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Project File: Rea-0316

# Revised Mitigative Drainage Study

Johnson Woods Condominiums Phase II  
Reading, Massachusetts

October 7, 2011  
Revised December 16, 2011



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

October 7, 2011  
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**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**

<u>Comparative Location</u>	<u>Description</u>
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 is 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 subcatchments 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 proposed development 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 the existing condition.

**TABLE I**  
**PEAK FLOW RATE SUMMARY**

<u>Comparison Location</u>	<u>Storm</u>	<u>Existing cfs</u>	<u>Proposed cfs</u>
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.	11.20 22.37 29.46 44.75	5.75 16.47 24.02 37.41
3	2 yr. 10 yr. 25 yr. 100 yr.	0.04 0.87 1.83 4.21	0.48 1.75 2.51 4.14
4	2 yr. 10 yr. 25 yr. 100 yr.	1.03 7.53 12.15 22.87	1.64 5.49 9.24 18.79
5	2 yr. 10 yr. 25 yr. 100 yr.	1.47 3.60 4.87 7.59	0.27 2.57 3.27 4.58
1 + 3	2 yr. 10 yr. 25 yr. 100 yr.	10.5 23.6 31.7 49.1	7.8 17.4 22.8 34.2
4 + 5	2 yr. 10 yr. 25 yr. 100 yr.	2.50 11.13 17.02 30.46	1.91 8.06 12.51 23.37

\* 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 oil debris traps.
  - \* Structural stormwater treatment measures (such as Stormceptor or equivalent devices) which are designed to improve water quality.
  - \* Subsurface pipe detention-recharge systems in areas that will allow groundwater recharge in accordance with the DEP Policy concerning stormwater management.
  - \* 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.
  - \* 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.
- Standard 3 - Groundwater recharge

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 target depth factor contained in the Stormwater Management Policy. The required and provided volume of groundwater recharge for the Johnson Woods Condominiums Phase II site are shown on **TABLE II**, the Provided Recharge Volume summary table.

**TABLE II**  
**PROVIDED RECHARGE VOLUME**

	<u>Required</u>	<u>Provided</u>
RES02	1,608 cu ft.	1,829 cu.ft.*
RES03	2,038 cu.ft.	1,915 cu.ft.**
RES04	2,510 cu.ft.	6,201 cu.ft.**
RES05 & RES06	2,100 cu.ft.	7,230 cu.ft.
RES07	1,117 cu.ft.	1,218 cu.ft.
RES08	927 cu.ft.	1,378 cu.ft.

\* From Phase I Study

\*\* From As Built

**GROUNDWATER RECHARGE CALCULATIONS**

The groundwater recharge for phase II is accomplished through the existing subsurface pipe detention-infiltration system RES02 (off of Johnson Woods Drive), stormwater management basins RES03 (northerly of Green Meadow Drive) and RES04 (southerly of Green Meadow Drive) and the proposed subsurface structural infiltration BMP's RES05, RES06, RES07 and RES08 located throughout the proposed development.

The recharge required for the extension of Green Meadow Drive and those condominiums which access it is achieved primarily through RES03 with those remaining impervious areas achieved through RES04. The recharge required for most of the remaining phase II development is achieved through the proposed four subsurface structural infiltration BMP's.

The required recharge for the rear roof of condominiums 70 and 71 is accounted for in RES04, similarly, the rear roof for condominiums 26,27,64 and 65 is accounted for in RES02.

A capture area adjustment is calculated to account for those impervious areas not captured by the drainage system to ensure that there is enough runoff directed to the infiltration practices. The capture area adjustment in general is calculated for those impervious areas accessed from Trevor Lane and Taylor Drive, comprising the bulk of the new impervious for phase II. Essentially, the required recharge, and consequently the capture area adjustment, are provided for the development generally associated with the new infiltration practices, RES05 through RES08. The capture area adjustment assumes an equal division amongst those recharge practices. No capture area adjustment is calculated for the additional impervious areas generally associated with the existing stormwater basins RES02 through RES04, as those impervious areas that are not tributary are accounted for, as stated above, therefore all impervious areas are considered.

**RES02 RECHARGE:**

- Soil Data

*Refer to the Watershed Maps for Hydrologic Soil Groups.*

- Capture Area Adjustment

*No capture area adjustment calculated for RES02.*

- Additional Required Recharge Volume Tributary to RES02

$$HSG = C$$

$$Rv = (F) \times (\text{Impervious Area})$$

$$Rv = [(0.25 \text{ in.}) \times (8390 \text{ ft}^2)] / (12 \text{ in/ft}) = 175 \text{ ft}^3$$

- Provided Recharge Volume

*The original phase I required recharge volume tributary to RES02 is 1433 ft<sup>3</sup> with a provided recharge volume of 1829 ft<sup>3</sup>. This yields an additional provided recharge volume of (1829 ft<sup>3</sup> - 1433 ft<sup>3</sup>) 396 ft<sup>3</sup>.*

*Since the additional required recharge volume is less than the additional provided recharge volume (175 ft<sup>3</sup> < 396 ft<sup>3</sup>), this results in compliance.*

**RES03 RECHARGE:**

- Soil Data

*Refer to the Watershed Maps for Hydrologic Soil Groups.*

- Capture Area Adjustment

*No capture area adjustment calculated for RES03.*

- Additional Required Recharge Volume Tributary to RES03

$$HSG = A$$

$$Rv = (F) \times (\text{Impervious Area})$$

$$Rv = [(0.6 \text{ in.}) \times (13444 \text{ ft}^2)] / (12 \text{ in/ft}) = 672 \text{ ft}^3$$

$$HSG = B$$

$$Rv = (F) \times (\text{Impervious Area})$$

$$Rv = [(0.35 \text{ in.}) \times (10600 \text{ ft}^2)] / (12 \text{ in/ft}) = 309 \text{ ft}^3$$

$$\therefore \Sigma = (672 \text{ ft}^3 + 309 \text{ ft}^3) = 981 \text{ ft}^3$$

- **Provided Recharge Volume**

*The original phase I required recharge volume tributary to RES03 is 1057 ft<sup>3</sup> with a provided recharge volume of 1915 ft<sup>3</sup> (from 2005 as-built). This yields an additional provided recharge volume of (1915 ft<sup>3</sup> - 1057 ft<sup>3</sup>) of 858 ft<sup>3</sup>.*

*Since the additional required recharge volume is greater than the additional provided recharge volume (981 ft<sup>3</sup> > 858 ft<sup>3</sup>), this results in a deficiency of (981 ft<sup>3</sup> - 858 ft<sup>3</sup>) 123 ft<sup>3</sup>. Assume the first 858 ft<sup>3</sup> will be accounted for in RES03 and the remaining 123 ft<sup>3</sup> will be accounted for in RES04.*

**RES04 RECHARGE:**

- **Soil Data**

*Refer to the Watershed Maps for Hydrologic Soil Groups.*

- **Capture Area Adjustment**

*No capture area adjustment calculated for RES04.*

- **Additional Required Recharge Volume Tributary to RES04**

$$HSG = C$$

$$Rv = (F) \times (\text{Impervious Area})$$

$$Rv = [(0.25 \text{ in.}) \times (5939 \text{ ft}^2)] / (12 \text{ in/ft}) = 124 \text{ ft}^3$$

$$HSG = A$$

$$Rv = (F) \times (\text{Impervious Area})$$

$$Rv = [(0.6 \text{ in.}) \times (4860 \text{ ft}^2)] / (12 \text{ in/ft}) = 243 \text{ ft}^3$$

$$\therefore \Sigma = (124 \text{ ft}^3 + 243 \text{ ft}^3 + 123 \text{ ft}^3_{\text{from RES03}}) = 490 \text{ ft}^3$$

- **Provided Recharge Volume**

*The original phase I required recharge volume tributary to RES04 is 2020 ft<sup>3</sup> with a provided recharge volume of 6201 ft<sup>3</sup> (from 2005 as-built). This yields an additional provided recharge volume of (6201 ft<sup>3</sup> - 2020 ft<sup>3</sup>) 4181 ft<sup>3</sup>.*

*Since the additional required recharge volume is less than the additional provided recharge volume (490 ft<sup>3</sup> < 4181 ft<sup>3</sup>), this results in compliance.*

**RES05 & RES06 RECHARGE:**

- Soil Data

*Refer to the soils data and the Watershed Maps for Hydrologic Soil Groups.*

- Capture Area Adjustment (RES05 through RES08)

*Minimum Area Calculation:*

$$A_{min. recharge} = (0.65) \times (Total Impervious Area)$$
$$A_{total impervious} = 152869 \text{ ft}^2$$

$$A_{min. recharge} = (0.65) \times (152869 \text{ ft}^2) = 99365 \text{ ft}^2$$
$$A_{actual. recharge} = 145755 \text{ ft}^2$$

$\therefore 145755 \text{ ft}^2 > 99365 \text{ ft}^2$ , complies with 65% minimum.

*Ratio of total site impervious area to site impervious area draining to recharge facilities:*  
 $(152869 \text{ ft}^2 / 145755 \text{ ft}^2) = 1.05$

- Required Recharge Volume Tributary to RES05 & RES06

*HSG = A*

$Rv = (F) \times (Impervious Area)$

$$Rv = [(0.6 \text{ in.}) \times (10843 \text{ ft}^2)] / (12 \text{ in/ft}) = 542 \text{ ft}^3$$

*HSG = B*

$Rv = (F) \times (Impervious Area)$

$$Rv = [(0.35 \text{ in.}) \times (7792 \text{ ft}^2)] / (12 \text{ in/ft}) = 227 \text{ ft}^3$$

*HSG = C*

$Rv = (F) \times (Impervious Area)$

$$Rv = [(0.25 \text{ in.}) \times (59069 \text{ ft}^2)] / (12 \text{ in/ft}) = 1231 \text{ ft}^3$$

$$\therefore \Sigma = (542 \text{ ft}^3 + 227 \text{ ft}^3 + 1231 \text{ ft}^3) = 2000 \text{ ft}^3$$

$$Rv_{min. required} = [(1.05) \times (2000 \text{ ft}^3)] = 2100 \text{ ft}^3$$

*Given that RES05 and RES06 are not hydraulically connected the required recharge volume is distributed between them using the 2 year volume percentages, (i.e., 53.3% for RES05 and 46.7% for RES06).*

$$Rv_{min. required res05} = [(0.533) \times (2100 \text{ ft}^3)] = 1119 \text{ ft}^3$$

$$Rv_{min. required res06} = [(0.467) \times (2100 \text{ ft}^3)] = 981 \text{ ft}^3$$

- Provided Recharge Volume RES05

*Simple Dynamic Method*

$K$  (Infiltration Rate) = 8.27 in/hr (Rawls Rate based upon soil testing)

$RV_{\text{soil capacity}} = (\text{Bottom Area}) \times (K) \times (12 \text{ in/ft}) \times (2 \text{ hrs})$

Provided Recharge Volume:

$RV_{\text{soil capacity}} = [(31.00 \text{ ft}) \times (82.00 \text{ ft}) \times (8.27 \text{ in/hr}) \times (2 \text{ hrs})] / (12 \text{ in/ft}) = 3504 \text{ ft}^3$

$\therefore 3504 \text{ ft}^3 > 1119 \text{ ft}^3$ , this results in compliance.

- Provided Recharge Volume RES06

*Simple Dynamic Method*

$K$  (Infiltration Rate) = 8.27 in/hr (Rawls Rate based upon soil testing)

$RV_{\text{soil capacity}} = (\text{Bottom Area}) \times (K) \times (12 \text{ in/ft}) \times (2 \text{ hrs})$

Provided Recharge Volume:

$RV_{\text{soil capacity}} = [(51.00 \text{ ft}) \times (53.00 \text{ ft}) \times (8.27 \text{ in/hr}) \times (2 \text{ hrs})] / (12 \text{ in/ft}) = 3726 \text{ ft}^3$

$\therefore 3726 \text{ ft}^3 > 981 \text{ ft}^3$ , this results in compliance.

- Drawdown Time Within 72 Hours RES05

$Time_{\text{drawdown}} = (Rv) / (K \times \text{Bottom Area})$

$Time_{\text{drawdown}} = 8883 \text{ ft}^3 / [(8.27 \text{ in/hr}) \times (31.00 \text{ ft}) \times (82.00 \text{ ft})] \times (12 \text{ in/ft}) = 5.1 \text{ hrs} < 72 \text{ hrs}$

- Drawdown Time Within 72 Hours RES06

$Time_{\text{drawdown}} = (Rv) / (K \times \text{Bottom Area})$

$Time_{\text{drawdown}} = 9502 \text{ ft}^3 / [(8.27 \text{ in/hr}) \times (51.00 \text{ ft}) \times (53.00 \text{ ft})] \times (12 \text{ in/ft}) = 5.1 \text{ hrs} < 72 \text{ hrs}$

- Mounding Analysis

*No mounding analysis required*

*(Proposed recharge system is greater than four feet from the estimated seasonal high groundwater).*

#### **RES07 RECHARGE:**

- Soil Data

*Refer to the soils data and the Watershed Maps for Hydrologic Soil Groups.*

- Required Recharge Volume Tributary to RES07

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$$\begin{aligned} HSG &= A \\ Rv &= (F) \times (\text{Impervious Area}) \\ Rv &= [(0.6 \text{ in.}) \times (8482 \text{ ft}^2)] / (12 \text{ in/ft}) = 424 \text{ ft}^3 \end{aligned}$$

$$\begin{aligned} HSG &= B \\ Rv &= (F) \times (\text{Impervious Area}) \\ Rv &= [(0.35 \text{ in.}) \times (2387 \text{ ft}^2)] / (12 \text{ in/ft}) = 70 \text{ ft}^3 \end{aligned}$$

$$\begin{aligned} HSG &= C \\ Rv &= (F) \times (\text{Impervious Area}) \\ Rv &= [(0.25 \text{ in.}) \times (27350 \text{ ft}^2)] / (12 \text{ in/ft}) = 570 \text{ ft}^3 \end{aligned}$$

$$\therefore \Sigma = (424 \text{ ft}^3 + 70 \text{ ft}^3 + 570 \text{ ft}^3) = 1064 \text{ ft}^3$$

$$RV_{\text{min. required}} = [(1.05) * (1064 \text{ ft}^3)] = 1117 \text{ ft}^3$$

- Provided Recharge Volume RES07

*Simple Dynamic Method*

*K (Infiltration Rate) = 8.27 in/hr (Rawls Rate based upon soil testing)*

$$RV_{\text{soil capacity}} = (\text{Bottom Area}) \times (K) \times (12 \text{ in/ft}) \times (2 \text{ hrs})$$

*Provided Recharge Volume:*

$$RV_{\text{soil capacity}} = [(26.00 \text{ ft}) \times (34.00 \text{ ft}) \times (8.27 \text{ in/hr}) \times (2 \text{ hrs})] / (12 \text{ in/ft}) = 1218 \text{ ft}^3$$

*$\therefore 1218 \text{ ft}^3 > 1117 \text{ ft}^3$ , this results in compliance.*

- Drawdown Time Within 72 Hours RES07

$$Time_{\text{drawdown}} = (Rv) / (K \times \text{Bottom Area})$$

$$Time_{\text{drawdown}} = 3070 \text{ ft}^3 / [(8.27 \text{ in/hr}) \times (26.00 \text{ ft}) \times (34.00 \text{ ft})] \times (12 \text{ in/ft}) = 5.0 \text{ hrs} < 72 \text{ hrs}$$

- Mounding Analysis

*No mounding analysis required*

*(Proposed recharge system is greater than four feet from the estimated seasonal high groundwater).*

#### **RES08 RECHARGE:**

- Soil Data

*Refer to the soils data and the Watershed Maps for Hydrologic Soil Groups.*

- Required Recharge Volume Tributary to RES08

HSG = A

$Rv = (F) \times (\text{Impervious Area})$

$$Rv = [(0.6 \text{ in.}) \times (2582 \text{ ft}^2)] / (12 \text{ in/ft}) = 129 \text{ ft}^3$$

HSG = B

$Rv = (F) \times (\text{Impervious Area})$

$$Rv = [(0.35 \text{ in.}) \times (22340 \text{ ft}^2)] / (12 \text{ in/ft}) = 652 \text{ ft}^3$$

HSG = C

$Rv = (F) \times (\text{Impervious Area})$

$$Rv = [(0.25 \text{ in.}) \times (4918 \text{ ft}^2)] / (12 \text{ in/ft}) = 102 \text{ ft}^3$$

$$\therefore \Sigma = (129 \text{ ft}^3 + 652 \text{ ft}^3 + 102 \text{ ft}^3) = 883 \text{ ft}^3$$

$$Rv_{\text{min. required}} = [(1.05) \times (883 \text{ ft}^3)] = 927 \text{ ft}^3$$

- Provided Recharge Volume RES08

*Simple Dynamic Method*

*K (Infiltration Rate) = 8.27 in/hr (Rawls Rate based upon soil testing)*

$$Rv_{\text{soil capacity}} = (\text{Bottom Area}) \times (K) \times (12 \text{ in/ft}) \times (2 \text{ hrs})$$

*Provided Recharge Volume:*

$$Rv_{\text{soil capacity}} = [(25.00 \text{ ft}) \times (40.00 \text{ ft}) \times (8.27 \text{ in/hr}) \times (2 \text{ hrs})] / (12 \text{ in/ft}) = 1378 \text{ ft}^3$$

$\therefore 1378 \text{ ft}^3 > 927 \text{ ft}^3$ , this results in compliance.

- Drawdown Time Within 72 Hours RES08

$\text{Time}_{\text{drawdown}} = (Rv) / (K \times \text{Bottom Area})$

$$\text{Time}_{\text{drawdown}} = 2667 \text{ ft}^3 / [(8.27 \text{ in/hr}) \times (25.00 \text{ ft}) \times (40.00 \text{ ft})] \times (12 \text{ in/ft}) = 3.9 \text{ hrs} < 72 \text{ hrs}$$

- Mounding Analysis

*No mounding analysis required*

*(Proposed recharge system is greater than four feet from the estimated seasonal high groundwater).*

- Standard 4 - 80% TSS Removal & Water Quality Volume

Standard 4 of the Policy is perhaps the focal point of the Stormwater Management Policy. It requires, basically, 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 oil debris 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.

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 proprietary 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 (*Eupatoriadelphus maculatus*). 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 volume required and provided for each of the comparison locations is shown in **TABLE III**, the Water Quality Volume summary table. Although the metric used for determining water quality for RES05 through RES08 is flow rate, a volumetric analysis is provided for completeness and given the somewhat nebulous method of water quality calculation. The water quality peak flow rate, given the use of proprietary stormwater treatment devices, for RES05 through RES08, is provided in **TABLE IIIa**, Water Quality Peak Flow Rate summary table, refer

to manufacturers design flow rate data in the Attachments section of this report for additional information.

**TABLE III**  
**WATER QUALITY VOLUME**

<u>Water Quality Volume</u>	<u>Required</u>	<u>Provided</u>
RES02	None for Phase II	None for Phase II
RES03	2,536 cu.ft.	2,862 cu.ft.*
RES04	8,153 cu.ft.	8,242 cu.ft.*
RES05 & RES06	5,696 cu.ft.	16,332 cu.ft.**
RES07	Roof Area Only	Not Required
RES08	1,782 cu.ft.	2,666 cu.ft.**

\* From As built

\*\* Storage below main hydraulic outlet

**TABLE IIIa**  
**WATER QUALITY PEAK FLOW RATE**

<u>Water Quality Peak Flow Rate</u>	<u>Required</u>	<u>Provided</u>
RES05 & RES06 <sub>upstream</sub>	1.65 cu.ft./sec.	STC 900*
RES06 <sub>downstream</sub>	0.25 cu.ft./sec.	STC 450i*
RES07	Roof Area Only	Not Required
RES08	0.59 cu.ft./sec.	STC 450i*

\* Refer to manufacturers design flow rate data

**WATER QUALITY VOLUME & TSS REMOVAL CALCULATIONS**

The standards for calculating water quality volume has changed since the original phase I design and has subsequently been rescinded. Presently it is unclear as to the preferred method of calculation. In lieu of a definitive methodology, the water quality volume calculations employed consist of the historic volumetric calculation for those areas associated with the existing stormwater management basins, RES02 through RES04, and the current water quality

peak flow rate for the new proposed subsurface structural infiltration BMP's RES05 through RES08.

Given that a runoff depth of 0.5 inches was used to calculate the required water quality volume for phase I, the same criteria is employed for those areas tributary to the existing stormwater management basins (RES02 through RES04), excluding certain types of impervious roofs. In this case, all roof areas are considered to be free of pollutants and do not require treatment.

The water quality volume calculation employed for the new proposed subsurface structural infiltration BMP's (RES05 through RES08) is based upon the MassDEP conversion of converting the water quality volume to an equivalent water quality peak flow rate. This calculation is then compared to the manufacturers (Rinker Materials) methodology, and a favorable comparison results with both analysis recommending the same treatment device.

- Water quality Volume RES02

*Since the flow area to RES02 is reduced 7% from the original phase I flow area, with imperviousness being reduced, it is assumed that the water quality volume is also reduced and therefore no analysis is necessary.*

- Water quality Volume Increase RES03

$$V_{wq\ increase} = [(Impervious\ Area) \times (Water\ Quality\ Depth)] / (12\ in/ft)$$

$$A_{impervious} = 10906\ ft^2$$

$$D_{wq} = 0.5\ in$$

$$V_{wq\ increase} = [(10906\ ft^2) \times (0.5\ in) / (12\ in/ft)] = 454\ ft^3$$

- Provided Water Quality Volume

*The original phase I required water quality volume is (1735 ft<sup>3</sup> + 347 ft<sup>3</sup>) 2082 ft<sup>3</sup> with a provided water quality volume of 2862 ft<sup>3</sup> (from 2005 as-built). This yields an additional provided water quality volume of (2862 ft<sup>3</sup> - 2082 ft<sup>3</sup>) 780 ft<sup>3</sup>.*

*Since the additional required water quality volume is less than the additional provided water quality volume (454 ft<sup>3</sup> < 780 ft<sup>3</sup>), this results in compliance.*

- Water quality Volume Increase RES04

$$V_{wq\ increase} = [(Impervious\ Area) \times (Water\ Quality\ Depth)] / (12\ in/ft)$$

$$A_{impervious} = 4147\ ft^2$$

$$D_{wq} = 0.5\ in$$

$$V_{wq\ increase} = [(4147\ ft^2) \times (0.5\ in) / (12\ in/ft)] = 173\ ft^3$$

- Provided Water Quality Volume

*The original phase I required water quality volume is  $(6650 \text{ ft}^3 + 1330 \text{ ft}^3)$  7980  $\text{ft}^3$  with a provided water quality volume of 8242  $\text{ft}^3$  (from 2005 as-built). This yields an additional provided water quality volume of  $(8242 \text{ ft}^3 - 7980 \text{ ft}^3)$  262  $\text{ft}^3$ .*

*Since the additional required water quality volume is less than the additional provided water quality volume  $(173 \text{ ft}^3 < 262 \text{ ft}^3)$ , this results in compliance.*

- Water quality Volume RES05 & RES06<sub>upstream</sub>

$$WQF = [(Unit\ Peak\ Discharge) \times (Impervious\ Surface\ Drainage\ Area) \times (Water\ Quality\ Volume)]$$

$$q_u = 774 \text{ csm/in}$$

$$A_{impervious} = 59427 \text{ ft}^2 \text{ (includes roofs)}$$

$$V_{wq} = 1.0 \text{ in}$$

$$WQF = [(774 \text{ ft}^3/\text{s } m^2 \text{ in}) \times (59472 \text{ ft}^2) \times (0.0015625 \text{ m}^2/\text{ac}) \times (1.0 \text{ in})] / (43560 \text{ ft}^2/\text{ac}) = 1.65 \text{ ft}^3/\text{s}$$

*∴ use Stormceptor model STC 900*

- Water quality Volume RES06<sub>downstream</sub>

$$WQF = [(Unit\ Peak\ Discharge) \times (Impervious\ Surface\ Drainage\ Area) \times (Water\ Quality\ Volume)]$$

$$q_u = 774 \text{ csm/in}$$

$$A_{impervious} = 8937 \text{ ft}^2 \text{ (includes roofs)}$$

$$V_{wq} = 1.0 \text{ in}$$

$$WQF = [(774 \text{ ft}^3/\text{s } m^2 \text{ in}) \times (8937 \text{ ft}^2) \times (0.0015625 \text{ m}^2/\text{ac}) \times (1.0 \text{ in})] / (43560 \text{ ft}^2/\text{ac}) = 0.25 \text{ ft}^3/\text{s}$$

*∴ use Stormceptor model STC 450i*

- Water quality Volume RES07

*The stormwater flow entering RES07 is from clean roof areas only and does not require treatment.*

- Water quality Volume for watershed 13-1

*Considering the relatively small amount of impervious and low flow rates,*

*∴ use Stormceptor model STC 450i*

- Water quality Volume RES08

$$WQF = [(Unit\ Peak\ Discharge) \times (Impervious\ Surface\ Drainage\ Area) \times (Water\ Quality\ Volume)]$$

$$q_u = 774 \text{ csm/in}$$

$$A_{\text{Impervious}} = 21379 \text{ ft}^2 \text{ (includes roofs)}$$

$$V_{\text{wq}} = 1.0 \text{ in}$$

$$WQF = [(774 \text{ ft}^3/\text{s m}^2\text{in}) \times (21379 \text{ ft}^2) \times (0.0015625 \text{ m}^2/\text{ac}) \times (1.0 \text{ in})] / (43560 \text{ ft}^2/\text{ac}) = 0.59 \text{ ft}^3/\text{s}$$

∴ use Stormceptor model STC 450i

- TSS Removal Calculations

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**

<u>RES No.</u>	<u>Total TSS Removal Provided</u>
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.

Stormwater Management standards 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 and filter fences, 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 Oil Debris Traps
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

Mitigative Drainage Study  
Johnson Woods Condominiums – Phase II, Reading, MA  
October 7, 2011, Revised December 16, 2011

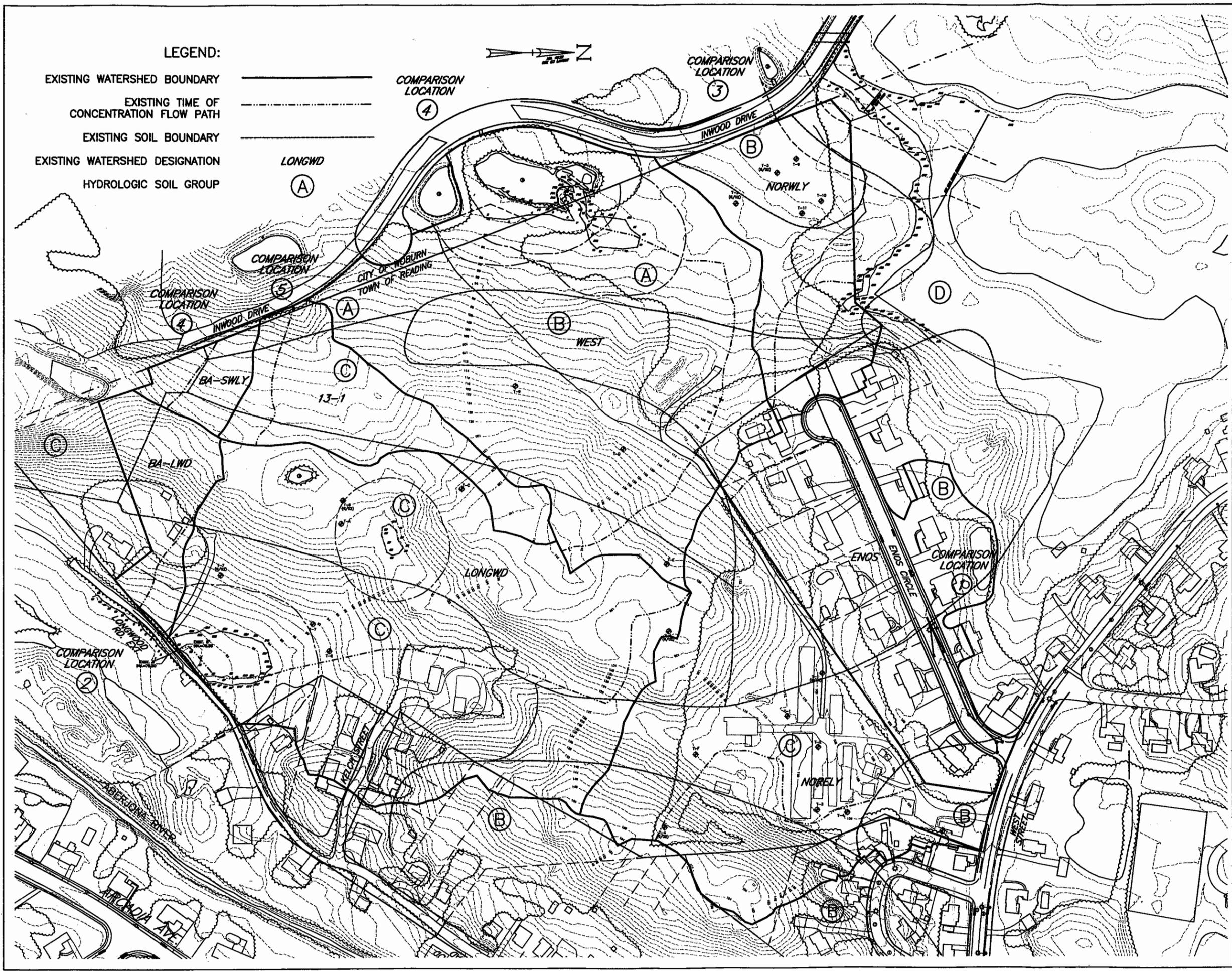
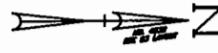
Operation and Maintenance Plan and Long-Term Pollution Prevention Plan for Johnson Woods Condominium Phase II, dated October 4, 2011.

## **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.

**LEGEND:**

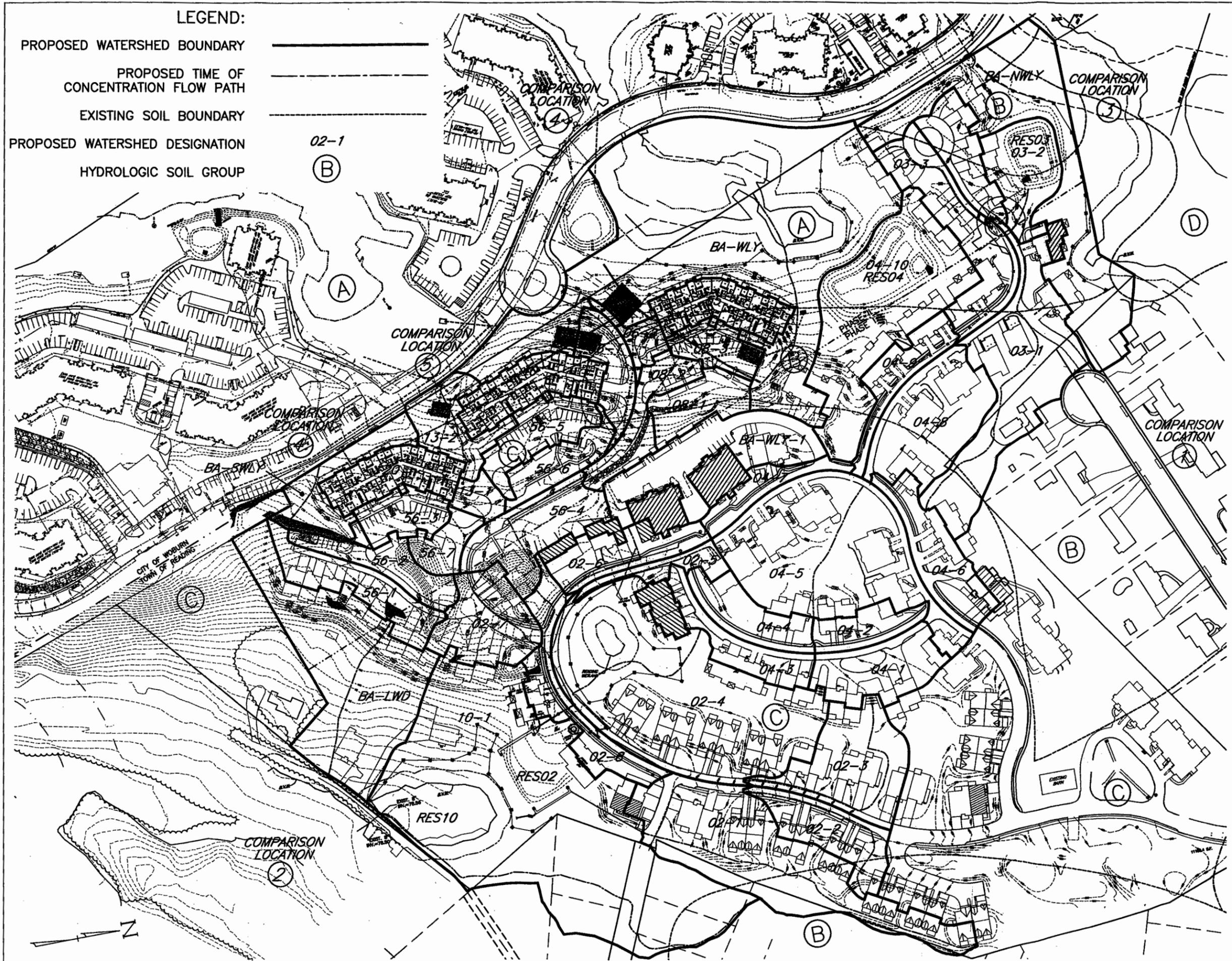
- EXISTING WATERSHED BOUNDARY
- EXISTING TIME OF CONCENTRATION FLOW PATH
- EXISTING SOIL BOUNDARY
- EXISTING WATERSHED DESIGNATION
- HYDROLOGIC SOIL GROUP



<p>Owner / Applicant:                  City of Woburn                  100 State Street                  Woburn, MA 01890</p> <p>Prepared By:                  [Signature]</p> <p>Scale:                  1" = 50'</p> <p>Date: December 6, 2011</p>	<p>Project No.: 10-0316                  Date: 10/24/11  <input type="checkbox"/> Issued For Permit  <input type="checkbox"/> Issued For Review  <input type="checkbox"/> Issued For Bid  <input type="checkbox"/> Issued For Construction  <input type="checkbox"/> Not For Construction</p> <p style="text-align: center;"><b>EXISTING CONDITION WATERSHED MAP                  JOHNSON WOODS                  PLANNED UNIT DEVELOPMENT                  READING, MASS.</b></p> <p>Drawing No.:  <span style="font-size: 2em; font-weight: bold;">W1</span></p> <p style="text-align: right;">SHEET 1 OF 1</p>
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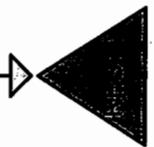
**LEGEND:**

- PROPOSED WATERSHED BOUNDARY
- PROPOSED TIME OF CONCENTRATION FLOW PATH
- EXISTING SOIL BOUNDARY
- PROPOSED WATERSHED DESIGNATION  02-1
- HYDROLOGIC SOIL GROUP B





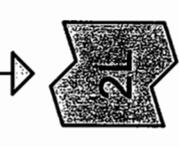
Xsect 4



Struc 10

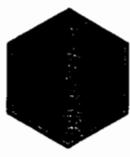


Xsect 5



AddHyd

COMPARISON LOCATION 2



Xsect 7

COMPARISON LOCATION 3



(new Subcat)



AddHyd

COMPARISON LOCATION 4



Exist CB @ Inwood Dr. Trib exist CB



COMPARISON LOCATION 5



Routing Diagram for JOHNSON WOODS PHASE 2 EXISTING R2  
Prepared by Microsoft, Printed 12/14/2011  
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# JOHNSON WOODS PHASE 2 EXISTING R2

Prepared by Microsoft

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Printed 12/14/2011

Page 1

## 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	CB13	93.81	93.47	53.6	0.0063	0.012	18.0	0.0	0.0

Time span=0.00-40.00 hrs, dt=0.10 hrs, 401 points  
 Runoff by SCS TR-20 method, UH=SCS  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment13-1: Trib exist CB** Runoff Area=119,006 sf Runoff Depth=0.68"  
 Flow Length=316' Tc=0.174 hrs CN=68 Runoff=1.47 cfs 0.155 af

**SubcatchmentBA-LWD: Xsect 5** Runoff Area=70,731 sf Runoff Depth=0.87"  
 Tc=0.100 hrs CN=72 Runoff=1.15 cfs 0.117 af

**SubcatchmentBA-SWLY: (new Subcat)** Runoff Area=32,938 sf Runoff Depth=0.59"  
 Flow Length=183' Tc=0.109 hrs CN=66 Runoff=0.36 cfs 0.037 af

**SubcatchmentLONGWD: Xsect 4** Runoff Area=601,773 sf Runoff Depth=0.87"  
 Tc=0.250 hrs CN=72 Runoff=8.94 cfs 1.000 af

**SubcatchmentNORWLY: Xsect 7** Runoff Area=3.720 ac Runoff Depth=0.07"  
 Tc=0.200 hrs CN=48 Runoff=0.04 cfs 0.023 af

**SubcatchmentWEST: Xsect 8** Runoff Area=575,500 sf Runoff Depth=0.20"  
 Tc=0.210 hrs CN=54 Runoff=0.86 cfs 0.216 af

**Pond CB13: Exist CB @ Inwood Dr.** Peak Elev=93.90' Inflow=0.04 cfs 0.023 af  
 18.0" Round Culvert n=0.012 L=53.6' S=0.0063 '/' Outflow=0.04 cfs 0.023 af

**Pond RES10: Struc 10** Peak Elev=80.12' Storage=0.127 af Inflow=8.94 cfs 1.000 af  
 Outflow=10.24 cfs 1.000 af

**Link 2L: AddHyd** Inflow=11.20 cfs 1.117 af  
 Primary=11.20 cfs 1.117 af

**Link 4L: AddHyd** Inflow=1.03 cfs 0.254 af  
 Primary=1.03 cfs 0.254 af

**Total Runoff Area = 35.858 ac Runoff Volume = 1.548 af Average Runoff Depth = 0.52"**

**Summary for Subcatchment 13-1: Trib exist CB**

Runoff = 1.47 cfs @ 12.29 hrs, Volume= 0.155 af, Depth= 0.68"

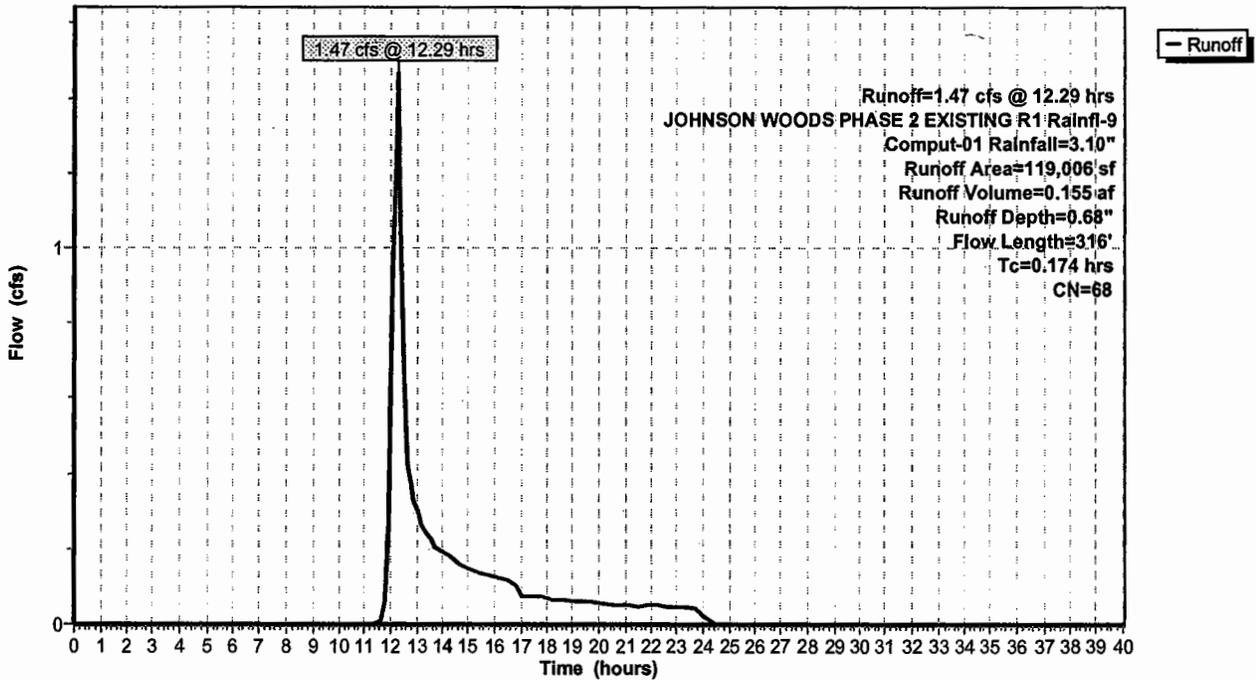
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.10 hrs  
 JOHNSON WOODS PHASE 2 EXISTING R1 Rainfl-9 Comput-01 Rainfall=3.10"

Area (sf)	CN	Description
5,376	36	Woods, Fair, HSG A
5,376	30	Woods, Good, HSG A
54,127	73	Woods, Fair, HSG C
54,127	70	Woods, Good, HSG C
119,006	68	Weighted Average

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**

Hydrograph



**Summary for Subcatchment BA-LWD: Xsect 5**

Runoff = 1.15 cfs @ 12.23 hrs, Volume= 0.117 af, Depth= 0.87"

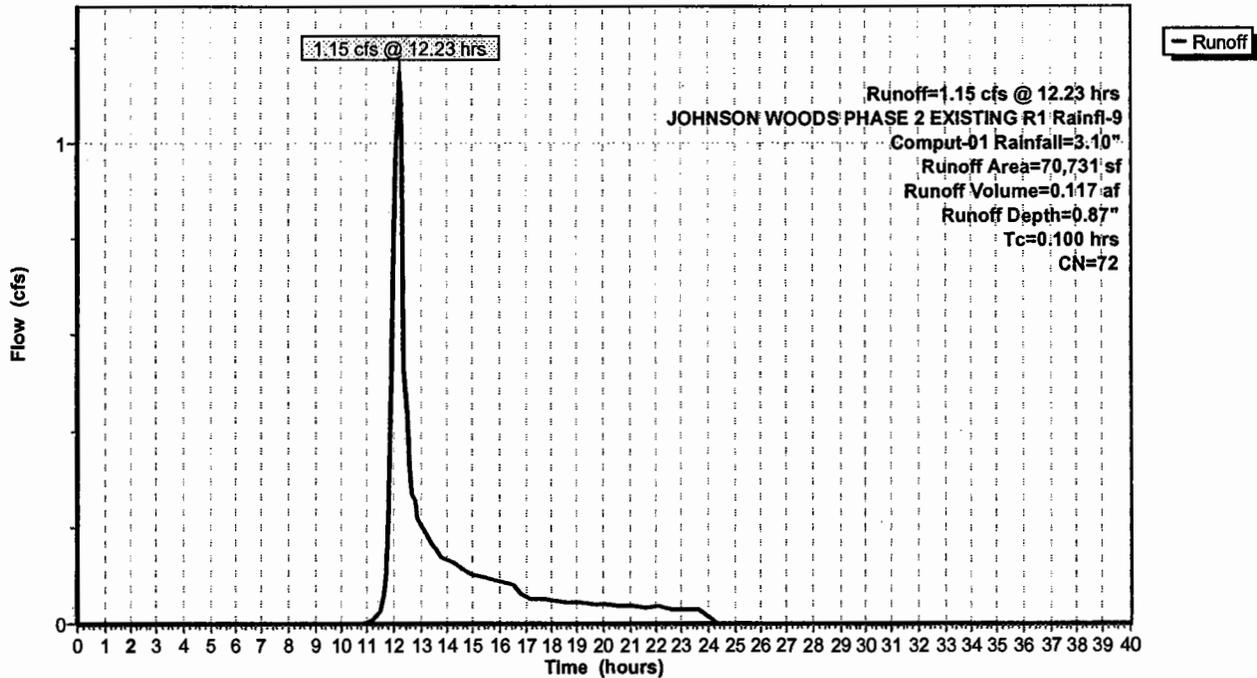
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.10 hrs  
 JOHNSON WOODS PHASE 2 EXISTING R1 Rainfl-9 Comput-01 Rainfall=3.10"

Area (sf)	CN	Description
* 20,545	73	
248	98	Paved parking, HSG C
10,028	74	>75% Grass cover, Good, HSG C
19,955	73	Woods, Fair, HSG C
19,955	70	Woods, Good, HSG C
70,731	72	Weighted Average

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

**Subcatchment BA-LWD: Xsect 5**

Hydrograph



**Summary for Subcatchment BA-SWLY: (new Subcat)**

Runoff = 0.36 cfs @ 12.26 hrs, Volume= 0.037 af, Depth= 0.59"

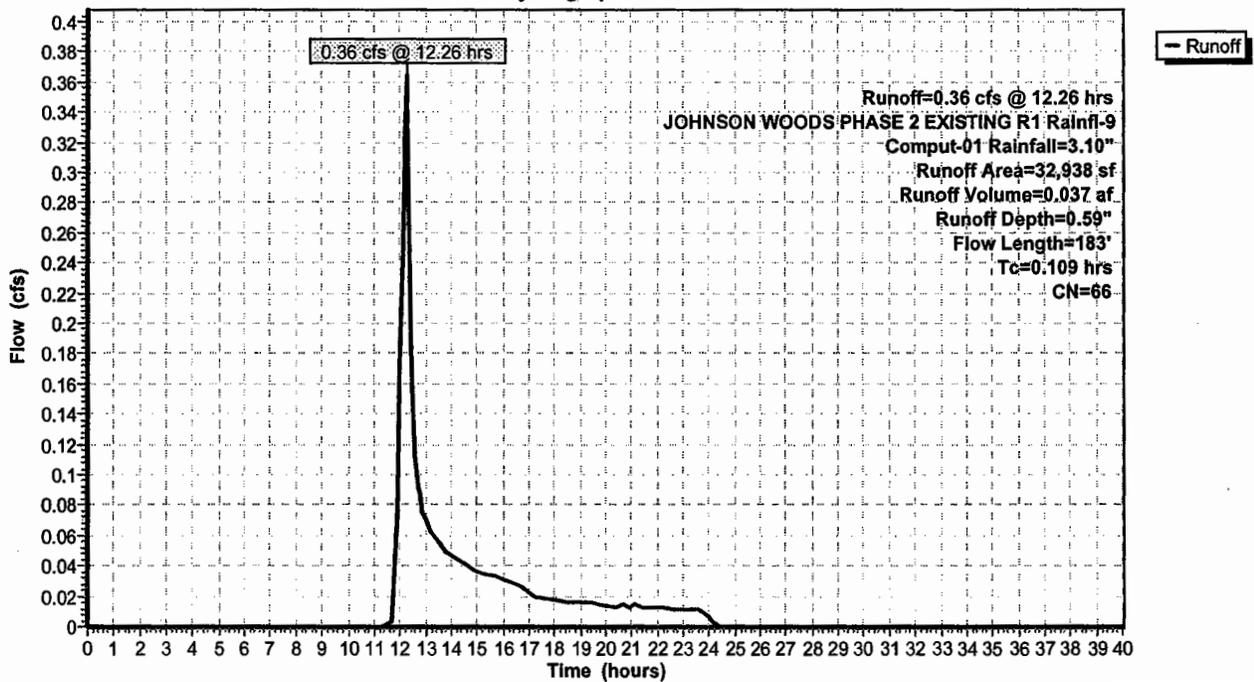
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.10 hrs  
 JOHNSON WOODS PHASE 2 EXISTING R1 Rainfl-9 Comput-01 Rainfall=3.10"

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

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: (new Subcat)**

Hydrograph



**Summary for Subcatchment LONGWD: Xsect 4**

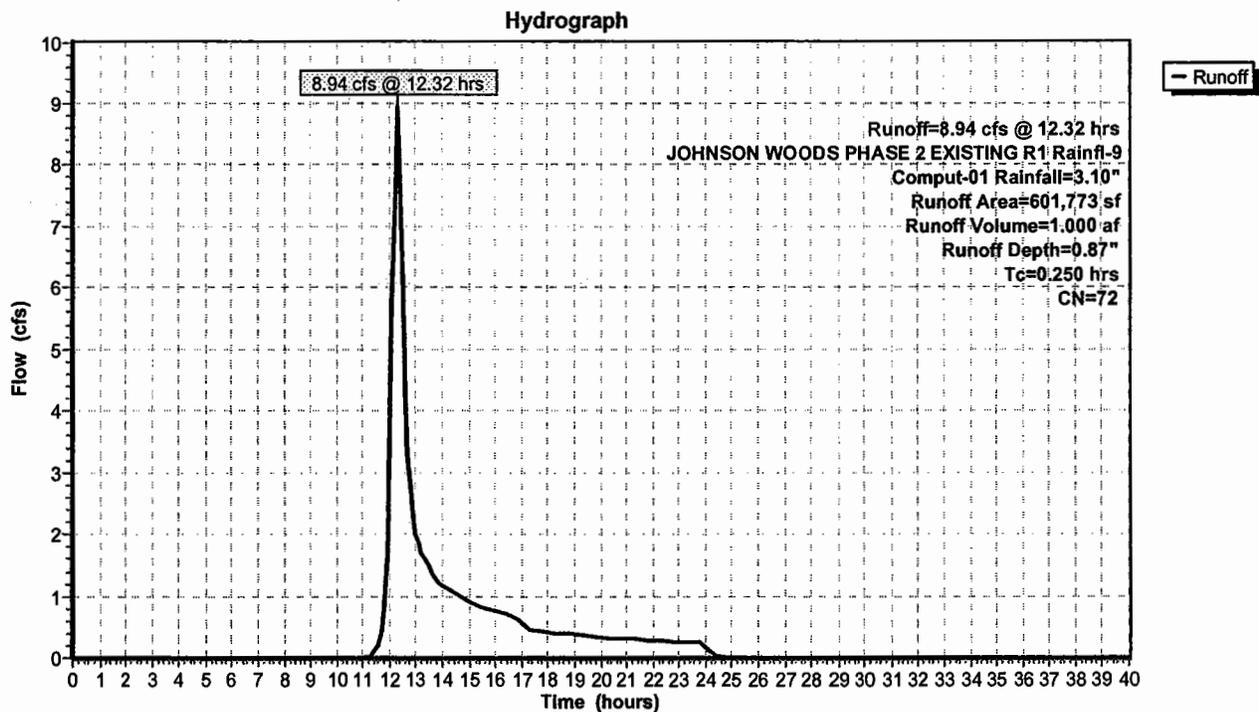
Runoff = 8.94 cfs @ 12.32 hrs, Volume= 1.000 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.10 hrs  
 JOHNSON WOODS PHASE 2 EXISTING R1 Rainfl-9 Comput-01 Rainfall=3.10"

Area (sf)	CN	Description
* 569,183	72	
1,840	74	>75% Grass cover, Good, HSG C
15,375	73	Woods, Fair, HSG C
15,375	70	Woods, Good, HSG C
601,773	72	Weighted Average

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

**Subcatchment LONGWD: Xsect 4**



**Summary for Subcatchment NORWLY: Xsect 7**

Runoff = 0.04 cfs @ 15.81 hrs, Volume= 0.023 af, Depth= 0.07"

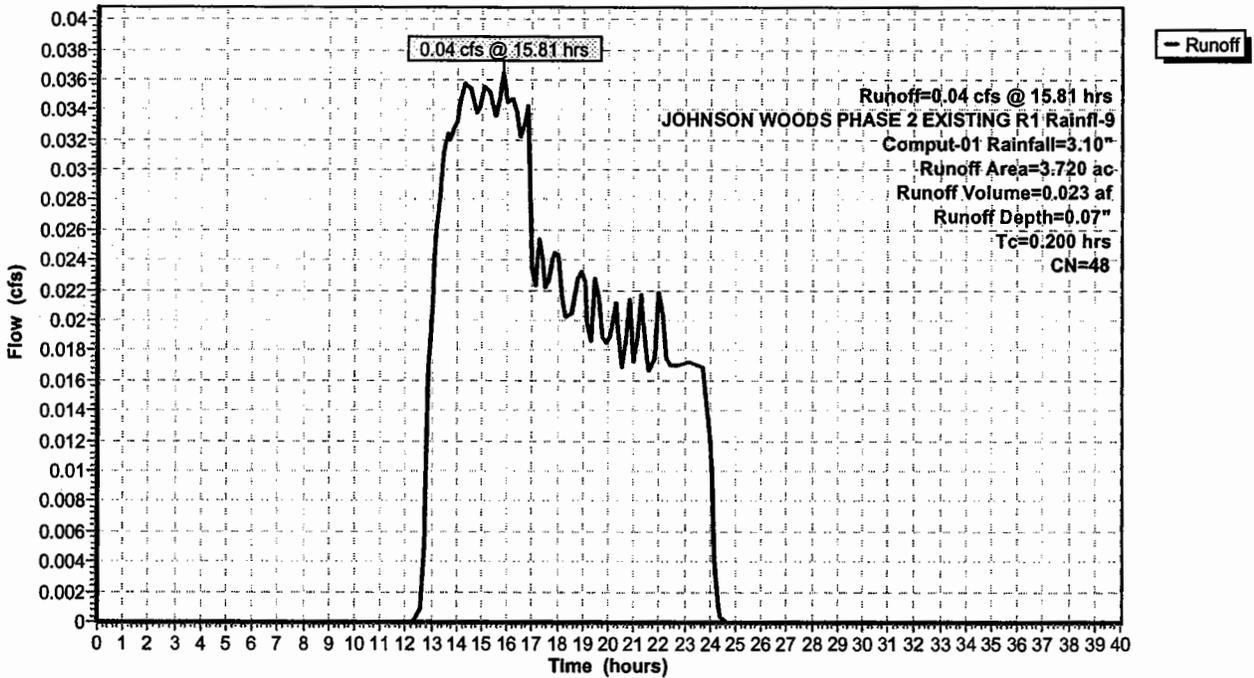
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.10 hrs  
 JOHNSON WOODS PHASE 2 EXISTING R1 Rainfl-9 Comput-01 Rainfall=3.10"

Area (ac)	CN	Description
* 3.720	48	

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

**Subcatchment NORWLY: Xsect 7**

Hydrograph



**Summary for Subcatchment WEST: Xsect 8**

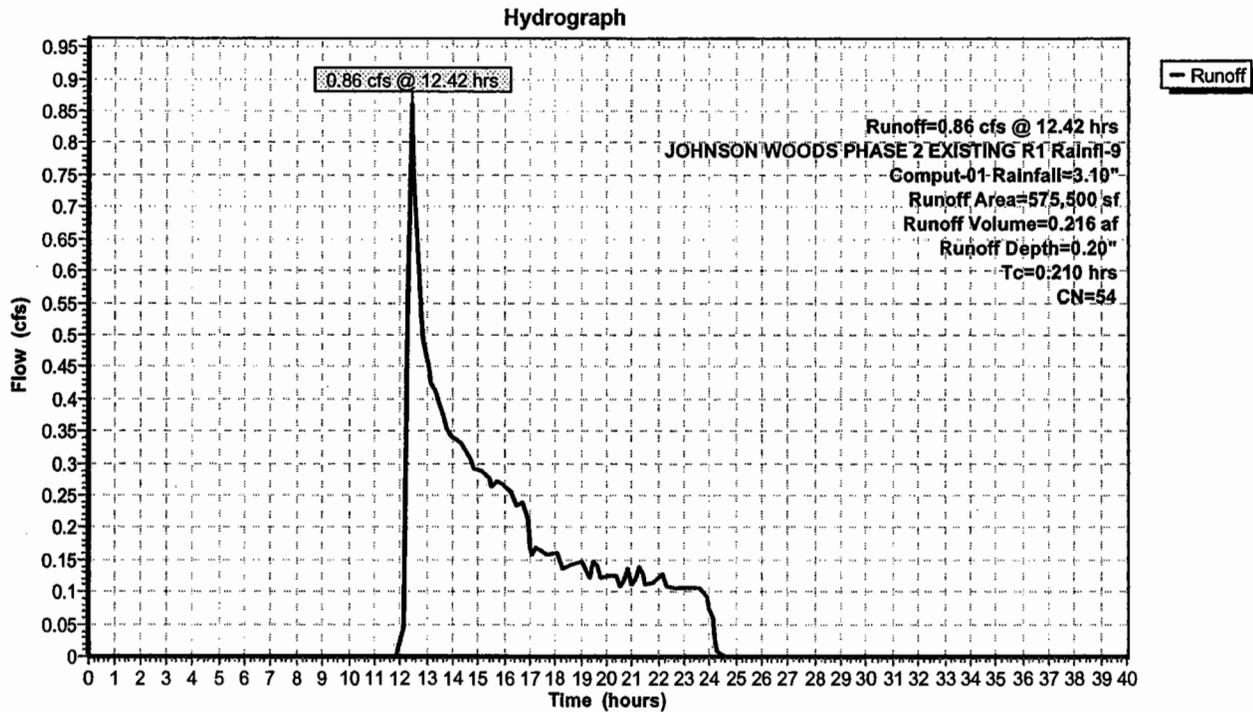
Runoff = 0.86 cfs @ 12.42 hrs, Volume= 0.216 af, Depth= 0.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-40.00 hrs, dt= 0.10 hrs  
 JOHNSON WOODS PHASE 2 EXISTING R1 Rainfl-9 Comput-01 Rainfall=3.10"

Area (sf)	CN	Description
* 497,013	55	
1,211	39	>75% Grass cover, Good, HSG A
18,539	36	Woods, Fair, HSG A
18,539	30	Woods, Good, HSG A
7,110	60	Woods, Fair, HSG B
7,110	55	Woods, Good, HSG B
12,989	73	Woods, Fair, HSG C
12,989	70	Woods, Good, HSG C
575,500	54	Weighted Average

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

**Subcatchment WEST: Xsect 8**



**Summary for Pond CB13: Exist CB @ Inwood Dr.**

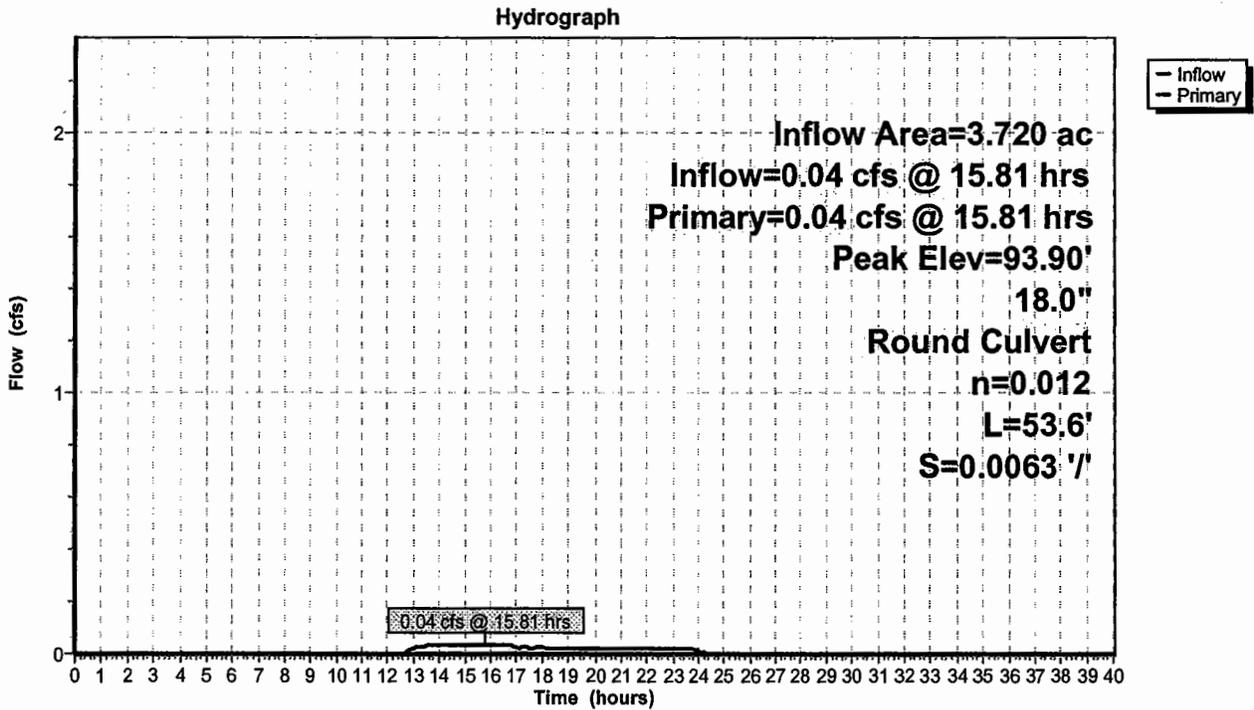
Inflow Area = 3.720 ac, Inflow Depth = 0.07" for Comput-01 event  
 Inflow = 0.04 cfs @ 15.81 hrs, Volume= 0.023 af  
 Outflow = 0.04 cfs @ 15.81 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min  
 Primary = 0.04 cfs @ 15.81 hrs, Volume= 0.023 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.10 hrs  
 Peak Elev= 93.90' @ 15.81 hrs  
 Flood Elev= 100.00'

Device #	Routing	Invert	Outlet Devices
#1	Primary	93.81'	<b>18.0" Round Culvert</b> 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=0.04 cfs @ 15.81 hrs HW=93.90' (Free Discharge)  
 ↳1=Culvert (Barrel Controls 0.04 cfs @ 1.23 fps)

**Pond CB13: Exist CB @ Inwood Dr.**



**Summary for Pond RES10: Struc 10**

Inflow Area = 13.815 ac, Inflow Depth = 0.87" for Comput-01 event  
 Inflow = 8.94 cfs @ 12.32 hrs, Volume= 1.000 af  
 Outflow = 10.24 cfs @ 12.33 hrs, Volume= 1.000 af, Atten= 0%, Lag= 0.7 min  
 Primary = 10.24 cfs @ 12.33 hrs, Volume= 1.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.10 hrs  
 Peak Elev= 80.12' @ 12.34 hrs Surf.Area= 0.000 ac Storage= 0.127 af

Plug-Flow detention time= 26.8 min calculated for 0.997 af (100% of inflow)  
 Center-of-Mass det. time= 26.8 min ( 905.8 - 879.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	78.60'	0.166 af	<b>Struc 10</b> Listed below (Recalc)

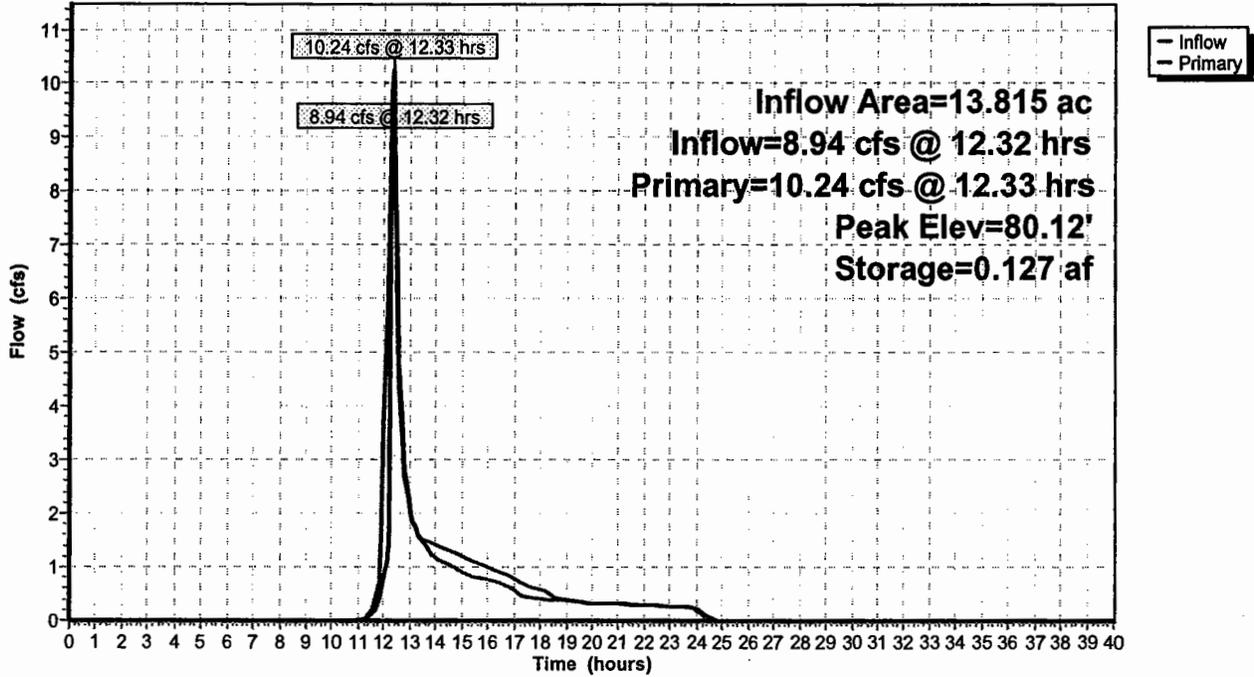
Elevation (feet)	Cum.Store (acre-feet)
78.60	0.000
79.00	0.007
79.50	0.038
80.00	0.105
80.10	0.123
80.20	0.144
80.30	0.166

Device	Routing	Invert	Outlet Devices
#1	Primary	78.60'	<b>Struc 10</b>
			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=9.12 cfs @ 12.33 hrs HW=80.11' TW=0.00' (Dynamic Tailwater)  
 ↳1=Struc 10 (Custom Controls 9.12 cfs)

**Pond RES10: Struc 10**

Hydrograph



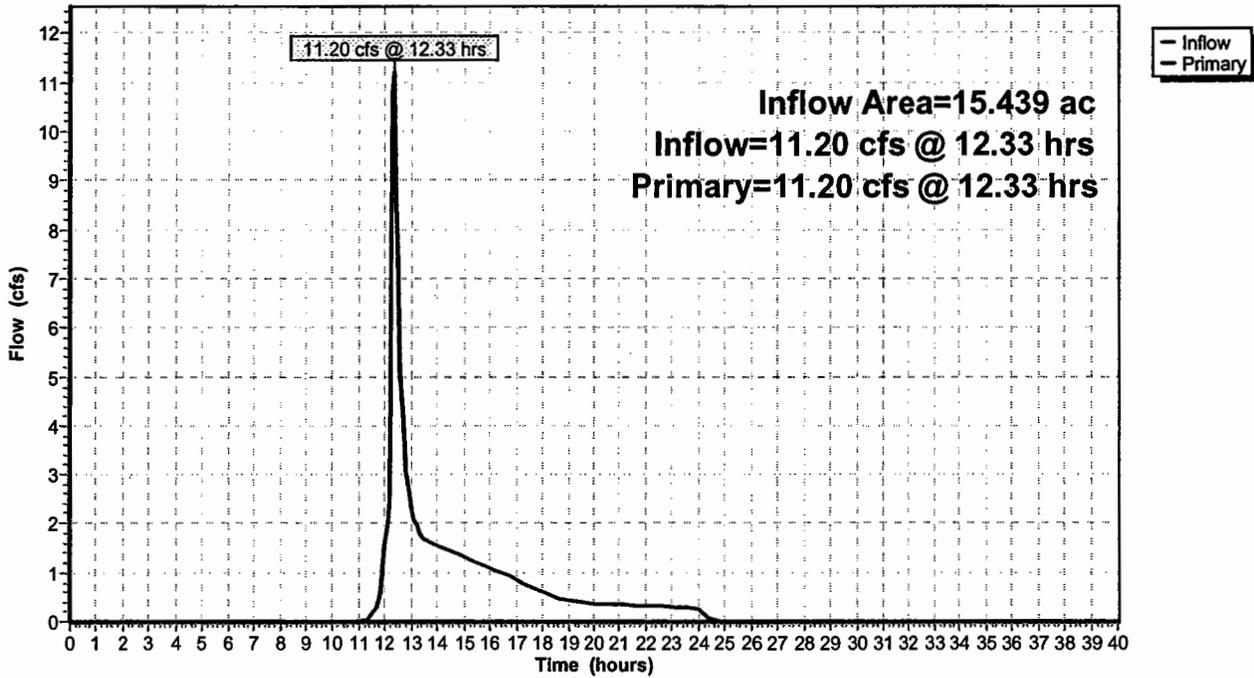
### Summary for Link 2L: AddHyd

Inflow Area = 15.439 ac, Inflow Depth = 0.87" for Comput-01 event  
Inflow = 11.20 cfs @ 12.33 hrs, Volume= 1.117 af  
Primary = 11.20 cfs @ 12.33 hrs, Volume= 1.117 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.10 hrs

### Link 2L: AddHyd

Hydrograph



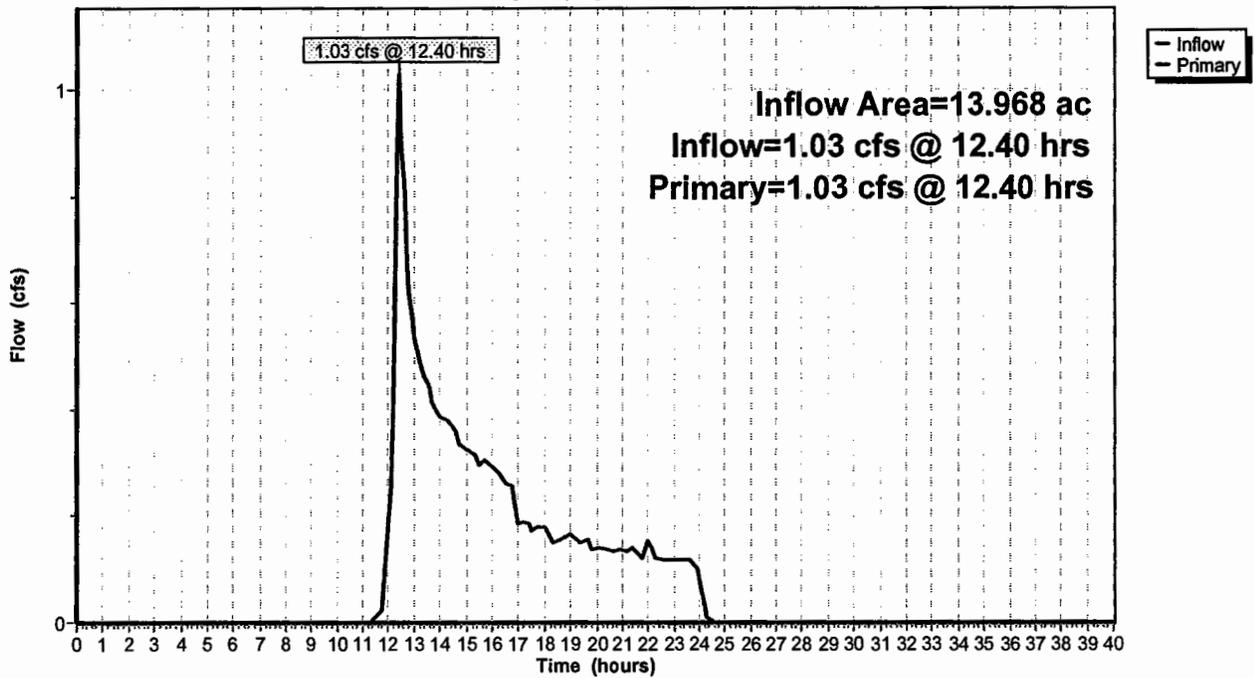
### Summary for Link 4L: AddHyd

Inflow Area = 13.968 ac, Inflow Depth = 0.22" for Comput-01 event  
Inflow = 1.03 cfs @ 12.40 hrs, Volume= 0.254 af  
Primary = 1.03 cfs @ 12.40 hrs, Volume= 0.254 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.10 hrs

### Link 4L: AddHyd

Hydrograph



Time span=0.00-40.00 hrs, dt=0.10 hrs, 401 points  
 Runoff by SCS TR-20 method, UH=SCS  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment13-1: Trib exist CB** Runoff Area=119,006 sf Runoff Depth=1.60"  
 Flow Length=316' Tc=0.174 hrs CN=68 Runoff=3.60 cfs 0.364 af

**SubcatchmentBA-LWD: Xsect 5** Runoff Area=70,731 sf Runoff Depth=1.89"  
 Tc=0.100 hrs CN=72 Runoff=2.51 cfs 0.256 af

**SubcatchmentBA-SWLY: (new Subcat)** Runoff Area=32,938 sf Runoff Depth=1.46"  
 Flow Length=183' Tc=0.109 hrs CN=66 Runoff=0.90 cfs 0.092 af

**SubcatchmentLONGWD: Xsect 4** Runoff Area=601,773 sf Runoff Depth=1.89"  
 Tc=0.250 hrs CN=72 Runoff=20.05 cfs 2.181 af

**SubcatchmentNORWLY: Xsect 7** Runoff Area=3,720 ac Runoff Depth=0.45"  
 Tc=0.200 hrs CN=48 Runoff=0.87 cfs 0.138 af

**SubcatchmentWEST: Xsect 8** Runoff Area=575,500 sf Runoff Depth=0.73"  
 Tc=0.210 hrs CN=54 Runoff=6.72 cfs 0.809 af

**Pond CB13: Exist CB @ Inwood Dr.** Peak Elev=94.82' Inflow=3.60 cfs 0.364 af  
 18.0" Round Culvert n=0.012 L=53.6' S=0.0063 '/' Outflow=3.60 cfs 0.364 af

**Pond RES10: Struc 10** Peak Elev=80.18' Storage=0.140 af Inflow=20.05 cfs 2.181 af  
 Outflow=20.16 cfs 2.181 af

**Link 2L: AddHyd** Inflow=22.37 cfs 2.437 af  
 Primary=22.37 cfs 2.437 af

**Link 4L: AddHyd** Inflow=7.53 cfs 0.901 af  
 Primary=7.53 cfs 0.901 af

**Total Runoff Area = 35.858 ac Runoff Volume = 3.841 af Average Runoff Depth = 1.29"**

Time span=0.00-40.00 hrs, dt=0.10 hrs, 401 points  
 Runoff by SCS TR-20 method, UH=SCS  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment13-1: Trib exist CB** Runoff Area=119,006 sf Runoff Depth=2.17"  
 Flow Length=316' Tc=0.174 hrs CN=68 Runoff=4.87 cfs 0.494 af

**SubcatchmentBA-LWD: Xsect 5** Runoff Area=70,731 sf Runoff Depth=2.51"  
 Tc=0.100 hrs CN=72 Runoff=3.31 cfs 0.340 af

**SubcatchmentBA-SWLY: (new Subcat)** Runoff Area=32,938 sf Runoff Depth=2.01"  
 Flow Length=183' Tc=0.109 hrs CN=66 Runoff=1.23 cfs 0.126 af

**SubcatchmentLONGWD: Xsect 4** Runoff Area=601,773 sf Runoff Depth=2.51"  
 Tc=0.250 hrs CN=72 Runoff=26.56 cfs 2.890 af

**SubcatchmentNORWLY: Xsect 7** Runoff Area=3.720 ac Runoff Depth=0.74"  
 Tc=0.200 hrs CN=48 Runoff=1.83 cfs 0.230 af

**SubcatchmentWEST: Xsect 8** Runoff Area=575,500 sf Runoff Depth=1.12"  
 Tc=0.210 hrs CN=54 Runoff=11.00 cfs 1.231 af

**Pond CB13: Exist CB @ Inwood Dr.** Peak Elev=95.03' Inflow=4.87 cfs 0.494 af  
 18.0" Round Culvert n=0.012 L=53.6' S=0.0063 '/' Outflow=4.87 cfs 0.494 af

**Pond RES10: Struc 10** Peak Elev=80.21' Storage=0.147 af Inflow=26.56 cfs 2.890 af  
 Outflow=26.46 cfs 2.890 af

**Link 2L: AddHyd** Inflow=29.46 cfs 3.230 af  
 Primary=29.46 cfs 3.230 af

**Link 4L: AddHyd** Inflow=12.15 cfs 1.358 af  
 Primary=12.15 cfs 1.358 af

**Total Runoff Area = 35.858 ac Runoff Volume = 5.312 af Average Runoff Depth = 1.78"**

Time span=0.00-40.00 hrs, dt=0.10 hrs, 401 points  
 Runoff by SCS TR-20 method, UH=SCS  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment13-1: Trib exist CB** Runoff Area=119,006 sf Runoff Depth=3.41"  
 Flow Length=316' Tc=0.174 hrs CN=68 Runoff=7.59 cfs 0.776 af

**SubcatchmentBA-LWD: Xsect 5** Runoff Area=70,731 sf Runoff Depth=3.83"  
 Tc=0.100 hrs CN=72 Runoff=4.98 cfs 0.518 af

**SubcatchmentBA-SWLY: (new Subcat)** Runoff Area=32,938 sf Runoff Depth=3.20"  
 Flow Length=183' Tc=0.109 hrs CN=66 Runoff=1.96 cfs 0.202 af

**SubcatchmentLONGWD: Xsect 4** Runoff Area=601,773 sf Runoff Depth=3.83"  
 Tc=0.250 hrs CN=72 Runoff=40.24 cfs 4.408 af

**SubcatchmentNORWLY: Xsect 7** Runoff Area=3.720 ac Runoff Depth=1.49"  
 Tc=0.200 hrs CN=48 Runoff=4.21 cfs 0.462 af

**SubcatchmentWEST: Xsect 8** Runoff Area=575,500 sf Runoff Depth=2.03"  
 Tc=0.210 hrs CN=54 Runoff=21.00 cfs 2.236 af

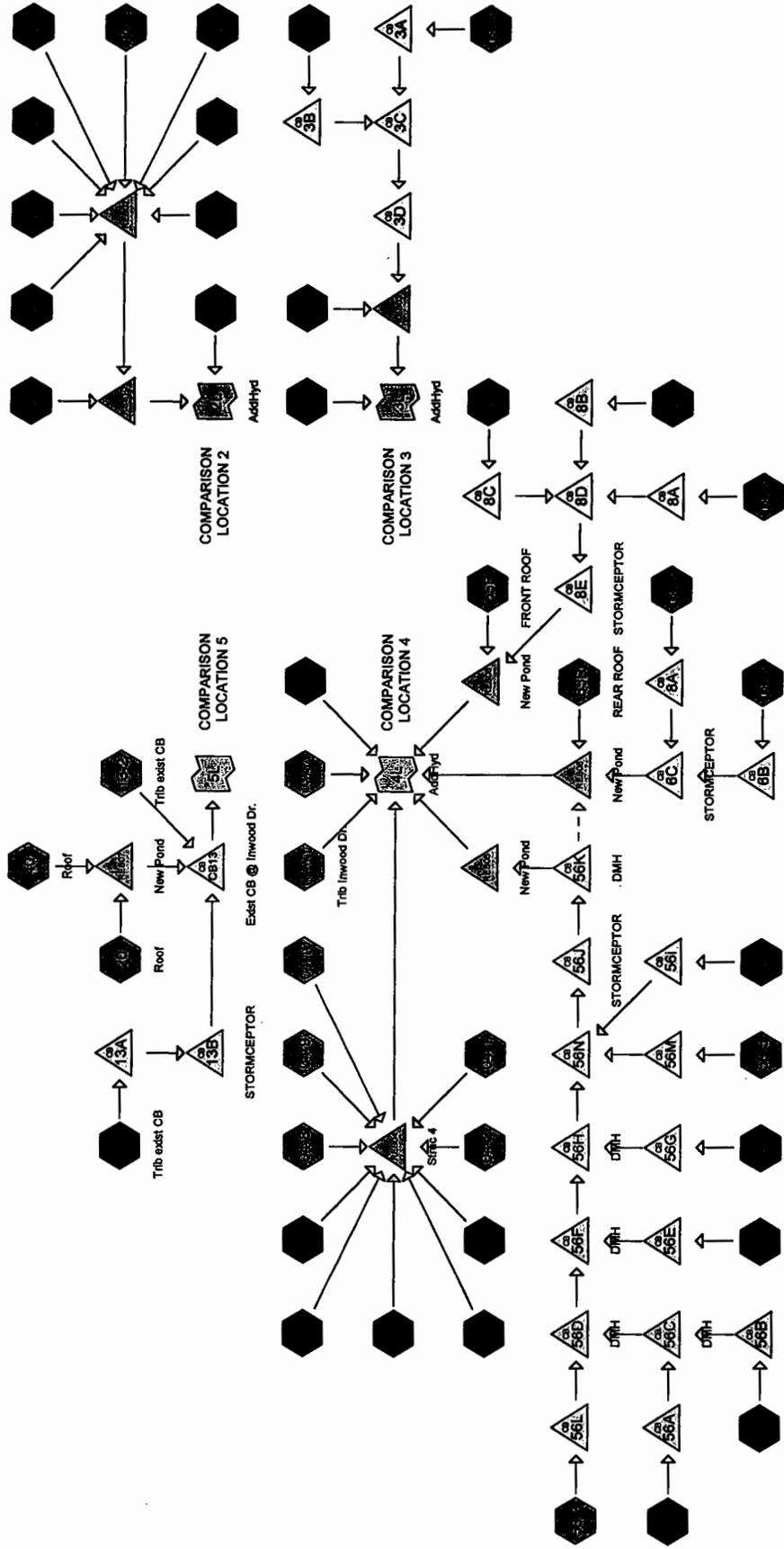
**Pond CB13: Exist CB @ Inwood Dr.** Peak Elev=95.49' Inflow=7.59 cfs 0.776 af  
 18.0" Round Culvert n=0.012 L=53.6' S=0.0063 '/' Outflow=7.59 cfs 0.776 af

**Pond RES10: Struc 10** Peak Elev=80.27' Storage=0.159 af Inflow=40.24 cfs 4.408 af  
 Outflow=40.21 cfs 4.408 af

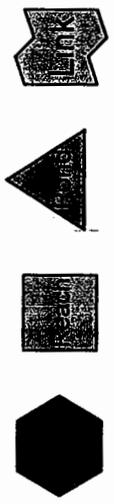
**Link 2L: AddHyd** Inflow=44.75 cfs 4.926 af  
 Primary=44.75 cfs 4.926 af

**Link 4L: AddHyd** Inflow=22.87 cfs 2.437 af  
 Primary=22.87 cfs 2.437 af

**Total Runoff Area = 35.858 ac Runoff Volume = 8.602 af Average Runoff Depth = 2.88"**



**Routing Diagram for JOHNSON WOODS PHASE 2 PROPOSED R2**  
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**JOHNSON WOODS PHASE 2 PROPOSED R2**

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JWPA2 Rainfl-9 2yr Rainfall=3.10"

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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

<b>Subcatchment02-1:</b>	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
<b>Subcatchment02-2:</b>	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
<b>Subcatchment02-3:</b>	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
<b>Subcatchment02-4:</b>	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
<b>Subcatchment02-5:</b>	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
<b>Subcatchment02-6:</b>	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
<b>Subcatchment02-7:</b>	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
<b>Subcatchment02-8:</b>	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
<b>Subcatchment03-1:</b>	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
<b>Subcatchment03-2:</b>	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
<b>Subcatchment03-3:</b>	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
<b>Subcatchment04-1:</b>	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
<b>Subcatchment04-10:</b>	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
<b>Subcatchment04-2:</b>	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
<b>Subcatchment04-3:</b>	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
<b>Subcatchment04-4:</b>	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

**JOHNSON WOODS PHASE 2 PROPOSED R2**

JWPA2 Rainfl-9 2yr Rainfall=3.10"

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<b>Subcatchment04-5:</b>	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
<b>Subcatchment04-6:</b>	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
<b>Subcatchment04-7:</b>	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
<b>Subcatchment04-8:</b>	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
<b>Subcatchment04-9:</b>	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
<b>Subcatchment06-1:</b>	Runoff Area=13,688 sf 37.13% Impervious Runoff Depth=0.72" Tc=6.0 min CN=69 Runoff=0.19 cfs 826 cf
<b>Subcatchment06-2:</b>	Runoff Area=6,154 sf 62.63% Impervious Runoff Depth=1.60" Tc=6.0 min CN=84 Runoff=0.19 cfs 820 cf
<b>Subcatchment08-1:</b>	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
<b>Subcatchment08-2:</b>	Runoff Area=15,509 sf 65.50% Impervious Runoff Depth=1.91" Tc=6.0 min CN=88 Runoff=0.55 cfs 2,465 cf
<b>Subcatchment08-3:</b>	Runoff Area=10,891 sf 78.40% Impervious Runoff Depth=2.08" Tc=6.0 min CN=90 Runoff=0.41 cfs 1,884 cf
<b>Subcatchment10-1:</b>	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
<b>Subcatchment13-1: Trib exist CB</b>	Runoff Area=5,717 sf 56.03% Impervious Runoff Depth=1.83" Tc=6.0 min CN=87 Runoff=0.19 cfs 870 cf
<b>Subcatchment13-2: Trib exist CB</b>	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
<b>Subcatchment20: Roof</b>	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
<b>Subcatchment40: Roof</b>	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
<b>Subcatchment55F: FRONT ROOF</b>	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
<b>Subcatchment55R: REAR ROOF</b>	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

**JOHNSON WOODS PHASE 2 PROPOSED R2**

JWPA2 Rainfl-9 2yr Rainfall=3.10"

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<b>Subcatchment56-1:</b>	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
<b>Subcatchment56-2:</b>	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
<b>Subcatchment56-3:</b>	Runoff Area=11,890 sf 78.15% Impervious Runoff Depth=2.35" Tc=6.0 min CN=93 Runoff=0.48 cfs 2,328 cf
<b>Subcatchment56-4:</b>	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
<b>Subcatchment56-5:</b>	Runoff Area=16,647 sf 72.30% Impervious Runoff Depth=2.16" Tc=6.0 min CN=91 Runoff=0.64 cfs 3,003 cf
<b>Subcatchment56-6:</b>	Runoff Area=12,798 sf 58.37% Impervious Runoff Depth=1.91" Tc=6.0 min CN=88 Runoff=0.45 cfs 2,034 cf
<b>Subcatchment56-7:</b>	Runoff Area=8,851 sf 37.76% Impervious Runoff Depth=1.53" Tc=6.0 min CN=83 Runoff=0.26 cfs 1,127 cf
<b>SubcatchmentBA-LWD:</b>	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
<b>SubcatchmentBA-NWLY:</b>	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
<b>SubcatchmentBA-SWLY: Trib Inwood Dr.</b>	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
<b>SubcatchmentBA-WLY:</b>	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
<b>SubcatchmentBA-WLY-1:</b>	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
<b>Pond 3A:</b>	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
<b>Pond 3B:</b>	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
<b>Pond 3C:</b>	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
<b>Pond 3D:</b>	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
<b>Pond 6A:</b>	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

**JOHNSON WOODS PHASE 2 PROPOSED R2**

JWPA2 Rainfl-9 2yr Rainfall=3.10"

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<b>Pond 6B:</b>	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
<b>Pond 6C: STORMCEPTOR</b>	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
<b>Pond 8A:</b>	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
<b>Pond 8B:</b>	Peak Elev=96.77' Inflow=0.55 cfs 2,465 cf 12.0" Round Culvert n=0.012 L=16.0' S=0.0112 '/' Outflow=0.55 cfs 2,465 cf
<b>Pond 8C:</b>	Peak Elev=99.77' Inflow=0.41 cfs 1,884 cf 12.0" Round Culvert n=0.012 L=28.6' S=0.0101 '/' Outflow=0.41 cfs 1,884 cf
<b>Pond 8D:</b>	Peak Elev=96.56' Inflow=1.21 cfs 5,413 cf 12.0" Round Culvert n=0.012 L=16.0' S=0.0106 '/' Outflow=1.21 cfs 5,413 cf
<b>Pond 8E: STORMCEPTOR</b>	Peak Elev=96.48' Inflow=1.21 cfs 5,413 cf 12.0" Round Culvert n=0.012 L=97.0' S=0.0113 '/' Outflow=1.21 cfs 5,413 cf
<b>Pond 13A:</b>	Peak Elev=109.52' Inflow=0.19 cfs 870 cf 12.0" Round Culvert n=0.012 L=37.0' S=0.0100 '/' Outflow=0.19 cfs 870 cf
<b>Pond 13B: STORMCEPTOR</b>	Peak Elev=109.06' Inflow=0.19 cfs 870 cf 12.0" Round Culvert n=0.012 L=64.0' S=0.0133 '/' Outflow=0.19 cfs 870 cf
<b>Pond 56A:</b>	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
<b>Pond 56B:</b>	Peak Elev=115.33' 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
<b>Pond 56C: DMH</b>	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
<b>Pond 56D: DMH</b>	Peak Elev=114.12' Inflow=1.69 cfs 7,744 cf 12.0" Round Culvert n=0.012 L=56.0' S=0.0100 '/' Outflow=1.69 cfs 7,744 cf
<b>Pond 56E:</b>	Peak Elev=115.98' Inflow=0.26 cfs 1,127 cf 12.0" Round Culvert n=0.012 L=16.0' S=0.0100 '/' Outflow=0.26 cfs 1,127 cf
<b>Pond 56F: DMH</b>	Peak Elev=113.29' Inflow=1.95 cfs 8,870 cf 15.0" Round Culvert n=0.012 L=187.0' S=0.0100 '/' Outflow=1.95 cfs 8,870 cf
<b>Pond 56G:</b>	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
<b>Pond 56H: DMH</b>	Peak Elev=111.55' Inflow=2.63 cfs 11,919 cf 15.0" Round Culvert n=0.012 L=65.0' S=0.0780 '/' Outflow=2.63 cfs 11,919 cf

**JOHNSON WOODS PHASE 2 PROPOSED R2**

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JWPA2 Rainfl-9 2yr Rainfall=3.10"

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**Pond 56i:** Peak Elev=106.38' Inflow=0.45 cfs 2,034 cf  
12.0" Round Culvert n=0.012 L=14.0' S=0.0114 ' /' Outflow=0.45 cfs 2,034 cf

**Pond 56J: STORMCEPTOR** Peak Elev=105.84' Inflow=3.72 cfs 16,956 cf  
18.0" Round Culvert n=0.012 L=113.0' S=0.0847 ' /' Outflow=3.72 cfs 16,956 cf

**Pond 56K: DMH** Peak Elev=96.16' Inflow=3.72 cfs 16,956 cf  
Primary=2.07 cfs 9,040 cf Secondary=1.65 cfs 7,916 cf Outflow=3.72 cfs 16,956 cf

**Pond 56L:** Peak Elev=116.81' Inflow=0.48 cfs 2,328 cf  
12.0" Round Culvert n=0.012 L=41.0' S=0.0115 ' /' Outflow=0.48 cfs 2,328 cf

**Pond 56M:** Peak Elev=107.36' Inflow=0.64 cfs 3,003 cf  
12.0" Round Culvert n=0.012 L=43.0' S=0.0100 ' /' Outflow=0.64 cfs 3,003 cf

**Pond 56N:** Peak Elev=106.36' Inflow=3.72 cfs 16,956 cf  
18.0" Round Culvert n=0.012 L=8.5' S=0.0482 ' /' Outflow=3.72 cfs 16,956 cf

**Pond CB13: 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

**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=93.64' Storage=1,434 cf Inflow=2.07 cfs 9,040 cf  
Discarded=1.06 cfs 9,040 cf Primary=0.00 cfs 0 cf Outflow=1.06 cfs 9,040 cf

**Pond RES06: New Pond** Peak Elev=85.66' Storage=2,032 cf Inflow=2.46 cfs 11,882 cf  
Discarded=1.13 cfs 11,882 cf Primary=0.00 cfs 0 cf Outflow=1.13 cfs 11,882 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=96.40' Storage=1,743 cf Inflow=1.58 cfs 7,434 cf  
Discarded=0.51 cfs 7,313 cf Primary=0.17 cfs 122 cf Outflow=0.68 cfs 7,434 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

**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

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*JWPA2 Rainfl-9 2yr Rainfall=3.10"*

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**Link 4L: AddHyd**

Inflow=1.64 cfs 36,673 cf  
Primary=1.64 cfs 36,673 cf

**Link 5L:**

Inflow=0.27 cfs 1,285 cf  
Primary=0.27 cfs 1,285 cf

**Total Runoff Area = 1,535,973 sf Runoff Volume = 156,277 cf Average Runoff Depth = 1.22"**  
**64.09% Pervious = 984,331 sf 35.91% Impervious = 551,642 sf**

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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	99.45	99.16	28.6	0.0101	0.012	12.0	0.0	0.0
11	8D	95.85	95.68	16.0	0.0106	0.012	12.0	0.0	0.0
12	8E	95.60	94.50	97.0	0.0113	0.012	12.0	0.0	0.0
13	13A	109.30	108.93	37.0	0.0100	0.012	12.0	0.0	0.0
14	13B	108.85	108.00	64.0	0.0133	0.012	12.0	0.0	0.0
15	56A	114.85	114.66	18.6	0.0102	0.012	12.0	0.0	0.0
16	56B	114.85	114.66	6.0	0.0317	0.012	12.0	0.0	0.0
17	56C	114.66	113.41	125.0	0.0100	0.012	12.0	0.0	0.0
18	56D	113.41	112.85	56.0	0.0100	0.012	12.0	0.0	0.0
19	56E	115.72	115.56	16.0	0.0100	0.012	12.0	0.0	0.0
20	56F	112.60	110.73	187.0	0.0100	0.012	15.0	0.0	0.0
21	56G	112.46	112.27	11.0	0.0173	0.012	12.0	0.0	0.0
22	56H	110.73	105.66	65.0	0.0780	0.012	15.0	0.0	0.0
23	56i	105.68	105.52	14.0	0.0114	0.012	12.0	0.0	0.0
24	56J	104.92	95.35	113.0	0.0847	0.012	18.0	0.0	0.0
25	56K	95.35	94.70	65.0	0.0100	0.012	12.0	0.0	0.0
26	56K	95.35	88.13	93.0	0.0776	0.012	10.0	0.0	0.0
27	56L	116.47	116.00	41.0	0.0115	0.012	12.0	0.0	0.0
28	56M	106.95	106.52	43.0	0.0100	0.012	12.0	0.0	0.0
29	56N	105.41	105.00	8.5	0.0482	0.012	18.0	0.0	0.0
30	CB13	93.81	93.47	53.6	0.0063	0.012	18.0	0.0	0.0
31	RES05	94.50	94.50	10.0	0.0000	0.012	18.0	0.0	0.0
32	RES06	86.50	86.25	7.0	0.0357	0.012	18.0	0.0	0.0
33	RES07	98.31	98.31	31.0	0.0000	0.012	18.0	0.0	0.0
34	RES08	96.20	94.00	106.0	0.0208	0.012	12.0	0.0	0.0

**Summary for Subcatchment 02-1:**

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

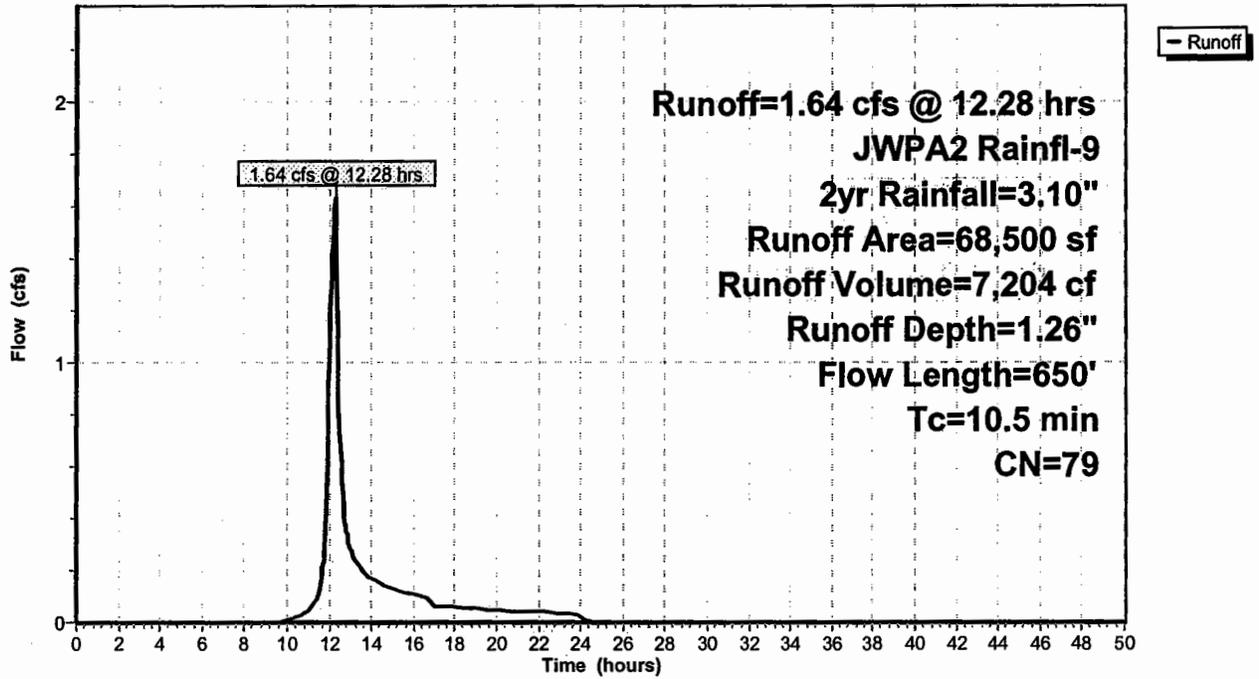
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		62.53% Pervious Area
25,669		37.47% Impervious Area

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

**Subcatchment 02-1:**

Hydrograph



**Summary for Subcatchment 02-2:**

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

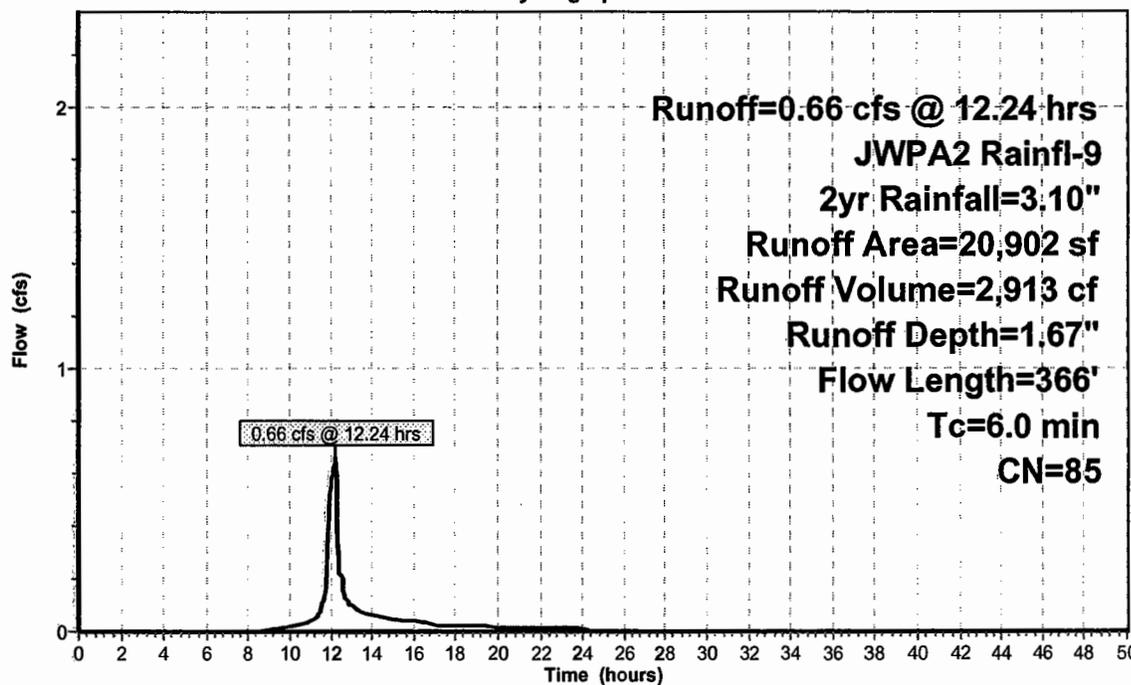
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		46.64% Pervious Area
11,154		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:**

Hydrograph



— Runoff

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**Summary for Subcatchment 02-3:**

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

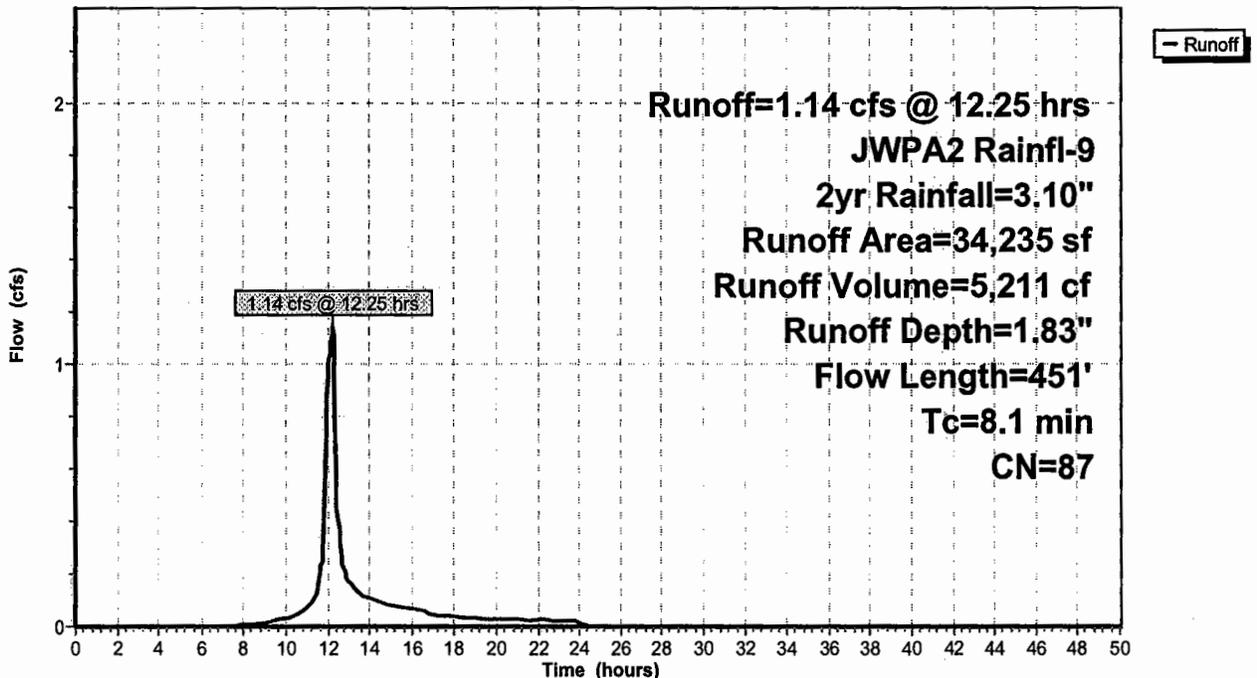
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		46.26% Pervious Area
18,399		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:**

Hydrograph



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JWPA2 Rainfl-9 2yr Rainfall=3.10"

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**Summary for Subcatchment 02-4:**

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

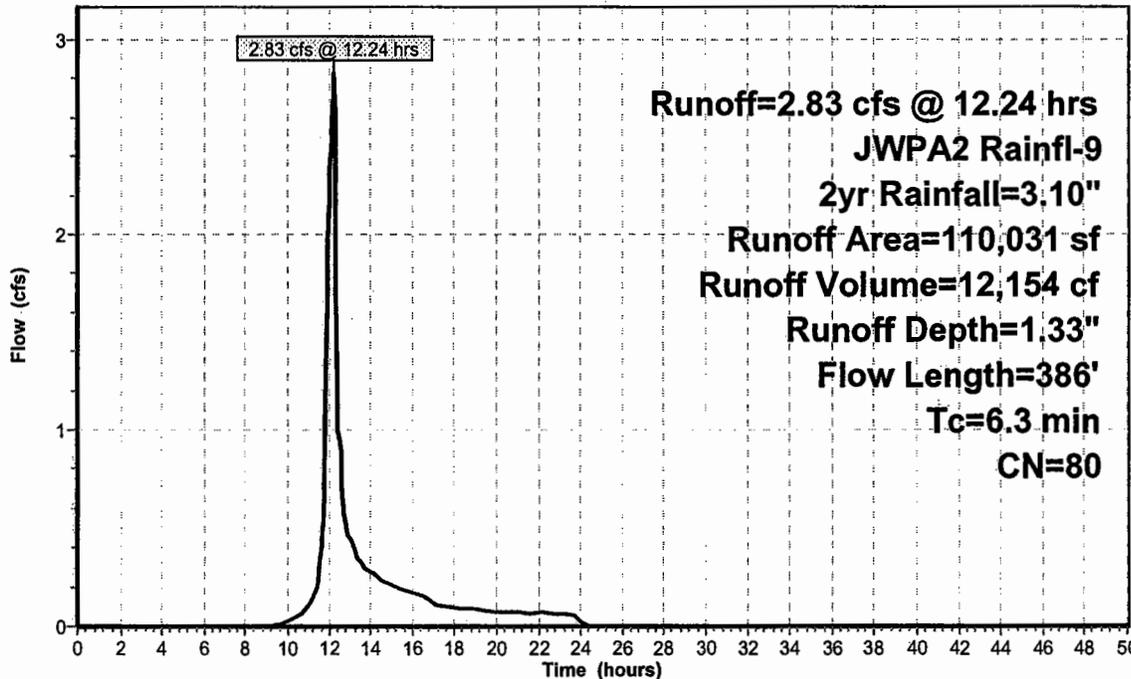
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		72.63% Pervious Area
30,119		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:**

Hydrograph



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JWPA2 Rainfl-9 2yr Rainfall=3.10"

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**Summary for Subcatchment 02-5:**

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

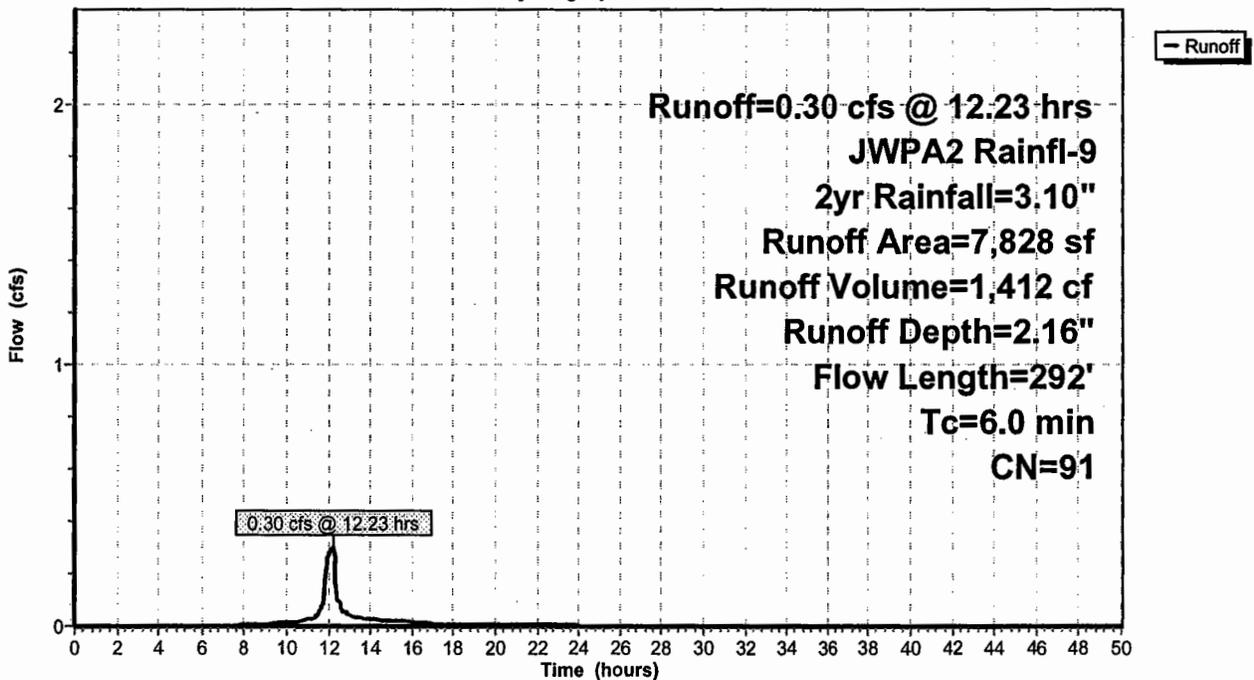
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		27.63% Pervious Area
5,665		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:**

Hydrograph



**Summary for Subcatchment 02-6:**

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

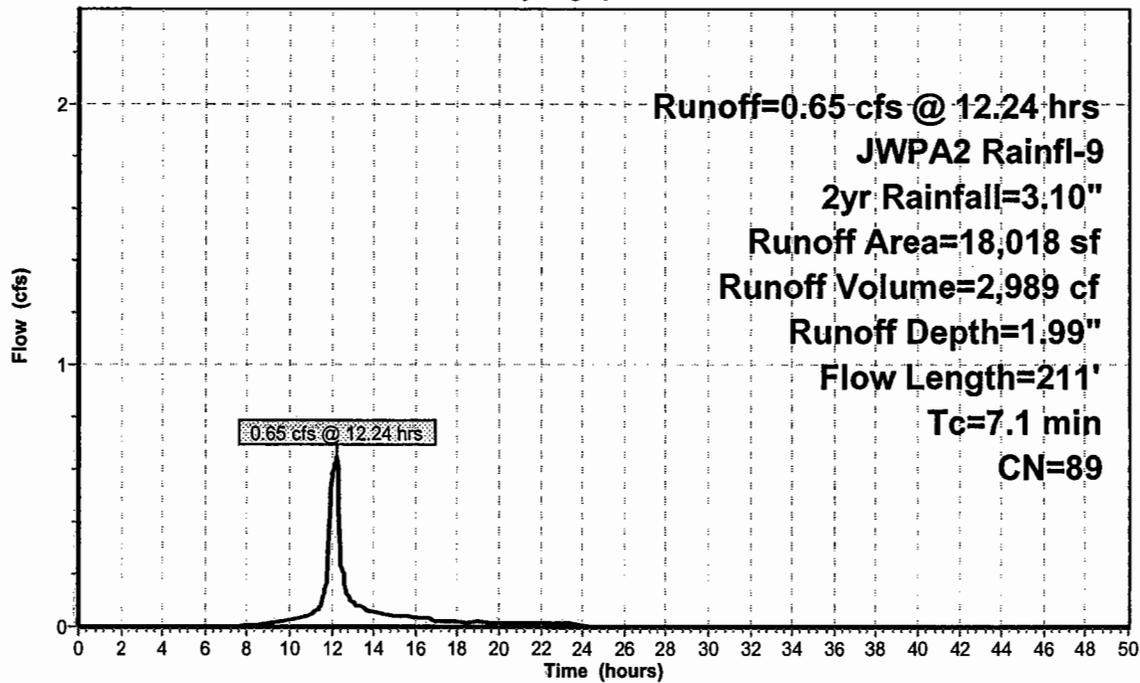
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		39.48% Pervious Area
10,905		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:**

Hydrograph



— Runoff

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## Summary for Subcatchment 02-7:

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

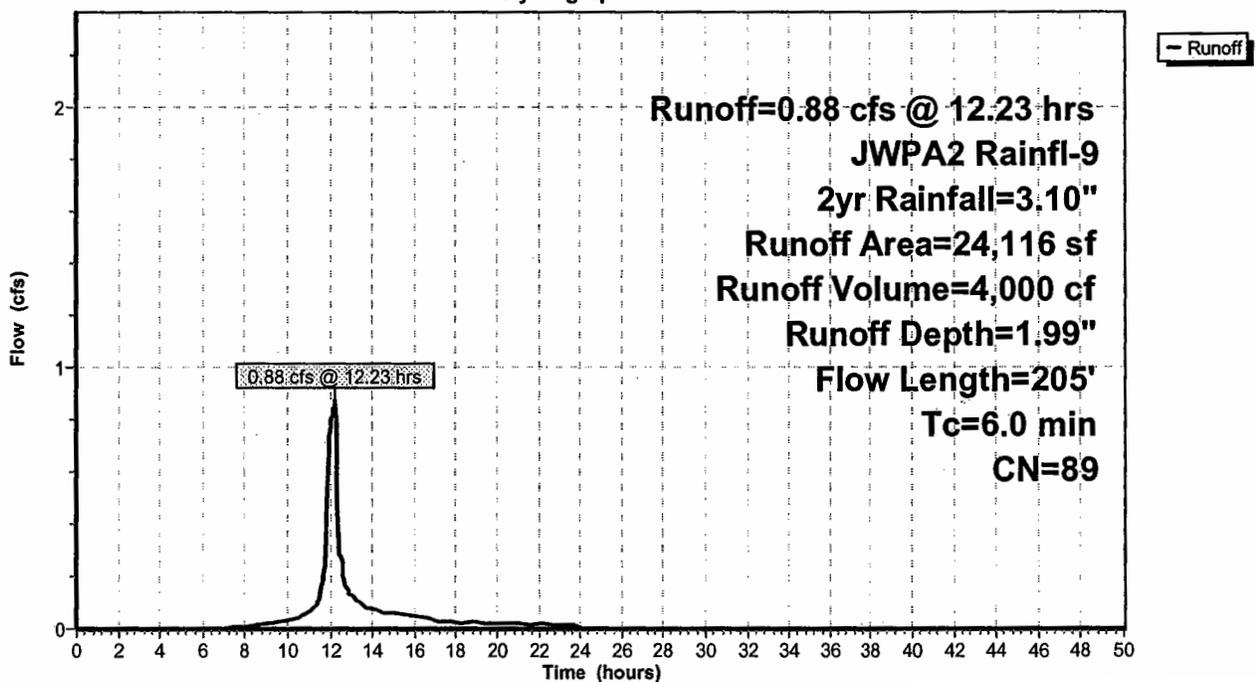
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		37.22% Pervious Area
15,141		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:

Hydrograph



**Summary for Subcatchment 02-8:**

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

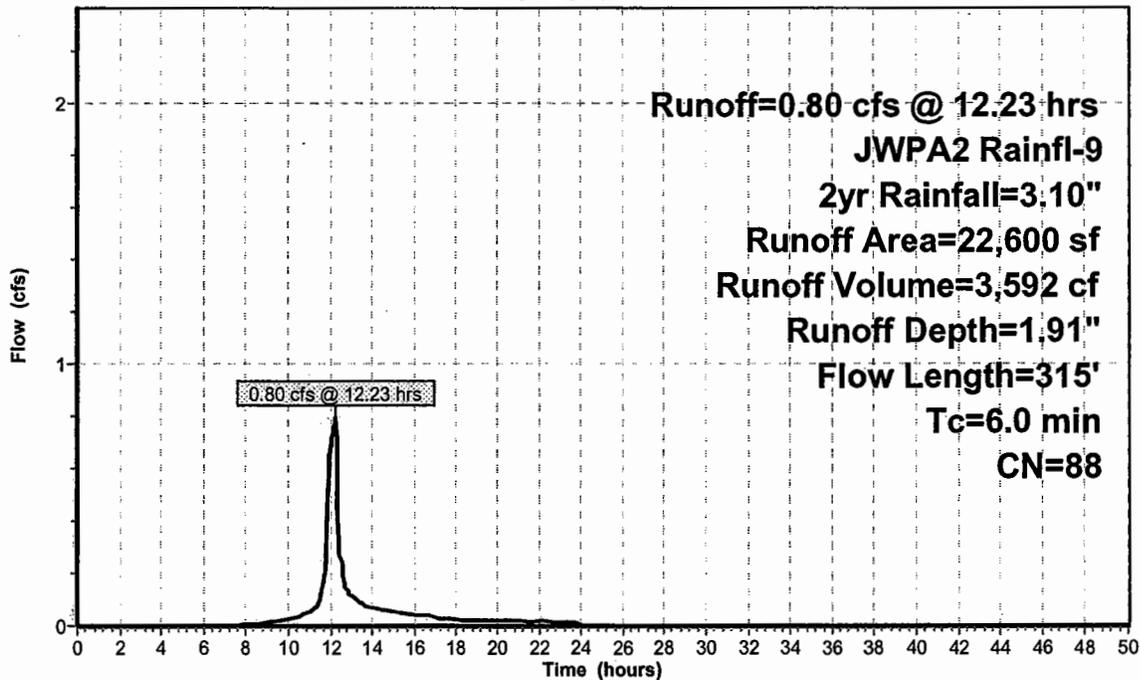
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		43.58% Pervious Area
12,750		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:**

Hydrograph



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**Summary for Subcatchment 03-1:**

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

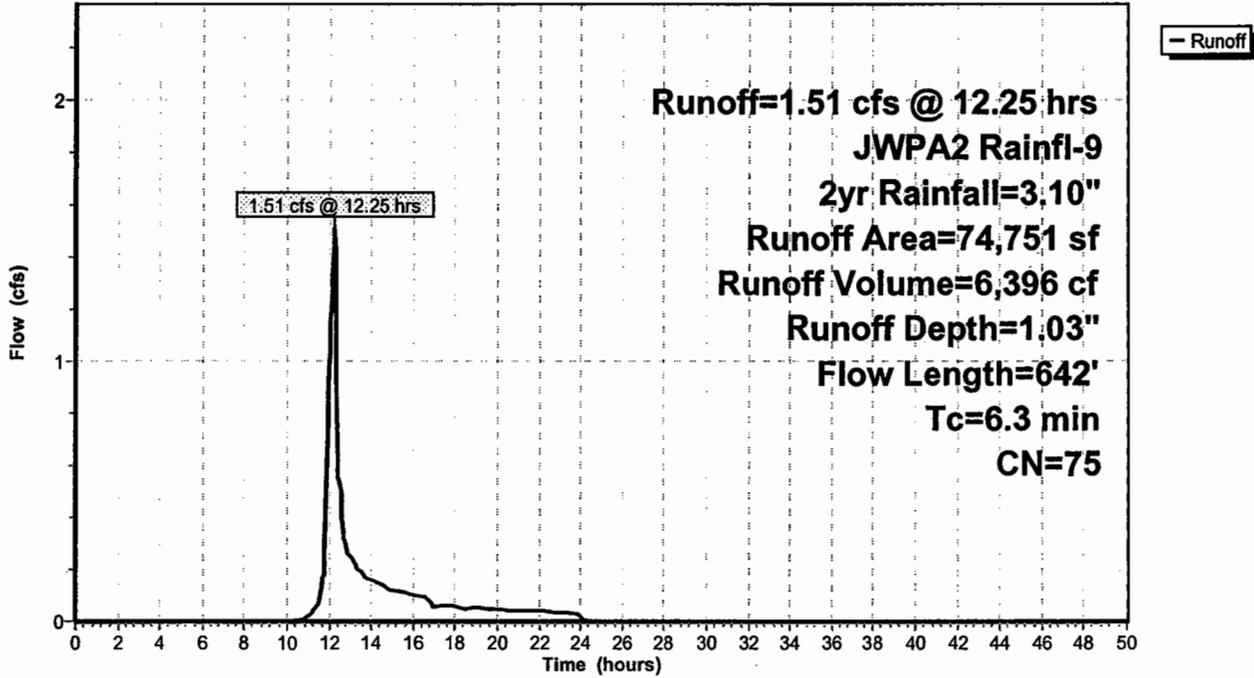
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		58.30% Pervious Area
31,171		41.70% Impervious Area

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

**Subcatchment 03-1:**

Hydrograph



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**Summary for Subcatchment 03-2:**

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

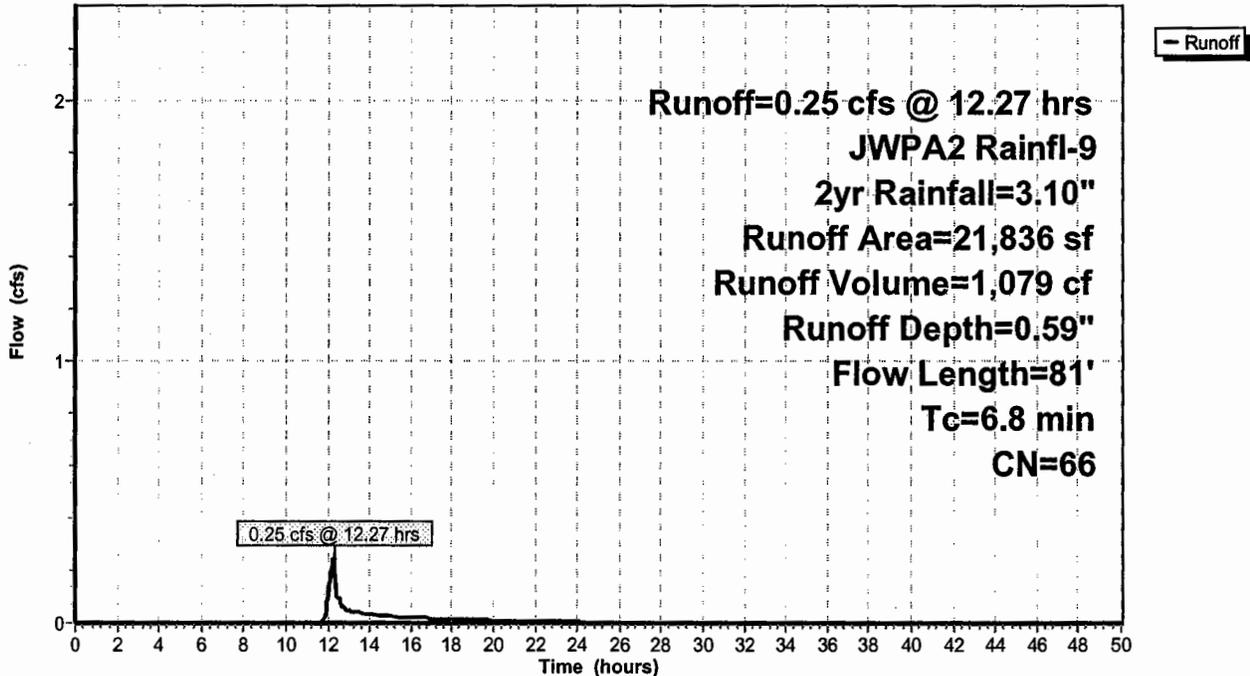
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		65.08% Pervious Area
7,625		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:**

Hydrograph



**Summary for Subcatchment 03-3:**

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

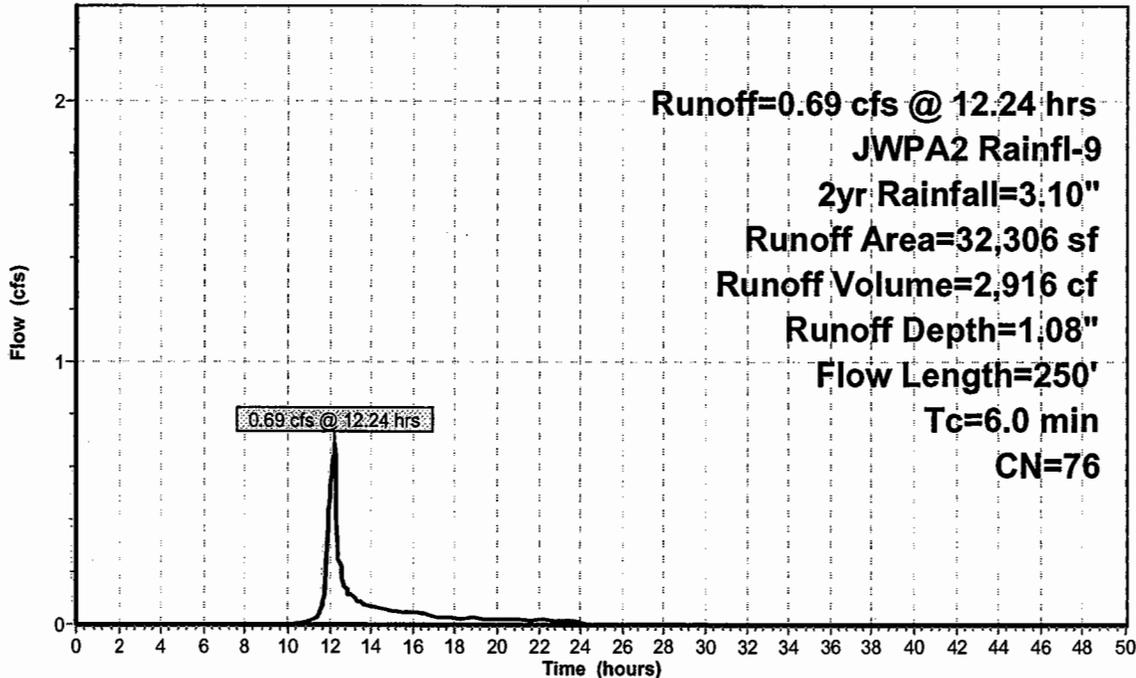
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		38.86% Pervious Area
19,751		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:**

Hydrograph



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**Summary for Subcatchment 04-1:**

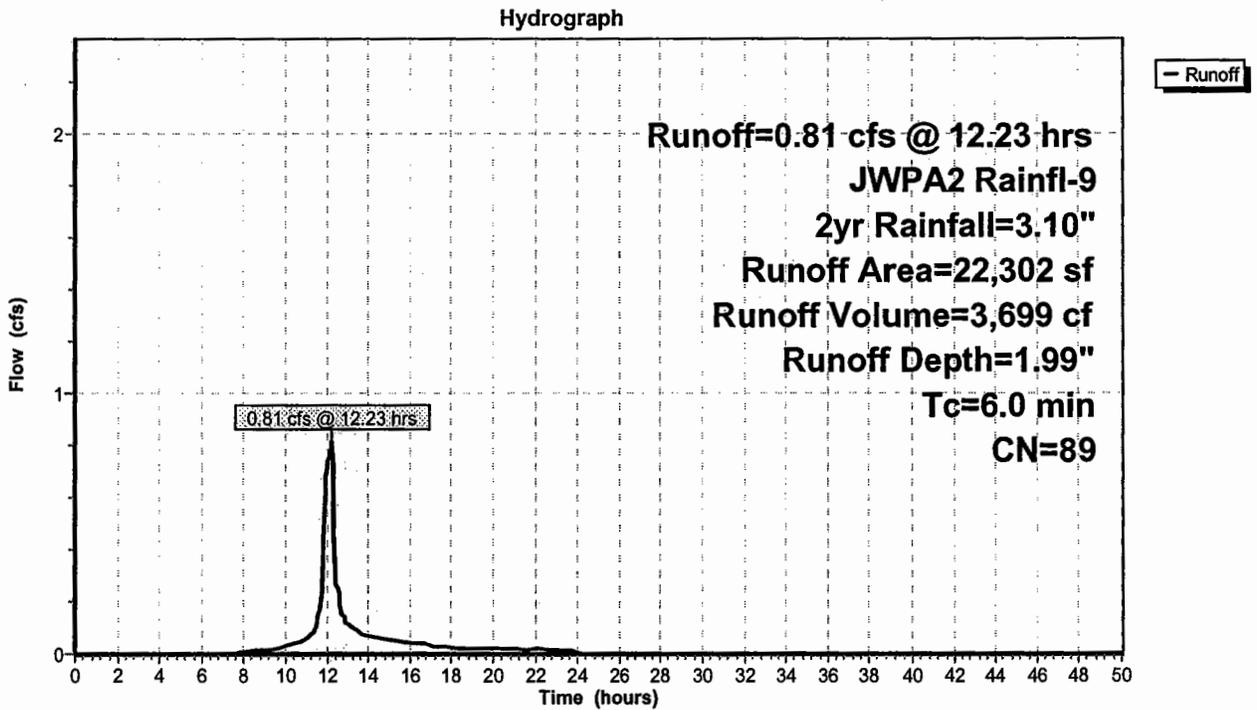
Runoff = 0.81 cfs @ 12.23 hrs, Volume= 3,699 cf, Depth= 1.99"

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		39.18% Pervious Area
13,563		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"

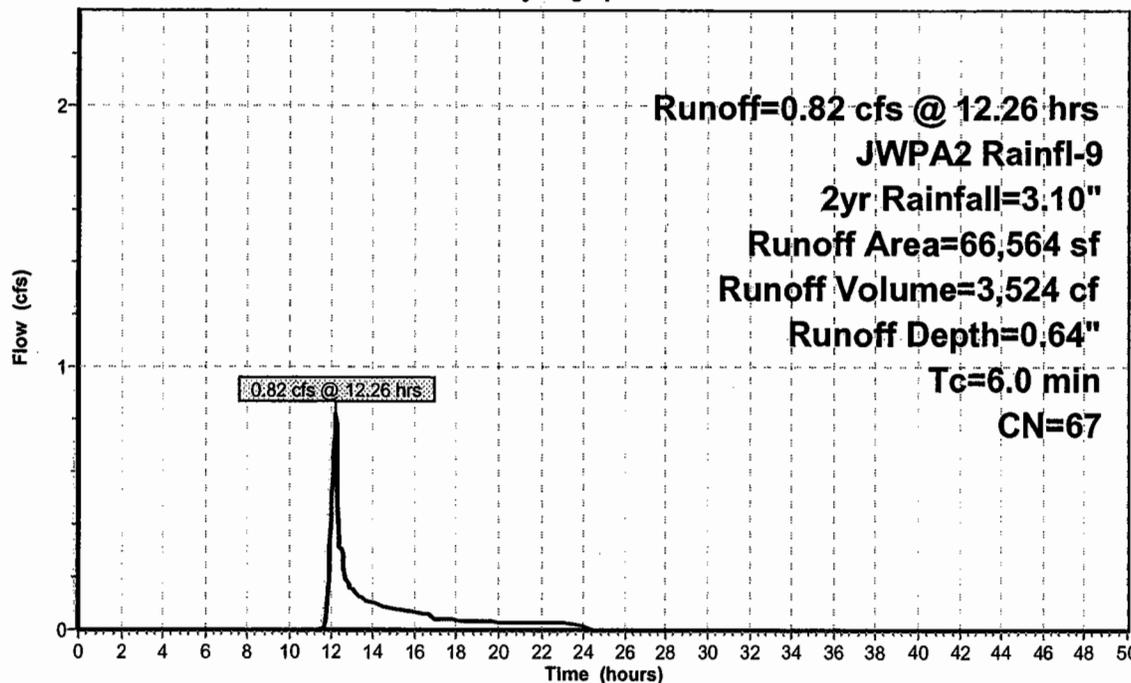
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		67.80% Pervious Area
21,433		32.20% Impervious Area

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

**Subcatchment 04-10:**

Hydrograph



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**Summary for Subcatchment 04-2:**

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

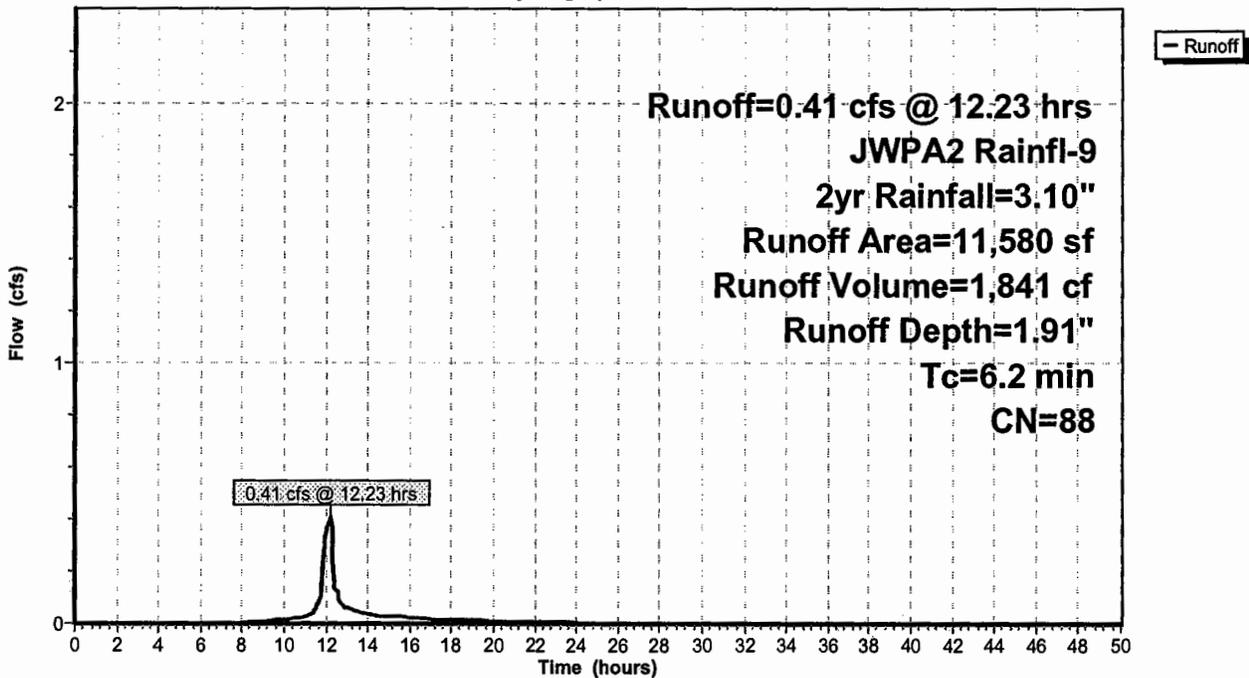
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		43.51% Pervious Area
6,541		56.49% Impervious Area

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

**Subcatchment 04-2:**

Hydrograph



**Summary for Subcatchment 04-3:**

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

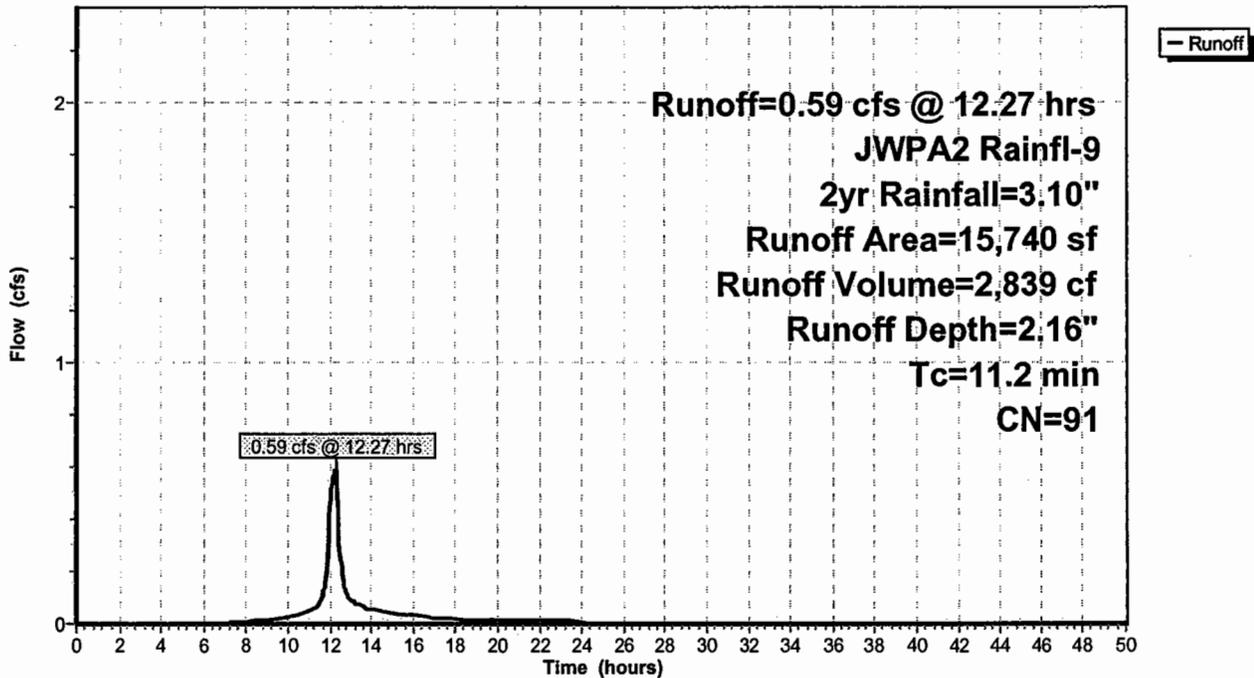
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		31.06% Pervious Area
10,851		68.94% Impervious Area

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

**Subcatchment 04-3:**

Hydrograph



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JWPA2 Rainfl-9 2yr Rainfall=3.10"

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**Summary for Subcatchment 04-4:**

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

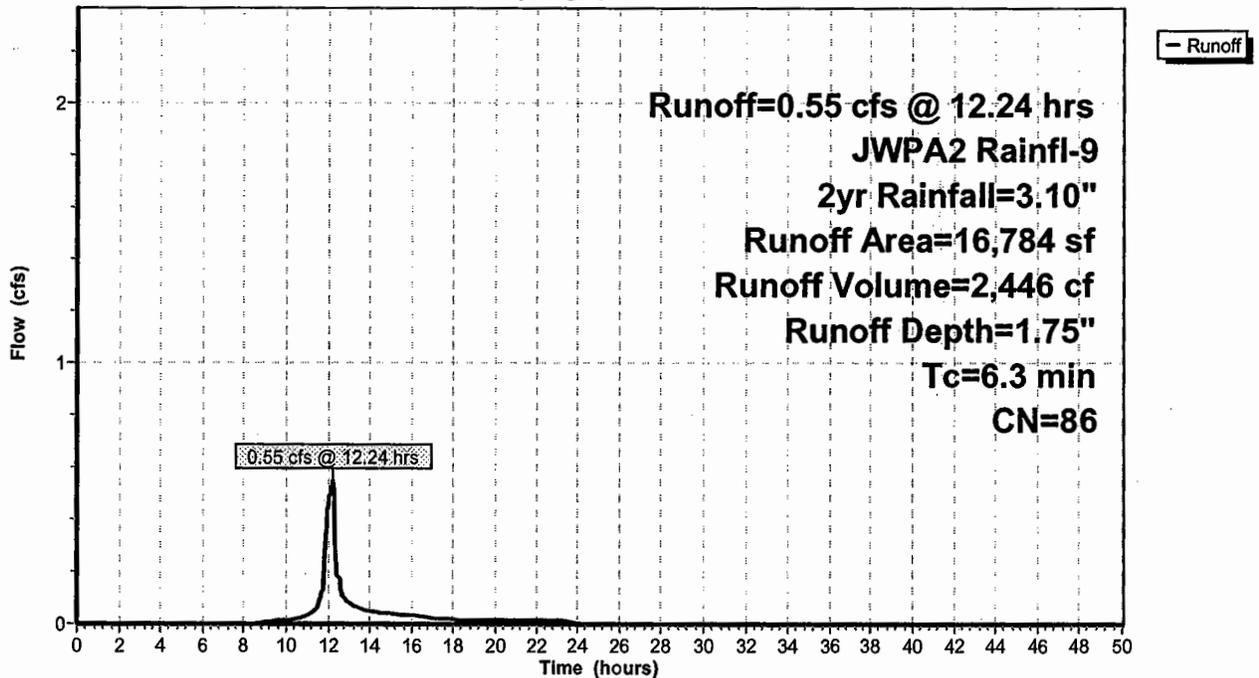
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		48.56% Pervious Area
8,633		51.44% Impervious Area

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

**Subcatchment 04-4:**

Hydrograph



**Summary for Subcatchment 04-5:**

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

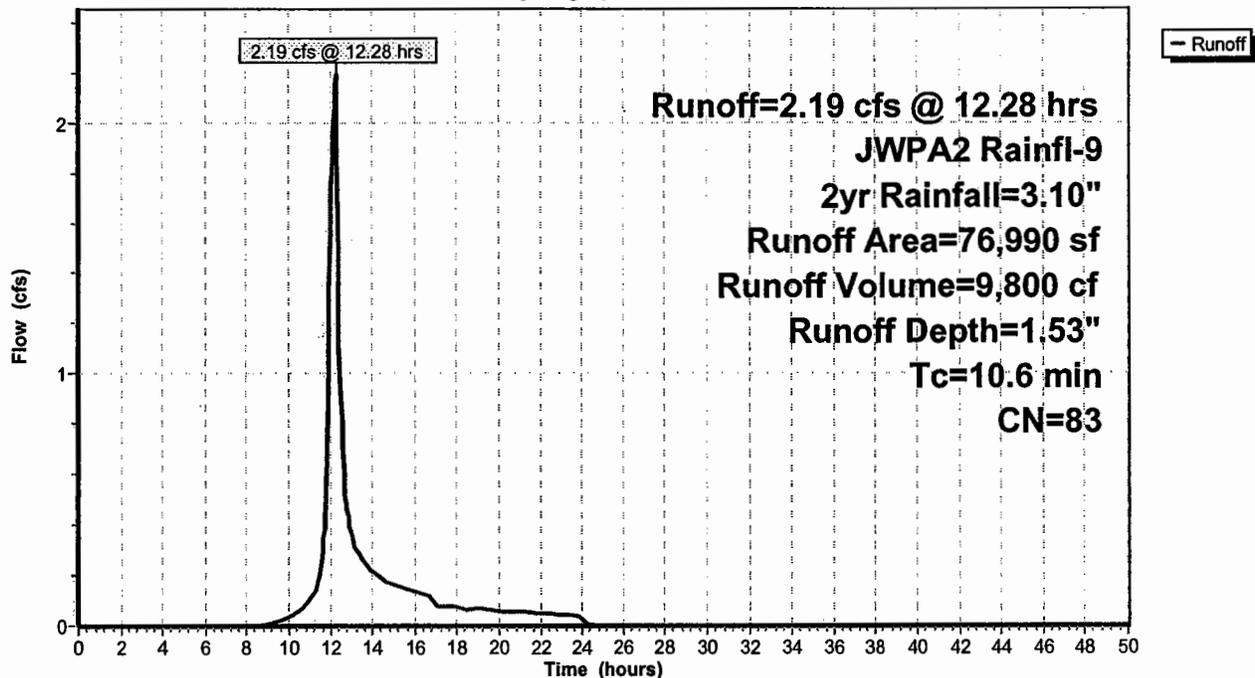
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		58.93% Pervious Area
31,621		41.07% Impervious Area

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

**Subcatchment 04-5:**

Hydrograph



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**Summary for Subcatchment 04-6:**

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

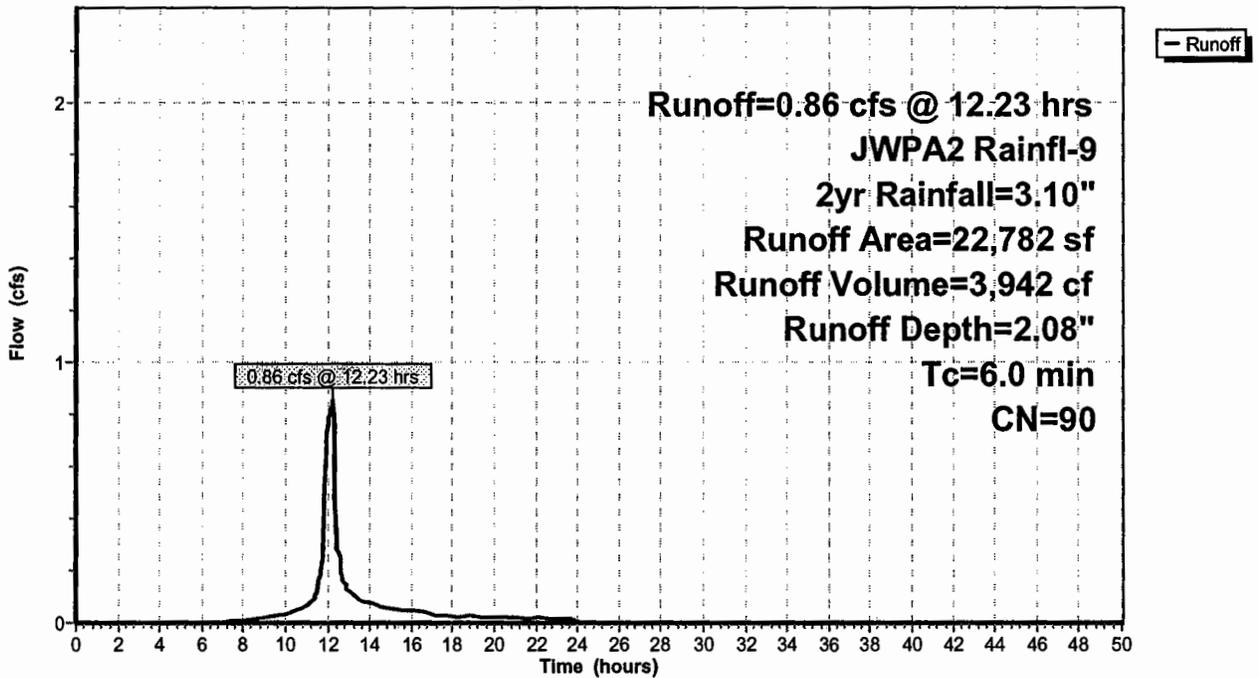
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		34.98% Pervious Area
14,812		65.02% Impervious Area

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

**Subcatchment 04-6:**

Hydrograph



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**Summary for Subcatchment 04-7:**

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

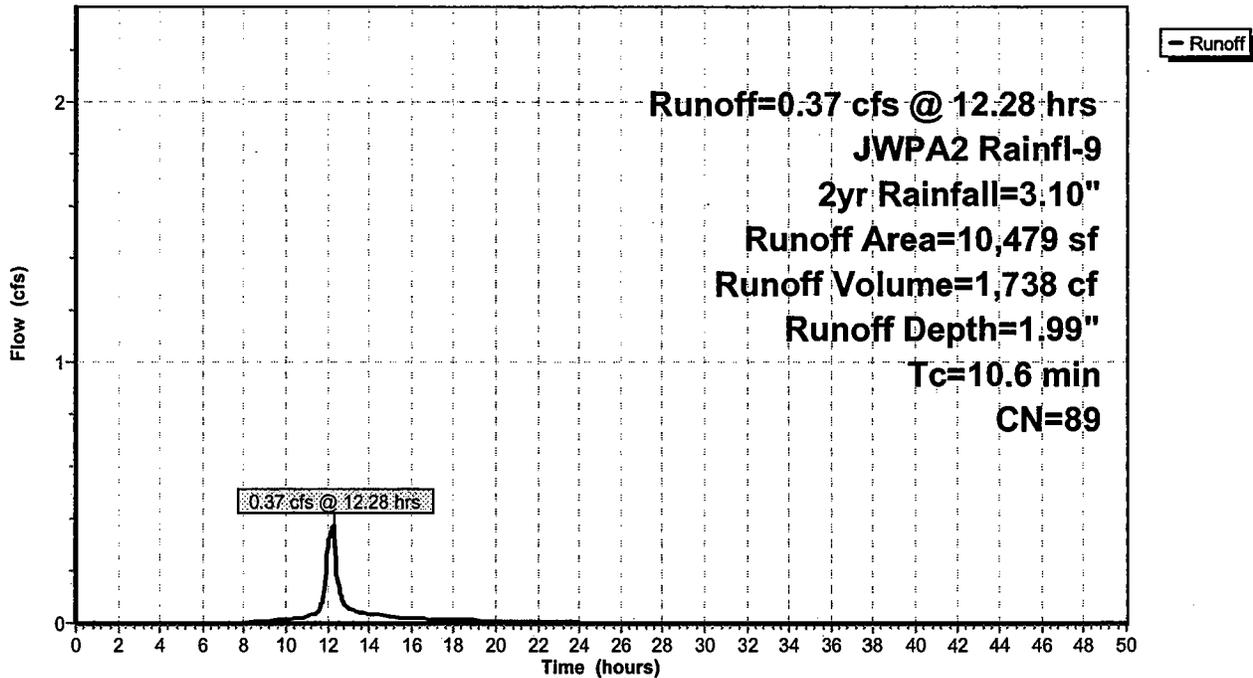
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		38.66% Pervious Area
6,428		61.34% Impervious Area

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

**Subcatchment 04-7:**

Hydrograph



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JWPA2 Rainfl-9 2yr Rainfall=3.10"

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**Summary for Subcatchment 04-8:**

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

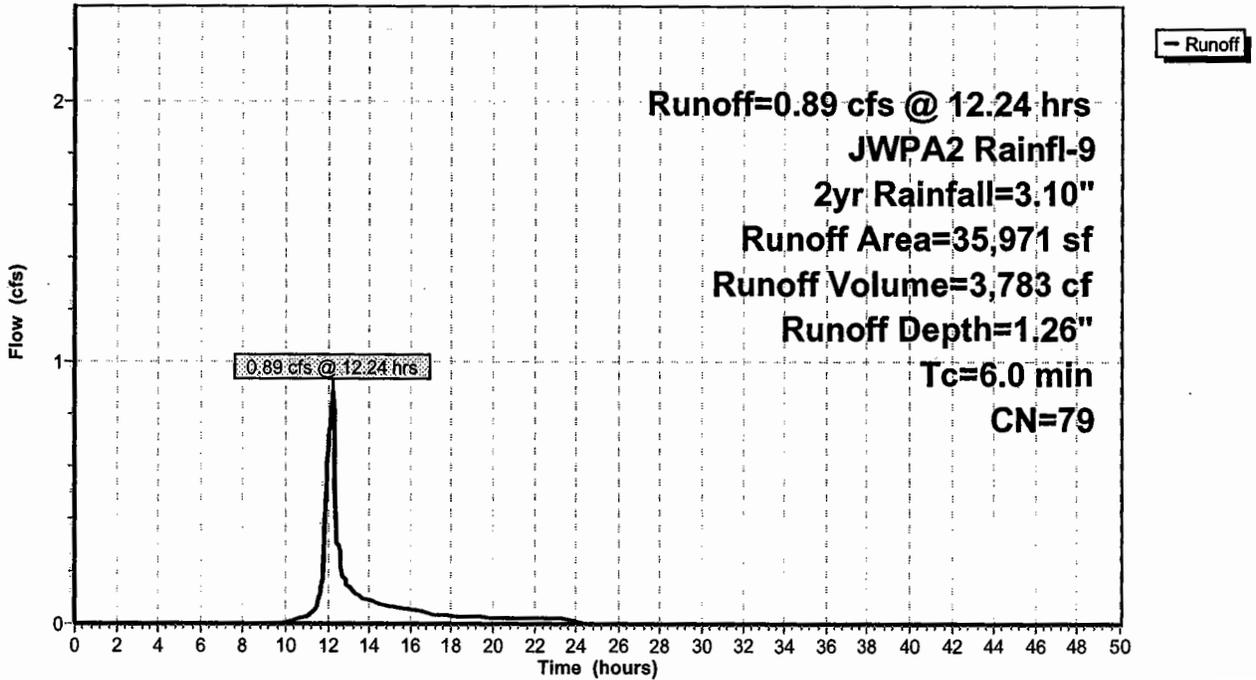
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		56.98% Pervious Area
15,475		43.02% Impervious Area

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

**Subcatchment 04-8:**

Hydrograph



**Summary for Subcatchment 04-9:**

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

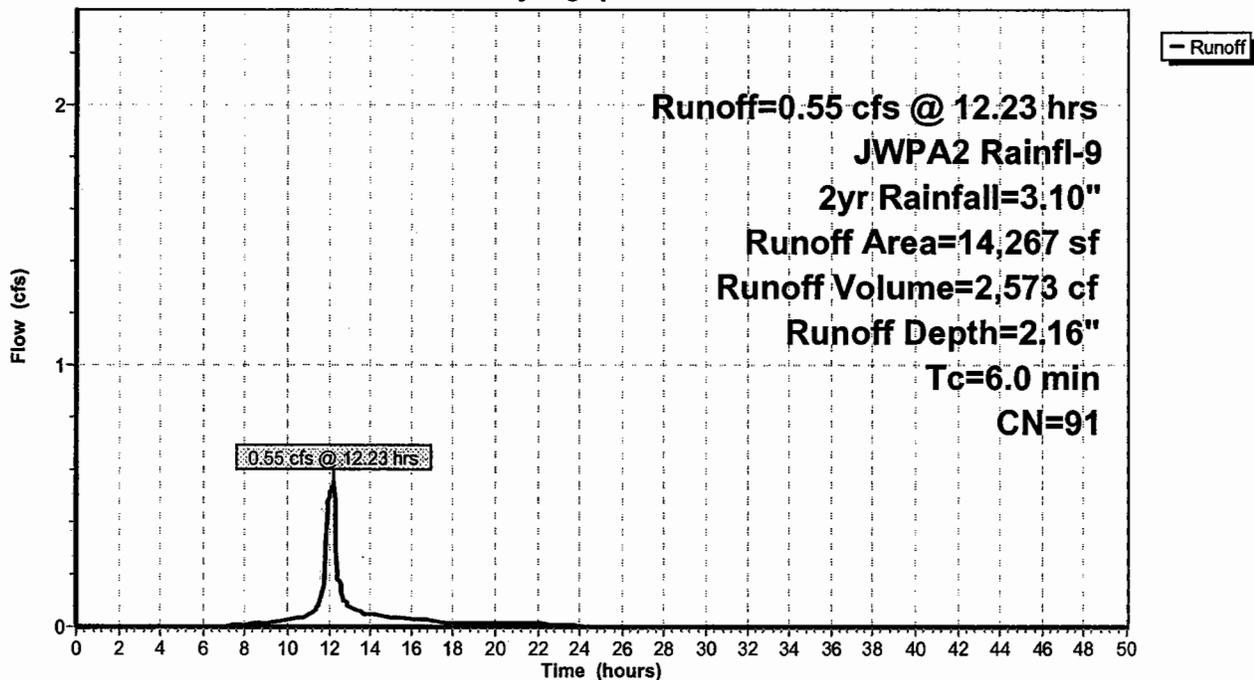
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		20.85% Pervious Area
11,293		79.15% Impervious Area

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

**Subcatchment 04-9:**

Hydrograph



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**Summary for Subcatchment 06-1:**

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

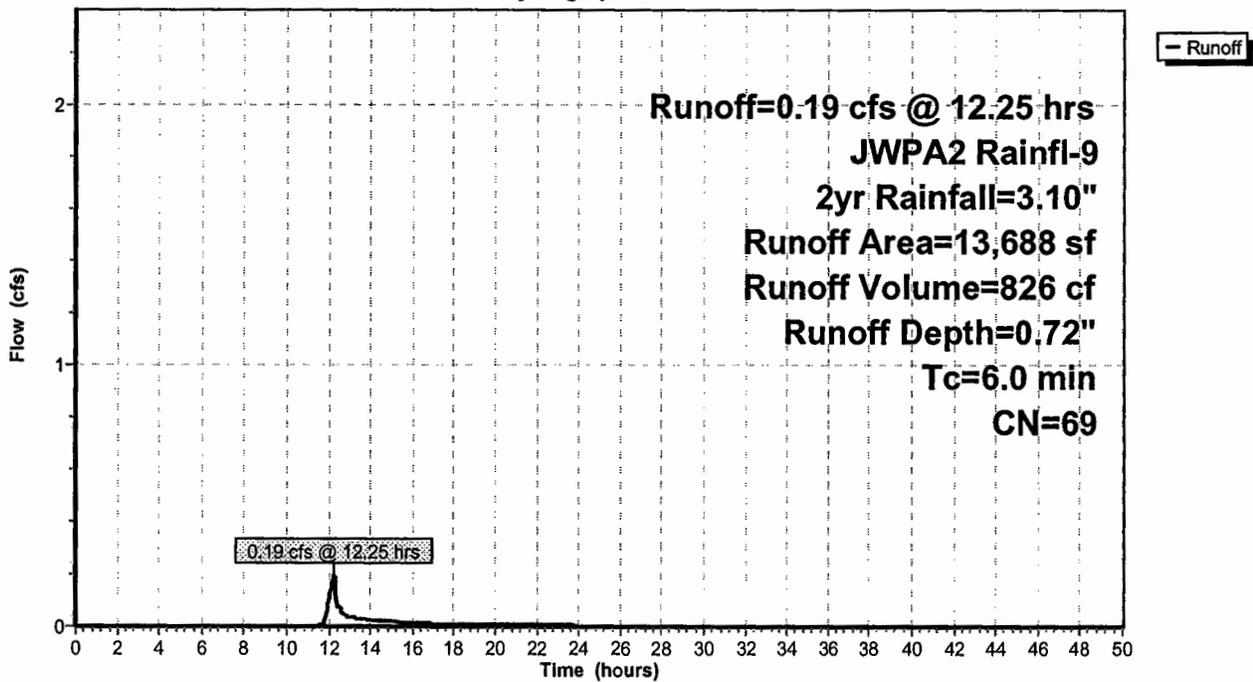
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		62.87% Pervious Area
5,083		37.13% Impervious Area

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

**Subcatchment 06-1:**

Hydrograph



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**Summary for Subcatchment 06-2:**

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

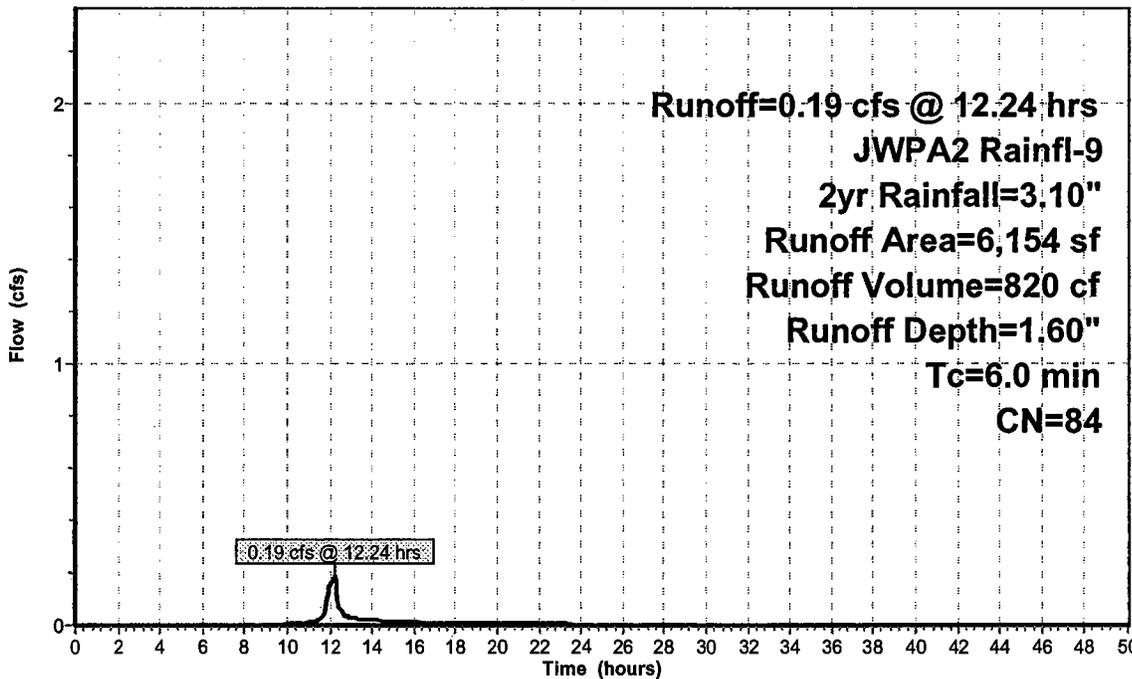
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		37.37% Pervious Area
3,854		62.63% Impervious Area

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

**Subcatchment 06-2:**

Hydrograph



— Runoff

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**Summary for Subcatchment 08-1:**

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

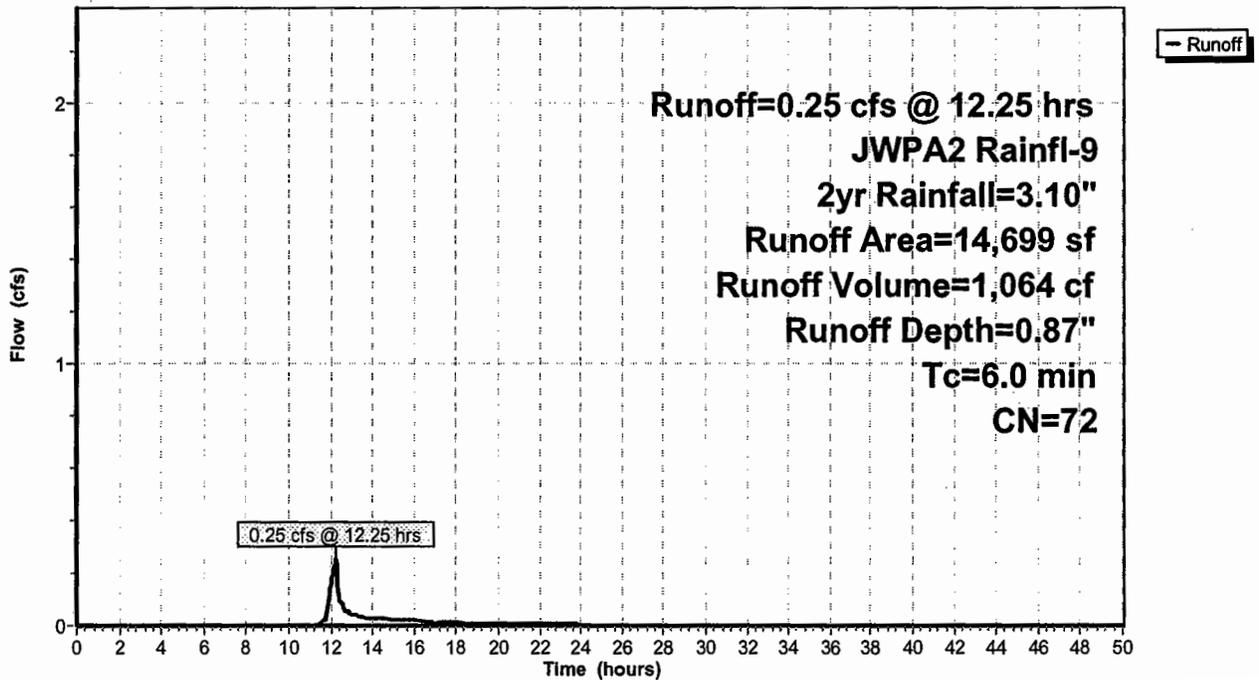
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		81.74% Pervious Area
2,684		18.26% Impervious Area

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

**Subcatchment 08-1:**

Hydrograph



**Summary for Subcatchment 08-2:**

Runoff = 0.55 cfs @ 12.23 hrs, Volume= 2,465 cf, Depth= 1.91"

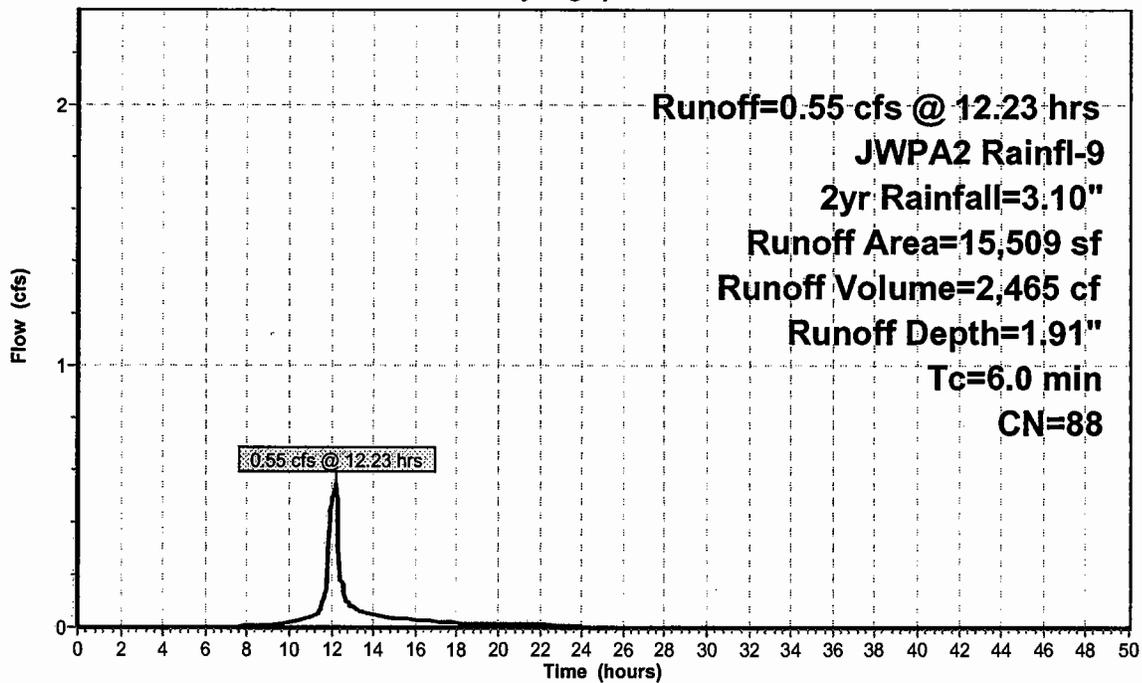
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
5,919	98	Paved parking, HSG B
1,570	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
15,509	88	Weighted Average
5,351		34.50% Pervious Area
10,158		65.50% Impervious Area

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

**Subcatchment 08-2:**

Hydrograph



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JWPA2 Rainfl-9 2yr Rainfall=3.10"

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## Summary for Subcatchment 08-3:

Runoff = 0.41 cfs @ 12.23 hrs, Volume= 1,884 cf, Depth= 2.08"

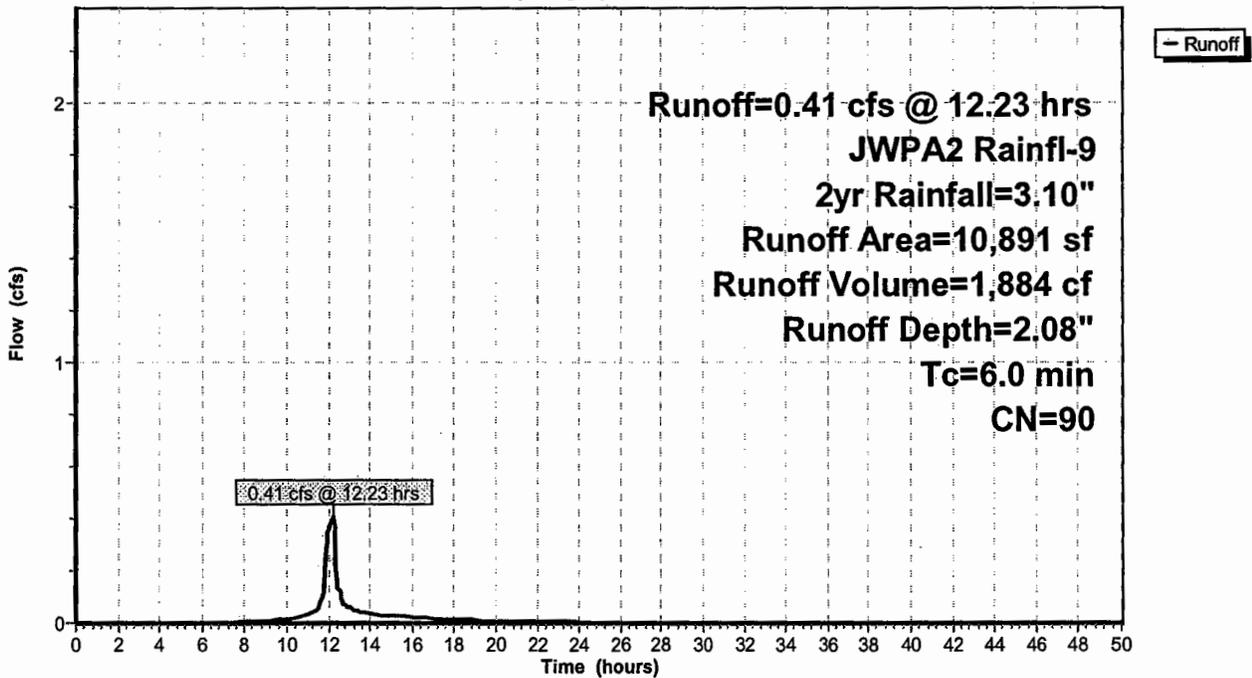
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
8,539	98	Paved parking, HSG B
2,352	61	>75% Grass cover, Good, HSG B
10,891	90	Weighted Average
2,352		21.60% Pervious Area
8,539		78.40% Impervious Area

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

## Subcatchment 08-3:

Hydrograph



**Summary for Subcatchment 10-1:**

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

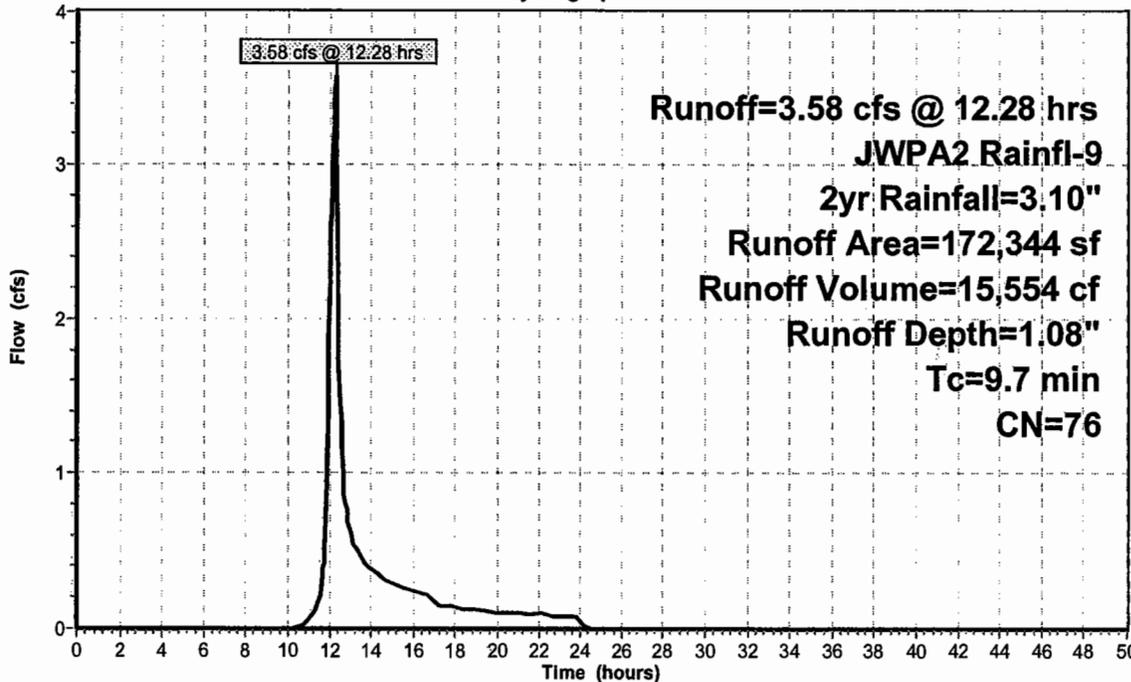
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		86.63% Pervious Area
23,043		13.37% Impervious Area

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

**Subcatchment 10-1:**

Hydrograph



— Runoff

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**Summary for Subcatchment 13-1: Trib exist CB**

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

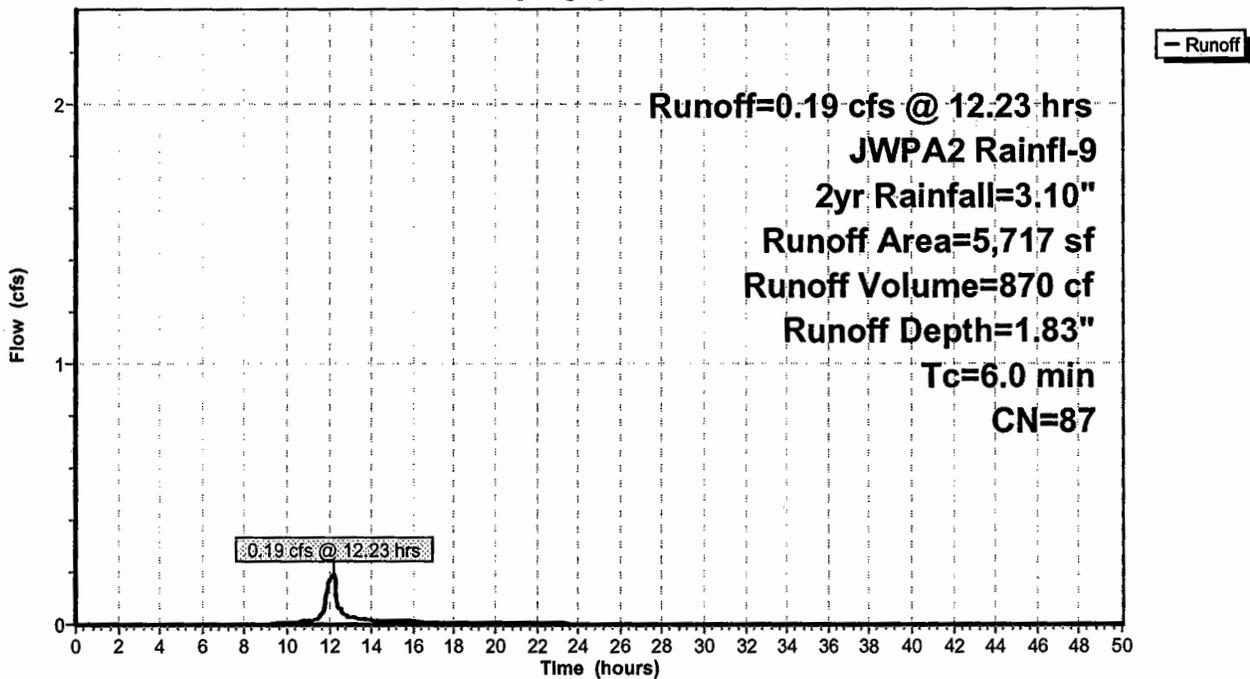
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		43.97% Pervious Area
3,203		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**

Hydrograph



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JWPA2 Rainfl-9 2yr Rainfall=3.10"

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**Summary for Subcatchment 13-2: Trib exist CB**

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

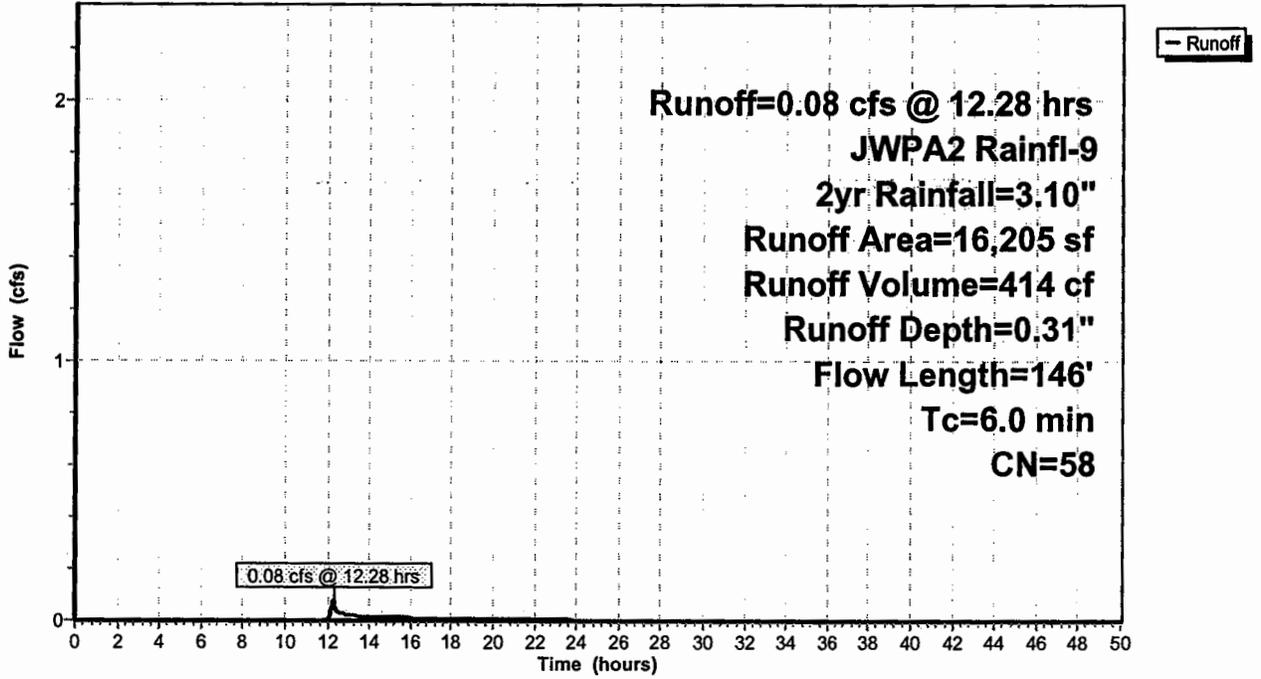
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		93.74% Pervious Area
1,014		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**

Hydrograph



**Summary for Subcatchment 20: Roof**

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

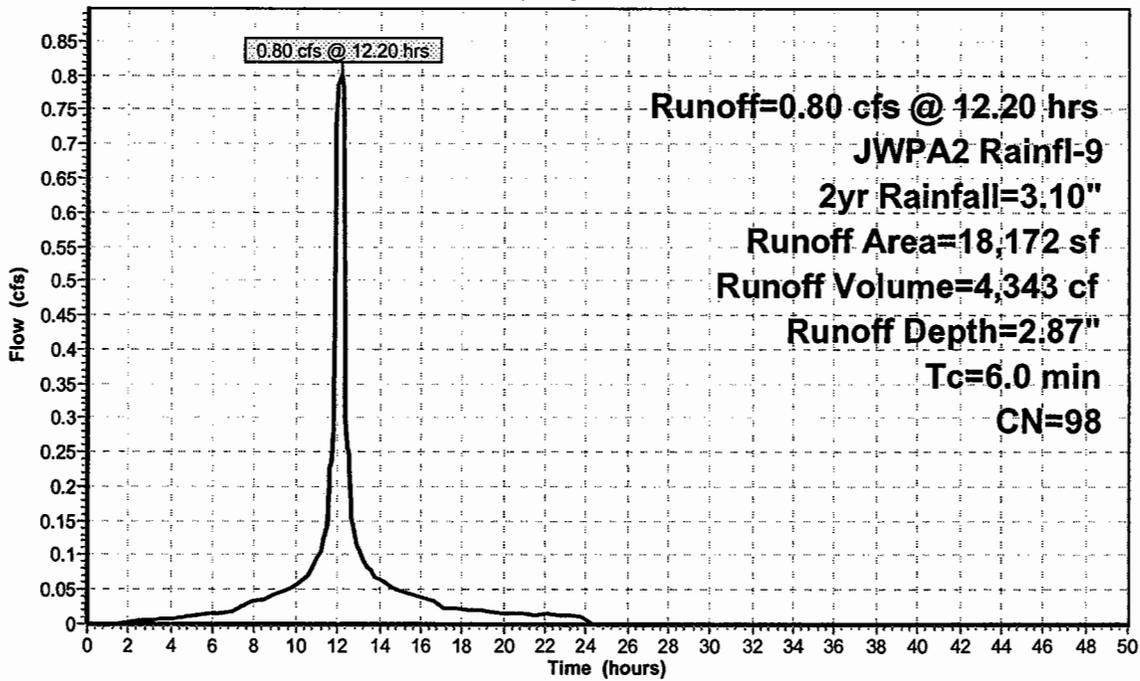
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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

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

**Subcatchment 20: Roof**

Hydrograph



**Summary for Subcatchment 40: Roof**

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

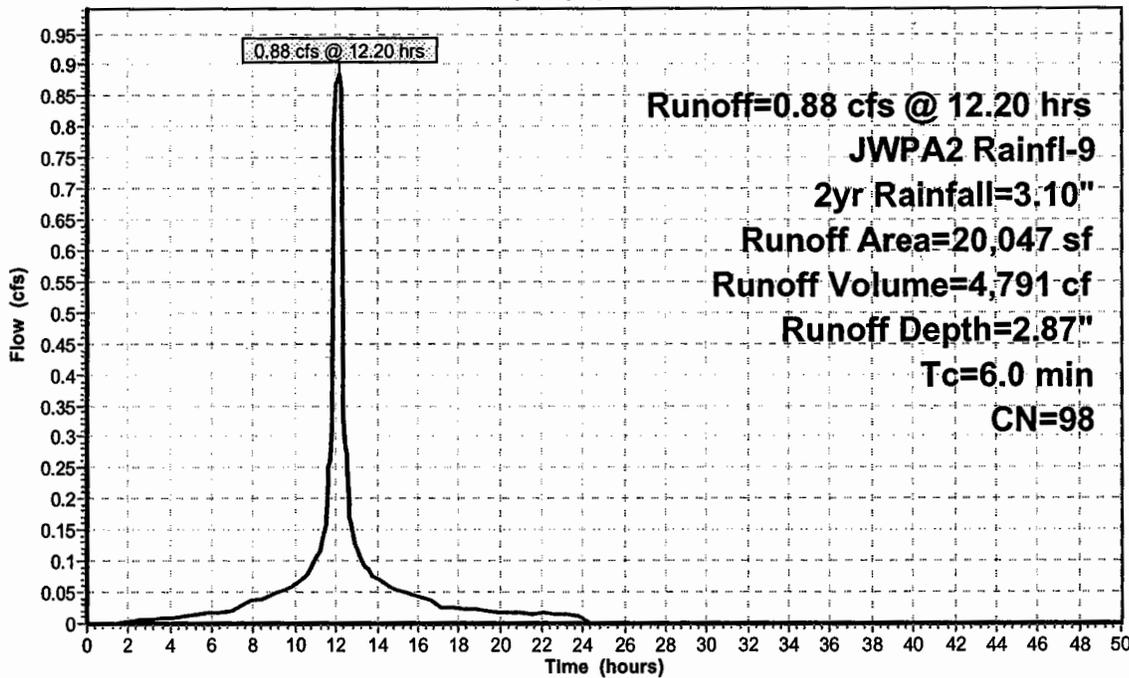
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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

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

**Subcatchment 40: Roof**

Hydrograph



**Summary for Subcatchment 55F: FRONT ROOF**

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

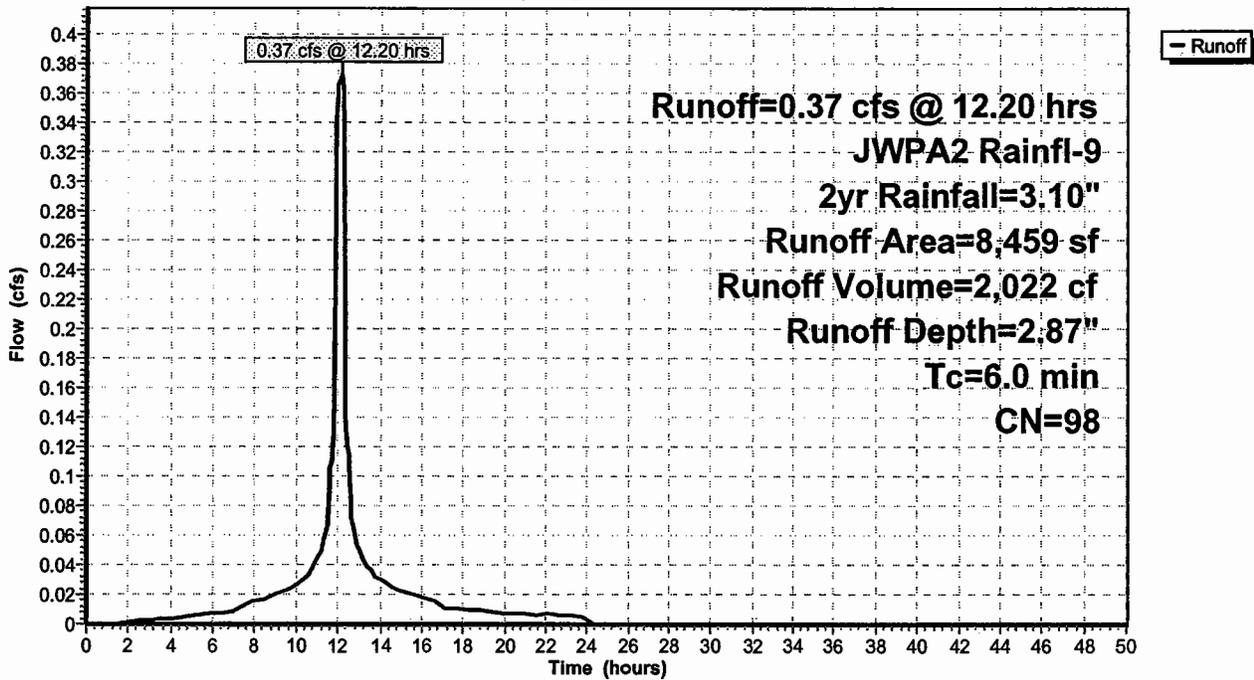
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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

Hydrograph



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JWPA2 Rainfl-9 2yr Rainfall=3.10"

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## Summary for Subcatchment 55R: REAR ROOF

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

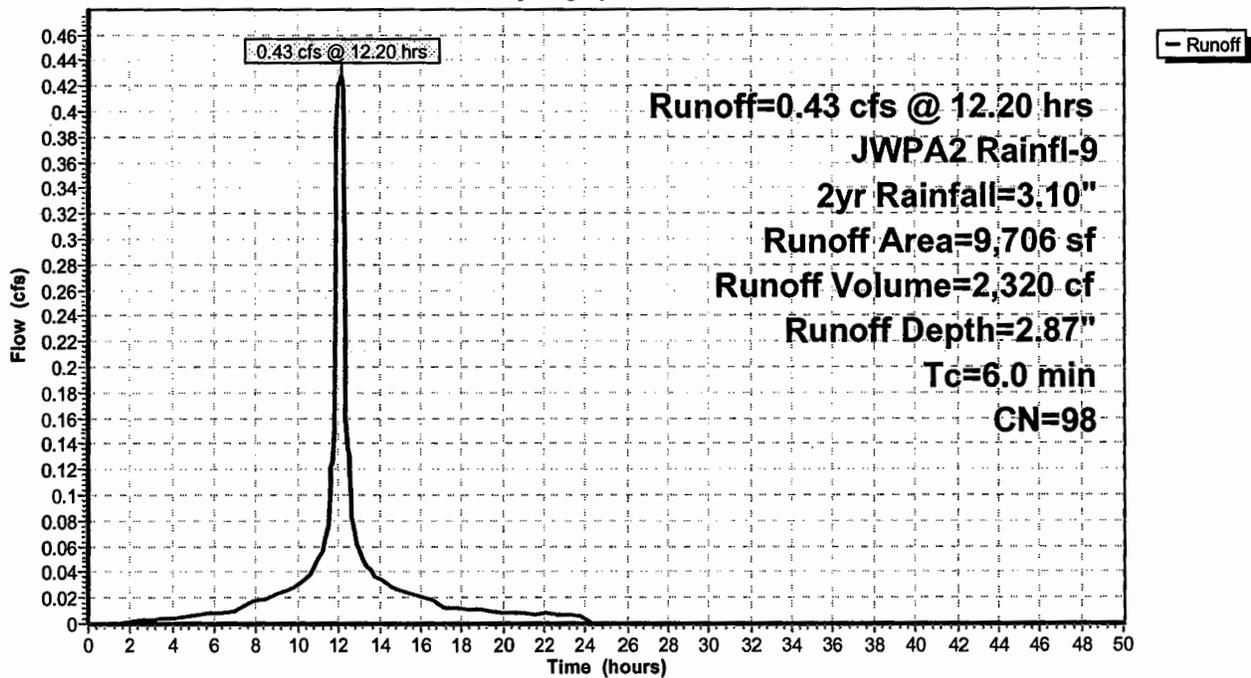
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
9,706	98	Roof
9,706		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

Hydrograph



**Summary for Subcatchment 56-1:**

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

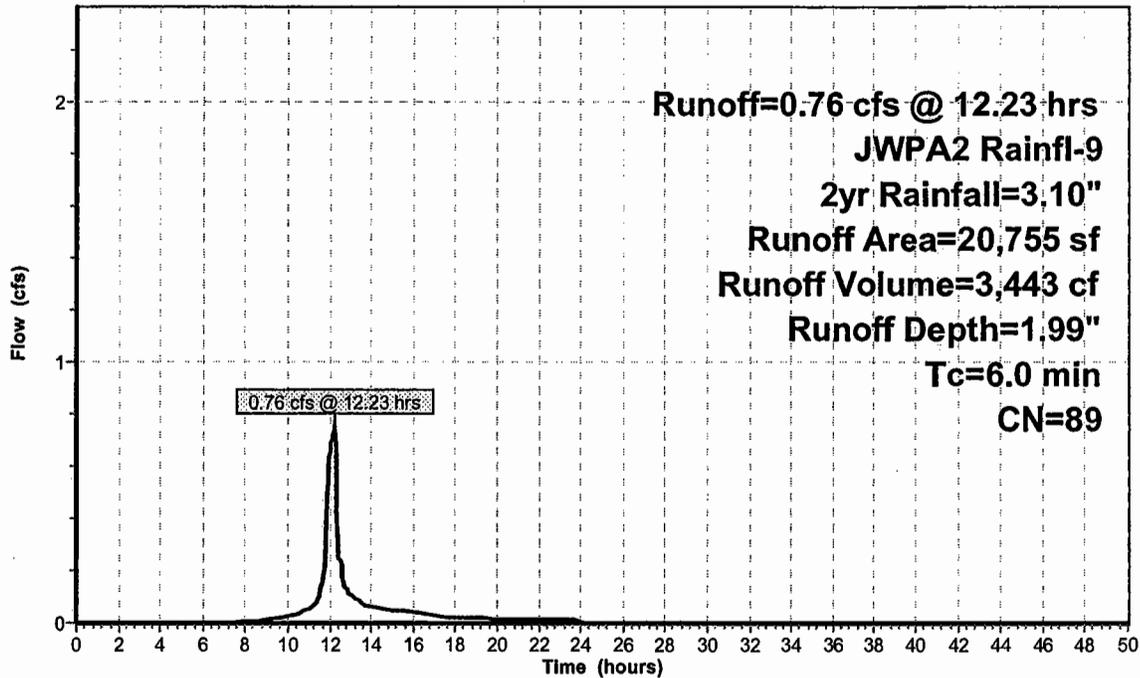
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		35.55% Pervious Area
13,376		64.45% Impervious Area

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

**Subcatchment 56-1:**

Hydrograph



# JOHNSON WOODS PHASE 2 PROPOSED R2

Prepared by Microsoft

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JWPA2 Rainfl-9 2yr Rainfall=3.10"

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## Summary for Subcatchment 56-2:

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

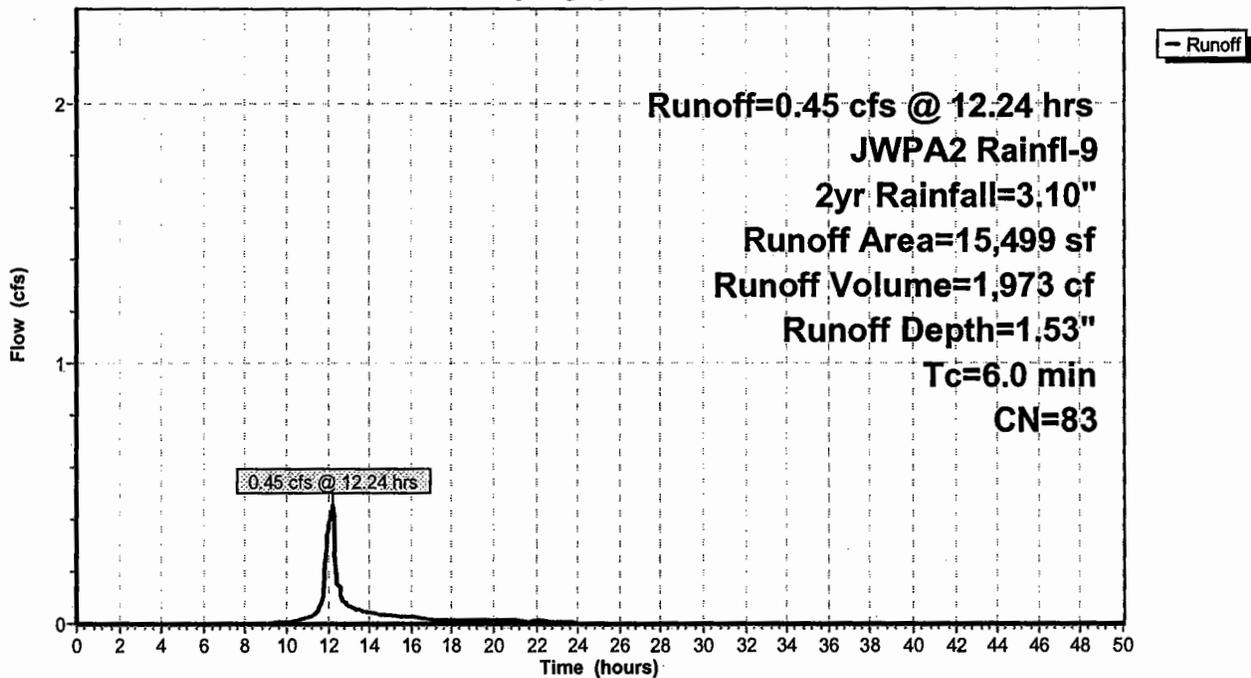
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		61.69% Pervious Area
5,938		38.31% Impervious Area

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

## Subcatchment 56-2:

Hydrograph



**Summary for Subcatchment 56-3:**

Runoff = 0.48 cfs @ 12.25 hrs, Volume= 2,328 cf, Depth= 2.35"

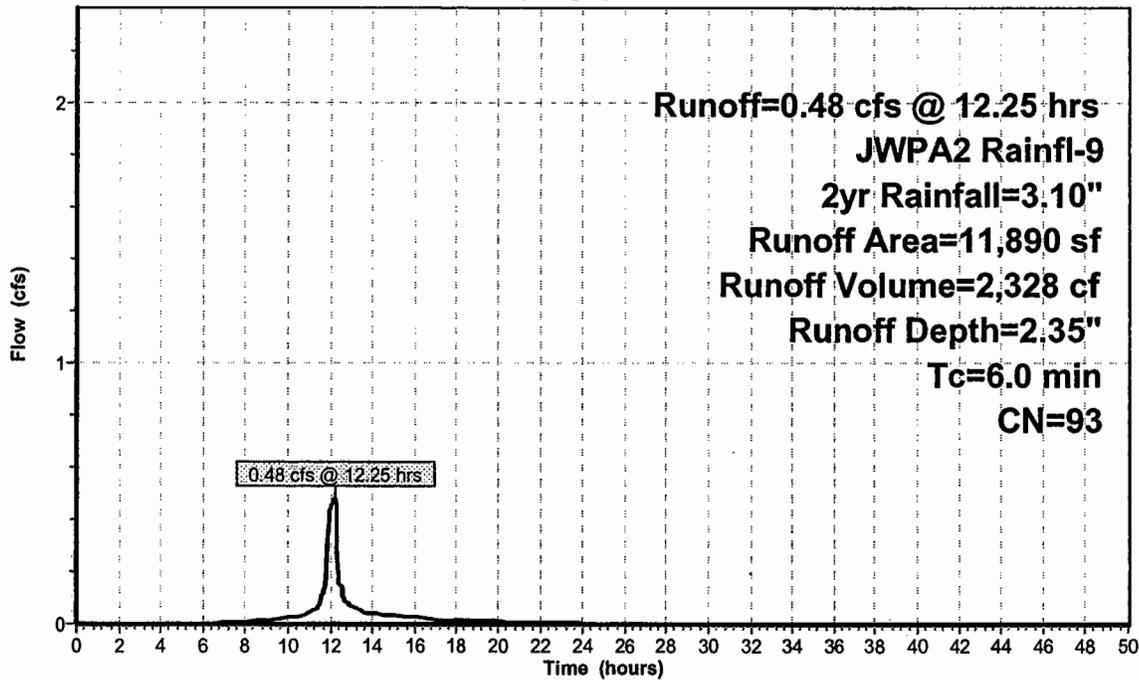
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
9,292	98	Paved parking, HSG C
2,598	74	>75% Grass cover, Good, HSG C
11,890	93	Weighted Average
2,598		21.85% Pervious Area
9,292		78.15% Impervious Area

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

**Subcatchment 56-3:**

Hydrograph



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JWPA2 Rainfl-9 2yr Rainfall=3.10"

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## Summary for Subcatchment 56-4:

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

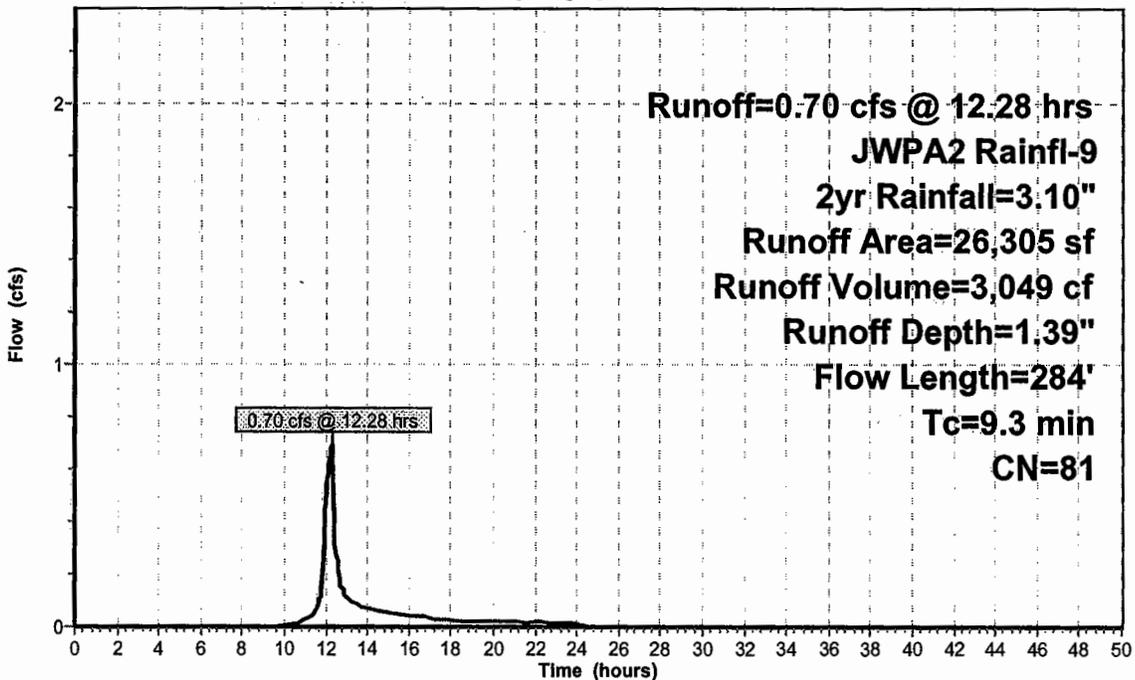
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		69.16% Pervious Area
8,113		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:

Hydrograph



**Summary for Subcatchment 56-5:**

Runoff = 0.64 cfs @ 12.23 hrs, Volume= 3,003 cf, Depth= 2.16"

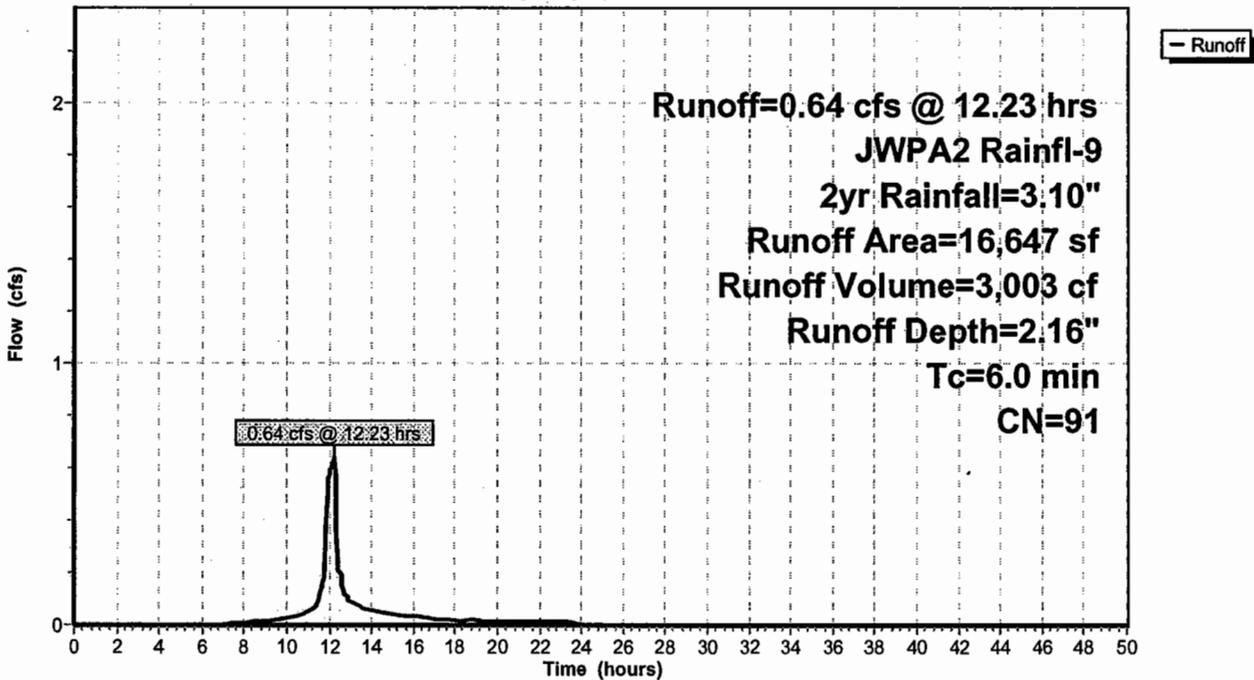
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
615	98	Paved parking, HSG B
476	61	>75% Grass cover, Good, HSG B
11,420	98	Paved parking, HSG C
4,136	74	>75% Grass cover, Good, HSG C
16,647	91	Weighted Average
4,612		27.70% Pervious Area
12,035		72.30% Impervious Area

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

**Subcatchment 56-5:**

Hydrograph



**Summary for Subcatchment 56-6:**

Runoff = 0.45 cfs @ 12.23 hrs, Volume= 2,034 cf, Depth= 1.91"

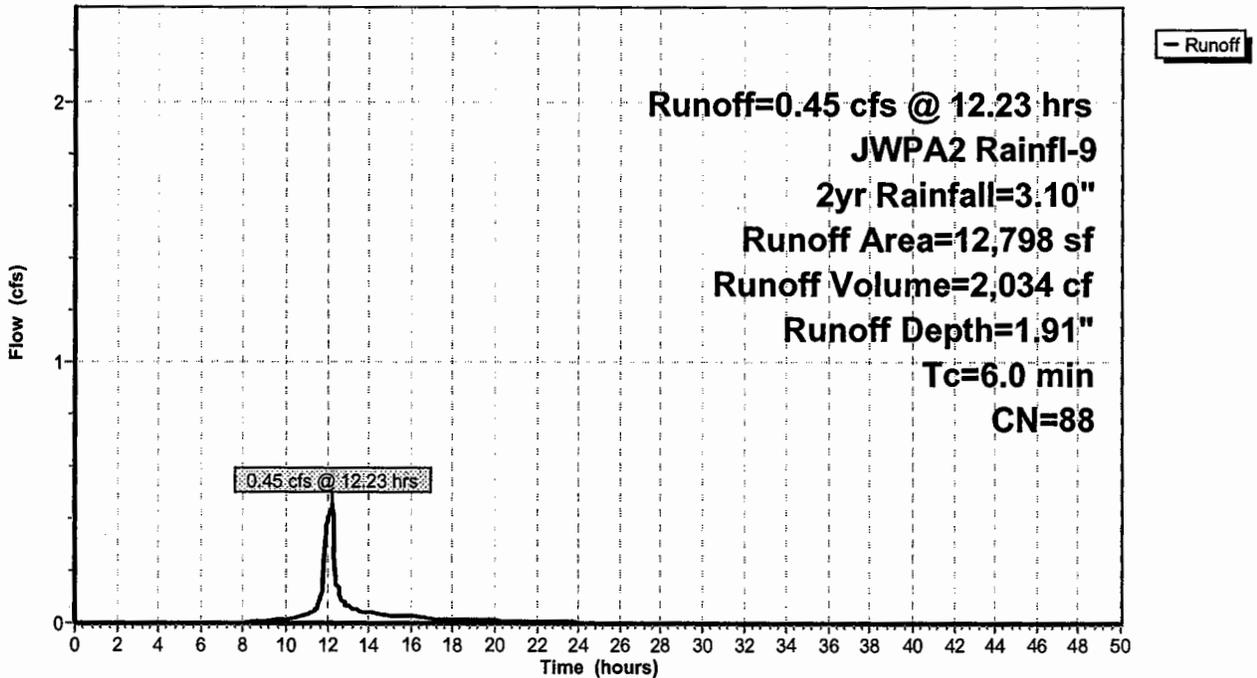
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
82	98	Paved parking, HSG B
287	61	>75% Grass cover, Good, HSG B
7,388	98	Paved parking, HSG C
5,041	74	>75% Grass cover, Good, HSG C
12,798	88	Weighted Average
5,328		41.63% Pervious Area
7,470		58.37% Impervious Area

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

**Subcatchment 56-6:**

Hydrograph



**Summary for Subcatchment 56-7:**

Runoff = 0.26 cfs @ 12.24 hrs, Volume= 1,127 cf, Depth= 1.53"

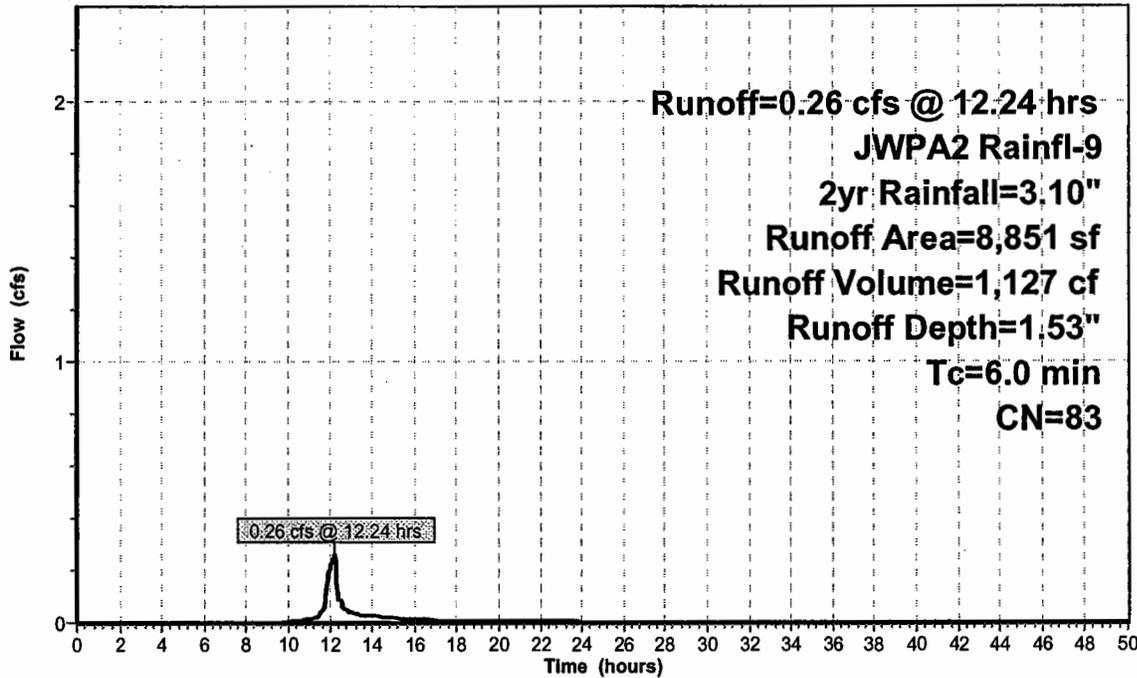
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

Area (sf)	CN	Description
3,342	98	Paved parking, HSG C
5,509	74	>75% Grass cover, Good, HSG C
8,851	83	Weighted Average
5,509		62.24% Pervious Area
3,342		37.76% Impervious Area

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

**Subcatchment 56-7:**

Hydrograph



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JWPA2 Rainfl-9 2yr Rainfall=3.10"

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**Summary for Subcatchment BA-LWD:**

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

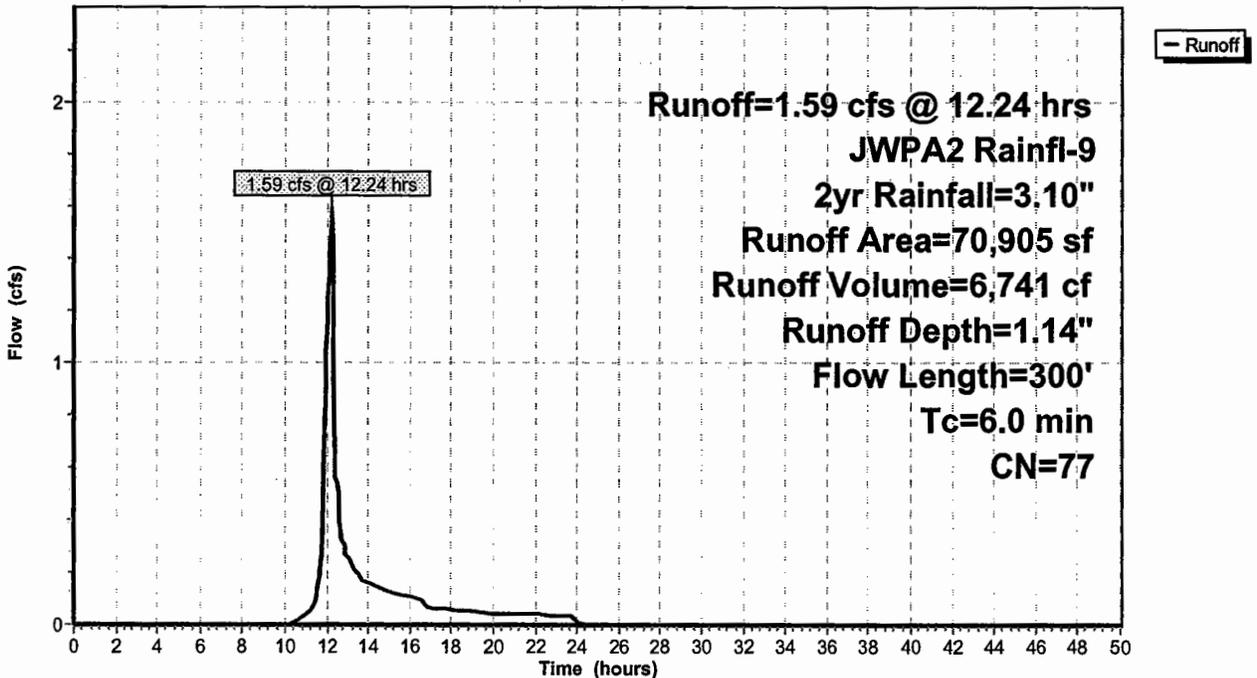
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		86.83% Pervious Area
9,338		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:**

Hydrograph



**JOHNSON WOODS PHASE 2 PROPOSED R2**

JWPA2 Rainfl-9 2yr Rainfall=3.10"

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**Summary for Subcatchment BA-NWLY:**

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

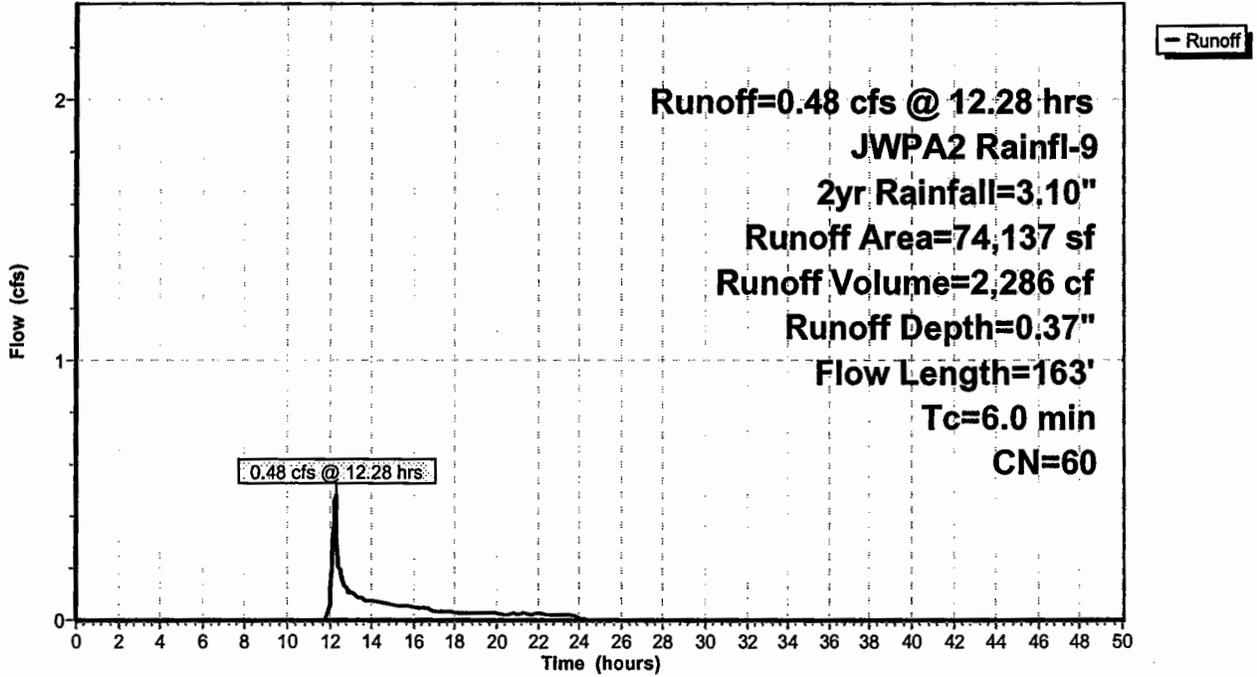
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		91.93% Pervious Area
5,982		8.07% Impervious Area

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

Subcatchment BA-NWLY:

Hydrograph



**JOHNSON WOODS PHASE 2 PROPOSED R2**

JWPA2 Rainfl-9 2yr Rainfall=3.10"

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**Summary for Subcatchment BA-SWLY: Trib Inwood Dr.**

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

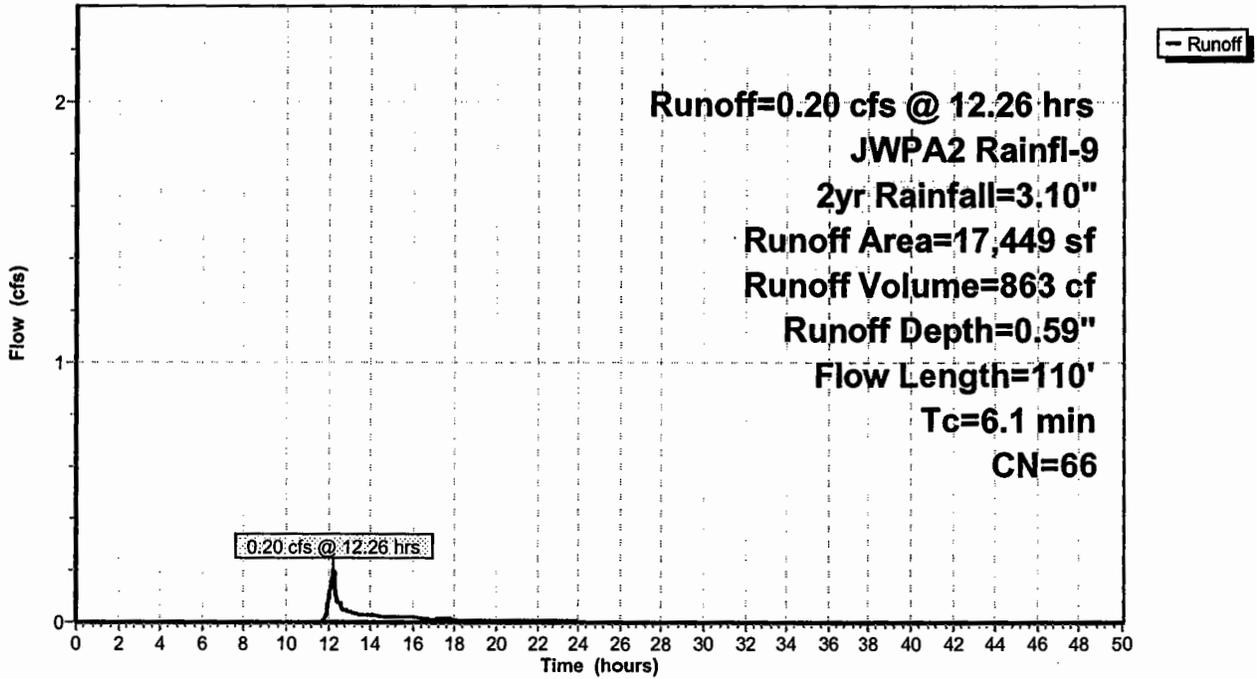
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		85.51% Pervious Area
2,529		14.49% Impervious Area

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

Subcatchment BA-SWLY: Trib Inwood Dr.

Hydrograph



**JOHNSON WOODS PHASE 2 PROPOSED R2**

JWPA2 Rainfl-9 2yr Rainfall=3.10"

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**Summary for Subcatchment BA-WLY:**

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

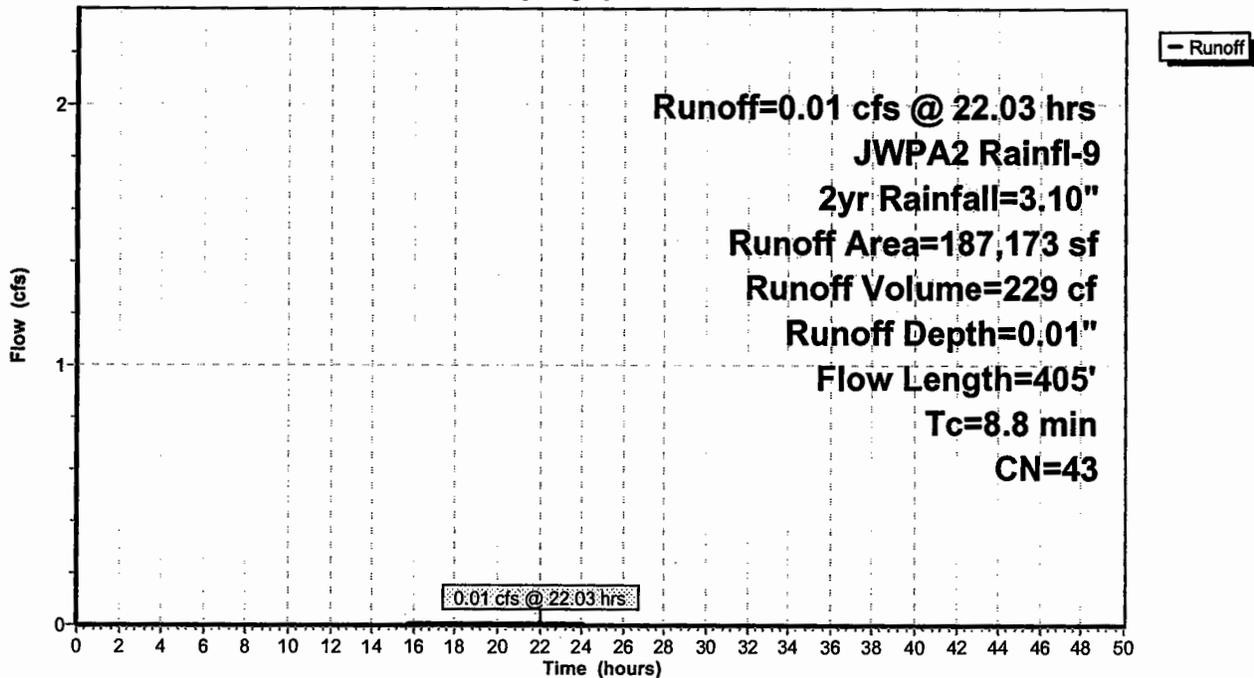
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		95.21% Pervious Area
8,968		4.79% Impervious Area

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

Subcatchment BA-WLY:

Hydrograph



**Summary for Subcatchment BA-WLY-1:**

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

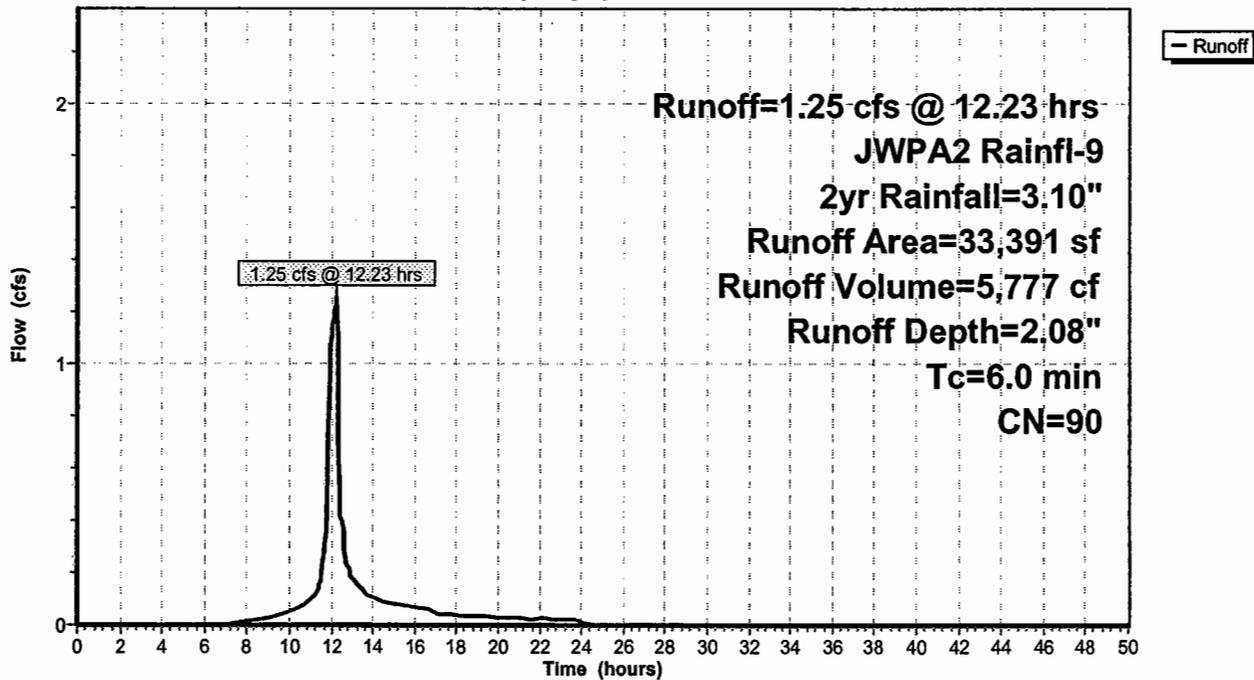
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs  
 JWPA2 Rainfl-9 2yr Rainfall=3.10"

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		33.22% Pervious Area
22,298		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:**

Hydrograph



**JOHNSON WOODS PHASE 2 PROPOSED R2**

JWPA2 Rainfl-9 2yr Rainfall=3.10"

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**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

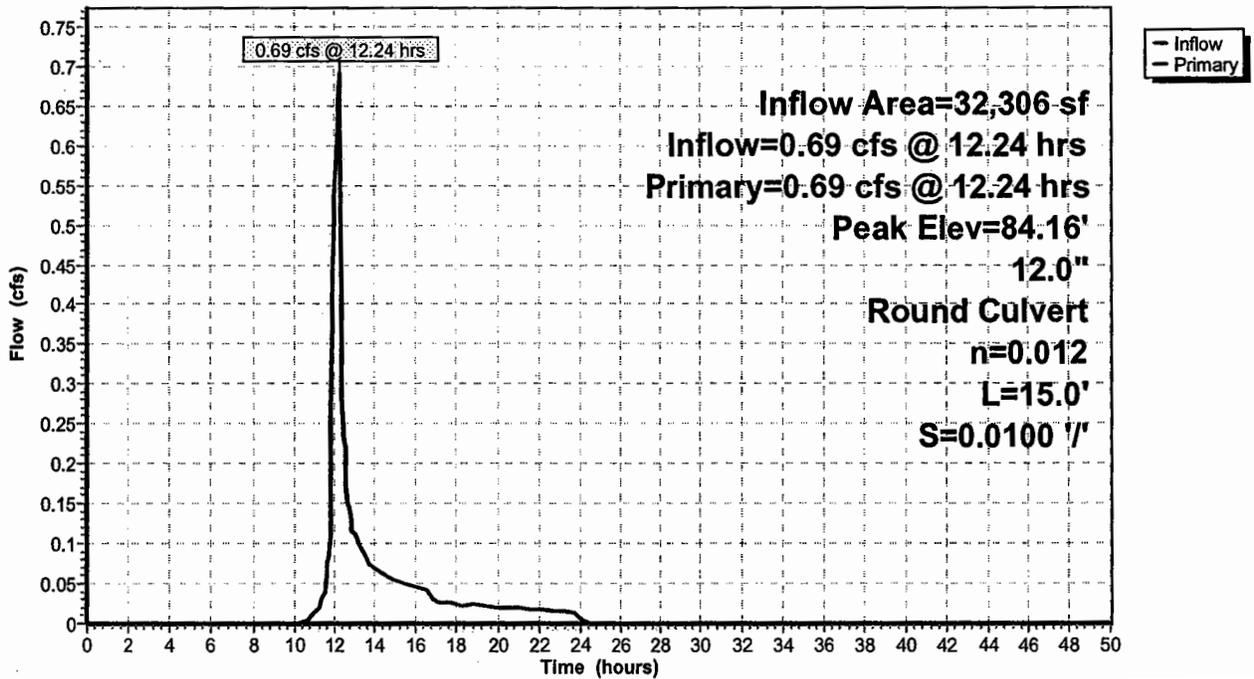
Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 84.16' @ 12.24 hrs  
 Flood Elev= 87.85'

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:**

Hydrograph



**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

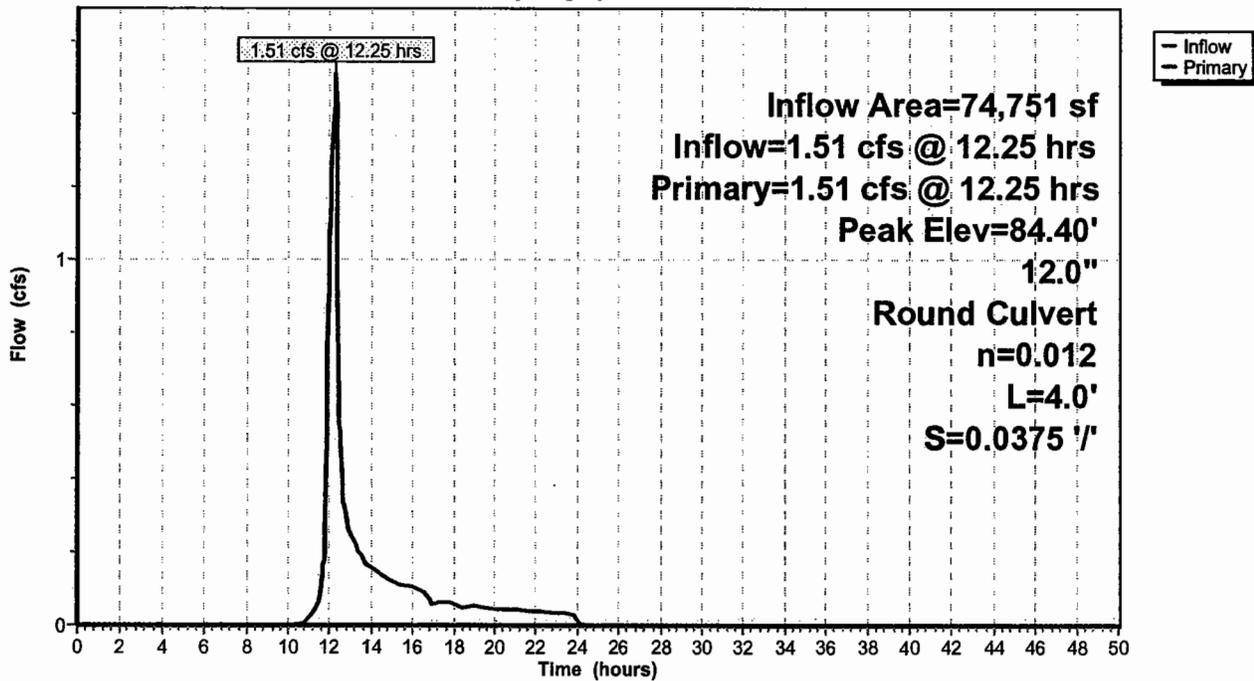
Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 84.40' @ 12.25 hrs  
 Flood Elev= 87.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	83.70'	<b>12.0" Round Culvert</b> 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:**

Hydrograph



**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

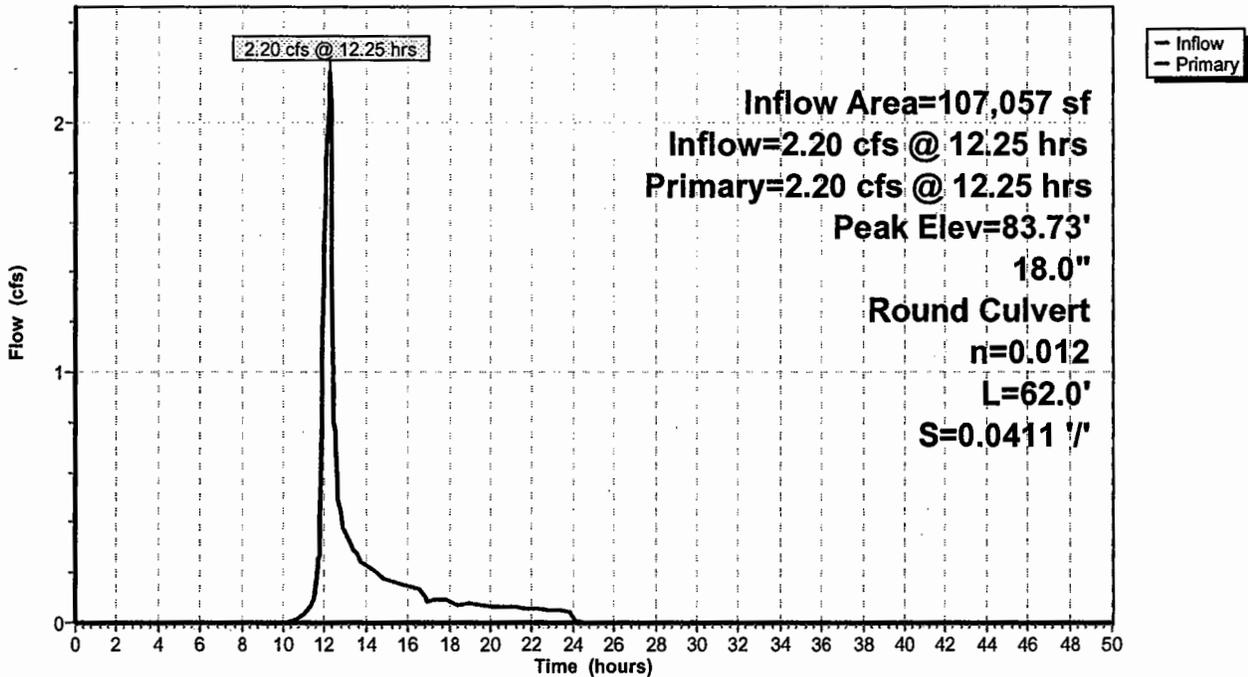
Flood Elev= 87.97'

Device #1	Routing	Invert	Outlet Devices
	Primary	83.05'	<b>18.0" Round Culvert</b> 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:**

Hydrograph



**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

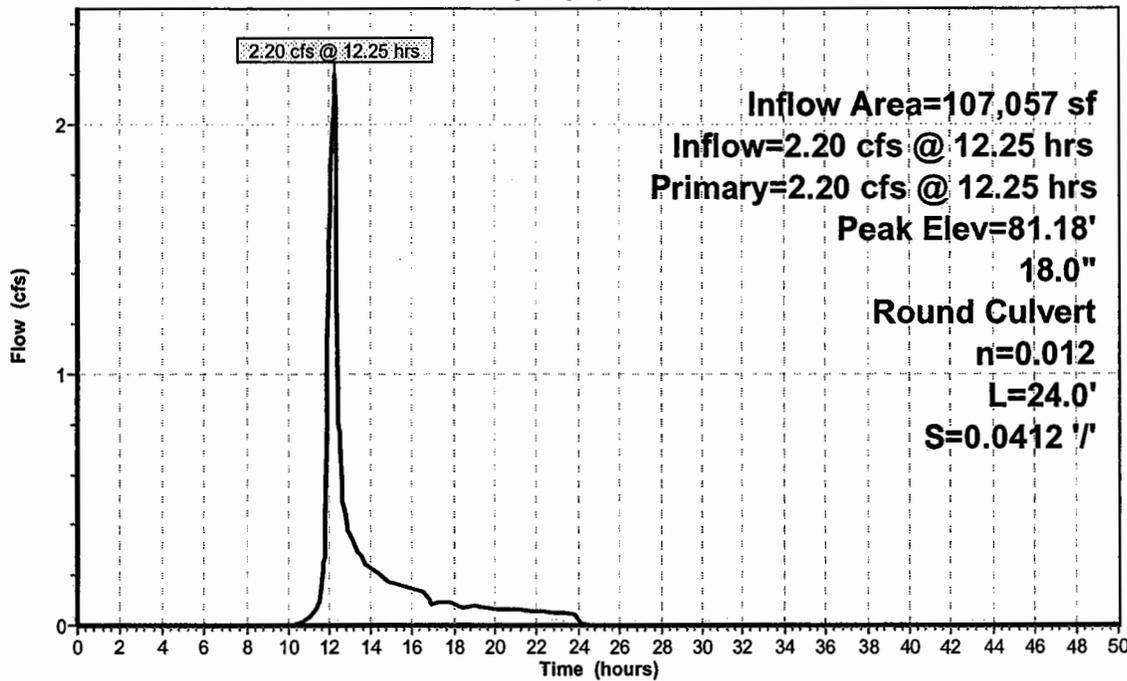
Flood Elev= 86.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	80.50'	<b>18.0" Round Culvert</b> 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:**

Hydrograph



**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

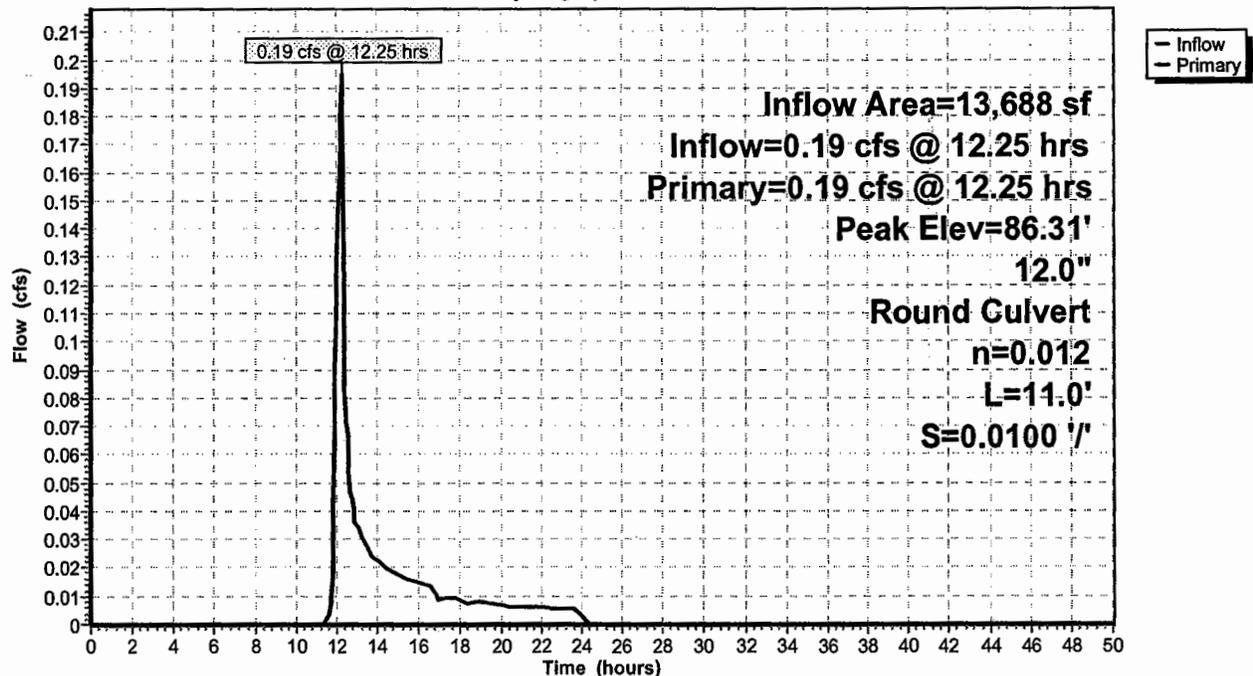
Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 86.31' @ 12.25 hrs  
 Flood Elev= 90.23'

Device	Routing	Invert	Outlet Devices
#1	Primary	86.08'	<b>12.0" Round Culvert</b> 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:**

Hydrograph



**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

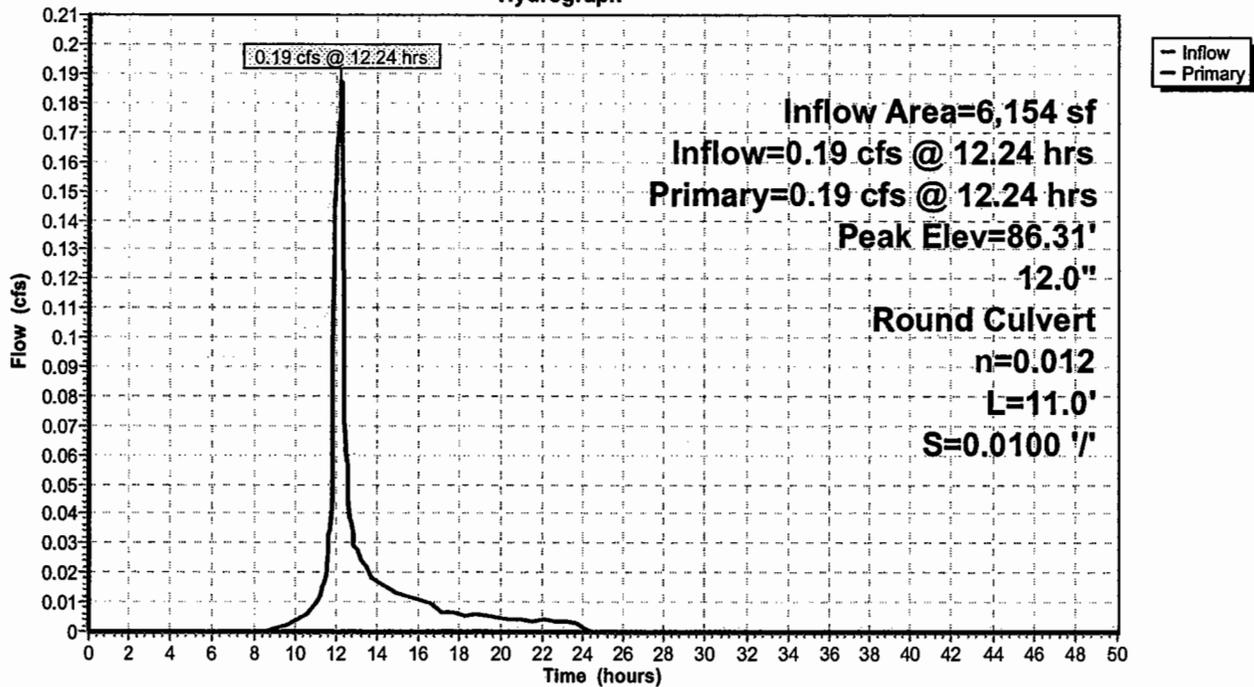
Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 86.31' @ 12.24 hrs  
 Flood Elev= 90.23'

Device	Routing	Invert	Outlet Devices
#1	Primary	86.08'	<b>12.0" Round Culvert</b> 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:**

Hydrograph



**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

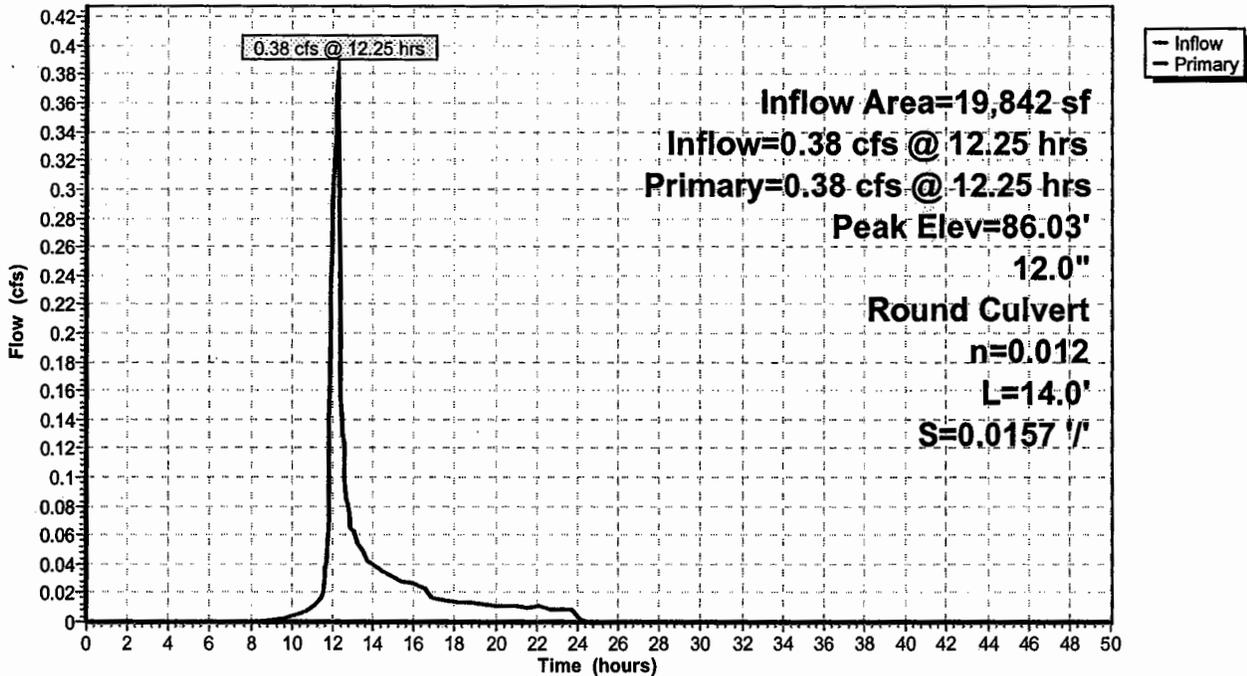
Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 86.03' @ 12.25 hrs  
 Flood Elev= 91.16'

Device	Routing	Invert	Outlet Devices
#1	Primary	85.72'	<b>12.0" Round Culvert</b> 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**

Hydrograph



**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

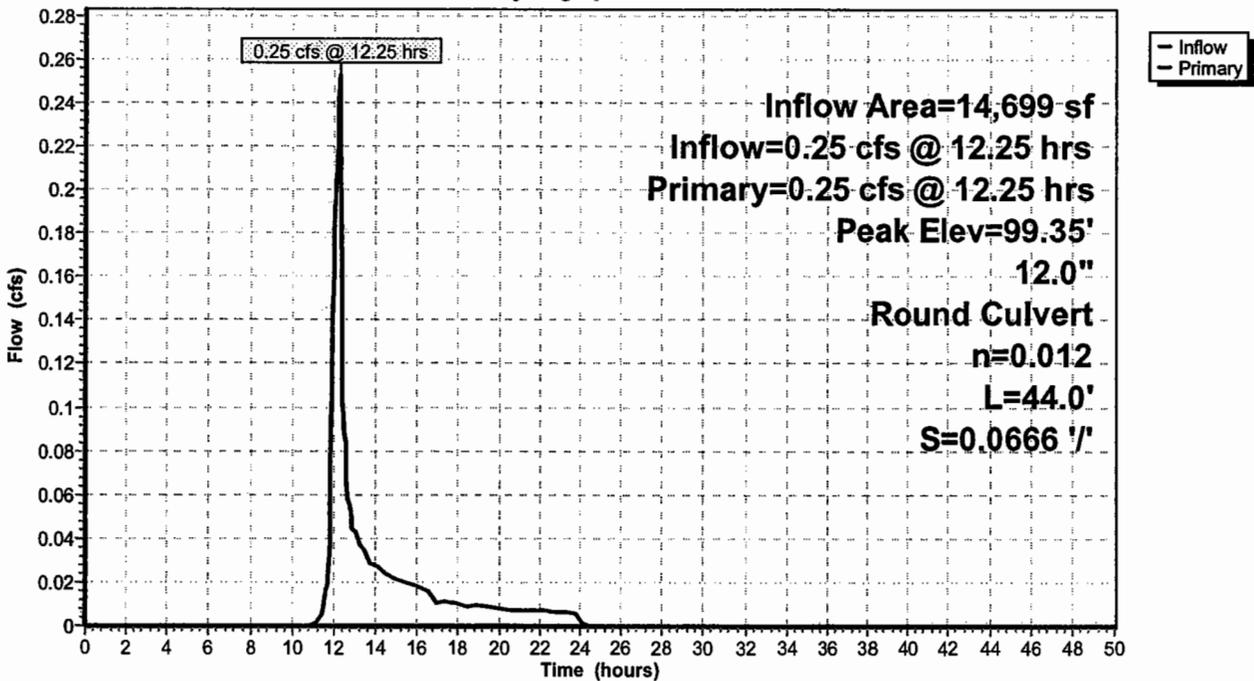
Flood Elev= 103.25'

Device #	Routing	Invert	Outlet Devices
#1	Primary	99.10'	<b>12.0" Round Culvert</b> 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=96.55' (Dynamic Tailwater)**  
 1=Culvert (Inlet Controls 0.25 cfs @ 1.69 fps)

**Pond 8A:**

Hydrograph



**Summary for Pond 8B:**

Inflow Area = 15,509 sf, 65.50% Impervious, Inflow Depth = 1.91" for 2yr event  
 Inflow = 0.55 cfs @ 12.23 hrs, Volume= 2,465 cf  
 Outflow = 0.55 cfs @ 12.23 hrs, Volume= 2,465 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 0.55 cfs @ 12.23 hrs, Volume= 2,465 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 96.77' @ 12.26 hrs

Flood Elev= 100.50'

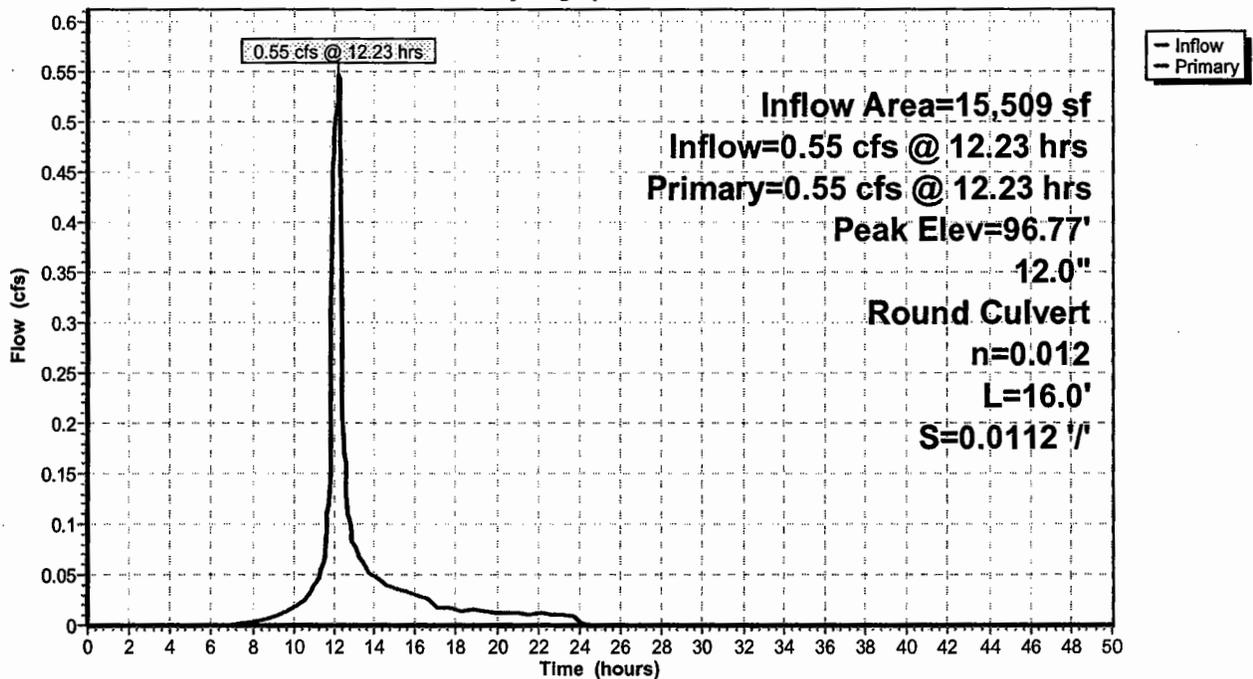
Device	Routing	Invert	Outlet Devices
#1	Primary	96.35'	<b>12.0" Round Culvert</b> L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.35' / 96.17' S= 0.0112 ' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.53 cfs @ 12.23 hrs HW=96.76' TW=96.53' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 0.53 cfs @ 2.59 fps)

**Pond 8B:**

Hydrograph



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## Summary for Pond 8C:

Inflow Area = 10,891 sf, 78.40% Impervious, Inflow Depth = 2.08" for 2yr event  
 Inflow = 0.41 cfs @ 12.23 hrs, Volume= 1,884 cf  
 Outflow = 0.41 cfs @ 12.23 hrs, Volume= 1,884 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 0.41 cfs @ 12.23 hrs, Volume= 1,884 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 99.77' @ 12.23 hrs

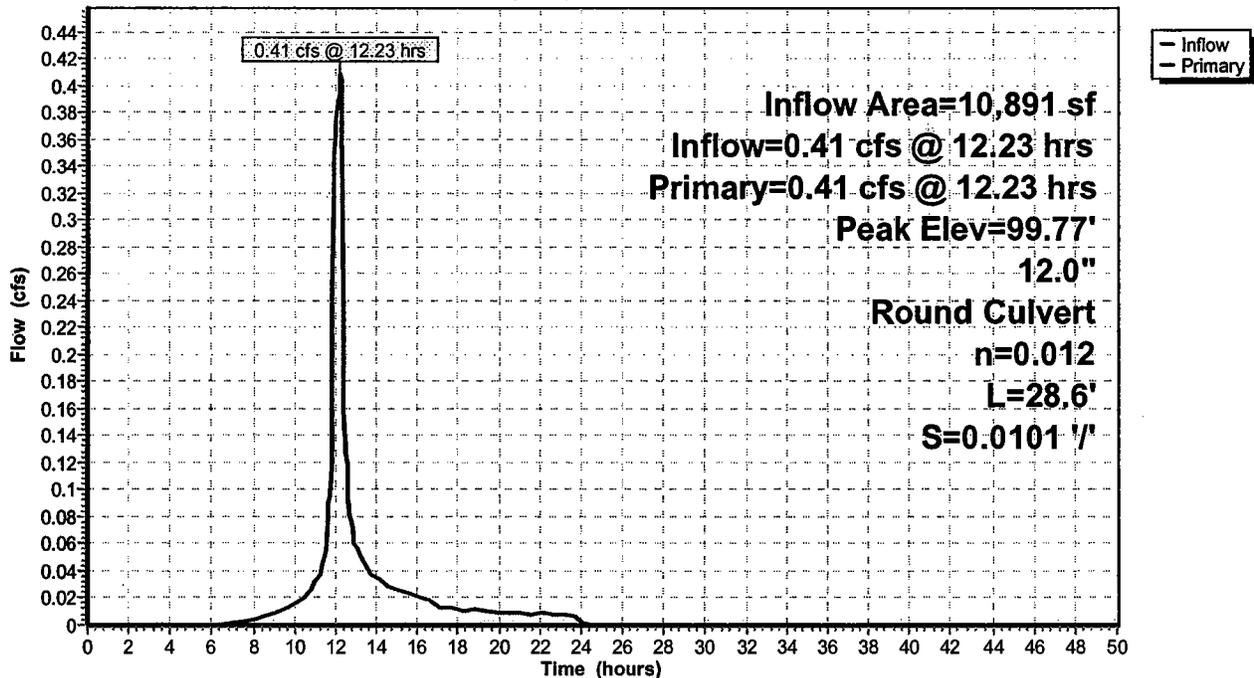
Flood Elev= 103.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	99.45'	<b>12.0" Round Culvert</b> L= 28.6' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 99.45' / 99.16' S= 0.0101 1' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.40 cfs @ 12.23 hrs HW=99.77' TW=96.53' (Dynamic Tailwater)  
 ←1=Culvert (Barrel Controls 0.40 cfs @ 2.76 fps)

## Pond 8C:

Hydrograph



**Summary for Pond 8D:**

Inflow Area = 41,099 sf, 52.02% Impervious, Inflow Depth = 1.58" for 2yr event  
 Inflow = 1.21 cfs @ 12.24 hrs, Volume= 5,413 cf  
 Outflow = 1.21 cfs @ 12.24 hrs, Volume= 5,413 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 1.21 cfs @ 12.24 hrs, Volume= 5,413 cf

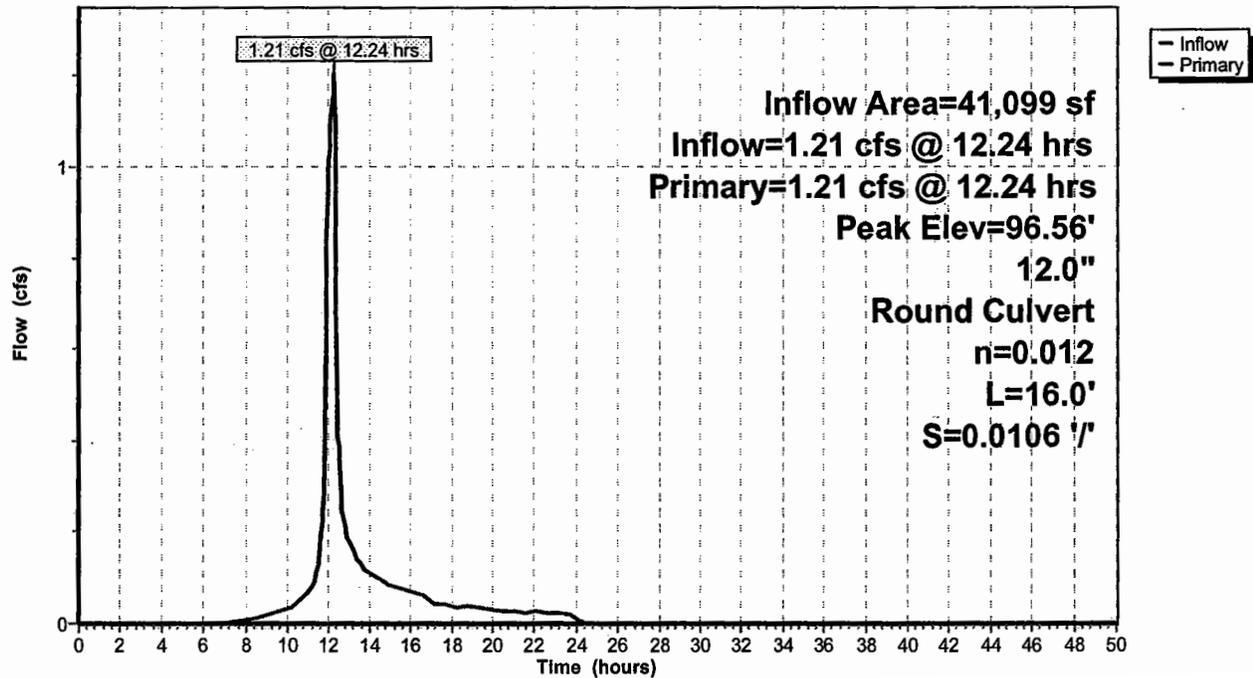
Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 96.56' @ 12.28 hrs  
 Flood Elev= 104.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	95.85'	<b>12.0" Round Culvert</b> L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.85' / 95.68' S= 0.0106 1/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.99 cfs @ 12.24 hrs HW=96.54' TW=96.36' (Dynamic Tailwater)  
 ↑=Culvert (Outlet Controls 0.99 cfs @ 2.42 fps)

**Pond 8D:**

Hydrograph



**Summary for Pond 8E: STORMCEPTOR**

Inflow Area = 41,099 sf, 52.02% Impervious, Inflow Depth = 1.58" for 2yr event  
 Inflow = 1.21 cfs @ 12.24 hrs, Volume= 5,413 cf  
 Outflow = 1.21 cfs @ 12.24 hrs, Volume= 5,413 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 1.21 cfs @ 12.24 hrs, Volume= 5,413 cf

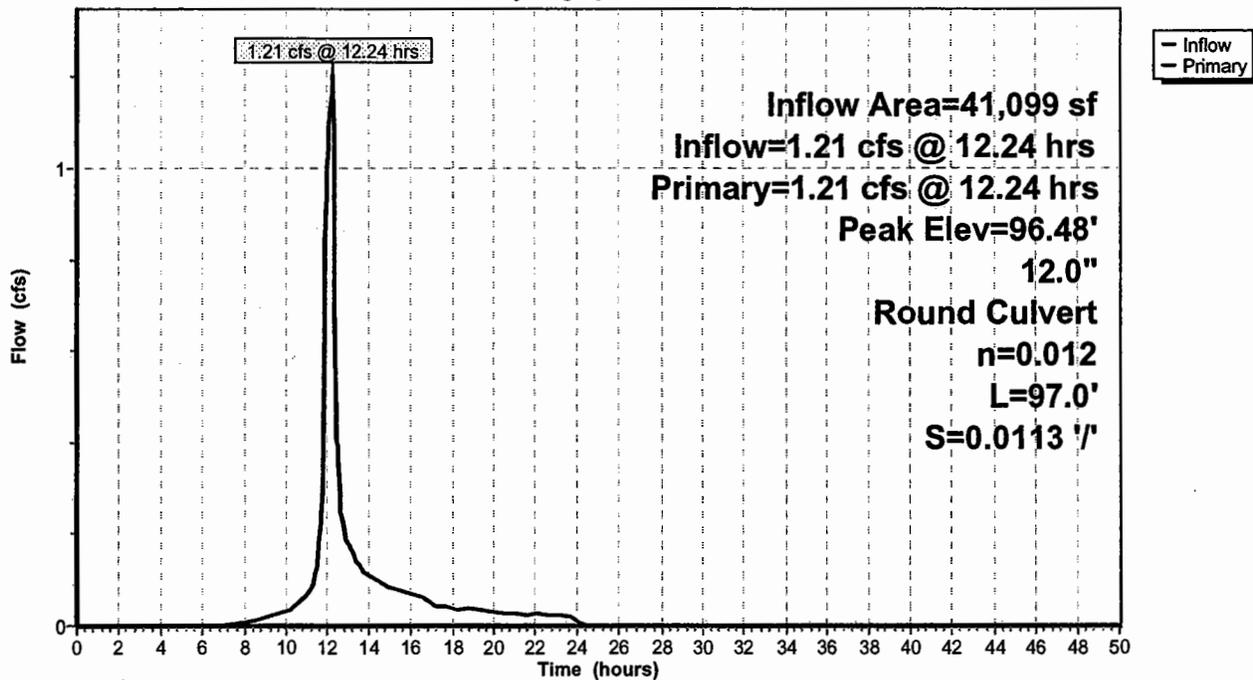
Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 96.48' @ 12.32 hrs  
 Flood Elev= 105.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	95.60'	<b>12.0" Round Culvert</b> L= 97.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 95.60' / 94.50' S= 0.0113 '/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=1.20 cfs @ 12.24 hrs HW=96.36' TW=95.96' (Dynamic Tailwater)  
 ←1=Culvert (Outlet Controls 1.20 cfs @ 2.60 fps)

**Pond 8E: STORMCEPTOR**

Hydrograph



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**Summary for Pond 13A:**

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

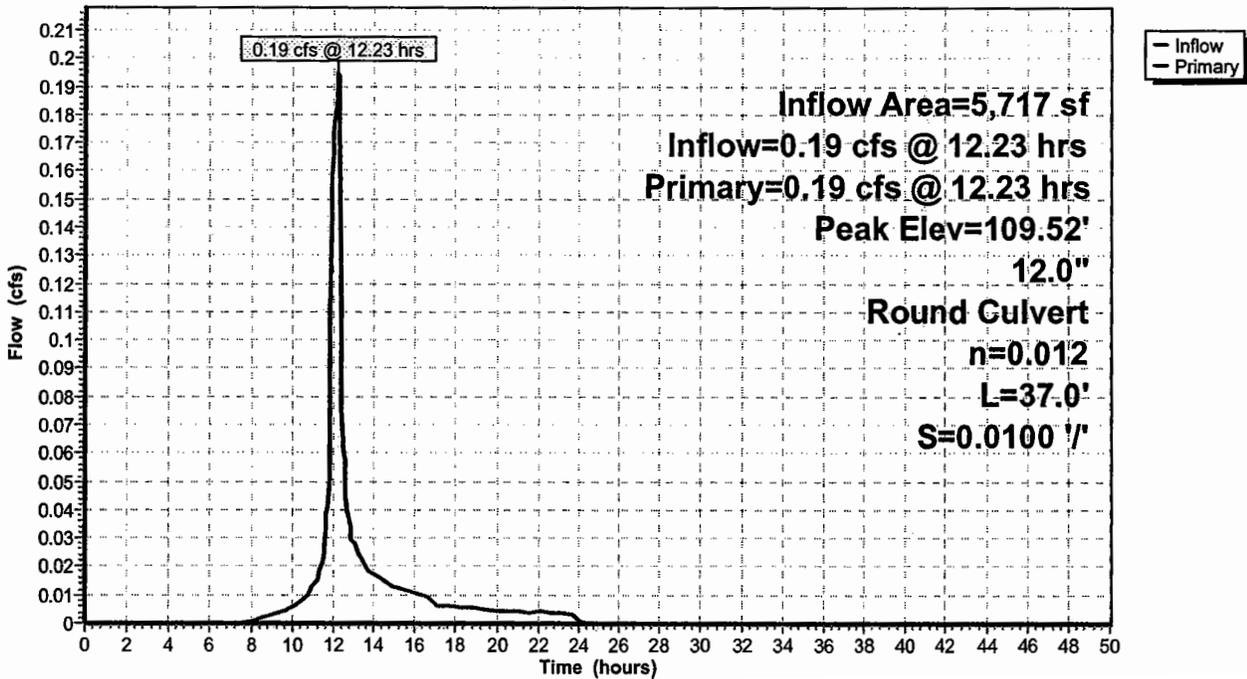
Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 109.52' @ 12.23 hrs  
 Flood Elev= 112.50'

Device #	Routing	Invert	Outlet Devices
#1	Primary	109.30'	<b>12.0" Round Culvert</b> L= 37.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 109.30' / 108.93' S= 0.0100 '/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.19 cfs @ 12.23 hrs HW=109.51' TW=109.06' (Dynamic Tailwater)  
 1=Culvert (Barrel Controls 0.19 cfs @ 2.36 fps)

**Pond 13A:**

Hydrograph



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## Summary for Pond 13B: 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= 109.06' @ 12.23 hrs

Flood Elev= 113.00'

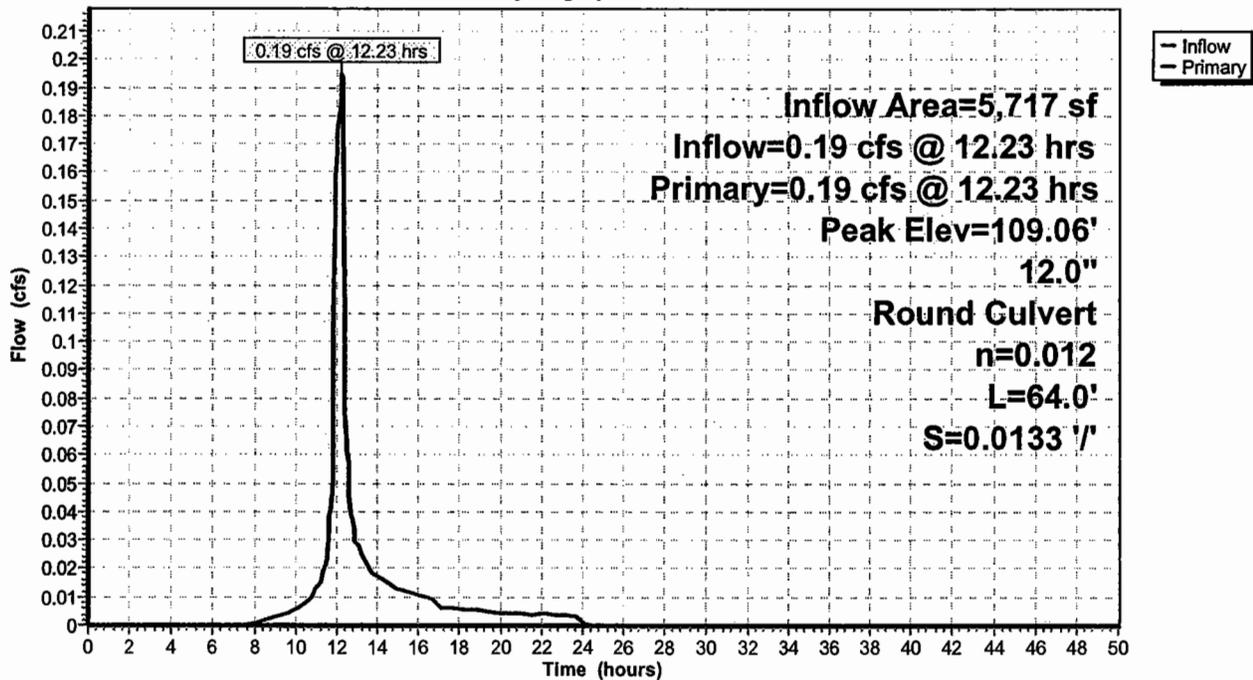
Device	Routing	Invert	Outlet Devices
#1	Primary	108.85'	<b>12.0" Round Culvert</b> L= 64.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 108.85' / 108.00' S= 0.0133 '/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.19 cfs @ 12.23 hrs HW=109.06' TW=94.05' (Dynamic Tailwater)

←1=Culvert (Inlet Controls 0.19 cfs @ 1.57 fps)

## Pond 13B: STORMCEPTOR

Hydrograph



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**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

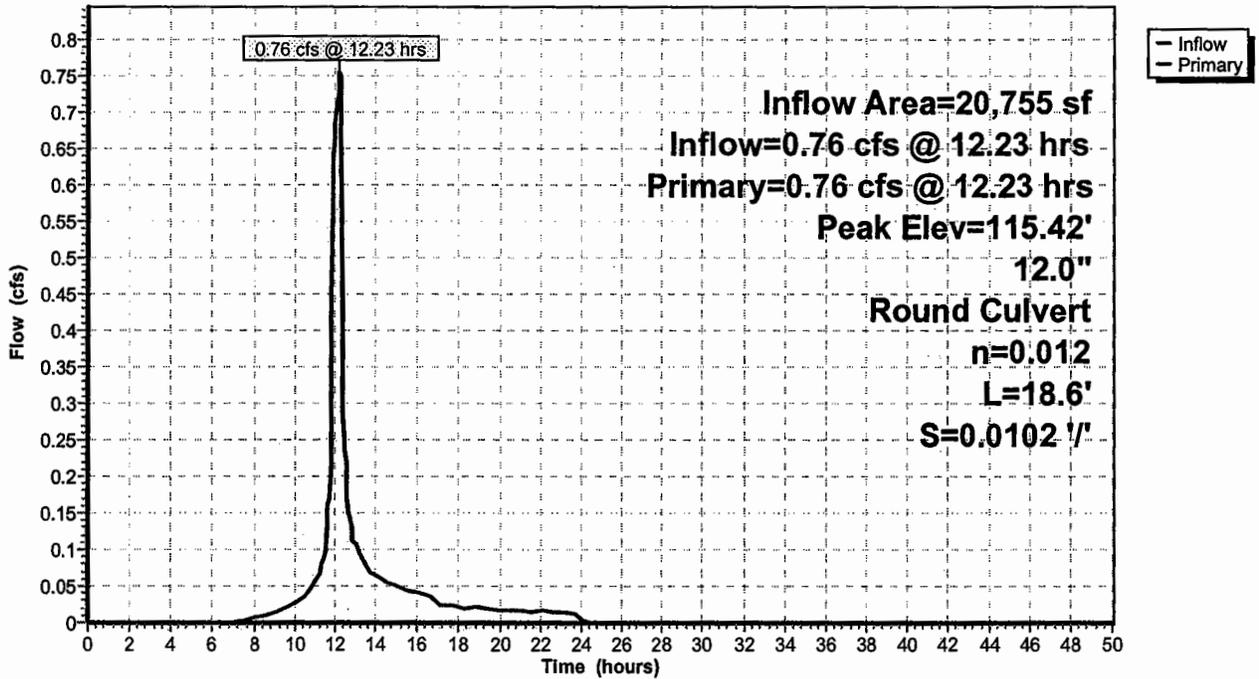
Flood Elev= 119.00'

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

Primary OutFlow Max=0.74 cfs @ 12.23 hrs HW=115.41' TW=115.23' (Dynamic Tailwater)  
 ←1=Culvert (Outlet Controls 0.74 cfs @ 2.36 fps)

**Pond 56A:**

Hydrograph



**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

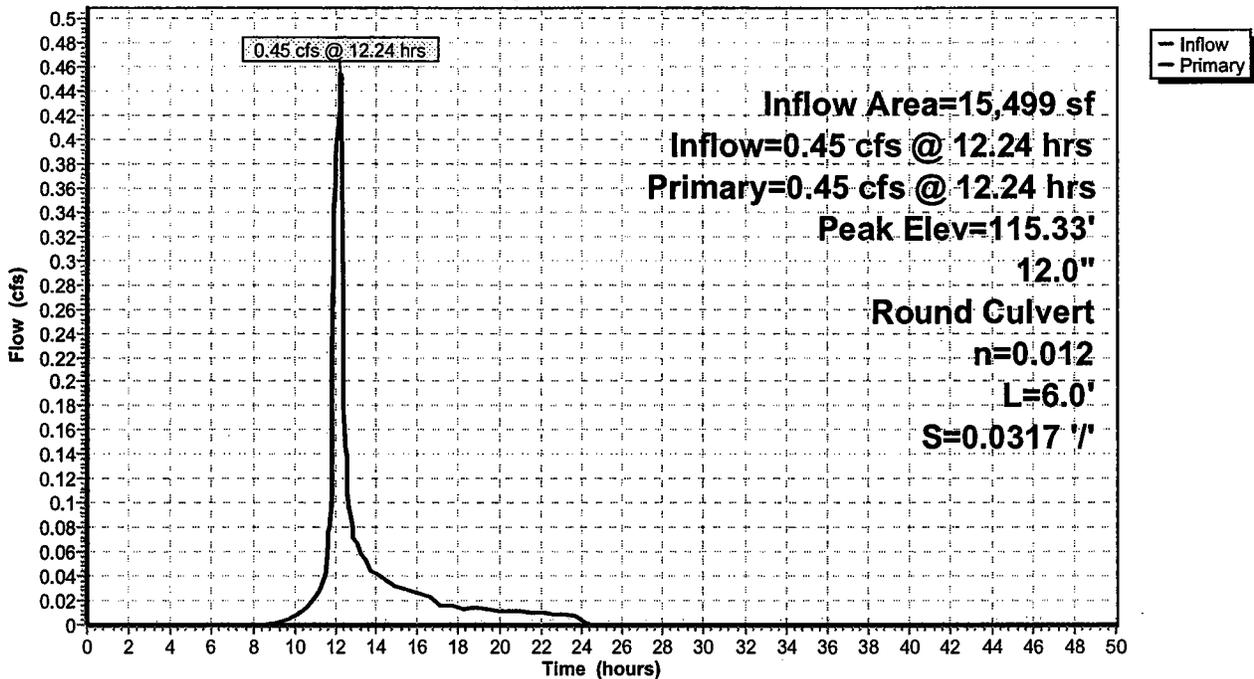
Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 115.33' @ 12.24 hrs  
 Flood Elev= 119.00'

Device #	Routing	Invert	Outlet Devices
#1	Primary	114.85'	<b>12.0" Round Culvert</b> 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 @ 1.80 fps)

**Pond 56B:**

Hydrograph



**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

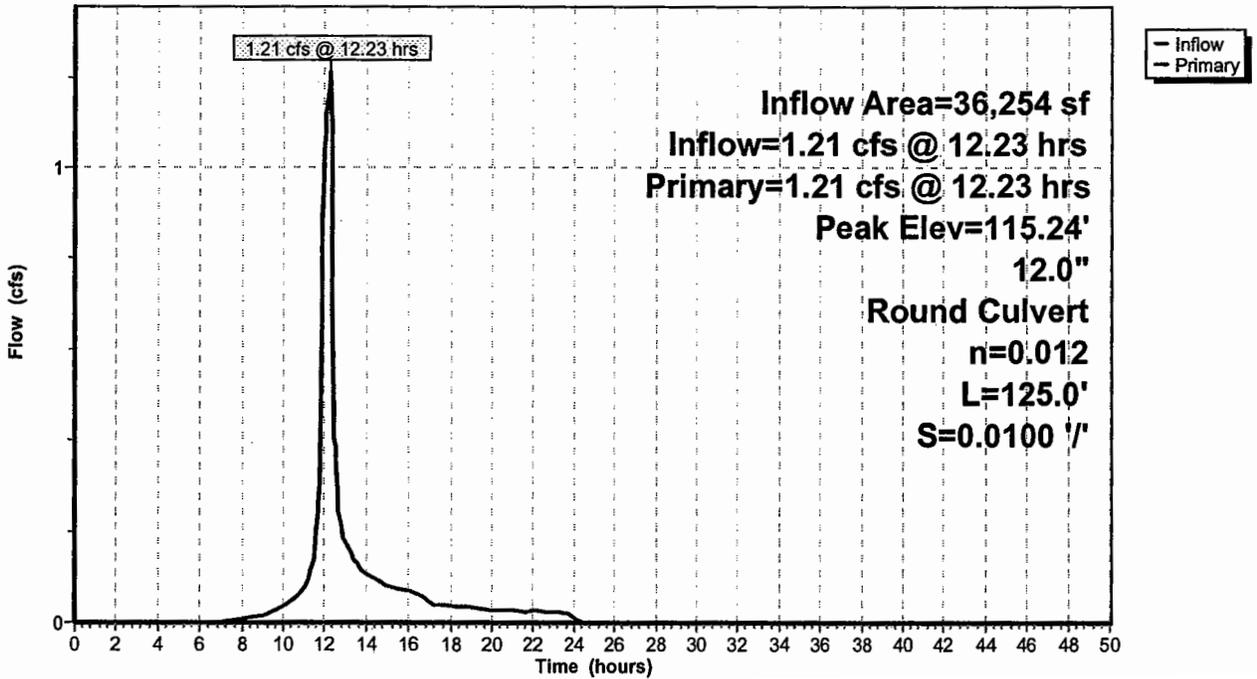
Flood Elev= 119.50'

Device #	Routing	Invert	Outlet Devices
#1	Primary	114.66'	<b>12.0" Round Culvert</b> 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=114.11' (Dynamic Tailwater)**  
 ← **1=Culvert (Outlet Controls 1.19 cfs @ 3.69 fps)**

**Pond 56C: DMH**

Hydrograph



**Summary for Pond 56D: DMH**

Inflow Area = 48,144 sf, 59.42% Impervious, Inflow Depth = 1.93" for 2yr event  
 Inflow = 1.69 cfs @ 12.23 hrs, Volume= 7,744 cf  
 Outflow = 1.69 cfs @ 12.23 hrs, Volume= 7,744 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 1.69 cfs @ 12.23 hrs, Volume= 7,744 cf

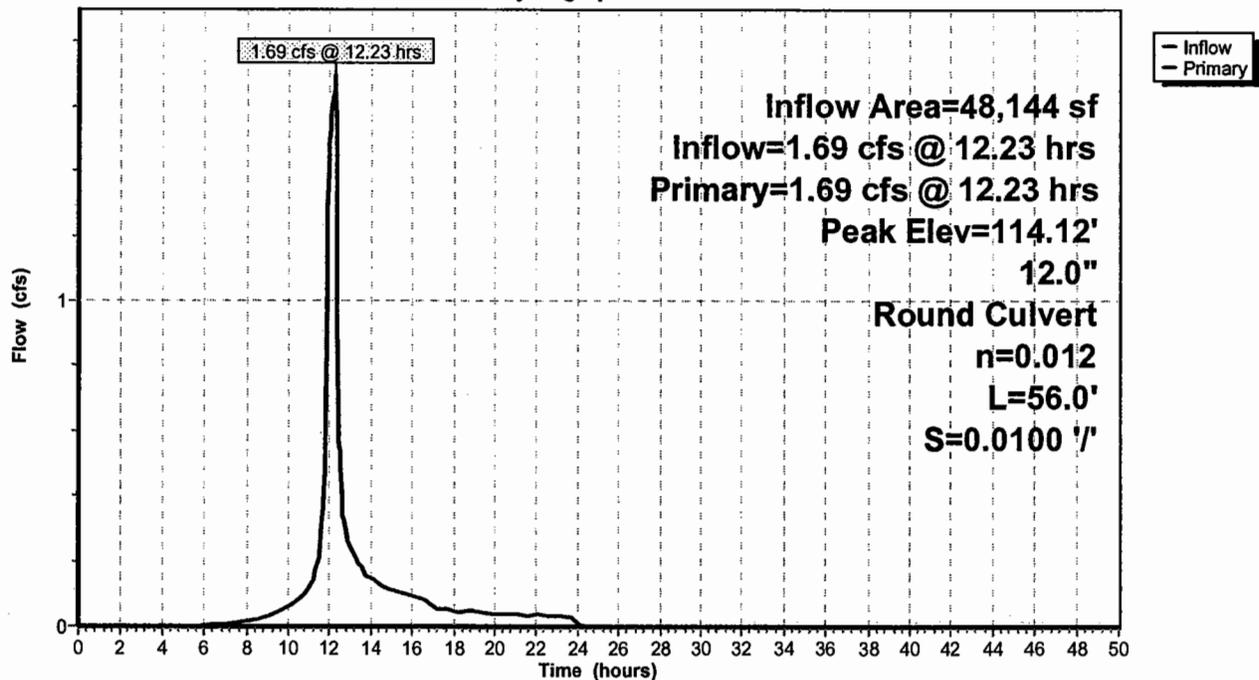
Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 114.12' @ 12.23 hrs  
 Flood Elev= 120.53'

Device	Routing	Invert	Outlet Devices
#1	Primary	113.41'	<b>12.0" Round Culvert</b> 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=1.67 cfs @ 12.23 hrs HW=114.11' TW=113.28' (Dynamic Tailwater)**  
 1=Culvert (Inlet Controls 1.67 cfs @ 2.85 fps)

**Pond 56D: DMH**

Hydrograph



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## Summary for Pond 56E:

Inflow Area = 8,851 sf, 37.76% Impervious, Inflow Depth = 1.53" for 2yr event  
Inflow = 0.26 cfs @ 12.24 hrs, Volume= 1,127 cf  
Outflow = 0.26 cfs @ 12.24 hrs, Volume= 1,127 cf, Atten= 0%, Lag= 0.0 min  
Primary = 0.26 cfs @ 12.24 hrs, Volume= 1,127 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 115.98' @ 12.24 hrs

Flood Elev= 119.87'

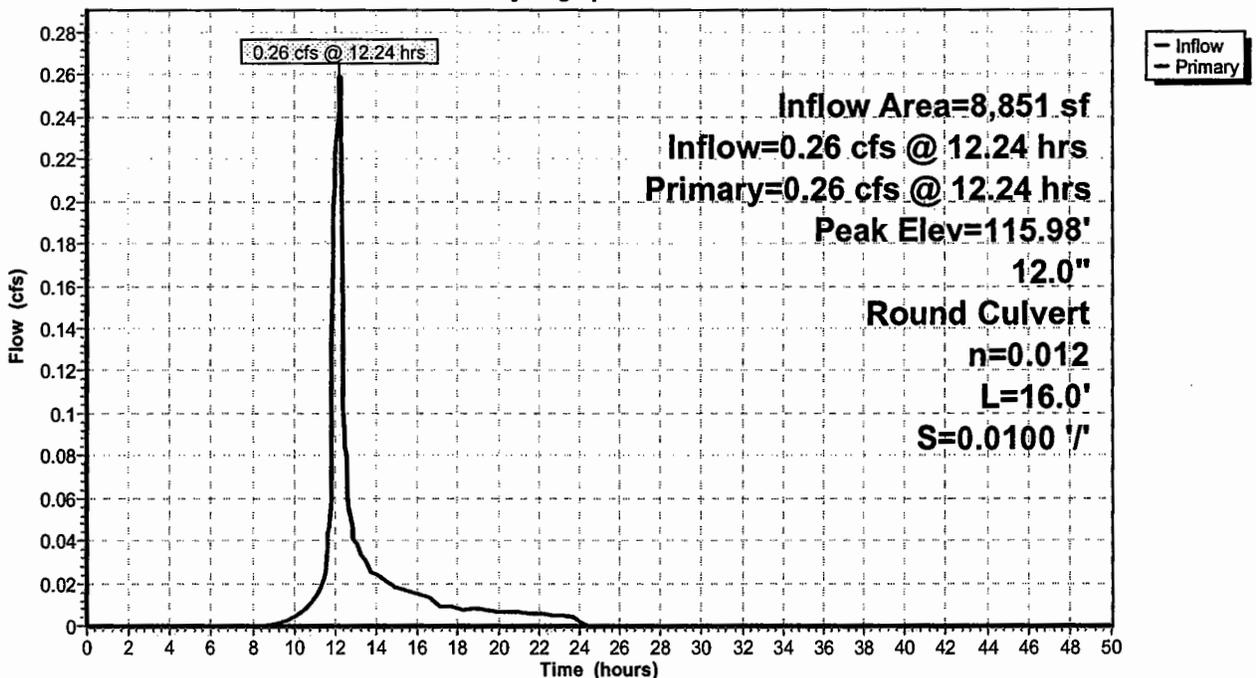
Device	Routing	Invert	Outlet Devices
#1	Primary	115.72'	<b>12.0" Round Culvert</b> L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 115.72' / 115.56' S= 0.0100 '/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.26 cfs @ 12.24 hrs HW=115.98' TW=113.28' (Dynamic Tailwater)

↑1=Culvert (Barrel Controls 0.26 cfs @ 2.34 fps)

## Pond 56E:

Hydrograph



**Summary for Pond 56F: DMH**

Inflow Area = 56,995 sf, 56.05% Impervious, Inflow Depth = 1.87" for 2yr event  
 Inflow = 1.95 cfs @ 12.23 hrs, Volume= 8,870 cf  
 Outflow = 1.95 cfs @ 12.23 hrs, Volume= 8,870 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 1.95 cfs @ 12.23 hrs, Volume= 8,870 cf

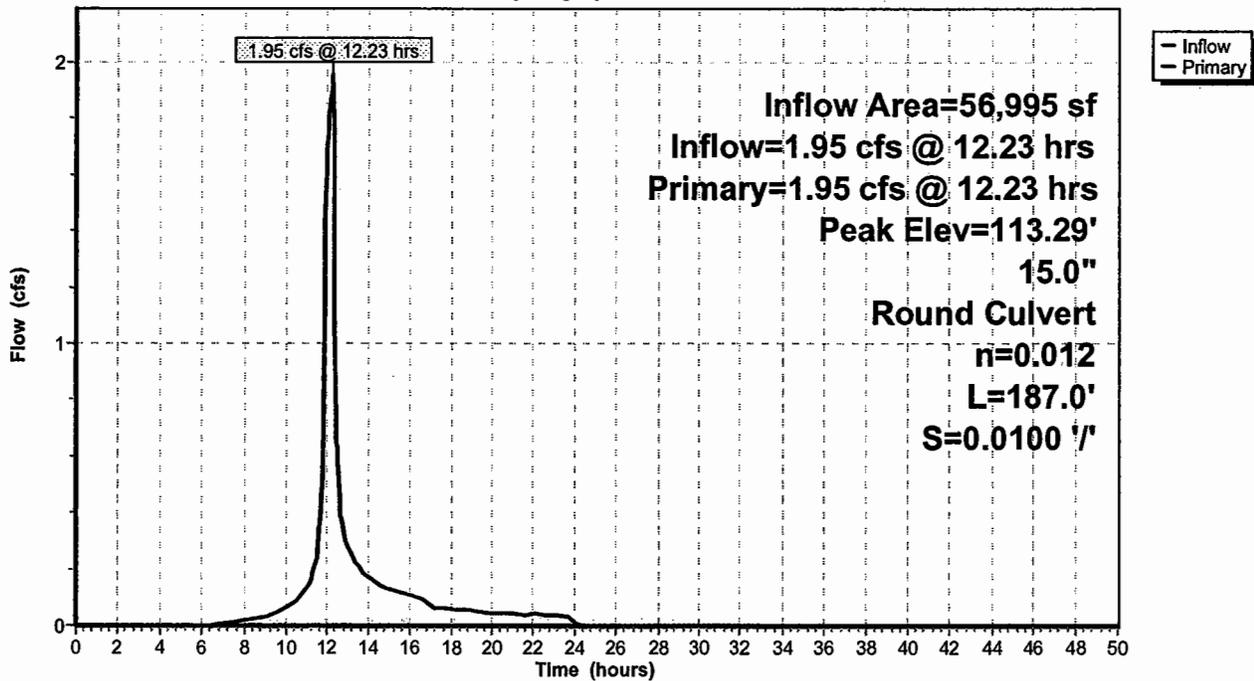
Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 113.29' @ 12.23 hrs  
 Flood Elev= 119.84'

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

Primary OutFlow Max=1.93 cfs @ 12.23 hrs HW=113.28' TW=111.54' (Dynamic Tailwater)  
 ←1=Culvert (Inlet Controls 1.93 cfs @ 2.81 fps)

**Pond 56F: DMH**

Hydrograph



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**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'

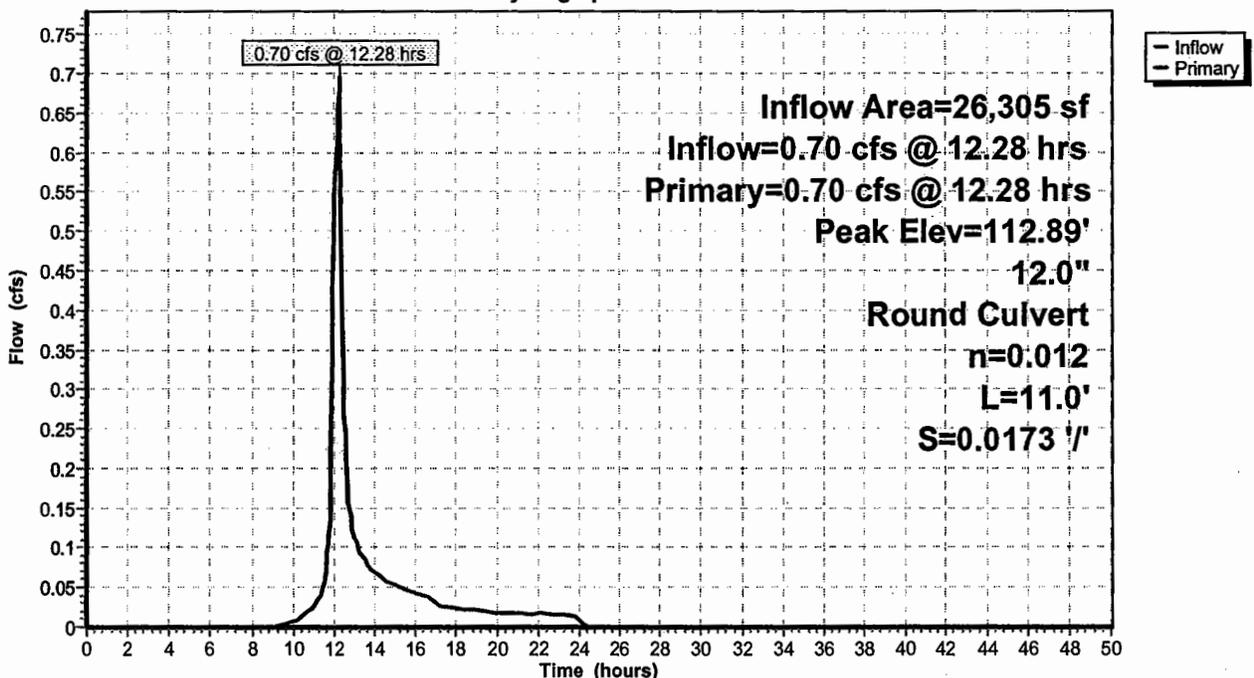
Device #	Routing	Invert	Outlet Devices
#1	Primary	112.46'	<b>12.0" Round Culvert</b> L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 112.46' / 112.27' S= 0.0173 '/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

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:**

Hydrograph



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## Summary for Pond 56H: DMH

Inflow Area = 83,300 sf, 48.09% Impervious, Inflow Depth = 1.72" for 2yr event  
Inflow = 2.63 cfs @ 12.24 hrs, Volume= 11,919 cf  
Outflow = 2.63 cfs @ 12.24 hrs, Volume= 11,919 cf, Atten= 0%, Lag= 0.0 min  
Primary = 2.63 cfs @ 12.24 hrs, Volume= 11,919 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'

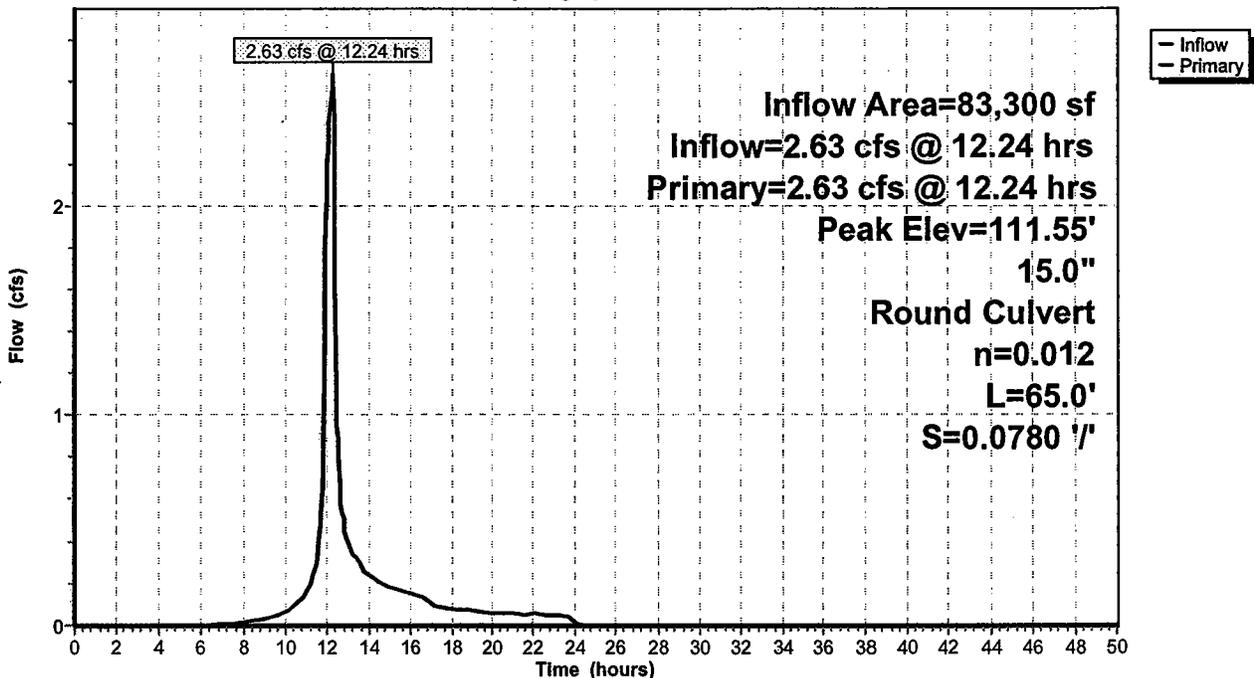
Device	Routing	Invert	Outlet Devices
#1	Primary	110.73'	<b>15.0" Round Culvert</b> L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 110.73' / 105.66' S= 0.0780 '/ Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=2.61 cfs @ 12.24 hrs HW=111.55' TW=106.35' (Dynamic Tailwater)

←1=Culvert (Inlet Controls 2.61 cfs @ 3.07 fps)

## Pond 56H: DMH

Hydrograph



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**Summary for Pond 56i:**

Inflow Area = 12,798 sf, 58.37% Impervious, Inflow Depth = 1.91" for 2yr event  
 Inflow = 0.45 cfs @ 12.23 hrs, Volume= 2,034 cf  
 Outflow = 0.45 cfs @ 12.23 hrs, Volume= 2,034 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 0.45 cfs @ 12.23 hrs, Volume= 2,034 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 106.38' @ 12.24 hrs

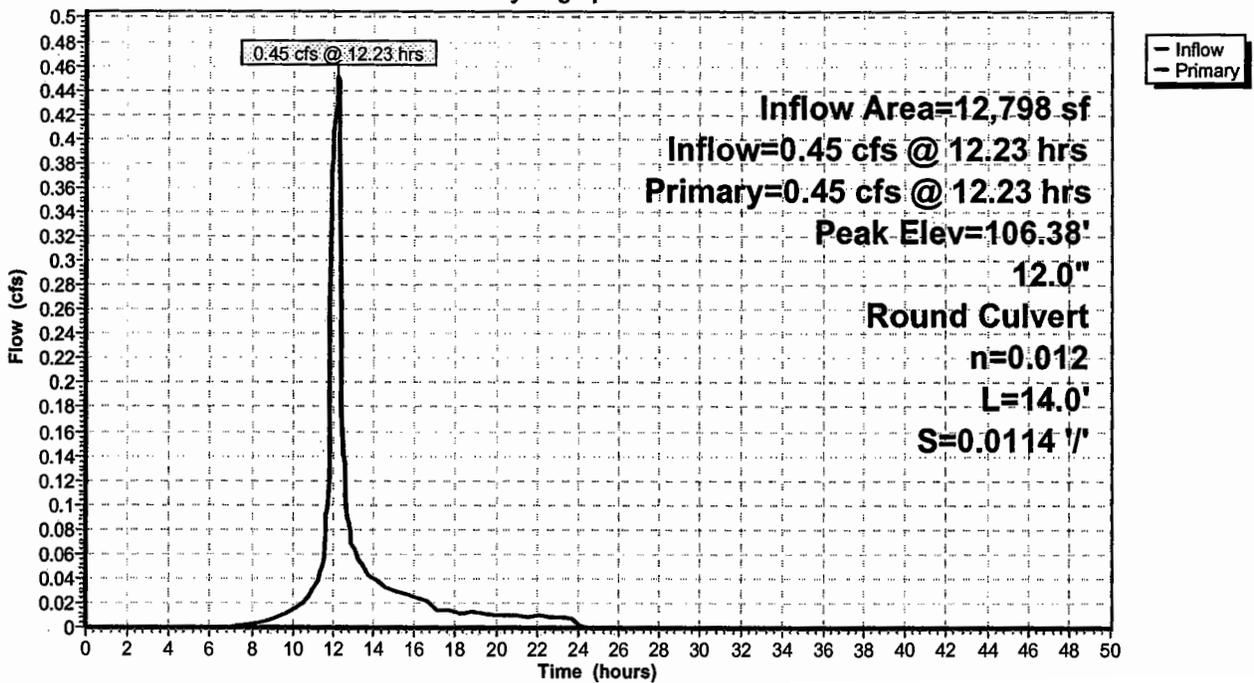
Flood Elev= 109.83'

Device #	Routing	Invert	Outlet Devices
#1	Primary	105.68'	<b>12.0" Round Culvert</b> L= 14.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 105.68' / 105.52' S= 0.0114 1/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.41 cfs @ 12.23 hrs HW=106.38' TW=106.35' (Dynamic Tailwater)  
 1=Culvert (Outlet Controls 0.41 cfs @ 0.98 fps)

**Pond 56i:**

Hydrograph



**Summary for Pond 56J: STORMCEPTOR**

Inflow Area = 112,745 sf, 52.83% Impervious, Inflow Depth = 1.80" for 2yr event  
 Inflow = 3.72 cfs @ 12.24 hrs, Volume= 16,956 cf  
 Outflow = 3.72 cfs @ 12.24 hrs, Volume= 16,956 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 3.72 cfs @ 12.24 hrs, Volume= 16,956 cf

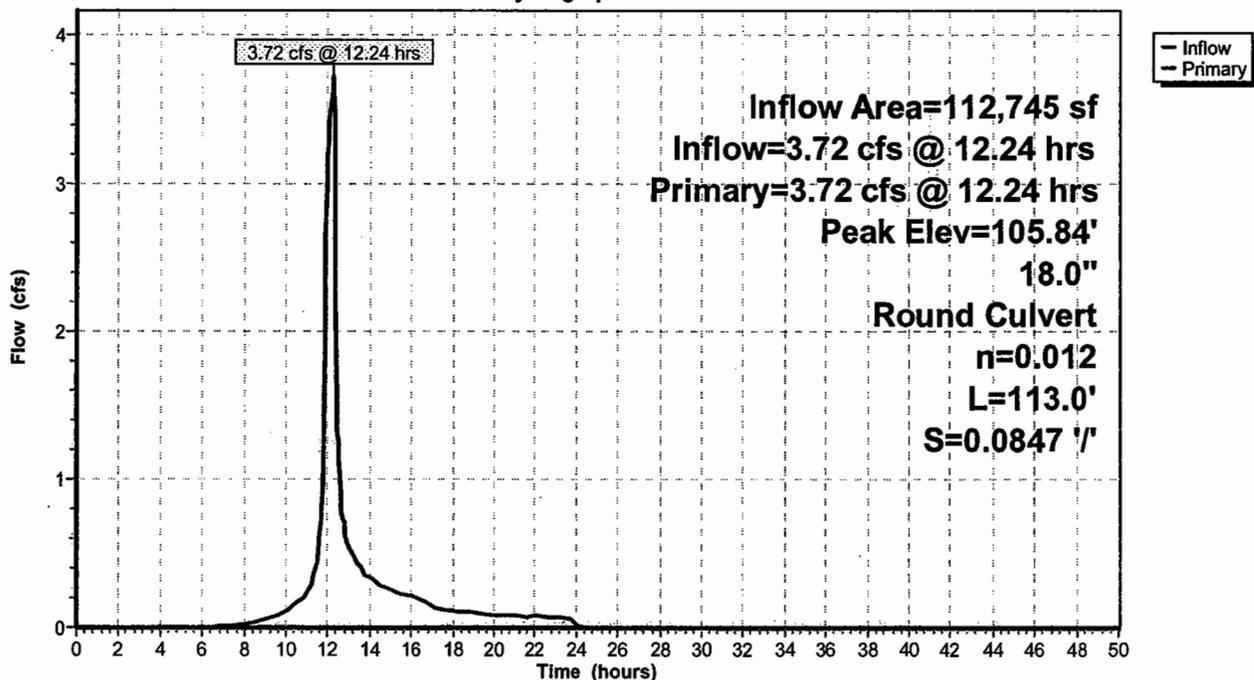
Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 105.84' @ 12.24 hrs  
 Flood Elev= 109.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	104.92'	<b>18.0" Round 95.35</b> L= 113.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 104.92' / 95.35' S= 0.0847 ' / Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

**Primary OutFlow Max=3.68 cfs @ 12.24 hrs HW=105.84' TW=96.15' (Dynamic Tailwater)**  
 ↳ **1=95.35 (Inlet Controls 3.68 cfs @ 3.26 fps)**

**Pond 56J: STORMCEPTOR**

Hydrograph



**Summary for Pond 56K: DMH**

Inflow Area = 112,745 sf, 52.83% Impervious, Inflow Depth = 1.80" for 2yr event  
 Inflow = 3.72 cfs @ 12.24 hrs, Volume= 16,956 cf  
 Outflow = 3.72 cfs @ 12.24 hrs, Volume= 16,956 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 2.07 cfs @ 12.24 hrs, Volume= 9,040 cf  
 Secondary = 1.65 cfs @ 12.24 hrs, Volume= 7,916 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 96.16' @ 12.24 hrs

Flood Elev= 100.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	95.35'	<b>12.0" Round Culvert</b> 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'	<b>10.0" Round Culvert</b> 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=2.05 cfs @ 12.24 hrs HW=96.15' TW=93.43' (Dynamic Tailwater)**

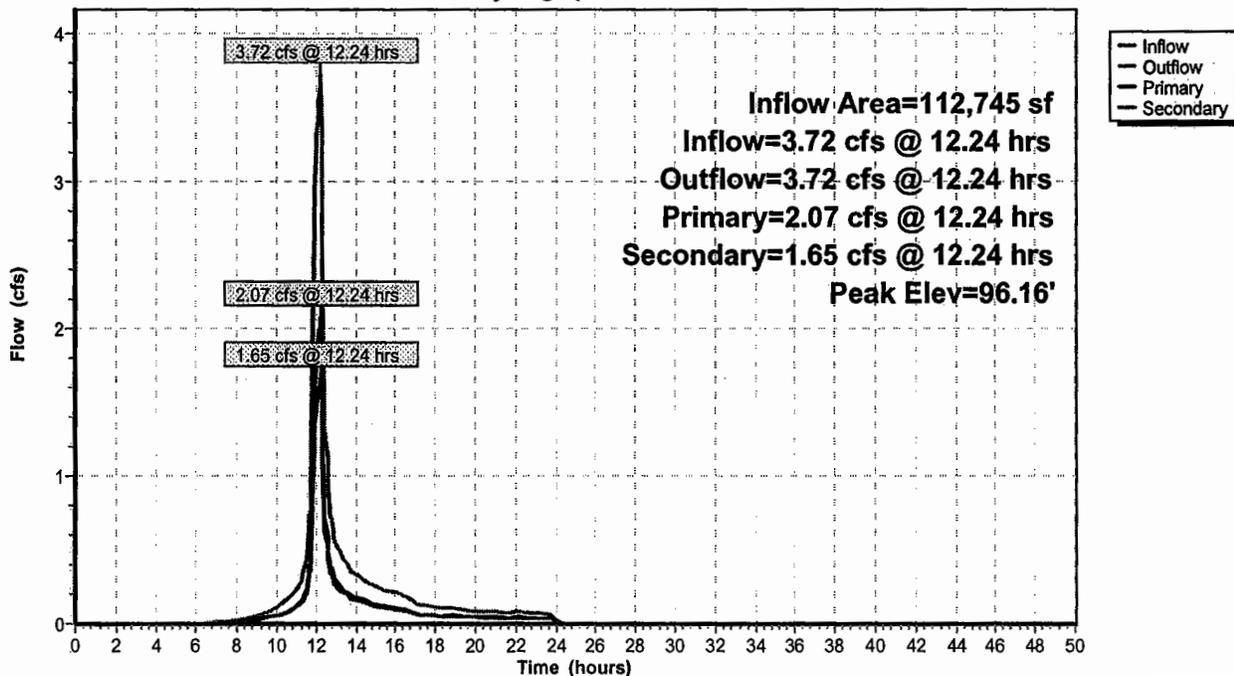
↳1=Culvert (Inlet Controls 2.05 cfs @ 3.04 fps)

**Secondary OutFlow Max=1.64 cfs @ 12.24 hrs HW=96.15' TW=85.41' (Dynamic Tailwater)**

↳2=Culvert (Inlet Controls 1.64 cfs @ 3.04 fps)

**Pond 56K: DMH**

Hydrograph



**JOHNSON WOODS PHASE 2 PROPOSED R2**

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**Summary for Pond 56L:**

Inflow Area = 11,890 sf, 78.15% Impervious, Inflow Depth = 2.35" for 2yr event  
 Inflow = 0.48 cfs @ 12.25 hrs, Volume= 2,328 cf  
 Outflow = 0.48 cfs @ 12.25 hrs, Volume= 2,328 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 0.48 cfs @ 12.25 hrs, Volume= 2,328 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 116.81' @ 12.25 hrs

Flood Elev= 120.62'

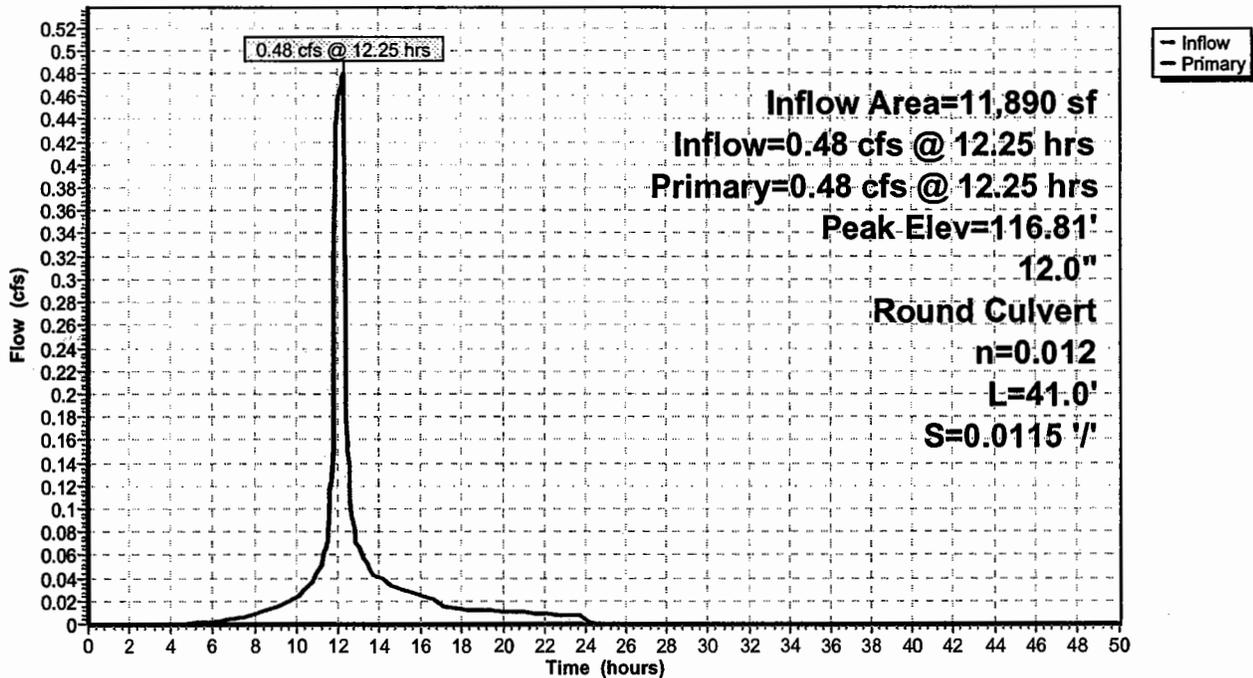
Device	Routing	Invert	Outlet Devices
#1	Primary	116.47'	<b>12.0" Round Culvert</b> L= 41.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 116.47' / 116.00' S= 0.0115 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.48 cfs @ 12.25 hrs HW=116.81' TW=114.11' (Dynamic Tailwater)

←1=Culvert (Inlet Controls 0.48 cfs @ 2.00 fps)

**Pond 56L:**

Hydrograph



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**Summary for Pond 56M:**

Inflow Area = 16,647 sf, 72.30% Impervious, Inflow Depth = 2.16" for 2yr event  
 Inflow = 0.64 cfs @ 12.23 hrs, Volume= 3,003 cf  
 Outflow = 0.64 cfs @ 12.23 hrs, Volume= 3,003 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 0.64 cfs @ 12.23 hrs, Volume= 3,003 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 107.36' @ 12.23 hrs

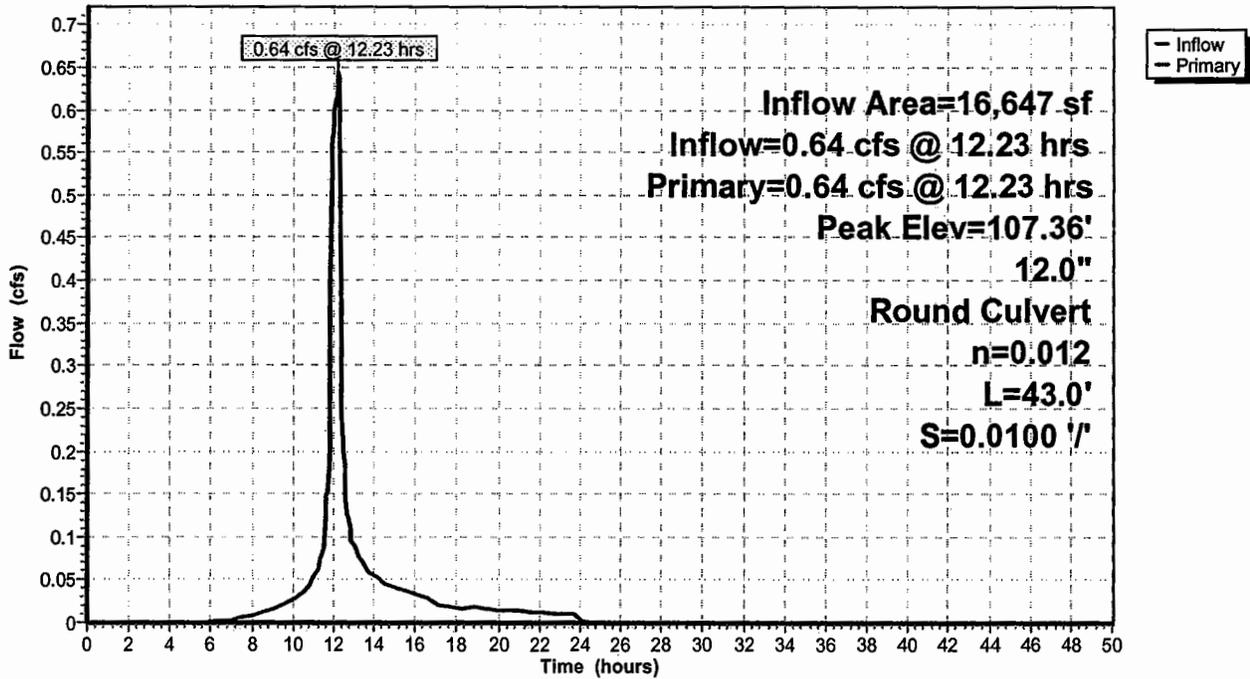
Flood Elev= 111.10'

Device #	Routing	Invert	Outlet Devices
#1	Primary	106.95'	<b>12.0" Round Culvert</b> L= 43.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 106.95' / 106.52' S= 0.0100 '/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.63 cfs @ 12.23 hrs HW=107.35' TW=106.35' (Dynamic Tailwater)  
 ↳1=Culvert (Barrel Controls 0.63 cfs @ 3.17 fps)

**Pond 56M:**

Hydrograph



**Summary for Pond 56N:**

Inflow Area = 112,745 sf, 52.83% Impervious, Inflow Depth = 1.80" for 2yr event  
 Inflow = 3.72 cfs @ 12.24 hrs, Volume= 16,956 cf  
 Outflow = 3.72 cfs @ 12.24 hrs, Volume= 16,956 cf, Atten= 0%, Lag= 0.0 min  
 Primary = 3.72 cfs @ 12.24 hrs, Volume= 16,956 cf

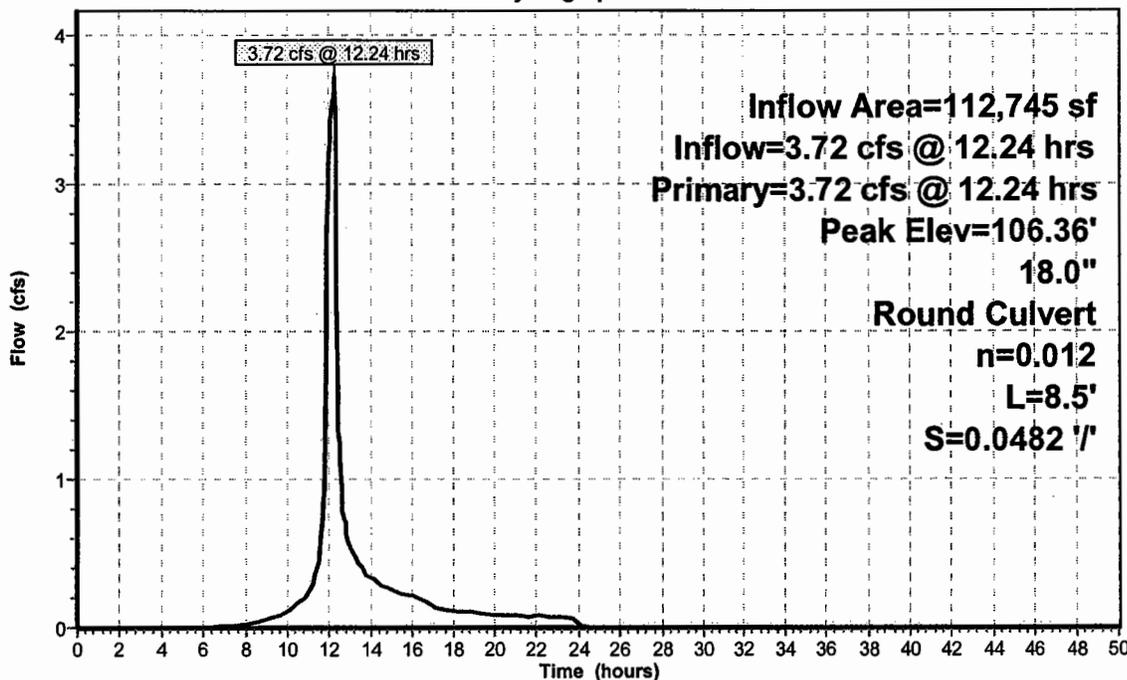
Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 106.36' @ 12.24 hrs  
 Flood Elev= 110.96'

Device	Routing	Invert	Outlet Devices
#1	Primary	105.41'	<b>18.0" Round Culvert</b> L= 8.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 105.41' / 105.00' S= 0.0482 ' /' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf

**Primary OutFlow Max=3.68 cfs @ 12.24 hrs HW=106.35' TW=105.84' (Dynamic Tailwater)**  
 ↳ **1=Culvert (Outlet Controls 3.68 cfs @ 4.50 fps)**

**Pond 56N:**

Hydrograph



**Summary for Pond CB13: 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

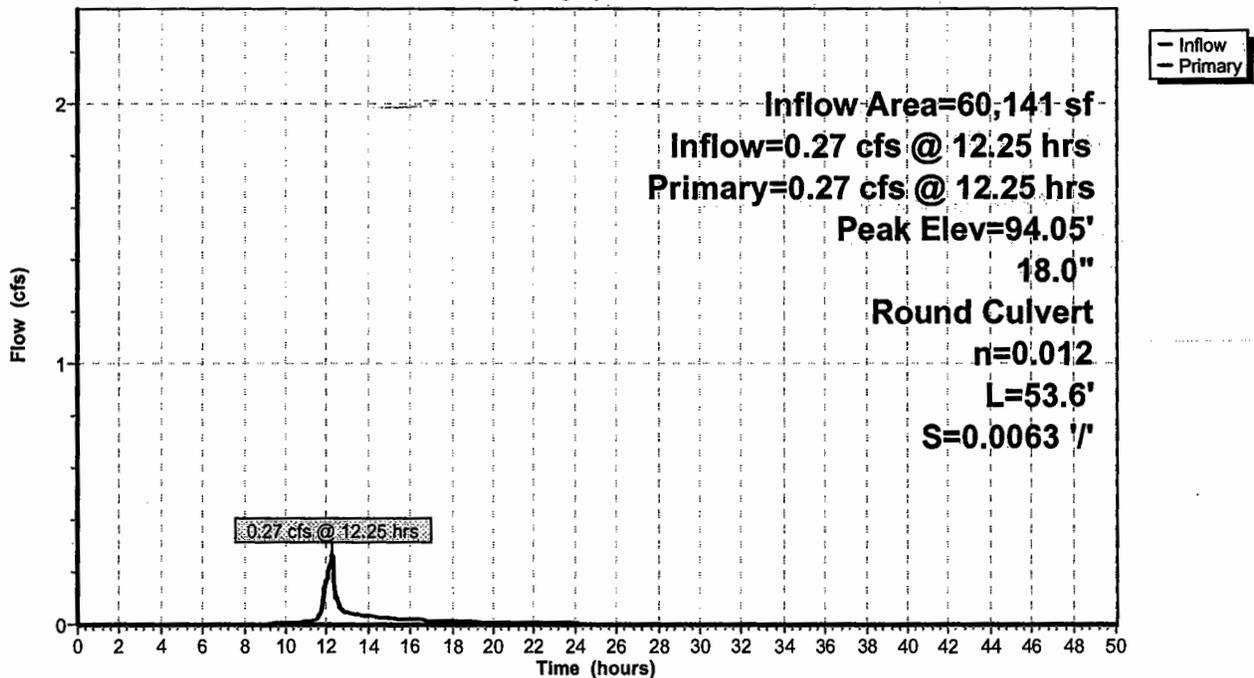
Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2  
 Peak Elev= 94.05' @ 12.25 hrs  
 Flood Elev= 100.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	93.81'	<b>18.0" Round Culvert</b> 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 CB13: Exist CB @ Inwood Dr.**

Hydrograph



**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	<b>134.00'W x 78.00'L x 5.50'H Prismatic</b> 57,486 cf Overall - 17,970 cf Embedded = 39,516 cf x 35.0% Voids
#2	88.50'	17,970 cf	<b>48.0" D x 130.0'L Pipe Storage</b> x 11 Inside #1
		31,801 cf	Total Available Storage

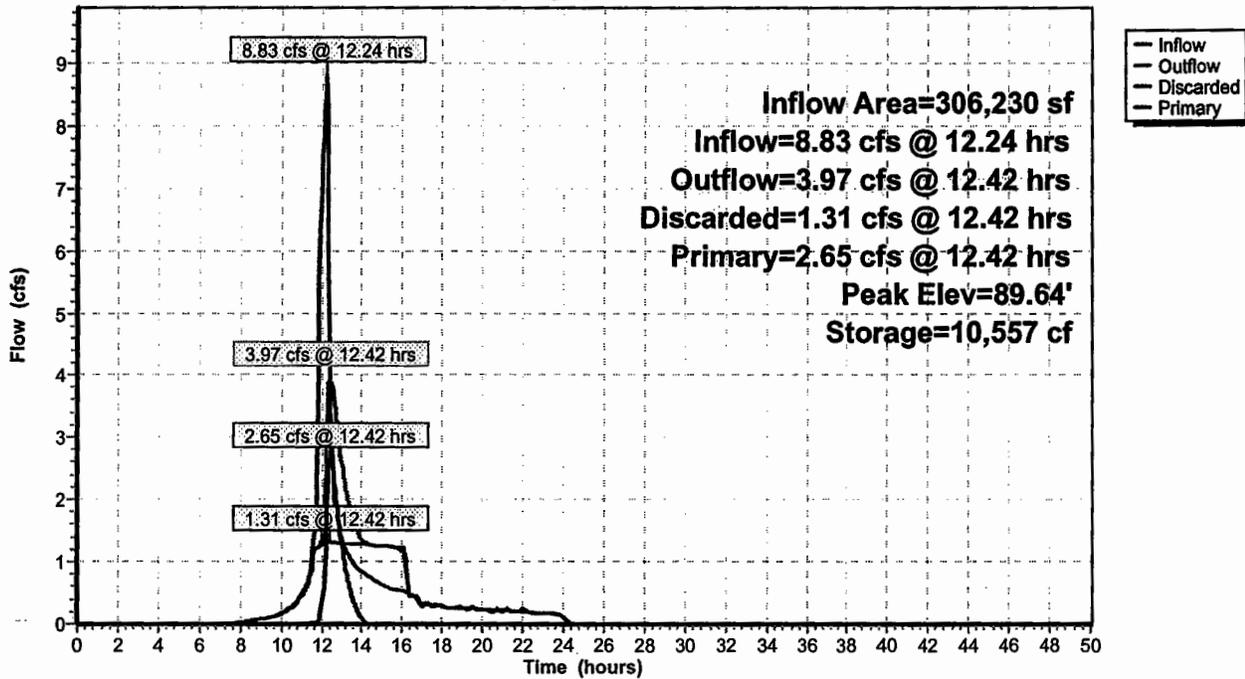
Device	Routing	Invert	Outlet Devices
#1	Primary	88.65'	<b>12.0" Vert. Orifice/Grate</b> C= 0.600
#2	Primary	90.08'	<b>20.0" Vert. Orifice/Grate</b> C= 0.600
#3	Discarded	87.50'	<b>5.000 in/hr Exfiltration over Wetted area</b> Phase-In= 0.02'

**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



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**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

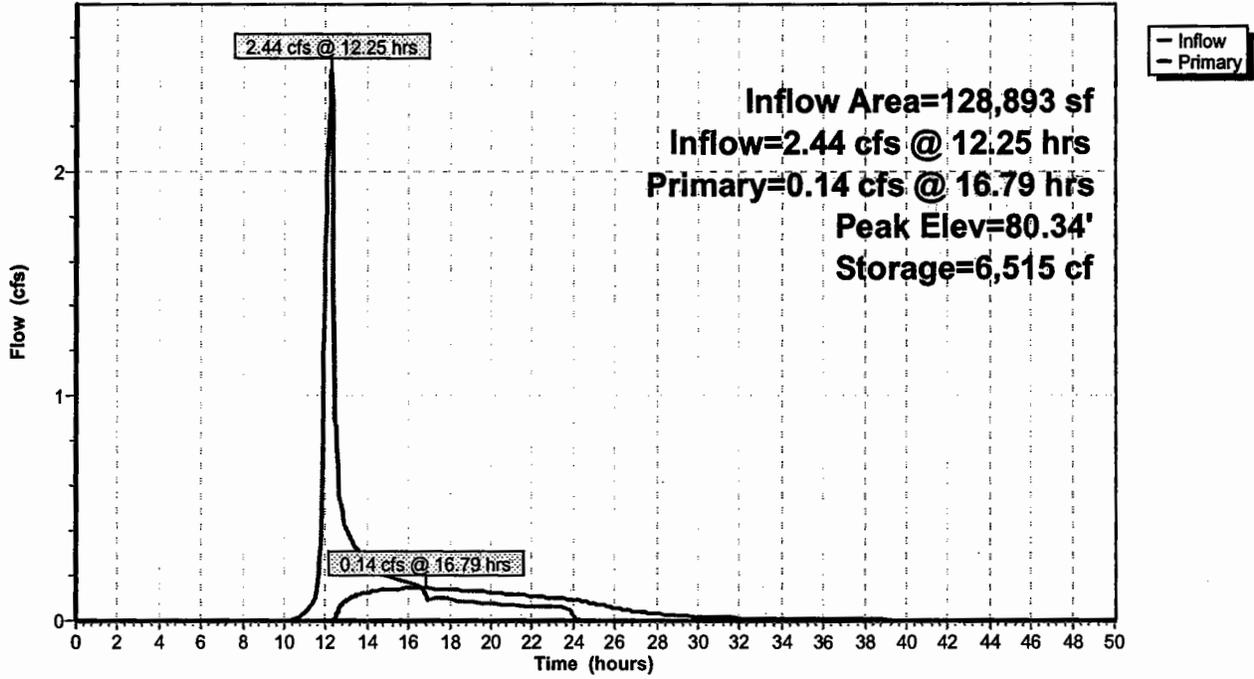
Device	Routing	Invert	Outlet Devices
#1	Primary	79.84'	3.0" Vert. Orifice/Grate C= 0.600
#2	Primary	83.00'	8.0' long x 12.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

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



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**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

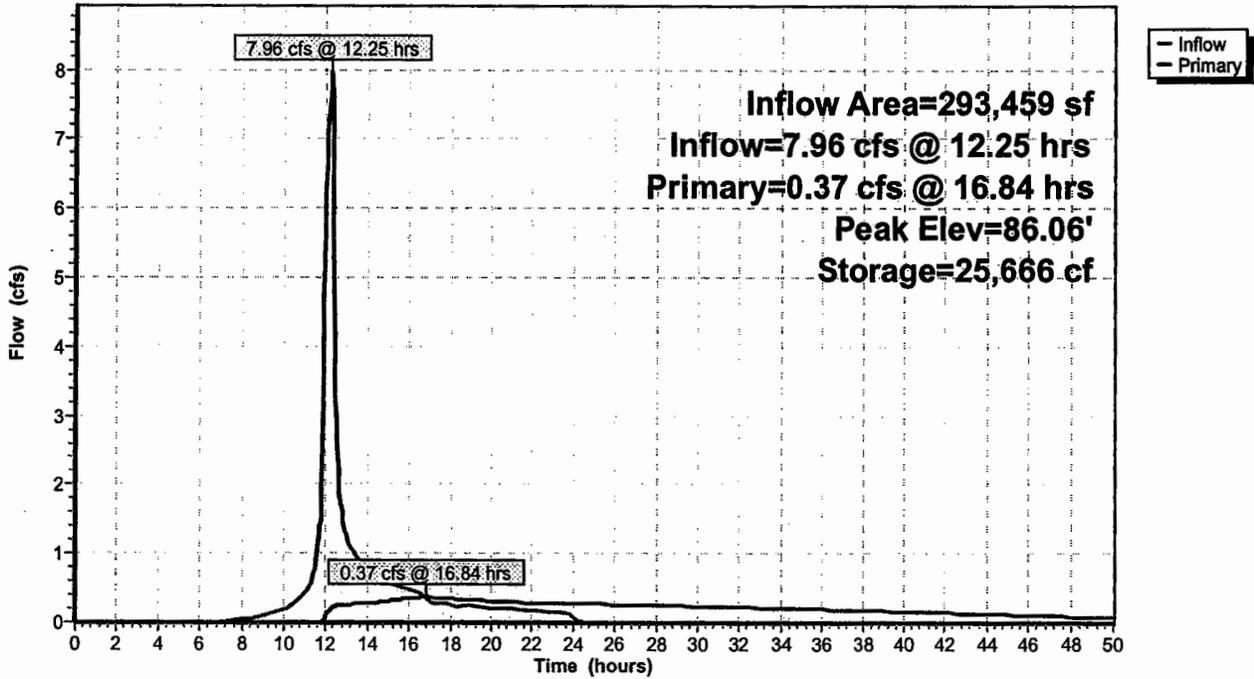
Device	Routing	Invert	Outlet Devices
#1	Primary	84.43'	3.0" Vert. Orifice/Grate C= 0.600
#2	Primary	85.93'	12.0" Vert. Orifice/Grate C= 0.600
#3	Primary	88.20'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70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

Hydrograph



**Summary for Pond RES05: New Pond**

Inflow Area = 112,745 sf, 52.83% Impervious, Inflow Depth = 0.96" for 2yr event  
 Inflow = 2.07 cfs @ 12.24 hrs, Volume= 9,040 cf  
 Outflow = 1.06 cfs @ 12.37 hrs, Volume= 9,040 cf, Atten= 49%, Lag= 8.3 min  
 Discarded = 1.06 cfs @ 12.37 hrs, Volume= 9,040 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= 93.64' @ 12.37 hrs Surf.Area= 2,542 sf Storage= 1,434 cf  
 Flood Elev= 97.88' Surf.Area= 2,542 sf Storage= 8,883 cf

Plug-Flow detention time=7.0 min calculated for 9,031 cf (100% of inflow)  
 Center-of-Mass det. time= 7.0 min ( 823.2 - 816.2 )

Volume	Invert	Avail.Storage	Storage Description
#1A	92.25'	2,745 cf	<b>31.00'W x 82.00'L x 5.50'H Field A</b> 13,981 cf Overall - 6,138 cf Embedded = 7,843 cf x 35.0% Voids
#2A	93.25'	6,138 cf	<b>CMP_Round 48 x 6 Inside #1</b> 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'	<b>16.000 in/hr Exfiltration over Wetted area</b> Phase-In= 0.08'
#2	Primary	96.83'	<b>30.0" W x 6.0" H Vert. Orifice/Grate</b> C= 0.600
#3	Device 2	94.50'	<b>18.0" Round Culvert</b> 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**

**ChamberModel = 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

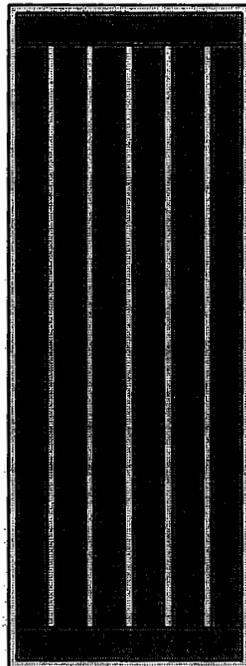
Stone + Chamber Storage = 8,883.1 cf = 0.204 af

Overall Storage Efficiency = 63.5%

6 Chambers

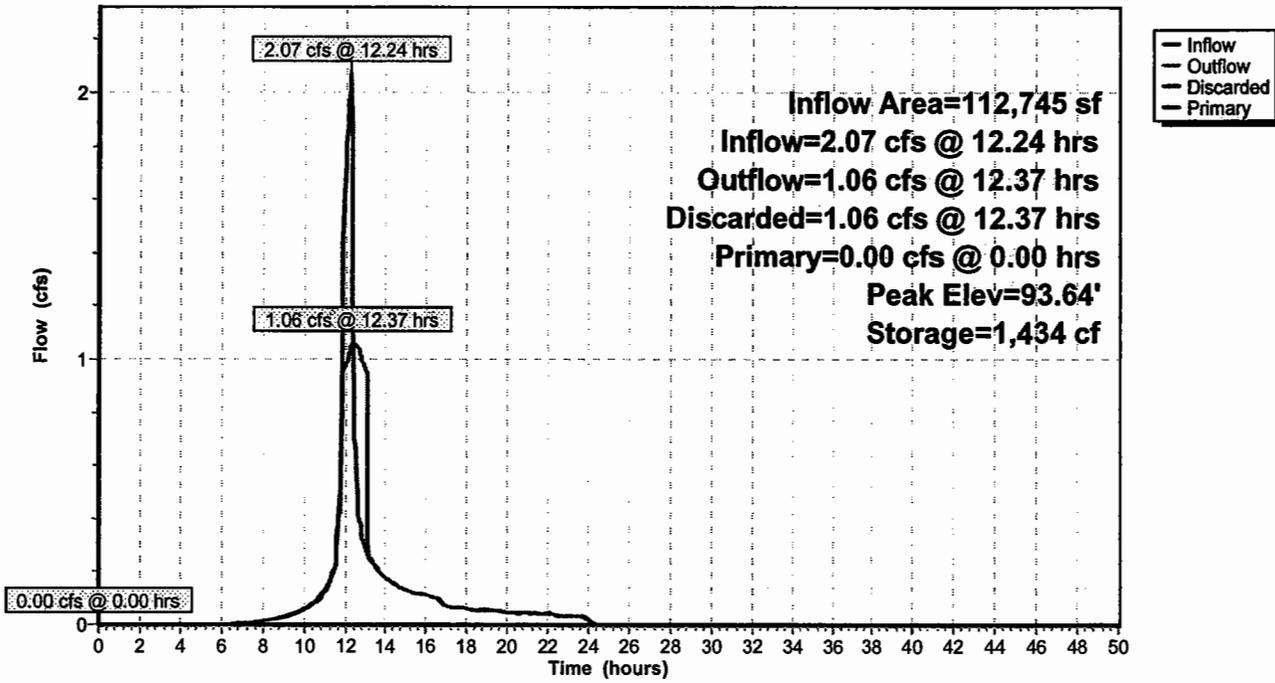
517.8 cy Field

290.5 cy Stone



Pond RES05: New Pond

Hydrograph



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**Summary for Pond RES06: New Pond**

Inflow Area = 29,548 sf, 63.09% Impervious, Inflow Depth = 4.83" for 2yr event  
 Inflow = 2.46 cfs @ 12.24 hrs, Volume= 11,882 cf  
 Outflow = 1.13 cfs @ 12.40 hrs, Volume= 11,882 cf, Atten= 54%, Lag= 10.0 min  
 Discarded = 1.13 cfs @ 12.40 hrs, Volume= 11,882 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= 2,032 cf  
 Flood Elev= 89.63' Surf.Area= 2,703 sf Storage= 9,502 cf

Plug-Flow detention time=9.3 min calculated for 11,870 cf (100% of inflow)  
 Center-of-Mass det. time=9.3 min ( 822.3 - 813.0 )

Volume	Invert	Avail.Storage	Storage Description
#1A	84.00'	2,888 cf	<b>51.00'W x 53.00'L x 5.50'H Field A</b> 14,867 cf Overall - 6,614 cf Embedded = 8,252 cf x 35.0% Voids
#2A	85.00'	6,614 cf	<b>CMP_Round 48 x 10 Inside #1</b> 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'	<b>16.000 in/hr Exfiltration over Wetted area</b> Phase-In= 0.08'
#2	Primary	88.63'	<b>30.0" W x 6.0" H Vert. Orifice/Grate</b> C= 0.600
#3	Device 2	86.50'	<b>18.0" Round Culvert</b> 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**

**ChamberModel = 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

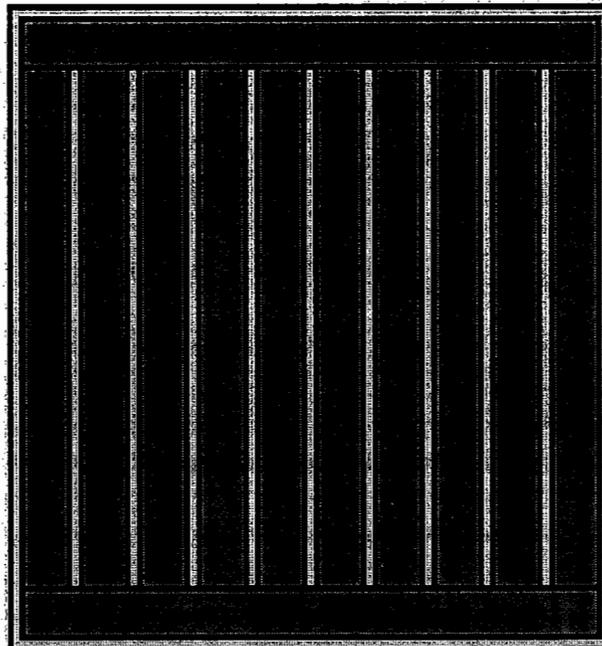
Stone + Chamber Storage = 9,502.4 cf = 0.218 af

Overall Storage Efficiency = 63.9%

10 Chambers

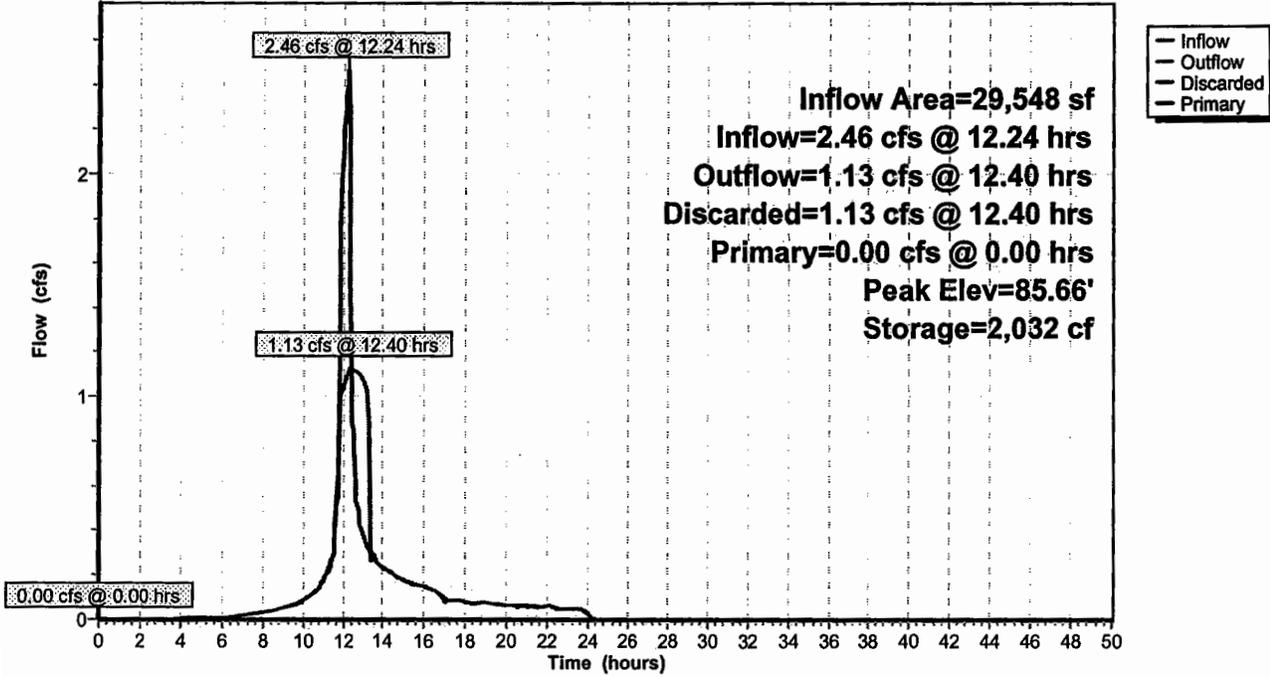
550.6 cy Field

305.6 cy Stone



Pond RES06: New Pond

Hydrograph



**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	<b>26.00'W x 34.00'L x 5.50'H Field A</b> 4,862 cf Overall - 2,104 cf Embedded = 2,758 cf x 35.0% Voids
#2A	95.25'	2,104 cf	<b>CMP_Round 48 x 5 Inside #1</b> 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'	<b>16.000 in/hr Exfiltration over Wetted area</b> Phase-In= 0.08'
#2	Primary	98.31'	<b>18.0" Round Culvert</b> 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)

**JOHNSON WOODS PHASE 2 PROPOSED R2**

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JWPA2 Rainfl-9 2yr Rainfall=3.10"

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**Pond RES07: New Pond - Chamber Wizard Field A**

**ChamberModel = 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

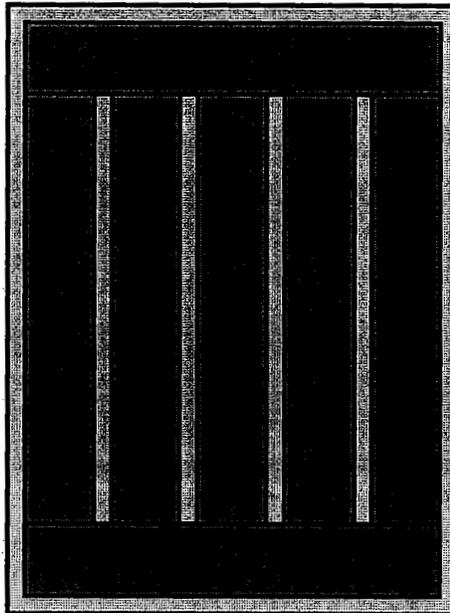
Stone + Chamber Storage = 3,069.6 cf = 0.070 af

Overall Storage Efficiency = 63.1%

5 Chambers

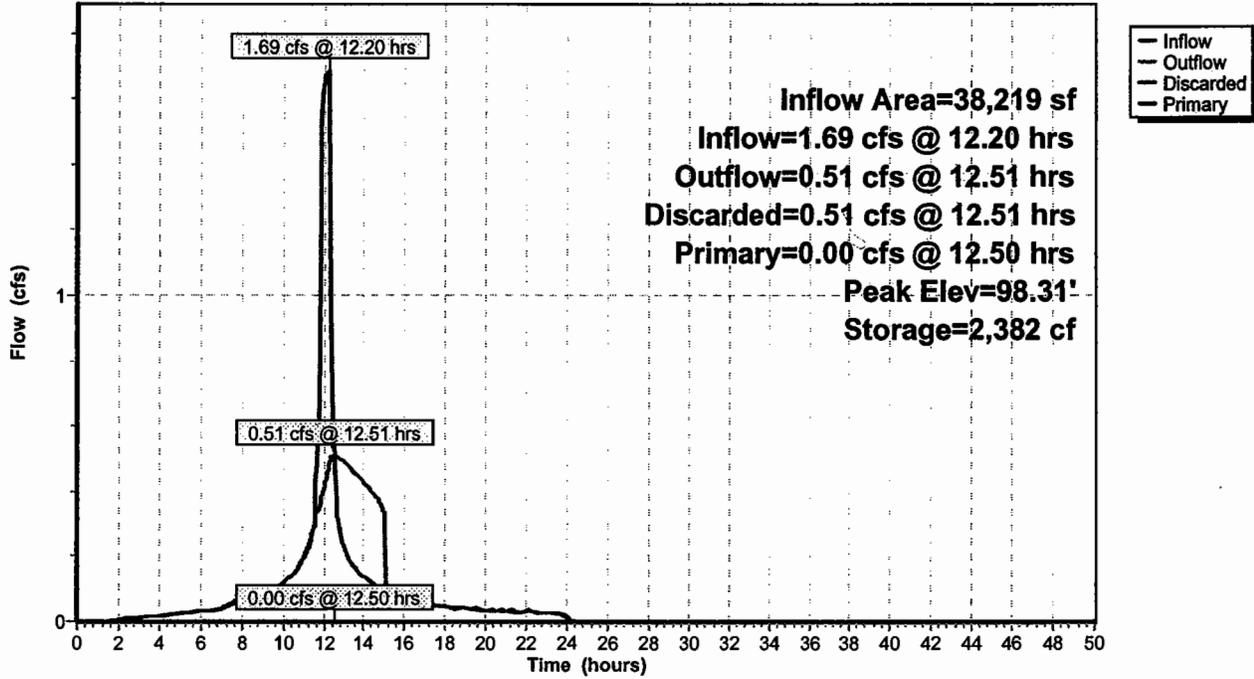
180.1 cy Field

102.1 cy Stone



Pond RES07: New Pond

Hydrograph



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JWPA2 Rainfl-9 2yr Rainfall=3.10"

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**Summary for Pond RES08: New Pond**

Inflow Area = 49,558 sf, 60.21% Impervious, Inflow Depth = 1.80" for 2yr event  
 Inflow = 1.58 cfs @ 12.23 hrs, Volume= 7,434 cf  
 Outflow = 0.68 cfs @ 12.40 hrs, Volume= 7,434 cf, Atten= 57%, Lag= 10.0 min  
 Discarded = 0.51 cfs @ 12.40 hrs, Volume= 7,313 cf  
 Primary = 0.17 cfs @ 12.40 hrs, Volume= 122 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 96.40' @ 12.40 hrs Surf.Area= 1,000 sf Storage= 1,743 cf

Flood Elev= 98.09' Surf.Area= 1,000 sf Storage= 2,667 cf

Plug-Flow detention time= 19.9 min calculated for 7,427 cf (100% of inflow)

Center-of-Mass det. time= 19.8 min ( 825.5 - 805.7 )

Volume	Invert	Avail.Storage	Storage Description
#1A	93.50'	987 cf	<b>25.00'W x 40.00'L x 4.50'H Field A</b> 4,500 cf Overall - 1,679 cf Embedded = 2,821 cf x 35.0% Voids
#2A	94.50'	1,679 cf	<b>CMP_Round 36 x 6 Inside #1</b> 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'	<b>16.000 in/hr Exfiltration over Wetted area</b> Phase-In= 0.08'
#2	Primary	96.20'	<b>12.0" Round Culvert</b> 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=96.40' (Free Discharge)↳ **1=Exfiltration** (Exfiltration Controls 0.51 cfs)**Primary OutFlow** Max=0.17 cfs @ 12.40 hrs HW=96.40' TW=0.00' (Dynamic Tailwater)↳ **2=Culvert** (Inlet Controls 0.17 cfs @ 1.52 fps)

**Pond RES08: New Pond - Chamber Wizard Field A**

**ChamberModel = 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

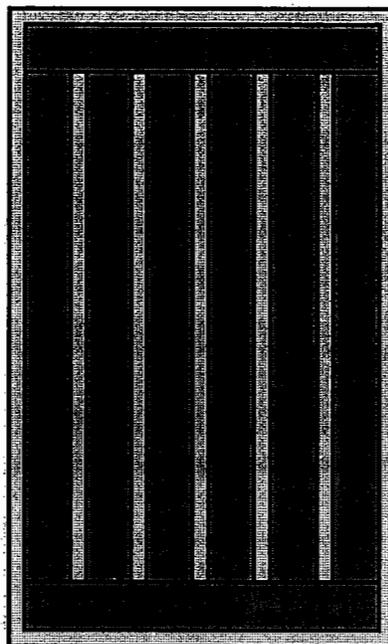
Stone + Chamber Storage = 2,666.7 cf = 0.061 af

Overall Storage Efficiency = 59.3%

6 Chambers

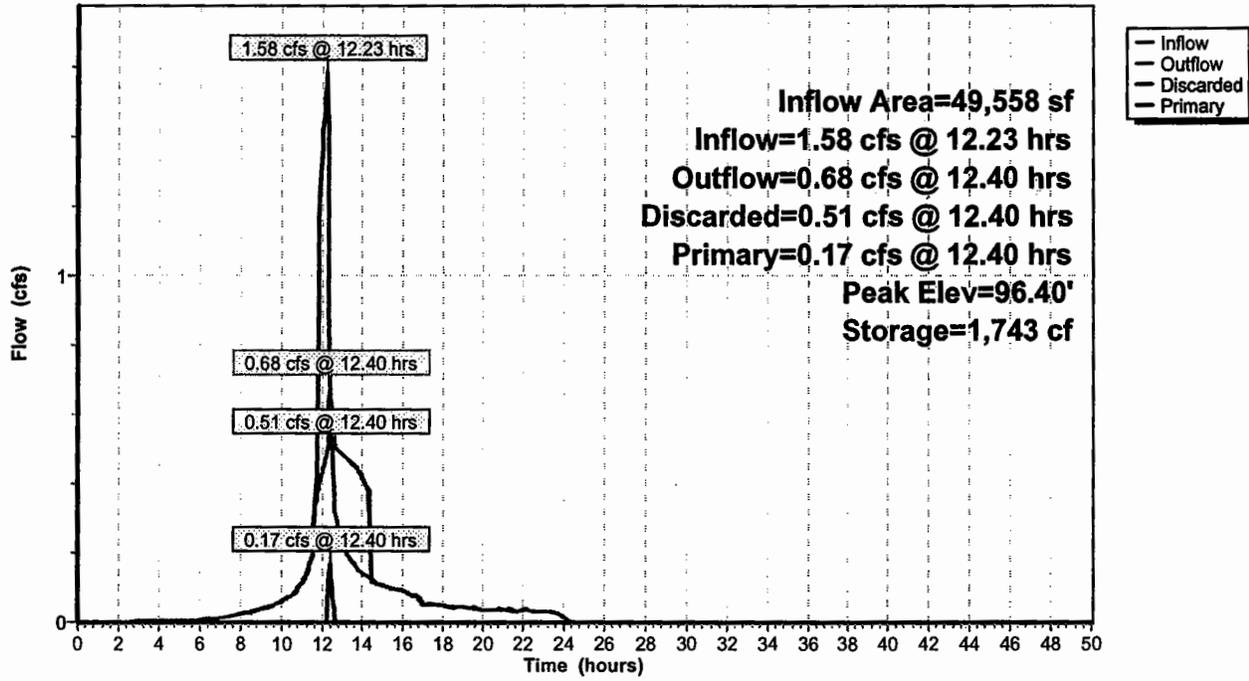
166.7 cy Field

104.5 cy Stone



Pond RES08: New Pond

Hydrograph



**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	<b>Struc 10</b> Listed below (Recalc)

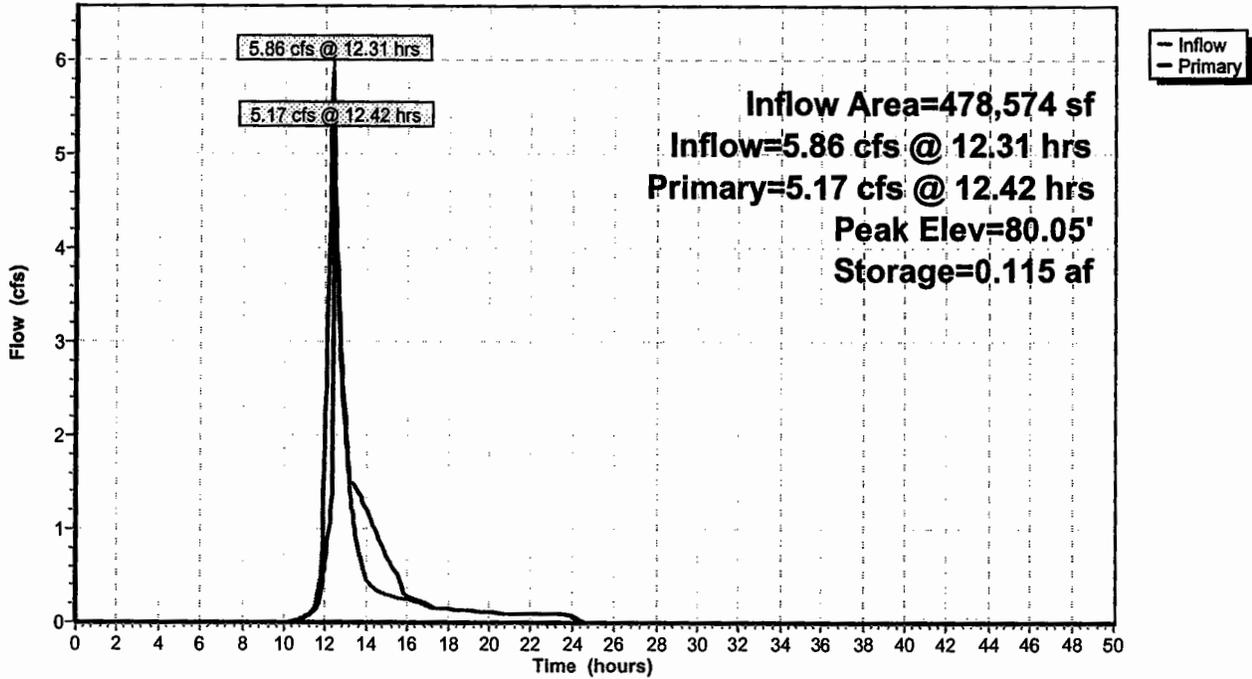
Elevation (feet)	Cum.Store (acre-feet)
78.60	0.000
79.00	0.007
79.50	0.038
80.00	0.105
80.10	0.123
80.20	0.144
80.30	0.166

Device	Routing	Invert	Outlet Devices
#1	Primary	78.60'	<b>Struc 10</b>
			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



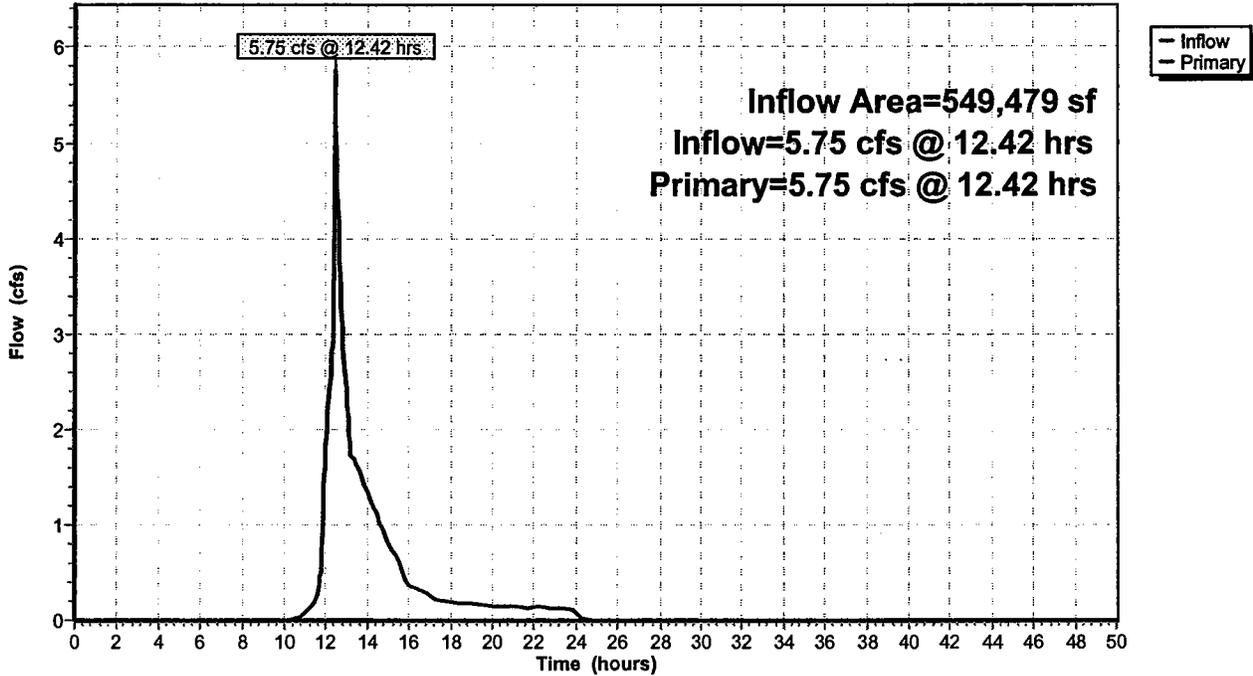
Summary for Link 2L: AddHyd

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

Hydrograph



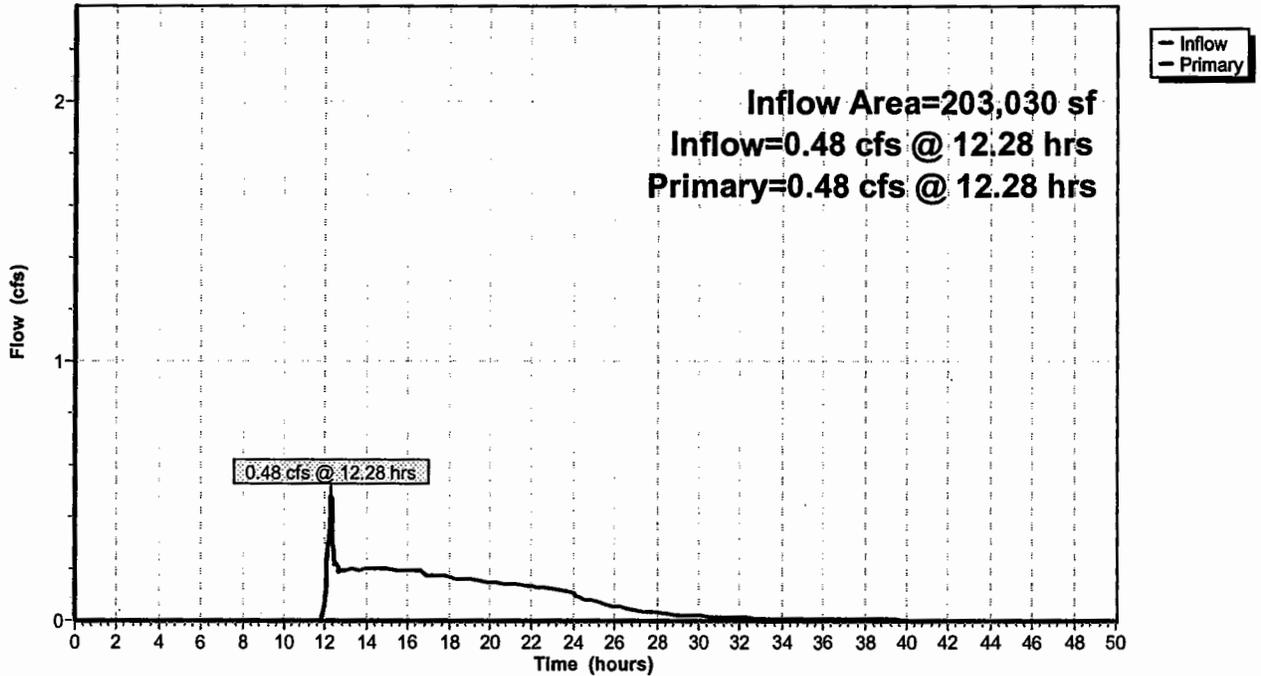
**Summary for Link 3L: AddHyd**

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**

Hydrograph



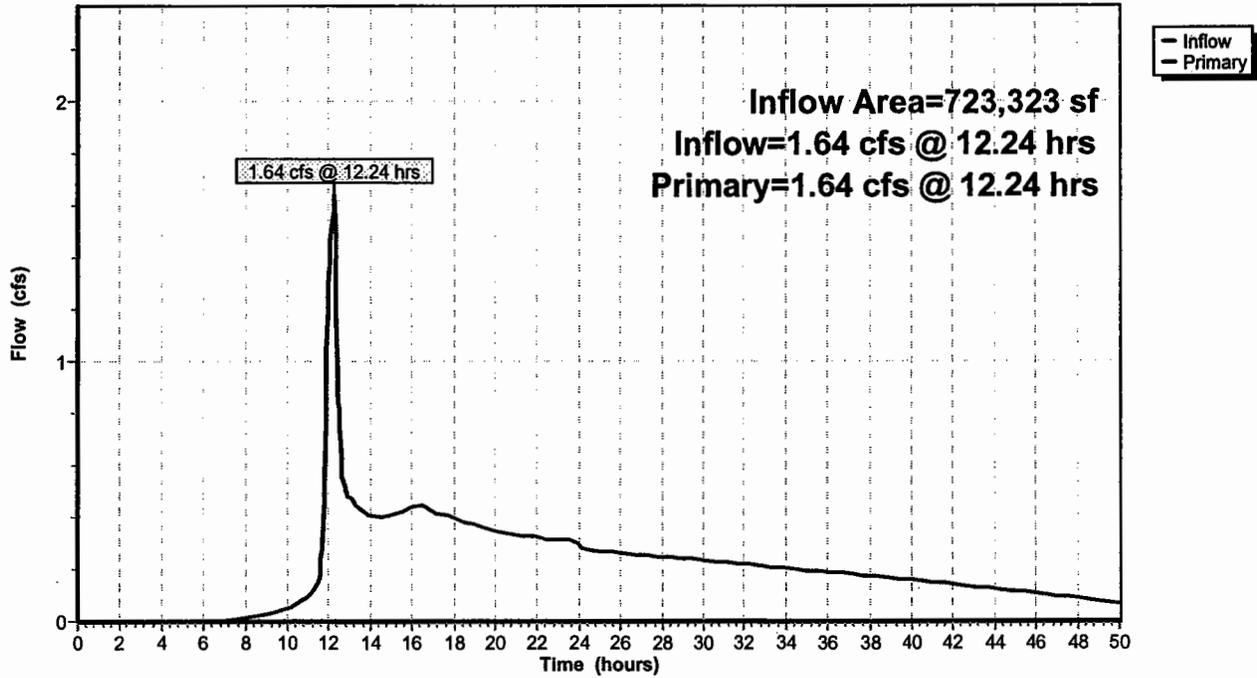
**Summary for Link 4L: AddHyd**

Inflow Area = 723,323 sf, 39.06% Impervious, Inflow Depth > 0.61" for 2yr event  
Inflow = 1.64 cfs @ 12.24 hrs, Volume= 36,673 cf  
Primary = 1.64 cfs @ 12.24 hrs, Volume= 36,673 cf, Atten= 0%, Lag= 0.0 min

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

**Link 4L: AddHyd**

Hydrograph



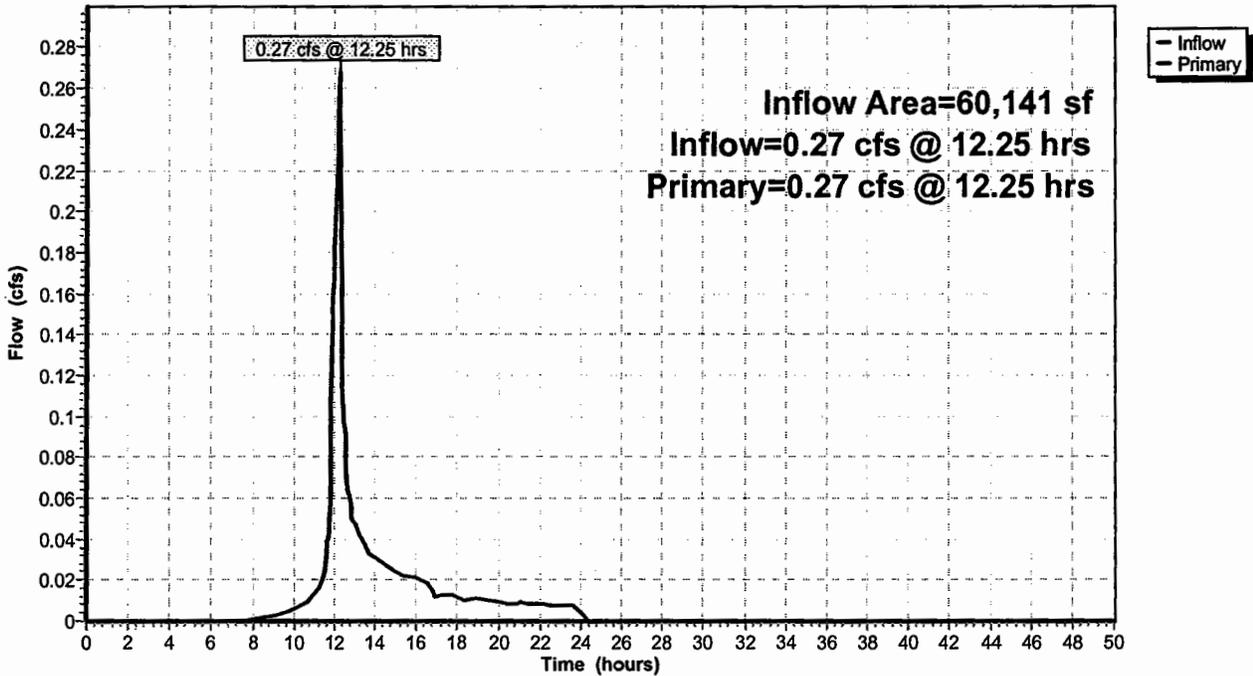
**Summary for Link 5L:**

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:**

Hydrograph



**JOHNSON WOODS PHASE 2 PROPOSED R2**

JWPA10 Rainfl-9 10yr Rainfall=4.60"

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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

<b>Subcatchment02-1:</b>	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
<b>Subcatchment02-2:</b>	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
<b>Subcatchment02-3:</b>	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
<b>Subcatchment02-4:</b>	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
<b>Subcatchment02-5:</b>	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
<b>Subcatchment02-6:</b>	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
<b>Subcatchment02-7:</b>	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
<b>Subcatchment02-8:</b>	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
<b>Subcatchment03-1:</b>	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
<b>Subcatchment03-2:</b>	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
<b>Subcatchment03-3:</b>	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
<b>Subcatchment04-1:</b>	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
<b>Subcatchment04-10:</b>	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
<b>Subcatchment04-2:</b>	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
<b>Subcatchment04-3:</b>	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
<b>Subcatchment04-4:</b>	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

**JOHNSON WOODS PHASE 2 PROPOSED R2**

JWPA10 Rainfl-9 10yr Rainfall=4.60"

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<b>Subcatchment04-5:</b>	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
<b>Subcatchment04-6:</b>	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
<b>Subcatchment04-7:</b>	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
<b>Subcatchment04-8:</b>	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
<b>Subcatchment04-9:</b>	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
<b>Subcatchment06-1:</b>	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
<b>Subcatchment06-2:</b>	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
<b>Subcatchment08-1:</b>	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
<b>Subcatchment08-2:</b>	Runoff Area=15,509 sf 65.50% Impervious Runoff Depth=3.29" Tc=6.0 min CN=88 Runoff=0.90 cfs 4,253 cf
<b>Subcatchment08-3:</b>	Runoff Area=10,891 sf 78.40% Impervious Runoff Depth=3.49" Tc=6.0 min CN=90 Runoff=0.65 cfs 3,169 cf
<b>Subcatchment10-1:</b>	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
<b>Subcatchment13-1: Trib exist CB</b>	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
<b>Subcatchment13-2: Trib exist CB</b>	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
<b>Subcatchment20: Roof</b>	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
<b>Subcatchment40: Roof</b>	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
<b>Subcatchment55F: FRONT ROOF</b>	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
<b>Subcatchment55R: REAR ROOF</b>	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

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JWPA10 Rainfl-9 10yr Rainfall=4.60"

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**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=11,890 sf 78.15% Impervious Runoff Depth=3.81"  
Tc=6.0 min CN=93 Runoff=0.75 cfs 3,771 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=16,647 sf 72.30% Impervious Runoff Depth=3.59"  
Tc=6.0 min CN=91 Runoff=1.01 cfs 4,987 cf

**Subcatchment56-6:** Runoff Area=12,798 sf 58.37% Impervious Runoff Depth=3.29"  
Tc=6.0 min CN=88 Runoff=0.75 cfs 3,509 cf

**Subcatchment56-7:** Runoff Area=8,851 sf 37.76% Impervious Runoff Depth=2.81"  
Tc=6.0 min CN=83 Runoff=0.46 cfs 2,076 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

<b>Pond 6B:</b>	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
<b>Pond 6C: STORMCEPTOR</b>	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
<b>Pond 8A:</b>	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
<b>Pond 8B:</b>	Peak Elev=97.76' Inflow=0.90 cfs 4,253 cf 12.0" Round Culvert n=0.012 L=16.0' S=0.0112 '/ Outflow=0.90 cfs 4,253 cf
<b>Pond 8C:</b>	Peak Elev=99.87' Inflow=0.65 cfs 3,169 cf 12.0" Round Culvert n=0.012 L=28.6' S=0.0101 '/ Outflow=0.65 cfs 3,169 cf
<b>Pond 8D:</b>	Peak Elev=97.71' Inflow=2.11 cfs 9,742 cf 12.0" Round Culvert n=0.012 L=16.0' S=0.0106 '/ Outflow=2.11 cfs 9,742 cf
<b>Pond 8E: STORMCEPTOR</b>	Peak Elev=97.44' Inflow=2.11 cfs 9,742 cf 12.0" Round Culvert n=0.012 L=97.0' S=0.0113 '/ Outflow=2.11 cfs 9,742 cf
<b>Pond 13A:</b>	Peak Elev=109.58' Inflow=0.33 cfs 1,521 cf 12.0" Round Culvert n=0.012 L=37.0' S=0.0100 '/ Outflow=0.33 cfs 1,521 cf
<b>Pond 13B: STORMCEPTOR</b>	Peak Elev=109.13' Inflow=0.33 cfs 1,521 cf 12.0" Round Culvert n=0.012 L=64.0' S=0.0133 '/ Outflow=0.33 cfs 1,521 cf
<b>Pond 56A:</b>	Peak Elev=115.67' 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
<b>Pond 56B:</b>	Peak Elev=115.58' 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
<b>Pond 56C: DMH</b>	Peak Elev=115.50' 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
<b>Pond 56D: DMH</b>	Peak Elev=114.46' Inflow=2.80 cfs 13,270 cf 12.0" Round Culvert n=0.012 L=56.0' S=0.0100 '/ Outflow=2.80 cfs 13,270 cf
<b>Pond 56E:</b>	Peak Elev=116.08' Inflow=0.46 cfs 2,076 cf 12.0" Round Culvert n=0.012 L=16.0' S=0.0100 '/ Outflow=0.46 cfs 2,076 cf
<b>Pond 56F: DMH</b>	Peak Elev=113.54' Inflow=3.26 cfs 15,346 cf 15.0" Round Culvert n=0.012 L=187.0' S=0.0100 '/ Outflow=3.26 cfs 15,346 cf
<b>Pond 56G:</b>	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
<b>Pond 56H: DMH</b>	Peak Elev=111.93' Inflow=4.51 cfs 21,121 cf 15.0" Round Culvert n=0.012 L=65.0' S=0.0780 '/ Outflow=4.51 cfs 21,121 cf

**JOHNSON WOODS PHASE 2 PROPOSED R2**

JWPA10 Rainfl-9 10yr Rainfall=4.60"

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**Pond 56i:** Peak Elev=106.82' Inflow=0.75 cfs 3,509 cf  
12.0" Round Culvert n=0.012 L=14.0' S=0.0114 '/' Outflow=0.75 cfs 3,509 cf

**Pond 56J: STORMCEPTOR** Peak Elev=106.21' Inflow=6.28 cfs 29,617 cf  
18.0" Round Culvert n=0.012 L=113.0' S=0.0847 '/' Outflow=6.28 cfs 29,617 cf

**Pond 56K: DMH** Peak Elev=96.78' Inflow=6.28 cfs 29,617 cf  
Primary=3.64 cfs 16,134 cf Secondary=2.64 cfs 13,484 cf Outflow=6.28 cfs 29,617 cf

**Pond 56L:** Peak Elev=116.91' Inflow=0.75 cfs 3,771 cf  
12.0" Round Culvert n=0.012 L=41.0' S=0.0115 '/' Outflow=0.75 cfs 3,771 cf

**Pond 56M:** Peak Elev=107.48' Inflow=1.01 cfs 4,987 cf  
12.0" Round Culvert n=0.012 L=43.0' S=0.0100 '/' Outflow=1.01 cfs 4,987 cf

**Pond 56N:** Peak Elev=106.80' Inflow=6.28 cfs 29,617 cf  
18.0" Round Culvert n=0.012 L=8.5' S=0.0482 '/' Outflow=6.28 cfs 29,617 cf

**Pond CB13: 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

**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=4,129 cf Inflow=3.64 cfs 16,134 cf  
Discarded=1.17 cfs 16,134 cf Primary=0.00 cfs 0 cf Outflow=1.17 cfs 16,134 cf

**Pond RES06: New Pond** Peak Elev=87.00' Storage=4,986 cf Inflow=4.07 cfs 20,411 cf  
Discarded=1.23 cfs 20,411 cf Primary=0.00 cfs 0 cf Outflow=1.23 cfs 20,411 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=2,193 cf Inflow=2.67 cfs 12,818 cf  
Discarded=0.54 cfs 10,398 cf Primary=2.02 cfs 2,420 cf Outflow=2.56 cfs 12,818 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

**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

**JOHNSON WOODS PHASE 2 PROPOSED R2**

*JWPA10 Rainfl-9 10yr Rainfall=4.60"*

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**Link 4L: AddHyd**

Inflow=5.49 cfs 77,357 cf  
Primary=5.49 cfs 77,357 cf

**Link 5L:**

Inflow=2.57 cfs 4,574 cf  
Primary=2.57 cfs 4,574 cf

**Total Runoff Area = 1,535,973 sf   Runoff Volume = 294,082 cf   Average Runoff Depth = 2.30"**  
**64.09% Pervious = 984,331 sf   35.91% Impervious = 551,642 sf**

**JOHNSON WOODS PHASE 2 PROPOSED R2**

JWPA25 Rainfl-9 25yr Rainfall=5.40"

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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

<b>Subcatchment02-1:</b>	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
<b>Subcatchment02-2:</b>	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
<b>Subcatchment02-3:</b>	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
<b>Subcatchment02-4:</b>	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
<b>Subcatchment02-5:</b>	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
<b>Subcatchment02-6:</b>	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
<b>Subcatchment02-7:</b>	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
<b>Subcatchment02-8:</b>	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
<b>Subcatchment03-1:</b>	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
<b>Subcatchment03-2:</b>	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
<b>Subcatchment03-3:</b>	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
<b>Subcatchment04-1:</b>	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
<b>Subcatchment04-10:</b>	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
<b>Subcatchment04-2:</b>	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
<b>Subcatchment04-3:</b>	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
<b>Subcatchment04-4:</b>	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

**JOHNSON WOODS PHASE 2 PROPOSED R2**

JWPA25 Rainfl-9 25yr Rainfall=5.40"

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<b>Subcatchment04-5:</b>	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
<b>Subcatchment04-6:</b>	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
<b>Subcatchment04-7:</b>	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
<b>Subcatchment04-8:</b>	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
<b>Subcatchment04-9:</b>	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
<b>Subcatchment06-1:</b>	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
<b>Subcatchment06-2:</b>	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
<b>Subcatchment08-1:</b>	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
<b>Subcatchment08-2:</b>	Runoff Area=15,509 sf 65.50% Impervious Runoff Depth=4.05" Tc=6.0 min CN=88 Runoff=1.08 cfs 5,234 cf
<b>Subcatchment08-3:</b>	Runoff Area=10,891 sf 78.40% Impervious Runoff Depth=4.26" Tc=6.0 min CN=90 Runoff=0.78 cfs 3,869 cf
<b>Subcatchment10-1:</b>	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
<b>Subcatchment13-1: Trib exist CB</b>	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
<b>Subcatchment13-2: Trib exist CB</b>	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
<b>Subcatchment20: Roof</b>	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
<b>Subcatchment40: Roof</b>	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
<b>Subcatchment55F: FRONT ROOF</b>	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
<b>Subcatchment55R: REAR ROOF</b>	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

**JOHNSON WOODS PHASE 2 PROPOSED R2**

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**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=11,890 sf 78.15% Impervious Runoff Depth=4.59"  
Tc=6.0 min CN=93 Runoff=0.89 cfs 4,549 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=16,647 sf 72.30% Impervious Runoff Depth=4.37"  
Tc=6.0 min CN=91 Runoff=1.21 cfs 6,064 cf

**Subcatchment56-6:** Runoff Area=12,798 sf 58.37% Impervious Runoff Depth=4.05"  
Tc=6.0 min CN=88 Runoff=0.89 cfs 4,319 cf

**Subcatchment56-7:** Runoff Area=8,851 sf 37.76% Impervious Runoff Depth=3.54"  
Tc=6.0 min CN=83 Runoff=0.57 cfs 2,610 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=87.93' 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=87.93' 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=87.93' 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=98.36' Inflow=1.08 cfs 5,234 cf  
12.0" Round Culvert n=0.012 L=16.0' S=0.0112 '/ Outflow=1.08 cfs 5,234 cf

**Pond 8C:** Peak Elev=99.92' Inflow=0.78 cfs 3,869 cf  
12.0" Round Culvert n=0.012 L=28.6' S=0.0101 '/ Outflow=0.78 cfs 3,869 cf

**Pond 8D:** Peak Elev=98.30' Inflow=2.60 cfs 12,178 cf  
12.0" Round Culvert n=0.012 L=16.0' S=0.0106 '/ Outflow=2.60 cfs 12,178 cf

**Pond 8E: STORMCEPTOR** Peak Elev=97.86' Inflow=2.60 cfs 12,178 cf  
12.0" Round Culvert n=0.012 L=97.0' S=0.0113 '/ Outflow=2.60 cfs 12,178 cf

**Pond 13A:** Peak Elev=109.61' Inflow=0.39 cfs 1,880 cf  
12.0" Round Culvert n=0.012 L=37.0' S=0.0100 '/ Outflow=0.39 cfs 1,880 cf

**Pond 13B: STORMCEPTOR** Peak Elev=109.16' Inflow=0.39 cfs 1,880 cf  
12.0" Round Culvert n=0.012 L=64.0' S=0.0133 '/ Outflow=0.39 cfs 1,880 cf

**Pond 56A:** Peak Elev=115.83' 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=115.74' 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=115.67' 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=114.71' Inflow=3.35 cfs 16,307 cf  
12.0" Round Culvert n=0.012 L=56.0' S=0.0100 '/ Outflow=3.35 cfs 16,307 cf

**Pond 56E:** Peak Elev=116.13' Inflow=0.57 cfs 2,610 cf  
12.0" Round Culvert n=0.012 L=16.0' S=0.0100 '/ Outflow=0.57 cfs 2,610 cf

**Pond 56F: DMH** Peak Elev=113.70' Inflow=3.91 cfs 18,917 cf  
15.0" Round Culvert n=0.012 L=187.0' S=0.0100 '/ Outflow=3.91 cfs 18,917 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 26,241 cf  
15.0" Round Culvert n=0.012 L=65.0' S=0.0780 '/ Outflow=5.52 cfs 26,241 cf

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JWPA25 Rainfl-9 25yr Rainfall=5.40"

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**Pond 56i:** Peak Elev=107.31' Inflow=0.89 cfs 4,319 cf  
12.0" Round Culvert n=0.012 L=14.0' S=0.0114 '/' Outflow=0.89 cfs 4,319 cf

**Pond 56J: STORMCEPTOR** Peak Elev=106.48' Inflow=7.66 cfs 36,625 cf  
18.0" Round Culvert n=0.012 L=113.0' S=0.0847 '/' Outflow=7.66 cfs 36,625 cf

**Pond 56K: DMH** Peak Elev=97.29' Inflow=7.66 cfs 36,625 cf  
Primary=4.41 cfs 19,659 cf Secondary=3.24 cfs 16,966 cf Outflow=7.66 cfs 36,625 cf

**Pond 56L:** Peak Elev=116.95' Inflow=0.89 cfs 4,549 cf  
12.0" Round Culvert n=0.012 L=41.0' S=0.0115 '/' Outflow=0.89 cfs 4,549 cf

**Pond 56M:** Peak Elev=107.63' Inflow=1.21 cfs 6,064 cf  
12.0" Round Culvert n=0.012 L=43.0' S=0.0100 '/' Outflow=1.21 cfs 6,064 cf

**Pond 56N:** Peak Elev=107.29' Inflow=7.66 cfs 36,625 cf  
18.0" Round Culvert n=0.012 L=8.5' S=0.0482 '/' Outflow=7.66 cfs 36,625 cf

**Pond CB13: 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

**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=95.68' Storage=5,585 cf Inflow=4.41 cfs 19,659 cf  
Discarded=1.23 cfs 19,659 cf Primary=0.00 cfs 0 cf Outflow=1.23 cfs 19,659 cf

**Pond RES06: New Pond** Peak Elev=87.92' Storage=7,079 cf Inflow=5.01 cfs 25,577 cf  
Discarded=1.30 cfs 25,577 cf Primary=0.00 cfs 0 cf Outflow=1.30 cfs 25,577 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=2,312 cf Inflow=3.26 cfs 15,817 cf  
Discarded=0.55 cfs 11,960 cf Primary=2.61 cfs 3,857 cf Outflow=3.16 cfs 15,817 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

**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

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**Link 4L: AddHyd**

Inflow=9.24 cfs 102,111 cf  
Primary=9.24 cfs 102,111 cf

**Link 5L:**

Inflow=3.27 cfs 6,665 cf  
Primary=3.27 cfs 6,665 cf

**Total Runoff Area = 1,535,973 sf Runoff Volume = 374,230 cf Average Runoff Depth = 2.92"  
64.09% Pervious = 984,331 sf 35.91% Impervious = 551,642 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

<b>Subcatchment02-1:</b>	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
<b>Subcatchment02-2:</b>	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
<b>Subcatchment02-3:</b>	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
<b>Subcatchment02-4:</b>	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
<b>Subcatchment02-5:</b>	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
<b>Subcatchment02-6:</b>	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
<b>Subcatchment02-7:</b>	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
<b>Subcatchment02-8:</b>	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
<b>Subcatchment03-1:</b>	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
<b>Subcatchment03-2:</b>	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
<b>Subcatchment03-3:</b>	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
<b>Subcatchment04-1:</b>	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
<b>Subcatchment04-10:</b>	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
<b>Subcatchment04-2:</b>	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
<b>Subcatchment04-3:</b>	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
<b>Subcatchment04-4:</b>	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

**JOHNSON WOODS PHASE 2 PROPOSED R2**

JWPA100 Rainfl-9 100yr Rainfall=7.00"

Prepared by Microsoft

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<b>Subcatchment04-5:</b>	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
<b>Subcatchment04-6:</b>	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
<b>Subcatchment04-7:</b>	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
<b>Subcatchment04-8:</b>	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
<b>Subcatchment04-9:</b>	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
<b>Subcatchment06-1:</b>	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
<b>Subcatchment06-2:</b>	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
<b>Subcatchment08-1:</b>	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
<b>Subcatchment08-2:</b>	Runoff Area=15,509 sf 65.50% Impervious Runoff Depth=5.59" Tc=6.0 min CN=88 Runoff=1.46 cfs 7,229 cf
<b>Subcatchment08-3:</b>	Runoff Area=10,891 sf 78.40% Impervious Runoff Depth=5.82" Tc=6.0 min CN=90 Runoff=1.04 cfs 5,285 cf
<b>Subcatchment10-1:</b>	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
<b>Subcatchment13-1: Trib exist CB</b>	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
<b>Subcatchment13-2: Trib exist CB</b>	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
<b>Subcatchment20: Roof</b>	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
<b>Subcatchment40: Roof</b>	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
<b>Subcatchment55F: FRONT ROOF</b>	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
<b>Subcatchment55R: REAR ROOF</b>	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

<b>Subcatchment56-1:</b>	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
<b>Subcatchment56-2:</b>	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
<b>Subcatchment56-3:</b>	Runoff Area=11,890 sf 78.15% Impervious Runoff Depth=6.17" Tc=6.0 min CN=93 Runoff=1.17 cfs 6,115 cf
<b>Subcatchment56-4:</b>	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
<b>Subcatchment56-5:</b>	Runoff Area=16,647 sf 72.30% Impervious Runoff Depth=5.94" Tc=6.0 min CN=91 Runoff=1.61 cfs 8,239 cf
<b>Subcatchment56-6:</b>	Runoff Area=12,798 sf 58.37% Impervious Runoff Depth=5.59" Tc=6.0 min CN=88 Runoff=1.20 cfs 5,965 cf
<b>Subcatchment56-7:</b>	Runoff Area=8,851 sf 37.76% Impervious Runoff Depth=5.03" Tc=6.0 min CN=83 Runoff=0.79 cfs 3,708 cf
<b>SubcatchmentBA-LWD:</b>	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
<b>SubcatchmentBA-NWLY:</b>	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
<b>SubcatchmentBA-SWLY: Trib Inwood Dr.</b>	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
<b>SubcatchmentBA-WLY:</b>	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
<b>SubcatchmentBA-WLY-1:</b>	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
<b>Pond 3A:</b>	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
<b>Pond 3B:</b>	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
<b>Pond 3C:</b>	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
<b>Pond 3D:</b>	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
<b>Pond 6A:</b>	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

<b>Pond 6B:</b>	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
<b>Pond 6C: STORMCEPTOR</b>	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
<b>Pond 8A:</b>	Peak Elev=99.98' 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
<b>Pond 8B:</b>	Peak Elev=99.99' Inflow=1.46 cfs 7,229 cf 12.0" Round Culvert n=0.012 L=16.0' S=0.0112 '/ Outflow=1.46 cfs 7,229 cf
<b>Pond 8C:</b>	Peak Elev=100.10' Inflow=1.04 cfs 5,285 cf 12.0" Round Culvert n=0.012 L=28.6' S=0.0101 '/ Outflow=1.04 cfs 5,285 cf
<b>Pond 8D:</b>	Peak Elev=99.89' Inflow=3.59 cfs 17,204 cf 12.0" Round Culvert n=0.012 L=16.0' S=0.0106 '/ Outflow=3.59 cfs 17,204 cf
<b>Pond 8E: STORMCEPTOR</b>	Peak Elev=99.03' Inflow=3.59 cfs 17,204 cf 12.0" Round Culvert n=0.012 L=97.0' S=0.0113 '/ Outflow=3.59 cfs 17,204 cf
<b>Pond 13A:</b>	Peak Elev=109.67' Inflow=0.53 cfs 2,610 cf 12.0" Round Culvert n=0.012 L=37.0' S=0.0100 '/ Outflow=0.53 cfs 2,610 cf
<b>Pond 13B: STORMCEPTOR</b>	Peak Elev=109.21' Inflow=0.53 cfs 2,610 cf 12.0" Round Culvert n=0.012 L=64.0' S=0.0133 '/ Outflow=0.53 cfs 2,610 cf
<b>Pond 56A:</b>	Peak Elev=117.52' 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
<b>Pond 56B:</b>	Peak Elev=117.38' 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
<b>Pond 56C: DMH</b>	Peak Elev=117.34' 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
<b>Pond 56D: DMH</b>	Peak Elev=116.02' Inflow=4.50 cfs 22,481 cf 12.0" Round Culvert n=0.012 L=56.0' S=0.0100 '/ Outflow=4.50 cfs 22,481 cf
<b>Pond 56E:</b>	Peak Elev=116.21' Inflow=0.79 cfs 3,708 cf 12.0" Round Culvert n=0.012 L=16.0' S=0.0100 '/ Outflow=0.79 cfs 3,708 cf
<b>Pond 56F: DMH</b>	Peak Elev=114.51' Inflow=5.28 cfs 26,190 cf 15.0" Round Culvert n=0.012 L=187.0' S=0.0100 '/ Outflow=5.28 cfs 26,190 cf
<b>Pond 56G:</b>	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
<b>Pond 56H: DMH</b>	Peak Elev=112.99' Inflow=7.55 cfs 36,723 cf 15.0" Round Culvert n=0.012 L=65.0' S=0.0780 '/ Outflow=7.55 cfs 36,723 cf

**JOHNSON WOODS PHASE 2 PROPOSED R2**

JWPA100 Rainfl-9 100yr Rainfall=7.00"

Prepared by Microsoft

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**Pond 56i:** Peak Elev=108.70' Inflow=1.20 cfs 5,965 cf  
12.0" Round Culvert n=0.012 L=14.0' S=0.0114 '/' Outflow=1.20 cfs 5,965 cf

**Pond 56J: STORMCEPTOR** Peak Elev=107.16' Inflow=10.31 cfs 50,927 cf  
18.0" Round Culvert n=0.012 L=113.0' S=0.0847 '/' Outflow=10.31 cfs 50,927 cf

**Pond 56K: DMH** Peak Elev=98.93' Inflow=10.31 cfs 50,927 cf  
Primary=5.82 cfs 25,100 cf Secondary=4.67 cfs 25,827 cf Outflow=10.31 cfs 50,927 cf

**Pond 56L:** Peak Elev=117.03' Inflow=1.17 cfs 6,115 cf  
12.0" Round Culvert n=0.012 L=41.0' S=0.0115 '/' Outflow=1.17 cfs 6,115 cf

**Pond 56M:** Peak Elev=108.78' Inflow=1.61 cfs 8,239 cf  
12.0" Round Culvert n=0.012 L=43.0' S=0.0100 '/' Outflow=1.61 cfs 8,239 cf

**Pond 56N:** Peak Elev=108.65' Inflow=10.31 cfs 50,927 cf  
18.0" Round Culvert n=0.012 L=8.5' S=0.0482 '/' Outflow=10.31 cfs 50,927 cf

**Pond CB13: 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

**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=96.99' Storage=8,109 cf Inflow=5.82 cfs 25,100 cf  
Discarded=1.34 cfs 24,903 cf Primary=0.53 cfs 197 cf Outflow=1.87 cfs 25,100 cf

**Pond RES06: New Pond** Peak Elev=89.33' Storage=9,339 cf Inflow=7.12 cfs 37,939 cf  
Discarded=1.41 cfs 33,242 cf Primary=3.97 cfs 4,697 cf Outflow=5.39 cfs 37,939 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=2,564 cf Inflow=4.41 cfs 21,970 cf  
Discarded=0.57 cfs 14,889 cf Primary=3.79 cfs 7,081 cf Outflow=4.37 cfs 21,970 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

**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=18.79 cfs 160,849 cf  
Primary=18.79 cfs 160,849 cf

**Link 5L:**

Inflow=4.58 cfs 11,239 cf  
Primary=4.58 cfs 11,239 cf

**Total Runoff Area = 1,535,973 sf Runoff Volume = 543,381 cf Average Runoff Depth = 4.25"**  
**64.09% Pervious = 984,331 sf 35.91% Impervious = 551,642 sf**