



Commissioner John O'Grady • Commissioner Marilyn Brown • Commissioner Kevin L. Boyce  
President

Economic Development & Planning Department  
James Schimmer, Director

# Technical Review Committee Agenda

Franklin County Engineer's Office  
970 Dublin Road  
Columbus, OH 43215

January 24, 2017  
1:30 p.m.

## 1. New Business

### A. Planning Commission

#### i. 672- PP-E – Brad Fisher

<b>Owner/Applicant:</b>	Rockford Homes Inc.
<b>Engineer:</b>	EMH&T - Jeff Strung
<b>Township:</b>	Jefferson Township
<b>Subdivision:</b>	Morrison Farms East
<b>Site:</b>	8211 Havens Corner (PID #170-000673), 8265 Havens Corner (170-001336), 5284 Taylor (171-000007), 3134 Waggoner Rd. 171-000587)
<b>Utilities:</b>	Public water and wastewater
<b>Request:</b>	Requesting a two-year extension of the approved preliminary plan for Morrison Farms East from the preliminary plan expiration date of April 8, 2017

#### ii. 681-V & PP – Brad Fisher

<b>Owner:</b>	Stanford J. Clark
<b>Applicant:</b>	Grand Communities, Ltd.
<b>Engineer:</b>	Civil & Environmental Consultants Inc. – Brian Burkhart
<b>Township:</b>	Jefferson Township
<b>Subdivision:</b>	Paddock Reserve
<b>Site:</b>	3866 Waggoner Rd. (PID #170-000101)
<b>Acreage:</b>	25.81-acres
<b>Utilities:</b>	Public water and wastewater
<b>Request:</b>	Requesting a Variance from Section 502.15 of the Franklin County Subdivision Regulations to allow the creation of a local street (no curb) that does not meet the minimum centerline radius requirement. Requesting Preliminary Plan approval of a 23 lot single-family subdivision with 15.81-acres of open space.

### B. Board of Zoning Appeals – No new cases

## 2. Adjournment of Meeting to February 21, 2017.

**VARIANCE or APPEAL APPLICATION**

for unincorporated Franklin County

Franklin County Development Department – Franklin County Planning Commission  
150 S. Front Street, FSL Suite 10 Columbus, OH 43215 Phone: (614) 525-3094

to be completed by FCPC Staff

Date Submitted: 1 / 17 / 17

Received By: JPL

Application No.: 681-V Fee: \$350.00

FCPC Date:     /     /    

**Property Owner/Subdivider/or Agent**

Signature: *Kirk D. Redden*

Date: 01 / 10 / 17

Name: Grand Communities, Ltd.

Address: 3940 Olympic Blvd., Suite 100

City, State, Zip: Erlanger, KY 41018

Phone No: (859) 344-5939

Section numbers(s) of the county subdivision regulations and a brief description of variance(s) or appeal(s) requested:

502.15- Minimum centerline radius for local street with no curb equals 250 ft.

Requesting a variance to allow the minimum centerline radius to equal 75 ft.

Jefferson Township Fire Department has reviewed the street layout for Paddock

Reserve and has signed off on the use of a reduced centerline radius.

Use a separate sheet to present additional description or information explaining why you feel the FCPC should grant the requested variance(s) or appeal(s).



FISCHER DEVELOPMENT COMPANY  
FISCHER DEVELOPMENT CO. II, INC.  
GRAND COMMUNITIES, LTD.



681-V

January 17<sup>th</sup>, 2017

Franklin County Planning Commission  
150 S. Front Street, FSL Suite 10  
Columbus, Ohio 43215

**RE: Variance Request and Reasoning**

Dear Franklin County Planning Commission Members,

The following letter summarizes Grand Communities, Ltd.'s ("GCL") reasoning for why it believes the Franklin County Planning Commission should grant the requested waiver to reduce the minimum centerline radius to seventy five feet (75').

1. Grand Communities has engaged in conversations with the Jefferson Township Fire Department to determine whether or not the proposed turning radius would cause concern for its largest vehicles. GCL had its consultant, Civil and Environmental Consultants, Inc., prepare a Turning Exhibit using the appropriate firetruck size. The Jefferson Township Fire Department has responded with a letter stating the turning radius is sufficient to accommodate their largest firetruck and they have no cause for concern at this time. This letter is attached hereto.
2. In the staff report prepared on September 14, 2016 regarding the Paddock Reserve development, the Franklin County Engineer provided no objections or comments related to the variance to the minimum centerline radius.
3. The requested variance allows Grand Communities, Ltd to incorporate a unique and creative turnaround loop design into the Paddock Reserve subdivision. GCL strongly believes this design enhances the community compared to the typical cul-de-sac layout by providing additional open space that serves as an amenity for the future residents. In addition, GCL's proposed open space area exceeds the similar design used in the nearby Woods at Swisher Creek subdivision. See Exhibits "A" and "B" attached hereto.

Please let us know if you require any additional information or clarification. We look forward to hearing from you, and answering any additional questions regarding the requested variance at the Franklin County Planning Commission meeting on February 8<sup>th</sup>, 2017. Thank you for your time and consideration.

Sincerely,

Kirk J. Ridder  
Project Planner  
Grand Communities, Ltd./Fischer Development Company

cc: *Mr. Jason Wisniewski, Vice President of Planning and Zoning at Grand Communities Ltd.*  
*Mr. Brian Burkhart, Project Manager at Civil & Environmental Consultants, Inc.*



**Jefferson Township Fire Department  
Fire Prevention Bureau**

6767 Havens Corners Rd · Blacklick OH 43004  
Phone 614-861-3757 · Fax 614-861-0968

November 4, 2016

Brian A. Burkhart  
Civil & Environmental Consultants, Inc.  
250 Old Wilson Bridge Road, Suite 250  
Worthington, OH 43085

Re: Paddock Reserve  
Waggoner Road  
Jefferson Township, Franklin Co

Mr. Brian Burkhart:

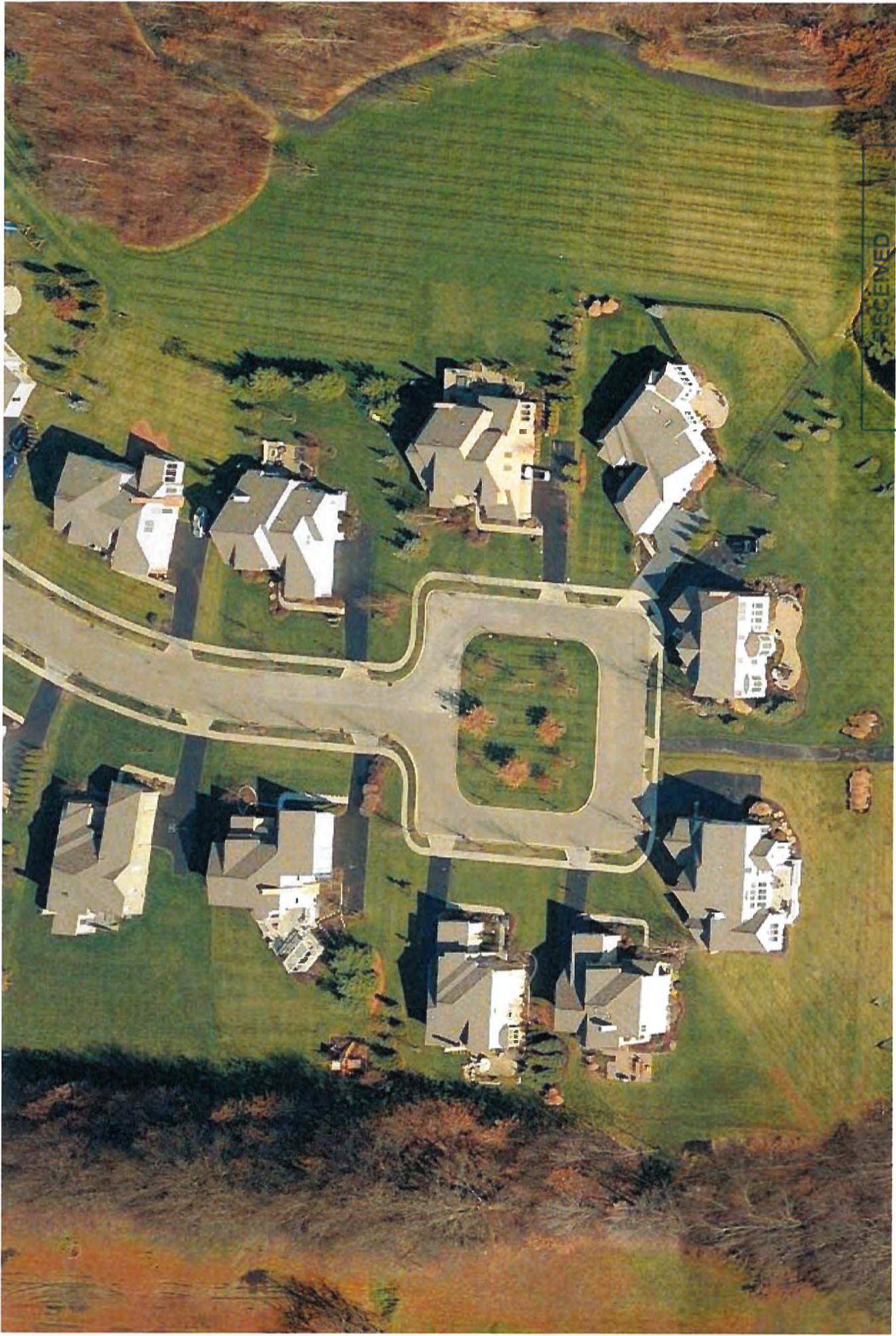
After reviewing the plans submitted for Paddock Reserve Subdivision there is no cause for concern at the present time. The turning radius is sufficient to accommodate the largest fire apparatus. Please contact the Fire Prevention Bureau if you have additional questions.

Thank you,

Chad Mast  
Fire Prevention Bureau  
Jefferson Township Fire  
614-588-5880



681-V



Grand Communities, Ltd.

**Paddock Reserve** Jefferson Township, Franklin County, Ohio

**Exhibit A - The Woods at Swisher Creek - Aerial View**

JAN 17 2017

Franklin County Planning Department  
Franklin County, OH



681-V

January 12, 2017



Grand Communities, Ltd.

**Paddock Reserve** Jefferson Township, Franklin County, Ohio

**Exhibit B - The Woods at Swisher Creek - Street View**

RECEIVED

JAN 17 2017

Franklin County Planning Department  
Franklin County, OH

681-V

January 12, 2017



Total Number of Lots Proposed: 23 Total Area: 25.81 acres  
Average Lot Dimension: 85 feet by 140 feet Typical Lot Area: 0.27 acre(s)  
Reserve Areas: 15.81 acres Streets: 2.86 acres Open Space: 15.81 acres  
Current Zoning? PSR- Planned Suburban Residential District Number of Proposed Final Plat Phases: 2  
Type of Water Supply Proposed: Jefferson Water & Sewer District  
Type of Wastewater Disposal Proposed: Jefferson Water & Sewer District  
Will the Subdivision Have Sidewalks? NO Curb/gutter? NO

Is a Variance to the Franklin County Subdivision Regulations requested? YES/NO  
If YES, Variance application form must be attached with the Preliminary Plan application.

Twenty (20) copies of the Preliminary Plan, including the E&S Plan, are submitted with this application.

The undersigned acknowledges this Preliminary Plan application does not constitute a Subdivision Plat application and understands the filing deadlines and meeting schedules associated with this request. Approval of a Preliminary Plan does not constitute acceptance of any public improvements shown. Such acceptance can only be made in conjunction with Final Plat requirements and procedures specified in the Franklin County Subdivision Regulations. The Subdivision Plat is not considered filed until a Final Plat application is submitted and accepted, in accordance with the Subdivision Regulations of Franklin County, Ohio.

To the best of my knowledge and belief, information and materials submitted as a part of this Preliminary Plan application are correct, complete and accurate. The Franklin County Technical Review Group members are hereby granted permission to enter the property for inspection and review purposes.

Property Owner's Signature Steve J. Coak Date: 1/5/17  
Engineer's Signature Brian Burkhardt, PE Date: 1/10/17

## **EROSION AND SEDIMENT CONTROL POLICY**

### Franklin County Subdivision Regulations

#### **General:**

Per the Franklin County Subdivision Regulations, an Erosion and Sediment Control Plan shall be required for major subdivisions, may be required for other development and shall conform with the *Ohio Department of Natural Resources, Division of Soil and Water Conservation manual, "Rainwater and Land Development."* Implementation of approved erosion control measures should precede earth-disturbing activities. The Ohio Environmental Protection Agency (OPEA) may also have jurisdiction over earth-disturbing activities.

#### **Purpose:**

The erosion and sediment (E&S) control plan is required for the purpose of reducing pollution to public and/or private water by sediment from accelerated soil erosion associated with construction activity.

#### **E&S Control Plan Requirements:**

The E&S plan shall be a separate sheet, be a part of subdivision improvement plans, provide information regarding the entire site and shall include the following:

1. Vicinity Map – Map locating the site in relation to the surrounding area. Indicate the location of receiving waters.
2. Work Limits – Indicate the limits of earth-disturbing activity; include borrow, spoil and stockpile areas.
3. Existing Topography – The existing contours of the entire site and adjacent land should be shown on the plan. Changes to the existing contours should also be shown on the plan. A topographic map should contain an appropriate scale and contour interval to clearly depict the topography of the site.
4. Existing Vegetation – Show existing tree lines, unique vegetation and areas that may affect erosion and sediment controls. Existing vegetation shall remain along waterways: minimum width of buffer strip on each side of the stream shall be two and one-half times the stream width measured from the top of the streambank or 50 feet, whichever is greater.
5. Soils – Show boundaries of the different soil types. A table relating relevant information concerning their limitations for the proposed use may be necessary. Information pertaining to the limitations of soil type can be determined from the Franklin County Soil Survey and Soil Potential Index.

Topsoil shall be segregated and stockpiled during grading of the site and be reapplied before the establishment of permanent vegetation.

6. Existing Drainage Patterns – Drainage patterns should be evident on the plan. Include off-site areas susceptible to sediment deposits or to erosion caused by accelerated runoff, as well as off-site areas affecting potential accelerated runoff and erosion. Indicate size of drainage area contributing to the site. Include any known

existing agriculture field tiles that may be present on the site. Any subsurface drainage tiles encountered during development shall be rerouted or connected into the subdivision's drainage system to ensure that these systems will continue drain upland properties.

7. Special Notes for Critical Areas – Give details and specifications for practices protecting streams, steep slopes, designated trees or stands of trees, etc.
8. Site Development – Show all planned locations of buildings, parking facilities, roads, utilities, easements, etc. Existing structures and facilities should also be shown.
9. Location of Practices – Show the location of all erosion and sediment control and stormwater management practices to be used on-site. Include measures that are to be utilized temporarily or permanently.

Temporary sediment basins and/or traps are to be utilized as the primary means of trapping sediment on site. They should be situated within the lowest points of elevation along the perimeter of the property and also adjacent to waterways whose headwaters originate upslope of the property. Enough land must be reserved to accommodate sediment basins and/or traps sized at 67 cubic yards of storage volume per acre of drainage area. (Note: this is not the same as per acre disturbed acre or per acre of the site). If permanent stormwater management ponds are proposed for the site, they must be retrofit to serve as sediment basins during active construction periods. Basins and traps shall be installed prior to any grading of the site.

Sediment barriers shall be installed to intercept sheet runoff from disturbed areas that do not drain into sediment basins or traps.

Vegetative practices shall be utilized on all disturbed areas within seven days if they are to remain dormant (undisturbed) for more than 45 days. Disturbed areas within 50 feet of any stream shall be stabilized within seven days.

10. Surface Water Locations - Show locations of springs, wetlands, streams, lakes, etc., on or within 200 feet of the site.
11. Detailed Drawings – Any structural practices used should be explained and illustrated with detailed drawings. Detailed drawings should be included for only those practices used on-site.
12. Specifications for Stabilization – Specifications for temporary and permanent seeding, mulching, construction entrances, etc., should be given. Include seeding mixtures and rates, lime and fertilizer application rates, and type and quantity of mulching for both temporary and permanent stabilization.
13. Construction Sequence – Provide a schedule relating the implementation of erosion and sediment control practices and stormwater management practices to major construction operations. By properly scheduling the construction, both the extent of exposed ground and the duration of exposure can be minimized.

#### Example of Construction Sequence:

1. Clearing and grubbing for those areas necessary for installation of sediment basins and traps and perimeter controls.
  2. Installation of sediment basin/traps and perimeter control.
  3. Continuation of clearing and grubbing within the areas designated to be disturbed.
  4. Road grading.
  5. Sewer and utility installation.
  6. Final grading.
  7. Application of permanent vegetative cover.
14. Maintenance and Inspection – Provide notes and information regarding maintenance for each practice to ensure continued performance.
15. Plan Reference Data – Title, scale, direction, legend and date shall be provided on all plans. The plan should also include name, address and telephone number of person(s) preparing the plan, as well as the owner of the property.

#### Plan Review and Enforcement:

1. Plan Review and Site Inspection – During and at the end of the construction of the subdivision street(s), utilities, etc., the erosion and sedimentation (E&S) control practices will be monitored by the Franklin Soil and Water Conservation District (FSWCD) personnel. The FSWCD personnel, based on a cooperative agreement with the Franklin County Commissioners and Franklin County Engineer, are responsible for plan review and approval will make periodic site inspections to ensure compliance. During inspections it may be determined that other erosion control practices, not already specified on this plan, may be necessary due to unforeseen environmental conditions and/or changes in drainage patterns caused by earth-moving activity.
2. Enforcement – Several milestones are reached at the end of the development process, which will be utilized to ensure proper placement of required conservation practices per the above.
  - A. Release of Surety – No surety, all or in part, will be released until the Franklin County Engineer's office is notified by FSWCD staff that the E&S practices, as previously approved, are in place and are properly functioning.
  - B. "Progress Letter" – The "progress letter" from the Franklin County Engineer to the Franklin County Development Department (providing assurance that street construction has been sufficiently and properly completed such that commencement of house construction is appropriate) will be forwarded only after assurance is received indicating all approved E&S practices are in place and are properly functioning.
  - C. Street Completion – The transfer and acceptance of any street for public purpose will occur only after assurance is received that all approved E&S practices are in place and are properly functioning.

- D. Building Permits and Inspections – The Franklin County Development Department, in cooperation with the FSWCD, reserves the right to withhold the issuance of building permits and inspections at any time during the homebuilding phase of the project until assurance is received that all approved erosion and sediment control practices are in place and are properly functioning.
- E. The Franklin County Planning Commission, in cooperation with the Franklin County Prosecuting Attorney's office and the FSWCD, reserve the right to pursue necessary legal actions at any time during the construction phases of the project to ensure compliance with the approved E&S control plan.

**STATEMENT OF UNDERSTANDING**

I understand and accept the responsibility to plan for and complete the required erosion and sediment control practices and hereby recognize them as an integral part of the subdivision named Paddock Reserve.

I will notify the FSWCD a minimum of three (3) work days prior to any land disturbance and will attend a preconstruction meeting with personnel from the FSWCD to review the implementation of the erosion control plan.

*Kurt D. Redder*

Signature of Subdivider/Developer

01 / 09 / 2017  
Date

3940 Olympic Blvd, Suite 100

Address of Subdivider/Developer

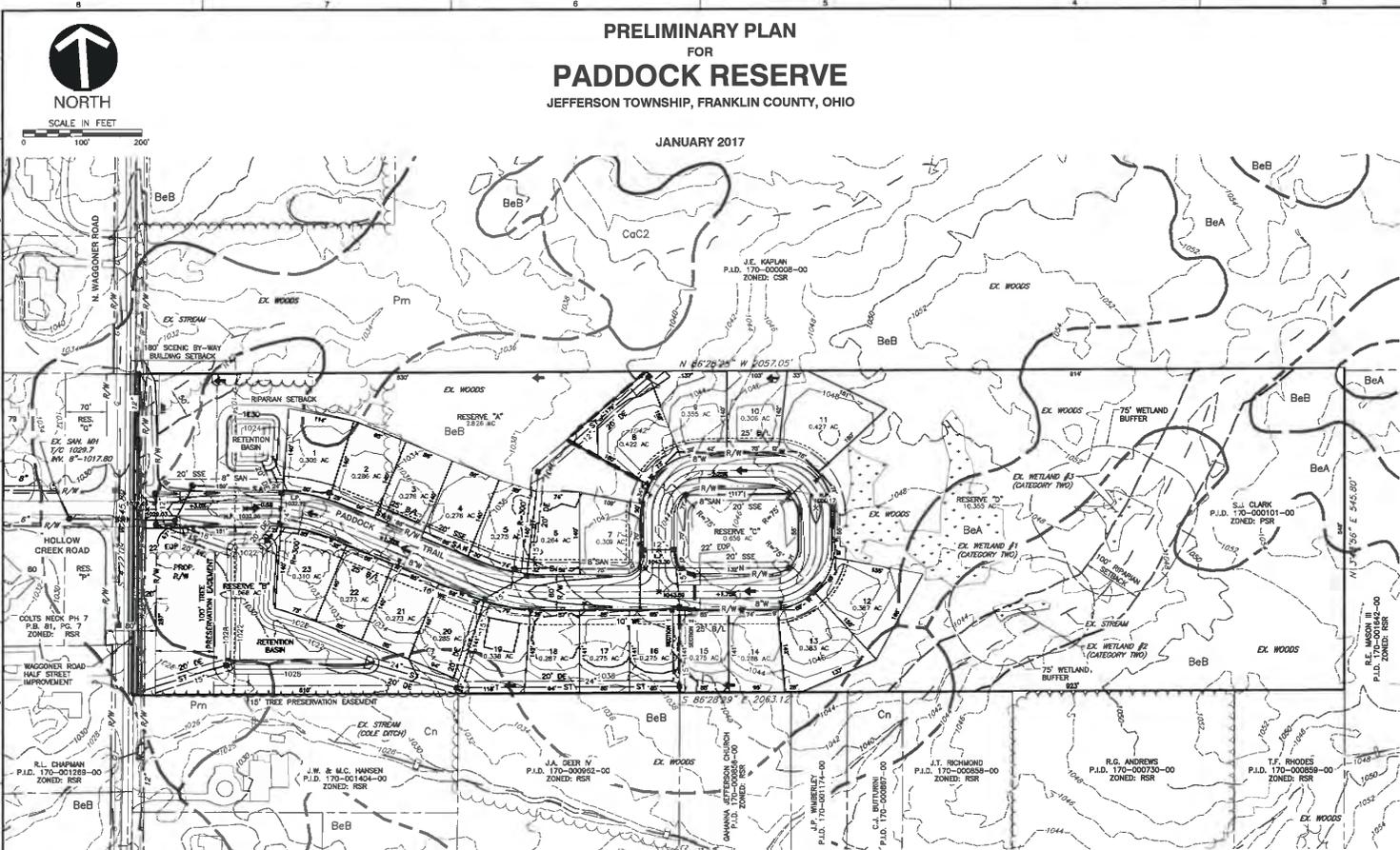
Erlanger, KY 41018

859-344-5939

Telephone Number

**PRELIMINARY PLAN  
FOR  
PADDOCK RESERVE**  
JEFFERSON TOWNSHIP, FRANKLIN COUNTY, OHIO

JANUARY 2017



**VICINITY MAP**  
SCALE: 1"=1,000'

**LEGEND**

- EXISTING PARCEL LINES
- EXISTING RIGHT-OF-WAY
- EXISTING PAVEMENT
- EXISTING CENTERLINE
- EXISTING TIE LINE
- EXISTING WETLAND BOUNDARY
- EXISTING STORM SEWER
- EXISTING GAS PIPELINE
- EXISTING WATER LINES
- EXISTING SANITARY SEWER
- EXISTING SANITARY MANHOLE
- EXISTING SECTION LINE
- EXISTING STREAM
- EXISTING STRUCTURE
- EXISTING OVERHEAD WIRES
- EXISTING UTILITY POLE
- EXISTING SOIL TYPE BOUNDARY
- EXISTING SOIL TYPE
- EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- PROPOSED SITE BOUNDARY
- PROPOSED PARCEL LINES
- PROPOSED RIGHT-OF-WAY
- PROPOSED PAVEMENT
- PROPOSED CENTERLINE
- PROPOSED DITCH
- PROPOSED EASEMENT
- PROPOSED SETBACK
- PROPOSED BASIN
- PROPOSED STORM SEWER
- PROPOSED STORM CATCH BASIN
- PROPOSED STORM MANHOLE
- PROPOSED WEIR WALL
- PROPOSED WATER LINES
- PROPOSED FIRE HYDRANT
- PROPOSED WATER VALVE
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY MANHOLE
- PROPOSED STORM ROUTING PATH
- PROPOSED DRAINAGE EASEMENT
- PROPOSED SANITARY EASEMENT
- PROPOSED WATER EASEMENT

**SOIL SURVEY LEGEND**

MAP SYMBOL	SOIL NAME
BeA	BENNINGTON SILT LOAM, 0 TO 2 PERCENT SLOPES
BeB	BENNINGTON SILT LOAM, 2 TO 8 PERCENT SLOPES
CaC2	CARDINGTON SILT LOAM, 8 TO 12 PERCENT SLOPES, ERODED
Cn	CONDOT SILT LOAM, 0 TO 1 PERCENT SLOPES
Pm	PEWMAW SILTY CLAY LOAM, 0 TO 1 PERCENT SLOPES

**SITE DATA**

SITE ADDRESS = 3888 WAGONER ROAD

SCHOOL DISTRICT = SAHAWNA-JEFFERSON LOCAL SCHOOLS

TOTAL SITE ACREAGE = 25.81 AC.

LOT ACREAGE = 7.148 ACRES

RESERVE ACREAGE = 15.806 ACRES

RIGHT OF WAY ACREAGE = 2.896 ACRES

TOTAL PROPOSED SINGLE FAMILY RESIDENTIAL LOTS = 23 (85'x140' TYP.)

EXISTING WOODS ON SITE = 23.04 ACRES (89%)

EXISTING WOODS PRESERVED WITHIN PROPOSED RESERVE AREAS = 13.24 ACRES (57%)

**ZONING**

CURRENT ZONE: PLANNED SUBURBAN RESIDENTIAL DISTRICT (PSR)

OPEN SPACE REQUIRED: 10.31± ACRES (40%)

OPEN SPACE PROVIDED: 15.81± ACRES (61%)

GROSS DENSITY: 0.88± LOTS/ACRE (23 LOTS/25.81 AC.)

NET DENSITY: 1.00± LOTS/ACRE (23 LOTS/ (25.81 AC.-2.88 AC.))

MINIMUM LOT SIZE: 10,000 SQ. FT. (0.230 AC.)

MINIMUM LOT WIDTH @ BUILDING SETBACK: 85'

**SETBACKS**

FRONT: 25'

SIDE: 5' MIN./15' TOTAL

REAR: 20% LOT DEPTH

- NOTES**
- PER FEMA FLOOD INSURANCE RATE MAP NUMBER 3904902216K, DATED 06/17/06; THE SITE IS ZONED X, OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.
  - WETLAND & STREAM DELINEATION COMPLETED BY DEC IN JUNE 2016.
  - RESERVE AREAS TO BE OWNED BY JEFFERSON TOWNSHIP AND MAINTAINED BY THE PADDOCK RESERVE HOME OWNERS ASSOCIATION FOR OPEN SPACE AND STORMWATER FACILITIES.
  - PER THE GROUND WATER POLLUTION POTENTIAL REPORT NO. 40 FOR FRANKLIN COUNTY, THE SITES POLLUTION POTENTIAL INDEX RANGE IS 100-119.
  - ROAD TYPICAL PER COUNTY SUBDIVISION STANDARDS.
  - PER FRANKLIN COUNTY SUBDIVISION REGULATIONS 422.01.B- LOTS 1, 2, 12, 13, 19, 20 & 21 HAVE POORLY DRAIN SOILS (Pm & Cn) LOCATED ON SITE, HOWEVER THESE SOILS ARE LOCATED OUTSIDE THE PROPOSED BUILDING FOOTPRINT.
  - A VARIANCE IS REQUIRED FROM FRANKLIN COUNTY SUBDIVISION REGULATIONS 502.15 TO ALLOW A CENTERLINE RADIUS LESS THAN 250 FT.
  - FOUR FOOT ANA. FENCING SHALL BE REQUIRED ALONG ANY RESERVE AREA ADJUTING LOTS IN THE PADDOCK RESERVE SUBDIVISION.
  - PARKING ALONG THE PADDOCK TRAIL SHALL BE PROHIBITED.
  - NO TREES SHALL BE PLANTED WITHIN THE PUBLIC RIGHT OF WAY.

- REFERENCES**
- PARCEL LINES FROM SURVEY COMPLETED BY DEC IN SEPTEMBER 2016.
  - TOPOGRAPHIC INFORMATION SHOWN FROM FRANKLIN COUNTY AUDITORS.
  - SOILS INFORMATION SHOWN FROM THE UNITED STATES DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE WEB SOIL SURVEY.
- ENGINEER/SURVEYOR**
- DAE & ENVIRONMENTAL CONSULTANTS, INC.  
250 OLD WILSON BRIDGE ROAD, SUITE 250  
WORTHINGTON, OH 43085
- CONTACT: BRIAN BURSHART, P.E.  
PHONE: 614-488-8204  
EMAIL: boburshart@daecinc.com

**DEVELOPER**  
GRAND COMMUNITIES LTD.  
3940 OLYMPIC BLVD, SUITE 100  
COLUMBIANA, TN 43018

CONTACT: JIMMIE RODGER  
PHONE: 602-344-5823  
EMAIL: jrodger@fischerhomes.com

**OWNER**  
STANFORD J CLARK  
1225 JADE ROAD  
SAHAWNA, TN 38372



**REVISION RECORD**

NO.	DATE	DESCRIPTION

**Civil & Environmental Consultants, Inc.**  
250 Old Wilson Bridge Road - Suite 250 - Worthington, OH 43085  
614-488-8203 - 888-598-8808  
www.daecinc.com

**GRAND COMMUNITIES, LTD.**  
**PADDOCK RESERVE**  
**JEFFERSON TOWNSHIP**  
**FRANKLIN COUNTY, OHIO**

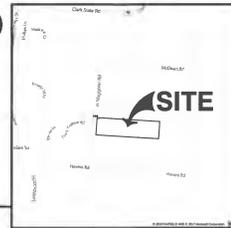
**PRELIMINARY PLAN**

DATE	DRAWN BY	CHK	MLC
JAN. 2017	DRYAN B...	...	...
DWG SCALE	1"=100'	CREATED BY	191-4508
PROJECT NO.	681-PP	APPROVED BY	

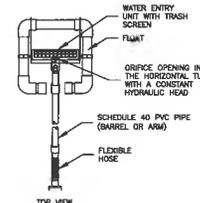
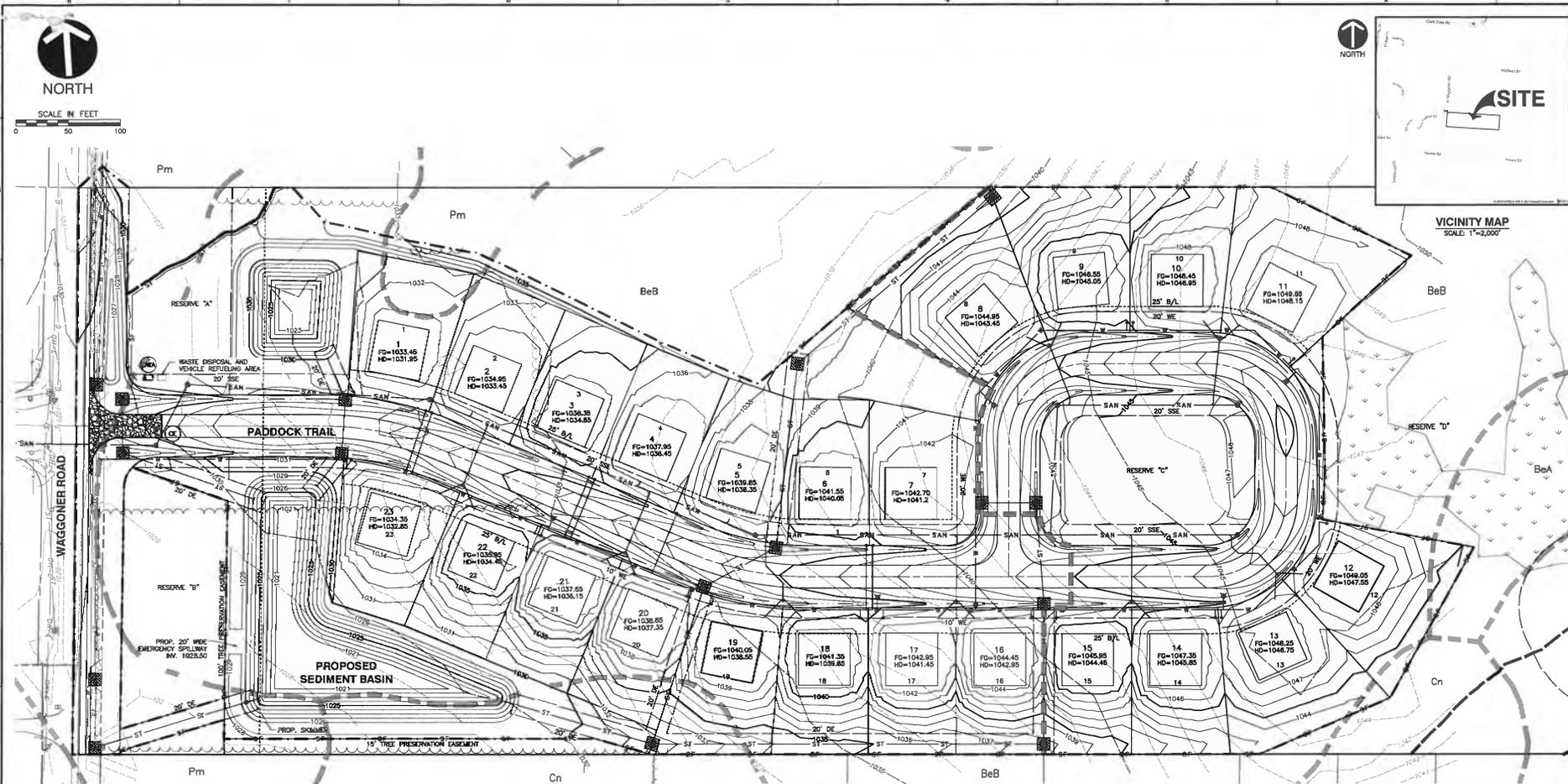
DRAWING NO. **SP1**  
SHEET 1 OF 1



SCALE IN FEET  
0 50 100

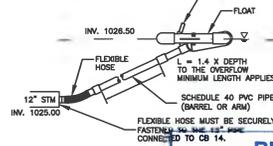
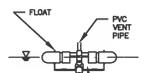


VICINITY MAP  
SCALE 1"=2,000'



- NOTES:**
1. PROPER DESIGN MUST BE COMPLETED TO MINIMIZE PIPING AROUND DISCHARGE PIPE.
  2. PROPER ORIFICE OPENING MUST BE SELECTED TO ENSURE POND DRAINS IN CORRECT AMOUNT OF TIME. MODIFICATIONS MAY BE REQUIRED IF FIELD CONDITIONS WARRANT A CHANGE.
  3. INSPECT SYSTEM REGULARLY TO ENSURE IT IS FUNCTIONING IN A CORRECT MANNER.
  4. UPON COMPLETION OF CONSTRUCTION ACTIVITIES, REMOVE SKIMMER.

SKIMMER DISCHARGE SYSTEM DETAIL  
NOT TO SCALE



**RECEIVED**  
**JAN 17 2017**  
Franklin County Planning Department  
Franklin County, OH

681-PP

**LEGEND**

- 070 --- EXISTING INDEX CONTOUR
- 071 --- EXISTING INTERMEDIATE CONTOUR
- --- EXISTING PROPERTY LINE
- --- EXISTING ADJACENT PROPERTY LINE
- --- EXISTING RIGHT-OF-WAY
- --- EXISTING CENTERLINE
- --- EXISTING PAVEMENT
- --- EXISTING WETLAND
- --- EXISTING STRUCTURE
- --- EXISTING FENCE
- OH-E --- EXISTING OVERHEAD ELECTRIC
- UR-E --- EXISTING UNDERGROUND ELECTRIC
- G --- EXISTING GAS PIPELINE
- W --- EXISTING WATER LINE
- SAN --- EXISTING SANITARY SEWER LINE
- ST --- EXISTING STORM SEWER LINE
- --- EXISTING FIRE HYDRANT/WATER VALVE
- --- EXISTING SANITARY MANHOLE
- --- EXISTING STORM STRUCTURES
- 070 --- PROPOSED INDEX CONTOUR
- 071 --- PROPOSED INTERMEDIATE CONTOUR
- --- PROPOSED PROPERTY LINE
- --- PROPOSED RIGHT-OF-WAY LINE
- --- PROPOSED CENTERLINE
- --- PROPOSED PAVEMENT
- --- PROPOSED EASEMENT
- --- PROPOSED SETBACK
- --- PROPOSED WATER LINE
- SAN --- PROPOSED SANITARY SEWER
- ST --- PROPOSED STORM SEWER
- W --- PROPOSED HYDRANT
- --- PROPOSED WATER VALVE
- --- PROPOSED SANITARY MANHOLE
- --- PROPOSED STORM STRUCTURE
- --- PROPOSED INLET PROTECTION
- --- PROPOSED CONSTRUCTION ENTRANCE
- --- PROPOSED SEDIMENT FENCE
- --- PROPOSED CONCRETE WASHOUT AREA
- --- PROPOSED LIMITS OF GRADING/DISTURBANCE

SOIL SURVEY LEGEND	
SYMBOL	SOIL NAME
BeA	BENNINGTON SILT LOAM, 0 TO 2 PERCENT SLOPES
BeB	BENNINGTON SILT LOAM, 2 TO 6 PERCENT SLOPES
CoC2	CORNINGTON SILT LOAM, 6 TO 12 PERCENT SLOPES, DROGGED
Ca	CONDOT SILT LOAM, 0 TO 1 PERCENT SLOPES
Pm	PEWAMO SILTY CLAY LOAM, 0 TO 1 PERCENT SLOPES

- NOTES**
1. CONTRACTOR TO INSTALL A SKIMMER TO CATCH BASIN #14 PER THE DETAILS ON THIS SHEET. SKIMMER TO REMAIN UNTIL CONSTRUCTION IS COMPLETE AND 75% VEGETATION IS ESTABLISHED.
  2. CONTRACTOR TO INSTALL ORANGE CONSTRUCTION FENCE AROUND TREE PRESERVATION AREAS.

REVISION RECORD		
NO.	DATE	DESCRIPTION

**Civil & Environmental Consultants, Inc.**  
250 Old Wilson Bridge Road, Suite 250 - Worthington, OH 43085  
614-540-6533 • 688-598-8808  
www.civilce.com

**GRAND COMMUNITIES, LTD.**  
**PADDOCK RESERVE**  
**PUBLIC STREET, STORM,**  
**AND WATER IMPROVEMENT PLAN**  
**JEFFERSON TWP, FRANKLIN CO.**

**EROSION & SEDIMENT CONTROL PLAN**

DATE: JANUARY 2017 (DRAWN BY: MDC)  
PROJECT NO.: 17-001 (CHECKED BY: CLC)  
DRAWING NO.: 181-000  
APPROVED BY:



**STORMWATER MANAGEMENT REPORT**

**PADDOCK RESERVE**

**JEFFERSON TOWNSHIP, FRANKLIN COUNTY, OHIO**

**Prepared For:**

**GRAND COMMUNITIES LTD.  
3940 OLYMPIC BLVD. SUITE 100  
ERLANGER, KY 41018**

**Prepared By:**

**CIVIL & ENVIRONMENTAL CONSULTANTS, INC.  
250 OLD WILSON BRIDGE ROAD, SUITE 250  
WORTHINGTON, OH 43085**

**CEC 161-606**

**January 2017**



**Civil & Environmental Consultants, Inc.**

## **PROJECT SUMMARY**

**Project Name:** Paddock Reserve  
**Location:** Jefferson Township, Franklin County, OH  
**Reviewing Agency:** Franklin County Engineer

## **HYDROLOGIC SUMMARY**

**Rainfall Data:** Per Franklin County Stormwater Drainage Manual  
1-yr: 2.20"  
2-yr: 2.63"  
5-yr: 3.24"  
10-yr: 3.74"  
25-yr: 4.44"  
50-yr: 5.02"  
100-yr: 5.63"

**Rainfall Distribution:** NRCS Type II 24 hour  
**Detention Policy:** Franklin County  
**Water Quality:** Ohio EPA  
**Hydrology Modeling Program:** HydroCAD

## **DESIGN SUMMARY**

**Retention:** Retention Basin  
**Water Quality:** Retention Basin  
**Receiving Water Body:** Unnamed Tributary to Blacklick Creek

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## APPENDICES

- Appendix A: Pre-Developed Calculations
- Appendix B: Post-Developed Calculations
- Appendix C: Critical Storm Calculations
- Appendix D: Water Quality Calculations
- Appendix E: Post-Developed Basin Calculations
- Appendix F: Sediment Basin Calculations
- Appendix G: Storm Sewer Calculations
- Appendix H: Pre & Post-Developed Drainage Maps

## **1.0 INTRODUCTION**

The following report provides a detailed analysis of the Stormwater Management Plan for Paddock Reserve. The proposed site is located to the east of Waggoner Road and to the north of Havens Road in Jefferson Township, Franklin County, Ohio.

Stormwater runoff and water quality for the entire Paddock Reserve development will be handled by a proposed retention basin located at the southwest corner of the property.

## 2.0 HYDROLOGIC ANALYSIS

Hydrologic parameters such as Runoff Curve Number and Time of Concentration were determined using the Natural Resources Conservation Service (NRCS) methodology. The 1-, 2-, 5-, 10-, 25-, 50-, and 100-year storm event discharge amounts were calculated using the NRCS TR-55 method. This analysis reflects the NRCS Type II, 24 hour storm duration.

### 3.0 PRE-DEVELOPED ANALYSIS

The project site is split into two drainage areas that converge at a culvert crossing at Waggoner Road, just south of the site.

Drainage Area “A” consists of 14.7 acres with Type C soils and a 53.2 minute time of concentration. This area drains from east to west to the roadside ditch/ storm sewer system of Waggoner Road which outlets to the culvert crossing.

Area	CN	Description
12.3 Ac.	70	Woods, Good, HSG C
2.2 Ac.	74	>75% Grass Cover, Good, HSG C
0.2 Ac.	98	Paved Parking, HSG C
<b>14.7 Ac.</b>	<b>71</b>	<b>Weighted Average</b>

Drainage Area “A” has been split into two sub areas in which one area will be disturbed and one area undisturbed for the proposed development.

Drainage Area “A-1” consists of 12.2 acres with Type C soils and a 53.2 minute time of concentration and will be the area that will be disturbed for the proposed development.

Area	CN	Description
10.3 Ac.	70	Woods, Good, HSG C
1.7 Ac.	74	>75% Grass Cover, Good, HSG C
0.2 Ac.	98	Paved Parking, HSG C
<b>12.2 Ac.</b>	<b>71</b>	<b>Weighted Average</b>

Drainage Area “A-2” consists of 2.5 acres with Type C soils and a 20.0 minute time of concentration and will be the area that will be undisturbed for the proposed development.

Area	CN	Description
2.0 Ac.	70	Woods, Good, HSG C
0.5 Ac.	74	>75% Grass Cover, Good, HSG C
<b>2.5 Ac.</b>	<b>71</b>	<b>Weighted Average</b>

Drainage Area “B” consists of 10.6 acres with Type C soils and a 51.6 minute time of concentration. This area drains to an existing stream located on the east half of the property that flows offsite to the south and then flows west to the culvert crossing at Waggoner Road.

Area	CN	Description
<b>10.6 Ac.</b>	<b>70</b>	Woods, Good, HSG C

Refer to Appendix A for the pre-developed flow rates.

#### 4.0 POST-DEVELOPED ANALYSIS

Drainage Area “A” consists of 15.3 acres with Type C soils and a 20.0 minute time of concentration.

Area	CN	Description
3.5 Ac.	70	Woods, Good, HSG C
1.5 Ac.	74	>75% Grass Cover, Good, HSG C
9.8 Ac.	81	1/3 Acre Lots, 30% Imp, HSG C
0.5 Ac.	98	Pond and Lake Surface
<b>15.3 Ac.</b>	<b>78</b>	<b>Weighted Average</b>

For post- developed conditions, Drainage Area “A” splits into two sub areas in which one area is directed towards the retention basin and one area remains undisturbed and by-passes the retention basin.

Drainage Area “A-1” consists of 12.8 acres with Type C soils and a 20.0 minute time of concentration and will be conveyed to and detained within the retention basin.

Area	CN	Description
1.5 Ac.	70	Woods, Good, HSG C
1.0 Ac.	74	>75% Grass Cover, Good, HSG C
9.8 Ac.	81	1/3 Acre Lots, 30% Imp, HSG C
0.5 Ac.	98	Pond and Lake Surface
<b>12.8 Ac.</b>	<b>80</b>	<b>Weighted Average</b>

Drainage Area “A-2” consists of 2.5 acres with Type C soils and a 20.0 minute time of concentration and will remain undisturbed and by-pass the retention basin. No increase in the peak rate of run-off from pre-developed conditions.

Area	CN	Description
2.0 Ac.	70	Woods, Good, HSG C
0.5 Ac.	74	>75% Grass Cover, Good, HSG C
<b>2.5 Ac.</b>	<b>71</b>	<b>Weighted Average</b>

Drainage Area “B” consists of 10.1 acres with Type C soils and a 51.6 minute time of concentration. No development will take place within this drainage area. No increase in the peak rate of run-off from pre-developed conditions.

Area	CN	Description
<b>10.1 Ac.</b>	<b>70</b>	Woods, Good, HSG C

Refer to Appendix B for the post-developed flow rates.

Due to the increase in runoff for Drainage Area “A-1”, stormwater management will be required for the proposed development. A retention basin will be constructed at the southwest corner of the site. Per the Franklin County Stormwater Drainage Manual, the critical storm method shall be utilized to determine the allowable release rates. Under this methodology, runoff from storm events less than or equal to the critical storm shall be released from the site at a rate no greater than the peak runoff during the 1-year storm event under pre-developed conditions. Additionally, the peak runoff rate during the 100-year storm event shall be released at a rate less than or equal to the peak runoff rate during the 10-year storm event under pre-developed conditions.

For Drainage Area “A-1”, the post-developed 1-year runoff volume increases 120% from the pre-developed condition; this results in a 25-year critical storm event.

$$\% \text{ Increase} = [(28,618 - 13,024) / 13,024] \times 100 = 120\%$$

Refer to Appendix C for the critical storm calculations.

<b>Table 1: Drainage Area “A-1” Summary of Release Rates</b>			
Storm Event (yr)	Pre-Dev Peak Flow (cfs)	Post-Dev Peak Flow (cfs)	Allowable Peak Flow (cfs)
1	1.71	9.17	1.71
2	3.13	13.46	1.71
5	5.63	20.07	1.71
10	7.97	25.79	1.71
25	11.52	34.10	1.71
50	14.68	41.16	7.97
100	18.14	48.79	7.97

## 5.0 WATER QUALITY

The Ohio EPA requires that the water quality volume for wet basins be detained for a period of 24 hours while releasing less than half of that volume in the first 8 hours.

The retention basin will treat a water quality volume of 9,496 cu. ft. for the 12.8 acre tributary area which has a corresponding water quality elevation of 1025.34. Drawdown of the water quality volume will be accomplished with a 2.7" orifice attached to the proposed principal spillway.

Refer to Appendix D for the water quality calculations.

## 6.0 RETENTION BASIN & OUTLET DESIGN

### Retention Basin Design Elevations:

1021.00 to 1025.00 - Permanent Pool

1025.00 to 1025.34 - Water Quality

1025.34 to 1028.50 - Retention

Top of Basin – 1029.50

100-yr Peak Elevation – 1028.47

### Retention Basin Principal Spillway:

Outlet pipe: 15" @ Invert 1024.75 to Invert 1023.85 (153' @ 0.59% Slope)

WQ Orifice: 2.7" @ Invert 1025.00

Orifice: 4"(H) x 9"(W) Window @ Invert 1026.50

Catch Basin #14: Top of Grate @ Invert 1028.10

### Retention Basin Emergency Spillway:

20' Wide Earthen Spillway @ Invert 1028.50

<b>Table 2: Retention Basin Release Rates</b>			
Storm Event (yr)	Peak Out-Flow (cfs)	Peak Elevation (ft)	Peak Storage (cf)
1	0.19	1026.12	23,519
2	0.29	1026.58	34,462
5	0.84	1026.91	42,775
10	1.22	1027.28	52,351
25	1.64	1027.88	69,142
50	3.27	1028.24	79,928
100	7.81	1028.47	86,833

Refer to Appendix E for the post-developed flow rates from the retention basin.

## 7.0 SEDIMENTATION

The proposed retention basin will be utilized as a sediment basin during construction. A temporary skimmer will be attached to the principal spillway (CB #14) and will provide the proper 48-hour drawdown.

Refer to Appendix F for the sediment basin calculations.

## **8.0 STORM SEWER**

A storm sewer network will be constructed to convey runoff to the proposed retention basin. The stormwater runoff will be collected using catch basins at localized low points. The storm sewer design on this project is based on the 5-year storm event and checked using the 10-year hydraulic grade line, per Franklin County stormwater regulations.

Refer to Appendix G for the storm sewer calculations.

## 9.0 CONCLUSION

The proposed retention basin meets all requirements for detention and water quality as set forth by the Franklin County and the Ohio EPA for the proposed Paddock Reserve development.

---

**APPENDIX A**

**PRE-DEVELOPED CALCULATIONS**

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Type II 24-hr 1-yr Rainfall=2.20"

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Page 1

**Summary for Subcatchment 1S: PRE-DEV "A"**

Runoff = 2.06 cfs @ 12.66 hrs, Volume= 0.360 af, Depth> 0.29"

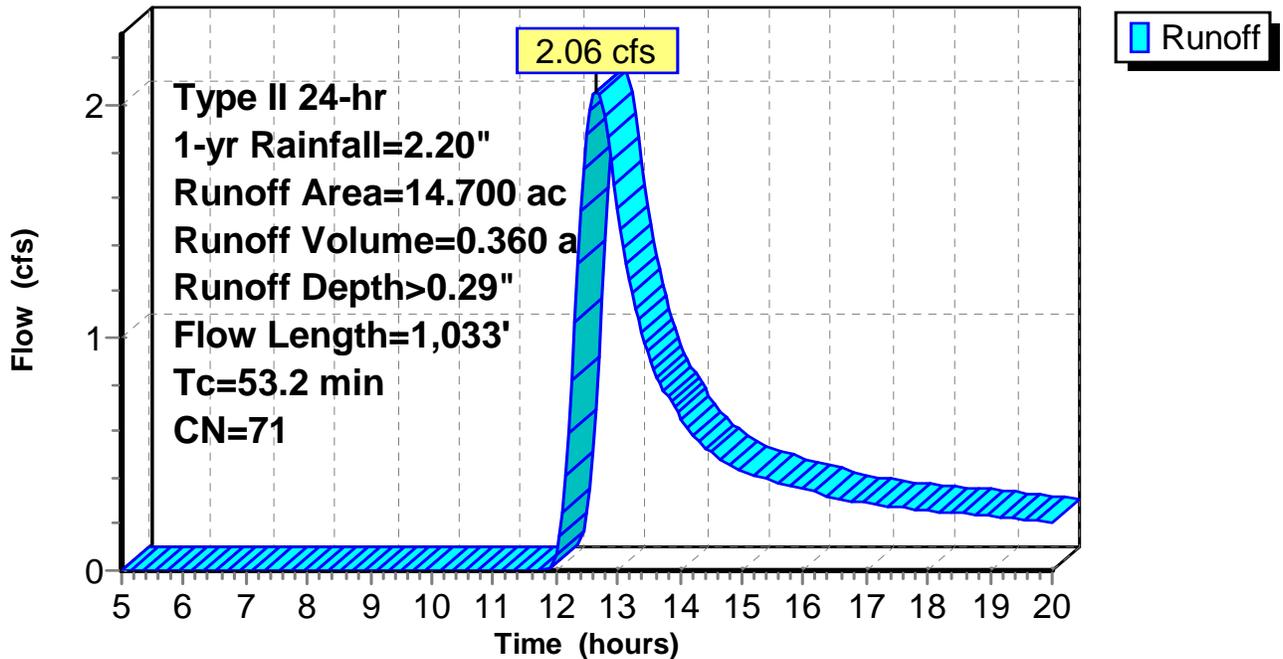
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 1-yr Rainfall=2.20"

Area (ac)	CN	Description
12.300	70	Woods, Good, HSG C
2.200	74	>75% Grass cover, Good, HSG C
0.200	98	Paved parking, HSG C
14.700	71	Weighted Average
14.500		98.64% Pervious Area
0.200		1.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	150	0.0227	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
22.1	883	0.0177	0.67		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
53.2	1,033	Total			

**Subcatchment 1S: PRE-DEV "A"**

**Hydrograph**



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Type II 24-hr 2-yr Rainfall=2.63"

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Page 2

**Summary for Subcatchment 1S: PRE-DEV "A"**

Runoff = 3.78 cfs @ 12.62 hrs, Volume= 0.586 af, Depth> 0.48"

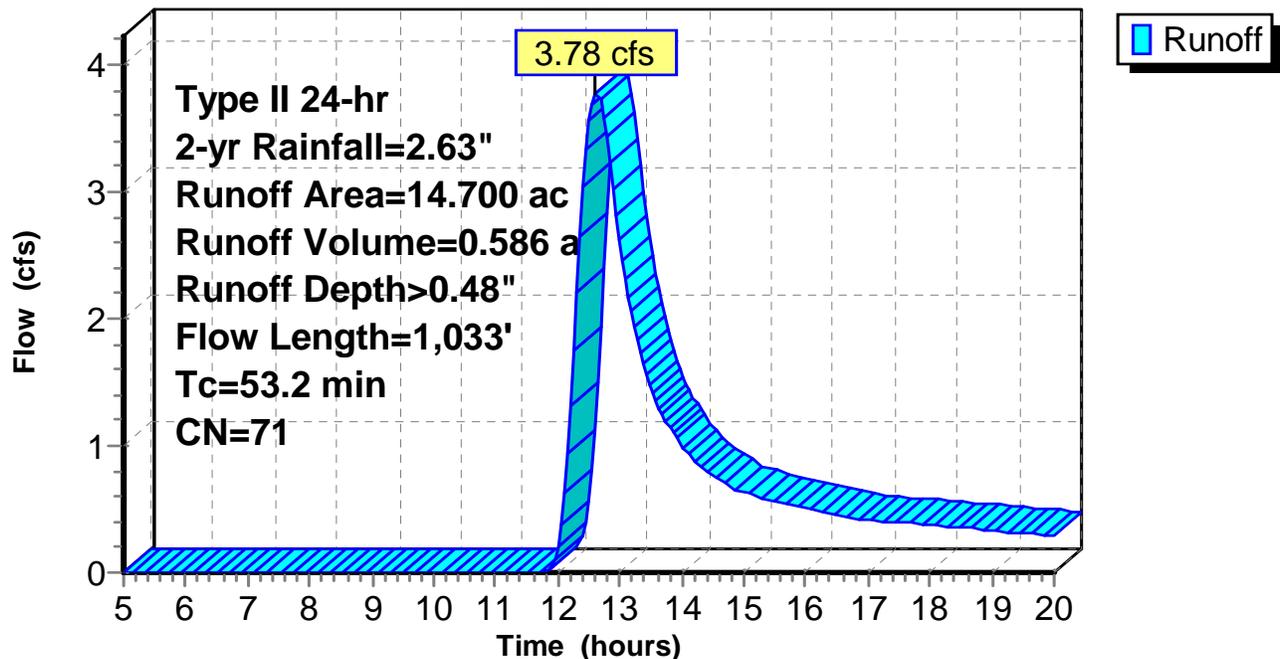
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2-yr Rainfall=2.63"

Area (ac)	CN	Description
12.300	70	Woods, Good, HSG C
2.200	74	>75% Grass cover, Good, HSG C
0.200	98	Paved parking, HSG C
14.700	71	Weighted Average
14.500		98.64% Pervious Area
0.200		1.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	150	0.0227	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
22.1	883	0.0177	0.67		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
53.2	1,033	Total			

**Subcatchment 1S: PRE-DEV "A"**

**Hydrograph**



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Type II 24-hr 5-yr Rainfall=3.24"

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**Summary for Subcatchment 1S: PRE-DEV "A"**

Runoff = 6.79 cfs @ 12.59 hrs, Volume= 0.965 af, Depth> 0.79"

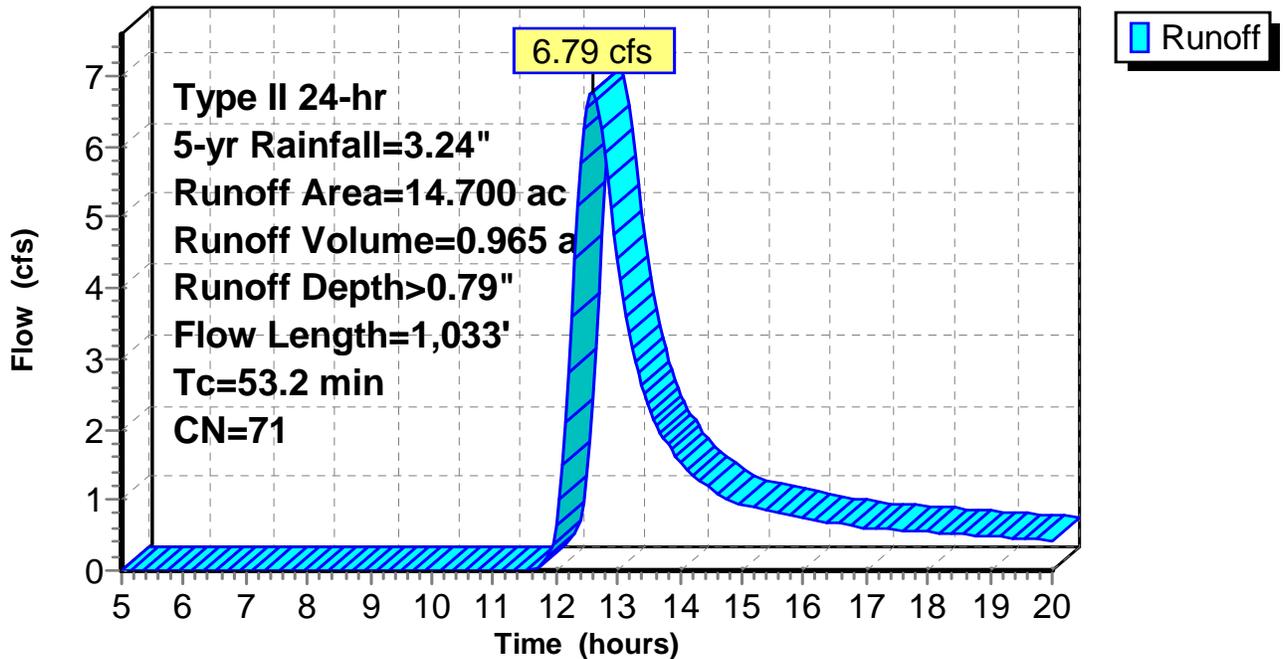
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 5-yr Rainfall=3.24"

Area (ac)	CN	Description
12.300	70	Woods, Good, HSG C
2.200	74	>75% Grass cover, Good, HSG C
0.200	98	Paved parking, HSG C
14.700	71	Weighted Average
14.500		98.64% Pervious Area
0.200		1.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	150	0.0227	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
22.1	883	0.0177	0.67		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
53.2	1,033	Total			

**Subcatchment 1S: PRE-DEV "A"**

**Hydrograph**



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Type II 24-hr 10-yr Rainfall=3.74"

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**Summary for Subcatchment 1S: PRE-DEV "A"**

Runoff = 9.60 cfs @ 12.58 hrs, Volume= 1.317 af, Depth> 1.08"

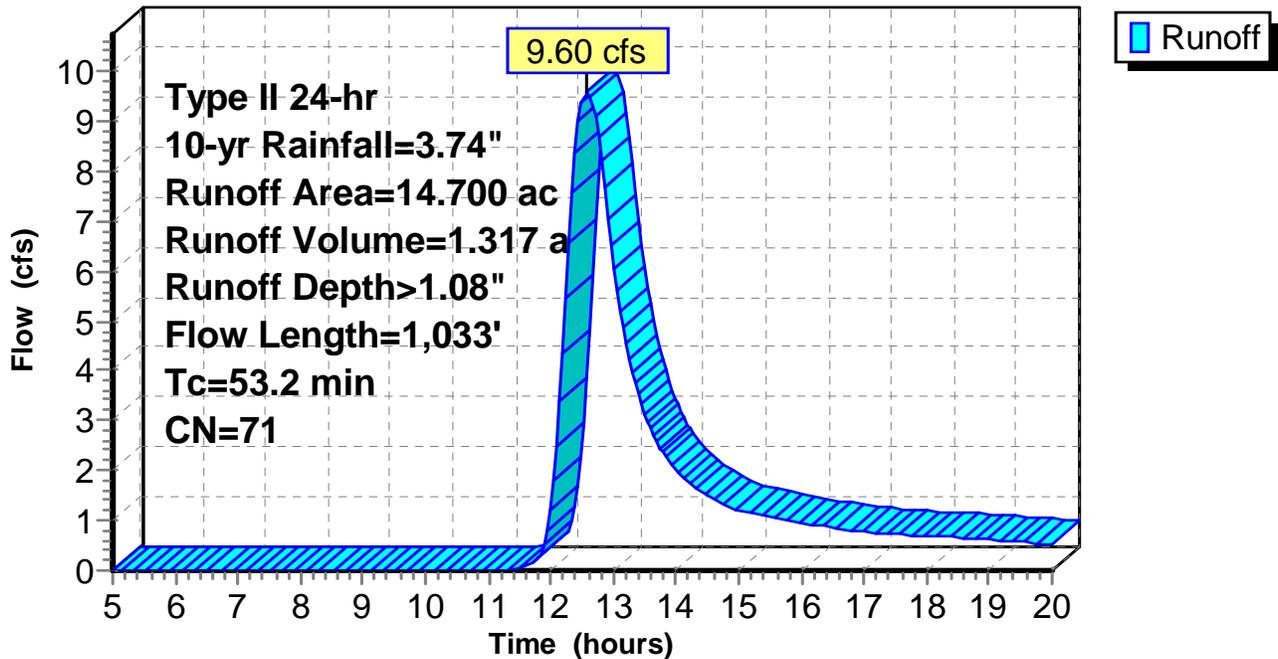
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10-yr Rainfall=3.74"

Area (ac)	CN	Description
12.300	70	Woods, Good, HSG C
2.200	74	>75% Grass cover, Good, HSG C
0.200	98	Paved parking, HSG C
14.700	71	Weighted Average
14.500		98.64% Pervious Area
0.200		1.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	150	0.0227	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
22.1	883	0.0177	0.67		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
53.2	1,033	Total			

**Subcatchment 1S: PRE-DEV "A"**

**Hydrograph**



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Type II 24-hr 25-yr Rainfall=4.44"

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**Summary for Subcatchment 1S: PRE-DEV "A"**

Runoff = 13.89 cfs @ 12.57 hrs, Volume= 1.857 af, Depth> 1.52"

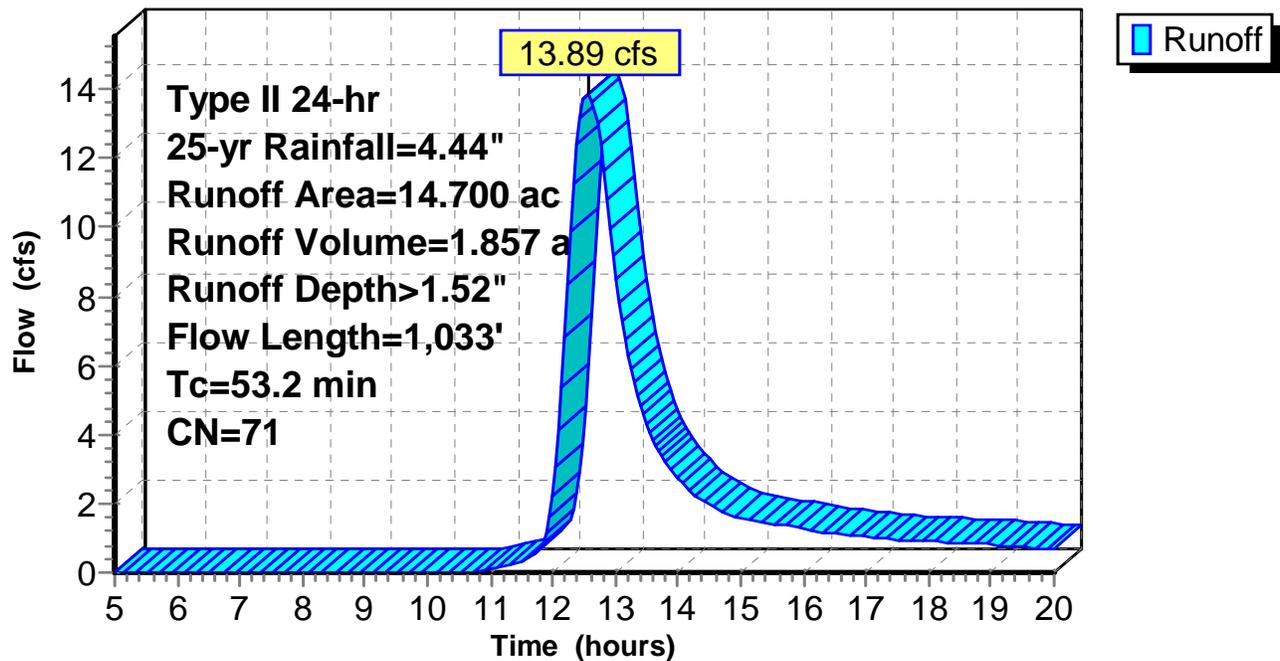
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 25-yr Rainfall=4.44"

Area (ac)	CN	Description
12.300	70	Woods, Good, HSG C
2.200	74	>75% Grass cover, Good, HSG C
0.200	98	Paved parking, HSG C
14.700	71	Weighted Average
14.500		98.64% Pervious Area
0.200		1.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	150	0.0227	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
22.1	883	0.0177	0.67		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
53.2	1,033	Total			

**Subcatchment 1S: PRE-DEV "A"**

**Hydrograph**



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Type II 24-hr 50-yr Rainfall=5.02"

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Page 6

**Summary for Subcatchment 1S: PRE-DEV "A"**

Runoff = 17.68 cfs @ 12.56 hrs, Volume= 2.338 af, Depth> 1.91"

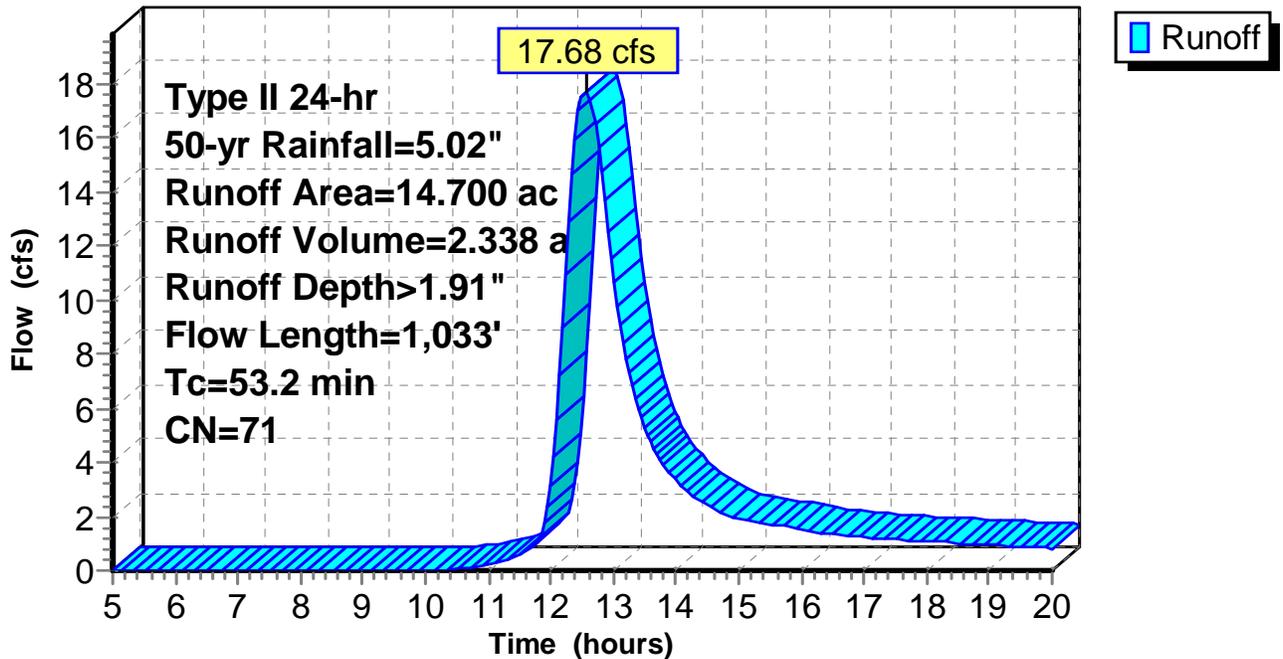
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 50-yr Rainfall=5.02"

Area (ac)	CN	Description
12.300	70	Woods, Good, HSG C
2.200	74	>75% Grass cover, Good, HSG C
0.200	98	Paved parking, HSG C
14.700	71	Weighted Average
14.500		98.64% Pervious Area
0.200		1.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	150	0.0227	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
22.1	883	0.0177	0.67		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
53.2	1,033	Total			

**Subcatchment 1S: PRE-DEV "A"**

**Hydrograph**



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Type II 24-hr 100-yr Rainfall=5.63"

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**Summary for Subcatchment 1S: PRE-DEV "A"**

Runoff = 21.86 cfs @ 12.55 hrs, Volume= 2.870 af, Depth> 2.34"

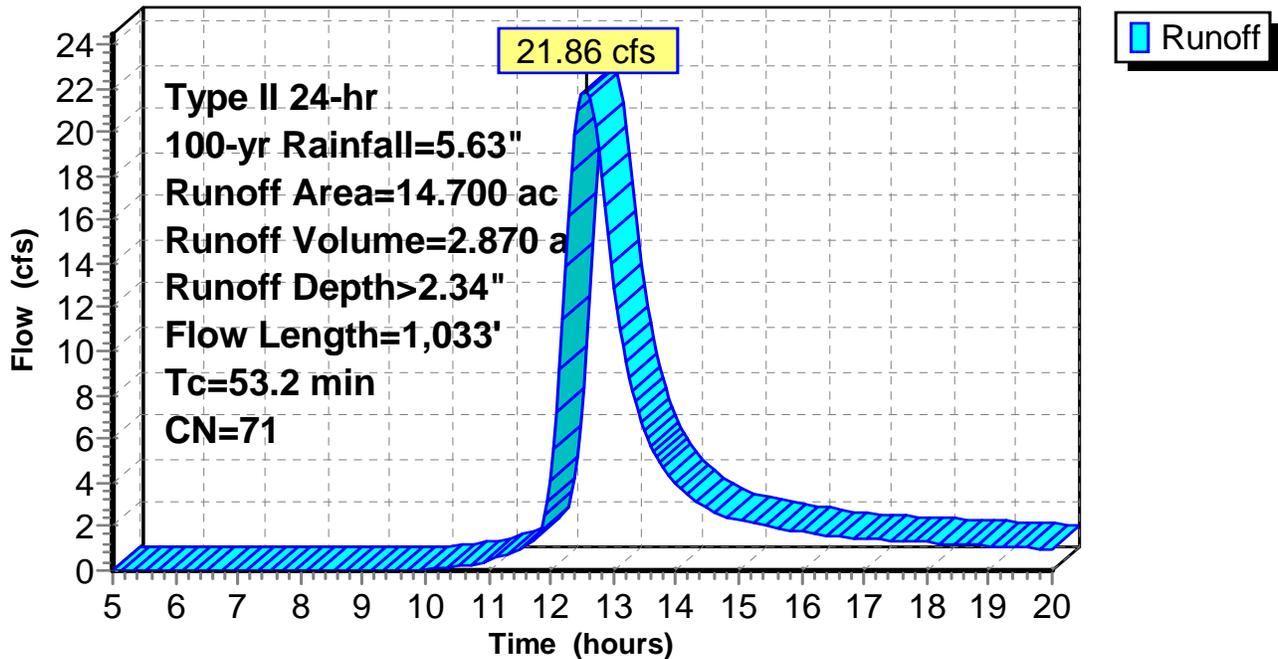
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-yr Rainfall=5.63"

Area (ac)	CN	Description
12.300	70	Woods, Good, HSG C
2.200	74	>75% Grass cover, Good, HSG C
0.200	98	Paved parking, HSG C
14.700	71	Weighted Average
14.500		98.64% Pervious Area
0.200		1.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	150	0.0227	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
22.1	883	0.0177	0.67		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
53.2	1,033	Total			

**Subcatchment 1S: PRE-DEV "A"**

**Hydrograph**



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Type II 24-hr 1-yr Rainfall=2.20"

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Page 1

**Summary for Subcatchment 8S: PRE-DEV "A-1"**

Runoff = 1.71 cfs @ 12.66 hrs, Volume= 0.299 af, Depth> 0.29"

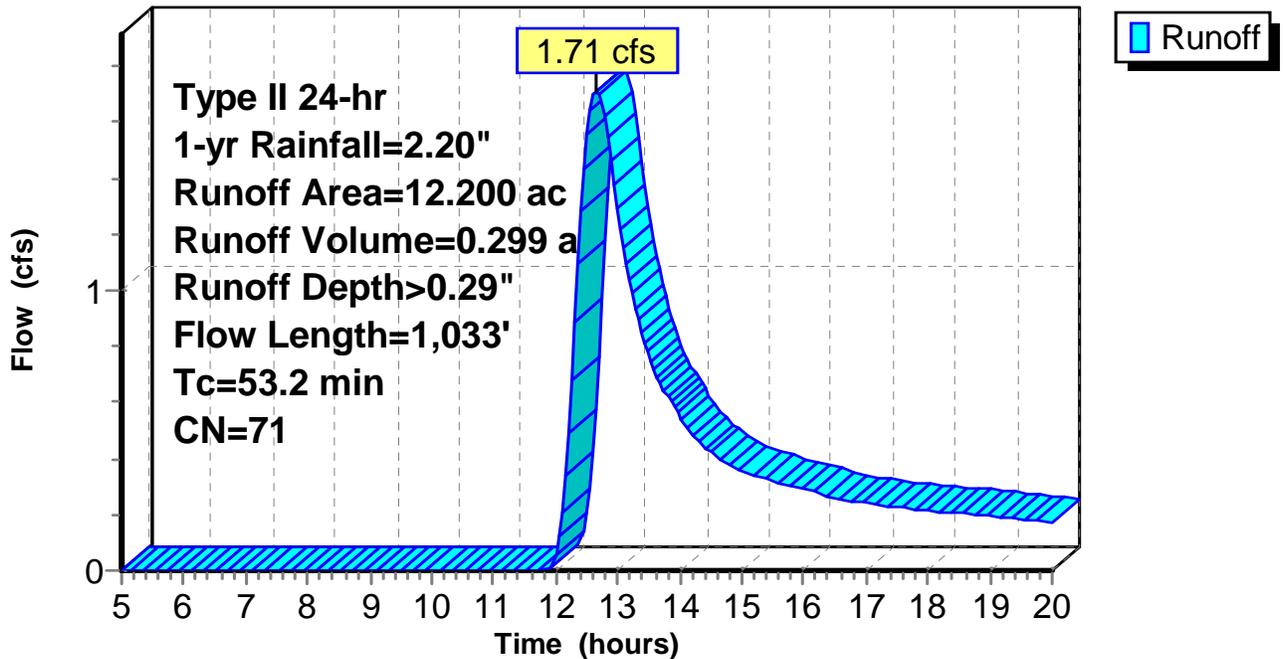
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 1-yr Rainfall=2.20"

Area (ac)	CN	Description
10.300	70	Woods, Good, HSG C
1.700	74	>75% Grass cover, Good, HSG C
0.200	98	Paved parking, HSG C
12.200	71	Weighted Average
12.000		98.36% Pervious Area
0.200		1.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	150	0.0227	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
22.1	883	0.0177	0.67		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
53.2	1,033	Total			

**Subcatchment 8S: PRE-DEV "A-1"**

**Hydrograph**



**161606-swm**

Prepared by Microsoft  
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Type II 24-hr 2-yr Rainfall=2.63"

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Page 2

**Summary for Subcatchment 8S: PRE-DEV "A-1"**

Runoff = 3.13 cfs @ 12.62 hrs, Volume= 0.486 af, Depth> 0.48"

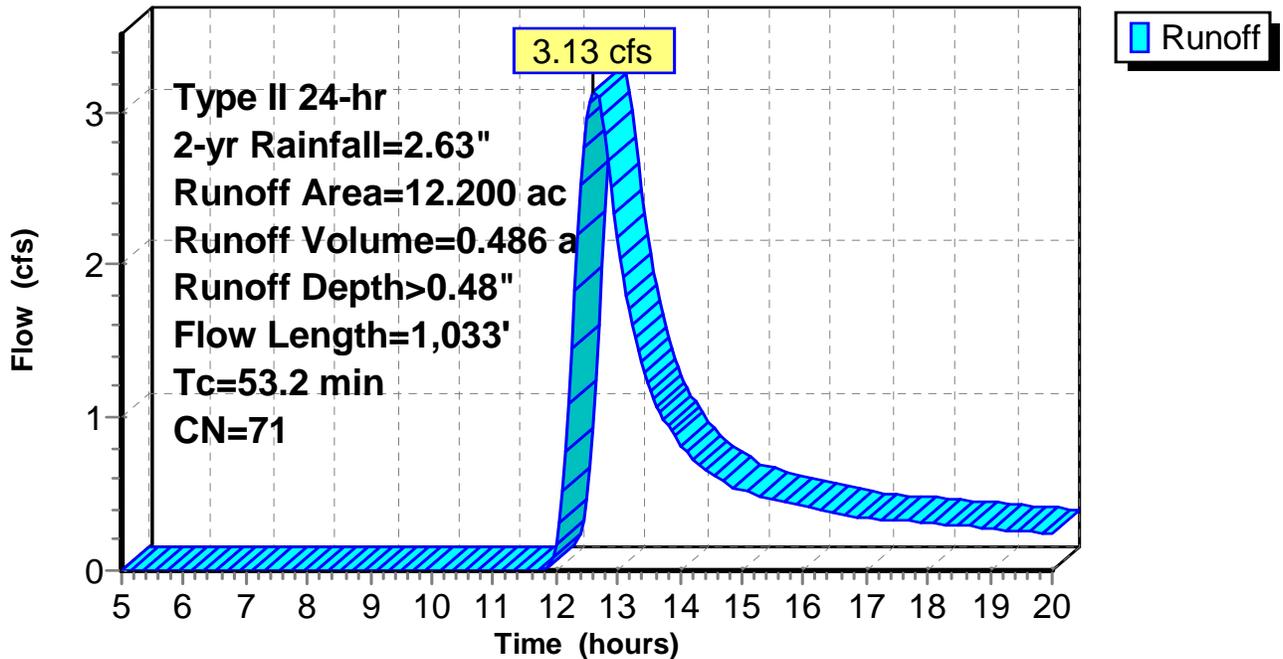
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2-yr Rainfall=2.63"

Area (ac)	CN	Description
10.300	70	Woods, Good, HSG C
1.700	74	>75% Grass cover, Good, HSG C
0.200	98	Paved parking, HSG C
12.200	71	Weighted Average
12.000		98.36% Pervious Area
0.200		1.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	150	0.0227	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
22.1	883	0.0177	0.67		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
53.2	1,033	Total			

**Subcatchment 8S: PRE-DEV "A-1"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 5-yr Rainfall=3.24"

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Page 3

**Summary for Subcatchment 8S: PRE-DEV "A-1"**

Runoff = 5.63 cfs @ 12.59 hrs, Volume= 0.801 af, Depth> 0.79"

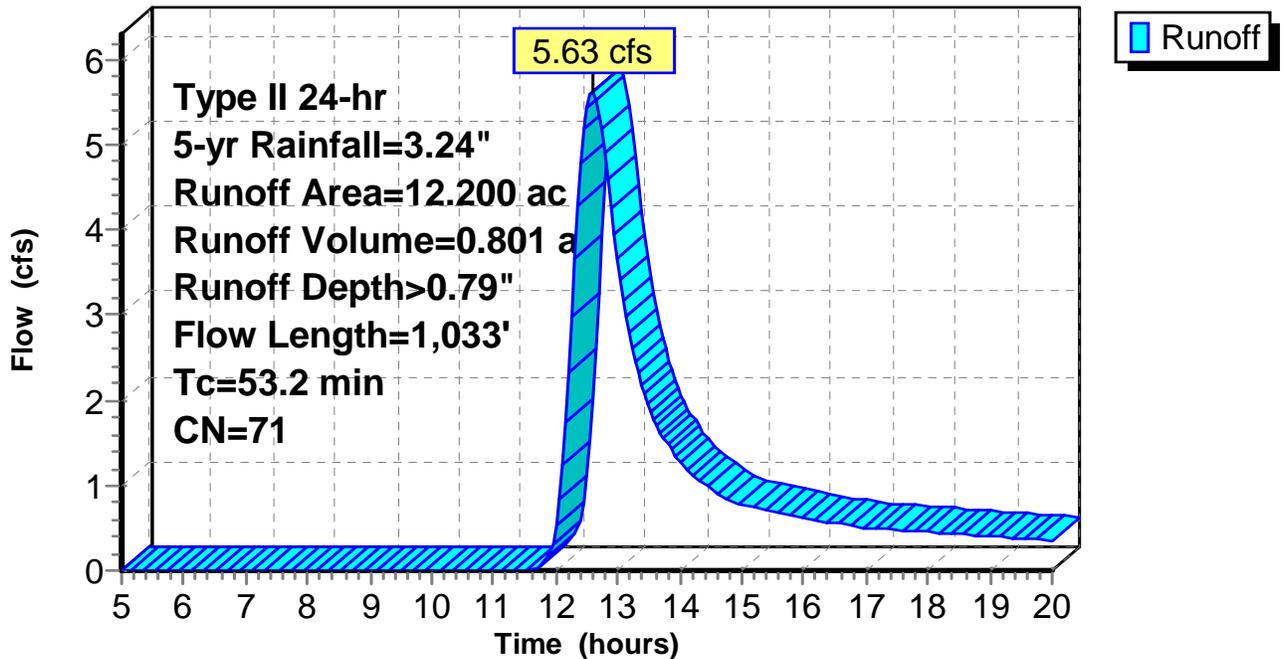
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 5-yr Rainfall=3.24"

Area (ac)	CN	Description
10.300	70	Woods, Good, HSG C
1.700	74	>75% Grass cover, Good, HSG C
0.200	98	Paved parking, HSG C
12.200	71	Weighted Average
12.000		98.36% Pervious Area
0.200		1.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	150	0.0227	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
22.1	883	0.0177	0.67		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
53.2	1,033	Total			

**Subcatchment 8S: PRE-DEV "A-1"**

**Hydrograph**



**161606-swm**

Type II 24-hr 10-yr Rainfall=3.74"

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**Summary for Subcatchment 8S: PRE-DEV "A-1"**

Runoff = 7.97 cfs @ 12.58 hrs, Volume= 1.093 af, Depth> 1.08"

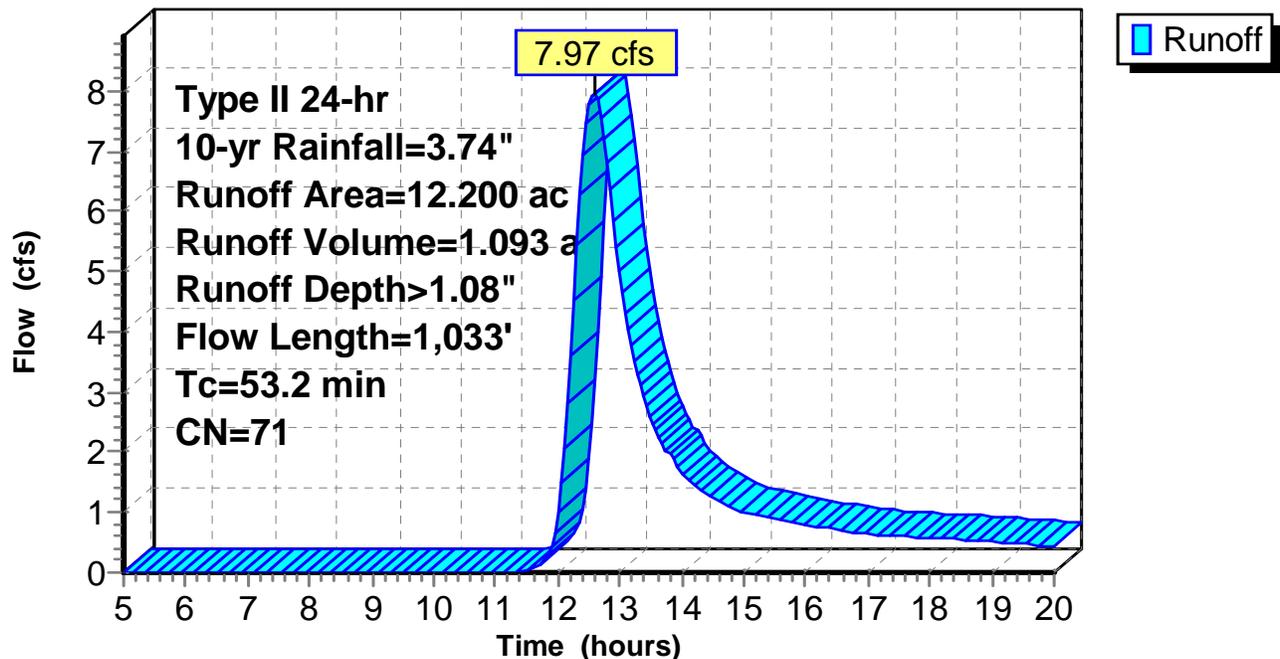
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10-yr Rainfall=3.74"

Area (ac)	CN	Description
10.300	70	Woods, Good, HSG C
1.700	74	>75% Grass cover, Good, HSG C
0.200	98	Paved parking, HSG C
12.200	71	Weighted Average
12.000		98.36% Pervious Area
0.200		1.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	150	0.0227	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
22.1	883	0.0177	0.67		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
53.2	1,033	Total			

**Subcatchment 8S: PRE-DEV "A-1"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 25-yr Rainfall=4.44"

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**Summary for Subcatchment 8S: PRE-DEV "A-1"**

Runoff = 11.52 cfs @ 12.57 hrs, Volume= 1.542 af, Depth> 1.52"

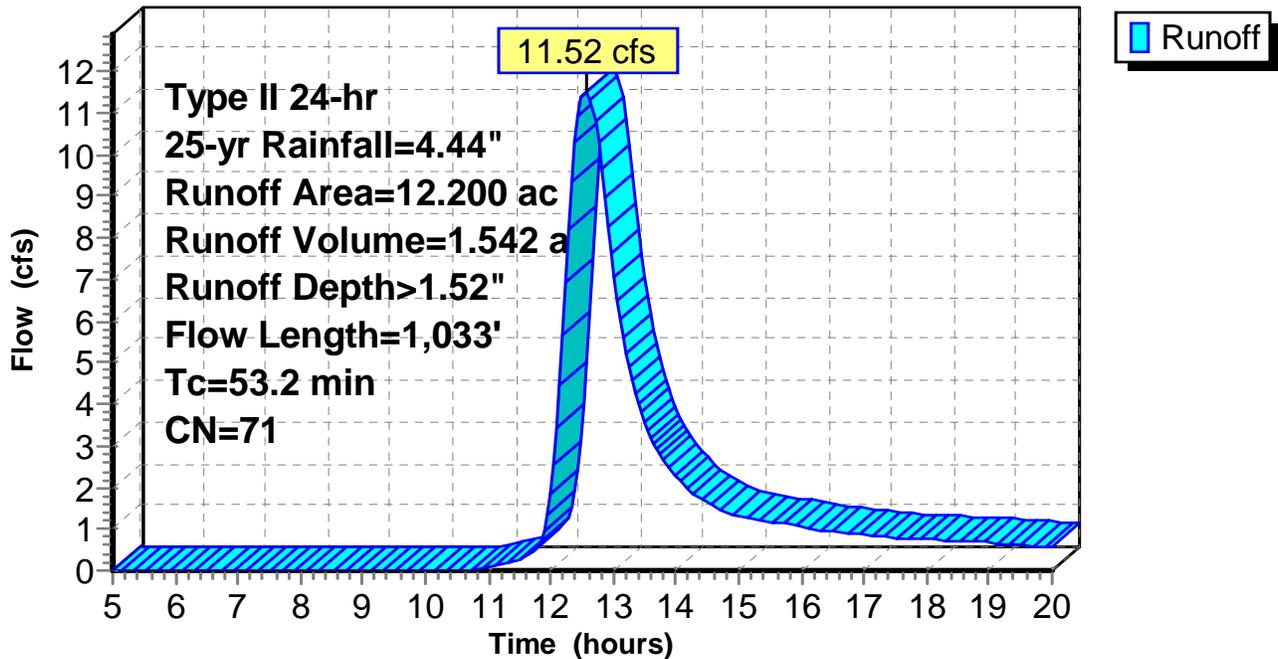
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 25-yr Rainfall=4.44"

Area (ac)	CN	Description
10.300	70	Woods, Good, HSG C
1.700	74	>75% Grass cover, Good, HSG C
0.200	98	Paved parking, HSG C
12.200	71	Weighted Average
12.000		98.36% Pervious Area
0.200		1.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	150	0.0227	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
22.1	883	0.0177	0.67		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
53.2	1,033	Total			

**Subcatchment 8S: PRE-DEV "A-1"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 50-yr Rainfall=5.02"

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**Summary for Subcatchment 8S: PRE-DEV "A-1"**

Runoff = 14.68 cfs @ 12.56 hrs, Volume= 1.941 af, Depth> 1.91"

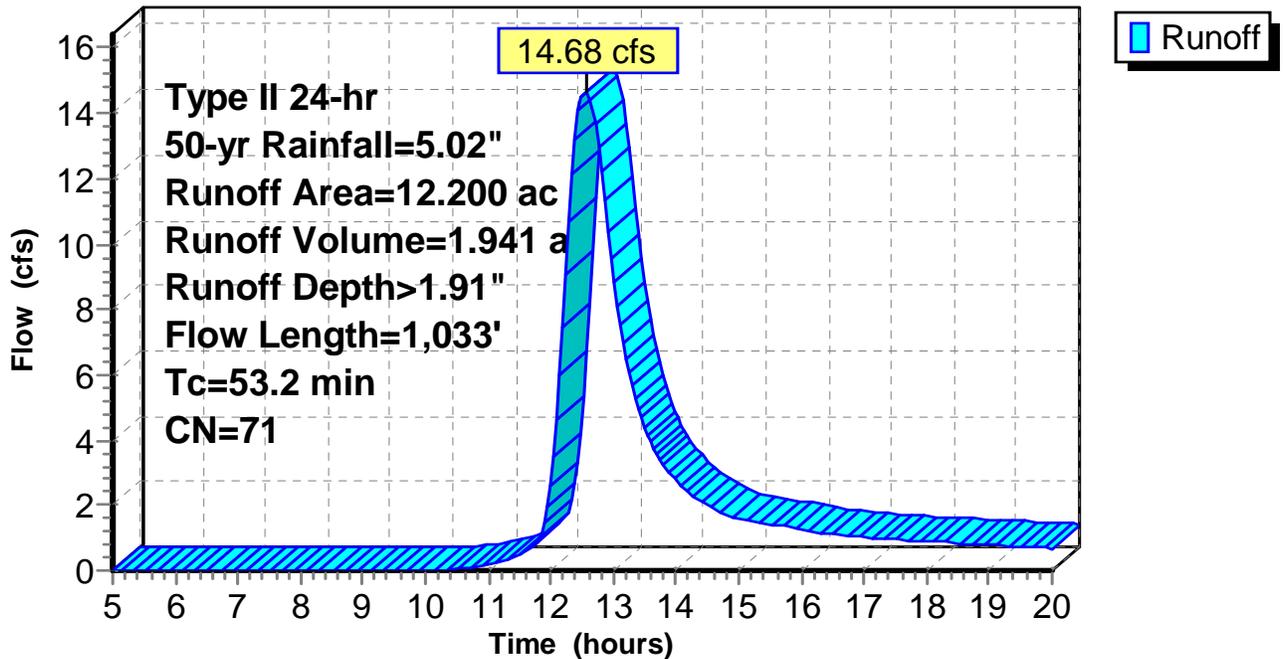
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 50-yr Rainfall=5.02"

Area (ac)	CN	Description
10.300	70	Woods, Good, HSG C
1.700	74	>75% Grass cover, Good, HSG C
0.200	98	Paved parking, HSG C
12.200	71	Weighted Average
12.000		98.36% Pervious Area
0.200		1.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	150	0.0227	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
22.1	883	0.0177	0.67		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
53.2	1,033	Total			

**Subcatchment 8S: PRE-DEV "A-1"**

**Hydrograph**



**161606-swm**

Type II 24-hr 100-yr Rainfall=5.63"

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**Summary for Subcatchment 8S: PRE-DEV "A-1"**

Runoff = 18.14 cfs @ 12.55 hrs, Volume= 2.382 af, Depth> 2.34"

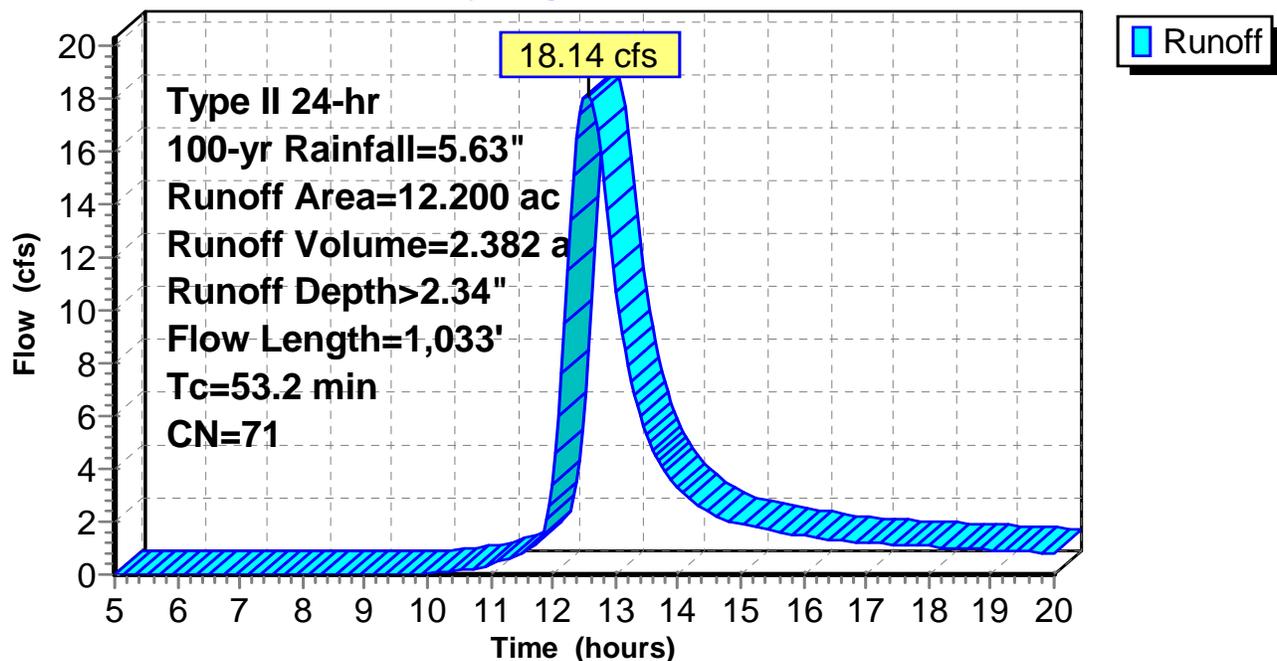
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-yr Rainfall=5.63"

Area (ac)	CN	Description
10.300	70	Woods, Good, HSG C
1.700	74	>75% Grass cover, Good, HSG C
0.200	98	Paved parking, HSG C
12.200	71	Weighted Average
12.000		98.36% Pervious Area
0.200		1.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.1	150	0.0227	0.08		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
22.1	883	0.0177	0.67		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
53.2	1,033	Total			

**Subcatchment 8S: PRE-DEV "A-1"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 1-yr Rainfall=2.20"

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**Summary for Subcatchment 9S: PRE-DEV "A-2"**

Runoff = 0.70 cfs @ 12.17 hrs, Volume= 0.063 af, Depth> 0.30"

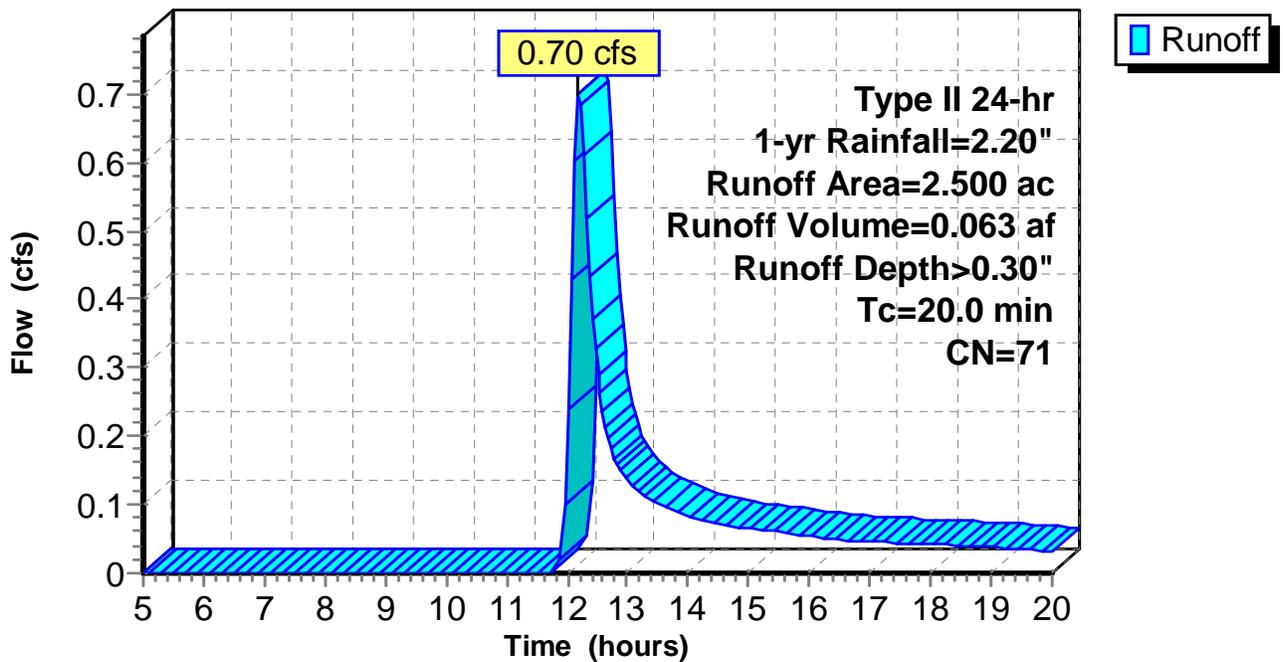
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 1-yr Rainfall=2.20"

Area (ac)	CN	Description
2.000	70	Woods, Good, HSG C
0.500	74	>75% Grass cover, Good, HSG C
2.500	71	Weighted Average
2.500		100.00% Pervious Area

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

**Subcatchment 9S: PRE-DEV "A-2"**

**Hydrograph**



**161606-swm**

Type II 24-hr 2-yr Rainfall=2.63"

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**Summary for Subcatchment 9S: PRE-DEV "A-2"**

Runoff = 1.29 cfs @ 12.16 hrs, Volume= 0.102 af, Depth> 0.49"

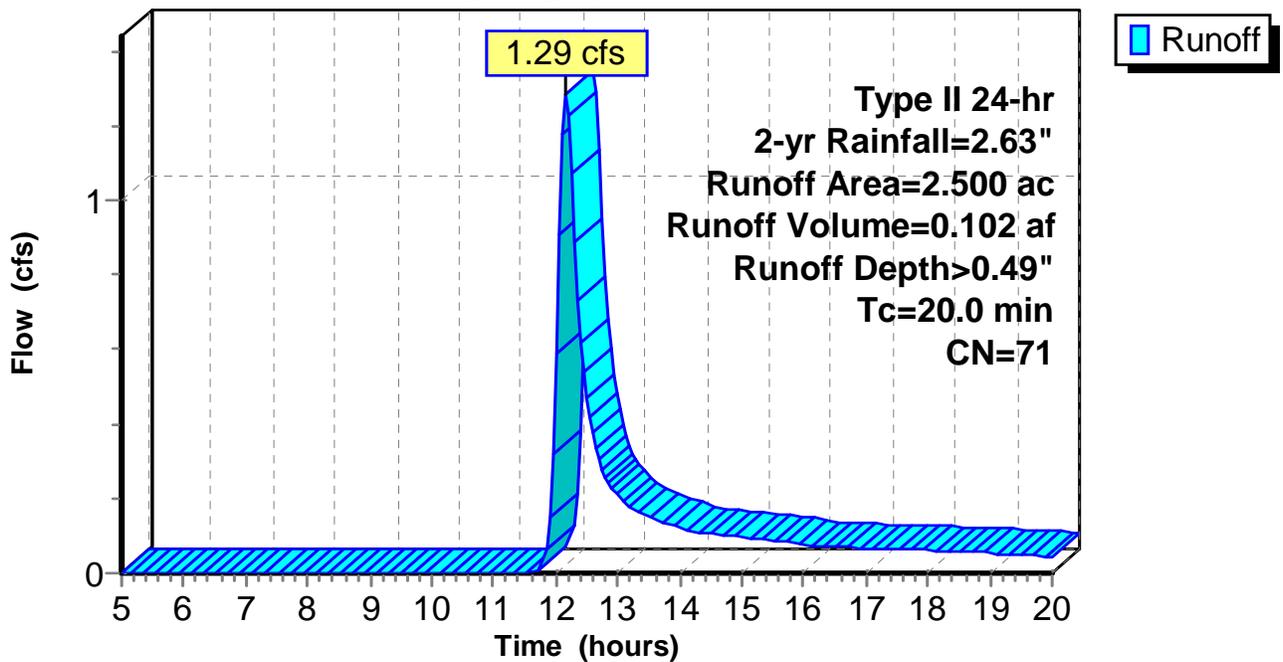
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 2-yr Rainfall=2.63"

Area (ac)	CN	Description
2.000	70	Woods, Good, HSG C
0.500	74	>75% Grass cover, Good, HSG C
2.500	71	Weighted Average
2.500		100.00% Pervious Area

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

**Subcatchment 9S: PRE-DEV "A-2"**

**Hydrograph**



**161606-swm**

Type II 24-hr 5-yr Rainfall=3.24"

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**Summary for Subcatchment 9S: PRE-DEV "A-2"**

Runoff = 2.29 cfs @ 12.15 hrs, Volume= 0.167 af, Depth> 0.80"

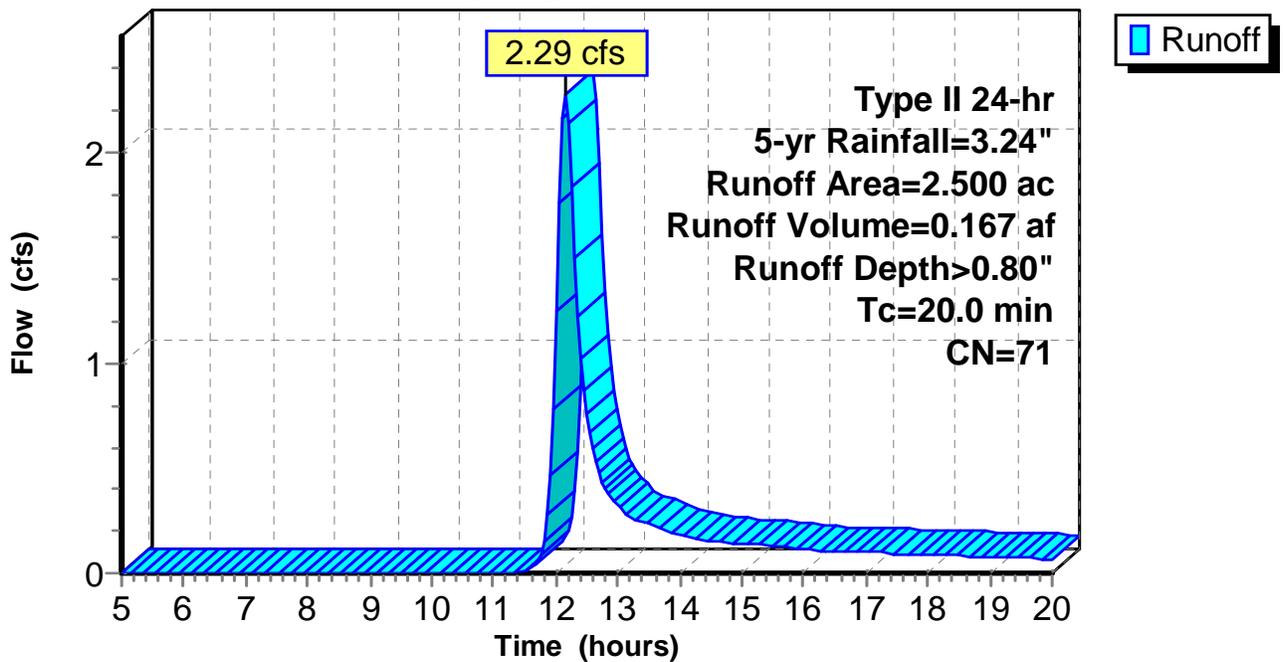
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 5-yr Rainfall=3.24"

Area (ac)	CN	Description
2.000	70	Woods, Good, HSG C
0.500	74	>75% Grass cover, Good, HSG C
2.500	71	Weighted Average
2.500		100.00% Pervious Area

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

**Subcatchment 9S: PRE-DEV "A-2"**

**Hydrograph**



**161606-swm**

Type II 24-hr 10-yr Rainfall=3.74"

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**Summary for Subcatchment 9S: PRE-DEV "A-2"**

Runoff = 3.20 cfs @ 12.14 hrs, Volume= 0.228 af, Depth> 1.09"

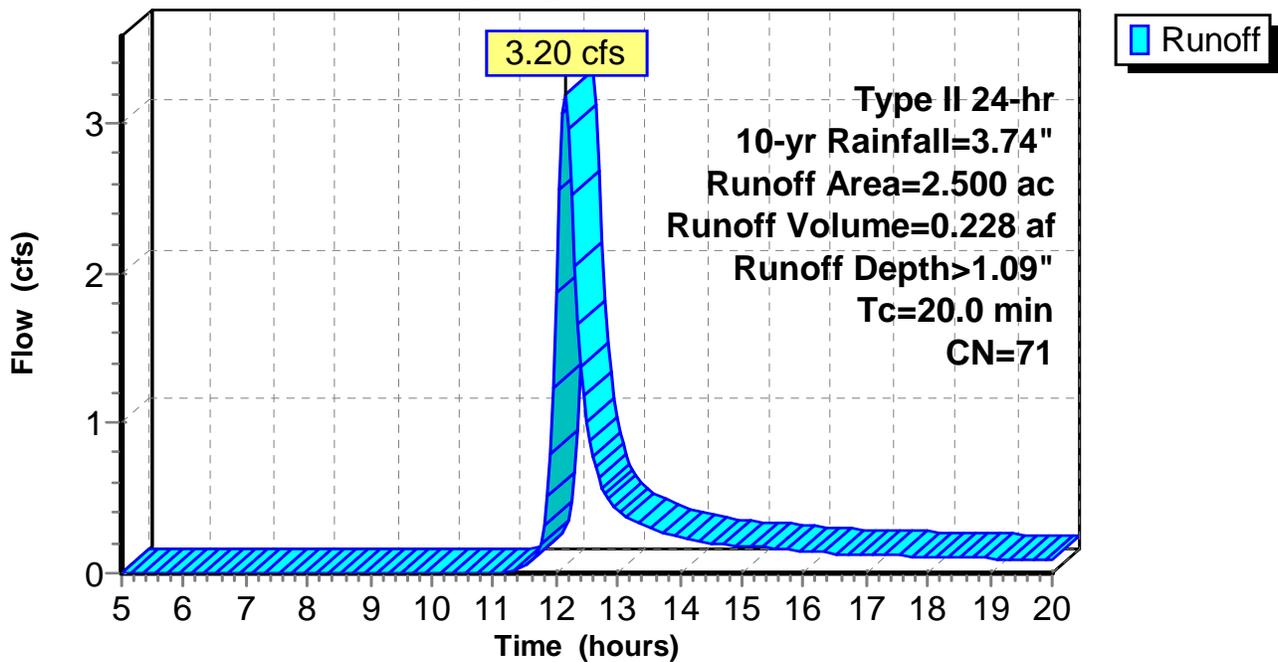
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10-yr Rainfall=3.74"

Area (ac)	CN	Description
2.000	70	Woods, Good, HSG C
0.500	74	>75% Grass cover, Good, HSG C
2.500	71	Weighted Average
2.500		100.00% Pervious Area

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

**Subcatchment 9S: PRE-DEV "A-2"**

**Hydrograph**



**161606-swm**

Type II 24-hr 25-yr Rainfall=4.44"

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**Summary for Subcatchment 9S: PRE-DEV "A-2"**

Runoff = 4.59 cfs @ 12.14 hrs, Volume= 0.321 af, Depth> 1.54"

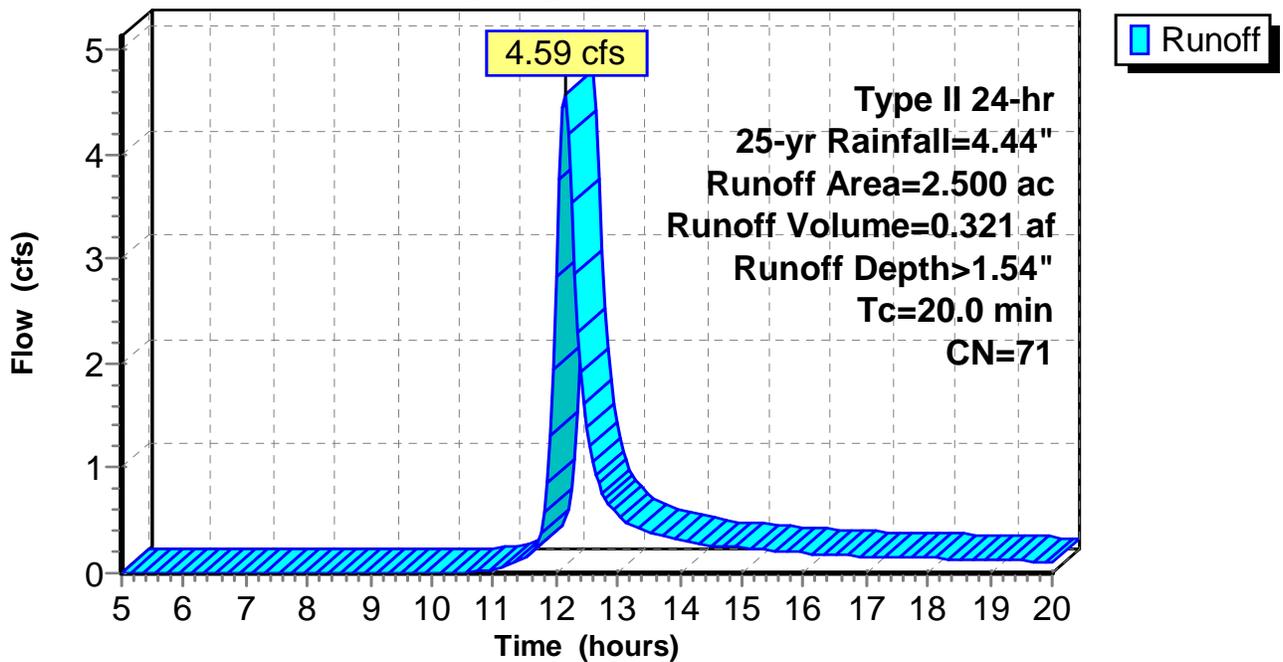
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 25-yr Rainfall=4.44"

Area (ac)	CN	Description
2.000	70	Woods, Good, HSG C
0.500	74	>75% Grass cover, Good, HSG C
2.500	71	Weighted Average
2.500		100.00% Pervious Area

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

**Subcatchment 9S: PRE-DEV "A-2"**

**Hydrograph**



**161606-swm**

Type II 24-hr 50-yr Rainfall=5.02"

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**Summary for Subcatchment 9S: PRE-DEV "A-2"**

Runoff = 5.81 cfs @ 12.13 hrs, Volume= 0.403 af, Depth> 1.94"

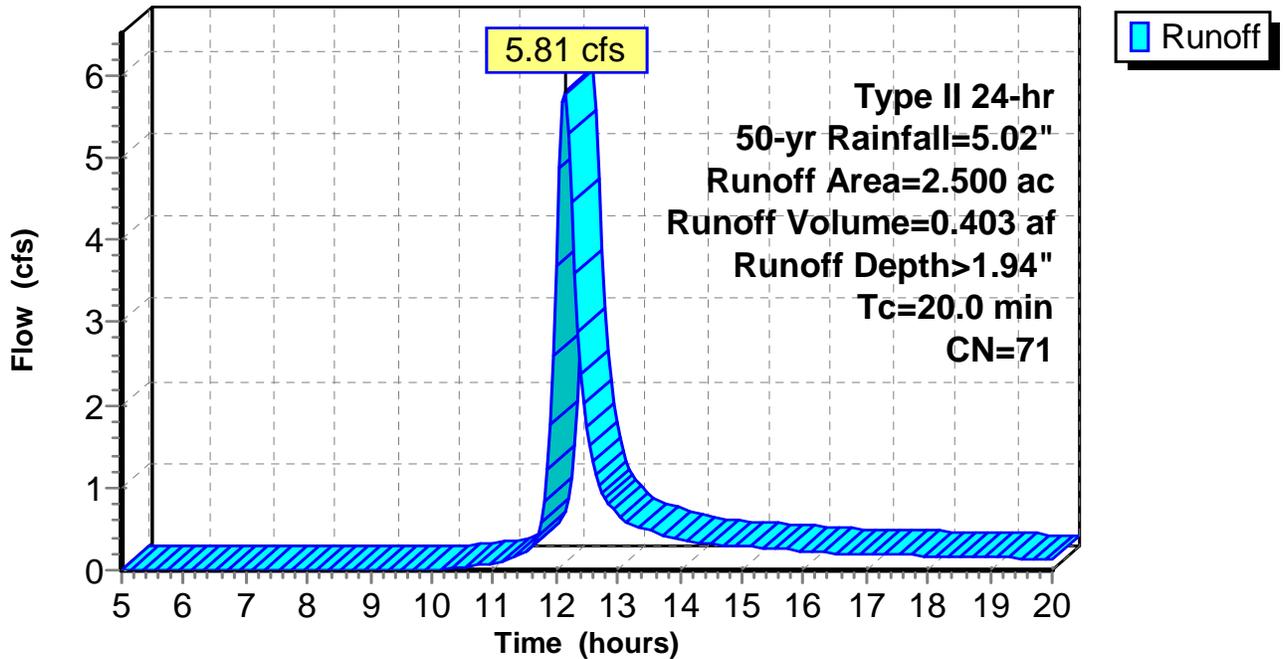
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 50-yr Rainfall=5.02"

Area (ac)	CN	Description
2.000	70	Woods, Good, HSG C
0.500	74	>75% Grass cover, Good, HSG C
2.500	71	Weighted Average
2.500		100.00% Pervious Area

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

**Subcatchment 9S: PRE-DEV "A-2"**

**Hydrograph**



**161606-swm**

Type II 24-hr 100-yr Rainfall=5.63"

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**Summary for Subcatchment 9S: PRE-DEV "A-2"**

Runoff = 7.15 cfs @ 12.13 hrs, Volume= 0.495 af, Depth> 2.38"

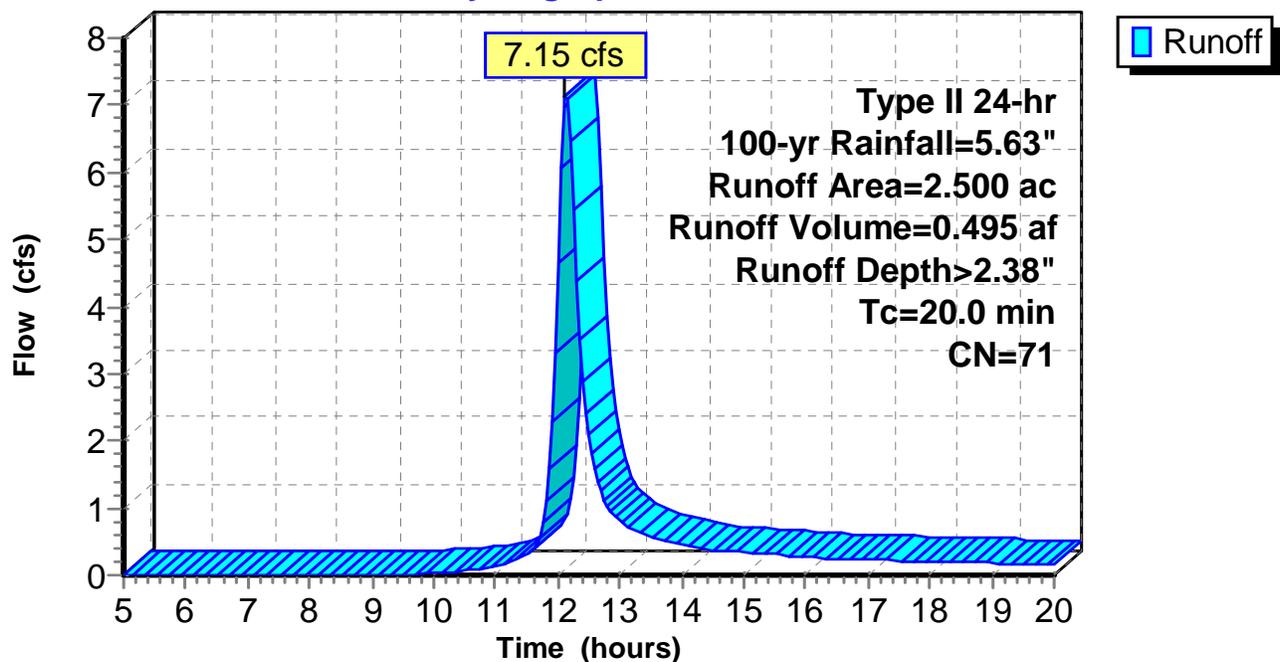
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Rainfall=5.63"

Area (ac)	CN	Description
2.000	70	Woods, Good, HSG C
0.500	74	>75% Grass cover, Good, HSG C
2.500	71	Weighted Average
2.500		100.00% Pervious Area

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

**Subcatchment 9S: PRE-DEV "A-2"**

**Hydrograph**



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Type II 24-hr 1-yr Rainfall=2.20"

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**Summary for Subcatchment 2S: PRE-DEV "B"**

Runoff = 1.32 cfs @ 12.65 hrs, Volume= 0.236 af, Depth> 0.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 1-yr Rainfall=2.20"

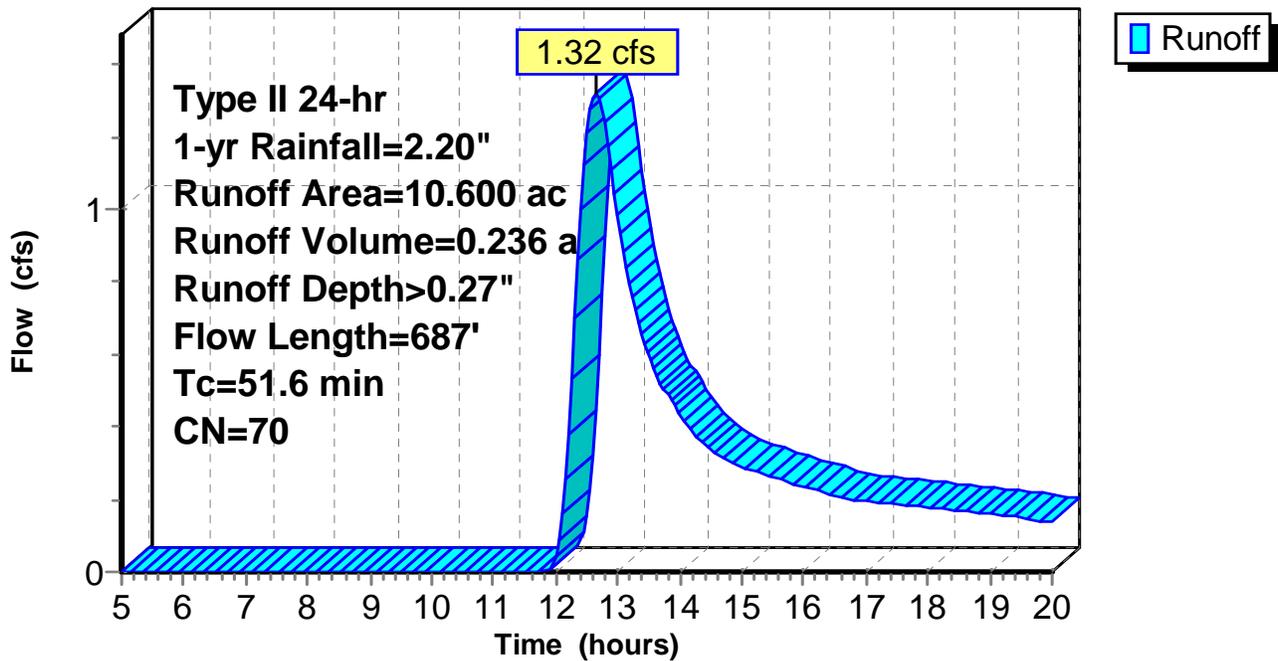
Area (ac)	CN	Description
10.600	70	Woods, Good, HSG C
10.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.7	150	0.0141	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
13.9	537	0.0166	0.64		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
51.6	687	Total			

**Subcatchment 2S: PRE-DEV "B"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 2-yr Rainfall=2.63"

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**Summary for Subcatchment 2S: PRE-DEV "B"**

Runoff = 2.50 cfs @ 12.61 hrs, Volume= 0.392 af, Depth> 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2-yr Rainfall=2.63"

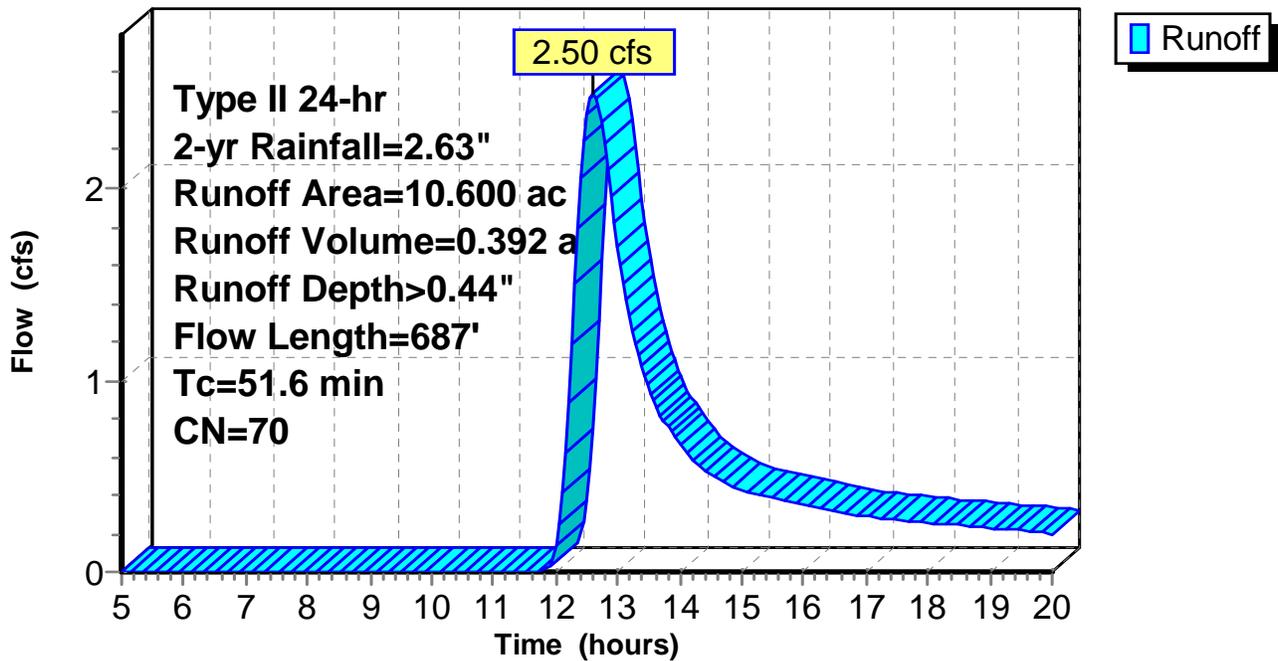
Area (ac)	CN	Description
10.600	70	Woods, Good, HSG C
10.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.7	150	0.0141	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
13.9	537	0.0166	0.64		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
51.6	687	Total			

**Subcatchment 2S: PRE-DEV "B"**

**Hydrograph**



**161606-swm**

Type II 24-hr 5-yr Rainfall=3.24"

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**Summary for Subcatchment 2S: PRE-DEV "B"**

Runoff = 4.63 cfs @ 12.57 hrs, Volume= 0.655 af, Depth> 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 5-yr Rainfall=3.24"

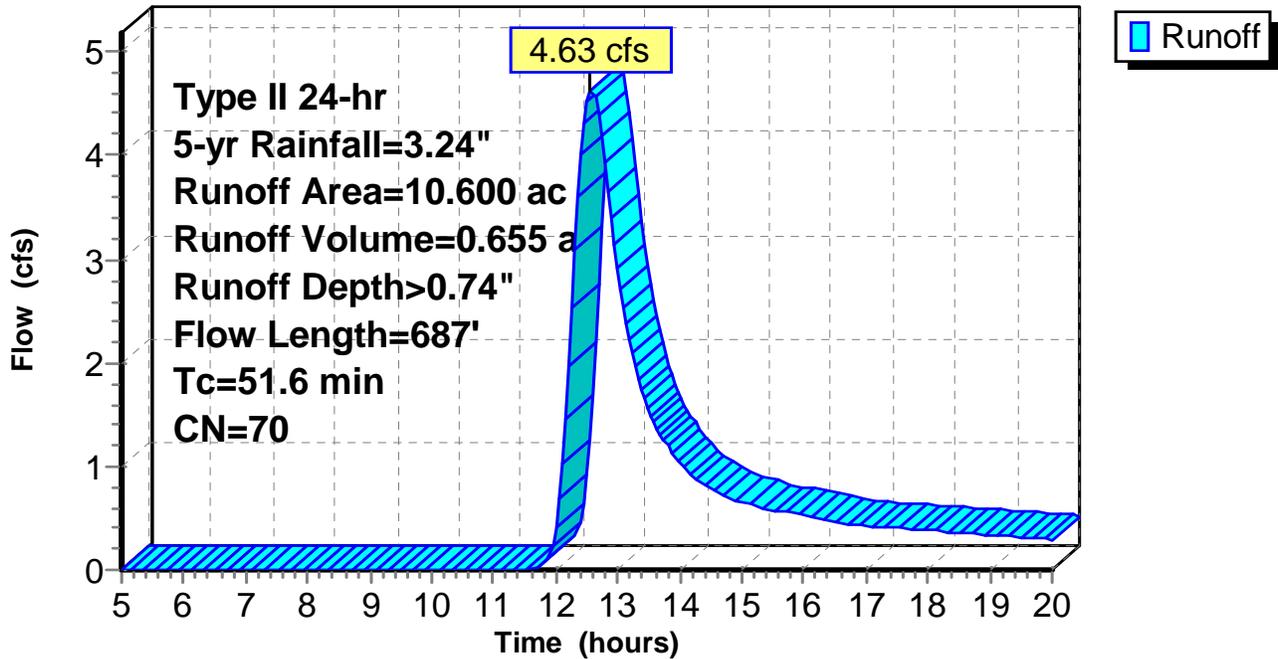
Area (ac)	CN	Description
10.600	70	Woods, Good, HSG C
10.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.7	150	0.0141	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
13.9	537	0.0166	0.64		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
51.6	687	Total			

**Subcatchment 2S: PRE-DEV "B"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 10-yr Rainfall=3.74"

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**Summary for Subcatchment 2S: PRE-DEV "B"**

Runoff = 6.64 cfs @ 12.56 hrs, Volume= 0.901 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10-yr Rainfall=3.74"

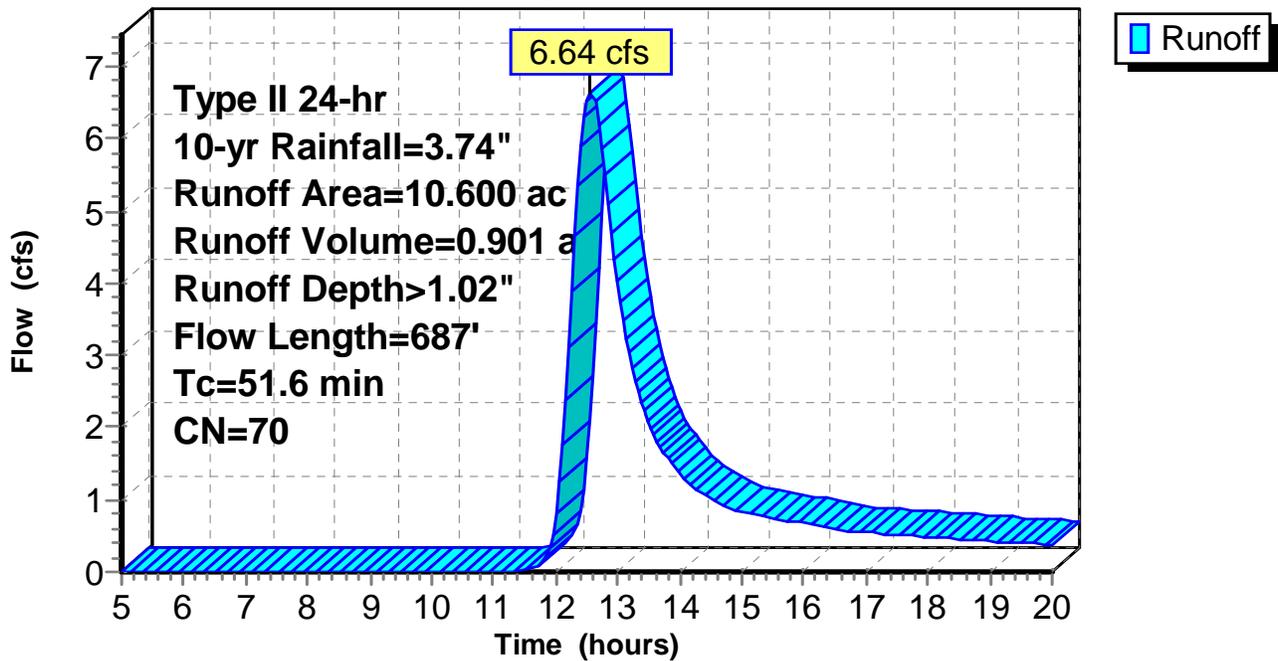
Area (ac)	CN	Description
10.600	70	Woods, Good, HSG C
10.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.7	150	0.0141	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
13.9	537	0.0166	0.64		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
51.6	687	Total			

**Subcatchment 2S: PRE-DEV "B"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 25-yr Rainfall=4.44"

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**Summary for Subcatchment 2S: PRE-DEV "B"**

Runoff = 9.74 cfs @ 12.55 hrs, Volume= 1.281 af, Depth> 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 25-yr Rainfall=4.44"

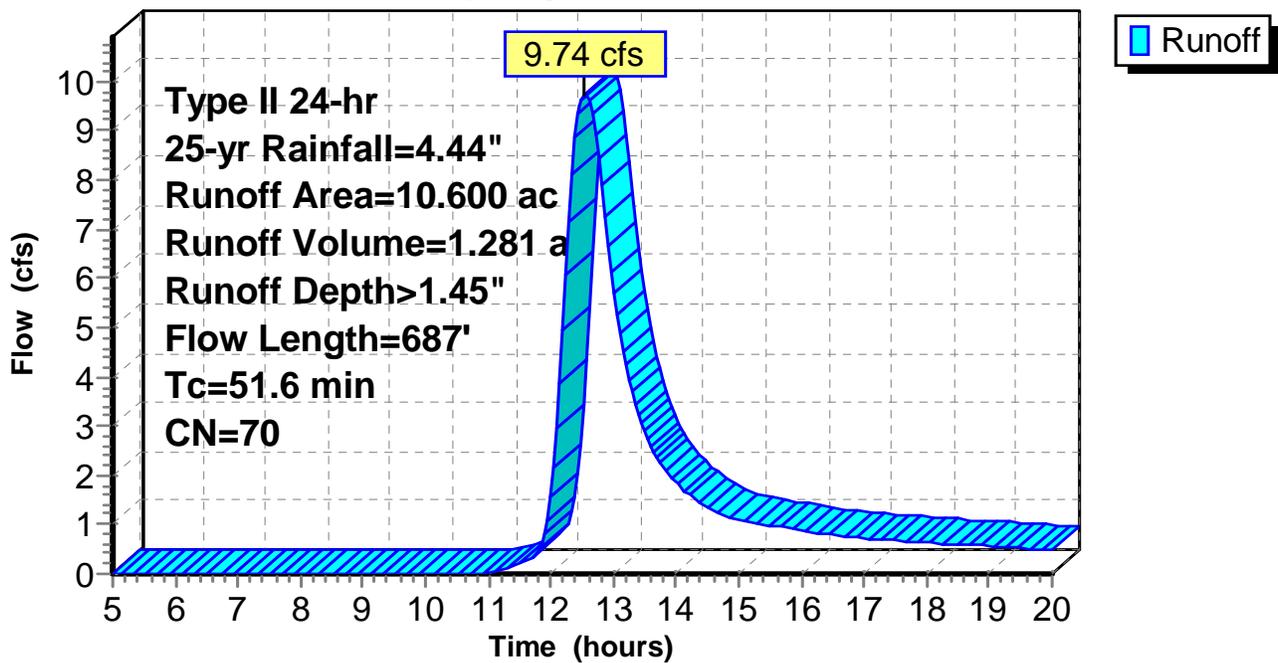
Area (ac)	CN	Description
10.600	70	Woods, Good, HSG C
10.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.7	150	0.0141	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
13.9	537	0.0166	0.64		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
51.6	687	Total			

**Subcatchment 2S: PRE-DEV "B"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 50-yr Rainfall=5.02"

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**Summary for Subcatchment 2S: PRE-DEV "B"**

Runoff = 12.49 cfs @ 12.54 hrs, Volume= 1.620 af, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 50-yr Rainfall=5.02"

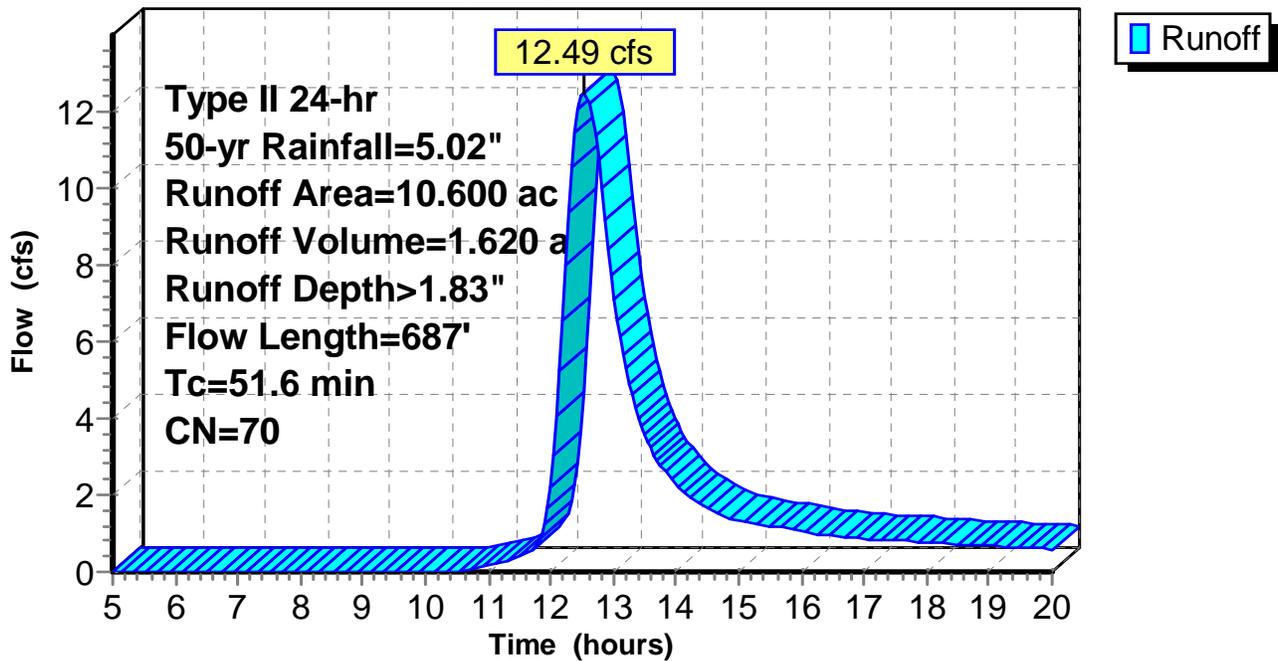
Area (ac)	CN	Description
10.600	70	Woods, Good, HSG C
10.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.7	150	0.0141	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
13.9	537	0.0166	0.64		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
51.6	687	Total			

**Subcatchment 2S: PRE-DEV "B"**

**Hydrograph**



**161606-swm**

Type II 24-hr 100-yr Rainfall=5.63"

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**Summary for Subcatchment 2S: PRE-DEV "B"**

Runoff = 15.52 cfs @ 12.53 hrs, Volume= 1.996 af, Depth> 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-yr Rainfall=5.63"

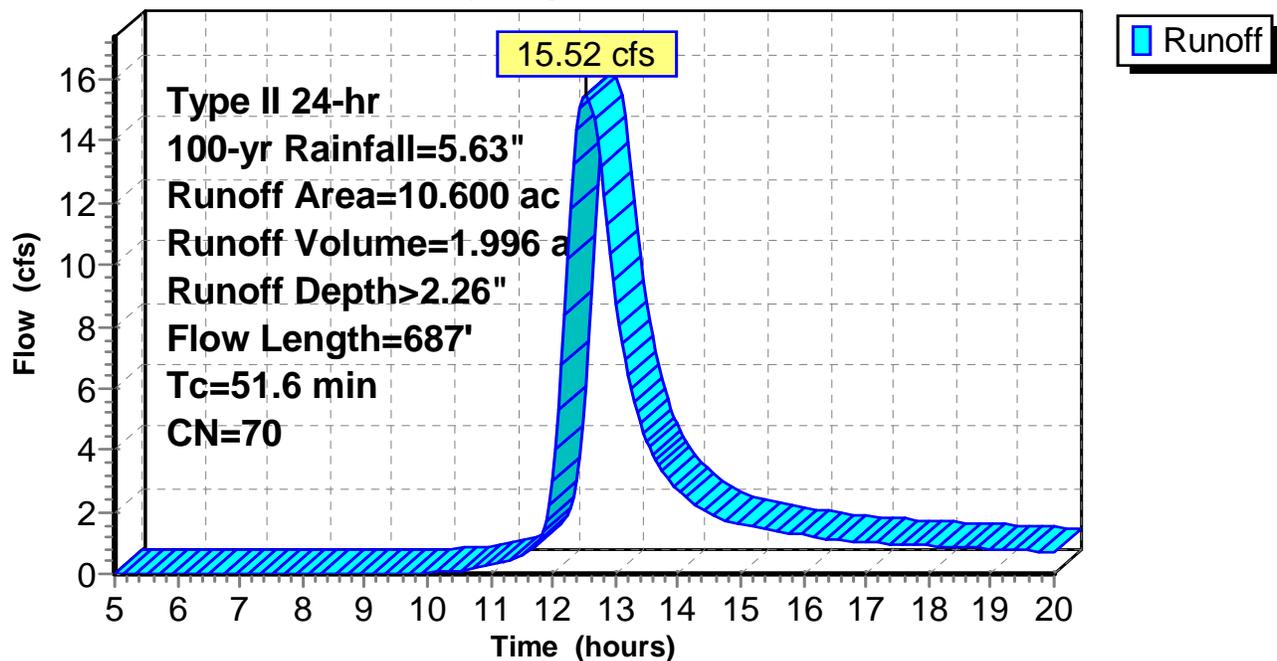
Area (ac)	CN	Description
10.600	70	Woods, Good, HSG C
10.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.7	150	0.0141	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
13.9	537	0.0166	0.64		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
51.6	687	Total			

**Subcatchment 2S: PRE-DEV "B"**

**Hydrograph**



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**APPENDIX B**

**POST-DEVELOPED CALCULATIONS**

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**161606-swm**

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Type II 24-hr 1-yr Rainfall=2.20"

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**Summary for Subcatchment 3S: POST-DEV "A"**

Runoff = 9.26 cfs @ 12.15 hrs, Volume= 0.680 af, Depth> 0.53"

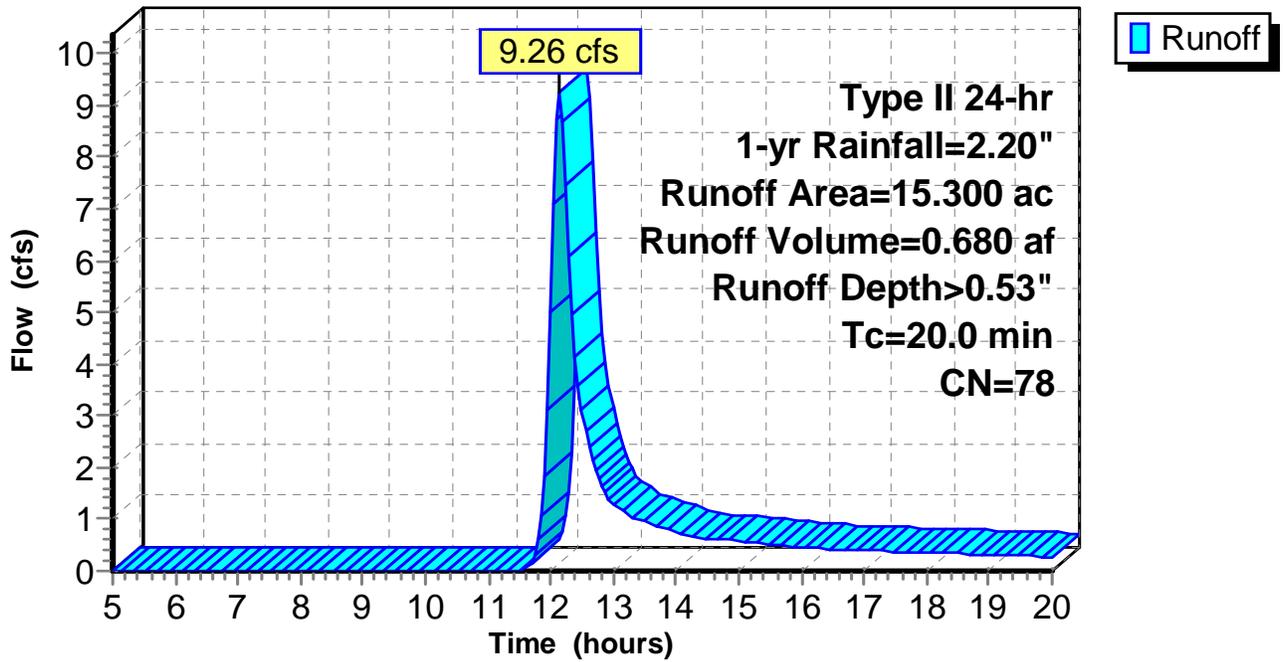
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 1-yr Rainfall=2.20"

Area (ac)	CN	Description
3.500	70	Woods, Good, HSG C
1.500	74	>75% Grass cover, Good, HSG C
9.800	81	1/3 acre lots, 30% imp, HSG C
0.500	98	Water Surface, HSG C
15.300	78	Weighted Average
11.860		77.52% Pervious Area
3.440		22.48% Impervious Area

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

**Subcatchment 3S: POST-DEV "A"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 2-yr Rainfall=2.63"

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**Summary for Subcatchment 3S: POST-DEV "A"**

Runoff = 14.08 cfs @ 12.14 hrs, Volume= 0.999 af, Depth> 0.78"

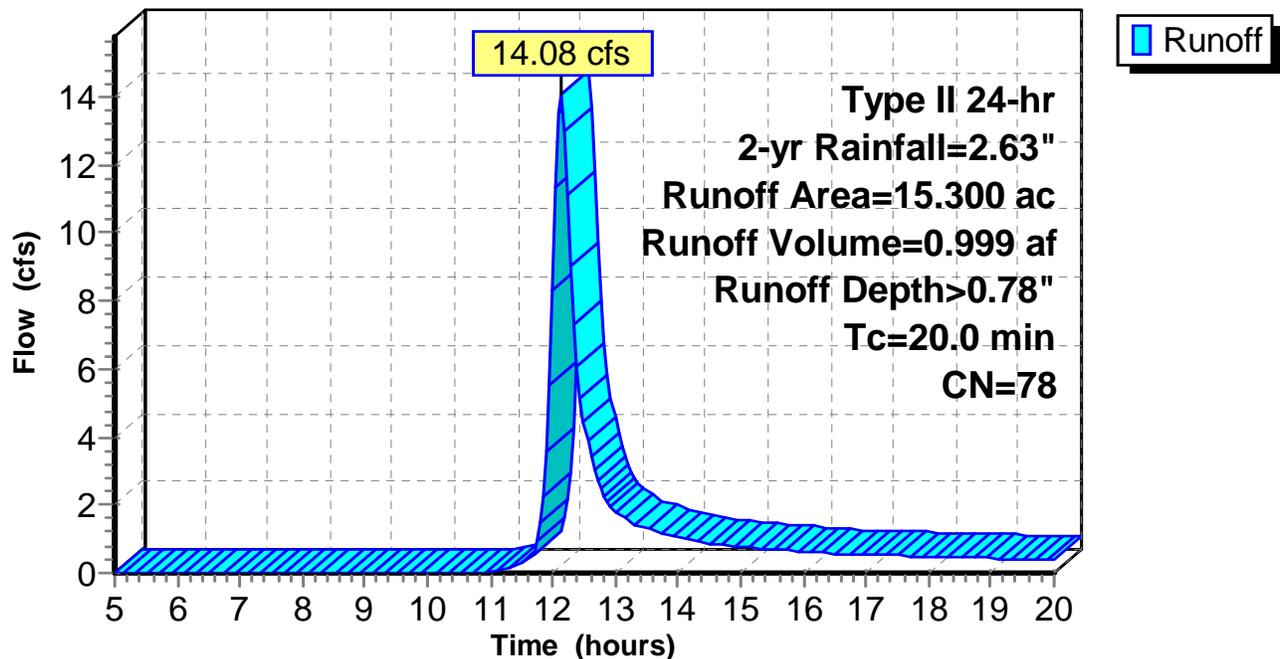
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 2-yr Rainfall=2.63"

Area (ac)	CN	Description
3.500	70	Woods, Good, HSG C
1.500	74	>75% Grass cover, Good, HSG C
9.800	81	1/3 acre lots, 30% imp, HSG C
0.500	98	Water Surface, HSG C
15.300	78	Weighted Average
11.860		77.52% Pervious Area
3.440		22.48% Impervious Area

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

**Subcatchment 3S: POST-DEV "A"**

**Hydrograph**



**161606-swm**

Type II 24-hr 5-yr Rainfall=3.24"

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**Summary for Subcatchment 3S: POST-DEV "A"**

Runoff = 21.61 cfs @ 12.14 hrs, Volume= 1.505 af, Depth> 1.18"

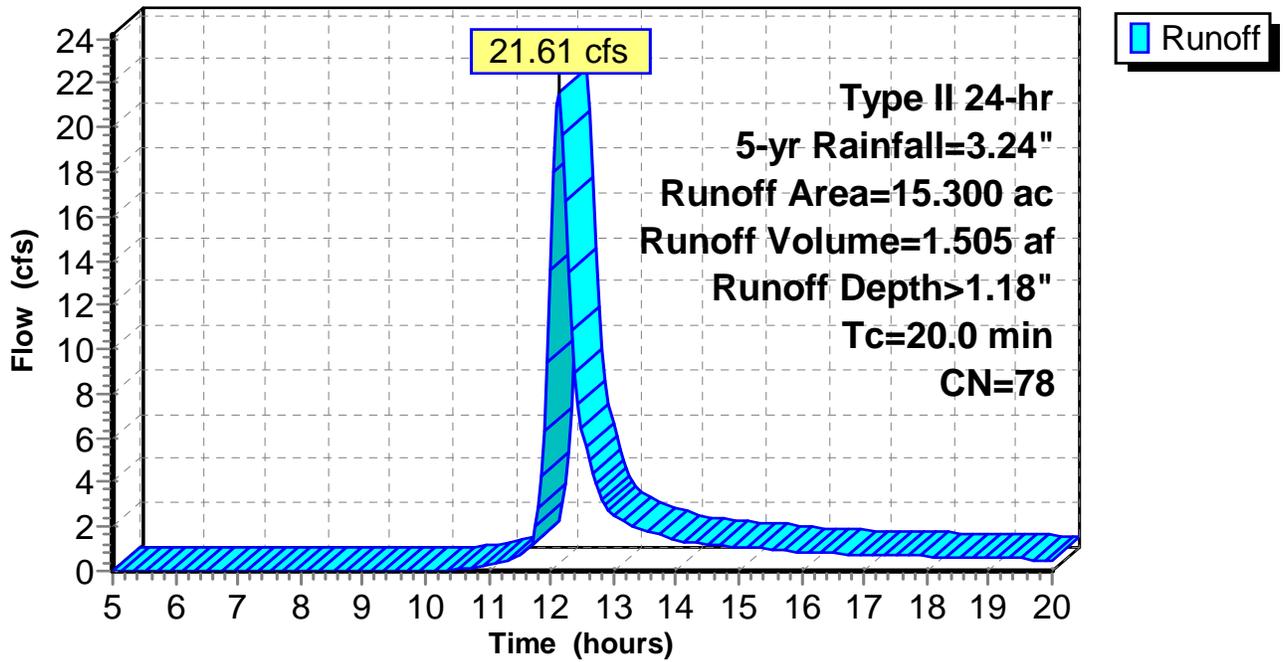
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 5-yr Rainfall=3.24"

Area (ac)	CN	Description
3.500	70	Woods, Good, HSG C
1.500	74	>75% Grass cover, Good, HSG C
9.800	81	1/3 acre lots, 30% imp, HSG C
0.500	98	Water Surface, HSG C
15.300	78	Weighted Average
11.860		77.52% Pervious Area
3.440		22.48% Impervious Area

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

**Subcatchment 3S: POST-DEV "A"**

**Hydrograph**



**161606-swm**

Type II 24-hr 10-yr Rainfall=3.74"

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**Summary for Subcatchment 3S: POST-DEV "A"**

Runoff = 28.20 cfs @ 12.13 hrs, Volume= 1.954 af, Depth> 1.53"

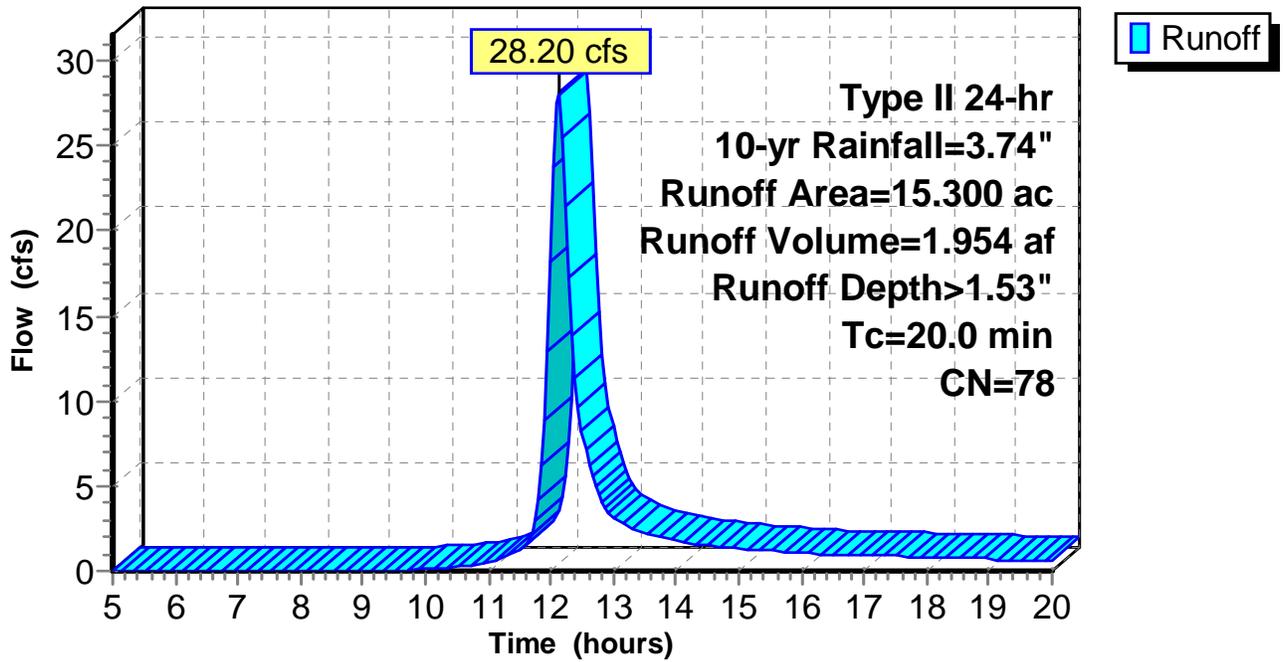
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10-yr Rainfall=3.74"

Area (ac)	CN	Description
3.500	70	Woods, Good, HSG C
1.500	74	>75% Grass cover, Good, HSG C
9.800	81	1/3 acre lots, 30% imp, HSG C
0.500	98	Water Surface, HSG C
15.300	78	Weighted Average
11.860		77.52% Pervious Area
3.440		22.48% Impervious Area

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

**Subcatchment 3S: POST-DEV "A"**

**Hydrograph**



**161606-swm**

Type II 24-hr 25-yr Rainfall=4.44"

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**Summary for Subcatchment 3S: POST-DEV "A"**

Runoff = 37.87 cfs @ 12.13 hrs, Volume= 2.621 af, Depth> 2.06"

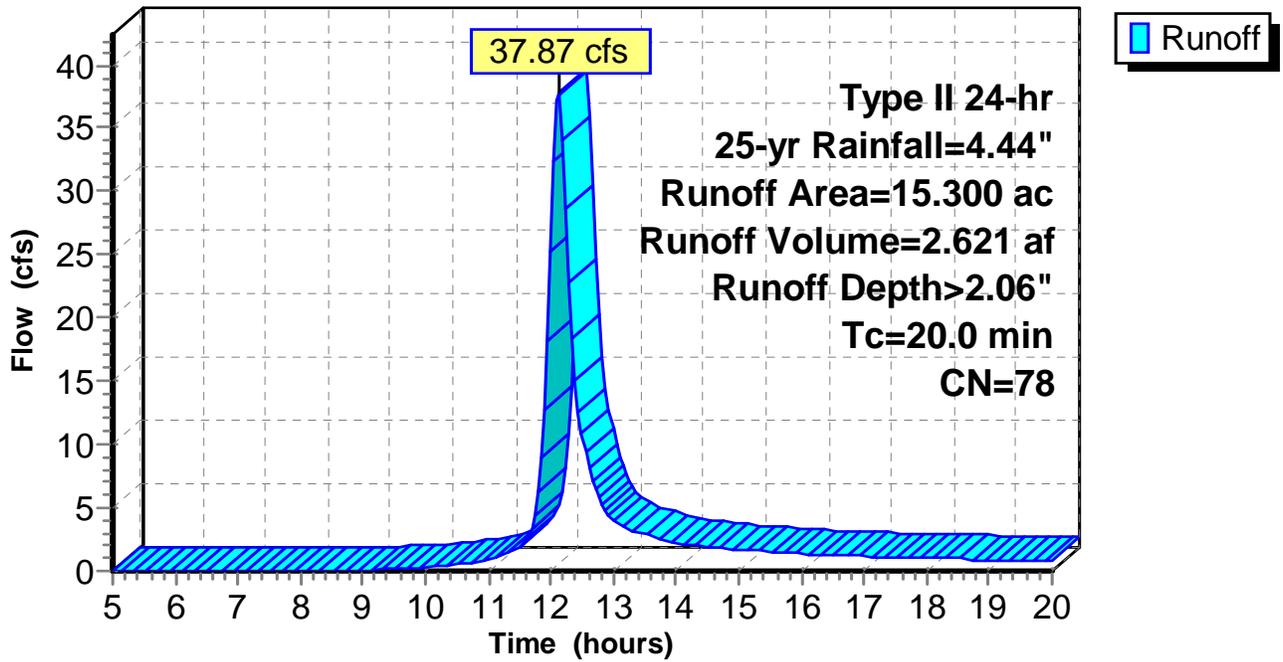
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 25-yr Rainfall=4.44"

Area (ac)	CN	Description
3.500	70	Woods, Good, HSG C
1.500	74	>75% Grass cover, Good, HSG C
9.800	81	1/3 acre lots, 30% imp, HSG C
0.500	98	Water Surface, HSG C
15.300	78	Weighted Average
11.860		77.52% Pervious Area
3.440		22.48% Impervious Area

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

**Subcatchment 3S: POST-DEV "A"**

**Hydrograph**



**161606-swm**

Type II 24-hr 50-yr Rainfall=5.02"

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**Summary for Subcatchment 3S: POST-DEV "A"**

Runoff = 46.14 cfs @ 12.13 hrs, Volume= 3.199 af, Depth> 2.51"

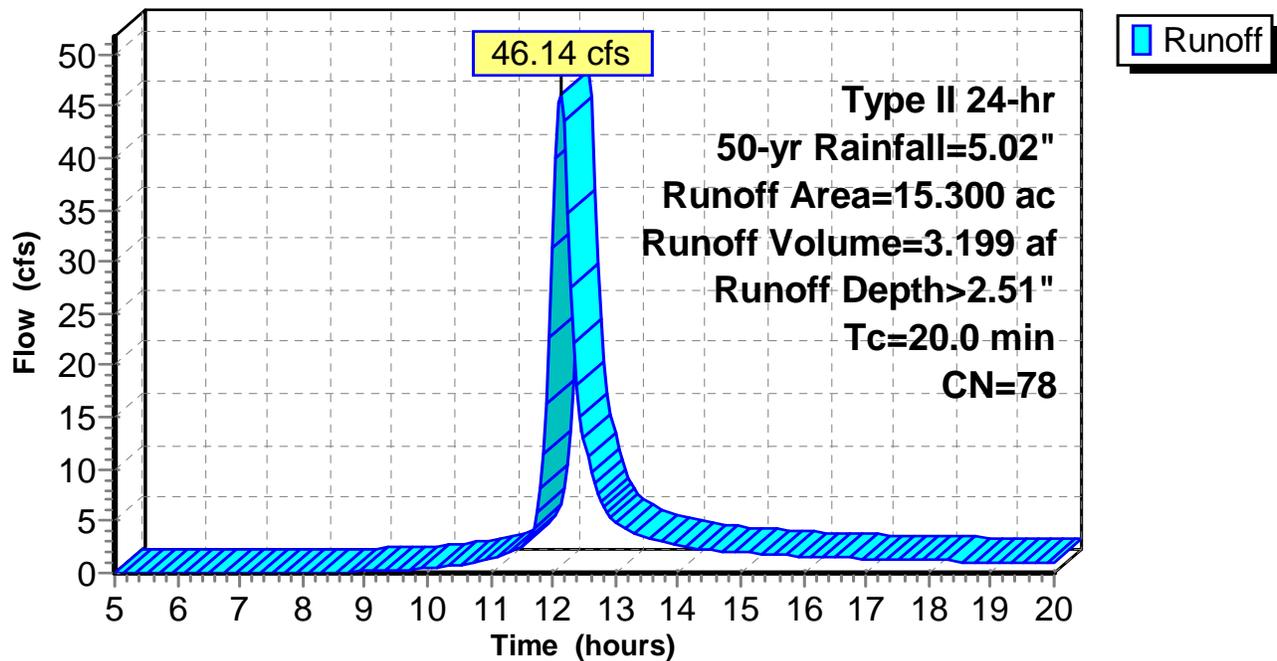
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 50-yr Rainfall=5.02"

Area (ac)	CN	Description
3.500	70	Woods, Good, HSG C
1.500	74	>75% Grass cover, Good, HSG C
9.800	81	1/3 acre lots, 30% imp, HSG C
0.500	98	Water Surface, HSG C
15.300	78	Weighted Average
11.860		77.52% Pervious Area
3.440		22.48% Impervious Area

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

**Subcatchment 3S: POST-DEV "A"**

**Hydrograph**



**161606-swm**

Type II 24-hr 100-yr Rainfall=5.63"

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**Summary for Subcatchment 3S: POST-DEV "A"**

Runoff = 55.02 cfs @ 12.13 hrs, Volume= 3.826 af, Depth> 3.00"

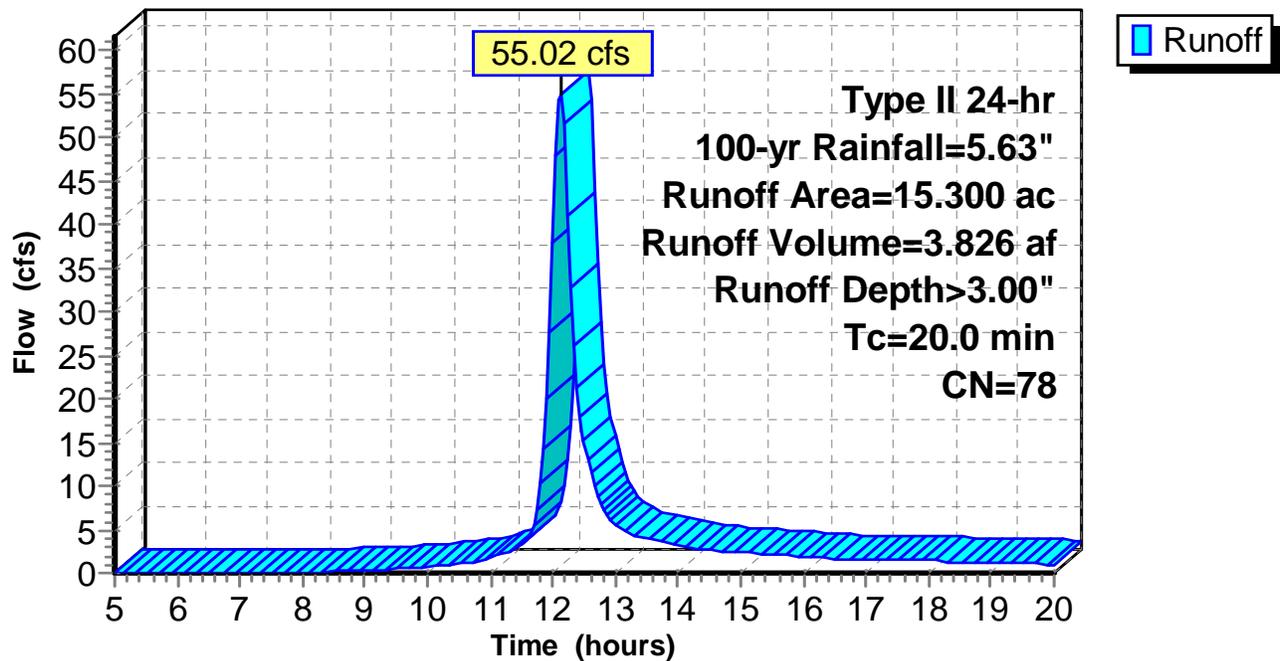
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-yr Rainfall=5.63"

Area (ac)	CN	Description
3.500	70	Woods, Good, HSG C
1.500	74	>75% Grass cover, Good, HSG C
9.800	81	1/3 acre lots, 30% imp, HSG C
0.500	98	Water Surface, HSG C
15.300	78	Weighted Average
11.860		77.52% Pervious Area
3.440		22.48% Impervious Area

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

**Subcatchment 3S: POST-DEV "A"**

**Hydrograph**



**161606-swm**

Type II 24-hr 1-yr Rainfall=2.20"

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**Summary for Subcatchment 4S: POST-DEV "A-1"**

Runoff = 9.17 cfs @ 12.14 hrs, Volume= 0.657 af, Depth> 0.62"

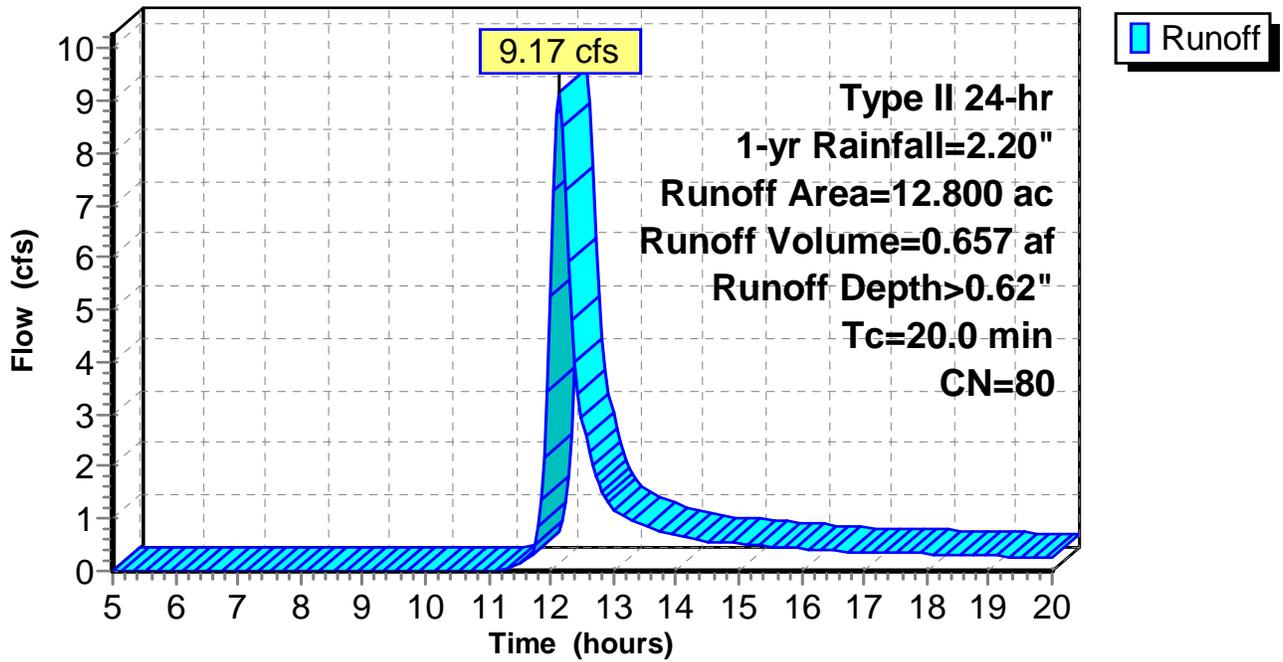
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 1-yr Rainfall=2.20"

Area (ac)	CN	Description
1.500	70	Woods, Good, HSG C
1.000	74	>75% Grass cover, Good, HSG C
9.800	81	1/3 acre lots, 30% imp, HSG C
0.500	98	Water Surface, HSG C
12.800	80	Weighted Average
9.360		73.12% Pervious Area
3.440		26.87% Impervious Area

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

**Subcatchment 4S: POST-DEV "A-1"**

**Hydrograph**



**161606-swm**

Type II 24-hr 2-yr Rainfall=2.63"

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**Summary for Subcatchment 4S: POST-DEV "A-1"**

Runoff = 13.46 cfs @ 12.14 hrs, Volume= 0.944 af, Depth> 0.88"

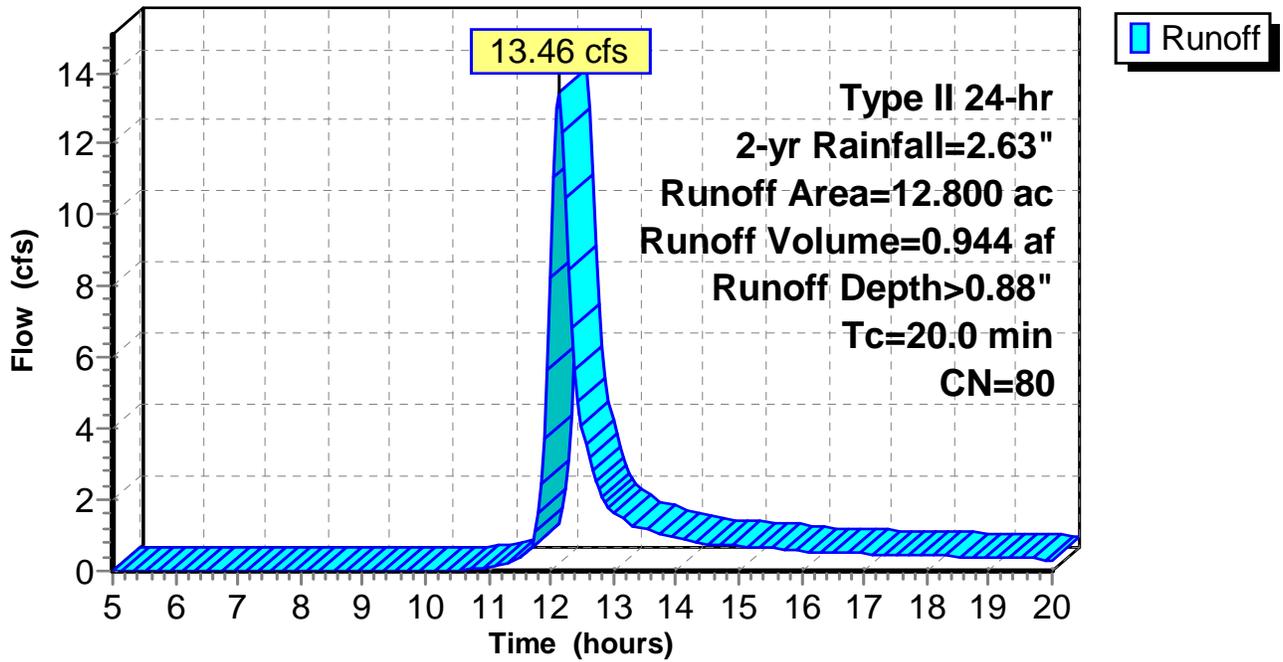
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2-yr Rainfall=2.63"

Area (ac)	CN	Description
1.500	70	Woods, Good, HSG C
1.000	74	>75% Grass cover, Good, HSG C
9.800	81	1/3 acre lots, 30% imp, HSG C
0.500	98	Water Surface, HSG C
12.800	80	Weighted Average
9.360		73.12% Pervious Area
3.440		26.87% Impervious Area

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

**Subcatchment 4S: POST-DEV "A-1"**

**Hydrograph**



**161606-swm**

Type II 24-hr 5-yr Rainfall=3.24"

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**Summary for Subcatchment 4S: POST-DEV "A-1"**

Runoff = 20.07 cfs @ 12.13 hrs, Volume= 1.391 af, Depth> 1.30"

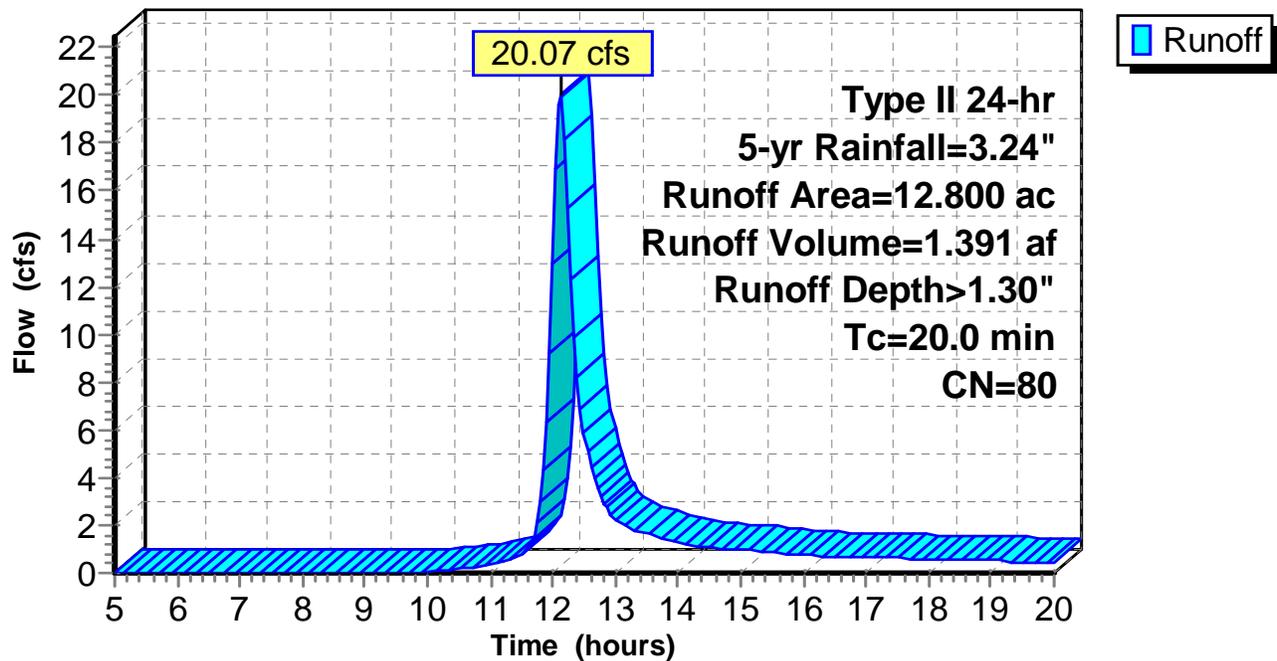
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 5-yr Rainfall=3.24"

Area (ac)	CN	Description
1.500	70	Woods, Good, HSG C
1.000	74	>75% Grass cover, Good, HSG C
9.800	81	1/3 acre lots, 30% imp, HSG C
0.500	98	Water Surface, HSG C
12.800	80	Weighted Average
9.360		73.12% Pervious Area
3.440		26.87% Impervious Area

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

**Subcatchment 4S: POST-DEV "A-1"**

**Hydrograph**



**161606-swm**

Type II 24-hr 10-yr Rainfall=3.74"

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**Summary for Subcatchment 4S: POST-DEV "A-1"**

Runoff = 25.79 cfs @ 12.13 hrs, Volume= 1.785 af, Depth> 1.67"

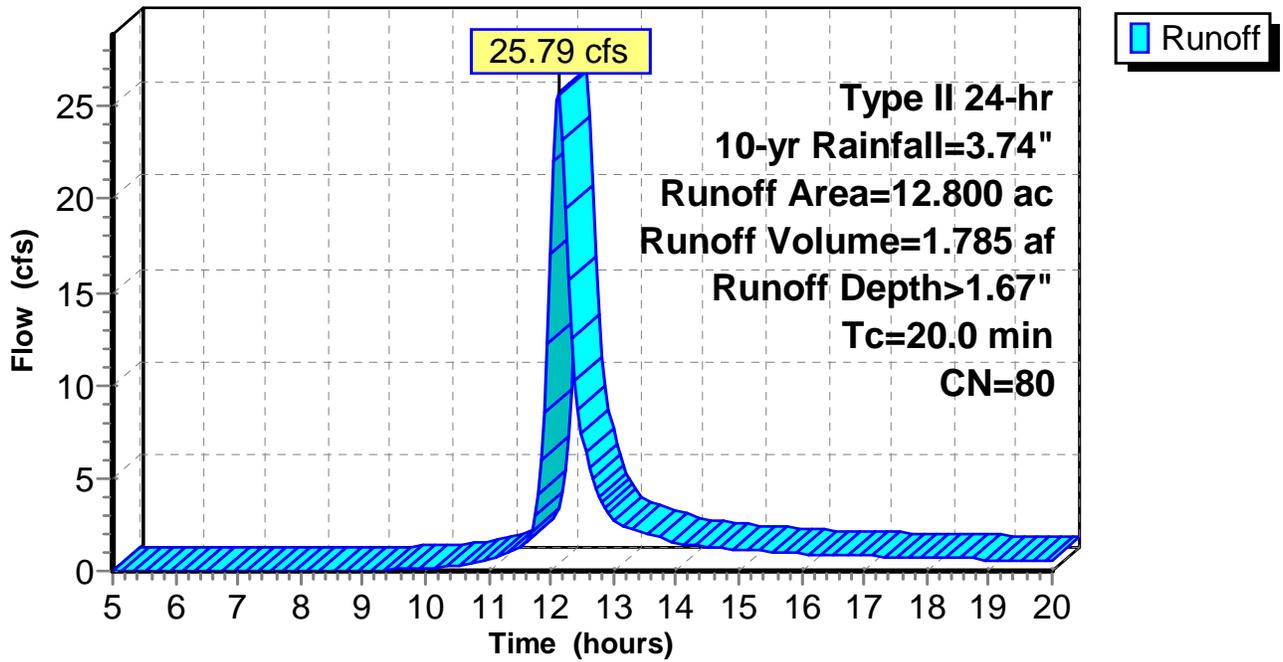
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10-yr Rainfall=3.74"

Area (ac)	CN	Description
1.500	70	Woods, Good, HSG C
1.000	74	>75% Grass cover, Good, HSG C
9.800	81	1/3 acre lots, 30% imp, HSG C
0.500	98	Water Surface, HSG C
12.800	80	Weighted Average
9.360		73.12% Pervious Area
3.440		26.87% Impervious Area

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

**Subcatchment 4S: POST-DEV "A-1"**

**Hydrograph**



**161606-swm**

Type II 24-hr 25-yr Rainfall=4.44"

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**Summary for Subcatchment 4S: POST-DEV "A-1"**

Runoff = 34.10 cfs @ 12.13 hrs, Volume= 2.364 af, Depth> 2.22"

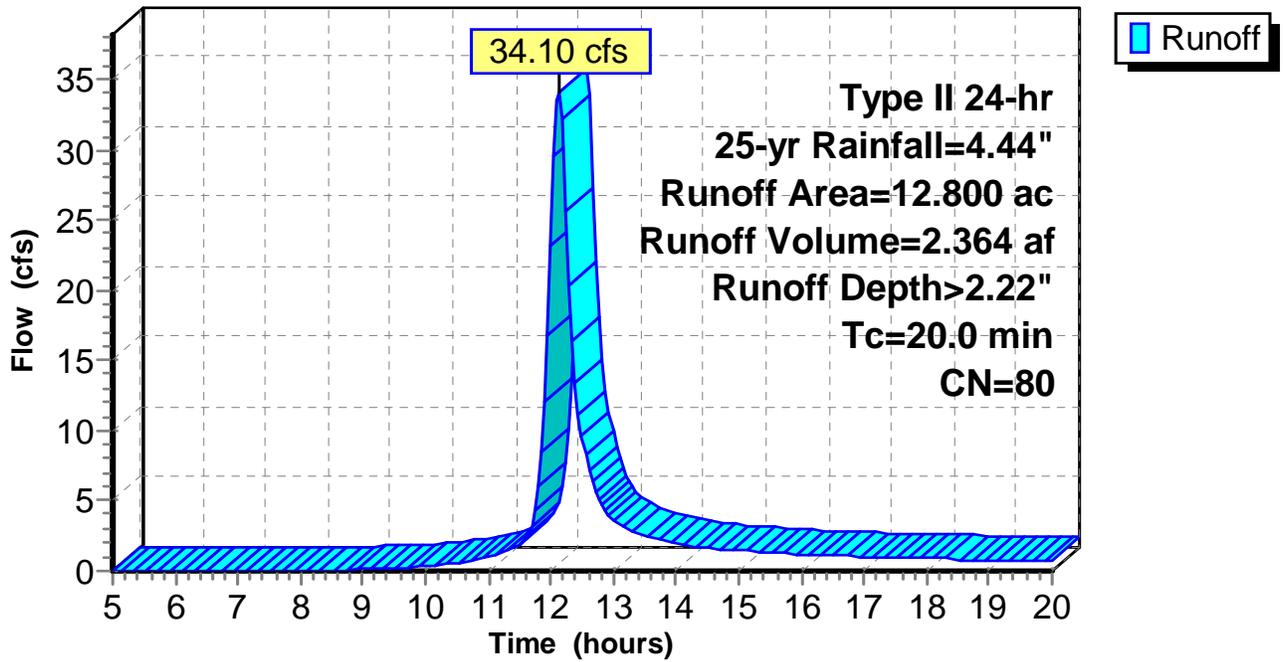
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 25-yr Rainfall=4.44"

Area (ac)	CN	Description
1.500	70	Woods, Good, HSG C
1.000	74	>75% Grass cover, Good, HSG C
9.800	81	1/3 acre lots, 30% imp, HSG C
0.500	98	Water Surface, HSG C
12.800	80	Weighted Average
9.360		73.12% Pervious Area
3.440		26.87% Impervious Area

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

**Subcatchment 4S: POST-DEV "A-1"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 50-yr Rainfall=5.02"

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**Summary for Subcatchment 4S: POST-DEV "A-1"**

Runoff = 41.16 cfs @ 12.13 hrs, Volume= 2.863 af, Depth> 2.68"

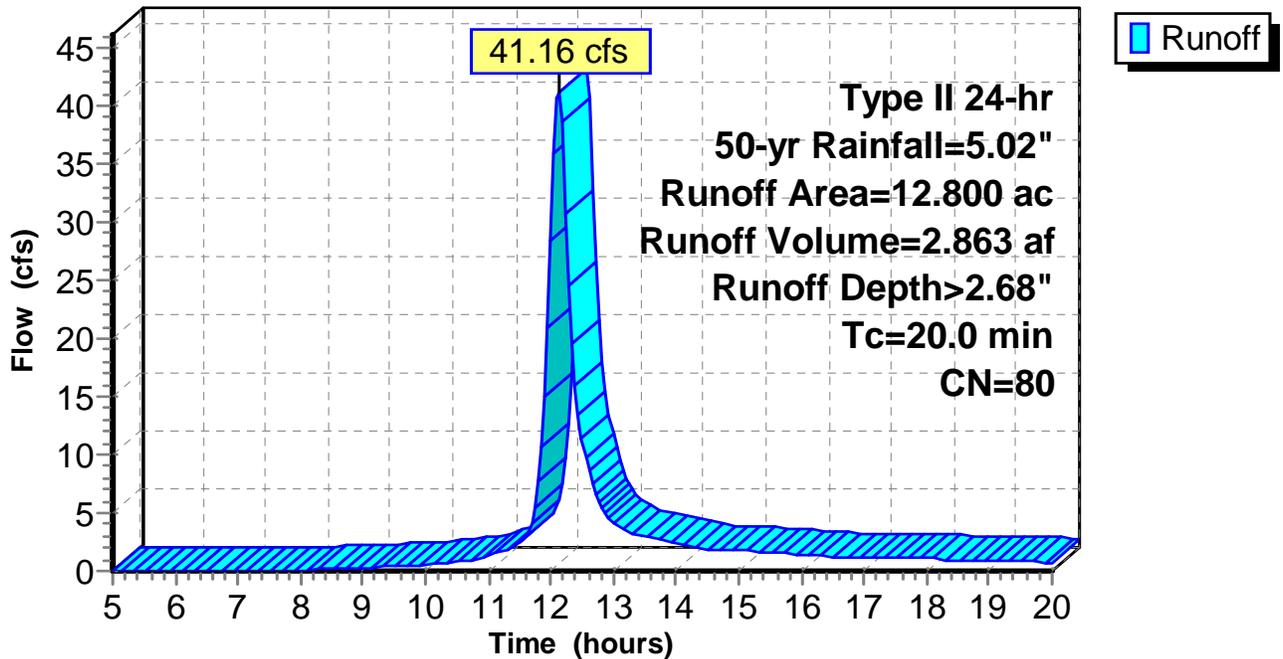
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 50-yr Rainfall=5.02"

Area (ac)	CN	Description
1.500	70	Woods, Good, HSG C
1.000	74	>75% Grass cover, Good, HSG C
9.800	81	1/3 acre lots, 30% imp, HSG C
0.500	98	Water Surface, HSG C
12.800	80	Weighted Average
9.360		73.12% Pervious Area
3.440		26.87% Impervious Area

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

**Subcatchment 4S: POST-DEV "A-1"**

**Hydrograph**



**161606-swm**

Type II 24-hr 100-yr Rainfall=5.63"

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**Summary for Subcatchment 4S: POST-DEV "A-1"**

Runoff = 48.79 cfs @ 12.12 hrs, Volume= 3.403 af, Depth> 3.19"

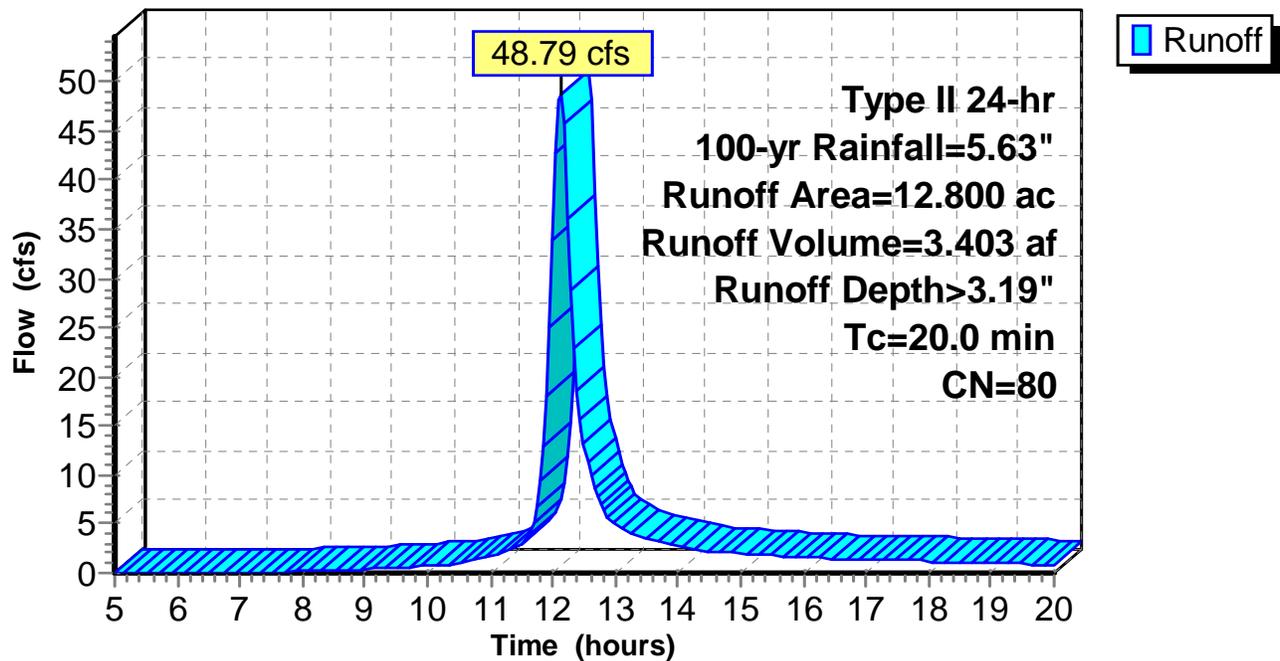
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-yr Rainfall=5.63"

Area (ac)	CN	Description
1.500	70	Woods, Good, HSG C
1.000	74	>75% Grass cover, Good, HSG C
9.800	81	1/3 acre lots, 30% imp, HSG C
0.500	98	Water Surface, HSG C
12.800	80	Weighted Average
9.360		73.12% Pervious Area
3.440		26.87% Impervious Area

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

**Subcatchment 4S: POST-DEV "A-1"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 1-yr Rainfall=2.20"

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**Summary for Subcatchment 5S: POST-DEV "A-2"**

Runoff = 0.70 cfs @ 12.17 hrs, Volume= 0.063 af, Depth> 0.30"

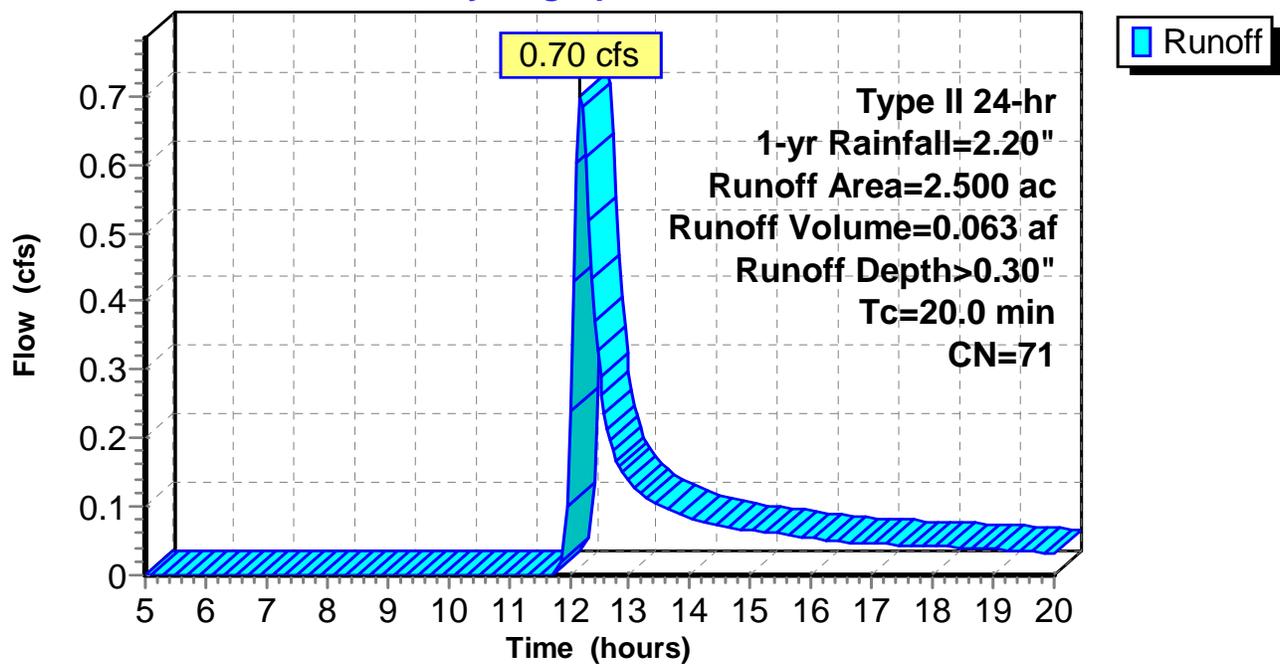
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 1-yr Rainfall=2.20"

Area (ac)	CN	Description
2.000	70	Woods, Good, HSG C
0.500	74	>75% Grass cover, Good, HSG C
2.500	71	Weighted Average
2.500		100.00% Pervious Area

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

**Subcatchment 5S: POST-DEV "A-2"**

**Hydrograph**



**161606-swm**

Type II 24-hr 2-yr Rainfall=2.63"

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**Summary for Subcatchment 5S: POST-DEV "A-2"**

Runoff = 1.29 cfs @ 12.16 hrs, Volume= 0.102 af, Depth> 0.49"

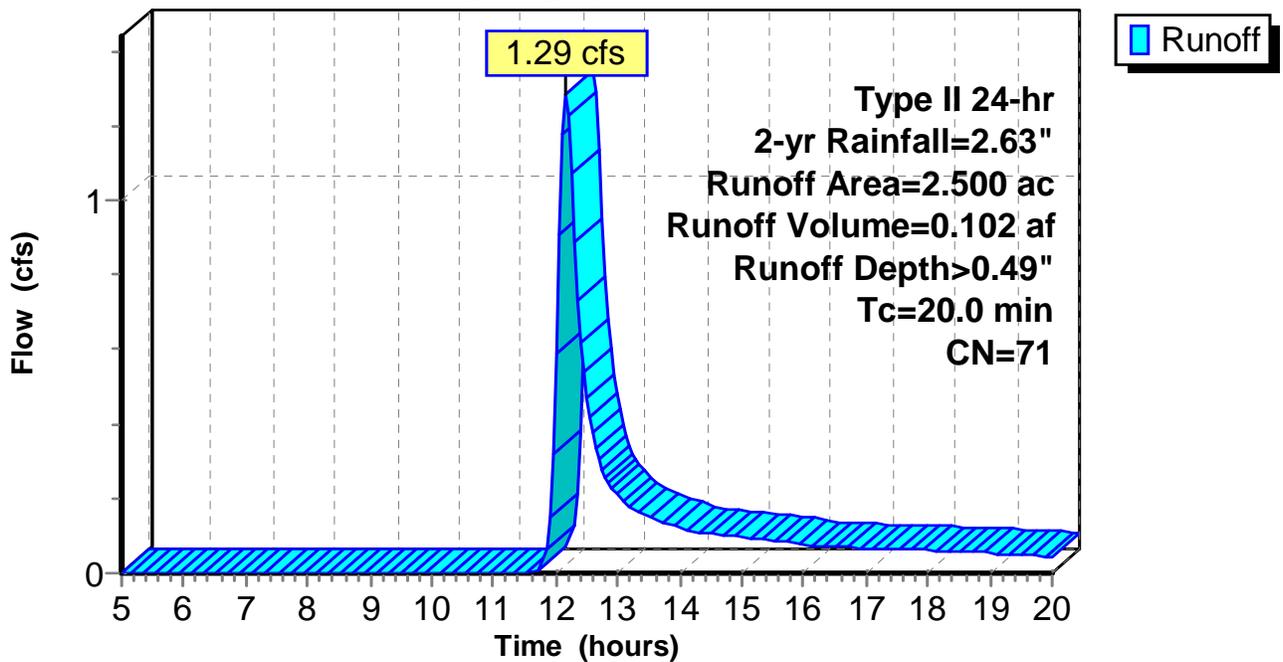
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 2-yr Rainfall=2.63"

Area (ac)	CN	Description
2.000	70	Woods, Good, HSG C
0.500	74	>75% Grass cover, Good, HSG C
2.500	71	Weighted Average
2.500		100.00% Pervious Area

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

**Subcatchment 5S: POST-DEV "A-2"**

**Hydrograph**



**161606-swm**

Type II 24-hr 5-yr Rainfall=3.24"

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**Summary for Subcatchment 5S: POST-DEV "A-2"**

Runoff = 2.29 cfs @ 12.15 hrs, Volume= 0.167 af, Depth> 0.80"

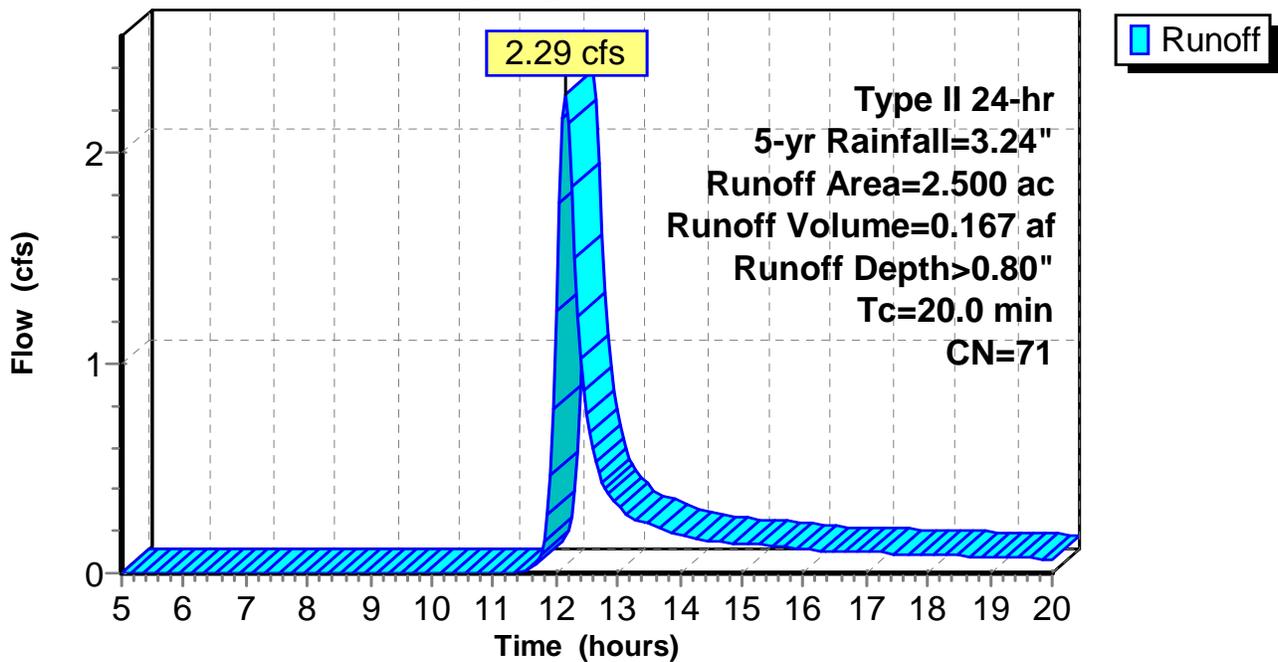
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 5-yr Rainfall=3.24"

Area (ac)	CN	Description
2.000	70	Woods, Good, HSG C
0.500	74	>75% Grass cover, Good, HSG C
2.500	71	Weighted Average
2.500		100.00% Pervious Area

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

**Subcatchment 5S: POST-DEV "A-2"**

**Hydrograph**



**161606-swm**

Type II 24-hr 10-yr Rainfall=3.74"

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**Summary for Subcatchment 5S: POST-DEV "A-2"**

Runoff = 3.20 cfs @ 12.14 hrs, Volume= 0.228 af, Depth> 1.09"

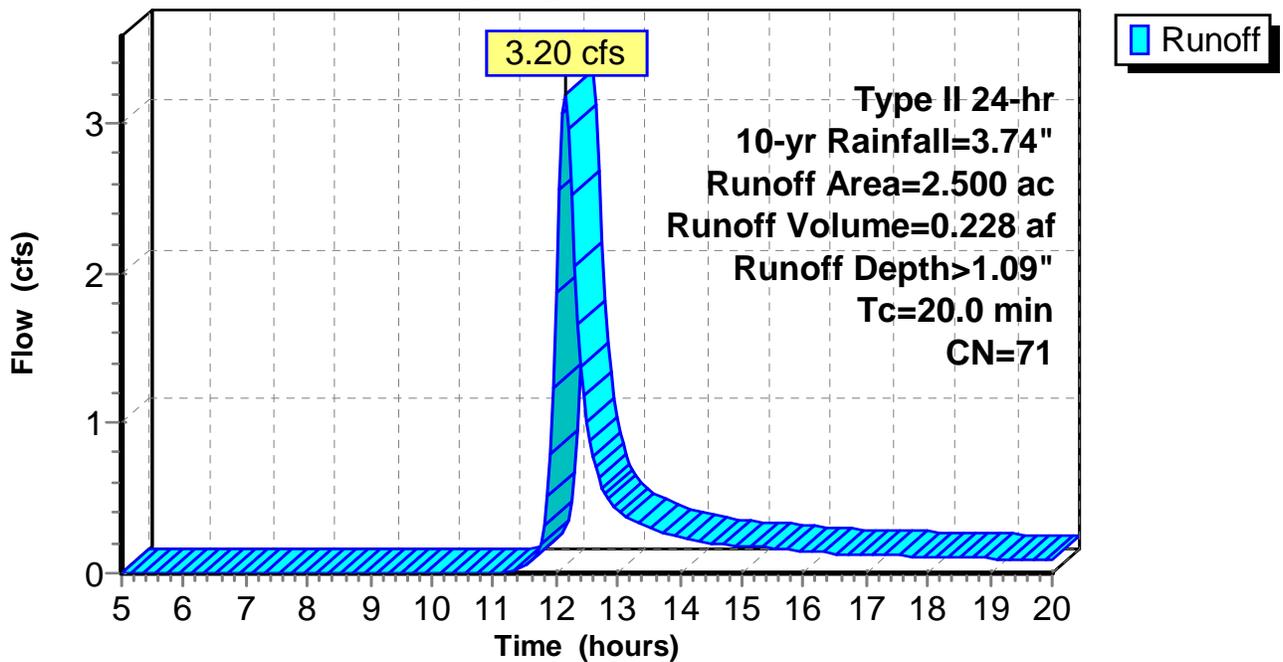
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 10-yr Rainfall=3.74"

Area (ac)	CN	Description
2.000	70	Woods, Good, HSG C
0.500	74	>75% Grass cover, Good, HSG C
2.500	71	Weighted Average
2.500		100.00% Pervious Area

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

**Subcatchment 5S: POST-DEV "A-2"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 25-yr Rainfall=4.44"

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**Summary for Subcatchment 5S: POST-DEV "A-2"**

Runoff = 4.59 cfs @ 12.14 hrs, Volume= 0.321 af, Depth> 1.54"

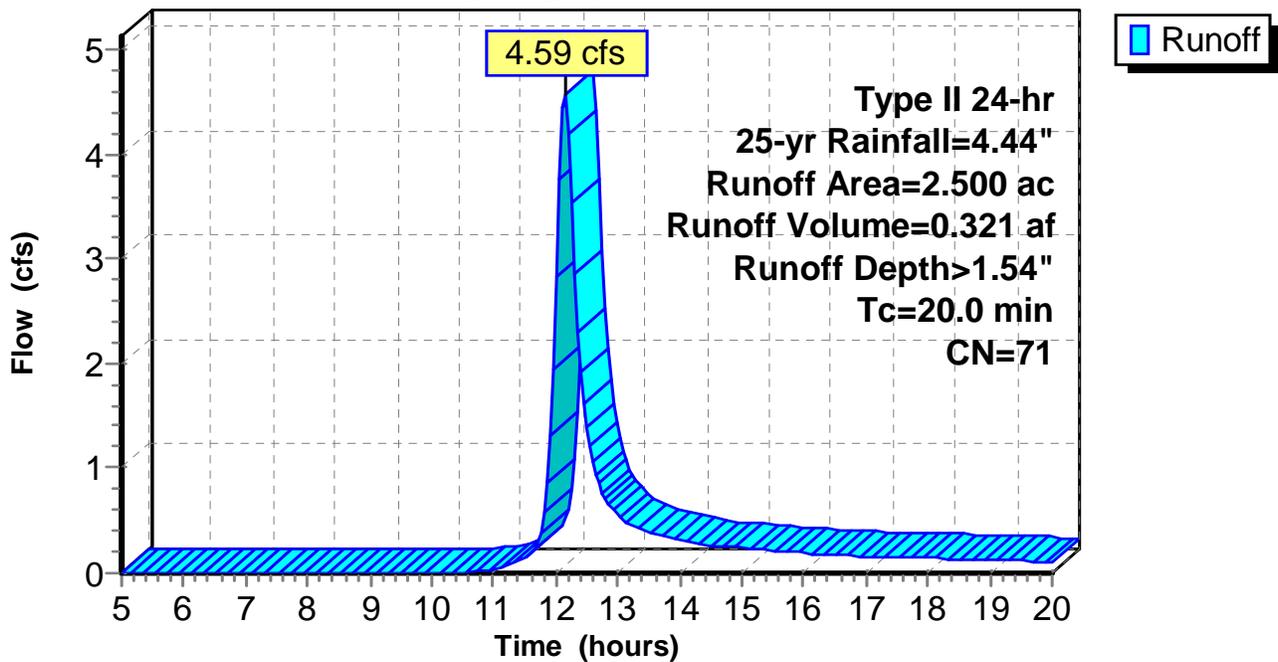
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 25-yr Rainfall=4.44"

Area (ac)	CN	Description
2.000	70	Woods, Good, HSG C
0.500	74	>75% Grass cover, Good, HSG C
2.500	71	Weighted Average
2.500		100.00% Pervious Area

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

**Subcatchment 5S: POST-DEV "A-2"**

**Hydrograph**



**161606-swm**

Type II 24-hr 50-yr Rainfall=5.02"

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**Summary for Subcatchment 5S: POST-DEV "A-2"**

Runoff = 5.81 cfs @ 12.13 hrs, Volume= 0.403 af, Depth> 1.94"

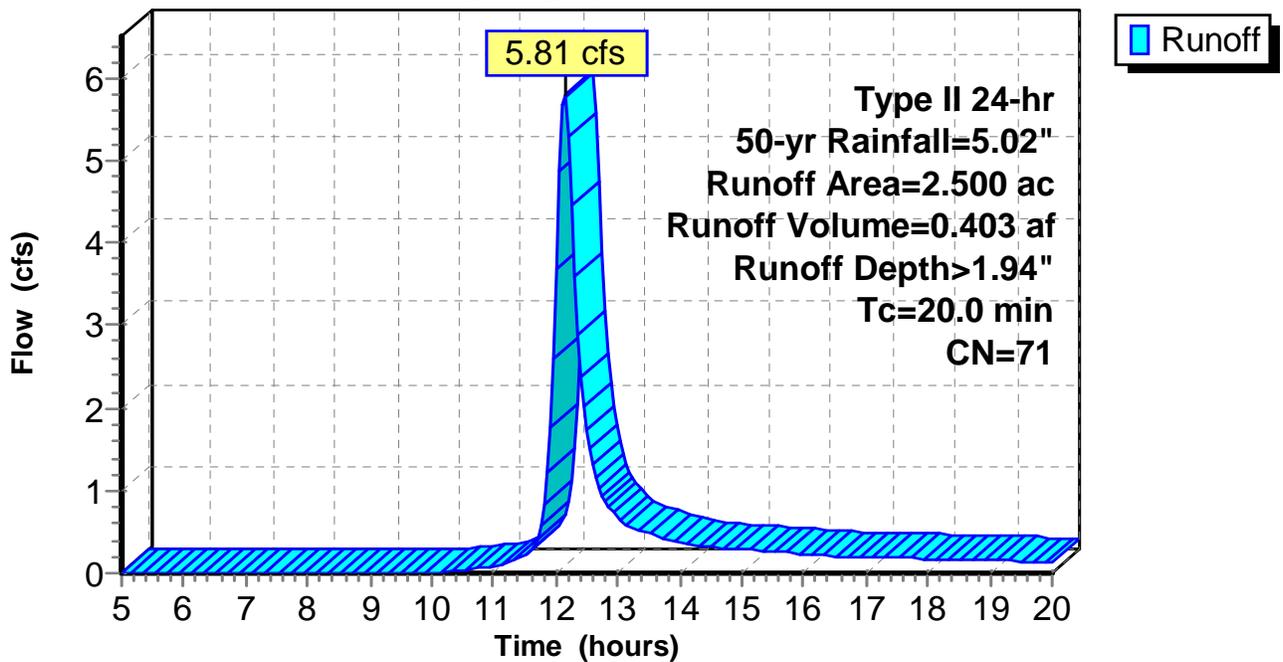
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 50-yr Rainfall=5.02"

Area (ac)	CN	Description
2.000	70	Woods, Good, HSG C
0.500	74	>75% Grass cover, Good, HSG C
2.500	71	Weighted Average
2.500		100.00% Pervious Area

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

**Subcatchment 5S: POST-DEV "A-2"**

**Hydrograph**



**161606-swm**

Type II 24-hr 100-yr Rainfall=5.63"

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**Summary for Subcatchment 5S: POST-DEV "A-2"**

Runoff = 7.15 cfs @ 12.13 hrs, Volume= 0.495 af, Depth> 2.38"

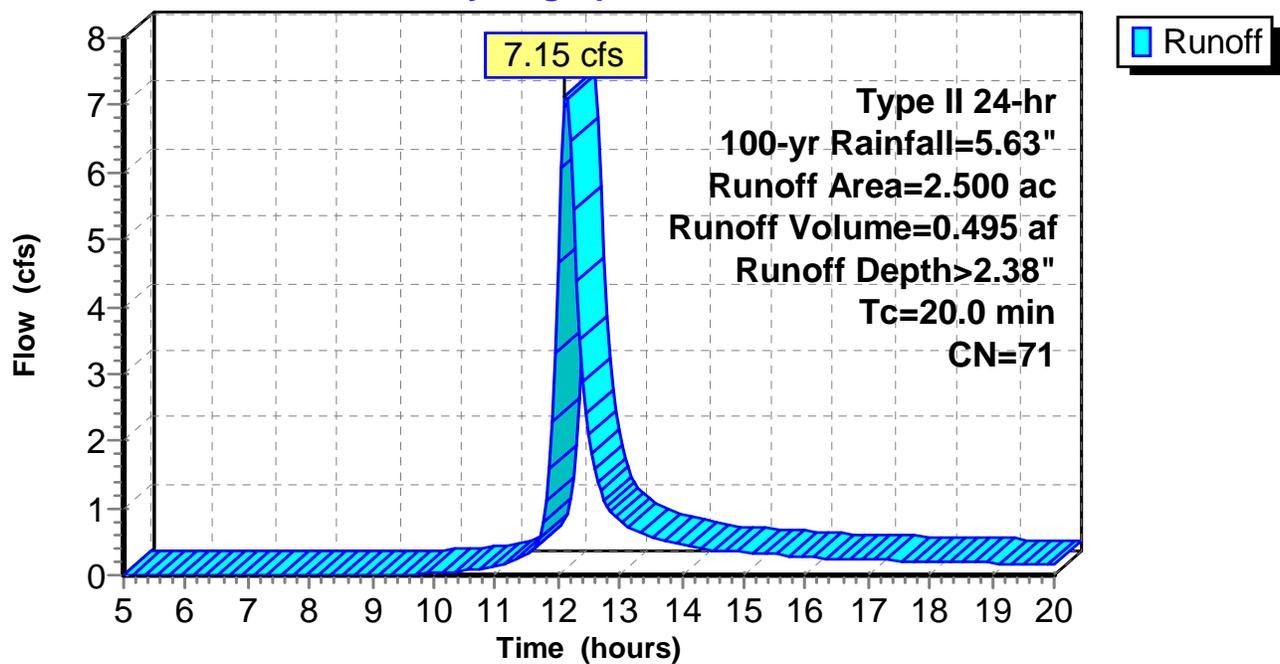
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-yr Rainfall=5.63"

Area (ac)	CN	Description
2.000	70	Woods, Good, HSG C
0.500	74	>75% Grass cover, Good, HSG C
2.500	71	Weighted Average
2.500		100.00% Pervious Area

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

**Subcatchment 5S: POST-DEV "A-2"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 1-yr Rainfall=2.20"

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Page 1

**Summary for Subcatchment 6S: POST-DEV "B"**

Runoff = 1.26 cfs @ 12.65 hrs, Volume= 0.225 af, Depth> 0.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 1-yr Rainfall=2.20"

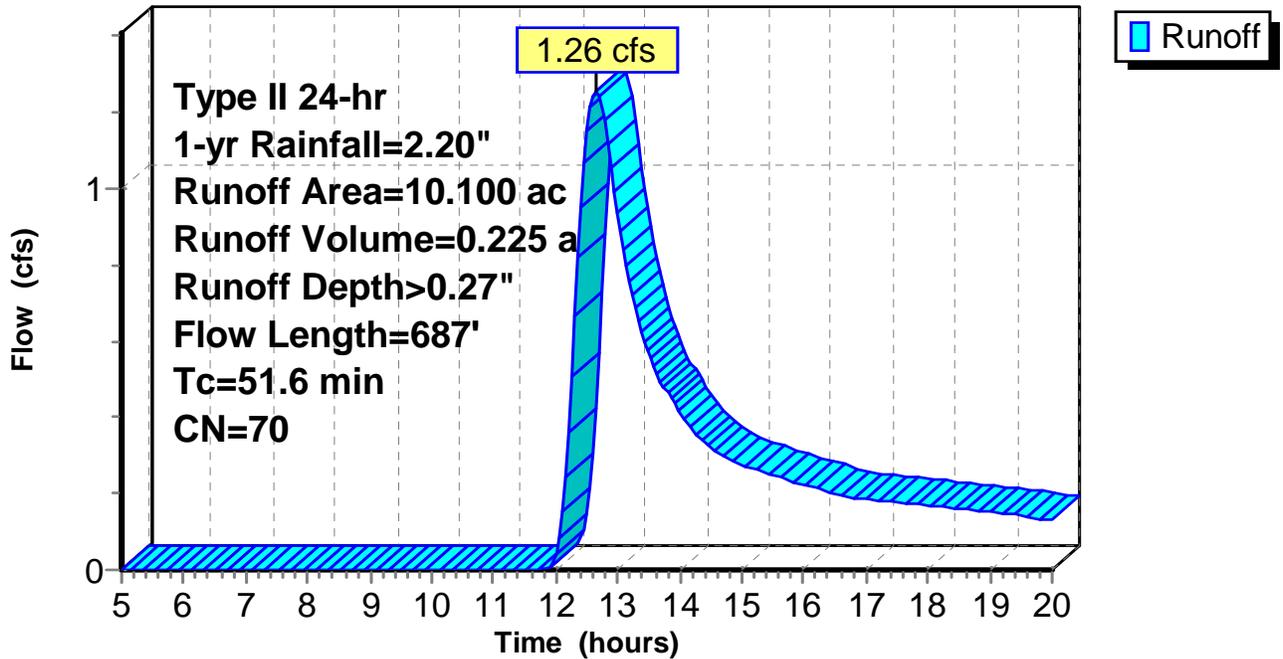
Area (ac)	CN	Description
10.100	70	Woods, Good, HSG C
10.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.7	150	0.0141	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
13.9	537	0.0166	0.64		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
51.6	687	Total			

**Subcatchment 6S: POST-DEV "B"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 2-yr Rainfall=2.63"

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**Summary for Subcatchment 6S: POST-DEV "B"**

Runoff = 2.39 cfs @ 12.61 hrs, Volume= 0.373 af, Depth> 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2-yr Rainfall=2.63"

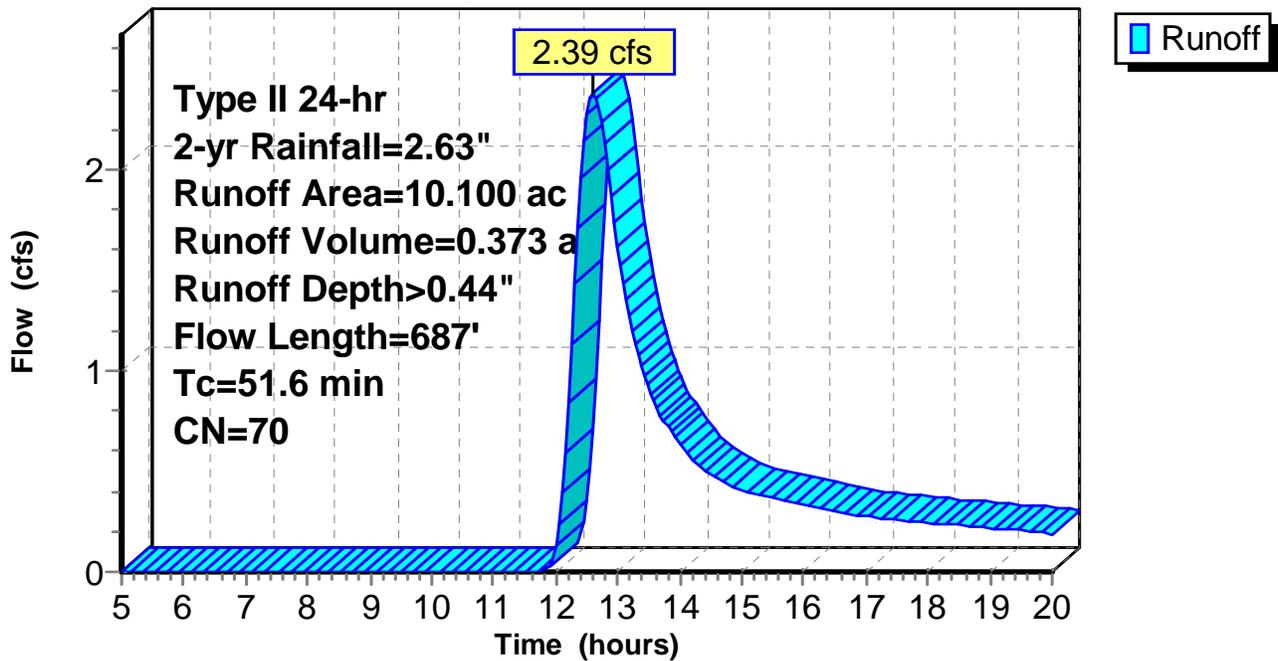
Area (ac)	CN	Description
10.100	70	Woods, Good, HSG C
10.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.7	150	0.0141	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
13.9	537	0.0166	0.64		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
51.6	687	Total			

**Subcatchment 6S: POST-DEV "B"**

**Hydrograph**



**161606-swm**

Type II 24-hr 5-yr Rainfall=3.24"

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**Summary for Subcatchment 6S: POST-DEV "B"**

Runoff = 4.41 cfs @ 12.57 hrs, Volume= 0.624 af, Depth> 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 5-yr Rainfall=3.24"

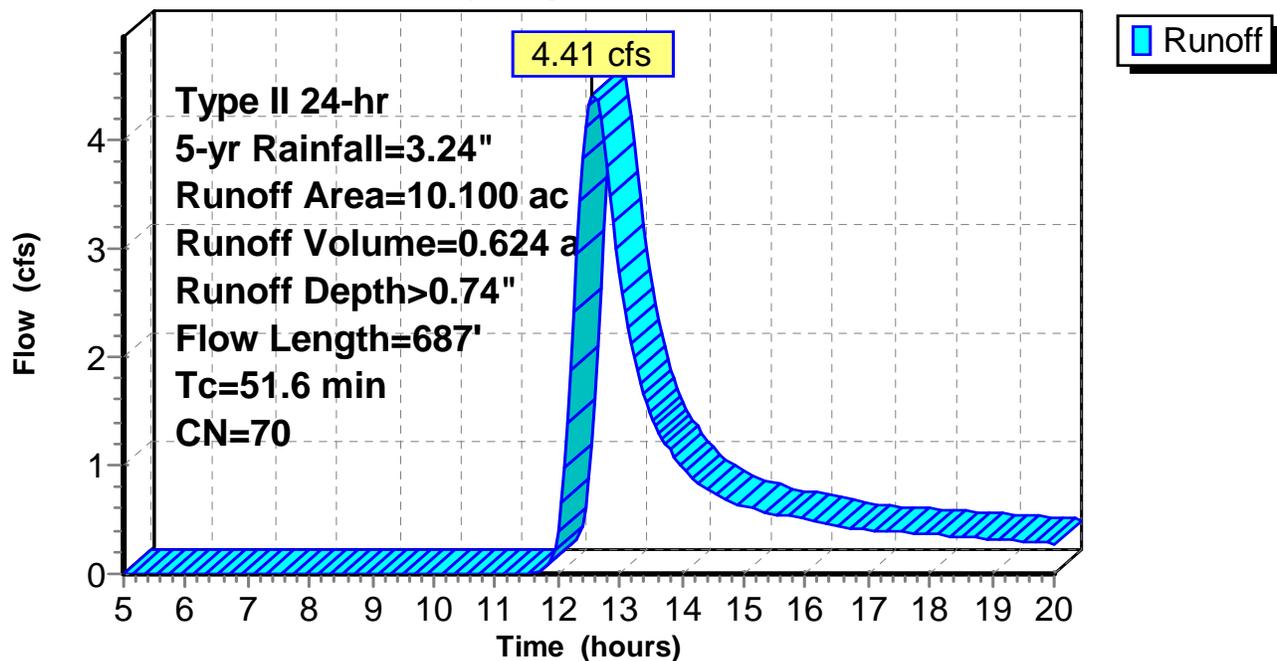
Area (ac)	CN	Description
10.100	70	Woods, Good, HSG C
10.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.7	150	0.0141	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
13.9	537	0.0166	0.64		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
51.6	687	Total			

**Subcatchment 6S: POST-DEV "B"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 10-yr Rainfall=3.74"

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**Summary for Subcatchment 6S: POST-DEV "B"**

Runoff = 6.33 cfs @ 12.56 hrs, Volume= 0.859 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10-yr Rainfall=3.74"

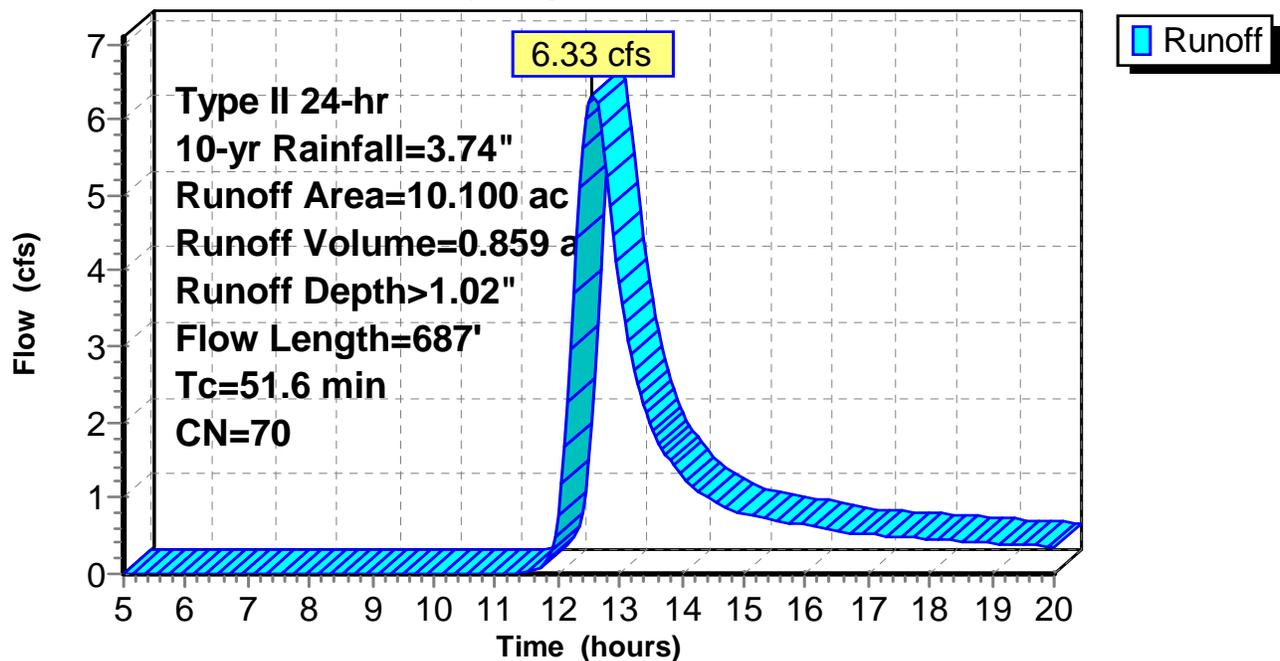
Area (ac)	CN	Description
10.100	70	Woods, Good, HSG C
10.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.7	150	0.0141	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
13.9	537	0.0166	0.64		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
51.6	687	Total			

**Subcatchment 6S: POST-DEV "B"**

**Hydrograph**



**161606-swm**

Type II 24-hr 25-yr Rainfall=4.44"

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**Summary for Subcatchment 6S: POST-DEV "B"**

Runoff = 9.28 cfs @ 12.55 hrs, Volume= 1.220 af, Depth> 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type II 24-hr 25-yr Rainfall=4.44"

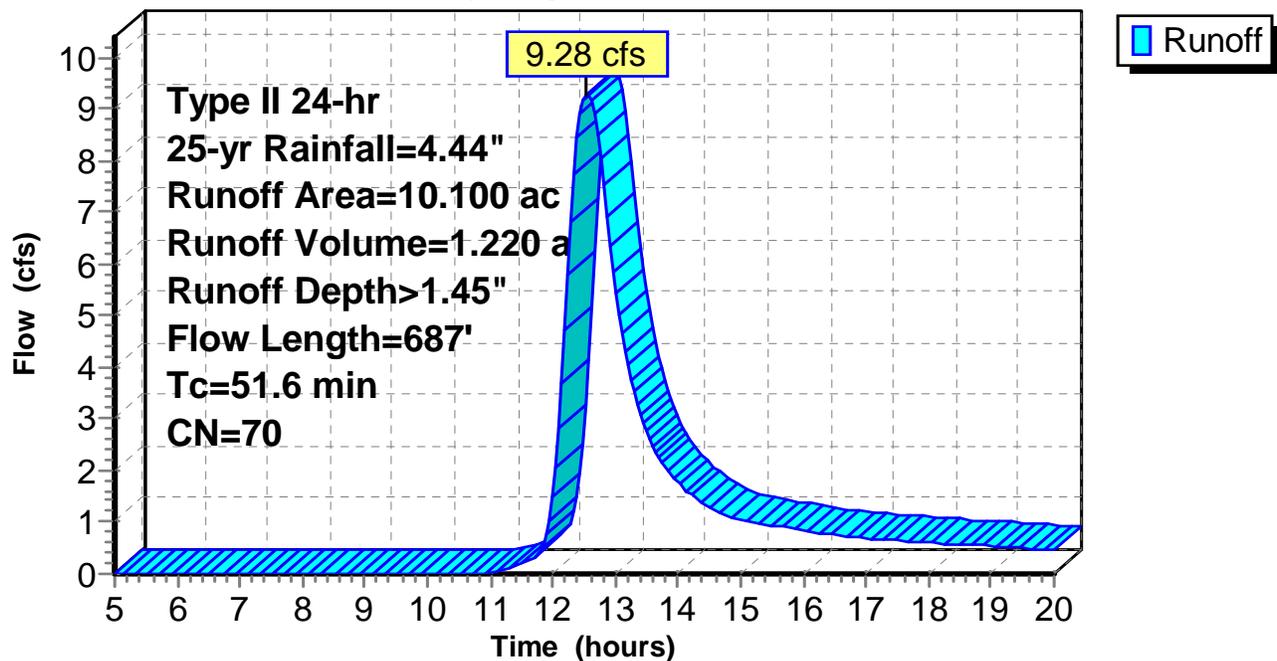
Area (ac)	CN	Description
10.100	70	Woods, Good, HSG C
10.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.7	150	0.0141	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
13.9	537	0.0166	0.64		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
51.6	687	Total			

**Subcatchment 6S: POST-DEV "B"**

**Hydrograph**



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Type II 24-hr 50-yr Rainfall=5.02"

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**Summary for Subcatchment 6S: POST-DEV "B"**

Runoff = 11.90 cfs @ 12.54 hrs, Volume= 1.544 af, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 50-yr Rainfall=5.02"

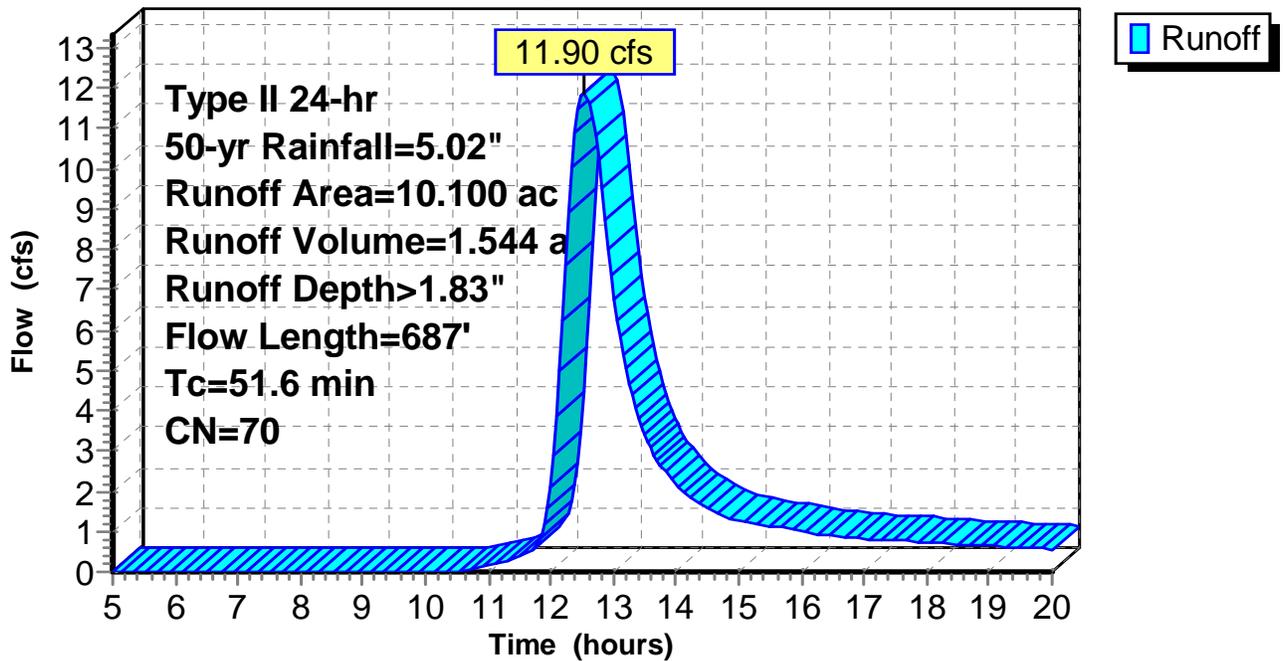
Area (ac)	CN	Description
10.100	70	Woods, Good, HSG C
10.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.7	150	0.0141	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
13.9	537	0.0166	0.64		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
51.6	687	Total			

**Subcatchment 6S: POST-DEV "B"**

**Hydrograph**



**161606-swm**

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Type II 24-hr 100-yr Rainfall=5.63"

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**Summary for Subcatchment 6S: POST-DEV "B"**

Runoff = 14.78 cfs @ 12.53 hrs, Volume= 1.902 af, Depth> 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type II 24-hr 100-yr Rainfall=5.63"

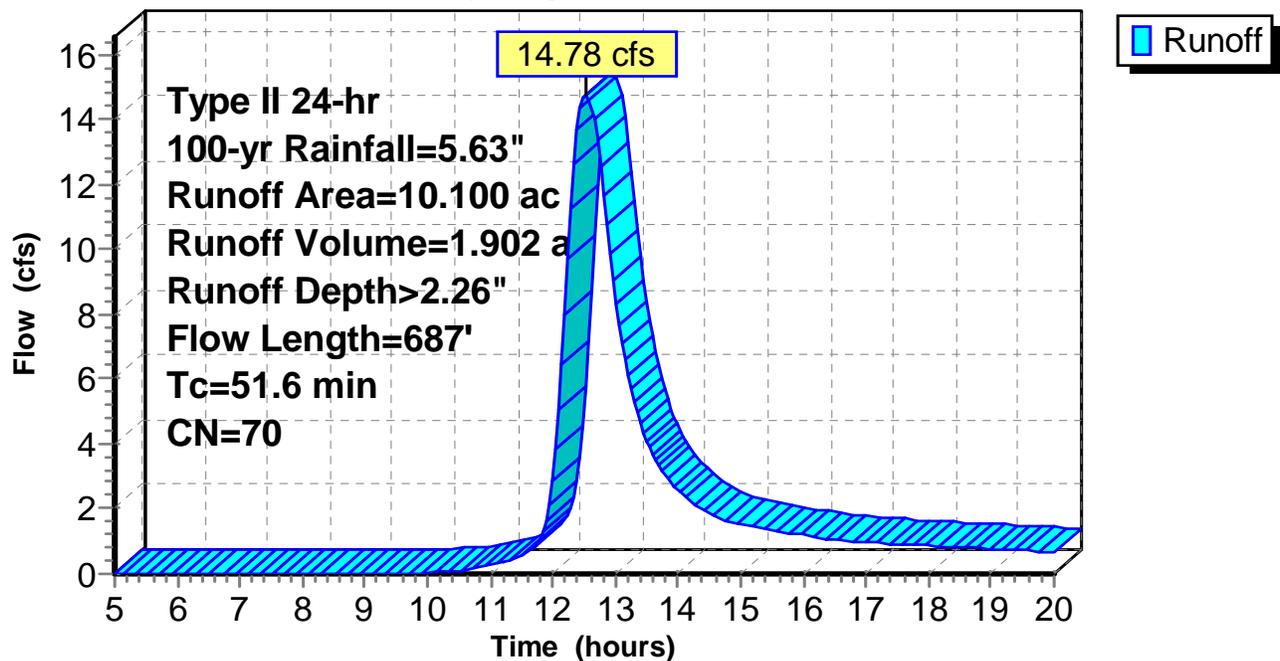
Area (ac)	CN	Description
10.100	70	Woods, Good, HSG C
10.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.7	150	0.0141	0.07		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.63"
13.9	537	0.0166	0.64		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
51.6	687	Total			

**Subcatchment 6S: POST-DEV "B"**

**Hydrograph**



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**APPENDIX C**

**CRITICAL STORM CALCULATIONS**

---



## Critical Storm Calculations

Design By: MDG  
 Checked By: BAB

Paddock Reserve (CEC 161-606)  
 1/16/2017

### PRE-DEV "A-1"

A= 12.2 AC.  
 CN= 71  
 Tc= 53.2 MIN

Q1= 1.71 CFS  
 V1= 13,024 CU. FT.

### POST-DEV "A-1"

A= 12.8 AC.  
 CN= 80  
 Tc= 20 MIN

Q1= 9.17 CFS  
 V1= 28,618 CU. FT.

PERCENT INCREASE IN RUNOFF VOLUME FOR THE 1-YR STORM EVENT= **120%**

% INCREASE IN RUNOFF VOLUME		CRITICAL STORM
-	10	1-YR
10	20	2-YR
20	50	5-YR
50	100	10-YR
100	250	<b>25-YR</b>
250	500	50-YR
500	-	100-YR

PRE-DEV PEAK FLOW		
Q1=	1.71	CFS
Q2=	3.13	CFS
Q5=	5.63	CFS
Q10=	7.97	CFS
Q25=	11.52	CFS
Q50=	14.68	CFS
Q100=	18.14	CFS

POST-DEV ALLOWABLE PEAK FLOW		
Q1=	1.71	CFS
Q2=	1.71	CFS
Q5=	1.71	CFS
Q10=	1.71	CFS
Q25=	1.71	CFS
Q50=	7.97	CFS
Q100=	7.97	CFS

---

**APPENDIX D**

**WATER QUALITY CALCULATIONS**

---

# Water Quality Orifice Design for Extended Detention Basin (Version 12/19/2014)

681-PP

For sizing of single water quality orifice in wet or dry extended detention basin or constructed wetland

Received 1/17/2017

Spreadsheet Created by Chris Barnes, PE, CPESC, CPSWQ, CMS4S - Assistant City Engineer, City of Canton, OH

PLEASE MAKE SURE YOU ARE USING THE MOST CURRENT VERSION AVAILABLE AT <http://cantonohio.gov/engineering/?pg=510>

Project Description:

PADDOCK RESERVE

Date: 1/16/2017

By: BAB

## Section 1: WATER QUALITY VOLUME CALCULATION

Water Quality Volume, WQv = CPA/12 ft<sup>3</sup> or acre-ft

Where Runoff Coefficient, C = value(s) from table OR formula:

Land Use	C	Acres
Industrial & Commercial	0.8	
High Density Residential (>8 dwellings/acre)	0.5	
Medium Density Residential (4 to 8 dwellings/acre)	0.4	
Low Density Residential (<4 dwellings/acre)	0.3	10.3
Open Space and Recreational Areas	0.2	2.5

$$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

Where i = fraction of post-construction impervious surface or use table

i = 0.55

Drainage Area, A = 12.80 acres (total area draining into Extended Detention Basin)

Calculated C = 0.2805 (composite C from table) OR C = 0.3701 (from formula)

Runoff Coefficient, C to be used = 0.27

Precipitation Depth, P = 0.75 inches

WQv = 9,496 ft<sup>3</sup> = 0.22 acre-ft

## Section 2: EXTENDED DETENTION BASIN DESIGN PARAMETERS

Type of Extended Detention Basin = Wet Ext. Det. Basin (Select from drop-down list)

Required Extended Detention Volume, EDv = 7,122 ft<sup>3</sup> = 0.75\*WQv for Wet Extended Detention Basin

Minimum required draw-down time = 24 hrs

Add'l 20% volume required for sediment storage = 1,899 ft<sup>3</sup> (Provide in forebays and/or micropools in addition to the permanent pool)

Calculated minimum permanent pool volume = 7,122 ft<sup>3</sup> (Sized at 75% of WQv)

Minimum permanent pool volume = 7,122 ft<sup>3</sup> (Enter calculated minimum permanent pool volume)

Total add'l volume required below WQ orifice = 9,021 ft<sup>3</sup> (Min. 20% for sediment storage + 75% for permanent pool = 95% of WQv)

1/2 of required EDv = 3,561 ft<sup>3</sup> (The first 1/2 of the WQv or extended detention volume (EDv) must not discharge in less than 1/3 of the minimum required drain time)

1/3 of required draw-down time = 8.00 hrs

Results = EXTENDED DETENTION BASIN DESIGN PARAMETERS OK.

## Section 3: BASIN ELEVATIONS & VOLUME INFORMATION (Volume calculated by elevation - area method)

WQ orifice invert elevation = 1025.00 ft

	Contour Elevation		Contour Area		Incremental Volume		Cumulative Volume	
	(ft)	(ft <sup>2</sup> )	(acres)	(ft <sup>3</sup> )	(ac-ft)	(ft <sup>3</sup> )	(ac-ft)	
Bottom of sediment storage =	1021.00	7,357	0.2	0	0	0	0	
	1022.00	10,011	0.2	8,684	0.2	8,684	0.2	
	1023.00	12,904	0.3	11,458	0.3	20,142	0.5	
	1024.00	15,997	0.4	14,451	0.3	34,592	0.8	
WQ orifice invert elevation =	1025.00	19,195	0.4	17,596	0.4	52,188	1.2	
	1026.00	22,493	0.5	20,844	0.5	73,032	1.7	
	1027.00	25,893	0.6	24,193	0.6	97,225	2.2	
	1028.00	29,392	0.7	27,643	0.6	124,868	2.9	
	1029.00	32,993	0.8	31,193	0.7	156,060	3.6	
	1029.50	34,830	0.8	16,956	0.4	173,016	4.0	

Resulting total volume provided below WQ orifice = 52,188 ft<sup>3</sup> which is > or equal to 9,021 ft<sup>3</sup> (Result is **549.57%** of the WQv)

Resulting EDv Elevation = 1,025.34 ft (corresponds to the required EDv when placed in the above basin configuration)

Resulting volume provided above WQ orifice = 120,828 ft<sup>3</sup> which is > or equal to 7,122 ft<sup>3</sup> (which is the required EDv)

Results = Sufficient volume provided BELOW WQ orifice (OK).

Sufficient volume provided ABOVE WQ orifice to contain EDv (OK). Ensure any/all flood control outlets are ABOVE the EDv elevation.

BASIN ELEVATIONS & VOLUME INFORMATION OK.

## Section 4: WQ ORIFICE CALCULATIONS - OHIO EPA METHOD #2 (from Post-Construction Q&A Document; using design parameters above)

EDv elevation = 1,025.34 ft (corresponds to the required EDv; calculated above)

WQ orifice invert elevation = 1,025.00 ft (user-defined from above)

Maximum Hydraulic Head, H<sub>max</sub> = 0.34168 ft (this is the EDv depth measured from the WQ orifice invert to the EDv elevation)

Orifice Coefficient, C = 0.61

Actual draw-down time = 24.00 hrs (this is the required draw-down time)

Average Discharge, Q<sub>avg</sub> = 0.08243 cfs (this is the average discharge corresponding to the required draw-down time)

Average Hydraulic Head, H<sub>avg</sub> = 0.17084 ft

Orifice Area, A = Q<sub>avg</sub> / [C(2gH<sub>avg</sub>)<sup>0.5</sup>] = 0.04074 ft<sup>2</sup>

Calculated Orifice Diameter, D = 2.73305 in

Volume discharged in 1/3 of draw-down time = 2,374.02 ft<sup>3</sup> which is less than 3,561 ft<sup>3</sup> (which is 1/2 of the required EDv)

Results = Anti-clogging device typically not required for this orifice diameter.

First 1/2 of EDv or WQv does not discharge in less than 1/3 of minimum drain time (OK).

WQ ORIFICE CALCULATIONS - OHIO EPA METHOD #2 OK.

ALL DESIGN PARAMETERS OK.

## Section 5: WQ ORIFICE CALCULATIONS - MANUAL ESTIMATE (using volumes, elevations, head values, and orifice coefficient above)

Orifice Diameter, D = 2.7 in

Maximum Hydraulic Head, H<sub>max</sub> = 0.34168 ft (this is the EDv depth measured from the WQ orifice invert to EDv elevation)

Average Discharge, Q<sub>avg</sub> = 0.08045 cfs (this is the average discharge corresponding to D, H<sub>max</sub>, and orifice C)

Actual draw-down time = 24.59111 hrs which is > or equal to 24.00 hrs (minimum draw-down time)

Volume discharged in 1/3 of required draw-down time = 2,316.95 ft<sup>3</sup> which is less than 3,561 ft<sup>3</sup> (which is 1/2 of the required EDv)

Results = Anti-clogging device typically not required for this orifice diameter.

Actual draw-down time is equal to or greater than minimum allowable draw-down time (OK).

First 1/2 of EDv or WQv does not discharge in less than 1/3 of minimum drain time (OK).

WQ ORIFICE CALCULATIONS - MANUAL ESTIMATE OK.

ALL DESIGN PARAMETERS OK.

---

**APPENDIX E**

**POST-DEVELOPED BASIN CALCULATIONS**

---

**161606-swm**

Type II 24-hr 1-yr Rainfall=2.20"

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Page 1

**Summary for Pond 7P: RETENTION BASIN**

Inflow Area = 12.800 ac, 26.87% Impervious, Inflow Depth > 0.62" for 1-yr event  
 Inflow = 9.17 cfs @ 12.14 hrs, Volume= 0.657 af  
 Outflow = 0.19 cfs @ 20.00 hrs, Volume= 0.117 af, Atten= 98%, Lag= 471.4 min  
 Primary = 0.19 cfs @ 20.00 hrs, Volume= 0.117 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 1,026.12' @ 20.00 hrs Surf.Area= 22,894 sf Storage= 23,519 cf

Plug-Flow detention time= 254.4 min calculated for 0.116 af (18% of inflow)  
 Center-of-Mass det. time= 153.4 min ( 974.0 - 820.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	1,025.00'	120,828 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,025.00	19,195	0	0
1,026.00	22,493	20,844	20,844
1,027.00	25,893	24,193	45,037
1,028.00	29,392	27,643	72,680
1,029.00	32,993	31,193	103,872
1,029.50	34,830	16,956	120,828

Device	Routing	Invert	Outlet Devices
#1	Primary	1,024.75'	<b>15.0" Round Culvert</b> L= 153.0' Ke= 0.200 Inlet / Outlet Invert= 1,024.75' / 1,023.85' S= 0.0059 ' / Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	1,025.00'	<b>2.7" Vert. Orifice/Grate</b> C= 0.600
#3	Device 1	1,026.50'	<b>9.0" W x 4.0" H Vert. Orifice/Grate</b> C= 0.600
#4	Device 1	1,028.10'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#5	Secondary	1,028.50'	<b>20.0' long x 12.0' breadth Broad-Crested Rectangular Weir</b> 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=0.19 cfs @ 20.00 hrs HW=1,026.12' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.19 cfs of 5.12 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.19 cfs @ 4.83 fps)
- ↑ **3=Orifice/Grate** ( Controls 0.00 cfs)
- ↑ **4=Orifice/Grate** ( Controls 0.00 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=1,025.00' (Free Discharge)

- ↑ **5=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

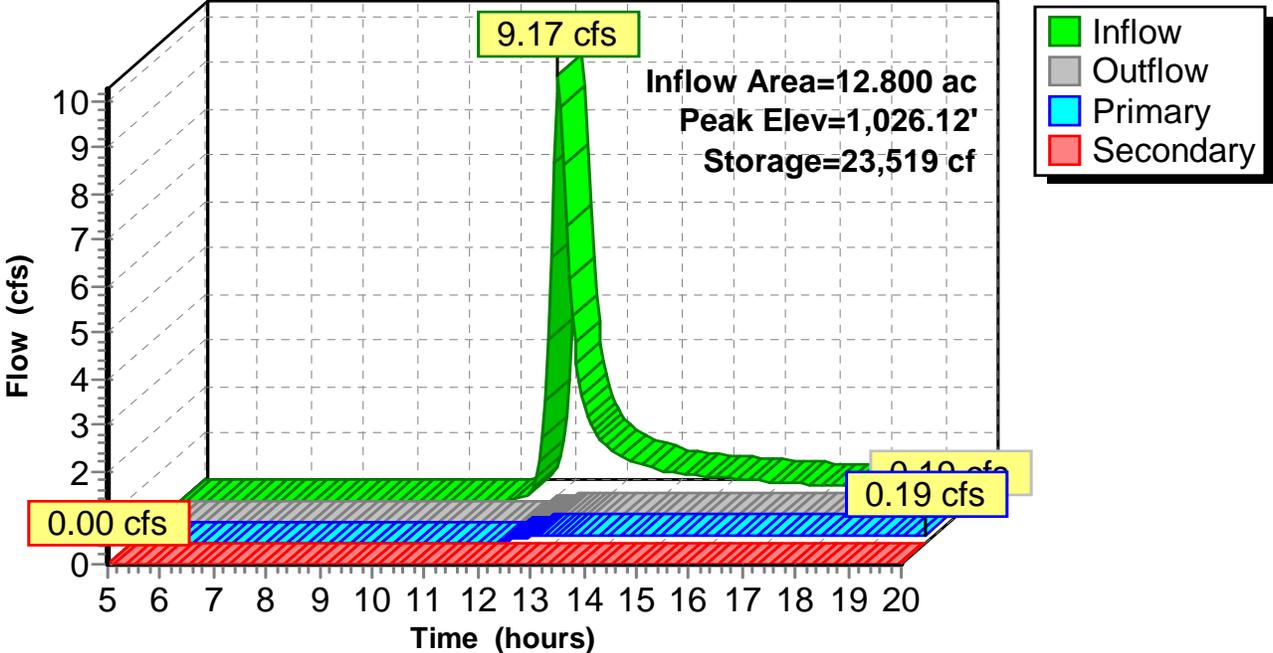
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Type II 24-hr 1-yr Rainfall=2.20"  
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Page 2

Pond 7P: RETENTION BASIN

Hydrograph



**161606-swm**

Type II 24-hr 2-yr Rainfall=2.63"

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Page 3

**Summary for Pond 7P: RETENTION BASIN**

Inflow Area = 12.800 ac, 26.87% Impervious, Inflow Depth > 0.88" for 2-yr event  
 Inflow = 13.46 cfs @ 12.14 hrs, Volume= 0.944 af  
 Outflow = 0.29 cfs @ 20.00 hrs, Volume= 0.152 af, Atten= 98%, Lag= 471.7 min  
 Primary = 0.29 cfs @ 20.00 hrs, Volume= 0.152 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 1,026.58' @ 20.00 hrs Surf.Area= 24,465 sf Storage= 34,462 cf

Plug-Flow detention time= 267.4 min calculated for 0.152 af (16% of inflow)  
 Center-of-Mass det. time= 167.6 min ( 980.7 - 813.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	1,025.00'	120,828 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,025.00	19,195	0	0
1,026.00	22,493	20,844	20,844
1,027.00	25,893	24,193	45,037
1,028.00	29,392	27,643	72,680
1,029.00	32,993	31,193	103,872
1,029.50	34,830	16,956	120,828

Device	Routing	Invert	Outlet Devices
#1	Primary	1,024.75'	<b>15.0" Round Culvert</b> L= 153.0' Ke= 0.200 Inlet / Outlet Invert= 1,024.75' / 1,023.85' S= 0.0059 ' / Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	1,025.00'	<b>2.7" Vert. Orifice/Grate</b> C= 0.600
#3	Device 1	1,026.50'	<b>9.0" W x 4.0" H Vert. Orifice/Grate</b> C= 0.600
#4	Device 1	1,028.10'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#5	Secondary	1,028.50'	<b>20.0' long x 12.0' breadth Broad-Crested Rectangular Weir</b> 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=0.29 cfs @ 20.00 hrs HW=1,026.58' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.29 cfs of 5.82 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.23 cfs @ 5.83 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.05 cfs @ 0.91 fps)
- ↑ **4=Orifice/Grate** ( Controls 0.00 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=1,025.00' (Free Discharge)

- ↑ **5=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

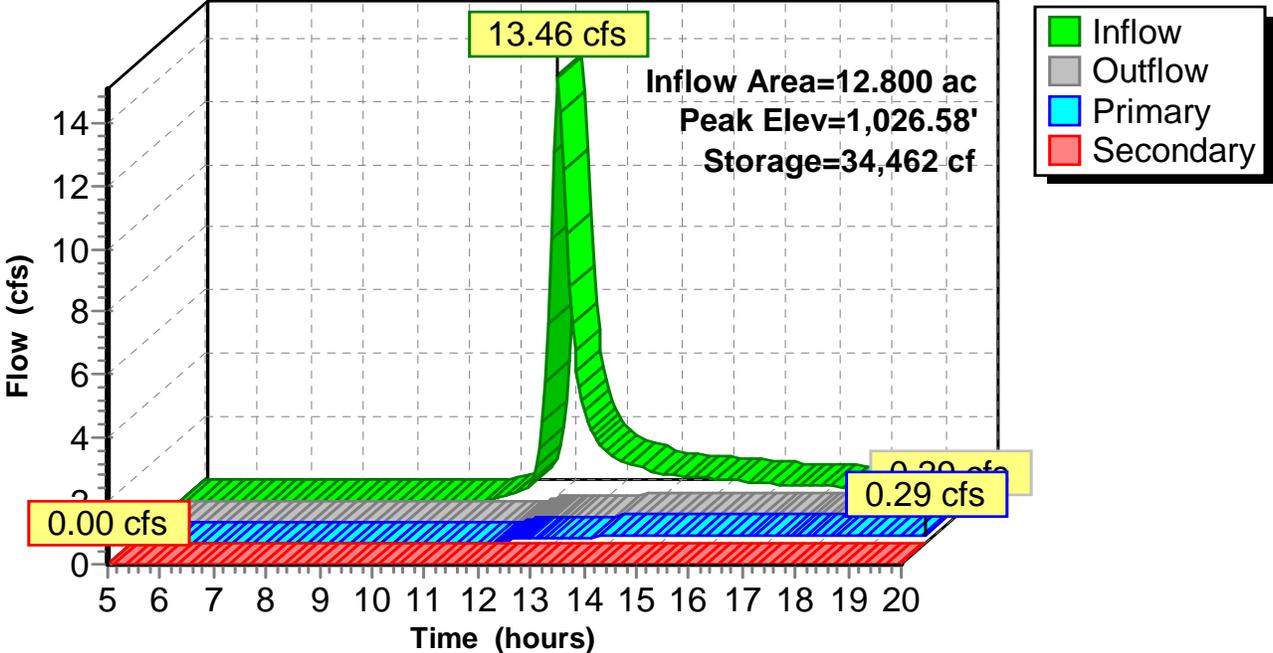
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Pond 7P: RETENTION BASIN

Hydrograph



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Type II 24-hr 5-yr Rainfall=3.24"

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**Summary for Pond 7P: RETENTION BASIN**

Inflow Area = 12.800 ac, 26.87% Impervious, Inflow Depth > 1.30" for 5-yr event  
 Inflow = 20.07 cfs @ 12.13 hrs, Volume= 1.391 af  
 Outflow = 0.84 cfs @ 15.66 hrs, Volume= 0.470 af, Atten= 96%, Lag= 211.4 min  
 Primary = 0.84 cfs @ 15.66 hrs, Volume= 0.470 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 1,026.91' @ 15.66 hrs Surf.Area= 25,594 sf Storage= 42,775 cf

Plug-Flow detention time= 261.2 min calculated for 0.470 af (34% of inflow)  
 Center-of-Mass det. time= 172.6 min ( 977.6 - 805.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	1,025.00'	120,828 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,025.00	19,195	0	0
1,026.00	22,493	20,844	20,844
1,027.00	25,893	24,193	45,037
1,028.00	29,392	27,643	72,680
1,029.00	32,993	31,193	103,872
1,029.50	34,830	16,956	120,828

Device	Routing	Invert	Outlet Devices
#1	Primary	1,024.75'	<b>15.0" Round Culvert</b> L= 153.0' Ke= 0.200 Inlet / Outlet Invert= 1,024.75' / 1,023.85' S= 0.0059 ' / Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	1,025.00'	<b>2.7" Vert. Orifice/Grate</b> C= 0.600
#3	Device 1	1,026.50'	<b>9.0" W x 4.0" H Vert. Orifice/Grate</b> C= 0.600
#4	Device 1	1,028.10'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#5	Secondary	1,028.50'	<b>20.0' long x 12.0' breadth Broad-Crested Rectangular Weir</b> 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=0.84 cfs @ 15.66 hrs HW=1,026.91' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.84 cfs of 6.44 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.26 cfs @ 6.46 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.58 cfs @ 2.33 fps)
- ↑ **4=Orifice/Grate** ( Controls 0.00 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=1,025.00' (Free Discharge)

- ↑ **5=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

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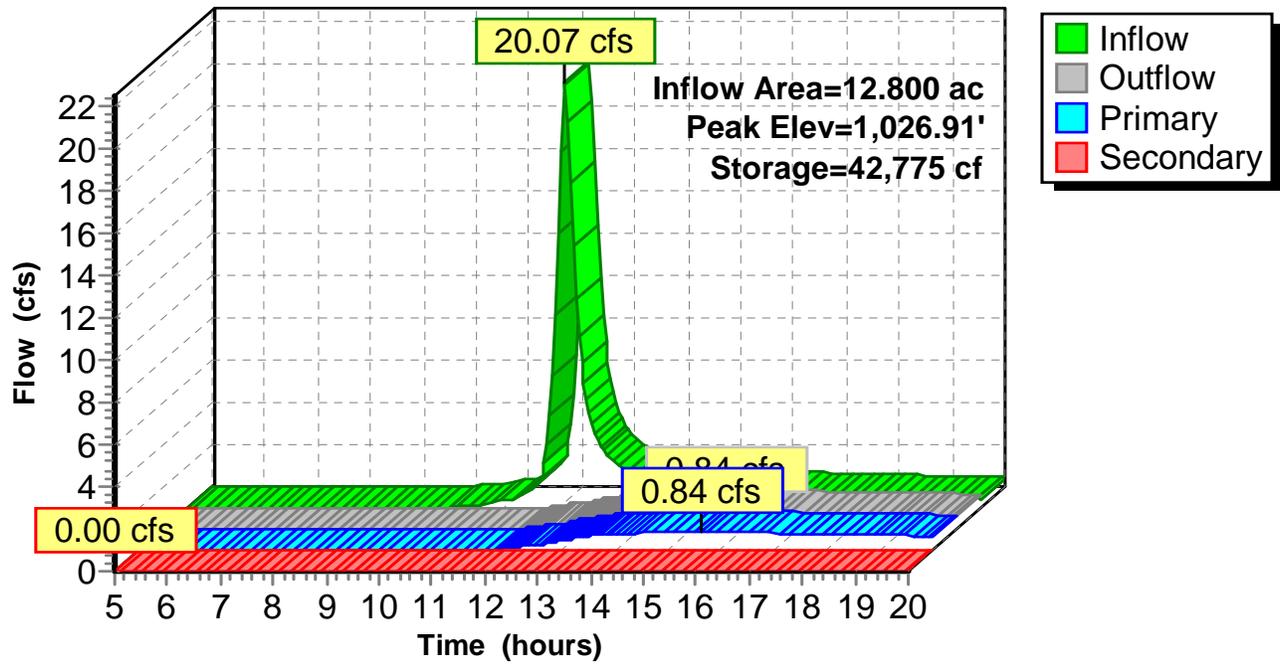
Type II 24-hr 5-yr Rainfall=3.24"

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Pond 7P: RETENTION BASIN

Hydrograph



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Type II 24-hr 10-yr Rainfall=3.74"

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**Summary for Pond 7P: RETENTION BASIN**

Inflow Area = 12.800 ac, 26.87% Impervious, Inflow Depth > 1.67" for 10-yr event  
 Inflow = 25.79 cfs @ 12.13 hrs, Volume= 1.785 af  
 Outflow = 1.22 cfs @ 14.87 hrs, Volume= 0.727 af, Atten= 95%, Lag= 164.3 min  
 Primary = 1.22 cfs @ 14.87 hrs, Volume= 0.727 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 1,027.28' @ 14.87 hrs Surf.Area= 26,863 sf Storage= 52,351 cf

Plug-Flow detention time= 250.2 min calculated for 0.727 af (41% of inflow)  
 Center-of-Mass det. time= 165.8 min ( 965.8 - 799.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	1,025.00'	120,828 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,025.00	19,195	0	0
1,026.00	22,493	20,844	20,844
1,027.00	25,893	24,193	45,037
1,028.00	29,392	27,643	72,680
1,029.00	32,993	31,193	103,872
1,029.50	34,830	16,956	120,828

Device	Routing	Invert	Outlet Devices
#1	Primary	1,024.75'	<b>15.0" Round Culvert</b> L= 153.0' Ke= 0.200 Inlet / Outlet Invert= 1,024.75' / 1,023.85' S= 0.0059 ' / Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	1,025.00'	<b>2.7" Vert. Orifice/Grate</b> C= 0.600
#3	Device 1	1,026.50'	<b>9.0" W x 4.0" H Vert. Orifice/Grate</b> C= 0.600
#4	Device 1	1,028.10'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#5	Secondary	1,028.50'	<b>20.0' long x 12.0' breadth Broad-Crested Rectangular Weir</b> 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=1.22 cfs @ 14.87 hrs HW=1,027.28' (Free Discharge)

- ↑ **1=Culvert** (Passes 1.22 cfs of 7.06 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.28 cfs @ 7.08 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.94 cfs @ 3.75 fps)
- ↑ **4=Orifice/Grate** ( Controls 0.00 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=1,025.00' (Free Discharge)

- ↑ **5=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

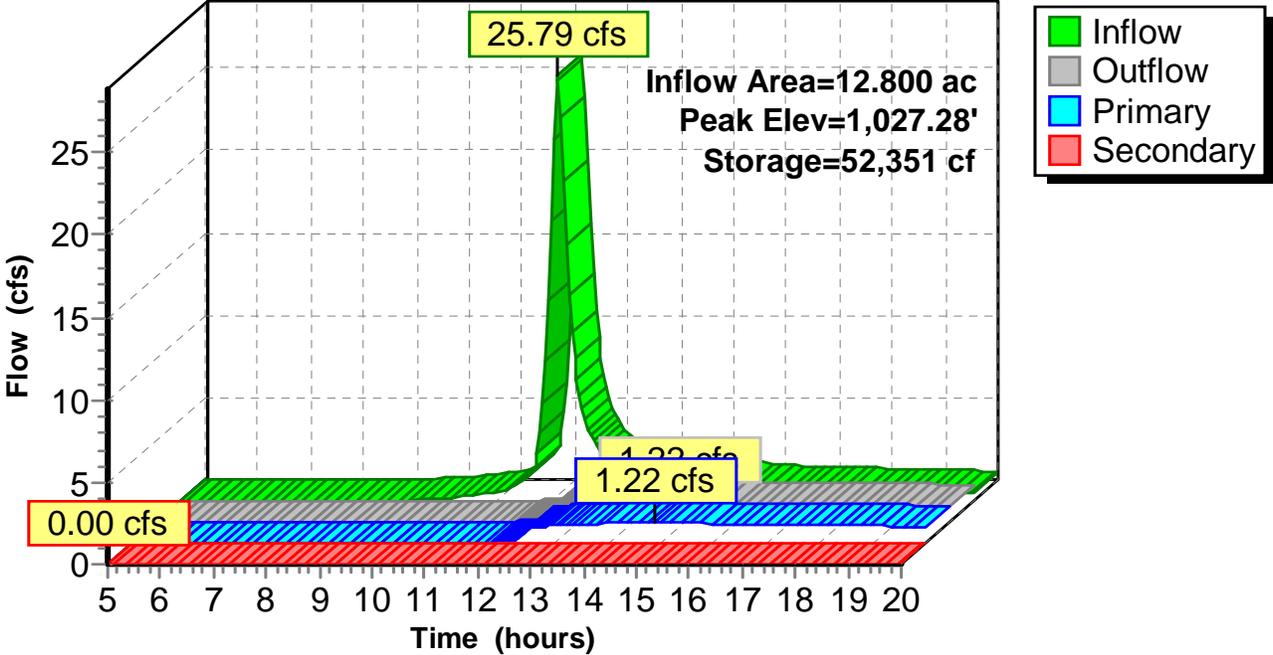
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Pond 7P: RETENTION BASIN

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Type II 24-hr 25-yr Rainfall=4.44"

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**Summary for Pond 7P: RETENTION BASIN**

Inflow Area = 12.800 ac, 26.87% Impervious, Inflow Depth > 2.22" for 25-yr event  
 Inflow = 34.10 cfs @ 12.13 hrs, Volume= 2.364 af  
 Outflow = 1.64 cfs @ 14.53 hrs, Volume= 1.013 af, Atten= 95%, Lag= 144.3 min  
 Primary = 1.64 cfs @ 14.53 hrs, Volume= 1.013 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 1,027.88' @ 14.53 hrs Surf.Area= 28,968 sf Storage= 69,142 cf

Plug-Flow detention time= 249.5 min calculated for 1.010 af (43% of inflow)  
 Center-of-Mass det. time= 167.8 min ( 961.8 - 794.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	1,025.00'	120,828 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,025.00	19,195	0	0
1,026.00	22,493	20,844	20,844
1,027.00	25,893	24,193	45,037
1,028.00	29,392	27,643	72,680
1,029.00	32,993	31,193	103,872
1,029.50	34,830	16,956	120,828

Device	Routing	Invert	Outlet Devices
#1	Primary	1,024.75'	<b>15.0" Round Culvert</b> L= 153.0' Ke= 0.200 Inlet / Outlet Invert= 1,024.75' / 1,023.85' S= 0.0059 ' / Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	1,025.00'	<b>2.7" Vert. Orifice/Grate</b> C= 0.600
#3	Device 1	1,026.50'	<b>9.0" W x 4.0" H Vert. Orifice/Grate</b> C= 0.600
#4	Device 1	1,028.10'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#5	Secondary	1,028.50'	<b>20.0' long x 12.0' breadth Broad-Crested Rectangular Weir</b> 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=1.64 cfs @ 14.53 hrs HW=1,027.88' (Free Discharge)

- ↑ **1=Culvert** (Passes 1.64 cfs of 7.97 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.32 cfs @ 8.01 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 1.32 cfs @ 5.30 fps)
- ↑ **4=Orifice/Grate** ( Controls 0.00 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=1,025.00' (Free Discharge)

- ↑ **5=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

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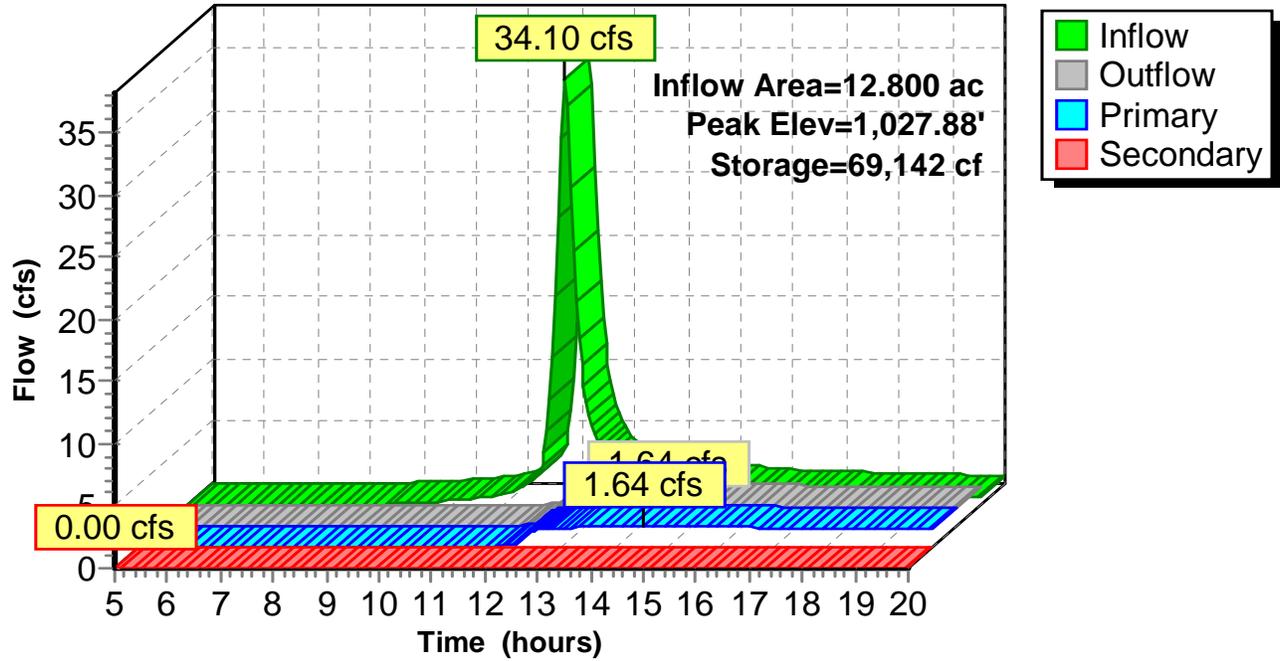
Type II 24-hr 25-yr Rainfall=4.44"

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### Pond 7P: RETENTION BASIN

#### Hydrograph



**161606-swm**

Type II 24-hr 50-yr Rainfall=5.02"

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**Summary for Pond 7P: RETENTION BASIN**

Inflow Area = 12.800 ac, 26.87% Impervious, Inflow Depth > 2.68" for 50-yr event  
 Inflow = 41.16 cfs @ 12.13 hrs, Volume= 2.863 af  
 Outflow = 3.27 cfs @ 13.34 hrs, Volume= 1.338 af, Atten= 92%, Lag= 72.5 min  
 Primary = 3.27 cfs @ 13.34 hrs, Volume= 1.338 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 1,028.24' @ 13.34 hrs Surf.Area= 30,267 sf Storage= 79,928 cf

Plug-Flow detention time= 228.8 min calculated for 1.334 af (47% of inflow)  
 Center-of-Mass det. time= 149.5 min ( 939.4 - 789.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	1,025.00'	120,828 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,025.00	19,195	0	0
1,026.00	22,493	20,844	20,844
1,027.00	25,893	24,193	45,037
1,028.00	29,392	27,643	72,680
1,029.00	32,993	31,193	103,872
1,029.50	34,830	16,956	120,828

Device	Routing	Invert	Outlet Devices
#1	Primary	1,024.75'	<b>15.0" Round Culvert</b> L= 153.0' Ke= 0.200 Inlet / Outlet Invert= 1,024.75' / 1,023.85' S= 0.0059 ' / Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	1,025.00'	<b>2.7" Vert. Orifice/Grate</b> C= 0.600
#3	Device 1	1,026.50'	<b>9.0" W x 4.0" H Vert. Orifice/Grate</b> C= 0.600
#4	Device 1	1,028.10'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#5	Secondary	1,028.50'	<b>20.0' long x 12.0' breadth Broad-Crested Rectangular Weir</b> 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=3.26 cfs @ 13.34 hrs HW=1,028.24' (Free Discharge)

- ↑ **1=Culvert** (Passes 3.26 cfs of 8.48 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.34 cfs @ 8.52 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 1.51 cfs @ 6.04 fps)
- ↑ **4=Orifice/Grate** (Weir Controls 1.41 cfs @ 1.24 fps)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=1,025.00' (Free Discharge)

- ↑ **5=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

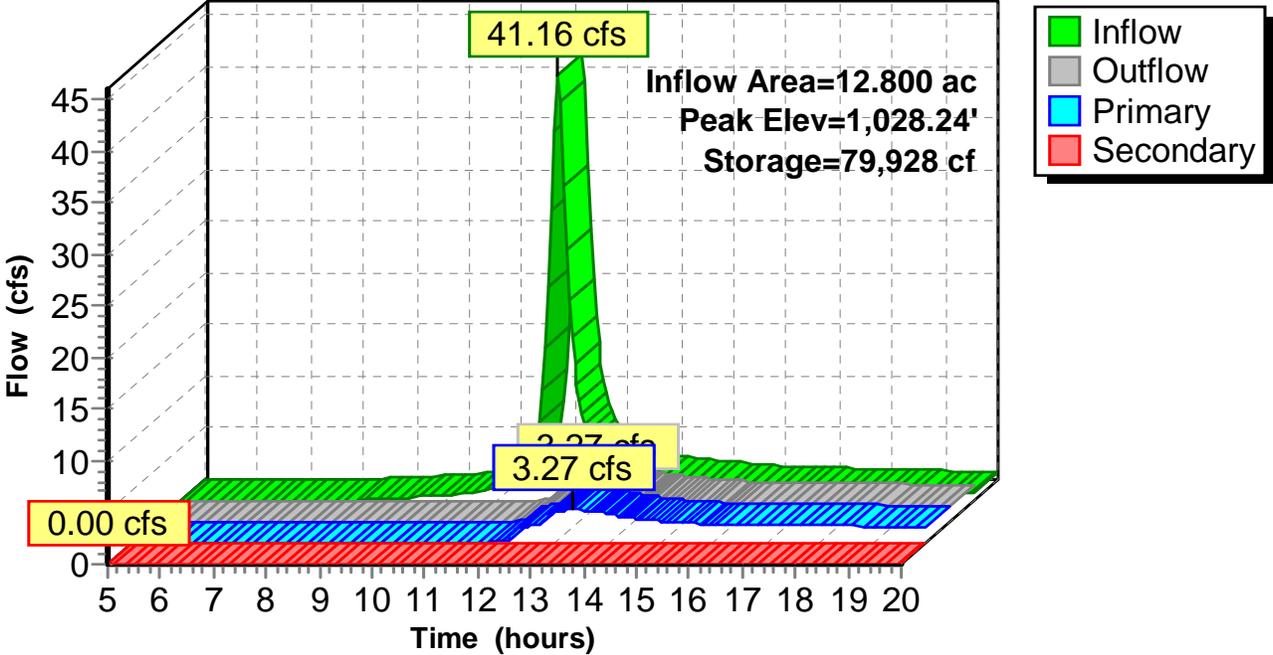
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Type II 24-hr 50-yr Rainfall=5.02"  
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**Pond 7P: RETENTION BASIN**

**Hydrograph**



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Type II 24-hr 100-yr Rainfall=5.63"

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**Summary for Pond 7P: RETENTION BASIN**

Inflow Area = 12.800 ac, 26.87% Impervious, Inflow Depth > 3.19" for 100-yr event  
 Inflow = 48.79 cfs @ 12.12 hrs, Volume= 3.403 af  
 Outflow = 7.81 cfs @ 12.70 hrs, Volume= 1.822 af, Atten= 84%, Lag= 34.6 min  
 Primary = 7.81 cfs @ 12.70 hrs, Volume= 1.822 af  
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 1,028.47' @ 12.70 hrs Surf.Area= 31,078 sf Storage= 86,833 cf

Plug-Flow detention time= 191.6 min calculated for 1.822 af (54% of inflow)  
 Center-of-Mass det. time= 115.6 min ( 901.6 - 786.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	1,025.00'	120,828 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,025.00	19,195	0	0
1,026.00	22,493	20,844	20,844
1,027.00	25,893	24,193	45,037
1,028.00	29,392	27,643	72,680
1,029.00	32,993	31,193	103,872
1,029.50	34,830	16,956	120,828

Device	Routing	Invert	Outlet Devices
#1	Primary	1,024.75'	<b>15.0" Round Culvert</b> L= 153.0' Ke= 0.200 Inlet / Outlet Invert= 1,024.75' / 1,023.85' S= 0.0059 ' / Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#2	Device 1	1,025.00'	<b>2.7" Vert. Orifice/Grate</b> C= 0.600
#3	Device 1	1,026.50'	<b>9.0" W x 4.0" H Vert. Orifice/Grate</b> C= 0.600
#4	Device 1	1,028.10'	<b>24.0" x 24.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#5	Secondary	1,028.50'	<b>20.0' long x 12.0' breadth Broad-Crested Rectangular Weir</b> 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=7.81 cfs @ 12.70 hrs HW=1,028.47' (Free Discharge)

- ↑ 1=Culvert (Passes 7.81 cfs of 8.78 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 0.35 cfs @ 8.82 fps)
- ↑ 3=Orifice/Grate (Orifice Controls 1.62 cfs @ 6.46 fps)
- ↑ 4=Orifice/Grate (Weir Controls 5.84 cfs @ 1.98 fps)

**Secondary OutFlow** Max=0.00 cfs @ 5.00 hrs HW=1,025.00' (Free Discharge)

- ↑ 5=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

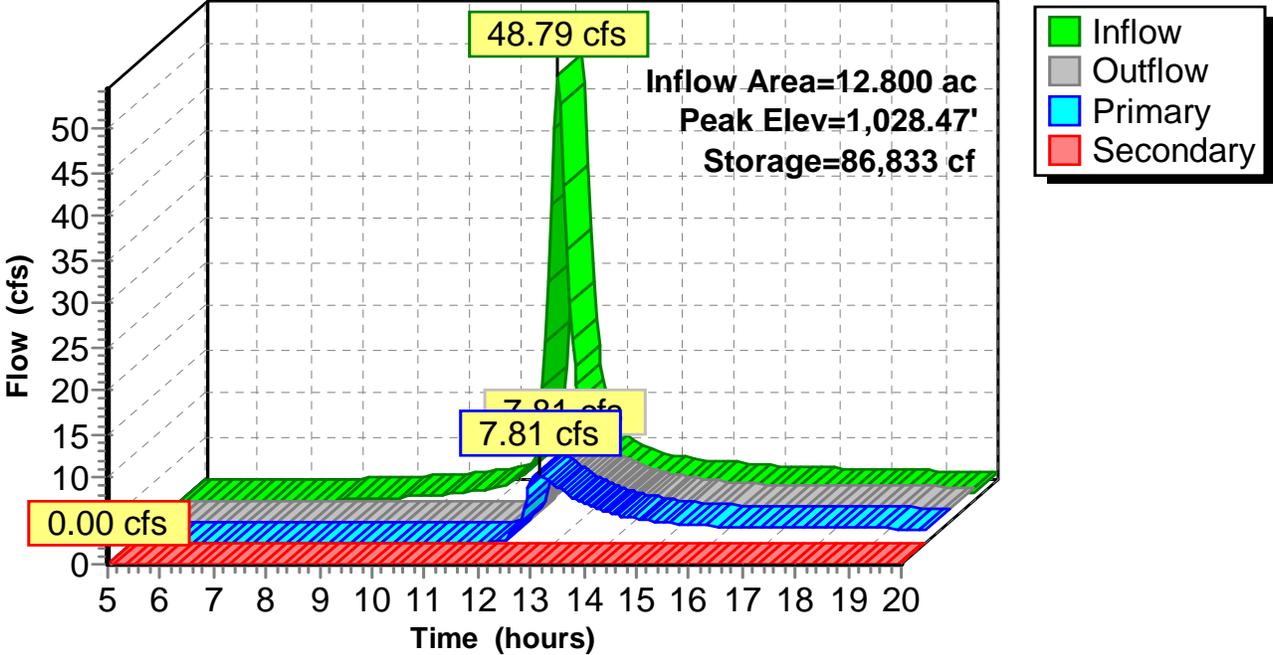
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Type II 24-hr 100-yr Rainfall=5.63"  
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Pond 7P: RETENTION BASIN

Hydrograph



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**APPENDIX F**

**SEDIMENT BASIN CALCULATIONS**

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## Sediment Basin Calculations

Design By: MDG  
Checked By: BAB

Paddock Reserve (CEC 161-606)  
1/16/2017

Drainage Area= 12.80 Acres

Disturbed Area= 12.80 Acres

Required Dewatering Zone= 23,040 CF  
(1,800 CF / Drainage Area)

Required Sediment Zone= 12,800 CF  
(1,000 CF / Disturbed Area)

### Basin Storage

Elevation (FT)	Area (FT <sup>2</sup> )	Incremental Volume (CF)	Cumulative Volume (CF)
1,021.00	7,357	0	0
1,022.00	10,011	8,684	8,684
1,023.00	12,904	11,457	20,141
1,024.00	15,997	14,450	34,592
1,025.00	19,195	17,596	52,188
1,026.00	22,493	20,844	73,032
1,026.50	24,181	11,668	84,700
1,027.00	25,893	12,518	97,219
1,028.00	29,392	27,643	124,861
1,029.00	32,993	31,193	156,054
1,029.50	34,830	16,956	173,010

Sediment Storage Zone= 1,021.00 to 1,025.00 = 52,188 CF -Provided

Dewatering Zone= 1,025.00 to 1,026.50 = 32,513 CF -Provided

Spillway Zone= 1,028.50 to 1,029.50

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**APPENDIX G**

**STORM SEWER CALCULATIONS**

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SHEET: 1 OF 8

JOB #: 161-606

PROJECT: Paddock Reserve

BY: MDG

CHECKED: BAB

DATE: 1/14/2017



*Civil & Environmental Consultants, Inc.*

STORM SEWER DESIGN

RP/CC:

STRUCTURES		DRAINAGE AREA (acres)				TIME (min)		5 YEAR STORM - SEWER DATA											
NUM	TYPE	STATION	Δ AREA	Σ AREA	C	Δ CA	Σ CA	Δ t	Σ t	I (in/hr)	Q (cfs)	LENGTH (ft)	SLOPE %	DIA (in)	V (fps)	CAP (cfs)	INVERT IN	INVERT OUT	T.C.
B	HW	134.81	1.92	1.92	0.56	1.08	1.08	0.05	5.00	6.07	6.53	43.47	4.00	24	14.4	45.4	1028.00		1030.50
2	CB	91.34	0.96	2.88	0.56	0.54	1.61	0.17	5.05	6.04	9.75	52.00	0.50	24	5.1	16.0	1026.16	1026.26	1030.75
1	CB	39.34	0.80	3.68	0.56	0.45	2.06	0.13	5.22	6.02	12.40	39.34	0.50	24	5.1	16.0	1025.80	1025.90	1030.75
A	HW	0.00	0.00	3.68	0.56	0.00	2.06		5.35	5.99								1025.60	1029.50

SHEET: 2 OF 8  
 JOB #: 161-606  
 PROJECT: Padlock Reserve

BY: MDG  
 CHECKED: BAB  
 DATE: 1/14/2017



*Civil & Environmental Consultants, Inc.*

STRUCTURE		TOTAL		STORM SEWER CHECK										10 YEAR STORM SEWER CHECK		RP/CC:	
LOC	STATION	Σ CA	TIME	Q (cfs)	LENGTH (ft)	DIA (in)	SLOPE %	Sf %	Sf L (ft)	TW or 0.8 D	HW ELEV	CRIT ELEV	REMARKS				
B	134.81	1.08	5.00	7.37	43.47	24	4.00	0.11	0.05	1028.32	1029.60	1030.50	OK				
2	91.34	1.61	5.05	11.00	52.00	24	0.50	0.24	0.12	1028.28	1027.76	1030.75	OK				
1	39.34	2.06	5.22	13.99	39.34	24	0.50	0.38	0.15	1028.15	1027.40	1030.75	OK				
A	0.00	2.06	5.35							1028.00	1027.20	1029.50	OK				

SHEET: 3 OF 8

JOB #: 161-606

PROJECT: Paddock Reserve

BY: MDG

CHECKED: BAB

DATE: 1/14/2017



*Civil & Environmental Consultants, Inc.*

STORM SEWER DESIGN RP/CC:

STRUCTURES		DRAINAGE AREA (acres)				TIME (min)		5 YEAR STORM - SEWER DATA											
NUM	TYPE	STATION	Δ AREA	Σ AREA	Δ CA	Σ CA	Δ t	Σ t	I (in/hr)	Q (cfs)	LENGTH (ft)	SLOPE %	DIA (in)	V (fps)	CAP (cfs)	INVERT IN	INVERT OUT	T.C.	
4	CB	186.30	0.18	0.18	0.10	0.10	0.28	5.00	6.07	0.61	52.00	0.45	12	3.1	2.4	1024.91		1027.41	
3	CB	134.30	0.12	0.30	0.07	0.17	0.69	5.28	5.99	1.01	134.30	0.30	18	3.3	5.8	1024.58	1024.68	1027.41	
C	HW	0.00	0.00	0.30	0.00	0.17		5.97	5.80								1024.17		1029.00

SHEET: 4 OF 8  
 JOB #: 161-606  
 PROJECT: Padlock Reserve

BY: MDG  
 CHECKED: BAB  
 DATE: 1/14/2017



*Civil & Environmental Consultants, Inc.*

STRUCTURE		TOTAL		STORM SEWER CHECK										RP/CC:	
LOC	STATION	Σ CA	TIME	SEWER DATA			10 YEAR STORM SEWER CHECK							CRIT ELEV	REMARKS
				Q (cfs)	LENGTH (ft)	DIA (in)	SLOPE %	Sf %	Sf L (ft)	TW or 0.8 D	HW ELEV	CRIT ELEV	REMARKS		
4	186.30	0.10	5.00							1026.61	1025.71	1027.41	OK		
3	134.30	0.17	5.28	0.69	52.00	12	0.45	0.04	0.02	1026.59	1025.78	1027.41	OK		
C	0.00	0.17	5.97	1.14	134.30	18	0.30	0.01	0.02	1026.57	1025.37	1029.00	OK		

SHEET: 5 OF 8

JOB #: 161-606

PROJECT: Paddock Reserve

BY: MDG

CHECKED: BAB

DATE: 1/14/2017



*Civil & Environmental Consultants, Inc.*

STORM SEWER DESIGN

RP/CC:

STRUCTURES		DRAINAGE AREA (acres)					TIME (min)		5 YEAR STORM - SEWER DATA										
NUM	TYPE	STATION	Δ AREA	Σ AREA	C	Δ CA	Σ CA	Δ t	Σ t	I (in/hr)	Q (cfs)	LENGTH (ft)	SLOPE %	DIA (in)	V (fps)	CAP (cfs)	INVERT IN	INVERT OUT	T.C.
9	CB	814.87	0.68	0.68	0.56	0.38	0.38	1.08	5.00	6.07	2.31	247.42	0.70	12	3.8	3.0	1035.81		1039.31
8	CB	567.45	0.82	1.50	0.56	0.46	0.84	0.73	6.08	5.77	4.85	178.44	0.60	15	4.1	5.0	1033.83	1034.08	1037.58
7	CB	389.01	0.48	1.98	0.56	0.27	1.11	0.26	6.81	5.58	6.19	79.11	0.95	15	5.1	6.3	1032.66	1032.76	1037.91
6	CB	309.90	0.73	2.71	0.56	0.41	1.52	0.32	7.07	5.50	8.35	159.03	2.40	15	8.2	10.0	1031.81	1031.91	1036.86
5	CB	150.87	0.68	7.47	0.56	2.67	4.18	0.35	7.39	5.42	22.68	150.87	1.00	24	7.2	22.7	1027.24	1027.99	1031.96
D	HW	0.00	0.00	7.47	0.56	0.00	4.18	7.74	7.74	5.34								1025.73	1029.00

SHEET: 4 OF 8  
 JOB #: 161-606  
 PROJECT: Padlock Reserve

BY: MDG  
 CHECKED: BAB  
 DATE: 1/14/2017



*Civil & Environmental Consultants, Inc.*

STRUCTURE		TOTAL		STORM SEWER CHECK										RP/CC:
LOC	STATION	Σ CA	TIME	SEWER DATA			10 YEAR STORM SEWER CHECK							
				Q (cfs)	LENGTH (ft)	DIA (in)	SLOPE %	Sf %	Sf L (ft)	TW or 0.8 D	HW ELEV	CRIT ELEV	REMARKS	
4	186.30	0.10	5.00							1026.61	1025.71	1026.61	1027.41	OK
3	134.30	0.17	5.28	0.69	52.00	12	0.45	0.04	0.02	1026.59	1025.78	1026.59	1027.41	OK
C	0.00	0.17	5.97	1.14	134.30	18	0.30	0.01	0.02	1026.57	1025.37	1026.57	1029.00	OK

SHEET: 5 OF 8

JOB #: 161-606

PROJECT: Paddock Reserve

BY: MDG

CHECKED: BAB

DATE: 1/14/2017



*Civil & Environmental Consultants, Inc.*

STORM SEWER DESIGN

RP/CC:

STRUCTURES		DRAINAGE AREA (acres)					TIME (min)		5 YEAR STORM - SEWER DATA										
NUM	TYPE	STATION	Δ AREA	Σ AREA	C	Δ CA	Σ CA	Δ t	Σ t	I (in/hr)	Q (cfs)	LENGTH (ft)	SLOPE %	DIA (in)	V (fps)	CAP (cfs)	INVERT IN	INVERT OUT	T.C.
9	CB	814.87	0.68	0.68	0.56	0.38	0.38	1.08	5.00	6.07	2.31	247.42	0.70	12	3.8	3.0	1035.81		1039.31
8	CB	567.45	0.82	1.50	0.56	0.46	0.84	0.73	6.08	5.77	4.85	178.44	0.60	15	4.1	5.0	1033.83	1034.08	1037.58
7	CB	389.01	0.48	1.98	0.56	0.27	1.11	0.26	6.81	5.58	6.19	79.11	0.95	15	5.1	6.3	1032.66	1032.76	1037.91
6	CB	309.90	0.73	2.71	0.56	0.41	1.52	0.32	7.07	5.50	8.35	159.03	2.40	15	8.2	10.0	1031.81	1031.91	1036.86
5	CB	150.87	0.68	7.47	0.56	2.67	4.18	0.35	7.39	5.42	22.68	150.87	1.00	24	7.2	22.7	1027.24	1027.99	1031.96
D	HW	0.00	0.00	7.47	0.56	0.00	4.18	7.74	7.74	5.34								1025.73	1029.00

SHEET: 6 OF 8

JOB #: 161-606

PROJECT: Padlock Reserve

BY: MDG

CHECKED: BAB

DATE: 1/14/2017



*Civil & Environmental Consultants, Inc.*

STORM SEWER CHECK

RP/CC:

STRUCTURE		TOTAL		SEWER DATA			10 YEAR STORM SEWER CHECK					REMARKS	
LOC	STATION	Σ CA	TIME	Q (cfs)	LENGTH (ft)	DIA (in)	SLOPE %	Sf %	Sf L (ft)	TW or 0.8 D	HW ELEV	CRIT ELEV	
9	814.87	0.38	5.00		247.42	12	0.70	0.54	1.33	1036.94	1036.61	1039.31	OK
8	567.45	0.84	6.08							1035.61	1034.83	1037.58	OK
7	389.01	1.11	6.81		178.44	15	0.60	0.72	1.28	1034.33	1033.66	1037.91	OK
					79.11	15	0.95	1.16	0.92				
6	309.90	1.52	7.07		159.03	15	2.40	2.12	3.36	1033.41	1032.81	1036.86	OK
5	150.87	4.18	7.39							1030.05	1028.84	1031.96	OK
D	0.00	4.18	7.74	25.52	150.87	24	1.00	1.27	1.92	1028.13	1027.33	1029.00	OK

SHEET: 7 OF 8

JOB #: 161-606

PROJECT: Paddock Reserve

BY: MDG

CHECKED: BAB

DATE: 1/14/2017



**Civil & Environmental Consultants, Inc.**

**STORM SEWER DESIGN**

RP/CC:

STRUCTURES		DRAINAGE AREA (acres)					TIME (min)		5 YEAR STORM - SEWER DATA										
NUM	TYPE	STATION	Δ AREA	Σ AREA	C	Δ CA	Σ CA	Δ t	Σ t	I (in/hr)	Q (cfs)	LENGTH (ft)	SLOPE %	DIA (in)	V (fps)	CAP (cfs)	INVERT IN	INVERT OUT	T.C.
13	CB	662.85	1.07	1.07	0.56	0.60	0.60	0.19	5.00	6.07	3.64	52.00	1.05	12	4.7	3.7	1037.82		1041.32
12	CB	610.85	1.18	2.25	0.56	0.66	1.26	0.26	5.19	6.02	7.58	97.33	1.40	15	6.2	7.7	1037.02	1037.27	1041.32
11	CB	513.52	0.76	3.01	0.56	0.43	1.69	0.27	5.45	5.96	10.05	134.87	2.45	15	8.3	10.1	1035.56	1035.66	1042.50
10	CB	378.65	1.07	4.08	0.56	0.60	2.28	0.83	5.72	5.88	13.44	378.65	1.10	24	7.6	23.8	1031.51	1032.26	1038.10
5	CB	0.00	0.00	4.08	0.56	0.00	2.28		6.55	5.64								1027.34	1031.96

SHEET: 6 OF 8

JOB #: 161-606

PROJECT: Padlock Reserve

BY: MDG

CHECKED: BAB

DATE: 1/14/2017



*Civil & Environmental Consultants, Inc.*

STORM SEWER CHECK

RP/CC:

STRUCTURE		TOTAL		SEWER DATA			10 YEAR STORM SEWER CHECK					REMARKS	
LOC	STATION	Σ CA	TIME	Q (cfs)	LENGTH (ft)	DIA (in)	SLOPE %	Sf %	Sf L (ft)	TW or 0.8 D	HW ELEV	CRIT ELEV	
9	814.87	0.38	5.00		247.42	12	0.70	0.54	1.33	1036.94	1036.61	1039.31	OK
8	567.45	0.84	6.08							1035.61	1034.83	1037.58	OK
7	389.01	1.11	6.81		178.44	15	0.60	0.72	1.28	1034.33	1033.66	1037.91	OK
6	309.90	1.52	7.07		79.11	15	0.95	1.16	0.92				
5	150.87	4.18	7.39		159.03	15	2.40	2.12	3.36	1033.41	1032.81	1036.86	OK
D	0.00	4.18	7.74	25.52	150.87	24	1.00	1.27	1.92	1030.05	1028.84	1031.96	OK
										1028.13	1027.33	1029.00	OK

SHEET: 7 OF 8

JOB #: 161-606

PROJECT: Paddock Reserve

BY: MDG

CHECKED: BAB

DATE: 1/14/2017



**Civil & Environmental Consultants, Inc.**

**STORM SEWER DESIGN**

RP/CC:

STRUCTURES			DRAINAGE AREA (acres)					TIME (min)		5 YEAR STORM - SEWER DATA									
NUM	TYPE	STATION	Δ AREA	Σ AREA	C	Δ CA	Σ CA	Δ t	Σ t	I (in/hr)	Q (cfs)	LENGTH (ft)	SLOPE %	DIA (in)	V (fps)	CAP (cfs)	INVERT IN	INVERT OUT	T.C.
13	CB	662.85	1.07	1.07	0.56	0.60	0.60	0.19	5.00	6.07	3.64	52.00	1.05	12	4.7	3.7	1037.82		1041.32
12	CB	610.85	1.18	2.25	0.56	0.66	1.26	0.26	5.19	6.02	7.58	97.33	1.40	15	6.2	7.7	1037.02	1037.27	1041.32
11	CB	513.52	0.76	3.01	0.56	0.43	1.69	0.27	5.45	5.96	10.05	134.87	2.45	15	8.3	10.1	1035.56	1035.66	1042.50
10	CB	378.65	1.07	4.08	0.56	0.60	2.28	0.83	5.72	5.88	13.44	378.65	1.10	24	7.6	23.8	1031.51	1032.26	1038.10
5	CB	0.00	0.00	4.08	0.56	0.00	2.28		6.55	5.64								1027.34	1031.96

SHEET: 8 OF 8

JOB #: 161-606

PROJECT: Padlock Reserve

BY: MDG  
 CHECKED: BAB  
 DATE: 1/14/2017



*Civil & Environmental Consultants, Inc.*

STORM SEWER CHECK

RP/CC:

STRUCTURE	STATION	TOTAL		SEWER DATA			10 YEAR STORM SEWER CHECK					REMARKS		
		Σ CA	TIME	Q (cfs)	LENGTH (ft)	DIA (in)	SLOPE %	Sf %	Sf L (ft)	TW or 0.8 D	HW ELEV		CRIT ELEV	
13	662.85	0.60	5.00	4.11	52.00	12	1.05	1.33	0.69	1039.65	1038.62	1039.65	1041.32	OK
12	610.85	1.26	5.19	8.55	97.33	15	1.40	1.75	1.71	1038.96	1038.02	1038.96	1041.32	OK
11	513.52	1.69	5.45	11.34	134.87	15	2.45	3.08	4.15	1037.26	1036.56	1037.26	1042.50	OK
10	378.65	2.28	5.72	15.15	378.65	24	1.10	0.45	1.70	1031.44	1033.11	1033.11	1038.10	OK
5	0.00	2.28	6.55							1029.74	1028.94	1029.74	1031.96	OK

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**APPENDIX H**

**PRE & POST-DEVELOPED DRAINAGE MAPS**

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January 10, 2017

Mr. Mathew Brown, AICP  
Planning Administrator  
Franklin County Economic Development & Planning Department  
150 South Front Street  
Columbus, Ohio 43215

Subject: Morrison Farms East  
Subdivision case 672-PP

Dear Mr. Brown,

On behalf of our client, Rockford Homes, we are respectfully requesting the extension of the approved preliminary plan for Morrison Farms East. The preliminary plan was approved on April 8, 2015 and will expire on April 8, 2017.

Morrison Farms East is a multiple phased development and therefore we are requesting a two year extension of the preliminary to April 8, 2019. Section two of the development was just constructed and finished this fall.

Please feel free to give me a call if you have any questions.

Sincerely,

A handwritten signature in blue ink, appearing to read "Jeffrey Strung", is written over the word "Sincerely,".

Jeffrey Adam Strung, PLA, ASLA  
Director of Planning and Landscape Architecture



672-PP-E