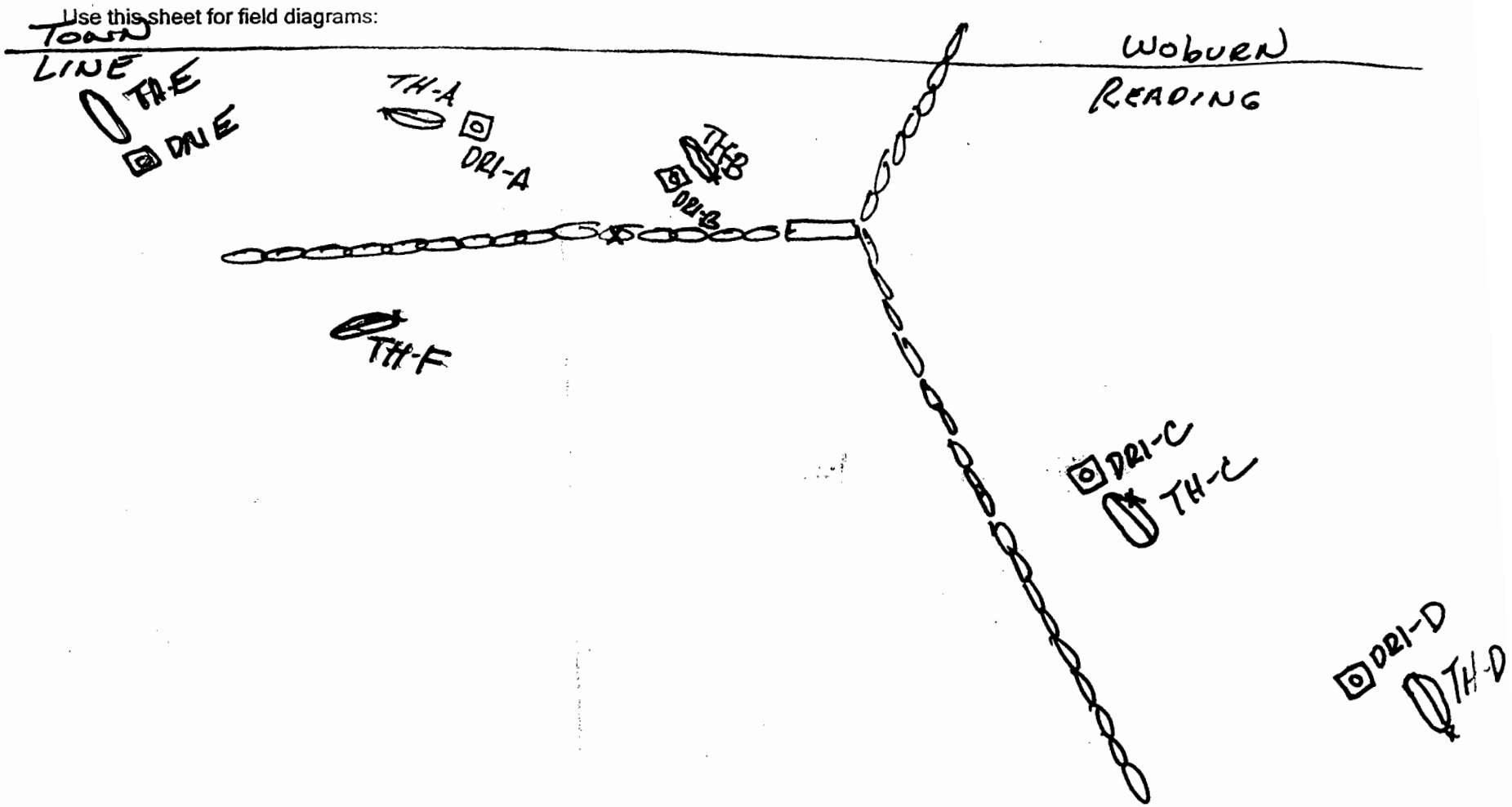
Additional Notes:

Commonwealth of Massachusetts
City/Town of READING

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

Field Diagrams

Use this sheet for field diagrams:



Commonwealth of Massachusetts
City/Town of READING

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

F. Certification

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

Gordon Rogerson	June 20, 2011
Signature of Soil Evaluator	Date
Gordon Rogerson SE2074	Nov. 1994
Typed or Printed Name of Soil Evaluator / License #	Date of Soil Evaluator Exam
Chris Cole	READING ENGINEERING
Name of Board of Health Witness	Board of Health

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

Commonwealth of Massachusetts
City/Town of READING

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

Hayes Engineering, Inc.
603 Salem Street
Wakefield, MA 01880
T: (781) 246-7800
F: (781) 246-7596
Nantucket: (508) 228-7605

A. Facility Information

Owner Name: Johnson Woods

Street Address:

Map/Lot #:

City: READING

State: MA

Zip Code:

TH-E	TH-F	TH-G	TH-H
101.67	108.50	111.92	113.73

B. Site Information

1. (Check one) ☑ New Construction ☐ Upgrade ☐ Repair

2. Published Soil Survey Available? ☐ Yes ☐ No If yes: Year Published ____ Publication Scale ____ Soil Map Unit ____

   Soil Name ____ Soil Limitations ____

3. Surficial Geological Report Available? ☐ Yes ☐ No If yes: Year Published ____ Publication Scale ____ Map Unit ____

   Geologic Material ____ Landform ____

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☐ Yes ☐ No Within the 100-year flood boundary? ☐ Yes ☐ No

   Within the 500-year flood boundary? ☐ Yes ☐ No Within a velocity zone? ☐ Yes ☐ No

5. Wetland Area: National Wetland Inventory Map — Map Unit ____ Name ____

   Wetlands Conservancy Program Map — Map Unit ____ Name ____

6. Current Water Resource Conditions (USGS): ____ Month/Year Range: ☐ Above Normal ☐ Normal ☐ Below Normal

7. Other references reviewed: ____

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

D. Determination of High Groundwater Elevation

1. Method Used:

	TH-E	TH-F	TH-G	TH-H
☐ Depth observed standing water in observation hole	A. inches	B. inches	A. inches	B. inches
☐ Depth weeping from side of observation hole	A. inches	B. inches	A. inches	B. inches
☐ Depth to soil redoximorphic features (mottles)	A. 7128 inches	B. 7132 inches	A. 7156 inches	B. 7108 inches
☐ Groundwater adjustment (USGS methodology)	A. inches	B. inches	A. inches	B. inches

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

Adjustment Factor _____ Adjusted Groundwater Level _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material
   a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

      ☐ Yes ☐ No

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

Commonwealth of Massachusetts
City/Town of READING

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

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

Deep Observation Hole Number: TH-E | Date: 7-20-11 | Time: | Weather: SUNNY 80°

1. Location

Ground Elevation at Surface of Hole: ——— Location (identify on plan): Johnson Woods

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

Vegetation: | Landform: | Position on Landscape (attach sheet):

3. Distances from:

Open Water Body	feet	Drainage Way	feet	Possible Wet Area	feet
Property Line	feet	Drinking Water Well	feet	Other	feet

4. Parent Material: Glacial till | Unsuitable Materials Present: ☐ Yes ☐ No

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

5. Groundwater Observed: ☐ Yes ☒ No | If yes: Depth Weeping from Pit: NO | Depth Standing Water in Hole: NO

Estimated Depth to High Groundwater: 7128 inches | elevation:

Commonwealth of Massachusetts
City/Town of READING

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

C. On-Site Review (continued)

Deep Observation Hole Number: TH-E

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-5	Ap	10YR 3/3				fsl	0	0/0	gr	mfr	
5-18	Bw	10YR 5/6				fsl	0	0/0	gr	mfr	
18-48	C1	2.5Y 5/4				grls	20	20/10/0	sg	mvfr	
48-88	C2	2.5Y 6/4				lfs	0	0/0	m	mfr	
88-128	C3	2.5Y 4/4	>128			cs	40	10/0/0	sg	mvfr	

Additional Notes:

Project File: REA-0316
Stormwater Pollution Prevention Plan (SWPPP)
Johnson Woods Realty Corp.
Johnson Woods Condominium Phase II
West Street
Reading, Massachusetts 01867

OPERATION AND MAINTENANCE PLAN AND LONG-TERM POLLUTION PREVENTION PLAN

for

Proposed Johnson Woods Condominium Phase II

West Street, Reading, Massachusetts
Date: October 4, 2011
By: Johnson Woods Realty Corp.
c/o Glover Property Management Inc.
8 Doaks Lane
Marblehead, MA 01945

Hayes Engineering, Inc.

HAYES ENGINEERING, INC,
603 Salem Street
Wakefield, MA 01880
Tel: (781) 246-2800
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JOHNSON WOODS CONDOMINIUM
PHASE II
READING, MASSACHUSETTS

OPERATION AND MAINTENANCE PLAN AND LONG-TERM POLLUTION PREVENTION PLAN

October 4, 2011

GENERAL

The management plan incorporates a combination of the following chain of structural best management practices to improve water quality of the stormwater runoff from the proposed roadway and other impervious surfaces, and control runoff to downgradient areas.

1. Constructed Stormwater Management Areas Designed to Improve Water Quality and Reduce Peak Rates of Runoff and Promote Groundwater Recharge
2. Deep Sump Catch Basin with Gas Traps
3. Subsurface Infiltration Perforated Pipes
4. Stormceptor Chamber
5. Existing Detention Basin
6. Level Spreader and Rip Rap
7. Parking Lot and Road Sweeping

These stormwater management facilities have unique characteristics, uses, planning considerations and maintenance requirements. The maintenance requirements, as suggested by the DEP in "Volume 2, Chapter 2: Structural BMP Specifications for the Massachusetts Stormwater Handbook", and the suggested schedules are summarized in the following sections. It is suggested that the following guidelines be adhered to following completion of the project and then adjusted, as necessary, based on the results of the required inspections and based on evidence of maintenance history. The owner can submit a revised maintenance schedule to the Engineering Division for review and approval. The maintenance and repair reports will be submitted to the Engineering Division annually by January 15th. There will be an inspection conducted for all components of the stormwater management system for major storm events equal to or exceeding 2 inches.

The general construction sequence that will be followed for the Phase II development will be approximately as follows, depending upon the economic conditions at the time:

1. Construct Taylor Drive and associated infrastructure improvements - 2012-2013
2. Construct first garden-style flat building - 2012-2013
3. Construct second garden-style flat building - 2013-2014
4. Construct third garden-style flat building - 2014-2015
5. Complete trail and fitness course
6. Construct Trevor Lane roadway - depends on Phase I progress
7. Construct Trevor Lane townhouse units as market demands
8. Construct Green Meadow Drive roadway extension
9. Construct Green Meadow Drive townhouse units as market demands

STANDARD 1: No New Untreated Discharges

The proposed stormwater management plan includes treatment for all discharge areas containing pavement impervious areas and includes sedimentation control measures to stabilize land disturbance areas during construction. All flows from pavement areas have at least 80% TSS removal rates.

STANDARD 2: Peak Rate Attenuation

The proposed stormwater management plan outlined in the Mitigative Drainage Study provides information relative to conformance to this standard.

STANDARD 3: Recharge

The proposed stormwater management plan outlined in the Mitigative Drainage Study provides information relative to the proposed recharge. The soil analysis was performed using the double-ring infiltrometer method. The analysis for the sizing of the BMPs was based upon the Dynamic Field Method. The stormwater recharge is designed to infiltrate significantly more volume than the minimum required volume. The system has also been designed to attenuate peak flows so the bottoms of the basins are equal to or greater than four feet above estimated seasonal high groundwater elevations. The Mitigative Drainage Study documents that the basin design storm will drain within 72 hours.

The recharge systems are located upgradent and approximately 80 feet or greater from the identified bordering vegetated wetland system areas. This will help dissipate groundwater flow to these areas. The developer has agreed to a Zone of Natural Vegetation to further protect the wetland system.

Good Housekeeping Practices

Good housekeeping practices can prevent and/or reduce pollutant runoff from the project to the stormwater management facilities through the use of street sweeping, erosion control and general site maintenance, thus reducing the need to clean and remove sediment, trash and deposits upon inspection.

Deep Sump Catch Basin with Gas Traps

The catch basins must be inspected four (4) times a year, including inspections in April and November. Inspections shall consist of two tasks: measuring and recording depth of sediment deposits contained within the basin, and inspecting structural basin, hood, "Snout" and sump components for damage. The inspection frequency may need to be increased if catch basins are regularly found to contain a significant amount of trash and sediment.

- Basins shall be cleaned using a vacuum truck when they are found to contain a significant amount of deposits (whenever the deposit depth is greater than or equal to one-half the depth from the bottom of the lowest invert) and there is a significant amount of trash, as specified in the MADEP Stormwater Handbook, Volume 2, Chapter 2, pages 3 through 5.

- Damaged basin components shall be repaired as soon after discovery as possible to ensure that the catch basin functions properly.

- Removed basin deposits must be handled as specified in the attached page (Structural BMPs – Volume 2, Chapter 2, page 5) from the MADEP Stormwater Handbook.

Subsurface Infiltration Perforated Pipe Recharge System

Recharge systems are prone to failure due to clogging. Adherence to this aggressive maintenance plan and schedule preserves effectiveness of the system. Note that the proposed subsurface perforated pipe system will be preceded by deep sump catch basins and Stormceptor units unless the runoff is directly from runoff areas. In that case, the runoff will not be pretreated prior to entering the subsurface management system.

- The subsurface system will be inspected after every major storm for the first few months after construction to ensure that proper function has been achieved. Thereafter, the area will be inspected at least four times a year. Water levels in the pipes should be recorded over several days to check drainage.

- The inspection ports for the recharger pipe system will be inspected after every major storm and the collected debris removed.

- Any required cleaning or other action will be documented and completed within seven business days.

- Ponded water inside the pipes (as visible from the inspection ports) after 24 hours or several days most likely indicates that the bottoms of the pipes are clogged.

- The inspection, cleaning and maintenance responsibility for the site drainage system shall belong to the owner.

- If inspection indicates that replacement or major repair is required, a work plan will be submitted within 7 days to the Engineering Division for review and repair.

STC Stormceptor Chambers

Regulating the sediment and petroleum product input to the proposed subsurface water quality system is the priority maintenance activity. Sediments and any oil spillage should be trapped and removed before they reach the chambers.

- Stormceptor chamber maintenance shall be performed on a regular basis as recommended by the manufacturer (described in the attached excerpt from the Stormceptor Maintenance Brochure obtained from the Stormceptor website www.stormceptor.com) and as summarized herein.

- Sediment removal is recommended annually, but is likely to vary widely based on site conditions and loadings. Typical maintenance cleaning can be done with a vacuum truck. Inspection for each of the Stormceptor units will include a quantification of the sediment load and oil and grease volumes. This is easily made from the surface with a tube dipstick with ball valve inserted through the cleanout pipe or other access port. Depths of sediment indicating maintenance are presented in the following table for the various models. Inspection of the internal structure should be part of the routine inspection plan. The units are designed to accept 15% of their capacity in solids annually based on maximum drainage area loading. Removal of sediment, oils and grease from the system will depend on rates of accumulation. All sediment and oil waste materials shall be disposed of in accordance with all Federal, State and Local regulations.

REQUIRED MAINTENANCE *

Model	Sediment Depth (in.)
STC 450i STC 900	8 *15

* based on 15% of the interceptor's sediment storage

Existing Detention Basins

- Careful observation of the system over time is required. The constructed basins will continue to have twice-a-year inspections to ensure that the existing basin vegetation is maintained and stable. Inspect basins during and after major storms to determine if the basins are meeting the expected detention times. Examine the control structures and stability of the basins to ensure that they are functioning and stable. Regular mowing will be accomplished, with the grass clippings removed each time. In addition, leaf accumulation, debris, tree growth and litter will be removed each time or more regularly if required. Remove sediment from the extended dry basin as necessary, and schedule once every five years if conditions require it.

- The outflow control structure shall be inspected at least twice per year and after heavy rainfall events. The discharge rip rap protection will be reviewed to insure no erosion is present.

Level Spreader

The level spreader should be checked periodically after every major storm to determine if the area has been damaged, and to determine if the design conditions have not changed. Any detrimental sediment accumulation should be removed. If rilling has taken place downgrade or adjacent to the level spreader, the damage should be repaired. Leaf litter shall be removed from the level spreader area. The vegetation in the vicinity downgradient of the spreader will be periodically inspected and fertilized to maintain healthy, dense growth.

Parking Lot and Roadway Sweeping

In order to minimize the TSS load to the deep sump catch basins and those BMPs downgradient, it is planned to sweep the parking lot and site drive areas four (4) times per year or more frequently if conditions require. Again, based upon actual experience and documentation, a revised schedule may be submitted to the Engineering Division for approval.

Removal of Siltation Controls

All siltation controls, including, but not limited to, hay bales and silt fence, shall be removed, with the approval of the Reading Town Engineering Department, as soon as practical after paving, re-vegetation and total stabilization of the site. Unvegetated areas remaining in the area of the siltation controls shall be loamed and seeded with the appropriate groundcover to insure re-vegetation as rapidly as possible after the removal of the siltation controls. In the case of all proposed stormwater management facilities, during construction of the proposed stormwater management system the developer shall be the owner and party responsible for maintenance.

Outlet Protection

The outlet protection should be checked the first few months after construction and after any major storm event during the site construction. Thereafter, inspect the channel twice a year, as well as after every major storm, for slope integrity soil moisture, vegetated health, soil stability, soil compaction, soil erosion, ponding and sediment accumulation. If the rip rap has been displaced, undermined or damaged, it should be repaired immediately. The channel immediately below the outlet should be checked to see that erosion is not occurring. The downstream channel should be kept clear of obstructions, such as fallen trees, debris, leaves and sediment, that could change flow patterns and/or tailwater depths in pipes. Repairs must be carried out immediately to avoid additional damage to the outlet protection apron.

Ownership / Maintenance Responsibility

The developer/owner (Johnson Woods Realty Corp. c/o Glover Property Management Corp.) shall be the owner and party responsible for maintenance of the stormwater management facilities during development construction and post construction long-term maintenance.

STANDARD #4: Water Quality

The Long-Term Pollution Prevention Plan

- Good housekeeping practices: Prevent or reduce pollutant runoff from the project development through the use of street sweeping, erosion and catch basin cleaning. It should be noted that we are not seeking credit for TSS removal with street sweeping for this project.

- Provisions for storing materials and waste products inside or under cover: All materials stored on site shall be stored in a neat and orderly fashion in their appropriate containers and under a roof or other secure enclosure. Waste products should be placed in secure receptacles until they are emptied by a licensed solid waste management company in Massachusetts.

- Requirements for routine inspections and maintenance of stormwater BMPs: Follow the guidelines outlined above.

- Spill prevention and response plans:

    - Prevention: All materials stored on site shall be stored in a neat and orderly fashion in their appropriate containers and under a roof or other secure enclosure. Products should be kept in their original containers with the original manufacturer's label. Products should not be mixed with one another unless recommended by the manufacturer. If possible, all of the product should be used up before disposing of the container. The manufacturer's recommendations for proper use and disposal should be followed.

- Response: Manufacturer's recommended methods for cleanup shall be followed. Spills should be cleaned up immediately after discovery. The spill area shall be kept well ventilated and personnel shall wear appropriate protective clothing to prevent injury from contact with a hazardous substance. Spills of toxic or hazardous material shall be reported to the appropriate State and/or local authority in accordance with local and/or State regulations.

- Provisions for maintenance of lawns, gardens and other landscaped areas: The project owner is responsible for these activities.

- Requirements for storage and use of fertilizers, herbicides and pesticides will be in compliance with all applied laws:

  - Fertilizers: Fertilizers shall be applied in the minimum amounts recommended by the manufacturer. Once applied, fertilizers shall be worked into the soil to limit exposure to stormwater. Storage shall be under a roof or other secure enclosure. The contents of any partially-used bags of fertilizer shall be transferred to a sealable plastic bag or bin to avoid spills.

  - Herbicides and Pesticides: Store herbicides and pesticides in original containers that are closed and labeled, in a secure area out of reach of children and pets. Avoid storing in damp areas where containers may become moist or rusty. Herbicides and pesticides should not be stored near food. Follow the label instructions strictly about where and how much to apply. Do not put herbicides and pesticides in the trash or down the drain. Use rubber gloves when handling, and use an appropriate cartridge mask if using products extensively.

- Provisions for solid waste management: Waste products should be placed in secure receptacles until they are emptied by a licensed solid waste management company in Massachusetts.

- Snow disposal and plowing plans relative to Wetland Resource Areas: Snow disposal should be in accordance with the Bureau of Resource Protection, Snow Disposal Guidelines, Guideline No. BRPG01-01, effective March 8, 2001. In general, snow will be plowed in accordance with standard operating procedures. During construction, snow will be plowed and stored in designated areas adjacent to the parking lots and roadways.

- Winter road salt and/or sand use and storage restrictions:

  - Salt/Sand: Whenever possible, use of environmentally friendly alternatives, i.e. calcium chloride and sand instead of salt for melting ice, should be considered.

- Street sweeping schedules: In order to minimize the Total Suspended Solids (TSS) load to the deep-sump catch basins and those BMPs down gradient, street sweeping should be performed at least four (4) times per year, primarily in spring and fall.

STANDARD 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

Provisions for prevention of illicit discharges to the stormwater management systems: **There are no proposed illicit discharges to the proposed stormwater management systems**. However, by definition, an illicit discharge does not include discharges from the following activities or facilities: firefighting, water-line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, water used for street washing and water used to clean buildings without detergents. See the information presented in the Johnson Woods Condominium Phase II plans for the proposed locations of the utilities. Upon review of said plans, it is evident that there are no entries of illicit discharges into the stormwater management system. The owner shall be responsible for verifying that there are no illicit discharges to the stormwater management system (discharges of water into the system other than stormwater) after the system has been constructed.

- Documentation that stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas, or from land uses with higher potential pollutant loads (LUHPPL): The project does not discharge to or near critical areas and is not a LUHPPL.

- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan: The responsibility lies with the property owner – Johnson Woods Realty Corp.

- List of emergency contacts for implementing Long-Term Pollution Prevention Plan for roadway: The responsibility lies with the property owner/developer during construction – Johnson Woods Realty Corp. and Glover Property Management Inc.

STANDARD 6: Critical Areas

The proposed project is not near a critical area. There are no certified vernal pools adjacent to the property and the applicant has agreed to a Zone of Natural Vegetation to further protect the wetland system.

STANDARD 7: Redevelopment and Other Projects Subject to the Standards Only to the Maximum Extent Practicable

The proposed project is not a redevelopment site.

STANDARD 8: Construction Period Pollution Prevention, and Erosion and Sedimentation Control

This document is the Stormwater Pollution Prevention Plan (SWPPP).

3. Prepare stabilized construction entrances.

4. Stabilize exposed surfaces where the period of exposure shall be more than two months but less than twelve months, within 14 days of last construction activity in that area.

5. Install stormwater management drainage systems, other utilities, and proposed roadways.

6. Construct buildings and install parking lot staging area to gravel elevations.

7. Install binder coat of pavement, including curbing.

8. Loam and seed all disturbed areas.

9. Install final pavement course and final inspection.

CONTROLS

Erosion and Sediment Controls Stabilization Practices

Temporary Stabilization – On sediment producing areas, where the period of exposure is more than two months but less than 12 months, the following procedures should be followed:

a. install needed surface water control measures,
b. perform all cultural operations at right angles to the slope,
c. apply seed uniformly to the rate indicated by broadcasting or hydraulic application, and
d. cover seed with mulch as needed.

Permanent Stabilization – To reduce damages from sediment and runoff to downstream areas, and to avoid erosion on the site itself, a permanent type cover shall be established as soon as possible. Seeding herbaceous cover is usually the most economical and practical way to stabilize any large area. On this site, a permanent cover utilizing standard commercial seed mixes containing species similar to Mixtures #3, #4 and #7 is appropriate. Sod or erosion control blanket infused with one of the aforementioned seed mixtures may be installed as permanent cover on the site at the Owner's discretion (See **Table 2**).

Structural Practices

Silt Fencing – shall be installed as shown on the Storm Water Pollution Prevention Plan to help prevent erosion and sedimentation.

CONTROLS (Continued)

Catch Basins – shall be fitted with filter fabric during construction to prevent the accumulation of sediments in the catch basin sumps. Catch basins are to be cleaned as needed during construction using a truck-mounted vacuum device.

TABLE 2

MIXTURE NO. 1 - Dry to Very Dry Sites

Switchgrass – 20 lbs. (Blackwell or Nebraska 28)
Redtop – 3 lbs; or Annual Ryegrass – 15 lbs.

Switchgrass seed requires a chilling period of three (3) weeks or longer at common household refrigerator temperatures, except when seeded in late fall or winter. Regular mowing should not be practiced. Very slow growing the first year.

MIXTURE NO. 2 – Dry to Very Dry Sites

Weeping Lovegrass – 5 lbs.

Cape and the Islands only. May be killed by severe winters and should not be seeded where regular mowing will be practiced. Spring seeding only between April 15 and May 15. Should not be used for sand dune stabilization.

MIXTURE NO. 3 – Moderately Moist to Dry Sites

Red fescue – 30 lbs.
Redtop – 3 lbs.; or Perennial Ryegrass – 15 lbs.

Resistant to foot traffic. Tolerant of shade. Good for lawn type cover.

MIXTURE NO. 4 – Moderately Moist to Very Dry Sites

Tall Fescue – 40 lbs.
Redtop – 3 lbs.; or Perennial Ryegrass – 15 lbs.

Resistant to foot traffic when well established. Tolerant of shade.

CONTROLS (Continued)

MIXTURE NO. 5 – Very Moist to Dry Sites

Reed canarygrass – 20 lbs.
Redtop – 3 lbs.; or Perennial Ryegrass – 15 lbs.

On moist and very moist sites, reed canarygrass can be established quicker by planting rootstocks.

MIXTURE NO. 6 – Moderately Moist to Dry Sites

Crown Vetch – 15 lbs.
Redtop – 3 lbs.; or Perennial Ryegrass – 15 lbs.

Crown vetch should not be seeded as the basic species where regular mowing will be practiced. Spring seeding is preferred.

MIXTURE NO. 7 – Moderately Moist to Dry Sites

Standard commercial grass or grass-legume mixtures used for lawns or long-term forage crop production. Mixtures should contain at least 75% perennial grasses or legumes. Annual fertilization should be planned.

MIXTURE NO. 8 – Moderately Moist Sites

Kentucky Bluegrass – 20 lbs.
Redtop – 2 lbs.; or Perennial Ryegrass – 15 lbs.

Cape and the Islands only, and seeded only in the spring. Should not be seeded where regular mowing will be practiced.

REFERENCE

United States Department of Agriculture, Soil Conservation Service, 1977. Guidelines for Soil and Water Conservation in Urbanizing Areas of Massachusetts. U.S.D.A. Soil Conservation Service, Amherst, Massachusetts, 88 pages.

TIMING OF CONTROLS/MEASURES

As indicated in the Sequence of Major Activities, the installation of erosion and sediment control shall be completed prior to major earth excavation activities. Areas where construction activities are exposed for more than two months but less than 12 months shall be stabilized with the temporary stabilization practices referred to above. Once construction activity is completed in an area, that area shall be stabilized with permanent seed and mulch.

CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

The stormwater pollution prevention plan reflects the requirements of the Massachusetts Wetlands Protection Act (MGL c.131, section 40) as administered by the Department of Environmental Protection (DEP). Note that there are no other applicable State or Federal requirements for sediment and erosion control plans (or permits) or stormwater management plans (or permits) required for this project to the best of our knowledge.

SPILL PREVENTION

The following are the material management practices that shall be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.

Good Housekeeping:

The following good housekeeping practices will be followed on site during the construction project.

1. A concerted effort shall be made to store only enough product required to complete a particular task.

2. All materials stored on site shall be stored in a neat and orderly fashion in their appropriate containers and, if possible, under a roof or other secure enclosure.

3. Products shall be kept in their original containers with the original manufacture's label.

4. Substances shall not be mixed with one another unless recommended by the manufacturer.

5. Whenever possible, all of a product shall be used up before disposing of the container.

SPILL PREVENTION (Continued)

Paints:

All containers shall be tightly sealed and stored when not required for use. Excess paint shall not be discharged into any catch basin, drain manhole or any portion of the stormwater management system. Excess paint shall be properly disposed of according to manufacturer's recommendations or State and local regulations.

Concrete Trucks:

Concrete trucks shall not be allowed to wash out or discharge surplus concrete or drum wash water on site.

SPILL CONTROL PRACTICES

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices shall be followed for spill prevention and cleanup:

1. Manufacturer's recommended methods for cleanup shall be readily available at the on-site trailer, and site personnel shall be made aware of the procedures and the location of the information.

2. Materials and equipment necessary for spill clean up shall be kept in the material storage area on site. Equipment and materials shall include, but not be limited to, brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust and plastic and metal trash containers specifically for this purpose.

3. All spills shall be cleaned up immediately after discovery.

4. The spill area shall be kept well ventilated, and personnel shall wear appropriate protective clothing to prevent injury from contact with hazardous substance.

5. Spills of toxic or hazardous material shall be reported to the appropriate State and/or local authority in accordance with local and/or State regulations.

6. The spill prevention plan shall be adjusted to include measures to prevent a particular type of spill from reoccurring and instructions on how to clean up the spill if there is another occurrence. A description of the spill, what caused it, and the clean up measures shall also be included.

7. The "Manager" shall be the spill prevention and cleanup coordinator. The "Manager" shall designate at least three other site personnel who will be trained in the spill control practices identified above.