SOLLI ENGINEERING

May 26, 2020

Inland Wetland Commission
Town of Monroe
7 Fan Hill Road
Monroe, CT 06468
(203) 452-8631

RE: Inland Wetlands Permit Application
Proposed Site Development & Restoration
64 Cambridge Drive, 4 Independence Drive
Monroe, Connecticut 06468
Project Number: 1903601

Dear Commission Members:

On behalf of the Applicants, Astro Land Holdings, LLC and Spacely Land Holdings, LLC, please find enclosed an application for an Inland Wetlands Permit for the proposed site development, restoration & earthwork activities located at 64 Cambridge Drive and 4 Independence Drive in Monroe, Connecticut. This application is also intended to address and correct all alleged violations set forth in your letter to the Applicant(s) dated November 13, 2019. This application and associated materials have been prepared in association with the "Existing Site Conditions Assessment", prepared by Solli Engineering and dated February 26, 2020, in response to IWV-2014-04 (File #845) and IWV-2014-05 (File #846).

The project entails the construction of a 2,360 SF building and associated grading, drainage and utilities in addition to earthwork activities. The project proposes the construction of the building, grading and drainage activities, utility installation, landscaping and mitigation within the upland review area. This application also proposes the creation of 675 square feet of wetland area on 64 Cambridge Drive to restore a portion of the property that was impacted as part of work associated with an approval granted for the neighboring property at 36 Timothy Hill Road.

The upland review area consists of the 100' buffer from existing on-site wetlands as well as the 500' buffer from existing vernal pool areas. The project proposes extensive filling activities to bring the property to a grade that mimics pre-existing drainage patterns, and to provide the existing on-site wetland and vernal pool areas with the appropriate contributing drainage areas.

The proposed grading improvements include approximately 1,304,870 CY of imported material, all of which will conform to the CT DEEP definition of "clean fill" as outlined in the Material Intake Protocol. Excavating and filling activities within the regulated areas, including installation of appropriate planting materials, have been designed to enhance existing and future stormwater areas, as well as existing vernal pools. Total fill anticipated to be placed within regulated areas equates to approximately 1,138,970 CY.

The on-site wetlands and vernal pool areas have been delineated and flagged by William Kenny Associates, LLC and a functions and values report has been included as part of this submission. We have enclosed the requisite copies of supporting documentation, and a check in the amount of $1,745.00 representing the required filing fee.

As the extent and scope of the proposed restoration project will take a considerable amount of time to implement, we respectfully request the Inland Wetlands Commission grant this permit for 10 years, in accordance with provisions established in §8.4.9.C of the Town of Monroe Inland Wetlands and Watercourses Regulations. We look forward to working with you in the processing of this application.

Respectfully,

Solli Engineering, LLC

Kevin Solli, P.E.
Principal

Enclosures:

- Inland Wetlands Application (10)
- Wetland & Vernal Pool Assessment (10)
- 24” x 36” Civil Plan Set (3)
- 18” x 24” Civil Plan Set (7)
- Engineering Report (2)
- Abutting Property Owners (1)
- DEEP Reporting Form (1)
- Bond Form (1)

CC: Denise Halstead
Rick Schultz
Scott Schatzlein
Arnold Karp
Paul Stone
Stuart Rudkin
Stephen Finn, Esq

TOWN OF MONROE
APPLICATION FOR PERMIT
INLAND WETLANDS COMMISSION
7 Fan Hill Road, Monroe, CT 06468
Tel. (203)452-2809

FOR OFFICE USE ONLY:
Application Number:
File Number: Submittal Date:
Application Fee Collected:
Public Hearing Fee Collected:
Date of Receipt:
Extensions (cumulative ≤ 65 days)
Public Hearing: Start End
Hearing: Start End
Deliberation: Start End
Approval Date: Denial Date:
270 Days Up:
Permit Expiration:

As the applicant, it is your responsibility to provide the information the Commission needs in order to process your application and make a fair determination of the issues. If you fail to supply the information it may result in delay, a denial of your application or both. We recommend that you read the Inland Wetlands and Watercourses Regulations and that you request a meeting with the Town Engineer (452-2809) prior to submitting your application. There is no charge to the applicant for this meeting.

SECTION A: Information about the property

1. Location of the Property:
a) Street Address: 64 Cambridge Drive & 4 Independence Drive, Monroe , Connecticut
b) Assessor's Map Number: 94 c) Parcel Number: 015/00 & 015/28

2. Where is the property deed found in the Monroe Land Records?
a) Volume: 64 Cambridge Drive : 2038; 4 Independence Drive: 2038 b) Page: 64 Cambridge Drive : 0049; 4 Independence Drive: 0051

3. Is the property located within a public water supply watershed?
□ No
■ Yes (*If " Yes, " the Applicant must send a copy of this application BY CERTIFIED MAIL ON OR BEFORE THE DATE OF THE APPLICATION to the Aquarion Water Company of Connecticut, 714 Black Rock Road, Easton, CT 06612, and the Commissioner of Public Health, 410 Capitol Avenue, Hartford, CT 06106; See Regulations Section 8.3).*

4. Is the property located within 500 feet of a town boundary?
■ No
□ Yes *(If" Yes ", the applicant must notify the Inland Wetland Agency of the adjacent municipality by certified mail and submit the receipt with this application).*

5. Is the property subject to an existing conservation easement?
■ No
□ Yes *(If" Yes ", the applicant must notify the party holding such restriction by certified mail no later than sixty days prior to the filing of this permit application, or submit a letter from the party holding the restriction verifying that the application is in compliance with the terms of the restriction; see Regulations Section 7.9c & 7.9d).*

6. Is there a flood plain located on the property?
■ No
□ Yes *(If" Yes ", indicate elevation and location of flood plain on the submission plan).*

7. Please attach a list of the names and mailing addresses of all land owners within 100 feet of the property.

SECTION B: Information about the applicant

8. Applicant's name and contact information:
a) Name: Astro Land Holdings LLC & Spacely Land Holdings LLC
b) Address: 16 Cross Street, New Canaan, Connecticut
c) Telephone: 203-972-3366 Fax: Email: akarp@karpassociates.com

9. What is the Applicant's interest in the property?
■ Owner
□ Option to purchase
□ Other

10. Applicant's representative's name and contact information:

a) Name: Kevin Solli, P.E.

b) Business Name: Solli Engineering LLC

c) Business Address: 501 Main Street, Suite 2A , Monroe, Connecticut

d) Telephone: 203-880-5455 Fax: 203-880-9695 Email: Kevin@Sollillc.com

11. Engineer's name and contact information:

a) Name: Kevin Solli, P.E.

b) Business Name: Solli Engineering LLC

c) Business Address: 501 Main Street, Suite 2A , Monroe, Connecticut

d) Telephone: 203-880-5455 Fax: 203-880-9695 Email: Kevin@Sollillc.com

12. Owner's name and contact information:

a) Name: Astro Land Holdings LLC & Spacely Land Holdings LLC

b) Address: 16 Cross Street, New Canaan, Connecticut

c) Telephone: 203-972-3366 Fax: _____ Email: akarp@karpassociates.com

d) Owner's signature Same as Applicant (granting permission for submission of application by the applicant)

Please note: If the applicant is not the current owner, this application must include the owner's signature or a written, witnessed consent to submit this application, signed and dated by the owner. Only the applicant and the agent listed on this application will receive copies of official action and correspondence.

SECTION C: Information about the proposed activity

(Please attach additional sheets if necessary)

13. Select one or more of the following types of Application requested:

■ Regulated Activity ■ Including Site Remediation □ Subdivision Report/Referral □ Map Amendment

□ Renewal/Extension of Issued Permit Number _____ □ Regulation Amendment

14. Describe the proposed activity covered by this application:

The project entails the construction of a 2,360 SF office building and associated grading,drainage and utilities in addition to earthwork activities in order to fill the northern portion of the site and restore former watershed drainage patterns. Wetland creation and significant upland areas of the site are to be restored with enhanced plantings. See Engineering Report and Project Narrative for more information.

15. List all activities which take place in regulated areas, including the upland review areas:

The project entails the construction of a 2,360 SF office building and associated grading,drainage and utilities in addition to earthwork activities in order to fill the northern portion of the site and restore former watershed drainage patterns. Wetland creation and significant upland areas of the site are to be restored with enhanced plantings. See Engineering Report and Project Narrative for more information.

16. List the total acreage of the following:

a) Overall project site: 71.90 Acres (Combined total, 64 Cambridge Drive & 4 Independence Drive)

b) Wetlands on the property: 17.17 Acres = 64 Cambridge Drive & 1.72 Acres = 4 Independence Drive

c) Upland review areas on the property: 25.99 Acres = 64 Cambridge Drive & 11.45 Acres = 4 Independence Drive

17. List the total area of the regulated areas to be altered:

a) Wetlands: 0 acres; 0 sq. ft.

b) Upland review areas (within 100 feet of a wetland or 150 feet of a watercourse): 24.98 acres; 1,087,983 sq. ft.

c) Total Regulated area to be altered (a + b above) for determination of fee: 24.98 acres; 1,087,983 sq. ft.

18. What alternatives to the proposed regulated activity did you consider? Why did you choose the activity proposed in this application as opposed to the alternatives considered? (See Regulations *Section 7.5f)*

The alternatives considered involved a simliar amount of regulated area disturbance, as the existing limits of disturbance on the project site would have been maintained. However, these alternative layouts and their associated grades failed to restore pre-existing drainage patterns to the onsite wetlands and failed to restore the 100' vernal pool envelope. The proposed site improvements were designed to rehydrate the existing on-site wetlands and restore the vernal pool envelopes.

19. List all measures of Low Impact Design/Development that have been incorporated into this application in order to minimize impact to wetlands.

The Low Impact Design/Development measures incorporated into this application include the use of vegetated water quality swales, limiting land disturbance activities, vegetated buffers across various areas of the site, the limited use of storm sewers and the use of filter strips. Please refer to the Engineering Report included in this application for more information.

SECTION D: Determination of Application Fee

(See Regulations Section 19)

20. Select type of Application Fee (choose one):

- □ Residential Use = $300.00 ..... _____
- ■ Commercial Use = $500.00 ..... $500.00
- □ Regulation Amendment = $500.00 ..... _____
- □ Map Amendment = $150.00 ..... _____
- □ Permit Modification = $100.00 ..... _____
- □ Renewal/Extension of Issue Permit = $100.00 ..... _____

21. Select the following additional fees that apply for regulated areas proposed to be disturbed:

Square Feet of Disturbed Area:

- □ Less than 1,000 square feet = $50.00 ..... _____
- □ 1,000 to 5,000 square feet = $100.00 ..... _____
- ■ More than 5,000 square feet = $100.00 (base amount) $100.00

*(Plus $5.00 for every **additional** 5,000 square feet rounded up)*

Disturbed Area (Line 17c) (-) 5,000 sq.ft. (÷) 5,000 sq.ft. (x) $5.00 per sq.ft. rounded up... $1,085

22. Department of Environmental Protection State Surcharge ..... + $60.00

23. TOTAL APPLICATION FEE: $1,745

****** Please note the Application Fees/State Fee must be payable to the Town of Monroe. Applicants paying with a personal check must include their driver's license number and telephone number on the check.***

SECTION E: Required support documents

(See Regulations Section 7)

Please indicate (check box) that the following documents have been included with the application:

a) Submit ten (10) copies of the following:

- ■ Completed Inland Wetlands Application.
- ■ A description of all filling and/or excavation activities within regulated areas (include estimates of quantity).
- ■ A Soils Report by a Soil Scientist (include a sketch of flagged wetland areas within said report).
- ■ A minimum of two alternative plans/sketches that were considered prior to choosing the proposed plans.
- □ A report from the Monroe Health Department.
- ■ A Wetlands Assessment Report.
- ■ An area plan showing all abutting properties and applicable downstream drainage systems.

b) Submit seven **(7)** reduced copies of the following (all plans must be folded):

- ☑ Seven reduced copies, **18' x 24'**, of the site plan showing existing and proposed conditions in relation to the wetlands, watercourses and upland review areas. Please include a location map, delineate the 100-foot wetland setback (upland review area) and/or the l50-foot watercourse setback (upland review area) in red, and incorporate an area plan showing all abutting properties and applicable downstream drainage systems. All plans must have a bar scale.

Application No._____ File No._____

c) Submit three **(3)** copies of the following (all plans must be folded):

- ■ Three full size copies of the site plan, **24' x 36'**, showing existing and proposed conditions in relation to the wetlands, watercourses and upland review areas. Please include a location map, delineate the 100-foot wetland setback (upland review area) and/or the l50-foot watercourse setback (upland review area) in red, and incorporate an area plan showing all abutting properties and applicable downstream drainage systems. All plans must have a bar scale.

d) Submit two (2) copies of the following:

- ■ Drainage calculations, if applicable.

e) Submit one (1) copy of the following:

- ☐ A list of the names and mailing addresses of all abutting property owners.
- ☑ A completed **D.E.E.P** report form (available at the Inland Wetlands Office or on the Town Website at www.monroect.org/Town Hall Departments/Inland Wetlands/Applications & Forms).
- ☑ Verification in writing that all wetlands have been flagged and the property address/location is adequately delineated and/or marked at the property.
- ☑ A completed bond form listing all wetlands related work and protective measures for same (available at the Inland Wetlands Office or on the Town Website at www.monroect.org/Town Hall Departments/Inland Wetlands/Applications & Forms).

PLEASE INCLUDE TEN (10) COPIES OF ANY FUTURE SUPPORTING DOCUMENTATION SUBMITTED TO THE COMMISSION (Plans: 3 Full Size copies - 24' x 36', and 7 Reduced Size copies - 18' x 24'). Plans prepared by engineers, surveyors and architects must be signed and sealed. The Commission may request additional copies of the application or supporting documents at any time.

Title of original submission plan (include author and date) _____

Proposed Site Development & Restoration - 64 Cambridge Drive & 4 Independence Drive - Monroe Connecticut - Prepared By Solli Engineering LLC - May 26, 2020

The undersigned applicant hereby consents for the owner, in the case where the applicant is not the owner, to necessary and proper access to the above mentioned property by the Inland Wetlands Commissioners, the Inland Wetlands Agent and other appropriate Town staff and/or authorized Town Consultants, at reasonable times, both before and after any permit has been granted or denied by the Commission, for the purpose of evaluating the application, monitoring compliance or correcting any violation of the Inland Wetlands and Watercourses Regulations brought about through actions or inactions of the applicant of permittee.

The undersigned warrants the truth of all statements contained herein and in all supporting documents according to the best of the applicant's knowledge and belief.

The undersigned applicant understands and agrees that the Commission may request additional information and it is the applicant's responsibility to provide this information in a timely fashion and to the Commission's satisfaction. If the information provided is incomplete or inaccurate, in the opinion of the Commission, the Commission may deny the application or request an extension to be granted by the Applicant in order to act within the legal time limits.

Type or Print the Name of the Applicant: ASTRO LAND HOLDING LLC

Signature of Applicant: Ronald M Karp Managing Member

(Latest revision: 3-27-18)

Application No._____ File No._____

c) Submit three **(3)** copies of the following (all plans must be folded):

- ■ Three full size copies of the site plan, **24' x 36'**, showing existing and proposed conditions in relation to the wetlands, watercourses and upland review areas. Please include a location map, delineate the 100-foot wetland setback (upland review area) and/or the 150-foot watercourse setback (upland review area) in red, and incorporate an area plan showing all abutting properties and applicable downstream drainage systems. All plans must have a bar scale.

d) Submit two (2) copies of the following:

- ■ Drainage calculations, if applicable.

e) Submit one (1) copy of the following:

- ☑ A list of the names and mailing addresses of all abutting property owners.
- ☑ A completed **D.E.E.P** report form (available at the Inland Wetlands Office or on the Town Website at www.monroect.org/Town Hall Departments/Inland Wetlands/Applications & Forms).
- ☑ Verification in writing that all wetlands have been flagged and the property address/location is adequately delineated and/or marked at the property.
- ☑ A completed bond form listing all wetlands related work and protective measures for same (available at the Inland Wetlands Office or on the Town Website at www.monroect.org/Town Hall Departments/Inland Wetlands/Applications & Forms).

PLEASE INCLUDE TEN (10) COPIES OF ANY FUTURE SUPPORTING DOCUMENTATION SUBMITTED TO THE COMMISSION (Plans: 3 Full Size copies - 24' x 36', and 7 Reduced Size copies - 18' x 24'). Plans prepared by engineers, surveyors and architects must be signed and sealed. The Commission may request additional copies of the application or supporting documents at any time.

Title of original submission plan (include author and date) _____

Proposed Site Development & Restoration - 64 Cambridge Drive & 4 Independence Drive - Monroe Connecticut - Prepared By Solli Engineering LLC - May 26, 2020

The undersigned applicant hereby consents for the owner, in the case where the applicant is not the owner, to necessary and proper access to the above mentioned property by the Inland Wetlands Commissioners, the Inland Wetlands Agent and other appropriate Town staff and/or authorized Town Consultants, at reasonable times, both before and after any permit has been granted or denied by the Commission, for the purpose of evaluating the application, monitoring compliance or correcting any violation of the Inland Wetlands and Watercourses Regulations brought about through actions or inactions of the applicant of permittee.

The undersigned warrants the truth of all statements contained herein and in all supporting documents according to the best of the applicant's knowledge and belief.

The undersigned applicant understands and agrees that the Commission may request additional information and it is the applicant's responsibility to provide this information in a timely fashion and to the Commission's satisfaction. If the information provided is incomplete or inaccurate, in the opinion of the Commission, the Commission may deny the application or request an extension to be granted by the Applicant in order to act within the legal time limits.

Type or Print the Name of the Applicant: SPACELY LAND HOLDINGS LLC

Signature of Applicant: Alan M Karp, Managing Member

(Latest revision: 3-27-18)

SOLLI ENGINEERING

Properties within 100 feet of 64 Cambridge Drive & 4 Independence Drive

7 Independence Drive
Landtrust Development LLC
Warren Cartmel Member
160 Judd Road
Easton, CT 06612
094/015/27

35 Cambridge Drive
Kalboys LLC
Showky Kaldawy – MGR
99 Staples Road
Easton, CT 06612
094/015/11

34 Enterprise Drive
JRD Properties-Monroe LLC
John R Dufour – MGR
146 Huntingdon Avenue
Waterbury, CT 06708
104/002/10

512 Pepper Street
New England Materials LLC
Kimball Group, LLC Member
1428 Monroe Turnpike
Monroe, CT 06468
094/015/RD

211 Garder Road
Town of Monroe (Public Works)
7 Fan Hill Road
Monroe, CT 06468
105/002/00

500 Pepper Street
Maybrook Properties LLC
C/O Duane Carruba – MGR
70 Research Drive
Milford, CT 06460
094/015/01

157 Garder Road
State of Connecticut
79 Elm Street
Hartford, CT 06106
105/001/02

74 Cambridge Drive
MMI of Monroe LLC+
Mary E Infante
641 Main Street
Monroe, CT 06468
094/015/13

155 Garder Road
Aquarion Water Co of Connecticut
% Tax Dept
600 Lindley Street
Bridgeport, CT 06606
105/001/00

98 Enterprise Drive
Enterprise Drive LLC
Guido Picarazzi MBR MGR
225 Knowlton Street
Bridgeport, CT 06608
094/015/15

159 Garder Road
State of Connecticut
79 Elm Street
Hartford, CT 06106
105/001/01

50 Cambridge Drive
Cambridge Drive RE LLC
50 Cambridge Drive
Monroe, CT 06468
094/015/04

36 Timothy Hill Road
Metropoulos Peter – TRSTEE
Thomas + Stella Maganas Family Trust
300 Connecticut Avenue
Norwalk, CT 06854
114/006/00

124 Enterprise Drive
M & J Videira LLC
Jack J Videira MBR
330 Dekalb Avenue
Bridgeport, CT 06607
094/015/17

5 Independence Drive
N & J Construction LLC
Bernard Braholli
PO BOX 347
Newtown, CT 06470
094/015/26

143 Enterprise Drive
Yankocy Properties LLC
Fred Yankocy
143 Enterprise Drive
Monroe, CT 06468
094/015/20

127 Enterprise Drive
TPG LLC
Todd P Gay MGR MBR
2 Bridge End Farm Lane
Sandy Hook, CT 06482
094/015/18

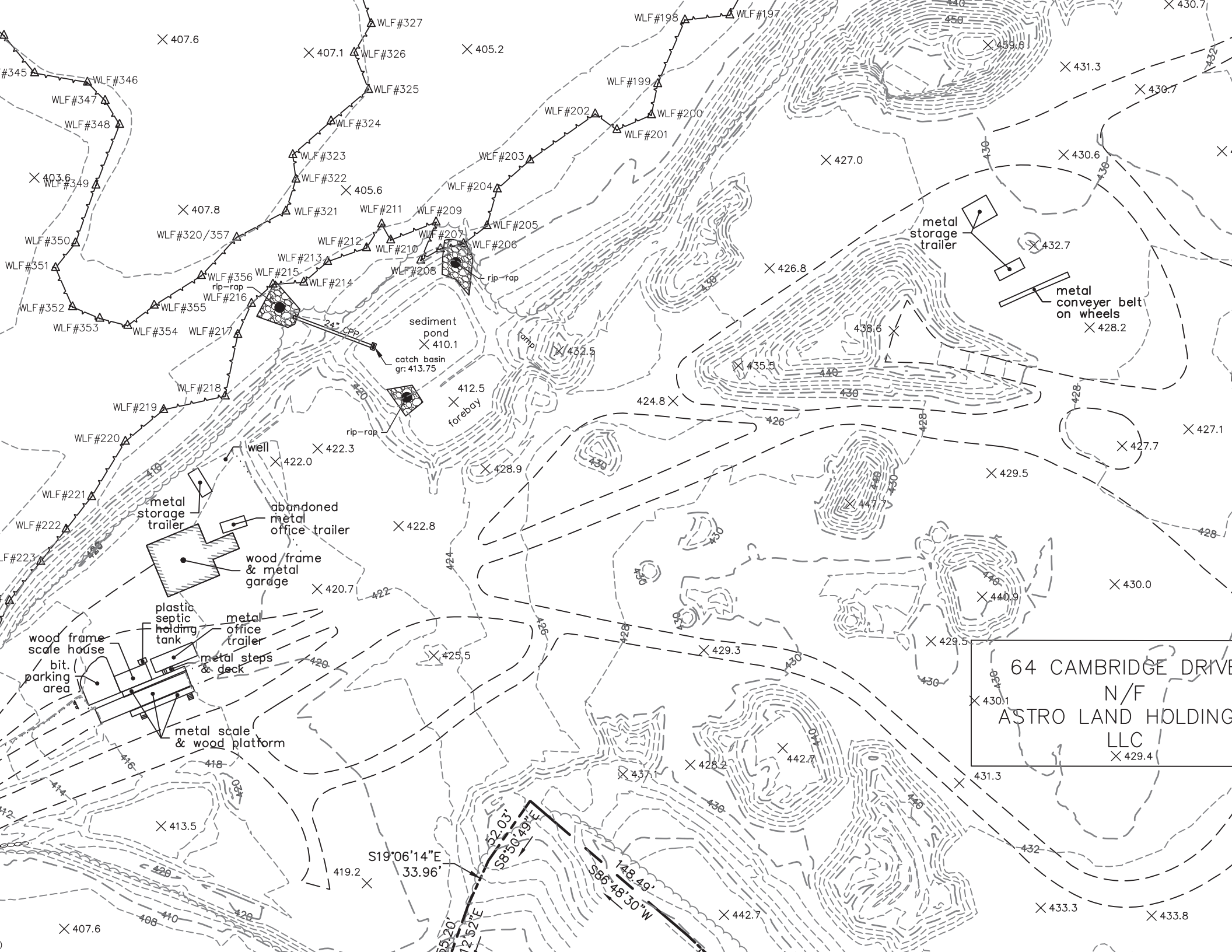
1 Independence Drive
Brit Car LLC
David R Colon MGR Member
1 Independence Drive
Monroe, CT 06468
094/015/19

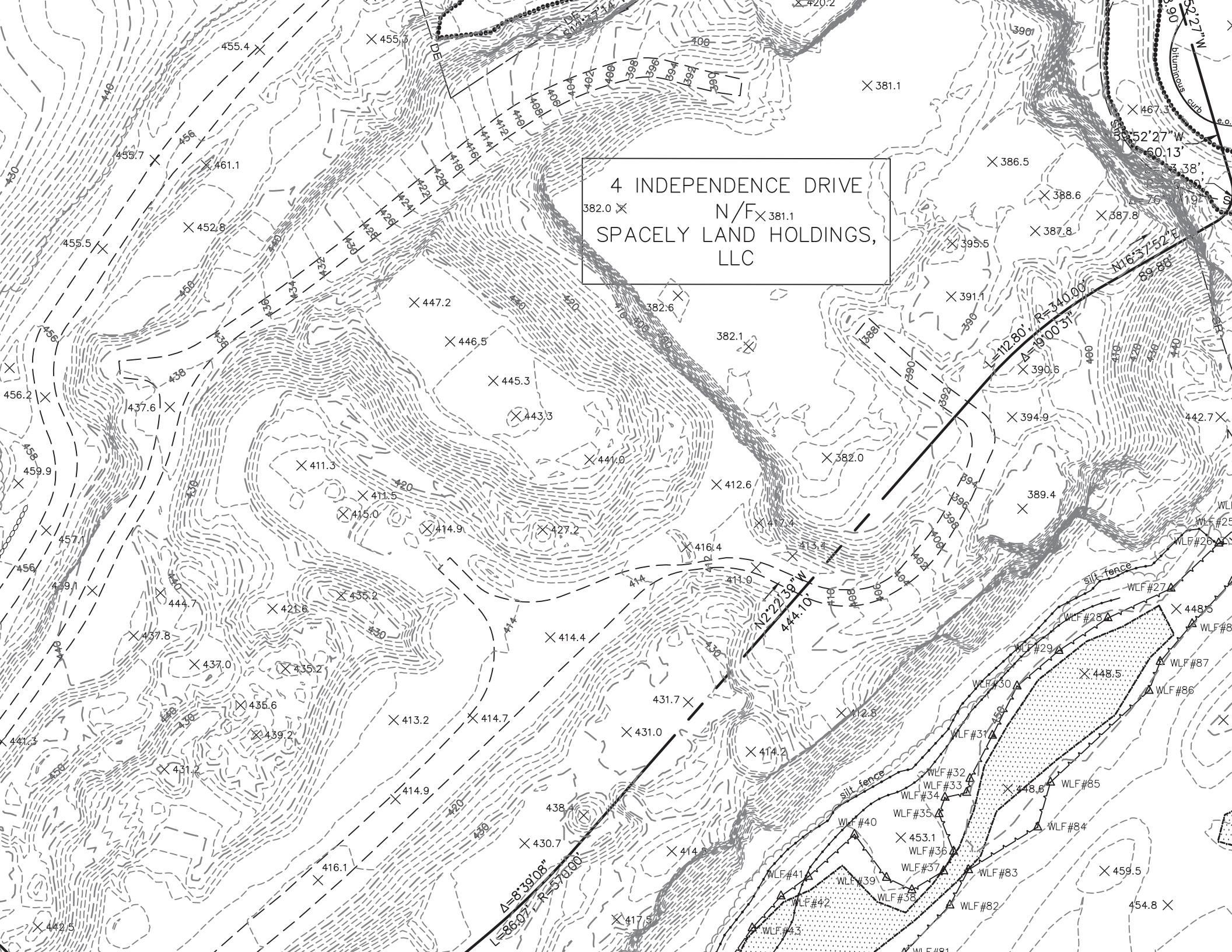
MONROE, CONNECTICUT

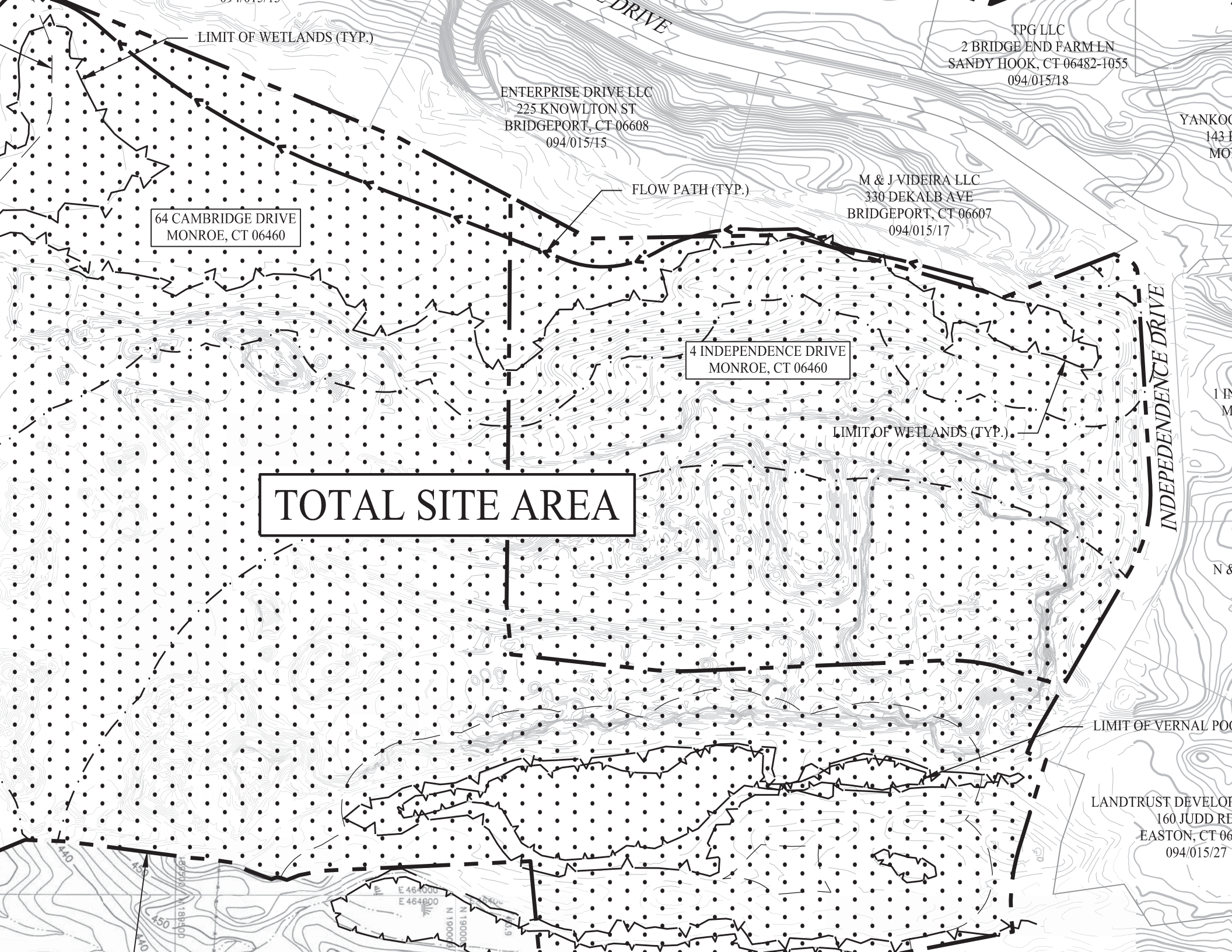
PREPARED FOR:

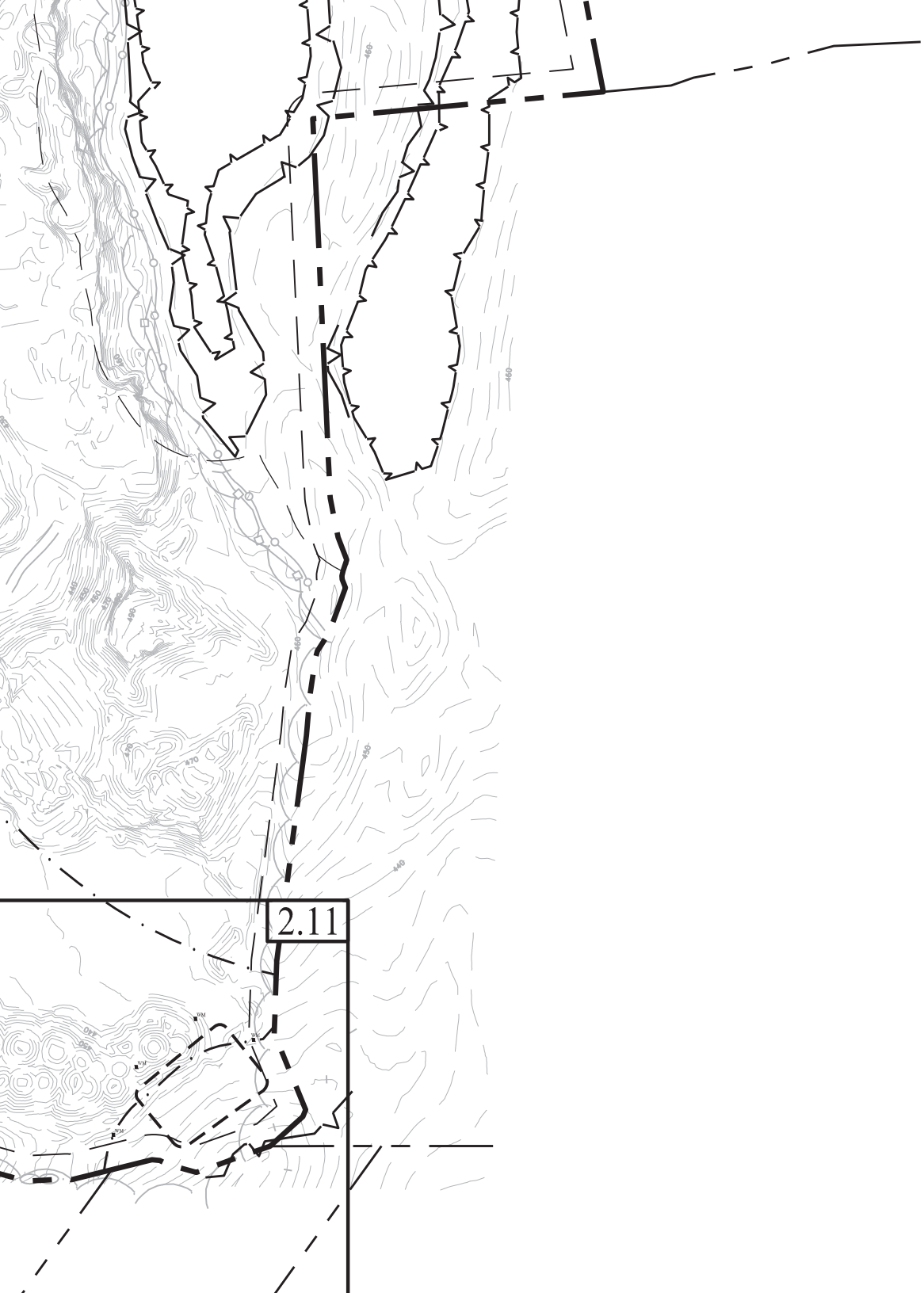
ASTRO LAND HOLDINGS LLC
& SPACELY LAND HOLDINGS LLC

16 CROSS STREET
NEW CANAAN, CONNECTICUT


WLF#327
WLF#326
WLF#325
WLF#324
WLF#323
WLF#322
WLF#321
WLF#320/357
WLF#356
WLF#355
WLF#354
WLF#353
WLF#352
WLF#351
WLF#350
WLF#349
WLF#348
WLF#347
WLF#346
WLF#345
WLF#217
WLF#218
WLF#219
WLF#220
WLF#221
WLF#222
WLF#223
WLF#214
WLF#215
WLF#216
WLF#213
WLF#212
WLF#211
WLF#210
WLF#209
WLF#208
WLF#207
WLF#206
WLF#205
WLF#204
WLF#203
WLF#202
WLF#201
WLF#200
WLF#199
WLF#198
WLF#197
407.6
407.1
405.2
403.6
407.8
405.6
427.0
459.6
431.3
430.7
430.6
426.8
432.7
metal storage trailer
metal conveyer belt on wheels
428.2
438.6
435.5
432.5
ramp
sediment pond
410.1
24" CPP
catch basin gr: 413.75
rip-rap
rip-rap
rip-rap
412.5
forebay
424.8
427.1
427.7
429.5
428.9
422.3
422.0
well
metal storage trailer
abandoned metal office trailer
wood frame & metal garage
422.8
420.7
447.7
plastic septic holding tank
metal office trailer
wood frame scale house
bit. parking area
metal steps & deck
metal scale & wood platform
425.5
429.3
430.0
440.9
64 CAMBRIDGE DRIVE
N/F
ASTRO LAND HOLDING LLC
429.4
430.1
431.3
428.2
442.7
437.1
413.5
419.2
S19°06'14"E
33.96'
52.03'
S8°50'49"E
S86°48'30"W
148.49'
442.7
433.3
433.8
407.6

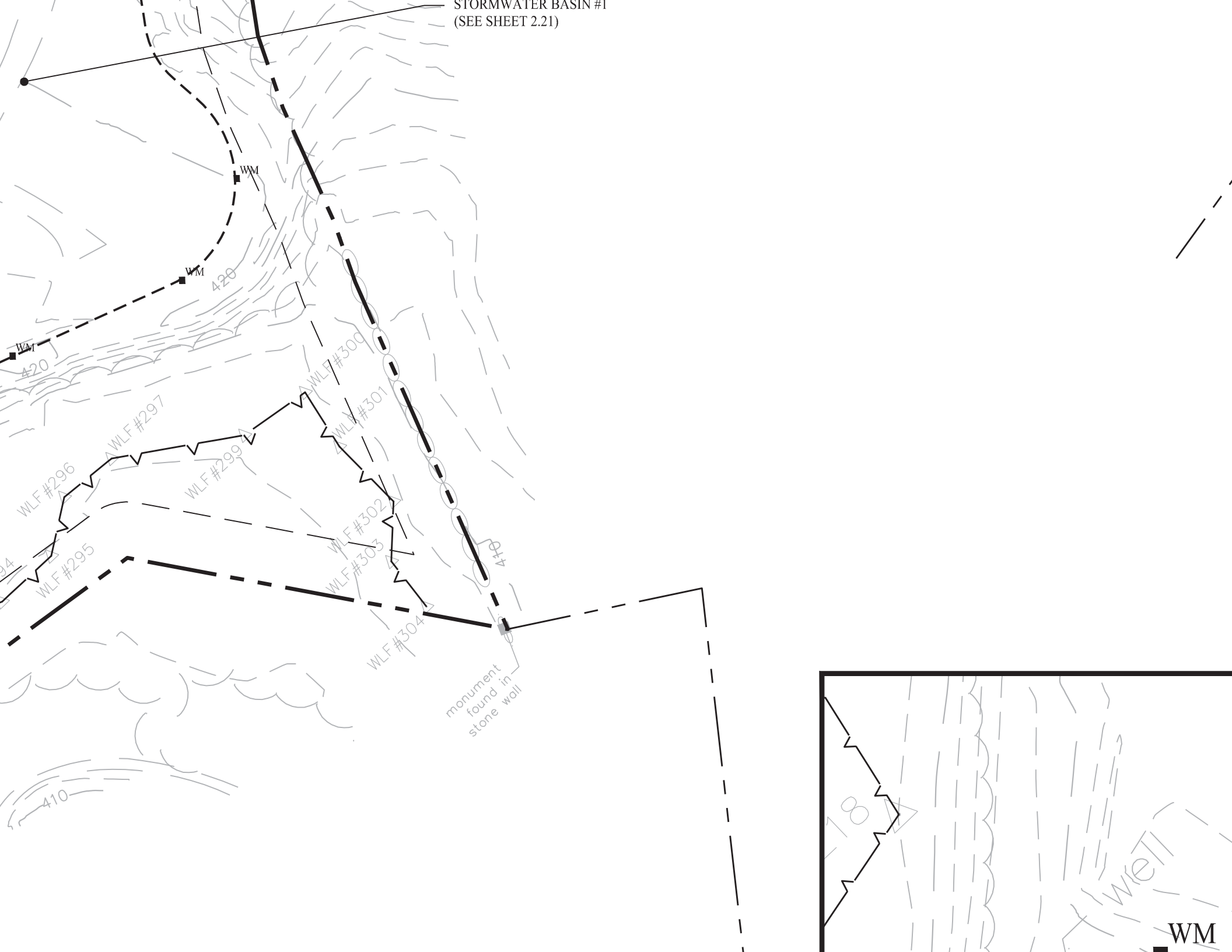

4 INDEPENDENCE DRIVE
N/F
SPACELY LAND HOLDINGS, LLC
382.0
381.1
S52°27"W
60.13'
bituminous curb
e.o.
N16°37'52"E
89.88'
L=112.80'
R=340.00'
Δ=19°00'31"
N12°22'38"W
444.10'
Δ=8°39'08"
L=86.07'
R=570.00'
silt fence
WLF #25
WLF #26
WLF #27
WLF #28
WLF #29
WLF #30
WLF #31
WLF #32
WLF #33
WLF #34
WLF #35
WLF #36
WLF #37
WLF #38
WLF #39
WLF #40
WLF #41
WLF #42
WLF #43
WLF #81
WLF #82
WLF #83
WLF #84
WLF #85
WLF #86
WLF #87
455.4
455.3
455.7
461.1
452.8
455.5
456.2
437.6
459.9
457.1
439.1
444.7
421.6
437.8
437.0
435.2
435.6
439.2
441.3
431.2
442.5
447.2
446.5
445.3
443.3
441.0
411.3
411.5
415.0
414.9
427.2
412.6
417.4
413.4
416.4
411.0
414.4
413.2
414.7
431.7
431.0
414.2
414.9
438.4
430.7
414.3
416.1
417.5
420.2
467.3
386.5
388.6
387.8
395.5
391.1
382.6
382.1
390.6
394.9
382.0
389.4
442.7
448.5
448.6
453.1
459.5
454.8
412.8

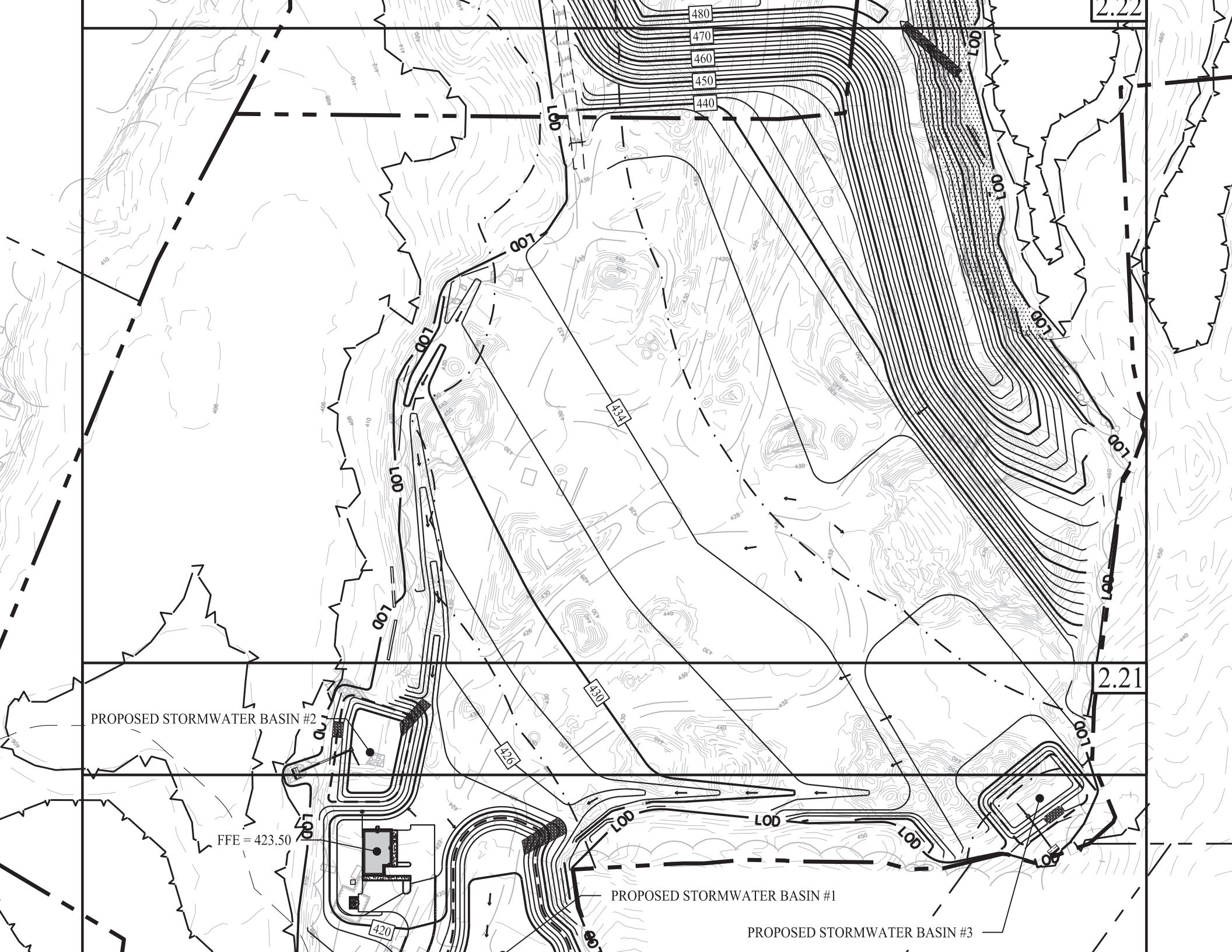

LIMIT OF WETLANDS (TYP.)
ENTERPRISE DRIVE LLC
225 KNOWLTON ST
BRIDGEPORT, CT 06608
094/015/15
TPG LLC
2 BRIDGE END FARM LN
SANDY HOOK, CT 06482-1055
094/015/18
FLOW PATH (TYP.)
M & J VIDEIRA LLC
330 DEKALB AVE
BRIDGEPORT, CT 06607
094/015/17
64 CAMBRIDGE DRIVE
MONROE, CT 06460
4 INDEPENDENCE DRIVE
MONROE, CT 06460
INDEPENDENCE DRIVE
LIMIT OF WETLANDS (TYP.)
TOTAL SITE AREA
LIMIT OF VERNAL POO
LANDTRUST DEVELOP
160 JUDD RD
EASTON, CT 06
094/015/27

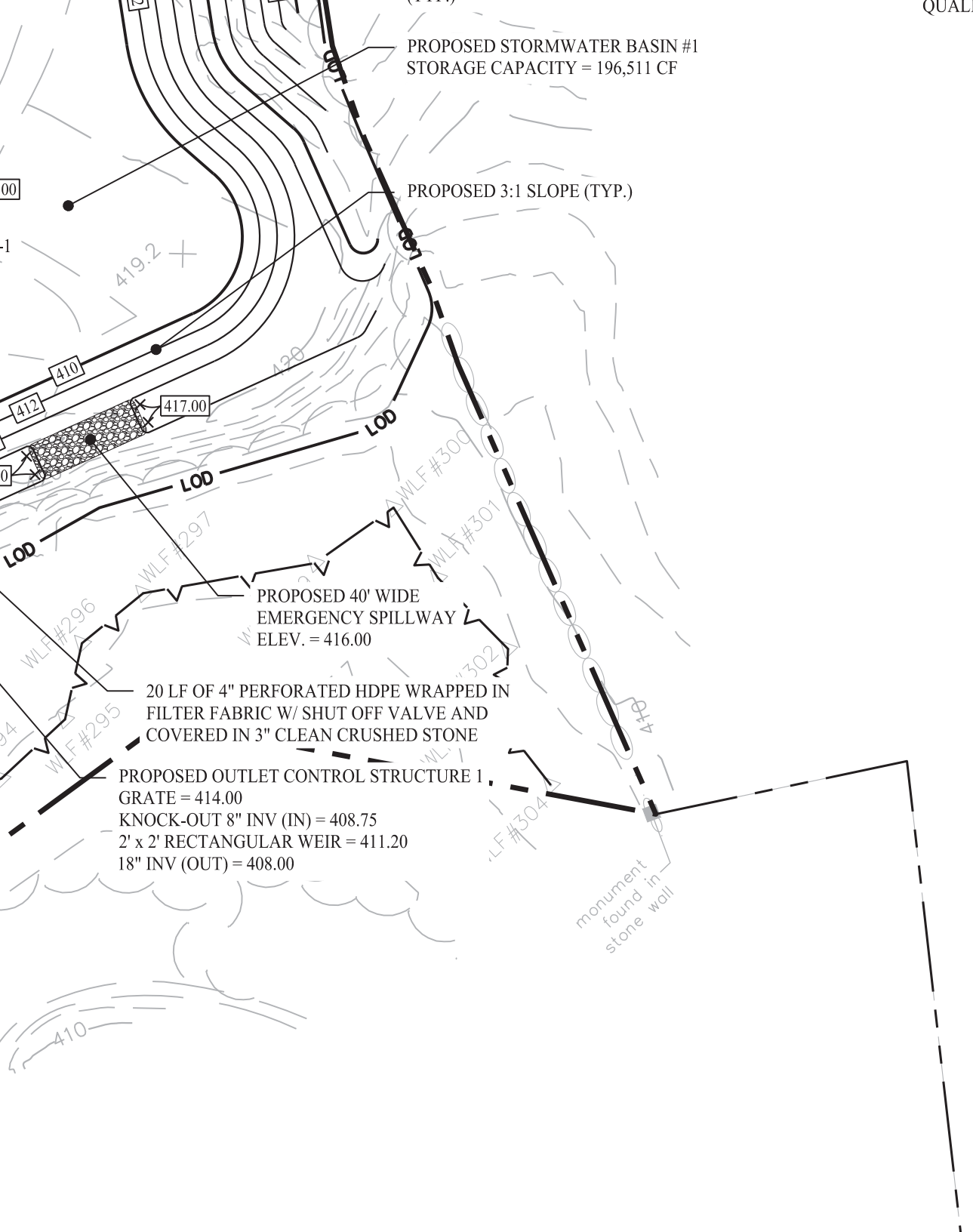


WE	
LOT AREA	
WETLANDS OI	
UPLAND REVI	
WETLANDS TO	
UPLAND REVI	
TOTAL REGUL	

LEGEND

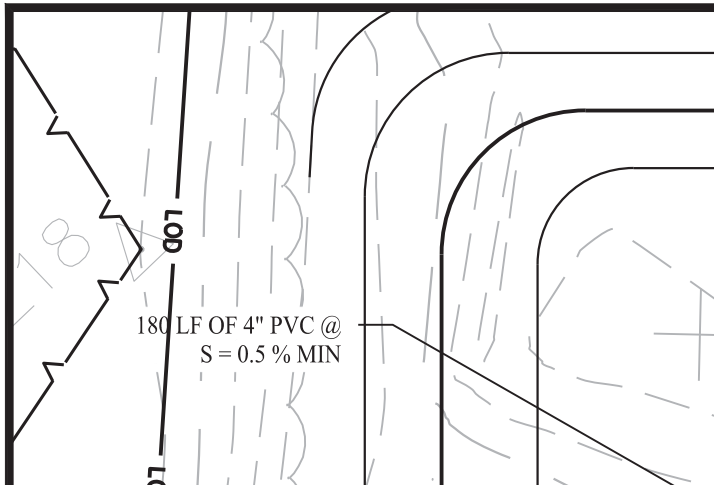

STORMWATER BASIN #1
(SEE SHEET 2.21)
WM
WM
WM
420
420
WLF#296
WLF#297
WLF#299
WLF#300
WLF#301
WLF#302
WLF#303
WLF#304
WLF#295
410
410
monument
found in
stone wall
WM
wet


2.22
2.21
480
470
460
450
440
434
430
426
420
LOD
PROPOSED STORMWATER BASIN #2
FFE = 423.50
PROPOSED STORMWATER BASIN #1
PROPOSED STORMWATER BASIN #3



QUALITY SWALE @ S = 2.0 %

OF DISTURBANCE (TYP.)



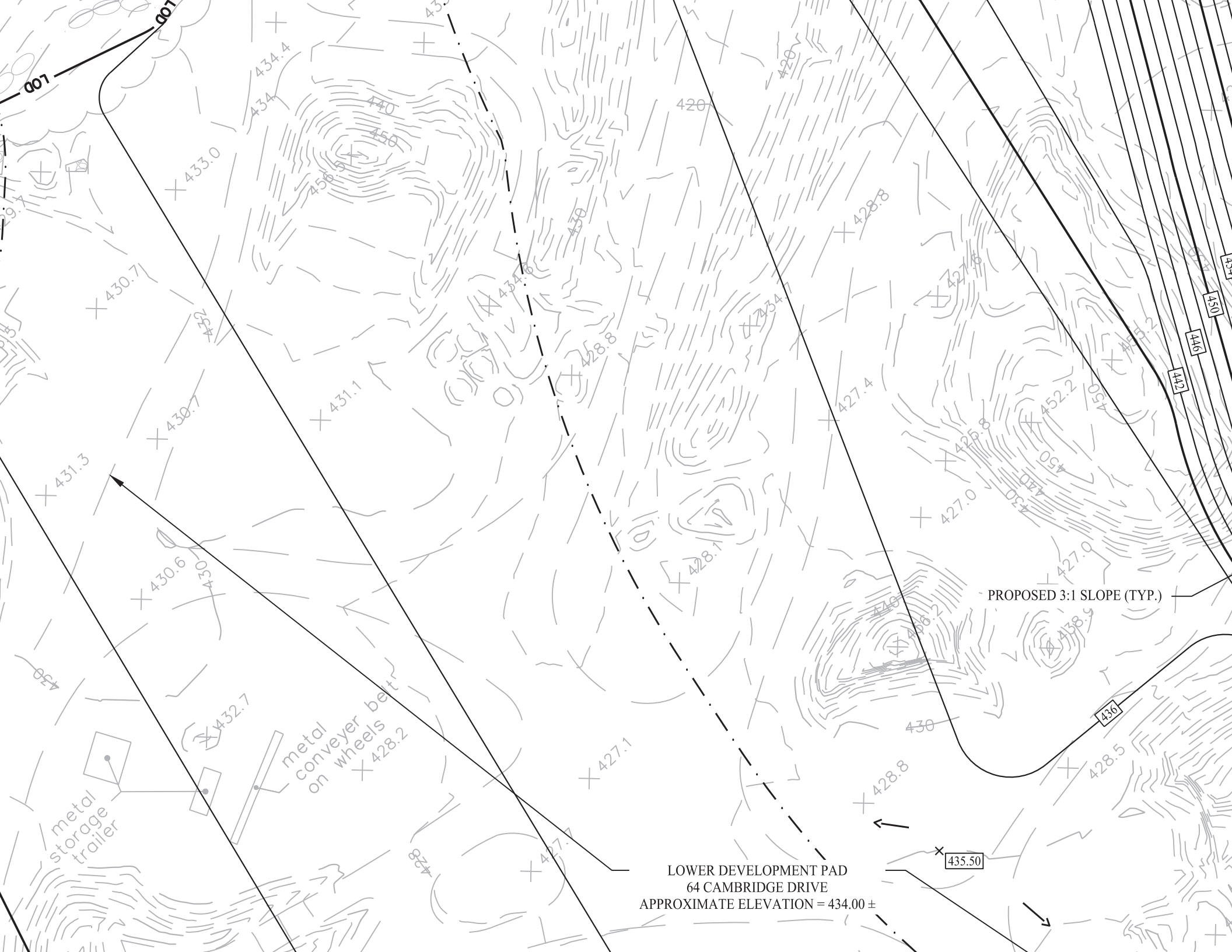
STO

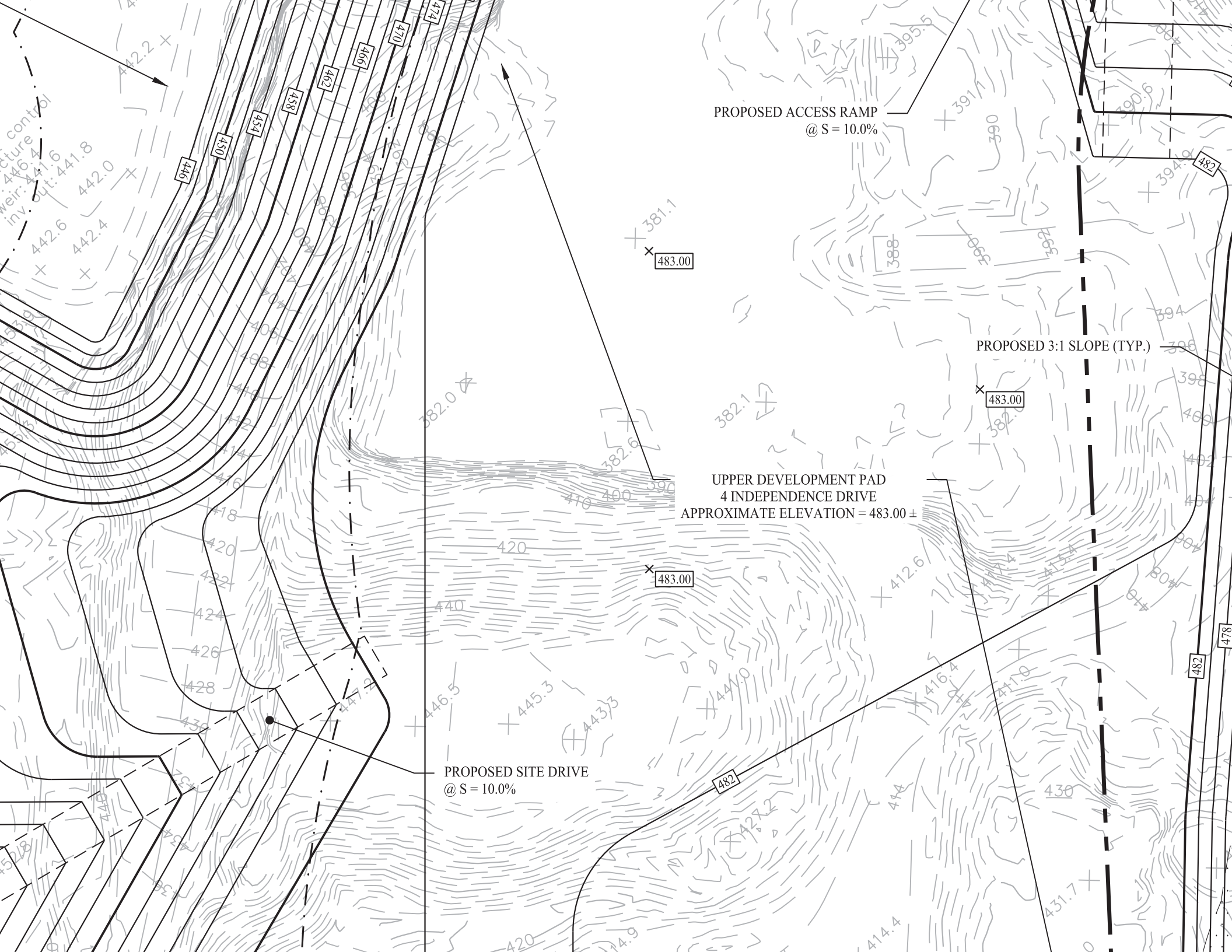
TESTIN

TEST P
0"-48"
LEDGE

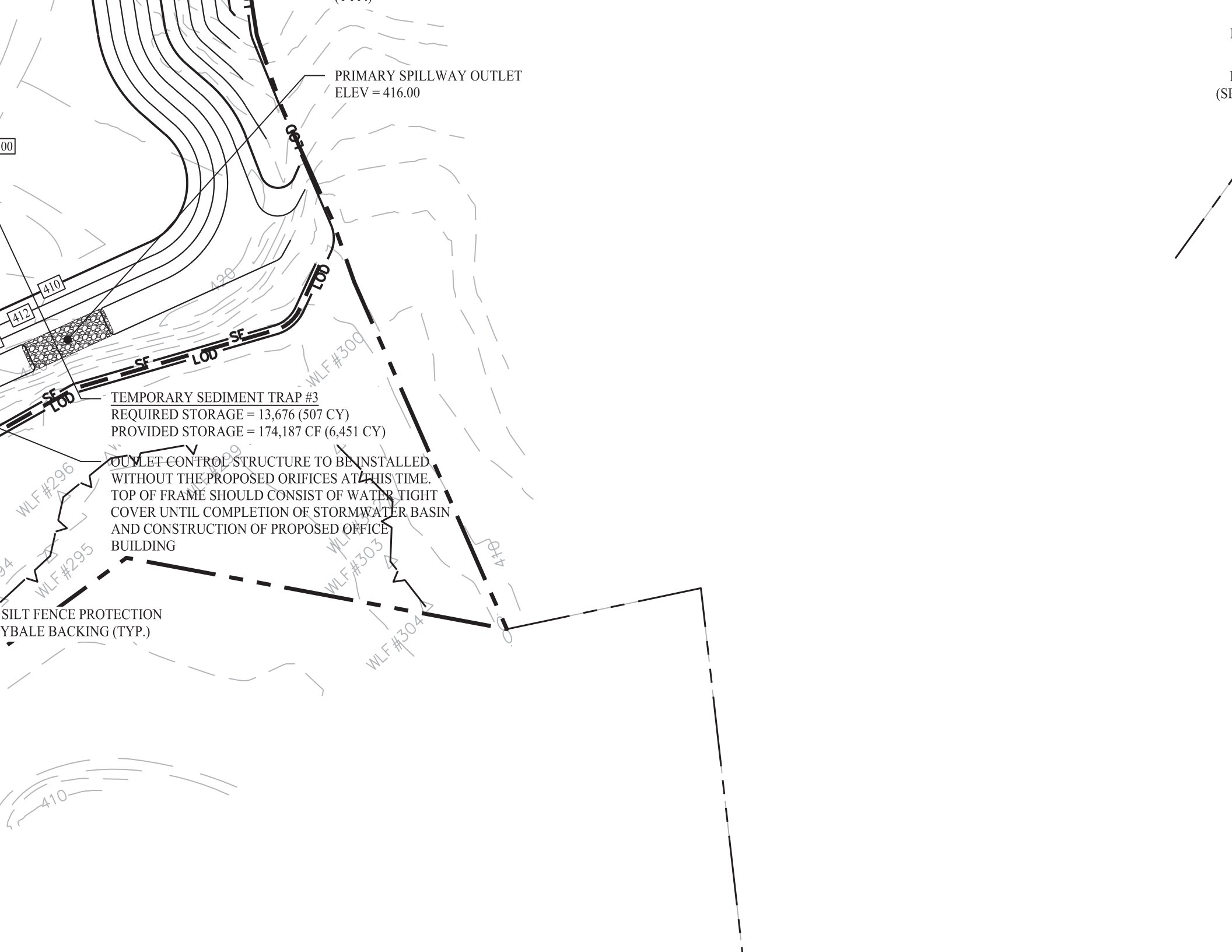
TEST P
0"- 6"
0"-72"
MOTTI
POSSIE

TEST P
0"-16"
16"- 36'
36"- 48'
48" - 11
LEDGE

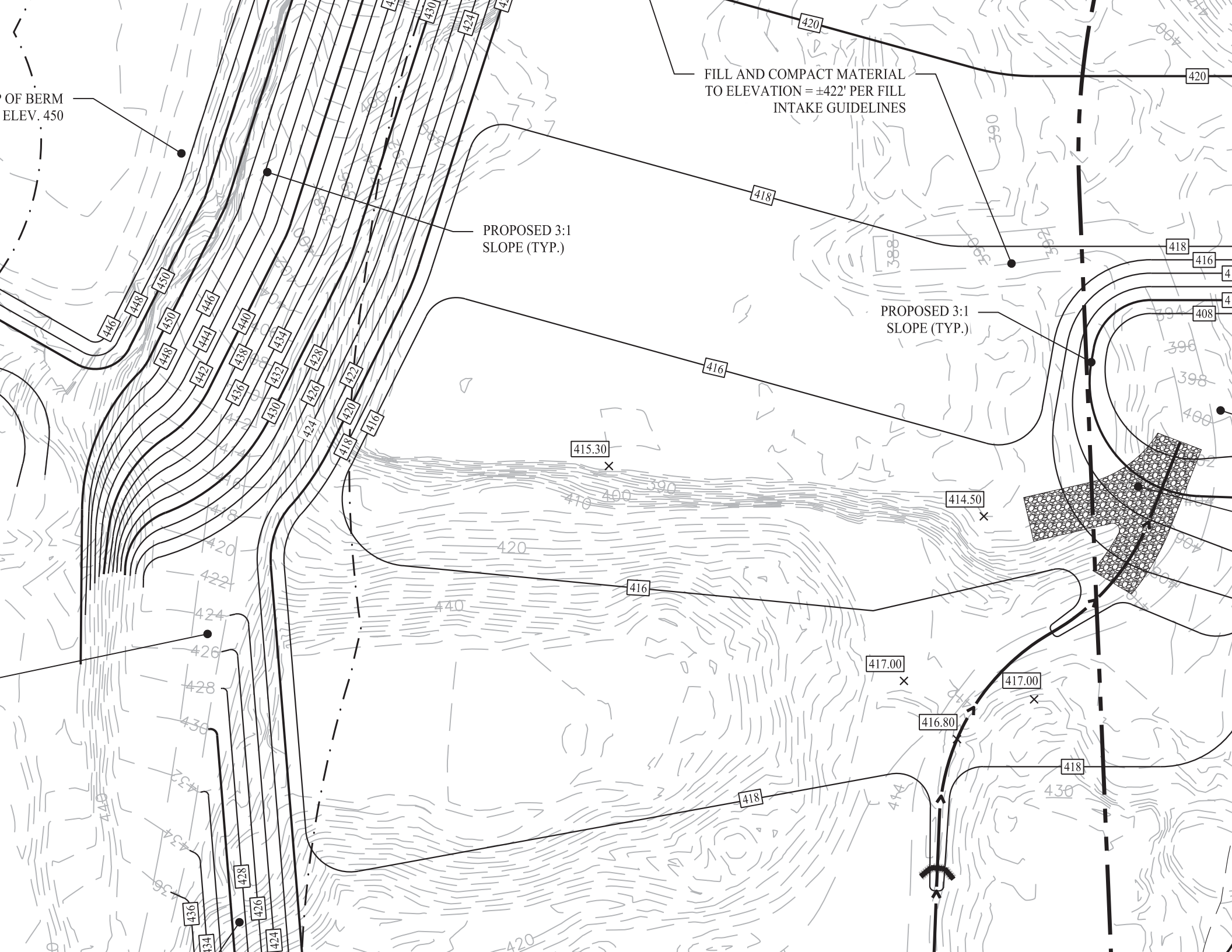

PROPOSED 3:1 SLOPE (TYP.)
LOWER DEVELOPMENT PAD
64 CAMBRIDGE DRIVE
APPROXIMATE ELEVATION = 434.00 ±
435.50
metal storage trailer
metal conveyer belt on wheels
428.2
432.7
436
442
446
450

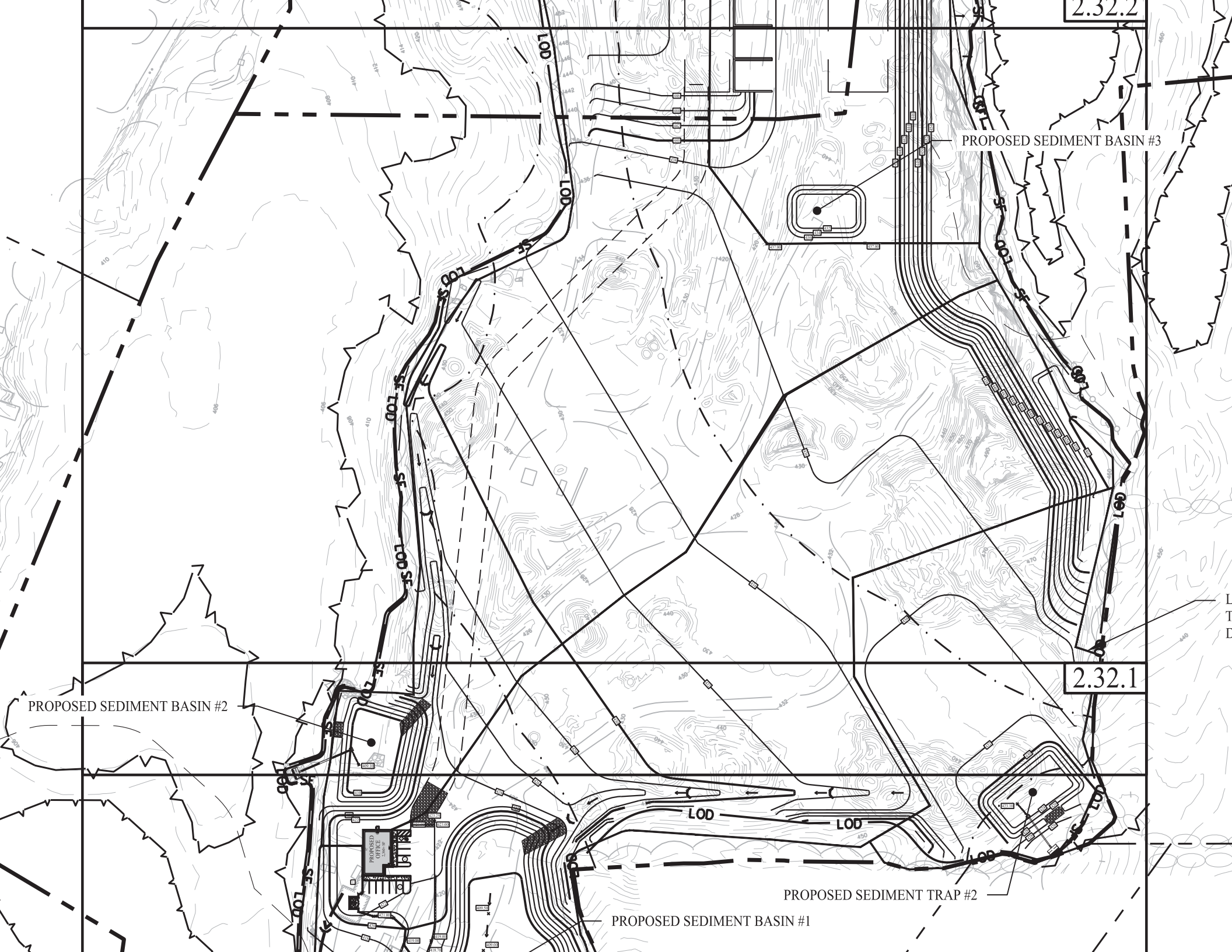

PROPOSED ACCESS RAMP
@ S = 10.0%
PROPOSED 3:1 SLOPE (TYP.)
UPPER DEVELOPMENT PAD
4 INDEPENDENCE DRIVE
APPROXIMATE ELEVATION = 483.00 ±
PROPOSED SITE DRIVE
@ S = 10.0%
483.00
483.00
483.00
482
482
482
478

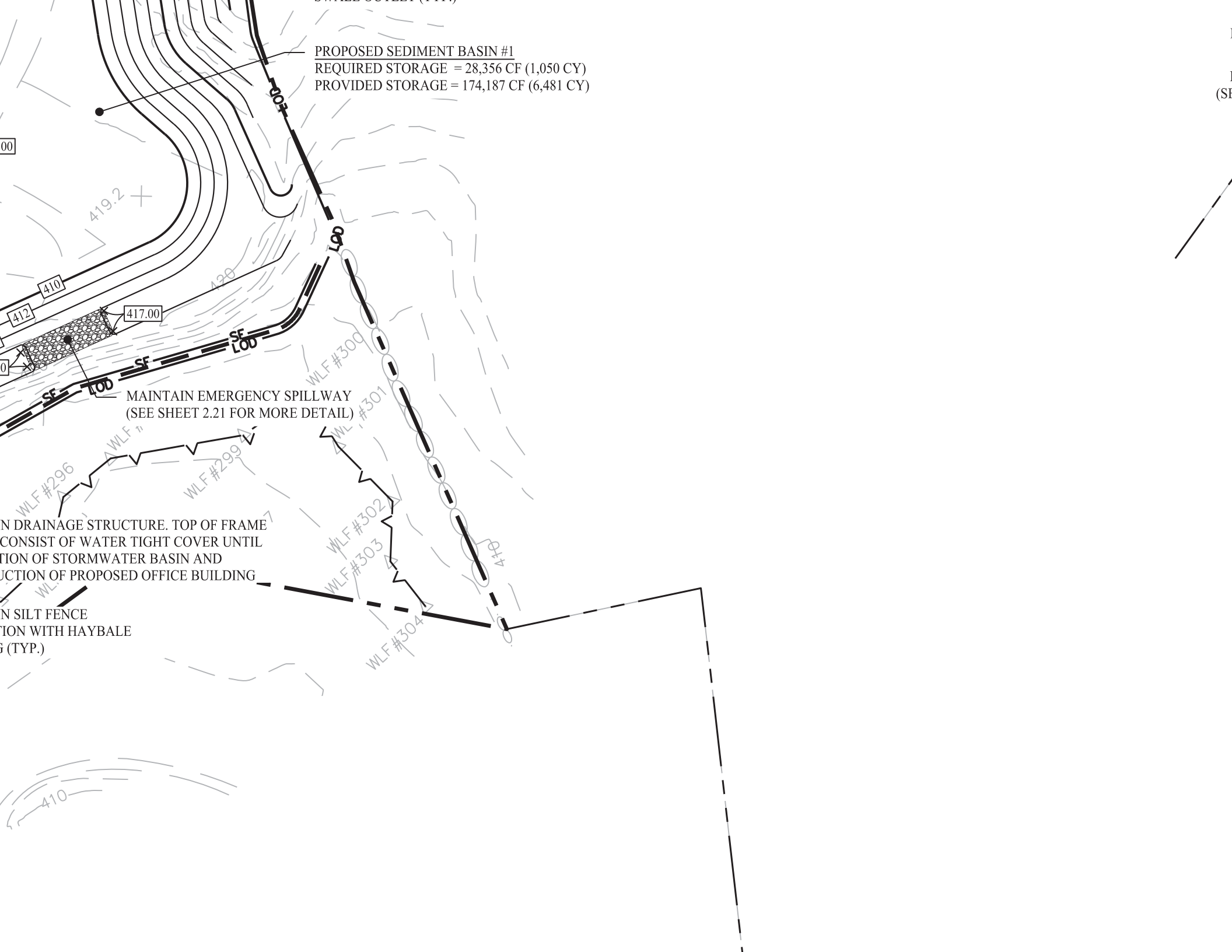

2.31.2
PROPOSED SEDIMENT TRAP
PROPOSED OPERATIONS AREA
2.31.1
PROPOSED SEDIMENT BASIN #1
MAINTAIN EXISTING GARAGE
PROPOSED SEDIMENT TRAP #3
LOD
SF

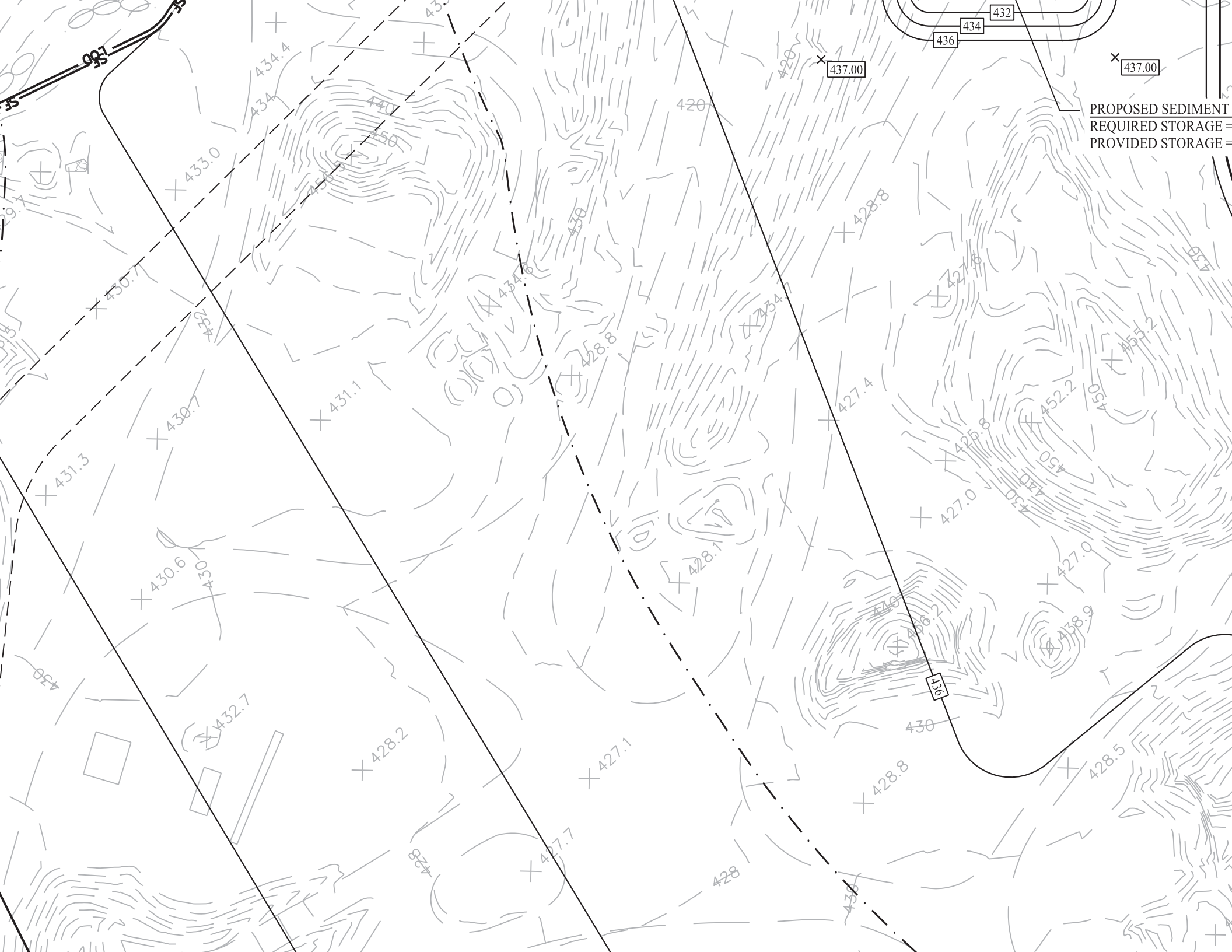

PRIMARY SPILLWAY OUTLET
ELEV = 416.00
TEMPORARY SEDIMENT TRAP #3
REQUIRED STORAGE = 13,676 (507 CY)
PROVIDED STORAGE = 174,187 CF (6,451 CY)
OUTLET CONTROL STRUCTURE TO BE INSTALLED WITHOUT THE PROPOSED ORIFICES AT THIS TIME. TOP OF FRAME SHOULD CONSIST OF WATER TIGHT COVER UNTIL COMPLETION OF STORMWATER BASIN AND CONSTRUCTION OF PROPOSED OFFICE BUILDING
SILT FENCE PROTECTION
YBALE BACKING (TYP.)
LOD
SF
410
412
420
WLF #309
WLF #296
WLF #295
WLF #303
WLF #304

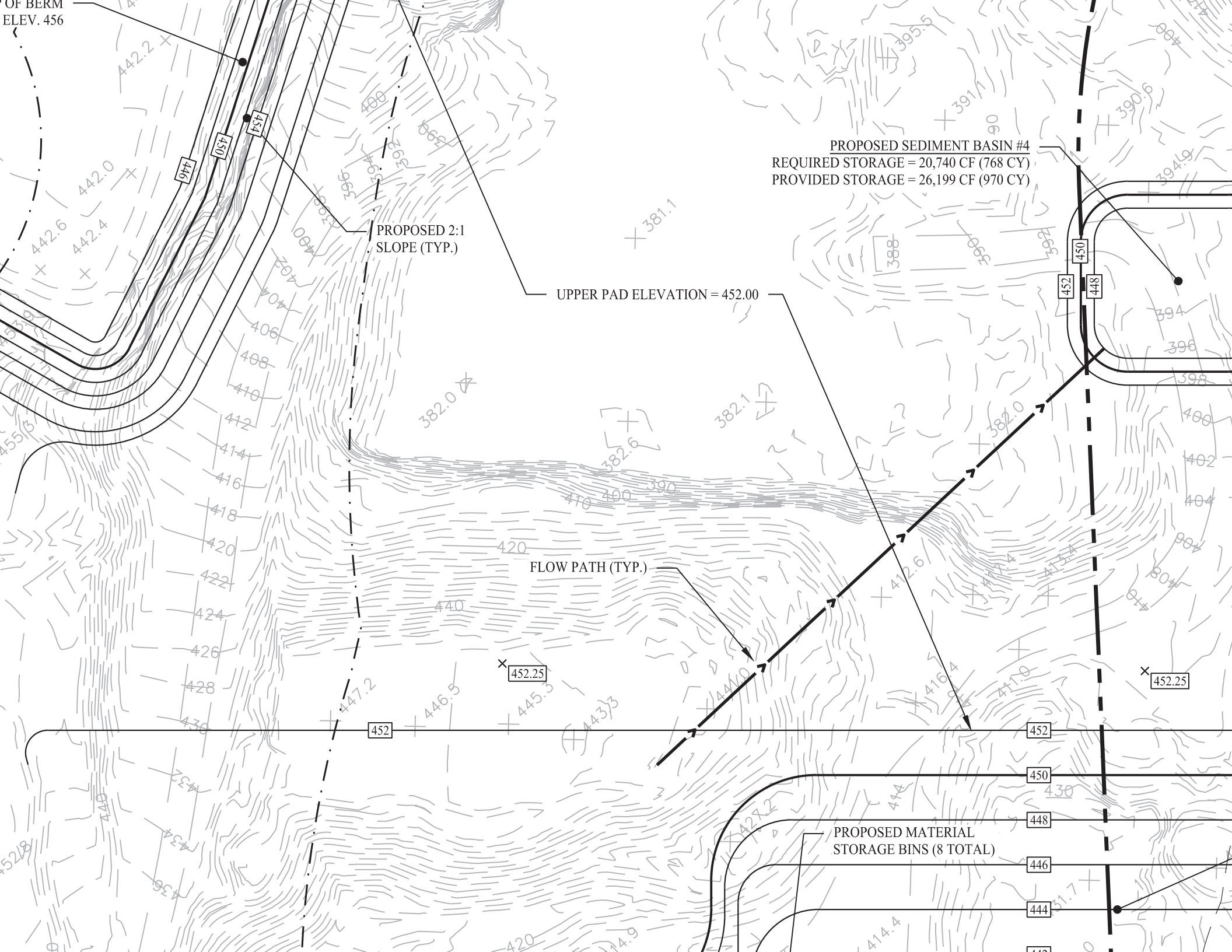

CYCLED CONCRETE
ROCESS STOCKPILE
426
428
430
40' TYP.
50' TYP.

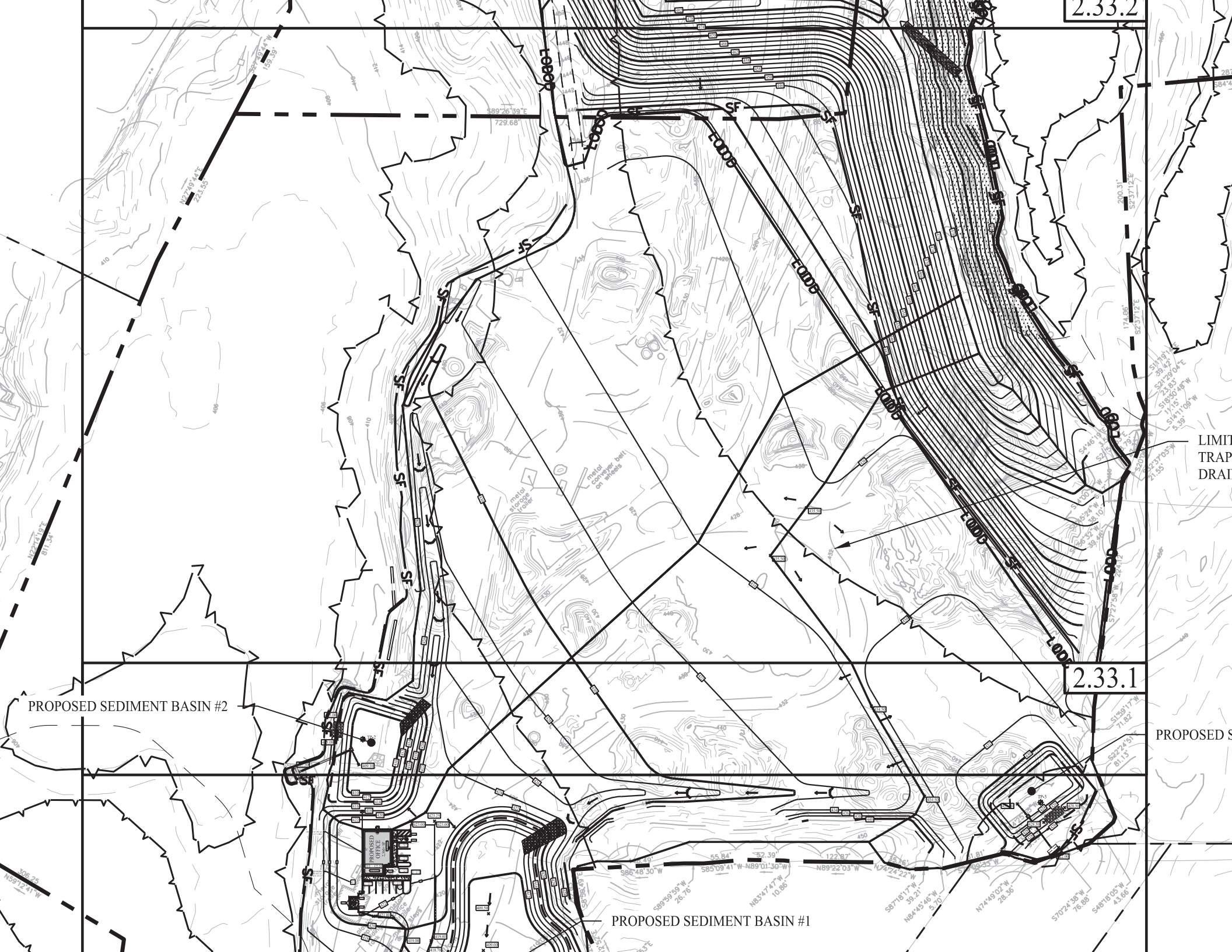

OF BERM
ELEV. 450
PROPOSED 3:1
SLOPE (TYP.)
FILL AND COMPACT MATERIAL
TO ELEVATION = ±422' PER FILL
INTAKE GUIDELINES
PROPOSED 3:1
SLOPE (TYP.)
415.30
414.50
417.00
417.00
416.80


2.32.2
2.32.1
PROPOSED SEDIMENT BASIN #3
PROPOSED SEDIMENT BASIN #2
PROPOSED SEDIMENT TRAP #2
PROPOSED SEDIMENT BASIN #1
LOD
SF
PROPOSED OFFICE


PROPOSED SEDIMENT BASIN #1
REQUIRED STORAGE = 28,356 CF (1,050 CY)
PROVIDED STORAGE = 174,187 CF (6,481 CY)
LOD
SF
LOD
SF
LOD
SF
LOD
MAINTAIN EMERGENCY SPILLWAY
(SEE SHEET 2.21 FOR MORE DETAIL)
417.00
419.2
410
412
430
WLF #296
WLF #299
WLF #309
WLF #301
WLF #302
WLF #303
WLF #304
N DRAINAGE STRUCTURE. TOP OF FRAME
CONSIST OF WATER TIGHT COVER UNTIL
TION OF STORMWATER BASIN AND
UCTION OF PROPOSED OFFICE BUILDING
N SILT FENCE
TION WITH HAYBALE
G (TYP.)
410

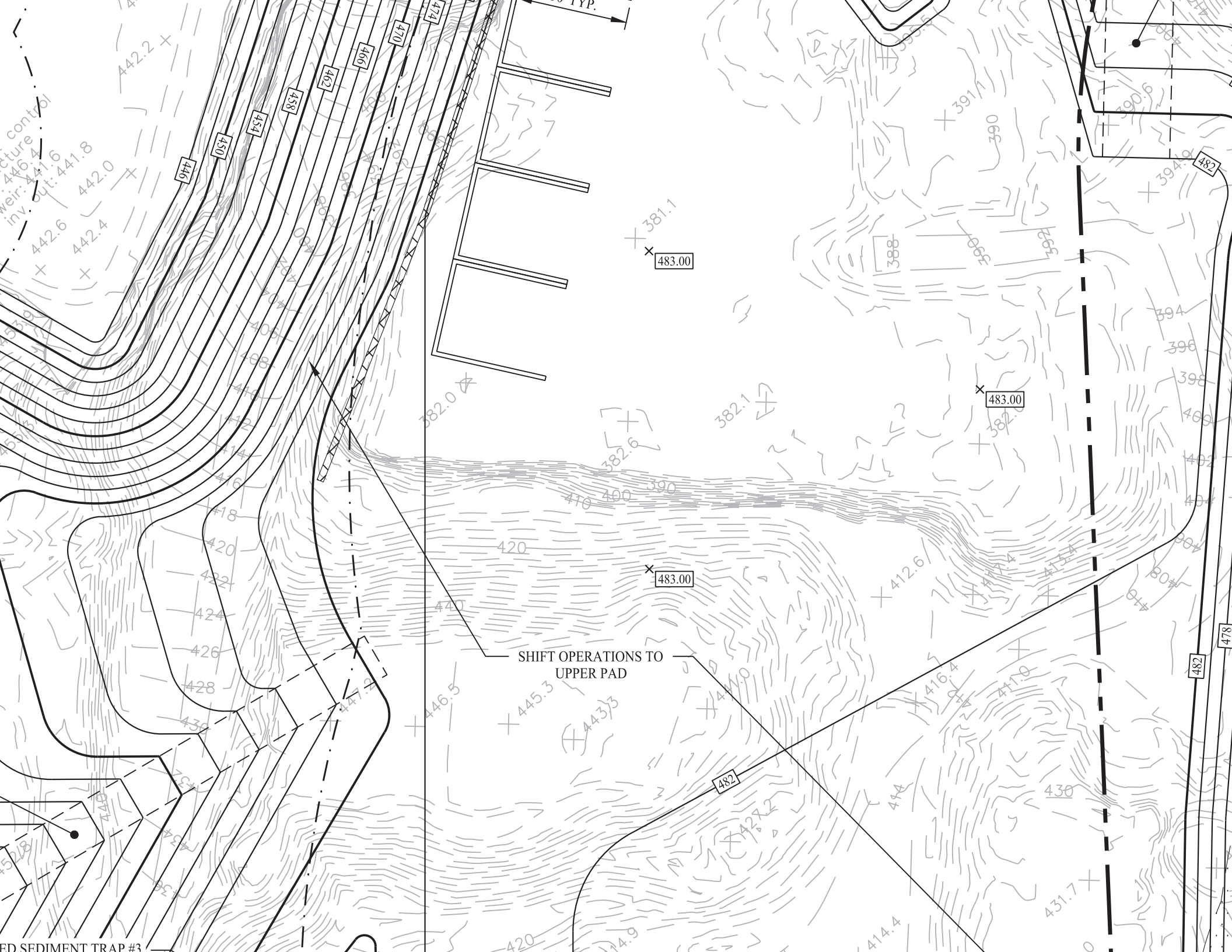

PROPOSED SEDIMENT
REQUIRED STORAGE =
PROVIDED STORAGE =
437.00
437.00
432
434
436
439
430


OF BERM
ELEV. 456
PROPOSED 2:1
SLOPE (TYP.)
PROPOSED SEDIMENT BASIN #4
REQUIRED STORAGE = 20,740 CF (768 CY)
PROVIDED STORAGE = 26,199 CF (970 CY)
UPPER PAD ELEVATION = 452.00
FLOW PATH (TYP.)
PROPOSED MATERIAL
STORAGE BINS (8 TOTAL)
452.25
452.25


2.33.2
2.33.1
PROPOSED SEDIMENT BASIN #2
PROPOSED SEDIMENT BASIN #1
PROPOSED OFFICE
LOD
SF
metal storage trailer
metal conveyer belt on wheels


REQUIRED STORAGE = 21,658 CF (802 CY)
PROVIDED STORAGE = 174,187 CF (6,451 CY)
PRO
00
419.2
410
412
417.00
SF
SF
SF
WLF #309
WLF #301
WLF #297
WLF #299
WLF #296
WLF #295
WLF #302
WLF #303
WLF #304
405.7
410
KNOCK OUT PROPOSED ORIFICES UPON COMPLETION
OF FINAL SITE GRADING AND STABILIZATION
AND HAYBALE
GRADING AND
EA (TYP.)

454
450
446
442
SF
LOD
436
435.50
CEASE OPERATIONS ON
LOWER PAD WHEN COMPLETE


SHIFT OPERATIONS TO
UPPER PAD
483.00
483.00
483.00
482
482
482
446
450
454
458
462
466
470
474
478

ENGINEER.

FINAL GRADING AND PAVING OPERATIONS:

1. ALL INLET AND OUTLET PROTECTION SHALL BE PLACED AND MAINTAINED AS SHOWN CONTROL PLANS AND DETAILS, AND AS DESCRIBED IN SPECIFICATIONS AND AS DESCR
2. NO CUT OR FILL SLOPES SHALL EXCEED 2:1 EXCEPT WHERE STABILIZED BY ROCK FACI EMBANKMENTS OR EROSION CONTROL BLANKETS, JUTE MESH AND VEGETATION. ALL BE SEEDED, AND ANY ROAD OR DRIVEWAY SHOULDER AND BANKS SHALL BE STABILI IMMEDIATELY UPON COMPLETION OF FINAL GRADING UNTIL TURF IS ESTABLISHED.
3. PAVEMENT SUB-BASE AND BASE COURSES SHALL BE INSTALLED OVER AREAS TO BE P AS FINAL SUB-GRADES ARE ESTABLISHED AND UNDERGROUND UTILITIES AND STORM SYSTEMS HAVE BEEN INSTALLED.
4. AFTER CONSTRUCTION OF PAVEMENT, TOPSOIL, FINAL SEED, MULCH AND LANDSCAPI ALL TEMPORARY EROSION CONTROL DEVICES ONLY AFTER ALL AREAS HAVE BEEN PA GRASS HAS BEEN WELL ESTABLISHED AND THE SITE HAS BEEN INSPECTED AND APPRO TOWN OF MONROE AND TOWN OF MONROE INLAND WETLANDS COMMISSION.

INSTALLATION OF SEDIMENTATION AND EROSION CONTROL MEASURES

I. SILTATION FENCE:
A. DIG A SIX INCH TRENCH ON THE UPHILL SIDE OF THE DESIGNATED FENCE LINE LOCA
B. POSITION THE POST AT THE BACK OF THE TRENCH (DOWNHILL SIDE), AND HAMMER T LEAST 1.5 FEET INTO THE GROUND.
C. LAY THE BOTTOM SIX INCHES OF THE FABRIC INTO THE TRENCH TO PREVENT UNDER STORM WATER RUN-OFF.
D. BACKFILL THE TRENCH AND COMPACT.

II. HAY BALES
A. BALES SHALL BE PLACED IN A SINGLE ROW, LENGTHWISE, ORIENTED PARALLEL TO T WITH ENDS OF ADJACENT BALES TIGHTLY ABUTTING ONE ANOTHER.
B. BALES SHALL BE ENTRENCHED AND BACKFILLED. A TRENCH SHALL BE EXCAVATED A BALE AND THE LENGTH OF THE PROPOSED BARRIER TO A MINIMUM DEPTH OF FOU AFTER THE BALES ARE STAKED, THE EXCAVATED SOIL SHALL BE BACKFILLED AGA BARRIER.
C. EACH BALE SHALL BE SECURELY ANCHORED BY AT LEAST TWO (2) STAKES.
D. THE GAPS BETWEEN BALES SHALL BE WEDGED WITH STRAW TO PREVENT WATER LE
E. THE BARRIER SHALL BE EXTENDED TO SUCH A LENGTH THAT THE BOTTOMS OF THE HIGHER IN ELEVATION THAN THE TOP OF THE LOWEST MIDDLE BALE, TO ENSURE TH WILL FLOW EITHER THROUGH OR OVER THE BARRIER, BUT NOT AROUND IT.

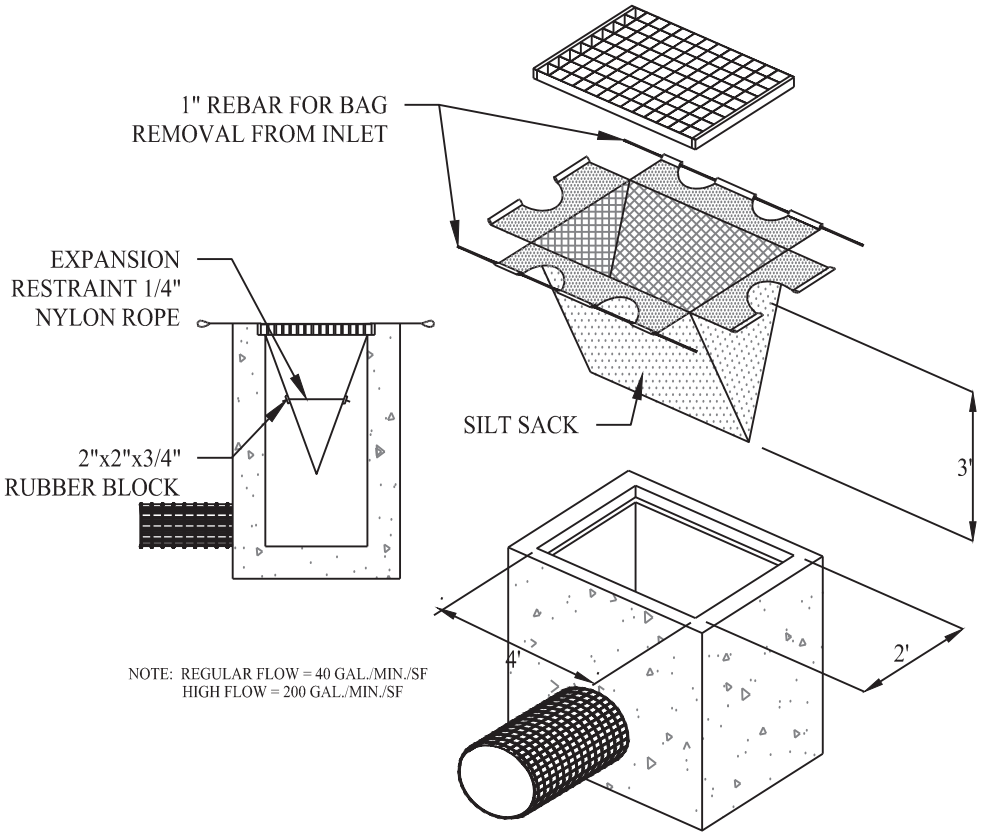
OPERATION AND MAINTENANCE OF SEDIMENTATION AND EROSION CONTROL MEASURES

I. SILTATION FENCE:
A. ALL SILTATION FENCES SHALL BE INSPECTED AS A MINIMUM WEEKLY OR AFTER EAC ALL DETERIORATED FABRIC AND DAMAGED POSTS SHALL BE REPLACED AND PROPE REPOSITIONED IN ACCORDANCE WITH THIS PLAN.
B. SEDIMENT DEPOSITS SHALL BE REMOVED FROM BEHIND THE FENCE WHEN THEY EXC OF ONE FOOT.

II. HAY BALES
A. ALL HAY BALE RINGS SHALL BE INSPECTED FOLLOWING EACH RAINFALL. REPAIR OR REPLACEMENT SHALL BE PROMPTLY MADE AS NEEDED.
B. DEPOSITS SHALL BE REMOVED AND CLEANED-OUT IF ONE HALF OF THE ORIGINAL HE BALES BECOMES FILLED WITH SEDIMENT.

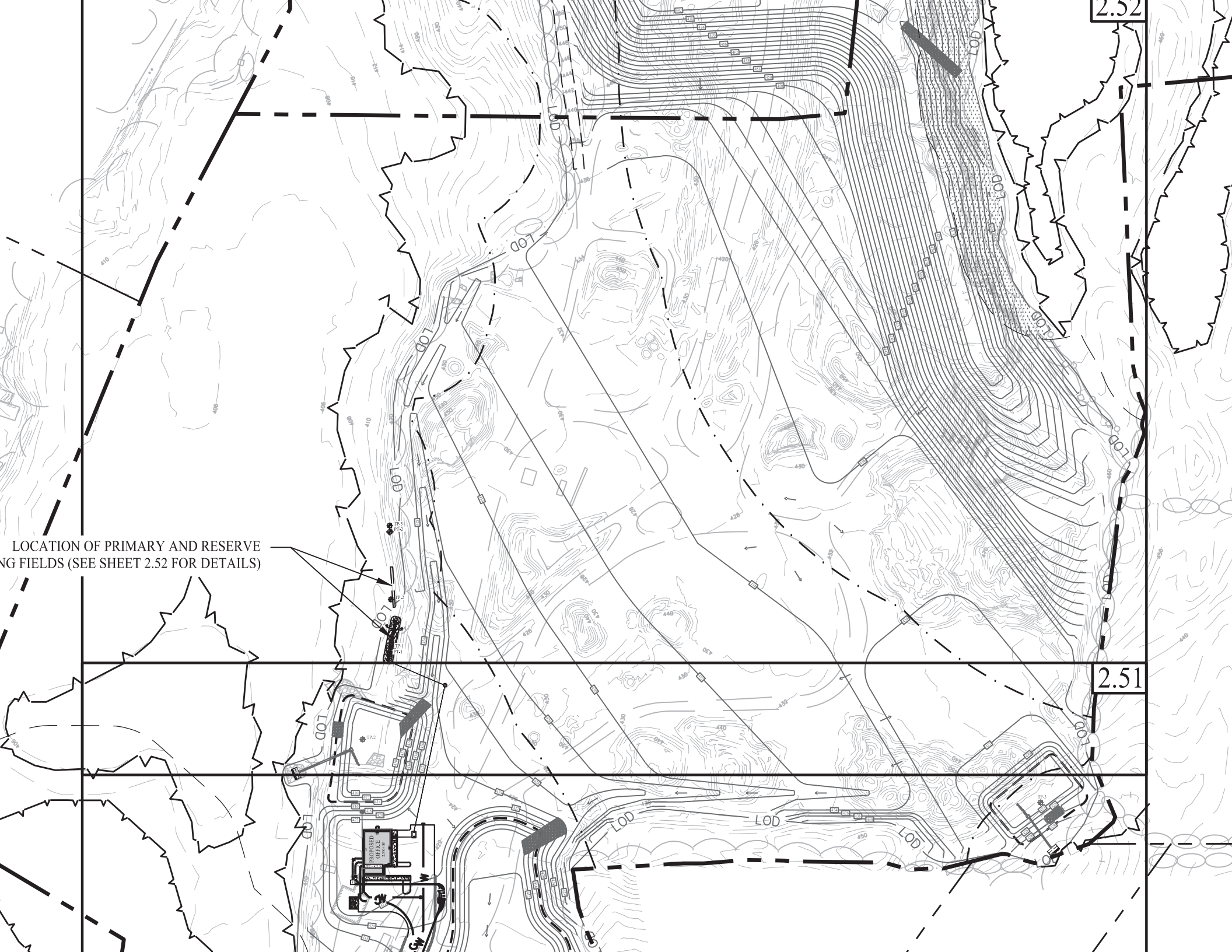
III. CHECK DAMS:
A. ALL STONE CHECK DAMS SHALL BE INSPECTED FOLLOWING EACH RAINFALL. REPAIR CHECK DAMS SHALL BE PROMPTLY MADE AND ACCUMULATED SEDIMENT REMOVED REACHES ONE HALF OF THE HEIGHT OF THE CHECK DAM.

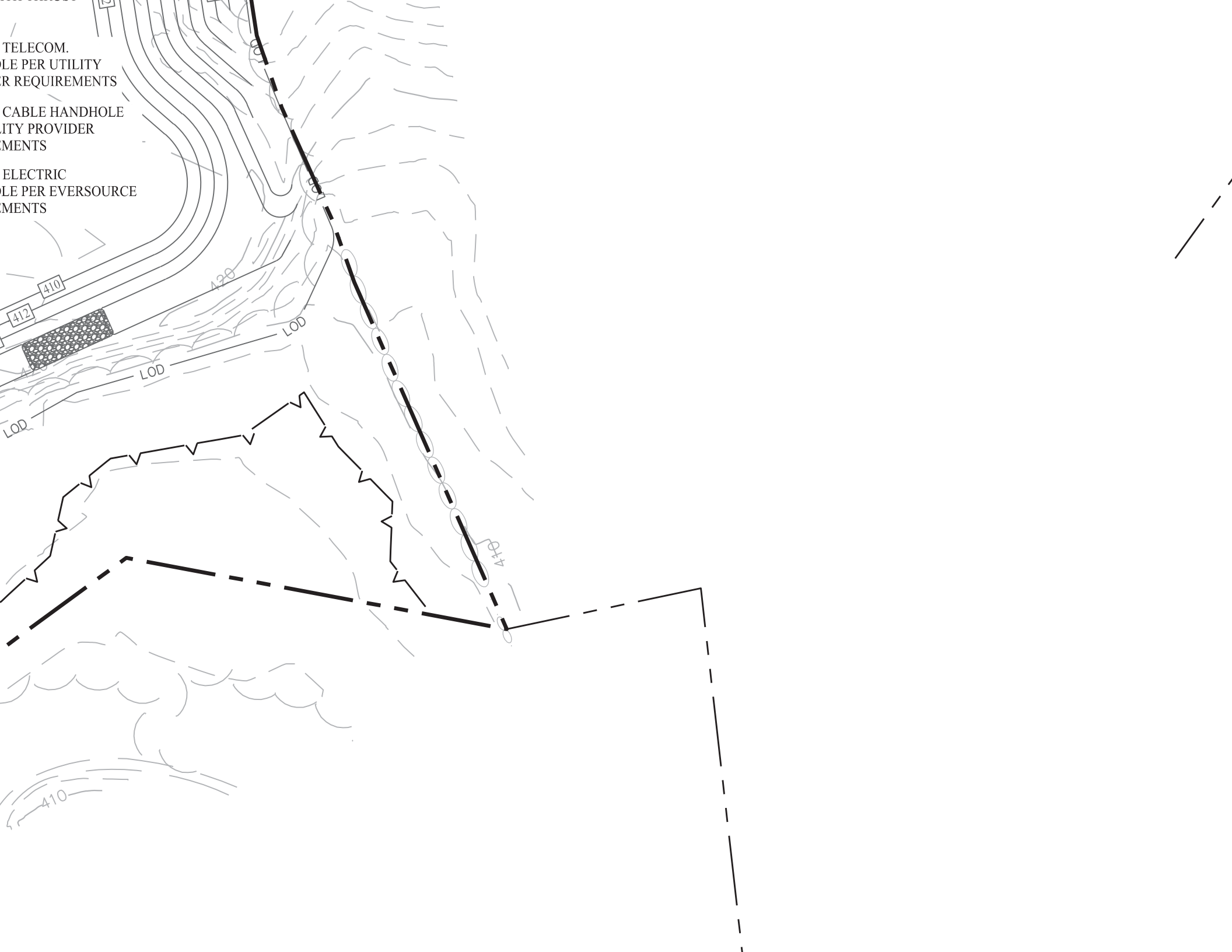
IV. TEMPORARY/PERMANENT DRAINAGE SWALES:
A. SWALES SHALL BE INSPECTED FOLLOWING EACH RAINFALL. REPAIR OF ANY WASHE ERODED SLOPES SHALL BE MADE PROMPTLY AND THE AREA SHALL BE RESEEDED AS



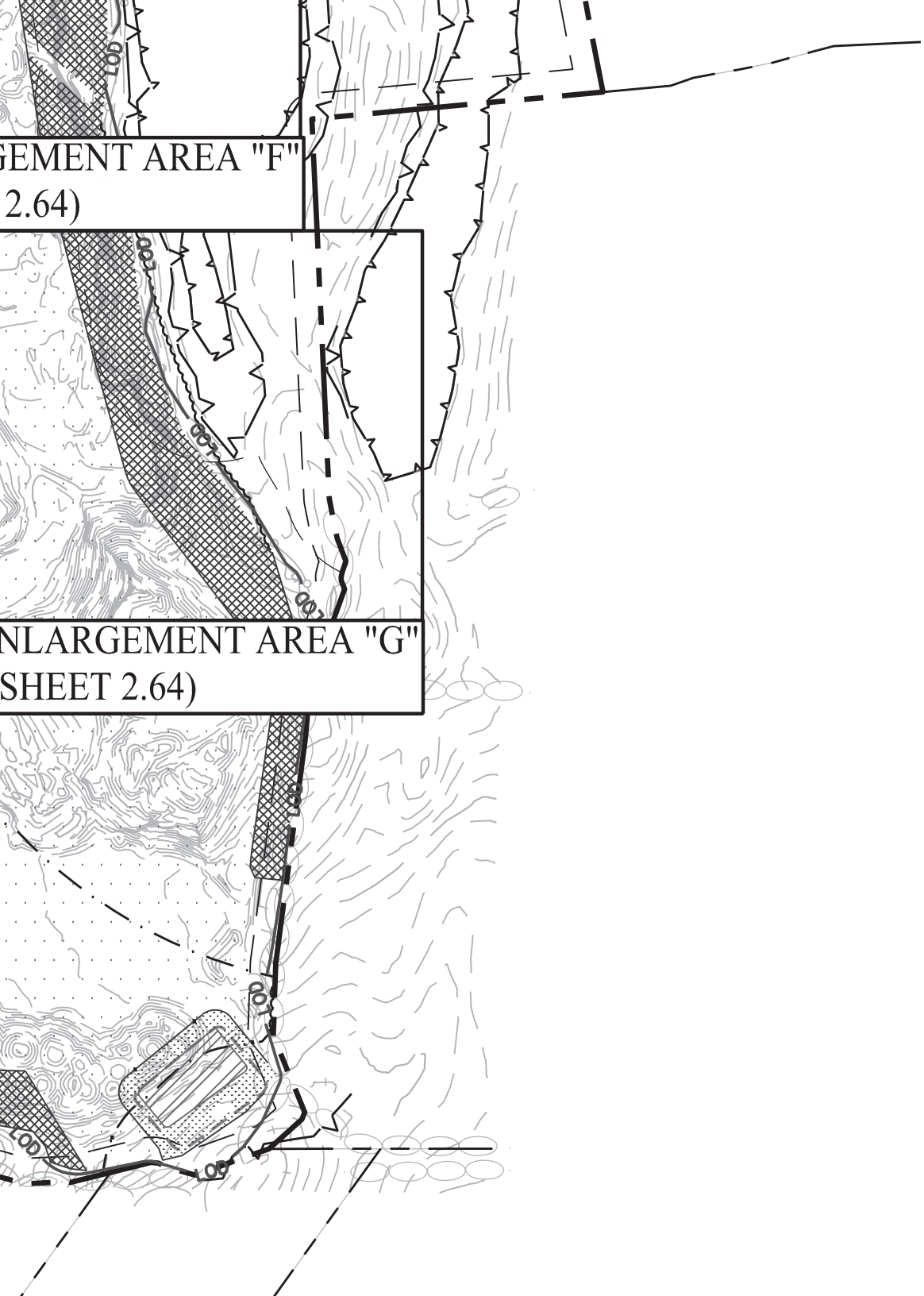
SILT SACK DETAIL

SCALE: NTS


2.52
2.51
LOCATION OF PRIMARY AND RESERVE
NG FIELDS (SEE SHEET 2.52 FOR DETAILS)
LOD
TP-1
TP-2
TP-3
PROPOSED
OFFICE


TELECOM.
LE PER UTILITY
R REQUIREMENTS
CABLE HANDHOLE
ITY PROVIDER
MENTS
ELECTRIC
LE PER EVERSOURCE
MENTS
410
412
420
LOD
LOD
LOD
410
410

ATE LOCATION OF
ON TEST HOLE



SB	13	SAMBUCUS CANADENSIS
VA	7	VACCINIUM ANGUSTIFOLIUM
VD	7	VIBURNUM DENTATUM
VC	7	VACCINIUM CORYMBOSUM

SEED MIX

NEW ENGLAND WETMIX (NEW ENGLAND WETLAND PLANTS, INC

APPLICATION RATE: 1 LB/2,500 S.F.

NEW ENGLAND ROADSIDE MATRIX UPLAND MIX

APPLICATION RATE: 1 LB/2,500 S.F.

NEW ENGLAND EROSION CONTROL/RESTORATION MIX

APPLICATION RATE: 1 LB/2,500 S.F.

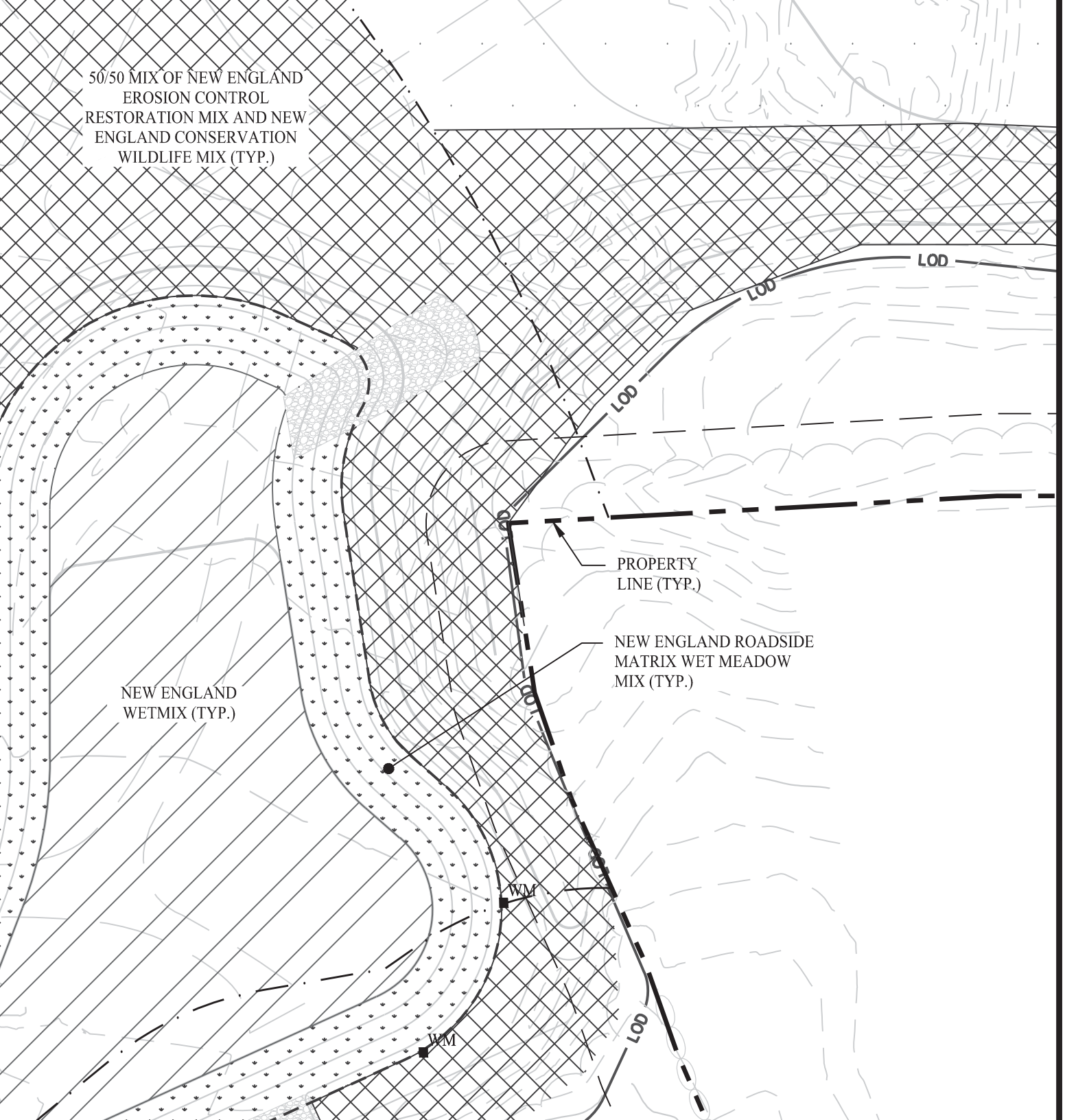
50:50 MIX OF NEW ENGLAND EROSION CONTROL/RESTORATION

APPLICATION RATE: 1 LB/ 1,250 S.F. (EROSION CONTROL/RES

APPLICATION RATE: 1 LB/ 725 S.F. (CONSERVATION WILDLI

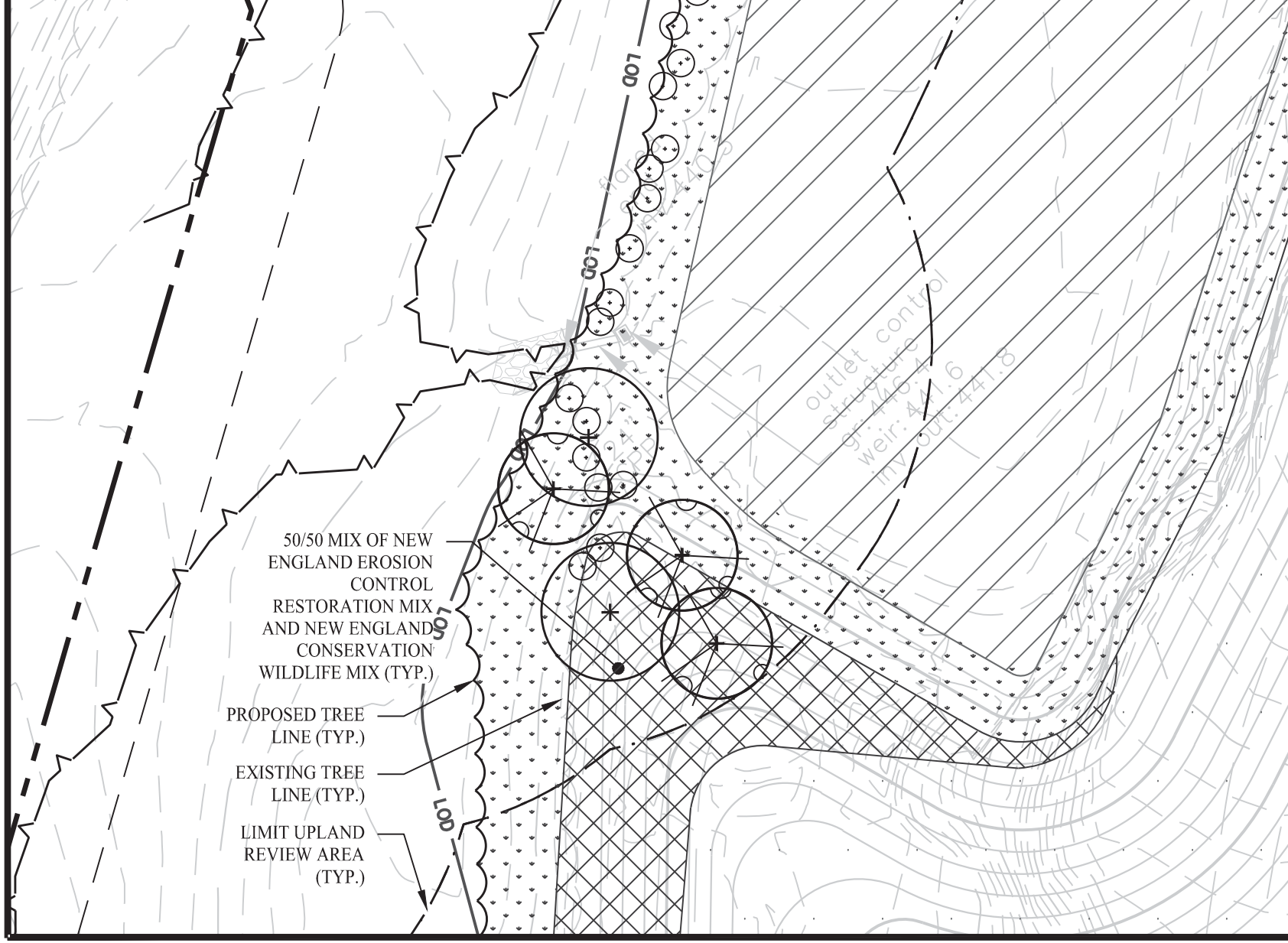
LAWN: PENNINGTON SMART SEED SUN AND SHADE

APPLICATION RATE PER MFR. RECOMMENDATIONS

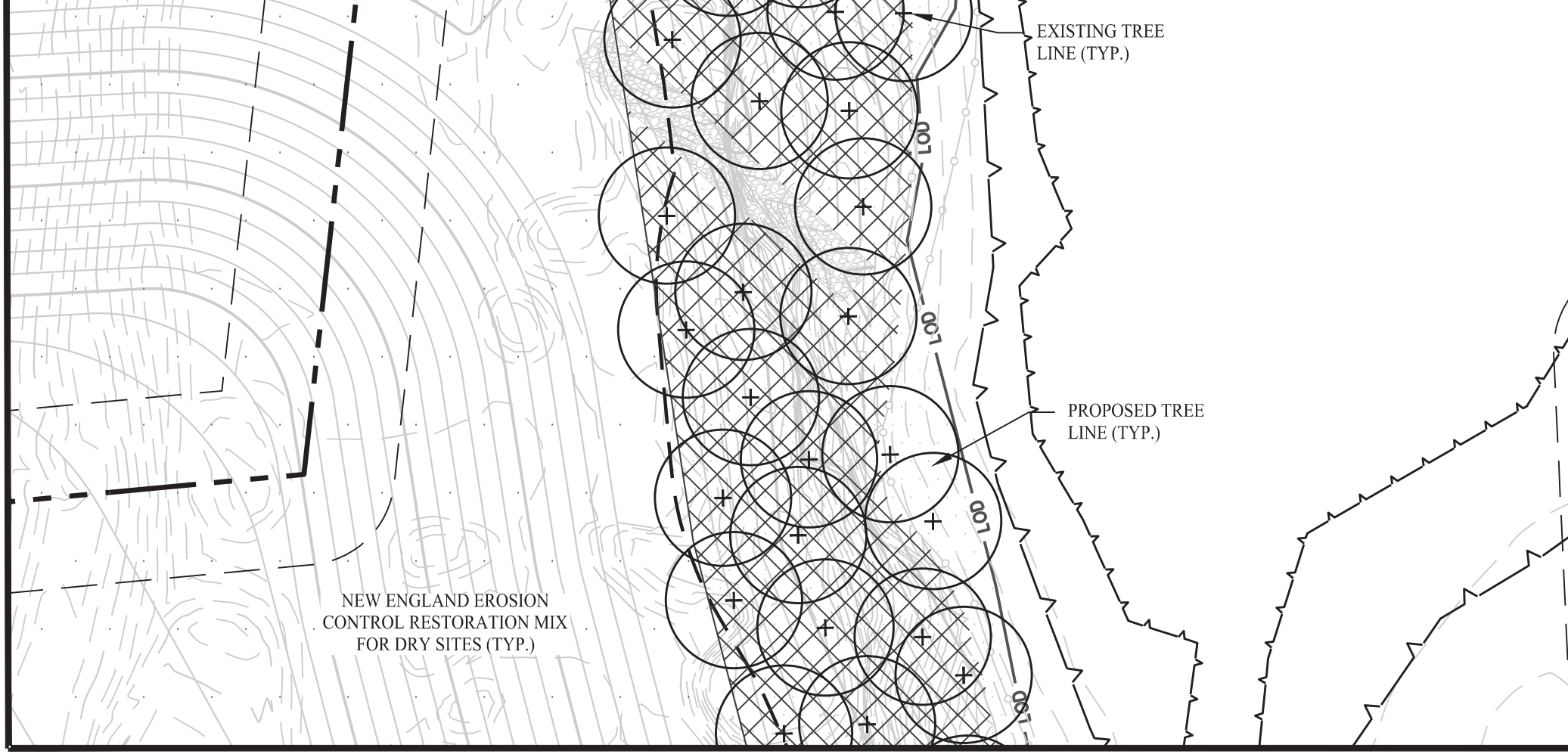


PLANT SCHEDULE

KEY	QTY	BOTANICAL NAM



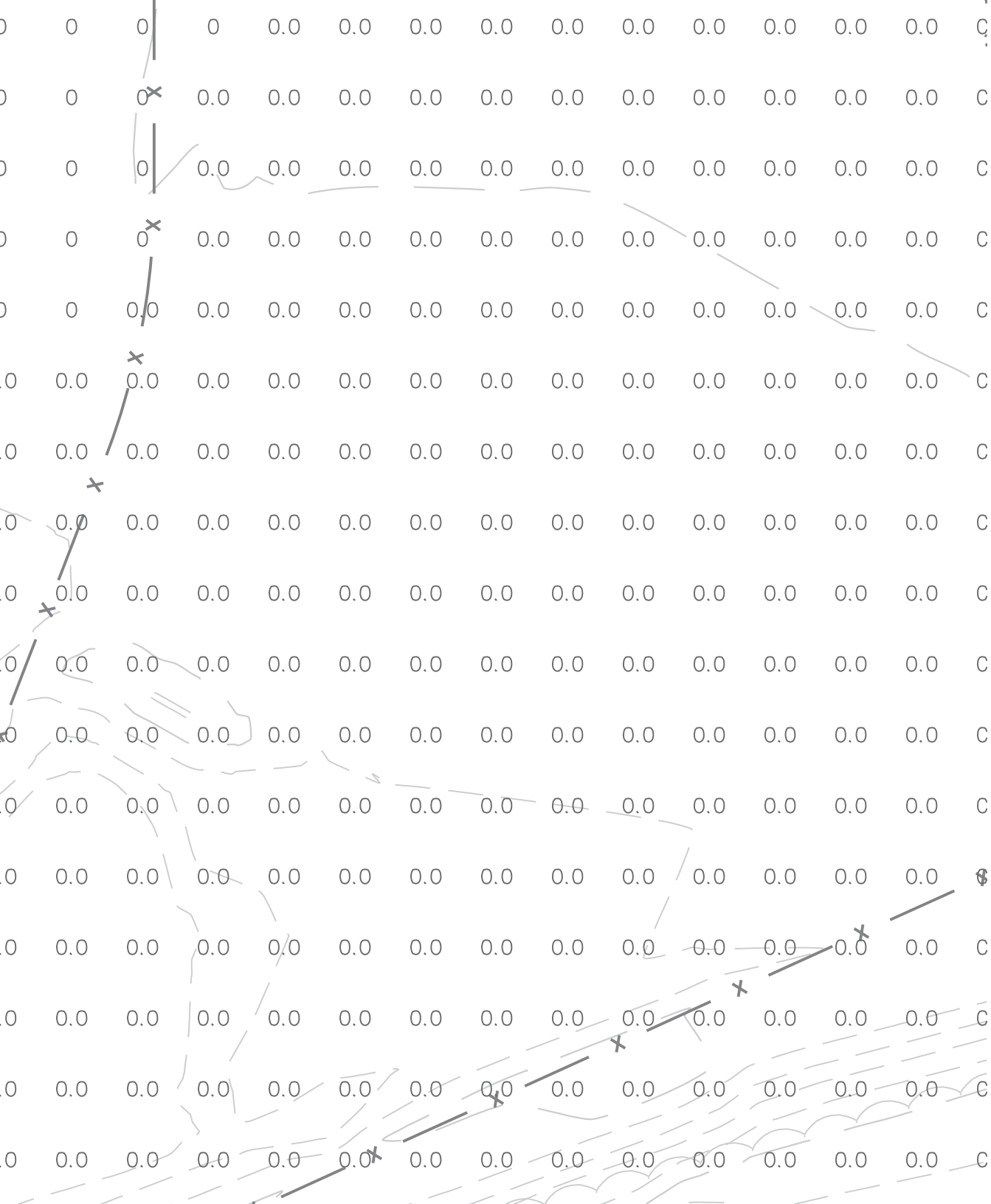
ENLARGEMENT AREA "D"

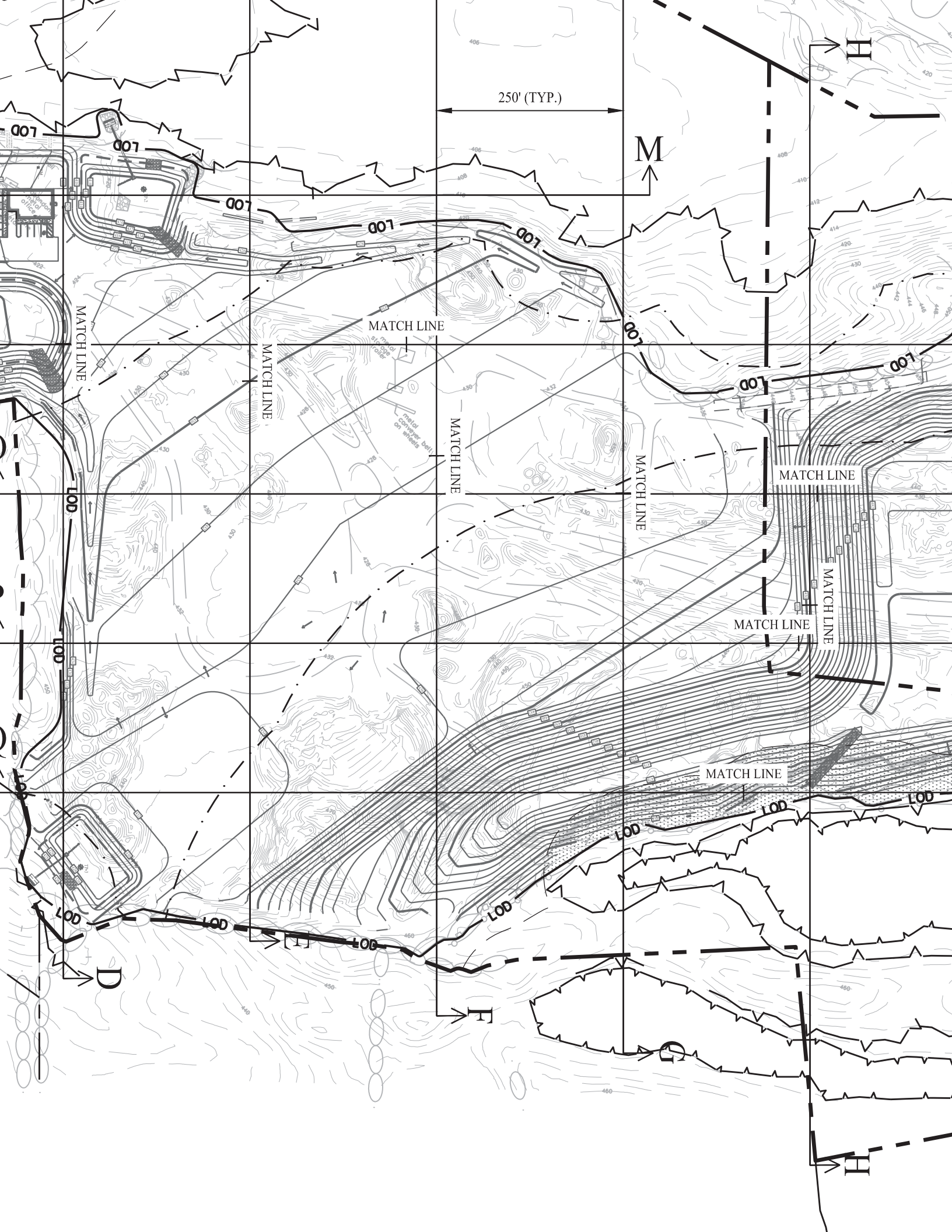


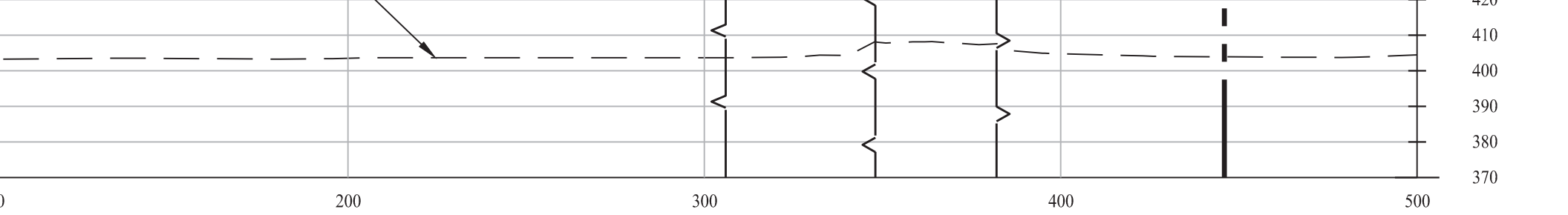
ENLARGEMENT AREA "F"

PLANT SCHEDULE

KEY	QTY	BOTANICAL NAME	COMMON NAME	ROOT	SIZE	COMMENTS
TREES						

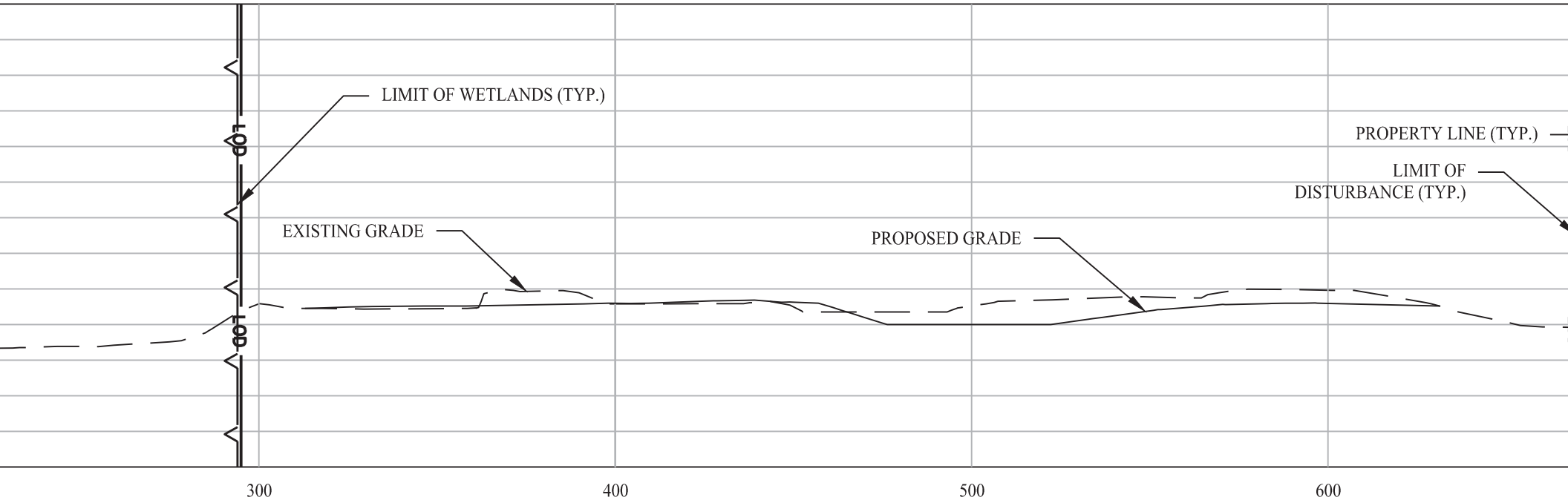



250' (TYP.)
M
H
MATCH LINE
MATCH LINE
MATCH LINE
MATCH LINE
MATCH LINE
MATCH LINE
MATCH LINE
MATCH LINE
LOD
D
F
G
H



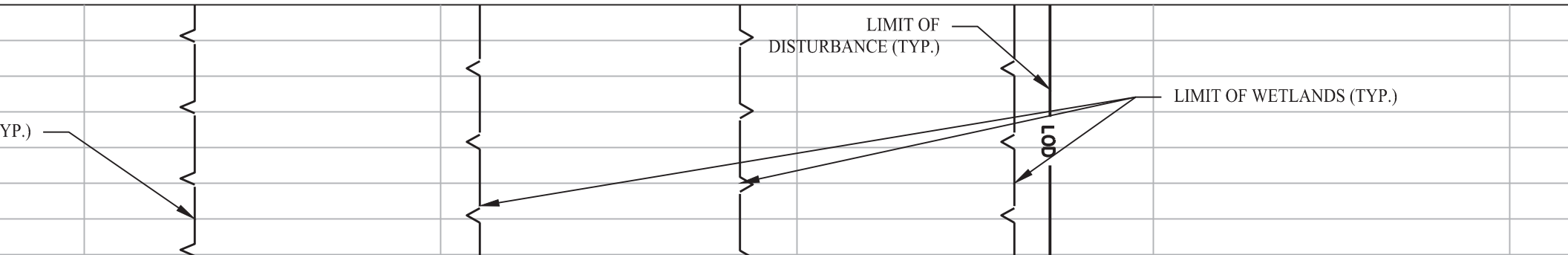
SECTION B

SCALE: H:1" = 40'
V:1" = 40'



SECTION C

SCALE: H:1" = 40'
V:1" = 40'

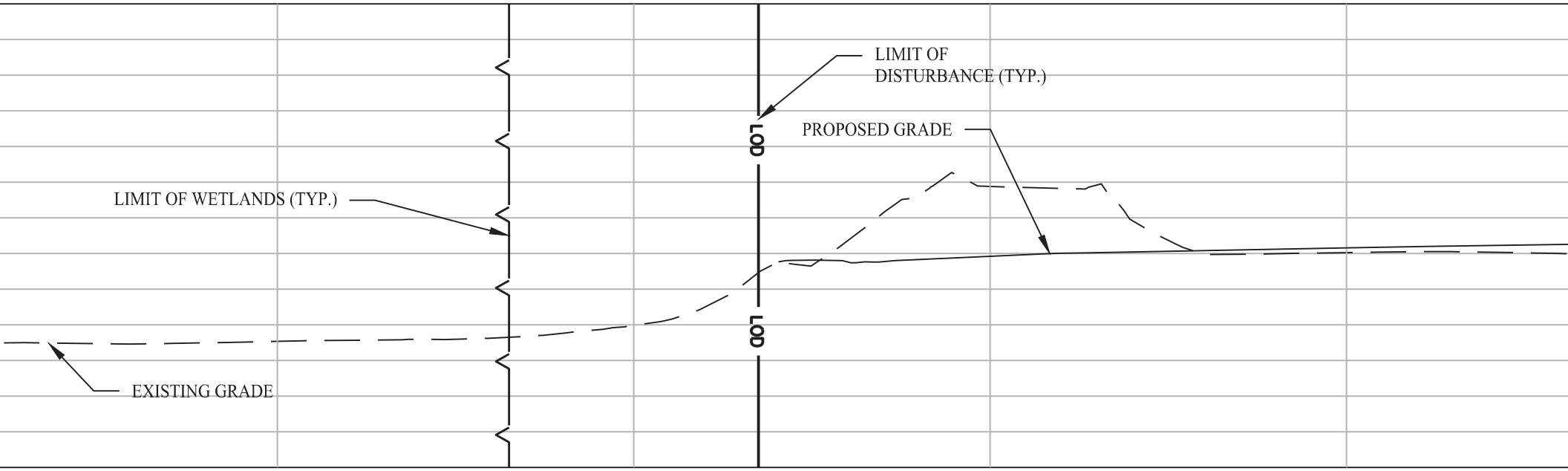


DIST

300 400 500 600

SECTION E (CONTINUED)

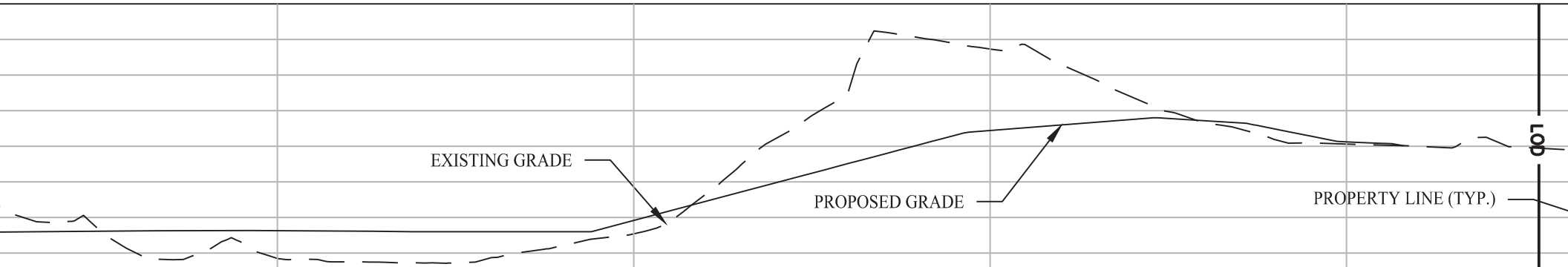
SCALE: H:1" = 40'
V:1" = 40'

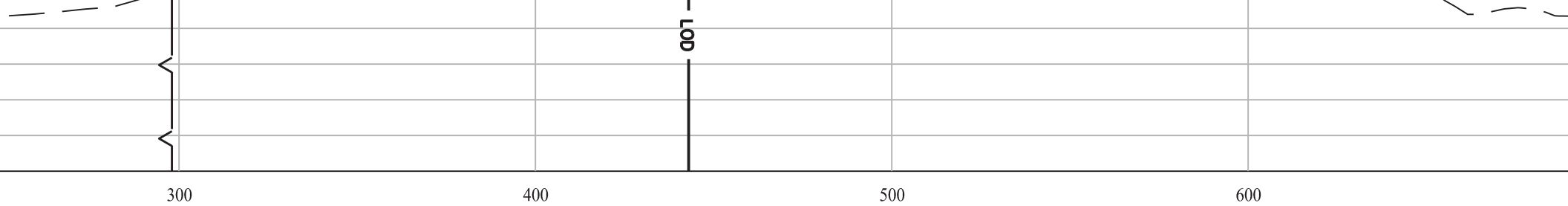


300 400 500 600

SECTION F

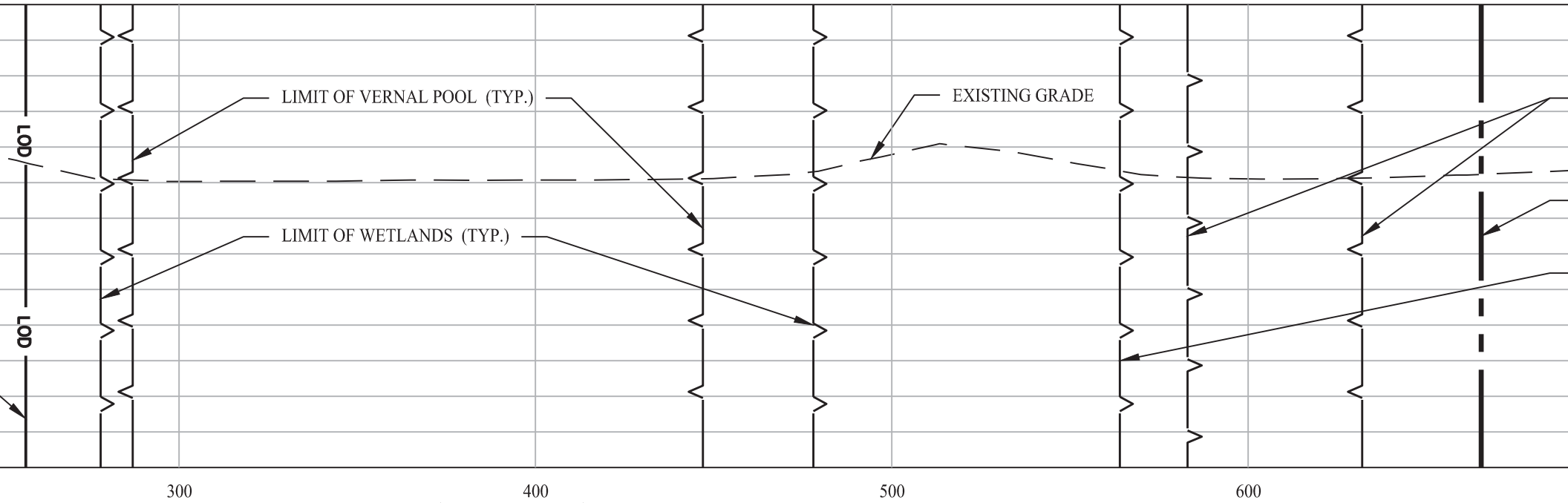
SCALE: H:1" = 40'
V:1" = 40'





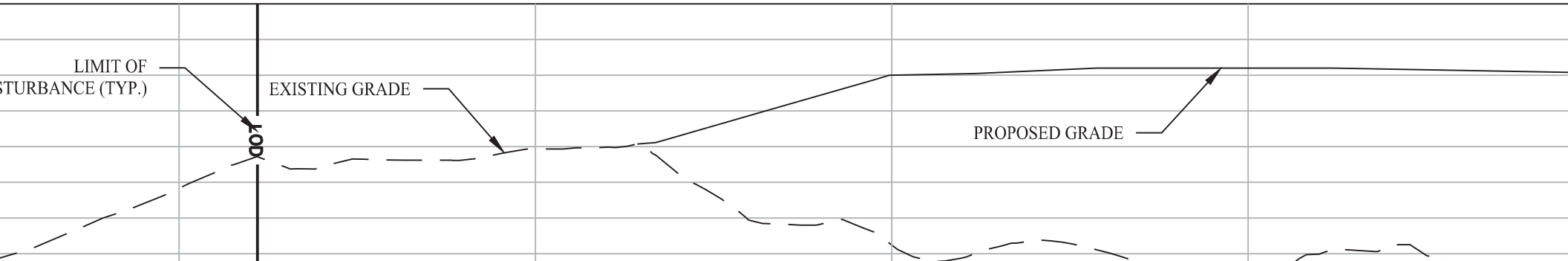
SECTION H

SCALE: H:1" = 40'
V:1" = 40'



SECTION H (CONTINUED)

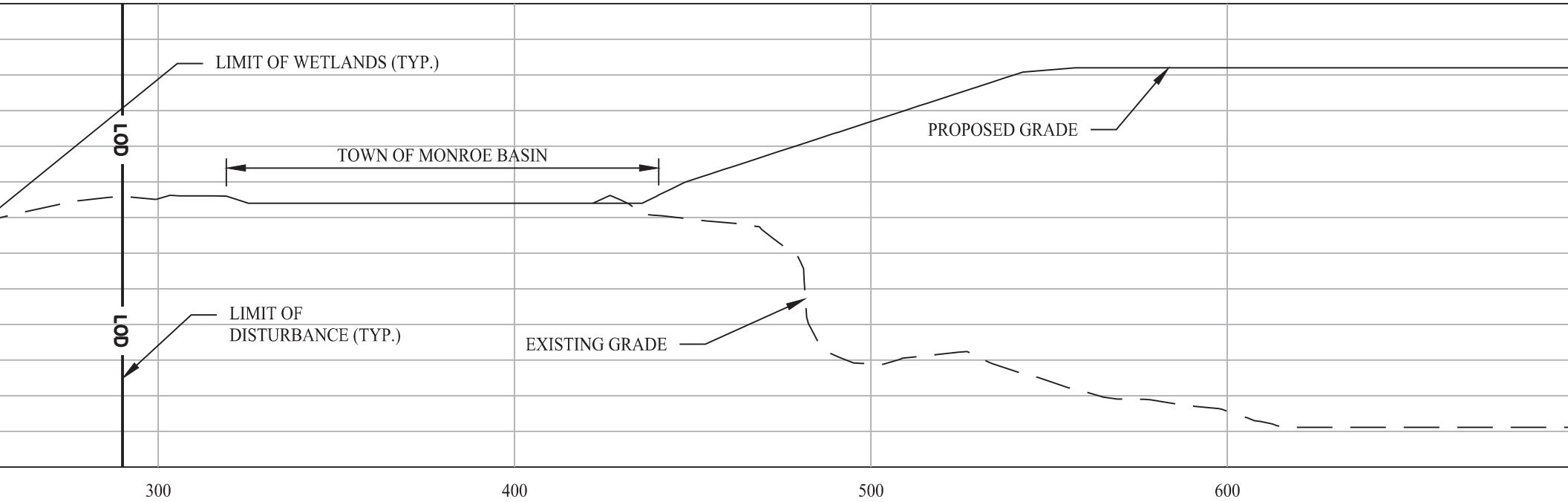
SCALE: H:1" = 40'
V:1" = 40'





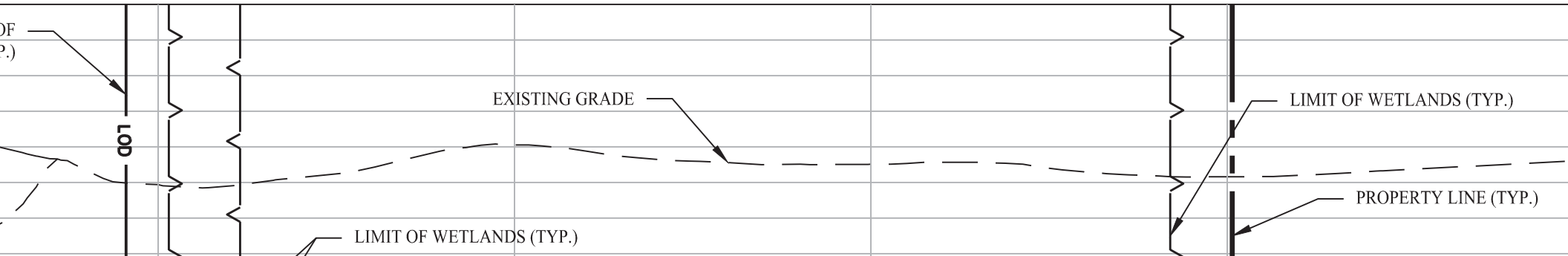
SECTION J (CONTINUED)

SCALE: H:1" = 40'
V:1" = 40'



SECTION K

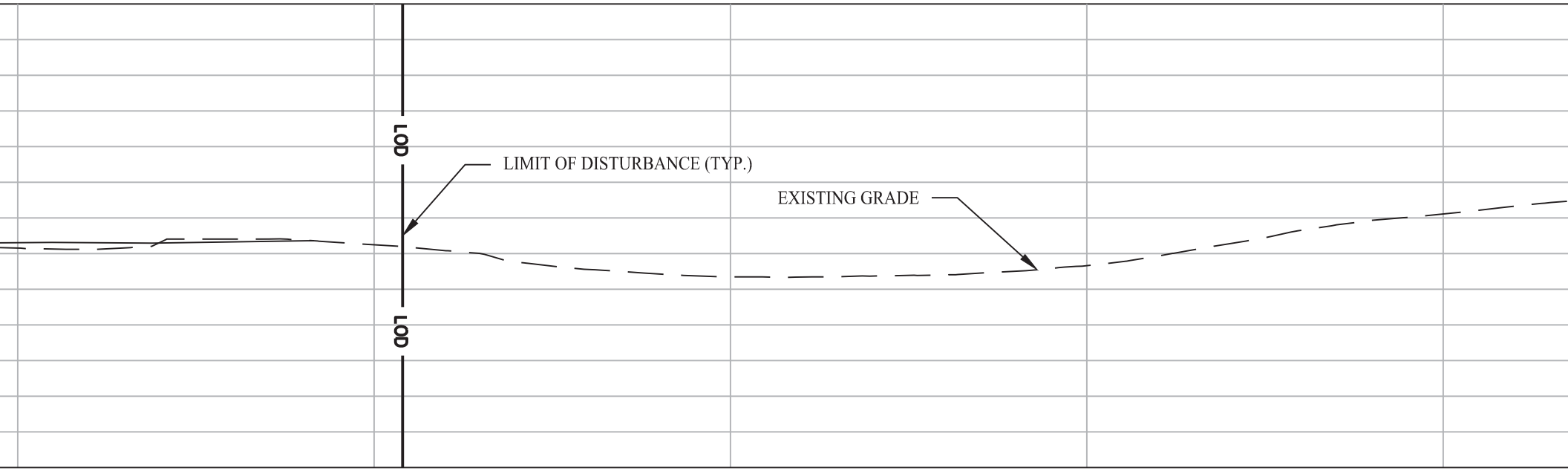
SCALE: H:1" = 40'
V:1" = 40'



200 300 400 500 600

SECTION N

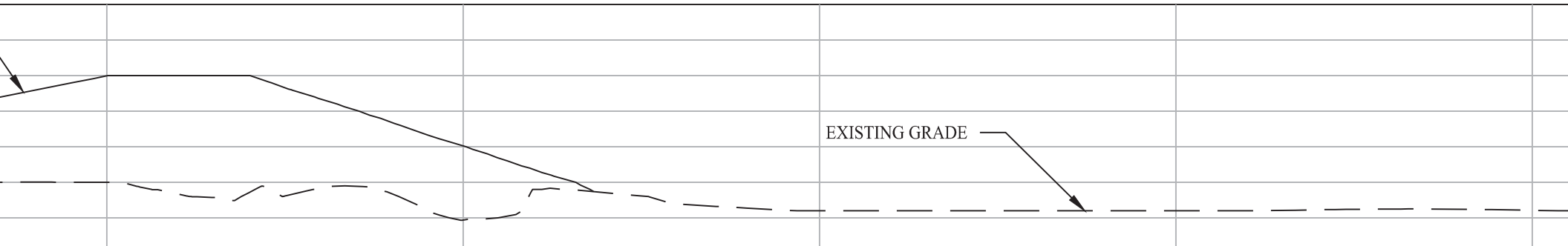
SCALE: H:1" = 40'
V:1" = 40'

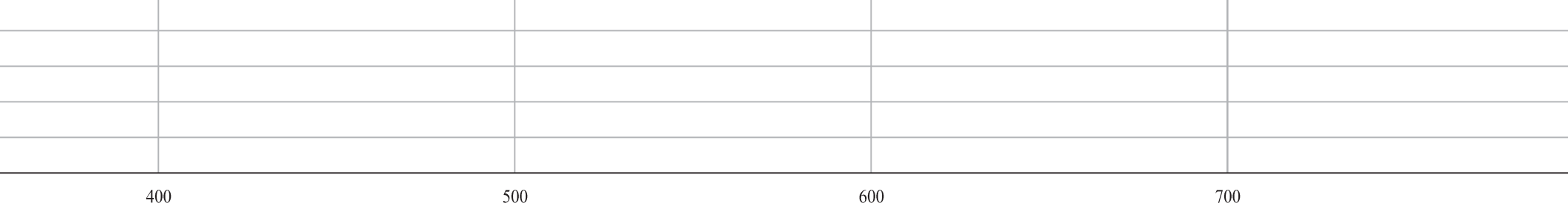


200 300 400 500 600

SECTION N (CONTINUED)

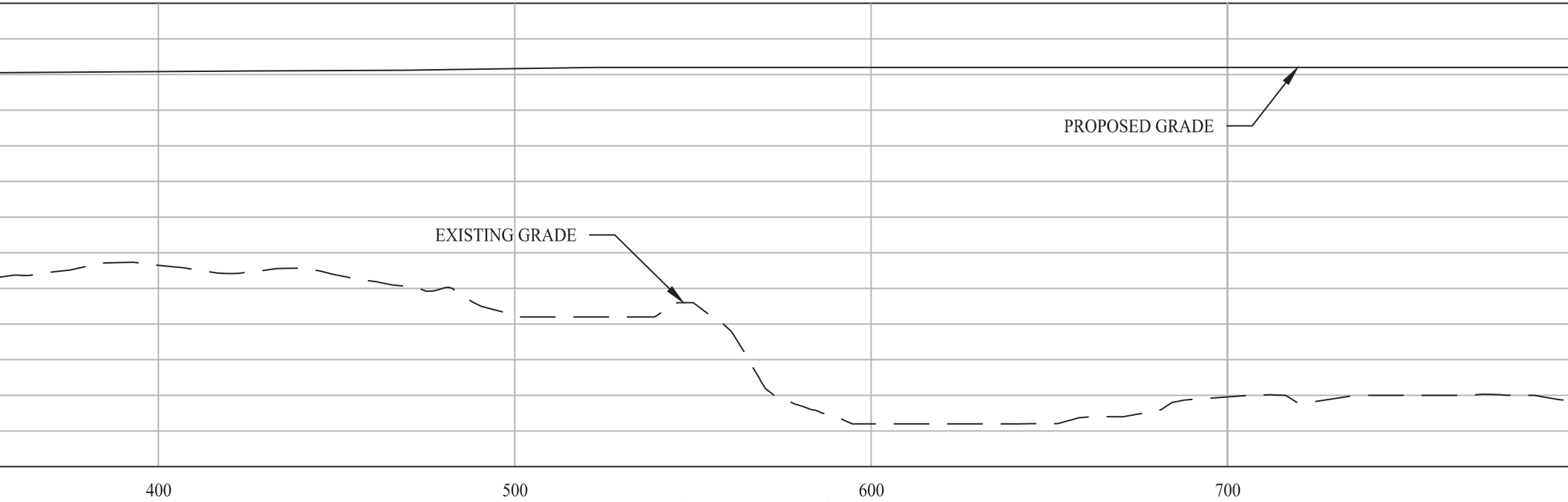
SCALE: H:1" = 40'
V:1" = 40'





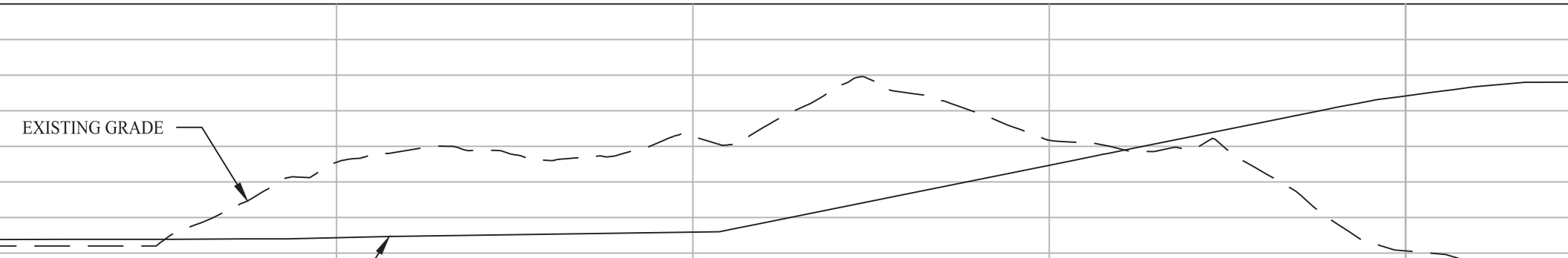
SECTION P

SCALE: H:1" = 40'
V:1" = 40'



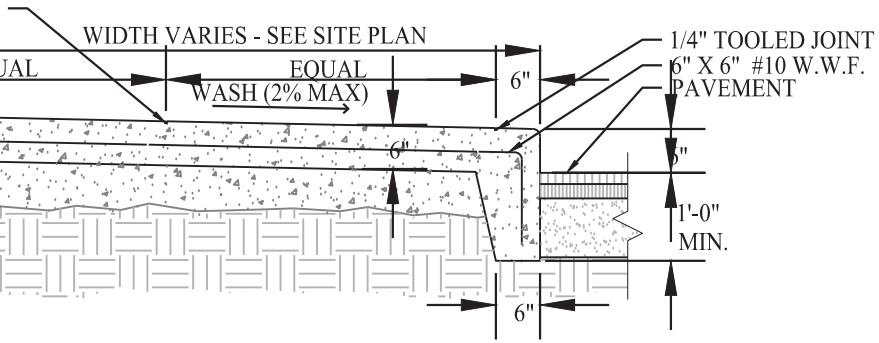
SECTION P (CONTINUED)

SCALE: H:1" = 40'
V:1" = 40'



PAVING DETAILS

SCALE: NTS



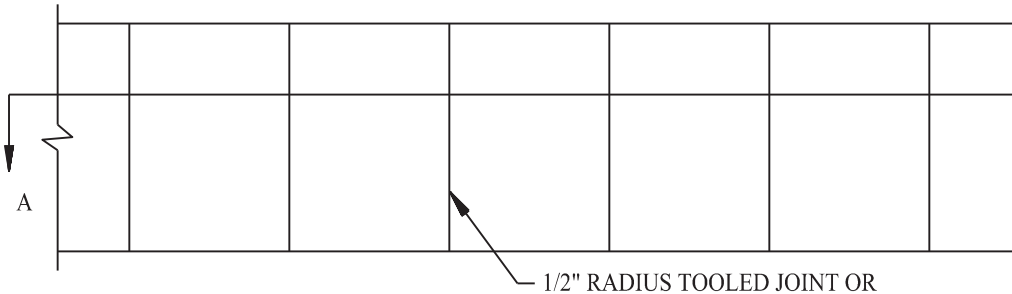
OINT 20' O.C.
4" TOOL JOINT
DIRECTED.
O BE 3000 P.S.I.

INTEGRAL CURB

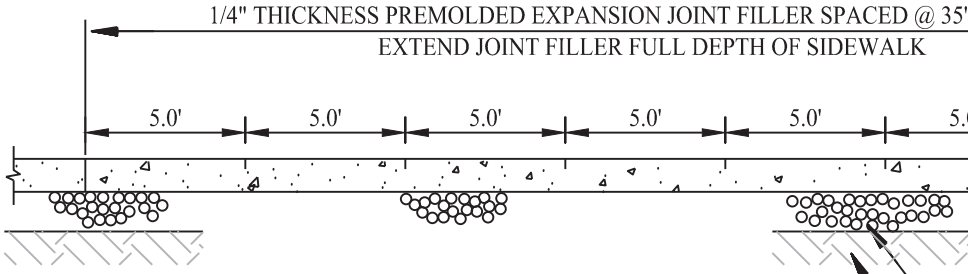
SCALE: NTS

CONCRETE BOLLARD D

SCALE: NTS



PLAN VIEW



SECTION A-A

NOTE:
WHERE REQUIRED REINFORCEMENT
WILL BE No. 3 BARS 24" O.C.
EACH WAY MAX. SPACING, OR
6 x 6 - W1.4 X W1.4 WWF

CONCRETE S

SCALE:

2”

DETERMINED BY ENGINEER IN PEAT
AND UNSUITABLE AREAS

CRETE DISTRIBUTION BOX

DETAIL PROVIDED BY CONNECTICUT PRECAST CORP.

TYPICAL SANITARY SEWER TRENCH SECTION

SCALE: NTS

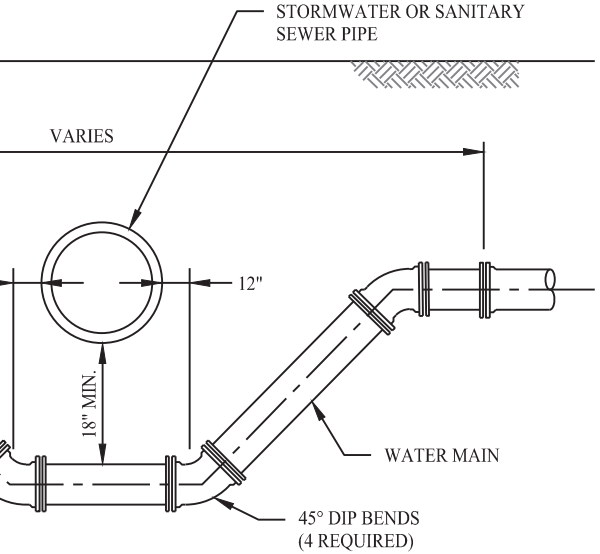
PAVEMENT PE
REQUIREMENT

GRAVEL OR PROCES

VERTICAL LIMIT OF
LINE IN ROCK SEE S

SELECT MATERIAL
THOROUGHLY COM

NO ROCK SHALL BE
4" FROM OUTSIDE O

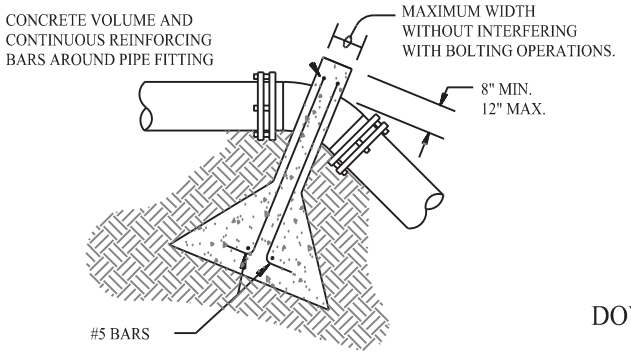


I LENGTH AS DETERMINED BY DIPRA RESTRAINED JOIN

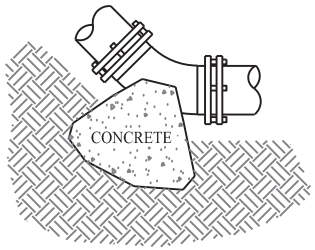
ED, FROM DEFLECTION POINT IN BOTH DIRECTIONS.
EWER IS AN ALTERNATIVE METHOD OF ADDRESSING A
8" VERTICAL SEPARATION DISTANCE. IN SUCH INSTANCES,
ON SHALL BE 12".

N CROSSING DETAIL

SCALE: NTS



UPWARD THRUST BLOCKING



DOWNWARD THRUST BLOCKING

(SEE HORIZONTAL BLOCKING DETAIL)

(ALL BENDS SIMILAR)

UPWARD THRUST BLOCKING (REQUIRED REINFORCING BARS & CUBIC YARDS OF P.C. CONCRETE												
PIPE SIZE	90° BEND			45° BEND			22½° BEND			11¼° BEND		
	CONC. C.Y.	REINF QTY.	REINF SIZE	CONC. C.Y.	REINF QTY.	REINF SIZE	CONC. C.Y.	REINF QTY.	REINF SIZE	CONC. C.Y.	REINF QTY.	REINF SIZE

NOTES:

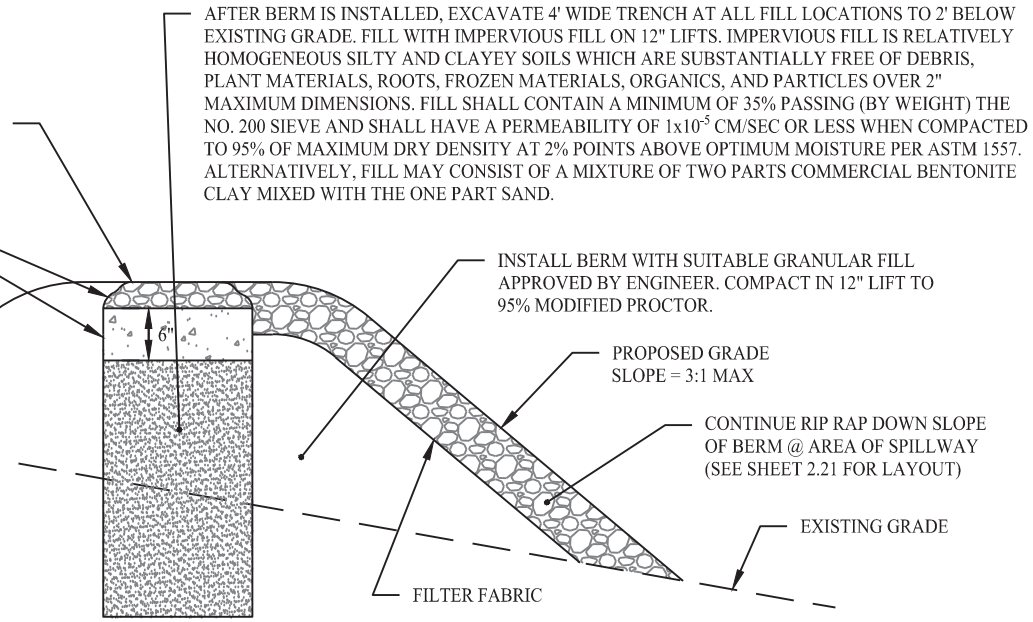
1. DO NOT COVER BELLS OR FLANGES WITH CONCRETE
2. WRAP ALL FITTINGS WITH VISQUEEN.
3. BACK ALL TEES ACCORDING TO SIZE OF BRANCH.
4. BACKING FUTURE LINE EXTENSIONS SHALL BE SUCH THAT LATER REMOVAL IS POSSIBLE.
5. ALL BENDS WHERE FITTINGS ARE USED, BOTH HORIZONTAL OR VERTICAL SHALL BE BACKED.
6. REACTION BACKING TABLE IS BASED ON ____ P.S.I. AND SOIL BEARING PRESSURE OF _____ lb./sq.ft. ADDITIONAL BACKING MAY BE REQUIRED IN SOME AREAS AS DIRECTED BY ENGINEERS.
7. ALL CONCRETE SHALL BE 2500 P.S.I.
8. 18" AND LARGER REQUIRES SPECIFIC ANTI-THRUST DESIGN.

VERTICAL THRUST BLOCKING DETAIL

SCALE: NTS

HORIZONT
LINE IN RO

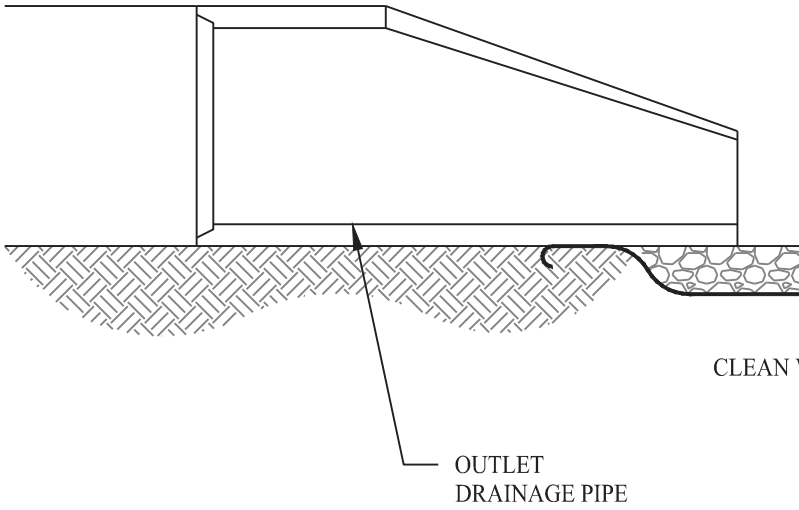
SCALE: NTS

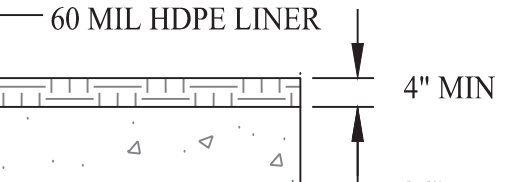


SPILLWAY IN FILL SECTION

SCALE: NTS

SCALE: NTS





ENGINEERING REPORT

For The Proposed:

Proposed Site Development & Restoration

Located At:

64 Cambridge Drive & 4 Independence Drive
Monroe, Connecticut 06468

Prepared On:

May 26, 2020

Prepared By:

SOLLI ENGINEERING

501 Main Street
Monroe, Connecticut 06468
T: (203) 880-5455 F: (203) 880-9695

Prepared For:

Astro Land Holdings LLC & Spacely Land Holdings LLC

Kevin M. Solli
CT PE #25759

TABLE OF CONTENTS

EXECUTIVE SUMMARY 3
INTRODUCTION 4
PROJECT DESCRIPTION 4
FORMER CONDITIONS 4
EXISTING CONDITIONS 4
PROPOSED CONDITIONS 5
STORMWATER MANAGEMENT 6
METHODOLOGY 6
EXISTING HYDROLOGY 7
PROPOSED HYROLOGY & HYDRAULICS 8
WATERSHED COMPARISON 11
STORMWATER CONCLUSION 11
SEPTIC SYSTEM DESIGN 12
SOIL CHARACTERISTICS 12
EXISTING SITE CONDITIONS 13
PROPOSED SEPTIC DESIGN 13
SOIL EROSION AND SEDIMENT CONTROL 14
PHASE ONE 14
PHASE TWO 15
PHASE THREE 15
EARTHWORK ANALYSIS & MATERIAL INTAKE PROTOCOL 15
OVERALL EARTHWORK ANALYSIS 15
PHASE ONE EARTHWORK OPERATIONS 16
PHASE TWO EARTHWORK OPERATIONS 16
PHASE THREE EARTHWORK OPERATIONS 16
MATERIAL INTAKE PROTOCOL 17
SITE UTILITIES 17
DESCRIPTION OF FILLING AND/OR EXCAVATION ACTIVITY WITHIN REGULATED AREA 18

LIST OF APPENDICES

APPENDIX A: FIGURES
Site Location Map (Figure 1)
FEMA Flood Map (Figure 2)
Soil Survey Map (Figure 3)
Public Water Supply Watershed Map (Figure 4)
Regulated Area Map (Figure 5)
Slope Area Map (Figure 6)

APPENDIX B: HYDROLOGY
Precipitation Data
Existing Drainage Area Map (DA-1)
Existing HydroCAD Report
Proposed Drainage Area Map (DA-2)
Proposed HydroCAD Report
Grass-Lined Swale HydroCAD Report
Hydrograph Return Recap Period Table
Hydrograph Summary Report

APPENDIX C: UTILITY INFORMATION
Drainage Test Pit Logs
Septic Test Pit Logs
Percolation Test Logs

APPENDIX D: MATERIAL ACCEPTANCE PROCEDURE
Material Acceptance Procedure
Excerpt from "Connecticut Department of Environmental Protection's Regulations for Solid Waste Management"

APPENDIX E: INSPECTION & MAINTENANCE PLAN
Long-Term Inspection & Maintenance Plan

APPENDIX F: PLANS
Watershed Area Maps (WS1, WS2, WS3, WS4)

EXECUTIVE SUMMARY

Solli Engineering has prepared this Engineering Report to provide an analysis of the stormwater drainage, utilities, soil erosion and sediment control measures, and remediation to existing uplands associated with the proposed Office Building and site improvements located at 64 Cambridge Drive & 4 Independence Drive, Monroe, Connecticut. The developed area of the project consists of approximately 39.03± acres of the total site's 71.90± acres. The design is intended to be in compliance with all applicable Town of Monroe codes and regulations as well as all other applicable state and federal requirements and regulations.

The site, consisting of 64 Cambridge Drive and 4 Independence Drive, totals approximately 71.90± acres, and is accessed via Cambridge Drive, providing access to the project site from Pepper Street. 64 Cambridge Drive totals 52.93 acres and is owned by Astro Land Holdings, LLC, and 4 Independence Drive totals 18.97 acres and is owned by Spacely Land Holdings, LLC.

The proposed development consists of the construction of a ±2,360 square-foot office building with associated driveways, parking lots, drainage and utilities. The proposed development will be accessed from Cambridge Drive, and will include new concrete sidewalks and a parking area at the front of the proposed building.

The proposed development will result in an increase in impervious area of approximately 0.46 acres compared to existing site conditions. The project includes the construction of three stormwater basins located in the southeastern corner of the property, to the north of the proposed building, and to the southeast of the proposed building. The stormwater basins serve to attenuate the water quality volume and increase in peak runoff from the proposed development and provide the adequate sediment storage during construction of the proposed development and improvements to the overall site. The proposed improvements and stormwater measures will result in improved water quality and the restoration of watersheds to the pre-existing condition of the property, prior to any site disturbance on the site.

The project proposes to import 1,304,870 cubic yards of material to the northern portion of the property and restore watersheds to the wetland system along the easterly property boundary. The applicant has developed a comprehensive Material Acceptance Procedure that has been implemented on the property. This procedure establishes a strict regimen of inspection, screening and testing requirements which is to be undertaken for any material proposed to be placed on the property. The procedure establishes that only materials which meet the definition of "Clean Fill" in accordance with Section 22a-201-1 of the Connecticut General Statutes and the Regulations of Connecticut State Agencies and the Connecticut Department of Energy and Environmental Protection (CTDEEP) requirements.

The stormwater quality measures were designed in accordance with the "2004 Connecticut Stormwater Quality Manual," published by The Connecticut Department of Environmental Protection. The stormwater quality measures provided as part of the proposed development will result in a significant enhancement to the stormwater discharge from the site.

The proposed plans for soil erosion and sediment control have been developed in accordance with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, prepared by the Connecticut Council on Soil and Water Conservation in cooperation with the Connecticut Department of Environmental Protection. The soil erosion and sediment control measures that will be proposed as part of this project include geotextile silt fences, temporary sediment traps/basins, temporary diversion swales, construction entrance, dust control measures, riprap stabilization, and inlet protection for existing and proposed drainage features.

INTRODUCTION

Solli Engineering has prepared this Engineering Report to provide an analysis of the stormwater management, utilities and soil erosion and sediment control measures, and remediation to existing uplands associated with the proposed Office Building and associated site improvements, located at 64 Cambridge Drive & 4 Independence Drive, Monroe, Connecticut. The design is intended to be in compliance with all applicable Town of Monroe codes and regulations as well as all other applicable state and federal requirements and regulations.

PROJECT DESCRIPTION

FORMER CONDITIONS

Prior to site disturbance following a 2005 Monroe Planning & Zoning approval, the existing site consisted of undisturbed woods. The terrain consisted of a large ridgeline splitting north to south down the center of the property, which directed stormwater flow east and west from the top of the ridgeline to wetlands on both the eastern and western edges of the property. The only site access occurred from Cambridge Drive, which was under construction just prior to the 2005 approval. The property sloped upward from the southern entrance to the northern portion, resulting in an 80 to 100-foot increase in elevation.

EXISTING CONDITIONS

The site is located at 64 Cambridge Drive & 4 Independence Drive in Monroe, Connecticut. The overall site totals approximately 71.90 acres and is zoned Industrial District 2 (I-2). The site is bound by industrial uses to the west, woods to the east, Independence Drive to the north, and Cambridge Drive to the south. The site is accessed via Cambridge Drive, providing access to the project site from Pepper Street.

Three wetland areas exist on site, and are located in the west, southeast, and northeast portions of the site. The wetlands were delineated by certified soil scientists from William Kenny Associates LLC on February 12th, 2020 and in April 2020. A portion of the proposed development is located within the upland review area. There are three vernal pools located in the north east corner of the 64 Cambridge Drive parcel. Theses vernal pools are part of a larger network of vernal pools located to the north and east of the property. There is also one vernal pool located in the south west corner of the site.

The site was previously approved for an industrial development of two buildings totaling 175,000 SF. The site has been disturbed in accordance with site construction for the project, while a portion of the property has been over excavated towards Independence Drive. Currently onsite exists a temporary scale house with an associated truck weight scale, a temporary construction trailer and an accessory metal building structure and wooden building structure. There is a small area for parking, which is occupied by current employees of the site. The existing buildings are temporary in nature.

The existing on-site drainage patterns are split into two relatively large areas. The southern portion of the site drains south to a series of sediment basins and traps located along the western and southern wetlands. The northern portion of the site generally drains toward a large low-lying area in the northern portion of the site. Water is dewatered from the low-lying area as necessary to a filter bag to the west before discharging into the existing wetlands on site to the west. An existing Town of Monroe municipal basin exists in the northwest corner of the site within the property of 4 Independence Drive. This municipal basin handles stormwater runoff from Enterprise and Independence Drive before discharging through an outlet control structure to the wetlands along the western edge of the site.

According to FEMA, the project site is not located within a 100-year flood zone or 500-year flood zone; refer to Figure 2, FEMA Flood Map, in Appendix A for more details. The project site is located within the Upper West Branch of the West Pequonnock Diversion public water supply watershed in accordance with the Connecticut Department of Public Health (CT DPH) requirements; Refer to Figure 4, Public Watershed Map, in Appendix A for more details.

PROPOSED CONDITIONS

The proposed development consists of the construction of a ±2,360 square-foot office building with associated driveways, parking lots, drainage and utilities. The proposed development will be accessed from Cambridge Drive, and will include a parking area at the front of the proposed building.

The northern portion of the site will be filled to an elevation of 483.00'± in order to restore former watershed patterns to the existing wetland system. The restoration will enable the rehydration of the wetlands and vernal pools in the northeastern portion of the site.

The project has been designed into three distinct phases in order to provide sufficient detail on how the work on the property will be completed.

The first phase of the project proposes to prepare the southerly pad on the property to be cleared of existing stockpiles of materials, and for the northerly portion of the property to be filled to an approximate elevation of 422.00'±. The temporary scale and associated trailer will be maintained in their current location, to monitor the intake of clean fill to be deposited on the property. Material processing will take place in the southerly portion of the property. The proposed stormwater basins will be constructed as part of phase 1 and will be utilized as sediment basins until final grading and stabilization is complete. Phase 1 of the project will allow for the southerly portion of the property to be cleared and cleaned to sufficiently market this portion of the property for a future commercial or industrial development.

The second phase of the project will move primary intake operations from the southerly end of the site to the central portion of the property. Material processing will take place in the central portion of the property, the temporary scale and associated trailer will be relocated towards the center of the site, and the proposed office building and associated parking will be constructed. Primary site access will remain from Cambridge Drive, but the majority of the southerly end of the property will be sufficiently stabilized and the construction access will move beyond the limits of the completed improvements. The northerly portion of the site will be filled to an approximate elevation of 452.00'±.

The third phase of the project will shift the active construction entrance from Cambridge Drive to Independence Drive. The material processing areas will be relocated toward the northern portion of the property. The site work for this phase will consist primarily of mass filling to an elevation of approximately 483.00'±. Final stabilization measures and landscape features within the phase three LOD will be completed and then formal project closeout will be established. The majority of the southern portion of the site will be complete and soil erosion and sediment control measures will be removed once the site has been stabilized. In the southeastern portion of the site, at the edge of the 100' vernal pool envelope, there will be a 20' wide berm that will provide a means of access for any required property maintenance and maintenance within the vernal pool envelope. This phase will also include significant remediation and restoration along this vernal envelope to further enhance the upland review area.

In addition to implementing the remediation planting areas previously approved as part of IWC-2015-19, the Overall Landscape Plan consists of large areas of seeding for site stabilization and naturalization with additional areas of native tree and shrub plantings along the wetland edges. Trees, shrubs and lawn areas are proposed in the immediate area surrounding the proposed office building and parking area. For more detail on the plantings within the regulated area refer to the Proposed Filling And/or Excavation Activity Within Regulated Area section at the end of this report.

The proposed development results in an increase in impervious area of approximately 0.46± acres when compared to existing conditions. Three stormwater basins, located in the southeastern corner of the property, to the north of the proposed building, and to the southeast of the proposed building will serve to attenuate water quality volume and increase in peak runoff generated by the proposed development. The detention basin has been designed using a conservative analysis, as no infiltration rate has been incorporated into the sizing calculations. In comparison to former conditions, the project will result in a net increase of 0.46 acres of impervious area, not including a 0.70 acre increase in impervious area as a result of the Section 4 Resubdivision work currently under construction. The former conditions of undisturbed woods throughout the property will remain outside of the limit of disturbance, while within the limit of disturbance the property will be seeded for site stabilization, with native plantings along the wetland edges. The watersheds occurring within the former conditions will also be restored as a result of the imported fill. Site access will occur from Independence Drive and Cambridge Drive, in comparison to access only from Cambridge Drive in the former condition.

STORMWATER MANAGEMENT

The stormwater management plan and design for the project is intended to be in compliance with the Town of Monroe Subdivision of Land Regulations Article III, Section 111-302, Town of Monroe MS4 Stormwater Management Plan, 2004 Connecticut Stormwater Quality Manual and the CT DOT 2000 Drainage Manual, while taking prevailing site conditions and practical considerations into account.

METHODOLOGY

Stormwater runoff analysis, for both existing and proposed conditions, was performed using the software package HydroCAD. This software uses a computer implementation of the SCS – Synthetic Unit Hydrograph methodology to compute volumes and rates of runoff. The watershed area, rainfall depths and intensity, curve number and time of concentration are factors that influence the computed results.

Rainfall depths for this property were used for calculating the volumes and rates of runoff for this particular project. The depths were taken from the NOAA Atlas 14 documents (Latitude: 41.3481°, Longitude: -73.2522°) and are listed in Table 1 below.

Table 1: Rainfall Data

Return Period	24-hr Rainfall Depth (in)
2-year	3.59
5-year	4.68
10-year	5.58
25-year	6.82
50-year	7.73
100-year	8.73

HydroCAD automatically computes the rainfall intensity from its own IDF curves when the rainfall intensity data is provided. Table 2 shows the data that was used to generate the IDF curves. This information was taken from the NOAA Atlas 14 documents (Latitude: 41.3481°, Longitude: -73.2522°) and are listed in Table 2 below.

Table 2: IDF Table

Intermediate Intensity Values (in/hr.)				
Return Period	**5-Minute**	**15-Minute**	**30-Minute**	**60-Minute**
2-yr	5.12	2.84	1.97	1.26
5-yr	6.34	3.52	2.44	1.56
10-yr	7.34	4.08	2.82	1.80
25-yr	8.72	4.85	3.35	2.14
50-yr	9.77	5.43	3.76	2.40
100-yr	10.90	6.03	4.17	2.66

SCS uses the runoff curve number (CN) method to estimate runoff from storm rainfall. The major factors that determine CN are the watershed's soil and cover conditions, cover type, treatment and hydrologic condition. The higher percentage of impervious cover within a watershed will result in a higher curve number. A composite curve number was calculated for each analyzed watershed.

The time of concentration is the time it takes for runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. The time of concentration is calculated by adding the travel times of sheet flow, shallow concentrated flow and open channel flow, or some combination of these depending on the watershed and its features.

EXISTING HYDROLOGY

Slopes on site range from approximately 1 percent to 100 percent, with a high elevation of approximately 514 feet at the top of the ridge located towards the center of the property and a low elevation of approximately 403 feet at the discharge point of the western wetland area. According to the NRCS Soil Survey Geographic database for the State of Connecticut, most of the property is comprised of Canton and Charlton soils and Charlton-Chatfield complex. The rest of the property consists of wetland soils including Leicester fine sandy loam and Sutton fine sandy loam. The soils within the proposed project area have a hydrologic soil group rating of B and D. A breakdown of all the soils, located within the property limits, as well as the NRCS Soil Survey Map for the site can be found in Appendix A, Figure 3.

Approximately 81.53 acres were analyzed for stormwater management purposes. The analysis for existing drainage was performed in regard to pre-existing site conditions, prior to construction operations. Based on existing drainage patterns, the area was divided into five contributing drainage areas, labeled Existing Drainage Area 1a (E-1a), Existing Drainage Area 1b (E-1b), Existing Drainage Area 2 (E-2), Existing Drainage Area 3 (E-3), and Existing Drainage Area 4 (E-4). The approximate location and delineation of these drainage areas can be seen on Sheet DA-1, Existing Drainage Area Map, found in Appendix B.

E-1 has a total contributing area of approximately 57.63 acres. This area encompasses the western portion of the site, which discharges into the existing wetland that extends for the majority of the western property edge. E-1 was divided into two separate areas, E-1a and E-1b, for the purposes of comparing proposed conditions. Both areas discharge into the Upper West Branch of the Pequonnock River through a series of channels (R1 and R2) in the wetland area. Runoff from E-1a travels overland and directly into the wetlands towards the Upper West Branch of the Pequonnock River. Onsite runoff from E-1b travels overland before entering the detention basin (Pond-1b) located in the northwest corner of the site. Offsite runoff includes several developments from Enterprise Drive and Independence Drive, which travels overland and through a connected stormwater drainage system to the Town of Monroe Municipal Basin. The existing outlet control structure is a modified concrete catch basin with a V-notch weir with bottom elevation 441.60 and TF of 446.40. Stormwater exits the basin through the outlet control structure and discharges into the wetlands.

E-2 has a contributing area of approximately 14.56 acres. This area is comprised of the northeast portion of the site. Runoff from this area travels north overland and discharges into the Great Pine Swamp, located to the north of Independence Drive.

E-3 has a contributing area of approximately 3.77 acres. This area is located in the southeast corner of the site. Runoff from this area travels southeast overland and discharges into the wetlands located in the southeast corner of the site.

E-4 has a contributing area of approximately 5.57 acres. This area is located in the southeast corner of the site. Runoff from this area travels southeast overland and discharges into the wetland area located to the east of the site access on Cambridge Drive.

Characteristics of these drainage areas are summarized in Table 3. A map depicting existing drainage areas and their characteristics, entitled "Existing Drainage Area Map (DA-1)", can be found in Appendix B.

Table 3: Existing Drainage Area Characteristics

Drainage Area	Area (Acres)	Curve Number (CN)	Time of Concentration (Minutes)
E-1a	39.76	74	30.60
E-1b	17.87	71	16.00
E-2	14.56	70	90.60
E-3	3.77	66	21.30
E-4	5.57	72	31.20

Existing peak flows and volumes of runoff for all analyzed storm-events are summarized in Table 4. Calculations for the existing hydrology can be found in Appendix B.

Table 4: Existing Peak Flows

Drainage Area	Peak Flow (cfs)					
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
E-1a	41.42	68.98	93.52	128.72	155.58	184.92
E-1b	23.31	40.17	55.38	77.39	94.29	112.82
E-2	5.30	9.49	13.35	19.05	23.47	28.34
E-3	2.90	5.60	8.12	11.86	14.79	18.05
E-4	5.08	8.75	12.05	16.82	20.49	24.52
Pond 1b	7.89	13.99	17.45	21.58	24.33	27.04
R1	7.80	13.92	17.41	21.55	24.30	27.02
R-2	35.14	61.87	84.42	115.47	138.63	163.77

PROPOSED HYROLOGY & HYDRAULICS

The design intent of the proposed development conditions from a stormwater perspective is to restore existing former watershed patterns to existing on site wetlands. This includes the rehydrating of the eastern vernal pools and the reestablishment of the eastern vernal pool envelope. The proposed development conditions within the 81.53 acres analyzed consist of drainage areas that are of similar patterns to existing contributing areas. Based on the proposed drainage patterns, the 81.53-acre area was divided into eight (8) contributing drainage areas, labeled Proposed Drainage Area 1a (P-1a), Proposed Drainage Area 1b (P-1b), Proposed Drainage Area 1c (P-1c), Proposed Drainage Area 1d (P-1d), Proposed Drainage Area 1e (P-1e), Proposed Drainage Area 2 (P-2), Proposed Drainage Area 3 (P-3) and Proposed Drainage Area 4 (P-4). The approximate location and delineation of these drainage areas can be seen on Sheet DA-2, Proposed Drainage Area Map, found in Appendix B.

P-1 encompasses the western portion of the site, which discharges into the existing wetland that extends for the majority of the western property edge. P-1 was divided into five separate areas, P-1a, P-1b, P-1c, P-1d, and P-1e. P-1a discharges directly into the wetlands along the western half of the site, while the other four areas discharge into separate stormwater basins before entering the wetlands.

P-1a has a contributing area of approximately 26.04 acres. This area encompasses the wetland area on the western edge of the site, as well as some of the area from the upper pad in the north half of the site. Runoff from P-1a travels south overland and through a series of channels into the Upper West Branch of the Pequonnock River.

P-1b has a contributing drainage area of approximately 16.72 acres. Onsite runoff from P-1b travels overland before entering the Town of Monroe Municipal Basin (Pond 1b) located in the northwest corner of the site. Offsite runoff includes several developments from Enterprise Drive and Independence Drive, which travels overland and through a connected stormwater drainage system to the detention basin. The outlet control structure is proposed to be protected and maintained as part of this project. Stormwater exits the basin through the outlet control structure and discharges into the wetlands.

P-1c has a contributing area of approximately 10.63 acres. Runoff from P-1c travels southwest overland, entering into a detention basin (Pond 1c) located to the north of the proposed office building. The outlet control structure is a modified concrete catch basin with an 8" orifice at 409.40, a 2' x 1.9' rectangular weir at 410.40, and TF of 413.00. Stormwater exits the basin through the outlet control structure and discharges into the wetlands. In order to detain the water quality volume, the basin was designed to hold the water quality volume before reaching the first invert elevation of the outlet control structure. To prevent the possibility of a decoy vernal pool, the basin was designed with a perforated pipe with manual relief valves at the bottom in order to drain the basin in the event water remains for an extended period of time.

P-1d has a contributing area of approximately 6.23 acres. Runoff from P-1d travels southwest overland, entering into a detention basin (Pond 1d) located to the east of the proposed office building. The outlet control structure is a modified concrete catch basin with an 8" orifice at 408.75, a 2' x 2' rectangular weir at 411.20, and TF of 414.00. Stormwater exits the basin through the outlet control structure and discharges into the wetlands. In order to detain the water quality volume, the basin was designed to hold the water quality volume before reaching the first invert elevation of the outlet control structure. To prevent the possibility of a decoy vernal pool, the basin was designed with a perforated pipe with manual relief valves at the bottom in order to drain the basin in the event water remains for an extended period of time.

P-1e has a contributing area of approximately 1.06± acres. Runoff from this area travels west overland into a detention basin (Pond 1e) and eventually into the onsite wetlands. The basin discharges, through an outlet spillway weir approximately 20 feet wide.

P-2 has a contributing area of approximately 12.65 acres. This area is comprised of the northeast portion of the site. Runoff from this area travels north overland and discharges into the Great Pine Swamp, located to the north of Independence Drive.

P-3 has a contributing area of approximately 4.79 acres. This area is located in the southeast corner of the site. Runoff from this area travels southeast overland, entering into a detention basin (Pond 3) located near the southeast property corner. The outlet control structure is a modified concrete catch basin with a 1.5' x 1.9' rectangular weir at 424.40 and TF of 427.00. Stormwater exits the basin through the outlet control structure and discharges into the wetlands located in the southeast corner of the site. In order to detain the water quality volume, the basin was designed to hold the water quality volume before reaching the first invert elevation of the outlet control structure. To prevent the possibility of a

decoy vernal pool, the basin was designed with a perforated pipe with manual relief valves at the bottom in order to drain the basin in the event water remains for an extended period of time.

P-4 has a contributing area of approximately 3.37 acres. This area is located in the southeast corner of the site. Runoff from this area travels southeast overland and discharges into the wetland area located to the east of the site access on Cambridge Drive.

Characteristics of these drainage areas are summarized in Table 5. A map depicting proposed drainage areas can be found in Appendix B.

Table 5: Proposed Drainage Area Characteristics

Drainage Area	Area (Acres)	Curve Number (CN)	Time of Concentration (Minutes)
P-1a	26.04	75	39.70
P-1b	16.72	70	43.20
P-1c	10.63	64	34.50
P-1d	6.23	67	33.10
P-1e	1.06	85	9.20
P-2	12.65	68	74.90
P-3	4.79	61	28.20
P-4	3.37	76	36.50

Proposed peak flows and volumes for all analyzed storms are summarized in Table 6. Calculations for the proposed hydrology can be found in Appendix B.

Table 6: Proposed Peak Flows

Drainage Area	Peak Flow (cfs)					
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
P-1a	23.96	39.41	53.11	72.71	87.64	103.92
P-1b	10.59	18.97	26.65	37.87	46.56	56.13
P-1c	4.87	10.08	15.12	22.69	28.67	35.36
P-1d	3.83	7.30	10.53	15.33	19.08	23.24
P-1e	3.41	4.91	6.16	7.89	9.18	10.55
P-2	4.62	8.63	12.35	17.88	22.20	26.99
P-3	1.86	4.27	6.66	10.32	13.25	16.55
P-4	3.48	5.64	7.55	10.26	12.32	14.56
Pond 1b	5.62	10.58	14.39	18.26	20.91	23.56
Pond 1c	1.41	5.48	9.99	16.85	22.06	27.75
Pond 1d	0.79	1.43	1.81	2.24	2.77	4.63
Pond 1e	0.00	0.10	0.37	2.18	4.89	7.41
Pond 3	0.14	0.87	2.44	5.38	7.83	10.55
R-1	5.60	10.55	14.38	18.25	20.90	23.55
R-2	21.15	37.95	52.84	73.50	88.51	104.59
R-3	23.03	44.10	62.68	88.75	108.08	130.03
R-4	22.90	43.83	62.65	88.75	108.01	129.90

Each stormwater basin was designed in order to attenuate for the 100-year storm in the drainage area.

Pond 1b is the existing Town of Monroe Municipal Basin which is proposed to be protected and maintained with the proposed development. The basin has a capacity of 141,234 cf and its outlet control structure is a modified concrete catch basin with a V-notch weir with bottom elevation 441.60 and TF of 446.40.

Pond 1c is an existing sediment basin located to the north of the proposed office building which is proposed to be expanded in order to attenuate for the 100-year storm in drainage area P-1c. The basin has a storage capacity of 41,305 cf and the outlet control structure is a modified concrete catch basin with an 8" orifice at 409.40, a 2' x 1.9' rectangular weir at 410.40, and TF of 413.00. The basin also has a 20' wide emergency spillway at 414.00. Stormwater Test Pit #2 was dug in the middle of the proposed basin. The soil in the test pit was observed to be olive-brown, coarse sandy loam from 0"-72". The test pit showed evidence of mottles at 32" and possible ledge at 72".

Pond 1d is located to the east of the proposed office building and is proposed to attenuate for the 100-year storm in drainage area P-1d. The basin has a storage capacity of 174,187 cf and the outlet control structure is a modified concrete catch basin with an 8" orifice at 408.75, a 2' x 2' rectangular weir at 411.20, and TF of 414.00. The basin also has a 35' wide emergency spillway at 416.00. Stormwater Test Pit #1 was dug in the middle of the proposed basin. The soil in the test pit was observed to be miscellaneous fill from 0"-42". The test pit also has ledge at 42".

Pond 1e is located to the west of the site access drive and was approved as part of the Section 4 General Permit application. The basin has a storage capacity of 9,417 cf and a 20' wide spillway at 406.35. This area has been designed with similar drainage patterns as previously approved and will not have any effect on the basin as previously designed.

Pond 3 is located in the southeast corner of the property and is designed to attenuate for the 100-year storm in drainage area P-3. The basin has a storage capacity of 27,841 cf and the outlet control structure is a modified concrete catch basin with a 1.5' x 1.9' rectangular weir at 424.40 and TF of 427.00. The basin also has a 25' wide emergency spillway at 427.50. Stormwater Test Pit #3 was dug in the middle of the proposed basin. The soil in the test pit was observed to be topsoil from 0" - 16", Miscellaneous sediment/silt from 16"-36", Yellow-brown fine sandy loam from 36" to 48"and Olive brown coarse sandy loam, little silt, from 48"-110" with ledge at 110".

There are also two grass-lined swales proposed as water quality measure. One swale is proposed up-gradient of Pond 1c and the other is proposed up-gradient of Pond 1d. The swales both feature a 2' depth with a longitudinal slope of 2%.

WATERSHED COMPARISON

As previously mentioned, the design intent of the overall project from a stormwater perspective was to reestablish former watershed patterns to existing onsite wetlands. In the former condition, the western wetlands had a contributing watershed area of 31.77± acres, while the eastern wetlands had a contributing watershed area of 9.71± acres. In the previously approved Planning & Zoning Application, the western wetlands had an increase in contributing watershed area to a total of 39.17± acres, while the eastern wetlands had a decrease in contributing watershed area to a total of 5.05± acres. In the existing conditions the western wetland has decreased in contributing watershed area to a total of 18.90± acres, while the eastern wetland has decreased in contributing watershed area to a total of 2.17± acres. In the proposed condition the western wetland contributing watershed area will be restored to the former size, with a total contributing watershed area of 34.19± acres. The eastern wetland contributing watershed area will also be restored, with a total contributing watershed area of 8.06± acres. The proposed condition will restore the vernal pool envelope and rehydrate both the eastern and western wetlands as a result in the increase in contributing watershed areas. For more information please refer to the Watershed Area Maps in Appendix F (WS1 – WS4).

STORMWATER CONCLUSION

The proposed development results in an increase in impervious area of approximately 0.47± acres when compared to existing conditions. The project includes the construction of three stormwater detention basins for the attenuation of

peak runoff. The stormwater management system serves to treat and detain the increase in runoff by the proposed development.

Table 7: Peak Flow Comparison Table

Drainage Area	Peak Flow (cfs)					
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
E-1* | **P-1****	35.14 | **22.90**	61.87 | **43.83**	84.42 | **62.65**	115.47 | **88.75**	138.63 | **108.01**	163.77 | **129.90**
E-2 | **P-2**	5.30 | **4.62**	9.49 | **8.63**	13.35 | **12.35**	19.05 | **17.88**	23.47 | **22.20**	28.34 | **26.99**
E-3 | **P-3*****	2.90 | **0.14**	5.60 | **0.87**	8.12 | **2.44**	11.86 | **5.38**	14.79 | **7.83**	18.05 | **10.55**
E-4 | **P-4**	5.08 | **3.48**	8.75 | **5.64**	12.05 | **7.55**	16.82 | **10.26**	20.49 | **12.32**	24.52 | **14.56**

*E-1 is the peak flow of R-2, which includes the peak flows from E-1a & R-1.
**P-1 is the peak flow of R-4, which includes the peak flows from R-3 & Pond 1e.
***P-3 is comprised of the peak flow from Pond 3.

The project is designed to comply with the Town of Monroe's MS4 Stormwater Management Plan. For new development and redevelopment of sites with less than forty percent of directly connected impervious area (DCIA), the water quality volume for the site is to be retained. The water quality volume for the site has been retained within the proposed basins. A maintenance plan has also been included in this report for the proposed stormwater systems. This plan provides an outline for items such as snow management, inspection of stormwater systems and sediment removal from stormwater basins. The project site will also be subject to a Connecticut Department of Energy and Environmental Protection (CT DEEP) General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities. Low impact development measures required as a part of the MS4 Stormwater Management Plan, such as vegetated water quality swales and the minimizing of land disturbance, have been implemented.

SEPTIC SYSTEM DESIGN

The subsurface sewage disposal systems proposed for the office building was designed in accordance with the technical standards established in the "Connecticut Public Health Code; On-site Sewage Disposal Regulations, and Technical Standards for Subsurface Sewage Disposal Systems" published by the Commissioner of Public Health, dated January 2018.

SOIL CHARACTERISTICS

According to the NRCS Soil Survey Geographic database for the State of Connecticut, the majority of the site is comprised of Canton and Charlton fine sandy loams, Leicester fine sandy loam, Sutton fine sandy loam and Charlton-Chatfield complex.

Canton and Charlton soils are comprised of approximately 10 to 35 percent of stones and boulders over the surface and have slopes ranging from 3 to 35 percent. Typically, the Canton soils have a surface layer of very dark grayish brown fine sandy loam about 3 inches thick. The subsoil is dark yellowish brown, yellowish-brown, and light olive brown fine sandy loam 19 inches thick. The sub stratum is olive gray and light olive gray gravelly loamy sand to a depth of 60 inches or more. Typically, the Charlton soils have a surface layer of very dark brown fine sandy loam about 2 inches thick. The subsoil is 25 inches thick. The upper 15 inches is dark yellowish brown fine sandy loam,

and the lower 10 inches is yellowish brown gravelly sandy loam. The sub stratum is light brownish gray gravelly sandy loam to a depth of 60 inches or more. The soil is well drained with intermittent areas of exposed bedrock.

The Leicester series consist of very deep, poorly drained soils formed in coarse-loamy till. They are nearly level or gently sloping soils in drainage ways and low-lying positions on hills. Slope ranges from 0 to 8 percent. Permeability is moderate or moderately rapid in the surface layer and subsoil and moderate to rapid in the substratum.

The Sutton series consists of very deep, moderately well drained loamy soils formed in melt-out till. They are nearly level to strongly sloping soils on hills, low ridges, and ground moraines, typically on footslopes, lower backslopes and in slight depressions. Slope ranges from 0 to 15 percent. Saturated hydraulic conductivity is moderately high or high throughout.

EXISTING SITE CONDITIONS

A site investigation was performed on March 12, 2020 by Solli Engineering, witnessed by Matt Brattoli from the Town of Monroe Health Department. The investigation included the digging of 3 deep test pits labeled TP 1 - 3. The test pits are located to the north of the proposed building at the edge of the wooded area of the site. Approximate locations of the test pits can be seen on the Site Utility Plan (Sheet 2.51). The soils throughout each test pits were rather consistent. The top layer of soil consisted of a miscellaneous fill ranging from a depth of 27-44" that was deposited there by the previous property owner as a part of their earthwork operation. In the layer of soil below that was either the existing topsoil or the existing dark yellow-brown fine sandy loam. The topsoil layer found in two out of the three test pits extended to a depth of 40" and 64". The dark yellow brown fine sandy loam layer of soil below that in extended between 76-88" in each of the three test pits. Finally, an olive brown coarse sandy loam was found as the bottom layer of each of the test pits, with a maximum depth ranging from 96-110". Test pit one and two showed evidence of mottles (Restrictive layer) at 60", while test pit number 3 showed evidence of mottles at 80". Test pit one and two also contained groundwater at an elevation of 84" for test pit number one and 92" for test pit number 2. The third test pit did not contain any groundwater. The mottles in these soil tests can be linked to their close proximity to the wetlands to the west. Soil observations and descriptions for each test pit were recorded by Solli Engineering. Two percolation tests were also conducted, one in the proposed area of the primary leaching field and one in the reserve leaching field. Both tests indicated a 1"/10min percolation rate or less. The test pit and percolation test logs can be found in Appendix C.

PROPOSED SEPTIC DESIGN

The effective leaching area (ELA) was determined for the proposed primary and reserve leaching area of the proposed office building. The effective leaching area is defined as a measure, in square feet, of the relative size of a leaching system or product that takes into account the amount of infiltrative area and type of infiltrative interface.

Per Connecticut Public Health Code, office buildings have a design flow of 20 GPD per (1) employee. The Connecticut Public Health code also recommends an average of 200 SF gross area / employee, which equates to 12 employees for a 2,360 SF building. The design is conservative, as it is anticipated there will be less than 12 employees. For a proposed building with (12) employees, the design flow is 240 GPD. Using a 1.5 GPD per SF application rate based off the 0-10.1 percolation rate obtained from test data, the proposed office building requires 160 SF of effective leaching area (ELA).

The proposed system will consist of 54 LF of 18" x 36" leaching trench to handle the required 160 SF of ELA. The reserve system will consist of 54 LF of 18" x 36" leaching trench to handle the required 160 SF of ELA. The MLSS calculation was required for the proposed design, as the depth to restrictive layer is 60 inches. The analysis yielded a required MLSS of 15 LF. Both the percolation test and test pit data can be found on the Site Utility Plan (Sheet 2.51).

The subsurface sewage disposal system for the proposed office building includes a 1,000-gallon H20 loaded septic tank to be installed directly off the east side of the proposed office building. From there, the effluent will travel by gravity through 4" Schedule 40 PVC pipe to connect into the proposed distribution box located to north and then discharges into the stone leaching trench. The bottom of the stone leaching trench was designed to be at least 18" above the restrictive layer and seasonal high water, which was determined to be from mottling at a depth of 60" below ground cover. The existing fill layer will be removed and replaced with select fill.

SOIL EROSION AND SEDIMENT CONTROL

The proposed plans for soil erosion and sediment control prepared for this project have been developed in accordance with the Town of Monroe Zoning Regulations, Article 6.5, adopted September 19, 2013, effective date October 1, 2013, as well as the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, prepared by the Connecticut Council on Soil and Water Conservation in cooperation with the Connecticut Department of Environmental Protection.

The soil erosion and sediment control measures that will be proposed as part of this project include geotextile silt fences, temporary sediment traps/basins, temporary diversion swales, construction entrances, dust control measures, riprap stabilization, and inlet protection for existing and proposed drainage features.

Based on the amount of fill required and operations for this proposed development, the soil erosion and sediment control measures have been designed for three different phases based on changes in operation.

PHASE ONE

Phase One will consist of two sediment basins and five sediment traps. Sediment Trap #3 and Sediment Basin #1, located east and north of the existing scale house, will handle most of the sediment generated from the southern half of the site. Sediment Trap #3 was designed with a capacity of 174,187 cubic feet which exceeds the required storage of 13,676 cubic feet. The bottom elevation of the trap is 408, with an emergency spillway at an elevation of 416. Sediment Basin #1 was designed with a capacity of 41,305 cubic feet; which exceeds the required storage of 27,472 cubic feet. This basin is designed with a bottom elevation of 409 with an emergency spillway elevation of 414. In addition to the two basins in the southern half of the site a sediment trap south of the existing scale house was designed to accommodate sediment generated in this portion of the site. The sediment basin was designed with a capacity of 4,980 cubic feet which exceeds the required storage of 3,375 cubic feet. Near the southeast property corner, Sediment Trap #4 was designed to accommodate sediment generated in that portion of the site. Sediment Trap #4 was designed with a capacity of 27,841 cubic feet, which exceeds the required storage of 10,311 cubic feet. Most of the sediment generated along the eastern property line will be captured by one of two sediment traps. Sediment Trap #5 is designed with a capacity of 28,510 cubic feet which exceeds the required storage of 15,630 cubic feet. The northern most sediment trap, Sediment Trap #6 is designed with a capacity of 7,458 cubic feet which exceeds the required storage of 4,414 cubic feet. One sediment basin, located towards the northeast corner of the site, will handle the majority of sediment generated from the northern half of the site. This sediment basin is designed with a capacity of 53,669 cubic feet, which exceeds the required storage of 44,727 cubic feet. This sediment basin is designed with a bottom elevation of 398 feet with a dewatering pump to a perforated pipe along the eastern property line. The outlet control structures for Sediment Basin #1 and Sediment Trap(s) #3/4 will be installed during this phase but will remain inactive until the completion of construction. The emergency spillway will act as the primary outlet.

PHASE TWO

Phase Two will consist of four sediment basins and two sediment traps. Sediment Basins #1 and #2 and Sediment Traps #1 and #2 will handle majority of the sediment generated from the southern portion of the site, while Sediment Basins #3 and #4 will handle majority of the sediment generated from the northern half of the site. The sediment basin to the east of the existing scale house (Sediment Basin #1) will remain as designed in Phase One throughout Phase Two. The sediment basin to the north of the existing scale house (Sediment Basin #2) will be expanded to have a capacity of 41,305 cubic feet which exceeds the required storage of 35,921 cubic feet. Sediment Basin #2 is designed with a bottom elevation of 409 with an emergency spillway elevation of 415. In addition to the two basins in the southern half of the site, Sediment Trap #1, south of the existing scale house, will remain as designed in Phase One with a capacity of 4,980 cubic feet which exceeds the required storage of 2,605 cubic feet. Most of the sediment generated in the southeast corner of the property line will be captured in Sediment Trap #2, which will remain as designed in Phase One. Sediment Trap #2 is designed with a capacity of 27,841 cubic feet which exceeds the required storage of 10,745 cubic feet. Two sediment basins, located on the northern portion of the site, will handle sediment generated in this portion of the site. Sediment Basin #3, located south of the proposed material processing bins, is designed with a capacity of 20,755 cubic feet which exceeds the required storage of 17,697 cubic feet. The northern most sediment basin, Sediment Basin #4, is designed with a capacity of 26,199 cubic feet which exceeds the required storage of 20,740 cubic feet. The outlet control structure for Sediment Trap #2 will be installed during this phase but will remain inactive until the completion of construction. The emergency spillway will act as the primary outlet.

PHASE THREE

Phase Three will consist of two sediment basins and four sediment traps. Sediment Basins #1 and #2 and Sediment Trap #1 will handle the sediment generated from the southern portion of the site, while Sediment Traps #2, #3 and #4 will handle the sediment generated from the northern half of the site. The sediment basin to the east of the existing scale house (Sediment Basin #1) will remain as designed in Phase One throughout Phase Three. The sediment basin to the north of the existing scale house (Sediment Basin #2) will remain as designed in Phase Two throughout Phase Three with a capacity of 41,305 cubic feet. Most of the sediment generated in the southeast corner of the property line will be captured in a Sediment Trap #1. Sediment Trap #1 is designed with a capacity of 27,841 cubic feet which exceeds the required storage of 17,334 cubic feet. Three sediment traps, located on the northern portion of the site, will handle sediment generated in this portion of the site. Sediment Trap #2 is designed with a capacity of 11,436 cubic feet which exceeds the required storage of 9,877 cubic feet. Sediment Trap #3 is designed with a capacity of 7,399 cubic feet which exceeds the required storage of 5,160 cubic feet. The northernmost sediment trap, Sediment Trap #4, is designed with a capacity of 7,224 cubic feet which exceeds the required storage of 5,244 cubic feet.

For more detail regarding layout and design of the soil erosion and sediment control measure implemented as part of this project see Sheet 2.31, Phase I Soil Erosion & Sediment Control Plan, Sheet 2.32, Phase II Soil Erosion & Sediment Control Plan, Sheet 2.33, Phase III Soil Erosion & Sediment Control Plan and Sheet 2.41, Sediment Erosion & Sediment Control Details.

EARTHWORK ANALYSIS & MATERIAL INTAKE PROTOCOL

OVERALL EARTHWORK ANALYSIS

The project proposes an overall cut of 26,112 CY, an overall fill of 1,330,982 CY and a net cut/fill of 1,304,870 CY of fill during the duration of the project. A majority of the filling operation is to occur in the northern portion of the site in order to raise the area to an elevation of 483.00’ ±. This will restore former watershed patterns as previously discussed. Filling operations along the eastern limit of disturbance will facilitate the restoration of the vernal pool

envelope by providing a 3:1 to 4:1 slope within the area. The southern portion of the site is to be graded as a future development pad, with a slight increase in elevation. The overall cut for the project is necessary to construct the stormwater basins, create an access drive from Independence Drive and decrease steep slopes along the limits of disturbance. This operation will occur in phases and all imported material will be subject to the material intake protocol, discussed below. Throughout each phase the staging of equipment and operations will shift to different site locations, beginning in the southern portion of the site in Phase 1 and ending with the operations in Phase 3 occurring towards the northern portion of the site.

PHASE ONE EARTHWORK OPERATIONS

During Phase One of the project, the existing scale house and associated temporary construction trailers and buildings are to remain while grading and earthwork operations commence. The area of lower elevation in the northern portion of the site will be raised to a pad elevation of 422.00' ±, with the fill being brought in and placed according to the material intake protocol guidelines. Temporary material bins will be constructed in the existing pad towards the southeastern portion of the project site to handle incoming material. The site access road, office building and associated utility connections will not be installed in this phase, as this phase's focus is to begin filling the lower elevation to the north and beginning remediation work across the site. Phase One will consist of approximately 81,693 CY of cut, 210,905 CY of fill and a net cut/fill of 129,212 CY of fill being imported and placed on site. The cut is required for construction of the stormwater basins as well as the sorting and processing of the large existing material stockpile in the northern portion of the site. The fill during Phase One will be placed to fill the depression in the northern portion of the site, as well as along the edges of the existing rock face to establish 3:1 slopes.

PHASE TWO EARTHWORK OPERATIONS

During Phase Two of the project, the existing scale house and associated temporary construction trailers and buildings will be demolished in order to construct the proposed site access drive, office building, parking areas and proposed utility connections. The pad elevation towards the southern portion of the site will be completed and the material processing area and bins will shift towards the middle of the site. The proposed 3:1 slopes along the existing limits of the rock ledge will be further constructed and the pad elevation in the northern portion of the site will be filled according to the material intake protocol to an approximate elevation of 452.00' ±. By the end of Phase Two, the proposed stormwater basins, office building, paved site access drive, associated parking and utility features, septic system and remediation work related to the southern portion of the site will have been completed. Phase Two will consist of approximately 6,781 CY of cut, 563,769 CY of fill and a net cut/fill of 556,988 CY of fill being imported and placed on site. The cut during this phase is for the construction of sediment basins and traps, while the fill will be placed in the northern portion of the site as well as to further establish the 3:1 slopes along the rock face.

PHASE THREE EARTHWORK OPERATIONS

In Phase Three, the work on the project site will be focused on the northern portion, with the material processing area and bins having been shifted to the upper elevation pad. The primary site access will be shifted to Independence Drive, and work during this phase will focus solely on filing operations in order to restore existing watershed patterns and rehydrate the eastern wetlands and vernal pools. There will be a ranging of 3:1 to 4:1 slopes along the eastern portion of the proposed site grading within the 100' vernal pool envelope to restore the area and provide sufficient area for amphibians and other wildlife to thrive. In the southeastern portion of the site, at the edge of the 100' vernal pool envelope there will be a 20' wide berm before a proposed 3:1 slope back down to the lower pad elevation which will provide a means of access for any required property maintenance and further distinguish the vernal pool envelope. Once the final site grading and stabilization is finalized, the project will be complete. Phase Three will consist of approximately 3,439 CY of cut, 600,391 CY of fill and a net cut/fill of 596,952 CY of fill being imported and placed on site. The cut during Phase Three will consist of sediment trap/basin construction as well as the construction of the

site access drive at Independence Drive through an existing berm. The fill for this phase will establish final elevations across the northern elevation pad.

MATERIAL INTAKE PROTOCOL

A material intake procedure has been created for the import of all fill material and in cooperation with the Connecticut Department of Environmental Protection's Solid Waste Management Regulations.

The purpose of this intake protocol is to ensure that all materials received on site meet the requirements for clean fill. As defined by the Solid Waste Management Regulations, clean fill means:

> (1) natural soil (2) rock, stone, sand, gravel, brick, ceramics, clean concrete, and asphalt paving fragments which are virtually inert and pose neither a pollution threat to ground or surface waters nor a fire hazard and (3) polluted soil as defined in subdivision (45) of subsection (a) of section 22a-133k-1 of the Regulations of Connecticut State Agencies which soil has been treated to reduce the concentration of pollutants to levels which do not exceed the applicable pollutant mobility criteria and direct exposure criteria established in sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies and which soil is reused in accordance with R.C.S.A. subdivision (3) of subsection (h) of section 22a-133k-2 of such regulations.

For more information regarding the material intake protocol refer to Appendix D, Material Intake Procedure

SITE UTILITIES

An existing water main within Cambridge Drive provides water service for the area. Water service for the proposed development will come from a connection to a water valve located in Cambridge Drive to be constructed as part of the Section 4 General Permit. The project proposes an 8" DIP water main to travel along the proposed site drive to the end of said site drive as an extension to the existing main. The proposed extension is approximately 839 and will be capped. The office building will be serviced by a 2" domestic line that will tie into the proposed 8" DIP via a corporation stop. For more information regarding the utility layout refer to the Site Utility Plan (Sheet 2.51) included as part of this application.

Existing electrical, telephone and cable services are located within Cambridge Drive and provide service to the existing scale house via underground conduit traveling from Cambridge Drive to the western side of the scale house. The proposed development will utilize these conduits to provide electric, telephone and cable service to the proposed building. The proposed conduit will follow the proposed drive. The project will also proposed hand holes for each utility. For more information regarding the utility layout refer to the Site Utility Plan (Sheet 2.51) included as part of this application.

An existing gas main within Cambridge Drive provides service to the area. The proposed development will connect into the existing gas main to provide service to the office building. The extension will follow the orientation of the proposed site drive and then connect into the building. For more information regarding the proposed gas line refer to the Site Utility Plan (Sheet 2.51) included as part of this application.

DESCRIPTION OF FILLING AND/OR EXCAVATION ACTIVITY WITHIN REGULATED AREA

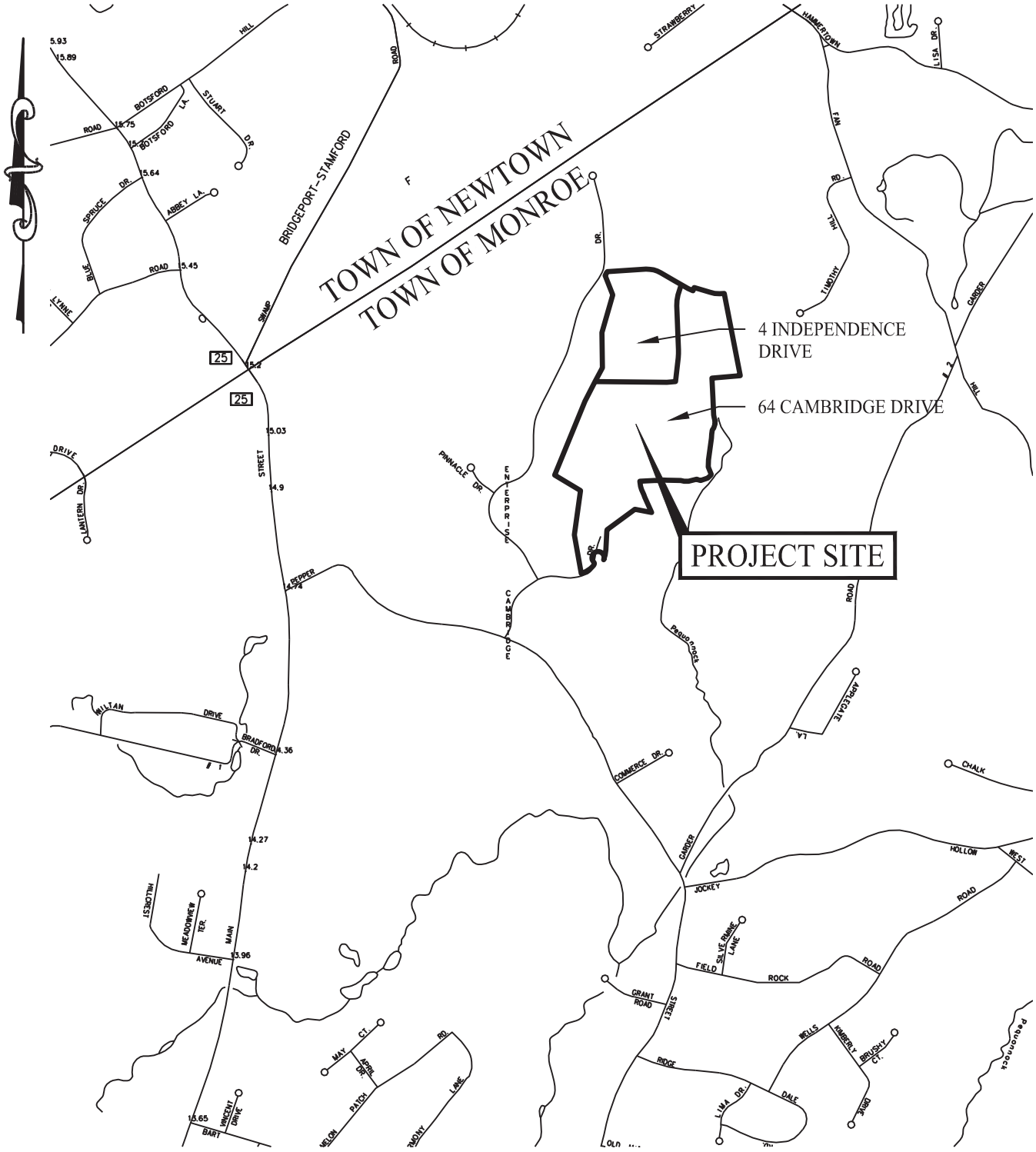
Proposed work within the regulated area consists of a portion of the proposed building, paved parking lot, storm drainage, septic leaching field and septic tank and stormwater detention basin.

Within the regulated area, the development will require a cut of approximately 20,924 CY. The proposed fill is approximately 1,159,894 CY. Therefore, the net fill within the regulated area totals approximately 1,138,970 CY.

The landscaping proposed within the regulated area consists of a variety of native overstory and understory trees and evergreen and deciduous shrub species. These are concentrated along the wetland edges and within the vernal pool envelope at the perimeter of the site. The biofiltration swales are seeded with a mix of New England Erosion Control Restoration Mix and New England Conservation Wildlife Mix. The basins bottoms are seeded with New England Wetmix and the banks with New England Roadside Matrix Upland Seed Mix. In the northeastern portion of the 64 Cambridge Drive, approximately 675 SF ± of previously disturbed wetland area will be remediated to restore a portion of the property that was impacted as part of work associated with an approval granted for the neighboring property at 36 Timothy Hill Road. The remediation area is to have any debris removed and be planted with shrubs and seeded while protecting and maintaining the existing trees in the area.

APPENDIX A
FIGURES

Site Location Map (Figure 1)
FEMA Flood Map (Figure 2)
Soil Survey Map (Figure 3)
Public Water Supply Watershed Map (Figure 4)
Regulated Area Map (Figure 5)
Slope Area Map (Figure 6)



NOTE: BASE MAP INFORMATION TAKEN FROM THE CONNDOT TOWN ROAD MAPS (TRU), MAP NUMBER 84 AND 96.

1,500 0 750 1,500

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468
T: (203) 880-5455 F: (203) 880-9695

SITE LOCATION MAP

64 CAMBRIDGE DRIVE & 4 INDEPENDENCE DRIVE
MONROE, CONNECTICUT

Project #:	1903601
Plan Date:	05/26/20
Scale:	1" = 1,500'
Figure:	1



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

NOTE: BASE MAP INFORMATION TAKEN FROM FEMA FLOOD INSURANCE RATE MAP, MAP NUMBERS 09001C0257F AND 09001C0276F

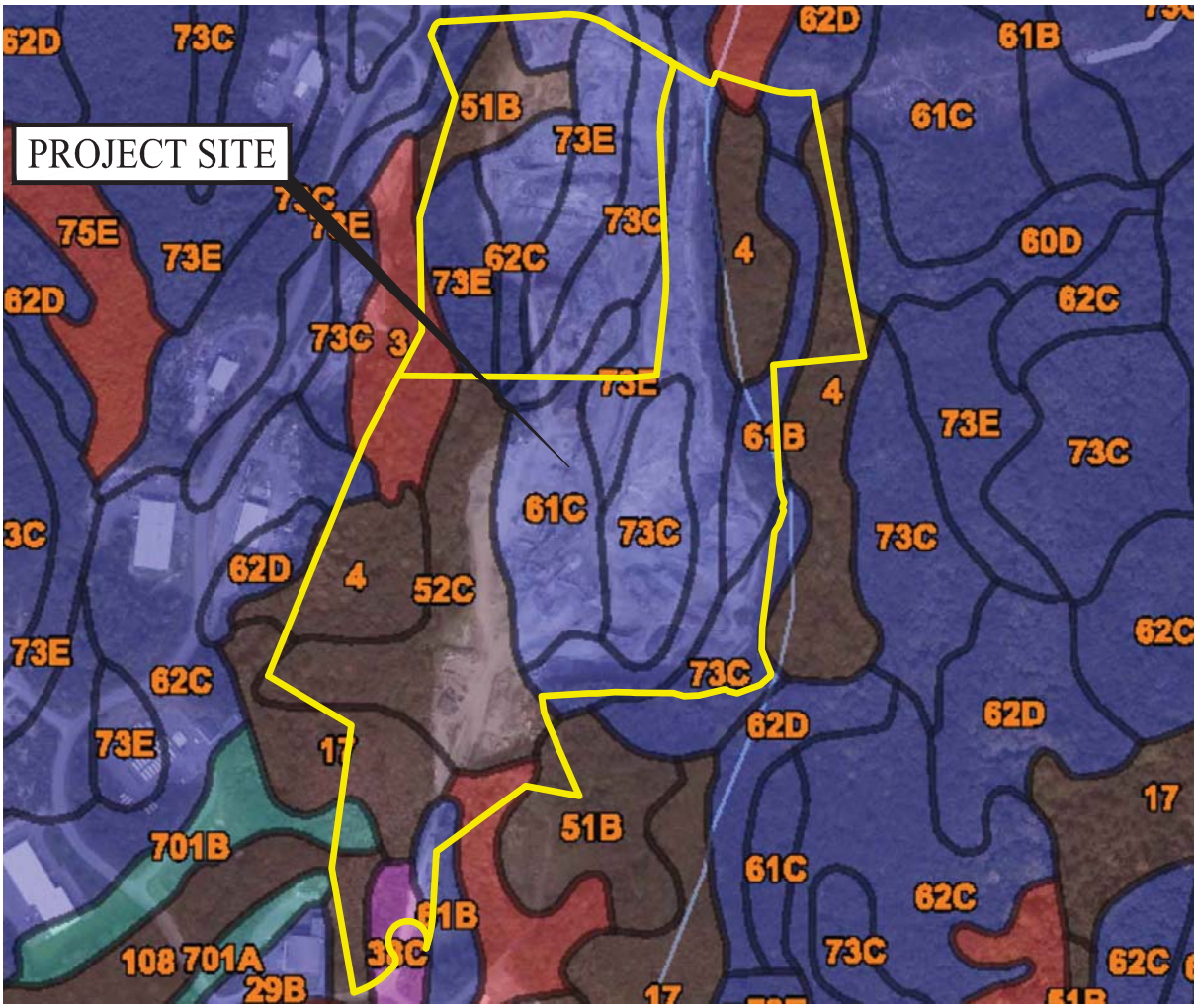
1,000 0 500 1,000

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468
T: (203) 880-5455 F: (203) 880-9695

FEMA FLOOD MAP

64 CAMBRIDGE DRIVE & 4 INDEPENDENCE DRIVE
MONROE, CONNECTICUT

Project #:	1903601
Plan Date:	05/26/20
Scale:	1" = 1,000'
Figure:	2



Map unit symbol	Map unit name	Rating
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	D
4	Leicester fine sandy loam	B/D
17	Timakwa and Natchaug soils, 0 to 2 percent slopes	B/D
38C	Hinckley loamy sand, 3 to 15 percent slopes	A
51B	Sutton fine sandy loam, 0 to 8 percent slopes, very stony	B/D
52C	Sutton fine sandy loam, 2 to 15 percent slopes, extremely stony	B/D

Map unit symbol	Map unit name	Rating
61B	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	B
61C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony	B
62C	Canton and Charlton fine sandy loams, 3 to 15 percent slopes, extremely stony	B
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	B
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	B

NOTE
SOIL MAP INFORMATION TAKEN FROM THE
NATURAL RESOURCES CONSERVATION SERVICE,
URL: http://websoilsurvey.nrcs.usda.gov
DATE OF IMAGE: OCTOBER 5, 2016.

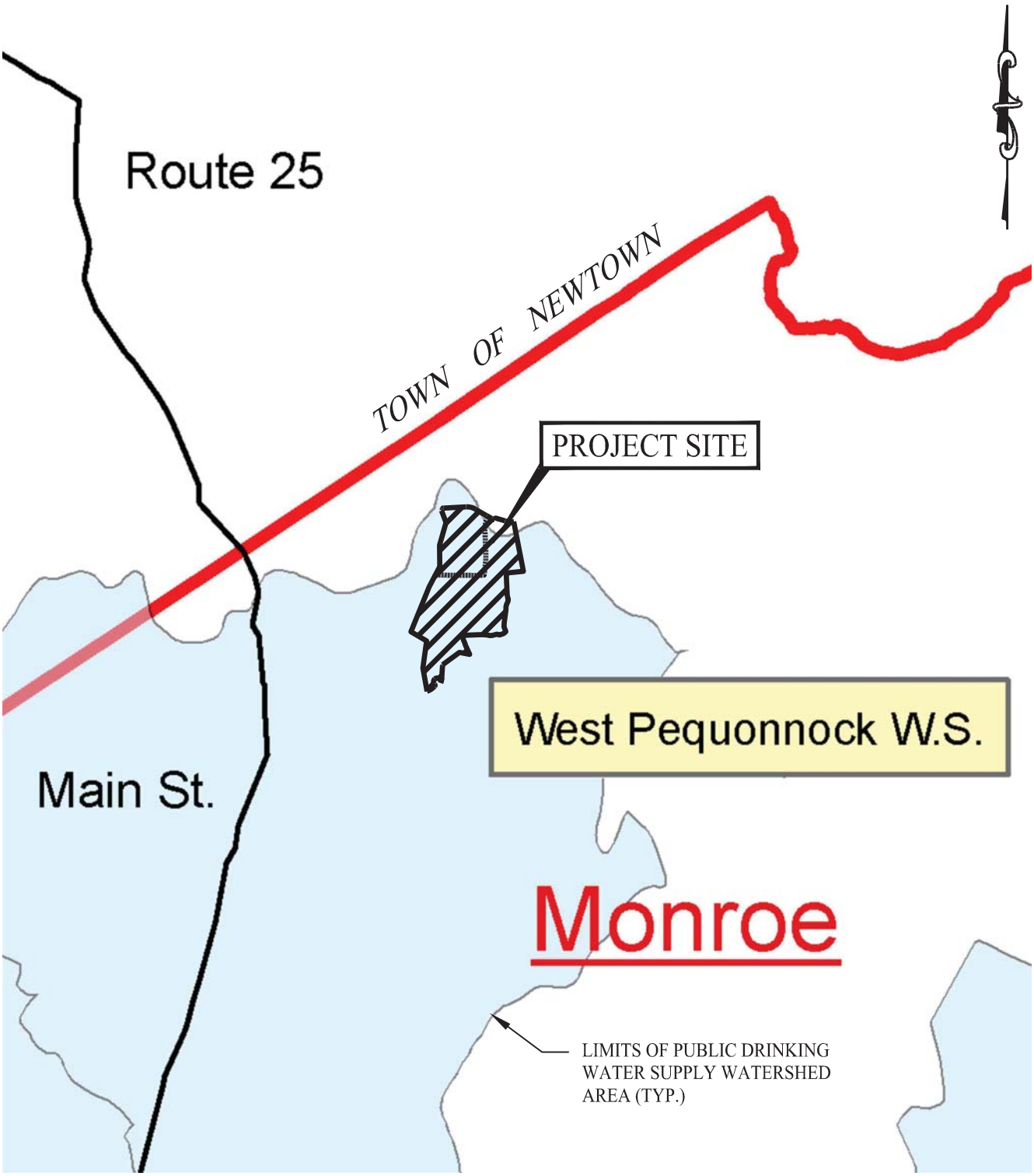
600 0 300 600

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468
T: (203) 880-5455 F: (203) 880-9695

SOIL SURVEY MAP

64 CAMBRIDGE DRIVE & 4 INDEPENDENCE DRIVE
MONROE, CONNECTICUT

Project #:	1903601
Plan Date:	05/26/20
Scale:	1" = 600'
Figure:	3



NOTE: WATERSHED INFORMATION TAKEN FROM A MAP ENTITLED "AQUARION WATER COMPANY PUBLIC DRINKING WATER SUPPLY WATERSHED AREAS; MONROE, CONNECTICUT," PROVIDED BY THE TOWN OF MONROE.

2,500 0 1,250 2,500

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468
T: (203) 880-5455 F: (203) 880-9695

PUBLIC WATER SUPPLY WATERSHED MAP

64 CAMBRIDGE DRIVE & 4 INDEPENDENCE DRIVE
MONROE, CONNECTICUT

Project #:	1903601
Plan Date:	05/26/20
Scale:	1" = 2,500'
Figure:	4

PROPERTY LINE

RIGHT-OF-WAY LINE

LIMIT OF WETLANDS

LIMIT OF UPLAND REVIEW AREA

LIMIT OF VERNAL POOL

LIMIT OF VERNAL POOL ENVELOPE

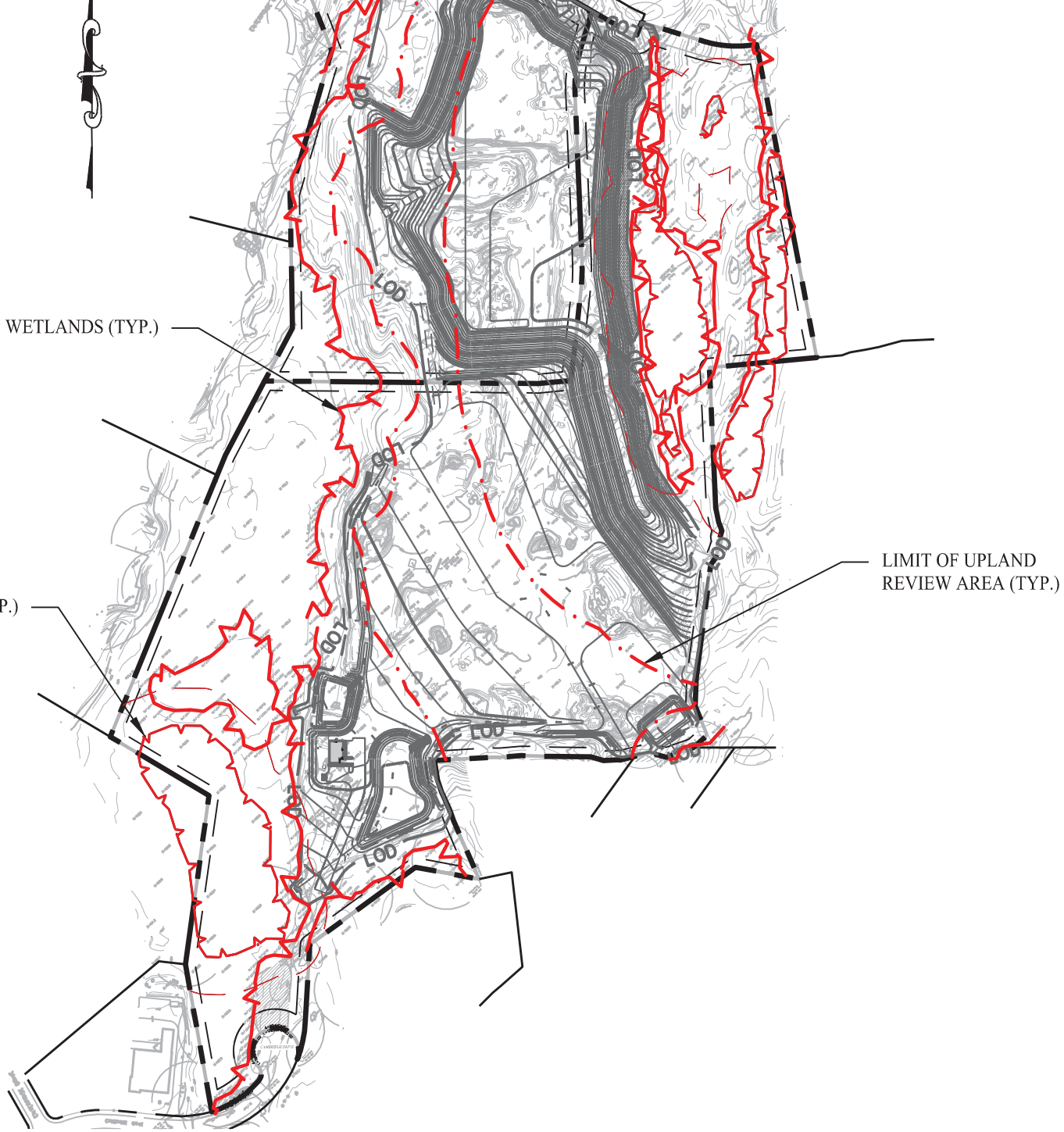
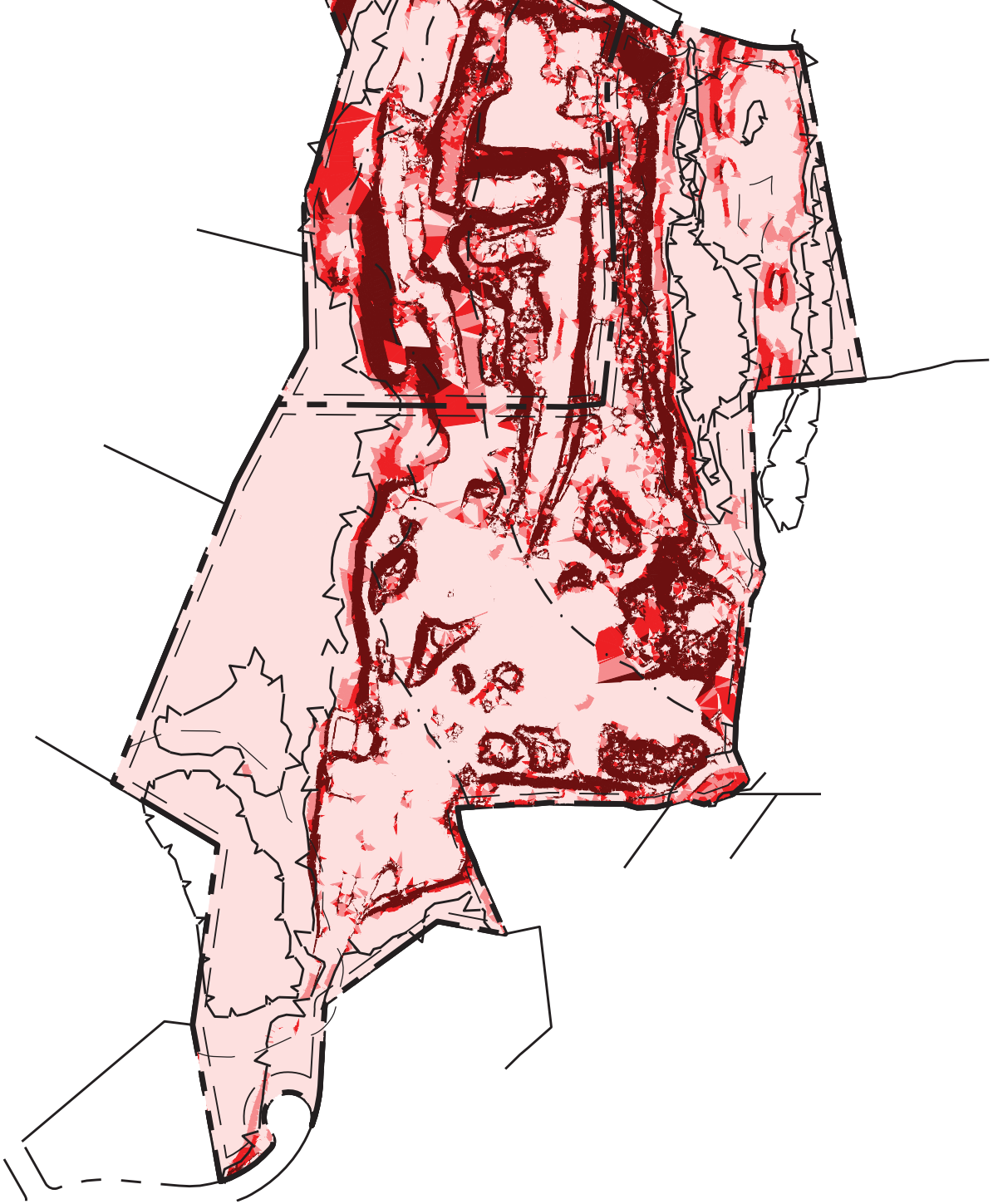


TABLE	
	LOT (ACRE)
	71.90±
	18.89±
	37.44±
	0.00±
	24.98±
ED	24.98±

Drawn By: CJP

Project: PROPOSED SITE DEVELOPMENT

Sheet Title:



Table

lope	Area	Color
	2018551.55	
	229160.33	
	233442.64	
%	650677.11	

Drawn By: AWC

Project: PROPOSED SITE DEVELOPMENT

Sheet Title:

APPENDIX B
HYDROLOGY

Precipitation Data
Existing Drainage Area Map (DA-1)
Existing HydroCAD Report
Proposed Drainage Area Map (DA-2)
Proposed HydroCAD Report
Grass-Lined Swale HydroCAD Report
Hydrograph Return Recap Period Table
Hydrograph Summary Report

NOAA Atlas 14, Volume 10, Version 3
Location name: Monroe, Connecticut, USA*
Latitude: 41.3481°, Longitude: -73.2522°
Elevation: 415.89 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.365** (0.278-0.469)	**0.427** (0.324-0.549)	**0.528** (0.400-0.681)	**0.612** (0.461-0.792)	**0.727** (0.533-0.973)	**0.814** (0.586-1.11)	**0.905** (0.635-1.27)	**1.01** (0.673-1.43)	**1.15** (0.743-1.68)	**1.26** (0.800-1.88)
10-min	**0.517** (0.393-0.664)	**0.604** (0.459-0.778)	**0.747** (0.567-0.964)	**0.866** (0.653-1.12)	**1.03** (0.755-1.38)	**1.15** (0.830-1.57)	**1.28** (0.899-1.79)	**1.43** (0.954-2.03)	**1.63** (1.05-2.38)	**1.79** (1.13-2.66)
15-min	**0.608** (0.463-0.781)	**0.711** (0.540-0.915)	**0.880** (0.667-1.14)	**1.02** (0.769-1.32)	**1.21** (0.888-1.62)	**1.36** (0.977-1.85)	**1.51** (1.06-2.11)	**1.68** (1.12-2.38)	**1.91** (1.24-2.80)	**2.11** (1.33-3.13)
30-min	**0.844** (0.642-1.09)	**0.986** (0.750-1.27)	**1.22** (0.923-1.57)	**1.41** (1.06-1.83)	**1.68** (1.23-2.24)	**1.88** (1.35-2.55)	**2.08** (1.46-2.90)	**2.30** (1.54-3.28)	**2.61** (1.69-3.81)	**2.84** (1.80-4.22)
60-min	**1.08** (0.822-1.39)	**1.26** (0.959-1.62)	**1.56** (1.18-2.01)	**1.80** (1.36-2.34)	**2.14** (1.57-2.86)	**2.40** (1.72-3.25)	**2.66** (1.85-3.69)	**2.93** (1.96-4.17)	**3.30** (2.13-4.82)	**3.58** (2.27-5.32)
2-hr	**1.40** (1.07-1.79)	**1.64** (1.26-2.10)	**2.04** (1.55-2.61)	**2.36** (1.79-3.04)	**2.81** (2.07-3.74)	**3.15** (2.28-4.26)	**3.51** (2.47-4.87)	**3.90** (2.62-5.51)	**4.46** (2.89-6.47)	**4.91** (3.12-7.25)
3-hr	**1.62** (1.24-2.06)	**1.90** (1.46-2.42)	**2.37** (1.81-3.02)	**2.76** (2.10-3.54)	**3.29** (2.44-4.37)	**3.69** (2.69-4.98)	**4.12** (2.92-5.73)	**4.60** (3.10-6.48)	**5.31** (3.45-7.68)	**5.89** (3.75-8.66)
6-hr	**2.03** (1.57-2.56)	**2.42** (1.87-3.05)	**3.05** (2.35-3.86)	**3.57** (2.74-4.55)	**4.29** (3.20-5.67)	**4.83** (3.54-6.49)	**5.40** (3.86-7.50)	**6.08** (4.11-8.51)	**7.08** (4.62-10.2)	**7.93** (5.06-11.6)
12-hr	**2.49** (1.94-3.12)	**3.01** (2.34-3.78)	**3.85** (2.98-4.85)	**4.55** (3.51-5.75)	**5.51** (4.13-7.24)	**6.23** (4.59-8.33)	**7.00** (5.03-9.67)	**7.91** (5.36-11.0)	**9.28** (6.07-13.2)	**10.4** (6.68-15.1)
24-hr	**2.93** (2.29-3.65)	**3.59** (2.81-4.48)	**4.68** (3.65-5.85)	**5.58** (4.33-7.01)	**6.82** (5.15-8.91)	**7.73** (5.74-10.3)	**8.73** (6.33-12.0)	**9.93** (6.76-13.7)	**11.8** (7.72-16.7)	**13.4** (8.57-19.2)
2-day	**3.32** (2.61-4.11)	**4.13** (3.25-5.12)	**5.45** (4.28-6.78)	**6.56** (5.12-8.18)	**8.07** (6.14-10.5)	**9.18** (6.87-12.2)	**10.4** (7.63-14.4)	**11.9** (8.15-16.4)	**14.4** (9.45-20.3)	**16.5** (10.6-23.6)
3-day	**3.62** (2.86-4.46)	**4.50** (3.56-5.56)	**5.96** (4.69-7.37)	**7.16** (5.61-8.90)	**8.82** (6.73-11.4)	**10.0** (7.53-13.3)	**11.4** (8.37-15.6)	**13.1** (8.94-17.9)	**15.8** (10.4-22.1)	**18.1** (11.7-25.8)
4-day	**3.89** (3.09-4.78)	**4.83** (3.83-5.94)	**6.36** (5.03-7.85)	**7.64** (6.00-9.46)	**9.39** (7.18-12.1)	**10.7** (8.03-14.1)	**12.1** (8.91-16.6)	**13.9** (9.51-18.9)	**16.7** (11.0-23.4)	**19.2** (12.4-27.3)
7-day	**4.66** (3.72-5.71)	**5.70** (4.54-6.97)	**7.38** (5.86-9.06)	**8.78** (6.93-10.8)	**10.7** (8.22-13.7)	**12.1** (9.14-15.9)	**13.7** (10.1-18.5)	**15.6** (10.7-21.1)	**18.5** (12.3-25.8)	**21.1** (13.6-29.8)
10-day	**5.43** (4.34-6.61)	**6.51** (5.21-7.94)	**8.29** (6.60-10.1)	**9.76** (7.73-12.0)	**11.8** (9.07-15.0)	**13.3** (10.0-17.3)	**14.9** (11.0-20.0)	**16.9** (11.6-22.8)	**19.8** (13.1-27.4)	**22.2** (14.4-31.3)
20-day	**7.74** (6.24-9.37)	**8.93** (7.19-10.8)	**10.9** (8.72-13.2)	**12.5** (9.96-15.2)	**14.7** (11.3-18.5)	**16.4** (12.4-21.0)	**18.1** (13.3-23.9)	**20.1** (13.9-26.9)	**22.8** (15.2-31.3)	**24.9** (16.2-34.9)
30-day	**9.65** (7.80-11.6)	**10.9** (8.81-13.2)	**13.0** (10.4-15.7)	**14.7** (11.7-17.8)	**17.0** (13.1-21.3)	**18.8** (14.2-23.8)	**20.6** (15.0-26.8)	**22.5** (15.7-30.0)	**25.0** (16.8-34.3)	**27.0** (17.6-37.6)
45-day	**12.0** (9.73-14.4)	**13.3** (10.8-16.0)	**15.5** (12.5-18.7)	**17.3** (13.9-20.9)	**19.8** (15.3-24.6)	**21.7** (16.4-27.3)	**23.6** (17.2-30.4)	**25.5** (17.8-33.8)	**27.9** (18.7-38.0)	**29.6** (19.3-41.1)
60-day	**13.9** (11.3-16.7)	**15.3** (12.5-18.3)	**17.6** (14.2-21.1)	**19.5** (15.7-23.5)	**22.1** (17.1-27.3)	**24.1** (18.2-30.2)	**26.1** (19.0-33.4)	**27.9** (19.6-36.9)	**30.3** (20.4-41.1)	**31.9** (20.9-44.2)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

NOAA Atlas 14, Volume 10, Version 3
Location name: Monroe, Connecticut, USA*
Latitude: 41.3481°, Longitude: -73.2522°
Elevation: 415.89 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

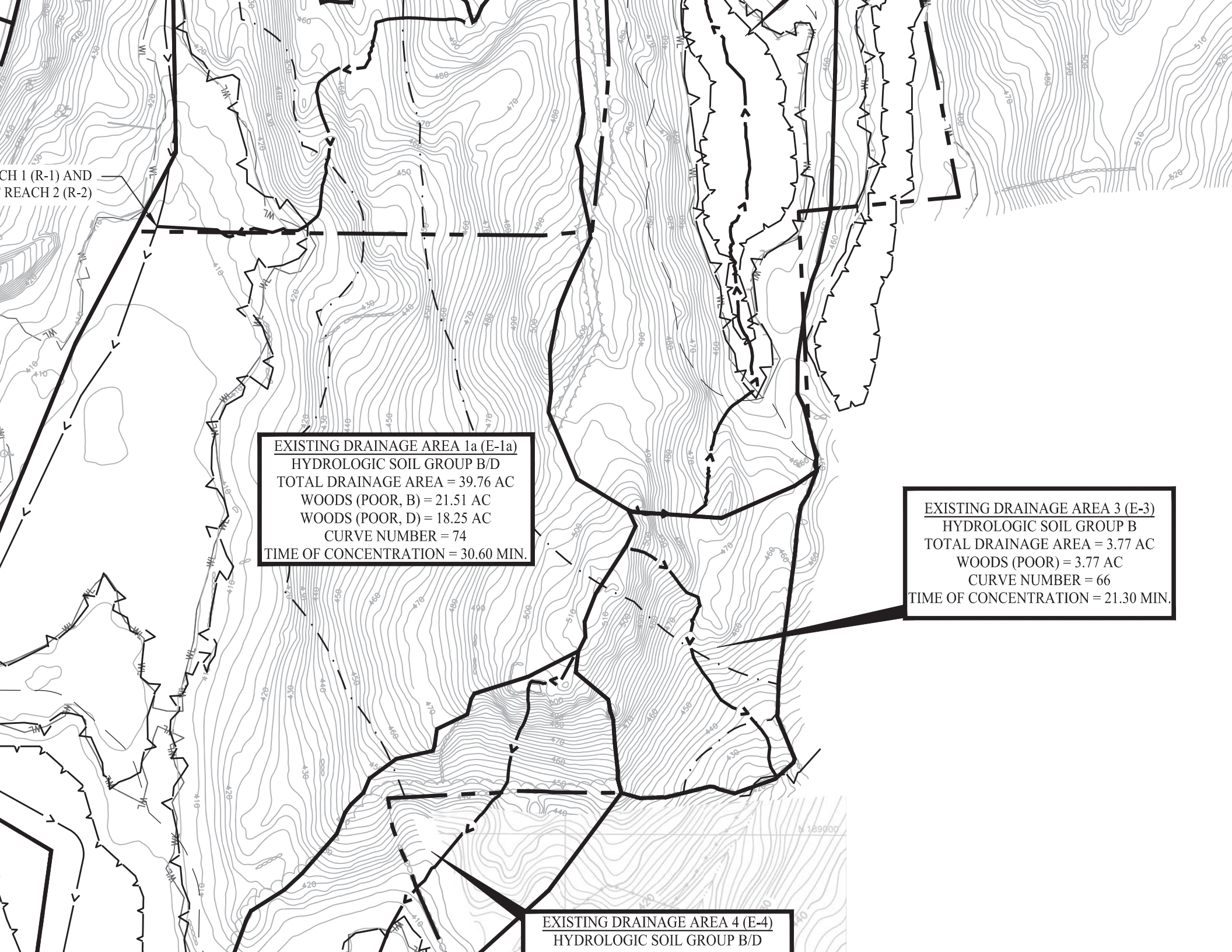
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.38** (3.34-5.63)	**5.12** (3.89-6.59)	**6.34** (4.80-8.17)	**7.34** (5.53-9.50)	**8.72** (6.40-11.7)	**9.77** (7.03-13.3)	**10.9** (7.62-15.2)	**12.1** (8.08-17.2)	**13.8** (8.92-20.2)	**15.2** (9.60-22.5)
10-min	**3.10** (2.36-3.98)	**3.62** (2.75-4.67)	**4.48** (3.40-5.78)	**5.20** (3.92-6.73)	**6.18** (4.53-8.27)	**6.92** (4.98-9.41)	**7.69** (5.39-10.8)	**8.55** (5.72-12.2)	**9.76** (6.31-14.3)	**10.8** (6.80-16.0)
15-min	**2.43** (1.85-3.12)	**2.84** (2.16-3.66)	**3.52** (2.67-4.54)	**4.08** (3.08-5.28)	**4.85** (3.55-6.49)	**5.43** (3.91-7.38)	**6.03** (4.23-8.44)	**6.70** (4.48-9.54)	**7.66** (4.95-11.2)	**8.43** (5.34-12.5)
30-min	**1.69** (1.28-2.17)	**1.97** (1.50-2.54)	**2.44** (1.85-3.14)	**2.82** (2.13-3.65)	**3.35** (2.45-4.48)	**3.76** (2.70-5.09)	**4.17** (2.91-5.80)	**4.61** (3.09-6.55)	**5.21** (3.37-7.61)	**5.69** (3.60-8.45)
60-min	**1.08** (0.822-1.39)	**1.26** (0.959-1.62)	**1.56** (1.18-2.01)	**1.80** (1.36-2.34)	**2.14** (1.57-2.86)	**2.40** (1.72-3.25)	**2.66** (1.85-3.69)	**2.93** (1.96-4.17)	**3.30** (2.13-4.82)	**3.58** (2.27-5.32)
2-hr	**0.700** (0.536-0.894)	**0.821** (0.628-1.05)	**1.02** (0.776-1.30)	**1.18** (0.896-1.52)	**1.41** (1.04-1.87)	**1.58** (1.14-2.13)	**1.75** (1.24-2.44)	**1.95** (1.31-2.76)	**2.23** (1.45-3.24)	**2.46** (1.56-3.62)
3-hr	**0.538** (0.413-0.684)	**0.633** (0.486-0.806)	**0.789** (0.604-1.01)	**0.918** (0.699-1.18)	**1.10** (0.812-1.46)	**1.23** (0.894-1.66)	**1.37** (0.972-1.91)	**1.53** (1.03-2.16)	**1.77** (1.15-2.56)	**1.96** (1.25-2.88)
6-hr	**0.339** (0.262-0.428)	**0.403** (0.312-0.510)	**0.509** (0.392-0.645)	**0.596** (0.457-0.759)	**0.717** (0.534-0.946)	**0.806** (0.591-1.08)	**0.902** (0.645-1.25)	**1.01** (0.686-1.42)	**1.18** (0.771-1.70)	**1.32** (0.845-1.93)
12-hr	**0.207** (0.161-0.259)	**0.249** (0.194-0.313)	**0.319** (0.248-0.402)	**0.378** (0.291-0.478)	**0.458** (0.343-0.601)	**0.517** (0.381-0.691)	**0.581** (0.418-0.803)	**0.657** (0.445-0.913)	**0.770** (0.503-1.10)	**0.866** (0.554-1.26)
24-hr	**0.122** (0.095-0.152)	**0.150** (0.117-0.187)	**0.195** (0.152-0.244)	**0.232** (0.180-0.292)	**0.284** (0.214-0.371)	**0.322** (0.239-0.429)	**0.364** (0.264-0.501)	**0.414** (0.282-0.572)	**0.491** (0.322-0.696)	**0.557** (0.357-0.802)
2-day	**0.069** (0.054-0.086)	**0.086** (0.068-0.107)	**0.114** (0.089-0.141)	**0.137** (0.107-0.170)	**0.168** (0.128-0.219)	**0.191** (0.143-0.254)	**0.217** (0.159-0.299)	**0.249** (0.170-0.342)	**0.299** (0.197-0.422)	**0.343** (0.221-0.491)
3-day	**0.050** (0.040-0.062)	**0.063** (0.049-0.077)	**0.083** (0.065-0.102)	**0.099** (0.078-0.124)	**0.122** (0.094-0.159)	**0.139** (0.105-0.185)	**0.158** (0.116-0.217)	**0.182** (0.124-0.248)	**0.219** (0.144-0.308)	**0.252** (0.162-0.359)
4-day	**0.041** (0.032-0.050)	**0.050** (0.040-0.062)	**0.066** (0.052-0.082)	**0.080** (0.062-0.099)	**0.098** (0.075-0.127)	**0.111** (0.084-0.147)	**0.126** (0.093-0.173)	**0.145** (0.099-0.197)	**0.174** (0.115-0.244)	**0.200** (0.129-0.284)
7-day	**0.028** (0.022-0.034)	**0.034** (0.027-0.042)	**0.044** (0.035-0.054)	**0.052** (0.041-0.064)	**0.064** (0.049-0.082)	**0.072** (0.054-0.094)	**0.081** (0.060-0.110)	**0.093** (0.064-0.126)	**0.110** (0.073-0.153)	**0.125** (0.081-0.177)
10-day	**0.023** (0.018-0.028)	**0.027** (0.022-0.033)	**0.035** (0.028-0.042)	**0.041** (0.032-0.050)	**0.049** (0.038-0.063)	**0.055** (0.042-0.072)	**0.062** (0.046-0.083)	**0.070** (0.048-0.095)	**0.082** (0.055-0.114)	**0.093** (0.060-0.131)
20-day	**0.016** (0.013-0.020)	**0.019** (0.015-0.023)	**0.023** (0.018-0.028)	**0.026** (0.021-0.032)	**0.031** (0.024-0.039)	**0.034** (0.026-0.044)	**0.038** (0.028-0.050)	**0.042** (0.029-0.056)	**0.047** (0.032-0.065)	**0.052** (0.034-0.073)
30-day	**0.013** (0.011-0.016)	**0.015** (0.012-0.018)	**0.018** (0.014-0.022)	**0.020** (0.016-0.025)	**0.024** (0.018-0.029)	**0.026** (0.020-0.033)	**0.029** (0.021-0.037)	**0.031** (0.022-0.042)	**0.035** (0.023-0.048)	**0.037** (0.024-0.052)
45-day	**0.011** (0.009-0.013)	**0.012** (0.010-0.015)	**0.014** (0.012-0.017)	**0.016** (0.013-0.019)	**0.018** (0.014-0.023)	**0.020** (0.015-0.025)	**0.022** (0.016-0.028)	**0.024** (0.016-0.031)	**0.026** (0.017-0.035)	**0.027** (0.018-0.038)
60-day	**0.010** (0.008-0.012)	**0.011** (0.009-0.013)	**0.012** (0.010-0.015)	**0.014** (0.011-0.016)	**0.015** (0.012-0.019)	**0.017** (0.013-0.021)	**0.018** (0.013-0.023)	**0.019** (0.014-0.026)	**0.021** (0.014-0.029)	**0.022** (0.014-0.031)

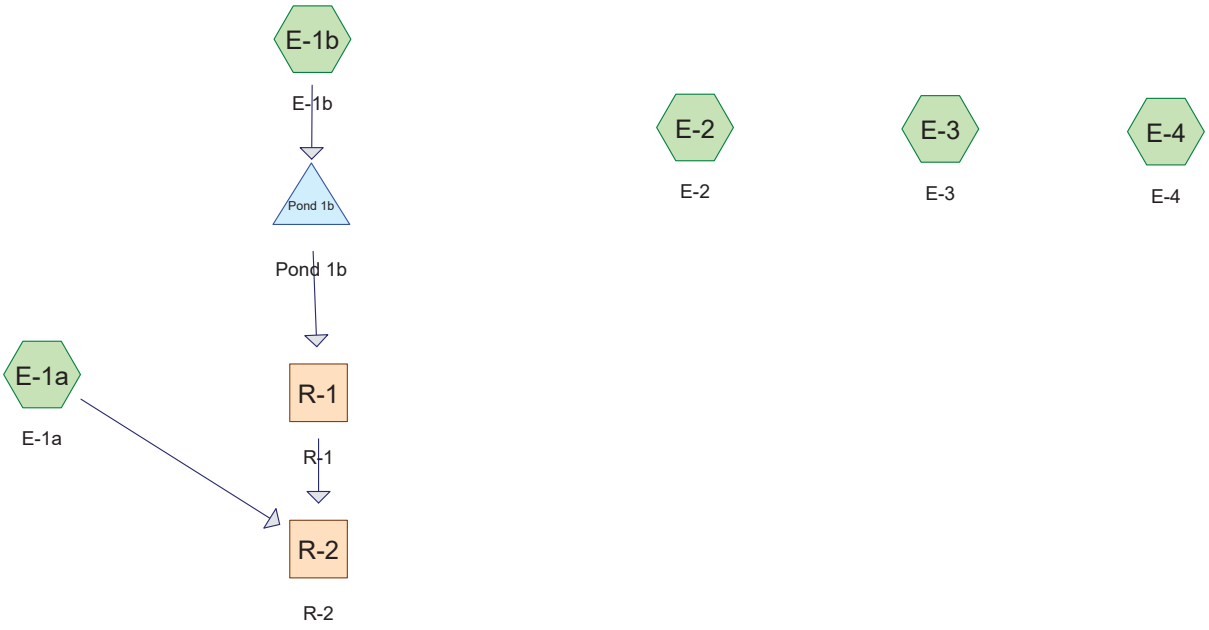
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top


CH 1 (R-1) AND
REACH 2 (R-2)
EXISTING DRAINAGE AREA 1a (E-1a)
HYDROLOGIC SOIL GROUP B/D
TOTAL DRAINAGE AREA = 39.76 AC
WOODS (POOR, B) = 21.51 AC
WOODS (POOR, D) = 18.25 AC
CURVE NUMBER = 74
TIME OF CONCENTRATION = 30.60 MIN.
EXISTING DRAINAGE AREA 3 (E-3)
HYDROLOGIC SOIL GROUP B
TOTAL DRAINAGE AREA = 3.77 AC
WOODS (POOR) = 3.77 AC
CURVE NUMBER = 66
TIME OF CONCENTRATION = 21.30 MIN.
EXISTING DRAINAGE AREA 4 (E-4)
HYDROLOGIC SOIL GROUP B/D



Subcat Reach Pond Link

Routing Diagram for 1903601 - Existing Hydrology
Prepared by Microsoft, Printed 4/6/2020
HydroCAD® 10.00-22 s/n 10621 © 2018 HydroCAD Software Solutions LLC

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1a: E-1a Runoff Area=39.760 ac 0.00% Impervious Runoff Depth>1.27"
Flow Length=900' Tc=30.6 min CN=74 Runoff=41.42 cfs 4.205 af

Subcatchment E-1b: E-1b Runoff Area=17.870 ac 24.90% Impervious Runoff Depth>1.10"
Flow Length=1,362' Tc=16.0 min CN=71 Runoff=23.31 cfs 1.633 af

Subcatchment E-2: E-2 Runoff Area=14.560 ac 0.00% Impervious Runoff Depth>1.01"
Flow Length=1,712' Tc=90.6 min CN=70 Runoff=5.30 cfs 1.226 af

Subcatchment E-3: E-3 Runoff Area=3.770 ac 0.00% Impervious Runoff Depth>0.83"
Flow Length=541' Tc=21.3 min CN=66 Runoff=2.90 cfs 0.260 af

Subcatchment E-4: E-4 Runoff Area=5.570 ac 0.00% Impervious Runoff Depth>1.15"
Flow Length=703' Tc=31.2 min CN=72 Runoff=5.08 cfs 0.533 af

Reach R-1: R-1 Avg. Flow Depth=0.40' Max Vel=3.39 fps Inflow=7.89 cfs 1.544 af
n=0.040 L=883.0' S=0.0351 '/' Capacity=39.83 cfs Outflow=7.80 cfs 1.534 af

Reach R-2: R-2 Avg. Flow Depth=1.34' Max Vel=2.10 fps Inflow=46.87 cfs 5.739 af
n=0.040 L=2,216.0' S=0.0032 '/' Capacity=22.11 cfs Outflow=35.14 cfs 5.585 af

Pond Pond 1b: Pond 1b Peak Elev=443.05' Storage=20,980 cf Inflow=23.31 cfs 1.633 af
Outflow=7.89 cfs 1.544 af

Summary for Subcatchment E-1a: E-1a

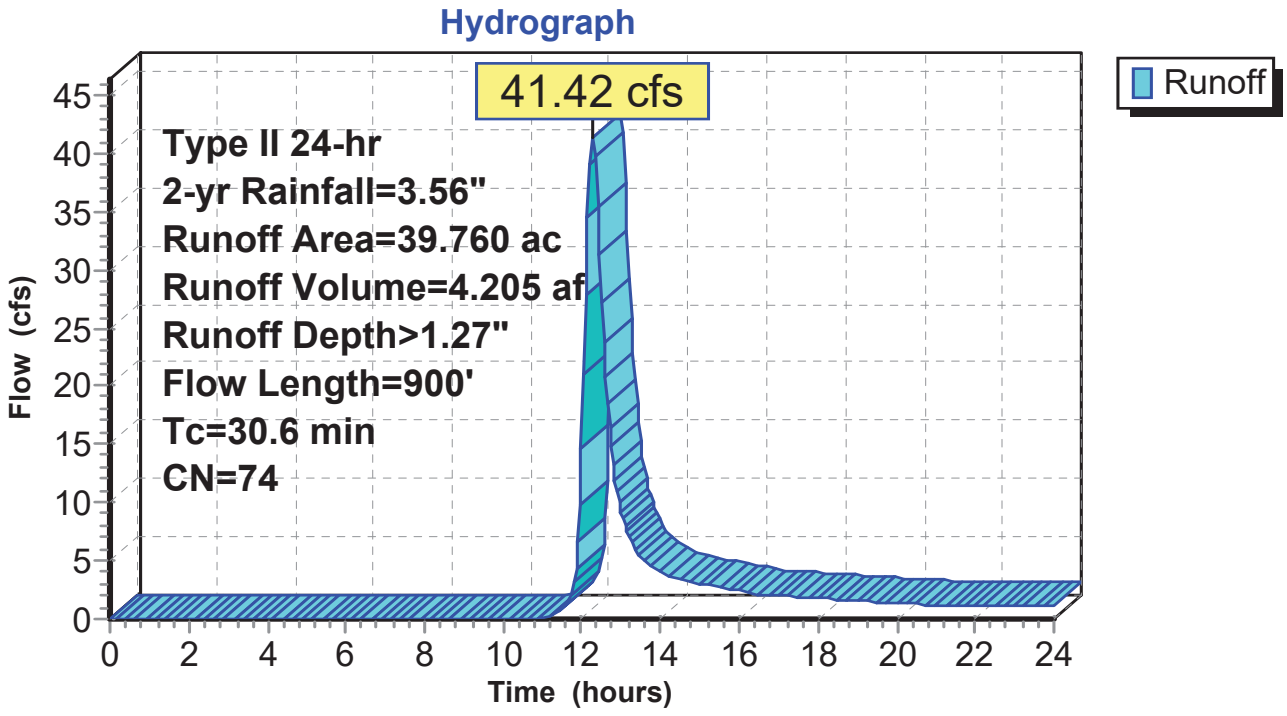
Runoff = 41.42 cfs @ 12.27 hrs, Volume= 4.205 af, Depth> 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.56"

Area (ac)	CN	Description
18.250	83	Woods, Poor, HSG D
21.510	66	Woods, Poor, HSG B
39.760	74	Weighted Average
39.760		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.1	150	0.1870	0.12		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
5.2	505	0.1030	1.60		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
5.3	245	0.0240	0.77		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
30.6	900	Total			

Subcatchment E-1a: E-1a



Summary for Subcatchment E-1b: E-1b

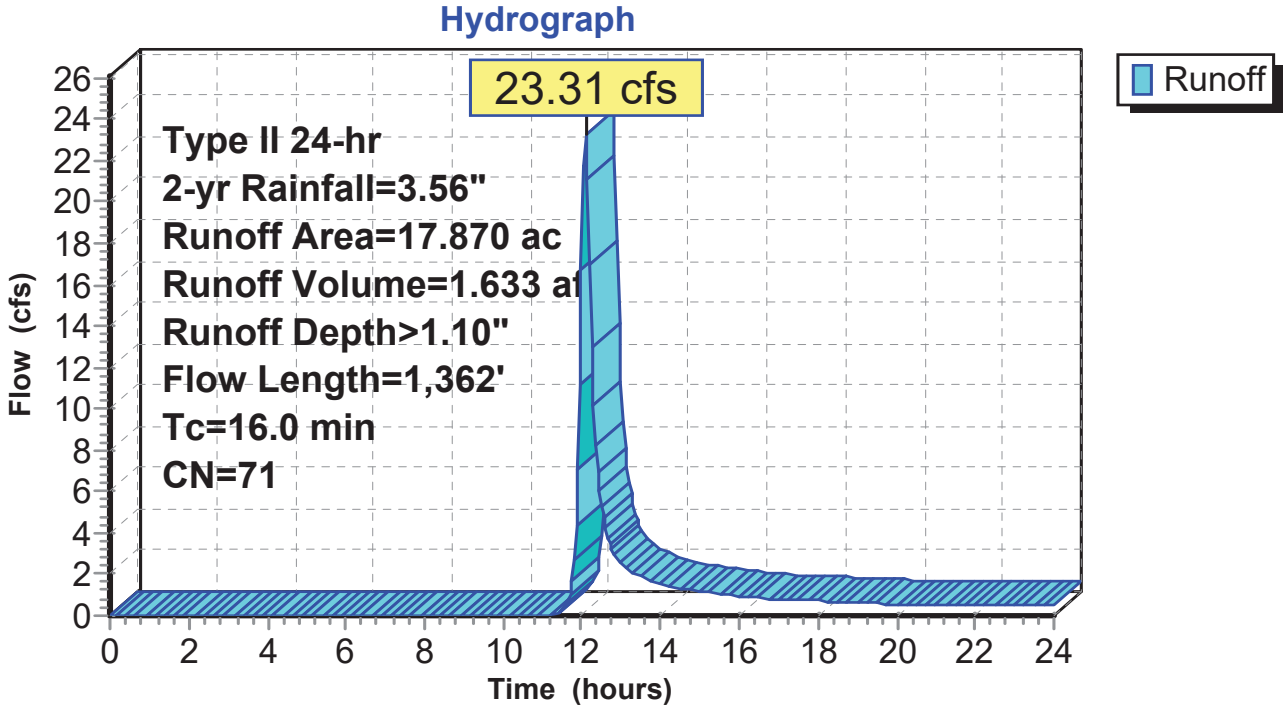
Runoff = 23.31 cfs @ 12.10 hrs, Volume= 1.633 af, Depth> 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.56"

Area (ac)	CN	Description
4.450	98	Paved parking, HSG B
3.860	61	>75% Grass cover, Good, HSG B
6.200	66	Woods, Poor, HSG B
3.360	55	Woods, Good, HSG B
17.870	71	Weighted Average
13.420		75.10% Pervious Area
4.450		24.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2	100	0.3600	0.15		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
0.8	232	0.0950	4.96		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
1.0	130	0.0120	2.22		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
3.0	900		5.00		**Direct Entry, DE**
16.0	1,362	Total			

Subcatchment E-1b: E-1b



Summary for Subcatchment E-2: E-2

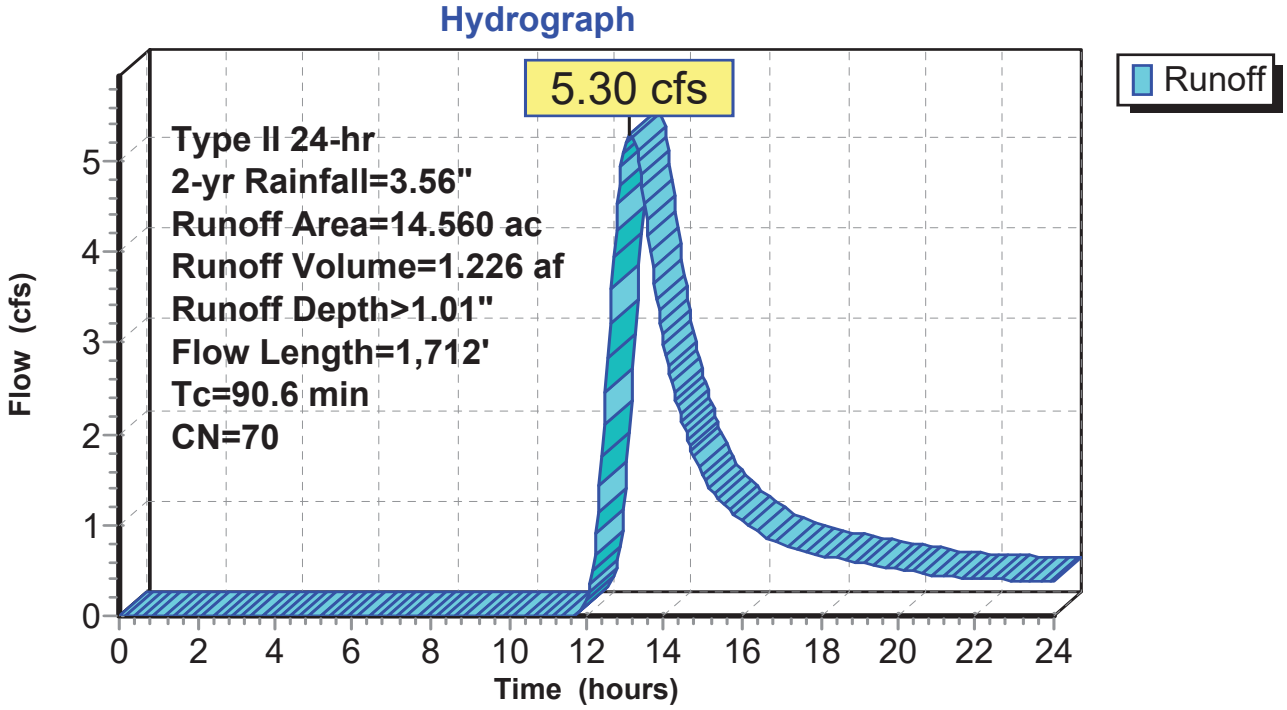
Runoff = 5.30 cfs @ 13.13 hrs, Volume= 1.226 af, Depth> 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.56"

Area (ac)	CN	Description
3.540	83	Woods, Poor, HSG D
11.020	66	Woods, Poor, HSG B
14.560	70	Weighted Average
14.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	150	0.2330	0.14		**Sheet Flow, BC** Woods: Dense underbrush n= 0.800 P2= 3.56"
2.5	211	0.0810	1.42		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
65.2	1,157	0.0035	0.30		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
4.5	194	0.0210	0.72		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
90.6	1,712	Total			

Subcatchment E-2: E-2



Summary for Subcatchment E-3: E-3

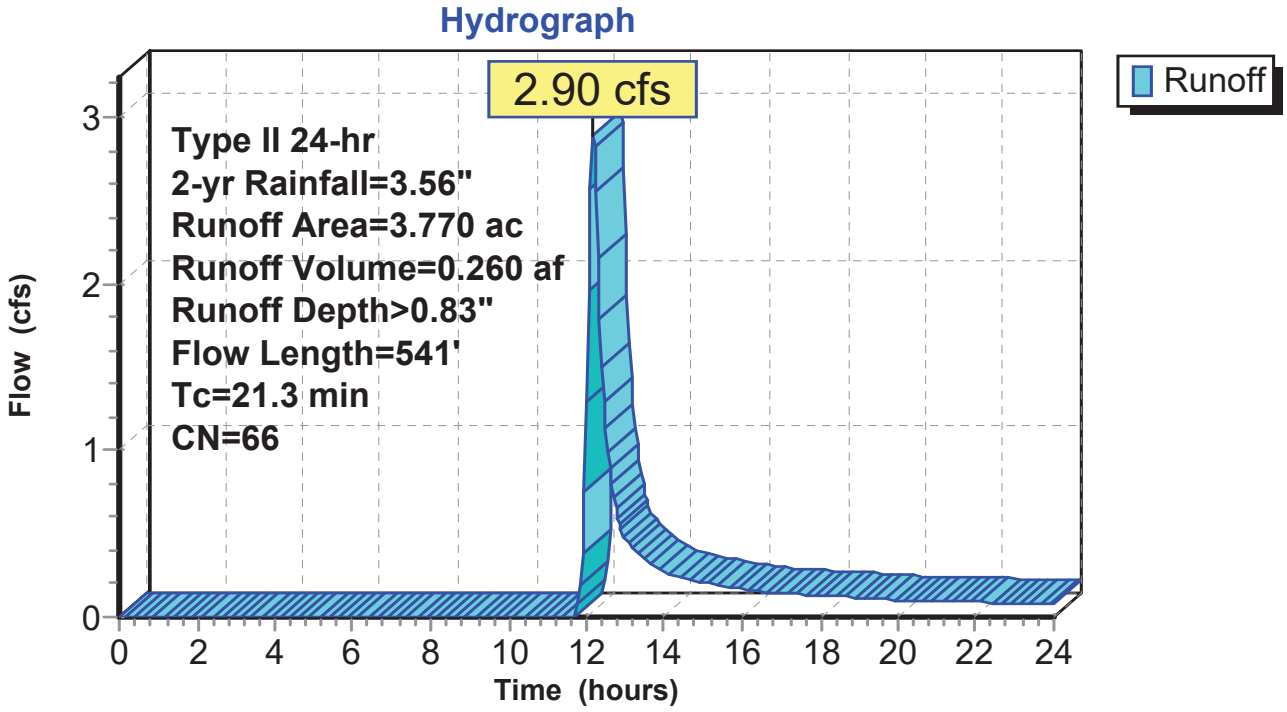
Runoff = 2.90 cfs @ 12.17 hrs, Volume= 0.260 af, Depth> 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.56"

Area (ac)	CN	Description
3.770	66	Woods, Poor, HSG B
3.770		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	150	0.2600	0.14		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
3.7	391	0.1230	1.75		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
21.3	541	Total			

Subcatchment E-3: E-3



Summary for Subcatchment E-4: E-4

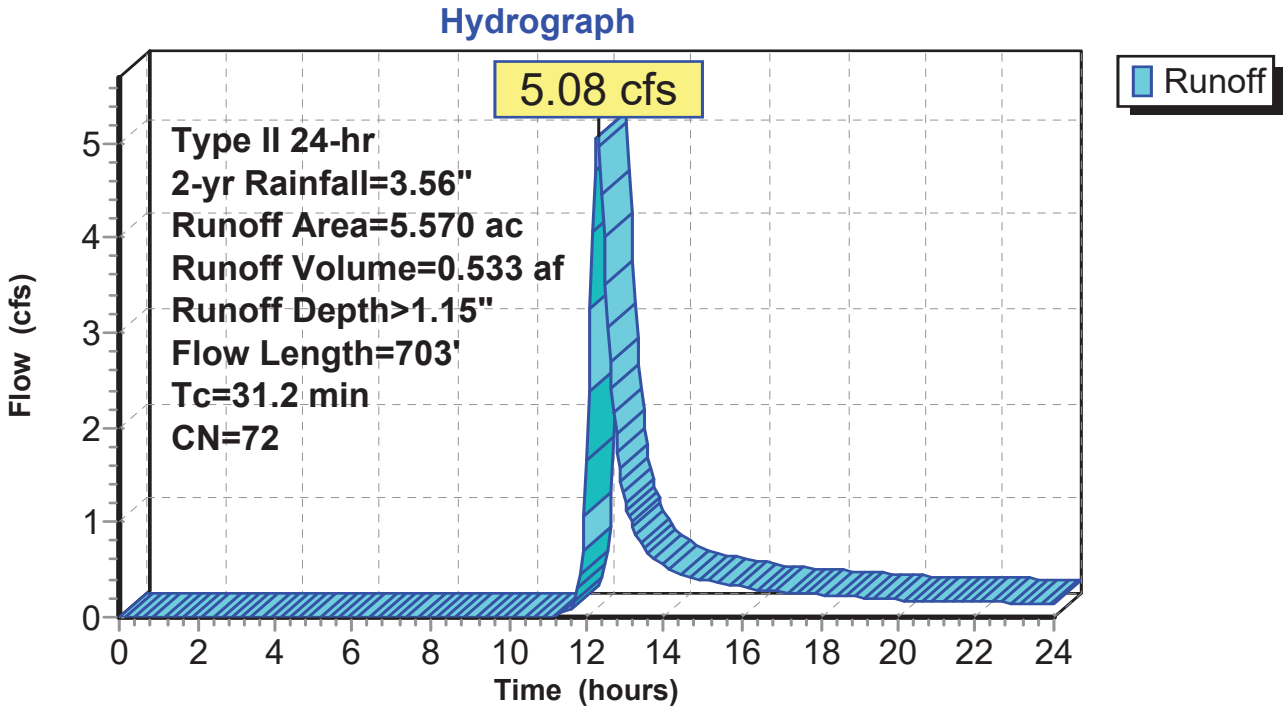
Runoff = 5.08 cfs @ 12.28 hrs, Volume= 0.533 af, Depth> 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.56"

Area (ac)	CN	Description
3.670	66	Woods, Poor, HSG B
1.900	83	Woods, Poor, HSG D
5.570	72	Weighted Average
5.570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.5	150	0.0930	0.09		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
4.7	553	0.1570	1.98		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
31.2	703	Total			

Subcatchment E-4: E-4



Summary for Reach R-1: R-1

Inflow Area = 17.870 ac, 24.90% Impervious, Inflow Depth > 1.04" for 2-yr event
Inflow = 7.89 cfs @ 12.37 hrs, Volume= 1.544 af
Outflow = 7.80 cfs @ 12.51 hrs, Volume= 1.534 af, Atten= 1%, Lag= 8.3 min

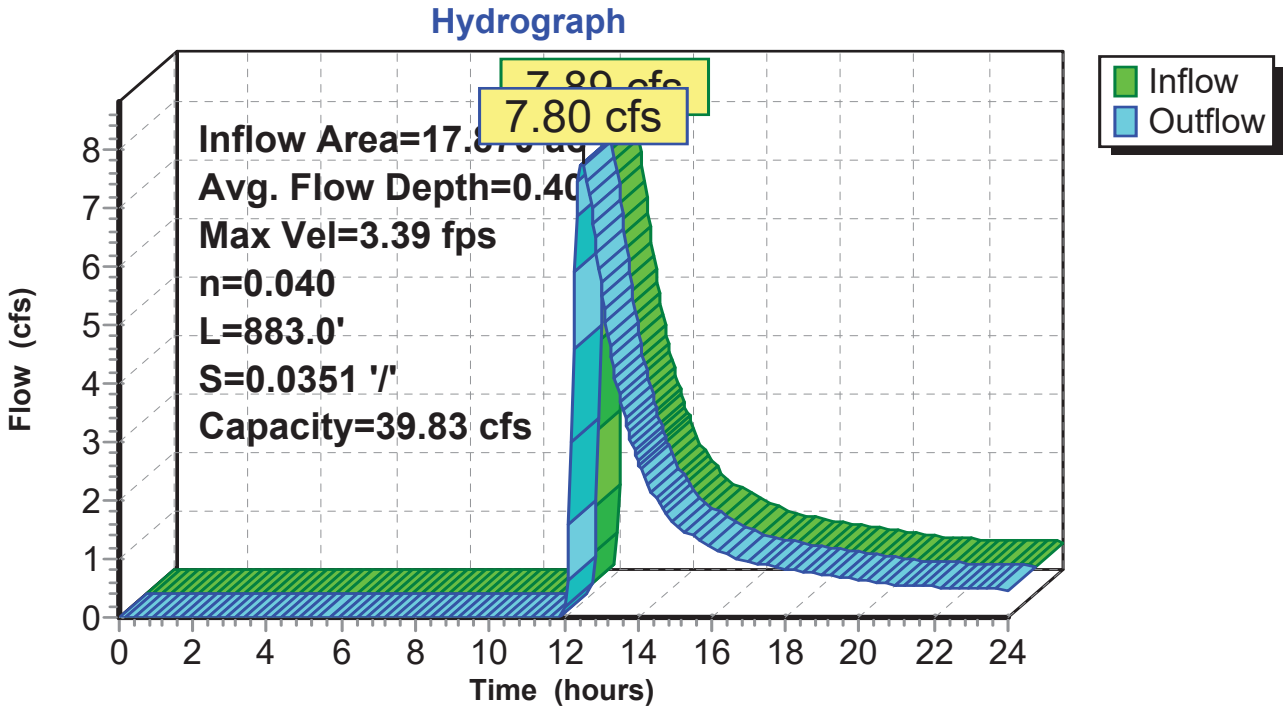
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.39 fps, Min. Travel Time= 4.3 min
Avg. Velocity = 1.70 fps, Avg. Travel Time= 8.6 min

Peak Storage= 2,035 cf @ 12.43 hrs
Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 39.83 cfs

5.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 883.0' Slope= 0.0351 '/'
Inlet Invert= 441.00', Outlet Invert= 410.00'



‡



Stage-Discharge for Reach R-1: R-1

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
441.00	0.00	0.00
441.01	0.32	0.02
441.02	0.51	0.05
441.03	0.67	0.10
441.04	0.80	0.16
441.05	0.93	0.24
441.06	1.05	0.32
441.07	1.16	0.42
441.08	1.26	0.52
441.09	1.36	0.63
441.10	1.45	0.76
441.11	1.54	0.89
441.12	1.63	1.03
441.13	1.72	1.17
441.14	1.80	1.33
441.15	1.88	1.49
441.16	1.96	1.66
441.17	2.03	1.84
441.18	2.10	2.03
441.19	2.18	2.22
441.20	2.25	2.43
441.21	2.31	2.63
441.22	2.38	2.85
441.23	2.45	3.07
441.24	2.51	3.30
441.25	2.57	3.54
441.26	2.63	3.78
441.27	2.70	4.03
441.28	2.76	4.29
441.29	2.81	4.55
441.30	2.87	4.82
441.31	2.93	5.10
441.32	2.98	5.38
441.33	3.04	5.68
441.34	3.09	5.97
441.35	3.15	6.28
441.36	3.20	6.59
441.37	3.25	6.90
441.38	3.30	7.23
441.39	3.35	7.56
441.40	3.40	7.89
441.41	3.45	8.24
441.42	3.50	8.59
441.43	3.55	8.94
441.44	3.60	9.30
441.45	3.64	9.67
441.46	3.69	10.05
441.47	3.74	10.43
441.48	3.78	10.82
441.49	3.83	11.21
441.50	3.87	11.61
441.51	3.91	12.02
441.52	3.96	12.43
441.53	4.00	12.85
441.54	4.04	13.28
441.55	4.09	13.71
441.56	4.13	14.15
441.57	4.17	14.59
441.58	4.21	15.04
441.59	4.25	15.50
441.60	4.29	15.97
441.61	4.33	16.44
441.62	4.37	16.91
441.63	4.41	17.40
441.64	4.45	17.89
441.65	4.49	18.38
441.66	4.53	18.89
441.67	4.57	19.39
441.68	4.60	19.91
441.69	4.64	20.43
441.70	4.68	20.96
441.71	4.72	21.49
441.72	4.75	22.03
441.73	4.79	22.58
441.74	4.82	23.14
441.75	4.86	23.70
441.76	4.90	24.26
441.77	4.93	24.84
441.78	4.97	25.42
441.79	5.00	26.00
441.80	5.04	26.60
441.81	5.07	27.19
441.82	5.11	27.80
441.83	5.14	28.41
441.84	5.17	29.03
441.85	5.21	29.66
441.86	5.24	30.29
441.87	5.27	30.93
441.88	5.31	31.57
441.89	5.34	32.22
441.90	5.37	32.88
441.91	5.41	33.55
441.92	5.44	34.22
441.93	5.47	34.90
441.94	5.50	35.58
441.95	5.53	36.27
441.96	5.57	36.97
441.97	5.60	37.67
441.98	5.63	38.39
441.99	5.66	39.10
442.00	**5.69**	**39.83**

Stage-Area-Storage for Reach R-1: R-1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
441.00	0.0	0
441.01	0.1	44
441.02	0.1	89
441.03	0.2	134
441.04	0.2	179
441.05	0.3	225
441.06	0.3	271
441.07	0.4	318
441.08	0.4	365
441.09	0.5	412
441.10	0.5	459
441.11	0.6	507
441.12	0.6	555
441.13	0.7	604
441.14	0.7	653
441.15	0.8	702
441.16	0.9	752
441.17	0.9	802
441.18	1.0	852
441.19	1.0	903
441.20	1.1	954
441.21	1.1	1,005
441.22	1.2	1,057
441.23	1.3	1,109
441.24	1.3	1,161
441.25	1.4	1,214
441.26	1.4	1,267
441.27	1.5	1,321
441.28	1.6	1,375
441.29	1.6	1,429
441.30	1.7	1,483
441.31	1.7	1,538
441.32	1.8	1,594
441.33	1.9	1,649
441.34	1.9	1,705
441.35	2.0	1,762
441.36	2.1	1,818
441.37	2.1	1,875
441.38	2.2	1,933
441.39	2.3	1,990
441.40	2.3	2,049
441.41	2.4	2,107
441.42	2.5	2,166
441.43	2.5	2,225
441.44	2.6	2,284
441.45	2.7	2,344
441.46	2.7	2,405
441.47	2.8	2,465
441.48	2.9	2,526
441.49	2.9	2,587
441.50	3.0	2,649
441.51	3.1	2,711
441.52	3.1	2,773
441.53	3.2	2,836
441.54	3.3	2,899
441.55	3.4	2,962
441.56	3.4	3,026
441.57	3.5	3,090
441.58	3.6	3,155
441.59	3.6	3,220
441.60	3.7	3,285
441.61	3.8	3,350
441.62	3.9	3,416
441.63	3.9	3,482
441.64	4.0	3,549
441.65	4.1	3,616
441.66	4.2	3,683
441.67	4.2	3,751
441.68	4.3	3,819
441.69	4.4	3,887
441.70	4.5	3,956
441.71	4.6	4,025
441.72	4.6	4,094
441.73	4.7	4,164
441.74	4.8	4,234
441.75	4.9	4,305
441.76	5.0	4,375
441.77	5.0	4,447
441.78	5.1	4,518
441.79	5.2	4,590
441.80	5.3	4,662
441.81	5.4	4,735
441.82	5.4	4,808
441.83	5.5	4,881
441.84	5.6	4,955
441.85	5.7	5,029
441.86	5.8	5,103
441.87	5.9	5,178
441.88	5.9	5,253
441.89	6.0	5,328
441.90	6.1	5,404
441.91	6.2	5,480
441.92	6.3	5,557
441.93	6.4	5,633
441.94	6.5	5,711
441.95	6.6	5,788
441.96	6.6	5,866
441.97	6.7	5,944
441.98	6.8	6,023
441.99	6.9	6,102
442.00	**7.0**	**6,181**

Summary for Reach R-2: R-2

Inflow Area = 57.630 ac, 7.72% Impervious, Inflow Depth > 1.19" for 2-yr event
Inflow = 46.87 cfs @ 12.30 hrs, Volume= 5.739 af
Outflow = 35.14 cfs @ 12.80 hrs, Volume= 5.585 af, Atten= 25%, Lag= 29.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.10 fps, Min. Travel Time= 17.6 min
Avg. Velocity = 0.94 fps, Avg. Travel Time= 39.4 min

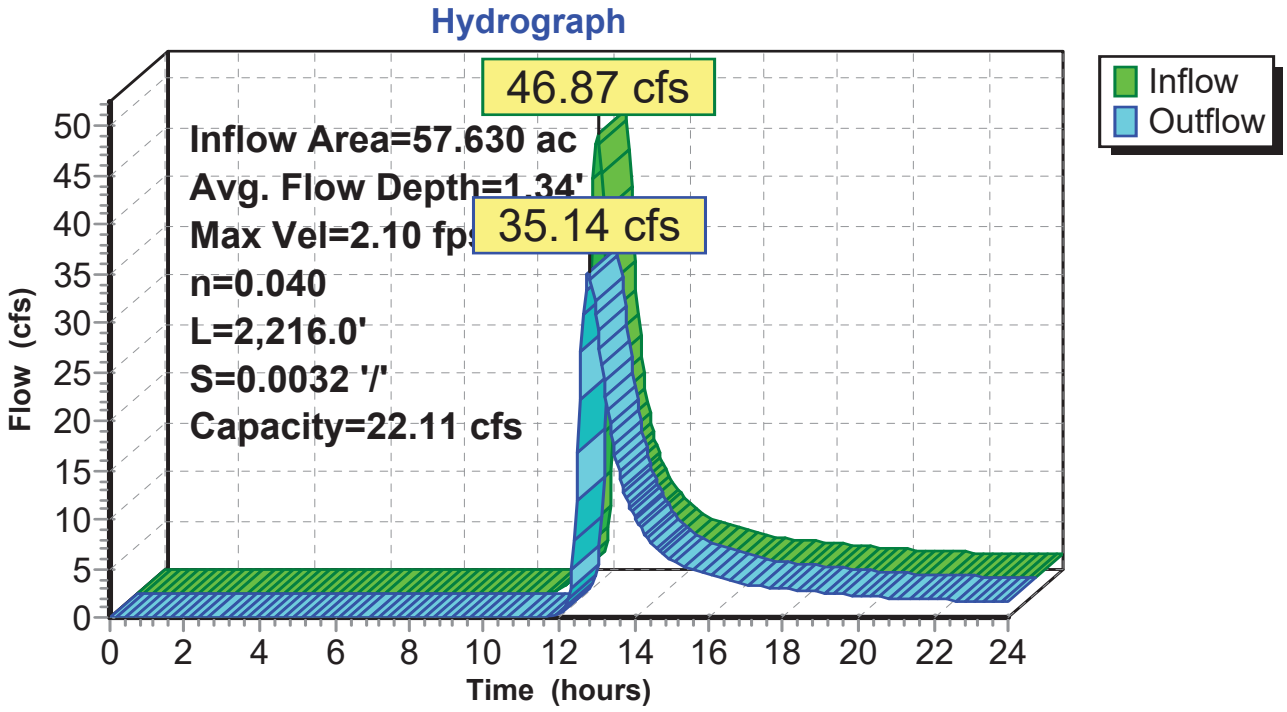
Peak Storage= 37,171 cf @ 12.50 hrs
Average Depth at Peak Storage= 1.34'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 22.11 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 2,216.0' Slope= 0.0032 '/'
Inlet Invert= 410.00', Outlet Invert= 403.00'



‡

Reach R-2: R-2



Stage-Discharge for Reach R-2: R-2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
410.00	0.00	0.00
410.01	0.10	0.01
410.02	0.15	0.03
410.03	0.20	0.06
410.04	0.24	0.10
410.05	0.28	0.14
410.06	0.32	0.19
410.07	0.35	0.25
410.08	0.38	0.31
410.09	0.41	0.38
410.10	0.44	0.45
410.11	0.47	0.53
410.12	0.50	0.61
410.13	0.52	0.70
410.14	0.55	0.79
410.15	0.58	0.89
410.16	0.60	0.99
410.17	0.62	1.10
410.18	0.65	1.21
410.19	0.67	1.32
410.20	0.69	1.44
410.21	0.71	1.56
410.22	0.74	1.69
410.23	0.76	1.82
410.24	0.78	1.96
410.25	0.80	2.09
410.26	0.82	2.24
410.27	0.84	2.38
410.28	0.86	2.53
410.29	0.88	2.69
410.30	0.89	2.84
410.31	0.91	3.01
410.32	0.93	3.17
410.33	0.95	3.34
410.34	0.97	3.51
410.35	0.98	3.69
410.36	1.00	3.87
410.37	1.02	4.05
410.38	1.04	4.24
410.39	1.05	4.43
410.40	1.07	4.62
410.41	1.09	4.82
410.42	1.10	5.02
410.43	1.12	5.22
410.44	1.13	5.43
410.45	1.15	5.64
410.46	1.16	5.85
410.47	1.18	6.07
410.48	1.20	6.29
410.49	1.21	6.51
410.50	1.23	6.74
410.51	1.24	6.97
410.52	1.25	7.20
410.53	1.27	7.44
410.54	1.28	7.68
410.55	1.30	7.92
410.56	1.31	8.17
410.57	1.33	8.42
410.58	1.34	8.67
410.59	1.35	8.93
410.60	1.37	9.19
410.61	1.38	9.45
410.62	1.39	9.72
410.63	1.41	9.98
410.64	1.42	10.26
410.65	1.43	10.53
410.66	1.45	10.81
410.67	1.46	11.09
410.68	1.47	11.38
410.69	1.49	11.66
410.70	1.50	11.95
410.71	1.51	12.25
410.72	1.52	12.55
410.73	1.54	12.85
410.74	1.55	13.15
410.75	1.56	13.46
410.76	1.57	13.77
410.77	1.58	14.08
410.78	1.60	14.39
410.79	1.61	14.71
410.80	1.62	15.03
410.81	1.63	15.36
410.82	1.64	15.69
410.83	1.66	16.02
410.84	1.67	16.35
410.85	1.68	16.69
410.86	1.69	17.03
410.87	1.70	17.37
410.88	1.71	17.72
410.89	1.72	18.07
410.90	1.73	18.42
410.91	1.75	18.78
410.92	1.76	19.14
410.93	1.77	19.50
410.94	1.78	19.86
410.95	1.79	20.23
410.96	1.80	20.60
410.97	1.81	20.97
410.98	1.82	21.35
410.99	1.83	21.73
411.00	**1.84**	**22.11**

Stage-Area-Storage for Reach R-2: R-2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
410.00	0.0	0
410.01	0.1	222
410.02	0.2	445
410.03	0.3	669
410.04	0.4	893
410.05	0.5	1,119
410.06	0.6	1,346
410.07	0.7	1,573
410.08	0.8	1,801
410.09	0.9	2,030
410.10	1.0	2,260
410.11	1.1	2,491
410.12	1.2	2,723
410.13	1.3	2,956
410.14	1.4	3,189
410.15	1.5	3,424
410.16	1.7	3,659
410.17	1.8	3,895
410.18	1.9	4,132
410.19	2.0	4,370
410.20	2.1	4,609
410.21	2.2	4,849
410.22	2.3	5,090
410.23	2.4	5,331
410.24	2.5	5,574
410.25	2.6	5,817
410.26	2.7	6,061
410.27	2.8	6,306
410.28	3.0	6,552
410.29	3.1	6,799
410.30	3.2	7,047
410.31	3.3	7,296
410.32	3.4	7,545
410.33	3.5	7,795
410.34	3.6	8,047
410.35	3.7	8,299
410.36	3.9	8,552
410.37	4.0	8,806
410.38	4.1	9,061
410.39	4.2	9,317
410.40	4.3	9,573
410.41	4.4	9,831
410.42	4.6	10,089
410.43	4.7	10,348
410.44	4.8	10,608
410.45	4.9	10,869
410.46	5.0	11,131
410.47	5.1	11,394
410.48	5.3	11,658
410.49	5.4	11,923
410.50	5.5	12,188
410.51	5.6	12,454
410.52	5.7	12,722
410.53	5.9	12,990
410.54	6.0	13,259
410.55	6.1	13,529
410.56	6.2	13,799
410.57	6.3	14,071
410.58	6.5	14,344
410.59	6.6	14,617
410.60	6.7	14,892
410.61	6.8	15,167
410.62	7.0	15,443
410.63	7.1	15,720
410.64	7.2	15,998
410.65	7.3	16,277
410.66	7.5	16,556
410.67	7.6	16,837
410.68	7.7	17,118
410.69	7.9	17,400
410.70	8.0	17,684
410.71	8.1	17,968
410.72	8.2	18,253
410.73	8.4	18,539
410.74	8.5	18,825
410.75	8.6	19,113
410.76	8.8	19,402
410.77	8.9	19,691
410.78	9.0	19,981
410.79	9.1	20,272
410.80	9.3	20,564
410.81	9.4	20,857
410.82	9.5	21,151
410.83	9.7	21,446
410.84	9.8	21,742
410.85	9.9	22,038
410.86	10.1	22,336
410.87	10.2	22,634
410.88	10.3	22,933
410.89	10.5	23,233
410.90	10.6	23,534
410.91	10.8	23,836
410.92	10.9	24,138
410.93	11.0	24,442
410.94	11.2	24,747
410.95	11.3	25,052
410.96	11.4	25,358
410.97	11.6	25,665
410.98	11.7	25,973
410.99	11.9	26,282
411.00	**12.0**	**26,592**

Summary for Pond Pond 1b: Pond 1b

Inflow Area = 17.870 ac, 24.90% Impervious, Inflow Depth > 1.10" for 2-yr event
Inflow = 23.31 cfs @ 12.10 hrs, Volume= 1.633 af
Outflow = 7.89 cfs @ 12.37 hrs, Volume= 1.544 af, Atten= 66%, Lag= 16.2 min
Primary = 7.89 cfs @ 12.37 hrs, Volume= 1.544 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 443.05' @ 12.37 hrs Surf.Area= 23,413 sf Storage= 20,980 cf

Plug-Flow detention time= 67.7 min calculated for 1.544 af (95% of inflow)
Center-of-Mass det. time= 38.8 min (906.7 - 867.9)

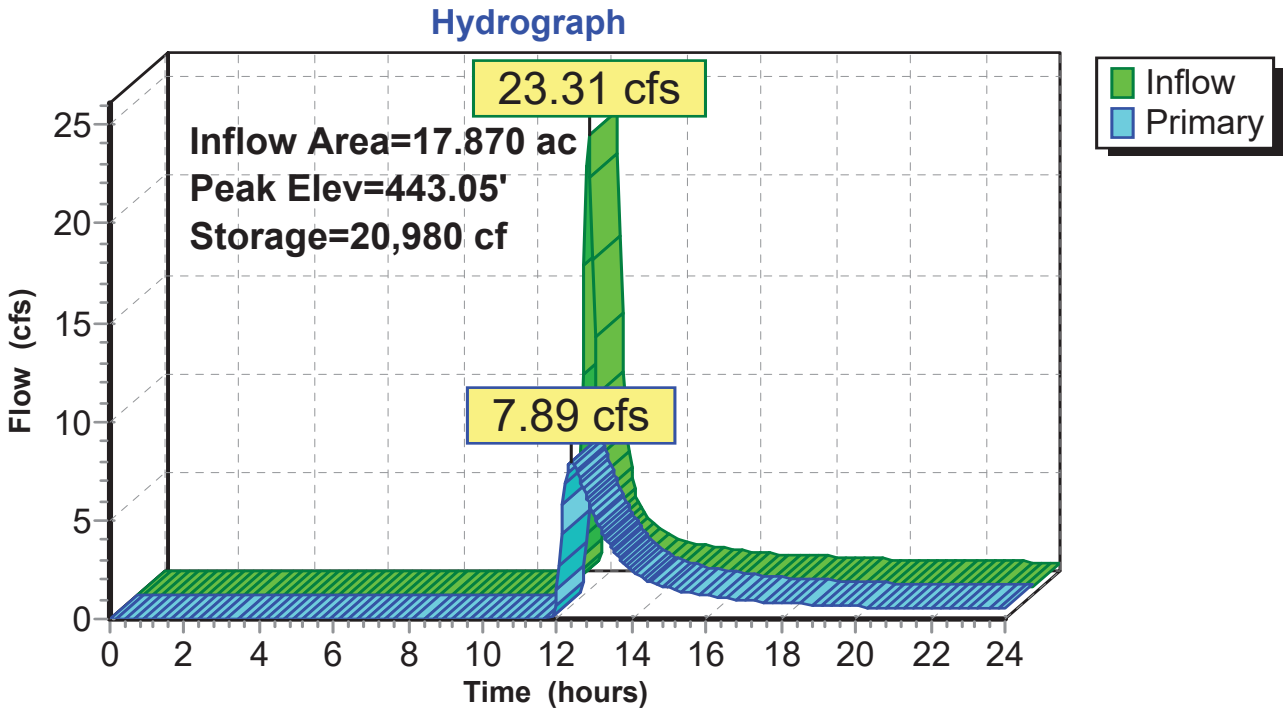
Volume	Invert	Avail.Storage	Storage Description
#1	441.50'	141,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
441.50	1,192	0	0
442.00	10,772	2,991	2,991
444.00	34,794	45,566	48,557
446.00	38,163	72,957	121,514
446.50	40,718	19,720	141,234

Device	Routing	Invert	Outlet Devices
#1	Primary	441.80'	**24.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	441.60'	**25.6 deg x 2.0' long x 4.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.64 (C= 3.30)
#3	Device 1	445.23'	**52.0" x 64.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	446.40'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=7.87 cfs @ 12.37 hrs HW=443.05' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 7.87 cfs @ 3.81 fps)
└**2=Sharp-Crested Vee/Trap Weir** (Passes 7.87 cfs of 12.97 cfs potential flow)
└**3=Orifice/Grate** (Controls 0.00 cfs)
└**4=Orifice/Grate** (Controls 0.00 cfs)

Pond Pond 1b: Pond 1b



Stage-Discharge for Pond Pond 1b: Pond 1b

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
441.50	0.00	443.62	13.79	445.74	25.94	447.86	34.03
441.54	0.00	443.66	14.14	445.78	26.11	447.90	34.16
441.58	0.00	443.70	14.47	445.82	26.29	447.94	34.29
441.62	0.00	443.74	14.77	445.86	26.46	447.98	34.43
441.66	0.00	443.78	15.03	445.90	26.63	448.02	34.56
441.70	0.00	443.82	15.28	445.94	26.80	448.06	34.69
441.74	0.00	443.86	15.57	445.98	26.97	448.10	34.82
441.78	0.00	443.90	15.87	446.02	27.14	448.14	34.96
441.82	0.00	443.94	16.15	446.06	27.31	448.18	35.09
441.86	0.02	443.98	16.43	446.10	27.48	448.22	35.22
441.90	0.06	444.02	16.71	446.14	27.65	448.26	35.35
441.94	0.12	444.06	16.98	446.18	27.81	448.30	35.48
441.98	0.20	444.10	17.25	446.22	27.97	448.34	35.60
442.02	0.30	444.14	17.51	446.26	28.14	448.38	35.73
442.06	0.42	444.18	17.77	446.30	28.30	448.42	35.86
442.10	0.55	444.22	18.03	446.34	28.46	448.46	35.99
442.14	0.70	444.26	18.28	446.38	28.62	448.50	36.11
442.18	0.87	444.30	18.53	446.42	28.78	448.54	36.24
442.22	1.06	444.34	18.77	446.46	28.94	448.58	36.37
442.26	1.26	444.38	19.01	446.50	29.10	448.62	36.49
442.30	1.48	444.42	19.25	446.54	29.25	448.66	36.62
442.34	1.71	444.46	19.49	446.58	29.41	448.70	36.74
442.38	1.96	444.50	19.72	446.62	29.56	448.74	36.87
442.42	2.22	444.54	19.95	446.66	29.72	448.78	36.99
442.46	2.50	444.58	20.18	446.70	29.87	448.82	37.11
442.50	2.79	444.62	20.41	446.74	30.03	448.86	37.24
442.54	3.09	444.66	20.63	446.78	30.18	448.90	37.36
442.58	3.41	444.70	20.85	446.82	30.33	448.94	37.48
442.62	3.74	444.74	21.07	446.86	30.48	448.98	37.60
442.66	4.08	444.78	21.29	446.90	30.63	449.02	37.73
442.70	4.43	444.82	21.50	446.94	30.78	449.06	37.85
442.74	4.79	444.86	21.71	446.98	30.93	449.10	37.97
442.78	5.16	444.90	21.92	447.02	31.07	449.14	38.09
442.82	5.54	444.94	22.13	447.06	31.22	449.18	38.21
442.86	5.93	444.98	22.33	447.10	31.37	449.22	38.33
442.90	6.32	445.02	22.54	447.14	31.51	449.26	38.45
442.94	6.72	445.06	22.74	447.18	31.66	449.30	38.57
442.98	7.13	445.10	22.94	447.22	31.80	449.34	38.68
443.02	7.55	445.14	23.14	447.26	31.95	449.38	38.80
443.06	7.97	445.18	23.34	447.30	32.09	449.42	38.92
443.10	8.39	445.22	23.53	447.34	32.23	449.46	39.04
443.14	8.82	445.26	23.73	447.38	32.37	449.50	**39.15**
443.18	9.25	445.30	23.92	447.42	32.51		
443.22	9.68	445.34	24.11	447.46	32.65		
443.26	10.11	445.38	24.30	447.50	32.79		
443.30	10.54	445.42	24.48	447.54	32.93		
443.34	10.97	445.46	24.67	447.58	33.07		
443.38	11.39	445.50	24.86	447.62	33.21		
443.42	11.81	445.54	25.04	447.66	33.35		
443.46	12.23	445.58	25.22	447.70	33.48		
443.50	12.63	445.62	25.40	447.74	33.62		
443.54	13.03	445.66	25.58	447.78	33.76		
443.58	13.42	445.70	25.76	447.82	33.89		

Stage-Area-Storage for Pond Pond 1b: Pond 1b

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
441.50	1,192	0
441.60	3,108	215
441.70	5,024	622
441.80	6,940	1,220
441.90	8,856	2,010
442.00	10,772	2,991
442.10	11,973	4,128
442.20	13,174	5,386
442.30	14,375	6,763
442.40	15,576	8,261
442.50	16,778	9,878
442.60	17,979	11,616
442.70	19,180	13,474
442.80	20,381	15,452
442.90	21,582	17,550
443.00	22,783	19,769
443.10	23,984	22,107
443.20	25,185	24,565
443.30	26,386	27,144
443.40	27,587	29,843
443.50	28,789	32,661
443.60	29,990	35,600
443.70	31,191	38,659
443.80	32,392	41,838
443.90	33,593	45,138
444.00	34,794	48,557
444.10	34,962	52,045
444.20	35,131	55,549
444.30	35,299	59,071
444.40	35,468	62,609
444.50	35,636	66,165
444.60	35,805	69,737
444.70	35,973	73,326
444.80	36,142	76,931
444.90	36,310	80,554
445.00	36,479	84,193
445.10	36,647	87,850
445.20	36,815	91,523
445.30	36,984	95,213
445.40	37,152	98,919
445.50	37,321	102,643
445.60	37,489	106,384
445.70	37,658	110,141
445.80	37,826	113,915
445.90	37,995	117,706
446.00	38,163	121,514
446.10	38,674	125,356
446.20	39,185	129,249
446.30	39,696	133,193
446.40	40,207	137,188
446.50	**40,718**	**141,234**
446.60	40,718	141,234
446.70	40,718	141,234
446.80	40,718	141,234
446.90	40,718	141,234
447.00	40,718	141,234
447.10	40,718	141,234
447.20	40,718	141,234
447.30	40,718	141,234
447.40	40,718	141,234
447.50	40,718	141,234
447.60	40,718	141,234
447.70	40,718	141,234
447.80	40,718	141,234
447.90	40,718	141,234
448.00	40,718	141,234
448.10	40,718	141,234
448.20	40,718	141,234
448.30	40,718	141,234
448.40	40,718	141,234
448.50	40,718	141,234
448.60	40,718	141,234
448.70	40,718	141,234
448.80	40,718	141,234
448.90	40,718	141,234
449.00	40,718	141,234
449.10	40,718	141,234
449.20	40,718	141,234
449.30	40,718	141,234
449.40	40,718	141,234
449.50	40,718	141,234

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1a: E-1a Runoff Area=39.760 ac 0.00% Impervious Runoff Depth>2.05"
Flow Length=900' Tc=30.6 min CN=74 Runoff=68.98 cfs 6.783 af

Subcatchment E-1b: E-1b Runoff Area=17.870 ac 24.90% Impervious Runoff Depth>1.83"
Flow Length=1,362' Tc=16.0 min CN=71 Runoff=40.17 cfs 2.718 af

Subcatchment E-2: E-2 Runoff Area=14.560 ac 0.00% Impervious Runoff Depth>1.71"
Flow Length=1,712' Tc=90.6 min CN=70 Runoff=9.49 cfs 2.072 af

Subcatchment E-3: E-3 Runoff Area=3.770 ac 0.00% Impervious Runoff Depth>1.46"
Flow Length=541' Tc=21.3 min CN=66 Runoff=5.60 cfs 0.460 af

Subcatchment E-4: E-4 Runoff Area=5.570 ac 0.00% Impervious Runoff Depth>1.89"
Flow Length=703' Tc=31.2 min CN=72 Runoff=8.75 cfs 0.878 af

Reach R-1: R-1 Avg. Flow Depth=0.55' Max Vel=4.11 fps Inflow=13.99 cfs 2.613 af
n=0.040 L=883.0' S=0.0351 '/' Capacity=39.83 cfs Outflow=13.92 cfs 2.599 af

Reach R-2: R-2 Avg. Flow Depth=2.04' Max Vel=2.33 fps Inflow=80.66 cfs 9.382 af
n=0.040 L=2,216.0' S=0.0032 '/' Capacity=22.11 cfs Outflow=61.87 cfs 9.187 af

Pond Pond 1b: Pond 1b Peak Elev=443.64' Storage=36,914 cf Inflow=40.17 cfs 2.718 af
Outflow=13.99 cfs 2.613 af

Summary for Subcatchment E-1a: E-1a

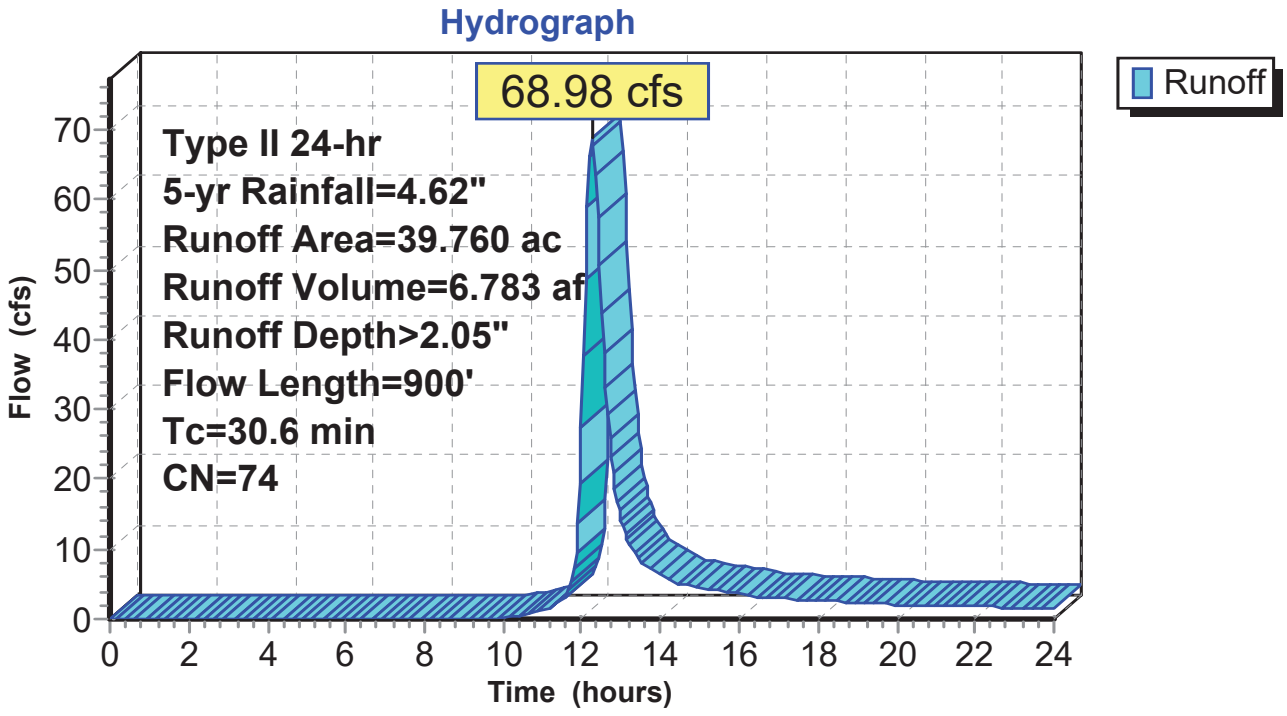
Runoff = 68.98 cfs @ 12.26 hrs, Volume= 6.783 af, Depth> 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=4.62"

Area (ac)	CN	Description
18.250	83	Woods, Poor, HSG D
21.510	66	Woods, Poor, HSG B
39.760	74	Weighted Average
39.760		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.1	150	0.1870	0.12		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
5.2	505	0.1030	1.60		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
5.3	245	0.0240	0.77		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
30.6	900	Total			

Subcatchment E-1a: E-1a



Summary for Subcatchment E-1b: E-1b

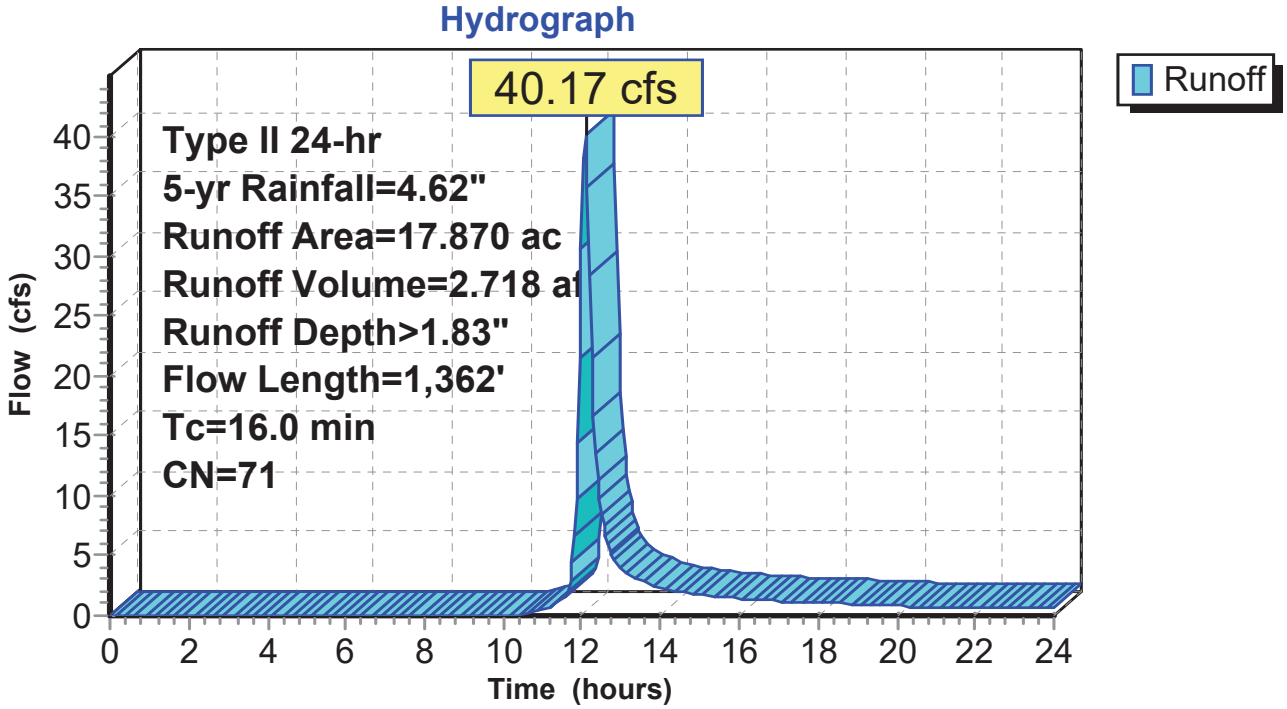
Runoff = 40.17 cfs @ 12.09 hrs, Volume= 2.718 af, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=4.62"

Area (ac)	CN	Description
4.450	98	Paved parking, HSG B
3.860	61	>75% Grass cover, Good, HSG B
6.200	66	Woods, Poor, HSG B
3.360	55	Woods, Good, HSG B
17.870	71	Weighted Average
13.420		75.10% Pervious Area
4.450		24.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2	100	0.3600	0.15		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
0.8	232	0.0950	4.96		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
1.0	130	0.0120	2.22		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
3.0	900		5.00		**Direct Entry, DE**
16.0	1,362	Total			

Subcatchment E-1b: E-1b



Summary for Subcatchment E-2: E-2

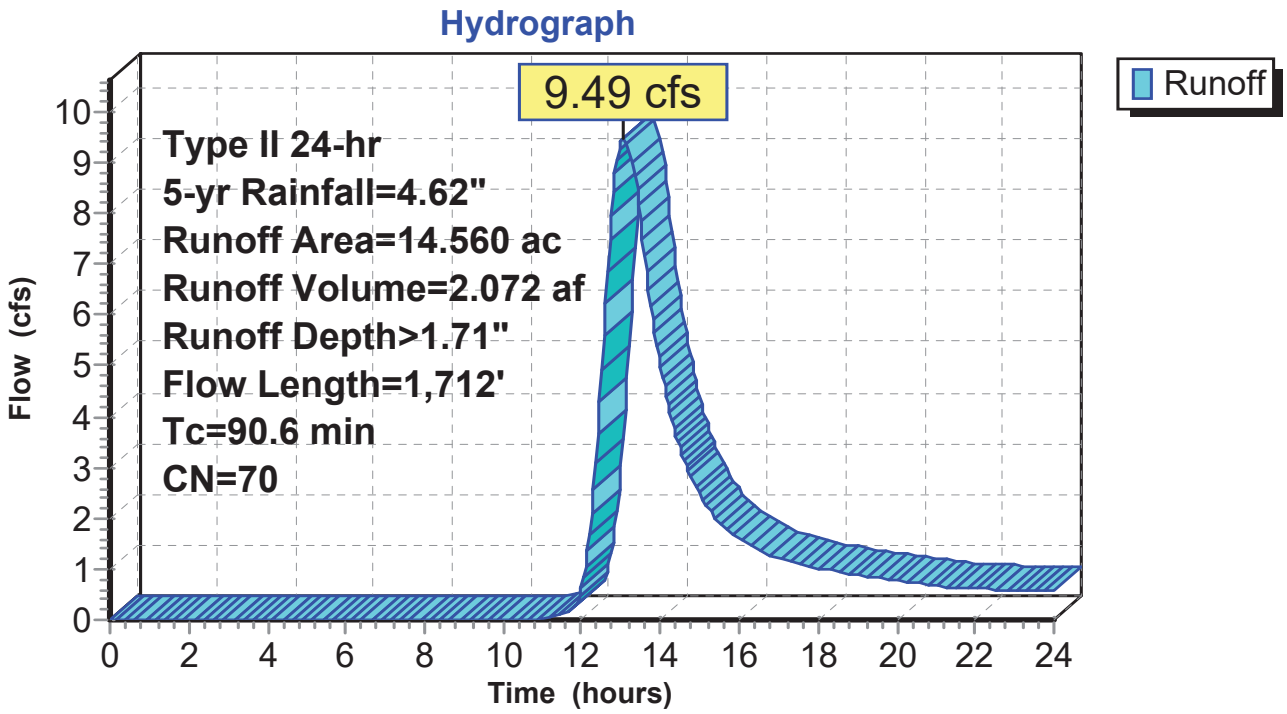
Runoff = 9.49 cfs @ 13.08 hrs, Volume= 2.072 af, Depth> 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=4.62"

Area (ac)	CN	Description
3.540	83	Woods, Poor, HSG D
11.020	66	Woods, Poor, HSG B
14.560	70	Weighted Average
14.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	150	0.2330	0.14		**Sheet Flow, BC** Woods: Dense underbrush n= 0.800 P2= 3.56"
2.5	211	0.0810	1.42		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
65.2	1,157	0.0035	0.30		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
4.5	194	0.0210	0.72		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
90.6	1,712	Total			

Subcatchment E-2: E-2



Summary for Subcatchment E-3: E-3

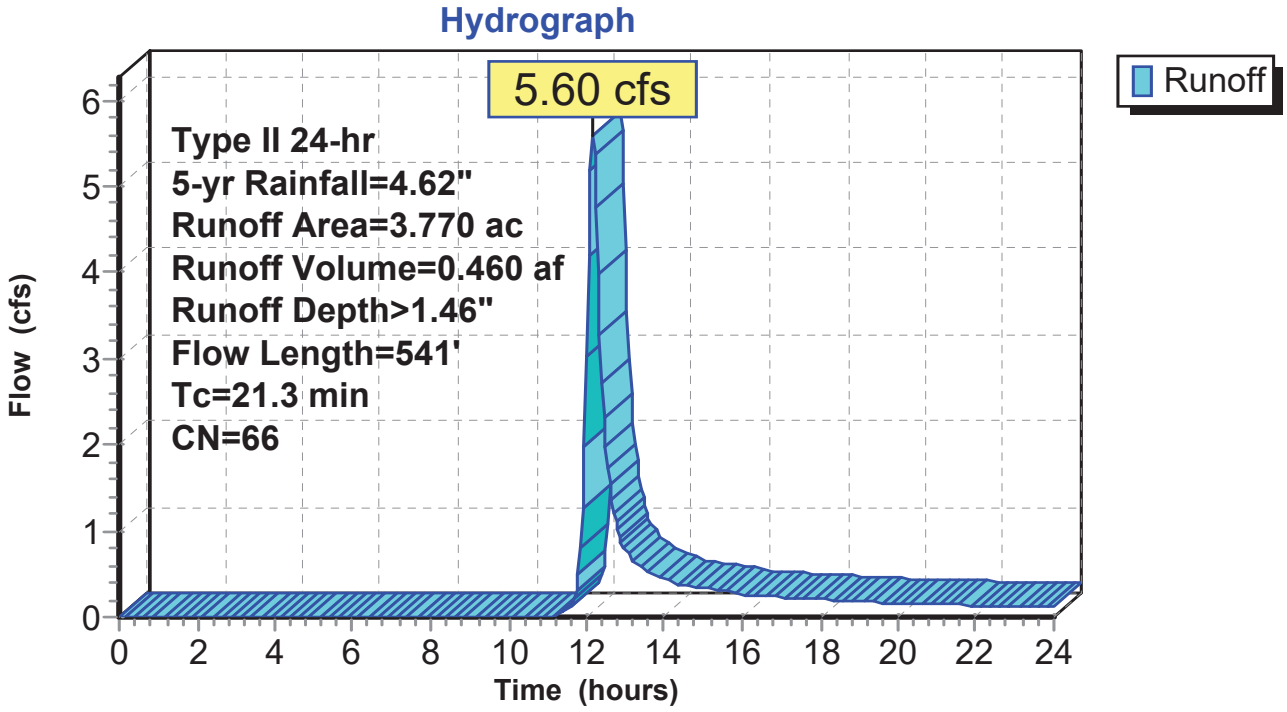
Runoff = 5.60 cfs @ 12.16 hrs, Volume= 0.460 af, Depth> 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=4.62"

Area (ac)	CN	Description
3.770	66	Woods, Poor, HSG B
3.770		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	150	0.2600	0.14		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
3.7	391	0.1230	1.75		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
21.3	541	Total			

Subcatchment E-3: E-3



Summary for Subcatchment E-4: E-4

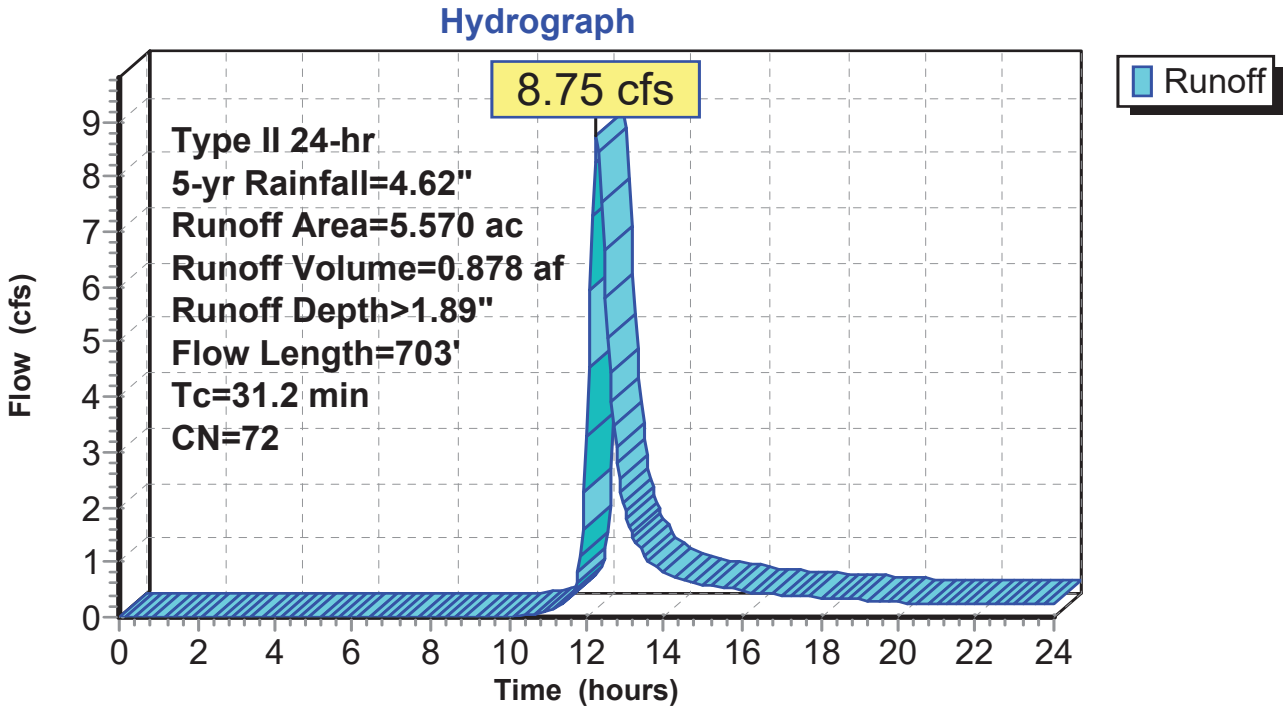
Runoff = 8.75 cfs @ 12.27 hrs, Volume= 0.878 af, Depth> 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=4.62"

Area (ac)	CN	Description
3.670	66	Woods, Poor, HSG B
1.900	83	Woods, Poor, HSG D
5.570	72	Weighted Average
5.570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.5	150	0.0930	0.09		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
4.7	553	0.1570	1.98		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
31.2	703	Total			

Subcatchment E-4: E-4



Summary for Reach R-1: R-1

Inflow Area = 17.870 ac, 24.90% Impervious, Inflow Depth > 1.75" for 5-yr event
Inflow = 13.99 cfs @ 12.35 hrs, Volume= 2.613 af
Outflow = 13.92 cfs @ 12.46 hrs, Volume= 2.599 af, Atten= 1%, Lag= 6.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.11 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 1.97 fps, Avg. Travel Time= 7.5 min

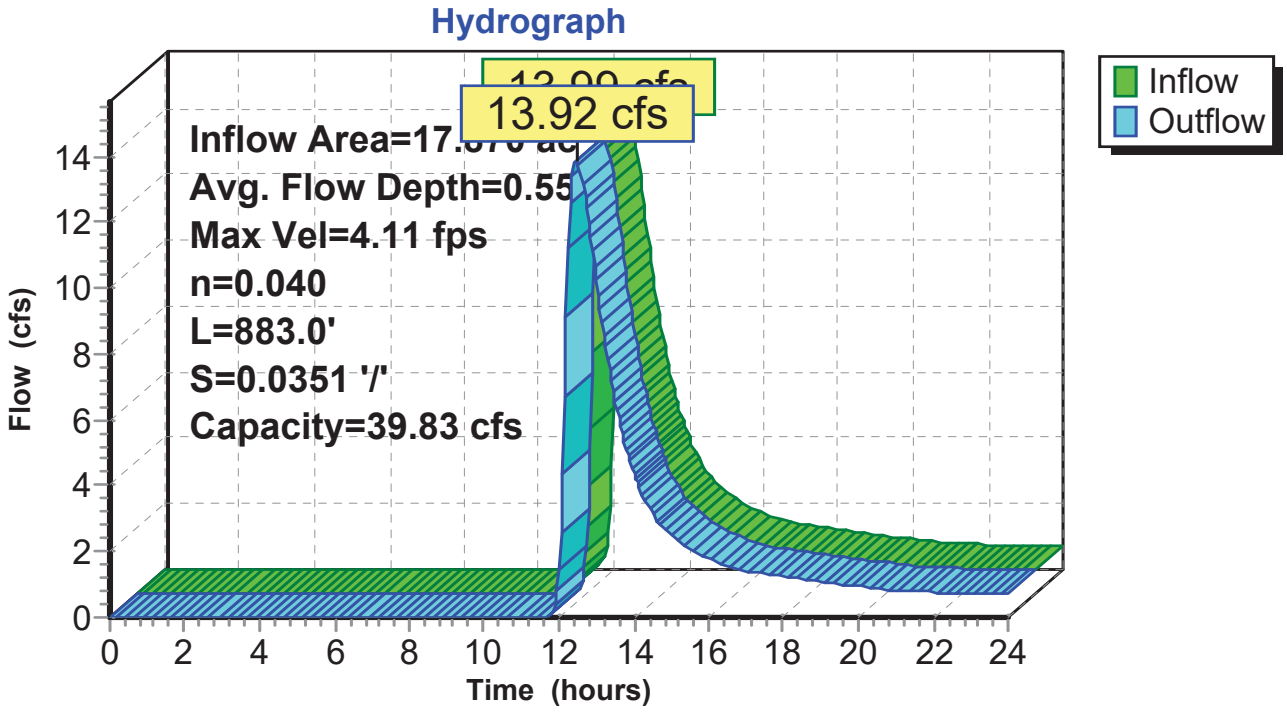
Peak Storage= 2,994 cf @ 12.40 hrs
Average Depth at Peak Storage= 0.55'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 39.83 cfs

5.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 883.0' Slope= 0.0351 '/'
Inlet Invert= 441.00', Outlet Invert= 410.00'



‡

Reach R-1: R-1



Stage-Discharge for Reach R-1: R-1

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
441.00	0.00	0.00
441.01	0.32	0.02
441.02	0.51	0.05
441.03	0.67	0.10
441.04	0.80	0.16
441.05	0.93	0.24
441.06	1.05	0.32
441.07	1.16	0.42
441.08	1.26	0.52
441.09	1.36	0.63
441.10	1.45	0.76
441.11	1.54	0.89
441.12	1.63	1.03
441.13	1.72	1.17
441.14	1.80	1.33
441.15	1.88	1.49
441.16	1.96	1.66
441.17	2.03	1.84
441.18	2.10	2.03
441.19	2.18	2.22
441.20	2.25	2.43
441.21	2.31	2.63
441.22	2.38	2.85
441.23	2.45	3.07
441.24	2.51	3.30
441.25	2.57	3.54
441.26	2.63	3.78
441.27	2.70	4.03
441.28	2.76	4.29
441.29	2.81	4.55
441.30	2.87	4.82
441.31	2.93	5.10
441.32	2.98	5.38
441.33	3.04	5.68
441.34	3.09	5.97
441.35	3.15	6.28
441.36	3.20	6.59
441.37	3.25	6.90
441.38	3.30	7.23
441.39	3.35	7.56
441.40	3.40	7.89
441.41	3.45	8.24
441.42	3.50	8.59
441.43	3.55	8.94
441.44	3.60	9.30
441.45	3.64	9.67
441.46	3.69	10.05
441.47	3.74	10.43
441.48	3.78	10.82
441.49	3.83	11.21
441.50	3.87	11.61
441.51	3.91	12.02
441.52	3.96	12.43
441.53	4.00	12.85
441.54	4.04	13.28
441.55	4.09	13.71
441.56	4.13	14.15
441.57	4.17	14.59
441.58	4.21	15.04
441.59	4.25	15.50
441.60	4.29	15.97
441.61	4.33	16.44
441.62	4.37	16.91
441.63	4.41	17.40
441.64	4.45	17.89
441.65	4.49	18.38
441.66	4.53	18.89
441.67	4.57	19.39
441.68	4.60	19.91
441.69	4.64	20.43
441.70	4.68	20.96
441.71	4.72	21.49
441.72	4.75	22.03
441.73	4.79	22.58
441.74	4.82	23.14
441.75	4.86	23.70
441.76	4.90	24.26
441.77	4.93	24.84
441.78	4.97	25.42
441.79	5.00	26.00
441.80	5.04	26.60
441.81	5.07	27.19
441.82	5.11	27.80
441.83	5.14	28.41
441.84	5.17	29.03
441.85	5.21	29.66
441.86	5.24	30.29
441.87	5.27	30.93
441.88	5.31	31.57
441.89	5.34	32.22
441.90	5.37	32.88
441.91	5.41	33.55
441.92	5.44	34.22
441.93	5.47	34.90
441.94	5.50	35.58
441.95	5.53	36.27
441.96	5.57	36.97
441.97	5.60	37.67
441.98	5.63	38.39
441.99	5.66	39.10
442.00	**5.69**	**39.83**

Stage-Area-Storage for Reach R-1: R-1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
441.00	0.0	0
441.01	0.1	44
441.02	0.1	89
441.03	0.2	134
441.04	0.2	179
441.05	0.3	225
441.06	0.3	271
441.07	0.4	318
441.08	0.4	365
441.09	0.5	412
441.10	0.5	459
441.11	0.6	507
441.12	0.6	555
441.13	0.7	604
441.14	0.7	653
441.15	0.8	702
441.16	0.9	752
441.17	0.9	802
441.18	1.0	852
441.19	1.0	903
441.20	1.1	954
441.21	1.1	1,005
441.22	1.2	1,057
441.23	1.3	1,109
441.24	1.3	1,161
441.25	1.4	1,214
441.26	1.4	1,267
441.27	1.5	1,321
441.28	1.6	1,375
441.29	1.6	1,429
441.30	1.7	1,483
441.31	1.7	1,538
441.32	1.8	1,594
441.33	1.9	1,649
441.34	1.9	1,705
441.35	2.0	1,762
441.36	2.1	1,818
441.37	2.1	1,875
441.38	2.2	1,933
441.39	2.3	1,990
441.40	2.3	2,049
441.41	2.4	2,107
441.42	2.5	2,166
441.43	2.5	2,225
441.44	2.6	2,284
441.45	2.7	2,344
441.46	2.7	2,405
441.47	2.8	2,465
441.48	2.9	2,526
441.49	2.9	2,587
441.50	3.0	2,649
441.51	3.1	2,711
441.52	3.1	2,773
441.53	3.2	2,836
441.54	3.3	2,899
441.55	3.4	2,962
441.56	3.4	3,026
441.57	3.5	3,090
441.58	3.6	3,155
441.59	3.6	3,220
441.60	3.7	3,285
441.61	3.8	3,350
441.62	3.9	3,416
441.63	3.9	3,482
441.64	4.0	3,549
441.65	4.1	3,616
441.66	4.2	3,683
441.67	4.2	3,751
441.68	4.3	3,819
441.69	4.4	3,887
441.70	4.5	3,956
441.71	4.6	4,025
441.72	4.6	4,094
441.73	4.7	4,164
441.74	4.8	4,234
441.75	4.9	4,305
441.76	5.0	4,375
441.77	5.0	4,447
441.78	5.1	4,518
441.79	5.2	4,590
441.80	5.3	4,662
441.81	5.4	4,735
441.82	5.4	4,808
441.83	5.5	4,881
441.84	5.6	4,955
441.85	5.7	5,029
441.86	5.8	5,103
441.87	5.9	5,178
441.88	5.9	5,253
441.89	6.0	5,328
441.90	6.1	5,404
441.91	6.2	5,480
441.92	6.3	5,557
441.93	6.4	5,633
441.94	6.5	5,711
441.95	6.6	5,788
441.96	6.6	5,866
441.97	6.7	5,944
441.98	6.8	6,023
441.99	6.9	6,102
442.00	**7.0**	**6,181**

Summary for Reach R-2: R-2

Inflow Area = 57.630 ac, 7.72% Impervious, Inflow Depth > 1.95" for 5-yr event
Inflow = 80.66 cfs @ 12.28 hrs, Volume= 9.382 af
Outflow = 61.87 cfs @ 12.74 hrs, Volume= 9.187 af, Atten= 23%, Lag= 27.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.33 fps, Min. Travel Time= 15.8 min
Avg. Velocity = 1.04 fps, Avg. Travel Time= 35.7 min

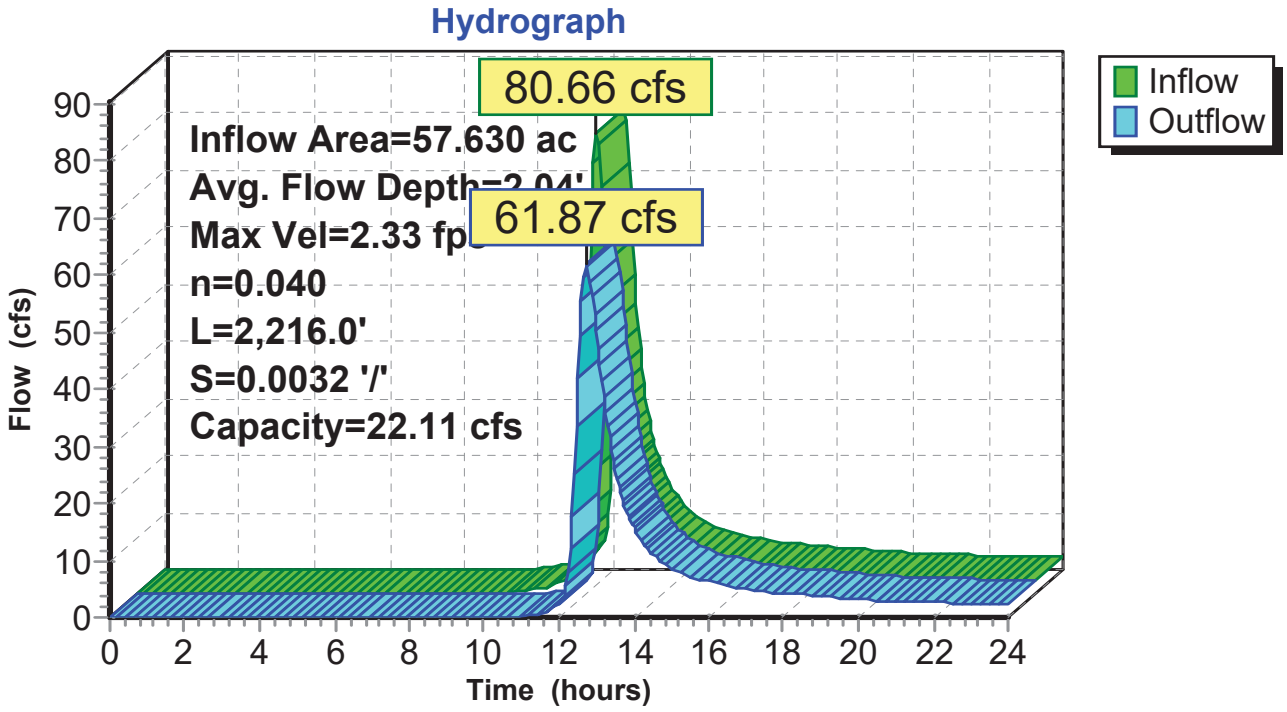
Peak Storage= 58,914 cf @ 12.47 hrs
Average Depth at Peak Storage= 2.04'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 22.11 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 2,216.0' Slope= 0.0032 '/'
Inlet Invert= 410.00', Outlet Invert= 403.00'



‡

Reach R-2: R-2



Stage-Discharge for Reach R-2: R-2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
410.00	0.00	0.00
410.01	0.10	0.01
410.02	0.15	0.03
410.03	0.20	0.06
410.04	0.24	0.10
410.05	0.28	0.14
410.06	0.32	0.19
410.07	0.35	0.25
410.08	0.38	0.31
410.09	0.41	0.38
410.10	0.44	0.45
410.11	0.47	0.53
410.12	0.50	0.61
410.13	0.52	0.70
410.14	0.55	0.79
410.15	0.58	0.89
410.16	0.60	0.99
410.17	0.62	1.10
410.18	0.65	1.21
410.19	0.67	1.32
410.20	0.69	1.44
410.21	0.71	1.56
410.22	0.74	1.69
410.23	0.76	1.82
410.24	0.78	1.96
410.25	0.80	2.09
410.26	0.82	2.24
410.27	0.84	2.38
410.28	0.86	2.53
410.29	0.88	2.69
410.30	0.89	2.84
410.31	0.91	3.01
410.32	0.93	3.17
410.33	0.95	3.34
410.34	0.97	3.51
410.35	0.98	3.69
410.36	1.00	3.87
410.37	1.02	4.05
410.38	1.04	4.24
410.39	1.05	4.43
410.40	1.07	4.62
410.41	1.09	4.82
410.42	1.10	5.02
410.43	1.12	5.22
410.44	1.13	5.43
410.45	1.15	5.64
410.46	1.16	5.85
410.47	1.18	6.07
410.48	1.20	6.29
410.49	1.21	6.51
410.50	1.23	6.74
410.51	1.24	6.97
410.52	1.25	7.20
410.53	1.27	7.44
410.54	1.28	7.68
410.55	1.30	7.92
410.56	1.31	8.17
410.57	1.33	8.42
410.58	1.34	8.67
410.59	1.35	8.93
410.60	1.37	9.19
410.61	1.38	9.45
410.62	1.39	9.72
410.63	1.41	9.98
410.64	1.42	10.26
410.65	1.43	10.53
410.66	1.45	10.81
410.67	1.46	11.09
410.68	1.47	11.38
410.69	1.49	11.66
410.70	1.50	11.95
410.71	1.51	12.25
410.72	1.52	12.55
410.73	1.54	12.85
410.74	1.55	13.15
410.75	1.56	13.46
410.76	1.57	13.77
410.77	1.58	14.08
410.78	1.60	14.39
410.79	1.61	14.71
410.80	1.62	15.03
410.81	1.63	15.36
410.82	1.64	15.69
410.83	1.66	16.02
410.84	1.67	16.35
410.85	1.68	16.69
410.86	1.69	17.03
410.87	1.70	17.37
410.88	1.71	17.72
410.89	1.72	18.07
410.90	1.73	18.42
410.91	1.75	18.78
410.92	1.76	19.14
410.93	1.77	19.50
410.94	1.78	19.86
410.95	1.79	20.23
410.96	1.80	20.60
410.97	1.81	20.97
410.98	1.82	21.35
410.99	1.83	21.73
411.00	**1.84**	**22.11**

Stage-Area-Storage for Reach R-2: R-2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
410.00	0.0	0
410.01	0.1	222
410.02	0.2	445
410.03	0.3	669
410.04	0.4	893
410.05	0.5	1,119
410.06	0.6	1,346
410.07	0.7	1,573
410.08	0.8	1,801
410.09	0.9	2,030
410.10	1.0	2,260
410.11	1.1	2,491
410.12	1.2	2,723
410.13	1.3	2,956
410.14	1.4	3,189
410.15	1.5	3,424
410.16	1.7	3,659
410.17	1.8	3,895
410.18	1.9	4,132
410.19	2.0	4,370
410.20	2.1	4,609
410.21	2.2	4,849
410.22	2.3	5,090
410.23	2.4	5,331
410.24	2.5	5,574
410.25	2.6	5,817
410.26	2.7	6,061
410.27	2.8	6,306
410.28	3.0	6,552
410.29	3.1	6,799
410.30	3.2	7,047
410.31	3.3	7,296
410.32	3.4	7,545
410.33	3.5	7,795
410.34	3.6	8,047
410.35	3.7	8,299
410.36	3.9	8,552
410.37	4.0	8,806
410.38	4.1	9,061
410.39	4.2	9,317
410.40	4.3	9,573
410.41	4.4	9,831
410.42	4.6	10,089
410.43	4.7	10,348
410.44	4.8	10,608
410.45	4.9	10,869
410.46	5.0	11,131
410.47	5.1	11,394
410.48	5.3	11,658
410.49	5.4	11,923
410.50	5.5	12,188
410.51	5.6	12,454
410.52	5.7	12,722
410.53	5.9	12,990
410.54	6.0	13,259
410.55	6.1	13,529
410.56	6.2	13,799
410.57	6.3	14,071
410.58	6.5	14,344
410.59	6.6	14,617
410.60	6.7	14,892
410.61	6.8	15,167
410.62	7.0	15,443
410.63	7.1	15,720
410.64	7.2	15,998
410.65	7.3	16,277
410.66	7.5	16,556
410.67	7.6	16,837
410.68	7.7	17,118
410.69	7.9	17,400
410.70	8.0	17,684
410.71	8.1	17,968
410.72	8.2	18,253
410.73	8.4	18,539
410.74	8.5	18,825
410.75	8.6	19,113
410.76	8.8	19,402
410.77	8.9	19,691
410.78	9.0	19,981
410.79	9.1	20,272
410.80	9.3	20,564
410.81	9.4	20,857
410.82	9.5	21,151
410.83	9.7	21,446
410.84	9.8	21,742
410.85	9.9	22,038
410.86	10.1	22,336
410.87	10.2	22,634
410.88	10.3	22,933
410.89	10.5	23,233
410.90	10.6	23,534
410.91	10.8	23,836
410.92	10.9	24,138
410.93	11.0	24,442
410.94	11.2	24,747
410.95	11.3	25,052
410.96	11.4	25,358
410.97	11.6	25,665
410.98	11.7	25,973
410.99	11.9	26,282
411.00	**12.0**	**26,592**

Summary for Pond Pond 1b: Pond 1b

Inflow Area = 17.870 ac, 24.90% Impervious, Inflow Depth > 1.83" for 5-yr event
Inflow = 40.17 cfs @ 12.09 hrs, Volume= 2.718 af
Outflow = 13.99 cfs @ 12.35 hrs, Volume= 2.613 af, Atten= 65%, Lag= 15.3 min
Primary = 13.99 cfs @ 12.35 hrs, Volume= 2.613 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 443.64' @ 12.35 hrs Surf.Area= 30,511 sf Storage= 36,914 cf

Plug-Flow detention time= 57.5 min calculated for 2.607 af (96% of inflow)
Center-of-Mass det. time= 36.1 min (888.7 - 852.6)

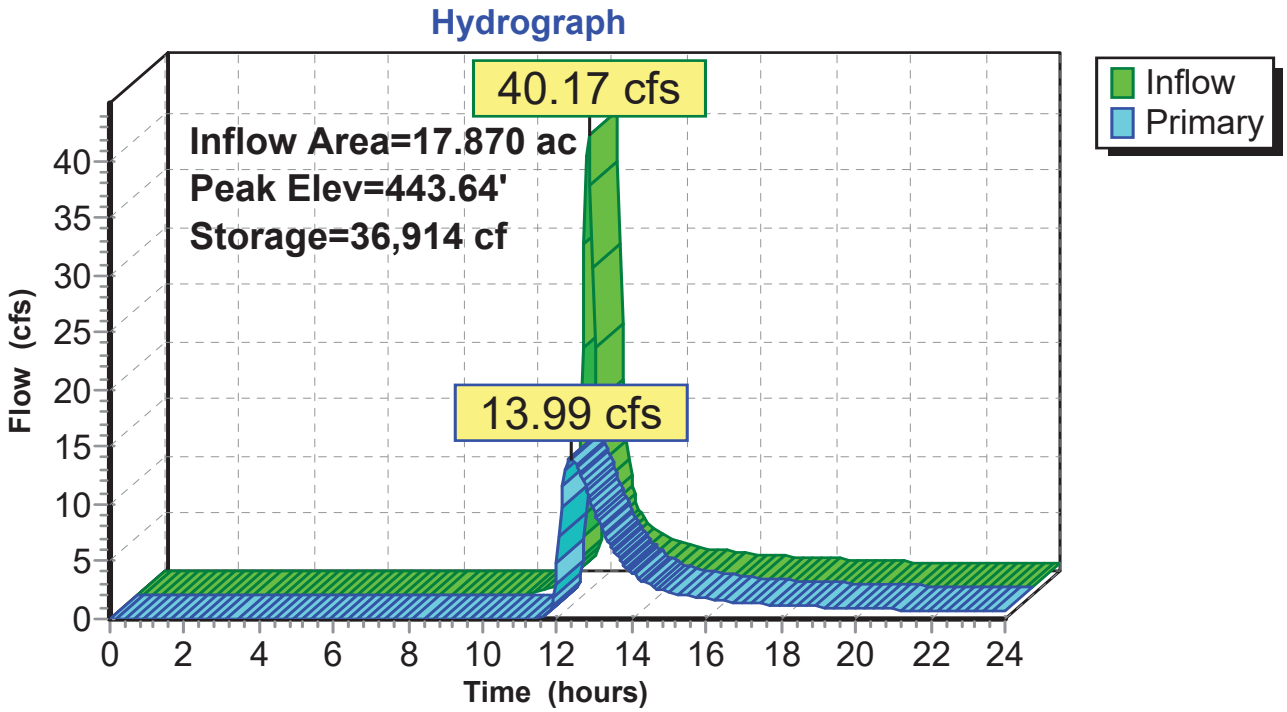
Volume	Invert	Avail.Storage	Storage Description
#1	441.50'	141,234 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
441.50	1,192	0	0
442.00	10,772	2,991	2,991
444.00	34,794	45,566	48,557
446.00	38,163	72,957	121,514
446.50	40,718	19,720	141,234

Device	Routing	Invert	Outlet Devices
#1	Primary	441.80'	**24.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	441.60'	**25.6 deg x 2.0' long x 4.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.64 (C= 3.30)
#3	Device 1	445.23'	**52.0" x 64.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	446.40'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=13.99 cfs @ 12.35 hrs HW=443.64' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 13.99 cfs @ 4.62 fps)
└**2=Sharp-Crested Vee/Trap Weir** (Passes 13.99 cfs of 22.78 cfs potential flow)
└**3=Orifice/Grate** (Controls 0.00 cfs)
└**4=Orifice/Grate** (Controls 0.00 cfs)

Pond Pond 1b: Pond 1b



Stage-Discharge for Pond Pond 1b: Pond 1b

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
441.50	0.00	443.62	13.79	445.74	25.94	447.86	34.03
441.54	0.00	443.66	14.14	445.78	26.11	447.90	34.16
441.58	0.00	443.70	14.47	445.82	26.29	447.94	34.29
441.62	0.00	443.74	14.77	445.86	26.46	447.98	34.43
441.66	0.00	443.78	15.03	445.90	26.63	448.02	34.56
441.70	0.00	443.82	15.28	445.94	26.80	448.06	34.69
441.74	0.00	443.86	15.57	445.98	26.97	448.10	34.82
441.78	0.00	443.90	15.87	446.02	27.14	448.14	34.96
441.82	0.00	443.94	16.15	446.06	27.31	448.18	35.09
441.86	0.02	443.98	16.43	446.10	27.48	448.22	35.22
441.90	0.06	444.02	16.71	446.14	27.65	448.26	35.35
441.94	0.12	444.06	16.98	446.18	27.81	448.30	35.48
441.98	0.20	444.10	17.25	446.22	27.97	448.34	35.60
442.02	0.30	444.14	17.51	446.26	28.14	448.38	35.73
442.06	0.42	444.18	17.77	446.30	28.30	448.42	35.86
442.10	0.55	444.22	18.03	446.34	28.46	448.46	35.99
442.14	0.70	444.26	18.28	446.38	28.62	448.50	36.11
442.18	0.87	444.30	18.53	446.42	28.78	448.54	36.24
442.22	1.06	444.34	18.77	446.46	28.94	448.58	36.37
442.26	1.26	444.38	19.01	446.50	29.10	448.62	36.49
442.30	1.48	444.42	19.25	446.54	29.25	448.66	36.62
442.34	1.71	444.46	19.49	446.58	29.41	448.70	36.74
442.38	1.96	444.50	19.72	446.62	29.56	448.74	36.87
442.42	2.22	444.54	19.95	446.66	29.72	448.78	36.99
442.46	2.50	444.58	20.18	446.70	29.87	448.82	37.11
442.50	2.79	444.62	20.41	446.74	30.03	448.86	37.24
442.54	3.09	444.66	20.63	446.78	30.18	448.90	37.36
442.58	3.41	444.70	20.85	446.82	30.33	448.94	37.48
442.62	3.74	444.74	21.07	446.86	30.48	448.98	37.60
442.66	4.08	444.78	21.29	446.90	30.63	449.02	37.73
442.70	4.43	444.82	21.50	446.94	30.78	449.06	37.85
442.74	4.79	444.86	21.71	446.98	30.93	449.10	37.97
442.78	5.16	444.90	21.92	447.02	31.07	449.14	38.09
442.82	5.54	444.94	22.13	447.06	31.22	449.18	38.21
442.86	5.93	444.98	22.33	447.10	31.37	449.22	38.33
442.90	6.32	445.02	22.54	447.14	31.51	449.26	38.45
442.94	6.72	445.06	22.74	447.18	31.66	449.30	38.57
442.98	7.13	445.10	22.94	447.22	31.80	449.34	38.68
443.02	7.55	445.14	23.14	447.26	31.95	449.38	38.80
443.06	7.97	445.18	23.34	447.30	32.09	449.42	38.92
443.10	8.39	445.22	23.53	447.34	32.23	449.46	39.04
443.14	8.82	445.26	23.73	447.38	32.37	449.50	**39.15**
443.18	9.25	445.30	23.92	447.42	32.51		
443.22	9.68	445.34	24.11	447.46	32.65		
443.26	10.11	445.38	24.30	447.50	32.79		
443.30	10.54	445.42	24.48	447.54	32.93		
443.34	10.97	445.46	24.67	447.58	33.07		
443.38	11.39	445.50	24.86	447.62	33.21		
443.42	11.81	445.54	25.04	447.66	33.35		
443.46	12.23	445.58	25.22	447.70	33.48		
443.50	12.63	445.62	25.40	447.74	33.62		
443.54	13.03	445.66	25.58	447.78	33.76		
443.58	13.42	445.70	25.76	447.82	33.89		

Stage-Area-Storage for Pond Pond 1b: Pond 1b

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
441.50	1,192	0
441.60	3,108	215
441.70	5,024	622
441.80	6,940	1,220
441.90	8,856	2,010
442.00	10,772	2,991
442.10	11,973	4,128
442.20	13,174	5,386
442.30	14,375	6,763
442.40	15,576	8,261
442.50	16,778	9,878
442.60	17,979	11,616
442.70	19,180	13,474
442.80	20,381	15,452
442.90	21,582	17,550
443.00	22,783	19,769
443.10	23,984	22,107
443.20	25,185	24,565
443.30	26,386	27,144
443.40	27,587	29,843
443.50	28,789	32,661
443.60	29,990	35,600
443.70	31,191	38,659
443.80	32,392	41,838
443.90	33,593	45,138
444.00	34,794	48,557
444.10	34,962	52,045
444.20	35,131	55,549
444.30	35,299	59,071
444.40	35,468	62,609
444.50	35,636	66,165
444.60	35,805	69,737
444.70	35,973	73,326
444.80	36,142	76,931
444.90	36,310	80,554
445.00	36,479	84,193
445.10	36,647	87,850
445.20	36,815	91,523
445.30	36,984	95,213
445.40	37,152	98,919
445.50	37,321	102,643
445.60	37,489	106,384
445.70	37,658	110,141
445.80	37,826	113,915
445.90	37,995	117,706
446.00	38,163	121,514
446.10	38,674	125,356
446.20	39,185	129,249
446.30	39,696	133,193
446.40	40,207	137,188
446.50	**40,718**	**141,234**
446.60	40,718	141,234
446.70	40,718	141,234
446.80	40,718	141,234
446.90	40,718	141,234
447.00	40,718	141,234
447.10	40,718	141,234
447.20	40,718	141,234
447.30	40,718	141,234
447.40	40,718	141,234
447.50	40,718	141,234
447.60	40,718	141,234
447.70	40,718	141,234
447.80	40,718	141,234
447.90	40,718	141,234
448.00	40,718	141,234
448.10	40,718	141,234
448.20	40,718	141,234
448.30	40,718	141,234
448.40	40,718	141,234
448.50	40,718	141,234
448.60	40,718	141,234
448.70	40,718	141,234
448.80	40,718	141,234
448.90	40,718	141,234
449.00	40,718	141,234
449.10	40,718	141,234
449.20	40,718	141,234
449.30	40,718	141,234
449.40	40,718	141,234
449.50	40,718	141,234

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1a: E-1a Runoff Area=39.760 ac 0.00% Impervious Runoff Depth>2.75"
Flow Length=900' Tc=30.6 min CN=74 Runoff=93.52 cfs 9.101 af

Subcatchment E-1b: E-1b Runoff Area=17.870 ac 24.90% Impervious Runoff Depth>2.49"
Flow Length=1,362' Tc=16.0 min CN=71 Runoff=55.38 cfs 3.709 af

Subcatchment E-2: E-2 Runoff Area=14.560 ac 0.00% Impervious Runoff Depth>2.35"
Flow Length=1,712' Tc=90.6 min CN=70 Runoff=13.35 cfs 2.849 af

Subcatchment E-3: E-3 Runoff Area=3.770 ac 0.00% Impervious Runoff Depth>2.06"
Flow Length=541' Tc=21.3 min CN=66 Runoff=8.12 cfs 0.648 af

Subcatchment E-4: E-4 Runoff Area=5.570 ac 0.00% Impervious Runoff Depth>2.57"
Flow Length=703' Tc=31.2 min CN=72 Runoff=12.05 cfs 1.192 af

Reach R-1: R-1 Avg. Flow Depth=0.63' Max Vel=4.41 fps Inflow=17.45 cfs 3.591 af
n=0.040 L=883.0' S=0.0351 '/' Capacity=39.83 cfs Outflow=17.41 cfs 3.575 af

Reach R-2: R-2 Avg. Flow Depth=2.63' Max Vel=2.43 fps Inflow=109.06 cfs 12.675 af
n=0.040 L=2,216.0' S=0.0032 '/' Capacity=22.11 cfs Outflow=84.42 cfs 12.446 af

Pond Pond 1b: Pond 1b Peak Elev=444.13' Storage=53,139 cf Inflow=55.38 cfs 3.709 af
Outflow=17.45 cfs 3.591 af

Summary for Subcatchment E-1a: E-1a

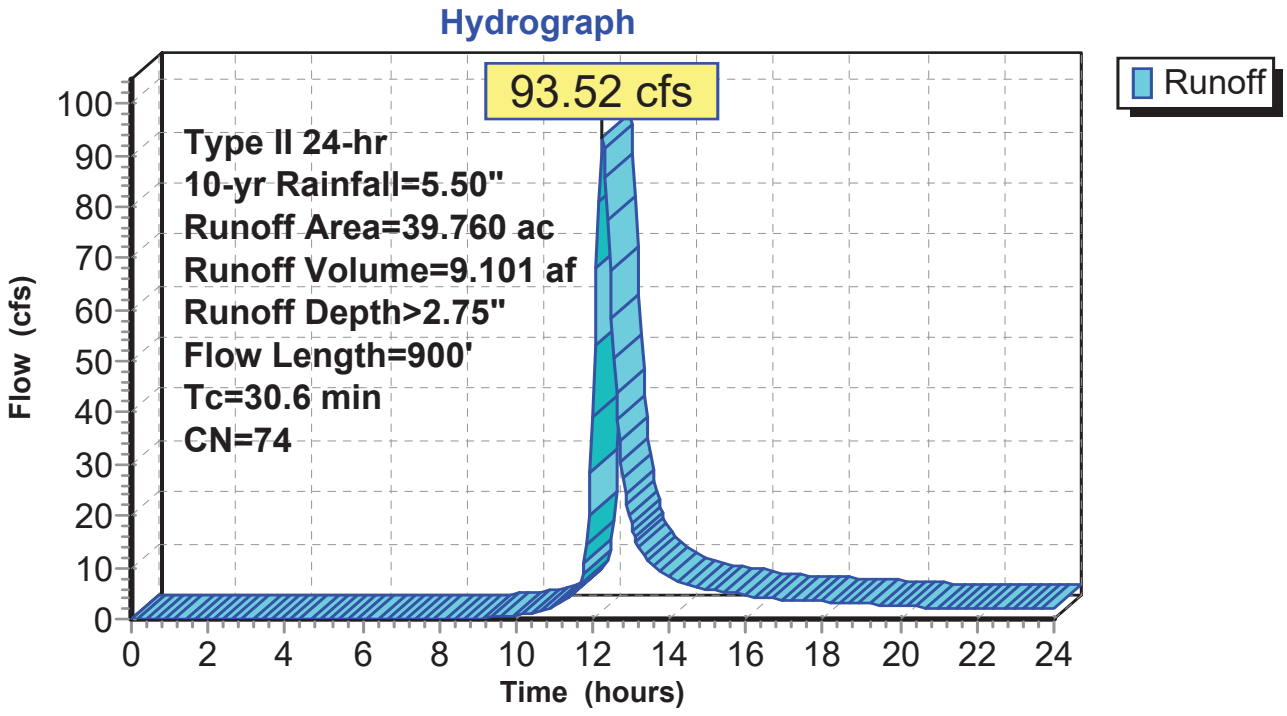
Runoff = 93.52 cfs @ 12.26 hrs, Volume= 9.101 af, Depth> 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.50"

Area (ac)	CN	Description
18.250	83	Woods, Poor, HSG D
21.510	66	Woods, Poor, HSG B
39.760	74	Weighted Average
39.760		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.1	150	0.1870	0.12		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
5.2	505	0.1030	1.60		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
5.3	245	0.0240	0.77		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
30.6	900	Total			

Subcatchment E-1a: E-1a



Summary for Subcatchment E-1b: E-1b

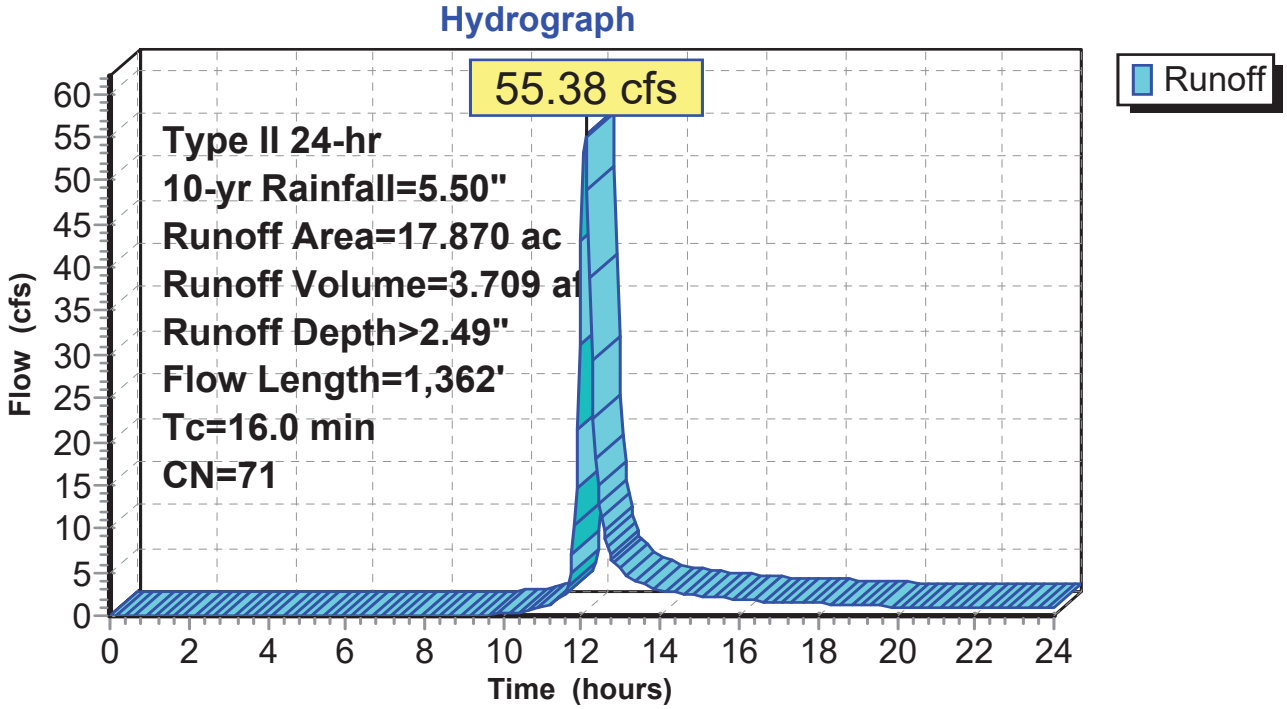
Runoff = 55.38 cfs @ 12.09 hrs, Volume= 3.709 af, Depth> 2.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.50"

Area (ac)	CN	Description
4.450	98	Paved parking, HSG B
3.860	61	>75% Grass cover, Good, HSG B
6.200	66	Woods, Poor, HSG B
3.360	55	Woods, Good, HSG B
17.870	71	Weighted Average
13.420		75.10% Pervious Area
4.450		24.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2	100	0.3600	0.15		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
0.8	232	0.0950	4.96		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
1.0	130	0.0120	2.22		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
3.0	900		5.00		**Direct Entry, DE**
16.0	1,362	Total			

Subcatchment E-1b: E-1b



Summary for Subcatchment E-2: E-2

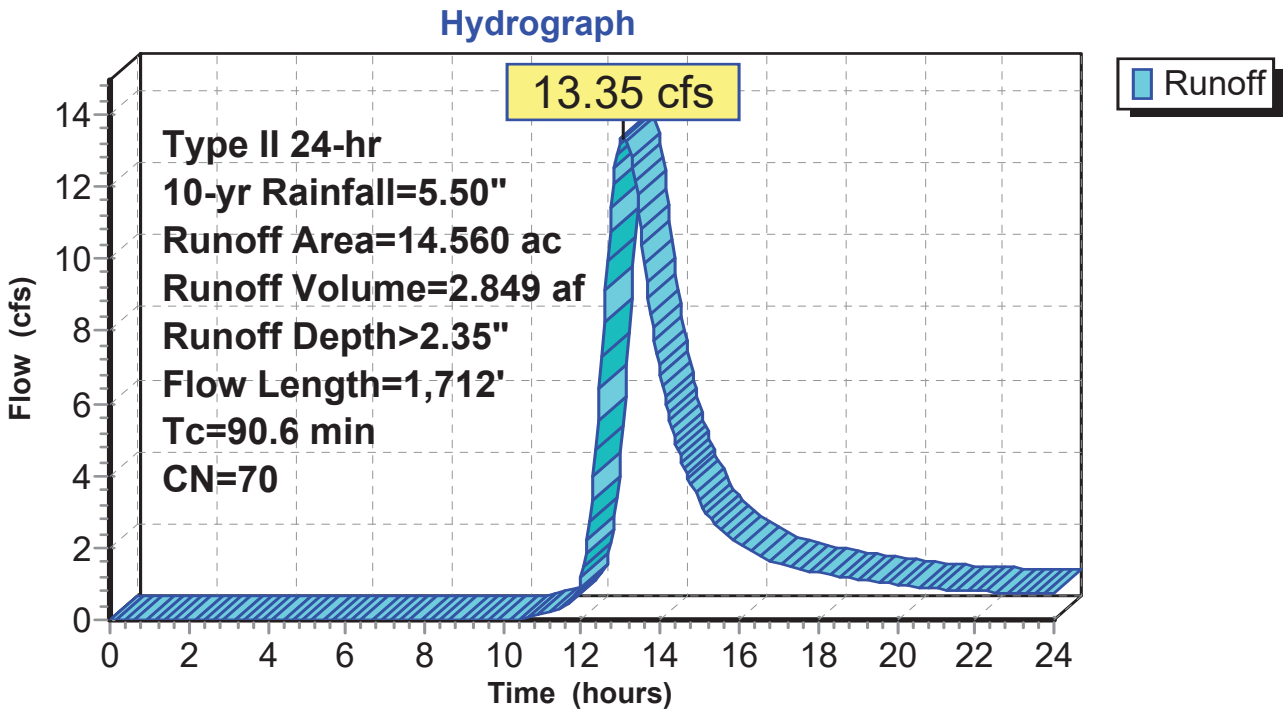
Runoff = 13.35 cfs @ 13.04 hrs, Volume= 2.849 af, Depth> 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.50"

Area (ac)	CN	Description
3.540	83	Woods, Poor, HSG D
11.020	66	Woods, Poor, HSG B
14.560	70	Weighted Average
14.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	150	0.2330	0.14		**Sheet Flow, BC** Woods: Dense underbrush n= 0.800 P2= 3.56"
2.5	211	0.0810	1.42		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
65.2	1,157	0.0035	0.30		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
4.5	194	0.0210	0.72		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
90.6	1,712	Total			

Subcatchment E-2: E-2



Summary for Subcatchment E-3: E-3

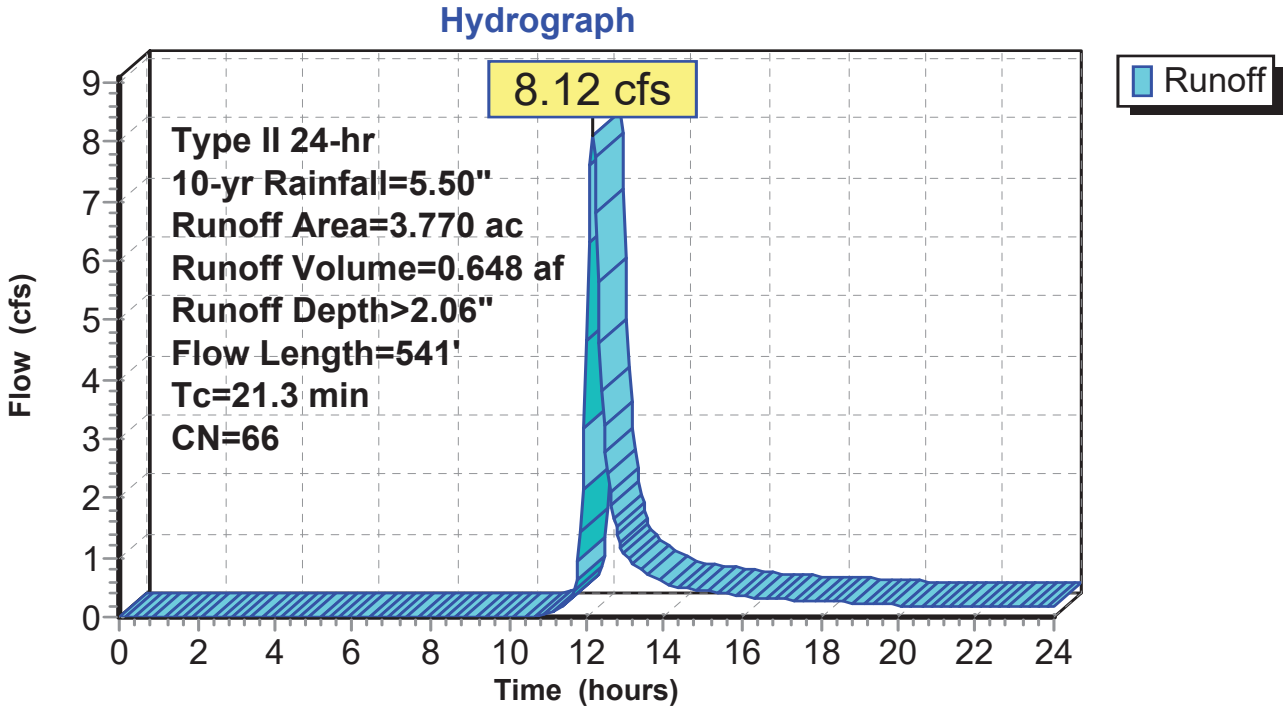
Runoff = 8.12 cfs @ 12.15 hrs, Volume= 0.648 af, Depth> 2.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.50"

Area (ac)	CN	Description
3.770	66	Woods, Poor, HSG B
3.770		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	150	0.2600	0.14		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
3.7	391	0.1230	1.75		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
21.3	541	Total			

Subcatchment E-3: E-3



Summary for Subcatchment E-4: E-4

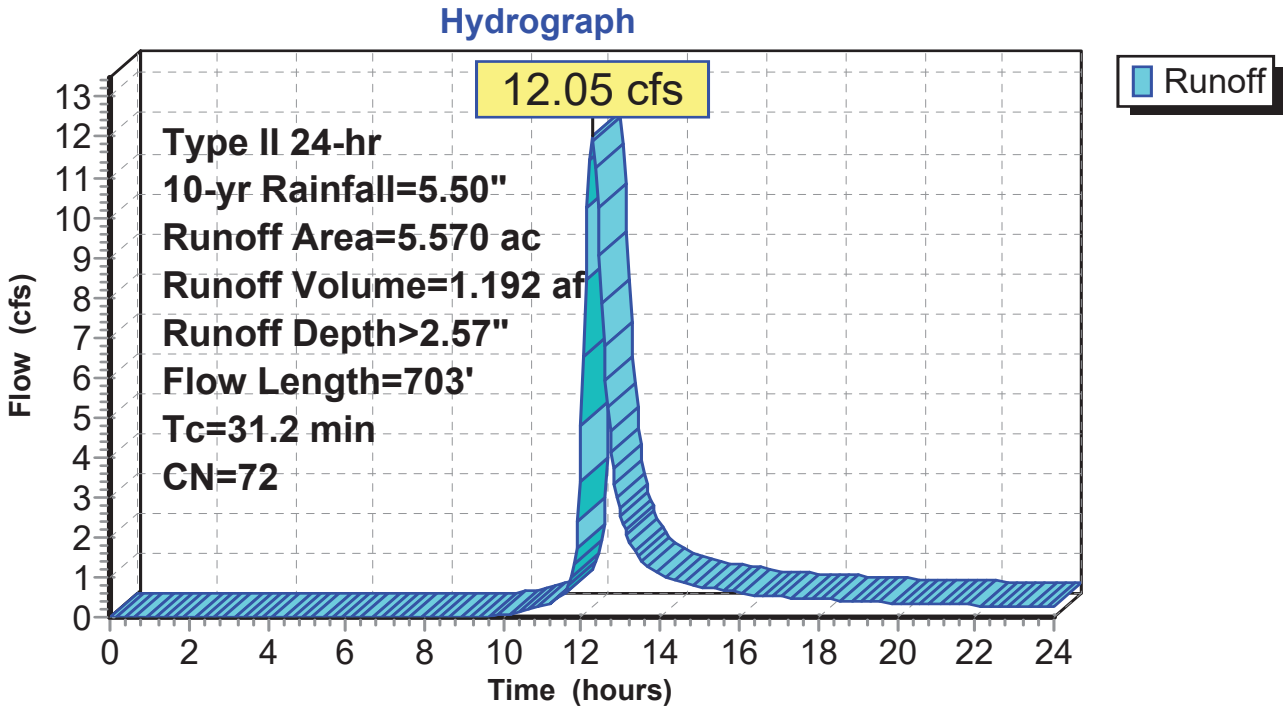
Runoff = 12.05 cfs @ 12.27 hrs, Volume= 1.192 af, Depth> 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.50"

Area (ac)	CN	Description
3.670	66	Woods, Poor, HSG B
1.900	83	Woods, Poor, HSG D
5.570	72	Weighted Average
5.570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.5	150	0.0930	0.09		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
4.7	553	0.1570	1.98		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
31.2	703	Total			

Subcatchment E-4: E-4



Summary for Reach R-1: R-1

Inflow Area = 17.870 ac, 24.90% Impervious, Inflow Depth > 2.41" for 10-yr event
Inflow = 17.45 cfs @ 12.36 hrs, Volume= 3.591 af
Outflow = 17.41 cfs @ 12.47 hrs, Volume= 3.575 af, Atten= 0%, Lag= 6.1 min

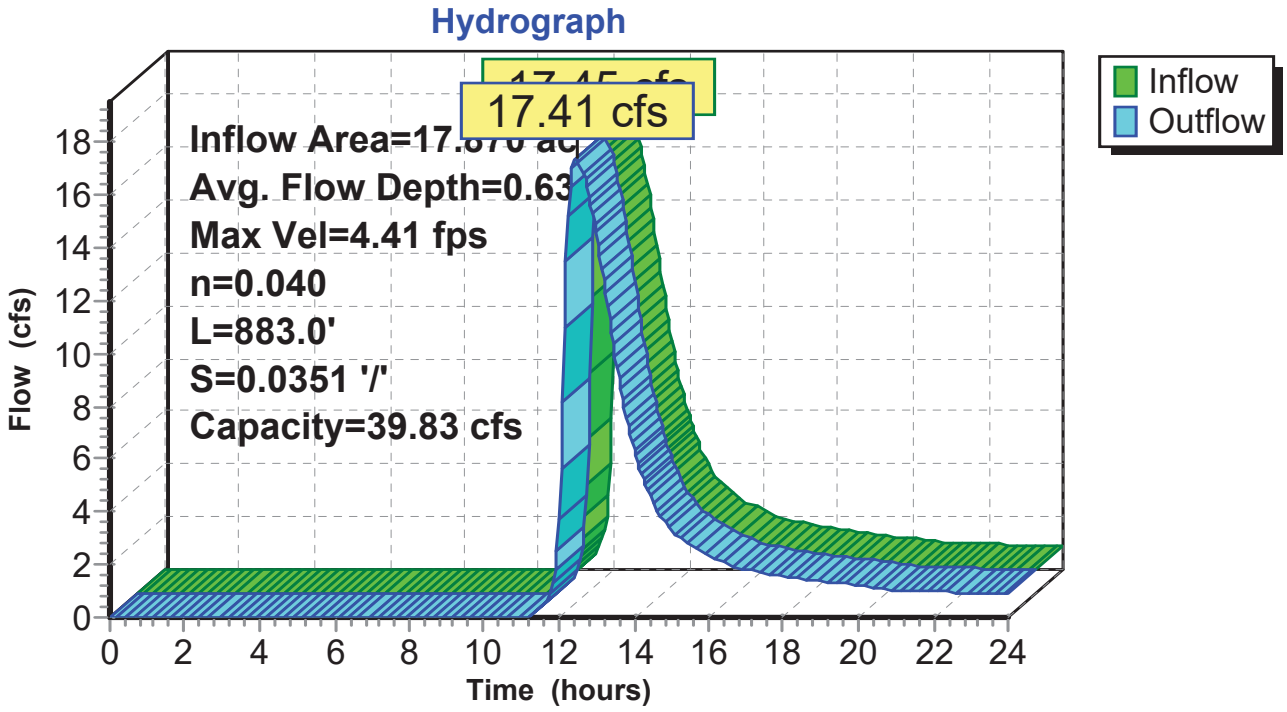
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.41 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 2.13 fps, Avg. Travel Time= 6.9 min

Peak Storage= 3,485 cf @ 12.41 hrs
Average Depth at Peak Storage= 0.63'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 39.83 cfs

5.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 883.0' Slope= 0.0351 '/'
Inlet Invert= 441.00', Outlet Invert= 410.00'



‡



Stage-Discharge for Reach R-1: R-1

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
441.00	0.00	0.00
441.01	0.32	0.02
441.02	0.51	0.05
441.03	0.67	0.10
441.04	0.80	0.16
441.05	0.93	0.24
441.06	1.05	0.32
441.07	1.16	0.42
441.08	1.26	0.52
441.09	1.36	0.63
441.10	1.45	0.76
441.11	1.54	0.89
441.12	1.63	1.03
441.13	1.72	1.17
441.14	1.80	1.33
441.15	1.88	1.49
441.16	1.96	1.66
441.17	2.03	1.84
441.18	2.10	2.03
441.19	2.18	2.22
441.20	2.25	2.43
441.21	2.31	2.63
441.22	2.38	2.85
441.23	2.45	3.07
441.24	2.51	3.30
441.25	2.57	3.54
441.26	2.63	3.78
441.27	2.70	4.03
441.28	2.76	4.29
441.29	2.81	4.55
441.30	2.87	4.82
441.31	2.93	5.10
441.32	2.98	5.38
441.33	3.04	5.68
441.34	3.09	5.97
441.35	3.15	6.28
441.36	3.20	6.59
441.37	3.25	6.90
441.38	3.30	7.23
441.39	3.35	7.56
441.40	3.40	7.89
441.41	3.45	8.24
441.42	3.50	8.59
441.43	3.55	8.94
441.44	3.60	9.30
441.45	3.64	9.67
441.46	3.69	10.05
441.47	3.74	10.43
441.48	3.78	10.82
441.49	3.83	11.21
441.50	3.87	11.61
441.51	3.91	12.02
441.52	3.96	12.43
441.53	4.00	12.85
441.54	4.04	13.28
441.55	4.09	13.71
441.56	4.13	14.15
441.57	4.17	14.59
441.58	4.21	15.04
441.59	4.25	15.50
441.60	4.29	15.97
441.61	4.33	16.44
441.62	4.37	16.91
441.63	4.41	17.40
441.64	4.45	17.89
441.65	4.49	18.38
441.66	4.53	18.89
441.67	4.57	19.39
441.68	4.60	19.91
441.69	4.64	20.43
441.70	4.68	20.96
441.71	4.72	21.49
441.72	4.75	22.03
441.73	4.79	22.58
441.74	4.82	23.14
441.75	4.86	23.70
441.76	4.90	24.26
441.77	4.93	24.84
441.78	4.97	25.42
441.79	5.00	26.00
441.80	5.04	26.60
441.81	5.07	27.19
441.82	5.11	27.80
441.83	5.14	28.41
441.84	5.17	29.03
441.85	5.21	29.66
441.86	5.24	30.29
441.87	5.27	30.93
441.88	5.31	31.57
441.89	5.34	32.22
441.90	5.37	32.88
441.91	5.41	33.55
441.92	5.44	34.22
441.93	5.47	34.90
441.94	5.50	35.58
441.95	5.53	36.27
441.96	5.57	36.97
441.97	5.60	37.67
441.98	5.63	38.39
441.99	5.66	39.10
442.00	**5.69**	**39.83**

Stage-Area-Storage for Reach R-1: R-1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
441.00	0.0	0
441.01	0.1	44
441.02	0.1	89
441.03	0.2	134
441.04	0.2	179
441.05	0.3	225
441.06	0.3	271
441.07	0.4	318
441.08	0.4	365
441.09	0.5	412
441.10	0.5	459
441.11	0.6	507
441.12	0.6	555
441.13	0.7	604
441.14	0.7	653
441.15	0.8	702
441.16	0.9	752
441.17	0.9	802
441.18	1.0	852
441.19	1.0	903
441.20	1.1	954
441.21	1.1	1,005
441.22	1.2	1,057
441.23	1.3	1,109
441.24	1.3	1,161
441.25	1.4	1,214
441.26	1.4	1,267
441.27	1.5	1,321
441.28	1.6	1,375
441.29	1.6	1,429
441.30	1.7	1,483
441.31	1.7	1,538
441.32	1.8	1,594
441.33	1.9	1,649
441.34	1.9	1,705
441.35	2.0	1,762
441.36	2.1	1,818
441.37	2.1	1,875
441.38	2.2	1,933
441.39	2.3	1,990
441.40	2.3	2,049
441.41	2.4	2,107
441.42	2.5	2,166
441.43	2.5	2,225
441.44	2.6	2,284
441.45	2.7	2,344
441.46	2.7	2,405
441.47	2.8	2,465
441.48	2.9	2,526
441.49	2.9	2,587
441.50	3.0	2,649
441.51	3.1	2,711
441.52	3.1	2,773
441.53	3.2	2,836
441.54	3.3	2,899
441.55	3.4	2,962
441.56	3.4	3,026
441.57	3.5	3,090
441.58	3.6	3,155
441.59	3.6	3,220
441.60	3.7	3,285
441.61	3.8	3,350
441.62	3.9	3,416
441.63	3.9	3,482
441.64	4.0	3,549
441.65	4.1	3,616
441.66	4.2	3,683
441.67	4.2	3,751
441.68	4.3	3,819
441.69	4.4	3,887
441.70	4.5	3,956
441.71	4.6	4,025
441.72	4.6	4,094
441.73	4.7	4,164
441.74	4.8	4,234
441.75	4.9	4,305
441.76	5.0	4,375
441.77	5.0	4,447
441.78	5.1	4,518
441.79	5.2	4,590
441.80	5.3	4,662
441.81	5.4	4,735
441.82	5.4	4,808
441.83	5.5	4,881
441.84	5.6	4,955
441.85	5.7	5,029
441.86	5.8	5,103
441.87	5.9	5,178
441.88	5.9	5,253
441.89	6.0	5,328
441.90	6.1	5,404
441.91	6.2	5,480
441.92	6.3	5,557
441.93	6.4	5,633
441.94	6.5	5,711
441.95	6.6	5,788
441.96	6.6	5,866
441.97	6.7	5,944
441.98	6.8	6,023
441.99	6.9	6,102
442.00	**7.0**	**6,181**

Summary for Reach R-2: R-2

Inflow Area = 57.630 ac, 7.72% Impervious, Inflow Depth > 2.64" for 10-yr event
Inflow = 109.06 cfs @ 12.27 hrs, Volume= 12.675 af
Outflow = 84.42 cfs @ 12.71 hrs, Volume= 12.446 af, Atten= 23%, Lag= 26.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.43 fps, Min. Travel Time= 15.2 min
Avg. Velocity = 1.10 fps, Avg. Travel Time= 33.5 min

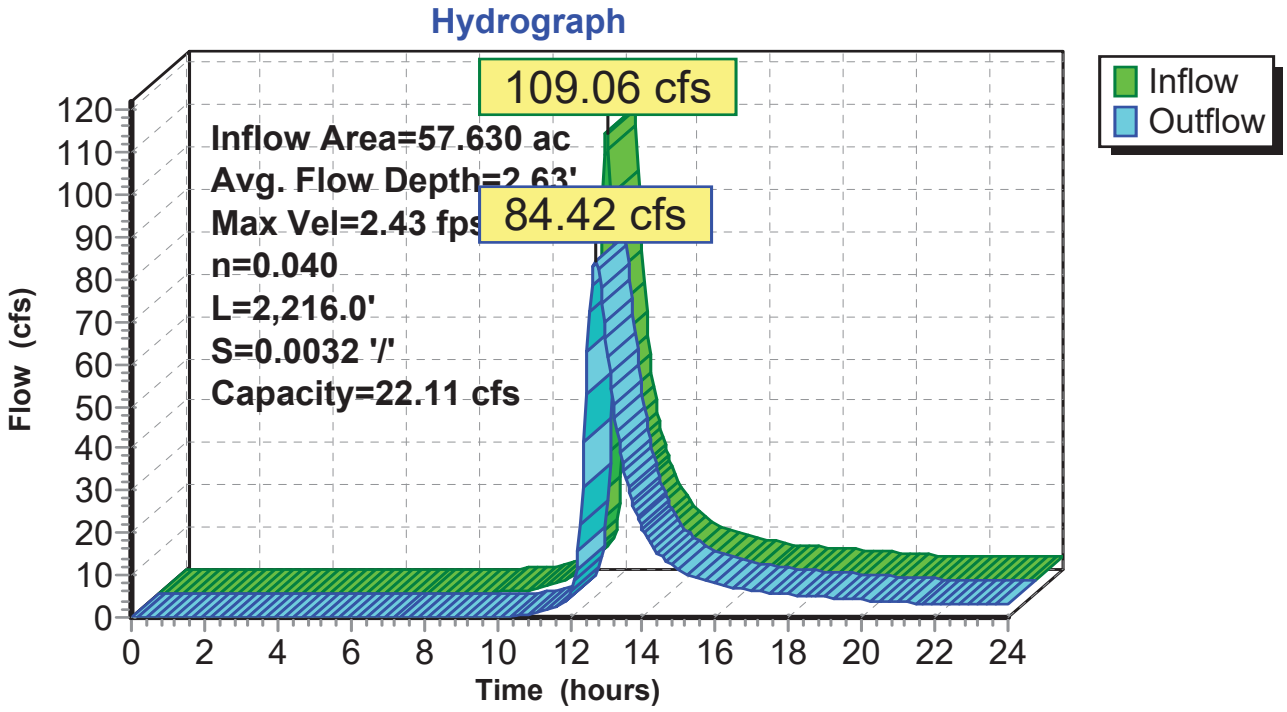
Peak Storage= 77,051 cf @ 12.46 hrs
Average Depth at Peak Storage= 2.63'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 22.11 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 2,216.0' Slope= 0.0032 '/'
Inlet Invert= 410.00', Outlet Invert= 403.00'



‡

Reach R-2: R-2



Stage-Discharge for Reach R-2: R-2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
410.00	0.00	0.00
410.01	0.10	0.01
410.02	0.15	0.03
410.03	0.20	0.06
410.04	0.24	0.10
410.05	0.28	0.14
410.06	0.32	0.19
410.07	0.35	0.25
410.08	0.38	0.31
410.09	0.41	0.38
410.10	0.44	0.45
410.11	0.47	0.53
410.12	0.50	0.61
410.13	0.52	0.70
410.14	0.55	0.79
410.15	0.58	0.89
410.16	0.60	0.99
410.17	0.62	1.10
410.18	0.65	1.21
410.19	0.67	1.32
410.20	0.69	1.44
410.21	0.71	1.56
410.22	0.74	1.69
410.23	0.76	1.82
410.24	0.78	1.96
410.25	0.80	2.09
410.26	0.82	2.24
410.27	0.84	2.38
410.28	0.86	2.53
410.29	0.88	2.69
410.30	0.89	2.84
410.31	0.91	3.01
410.32	0.93	3.17
410.33	0.95	3.34
410.34	0.97	3.51
410.35	0.98	3.69
410.36	1.00	3.87
410.37	1.02	4.05
410.38	1.04	4.24
410.39	1.05	4.43
410.40	1.07	4.62
410.41	1.09	4.82
410.42	1.10	5.02
410.43	1.12	5.22
410.44	1.13	5.43
410.45	1.15	5.64
410.46	1.16	5.85
410.47	1.18	6.07
410.48	1.20	6.29
410.49	1.21	6.51
410.50	1.23	6.74
410.51	1.24	6.97
410.52	1.25	7.20
410.53	1.27	7.44
410.54	1.28	7.68
410.55	1.30	7.92
410.56	1.31	8.17
410.57	1.33	8.42
410.58	1.34	8.67
410.59	1.35	8.93
410.60	1.37	9.19
410.61	1.38	9.45
410.62	1.39	9.72
410.63	1.41	9.98
410.64	1.42	10.26
410.65	1.43	10.53
410.66	1.45	10.81
410.67	1.46	11.09
410.68	1.47	11.38
410.69	1.49	11.66
410.70	1.50	11.95
410.71	1.51	12.25
410.72	1.52	12.55
410.73	1.54	12.85
410.74	1.55	13.15
410.75	1.56	13.46
410.76	1.57	13.77
410.77	1.58	14.08
410.78	1.60	14.39
410.79	1.61	14.71
410.80	1.62	15.03
410.81	1.63	15.36
410.82	1.64	15.69
410.83	1.66	16.02
410.84	1.67	16.35
410.85	1.68	16.69
410.86	1.69	17.03
410.87	1.70	17.37
410.88	1.71	17.72
410.89	1.72	18.07
410.90	1.73	18.42
410.91	1.75	18.78
410.92	1.76	19.14
410.93	1.77	19.50
410.94	1.78	19.86
410.95	1.79	20.23
410.96	1.80	20.60
410.97	1.81	20.97
410.98	1.82	21.35
410.99	1.83	21.73
411.00	**1.84**	**22.11**

Stage-Area-Storage for Reach R-2: R-2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
410.00	0.0	0
410.01	0.1	222
410.02	0.2	445
410.03	0.3	669
410.04	0.4	893
410.05	0.5	1,119
410.06	0.6	1,346
410.07	0.7	1,573
410.08	0.8	1,801
410.09	0.9	2,030
410.10	1.0	2,260
410.11	1.1	2,491
410.12	1.2	2,723
410.13	1.3	2,956
410.14	1.4	3,189
410.15	1.5	3,424
410.16	1.7	3,659
410.17	1.8	3,895
410.18	1.9	4,132
410.19	2.0	4,370
410.20	2.1	4,609
410.21	2.2	4,849
410.22	2.3	5,090
410.23	2.4	5,331
410.24	2.5	5,574
410.25	2.6	5,817
410.26	2.7	6,061
410.27	2.8	6,306
410.28	3.0	6,552
410.29	3.1	6,799
410.30	3.2	7,047
410.31	3.3	7,296
410.32	3.4	7,545
410.33	3.5	7,795
410.34	3.6	8,047
410.35	3.7	8,299
410.36	3.9	8,552
410.37	4.0	8,806
410.38	4.1	9,061
410.39	4.2	9,317
410.40	4.3	9,573
410.41	4.4	9,831
410.42	4.6	10,089
410.43	4.7	10,348
410.44	4.8	10,608
410.45	4.9	10,869
410.46	5.0	11,131
410.47	5.1	11,394
410.48	5.3	11,658
410.49	5.4	11,923
410.50	5.5	12,188
410.51	5.6	12,454
410.52	5.7	12,722
410.53	5.9	12,990
410.54	6.0	13,259
410.55	6.1	13,529
410.56	6.2	13,799
410.57	6.3	14,071
410.58	6.5	14,344
410.59	6.6	14,617
410.60	6.7	14,892
410.61	6.8	15,167
410.62	7.0	15,443
410.63	7.1	15,720
410.64	7.2	15,998
410.65	7.3	16,277
410.66	7.5	16,556
410.67	7.6	16,837
410.68	7.7	17,118
410.69	7.9	17,400
410.70	8.0	17,684
410.71	8.1	17,968
410.72	8.2	18,253
410.73	8.4	18,539
410.74	8.5	18,825
410.75	8.6	19,113
410.76	8.8	19,402
410.77	8.9	19,691
410.78	9.0	19,981
410.79	9.1	20,272
410.80	9.3	20,564
410.81	9.4	20,857
410.82	9.5	21,151
410.83	9.7	21,446
410.84	9.8	21,742
410.85	9.9	22,038
410.86	10.1	22,336
410.87	10.2	22,634
410.88	10.3	22,933
410.89	10.5	23,233
410.90	10.6	23,534
410.91	10.8	23,836
410.92	10.9	24,138
410.93	11.0	24,442
410.94	11.2	24,747
410.95	11.3	25,052
410.96	11.4	25,358
410.97	11.6	25,665
410.98	11.7	25,973
410.99	11.9	26,282
411.00	**12.0**	**26,592**

Summary for Pond Pond 1b: Pond 1b

Inflow Area = 17.870 ac, 24.90% Impervious, Inflow Depth > 2.49" for 10-yr event
Inflow = 55.38 cfs @ 12.09 hrs, Volume= 3.709 af
Outflow = 17.45 cfs @ 12.36 hrs, Volume= 3.591 af, Atten= 68%, Lag= 16.6 min
Primary = 17.45 cfs @ 12.36 hrs, Volume= 3.591 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 444.13' @ 12.36 hrs Surf.Area= 35,015 sf Storage= 53,139 cf

Plug-Flow detention time= 55.3 min calculated for 3.583 af (97% of inflow)
Center-of-Mass det. time= 37.3 min (880.9 - 843.6)

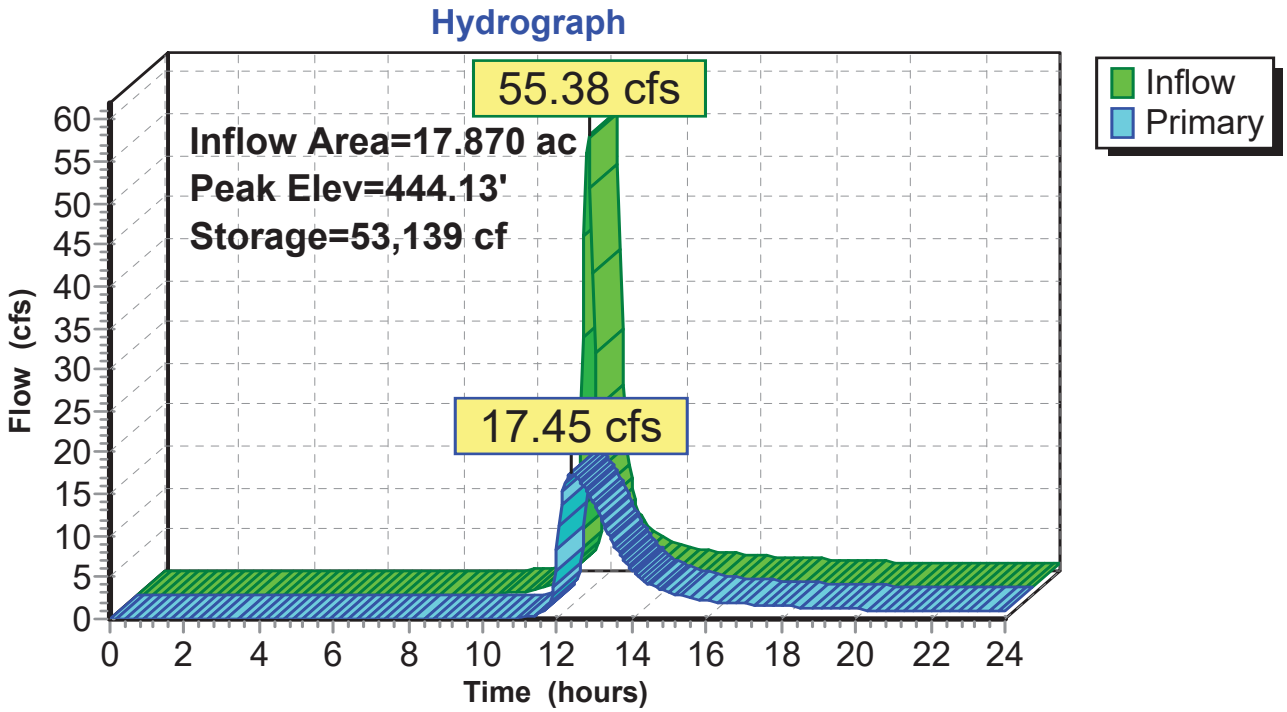
Volume	Invert	Avail.Storage	Storage Description
#1	441.50'	141,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
441.50	1,192	0	0
442.00	10,772	2,991	2,991
444.00	34,794	45,566	48,557
446.00	38,163	72,957	121,514
446.50	40,718	19,720	141,234

Device	Routing	Invert	Outlet Devices
#1	Primary	441.80'	**24.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	441.60'	**25.6 deg x 2.0' long x 4.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.64 (C= 3.30)
#3	Device 1	445.23'	**52.0" x 64.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	446.40'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=17.44 cfs @ 12.36 hrs HW=444.13' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 17.44 cfs @ 5.55 fps)
└**2=Sharp-Crested Vee/Trap Weir** (Passes 17.44 cfs of 32.59 cfs potential flow)
└**3=Orifice/Grate** (Controls 0.00 cfs)
└**4=Orifice/Grate** (Controls 0.00 cfs)

Pond Pond 1b: Pond 1b



Stage-Discharge for Pond Pond 1b: Pond 1b

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
441.50	0.00	443.62	13.79	445.74	25.94	447.86	34.03
441.54	0.00	443.66	14.14	445.78	26.11	447.90	34.16
441.58	0.00	443.70	14.47	445.82	26.29	447.94	34.29
441.62	0.00	443.74	14.77	445.86	26.46	447.98	34.43
441.66	0.00	443.78	15.03	445.90	26.63	448.02	34.56
441.70	0.00	443.82	15.28	445.94	26.80	448.06	34.69
441.74	0.00	443.86	15.57	445.98	26.97	448.10	34.82
441.78	0.00	443.90	15.87	446.02	27.14	448.14	34.96
441.82	0.00	443.94	16.15	446.06	27.31	448.18	35.09
441.86	0.02	443.98	16.43	446.10	27.48	448.22	35.22
441.90	0.06	444.02	16.71	446.14	27.65	448.26	35.35
441.94	0.12	444.06	16.98	446.18	27.81	448.30	35.48
441.98	0.20	444.10	17.25	446.22	27.97	448.34	35.60
442.02	0.30	444.14	17.51	446.26	28.14	448.38	35.73
442.06	0.42	444.18	17.77	446.30	28.30	448.42	35.86
442.10	0.55	444.22	18.03	446.34	28.46	448.46	35.99
442.14	0.70	444.26	18.28	446.38	28.62	448.50	36.11
442.18	0.87	444.30	18.53	446.42	28.78	448.54	36.24
442.22	1.06	444.34	18.77	446.46	28.94	448.58	36.37
442.26	1.26	444.38	19.01	446.50	29.10	448.62	36.49
442.30	1.48	444.42	19.25	446.54	29.25	448.66	36.62
442.34	1.71	444.46	19.49	446.58	29.41	448.70	36.74
442.38	1.96	444.50	19.72	446.62	29.56	448.74	36.87
442.42	2.22	444.54	19.95	446.66	29.72	448.78	36.99
442.46	2.50	444.58	20.18	446.70	29.87	448.82	37.11
442.50	2.79	444.62	20.41	446.74	30.03	448.86	37.24
442.54	3.09	444.66	20.63	446.78	30.18	448.90	37.36
442.58	3.41	444.70	20.85	446.82	30.33	448.94	37.48
442.62	3.74	444.74	21.07	446.86	30.48	448.98	37.60
442.66	4.08	444.78	21.29	446.90	30.63	449.02	37.73
442.70	4.43	444.82	21.50	446.94	30.78	449.06	37.85
442.74	4.79	444.86	21.71	446.98	30.93	449.10	37.97
442.78	5.16	444.90	21.92	447.02	31.07	449.14	38.09
442.82	5.54	444.94	22.13	447.06	31.22	449.18	38.21
442.86	5.93	444.98	22.33	447.10	31.37	449.22	38.33
442.90	6.32	445.02	22.54	447.14	31.51	449.26	38.45
442.94	6.72	445.06	22.74	447.18	31.66	449.30	38.57
442.98	7.13	445.10	22.94	447.22	31.80	449.34	38.68
443.02	7.55	445.14	23.14	447.26	31.95	449.38	38.80
443.06	7.97	445.18	23.34	447.30	32.09	449.42	38.92
443.10	8.39	445.22	23.53	447.34	32.23	449.46	39.04
443.14	8.82	445.26	23.73	447.38	32.37	449.50	**39.15**
443.18	9.25	445.30	23.92	447.42	32.51		
443.22	9.68	445.34	24.11	447.46	32.65		
443.26	10.11	445.38	24.30	447.50	32.79		
443.30	10.54	445.42	24.48	447.54	32.93		
443.34	10.97	445.46	24.67	447.58	33.07		
443.38	11.39	445.50	24.86	447.62	33.21		
443.42	11.81	445.54	25.04	447.66	33.35		
443.46	12.23	445.58	25.22	447.70	33.48		
443.50	12.63	445.62	25.40	447.74	33.62		
443.54	13.03	445.66	25.58	447.78	33.76		
443.58	13.42	445.70	25.76	447.82	33.89		

Stage-Area-Storage for Pond Pond 1b: Pond 1b

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
441.50	1,192	0
441.60	3,108	215
441.70	5,024	622
441.80	6,940	1,220
441.90	8,856	2,010
442.00	10,772	2,991
442.10	11,973	4,128
442.20	13,174	5,386
442.30	14,375	6,763
442.40	15,576	8,261
442.50	16,778	9,878
442.60	17,979	11,616
442.70	19,180	13,474
442.80	20,381	15,452
442.90	21,582	17,550
443.00	22,783	19,769
443.10	23,984	22,107
443.20	25,185	24,565
443.30	26,386	27,144
443.40	27,587	29,843
443.50	28,789	32,661
443.60	29,990	35,600
443.70	31,191	38,659
443.80	32,392	41,838
443.90	33,593	45,138
444.00	34,794	48,557
444.10	34,962	52,045
444.20	35,131	55,549
444.30	35,299	59,071
444.40	35,468	62,609
444.50	35,636	66,165
444.60	35,805	69,737
444.70	35,973	73,326
444.80	36,142	76,931
444.90	36,310	80,554
445.00	36,479	84,193
445.10	36,647	87,850
445.20	36,815	91,523
445.30	36,984	95,213
445.40	37,152	98,919
445.50	37,321	102,643
445.60	37,489	106,384
445.70	37,658	110,141
445.80	37,826	113,915
445.90	37,995	117,706
446.00	38,163	121,514
446.10	38,674	125,356
446.20	39,185	129,249
446.30	39,696	133,193
446.40	40,207	137,188
446.50	**40,718**	**141,234**
446.60	40,718	141,234
446.70	40,718	141,234
446.80	40,718	141,234
446.90	40,718	141,234
447.00	40,718	141,234
447.10	40,718	141,234
447.20	40,718	141,234
447.30	40,718	141,234
447.40	40,718	141,234
447.50	40,718	141,234
447.60	40,718	141,234
447.70	40,718	141,234
447.80	40,718	141,234
447.90	40,718	141,234
448.00	40,718	141,234
448.10	40,718	141,234
448.20	40,718	141,234
448.30	40,718	141,234
448.40	40,718	141,234
448.50	40,718	141,234
448.60	40,718	141,234
448.70	40,718	141,234
448.80	40,718	141,234
448.90	40,718	141,234
449.00	40,718	141,234
449.10	40,718	141,234
449.20	40,718	141,234
449.30	40,718	141,234
449.40	40,718	141,234
449.50	40,718	141,234

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1a: E-1a Runoff Area=39.760 ac 0.00% Impervious Runoff Depth>3.76"
Flow Length=900' Tc=30.6 min CN=74 Runoff=128.72 cfs 12.463 af

Subcatchment E-1b: E-1b Runoff Area=17.870 ac 24.90% Impervious Runoff Depth>3.47"
Flow Length=1,362' Tc=16.0 min CN=71 Runoff=77.39 cfs 5.163 af

Subcatchment E-2: E-2 Runoff Area=14.560 ac 0.00% Impervious Runoff Depth>3.29"
Flow Length=1,712' Tc=90.6 min CN=70 Runoff=19.05 cfs 3.995 af

Subcatchment E-3: E-3 Runoff Area=3.770 ac 0.00% Impervious Runoff Depth>2.96"
Flow Length=541' Tc=21.3 min CN=66 Runoff=11.86 cfs 0.930 af

Subcatchment E-4: E-4 Runoff Area=5.570 ac 0.00% Impervious Runoff Depth>3.55"
Flow Length=703' Tc=31.2 min CN=72 Runoff=16.82 cfs 1.650 af

Reach R-1: R-1 Avg. Flow Depth=0.71' Max Vel=4.72 fps Inflow=21.58 cfs 5.027 af
n=0.040 L=883.0' S=0.0351 '/' Capacity=39.83 cfs Outflow=21.55 cfs 5.009 af

Reach R-2: R-2 Avg. Flow Depth=3.44' Max Vel=2.51 fps Inflow=148.09 cfs 17.472 af
n=0.040 L=2,216.0' S=0.0032 '/' Capacity=22.11 cfs Outflow=115.47 cfs 17.199 af

Pond Pond 1b: Pond 1b Peak Elev=444.84' Storage=78,237 cf Inflow=77.39 cfs 5.163 af
Outflow=21.58 cfs 5.027 af

Summary for Subcatchment E-1a: E-1a

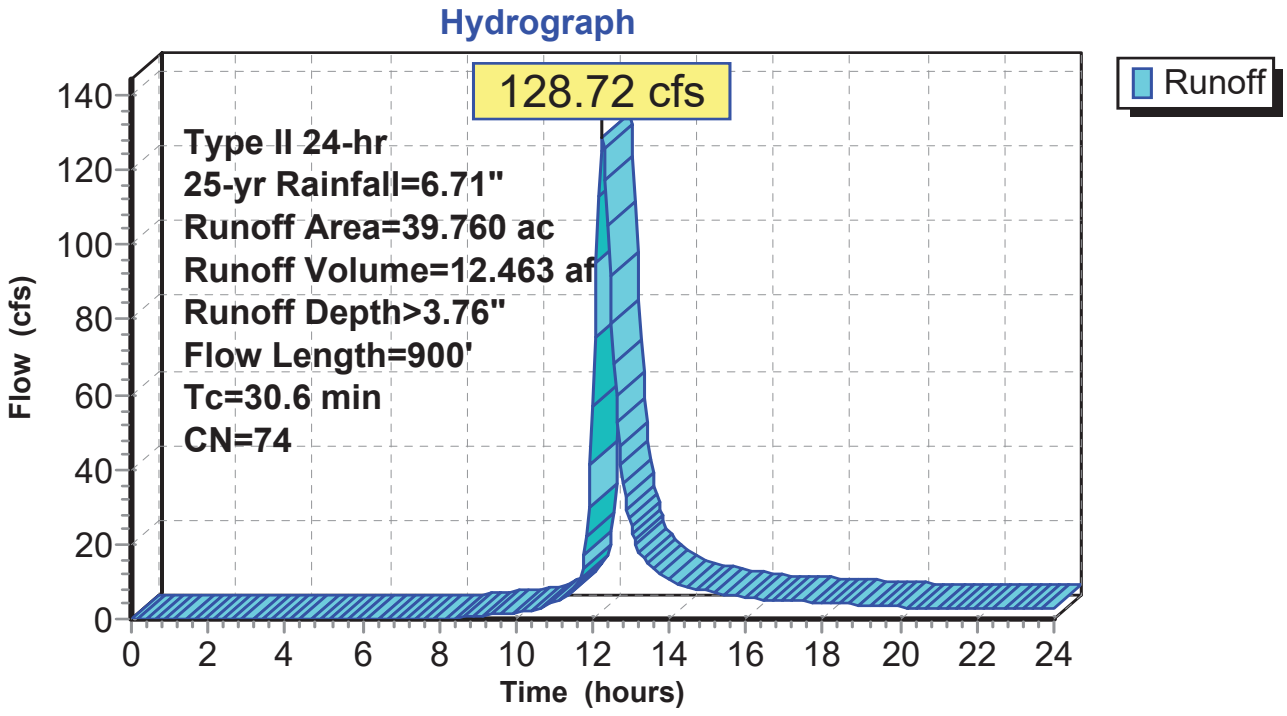
Runoff = 128.72 cfs @ 12.25 hrs, Volume= 12.463 af, Depth> 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.71"

Area (ac)	CN	Description
18.250	83	Woods, Poor, HSG D
21.510	66	Woods, Poor, HSG B
39.760	74	Weighted Average
39.760		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.1	150	0.1870	0.12		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
5.2	505	0.1030	1.60		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
5.3	245	0.0240	0.77		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
30.6	900	Total			

Subcatchment E-1a: E-1a



Summary for Subcatchment E-1b: E-1b

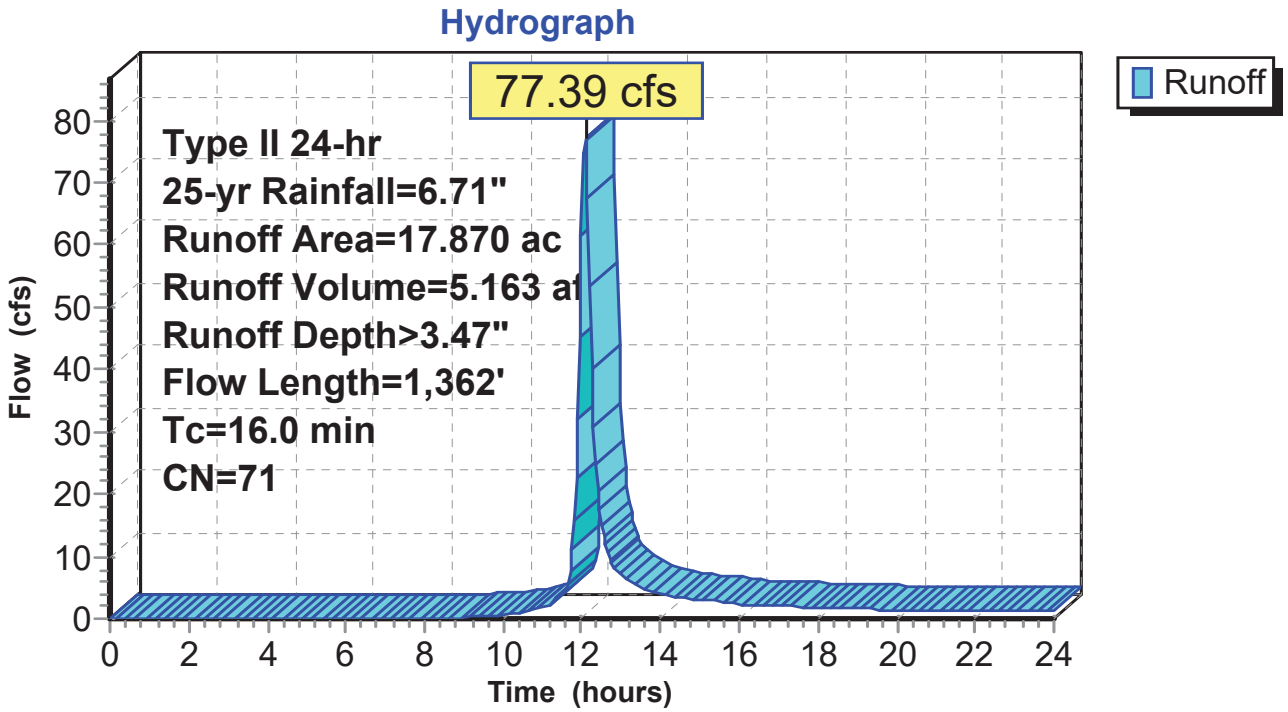
Runoff = 77.39 cfs @ 12.08 hrs, Volume= 5.163 af, Depth> 3.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.71"

Area (ac)	CN	Description
4.450	98	Paved parking, HSG B
3.860	61	>75% Grass cover, Good, HSG B
6.200	66	Woods, Poor, HSG B
3.360	55	Woods, Good, HSG B
17.870	71	Weighted Average
13.420		75.10% Pervious Area
4.450		24.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2	100	0.3600	0.15		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
0.8	232	0.0950	4.96		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
1.0	130	0.0120	2.22		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
3.0	900		5.00		**Direct Entry, DE**
16.0	1,362	Total			

Subcatchment E-1b: E-1b



Summary for Subcatchment E-2: E-2

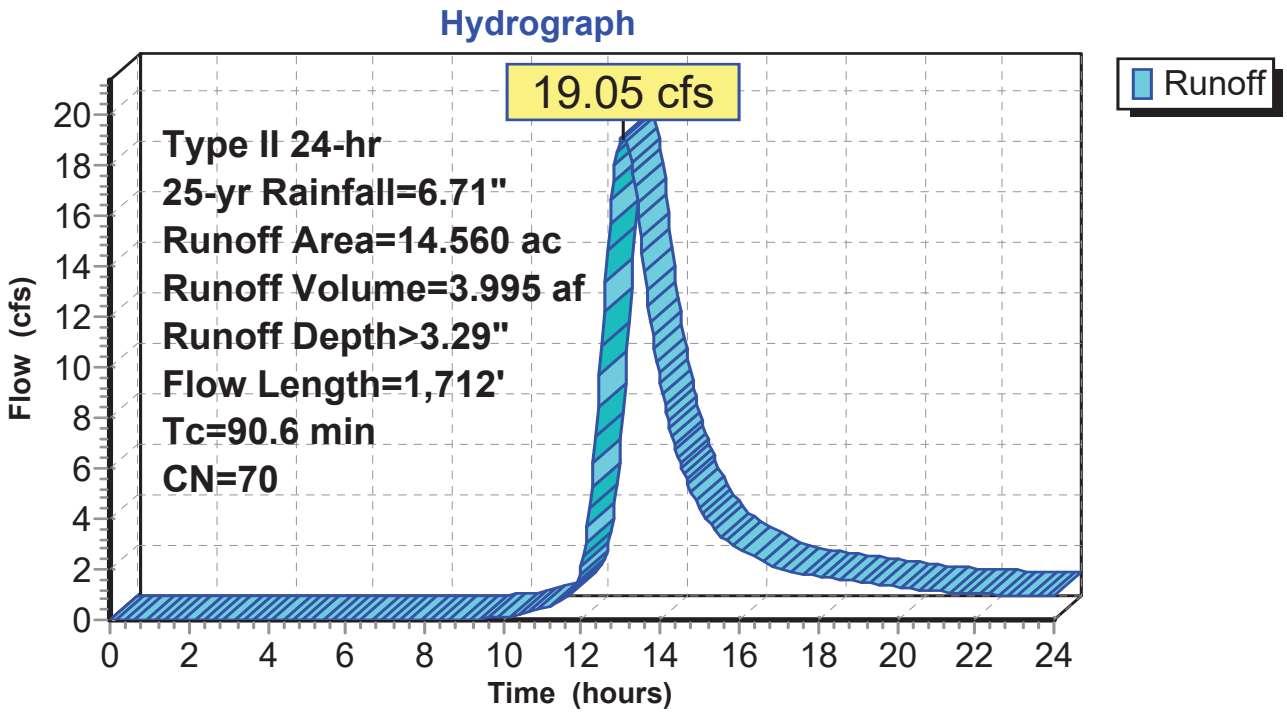
Runoff = 19.05 cfs @ 13.02 hrs, Volume= 3.995 af, Depth> 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.71"

Area (ac)	CN	Description
3.540	83	Woods, Poor, HSG D
11.020	66	Woods, Poor, HSG B
14.560	70	Weighted Average
14.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	150	0.2330	0.14		**Sheet Flow, BC** Woods: Dense underbrush n= 0.800 P2= 3.56"
2.5	211	0.0810	1.42		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
65.2	1,157	0.0035	0.30		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
4.5	194	0.0210	0.72		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
90.6	1,712	Total			

Subcatchment E-2: E-2



Summary for Subcatchment E-3: E-3

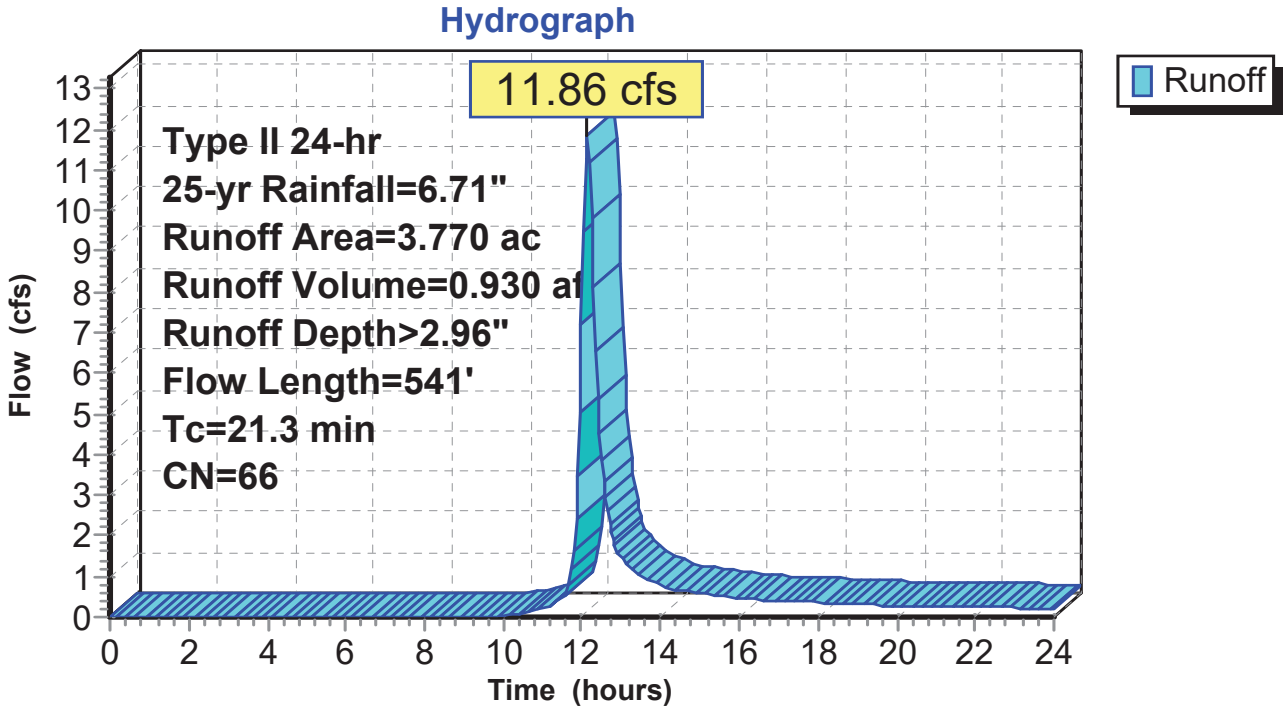
Runoff = 11.86 cfs @ 12.15 hrs, Volume= 0.930 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.71"

Area (ac)	CN	Description
3.770	66	Woods, Poor, HSG B
3.770		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	150	0.2600	0.14		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
3.7	391	0.1230	1.75		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
21.3	541	Total			

Subcatchment E-3: E-3



Summary for Subcatchment E-4: E-4

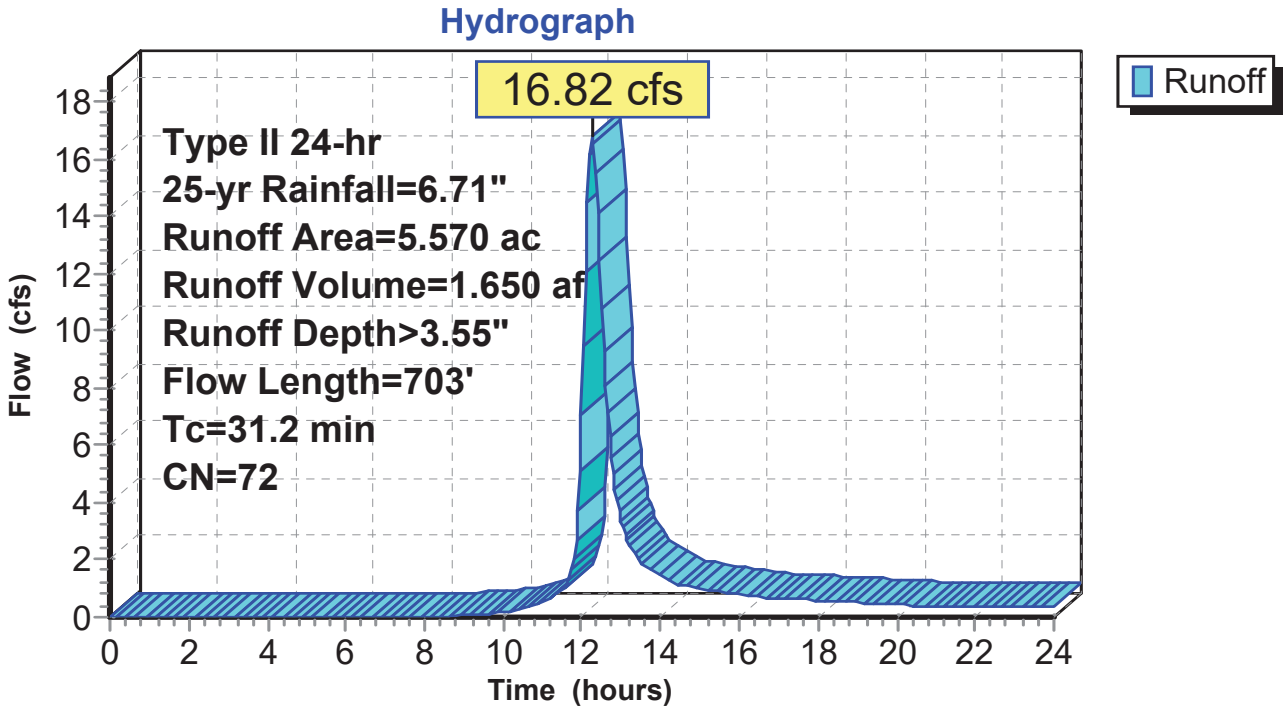
Runoff = 16.82 cfs @ 12.26 hrs, Volume= 1.650 af, Depth> 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.71"

Area (ac)	CN	Description
3.670	66	Woods, Poor, HSG B
1.900	83	Woods, Poor, HSG D
5.570	72	Weighted Average
5.570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.5	150	0.0930	0.09		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
4.7	553	0.1570	1.98		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
31.2	703	Total			

Subcatchment E-4: E-4



Summary for Reach R-1: R-1

Inflow Area = 17.870 ac, 24.90% Impervious, Inflow Depth > 3.38" for 25-yr event
Inflow = 21.58 cfs @ 12.39 hrs, Volume= 5.027 af
Outflow = 21.55 cfs @ 12.48 hrs, Volume= 5.009 af, Atten= 0%, Lag= 5.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.72 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 2.33 fps, Avg. Travel Time= 6.3 min

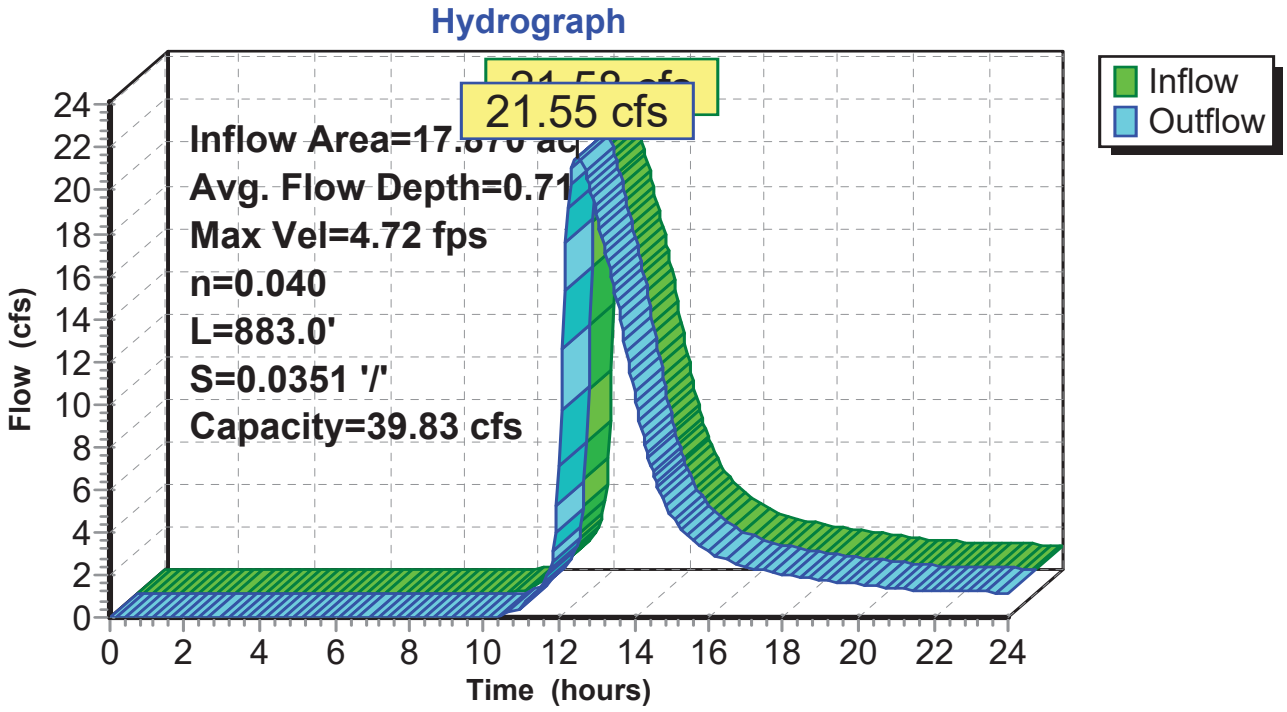
Peak Storage= 4,032 cf @ 12.43 hrs
Average Depth at Peak Storage= 0.71'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 39.83 cfs

5.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 883.0' Slope= 0.0351 '/'
Inlet Invert= 441.00', Outlet Invert= 410.00'



‡

Reach R-1: R-1



Stage-Discharge for Reach R-1: R-1

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
441.00	0.00	0.00
441.01	0.32	0.02
441.02	0.51	0.05
441.03	0.67	0.10
441.04	0.80	0.16
441.05	0.93	0.24
441.06	1.05	0.32
441.07	1.16	0.42
441.08	1.26	0.52
441.09	1.36	0.63
441.10	1.45	0.76
441.11	1.54	0.89
441.12	1.63	1.03
441.13	1.72	1.17
441.14	1.80	1.33
441.15	1.88	1.49
441.16	1.96	1.66
441.17	2.03	1.84
441.18	2.10	2.03
441.19	2.18	2.22
441.20	2.25	2.43
441.21	2.31	2.63
441.22	2.38	2.85
441.23	2.45	3.07
441.24	2.51	3.30
441.25	2.57	3.54
441.26	2.63	3.78
441.27	2.70	4.03
441.28	2.76	4.29
441.29	2.81	4.55
441.30	2.87	4.82
441.31	2.93	5.10
441.32	2.98	5.38
441.33	3.04	5.68
441.34	3.09	5.97
441.35	3.15	6.28
441.36	3.20	6.59
441.37	3.25	6.90
441.38	3.30	7.23
441.39	3.35	7.56
441.40	3.40	7.89
441.41	3.45	8.24
441.42	3.50	8.59
441.43	3.55	8.94
441.44	3.60	9.30
441.45	3.64	9.67
441.46	3.69	10.05
441.47	3.74	10.43
441.48	3.78	10.82
441.49	3.83	11.21
441.50	3.87	11.61
441.51	3.91	12.02
441.52	3.96	12.43
441.53	4.00	12.85
441.54	4.04	13.28
441.55	4.09	13.71
441.56	4.13	14.15
441.57	4.17	14.59
441.58	4.21	15.04
441.59	4.25	15.50
441.60	4.29	15.97
441.61	4.33	16.44
441.62	4.37	16.91
441.63	4.41	17.40
441.64	4.45	17.89
441.65	4.49	18.38
441.66	4.53	18.89
441.67	4.57	19.39
441.68	4.60	19.91
441.69	4.64	20.43
441.70	4.68	20.96
441.71	4.72	21.49
441.72	4.75	22.03
441.73	4.79	22.58
441.74	4.82	23.14
441.75	4.86	23.70
441.76	4.90	24.26
441.77	4.93	24.84
441.78	4.97	25.42
441.79	5.00	26.00
441.80	5.04	26.60
441.81	5.07	27.19
441.82	5.11	27.80
441.83	5.14	28.41
441.84	5.17	29.03
441.85	5.21	29.66
441.86	5.24	30.29
441.87	5.27	30.93
441.88	5.31	31.57
441.89	5.34	32.22
441.90	5.37	32.88
441.91	5.41	33.55
441.92	5.44	34.22
441.93	5.47	34.90
441.94	5.50	35.58
441.95	5.53	36.27
441.96	5.57	36.97
441.97	5.60	37.67
441.98	5.63	38.39
441.99	5.66	39.10
442.00	**5.69**	**39.83**

Stage-Area-Storage for Reach R-1: R-1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
441.00	0.0	0
441.01	0.1	44
441.02	0.1	89
441.03	0.2	134
441.04	0.2	179
441.05	0.3	225
441.06	0.3	271
441.07	0.4	318
441.08	0.4	365
441.09	0.5	412
441.10	0.5	459
441.11	0.6	507
441.12	0.6	555
441.13	0.7	604
441.14	0.7	653
441.15	0.8	702
441.16	0.9	752
441.17	0.9	802
441.18	1.0	852
441.19	1.0	903
441.20	1.1	954
441.21	1.1	1,005
441.22	1.2	1,057
441.23	1.3	1,109
441.24	1.3	1,161
441.25	1.4	1,214
441.26	1.4	1,267
441.27	1.5	1,321
441.28	1.6	1,375
441.29	1.6	1,429
441.30	1.7	1,483
441.31	1.7	1,538
441.32	1.8	1,594
441.33	1.9	1,649
441.34	1.9	1,705
441.35	2.0	1,762
441.36	2.1	1,818
441.37	2.1	1,875
441.38	2.2	1,933
441.39	2.3	1,990
441.40	2.3	2,049
441.41	2.4	2,107
441.42	2.5	2,166
441.43	2.5	2,225
441.44	2.6	2,284
441.45	2.7	2,344
441.46	2.7	2,405
441.47	2.8	2,465
441.48	2.9	2,526
441.49	2.9	2,587
441.50	3.0	2,649
441.51	3.1	2,711
441.52	3.1	2,773
441.53	3.2	2,836
441.54	3.3	2,899
441.55	3.4	2,962
441.56	3.4	3,026
441.57	3.5	3,090
441.58	3.6	3,155
441.59	3.6	3,220
441.60	3.7	3,285
441.61	3.8	3,350
441.62	3.9	3,416
441.63	3.9	3,482
441.64	4.0	3,549
441.65	4.1	3,616
441.66	4.2	3,683
441.67	4.2	3,751
441.68	4.3	3,819
441.69	4.4	3,887
441.70	4.5	3,956
441.71	4.6	4,025
441.72	4.6	4,094
441.73	4.7	4,164
441.74	4.8	4,234
441.75	4.9	4,305
441.76	5.0	4,375
441.77	5.0	4,447
441.78	5.1	4,518
441.79	5.2	4,590
441.80	5.3	4,662
441.81	5.4	4,735
441.82	5.4	4,808
441.83	5.5	4,881
441.84	5.6	4,955
441.85	5.7	5,029
441.86	5.8	5,103
441.87	5.9	5,178
441.88	5.9	5,253
441.89	6.0	5,328
441.90	6.1	5,404
441.91	6.2	5,480
441.92	6.3	5,557
441.93	6.4	5,633
441.94	6.5	5,711
441.95	6.6	5,788
441.96	6.6	5,866
441.97	6.7	5,944
441.98	6.8	6,023
441.99	6.9	6,102
442.00	**7.0**	**6,181**

Summary for Reach R-2: R-2

Inflow Area = 57.630 ac, 7.72% Impervious, Inflow Depth > 3.64" for 25-yr event
Inflow = 148.09 cfs @ 12.26 hrs, Volume= 17.472 af
Outflow = 115.47 cfs @ 12.69 hrs, Volume= 17.199 af, Atten= 22%, Lag= 25.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.51 fps, Min. Travel Time= 14.7 min
Avg. Velocity = 1.18 fps, Avg. Travel Time= 31.3 min

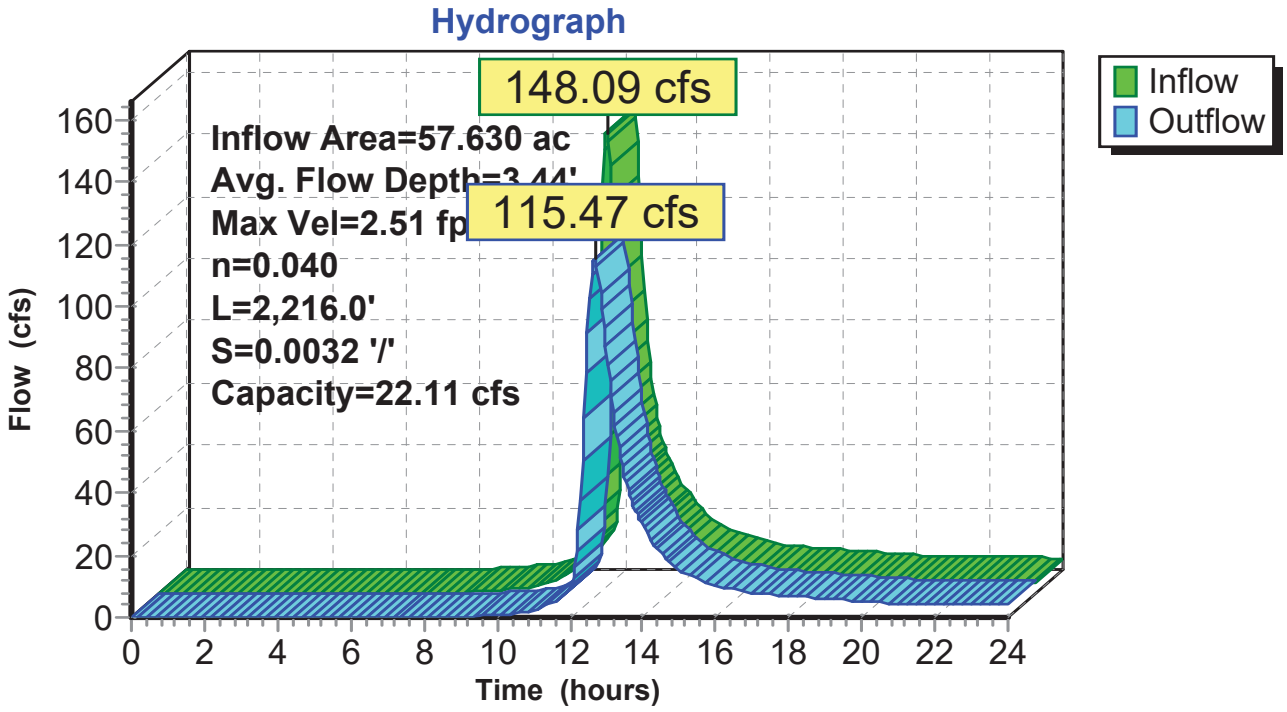
Peak Storage= 102,212 cf @ 12.44 hrs
Average Depth at Peak Storage= 3.44'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 22.11 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 2,216.0' Slope= 0.0032 '/'
Inlet Invert= 410.00', Outlet Invert= 403.00'



‡

Reach R-2: R-2



Stage-Discharge for Reach R-2: R-2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
410.00	0.00	0.00
410.01	0.10	0.01
410.02	0.15	0.03
410.03	0.20	0.06
410.04	0.24	0.10
410.05	0.28	0.14
410.06	0.32	0.19
410.07	0.35	0.25
410.08	0.38	0.31
410.09	0.41	0.38
410.10	0.44	0.45
410.11	0.47	0.53
410.12	0.50	0.61
410.13	0.52	0.70
410.14	0.55	0.79
410.15	0.58	0.89
410.16	0.60	0.99
410.17	0.62	1.10
410.18	0.65	1.21
410.19	0.67	1.32
410.20	0.69	1.44
410.21	0.71	1.56
410.22	0.74	1.69
410.23	0.76	1.82
410.24	0.78	1.96
410.25	0.80	2.09
410.26	0.82	2.24
410.27	0.84	2.38
410.28	0.86	2.53
410.29	0.88	2.69
410.30	0.89	2.84
410.31	0.91	3.01
410.32	0.93	3.17
410.33	0.95	3.34
410.34	0.97	3.51
410.35	0.98	3.69
410.36	1.00	3.87
410.37	1.02	4.05
410.38	1.04	4.24
410.39	1.05	4.43
410.40	1.07	4.62
410.41	1.09	4.82
410.42	1.10	5.02
410.43	1.12	5.22
410.44	1.13	5.43
410.45	1.15	5.64
410.46	1.16	5.85
410.47	1.18	6.07
410.48	1.20	6.29
410.49	1.21	6.51
410.50	1.23	6.74
410.51	1.24	6.97
410.52	1.25	7.20
410.53	1.27	7.44
410.54	1.28	7.68
410.55	1.30	7.92
410.56	1.31	8.17
410.57	1.33	8.42
410.58	1.34	8.67
410.59	1.35	8.93
410.60	1.37	9.19
410.61	1.38	9.45
410.62	1.39	9.72
410.63	1.41	9.98
410.64	1.42	10.26
410.65	1.43	10.53
410.66	1.45	10.81
410.67	1.46	11.09
410.68	1.47	11.38
410.69	1.49	11.66
410.70	1.50	11.95
410.71	1.51	12.25
410.72	1.52	12.55
410.73	1.54	12.85
410.74	1.55	13.15
410.75	1.56	13.46
410.76	1.57	13.77
410.77	1.58	14.08
410.78	1.60	14.39
410.79	1.61	14.71
410.80	1.62	15.03
410.81	1.63	15.36
410.82	1.64	15.69
410.83	1.66	16.02
410.84	1.67	16.35
410.85	1.68	16.69
410.86	1.69	17.03
410.87	1.70	17.37
410.88	1.71	17.72
410.89	1.72	18.07
410.90	1.73	18.42
410.91	1.75	18.78
410.92	1.76	19.14
410.93	1.77	19.50
410.94	1.78	19.86
410.95	1.79	20.23
410.96	1.80	20.60
410.97	1.81	20.97
410.98	1.82	21.35
410.99	1.83	21.73
411.00	**1.84**	**22.11**

Stage-Area-Storage for Reach R-2: R-2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
410.00	0.0	0
410.01	0.1	222
410.02	0.2	445
410.03	0.3	669
410.04	0.4	893
410.05	0.5	1,119
410.06	0.6	1,346
410.07	0.7	1,573
410.08	0.8	1,801
410.09	0.9	2,030
410.10	1.0	2,260
410.11	1.1	2,491
410.12	1.2	2,723
410.13	1.3	2,956
410.14	1.4	3,189
410.15	1.5	3,424
410.16	1.7	3,659
410.17	1.8	3,895
410.18	1.9	4,132
410.19	2.0	4,370
410.20	2.1	4,609
410.21	2.2	4,849
410.22	2.3	5,090
410.23	2.4	5,331
410.24	2.5	5,574
410.25	2.6	5,817
410.26	2.7	6,061
410.27	2.8	6,306
410.28	3.0	6,552
410.29	3.1	6,799
410.30	3.2	7,047
410.31	3.3	7,296
410.32	3.4	7,545
410.33	3.5	7,795
410.34	3.6	8,047
410.35	3.7	8,299
410.36	3.9	8,552
410.37	4.0	8,806
410.38	4.1	9,061
410.39	4.2	9,317
410.40	4.3	9,573
410.41	4.4	9,831
410.42	4.6	10,089
410.43	4.7	10,348
410.44	4.8	10,608
410.45	4.9	10,869
410.46	5.0	11,131
410.47	5.1	11,394
410.48	5.3	11,658
410.49	5.4	11,923
410.50	5.5	12,188
410.51	5.6	12,454
410.52	5.7	12,722
410.53	5.9	12,990
410.54	6.0	13,259
410.55	6.1	13,529
410.56	6.2	13,799
410.57	6.3	14,071
410.58	6.5	14,344
410.59	6.6	14,617
410.60	6.7	14,892
410.61	6.8	15,167
410.62	7.0	15,443
410.63	7.1	15,720
410.64	7.2	15,998
410.65	7.3	16,277
410.66	7.5	16,556
410.67	7.6	16,837
410.68	7.7	17,118
410.69	7.9	17,400
410.70	8.0	17,684
410.71	8.1	17,968
410.72	8.2	18,253
410.73	8.4	18,539
410.74	8.5	18,825
410.75	8.6	19,113
410.76	8.8	19,402
410.77	8.9	19,691
410.78	9.0	19,981
410.79	9.1	20,272
410.80	9.3	20,564
410.81	9.4	20,857
410.82	9.5	21,151
410.83	9.7	21,446
410.84	9.8	21,742
410.85	9.9	22,038
410.86	10.1	22,336
410.87	10.2	22,634
410.88	10.3	22,933
410.89	10.5	23,233
410.90	10.6	23,534
410.91	10.8	23,836
410.92	10.9	24,138
410.93	11.0	24,442
410.94	11.2	24,747
410.95	11.3	25,052
410.96	11.4	25,358
410.97	11.6	25,665
410.98	11.7	25,973
410.99	11.9	26,282
411.00	**12.0**	**26,592**

Summary for Pond Pond 1b: Pond 1b

Inflow Area = 17.870 ac, 24.90% Impervious, Inflow Depth > 3.47" for 25-yr event
Inflow = 77.39 cfs @ 12.08 hrs, Volume= 5.163 af
Outflow = 21.58 cfs @ 12.39 hrs, Volume= 5.027 af, Atten= 72%, Lag= 18.2 min
Primary = 21.58 cfs @ 12.39 hrs, Volume= 5.027 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 444.84' @ 12.39 hrs Surf.Area= 36,202 sf Storage= 78,237 cf

Plug-Flow detention time= 55.9 min calculated for 5.027 af (97% of inflow)
Center-of-Mass det. time= 40.8 min (875.0 - 834.3)

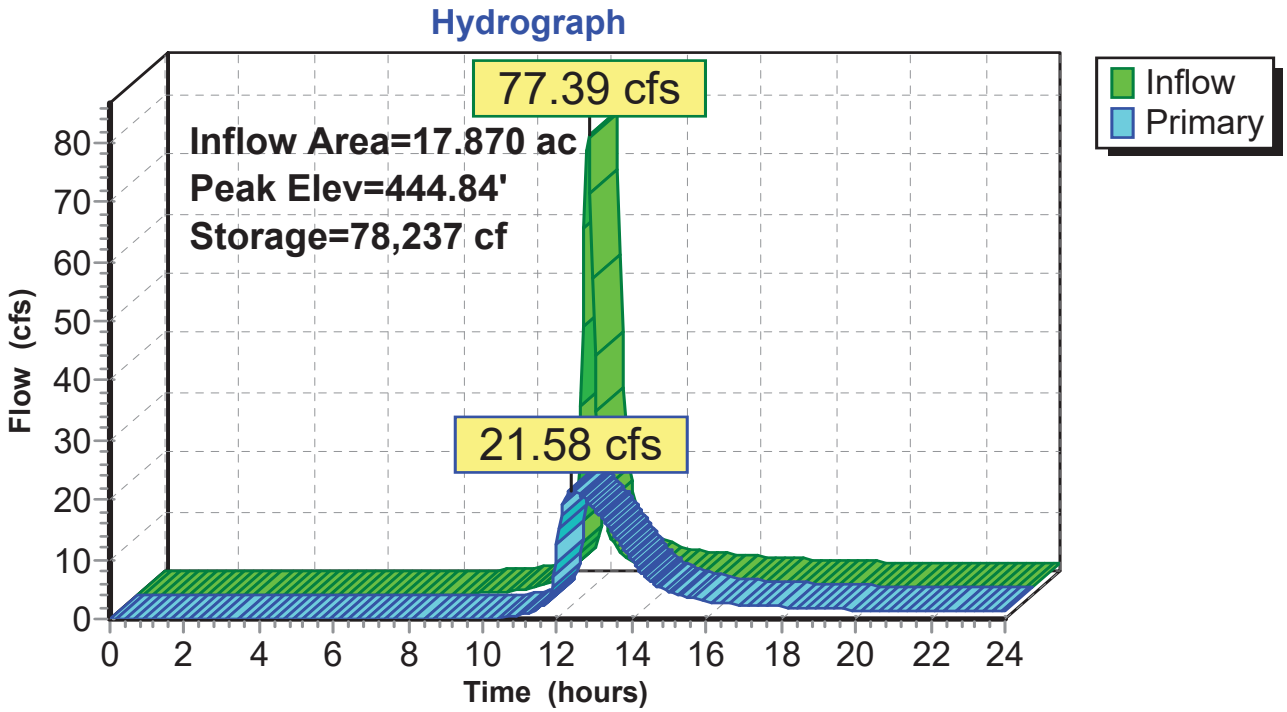
Volume	Invert	Avail.Storage	Storage Description
#1	441.50'	141,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
441.50	1,192	0	0
442.00	10,772	2,991	2,991
444.00	34,794	45,566	48,557
446.00	38,163	72,957	121,514
446.50	40,718	19,720	141,234

Device	Routing	Invert	Outlet Devices
#1	Primary	441.80'	**24.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	441.60'	**25.6 deg x 2.0' long x 4.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.64 (C= 3.30)
#3	Device 1	445.23'	**52.0" x 64.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	446.40'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=21.58 cfs @ 12.39 hrs HW=444.83' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 21.58 cfs @ 6.87 fps)
  ├**2=Sharp-Crested Vee/Trap Weir** (Passes 21.58 cfs of 49.62 cfs potential flow)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond Pond 1b: Pond 1b



Stage-Discharge for Pond Pond 1b: Pond 1b

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
441.50	0.00	443.62	13.79	445.74	25.94	447.86	34.03
441.54	0.00	443.66	14.14	445.78	26.11	447.90	34.16
441.58	0.00	443.70	14.47	445.82	26.29	447.94	34.29
441.62	0.00	443.74	14.77	445.86	26.46	447.98	34.43
441.66	0.00	443.78	15.03	445.90	26.63	448.02	34.56
441.70	0.00	443.82	15.28	445.94	26.80	448.06	34.69
441.74	0.00	443.86	15.57	445.98	26.97	448.10	34.82
441.78	0.00	443.90	15.87	446.02	27.14	448.14	34.96
441.82	0.00	443.94	16.15	446.06	27.31	448.18	35.09
441.86	0.02	443.98	16.43	446.10	27.48	448.22	35.22
441.90	0.06	444.02	16.71	446.14	27.65	448.26	35.35
441.94	0.12	444.06	16.98	446.18	27.81	448.30	35.48
441.98	0.20	444.10	17.25	446.22	27.97	448.34	35.60
442.02	0.30	444.14	17.51	446.26	28.14	448.38	35.73
442.06	0.42	444.18	17.77	446.30	28.30	448.42	35.86
442.10	0.55	444.22	18.03	446.34	28.46	448.46	35.99
442.14	0.70	444.26	18.28	446.38	28.62	448.50	36.11
442.18	0.87	444.30	18.53	446.42	28.78	448.54	36.24
442.22	1.06	444.34	18.77	446.46	28.94	448.58	36.37
442.26	1.26	444.38	19.01	446.50	29.10	448.62	36.49
442.30	1.48	444.42	19.25	446.54	29.25	448.66	36.62
442.34	1.71	444.46	19.49	446.58	29.41	448.70	36.74
442.38	1.96	444.50	19.72	446.62	29.56	448.74	36.87
442.42	2.22	444.54	19.95	446.66	29.72	448.78	36.99
442.46	2.50	444.58	20.18	446.70	29.87	448.82	37.11
442.50	2.79	444.62	20.41	446.74	30.03	448.86	37.24
442.54	3.09	444.66	20.63	446.78	30.18	448.90	37.36
442.58	3.41	444.70	20.85	446.82	30.33	448.94	37.48
442.62	3.74	444.74	21.07	446.86	30.48	448.98	37.60
442.66	4.08	444.78	21.29	446.90	30.63	449.02	37.73
442.70	4.43	444.82	21.50	446.94	30.78	449.06	37.85
442.74	4.79	444.86	21.71	446.98	30.93	449.10	37.97
442.78	5.16	444.90	21.92	447.02	31.07	449.14	38.09
442.82	5.54	444.94	22.13	447.06	31.22	449.18	38.21
442.86	5.93	444.98	22.33	447.10	31.37	449.22	38.33
442.90	6.32	445.02	22.54	447.14	31.51	449.26	38.45
442.94	6.72	445.06	22.74	447.18	31.66	449.30	38.57
442.98	7.13	445.10	22.94	447.22	31.80	449.34	38.68
443.02	7.55	445.14	23.14	447.26	31.95	449.38	38.80
443.06	7.97	445.18	23.34	447.30	32.09	449.42	38.92
443.10	8.39	445.22	23.53	447.34	32.23	449.46	39.04
443.14	8.82	445.26	23.73	447.38	32.37	449.50	**39.15**
443.18	9.25	445.30	23.92	447.42	32.51		
443.22	9.68	445.34	24.11	447.46	32.65		
443.26	10.11	445.38	24.30	447.50	32.79		
443.30	10.54	445.42	24.48	447.54	32.93		
443.34	10.97	445.46	24.67	447.58	33.07		
443.38	11.39	445.50	24.86	447.62	33.21		
443.42	11.81	445.54	25.04	447.66	33.35		
443.46	12.23	445.58	25.22	447.70	33.48		
443.50	12.63	445.62	25.40	447.74	33.62		
443.54	13.03	445.66	25.58	447.78	33.76		
443.58	13.42	445.70	25.76	447.82	33.89		

Stage-Area-Storage for Pond Pond 1b: Pond 1b

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
441.50	1,192	0
441.60	3,108	215
441.70	5,024	622
441.80	6,940	1,220
441.90	8,856	2,010
442.00	10,772	2,991
442.10	11,973	4,128
442.20	13,174	5,386
442.30	14,375	6,763
442.40	15,576	8,261
442.50	16,778	9,878
442.60	17,979	11,616
442.70	19,180	13,474
442.80	20,381	15,452
442.90	21,582	17,550
443.00	22,783	19,769
443.10	23,984	22,107
443.20	25,185	24,565
443.30	26,386	27,144
443.40	27,587	29,843
443.50	28,789	32,661
443.60	29,990	35,600
443.70	31,191	38,659
443.80	32,392	41,838
443.90	33,593	45,138
444.00	34,794	48,557
444.10	34,962	52,045
444.20	35,131	55,549
444.30	35,299	59,071
444.40	35,468	62,609
444.50	35,636	66,165
444.60	35,805	69,737
444.70	35,973	73,326
444.80	36,142	76,931
444.90	36,310	80,554
445.00	36,479	84,193
445.10	36,647	87,850
445.20	36,815	91,523
445.30	36,984	95,213
445.40	37,152	98,919
445.50	37,321	102,643
445.60	37,489	106,384
445.70	37,658	110,141
445.80	37,826	113,915
445.90	37,995	117,706
446.00	38,163	121,514
446.10	38,674	125,356
446.20	39,185	129,249
446.30	39,696	133,193
446.40	40,207	137,188
446.50	**40,718**	**141,234**
446.60	40,718	141,234
446.70	40,718	141,234
446.80	40,718	141,234
446.90	40,718	141,234
447.00	40,718	141,234
447.10	40,718	141,234
447.20	40,718	141,234
447.30	40,718	141,234
447.40	40,718	141,234
447.50	40,718	141,234
447.60	40,718	141,234
447.70	40,718	141,234
447.80	40,718	141,234
447.90	40,718	141,234
448.00	40,718	141,234
448.10	40,718	141,234
448.20	40,718	141,234
448.30	40,718	141,234
448.40	40,718	141,234
448.50	40,718	141,234
448.60	40,718	141,234
448.70	40,718	141,234
448.80	40,718	141,234
448.90	40,718	141,234
449.00	40,718	141,234
449.10	40,718	141,234
449.20	40,718	141,234
449.30	40,718	141,234
449.40	40,718	141,234
449.50	40,718	141,234

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1a: E-1a Runoff Area=39.760 ac 0.00% Impervious Runoff Depth>4.54"
Flow Length=900' Tc=30.6 min CN=74 Runoff=155.58 cfs 15.058 af

Subcatchment E-1b: E-1b Runoff Area=17.870 ac 24.90% Impervious Runoff Depth>4.23"
Flow Length=1,362' Tc=16.0 min CN=71 Runoff=94.29 cfs 6.294 af

Subcatchment E-2: E-2 Runoff Area=14.560 ac 0.00% Impervious Runoff Depth>4.03"
Flow Length=1,712' Tc=90.6 min CN=70 Runoff=23.47 cfs 4.889 af

Subcatchment E-3: E-3 Runoff Area=3.770 ac 0.00% Impervious Runoff Depth>3.67"
Flow Length=541' Tc=21.3 min CN=66 Runoff=14.79 cfs 1.153 af

Subcatchment E-4: E-4 Runoff Area=5.570 ac 0.00% Impervious Runoff Depth>4.32"
Flow Length=703' Tc=31.2 min CN=72 Runoff=20.49 cfs 2.005 af

Reach R-1: R-1 Avg. Flow Depth=0.76' Max Vel=4.90 fps Inflow=24.33 cfs 6.146 af
n=0.040 L=883.0' S=0.0351 '/' Capacity=39.83 cfs Outflow=24.30 cfs 6.125 af

Reach R-2: R-2 Avg. Flow Depth=4.05' Max Vel=2.54 fps Inflow=177.44 cfs 21.184 af
n=0.040 L=2,216.0' S=0.0032 '/' Capacity=22.11 cfs Outflow=138.63 cfs 20.879 af

Pond Pond 1b: Pond 1b Peak Elev=445.39' Storage=98,435 cf Inflow=94.29 cfs 6.294 af
Outflow=24.33 cfs 6.146 af

Summary for Subcatchment E-1a: E-1a

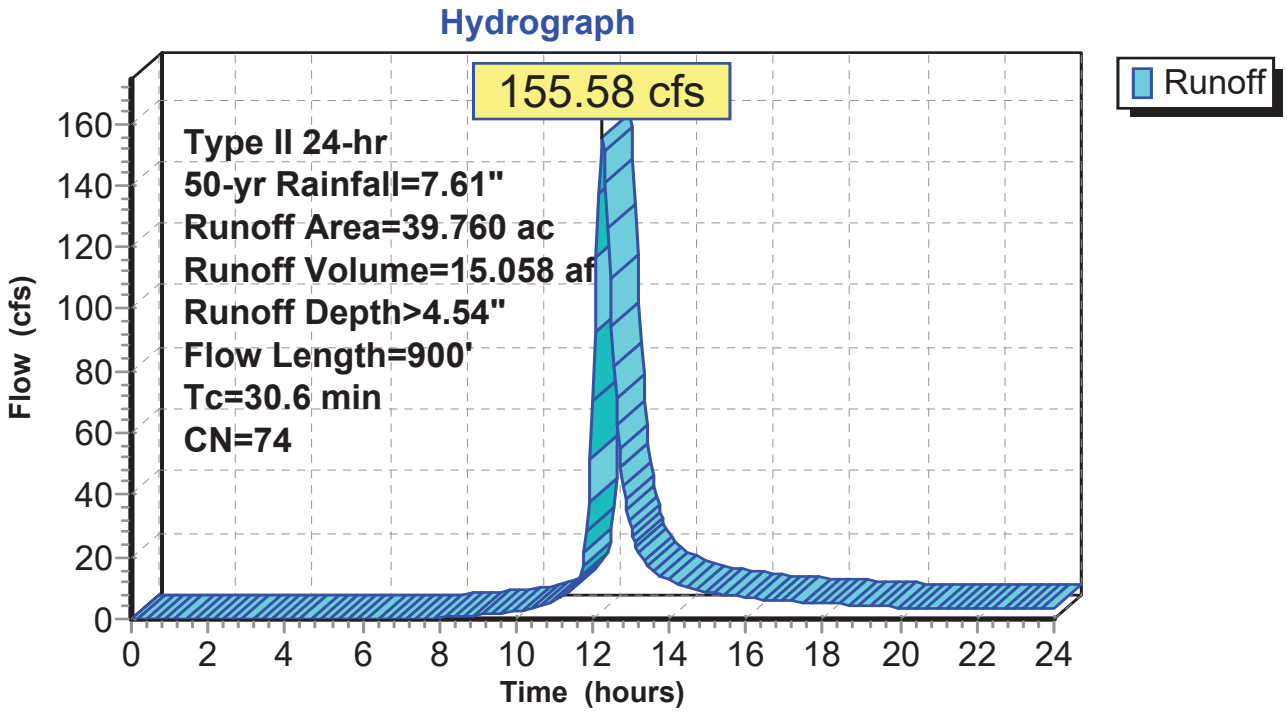
Runoff = 155.58 cfs @ 12.25 hrs, Volume= 15.058 af, Depth> 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=7.61"

Area (ac)	CN	Description
18.250	83	Woods, Poor, HSG D
21.510	66	Woods, Poor, HSG B
39.760	74	Weighted Average
39.760		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.1	150	0.1870	0.12		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
5.2	505	0.1030	1.60		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
5.3	245	0.0240	0.77		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
30.6	900	Total			

Subcatchment E-1a: E-1a



Summary for Subcatchment E-1b: E-1b

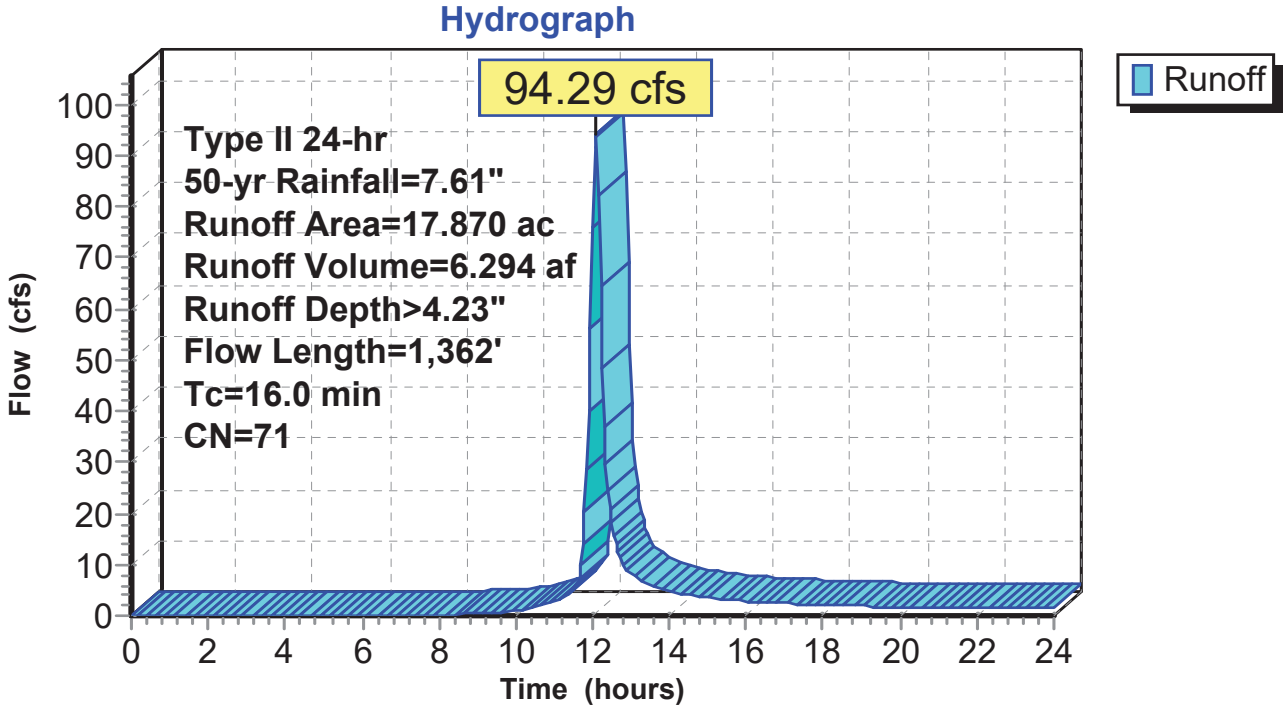
Runoff = 94.29 cfs @ 12.08 hrs, Volume= 6.294 af, Depth> 4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=7.61"

Area (ac)	CN	Description
4.450	98	Paved parking, HSG B
3.860	61	>75% Grass cover, Good, HSG B
6.200	66	Woods, Poor, HSG B
3.360	55	Woods, Good, HSG B
17.870	71	Weighted Average
13.420		75.10% Pervious Area
4.450		24.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2	100	0.3600	0.15		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
0.8	232	0.0950	4.96		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
1.0	130	0.0120	2.22		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
3.0	900		5.00		**Direct Entry, DE**
16.0	1,362	Total			

Subcatchment E-1b: E-1b



Summary for Subcatchment E-2: E-2

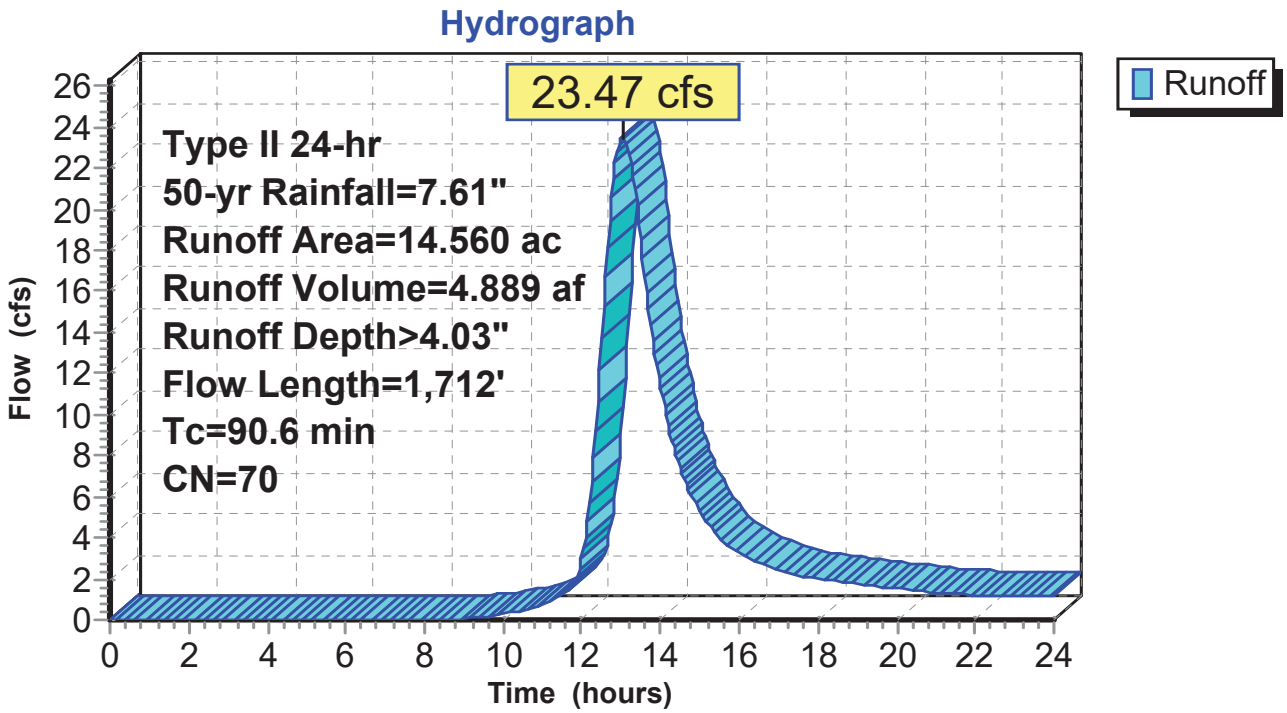
Runoff = 23.47 cfs @ 13.02 hrs, Volume= 4.889 af, Depth> 4.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=7.61"

Area (ac)	CN	Description
3.540	83	Woods, Poor, HSG D
11.020	66	Woods, Poor, HSG B
14.560	70	Weighted Average
14.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	150	0.2330	0.14		**Sheet Flow, BC** Woods: Dense underbrush n= 0.800 P2= 3.56"
2.5	211	0.0810	1.42		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
65.2	1,157	0.0035	0.30		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
4.5	194	0.0210	0.72		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
90.6	1,712	Total			

Subcatchment E-2: E-2



Summary for Subcatchment E-3: E-3

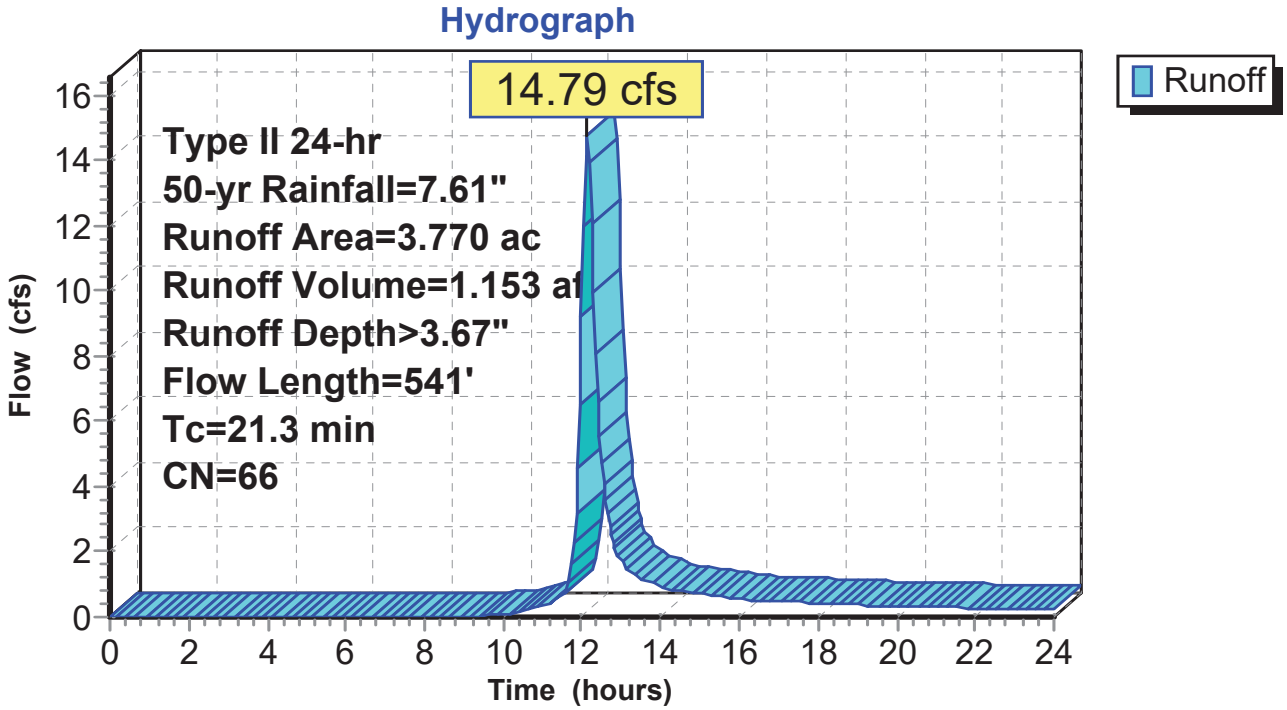
Runoff = 14.79 cfs @ 12.15 hrs, Volume= 1.153 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=7.61"

Area (ac)	CN	Description
3.770	66	Woods, Poor, HSG B
3.770		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	150	0.2600	0.14		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
3.7	391	0.1230	1.75		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
21.3	541	Total			

Subcatchment E-3: E-3



Summary for Subcatchment E-4: E-4

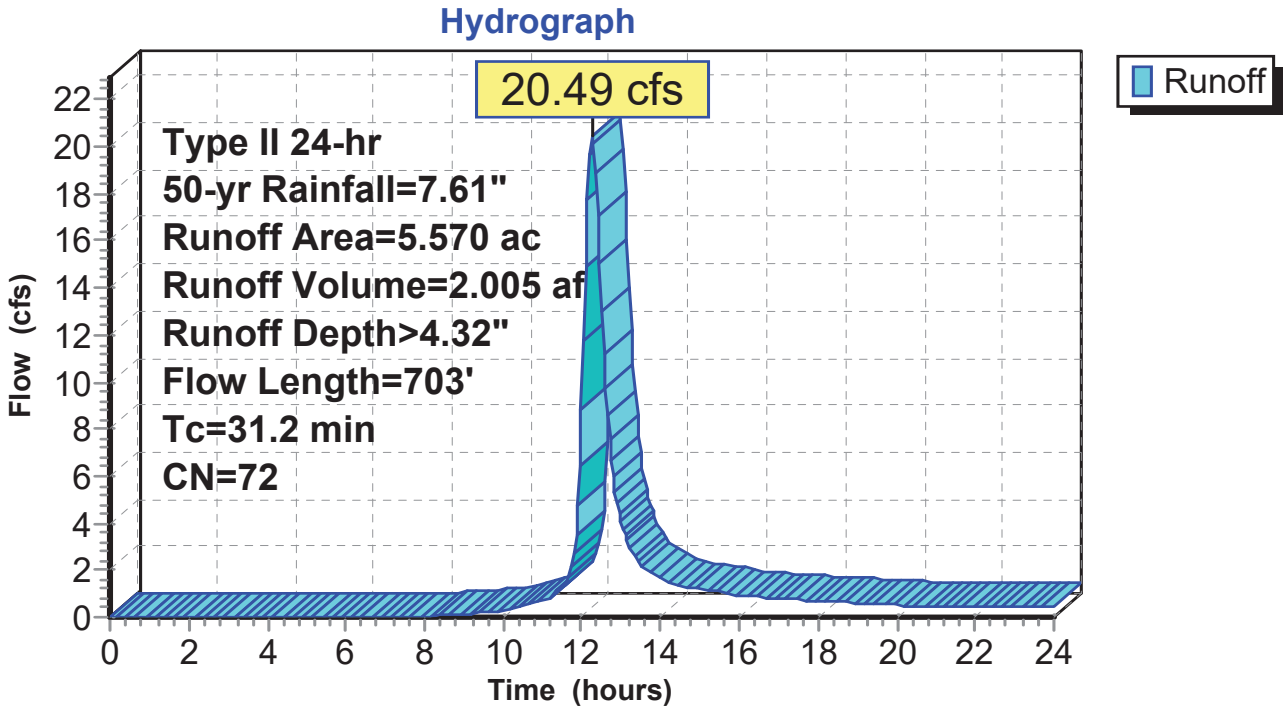
Runoff = 20.49 cfs @ 12.26 hrs, Volume= 2.005 af, Depth> 4.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=7.61"

Area (ac)	CN	Description
3.670	66	Woods, Poor, HSG B
1.900	83	Woods, Poor, HSG D
5.570	72	Weighted Average
5.570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.5	150	0.0930	0.09		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
4.7	553	0.1570	1.98		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
31.2	703	Total			

Subcatchment E-4: E-4



Summary for Reach R-1: R-1

Inflow Area = 17.870 ac, 24.90% Impervious, Inflow Depth > 4.13" for 50-yr event
Inflow = 24.33 cfs @ 12.41 hrs, Volume= 6.146 af
Outflow = 24.30 cfs @ 12.50 hrs, Volume= 6.125 af, Atten= 0%, Lag= 5.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.90 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 2.45 fps, Avg. Travel Time= 6.0 min

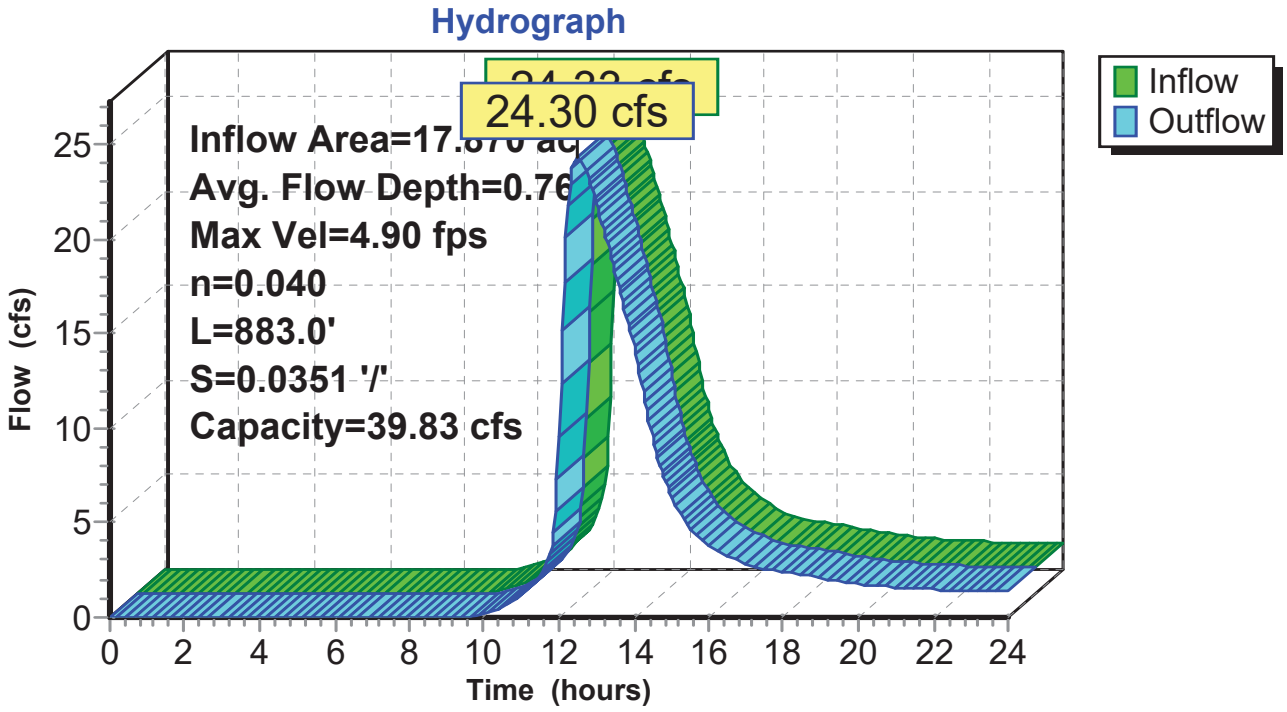
Peak Storage= 4,380 cf @ 12.45 hrs
Average Depth at Peak Storage= 0.76'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 39.83 cfs

5.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 883.0' Slope= 0.0351 '/'
Inlet Invert= 441.00', Outlet Invert= 410.00'



‡

Reach R-1: R-1



Stage-Discharge for Reach R-1: R-1

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
441.00	0.00	0.00
441.01	0.32	0.02
441.02	0.51	0.05
441.03	0.67	0.10
441.04	0.80	0.16
441.05	0.93	0.24
441.06	1.05	0.32
441.07	1.16	0.42
441.08	1.26	0.52
441.09	1.36	0.63
441.10	1.45	0.76
441.11	1.54	0.89
441.12	1.63	1.03
441.13	1.72	1.17
441.14	1.80	1.33
441.15	1.88	1.49
441.16	1.96	1.66
441.17	2.03	1.84
441.18	2.10	2.03
441.19	2.18	2.22
441.20	2.25	2.43
441.21	2.31	2.63
441.22	2.38	2.85
441.23	2.45	3.07
441.24	2.51	3.30
441.25	2.57	3.54
441.26	2.63	3.78
441.27	2.70	4.03
441.28	2.76	4.29
441.29	2.81	4.55
441.30	2.87	4.82
441.31	2.93	5.10
441.32	2.98	5.38
441.33	3.04	5.68
441.34	3.09	5.97
441.35	3.15	6.28
441.36	3.20	6.59
441.37	3.25	6.90
441.38	3.30	7.23
441.39	3.35	7.56
441.40	3.40	7.89
441.41	3.45	8.24
441.42	3.50	8.59
441.43	3.55	8.94
441.44	3.60	9.30
441.45	3.64	9.67
441.46	3.69	10.05
441.47	3.74	10.43
441.48	3.78	10.82
441.49	3.83	11.21
441.50	3.87	11.61
441.51	3.91	12.02
441.52	3.96	12.43
441.53	4.00	12.85
441.54	4.04	13.28
441.55	4.09	13.71
441.56	4.13	14.15
441.57	4.17	14.59
441.58	4.21	15.04
441.59	4.25	15.50
441.60	4.29	15.97
441.61	4.33	16.44
441.62	4.37	16.91
441.63	4.41	17.40
441.64	4.45	17.89
441.65	4.49	18.38
441.66	4.53	18.89
441.67	4.57	19.39
441.68	4.60	19.91
441.69	4.64	20.43
441.70	4.68	20.96
441.71	4.72	21.49
441.72	4.75	22.03
441.73	4.79	22.58
441.74	4.82	23.14
441.75	4.86	23.70
441.76	4.90	24.26
441.77	4.93	24.84
441.78	4.97	25.42
441.79	5.00	26.00
441.80	5.04	26.60
441.81	5.07	27.19
441.82	5.11	27.80
441.83	5.14	28.41
441.84	5.17	29.03
441.85	5.21	29.66
441.86	5.24	30.29
441.87	5.27	30.93
441.88	5.31	31.57
441.89	5.34	32.22
441.90	5.37	32.88
441.91	5.41	33.55
441.92	5.44	34.22
441.93	5.47	34.90
441.94	5.50	35.58
441.95	5.53	36.27
441.96	5.57	36.97
441.97	5.60	37.67
441.98	5.63	38.39
441.99	5.66	39.10
442.00	**5.69**	**39.83**

Stage-Area-Storage for Reach R-1: R-1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
441.00	0.0	0
441.01	0.1	44
441.02	0.1	89
441.03	0.2	134
441.04	0.2	179
441.05	0.3	225
441.06	0.3	271
441.07	0.4	318
441.08	0.4	365
441.09	0.5	412
441.10	0.5	459
441.11	0.6	507
441.12	0.6	555
441.13	0.7	604
441.14	0.7	653
441.15	0.8	702
441.16	0.9	752
441.17	0.9	802
441.18	1.0	852
441.19	1.0	903
441.20	1.1	954
441.21	1.1	1,005
441.22	1.2	1,057
441.23	1.3	1,109
441.24	1.3	1,161
441.25	1.4	1,214
441.26	1.4	1,267
441.27	1.5	1,321
441.28	1.6	1,375
441.29	1.6	1,429
441.30	1.7	1,483
441.31	1.7	1,538
441.32	1.8	1,594
441.33	1.9	1,649
441.34	1.9	1,705
441.35	2.0	1,762
441.36	2.1	1,818
441.37	2.1	1,875
441.38	2.2	1,933
441.39	2.3	1,990
441.40	2.3	2,049
441.41	2.4	2,107
441.42	2.5	2,166
441.43	2.5	2,225
441.44	2.6	2,284
441.45	2.7	2,344
441.46	2.7	2,405
441.47	2.8	2,465
441.48	2.9	2,526
441.49	2.9	2,587
441.50	3.0	2,649
441.51	3.1	2,711
441.52	3.1	2,773
441.53	3.2	2,836
441.54	3.3	2,899
441.55	3.4	2,962
441.56	3.4	3,026
441.57	3.5	3,090
441.58	3.6	3,155
441.59	3.6	3,220
441.60	3.7	3,285
441.61	3.8	3,350
441.62	3.9	3,416
441.63	3.9	3,482
441.64	4.0	3,549
441.65	4.1	3,616
441.66	4.2	3,683
441.67	4.2	3,751
441.68	4.3	3,819
441.69	4.4	3,887
441.70	4.5	3,956
441.71	4.6	4,025
441.72	4.6	4,094
441.73	4.7	4,164
441.74	4.8	4,234
441.75	4.9	4,305
441.76	5.0	4,375
441.77	5.0	4,447
441.78	5.1	4,518
441.79	5.2	4,590
441.80	5.3	4,662
441.81	5.4	4,735
441.82	5.4	4,808
441.83	5.5	4,881
441.84	5.6	4,955
441.85	5.7	5,029
441.86	5.8	5,103
441.87	5.9	5,178
441.88	5.9	5,253
441.89	6.0	5,328
441.90	6.1	5,404
441.91	6.2	5,480
441.92	6.3	5,557
441.93	6.4	5,633
441.94	6.5	5,711
441.95	6.6	5,788
441.96	6.6	5,866
441.97	6.7	5,944
441.98	6.8	6,023
441.99	6.9	6,102
442.00	**7.0**	**6,181**

Summary for Reach R-2: R-2

Inflow Area = 57.630 ac, 7.72% Impervious, Inflow Depth > 4.41" for 50-yr event
Inflow = 177.44 cfs @ 12.26 hrs, Volume= 21.184 af
Outflow = 138.63 cfs @ 12.68 hrs, Volume= 20.879 af, Atten= 22%, Lag= 25.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.54 fps, Min. Travel Time= 14.5 min
Avg. Velocity = 1.23 fps, Avg. Travel Time= 29.9 min

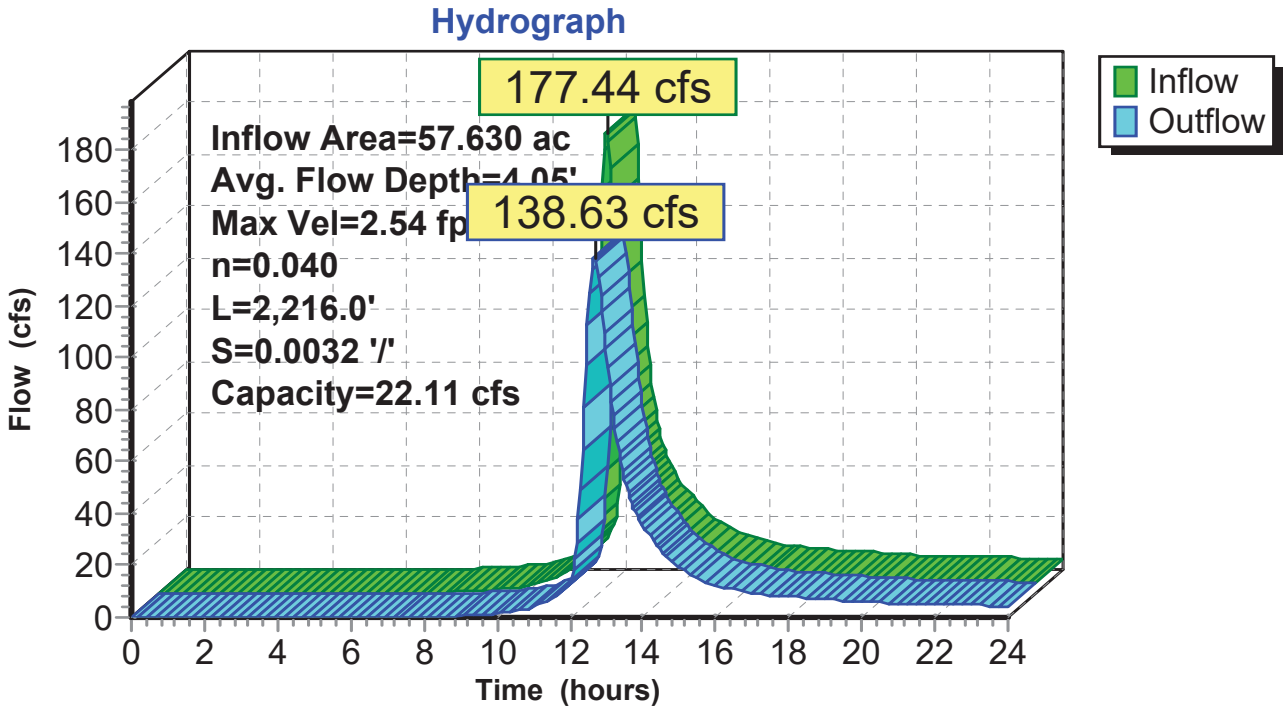
Peak Storage= 121,048 cf @ 12.44 hrs
Average Depth at Peak Storage= 4.05'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 22.11 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 2,216.0' Slope= 0.0032 '/'
Inlet Invert= 410.00', Outlet Invert= 403.00'



‡

Reach R-2: R-2



Stage-Discharge for Reach R-2: R-2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
410.00	0.00	0.00
410.01	0.10	0.01
410.02	0.15	0.03
410.03	0.20	0.06
410.04	0.24	0.10
410.05	0.28	0.14
410.06	0.32	0.19
410.07	0.35	0.25
410.08	0.38	0.31
410.09	0.41	0.38
410.10	0.44	0.45
410.11	0.47	0.53
410.12	0.50	0.61
410.13	0.52	0.70
410.14	0.55	0.79
410.15	0.58	0.89
410.16	0.60	0.99
410.17	0.62	1.10
410.18	0.65	1.21
410.19	0.67	1.32
410.20	0.69	1.44
410.21	0.71	1.56
410.22	0.74	1.69
410.23	0.76	1.82
410.24	0.78	1.96
410.25	0.80	2.09
410.26	0.82	2.24
410.27	0.84	2.38
410.28	0.86	2.53
410.29	0.88	2.69
410.30	0.89	2.84
410.31	0.91	3.01
410.32	0.93	3.17
410.33	0.95	3.34
410.34	0.97	3.51
410.35	0.98	3.69
410.36	1.00	3.87
410.37	1.02	4.05
410.38	1.04	4.24
410.39	1.05	4.43
410.40	1.07	4.62
410.41	1.09	4.82
410.42	1.10	5.02
410.43	1.12	5.22
410.44	1.13	5.43
410.45	1.15	5.64
410.46	1.16	5.85
410.47	1.18	6.07
410.48	1.20	6.29
410.49	1.21	6.51
410.50	1.23	6.74
410.51	1.24	6.97
410.52	1.25	7.20
410.53	1.27	7.44
410.54	1.28	7.68
410.55	1.30	7.92
410.56	1.31	8.17
410.57	1.33	8.42
410.58	1.34	8.67
410.59	1.35	8.93
410.60	1.37	9.19
410.61	1.38	9.45
410.62	1.39	9.72
410.63	1.41	9.98
410.64	1.42	10.26
410.65	1.43	10.53
410.66	1.45	10.81
410.67	1.46	11.09
410.68	1.47	11.38
410.69	1.49	11.66
410.70	1.50	11.95
410.71	1.51	12.25
410.72	1.52	12.55
410.73	1.54	12.85
410.74	1.55	13.15
410.75	1.56	13.46
410.76	1.57	13.77
410.77	1.58	14.08
410.78	1.60	14.39
410.79	1.61	14.71
410.80	1.62	15.03
410.81	1.63	15.36
410.82	1.64	15.69
410.83	1.66	16.02
410.84	1.67	16.35
410.85	1.68	16.69
410.86	1.69	17.03
410.87	1.70	17.37
410.88	1.71	17.72
410.89	1.72	18.07
410.90	1.73	18.42
410.91	1.75	18.78
410.92	1.76	19.14
410.93	1.77	19.50
410.94	1.78	19.86
410.95	1.79	20.23
410.96	1.80	20.60
410.97	1.81	20.97
410.98	1.82	21.35
410.99	1.83	21.73
411.00	**1.84**	**22.11**

Stage-Area-Storage for Reach R-2: R-2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
410.00	0.0	0
410.01	0.1	222
410.02	0.2	445
410.03	0.3	669
410.04	0.4	893
410.05	0.5	1,119
410.06	0.6	1,346
410.07	0.7	1,573
410.08	0.8	1,801
410.09	0.9	2,030
410.10	1.0	2,260
410.11	1.1	2,491
410.12	1.2	2,723
410.13	1.3	2,956
410.14	1.4	3,189
410.15	1.5	3,424
410.16	1.7	3,659
410.17	1.8	3,895
410.18	1.9	4,132
410.19	2.0	4,370
410.20	2.1	4,609
410.21	2.2	4,849
410.22	2.3	5,090
410.23	2.4	5,331
410.24	2.5	5,574
410.25	2.6	5,817
410.26	2.7	6,061
410.27	2.8	6,306
410.28	3.0	6,552
410.29	3.1	6,799
410.30	3.2	7,047
410.31	3.3	7,296
410.32	3.4	7,545
410.33	3.5	7,795
410.34	3.6	8,047
410.35	3.7	8,299
410.36	3.9	8,552
410.37	4.0	8,806
410.38	4.1	9,061
410.39	4.2	9,317
410.40	4.3	9,573
410.41	4.4	9,831
410.42	4.6	10,089
410.43	4.7	10,348
410.44	4.8	10,608
410.45	4.9	10,869
410.46	5.0	11,131
410.47	5.1	11,394
410.48	5.3	11,658
410.49	5.4	11,923
410.50	5.5	12,188
410.51	5.6	12,454
410.52	5.7	12,722
410.53	5.9	12,990
410.54	6.0	13,259
410.55	6.1	13,529
410.56	6.2	13,799
410.57	6.3	14,071
410.58	6.5	14,344
410.59	6.6	14,617
410.60	6.7	14,892
410.61	6.8	15,167
410.62	7.0	15,443
410.63	7.1	15,720
410.64	7.2	15,998
410.65	7.3	16,277
410.66	7.5	16,556
410.67	7.6	16,837
410.68	7.7	17,118
410.69	7.9	17,400
410.70	8.0	17,684
410.71	8.1	17,968
410.72	8.2	18,253
410.73	8.4	18,539
410.74	8.5	18,825
410.75	8.6	19,113
410.76	8.8	19,402
410.77	8.9	19,691
410.78	9.0	19,981
410.79	9.1	20,272
410.80	9.3	20,564
410.81	9.4	20,857
410.82	9.5	21,151
410.83	9.7	21,446
410.84	9.8	21,742
410.85	9.9	22,038
410.86	10.1	22,336
410.87	10.2	22,634
410.88	10.3	22,933
410.89	10.5	23,233
410.90	10.6	23,534
410.91	10.8	23,836
410.92	10.9	24,138
410.93	11.0	24,442
410.94	11.2	24,747
410.95	11.3	25,052
410.96	11.4	25,358
410.97	11.6	25,665
410.98	11.7	25,973
410.99	11.9	26,282
411.00	**12.0**	**26,592**

Summary for Pond Pond 1b: Pond 1b

Inflow Area = 17.870 ac, 24.90% Impervious, Inflow Depth > 4.23" for 50-yr event
Inflow = 94.29 cfs @ 12.08 hrs, Volume= 6.294 af
Outflow = 24.33 cfs @ 12.41 hrs, Volume= 6.146 af, Atten= 74%, Lag= 19.4 min
Primary = 24.33 cfs @ 12.41 hrs, Volume= 6.146 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 445.39' @ 12.41 hrs Surf.Area= 37,130 sf Storage= 98,435 cf

Plug-Flow detention time= 57.4 min calculated for 6.133 af (97% of inflow)
Center-of-Mass det. time= 43.8 min (872.5 - 828.7)

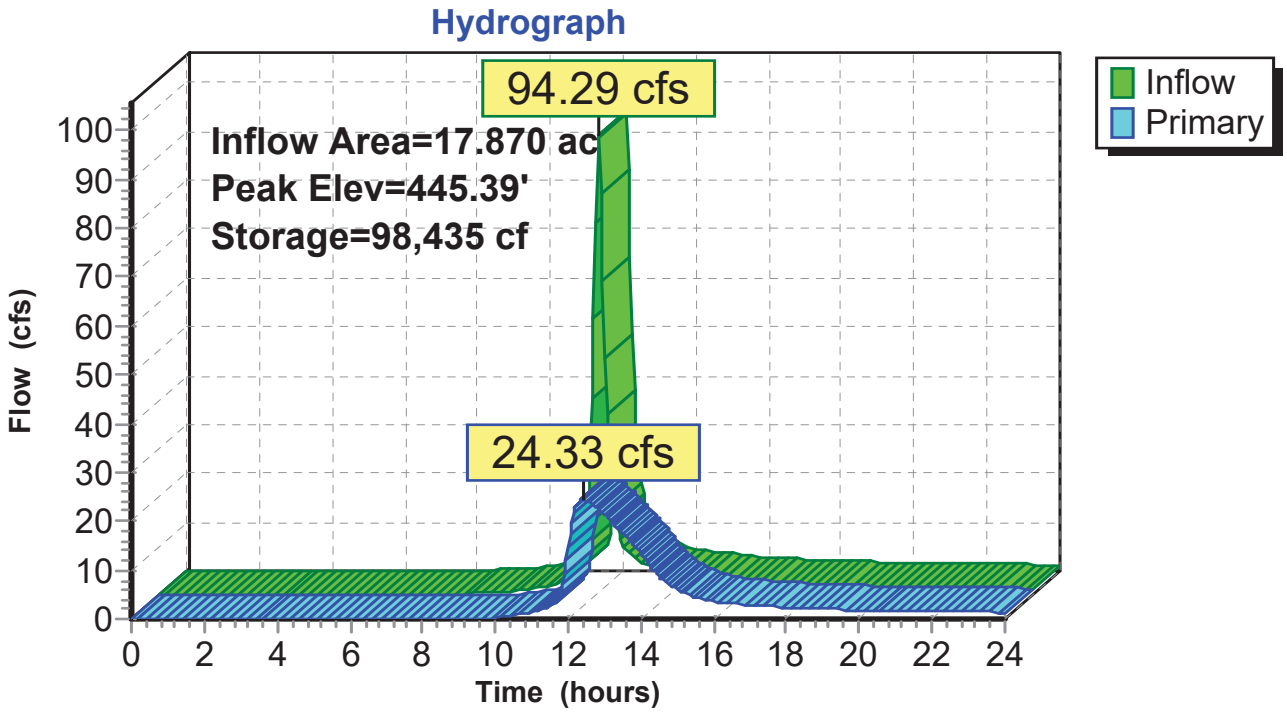
Volume	Invert	Avail.Storage	Storage Description
#1	441.50'	141,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
441.50	1,192	0	0
442.00	10,772	2,991	2,991
444.00	34,794	45,566	48,557
446.00	38,163	72,957	121,514
446.50	40,718	19,720	141,234

Device	Routing	Invert	Outlet Devices
#1	Primary	441.80'	**24.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	441.60'	**25.6 deg x 2.0' long x 4.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.64 (C= 3.30)
#3	Device 1	445.23'	**52.0" x 64.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	446.40'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=24.32 cfs @ 12.41 hrs HW=445.39' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 24.32 cfs @ 7.74 fps)
  ├**2=Sharp-Crested Vee/Trap Weir** (Passes < 65.29 cfs potential flow)
  ├**3=Orifice/Grate** (Passes < 3.89 cfs potential flow)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond Pond 1b: Pond 1b



Stage-Discharge for Pond Pond 1b: Pond 1b

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
441.50	0.00	443.62	13.79	445.74	25.94	447.86	34.03
441.54	0.00	443.66	14.14	445.78	26.11	447.90	34.16
441.58	0.00	443.70	14.47	445.82	26.29	447.94	34.29
441.62	0.00	443.74	14.77	445.86	26.46	447.98	34.43
441.66	0.00	443.78	15.03	445.90	26.63	448.02	34.56
441.70	0.00	443.82	15.28	445.94	26.80	448.06	34.69
441.74	0.00	443.86	15.57	445.98	26.97	448.10	34.82
441.78	0.00	443.90	15.87	446.02	27.14	448.14	34.96
441.82	0.00	443.94	16.15	446.06	27.31	448.18	35.09
441.86	0.02	443.98	16.43	446.10	27.48	448.22	35.22
441.90	0.06	444.02	16.71	446.14	27.65	448.26	35.35
441.94	0.12	444.06	16.98	446.18	27.81	448.30	35.48
441.98	0.20	444.10	17.25	446.22	27.97	448.34	35.60
442.02	0.30	444.14	17.51	446.26	28.14	448.38	35.73
442.06	0.42	444.18	17.77	446.30	28.30	448.42	35.86
442.10	0.55	444.22	18.03	446.34	28.46	448.46	35.99
442.14	0.70	444.26	18.28	446.38	28.62	448.50	36.11
442.18	0.87	444.30	18.53	446.42	28.78	448.54	36.24
442.22	1.06	444.34	18.77	446.46	28.94	448.58	36.37
442.26	1.26	444.38	19.01	446.50	29.10	448.62	36.49
442.30	1.48	444.42	19.25	446.54	29.25	448.66	36.62
442.34	1.71	444.46	19.49	446.58	29.41	448.70	36.74
442.38	1.96	444.50	19.72	446.62	29.56	448.74	36.87
442.42	2.22	444.54	19.95	446.66	29.72	448.78	36.99
442.46	2.50	444.58	20.18	446.70	29.87	448.82	37.11
442.50	2.79	444.62	20.41	446.74	30.03	448.86	37.24
442.54	3.09	444.66	20.63	446.78	30.18	448.90	37.36
442.58	3.41	444.70	20.85	446.82	30.33	448.94	37.48
442.62	3.74	444.74	21.07	446.86	30.48	448.98	37.60
442.66	4.08	444.78	21.29	446.90	30.63	449.02	37.73
442.70	4.43	444.82	21.50	446.94	30.78	449.06	37.85
442.74	4.79	444.86	21.71	446.98	30.93	449.10	37.97
442.78	5.16	444.90	21.92	447.02	31.07	449.14	38.09
442.82	5.54	444.94	22.13	447.06	31.22	449.18	38.21
442.86	5.93	444.98	22.33	447.10	31.37	449.22	38.33
442.90	6.32	445.02	22.54	447.14	31.51	449.26	38.45
442.94	6.72	445.06	22.74	447.18	31.66	449.30	38.57
442.98	7.13	445.10	22.94	447.22	31.80	449.34	38.68
443.02	7.55	445.14	23.14	447.26	31.95	449.38	38.80
443.06	7.97	445.18	23.34	447.30	32.09	449.42	38.92
443.10	8.39	445.22	23.53	447.34	32.23	449.46	39.04
443.14	8.82	445.26	23.73	447.38	32.37	449.50	**39.15**
443.18	9.25	445.30	23.92	447.42	32.51		
443.22	9.68	445.34	24.11	447.46	32.65		
443.26	10.11	445.38	24.30	447.50	32.79		
443.30	10.54	445.42	24.48	447.54	32.93		
443.34	10.97	445.46	24.67	447.58	33.07		
443.38	11.39	445.50	24.86	447.62	33.21		
443.42	11.81	445.54	25.04	447.66	33.35		
443.46	12.23	445.58	25.22	447.70	33.48		
443.50	12.63	445.62	25.40	447.74	33.62		
443.54	13.03	445.66	25.58	447.78	33.76		
443.58	13.42	445.70	25.76	447.82	33.89		

Stage-Area-Storage for Pond Pond 1b: Pond 1b

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
441.50	1,192	0
441.60	3,108	215
441.70	5,024	622
441.80	6,940	1,220
441.90	8,856	2,010
442.00	10,772	2,991
442.10	11,973	4,128
442.20	13,174	5,386
442.30	14,375	6,763
442.40	15,576	8,261
442.50	16,778	9,878
442.60	17,979	11,616
442.70	19,180	13,474
442.80	20,381	15,452
442.90	21,582	17,550
443.00	22,783	19,769
443.10	23,984	22,107
443.20	25,185	24,565
443.30	26,386	27,144
443.40	27,587	29,843
443.50	28,789	32,661
443.60	29,990	35,600
443.70	31,191	38,659
443.80	32,392	41,838
443.90	33,593	45,138
444.00	34,794	48,557
444.10	34,962	52,045
444.20	35,131	55,549
444.30	35,299	59,071
444.40	35,468	62,609
444.50	35,636	66,165
444.60	35,805	69,737
444.70	35,973	73,326
444.80	36,142	76,931
444.90	36,310	80,554
445.00	36,479	84,193
445.10	36,647	87,850
445.20	36,815	91,523
445.30	36,984	95,213
445.40	37,152	98,919
445.50	37,321	102,643
445.60	37,489	106,384
445.70	37,658	110,141
445.80	37,826	113,915
445.90	37,995	117,706
446.00	38,163	121,514
446.10	38,674	125,356
446.20	39,185	129,249
446.30	39,696	133,193
446.40	40,207	137,188
446.50	**40,718**	**141,234**
446.60	40,718	141,234
446.70	40,718	141,234
446.80	40,718	141,234
446.90	40,718	141,234
447.00	40,718	141,234
447.10	40,718	141,234
447.20	40,718	141,234
447.30	40,718	141,234
447.40	40,718	141,234
447.50	40,718	141,234
447.60	40,718	141,234
447.70	40,718	141,234
447.80	40,718	141,234
447.90	40,718	141,234
448.00	40,718	141,234
448.10	40,718	141,234
448.20	40,718	141,234
448.30	40,718	141,234
448.40	40,718	141,234
448.50	40,718	141,234
448.60	40,718	141,234
448.70	40,718	141,234
448.80	40,718	141,234
448.90	40,718	141,234
449.00	40,718	141,234
449.10	40,718	141,234
449.20	40,718	141,234
449.30	40,718	141,234
449.40	40,718	141,234
449.50	40,718	141,234

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1a: E-1a Runoff Area=39.760 ac 0.00% Impervious Runoff Depth>5.41"
Flow Length=900' Tc=30.6 min CN=74 Runoff=184.92 cfs 17.921 af

Subcatchment E-1b: E-1b Runoff Area=17.870 ac 24.90% Impervious Runoff Depth>5.07"
Flow Length=1,362' Tc=16.0 min CN=71 Runoff=112.82 cfs 7.547 af

Subcatchment E-2: E-2 Runoff Area=14.560 ac 0.00% Impervious Runoff Depth>4.85"
Flow Length=1,712' Tc=90.6 min CN=70 Runoff=28.34 cfs 5.884 af

Subcatchment E-3: E-3 Runoff Area=3.770 ac 0.00% Impervious Runoff Depth>4.46"
Flow Length=541' Tc=21.3 min CN=66 Runoff=18.05 cfs 1.402 af

Subcatchment E-4: E-4 Runoff Area=5.570 ac 0.00% Impervious Runoff Depth>5.17"
Flow Length=703' Tc=31.2 min CN=72 Runoff=24.52 cfs 2.399 af

Reach R-1: R-1 Avg. Flow Depth=0.81' Max Vel=5.06 fps Inflow=27.04 cfs 7.388 af
n=0.040 L=883.0' S=0.0351 '/' Capacity=39.83 cfs Outflow=27.02 cfs 7.365 af

Reach R-2: R-2 Avg. Flow Depth=4.71' Max Vel=2.57 fps Inflow=209.22 cfs 25.286 af
n=0.040 L=2,216.0' S=0.0032 '/' Capacity=22.11 cfs Outflow=163.77 cfs 24.949 af

Pond Pond 1b: Pond 1b Peak Elev=446.00' Storage=121,348 cf Inflow=112.82 cfs 7.547 af
Outflow=27.04 cfs 7.388 af

Summary for Subcatchment E-1a: E-1a

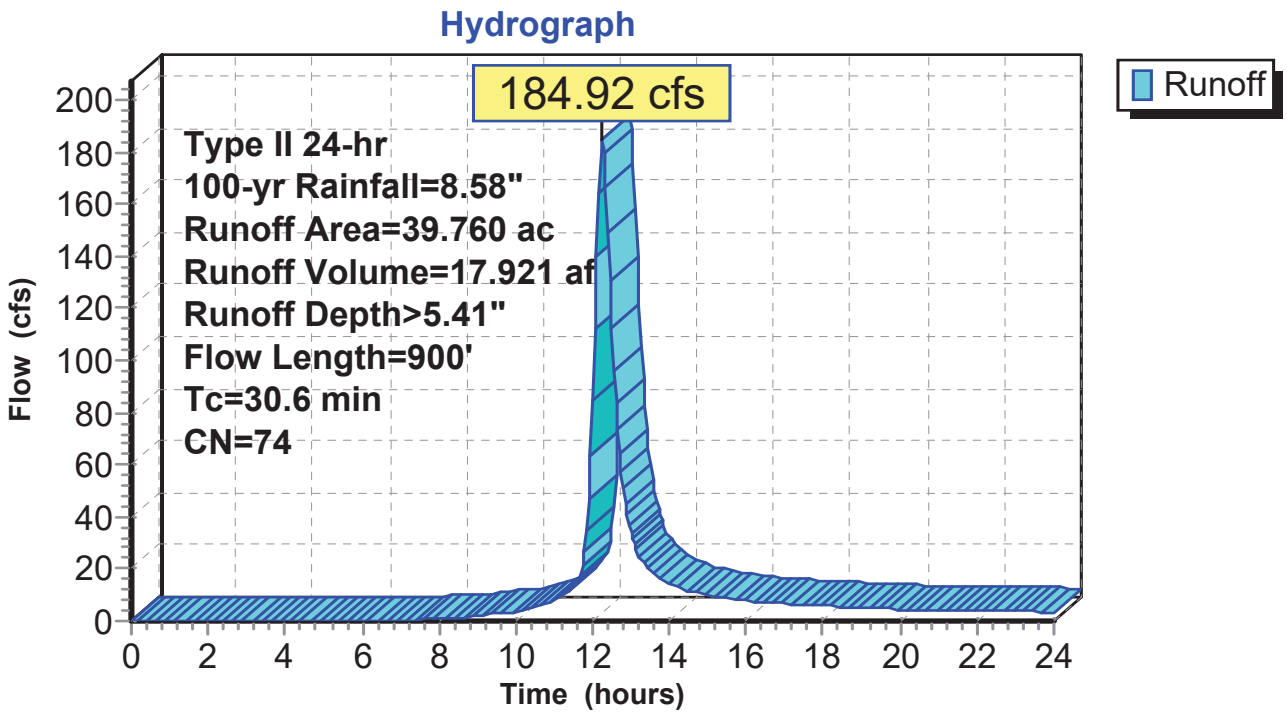
Runoff = 184.92 cfs @ 12.25 hrs, Volume= 17.921 af, Depth> 5.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.58"

Area (ac)	CN	Description
18.250	83	Woods, Poor, HSG D
21.510	66	Woods, Poor, HSG B
39.760	74	Weighted Average
39.760		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.1	150	0.1870	0.12		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
5.2	505	0.1030	1.60		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
5.3	245	0.0240	0.77		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
30.6	900	Total			

Subcatchment E-1a: E-1a



Summary for Subcatchment E-1b: E-1b

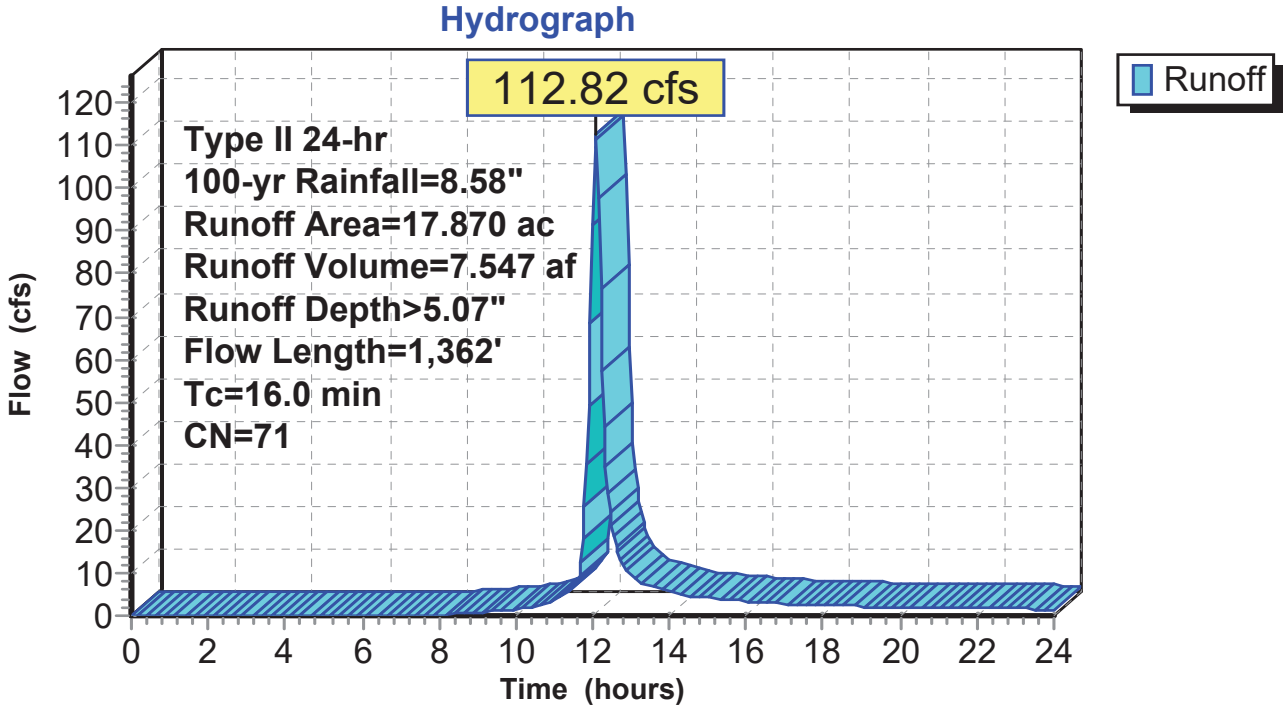
Runoff = 112.82 cfs @ 12.08 hrs, Volume= 7.547 af, Depth> 5.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.58"

Area (ac)	CN	Description
4.450	98	Paved parking, HSG B
3.860	61	>75% Grass cover, Good, HSG B
6.200	66	Woods, Poor, HSG B
3.360	55	Woods, Good, HSG B
17.870	71	Weighted Average
13.420		75.10% Pervious Area
4.450		24.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.2	100	0.3600	0.15		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
0.8	232	0.0950	4.96		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
1.0	130	0.0120	2.22		**Shallow Concentrated Flow, CD** Paved Kv= 20.3 fps
3.0	900		5.00		**Direct Entry, DE**
16.0	1,362	Total			

Subcatchment E-1b: E-1b



Summary for Subcatchment E-2: E-2

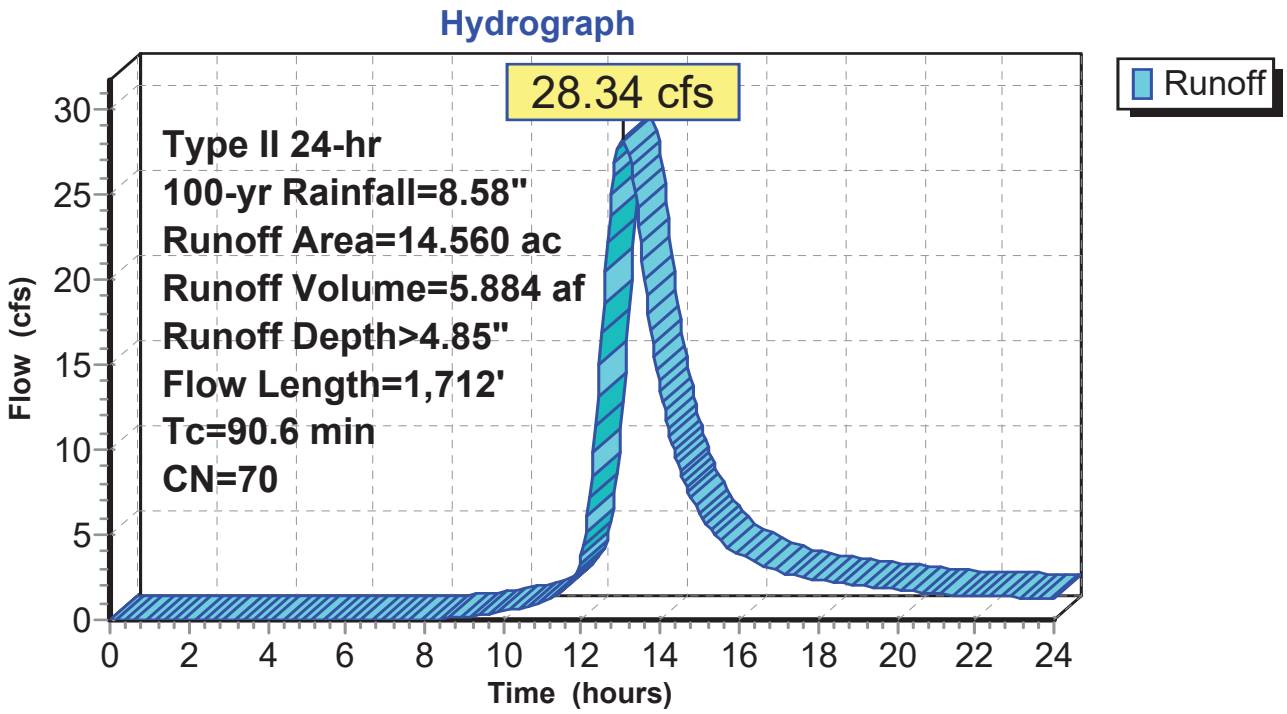
Runoff = 28.34 cfs @ 13.01 hrs, Volume= 5.884 af, Depth> 4.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.58"

Area (ac)	CN	Description
3.540	83	Woods, Poor, HSG D
11.020	66	Woods, Poor, HSG B
14.560	70	Weighted Average
14.560		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.4	150	0.2330	0.14		**Sheet Flow, BC** Woods: Dense underbrush n= 0.800 P2= 3.56"
2.5	211	0.0810	1.42		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
65.2	1,157	0.0035	0.30		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
4.5	194	0.0210	0.72		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
90.6	1,712	Total			

Subcatchment E-2: E-2



Summary for Subcatchment E-3: E-3

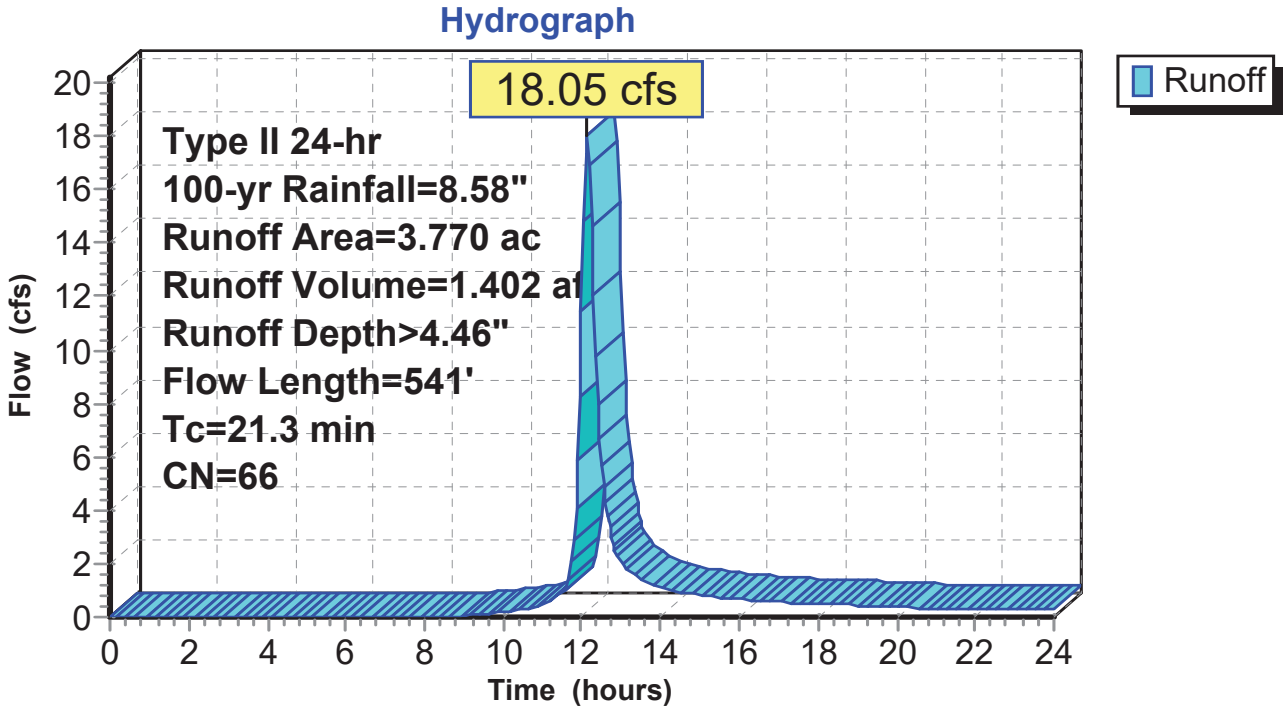
Runoff = 18.05 cfs @ 12.14 hrs, Volume= 1.402 af, Depth> 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.58"

Area (ac)	CN	Description
3.770	66	Woods, Poor, HSG B
3.770		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	150	0.2600	0.14		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
3.7	391	0.1230	1.75		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
21.3	541	Total			

Subcatchment E-3: E-3



Summary for Subcatchment E-4: E-4

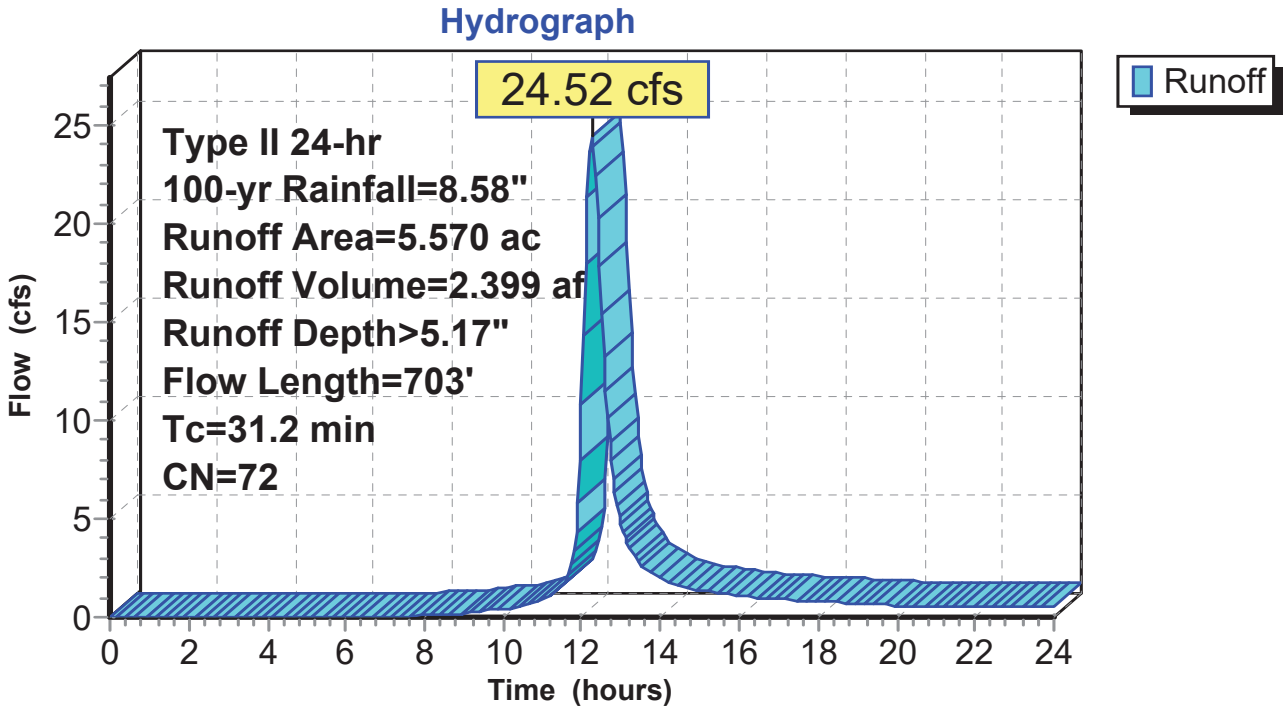
Runoff = 24.52 cfs @ 12.26 hrs, Volume= 2.399 af, Depth> 5.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.58"

Area (ac)	CN	Description
3.670	66	Woods, Poor, HSG B
1.900	83	Woods, Poor, HSG D
5.570	72	Weighted Average
5.570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.5	150	0.0930	0.09		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
4.7	553	0.1570	1.98		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
31.2	703	Total			

Subcatchment E-4: E-4



Summary for Reach R-1: R-1

Inflow Area = 17.870 ac, 24.90% Impervious, Inflow Depth > 4.96" for 100-yr event
Inflow = 27.04 cfs @ 12.42 hrs, Volume= 7.388 af
Outflow = 27.02 cfs @ 12.51 hrs, Volume= 7.365 af, Atten= 0%, Lag= 5.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.06 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 2.57 fps, Avg. Travel Time= 5.7 min

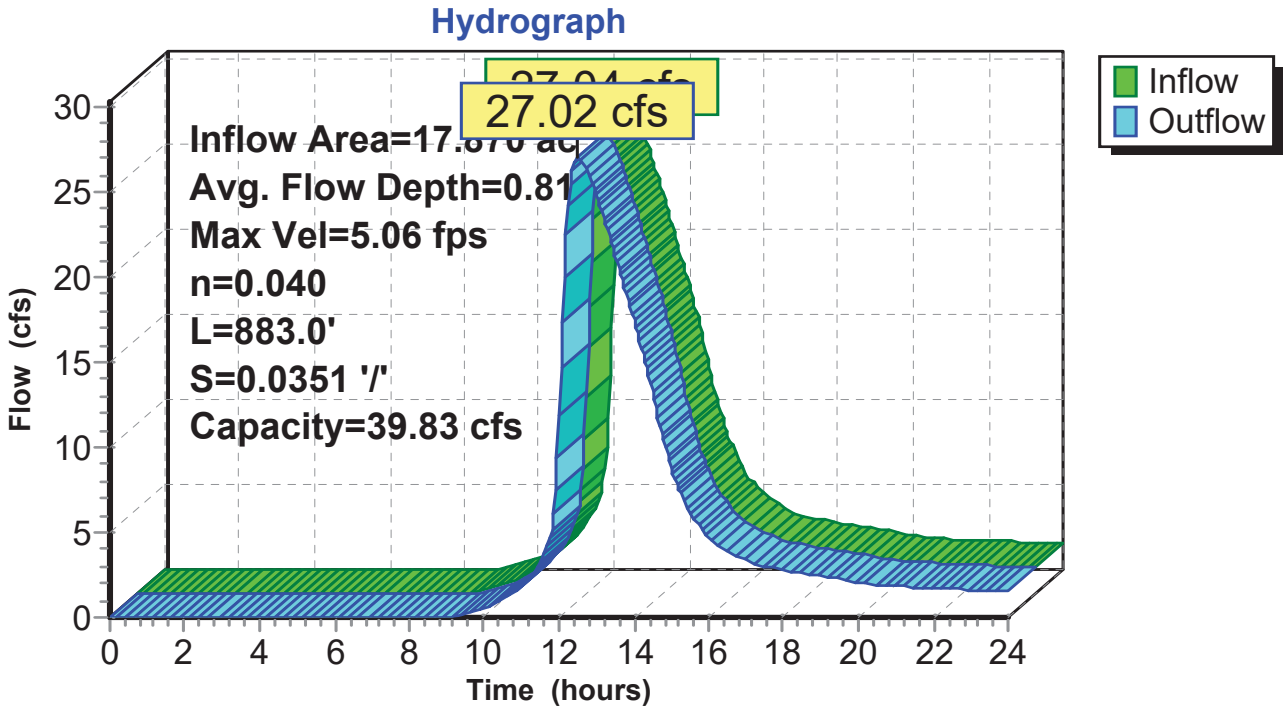
Peak Storage= 4,713 cf @ 12.46 hrs
Average Depth at Peak Storage= 0.81'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 39.83 cfs

5.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 883.0' Slope= 0.0351 '/'
Inlet Invert= 441.00', Outlet Invert= 410.00'



‡

Reach R-1: R-1



Stage-Discharge for Reach R-1: R-1

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
441.00	0.00	0.00
441.01	0.32	0.02
441.02	0.51	0.05
441.03	0.67	0.10
441.04	0.80	0.16
441.05	0.93	0.24
441.06	1.05	0.32
441.07	1.16	0.42
441.08	1.26	0.52
441.09	1.36	0.63
441.10	1.45	0.76
441.11	1.54	0.89
441.12	1.63	1.03
441.13	1.72	1.17
441.14	1.80	1.33
441.15	1.88	1.49
441.16	1.96	1.66
441.17	2.03	1.84
441.18	2.10	2.03
441.19	2.18	2.22
441.20	2.25	2.43
441.21	2.31	2.63
441.22	2.38	2.85
441.23	2.45	3.07
441.24	2.51	3.30
441.25	2.57	3.54
441.26	2.63	3.78
441.27	2.70	4.03
441.28	2.76	4.29
441.29	2.81	4.55
441.30	2.87	4.82
441.31	2.93	5.10
441.32	2.98	5.38
441.33	3.04	5.68
441.34	3.09	5.97
441.35	3.15	6.28
441.36	3.20	6.59
441.37	3.25	6.90
441.38	3.30	7.23
441.39	3.35	7.56
441.40	3.40	7.89
441.41	3.45	8.24
441.42	3.50	8.59
441.43	3.55	8.94
441.44	3.60	9.30
441.45	3.64	9.67
441.46	3.69	10.05
441.47	3.74	10.43
441.48	3.78	10.82
441.49	3.83	11.21
441.50	3.87	11.61
441.51	3.91	12.02
441.52	3.96	12.43
441.53	4.00	12.85
441.54	4.04	13.28
441.55	4.09	13.71
441.56	4.13	14.15
441.57	4.17	14.59
441.58	4.21	15.04
441.59	4.25	15.50
441.60	4.29	15.97
441.61	4.33	16.44
441.62	4.37	16.91
441.63	4.41	17.40
441.64	4.45	17.89
441.65	4.49	18.38
441.66	4.53	18.89
441.67	4.57	19.39
441.68	4.60	19.91
441.69	4.64	20.43
441.70	4.68	20.96
441.71	4.72	21.49
441.72	4.75	22.03
441.73	4.79	22.58
441.74	4.82	23.14
441.75	4.86	23.70
441.76	4.90	24.26
441.77	4.93	24.84
441.78	4.97	25.42
441.79	5.00	26.00
441.80	5.04	26.60
441.81	5.07	27.19
441.82	5.11	27.80
441.83	5.14	28.41
441.84	5.17	29.03
441.85	5.21	29.66
441.86	5.24	30.29
441.87	5.27	30.93
441.88	5.31	31.57
441.89	5.34	32.22
441.90	5.37	32.88
441.91	5.41	33.55
441.92	5.44	34.22
441.93	5.47	34.90
441.94	5.50	35.58
441.95	5.53	36.27
441.96	5.57	36.97
441.97	5.60	37.67
441.98	5.63	38.39
441.99	5.66	39.10
442.00	**5.69**	**39.83**

Stage-Area-Storage for Reach R-1: R-1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
441.00	0.0	0
441.01	0.1	44
441.02	0.1	89
441.03	0.2	134
441.04	0.2	179
441.05	0.3	225
441.06	0.3	271
441.07	0.4	318
441.08	0.4	365
441.09	0.5	412
441.10	0.5	459
441.11	0.6	507
441.12	0.6	555
441.13	0.7	604
441.14	0.7	653
441.15	0.8	702
441.16	0.9	752
441.17	0.9	802
441.18	1.0	852
441.19	1.0	903
441.20	1.1	954
441.21	1.1	1,005
441.22	1.2	1,057
441.23	1.3	1,109
441.24	1.3	1,161
441.25	1.4	1,214
441.26	1.4	1,267
441.27	1.5	1,321
441.28	1.6	1,375
441.29	1.6	1,429
441.30	1.7	1,483
441.31	1.7	1,538
441.32	1.8	1,594
441.33	1.9	1,649
441.34	1.9	1,705
441.35	2.0	1,762
441.36	2.1	1,818
441.37	2.1	1,875
441.38	2.2	1,933
441.39	2.3	1,990
441.40	2.3	2,049
441.41	2.4	2,107
441.42	2.5	2,166
441.43	2.5	2,225
441.44	2.6	2,284
441.45	2.7	2,344
441.46	2.7	2,405
441.47	2.8	2,465
441.48	2.9	2,526
441.49	2.9	2,587
441.50	3.0	2,649
441.51	3.1	2,711
441.52	3.1	2,773
441.53	3.2	2,836
441.54	3.3	2,899
441.55	3.4	2,962
441.56	3.4	3,026
441.57	3.5	3,090
441.58	3.6	3,155
441.59	3.6	3,220
441.60	3.7	3,285
441.61	3.8	3,350
441.62	3.9	3,416
441.63	3.9	3,482
441.64	4.0	3,549
441.65	4.1	3,616
441.66	4.2	3,683
441.67	4.2	3,751
441.68	4.3	3,819
441.69	4.4	3,887
441.70	4.5	3,956
441.71	4.6	4,025
441.72	4.6	4,094
441.73	4.7	4,164
441.74	4.8	4,234
441.75	4.9	4,305
441.76	5.0	4,375
441.77	5.0	4,447
441.78	5.1	4,518
441.79	5.2	4,590
441.80	5.3	4,662
441.81	5.4	4,735
441.82	5.4	4,808
441.83	5.5	4,881
441.84	5.6	4,955
441.85	5.7	5,029
441.86	5.8	5,103
441.87	5.9	5,178
441.88	5.9	5,253
441.89	6.0	5,328
441.90	6.1	5,404
441.91	6.2	5,480
441.92	6.3	5,557
441.93	6.4	5,633
441.94	6.5	5,711
441.95	6.6	5,788
441.96	6.6	5,866
441.97	6.7	5,944
441.98	6.8	6,023
441.99	6.9	6,102
442.00	**7.0**	**6,181**

Summary for Reach R-2: R-2

Inflow Area = 57.630 ac, 7.72% Impervious, Inflow Depth > 5.27" for 100-yr event
Inflow = 209.22 cfs @ 12.25 hrs, Volume= 25.286 af
Outflow = 163.77 cfs @ 12.67 hrs, Volume= 24.949 af, Atten= 22%, Lag= 25.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.57 fps, Min. Travel Time= 14.4 min
Avg. Velocity = 1.29 fps, Avg. Travel Time= 28.7 min

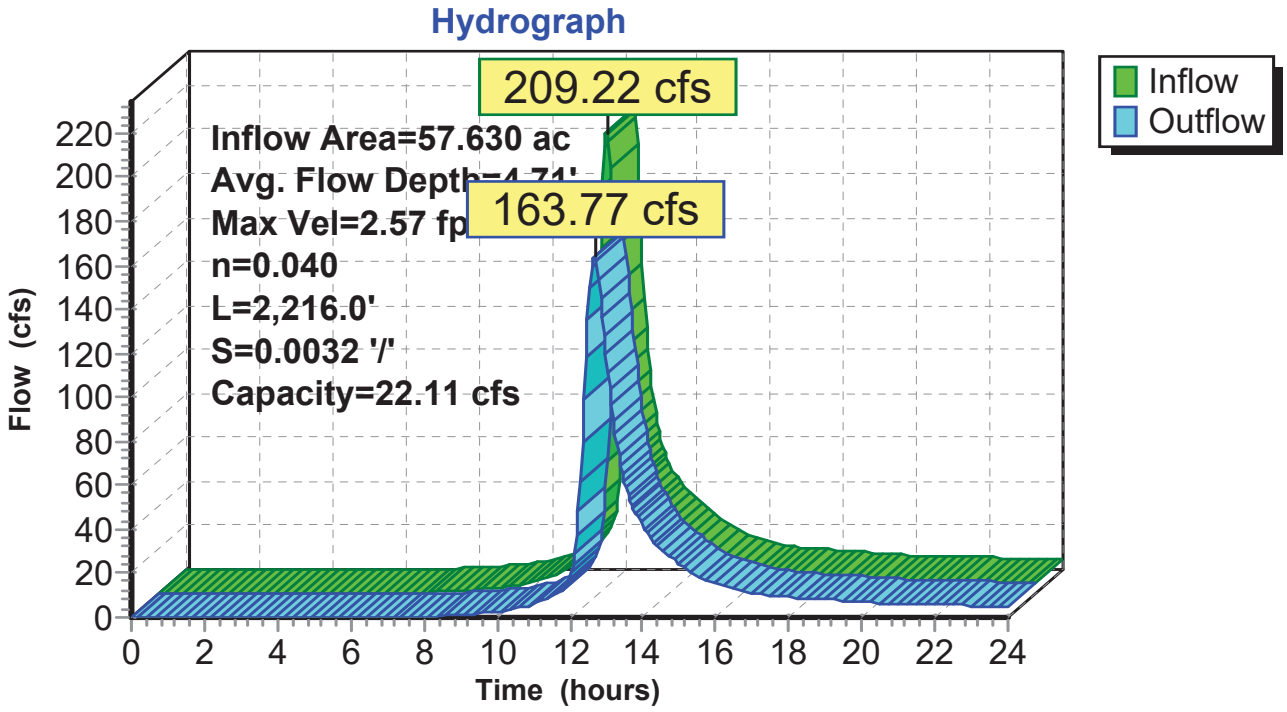
Peak Storage= 141,391 cf @ 12.43 hrs
Average Depth at Peak Storage= 4.71'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 22.11 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 2,216.0' Slope= 0.0032 '/'
Inlet Invert= 410.00', Outlet Invert= 403.00'



‡

Reach R-2: R-2



Stage-Discharge for Reach R-2: R-2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
410.00	0.00	0.00
410.01	0.10	0.01
410.02	0.15	0.03
410.03	0.20	0.06
410.04	0.24	0.10
410.05	0.28	0.14
410.06	0.32	0.19
410.07	0.35	0.25
410.08	0.38	0.31
410.09	0.41	0.38
410.10	0.44	0.45
410.11	0.47	0.53
410.12	0.50	0.61
410.13	0.52	0.70
410.14	0.55	0.79
410.15	0.58	0.89
410.16	0.60	0.99
410.17	0.62	1.10
410.18	0.65	1.21
410.19	0.67	1.32
410.20	0.69	1.44
410.21	0.71	1.56
410.22	0.74	1.69
410.23	0.76	1.82
410.24	0.78	1.96
410.25	0.80	2.09
410.26	0.82	2.24
410.27	0.84	2.38
410.28	0.86	2.53
410.29	0.88	2.69
410.30	0.89	2.84
410.31	0.91	3.01
410.32	0.93	3.17
410.33	0.95	3.34
410.34	0.97	3.51
410.35	0.98	3.69
410.36	1.00	3.87
410.37	1.02	4.05
410.38	1.04	4.24
410.39	1.05	4.43
410.40	1.07	4.62
410.41	1.09	4.82
410.42	1.10	5.02
410.43	1.12	5.22
410.44	1.13	5.43
410.45	1.15	5.64
410.46	1.16	5.85
410.47	1.18	6.07
410.48	1.20	6.29
410.49	1.21	6.51
410.50	1.23	6.74
410.51	1.24	6.97
410.52	1.25	7.20
410.53	1.27	7.44
410.54	1.28	7.68
410.55	1.30	7.92
410.56	1.31	8.17
410.57	1.33	8.42
410.58	1.34	8.67
410.59	1.35	8.93
410.60	1.37	9.19
410.61	1.38	9.45
410.62	1.39	9.72
410.63	1.41	9.98
410.64	1.42	10.26
410.65	1.43	10.53
410.66	1.45	10.81
410.67	1.46	11.09
410.68	1.47	11.38
410.69	1.49	11.66
410.70	1.50	11.95
410.71	1.51	12.25
410.72	1.52	12.55
410.73	1.54	12.85
410.74	1.55	13.15
410.75	1.56	13.46
410.76	1.57	13.77
410.77	1.58	14.08
410.78	1.60	14.39
410.79	1.61	14.71
410.80	1.62	15.03
410.81	1.63	15.36
410.82	1.64	15.69
410.83	1.66	16.02
410.84	1.67	16.35
410.85	1.68	16.69
410.86	1.69	17.03
410.87	1.70	17.37
410.88	1.71	17.72
410.89	1.72	18.07
410.90	1.73	18.42
410.91	1.75	18.78
410.92	1.76	19.14
410.93	1.77	19.50
410.94	1.78	19.86
410.95	1.79	20.23
410.96	1.80	20.60
410.97	1.81	20.97
410.98	1.82	21.35
410.99	1.83	21.73
411.00	**1.84**	**22.11**

Stage-Area-Storage for Reach R-2: R-2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
410.00	0.0	0
410.01	0.1	222
410.02	0.2	445
410.03	0.3	669
410.04	0.4	893
410.05	0.5	1,119
410.06	0.6	1,346
410.07	0.7	1,573
410.08	0.8	1,801
410.09	0.9	2,030
410.10	1.0	2,260
410.11	1.1	2,491
410.12	1.2	2,723
410.13	1.3	2,956
410.14	1.4	3,189
410.15	1.5	3,424
410.16	1.7	3,659
410.17	1.8	3,895
410.18	1.9	4,132
410.19	2.0	4,370
410.20	2.1	4,609
410.21	2.2	4,849
410.22	2.3	5,090
410.23	2.4	5,331
410.24	2.5	5,574
410.25	2.6	5,817
410.26	2.7	6,061
410.27	2.8	6,306
410.28	3.0	6,552
410.29	3.1	6,799
410.30	3.2	7,047
410.31	3.3	7,296
410.32	3.4	7,545
410.33	3.5	7,795
410.34	3.6	8,047
410.35	3.7	8,299
410.36	3.9	8,552
410.37	4.0	8,806
410.38	4.1	9,061
410.39	4.2	9,317
410.40	4.3	9,573
410.41	4.4	9,831
410.42	4.6	10,089
410.43	4.7	10,348
410.44	4.8	10,608
410.45	4.9	10,869
410.46	5.0	11,131
410.47	5.1	11,394
410.48	5.3	11,658
410.49	5.4	11,923
410.50	5.5	12,188
410.51	5.6	12,454
410.52	5.7	12,722
410.53	5.9	12,990
410.54	6.0	13,259
410.55	6.1	13,529
410.56	6.2	13,799
410.57	6.3	14,071
410.58	6.5	14,344
410.59	6.6	14,617
410.60	6.7	14,892
410.61	6.8	15,167
410.62	7.0	15,443
410.63	7.1	15,720
410.64	7.2	15,998
410.65	7.3	16,277
410.66	7.5	16,556
410.67	7.6	16,837
410.68	7.7	17,118
410.69	7.9	17,400
410.70	8.0	17,684
410.71	8.1	17,968
410.72	8.2	18,253
410.73	8.4	18,539
410.74	8.5	18,825
410.75	8.6	19,113
410.76	8.8	19,402
410.77	8.9	19,691
410.78	9.0	19,981
410.79	9.1	20,272
410.80	9.3	20,564
410.81	9.4	20,857
410.82	9.5	21,151
410.83	9.7	21,446
410.84	9.8	21,742
410.85	9.9	22,038
410.86	10.1	22,336
410.87	10.2	22,634
410.88	10.3	22,933
410.89	10.5	23,233
410.90	10.6	23,534
410.91	10.8	23,836
410.92	10.9	24,138
410.93	11.0	24,442
410.94	11.2	24,747
410.95	11.3	25,052
410.96	11.4	25,358
410.97	11.6	25,665
410.98	11.7	25,973
410.99	11.9	26,282
411.00	**12.0**	**26,592**

Summary for Pond Pond 1b: Pond 1b

Inflow Area = 17.870 ac, 24.90% Impervious, Inflow Depth > 5.07" for 100-yr event
Inflow = 112.82 cfs @ 12.08 hrs, Volume= 7.547 af
Outflow = 27.04 cfs @ 12.42 hrs, Volume= 7.388 af, Atten= 76%, Lag= 20.4 min
Primary = 27.04 cfs @ 12.42 hrs, Volume= 7.388 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 446.00' @ 12.42 hrs Surf.Area= 38,156 sf Storage= 121,348 cf

Plug-Flow detention time= 59.7 min calculated for 7.388 af (98% of inflow)
Center-of-Mass det. time= 47.3 min (870.8 - 823.6)

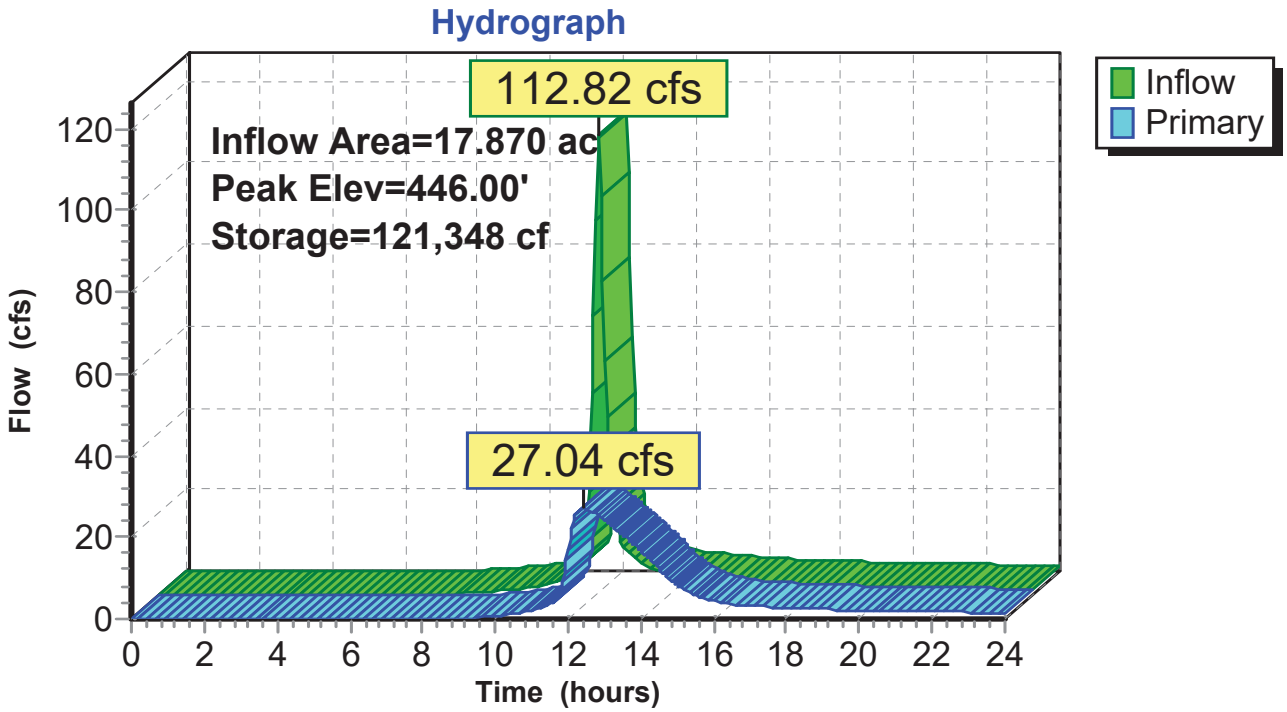
Volume	Invert	Avail.Storage	Storage Description
#1	441.50'	141,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
441.50	1,192	0	0
442.00	10,772	2,991	2,991
444.00	34,794	45,566	48,557
446.00	38,163	72,957	121,514
446.50	40,718	19,720	141,234

Device	Routing	Invert	Outlet Devices
#1	Primary	441.80'	**24.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	441.60'	**25.6 deg x 2.0' long x 4.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.64 (C= 3.30)
#3	Device 1	445.23'	**52.0" x 64.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	446.40'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=27.03 cfs @ 12.42 hrs HW=445.99' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 27.03 cfs @ 8.60 fps)
  └**2=Sharp-Crested Vee/Trap Weir** (Passes < 81.81 cfs potential flow)
  └**3=Orifice/Grate** (Passes < 42.10 cfs potential flow)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond Pond 1b: Pond 1b

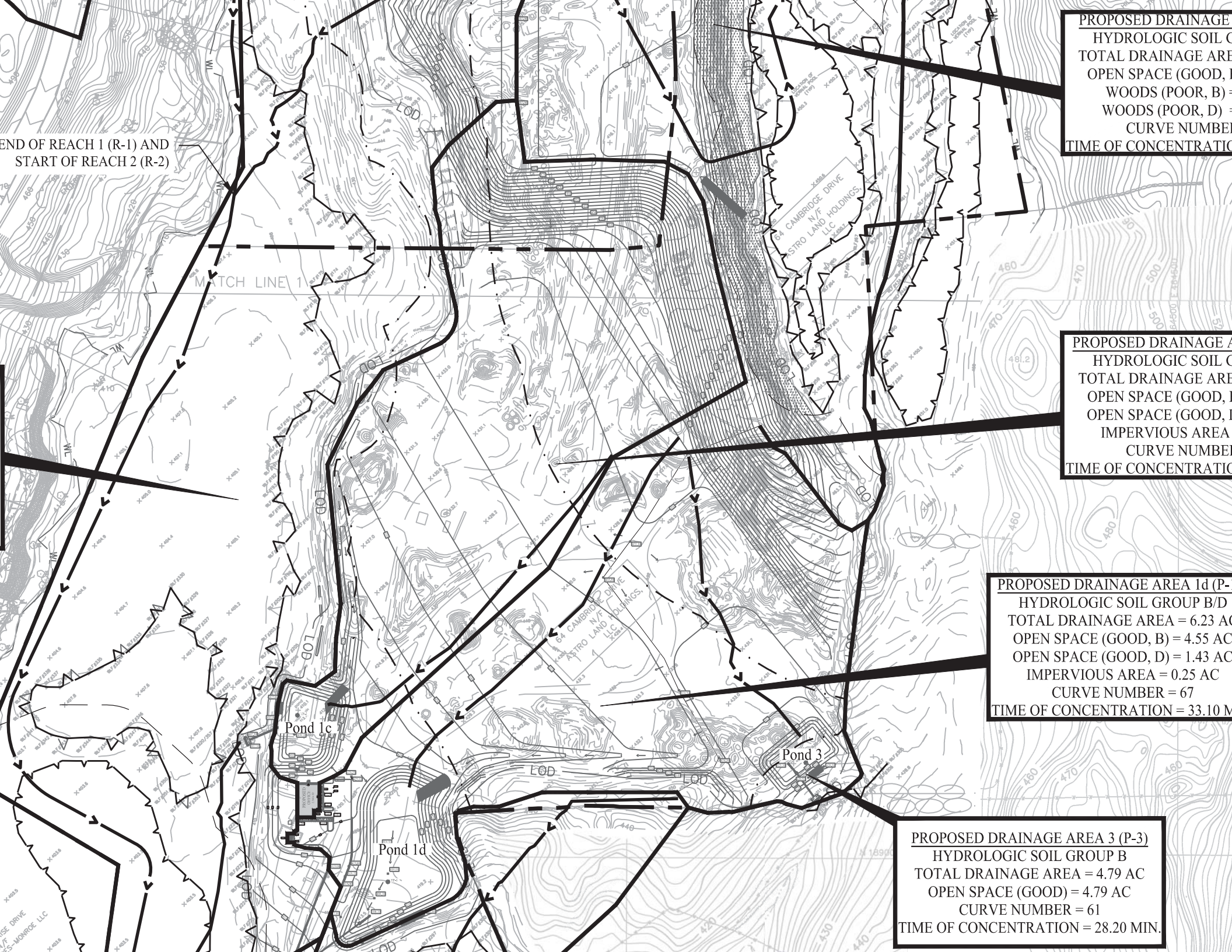


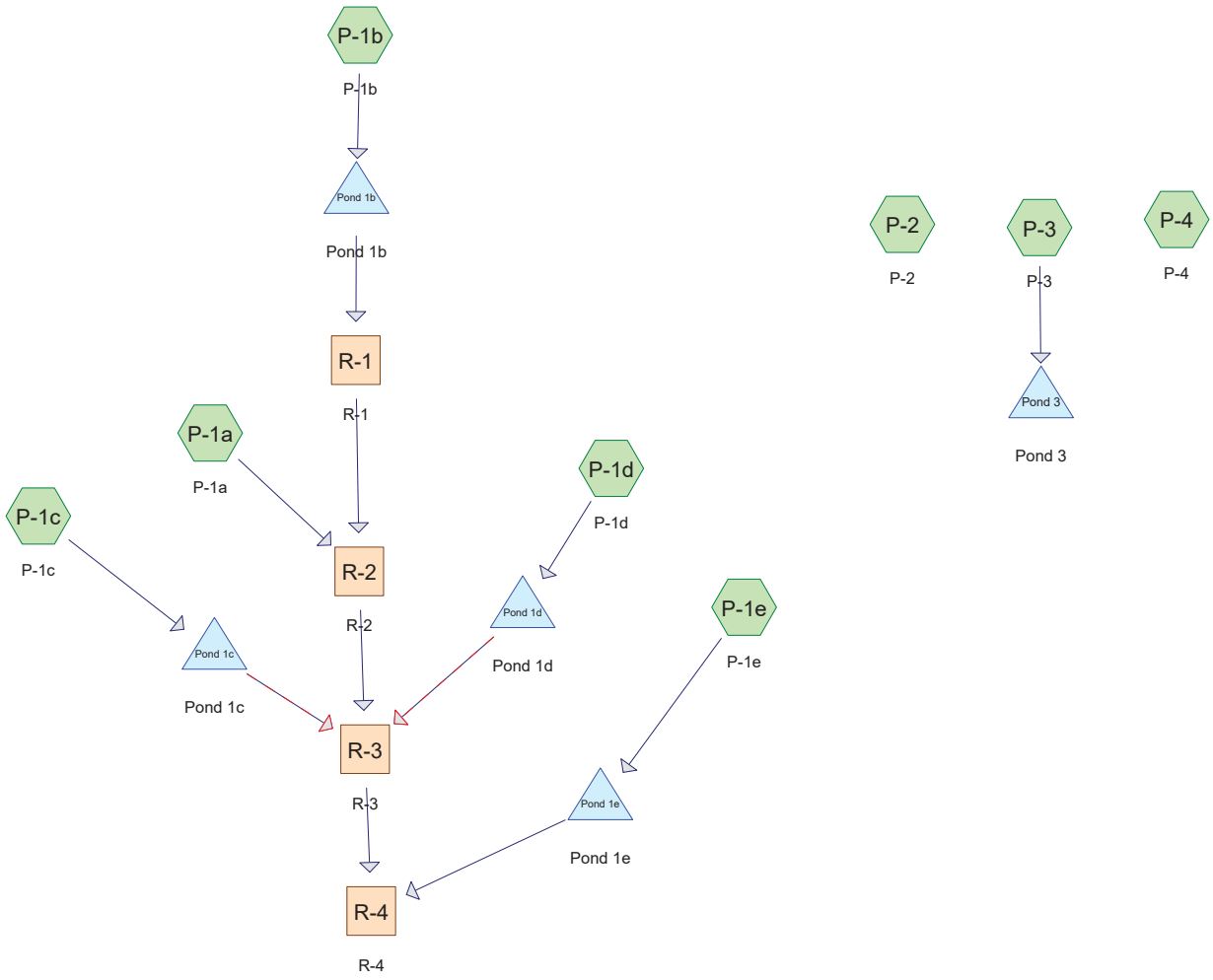
Stage-Discharge for Pond Pond 1b: Pond 1b

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
441.50	0.00	443.62	13.79	445.74	25.94	447.86	34.03
441.54	0.00	443.66	14.14	445.78	26.11	447.90	34.16
441.58	0.00	443.70	14.47	445.82	26.29	447.94	34.29
441.62	0.00	443.74	14.77	445.86	26.46	447.98	34.43
441.66	0.00	443.78	15.03	445.90	26.63	448.02	34.56
441.70	0.00	443.82	15.28	445.94	26.80	448.06	34.69
441.74	0.00	443.86	15.57	445.98	26.97	448.10	34.82
441.78	0.00	443.90	15.87	446.02	27.14	448.14	34.96
441.82	0.00	443.94	16.15	446.06	27.31	448.18	35.09
441.86	0.02	443.98	16.43	446.10	27.48	448.22	35.22
441.90	0.06	444.02	16.71	446.14	27.65	448.26	35.35
441.94	0.12	444.06	16.98	446.18	27.81	448.30	35.48
441.98	0.20	444.10	17.25	446.22	27.97	448.34	35.60
442.02	0.30	444.14	17.51	446.26	28.14	448.38	35.73
442.06	0.42	444.18	17.77	446.30	28.30	448.42	35.86
442.10	0.55	444.22	18.03	446.34	28.46	448.46	35.99
442.14	0.70	444.26	18.28	446.38	28.62	448.50	36.11
442.18	0.87	444.30	18.53	446.42	28.78	448.54	36.24
442.22	1.06	444.34	18.77	446.46	28.94	448.58	36.37
442.26	1.26	444.38	19.01	446.50	29.10	448.62	36.49
442.30	1.48	444.42	19.25	446.54	29.25	448.66	36.62
442.34	1.71	444.46	19.49	446.58	29.41	448.70	36.74
442.38	1.96	444.50	19.72	446.62	29.56	448.74	36.87
442.42	2.22	444.54	19.95	446.66	29.72	448.78	36.99
442.46	2.50	444.58	20.18	446.70	29.87	448.82	37.11
442.50	2.79	444.62	20.41	446.74	30.03	448.86	37.24
442.54	3.09	444.66	20.63	446.78	30.18	448.90	37.36
442.58	3.41	444.70	20.85	446.82	30.33	448.94	37.48
442.62	3.74	444.74	21.07	446.86	30.48	448.98	37.60
442.66	4.08	444.78	21.29	446.90	30.63	449.02	37.73
442.70	4.43	444.82	21.50	446.94	30.78	449.06	37.85
442.74	4.79	444.86	21.71	446.98	30.93	449.10	37.97
442.78	5.16	444.90	21.92	447.02	31.07	449.14	38.09
442.82	5.54	444.94	22.13	447.06	31.22	449.18	38.21
442.86	5.93	444.98	22.33	447.10	31.37	449.22	38.33
442.90	6.32	445.02	22.54	447.14	31.51	449.26	38.45
442.94	6.72	445.06	22.74	447.18	31.66	449.30	38.57
442.98	7.13	445.10	22.94	447.22	31.80	449.34	38.68
443.02	7.55	445.14	23.14	447.26	31.95	449.38	38.80
443.06	7.97	445.18	23.34	447.30	32.09	449.42	38.92
443.10	8.39	445.22	23.53	447.34	32.23	449.46	39.04
443.14	8.82	445.26	23.73	447.38	32.37	449.50	**39.15**
443.18	9.25	445.30	23.92	447.42	32.51		
443.22	9.68	445.34	24.11	447.46	32.65		
443.26	10.11	445.38	24.30	447.50	32.79		
443.30	10.54	445.42	24.48	447.54	32.93		
443.34	10.97	445.46	24.67	447.58	33.07		
443.38	11.39	445.50	24.86	447.62	33.21		
443.42	11.81	445.54	25.04	447.66	33.35		
443.46	12.23	445.58	25.22	447.70	33.48		
443.50	12.63	445.62	25.40	447.74	33.62		
443.54	13.03	445.66	25.58	447.78	33.76		
443.58	13.42	445.70	25.76	447.82	33.89		

Stage-Area-Storage for Pond Pond 1b: Pond 1b

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
441.50	1,192	0
441.60	3,108	215
441.70	5,024	622
441.80	6,940	1,220
441.90	8,856	2,010
442.00	10,772	2,991
442.10	11,973	4,128
442.20	13,174	5,386
442.30	14,375	6,763
442.40	15,576	8,261
442.50	16,778	9,878
442.60	17,979	11,616
442.70	19,180	13,474
442.80	20,381	15,452
442.90	21,582	17,550
443.00	22,783	19,769
443.10	23,984	22,107
443.20	25,185	24,565
443.30	26,386	27,144
443.40	27,587	29,843
443.50	28,789	32,661
443.60	29,990	35,600
443.70	31,191	38,659
443.80	32,392	41,838
443.90	33,593	45,138
444.00	34,794	48,557
444.10	34,962	52,045
444.20	35,131	55,549
444.30	35,299	59,071
444.40	35,468	62,609
444.50	35,636	66,165
444.60	35,805	69,737
444.70	35,973	73,326
444.80	36,142	76,931
444.90	36,310	80,554
445.00	36,479	84,193
445.10	36,647	87,850
445.20	36,815	91,523
445.30	36,984	95,213
445.40	37,152	98,919
445.50	37,321	102,643
445.60	37,489	106,384
445.70	37,658	110,141
445.80	37,826	113,915
445.90	37,995	117,706
446.00	38,163	121,514
446.10	38,674	125,356
446.20	39,185	129,249
446.30	39,696	133,193
446.40	40,207	137,188
446.50	**40,718**	**141,234**
446.60	40,718	141,234
446.70	40,718	141,234
446.80	40,718	141,234
446.90	40,718	141,234
447.00	40,718	141,234
447.10	40,718	141,234
447.20	40,718	141,234
447.30	40,718	141,234
447.40	40,718	141,234
447.50	40,718	141,234
447.60	40,718	141,234
447.70	40,718	141,234
447.80	40,718	141,234
447.90	40,718	141,234
448.00	40,718	141,234
448.10	40,718	141,234
448.20	40,718	141,234
448.30	40,718	141,234
448.40	40,718	141,234
448.50	40,718	141,234
448.60	40,718	141,234
448.70	40,718	141,234
448.80	40,718	141,234
448.90	40,718	141,234
449.00	40,718	141,234
449.10	40,718	141,234
449.20	40,718	141,234
449.30	40,718	141,234
449.40	40,718	141,234
449.50	40,718	141,234


END OF REACH 1 (R-1) AND
START OF REACH 2 (R-2)
MATCH LINE 1
LOD
WL
64 CAMBRIDGE DRIVE
N/F
ASTRO LAND HOLDINGS,
LLC
Pond 1c
Pond 1d
Pond 3
PROPOSED DRAINAGE
HYDROLOGIC SOIL G
TOTAL DRAINAGE ARE
OPEN SPACE (GOOD, I
WOODS (POOR, B) =
WOODS (POOR, D) =
CURVE NUMBE
TIME OF CONCENTRATIO
PROPOSED DRAINAGE A
HYDROLOGIC SOIL G
TOTAL DRAINAGE ARE
OPEN SPACE (GOOD, I
OPEN SPACE (GOOD, I
IMPERVIOUS AREA
CURVE NUMBE
TIME OF CONCENTRATIO
PROPOSED DRAINAGE AREA 1d (P-
HYDROLOGIC SOIL GROUP B/D
TOTAL DRAINAGE AREA = 6.23 AC
OPEN SPACE (GOOD, B) = 4.55 AC
OPEN SPACE (GOOD, D) = 1.43 AC
IMPERVIOUS AREA = 0.25 AC
CURVE NUMBER = 67
TIME OF CONCENTRATION = 33.10 M
PROPOSED DRAINAGE AREA 3 (P-3)
HYDROLOGIC SOIL GROUP B
TOTAL DRAINAGE AREA = 4.79 AC
OPEN SPACE (GOOD) = 4.79 AC
CURVE NUMBER = 61
TIME OF CONCENTRATION = 28.20 MIN.



Subcat Reach Pond Link

Routing Diagram for 1903601 - Proposed Hydrology
Prepared by Microsoft, Printed 5/20/2020
HydroCAD® 10.00-22 s/n 10621 © 2018 HydroCAD Software Solutions LLC

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1a: P-1a Runoff Area=26.040 ac 0.35% Impervious Runoff Depth>1.33"
Flow Length=968' Tc=39.7 min CN=75 Runoff=23.96 cfs 2.881 af

Subcatchment P-1b: P-1b Runoff Area=16.720 ac 26.61% Impervious Runoff Depth>1.03"
Flow Length=786' Tc=43.2 min CN=70 Runoff=10.59 cfs 1.434 af

Subcatchment P-1c: P-1c Runoff Area=10.630 ac 0.56% Impervious Runoff Depth>0.73"
Flow Length=726' Tc=34.5 min CN=64 Runoff=4.87 cfs 0.643 af

Subcatchment P-1d: P-1d Runoff Area=6.230 ac 4.01% Impervious Runoff Depth>0.87"
Flow Length=766' Tc=33.1 min CN=67 Runoff=3.83 cfs 0.453 af

Subcatchment P-1e: P-1e Runoff Area=1.060 ac 65.09% Impervious Runoff Depth>2.06"
Tc=9.2 min CN=85 Runoff=3.41 cfs 0.182 af

Subcatchment P-2: P-2 Runoff Area=12.650 ac 0.00% Impervious Runoff Depth>0.91"
Flow Length=1,476' Tc=74.9 min CN=68 Runoff=4.62 cfs 0.959 af

Subcatchment P-3: P-3 Runoff Area=4.790 ac 0.00% Impervious Runoff Depth>0.59"
Flow Length=551' Tc=28.2 min CN=61 Runoff=1.86 cfs 0.237 af

Subcatchment P-4: P-4 Runoff Area=3.370 ac 0.00% Impervious Runoff Depth>1.39"
Flow Length=590' Tc=36.5 min CN=76 Runoff=3.48 cfs 0.391 af

Reach R-1: R-1 Avg. Flow Depth=0.32' Max Vel=3.13 fps Inflow=5.62 cfs 1.349 af
n=0.040 L=799.0' S=0.0388 '/' Capacity=41.87 cfs Outflow=5.60 cfs 1.340 af

Reach R-2: R-2 Avg. Flow Depth=0.94' Max Vel=1.90 fps Inflow=24.58 cfs 4.221 af
n=0.040 L=1,801.0' S=0.0036 '/' Capacity=23.64 cfs Outflow=21.15 cfs 4.120 af

Reach R-3: R-3 Avg. Flow Depth=1.46' Max Vel=1.25 fps Inflow=23.24 cfs 5.023 af
n=0.040 L=280.0' S=0.0011 '/' Capacity=12.88 cfs Outflow=23.03 cfs 4.994 af

Reach R-4: R-4 Avg. Flow Depth=1.54' Max Vel=1.18 fps Inflow=23.03 cfs 4.994 af
n=0.040 L=219.0' S=0.0009 '/' Capacity=11.89 cfs Outflow=22.90 cfs 4.971 af

Pond Pond 1b: Pond 1b Peak Elev=442.83' Storage=16,033 cf Inflow=10.59 cfs 1.434 af
Outflow=5.62 cfs 1.349 af

Pond Pond 1c: Pond 1c Peak Elev=410.42' Storage=8,974 cf Inflow=4.87 cfs 0.643 af
Primary=1.41 cfs 0.552 af Secondary=0.00 cfs 0.000 af Outflow=1.41 cfs 0.552 af

Pond Pond 1d: Pond 1d Peak Elev=409.31' Storage=7,829 cf Inflow=3.83 cfs 0.453 af
Primary=0.79 cfs 0.351 af Secondary=0.00 cfs 0.000 af Outflow=0.79 cfs 0.351 af

Pond Pond 1e: Pond 1e Peak Elev=406.16' Storage=7,941 cf Inflow=3.41 cfs 0.182 af
Outflow=0.00 cfs 0.000 af

Pond Pond 3: Pond 3 Peak Elev=424.49' Storage=7,071 cf Inflow=1.86 cfs 0.237 af
Primary=0.14 cfs 0.078 af Secondary=0.00 cfs 0.000 af Outflow=0.14 cfs 0.078 af

Summary for Subcatchment P-1a: P-1a

Runoff = 23.96 cfs @ 12.39 hrs, Volume= 2.881 af, Depth> 1.33"

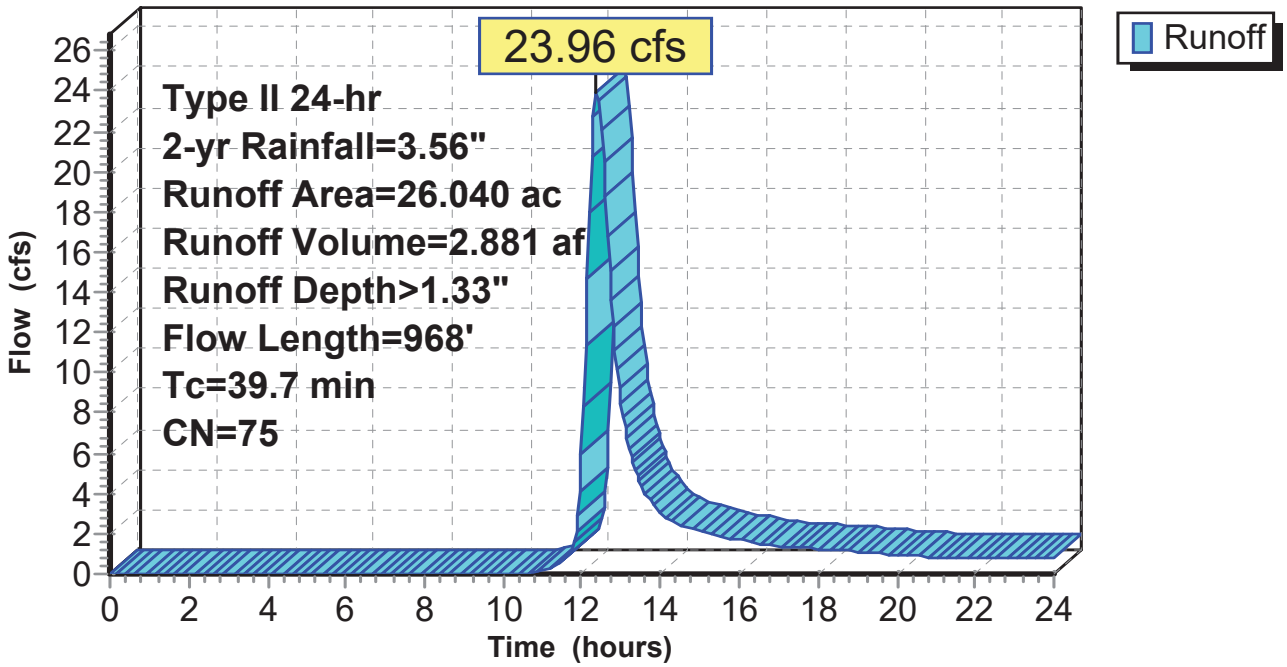
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.56"

Area (ac)	CN	Description
1.270	80	>75% Grass cover, Good, HSG D
3.830	61	>75% Grass cover, Good, HSG B
14.130	83	Woods, Poor, HSG D
6.720	66	Woods, Poor, HSG B
0.090	98	Paved parking, HSG B
26.040	75	Weighted Average
25.950		99.65% Pervious Area
0.090		0.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.0	150	0.0067	0.09		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
2.1	115	0.0170	0.91		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.1	262	0.0920	2.12		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
1.8	227	0.1850	2.15		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
4.7	214	0.0230	0.76		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
39.7	968	Total			

Subcatchment P-1a: P-1a

Hydrograph



Summary for Subcatchment P-1b: P-1b

Runoff = 10.59 cfs @ 12.45 hrs, Volume= 1.434 af, Depth> 1.03"

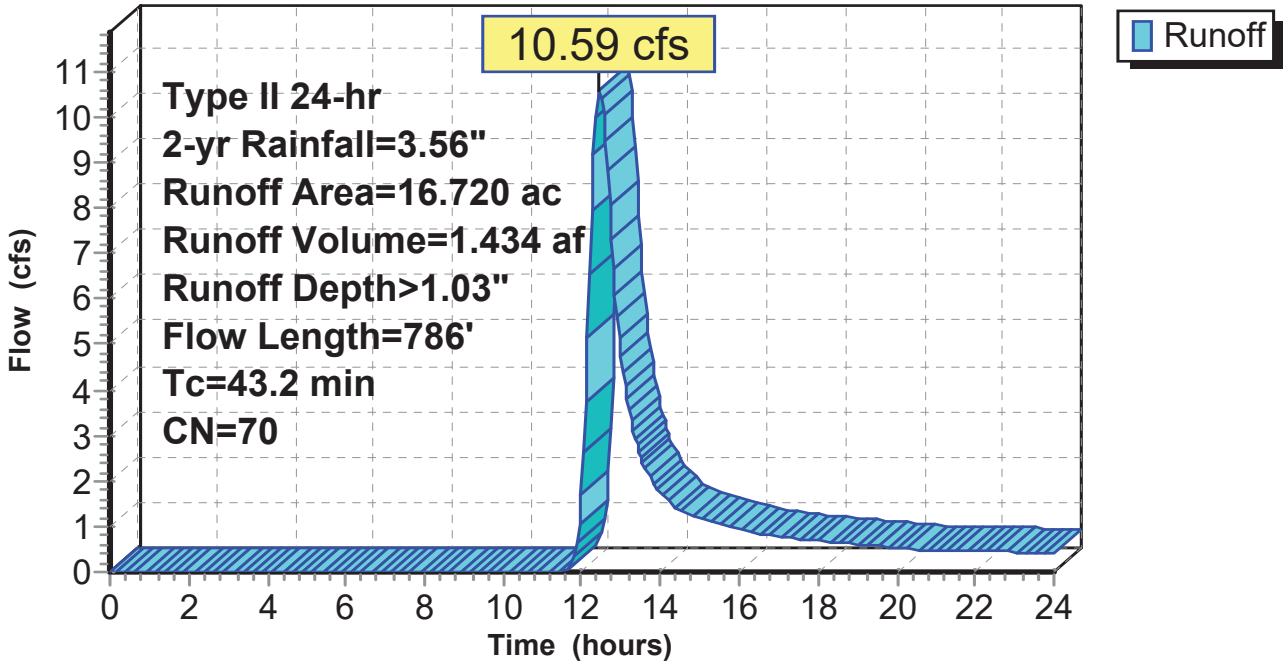
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.56"

Area (ac)	CN	Description
9.360	61	>75% Grass cover, Good, HSG B
4.450	98	Paved parking, HSG B
2.910	55	Woods, Good, HSG B
16.720	70	Weighted Average
12.270		73.39% Pervious Area
4.450		26.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.0	150	0.0030	0.06		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
1.4	57	0.0090	0.66		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.2	109	0.2290	7.70		**Shallow Concentrated Flow, CD** Unpaved Kv= 16.1 fps
0.8	164	0.0270	3.34		**Shallow Concentrated Flow, DE** Paved Kv= 20.3 fps
0.8	306	0.0120	6.51	11.51	**Pipe Channel, EF** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
43.2	786	Total			

Subcatchment P-1b: P-1b

Hydrograph



Summary for Subcatchment P-1c: P-1c

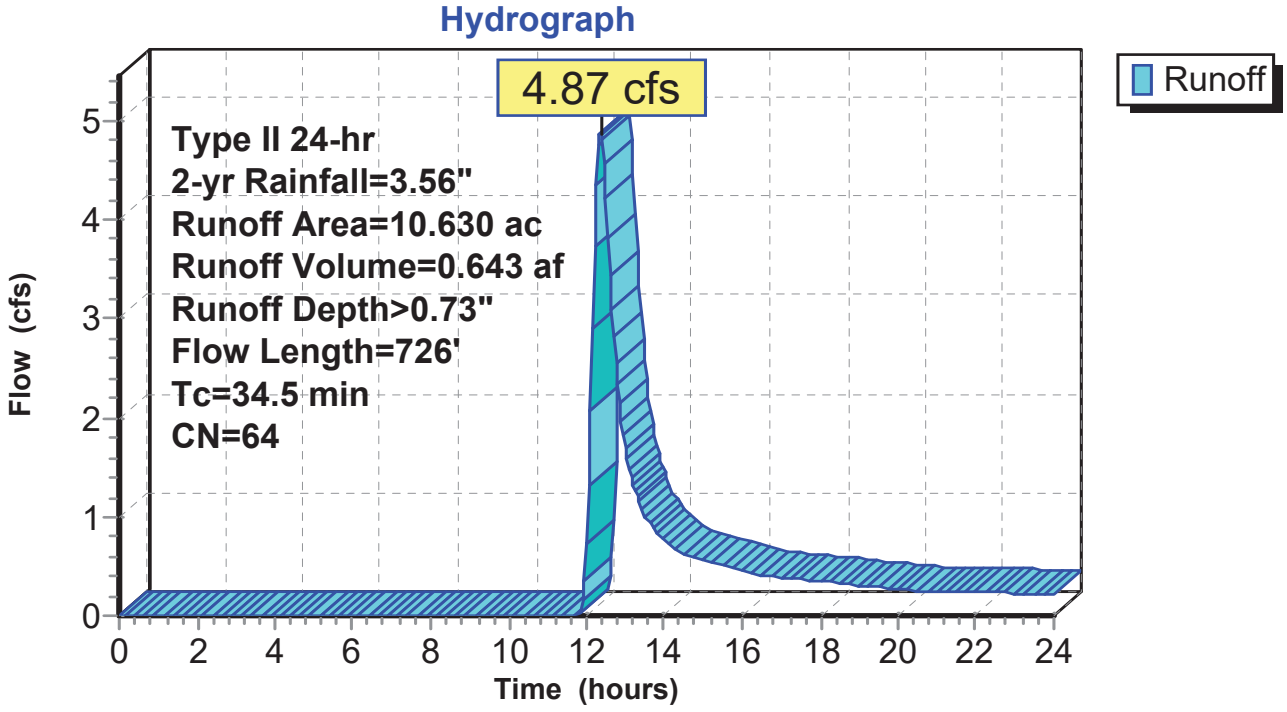
Runoff = 4.87 cfs @ 12.36 hrs, Volume= 0.643 af, Depth> 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.56"

Area (ac)	CN	Description
8.950	61	>75% Grass cover, Good, HSG B
1.620	80	>75% Grass cover, Good, HSG D
0.060	98	Paved parking, HSG D
10.630	64	Weighted Average
10.570		99.44% Pervious Area
0.060		0.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.7	150	0.0100	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
6.7	323	0.0130	0.80		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.8	201	0.0300	1.21		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.3	52	0.2300	3.36		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
34.5	726	Total			

Subcatchment P-1c: P-1c



Summary for Subcatchment P-1d: P-1d

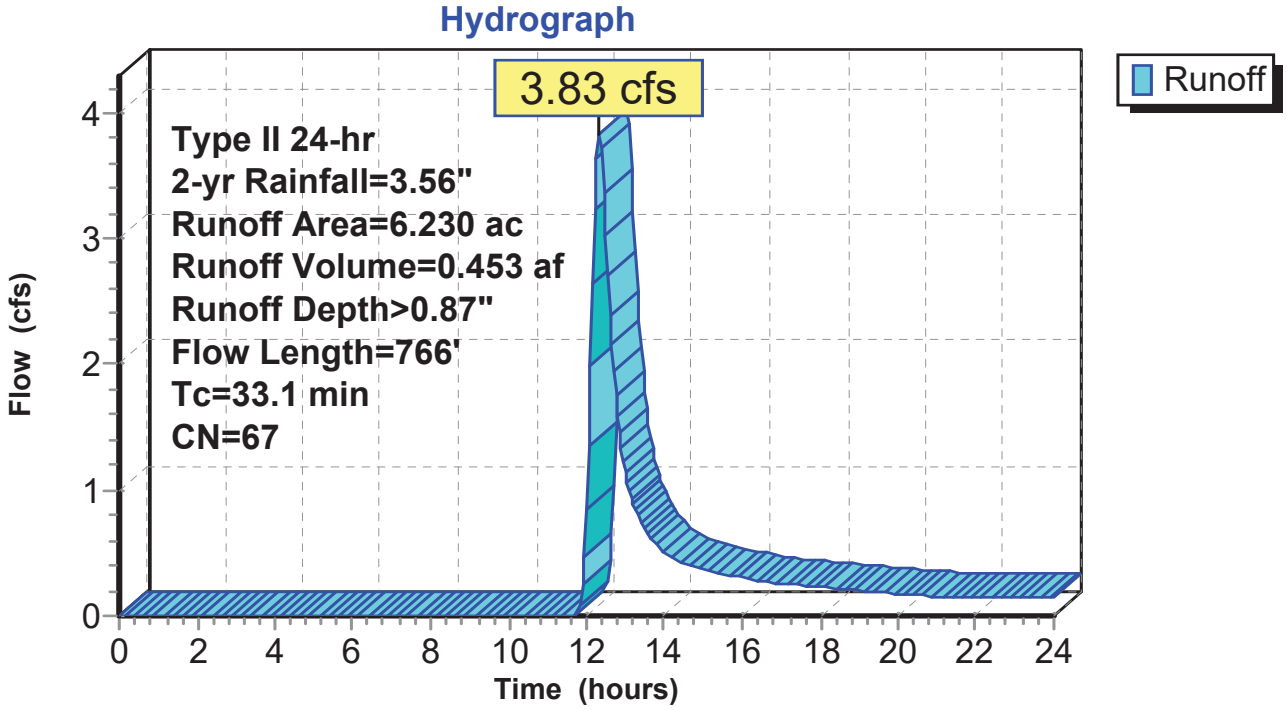
Runoff = 3.83 cfs @ 12.32 hrs, Volume= 0.453 af, Depth> 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.56"

Area (ac)	CN	Description
1.430	80	>75% Grass cover, Good, HSG D
4.550	61	>75% Grass cover, Good, HSG B
0.250	98	Paved parking, HSG B
6.230	67	Weighted Average
5.980		95.99% Pervious Area
0.250		4.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	150	0.0130	0.11		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.8	435	0.0140	0.83		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.1	181	0.0440	1.47		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
33.1	766	Total			

Subcatchment P-1d: P-1d



Summary for Subcatchment P-1e: P-1e

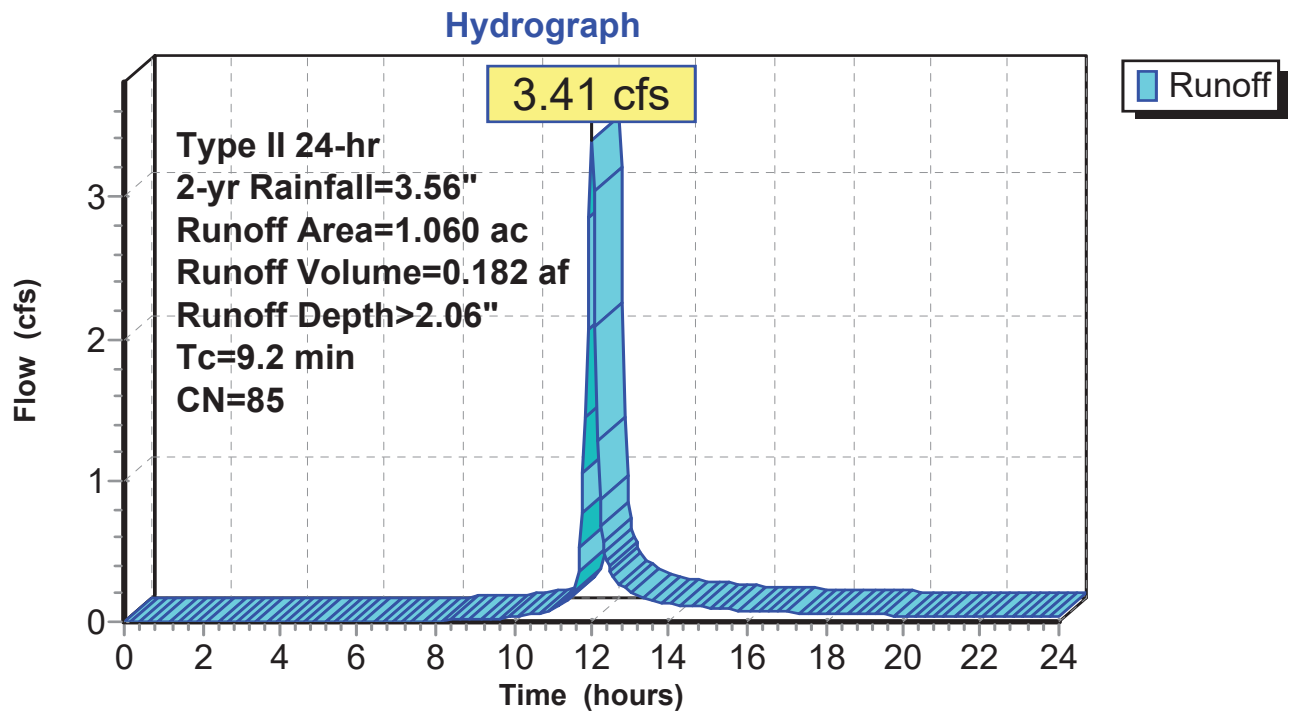
Runoff = 3.41 cfs @ 12.01 hrs, Volume= 0.182 af, Depth> 2.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.56"

Area (ac)	CN	Description
0.690	98	Paved parking, HSG B
0.370	61	>75% Grass cover, Good, HSG B
1.060	85	Weighted Average
0.370		34.91% Pervious Area
0.690		65.09% Impervious Area

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

Subcatchment P-1e: P-1e



Summary for Subcatchment P-2: P-2

Runoff = 4.62 cfs @ 12.90 hrs, Volume= 0.959 af, Depth> 0.91"

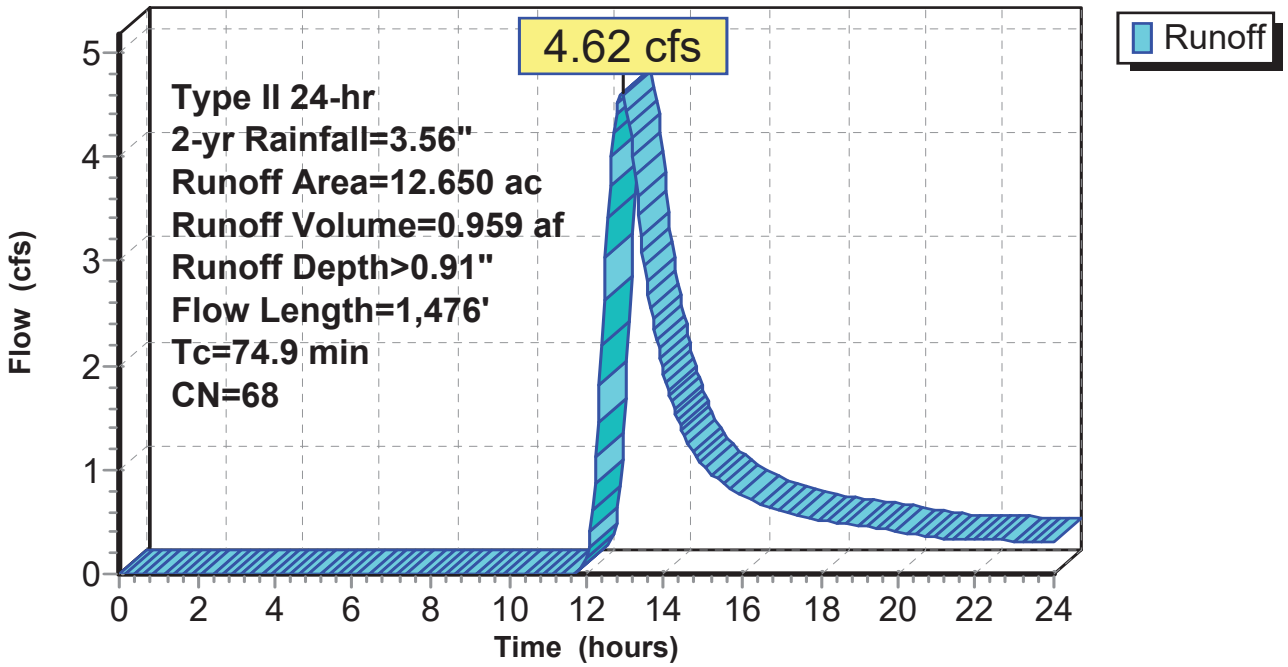
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.56"

Area (ac)	CN	Description
7.070	61	>75% Grass cover, Good, HSG B
2.000	66	Woods, Poor, HSG B
3.580	83	Woods, Poor, HSG D
12.650	68	Weighted Average
12.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	150	0.0087	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.6	362	0.0100	0.70		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.3	66	0.3330	4.04		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.8	68	0.0800	1.41		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
39.1	830	0.0050	0.35		**Shallow Concentrated Flow, EF** Woodland Kv= 5.0 fps
74.9	1,476	Total			

Subcatchment P-2: P-2

Hydrograph



Summary for Subcatchment P-3: P-3

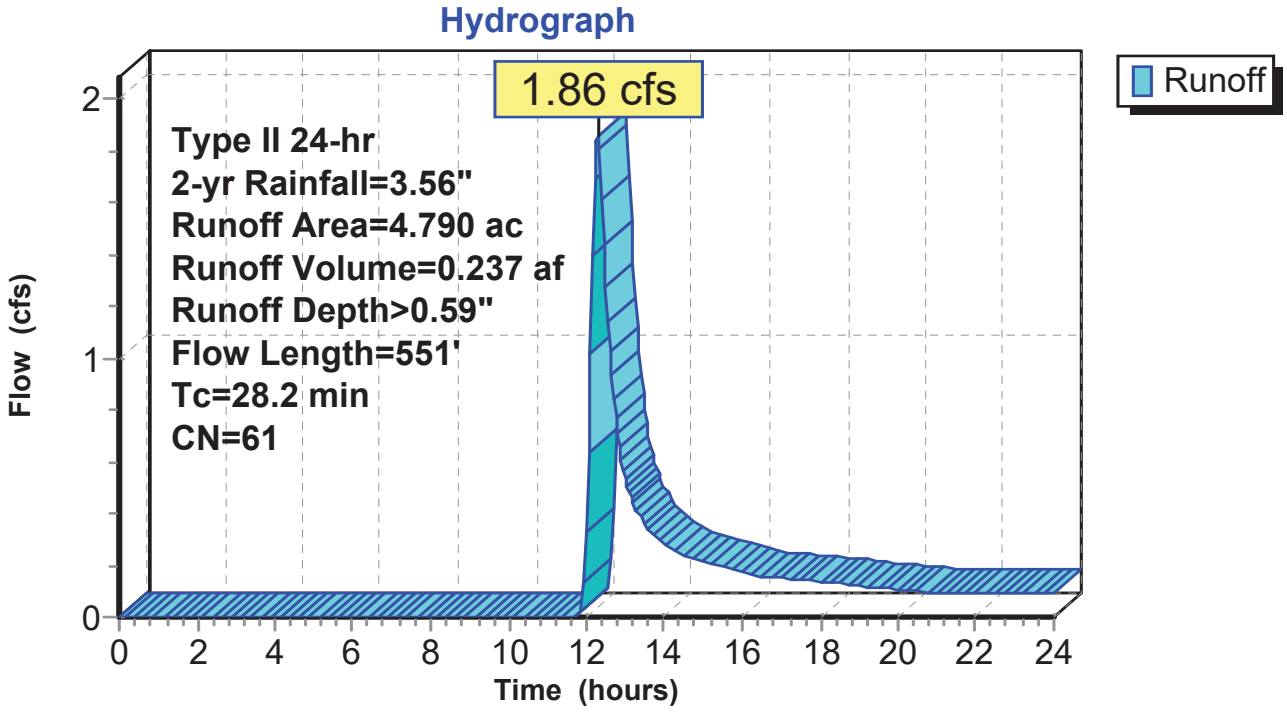
Runoff = 1.86 cfs @ 12.28 hrs, Volume= 0.237 af, Depth> 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.56"

Area (ac)	CN	Description
4.790	61	>75% Grass cover, Good, HSG B
4.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.5	150	0.0180	0.13		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.7	401	0.0120	0.77		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
28.2	551	Total			

Subcatchment P-3: P-3



Summary for Subcatchment P-4: P-4

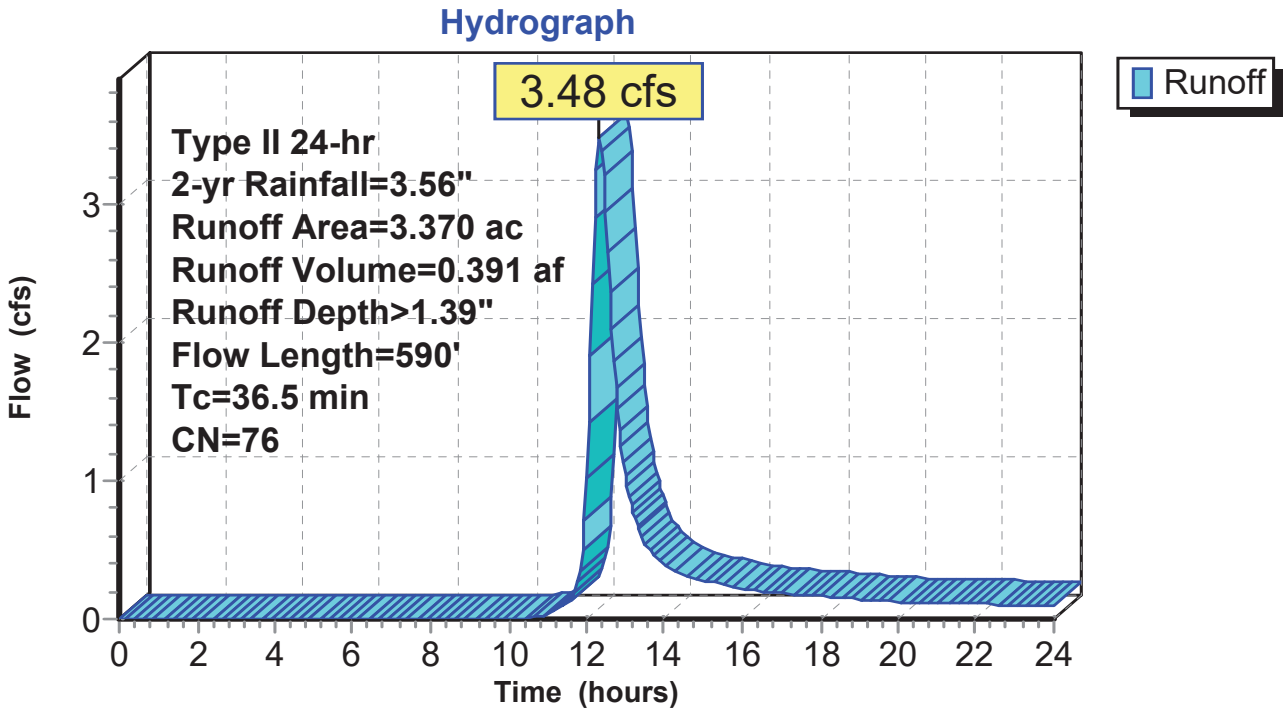
Runoff = 3.48 cfs @ 12.34 hrs, Volume= 0.391 af, Depth> 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.56"

Area (ac)	CN	Description
1.830	83	Woods, Poor, HSG D
1.140	66	Woods, Poor, HSG B
0.290	80	>75% Grass cover, Good, HSG D
0.110	61	>75% Grass cover, Good, HSG B
3.370	76	Weighted Average
3.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.6	150	0.0600	0.08		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
4.9	440	0.0890	1.49		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
36.5	590	Total			

Subcatchment P-4: P-4



Summary for Reach R-1: R-1

Inflow Area = 16.720 ac, 26.61% Impervious, Inflow Depth > 0.97" for 2-yr event
Inflow = 5.62 cfs @ 12.90 hrs, Volume= 1.349 af
Outflow = 5.60 cfs @ 13.02 hrs, Volume= 1.340 af, Atten= 0%, Lag= 7.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.13 fps, Min. Travel Time= 4.3 min
Avg. Velocity = 1.70 fps, Avg. Travel Time= 7.8 min

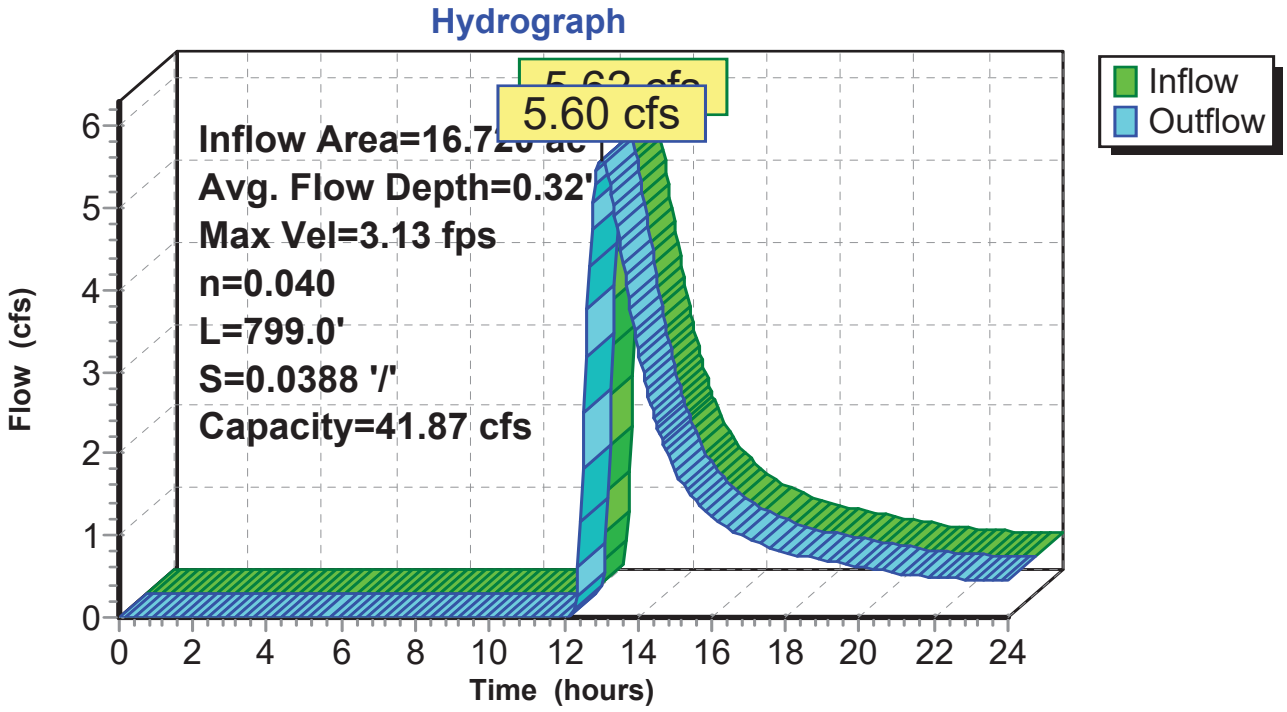
Peak Storage= 1,433 cf @ 12.95 hrs
Average Depth at Peak Storage= 0.32'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 41.87 cfs

5.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 799.0' Slope= 0.0388 '/'
Inlet Invert= 441.00', Outlet Invert= 410.00'



‡

Reach R-1: R-1



Stage-Discharge for Reach R-1: R-1

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
441.00	0.00	0.00
441.01	0.34	0.02
441.02	0.54	0.05
441.03	0.70	0.11
441.04	0.84	0.17
441.05	0.98	0.25
441.06	1.10	0.34
441.07	1.22	0.44
441.08	1.32	0.55
441.09	1.43	0.67
441.10	1.53	0.79
441.11	1.62	0.93
441.12	1.72	1.08
441.13	1.81	1.23
441.14	1.89	1.40
441.15	1.97	1.57
441.16	2.06	1.75
441.17	2.14	1.94
441.18	2.21	2.13
441.19	2.29	2.34
441.20	2.36	2.55
441.21	2.43	2.77
441.22	2.50	3.00
441.23	2.57	3.23
441.24	2.64	3.47
441.25	2.70	3.72
441.26	2.77	3.98
441.27	2.83	4.24
441.28	2.90	4.51
441.29	2.96	4.79
441.30	3.02	5.07
441.31	3.08	5.36
441.32	3.14	5.66
441.33	3.19	5.97
441.34	3.25	6.28
441.35	3.31	6.60
441.36	3.36	6.92
441.37	3.42	7.26
441.38	3.47	7.60
441.39	3.52	7.94
441.40	3.58	8.30
441.41	3.63	8.66
441.42	3.68	9.03
441.43	3.73	9.40
441.44	3.78	9.78
441.45	3.83	10.17
441.46	3.88	10.56
441.47	3.93	10.96
441.48	3.97	11.37
441.49	4.02	11.78
441.50	4.07	12.21
441.51	4.11	12.63
441.52	4.16	13.07
441.53	4.21	13.51
441.54	4.25	13.96
441.55	4.30	14.41
441.56	4.34	14.87
441.57	4.38	15.34
441.58	4.43	15.82
441.59	4.47	16.30
441.60	4.51	16.78
441.61	4.55	17.28
441.62	4.60	17.78
441.63	4.64	18.29
441.64	4.68	18.80
441.65	4.72	19.32
441.66	4.76	19.85
441.67	4.80	20.39
441.68	4.84	20.93
441.69	4.88	21.48
441.70	4.92	22.03
441.71	4.96	22.60
441.72	5.00	23.16
441.73	5.03	23.74
441.74	5.07	24.32
441.75	5.11	24.91
441.76	5.15	25.51
441.77	5.18	26.11
441.78	5.22	26.72
441.79	5.26	27.34
441.80	5.30	27.96
441.81	5.33	28.59
441.82	5.37	29.22
441.83	5.40	29.87
441.84	5.44	30.52
441.85	5.47	31.18
441.86	5.51	31.84
441.87	5.54	32.51
441.88	5.58	33.19
441.89	5.61	33.87
441.90	5.65	34.57
441.91	5.68	35.27
441.92	5.72	35.97
441.93	5.75	36.68
441.94	5.78	37.40
441.95	5.82	38.13
441.96	5.85	38.86
441.97	5.88	39.60
441.98	5.92	40.35
441.99	5.95	41.11
442.00	**5.98**	**41.87**

Stage-Area-Storage for Reach R-1: R-1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
441.00	0.0	0
441.01	0.1	40
441.02	0.1	81
441.03	0.2	121
441.04	0.2	162
441.05	0.3	204
441.06	0.3	245
441.07	0.4	287
441.08	0.4	330
441.09	0.5	372
441.10	0.5	415
441.11	0.6	459
441.12	0.6	502
441.13	0.7	546
441.14	0.7	591
441.15	0.8	635
441.16	0.9	680
441.17	0.9	725
441.18	1.0	771
441.19	1.0	817
441.20	1.1	863
441.21	1.1	909
441.22	1.2	956
441.23	1.3	1,003
441.24	1.3	1,051
441.25	1.4	1,099
441.26	1.4	1,147
441.27	1.5	1,195
441.28	1.6	1,244
441.29	1.6	1,293
441.30	1.7	1,342
441.31	1.7	1,392
441.32	1.8	1,442
441.33	1.9	1,492
441.34	1.9	1,543
441.35	2.0	1,594
441.36	2.1	1,645
441.37	2.1	1,697
441.38	2.2	1,749
441.39	2.3	1,801
441.40	2.3	1,854
441.41	2.4	1,907
441.42	2.5	1,960
441.43	2.5	2,013
441.44	2.6	2,067
441.45	2.7	2,121
441.46	2.7	2,176
441.47	2.8	2,231
441.48	2.9	2,286
441.49	2.9	2,341
441.50	3.0	2,397
441.51	3.1	2,453
441.52	3.1	2,509
441.53	3.2	2,566
441.54	3.3	2,623
441.55	3.4	2,681
441.56	3.4	2,738
441.57	3.5	2,796
441.58	3.6	2,855
441.59	3.6	2,913
441.60	3.7	2,972
441.61	3.8	3,032
441.62	3.9	3,091
441.63	3.9	3,151
441.64	4.0	3,211
441.65	4.1	3,272
441.66	4.2	3,333
441.67	4.2	3,394
441.68	4.3	3,456
441.69	4.4	3,517
441.70	4.5	3,580
441.71	4.6	3,642
441.72	4.6	3,705
441.73	4.7	3,768
441.74	4.8	3,831
441.75	4.9	3,895
441.76	5.0	3,959
441.77	5.0	4,024
441.78	5.1	4,088
441.79	5.2	4,153
441.80	5.3	4,219
441.81	5.4	4,284
441.82	5.4	4,350
441.83	5.5	4,417
441.84	5.6	4,483
441.85	5.7	4,550
441.86	5.8	4,618
441.87	5.9	4,685
441.88	5.9	4,753
441.89	6.0	4,821
441.90	6.1	4,890
441.91	6.2	4,959
441.92	6.3	5,028
441.93	6.4	5,097
441.94	6.5	5,167
441.95	6.6	5,237
441.96	6.6	5,308
441.97	6.7	5,379
441.98	6.8	5,450
441.99	6.9	5,521
442.00	**7.0**	**5,593**

Summary for Reach R-2: R-2

Inflow Area = 42.760 ac, 10.62% Impervious, Inflow Depth > 1.18" for 2-yr event
Inflow = 24.58 cfs @ 12.42 hrs, Volume= 4.221 af
Outflow = 21.15 cfs @ 12.90 hrs, Volume= 4.120 af, Atten= 14%, Lag= 28.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.90 fps, Min. Travel Time= 15.8 min
Avg. Velocity = 0.88 fps, Avg. Travel Time= 34.3 min

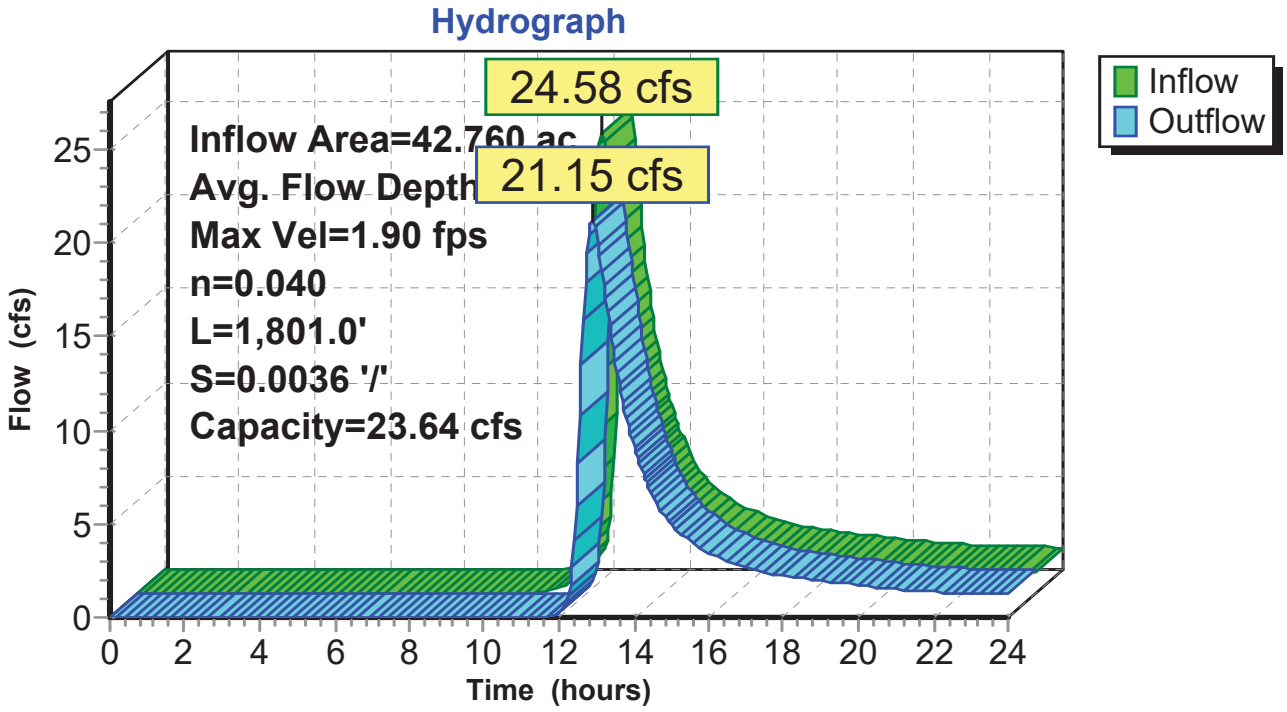
Peak Storage= 20,083 cf @ 12.63 hrs
Average Depth at Peak Storage= 0.94'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 23.64 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 1,801.0' Slope= 0.0036 '/'
Inlet Invert= 410.00', Outlet Invert= 403.50'



‡

Reach R-2: R-2



Stage-Discharge for Reach R-2: R-2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
410.00	0.00	0.00
410.01	0.10	0.01
410.02	0.16	0.03
410.03	0.21	0.06
410.04	0.26	0.10
410.05	0.30	0.15
410.06	0.34	0.21
410.07	0.37	0.27
410.08	0.41	0.33
410.09	0.44	0.40
410.10	0.47	0.48
410.11	0.50	0.57
410.12	0.53	0.65
410.13	0.56	0.75
410.14	0.59	0.85
410.15	0.62	0.95
410.16	0.64	1.06
410.17	0.67	1.17
410.18	0.69	1.29
410.19	0.72	1.41
410.20	0.74	1.54
410.21	0.76	1.67
410.22	0.79	1.81
410.23	0.81	1.95
410.24	0.83	2.09
410.25	0.85	2.24
410.26	0.87	2.39
410.27	0.89	2.55
410.28	0.92	2.71
410.29	0.94	2.87
410.30	0.96	3.04
410.31	0.98	3.21
410.32	1.00	3.39
410.33	1.01	3.57
410.34	1.03	3.75
410.35	1.05	3.94
410.36	1.07	4.13
410.37	1.09	4.33
410.38	1.11	4.53
410.39	1.13	4.73
410.40	1.14	4.94
410.41	1.16	5.15
410.42	1.18	5.36
410.43	1.19	5.58
410.44	1.21	5.80
410.45	1.23	6.03
410.46	1.24	6.25
410.47	1.26	6.49
410.48	1.28	6.72
410.49	1.29	6.96
410.50	1.31	7.20
410.51	1.33	7.45
410.52	1.34	7.70
410.53	1.36	7.95
410.54	1.37	8.21
410.55	1.39	8.47
410.56	1.40	8.73
410.57	1.42	9.00
410.58	1.43	9.27
410.59	1.45	9.54
410.60	1.46	9.82
410.61	1.48	10.10
410.62	1.49	10.38
410.63	1.50	10.67
410.64	1.52	10.96
410.65	1.53	11.26
410.66	1.55	11.55
410.67	1.56	11.86
410.68	1.57	12.16
410.69	1.59	12.47
410.70	1.60	12.78
410.71	1.61	13.09
410.72	1.63	13.41
410.73	1.64	13.73
410.74	1.65	14.06
410.75	1.67	14.38
410.76	1.68	14.71
410.77	1.69	15.05
410.78	1.71	15.39
410.79	1.72	15.73
410.80	1.73	16.07
410.81	1.74	16.42
410.82	1.76	16.77
410.83	1.77	17.12
410.84	1.78	17.48
410.85	1.79	17.84
410.86	1.81	18.20
410.87	1.82	18.57
410.88	1.83	18.94
410.89	1.84	19.31
410.90	1.85	19.69
410.91	1.87	20.07
410.92	1.88	20.45
410.93	1.89	20.84
410.94	1.90	21.23
410.95	1.91	21.62
410.96	1.92	22.02
410.97	1.94	22.42
410.98	1.95	22.82
410.99	1.96	23.23
411.00	**1.97**	**23.64**

Stage-Area-Storage for Reach R-2: R-2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
410.00	0.0	0
410.01	0.1	180
410.02	0.2	362
410.03	0.3	544
410.04	0.4	726
410.05	0.5	910
410.06	0.6	1,094
410.07	0.7	1,278
410.08	0.8	1,464
410.09	0.9	1,650
410.10	1.0	1,837
410.11	1.1	2,025
410.12	1.2	2,213
410.13	1.3	2,402
410.14	1.4	2,592
410.15	1.5	2,783
410.16	1.7	2,974
410.17	1.8	3,166
410.18	1.9	3,359
410.19	2.0	3,552
410.20	2.1	3,746
410.21	2.2	3,941
410.22	2.3	4,137
410.23	2.4	4,333
410.24	2.5	4,530
410.25	2.6	4,728
410.26	2.7	4,926
410.27	2.8	5,125
410.28	3.0	5,325
410.29	3.1	5,526
410.30	3.2	5,727
410.31	3.3	5,929
410.32	3.4	6,132
410.33	3.5	6,336
410.34	3.6	6,540
410.35	3.7	6,745
410.36	3.9	6,950
410.37	4.0	7,157
410.38	4.1	7,364
410.39	4.2	7,572
410.40	4.3	7,780
410.41	4.4	7,990
410.42	4.6	8,200
410.43	4.7	8,410
410.44	4.8	8,622
410.45	4.9	8,834
410.46	5.0	9,047
410.47	5.1	9,260
410.48	5.3	9,475
410.49	5.4	9,690
410.50	5.5	9,906
410.51	5.6	10,122
410.52	5.7	10,339
410.53	5.9	10,557
410.54	6.0	10,776
410.55	6.1	10,995
410.56	6.2	11,215
410.57	6.3	11,436
410.58	6.5	11,658
410.59	6.6	11,880
410.60	6.7	12,103
410.61	6.8	12,326
410.62	7.0	12,551
410.63	7.1	12,776
410.64	7.2	13,002
410.65	7.3	13,228
410.66	7.5	13,456
410.67	7.6	13,684
410.68	7.7	13,912
410.69	7.9	14,142
410.70	8.0	14,372
410.71	8.1	14,603
410.72	8.2	14,834
410.73	8.4	15,067
410.74	8.5	15,300
410.75	8.6	15,534
410.76	8.8	15,768
410.77	8.9	16,003
410.78	9.0	16,239
410.79	9.1	16,476
410.80	9.3	16,713
410.81	9.4	16,951
410.82	9.5	17,190
410.83	9.7	17,430
410.84	9.8	17,670
410.85	9.9	17,911
410.86	10.1	18,153
410.87	10.2	18,395
410.88	10.3	18,638
410.89	10.5	18,882
410.90	10.6	19,127
410.91	10.8	19,372
410.92	10.9	19,618
410.93	11.0	19,865
410.94	11.2	20,112
410.95	11.3	20,360
410.96	11.4	20,609
410.97	11.6	20,859
410.98	11.7	21,109
410.99	11.9	21,360
411.00	**12.0**	**21,612**

Summary for Reach R-3: R-3

Inflow Area = 59.620 ac, 8.13% Impervious, Inflow Depth > 1.01" for 2-yr event
Inflow = 23.24 cfs @ 12.90 hrs, Volume= 5.023 af
Outflow = 23.03 cfs @ 13.02 hrs, Volume= 4.994 af, Atten= 1%, Lag= 7.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.25 fps, Min. Travel Time= 3.7 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 7.2 min

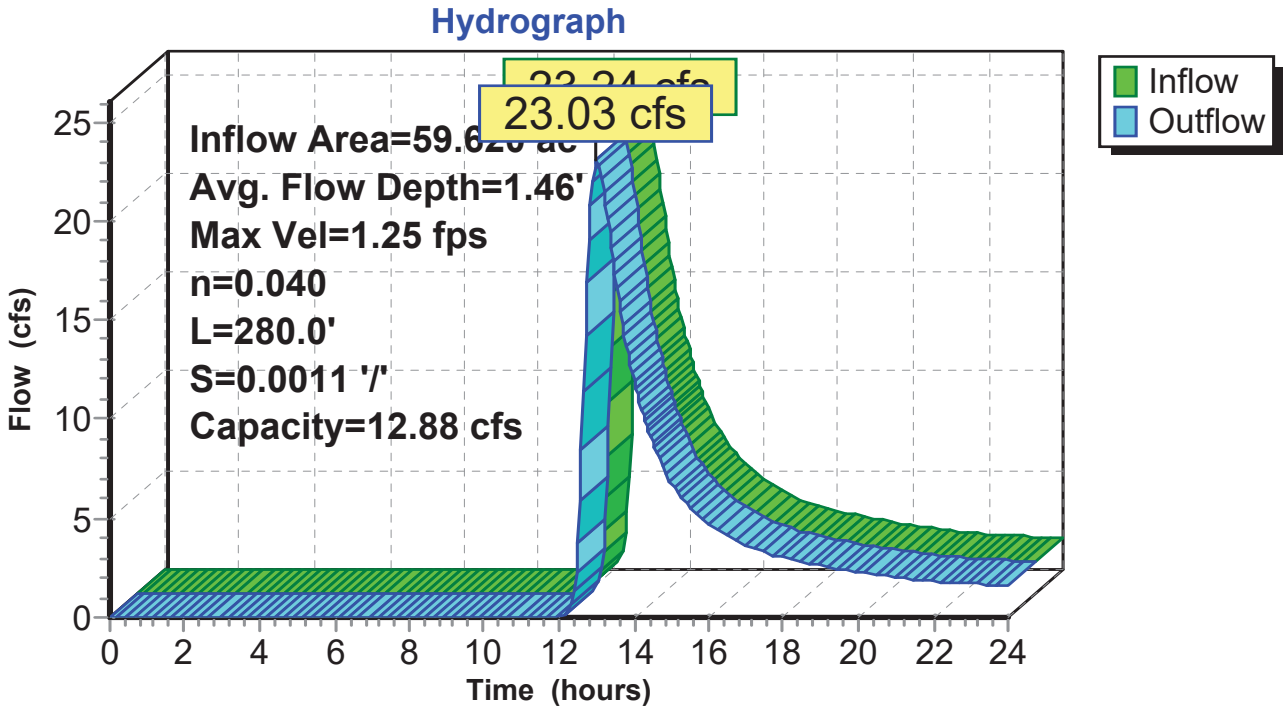
Peak Storage= 5,147 cf @ 12.96 hrs
Average Depth at Peak Storage= 1.46'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 12.88 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 280.0' Slope= 0.0011 '/'
Inlet Invert= 403.50', Outlet Invert= 403.20'



‡

Reach R-3: R-3



Stage-Discharge for Reach R-3: R-3

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
403.50	0.00	0.00
403.51	0.06	0.01
403.52	0.09	0.02
403.53	0.12	0.04
403.54	0.14	0.06
403.55	0.16	0.08
403.56	0.18	0.11
403.57	0.20	0.14
403.58	0.22	0.18
403.59	0.24	0.22
403.60	0.26	0.26
403.61	0.27	0.31
403.62	0.29	0.36
403.63	0.31	0.41
403.64	0.32	0.46
403.65	0.34	0.52
403.66	0.35	0.58
403.67	0.36	0.64
403.68	0.38	0.70
403.69	0.39	0.77
403.70	0.40	0.84
403.71	0.42	0.91
403.72	0.43	0.98
403.73	0.44	1.06
403.74	0.45	1.14
403.75	0.46	1.22
403.76	0.48	1.30
403.77	0.49	1.39
403.78	0.50	1.48
403.79	0.51	1.56
403.80	0.52	1.66
403.81	0.53	1.75
403.82	0.54	1.85
403.83	0.55	1.94
403.84	0.56	2.05
403.85	0.57	2.15
403.86	0.58	2.25
403.87	0.59	2.36
403.88	0.60	2.47
403.89	0.61	2.58
403.90	0.62	2.69
403.91	0.63	2.80
403.92	0.64	2.92
403.93	0.65	3.04
403.94	0.66	3.16
403.95	0.67	3.28
403.96	0.68	3.41
403.97	0.69	3.53
403.98	0.70	3.66
403.99	0.70	3.79
404.00	0.71	3.92
404.01	0.72	4.06
404.02	0.73	4.19
404.03	0.74	4.33
404.04	0.75	4.47
404.05	0.76	4.61
404.06	0.76	4.76
404.07	0.77	4.90
404.08	0.78	5.05
404.09	0.79	5.20
404.10	0.80	5.35
404.11	0.80	5.50
404.12	0.81	5.66
404.13	0.82	5.81
404.14	0.83	5.97
404.15	0.84	6.13
404.16	0.84	6.30
404.17	0.85	6.46
404.18	0.86	6.63
404.19	0.87	6.79
404.20	0.87	6.96
404.21	0.88	7.13
404.22	0.89	7.31
404.23	0.89	7.48
404.24	0.90	7.66
404.25	0.91	7.84
404.26	0.92	8.02
404.27	0.92	8.20
404.28	0.93	8.38
404.29	0.94	8.57
404.30	0.94	8.76
404.31	0.95	8.95
404.32	0.96	9.14
404.33	0.96	9.33
404.34	0.97	9.52
404.35	0.98	9.72
404.36	0.98	9.92
404.37	0.99	10.12
404.38	1.00	10.32
404.39	1.00	10.52
404.40	1.01	10.73
404.41	1.02	10.94
404.42	1.02	11.14
404.43	1.03	11.36
404.44	1.04	11.57
404.45	1.04	11.78
404.46	1.05	12.00
404.47	1.05	12.22
404.48	1.06	12.43
404.49	1.07	12.66
404.50	**1.07**	**12.88**

Stage-Area-Storage for Reach R-3: R-3

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
403.50	0.0	0
403.51	0.1	28
403.52	0.2	56
403.53	0.3	85
403.54	0.4	113
403.55	0.5	141
403.56	0.6	170
403.57	0.7	199
403.58	0.8	228
403.59	0.9	257
403.60	1.0	286
403.61	1.1	315
403.62	1.2	344
403.63	1.3	373
403.64	1.4	403
403.65	1.5	433
403.66	1.7	462
403.67	1.8	492
403.68	1.9	522
403.69	2.0	552
403.70	2.1	582
403.71	2.2	613
403.72	2.3	643
403.73	2.4	674
403.74	2.5	704
403.75	2.6	735
403.76	2.7	766
403.77	2.8	797
403.78	3.0	828
403.79	3.1	859
403.80	3.2	890
403.81	3.3	922
403.82	3.4	953
403.83	3.5	985
403.84	3.6	1,017
403.85	3.7	1,049
403.86	3.9	1,081
403.87	4.0	1,113
403.88	4.1	1,145
403.89	4.2	1,177
403.90	4.3	1,210
403.91	4.4	1,242
403.92	4.6	1,275
403.93	4.7	1,308
403.94	4.8	1,340
403.95	4.9	1,373
403.96	5.0	1,406
403.97	5.1	1,440
403.98	5.3	1,473
403.99	5.4	1,506
404.00	5.5	1,540
404.01	5.6	1,574
404.02	5.7	1,607
404.03	5.9	1,641
404.04	6.0	1,675
404.05	6.1	1,709
404.06	6.2	1,744
404.07	6.3	1,778
404.08	6.5	1,812
404.09	6.6	1,847
404.10	6.7	1,882
404.11	6.8	1,916
404.12	7.0	1,951
404.13	7.1	1,986
404.14	7.2	2,021
404.15	7.3	2,057
404.16	7.5	2,092
404.17	7.6	2,127
404.18	7.7	2,163
404.19	7.9	2,199
404.20	8.0	2,234
404.21	8.1	2,270
404.22	8.2	2,306
404.23	8.4	2,342
404.24	8.5	2,379
404.25	8.6	2,415
404.26	8.8	2,451
404.27	8.9	2,488
404.28	9.0	2,525
404.29	9.1	2,561
404.30	9.3	2,598
404.31	9.4	2,635
404.32	9.5	2,673
404.33	9.7	2,710
404.34	9.8	2,747
404.35	9.9	2,785
404.36	10.1	2,822
404.37	10.2	2,860
404.38	10.3	2,898
404.39	10.5	2,936
404.40	10.6	2,974
404.41	10.8	3,012
404.42	10.9	3,050
404.43	11.0	3,088
404.44	11.2	3,127
404.45	11.3	3,165
404.46	11.4	3,204
404.47	11.6	3,243
404.48	11.7	3,282
404.49	11.9	3,321
404.50	**12.0**	**3,360**

Summary for Reach R-4: R-4

Inflow Area = 60.680 ac, 9.13% Impervious, Inflow Depth > 0.99" for 2-yr event
Inflow = 23.03 cfs @ 13.02 hrs, Volume= 4.994 af
Outflow = 22.90 cfs @ 13.12 hrs, Volume= 4.971 af, Atten= 1%, Lag= 5.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.18 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.62 fps, Avg. Travel Time= 5.9 min

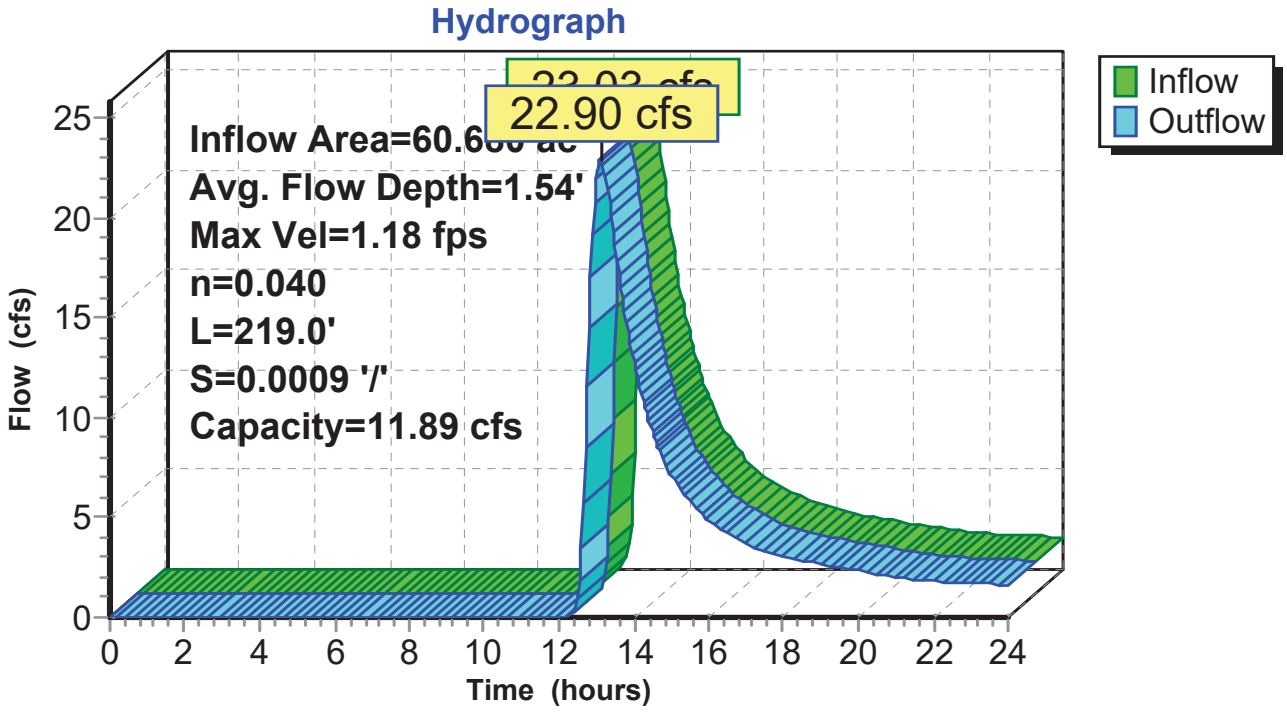
Peak Storage= 4,267 cf @ 13.06 hrs
Average Depth at Peak Storage= 1.54'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 11.89 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 219.0' Slope= 0.0009 '/'
Inlet Invert= 403.20', Outlet Invert= 403.00'



‡

Reach R-4: R-4



Stage-Discharge for Reach R-4: R-4

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
403.20	0.00	0.00
403.21	0.05	0.01
403.22	0.08	0.02
403.23	0.11	0.03
403.24	0.13	0.05
403.25	0.15	0.08
403.26	0.17	0.10
403.27	0.19	0.13
403.28	0.21	0.17
403.29	0.22	0.20
403.30	0.24	0.24
403.31	0.25	0.28
403.32	0.27	0.33
403.33	0.28	0.38
403.34	0.30	0.43
403.35	0.31	0.48
403.36	0.32	0.53
403.37	0.34	0.59
403.38	0.35	0.65
403.39	0.36	0.71
403.40	0.37	0.77
403.41	0.38	0.84
403.42	0.40	0.91
403.43	0.41	0.98
403.44	0.42	1.05
403.45	0.43	1.13
403.46	0.44	1.20
403.47	0.45	1.28
403.48	0.46	1.36
403.49	0.47	1.44
403.50	0.48	1.53
403.51	0.49	1.62
403.52	0.50	1.70
403.53	0.51	1.80
403.54	0.52	1.89
403.55	0.53	1.98
403.56	0.54	2.08
403.57	0.55	2.18
403.58	0.56	2.28
403.59	0.57	2.38
403.60	0.57	2.48
403.61	0.58	2.59
403.62	0.59	2.70
403.63	0.60	2.81
403.64	0.61	2.92
403.65	0.62	3.03
403.66	0.63	3.15
403.67	0.63	3.26
403.68	0.64	3.38
403.69	0.65	3.50
403.70	0.66	3.62
403.71	0.67	3.75
403.72	0.67	3.87
403.73	0.68	4.00
403.74	0.69	4.13
403.75	0.70	4.26
403.76	0.71	4.39
403.77	0.71	4.53
403.78	0.72	4.66
403.79	0.73	4.80
403.80	0.74	4.94
403.81	0.74	5.08
403.82	0.75	5.22
403.83	0.76	5.37
403.84	0.76	5.51
403.85	0.77	5.66
403.86	0.78	5.81
403.87	0.78	5.96
403.88	0.79	6.12
403.89	0.80	6.27
403.90	0.81	6.43
403.91	0.81	6.59
403.92	0.82	6.75
403.93	0.83	6.91
403.94	0.83	7.07
403.95	0.84	7.24
403.96	0.85	7.40
403.97	0.85	7.57
403.98	0.86	7.74
403.99	0.86	7.91
404.00	0.87	8.08
404.01	0.88	8.26
404.02	0.88	8.43
404.03	0.89	8.61
404.04	0.90	8.79
404.05	0.90	8.97
404.06	0.91	9.16
404.07	0.91	9.34
404.08	0.92	9.53
404.09	0.93	9.72
404.10	0.93	9.91
404.11	0.94	10.10
404.12	0.94	10.29
404.13	0.95	10.48
404.14	0.96	10.68
404.15	0.96	10.88
404.16	0.97	11.08
404.17	0.97	11.28
404.18	0.98	11.48
404.19	0.99	11.68
404.20	**0.99**	**11.89**

Stage-Area-Storage for Reach R-4: R-4

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
403.20	0.0	0
403.21	0.1	22
403.22	0.2	44
403.23	0.3	66
403.24	0.4	88
403.25	0.5	111
403.26	0.6	133
403.27	0.7	155
403.28	0.8	178
403.29	0.9	201
403.30	1.0	223
403.31	1.1	246
403.32	1.2	269
403.33	1.3	292
403.34	1.4	315
403.35	1.5	338
403.36	1.7	362
403.37	1.8	385
403.38	1.9	408
403.39	2.0	432
403.40	2.1	456
403.41	2.2	479
403.42	2.3	503
403.43	2.4	527
403.44	2.5	551
403.45	2.6	575
403.46	2.7	599
403.47	2.8	623
403.48	3.0	648
403.49	3.1	672
403.50	3.2	696
403.51	3.3	721
403.52	3.4	746
403.53	3.5	770
403.54	3.6	795
403.55	3.7	820
403.56	3.9	845
403.57	4.0	870
403.58	4.1	895
403.59	4.2	921
403.60	4.3	946
403.61	4.4	972
403.62	4.6	997
403.63	4.7	1,023
403.64	4.8	1,048
403.65	4.9	1,074
403.66	5.0	1,100
403.67	5.1	1,126
403.68	5.3	1,152
403.69	5.4	1,178
403.70	5.5	1,205
403.71	5.6	1,231
403.72	5.7	1,257
403.73	5.9	1,284
403.74	6.0	1,310
403.75	6.1	1,337
403.76	6.2	1,364
403.77	6.3	1,391
403.78	6.5	1,418
403.79	6.6	1,445
403.80	6.7	1,472
403.81	6.8	1,499
403.82	7.0	1,526
403.83	7.1	1,554
403.84	7.2	1,581
403.85	7.3	1,609
403.86	7.5	1,636
403.87	7.6	1,664
403.88	7.7	1,692
403.89	7.9	1,720
403.90	8.0	1,748
403.91	8.1	1,776
403.92	8.2	1,804
403.93	8.4	1,832
403.94	8.5	1,860
403.95	8.6	1,889
403.96	8.8	1,917
403.97	8.9	1,946
403.98	9.0	1,975
403.99	9.1	2,003
404.00	9.3	2,032
404.01	9.4	2,061
404.02	9.5	2,090
404.03	9.7	2,119
404.04	9.8	2,149
404.05	9.9	2,178
404.06	10.1	2,207
404.07	10.2	2,237
404.08	10.3	2,266
404.09	10.5	2,296
404.10	10.6	2,326
404.11	10.8	2,356
404.12	10.9	2,386
404.13	11.0	2,416
404.14	11.2	2,446
404.15	11.3	2,476
404.16	11.4	2,506
404.17	11.6	2,536
404.18	11.7	2,567
404.19	11.9	2,597
404.20	**12.0**	**2,628**

Summary for Pond Pond 1b: Pond 1b

Inflow Area = 16.720 ac, 26.61% Impervious, Inflow Depth > 1.03" for 2-yr event
Inflow = 10.59 cfs @ 12.45 hrs, Volume= 1.434 af
Outflow = 5.62 cfs @ 12.90 hrs, Volume= 1.349 af, Atten= 47%, Lag= 27.1 min
Primary = 5.62 cfs @ 12.90 hrs, Volume= 1.349 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 442.83' @ 12.90 hrs Surf.Area= 20,720 sf Storage= 16,033 cf

Plug-Flow detention time= 71.0 min calculated for 1.349 af (94% of inflow)
Center-of-Mass det. time= 40.7 min (931.2 - 890.6)

Volume	Invert	Avail.Storage	Storage Description
#1	441.50'	141,234 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

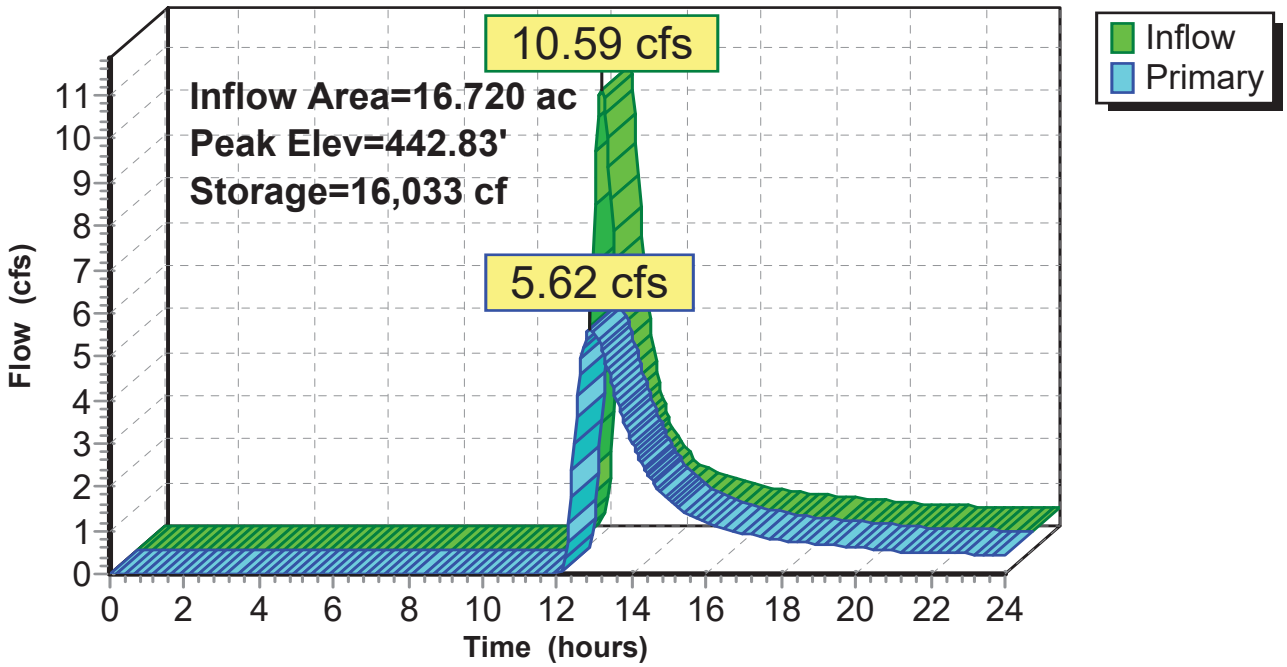
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
441.50	1,192	0	0
442.00	10,772	2,991	2,991
444.00	34,794	45,566	48,557
446.00	38,163	72,957	121,514
446.50	40,718	19,720	141,234

Device	Routing	Invert	Outlet Devices
#1	Primary	441.80'	**24.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	441.60'	**25.6 deg x 2.0' long x 4.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.64 (C= 3.30)
#3	Device 1	445.23'	**52.0" W x 64.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	446.40'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=5.62 cfs @ 12.90 hrs HW=442.83' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 5.62 cfs @ 3.45 fps)
  ├**2=Sharp-Crested Vee/Trap Weir** (Passes 5.62 cfs of 9.89 cfs potential flow)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond Pond 1b: Pond 1b

Hydrograph



Stage-Discharge for Pond Pond 1b: Pond 1b

Elevation (feet)	Primary (cfs)
441.50	0.00
441.60	0.00
441.70	0.00
441.80	0.00
441.90	0.06
442.00	0.25
442.10	0.55
442.20	0.96
442.30	1.48
442.40	2.09
442.50	2.79
442.60	3.57
442.70	4.43
442.80	5.35
442.90	6.32
443.00	7.34
443.10	8.39
443.20	9.46
443.30	10.54
443.40	11.60
443.50	12.63
443.60	13.60
443.70	14.47
443.80	15.13
443.90	15.87
444.00	16.57
444.10	17.25
444.20	17.90
444.30	18.53
444.40	19.13
444.50	19.72
444.60	20.29
444.70	20.85
444.80	21.39
444.90	21.92
445.00	22.44
445.10	22.94
445.20	23.43
445.30	23.92
445.40	24.39
445.50	24.86
445.60	25.31
445.70	25.76
445.80	26.20
445.90	26.63
446.00	27.06
446.10	27.48
446.20	27.89
446.30	28.30
446.40	28.70
446.50	29.10
446.60	29.49
446.70	29.87
446.80	30.25
446.90	30.63
447.00	31.00
447.10	31.37
447.20	31.73
447.30	32.09
447.40	32.44
447.50	32.79
447.60	33.14
447.70	33.48
447.80	33.82
447.90	34.16
448.00	34.49
448.10	34.82
448.20	35.15
448.30	35.48
448.40	35.80
448.50	36.11
448.60	36.43
448.70	36.74
448.80	37.05
448.90	37.36
449.00	37.67
449.10	37.97
449.20	38.27
449.30	38.57
449.40	38.86
449.50	39.15
449.60	39.45
449.70	39.73
449.80	40.02
449.90	40.31
450.00	40.59
450.10	40.87
450.20	41.15
450.30	41.43
450.40	41.70
450.50	**41.97**

Stage-Area-Storage for Pond Pond 1b: Pond 1b

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
441.50	1,192	0
441.60	3,108	215
441.70	5,024	622
441.80	6,940	1,220
441.90	8,856	2,010
442.00	10,772	2,991
442.10	11,973	4,128
442.20	13,174	5,386
442.30	14,375	6,763
442.40	15,576	8,261
442.50	16,778	9,878
442.60	17,979	11,616
442.70	19,180	13,474
442.80	20,381	15,452
442.90	21,582	17,550
443.00	22,783	19,769
443.10	23,984	22,107
443.20	25,185	24,565
443.30	26,386	27,144
443.40	27,587	29,843
443.50	28,789	32,661
443.60	29,990	35,600
443.70	31,191	38,659
443.80	32,392	41,838
443.90	33,593	45,138
444.00	34,794	48,557
444.10	34,962	52,045
444.20	35,131	55,549
444.30	35,299	59,071
444.40	35,468	62,609
444.50	35,636	66,165
444.60	35,805	69,737
444.70	35,973	73,326
444.80	36,142	76,931
444.90	36,310	80,554
445.00	36,479	84,193
445.10	36,647	87,850
445.20	36,815	91,523
445.30	36,984	95,213
445.40	37,152	98,919
445.50	37,321	102,643
445.60	37,489	106,384
445.70	37,658	110,141
445.80	37,826	113,915
445.90	37,995	117,706
446.00	38,163	121,514
446.10	38,674	125,356
446.20	39,185	129,249
446.30	39,696	133,193
446.40	40,207	137,188
446.50	**40,718**	**141,234**
446.60	40,718	141,234
446.70	40,718	141,234
446.80	40,718	141,234
446.90	40,718	141,234
447.00	40,718	141,234
447.10	40,718	141,234
447.20	40,718	141,234
447.30	40,718	141,234
447.40	40,718	141,234
447.50	40,718	141,234
447.60	40,718	141,234
447.70	40,718	141,234
447.80	40,718	141,234
447.90	40,718	141,234
448.00	40,718	141,234
448.10	40,718	141,234
448.20	40,718	141,234
448.30	40,718	141,234
448.40	40,718	141,234
448.50	40,718	141,234
448.60	40,718	141,234
448.70	40,718	141,234
448.80	40,718	141,234
448.90	40,718	141,234
449.00	40,718	141,234
449.10	40,718	141,234
449.20	40,718	141,234
449.30	40,718	141,234
449.40	40,718	141,234
449.50	40,718	141,234
449.60	40,718	141,234
449.70	40,718	141,234
449.80	40,718	141,234
449.90	40,718	141,234
450.00	40,718	141,234
450.10	40,718	141,234
450.20	40,718	141,234
450.30	40,718	141,234
450.40	40,718	141,234
450.50	40,718	141,234

Summary for Pond Pond 1c: Pond 1c

Inflow Area = 10.630 ac, 0.56% Impervious, Inflow Depth > 0.73" for 2-yr event
Inflow = 4.87 cfs @ 12.36 hrs, Volume= 0.643 af
Outflow = 1.41 cfs @ 13.15 hrs, Volume= 0.552 af, Atten= 71%, Lag= 47.5 min
Primary = 1.41 cfs @ 13.15 hrs, Volume= 0.552 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 410.42' @ 13.15 hrs Surf.Area= 7,048 sf Storage= 8,974 cf

Plug-Flow detention time= 131.5 min calculated for 0.552 af (86% of inflow)
Center-of-Mass det. time= 66.6 min (971.9 - 905.4)

Volume	Invert	Avail.Storage	Storage Description
#1	409.00'	53,054 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

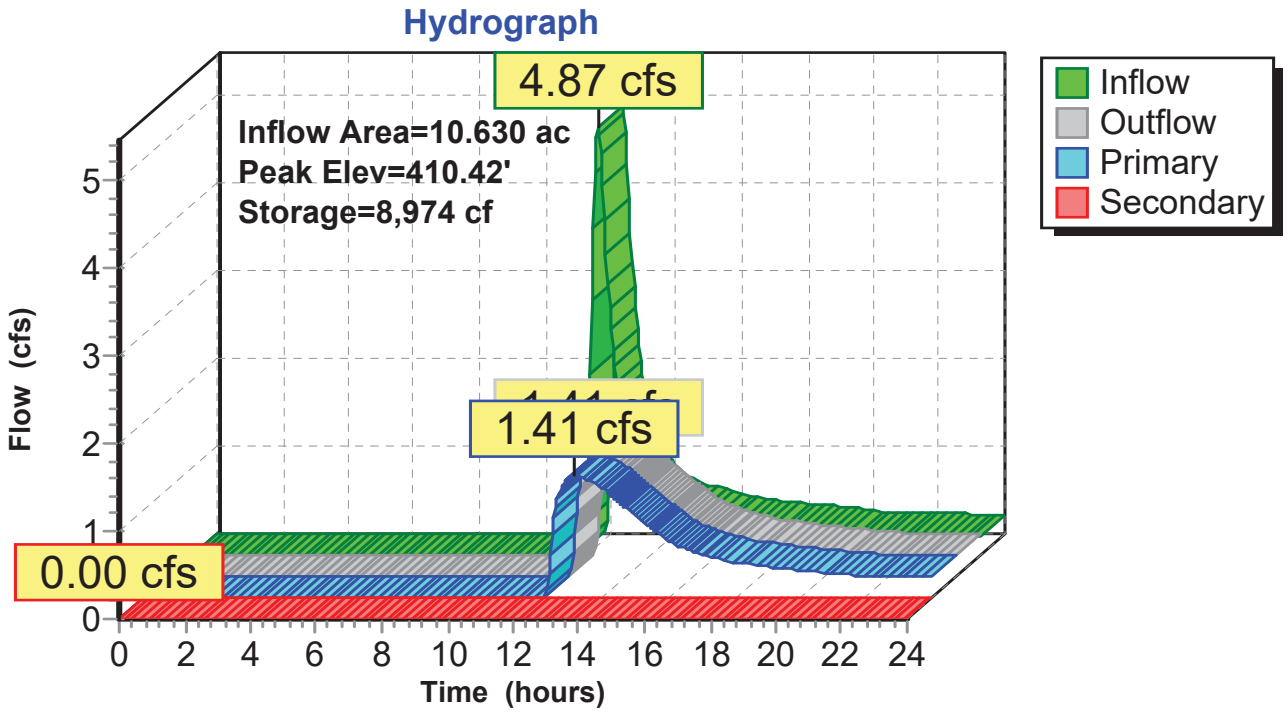
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
409.00	5,642	0	0
410.00	6,603	6,123	6,123
412.00	8,732	15,335	21,458
414.00	11,115	19,847	41,305
415.00	12,383	11,749	53,054

Device	Routing	Invert	Outlet Devices
#1	Primary	408.00'	**24.0" Round Culvert** L= 62.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 408.00' / 407.30' S= 0.0113 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Device 1	409.40'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	410.40'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height
#4	Device 1	413.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#5	Secondary	414.00'	**20.0' long x 14.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=1.41 cfs @ 13.15 hrs HW=410.42' (Free Discharge)
└**1=Culvert** (Passes 1.41 cfs of 18.01 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 1.39 cfs @ 3.98 fps)
  ├**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.02 cfs @ 0.44 fps)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=409.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 1c: Pond 1c



Stage-Discharge for Pond Pond 1c: Pond 1c

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
409.00	0.00	0.00	0.00
409.10	0.00	0.00	0.00
409.20	0.00	0.00	0.00
409.30	0.00	0.00	0.00
409.40	0.00	0.00	0.00
409.50	0.04	0.04	0.00
409.60	0.13	0.13	0.00
409.70	0.28	0.28	0.00
409.80	0.47	0.47	0.00
409.90	0.68	0.68	0.00
410.00	0.87	0.87	0.00
410.10	1.02	1.02	0.00
410.20	1.15	1.15	0.00
410.30	1.27	1.27	0.00
410.40	1.37	1.37	0.00
410.50	1.68	1.68	0.00
410.60	2.15	2.15	0.00
410.70	2.72	2.72	0.00
410.80	3.37	3.37	0.00
410.90	4.08	4.08	0.00
411.00	4.86	4.86	0.00
411.10	5.69	5.69	0.00
411.20	6.56	6.56	0.00
411.30	7.48	7.48	0.00
411.40	8.43	8.43	0.00
411.50	9.42	9.42	0.00
411.60	10.45	10.45	0.00
411.70	11.50	11.50	0.00
411.80	12.57	12.57	0.00
411.90	13.67	13.67	0.00
412.00	14.79	14.79	0.00
412.10	15.93	15.93	0.00
412.20	17.09	17.09	0.00
412.30	18.26	18.26	0.00
412.40	19.45	19.45	0.00
412.50	20.64	20.64	0.00
412.60	21.85	21.85	0.00
412.70	23.06	23.06	0.00
412.80	24.28	24.28	0.00
412.90	25.50	25.50	0.00
413.00	26.72	26.72	0.00
413.10	28.12	28.12	0.00
413.20	29.66	29.66	0.00
413.30	31.28	31.28	0.00
413.40	31.73	31.73	0.00
413.50	32.09	32.09	0.00
413.60	32.44	32.44	0.00
413.70	32.79	32.79	0.00
413.80	33.14	33.14	0.00
413.90	33.48	33.48	0.00
414.00	33.82	33.82	0.00
414.10	35.83	34.16	1.67
414.20	39.22	34.49	4.72
414.30	43.55	34.82	8.73
414.40	48.66	35.15	13.51
414.50	54.46	35.48	18.99
414.60	60.89	35.80	25.10
414.70	67.45	36.11	31.33
414.80	74.35	36.43	37.92
414.90	81.91	36.74	45.17
415.00	89.85	37.05	52.80
415.10	98.39	37.36	61.03
415.20	107.34	37.67	69.67
415.30	116.53	37.97	78.56
415.40	126.06	38.27	87.79
415.50	135.57	38.57	97.00
415.60	145.32	38.86	106.45
415.70	155.74	39.15	116.59
415.80	166.47	39.45	127.03
415.90	177.49	39.73	137.76
416.00	188.80	40.02	148.78
416.10	**200.38**	**40.31**	**160.07**

Stage-Area-Storage for Pond Pond 1c: Pond 1c

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
409.00	5,642	0
409.10	5,738	569
409.20	5,834	1,148
409.30	5,930	1,736
409.40	6,026	2,334
409.50	6,123	2,941
409.60	6,219	3,558
409.70	6,315	4,185
409.80	6,411	4,821
409.90	6,507	5,467
410.00	6,603	6,123
410.10	6,709	6,788
410.20	6,816	7,464
410.30	6,922	8,151
410.40	7,029	8,849
410.50	7,135	9,557
410.60	7,242	10,276
410.70	7,348	11,005
410.80	7,455	11,746
410.90	7,561	12,496
411.00	7,668	13,258
411.10	7,774	14,030
411.20	7,880	14,813
411.30	7,987	15,606
411.40	8,093	16,410
411.50	8,200	17,225
411.60	8,306	18,050
411.70	8,413	18,886
411.80	8,519	19,732
411.90	8,626	20,590
412.00	8,732	21,458
412.10	8,851	22,337
412.20	8,970	23,228
412.30	9,089	24,131
412.40	9,209	25,046
412.50	9,328	25,972
412.60	9,447	26,911
412.70	9,566	27,862
412.80	9,685	28,824
412.90	9,804	29,799
413.00	9,924	30,785
413.10	10,043	31,784
413.20	10,162	32,794
413.30	10,281	33,816
413.40	10,400	34,850
413.50	10,519	35,896
413.60	10,638	36,954
413.70	10,758	38,024
413.80	10,877	39,105
413.90	10,996	40,199
414.00	11,115	41,305
414.10	11,242	42,422
414.20	11,369	43,553
414.30	11,495	44,696
414.40	11,622	45,852
414.50	11,749	47,021
414.60	11,876	48,202
414.70	12,003	49,396
414.80	12,129	50,602
414.90	12,256	51,822
415.00	**12,383**	**53,054**
415.10	12,383	53,054
415.20	12,383	53,054
415.30	12,383	53,054
415.40	12,383	53,054
415.50	12,383	53,054
415.60	12,383	53,054
415.70	12,383	53,054
415.80	12,383	53,054
415.90	12,383	53,054
416.00	12,383	53,054
416.10	12,383	53,054

Summary for Pond Pond 1d: Pond 1d

Inflow Area = 6.230 ac, 4.01% Impervious, Inflow Depth > 0.87" for 2-yr event
Inflow = 3.83 cfs @ 12.32 hrs, Volume= 0.453 af
Outflow = 0.79 cfs @ 13.31 hrs, Volume= 0.351 af, Atten= 79%, Lag= 59.4 min
Primary = 0.79 cfs @ 13.31 hrs, Volume= 0.351 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 409.31' @ 13.31 hrs Surf.Area= 11,153 sf Storage= 7,829 cf

Plug-Flow detention time= 191.0 min calculated for 0.351 af (77% of inflow)
Center-of-Mass det. time= 98.2 min (991.5 - 893.3)

Volume	Invert	Avail.Storage	Storage Description
#1	408.00'	209,097 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

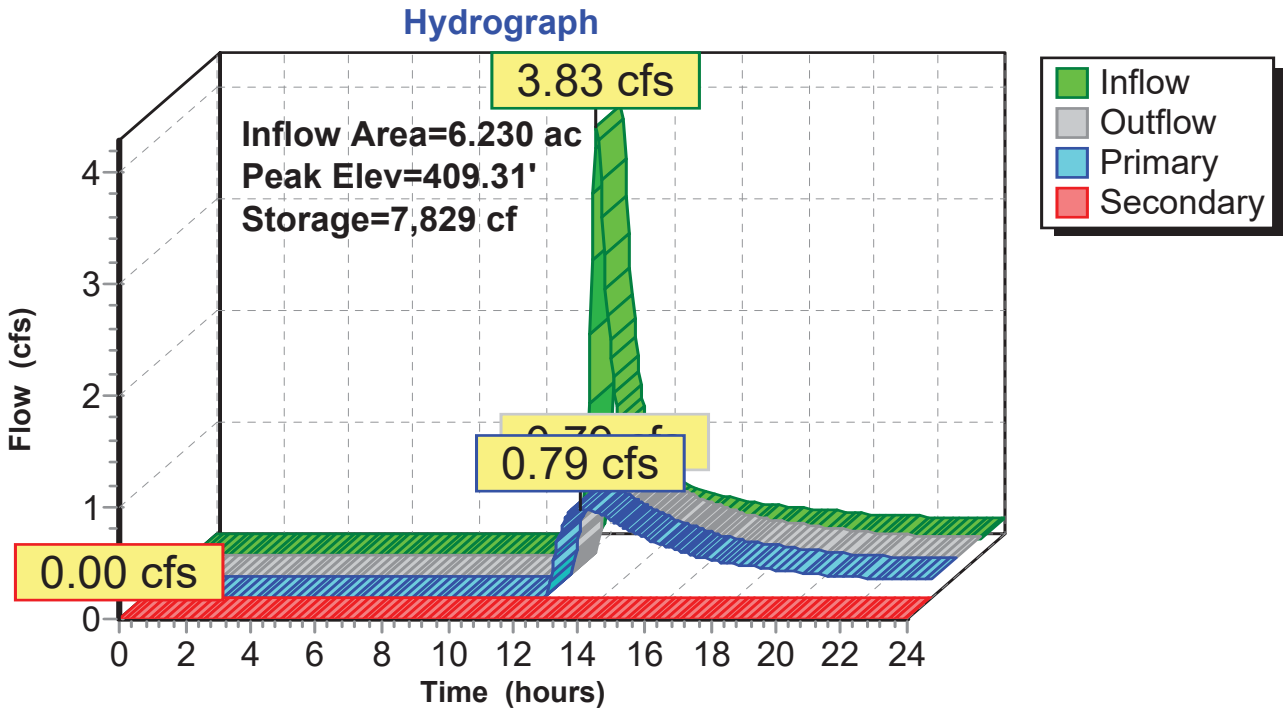
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
408.00	800	0	0
410.00	16,607	17,407	17,407
412.00	24,332	40,939	58,346
414.00	28,916	53,248	111,594
416.00	33,677	62,593	174,187
417.00	36,142	34,910	209,097

Device	Routing	Invert	Outlet Devices
#1	Primary	408.00'	**24.0" Round Culvert** L= 235.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 408.00' / 406.00' S= 0.0085 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	408.75'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	411.20'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.0' Crest Height
#4	Device 1	414.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#5	Secondary	416.00'	**35.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.80 cfs @ 13.31 hrs HW=409.31' (Free Discharge)
└**1=Culvert** (Passes 0.80 cfs of 8.50 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.80 cfs @ 2.55 fps)
  ├**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=408.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 1d: Pond 1d



Stage-Discharge for Pond Pond 1d: Pond 1d

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
408.00	0.00	0.00	0.00
408.10	0.00	0.00	0.00
408.20	0.00	0.00	0.00
408.30	0.00	0.00	0.00
408.40	0.00	0.00	0.00
408.50	0.00	0.00	0.00
408.60	0.00	0.00	0.00
408.70	0.00	0.00	0.00
408.80	0.01	0.01	0.00
408.90	0.08	0.08	0.00
409.00	0.20	0.20	0.00
409.10	0.37	0.37	0.00
409.20	0.57	0.57	0.00
409.30	0.78	0.78	0.00
409.40	0.95	0.95	0.00
409.50	1.08	1.08	0.00
409.60	1.21	1.21	0.00
409.70	1.32	1.32	0.00
409.80	1.42	1.42	0.00
409.90	1.52	1.52	0.00
410.00	1.61	1.61	0.00
410.10	1.69	1.69	0.00
410.20	1.78	1.78	0.00
410.30	1.85	1.85	0.00
410.40	1.93	1.93	0.00
410.50	2.00	2.00	0.00
410.60	2.07	2.07	0.00
410.70	2.14	2.14	0.00
410.80	2.20	2.20	0.00
410.90	2.27	2.27	0.00
411.00	2.33	2.33	0.00
411.10	2.39	2.39	0.00
411.20	2.45	2.45	0.00
411.30	2.71	2.71	0.00
411.40	3.14	3.14	0.00
411.50	3.67	3.67	0.00
411.60	4.29	4.29	0.00
411.70	4.98	4.98	0.00
411.80	5.73	5.73	0.00
411.90	6.54	6.54	0.00
412.00	7.39	7.39	0.00
412.10	8.28	8.28	0.00
412.20	9.21	9.21	0.00
412.30	10.18	10.18	0.00
412.40	11.18	11.18	0.00
412.50	12.21	12.21	0.00
412.60	13.27	13.27	0.00
412.70	14.35	14.35	0.00
412.80	15.45	15.45	0.00
412.90	16.57	16.57	0.00
413.00	17.70	17.70	0.00
413.10	18.85	18.85	0.00
413.20	20.02	20.02	0.00
413.30	21.19	21.19	0.00
413.40	22.38	22.38	0.00
413.50	23.57	23.57	0.00
413.60	24.76	24.76	0.00
413.70	25.96	25.96	0.00
413.80	27.17	27.17	0.00
413.90	28.37	28.37	0.00
414.00	29.57	29.57	0.00
414.10	30.94	30.94	0.00
414.20	32.44	32.44	0.00
414.30	34.04	34.04	0.00
414.40	35.15	35.15	0.00
414.50	35.48	35.48	0.00
414.60	35.80	35.80	0.00
414.70	36.11	36.11	0.00
414.80	36.43	36.43	0.00
414.90	36.74	36.74	0.00
415.00	37.05	37.05	0.00
415.10	37.36	37.36	0.00
415.20	37.62	37.62	0.00
415.30	37.88	37.88	0.00
415.40	38.14	38.14	0.00
415.50	38.40	38.40	0.00
415.60	38.65	38.65	0.00
415.70	38.91	38.91	0.00
415.80	39.16	39.16	0.00
415.90	39.41	39.41	0.00
416.00	39.66	39.66	0.00
416.10	42.75	39.91	2.84
416.20	48.20	40.15	8.05
416.30	55.32	40.39	14.92
416.40	63.84	40.64	23.20
416.50	73.79	40.88	32.92
416.60	85.04	41.12	43.92
416.70	96.39	41.36	55.04
416.80	108.46	41.59	66.87
416.90	121.47	41.83	79.64
417.00	135.16	42.06	93.10
417.10	**149.91**	**42.30**	**107.61**

Stage-Area-Storage for Pond Pond 1d: Pond 1d

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
408.00	800	0
408.10	1,590	120
408.20	2,381	318
408.30	3,171	596
408.40	3,961	952
408.50	4,752	1,388
408.60	5,542	1,903
408.70	6,332	2,496
408.80	7,123	3,169
408.90	7,913	3,921
409.00	8,704	4,752
409.10	9,494	5,662
409.20	10,284	6,651
409.30	11,075	7,718
409.40	11,865	8,865
409.50	12,655	10,091
409.60	13,446	11,396
409.70	14,236	12,781
409.80	15,026	14,244
409.90	15,817	15,786
410.00	16,607	17,407
410.10	16,993	19,087
410.20	17,379	20,806
410.30	17,766	22,563
410.40	18,152	24,359
410.50	18,538	26,193
410.60	18,925	28,066
410.70	19,311	29,978
410.80	19,697	31,929
410.90	20,083	33,918
411.00	20,470	35,945
411.10	20,856	38,012
411.20	21,242	40,116
411.30	21,628	42,260
411.40	22,014	44,442
411.50	22,401	46,663
411.60	22,787	48,922
411.70	23,173	51,220
411.80	23,560	53,557
411.90	23,946	55,932
412.00	24,332	58,346
412.10	24,561	60,791
412.20	24,790	63,258
412.30	25,020	65,749
412.40	25,249	68,262
412.50	25,478	70,799
412.60	25,707	73,358
412.70	25,936	75,940
412.80	26,166	78,545
412.90	26,395	81,173
413.00	26,624	83,824
413.10	26,853	86,498
413.20	27,082	89,195
413.30	27,312	91,914
413.40	27,541	94,657
413.50	27,770	97,423
413.60	27,999	100,211
413.70	28,228	103,022
413.80	28,458	105,857
413.90	28,687	108,714
414.00	28,916	111,594
414.10	29,154	114,498
414.20	29,392	117,425
414.30	29,630	120,376
414.40	29,868	123,351
414.50	30,106	126,350
414.60	30,344	129,372
414.70	30,582	132,418
414.80	30,820	135,489
414.90	31,058	138,583
415.00	31,297	141,700
415.10	31,535	144,842
415.20	31,773	148,007
415.30	32,011	151,196
415.40	32,249	154,409
415.50	32,487	157,646
415.60	32,725	160,907
415.70	32,963	164,191
415.80	33,201	167,499
415.90	33,439	170,831
416.00	33,677	174,187
416.10	33,924	177,567
416.20	34,170	180,972
416.30	34,417	184,401
416.40	34,663	187,855
416.50	34,910	191,334
416.60	35,156	194,837
416.70	35,402	198,365
416.80	35,649	201,917
416.90	35,895	205,495
417.00	**36,142**	**209,097**
417.10	36,142	209,097

Summary for Pond Pond 1e: Pond 1e

Inflow Area = 1.060 ac, 65.09% Impervious, Inflow Depth > 2.06" for 2-yr event
Inflow = 3.41 cfs @ 12.01 hrs, Volume= 0.182 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 406.16' @ 24.00 hrs Surf.Area= 7,605 sf Storage= 7,941 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

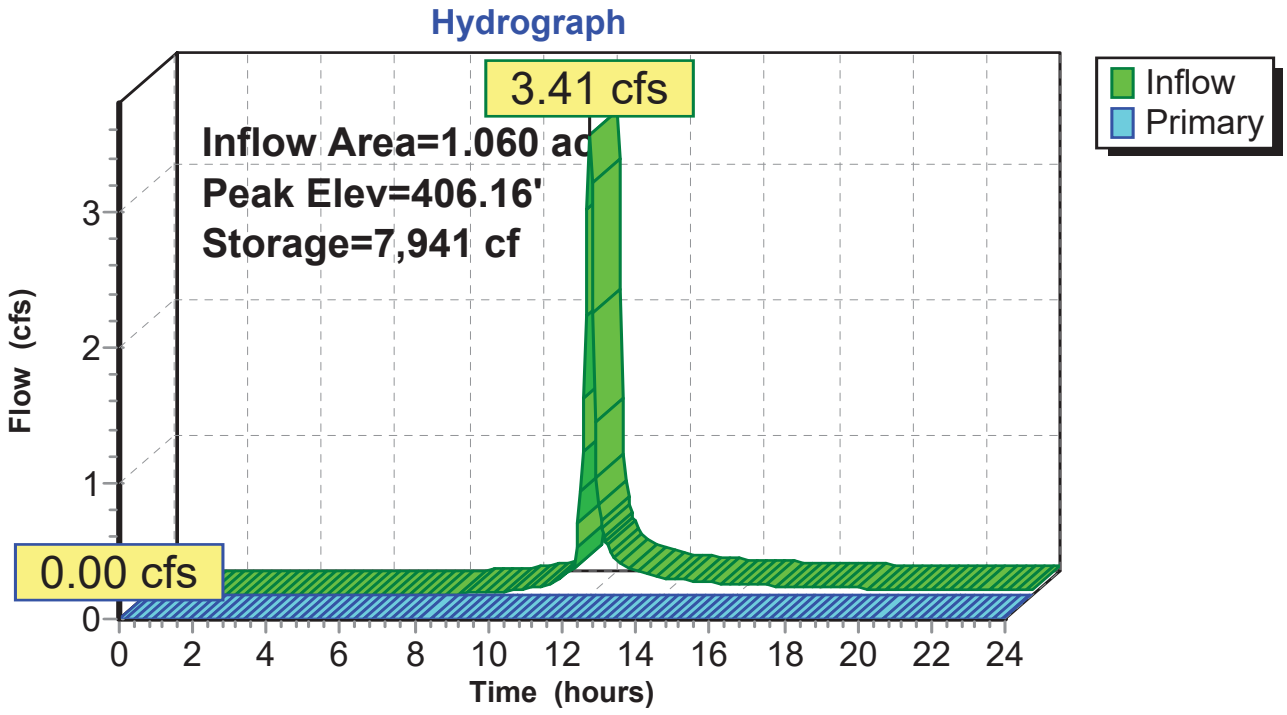
Volume	Invert	Avail.Storage	Storage Description
#1	405.00'	12,667 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
405.00	6,101	0	0
406.00	7,395	6,748	6,748
406.35	7,857	2,669	9,417
406.75	8,394	3,250	12,667

Device	Routing	Invert	Outlet Devices
#1	Primary	406.35'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=405.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond Pond 1e: Pond 1e



Stage-Discharge for Pond Pond 1e: Pond 1e

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
405.00	0.00	405.53	0.00	406.06	0.00	406.59	5.89
405.01	0.00	405.54	0.00	406.07	0.00	406.60	6.27
405.02	0.00	405.55	0.00	406.08	0.00	406.61	6.66
405.03	0.00	405.56	0.00	406.09	0.00	406.62	7.06
405.04	0.00	405.57	0.00	406.10	0.00	406.63	7.46
405.05	0.00	405.58	0.00	406.11	0.00	406.64	7.88
405.06	0.00	405.59	0.00	406.12	0.00	406.65	8.30
405.07	0.00	405.60	0.00	406.13	0.00	406.66	8.73
405.08	0.00	405.61	0.00	406.14	0.00	406.67	9.17
405.09	0.00	405.62	0.00	406.15	0.00	406.68	9.61
405.10	0.00	405.63	0.00	406.16	0.00	406.69	10.07
405.11	0.00	405.64	0.00	406.17	0.00	406.70	10.53
405.12	0.00	405.65	0.00	406.18	0.00	406.71	11.00
405.13	0.00	405.66	0.00	406.19	0.00	406.72	11.48
405.14	0.00	405.67	0.00	406.20	0.00	406.73	11.96
405.15	0.00	405.68	0.00	406.21	0.00	406.74	12.45
405.16	0.00	405.69	0.00	406.22	0.00	406.75	**12.95**
405.17	0.00	405.70	0.00	406.23	0.00		
405.18	0.00	405.71	0.00	406.24	0.00		
405.19	0.00	405.72	0.00	406.25	0.00		
405.20	0.00	405.73	0.00	406.26	0.00		
405.21	0.00	405.74	0.00	406.27	0.00		
405.22	0.00	405.75	0.00	406.28	0.00		
405.23	0.00	405.76	0.00	406.29	0.00		
405.24	0.00	405.77	0.00	406.30	0.00		
405.25	0.00	405.78	0.00	406.31	0.00		
405.26	0.00	405.79	0.00	406.32	0.00		
405.27	0.00	405.80	0.00	406.33	0.00		
405.28	0.00	405.81	0.00	406.34	0.00		
405.29	0.00	405.82	0.00	406.35	0.00		
405.30	0.00	405.83	0.00	406.36	0.05		
405.31	0.00	405.84	0.00	406.37	0.14		
405.32	0.00	405.85	0.00	406.38	0.26		
405.33	0.00	405.86	0.00	406.39	0.40		
405.34	0.00	405.87	0.00	406.40	0.56		
405.35	0.00	405.88	0.00	406.41	0.73		
405.36	0.00	405.89	0.00	406.42	0.92		
405.37	0.00	405.90	0.00	406.43	1.13		
405.38	0.00	405.91	0.00	406.44	1.34		
405.39	0.00	405.92	0.00	406.45	1.57		
405.40	0.00	405.93	0.00	406.46	1.82		
405.41	0.00	405.94	0.00	406.47	2.07		
405.42	0.00	405.95	0.00	406.48	2.33		
405.43	0.00	405.96	0.00	406.49	2.61		
405.44	0.00	405.97	0.00	406.50	2.89		
405.45	0.00	405.98	0.00	406.51	3.19		
405.46	0.00	405.99	0.00	406.52	3.49		
405.47	0.00	406.00	0.00	406.53	3.80		
405.48	0.00	406.01	0.00	406.54	4.12		
405.49	0.00	406.02	0.00	406.55	4.45		
405.50	0.00	406.03	0.00	406.56	4.80		
405.51	0.00	406.04	0.00	406.57	5.15		
405.52	0.00	406.05	0.00	406.58	5.52		

Stage-Area-Storage for Pond Pond 1e: Pond 1e

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
405.00	6,101	0
405.02	6,127	122
405.04	6,153	245
405.06	6,179	368
405.08	6,205	492
405.10	6,230	617
405.12	6,256	741
405.14	6,282	867
405.16	6,308	993
405.18	6,334	1,119
405.20	6,360	1,246
405.22	6,386	1,374
405.24	6,412	1,502
405.26	6,437	1,630
405.28	6,463	1,759
405.30	6,489	1,889
405.32	6,515	2,019
405.34	6,541	2,149
405.36	6,567	2,280
405.38	6,593	2,412
405.40	6,619	2,544
405.42	6,644	2,677
405.44	6,670	2,810
405.46	6,696	2,943
405.48	6,722	3,078
405.50	6,748	3,212
405.52	6,774	3,347
405.54	6,800	3,483
405.56	6,826	3,619
405.58	6,852	3,756
405.60	6,877	3,894
405.62	6,903	4,031
405.64	6,929	4,170
405.66	6,955	4,308
405.68	6,981	4,448
405.70	7,007	4,588
405.72	7,033	4,728
405.74	7,059	4,869
405.76	7,084	5,010
405.78	7,110	5,152
405.80	7,136	5,295
405.82	7,162	5,438
405.84	7,188	5,581
405.86	7,214	5,725
405.88	7,240	5,870
405.90	7,266	6,015
405.92	7,291	6,161
405.94	7,317	6,307
405.96	7,343	6,453
405.98	7,369	6,600
406.00	7,395	6,748
406.02	7,421	6,896
406.04	7,448	7,045
406.06	7,474	7,194
406.08	7,501	7,344
406.10	7,527	7,494
406.12	7,553	7,645
406.14	7,580	7,796
406.16	7,606	7,948
406.18	7,633	8,100
406.20	7,659	8,253
406.22	7,685	8,407
406.24	7,712	8,561
406.26	7,738	8,715
406.28	7,765	8,870
406.30	7,791	9,026
406.32	7,817	9,182
406.34	7,844	9,339
406.36	7,870	9,496
406.38	7,897	9,653
406.40	7,924	9,812
406.42	7,951	9,970
406.44	7,978	10,130
406.46	8,005	10,289
406.48	8,032	10,450
406.50	8,058	10,611
406.52	8,085	10,772
406.54	8,112	10,934
406.56	8,139	11,097
406.58	8,166	11,260
406.60	8,193	11,423
406.62	8,219	11,587
406.64	8,246	11,752
406.66	8,273	11,917
406.68	8,300	12,083
406.70	8,327	12,249
406.72	8,354	12,416
406.74	**8,381**	**12,583**

Summary for Pond Pond 3: Pond 3

Inflow Area = 4.790 ac, 0.00% Impervious, Inflow Depth > 0.59" for 2-yr event
Inflow = 1.86 cfs @ 12.28 hrs, Volume= 0.237 af
Outflow = 0.14 cfs @ 17.65 hrs, Volume= 0.078 af, Atten= 92%, Lag= 322.2 min
Primary = 0.14 cfs @ 17.65 hrs, Volume= 0.078 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 424.49' @ 17.65 hrs Surf.Area= 5,418 sf Storage= 7,071 cf

Plug-Flow detention time= 436.8 min calculated for 0.078 af (33% of inflow)
Center-of-Mass det. time= 263.9 min (1,177.8 - 913.9)

Volume	Invert	Avail.Storage	Storage Description
#1	423.00'	36,852 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
423.00	4,083	0	0
424.00	4,941	4,512	4,512
426.00	6,873	11,814	16,326
428.00	9,007	15,880	32,206
428.50	9,575	4,646	36,852

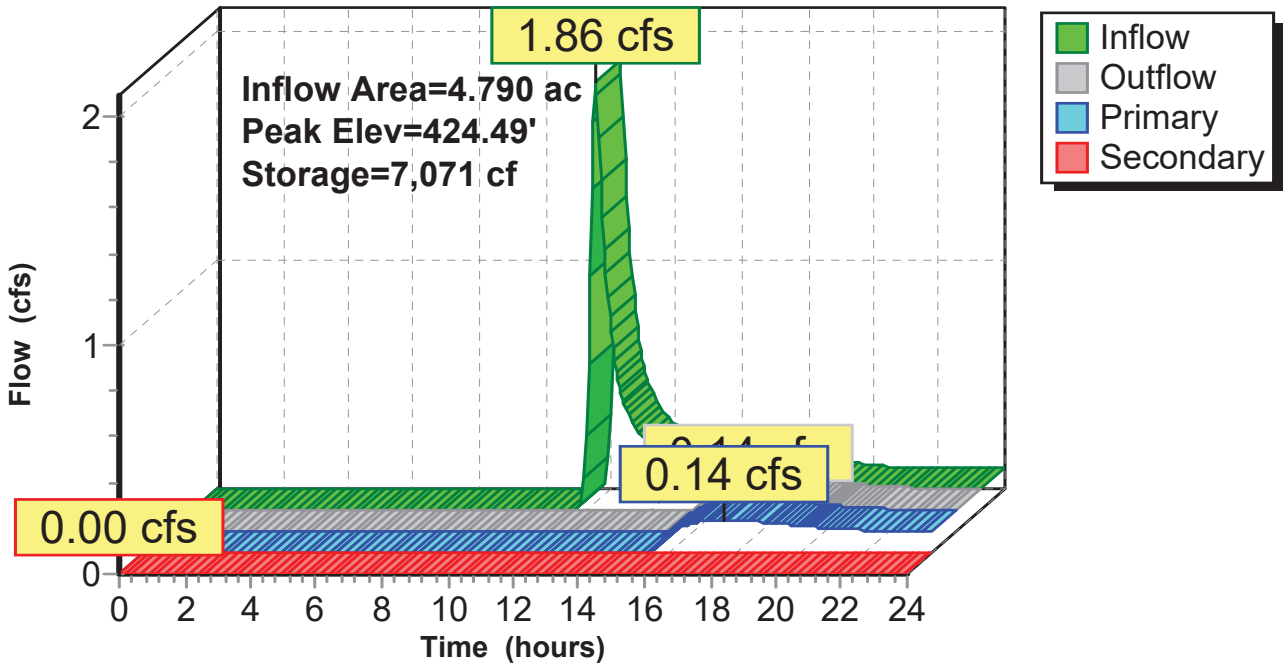
Device	Routing	Invert	Outlet Devices
#1	Primary	423.00'	**18.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 423.00' / 422.00' S= 0.0217 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	424.40'	**1.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height
#3	Device 1	427.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#4	Secondary	427.50'	**25.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.14 cfs @ 17.65 hrs HW=424.49' (Free Discharge)
└**1=Culvert** (Passes 0.14 cfs of 7.35 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.14 cfs @ 1.01 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=423.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 3: Pond 3

Hydrograph



Stage-Discharge for Pond Pond 3: Pond 3

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
423.00	0.00	0.00	0.00
423.10	0.00	0.00	0.00
423.20	0.00	0.00	0.00
423.30	0.00	0.00	0.00
423.40	0.00	0.00	0.00
423.50	0.00	0.00	0.00
423.60	0.00	0.00	0.00
423.70	0.00	0.00	0.00
423.80	0.00	0.00	0.00
423.90	0.00	0.00	0.00
424.00	0.00	0.00	0.00
424.10	0.00	0.00	0.00
424.20	0.00	0.00	0.00
424.30	0.00	0.00	0.00
424.40	0.00	0.00	0.00
424.50	0.15	0.15	0.00
424.60	0.43	0.43	0.00
424.70	0.79	0.79	0.00
424.80	1.20	1.20	0.00
424.90	1.67	1.67	0.00
425.00	2.18	2.18	0.00
425.10	2.72	2.72	0.00
425.20	3.30	3.30	0.00
425.30	3.90	3.90	0.00
425.40	4.52	4.52	0.00
425.50	5.17	5.17	0.00
425.60	5.83	5.83	0.00
425.70	6.51	6.51	0.00
425.80	7.20	7.20	0.00
425.90	7.91	7.91	0.00
426.00	8.61	8.61	0.00
426.10	9.33	9.33	0.00
426.20	10.05	10.05	0.00
426.30	10.77	10.77	0.00
426.40	11.48	11.48	0.00
426.50	12.20	12.20	0.00
426.60	12.91	12.91	0.00
426.70	13.62	13.62	0.00
426.80	14.32	14.32	0.00
426.90	15.01	15.01	0.00
427.00	15.34	15.34	0.00
427.10	15.57	15.57	0.00
427.20	15.80	15.80	0.00
427.30	16.03	16.03	0.00
427.40	16.26	16.26	0.00
427.50	16.48	16.48	0.00
427.60	18.73	16.70	2.03
427.70	22.66	16.91	5.75
427.80	27.78	17.12	10.66
427.90	33.90	17.33	16.57
428.00	41.05	17.54	23.51
428.10	49.12	17.75	31.37
428.20	57.26	17.95	39.31
428.30	65.91	18.15	47.76
428.40	75.23	18.35	56.89
428.50	85.04	18.54	66.50
428.60	95.60	18.74	76.86
428.70	106.68	18.93	87.75
428.80	117.87	19.12	98.75
428.90	129.47	19.31	110.16
429.00	141.21	19.50	121.71
429.10	153.26	19.68	133.57
429.20	166.15	19.86	146.29
429.30	179.43	20.05	159.39
429.40	193.08	20.23	172.85
429.50	207.08	20.40	186.68
429.60	221.43	20.58	200.85
429.70	236.12	20.76	215.37
429.80	251.14	20.93	230.22
429.90	266.49	21.10	245.39
430.00	282.16	21.27	260.89
430.10	**298.14**	**21.44**	**276.70**

Stage-Area-Storage for Pond Pond 3: Pond 3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
423.00	4,083	0
423.10	4,169	413
423.20	4,255	834
423.30	4,340	1,264
423.40	4,426	1,702
423.50	4,512	2,149
423.60	4,598	2,604
423.70	4,684	3,068
423.80	4,769	3,541
423.90	4,855	4,022
424.00	4,941	4,512
424.10	5,038	5,011
424.20	5,134	5,520
424.30	5,231	6,038
424.40	5,327	6,566
424.50	5,424	7,103
424.60	5,521	7,650
424.70	5,617	8,207
424.80	5,714	8,774
424.90	5,810	9,350
425.00	5,907	9,936
425.10	6,004	10,532
425.20	6,100	11,137
425.30	6,197	11,752
425.40	6,293	12,376
425.50	6,390	13,010
425.60	6,487	13,654
425.70	6,583	14,308
425.80	6,680	14,971
425.90	6,776	15,644
426.00	6,873	16,326
426.10	6,980	17,019
426.20	7,086	17,722
426.30	7,193	18,436
426.40	7,300	19,161
426.50	7,407	19,896
426.60	7,513	20,642
426.70	7,620	21,399
426.80	7,727	22,166
426.90	7,833	22,944
427.00	7,940	23,733
427.10	8,047	24,532
427.20	8,153	25,342
427.30	8,260	26,163
427.40	8,367	26,994
427.50	8,474	27,836
427.60	8,580	28,689
427.70	8,687	29,552
427.80	8,794	30,426
427.90	8,900	31,311
428.00	9,007	32,206
428.10	9,121	33,112
428.20	9,234	34,030
428.30	9,348	34,959
428.40	9,461	35,900
428.50	**9,575**	**36,852**
428.60	9,575	36,852
428.70	9,575	36,852
428.80	9,575	36,852
428.90	9,575	36,852
429.00	9,575	36,852
429.10	9,575	36,852
429.20	9,575	36,852
429.30	9,575	36,852
429.40	9,575	36,852
429.50	9,575	36,852
429.60	9,575	36,852
429.70	9,575	36,852
429.80	9,575	36,852
429.90	9,575	36,852
430.00	9,575	36,852
430.10	9,575	36,852

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1a: P-1a Runoff Area=26.040 ac 0.35% Impervious Runoff Depth>2.12"
Flow Length=968' Tc=39.7 min CN=75 Runoff=39.41 cfs 4.602 af

Subcatchment P-1b: P-1b Runoff Area=16.720 ac 26.61% Impervious Runoff Depth>1.74"
Flow Length=786' Tc=43.2 min CN=70 Runoff=18.97 cfs 2.418 af

Subcatchment P-1c: P-1c Runoff Area=10.630 ac 0.56% Impervious Runoff Depth>1.32"
Flow Length=726' Tc=34.5 min CN=64 Runoff=10.08 cfs 1.172 af

Subcatchment P-1d: P-1d Runoff Area=6.230 ac 4.01% Impervious Runoff Depth>1.53"
Flow Length=766' Tc=33.1 min CN=67 Runoff=7.30 cfs 0.793 af

Subcatchment P-1e: P-1e Runoff Area=1.060 ac 65.09% Impervious Runoff Depth>3.01"
Tc=9.2 min CN=85 Runoff=4.91 cfs 0.266 af

Subcatchment P-2: P-2 Runoff Area=12.650 ac 0.00% Impervious Runoff Depth>1.57"
Flow Length=1,476' Tc=74.9 min CN=68 Runoff=8.63 cfs 1.659 af

Subcatchment P-3: P-3 Runoff Area=4.790 ac 0.00% Impervious Runoff Depth>1.13"
Flow Length=551' Tc=28.2 min CN=61 Runoff=4.27 cfs 0.453 af

Subcatchment P-4: P-4 Runoff Area=3.370 ac 0.00% Impervious Runoff Depth>2.20"
Flow Length=590' Tc=36.5 min CN=76 Runoff=5.64 cfs 0.619 af

Reach R-1: R-1 Avg. Flow Depth=0.46' Max Vel=3.88 fps Inflow=10.58 cfs 2.316 af
n=0.040 L=799.0' S=0.0388 '/' Capacity=41.87 cfs Outflow=10.55 cfs 2.304 af

Reach R-2: R-2 Avg. Flow Depth=1.35' Max Vel=2.25 fps Inflow=42.99 cfs 6.906 af
n=0.040 L=1,801.0' S=0.0036 '/' Capacity=23.64 cfs Outflow=37.95 cfs 6.780 af

Reach R-3: R-3 Avg. Flow Depth=2.40' Max Vel=1.40 fps Inflow=44.51 cfs 8.530 af
n=0.040 L=280.0' S=0.0011 '/' Capacity=12.88 cfs Outflow=44.10 cfs 8.493 af

Reach R-4: R-4 Avg. Flow Depth=2.55' Max Vel=1.30 fps Inflow=44.10 cfs 8.542 af
n=0.040 L=219.0' S=0.0009 '/' Capacity=11.89 cfs Outflow=43.83 cfs 8.511 af

Pond Pond 1b: Pond 1b Peak Elev=443.30' Storage=27,238 cf Inflow=18.97 cfs 2.418 af
Outflow=10.58 cfs 2.316 af

Pond Pond 1c: Pond 1c Peak Elev=411.08' Storage=13,841 cf Inflow=10.08 cfs 1.172 af
Primary=5.48 cfs 1.070 af Secondary=0.00 cfs 0.000 af Outflow=5.48 cfs 1.070 af

Pond Pond 1d: Pond 1d Peak Elev=409.81' Storage=14,356 cf Inflow=7.30 cfs 0.793 af
Primary=1.43 cfs 0.679 af Secondary=0.00 cfs 0.000 af Outflow=1.43 cfs 0.679 af

Pond Pond 1e: Pond 1e Peak Elev=406.37' Storage=9,540 cf Inflow=4.91 cfs 0.266 af
Outflow=0.10 cfs 0.048 af

Pond Pond 3: Pond 3 Peak Elev=424.72' Storage=8,316 cf Inflow=4.27 cfs 0.453 af
Primary=0.87 cfs 0.291 af Secondary=0.00 cfs 0.000 af Outflow=0.87 cfs 0.291 af

Summary for Subcatchment P-1a: P-1a

Runoff = 39.41 cfs @ 12.37 hrs, Volume= 4.602 af, Depth> 2.12"

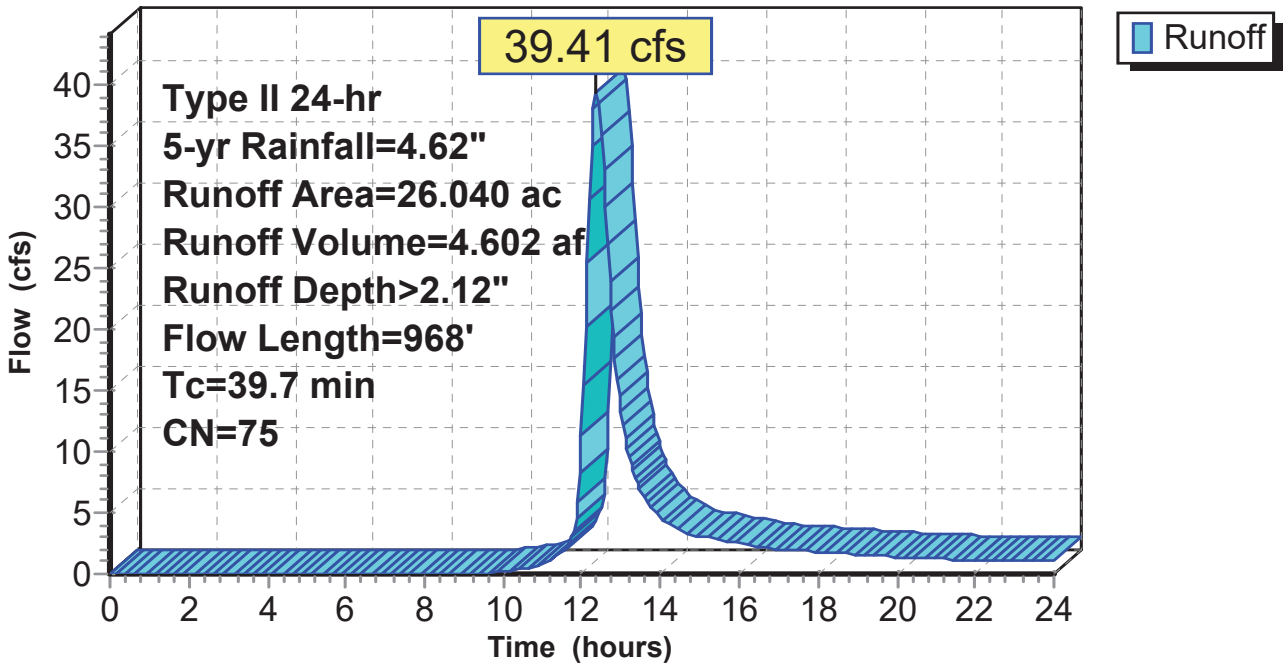
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=4.62"

Area (ac)	CN	Description
1.270	80	>75% Grass cover, Good, HSG D
3.830	61	>75% Grass cover, Good, HSG B
14.130	83	Woods, Poor, HSG D
6.720	66	Woods, Poor, HSG B
0.090	98	Paved parking, HSG B
26.040	75	Weighted Average
25.950		99.65% Pervious Area
0.090		0.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.0	150	0.0067	0.09		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
2.1	115	0.0170	0.91		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.1	262	0.0920	2.12		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
1.8	227	0.1850	2.15		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
4.7	214	0.0230	0.76		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
39.7	968	Total			

Subcatchment P-1a: P-1a

Hydrograph



Summary for Subcatchment P-1b: P-1b

Runoff = 18.97 cfs @ 12.43 hrs, Volume= 2.418 af, Depth> 1.74"

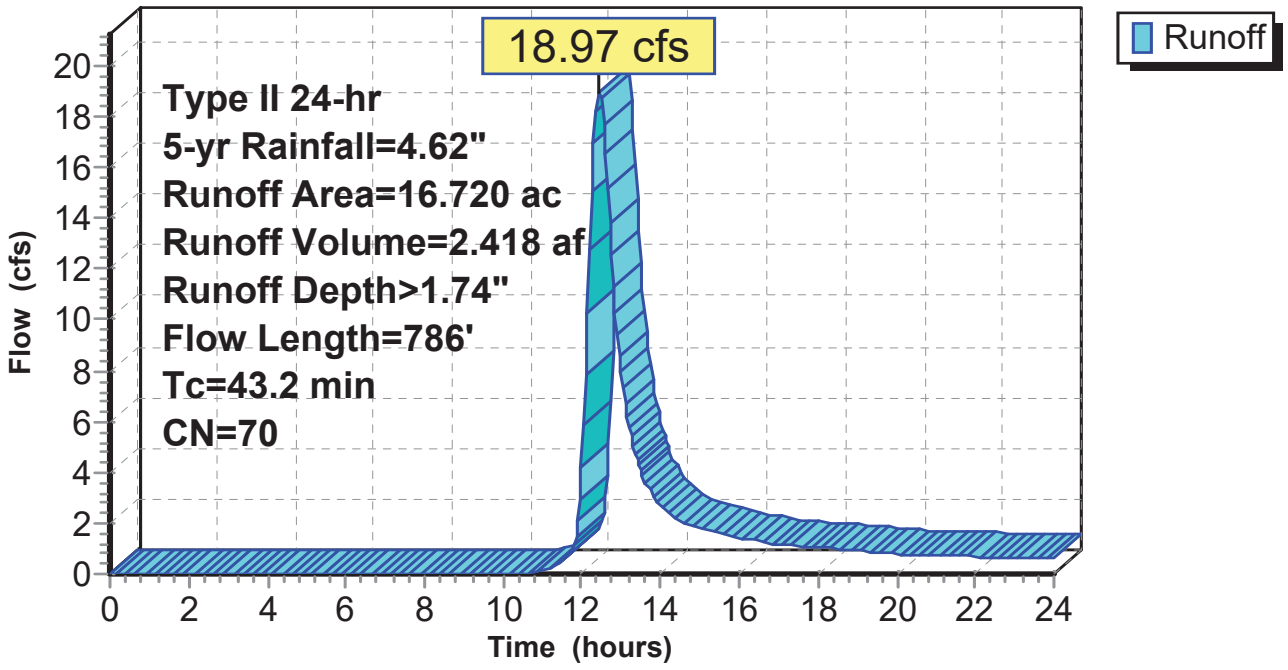
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=4.62"

Area (ac)	CN	Description
9.360	61	>75% Grass cover, Good, HSG B
4.450	98	Paved parking, HSG B
2.910	55	Woods, Good, HSG B
16.720	70	Weighted Average
12.270		73.39% Pervious Area
4.450		26.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.0	150	0.0030	0.06		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
1.4	57	0.0090	0.66		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.2	109	0.2290	7.70		**Shallow Concentrated Flow, CD** Unpaved Kv= 16.1 fps
0.8	164	0.0270	3.34		**Shallow Concentrated Flow, DE** Paved Kv= 20.3 fps
0.8	306	0.0120	6.51	11.51	**Pipe Channel, EF** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
43.2	786	Total			

Subcatchment P-1b: P-1b

Hydrograph



Summary for Subcatchment P-1c: P-1c

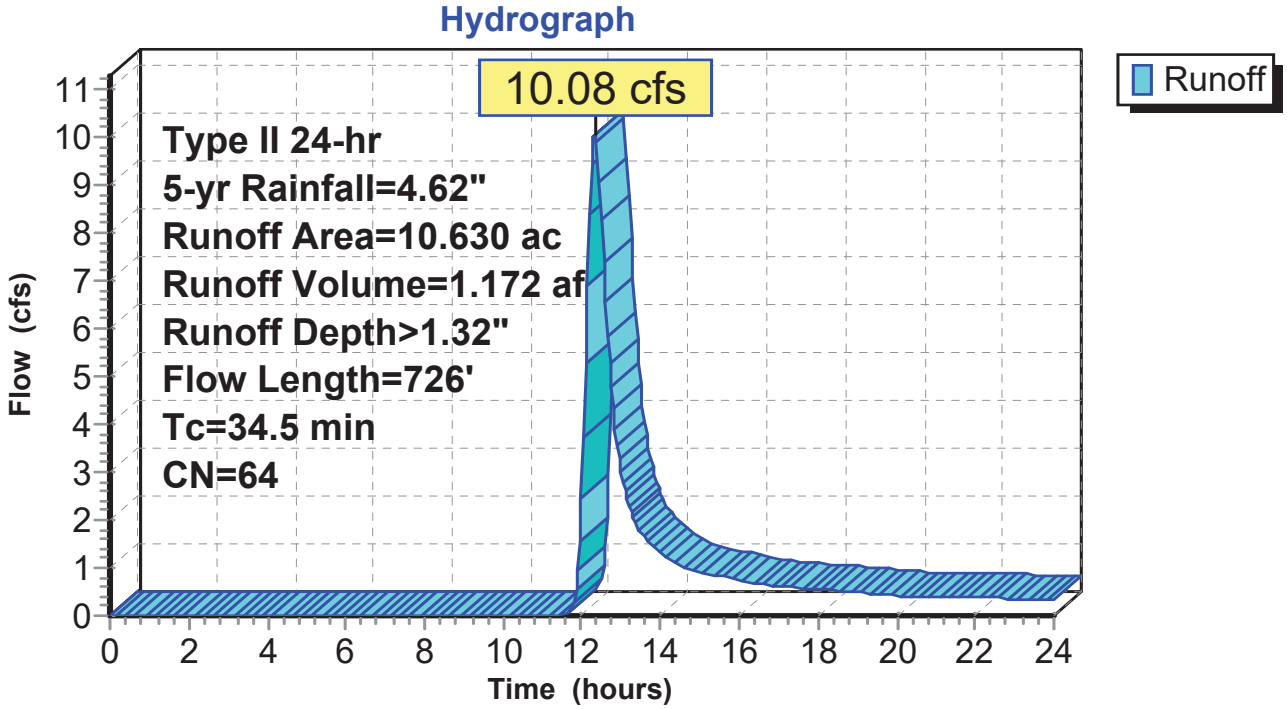
Runoff = 10.08 cfs @ 12.33 hrs, Volume= 1.172 af, Depth> 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=4.62"

Area (ac)	CN	Description
8.950	61	>75% Grass cover, Good, HSG B
1.620	80	>75% Grass cover, Good, HSG D
0.060	98	Paved parking, HSG D
10.630	64	Weighted Average
10.570		99.44% Pervious Area
0.060		0.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.7	150	0.0100	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
6.7	323	0.0130	0.80		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.8	201	0.0300	1.21		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.3	52	0.2300	3.36		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
34.5	726	Total			

Subcatchment P-1c: P-1c



Summary for Subcatchment P-1d: P-1d

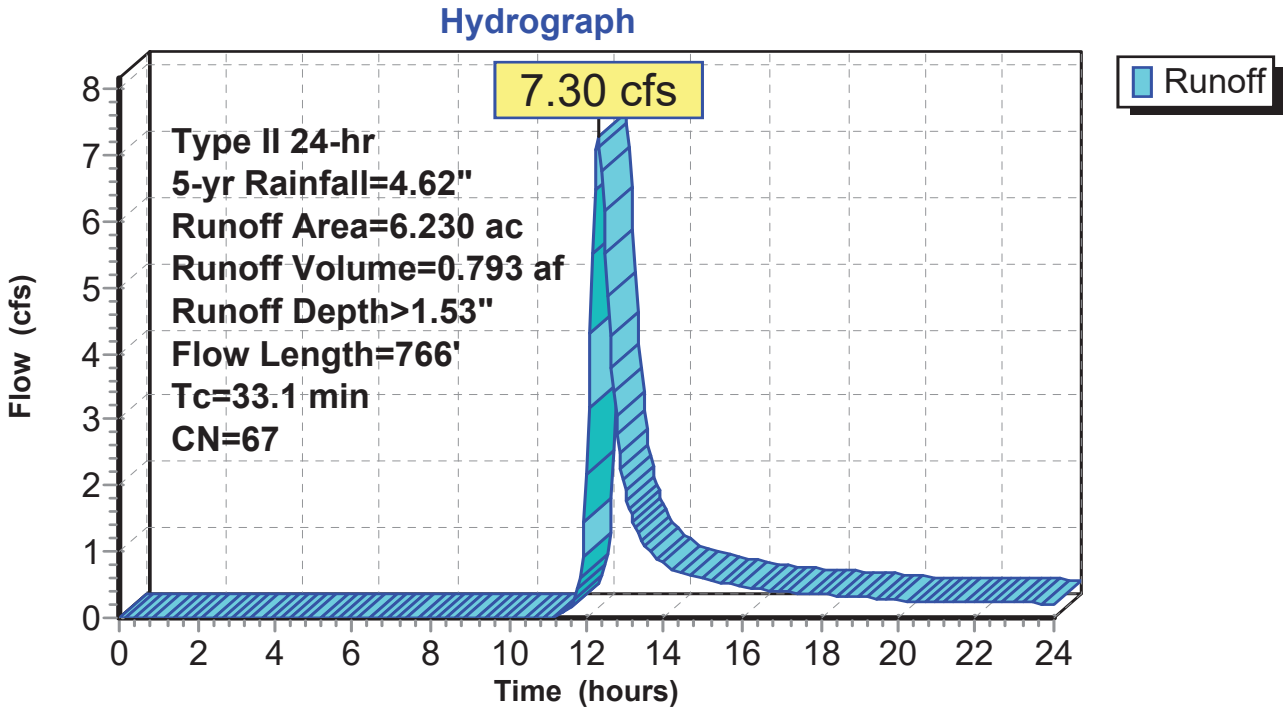
Runoff = 7.30 cfs @ 12.30 hrs, Volume= 0.793 af, Depth> 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=4.62"

Area (ac)	CN	Description
1.430	80	>75% Grass cover, Good, HSG D
4.550	61	>75% Grass cover, Good, HSG B
0.250	98	Paved parking, HSG B
6.230	67	Weighted Average
5.980		95.99% Pervious Area
0.250		4.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	150	0.0130	0.11		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.8	435	0.0140	0.83		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.1	181	0.0440	1.47		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
33.1	766	Total			

Subcatchment P-1d: P-1d



Summary for Subcatchment P-1e: P-1e

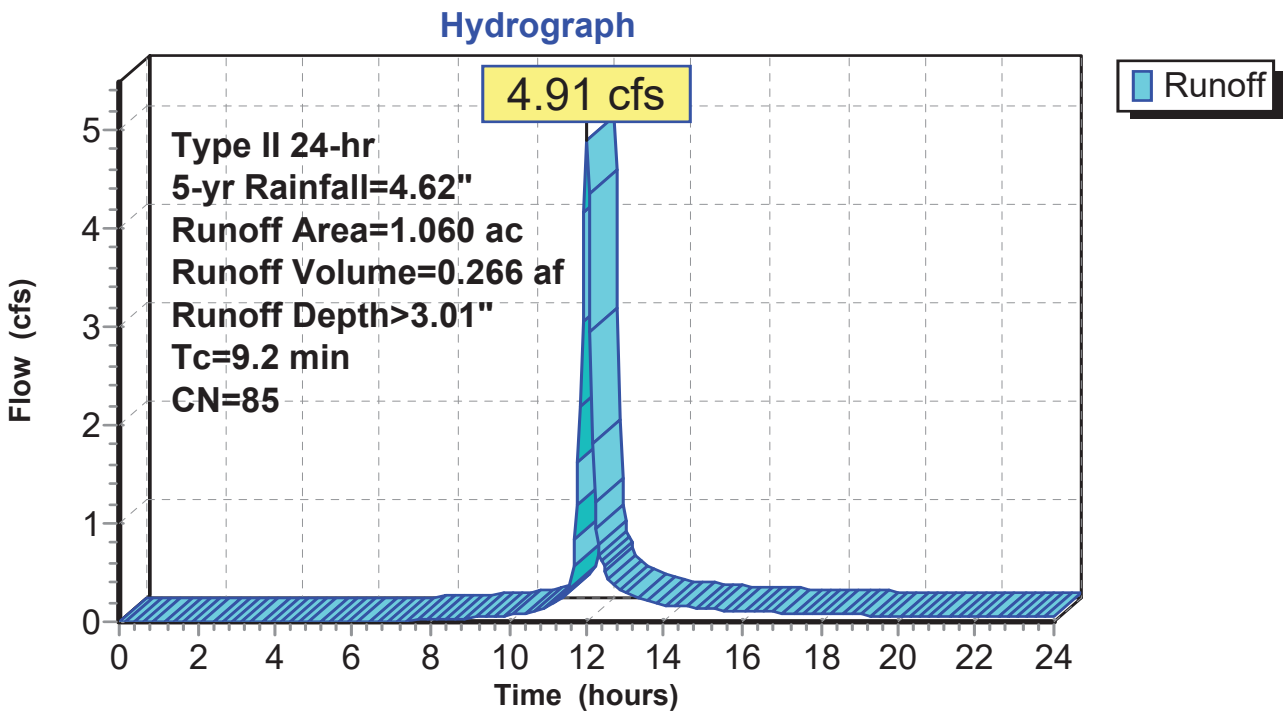
Runoff = 4.91 cfs @ 12.00 hrs, Volume= 0.266 af, Depth> 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=4.62"

Area (ac)	CN	Description
0.690	98	Paved parking, HSG B
0.370	61	>75% Grass cover, Good, HSG B
1.060	85	Weighted Average
0.370		34.91% Pervious Area
0.690		65.09% Impervious Area

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

Subcatchment P-1e: P-1e



Summary for Subcatchment P-2: P-2

Runoff = 8.63 cfs @ 12.88 hrs, Volume= 1.659 af, Depth> 1.57"

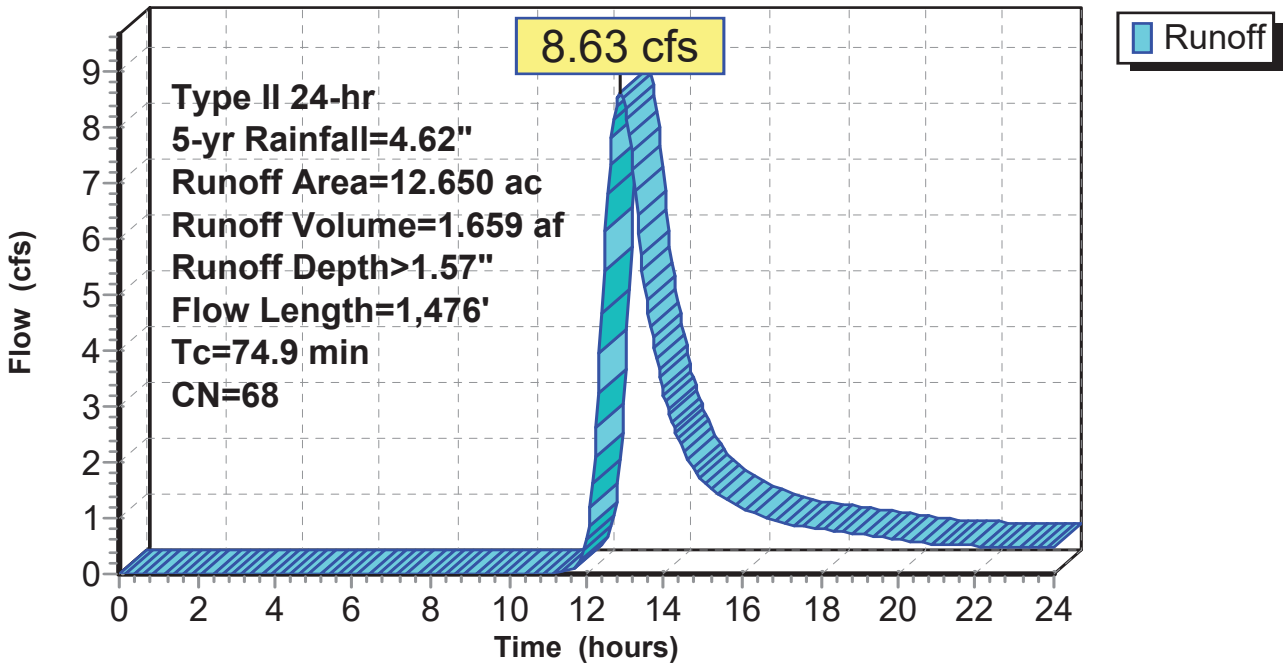
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=4.62"

Area (ac)	CN	Description
7.070	61	>75% Grass cover, Good, HSG B
2.000	66	Woods, Poor, HSG B
3.580	83	Woods, Poor, HSG D
12.650	68	Weighted Average
12.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	150	0.0087	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.6	362	0.0100	0.70		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.3	66	0.3330	4.04		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.8	68	0.0800	1.41		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
39.1	830	0.0050	0.35		**Shallow Concentrated Flow, EF** Woodland Kv= 5.0 fps
74.9	1,476	Total			

Subcatchment P-2: P-2

Hydrograph



Summary for Subcatchment P-3: P-3

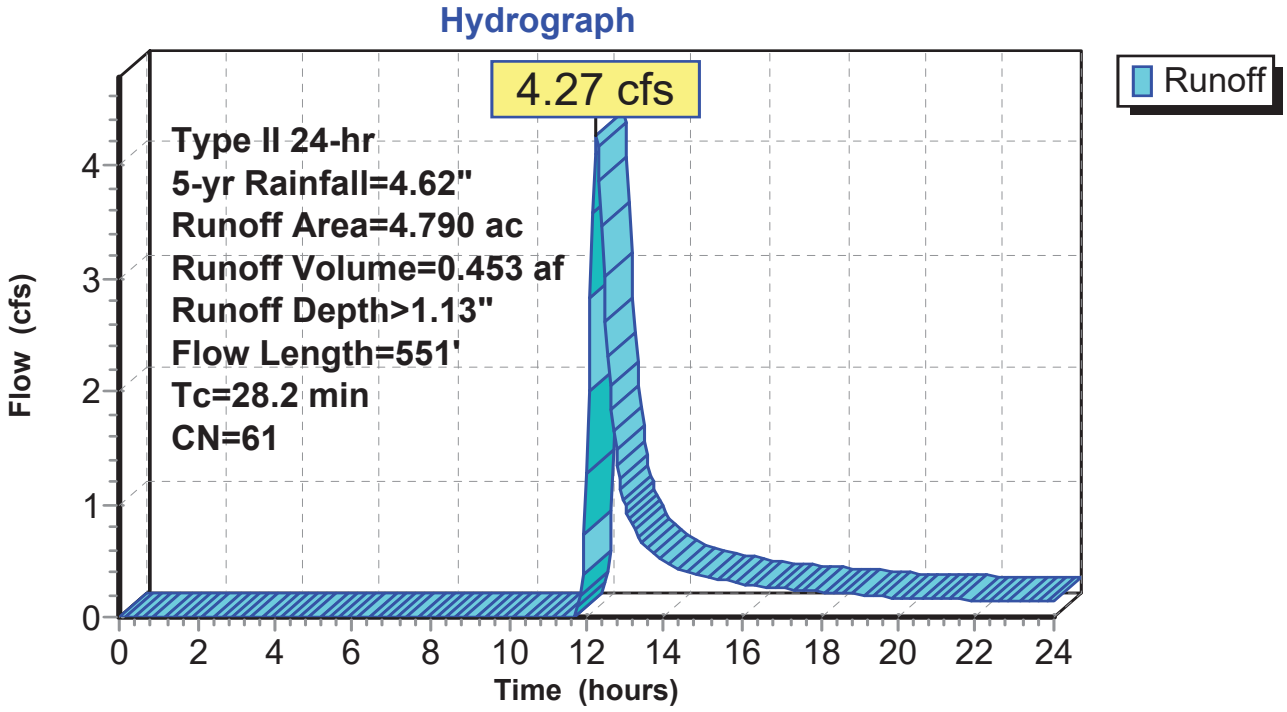
Runoff = 4.27 cfs @ 12.26 hrs, Volume= 0.453 af, Depth> 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=4.62"

Area (ac)	CN	Description
4.790	61	>75% Grass cover, Good, HSG B
4.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.5	150	0.0180	0.13		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.7	401	0.0120	0.77		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
28.2	551	Total			

Subcatchment P-3: P-3



Summary for Subcatchment P-4: P-4

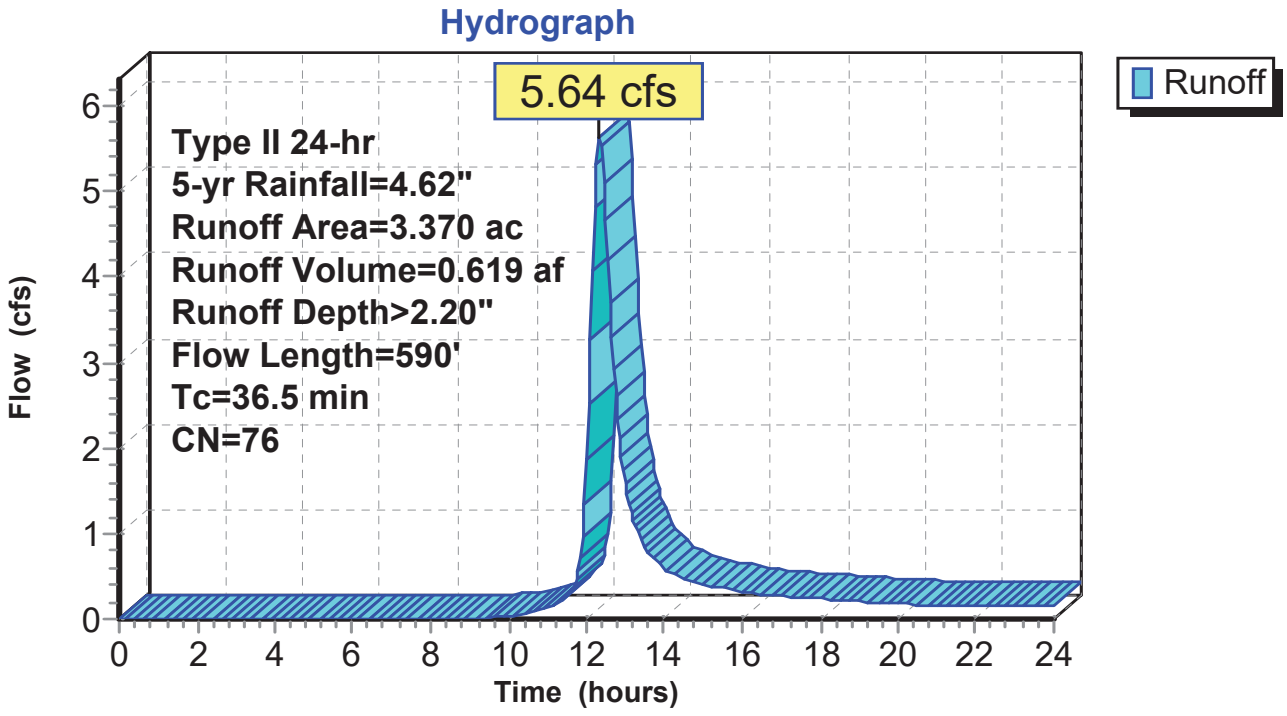
Runoff = 5.64 cfs @ 12.33 hrs, Volume= 0.619 af, Depth> 2.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=4.62"

Area (ac)	CN	Description
1.830	83	Woods, Poor, HSG D
1.140	66	Woods, Poor, HSG B
0.290	80	>75% Grass cover, Good, HSG D
0.110	61	>75% Grass cover, Good, HSG B
3.370	76	Weighted Average
3.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.6	150	0.0600	0.08		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
4.9	440	0.0890	1.49		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
36.5	590	Total			

Subcatchment P-4: P-4



Summary for Reach R-1: R-1

Inflow Area = 16.720 ac, 26.61% Impervious, Inflow Depth > 1.66" for 5-yr event
Inflow = 10.58 cfs @ 12.84 hrs, Volume= 2.316 af
Outflow = 10.55 cfs @ 12.94 hrs, Volume= 2.304 af, Atten= 0%, Lag= 6.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.88 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 2.01 fps, Avg. Travel Time= 6.6 min

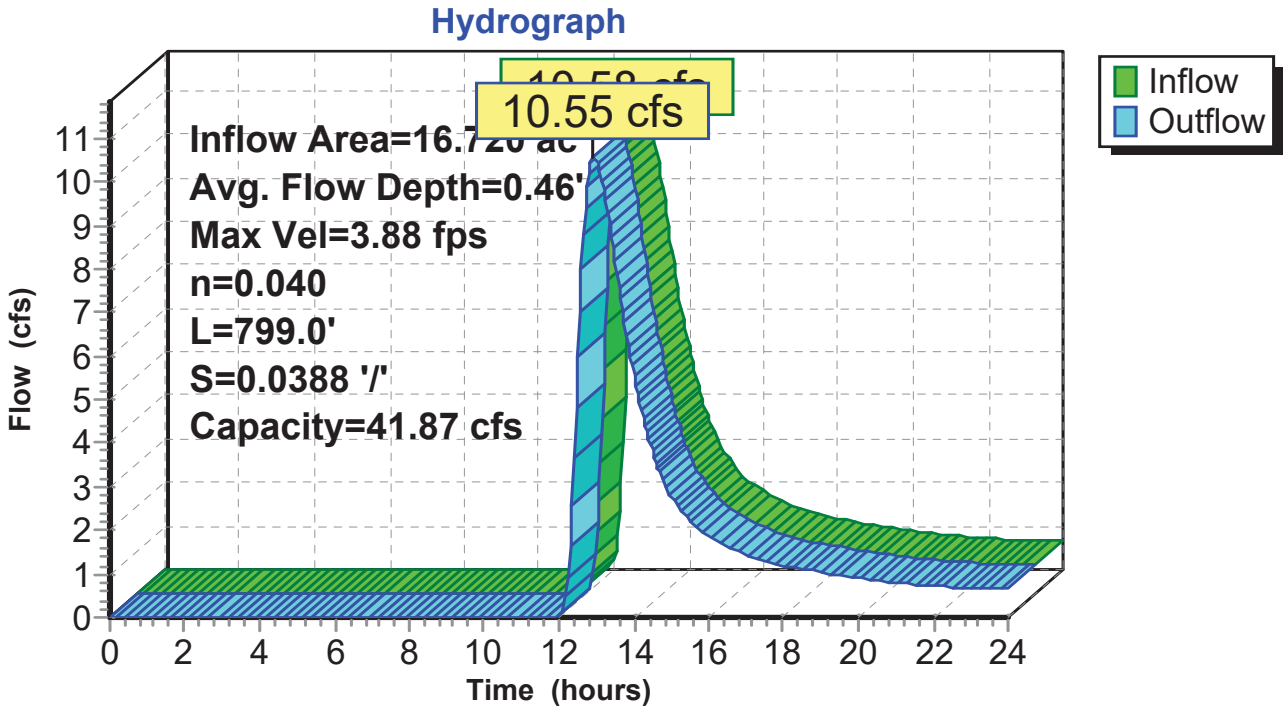
Peak Storage= 2,175 cf @ 12.88 hrs
Average Depth at Peak Storage= 0.46'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 41.87 cfs

5.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 799.0' Slope= 0.0388 '/'
Inlet Invert= 441.00', Outlet Invert= 410.00'



‡

Reach R-1: R-1



Stage-Discharge for Reach R-1: R-1

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
441.00	0.00	0.00
441.01	0.34	0.02
441.02	0.54	0.05
441.03	0.70	0.11
441.04	0.84	0.17
441.05	0.98	0.25
441.06	1.10	0.34
441.07	1.22	0.44
441.08	1.32	0.55
441.09	1.43	0.67
441.10	1.53	0.79
441.11	1.62	0.93
441.12	1.72	1.08
441.13	1.81	1.23
441.14	1.89	1.40
441.15	1.97	1.57
441.16	2.06	1.75
441.17	2.14	1.94
441.18	2.21	2.13
441.19	2.29	2.34
441.20	2.36	2.55
441.21	2.43	2.77
441.22	2.50	3.00
441.23	2.57	3.23
441.24	2.64	3.47
441.25	2.70	3.72
441.26	2.77	3.98
441.27	2.83	4.24
441.28	2.90	4.51
441.29	2.96	4.79
441.30	3.02	5.07
441.31	3.08	5.36
441.32	3.14	5.66
441.33	3.19	5.97
441.34	3.25	6.28
441.35	3.31	6.60
441.36	3.36	6.92
441.37	3.42	7.26
441.38	3.47	7.60
441.39	3.52	7.94
441.40	3.58	8.30
441.41	3.63	8.66
441.42	3.68	9.03
441.43	3.73	9.40
441.44	3.78	9.78
441.45	3.83	10.17
441.46	3.88	10.56
441.47	3.93	10.96
441.48	3.97	11.37
441.49	4.02	11.78
441.50	4.07	12.21
441.51	4.11	12.63
441.52	4.16	13.07
441.53	4.21	13.51
441.54	4.25	13.96
441.55	4.30	14.41
441.56	4.34	14.87
441.57	4.38	15.34
441.58	4.43	15.82
441.59	4.47	16.30
441.60	4.51	16.78
441.61	4.55	17.28
441.62	4.60	17.78
441.63	4.64	18.29
441.64	4.68	18.80
441.65	4.72	19.32
441.66	4.76	19.85
441.67	4.80	20.39
441.68	4.84	20.93
441.69	4.88	21.48
441.70	4.92	22.03
441.71	4.96	22.60
441.72	5.00	23.16
441.73	5.03	23.74
441.74	5.07	24.32
441.75	5.11	24.91
441.76	5.15	25.51
441.77	5.18	26.11
441.78	5.22	26.72
441.79	5.26	27.34
441.80	5.30	27.96
441.81	5.33	28.59
441.82	5.37	29.22
441.83	5.40	29.87
441.84	5.44	30.52
441.85	5.47	31.18
441.86	5.51	31.84
441.87	5.54	32.51
441.88	5.58	33.19
441.89	5.61	33.87
441.90	5.65	34.57
441.91	5.68	35.27
441.92	5.72	35.97
441.93	5.75	36.68
441.94	5.78	37.40
441.95	5.82	38.13
441.96	5.85	38.86
441.97	5.88	39.60
441.98	5.92	40.35
441.99	5.95	41.11
442.00	**5.98**	**41.87**

Stage-Area-Storage for Reach R-1: R-1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
441.00	0.0	0
441.01	0.1	40
441.02	0.1	81
441.03	0.2	121
441.04	0.2	162
441.05	0.3	204
441.06	0.3	245
441.07	0.4	287
441.08	0.4	330
441.09	0.5	372
441.10	0.5	415
441.11	0.6	459
441.12	0.6	502
441.13	0.7	546
441.14	0.7	591
441.15	0.8	635
441.16	0.9	680
441.17	0.9	725
441.18	1.0	771
441.19	1.0	817
441.20	1.1	863
441.21	1.1	909
441.22	1.2	956
441.23	1.3	1,003
441.24	1.3	1,051
441.25	1.4	1,099
441.26	1.4	1,147
441.27	1.5	1,195
441.28	1.6	1,244
441.29	1.6	1,293
441.30	1.7	1,342
441.31	1.7	1,392
441.32	1.8	1,442
441.33	1.9	1,492
441.34	1.9	1,543
441.35	2.0	1,594
441.36	2.1	1,645
441.37	2.1	1,697
441.38	2.2	1,749
441.39	2.3	1,801
441.40	2.3	1,854
441.41	2.4	1,907
441.42	2.5	1,960
441.43	2.5	2,013
441.44	2.6	2,067
441.45	2.7	2,121
441.46	2.7	2,176
441.47	2.8	2,231
441.48	2.9	2,286
441.49	2.9	2,341
441.50	3.0	2,397
441.51	3.1	2,453
441.52	3.1	2,509
441.53	3.2	2,566
441.54	3.3	2,623
441.55	3.4	2,681
441.56	3.4	2,738
441.57	3.5	2,796
441.58	3.6	2,855
441.59	3.6	2,913
441.60	3.7	2,972
441.61	3.8	3,032
441.62	3.9	3,091
441.63	3.9	3,151
441.64	4.0	3,211
441.65	4.1	3,272
441.66	4.2	3,333
441.67	4.2	3,394
441.68	4.3	3,456
441.69	4.4	3,517
441.70	4.5	3,580
441.71	4.6	3,642
441.72	4.6	3,705
441.73	4.7	3,768
441.74	4.8	3,831
441.75	4.9	3,895
441.76	5.0	3,959
441.77	5.0	4,024
441.78	5.1	4,088
441.79	5.2	4,153
441.80	5.3	4,219
441.81	5.4	4,284
441.82	5.4	4,350
441.83	5.5	4,417
441.84	5.6	4,483
441.85	5.7	4,550
441.86	5.8	4,618
441.87	5.9	4,685
441.88	5.9	4,753
441.89	6.0	4,821
441.90	6.1	4,890
441.91	6.2	4,959
441.92	6.3	5,028
441.93	6.4	5,097
441.94	6.5	5,167
441.95	6.6	5,237
441.96	6.6	5,308
441.97	6.7	5,379
441.98	6.8	5,450
441.99	6.9	5,521
442.00	**7.0**	**5,593**

Summary for Reach R-2: R-2

Inflow Area = 42.760 ac, 10.62% Impervious, Inflow Depth > 1.94" for 5-yr event
Inflow = 42.99 cfs @ 12.42 hrs, Volume= 6.906 af
Outflow = 37.95 cfs @ 12.82 hrs, Volume= 6.780 af, Atten= 12%, Lag= 24.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.25 fps, Min. Travel Time= 13.4 min
Avg. Velocity = 0.98 fps, Avg. Travel Time= 30.7 min

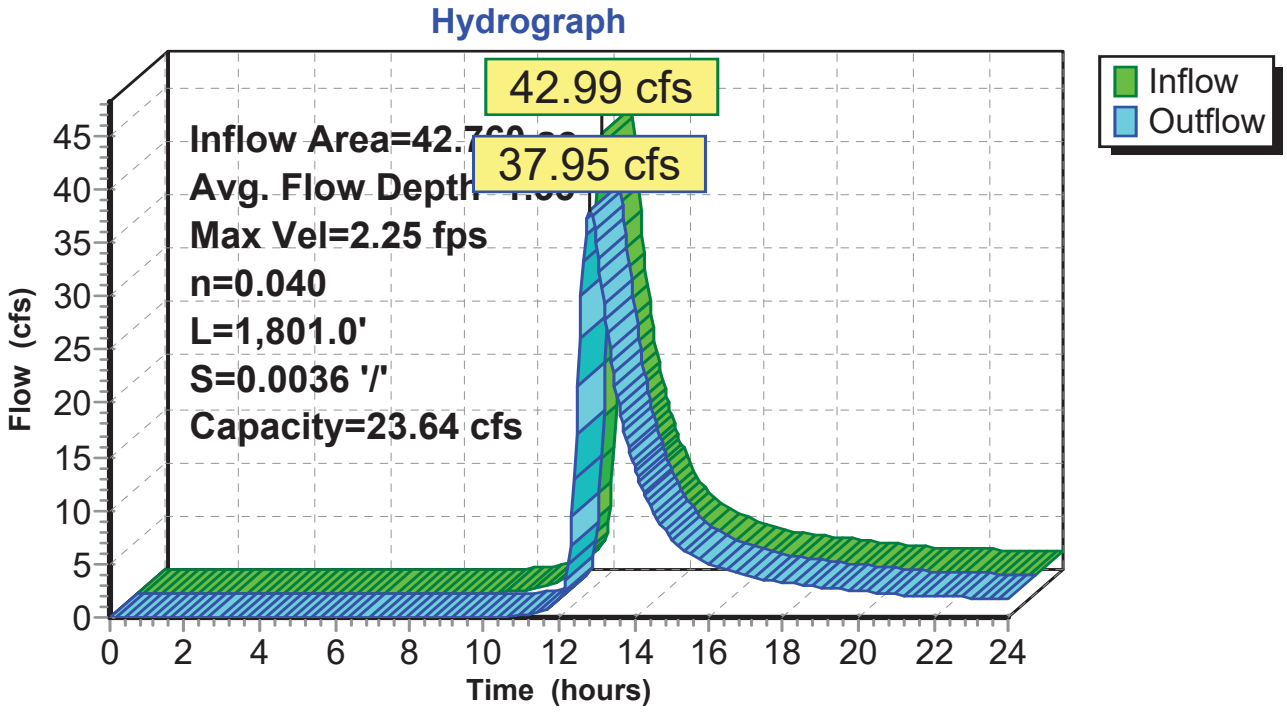
Peak Storage= 30,465 cf @ 12.60 hrs
Average Depth at Peak Storage= 1.35'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 23.64 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 1,801.0' Slope= 0.0036 '/'
Inlet Invert= 410.00', Outlet Invert= 403.50'



‡

Reach R-2: R-2



Stage-Discharge for Reach R-2: R-2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
410.00	0.00	0.00
410.01	0.10	0.01
410.02	0.16	0.03
410.03	0.21	0.06
410.04	0.26	0.10
410.05	0.30	0.15
410.06	0.34	0.21
410.07	0.37	0.27
410.08	0.41	0.33
410.09	0.44	0.40
410.10	0.47	0.48
410.11	0.50	0.57
410.12	0.53	0.65
410.13	0.56	0.75
410.14	0.59	0.85
410.15	0.62	0.95
410.16	0.64	1.06
410.17	0.67	1.17
410.18	0.69	1.29
410.19	0.72	1.41
410.20	0.74	1.54
410.21	0.76	1.67
410.22	0.79	1.81
410.23	0.81	1.95
410.24	0.83	2.09
410.25	0.85	2.24
410.26	0.87	2.39
410.27	0.89	2.55
410.28	0.92	2.71
410.29	0.94	2.87
410.30	0.96	3.04
410.31	0.98	3.21
410.32	1.00	3.39
410.33	1.01	3.57
410.34	1.03	3.75
410.35	1.05	3.94
410.36	1.07	4.13
410.37	1.09	4.33
410.38	1.11	4.53
410.39	1.13	4.73
410.40	1.14	4.94
410.41	1.16	5.15
410.42	1.18	5.36
410.43	1.19	5.58
410.44	1.21	5.80
410.45	1.23	6.03
410.46	1.24	6.25
410.47	1.26	6.49
410.48	1.28	6.72
410.49	1.29	6.96
410.50	1.31	7.20
410.51	1.33	7.45
410.52	1.34	7.70
410.53	1.36	7.95
410.54	1.37	8.21
410.55	1.39	8.47
410.56	1.40	8.73
410.57	1.42	9.00
410.58	1.43	9.27
410.59	1.45	9.54
410.60	1.46	9.82
410.61	1.48	10.10
410.62	1.49	10.38
410.63	1.50	10.67
410.64	1.52	10.96
410.65	1.53	11.26
410.66	1.55	11.55
410.67	1.56	11.86
410.68	1.57	12.16
410.69	1.59	12.47
410.70	1.60	12.78
410.71	1.61	13.09
410.72	1.63	13.41
410.73	1.64	13.73
410.74	1.65	14.06
410.75	1.67	14.38
410.76	1.68	14.71
410.77	1.69	15.05
410.78	1.71	15.39
410.79	1.72	15.73
410.80	1.73	16.07
410.81	1.74	16.42
410.82	1.76	16.77
410.83	1.77	17.12
410.84	1.78	17.48
410.85	1.79	17.84
410.86	1.81	18.20
410.87	1.82	18.57
410.88	1.83	18.94
410.89	1.84	19.31
410.90	1.85	19.69
410.91	1.87	20.07
410.92	1.88	20.45
410.93	1.89	20.84
410.94	1.90	21.23
410.95	1.91	21.62
410.96	1.92	22.02
410.97	1.94	22.42
410.98	1.95	22.82
410.99	1.96	23.23
411.00	**1.97**	**23.64**

Stage-Area-Storage for Reach R-2: R-2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
410.00	0.0	0
410.01	0.1	180
410.02	0.2	362
410.03	0.3	544
410.04	0.4	726
410.05	0.5	910
410.06	0.6	1,094
410.07	0.7	1,278
410.08	0.8	1,464
410.09	0.9	1,650
410.10	1.0	1,837
410.11	1.1	2,025
410.12	1.2	2,213
410.13	1.3	2,402
410.14	1.4	2,592
410.15	1.5	2,783
410.16	1.7	2,974
410.17	1.8	3,166
410.18	1.9	3,359
410.19	2.0	3,552
410.20	2.1	3,746
410.21	2.2	3,941
410.22	2.3	4,137
410.23	2.4	4,333
410.24	2.5	4,530
410.25	2.6	4,728
410.26	2.7	4,926
410.27	2.8	5,125
410.28	3.0	5,325
410.29	3.1	5,526
410.30	3.2	5,727
410.31	3.3	5,929
410.32	3.4	6,132
410.33	3.5	6,336
410.34	3.6	6,540
410.35	3.7	6,745
410.36	3.9	6,950
410.37	4.0	7,157
410.38	4.1	7,364
410.39	4.2	7,572
410.40	4.3	7,780
410.41	4.4	7,990
410.42	4.6	8,200
410.43	4.7	8,410
410.44	4.8	8,622
410.45	4.9	8,834
410.46	5.0	9,047
410.47	5.1	9,260
410.48	5.3	9,475
410.49	5.4	9,690
410.50	5.5	9,906
410.51	5.6	10,122
410.52	5.7	10,339
410.53	5.9	10,557
410.54	6.0	10,776
410.55	6.1	10,995
410.56	6.2	11,215
410.57	6.3	11,436
410.58	6.5	11,658
410.59	6.6	11,880
410.60	6.7	12,103
410.61	6.8	12,326
410.62	7.0	12,551
410.63	7.1	12,776
410.64	7.2	13,002
410.65	7.3	13,228
410.66	7.5	13,456
410.67	7.6	13,684
410.68	7.7	13,912
410.69	7.9	14,142
410.70	8.0	14,372
410.71	8.1	14,603
410.72	8.2	14,834
410.73	8.4	15,067
410.74	8.5	15,300
410.75	8.6	15,534
410.76	8.8	15,768
410.77	8.9	16,003
410.78	9.0	16,239
410.79	9.1	16,476
410.80	9.3	16,713
410.81	9.4	16,951
410.82	9.5	17,190
410.83	9.7	17,430
410.84	9.8	17,670
410.85	9.9	17,911
410.86	10.1	18,153
410.87	10.2	18,395
410.88	10.3	18,638
410.89	10.5	18,882
410.90	10.6	19,127
410.91	10.8	19,372
410.92	10.9	19,618
410.93	11.0	19,865
410.94	11.2	20,112
410.95	11.3	20,360
410.96	11.4	20,609
410.97	11.6	20,859
410.98	11.7	21,109
410.99	11.9	21,360
411.00	**12.0**	**21,612**

Summary for Reach R-3: R-3

Inflow Area = 59.620 ac, 8.13% Impervious, Inflow Depth > 1.72" for 5-yr event
Inflow = 44.51 cfs @ 12.81 hrs, Volume= 8.530 af
Outflow = 44.10 cfs @ 12.92 hrs, Volume= 8.493 af, Atten= 1%, Lag= 6.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.40 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 0.71 fps, Avg. Travel Time= 6.5 min

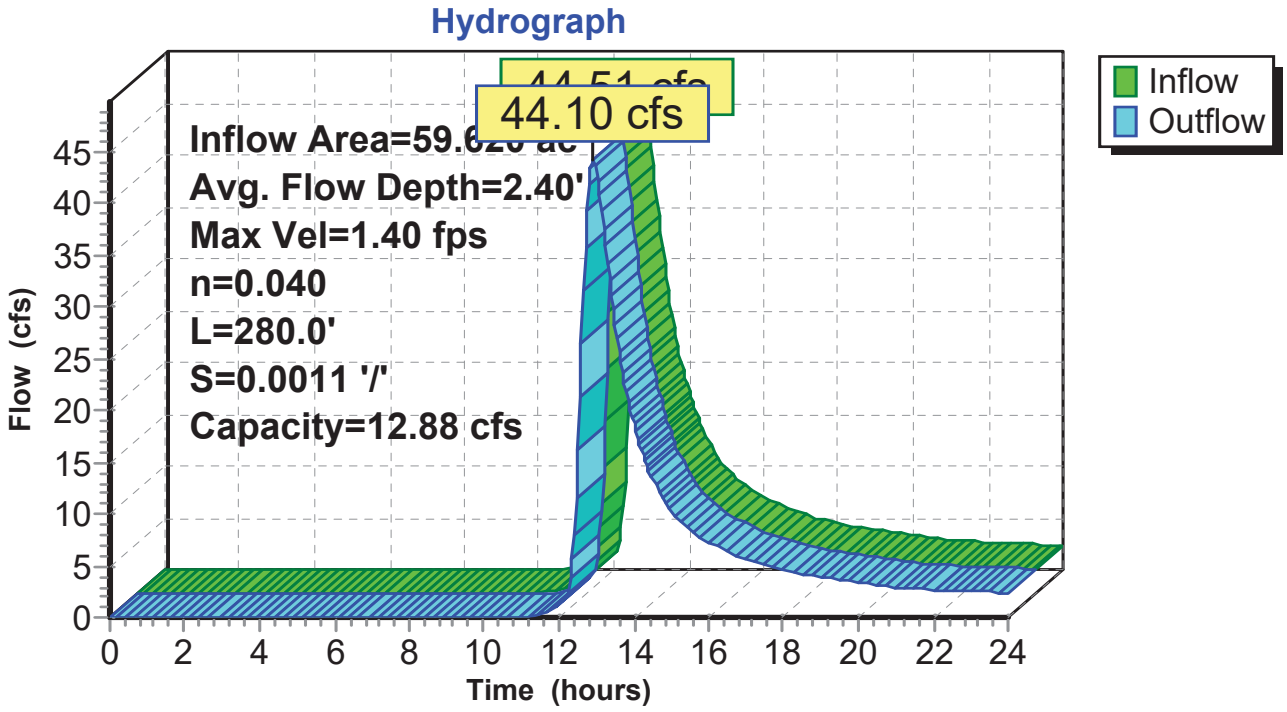
Peak Storage= 8,847 cf @ 12.87 hrs
Average Depth at Peak Storage= 2.40'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 12.88 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 280.0' Slope= 0.0011 '/'
Inlet Invert= 403.50', Outlet Invert= 403.20'



‡

Reach R-3: R-3



Stage-Discharge for Reach R-3: R-3

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
403.50	0.00	0.00
403.51	0.06	0.01
403.52	0.09	0.02
403.53	0.12	0.04
403.54	0.14	0.06
403.55	0.16	0.08
403.56	0.18	0.11
403.57	0.20	0.14
403.58	0.22	0.18
403.59	0.24	0.22
403.60	0.26	0.26
403.61	0.27	0.31
403.62	0.29	0.36
403.63	0.31	0.41
403.64	0.32	0.46
403.65	0.34	0.52
403.66	0.35	0.58
403.67	0.36	0.64
403.68	0.38	0.70
403.69	0.39	0.77
403.70	0.40	0.84
403.71	0.42	0.91
403.72	0.43	0.98
403.73	0.44	1.06
403.74	0.45	1.14
403.75	0.46	1.22
403.76	0.48	1.30
403.77	0.49	1.39
403.78	0.50	1.48
403.79	0.51	1.56
403.80	0.52	1.66
403.81	0.53	1.75
403.82	0.54	1.85
403.83	0.55	1.94
403.84	0.56	2.05
403.85	0.57	2.15
403.86	0.58	2.25
403.87	0.59	2.36
403.88	0.60	2.47
403.89	0.61	2.58
403.90	0.62	2.69
403.91	0.63	2.80
403.92	0.64	2.92
403.93	0.65	3.04
403.94	0.66	3.16
403.95	0.67	3.28
403.96	0.68	3.41
403.97	0.69	3.53
403.98	0.70	3.66
403.99	0.70	3.79
404.00	0.71	3.92
404.01	0.72	4.06
404.02	0.73	4.19
404.03	0.74	4.33
404.04	0.75	4.47
404.05	0.76	4.61
404.06	0.76	4.76
404.07	0.77	4.90
404.08	0.78	5.05
404.09	0.79	5.20
404.10	0.80	5.35
404.11	0.80	5.50
404.12	0.81	5.66
404.13	0.82	5.81
404.14	0.83	5.97
404.15	0.84	6.13
404.16	0.84	6.30
404.17	0.85	6.46
404.18	0.86	6.63
404.19	0.87	6.79
404.20	0.87	6.96
404.21	0.88	7.13
404.22	0.89	7.31
404.23	0.89	7.48
404.24	0.90	7.66
404.25	0.91	7.84
404.26	0.92	8.02
404.27	0.92	8.20
404.28	0.93	8.38
404.29	0.94	8.57
404.30	0.94	8.76
404.31	0.95	8.95
404.32	0.96	9.14
404.33	0.96	9.33
404.34	0.97	9.52
404.35	0.98	9.72
404.36	0.98	9.92
404.37	0.99	10.12
404.38	1.00	10.32
404.39	1.00	10.52
404.40	1.01	10.73
404.41	1.02	10.94
404.42	1.02	11.14
404.43	1.03	11.36
404.44	1.04	11.57
404.45	1.04	11.78
404.46	1.05	12.00
404.47	1.05	12.22
404.48	1.06	12.43
404.49	1.07	12.66
404.50	**1.07**	**12.88**

Stage-Area-Storage for Reach R-3: R-3

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
403.50	0.0	0
403.51	0.1	28
403.52	0.2	56
403.53	0.3	85
403.54	0.4	113
403.55	0.5	141
403.56	0.6	170
403.57	0.7	199
403.58	0.8	228
403.59	0.9	257
403.60	1.0	286
403.61	1.1	315
403.62	1.2	344
403.63	1.3	373
403.64	1.4	403
403.65	1.5	433
403.66	1.7	462
403.67	1.8	492
403.68	1.9	522
403.69	2.0	552
403.70	2.1	582
403.71	2.2	613
403.72	2.3	643
403.73	2.4	674
403.74	2.5	704
403.75	2.6	735
403.76	2.7	766
403.77	2.8	797
403.78	3.0	828
403.79	3.1	859
403.80	3.2	890
403.81	3.3	922
403.82	3.4	953
403.83	3.5	985
403.84	3.6	1,017
403.85	3.7	1,049
403.86	3.9	1,081
403.87	4.0	1,113
403.88	4.1	1,145
403.89	4.2	1,177
403.90	4.3	1,210
403.91	4.4	1,242
403.92	4.6	1,275
403.93	4.7	1,308
403.94	4.8	1,340
403.95	4.9	1,373
403.96	5.0	1,406
403.97	5.1	1,440
403.98	5.3	1,473
403.99	5.4	1,506
404.00	5.5	1,540
404.01	5.6	1,574
404.02	5.7	1,607
404.03	5.9	1,641
404.04	6.0	1,675
404.05	6.1	1,709
404.06	6.2	1,744
404.07	6.3	1,778
404.08	6.5	1,812
404.09	6.6	1,847
404.10	6.7	1,882
404.11	6.8	1,916
404.12	7.0	1,951
404.13	7.1	1,986
404.14	7.2	2,021
404.15	7.3	2,057
404.16	7.5	2,092
404.17	7.6	2,127
404.18	7.7	2,163
404.19	7.9	2,199
404.20	8.0	2,234
404.21	8.1	2,270
404.22	8.2	2,306
404.23	8.4	2,342
404.24	8.5	2,379
404.25	8.6	2,415
404.26	8.8	2,451
404.27	8.9	2,488
404.28	9.0	2,525
404.29	9.1	2,561
404.30	9.3	2,598
404.31	9.4	2,635
404.32	9.5	2,673
404.33	9.7	2,710
404.34	9.8	2,747
404.35	9.9	2,785
404.36	10.1	2,822
404.37	10.2	2,860
404.38	10.3	2,898
404.39	10.5	2,936
404.40	10.6	2,974
404.41	10.8	3,012
404.42	10.9	3,050
404.43	11.0	3,088
404.44	11.2	3,127
404.45	11.3	3,165
404.46	11.4	3,204
404.47	11.6	3,243
404.48	11.7	3,282
404.49	11.9	3,321
404.50	**12.0**	**3,360**

Summary for Reach R-4: R-4

Inflow Area = 60.680 ac, 9.13% Impervious, Inflow Depth > 1.69" for 5-yr event
Inflow = 44.10 cfs @ 12.92 hrs, Volume= 8.542 af
Outflow = 43.83 cfs @ 13.01 hrs, Volume= 8.511 af, Atten= 1%, Lag= 5.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.30 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 5.4 min

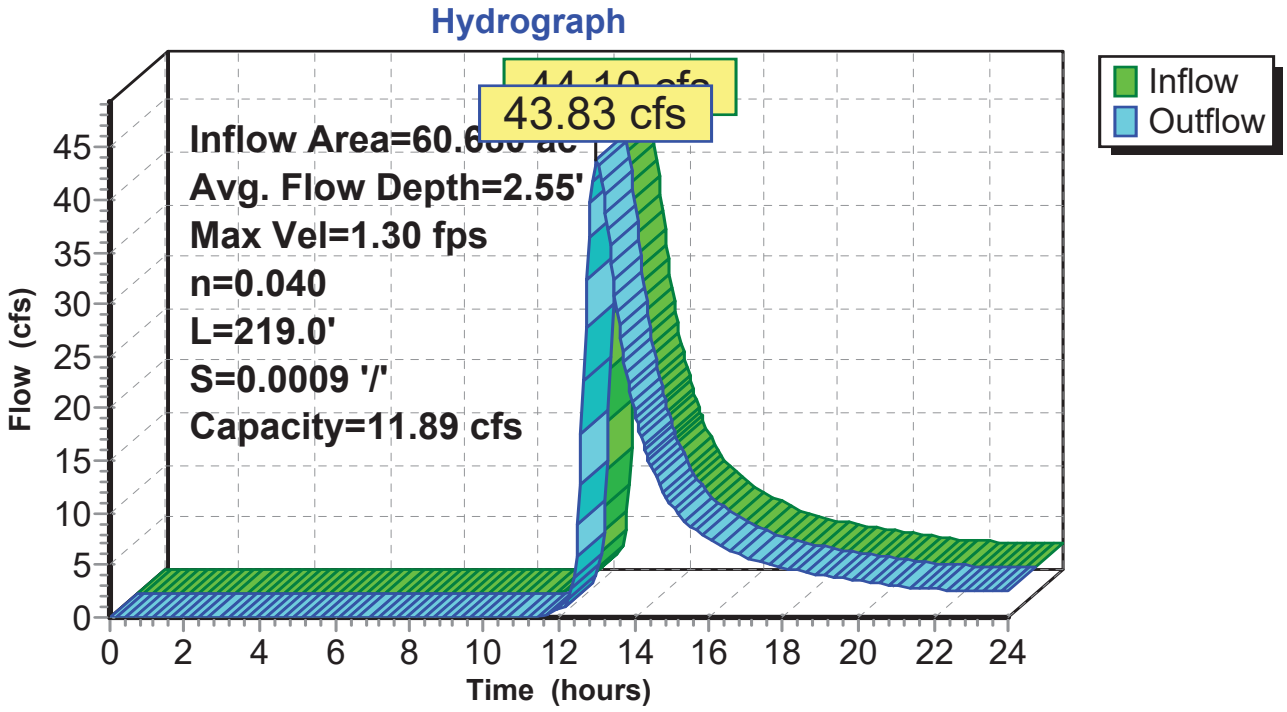
Peak Storage= 7,381 cf @ 12.97 hrs
Average Depth at Peak Storage= 2.55'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 11.89 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 219.0' Slope= 0.0009 '/'
Inlet Invert= 403.20', Outlet Invert= 403.00'



‡

Reach R-4: R-4



Stage-Discharge for Reach R-4: R-4

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
403.20	0.00	0.00
403.21	0.05	0.01
403.22	0.08	0.02
403.23	0.11	0.03
403.24	0.13	0.05
403.25	0.15	0.08
403.26	0.17	0.10
403.27	0.19	0.13
403.28	0.21	0.17
403.29	0.22	0.20
403.30	0.24	0.24
403.31	0.25	0.28
403.32	0.27	0.33
403.33	0.28	0.38
403.34	0.30	0.43
403.35	0.31	0.48
403.36	0.32	0.53
403.37	0.34	0.59
403.38	0.35	0.65
403.39	0.36	0.71
403.40	0.37	0.77
403.41	0.38	0.84
403.42	0.40	0.91
403.43	0.41	0.98
403.44	0.42	1.05
403.45	0.43	1.13
403.46	0.44	1.20
403.47	0.45	1.28
403.48	0.46	1.36
403.49	0.47	1.44
403.50	0.48	1.53
403.51	0.49	1.62
403.52	0.50	1.70
403.53	0.51	1.80
403.54	0.52	1.89
403.55	0.53	1.98
403.56	0.54	2.08
403.57	0.55	2.18
403.58	0.56	2.28
403.59	0.57	2.38
403.60	0.57	2.48
403.61	0.58	2.59
403.62	0.59	2.70
403.63	0.60	2.81
403.64	0.61	2.92
403.65	0.62	3.03
403.66	0.63	3.15
403.67	0.63	3.26
403.68	0.64	3.38
403.69	0.65	3.50
403.70	0.66	3.62
403.71	0.67	3.75
403.72	0.67	3.87
403.73	0.68	4.00
403.74	0.69	4.13
403.75	0.70	4.26
403.76	0.71	4.39
403.77	0.71	4.53
403.78	0.72	4.66
403.79	0.73	4.80
403.80	0.74	4.94
403.81	0.74	5.08
403.82	0.75	5.22
403.83	0.76	5.37
403.84	0.76	5.51
403.85	0.77	5.66
403.86	0.78	5.81
403.87	0.78	5.96
403.88	0.79	6.12
403.89	0.80	6.27
403.90	0.81	6.43
403.91	0.81	6.59
403.92	0.82	6.75
403.93	0.83	6.91
403.94	0.83	7.07
403.95	0.84	7.24
403.96	0.85	7.40
403.97	0.85	7.57
403.98	0.86	7.74
403.99	0.86	7.91
404.00	0.87	8.08
404.01	0.88	8.26
404.02	0.88	8.43
404.03	0.89	8.61
404.04	0.90	8.79
404.05	0.90	8.97
404.06	0.91	9.16
404.07	0.91	9.34
404.08	0.92	9.53
404.09	0.93	9.72
404.10	0.93	9.91
404.11	0.94	10.10
404.12	0.94	10.29
404.13	0.95	10.48
404.14	0.96	10.68
404.15	0.96	10.88
404.16	0.97	11.08
404.17	0.97	11.28
404.18	0.98	11.48
404.19	0.99	11.68
404.20	**0.99**	**11.89**

Stage-Area-Storage for Reach R-4: R-4

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
403.20	0.0	0
403.21	0.1	22
403.22	0.2	44
403.23	0.3	66
403.24	0.4	88
403.25	0.5	111
403.26	0.6	133
403.27	0.7	155
403.28	0.8	178
403.29	0.9	201
403.30	1.0	223
403.31	1.1	246
403.32	1.2	269
403.33	1.3	292
403.34	1.4	315
403.35	1.5	338
403.36	1.7	362
403.37	1.8	385
403.38	1.9	408
403.39	2.0	432
403.40	2.1	456
403.41	2.2	479
403.42	2.3	503
403.43	2.4	527
403.44	2.5	551
403.45	2.6	575
403.46	2.7	599
403.47	2.8	623
403.48	3.0	648
403.49	3.1	672
403.50	3.2	696
403.51	3.3	721
403.52	3.4	746
403.53	3.5	770
403.54	3.6	795
403.55	3.7	820
403.56	3.9	845
403.57	4.0	870
403.58	4.1	895
403.59	4.2	921
403.60	4.3	946
403.61	4.4	972
403.62	4.6	997
403.63	4.7	1,023
403.64	4.8	1,048
403.65	4.9	1,074
403.66	5.0	1,100
403.67	5.1	1,126
403.68	5.3	1,152
403.69	5.4	1,178
403.70	5.5	1,205
403.71	5.6	1,231
403.72	5.7	1,257
403.73	5.9	1,284
403.74	6.0	1,310
403.75	6.1	1,337
403.76	6.2	1,364
403.77	6.3	1,391
403.78	6.5	1,418
403.79	6.6	1,445
403.80	6.7	1,472
403.81	6.8	1,499
403.82	7.0	1,526
403.83	7.1	1,554
403.84	7.2	1,581
403.85	7.3	1,609
403.86	7.5	1,636
403.87	7.6	1,664
403.88	7.7	1,692
403.89	7.9	1,720
403.90	8.0	1,748
403.91	8.1	1,776
403.92	8.2	1,804
403.93	8.4	1,832
403.94	8.5	1,860
403.95	8.6	1,889
403.96	8.8	1,917
403.97	8.9	1,946
403.98	9.0	1,975
403.99	9.1	2,003
404.00	9.3	2,032
404.01	9.4	2,061
404.02	9.5	2,090
404.03	9.7	2,119
404.04	9.8	2,149
404.05	9.9	2,178
404.06	10.1	2,207
404.07	10.2	2,237
404.08	10.3	2,266
404.09	10.5	2,296
404.10	10.6	2,326
404.11	10.8	2,356
404.12	10.9	2,386
404.13	11.0	2,416
404.14	11.2	2,446
404.15	11.3	2,476
404.16	11.4	2,506
404.17	11.6	2,536
404.18	11.7	2,567
404.19	11.9	2,597
404.20	**12.0**	**2,628**

Summary for Pond Pond 1b: Pond 1b

Inflow Area = 16.720 ac, 26.61% Impervious, Inflow Depth > 1.74" for 5-yr event
Inflow = 18.97 cfs @ 12.43 hrs, Volume= 2.418 af
Outflow = 10.58 cfs @ 12.84 hrs, Volume= 2.316 af, Atten= 44%, Lag= 24.4 min
Primary = 10.58 cfs @ 12.84 hrs, Volume= 2.316 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 443.30' @ 12.84 hrs Surf.Area= 26,429 sf Storage= 27,238 cf

Plug-Flow detention time= 58.6 min calculated for 2.311 af (96% of inflow)
Center-of-Mass det. time= 36.3 min (911.5 - 875.2)

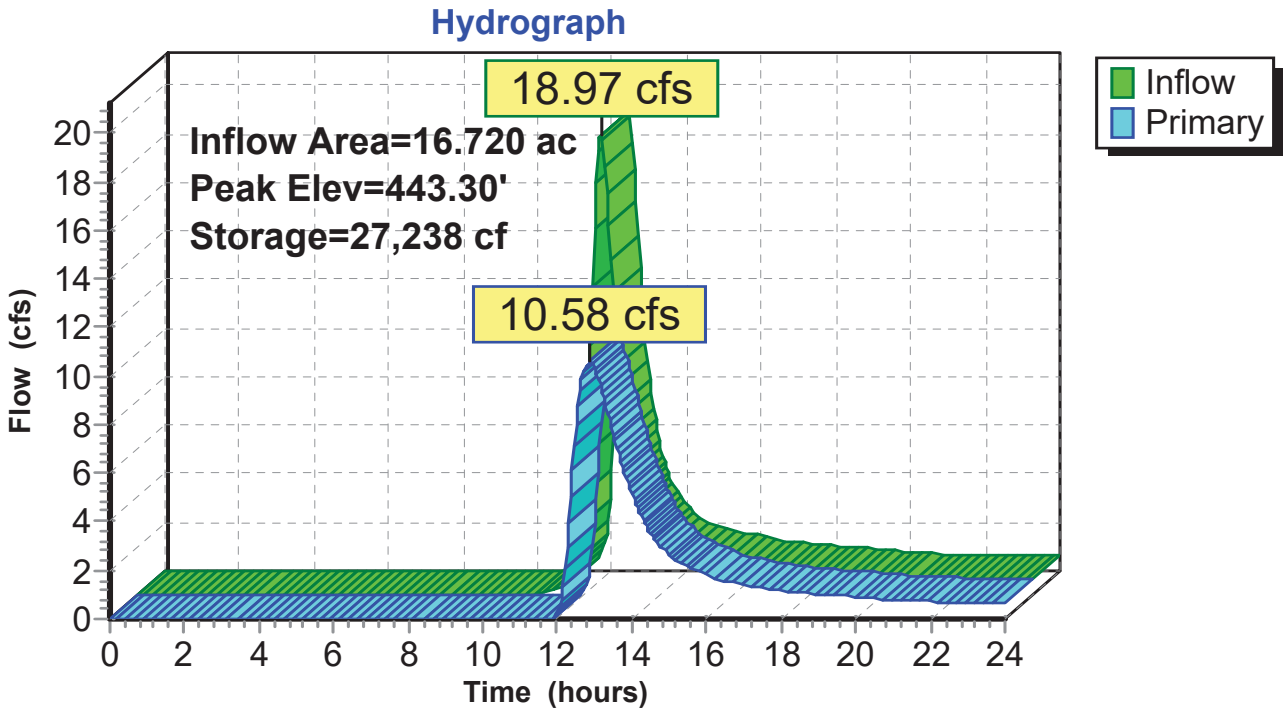
Volume	Invert	Avail.Storage	Storage Description
#1	441.50'	141,234 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
441.50	1,192	0	0
442.00	10,772	2,991	2,991
444.00	34,794	45,566	48,557
446.00	38,163	72,957	121,514
446.50	40,718	19,720	141,234

Device	Routing	Invert	Outlet Devices
#1	Primary	441.80'	**24.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	441.60'	**25.6 deg x 2.0' long x 4.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.64 (C= 3.30)
#3	Device 1	445.23'	**52.0" W x 64.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	446.40'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=10.57 cfs @ 12.84 hrs HW=443.30' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 10.57 cfs @ 4.17 fps)
  ├**2=Sharp-Crested Vee/Trap Weir** (Passes 10.57 cfs of 16.86 cfs potential flow)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond Pond 1b: Pond 1b



Stage-Discharge for Pond Pond 1b: Pond 1b

Elevation (feet)	Primary (cfs)
441.50	0.00
441.60	0.00
441.70	0.00
441.80	0.00
441.90	0.06
442.00	0.25
442.10	0.55
442.20	0.96
442.30	1.48
442.40	2.09
442.50	2.79
442.60	3.57
442.70	4.43
442.80	5.35
442.90	6.32
443.00	7.34
443.10	8.39
443.20	9.46
443.30	10.54
443.40	11.60
443.50	12.63
443.60	13.60
443.70	14.47
443.80	15.13
443.90	15.87
444.00	16.57
444.10	17.25
444.20	17.90
444.30	18.53
444.40	19.13
444.50	19.72
444.60	20.29
444.70	20.85
444.80	21.39
444.90	21.92
445.00	22.44
445.10	22.94
445.20	23.43
445.30	23.92
445.40	24.39
445.50	24.86
445.60	25.31
445.70	25.76
445.80	26.20
445.90	26.63
446.00	27.06
446.10	27.48
446.20	27.89
446.30	28.30
446.40	28.70
446.50	29.10
446.60	29.49
446.70	29.87
446.80	30.25
446.90	30.63
447.00	31.00
447.10	31.37
447.20	31.73
447.30	32.09
447.40	32.44
447.50	32.79
447.60	33.14
447.70	33.48
447.80	33.82
447.90	34.16
448.00	34.49
448.10	34.82
448.20	35.15
448.30	35.48
448.40	35.80
448.50	36.11
448.60	36.43
448.70	36.74
448.80	37.05
448.90	37.36
449.00	37.67
449.10	37.97
449.20	38.27
449.30	38.57
449.40	38.86
449.50	39.15
449.60	39.45
449.70	39.73
449.80	40.02
449.90	40.31
450.00	40.59
450.10	40.87
450.20	41.15
450.30	41.43
450.40	41.70
450.50	**41.97**

Stage-Area-Storage for Pond Pond 1b: Pond 1b

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
441.50	1,192	0
441.60	3,108	215
441.70	5,024	622
441.80	6,940	1,220
441.90	8,856	2,010
442.00	10,772	2,991
442.10	11,973	4,128
442.20	13,174	5,386
442.30	14,375	6,763
442.40	15,576	8,261
442.50	16,778	9,878
442.60	17,979	11,616
442.70	19,180	13,474
442.80	20,381	15,452
442.90	21,582	17,550
443.00	22,783	19,769
443.10	23,984	22,107
443.20	25,185	24,565
443.30	26,386	27,144
443.40	27,587	29,843
443.50	28,789	32,661
443.60	29,990	35,600
443.70	31,191	38,659
443.80	32,392	41,838
443.90	33,593	45,138
444.00	34,794	48,557
444.10	34,962	52,045
444.20	35,131	55,549
444.30	35,299	59,071
444.40	35,468	62,609
444.50	35,636	66,165
444.60	35,805	69,737
444.70	35,973	73,326
444.80	36,142	76,931
444.90	36,310	80,554
445.00	36,479	84,193
445.10	36,647	87,850
445.20	36,815	91,523
445.30	36,984	95,213
445.40	37,152	98,919
445.50	37,321	102,643
445.60	37,489	106,384
445.70	37,658	110,141
445.80	37,826	113,915
445.90	37,995	117,706
446.00	38,163	121,514
446.10	38,674	125,356
446.20	39,185	129,249
446.30	39,696	133,193
446.40	40,207	137,188
446.50	**40,718**	**141,234**
446.60	40,718	141,234
446.70	40,718	141,234
446.80	40,718	141,234
446.90	40,718	141,234
447.00	40,718	141,234
447.10	40,718	141,234
447.20	40,718	141,234
447.30	40,718	141,234
447.40	40,718	141,234
447.50	40,718	141,234
447.60	40,718	141,234
447.70	40,718	141,234
447.80	40,718	141,234
447.90	40,718	141,234
448.00	40,718	141,234
448.10	40,718	141,234
448.20	40,718	141,234
448.30	40,718	141,234
448.40	40,718	141,234
448.50	40,718	141,234
448.60	40,718	141,234
448.70	40,718	141,234
448.80	40,718	141,234
448.90	40,718	141,234
449.00	40,718	141,234
449.10	40,718	141,234
449.20	40,718	141,234
449.30	40,718	141,234
449.40	40,718	141,234
449.50	40,718	141,234
449.60	40,718	141,234
449.70	40,718	141,234
449.80	40,718	141,234
449.90	40,718	141,234
450.00	40,718	141,234
450.10	40,718	141,234
450.20	40,718	141,234
450.30	40,718	141,234
450.40	40,718	141,234
450.50	40,718	141,234

Summary for Pond Pond 1c: Pond 1c

Inflow Area = 10.630 ac, 0.56% Impervious, Inflow Depth > 1.32" for 5-yr event
Inflow = 10.08 cfs @ 12.33 hrs, Volume= 1.172 af
Outflow = 5.48 cfs @ 12.68 hrs, Volume= 1.070 af, Atten= 46%, Lag= 21.3 min
Primary = 5.48 cfs @ 12.68 hrs, Volume= 1.070 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 411.08' @ 12.68 hrs Surf.Area= 7,748 sf Storage= 13,841 cf

Plug-Flow detention time= 91.2 min calculated for 1.070 af (91% of inflow)
Center-of-Mass det. time= 48.1 min (933.2 - 885.1)

Volume	Invert	Avail.Storage	Storage Description
#1	409.00'	53,054 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
409.00	5,642	0	0
410.00	6,603	6,123	6,123
412.00	8,732	15,335	21,458
414.00	11,115	19,847	41,305
415.00	12,383	11,749	53,054

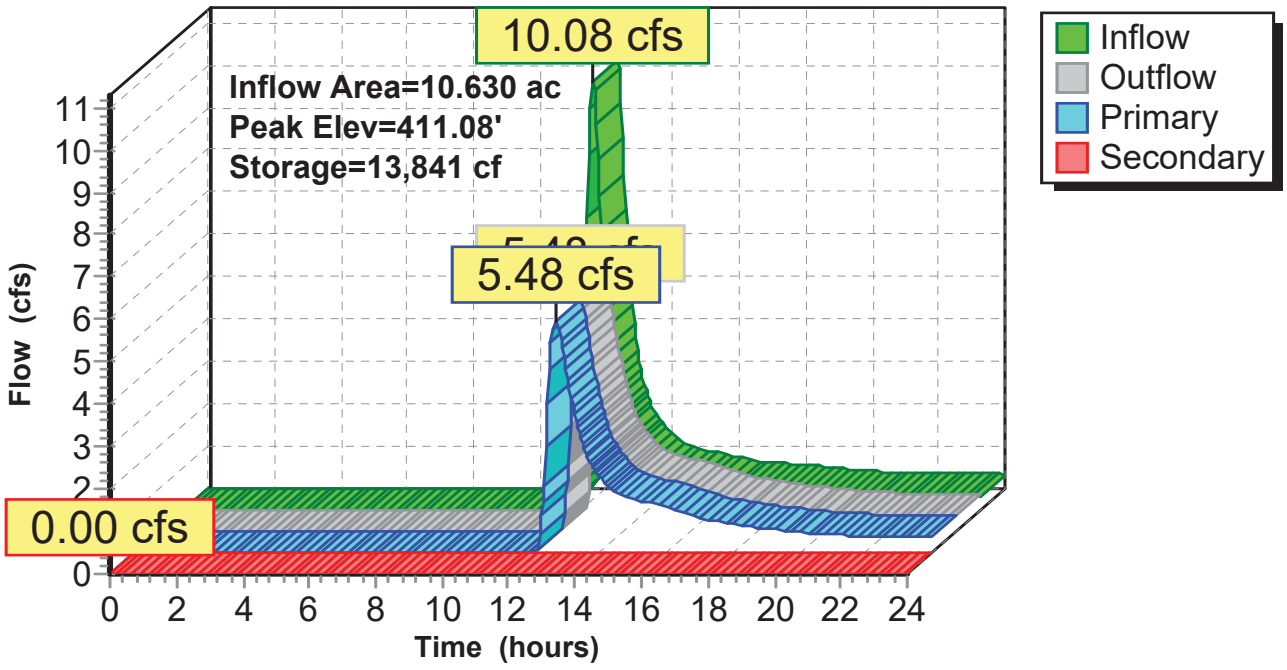
Device	Routing	Invert	Outlet Devices
#1	Primary	408.00'	**24.0" Round Culvert** L= 62.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 408.00' / 407.30' S= 0.0113 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Device 1	409.40'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	410.40'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height
#4	Device 1	413.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#5	Secondary	414.00'	**20.0' long x 14.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=5.47 cfs @ 12.68 hrs HW=411.07' (Free Discharge)
└**1=Culvert** (Passes 5.47 cfs of 21.79 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 1.95 cfs @ 5.58 fps)
  ├**3=Sharp-Crested Rectangular Weir** (Weir Controls 3.52 cfs @ 2.80 fps)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=409.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 1c: Pond 1c

Hydrograph



Stage-Discharge for Pond Pond 1c: Pond 1c

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
409.00	0.00	0.00	0.00
409.10	0.00	0.00	0.00
409.20	0.00	0.00	0.00
409.30	0.00	0.00	0.00
409.40	0.00	0.00	0.00
409.50	0.04	0.04	0.00
409.60	0.13	0.13	0.00
409.70	0.28	0.28	0.00
409.80	0.47	0.47	0.00
409.90	0.68	0.68	0.00
410.00	0.87	0.87	0.00
410.10	1.02	1.02	0.00
410.20	1.15	1.15	0.00
410.30	1.27	1.27	0.00
410.40	1.37	1.37	0.00
410.50	1.68	1.68	0.00
410.60	2.15	2.15	0.00
410.70	2.72	2.72	0.00
410.80	3.37	3.37	0.00
410.90	4.08	4.08	0.00
411.00	4.86	4.86	0.00
411.10	5.69	5.69	0.00
411.20	6.56	6.56	0.00
411.30	7.48	7.48	0.00
411.40	8.43	8.43	0.00
411.50	9.42	9.42	0.00
411.60	10.45	10.45	0.00
411.70	11.50	11.50	0.00
411.80	12.57	12.57	0.00
411.90	13.67	13.67	0.00
412.00	14.79	14.79	0.00
412.10	15.93	15.93	0.00
412.20	17.09	17.09	0.00
412.30	18.26	18.26	0.00
412.40	19.45	19.45	0.00
412.50	20.64	20.64	0.00
412.60	21.85	21.85	0.00
412.70	23.06	23.06	0.00
412.80	24.28	24.28	0.00
412.90	25.50	25.50	0.00
413.00	26.72	26.72	0.00
413.10	28.12	28.12	0.00
413.20	29.66	29.66	0.00
413.30	31.28	31.28	0.00
413.40	31.73	31.73	0.00
413.50	32.09	32.09	0.00
413.60	32.44	32.44	0.00
413.70	32.79	32.79	0.00
413.80	33.14	33.14	0.00
413.90	33.48	33.48	0.00
414.00	33.82	33.82	0.00
414.10	35.83	34.16	1.67
414.20	39.22	34.49	4.72
414.30	43.55	34.82	8.73
414.40	48.66	35.15	13.51
414.50	54.46	35.48	18.99
414.60	60.89	35.80	25.10
414.70	67.45	36.11	31.33
414.80	74.35	36.43	37.92
414.90	81.91	36.74	45.17
415.00	89.85	37.05	52.80
415.10	98.39	37.36	61.03
415.20	107.34	37.67	69.67
415.30	116.53	37.97	78.56
415.40	126.06	38.27	87.79
415.50	135.57	38.57	97.00
415.60	145.32	38.86	106.45
415.70	155.74	39.15	116.59
415.80	166.47	39.45	127.03
415.90	177.49	39.73	137.76
416.00	188.80	40.02	148.78
416.10	**200.38**	**40.31**	**160.07**

Stage-Area-Storage for Pond Pond 1c: Pond 1c

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
409.00	5,642	0
409.10	5,738	569
409.20	5,834	1,148
409.30	5,930	1,736
409.40	6,026	2,334
409.50	6,123	2,941
409.60	6,219	3,558
409.70	6,315	4,185
409.80	6,411	4,821
409.90	6,507	5,467
410.00	6,603	6,123
410.10	6,709	6,788
410.20	6,816	7,464
410.30	6,922	8,151
410.40	7,029	8,849
410.50	7,135	9,557
410.60	7,242	10,276
410.70	7,348	11,005
410.80	7,455	11,746
410.90	7,561	12,496
411.00	7,668	13,258
411.10	7,774	14,030
411.20	7,880	14,813
411.30	7,987	15,606
411.40	8,093	16,410
411.50	8,200	17,225
411.60	8,306	18,050
411.70	8,413	18,886
411.80	8,519	19,732
411.90	8,626	20,590
412.00	8,732	21,458
412.10	8,851	22,337
412.20	8,970	23,228
412.30	9,089	24,131
412.40	9,209	25,046
412.50	9,328	25,972
412.60	9,447	26,911
412.70	9,566	27,862
412.80	9,685	28,824
412.90	9,804	29,799
413.00	9,924	30,785
413.10	10,043	31,784
413.20	10,162	32,794
413.30	10,281	33,816
413.40	10,400	34,850
413.50	10,519	35,896
413.60	10,638	36,954
413.70	10,758	38,024
413.80	10,877	39,105
413.90	10,996	40,199
414.00	11,115	41,305
414.10	11,242	42,422
414.20	11,369	43,553
414.30	11,495	44,696
414.40	11,622	45,852
414.50	11,749	47,021
414.60	11,876	48,202
414.70	12,003	49,396
414.80	12,129	50,602
414.90	12,256	51,822
415.00	**12,383**	**53,054**
415.10	12,383	53,054
415.20	12,383	53,054
415.30	12,383	53,054
415.40	12,383	53,054
415.50	12,383	53,054
415.60	12,383	53,054
415.70	12,383	53,054
415.80	12,383	53,054
415.90	12,383	53,054
416.00	12,383	53,054
416.10	12,383	53,054

Summary for Pond Pond 1d: Pond 1d

Inflow Area = 6.230 ac, 4.01% Impervious, Inflow Depth > 1.53" for 5-yr event
Inflow = 7.30 cfs @ 12.30 hrs, Volume= 0.793 af
Outflow = 1.43 cfs @ 13.22 hrs, Volume= 0.679 af, Atten= 80%, Lag= 55.1 min
Primary = 1.43 cfs @ 13.22 hrs, Volume= 0.679 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 409.81' @ 13.22 hrs Surf.Area= 15,086 sf Storage= 14,356 cf

Plug-Flow detention time= 161.8 min calculated for 0.678 af (86% of inflow)
Center-of-Mass det. time= 96.8 min (972.5 - 875.7)

Volume	Invert	Avail.Storage	Storage Description
#1	408.00'	209,097 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

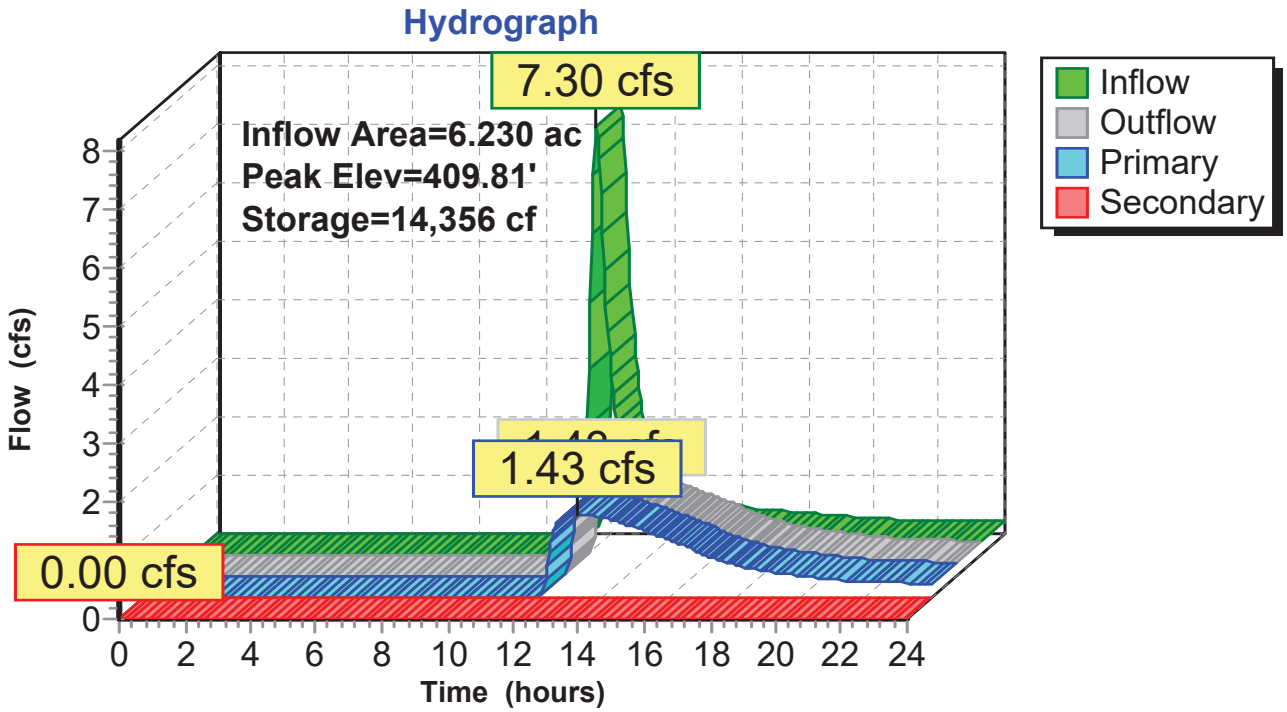
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
408.00	800	0	0
410.00	16,607	17,407	17,407
412.00	24,332	40,939	58,346
414.00	28,916	53,248	111,594
416.00	33,677	62,593	174,187
417.00	36,142	34,910	209,097

Device	Routing	Invert	Outlet Devices
#1	Primary	408.00'	**24.0" Round Culvert** L= 235.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 408.00' / 406.00' S= 0.0085 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	408.75'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	411.20'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.0' Crest Height
#4	Device 1	414.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#5	Secondary	416.00'	**35.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=1.43 cfs @ 13.22 hrs HW=409.81' (Free Discharge)
└**1=Culvert** (Passes 1.43 cfs of 13.67 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 1.43 cfs @ 4.10 fps)
  ├**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=408.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 1d: Pond 1d



Stage-Discharge for Pond Pond 1d: Pond 1d

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
408.00	0.00	0.00	0.00
408.10	0.00	0.00	0.00
408.20	0.00	0.00	0.00
408.30	0.00	0.00	0.00
408.40	0.00	0.00	0.00
408.50	0.00	0.00	0.00
408.60	0.00	0.00	0.00
408.70	0.00	0.00	0.00
408.80	0.01	0.01	0.00
408.90	0.08	0.08	0.00
409.00	0.20	0.20	0.00
409.10	0.37	0.37	0.00
409.20	0.57	0.57	0.00
409.30	0.78	0.78	0.00
409.40	0.95	0.95	0.00
409.50	1.08	1.08	0.00
409.60	1.21	1.21	0.00
409.70	1.32	1.32	0.00
409.80	1.42	1.42	0.00
409.90	1.52	1.52	0.00
410.00	1.61	1.61	0.00
410.10	1.69	1.69	0.00
410.20	1.78	1.78	0.00
410.30	1.85	1.85	0.00
410.40	1.93	1.93	0.00
410.50	2.00	2.00	0.00
410.60	2.07	2.07	0.00
410.70	2.14	2.14	0.00
410.80	2.20	2.20	0.00
410.90	2.27	2.27	0.00
411.00	2.33	2.33	0.00
411.10	2.39	2.39	0.00
411.20	2.45	2.45	0.00
411.30	2.71	2.71	0.00
411.40	3.14	3.14	0.00
411.50	3.67	3.67	0.00
411.60	4.29	4.29	0.00
411.70	4.98	4.98	0.00
411.80	5.73	5.73	0.00
411.90	6.54	6.54	0.00
412.00	7.39	7.39	0.00
412.10	8.28	8.28	0.00
412.20	9.21	9.21	0.00
412.30	10.18	10.18	0.00
412.40	11.18	11.18	0.00
412.50	12.21	12.21	0.00
412.60	13.27	13.27	0.00
412.70	14.35	14.35	0.00
412.80	15.45	15.45	0.00
412.90	16.57	16.57	0.00
413.00	17.70	17.70	0.00
413.10	18.85	18.85	0.00
413.20	20.02	20.02	0.00
413.30	21.19	21.19	0.00
413.40	22.38	22.38	0.00
413.50	23.57	23.57	0.00
413.60	24.76	24.76	0.00
413.70	25.96	25.96	0.00
413.80	27.17	27.17	0.00
413.90	28.37	28.37	0.00
414.00	29.57	29.57	0.00
414.10	30.94	30.94	0.00
414.20	32.44	32.44	0.00
414.30	34.04	34.04	0.00
414.40	35.15	35.15	0.00
414.50	35.48	35.48	0.00
414.60	35.80	35.80	0.00
414.70	36.11	36.11	0.00
414.80	36.43	36.43	0.00
414.90	36.74	36.74	0.00
415.00	37.05	37.05	0.00
415.10	37.36	37.36	0.00
415.20	37.62	37.62	0.00
415.30	37.88	37.88	0.00
415.40	38.14	38.14	0.00
415.50	38.40	38.40	0.00
415.60	38.65	38.65	0.00
415.70	38.91	38.91	0.00
415.80	39.16	39.16	0.00
415.90	39.41	39.41	0.00
416.00	39.66	39.66	0.00
416.10	42.75	39.91	2.84
416.20	48.20	40.15	8.05
416.30	55.32	40.39	14.92
416.40	63.84	40.64	23.20
416.50	73.79	40.88	32.92
416.60	85.04	41.12	43.92
416.70	96.39	41.36	55.04
416.80	108.46	41.59	66.87
416.90	121.47	41.83	79.64
417.00	135.16	42.06	93.10
417.10	**149.91**	**42.30**	**107.61**

Stage-Area-Storage for Pond Pond 1d: Pond 1d

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
408.00	800	0
408.10	1,590	120
408.20	2,381	318
408.30	3,171	596
408.40	3,961	952
408.50	4,752	1,388
408.60	5,542	1,903
408.70	6,332	2,496
408.80	7,123	3,169
408.90	7,913	3,921
409.00	8,704	4,752
409.10	9,494	5,662
409.20	10,284	6,651
409.30	11,075	7,718
409.40	11,865	8,865
409.50	12,655	10,091
409.60	13,446	11,396
409.70	14,236	12,781
409.80	15,026	14,244
409.90	15,817	15,786
410.00	16,607	17,407
410.10	16,993	19,087
410.20	17,379	20,806
410.30	17,766	22,563
410.40	18,152	24,359
410.50	18,538	26,193
410.60	18,925	28,066
410.70	19,311	29,978
410.80	19,697	31,929
410.90	20,083	33,918
411.00	20,470	35,945
411.10	20,856	38,012
411.20	21,242	40,116
411.30	21,628	42,260
411.40	22,014	44,442
411.50	22,401	46,663
411.60	22,787	48,922
411.70	23,173	51,220
411.80	23,560	53,557
411.90	23,946	55,932
412.00	24,332	58,346
412.10	24,561	60,791
412.20	24,790	63,258
412.30	25,020	65,749
412.40	25,249	68,262
412.50	25,478	70,799
412.60	25,707	73,358
412.70	25,936	75,940
412.80	26,166	78,545
412.90	26,395	81,173
413.00	26,624	83,824
413.10	26,853	86,498
413.20	27,082	89,195
413.30	27,312	91,914
413.40	27,541	94,657
413.50	27,770	97,423
413.60	27,999	100,211
413.70	28,228	103,022
413.80	28,458	105,857
413.90	28,687	108,714
414.00	28,916	111,594
414.10	29,154	114,498
414.20	29,392	117,425
414.30	29,630	120,376
414.40	29,868	123,351
414.50	30,106	126,350
414.60	30,344	129,372
414.70	30,582	132,418
414.80	30,820	135,489
414.90	31,058	138,583
415.00	31,297	141,700
415.10	31,535	144,842
415.20	31,773	148,007
415.30	32,011	151,196
415.40	32,249	154,409
415.50	32,487	157,646
415.60	32,725	160,907
415.70	32,963	164,191
415.80	33,201	167,499
415.90	33,439	170,831
416.00	33,677	174,187
416.10	33,924	177,567
416.20	34,170	180,972
416.30	34,417	184,401
416.40	34,663	187,855
416.50	34,910	191,334
416.60	35,156	194,837
416.70	35,402	198,365
416.80	35,649	201,917
416.90	35,895	205,495
417.00	**36,142**	**209,097**
417.10	36,142	209,097

Summary for Pond Pond 1e: Pond 1e

Inflow Area = 1.060 ac, 65.09% Impervious, Inflow Depth > 3.01" for 5-yr event
Inflow = 4.91 cfs @ 12.00 hrs, Volume= 0.266 af
Outflow = 0.10 cfs @ 16.48 hrs, Volume= 0.048 af, Atten= 98%, Lag= 268.4 min
Primary = 0.10 cfs @ 16.48 hrs, Volume= 0.048 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 406.37' @ 16.48 hrs Surf.Area= 7,878 sf Storage= 9,540 cf

Plug-Flow detention time= 502.2 min calculated for 0.048 af (18% of inflow)
Center-of-Mass det. time= 349.7 min (1,159.1 - 809.4)

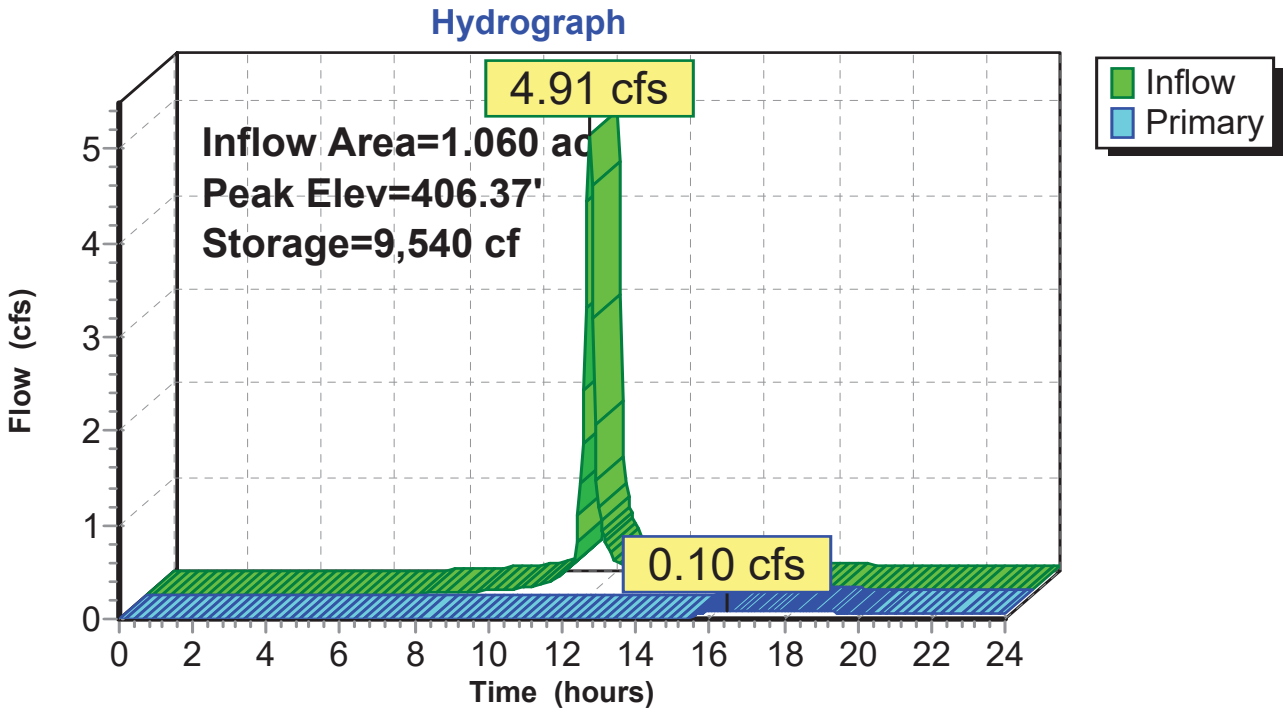
Volume	Invert	Avail.Storage	Storage Description
#1	405.00'	12,667 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
405.00	6,101	0	0
406.00	7,395	6,748	6,748
406.35	7,857	2,669	9,417
406.75	8,394	3,250	12,667

Device	Routing	Invert	Outlet Devices
#1	Primary	406.35'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.10 cfs @ 16.48 hrs HW=406.37' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.10 cfs @ 0.31 fps)

Pond Pond 1e: Pond 1e



Stage-Discharge for Pond Pond 1e: Pond 1e

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
405.00	0.00	405.53	0.00	406.06	0.00	406.59	5.89
405.01	0.00	405.54	0.00	406.07	0.00	406.60	6.27
405.02	0.00	405.55	0.00	406.08	0.00	406.61	6.66
405.03	0.00	405.56	0.00	406.09	0.00	406.62	7.06
405.04	0.00	405.57	0.00	406.10	0.00	406.63	7.46
405.05	0.00	405.58	0.00	406.11	0.00	406.64	7.88
405.06	0.00	405.59	0.00	406.12	0.00	406.65	8.30
405.07	0.00	405.60	0.00	406.13	0.00	406.66	8.73
405.08	0.00	405.61	0.00	406.14	0.00	406.67	9.17
405.09	0.00	405.62	0.00	406.15	0.00	406.68	9.61
405.10	0.00	405.63	0.00	406.16	0.00	406.69	10.07
405.11	0.00	405.64	0.00	406.17	0.00	406.70	10.53
405.12	0.00	405.65	0.00	406.18	0.00	406.71	11.00
405.13	0.00	405.66	0.00	406.19	0.00	406.72	11.48
405.14	0.00	405.67	0.00	406.20	0.00	406.73	11.96
405.15	0.00	405.68	0.00	406.21	0.00	406.74	12.45
405.16	0.00	405.69	0.00	406.22	0.00	406.75	**12.95**
405.17	0.00	405.70	0.00	406.23	0.00		
405.18	0.00	405.71	0.00	406.24	0.00		
405.19	0.00	405.72	0.00	406.25	0.00		
405.20	0.00	405.73	0.00	406.26	0.00		
405.21	0.00	405.74	0.00	406.27	0.00		
405.22	0.00	405.75	0.00	406.28	0.00		
405.23	0.00	405.76	0.00	406.29	0.00		
405.24	0.00	405.77	0.00	406.30	0.00		
405.25	0.00	405.78	0.00	406.31	0.00		
405.26	0.00	405.79	0.00	406.32	0.00		
405.27	0.00	405.80	0.00	406.33	0.00		
405.28	0.00	405.81	0.00	406.34	0.00		
405.29	0.00	405.82	0.00	406.35	0.00		
405.30	0.00	405.83	0.00	406.36	0.05		
405.31	0.00	405.84	0.00	406.37	0.14		
405.32	0.00	405.85	0.00	406.38	0.26		
405.33	0.00	405.86	0.00	406.39	0.40		
405.34	0.00	405.87	0.00	406.40	0.56		
405.35	0.00	405.88	0.00	406.41	0.73		
405.36	0.00	405.89	0.00	406.42	0.92		
405.37	0.00	405.90	0.00	406.43	1.13		
405.38	0.00	405.91	0.00	406.44	1.34		
405.39	0.00	405.92	0.00	406.45	1.57		
405.40	0.00	405.93	0.00	406.46	1.82		
405.41	0.00	405.94	0.00	406.47	2.07		
405.42	0.00	405.95	0.00	406.48	2.33		
405.43	0.00	405.96	0.00	406.49	2.61		
405.44	0.00	405.97	0.00	406.50	2.89		
405.45	0.00	405.98	0.00	406.51	3.19		
405.46	0.00	405.99	0.00	406.52	3.49		
405.47	0.00	406.00	0.00	406.53	3.80		
405.48	0.00	406.01	0.00	406.54	4.12		
405.49	0.00	406.02	0.00	406.55	4.45		
405.50	0.00	406.03	0.00	406.56	4.80		
405.51	0.00	406.04	0.00	406.57	5.15		
405.52	0.00	406.05	0.00	406.58	5.52		

Stage-Area-Storage for Pond Pond 1e: Pond 1e

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
405.00	6,101	0
405.02	6,127	122
405.04	6,153	245
405.06	6,179	368
405.08	6,205	492
405.10	6,230	617
405.12	6,256	741
405.14	6,282	867
405.16	6,308	993
405.18	6,334	1,119
405.20	6,360	1,246
405.22	6,386	1,374
405.24	6,412	1,502
405.26	6,437	1,630
405.28	6,463	1,759
405.30	6,489	1,889
405.32	6,515	2,019
405.34	6,541	2,149
405.36	6,567	2,280
405.38	6,593	2,412
405.40	6,619	2,544
405.42	6,644	2,677
405.44	6,670	2,810
405.46	6,696	2,943
405.48	6,722	3,078
405.50	6,748	3,212
405.52	6,774	3,347
405.54	6,800	3,483
405.56	6,826	3,619
405.58	6,852	3,756
405.60	6,877	3,894
405.62	6,903	4,031
405.64	6,929	4,170
405.66	6,955	4,308
405.68	6,981	4,448
405.70	7,007	4,588
405.72	7,033	4,728
405.74	7,059	4,869
405.76	7,084	5,010
405.78	7,110	5,152
405.80	7,136	5,295
405.82	7,162	5,438
405.84	7,188	5,581
405.86	7,214	5,725
405.88	7,240	5,870
405.90	7,266	6,015
405.92	7,291	6,161
405.94	7,317	6,307
405.96	7,343	6,453
405.98	7,369	6,600
406.00	7,395	6,748
406.02	7,421	6,896
406.04	7,448	7,045
406.06	7,474	7,194
406.08	7,501	7,344
406.10	7,527	7,494
406.12	7,553	7,645
406.14	7,580	7,796
406.16	7,606	7,948
406.18	7,633	8,100
406.20	7,659	8,253
406.22	7,685	8,407
406.24	7,712	8,561
406.26	7,738	8,715
406.28	7,765	8,870
406.30	7,791	9,026
406.32	7,817	9,182
406.34	7,844	9,339
406.36	7,870	9,496
406.38	7,897	9,653
406.40	7,924	9,812
406.42	7,951	9,970
406.44	7,978	10,130
406.46	8,005	10,289
406.48	8,032	10,450
406.50	8,058	10,611
406.52	8,085	10,772
406.54	8,112	10,934
406.56	8,139	11,097
406.58	8,166	11,260
406.60	8,193	11,423
406.62	8,219	11,587
406.64	8,246	11,752
406.66	8,273	11,917
406.68	8,300	12,083
406.70	8,327	12,249
406.72	8,354	12,416
406.74	**8,381**	**12,583**

Summary for Pond Pond 3: Pond 3

Inflow Area = 4.790 ac, 0.00% Impervious, Inflow Depth > 1.13" for 5-yr event
Inflow = 4.27 cfs @ 12.26 hrs, Volume= 0.453 af
Outflow = 0.87 cfs @ 13.11 hrs, Volume= 0.291 af, Atten= 80%, Lag= 51.0 min
Primary = 0.87 cfs @ 13.11 hrs, Volume= 0.291 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 424.72' @ 13.11 hrs Surf.Area= 5,636 sf Storage= 8,316 cf

Plug-Flow detention time= 226.7 min calculated for 0.290 af (64% of inflow)
Center-of-Mass det. time= 102.6 min (992.5 - 889.8)

Volume	Invert	Avail.Storage	Storage Description
#1	423.00'	36,852 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

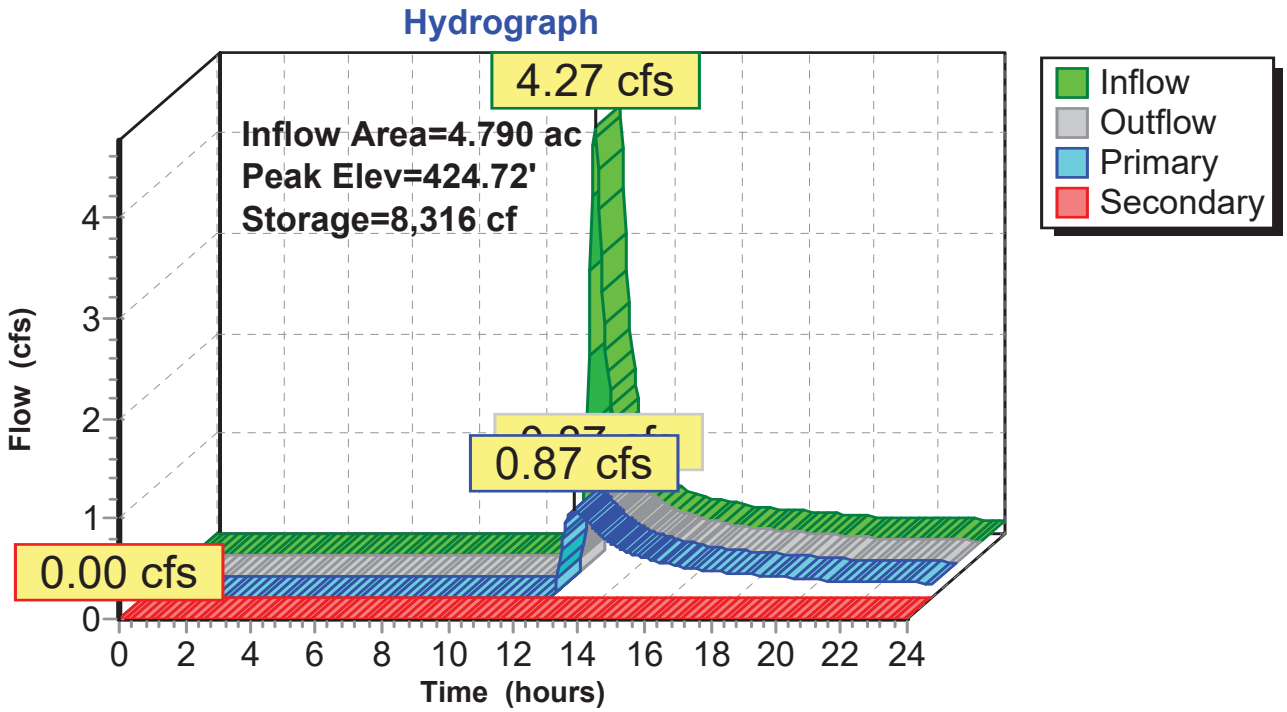
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
423.00	4,083	0	0
424.00	4,941	4,512	4,512
426.00	6,873	11,814	16,326
428.00	9,007	15,880	32,206
428.50	9,575	4,646	36,852

Device	Routing	Invert	Outlet Devices
#1	Primary	423.00'	**18.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 423.00' / 422.00' S= 0.0217 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	424.40'	**1.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height
#3	Device 1	427.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#4	Secondary	427.50'	**25.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.86 cfs @ 13.11 hrs HW=424.72' (Free Discharge)
└**1=Culvert** (Passes 0.86 cfs of 8.38 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.86 cfs @ 1.89 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=423.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 3: Pond 3



Stage-Discharge for Pond Pond 3: Pond 3

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
423.00	0.00	0.00	0.00
423.10	0.00	0.00	0.00
423.20	0.00	0.00	0.00
423.30	0.00	0.00	0.00
423.40	0.00	0.00	0.00
423.50	0.00	0.00	0.00
423.60	0.00	0.00	0.00
423.70	0.00	0.00	0.00
423.80	0.00	0.00	0.00
423.90	0.00	0.00	0.00
424.00	0.00	0.00	0.00
424.10	0.00	0.00	0.00
424.20	0.00	0.00	0.00
424.30	0.00	0.00	0.00
424.40	0.00	0.00	0.00
424.50	0.15	0.15	0.00
424.60	0.43	0.43	0.00
424.70	0.79	0.79	0.00
424.80	1.20	1.20	0.00
424.90	1.67	1.67	0.00
425.00	2.18	2.18	0.00
425.10	2.72	2.72	0.00
425.20	3.30	3.30	0.00
425.30	3.90	3.90	0.00
425.40	4.52	4.52	0.00
425.50	5.17	5.17	0.00
425.60	5.83	5.83	0.00
425.70	6.51	6.51	0.00
425.80	7.20	7.20	0.00
425.90	7.91	7.91	0.00
426.00	8.61	8.61	0.00
426.10	9.33	9.33	0.00
426.20	10.05	10.05	0.00
426.30	10.77	10.77	0.00
426.40	11.48	11.48	0.00
426.50	12.20	12.20	0.00
426.60	12.91	12.91	0.00
426.70	13.62	13.62	0.00
426.80	14.32	14.32	0.00
426.90	15.01	15.01	0.00
427.00	15.34	15.34	0.00
427.10	15.57	15.57	0.00
427.20	15.80	15.80	0.00
427.30	16.03	16.03	0.00
427.40	16.26	16.26	0.00
427.50	16.48	16.48	0.00
427.60	18.73	16.70	2.03
427.70	22.66	16.91	5.75
427.80	27.78	17.12	10.66
427.90	33.90	17.33	16.57
428.00	41.05	17.54	23.51
428.10	49.12	17.75	31.37
428.20	57.26	17.95	39.31
428.30	65.91	18.15	47.76
428.40	75.23	18.35	56.89
428.50	85.04	18.54	66.50
428.60	95.60	18.74	76.86
428.70	106.68	18.93	87.75
428.80	117.87	19.12	98.75
428.90	129.47	19.31	110.16
429.00	141.21	19.50	121.71
429.10	153.26	19.68	133.57
429.20	166.15	19.86	146.29
429.30	179.43	20.05	159.39
429.40	193.08	20.23	172.85
429.50	207.08	20.40	186.68
429.60	221.43	20.58	200.85
429.70	236.12	20.76	215.37
429.80	251.14	20.93	230.22
429.90	266.49	21.10	245.39
430.00	282.16	21.27	260.89
430.10	**298.14**	**21.44**	**276.70**

Stage-Area-Storage for Pond Pond 3: Pond 3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
423.00	4,083	0
423.10	4,169	413
423.20	4,255	834
423.30	4,340	1,264
423.40	4,426	1,702
423.50	4,512	2,149
423.60	4,598	2,604
423.70	4,684	3,068
423.80	4,769	3,541
423.90	4,855	4,022
424.00	4,941	4,512
424.10	5,038	5,011
424.20	5,134	5,520
424.30	5,231	6,038
424.40	5,327	6,566
424.50	5,424	7,103
424.60	5,521	7,650
424.70	5,617	8,207
424.80	5,714	8,774
424.90	5,810	9,350
425.00	5,907	9,936
425.10	6,004	10,532
425.20	6,100	11,137
425.30	6,197	11,752
425.40	6,293	12,376
425.50	6,390	13,010
425.60	6,487	13,654
425.70	6,583	14,308
425.80	6,680	14,971
425.90	6,776	15,644
426.00	6,873	16,326
426.10	6,980	17,019
426.20	7,086	17,722
426.30	7,193	18,436
426.40	7,300	19,161
426.50	7,407	19,896
426.60	7,513	20,642
426.70	7,620	21,399
426.80	7,727	22,166
426.90	7,833	22,944
427.00	7,940	23,733
427.10	8,047	24,532
427.20	8,153	25,342
427.30	8,260	26,163
427.40	8,367	26,994
427.50	8,474	27,836
427.60	8,580	28,689
427.70	8,687	29,552
427.80	8,794	30,426
427.90	8,900	31,311
428.00	9,007	32,206
428.10	9,121	33,112
428.20	9,234	34,030
428.30	9,348	34,959
428.40	9,461	35,900
428.50	**9,575**	**36,852**
428.60	9,575	36,852
428.70	9,575	36,852
428.80	9,575	36,852
428.90	9,575	36,852
429.00	9,575	36,852
429.10	9,575	36,852
429.20	9,575	36,852
429.30	9,575	36,852
429.40	9,575	36,852
429.50	9,575	36,852
429.60	9,575	36,852
429.70	9,575	36,852
429.80	9,575	36,852
429.90	9,575	36,852
430.00	9,575	36,852
430.10	9,575	36,852

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1a: P-1a Runoff Area=26.040 ac 0.35% Impervious Runoff Depth>2.83"
Flow Length=968' Tc=39.7 min CN=75 Runoff=53.11 cfs 6.142 af

Subcatchment P-1b: P-1b Runoff Area=16.720 ac 26.61% Impervious Runoff Depth>2.38"
Flow Length=786' Tc=43.2 min CN=70 Runoff=26.65 cfs 3.322 af

Subcatchment P-1c: P-1c Runoff Area=10.630 ac 0.56% Impervious Runoff Depth>1.89"
Flow Length=726' Tc=34.5 min CN=64 Runoff=15.12 cfs 1.677 af

Subcatchment P-1d: P-1d Runoff Area=6.230 ac 4.01% Impervious Runoff Depth>2.14"
Flow Length=766' Tc=33.1 min CN=67 Runoff=10.53 cfs 1.110 af

Subcatchment P-1e: P-1e Runoff Area=1.060 ac 65.09% Impervious Runoff Depth>3.83"
Tc=9.2 min CN=85 Runoff=6.16 cfs 0.338 af

Subcatchment P-2: P-2 Runoff Area=12.650 ac 0.00% Impervious Runoff Depth>2.19"
Flow Length=1,476' Tc=74.9 min CN=68 Runoff=12.35 cfs 2.310 af

Subcatchment P-3: P-3 Runoff Area=4.790 ac 0.00% Impervious Runoff Depth>1.66"
Flow Length=551' Tc=28.2 min CN=61 Runoff=6.66 cfs 0.664 af

Subcatchment P-4: P-4 Runoff Area=3.370 ac 0.00% Impervious Runoff Depth>2.93"
Flow Length=590' Tc=36.5 min CN=76 Runoff=7.55 cfs 0.821 af

Reach R-1: R-1 Avg. Flow Depth=0.55' Max Vel=4.29 fps Inflow=14.39 cfs 3.207 af
n=0.040 L=799.0' S=0.0388 '/' Capacity=41.87 cfs Outflow=14.38 cfs 3.194 af

Reach R-2: R-2 Avg. Flow Depth=1.72' Max Vel=2.40 fps Inflow=59.67 cfs 9.335 af
n=0.040 L=1,801.0' S=0.0036 '/' Capacity=23.64 cfs Outflow=52.84 cfs 9.189 af

Reach R-3: R-3 Avg. Flow Depth=3.24' Max Vel=1.45 fps Inflow=63.26 cfs 11.742 af
n=0.040 L=280.0' S=0.0011 '/' Capacity=12.88 cfs Outflow=62.68 cfs 11.699 af

Reach R-4: R-4 Avg. Flow Depth=3.47' Max Vel=1.35 fps Inflow=63.03 cfs 11.819 af
n=0.040 L=219.0' S=0.0009 '/' Capacity=11.89 cfs Outflow=62.65 cfs 11.782 af

Pond Pond 1b: Pond 1b Peak Elev=443.69' Storage=38,418 cf Inflow=26.65 cfs 3.322 af
Outflow=14.39 cfs 3.207 af

Pond Pond 1c: Pond 1c Peak Elev=411.56' Storage=17,682 cf Inflow=15.12 cfs 1.677 af
Primary=9.99 cfs 1.566 af Secondary=0.00 cfs 0.000 af Outflow=9.99 cfs 1.566 af

Pond Pond 1d: Pond 1d Peak Elev=410.24' Storage=21,558 cf Inflow=10.53 cfs 1.110 af
Primary=1.81 cfs 0.987 af Secondary=0.00 cfs 0.000 af Outflow=1.81 cfs 0.987 af

Pond Pond 1e: Pond 1e Peak Elev=406.39' Storage=9,713 cf Inflow=6.16 cfs 0.338 af
Outflow=0.37 cfs 0.120 af

Pond Pond 3: Pond 3 Peak Elev=425.05' Storage=10,228 cf Inflow=6.66 cfs 0.664 af
Primary=2.44 cfs 0.499 af Secondary=0.00 cfs 0.000 af Outflow=2.44 cfs 0.499 af

Summary for Subcatchment P-1a: P-1a

Runoff = 53.11 cfs @ 12.37 hrs, Volume= 6.142 af, Depth> 2.83"

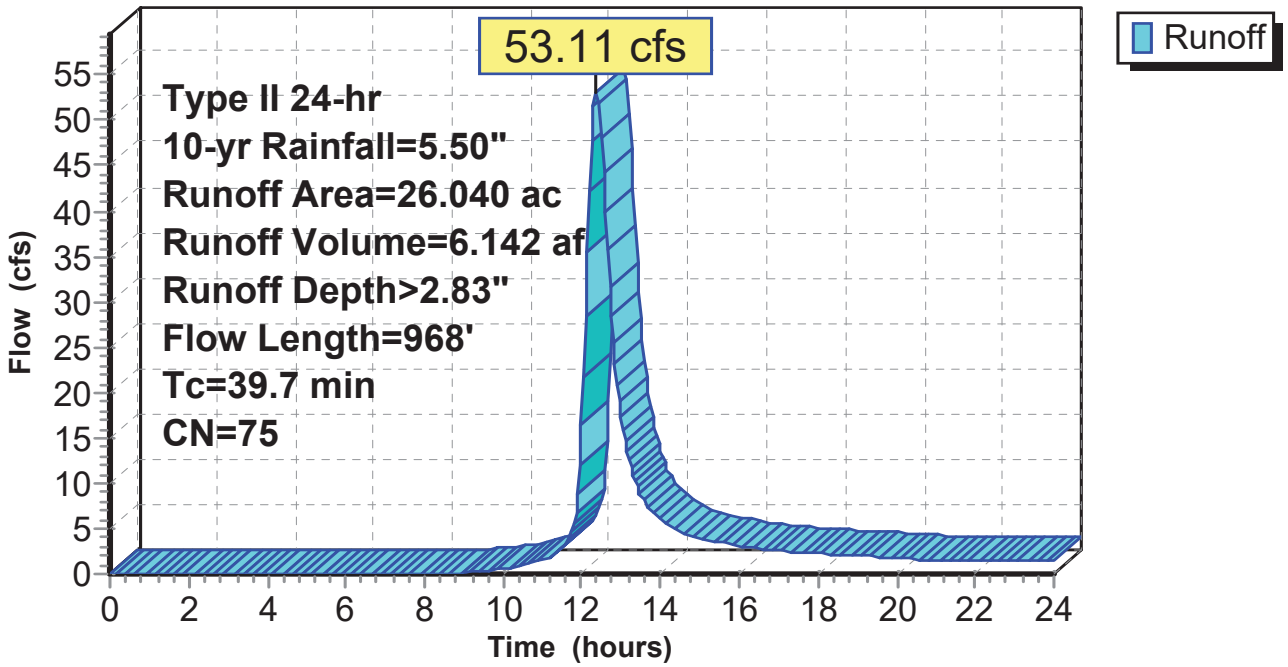
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.50"

Area (ac)	CN	Description
1.270	80	>75% Grass cover, Good, HSG D
3.830	61	>75% Grass cover, Good, HSG B
14.130	83	Woods, Poor, HSG D
6.720	66	Woods, Poor, HSG B
0.090	98	Paved parking, HSG B
26.040	75	Weighted Average
25.950		99.65% Pervious Area
0.090		0.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.0	150	0.0067	0.09		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
2.1	115	0.0170	0.91		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.1	262	0.0920	2.12		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
1.8	227	0.1850	2.15		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
4.7	214	0.0230	0.76		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
39.7	968	Total			

Subcatchment P-1a: P-1a

Hydrograph



Summary for Subcatchment P-1b: P-1b

Runoff = 26.65 cfs @ 12.42 hrs, Volume= 3.322 af, Depth> 2.38"

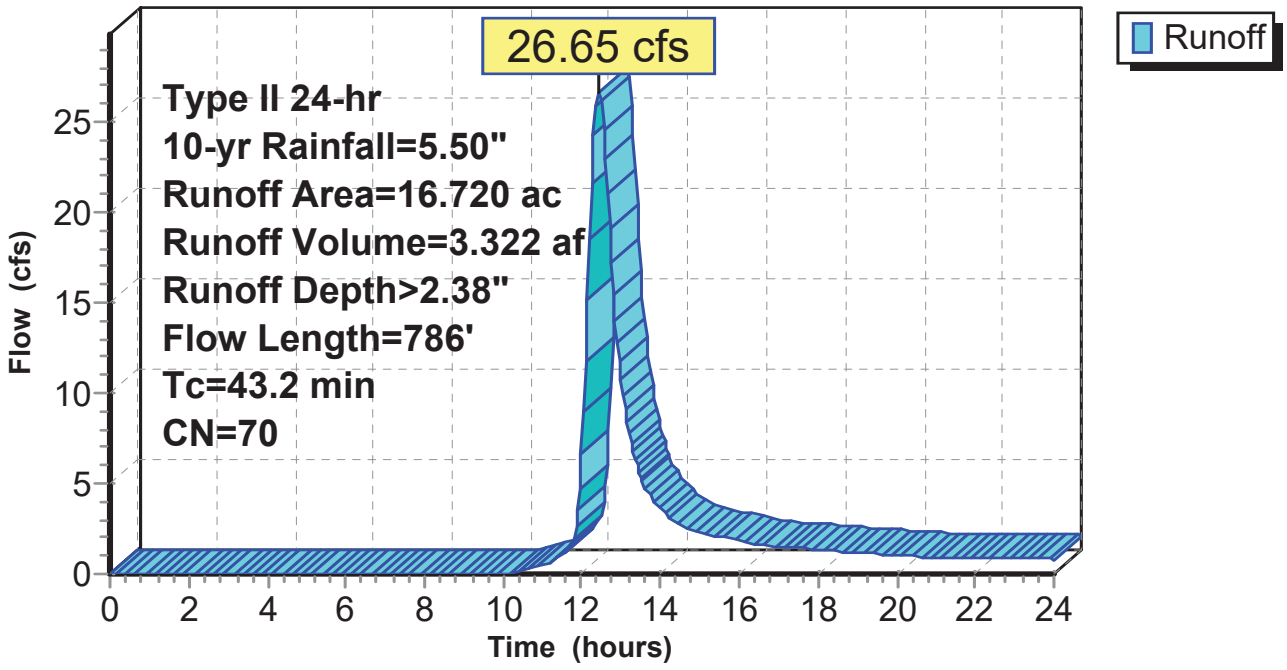
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.50"

Area (ac)	CN	Description
9.360	61	>75% Grass cover, Good, HSG B
4.450	98	Paved parking, HSG B
2.910	55	Woods, Good, HSG B
16.720	70	Weighted Average
12.270		73.39% Pervious Area
4.450		26.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.0	150	0.0030	0.06		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
1.4	57	0.0090	0.66		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.2	109	0.2290	7.70		**Shallow Concentrated Flow, CD** Unpaved Kv= 16.1 fps
0.8	164	0.0270	3.34		**Shallow Concentrated Flow, DE** Paved Kv= 20.3 fps
0.8	306	0.0120	6.51	11.51	**Pipe Channel, EF** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
43.2	786	Total			

Subcatchment P-1b: P-1b

Hydrograph



Summary for Subcatchment P-1c: P-1c

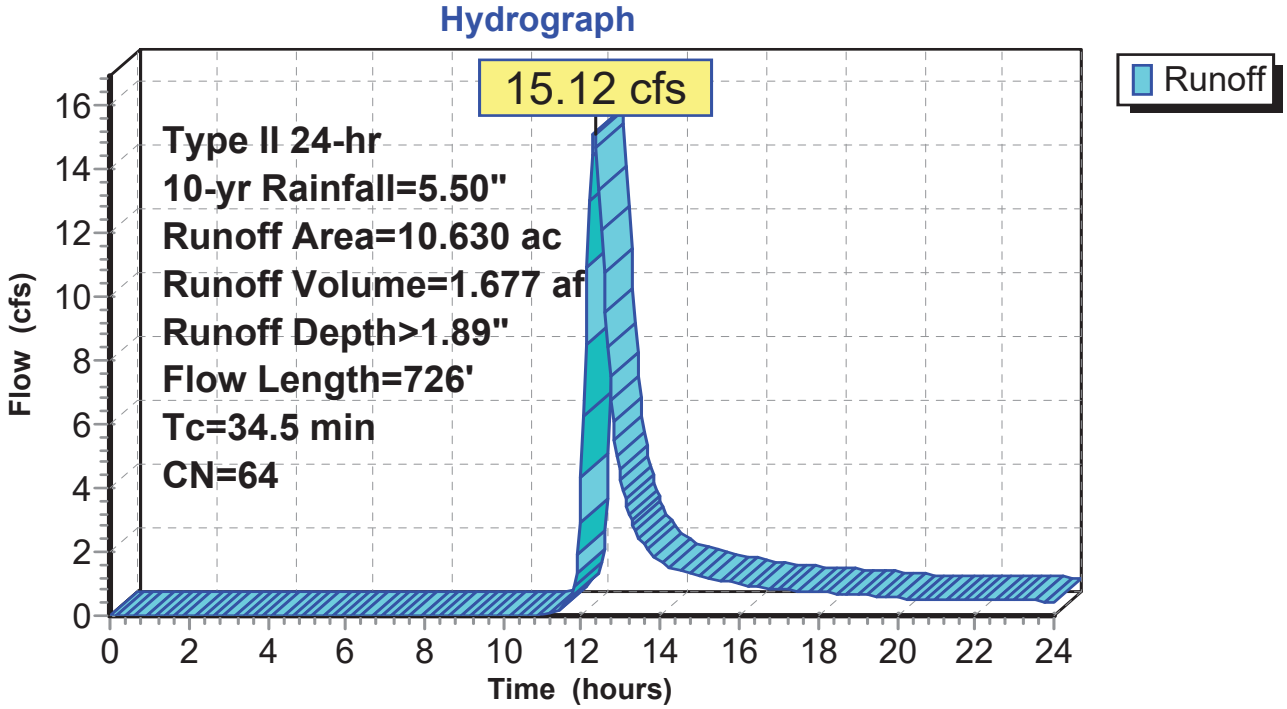
Runoff = 15.12 cfs @ 12.32 hrs, Volume= 1.677 af, Depth> 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.50"

Area (ac)	CN	Description
8.950	61	>75% Grass cover, Good, HSG B
1.620	80	>75% Grass cover, Good, HSG D
0.060	98	Paved parking, HSG D
10.630	64	Weighted Average
10.570		99.44% Pervious Area
0.060		0.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.7	150	0.0100	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
6.7	323	0.0130	0.80		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.8	201	0.0300	1.21		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.3	52	0.2300	3.36		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
34.5	726	Total			

Subcatchment P-1c: P-1c



Summary for Subcatchment P-1d: P-1d

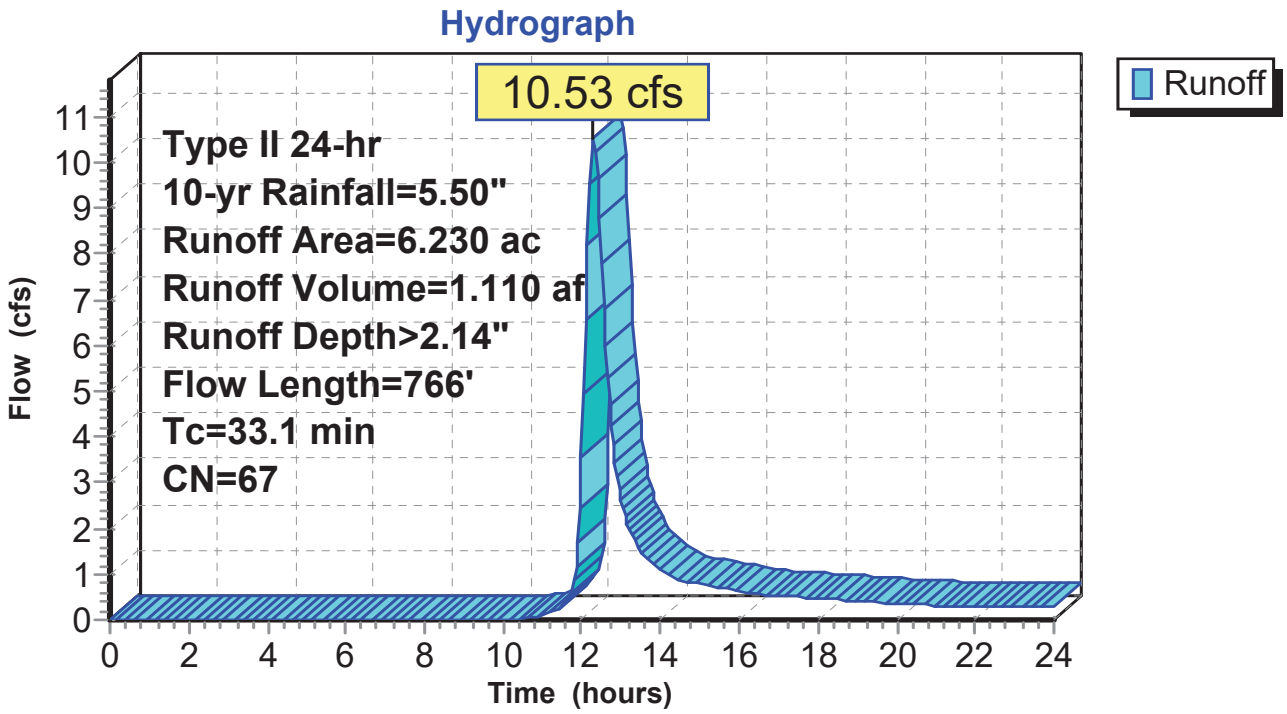
Runoff = 10.53 cfs @ 12.30 hrs, Volume= 1.110 af, Depth> 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.50"

Area (ac)	CN	Description
1.430	80	>75% Grass cover, Good, HSG D
4.550	61	>75% Grass cover, Good, HSG B
0.250	98	Paved parking, HSG B
6.230	67	Weighted Average
5.980		95.99% Pervious Area
0.250		4.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	150	0.0130	0.11		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.8	435	0.0140	0.83		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.1	181	0.0440	1.47		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
33.1	766	Total			

Subcatchment P-1d: P-1d



Summary for Subcatchment P-1e: P-1e

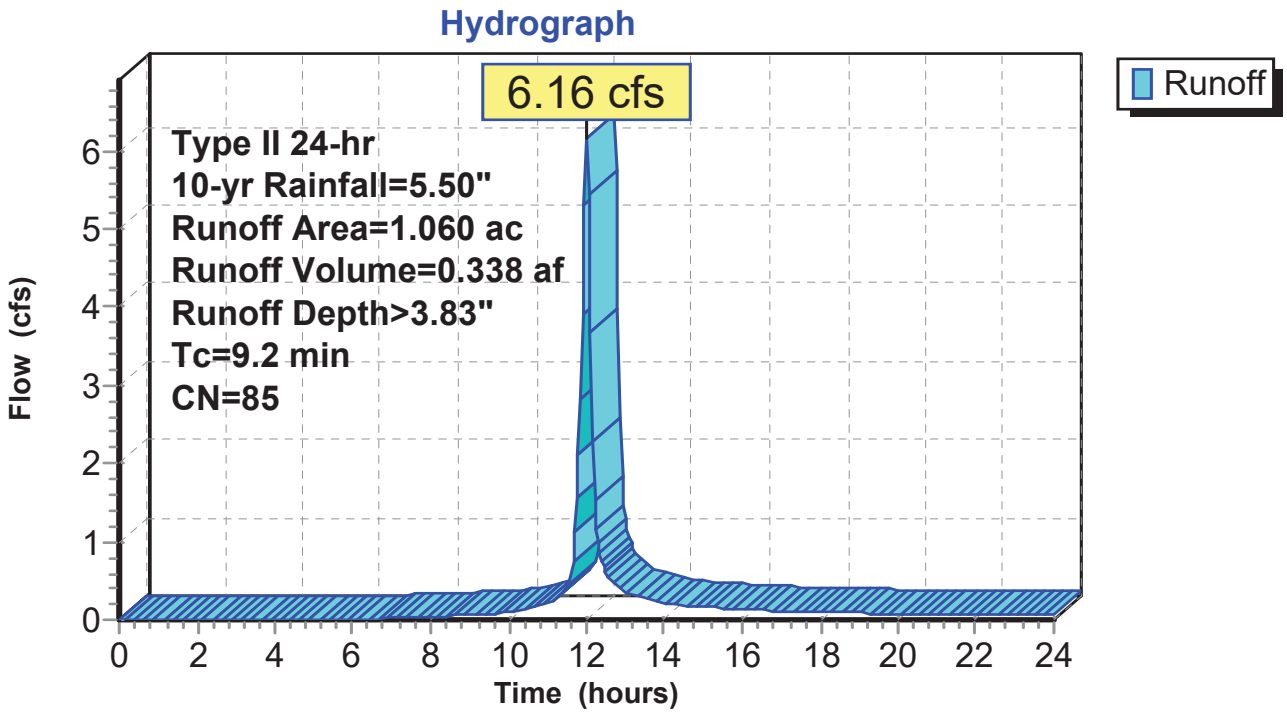
Runoff = 6.16 cfs @ 12.00 hrs, Volume= 0.338 af, Depth> 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.50"

Area (ac)	CN	Description
0.690	98	Paved parking, HSG B
0.370	61	>75% Grass cover, Good, HSG B
1.060	85	Weighted Average
0.370		34.91% Pervious Area
0.690		65.09% Impervious Area

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

Subcatchment P-1e: P-1e



Summary for Subcatchment P-2: P-2

Runoff = 12.35 cfs @ 12.86 hrs, Volume= 2.310 af, Depth> 2.19"

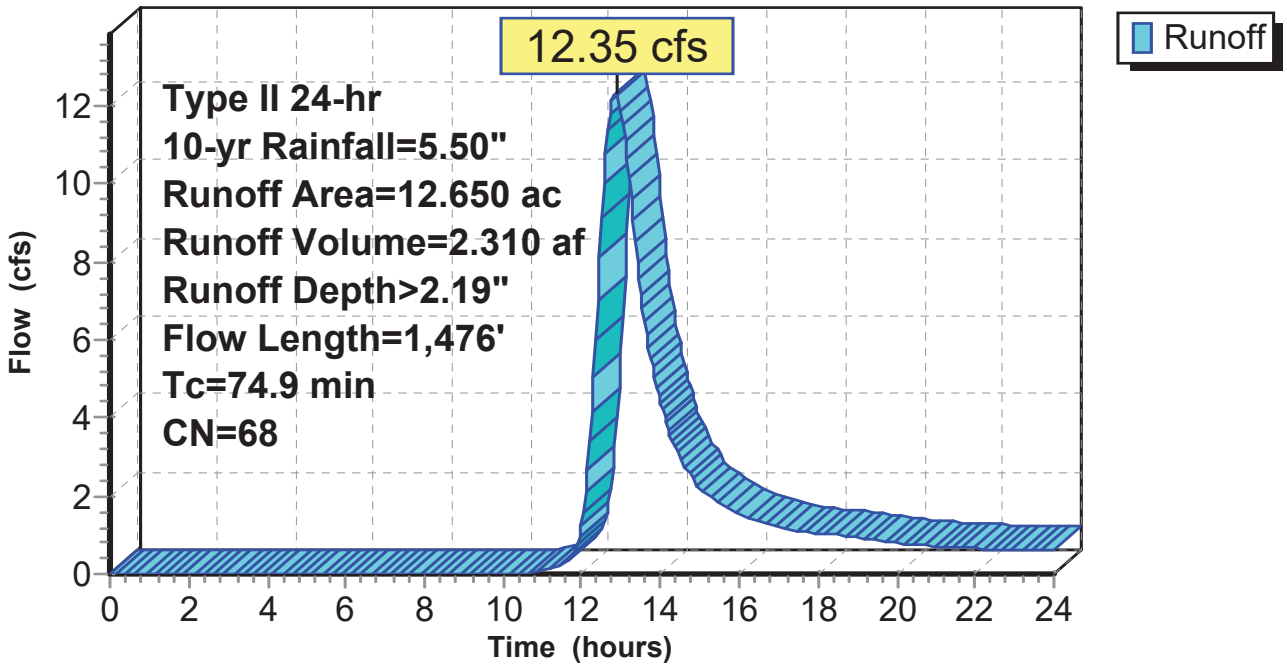
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.50"

Area (ac)	CN	Description
7.070	61	>75% Grass cover, Good, HSG B
2.000	66	Woods, Poor, HSG B
3.580	83	Woods, Poor, HSG D
12.650	68	Weighted Average
12.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	150	0.0087	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.6	362	0.0100	0.70		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.3	66	0.3330	4.04		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.8	68	0.0800	1.41		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
39.1	830	0.0050	0.35		**Shallow Concentrated Flow, EF** Woodland Kv= 5.0 fps
74.9	1,476	Total			

Subcatchment P-2: P-2

Hydrograph



Summary for Subcatchment P-3: P-3

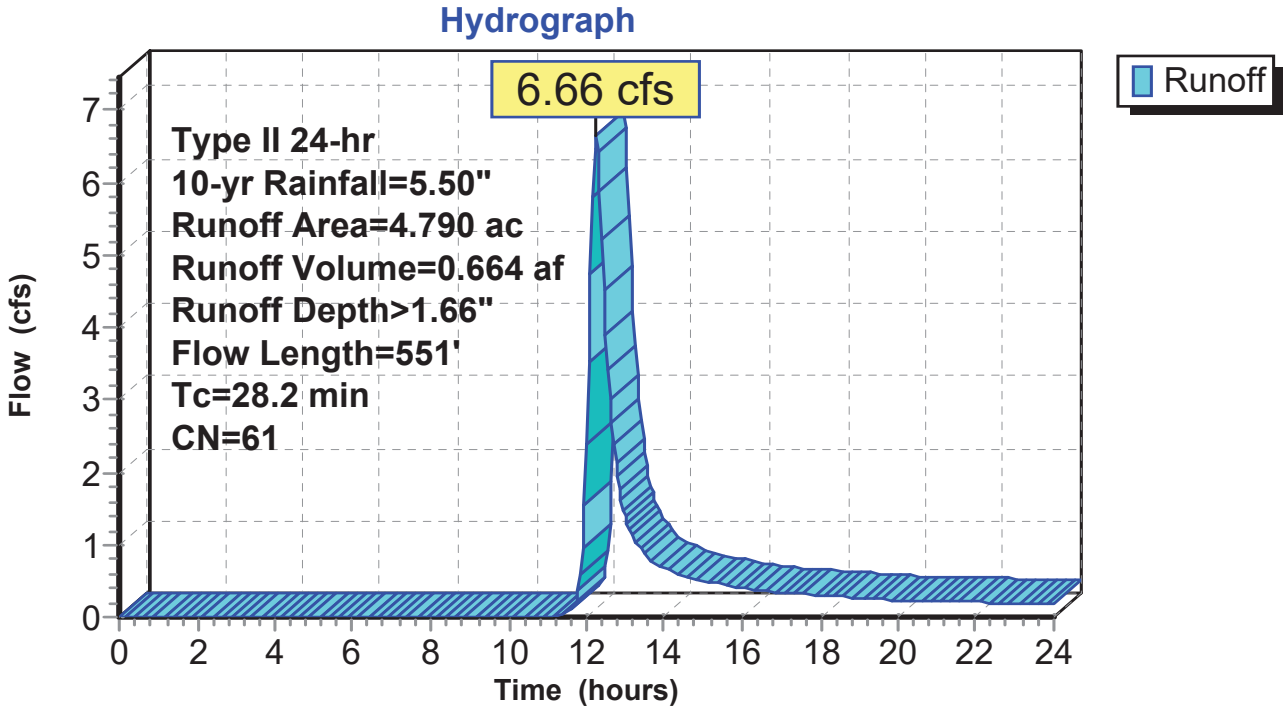
Runoff = 6.66 cfs @ 12.25 hrs, Volume= 0.664 af, Depth> 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.50"

Area (ac)	CN	Description
4.790	61	>75% Grass cover, Good, HSG B
4.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.5	150	0.0180	0.13		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.7	401	0.0120	0.77		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
28.2	551	Total			

Subcatchment P-3: P-3



Summary for Subcatchment P-4: P-4

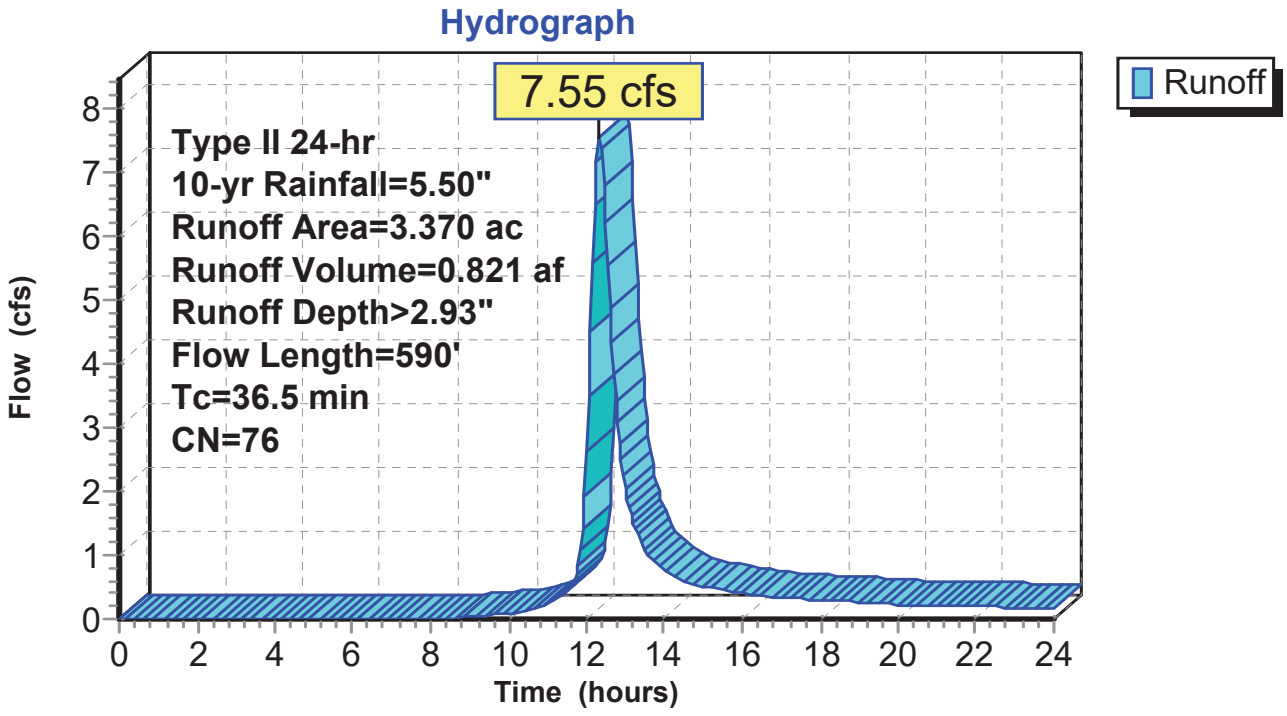
Runoff = 7.55 cfs @ 12.32 hrs, Volume= 0.821 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.50"

Area (ac)	CN	Description
1.830	83	Woods, Poor, HSG D
1.140	66	Woods, Poor, HSG B
0.290	80	>75% Grass cover, Good, HSG D
0.110	61	>75% Grass cover, Good, HSG B
3.370	76	Weighted Average
3.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.6	150	0.0600	0.08		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
4.9	440	0.0890	1.49		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
36.5	590	Total			

Subcatchment P-4: P-4



Summary for Reach R-1: R-1

Inflow Area = 16.720 ac, 26.61% Impervious, Inflow Depth > 2.30" for 10-yr event
Inflow = 14.39 cfs @ 12.84 hrs, Volume= 3.207 af
Outflow = 14.38 cfs @ 12.93 hrs, Volume= 3.194 af, Atten= 0%, Lag= 5.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.29 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 2.18 fps, Avg. Travel Time= 6.1 min

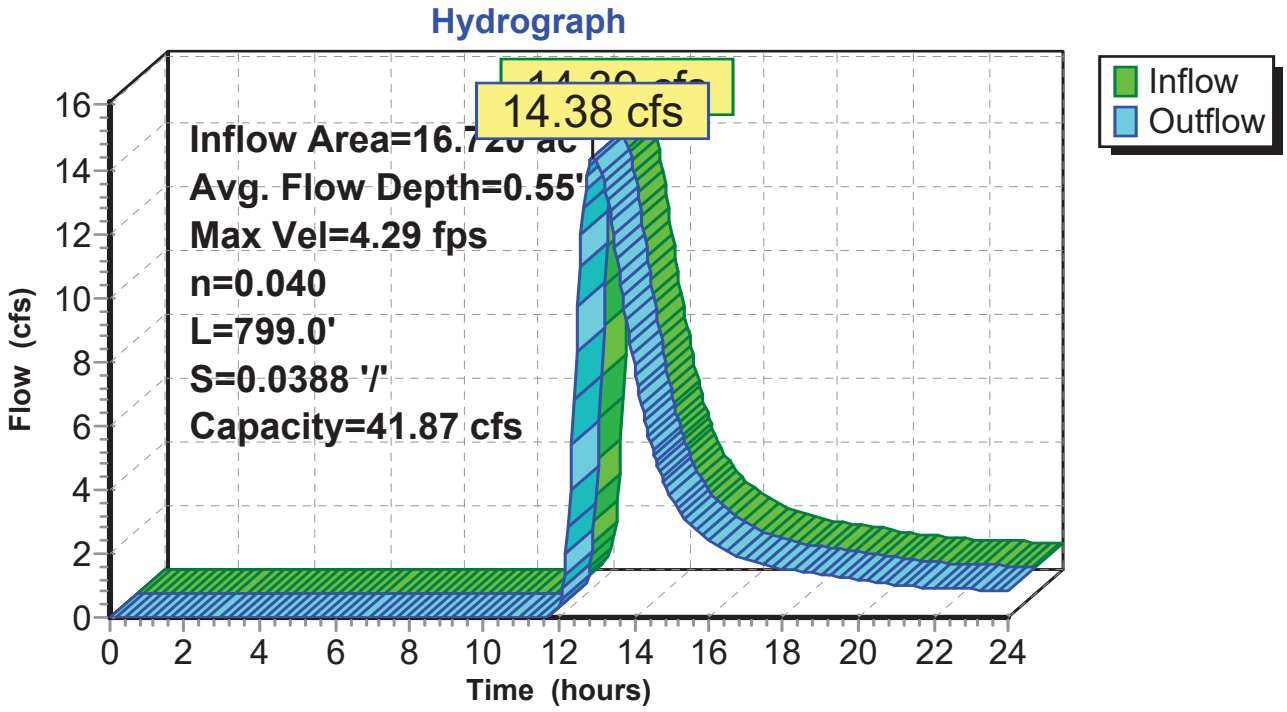
Peak Storage= 2,676 cf @ 12.88 hrs
Average Depth at Peak Storage= 0.55'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 41.87 cfs

5.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 799.0' Slope= 0.0388 '/'
Inlet Invert= 441.00', Outlet Invert= 410.00'



‡

Reach R-1: R-1



Stage-Discharge for Reach R-1: R-1

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
441.00	0.00	0.00
441.01	0.34	0.02
441.02	0.54	0.05
441.03	0.70	0.11
441.04	0.84	0.17
441.05	0.98	0.25
441.06	1.10	0.34
441.07	1.22	0.44
441.08	1.32	0.55
441.09	1.43	0.67
441.10	1.53	0.79
441.11	1.62	0.93
441.12	1.72	1.08
441.13	1.81	1.23
441.14	1.89	1.40
441.15	1.97	1.57
441.16	2.06	1.75
441.17	2.14	1.94
441.18	2.21	2.13
441.19	2.29	2.34
441.20	2.36	2.55
441.21	2.43	2.77
441.22	2.50	3.00
441.23	2.57	3.23
441.24	2.64	3.47
441.25	2.70	3.72
441.26	2.77	3.98
441.27	2.83	4.24
441.28	2.90	4.51
441.29	2.96	4.79
441.30	3.02	5.07
441.31	3.08	5.36
441.32	3.14	5.66
441.33	3.19	5.97
441.34	3.25	6.28
441.35	3.31	6.60
441.36	3.36	6.92
441.37	3.42	7.26
441.38	3.47	7.60
441.39	3.52	7.94
441.40	3.58	8.30
441.41	3.63	8.66
441.42	3.68	9.03
441.43	3.73	9.40
441.44	3.78	9.78
441.45	3.83	10.17
441.46	3.88	10.56
441.47	3.93	10.96
441.48	3.97	11.37
441.49	4.02	11.78
441.50	4.07	12.21
441.51	4.11	12.63
441.52	4.16	13.07
441.53	4.21	13.51
441.54	4.25	13.96
441.55	4.30	14.41
441.56	4.34	14.87
441.57	4.38	15.34
441.58	4.43	15.82
441.59	4.47	16.30
441.60	4.51	16.78
441.61	4.55	17.28
441.62	4.60	17.78
441.63	4.64	18.29
441.64	4.68	18.80
441.65	4.72	19.32
441.66	4.76	19.85
441.67	4.80	20.39
441.68	4.84	20.93
441.69	4.88	21.48
441.70	4.92	22.03
441.71	4.96	22.60
441.72	5.00	23.16
441.73	5.03	23.74
441.74	5.07	24.32
441.75	5.11	24.91
441.76	5.15	25.51
441.77	5.18	26.11
441.78	5.22	26.72
441.79	5.26	27.34
441.80	5.30	27.96
441.81	5.33	28.59
441.82	5.37	29.22
441.83	5.40	29.87
441.84	5.44	30.52
441.85	5.47	31.18
441.86	5.51	31.84
441.87	5.54	32.51
441.88	5.58	33.19
441.89	5.61	33.87
441.90	5.65	34.57
441.91	5.68	35.27
441.92	5.72	35.97
441.93	5.75	36.68
441.94	5.78	37.40
441.95	5.82	38.13
441.96	5.85	38.86
441.97	5.88	39.60
441.98	5.92	40.35
441.99	5.95	41.11
442.00	**5.98**	**41.87**

Stage-Area-Storage for Reach R-1: R-1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
441.00	0.0	0
441.01	0.1	40
441.02	0.1	81
441.03	0.2	121
441.04	0.2	162
441.05	0.3	204
441.06	0.3	245
441.07	0.4	287
441.08	0.4	330
441.09	0.5	372
441.10	0.5	415
441.11	0.6	459
441.12	0.6	502
441.13	0.7	546
441.14	0.7	591
441.15	0.8	635
441.16	0.9	680
441.17	0.9	725
441.18	1.0	771
441.19	1.0	817
441.20	1.1	863
441.21	1.1	909
441.22	1.2	956
441.23	1.3	1,003
441.24	1.3	1,051
441.25	1.4	1,099
441.26	1.4	1,147
441.27	1.5	1,195
441.28	1.6	1,244
441.29	1.6	1,293
441.30	1.7	1,342
441.31	1.7	1,392
441.32	1.8	1,442
441.33	1.9	1,492
441.34	1.9	1,543
441.35	2.0	1,594
441.36	2.1	1,645
441.37	2.1	1,697
441.38	2.2	1,749
441.39	2.3	1,801
441.40	2.3	1,854
441.41	2.4	1,907
441.42	2.5	1,960
441.43	2.5	2,013
441.44	2.6	2,067
441.45	2.7	2,121
441.46	2.7	2,176
441.47	2.8	2,231
441.48	2.9	2,286
441.49	2.9	2,341
441.50	3.0	2,397
441.51	3.1	2,453
441.52	3.1	2,509
441.53	3.2	2,566
441.54	3.3	2,623
441.55	3.4	2,681
441.56	3.4	2,738
441.57	3.5	2,796
441.58	3.6	2,855
441.59	3.6	2,913
441.60	3.7	2,972
441.61	3.8	3,032
441.62	3.9	3,091
441.63	3.9	3,151
441.64	4.0	3,211
441.65	4.1	3,272
441.66	4.2	3,333
441.67	4.2	3,394
441.68	4.3	3,456
441.69	4.4	3,517
441.70	4.5	3,580
441.71	4.6	3,642
441.72	4.6	3,705
441.73	4.7	3,768
441.74	4.8	3,831
441.75	4.9	3,895
441.76	5.0	3,959
441.77	5.0	4,024
441.78	5.1	4,088
441.79	5.2	4,153
441.80	5.3	4,219
441.81	5.4	4,284
441.82	5.4	4,350
441.83	5.5	4,417
441.84	5.6	4,483
441.85	5.7	4,550
441.86	5.8	4,618
441.87	5.9	4,685
441.88	5.9	4,753
441.89	6.0	4,821
441.90	6.1	4,890
441.91	6.2	4,959
441.92	6.3	5,028
441.93	6.4	5,097
441.94	6.5	5,167
441.95	6.6	5,237
441.96	6.6	5,308
441.97	6.7	5,379
441.98	6.8	5,450
441.99	6.9	5,521
442.00	**7.0**	**5,593**

Summary for Reach R-2: R-2

Inflow Area = 42.760 ac, 10.62% Impervious, Inflow Depth > 2.62" for 10-yr event
Inflow = 59.67 cfs @ 12.41 hrs, Volume= 9.335 af
Outflow = 52.84 cfs @ 12.80 hrs, Volume= 9.189 af, Atten= 11%, Lag= 23.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.40 fps, Min. Travel Time= 12.5 min
Avg. Velocity = 1.05 fps, Avg. Travel Time= 28.7 min

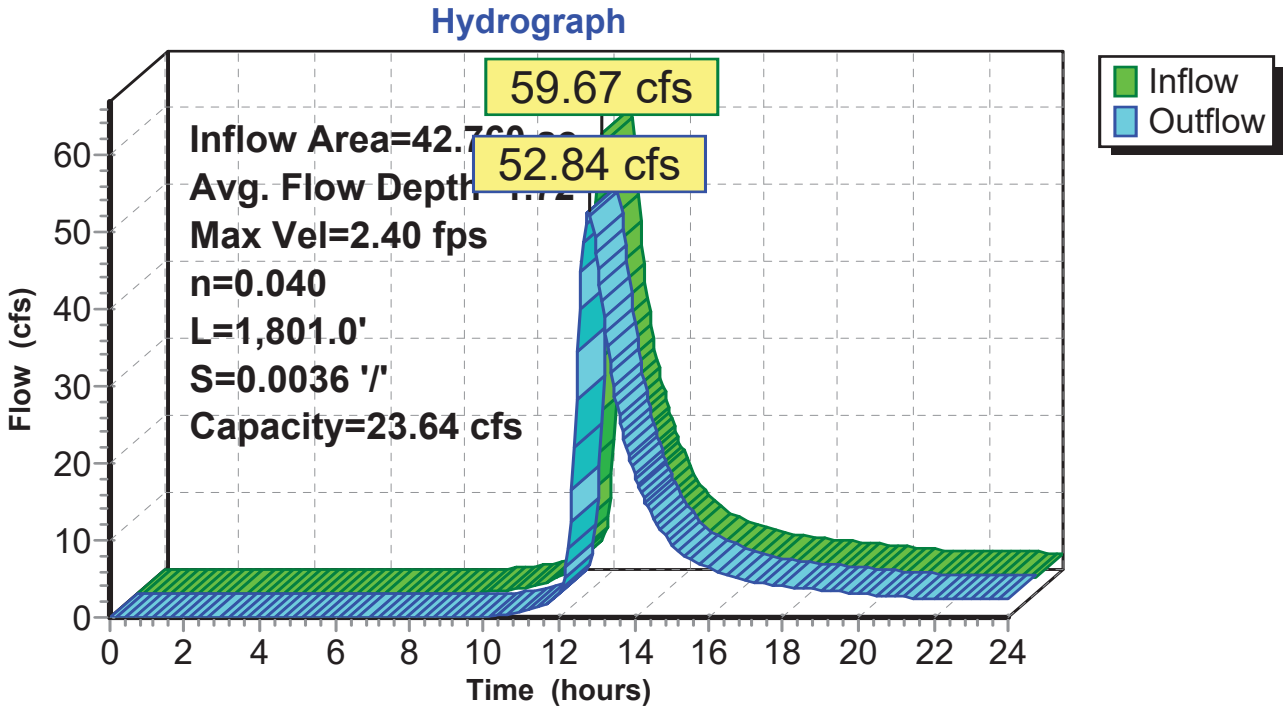
Peak Storage= 39,616 cf @ 12.59 hrs
Average Depth at Peak Storage= 1.72'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 23.64 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 1,801.0' Slope= 0.0036 '/'
Inlet Invert= 410.00', Outlet Invert= 403.50'



‡

Reach R-2: R-2



Stage-Discharge for Reach R-2: R-2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
410.00	0.00	0.00
410.01	0.10	0.01
410.02	0.16	0.03
410.03	0.21	0.06
410.04	0.26	0.10
410.05	0.30	0.15
410.06	0.34	0.21
410.07	0.37	0.27
410.08	0.41	0.33
410.09	0.44	0.40
410.10	0.47	0.48
410.11	0.50	0.57
410.12	0.53	0.65
410.13	0.56	0.75
410.14	0.59	0.85
410.15	0.62	0.95
410.16	0.64	1.06
410.17	0.67	1.17
410.18	0.69	1.29
410.19	0.72	1.41
410.20	0.74	1.54
410.21	0.76	1.67
410.22	0.79	1.81
410.23	0.81	1.95
410.24	0.83	2.09
410.25	0.85	2.24
410.26	0.87	2.39
410.27	0.89	2.55
410.28	0.92	2.71
410.29	0.94	2.87
410.30	0.96	3.04
410.31	0.98	3.21
410.32	1.00	3.39
410.33	1.01	3.57
410.34	1.03	3.75
410.35	1.05	3.94
410.36	1.07	4.13
410.37	1.09	4.33
410.38	1.11	4.53
410.39	1.13	4.73
410.40	1.14	4.94
410.41	1.16	5.15
410.42	1.18	5.36
410.43	1.19	5.58
410.44	1.21	5.80
410.45	1.23	6.03
410.46	1.24	6.25
410.47	1.26	6.49
410.48	1.28	6.72
410.49	1.29	6.96
410.50	1.31	7.20
410.51	1.33	7.45
410.52	1.34	7.70
410.53	1.36	7.95
410.54	1.37	8.21
410.55	1.39	8.47
410.56	1.40	8.73
410.57	1.42	9.00
410.58	1.43	9.27
410.59	1.45	9.54
410.60	1.46	9.82
410.61	1.48	10.10
410.62	1.49	10.38
410.63	1.50	10.67
410.64	1.52	10.96
410.65	1.53	11.26
410.66	1.55	11.55
410.67	1.56	11.86
410.68	1.57	12.16
410.69	1.59	12.47
410.70	1.60	12.78
410.71	1.61	13.09
410.72	1.63	13.41
410.73	1.64	13.73
410.74	1.65	14.06
410.75	1.67	14.38
410.76	1.68	14.71
410.77	1.69	15.05
410.78	1.71	15.39
410.79	1.72	15.73
410.80	1.73	16.07
410.81	1.74	16.42
410.82	1.76	16.77
410.83	1.77	17.12
410.84	1.78	17.48
410.85	1.79	17.84
410.86	1.81	18.20
410.87	1.82	18.57
410.88	1.83	18.94
410.89	1.84	19.31
410.90	1.85	19.69
410.91	1.87	20.07
410.92	1.88	20.45
410.93	1.89	20.84
410.94	1.90	21.23
410.95	1.91	21.62
410.96	1.92	22.02
410.97	1.94	22.42
410.98	1.95	22.82
410.99	1.96	23.23
411.00	**1.97**	**23.64**

Stage-Area-Storage for Reach R-2: R-2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
410.00	0.0	0
410.01	0.1	180
410.02	0.2	362
410.03	0.3	544
410.04	0.4	726
410.05	0.5	910
410.06	0.6	1,094
410.07	0.7	1,278
410.08	0.8	1,464
410.09	0.9	1,650
410.10	1.0	1,837
410.11	1.1	2,025
410.12	1.2	2,213
410.13	1.3	2,402
410.14	1.4	2,592
410.15	1.5	2,783
410.16	1.7	2,974
410.17	1.8	3,166
410.18	1.9	3,359
410.19	2.0	3,552
410.20	2.1	3,746
410.21	2.2	3,941
410.22	2.3	4,137
410.23	2.4	4,333
410.24	2.5	4,530
410.25	2.6	4,728
410.26	2.7	4,926
410.27	2.8	5,125
410.28	3.0	5,325
410.29	3.1	5,526
410.30	3.2	5,727
410.31	3.3	5,929
410.32	3.4	6,132
410.33	3.5	6,336
410.34	3.6	6,540
410.35	3.7	6,745
410.36	3.9	6,950
410.37	4.0	7,157
410.38	4.1	7,364
410.39	4.2	7,572
410.40	4.3	7,780
410.41	4.4	7,990
410.42	4.6	8,200
410.43	4.7	8,410
410.44	4.8	8,622
410.45	4.9	8,834
410.46	5.0	9,047
410.47	5.1	9,260
410.48	5.3	9,475
410.49	5.4	9,690
410.50	5.5	9,906
410.51	5.6	10,122
410.52	5.7	10,339
410.53	5.9	10,557
410.54	6.0	10,776
410.55	6.1	10,995
410.56	6.2	11,215
410.57	6.3	11,436
410.58	6.5	11,658
410.59	6.6	11,880
410.60	6.7	12,103
410.61	6.8	12,326
410.62	7.0	12,551
410.63	7.1	12,776
410.64	7.2	13,002
410.65	7.3	13,228
410.66	7.5	13,456
410.67	7.6	13,684
410.68	7.7	13,912
410.69	7.9	14,142
410.70	8.0	14,372
410.71	8.1	14,603
410.72	8.2	14,834
410.73	8.4	15,067
410.74	8.5	15,300
410.75	8.6	15,534
410.76	8.8	15,768
410.77	8.9	16,003
410.78	9.0	16,239
410.79	9.1	16,476
410.80	9.3	16,713
410.81	9.4	16,951
410.82	9.5	17,190
410.83	9.7	17,430
410.84	9.8	17,670
410.85	9.9	17,911
410.86	10.1	18,153
410.87	10.2	18,395
410.88	10.3	18,638
410.89	10.5	18,882
410.90	10.6	19,127
410.91	10.8	19,372
410.92	10.9	19,618
410.93	11.0	19,865
410.94	11.2	20,112
410.95	11.3	20,360
410.96	11.4	20,609
410.97	11.6	20,859
410.98	11.7	21,109
410.99	11.9	21,360
411.00	**12.0**	**21,612**

Summary for Reach R-3: R-3

Inflow Area = 59.620 ac, 8.13% Impervious, Inflow Depth > 2.36" for 10-yr event
Inflow = 63.26 cfs @ 12.77 hrs, Volume= 11.742 af
Outflow = 62.68 cfs @ 12.88 hrs, Volume= 11.699 af, Atten= 1%, Lag= 6.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.45 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 6.2 min

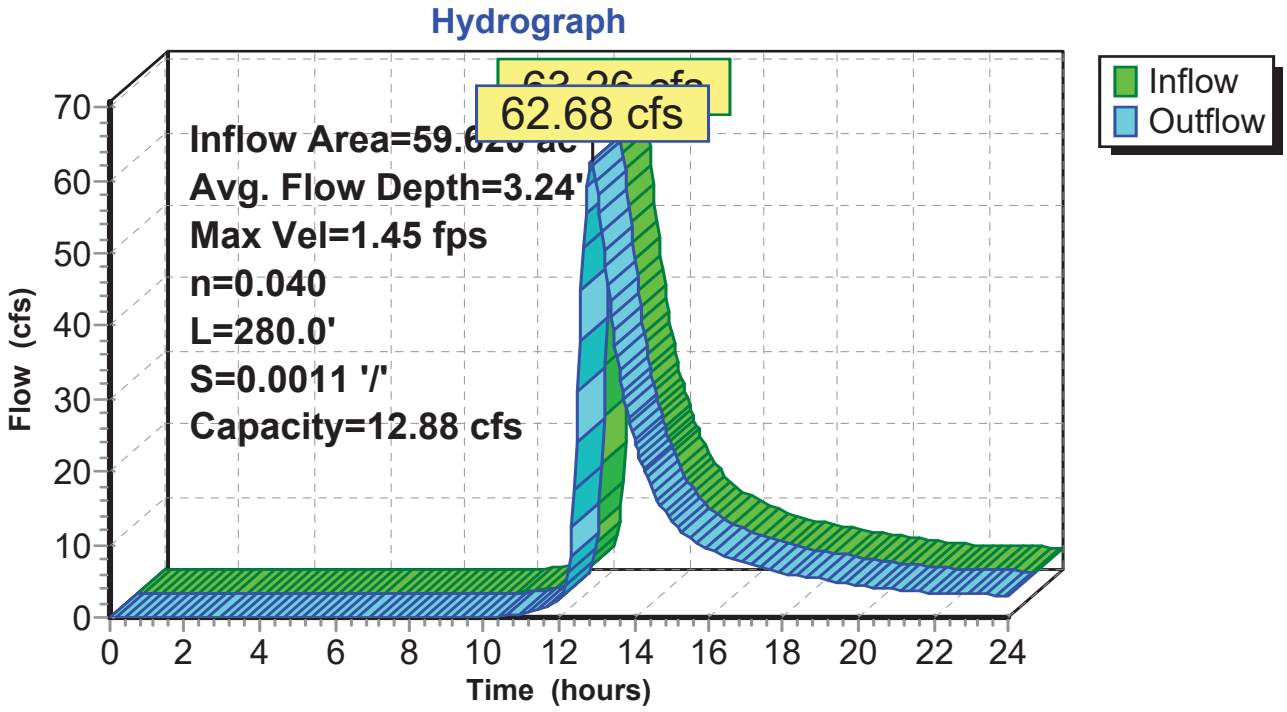
Peak Storage= 12,111 cf @ 12.82 hrs
Average Depth at Peak Storage= 3.24'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 12.88 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 280.0' Slope= 0.0011 '/'
Inlet Invert= 403.50', Outlet Invert= 403.20'



‡

Reach R-3: R-3



Stage-Discharge for Reach R-3: R-3

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
403.50	0.00	0.00
403.51	0.06	0.01
403.52	0.09	0.02
403.53	0.12	0.04
403.54	0.14	0.06
403.55	0.16	0.08
403.56	0.18	0.11
403.57	0.20	0.14
403.58	0.22	0.18
403.59	0.24	0.22
403.60	0.26	0.26
403.61	0.27	0.31
403.62	0.29	0.36
403.63	0.31	0.41
403.64	0.32	0.46
403.65	0.34	0.52
403.66	0.35	0.58
403.67	0.36	0.64
403.68	0.38	0.70
403.69	0.39	0.77
403.70	0.40	0.84
403.71	0.42	0.91
403.72	0.43	0.98
403.73	0.44	1.06
403.74	0.45	1.14
403.75	0.46	1.22
403.76	0.48	1.30
403.77	0.49	1.39
403.78	0.50	1.48
403.79	0.51	1.56
403.80	0.52	1.66
403.81	0.53	1.75
403.82	0.54	1.85
403.83	0.55	1.94
403.84	0.56	2.05
403.85	0.57	2.15
403.86	0.58	2.25
403.87	0.59	2.36
403.88	0.60	2.47
403.89	0.61	2.58
403.90	0.62	2.69
403.91	0.63	2.80
403.92	0.64	2.92
403.93	0.65	3.04
403.94	0.66	3.16
403.95	0.67	3.28
403.96	0.68	3.41
403.97	0.69	3.53
403.98	0.70	3.66
403.99	0.70	3.79
404.00	0.71	3.92
404.01	0.72	4.06
404.02	0.73	4.19
404.03	0.74	4.33
404.04	0.75	4.47
404.05	0.76	4.61
404.06	0.76	4.76
404.07	0.77	4.90
404.08	0.78	5.05
404.09	0.79	5.20
404.10	0.80	5.35
404.11	0.80	5.50
404.12	0.81	5.66
404.13	0.82	5.81
404.14	0.83	5.97
404.15	0.84	6.13
404.16	0.84	6.30
404.17	0.85	6.46
404.18	0.86	6.63
404.19	0.87	6.79
404.20	0.87	6.96
404.21	0.88	7.13
404.22	0.89	7.31
404.23	0.89	7.48
404.24	0.90	7.66
404.25	0.91	7.84
404.26	0.92	8.02
404.27	0.92	8.20
404.28	0.93	8.38
404.29	0.94	8.57
404.30	0.94	8.76
404.31	0.95	8.95
404.32	0.96	9.14
404.33	0.96	9.33
404.34	0.97	9.52
404.35	0.98	9.72
404.36	0.98	9.92
404.37	0.99	10.12
404.38	1.00	10.32
404.39	1.00	10.52
404.40	1.01	10.73
404.41	1.02	10.94
404.42	1.02	11.14
404.43	1.03	11.36
404.44	1.04	11.57
404.45	1.04	11.78
404.46	1.05	12.00
404.47	1.05	12.22
404.48	1.06	12.43
404.49	1.07	12.66
404.50	**1.07**	**12.88**

Stage-Area-Storage for Reach R-3: R-3

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
403.50	0.0	0
403.51	0.1	28
403.52	0.2	56
403.53	0.3	85
403.54	0.4	113
403.55	0.5	141
403.56	0.6	170
403.57	0.7	199
403.58	0.8	228
403.59	0.9	257
403.60	1.0	286
403.61	1.1	315
403.62	1.2	344
403.63	1.3	373
403.64	1.4	403
403.65	1.5	433
403.66	1.7	462
403.67	1.8	492
403.68	1.9	522
403.69	2.0	552
403.70	2.1	582
403.71	2.2	613
403.72	2.3	643
403.73	2.4	674
403.74	2.5	704
403.75	2.6	735
403.76	2.7	766
403.77	2.8	797
403.78	3.0	828
403.79	3.1	859
403.80	3.2	890
403.81	3.3	922
403.82	3.4	953
403.83	3.5	985
403.84	3.6	1,017
403.85	3.7	1,049
403.86	3.9	1,081
403.87	4.0	1,113
403.88	4.1	1,145
403.89	4.2	1,177
403.90	4.3	1,210
403.91	4.4	1,242
403.92	4.6	1,275
403.93	4.7	1,308
403.94	4.8	1,340
403.95	4.9	1,373
403.96	5.0	1,406
403.97	5.1	1,440
403.98	5.3	1,473
403.99	5.4	1,506
404.00	5.5	1,540
404.01	5.6	1,574
404.02	5.7	1,607
404.03	5.9	1,641
404.04	6.0	1,675
404.05	6.1	1,709
404.06	6.2	1,744
404.07	6.3	1,778
404.08	6.5	1,812
404.09	6.6	1,847
404.10	6.7	1,882
404.11	6.8	1,916
404.12	7.0	1,951
404.13	7.1	1,986
404.14	7.2	2,021
404.15	7.3	2,057
404.16	7.5	2,092
404.17	7.6	2,127
404.18	7.7	2,163
404.19	7.9	2,199
404.20	8.0	2,234
404.21	8.1	2,270
404.22	8.2	2,306
404.23	8.4	2,342
404.24	8.5	2,379
404.25	8.6	2,415
404.26	8.8	2,451
404.27	8.9	2,488
404.28	9.0	2,525
404.29	9.1	2,561
404.30	9.3	2,598
404.31	9.4	2,635
404.32	9.5	2,673
404.33	9.7	2,710
404.34	9.8	2,747
404.35	9.9	2,785
404.36	10.1	2,822
404.37	10.2	2,860
404.38	10.3	2,898
404.39	10.5	2,936
404.40	10.6	2,974
404.41	10.8	3,012
404.42	10.9	3,050
404.43	11.0	3,088
404.44	11.2	3,127
404.45	11.3	3,165
404.46	11.4	3,204
404.47	11.6	3,243
404.48	11.7	3,282
404.49	11.9	3,321
404.50	**12.0**	**3,360**

Summary for Reach R-4: R-4

Inflow Area = 60.680 ac, 9.13% Impervious, Inflow Depth > 2.34" for 10-yr event
Inflow = 63.03 cfs @ 12.88 hrs, Volume= 11.819 af
Outflow = 62.65 cfs @ 12.97 hrs, Volume= 11.782 af, Atten= 1%, Lag= 5.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.35 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 0.72 fps, Avg. Travel Time= 5.0 min

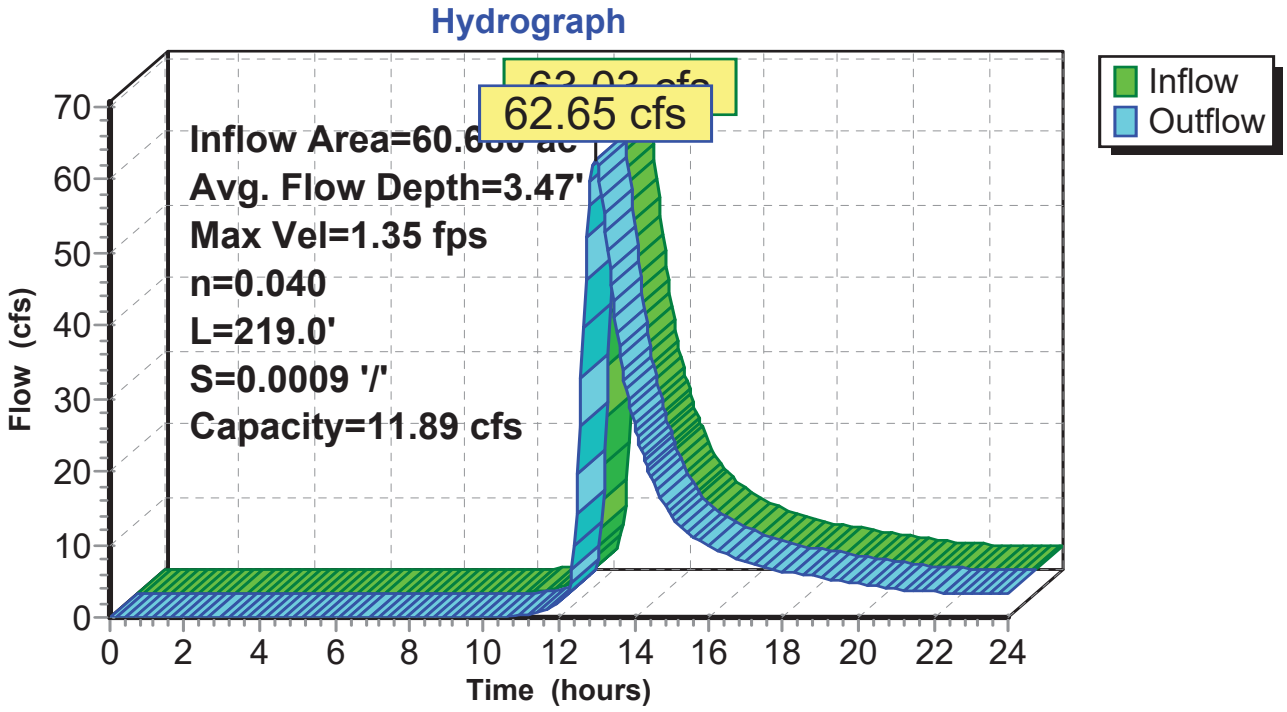
Peak Storage= 10,182 cf @ 12.92 hrs
Average Depth at Peak Storage= 3.47'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 11.89 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 219.0' Slope= 0.0009 '/'
Inlet Invert= 403.20', Outlet Invert= 403.00'



‡

Reach R-4: R-4



Stage-Discharge for Reach R-4: R-4

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
403.20	0.00	0.00
403.21	0.05	0.01
403.22	0.08	0.02
403.23	0.11	0.03
403.24	0.13	0.05
403.25	0.15	0.08
403.26	0.17	0.10
403.27	0.19	0.13
403.28	0.21	0.17
403.29	0.22	0.20
403.30	0.24	0.24
403.31	0.25	0.28
403.32	0.27	0.33
403.33	0.28	0.38
403.34	0.30	0.43
403.35	0.31	0.48
403.36	0.32	0.53
403.37	0.34	0.59
403.38	0.35	0.65
403.39	0.36	0.71
403.40	0.37	0.77
403.41	0.38	0.84
403.42	0.40	0.91
403.43	0.41	0.98
403.44	0.42	1.05
403.45	0.43	1.13
403.46	0.44	1.20
403.47	0.45	1.28
403.48	0.46	1.36
403.49	0.47	1.44
403.50	0.48	1.53
403.51	0.49	1.62
403.52	0.50	1.70
403.53	0.51	1.80
403.54	0.52	1.89
403.55	0.53	1.98
403.56	0.54	2.08
403.57	0.55	2.18
403.58	0.56	2.28
403.59	0.57	2.38
403.60	0.57	2.48
403.61	0.58	2.59
403.62	0.59	2.70
403.63	0.60	2.81
403.64	0.61	2.92
403.65	0.62	3.03
403.66	0.63	3.15
403.67	0.63	3.26
403.68	0.64	3.38
403.69	0.65	3.50
403.70	0.66	3.62
403.71	0.67	3.75
403.72	0.67	3.87
403.73	0.68	4.00
403.74	0.69	4.13
403.75	0.70	4.26
403.76	0.71	4.39
403.77	0.71	4.53
403.78	0.72	4.66
403.79	0.73	4.80
403.80	0.74	4.94
403.81	0.74	5.08
403.82	0.75	5.22
403.83	0.76	5.37
403.84	0.76	5.51
403.85	0.77	5.66
403.86	0.78	5.81
403.87	0.78	5.96
403.88	0.79	6.12
403.89	0.80	6.27
403.90	0.81	6.43
403.91	0.81	6.59
403.92	0.82	6.75
403.93	0.83	6.91
403.94	0.83	7.07
403.95	0.84	7.24
403.96	0.85	7.40
403.97	0.85	7.57
403.98	0.86	7.74
403.99	0.86	7.91
404.00	0.87	8.08
404.01	0.88	8.26
404.02	0.88	8.43
404.03	0.89	8.61
404.04	0.90	8.79
404.05	0.90	8.97
404.06	0.91	9.16
404.07	0.91	9.34
404.08	0.92	9.53
404.09	0.93	9.72
404.10	0.93	9.91
404.11	0.94	10.10
404.12	0.94	10.29
404.13	0.95	10.48
404.14	0.96	10.68
404.15	0.96	10.88
404.16	0.97	11.08
404.17	0.97	11.28
404.18	0.98	11.48
404.19	0.99	11.68
404.20	**0.99**	**11.89**

Stage-Area-Storage for Reach R-4: R-4

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
403.20	0.0	0
403.21	0.1	22
403.22	0.2	44
403.23	0.3	66
403.24	0.4	88
403.25	0.5	111
403.26	0.6	133
403.27	0.7	155
403.28	0.8	178
403.29	0.9	201
403.30	1.0	223
403.31	1.1	246
403.32	1.2	269
403.33	1.3	292
403.34	1.4	315
403.35	1.5	338
403.36	1.7	362
403.37	1.8	385
403.38	1.9	408
403.39	2.0	432
403.40	2.1	456
403.41	2.2	479
403.42	2.3	503
403.43	2.4	527
403.44	2.5	551
403.45	2.6	575
403.46	2.7	599
403.47	2.8	623
403.48	3.0	648
403.49	3.1	672
403.50	3.2	696
403.51	3.3	721
403.52	3.4	746
403.53	3.5	770
403.54	3.6	795
403.55	3.7	820
403.56	3.9	845
403.57	4.0	870
403.58	4.1	895
403.59	4.2	921
403.60	4.3	946
403.61	4.4	972
403.62	4.6	997
403.63	4.7	1,023
403.64	4.8	1,048
403.65	4.9	1,074
403.66	5.0	1,100
403.67	5.1	1,126
403.68	5.3	1,152
403.69	5.4	1,178
403.70	5.5	1,205
403.71	5.6	1,231
403.72	5.7	1,257
403.73	5.9	1,284
403.74	6.0	1,310
403.75	6.1	1,337
403.76	6.2	1,364
403.77	6.3	1,391
403.78	6.5	1,418
403.79	6.6	1,445
403.80	6.7	1,472
403.81	6.8	1,499
403.82	7.0	1,526
403.83	7.1	1,554
403.84	7.2	1,581
403.85	7.3	1,609
403.86	7.5	1,636
403.87	7.6	1,664
403.88	7.7	1,692
403.89	7.9	1,720
403.90	8.0	1,748
403.91	8.1	1,776
403.92	8.2	1,804
403.93	8.4	1,832
403.94	8.5	1,860
403.95	8.6	1,889
403.96	8.8	1,917
403.97	8.9	1,946
403.98	9.0	1,975
403.99	9.1	2,003
404.00	9.3	2,032
404.01	9.4	2,061
404.02	9.5	2,090
404.03	9.7	2,119
404.04	9.8	2,149
404.05	9.9	2,178
404.06	10.1	2,207
404.07	10.2	2,237
404.08	10.3	2,266
404.09	10.5	2,296
404.10	10.6	2,326
404.11	10.8	2,356
404.12	10.9	2,386
404.13	11.0	2,416
404.14	11.2	2,446
404.15	11.3	2,476
404.16	11.4	2,506
404.17	11.6	2,536
404.18	11.7	2,567
404.19	11.9	2,597
404.20	**12.0**	**2,628**

Summary for Pond Pond 1b: Pond 1b

Inflow Area = 16.720 ac, 26.61% Impervious, Inflow Depth > 2.38" for 10-yr event
Inflow = 26.65 cfs @ 12.42 hrs, Volume= 3.322 af
Outflow = 14.39 cfs @ 12.84 hrs, Volume= 3.207 af, Atten= 46%, Lag= 25.0 min
Primary = 14.39 cfs @ 12.84 hrs, Volume= 3.207 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 443.69' @ 12.84 hrs Surf.Area= 31,098 sf Storage= 38,418 cf

Plug-Flow detention time= 54.5 min calculated for 3.207 af (97% of inflow)
Center-of-Mass det. time= 35.9 min (902.2 - 866.3)

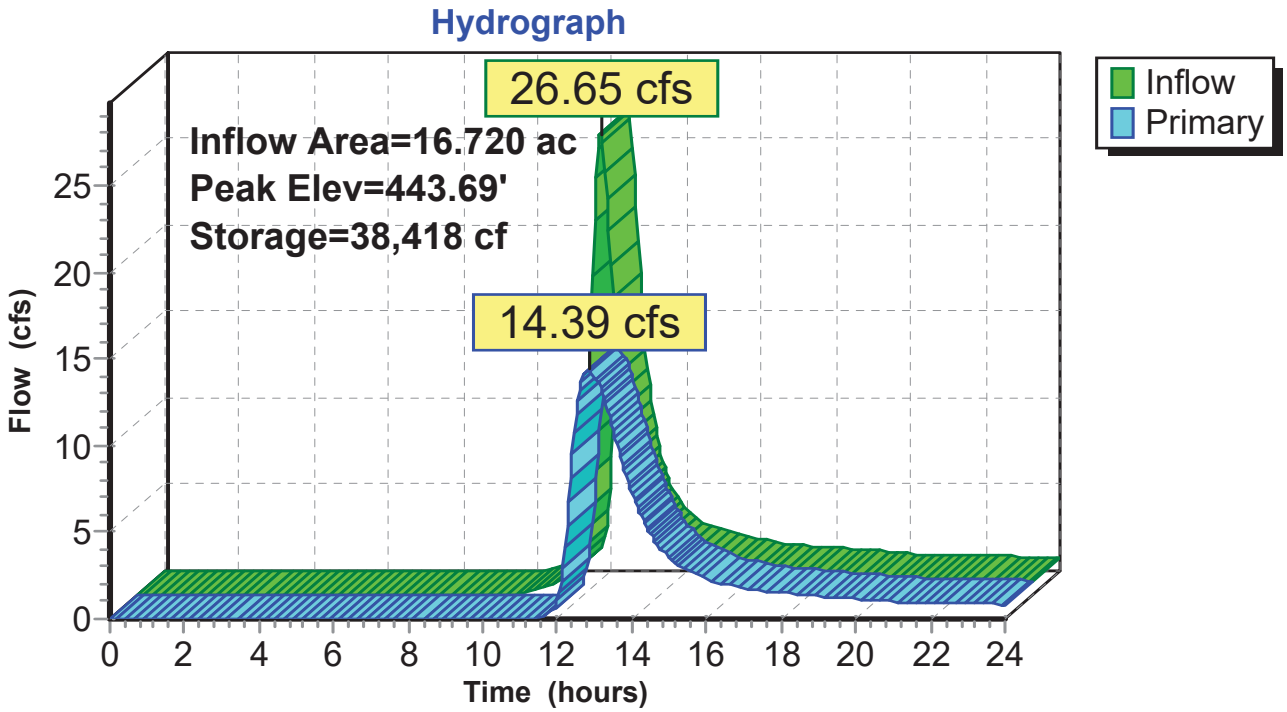
Volume	Invert	Avail.Storage	Storage Description
#1	441.50'	141,234 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
441.50	1,192	0	0
442.00	10,772	2,991	2,991
444.00	34,794	45,566	48,557
446.00	38,163	72,957	121,514
446.50	40,718	19,720	141,234

Device	Routing	Invert	Outlet Devices
#1	Primary	441.80'	**24.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	441.60'	**25.6 deg x 2.0' long x 4.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.64 (C= 3.30)
#3	Device 1	445.23'	**52.0" W x 64.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	446.40'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=14.40 cfs @ 12.84 hrs HW=443.69' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 14.40 cfs @ 4.68 fps)
  ├**2=Sharp-Crested Vee/Trap Weir** (Passes 14.40 cfs of 23.69 cfs potential flow)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond Pond 1b: Pond 1b



Stage-Discharge for Pond Pond 1b: Pond 1b

Elevation (feet)	Primary (cfs)
441.50	0.00
441.60	0.00
441.70	0.00
441.80	0.00
441.90	0.06
442.00	0.25
442.10	0.55
442.20	0.96
442.30	1.48
442.40	2.09
442.50	2.79
442.60	3.57
442.70	4.43
442.80	5.35
442.90	6.32
443.00	7.34
443.10	8.39
443.20	9.46
443.30	10.54
443.40	11.60
443.50	12.63
443.60	13.60
443.70	14.47
443.80	15.13
443.90	15.87
444.00	16.57
444.10	17.25
444.20	17.90
444.30	18.53
444.40	19.13
444.50	19.72
444.60	20.29
444.70	20.85
444.80	21.39
444.90	21.92
445.00	22.44
445.10	22.94
445.20	23.43
445.30	23.92
445.40	24.39
445.50	24.86
445.60	25.31
445.70	25.76
445.80	26.20
445.90	26.63
446.00	27.06
446.10	27.48
446.20	27.89
446.30	28.30
446.40	28.70
446.50	29.10
446.60	29.49
446.70	29.87
446.80	30.25
446.90	30.63
447.00	31.00
447.10	31.37
447.20	31.73
447.30	32.09
447.40	32.44
447.50	32.79
447.60	33.14
447.70	33.48
447.80	33.82
447.90	34.16
448.00	34.49
448.10	34.82
448.20	35.15
448.30	35.48
448.40	35.80
448.50	36.11
448.60	36.43
448.70	36.74
448.80	37.05
448.90	37.36
449.00	37.67
449.10	37.97
449.20	38.27
449.30	38.57
449.40	38.86
449.50	39.15
449.60	39.45
449.70	39.73
449.80	40.02
449.90	40.31
450.00	40.59
450.10	40.87
450.20	41.15
450.30	41.43
450.40	41.70
450.50	**41.97**

Stage-Area-Storage for Pond Pond 1b: Pond 1b

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
441.50	1,192	0
441.60	3,108	215
441.70	5,024	622
441.80	6,940	1,220
441.90	8,856	2,010
442.00	10,772	2,991
442.10	11,973	4,128
442.20	13,174	5,386
442.30	14,375	6,763
442.40	15,576	8,261
442.50	16,778	9,878
442.60	17,979	11,616
442.70	19,180	13,474
442.80	20,381	15,452
442.90	21,582	17,550
443.00	22,783	19,769
443.10	23,984	22,107
443.20	25,185	24,565
443.30	26,386	27,144
443.40	27,587	29,843
443.50	28,789	32,661
443.60	29,990	35,600
443.70	31,191	38,659
443.80	32,392	41,838
443.90	33,593	45,138
444.00	34,794	48,557
444.10	34,962	52,045
444.20	35,131	55,549
444.30	35,299	59,071
444.40	35,468	62,609
444.50	35,636	66,165
444.60	35,805	69,737
444.70	35,973	73,326
444.80	36,142	76,931
444.90	36,310	80,554
445.00	36,479	84,193
445.10	36,647	87,850
445.20	36,815	91,523
445.30	36,984	95,213
445.40	37,152	98,919
445.50	37,321	102,643
445.60	37,489	106,384
445.70	37,658	110,141
445.80	37,826	113,915
445.90	37,995	117,706
446.00	38,163	121,514
446.10	38,674	125,356
446.20	39,185	129,249
446.30	39,696	133,193
446.40	40,207	137,188
446.50	**40,718**	**141,234**
446.60	40,718	141,234
446.70	40,718	141,234
446.80	40,718	141,234
446.90	40,718	141,234
447.00	40,718	141,234
447.10	40,718	141,234
447.20	40,718	141,234
447.30	40,718	141,234
447.40	40,718	141,234
447.50	40,718	141,234
447.60	40,718	141,234
447.70	40,718	141,234
447.80	40,718	141,234
447.90	40,718	141,234
448.00	40,718	141,234
448.10	40,718	141,234
448.20	40,718	141,234
448.30	40,718	141,234
448.40	40,718	141,234
448.50	40,718	141,234
448.60	40,718	141,234
448.70	40,718	141,234
448.80	40,718	141,234
448.90	40,718	141,234
449.00	40,718	141,234
449.10	40,718	141,234
449.20	40,718	141,234
449.30	40,718	141,234
449.40	40,718	141,234
449.50	40,718	141,234
449.60	40,718	141,234
449.70	40,718	141,234
449.80	40,718	141,234
449.90	40,718	141,234
450.00	40,718	141,234
450.10	40,718	141,234
450.20	40,718	141,234
450.30	40,718	141,234
450.40	40,718	141,234
450.50	40,718	141,234

Summary for Pond Pond 1c: Pond 1c

Inflow Area = 10.630 ac, 0.56% Impervious, Inflow Depth > 1.89" for 10-yr event
Inflow = 15.12 cfs @ 12.32 hrs, Volume= 1.677 af
Outflow = 9.99 cfs @ 12.58 hrs, Volume= 1.566 af, Atten= 34%, Lag= 15.8 min
Primary = 9.99 cfs @ 12.58 hrs, Volume= 1.566 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 411.56' @ 12.58 hrs Surf.Area= 8,259 sf Storage= 17,682 cf

Plug-Flow detention time= 73.6 min calculated for 1.566 af (93% of inflow)
Center-of-Mass det. time= 39.7 min (914.0 - 874.3)

Volume	Invert	Avail.Storage	Storage Description
#1	409.00'	53,054 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

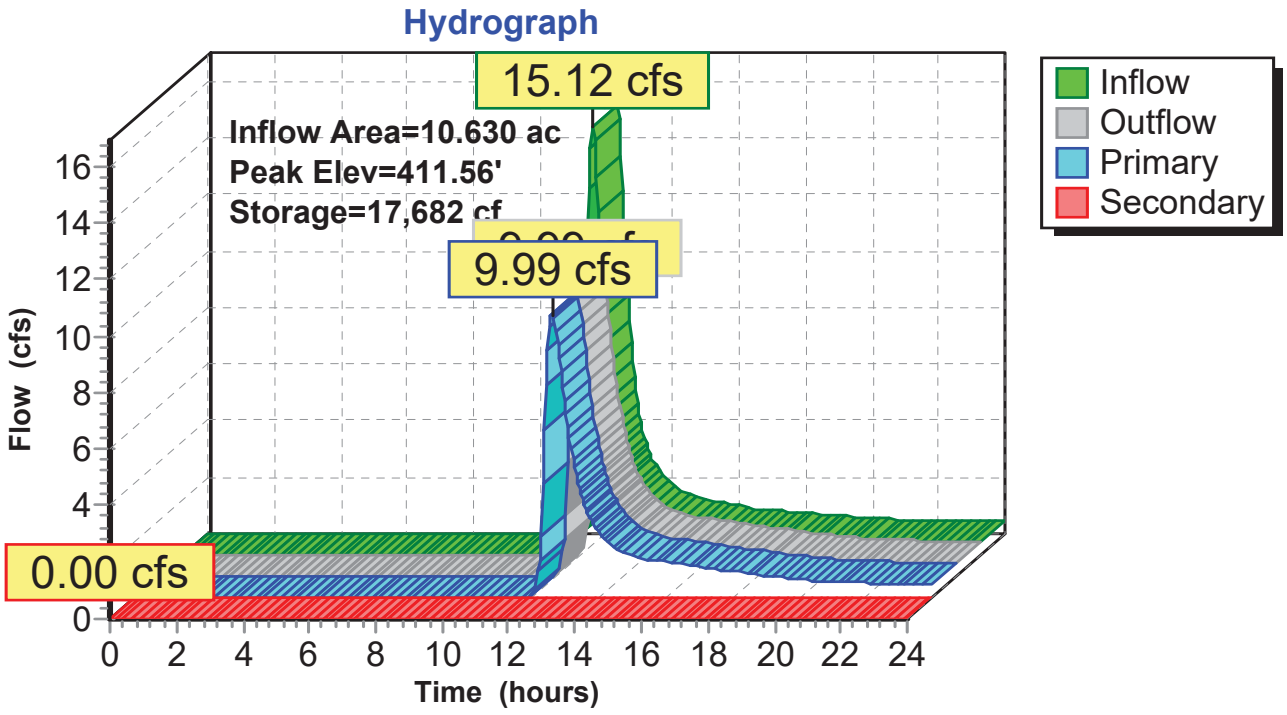
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
409.00	5,642	0	0
410.00	6,603	6,123	6,123
412.00	8,732	15,335	21,458
414.00	11,115	19,847	41,305
415.00	12,383	11,749	53,054

Device	Routing	Invert	Outlet Devices
#1	Primary	408.00'	**24.0" Round Culvert** L= 62.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 408.00' / 407.30' S= 0.0113 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Device 1	409.40'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	410.40'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height
#4	Device 1	413.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#5	Secondary	414.00'	**20.0' long x 14.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=9.96 cfs @ 12.58 hrs HW=411.55' (Free Discharge)
└**1=Culvert** (Passes 9.96 cfs of 24.17 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 2.27 cfs @ 6.50 fps)
  ├**3=Sharp-Crested Rectangular Weir** (Weir Controls 7.69 cfs @ 3.77 fps)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=409.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 1c: Pond 1c



Stage-Discharge for Pond Pond 1c: Pond 1c

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
409.00	0.00	0.00	0.00
409.10	0.00	0.00	0.00
409.20	0.00	0.00	0.00
409.30	0.00	0.00	0.00
409.40	0.00	0.00	0.00
409.50	0.04	0.04	0.00
409.60	0.13	0.13	0.00
409.70	0.28	0.28	0.00
409.80	0.47	0.47	0.00
409.90	0.68	0.68	0.00
410.00	0.87	0.87	0.00
410.10	1.02	1.02	0.00
410.20	1.15	1.15	0.00
410.30	1.27	1.27	0.00
410.40	1.37	1.37	0.00
410.50	1.68	1.68	0.00
410.60	2.15	2.15	0.00
410.70	2.72	2.72	0.00
410.80	3.37	3.37	0.00
410.90	4.08	4.08	0.00
411.00	4.86	4.86	0.00
411.10	5.69	5.69	0.00
411.20	6.56	6.56	0.00
411.30	7.48	7.48	0.00
411.40	8.43	8.43	0.00
411.50	9.42	9.42	0.00
411.60	10.45	10.45	0.00
411.70	11.50	11.50	0.00
411.80	12.57	12.57	0.00
411.90	13.67	13.67	0.00
412.00	14.79	14.79	0.00
412.10	15.93	15.93	0.00
412.20	17.09	17.09	0.00
412.30	18.26	18.26	0.00
412.40	19.45	19.45	0.00
412.50	20.64	20.64	0.00
412.60	21.85	21.85	0.00
412.70	23.06	23.06	0.00
412.80	24.28	24.28	0.00
412.90	25.50	25.50	0.00
413.00	26.72	26.72	0.00
413.10	28.12	28.12	0.00
413.20	29.66	29.66	0.00
413.30	31.28	31.28	0.00
413.40	31.73	31.73	0.00
413.50	32.09	32.09	0.00
413.60	32.44	32.44	0.00
413.70	32.79	32.79	0.00
413.80	33.14	33.14	0.00
413.90	33.48	33.48	0.00
414.00	33.82	33.82	0.00
414.10	35.83	34.16	1.67
414.20	39.22	34.49	4.72
414.30	43.55	34.82	8.73
414.40	48.66	35.15	13.51
414.50	54.46	35.48	18.99
414.60	60.89	35.80	25.10
414.70	67.45	36.11	31.33
414.80	74.35	36.43	37.92
414.90	81.91	36.74	45.17
415.00	89.85	37.05	52.80
415.10	98.39	37.36	61.03
415.20	107.34	37.67	69.67
415.30	116.53	37.97	78.56
415.40	126.06	38.27	87.79
415.50	135.57	38.57	97.00
415.60	145.32	38.86	106.45
415.70	155.74	39.15	116.59
415.80	166.47	39.45	127.03
415.90	177.49	39.73	137.76
416.00	188.80	40.02	148.78
416.10	**200.38**	**40.31**	**160.07**

Stage-Area-Storage for Pond Pond 1c: Pond 1c

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
409.00	5,642	0
409.10	5,738	569
409.20	5,834	1,148
409.30	5,930	1,736
409.40	6,026	2,334
409.50	6,123	2,941
409.60	6,219	3,558
409.70	6,315	4,185
409.80	6,411	4,821
409.90	6,507	5,467
410.00	6,603	6,123
410.10	6,709	6,788
410.20	6,816	7,464
410.30	6,922	8,151
410.40	7,029	8,849
410.50	7,135	9,557
410.60	7,242	10,276
410.70	7,348	11,005
410.80	7,455	11,746
410.90	7,561	12,496
411.00	7,668	13,258
411.10	7,774	14,030
411.20	7,880	14,813
411.30	7,987	15,606
411.40	8,093	16,410
411.50	8,200	17,225
411.60	8,306	18,050
411.70	8,413	18,886
411.80	8,519	19,732
411.90	8,626	20,590
412.00	8,732	21,458
412.10	8,851	22,337
412.20	8,970	23,228
412.30	9,089	24,131
412.40	9,209	25,046
412.50	9,328	25,972
412.60	9,447	26,911
412.70	9,566	27,862
412.80	9,685	28,824
412.90	9,804	29,799
413.00	9,924	30,785
413.10	10,043	31,784
413.20	10,162	32,794
413.30	10,281	33,816
413.40	10,400	34,850
413.50	10,519	35,896
413.60	10,638	36,954
413.70	10,758	38,024
413.80	10,877	39,105
413.90	10,996	40,199
414.00	11,115	41,305
414.10	11,242	42,422
414.20	11,369	43,553
414.30	11,495	44,696
414.40	11,622	45,852
414.50	11,749	47,021
414.60	11,876	48,202
414.70	12,003	49,396
414.80	12,129	50,602
414.90	12,256	51,822
415.00	**12,383**	**53,054**
415.10	12,383	53,054
415.20	12,383	53,054
415.30	12,383	53,054
415.40	12,383	53,054
415.50	12,383	53,054
415.60	12,383	53,054
415.70	12,383	53,054
415.80	12,383	53,054
415.90	12,383	53,054
416.00	12,383	53,054
416.10	12,383	53,054

Summary for Pond Pond 1d: Pond 1d

Inflow Area = 6.230 ac, 4.01% Impervious, Inflow Depth > 2.14" for 10-yr event
Inflow = 10.53 cfs @ 12.30 hrs, Volume= 1.110 af
Outflow = 1.81 cfs @ 13.28 hrs, Volume= 0.987 af, Atten= 83%, Lag= 59.0 min
Primary = 1.81 cfs @ 13.28 hrs, Volume= 0.987 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 410.24' @ 13.28 hrs Surf.Area= 17,546 sf Storage= 21,558 cf

Plug-Flow detention time= 168.5 min calculated for 0.987 af (89% of inflow)
Center-of-Mass det. time= 115.5 min (981.4 - 865.9)

Volume	Invert	Avail.Storage	Storage Description
#1	408.00'	209,097 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

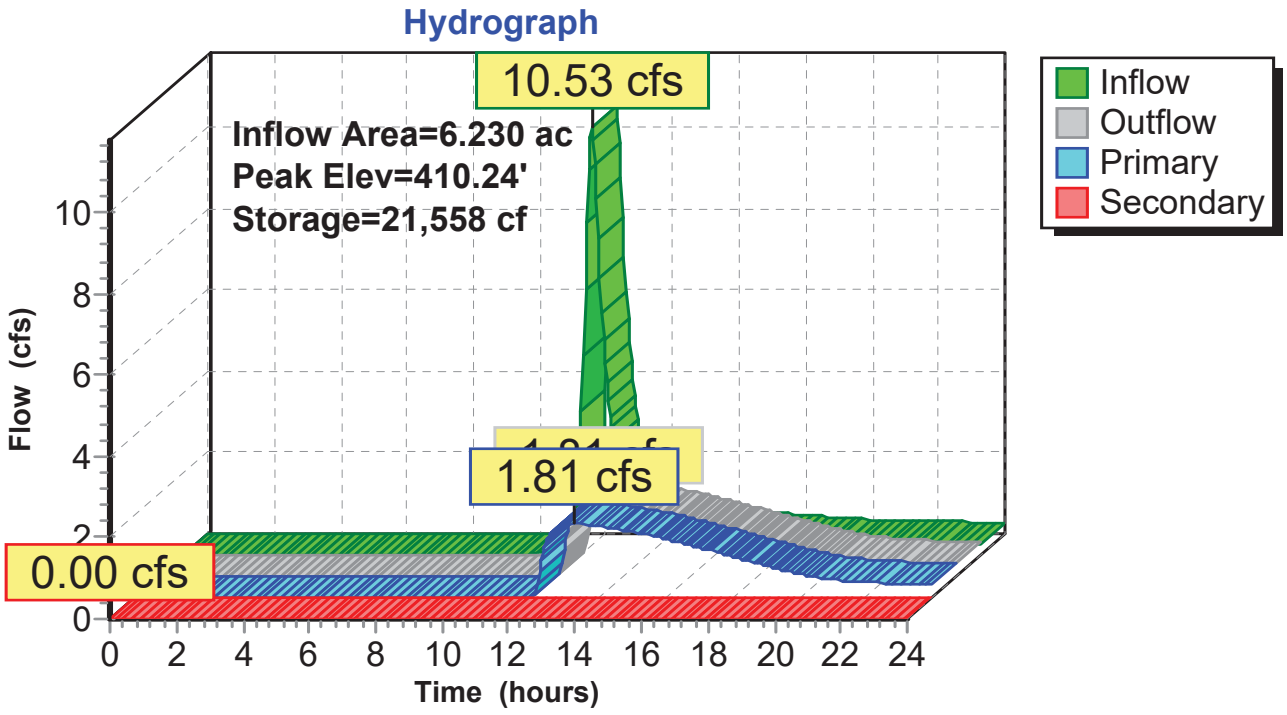
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
408.00	800	0	0
410.00	16,607	17,407	17,407
412.00	24,332	40,939	58,346
414.00	28,916	53,248	111,594
416.00	33,677	62,593	174,187
417.00	36,142	34,910	209,097

Device	Routing	Invert	Outlet Devices
#1	Primary	408.00'	**24.0" Round Culvert** L= 235.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 408.00' / 406.00' S= 0.0085 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	408.75'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	411.20'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.0' Crest Height
#4	Device 1	414.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#5	Secondary	416.00'	**35.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=1.81 cfs @ 13.28 hrs HW=410.24' (Free Discharge)
└**1=Culvert** (Passes 1.81 cfs of 16.86 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 1.81 cfs @ 5.19 fps)
  ├**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=408.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 1d: Pond 1d



Stage-Discharge for Pond Pond 1d: Pond 1d

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
408.00	0.00	0.00	0.00
408.10	0.00	0.00	0.00
408.20	0.00	0.00	0.00
408.30	0.00	0.00	0.00
408.40	0.00	0.00	0.00
408.50	0.00	0.00	0.00
408.60	0.00	0.00	0.00
408.70	0.00	0.00	0.00
408.80	0.01	0.01	0.00
408.90	0.08	0.08	0.00
409.00	0.20	0.20	0.00
409.10	0.37	0.37	0.00
409.20	0.57	0.57	0.00
409.30	0.78	0.78	0.00
409.40	0.95	0.95	0.00
409.50	1.08	1.08	0.00
409.60	1.21	1.21	0.00
409.70	1.32	1.32	0.00
409.80	1.42	1.42	0.00
409.90	1.52	1.52	0.00
410.00	1.61	1.61	0.00
410.10	1.69	1.69	0.00
410.20	1.78	1.78	0.00
410.30	1.85	1.85	0.00
410.40	1.93	1.93	0.00
410.50	2.00	2.00	0.00
410.60	2.07	2.07	0.00
410.70	2.14	2.14	0.00
410.80	2.20	2.20	0.00
410.90	2.27	2.27	0.00
411.00	2.33	2.33	0.00
411.10	2.39	2.39	0.00
411.20	2.45	2.45	0.00
411.30	2.71	2.71	0.00
411.40	3.14	3.14	0.00
411.50	3.67	3.67	0.00
411.60	4.29	4.29	0.00
411.70	4.98	4.98	0.00
411.80	5.73	5.73	0.00
411.90	6.54	6.54	0.00
412.00	7.39	7.39	0.00
412.10	8.28	8.28	0.00
412.20	9.21	9.21	0.00
412.30	10.18	10.18	0.00
412.40	11.18	11.18	0.00
412.50	12.21	12.21	0.00
412.60	13.27	13.27	0.00
412.70	14.35	14.35	0.00
412.80	15.45	15.45	0.00
412.90	16.57	16.57	0.00
413.00	17.70	17.70	0.00
413.10	18.85	18.85	0.00
413.20	20.02	20.02	0.00
413.30	21.19	21.19	0.00
413.40	22.38	22.38	0.00
413.50	23.57	23.57	0.00
413.60	24.76	24.76	0.00
413.70	25.96	25.96	0.00
413.80	27.17	27.17	0.00
413.90	28.37	28.37	0.00
414.00	29.57	29.57	0.00
414.10	30.94	30.94	0.00
414.20	32.44	32.44	0.00
414.30	34.04	34.04	0.00
414.40	35.15	35.15	0.00
414.50	35.48	35.48	0.00
414.60	35.80	35.80	0.00
414.70	36.11	36.11	0.00
414.80	36.43	36.43	0.00
414.90	36.74	36.74	0.00
415.00	37.05	37.05	0.00
415.10	37.36	37.36	0.00
415.20	37.62	37.62	0.00
415.30	37.88	37.88	0.00
415.40	38.14	38.14	0.00
415.50	38.40	38.40	0.00
415.60	38.65	38.65	0.00
415.70	38.91	38.91	0.00
415.80	39.16	39.16	0.00
415.90	39.41	39.41	0.00
416.00	39.66	39.66	0.00
416.10	42.75	39.91	2.84
416.20	48.20	40.15	8.05
416.30	55.32	40.39	14.92
416.40	63.84	40.64	23.20
416.50	73.79	40.88	32.92
416.60	85.04	41.12	43.92
416.70	96.39	41.36	55.04
416.80	108.46	41.59	66.87
416.90	121.47	41.83	79.64
417.00	135.16	42.06	93.10
417.10	**149.91**	**42.30**	**107.61**

Stage-Area-Storage for Pond Pond 1d: Pond 1d

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
408.00	800	0
408.10	1,590	120
408.20	2,381	318
408.30	3,171	596
408.40	3,961	952
408.50	4,752	1,388
408.60	5,542	1,903
408.70	6,332	2,496
408.80	7,123	3,169
408.90	7,913	3,921
409.00	8,704	4,752
409.10	9,494	5,662
409.20	10,284	6,651
409.30	11,075	7,718
409.40	11,865	8,865
409.50	12,655	10,091
409.60	13,446	11,396
409.70	14,236	12,781
409.80	15,026	14,244
409.90	15,817	15,786
410.00	16,607	17,407
410.10	16,993	19,087
410.20	17,379	20,806
410.30	17,766	22,563
410.40	18,152	24,359
410.50	18,538	26,193
410.60	18,925	28,066
410.70	19,311	29,978
410.80	19,697	31,929
410.90	20,083	33,918
411.00	20,470	35,945
411.10	20,856	38,012
411.20	21,242	40,116
411.30	21,628	42,260
411.40	22,014	44,442
411.50	22,401	46,663
411.60	22,787	48,922
411.70	23,173	51,220
411.80	23,560	53,557
411.90	23,946	55,932
412.00	24,332	58,346
412.10	24,561	60,791
412.20	24,790	63,258
412.30	25,020	65,749
412.40	25,249	68,262
412.50	25,478	70,799
412.60	25,707	73,358
412.70	25,936	75,940
412.80	26,166	78,545
412.90	26,395	81,173
413.00	26,624	83,824
413.10	26,853	86,498
413.20	27,082	89,195
413.30	27,312	91,914
413.40	27,541	94,657
413.50	27,770	97,423
413.60	27,999	100,211
413.70	28,228	103,022
413.80	28,458	105,857
413.90	28,687	108,714
414.00	28,916	111,594
414.10	29,154	114,498
414.20	29,392	117,425
414.30	29,630	120,376
414.40	29,868	123,351
414.50	30,106	126,350
414.60	30,344	129,372
414.70	30,582	132,418
414.80	30,820	135,489
414.90	31,058	138,583
415.00	31,297	141,700
415.10	31,535	144,842
415.20	31,773	148,007
415.30	32,011	151,196
415.40	32,249	154,409
415.50	32,487	157,646
415.60	32,725	160,907
415.70	32,963	164,191
415.80	33,201	167,499
415.90	33,439	170,831
416.00	33,677	174,187
416.10	33,924	177,567
416.20	34,170	180,972
416.30	34,417	184,401
416.40	34,663	187,855
416.50	34,910	191,334
416.60	35,156	194,837
416.70	35,402	198,365
416.80	35,649	201,917
416.90	35,895	205,495
417.00	**36,142**	**209,097**
417.10	36,142	209,097

Summary for Pond Pond 1e: Pond 1e

Inflow Area = 1.060 ac, 65.09% Impervious, Inflow Depth > 3.83" for 10-yr event
Inflow = 6.16 cfs @ 12.00 hrs, Volume= 0.338 af
Outflow = 0.37 cfs @ 12.98 hrs, Volume= 0.120 af, Atten= 94%, Lag= 58.8 min
Primary = 0.37 cfs @ 12.98 hrs, Volume= 0.120 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 406.39' @ 12.98 hrs Surf.Area= 7,907 sf Storage= 9,713 cf

Plug-Flow detention time= 317.4 min calculated for 0.120 af (35% of inflow)
Center-of-Mass det. time= 193.2 min (995.8 - 802.6)

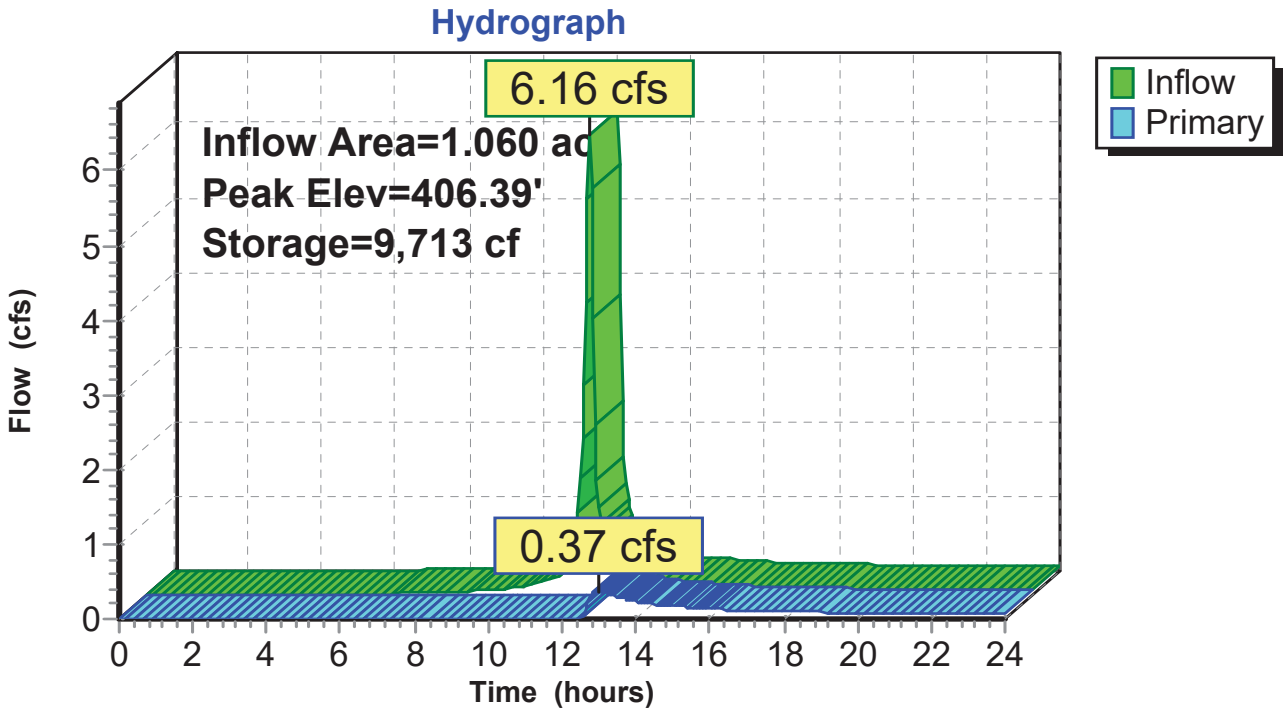
Volume	Invert	Avail.Storage	Storage Description
#1	405.00'	12,667 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
405.00	6,101	0	0
406.00	7,395	6,748	6,748
406.35	7,857	2,669	9,417
406.75	8,394	3,250	12,667

Device	Routing	Invert	Outlet Devices
#1	Primary	406.35'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.36 cfs @ 12.98 hrs HW=406.39' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.36 cfs @ 0.48 fps)

Pond Pond 1e: Pond 1e



Stage-Discharge for Pond Pond 1e: Pond 1e

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
405.00	0.00	405.53	0.00	406.06	0.00	406.59	5.89
405.01	0.00	405.54	0.00	406.07	0.00	406.60	6.27
405.02	0.00	405.55	0.00	406.08	0.00	406.61	6.66
405.03	0.00	405.56	0.00	406.09	0.00	406.62	7.06
405.04	0.00	405.57	0.00	406.10	0.00	406.63	7.46
405.05	0.00	405.58	0.00	406.11	0.00	406.64	7.88
405.06	0.00	405.59	0.00	406.12	0.00	406.65	8.30
405.07	0.00	405.60	0.00	406.13	0.00	406.66	8.73
405.08	0.00	405.61	0.00	406.14	0.00	406.67	9.17
405.09	0.00	405.62	0.00	406.15	0.00	406.68	9.61
405.10	0.00	405.63	0.00	406.16	0.00	406.69	10.07
405.11	0.00	405.64	0.00	406.17	0.00	406.70	10.53
405.12	0.00	405.65	0.00	406.18	0.00	406.71	11.00
405.13	0.00	405.66	0.00	406.19	0.00	406.72	11.48
405.14	0.00	405.67	0.00	406.20	0.00	406.73	11.96
405.15	0.00	405.68	0.00	406.21	0.00	406.74	12.45
405.16	0.00	405.69	0.00	406.22	0.00	406.75	**12.95**
405.17	0.00	405.70	0.00	406.23	0.00		
405.18	0.00	405.71	0.00	406.24	0.00		
405.19	0.00	405.72	0.00	406.25	0.00		
405.20	0.00	405.73	0.00	406.26	0.00		
405.21	0.00	405.74	0.00	406.27	0.00		
405.22	0.00	405.75	0.00	406.28	0.00		
405.23	0.00	405.76	0.00	406.29	0.00		
405.24	0.00	405.77	0.00	406.30	0.00		
405.25	0.00	405.78	0.00	406.31	0.00		
405.26	0.00	405.79	0.00	406.32	0.00		
405.27	0.00	405.80	0.00	406.33	0.00		
405.28	0.00	405.81	0.00	406.34	0.00		
405.29	0.00	405.82	0.00	406.35	0.00		
405.30	0.00	405.83	0.00	406.36	0.05		
405.31	0.00	405.84	0.00	406.37	0.14		
405.32	0.00	405.85	0.00	406.38	0.26		
405.33	0.00	405.86	0.00	406.39	0.40		
405.34	0.00	405.87	0.00	406.40	0.56		
405.35	0.00	405.88	0.00	406.41	0.73		
405.36	0.00	405.89	0.00	406.42	0.92		
405.37	0.00	405.90	0.00	406.43	1.13		
405.38	0.00	405.91	0.00	406.44	1.34		
405.39	0.00	405.92	0.00	406.45	1.57		
405.40	0.00	405.93	0.00	406.46	1.82		
405.41	0.00	405.94	0.00	406.47	2.07		
405.42	0.00	405.95	0.00	406.48	2.33		
405.43	0.00	405.96	0.00	406.49	2.61		
405.44	0.00	405.97	0.00	406.50	2.89		
405.45	0.00	405.98	0.00	406.51	3.19		
405.46	0.00	405.99	0.00	406.52	3.49		
405.47	0.00	406.00	0.00	406.53	3.80		
405.48	0.00	406.01	0.00	406.54	4.12		
405.49	0.00	406.02	0.00	406.55	4.45		
405.50	0.00	406.03	0.00	406.56	4.80		
405.51	0.00	406.04	0.00	406.57	5.15		
405.52	0.00	406.05	0.00	406.58	5.52		

Stage-Area-Storage for Pond Pond 1e: Pond 1e

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
405.00	6,101	0
405.02	6,127	122
405.04	6,153	245
405.06	6,179	368
405.08	6,205	492
405.10	6,230	617
405.12	6,256	741
405.14	6,282	867
405.16	6,308	993
405.18	6,334	1,119
405.20	6,360	1,246
405.22	6,386	1,374
405.24	6,412	1,502
405.26	6,437	1,630
405.28	6,463	1,759
405.30	6,489	1,889
405.32	6,515	2,019
405.34	6,541	2,149
405.36	6,567	2,280
405.38	6,593	2,412
405.40	6,619	2,544
405.42	6,644	2,677
405.44	6,670	2,810
405.46	6,696	2,943
405.48	6,722	3,078
405.50	6,748	3,212
405.52	6,774	3,347
405.54	6,800	3,483
405.56	6,826	3,619
405.58	6,852	3,756
405.60	6,877	3,894
405.62	6,903	4,031
405.64	6,929	4,170
405.66	6,955	4,308
405.68	6,981	4,448
405.70	7,007	4,588
405.72	7,033	4,728
405.74	7,059	4,869
405.76	7,084	5,010
405.78	7,110	5,152
405.80	7,136	5,295
405.82	7,162	5,438
405.84	7,188	5,581
405.86	7,214	5,725
405.88	7,240	5,870
405.90	7,266	6,015
405.92	7,291	6,161
405.94	7,317	6,307
405.96	7,343	6,453
405.98	7,369	6,600
406.00	7,395	6,748
406.02	7,421	6,896
406.04	7,448	7,045
406.06	7,474	7,194
406.08	7,501	7,344
406.10	7,527	7,494
406.12	7,553	7,645
406.14	7,580	7,796
406.16	7,606	7,948
406.18	7,633	8,100
406.20	7,659	8,253
406.22	7,685	8,407
406.24	7,712	8,561
406.26	7,738	8,715
406.28	7,765	8,870
406.30	7,791	9,026
406.32	7,817	9,182
406.34	7,844	9,339
406.36	7,870	9,496
406.38	7,897	9,653
406.40	7,924	9,812
406.42	7,951	9,970
406.44	7,978	10,130
406.46	8,005	10,289
406.48	8,032	10,450
406.50	8,058	10,611
406.52	8,085	10,772
406.54	8,112	10,934
406.56	8,139	11,097
406.58	8,166	11,260
406.60	8,193	11,423
406.62	8,219	11,587
406.64	8,246	11,752
406.66	8,273	11,917
406.68	8,300	12,083
406.70	8,327	12,249
406.72	8,354	12,416
406.74	**8,381**	**12,583**

Summary for Pond Pond 3: Pond 3

Inflow Area = 4.790 ac, 0.00% Impervious, Inflow Depth > 1.66" for 10-yr event
Inflow = 6.66 cfs @ 12.25 hrs, Volume= 0.664 af
Outflow = 2.44 cfs @ 12.69 hrs, Volume= 0.499 af, Atten= 63%, Lag= 26.9 min
Primary = 2.44 cfs @ 12.69 hrs, Volume= 0.499 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 425.05' @ 12.69 hrs Surf.Area= 5,955 sf Storage= 10,228 cf

Plug-Flow detention time= 164.4 min calculated for 0.499 af (75% of inflow)
Center-of-Mass det. time= 66.3 min (943.8 - 877.5)

Volume	Invert	Avail.Storage	Storage Description
#1	423.00'	36,852 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

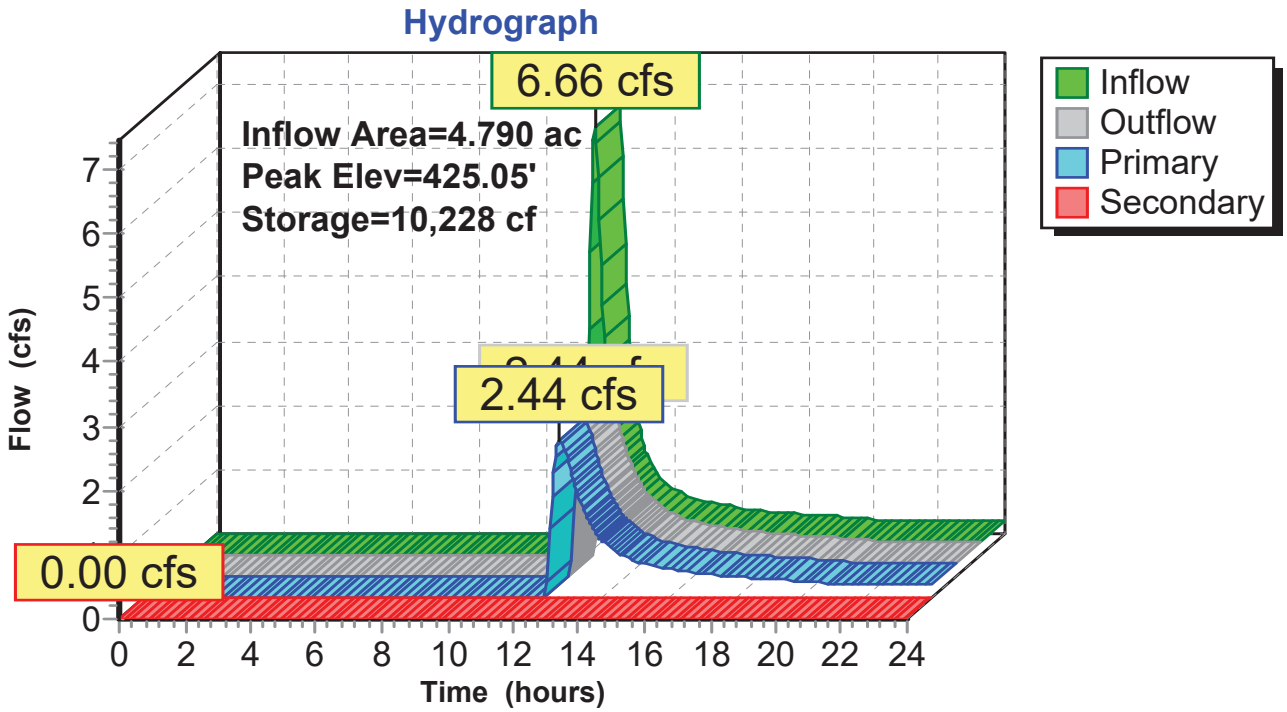
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
423.00	4,083	0	0
424.00	4,941	4,512	4,512
426.00	6,873	11,814	16,326
428.00	9,007	15,880	32,206
428.50	9,575	4,646	36,852

Device	Routing	Invert	Outlet Devices
#1	Primary	423.00'	**18.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 423.00' / 422.00' S= 0.0217 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	424.40'	**1.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height
#3	Device 1	427.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#4	Secondary	427.50'	**25.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=2.44 cfs @ 12.69 hrs HW=425.05' (Free Discharge)
└**1=Culvert** (Passes 2.44 cfs of 9.70 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 2.44 cfs @ 2.74 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=423.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 3: Pond 3



Stage-Discharge for Pond Pond 3: Pond 3

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
423.00	0.00	0.00	0.00
423.10	0.00	0.00	0.00
423.20	0.00	0.00	0.00
423.30	0.00	0.00	0.00
423.40	0.00	0.00	0.00
423.50	0.00	0.00	0.00
423.60	0.00	0.00	0.00
423.70	0.00	0.00	0.00
423.80	0.00	0.00	0.00
423.90	0.00	0.00	0.00
424.00	0.00	0.00	0.00
424.10	0.00	0.00	0.00
424.20	0.00	0.00	0.00
424.30	0.00	0.00	0.00
424.40	0.00	0.00	0.00
424.50	0.15	0.15	0.00
424.60	0.43	0.43	0.00
424.70	0.79	0.79	0.00
424.80	1.20	1.20	0.00
424.90	1.67	1.67	0.00
425.00	2.18	2.18	0.00
425.10	2.72	2.72	0.00
425.20	3.30	3.30	0.00
425.30	3.90	3.90	0.00
425.40	4.52	4.52	0.00
425.50	5.17	5.17	0.00
425.60	5.83	5.83	0.00
425.70	6.51	6.51	0.00
425.80	7.20	7.20	0.00
425.90	7.91	7.91	0.00
426.00	8.61	8.61	0.00
426.10	9.33	9.33	0.00
426.20	10.05	10.05	0.00
426.30	10.77	10.77	0.00
426.40	11.48	11.48	0.00
426.50	12.20	12.20	0.00
426.60	12.91	12.91	0.00
426.70	13.62	13.62	0.00
426.80	14.32	14.32	0.00
426.90	15.01	15.01	0.00
427.00	15.34	15.34	0.00
427.10	15.57	15.57	0.00
427.20	15.80	15.80	0.00
427.30	16.03	16.03	0.00
427.40	16.26	16.26	0.00
427.50	16.48	16.48	0.00
427.60	18.73	16.70	2.03
427.70	22.66	16.91	5.75
427.80	27.78	17.12	10.66
427.90	33.90	17.33	16.57
428.00	41.05	17.54	23.51
428.10	49.12	17.75	31.37
428.20	57.26	17.95	39.31
428.30	65.91	18.15	47.76
428.40	75.23	18.35	56.89
428.50	85.04	18.54	66.50
428.60	95.60	18.74	76.86
428.70	106.68	18.93	87.75
428.80	117.87	19.12	98.75
428.90	129.47	19.31	110.16
429.00	141.21	19.50	121.71
429.10	153.26	19.68	133.57
429.20	166.15	19.86	146.29
429.30	179.43	20.05	159.39
429.40	193.08	20.23	172.85
429.50	207.08	20.40	186.68
429.60	221.43	20.58	200.85
429.70	236.12	20.76	215.37
429.80	251.14	20.93	230.22
429.90	266.49	21.10	245.39
430.00	282.16	21.27	260.89
430.10	**298.14**	**21.44**	**276.70**

Stage-Area-Storage for Pond Pond 3: Pond 3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
423.00	4,083	0
423.10	4,169	413
423.20	4,255	834
423.30	4,340	1,264
423.40	4,426	1,702
423.50	4,512	2,149
423.60	4,598	2,604
423.70	4,684	3,068
423.80	4,769	3,541
423.90	4,855	4,022
424.00	4,941	4,512
424.10	5,038	5,011
424.20	5,134	5,520
424.30	5,231	6,038
424.40	5,327	6,566
424.50	5,424	7,103
424.60	5,521	7,650
424.70	5,617	8,207
424.80	5,714	8,774
424.90	5,810	9,350
425.00	5,907	9,936
425.10	6,004	10,532
425.20	6,100	11,137
425.30	6,197	11,752
425.40	6,293	12,376
425.50	6,390	13,010
425.60	6,487	13,654
425.70	6,583	14,308
425.80	6,680	14,971
425.90	6,776	15,644
426.00	6,873	16,326
426.10	6,980	17,019
426.20	7,086	17,722
426.30	7,193	18,436
426.40	7,300	19,161
426.50	7,407	19,896
426.60	7,513	20,642
426.70	7,620	21,399
426.80	7,727	22,166
426.90	7,833	22,944
427.00	7,940	23,733
427.10	8,047	24,532
427.20	8,153	25,342
427.30	8,260	26,163
427.40	8,367	26,994
427.50	8,474	27,836
427.60	8,580	28,689
427.70	8,687	29,552
427.80	8,794	30,426
427.90	8,900	31,311
428.00	9,007	32,206
428.10	9,121	33,112
428.20	9,234	34,030
428.30	9,348	34,959
428.40	9,461	35,900
428.50	**9,575**	**36,852**
428.60	9,575	36,852
428.70	9,575	36,852
428.80	9,575	36,852
428.90	9,575	36,852
429.00	9,575	36,852
429.10	9,575	36,852
429.20	9,575	36,852
429.30	9,575	36,852
429.40	9,575	36,852
429.50	9,575	36,852
429.60	9,575	36,852
429.70	9,575	36,852
429.80	9,575	36,852
429.90	9,575	36,852
430.00	9,575	36,852
430.10	9,575	36,852

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1a: P-1a Runoff Area=26.040 ac 0.35% Impervious Runoff Depth>3.86"
Flow Length=968' Tc=39.7 min CN=75 Runoff=72.71 cfs 8.368 af

Subcatchment P-1b: P-1b Runoff Area=16.720 ac 26.61% Impervious Runoff Depth>3.34"
Flow Length=786' Tc=43.2 min CN=70 Runoff=37.87 cfs 4.653 af

Subcatchment P-1c: P-1c Runoff Area=10.630 ac 0.56% Impervious Runoff Depth>2.75"
Flow Length=726' Tc=34.5 min CN=64 Runoff=22.69 cfs 2.440 af

Subcatchment P-1d: P-1d Runoff Area=6.230 ac 4.01% Impervious Runoff Depth>3.05"
Flow Length=766' Tc=33.1 min CN=67 Runoff=15.33 cfs 1.583 af

Subcatchment P-1e: P-1e Runoff Area=1.060 ac 65.09% Impervious Runoff Depth>4.97"
Tc=9.2 min CN=85 Runoff=7.89 cfs 0.439 af

Subcatchment P-2: P-2 Runoff Area=12.650 ac 0.00% Impervious Runoff Depth>3.11"
Flow Length=1,476' Tc=74.9 min CN=68 Runoff=17.88 cfs 3.277 af

Subcatchment P-3: P-3 Runoff Area=4.790 ac 0.00% Impervious Runoff Depth>2.47"
Flow Length=551' Tc=28.2 min CN=61 Runoff=10.32 cfs 0.987 af

Subcatchment P-4: P-4 Runoff Area=3.370 ac 0.00% Impervious Runoff Depth>3.96"
Flow Length=590' Tc=36.5 min CN=76 Runoff=10.26 cfs 1.113 af

Reach R-1: R-1 Avg. Flow Depth=0.63' Max Vel=4.63 fps Inflow=18.26 cfs 4.521 af
n=0.040 L=799.0' S=0.0388 '/' Capacity=41.87 cfs Outflow=18.25 cfs 4.505 af

Reach R-2: R-2 Avg. Flow Depth=2.22' Max Vel=2.53 fps Inflow=83.09 cfs 12.874 af
n=0.040 L=1,801.0' S=0.0036 '/' Capacity=23.64 cfs Outflow=73.50 cfs 12.700 af

Reach R-3: R-3 Avg. Flow Depth=4.40' Max Vel=1.49 fps Inflow=89.56 cfs 16.461 af
n=0.040 L=280.0' S=0.0011 '/' Capacity=12.88 cfs Outflow=88.75 cfs 16.408 af

Reach R-4: R-4 Avg. Flow Depth=4.74' Max Vel=1.38 fps Inflow=89.33 cfs 16.628 af
n=0.040 L=219.0' S=0.0009 '/' Capacity=11.89 cfs Outflow=88.75 cfs 16.584 af

Pond Pond 1b: Pond 1b Peak Elev=444.26' Storage=57,586 cf Inflow=37.87 cfs 4.653 af
Outflow=18.26 cfs 4.521 af

Pond Pond 1c: Pond 1c Peak Elev=412.18' Storage=23,039 cf Inflow=22.69 cfs 2.440 af
Primary=16.85 cfs 2.318 af Secondary=0.00 cfs 0.000 af Outflow=16.85 cfs 2.318 af

Pond Pond 1d: Pond 1d Peak Elev=410.87' Storage=33,242 cf Inflow=15.33 cfs 1.583 af
Primary=2.24 cfs 1.443 af Secondary=0.00 cfs 0.000 af Outflow=2.24 cfs 1.443 af

Pond Pond 1e: Pond 1e Peak Elev=406.47' Storage=10,403 cf Inflow=7.89 cfs 0.439 af
Outflow=2.18 cfs 0.220 af

Pond Pond 3: Pond 3 Peak Elev=425.53' Storage=13,211 cf Inflow=10.32 cfs 0.987 af
Primary=5.38 cfs 0.819 af Secondary=0.00 cfs 0.000 af Outflow=5.38 cfs 0.819 af

Summary for Subcatchment P-1a: P-1a

Runoff = 72.71 cfs @ 12.36 hrs, Volume= 8.368 af, Depth> 3.86"

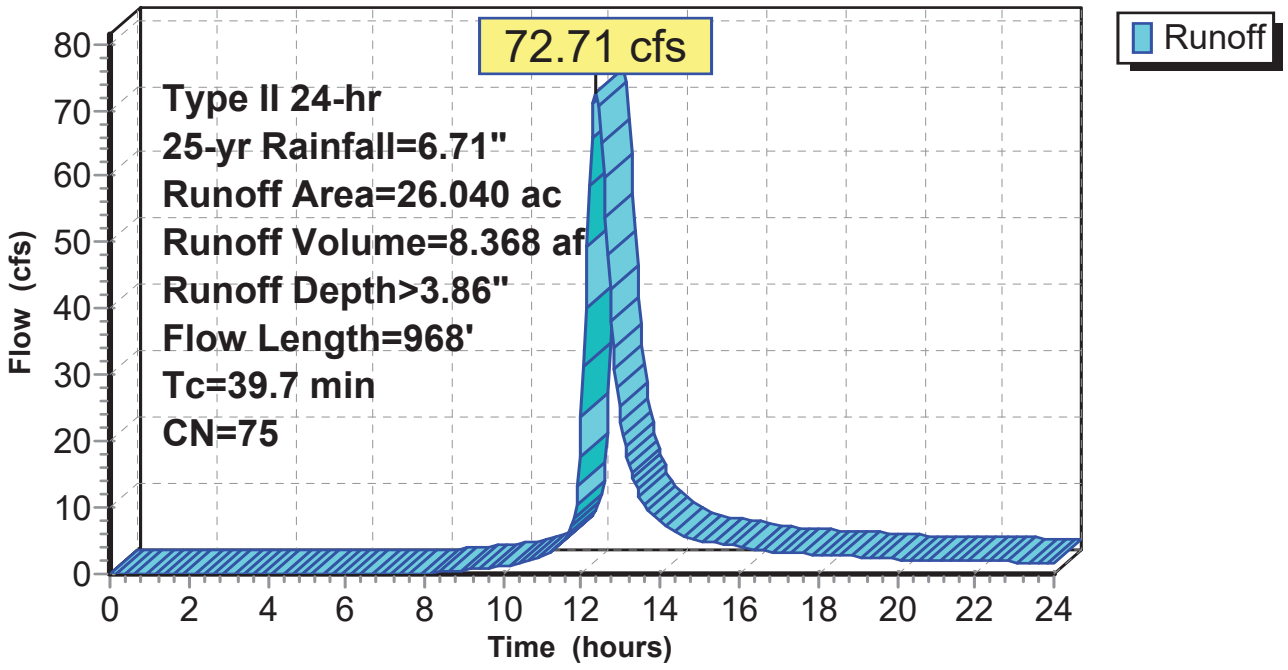
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.71"

Area (ac)	CN	Description
1.270	80	>75% Grass cover, Good, HSG D
3.830	61	>75% Grass cover, Good, HSG B
14.130	83	Woods, Poor, HSG D
6.720	66	Woods, Poor, HSG B
0.090	98	Paved parking, HSG B
26.040	75	Weighted Average
25.950		99.65% Pervious Area
0.090		0.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.0	150	0.0067	0.09		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
2.1	115	0.0170	0.91		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.1	262	0.0920	2.12		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
1.8	227	0.1850	2.15		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
4.7	214	0.0230	0.76		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
39.7	968	Total			

Subcatchment P-1a: P-1a

Hydrograph



Summary for Subcatchment P-1b: P-1b

Runoff = 37.87 cfs @ 12.41 hrs, Volume= 4.653 af, Depth> 3.34"

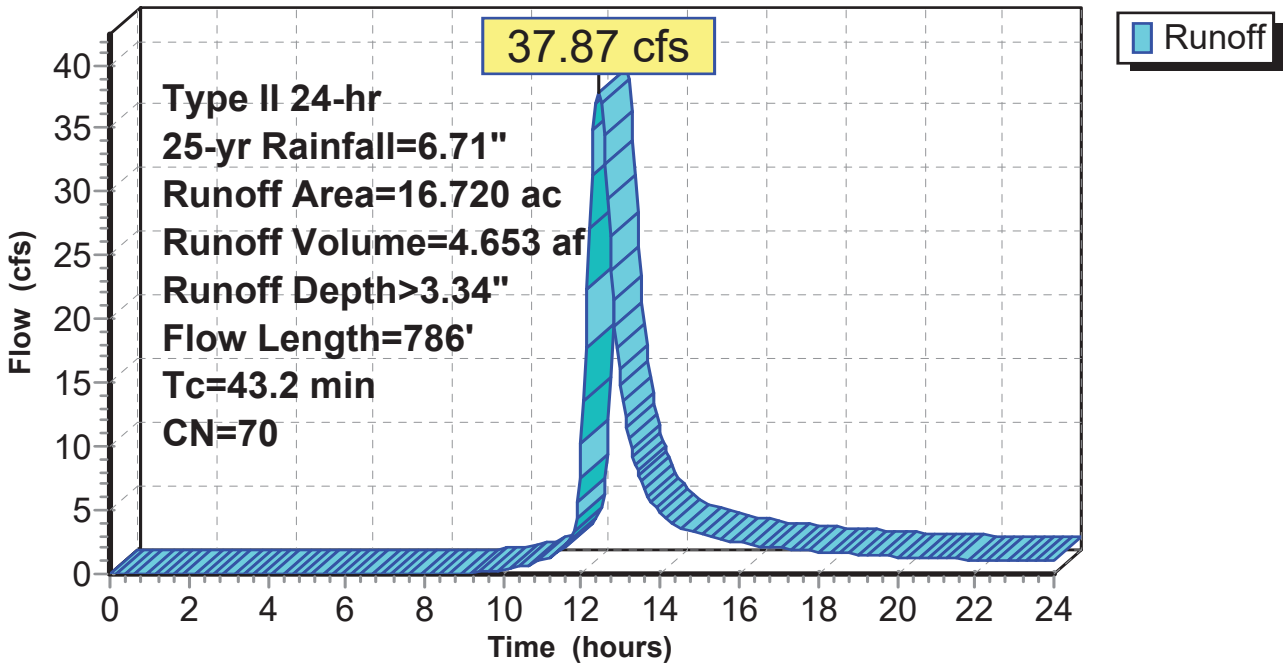
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.71"

Area (ac)	CN	Description
9.360	61	>75% Grass cover, Good, HSG B
4.450	98	Paved parking, HSG B
2.910	55	Woods, Good, HSG B
16.720	70	Weighted Average
12.270		73.39% Pervious Area
4.450		26.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.0	150	0.0030	0.06		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
1.4	57	0.0090	0.66		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.2	109	0.2290	7.70		**Shallow Concentrated Flow, CD** Unpaved Kv= 16.1 fps
0.8	164	0.0270	3.34		**Shallow Concentrated Flow, DE** Paved Kv= 20.3 fps
0.8	306	0.0120	6.51	11.51	**Pipe Channel, EF** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
43.2	786	Total			

Subcatchment P-1b: P-1b

Hydrograph



Summary for Subcatchment P-1c: P-1c

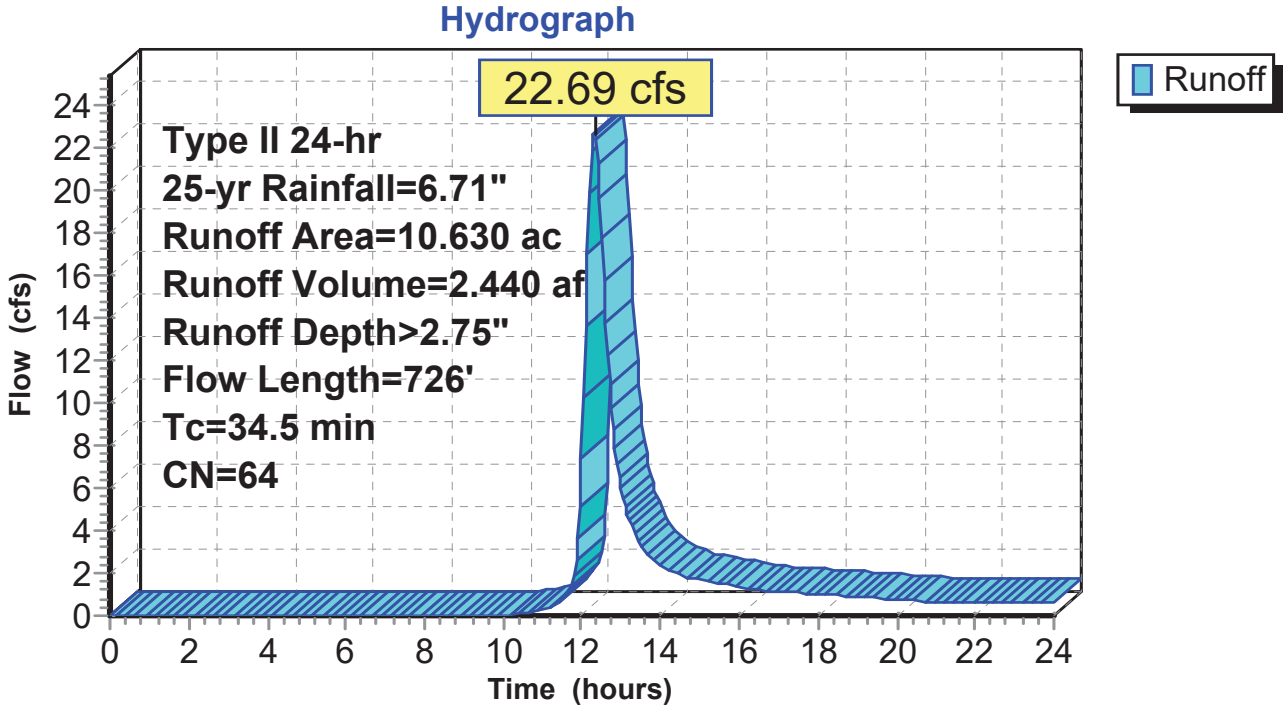
Runoff = 22.69 cfs @ 12.31 hrs, Volume= 2.440 af, Depth> 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.71"

Area (ac)	CN	Description
8.950	61	>75% Grass cover, Good, HSG B
1.620	80	>75% Grass cover, Good, HSG D
0.060	98	Paved parking, HSG D
10.630	64	Weighted Average
10.570		99.44% Pervious Area
0.060		0.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.7	150	0.0100	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
6.7	323	0.0130	0.80		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.8	201	0.0300	1.21		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.3	52	0.2300	3.36		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
34.5	726	Total			

Subcatchment P-1c: P-1c



Summary for Subcatchment P-1d: P-1d

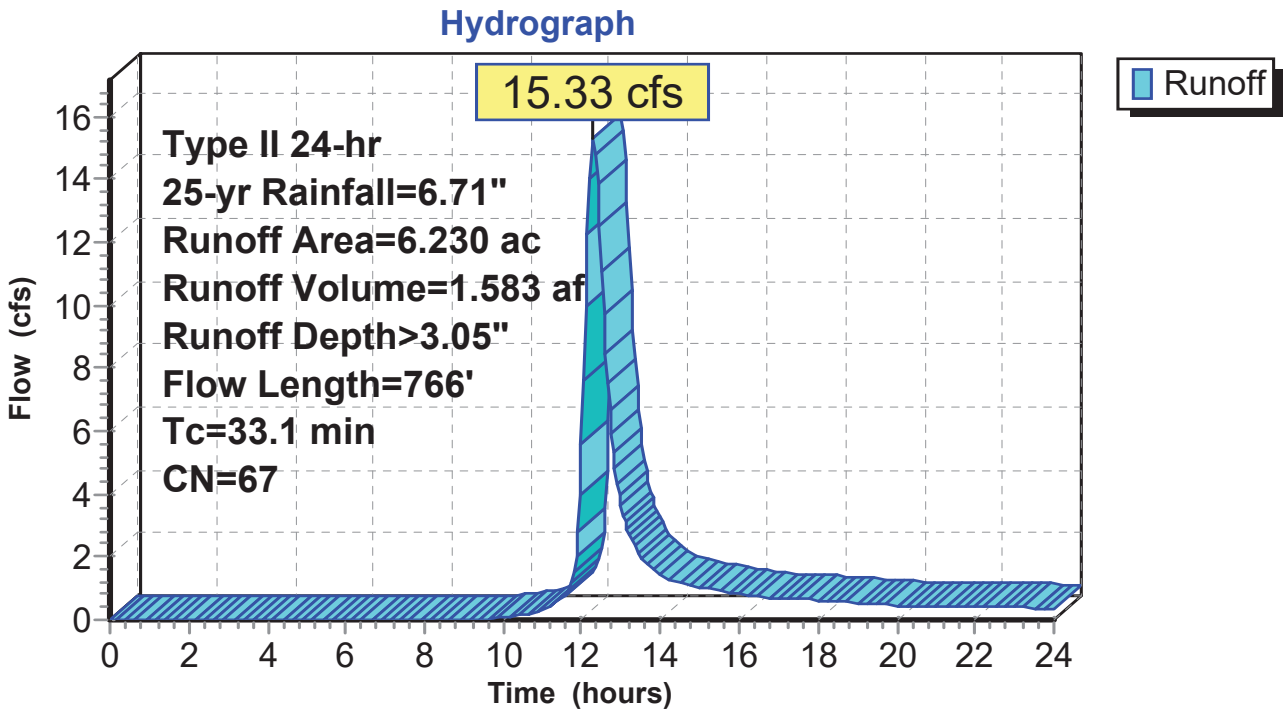
Runoff = 15.33 cfs @ 12.29 hrs, Volume= 1.583 af, Depth> 3.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.71"

Area (ac)	CN	Description
1.430	80	>75% Grass cover, Good, HSG D
4.550	61	>75% Grass cover, Good, HSG B
0.250	98	Paved parking, HSG B
6.230	67	Weighted Average
5.980		95.99% Pervious Area
0.250		4.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	150	0.0130	0.11		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.8	435	0.0140	0.83		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.1	181	0.0440	1.47		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
33.1	766	Total			

Subcatchment P-1d: P-1d



Summary for Subcatchment P-1e: P-1e

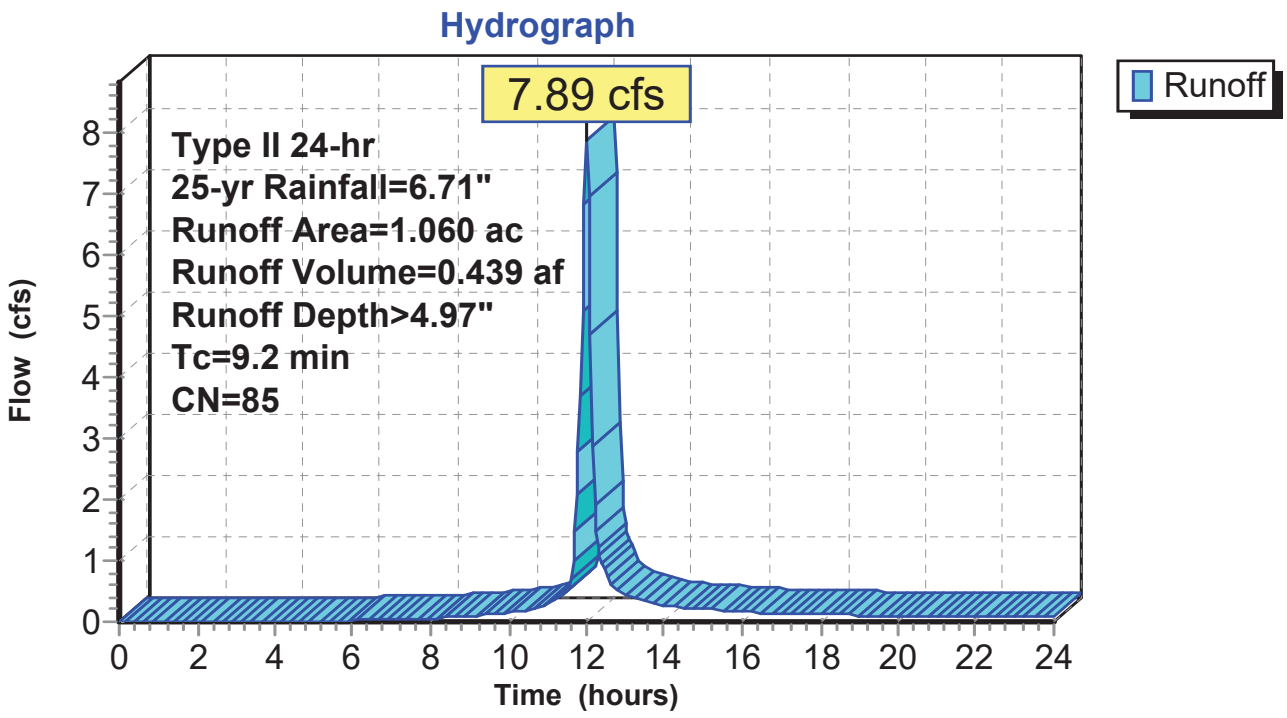
Runoff = 7.89 cfs @ 12.00 hrs, Volume= 0.439 af, Depth> 4.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.71"

Area (ac)	CN	Description
0.690	98	Paved parking, HSG B
0.370	61	>75% Grass cover, Good, HSG B
1.060	85	Weighted Average
0.370		34.91% Pervious Area
0.690		65.09% Impervious Area

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

Subcatchment P-1e: P-1e



Summary for Subcatchment P-2: P-2

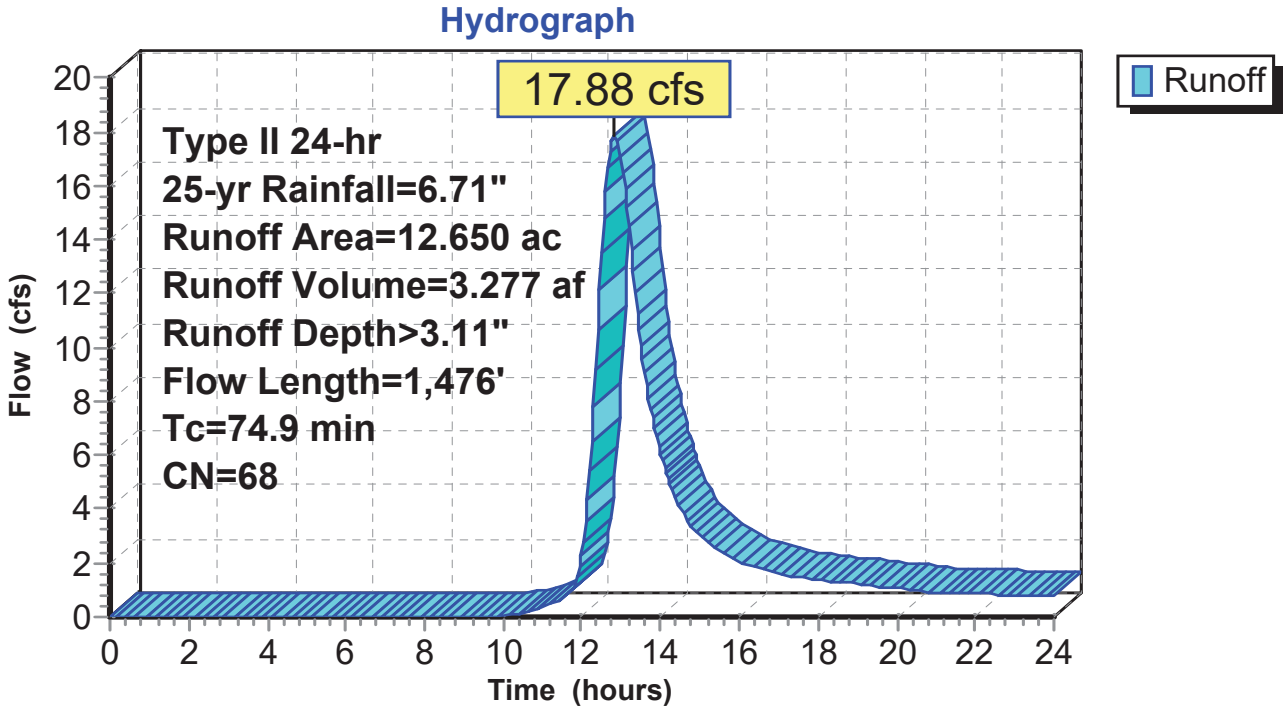
Runoff = 17.88 cfs @ 12.84 hrs, Volume= 3.277 af, Depth> 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.71"

Area (ac)	CN	Description
7.070	61	>75% Grass cover, Good, HSG B
2.000	66	Woods, Poor, HSG B
3.580	83	Woods, Poor, HSG D
12.650	68	Weighted Average
12.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	150	0.0087	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.6	362	0.0100	0.70		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.3	66	0.3330	4.04		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.8	68	0.0800	1.41		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
39.1	830	0.0050	0.35		**Shallow Concentrated Flow, EF** Woodland Kv= 5.0 fps
74.9	1,476	Total			

Subcatchment P-2: P-2



Summary for Subcatchment P-3: P-3

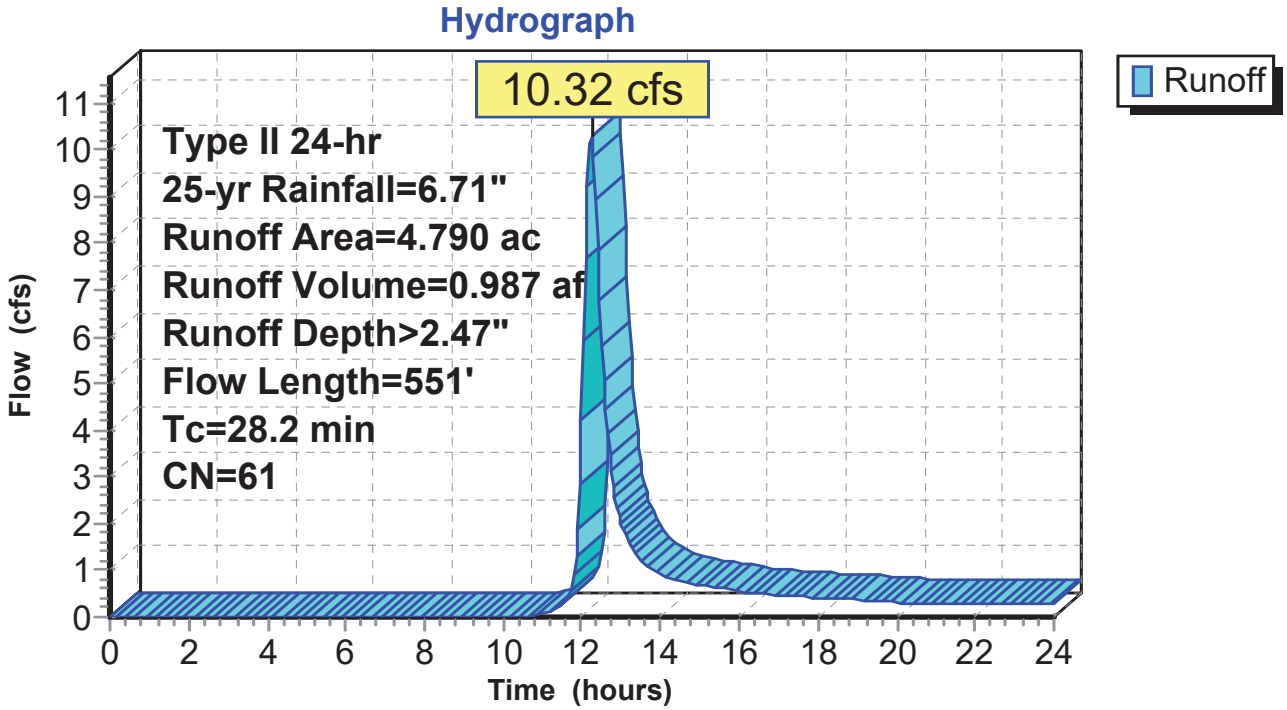
Runoff = 10.32 cfs @ 12.24 hrs, Volume= 0.987 af, Depth> 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.71"

Area (ac)	CN	Description
4.790	61	>75% Grass cover, Good, HSG B
4.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.5	150	0.0180	0.13		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.7	401	0.0120	0.77		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
28.2	551	Total			

Subcatchment P-3: P-3



Summary for Subcatchment P-4: P-4

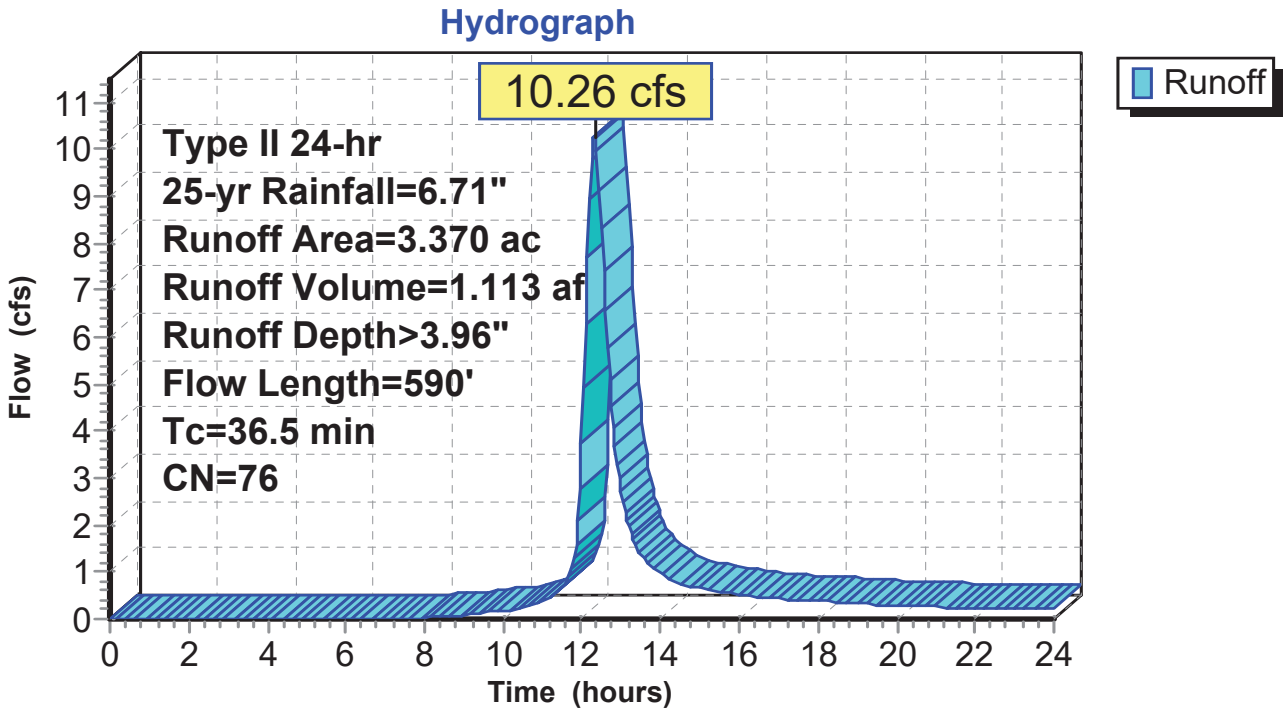
Runoff = 10.26 cfs @ 12.32 hrs, Volume= 1.113 af, Depth> 3.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.71"

Area (ac)	CN	Description
1.830	83	Woods, Poor, HSG D
1.140	66	Woods, Poor, HSG B
0.290	80	>75% Grass cover, Good, HSG D
0.110	61	>75% Grass cover, Good, HSG B
3.370	76	Weighted Average
3.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.6	150	0.0600	0.08		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
4.9	440	0.0890	1.49		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
36.5	590	Total			

Subcatchment P-4: P-4



Summary for Reach R-1: R-1

Inflow Area = 16.720 ac, 26.61% Impervious, Inflow Depth > 3.24" for 25-yr event
Inflow = 18.26 cfs @ 12.88 hrs, Volume= 4.521 af
Outflow = 18.25 cfs @ 12.97 hrs, Volume= 4.505 af, Atten= 0%, Lag= 5.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.63 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 2.37 fps, Avg. Travel Time= 5.6 min

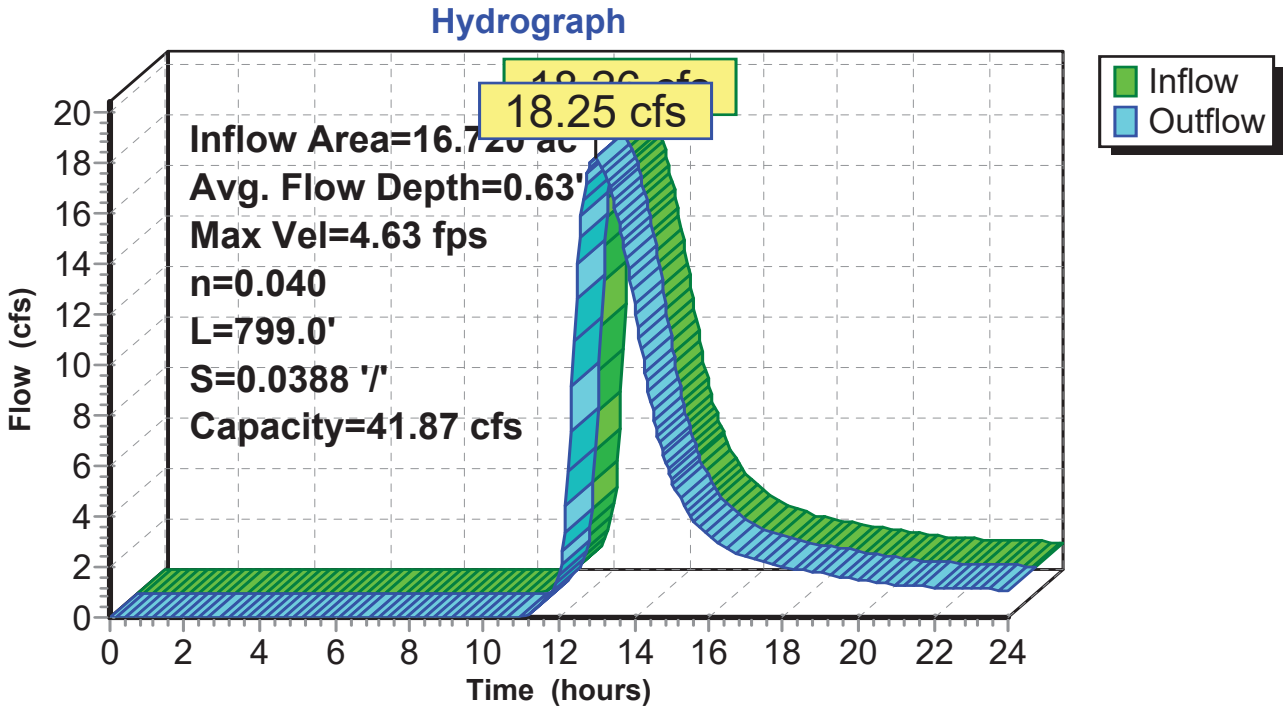
Peak Storage= 3,147 cf @ 12.92 hrs
Average Depth at Peak Storage= 0.63'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 41.87 cfs

5.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 799.0' Slope= 0.0388 '/'
Inlet Invert= 441.00', Outlet Invert= 410.00'



‡

Reach R-1: R-1



Stage-Discharge for Reach R-1: R-1

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
441.00	0.00	0.00
441.01	0.34	0.02
441.02	0.54	0.05
441.03	0.70	0.11
441.04	0.84	0.17
441.05	0.98	0.25
441.06	1.10	0.34
441.07	1.22	0.44
441.08	1.32	0.55
441.09	1.43	0.67
441.10	1.53	0.79
441.11	1.62	0.93
441.12	1.72	1.08
441.13	1.81	1.23
441.14	1.89	1.40
441.15	1.97	1.57
441.16	2.06	1.75
441.17	2.14	1.94
441.18	2.21	2.13
441.19	2.29	2.34
441.20	2.36	2.55
441.21	2.43	2.77
441.22	2.50	3.00
441.23	2.57	3.23
441.24	2.64	3.47
441.25	2.70	3.72
441.26	2.77	3.98
441.27	2.83	4.24
441.28	2.90	4.51
441.29	2.96	4.79
441.30	3.02	5.07
441.31	3.08	5.36
441.32	3.14	5.66
441.33	3.19	5.97
441.34	3.25	6.28
441.35	3.31	6.60
441.36	3.36	6.92
441.37	3.42	7.26
441.38	3.47	7.60
441.39	3.52	7.94
441.40	3.58	8.30
441.41	3.63	8.66
441.42	3.68	9.03
441.43	3.73	9.40
441.44	3.78	9.78
441.45	3.83	10.17
441.46	3.88	10.56
441.47	3.93	10.96
441.48	3.97	11.37
441.49	4.02	11.78
441.50	4.07	12.21
441.51	4.11	12.63
441.52	4.16	13.07
441.53	4.21	13.51
441.54	4.25	13.96
441.55	4.30	14.41
441.56	4.34	14.87
441.57	4.38	15.34
441.58	4.43	15.82
441.59	4.47	16.30
441.60	4.51	16.78
441.61	4.55	17.28
441.62	4.60	17.78
441.63	4.64	18.29
441.64	4.68	18.80
441.65	4.72	19.32
441.66	4.76	19.85
441.67	4.80	20.39
441.68	4.84	20.93
441.69	4.88	21.48
441.70	4.92	22.03
441.71	4.96	22.60
441.72	5.00	23.16
441.73	5.03	23.74
441.74	5.07	24.32
441.75	5.11	24.91
441.76	5.15	25.51
441.77	5.18	26.11
441.78	5.22	26.72
441.79	5.26	27.34
441.80	5.30	27.96
441.81	5.33	28.59
441.82	5.37	29.22
441.83	5.40	29.87
441.84	5.44	30.52
441.85	5.47	31.18
441.86	5.51	31.84
441.87	5.54	32.51
441.88	5.58	33.19
441.89	5.61	33.87
441.90	5.65	34.57
441.91	5.68	35.27
441.92	5.72	35.97
441.93	5.75	36.68
441.94	5.78	37.40
441.95	5.82	38.13
441.96	5.85	38.86
441.97	5.88	39.60
441.98	5.92	40.35
441.99	5.95	41.11
442.00	**5.98**	**41.87**

Stage-Area-Storage for Reach R-1: R-1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
441.00	0.0	0
441.01	0.1	40
441.02	0.1	81
441.03	0.2	121
441.04	0.2	162
441.05	0.3	204
441.06	0.3	245
441.07	0.4	287
441.08	0.4	330
441.09	0.5	372
441.10	0.5	415
441.11	0.6	459
441.12	0.6	502
441.13	0.7	546
441.14	0.7	591
441.15	0.8	635
441.16	0.9	680
441.17	0.9	725
441.18	1.0	771
441.19	1.0	817
441.20	1.1	863
441.21	1.1	909
441.22	1.2	956
441.23	1.3	1,003
441.24	1.3	1,051
441.25	1.4	1,099
441.26	1.4	1,147
441.27	1.5	1,195
441.28	1.6	1,244
441.29	1.6	1,293
441.30	1.7	1,342
441.31	1.7	1,392
441.32	1.8	1,442
441.33	1.9	1,492
441.34	1.9	1,543
441.35	2.0	1,594
441.36	2.1	1,645
441.37	2.1	1,697
441.38	2.2	1,749
441.39	2.3	1,801
441.40	2.3	1,854
441.41	2.4	1,907
441.42	2.5	1,960
441.43	2.5	2,013
441.44	2.6	2,067
441.45	2.7	2,121
441.46	2.7	2,176
441.47	2.8	2,231
441.48	2.9	2,286
441.49	2.9	2,341
441.50	3.0	2,397
441.51	3.1	2,453
441.52	3.1	2,509
441.53	3.2	2,566
441.54	3.3	2,623
441.55	3.4	2,681
441.56	3.4	2,738
441.57	3.5	2,796
441.58	3.6	2,855
441.59	3.6	2,913
441.60	3.7	2,972
441.61	3.8	3,032
441.62	3.9	3,091
441.63	3.9	3,151
441.64	4.0	3,211
441.65	4.1	3,272
441.66	4.2	3,333
441.67	4.2	3,394
441.68	4.3	3,456
441.69	4.4	3,517
441.70	4.5	3,580
441.71	4.6	3,642
441.72	4.6	3,705
441.73	4.7	3,768
441.74	4.8	3,831
441.75	4.9	3,895
441.76	5.0	3,959
441.77	5.0	4,024
441.78	5.1	4,088
441.79	5.2	4,153
441.80	5.3	4,219
441.81	5.4	4,284
441.82	5.4	4,350
441.83	5.5	4,417
441.84	5.6	4,483
441.85	5.7	4,550
441.86	5.8	4,618
441.87	5.9	4,685
441.88	5.9	4,753
441.89	6.0	4,821
441.90	6.1	4,890
441.91	6.2	4,959
441.92	6.3	5,028
441.93	6.4	5,097
441.94	6.5	5,167
441.95	6.6	5,237
441.96	6.6	5,308
441.97	6.7	5,379
441.98	6.8	5,450
441.99	6.9	5,521
442.00	**7.0**	**5,593**

Summary for Reach R-2: R-2

Inflow Area = 42.760 ac, 10.62% Impervious, Inflow Depth > 3.61" for 25-yr event
Inflow = 83.09 cfs @ 12.40 hrs, Volume= 12.874 af
Outflow = 73.50 cfs @ 12.76 hrs, Volume= 12.700 af, Atten= 12%, Lag= 21.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.53 fps, Min. Travel Time= 11.9 min
Avg. Velocity = 1.12 fps, Avg. Travel Time= 26.8 min

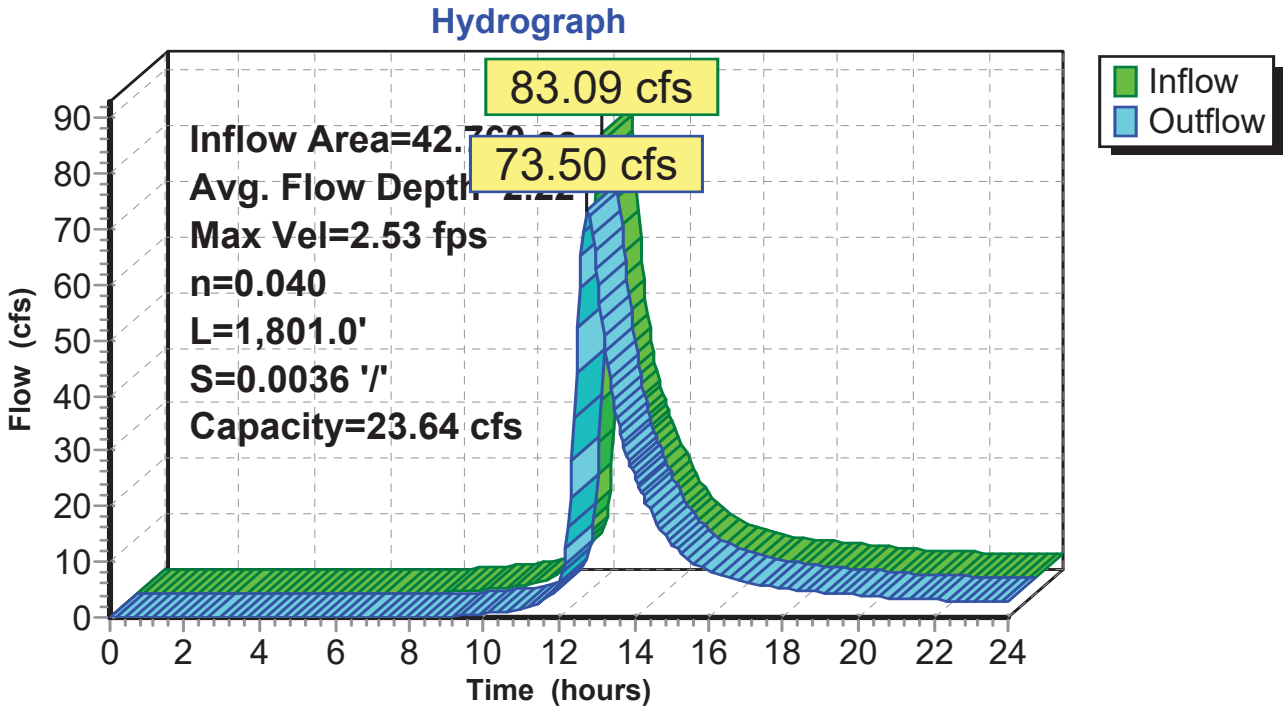
Peak Storage= 52,304 cf @ 12.57 hrs
Average Depth at Peak Storage= 2.22'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 23.64 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 1,801.0' Slope= 0.0036 '/'
Inlet Invert= 410.00', Outlet Invert= 403.50'



‡

Reach R-2: R-2



Stage-Discharge for Reach R-2: R-2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
410.00	0.00	0.00
410.01	0.10	0.01
410.02	0.16	0.03
410.03	0.21	0.06
410.04	0.26	0.10
410.05	0.30	0.15
410.06	0.34	0.21
410.07	0.37	0.27
410.08	0.41	0.33
410.09	0.44	0.40
410.10	0.47	0.48
410.11	0.50	0.57
410.12	0.53	0.65
410.13	0.56	0.75
410.14	0.59	0.85
410.15	0.62	0.95
410.16	0.64	1.06
410.17	0.67	1.17
410.18	0.69	1.29
410.19	0.72	1.41
410.20	0.74	1.54
410.21	0.76	1.67
410.22	0.79	1.81
410.23	0.81	1.95
410.24	0.83	2.09
410.25	0.85	2.24
410.26	0.87	2.39
410.27	0.89	2.55
410.28	0.92	2.71
410.29	0.94	2.87
410.30	0.96	3.04
410.31	0.98	3.21
410.32	1.00	3.39
410.33	1.01	3.57
410.34	1.03	3.75
410.35	1.05	3.94
410.36	1.07	4.13
410.37	1.09	4.33
410.38	1.11	4.53
410.39	1.13	4.73
410.40	1.14	4.94
410.41	1.16	5.15
410.42	1.18	5.36
410.43	1.19	5.58
410.44	1.21	5.80
410.45	1.23	6.03
410.46	1.24	6.25
410.47	1.26	6.49
410.48	1.28	6.72
410.49	1.29	6.96
410.50	1.31	7.20
410.51	1.33	7.45
410.52	1.34	7.70
410.53	1.36	7.95
410.54	1.37	8.21
410.55	1.39	8.47
410.56	1.40	8.73
410.57	1.42	9.00
410.58	1.43	9.27
410.59	1.45	9.54
410.60	1.46	9.82
410.61	1.48	10.10
410.62	1.49	10.38
410.63	1.50	10.67
410.64	1.52	10.96
410.65	1.53	11.26
410.66	1.55	11.55
410.67	1.56	11.86
410.68	1.57	12.16
410.69	1.59	12.47
410.70	1.60	12.78
410.71	1.61	13.09
410.72	1.63	13.41
410.73	1.64	13.73
410.74	1.65	14.06
410.75	1.67	14.38
410.76	1.68	14.71
410.77	1.69	15.05
410.78	1.71	15.39
410.79	1.72	15.73
410.80	1.73	16.07
410.81	1.74	16.42
410.82	1.76	16.77
410.83	1.77	17.12
410.84	1.78	17.48
410.85	1.79	17.84
410.86	1.81	18.20
410.87	1.82	18.57
410.88	1.83	18.94
410.89	1.84	19.31
410.90	1.85	19.69
410.91	1.87	20.07
410.92	1.88	20.45
410.93	1.89	20.84
410.94	1.90	21.23
410.95	1.91	21.62
410.96	1.92	22.02
410.97	1.94	22.42
410.98	1.95	22.82
410.99	1.96	23.23
411.00	**1.97**	**23.64**

Stage-Area-Storage for Reach R-2: R-2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
410.00	0.0	0
410.01	0.1	180
410.02	0.2	362
410.03	0.3	544
410.04	0.4	726
410.05	0.5	910
410.06	0.6	1,094
410.07	0.7	1,278
410.08	0.8	1,464
410.09	0.9	1,650
410.10	1.0	1,837
410.11	1.1	2,025
410.12	1.2	2,213
410.13	1.3	2,402
410.14	1.4	2,592
410.15	1.5	2,783
410.16	1.7	2,974
410.17	1.8	3,166
410.18	1.9	3,359
410.19	2.0	3,552
410.20	2.1	3,746
410.21	2.2	3,941
410.22	2.3	4,137
410.23	2.4	4,333
410.24	2.5	4,530
410.25	2.6	4,728
410.26	2.7	4,926
410.27	2.8	5,125
410.28	3.0	5,325
410.29	3.1	5,526
410.30	3.2	5,727
410.31	3.3	5,929
410.32	3.4	6,132
410.33	3.5	6,336
410.34	3.6	6,540
410.35	3.7	6,745
410.36	3.9	6,950
410.37	4.0	7,157
410.38	4.1	7,364
410.39	4.2	7,572
410.40	4.3	7,780
410.41	4.4	7,990
410.42	4.6	8,200
410.43	4.7	8,410
410.44	4.8	8,622
410.45	4.9	8,834
410.46	5.0	9,047
410.47	5.1	9,260
410.48	5.3	9,475
410.49	5.4	9,690
410.50	5.5	9,906
410.51	5.6	10,122
410.52	5.7	10,339
410.53	5.9	10,557
410.54	6.0	10,776
410.55	6.1	10,995
410.56	6.2	11,215
410.57	6.3	11,436
410.58	6.5	11,658
410.59	6.6	11,880
410.60	6.7	12,103
410.61	6.8	12,326
410.62	7.0	12,551
410.63	7.1	12,776
410.64	7.2	13,002
410.65	7.3	13,228
410.66	7.5	13,456
410.67	7.6	13,684
410.68	7.7	13,912
410.69	7.9	14,142
410.70	8.0	14,372
410.71	8.1	14,603
410.72	8.2	14,834
410.73	8.4	15,067
410.74	8.5	15,300
410.75	8.6	15,534
410.76	8.8	15,768
410.77	8.9	16,003
410.78	9.0	16,239
410.79	9.1	16,476
410.80	9.3	16,713
410.81	9.4	16,951
410.82	9.5	17,190
410.83	9.7	17,430
410.84	9.8	17,670
410.85	9.9	17,911
410.86	10.1	18,153
410.87	10.2	18,395
410.88	10.3	18,638
410.89	10.5	18,882
410.90	10.6	19,127
410.91	10.8	19,372
410.92	10.9	19,618
410.93	11.0	19,865
410.94	11.2	20,112
410.95	11.3	20,360
410.96	11.4	20,609
410.97	11.6	20,859
410.98	11.7	21,109
410.99	11.9	21,360
411.00	**12.0**	**21,612**

Summary for Reach R-3: R-3

Inflow Area = 59.620 ac, 8.13% Impervious, Inflow Depth > 3.31" for 25-yr event
Inflow = 89.56 cfs @ 12.73 hrs, Volume= 16.461 af
Outflow = 88.75 cfs @ 12.84 hrs, Volume= 16.408 af, Atten= 1%, Lag= 6.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.49 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.81 fps, Avg. Travel Time= 5.8 min

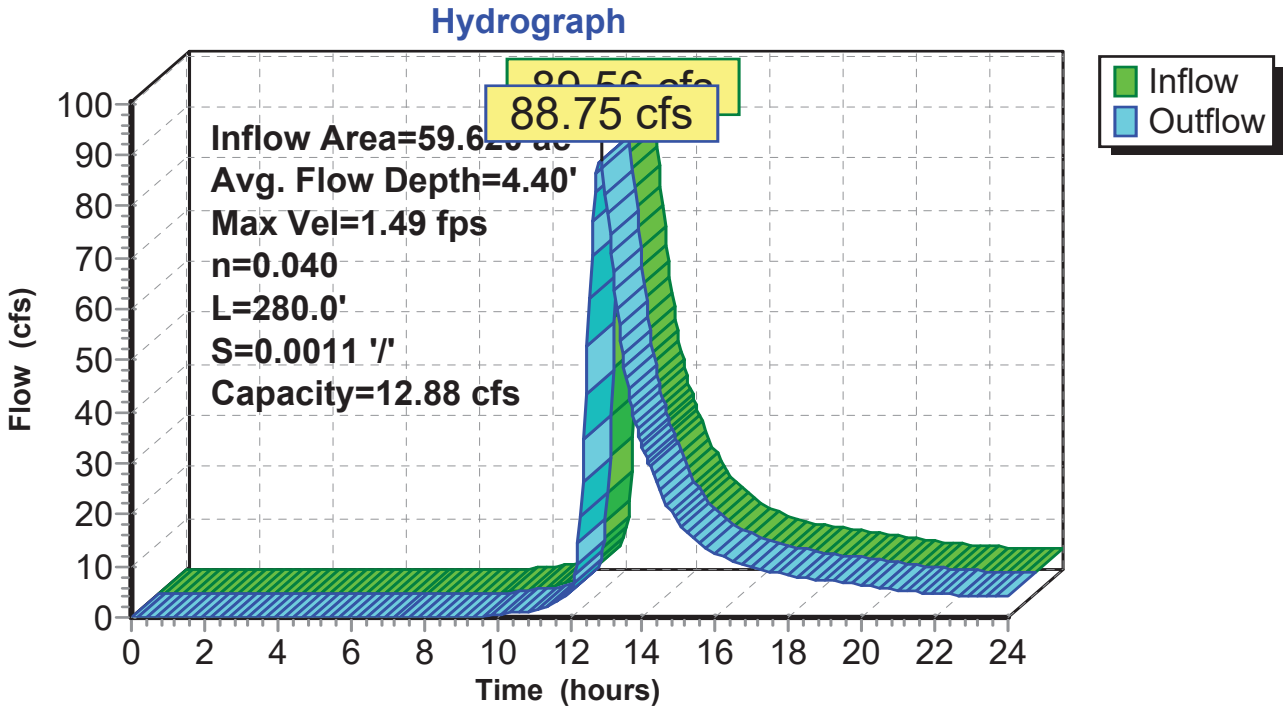
Peak Storage= 16,682 cf @ 12.78 hrs
Average Depth at Peak Storage= 4.40'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 12.88 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 280.0' Slope= 0.0011 '/'
Inlet Invert= 403.50', Outlet Invert= 403.20'



‡

Reach R-3: R-3



Stage-Discharge for Reach R-3: R-3

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
403.50	0.00	0.00
403.51	0.06	0.01
403.52	0.09	0.02
403.53	0.12	0.04
403.54	0.14	0.06
403.55	0.16	0.08
403.56	0.18	0.11
403.57	0.20	0.14
403.58	0.22	0.18
403.59	0.24	0.22
403.60	0.26	0.26
403.61	0.27	0.31
403.62	0.29	0.36
403.63	0.31	0.41
403.64	0.32	0.46
403.65	0.34	0.52
403.66	0.35	0.58
403.67	0.36	0.64
403.68	0.38	0.70
403.69	0.39	0.77
403.70	0.40	0.84
403.71	0.42	0.91
403.72	0.43	0.98
403.73	0.44	1.06
403.74	0.45	1.14
403.75	0.46	1.22
403.76	0.48	1.30
403.77	0.49	1.39
403.78	0.50	1.48
403.79	0.51	1.56
403.80	0.52	1.66
403.81	0.53	1.75
403.82	0.54	1.85
403.83	0.55	1.94
403.84	0.56	2.05
403.85	0.57	2.15
403.86	0.58	2.25
403.87	0.59	2.36
403.88	0.60	2.47
403.89	0.61	2.58
403.90	0.62	2.69
403.91	0.63	2.80
403.92	0.64	2.92
403.93	0.65	3.04
403.94	0.66	3.16
403.95	0.67	3.28
403.96	0.68	3.41
403.97	0.69	3.53
403.98	0.70	3.66
403.99	0.70	3.79
404.00	0.71	3.92
404.01	0.72	4.06
404.02	0.73	4.19
404.03	0.74	4.33
404.04	0.75	4.47
404.05	0.76	4.61
404.06	0.76	4.76
404.07	0.77	4.90
404.08	0.78	5.05
404.09	0.79	5.20
404.10	0.80	5.35
404.11	0.80	5.50
404.12	0.81	5.66
404.13	0.82	5.81
404.14	0.83	5.97
404.15	0.84	6.13
404.16	0.84	6.30
404.17	0.85	6.46
404.18	0.86	6.63
404.19	0.87	6.79
404.20	0.87	6.96
404.21	0.88	7.13
404.22	0.89	7.31
404.23	0.89	7.48
404.24	0.90	7.66
404.25	0.91	7.84
404.26	0.92	8.02
404.27	0.92	8.20
404.28	0.93	8.38
404.29	0.94	8.57
404.30	0.94	8.76
404.31	0.95	8.95
404.32	0.96	9.14
404.33	0.96	9.33
404.34	0.97	9.52
404.35	0.98	9.72
404.36	0.98	9.92
404.37	0.99	10.12
404.38	1.00	10.32
404.39	1.00	10.52
404.40	1.01	10.73
404.41	1.02	10.94
404.42	1.02	11.14
404.43	1.03	11.36
404.44	1.04	11.57
404.45	1.04	11.78
404.46	1.05	12.00
404.47	1.05	12.22
404.48	1.06	12.43
404.49	1.07	12.66
404.50	**1.07**	**12.88**

Stage-Area-Storage for Reach R-3: R-3

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
403.50	0.0	0
403.51	0.1	28
403.52	0.2	56
403.53	0.3	85
403.54	0.4	113
403.55	0.5	141
403.56	0.6	170
403.57	0.7	199
403.58	0.8	228
403.59	0.9	257
403.60	1.0	286
403.61	1.1	315
403.62	1.2	344
403.63	1.3	373
403.64	1.4	403
403.65	1.5	433
403.66	1.7	462
403.67	1.8	492
403.68	1.9	522
403.69	2.0	552
403.70	2.1	582
403.71	2.2	613
403.72	2.3	643
403.73	2.4	674
403.74	2.5	704
403.75	2.6	735
403.76	2.7	766
403.77	2.8	797
403.78	3.0	828
403.79	3.1	859
403.80	3.2	890
403.81	3.3	922
403.82	3.4	953
403.83	3.5	985
403.84	3.6	1,017
403.85	3.7	1,049
403.86	3.9	1,081
403.87	4.0	1,113
403.88	4.1	1,145
403.89	4.2	1,177
403.90	4.3	1,210
403.91	4.4	1,242
403.92	4.6	1,275
403.93	4.7	1,308
403.94	4.8	1,340
403.95	4.9	1,373
403.96	5.0	1,406
403.97	5.1	1,440
403.98	5.3	1,473
403.99	5.4	1,506
404.00	5.5	1,540
404.01	5.6	1,574
404.02	5.7	1,607
404.03	5.9	1,641
404.04	6.0	1,675
404.05	6.1	1,709
404.06	6.2	1,744
404.07	6.3	1,778
404.08	6.5	1,812
404.09	6.6	1,847
404.10	6.7	1,882
404.11	6.8	1,916
404.12	7.0	1,951
404.13	7.1	1,986
404.14	7.2	2,021
404.15	7.3	2,057
404.16	7.5	2,092
404.17	7.6	2,127
404.18	7.7	2,163
404.19	7.9	2,199
404.20	8.0	2,234
404.21	8.1	2,270
404.22	8.2	2,306
404.23	8.4	2,342
404.24	8.5	2,379
404.25	8.6	2,415
404.26	8.8	2,451
404.27	8.9	2,488
404.28	9.0	2,525
404.29	9.1	2,561
404.30	9.3	2,598
404.31	9.4	2,635
404.32	9.5	2,673
404.33	9.7	2,710
404.34	9.8	2,747
404.35	9.9	2,785
404.36	10.1	2,822
404.37	10.2	2,860
404.38	10.3	2,898
404.39	10.5	2,936
404.40	10.6	2,974
404.41	10.8	3,012
404.42	10.9	3,050
404.43	11.0	3,088
404.44	11.2	3,127
404.45	11.3	3,165
404.46	11.4	3,204
404.47	11.6	3,243
404.48	11.7	3,282
404.49	11.9	3,321
404.50	**12.0**	**3,360**

Summary for Reach R-4: R-4

Inflow Area = 60.680 ac, 9.13% Impervious, Inflow Depth > 3.29" for 25-yr event
Inflow = 89.33 cfs @ 12.84 hrs, Volume= 16.628 af
Outflow = 88.75 cfs @ 12.92 hrs, Volume= 16.584 af, Atten= 1%, Lag= 5.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.38 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 0.77 fps, Avg. Travel Time= 4.7 min

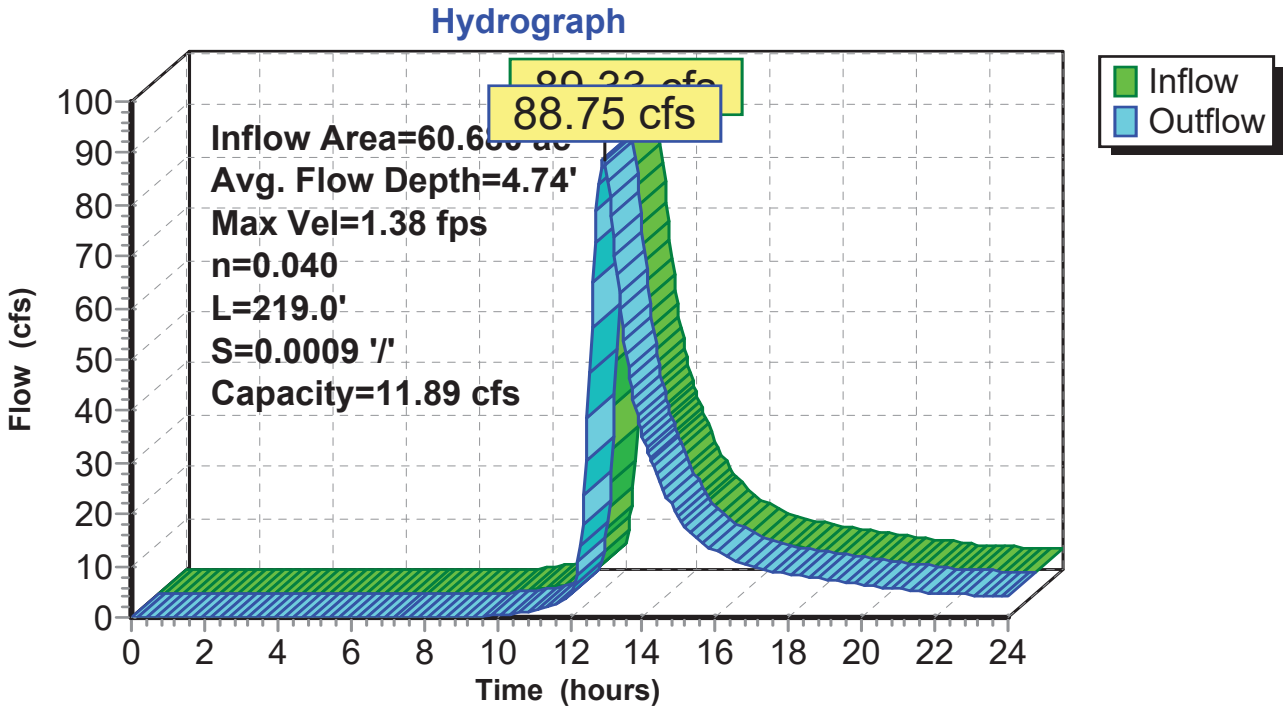
Peak Storage= 14,064 cf @ 12.88 hrs
Average Depth at Peak Storage= 4.74'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 11.89 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 219.0' Slope= 0.0009 '/'
Inlet Invert= 403.20', Outlet Invert= 403.00'



‡

Reach R-4: R-4



Stage-Discharge for Reach R-4: R-4

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
403.20	0.00	0.00
403.21	0.05	0.01
403.22	0.08	0.02
403.23	0.11	0.03
403.24	0.13	0.05
403.25	0.15	0.08
403.26	0.17	0.10
403.27	0.19	0.13
403.28	0.21	0.17
403.29	0.22	0.20
403.30	0.24	0.24
403.31	0.25	0.28
403.32	0.27	0.33
403.33	0.28	0.38
403.34	0.30	0.43
403.35	0.31	0.48
403.36	0.32	0.53
403.37	0.34	0.59
403.38	0.35	0.65
403.39	0.36	0.71
403.40	0.37	0.77
403.41	0.38	0.84
403.42	0.40	0.91
403.43	0.41	0.98
403.44	0.42	1.05
403.45	0.43	1.13
403.46	0.44	1.20
403.47	0.45	1.28
403.48	0.46	1.36
403.49	0.47	1.44
403.50	0.48	1.53
403.51	0.49	1.62
403.52	0.50	1.70
403.53	0.51	1.80
403.54	0.52	1.89
403.55	0.53	1.98
403.56	0.54	2.08
403.57	0.55	2.18
403.58	0.56	2.28
403.59	0.57	2.38
403.60	0.57	2.48
403.61	0.58	2.59
403.62	0.59	2.70
403.63	0.60	2.81
403.64	0.61	2.92
403.65	0.62	3.03
403.66	0.63	3.15
403.67	0.63	3.26
403.68	0.64	3.38
403.69	0.65	3.50
403.70	0.66	3.62
403.71	0.67	3.75
403.72	0.67	3.87
403.73	0.68	4.00
403.74	0.69	4.13
403.75	0.70	4.26
403.76	0.71	4.39
403.77	0.71	4.53
403.78	0.72	4.66
403.79	0.73	4.80
403.80	0.74	4.94
403.81	0.74	5.08
403.82	0.75	5.22
403.83	0.76	5.37
403.84	0.76	5.51
403.85	0.77	5.66
403.86	0.78	5.81
403.87	0.78	5.96
403.88	0.79	6.12
403.89	0.80	6.27
403.90	0.81	6.43
403.91	0.81	6.59
403.92	0.82	6.75
403.93	0.83	6.91
403.94	0.83	7.07
403.95	0.84	7.24
403.96	0.85	7.40
403.97	0.85	7.57
403.98	0.86	7.74
403.99	0.86	7.91
404.00	0.87	8.08
404.01	0.88	8.26
404.02	0.88	8.43
404.03	0.89	8.61
404.04	0.90	8.79
404.05	0.90	8.97
404.06	0.91	9.16
404.07	0.91	9.34
404.08	0.92	9.53
404.09	0.93	9.72
404.10	0.93	9.91
404.11	0.94	10.10
404.12	0.94	10.29
404.13	0.95	10.48
404.14	0.96	10.68
404.15	0.96	10.88
404.16	0.97	11.08
404.17	0.97	11.28
404.18	0.98	11.48
404.19	0.99	11.68
404.20	**0.99**	**11.89**

Stage-Area-Storage for Reach R-4: R-4

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
403.20	0.0	0
403.21	0.1	22
403.22	0.2	44
403.23	0.3	66
403.24	0.4	88
403.25	0.5	111
403.26	0.6	133
403.27	0.7	155
403.28	0.8	178
403.29	0.9	201
403.30	1.0	223
403.31	1.1	246
403.32	1.2	269
403.33	1.3	292
403.34	1.4	315
403.35	1.5	338
403.36	1.7	362
403.37	1.8	385
403.38	1.9	408
403.39	2.0	432
403.40	2.1	456
403.41	2.2	479
403.42	2.3	503
403.43	2.4	527
403.44	2.5	551
403.45	2.6	575
403.46	2.7	599
403.47	2.8	623
403.48	3.0	648
403.49	3.1	672
403.50	3.2	696
403.51	3.3	721
403.52	3.4	746
403.53	3.5	770
403.54	3.6	795
403.55	3.7	820
403.56	3.9	845
403.57	4.0	870
403.58	4.1	895
403.59	4.2	921
403.60	4.3	946
403.61	4.4	972
403.62	4.6	997
403.63	4.7	1,023
403.64	4.8	1,048
403.65	4.9	1,074
403.66	5.0	1,100
403.67	5.1	1,126
403.68	5.3	1,152
403.69	5.4	1,178
403.70	5.5	1,205
403.71	5.6	1,231
403.72	5.7	1,257
403.73	5.9	1,284
403.74	6.0	1,310
403.75	6.1	1,337
403.76	6.2	1,364
403.77	6.3	1,391
403.78	6.5	1,418
403.79	6.6	1,445
403.80	6.7	1,472
403.81	6.8	1,499
403.82	7.0	1,526
403.83	7.1	1,554
403.84	7.2	1,581
403.85	7.3	1,609
403.86	7.5	1,636
403.87	7.6	1,664
403.88	7.7	1,692
403.89	7.9	1,720
403.90	8.0	1,748
403.91	8.1	1,776
403.92	8.2	1,804
403.93	8.4	1,832
403.94	8.5	1,860
403.95	8.6	1,889
403.96	8.8	1,917
403.97	8.9	1,946
403.98	9.0	1,975
403.99	9.1	2,003
404.00	9.3	2,032
404.01	9.4	2,061
404.02	9.5	2,090
404.03	9.7	2,119
404.04	9.8	2,149
404.05	9.9	2,178
404.06	10.1	2,207
404.07	10.2	2,237
404.08	10.3	2,266
404.09	10.5	2,296
404.10	10.6	2,326
404.11	10.8	2,356
404.12	10.9	2,386
404.13	11.0	2,416
404.14	11.2	2,446
404.15	11.3	2,476
404.16	11.4	2,506
404.17	11.6	2,536
404.18	11.7	2,567
404.19	11.9	2,597
404.20	**12.0**	**2,628**

Summary for Pond Pond 1b: Pond 1b

Inflow Area = 16.720 ac, 26.61% Impervious, Inflow Depth > 3.34" for 25-yr event
Inflow = 37.87 cfs @ 12.41 hrs, Volume= 4.653 af
Outflow = 18.26 cfs @ 12.88 hrs, Volume= 4.521 af, Atten= 52%, Lag= 28.2 min
Primary = 18.26 cfs @ 12.88 hrs, Volume= 4.521 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 444.26' @ 12.88 hrs Surf.Area= 35,228 sf Storage= 57,586 cf

Plug-Flow detention time= 53.7 min calculated for 4.521 af (97% of inflow)
Center-of-Mass det. time= 38.2 min (895.2 - 857.0)

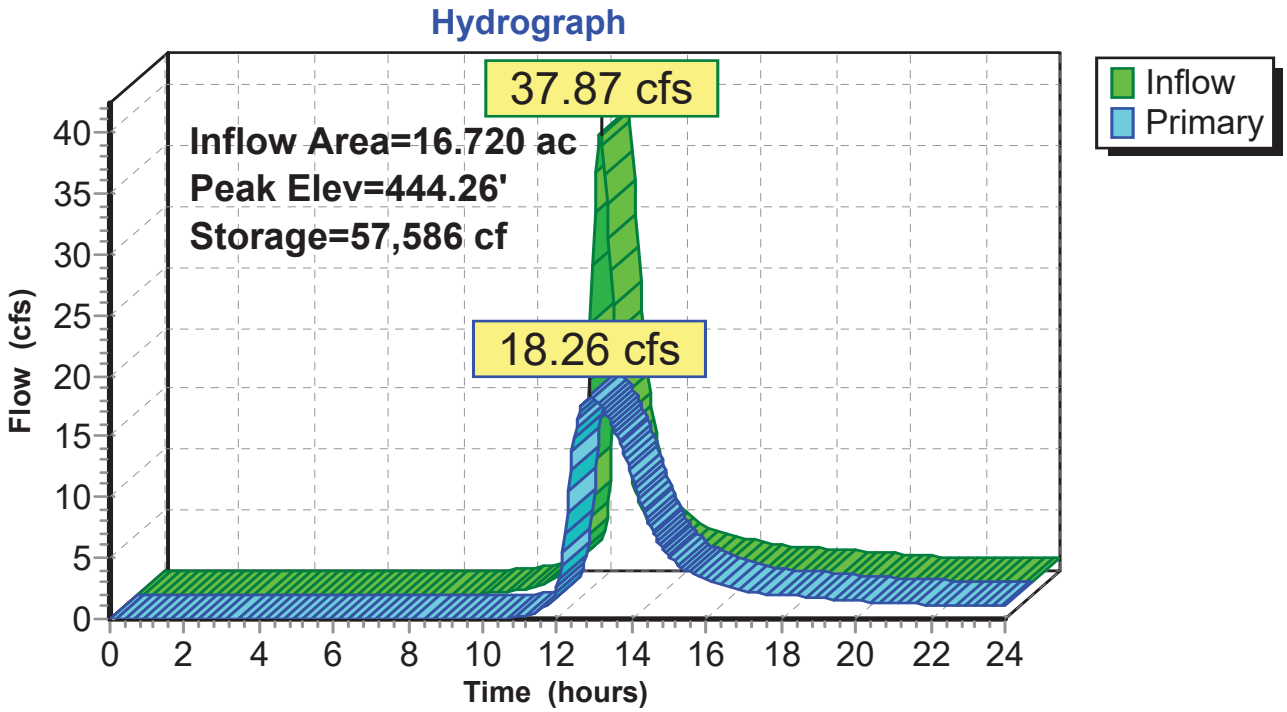
Volume	Invert	Avail.Storage	Storage Description
#1	441.50'	141,234 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
441.50	1,192	0	0
442.00	10,772	2,991	2,991
444.00	34,794	45,566	48,557
446.00	38,163	72,957	121,514
446.50	40,718	19,720	141,234

Device	Routing	Invert	Outlet Devices
#1	Primary	441.80'	**24.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	441.60'	**25.6 deg x 2.0' long x 4.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.64 (C= 3.30)
#3	Device 1	445.23'	**52.0" W x 64.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	446.40'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=18.26 cfs @ 12.88 hrs HW=444.26' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 18.26 cfs @ 5.81 fps)
  ├**2=Sharp-Crested Vee/Trap Weir** (Passes 18.26 cfs of 35.42 cfs potential flow)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond Pond 1b: Pond 1b



Stage-Discharge for Pond Pond 1b: Pond 1b

Elevation (feet)	Primary (cfs)
441.50	0.00
441.60	0.00
441.70	0.00
441.80	0.00
441.90	0.06
442.00	0.25
442.10	0.55
442.20	0.96
442.30	1.48
442.40	2.09
442.50	2.79
442.60	3.57
442.70	4.43
442.80	5.35
442.90	6.32
443.00	7.34
443.10	8.39
443.20	9.46
443.30	10.54
443.40	11.60
443.50	12.63
443.60	13.60
443.70	14.47
443.80	15.13
443.90	15.87
444.00	16.57
444.10	17.25
444.20	17.90
444.30	18.53
444.40	19.13
444.50	19.72
444.60	20.29
444.70	20.85
444.80	21.39
444.90	21.92
445.00	22.44
445.10	22.94
445.20	23.43
445.30	23.92
445.40	24.39
445.50	24.86
445.60	25.31
445.70	25.76
445.80	26.20
445.90	26.63
446.00	27.06
446.10	27.48
446.20	27.89
446.30	28.30
446.40	28.70
446.50	29.10
446.60	29.49
446.70	29.87
446.80	30.25
446.90	30.63
447.00	31.00
447.10	31.37
447.20	31.73
447.30	32.09
447.40	32.44
447.50	32.79
447.60	33.14
447.70	33.48
447.80	33.82
447.90	34.16
448.00	34.49
448.10	34.82
448.20	35.15
448.30	35.48
448.40	35.80
448.50	36.11
448.60	36.43
448.70	36.74
448.80	37.05
448.90	37.36
449.00	37.67
449.10	37.97
449.20	38.27
449.30	38.57
449.40	38.86
449.50	39.15
449.60	39.45
449.70	39.73
449.80	40.02
449.90	40.31
450.00	40.59
450.10	40.87
450.20	41.15
450.30	41.43
450.40	41.70
450.50	**41.97**

Stage-Area-Storage for Pond Pond 1b: Pond 1b

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
441.50	1,192	0
441.60	3,108	215
441.70	5,024	622
441.80	6,940	1,220
441.90	8,856	2,010
442.00	10,772	2,991
442.10	11,973	4,128
442.20	13,174	5,386
442.30	14,375	6,763
442.40	15,576	8,261
442.50	16,778	9,878
442.60	17,979	11,616
442.70	19,180	13,474
442.80	20,381	15,452
442.90	21,582	17,550
443.00	22,783	19,769
443.10	23,984	22,107
443.20	25,185	24,565
443.30	26,386	27,144
443.40	27,587	29,843
443.50	28,789	32,661
443.60	29,990	35,600
443.70	31,191	38,659
443.80	32,392	41,838
443.90	33,593	45,138
444.00	34,794	48,557
444.10	34,962	52,045
444.20	35,131	55,549
444.30	35,299	59,071
444.40	35,468	62,609
444.50	35,636	66,165
444.60	35,805	69,737
444.70	35,973	73,326
444.80	36,142	76,931
444.90	36,310	80,554
445.00	36,479	84,193
445.10	36,647	87,850
445.20	36,815	91,523
445.30	36,984	95,213
445.40	37,152	98,919
445.50	37,321	102,643
445.60	37,489	106,384
445.70	37,658	110,141
445.80	37,826	113,915
445.90	37,995	117,706
446.00	38,163	121,514
446.10	38,674	125,356
446.20	39,185	129,249
446.30	39,696	133,193
446.40	40,207	137,188
446.50	**40,718**	**141,234**
446.60	40,718	141,234
446.70	40,718	141,234
446.80	40,718	141,234
446.90	40,718	141,234
447.00	40,718	141,234
447.10	40,718	141,234
447.20	40,718	141,234
447.30	40,718	141,234
447.40	40,718	141,234
447.50	40,718	141,234
447.60	40,718	141,234
447.70	40,718	141,234
447.80	40,718	141,234
447.90	40,718	141,234
448.00	40,718	141,234
448.10	40,718	141,234
448.20	40,718	141,234
448.30	40,718	141,234
448.40	40,718	141,234
448.50	40,718	141,234
448.60	40,718	141,234
448.70	40,718	141,234
448.80	40,718	141,234
448.90	40,718	141,234
449.00	40,718	141,234
449.10	40,718	141,234
449.20	40,718	141,234
449.30	40,718	141,234
449.40	40,718	141,234
449.50	40,718	141,234
449.60	40,718	141,234
449.70	40,718	141,234
449.80	40,718	141,234
449.90	40,718	141,234
450.00	40,718	141,234
450.10	40,718	141,234
450.20	40,718	141,234
450.30	40,718	141,234
450.40	40,718	141,234
450.50	40,718	141,234

Summary for Pond Pond 1c: Pond 1c

Inflow Area = 10.630 ac, 0.56% Impervious, Inflow Depth > 2.75" for 25-yr event
Inflow = 22.69 cfs @ 12.31 hrs, Volume= 2.440 af
Outflow = 16.85 cfs @ 12.52 hrs, Volume= 2.318 af, Atten= 26%, Lag= 12.8 min
Primary = 16.85 cfs @ 12.52 hrs, Volume= 2.318 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 412.18' @ 12.52 hrs Surf.Area= 8,945 sf Storage= 23,039 cf

Plug-Flow detention time= 60.0 min calculated for 2.318 af (95% of inflow)
Center-of-Mass det. time= 33.4 min (896.9 - 863.5)

Volume	Invert	Avail.Storage	Storage Description
#1	409.00'	53,054 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

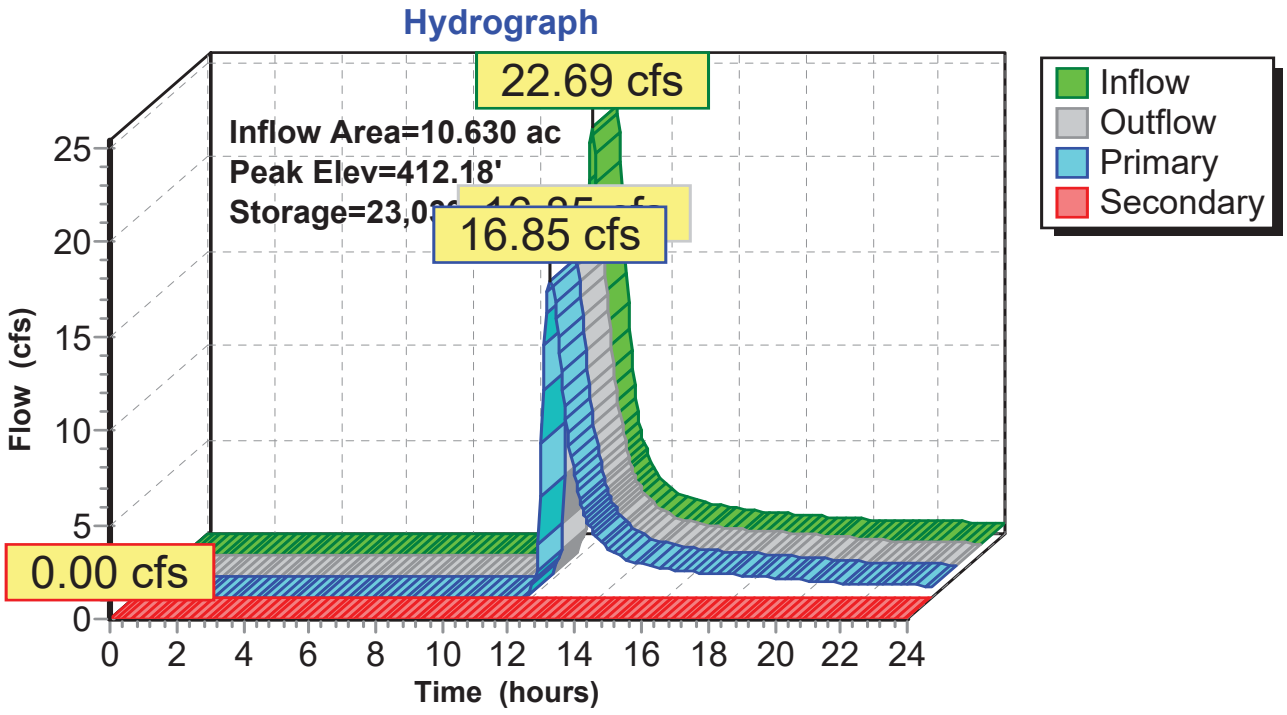
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
409.00	5,642	0	0
410.00	6,603	6,123	6,123
412.00	8,732	15,335	21,458
414.00	11,115	19,847	41,305
415.00	12,383	11,749	53,054

Device	Routing	Invert	Outlet Devices
#1	Primary	408.00'	**24.0" Round Culvert** L= 62.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 408.00' / 407.30' S= 0.0113 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Device 1	409.40'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	410.40'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height
#4	Device 1	413.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#5	Secondary	414.00'	**20.0' long x 14.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=16.78 cfs @ 12.52 hrs HW=412.17' (Free Discharge)
└**1=Culvert** (Passes 16.78 cfs of 26.95 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 2.63 cfs @ 7.52 fps)
  ├**3=Sharp-Crested Rectangular Weir** (Weir Controls 14.15 cfs @ 4.85 fps)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=409.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 1c: Pond 1c



Stage-Discharge for Pond Pond 1c: Pond 1c

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
409.00	0.00	0.00	0.00
409.10	0.00	0.00	0.00
409.20	0.00	0.00	0.00
409.30	0.00	0.00	0.00
409.40	0.00	0.00	0.00
409.50	0.04	0.04	0.00
409.60	0.13	0.13	0.00
409.70	0.28	0.28	0.00
409.80	0.47	0.47	0.00
409.90	0.68	0.68	0.00
410.00	0.87	0.87	0.00
410.10	1.02	1.02	0.00
410.20	1.15	1.15	0.00
410.30	1.27	1.27	0.00
410.40	1.37	1.37	0.00
410.50	1.68	1.68	0.00
410.60	2.15	2.15	0.00
410.70	2.72	2.72	0.00
410.80	3.37	3.37	0.00
410.90	4.08	4.08	0.00
411.00	4.86	4.86	0.00
411.10	5.69	5.69	0.00
411.20	6.56	6.56	0.00
411.30	7.48	7.48	0.00
411.40	8.43	8.43	0.00
411.50	9.42	9.42	0.00
411.60	10.45	10.45	0.00
411.70	11.50	11.50	0.00
411.80	12.57	12.57	0.00
411.90	13.67	13.67	0.00
412.00	14.79	14.79	0.00
412.10	15.93	15.93	0.00
412.20	17.09	17.09	0.00
412.30	18.26	18.26	0.00
412.40	19.45	19.45	0.00
412.50	20.64	20.64	0.00
412.60	21.85	21.85	0.00
412.70	23.06	23.06	0.00
412.80	24.28	24.28	0.00
412.90	25.50	25.50	0.00
413.00	26.72	26.72	0.00
413.10	28.12	28.12	0.00
413.20	29.66	29.66	0.00
413.30	31.28	31.28	0.00
413.40	31.73	31.73	0.00
413.50	32.09	32.09	0.00
413.60	32.44	32.44	0.00
413.70	32.79	32.79	0.00
413.80	33.14	33.14	0.00
413.90	33.48	33.48	0.00
414.00	33.82	33.82	0.00
414.10	35.83	34.16	1.67
414.20	39.22	34.49	4.72
414.30	43.55	34.82	8.73
414.40	48.66	35.15	13.51
414.50	54.46	35.48	18.99
414.60	60.89	35.80	25.10
414.70	67.45	36.11	31.33
414.80	74.35	36.43	37.92
414.90	81.91	36.74	45.17
415.00	89.85	37.05	52.80
415.10	98.39	37.36	61.03
415.20	107.34	37.67	69.67
415.30	116.53	37.97	78.56
415.40	126.06	38.27	87.79
415.50	135.57	38.57	97.00
415.60	145.32	38.86	106.45
415.70	155.74	39.15	116.59
415.80	166.47	39.45	127.03
415.90	177.49	39.73	137.76
416.00	188.80	40.02	148.78
416.10	**200.38**	**40.31**	**160.07**

Stage-Area-Storage for Pond Pond 1c: Pond 1c

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
409.00	5,642	0
409.10	5,738	569
409.20	5,834	1,148
409.30	5,930	1,736
409.40	6,026	2,334
409.50	6,123	2,941
409.60	6,219	3,558
409.70	6,315	4,185
409.80	6,411	4,821
409.90	6,507	5,467
410.00	6,603	6,123
410.10	6,709	6,788
410.20	6,816	7,464
410.30	6,922	8,151
410.40	7,029	8,849
410.50	7,135	9,557
410.60	7,242	10,276
410.70	7,348	11,005
410.80	7,455	11,746
410.90	7,561	12,496
411.00	7,668	13,258
411.10	7,774	14,030
411.20	7,880	14,813
411.30	7,987	15,606
411.40	8,093	16,410
411.50	8,200	17,225
411.60	8,306	18,050
411.70	8,413	18,886
411.80	8,519	19,732
411.90	8,626	20,590
412.00	8,732	21,458
412.10	8,851	22,337
412.20	8,970	23,228
412.30	9,089	24,131
412.40	9,209	25,046
412.50	9,328	25,972
412.60	9,447	26,911
412.70	9,566	27,862
412.80	9,685	28,824
412.90	9,804	29,799
413.00	9,924	30,785
413.10	10,043	31,784
413.20	10,162	32,794
413.30	10,281	33,816
413.40	10,400	34,850
413.50	10,519	35,896
413.60	10,638	36,954
413.70	10,758	38,024
413.80	10,877	39,105
413.90	10,996	40,199
414.00	11,115	41,305
414.10	11,242	42,422
414.20	11,369	43,553
414.30	11,495	44,696
414.40	11,622	45,852
414.50	11,749	47,021
414.60	11,876	48,202
414.70	12,003	49,396
414.80	12,129	50,602
414.90	12,256	51,822
415.00	**12,383**	**53,054**
415.10	12,383	53,054
415.20	12,383	53,054
415.30	12,383	53,054
415.40	12,383	53,054
415.50	12,383	53,054
415.60	12,383	53,054
415.70	12,383	53,054
415.80	12,383	53,054
415.90	12,383	53,054
416.00	12,383	53,054
416.10	12,383	53,054

Summary for Pond Pond 1d: Pond 1d

Inflow Area = 6.230 ac, 4.01% Impervious, Inflow Depth > 3.05" for 25-yr event
Inflow = 15.33 cfs @ 12.29 hrs, Volume= 1.583 af
Outflow = 2.24 cfs @ 13.38 hrs, Volume= 1.443 af, Atten= 85%, Lag= 65.2 min
Primary = 2.24 cfs @ 13.38 hrs, Volume= 1.443 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 410.87' @ 13.38 hrs Surf.Area= 19,953 sf Storage= 33,242 cf

Plug-Flow detention time= 192.8 min calculated for 1.440 af (91% of inflow)
Center-of-Mass det. time= 148.8 min (1,004.7 - 855.9)

Volume	Invert	Avail.Storage	Storage Description
#1	408.00'	209,097 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

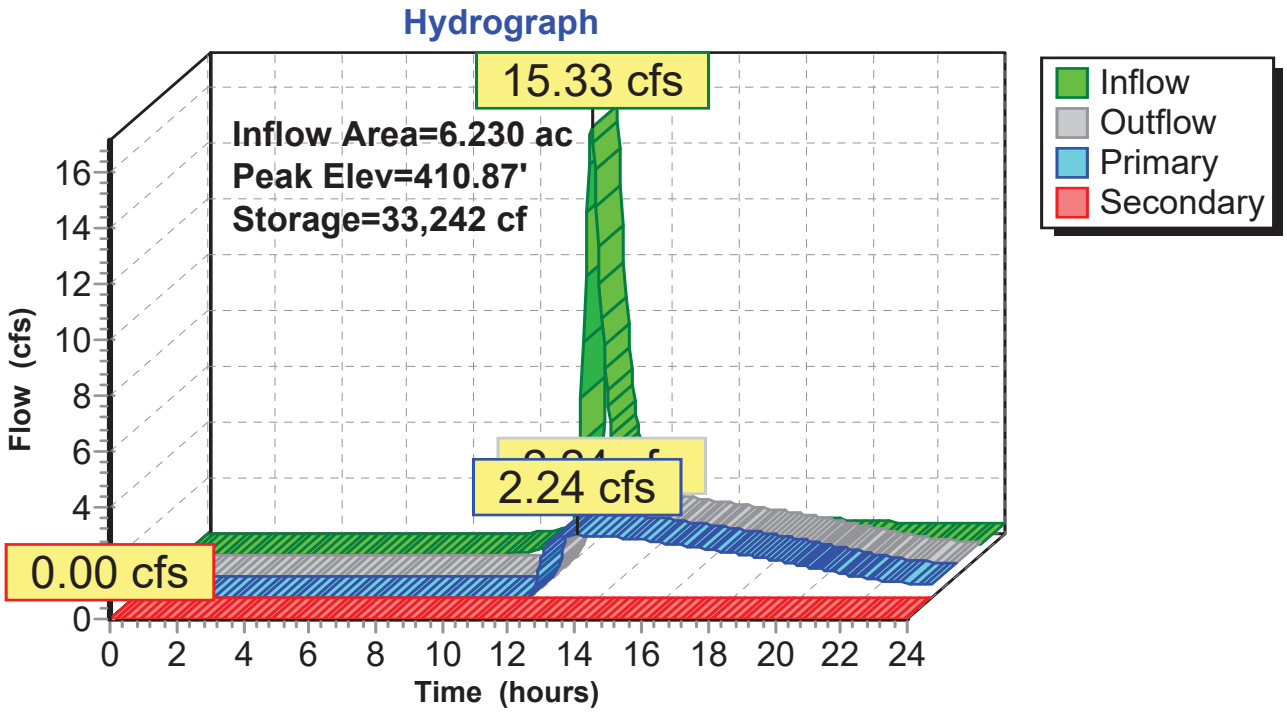
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
408.00	800	0	0
410.00	16,607	17,407	17,407
412.00	24,332	40,939	58,346
414.00	28,916	53,248	111,594
416.00	33,677	62,593	174,187
417.00	36,142	34,910	209,097

Device	Routing	Invert	Outlet Devices
#1	Primary	408.00'	**24.0" Round Culvert** L= 235.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 408.00' / 406.00' S= 0.0085 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	408.75'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	411.20'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.0' Crest Height
#4	Device 1	414.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#5	Secondary	416.00'	**35.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=2.24 cfs @ 13.38 hrs HW=410.87' (Free Discharge)
- **1=Culvert** (Passes 2.24 cfs of 20.66 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 2.24 cfs @ 6.43 fps)
  - **3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  - **4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=408.00' (Free Discharge)
- **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 1d: Pond 1d



Stage-Discharge for Pond Pond 1d: Pond 1d

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
408.00	0.00	0.00	0.00
408.10	0.00	0.00	0.00
408.20	0.00	0.00	0.00
408.30	0.00	0.00	0.00
408.40	0.00	0.00	0.00
408.50	0.00	0.00	0.00
408.60	0.00	0.00	0.00
408.70	0.00	0.00	0.00
408.80	0.01	0.01	0.00
408.90	0.08	0.08	0.00
409.00	0.20	0.20	0.00
409.10	0.37	0.37	0.00
409.20	0.57	0.57	0.00
409.30	0.78	0.78	0.00
409.40	0.95	0.95	0.00
409.50	1.08	1.08	0.00
409.60	1.21	1.21	0.00
409.70	1.32	1.32	0.00
409.80	1.42	1.42	0.00
409.90	1.52	1.52	0.00
410.00	1.61	1.61	0.00
410.10	1.69	1.69	0.00
410.20	1.78	1.78	0.00
410.30	1.85	1.85	0.00
410.40	1.93	1.93	0.00
410.50	2.00	2.00	0.00
410.60	2.07	2.07	0.00
410.70	2.14	2.14	0.00
410.80	2.20	2.20	0.00
410.90	2.27	2.27	0.00
411.00	2.33	2.33	0.00
411.10	2.39	2.39	0.00
411.20	2.45	2.45	0.00
411.30	2.71	2.71	0.00
411.40	3.14	3.14	0.00
411.50	3.67	3.67	0.00
411.60	4.29	4.29	0.00
411.70	4.98	4.98	0.00
411.80	5.73	5.73	0.00
411.90	6.54	6.54	0.00
412.00	7.39	7.39	0.00
412.10	8.28	8.28	0.00
412.20	9.21	9.21	0.00
412.30	10.18	10.18	0.00
412.40	11.18	11.18	0.00
412.50	12.21	12.21	0.00
412.60	13.27	13.27	0.00
412.70	14.35	14.35	0.00
412.80	15.45	15.45	0.00
412.90	16.57	16.57	0.00
413.00	17.70	17.70	0.00
413.10	18.85	18.85	0.00
413.20	20.02	20.02	0.00
413.30	21.19	21.19	0.00
413.40	22.38	22.38	0.00
413.50	23.57	23.57	0.00
413.60	24.76	24.76	0.00
413.70	25.96	25.96	0.00
413.80	27.17	27.17	0.00
413.90	28.37	28.37	0.00
414.00	29.57	29.57	0.00
414.10	30.94	30.94	0.00
414.20	32.44	32.44	0.00
414.30	34.04	34.04	0.00
414.40	35.15	35.15	0.00
414.50	35.48	35.48	0.00
414.60	35.80	35.80	0.00
414.70	36.11	36.11	0.00
414.80	36.43	36.43	0.00
414.90	36.74	36.74	0.00
415.00	37.05	37.05	0.00
415.10	37.36	37.36	0.00
415.20	37.62	37.62	0.00
415.30	37.88	37.88	0.00
415.40	38.14	38.14	0.00
415.50	38.40	38.40	0.00
415.60	38.65	38.65	0.00
415.70	38.91	38.91	0.00
415.80	39.16	39.16	0.00
415.90	39.41	39.41	0.00
416.00	39.66	39.66	0.00
416.10	42.75	39.91	2.84
416.20	48.20	40.15	8.05
416.30	55.32	40.39	14.92
416.40	63.84	40.64	23.20
416.50	73.79	40.88	32.92
416.60	85.04	41.12	43.92
416.70	96.39	41.36	55.04
416.80	108.46	41.59	66.87
416.90	121.47	41.83	79.64
417.00	135.16	42.06	93.10
417.10	**149.91**	**42.30**	**107.61**

Stage-Area-Storage for Pond Pond 1d: Pond 1d

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
408.00	800	0
408.10	1,590	120
408.20	2,381	318
408.30	3,171	596
408.40	3,961	952
408.50	4,752	1,388
408.60	5,542	1,903
408.70	6,332	2,496
408.80	7,123	3,169
408.90	7,913	3,921
409.00	8,704	4,752
409.10	9,494	5,662
409.20	10,284	6,651
409.30	11,075	7,718
409.40	11,865	8,865
409.50	12,655	10,091
409.60	13,446	11,396
409.70	14,236	12,781
409.80	15,026	14,244
409.90	15,817	15,786
410.00	16,607	17,407
410.10	16,993	19,087
410.20	17,379	20,806
410.30	17,766	22,563
410.40	18,152	24,359
410.50	18,538	26,193
410.60	18,925	28,066
410.70	19,311	29,978
410.80	19,697	31,929
410.90	20,083	33,918
411.00	20,470	35,945
411.10	20,856	38,012
411.20	21,242	40,116
411.30	21,628	42,260
411.40	22,014	44,442
411.50	22,401	46,663
411.60	22,787	48,922
411.70	23,173	51,220
411.80	23,560	53,557
411.90	23,946	55,932
412.00	24,332	58,346
412.10	24,561	60,791
412.20	24,790	63,258
412.30	25,020	65,749
412.40	25,249	68,262
412.50	25,478	70,799
412.60	25,707	73,358
412.70	25,936	75,940
412.80	26,166	78,545
412.90	26,395	81,173
413.00	26,624	83,824
413.10	26,853	86,498
413.20	27,082	89,195
413.30	27,312	91,914
413.40	27,541	94,657
413.50	27,770	97,423
413.60	27,999	100,211
413.70	28,228	103,022
413.80	28,458	105,857
413.90	28,687	108,714
414.00	28,916	111,594
414.10	29,154	114,498
414.20	29,392	117,425
414.30	29,630	120,376
414.40	29,868	123,351
414.50	30,106	126,350
414.60	30,344	129,372
414.70	30,582	132,418
414.80	30,820	135,489
414.90	31,058	138,583
415.00	31,297	141,700
415.10	31,535	144,842
415.20	31,773	148,007
415.30	32,011	151,196
415.40	32,249	154,409
415.50	32,487	157,646
415.60	32,725	160,907
415.70	32,963	164,191
415.80	33,201	167,499
415.90	33,439	170,831
416.00	33,677	174,187
416.10	33,924	177,567
416.20	34,170	180,972
416.30	34,417	184,401
416.40	34,663	187,855
416.50	34,910	191,334
416.60	35,156	194,837
416.70	35,402	198,365
416.80	35,649	201,917
416.90	35,895	205,495
417.00	**36,142**	**209,097**
417.10	36,142	209,097

Summary for Pond Pond 1e: Pond 1e

Inflow Area = 1.060 ac, 65.09% Impervious, Inflow Depth > 4.97" for 25-yr event
Inflow = 7.89 cfs @ 12.00 hrs, Volume= 0.439 af
Outflow = 2.18 cfs @ 12.20 hrs, Volume= 0.220 af, Atten= 72%, Lag= 11.8 min
Primary = 2.18 cfs @ 12.20 hrs, Volume= 0.220 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 406.47' @ 12.20 hrs Surf.Area= 8,024 sf Storage= 10,403 cf

Plug-Flow detention time= 228.9 min calculated for 0.220 af (50% of inflow)
Center-of-Mass det. time= 118.3 min (913.6 - 795.3)

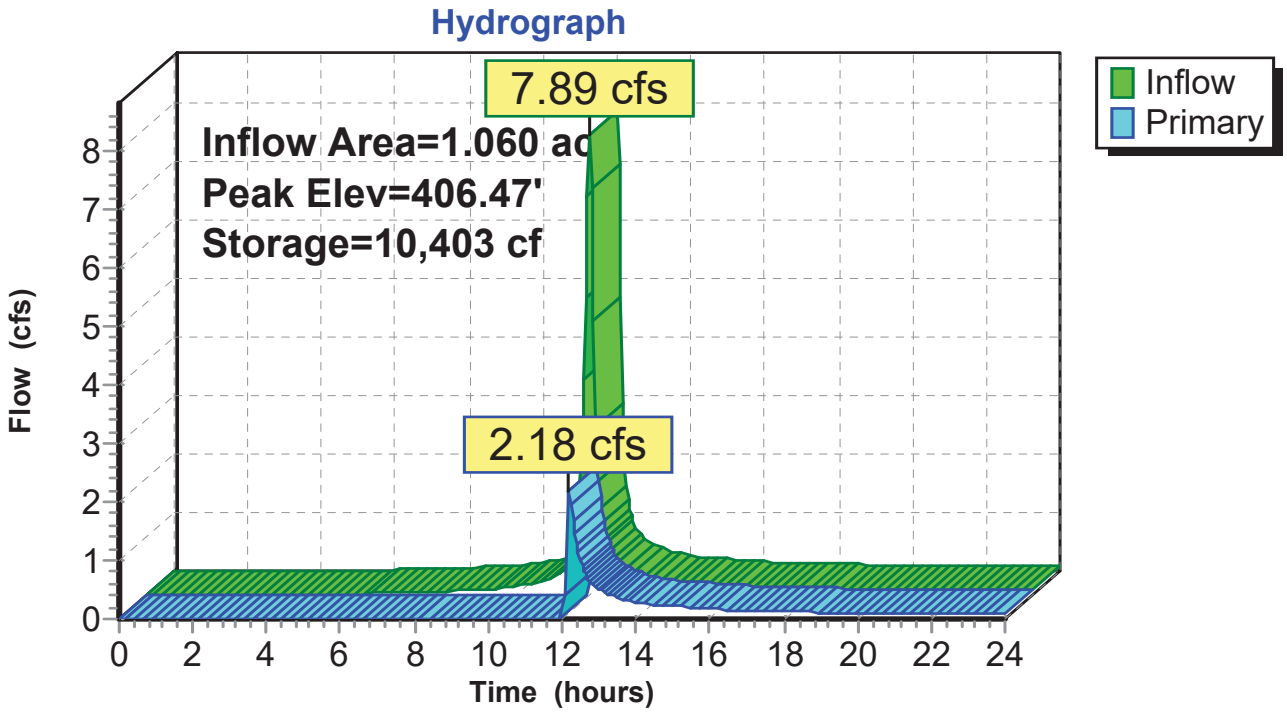
Volume	Invert	Avail.Storage	Storage Description
#1	405.00'	12,667 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
405.00	6,101	0	0
406.00	7,395	6,748	6,748
406.35	7,857	2,669	9,417
406.75	8,394	3,250	12,667

Device	Routing	Invert	Outlet Devices
#1	Primary	406.35'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=2.17 cfs @ 12.20 hrs HW=406.47' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.17 cfs @ 0.88 fps)

Pond Pond 1e: Pond 1e



Stage-Discharge for Pond Pond 1e: Pond 1e

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
405.00	0.00	405.53	0.00	406.06	0.00	406.59	5.89
405.01	0.00	405.54	0.00	406.07	0.00	406.60	6.27
405.02	0.00	405.55	0.00	406.08	0.00	406.61	6.66
405.03	0.00	405.56	0.00	406.09	0.00	406.62	7.06
405.04	0.00	405.57	0.00	406.10	0.00	406.63	7.46
405.05	0.00	405.58	0.00	406.11	0.00	406.64	7.88
405.06	0.00	405.59	0.00	406.12	0.00	406.65	8.30
405.07	0.00	405.60	0.00	406.13	0.00	406.66	8.73
405.08	0.00	405.61	0.00	406.14	0.00	406.67	9.17
405.09	0.00	405.62	0.00	406.15	0.00	406.68	9.61
405.10	0.00	405.63	0.00	406.16	0.00	406.69	10.07
405.11	0.00	405.64	0.00	406.17	0.00	406.70	10.53
405.12	0.00	405.65	0.00	406.18	0.00	406.71	11.00
405.13	0.00	405.66	0.00	406.19	0.00	406.72	11.48
405.14	0.00	405.67	0.00	406.20	0.00	406.73	11.96
405.15	0.00	405.68	0.00	406.21	0.00	406.74	12.45
405.16	0.00	405.69	0.00	406.22	0.00	406.75	**12.95**
405.17	0.00	405.70	0.00	406.23	0.00		
405.18	0.00	405.71	0.00	406.24	0.00		
405.19	0.00	405.72	0.00	406.25	0.00		
405.20	0.00	405.73	0.00	406.26	0.00		
405.21	0.00	405.74	0.00	406.27	0.00		
405.22	0.00	405.75	0.00	406.28	0.00		
405.23	0.00	405.76	0.00	406.29	0.00		
405.24	0.00	405.77	0.00	406.30	0.00		
405.25	0.00	405.78	0.00	406.31	0.00		
405.26	0.00	405.79	0.00	406.32	0.00		
405.27	0.00	405.80	0.00	406.33	0.00		
405.28	0.00	405.81	0.00	406.34	0.00		
405.29	0.00	405.82	0.00	406.35	0.00		
405.30	0.00	405.83	0.00	406.36	0.05		
405.31	0.00	405.84	0.00	406.37	0.14		
405.32	0.00	405.85	0.00	406.38	0.26		
405.33	0.00	405.86	0.00	406.39	0.40		
405.34	0.00	405.87	0.00	406.40	0.56		
405.35	0.00	405.88	0.00	406.41	0.73		
405.36	0.00	405.89	0.00	406.42	0.92		
405.37	0.00	405.90	0.00	406.43	1.13		
405.38	0.00	405.91	0.00	406.44	1.34		
405.39	0.00	405.92	0.00	406.45	1.57		
405.40	0.00	405.93	0.00	406.46	1.82		
405.41	0.00	405.94	0.00	406.47	2.07		
405.42	0.00	405.95	0.00	406.48	2.33		
405.43	0.00	405.96	0.00	406.49	2.61		
405.44	0.00	405.97	0.00	406.50	2.89		
405.45	0.00	405.98	0.00	406.51	3.19		
405.46	0.00	405.99	0.00	406.52	3.49		
405.47	0.00	406.00	0.00	406.53	3.80		
405.48	0.00	406.01	0.00	406.54	4.12		
405.49	0.00	406.02	0.00	406.55	4.45		
405.50	0.00	406.03	0.00	406.56	4.80		
405.51	0.00	406.04	0.00	406.57	5.15		
405.52	0.00	406.05	0.00	406.58	5.52		

Stage-Area-Storage for Pond Pond 1e: Pond 1e

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
405.00	6,101	0
405.02	6,127	122
405.04	6,153	245
405.06	6,179	368
405.08	6,205	492
405.10	6,230	617
405.12	6,256	741
405.14	6,282	867
405.16	6,308	993
405.18	6,334	1,119
405.20	6,360	1,246
405.22	6,386	1,374
405.24	6,412	1,502
405.26	6,437	1,630
405.28	6,463	1,759
405.30	6,489	1,889
405.32	6,515	2,019
405.34	6,541	2,149
405.36	6,567	2,280
405.38	6,593	2,412
405.40	6,619	2,544
405.42	6,644	2,677
405.44	6,670	2,810
405.46	6,696	2,943
405.48	6,722	3,078
405.50	6,748	3,212
405.52	6,774	3,347
405.54	6,800	3,483
405.56	6,826	3,619
405.58	6,852	3,756
405.60	6,877	3,894
405.62	6,903	4,031
405.64	6,929	4,170
405.66	6,955	4,308
405.68	6,981	4,448
405.70	7,007	4,588
405.72	7,033	4,728
405.74	7,059	4,869
405.76	7,084	5,010
405.78	7,110	5,152
405.80	7,136	5,295
405.82	7,162	5,438
405.84	7,188	5,581
405.86	7,214	5,725
405.88	7,240	5,870
405.90	7,266	6,015
405.92	7,291	6,161
405.94	7,317	6,307
405.96	7,343	6,453
405.98	7,369	6,600
406.00	7,395	6,748
406.02	7,421	6,896
406.04	7,448	7,045
406.06	7,474	7,194
406.08	7,501	7,344
406.10	7,527	7,494
406.12	7,553	7,645
406.14	7,580	7,796
406.16	7,606	7,948
406.18	7,633	8,100
406.20	7,659	8,253
406.22	7,685	8,407
406.24	7,712	8,561
406.26	7,738	8,715
406.28	7,765	8,870
406.30	7,791	9,026
406.32	7,817	9,182
406.34	7,844	9,339
406.36	7,870	9,496
406.38	7,897	9,653
406.40	7,924	9,812
406.42	7,951	9,970
406.44	7,978	10,130
406.46	8,005	10,289
406.48	8,032	10,450
406.50	8,058	10,611
406.52	8,085	10,772
406.54	8,112	10,934
406.56	8,139	11,097
406.58	8,166	11,260
406.60	8,193	11,423
406.62	8,219	11,587
406.64	8,246	11,752
406.66	8,273	11,917
406.68	8,300	12,083
406.70	8,327	12,249
406.72	8,354	12,416
406.74	**8,381**	**12,583**

Summary for Pond Pond 3: Pond 3

Inflow Area = 4.790 ac, 0.00% Impervious, Inflow Depth > 2.47" for 25-yr event
Inflow = 10.32 cfs @ 12.24 hrs, Volume= 0.987 af
Outflow = 5.38 cfs @ 12.53 hrs, Volume= 0.819 af, Atten= 48%, Lag= 17.7 min
Primary = 5.38 cfs @ 12.53 hrs, Volume= 0.819 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 425.53' @ 12.53 hrs Surf.Area= 6,420 sf Storage= 13,211 cf

Plug-Flow detention time= 120.6 min calculated for 0.819 af (83% of inflow)
Center-of-Mass det. time= 45.9 min (911.5 - 865.6)

Volume	Invert	Avail.Storage	Storage Description
#1	423.00'	36,852 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

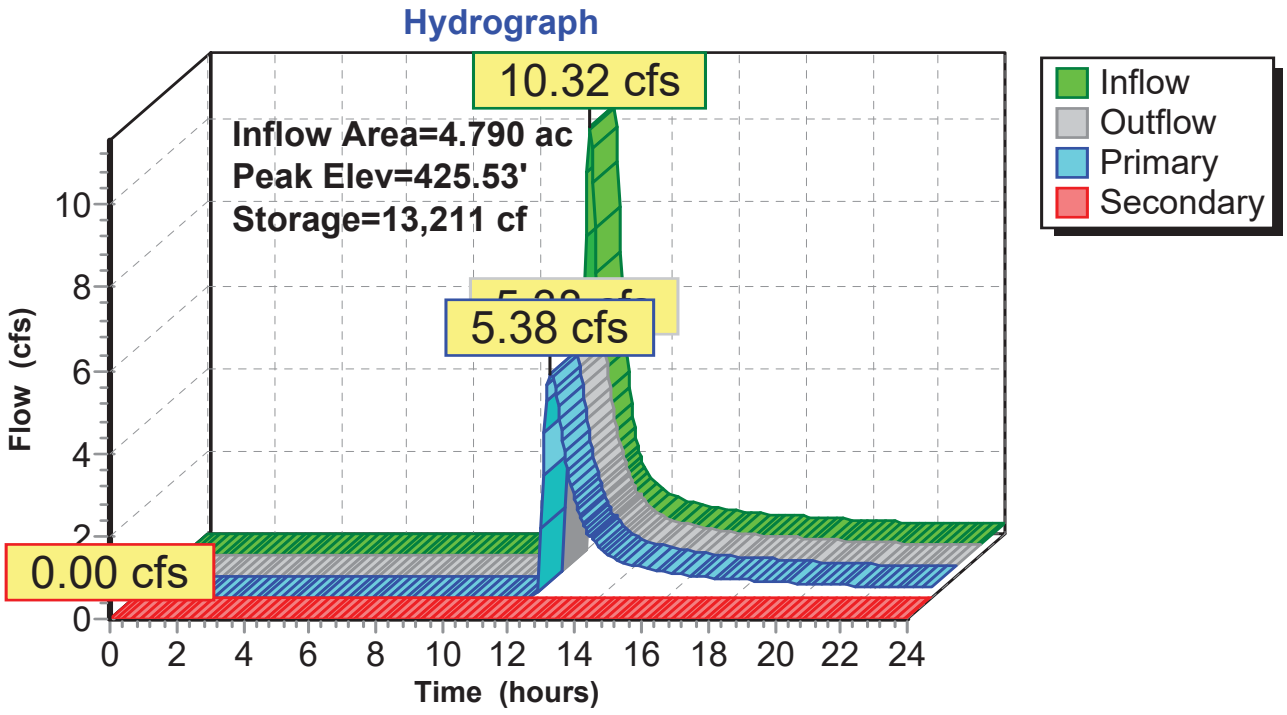
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
423.00	4,083	0	0
424.00	4,941	4,512	4,512
426.00	6,873	11,814	16,326
428.00	9,007	15,880	32,206
428.50	9,575	4,646	36,852

Device	Routing	Invert	Outlet Devices
#1	Primary	423.00'	**18.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 423.00' / 422.00' S= 0.0217 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	424.40'	**1.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height
#3	Device 1	427.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#4	Secondary	427.50'	**25.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=5.36 cfs @ 12.53 hrs HW=425.53' (Free Discharge)
└**1=Culvert** (Passes 5.36 cfs of 11.35 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Weir Controls 5.36 cfs @ 3.73 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=423.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 3: Pond 3



Stage-Discharge for Pond Pond 3: Pond 3

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
423.00	0.00	0.00	0.00
423.10	0.00	0.00	0.00
423.20	0.00	0.00	0.00
423.30	0.00	0.00	0.00
423.40	0.00	0.00	0.00
423.50	0.00	0.00	0.00
423.60	0.00	0.00	0.00
423.70	0.00	0.00	0.00
423.80	0.00	0.00	0.00
423.90	0.00	0.00	0.00
424.00	0.00	0.00	0.00
424.10	0.00	0.00	0.00
424.20	0.00	0.00	0.00
424.30	0.00	0.00	0.00
424.40	0.00	0.00	0.00
424.50	0.15	0.15	0.00
424.60	0.43	0.43	0.00
424.70	0.79	0.79	0.00
424.80	1.20	1.20	0.00
424.90	1.67	1.67	0.00
425.00	2.18	2.18	0.00
425.10	2.72	2.72	0.00
425.20	3.30	3.30	0.00
425.30	3.90	3.90	0.00
425.40	4.52	4.52	0.00
425.50	5.17	5.17	0.00
425.60	5.83	5.83	0.00
425.70	6.51	6.51	0.00
425.80	7.20	7.20	0.00
425.90	7.91	7.91	0.00
426.00	8.61	8.61	0.00
426.10	9.33	9.33	0.00
426.20	10.05	10.05	0.00
426.30	10.77	10.77	0.00
426.40	11.48	11.48	0.00
426.50	12.20	12.20	0.00
426.60	12.91	12.91	0.00
426.70	13.62	13.62	0.00
426.80	14.32	14.32	0.00
426.90	15.01	15.01	0.00
427.00	15.34	15.34	0.00
427.10	15.57	15.57	0.00
427.20	15.80	15.80	0.00
427.30	16.03	16.03	0.00
427.40	16.26	16.26	0.00
427.50	16.48	16.48	0.00
427.60	18.73	16.70	2.03
427.70	22.66	16.91	5.75
427.80	27.78	17.12	10.66
427.90	33.90	17.33	16.57
428.00	41.05	17.54	23.51
428.10	49.12	17.75	31.37
428.20	57.26	17.95	39.31
428.30	65.91	18.15	47.76
428.40	75.23	18.35	56.89
428.50	85.04	18.54	66.50
428.60	95.60	18.74	76.86
428.70	106.68	18.93	87.75
428.80	117.87	19.12	98.75
428.90	129.47	19.31	110.16
429.00	141.21	19.50	121.71
429.10	153.26	19.68	133.57
429.20	166.15	19.86	146.29
429.30	179.43	20.05	159.39
429.40	193.08	20.23	172.85
429.50	207.08	20.40	186.68
429.60	221.43	20.58	200.85
429.70	236.12	20.76	215.37
429.80	251.14	20.93	230.22
429.90	266.49	21.10	245.39
430.00	282.16	21.27	260.89
430.10	**298.14**	**21.44**	**276.70**

Stage-Area-Storage for Pond Pond 3: Pond 3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
423.00	4,083	0
423.10	4,169	413
423.20	4,255	834
423.30	4,340	1,264
423.40	4,426	1,702
423.50	4,512	2,149
423.60	4,598	2,604
423.70	4,684	3,068
423.80	4,769	3,541
423.90	4,855	4,022
424.00	4,941	4,512
424.10	5,038	5,011
424.20	5,134	5,520
424.30	5,231	6,038
424.40	5,327	6,566
424.50	5,424	7,103
424.60	5,521	7,650
424.70	5,617	8,207
424.80	5,714	8,774
424.90	5,810	9,350
425.00	5,907	9,936
425.10	6,004	10,532
425.20	6,100	11,137
425.30	6,197	11,752
425.40	6,293	12,376
425.50	6,390	13,010
425.60	6,487	13,654
425.70	6,583	14,308
425.80	6,680	14,971
425.90	6,776	15,644
426.00	6,873	16,326
426.10	6,980	17,019
426.20	7,086	17,722
426.30	7,193	18,436
426.40	7,300	19,161
426.50	7,407	19,896
426.60	7,513	20,642
426.70	7,620	21,399
426.80	7,727	22,166
426.90	7,833	22,944
427.00	7,940	23,733
427.10	8,047	24,532
427.20	8,153	25,342
427.30	8,260	26,163
427.40	8,367	26,994
427.50	8,474	27,836
427.60	8,580	28,689
427.70	8,687	29,552
427.80	8,794	30,426
427.90	8,900	31,311
428.00	9,007	32,206
428.10	9,121	33,112
428.20	9,234	34,030
428.30	9,348	34,959
428.40	9,461	35,900
428.50	**9,575**	**36,852**
428.60	9,575	36,852
428.70	9,575	36,852
428.80	9,575	36,852
428.90	9,575	36,852
429.00	9,575	36,852
429.10	9,575	36,852
429.20	9,575	36,852
429.30	9,575	36,852
429.40	9,575	36,852
429.50	9,575	36,852
429.60	9,575	36,852
429.70	9,575	36,852
429.80	9,575	36,852
429.90	9,575	36,852
430.00	9,575	36,852
430.10	9,575	36,852

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1a: P-1a Runoff Area=26.040 ac 0.35% Impervious Runoff Depth>4.65"
Flow Length=968' Tc=39.7 min CN=75 Runoff=87.64 cfs 10.083 af

Subcatchment P-1b: P-1b Runoff Area=16.720 ac 26.61% Impervious Runoff Depth>4.08"
Flow Length=786' Tc=43.2 min CN=70 Runoff=46.56 cfs 5.691 af

Subcatchment P-1c: P-1c Runoff Area=10.630 ac 0.56% Impervious Runoff Depth>3.44"
Flow Length=726' Tc=34.5 min CN=64 Runoff=28.67 cfs 3.046 af

Subcatchment P-1d: P-1d Runoff Area=6.230 ac 4.01% Impervious Runoff Depth>3.77"
Flow Length=766' Tc=33.1 min CN=67 Runoff=19.08 cfs 1.955 af

Subcatchment P-1e: P-1e Runoff Area=1.060 ac 65.09% Impervious Runoff Depth>5.83"
Tc=9.2 min CN=85 Runoff=9.18 cfs 0.515 af

Subcatchment P-2: P-2 Runoff Area=12.650 ac 0.00% Impervious Runoff Depth>3.83"
Flow Length=1,476' Tc=74.9 min CN=68 Runoff=22.20 cfs 4.036 af

Subcatchment P-3: P-3 Runoff Area=4.790 ac 0.00% Impervious Runoff Depth>3.12"
Flow Length=551' Tc=28.2 min CN=61 Runoff=13.25 cfs 1.247 af

Subcatchment P-4: P-4 Runoff Area=3.370 ac 0.00% Impervious Runoff Depth>4.76"
Flow Length=590' Tc=36.5 min CN=76 Runoff=12.32 cfs 1.338 af

Reach R-1: R-1 Avg. Flow Depth=0.68' Max Vel=4.84 fps Inflow=20.91 cfs 5.549 af
n=0.040 L=799.0' S=0.0388 '/' Capacity=41.87 cfs Outflow=20.90 cfs 5.531 af

Reach R-2: R-2 Avg. Flow Depth=2.59' Max Vel=2.59 fps Inflow=100.39 cfs 15.614 af
n=0.040 L=1,801.0' S=0.0036 '/' Capacity=23.64 cfs Outflow=88.51 cfs 15.421 af

Reach R-3: R-3 Avg. Flow Depth=5.27' Max Vel=1.51 fps Inflow=109.07 cfs 20.126 af
n=0.040 L=280.0' S=0.0011 '/' Capacity=12.88 cfs Outflow=108.08 cfs 20.065 af

Reach R-4: R-4 Avg. Flow Depth=5.67' Max Vel=1.40 fps Inflow=108.77 cfs 20.361 af
n=0.040 L=219.0' S=0.0009 '/' Capacity=11.89 cfs Outflow=108.01 cfs 20.309 af

Pond Pond 1b: Pond 1b Peak Elev=444.71' Storage=73,726 cf Inflow=46.56 cfs 5.691 af
Outflow=20.91 cfs 5.549 af

Pond Pond 1c: Pond 1c Peak Elev=412.62' Storage=27,080 cf Inflow=28.67 cfs 3.046 af
Primary=22.06 cfs 2.915 af Secondary=0.00 cfs 0.000 af Outflow=22.06 cfs 2.915 af

Pond Pond 1d: Pond 1d Peak Elev=411.31' Storage=42,539 cf Inflow=19.08 cfs 1.955 af
Primary=2.77 cfs 1.790 af Secondary=0.00 cfs 0.000 af Outflow=2.77 cfs 1.790 af

Pond Pond 1e: Pond 1e Peak Elev=406.56' Storage=11,124 cf Inflow=9.18 cfs 0.515 af
Outflow=4.89 cfs 0.296 af

Pond Pond 3: Pond 3 Peak Elev=425.89' Storage=15,575 cf Inflow=13.25 cfs 1.247 af
Primary=7.83 cfs 1.076 af Secondary=0.00 cfs 0.000 af Outflow=7.83 cfs 1.076 af

Summary for Subcatchment P-1a: P-1a

Runoff = 87.64 cfs @ 12.36 hrs, Volume= 10.083 af, Depth> 4.65"

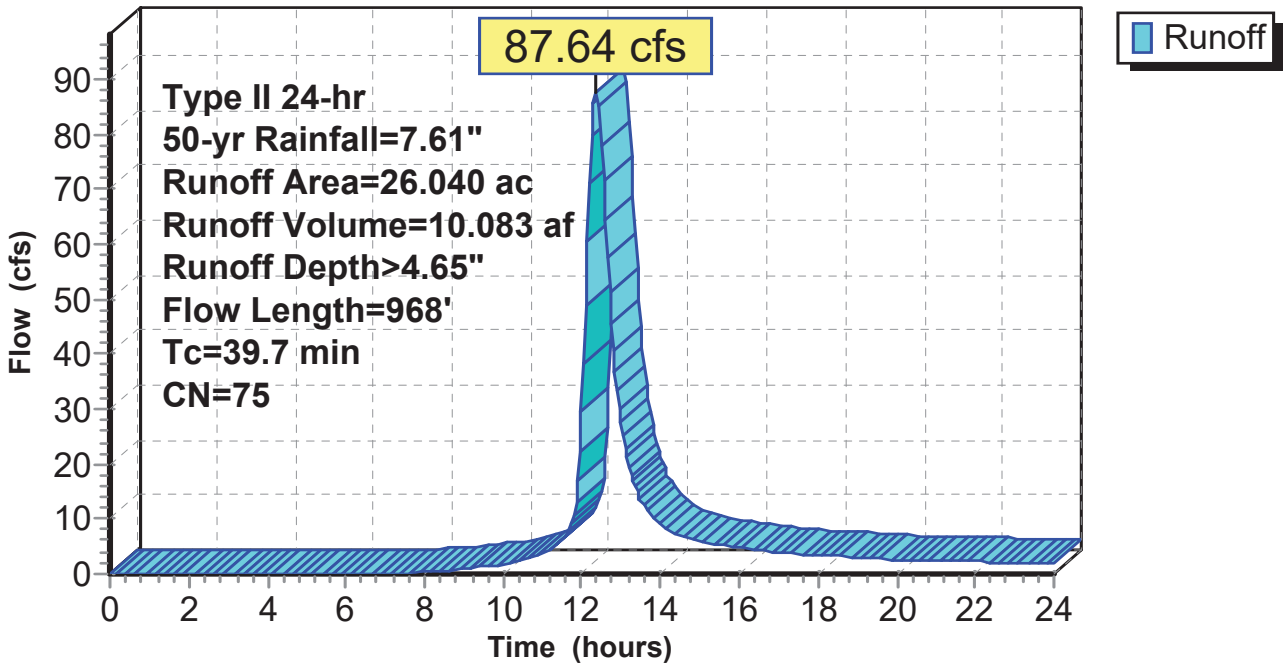
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=7.61"

Area (ac)	CN	Description
1.270	80	>75% Grass cover, Good, HSG D
3.830	61	>75% Grass cover, Good, HSG B
14.130	83	Woods, Poor, HSG D
6.720	66	Woods, Poor, HSG B
0.090	98	Paved parking, HSG B
26.040	75	Weighted Average
25.950		99.65% Pervious Area
0.090		0.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.0	150	0.0067	0.09		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
2.1	115	0.0170	0.91		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.1	262	0.0920	2.12		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
1.8	227	0.1850	2.15		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
4.7	214	0.0230	0.76		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
39.7	968	Total			

Subcatchment P-1a: P-1a

Hydrograph



Summary for Subcatchment P-1b: P-1b

Runoff = 46.56 cfs @ 12.41 hrs, Volume= 5.691 af, Depth> 4.08"

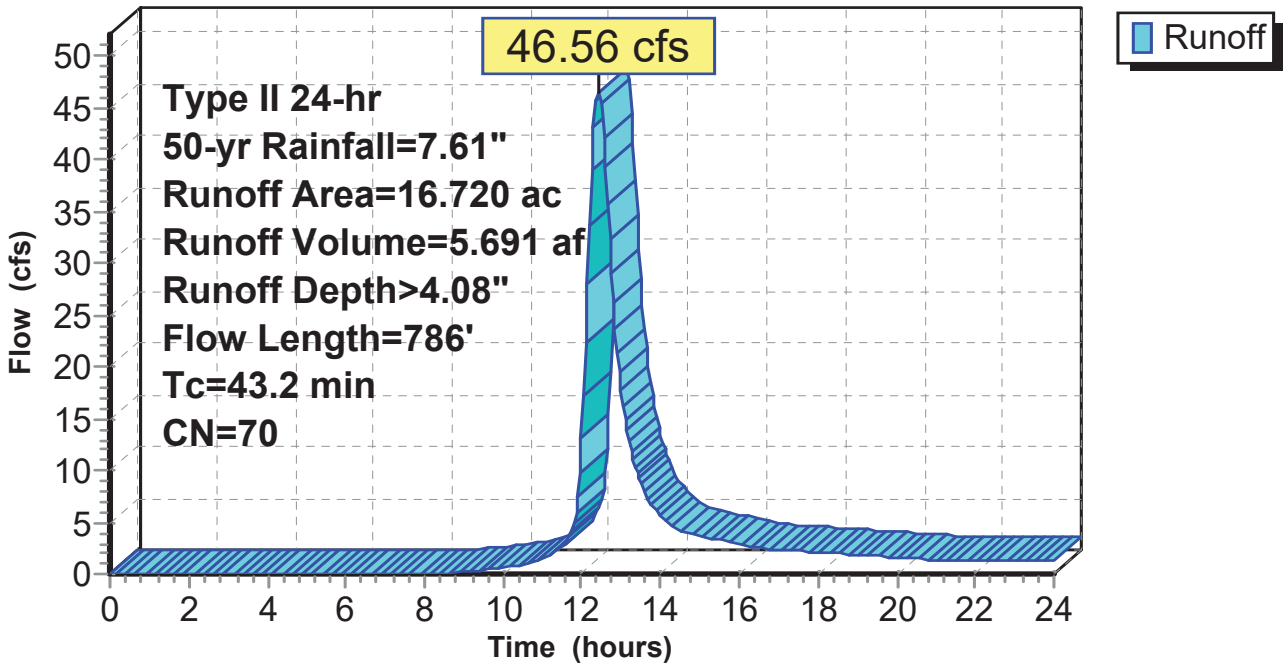
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=7.61"

Area (ac)	CN	Description
9.360	61	>75% Grass cover, Good, HSG B
4.450	98	Paved parking, HSG B
2.910	55	Woods, Good, HSG B
16.720	70	Weighted Average
12.270		73.39% Pervious Area
4.450		26.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.0	150	0.0030	0.06		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
1.4	57	0.0090	0.66		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.2	109	0.2290	7.70		**Shallow Concentrated Flow, CD** Unpaved Kv= 16.1 fps
0.8	164	0.0270	3.34		**Shallow Concentrated Flow, DE** Paved Kv= 20.3 fps
0.8	306	0.0120	6.51	11.51	**Pipe Channel, EF** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
43.2	786	Total			

Subcatchment P-1b: P-1b

Hydrograph



Summary for Subcatchment P-1c: P-1c

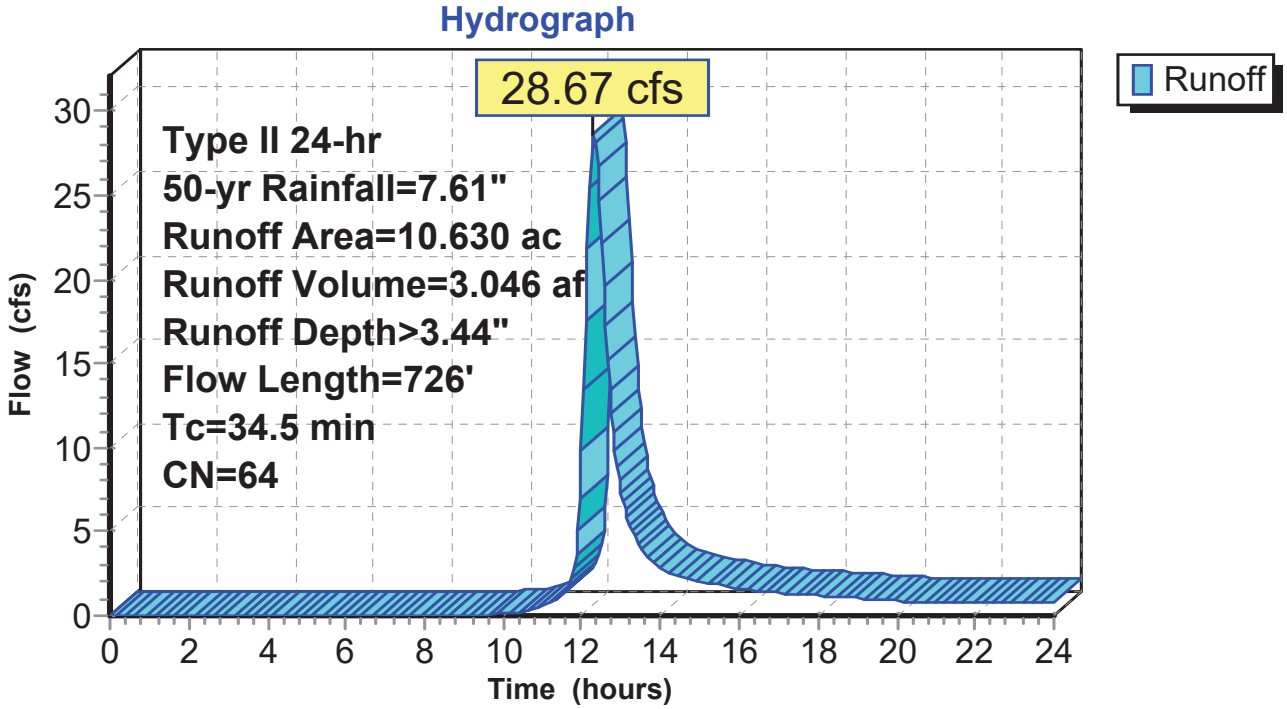
Runoff = 28.67 cfs @ 12.31 hrs, Volume= 3.046 af, Depth> 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=7.61"

Area (ac)	CN	Description
8.950	61	>75% Grass cover, Good, HSG B
1.620	80	>75% Grass cover, Good, HSG D
0.060	98	Paved parking, HSG D
10.630	64	Weighted Average
10.570		99.44% Pervious Area
0.060		0.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.7	150	0.0100	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
6.7	323	0.0130	0.80		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.8	201	0.0300	1.21		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.3	52	0.2300	3.36		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
34.5	726	Total			

Subcatchment P-1c: P-1c



Summary for Subcatchment P-1d: P-1d

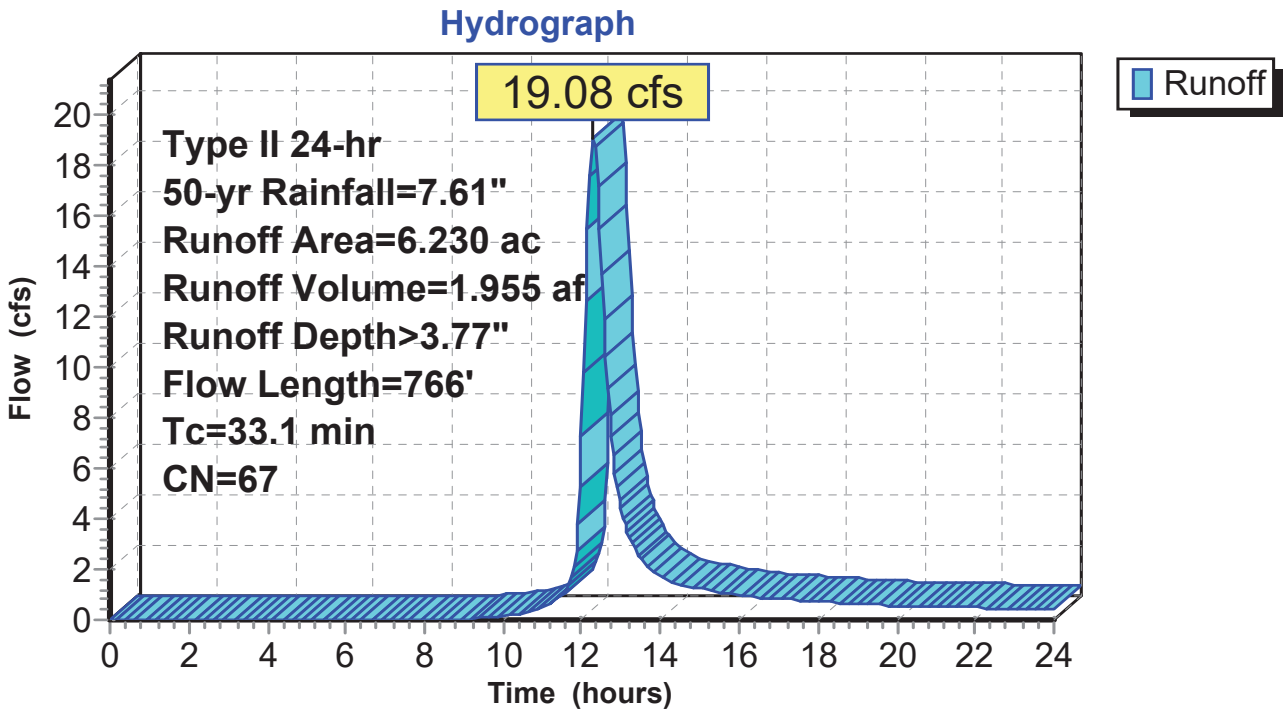
Runoff = 19.08 cfs @ 12.29 hrs, Volume= 1.955 af, Depth> 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=7.61"

Area (ac)	CN	Description
1.430	80	>75% Grass cover, Good, HSG D
4.550	61	>75% Grass cover, Good, HSG B
0.250	98	Paved parking, HSG B
6.230	67	Weighted Average
5.980		95.99% Pervious Area
0.250		4.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	150	0.0130	0.11		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.8	435	0.0140	0.83		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.1	181	0.0440	1.47		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
33.1	766	Total			

Subcatchment P-1d: P-1d



Summary for Subcatchment P-1e: P-1e

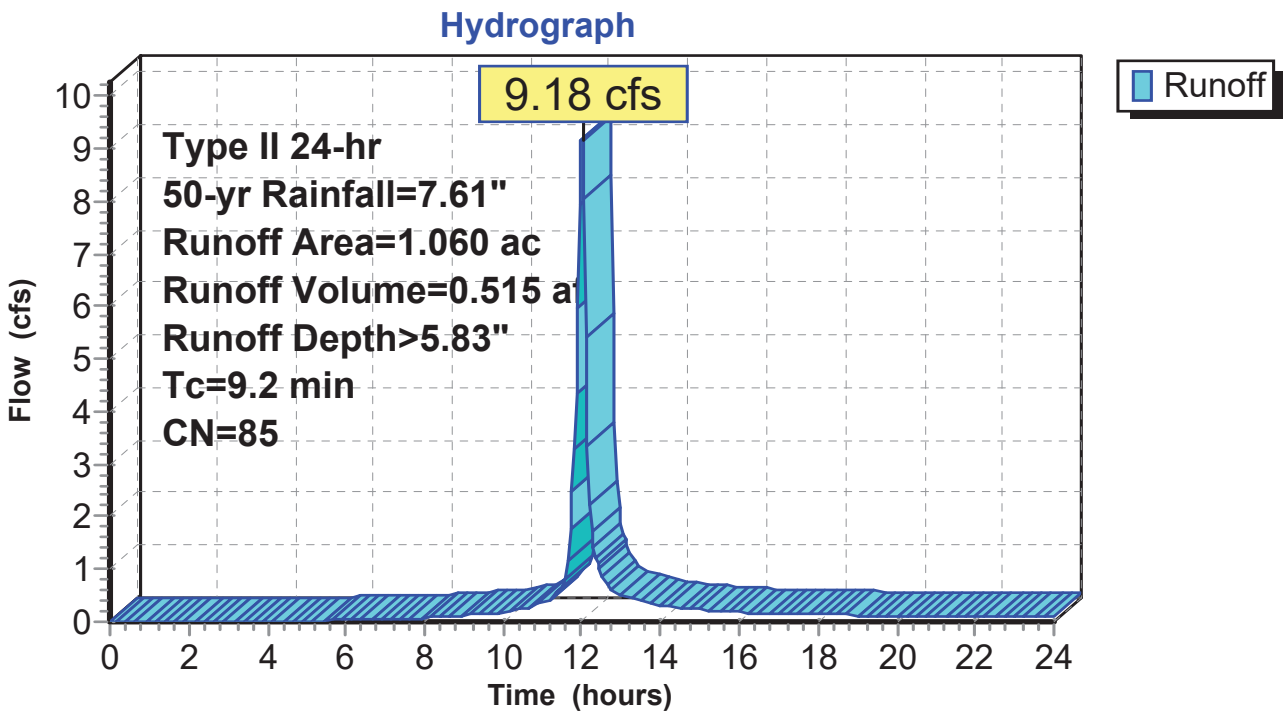
Runoff = 9.18 cfs @ 12.00 hrs, Volume= 0.515 af, Depth> 5.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=7.61"

Area (ac)	CN	Description
0.690	98	Paved parking, HSG B
0.370	61	>75% Grass cover, Good, HSG B
1.060	85	Weighted Average
0.370		34.91% Pervious Area
0.690		65.09% Impervious Area

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

Subcatchment P-1e: P-1e



Summary for Subcatchment P-2: P-2

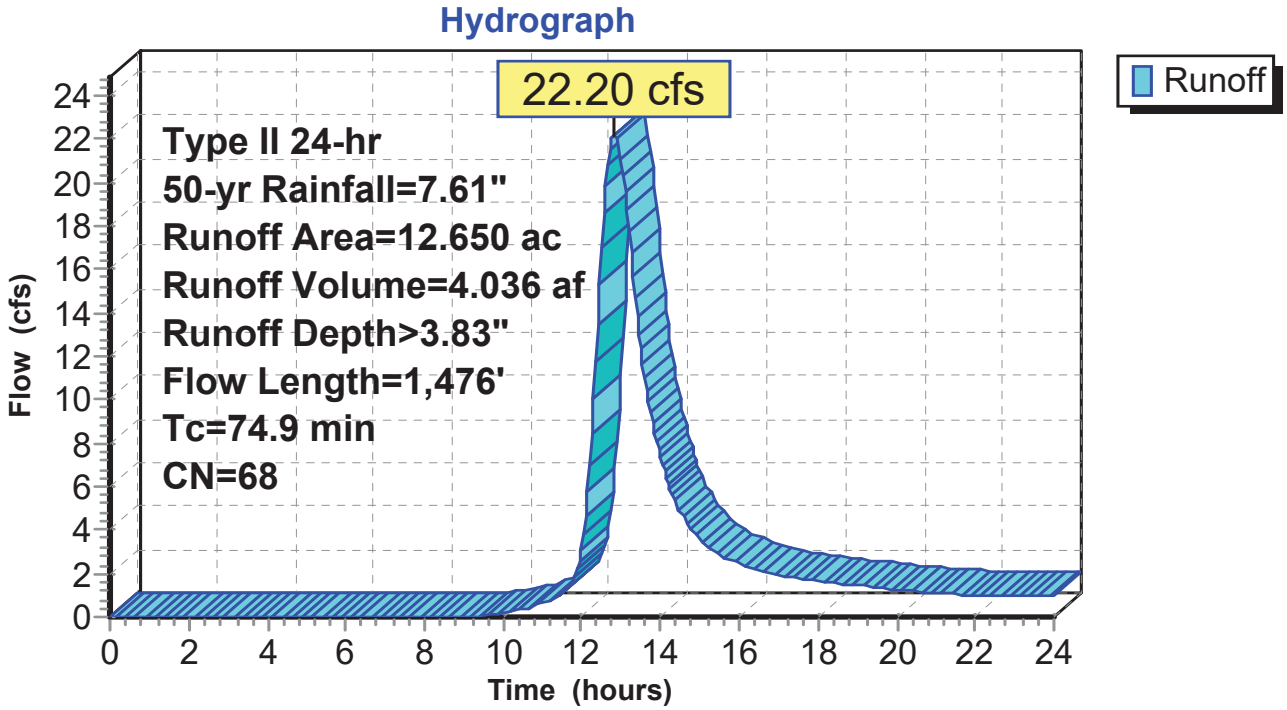
Runoff = 22.20 cfs @ 12.83 hrs, Volume= 4.036 af, Depth> 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=7.61"

Area (ac)	CN	Description
7.070	61	>75% Grass cover, Good, HSG B
2.000	66	Woods, Poor, HSG B
3.580	83	Woods, Poor, HSG D
12.650	68	Weighted Average
12.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	150	0.0087	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.6	362	0.0100	0.70		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.3	66	0.3330	4.04		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.8	68	0.0800	1.41		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
39.1	830	0.0050	0.35		**Shallow Concentrated Flow, EF** Woodland Kv= 5.0 fps
74.9	1,476	Total			

Subcatchment P-2: P-2



Summary for Subcatchment P-3: P-3

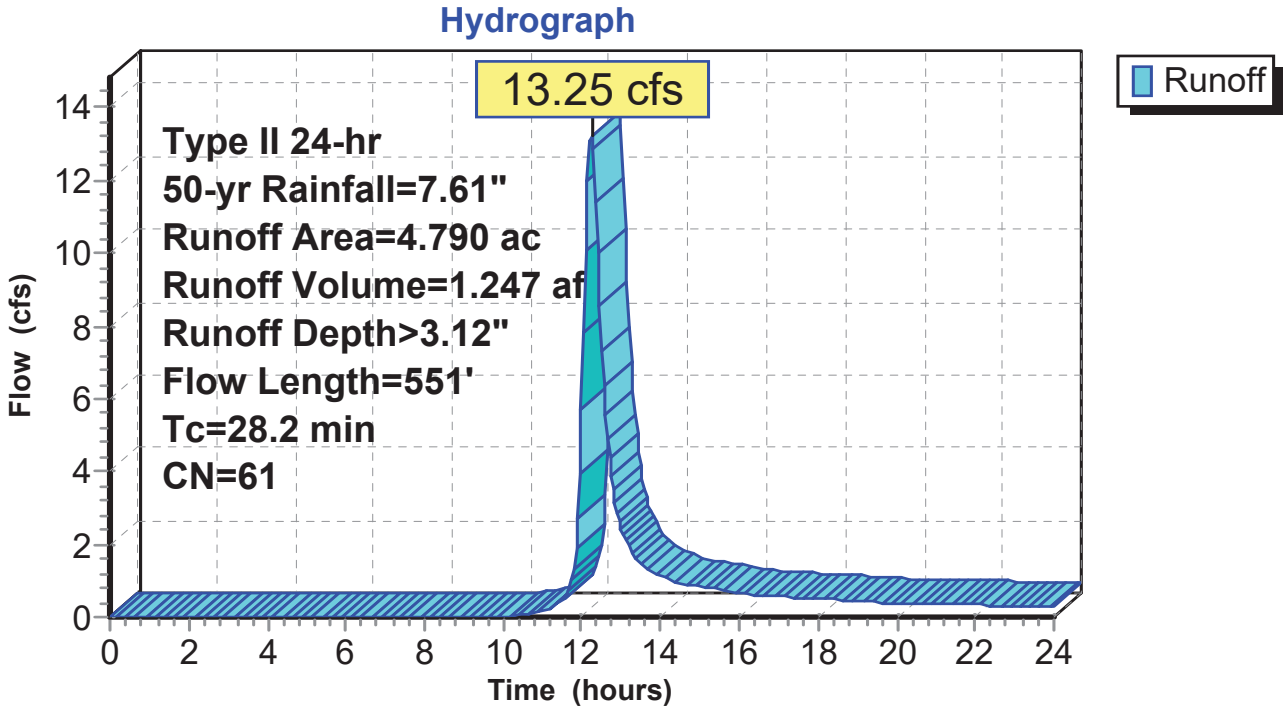
Runoff = 13.25 cfs @ 12.23 hrs, Volume= 1.247 af, Depth> 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=7.61"

Area (ac)	CN	Description
4.790	61	>75% Grass cover, Good, HSG B
4.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.5	150	0.0180	0.13		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.7	401	0.0120	0.77		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
28.2	551	Total			

Subcatchment P-3: P-3



Summary for Subcatchment P-4: P-4

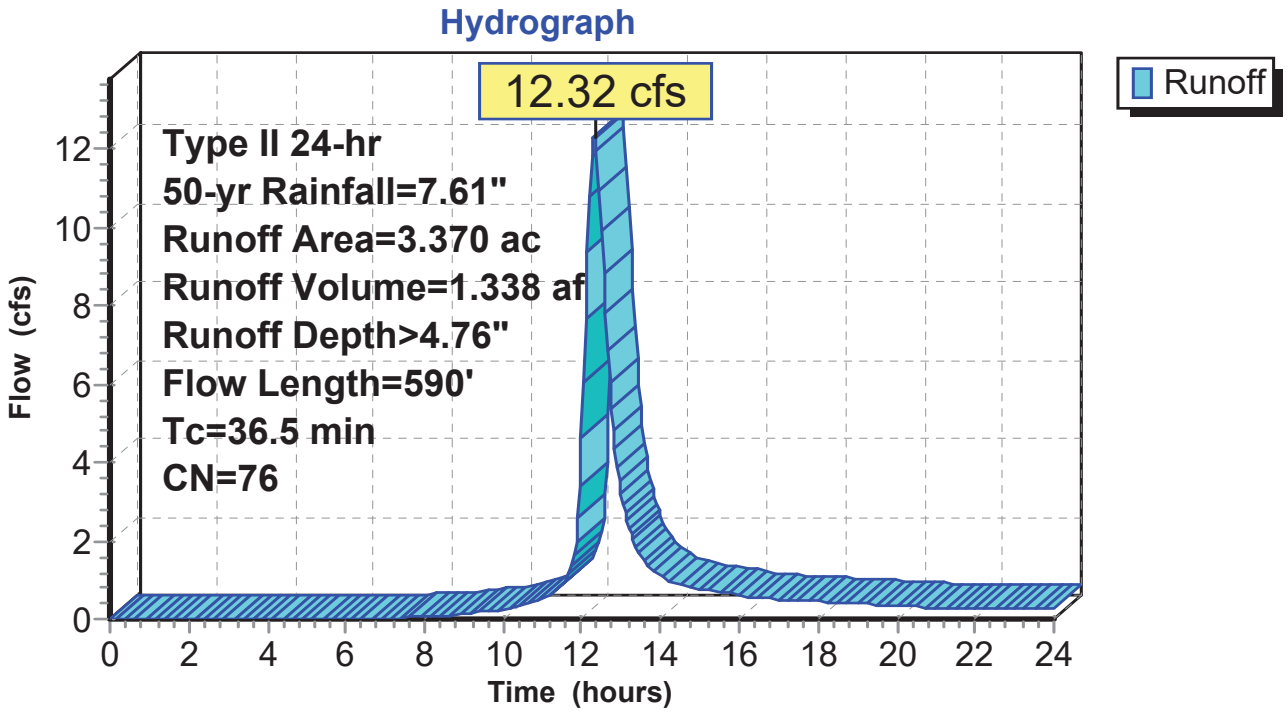
Runoff = 12.32 cfs @ 12.32 hrs, Volume= 1.338 af, Depth> 4.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=7.61"

Area (ac)	CN	Description
1.830	83	Woods, Poor, HSG D
1.140	66	Woods, Poor, HSG B
0.290	80	>75% Grass cover, Good, HSG D
0.110	61	>75% Grass cover, Good, HSG B
3.370	76	Weighted Average
3.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.6	150	0.0600	0.08		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
4.9	440	0.0890	1.49		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
36.5	590	Total			

Subcatchment P-4: P-4



Summary for Reach R-1: R-1

Inflow Area = 16.720 ac, 26.61% Impervious, Inflow Depth > 3.98" for 50-yr event
Inflow = 20.91 cfs @ 12.91 hrs, Volume= 5.549 af
Outflow = 20.90 cfs @ 12.99 hrs, Volume= 5.531 af, Atten= 0%, Lag= 4.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.84 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 2.49 fps, Avg. Travel Time= 5.3 min

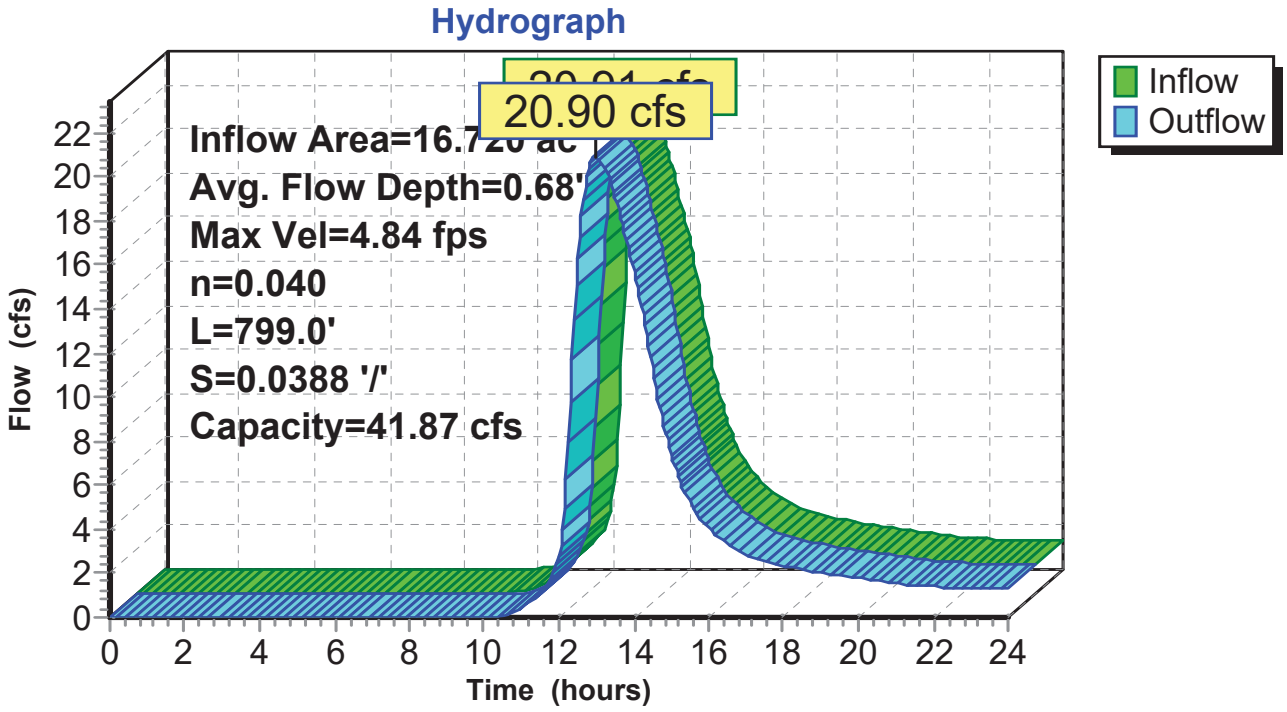
Peak Storage= 3,452 cf @ 12.95 hrs
Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 41.87 cfs

5.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 799.0' Slope= 0.0388 '/'
Inlet Invert= 441.00', Outlet Invert= 410.00'



‡

Reach R-1: R-1



Stage-Discharge for Reach R-1: R-1

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
441.00	0.00	0.00
441.01	0.34	0.02
441.02	0.54	0.05
441.03	0.70	0.11
441.04	0.84	0.17
441.05	0.98	0.25
441.06	1.10	0.34
441.07	1.22	0.44
441.08	1.32	0.55
441.09	1.43	0.67
441.10	1.53	0.79
441.11	1.62	0.93
441.12	1.72	1.08
441.13	1.81	1.23
441.14	1.89	1.40
441.15	1.97	1.57
441.16	2.06	1.75
441.17	2.14	1.94
441.18	2.21	2.13
441.19	2.29	2.34
441.20	2.36	2.55
441.21	2.43	2.77
441.22	2.50	3.00
441.23	2.57	3.23
441.24	2.64	3.47
441.25	2.70	3.72
441.26	2.77	3.98
441.27	2.83	4.24
441.28	2.90	4.51
441.29	2.96	4.79
441.30	3.02	5.07
441.31	3.08	5.36
441.32	3.14	5.66
441.33	3.19	5.97
441.34	3.25	6.28
441.35	3.31	6.60
441.36	3.36	6.92
441.37	3.42	7.26
441.38	3.47	7.60
441.39	3.52	7.94
441.40	3.58	8.30
441.41	3.63	8.66
441.42	3.68	9.03
441.43	3.73	9.40
441.44	3.78	9.78
441.45	3.83	10.17
441.46	3.88	10.56
441.47	3.93	10.96
441.48	3.97	11.37
441.49	4.02	11.78
441.50	4.07	12.21
441.51	4.11	12.63
441.52	4.16	13.07
441.53	4.21	13.51
441.54	4.25	13.96
441.55	4.30	14.41
441.56	4.34	14.87
441.57	4.38	15.34
441.58	4.43	15.82
441.59	4.47	16.30
441.60	4.51	16.78
441.61	4.55	17.28
441.62	4.60	17.78
441.63	4.64	18.29
441.64	4.68	18.80
441.65	4.72	19.32
441.66	4.76	19.85
441.67	4.80	20.39
441.68	4.84	20.93
441.69	4.88	21.48
441.70	4.92	22.03
441.71	4.96	22.60
441.72	5.00	23.16
441.73	5.03	23.74
441.74	5.07	24.32
441.75	5.11	24.91
441.76	5.15	25.51
441.77	5.18	26.11
441.78	5.22	26.72
441.79	5.26	27.34
441.80	5.30	27.96
441.81	5.33	28.59
441.82	5.37	29.22
441.83	5.40	29.87
441.84	5.44	30.52
441.85	5.47	31.18
441.86	5.51	31.84
441.87	5.54	32.51
441.88	5.58	33.19
441.89	5.61	33.87
441.90	5.65	34.57
441.91	5.68	35.27
441.92	5.72	35.97
441.93	5.75	36.68
441.94	5.78	37.40
441.95	5.82	38.13
441.96	5.85	38.86
441.97	5.88	39.60
441.98	5.92	40.35
441.99	5.95	41.11
442.00	**5.98**	**41.87**

Stage-Area-Storage for Reach R-1: R-1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
441.00	0.0	0
441.01	0.1	40
441.02	0.1	81
441.03	0.2	121
441.04	0.2	162
441.05	0.3	204
441.06	0.3	245
441.07	0.4	287
441.08	0.4	330
441.09	0.5	372
441.10	0.5	415
441.11	0.6	459
441.12	0.6	502
441.13	0.7	546
441.14	0.7	591
441.15	0.8	635
441.16	0.9	680
441.17	0.9	725
441.18	1.0	771
441.19	1.0	817
441.20	1.1	863
441.21	1.1	909
441.22	1.2	956
441.23	1.3	1,003
441.24	1.3	1,051
441.25	1.4	1,099
441.26	1.4	1,147
441.27	1.5	1,195
441.28	1.6	1,244
441.29	1.6	1,293
441.30	1.7	1,342
441.31	1.7	1,392
441.32	1.8	1,442
441.33	1.9	1,492
441.34	1.9	1,543
441.35	2.0	1,594
441.36	2.1	1,645
441.37	2.1	1,697
441.38	2.2	1,749
441.39	2.3	1,801
441.40	2.3	1,854
441.41	2.4	1,907
441.42	2.5	1,960
441.43	2.5	2,013
441.44	2.6	2,067
441.45	2.7	2,121
441.46	2.7	2,176
441.47	2.8	2,231
441.48	2.9	2,286
441.49	2.9	2,341
441.50	3.0	2,397
441.51	3.1	2,453
441.52	3.1	2,509
441.53	3.2	2,566
441.54	3.3	2,623
441.55	3.4	2,681
441.56	3.4	2,738
441.57	3.5	2,796
441.58	3.6	2,855
441.59	3.6	2,913
441.60	3.7	2,972
441.61	3.8	3,032
441.62	3.9	3,091
441.63	3.9	3,151
441.64	4.0	3,211
441.65	4.1	3,272
441.66	4.2	3,333
441.67	4.2	3,394
441.68	4.3	3,456
441.69	4.4	3,517
441.70	4.5	3,580
441.71	4.6	3,642
441.72	4.6	3,705
441.73	4.7	3,768
441.74	4.8	3,831
441.75	4.9	3,895
441.76	5.0	3,959
441.77	5.0	4,024
441.78	5.1	4,088
441.79	5.2	4,153
441.80	5.3	4,219
441.81	5.4	4,284
441.82	5.4	4,350
441.83	5.5	4,417
441.84	5.6	4,483
441.85	5.7	4,550
441.86	5.8	4,618
441.87	5.9	4,685
441.88	5.9	4,753
441.89	6.0	4,821
441.90	6.1	4,890
441.91	6.2	4,959
441.92	6.3	5,028
441.93	6.4	5,097
441.94	6.5	5,167
441.95	6.6	5,237
441.96	6.6	5,308
441.97	6.7	5,379
441.98	6.8	5,450
441.99	6.9	5,521
442.00	**7.0**	**5,593**

Summary for Reach R-2: R-2

Inflow Area = 42.760 ac, 10.62% Impervious, Inflow Depth > 4.38" for 50-yr event
Inflow = 100.39 cfs @ 12.39 hrs, Volume= 15.614 af
Outflow = 88.51 cfs @ 12.75 hrs, Volume= 15.421 af, Atten= 12%, Lag= 21.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.59 fps, Min. Travel Time= 11.6 min
Avg. Velocity = 1.17 fps, Avg. Travel Time= 25.6 min

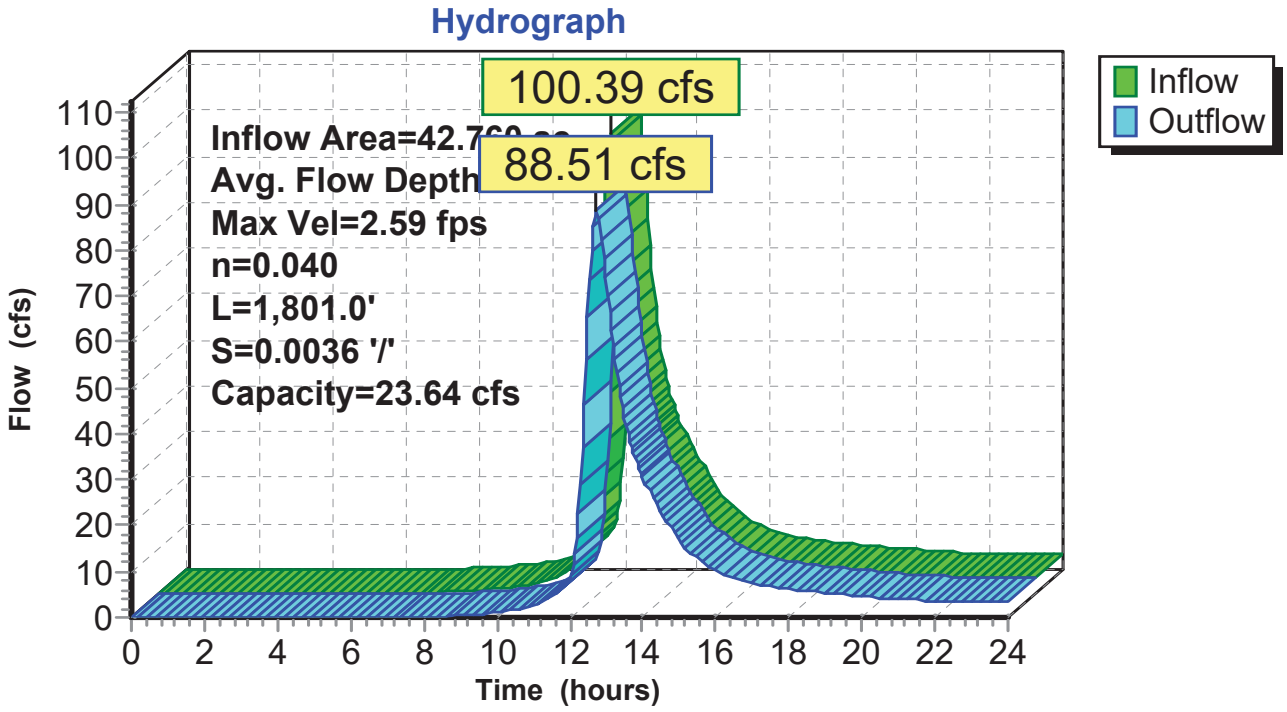
Peak Storage= 61,585 cf @ 12.55 hrs
Average Depth at Peak Storage= 2.59'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 23.64 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 1,801.0' Slope= 0.0036 '/'
Inlet Invert= 410.00', Outlet Invert= 403.50'



‡

Reach R-2: R-2



Stage-Discharge for Reach R-2: R-2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
410.00	0.00	0.00
410.01	0.10	0.01
410.02	0.16	0.03
410.03	0.21	0.06
410.04	0.26	0.10
410.05	0.30	0.15
410.06	0.34	0.21
410.07	0.37	0.27
410.08	0.41	0.33
410.09	0.44	0.40
410.10	0.47	0.48
410.11	0.50	0.57
410.12	0.53	0.65
410.13	0.56	0.75
410.14	0.59	0.85
410.15	0.62	0.95
410.16	0.64	1.06
410.17	0.67	1.17
410.18	0.69	1.29
410.19	0.72	1.41
410.20	0.74	1.54
410.21	0.76	1.67
410.22	0.79	1.81
410.23	0.81	1.95
410.24	0.83	2.09
410.25	0.85	2.24
410.26	0.87	2.39
410.27	0.89	2.55
410.28	0.92	2.71
410.29	0.94	2.87
410.30	0.96	3.04
410.31	0.98	3.21
410.32	1.00	3.39
410.33	1.01	3.57
410.34	1.03	3.75
410.35	1.05	3.94
410.36	1.07	4.13
410.37	1.09	4.33
410.38	1.11	4.53
410.39	1.13	4.73
410.40	1.14	4.94
410.41	1.16	5.15
410.42	1.18	5.36
410.43	1.19	5.58
410.44	1.21	5.80
410.45	1.23	6.03
410.46	1.24	6.25
410.47	1.26	6.49
410.48	1.28	6.72
410.49	1.29	6.96
410.50	1.31	7.20
410.51	1.33	7.45
410.52	1.34	7.70
410.53	1.36	7.95
410.54	1.37	8.21
410.55	1.39	8.47
410.56	1.40	8.73
410.57	1.42	9.00
410.58	1.43	9.27
410.59	1.45	9.54
410.60	1.46	9.82
410.61	1.48	10.10
410.62	1.49	10.38
410.63	1.50	10.67
410.64	1.52	10.96
410.65	1.53	11.26
410.66	1.55	11.55
410.67	1.56	11.86
410.68	1.57	12.16
410.69	1.59	12.47
410.70	1.60	12.78
410.71	1.61	13.09
410.72	1.63	13.41
410.73	1.64	13.73
410.74	1.65	14.06
410.75	1.67	14.38
410.76	1.68	14.71
410.77	1.69	15.05
410.78	1.71	15.39
410.79	1.72	15.73
410.80	1.73	16.07
410.81	1.74	16.42
410.82	1.76	16.77
410.83	1.77	17.12
410.84	1.78	17.48
410.85	1.79	17.84
410.86	1.81	18.20
410.87	1.82	18.57
410.88	1.83	18.94
410.89	1.84	19.31
410.90	1.85	19.69
410.91	1.87	20.07
410.92	1.88	20.45
410.93	1.89	20.84
410.94	1.90	21.23
410.95	1.91	21.62
410.96	1.92	22.02
410.97	1.94	22.42
410.98	1.95	22.82
410.99	1.96	23.23
411.00	**1.97**	**23.64**

Stage-Area-Storage for Reach R-2: R-2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
410.00	0.0	0
410.01	0.1	180
410.02	0.2	362
410.03	0.3	544
410.04	0.4	726
410.05	0.5	910
410.06	0.6	1,094
410.07	0.7	1,278
410.08	0.8	1,464
410.09	0.9	1,650
410.10	1.0	1,837
410.11	1.1	2,025
410.12	1.2	2,213
410.13	1.3	2,402
410.14	1.4	2,592
410.15	1.5	2,783
410.16	1.7	2,974
410.17	1.8	3,166
410.18	1.9	3,359
410.19	2.0	3,552
410.20	2.1	3,746
410.21	2.2	3,941
410.22	2.3	4,137
410.23	2.4	4,333
410.24	2.5	4,530
410.25	2.6	4,728
410.26	2.7	4,926
410.27	2.8	5,125
410.28	3.0	5,325
410.29	3.1	5,526
410.30	3.2	5,727
410.31	3.3	5,929
410.32	3.4	6,132
410.33	3.5	6,336
410.34	3.6	6,540
410.35	3.7	6,745
410.36	3.9	6,950
410.37	4.0	7,157
410.38	4.1	7,364
410.39	4.2	7,572
410.40	4.3	7,780
410.41	4.4	7,990
410.42	4.6	8,200
410.43	4.7	8,410
410.44	4.8	8,622
410.45	4.9	8,834
410.46	5.0	9,047
410.47	5.1	9,260
410.48	5.3	9,475
410.49	5.4	9,690
410.50	5.5	9,906
410.51	5.6	10,122
410.52	5.7	10,339
410.53	5.9	10,557
410.54	6.0	10,776
410.55	6.1	10,995
410.56	6.2	11,215
410.57	6.3	11,436
410.58	6.5	11,658
410.59	6.6	11,880
410.60	6.7	12,103
410.61	6.8	12,326
410.62	7.0	12,551
410.63	7.1	12,776
410.64	7.2	13,002
410.65	7.3	13,228
410.66	7.5	13,456
410.67	7.6	13,684
410.68	7.7	13,912
410.69	7.9	14,142
410.70	8.0	14,372
410.71	8.1	14,603
410.72	8.2	14,834
410.73	8.4	15,067
410.74	8.5	15,300
410.75	8.6	15,534
410.76	8.8	15,768
410.77	8.9	16,003
410.78	9.0	16,239
410.79	9.1	16,476
410.80	9.3	16,713
410.81	9.4	16,951
410.82	9.5	17,190
410.83	9.7	17,430
410.84	9.8	17,670
410.85	9.9	17,911
410.86	10.1	18,153
410.87	10.2	18,395
410.88	10.3	18,638
410.89	10.5	18,882
410.90	10.6	19,127
410.91	10.8	19,372
410.92	10.9	19,618
410.93	11.0	19,865
410.94	11.2	20,112
410.95	11.3	20,360
410.96	11.4	20,609
410.97	11.6	20,859
410.98	11.7	21,109
410.99	11.9	21,360
411.00	**12.0**	**21,612**

Summary for Reach R-3: R-3

Inflow Area = 59.620 ac, 8.13% Impervious, Inflow Depth > 4.05" for 50-yr event
Inflow = 109.07 cfs @ 12.71 hrs, Volume= 20.126 af
Outflow = 108.08 cfs @ 12.82 hrs, Volume= 20.065 af, Atten= 1%, Lag= 6.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.51 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.84 fps, Avg. Travel Time= 5.5 min

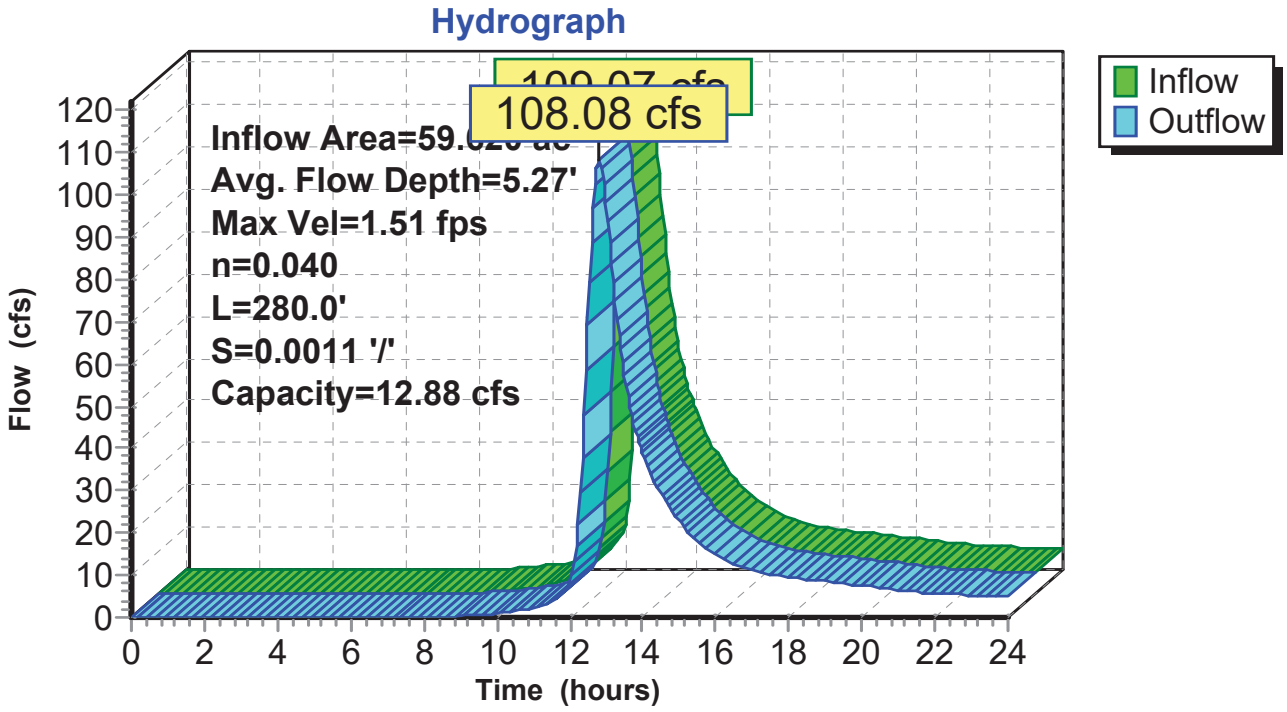
Peak Storage= 20,076 cf @ 12.77 hrs
Average Depth at Peak Storage= 5.27'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 12.88 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 280.0' Slope= 0.0011 '/'
Inlet Invert= 403.50', Outlet Invert= 403.20'



‡

Reach R-3: R-3



Stage-Discharge for Reach R-3: R-3

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
403.50	0.00	0.00
403.51	0.06	0.01
403.52	0.09	0.02
403.53	0.12	0.04
403.54	0.14	0.06
403.55	0.16	0.08
403.56	0.18	0.11
403.57	0.20	0.14
403.58	0.22	0.18
403.59	0.24	0.22
403.60	0.26	0.26
403.61	0.27	0.31
403.62	0.29	0.36
403.63	0.31	0.41
403.64	0.32	0.46
403.65	0.34	0.52
403.66	0.35	0.58
403.67	0.36	0.64
403.68	0.38	0.70
403.69	0.39	0.77
403.70	0.40	0.84
403.71	0.42	0.91
403.72	0.43	0.98
403.73	0.44	1.06
403.74	0.45	1.14
403.75	0.46	1.22
403.76	0.48	1.30
403.77	0.49	1.39
403.78	0.50	1.48
403.79	0.51	1.56
403.80	0.52	1.66
403.81	0.53	1.75
403.82	0.54	1.85
403.83	0.55	1.94
403.84	0.56	2.05
403.85	0.57	2.15
403.86	0.58	2.25
403.87	0.59	2.36
403.88	0.60	2.47
403.89	0.61	2.58
403.90	0.62	2.69
403.91	0.63	2.80
403.92	0.64	2.92
403.93	0.65	3.04
403.94	0.66	3.16
403.95	0.67	3.28
403.96	0.68	3.41
403.97	0.69	3.53
403.98	0.70	3.66
403.99	0.70	3.79
404.00	0.71	3.92
404.01	0.72	4.06
404.02	0.73	4.19
404.03	0.74	4.33
404.04	0.75	4.47
404.05	0.76	4.61
404.06	0.76	4.76
404.07	0.77	4.90
404.08	0.78	5.05
404.09	0.79	5.20
404.10	0.80	5.35
404.11	0.80	5.50
404.12	0.81	5.66
404.13	0.82	5.81
404.14	0.83	5.97
404.15	0.84	6.13
404.16	0.84	6.30
404.17	0.85	6.46
404.18	0.86	6.63
404.19	0.87	6.79
404.20	0.87	6.96
404.21	0.88	7.13
404.22	0.89	7.31
404.23	0.89	7.48
404.24	0.90	7.66
404.25	0.91	7.84
404.26	0.92	8.02
404.27	0.92	8.20
404.28	0.93	8.38
404.29	0.94	8.57
404.30	0.94	8.76
404.31	0.95	8.95
404.32	0.96	9.14
404.33	0.96	9.33
404.34	0.97	9.52
404.35	0.98	9.72
404.36	0.98	9.92
404.37	0.99	10.12
404.38	1.00	10.32
404.39	1.00	10.52
404.40	1.01	10.73
404.41	1.02	10.94
404.42	1.02	11.14
404.43	1.03	11.36
404.44	1.04	11.57
404.45	1.04	11.78
404.46	1.05	12.00
404.47	1.05	12.22
404.48	1.06	12.43
404.49	1.07	12.66
404.50	**1.07**	**12.88**

Stage-Area-Storage for Reach R-3: R-3

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
403.50	0.0	0
403.51	0.1	28
403.52	0.2	56
403.53	0.3	85
403.54	0.4	113
403.55	0.5	141
403.56	0.6	170
403.57	0.7	199
403.58	0.8	228
403.59	0.9	257
403.60	1.0	286
403.61	1.1	315
403.62	1.2	344
403.63	1.3	373
403.64	1.4	403
403.65	1.5	433
403.66	1.7	462
403.67	1.8	492
403.68	1.9	522
403.69	2.0	552
403.70	2.1	582
403.71	2.2	613
403.72	2.3	643
403.73	2.4	674
403.74	2.5	704
403.75	2.6	735
403.76	2.7	766
403.77	2.8	797
403.78	3.0	828
403.79	3.1	859
403.80	3.2	890
403.81	3.3	922
403.82	3.4	953
403.83	3.5	985
403.84	3.6	1,017
403.85	3.7	1,049
403.86	3.9	1,081
403.87	4.0	1,113
403.88	4.1	1,145
403.89	4.2	1,177
403.90	4.3	1,210
403.91	4.4	1,242
403.92	4.6	1,275
403.93	4.7	1,308
403.94	4.8	1,340
403.95	4.9	1,373
403.96	5.0	1,406
403.97	5.1	1,440
403.98	5.3	1,473
403.99	5.4	1,506
404.00	5.5	1,540
404.01	5.6	1,574
404.02	5.7	1,607
404.03	5.9	1,641
404.04	6.0	1,675
404.05	6.1	1,709
404.06	6.2	1,744
404.07	6.3	1,778
404.08	6.5	1,812
404.09	6.6	1,847
404.10	6.7	1,882
404.11	6.8	1,916
404.12	7.0	1,951
404.13	7.1	1,986
404.14	7.2	2,021
404.15	7.3	2,057
404.16	7.5	2,092
404.17	7.6	2,127
404.18	7.7	2,163
404.19	7.9	2,199
404.20	8.0	2,234
404.21	8.1	2,270
404.22	8.2	2,306
404.23	8.4	2,342
404.24	8.5	2,379
404.25	8.6	2,415
404.26	8.8	2,451
404.27	8.9	2,488
404.28	9.0	2,525
404.29	9.1	2,561
404.30	9.3	2,598
404.31	9.4	2,635
404.32	9.5	2,673
404.33	9.7	2,710
404.34	9.8	2,747
404.35	9.9	2,785
404.36	10.1	2,822
404.37	10.2	2,860
404.38	10.3	2,898
404.39	10.5	2,936
404.40	10.6	2,974
404.41	10.8	3,012
404.42	10.9	3,050
404.43	11.0	3,088
404.44	11.2	3,127
404.45	11.3	3,165
404.46	11.4	3,204
404.47	11.6	3,243
404.48	11.7	3,282
404.49	11.9	3,321
404.50	**12.0**	**3,360**

Summary for Reach R-4: R-4

Inflow Area = 60.680 ac, 9.13% Impervious, Inflow Depth > 4.03" for 50-yr event
Inflow = 108.77 cfs @ 12.82 hrs, Volume= 20.361 af
Outflow = 108.01 cfs @ 12.90 hrs, Volume= 20.309 af, Atten= 1%, Lag= 5.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.40 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 0.80 fps, Avg. Travel Time= 4.5 min

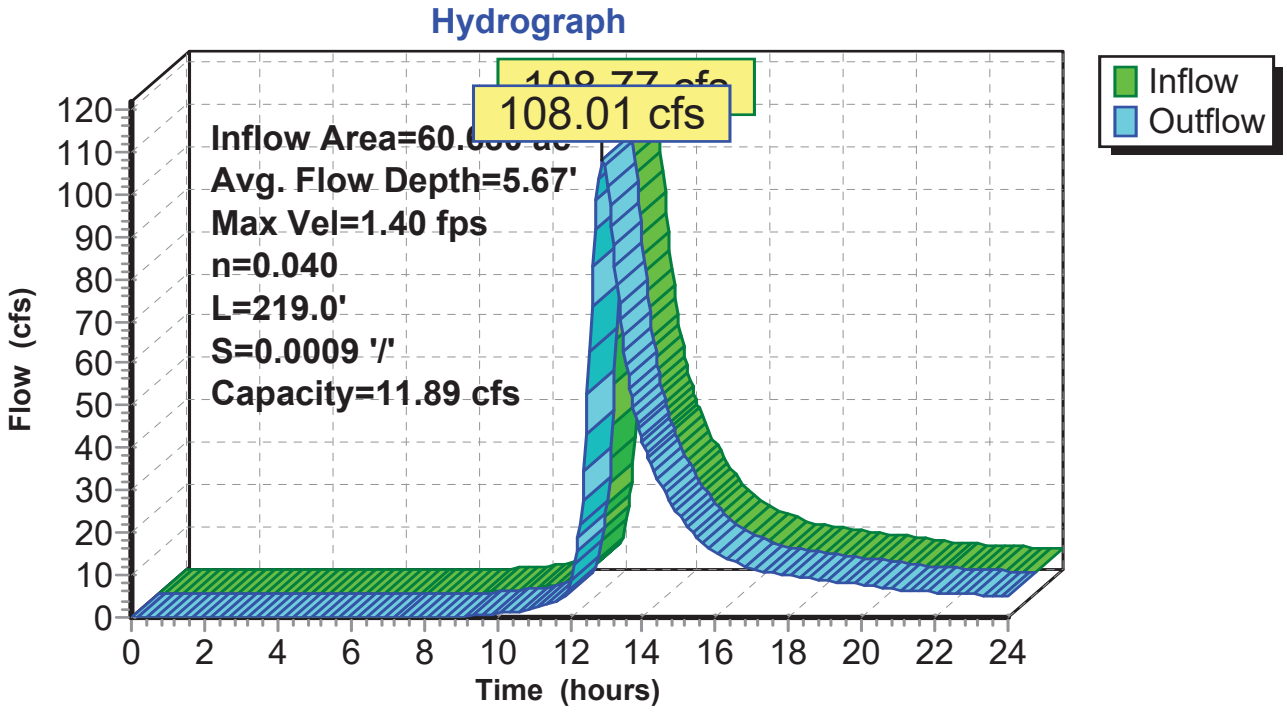
Peak Storage= 16,936 cf @ 12.86 hrs
Average Depth at Peak Storage= 5.67'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 11.89 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 219.0' Slope= 0.0009 '/'
Inlet Invert= 403.20', Outlet Invert= 403.00'



‡

Reach R-4: R-4



Stage-Discharge for Reach R-4: R-4

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
403.20	0.00	0.00
403.21	0.05	0.01
403.22	0.08	0.02
403.23	0.11	0.03
403.24	0.13	0.05
403.25	0.15	0.08
403.26	0.17	0.10
403.27	0.19	0.13
403.28	0.21	0.17
403.29	0.22	0.20
403.30	0.24	0.24
403.31	0.25	0.28
403.32	0.27	0.33
403.33	0.28	0.38
403.34	0.30	0.43
403.35	0.31	0.48
403.36	0.32	0.53
403.37	0.34	0.59
403.38	0.35	0.65
403.39	0.36	0.71
403.40	0.37	0.77
403.41	0.38	0.84
403.42	0.40	0.91
403.43	0.41	0.98
403.44	0.42	1.05
403.45	0.43	1.13
403.46	0.44	1.20
403.47	0.45	1.28
403.48	0.46	1.36
403.49	0.47	1.44
403.50	0.48	1.53
403.51	0.49	1.62
403.52	0.50	1.70
403.53	0.51	1.80
403.54	0.52	1.89
403.55	0.53	1.98
403.56	0.54	2.08
403.57	0.55	2.18
403.58	0.56	2.28
403.59	0.57	2.38
403.60	0.57	2.48
403.61	0.58	2.59
403.62	0.59	2.70
403.63	0.60	2.81
403.64	0.61	2.92
403.65	0.62	3.03
403.66	0.63	3.15
403.67	0.63	3.26
403.68	0.64	3.38
403.69	0.65	3.50
403.70	0.66	3.62
403.71	0.67	3.75
403.72	0.67	3.87
403.73	0.68	4.00
403.74	0.69	4.13
403.75	0.70	4.26
403.76	0.71	4.39
403.77	0.71	4.53
403.78	0.72	4.66
403.79	0.73	4.80
403.80	0.74	4.94
403.81	0.74	5.08
403.82	0.75	5.22
403.83	0.76	5.37
403.84	0.76	5.51
403.85	0.77	5.66
403.86	0.78	5.81
403.87	0.78	5.96
403.88	0.79	6.12
403.89	0.80	6.27
403.90	0.81	6.43
403.91	0.81	6.59
403.92	0.82	6.75
403.93	0.83	6.91
403.94	0.83	7.07
403.95	0.84	7.24
403.96	0.85	7.40
403.97	0.85	7.57
403.98	0.86	7.74
403.99	0.86	7.91
404.00	0.87	8.08
404.01	0.88	8.26
404.02	0.88	8.43
404.03	0.89	8.61
404.04	0.90	8.79
404.05	0.90	8.97
404.06	0.91	9.16
404.07	0.91	9.34
404.08	0.92	9.53
404.09	0.93	9.72
404.10	0.93	9.91
404.11	0.94	10.10
404.12	0.94	10.29
404.13	0.95	10.48
404.14	0.96	10.68
404.15	0.96	10.88
404.16	0.97	11.08
404.17	0.97	11.28
404.18	0.98	11.48
404.19	0.99	11.68
404.20	**0.99**	**11.89**

Stage-Area-Storage for Reach R-4: R-4

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
403.20	0.0	0
403.21	0.1	22
403.22	0.2	44
403.23	0.3	66
403.24	0.4	88
403.25	0.5	111
403.26	0.6	133
403.27	0.7	155
403.28	0.8	178
403.29	0.9	201
403.30	1.0	223
403.31	1.1	246
403.32	1.2	269
403.33	1.3	292
403.34	1.4	315
403.35	1.5	338
403.36	1.7	362
403.37	1.8	385
403.38	1.9	408
403.39	2.0	432
403.40	2.1	456
403.41	2.2	479
403.42	2.3	503
403.43	2.4	527
403.44	2.5	551
403.45	2.6	575
403.46	2.7	599
403.47	2.8	623
403.48	3.0	648
403.49	3.1	672
403.50	3.2	696
403.51	3.3	721
403.52	3.4	746
403.53	3.5	770
403.54	3.6	795
403.55	3.7	820
403.56	3.9	845
403.57	4.0	870
403.58	4.1	895
403.59	4.2	921
403.60	4.3	946
403.61	4.4	972
403.62	4.6	997
403.63	4.7	1,023
403.64	4.8	1,048
403.65	4.9	1,074
403.66	5.0	1,100
403.67	5.1	1,126
403.68	5.3	1,152
403.69	5.4	1,178
403.70	5.5	1,205
403.71	5.6	1,231
403.72	5.7	1,257
403.73	5.9	1,284
403.74	6.0	1,310
403.75	6.1	1,337
403.76	6.2	1,364
403.77	6.3	1,391
403.78	6.5	1,418
403.79	6.6	1,445
403.80	6.7	1,472
403.81	6.8	1,499
403.82	7.0	1,526
403.83	7.1	1,554
403.84	7.2	1,581
403.85	7.3	1,609
403.86	7.5	1,636
403.87	7.6	1,664
403.88	7.7	1,692
403.89	7.9	1,720
403.90	8.0	1,748
403.91	8.1	1,776
403.92	8.2	1,804
403.93	8.4	1,832
403.94	8.5	1,860
403.95	8.6	1,889
403.96	8.8	1,917
403.97	8.9	1,946
403.98	9.0	1,975
403.99	9.1	2,003
404.00	9.3	2,032
404.01	9.4	2,061
404.02	9.5	2,090
404.03	9.7	2,119
404.04	9.8	2,149
404.05	9.9	2,178
404.06	10.1	2,207
404.07	10.2	2,237
404.08	10.3	2,266
404.09	10.5	2,296
404.10	10.6	2,326
404.11	10.8	2,356
404.12	10.9	2,386
404.13	11.0	2,416
404.14	11.2	2,446
404.15	11.3	2,476
404.16	11.4	2,506
404.17	11.6	2,536
404.18	11.7	2,567
404.19	11.9	2,597
404.20	**12.0**	**2,628**

Summary for Pond Pond 1b: Pond 1b

Inflow Area = 16.720 ac, 26.61% Impervious, Inflow Depth > 4.08" for 50-yr event
Inflow = 46.56 cfs @ 12.41 hrs, Volume= 5.691 af
Outflow = 20.91 cfs @ 12.91 hrs, Volume= 5.549 af, Atten= 55%, Lag= 30.2 min
Primary = 20.91 cfs @ 12.91 hrs, Volume= 5.549 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 444.71' @ 12.91 hrs Surf.Area= 35,992 sf Storage= 73,726 cf

Plug-Flow detention time= 54.8 min calculated for 5.549 af (97% of inflow)
Center-of-Mass det. time= 40.8 min (892.3 - 851.5)

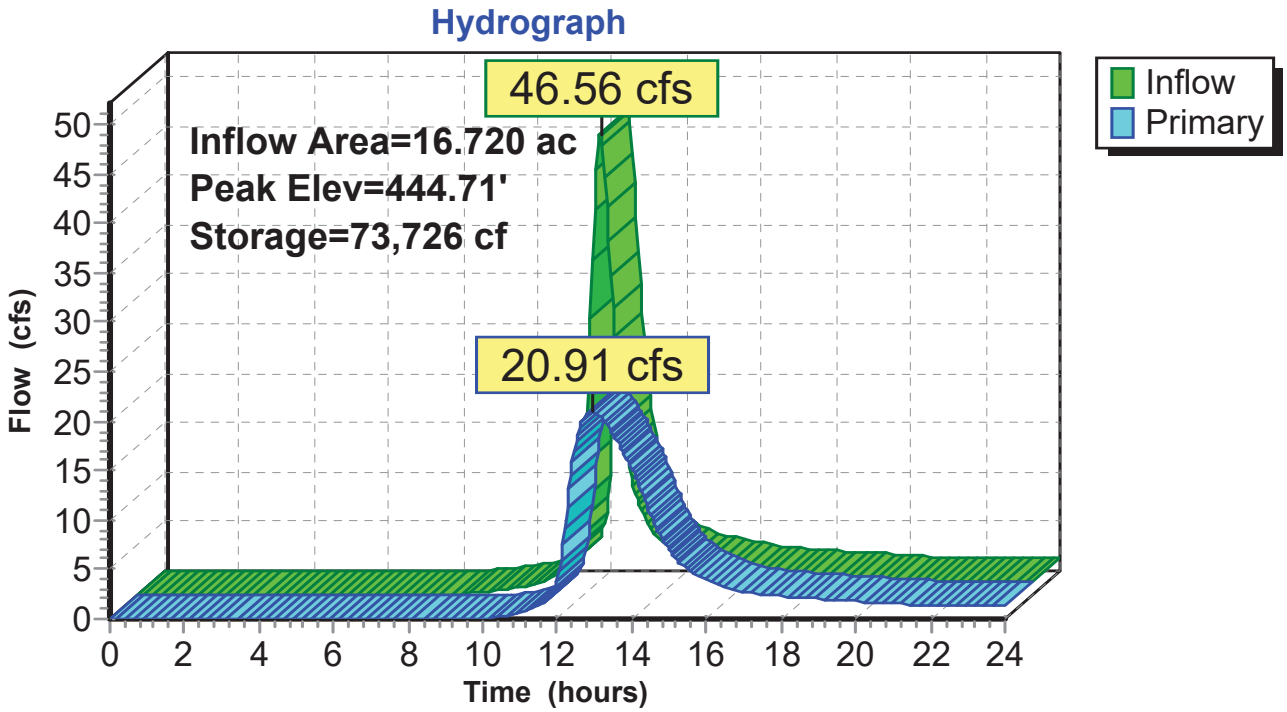
Volume	Invert	Avail.Storage	Storage Description
#1	441.50'	141,234 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
441.50	1,192	0	0
442.00	10,772	2,991	2,991
444.00	34,794	45,566	48,557
446.00	38,163	72,957	121,514
446.50	40,718	19,720	141,234

Device	Routing	Invert	Outlet Devices
#1	Primary	441.80'	**24.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	441.60'	**25.6 deg x 2.0' long x 4.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.64 (C= 3.30)
#3	Device 1	445.23'	**52.0" W x 64.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	446.40'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=20.91 cfs @ 12.91 hrs HW=444.71' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 20.91 cfs @ 6.65 fps)
  ├**2=Sharp-Crested Vee/Trap Weir** (Passes 20.91 cfs of 46.37 cfs potential flow)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond Pond 1b: Pond 1b



Stage-Discharge for Pond Pond 1b: Pond 1b

Elevation (feet)	Primary (cfs)
441.50	0.00
441.60	0.00
441.70	0.00
441.80	0.00
441.90	0.06
442.00	0.25
442.10	0.55
442.20	0.96
442.30	1.48
442.40	2.09
442.50	2.79
442.60	3.57
442.70	4.43
442.80	5.35
442.90	6.32
443.00	7.34
443.10	8.39
443.20	9.46
443.30	10.54
443.40	11.60
443.50	12.63
443.60	13.60
443.70	14.47
443.80	15.13
443.90	15.87
444.00	16.57
444.10	17.25
444.20	17.90
444.30	18.53
444.40	19.13
444.50	19.72
444.60	20.29
444.70	20.85
444.80	21.39
444.90	21.92
445.00	22.44
445.10	22.94
445.20	23.43
445.30	23.92
445.40	24.39
445.50	24.86
445.60	25.31
445.70	25.76
445.80	26.20
445.90	26.63
446.00	27.06
446.10	27.48
446.20	27.89
446.30	28.30
446.40	28.70
446.50	29.10
446.60	29.49
446.70	29.87
446.80	30.25
446.90	30.63
447.00	31.00
447.10	31.37
447.20	31.73
447.30	32.09
447.40	32.44
447.50	32.79
447.60	33.14
447.70	33.48
447.80	33.82
447.90	34.16
448.00	34.49
448.10	34.82
448.20	35.15
448.30	35.48
448.40	35.80
448.50	36.11
448.60	36.43
448.70	36.74
448.80	37.05
448.90	37.36
449.00	37.67
449.10	37.97
449.20	38.27
449.30	38.57
449.40	38.86
449.50	39.15
449.60	39.45
449.70	39.73
449.80	40.02
449.90	40.31
450.00	40.59
450.10	40.87
450.20	41.15
450.30	41.43
450.40	41.70
450.50	**41.97**

Stage-Area-Storage for Pond Pond 1b: Pond 1b

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
441.50	1,192	0
441.60	3,108	215
441.70	5,024	622
441.80	6,940	1,220
441.90	8,856	2,010
442.00	10,772	2,991
442.10	11,973	4,128
442.20	13,174	5,386
442.30	14,375	6,763
442.40	15,576	8,261
442.50	16,778	9,878
442.60	17,979	11,616
442.70	19,180	13,474
442.80	20,381	15,452
442.90	21,582	17,550
443.00	22,783	19,769
443.10	23,984	22,107
443.20	25,185	24,565
443.30	26,386	27,144
443.40	27,587	29,843
443.50	28,789	32,661
443.60	29,990	35,600
443.70	31,191	38,659
443.80	32,392	41,838
443.90	33,593	45,138
444.00	34,794	48,557
444.10	34,962	52,045
444.20	35,131	55,549
444.30	35,299	59,071
444.40	35,468	62,609
444.50	35,636	66,165
444.60	35,805	69,737
444.70	35,973	73,326
444.80	36,142	76,931
444.90	36,310	80,554
445.00	36,479	84,193
445.10	36,647	87,850
445.20	36,815	91,523
445.30	36,984	95,213
445.40	37,152	98,919
445.50	37,321	102,643
445.60	37,489	106,384
445.70	37,658	110,141
445.80	37,826	113,915
445.90	37,995	117,706
446.00	38,163	121,514
446.10	38,674	125,356
446.20	39,185	129,249
446.30	39,696	133,193
446.40	40,207	137,188
446.50	**40,718**	**141,234**
446.60	40,718	141,234
446.70	40,718	141,234
446.80	40,718	141,234
446.90	40,718	141,234
447.00	40,718	141,234
447.10	40,718	141,234
447.20	40,718	141,234
447.30	40,718	141,234
447.40	40,718	141,234
447.50	40,718	141,234
447.60	40,718	141,234
447.70	40,718	141,234
447.80	40,718	141,234
447.90	40,718	141,234
448.00	40,718	141,234
448.10	40,718	141,234
448.20	40,718	141,234
448.30	40,718	141,234
448.40	40,718	141,234
448.50	40,718	141,234
448.60	40,718	141,234
448.70	40,718	141,234
448.80	40,718	141,234
448.90	40,718	141,234
449.00	40,718	141,234
449.10	40,718	141,234
449.20	40,718	141,234
449.30	40,718	141,234
449.40	40,718	141,234
449.50	40,718	141,234
449.60	40,718	141,234
449.70	40,718	141,234
449.80	40,718	141,234
449.90	40,718	141,234
450.00	40,718	141,234
450.10	40,718	141,234
450.20	40,718	141,234
450.30	40,718	141,234
450.40	40,718	141,234
450.50	40,718	141,234

Summary for Pond Pond 1c: Pond 1c

Inflow Area = 10.630 ac, 0.56% Impervious, Inflow Depth > 3.44" for 50-yr event
Inflow = 28.67 cfs @ 12.31 hrs, Volume= 3.046 af
Outflow = 22.06 cfs @ 12.50 hrs, Volume= 2.915 af, Atten= 23%, Lag= 11.8 min
Primary = 22.06 cfs @ 12.50 hrs, Volume= 2.915 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 412.62' @ 12.50 hrs Surf.Area= 9,468 sf Storage= 27,080 cf

Plug-Flow detention time= 53.6 min calculated for 2.909 af (95% of inflow)
Center-of-Mass det. time= 30.5 min (887.7 - 857.3)

Volume	Invert	Avail.Storage	Storage Description
#1	409.00'	53,054 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

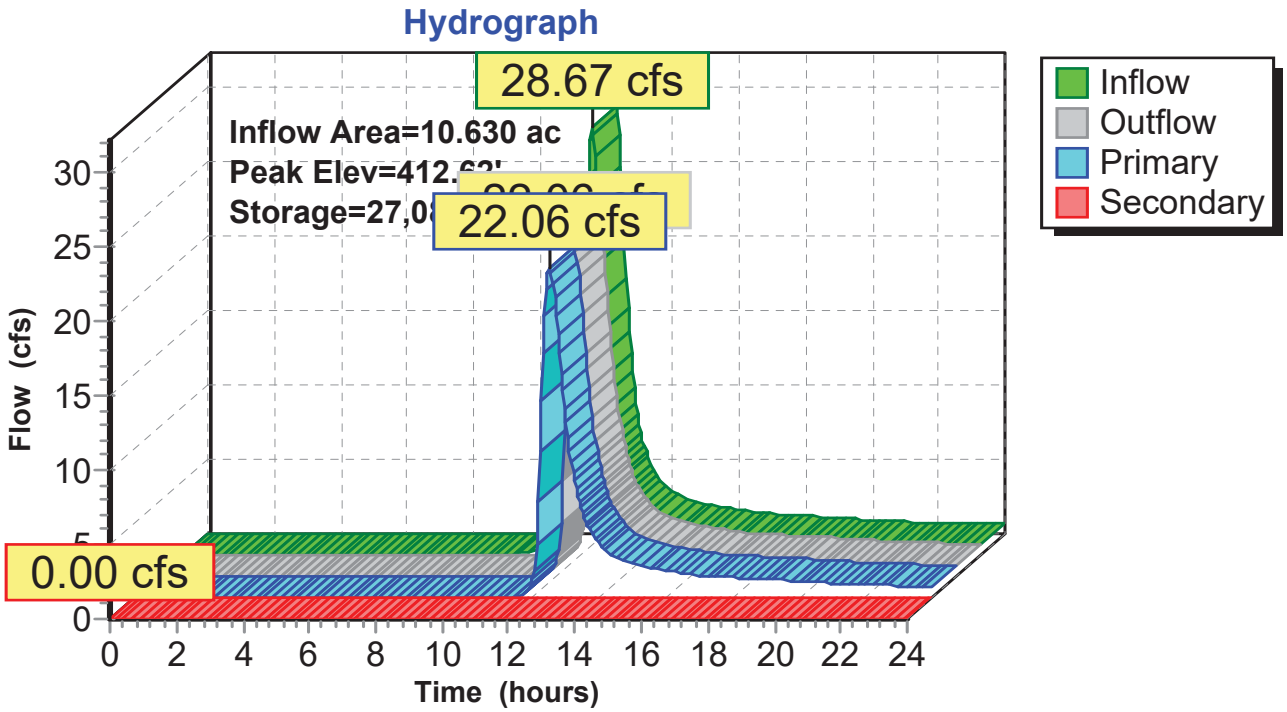
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
409.00	5,642	0	0
410.00	6,603	6,123	6,123
412.00	8,732	15,335	21,458
414.00	11,115	19,847	41,305
415.00	12,383	11,749	53,054

Device	Routing	Invert	Outlet Devices
#1	Primary	408.00'	**24.0" Round Culvert** L= 62.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 408.00' / 407.30' S= 0.0113 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Device 1	409.40'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	410.40'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height
#4	Device 1	413.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#5	Secondary	414.00'	**20.0' long x 14.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=22.04 cfs @ 12.50 hrs HW=412.62' (Free Discharge)
└**1=Culvert** (Passes 22.04 cfs of 28.76 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 2.85 cfs @ 8.17 fps)
  ├**3=Sharp-Crested Rectangular Weir** (Weir Controls 19.19 cfs @ 5.56 fps)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=409.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 1c: Pond 1c



Stage-Discharge for Pond Pond 1c: Pond 1c

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
409.00	0.00	0.00	0.00
409.10	0.00	0.00	0.00
409.20	0.00	0.00	0.00
409.30	0.00	0.00	0.00
409.40	0.00	0.00	0.00
409.50	0.04	0.04	0.00
409.60	0.13	0.13	0.00
409.70	0.28	0.28	0.00
409.80	0.47	0.47	0.00
409.90	0.68	0.68	0.00
410.00	0.87	0.87	0.00
410.10	1.02	1.02	0.00
410.20	1.15	1.15	0.00
410.30	1.27	1.27	0.00
410.40	1.37	1.37	0.00
410.50	1.68	1.68	0.00
410.60	2.15	2.15	0.00
410.70	2.72	2.72	0.00
410.80	3.37	3.37	0.00
410.90	4.08	4.08	0.00
411.00	4.86	4.86	0.00
411.10	5.69	5.69	0.00
411.20	6.56	6.56	0.00
411.30	7.48	7.48	0.00
411.40	8.43	8.43	0.00
411.50	9.42	9.42	0.00
411.60	10.45	10.45	0.00
411.70	11.50	11.50	0.00
411.80	12.57	12.57	0.00
411.90	13.67	13.67	0.00
412.00	14.79	14.79	0.00
412.10	15.93	15.93	0.00
412.20	17.09	17.09	0.00
412.30	18.26	18.26	0.00
412.40	19.45	19.45	0.00
412.50	20.64	20.64	0.00
412.60	21.85	21.85	0.00
412.70	23.06	23.06	0.00
412.80	24.28	24.28	0.00
412.90	25.50	25.50	0.00
413.00	26.72	26.72	0.00
413.10	28.12	28.12	0.00
413.20	29.66	29.66	0.00
413.30	31.28	31.28	0.00
413.40	31.73	31.73	0.00
413.50	32.09	32.09	0.00
413.60	32.44	32.44	0.00
413.70	32.79	32.79	0.00
413.80	33.14	33.14	0.00
413.90	33.48	33.48	0.00
414.00	33.82	33.82	0.00
414.10	35.83	34.16	1.67
414.20	39.22	34.49	4.72
414.30	43.55	34.82	8.73
414.40	48.66	35.15	13.51
414.50	54.46	35.48	18.99
414.60	60.89	35.80	25.10
414.70	67.45	36.11	31.33
414.80	74.35	36.43	37.92
414.90	81.91	36.74	45.17
415.00	89.85	37.05	52.80
415.10	98.39	37.36	61.03
415.20	107.34	37.67	69.67
415.30	116.53	37.97	78.56
415.40	126.06	38.27	87.79
415.50	135.57	38.57	97.00
415.60	145.32	38.86	106.45
415.70	155.74	39.15	116.59
415.80	166.47	39.45	127.03
415.90	177.49	39.73	137.76
416.00	188.80	40.02	148.78
416.10	**200.38**	**40.31**	**160.07**

Stage-Area-Storage for Pond Pond 1c: Pond 1c

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
409.00	5,642	0
409.10	5,738	569
409.20	5,834	1,148
409.30	5,930	1,736
409.40	6,026	2,334
409.50	6,123	2,941
409.60	6,219	3,558
409.70	6,315	4,185
409.80	6,411	4,821
409.90	6,507	5,467
410.00	6,603	6,123
410.10	6,709	6,788
410.20	6,816	7,464
410.30	6,922	8,151
410.40	7,029	8,849
410.50	7,135	9,557
410.60	7,242	10,276
410.70	7,348	11,005
410.80	7,455	11,746
410.90	7,561	12,496
411.00	7,668	13,258
411.10	7,774	14,030
411.20	7,880	14,813
411.30	7,987	15,606
411.40	8,093	16,410
411.50	8,200	17,225
411.60	8,306	18,050
411.70	8,413	18,886
411.80	8,519	19,732
411.90	8,626	20,590
412.00	8,732	21,458
412.10	8,851	22,337
412.20	8,970	23,228
412.30	9,089	24,131
412.40	9,209	25,046
412.50	9,328	25,972
412.60	9,447	26,911
412.70	9,566	27,862
412.80	9,685	28,824
412.90	9,804	29,799
413.00	9,924	30,785
413.10	10,043	31,784
413.20	10,162	32,794
413.30	10,281	33,816
413.40	10,400	34,850
413.50	10,519	35,896
413.60	10,638	36,954
413.70	10,758	38,024
413.80	10,877	39,105
413.90	10,996	40,199
414.00	11,115	41,305
414.10	11,242	42,422
414.20	11,369	43,553
414.30	11,495	44,696
414.40	11,622	45,852
414.50	11,749	47,021
414.60	11,876	48,202
414.70	12,003	49,396
414.80	12,129	50,602
414.90	12,256	51,822
415.00	**12,383**	**53,054**
415.10	12,383	53,054
415.20	12,383	53,054
415.30	12,383	53,054
415.40	12,383	53,054
415.50	12,383	53,054
415.60	12,383	53,054
415.70	12,383	53,054
415.80	12,383	53,054
415.90	12,383	53,054
416.00	12,383	53,054
416.10	12,383	53,054

Summary for Pond Pond 1d: Pond 1d

Inflow Area = 6.230 ac, 4.01% Impervious, Inflow Depth > 3.77" for 50-yr event
Inflow = 19.08 cfs @ 12.29 hrs, Volume= 1.955 af
Outflow = 2.77 cfs @ 13.35 hrs, Volume= 1.790 af, Atten= 85%, Lag= 63.9 min
Primary = 2.77 cfs @ 13.35 hrs, Volume= 1.790 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 411.31' @ 13.35 hrs Surf.Area= 21,678 sf Storage= 42,539 cf

Plug-Flow detention time= 211.8 min calculated for 1.790 af (92% of inflow)
Center-of-Mass det. time= 169.3 min (1,019.2 - 850.0)

Volume	Invert	Avail.Storage	Storage Description
#1	408.00'	209,097 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

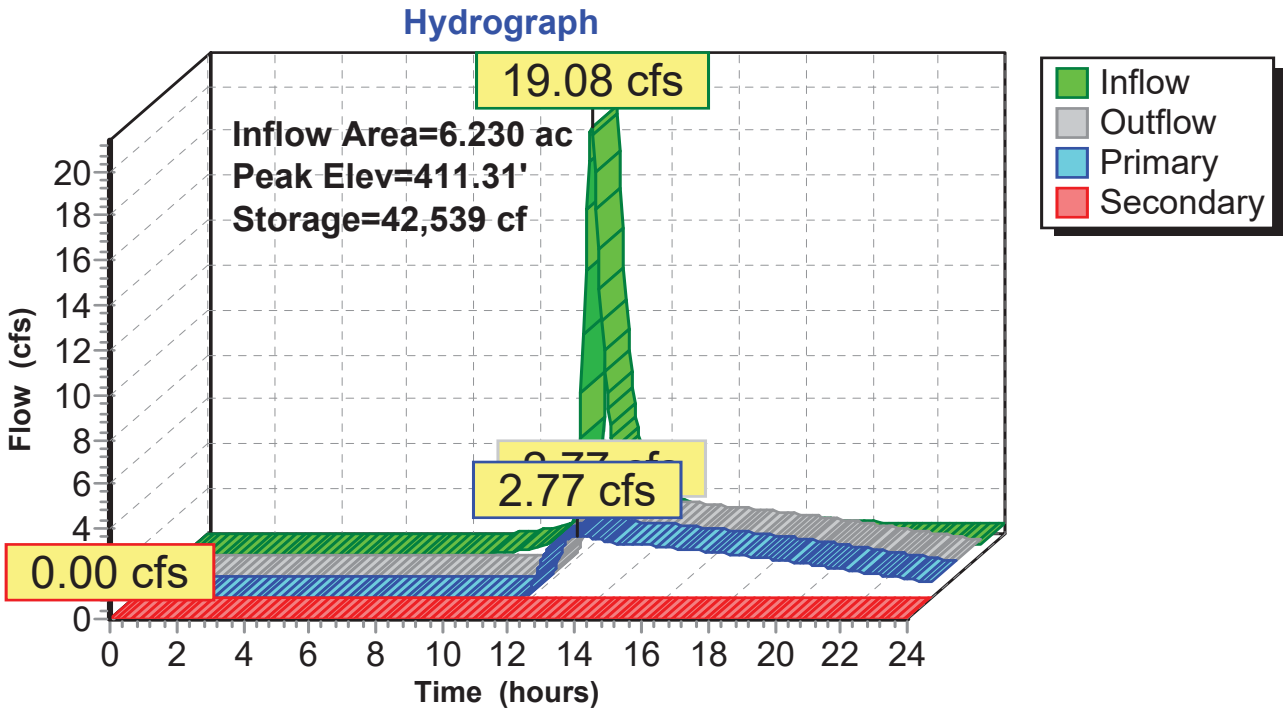
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
408.00	800	0	0
410.00	16,607	17,407	17,407
412.00	24,332	40,939	58,346
414.00	28,916	53,248	111,594
416.00	33,677	62,593	174,187
417.00	36,142	34,910	209,097

Device	Routing	Invert	Outlet Devices
#1	Primary	408.00'	**24.0" Round Culvert** L= 235.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 408.00' / 406.00' S= 0.0085 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	408.75'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	411.20'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.0' Crest Height
#4	Device 1	414.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#5	Secondary	416.00'	**35.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=2.76 cfs @ 13.35 hrs HW=411.31' (Free Discharge)
└**1=Culvert** (Passes 2.76 cfs of 23.00 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 2.51 cfs @ 7.19 fps)
  ├**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.25 cfs @ 1.11 fps)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=408.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 1d: Pond 1d



Stage-Discharge for Pond Pond 1d: Pond 1d

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
408.00	0.00	0.00	0.00
408.10	0.00	0.00	0.00
408.20	0.00	0.00	0.00
408.30	0.00	0.00	0.00
408.40	0.00	0.00	0.00
408.50	0.00	0.00	0.00
408.60	0.00	0.00	0.00
408.70	0.00	0.00	0.00
408.80	0.01	0.01	0.00
408.90	0.08	0.08	0.00
409.00	0.20	0.20	0.00
409.10	0.37	0.37	0.00
409.20	0.57	0.57	0.00
409.30	0.78	0.78	0.00
409.40	0.95	0.95	0.00
409.50	1.08	1.08	0.00
409.60	1.21	1.21	0.00
409.70	1.32	1.32	0.00
409.80	1.42	1.42	0.00
409.90	1.52	1.52	0.00
410.00	1.61	1.61	0.00
410.10	1.69	1.69	0.00
410.20	1.78	1.78	0.00
410.30	1.85	1.85	0.00
410.40	1.93	1.93	0.00
410.50	2.00	2.00	0.00
410.60	2.07	2.07	0.00
410.70	2.14	2.14	0.00
410.80	2.20	2.20	0.00
410.90	2.27	2.27	0.00
411.00	2.33	2.33	0.00
411.10	2.39	2.39	0.00
411.20	2.45	2.45	0.00
411.30	2.71	2.71	0.00
411.40	3.14	3.14	0.00
411.50	3.67	3.67	0.00
411.60	4.29	4.29	0.00
411.70	4.98	4.98	0.00
411.80	5.73	5.73	0.00
411.90	6.54	6.54	0.00
412.00	7.39	7.39	0.00
412.10	8.28	8.28	0.00
412.20	9.21	9.21	0.00
412.30	10.18	10.18	0.00
412.40	11.18	11.18	0.00
412.50	12.21	12.21	0.00
412.60	13.27	13.27	0.00
412.70	14.35	14.35	0.00
412.80	15.45	15.45	0.00
412.90	16.57	16.57	0.00
413.00	17.70	17.70	0.00
413.10	18.85	18.85	0.00
413.20	20.02	20.02	0.00
413.30	21.19	21.19	0.00
413.40	22.38	22.38	0.00
413.50	23.57	23.57	0.00
413.60	24.76	24.76	0.00
413.70	25.96	25.96	0.00
413.80	27.17	27.17	0.00
413.90	28.37	28.37	0.00
414.00	29.57	29.57	0.00
414.10	30.94	30.94	0.00
414.20	32.44	32.44	0.00
414.30	34.04	34.04	0.00
414.40	35.15	35.15	0.00
414.50	35.48	35.48	0.00
414.60	35.80	35.80	0.00
414.70	36.11	36.11	0.00
414.80	36.43	36.43	0.00
414.90	36.74	36.74	0.00
415.00	37.05	37.05	0.00
415.10	37.36	37.36	0.00
415.20	37.62	37.62	0.00
415.30	37.88	37.88	0.00
415.40	38.14	38.14	0.00
415.50	38.40	38.40	0.00
415.60	38.65	38.65	0.00
415.70	38.91	38.91	0.00
415.80	39.16	39.16	0.00
415.90	39.41	39.41	0.00
416.00	39.66	39.66	0.00
416.10	42.75	39.91	2.84
416.20	48.20	40.15	8.05
416.30	55.32	40.39	14.92
416.40	63.84	40.64	23.20
416.50	73.79	40.88	32.92
416.60	85.04	41.12	43.92
416.70	96.39	41.36	55.04
416.80	108.46	41.59	66.87
416.90	121.47	41.83	79.64
417.00	135.16	42.06	93.10
417.10	**149.91**	**42.30**	**107.61**

Stage-Area-Storage for Pond Pond 1d: Pond 1d

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
408.00	800	0
408.10	1,590	120
408.20	2,381	318
408.30	3,171	596
408.40	3,961	952
408.50	4,752	1,388
408.60	5,542	1,903
408.70	6,332	2,496
408.80	7,123	3,169
408.90	7,913	3,921
409.00	8,704	4,752
409.10	9,494	5,662
409.20	10,284	6,651
409.30	11,075	7,718
409.40	11,865	8,865
409.50	12,655	10,091
409.60	13,446	11,396
409.70	14,236	12,781
409.80	15,026	14,244
409.90	15,817	15,786
410.00	16,607	17,407
410.10	16,993	19,087
410.20	17,379	20,806
410.30	17,766	22,563
410.40	18,152	24,359
410.50	18,538	26,193
410.60	18,925	28,066
410.70	19,311	29,978
410.80	19,697	31,929
410.90	20,083	33,918
411.00	20,470	35,945
411.10	20,856	38,012
411.20	21,242	40,116
411.30	21,628	42,260
411.40	22,014	44,442
411.50	22,401	46,663
411.60	22,787	48,922
411.70	23,173	51,220
411.80	23,560	53,557
411.90	23,946	55,932
412.00	24,332	58,346
412.10	24,561	60,791
412.20	24,790	63,258
412.30	25,020	65,749
412.40	25,249	68,262
412.50	25,478	70,799
412.60	25,707	73,358
412.70	25,936	75,940
412.80	26,166	78,545
412.90	26,395	81,173
413.00	26,624	83,824
413.10	26,853	86,498
413.20	27,082	89,195
413.30	27,312	91,914
413.40	27,541	94,657
413.50	27,770	97,423
413.60	27,999	100,211
413.70	28,228	103,022
413.80	28,458	105,857
413.90	28,687	108,714
414.00	28,916	111,594
414.10	29,154	114,498
414.20	29,392	117,425
414.30	29,630	120,376
414.40	29,868	123,351
414.50	30,106	126,350
414.60	30,344	129,372
414.70	30,582	132,418
414.80	30,820	135,489
414.90	31,058	138,583
415.00	31,297	141,700
415.10	31,535	144,842
415.20	31,773	148,007
415.30	32,011	151,196
415.40	32,249	154,409
415.50	32,487	157,646
415.60	32,725	160,907
415.70	32,963	164,191
415.80	33,201	167,499
415.90	33,439	170,831
416.00	33,677	174,187
416.10	33,924	177,567
416.20	34,170	180,972
416.30	34,417	184,401
416.40	34,663	187,855
416.50	34,910	191,334
416.60	35,156	194,837
416.70	35,402	198,365
416.80	35,649	201,917
416.90	35,895	205,495
417.00	**36,142**	**209,097**
417.10	36,142	209,097

Summary for Pond Pond 1e: Pond 1e

Inflow Area = 1.060 ac, 65.09% Impervious, Inflow Depth > 5.83" for 50-yr event
Inflow = 9.18 cfs @ 12.00 hrs, Volume= 0.515 af
Outflow = 4.89 cfs @ 12.12 hrs, Volume= 0.296 af, Atten= 47%, Lag= 7.2 min
Primary = 4.89 cfs @ 12.12 hrs, Volume= 0.296 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 406.56' @ 12.12 hrs Surf.Area= 8,143 sf Storage= 11,124 cf

Plug-Flow detention time= 199.7 min calculated for 0.295 af (57% of inflow)
Center-of-Mass det. time= 95.0 min (885.9 - 790.9)

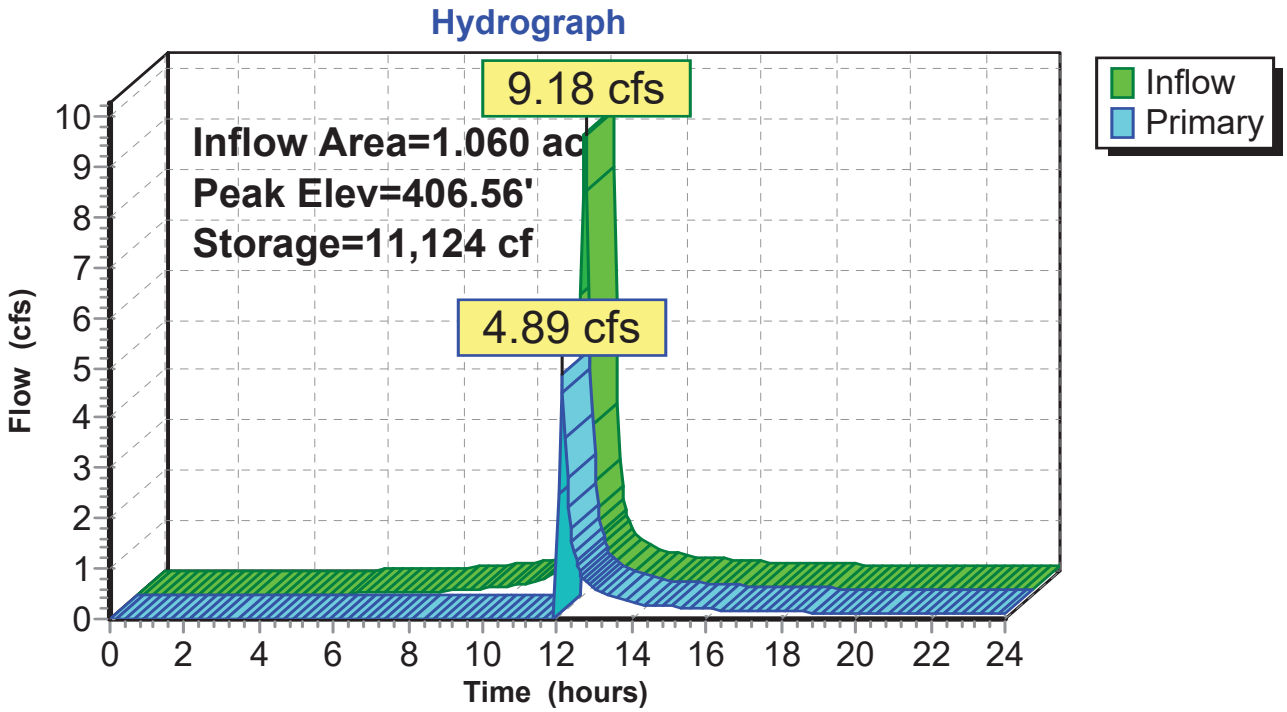
Volume	Invert	Avail.Storage	Storage Description
#1	405.00'	12,667 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
405.00	6,101	0	0
406.00	7,395	6,748	6,748
406.35	7,857	2,669	9,417
406.75	8,394	3,250	12,667

Device	Routing	Invert	Outlet Devices
#1	Primary	406.35'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=4.60 cfs @ 12.12 hrs HW=406.55' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 4.60 cfs @ 1.13 fps)

Pond Pond 1e: Pond 1e



Stage-Discharge for Pond Pond 1e: Pond 1e

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
405.00	0.00	405.53	0.00	406.06	0.00	406.59	5.89
405.01	0.00	405.54	0.00	406.07	0.00	406.60	6.27
405.02	0.00	405.55	0.00	406.08	0.00	406.61	6.66
405.03	0.00	405.56	0.00	406.09	0.00	406.62	7.06
405.04	0.00	405.57	0.00	406.10	0.00	406.63	7.46
405.05	0.00	405.58	0.00	406.11	0.00	406.64	7.88
405.06	0.00	405.59	0.00	406.12	0.00	406.65	8.30
405.07	0.00	405.60	0.00	406.13	0.00	406.66	8.73
405.08	0.00	405.61	0.00	406.14	0.00	406.67	9.17
405.09	0.00	405.62	0.00	406.15	0.00	406.68	9.61
405.10	0.00	405.63	0.00	406.16	0.00	406.69	10.07
405.11	0.00	405.64	0.00	406.17	0.00	406.70	10.53
405.12	0.00	405.65	0.00	406.18	0.00	406.71	11.00
405.13	0.00	405.66	0.00	406.19	0.00	406.72	11.48
405.14	0.00	405.67	0.00	406.20	0.00	406.73	11.96
405.15	0.00	405.68	0.00	406.21	0.00	406.74	12.45
405.16	0.00	405.69	0.00	406.22	0.00	406.75	**12.95**
405.17	0.00	405.70	0.00	406.23	0.00		
405.18	0.00	405.71	0.00	406.24	0.00		
405.19	0.00	405.72	0.00	406.25	0.00		
405.20	0.00	405.73	0.00	406.26	0.00		
405.21	0.00	405.74	0.00	406.27	0.00		
405.22	0.00	405.75	0.00	406.28	0.00		
405.23	0.00	405.76	0.00	406.29	0.00		
405.24	0.00	405.77	0.00	406.30	0.00		
405.25	0.00	405.78	0.00	406.31	0.00		
405.26	0.00	405.79	0.00	406.32	0.00		
405.27	0.00	405.80	0.00	406.33	0.00		
405.28	0.00	405.81	0.00	406.34	0.00		
405.29	0.00	405.82	0.00	406.35	0.00		
405.30	0.00	405.83	0.00	406.36	0.05		
405.31	0.00	405.84	0.00	406.37	0.14		
405.32	0.00	405.85	0.00	406.38	0.26		
405.33	0.00	405.86	0.00	406.39	0.40		
405.34	0.00	405.87	0.00	406.40	0.56		
405.35	0.00	405.88	0.00	406.41	0.73		
405.36	0.00	405.89	0.00	406.42	0.92		
405.37	0.00	405.90	0.00	406.43	1.13		
405.38	0.00	405.91	0.00	406.44	1.34		
405.39	0.00	405.92	0.00	406.45	1.57		
405.40	0.00	405.93	0.00	406.46	1.82		
405.41	0.00	405.94	0.00	406.47	2.07		
405.42	0.00	405.95	0.00	406.48	2.33		
405.43	0.00	405.96	0.00	406.49	2.61		
405.44	0.00	405.97	0.00	406.50	2.89		
405.45	0.00	405.98	0.00	406.51	3.19		
405.46	0.00	405.99	0.00	406.52	3.49		
405.47	0.00	406.00	0.00	406.53	3.80		
405.48	0.00	406.01	0.00	406.54	4.12		
405.49	0.00	406.02	0.00	406.55	4.45		
405.50	0.00	406.03	0.00	406.56	4.80		
405.51	0.00	406.04	0.00	406.57	5.15		
405.52	0.00	406.05	0.00	406.58	5.52		

Stage-Area-Storage for Pond Pond 1e: Pond 1e

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
405.00	6,101	0
405.02	6,127	122
405.04	6,153	245
405.06	6,179	368
405.08	6,205	492
405.10	6,230	617
405.12	6,256	741
405.14	6,282	867
405.16	6,308	993
405.18	6,334	1,119
405.20	6,360	1,246
405.22	6,386	1,374
405.24	6,412	1,502
405.26	6,437	1,630
405.28	6,463	1,759
405.30	6,489	1,889
405.32	6,515	2,019
405.34	6,541	2,149
405.36	6,567	2,280
405.38	6,593	2,412
405.40	6,619	2,544
405.42	6,644	2,677
405.44	6,670	2,810
405.46	6,696	2,943
405.48	6,722	3,078
405.50	6,748	3,212
405.52	6,774	3,347
405.54	6,800	3,483
405.56	6,826	3,619
405.58	6,852	3,756
405.60	6,877	3,894
405.62	6,903	4,031
405.64	6,929	4,170
405.66	6,955	4,308
405.68	6,981	4,448
405.70	7,007	4,588
405.72	7,033	4,728
405.74	7,059	4,869
405.76	7,084	5,010
405.78	7,110	5,152
405.80	7,136	5,295
405.82	7,162	5,438
405.84	7,188	5,581
405.86	7,214	5,725
405.88	7,240	5,870
405.90	7,266	6,015
405.92	7,291	6,161
405.94	7,317	6,307
405.96	7,343	6,453
405.98	7,369	6,600
406.00	7,395	6,748
406.02	7,421	6,896
406.04	7,448	7,045
406.06	7,474	7,194
406.08	7,501	7,344
406.10	7,527	7,494
406.12	7,553	7,645
406.14	7,580	7,796
406.16	7,606	7,948
406.18	7,633	8,100
406.20	7,659	8,253
406.22	7,685	8,407
406.24	7,712	8,561
406.26	7,738	8,715
406.28	7,765	8,870
406.30	7,791	9,026
406.32	7,817	9,182
406.34	7,844	9,339
406.36	7,870	9,496
406.38	7,897	9,653
406.40	7,924	9,812
406.42	7,951	9,970
406.44	7,978	10,130
406.46	8,005	10,289
406.48	8,032	10,450
406.50	8,058	10,611
406.52	8,085	10,772
406.54	8,112	10,934
406.56	8,139	11,097
406.58	8,166	11,260
406.60	8,193	11,423
406.62	8,219	11,587
406.64	8,246	11,752
406.66	8,273	11,917
406.68	8,300	12,083
406.70	8,327	12,249
406.72	8,354	12,416
406.74	**8,381**	**12,583**

Summary for Pond Pond 3: Pond 3

Inflow Area = 4.790 ac, 0.00% Impervious, Inflow Depth > 3.12" for 50-yr event
Inflow = 13.25 cfs @ 12.23 hrs, Volume= 1.247 af
Outflow = 7.83 cfs @ 12.48 hrs, Volume= 1.076 af, Atten= 41%, Lag= 15.0 min
Primary = 7.83 cfs @ 12.48 hrs, Volume= 1.076 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 425.89' @ 12.48 hrs Surf.Area= 6,767 sf Storage= 15,575 cf

Plug-Flow detention time= 101.1 min calculated for 1.074 af (86% of inflow)
Center-of-Mass det. time= 38.5 min (897.4 - 858.9)

Volume	Invert	Avail.Storage	Storage Description
#1	423.00'	36,852 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

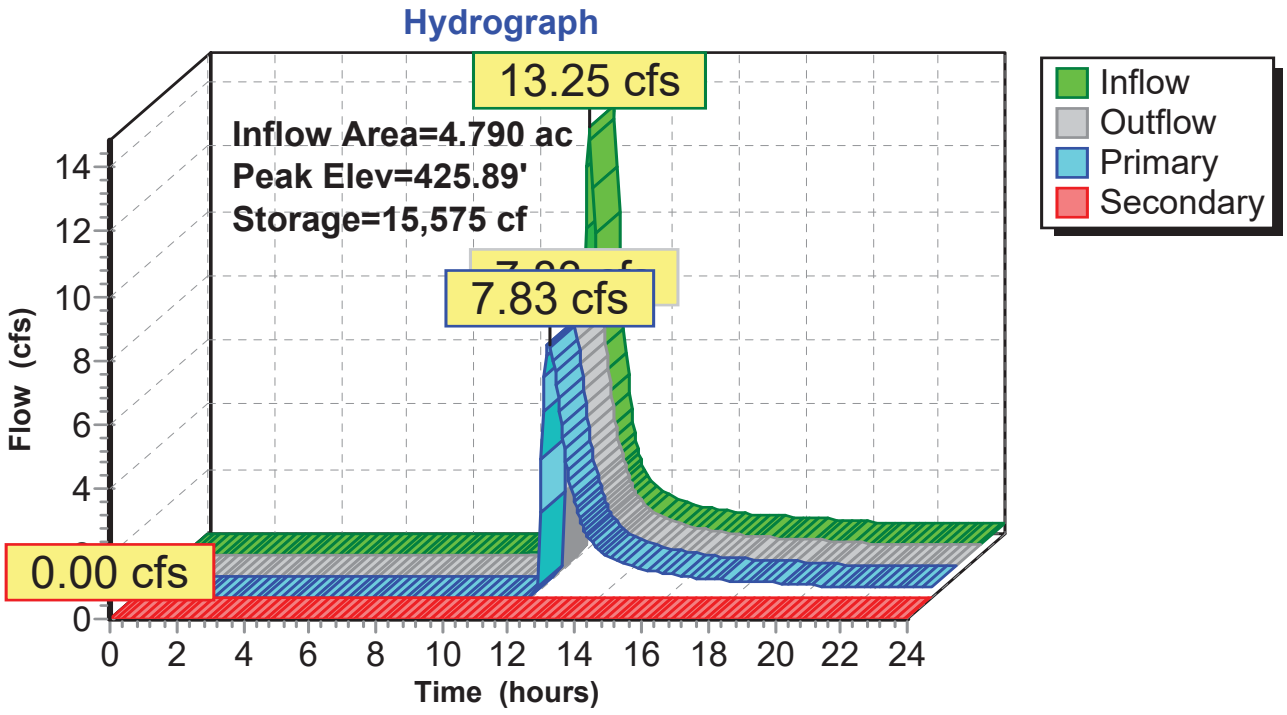
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
423.00	4,083	0	0
424.00	4,941	4,512	4,512
426.00	6,873	11,814	16,326
428.00	9,007	15,880	32,206
428.50	9,575	4,646	36,852

Device	Routing	Invert	Outlet Devices
#1	Primary	423.00'	**18.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 423.00' / 422.00' S= 0.0217 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	424.40'	**1.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height
#3	Device 1	427.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#4	Secondary	427.50'	**25.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=7.81 cfs @ 12.48 hrs HW=425.89' (Free Discharge)
└**1=Culvert** (Passes 7.81 cfs of 12.44 cfs potential flow)
  └**2=Sharp-Crested Rectangular Weir** (Weir Controls 7.81 cfs @ 4.37 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=423.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 3: Pond 3



Stage-Discharge for Pond Pond 3: Pond 3

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
423.00	0.00	0.00	0.00
423.10	0.00	0.00	0.00
423.20	0.00	0.00	0.00
423.30	0.00	0.00	0.00
423.40	0.00	0.00	0.00
423.50	0.00	0.00	0.00
423.60	0.00	0.00	0.00
423.70	0.00	0.00	0.00
423.80	0.00	0.00	0.00
423.90	0.00	0.00	0.00
424.00	0.00	0.00	0.00
424.10	0.00	0.00	0.00
424.20	0.00	0.00	0.00
424.30	0.00	0.00	0.00
424.40	0.00	0.00	0.00
424.50	0.15	0.15	0.00
424.60	0.43	0.43	0.00
424.70	0.79	0.79	0.00
424.80	1.20	1.20	0.00
424.90	1.67	1.67	0.00
425.00	2.18	2.18	0.00
425.10	2.72	2.72	0.00
425.20	3.30	3.30	0.00
425.30	3.90	3.90	0.00
425.40	4.52	4.52	0.00
425.50	5.17	5.17	0.00
425.60	5.83	5.83	0.00
425.70	6.51	6.51	0.00
425.80	7.20	7.20	0.00
425.90	7.91	7.91	0.00
426.00	8.61	8.61	0.00
426.10	9.33	9.33	0.00
426.20	10.05	10.05	0.00
426.30	10.77	10.77	0.00
426.40	11.48	11.48	0.00
426.50	12.20	12.20	0.00
426.60	12.91	12.91	0.00
426.70	13.62	13.62	0.00
426.80	14.32	14.32	0.00
426.90	15.01	15.01	0.00
427.00	15.34	15.34	0.00
427.10	15.57	15.57	0.00
427.20	15.80	15.80	0.00
427.30	16.03	16.03	0.00
427.40	16.26	16.26	0.00
427.50	16.48	16.48	0.00
427.60	18.73	16.70	2.03
427.70	22.66	16.91	5.75
427.80	27.78	17.12	10.66
427.90	33.90	17.33	16.57
428.00	41.05	17.54	23.51
428.10	49.12	17.75	31.37
428.20	57.26	17.95	39.31
428.30	65.91	18.15	47.76
428.40	75.23	18.35	56.89
428.50	85.04	18.54	66.50
428.60	95.60	18.74	76.86
428.70	106.68	18.93	87.75
428.80	117.87	19.12	98.75
428.90	129.47	19.31	110.16
429.00	141.21	19.50	121.71
429.10	153.26	19.68	133.57
429.20	166.15	19.86	146.29
429.30	179.43	20.05	159.39
429.40	193.08	20.23	172.85
429.50	207.08	20.40	186.68
429.60	221.43	20.58	200.85
429.70	236.12	20.76	215.37
429.80	251.14	20.93	230.22
429.90	266.49	21.10	245.39
430.00	282.16	21.27	260.89
430.10	**298.14**	**21.44**	**276.70**

Stage-Area-Storage for Pond Pond 3: Pond 3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
423.00	4,083	0
423.10	4,169	413
423.20	4,255	834
423.30	4,340	1,264
423.40	4,426	1,702
423.50	4,512	2,149
423.60	4,598	2,604
423.70	4,684	3,068
423.80	4,769	3,541
423.90	4,855	4,022
424.00	4,941	4,512
424.10	5,038	5,011
424.20	5,134	5,520
424.30	5,231	6,038
424.40	5,327	6,566
424.50	5,424	7,103
424.60	5,521	7,650
424.70	5,617	8,207
424.80	5,714	8,774
424.90	5,810	9,350
425.00	5,907	9,936
425.10	6,004	10,532
425.20	6,100	11,137
425.30	6,197	11,752
425.40	6,293	12,376
425.50	6,390	13,010
425.60	6,487	13,654
425.70	6,583	14,308
425.80	6,680	14,971
425.90	6,776	15,644
426.00	6,873	16,326
426.10	6,980	17,019
426.20	7,086	17,722
426.30	7,193	18,436
426.40	7,300	19,161
426.50	7,407	19,896
426.60	7,513	20,642
426.70	7,620	21,399
426.80	7,727	22,166
426.90	7,833	22,944
427.00	7,940	23,733
427.10	8,047	24,532
427.20	8,153	25,342
427.30	8,260	26,163
427.40	8,367	26,994
427.50	8,474	27,836
427.60	8,580	28,689
427.70	8,687	29,552
427.80	8,794	30,426
427.90	8,900	31,311
428.00	9,007	32,206
428.10	9,121	33,112
428.20	9,234	34,030
428.30	9,348	34,959
428.40	9,461	35,900
428.50	**9,575**	**36,852**
428.60	9,575	36,852
428.70	9,575	36,852
428.80	9,575	36,852
428.90	9,575	36,852
429.00	9,575	36,852
429.10	9,575	36,852
429.20	9,575	36,852
429.30	9,575	36,852
429.40	9,575	36,852
429.50	9,575	36,852
429.60	9,575	36,852
429.70	9,575	36,852
429.80	9,575	36,852
429.90	9,575	36,852
430.00	9,575	36,852
430.10	9,575	36,852

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1a: P-1a Runoff Area=26.040 ac 0.35% Impervious Runoff Depth>5.52"
Flow Length=968' Tc=39.7 min CN=75 Runoff=103.92 cfs 11.971 af

Subcatchment P-1b: P-1b Runoff Area=16.720 ac 26.61% Impervious Runoff Depth>4.91"
Flow Length=786' Tc=43.2 min CN=70 Runoff=56.13 cfs 6.845 af

Subcatchment P-1c: P-1c Runoff Area=10.630 ac 0.56% Impervious Runoff Depth>4.21"
Flow Length=726' Tc=34.5 min CN=64 Runoff=35.36 cfs 3.729 af

Subcatchment P-1d: P-1d Runoff Area=6.230 ac 4.01% Impervious Runoff Depth>4.57"
Flow Length=766' Tc=33.1 min CN=67 Runoff=23.24 cfs 2.371 af

Subcatchment P-1e: P-1e Runoff Area=1.060 ac 65.09% Impervious Runoff Depth>6.76"
Tc=9.2 min CN=85 Runoff=10.55 cfs 0.597 af

Subcatchment P-2: P-2 Runoff Area=12.650 ac 0.00% Impervious Runoff Depth>4.63"
Flow Length=1,476' Tc=74.9 min CN=68 Runoff=26.99 cfs 4.884 af

Subcatchment P-3: P-3 Runoff Area=4.790 ac 0.00% Impervious Runoff Depth>3.86"
Flow Length=551' Tc=28.2 min CN=61 Runoff=16.55 cfs 1.542 af

Subcatchment P-4: P-4 Runoff Area=3.370 ac 0.00% Impervious Runoff Depth>5.64"
Flow Length=590' Tc=36.5 min CN=76 Runoff=14.56 cfs 1.584 af

Reach R-1: R-1 Avg. Flow Depth=0.73' Max Vel=5.02 fps Inflow=23.56 cfs 6.691 af
n=0.040 L=799.0' S=0.0388 '/' Capacity=41.87 cfs Outflow=23.55 cfs 6.671 af

Reach R-2: R-2 Avg. Flow Depth=2.98' Max Vel=2.64 fps Inflow=118.66 cfs 18.642 af
n=0.040 L=1,801.0' S=0.0036 '/' Capacity=23.64 cfs Outflow=104.59 cfs 18.429 af

Reach R-3: R-3 Avg. Flow Depth=6.25' Max Vel=1.52 fps Inflow=131.20 cfs 24.186 af
n=0.040 L=280.0' S=0.0011 '/' Capacity=12.88 cfs Outflow=130.03 cfs 24.117 af

Reach R-4: R-4 Avg. Flow Depth=6.74' Max Vel=1.41 fps Inflow=130.82 cfs 24.495 af
n=0.040 L=219.0' S=0.0009 '/' Capacity=11.89 cfs Outflow=129.90 cfs 24.436 af

Pond Pond 1b: Pond 1b Peak Elev=445.23' Storage=92,454 cf Inflow=56.13 cfs 6.845 af
Outflow=23.56 cfs 6.691 af

Pond Pond 1c: Pond 1c Peak Elev=413.07' Storage=31,524 cf Inflow=35.36 cfs 3.729 af
Primary=27.75 cfs 3.585 af Secondary=0.00 cfs 0.000 af Outflow=27.75 cfs 3.585 af

Pond Pond 1d: Pond 1d Peak Elev=411.65' Storage=50,060 cf Inflow=23.24 cfs 2.371 af
Primary=4.63 cfs 2.172 af Secondary=0.00 cfs 0.000 af Outflow=4.63 cfs 2.172 af

Pond Pond 1e: Pond 1e Peak Elev=406.63' Storage=11,660 cf Inflow=10.55 cfs 0.597 af
Outflow=7.41 cfs 0.378 af

Pond Pond 3: Pond 3 Peak Elev=426.27' Storage=18,222 cf Inflow=16.55 cfs 1.542 af
Primary=10.55 cfs 1.369 af Secondary=0.00 cfs 0.000 af Outflow=10.55 cfs 1.369 af

Summary for Subcatchment P-1a: P-1a

Runoff = 103.92 cfs @ 12.36 hrs, Volume= 11.971 af, Depth> 5.52"

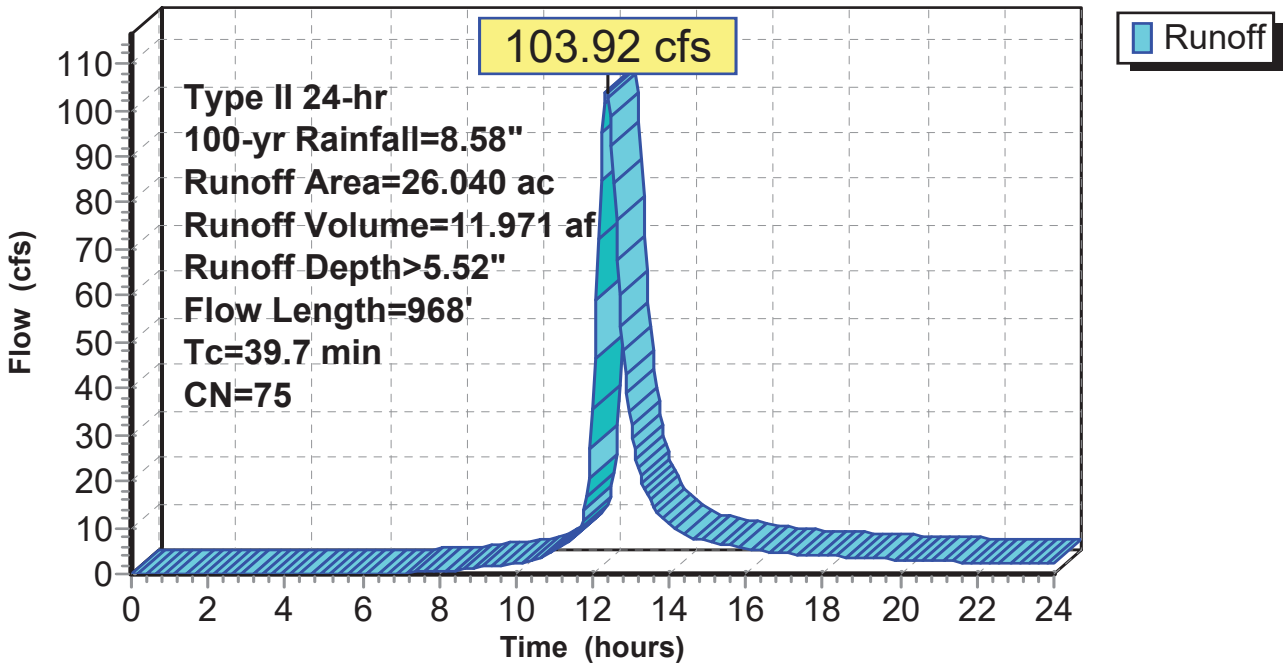
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.58"

Area (ac)	CN	Description
1.270	80	>75% Grass cover, Good, HSG D
3.830	61	>75% Grass cover, Good, HSG B
14.130	83	Woods, Poor, HSG D
6.720	66	Woods, Poor, HSG B
0.090	98	Paved parking, HSG B
26.040	75	Weighted Average
25.950		99.65% Pervious Area
0.090		0.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.0	150	0.0067	0.09		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
2.1	115	0.0170	0.91		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.1	262	0.0920	2.12		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
1.8	227	0.1850	2.15		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
4.7	214	0.0230	0.76		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
39.7	968	Total			

Subcatchment P-1a: P-1a

Hydrograph



Summary for Subcatchment P-1b: P-1b

Runoff = 56.13 cfs @ 12.41 hrs, Volume= 6.845 af, Depth> 4.91"

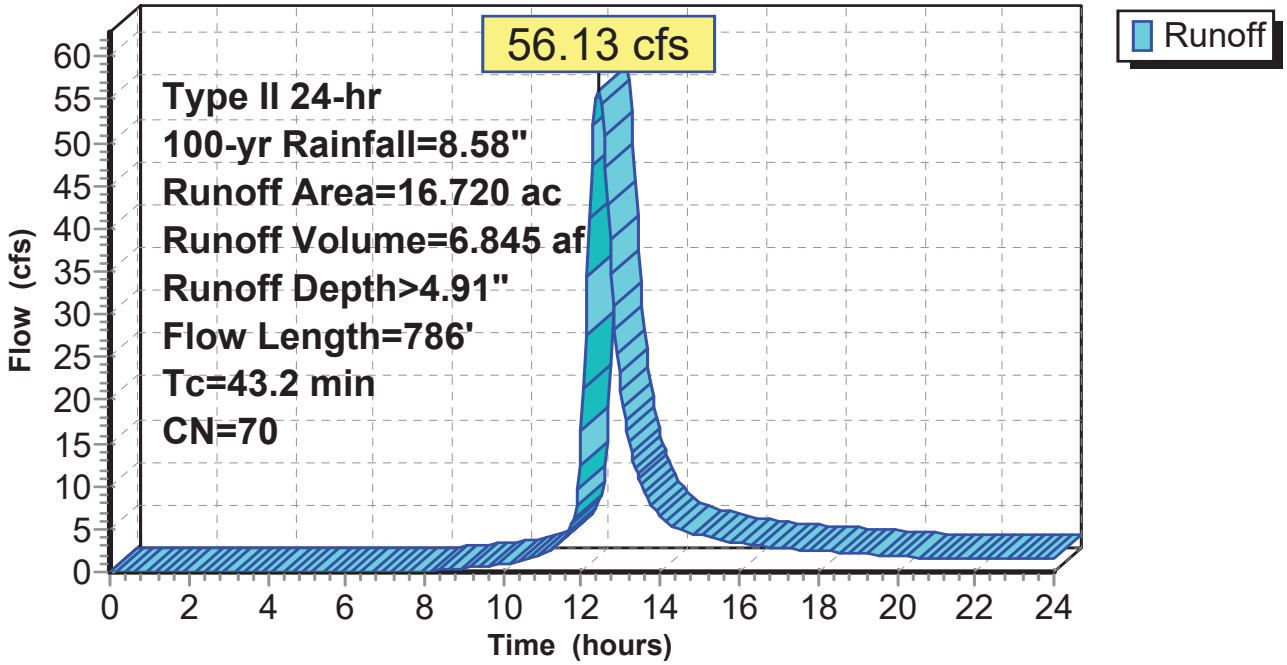
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.58"

Area (ac)	CN	Description
9.360	61	>75% Grass cover, Good, HSG B
4.450	98	Paved parking, HSG B
2.910	55	Woods, Good, HSG B
16.720	70	Weighted Average
12.270		73.39% Pervious Area
4.450		26.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.0	150	0.0030	0.06		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
1.4	57	0.0090	0.66		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.2	109	0.2290	7.70		**Shallow Concentrated Flow, CD** Unpaved Kv= 16.1 fps
0.8	164	0.0270	3.34		**Shallow Concentrated Flow, DE** Paved Kv= 20.3 fps
0.8	306	0.0120	6.51	11.51	**Pipe Channel, EF** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
43.2	786	Total			

Subcatchment P-1b: P-1b

Hydrograph



Summary for Subcatchment P-1c: P-1c

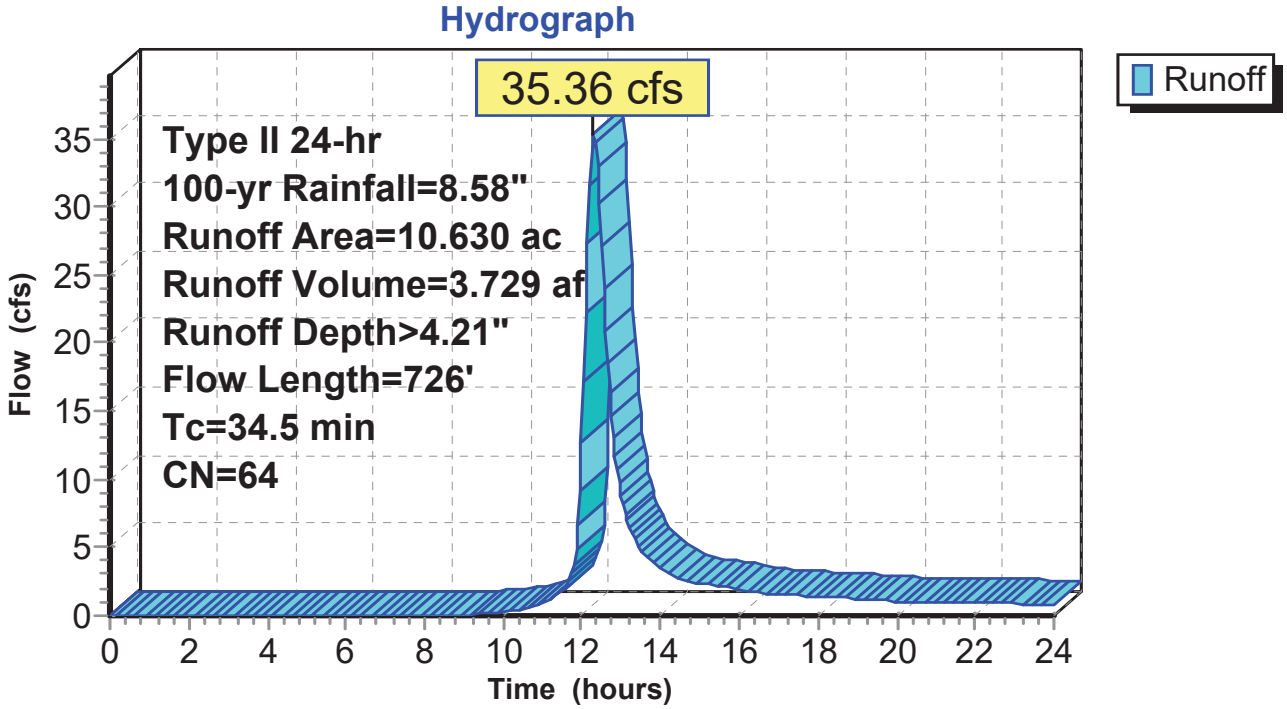
Runoff = 35.36 cfs @ 12.30 hrs, Volume= 3.729 af, Depth> 4.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.58"

Area (ac)	CN	Description
8.950	61	>75% Grass cover, Good, HSG B
1.620	80	>75% Grass cover, Good, HSG D
0.060	98	Paved parking, HSG D
10.630	64	Weighted Average
10.570		99.44% Pervious Area
0.060		0.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.7	150	0.0100	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
6.7	323	0.0130	0.80		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.8	201	0.0300	1.21		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.3	52	0.2300	3.36		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
34.5	726	Total			

Subcatchment P-1c: P-1c



Summary for Subcatchment P-1d: P-1d

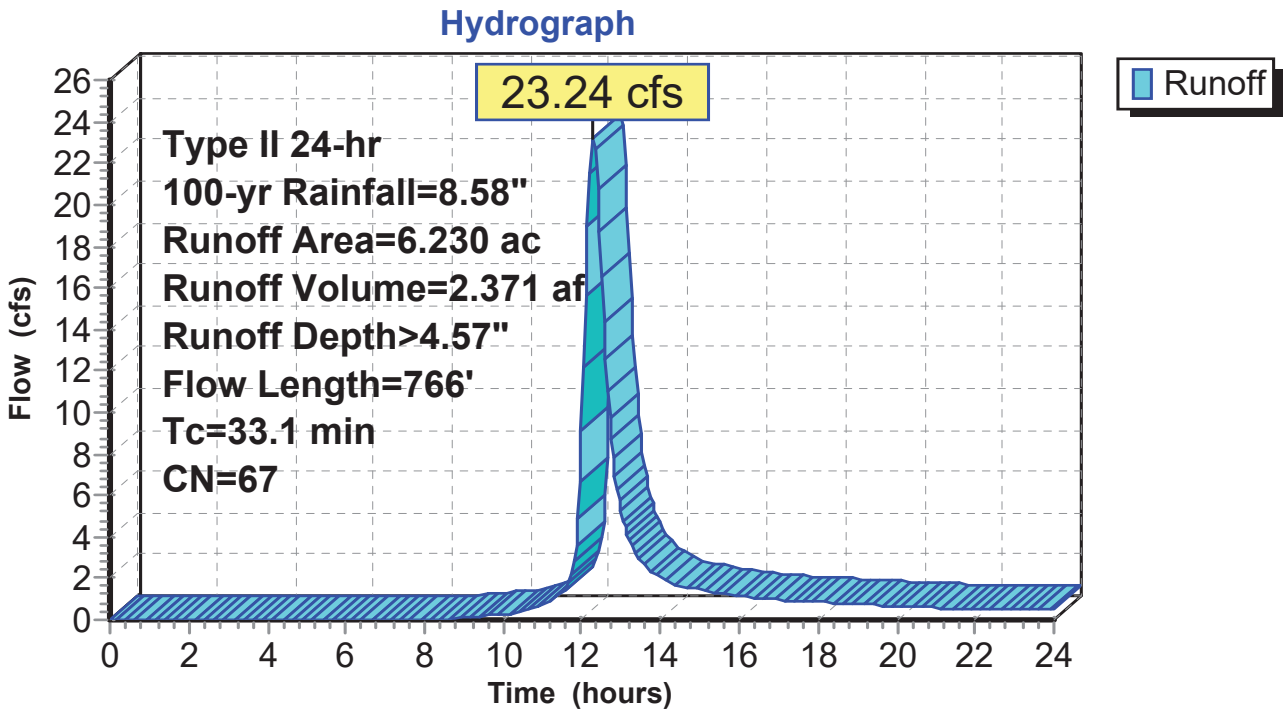
Runoff = 23.24 cfs @ 12.28 hrs, Volume= 2.371 af, Depth> 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.58"

Area (ac)	CN	Description
1.430	80	>75% Grass cover, Good, HSG D
4.550	61	>75% Grass cover, Good, HSG B
0.250	98	Paved parking, HSG B
6.230	67	Weighted Average
5.980		95.99% Pervious Area
0.250		4.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	150	0.0130	0.11		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.8	435	0.0140	0.83		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
2.1	181	0.0440	1.47		**Shallow Concentrated Flow, DE** Short Grass Pasture Kv= 7.0 fps
33.1	766	Total			

Subcatchment P-1d: P-1d



Summary for Subcatchment P-1e: P-1e

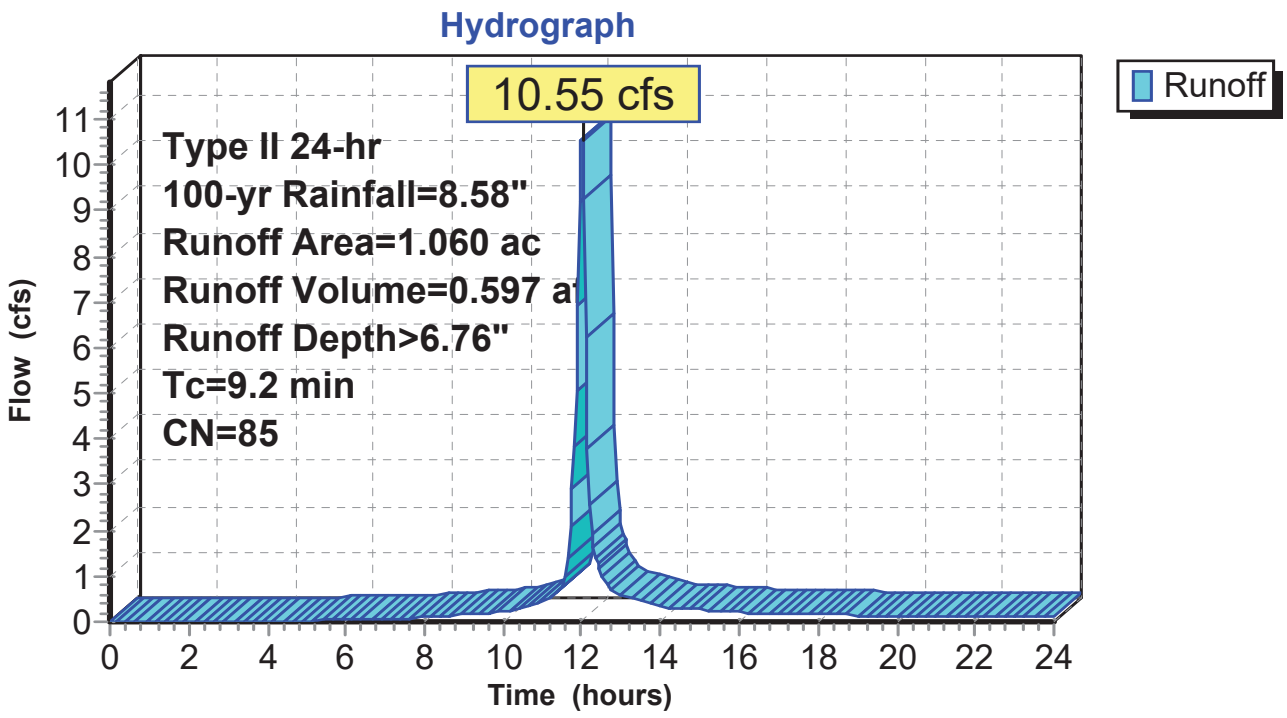
Runoff = 10.55 cfs @ 12.00 hrs, Volume= 0.597 af, Depth> 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.58"

Area (ac)	CN	Description
0.690	98	Paved parking, HSG B
0.370	61	>75% Grass cover, Good, HSG B
1.060	85	Weighted Average
0.370		34.91% Pervious Area
0.690		65.09% Impervious Area

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

Subcatchment P-1e: P-1e



Summary for Subcatchment P-2: P-2

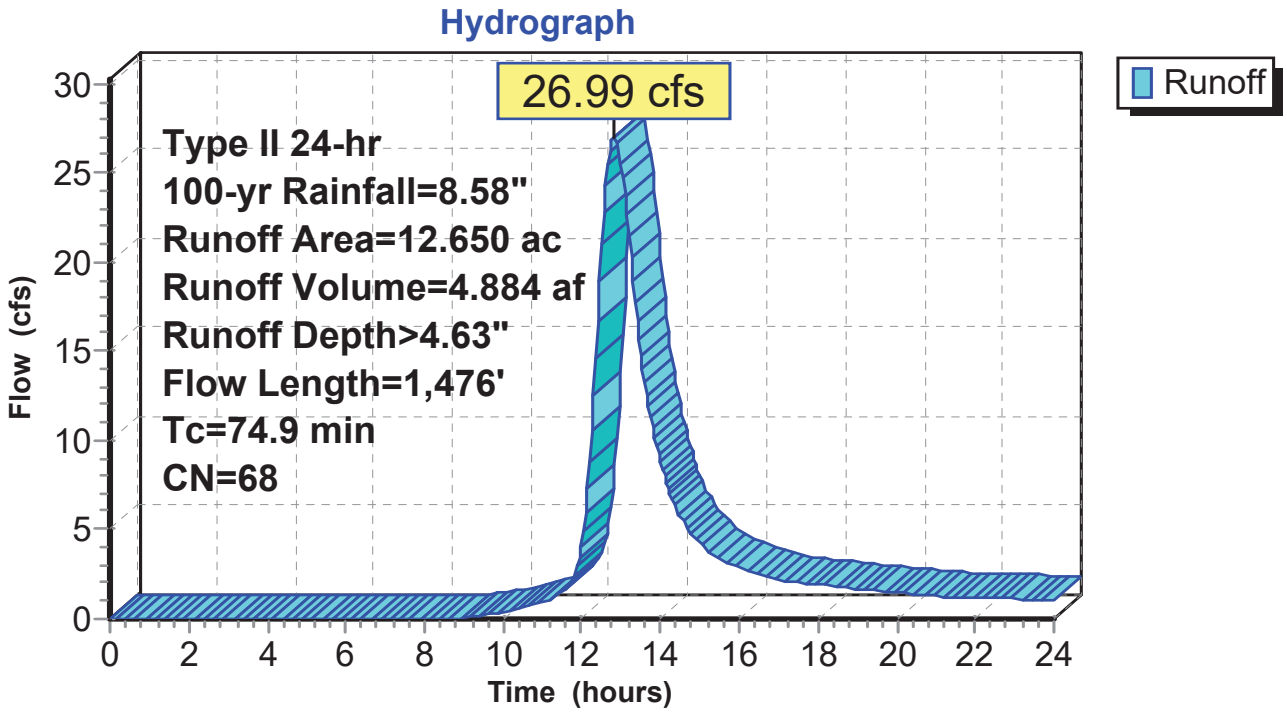
Runoff = 26.99 cfs @ 12.82 hrs, Volume= 4.884 af, Depth> 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.58"

Area (ac)	CN	Description
7.070	61	>75% Grass cover, Good, HSG B
2.000	66	Woods, Poor, HSG B
3.580	83	Woods, Poor, HSG D
12.650	68	Weighted Average
12.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	150	0.0087	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.6	362	0.0100	0.70		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
0.3	66	0.3330	4.04		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
0.8	68	0.0800	1.41		**Shallow Concentrated Flow, DE** Woodland Kv= 5.0 fps
39.1	830	0.0050	0.35		**Shallow Concentrated Flow, EF** Woodland Kv= 5.0 fps
74.9	1,476	Total			

Subcatchment P-2: P-2



Summary for Subcatchment P-3: P-3

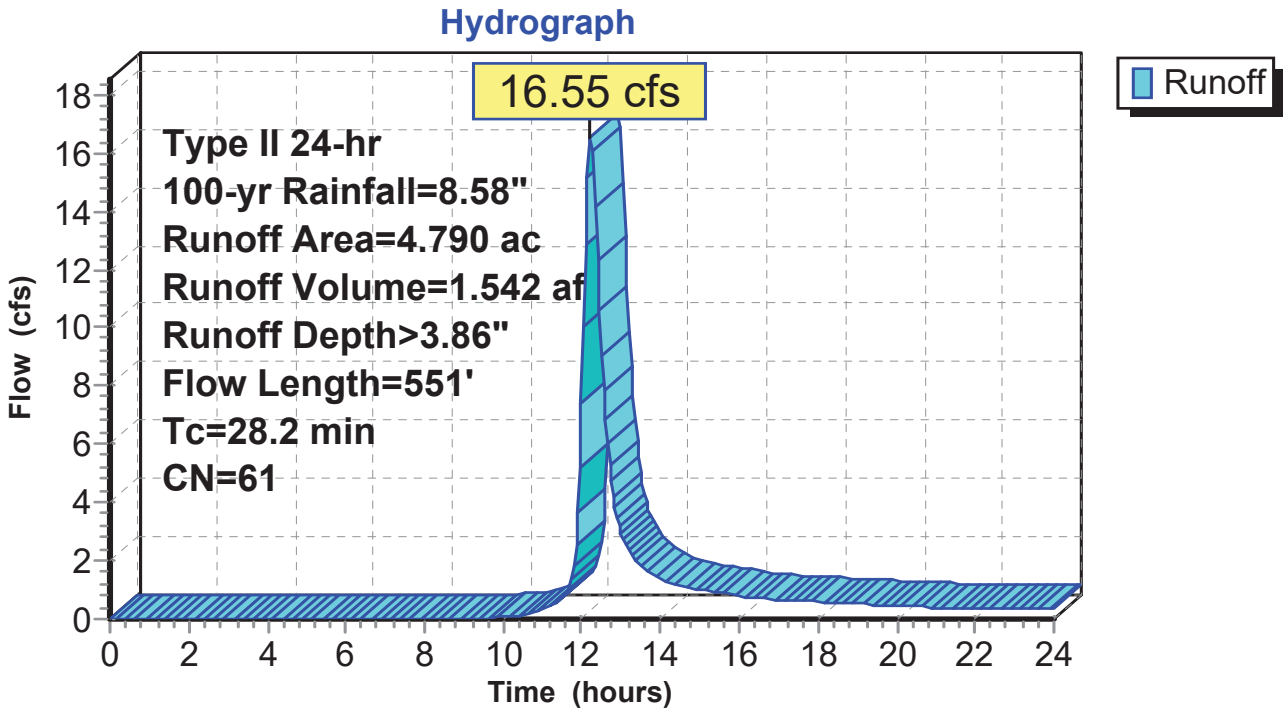
Runoff = 16.55 cfs @ 12.23 hrs, Volume= 1.542 af, Depth> 3.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.58"

Area (ac)	CN	Description
4.790	61	>75% Grass cover, Good, HSG B
4.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.5	150	0.0180	0.13		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
8.7	401	0.0120	0.77		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
28.2	551	Total			

Subcatchment P-3: P-3



Summary for Subcatchment P-4: P-4

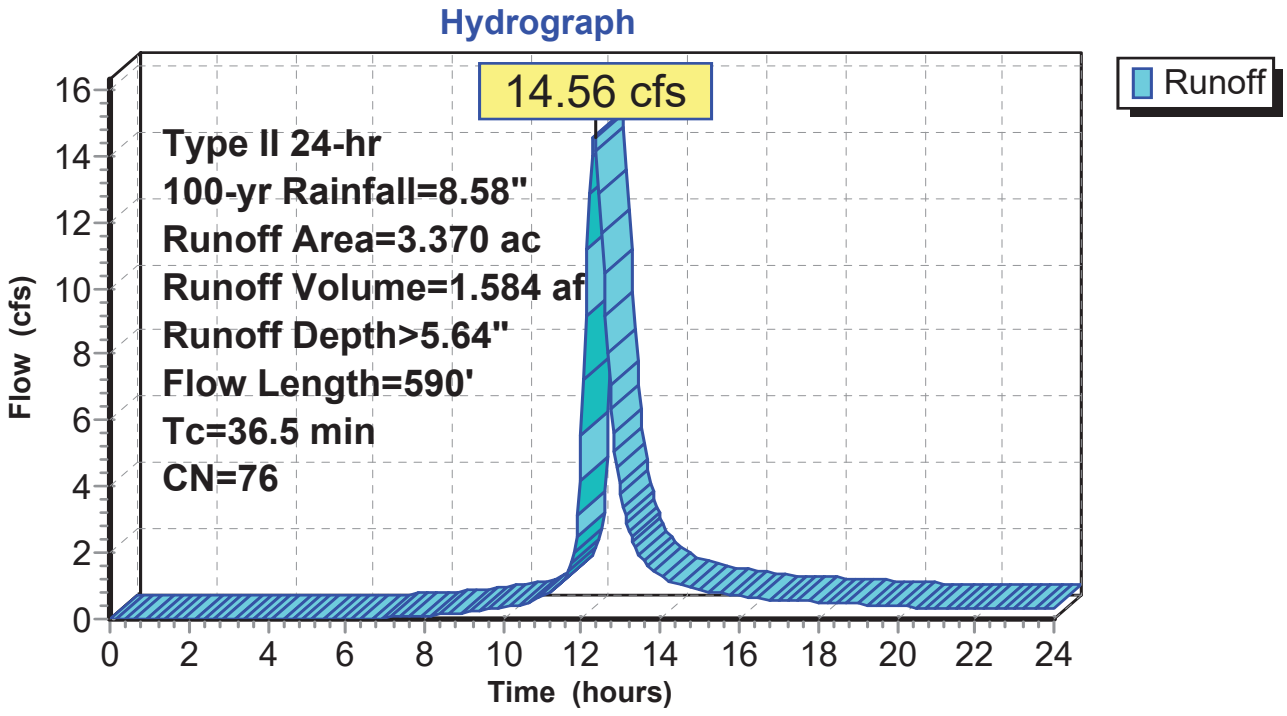
Runoff = 14.56 cfs @ 12.32 hrs, Volume= 1.584 af, Depth> 5.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.58"

Area (ac)	CN	Description
1.830	83	Woods, Poor, HSG D
1.140	66	Woods, Poor, HSG B
0.290	80	>75% Grass cover, Good, HSG D
0.110	61	>75% Grass cover, Good, HSG B
3.370	76	Weighted Average
3.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.6	150	0.0600	0.08		**Sheet Flow, AB** Woods: Dense underbrush n= 0.800 P2= 3.56"
4.9	440	0.0890	1.49		**Shallow Concentrated Flow, BC** Woodland Kv= 5.0 fps
36.5	590	Total			

Subcatchment P-4: P-4



Summary for Reach R-1: R-1

Inflow Area = 16.720 ac, 26.61% Impervious, Inflow Depth > 4.80" for 100-yr event
Inflow = 23.56 cfs @ 12.94 hrs, Volume= 6.691 af
Outflow = 23.55 cfs @ 13.02 hrs, Volume= 6.671 af, Atten= 0%, Lag= 4.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.02 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 2.61 fps, Avg. Travel Time= 5.1 min

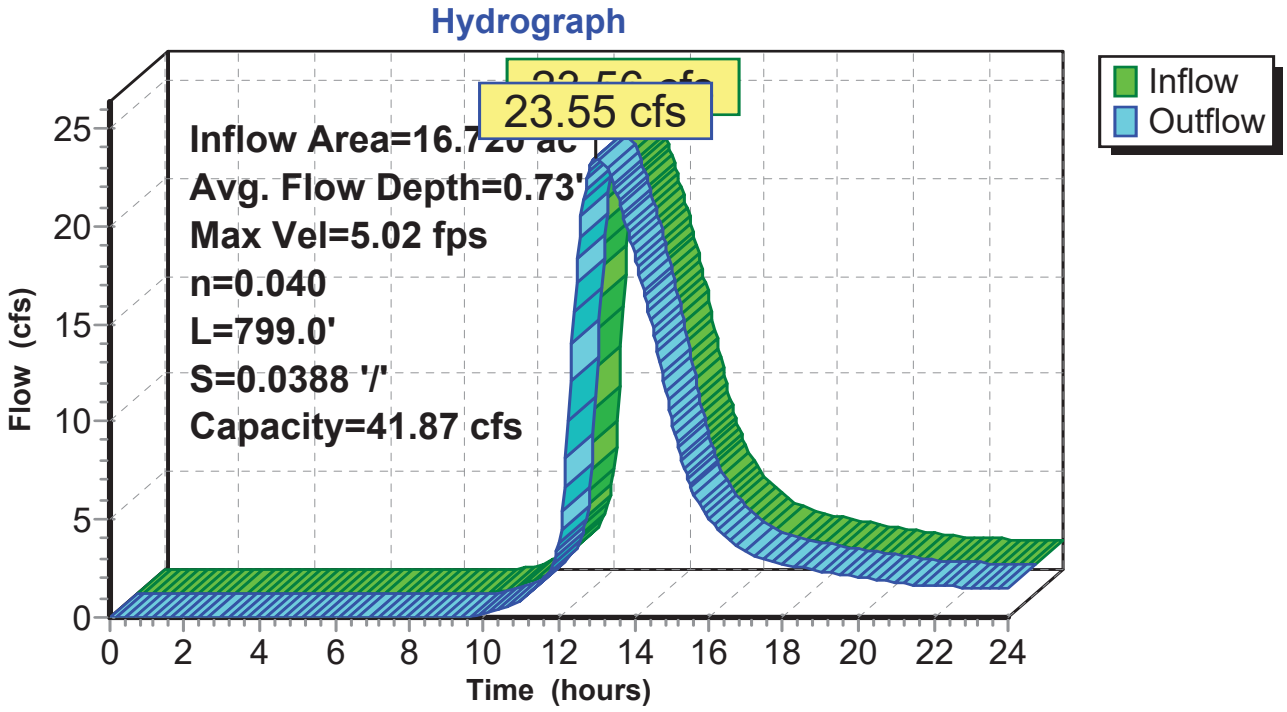
Peak Storage= 3,747 cf @ 12.97 hrs
Average Depth at Peak Storage= 0.73'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 41.87 cfs

5.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 799.0' Slope= 0.0388 '/'
Inlet Invert= 441.00', Outlet Invert= 410.00'



‡

Reach R-1: R-1



Stage-Discharge for Reach R-1: R-1

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
441.00	0.00	0.00
441.01	0.34	0.02
441.02	0.54	0.05
441.03	0.70	0.11
441.04	0.84	0.17
441.05	0.98	0.25
441.06	1.10	0.34
441.07	1.22	0.44
441.08	1.32	0.55
441.09	1.43	0.67
441.10	1.53	0.79
441.11	1.62	0.93
441.12	1.72	1.08
441.13	1.81	1.23
441.14	1.89	1.40
441.15	1.97	1.57
441.16	2.06	1.75
441.17	2.14	1.94
441.18	2.21	2.13
441.19	2.29	2.34
441.20	2.36	2.55
441.21	2.43	2.77
441.22	2.50	3.00
441.23	2.57	3.23
441.24	2.64	3.47
441.25	2.70	3.72
441.26	2.77	3.98
441.27	2.83	4.24
441.28	2.90	4.51
441.29	2.96	4.79
441.30	3.02	5.07
441.31	3.08	5.36
441.32	3.14	5.66
441.33	3.19	5.97
441.34	3.25	6.28
441.35	3.31	6.60
441.36	3.36	6.92
441.37	3.42	7.26
441.38	3.47	7.60
441.39	3.52	7.94
441.40	3.58	8.30
441.41	3.63	8.66
441.42	3.68	9.03
441.43	3.73	9.40
441.44	3.78	9.78
441.45	3.83	10.17
441.46	3.88	10.56
441.47	3.93	10.96
441.48	3.97	11.37
441.49	4.02	11.78
441.50	4.07	12.21
441.51	4.11	12.63
441.52	4.16	13.07
441.53	4.21	13.51
441.54	4.25	13.96
441.55	4.30	14.41
441.56	4.34	14.87
441.57	4.38	15.34
441.58	4.43	15.82
441.59	4.47	16.30
441.60	4.51	16.78
441.61	4.55	17.28
441.62	4.60	17.78
441.63	4.64	18.29
441.64	4.68	18.80
441.65	4.72	19.32
441.66	4.76	19.85
441.67	4.80	20.39
441.68	4.84	20.93
441.69	4.88	21.48
441.70	4.92	22.03
441.71	4.96	22.60
441.72	5.00	23.16
441.73	5.03	23.74
441.74	5.07	24.32
441.75	5.11	24.91
441.76	5.15	25.51
441.77	5.18	26.11
441.78	5.22	26.72
441.79	5.26	27.34
441.80	5.30	27.96
441.81	5.33	28.59
441.82	5.37	29.22
441.83	5.40	29.87
441.84	5.44	30.52
441.85	5.47	31.18
441.86	5.51	31.84
441.87	5.54	32.51
441.88	5.58	33.19
441.89	5.61	33.87
441.90	5.65	34.57
441.91	5.68	35.27
441.92	5.72	35.97
441.93	5.75	36.68
441.94	5.78	37.40
441.95	5.82	38.13
441.96	5.85	38.86
441.97	5.88	39.60
441.98	5.92	40.35
441.99	5.95	41.11
442.00	**5.98**	**41.87**

Stage-Area-Storage for Reach R-1: R-1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
441.00	0.0	0
441.01	0.1	40
441.02	0.1	81
441.03	0.2	121
441.04	0.2	162
441.05	0.3	204
441.06	0.3	245
441.07	0.4	287
441.08	0.4	330
441.09	0.5	372
441.10	0.5	415
441.11	0.6	459
441.12	0.6	502
441.13	0.7	546
441.14	0.7	591
441.15	0.8	635
441.16	0.9	680
441.17	0.9	725
441.18	1.0	771
441.19	1.0	817
441.20	1.1	863
441.21	1.1	909
441.22	1.2	956
441.23	1.3	1,003
441.24	1.3	1,051
441.25	1.4	1,099
441.26	1.4	1,147
441.27	1.5	1,195
441.28	1.6	1,244
441.29	1.6	1,293
441.30	1.7	1,342
441.31	1.7	1,392
441.32	1.8	1,442
441.33	1.9	1,492
441.34	1.9	1,543
441.35	2.0	1,594
441.36	2.1	1,645
441.37	2.1	1,697
441.38	2.2	1,749
441.39	2.3	1,801
441.40	2.3	1,854
441.41	2.4	1,907
441.42	2.5	1,960
441.43	2.5	2,013
441.44	2.6	2,067
441.45	2.7	2,121
441.46	2.7	2,176
441.47	2.8	2,231
441.48	2.9	2,286
441.49	2.9	2,341
441.50	3.0	2,397
441.51	3.1	2,453
441.52	3.1	2,509
441.53	3.2	2,566
441.54	3.3	2,623
441.55	3.4	2,681
441.56	3.4	2,738
441.57	3.5	2,796
441.58	3.6	2,855
441.59	3.6	2,913
441.60	3.7	2,972
441.61	3.8	3,032
441.62	3.9	3,091
441.63	3.9	3,151
441.64	4.0	3,211
441.65	4.1	3,272
441.66	4.2	3,333
441.67	4.2	3,394
441.68	4.3	3,456
441.69	4.4	3,517
441.70	4.5	3,580
441.71	4.6	3,642
441.72	4.6	3,705
441.73	4.7	3,768
441.74	4.8	3,831
441.75	4.9	3,895
441.76	5.0	3,959
441.77	5.0	4,024
441.78	5.1	4,088
441.79	5.2	4,153
441.80	5.3	4,219
441.81	5.4	4,284
441.82	5.4	4,350
441.83	5.5	4,417
441.84	5.6	4,483
441.85	5.7	4,550
441.86	5.8	4,618
441.87	5.9	4,685
441.88	5.9	4,753
441.89	6.0	4,821
441.90	6.1	4,890
441.91	6.2	4,959
441.92	6.3	5,028
441.93	6.4	5,097
441.94	6.5	5,167
441.95	6.6	5,237
441.96	6.6	5,308
441.97	6.7	5,379
441.98	6.8	5,450
441.99	6.9	5,521
442.00	**7.0**	**5,593**

Summary for Reach R-2: R-2

Inflow Area = 42.760 ac, 10.62% Impervious, Inflow Depth > 5.23" for 100-yr event
Inflow = 118.66 cfs @ 12.38 hrs, Volume= 18.642 af
Outflow = 104.59 cfs @ 12.74 hrs, Volume= 18.429 af, Atten= 12%, Lag= 21.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.64 fps, Min. Travel Time= 11.4 min
Avg. Velocity = 1.23 fps, Avg. Travel Time= 24.4 min

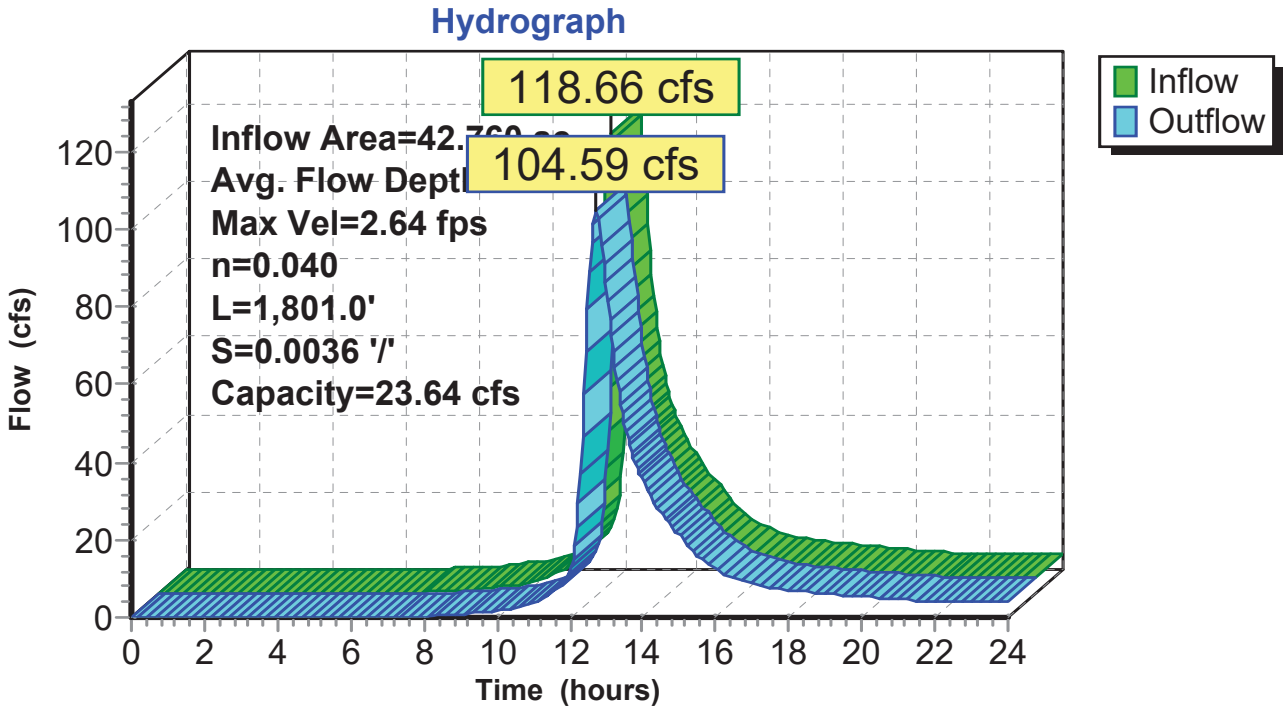
Peak Storage= 71,514 cf @ 12.55 hrs
Average Depth at Peak Storage= 2.98'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 23.64 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 1,801.0' Slope= 0.0036 '/'
Inlet Invert= 410.00', Outlet Invert= 403.50'



‡

Reach R-2: R-2



Stage-Discharge for Reach R-2: R-2

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
410.00	0.00	0.00
410.01	0.10	0.01
410.02	0.16	0.03
410.03	0.21	0.06
410.04	0.26	0.10
410.05	0.30	0.15
410.06	0.34	0.21
410.07	0.37	0.27
410.08	0.41	0.33
410.09	0.44	0.40
410.10	0.47	0.48
410.11	0.50	0.57
410.12	0.53	0.65
410.13	0.56	0.75
410.14	0.59	0.85
410.15	0.62	0.95
410.16	0.64	1.06
410.17	0.67	1.17
410.18	0.69	1.29
410.19	0.72	1.41
410.20	0.74	1.54
410.21	0.76	1.67
410.22	0.79	1.81
410.23	0.81	1.95
410.24	0.83	2.09
410.25	0.85	2.24
410.26	0.87	2.39
410.27	0.89	2.55
410.28	0.92	2.71
410.29	0.94	2.87
410.30	0.96	3.04
410.31	0.98	3.21
410.32	1.00	3.39
410.33	1.01	3.57
410.34	1.03	3.75
410.35	1.05	3.94
410.36	1.07	4.13
410.37	1.09	4.33
410.38	1.11	4.53
410.39	1.13	4.73
410.40	1.14	4.94
410.41	1.16	5.15
410.42	1.18	5.36
410.43	1.19	5.58
410.44	1.21	5.80
410.45	1.23	6.03
410.46	1.24	6.25
410.47	1.26	6.49
410.48	1.28	6.72
410.49	1.29	6.96
410.50	1.31	7.20
410.51	1.33	7.45
410.52	1.34	7.70
410.53	1.36	7.95
410.54	1.37	8.21
410.55	1.39	8.47
410.56	1.40	8.73
410.57	1.42	9.00
410.58	1.43	9.27
410.59	1.45	9.54
410.60	1.46	9.82
410.61	1.48	10.10
410.62	1.49	10.38
410.63	1.50	10.67
410.64	1.52	10.96
410.65	1.53	11.26
410.66	1.55	11.55
410.67	1.56	11.86
410.68	1.57	12.16
410.69	1.59	12.47
410.70	1.60	12.78
410.71	1.61	13.09
410.72	1.63	13.41
410.73	1.64	13.73
410.74	1.65	14.06
410.75	1.67	14.38
410.76	1.68	14.71
410.77	1.69	15.05
410.78	1.71	15.39
410.79	1.72	15.73
410.80	1.73	16.07
410.81	1.74	16.42
410.82	1.76	16.77
410.83	1.77	17.12
410.84	1.78	17.48
410.85	1.79	17.84
410.86	1.81	18.20
410.87	1.82	18.57
410.88	1.83	18.94
410.89	1.84	19.31
410.90	1.85	19.69
410.91	1.87	20.07
410.92	1.88	20.45
410.93	1.89	20.84
410.94	1.90	21.23
410.95	1.91	21.62
410.96	1.92	22.02
410.97	1.94	22.42
410.98	1.95	22.82
410.99	1.96	23.23
411.00	**1.97**	**23.64**

Stage-Area-Storage for Reach R-2: R-2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
410.00	0.0	0
410.01	0.1	180
410.02	0.2	362
410.03	0.3	544
410.04	0.4	726
410.05	0.5	910
410.06	0.6	1,094
410.07	0.7	1,278
410.08	0.8	1,464
410.09	0.9	1,650
410.10	1.0	1,837
410.11	1.1	2,025
410.12	1.2	2,213
410.13	1.3	2,402
410.14	1.4	2,592
410.15	1.5	2,783
410.16	1.7	2,974
410.17	1.8	3,166
410.18	1.9	3,359
410.19	2.0	3,552
410.20	2.1	3,746
410.21	2.2	3,941
410.22	2.3	4,137
410.23	2.4	4,333
410.24	2.5	4,530
410.25	2.6	4,728
410.26	2.7	4,926
410.27	2.8	5,125
410.28	3.0	5,325
410.29	3.1	5,526
410.30	3.2	5,727
410.31	3.3	5,929
410.32	3.4	6,132
410.33	3.5	6,336
410.34	3.6	6,540
410.35	3.7	6,745
410.36	3.9	6,950
410.37	4.0	7,157
410.38	4.1	7,364
410.39	4.2	7,572
410.40	4.3	7,780
410.41	4.4	7,990
410.42	4.6	8,200
410.43	4.7	8,410
410.44	4.8	8,622
410.45	4.9	8,834
410.46	5.0	9,047
410.47	5.1	9,260
410.48	5.3	9,475
410.49	5.4	9,690
410.50	5.5	9,906
410.51	5.6	10,122
410.52	5.7	10,339
410.53	5.9	10,557
410.54	6.0	10,776
410.55	6.1	10,995
410.56	6.2	11,215
410.57	6.3	11,436
410.58	6.5	11,658
410.59	6.6	11,880
410.60	6.7	12,103
410.61	6.8	12,326
410.62	7.0	12,551
410.63	7.1	12,776
410.64	7.2	13,002
410.65	7.3	13,228
410.66	7.5	13,456
410.67	7.6	13,684
410.68	7.7	13,912
410.69	7.9	14,142
410.70	8.0	14,372
410.71	8.1	14,603
410.72	8.2	14,834
410.73	8.4	15,067
410.74	8.5	15,300
410.75	8.6	15,534
410.76	8.8	15,768
410.77	8.9	16,003
410.78	9.0	16,239
410.79	9.1	16,476
410.80	9.3	16,713
410.81	9.4	16,951
410.82	9.5	17,190
410.83	9.7	17,430
410.84	9.8	17,670
410.85	9.9	17,911
410.86	10.1	18,153
410.87	10.2	18,395
410.88	10.3	18,638
410.89	10.5	18,882
410.90	10.6	19,127
410.91	10.8	19,372
410.92	10.9	19,618
410.93	11.0	19,865
410.94	11.2	20,112
410.95	11.3	20,360
410.96	11.4	20,609
410.97	11.6	20,859
410.98	11.7	21,109
410.99	11.9	21,360
411.00	**12.0**	**21,612**

Summary for Reach R-3: R-3

Inflow Area = 59.620 ac, 8.13% Impervious, Inflow Depth > 4.87" for 100-yr event
Inflow = 131.20 cfs @ 12.71 hrs, Volume= 24.186 af
Outflow = 130.03 cfs @ 12.81 hrs, Volume= 24.117 af, Atten= 1%, Lag= 6.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.52 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.87 fps, Avg. Travel Time= 5.4 min

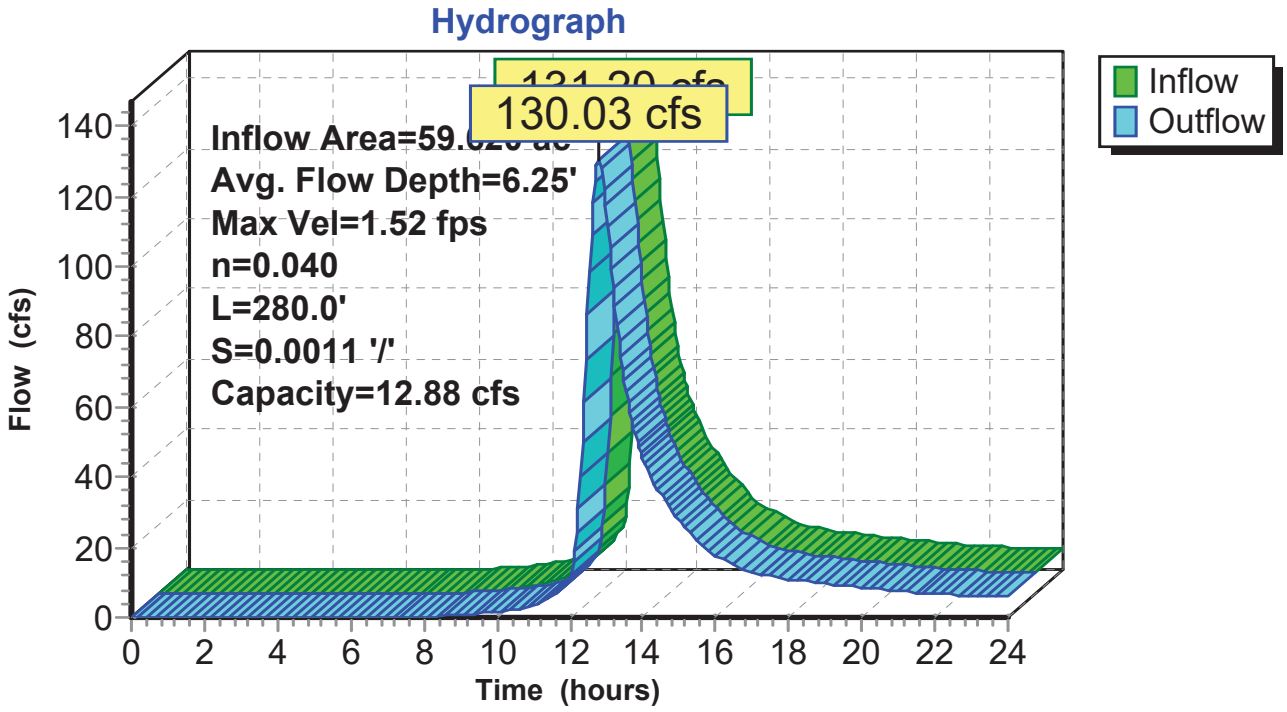
Peak Storage= 23,928 cf @ 12.76 hrs
Average Depth at Peak Storage= 6.25'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 12.88 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 280.0' Slope= 0.0011 '/'
Inlet Invert= 403.50', Outlet Invert= 403.20'



‡

Reach R-3: R-3



Stage-Discharge for Reach R-3: R-3

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
403.50	0.00	0.00
403.51	0.06	0.01
403.52	0.09	0.02
403.53	0.12	0.04
403.54	0.14	0.06
403.55	0.16	0.08
403.56	0.18	0.11
403.57	0.20	0.14
403.58	0.22	0.18
403.59	0.24	0.22
403.60	0.26	0.26
403.61	0.27	0.31
403.62	0.29	0.36
403.63	0.31	0.41
403.64	0.32	0.46
403.65	0.34	0.52
403.66	0.35	0.58
403.67	0.36	0.64
403.68	0.38	0.70
403.69	0.39	0.77
403.70	0.40	0.84
403.71	0.42	0.91
403.72	0.43	0.98
403.73	0.44	1.06
403.74	0.45	1.14
403.75	0.46	1.22
403.76	0.48	1.30
403.77	0.49	1.39
403.78	0.50	1.48
403.79	0.51	1.56
403.80	0.52	1.66
403.81	0.53	1.75
403.82	0.54	1.85
403.83	0.55	1.94
403.84	0.56	2.05
403.85	0.57	2.15
403.86	0.58	2.25
403.87	0.59	2.36
403.88	0.60	2.47
403.89	0.61	2.58
403.90	0.62	2.69
403.91	0.63	2.80
403.92	0.64	2.92
403.93	0.65	3.04
403.94	0.66	3.16
403.95	0.67	3.28
403.96	0.68	3.41
403.97	0.69	3.53
403.98	0.70	3.66
403.99	0.70	3.79
404.00	0.71	3.92
404.01	0.72	4.06
404.02	0.73	4.19
404.03	0.74	4.33
404.04	0.75	4.47
404.05	0.76	4.61
404.06	0.76	4.76
404.07	0.77	4.90
404.08	0.78	5.05
404.09	0.79	5.20
404.10	0.80	5.35
404.11	0.80	5.50
404.12	0.81	5.66
404.13	0.82	5.81
404.14	0.83	5.97
404.15	0.84	6.13
404.16	0.84	6.30
404.17	0.85	6.46
404.18	0.86	6.63
404.19	0.87	6.79
404.20	0.87	6.96
404.21	0.88	7.13
404.22	0.89	7.31
404.23	0.89	7.48
404.24	0.90	7.66
404.25	0.91	7.84
404.26	0.92	8.02
404.27	0.92	8.20
404.28	0.93	8.38
404.29	0.94	8.57
404.30	0.94	8.76
404.31	0.95	8.95
404.32	0.96	9.14
404.33	0.96	9.33
404.34	0.97	9.52
404.35	0.98	9.72
404.36	0.98	9.92
404.37	0.99	10.12
404.38	1.00	10.32
404.39	1.00	10.52
404.40	1.01	10.73
404.41	1.02	10.94
404.42	1.02	11.14
404.43	1.03	11.36
404.44	1.04	11.57
404.45	1.04	11.78
404.46	1.05	12.00
404.47	1.05	12.22
404.48	1.06	12.43
404.49	1.07	12.66
404.50	**1.07**	**12.88**

Stage-Area-Storage for Reach R-3: R-3

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
403.50	0.0	0
403.51	0.1	28
403.52	0.2	56
403.53	0.3	85
403.54	0.4	113
403.55	0.5	141
403.56	0.6	170
403.57	0.7	199
403.58	0.8	228
403.59	0.9	257
403.60	1.0	286
403.61	1.1	315
403.62	1.2	344
403.63	1.3	373
403.64	1.4	403
403.65	1.5	433
403.66	1.7	462
403.67	1.8	492
403.68	1.9	522
403.69	2.0	552
403.70	2.1	582
403.71	2.2	613
403.72	2.3	643
403.73	2.4	674
403.74	2.5	704
403.75	2.6	735
403.76	2.7	766
403.77	2.8	797
403.78	3.0	828
403.79	3.1	859
403.80	3.2	890
403.81	3.3	922
403.82	3.4	953
403.83	3.5	985
403.84	3.6	1,017
403.85	3.7	1,049
403.86	3.9	1,081
403.87	4.0	1,113
403.88	4.1	1,145
403.89	4.2	1,177
403.90	4.3	1,210
403.91	4.4	1,242
403.92	4.6	1,275
403.93	4.7	1,308
403.94	4.8	1,340
403.95	4.9	1,373
403.96	5.0	1,406
403.97	5.1	1,440
403.98	5.3	1,473
403.99	5.4	1,506
404.00	5.5	1,540
404.01	5.6	1,574
404.02	5.7	1,607
404.03	5.9	1,641
404.04	6.0	1,675
404.05	6.1	1,709
404.06	6.2	1,744
404.07	6.3	1,778
404.08	6.5	1,812
404.09	6.6	1,847
404.10	6.7	1,882
404.11	6.8	1,916
404.12	7.0	1,951
404.13	7.1	1,986
404.14	7.2	2,021
404.15	7.3	2,057
404.16	7.5	2,092
404.17	7.6	2,127
404.18	7.7	2,163
404.19	7.9	2,199
404.20	8.0	2,234
404.21	8.1	2,270
404.22	8.2	2,306
404.23	8.4	2,342
404.24	8.5	2,379
404.25	8.6	2,415
404.26	8.8	2,451
404.27	8.9	2,488
404.28	9.0	2,525
404.29	9.1	2,561
404.30	9.3	2,598
404.31	9.4	2,635
404.32	9.5	2,673
404.33	9.7	2,710
404.34	9.8	2,747
404.35	9.9	2,785
404.36	10.1	2,822
404.37	10.2	2,860
404.38	10.3	2,898
404.39	10.5	2,936
404.40	10.6	2,974
404.41	10.8	3,012
404.42	10.9	3,050
404.43	11.0	3,088
404.44	11.2	3,127
404.45	11.3	3,165
404.46	11.4	3,204
404.47	11.6	3,243
404.48	11.7	3,282
404.49	11.9	3,321
404.50	**12.0**	**3,360**

Summary for Reach R-4: R-4

Inflow Area = 60.680 ac, 9.13% Impervious, Inflow Depth > 4.84" for 100-yr event
Inflow = 130.82 cfs @ 12.81 hrs, Volume= 24.495 af
Outflow = 129.90 cfs @ 12.89 hrs, Volume= 24.436 af, Atten= 1%, Lag= 5.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.41 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 0.83 fps, Avg. Travel Time= 4.4 min

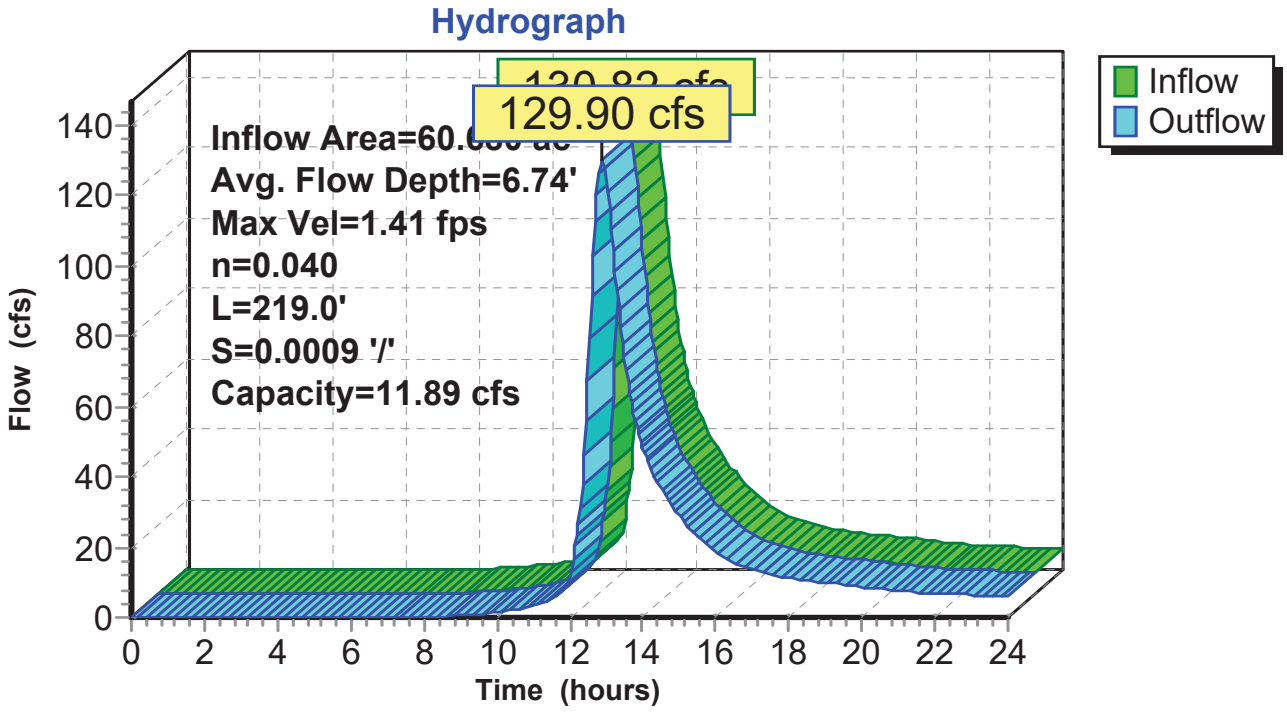
Peak Storage= 20,195 cf @ 12.85 hrs
Average Depth at Peak Storage= 6.74'
Bank-Full Depth= 1.00' Flow Area= 12.0 sf, Capacity= 11.89 cfs

10.00' x 1.00' deep channel, n= 0.040
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 219.0' Slope= 0.0009 '/'
Inlet Invert= 403.20', Outlet Invert= 403.00'



‡

Reach R-4: R-4



Stage-Discharge for Reach R-4: R-4

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
403.20	0.00	0.00
403.21	0.05	0.01
403.22	0.08	0.02
403.23	0.11	0.03
403.24	0.13	0.05
403.25	0.15	0.08
403.26	0.17	0.10
403.27	0.19	0.13
403.28	0.21	0.17
403.29	0.22	0.20
403.30	0.24	0.24
403.31	0.25	0.28
403.32	0.27	0.33
403.33	0.28	0.38
403.34	0.30	0.43
403.35	0.31	0.48
403.36	0.32	0.53
403.37	0.34	0.59
403.38	0.35	0.65
403.39	0.36	0.71
403.40	0.37	0.77
403.41	0.38	0.84
403.42	0.40	0.91
403.43	0.41	0.98
403.44	0.42	1.05
403.45	0.43	1.13
403.46	0.44	1.20
403.47	0.45	1.28
403.48	0.46	1.36
403.49	0.47	1.44
403.50	0.48	1.53
403.51	0.49	1.62
403.52	0.50	1.70
403.53	0.51	1.80
403.54	0.52	1.89
403.55	0.53	1.98
403.56	0.54	2.08
403.57	0.55	2.18
403.58	0.56	2.28
403.59	0.57	2.38
403.60	0.57	2.48
403.61	0.58	2.59
403.62	0.59	2.70
403.63	0.60	2.81
403.64	0.61	2.92
403.65	0.62	3.03
403.66	0.63	3.15
403.67	0.63	3.26
403.68	0.64	3.38
403.69	0.65	3.50
403.70	0.66	3.62
403.71	0.67	3.75
403.72	0.67	3.87
403.73	0.68	4.00
403.74	0.69	4.13
403.75	0.70	4.26
403.76	0.71	4.39
403.77	0.71	4.53
403.78	0.72	4.66
403.79	0.73	4.80
403.80	0.74	4.94
403.81	0.74	5.08
403.82	0.75	5.22
403.83	0.76	5.37
403.84	0.76	5.51
403.85	0.77	5.66
403.86	0.78	5.81
403.87	0.78	5.96
403.88	0.79	6.12
403.89	0.80	6.27
403.90	0.81	6.43
403.91	0.81	6.59
403.92	0.82	6.75
403.93	0.83	6.91
403.94	0.83	7.07
403.95	0.84	7.24
403.96	0.85	7.40
403.97	0.85	7.57
403.98	0.86	7.74
403.99	0.86	7.91
404.00	0.87	8.08
404.01	0.88	8.26
404.02	0.88	8.43
404.03	0.89	8.61
404.04	0.90	8.79
404.05	0.90	8.97
404.06	0.91	9.16
404.07	0.91	9.34
404.08	0.92	9.53
404.09	0.93	9.72
404.10	0.93	9.91
404.11	0.94	10.10
404.12	0.94	10.29
404.13	0.95	10.48
404.14	0.96	10.68
404.15	0.96	10.88
404.16	0.97	11.08
404.17	0.97	11.28
404.18	0.98	11.48
404.19	0.99	11.68
404.20	**0.99**	**11.89**

Stage-Area-Storage for Reach R-4: R-4

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
403.20	0.0	0
403.21	0.1	22
403.22	0.2	44
403.23	0.3	66
403.24	0.4	88
403.25	0.5	111
403.26	0.6	133
403.27	0.7	155
403.28	0.8	178
403.29	0.9	201
403.30	1.0	223
403.31	1.1	246
403.32	1.2	269
403.33	1.3	292
403.34	1.4	315
403.35	1.5	338
403.36	1.7	362
403.37	1.8	385
403.38	1.9	408
403.39	2.0	432
403.40	2.1	456
403.41	2.2	479
403.42	2.3	503
403.43	2.4	527
403.44	2.5	551
403.45	2.6	575
403.46	2.7	599
403.47	2.8	623
403.48	3.0	648
403.49	3.1	672
403.50	3.2	696
403.51	3.3	721
403.52	3.4	746
403.53	3.5	770
403.54	3.6	795
403.55	3.7	820
403.56	3.9	845
403.57	4.0	870
403.58	4.1	895
403.59	4.2	921
403.60	4.3	946
403.61	4.4	972
403.62	4.6	997
403.63	4.7	1,023
403.64	4.8	1,048
403.65	4.9	1,074
403.66	5.0	1,100
403.67	5.1	1,126
403.68	5.3	1,152
403.69	5.4	1,178
403.70	5.5	1,205
403.71	5.6	1,231
403.72	5.7	1,257
403.73	5.9	1,284
403.74	6.0	1,310
403.75	6.1	1,337
403.76	6.2	1,364
403.77	6.3	1,391
403.78	6.5	1,418
403.79	6.6	1,445
403.80	6.7	1,472
403.81	6.8	1,499
403.82	7.0	1,526
403.83	7.1	1,554
403.84	7.2	1,581
403.85	7.3	1,609
403.86	7.5	1,636
403.87	7.6	1,664
403.88	7.7	1,692
403.89	7.9	1,720
403.90	8.0	1,748
403.91	8.1	1,776
403.92	8.2	1,804
403.93	8.4	1,832
403.94	8.5	1,860
403.95	8.6	1,889
403.96	8.8	1,917
403.97	8.9	1,946
403.98	9.0	1,975
403.99	9.1	2,003
404.00	9.3	2,032
404.01	9.4	2,061
404.02	9.5	2,090
404.03	9.7	2,119
404.04	9.8	2,149
404.05	9.9	2,178
404.06	10.1	2,207
404.07	10.2	2,237
404.08	10.3	2,266
404.09	10.5	2,296
404.10	10.6	2,326
404.11	10.8	2,356
404.12	10.9	2,386
404.13	11.0	2,416
404.14	11.2	2,446
404.15	11.3	2,476
404.16	11.4	2,506
404.17	11.6	2,536
404.18	11.7	2,567
404.19	11.9	2,597
404.20	**12.0**	**2,628**

Summary for Pond Pond 1b: Pond 1b

Inflow Area = 16.720 ac, 26.61% Impervious, Inflow Depth > 4.91" for 100-yr event
Inflow = 56.13 cfs @ 12.41 hrs, Volume= 6.845 af
Outflow = 23.56 cfs @ 12.94 hrs, Volume= 6.691 af, Atten= 58%, Lag= 32.2 min
Primary = 23.56 cfs @ 12.94 hrs, Volume= 6.691 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 445.23' @ 12.94 hrs Surf.Area= 36,858 sf Storage= 92,454 cf

Plug-Flow detention time= 56.6 min calculated for 6.691 af (98% of inflow)
Center-of-Mass det. time= 43.9 min (890.3 - 846.4)

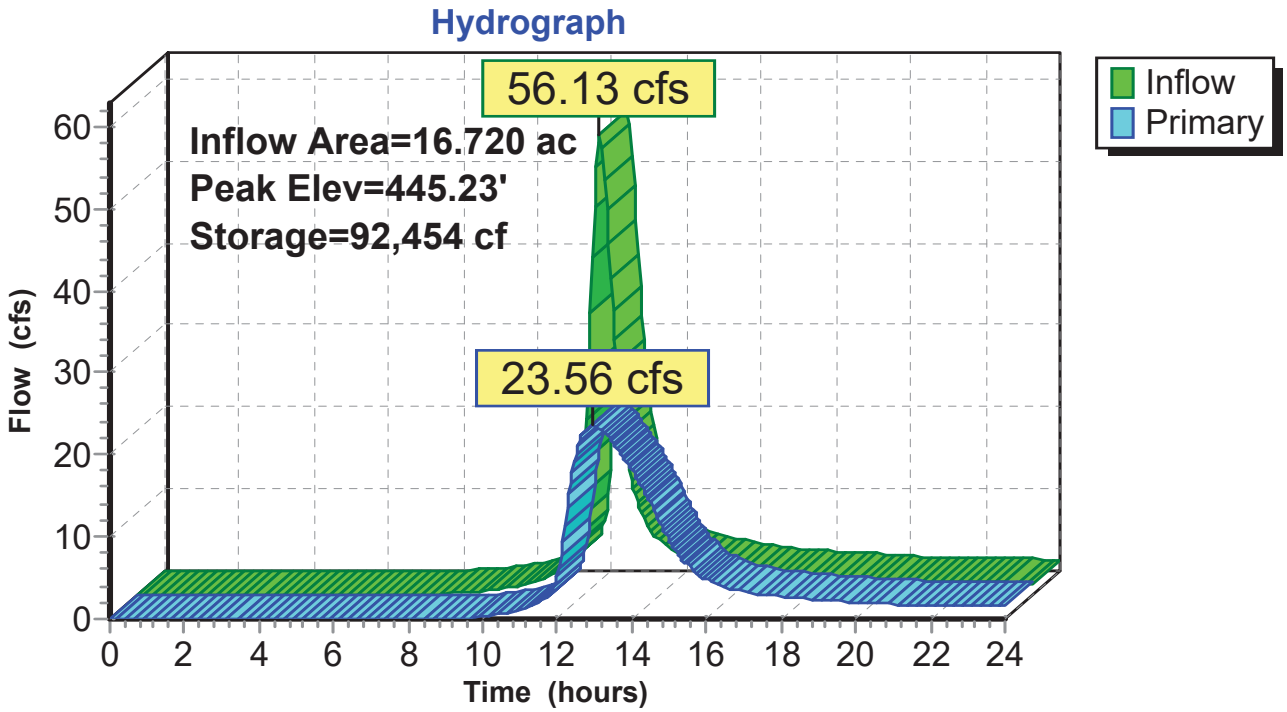
Volume	Invert	Avail.Storage	Storage Description
#1	441.50'	141,234 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
441.50	1,192	0	0
442.00	10,772	2,991	2,991
444.00	34,794	45,566	48,557
446.00	38,163	72,957	121,514
446.50	40,718	19,720	141,234

Device	Routing	Invert	Outlet Devices
#1	Primary	441.80'	**24.0" Vert. Orifice/Grate** C= 0.600
#2	Device 1	441.60'	**25.6 deg x 2.0' long x 4.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.64 (C= 3.30)
#3	Device 1	445.23'	**52.0" W x 64.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	446.40'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=23.55 cfs @ 12.94 hrs HW=445.22' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 23.55 cfs @ 7.50 fps)
  ├**2=Sharp-Crested Vee/Trap Weir** (Passes 23.55 cfs of 60.50 cfs potential flow)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond Pond 1b: Pond 1b



Stage-Discharge for Pond Pond 1b: Pond 1b

Elevation (feet)	Primary (cfs)
441.50	0.00
441.60	0.00
441.70	0.00
441.80	0.00
441.90	0.06
442.00	0.25
442.10	0.55
442.20	0.96
442.30	1.48
442.40	2.09
442.50	2.79
442.60	3.57
442.70	4.43
442.80	5.35
442.90	6.32
443.00	7.34
443.10	8.39
443.20	9.46
443.30	10.54
443.40	11.60
443.50	12.63
443.60	13.60
443.70	14.47
443.80	15.13
443.90	15.87
444.00	16.57
444.10	17.25
444.20	17.90
444.30	18.53
444.40	19.13
444.50	19.72
444.60	20.29
444.70	20.85
444.80	21.39
444.90	21.92
445.00	22.44
445.10	22.94
445.20	23.43
445.30	23.92
445.40	24.39
445.50	24.86
445.60	25.31
445.70	25.76
445.80	26.20
445.90	26.63
446.00	27.06
446.10	27.48
446.20	27.89
446.30	28.30
446.40	28.70
446.50	29.10
446.60	29.49
446.70	29.87
446.80	30.25
446.90	30.63
447.00	31.00
447.10	31.37
447.20	31.73
447.30	32.09
447.40	32.44
447.50	32.79
447.60	33.14
447.70	33.48
447.80	33.82
447.90	34.16
448.00	34.49
448.10	34.82
448.20	35.15
448.30	35.48
448.40	35.80
448.50	36.11
448.60	36.43
448.70	36.74
448.80	37.05
448.90	37.36
449.00	37.67
449.10	37.97
449.20	38.27
449.30	38.57
449.40	38.86
449.50	39.15
449.60	39.45
449.70	39.73
449.80	40.02
449.90	40.31
450.00	40.59
450.10	40.87
450.20	41.15
450.30	41.43
450.40	41.70
450.50	**41.97**

Stage-Area-Storage for Pond Pond 1b: Pond 1b

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
441.50	1,192	0
441.60	3,108	215
441.70	5,024	622
441.80	6,940	1,220
441.90	8,856	2,010
442.00	10,772	2,991
442.10	11,973	4,128
442.20	13,174	5,386
442.30	14,375	6,763
442.40	15,576	8,261
442.50	16,778	9,878
442.60	17,979	11,616
442.70	19,180	13,474
442.80	20,381	15,452
442.90	21,582	17,550
443.00	22,783	19,769
443.10	23,984	22,107
443.20	25,185	24,565
443.30	26,386	27,144
443.40	27,587	29,843
443.50	28,789	32,661
443.60	29,990	35,600
443.70	31,191	38,659
443.80	32,392	41,838
443.90	33,593	45,138
444.00	34,794	48,557
444.10	34,962	52,045
444.20	35,131	55,549
444.30	35,299	59,071
444.40	35,468	62,609
444.50	35,636	66,165
444.60	35,805	69,737
444.70	35,973	73,326
444.80	36,142	76,931
444.90	36,310	80,554
445.00	36,479	84,193
445.10	36,647	87,850
445.20	36,815	91,523
445.30	36,984	95,213
445.40	37,152	98,919
445.50	37,321	102,643
445.60	37,489	106,384
445.70	37,658	110,141
445.80	37,826	113,915
445.90	37,995	117,706
446.00	38,163	121,514
446.10	38,674	125,356
446.20	39,185	129,249
446.30	39,696	133,193
446.40	40,207	137,188
446.50	**40,718**	**141,234**
446.60	40,718	141,234
446.70	40,718	141,234
446.80	40,718	141,234
446.90	40,718	141,234
447.00	40,718	141,234
447.10	40,718	141,234
447.20	40,718	141,234
447.30	40,718	141,234
447.40	40,718	141,234
447.50	40,718	141,234
447.60	40,718	141,234
447.70	40,718	141,234
447.80	40,718	141,234
447.90	40,718	141,234
448.00	40,718	141,234
448.10	40,718	141,234
448.20	40,718	141,234
448.30	40,718	141,234
448.40	40,718	141,234
448.50	40,718	141,234
448.60	40,718	141,234
448.70	40,718	141,234
448.80	40,718	141,234
448.90	40,718	141,234
449.00	40,718	141,234
449.10	40,718	141,234
449.20	40,718	141,234
449.30	40,718	141,234
449.40	40,718	141,234
449.50	40,718	141,234
449.60	40,718	141,234
449.70	40,718	141,234
449.80	40,718	141,234
449.90	40,718	141,234
450.00	40,718	141,234
450.10	40,718	141,234
450.20	40,718	141,234
450.30	40,718	141,234
450.40	40,718	141,234
450.50	40,718	141,234

Summary for Pond Pond 1c: Pond 1c

Inflow Area = 10.630 ac, 0.56% Impervious, Inflow Depth > 4.21" for 100-yr event
Inflow = 35.36 cfs @ 12.30 hrs, Volume= 3.729 af
Outflow = 27.75 cfs @ 12.49 hrs, Volume= 3.585 af, Atten= 22%, Lag= 11.3 min
Primary = 27.75 cfs @ 12.49 hrs, Volume= 3.585 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 413.07' @ 12.49 hrs Surf.Area= 10,012 sf Storage= 31,524 cf

Plug-Flow detention time= 48.9 min calculated for 3.585 af (96% of inflow)
Center-of-Mass det. time= 27.8 min (879.4 - 851.6)

Volume	Invert	Avail.Storage	Storage Description
#1	409.00'	53,054 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

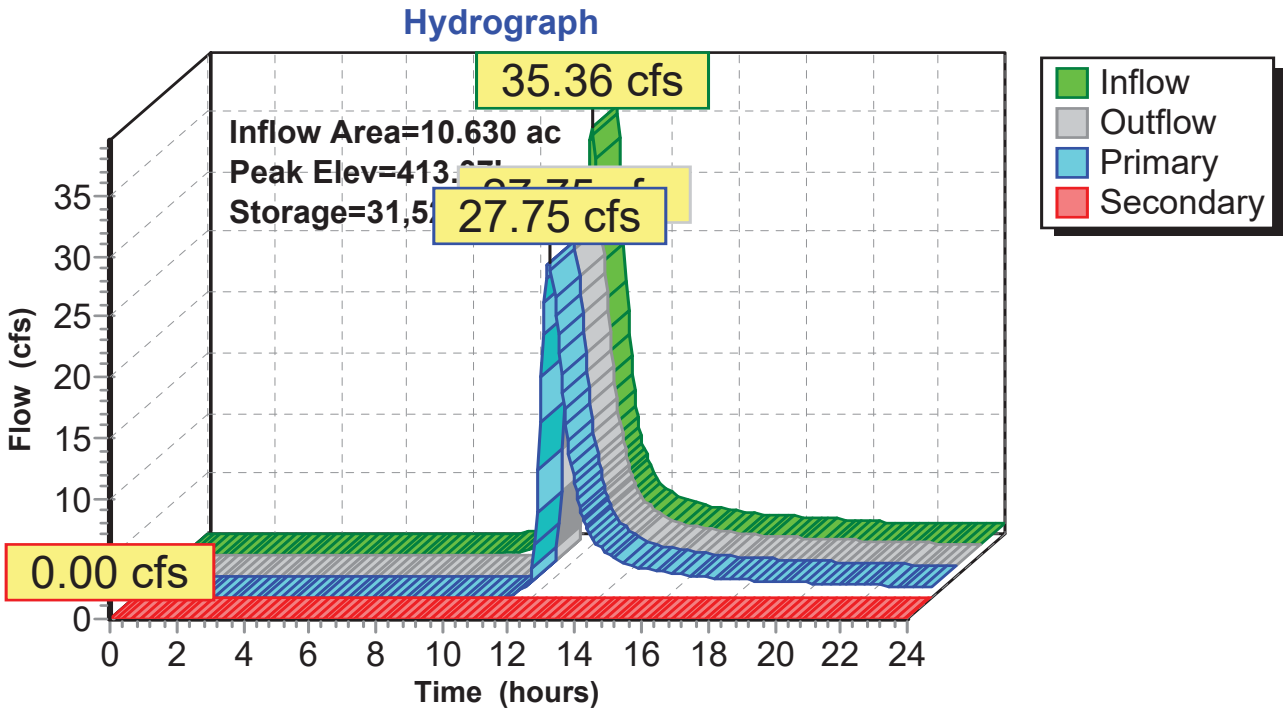
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
409.00	5,642	0	0
410.00	6,603	6,123	6,123
412.00	8,732	15,335	21,458
414.00	11,115	19,847	41,305
415.00	12,383	11,749	53,054

Device	Routing	Invert	Outlet Devices
#1	Primary	408.00'	**24.0" Round Culvert** L= 62.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 408.00' / 407.30' S= 0.0113 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Device 1	409.40'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	410.40'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height
#4	Device 1	413.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#5	Secondary	414.00'	**20.0' long x 14.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.64 2.67 2.70 2.65 2.64 2.65 2.65 2.63

Primary OutFlow Max=27.69 cfs @ 12.49 hrs HW=413.07' (Free Discharge)
- **1=Culvert** (Passes 27.69 cfs of 30.52 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 3.07 cfs @ 8.80 fps)
  - **3=Sharp-Crested Rectangular Weir** (Weir Controls 24.52 cfs @ 6.26 fps)
  - **4=Orifice/Grate** (Orifice Controls 0.10 cfs @ 0.85 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=409.00' (Free Discharge)
- **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 1c: Pond 1c



Stage-Discharge for Pond Pond 1c: Pond 1c

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
409.00	0.00	0.00	0.00
409.10	0.00	0.00	0.00
409.20	0.00	0.00	0.00
409.30	0.00	0.00	0.00
409.40	0.00	0.00	0.00
409.50	0.04	0.04	0.00
409.60	0.13	0.13	0.00
409.70	0.28	0.28	0.00
409.80	0.47	0.47	0.00
409.90	0.68	0.68	0.00
410.00	0.87	0.87	0.00
410.10	1.02	1.02	0.00
410.20	1.15	1.15	0.00
410.30	1.27	1.27	0.00
410.40	1.37	1.37	0.00
410.50	1.68	1.68	0.00
410.60	2.15	2.15	0.00
410.70	2.72	2.72	0.00
410.80	3.37	3.37	0.00
410.90	4.08	4.08	0.00
411.00	4.86	4.86	0.00
411.10	5.69	5.69	0.00
411.20	6.56	6.56	0.00
411.30	7.48	7.48	0.00
411.40	8.43	8.43	0.00
411.50	9.42	9.42	0.00
411.60	10.45	10.45	0.00
411.70	11.50	11.50	0.00
411.80	12.57	12.57	0.00
411.90	13.67	13.67	0.00
412.00	14.79	14.79	0.00
412.10	15.93	15.93	0.00
412.20	17.09	17.09	0.00
412.30	18.26	18.26	0.00
412.40	19.45	19.45	0.00
412.50	20.64	20.64	0.00
412.60	21.85	21.85	0.00
412.70	23.06	23.06	0.00
412.80	24.28	24.28	0.00
412.90	25.50	25.50	0.00
413.00	26.72	26.72	0.00
413.10	28.12	28.12	0.00
413.20	29.66	29.66	0.00
413.30	31.28	31.28	0.00
413.40	31.73	31.73	0.00
413.50	32.09	32.09	0.00
413.60	32.44	32.44	0.00
413.70	32.79	32.79	0.00
413.80	33.14	33.14	0.00
413.90	33.48	33.48	0.00
414.00	33.82	33.82	0.00
414.10	35.83	34.16	1.67
414.20	39.22	34.49	4.72
414.30	43.55	34.82	8.73
414.40	48.66	35.15	13.51
414.50	54.46	35.48	18.99
414.60	60.89	35.80	25.10
414.70	67.45	36.11	31.33
414.80	74.35	36.43	37.92
414.90	81.91	36.74	45.17
415.00	89.85	37.05	52.80
415.10	98.39	37.36	61.03
415.20	107.34	37.67	69.67
415.30	116.53	37.97	78.56
415.40	126.06	38.27	87.79
415.50	135.57	38.57	97.00
415.60	145.32	38.86	106.45
415.70	155.74	39.15	116.59
415.80	166.47	39.45	127.03
415.90	177.49	39.73	137.76
416.00	188.80	40.02	148.78
416.10	**200.38**	**40.31**	**160.07**

Stage-Area-Storage for Pond Pond 1c: Pond 1c

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
409.00	5,642	0
409.10	5,738	569
409.20	5,834	1,148
409.30	5,930	1,736
409.40	6,026	2,334
409.50	6,123	2,941
409.60	6,219	3,558
409.70	6,315	4,185
409.80	6,411	4,821
409.90	6,507	5,467
410.00	6,603	6,123
410.10	6,709	6,788
410.20	6,816	7,464
410.30	6,922	8,151
410.40	7,029	8,849
410.50	7,135	9,557
410.60	7,242	10,276
410.70	7,348	11,005
410.80	7,455	11,746
410.90	7,561	12,496
411.00	7,668	13,258
411.10	7,774	14,030
411.20	7,880	14,813
411.30	7,987	15,606
411.40	8,093	16,410
411.50	8,200	17,225
411.60	8,306	18,050
411.70	8,413	18,886
411.80	8,519	19,732
411.90	8,626	20,590
412.00	8,732	21,458
412.10	8,851	22,337
412.20	8,970	23,228
412.30	9,089	24,131
412.40	9,209	25,046
412.50	9,328	25,972
412.60	9,447	26,911
412.70	9,566	27,862
412.80	9,685	28,824
412.90	9,804	29,799
413.00	9,924	30,785
413.10	10,043	31,784
413.20	10,162	32,794
413.30	10,281	33,816
413.40	10,400	34,850
413.50	10,519	35,896
413.60	10,638	36,954
413.70	10,758	38,024
413.80	10,877	39,105
413.90	10,996	40,199
414.00	11,115	41,305
414.10	11,242	42,422
414.20	11,369	43,553
414.30	11,495	44,696
414.40	11,622	45,852
414.50	11,749	47,021
414.60	11,876	48,202
414.70	12,003	49,396
414.80	12,129	50,602
414.90	12,256	51,822
415.00	**12,383**	**53,054**
415.10	12,383	53,054
415.20	12,383	53,054
415.30	12,383	53,054
415.40	12,383	53,054
415.50	12,383	53,054
415.60	12,383	53,054
415.70	12,383	53,054
415.80	12,383	53,054
415.90	12,383	53,054
416.00	12,383	53,054
416.10	12,383	53,054

Summary for Pond Pond 1d: Pond 1d

Inflow Area = 6.230 ac, 4.01% Impervious, Inflow Depth > 4.57" for 100-yr event
Inflow = 23.24 cfs @ 12.28 hrs, Volume= 2.371 af
Outflow = 4.63 cfs @ 13.07 hrs, Volume= 2.172 af, Atten= 80%, Lag= 47.5 min
Primary = 4.63 cfs @ 13.07 hrs, Volume= 2.172 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 411.65' @ 13.07 hrs Surf.Area= 22,979 sf Storage= 50,060 cf

Plug-Flow detention time= 203.7 min calculated for 2.172 af (92% of inflow)
Center-of-Mass det. time= 161.3 min (1,005.9 - 844.6)

Volume	Invert	Avail.Storage	Storage Description
#1	408.00'	209,097 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

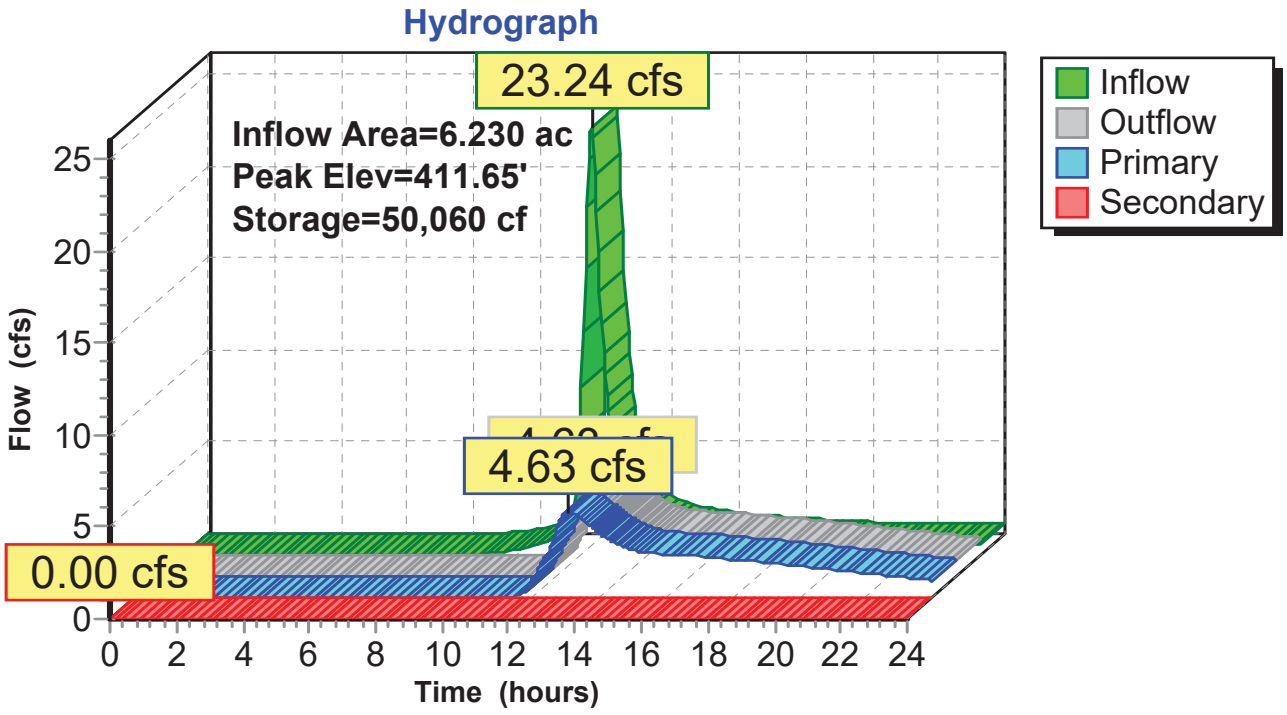
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
408.00	800	0	0
410.00	16,607	17,407	17,407
412.00	24,332	40,939	58,346
414.00	28,916	53,248	111,594
416.00	33,677	62,593	174,187
417.00	36,142	34,910	209,097

Device	Routing	Invert	Outlet Devices
#1	Primary	408.00'	**24.0" Round Culvert** L= 235.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 408.00' / 406.00' S= 0.0085 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	408.75'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	411.20'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 2.0' Crest Height
#4	Device 1	414.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#5	Secondary	416.00'	**35.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=4.63 cfs @ 13.07 hrs HW=411.65' (Free Discharge)
└**1=Culvert** (Passes 4.63 cfs of 24.62 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 2.69 cfs @ 7.71 fps)
  ├**3=Sharp-Crested Rectangular Weir** (Weir Controls 1.93 cfs @ 2.25 fps)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=408.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 1d: Pond 1d



Stage-Discharge for Pond Pond 1d: Pond 1d

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
408.00	0.00	0.00	0.00
408.10	0.00	0.00	0.00
408.20	0.00	0.00	0.00
408.30	0.00	0.00	0.00
408.40	0.00	0.00	0.00
408.50	0.00	0.00	0.00
408.60	0.00	0.00	0.00
408.70	0.00	0.00	0.00
408.80	0.01	0.01	0.00
408.90	0.08	0.08	0.00
409.00	0.20	0.20	0.00
409.10	0.37	0.37	0.00
409.20	0.57	0.57	0.00
409.30	0.78	0.78	0.00
409.40	0.95	0.95	0.00
409.50	1.08	1.08	0.00
409.60	1.21	1.21	0.00
409.70	1.32	1.32	0.00
409.80	1.42	1.42	0.00
409.90	1.52	1.52	0.00
410.00	1.61	1.61	0.00
410.10	1.69	1.69	0.00
410.20	1.78	1.78	0.00
410.30	1.85	1.85	0.00
410.40	1.93	1.93	0.00
410.50	2.00	2.00	0.00
410.60	2.07	2.07	0.00
410.70	2.14	2.14	0.00
410.80	2.20	2.20	0.00
410.90	2.27	2.27	0.00
411.00	2.33	2.33	0.00
411.10	2.39	2.39	0.00
411.20	2.45	2.45	0.00
411.30	2.71	2.71	0.00
411.40	3.14	3.14	0.00
411.50	3.67	3.67	0.00
411.60	4.29	4.29	0.00
411.70	4.98	4.98	0.00
411.80	5.73	5.73	0.00
411.90	6.54	6.54	0.00
412.00	7.39	7.39	0.00
412.10	8.28	8.28	0.00
412.20	9.21	9.21	0.00
412.30	10.18	10.18	0.00
412.40	11.18	11.18	0.00
412.50	12.21	12.21	0.00
412.60	13.27	13.27	0.00
412.70	14.35	14.35	0.00
412.80	15.45	15.45	0.00
412.90	16.57	16.57	0.00
413.00	17.70	17.70	0.00
413.10	18.85	18.85	0.00
413.20	20.02	20.02	0.00
413.30	21.19	21.19	0.00
413.40	22.38	22.38	0.00
413.50	23.57	23.57	0.00
413.60	24.76	24.76	0.00
413.70	25.96	25.96	0.00
413.80	27.17	27.17	0.00
413.90	28.37	28.37	0.00
414.00	29.57	29.57	0.00
414.10	30.94	30.94	0.00
414.20	32.44	32.44	0.00
414.30	34.04	34.04	0.00
414.40	35.15	35.15	0.00
414.50	35.48	35.48	0.00
414.60	35.80	35.80	0.00
414.70	36.11	36.11	0.00
414.80	36.43	36.43	0.00
414.90	36.74	36.74	0.00
415.00	37.05	37.05	0.00
415.10	37.36	37.36	0.00
415.20	37.62	37.62	0.00
415.30	37.88	37.88	0.00
415.40	38.14	38.14	0.00
415.50	38.40	38.40	0.00
415.60	38.65	38.65	0.00
415.70	38.91	38.91	0.00
415.80	39.16	39.16	0.00
415.90	39.41	39.41	0.00
416.00	39.66	39.66	0.00
416.10	42.75	39.91	2.84
416.20	48.20	40.15	8.05
416.30	55.32	40.39	14.92
416.40	63.84	40.64	23.20
416.50	73.79	40.88	32.92
416.60	85.04	41.12	43.92
416.70	96.39	41.36	55.04
416.80	108.46	41.59	66.87
416.90	121.47	41.83	79.64
417.00	135.16	42.06	93.10
417.10	**149.91**	**42.30**	**107.61**

Stage-Area-Storage for Pond Pond 1d: Pond 1d

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
408.00	800	0
408.10	1,590	120
408.20	2,381	318
408.30	3,171	596
408.40	3,961	952
408.50	4,752	1,388
408.60	5,542	1,903
408.70	6,332	2,496
408.80	7,123	3,169
408.90	7,913	3,921
409.00	8,704	4,752
409.10	9,494	5,662
409.20	10,284	6,651
409.30	11,075	7,718
409.40	11,865	8,865
409.50	12,655	10,091
409.60	13,446	11,396
409.70	14,236	12,781
409.80	15,026	14,244
409.90	15,817	15,786
410.00	16,607	17,407
410.10	16,993	19,087
410.20	17,379	20,806
410.30	17,766	22,563
410.40	18,152	24,359
410.50	18,538	26,193
410.60	18,925	28,066
410.70	19,311	29,978
410.80	19,697	31,929
410.90	20,083	33,918
411.00	20,470	35,945
411.10	20,856	38,012
411.20	21,242	40,116
411.30	21,628	42,260
411.40	22,014	44,442
411.50	22,401	46,663
411.60	22,787	48,922
411.70	23,173	51,220
411.80	23,560	53,557
411.90	23,946	55,932
412.00	24,332	58,346
412.10	24,561	60,791
412.20	24,790	63,258
412.30	25,020	65,749
412.40	25,249	68,262
412.50	25,478	70,799
412.60	25,707	73,358
412.70	25,936	75,940
412.80	26,166	78,545
412.90	26,395	81,173
413.00	26,624	83,824
413.10	26,853	86,498
413.20	27,082	89,195
413.30	27,312	91,914
413.40	27,541	94,657
413.50	27,770	97,423
413.60	27,999	100,211
413.70	28,228	103,022
413.80	28,458	105,857
413.90	28,687	108,714
414.00	28,916	111,594
414.10	29,154	114,498
414.20	29,392	117,425
414.30	29,630	120,376
414.40	29,868	123,351
414.50	30,106	126,350
414.60	30,344	129,372
414.70	30,582	132,418
414.80	30,820	135,489
414.90	31,058	138,583
415.00	31,297	141,700
415.10	31,535	144,842
415.20	31,773	148,007
415.30	32,011	151,196
415.40	32,249	154,409
415.50	32,487	157,646
415.60	32,725	160,907
415.70	32,963	164,191
415.80	33,201	167,499
415.90	33,439	170,831
416.00	33,677	174,187
416.10	33,924	177,567
416.20	34,170	180,972
416.30	34,417	184,401
416.40	34,663	187,855
416.50	34,910	191,334
416.60	35,156	194,837
416.70	35,402	198,365
416.80	35,649	201,917
416.90	35,895	205,495
417.00	**36,142**	**209,097**
417.10	36,142	209,097

Summary for Pond Pond 1e: Pond 1e

Inflow Area = 1.060 ac, 65.09% Impervious, Inflow Depth > 6.76" for 100-yr event
Inflow = 10.55 cfs @ 12.00 hrs, Volume= 0.597 af
Outflow = 7.41 cfs @ 12.09 hrs, Volume= 0.378 af, Atten= 30%, Lag= 5.3 min
Primary = 7.41 cfs @ 12.09 hrs, Volume= 0.378 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 406.63' @ 12.09 hrs Surf.Area= 8,231 sf Storage= 11,660 cf

Plug-Flow detention time= 181.8 min calculated for 0.378 af (63% of inflow)
Center-of-Mass det. time= 81.0 min (867.8 - 786.8)

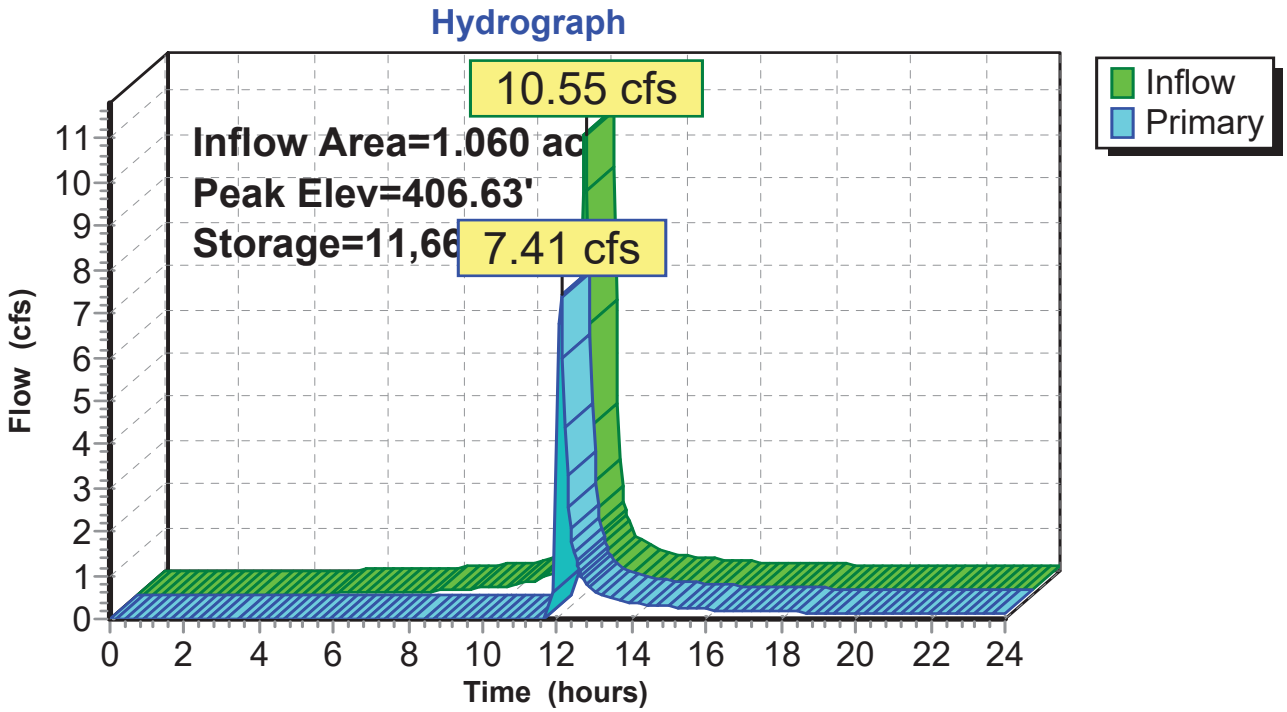
Volume	Invert	Avail.Storage	Storage Description
#1	405.00'	12,667 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
405.00	6,101	0	0
406.00	7,395	6,748	6,748
406.35	7,857	2,669	9,417
406.75	8,394	3,250	12,667

Device	Routing	Invert	Outlet Devices
#1	Primary	406.35'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=7.24 cfs @ 12.09 hrs HW=406.62' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 7.24 cfs @ 1.32 fps)

Pond Pond 1e: Pond 1e



Stage-Discharge for Pond Pond 1e: Pond 1e

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
405.00	0.00	405.53	0.00	406.06	0.00	406.59	5.89
405.01	0.00	405.54	0.00	406.07	0.00	406.60	6.27
405.02	0.00	405.55	0.00	406.08	0.00	406.61	6.66
405.03	0.00	405.56	0.00	406.09	0.00	406.62	7.06
405.04	0.00	405.57	0.00	406.10	0.00	406.63	7.46
405.05	0.00	405.58	0.00	406.11	0.00	406.64	7.88
405.06	0.00	405.59	0.00	406.12	0.00	406.65	8.30
405.07	0.00	405.60	0.00	406.13	0.00	406.66	8.73
405.08	0.00	405.61	0.00	406.14	0.00	406.67	9.17
405.09	0.00	405.62	0.00	406.15	0.00	406.68	9.61
405.10	0.00	405.63	0.00	406.16	0.00	406.69	10.07
405.11	0.00	405.64	0.00	406.17	0.00	406.70	10.53
405.12	0.00	405.65	0.00	406.18	0.00	406.71	11.00
405.13	0.00	405.66	0.00	406.19	0.00	406.72	11.48
405.14	0.00	405.67	0.00	406.20	0.00	406.73	11.96
405.15	0.00	405.68	0.00	406.21	0.00	406.74	12.45
405.16	0.00	405.69	0.00	406.22	0.00	406.75	**12.95**
405.17	0.00	405.70	0.00	406.23	0.00		
405.18	0.00	405.71	0.00	406.24	0.00		
405.19	0.00	405.72	0.00	406.25	0.00		
405.20	0.00	405.73	0.00	406.26	0.00		
405.21	0.00	405.74	0.00	406.27	0.00		
405.22	0.00	405.75	0.00	406.28	0.00		
405.23	0.00	405.76	0.00	406.29	0.00		
405.24	0.00	405.77	0.00	406.30	0.00		
405.25	0.00	405.78	0.00	406.31	0.00		
405.26	0.00	405.79	0.00	406.32	0.00		
405.27	0.00	405.80	0.00	406.33	0.00		
405.28	0.00	405.81	0.00	406.34	0.00		
405.29	0.00	405.82	0.00	406.35	0.00		
405.30	0.00	405.83	0.00	406.36	0.05		
405.31	0.00	405.84	0.00	406.37	0.14		
405.32	0.00	405.85	0.00	406.38	0.26		
405.33	0.00	405.86	0.00	406.39	0.40		
405.34	0.00	405.87	0.00	406.40	0.56		
405.35	0.00	405.88	0.00	406.41	0.73		
405.36	0.00	405.89	0.00	406.42	0.92		
405.37	0.00	405.90	0.00	406.43	1.13		
405.38	0.00	405.91	0.00	406.44	1.34		
405.39	0.00	405.92	0.00	406.45	1.57		
405.40	0.00	405.93	0.00	406.46	1.82		
405.41	0.00	405.94	0.00	406.47	2.07		
405.42	0.00	405.95	0.00	406.48	2.33		
405.43	0.00	405.96	0.00	406.49	2.61		
405.44	0.00	405.97	0.00	406.50	2.89		
405.45	0.00	405.98	0.00	406.51	3.19		
405.46	0.00	405.99	0.00	406.52	3.49		
405.47	0.00	406.00	0.00	406.53	3.80		
405.48	0.00	406.01	0.00	406.54	4.12		
405.49	0.00	406.02	0.00	406.55	4.45		
405.50	0.00	406.03	0.00	406.56	4.80		
405.51	0.00	406.04	0.00	406.57	5.15		
405.52	0.00	406.05	0.00	406.58	5.52		

Stage-Area-Storage for Pond Pond 1e: Pond 1e

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
405.00	6,101	0
405.02	6,127	122
405.04	6,153	245
405.06	6,179	368
405.08	6,205	492
405.10	6,230	617
405.12	6,256	741
405.14	6,282	867
405.16	6,308	993
405.18	6,334	1,119
405.20	6,360	1,246
405.22	6,386	1,374
405.24	6,412	1,502
405.26	6,437	1,630
405.28	6,463	1,759
405.30	6,489	1,889
405.32	6,515	2,019
405.34	6,541	2,149
405.36	6,567	2,280
405.38	6,593	2,412
405.40	6,619	2,544
405.42	6,644	2,677
405.44	6,670	2,810
405.46	6,696	2,943
405.48	6,722	3,078
405.50	6,748	3,212
405.52	6,774	3,347
405.54	6,800	3,483
405.56	6,826	3,619
405.58	6,852	3,756
405.60	6,877	3,894
405.62	6,903	4,031
405.64	6,929	4,170
405.66	6,955	4,308
405.68	6,981	4,448
405.70	7,007	4,588
405.72	7,033	4,728
405.74	7,059	4,869
405.76	7,084	5,010
405.78	7,110	5,152
405.80	7,136	5,295
405.82	7,162	5,438
405.84	7,188	5,581
405.86	7,214	5,725
405.88	7,240	5,870
405.90	7,266	6,015
405.92	7,291	6,161
405.94	7,317	6,307
405.96	7,343	6,453
405.98	7,369	6,600
406.00	7,395	6,748
406.02	7,421	6,896
406.04	7,448	7,045
406.06	7,474	7,194
406.08	7,501	7,344
406.10	7,527	7,494
406.12	7,553	7,645
406.14	7,580	7,796
406.16	7,606	7,948
406.18	7,633	8,100
406.20	7,659	8,253
406.22	7,685	8,407
406.24	7,712	8,561
406.26	7,738	8,715
406.28	7,765	8,870
406.30	7,791	9,026
406.32	7,817	9,182
406.34	7,844	9,339
406.36	7,870	9,496
406.38	7,897	9,653
406.40	7,924	9,812
406.42	7,951	9,970
406.44	7,978	10,130
406.46	8,005	10,289
406.48	8,032	10,450
406.50	8,058	10,611
406.52	8,085	10,772
406.54	8,112	10,934
406.56	8,139	11,097
406.58	8,166	11,260
406.60	8,193	11,423
406.62	8,219	11,587
406.64	8,246	11,752
406.66	8,273	11,917
406.68	8,300	12,083
406.70	8,327	12,249
406.72	8,354	12,416
406.74	**8,381**	**12,583**

Summary for Pond Pond 3: Pond 3

Inflow Area = 4.790 ac, 0.00% Impervious, Inflow Depth > 3.86" for 100-yr event
Inflow = 16.55 cfs @ 12.23 hrs, Volume= 1.542 af
Outflow = 10.55 cfs @ 12.45 hrs, Volume= 1.369 af, Atten= 36%, Lag= 13.5 min
Primary = 10.55 cfs @ 12.45 hrs, Volume= 1.369 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 426.27' @ 12.45 hrs Surf.Area= 7,161 sf Storage= 18,222 cf

Plug-Flow detention time= 87.9 min calculated for 1.369 af (89% of inflow)
Center-of-Mass det. time= 33.9 min (886.8 - 852.9)

Volume	Invert	Avail.Storage	Storage Description
#1	423.00'	36,852 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

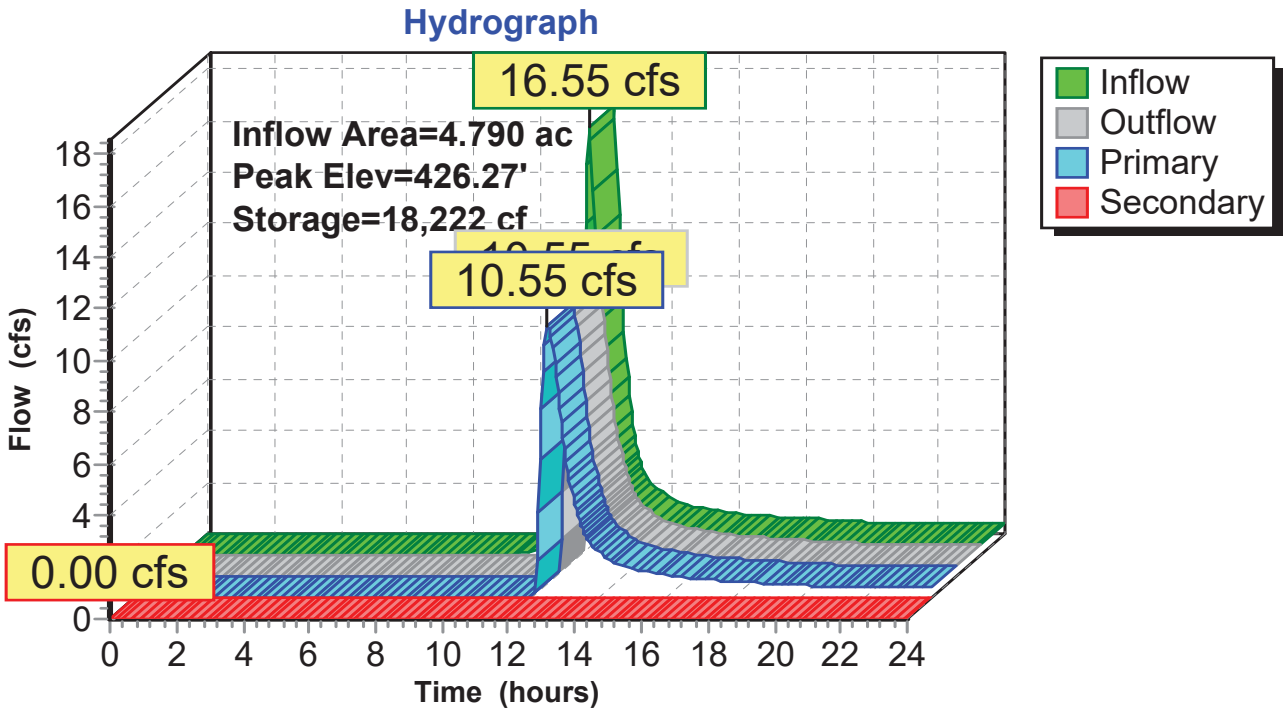
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
423.00	4,083	0	0
424.00	4,941	4,512	4,512
426.00	6,873	11,814	16,326
428.00	9,007	15,880	32,206
428.50	9,575	4,646	36,852

Device	Routing	Invert	Outlet Devices
#1	Primary	423.00'	**18.0" Round Culvert** L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 423.00' / 422.00' S= 0.0217 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	424.40'	**1.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.9' Crest Height
#3	Device 1	427.00'	**20.4" W x 37.2" H Vert. Orifice/Grate** C= 0.600
#4	Secondary	427.50'	**25.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=10.54 cfs @ 12.45 hrs HW=426.27' (Free Discharge)
└**1=Culvert** (Passes 10.54 cfs of 13.50 cfs potential flow)
  └**2=Sharp-Crested Rectangular Weir** (Weir Controls 10.54 cfs @ 5.01 fps)
  └**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=423.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Pond 3: Pond 3

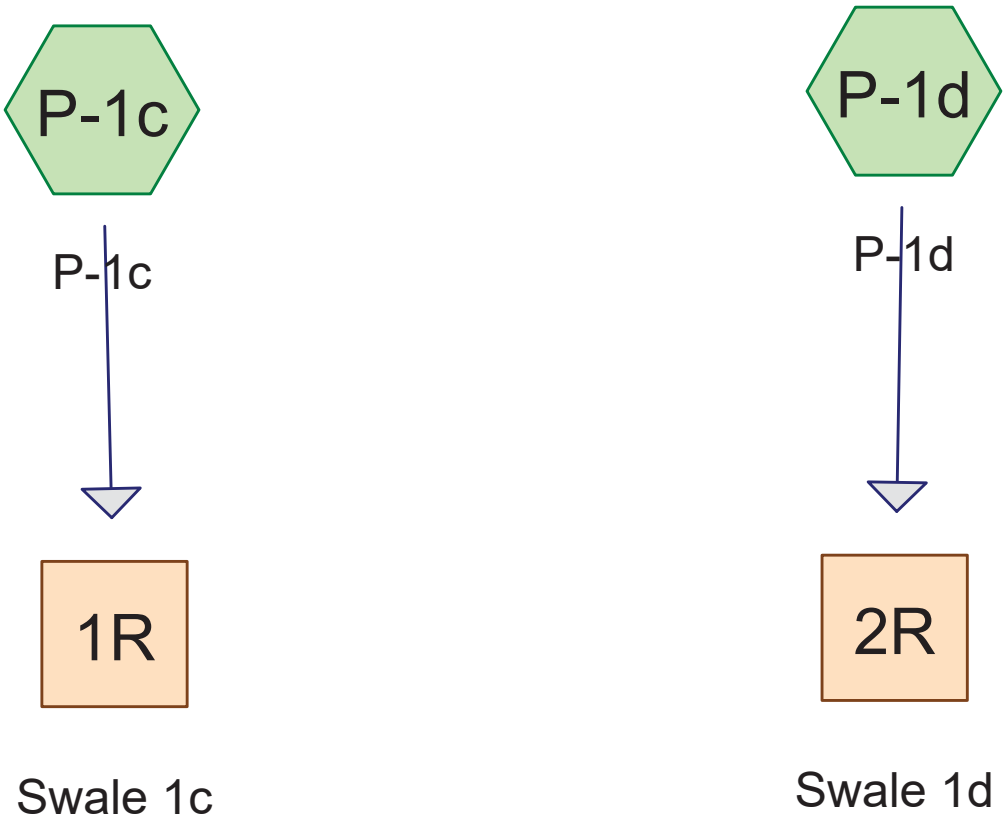


Stage-Discharge for Pond Pond 3: Pond 3

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
423.00	0.00	0.00	0.00
423.10	0.00	0.00	0.00
423.20	0.00	0.00	0.00
423.30	0.00	0.00	0.00
423.40	0.00	0.00	0.00
423.50	0.00	0.00	0.00
423.60	0.00	0.00	0.00
423.70	0.00	0.00	0.00
423.80	0.00	0.00	0.00
423.90	0.00	0.00	0.00
424.00	0.00	0.00	0.00
424.10	0.00	0.00	0.00
424.20	0.00	0.00	0.00
424.30	0.00	0.00	0.00
424.40	0.00	0.00	0.00
424.50	0.15	0.15	0.00
424.60	0.43	0.43	0.00
424.70	0.79	0.79	0.00
424.80	1.20	1.20	0.00
424.90	1.67	1.67	0.00
425.00	2.18	2.18	0.00
425.10	2.72	2.72	0.00
425.20	3.30	3.30	0.00
425.30	3.90	3.90	0.00
425.40	4.52	4.52	0.00
425.50	5.17	5.17	0.00
425.60	5.83	5.83	0.00
425.70	6.51	6.51	0.00
425.80	7.20	7.20	0.00
425.90	7.91	7.91	0.00
426.00	8.61	8.61	0.00
426.10	9.33	9.33	0.00
426.20	10.05	10.05	0.00
426.30	10.77	10.77	0.00
426.40	11.48	11.48	0.00
426.50	12.20	12.20	0.00
426.60	12.91	12.91	0.00
426.70	13.62	13.62	0.00
426.80	14.32	14.32	0.00
426.90	15.01	15.01	0.00
427.00	15.34	15.34	0.00
427.10	15.57	15.57	0.00
427.20	15.80	15.80	0.00
427.30	16.03	16.03	0.00
427.40	16.26	16.26	0.00
427.50	16.48	16.48	0.00
427.60	18.73	16.70	2.03
427.70	22.66	16.91	5.75
427.80	27.78	17.12	10.66
427.90	33.90	17.33	16.57
428.00	41.05	17.54	23.51
428.10	49.12	17.75	31.37
428.20	57.26	17.95	39.31
428.30	65.91	18.15	47.76
428.40	75.23	18.35	56.89
428.50	85.04	18.54	66.50
428.60	95.60	18.74	76.86
428.70	106.68	18.93	87.75
428.80	117.87	19.12	98.75
428.90	129.47	19.31	110.16
429.00	141.21	19.50	121.71
429.10	153.26	19.68	133.57
429.20	166.15	19.86	146.29
429.30	179.43	20.05	159.39
429.40	193.08	20.23	172.85
429.50	207.08	20.40	186.68
429.60	221.43	20.58	200.85
429.70	236.12	20.76	215.37
429.80	251.14	20.93	230.22
429.90	266.49	21.10	245.39
430.00	282.16	21.27	260.89
430.10	**298.14**	**21.44**	**276.70**

Stage-Area-Storage for Pond Pond 3: Pond 3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
423.00	4,083	0
423.10	4,169	413
423.20	4,255	834
423.30	4,340	1,264
423.40	4,426	1,702
423.50	4,512	2,149
423.60	4,598	2,604
423.70	4,684	3,068
423.80	4,769	3,541
423.90	4,855	4,022
424.00	4,941	4,512
424.10	5,038	5,011
424.20	5,134	5,520
424.30	5,231	6,038
424.40	5,327	6,566
424.50	5,424	7,103
424.60	5,521	7,650
424.70	5,617	8,207
424.80	5,714	8,774
424.90	5,810	9,350
425.00	5,907	9,936
425.10	6,004	10,532
425.20	6,100	11,137
425.30	6,197	11,752
425.40	6,293	12,376
425.50	6,390	13,010
425.60	6,487	13,654
425.70	6,583	14,308
425.80	6,680	14,971
425.90	6,776	15,644
426.00	6,873	16,326
426.10	6,980	17,019
426.20	7,086	17,722
426.30	7,193	18,436
426.40	7,300	19,161
426.50	7,407	19,896
426.60	7,513	20,642
426.70	7,620	21,399
426.80	7,727	22,166
426.90	7,833	22,944
427.00	7,940	23,733
427.10	8,047	24,532
427.20	8,153	25,342
427.30	8,260	26,163
427.40	8,367	26,994
427.50	8,474	27,836
427.60	8,580	28,689
427.70	8,687	29,552
427.80	8,794	30,426
427.90	8,900	31,311
428.00	9,007	32,206
428.10	9,121	33,112
428.20	9,234	34,030
428.30	9,348	34,959
428.40	9,461	35,900
428.50	**9,575**	**36,852**
428.60	9,575	36,852
428.70	9,575	36,852
428.80	9,575	36,852
428.90	9,575	36,852
429.00	9,575	36,852
429.10	9,575	36,852
429.20	9,575	36,852
429.30	9,575	36,852
429.40	9,575	36,852
429.50	9,575	36,852
429.60	9,575	36,852
429.70	9,575	36,852
429.80	9,575	36,852
429.90	9,575	36,852
430.00	9,575	36,852
430.10	9,575	36,852



Subcat Reach Pond Link

Routing Diagram for 1903601 - Swales
Prepared by Microsoft, Printed 4/7/2020
HydroCAD® 10.00-22 s/n 10621 © 2018 HydroCAD Software Solutions LLC

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1c: P-1c Runoff Area=10.570 ac 0.00% Impervious Runoff Depth>0.73"
Flow Length=660' Tc=15.8 min CN=64 Runoff=8.26 cfs 0.644 af

Subcatchment P-1d: P-1d Runoff Area=6.410 ac 5.46% Impervious Runoff Depth>0.88"
Flow Length=74' Slope=0.0330 '/' Tc=8.7 min CN=67 Runoff=8.46 cfs 0.471 af

Reach 1R: Swale 1c Avg. Flow Depth=0.32' Max Vel=2.75 fps Inflow=8.26 cfs 0.644 af
n=0.030 L=600.0' S=0.0167 '/' Capacity=219.36 cfs Outflow=7.65 cfs 0.639 af

Reach 2R: Swale 1d Avg. Flow Depth=0.36' Max Vel=3.13 fps Inflow=8.46 cfs 0.471 af
n=0.030 L=423.0' S=0.0189 '/' Capacity=193.43 cfs Outflow=7.81 cfs 0.468 af

Summary for Subcatchment P-1c: P-1c

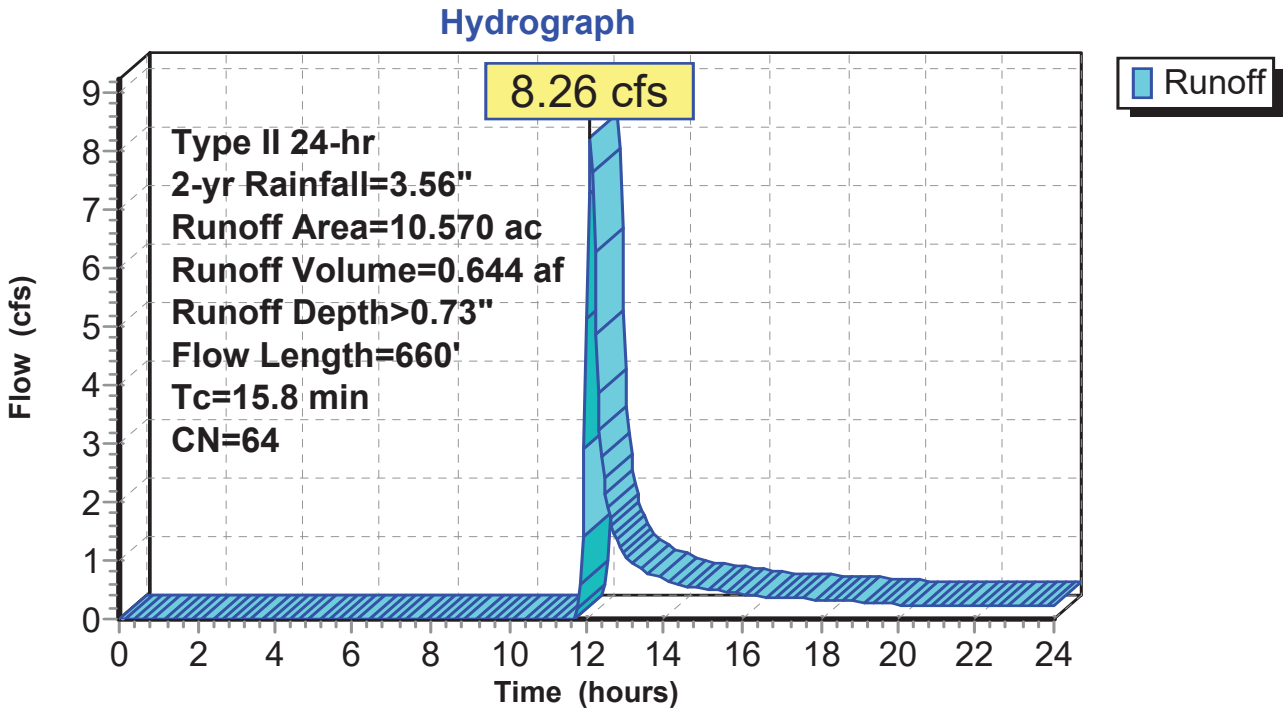
Runoff = 8.26 cfs @ 12.11 hrs, Volume= 0.644 af, Depth> 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.56"

Area (ac)	CN	Description
9.160	61	>75% Grass cover, Good, HSG B
1.410	80	>75% Grass cover, Good, HSG D
10.570	64	Weighted Average
10.570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.2330	0.36		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
1.3	126	0.0550	1.64		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
7.5	384	0.0150	0.86		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
15.8	660	Total			

Subcatchment P-1c: P-1c



Summary for Subcatchment P-1d: P-1d

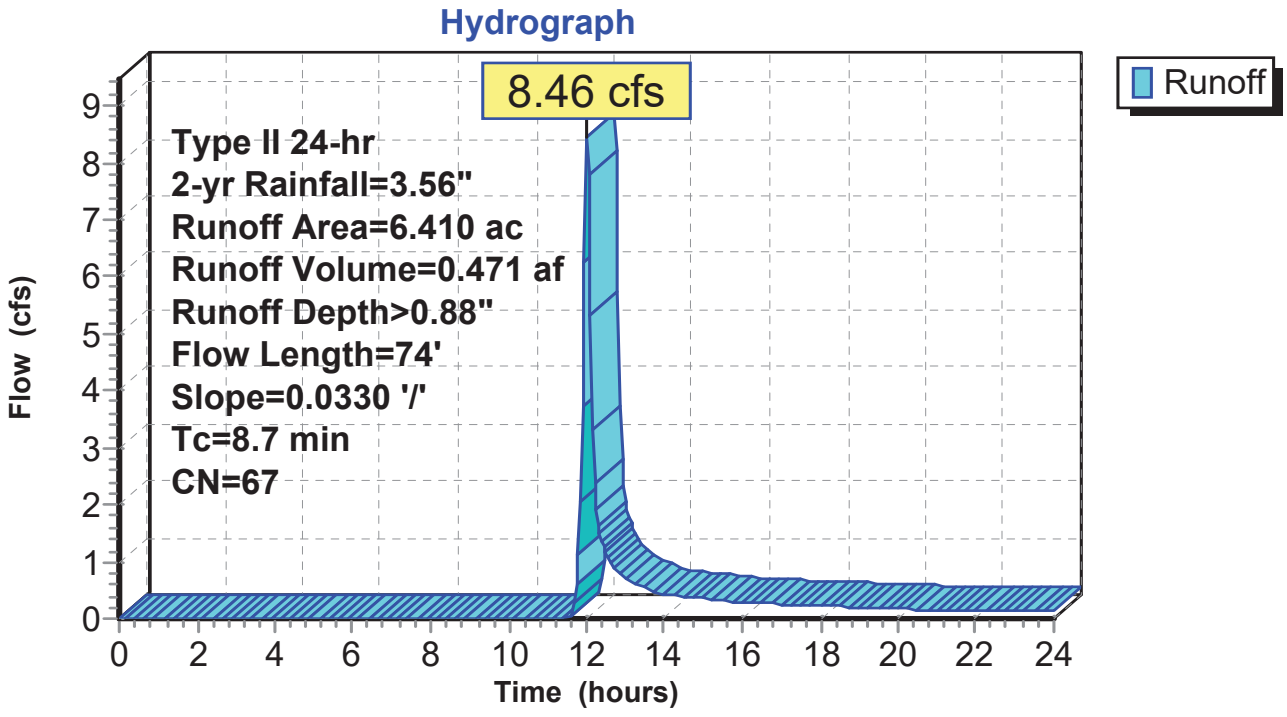
Runoff = 8.46 cfs @ 12.01 hrs, Volume= 0.471 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Rainfall=3.56"

Area (ac)	CN	Description
1.420	80	>75% Grass cover, Good, HSG D
4.640	61	>75% Grass cover, Good, HSG B
0.350	98	Paved parking, HSG B
6.410	67	Weighted Average
6.060		94.54% Pervious Area
0.350		5.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	74	0.0330	0.14		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"

Subcatchment P-1d: P-1d



Summary for Reach 1R: Swale 1c

Inflow Area = 10.570 ac, 0.00% Impervious, Inflow Depth > 0.73" for 2-yr event
Inflow = 8.26 cfs @ 12.11 hrs, Volume= 0.644 af
Outflow = 7.65 cfs @ 12.21 hrs, Volume= 0.639 af, Atten= 7%, Lag= 6.4 min

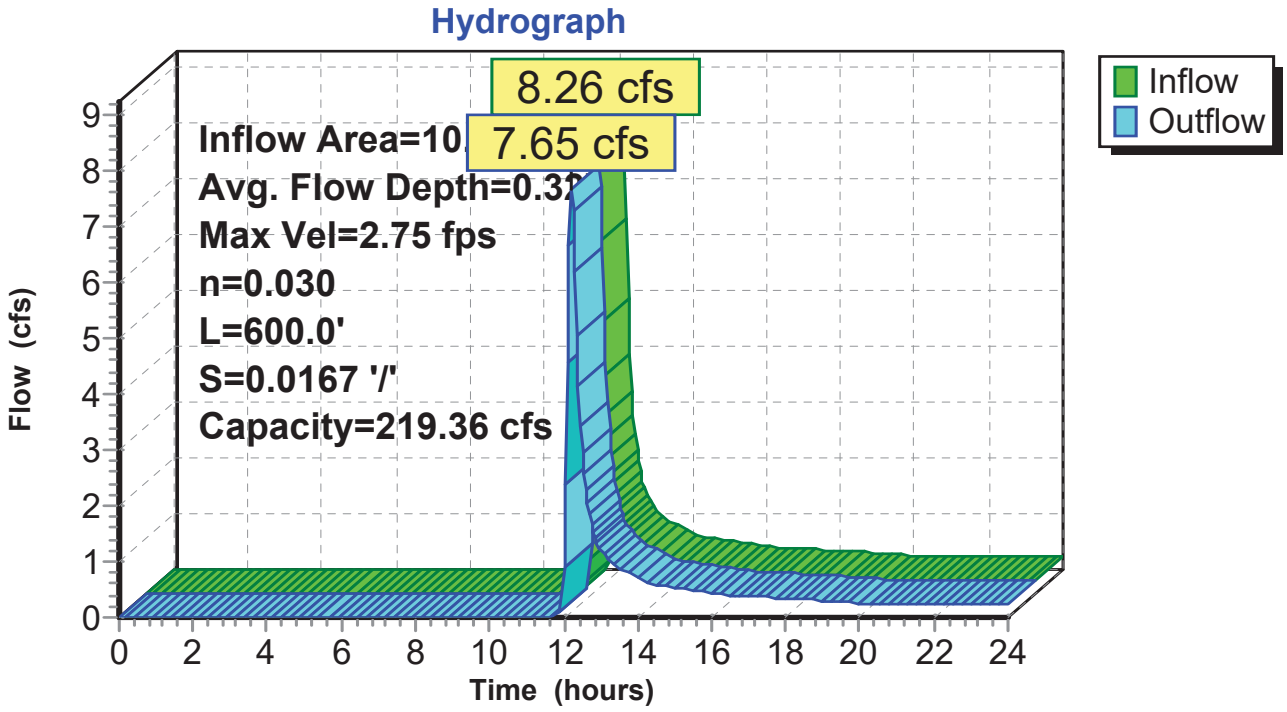
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.75 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 0.96 fps, Avg. Travel Time= 10.4 min

Peak Storage= 1,692 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.32'
Bank-Full Depth= 2.00' Flow Area= 28.0 sf, Capacity= 219.36 cfs

8.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 600.0' Slope= 0.0167 '/'
Inlet Invert= 432.00', Outlet Invert= 422.00'



‡



Stage-Discharge for Reach 1R: Swale 1c

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
432.00	0.00	0.00
432.02	0.47	0.08
432.04	0.74	0.24
432.06	0.96	0.47
432.08	1.16	0.77
432.10	1.34	1.11
432.12	1.51	1.51
432.14	1.66	1.96
432.16	1.81	2.46
432.18	1.95	3.00
432.20	2.08	3.58
432.22	2.21	4.21
432.24	2.33	4.88
432.26	2.45	5.59
432.28	2.56	6.34
432.30	2.67	7.13
432.32	2.78	7.96
432.34	2.88	8.83
432.36	2.98	9.74
432.38	3.08	10.69
432.40	3.17	11.68
432.42	3.27	12.70
432.44	3.36	13.77
432.46	3.45	14.87
432.48	3.53	16.01
432.50	3.62	17.18
432.52	3.70	18.40
432.54	3.78	19.65
432.56	3.86	20.94
432.58	3.94	22.27
432.60	4.02	23.64
432.62	4.10	25.05
432.64	4.17	26.49
432.66	4.25	27.97
432.68	4.32	29.49
432.70	4.39	31.04
432.72	4.46	32.64
432.74	4.53	34.27
432.76	4.60	35.94
432.78	4.67	37.65
432.80	4.73	39.39
432.82	4.80	41.18
432.84	4.87	43.00
432.86	4.93	44.86
432.88	4.99	46.76
432.90	5.06	48.70
432.92	5.12	50.68
432.94	5.18	52.70
432.96	5.24	54.76
432.98	5.30	56.85
433.00	5.36	58.99
433.02	5.42	61.16
433.04	5.48	63.38
433.06	5.54	65.63
433.08	5.60	67.93
433.10	5.65	70.26
433.12	5.71	72.64
433.14	5.76	75.05
433.16	5.82	77.51
433.18	5.88	80.00
433.20	5.93	82.54
433.22	5.98	85.12
433.24	6.04	87.74
433.26	6.09	90.40
433.28	6.14	93.10
433.30	6.20	95.85
433.32	6.25	98.63
433.34	6.30	101.46
433.36	6.35	104.33
433.38	6.40	107.24
433.40	6.45	110.19
433.42	6.50	113.19
433.44	6.55	116.23
433.46	6.60	119.31
433.48	6.65	122.44
433.50	6.70	125.61
433.52	6.75	128.82
433.54	6.80	132.08
433.56	6.84	135.38
433.58	6.89	138.72
433.60	6.94	142.11
433.62	6.99	145.54
433.64	7.03	149.01
433.66	7.08	152.53
433.68	7.13	156.10
433.70	7.17	159.71
433.72	7.22	163.36
433.74	7.26	167.06
433.76	7.31	170.81
433.78	7.35	174.60
433.80	7.40	178.44
433.82	7.44	182.32
433.84	7.49	186.25
433.86	7.53	190.22
433.88	7.57	194.25
433.90	7.62	198.31
433.92	7.66	202.43
433.94	7.71	206.59
433.96	7.75	210.80
433.98	7.79	215.05
434.00	**7.83**	**219.36**

Stage-Area-Storage for Reach 1R: Swale 1c

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
432.00	0.0	0
432.02	0.2	97
432.04	0.3	195
432.06	0.5	294
432.08	0.7	396
432.10	0.8	498
432.12	1.0	602
432.14	1.2	707
432.16	1.4	814
432.18	1.5	922
432.20	1.7	1,032
432.22	1.9	1,143
432.24	2.1	1,256
432.26	2.3	1,370
432.28	2.5	1,485
432.30	2.7	1,602
432.32	2.9	1,720
432.34	3.1	1,840
432.36	3.3	1,961
432.38	3.5	2,084
432.40	3.7	2,208
432.42	3.9	2,334
432.44	4.1	2,460
432.46	4.3	2,589
432.48	4.5	2,719
432.50	4.8	2,850
432.52	5.0	2,983
432.54	5.2	3,117
432.56	5.4	3,252
432.58	5.6	3,390
432.60	5.9	3,528
432.62	6.1	3,668
432.64	6.3	3,809
432.66	6.6	3,952
432.68	6.8	4,096
432.70	7.1	4,242
432.72	7.3	4,389
432.74	7.6	4,538
432.76	7.8	4,688
432.78	8.1	4,839
432.80	8.3	4,992
432.82	8.6	5,146
432.84	8.8	5,302
432.86	9.1	5,459
432.88	9.4	5,618
432.90	9.6	5,778
432.92	9.9	5,940
432.94	10.2	6,102
432.96	10.4	6,267
432.98	10.7	6,433
433.00	11.0	6,600
433.02	11.3	6,769
433.04	11.6	6,939
433.06	11.9	7,110
433.08	12.1	7,284
433.10	12.4	7,458
433.12	12.7	7,634
433.14	13.0	7,811
433.16	13.3	7,990
433.18	13.6	8,170
433.20	13.9	8,352
433.22	14.2	8,535
433.24	14.5	8,720
433.26	14.8	8,906
433.28	15.2	9,093
433.30	15.5	9,282
433.32	15.8	9,472
433.34	16.1	9,664
433.36	16.4	9,857
433.38	16.8	10,052
433.40	17.1	10,248
433.42	17.4	10,446
433.44	17.7	10,644
433.46	18.1	10,845
433.48	18.4	11,047
433.50	18.8	11,250
433.52	19.1	11,455
433.54	19.4	11,661
433.56	19.8	11,868
433.58	20.1	12,078
433.60	20.5	12,288
433.62	20.8	12,500
433.64	21.2	12,713
433.66	21.5	12,928
433.68	21.9	13,144
433.70	22.3	13,362
433.72	22.6	13,581
433.74	23.0	13,802
433.76	23.4	14,024
433.78	23.7	14,247
433.80	24.1	14,472
433.82	24.5	14,698
433.84	24.9	14,926
433.86	25.3	15,155
433.88	25.6	15,386
433.90	26.0	15,618
433.92	26.4	15,852
433.94	26.8	16,086
433.96	27.2	16,323
433.98	27.6	16,561
434.00	**28.0**	**16,800**

Summary for Reach 2R: Swale 1d

Inflow Area = 6.410 ac, 5.46% Impervious, Inflow Depth > 0.88" for 2-yr event
Inflow = 8.46 cfs @ 12.01 hrs, Volume= 0.471 af
Outflow = 7.81 cfs @ 12.08 hrs, Volume= 0.468 af, Atten= 8%, Lag= 4.1 min

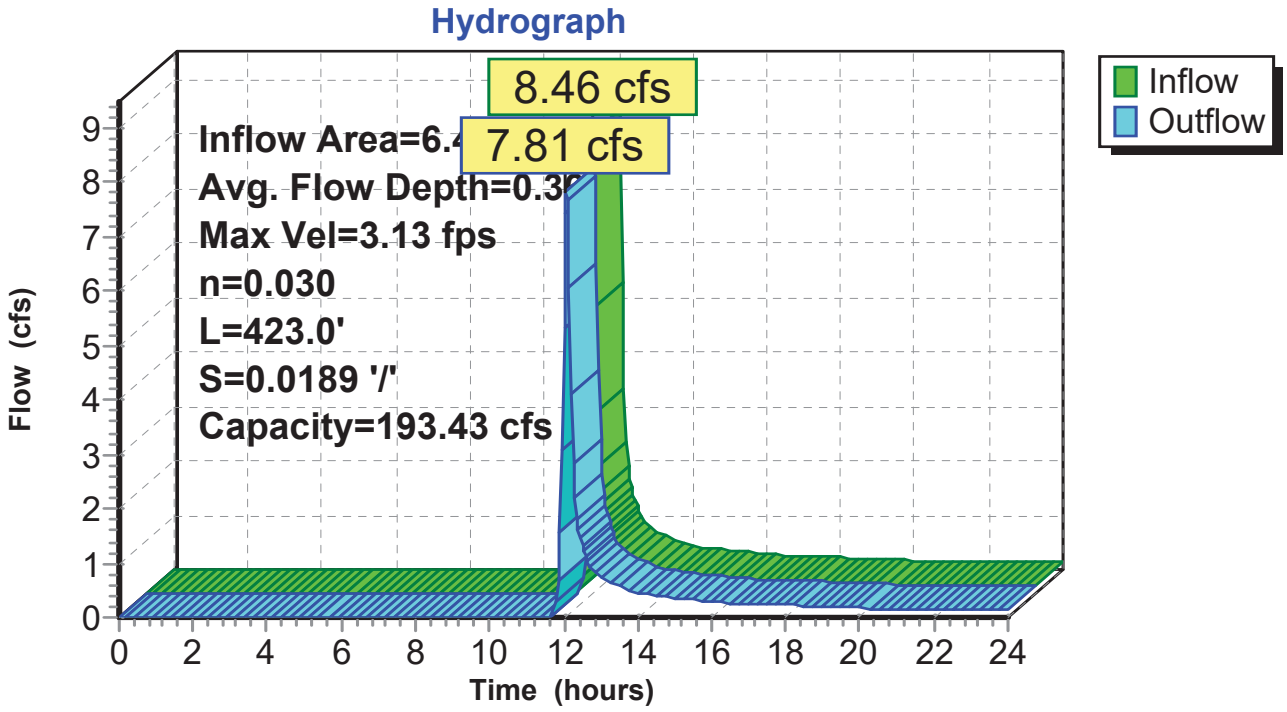
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.13 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 0.96 fps, Avg. Travel Time= 7.4 min

Peak Storage= 1,093 cf @ 12.04 hrs
Average Depth at Peak Storage= 0.36'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 193.43 cfs

6.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 18.00'
Length= 423.0' Slope= 0.0189 '/'
Inlet Invert= 432.00', Outlet Invert= 424.00'



‡



Stage-Discharge for Reach 2R: Swale 1d

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
432.00	0.00	0.00
432.02	0.50	0.06
432.04	0.79	0.19
432.06	1.02	0.38
432.08	1.23	0.61
432.10	1.42	0.89
432.12	1.59	1.21
432.14	1.75	1.58
432.16	1.90	1.97
432.18	2.05	2.41
432.20	2.19	2.88
432.22	2.32	3.39
432.24	2.44	3.94
432.26	2.56	4.52
432.28	2.68	5.13
432.30	2.79	5.78
432.32	2.90	6.46
432.34	3.00	7.17
432.36	3.11	7.92
432.38	3.21	8.70
432.40	3.30	9.51
432.42	3.40	10.36
432.44	3.49	11.24
432.46	3.58	12.15
432.48	3.67	13.10
432.50	3.76	14.08
432.52	3.84	15.10
432.54	3.92	16.14
432.56	4.00	17.22
432.58	4.08	18.34
432.60	4.16	19.48
432.62	4.24	20.67
432.64	4.32	21.88
432.66	4.39	23.13
432.68	4.47	24.41
432.70	4.54	25.73
432.72	4.61	27.08
432.74	4.68	28.47
432.76	4.75	29.89
432.78	4.82	31.35
432.80	4.89	32.84
432.82	4.95	34.37
432.84	5.02	35.93
432.86	5.09	37.52
432.88	5.15	39.16
432.90	5.21	40.83
432.92	5.28	42.53
432.94	5.34	44.27
432.96	5.40	46.05
432.98	5.46	47.86
433.00	5.52	49.72
433.02	5.58	51.60
433.04	5.64	53.53
433.06	5.70	55.49
433.08	5.76	57.49
433.10	5.82	59.53
433.12	5.88	61.60
433.14	5.93	63.72
433.16	5.99	65.87
433.18	6.05	68.06
433.20	6.10	70.29
433.22	6.16	72.56
433.24	6.21	74.86
433.26	6.27	77.21
433.28	6.32	79.60
433.30	6.37	82.02
433.32	6.43	84.49
433.34	6.48	86.99
433.36	6.53	89.54
433.38	6.58	92.12
433.40	6.64	94.75
433.42	6.69	97.42
433.44	6.74	100.13
433.46	6.79	102.88
433.48	6.84	105.67
433.50	6.89	108.50
433.52	6.94	111.38
433.54	6.99	114.29
433.56	7.04	117.25
433.58	7.09	120.25
433.60	7.14	123.30
433.62	7.18	126.38
433.64	7.23	129.51
433.66	7.28	132.69
433.68	7.33	135.90
433.70	7.37	139.16
433.72	7.42	142.47
433.74	7.47	145.81
433.76	7.52	149.20
433.78	7.56	152.64
433.80	7.61	156.12
433.82	7.65	159.65
433.84	7.70	163.22
433.86	7.75	166.83
433.88	7.79	170.50
433.90	7.84	174.20
433.92	7.88	177.96
433.94	7.93	181.75
433.96	7.97	185.60
433.98	8.02	189.49
434.00	**8.06**	**193.43**

Stage-Area-Storage for Reach 2R: Swale 1d

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
432.00	0.0	0
432.02	0.1	51
432.04	0.2	104
432.06	0.4	157
432.08	0.5	211
432.10	0.6	266
432.12	0.8	323
432.14	0.9	380
432.16	1.0	439
432.18	1.2	498
432.20	1.3	558
432.22	1.5	620
432.24	1.6	682
432.26	1.8	746
432.28	1.9	810
432.30	2.1	876
432.32	2.2	942
432.34	2.4	1,010
432.36	2.5	1,078
432.38	2.7	1,148
432.40	2.9	1,218
432.42	3.0	1,290
432.44	3.2	1,362
432.46	3.4	1,436
432.48	3.6	1,511
432.50	3.8	1,586
432.52	3.9	1,663
432.54	4.1	1,741
432.56	4.3	1,819
432.58	4.5	1,899
432.60	4.7	1,980
432.62	4.9	2,061
432.64	5.1	2,144
432.66	5.3	2,228
432.68	5.5	2,313
432.70	5.7	2,398
432.72	5.9	2,485
432.74	6.1	2,573
432.76	6.3	2,662
432.78	6.5	2,752
432.80	6.7	2,843
432.82	6.9	2,934
432.84	7.2	3,027
432.86	7.4	3,121
432.88	7.6	3,216
432.90	7.8	3,312
432.92	8.1	3,409
432.94	8.3	3,507
432.96	8.5	3,606
432.98	8.8	3,706
433.00	9.0	3,807
433.02	9.2	3,909
433.04	9.5	4,012
433.06	9.7	4,116
433.08	10.0	4,221
433.10	10.2	4,327
433.12	10.5	4,434
433.14	10.7	4,543
433.16	11.0	4,652
433.18	11.3	4,762
433.20	11.5	4,873
433.22	11.8	4,985
433.24	12.1	5,098
433.26	12.3	5,213
433.28	12.6	5,328
433.30	12.9	5,444
433.32	13.1	5,561
433.34	13.4	5,680
433.36	13.7	5,799
433.38	14.0	5,919
433.40	14.3	6,040
433.42	14.6	6,163
433.44	14.9	6,286
433.46	15.2	6,410
433.48	15.5	6,536
433.50	15.8	6,662
433.52	16.1	6,790
433.54	16.4	6,918
433.56	16.7	7,048
433.58	17.0	7,178
433.60	17.3	7,309
433.62	17.6	7,442
433.64	17.9	7,575
433.66	18.2	7,710
433.68	18.5	7,845
433.70	18.9	7,982
433.72	19.2	8,120
433.74	19.5	8,258
433.76	19.9	8,398
433.78	20.2	8,538
433.80	20.5	8,680
433.82	20.9	8,823
433.84	21.2	8,966
433.86	21.5	9,111
433.88	21.9	9,257
433.90	22.2	9,403
433.92	22.6	9,551
433.94	22.9	9,700
433.96	23.3	9,849
433.98	23.6	10,000
434.00	**24.0**	**10,152**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1c: P-1c Runoff Area=10.570 ac 0.00% Impervious Runoff Depth>1.33"
Flow Length=660' Tc=15.8 min CN=64 Runoff=16.64 cfs 1.174 af

Subcatchment P-1d: P-1d Runoff Area=6.410 ac 5.46% Impervious Runoff Depth>1.54"
Flow Length=74' Slope=0.0330 '/' Tc=8.7 min CN=67 Runoff=15.50 cfs 0.822 af

Reach 1R: Swale 1c Avg. Flow Depth=0.48' Max Vel=3.52 fps Inflow=16.64 cfs 1.174 af
n=0.030 L=600.0' S=0.0167 '/' Capacity=219.36 cfs Outflow=15.93 cfs 1.167 af

Reach 2R: Swale 1d Avg. Flow Depth=0.52' Max Vel=3.81 fps Inflow=15.50 cfs 0.822 af
n=0.030 L=423.0' S=0.0189 '/' Capacity=193.43 cfs Outflow=14.43 cfs 0.819 af

Summary for Subcatchment P-1c: P-1c

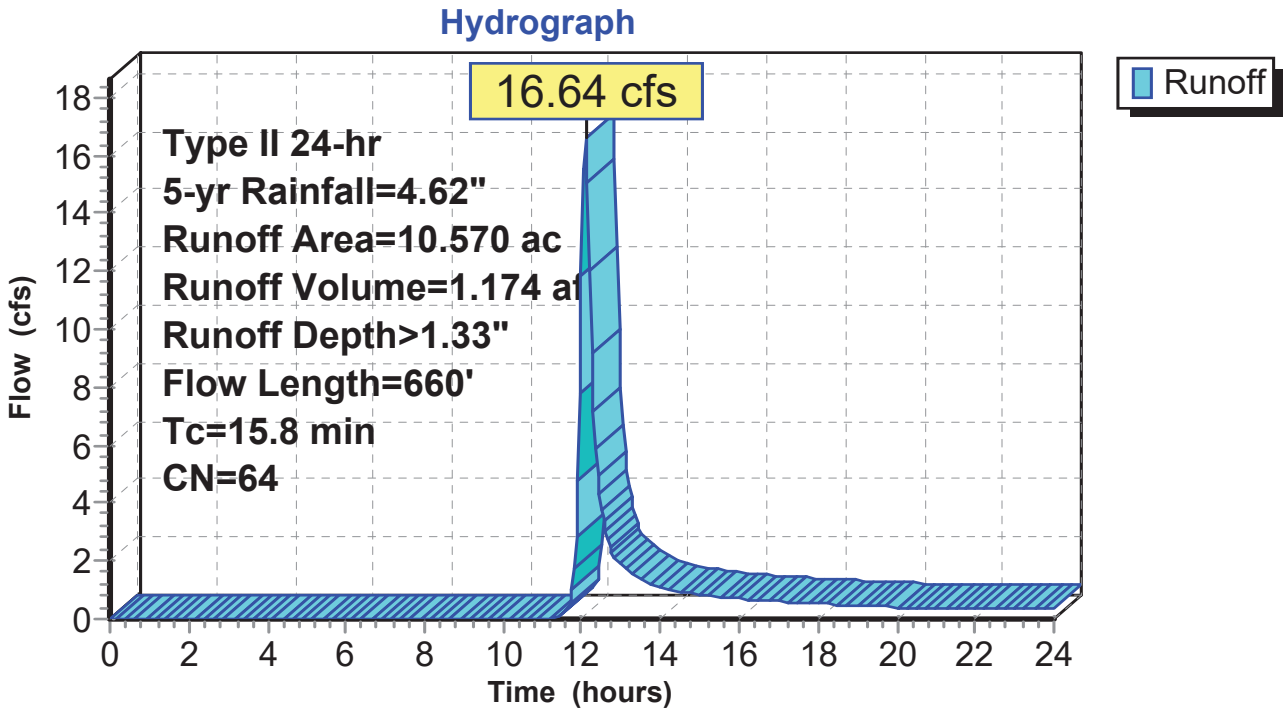
Runoff = 16.64 cfs @ 12.10 hrs, Volume= 1.174 af, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=4.62"

Area (ac)	CN	Description
9.160	61	>75% Grass cover, Good, HSG B
1.410	80	>75% Grass cover, Good, HSG D
10.570	64	Weighted Average
10.570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.2330	0.36		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
1.3	126	0.0550	1.64		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
7.5	384	0.0150	0.86		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
15.8	660	Total			

Subcatchment P-1c: P-1c



Summary for Subcatchment P-1d: P-1d

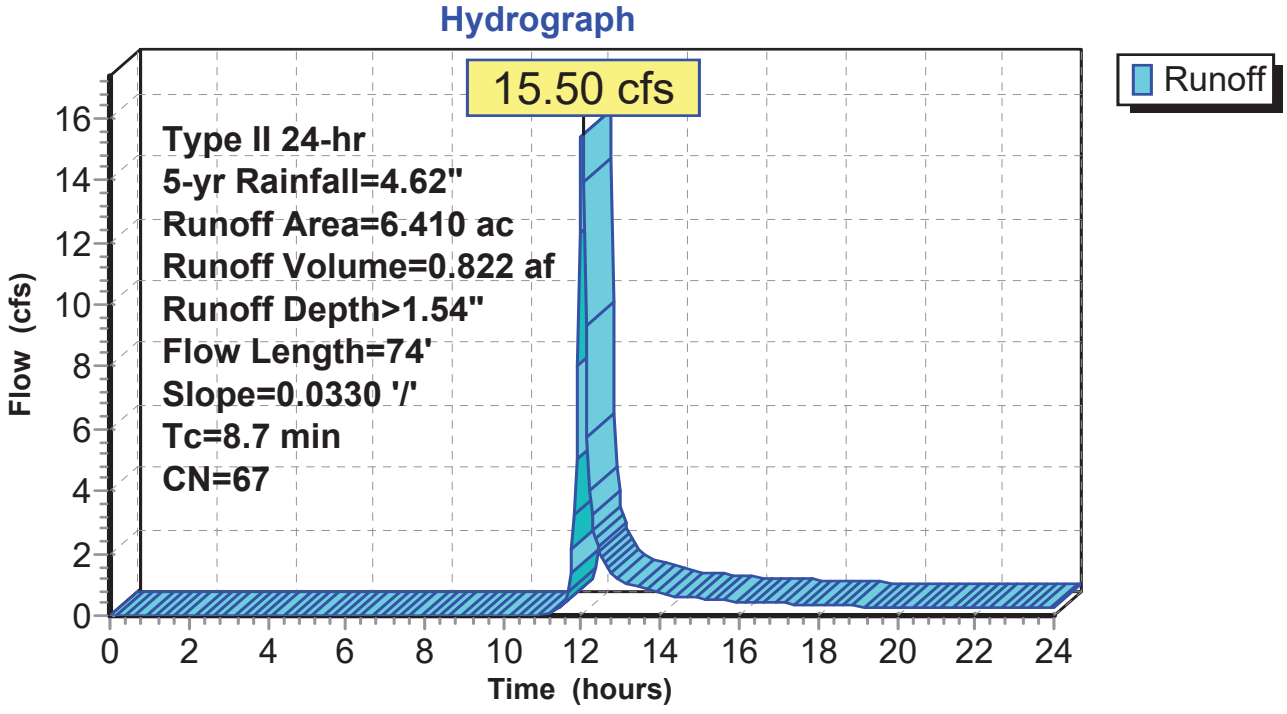
Runoff = 15.50 cfs @ 12.01 hrs, Volume= 0.822 af, Depth> 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-yr Rainfall=4.62"

Area (ac)	CN	Description
1.420	80	>75% Grass cover, Good, HSG D
4.640	61	>75% Grass cover, Good, HSG B
0.350	98	Paved parking, HSG B
6.410	67	Weighted Average
6.060		94.54% Pervious Area
0.350		5.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	74	0.0330	0.14		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"

Subcatchment P-1d: P-1d



Summary for Reach 1R: Swale 1c

Inflow Area = 10.570 ac, 0.00% Impervious, Inflow Depth > 1.33" for 5-yr event
Inflow = 16.64 cfs @ 12.10 hrs, Volume= 1.174 af
Outflow = 15.93 cfs @ 12.18 hrs, Volume= 1.167 af, Atten= 4%, Lag= 4.8 min

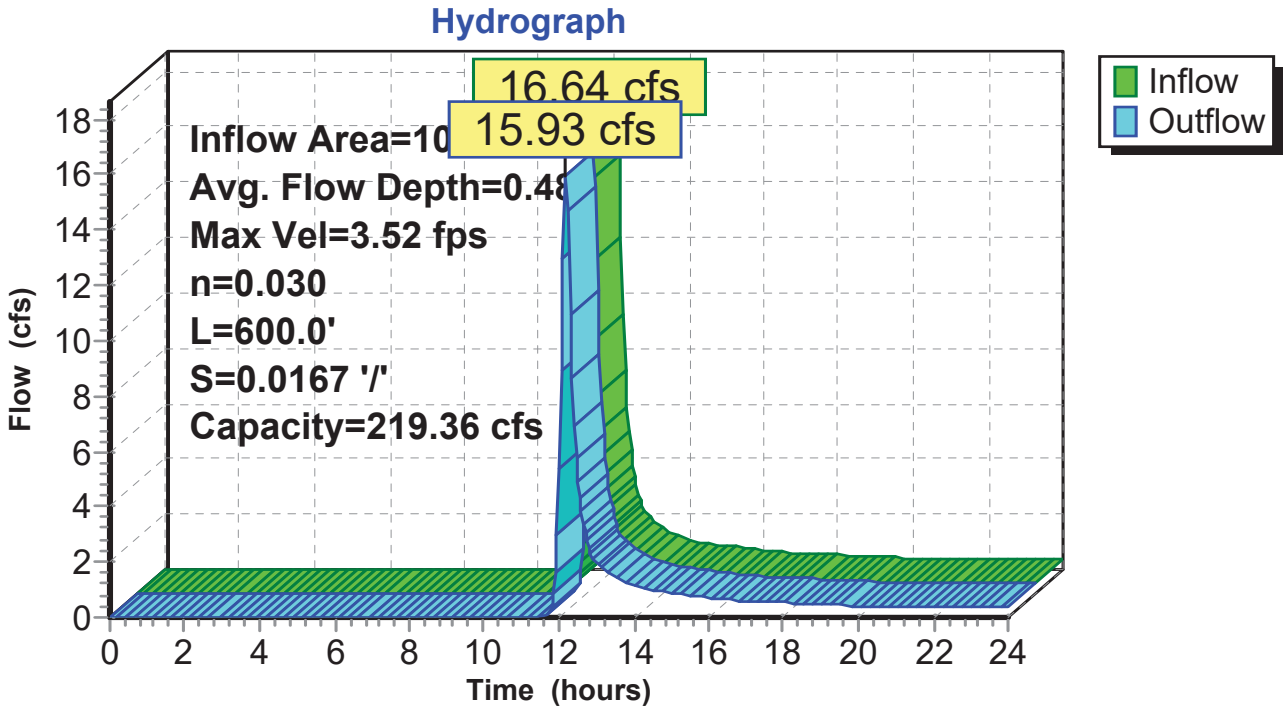
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.52 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 1.15 fps, Avg. Travel Time= 8.7 min

Peak Storage= 2,717 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.48'
Bank-Full Depth= 2.00' Flow Area= 28.0 sf, Capacity= 219.36 cfs

8.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 600.0' Slope= 0.0167 '/'
Inlet Invert= 432.00', Outlet Invert= 422.00'



‡



Stage-Discharge for Reach 1R: Swale 1c

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
432.00	0.00	0.00
432.02	0.47	0.08
432.04	0.74	0.24
432.06	0.96	0.47
432.08	1.16	0.77
432.10	1.34	1.11
432.12	1.51	1.51
432.14	1.66	1.96
432.16	1.81	2.46
432.18	1.95	3.00
432.20	2.08	3.58
432.22	2.21	4.21
432.24	2.33	4.88
432.26	2.45	5.59
432.28	2.56	6.34
432.30	2.67	7.13
432.32	2.78	7.96
432.34	2.88	8.83
432.36	2.98	9.74
432.38	3.08	10.69
432.40	3.17	11.68
432.42	3.27	12.70
432.44	3.36	13.77
432.46	3.45	14.87
432.48	3.53	16.01
432.50	3.62	17.18
432.52	3.70	18.40
432.54	3.78	19.65
432.56	3.86	20.94
432.58	3.94	22.27
432.60	4.02	23.64
432.62	4.10	25.05
432.64	4.17	26.49
432.66	4.25	27.97
432.68	4.32	29.49
432.70	4.39	31.04
432.72	4.46	32.64
432.74	4.53	34.27
432.76	4.60	35.94
432.78	4.67	37.65
432.80	4.73	39.39
432.82	4.80	41.18
432.84	4.87	43.00
432.86	4.93	44.86
432.88	4.99	46.76
432.90	5.06	48.70
432.92	5.12	50.68
432.94	5.18	52.70
432.96	5.24	54.76
432.98	5.30	56.85
433.00	5.36	58.99
433.02	5.42	61.16
433.04	5.48	63.38
433.06	5.54	65.63
433.08	5.60	67.93
433.10	5.65	70.26
433.12	5.71	72.64
433.14	5.76	75.05
433.16	5.82	77.51
433.18	5.88	80.00
433.20	5.93	82.54
433.22	5.98	85.12
433.24	6.04	87.74
433.26	6.09	90.40
433.28	6.14	93.10
433.30	6.20	95.85
433.32	6.25	98.63
433.34	6.30	101.46
433.36	6.35	104.33
433.38	6.40	107.24
433.40	6.45	110.19
433.42	6.50	113.19
433.44	6.55	116.23
433.46	6.60	119.31
433.48	6.65	122.44
433.50	6.70	125.61
433.52	6.75	128.82
433.54	6.80	132.08
433.56	6.84	135.38
433.58	6.89	138.72
433.60	6.94	142.11
433.62	6.99	145.54
433.64	7.03	149.01
433.66	7.08	152.53
433.68	7.13	156.10
433.70	7.17	159.71
433.72	7.22	163.36
433.74	7.26	167.06
433.76	7.31	170.81
433.78	7.35	174.60
433.80	7.40	178.44
433.82	7.44	182.32
433.84	7.49	186.25
433.86	7.53	190.22
433.88	7.57	194.25
433.90	7.62	198.31
433.92	7.66	202.43
433.94	7.71	206.59
433.96	7.75	210.80
433.98	7.79	215.05
434.00	**7.83**	**219.36**

Stage-Area-Storage for Reach 1R: Swale 1c

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
432.00	0.0	0
432.02	0.2	97
432.04	0.3	195
432.06	0.5	294
432.08	0.7	396
432.10	0.8	498
432.12	1.0	602
432.14	1.2	707
432.16	1.4	814
432.18	1.5	922
432.20	1.7	1,032
432.22	1.9	1,143
432.24	2.1	1,256
432.26	2.3	1,370
432.28	2.5	1,485
432.30	2.7	1,602
432.32	2.9	1,720
432.34	3.1	1,840
432.36	3.3	1,961
432.38	3.5	2,084
432.40	3.7	2,208
432.42	3.9	2,334
432.44	4.1	2,460
432.46	4.3	2,589
432.48	4.5	2,719
432.50	4.8	2,850
432.52	5.0	2,983
432.54	5.2	3,117
432.56	5.4	3,252
432.58	5.6	3,390
432.60	5.9	3,528
432.62	6.1	3,668
432.64	6.3	3,809
432.66	6.6	3,952
432.68	6.8	4,096
432.70	7.1	4,242
432.72	7.3	4,389
432.74	7.6	4,538
432.76	7.8	4,688
432.78	8.1	4,839
432.80	8.3	4,992
432.82	8.6	5,146
432.84	8.8	5,302
432.86	9.1	5,459
432.88	9.4	5,618
432.90	9.6	5,778
432.92	9.9	5,940
432.94	10.2	6,102
432.96	10.4	6,267
432.98	10.7	6,433
433.00	11.0	6,600
433.02	11.3	6,769
433.04	11.6	6,939
433.06	11.9	7,110
433.08	12.1	7,284
433.10	12.4	7,458
433.12	12.7	7,634
433.14	13.0	7,811
433.16	13.3	7,990
433.18	13.6	8,170
433.20	13.9	8,352
433.22	14.2	8,535
433.24	14.5	8,720
433.26	14.8	8,906
433.28	15.2	9,093
433.30	15.5	9,282
433.32	15.8	9,472
433.34	16.1	9,664
433.36	16.4	9,857
433.38	16.8	10,052
433.40	17.1	10,248
433.42	17.4	10,446
433.44	17.7	10,644
433.46	18.1	10,845
433.48	18.4	11,047
433.50	18.8	11,250
433.52	19.1	11,455
433.54	19.4	11,661
433.56	19.8	11,868
433.58	20.1	12,078
433.60	20.5	12,288
433.62	20.8	12,500
433.64	21.2	12,713
433.66	21.5	12,928
433.68	21.9	13,144
433.70	22.3	13,362
433.72	22.6	13,581
433.74	23.0	13,802
433.76	23.4	14,024
433.78	23.7	14,247
433.80	24.1	14,472
433.82	24.5	14,698
433.84	24.9	14,926
433.86	25.3	15,155
433.88	25.6	15,386
433.90	26.0	15,618
433.92	26.4	15,852
433.94	26.8	16,086
433.96	27.2	16,323
433.98	27.6	16,561
434.00	**28.0**	**16,800**

Summary for Reach 2R: Swale 1d

Inflow Area = 6.410 ac, 5.46% Impervious, Inflow Depth > 1.54" for 5-yr event
Inflow = 15.50 cfs @ 12.01 hrs, Volume= 0.822 af
Outflow = 14.43 cfs @ 12.06 hrs, Volume= 0.819 af, Atten= 7%, Lag= 3.2 min

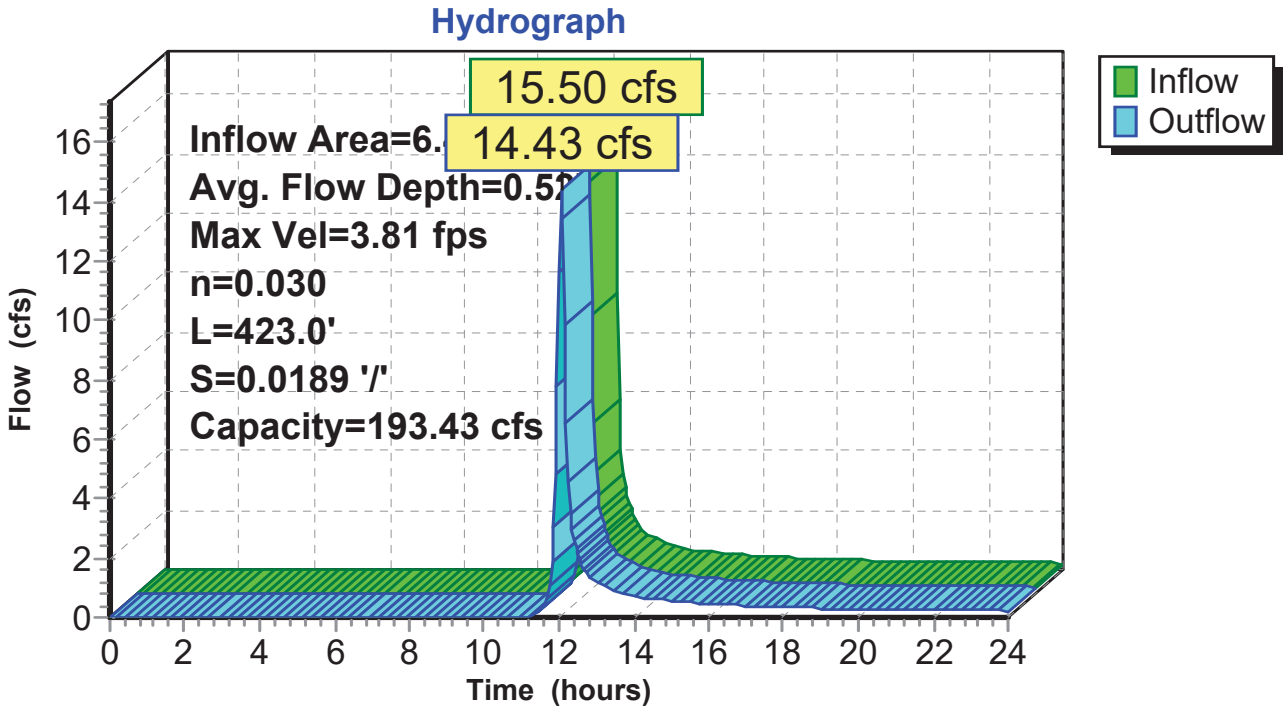
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.81 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 1.12 fps, Avg. Travel Time= 6.3 min

Peak Storage= 1,652 cf @ 12.03 hrs
Average Depth at Peak Storage= 0.52'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 193.43 cfs

6.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 18.00'
Length= 423.0' Slope= 0.0189 '/'
Inlet Invert= 432.00', Outlet Invert= 424.00'



‡



Stage-Discharge for Reach 2R: Swale 1d

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
432.00	0.00	0.00
432.02	0.50	0.06
432.04	0.79	0.19
432.06	1.02	0.38
432.08	1.23	0.61
432.10	1.42	0.89
432.12	1.59	1.21
432.14	1.75	1.58
432.16	1.90	1.97
432.18	2.05	2.41
432.20	2.19	2.88
432.22	2.32	3.39
432.24	2.44	3.94
432.26	2.56	4.52
432.28	2.68	5.13
432.30	2.79	5.78
432.32	2.90	6.46
432.34	3.00	7.17
432.36	3.11	7.92
432.38	3.21	8.70
432.40	3.30	9.51
432.42	3.40	10.36
432.44	3.49	11.24
432.46	3.58	12.15
432.48	3.67	13.10
432.50	3.76	14.08
432.52	3.84	15.10
432.54	3.92	16.14
432.56	4.00	17.22
432.58	4.08	18.34
432.60	4.16	19.48
432.62	4.24	20.67
432.64	4.32	21.88
432.66	4.39	23.13
432.68	4.47	24.41
432.70	4.54	25.73
432.72	4.61	27.08
432.74	4.68	28.47
432.76	4.75	29.89
432.78	4.82	31.35
432.80	4.89	32.84
432.82	4.95	34.37
432.84	5.02	35.93
432.86	5.09	37.52
432.88	5.15	39.16
432.90	5.21	40.83
432.92	5.28	42.53
432.94	5.34	44.27
432.96	5.40	46.05
432.98	5.46	47.86
433.00	5.52	49.72
433.02	5.58	51.60
433.04	5.64	53.53
433.06	5.70	55.49
433.08	5.76	57.49
433.10	5.82	59.53
433.12	5.88	61.60
433.14	5.93	63.72
433.16	5.99	65.87
433.18	6.05	68.06
433.20	6.10	70.29
433.22	6.16	72.56
433.24	6.21	74.86
433.26	6.27	77.21
433.28	6.32	79.60
433.30	6.37	82.02
433.32	6.43	84.49
433.34	6.48	86.99
433.36	6.53	89.54
433.38	6.58	92.12
433.40	6.64	94.75
433.42	6.69	97.42
433.44	6.74	100.13
433.46	6.79	102.88
433.48	6.84	105.67
433.50	6.89	108.50
433.52	6.94	111.38
433.54	6.99	114.29
433.56	7.04	117.25
433.58	7.09	120.25
433.60	7.14	123.30
433.62	7.18	126.38
433.64	7.23	129.51
433.66	7.28	132.69
433.68	7.33	135.90
433.70	7.37	139.16
433.72	7.42	142.47
433.74	7.47	145.81
433.76	7.52	149.20
433.78	7.56	152.64
433.80	7.61	156.12
433.82	7.65	159.65
433.84	7.70	163.22
433.86	7.75	166.83
433.88	7.79	170.50
433.90	7.84	174.20
433.92	7.88	177.96
433.94	7.93	181.75
433.96	7.97	185.60
433.98	8.02	189.49
434.00	**8.06**	**193.43**

Stage-Area-Storage for Reach 2R: Swale 1d

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
432.00	0.0	0
432.02	0.1	51
432.04	0.2	104
432.06	0.4	157
432.08	0.5	211
432.10	0.6	266
432.12	0.8	323
432.14	0.9	380
432.16	1.0	439
432.18	1.2	498
432.20	1.3	558
432.22	1.5	620
432.24	1.6	682
432.26	1.8	746
432.28	1.9	810
432.30	2.1	876
432.32	2.2	942
432.34	2.4	1,010
432.36	2.5	1,078
432.38	2.7	1,148
432.40	2.9	1,218
432.42	3.0	1,290
432.44	3.2	1,362
432.46	3.4	1,436
432.48	3.6	1,511
432.50	3.8	1,586
432.52	3.9	1,663
432.54	4.1	1,741
432.56	4.3	1,819
432.58	4.5	1,899
432.60	4.7	1,980
432.62	4.9	2,061
432.64	5.1	2,144
432.66	5.3	2,228
432.68	5.5	2,313
432.70	5.7	2,398
432.72	5.9	2,485
432.74	6.1	2,573
432.76	6.3	2,662
432.78	6.5	2,752
432.80	6.7	2,843
432.82	6.9	2,934
432.84	7.2	3,027
432.86	7.4	3,121
432.88	7.6	3,216
432.90	7.8	3,312
432.92	8.1	3,409
432.94	8.3	3,507
432.96	8.5	3,606
432.98	8.8	3,706
433.00	9.0	3,807
433.02	9.2	3,909
433.04	9.5	4,012
433.06	9.7	4,116
433.08	10.0	4,221
433.10	10.2	4,327
433.12	10.5	4,434
433.14	10.7	4,543
433.16	11.0	4,652
433.18	11.3	4,762
433.20	11.5	4,873
433.22	11.8	4,985
433.24	12.1	5,098
433.26	12.3	5,213
433.28	12.6	5,328
433.30	12.9	5,444
433.32	13.1	5,561
433.34	13.4	5,680
433.36	13.7	5,799
433.38	14.0	5,919
433.40	14.3	6,040
433.42	14.6	6,163
433.44	14.9	6,286
433.46	15.2	6,410
433.48	15.5	6,536
433.50	15.8	6,662
433.52	16.1	6,790
433.54	16.4	6,918
433.56	16.7	7,048
433.58	17.0	7,178
433.60	17.3	7,309
433.62	17.6	7,442
433.64	17.9	7,575
433.66	18.2	7,710
433.68	18.5	7,845
433.70	18.9	7,982
433.72	19.2	8,120
433.74	19.5	8,258
433.76	19.9	8,398
433.78	20.2	8,538
433.80	20.5	8,680
433.82	20.9	8,823
433.84	21.2	8,966
433.86	21.5	9,111
433.88	21.9	9,257
433.90	22.2	9,403
433.92	22.6	9,551
433.94	22.9	9,700
433.96	23.3	9,849
433.98	23.6	10,000
434.00	**24.0**	**10,152**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1c: P-1c Runoff Area=10.570 ac 0.00% Impervious Runoff Depth>1.90"
Flow Length=660' Tc=15.8 min CN=64 Runoff=24.56 cfs 1.678 af

Subcatchment P-1d: P-1d Runoff Area=6.410 ac 5.46% Impervious Runoff Depth>2.15"
Flow Length=74' Slope=0.0330 '/' Tc=8.7 min CN=67 Runoff=21.97 cfs 1.151 af

Reach 1R: Swale 1c Avg. Flow Depth=0.60' Max Vel=4.02 fps Inflow=24.56 cfs 1.678 af
n=0.030 L=600.0' S=0.0167 '/' Capacity=219.36 cfs Outflow=23.66 cfs 1.670 af

Reach 2R: Swale 1d Avg. Flow Depth=0.63' Max Vel=4.24 fps Inflow=21.97 cfs 1.151 af
n=0.030 L=423.0' S=0.0189 '/' Capacity=193.43 cfs Outflow=20.58 cfs 1.147 af

Summary for Subcatchment P-1c: P-1c

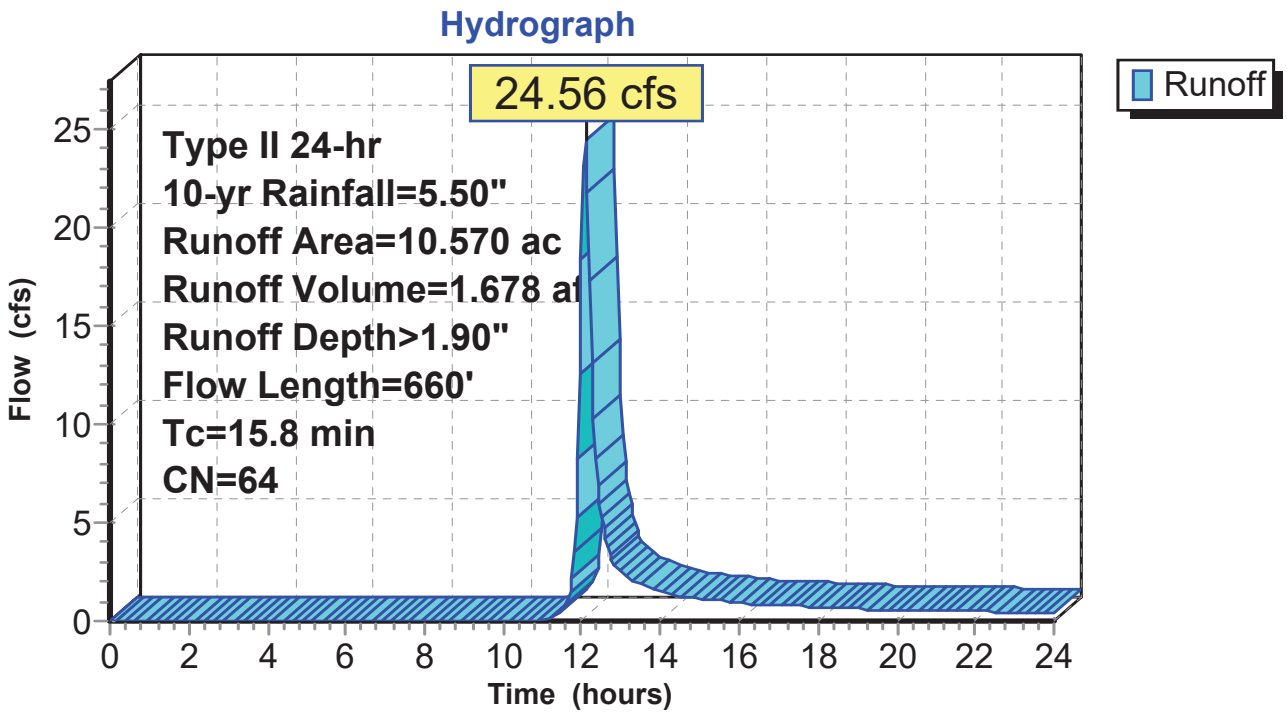
Runoff = 24.56 cfs @ 12.09 hrs, Volume= 1.678 af, Depth> 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.50"

Area (ac)	CN	Description
9.160	61	>75% Grass cover, Good, HSG B
1.410	80	>75% Grass cover, Good, HSG D
10.570	64	Weighted Average
10.570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.2330	0.36		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
1.3	126	0.0550	1.64		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
7.5	384	0.0150	0.86		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
15.8	660	Total			

Subcatchment P-1c: P-1c



Summary for Subcatchment P-1d: P-1d

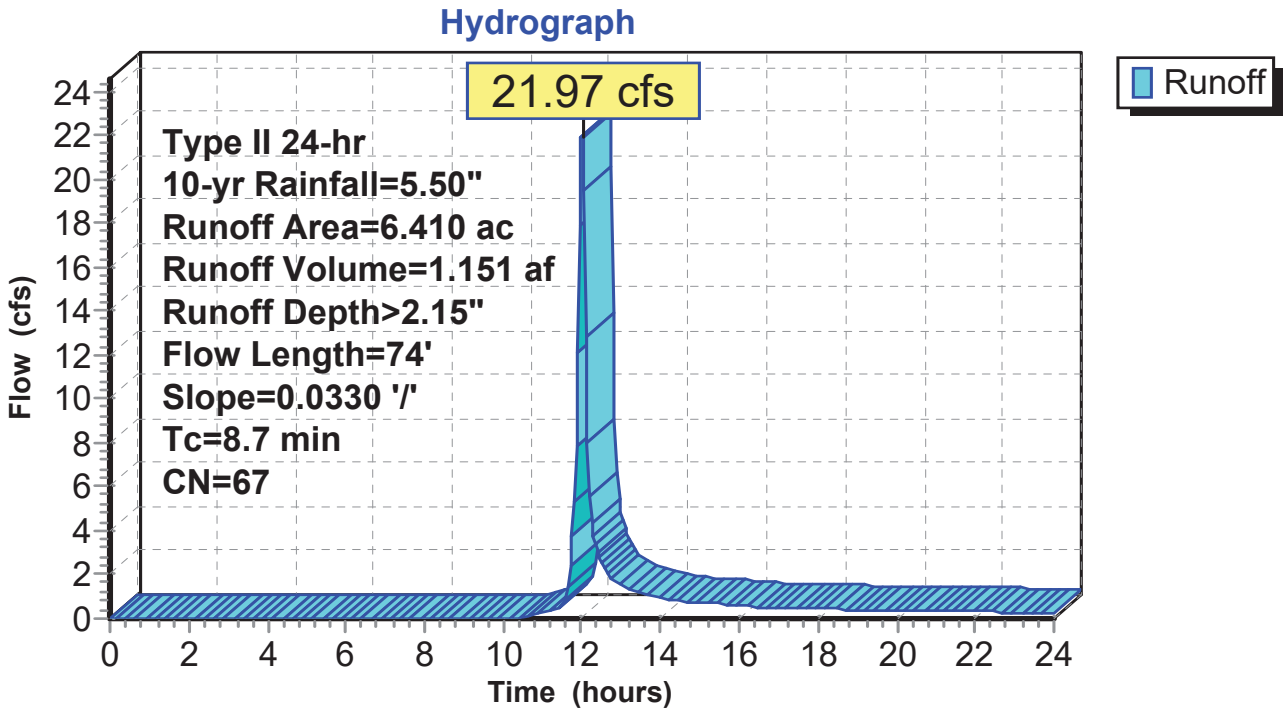
Runoff = 21.97 cfs @ 12.01 hrs, Volume= 1.151 af, Depth> 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=5.50"

Area (ac)	CN	Description
1.420	80	>75% Grass cover, Good, HSG D
4.640	61	>75% Grass cover, Good, HSG B
0.350	98	Paved parking, HSG B
6.410	67	Weighted Average
6.060		94.54% Pervious Area
0.350		5.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	74	0.0330	0.14		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"

Subcatchment P-1d: P-1d



Summary for Reach 1R: Swale 1c

Inflow Area = 10.570 ac, 0.00% Impervious, Inflow Depth > 1.90" for 10-yr event
Inflow = 24.56 cfs @ 12.09 hrs, Volume= 1.678 af
Outflow = 23.66 cfs @ 12.16 hrs, Volume= 1.670 af, Atten= 4%, Lag= 4.3 min

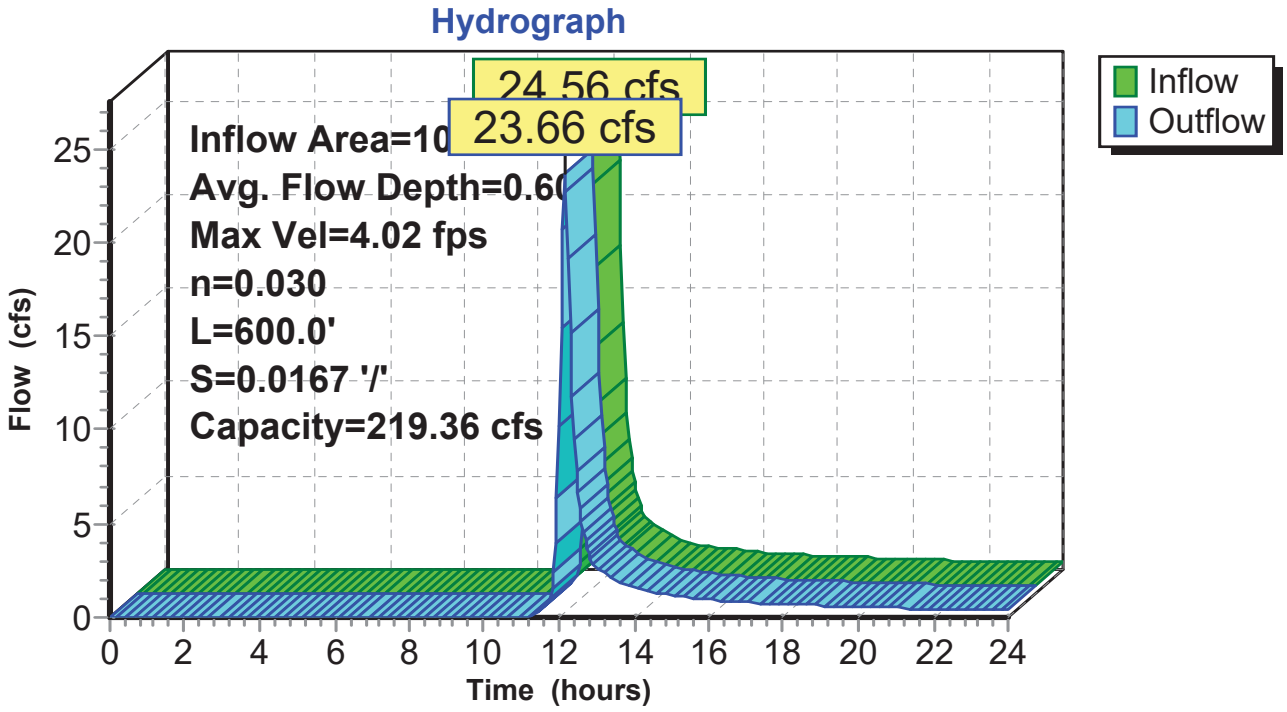
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.02 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 1.27 fps, Avg. Travel Time= 7.9 min

Peak Storage= 3,556 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.60'
Bank-Full Depth= 2.00' Flow Area= 28.0 sf, Capacity= 219.36 cfs

8.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 600.0' Slope= 0.0167 '/'
Inlet Invert= 432.00', Outlet Invert= 422.00'



‡



Stage-Discharge for Reach 1R: Swale 1c

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
432.00	0.00	0.00
432.02	0.47	0.08
432.04	0.74	0.24
432.06	0.96	0.47
432.08	1.16	0.77
432.10	1.34	1.11
432.12	1.51	1.51
432.14	1.66	1.96
432.16	1.81	2.46
432.18	1.95	3.00
432.20	2.08	3.58
432.22	2.21	4.21
432.24	2.33	4.88
432.26	2.45	5.59
432.28	2.56	6.34
432.30	2.67	7.13
432.32	2.78	7.96
432.34	2.88	8.83
432.36	2.98	9.74
432.38	3.08	10.69
432.40	3.17	11.68
432.42	3.27	12.70
432.44	3.36	13.77
432.46	3.45	14.87
432.48	3.53	16.01
432.50	3.62	17.18
432.52	3.70	18.40
432.54	3.78	19.65
432.56	3.86	20.94
432.58	3.94	22.27
432.60	4.02	23.64
432.62	4.10	25.05
432.64	4.17	26.49
432.66	4.25	27.97
432.68	4.32	29.49
432.70	4.39	31.04
432.72	4.46	32.64
432.74	4.53	34.27
432.76	4.60	35.94
432.78	4.67	37.65
432.80	4.73	39.39
432.82	4.80	41.18
432.84	4.87	43.00
432.86	4.93	44.86
432.88	4.99	46.76
432.90	5.06	48.70
432.92	5.12	50.68
432.94	5.18	52.70
432.96	5.24	54.76
432.98	5.30	56.85
433.00	5.36	58.99
433.02	5.42	61.16
433.04	5.48	63.38
433.06	5.54	65.63
433.08	5.60	67.93
433.10	5.65	70.26
433.12	5.71	72.64
433.14	5.76	75.05
433.16	5.82	77.51
433.18	5.88	80.00
433.20	5.93	82.54
433.22	5.98	85.12
433.24	6.04	87.74
433.26	6.09	90.40
433.28	6.14	93.10
433.30	6.20	95.85
433.32	6.25	98.63
433.34	6.30	101.46
433.36	6.35	104.33
433.38	6.40	107.24
433.40	6.45	110.19
433.42	6.50	113.19
433.44	6.55	116.23
433.46	6.60	119.31
433.48	6.65	122.44
433.50	6.70	125.61
433.52	6.75	128.82
433.54	6.80	132.08
433.56	6.84	135.38
433.58	6.89	138.72
433.60	6.94	142.11
433.62	6.99	145.54
433.64	7.03	149.01
433.66	7.08	152.53
433.68	7.13	156.10
433.70	7.17	159.71
433.72	7.22	163.36
433.74	7.26	167.06
433.76	7.31	170.81
433.78	7.35	174.60
433.80	7.40	178.44
433.82	7.44	182.32
433.84	7.49	186.25
433.86	7.53	190.22
433.88	7.57	194.25
433.90	7.62	198.31
433.92	7.66	202.43
433.94	7.71	206.59
433.96	7.75	210.80
433.98	7.79	215.05
434.00	**7.83**	**219.36**

Stage-Area-Storage for Reach 1R: Swale 1c

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
432.00	0.0	0
432.02	0.2	97
432.04	0.3	195
432.06	0.5	294
432.08	0.7	396
432.10	0.8	498
432.12	1.0	602
432.14	1.2	707
432.16	1.4	814
432.18	1.5	922
432.20	1.7	1,032
432.22	1.9	1,143
432.24	2.1	1,256
432.26	2.3	1,370
432.28	2.5	1,485
432.30	2.7	1,602
432.32	2.9	1,720
432.34	3.1	1,840
432.36	3.3	1,961
432.38	3.5	2,084
432.40	3.7	2,208
432.42	3.9	2,334
432.44	4.1	2,460
432.46	4.3	2,589
432.48	4.5	2,719
432.50	4.8	2,850
432.52	5.0	2,983
432.54	5.2	3,117
432.56	5.4	3,252
432.58	5.6	3,390
432.60	5.9	3,528
432.62	6.1	3,668
432.64	6.3	3,809
432.66	6.6	3,952
432.68	6.8	4,096
432.70	7.1	4,242
432.72	7.3	4,389
432.74	7.6	4,538
432.76	7.8	4,688
432.78	8.1	4,839
432.80	8.3	4,992
432.82	8.6	5,146
432.84	8.8	5,302
432.86	9.1	5,459
432.88	9.4	5,618
432.90	9.6	5,778
432.92	9.9	5,940
432.94	10.2	6,102
432.96	10.4	6,267
432.98	10.7	6,433
433.00	11.0	6,600
433.02	11.3	6,769
433.04	11.6	6,939
433.06	11.9	7,110
433.08	12.1	7,284
433.10	12.4	7,458
433.12	12.7	7,634
433.14	13.0	7,811
433.16	13.3	7,990
433.18	13.6	8,170
433.20	13.9	8,352
433.22	14.2	8,535
433.24	14.5	8,720
433.26	14.8	8,906
433.28	15.2	9,093
433.30	15.5	9,282
433.32	15.8	9,472
433.34	16.1	9,664
433.36	16.4	9,857
433.38	16.8	10,052
433.40	17.1	10,248
433.42	17.4	10,446
433.44	17.7	10,644
433.46	18.1	10,845
433.48	18.4	11,047
433.50	18.8	11,250
433.52	19.1	11,455
433.54	19.4	11,661
433.56	19.8	11,868
433.58	20.1	12,078
433.60	20.5	12,288
433.62	20.8	12,500
433.64	21.2	12,713
433.66	21.5	12,928
433.68	21.9	13,144
433.70	22.3	13,362
433.72	22.6	13,581
433.74	23.0	13,802
433.76	23.4	14,024
433.78	23.7	14,247
433.80	24.1	14,472
433.82	24.5	14,698
433.84	24.9	14,926
433.86	25.3	15,155
433.88	25.6	15,386
433.90	26.0	15,618
433.92	26.4	15,852
433.94	26.8	16,086
433.96	27.2	16,323
433.98	27.6	16,561
434.00	**28.0**	**16,800**

Summary for Reach 2R: Swale 1d

Inflow Area = 6.410 ac, 5.46% Impervious, Inflow Depth > 2.15" for 10-yr event
Inflow = 21.97 cfs @ 12.01 hrs, Volume= 1.151 af
Outflow = 20.58 cfs @ 12.05 hrs, Volume= 1.147 af, Atten= 6%, Lag= 2.9 min

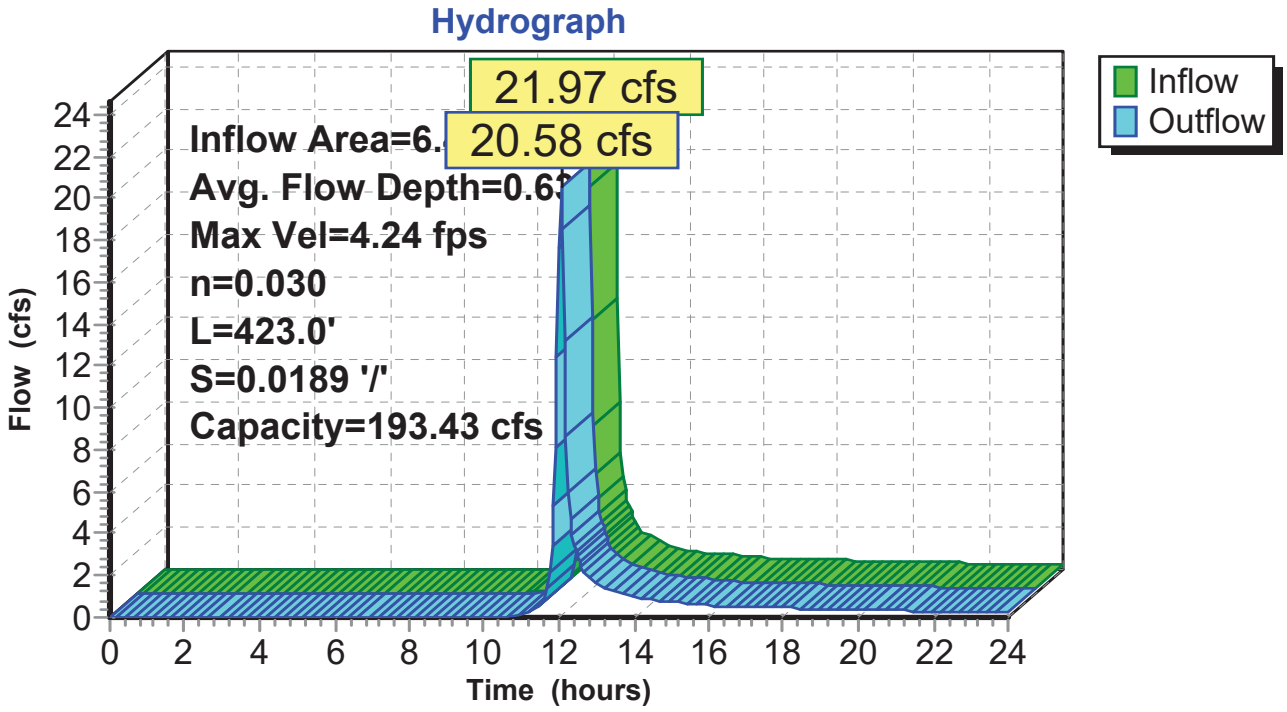
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.24 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 1.22 fps, Avg. Travel Time= 5.8 min

Peak Storage= 2,104 cf @ 12.03 hrs
Average Depth at Peak Storage= 0.63'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 193.43 cfs

6.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 18.00'
Length= 423.0' Slope= 0.0189 '/'
Inlet Invert= 432.00', Outlet Invert= 424.00'



‡



Stage-Discharge for Reach 2R: Swale 1d

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
432.00	0.00	0.00
432.02	0.50	0.06
432.04	0.79	0.19
432.06	1.02	0.38
432.08	1.23	0.61
432.10	1.42	0.89
432.12	1.59	1.21
432.14	1.75	1.58
432.16	1.90	1.97
432.18	2.05	2.41
432.20	2.19	2.88
432.22	2.32	3.39
432.24	2.44	3.94
432.26	2.56	4.52
432.28	2.68	5.13
432.30	2.79	5.78
432.32	2.90	6.46
432.34	3.00	7.17
432.36	3.11	7.92
432.38	3.21	8.70
432.40	3.30	9.51
432.42	3.40	10.36
432.44	3.49	11.24
432.46	3.58	12.15
432.48	3.67	13.10
432.50	3.76	14.08
432.52	3.84	15.10
432.54	3.92	16.14
432.56	4.00	17.22
432.58	4.08	18.34
432.60	4.16	19.48
432.62	4.24	20.67
432.64	4.32	21.88
432.66	4.39	23.13
432.68	4.47	24.41
432.70	4.54	25.73
432.72	4.61	27.08
432.74	4.68	28.47
432.76	4.75	29.89
432.78	4.82	31.35
432.80	4.89	32.84
432.82	4.95	34.37
432.84	5.02	35.93
432.86	5.09	37.52
432.88	5.15	39.16
432.90	5.21	40.83
432.92	5.28	42.53
432.94	5.34	44.27
432.96	5.40	46.05
432.98	5.46	47.86
433.00	5.52	49.72
433.02	5.58	51.60
433.04	5.64	53.53
433.06	5.70	55.49
433.08	5.76	57.49
433.10	5.82	59.53
433.12	5.88	61.60
433.14	5.93	63.72
433.16	5.99	65.87
433.18	6.05	68.06
433.20	6.10	70.29
433.22	6.16	72.56
433.24	6.21	74.86
433.26	6.27	77.21
433.28	6.32	79.60
433.30	6.37	82.02
433.32	6.43	84.49
433.34	6.48	86.99
433.36	6.53	89.54
433.38	6.58	92.12
433.40	6.64	94.75
433.42	6.69	97.42
433.44	6.74	100.13
433.46	6.79	102.88
433.48	6.84	105.67
433.50	6.89	108.50
433.52	6.94	111.38
433.54	6.99	114.29
433.56	7.04	117.25
433.58	7.09	120.25
433.60	7.14	123.30
433.62	7.18	126.38
433.64	7.23	129.51
433.66	7.28	132.69
433.68	7.33	135.90
433.70	7.37	139.16
433.72	7.42	142.47
433.74	7.47	145.81
433.76	7.52	149.20
433.78	7.56	152.64
433.80	7.61	156.12
433.82	7.65	159.65
433.84	7.70	163.22
433.86	7.75	166.83
433.88	7.79	170.50
433.90	7.84	174.20
433.92	7.88	177.96
433.94	7.93	181.75
433.96	7.97	185.60
433.98	8.02	189.49
434.00	**8.06**	**193.43**

Stage-Area-Storage for Reach 2R: Swale 1d

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
432.00	0.0	0
432.02	0.1	51
432.04	0.2	104
432.06	0.4	157
432.08	0.5	211
432.10	0.6	266
432.12	0.8	323
432.14	0.9	380
432.16	1.0	439
432.18	1.2	498
432.20	1.3	558
432.22	1.5	620
432.24	1.6	682
432.26	1.8	746
432.28	1.9	810
432.30	2.1	876
432.32	2.2	942
432.34	2.4	1,010
432.36	2.5	1,078
432.38	2.7	1,148
432.40	2.9	1,218
432.42	3.0	1,290
432.44	3.2	1,362
432.46	3.4	1,436
432.48	3.6	1,511
432.50	3.8	1,586
432.52	3.9	1,663
432.54	4.1	1,741
432.56	4.3	1,819
432.58	4.5	1,899
432.60	4.7	1,980
432.62	4.9	2,061
432.64	5.1	2,144
432.66	5.3	2,228
432.68	5.5	2,313
432.70	5.7	2,398
432.72	5.9	2,485
432.74	6.1	2,573
432.76	6.3	2,662
432.78	6.5	2,752
432.80	6.7	2,843
432.82	6.9	2,934
432.84	7.2	3,027
432.86	7.4	3,121
432.88	7.6	3,216
432.90	7.8	3,312
432.92	8.1	3,409
432.94	8.3	3,507
432.96	8.5	3,606
432.98	8.8	3,706
433.00	9.0	3,807
433.02	9.2	3,909
433.04	9.5	4,012
433.06	9.7	4,116
433.08	10.0	4,221
433.10	10.2	4,327
433.12	10.5	4,434
433.14	10.7	4,543
433.16	11.0	4,652
433.18	11.3	4,762
433.20	11.5	4,873
433.22	11.8	4,985
433.24	12.1	5,098
433.26	12.3	5,213
433.28	12.6	5,328
433.30	12.9	5,444
433.32	13.1	5,561
433.34	13.4	5,680
433.36	13.7	5,799
433.38	14.0	5,919
433.40	14.3	6,040
433.42	14.6	6,163
433.44	14.9	6,286
433.46	15.2	6,410
433.48	15.5	6,536
433.50	15.8	6,662
433.52	16.1	6,790
433.54	16.4	6,918
433.56	16.7	7,048
433.58	17.0	7,178
433.60	17.3	7,309
433.62	17.6	7,442
433.64	17.9	7,575
433.66	18.2	7,710
433.68	18.5	7,845
433.70	18.9	7,982
433.72	19.2	8,120
433.74	19.5	8,258
433.76	19.9	8,398
433.78	20.2	8,538
433.80	20.5	8,680
433.82	20.9	8,823
433.84	21.2	8,966
433.86	21.5	9,111
433.88	21.9	9,257
433.90	22.2	9,403
433.92	22.6	9,551
433.94	22.9	9,700
433.96	23.3	9,849
433.98	23.6	10,000
434.00	**24.0**	**10,152**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1c: P-1c Runoff Area=10.570 ac 0.00% Impervious Runoff Depth>2.77"
Flow Length=660' Tc=15.8 min CN=64 Runoff=36.41 cfs 2.440 af

Subcatchment P-1d: P-1d Runoff Area=6.410 ac 5.46% Impervious Runoff Depth>3.07"
Flow Length=74' Slope=0.0330 '/' Tc=8.7 min CN=67 Runoff=31.47 cfs 1.640 af

Reach 1R: Swale 1c Avg. Flow Depth=0.76' Max Vel=4.58 fps Inflow=36.41 cfs 2.440 af
n=0.030 L=600.0' S=0.0167 '/' Capacity=219.36 cfs Outflow=35.14 cfs 2.431 af

Reach 2R: Swale 1d Avg. Flow Depth=0.77' Max Vel=4.75 fps Inflow=31.47 cfs 1.640 af
n=0.030 L=423.0' S=0.0189 '/' Capacity=193.43 cfs Outflow=29.63 cfs 1.636 af

Summary for Subcatchment P-1c: P-1c

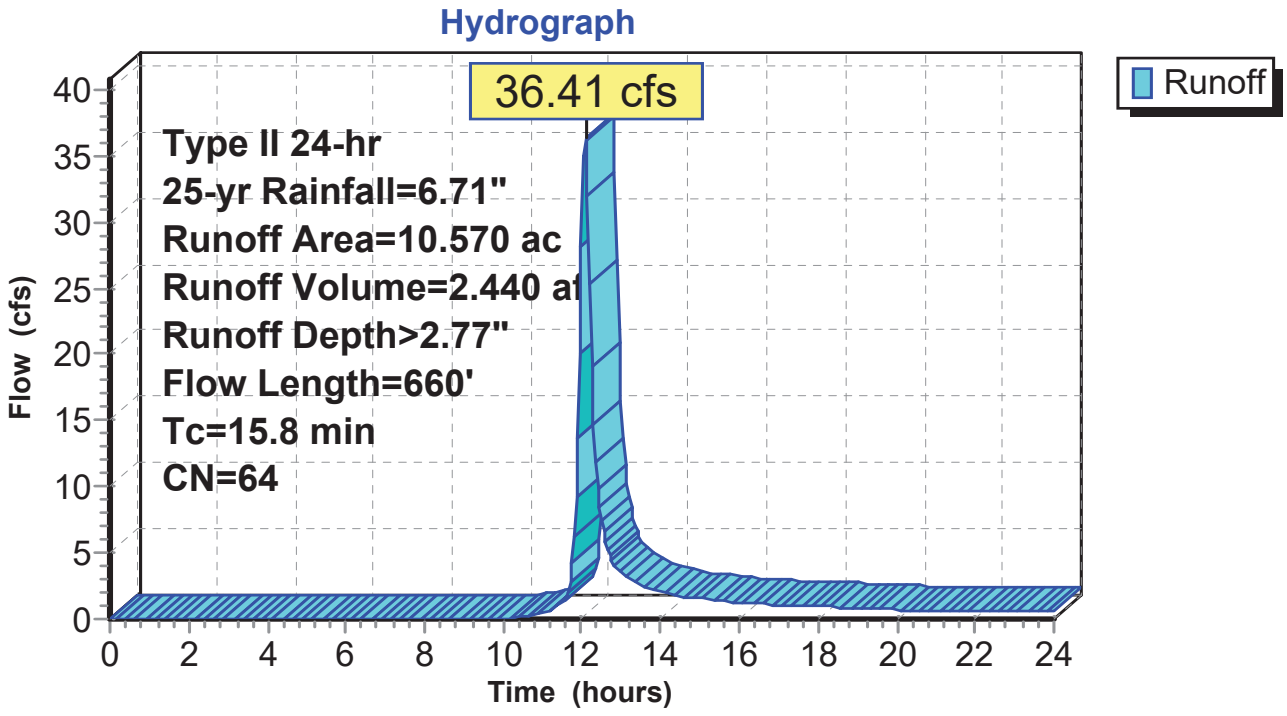
Runoff = 36.41 cfs @ 12.09 hrs, Volume= 2.440 af, Depth> 2.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.71"

Area (ac)	CN	Description
9.160	61	>75% Grass cover, Good, HSG B
1.410	80	>75% Grass cover, Good, HSG D
10.570	64	Weighted Average
10.570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.2330	0.36		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
1.3	126	0.0550	1.64		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
7.5	384	0.0150	0.86		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
15.8	660	Total			

Subcatchment P-1c: P-1c



Summary for Subcatchment P-1d: P-1d

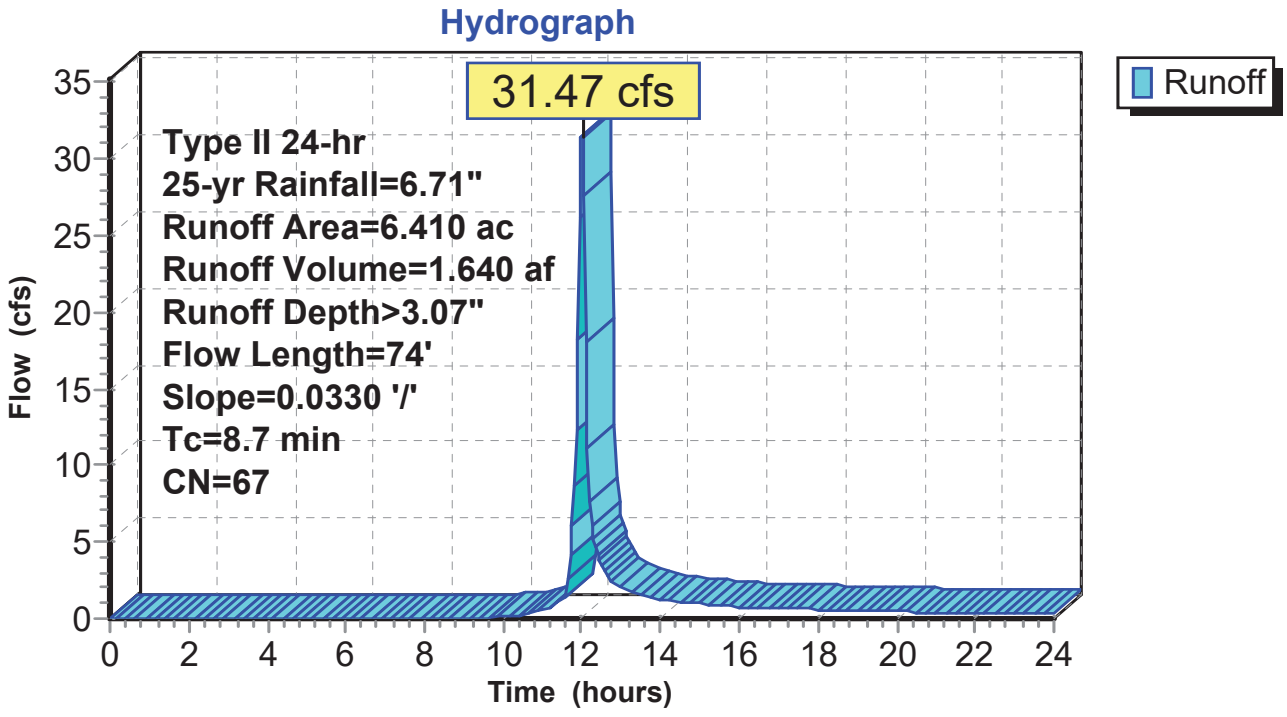
Runoff = 31.47 cfs @ 12.00 hrs, Volume= 1.640 af, Depth> 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=6.71"

Area (ac)	CN	Description
1.420	80	>75% Grass cover, Good, HSG D
4.640	61	>75% Grass cover, Good, HSG B
0.350	98	Paved parking, HSG B
6.410	67	Weighted Average
6.060		94.54% Pervious Area
0.350		5.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	74	0.0330	0.14		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"

Subcatchment P-1d: P-1d



Summary for Reach 1R: Swale 1c

Inflow Area = 10.570 ac, 0.00% Impervious, Inflow Depth > 2.77" for 25-yr event
Inflow = 36.41 cfs @ 12.09 hrs, Volume= 2.440 af
Outflow = 35.14 cfs @ 12.15 hrs, Volume= 2.431 af, Atten= 3%, Lag= 3.8 min

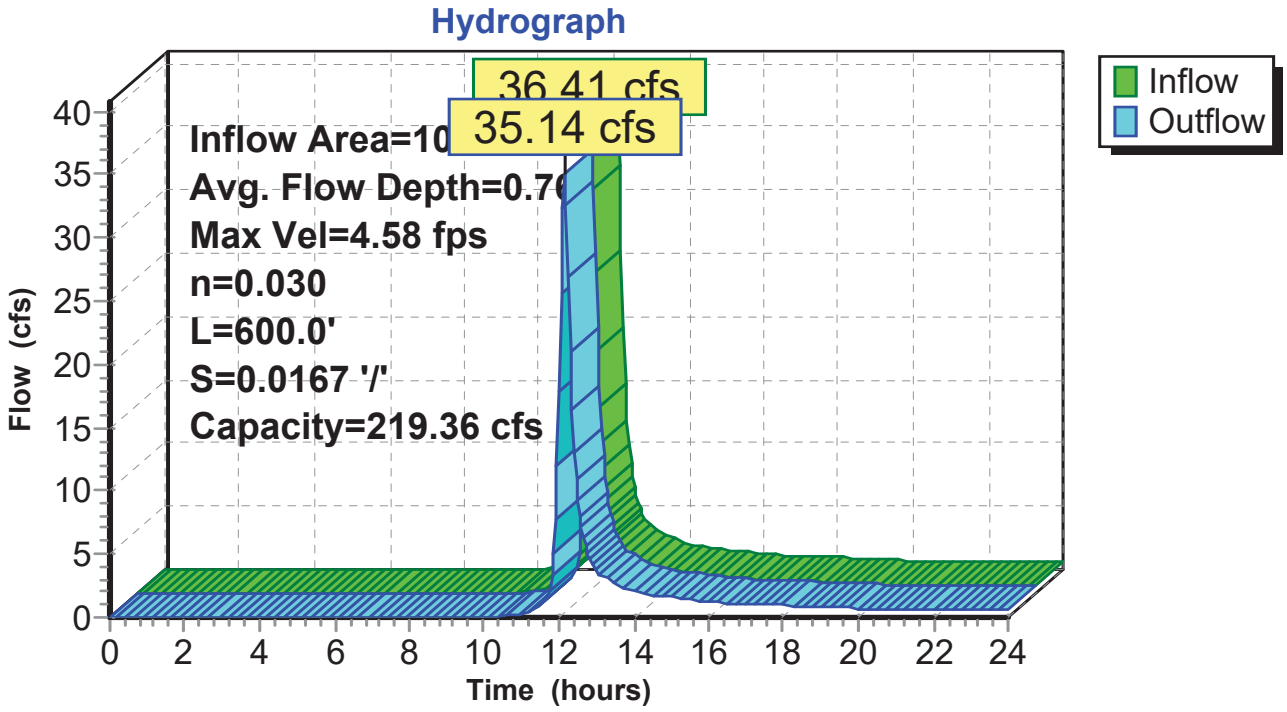
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.58 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 1.40 fps, Avg. Travel Time= 7.2 min

Peak Storage= 4,667 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.76'
Bank-Full Depth= 2.00' Flow Area= 28.0 sf, Capacity= 219.36 cfs

8.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 600.0' Slope= 0.0167 '/'
Inlet Invert= 432.00', Outlet Invert= 422.00'



‡



Stage-Discharge for Reach 1R: Swale 1c

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
432.00	0.00	0.00
432.02	0.47	0.08
432.04	0.74	0.24
432.06	0.96	0.47
432.08	1.16	0.77
432.10	1.34	1.11
432.12	1.51	1.51
432.14	1.66	1.96
432.16	1.81	2.46
432.18	1.95	3.00
432.20	2.08	3.58
432.22	2.21	4.21
432.24	2.33	4.88
432.26	2.45	5.59
432.28	2.56	6.34
432.30	2.67	7.13
432.32	2.78	7.96
432.34	2.88	8.83
432.36	2.98	9.74
432.38	3.08	10.69
432.40	3.17	11.68
432.42	3.27	12.70
432.44	3.36	13.77
432.46	3.45	14.87
432.48	3.53	16.01
432.50	3.62	17.18
432.52	3.70	18.40
432.54	3.78	19.65
432.56	3.86	20.94
432.58	3.94	22.27
432.60	4.02	23.64
432.62	4.10	25.05
432.64	4.17	26.49
432.66	4.25	27.97
432.68	4.32	29.49
432.70	4.39	31.04
432.72	4.46	32.64
432.74	4.53	34.27
432.76	4.60	35.94
432.78	4.67	37.65
432.80	4.73	39.39
432.82	4.80	41.18
432.84	4.87	43.00
432.86	4.93	44.86
432.88	4.99	46.76
432.90	5.06	48.70
432.92	5.12	50.68
432.94	5.18	52.70
432.96	5.24	54.76
432.98	5.30	56.85
433.00	5.36	58.99
433.02	5.42	61.16
433.04	5.48	63.38
433.06	5.54	65.63
433.08	5.60	67.93
433.10	5.65	70.26
433.12	5.71	72.64
433.14	5.76	75.05
433.16	5.82	77.51
433.18	5.88	80.00
433.20	5.93	82.54
433.22	5.98	85.12
433.24	6.04	87.74
433.26	6.09	90.40
433.28	6.14	93.10
433.30	6.20	95.85
433.32	6.25	98.63
433.34	6.30	101.46
433.36	6.35	104.33
433.38	6.40	107.24
433.40	6.45	110.19
433.42	6.50	113.19
433.44	6.55	116.23
433.46	6.60	119.31
433.48	6.65	122.44
433.50	6.70	125.61
433.52	6.75	128.82
433.54	6.80	132.08
433.56	6.84	135.38
433.58	6.89	138.72
433.60	6.94	142.11
433.62	6.99	145.54
433.64	7.03	149.01
433.66	7.08	152.53
433.68	7.13	156.10
433.70	7.17	159.71
433.72	7.22	163.36
433.74	7.26	167.06
433.76	7.31	170.81
433.78	7.35	174.60
433.80	7.40	178.44
433.82	7.44	182.32
433.84	7.49	186.25
433.86	7.53	190.22
433.88	7.57	194.25
433.90	7.62	198.31
433.92	7.66	202.43
433.94	7.71	206.59
433.96	7.75	210.80
433.98	7.79	215.05
434.00	**7.83**	**219.36**

Stage-Area-Storage for Reach 1R: Swale 1c

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
432.00	0.0	0
432.02	0.2	97
432.04	0.3	195
432.06	0.5	294
432.08	0.7	396
432.10	0.8	498
432.12	1.0	602
432.14	1.2	707
432.16	1.4	814
432.18	1.5	922
432.20	1.7	1,032
432.22	1.9	1,143
432.24	2.1	1,256
432.26	2.3	1,370
432.28	2.5	1,485
432.30	2.7	1,602
432.32	2.9	1,720
432.34	3.1	1,840
432.36	3.3	1,961
432.38	3.5	2,084
432.40	3.7	2,208
432.42	3.9	2,334
432.44	4.1	2,460
432.46	4.3	2,589
432.48	4.5	2,719
432.50	4.8	2,850
432.52	5.0	2,983
432.54	5.2	3,117
432.56	5.4	3,252
432.58	5.6	3,390
432.60	5.9	3,528
432.62	6.1	3,668
432.64	6.3	3,809
432.66	6.6	3,952
432.68	6.8	4,096
432.70	7.1	4,242
432.72	7.3	4,389
432.74	7.6	4,538
432.76	7.8	4,688
432.78	8.1	4,839
432.80	8.3	4,992
432.82	8.6	5,146
432.84	8.8	5,302
432.86	9.1	5,459
432.88	9.4	5,618
432.90	9.6	5,778
432.92	9.9	5,940
432.94	10.2	6,102
432.96	10.4	6,267
432.98	10.7	6,433
433.00	11.0	6,600
433.02	11.3	6,769
433.04	11.6	6,939
433.06	11.9	7,110
433.08	12.1	7,284
433.10	12.4	7,458
433.12	12.7	7,634
433.14	13.0	7,811
433.16	13.3	7,990
433.18	13.6	8,170
433.20	13.9	8,352
433.22	14.2	8,535
433.24	14.5	8,720
433.26	14.8	8,906
433.28	15.2	9,093
433.30	15.5	9,282
433.32	15.8	9,472
433.34	16.1	9,664
433.36	16.4	9,857
433.38	16.8	10,052
433.40	17.1	10,248
433.42	17.4	10,446
433.44	17.7	10,644
433.46	18.1	10,845
433.48	18.4	11,047
433.50	18.8	11,250
433.52	19.1	11,455
433.54	19.4	11,661
433.56	19.8	11,868
433.58	20.1	12,078
433.60	20.5	12,288
433.62	20.8	12,500
433.64	21.2	12,713
433.66	21.5	12,928
433.68	21.9	13,144
433.70	22.3	13,362
433.72	22.6	13,581
433.74	23.0	13,802
433.76	23.4	14,024
433.78	23.7	14,247
433.80	24.1	14,472
433.82	24.5	14,698
433.84	24.9	14,926
433.86	25.3	15,155
433.88	25.6	15,386
433.90	26.0	15,618
433.92	26.4	15,852
433.94	26.8	16,086
433.96	27.2	16,323
433.98	27.6	16,561
434.00	**28.0**	**16,800**

Summary for Reach 2R: Swale 1d

Inflow Area = 6.410 ac, 5.46% Impervious, Inflow Depth > 3.07" for 25-yr event
Inflow = 31.47 cfs @ 12.00 hrs, Volume= 1.640 af
Outflow = 29.63 cfs @ 12.05 hrs, Volume= 1.636 af, Atten= 6%, Lag= 2.6 min

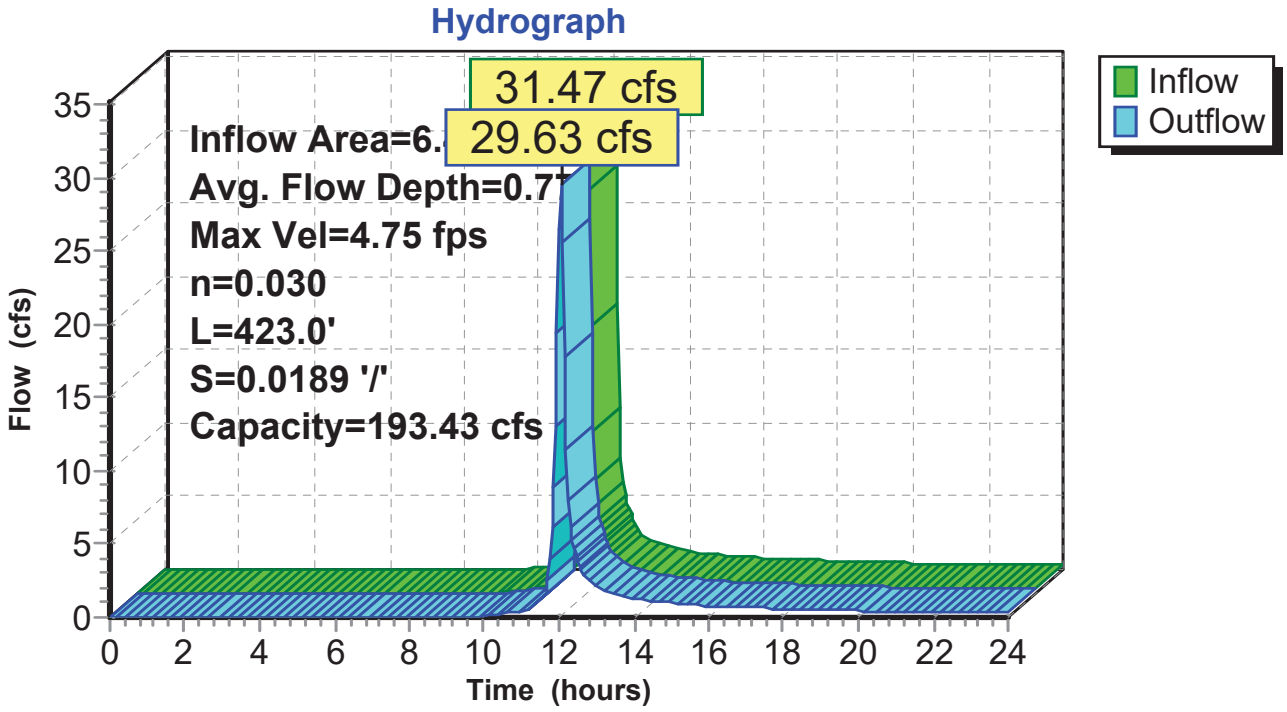
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.75 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.34 fps, Avg. Travel Time= 5.3 min

Peak Storage= 2,702 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.77'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 193.43 cfs

6.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 18.00'
Length= 423.0' Slope= 0.0189 '/'
Inlet Invert= 432.00', Outlet Invert= 424.00'



‡



Stage-Discharge for Reach 2R: Swale 1d

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
432.00	0.00	0.00
432.02	0.50	0.06
432.04	0.79	0.19
432.06	1.02	0.38
432.08	1.23	0.61
432.10	1.42	0.89
432.12	1.59	1.21
432.14	1.75	1.58
432.16	1.90	1.97
432.18	2.05	2.41
432.20	2.19	2.88
432.22	2.32	3.39
432.24	2.44	3.94
432.26	2.56	4.52
432.28	2.68	5.13
432.30	2.79	5.78
432.32	2.90	6.46
432.34	3.00	7.17
432.36	3.11	7.92
432.38	3.21	8.70
432.40	3.30	9.51
432.42	3.40	10.36
432.44	3.49	11.24
432.46	3.58	12.15
432.48	3.67	13.10
432.50	3.76	14.08
432.52	3.84	15.10
432.54	3.92	16.14
432.56	4.00	17.22
432.58	4.08	18.34
432.60	4.16	19.48
432.62	4.24	20.67
432.64	4.32	21.88
432.66	4.39	23.13
432.68	4.47	24.41
432.70	4.54	25.73
432.72	4.61	27.08
432.74	4.68	28.47
432.76	4.75	29.89
432.78	4.82	31.35
432.80	4.89	32.84
432.82	4.95	34.37
432.84	5.02	35.93
432.86	5.09	37.52
432.88	5.15	39.16
432.90	5.21	40.83
432.92	5.28	42.53
432.94	5.34	44.27
432.96	5.40	46.05
432.98	5.46	47.86
433.00	5.52	49.72
433.02	5.58	51.60
433.04	5.64	53.53
433.06	5.70	55.49
433.08	5.76	57.49
433.10	5.82	59.53
433.12	5.88	61.60
433.14	5.93	63.72
433.16	5.99	65.87
433.18	6.05	68.06
433.20	6.10	70.29
433.22	6.16	72.56
433.24	6.21	74.86
433.26	6.27	77.21
433.28	6.32	79.60
433.30	6.37	82.02
433.32	6.43	84.49
433.34	6.48	86.99
433.36	6.53	89.54
433.38	6.58	92.12
433.40	6.64	94.75
433.42	6.69	97.42
433.44	6.74	100.13
433.46	6.79	102.88
433.48	6.84	105.67
433.50	6.89	108.50
433.52	6.94	111.38
433.54	6.99	114.29
433.56	7.04	117.25
433.58	7.09	120.25
433.60	7.14	123.30
433.62	7.18	126.38
433.64	7.23	129.51
433.66	7.28	132.69
433.68	7.33	135.90
433.70	7.37	139.16
433.72	7.42	142.47
433.74	7.47	145.81
433.76	7.52	149.20
433.78	7.56	152.64
433.80	7.61	156.12
433.82	7.65	159.65
433.84	7.70	163.22
433.86	7.75	166.83
433.88	7.79	170.50
433.90	7.84	174.20
433.92	7.88	177.96
433.94	7.93	181.75
433.96	7.97	185.60
433.98	8.02	189.49
434.00	**8.06**	**193.43**

Stage-Area-Storage for Reach 2R: Swale 1d

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
432.00	0.0	0
432.02	0.1	51
432.04	0.2	104
432.06	0.4	157
432.08	0.5	211
432.10	0.6	266
432.12	0.8	323
432.14	0.9	380
432.16	1.0	439
432.18	1.2	498
432.20	1.3	558
432.22	1.5	620
432.24	1.6	682
432.26	1.8	746
432.28	1.9	810
432.30	2.1	876
432.32	2.2	942
432.34	2.4	1,010
432.36	2.5	1,078
432.38	2.7	1,148
432.40	2.9	1,218
432.42	3.0	1,290
432.44	3.2	1,362
432.46	3.4	1,436
432.48	3.6	1,511
432.50	3.8	1,586
432.52	3.9	1,663
432.54	4.1	1,741
432.56	4.3	1,819
432.58	4.5	1,899
432.60	4.7	1,980
432.62	4.9	2,061
432.64	5.1	2,144
432.66	5.3	2,228
432.68	5.5	2,313
432.70	5.7	2,398
432.72	5.9	2,485
432.74	6.1	2,573
432.76	6.3	2,662
432.78	6.5	2,752
432.80	6.7	2,843
432.82	6.9	2,934
432.84	7.2	3,027
432.86	7.4	3,121
432.88	7.6	3,216
432.90	7.8	3,312
432.92	8.1	3,409
432.94	8.3	3,507
432.96	8.5	3,606
432.98	8.8	3,706
433.00	9.0	3,807
433.02	9.2	3,909
433.04	9.5	4,012
433.06	9.7	4,116
433.08	10.0	4,221
433.10	10.2	4,327
433.12	10.5	4,434
433.14	10.7	4,543
433.16	11.0	4,652
433.18	11.3	4,762
433.20	11.5	4,873
433.22	11.8	4,985
433.24	12.1	5,098
433.26	12.3	5,213
433.28	12.6	5,328
433.30	12.9	5,444
433.32	13.1	5,561
433.34	13.4	5,680
433.36	13.7	5,799
433.38	14.0	5,919
433.40	14.3	6,040
433.42	14.6	6,163
433.44	14.9	6,286
433.46	15.2	6,410
433.48	15.5	6,536
433.50	15.8	6,662
433.52	16.1	6,790
433.54	16.4	6,918
433.56	16.7	7,048
433.58	17.0	7,178
433.60	17.3	7,309
433.62	17.6	7,442
433.64	17.9	7,575
433.66	18.2	7,710
433.68	18.5	7,845
433.70	18.9	7,982
433.72	19.2	8,120
433.74	19.5	8,258
433.76	19.9	8,398
433.78	20.2	8,538
433.80	20.5	8,680
433.82	20.9	8,823
433.84	21.2	8,966
433.86	21.5	9,111
433.88	21.9	9,257
433.90	22.2	9,403
433.92	22.6	9,551
433.94	22.9	9,700
433.96	23.3	9,849
433.98	23.6	10,000
434.00	**24.0**	**10,152**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1c: P-1c Runoff Area=10.570 ac 0.00% Impervious Runoff Depth>3.46"
Flow Length=660' Tc=15.8 min CN=64 Runoff=45.74 cfs 3.046 af

Subcatchment P-1d: P-1d Runoff Area=6.410 ac 5.46% Impervious Runoff Depth>3.79"
Flow Length=74' Slope=0.0330 '/' Tc=8.7 min CN=67 Runoff=38.84 cfs 2.026 af

Reach 1R: Swale 1c Avg. Flow Depth=0.86' Max Vel=4.93 fps Inflow=45.74 cfs 3.046 af
n=0.030 L=600.0' S=0.0167 '/' Capacity=219.36 cfs Outflow=44.17 cfs 3.036 af

Reach 2R: Swale 1d Avg. Flow Depth=0.86' Max Vel=5.07 fps Inflow=38.84 cfs 2.026 af
n=0.030 L=423.0' S=0.0189 '/' Capacity=193.43 cfs Outflow=36.67 cfs 2.021 af

Summary for Subcatchment P-1c: P-1c

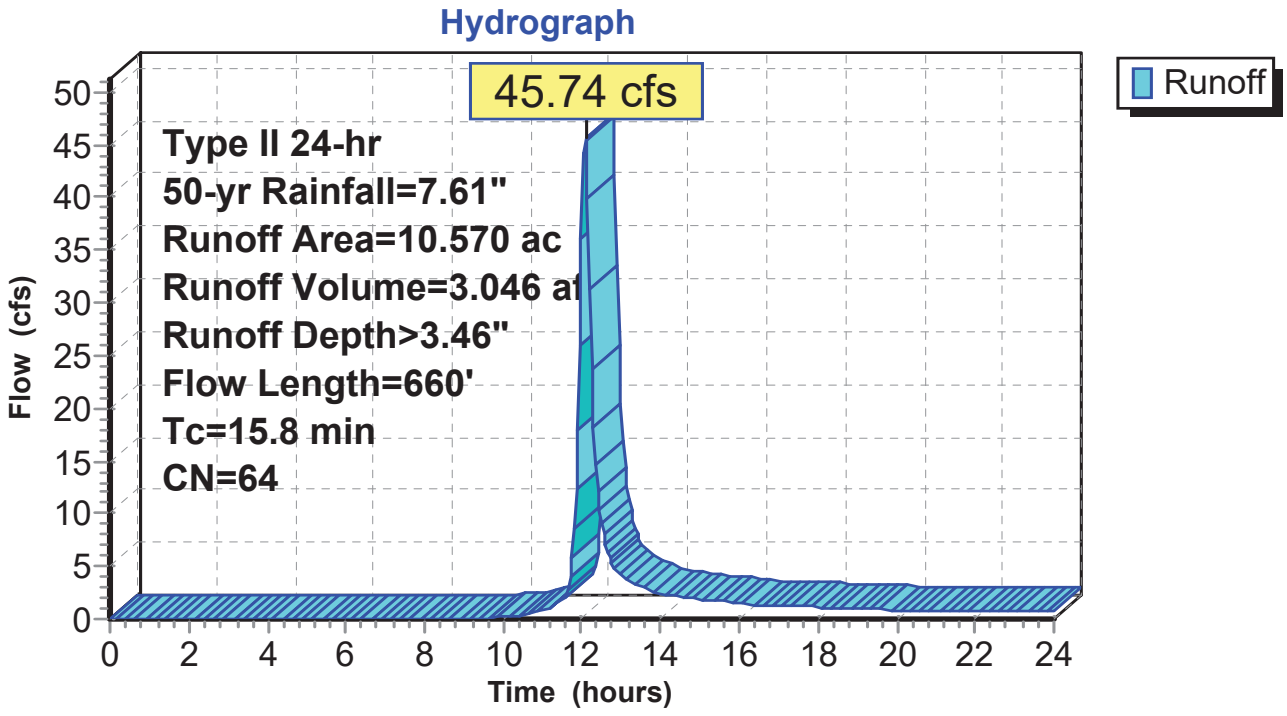
Runoff = 45.74 cfs @ 12.08 hrs, Volume= 3.046 af, Depth> 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=7.61"

Area (ac)	CN	Description
9.160	61	>75% Grass cover, Good, HSG B
1.410	80	>75% Grass cover, Good, HSG D
10.570	64	Weighted Average
10.570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.2330	0.36		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
1.3	126	0.0550	1.64		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
7.5	384	0.0150	0.86		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
15.8	660	Total			

Subcatchment P-1c: P-1c



Summary for Subcatchment P-1d: P-1d

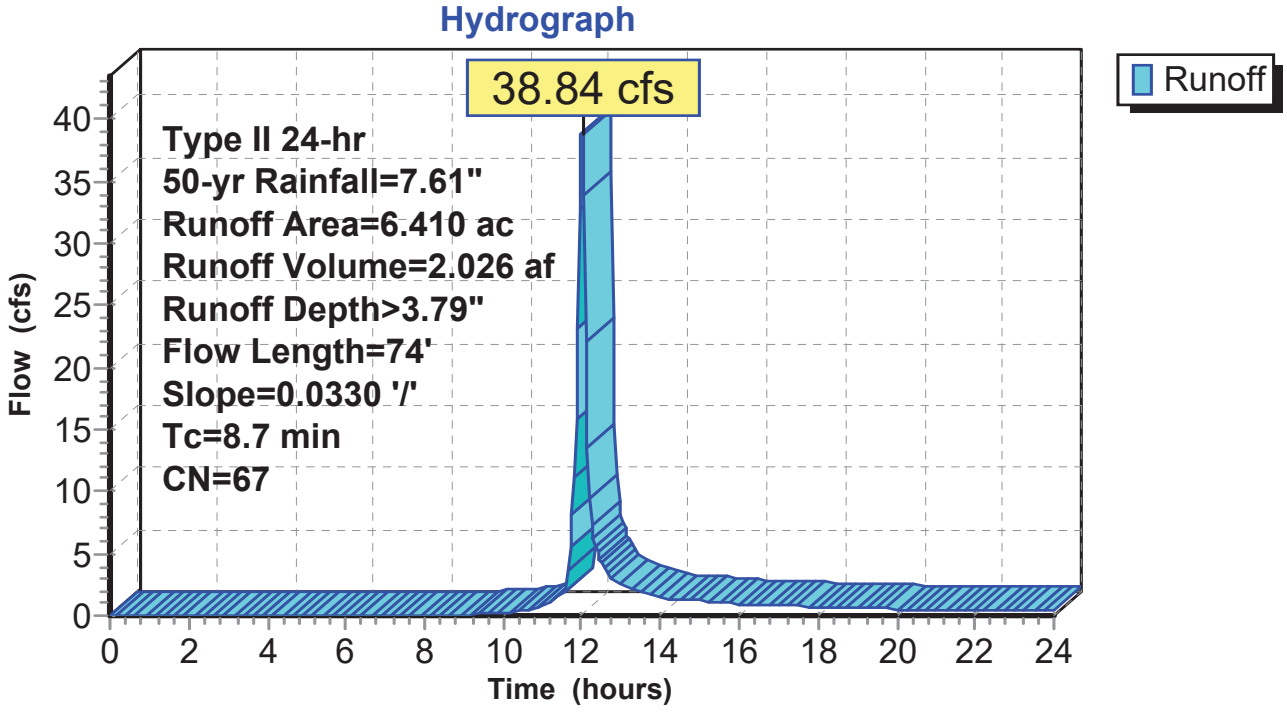
Runoff = 38.84 cfs @ 12.00 hrs, Volume= 2.026 af, Depth> 3.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-yr Rainfall=7.61"

Area (ac)	CN	Description
1.420	80	>75% Grass cover, Good, HSG D
4.640	61	>75% Grass cover, Good, HSG B
0.350	98	Paved parking, HSG B
6.410	67	Weighted Average
6.060		94.54% Pervious Area
0.350		5.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	74	0.0330	0.14		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"

Subcatchment P-1d: P-1d



Summary for Reach 1R: Swale 1c

Inflow Area = 10.570 ac, 0.00% Impervious, Inflow Depth > 3.46" for 50-yr event
Inflow = 45.74 cfs @ 12.08 hrs, Volume= 3.046 af
Outflow = 44.17 cfs @ 12.14 hrs, Volume= 3.036 af, Atten= 3%, Lag= 3.6 min

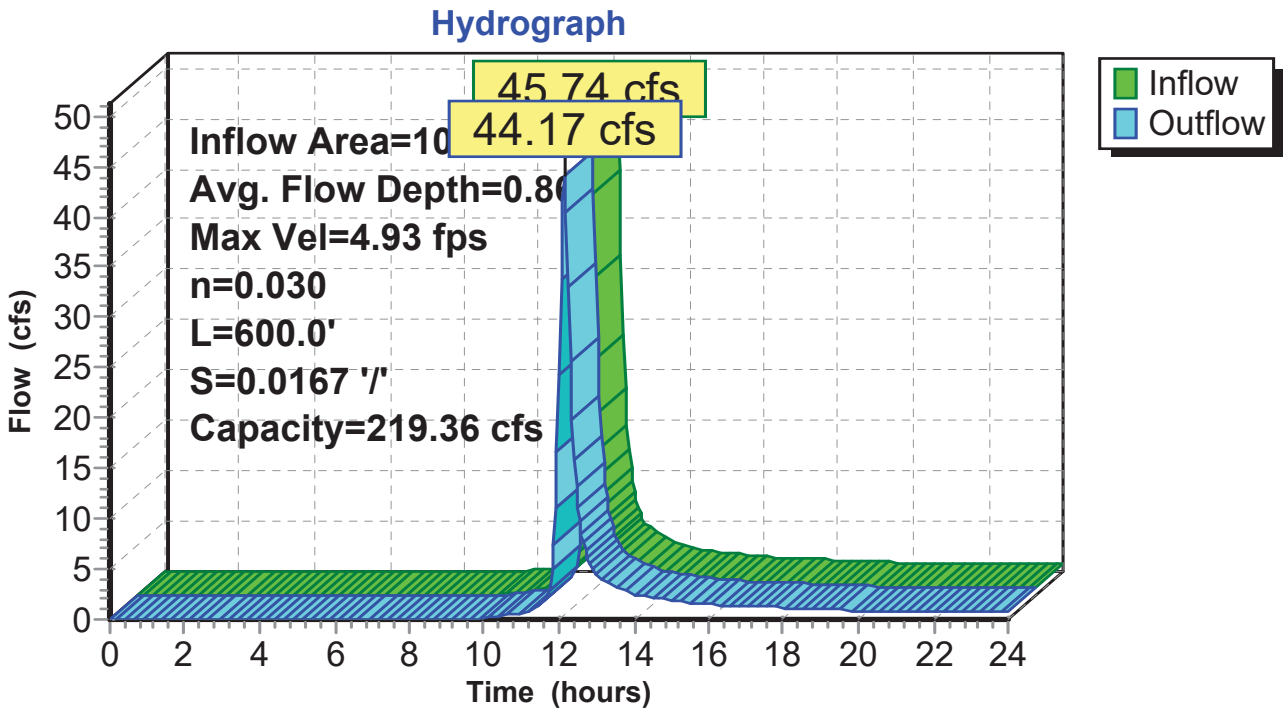
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.93 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 1.47 fps, Avg. Travel Time= 6.8 min

Peak Storage= 5,470 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.86'
Bank-Full Depth= 2.00' Flow Area= 28.0 sf, Capacity= 219.36 cfs

8.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 600.0' Slope= 0.0167 '/'
Inlet Invert= 432.00', Outlet Invert= 422.00'



‡



Stage-Discharge for Reach 1R: Swale 1c

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
432.00	0.00	0.00
432.02	0.47	0.08
432.04	0.74	0.24
432.06	0.96	0.47
432.08	1.16	0.77
432.10	1.34	1.11
432.12	1.51	1.51
432.14	1.66	1.96
432.16	1.81	2.46
432.18	1.95	3.00
432.20	2.08	3.58
432.22	2.21	4.21
432.24	2.33	4.88
432.26	2.45	5.59
432.28	2.56	6.34
432.30	2.67	7.13
432.32	2.78	7.96
432.34	2.88	8.83
432.36	2.98	9.74
432.38	3.08	10.69
432.40	3.17	11.68
432.42	3.27	12.70
432.44	3.36	13.77
432.46	3.45	14.87
432.48	3.53	16.01
432.50	3.62	17.18
432.52	3.70	18.40
432.54	3.78	19.65
432.56	3.86	20.94
432.58	3.94	22.27
432.60	4.02	23.64
432.62	4.10	25.05
432.64	4.17	26.49
432.66	4.25	27.97
432.68	4.32	29.49
432.70	4.39	31.04
432.72	4.46	32.64
432.74	4.53	34.27
432.76	4.60	35.94
432.78	4.67	37.65
432.80	4.73	39.39
432.82	4.80	41.18
432.84	4.87	43.00
432.86	4.93	44.86
432.88	4.99	46.76
432.90	5.06	48.70
432.92	5.12	50.68
432.94	5.18	52.70
432.96	5.24	54.76
432.98	5.30	56.85
433.00	5.36	58.99
433.02	5.42	61.16
433.04	5.48	63.38
433.06	5.54	65.63
433.08	5.60	67.93
433.10	5.65	70.26
433.12	5.71	72.64
433.14	5.76	75.05
433.16	5.82	77.51
433.18	5.88	80.00
433.20	5.93	82.54
433.22	5.98	85.12
433.24	6.04	87.74
433.26	6.09	90.40
433.28	6.14	93.10
433.30	6.20	95.85
433.32	6.25	98.63
433.34	6.30	101.46
433.36	6.35	104.33
433.38	6.40	107.24
433.40	6.45	110.19
433.42	6.50	113.19
433.44	6.55	116.23
433.46	6.60	119.31
433.48	6.65	122.44
433.50	6.70	125.61
433.52	6.75	128.82
433.54	6.80	132.08
433.56	6.84	135.38
433.58	6.89	138.72
433.60	6.94	142.11
433.62	6.99	145.54
433.64	7.03	149.01
433.66	7.08	152.53
433.68	7.13	156.10
433.70	7.17	159.71
433.72	7.22	163.36
433.74	7.26	167.06
433.76	7.31	170.81
433.78	7.35	174.60
433.80	7.40	178.44
433.82	7.44	182.32
433.84	7.49	186.25
433.86	7.53	190.22
433.88	7.57	194.25
433.90	7.62	198.31
433.92	7.66	202.43
433.94	7.71	206.59
433.96	7.75	210.80
433.98	7.79	215.05
434.00	**7.83**	**219.36**

Stage-Area-Storage for Reach 1R: Swale 1c

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
432.00	0.0	0
432.02	0.2	97
432.04	0.3	195
432.06	0.5	294
432.08	0.7	396
432.10	0.8	498
432.12	1.0	602
432.14	1.2	707
432.16	1.4	814
432.18	1.5	922
432.20	1.7	1,032
432.22	1.9	1,143
432.24	2.1	1,256
432.26	2.3	1,370
432.28	2.5	1,485
432.30	2.7	1,602
432.32	2.9	1,720
432.34	3.1	1,840
432.36	3.3	1,961
432.38	3.5	2,084
432.40	3.7	2,208
432.42	3.9	2,334
432.44	4.1	2,460
432.46	4.3	2,589
432.48	4.5	2,719
432.50	4.8	2,850
432.52	5.0	2,983
432.54	5.2	3,117
432.56	5.4	3,252
432.58	5.6	3,390
432.60	5.9	3,528
432.62	6.1	3,668
432.64	6.3	3,809
432.66	6.6	3,952
432.68	6.8	4,096
432.70	7.1	4,242
432.72	7.3	4,389
432.74	7.6	4,538
432.76	7.8	4,688
432.78	8.1	4,839
432.80	8.3	4,992
432.82	8.6	5,146
432.84	8.8	5,302
432.86	9.1	5,459
432.88	9.4	5,618
432.90	9.6	5,778
432.92	9.9	5,940
432.94	10.2	6,102
432.96	10.4	6,267
432.98	10.7	6,433
433.00	11.0	6,600
433.02	11.3	6,769
433.04	11.6	6,939
433.06	11.9	7,110
433.08	12.1	7,284
433.10	12.4	7,458
433.12	12.7	7,634
433.14	13.0	7,811
433.16	13.3	7,990
433.18	13.6	8,170
433.20	13.9	8,352
433.22	14.2	8,535
433.24	14.5	8,720
433.26	14.8	8,906
433.28	15.2	9,093
433.30	15.5	9,282
433.32	15.8	9,472
433.34	16.1	9,664
433.36	16.4	9,857
433.38	16.8	10,052
433.40	17.1	10,248
433.42	17.4	10,446
433.44	17.7	10,644
433.46	18.1	10,845
433.48	18.4	11,047
433.50	18.8	11,250
433.52	19.1	11,455
433.54	19.4	11,661
433.56	19.8	11,868
433.58	20.1	12,078
433.60	20.5	12,288
433.62	20.8	12,500
433.64	21.2	12,713
433.66	21.5	12,928
433.68	21.9	13,144
433.70	22.3	13,362
433.72	22.6	13,581
433.74	23.0	13,802
433.76	23.4	14,024
433.78	23.7	14,247
433.80	24.1	14,472
433.82	24.5	14,698
433.84	24.9	14,926
433.86	25.3	15,155
433.88	25.6	15,386
433.90	26.0	15,618
433.92	26.4	15,852
433.94	26.8	16,086
433.96	27.2	16,323
433.98	27.6	16,561
434.00	**28.0**	**16,800**

Summary for Reach 2R: Swale 1d

Inflow Area = 6.410 ac, 5.46% Impervious, Inflow Depth > 3.79" for 50-yr event
Inflow = 38.84 cfs @ 12.00 hrs, Volume= 2.026 af
Outflow = 36.67 cfs @ 12.04 hrs, Volume= 2.021 af, Atten= 6%, Lag= 2.4 min

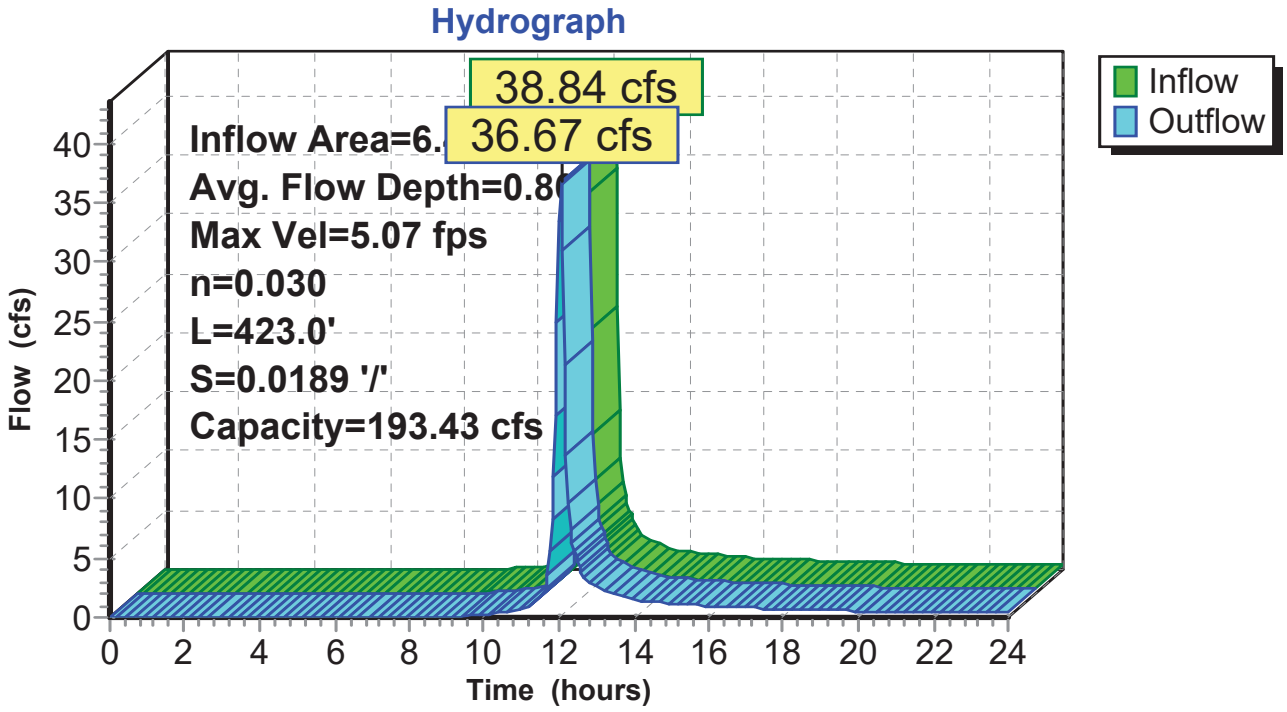
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.07 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 1.41 fps, Avg. Travel Time= 5.0 min

Peak Storage= 3,137 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.86'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 193.43 cfs

6.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 18.00'
Length= 423.0' Slope= 0.0189 '/'
Inlet Invert= 432.00', Outlet Invert= 424.00'



‡



Stage-Discharge for Reach 2R: Swale 1d

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
432.00	0.00	0.00
432.02	0.50	0.06
432.04	0.79	0.19
432.06	1.02	0.38
432.08	1.23	0.61
432.10	1.42	0.89
432.12	1.59	1.21
432.14	1.75	1.58
432.16	1.90	1.97
432.18	2.05	2.41
432.20	2.19	2.88
432.22	2.32	3.39
432.24	2.44	3.94
432.26	2.56	4.52
432.28	2.68	5.13
432.30	2.79	5.78
432.32	2.90	6.46
432.34	3.00	7.17
432.36	3.11	7.92
432.38	3.21	8.70
432.40	3.30	9.51
432.42	3.40	10.36
432.44	3.49	11.24
432.46	3.58	12.15
432.48	3.67	13.10
432.50	3.76	14.08
432.52	3.84	15.10
432.54	3.92	16.14
432.56	4.00	17.22
432.58	4.08	18.34
432.60	4.16	19.48
432.62	4.24	20.67
432.64	4.32	21.88
432.66	4.39	23.13
432.68	4.47	24.41
432.70	4.54	25.73
432.72	4.61	27.08
432.74	4.68	28.47
432.76	4.75	29.89
432.78	4.82	31.35
432.80	4.89	32.84
432.82	4.95	34.37
432.84	5.02	35.93
432.86	5.09	37.52
432.88	5.15	39.16
432.90	5.21	40.83
432.92	5.28	42.53
432.94	5.34	44.27
432.96	5.40	46.05
432.98	5.46	47.86
433.00	5.52	49.72
433.02	5.58	51.60
433.04	5.64	53.53
433.06	5.70	55.49
433.08	5.76	57.49
433.10	5.82	59.53
433.12	5.88	61.60
433.14	5.93	63.72
433.16	5.99	65.87
433.18	6.05	68.06
433.20	6.10	70.29
433.22	6.16	72.56
433.24	6.21	74.86
433.26	6.27	77.21
433.28	6.32	79.60
433.30	6.37	82.02
433.32	6.43	84.49
433.34	6.48	86.99
433.36	6.53	89.54
433.38	6.58	92.12
433.40	6.64	94.75
433.42	6.69	97.42
433.44	6.74	100.13
433.46	6.79	102.88
433.48	6.84	105.67
433.50	6.89	108.50
433.52	6.94	111.38
433.54	6.99	114.29
433.56	7.04	117.25
433.58	7.09	120.25
433.60	7.14	123.30
433.62	7.18	126.38
433.64	7.23	129.51
433.66	7.28	132.69
433.68	7.33	135.90
433.70	7.37	139.16
433.72	7.42	142.47
433.74	7.47	145.81
433.76	7.52	149.20
433.78	7.56	152.64
433.80	7.61	156.12
433.82	7.65	159.65
433.84	7.70	163.22
433.86	7.75	166.83
433.88	7.79	170.50
433.90	7.84	174.20
433.92	7.88	177.96
433.94	7.93	181.75
433.96	7.97	185.60
433.98	8.02	189.49
434.00	**8.06**	**193.43**

Stage-Area-Storage for Reach 2R: Swale 1d

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
432.00	0.0	0
432.02	0.1	51
432.04	0.2	104
432.06	0.4	157
432.08	0.5	211
432.10	0.6	266
432.12	0.8	323
432.14	0.9	380
432.16	1.0	439
432.18	1.2	498
432.20	1.3	558
432.22	1.5	620
432.24	1.6	682
432.26	1.8	746
432.28	1.9	810
432.30	2.1	876
432.32	2.2	942
432.34	2.4	1,010
432.36	2.5	1,078
432.38	2.7	1,148
432.40	2.9	1,218
432.42	3.0	1,290
432.44	3.2	1,362
432.46	3.4	1,436
432.48	3.6	1,511
432.50	3.8	1,586
432.52	3.9	1,663
432.54	4.1	1,741
432.56	4.3	1,819
432.58	4.5	1,899
432.60	4.7	1,980
432.62	4.9	2,061
432.64	5.1	2,144
432.66	5.3	2,228
432.68	5.5	2,313
432.70	5.7	2,398
432.72	5.9	2,485
432.74	6.1	2,573
432.76	6.3	2,662
432.78	6.5	2,752
432.80	6.7	2,843
432.82	6.9	2,934
432.84	7.2	3,027
432.86	7.4	3,121
432.88	7.6	3,216
432.90	7.8	3,312
432.92	8.1	3,409
432.94	8.3	3,507
432.96	8.5	3,606
432.98	8.8	3,706
433.00	9.0	3,807
433.02	9.2	3,909
433.04	9.5	4,012
433.06	9.7	4,116
433.08	10.0	4,221
433.10	10.2	4,327
433.12	10.5	4,434
433.14	10.7	4,543
433.16	11.0	4,652
433.18	11.3	4,762
433.20	11.5	4,873
433.22	11.8	4,985
433.24	12.1	5,098
433.26	12.3	5,213
433.28	12.6	5,328
433.30	12.9	5,444
433.32	13.1	5,561
433.34	13.4	5,680
433.36	13.7	5,799
433.38	14.0	5,919
433.40	14.3	6,040
433.42	14.6	6,163
433.44	14.9	6,286
433.46	15.2	6,410
433.48	15.5	6,536
433.50	15.8	6,662
433.52	16.1	6,790
433.54	16.4	6,918
433.56	16.7	7,048
433.58	17.0	7,178
433.60	17.3	7,309
433.62	17.6	7,442
433.64	17.9	7,575
433.66	18.2	7,710
433.68	18.5	7,845
433.70	18.9	7,982
433.72	19.2	8,120
433.74	19.5	8,258
433.76	19.9	8,398
433.78	20.2	8,538
433.80	20.5	8,680
433.82	20.9	8,823
433.84	21.2	8,966
433.86	21.5	9,111
433.88	21.9	9,257
433.90	22.2	9,403
433.92	22.6	9,551
433.94	22.9	9,700
433.96	23.3	9,849
433.98	23.6	10,000
434.00	**24.0**	**10,152**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1c: P-1c Runoff Area=10.570 ac 0.00% Impervious Runoff Depth>4.23"
Flow Length=660' Tc=15.8 min CN=64 Runoff=56.14 cfs 3.728 af

Subcatchment P-1d: P-1d Runoff Area=6.410 ac 5.46% Impervious Runoff Depth>4.60"
Flow Length=74' Slope=0.0330 '/' Tc=8.7 min CN=67 Runoff=46.98 cfs 2.456 af

Reach 1R: Swale 1c Avg. Flow Depth=0.97' Max Vel=5.26 fps Inflow=56.14 cfs 3.728 af
n=0.030 L=600.0' S=0.0167 '/' Capacity=219.36 cfs Outflow=54.25 cfs 3.716 af

Reach 2R: Swale 1d Avg. Flow Depth=0.96' Max Vel=5.37 fps Inflow=46.98 cfs 2.456 af
n=0.030 L=423.0' S=0.0189 '/' Capacity=193.43 cfs Outflow=44.44 cfs 2.451 af

Summary for Subcatchment P-1c: P-1c

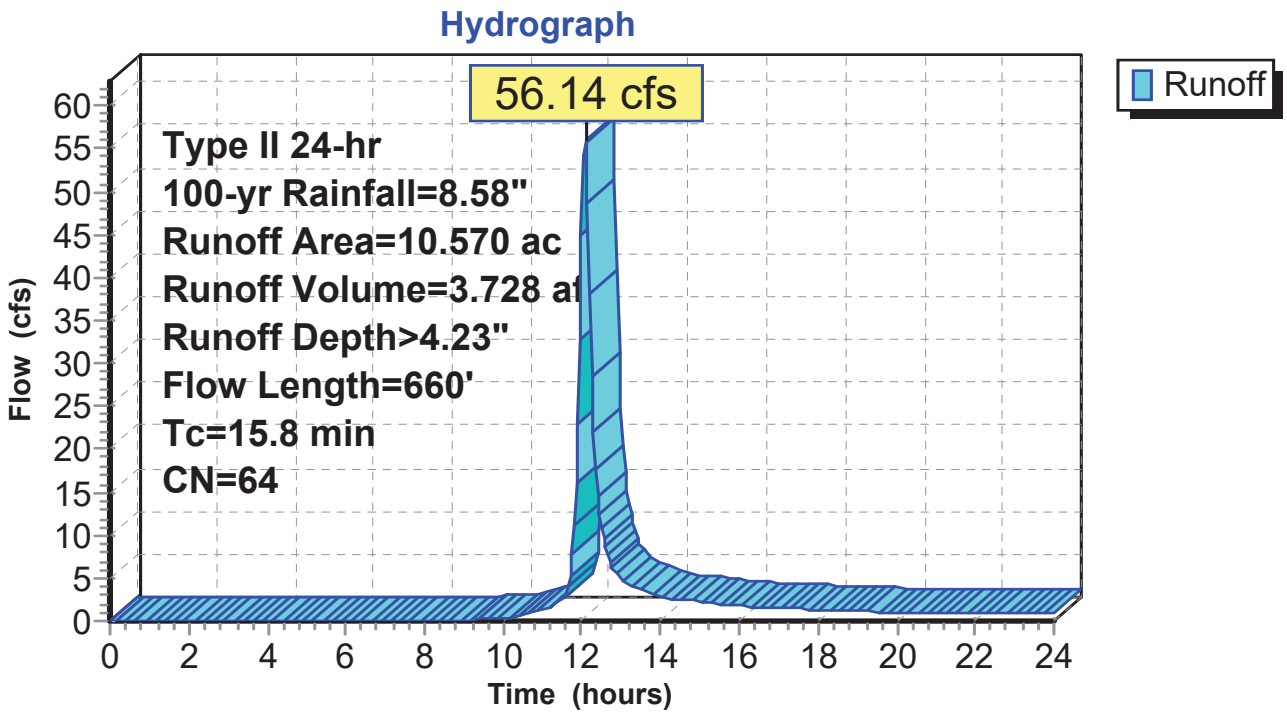
Runoff = 56.14 cfs @ 12.08 hrs, Volume= 3.728 af, Depth> 4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.58"

Area (ac)	CN	Description
9.160	61	>75% Grass cover, Good, HSG B
1.410	80	>75% Grass cover, Good, HSG D
10.570	64	Weighted Average
10.570		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.2330	0.36		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"
1.3	126	0.0550	1.64		**Shallow Concentrated Flow, BC** Short Grass Pasture Kv= 7.0 fps
7.5	384	0.0150	0.86		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
15.8	660	Total			

Subcatchment P-1c: P-1c



Summary for Subcatchment P-1d: P-1d

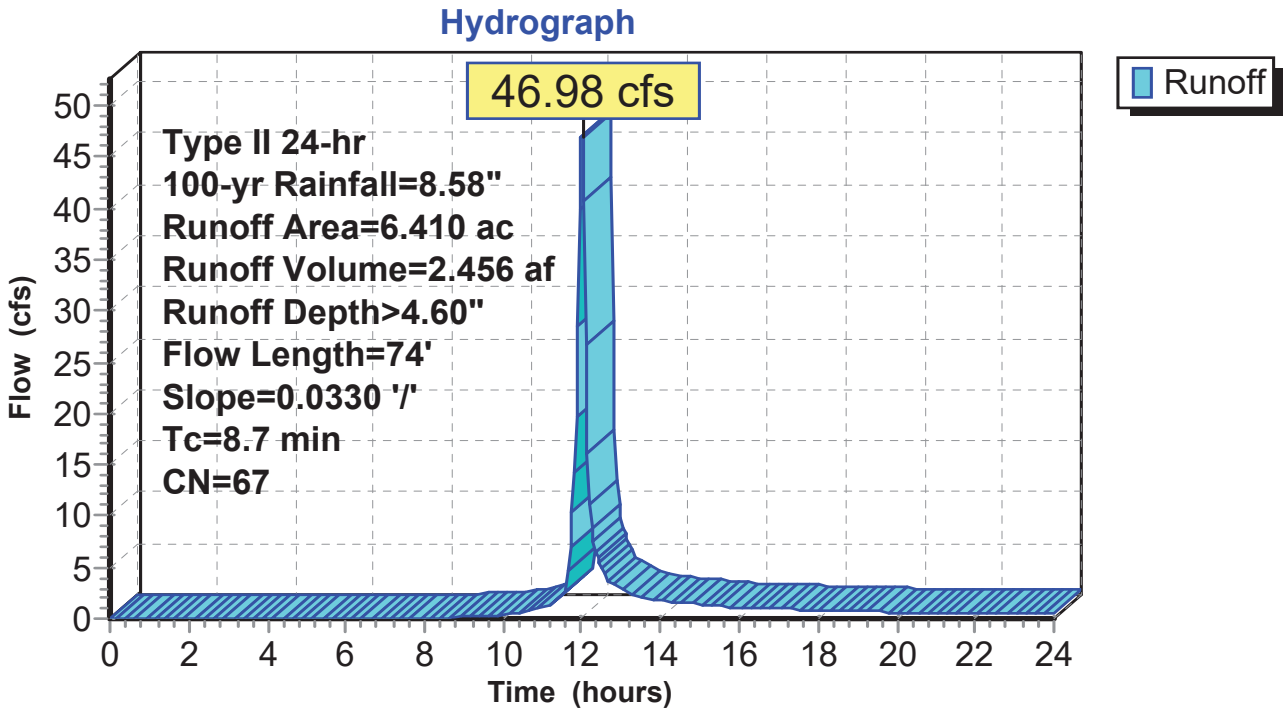
Runoff = 46.98 cfs @ 12.00 hrs, Volume= 2.456 af, Depth> 4.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=8.58"

Area (ac)	CN	Description
1.420	80	>75% Grass cover, Good, HSG D
4.640	61	>75% Grass cover, Good, HSG B
0.350	98	Paved parking, HSG B
6.410	67	Weighted Average
6.060		94.54% Pervious Area
0.350		5.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	74	0.0330	0.14		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.56"

Subcatchment P-1d: P-1d



Summary for Reach 1R: Swale 1c

Inflow Area = 10.570 ac, 0.00% Impervious, Inflow Depth > 4.23" for 100-yr event
Inflow = 56.14 cfs @ 12.08 hrs, Volume= 3.728 af
Outflow = 54.25 cfs @ 12.14 hrs, Volume= 3.716 af, Atten= 3%, Lag= 3.4 min

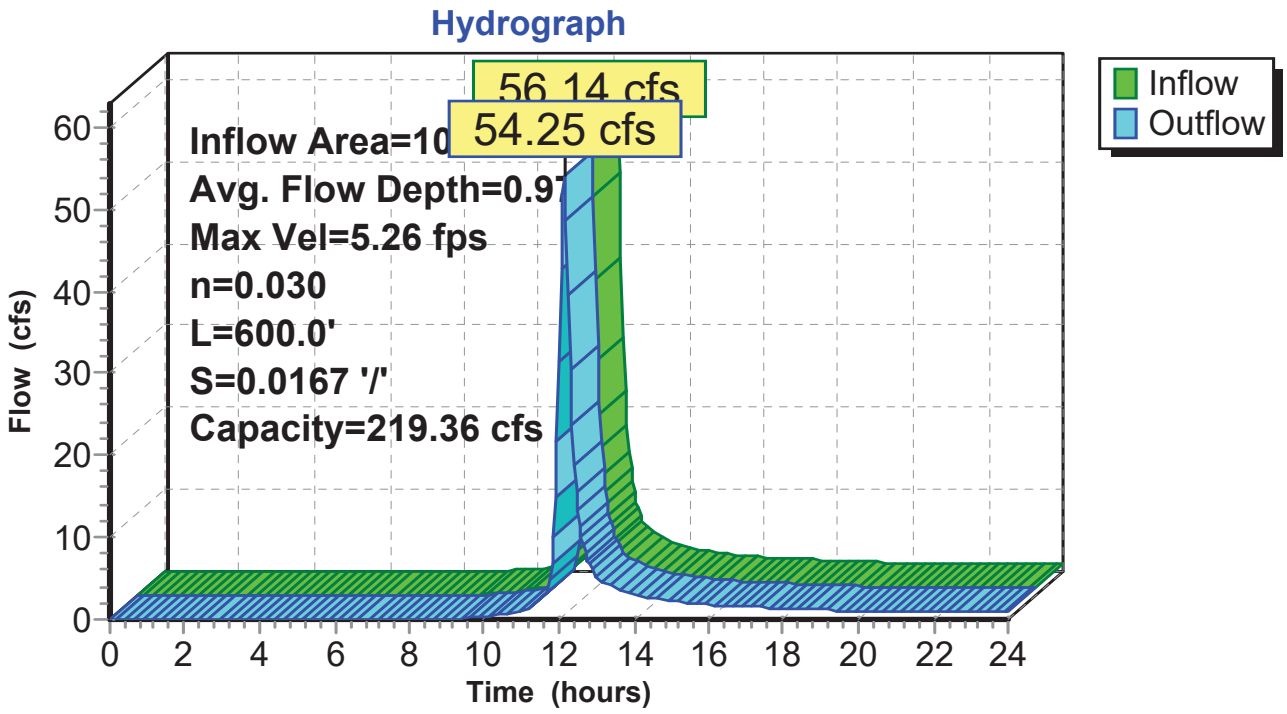
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.26 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 1.56 fps, Avg. Travel Time= 6.4 min

Peak Storage= 6,314 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.97'
Bank-Full Depth= 2.00' Flow Area= 28.0 sf, Capacity= 219.36 cfs

8.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 600.0' Slope= 0.0167 '/'
Inlet Invert= 432.00', Outlet Invert= 422.00'



‡



Stage-Discharge for Reach 1R: Swale 1c

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
432.00	0.00	0.00
432.02	0.47	0.08
432.04	0.74	0.24
432.06	0.96	0.47
432.08	1.16	0.77
432.10	1.34	1.11
432.12	1.51	1.51
432.14	1.66	1.96
432.16	1.81	2.46
432.18	1.95	3.00
432.20	2.08	3.58
432.22	2.21	4.21
432.24	2.33	4.88
432.26	2.45	5.59
432.28	2.56	6.34
432.30	2.67	7.13
432.32	2.78	7.96
432.34	2.88	8.83
432.36	2.98	9.74
432.38	3.08	10.69
432.40	3.17	11.68
432.42	3.27	12.70
432.44	3.36	13.77
432.46	3.45	14.87
432.48	3.53	16.01
432.50	3.62	17.18
432.52	3.70	18.40
432.54	3.78	19.65
432.56	3.86	20.94
432.58	3.94	22.27
432.60	4.02	23.64
432.62	4.10	25.05
432.64	4.17	26.49
432.66	4.25	27.97
432.68	4.32	29.49
432.70	4.39	31.04
432.72	4.46	32.64
432.74	4.53	34.27
432.76	4.60	35.94
432.78	4.67	37.65
432.80	4.73	39.39
432.82	4.80	41.18
432.84	4.87	43.00
432.86	4.93	44.86
432.88	4.99	46.76
432.90	5.06	48.70
432.92	5.12	50.68
432.94	5.18	52.70
432.96	5.24	54.76
432.98	5.30	56.85
433.00	5.36	58.99
433.02	5.42	61.16
433.04	5.48	63.38
433.06	5.54	65.63
433.08	5.60	67.93
433.10	5.65	70.26
433.12	5.71	72.64
433.14	5.76	75.05
433.16	5.82	77.51
433.18	5.88	80.00
433.20	5.93	82.54
433.22	5.98	85.12
433.24	6.04	87.74
433.26	6.09	90.40
433.28	6.14	93.10
433.30	6.20	95.85
433.32	6.25	98.63
433.34	6.30	101.46
433.36	6.35	104.33
433.38	6.40	107.24
433.40	6.45	110.19
433.42	6.50	113.19
433.44	6.55	116.23
433.46	6.60	119.31
433.48	6.65	122.44
433.50	6.70	125.61
433.52	6.75	128.82
433.54	6.80	132.08
433.56	6.84	135.38
433.58	6.89	138.72
433.60	6.94	142.11
433.62	6.99	145.54
433.64	7.03	149.01
433.66	7.08	152.53
433.68	7.13	156.10
433.70	7.17	159.71
433.72	7.22	163.36
433.74	7.26	167.06
433.76	7.31	170.81
433.78	7.35	174.60
433.80	7.40	178.44
433.82	7.44	182.32
433.84	7.49	186.25
433.86	7.53	190.22
433.88	7.57	194.25
433.90	7.62	198.31
433.92	7.66	202.43
433.94	7.71	206.59
433.96	7.75	210.80
433.98	7.79	215.05
434.00	**7.83**	**219.36**

Stage-Area-Storage for Reach 1R: Swale 1c

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
432.00	0.0	0
432.02	0.2	97
432.04	0.3	195
432.06	0.5	294
432.08	0.7	396
432.10	0.8	498
432.12	1.0	602
432.14	1.2	707
432.16	1.4	814
432.18	1.5	922
432.20	1.7	1,032
432.22	1.9	1,143
432.24	2.1	1,256
432.26	2.3	1,370
432.28	2.5	1,485
432.30	2.7	1,602
432.32	2.9	1,720
432.34	3.1	1,840
432.36	3.3	1,961
432.38	3.5	2,084
432.40	3.7	2,208
432.42	3.9	2,334
432.44	4.1	2,460
432.46	4.3	2,589
432.48	4.5	2,719
432.50	4.8	2,850
432.52	5.0	2,983
432.54	5.2	3,117
432.56	5.4	3,252
432.58	5.6	3,390
432.60	5.9	3,528
432.62	6.1	3,668
432.64	6.3	3,809
432.66	6.6	3,952
432.68	6.8	4,096
432.70	7.1	4,242
432.72	7.3	4,389
432.74	7.6	4,538
432.76	7.8	4,688
432.78	8.1	4,839
432.80	8.3	4,992
432.82	8.6	5,146
432.84	8.8	5,302
432.86	9.1	5,459
432.88	9.4	5,618
432.90	9.6	5,778
432.92	9.9	5,940
432.94	10.2	6,102
432.96	10.4	6,267
432.98	10.7	6,433
433.00	11.0	6,600
433.02	11.3	6,769
433.04	11.6	6,939
433.06	11.9	7,110
433.08	12.1	7,284
433.10	12.4	7,458
433.12	12.7	7,634
433.14	13.0	7,811
433.16	13.3	7,990
433.18	13.6	8,170
433.20	13.9	8,352
433.22	14.2	8,535
433.24	14.5	8,720
433.26	14.8	8,906
433.28	15.2	9,093
433.30	15.5	9,282
433.32	15.8	9,472
433.34	16.1	9,664
433.36	16.4	9,857
433.38	16.8	10,052
433.40	17.1	10,248
433.42	17.4	10,446
433.44	17.7	10,644
433.46	18.1	10,845
433.48	18.4	11,047
433.50	18.8	11,250
433.52	19.1	11,455
433.54	19.4	11,661
433.56	19.8	11,868
433.58	20.1	12,078
433.60	20.5	12,288
433.62	20.8	12,500
433.64	21.2	12,713
433.66	21.5	12,928
433.68	21.9	13,144
433.70	22.3	13,362
433.72	22.6	13,581
433.74	23.0	13,802
433.76	23.4	14,024
433.78	23.7	14,247
433.80	24.1	14,472
433.82	24.5	14,698
433.84	24.9	14,926
433.86	25.3	15,155
433.88	25.6	15,386
433.90	26.0	15,618
433.92	26.4	15,852
433.94	26.8	16,086
433.96	27.2	16,323
433.98	27.6	16,561
434.00	**28.0**	**16,800**

Summary for Reach 2R: Swale 1d

Inflow Area = 6.410 ac, 5.46% Impervious, Inflow Depth > 4.60" for 100-yr event
Inflow = 46.98 cfs @ 12.00 hrs, Volume= 2.456 af
Outflow = 44.44 cfs @ 12.04 hrs, Volume= 2.451 af, Atten= 5%, Lag= 2.3 min

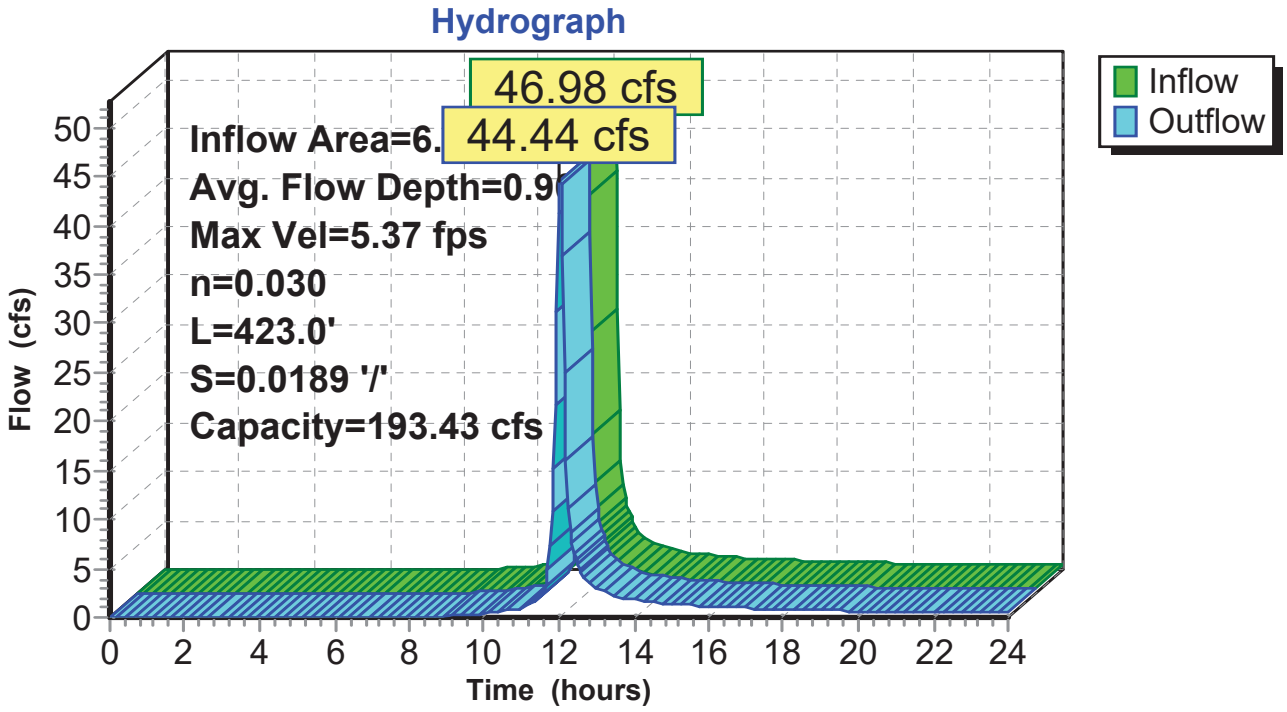
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.37 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 1.48 fps, Avg. Travel Time= 4.8 min

Peak Storage= 3,593 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.96'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 193.43 cfs

6.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 18.00'
Length= 423.0' Slope= 0.0189 '/'
Inlet Invert= 432.00', Outlet Invert= 424.00'



‡



Stage-Discharge for Reach 2R: Swale 1d

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
432.00	0.00	0.00
432.02	0.50	0.06
432.04	0.79	0.19
432.06	1.02	0.38
432.08	1.23	0.61
432.10	1.42	0.89
432.12	1.59	1.21
432.14	1.75	1.58
432.16	1.90	1.97
432.18	2.05	2.41
432.20	2.19	2.88
432.22	2.32	3.39
432.24	2.44	3.94
432.26	2.56	4.52
432.28	2.68	5.13
432.30	2.79	5.78
432.32	2.90	6.46
432.34	3.00	7.17
432.36	3.11	7.92
432.38	3.21	8.70
432.40	3.30	9.51
432.42	3.40	10.36
432.44	3.49	11.24
432.46	3.58	12.15
432.48	3.67	13.10
432.50	3.76	14.08
432.52	3.84	15.10
432.54	3.92	16.14
432.56	4.00	17.22
432.58	4.08	18.34
432.60	4.16	19.48
432.62	4.24	20.67
432.64	4.32	21.88
432.66	4.39	23.13
432.68	4.47	24.41
432.70	4.54	25.73
432.72	4.61	27.08
432.74	4.68	28.47
432.76	4.75	29.89
432.78	4.82	31.35
432.80	4.89	32.84
432.82	4.95	34.37
432.84	5.02	35.93
432.86	5.09	37.52
432.88	5.15	39.16
432.90	5.21	40.83
432.92	5.28	42.53
432.94	5.34	44.27
432.96	5.40	46.05
432.98	5.46	47.86
433.00	5.52	49.72
433.02	5.58	51.60
433.04	5.64	53.53
433.06	5.70	55.49
433.08	5.76	57.49
433.10	5.82	59.53
433.12	5.88	61.60
433.14	5.93	63.72
433.16	5.99	65.87
433.18	6.05	68.06
433.20	6.10	70.29
433.22	6.16	72.56
433.24	6.21	74.86
433.26	6.27	77.21
433.28	6.32	79.60
433.30	6.37	82.02
433.32	6.43	84.49
433.34	6.48	86.99
433.36	6.53	89.54
433.38	6.58	92.12
433.40	6.64	94.75
433.42	6.69	97.42
433.44	6.74	100.13
433.46	6.79	102.88
433.48	6.84	105.67
433.50	6.89	108.50
433.52	6.94	111.38
433.54	6.99	114.29
433.56	7.04	117.25
433.58	7.09	120.25
433.60	7.14	123.30
433.62	7.18	126.38
433.64	7.23	129.51
433.66	7.28	132.69
433.68	7.33	135.90
433.70	7.37	139.16
433.72	7.42	142.47
433.74	7.47	145.81
433.76	7.52	149.20
433.78	7.56	152.64
433.80	7.61	156.12
433.82	7.65	159.65
433.84	7.70	163.22
433.86	7.75	166.83
433.88	7.79	170.50
433.90	7.84	174.20
433.92	7.88	177.96
433.94	7.93	181.75
433.96	7.97	185.60
433.98	8.02	189.49
434.00	**8.06**	**193.43**

Stage-Area-Storage for Reach 2R: Swale 1d

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
432.00	0.0	0
432.02	0.1	51
432.04	0.2	104
432.06	0.4	157
432.08	0.5	211
432.10	0.6	266
432.12	0.8	323
432.14	0.9	380
432.16	1.0	439
432.18	1.2	498
432.20	1.3	558
432.22	1.5	620
432.24	1.6	682
432.26	1.8	746
432.28	1.9	810
432.30	2.1	876
432.32	2.2	942
432.34	2.4	1,010
432.36	2.5	1,078
432.38	2.7	1,148
432.40	2.9	1,218
432.42	3.0	1,290
432.44	3.2	1,362
432.46	3.4	1,436
432.48	3.6	1,511
432.50	3.8	1,586
432.52	3.9	1,663
432.54	4.1	1,741
432.56	4.3	1,819
432.58	4.5	1,899
432.60	4.7	1,980
432.62	4.9	2,061
432.64	5.1	2,144
432.66	5.3	2,228
432.68	5.5	2,313
432.70	5.7	2,398
432.72	5.9	2,485
432.74	6.1	2,573
432.76	6.3	2,662
432.78	6.5	2,752
432.80	6.7	2,843
432.82	6.9	2,934
432.84	7.2	3,027
432.86	7.4	3,121
432.88	7.6	3,216
432.90	7.8	3,312
432.92	8.1	3,409
432.94	8.3	3,507
432.96	8.5	3,606
432.98	8.8	3,706
433.00	9.0	3,807
433.02	9.2	3,909
433.04	9.5	4,012
433.06	9.7	4,116
433.08	10.0	4,221
433.10	10.2	4,327
433.12	10.5	4,434
433.14	10.7	4,543
433.16	11.0	4,652
433.18	11.3	4,762
433.20	11.5	4,873
433.22	11.8	4,985
433.24	12.1	5,098
433.26	12.3	5,213
433.28	12.6	5,328
433.30	12.9	5,444
433.32	13.1	5,561
433.34	13.4	5,680
433.36	13.7	5,799
433.38	14.0	5,919
433.40	14.3	6,040
433.42	14.6	6,163
433.44	14.9	6,286
433.46	15.2	6,410
433.48	15.5	6,536
433.50	15.8	6,662
433.52	16.1	6,790
433.54	16.4	6,918
433.56	16.7	7,048
433.58	17.0	7,178
433.60	17.3	7,309
433.62	17.6	7,442
433.64	17.9	7,575
433.66	18.2	7,710
433.68	18.5	7,845
433.70	18.9	7,982
433.72	19.2	8,120
433.74	19.5	8,258
433.76	19.9	8,398
433.78	20.2	8,538
433.80	20.5	8,680
433.82	20.9	8,823
433.84	21.2	8,966
433.86	21.5	9,111
433.88	21.9	9,257
433.90	22.2	9,403
433.92	22.6	9,551
433.94	22.9	9,700
433.96	23.3	9,849
433.98	23.6	10,000
434.00	**24.0**	**10,152**

SOLLI ENGINEERING

Hydrograph Return Period Recap

Hyd. No.	Hydrograph Type (Origin)	Inflow Hyd(s)	Peak Outflow (cfs)						Hydrograph Description
			2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
E-1a	Subcatchment	-	41.42	68.98	93.52	128.72	155.58	184.92	E-1a
E-1b	Subcatchment	-	23.31	40.17	55.38	77.39	94.29	112.82	E-1b
E-2	Subcatchment	-	5.30	9.49	13.35	19.05	23.47	28.34	E-2
E-3	Subcatchment	-	2.90	5.60	8.12	11.86	14.79	18.05	E-3
E-4	Subcatchment	-	5.08	8.75	12.05	16.82	20.49	24.52	E-4
Pond 1b	Pond	E-1b	7.89	13.99	17.45	21.58	24.33	27.04	Pond 1b
R-1	Reach	Pond 1b	7.80	13.92	17.41	21.55	24.30	27.02	R-1
R-2	Reach	E-1a, R-1	35.14	61.87	84.42	115.47	138.63	163.77	R-2

501 Main Street, Suite 2A
Monroe, CT 06468
Office: (203) 880-5455

351 Newbury Street, Suite 303
Boston, MA 02115
Office: (617) 203-3160

www.SolliEngineering.com

Hydrograph Return Period Recap

Hyd. No.	Hydrograph Type (Origin)	Inflow Hyd(s)	Peak Outflow (cfs)						Hydrograph Description
			2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
P-1a	Subcatchment	-	23.96	39.41	53.11	72.71	87.64	103.92	P-1a
P-1b	Subcatchment	-	10.59	18.97	26.65	37.87	46.56	56.13	P-1b
P-1c	Subcatchment	-	4.87	10.08	15.12	22.69	28.67	35.36	P-1c
P-1d	Subcatchment	-	3.83	7.30	10.53	15.33	19.08	23.24	P-1d
P-1e	Subcatchment	-	3.41	4.91	6.16	7.89	9.18	10.55	P-1e
P-2	Subcatchment	-	4.62	8.63	12.35	17.88	22.20	26.99	P-2
P-3	Subcatchment	-	1.86	4.27	6.66	10.32	13.25	16.55	P-3
P-4	Subcatchment	-	3.48	5.64	7.55	10.26	12.32	14.56	P-4
Pond 1b	Pond	P-1b	5.62	10.58	14.39	18.26	20.91	23.56	Pond 1b
Pond 1c	Pond	P-1c	1.41	5.48	9.99	16.85	22.06	27.75	Pond 1c
Pond 1d	Pond	P-1d	0.79	1.43	1.81	2.24	2.77	4.63	Pond 1d
Pond 1e	Pond	P-1e	0.00	0.10	0.37	2.18	4.89	7.41	Pond 1e
Pond 3	Pond	P-3	0.14	0.87	2.44	5.38	7.83	10.55	Pond 3
R-1	Reach	Pond 1b	5.60	10.55	14.38	18.25	20.90	23.55	R-1
R-2	Reach	R-1, P-1a	21.15	37.95	52.84	73.50	88.51	104.59	R-2

R-3	Reach	R-2, Pond 1c, Pond 1d	23.03	44.10	62.68	88.75	108.08	130.03	R-3
R-4	Reach	R-3, Pond 1e	22.90	43.83	62.65	88.75	108.01	129.90	R-4

Hydrograph Summary Report (2-Year Storm)

Hyd. No.	Hydrograph	Inflow Hyd(s)	Peak Flow (cfs)	Time to Peak (hrs)	Hyd. Volume (cf)	Max. Elevation (ft)	Total Storage Used (cf)
E-1a	E-1a	-	41.42	12.27	183,170	-	-
E-1b	E-1b	-	23.31	12.10	71,113	-	-
E-2	E-2	-	5.3	13.13	53,405	-	-
E-3	E-3	-	2.9	12.17	11,326	-	-
E-4	E-4	-	5.08	12.28	23,217	-	-
Pond 1b	Pond 1b	E-1b	7.89	12.37	67,257	443.05	20,980
R-1	R-1	Pond-1b	7.8	12.51	66,821	-	-
R-2	R-2	E-1a, Pond-1b	35.14	12.80	243,282	-	-
P-1a	P-1a	-	23.96	12.39	125,496	-	-
P-1b	P-1b	-	10.59	12.45	62,465	-	-
P-1c	P-1c	-	4.87	12.36	28,009	-	-
P-1d	P-1d	-	3.83	12.32	19,733	-	-
P-1e	P-1e	-	3.41	12.01	7,928	-	-
P-2	P-2	-	4.62	12.90	41,774	-	-
P-3	P-3	-	1.86	12.28	10,324	-	-
P-4	P-4	-	3.48	12.34	17,032	-	-
Pond 1b	Pond 1b	P-1b	5.62	12.90	58,762	442.83	16,033
Pond 1c	Pond 1c	P-1c	1.41	13.15	24,045	410.42	8,974
Pond 1d	Pond 1d	P-1d	0.79	13.31	15,290	409.31	7,829
Pond 1e	Pond 1e	P-1e	0	0.00	0	406.16	7,941
Pond 3	Pond 3	P-3	0.14	17.65	3,398	424.49	7,071
R-1	R-1	Pond 1b	5.6	13.02	58,370	-	-
R-2	R-2	R-1, P-1a	21.15	12.90	179,467	-	-
R-3	R-3	R-2, Pond 1c, Pond 1d	23.03	13.02	217,539	-	-
R-4	R-4	R-3, Pond 1e	22.9	13.12	216,537	-	-
E-1	E-1	E-1a, Pond-1b	35.14	12.80	243,282	-	-
P-1	P-1	R-3, Pond 1e	22.9	13.12	216,537	-	-
E-2	E-2	-	5.3	13.13	53,405	-	-
P-2	P-2	-	4.62	12.90	41,774	-	-
E-3	E-3	-	2.9	12.17	11,326	-	-
P-3	P-3	Pond 3	0.14	17.65	3,398	-	-
E-4	E-4	-	5.08	12.28	23,217	-	-
P-4	P-4	-	3.48	12.34	17,032	-	-

Hydrograph Summary Report (5-Year Storm)

Hyd. No.	Hydrograph	Inflow Hyd(s)	Peak Flow (cfs)	Time to Peak (hrs)	Hyd. Volume (cf)	Max. Elevation (ft)	Total Storage Used (cf)
E-1a	E-1a	-	68.98	12.26	295,467	-	-
E-1b	E-1b	-	40.17	12.09	118,396	-	-
E-2	E-2	-	9.49	13.08	90,256	-	-
E-3	E-3	-	5.6	12.16	20,038	-	-
E-4	E-4	-	8.75	12.27	38,246	-	-
Pond 1b	Pond 1b	E-1b	13.99	12.35	113,822	443.64	36,914
R-1	R-1	Pond-1b	13.92	12.46	113,212	-	-
R-2	R-2	E-1a, Pond-1b	61.87	12.74	400,186	-	-
P-1a	P-1a	-	39.41	12.37	200,463	-	-
P-1b	P-1b	-	18.97	12.43	105,328	-	-
P-1c	P-1c	-	10.08	12.33	51,052	-	-
P-1d	P-1d	-	7.3	12.30	34,543	-	-
P-1e	P-1e	-	4.91	12.00	11,587	-	-
P-2	P-2	-	8.63	12.88	72,266	-	-
P-3	P-3	-	4.27	12.26	19,733	-	-
P-4	P-4	-	5.64	12.33	26,964	-	-
Pond 1b	Pond 1b	P-1b	10.58	12.84	100,885	443.3	27,238
Pond 1c	Pond 1c	P-1c	5.48	12.68	46,609	411.08	13,841
Pond 1d	Pond 1d	P-1d	1.43	13.22	29,577	409.81	14,356
Pond 1e	Pond 1e	P-1e	0.1	16.48	2,091	406.37	9,540
Pond 3	Pond 3	P-3	0.87	13.11	12,676	424.72	8,316
R-1	R-1	Pond 1b	10.55	12.94	100,362	-	-
R-2	R-2	R-1, P-1a	37.95	12.82	295,337	-	-
R-3	R-3	R-2, Pond 1c, Pond 1d	44.1	12.92	369,955	-	-
R-4	R-4	R-3, Pond 1e	43.83	13.01	370,739	-	-
E-1	E-1	E-1a, Pond-1b	61.87	12.74	400,186	-	-
P-1	P-1	R-3, Pond 1e	43.83	13.01	370,739	-	-
E-2	E-2	-	9.49	13.08	90,256	-	-
P-2	P-2	-	8.63	12.88	72,266	-	-
E-3	E-3	-	5.6	12.16	20,038	-	-
P-3	P-3	Pond 3	0.87	13.11	12,676	-	-
E-4	E-4	-	8.75	12.27	38,246	-	-
P-4	P-4	-	5.64	12.33	26,964	-	-

Hydrograph Summary Report (10-Year Storm)

Hyd. No.	Hydrograph	Inflow Hyd(s)	Peak Flow (cfs)	Time to Peak (hrs)	Hyd. Volume (cf)	Max. Elevation (ft)	Total Storage Used (cf)
E-1a	E-1a	-	93.52	12.26	396,440	-	-
E-1b	E-1b	-	55.38	12.09	161,564	-	-
E-2	E-2	-	13.35	13.04	124,102	-	-
E-3	E-3	-	8.12	12.15	28,227	-	-
E-4	E-4	-	12.05	12.27	51,924	-	-
Pond 1b	Pond 1b	E-1b	17.45	12.36	156,424	444.13	53,139
R-1	R-1	Pond-1b	17.41	12.47	155,727	-	-
R-2	R-2	E-1a, Pond-1b	84.42	12.71	542,148	-	-
P-1a	P-1a	-	53.11	12.37	267,546	-	-
P-1b	P-1b	-	26.65	12.42	144,706	-	-
P-1c	P-1c	-	15.12	12.32	73,050	-	-
P-1d	P-1d	-	10.53	12.30	48,352	-	-
P-1e	P-1e	-	6.16	12.00	14,723	-	-
P-2	P-2	-	12.35	12.86	100,624	-	-
P-3	P-3	-	6.66	12.25	28,924	-	-
P-4	P-4	-	7.55	12.32	35,763	-	-
Pond 1b	Pond 1b	P-1b	14.39	12.84	139,697	443.69	38,418
Pond 1c	Pond 1c	P-1c	9.99	12.58	68,215	411.56	17,682
Pond 1d	Pond 1d	P-1d	1.81	13.28	42,994	410.24	21,558
Pond 1e	Pond 1e	P-1e	0.37	12.98	5,227	406.39	9,713
Pond 3	Pond 3	P-3	2.44	12.69	21,736	425.05	10,228
R-1	R-1	Pond 1b	14.38	12.93	139,131	-	-
R-2	R-2	R-1, P-1a	52.84	12.80	400,273	-	-
R-3	R-3	2, Pond 1c, Pond 1	62.68	12.88	509,608	-	-
R-4	R-4	R-3, Pond 1e	62.65	12.97	513,224	-	-
E-1	E-1	E-1a, Pond-1b	84.42	12.71	542,148	-	-
P-1	P-1	R-3, Pond 1e	62.65	12.97	513,224	-	-
E-2	E-2	-	13.35	13.04	124,102	-	-
P-2	P-2	-	12.35	12.86	100,624	-	-
E-3	E-3	-	8.12	12.15	28,227	-	-
P-3	P-3	Pond 3	2.44	12.69	21,736	-	-
E-4	E-4	-	12.05	12.27	51,924	-	-
P-4	P-4	-	7.55	12.32	35,763	-	-

Hydrograph Summary Report (25-Year Storm)

Hyd. No.	Hydrograph	Inflow Hyd(s)	Peak Flow (cfs)	Time to Peak (hrs)	Hyd. Volume (cf)	Max. Elevation (ft)	Total Storage Used (cf)
E-1a	E-1a	-	128.72	12.25	542,888	-	-
E-1b	E-1b	-	77.39	12.08	224,900	-	-
E-2	E-2	-	19.05	13.02	174,022	-	-
E-3	E-3	-	11.86	12.15	40,511	-	-
E-4	E-4	-	16.82	12.26	71,874	-	-
Pond 1b	Pond 1b	E-1b	21.58	12.39	218,976	444.84	78,237
R-1	R-1	Pond-1b	21.55	12.48	218,192	-	-
R-2	R-2	E-1a, Pond-1b	115.47	12.69	749,188	-	-
P-1a	P-1a	-	72.71	12.36	364,510	-	-
P-1b	P-1b	-	37.87	12.41	202,685	-	-
P-1c	P-1c	-	22.69	12.31	106,286	-	-
P-1d	P-1d	-	15.33	12.29	68,955	-	-
P-1e	P-1e	-	7.89	12.00	19,123	-	-
P-2	P-2	-	17.88	12.84	142,746	-	-
P-3	P-3	-	10.32	12.24	42,994	-	-
P-4	P-4	-	10.26	12.32	48,482	-	-
Pond 1b	Pond 1b	P-1b	18.26	12.88	196,935	444.26	57,586
Pond 1c	Pond 1c	P-1c	16.85	12.52	100,972	412.18	23,039
Pond 1d	Pond 1d	P-1d	2.24	13.38	62,857	410.87	33,242
Pond 1e	Pond 1e	P-1e	2.18	12.20	9,583	406.47	10,403
Pond 3	Pond 3	P-3	5.38	12.53	35,676	425.53	13,211
R-1	R-1	Pond 1b	18.25	12.97	196,238	-	-
R-2	R-2	R-1, P-1a	73.5	12.76	553,212	-	-
R-3	R-3	2, Pond 1c, Pond 1	88.75	12.84	714,732	-	-
R-4	R-4	R-3, Pond 1e	88.75	12.92	722,399	-	-
E-1	E-1	E-1a, Pond-1b	115.47	12.69	749,188	-	-
P-1	P-1	R-3, Pond 1e	88.75	12.92	722,399	-	-
E-2	E-2	-	19.05	13.02	174,022	-	-
P-2	P-2	-	17.88	12.84	142,746	-	-
E-3	E-3	-	11.86	12.15	40,511	-	-
P-3	P-3	Pond 3	5.38	12.53	35,676	-	-
E-4	E-4	-	16.82	12.26	71,874	-	-
P-4	P-4	-	10.26	12.32	48,482	-	-

Hydrograph Summary Report (50-Year Storm)

Hyd. No.	Hydrograph	Inflow Hyd(s)	Peak Flow (cfs)	Time to Peak (hrs)	Hyd. Volume (cf)	Max. Elevation (ft)	Total Storage Used (cf)
E-1a	E-1a	-	155.58	12.25	655,926	-	-
E-1b	E-1b	-	94.29	12.08	274,167	-	-
E-2	E-2	-	23.47	13.02	212,965	-	-
E-3	E-3	-	14.79	12.15	50,225	-	-
E-4	E-4	-	20.49	12.26	87,338	-	-
Pond 1b	Pond 1b	E-1b	24.33	12.41	267,720	445.39	98,435
R-1	R-1	Pond-1b	24.3	12.50	266,805	-	-
R-2	R-2	E-1a, Pond-1b	138.63	12.68	909,489	-	-
P-1a	P-1a	-	87.64	12.36	439,215	-	-
P-1b	P-1b	-	46.56	12.41	247,900	-	-
P-1c	P-1c	-	28.67	12.31	132,684	-	-
P-1d	P-1d	-	19.08	12.29	85,160	-	-
P-1e	P-1e	-	9.18	12.00	22,433	-	-
P-2	P-2	-	22.2	12.83	175,808	-	-
P-3	P-3	-	13.25	12.23	54,319	-	-
P-4	P-4	-	12.32	12.32	58,283	-	-
Pond 1b	Pond 1b	P-1b	20.91	12.91	241,714	444.71	73,726
Pond 1c	Pond 1c	P-1c	22.06	12.50	126,977	412.62	27,080
Pond 1d	Pond 1d	P-1d	2.77	13.35	77,972	411.31	42,539
Pond 1e	Pond 1e	P-1e	4.89	12.12	12,894	406.56	11,124
Pond 3	Pond 3	P-3	7.83	12.48	46,871	425.89	15,575
R-1	R-1	Pond 1b	20.9	12.99	240,930	-	-
R-2	R-2	R-1, P-1a	88.51	12.75	671,739	-	-
R-3	R-3	2, Pond 1c, Pond 1	108.08	12.82	874,031	-	-
R-4	R-4	R-3, Pond 1e	108.01	12.90	884,660	-	-
E-1	E-1	E-1a, Pond-1b	138.63	12.68	909,489	-	-
P-1	P-1	R-3, Pond 1e	108.01	12.90	884,660	-	-
E-2	E-2	-	23.47	13.02	212,965	-	-
P-2	P-2	-	22.2	12.83	175,808	-	-
E-3	E-3	-	14.79	12.15	50,225	-	-
P-3	P-3	Pond 3	7.83	12.48	46,871	-	-
E-4	E-4	-	20.49	12.26	87,338	-	-
P-4	P-4	-	12.32	12.32	58,283	-	-

Hydrograph Summary Report (100-Year Storm)

Hyd. No.	Hydrograph	Inflow Hyd(s)	Peak Flow (cfs)	Time to Peak (hrs)	Hyd. Volume (cf)	Max. Elevation (ft)	Total Storage Used (cf)
E-1a	E-1a	-	184.92	12.25	780,639	-	-
E-1b	E-1b	-	112.82	12.08	328,747	-	-
E-2	E-2	-	28.34	13.01	256,307	-	-
E-3	E-3	-	18.05	12.14	61,071	-	-
E-4	E-4	-	24.52	12.26	104,500	-	-
Pond 1b	Pond 1b	E-1b	27.04	12.42	321,821	446.00	121,348
R-1	R-1	Pond-1b	27.02	12.51	320,819	-	-
R-2	R-2	E-1a, Pond-1b	163.77	12.67	1,086,778	-	-
P-1a	P-1a	-	103.92	12.36	521,457	-	-
P-1b	P-1b	-	56.13	12.41	298,168	-	-
P-1c	P-1c	-	35.36	12.30	162,435	-	-
P-1d	P-1d	-	23.24	12.28	103,281	-	-
P-1e	P-1e	-	10.55	12.00	26,005	-	-
P-2	P-2	-	26.99	12.82	212,747	-	-
P-3	P-3	-	16.55	12.23	67,170	-	-
P-4	P-4	-	14.56	12.32	68,999	-	-
Pond 1b	Pond 1b	P-1b	23.56	12.94	291,460	445.23	92,454
Pond 1c	Pond 1c	P-1c	27.75	12.49	156,163	413.07	31,524
Pond 1d	Pond 1d	P-1d	4.63	13.07	94,612	411.65	50,060
Pond 1e	Pond 1e	P-1e	7.41	12.09	16,466	406.63	11,660
Pond 3	Pond 3	P-3	10.55	12.45	59,634	426.27	18,222
R-1	R-1	Pond 1b	23.55	13.02	290,589	-	-
R-2	R-2	R-1, P-1a	104.59	12.74	802,767	-	-
R-3	R-3	2, Pond 1c, Pond 1	130.03	12.81	1,050,537	-	-
R-4	R-4	R-3, Pond 1e	129.9	12.89	1,064,432	-	-
E-1	E-1	E-1a, Pond-1b	163.77	12.67	1,086,778	-	-
P-1	P-1	R-3, Pond 1e	129.9	12.89	1,064,432	-	-
E-2	E-2	-	28.34	13.01	256,307	-	-
P-2	P-2	-	26.99	12.82	212,747	-	-
E-3	E-3	-	18.05	12.14	61,071	-	-
P-3	P-3	Pond 3	10.55	12.45	59,634	-	-
E-4	E-4	-	24.52	12.26	104,500	-	-
P-4	P-4	-	14.56	12.32	68,999	-	-

APPENDIX C
UTILITY INFORMATION

Drainage Test Pit Logs
Septic Test Pit Logs
Percolation Test Logs

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468
T: (203) 880-5455 F: (203) 880-9695

Proposed Site Development & Restoration

64 Cambridge Drive & 4 Independence Drive, Monroe, Connecticut

TP-1

Project # 1903601

March 27, 2020

TEST PIT FIELD LOG

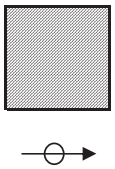
PERSONNEL PRESENT	EXCAVATION EQUIPMENT					
Chris Pawlowski	Contractor	Rockhead LLC			Assumed Ground Surface El.	419.00
Stuart Rudkin	Operator	Stuart Rudkin			Datum	
	Make	John Deere	Model	160	Temperature	55°F
	Bucket Capacity	2 YD	Reach	14'	Weather	Clear

Depth	Soil Description	Excav. Effort	Cobble and Boulder Data	Remark No.
0" - 48"	Miscellaneous fill	E/**M**/D	**C**/S/M/L	

REMARKS:

1. Ledge @ 48"

TEST PIT PLAN



North

LEGEND

COBBLES AND BOULDERS

Size Range Classification	Letter Designation
3" - 12"	Cobble (C)
12" - 24"	Small (S)
24" - 36"	Medium (M)
36" and Larger	Large (L)

PROPORTIONS USED (QUANTITATIVE TERMS)

TRACE (TR)	0-10%
LITTLE (LI)	10-20%
SOME (SO)	20-35%
AND	35-50%

QUALITATIVE TERMS

OCCASIONAL
FEW
FREQUENT
NUMEROUS

EXCAVATION EFFORT

E - Easy
M - Moderate
D - Difficult

▼ Observed Depth to Groundwater

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468
T: (203) 880-5455 F: (203) 880-9695

Proposed Site Development & Restoration

64 Cambridge Drive & 4 Independence Drive, Monroe, Connecticut

TP-2

Project # 1903601

March 27, 2020

TEST PIT FIELD LOG

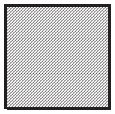
PERSONNEL PRESENT	EXCAVATION EQUIPMENT					
Chris Pawlowski	Contractor	Rockhead LLC			Assumed Ground Surface El.	410.00
Stuart Rudkin	Operator	Stuart Rudkin			Datum	
	Make	John Deere	Model	160	Temperature	55°F
	Bucket Capacity	2 YD	Reach	14'	Weather	Clear

Depth	Soil Description	Excav. Effort	Cobble and Boulder Data	Remark No.
0" - 6"	Miscellaneous sediment/silt	**E**/M/D	**C**/S/M/L	
6" - 72"	Olive brown coarse sandy loam	**E**/M/D	**C**/S/M/L	

REMARKS:

1. Mottles @ 32"
2. Possible ledge @ 72"

TEST PIT PLAN



North

LEGEND

COBBLES AND BOULDERS

Size Range Classification	Letter Designation
3" - 12"	Cobble (C)
12" - 24"	Small (S)
24" - 36"	Medium (M)
36" and Larger	Large (L)

PROPORTIONS USED (QUANTITATIVE TERMS)

TRACE (TR)	0-10%
LITTLE (LI)	10-20%
SOME (SO)	20-35%
AND	35-50%

QUALITATIVE TERMS

OCCASIONAL
FEW
FREQUENT
NUMEROUS

EXCAVATION EFFORT

E - Easy
M - Moderate
D - Difficult

▼ Observed Depth to Groundwater

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468
T: (203) 880-5455 F: (203) 880-9695

Proposed Site Development & Restoration

64 Cambridge Drive & 4 Independence Drive, Monroe, Connecticut

TP-3

Project # 1903601

May 5, 2020

TEST PIT FIELD LOG

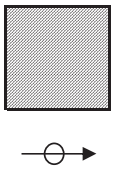
PERSONNEL PRESENT	EXCAVATION EQUIPMENT					
Chris Pawlowski	Contractor	Rockhead LLC			Assumed Ground Surface El.	430.50
Stan Tiburske	Operator	Stan Tiburske			Datum	
	Make	John Deere	Model	360	Temperature	60°F
	Bucket Capacity	4 YD	Reach	16'	Weather	Clear

Depth	Soil Description	Excav. Effort	Cobble and Boulder Data	Remark No.
0" - 16"	Topsoil	**E**/M/D	**C**/S/M/L	
16" - 36"	Miscellaneous sediment/silt	**E**/M/D	**C**/S/M/L	
36" - 48"	Yellow-brown fine sandy loam	**E**/M/D	**C**/S/M/L	
48" - 110"	Olive brown coarse sandy loam, little silt	**E**/M/D	**C**/S/M/L	

REMARKS:

1. Ledge @ 110"

TEST PIT PLAN



North

LEGEND

COBBLES AND BOULDERS

Size Range Classification	Letter Designation
3" - 12"	Cobble (C)
12" - 24"	Small (S)
24" - 36"	Medium (M)
36" and Larger	Large (L)

PROPORTIONS USED (QUANTITATIVE TERMS)

TRACE (TR)	0-10%
LITTLE (LI)	10-20%
SOME (SO)	20-35%
AND	35-50%

QUALITATIVE TERMS

OCCASIONAL
FEW
FREQUENT
NUMEROUS

EXCAVATION EFFORT

E - Easy
M - Moderate
D - Difficult

▼ Observed Depth to Groundwater

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468
T: (203) 880-5455 F: (203) 880-9695

Proposed Site Development & Restoration

64 Cambridge Drive & 4 Independence Drive, Monroe, Connecticut

TP-1

Project # 1903601

March 12, 2020

TEST PIT FIELD LOG

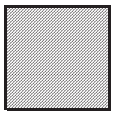
PERSONNEL PRESENT	EXCAVATION EQUIPMENT					
Chris Pawlowski	Contractor	Rockhead LLC			Assumed Ground Surface El.	415.00
Russ Cyr	Operator	John Kimball			Datum	
Matt Brattoli	Make	John Deere	Model	380G	Temperature	42°F
John Kimball	Bucket Capacity	4 YD	Reach	26'	Weather	Cloudy

Depth	Soil Description	Excav. Effort	Cobble and Boulder Data	Remark No.
0" - 44"	Miscellaneous fill	**E**/M/D	**C**/S/M/L	
44" - 64"	Topsoil	**E**/M/D	**C**/S/M/L	
64" - 88"	Dark yellow-brown fine sandy loam	**E**/M/D	**C**/S/M/L	
88" - 102"	Olive brown coarse sandy loam	**E**/M/D	**C**/S/M/L	

REMARKS:

1. Mottles @ 60"
2. Groundwater @ 84"

TEST PIT PLAN



North

LEGEND

COBBLES AND BOULDERS

Size Range Classification	Letter Designation
3" - 12"	Cobble (C)
12" - 24"	Small (S)
24" - 36"	Medium (M)
36" and Larger	Large (L)

PROPORTIONS USED (QUANTITATIVE TERMS)

TRACE (TR)	0-10%
LITTLE (LI)	10-20%
SOME (SO)	20-35%
AND	35-50%

QUALITATIVE TERMS

OCCASIONAL
FEW
FREQUENT
NUMEROUS

EXCAVATION EFFORT

E - Easy
M - Moderate
D - Difficult

▼ Observed Depth to Groundwater

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468
T: (203) 880-5455 F: (203) 880-9695

Proposed Site Development & Restoration

64 Cambridge Drive & 4 Independence Drive, Monroe, Connecticut

TP-2

Project # 1903601

March 12, 2020

TEST PIT FIELD LOG

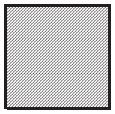
PERSONNEL PRESENT	EXCAVATION EQUIPMENT					
Chris Pawlowski	Contractor	Rockhead LLC			Assumed Ground Surface El.	411.80
Russ Cyr	Operator	John Kimball			Datum	
Matt Brattoli	Make	John Deere	Model	380G	Temperature	42°F
John Kimball	Bucket Capacity	4 YD	Reach	26'	Weather	Cloudy

Depth	Soil Description	Excav. Effort	Cobble and Boulder Data	Remark No.
0" - 36"	Miscellaneous fill	**E**/M/D	**C**/S/M/L	
36" - 80"	Dark yellow-brown fine sandy loam	**E**/M/D	**C**/S/M/L	
80" - 96"	Olive brown coarse sandy loam	**E**/M/D	**C**/S/M/L	

REMARKS:

1. Mottles @ 60"
2. Groundwater @ 92"
3. Roots @ 48"

TEST PIT PLAN



North

LEGEND

COBBLES AND BOULDERS

Size Range Classification	Letter Designation
3" - 12"	Cobble (C)
12" - 24"	Small (S)
24" - 36"	Medium (M)
36" and Larger	Large (L)

PROPORTIONS USED (QUANTITATIVE TERMS)

TRACE (TR)	0-10%
LITTLE (LI)	10-20%
SOME (SO)	20-35%
AND	35-50%

QUALITATIVE TERMS

OCCASIONAL
FEW
FREQUENT
NUMEROUS

EXCAVATION EFFORT

E - Easy
M - Moderate
D - Difficult

▼ Observed Depth to Groundwater

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468
T: (203) 880-5455 F: (203) 880-9695

Proposed Site Development & Restoration

64 Cambridge Drive & 4 Independence Drive, Monroe, Connecticut

TP-3

Project # 1903601

March 12, 2020

TEST PIT FIELD LOG

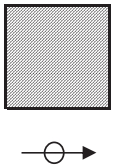
PERSONNEL PRESENT	EXCAVATION EQUIPMENT					
Chris Pawlowski	Contractor	Rockhead LLC			Assumed Ground Surface El.	416.50
Russ Cyr	Operator	John Kimball			Datum	
Matt Brattoli	Make	John Deere	Model	380G	Temperature	42°F
John Kimball	Bucket Capacity	4 YD	Reach	26'	Weather	Cloudy

Depth	Soil Description	Excav. Effort	Cobble and Boulder Data	Remark No.
0" - 27"	Miscellaneous fill	**E**/M/D	**C**/S/M/L	
27" - 40"	Topsoil	**E**/M/D	**C**/S/M/L	
40" - 76"	Dark yellow-brown fine sandy loam	**E**/M/D	**C**/S/M/L	
76" - 110"	Olive brown coarse sandy loam	**E**/M/D	**C**/S/M/L	

REMARKS:

1. Mottles @ 80"
2. Roots @ 70"

TEST PIT PLAN



North

LEGEND

COBBLES AND BOULDERS

Size Range Classification	Letter Designation
3" - 12"	Cobble (C)
12" - 24"	Small (S)
24" - 36"	Medium (M)
36" and Larger	Large (L)

PROPORTIONS USED (QUANTITATIVE TERMS)

TRACE (TR)	0-10%
LITTLE (LI)	10-20%
SOME (SO)	20-35%
AND	35-50%

QUALITATIVE TERMS

OCCASIONAL
FEW
FREQUENT
NUMEROUS

EXCAVATION EFFORT

E - Easy
M - Moderate
D - Difficult

▼ Observed Depth to Groundwater

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468
T: (203) 880-5455 F: (203) 800-9695

Proposed Site Development & Restoration
64 Cambridge & 4 Independence Drive, Monroe, Connecticut

PT-1
Project # 1903601
March 12, 2020

PERC TEST FIELD LOG

Name						
Chris Pawlowski	Contractor	Rockhead LLC			Assumed Ground Surface El.	415.00
Russ Cyr	Operator	John Kimball			Datum	
Matt Brattoli	Make	John Deere	Model	380G	Temperature	42°F
John Kimball	Bucket Capacity	4 YD	Reach	26'	Weather	Cloudy

Time	Description		Water Elevation (Inches)	Elevation Difference (Inches)	Remark No.
	Bottom of perc hole below grade = 50"				
	Bottom of perc hole below shelf = 18"				
	Diameter of perc hole = 8"				
	Measured From 19				
9:45 AM	Pre-soak				
10:50 AM	End of Pre-soak				
12:10 PM	First soak	1	18		
12:15 PM	First soak	3 1/4	15 3/4	2 1/4	
12:20 PM	First soak	4 3/4	14 1/4	1 1/2	
12:25 PM	First soak	6	13	1 1/4	
12:30 PM	First soak	7 1/4	11 3/4	1 1/4	
12:35 PM	First soak	8 3/8	10 5/8	1 1/8	
12:40 PM	First soak	9 1/4	9 3/4	7/8	
12:45 PM	First soak	10 1/8	8 7/8	7/8	
12:50 PM	First soak	10 7/8	8 1/8	3/4	
12:55 PM	First soak	11 1/2	7 1/2	5/8	
1:00 PM	First soak	12 1/8	6 7/8	5/8	
1:05 PM	First soak	12 3/4	6 1/4	5/8	
1:10 PM	First soak	13 1/4	5 3/4	1/2	
1:15 PM	First soak	13 3/4	5 1/4	1/2	
1:20 PM	First soak	14 1/4	4 3/4	1/2	
			Uniform Rate	1/2 Inch / 5 Min	

REMARKS:
1 Inch / 10 Min Rate

SOLLI ENGINEERING
501 Main Street, Monroe, CT 06468
T: (203) 880-5455 F: (203) 800-9695

Proposed Site Development & Restoration
64 Cambridge & 4 Independence Drive, Monroe, Connecticut

PT-2
Project # 1903601
March 12, 2020

PERC TEST FIELD LOG

Name							
Chris Pawlowski	Contractor	Rockhead LLC			Assumed Ground Surface El.	416.50	
Russ Cyr	Operator	John Kimball			Datum		
Matt Brattoli	Make	John Deere	Model	380G	Temperature	42°F	
John Kimball	Bucket Capacity	4 YD	Reach	26'	Weather	Cloudy	

Time	Description		Water Elevation (Inches)	Elevation Difference (Inches)	Remark No.
	Bottom of perc hole below grade = 27"				
	Bottom of perc hole below shelf = 18"				
	Diameter of perc hole = 6.5"				
	Measured From 19				
10:50 AM	Pre-soak				
11:30 AM	End of Pre-soak				
12:08 PM	First soak	1	18		
12:13 PM	First soak	5 7/8	13 1/8	4 7/8	
12:18 PM	First soak	8 1/2	10 1/2	2 5/8	
12:23 PM	First soak	10 3/4	8 1/4	2 1/4	
12:28 PM	First soak	12 1/4	6 3/4	1 1/2	
12:33 PM	First soak	13 1/4	5 3/4	1	
12:38 PM	First soak	14 1/8	4 7/8	7/8	
12:43 PM	First soak	15	4	7/8	
12:48 PM	First soak	15 3/4	3 1/4	3/4	
12:53 PM	First soak	16 1/2	2 1/2	3/4	
12:58 PM	First soak	17 1/8	1 7/8	5/8	
1:03 PM	First soak	17 3/4	1 1/4	5/8	
1:08 PM	First soak	Dry			
			Uniform Rate	5/8 Inch / 5 Min	

REMARKS:
1 Inch / 8 Min Rate

APPENDIX D
MATERIAL ACCEPTANCE PROCEDURE

Material Acceptance Procedure
Excerpt from "Connecticut Department of Environmental Protection's Regulations for Solid Waste Management"

Rockhead Material Acceptance Procedure
64 Cambridge Drive & 4 Independence Drive
Monroe, CT 06468

1.0 PURPOSE:

The purpose of this document is to provide guidance for implementing a procedure for materials received by ROCKHEAD facilities to meet the requirements for clean fill.

2.0 SCOPE:

This procedure applies to all ROCKHEAD recyclable materials handling operations.

3.0 RESPONSIBILITIES:

ROCKHEAD personnel will conduct initial screening of material as described within this procedure.

ROCKHEAD personnel will check to make sure that only customers with signed Certificates of Conformance will deposit material at any ROCKHEAD facility.

ROCKHEAD personnel will timely process all Certificates of Conformance.

These procedures will be updated as necessary to conform with all applicable environmental regulations.

4.0 DEFINITIONS:

Certificate of Conformance (C of C)- A document used to check that the owner of material brought to the sight has read and agreed to abide by ROCKHEAD requirements that only material on the Material Acceptance List are allowed at the site. (Exhibit A)

Clean Fill - "Clean fill" means (1) natural soil (2) rock, stone, sand, gravel, brick, ceramics, clean concrete, and asphalt paving fragments which are virtually inert and pose neither a pollution threat to ground or surface waters nor a fire hazard and (3) polluted soil as defined in subdivision (45) of subsection (a) of section 22a-133k-1 of the Regulations of Connecticut State Agencies which soil has been treated to reduce the concentration of pollutants to levels which do not exceed the applicable pollutant mobility criteria and direct exposure criteria established in sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies and

which soil is reused in accordance with R.C.S.A. subdivision (3) of subsection (h) of section 22a-133k-2 of such regulations.

Material Acceptance List — a document developed to ensure compliance with the CTDEEP definition of clean fill which includes uncontaminated soil, rock, stone, sand, gravel, concrete, brick and asphalt fragments. (Exhibit B)

Natural soil - means soil in which all substances naturally occurring therein are present in concentrations not exceeding the concentrations of such substance occurring naturally in the environment and in which soil no other substance is analytically detectable. For the purpose of this definition, substance shall have the same meaning as in section 22a-133kI of the Regulations of Connecticut State Agencies.

PID Meter- tool used to initially screen incoming materials for volatile organics

5.0 PROCEDURE:

5.1 Scale House Review

5.1.1 All drivers will be asked to identify:

- The company they represent
- What type of material they are transporting
- What is the source of the material

5.1.2 ROCKHEAD personnel will check the Certificate of Conformity (C of C) list to ensure that the customer has a signed C of C. This ensures that the customer in question has read and signed the agreement to abide by ROCKHEAD's restrictions of acceptable materials that can be brought to the site. If the customer does not have a signed C of C, the load will be rejected. The customer will be given a copy of the C of C to complete and return at a later time for use on a future load of material.

5.1.3 The type and source of the material the customer is transporting is then checked against the Material Acceptance List provided in Exhibit B by ROCKHEAD personnel. If the material passes this requirement, a location will be designated to the driver to dump the load.

5.2 Operator Review

5.2.1 ROCKHEAD personnel will conduct a visual inspection of the load at the dumping location to ensure that only material identified in Exhibit B is accepted. If the load contains soils, the procedures under Sections 5.3 and 5.4 are to be followed.

5.3 Soil Screening

5.3.1 A properly calibrated PID meter will be used to evaluate each load of soil that enters the facility. This will be performed by ROCKHEAD personnel prior to leaving the material on-site. If any odor above background levels is detected, the material will be rejected and not allowed to remain at the facility.

5.4 Rockhead Quality Assurance / Quality Control Procedures

5.4.1 Material proposed to be deposited and used as fill at the property shall be evaluated in accordance with the analytical testing requirements indicated below.

5.4.2 Material must be randomly sampled for chemical constituents and physical characteristics according to prevailing standards and practices for collection and analyzing soil and sediment samples (i.e. EPA QA-G-55 or equivalent). The required random sampling frequency to be completed by Rockhead shall be one sample per 3,000 cubic yards of materials imported to the facility.

5.4.3 The materials proposed to be deposited and used as fill must be tested using current test methods in EPA SW-846, except for ETPH, which must be analyzed by the CTDEEP approved method.

Analytical Test	Test Method
Extractable Petroleum Hydrocarbons (ETPH)	CTDEEP Approved Method
Polychlorinated Biphenyls (PCBs)	EPA SW-846- Method 8082A
Total Metals (As, Ba, Cd, Cr, Pb, Se, Ag, Cu, Ni, Zn)	EPA SW-846 Method 6010C
Total Mercury (Hg)	EPA SW-846 Method 7471B
Metals by Synthetic Precipitation Leaching Procedure*	EPA SW-846 Method 1312
Metals by Toxicity Characteristic Leaching Procedure	EPA SW-846 Method 1311
Semi-volatile Organic Compounds (SVOCs)	EPA SW-846 Method 8270D
Volatile Organic Compounds (VOCs)	EPA SW-846 Method 88260C
Any other substance reasonably expected to be present Based on the environmental conditions at the material source	Appropriate/Current EPA SW-846 Test Method

*At minimum, required for Arsenic, Lead, and Mercury

6.0 EDUCATION AND TRAINING:

ROCKHEAD will require that any of its employees involved in the acceptance of materials to read this procedure.

7.0 REFERENCES

Exhibit A – Certificate of Conformity

Exhibit B – Material Acceptance List

Exhibit C – Automatically Rejected Materials

Exhibit A

CERTIFICATE OF CONFORMITY

I (we) certify that all materials delivered to Rockhead LLC, 64 Cambridge Drive and/or 4 Independence Drive in Monroe, Connecticut, contain only materials which meet the state of Connecticut Department of Environmental Protection Sec. 22a-209-1. Definition of "Clean Fill".

"Clean Fill" means (1) natural soil (2) rock, stone, sand, gravel, brick, ceramics, clean concrete, and asphalt paving fragments which are virtually inert and pose neither a pollution threat to ground or surface waters nor a fire hazard. I (we) also certify that these materials do not contain, nor are they mixed with hazardous wastes, oil or petroleum, waste oil or chemical liquids regulated by local, state and/or federal law.

In addition, I (we) agree to defend, indemnify and hold harmless ROCKHEAD, LLC, Astro Land Holdings, LLC, Spacely Land Holdings, LLC and their respective officers, agents and employees from any harm, damage or loss resulting from a delivery that does not conform to these restrictions.

Company Name:

_____

Signature:

By:_____

Print Name: _____

Its:_____
Duly Authorized

Exhibit B

Acceptable Materials

- Natural Soil
- Rock
- Stone
- Sand
- Gravel
- Clean Concrete
- Ceramics
- Brick
- Asphalt Paving Fragments

Exhibit C

Automatically Rejected Materials

Contaminated soil
Odorous material
Concrete pipe/holding tanks
Stained/painted concrete
Concrete with residual mastic
Electrical wires
Fabrics
Roofing/siding
Vinyl tile
Floor coverings
Glass
Wood/brush
Materials from
"high risk" usages*
Batteries
Insulation
Other Construction Debris
Trash
Rubber/tires
Plaster/lath/sheet rock
Surfacing materials/stucco
Scrap metal

*At discretion of management. Examples include: auto facilities, machine shops, metal finishing operations, etc.

Connecticut Secretary of the State
Authenticated Electronic Legal Material

Agency
Department of Environmental Protection

Subject
Solid Waste Management

Inclusive Sections
§§ 22a-209-1—22a-209-17

CONTENTS

Sec. 22a-209-1. Definitions
Sec. 22a-209-2. Prohibition of open dumps
Sec. 22a-209-3. Applicability
Sec. 22a-209-4. Permits for solid waste facilities
Sec. 22a-209-5. Contract approvals
Sec. 22a-209-6. Certification of operators
Sec. 22a-209-7. Solid waste disposal areas
Sec. 22a-209-8. Special waste disposal
Sec. 22a-209-9. Solid waste transfer stations
Sec. 22a-209-10. Resource recovery facilities and other volume reduction plants
Sec. 22a-209-11. Variances
Sec. 22a-209-12. Violations
Sec. 22a-209-13. Closing of solid waste facilities
Sec. 22a-209-14. Disposal of residue
Sec. 22a-209-15. Biomedical waste
Sec. APPENDIX I.
Sec. 22a-209-16. Fees for transfer of a permit to construct or a permit to operate a solid waste facility
Sec. 22a-209-17. Mercury-containing lamps

Solid Waste Management

Sec. 22a-209-1. Definitions

"AASHTO specification" means a standard of performance for buried structures set forth in "Standard Specifications for Transportation Materials," published by the American Association of State Highway and Transportation Officials in 1989, 14TH edition.

"All weather access" means that affected roads or land surface can support operation of vehicles for the transportation of solid waste and vehicles for the maintenance of solid waste facilities under all normal climatic conditions, provided that snow is removed and flooding is precluded.

"Alter" (1) when referring to a solid waste facility which has no permit, means to change the existing configuration or method of operation of the facility in any manner, including but not limited to adding to the volume of solid waste deposited at the facility; (2) when referring to a solid waste facility which holds a permit, means to change the approved configuration or method of operation of the facility in any manner, including but not limited to adding to the approved volume of solid waste deposited at the facility.

"Asbestos" means actinolite, amosite, antnophyllite, chrysotile, crocidolite, tremolite, or any material which contains the above, all or part of which is in a friable state.

"ASTM specification" means a standard for pipes or other construction materials set forth in "Annual Book of ASTM Standards," published by the American Society of Testing Materials in 1989.

"Base flood" means a flood that has a one percent or greater chance of recurring in any year or a flood of a magnitude equaled or exceeded once in 100 years on the average over a significantly long period. If the Commissioner deems it necessary for a particular location, the base flood shall represent a less common occurrence as specified by him or her.

"Bird hazard" means an increase in the likelihood of bird/aircraft collisions that may cause damage to the aircraft or injury to its occupants.

"Bulky waste" means landclearing debris and waste resulting directly from demolition activities other than clean fill.

"Cell construction method" means the spreading, compacting and daily covering of solid wastes through use of the area, ramp, or trench methods of landfilling.

"Certified operator" means the solid waste facility operator or an employee of the such operator who is present on site and oversees or carries out the daily operation of the facility, and whose qualifications are approved in accordance with Section 22a-209-6 of the Regulations of Connecticut State Agencies.

"Certified soil scientist" means a person who has been certified as a soil scientist by the Board of Directors of the Society of Soil Scientists of Southern New England.

"Clean fill" means (1) natural soil (2) rock, brick, ceramics, concrete, and asphalt paving fragments which are virtually inert and pose neither a pollution threat to ground or surface waters nor a fire hazard and (3) polluted soil as defined in subdivision (45) of subsection (a) of section 22a-133k-1 of the Regulations of Connecticut State Agencies which soil has been treated to reduce the concentration of pollutants to levels which do not exceed the

applicable pollutant mobility criteria and direct exposure criteria established in sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies and which soil is reused in accordance with R.C.S.A. subdivision (3) of subsection (h) of section 22a-133k-2 of such regulations.

"Cover material" means soil, or other suitable material as approved by the Commissioner, which is used to cover compacted solid waste in a solid or special waste disposal area. Any soils used shall be classified as GM, silty gravels, poorly graded gravel-sand-silt mixtures; GC, clayey gravels, poorly graded gravel-sand-clay mixtures; SM, silty sands, poorly graded sand-silt mixtures; SC, clayey sands, poorly graded sand-clay mixtures; ML, inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity in accordance with the unified soil classification system.

"Dewater" means to subject material to a process that removes water.

"Dioxin sampling well" means a stainless steel ground water monitoring well installed within the area of predicted leachate plume from any portion of a solid waste facility at which residue is disposed.

"Facility plan" means the engineering studies and proposals to build, establish, alter, operate, monitor and close a solid waste facility, required by Section 22a-209-4(b) (2) of the Regulations of Connecticut State Agencies.

"Floodplain" means the lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, which are inundated by the base flood.

"Friable" means readily crumbled, pulverized or reduced to powder, when dry, by hand pressure.

"Geotextile" means a woven or nonwoven fabric or film which is utilized for the engineering management of soil and water.

"Groundwater" means water present in the zone of saturation.

"Groundwater monitoring well" means a dug, driven or drilled well used to determine groundwater elevation, direction of groundwater flow, or the quality of groundwater.

"Hazardous Waste" means any waste material which may pose a present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of or otherwise managed, including hazardous waste identified in accordance with Section 3001 of the Resource Conservation and Recovery Act of 1976 (42 USC 6901 et seq.) as amended.

"Leachate" means that liquid which results from ground or surface water which has been in contact with solid waste and has extracted material, either dissolved or suspended, from the solid waste.

"Lift" means a horizontal layer of cells within a solid waste disposal area at which the cell construction method is utilized.

"Lower explosive limit" means the lowest percent by volume of gas which will propagate a flame in air at 25°C and atmospheric pressure.

"Maximum high water table" means the highest elevation reached by the upper level of

APPENDIX E
INSPECTION & MAINTENANCE PLAN

Long-Term Inspection & Maintenance Plan

LONG-TERM INSPECTIONS & MAINTENANCE MANUAL

For The Proposed:

Site Development & Restoration

Located At:
64 Cambridge Drive & 4 Independence Drive
Monroe, Connecticut 06468

Prepared On:
May 26th, 2020

Submission for:
Site Development Plan &
Inland Wetlands Application

Prepared By:

SOLLI ENGINEERING

501 Main Street, Suite 2A
Monroe, Connecticut 06468
T: (203) 880 - 5455

Prepared For:

Astro Land Holdings LLC & Spacely Land Holdings LLC

16 Cross Street
New Canaan, Connecticut 06840

TABLE OF CONTENTS

INTRODUCTION 2
RESPONSIBILITY 2
DOCUMENTATION 3
MAINTENANCE PROGRAM 3
OULET CONTROL STRUCTURES 3
RIPRAP APRON OUTLET PROTECTION 3
PESTICIDES, HERBICIDES AND FERTILIZERS 4
TRASH REMOVAL 4
SNOW REMOVAL 4
STREET SWEEPING 4
EMERGENCY SPILL CONTAINMENT 5

INTRODUCTION

The long-term Stormwater Management System Operations and Maintenance (O&M) Plan, filed with the Town of Monroe, shall be implemented at the proposed Site Redevelopment & Restoration at 64 Cambridge Dive & 4 Independence Drive, to ensure that the stormwater management functions as designed. The owner possesses the primary responsibility for overseeing and implementing the O&M plan and assigning a Property Manager who will be responsible for the proper operation and maintenance of the stormwater structures. In case of transfer of property ownership, future property owners shall be notified of the presence of the stormwater management system and the requirements for proper implementation of the O&M plan. Included in the manual is the O&M plan identifying key components of the stormwater system as well as a log for tracking inspections & maintenance.

The stormwater management system protects and enhances the stormwater runoff water quality through the removal of sediment and pollutants, and source control significantly reduces the amount of pollutants entering the system. Preventive maintenance of the system will include a comprehensive source reduction program of regular vacuuming and litter removal, prohibitions on the use of pesticides and maintenance of designated waste and recycling.

RESPONSIBILITY

The purpose of the Stormwater Operations and Maintenance (O&M) plan is to ensure inspection of the system, removal of accumulated sediments, oils, and debris and implementation of corrective action and record keeping activities. The below O&M activities associated with the site will be performed by a Contract Operator for the scope of maintenance. The Contract Operator will be a professional engineer or other technical professional with expertise and experience with stormwater management facilities operation and maintenance.

The ongoing responsibility is the Owner, its successors and assigns. Adequate maintenance is defined in this document as good working condition.

Contact information is provided:

Responsibility for Operations and Maintenance

Contact: Astro Land Holdings LLC & Spacely Land Holdings LLC
Address: 16 Cross Street
City, State: New Canaan, Connecticut 06840

DOCUMENTATION

An inspection and maintenance record log and schedule will be kept by the Owner or Property Manager summarizing inspections, maintenance, repairs and any corrective actions taken. The log will include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean-out of any sediments or debris, the location where the sediment and debris was disposed after removal will be indicated. Inspection & Maintenance Logs will be kept on file at the on-site Property Management office.

MAINTENANCE PROGRAM

The Owner, Property Manager and maintenance staff will conduct the Operation and Maintenance program set forth in this document. The Owner or Property Manager will ensure that inspections and record keeping are timely and accurate, and that cleaning and maintenance are performed in accordance with the recommended frequency for each stormwater component. Inspection & Maintenance Log Forms, shall include the date and the amount of the last significant storm event in excess of 1" of rain in a 24-hour period, physical conditions of the structures, depth of sediment in structures, evidence of overtopping or debris blockage and maintenance required of each structure. The following areas, facilities and measures will be inspected by the Owner or Property Manager and maintained as specified below. Identified deficiencies will be corrected. Accumulated sediments and debris will be properly handled and disposed of off-site, in accordance with local, state, and federal guidelines and regulations.

OUTLET CONTROL STRUCTURES

Outlet control structures are concrete structures which are designed to retain removed trash, debris, and coarse sediment from stormwater runoff and serve as temporary spill containment devices for floatables such as oil and greases prior to discharge into a storm sewer pipe. The functions of a deep sump catch basin include:

- A grate and/or vertical notch found in the curbing that allow stormwater to enter the structure while filtering out larger objects such as trash and leaves.

At a minimum, outlet control structures shall be inspected twice per year. Ideally, inspections should be conducted in the fall, at the end of the leaf-drop, in the spring following snow-melt and following heavy rain falls, defined as a storm event exceeding one inch of rain fall within a twenty-four hour period to verify that inlet openings are not clogged by debris. Each structure should be cleaned whenever the depth of sediment deposits is greater than or equal to one half the depth of the sump from the bottom of the structure to the bottom of the lowest pipe invert. Structures shall be inspected for a buildup of sediments, oils, debris, cracks, breaks, or deformations. Any function of the structure that is not in working order will be replaced with similar materials, as per detail, to prevent the storm sewer system from failing.

The structures shall be cleaned by means of handheld shovels, scallop shovel and/or vacuum truck. Vacuum truck may be required instead of shovels to avoid damage to structure. The grate opening shall be clear of any foreign or lodged object. If floating hydrocarbons are observed during an inspection, the

material should be removed immediately by skimming, absorbent materials or other methods and salts used in the winter will be removed from the structure sumps in the early spring. Leaves, pine needles and branches brought down by autumn winds, rain, and cold weather will be removed from the structure sumps in the late fall. Collected sediment, debris and hydrocarbons will be properly disposed of per local, state and federal requirements.

RIPRAP APRON OUTLET PROTECTION

Inspect at least once annually for accumulation of sediment and debris and for signs of erosion within approach channel, riprap apron or down-slope of the apron. Remove debris whenever observed during inspection. Remove sediment when accumulation exceeds 25% of riprap depth. Snow should not be stored within or down-slope of the riprap apron. Repair any erosion and re-grade or replace riprap material, as warranted by inspection. Reconstruct the riprap apron if down-slope channelization indicates that the apron is not level or that discharge has become concentrated, and corrections cannot be made through minor re-grading.

PESTICIDES, HERBICIDES AND FERTILIZERS

Pesticides and herbicides shall be used sparingly. Fertilizers should be restricted to the use of organic fertilizers only. Exterior storage of fertilizers, herbicides, pesticides or other toxic or hazardous materials should be prohibited.

TRASH REMOVAL

Once a month the owner of the site or a designated property manager should walk the site and remove any debris or trash that is seen. The site walk shall include the existing surface detention basin to the east of the retaining wall and the surrounding wooded area adjacent to the edge of the proposed paved area to the south. All trash and debris are to be collected and disposed of in an approved manner.

SNOW REMOVAL

Snow accumulations removed from roadway, driveway and parking areas should be placed in areas outlined on the approved Overall Site Plan (Sheet 2.10) where sand and other debris will remain after snowmelt for later removal. Excess snow should be removed from the site and properly disposed of in an approved snow disposal facility. Care must be exercised not to deposit snow in the following areas: on top of storm drain catch basins; in natural depressions and where sand and debris can directly get into the watercourse.

STREET SWEEPING

Street sweeping is a pollution prevention practice that removes sediment, debris and trash that accumulates along streets and roads from winter sanding practices and everyday use. Street sweeping is often performed to improve aesthetics and to reduce the export of sand to the drainage network and receiving waters. In addition to sediment, debris and trash, other pollutants that may be minimized through street sweeping include some nutrients, oxygen-demanding substances and trace metals.

There are three typical types of sweeping methods, including mechanical, regenerative-air and vacuum-assisted. Mechanical sweepers are the most common and use rotating brooms or brushes to force debris from the pavement. Regenerative-air sweepers combine the rotating brooms of mechanical sweepers with forced air to dislodge the remaining dirt and use a high-power vacuum to pick up the dislodged particles. Vacuum filter sweepers are available in wet and dry types. Dry types use brooms to agitate the sediment prior to vacuuming. Wet types work in a similar fashion but use water to suppress dust during the collection activity. Vacuum sweepers and regenerative air sweepers are considered the more effective than the mechanical sweeper.

At a minimum, street sweeping should be performed once annually, preferably as soon as possible after the snow melts to reduce the amount of sand, grit, and debris and associated pollutants from winter sanding from entering surface waters. Identify areas of concern based on traffic volume, land use, field observations of sediment and trash accumulation and proximity to surface waters. Increase sweeping frequency in these areas to maximize pollutant removal benefits.

EMERGENCY SPILL CONTAINMENT

The Owner, along with the on-site Property Manager is responsible for educating staff and informing tenants on the environmental benefits associated with the use of pavement at the site. Staff must be trained, and tenants informed via the community website as to the proper spill prevention control and response procedures should a spill occur on the pavement surface. Proper spill control products, such as a granular dry absorbent, must be kept on-site at the property management office in a clean, dry chemical and corrosion resistant container.

A spill of greater than 10 gallons of oil or a spill of any quantity that has reached a surface water, into a sewer, storm drain, ditch, or culvert leading to a surface water, is immediately reported to one or more municipal, state, or federal authority.

In the event of a hazardous waste spill on-site, the following protocol should be followed.

- If it is safe to do so, maintenance staff or tenants detecting an oil spill should immediately stop the release and use available materials to prevent the spread of oil, Tetra Tech 6 particularly from discharging towards leaching catch basins located within the access driveway.
- If there is a potentially flammable, toxic or explosive condition, evacuate the vicinity of the spill.
- If it's believed that a reportable or dangerous condition exists, immediately call your local Fire Department to notify them of the release.
- If it is believed that a reportable condition exists, immediately call the Connecticut Department of Energy & Environmental Protection (CT DEEP) to notify them of the release. Call the CT DEEP Emergency Response Section toll free statewide number, 860-424-3338. Be prepared to provide the following information to the CT DEEP and the Fire Department:
    - Identity of the caller
    - Contact phone number
    - Location of the spill

    - Type of product spilled
    - Approximate quantity or product spilled
    - Extent of actual and/or potential water pollution
    - Date and time of spill
    - Cause of spill
- Contact a Licensed Site Professional (LSP) to assist in further handling of the material(s) and DEP.

	Title:	Inpsection #:
	Location:	Project #:
		Field Date:

INSPECTION & MAINTENANCE LOG

Name(s) & Title(s) of Individual(s) performing inspection: _____

Week of Inspection: _____

Type of Inspection:

☐ Monthly ☐ Quarterly ☐ Biannually ☐ Annually ☐ Emergency

Weather (during inspection)

☐ Clear ☐ Cloudy ☐ Rain ☐ Snow ☐ Sunny ☐ Windy ☐ Fog

Other:

Time of Inspection:		**Temp. during inspection:**	°F
Start Time:	**a.m.** **End Time:** **a.m.**	**Precip. since last inspection:**	"

Site Specific BMP's

#	BMP	Maintenance Required		Corrective Action Needed & Notes
1		☐ Yes	☐ No	
2		☐ Yes	☐ No	
3		☐ Yes	☐ No	
4		☐ Yes	☐ No	
5		☐ Yes	☐ No	
6		☐ Yes	☐ No	
7		☐ Yes	☐ No	
8		☐ Yes	☐ No	
9		☐ Yes	☐ No	
10		☐ Yes	☐ No	

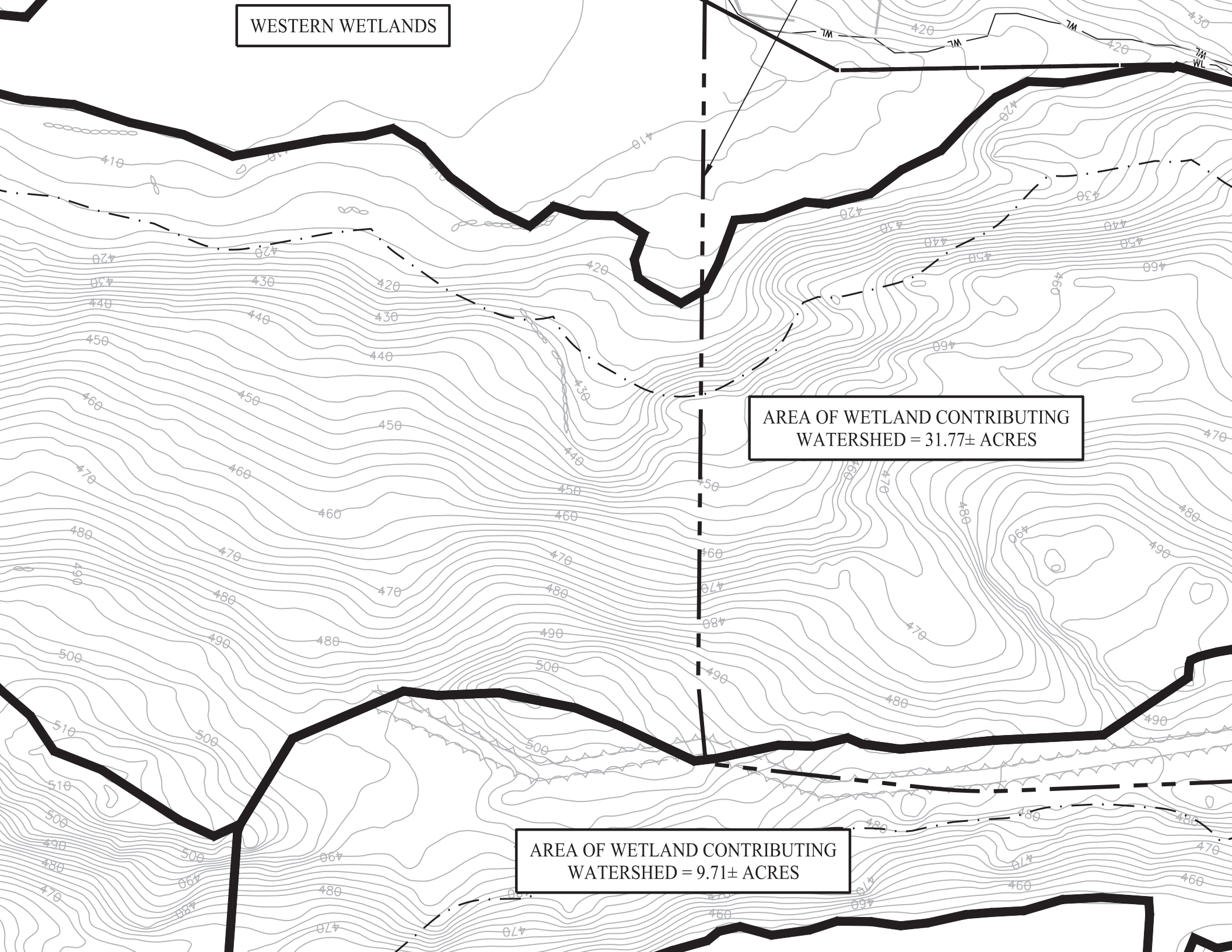
Overall Site Maintenance Concerns

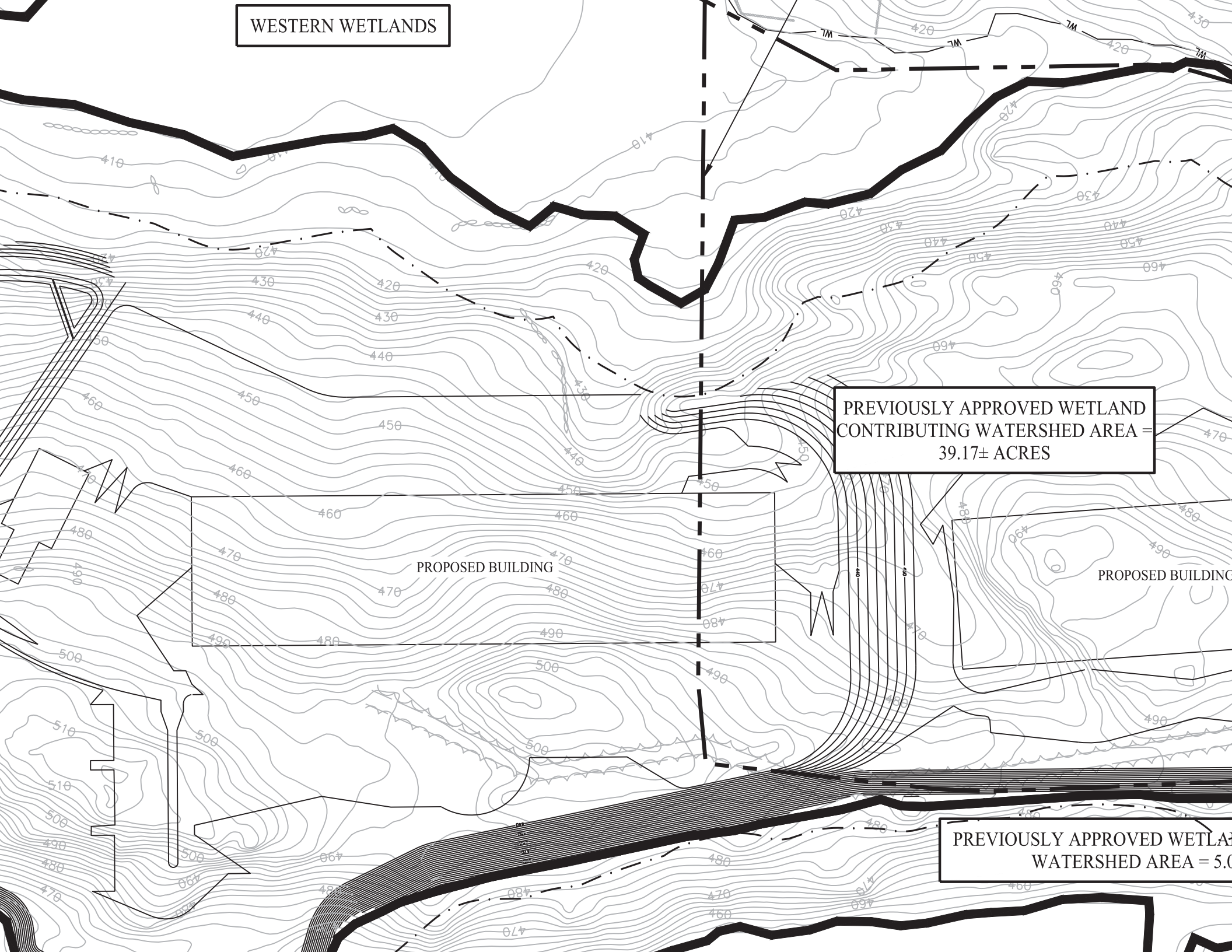
BMP/Activity	Maintenance Required		Corrective Action Needed & Notes
Are discharge points & receiving waters free of any sediment deposits?	☐ Yes	☐ No	
Are storm drain inlets properly working?	☐ Yes	☐ No	
Is trash/litter from site areas collected & placed in covered dumpsters?	☐ Yes	☐ No	
What is the level of sediment within the storwmater basins?	☐ Yes	☐ No	
What is the level of sediment within the outlet control structures?	☐ Yes	☐ No	
(Other)	☐ Yes	☐ No	

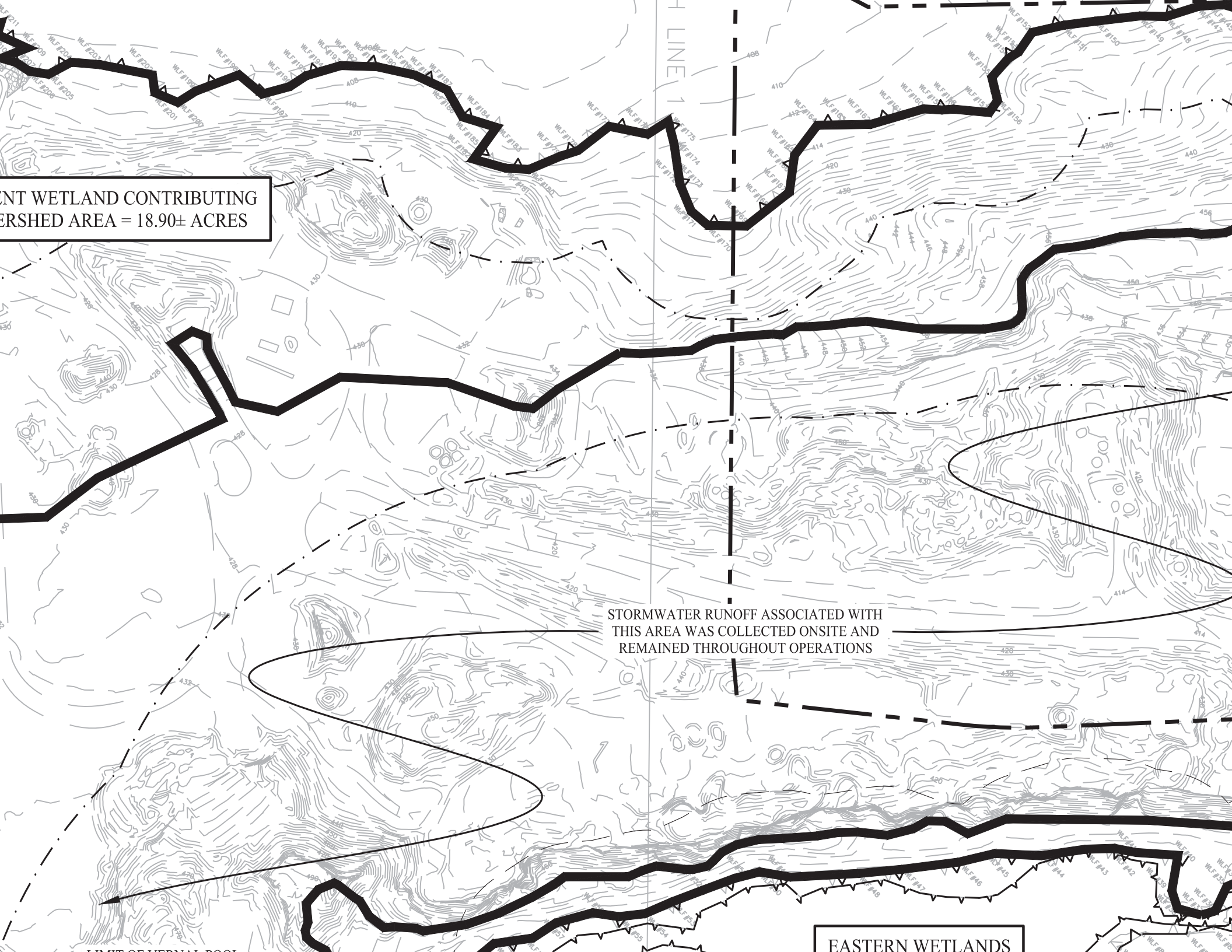
Inspector(s) Signature(s): _____

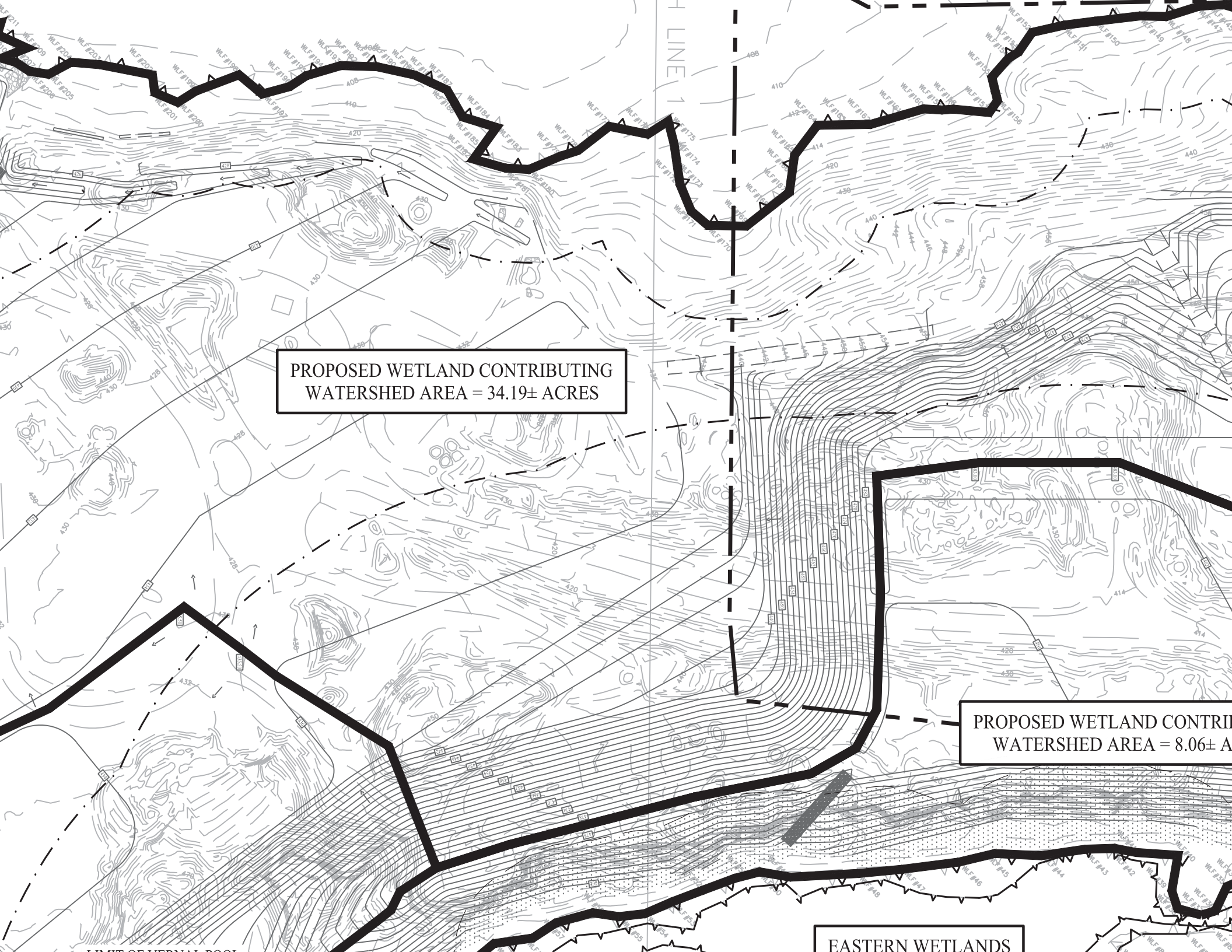
APPENDIX F
PLANS

Watershed Area Maps (WS1, WS2, WS3, WS4)


WESTERN WETLANDS
AREA OF WETLAND CONTRIBUTING
WATERSHED = 31.77± ACRES
AREA OF WETLAND CONTRIBUTING
WATERSHED = 9.71± ACRES


WESTERN WETLANDS
PREVIOUSLY APPROVED WETLAND
CONTRIBUTING WATERSHED AREA =
39.17± ACRES
PROPOSED BUILDING
PROPOSED BUILDING
PREVIOUSLY APPROVED WETLA
WATERSHED AREA = 5.0


ENT WETLAND CONTRIBUTING
ERSHED AREA = 18.90± ACRES
STORMWATER RUNOFF ASSOCIATED WITH
THIS AREA WAS COLLECTED ONSITE AND
REMAINED THROUGHOUT OPERATIONS
EASTERN WETLANDS


PROPOSED WETLAND CONTRIBUTING
WATERSHED AREA = 34.19± ACRES
PROPOSED WETLAND CONTRI
WATERSHED AREA = 8.06± A
EASTERN WETLANDS
LIMIT OF VERNAL POOL

64 CAMBRIDGE DRIVE & 4 INDEPENDENCE DRIVE

PROPOSED SITE DEVELOPMENT & RESTORATION

MONROE, CONNECTICUT

WETLAND & VERNAL POOL ASSESSMENT REPORT

PREPARED FOR:

Town of Monroe
7 Fan Hill Road
Monroe, CT 06864

PREPARED BY:

WILLIAM KENNY ASSOCIATES LLC
195 TUNXIS HILL CUTOFF S
FAIRFIELD, CT 06825

May 26, 2020

Ref. No. 4414

1.0 INTRODUCTION 1
2.0 SITE CONDITIONS & DEVELOPMENT HISTORY 2
3.0 WETLAND CONDITIONS – PAST & PRESENT 4
3.1.1 Inland Wetlands & Watercourses Delineations 4
3.1.2 Hydrologic & Morphological Conditions 4
3.1.3 Watershed Conditions 5
3.1.4 Vegetation 5
3.2 Wetlands & Watercourses Functional Capacity Comparison 6
4.0 VERNAL POOL CONDITIONS – PAST & PRESENT 10
4.1.1 2014 Conditions 10
4.1.2 2020 Conditions 10
4.2 Vernal Pool Assessment Comparison 12
5.0 POTENTIAL IMPACT EVALUATION 13
5.1 Proposed Development & Restoration Activities 13
5.2 Potential Impacts & Mitigation 13
5.2.1 Potential Direct Wetland Impacts 14
5.2.2 Potential Indirect Wetland Impacts During Construction 14
5.2.3 Potential Indirect Wetland After Construction 15
6.0 ALTERNATE PLANS 17
7.0 CONCLUSION 19
8.0 REFERENCES 20

TABLES

Table 1 – Wetlands & Watercourses Functional Assessment: 2006-Approved versus Proposed Conditions 7
Table 2 – Vernal Pool 2020 12
Table 3 – Vernal Pool & Land Development Site Conditions for Pre-Development, 2006 Approved Plan, Current Conditions, Proposed Plans & Alternate Plans 18

APPENDICES

Appendix A – List of Reviewed Project Documents
Appendix B – Wetland Functions & Values & Vernal Pool Assessment: 64 Cambridge Drive & 4 Independence Drive, Monroe

Appendix C – Alternate Development Plans

Appendix D – WKA Delineation Report: 64 Cambridge Drive & 4 Independence Drive, Monroe, Connecticut

1.0 INTRODUCTION

William Kenny Associates LLC (WKA) has completed an assessment of the 52.93-acre property at 64 Cambridge Drive and 18.97-acre property at 4 Independence Drive in Monroe Connecticut to inventory and assess existing wetland and watercourse conditions and functions as compared to the reported conditions in 2014 and as they relate to the currently proposed site development and restoration activities. The following report includes the methods and results of this investigation, which included a wetland delineation, vernal pool assessment and additional site investigations. Wetland delineations were conducted by WKA in February of 2020 and site investigations and vernal pool assessments were conducted in March and April of 2020. In addition to our field investigations, our assessment is based on a review of the various project plans, environmental and engineering reports, regulatory documents and vernal pool conservation guidelines (Appendix A). Proposed conditions were assessed based on a review of the *Proposed Site Development & Restoration* drawings and the *Engineering Report*, prepared by Solli Engineering, dated May 26, 2020.

In summary, the proposed development and restoration of the properties will substantially restore the functions and values of onsite wetlands to a level greater than what we expect would be present if the Town approved 2006 site development plan was fully implemented. A restoration plan has been designed to restore the impacted hydrologic conditions of the vernal pools, wetlands and watersheds and the planting plan will restore forested areas within the critical terrestrial habitat of the vernal pools. The hydrologic conditions of the watershed will be restored to a level substantially similar to pre-development conditions. Land between east and west of the development pads and bordering adjacent wetlands to the west and east will be vegetated with native meadow vegetation and trees and allowed to succeed into a forest over time. The undeveloped areas onsite will be equal to or greater than the conditions approved in the 2006 plans.

2.0 SITE CONDITIONS & DEVELOPMENT HISTORY

The approximate 71.90-acre combined properties are located at 64 Cambridge Drive and 4 Independence Drive in Monroe, Connecticut. 4 Independence Drive is an 18.97-acre property in the northwest portion of the project site and 64 Cambridge Drive is a 52.93-acre property that bounds 4 Independence Drive to the east and south. Cambridge Drive is south of the site and Independence Drive is north of the site. Wetlands and watercourses on the properties were delineated by Environmental Planning Services LLC (EPS) in 2004 prior to quarry activities at the site.

In 2006, the Town of Monroe issued Planning and Zoning (P&Z) issued an approval for the development of the quarry at 64 Cambridge Drive and 4 Independence Drive. No permit from the Town of Monroe Inland Wetlands Commission (IWC) was needed at that time as the limit of disturbance (LOD) was greater than 50 feet from the regulated upland review area (RURA). The site plans and drawings associated with these approvals were prepared by Spath & Bjorkland. In 2015 and 2016, the P&Z and IWC re-issued permits for the development of the quarry at 64 Cambridge Drive and 4 Independence Drive. The P&Z Site Plan Approval dated March 3, 2016 allowed for the construction of two buildings on 64 Cambridge Drive with no conditions attached. A Zoning Board Approval (ZBA) Waiver File No. 1235 was also incorporated into this approval to allow for rock processing onsite. The IWC issued a letter stating that substantial evidence was proposed to indicate that no adverse impacts to onsite wetlands and/or watercourses was proposed in the *Proposed Resubdivision Section Four of the Pepper Street Business Park* drawings, prepared by Solli Engineering, last revised September 22, 2015.

The quarry activities significantly altered the shape and grade of the central portion of the property, extending from the northern site boundary to the southern site boundary, and encompasses approximately 39.03 acres (54 percent) of the site. Much of the altered land area, but not all, was approved for some level of alteration. As of today, the conditions on the project site include a greater area of disturbance and a deeper excavation than what was referenced in the approved site plans. The land surface modifications have reduced the size of the watershed drainage areas for onsite wetlands by approximately 50 percent. The deepened excavation activity required pumps to remove water from the quarry and direct it toward a stormwater basin

at 4 Independence Drive, which outflows to the west toward an onsite wetland. Quarry excavation and the pumping of water from one watershed to another, has resulted in significant changes to onsite wetlands (detailed in the following sections). The relatively undisturbed ecological communities remaining at the project site include areas of forest, wetlands and watercourses to the west, east and south and cleared successional meadow to the northeast.

3.0 WETLAND CONDITIONS – PAST & PRESENT

3.1.1 Inland Wetland & Watercourse Delineation

Four wetlands were identified and delineated onsite by EPS in 2004 and 2014 with little variation in the delineation results. These wetlands are identified as Wetlands 1 through 4 in 'Figure 1' of the EPS *Wetland Functions and Values and Vernal Pool Assessment: 64 Cambridge Drive & 4 Independence Drive, Monroe report*, dated May 30, 2014 (Appendix B). Wetland 1 encompasses the western portion of the properties, and Wetlands 2, 3 and 4 are located in the eastern portion. In 2020, WKA re-investigated the site and identified and delineated three wetlands, corresponding to the previously delineated Wetland 1, 2 and 4 (Appendix D). Wetland boundaries delineated by EPS and WKA all relatively correspond to the same boundaries with slight variations between based on differing professional judgement as shown on the *Wetland Comparison Exhibit* drawing, prepared by Solli Engineering, dated February 26, 2020. Wetland 3 was not considered a to be a wetland in WKA's 2020 delineation, as wetland morphological features (i.e. the presence of a reduce or gleyed soil matrix) were not present.

3.1.2 Hydrologic & Morphological Conditions

EPS characterized the hydrologic and vegetative characteristics of these wetland systems in their 2014 report. Wetland 1, which extends and flows north to south through the western portion of the project site, receives discharge from Pine Swamp north of the site. Wetland 1 discharges into the West Branch of the Pequonock River approximately 4,000 feet south of Cambridge Drive. During the 2014 EPS investigation, Wetland 2 extended and flowed south to north through the eastern portion of the project site and fed into Pine Swamp to the north. WKA's 2020 wetland delineation and site investigation of the properties indicated that the northern portion of Wetland 2 no longer connects to Pine Swamp north of the site, and instead ends approximately 25 feet from the northern property line of 64 Cambridge Drive. This modification is due to construction activities that were approved by the Monroe IWC and that are for the extension of Independence Drive. Due to these activities, Wetland 2 now is classified as an isolated system. Wetland 3, which was a relatively small isolated system in the eastern portion of the project site, was described in the 2014 report as being 'deep and containing very

dark tannic water' and approximately 25 feet in diameter. Wetland 4, which extends and flows both south to north and north to south is located along the eastern border of the project site. The northern portion of this wetland feeds into Pine Swamp to the north and the southern portion of this wetland drains to the West Branch of the Pequonock River 3.3 miles south of the site. The West Branch of the Pequonock River drains to the Pequonock River.

3.1.3 Watershed Conditions

The site lies within two subregional watersheds, with the eastern portion of the property, including Wetlands 2 and 3, are within the Halfway River watershed, and the majority of the site, including Wetlands 1 and 4, are within the Pequonock River watershed. The drainage areas to Wetlands 2 and 3 have been noticeably altered as a result of onsite development. According to the *Engineering Report*, Wetland 2's drainage area today is about 43 percent smaller than the conditions at the time of the 2006 approval. This reduction would make the wetland drier and our 2020 site observations confirm that Wetland 2 is significantly drier than in the past. Similarly, field observations indicate that this is also the case for Wetland 3. Surface water was not observed in both Wetland 2 and 3 during any of the site visits in the winter and spring of 2020. Based on EPS historic data and the current vegetative, microtopographic and soil conditions, Wetland 2 should have been inundated up to 12 inches or more of water during the winter and spring of 2020. Due to the lack of poorly and very poorly drained soils at Wetland 3, the amount of drying is not as clear as it is for Wetland 2. The hydrologic conditions of Wetlands 1 and 4 are not noticeably altered based on our 2020 site observations. Standing water was present in much of Wetland 1 and 4 during all of our site visits.

3.1.4 Vegetative Conditions

The 2014 EPS report classified Wetlands 1, 2 and 4 as wooded swamps with red maple, American elm, yellow birch, green ash, ironwood and sweet gum trees. Spicebush, sweet pepperbush, winterberry, highbush blueberry, speckled alder, silky dogwood and northern arrow-wood viburnum comprised the shrub community. Fox grape was the only noted vine species and skunk cabbage, tussock sedge, cinnamon fern, sensitive fern, Canadian mayflower and northern white violet comprised the groundcover throughout these wetland systems. Wetland 3 was classified by EPS as a classic vernal pool rather than a wooded swamp, due to it being a small

isolated depression with no access to an input of surface water like the other systems onsite. Wetland 3 contained similar vegetation; however, the shrub layer was denser than the tree and groundcover species in this system.

3.2 Wetland & Watercourse Functional Capacity Comparison

A comparison of the capacity of the onsite wetland and watercourse systems to perform typical wetland and watercourse functions was performed. The functional capacities of two development scenarios were compared and contrasted: the P&Z-approved 2006 development plan and the currently proposed development and restoration plan. This assessment was completed within the context of typical wetlands functions and values as established by Normandeau Associates, Inc. in the 1998 publication, *A Rapid Procedure for Assessing Wetland Functional Capacity*.

Our assessment of wetland conditions is based on our 2020 evaluation of onsite wetlands and based on the assessment completed by EPS in 2014. The 2014 EPS report characterized the functions and values of the onsite wetlands using *The Highway Methodology Workbook Supplement, Wetland Functions and Values: A Descriptive Approach* (1995) issued by the United States Army Corps of Engineers New England District as their basis for evaluating wetlands. This method includes the analysis of societal values such as recreation, education and aesthetic quality. The two methods assess similar common wetland functions.

The assessment revealed that the wetland functions will be improved from the functional capacities that would be expected if the 2006 approved site plan was fully developed. A summary of this evaluation is presented in the table below.

Table One: Wetlands & Watercourses Functional Capacity Assessment: 2006-Approved versus 2020-Proposed Conditions

WETLAND FUNCTIONS	RELATIVE CAPACITY TO PERFORM FUNCTION		FUNCTIONAL DETAILS
	Approved Functions	Proposed Functions	
WETLAND 1			
1. Modification of Groundwater Discharge	HIGH	HIGH	**Unchanged** – The capacity of the wetland to influence the amount of water moving from ground water to surface water is not expected to be altered.
2. Modification of Groundwater Recharge	LOW	LOW	**Unchanged** – The capacity of the wetland to influence the amount of water moving from surface water to ground water is not expected to be altered.
3. Storm and Flood Water Storage	HIGH	HIGH	**Unchanged** – The capacity of the wetland to store floodwater is not expected to be altered.
4. Modification of Water Quality	HIGH	HIGH	**Unchanged** – The capacity of the wetland to modify water quality is not expected to be altered.
5. Export of Detritus	MODERATE	MODERATE	**Unchanged** – The capacity of the wetland to export organic detritus from the wetland to the adjacent and downstream aquatic ecosystems is not expected to be altered.
6. Contribution to Abundance and Diversity of Wetland Flora	HIGH	HIGH	**Unchanged** – The wetland's capacity to contribute to the abundance and diversity of wetland flora is not expected to be altered.
7. Contribution to Abundance and Diversity of Wetland Fauna	HIGH	HIGH	**Unchanged** – The wetland's capacity to contribute to the abundance and diversity of wetland fauna is not expected to be altered.
WETLAND 2			
1. Modification of Groundwater Discharge	HIGH	HIGH	**Slightly Improved** – The capacity of the wetland to influence the amount of water moving from ground water to surface water is expected to increase more due to a larger watershed.

2. Modification of Groundwater Recharge	*LOW*	*LOW*	*Unchanged – The capacity of the wetland to influence the amount of water moving from surface water to ground water is not expected to be altered.*
3. Storm and Flood Water Storage	*HIGH*	*HIGH*	*Slightly Improved– The capacity of the wetland to store floodwater is expected to increase due to a larger watershed.*
4. Modification of Water Quality	*HIGH*	*HIGH*	*Slightly Improved – The capacity of the wetland to modify water quality is expected to increase due to a larger watershed.*
5. Export of Detritus	*MODERATE*	*MODERATE*	*Unchanged – The capacity of the wetland to export organic detritus from the wetland to the adjacent and downstream aquatic ecosystems is not expected to be altered.*
6. Contribution to Abundance and Diversity of Wetland Flora	*HIGH*	*HIGH*	*Unchanged – The wetland's capacity to contribute to the abundance and diversity of wetland flora is not expected to be altered.*
7. Contribution to Abundance and Diversity of Wetland Fauna	*HIGH*	*HIGH*	*Unchanged – The wetland's capacity to contribute to the abundance and diversity of wetland fauna is not expected to be altered.*
WETLAND 3 (WKA does not consider this area to be a wetland)[1]			
Modification of Groundwater Discharge	*LOW*	*LOW*	*Unchanged – The capacity of the area formerly known as Wetland 3 to influence the amount of water moving from ground water to surface water is not expected to be altered.*
Modification of Groundwater Recharge	*MODERATE-LOW*	*MODERATE-LOW*	*Unchanged – The capacity of the area formerly known as Wetland 3 to influence the amount of water moving from surface water to ground water is not expected to be altered.*
Storm and Flood Water Storage	*LOW*	*LOW*	*Unchanged – The capacity of the area formerly known as Wetland 3 to store floodwater is not expected to be altered.*
Modification of Water Quality	*LOW*	*LOW*	*Unchanged – The capacity of the area formerly known as Wetland 3 to modify water quality is not expected to be altered.*
Export of Detritus	*LOW*	*LOW*	*Unchanged – The capacity of the area formerly known as Wetland 3 to export organic detritus from the wetland to the adjacent and downstream aquatic ecosystems is not expected to be altered.*
Contribution to Abundance and Diversity of Wetland	*MODERATE-LOW*	*MODERATE-LOW*	*Unchanged – The capacity of the area formerly known as Wetland 3 to contribute to the abundance and diversity of wetland flora is not expected to be altered.*

[1] The 2020 WKA investigation showed this area is no longer a wetland. However, its ability as an upland to function at levels found in both wetlands and uplands will persists due to its landform characteristics and vegetation.

Vegetation			
Contribution to Abundance and Diversity of Wetland Fauna	*MODERATE-LOW*	*MODERATE-LOW*	*Reduced – The capacity of the area formerly known as Wetland 3 to contribute to the abundance and diversity of wetland fauna is not expected to be altered.*
WETLAND 4			
Modification of Groundwater Discharge	*HIGH*	*HIGH*	*Unchanged – The capacity of the wetland to influence the amount of water moving from ground water to surface water is not expected to be altered.*
Modification of Groundwater Recharge	*LOW*	*LOW*	*Unchanged – The capacity of the wetland to influence the amount of water moving from surface water to ground water is not expected to be altered.*
Storm and Flood Water Storage	*HIGH*	*HIGH*	*Unchanged – The capacity of the wetland to store floodwater is not expected to be altered.*
Modification of Water Quality	*HIGH*	*HIGH*	*Unchanged – The capacity of the wetland to modify water quality is not expected to be altered.*
Export of Detritus	*MODERATE*	*MODERATE*	*Unchanged – The capacity of the wetland to export organic detritus from the wetland to the adjacent and downstream aquatic ecosystems is not expected to be altered.*
Contribution to Abundance and Diversity of Wetland Vegetation	*HIGH*	*HIGH*	*Unchanged – The wetland's capacity to contribute to the abundance and diversity of wetland flora is not expected to be altered.*
Contribution to Abundance and Diversity of Wetland Fauna	*HIGH*	*HIGH*	*Unchanged – The wetland's capacity to contribute to the abundance and diversity of wetland fauna is not expected to be altered.*

4.0 VERNAL POOL CONDITIONS – PAST & PRESENT

4.1.1 Vernal Pool 2014 Conditions

According to the 2014 EPS report, each wetland system supported vernal pool species (see 'Figure 2' Appendix B for additional information). The pools in Wetlands 1, 2 and 4 supported breeding and development of the vernal pool obligate wood frogs (*Lithobates sylvaticus*) and spotted salamanders (*Ambystoma maculatum*) in the 2014 survey. Wetland 3 contained amphibian vernal pool indicator species in the 2004 survey, but no amphibian indicator species were observed in the 2014 survey. Fairy shrimp (*Anostraca sp.*) were observed during the 2014 study and follow-up surveys were recommended to re-assess the pool for amphibian obligate species due to this observation. Vernal Pool 2 was considered to be the most productive pool onsite, as greater than 100 egg clutches of wood frog and/or spotted salamander eggs were observed. In addition to obligate vernal pool species observed onsite, several facultative vernal pool species such as spring peeper (*Pseudacris crucifer*), four-toed salamander (*Hemidactylium scutatum*) and grey treefrog (*Hyla versicolor*) were observed in or adjacent to vernal pools. Spring peepers, four-toed salamanders and grey treefrogs will use vernal pool systems for their breeding but are not confined to such systems as wood frogs and spotted salamanders are and are therefore registered as a facultative species.

4.1.2 Vernal Pool 2020 Conditions

WKA conducted a vernal pool assessment in March and April 2020 in accordance with the Connecticut Association of Wetland Scientists' (CAWS) Vernal Pool Monitoring Program protocol. Monitoring was conducted on March 12 and 17 and April 1 and 6. Each vernal pool previously identified in EPS's 2014 report was investigated for vernal pool obligate species. Table 2 provides a summary of critical pool characteristics, as defined by Calhoun and Klemens (2002), that were assessed during our investigation.

Vernal Pool 1, located within the southern portion of Wetland 1, while previously identified as a 'cryptic' vernal pool by EPS in 2014, is not serving as a vernal pool this season. No egg clutches of wood frog nor spotted salamanders were identified during 2020 investigations of this pool and no fairy shrimp were identified within the pool. Small warm water fish were observed within the vernal pool during the subsequent investigation. The

presence of finfish within a vernal pool system indicates that the pool may not serve as adequate habitat for vernal pool obligate species breeding, due to the predation of eggs and larvae by fish. Depth of water within the pool ranged from four to twenty inches during the initial investigation and three to thirteen inches during the subsequent. The decrease in water depth within the vernal pool is likely due to evaporation, as consecutive warm days with no precipitation preceded the subsequent investigation. The substrate of this inactive vernal pool is deep mud/muck, approximately 30 inches deep or more within the central portions of the pool. Surface algae, deep water and turbidity caused by disturbing the pond substrate while conducting investigations moderately impair visibility of egg clutches within this pool. Spring peepers were heard chorusing during both 2020 investigations, and green frogs (*Lithobates clamitans*), common musk turtle (*Sternotherus odoratus*) and mallards (*Anas platyrhynchos*) were observed during the subsequent investigation. Green frogs and musk turtles will prey upon amphibian eggs, and therefore, like finfish, lowers the likelihood that this system will serve as vernal pool habitat this year.

Vernal Pools 2 and 3 were inactive due to the absence of surface water within the vernal pools during investigations. Vernal Pool 2 includes a portion of Wetland 2 and Vernal Pool 3 encompassed the entirety of the formerly identified Wetland 3 (no longer a wetland). Due to the lack of surface water within these systems, these wetlands cannot function as vernal pools. Unlike Vernal Pool 1 which is inactive for the season, the lack of water within a vernal pool system eliminates its function as a breeding area, as surface water is needed to be held within these pools for a long enough time to facilitate amphibian breeding and development (three to six months).

Vernal Pool 4 is located within the northern portion of Wetland 4 and is the only vernal pool identified by EPS currently serving as amphibian breeding habitat this season. Approximately 30 clutches of intact wood frog eggs and three clutches of intact spotted salamander eggs were identified within the central portion of Vernal Pool 4. Fairy shrimp were discovered during the initial investigation of this pool but were absent during the subsequent survey. No finfish were observed within the pool. Depth of water within the pool ranged from four to eight inches depending on location. The substrate of the pool is leaf litter. Surface algae is low throughout the pool and does not impair visual identification. Spring peepers were heard chorusing during both investigations of this pool.

Table Two: Vernal Pool 2020 Conditions

POOL OR TERRESTRIAL HABITAT CONDITIONS	VERNAL POOL ID			
	1	2	3	4
State-listed Species Present or Breeding in the Vernal Pool	No	No	No	No
Two or More Vernal Pool Indicator Species Breeding in the Vernal Pool	No	No	No	Yes
25 or More Egg Masses (Regardless of Species) Present in the Pool by the End of the Breeding Season	No	No	No	Yes

4.2 Vernal Pool Assessment Comparison

EPS' 2014 report characterized all vernal pools onsite to be of exceptional quality. Each pool had evidence of several vernal pool obligate species and evidence of breeding. Vernal Pool 2 was described as the most productive with significant breeding choruses being overheard during surveying and large amounts of egg clutches being identified. WKA's 2020 investigation indicated that only Vernal Pool 4 remains an actively productive habitat for vernal pool obligate species. Vernal Pools 2 and 3 no longer provide breeding and development for obligate vernal pool amphibians or provide habitat for fairy shrimp, as there was no standing water present at the time of investigation (Vernal Pool 2 & 3). Vernal Pool 1, while having standing water, had no evidence of breeding (no egg masses or larvae of vernal pool obligate species).

5.0 POTENTIAL IMPACT EVALUATION

5.1 Proposed Development & Restoration Activities

The proposed activities involve a ten-year, multistage plan to fill the quarry to allow for potential future site development and are also intended to address and correct all alleged violations set forth in your letter to the Applicant(s) dated November 13, 2019. This will be accomplished by re-grading the land to create two 'development' pads, an upper pad located on 4 Independence Drive and a lower pad located on 64 Cambridge Drive. According to the *Proposed Site Development & Restoration* drawings, the upper pad will be at about elevation 482 and the lower pad will be at about elevation 434. Surface grades in the area of the upper pad will need to be elevated approximately 100 feet. Surface grades in the area of the lower pad will need to be adjusted about 10 feet (excluding existing stockpiles within this area). At the lower pad the existing trailer and scale house will be demolished, and a small office will be constructed. An asphalt drive and parking area is also proposed leading to the office. Three stormwater basins will be constructed to manage stormwater runoff quality and quantity from the proposed improvements. These stormwater basins have been designed to the standards set by the *Town of Monroe MS4 Stormwater Management Plan* and the *CT DEEP 2004 Stormwater Quality Manual.* All three basins have been designed to manage stormwater up to the 100-year storm. At the upper pad, the existing Town of Monroe stormwater basin is to be maintained and the access road will be restored. The hydrologic conditions of the contributing watersheds will be restored to levels substantially similar to pre-development conditions. Land between east and west of the development pads and bordering adjacent wetlands to the west and east will be vegetated with native meadow vegetation and trees and allowed to succeed into a forest over time. The undeveloped areas onsite will be equal to or greater than the conditions approved in the 2006 plans.

5.2 Potential Impacts & Mitigation

Land development has the potential to directly and indirectly cause impacts to wetlands and watercourses during and after construction from activities such as vegetation clearing, soil filling, excavation, or pollution of stormwater. For this investigation, a comparison of the approved conditions in the 2006 IWC Permit, the present conditions of the developed site and the

proposed conditions of the new project will be assessed in regard to the impacts they had or will have toward onsite wetlands and watercourses.

5.2.1 Potential Direct Wetland Impacts

The 2006 approvals plans indicated no potential for direct long- or short-term impacts to wetlands and watercourses onsite. The limit of disturbance (LOD) for site development was outside of bounds of onsite wetlands and watercourse and outside the regulated upland review area (RURA) at that time for these systems. No construction was to take place within wetlands, and as such, no long- or short-term direct impacts were anticipated.

The current project proposes no direct long- or short-term adverse impacts to inland wetlands or watercourses on or off the site as no activities are planned within the inland wetland and watercourse systems.

5.2.2 Potential Indirect Wetland Impacts During Construction

During construction, wetlands and watercourses can be indirectly impacted from sediment laden water from the site construction activities. The 2006 approval included a soil erosion and sediment control plan. Since 2006, the implementation and management of soil erosion and sediment control measures have prevented many instances of indirect impacts. However, some impacts from soil erosion and sedimentation have occurred. The 2020 investigation of the project site identified areas where sedimentation occurred within onsite wetlands, primarily Wetland 1 and 2, via stormwater runoff. However, this sedimentation does not appear to be substantially affecting the functions and values of theses wetlands. The sedimentation is less a few inches deep and is in only few, relatively small locations.

The proposed project includes a robust and extensive soil erosion and sediment control plan that will be incorporated during site development and restoration activities. Control measures includes silt fencing, temporary sediment traps and basins, temporary diversion swales, anti-tracking pads at construction entrances, dust control measures, riprap stabilization and inlet protection. Additionally, through multistage construction sequencing, the area and duration of land disturbance at any given time will be minimized and relegated to specific portions of the project site. The control measures are detailed in the *Proposed Site Development & Restoration* drawings and will be installed and maintained in accordance with the *CT DEEP 2002 Guidelines*

for Soil Erosion and Sediment Control. Monitoring and maintenance of these measures will be critical to ensure their effectiveness. They will be installed and maintained by the contractor and inspected by a qualified and approved site monitor.

Wetland hydrologic conditions can be indirectly impacted during construction by altering drainage patterns and watershed areas. As discussed in the *Wetland Conditions* section, the drainage areas of Wetlands 2 and 3 have been reduced as a result of on- and offsite construction activity and these wetlands lack surface water today. The drainage area for Wetland 1 has been increased due to pumping activities directing water to the sedimentation basin on 4 Independence Drive, which drains to Wetland 1.

The proposed project includes water handling measures during proposed construction activity and will assist in restoring wetland hydrologic conditions. More water will be directed to Wetlands 2 and 3 and less water will be directed to Wetland 1through various temporary water handling measures during the multi-stage site development, in which surface and groundwater will be pumped from the quarry, filtered via sedimentation basins and allowed to seep back into Wetlands 2 and 3 through perforated piping bordering Wetland 2.

5.2.3 Potential Indirect Wetland Impacts After Construction

In the long-term and if not properly mitigated, wetlands and watercourses can be indirectly adversely impacted by stormwater runoff that flows from structures, pavement and vegetated surfaces. As originally approved in 2006, the majority of stormwater runoff from the developed portions of the project site would be directed south towards a series of sedimentation traps and north towards a low-lying area where it is dewatered to a filter bag located to the west of Wetland 1. This northern system was observed to be functional during the 2020 investigation.

The proposed project improves onsite stormwater management capabilities. Approximately 2,360 square-feet of new improvements are proposed resulting in an approximate 0.46-acre increase in impervious coverage onsite. As such, the proposed project includes a stormwater management system designed to meet or exceed the current local and state design standards. These systems include three new stormwater detention basins in the southern and southeastern portions of the project site. These basins will be used as sedimentation basins during construction and will function as stormwater basins post construction. The basins are

designed to collect, detain and treat stormwater runoff up to and including the 100-year storm. In the event these systems reach capacity in a significant event, pipes will direct water to riprap energy dispersal pads which will decrease the velocity of stormwater and prevent soil erosion within the wetland buffer.

In addition to managing the flow rates and quality of stormwater runoff, the proposed stormwater management system is designed to permanently restore hydrologic conditions in the onsite wetlands as well as restoring the watershed areas to pre-development acreage. According to the 2006 approval, dewatering impacts were approved by the IWC and the project was approved to alter hydrologic conditions onsite; however, not to the extent observed in current conditions. As detailed in 'Appendix G' of the *Engineering Report,* the existing contributing watershed areas are approximately 48 percent smaller than those approved in 2006. The proposed project will restore the watersheds to pre-development (see Table 4). This will be achieved primarily through the filling of the quarry.

Wetland and watercourse buffers are important to maintain as they help bioremediate pollutants, provide habitat for and fauna that utilize vernal pools, wetland and upland areas. The 2006 site development plan includes buffers that were more than 50 feet wide. However, the current LOD is closer to onsite wetlands than proposed with the 2006 plan, specifically Wetland 2. This has also decreased the undeveloped area of the vernal pool envelope and critical terrestrial habitat for Vernal Pool 2.

The proposed project includes vegetated wetland buffers that will be planted with native trees shrubs and groundcovers restoring the naturalized wetland buffer to conditions similar to the approved 2006 conditions. By increasing the size of the wetland buffer, the potential to treat stormwater entering the wetland through biofiltration is improved. Additionally, increasing the buffer will increase the undeveloped area of the vernal pool envelope for Vernal Pool 2, 3 and 4 and will increase the undeveloped area within the critical terrestrial habitat to levels substantially

similar to the 2006 plan. Reforestation will also increase the amount of available upland habitat that vernal pool obligate species use outside of the breeding season.

6.0 ALTERNATE DEVELOPMENT PLANS

The Applicant has provided two alternate plans for site development (Appendix C). The first plan proposes a design aligned with the approved 2006 project: the quarry would be filled and two structures are proposed. This plan would restore the hydrologic conditions and vegetative buffers to the conditions approved in 2006. As such, the eastern watershed would not be restored to pre-development conditions. The second plan proposes only to fill the quarry and does not include other improvements. The vegetated buffers would be restored; however, the contributing watersheds would remain as they exist today. Neither of the alternate plans are able to restore the hydrologic conditions to pre-development conditions. As such, we find the current proposal to be the most feasible and prudent option.

The following table summarizes key changes to onsite vernal pools that have occurred since pre-development conditions in 2006 and the calculated conditions of the proposed plan and each alternate plan. Under the proposed project, the combined size of the contributing watersheds for the onsite vernal pools will be restored to approximately 100 percent of pre-development conditions. The forested vernal pool buffers will be restored to approximately 100 percent of the 2006 approved conditions. For the purposes of this table, the forested area calculations consider the long-term outcome of the proposed planting plan (i.e. proposed young plantings that will become forest are the considered forest in the table).

Table Three: Vernal Pool & Land Development Site Conditions for Pre-development, 2006 Approved Plan, Current Conditions, Proposed Plan and Alternate Plans

VERNAL POOL ID & DATE OF ONSITE CONDITIONS	VERNAL POOL ONSITE CONDITION		
	Watershed Area (ac)	Onsite Undeveloped Land[1] within 100' of VP (ac)	Onsite Undeveloped Land[1] Between 100' and 750' from VP (ac)
Vernal Pool 1			
Pre-development	31.8	3.1	17.7
2006 Approved Plan	39.2	2.7	9.0
Current Conditions	18.9	2.8	8.0
Proposed Plan	34.2	2.8	10.9
Alternate Plan 1	39.2	2.2	9.2
Alternate Plan 2	18.9	2.2	9.2
Vernal Pool 2			
Pre-development	9.7	5.4	35.2
2006 Approved Plan	5.1	5.4	8.1
Current Conditions	2.2	3.6	3.9
Proposed Plan	8.1	5.4	8.2
Alternate Plan 1	5.1	5.4	8.2
Alternate Plan 2	2.2	5.4	8.2
Vernal Pool 3			
Pre-development	9.7	1.3	19.3
2006 Approved Plan	5.1	1.3	10.3
Current Conditions	2.2	1.2	6.9
Proposed Plan	8.1	1.3	11.2
Alternate Plan 1	5.1	1.3	11.2
Alternate Plan 2	2.2	1.3	11.2
Vernal Pool 4			
Pre-development	2.7	2.5	29.2
2006 Approved Plan	2.7	2.5	12.4
Current Conditions	2.7	2.5	6.1
Proposed Plan	2.7	2.5	12.4
Alternate Plan 1	2.7	2.5	12.4
Alternate Plan 2	2.7	2.5	12.4

[1] Undeveloped land calculations refer to undeveloped land at the project site.

7.0 CONCLUSION

Based on our investigation and assessment of onsite inland wetlands and watercourses systems and vernal pools at 64 Cambridge Drive and 4 Independence Drive in Monroe, Connecticut, we conclude that the proposed development and restoration of the properties will substantially restore the functions and values of onsite wetlands that we expect would be present if the Town approved site development plan was fully implemented. A restoration plan has been designed to restore the impacted hydrologic conditions of the vernal pools, wetlands and watersheds and the planting plan will restore forested areas within the critical terrestrial habitat of the vernal pools.

8.0 REFERENCES

1. Calhoun, A.J.K. and M.W. Klemens. 2002. Best development practices: Conserving pool-breeding amphibians in residential and commercial developments in the northeastern United States. MCA Technical Paper No. 5, Metropolitan Conservation Alliance, Wildlife Conservation Society, Bronx, New York.

2. Cowardin, Lewis M., Carter, Virginia, Golet, Francis C, and LaRoe, Edward T.1979. "Classification of Deepwater Habitats of The United States," United States Fish and Wildlife Service, United States Office of Interior, pg. 1-131.

3. CT ECO. "Connecticut Environmental Conditions Online." Hartford, CT. Department of Environmental Protection and University of Connecticut, 2001.

4. Dowhan, Joseph J., and Craig Robert J.1976. "Rare and Endangered Species of Connecticut and Their Habitats," State Geological and Natural History Survey of Connecticut, The Natural Resources Center Department of Environmental Protection, pg. 1-33.

5. The Highway Methodology Workbook Supplement, Wetland Functions & Values: A Descriptive Approach, issued by the United States Army Corps of Engineers New England District, dated 1995.

6. Magee, Dennis W. and Hollands Garrett G.1998. "A Rapid Procedure for Assessing Wetland Functional Capacity," Normandeau Associates Incorporated and ENSR, pg. 1-190.

7. McElroy, Marianne.1981. "Natural Drainage Basins in Connecticut," State of Connecticut Natural Resources Center, Department of Environmental Protection in cooperation with the U.S. Geological and Natural History Survey.

8. Rodgers, John.1985. "Bedrock Geology Map of Connecticut," U.S Geological Survey.

9. Stone, Janet Radway et al..1992. "Surficial Materials Map of Connecticut," Connecticut Department of Environmental Protection, Geologic and Natural History Survey.

10. Water Quality Classifications Map of Connecticut, South Central Coast, compiled by Bureau of Water Management, Planning and Standards Division, Connecticut Department of Environmental Protection, dated 1993.

APPENDIX A:

List of Reviewed Project Documents

LIST OF PROJECT DOCUMENTS

1. The *Proposed Site Development & Restoration* drawings, prepared by Solli Engineering, dated May 26, 2020.

2. The *Engineering Report*, prepared by Solli Engineering, dated May 26, 2020.

3. The *Pre-Existing, Previously Approved, Current & Proposed Watershed Area Maps* drawing, prepared by Solli Engineering, dated April 21, 2020.

4. The *2004 Drainage Area Map* drawing, prepared by Solli Engineering, dated February 26, 2020.

5. The *Wetland Comparison Exhibit* drawing, prepared by Solli Engineering, dated February 26, 2020.

6. *Memorandum: 64 Cambridge Drive & 4 Independence Drive Existing Site Conditions Assessment Response to Notice of Violation IWV-201404 (File # 845) & IWV-2014-05 (File # 856)* report, prepared by Solli Engineering, dated February 26, 2020.

7. *Town of Monroe Planning & Zoning Commission: Approval Resubdivision (SUB-2015-02-File # 1257C)*, dated March 3, 2016.

8. *Town of Monroe Inland Wetlands Commission: Notice of Decision File No. 974 IWC Application No. IWC-2015-19*, dated December 15, 2015.

9. *Wetland Functions and Values and Vernal Pool Assessment: 64 Cambridge Drive & 4 Independence Drive, Monroe* report, prepared by Environmental Planning Services, dated May 30, 2014.

APPENDIX B:

Wetland Functions and Values and Vernal Pool Assessment: 64 Cambridge Drive & 4 Independence Drive, Monroe

Wetland Functions and Values and Vernal Pool Assessment
64 Cambridge Drive and 4 Independence Drive, Monroe

Submitted To:

Kevin Solli, P.E.
Solli Engineering
523 Pepper Street
Monroe, CT 06468

Completion Date:

May 30, 2014

1.0 INTRODUCTION

This report documents the results of investigations conducted by Environmental Planning Services (EPS) of wetlands located at 64 Cambridge Drive and 4 Independence Drive in Monroe (the "site" hereinafter, see Figure 1). Field visits were conducted on April 9, 17, 18, 20 and 21, 2014, by an EPS Registered Soil Scientist and Certified Professional Wetland Scientist in order to delineate site wetlands, gather data on wetland functions and values and investigated site wetlands for the presence of breeding activity by vernal pool indicator species. These survey dates coincided with the active breeding period of vernal pool indicator species, during which amphibians in amplexus, breeding choruses, salamander spermataphore and amphibian egg masses are typically observable.

The site was also part of a comprehensive wetland and biological survey conducted by EPS in 1998, 2002 and 2003 on behalf of Cambridge Investments, LLC during the development of the Pepper Street Business Park. Biological data collected during that previous survey was used to inform and supplement the findings of this report.

2.0 WETLANDS

Four wetlands occur on the site as illustrated on Figure 1 and summarized in Table 1. One of the four wetlands (Wetland 3) is small (<1/2 acre) and isolated; the other three are large headwater wetlands contiguous with upper perennial stream systems.

Table 1: Site wetlands by number, delineation sequence, habitat type and watershed location

Wetland	Flag Numbers	Habitat Type	Local-Subregional Watershed
1	1-133, 1X-35X	Wooded swamp, cryptic vernal pool	West Branch Pequonnock River – Pequonnock River
2	36X-149X	Wooded swamp, cryptic vernal pool	Pine Swamp-Halfway River
3	233X/252X	Vernal pool (classic)	Isolated
4	1Y-70Y, 150X-232X	Wooded swamp, cryptic vernal pool	Pine Swamp-Halfway River and West Branch Pequonnock River – Pequonnock River

Site wetlands lie in two watersheds, with Wetland 2 and the northern portion of Wetland 4 draining north into Pine Swamp, a tributary to the Halfway River. Wetland 1 and the southern portion of Wetland 4 drain south into the West Branch of the Pequonnock River. General characteristics of the four wetlands are described below:

Wetland 1: a large seasonally-flooded to seasonally-saturated wooded swamp with an unnamed 1st-order (a.k.a. headwater) perennial stream embedded within the southern end of the wetland. Wetland 1 drains south to the West Branch of the Pequonnock River. The wetland lies in a broad drainageway west of the existing site work and east of Enterprise Drive. There is an embedded (a.k.a. cryptic) vernal pool in the southern portion of the wetland. Wetland 1 is hydrologically contiguous with Wetland 4. The wetland is fragmented by Cambridge Drive which is the access road to the ongoing site work, and the road

construction coupled with the mining activities has resulted in sediment deposition in the wetland in areas immediately adjacent to the existing crossing. Wind-blown fines from mining activity were also present, coating vegetation and the ground surface.

Wetland 2: a headwater wooded swamp with intermittent stream, flowing north into Pine Swamp. The wetland contains embedded "cryptic" vernal pools, hummocky micro-topography and a dense shrub layer. Wetland 2 is hydrologically connected to Wetland 4 offsite to the north. Despite the close proximity of the ongoing site work, no significant wetland disturbance was observed. The vegetation and ground in the southern portion of the wetland was coated with wind-blown fines from mining activity.

Wetland 3: an isolated, seasonally-flooded and deeply ponded wooded swamp and vernal pool. Portions of the wetland have a dense shrub layer. The wetland lies in a confined basin situated between Wetlands 2 and 4 and likely has a perched water table.

Wetland 4: a large wooded swamp that lies on a watershed divide, with the northern portions of the wetland draining north to Pine Swamp and the southern portions of the wetland draining south into the West Branch of the Pequonnock River. The wetland includes intermittent channels at both the northern and southern ends, and areas of the wetland have a dense shrub layer. The northern portion of the wetland contains an embedded vernal pool.

3.0 WETLAND VEGETATION

Wetlands consist of palustrine forested wetlands or "wooded swamps". Vegetation consists of Red Maple *(Acer rubrum)* with American Elm *(Ulmus americana),* Yellow Birch, Green Ash *(Fraxinus pensylvanica),* Ironwood, and Black Gum *(Nyssa sylvatica)* in the tree layer. The shrub layer is mostly moderately dense to dense except for some ponded wet depressions and vernal pools where the shrub layer is restricted to the edges and hummocks. The shrub layer consists predominantly of Spicebush *(Lindera benzoin),* Sweet Pepperbush *(Clethra alnifolia),* Winterberry *(flex verticillata),* and Highbush Blueberry *(Vaccinium corymbosum)* with Speckled Alder *(Alnus rugosa),* Silky Dogwood *(Comus amomum)* and Northern Arrow-wood *(Viburnum recognitum).* The scattered vine layer is chiefly Fox Grape. The herb layer is relatively dense except for streambeds and ponded areas and consists primarily of Skunk Cabbage *(Symplocarpus foetidus),* Tussock Sedge *(Carex stricta),* Cinnamon Fem *(Osmunda cinnamomea),* Sensitive Fem *(Onoclea sensibilis)* with Canada Mayflower and Northern White Violet *(Viola pa/lens).*

4.0 UPLAND VEGETATION

Upland vegetation consists of mixed hardwood forest. The tree canopy is nearly continuous and the average diameter at breast height of less than one foot. Dominant tree species are Black Birch *(Betula lenta),* Yellow Birch *(Betula lutea),* White Oak *(Quercus alba),* Scarlet Oak *(Quercus coccinea),* Black Oak *(Quercus velutina),* Ironwood *(Carpinus caroliniana)* with American Beech *(Fagus grandifolia)* and Shagbark Hickory *(Carya ovata).* The vine layer is mostly Fox Grape. The shrub layer is relatively open with scattered, low-growing thickets of Black Huckleberry *(Gaylusaccia baccata*), Early Lowbush Blueberry *(Vaccinium vacil/ans),* and Maple-leaved Viburnum *(Viburnum acerifolium).* The open herb layer consists mainly of Canada Mayflower *(Maianthemum canadense),* Pennsylvania Sedge *(Carexpensylvanica),* Hay-

scented Fem *(Dennstaedtia punctiloba),* Tree Clubmoss *(Lycopodium obscurum),* Trailing Clubmoss *(Lycopodium complanatum),* Poison Ivy, Virginia Creeper, and White Wood Aster *(Aster divaricatus).*

5.0 VERNAL POOL SURVEY RESULTS

Four vernal pools occur on the site as noted on Figure 2. Pools 1, 2 and 4 were identified as vernal pools in the previous study, and they each continue to support two indicator species, wood frog (*Rana sylvatica*) and spotted salamander (*Ambystoma maculatum*). The most productive pool observed was Pool 2, as this pool had a robust wood frog breeding chorus and large numbers of both wood frog and spotted salamander egg masses (>100) were observed.

Pool 3 was identified as a vernal pool in the previous study of the overall Pepper Street Business Park development, as it contained breeding by indicator amphibians. However, no amphibian breeding was observed during this survey. Due to the deep, very dark tannic water, egg masses may have been overlooked, and follow-up dip-net surveys are recommended in June. One uncommon invertebrate indicator species, fairy shrimp *(Anostraca sp.),* was observed. Based on the hydrology, the presence of fairy shrimp, the past EPS survey data, and its proximity to Pools 2 and 4 we believe it is highly likely that Pool 3 continues to support breeding of indicator amphibians, at least during some years.

One facultative species, the spring peeper (*Pseudacris crucifer*) was observed in or adjacent to all vernal pools. Other facultative species present on the site as observed in the previous survey are four-toed salamander (*Hemidactylium scutatum*) and gray treefrog (*Hyla versicolor*).

In order to assess these pools qualitatively, the methodology described in *Best Development Practices: Conserving Pool Breeding Amphibians in Residential and Commercial Developments in the Northeastern Unites States* (Calhoun and Klemens, 2002) was used. This assessment methodology utilizes a three-tiered rating system, with the tier designation determined by examining the biological value of the pool in conjunction with the condition of the habitat surrounding the pool, which is the area used by vernal pool amphibians during the non-breeding season (Calhoun and Klemens, 2002, p. 9). The higher the species diversity and abundance coupled with an un-fragmented forested corridor surrounding the pool, the higher the tier rating. Pools 1, 2 and 4 meet the *biological* criteria of a Tier I or highest quality pool (BDP, p 9, Section A). This is due to the fact that they all contained breeding by both wood frogs and spotted salamanders.

Although no breeding amphibians were observed in Pool 3 it was also considered a Tier I pool due to the presence of fairy shrimp (an indicator species) and the presence of breeding amphibians during the previous survey. Additionally, the pool had suitable hydrology and showed no signs of disturbance from the previously observed condition. The deep tannic water easily obscures egg masses and the early-season survey period did not allow for larval observations. Should a follow-up dip-netting survey be conducted, it has a high likelihood of yielding amphibian larvae. If amphibians proved to be absent, a possible scenario is that this pool is used for breeding by amphibians periodically as opposed to annually, as is sometimes the case when multiple pools occur close together on an interconnected landscape (i.e., meta-population dynamics).

Analysis of the landscape condition (BDP, p. 9, Section B) would be required to complete the full BDP analysis and this was not conducted as it was beyond the scope of this assessment. A preliminary review of 2012 aerial photography suggests that there is sufficient forestland surrounding the pools to classify them all as Tier I pools.

6.0 NATURAL DIVERSITY DATABASE REVIEW & STATE-LISTED SPECIES

The Connecticut Department of Energy and Environmental Protection's Natural Diversity Database program represents current documented data showing the known locations of any state or federally listed endangered, threatened or special concern species or areas designated as "significant natural communities". The most recent maps, dated December, 2013 were reviewed. No natural diversity database records occur on the site. Based on field surveys conducted previously, one state-listed species of special concern, the eastern box turtle (*Terrapene c. carolina*) is known to occur in the vicinity of the site. A single female turtle was observed on June 21, 2002, prior to the development of Pepper Street Business Park. The turtle was located within habitat now occupied by Enterprise Drive and commercial buildings. Our field surveys were conducted too early in the season (prior to May) to observe active box turtles, but suitable habitat exists throughout the site.

7.0 WETLAND FUNCTIONS AND VALUES ASSESSMENT

Over the last three decades, ecologists, wetland scientists, biologists, hydrologists, and environmental engineers have recognized not all wetlands perform the same functions, or provide the same values for their various functions.

There are many methods of evaluating wetlands and these methods have often chosen different parameters to evaluate. This study uses *The Highway Methodology Workbook Supplement, Wetland Functions and Values: A Descriptive Approach* (1995) issued by the US Army Corps of Engineers New England District (ACOE NED). This evaluation provides a qualitative approach in which wetland functions can be considered principal, secondary, or unlikely to be provided at a significant level. Functions and values can be principal if they are an important physical component of a wetland ecosystem (function only), and/or are considered of special value to society, from a local, regional, and/or national perspective. The ACOE NED recommends that wetland values and functions be determined through "best professional judgment" based on a qualitative description of the physical attributes of wetlands and the functions and values exhibited.

The Highway Methodology recognizes the following 13 separate wetland functions and values: groundwater recharge/discharge, floodwater storage, fish and shellfish habitat, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, production export, sediment/shoreline stabilization, wetland wildlife habitat, recreational value, educational/scientific value, uniqueness, visual/aesthetic quality and threatened and endangered species habitat.

The degree to which a wetland provides each of these functions is determined by one or more of the following factors: landscape position, substrate, hydrology, vegetation, history of disturbance, and size. Each wetland may provide one or more of the listed functions at significant levels.

The determining factors that affect the level of function provided by a wetland can often be broken into two categories. The ***effectiveness*** of a wetland to provide a specified function is generally dependent on factors within the wetland whereas the ***opportunity*** to provide a function is often influenced by the wetland's position in the landscape as well as adjacent land uses. Functions and values are summarized in Table 2 and discussed in Section 7.1.

Table 2: Summary of wetland functions and values, Cambridge and Independence Drive

Wetland	Groundwater Recharge/Discharge	Sediment/Shoreline Stabilization	Floodflow Alteration	Fish & Shellfish Habitat	Sediment/Toxicant/ Pathogen Retention	Nutrient Removal/Attenuation	Production Export	Wildlife Habitat	Recreation	Educational/Scientific Value	Uniqueness/Heritage	Visual Quality/Aesthetics	Listed Species Habitat
Wetland 1	P	U	P	U	P	P	S	P	U	S	S	S	U
Wetland 2	P	U	P	U	P	P	S	P	U	S	S	S	U
Wetland 3	U	U	U	U	U	U	S	P	U	S	S	S	U
Wetland 4	P	U	P	U	P	P	S	P	U	S	S	S	U

Suitability
P = principal function
S = secondary function
U = function unlikely to be provided at a significant level

7.1 Wetland Functions and Values Discussion

Wetlands 1, 2 and 4 are all large, long-hydroperiod headwater wetlands located in the upper portions of the watershed, and therefore they play an important role in floodwater storage. These three wetlands also provide significant pollutant (e.g., sediment) and nutrient capture and attenuation function. Wetland wildlife habitat was identified as a principal function for all wetlands due to the fact that they provide breeding habitat for obligate vernal pool wildlife. With the exception of wetland wildlife habitat function, the overall functions and values provided by Wetland 3 are limited due to its small size and the fact that it isolated (physically and hydrologically) from other wetlands.

The functions and values of Wetlands 1, 2 and 4 have been diminished slightly, but not adversely, as a result of the development of the Business Park and ongoing site work. That development resulted in forest fragmentation, reduced wetland connectivity and loss of habitat in the wetland buffer (i.e., uplands surrounding the wetlands), with the primary result being a reduction in wildlife habitat function with limited diminution of other functions. The diminished wildlife value is attributable to the scale of development and the loss of habitat connectivity rather than direct loss of wetland habitat, and is not unique but commensurate with other developments of this scale.

The ongoing site work (and unpaved access road) have resulted in the deposition of water-born and wind-blown sediment in the lower portions of Wetland 1 (adjacent to Cambridge Drive) and the southern portions of Wetland 4. These discharges were discrete rather than large scale and have not resulted in a loss of total wetland area. No deliberate, machine-deposited fill was observed. Comparing the previously delineated wetland boundary with the recently delineated wetland boundary confirms that these boundaries are fundamentally the same (see "Wetland Comparison Plan", sheet C-2, prepared by Solli Engineering, dated 5/30/14). Most importantly, there has been no significant adverse impact on these wetlands. They remain high functioning and important resources in the Halfway River and West Branch Pequonnock River watersheds.

FIGURES 1 and 2



FIGURE 1
Location Map
Cambridge &
Independance Dr
Monroe, CT

Study Area

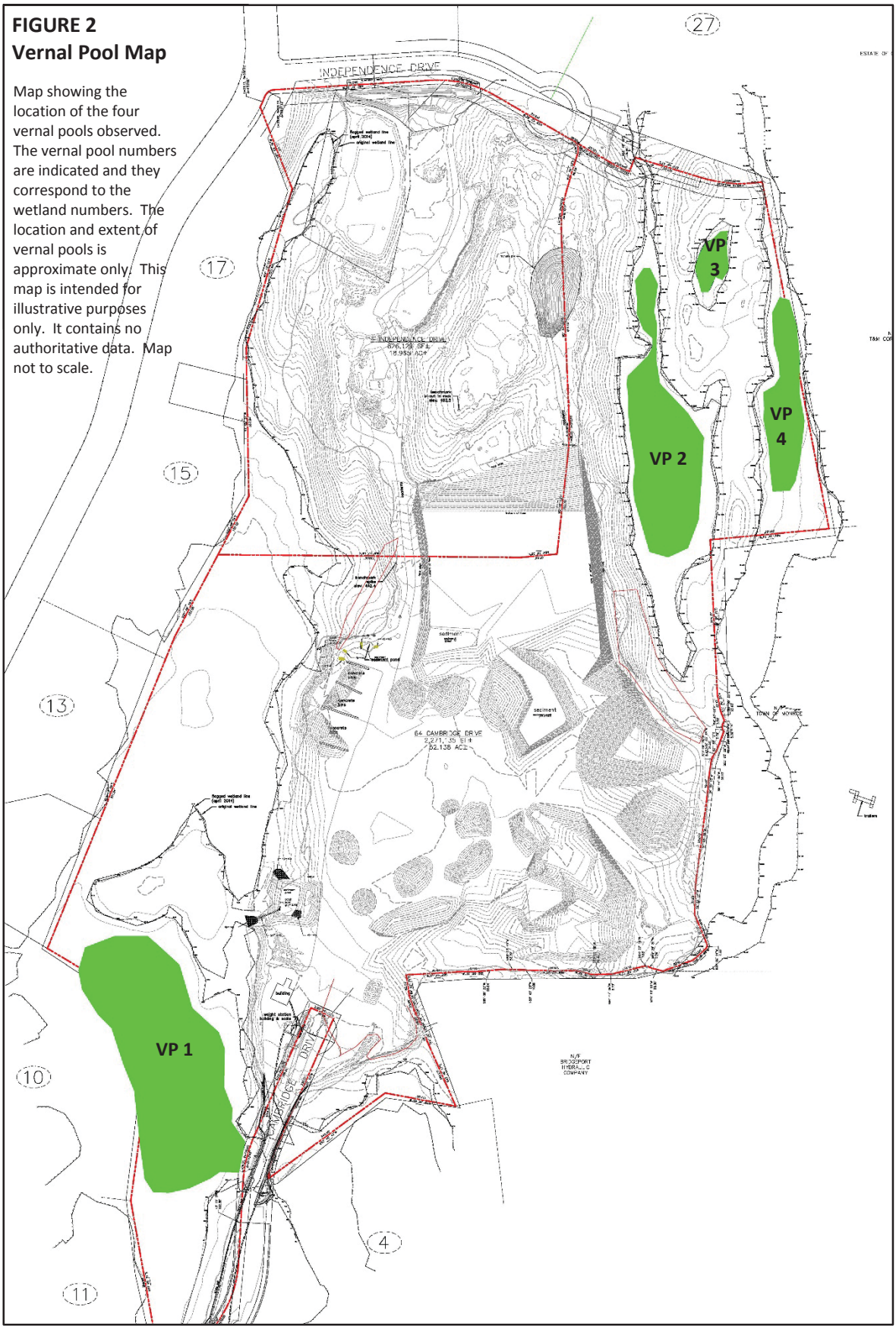
2012 aerial photograph (source: USDA) illustrating the extent of the study area, with wetland numbers indicated in yellow. Streams are indicated in blue. This map is intended for general planning purposes only. It contains no authoritative data.

SCALE
0 250 500 Feet
N

Environmental Planning Services
89 Belknap Road
West Hartford, CT 06117
860-236-1578
www.epsct.com

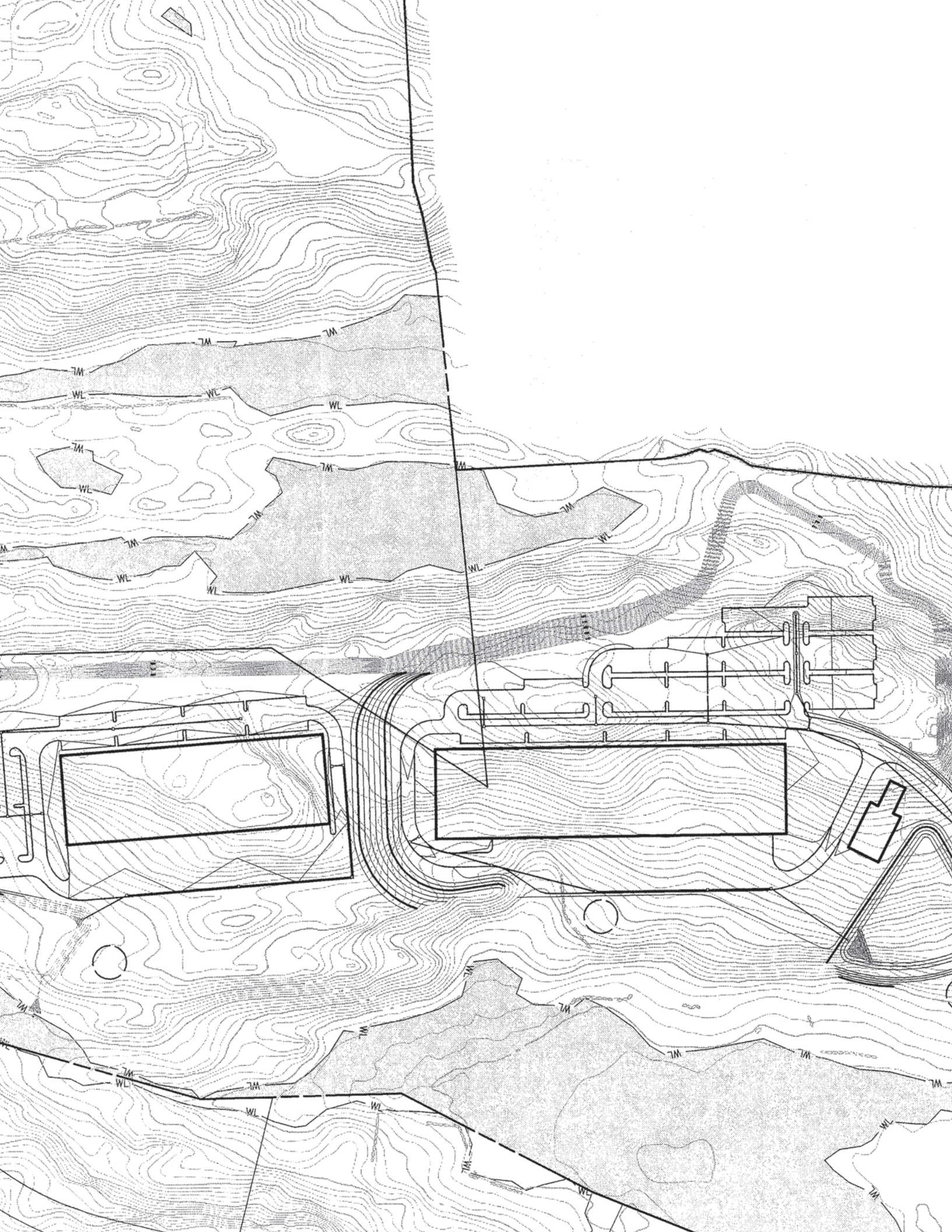
FIGURE 2
Vernal Pool Map

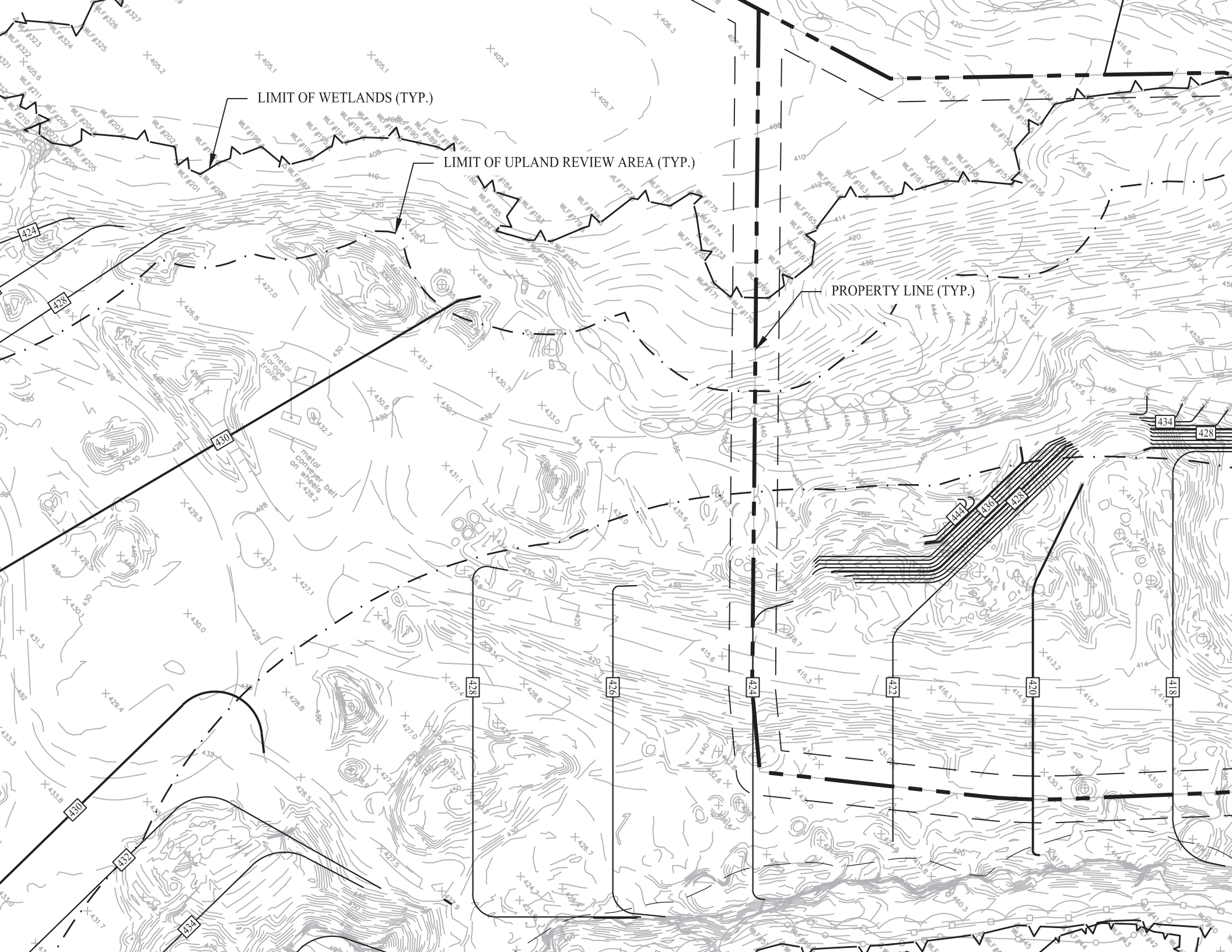
Map showing the location of the four vernal pools observed. The vernal pool numbers are indicated and they correspond to the wetland numbers. The location and extent of vernal pools is approximate only. This map is intended for illustrative purposes only. It contains no authoritative data. Map not to scale.



APPENDIX C:

Alternate Development Plans


WL


LIMIT OF WETLANDS (TYP.)
LIMIT OF UPLAND REVIEW AREA (TYP.)
PROPERTY LINE (TYP.)
metal storage trailer
metal conveyer belt on wheels

APPENDIX D:

WKA Delineation Report: 64 Cambridge Drive & 4 Independence Drive, Monroe, Connecticut

WILLIAM KENNY ASSOCIATES LLC

SOIL SCIENCE
ECOLOGICAL SERVICES
LAND USE PLANNING
LANDSCAPE ARCHITECTURE

February 12, 2020

Mr. Arnold Karp
Karp Associates, Inc.
16 Cross Street
New Canaan, CT 06840

Re: Wetland and Watercourse Delineation
64 Cambridge Drive & 4 Independence Drive, Monroe, Connecticut

Dear Mr. Karp:

As requested, we visited the referenced properties to determine the presence or absence of wetlands and/or watercourses, to demarcate (flag) the boundaries of wetlands and watercourses identified, and to identify onsite soil types. This letter includes the methods and results of our investigations, which we completed, January 31, February 3 and February 12, 2020. In summary, three inland wetland and watercourse systems were identified and delineated. The systems, which are located in the northeastern portion of the property and along the western and southern property boundaries, are forested wetlands.

Regulatory Definitions

The Inland Wetlands and Watercourses Act (Connecticut General Statutes §22a-38) defines inland wetlands as "land, including submerged land...which consists of any soil types designated as poorly drained, very poorly drained, alluvial, and floodplain." Watercourses are defined in the act as "rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs and all other bodies of water, natural or artificial, vernal or intermittent, public or private, which are contained within, flow through or border upon the state or any portion thereof." The Act defines Intermittent Watercourses as having a defined permanent channel and bank and the occurrence of two or more of the following characteristics: A) evidence of scour or deposits of recent alluvium or detritus, B) the presence of standing or flowing water for a duration longer than a particular storm incident, and C) the presence of hydrophytic vegetation.

195 TUNXIS HILL CUTOFF SOUTH
FAIRFIELD, CT 06825
PHONE: 203 366 0588
FAX: 203 366 0067
www.wkassociates.net

Methodology

A second order soil survey in accordance with the principles and practices noted in the USDA publication *Soil Survey Manual* (1993) was completed at the subject site. The classification system of the National Cooperative Soil Survey was used in this investigation. Soil map units identified at the project site generally correspond to those included in the *Soil Survey of the State of Connecticut* (USDA 2005).

Wetland determinations were completed based on the presence of poorly drained, very poorly drained, alluvial, or floodplain soils and submerged land (e.g. a pond). Soil types were identified by observation of soil morphology (soil texture, color, structure, etc.). To observe the morphology of the property's soils, test pits and/or borings (maximum depth of two feet) were completed at the site.

Intermittent watercourse determinations were made based on the presence of a defined permanent channel and bank and the occurrence of two or more of the following characteristics: A) evidence of scour or deposits of recent alluvium or detritus, B) the presence of standing or flowing water for a duration longer than a particular storm incident, and C) the presence of hydrophytic vegetation.

Wetland boundaries were demarcated (flagged) with pink surveyor's tape (hung from vegetation) or small flags (on wire stakes) labeled "William Kenny Associates" that are generally spaced a maximum of every 50 feet. Complete boundaries are located along the lines that connect these sequentially numbered flags. The wetland boundaries are subject to change until adopted by local, state, or federal regulatory agencies.

Results

The approximate 72.1-acre commerical properties are located at 64 Cambridge Drive and 4 Independence Drive in Monroe, Connecticut. Cambridge Drive borders the southern property boundary and Independence Drive borders the northern property boundary. Property improvements include several buildings and paved and unpaved drives and access and stockpile areas. The majority of the property is unvegetated. The vegetative cover in the southwestern, northeastern and central-western portions of the property and along the southern, southeastern and northwestern boundaries is a broadleaved deciduous forest. A meadow is present in the northwestern corner of the property. During the review, the sky was partly cloudy to cloudy and air temperatures were in the 30's ^{o} F to 40's ^{o} F.

Three inland wetland and watercourse systems were identified and delineated. The systems, which are located in the northeastern portion of the property and along the western and southern property boundaries, are forested wetlands. Wetland soils are primarily poorly drained fine sandy loams that formed from glacial till deposits. The approximate locations of the systems are shown on the attached map. The boundaries of the systems were marked at the site with flags numbered 1 to 44A, 20 to 98, 100 to 261, 280 to 304, 310 to 313, 320 to 357 and 360 to 364.

Seven soil map units were identified on the property (three wetland and four upland). Each map unit represents a specific area on the landscape and consists of one or more soils for which the unit is named. Other soils (inclusions that are generally too small to be delineated separately) may account for 10 to 15 percent of each map unit. The mapped units are identified in the following table by name

and symbol and typical characteristics (parent material, drainage class, high water table, depth to bedrock, and slope). These characteristics are generally the primary characteristics to be considered in land use planning and management. A description of each characteristic and their land use implications follows the table. A complete description of each soil map unit can be found in the *Soil Survey of the State of Connecticut* (USDA 2005), and at *https://soilseries.sc.egov.usda.gov/osdname.aspx.* During the review, there was no soil frost and no snow cover. The upland soil was moist and the wetland soil was wet to inundated.

Map Unit Sym.	Map Unit Name	Parent Material	Slope (%)	Drainage Class	High Water Table Depth (ft)	High Water Table Kind	High Water Table Mos.	Depth To Bedrock (in)
	Upland Soil							
50	Sutton fine sandy loam	Loose Glacial Till	3-8	Moderately Well Drained	1.5-3.5	Apparent	Nov-Apr	>60
60	Canton and Charlton Fine sandy loam	Loose Glacial Till Loose Glacial Till	0-15 0-15	Well Drained Well Drained	>6.0 >6.0	-- --	-- --	>60 >60
303	Pits	Properties and characteristics are variable						
308	Udorthents, Smoothed	Excavated or Filled Soil (>2 feet)	0-45	Well Drained to Somewhat Poorly Drained	1.5->6.0	Apparent	Nov-May	>60
	Wetland Soil							
3	Ridgebury Leicester Whitman extremely stony fine sandy loam	Compact Glacial Till Loose glacial Till Compact Glacial Till	0-8 0-3 0-3	Poorly Drained Poorly Drained Very Poorly Drained	0.0-1.5 0.0-1.5 0.0-1.5	Perched Apparent Perched	Nov-May Nov-May Sep-Jun	>60 >60 >60
4	Leicester fine sandy loam	Loose glacial Till	0-3	Poorly Drained	0.0-1.5	Apparent	Nov-May	>60
17	Timakwa Natchaug Soils	Organic Material	0-2	Very Poorly Drained	+1-1.0	Apparent	Oct-Jun	>60

Parent material is the unconsolidated organic and mineral material in which soil forms. Soil inherits characteristics, such as mineralogy and texture, from its parent material. Glacial till is unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice. Glacial outwash consists of gravel, sand, and silt, which are commonly stratified and deposited by glacial melt water. Alluvium is material such as sand, silt, or clay, deposited on land by streams. Organic deposits consist of decomposed plant and animal parts.

A soil's texture affects the ease of digging, filling, and compacting and the permeability of a soil. Generally sand and gravel soils, such as outwash soils, have higher permeability rates than most glacial till soils. Soil permeability affects the cost to design and construct subsurface sanitary disposal facilities and, if too slow or too fast, may preclude their use. Outwash soils are generally excellent sources of natural aggregates (sand and gravel) suitable for commercial use, such as construction sub base material. Organic layers in soils can cause movement of structural footings. Compacted glacial

till layers make excavating more difficult and may preclude the use of subsurface sanitary disposal systems or increase their design and construction costs if fill material is required.

Generally, soils with steeper slopes increase construction costs, increase the potential for erosion and sedimentation impacts, and reduce the feasibility of locating subsurface sanitary disposal facilities.

Drainage class refers to the frequency and duration of periods of soil saturation or partial saturation during soil formation. Seven classes of natural drainage classes exist. They range from excessively drained, where water is removed from the soil very rapidly, to very poorly drained, where water is removed so slowly that free water remains at or near the soil surface during most of the growing season. Soil drainage affects the type and growth of plants found in an area. When landscaping or gardening, drainage class information can be used to assure that proposed plants are adapted to existing drainage conditions or that necessary alterations to drainage conditions (irrigation or drainage systems) are provided to assure plant survival.

High water table is the highest level of a saturated zone in the soil in most years. The water table can affect the timing of excavations; the ease of excavating, constructing, and grading; and the supporting capacity of the soil. Shallow water tables may preclude the use of subsurface sanitary disposal systems or increase design and construction costs if fill material is required.

The depth to bedrock refers to the depth to fixed rock. Bedrock depth affects the ease and cost of construction, such as digging, filling, compacting, and planting. Shallow depth bedrock may preclude the use of subsurface sanitary disposal systems or increase design and construction costs if fill material is required.

Conclusions

Today, we investigated the properties at 64 Cambridge Drive and 4 Independence Drive in Monroe, Connecticut and identified and delineated three inland wetland and watercourse systems. Thank you for the opportunity to assist you. If you should have any questions or comments, please do not hesitate to contact us.

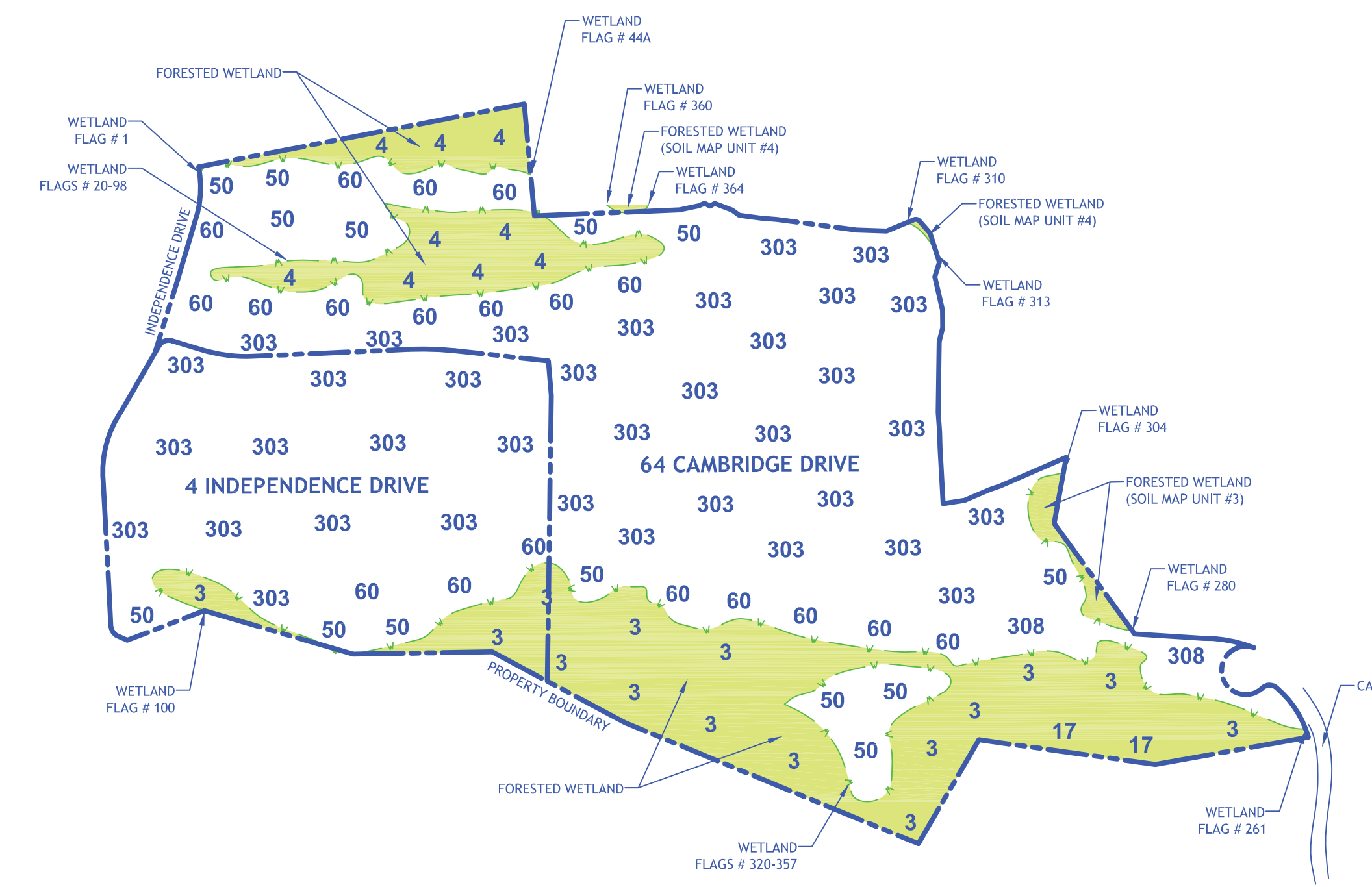
Sincerely,



William L. Kenny, PWS, PLA
Soil Scientist

Enclosure

Ref. No. 4414



NCLUDING THE WETLAND
ARY IS NOT A SURVEYED
RKED (FLAGGED).
D BY WILLIAM KENNY ASSOC.
VING PREPARED BY ACCURATE.

WETL

64 CA
4 INDE
MONR

TOWN OF MONROE

Issued: 10-9-07

BOND ESTIMATE FORM (Private Site Development)

☐ PLANNING & ZONING COMMISSION
MEETING DATE _____

APPLICANT: Spacely Land Holdings LLC & Astro Land Holdings LLC
ENGINEER: Solli Engineering, LLC
TEL.: 203-880-5455

*APPLICATION NO: _____
*FILE NO: _____
DATE: May 26, 2020

PROJECT NAME: Proposed Site Development and Restoration

PROJECT LOCATION: 64 Cambridge Drive & 4 Independence Drive

*BOND RECOMMENDATION

NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST	Comments by Town Engr. Unit Price*	Comments by Town Engr. Cost*
1.	Sedimentation and Erosion Control Measures	L.S.	1	$1,000	$1,000		
2.	Silt Fence or Hay Bales	L.F.	4,975	$3.00	$14,925		
3.	Topsoil, Seed, Fertilizing, and Mulching (entire disturbed area)	S.F.	1,087,983	$0.10	$108,798		
4.	Landscaping (extent to provide for restoration and aesthetic considerations)	L.S.	1	$5,000	$5,000		
5.	Grading (for site restoration that will provide safe and stable conditions)	L.S.	1	$10,000	$10,000		
6.	Other						
	(+) 10% for Contingencies				$13,972		
* To be filled in by the Town				Total Cost =	$153,695	*	

Submitted by: Chris Pawlowski

Approved by: _____

Total costs as determined by the Town Engineer represent adjusted values assuming a Municipal bid arrangement with inflation, noting that the terms of the bond may be in effect for up to 10 or more years (statutory time allowance for performance of requirements).

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

79 Elm Street • Hartford, CT 06106-5127 www.ct.gov/deep Affirmative Action/Equal Opportunity Employer

STATEWIDE INLAND WETLANDS & WATERCOURSES ACTIVITY REPORTING FORM

Pursuant to section 22a-39(m) of the General Statutes of Connecticut and section 22a-39-14 of the Regulations of Connecticut State Agencies, inland wetlands agencies must complete the Statewide Inland Wetlands & Watercourses Activity Reporting Form for **each** action taken by such agency.

This form may be made part of a municipality's inland wetlands application package. If the municipality chooses to do this, it is recommended that a copy of the Town and Quadrangle Index of Connecticut and a copy of the municipality's subregional drainage basin map be included in the package.

Please remember, the inland wetlands agency is responsible for ensuring that the information provided is **accurate** and that it reflects the **final** action of the agency. Incomplete or incomprehensible forms will be mailed back to the agency. Instructions for completing the form are located on the following pages.

The inland wetlands agency shall mail completed forms for actions taken during a calendar month no later than the 15th day of the following month to the Department of Energy and Environmental Protection (DEEP). Do **not** mail this cover page or the instruction pages. Please mail **only** the **completed** reporting form to:

DEEP Land & Water Resources Division
Inland Wetlands Management Program
79 Elm Street, 3rd Floor
Hartford, CT 06106

Questions may be directed to the DEEP's Inland Wetlands Management Program at (860) 424-3019.

INSTRUCTIONS FOR COMPLETING

THE STATEWIDE INLAND WETLANDS & WATERCOURSES ACTIVITY REPORTING FORM

Use a separate form to report EACH action taken by the Agency. Complete the form as described below. Do NOT submit a reporting form for withdrawn actions.

PART I: Must Be Completed By The Inland Wetlands Agency

1. Choose the year and month the Inland Wetlands Agency took the action being reported. If multiple actions were taken regarding the same project or activity then multiple forms need to be completed.

2. Choose ONE code letter to describe the final action or decision taken by the Inland Wetlands Agency. Do NOT submit a reporting form for withdrawn actions. Do NOT enter multiple code letters (for example: if an enforcement notice was given and subsequent permit issued - two forms for the two separate actions are to be completed).

   A = A Permit Granted by the Inland Wetlands Agency (not including map amendments, see code D below)
   B = Any Permit Denied by the Inland Wetlands Agency
   C = A Permit Renewed or Amended by the Inland Wetlands Agency
   D = A Map Amendment to the Official Town Wetlands Map - or -
   An Approved/Permitted Wetland or Watercourse Boundary Amendment to a Project Site Map
   E = An Enforcement Action: Permit Revocation, Citation, Notice of Violation, Order, Court Injunction, or Court Fines
   F = A Jurisdictional Ruling by the Inland Wetlands Agency (i.e.: activities "permitted as of right" or activities considered non-regulated)
   G = An Agent Approval pursuant to CGS 22a-42a(c)(2)
   H = An Appeal of Agent Approval Pursuant to 22a-42a(c)(2)

3. Check "yes" if a public hearing was held in regards to the action taken; otherwise check "no".

4. Enter the name of the Inland Wetlands Agency official verifying that the information provided on this form is accurate and that it reflects the FINAL action of the agency.

PART II: To Be Completed By The Inland Wetlands Agency Or The Applicant - If Part II is completed by the applicant, the applicant MUST return the form to the Inland Wetlands Agency. The Inland Wetlands Agency MUST ensure that the information provided is accurate and that it reflects the FINAL action of the Agency.

5. Enter the name of the municipality for which the Inland Wetlands Agency has jurisdiction and in which the action/project/activity is occurring.

   Check "yes" if the action/project/activity crosses municipal boundaries and enter the name(s) of the other municipality(ies) where indicated. Check "no" if it does not cross municipal boundaries.

6. Enter the USGS Quad Map name or number (1 through 115) as found on the Connecticut Town and Quadrangle Index Map (the directory to all USGS Quad Maps) that contains the location of the action/project/activity. Click on the following website for USGS Quad Map information:
   http://ct.gov/deep/lib/deep/gis/resources/Index_NamedQuadTown.pdf

   ALSO enter the four-digit identification number of the corresponding Subregional Drainage Basin in which the action/project/activity is located. If the action/project/activity is located in more than one subregional drainage basin, enter the number of the basin in which the majority of the action/project/activity is located. Town subregional drainage basin maps can be found at UConn – CLEAR's website: http://clear.uconn.edu/data/map_set/index.htm

7. Enter the name of the individual applying for, petitioning, or receiving the action.

8. Enter the name and address or location of the action/project/activity. Check if the action/project/activity is TEMPORARY or PERMANENT in nature. Also provide a brief DESCRIPTION of the action/project/activity. It is always best to provide as much information as possible (i.e., don't just state "forestry", provide details such as "20 acre forestry harvest, permit required for stream crossing".)

9. Carefully review the list below and enter ONLY ONE code letter which best characterizes the action/project/activity. All state agency projects must code "N".

A = Residential Improvement by Homeowner
B = New Residential Development for Single Family Units
C = New Residential Development for Multi-Family / Condos
D = Commercial / Industrial Uses
E = Municipal Project
F = Utility Company Project
G = Agriculture, Forestry or Conservation
H = Wetland Restoration, Enhancement, Creation
I = Storm Water / Flood Control
J = Erosion / Sedimentation Control
K = Recreation / Boating / Navigation
L = Routine Maintenance
M = Map Amendment
N = State Agency Project
P = Other (this code includes the approval of concept plans with no-on-the-ground work)

10. Enter between one and four code numbers to best characterize the project or activity being reported. Enter "NA" if this form is being completed for the action of map amendment. You MUST provide code 12 if the activity is located in an established upland review area. You MUST provide code 14 if the activity is located beyond the established upland review area or no established upland review area exists.

1 = Filling
2 = Excavation
3 = Land Clearing / Grubbing (no other activity)
4 = Stream Channelization
5 = Stream Stabilization (includes lakeshore stabilization)
6 = Stream Clearance (removal of debris only)
7 = Culverting (not for roadways)
8 = Underground Utilities Only (no other activities)
9 = Roadway / Driveway Construction
10 = Drainage Improvements
11 = Pond, Lake Dredging / Dam Construction
12 = Activity in an Established Upland Review Area
14 = Activity in Upland

Examples: Jurisdictional ruling allowing construction of a parking lot in an upland where the municipality does not have an established upland review area must use code 14, other possible codes are 2 and 10. Permitted construction of a free standing garage (residential improvement by homeowner) partially in an established upland review area with the remainder in the upland must use code 12 and 14, other possible codes are 1 and 2.

11. Leave blank for TEMPORARY alterations but please indicate action/project/activity is temporary under question #8 on the form. For PERMANENT alterations, enter in acres the area of wetland soils or watercourses altered. Include areas that are permanently altered, or are proposed to be, for all agency permits, denials, amendments, renewals, jurisdictional rulings, and enforcement actions. For those activities that involve filling or dredging of lakes, ponds or similar open water bodies enter the acres filled or dredged under "open water body". For those activities that involve directly altering a linear reach of a brook, river, lakeshore or similar linear watercourse, enter the total linear feet altered under "stream". Remember that these figures represent only the acreage altered not the total acreage of wetlands or watercourses on the site. You MUST provide all information in ACRES (or linear feet as indicated) including those areas less than one acre. To convert from square feet to acres, divide square feet by the number 43,560. If this report is being completed for an agency jurisdictional ruling and detailed information is not available, provide an estimate. Enter zero if there is no alteration.

12. Enter in acres the area of upland altered as a result of an ACTIVITY REGULATED BY the inland wetlands agency, or as a result of an AGENT APPROVAL pursuant to CGS section 22a-42a(c)(2). Leave blank for TEMPORARY alterations but please indicate action/project/activity is temporary under question #8 on the form. Include areas that are permanently altered, or proposed to be permanently altered, for all agent approvals, agency permits, denials, amendments, renewals, jurisdictional rulings, and enforcement actions. You MUST provide all information in ACRES including those areas less than one acre. See directions above (#11) for conversion factor. If this report is being completed for an agent approval or an agency jurisdictional ruling and detailed information is not available, provide an estimate. Enter zero if there is no alteration.

13. Enter the acres that are, or are proposed to be, restored, enhanced or created for all agency permits, denials, amendments, renewals, jurisdictional rulings and enforcement actions. NOTE restored or enhanced applies to previously existing wetlands or watercourses. Created applies to a non-wetland or non-watercourse area which is converted into wetlands or watercourses (question #10 must provide 12 and/or 14 as an answer, and question #12 must also be answered). You MUST provide all information in ACRES including those areas less than one acre. See directions above (#11) for conversion factor. Enter zero if there is no restoration, enhancement or creation.

PART III: To Be Completed By The DEEP - Please leave this area blank. Incomplete or incomprehensible forms will be mailed back to the inland wetlands agency.

Connecticut Department of
ENERGY & ENVIRONMENTAL PROTECTION

GIS CODE #: ___ ___ ___ ___ ___ ___ ___ ___ ___
For DEEP Use Only

79 Elm Street • Hartford, CT 06106-5127 www.ct.gov/deep Affirmative Action/Equal Opportunity Employer

Statewide Inland Wetlands & Watercourses Activity Reporting Form

Please complete and mail this form in accordance with the instructions on pages 2 and 3 to:
DEEP Land & Water Resources Division, Inland Wetlands Management Program, 79 Elm Street, 3rd Floor, Hartford, CT 06106
Incomplete or incomprehensible forms will be mailed back to the inland wetlands agency.

PART I: Must Be Completed By The Inland Wetlands Agency

1. DATE ACTION WAS TAKEN: year: _____ month: _____
2. ACTION TAKEN (see instructions, only use one code): _____
3. WAS A PUBLIC HEARING HELD (check one)? yes ☐ no ☐
4. NAME OF AGENCY OFFICIAL VERIFYING AND COMPLETING THIS FORM:
   (print name) _____ (signature) _____

PART II: To Be Completed By The Inland Wetlands Agency Or The Applicant

5. TOWN IN WHICH THE ACTION IS OCCURRING (print name): Town of Monroe
   does this project cross municipal boundaries (check one)? yes ☐ no ■
   if yes, list the other town(s) in which the action is occurring (print name(s)): _____, _____
6. LOCATION (see instructions for information): USGS quad name: Long Hill or number: 93
   subregional drainage basin number: 7105-02
7. NAME OF APPLICANT, VIOLATOR OR PETITIONER (print name): Astro Land Holdings LLC & Spacely Land Holdings LLC
8. NAME & ADDRESS / LOCATION OF PROJECT SITE (print information): 64 Cambridge Drive & 4 Independence Drive, Monroe CT
   briefly describe the action/project/activity (check and print information): temporary ☐ permanent ■ description:
   Construction of 2,360 SF office building and associated grading, drainage, landscaping and utility improvements.
9. ACTIVITY *PURPOSE* CODE (see instructions, only use one code): D
10. ACTIVITY *TYPE* CODE(S) (see instructions for codes): 1, 2, 10, 14
11. WETLAND / WATERCOURSE AREA ALTERED (must provide acres or linear feet):
    wetlands: 0 acres open water body: 0 acres stream: 0 linear feet
12. UPLAND AREA ALTERED (must provide acres): 24.98 acres
13. AREA OF WETLANDS / WATERCOURSES RESTORED, ENHANCED OR CREATED (must provide acres): 0.015 acres

DATE RECEIVED:

PART III: To Be Completed By The DEEP

DATE RETURNED TO DEEP:

FORM COMPLETED: YES NO

FORM CORRECTED / COMPLETED: YES NO

SOLLI ENGINEERING

May 26, 2020

Brian T. Roach
Supervisor, Environmental Protection
Aquarion Water Company
714 Black Rock Road
Easton, CT 06612
(203) 452-3508

RE: 64 Cambridge Drive & 4 Independence Drive
Monroe, Connecticut 06468
Inland Wetlands Application Submission
Project Number 1903601

Dear Mr. Roach:

Please accept the following "notice" as required pursuant to CGS §8-3i and 22a-354c in regard to our submission of an Inland Wetlands Application to the Town of Monroe pertaining to work to be done within the Greater Bridgeport System (West Pequonnock Diversion) watershed area.

The proposed application involves the following activities:

> The project entails the construction of a 2,360 SF building and associated grading, drainage, and utilities in addition to earthwork activities in order to fill the northern portion of the project site, which consists of the property of 64 Cambridge Drive and 4 Independence Drive.

Copies of the Site Layout Plans (Sheets 2.10 & 2.11), Utility Plans (Sheets 2.50, 2.51 & 2.52) and Application are attached for your review. Please feel free to reach out with any questions or comments you may have regarding the properties and the proposed site improvements.

Thank you for your consideration in this matter.

Respectfully,

Solli Engineering, LLC

Chris Pawlowski, EIT
Design Engineer

SOLLI ENGINEERING

May 26, 2020

Commissioner Deidre S. Gifford
Department of Public Health
410 Capitol Avenue
Hartford, CT 06134

RE: 64 Cambridge Drive & 4 Independence Drive
Monroe, Connecticut 06468
Inland Wetlands Application Submission
Project Number: 1903601

Dear Commissioner Deidre S. Gifford:

Please accept the following "notice" as required pursuant to CGS §8-3i and 22a-354c in regard to our submission of an Inland Wetlands Application to the Town of Monroe pertaining to work to be done within the Greater Bridgeport System (West Pequonnock Diversion) watershed area.

The proposed application involves the following activities:

> The project entails the construction of a 2,360 SF building and associated grading, drainage, and utilities in addition to earthwork activities in order to fill the northern portion of the project site, which consists of the property of 64 Cambridge Drive and 4 Independence Drive.

Copies of the Site Layout Plans (Sheets 2.10 & 2.11), Utility Plans (Sheets 2.50, 2.51 & 2.52) and Application are attached for your review. Please feel free to reach out with any questions or comments you may have regarding the properties and the proposed site improvements.

Thank you for your consideration in this matter.

Respectfully,

Solli Engineering, LLC

Chris Pawlowski, EIT
Design Engineer

Solli Engineering, LLC ♦ 501 Main Street ♦ Monroe, CT 06468 ♦ (203) 880-5455 (Phone) ♦ 203-880-9695 (Fax)

Watershed or Aquifer Area Project Notification Form

REQUIREMENT:

Within seven days of filing, all applicants before a municipal Zoning Commission, Planning and Zoning Commission, Zoning Board of Appeals or Inland Wetlands Commission for any project located within a public water supply aquifer or watershed area are reguired by Public Act No. 06-53 of the CT General Statutes to notify The Commissioner of Public Health and the project area Water Company of the proposed project by providing the following information.

To determine if your project falls within a public water supply aquifer or watershed area visit the appropriate town hall and look at their *Public Drinking Water Source Protection Areas* map. If your project falls completely within or contain any part of a public water supply aquifer or watershed you are required to complete the following information.

Note: You will need information obtained from the *Public Drinking Water Source Protection Areas* map located in the appropriate town hall to complete this form.

Step 1: Have you already notified the CT Department of Public Health (CTDPH) of this project?

☑ No, Go to Step 2

☐ Yes, I have notified DPH under a different project name - Complete steps 4-6

☐ Yes, same name different year - Notification Year ☐ Complete steps 4-6

Step 2:

1. Name of public water supply aquifer your project lies within:
2. Name of the public water supply watershed your project lies within: GREATER BRIDGEPORT SY
3. Public Water Supply Identification number (PWSID) for the water utility: CT 0150011

Step 3: For 1-5 Check all that apply

1. My project is proposing:

☐ Industrial use; ☑ Commercial use; ☐ Agricultural use; ☐ Residential use;

☐ Recreational use; ☐ Transportation improvements; ☐ Institutional (school, hospital, nursing home, etc.);

☐ Quarry/Mining; ☐ Zone Change, Please Describe:

☐ Other, Please describe:

2. The total acreage of my project is:

☐ Less than or equal to 5 acres ☑ Greater than 5 acres

3. My project site contains, abuts or is within 50 feet of a:

☑ Wetland; ☑ Stream; ☐ River; ☐ Pond or Lake

4. Existing use of my project site is:

☐ Grassland/meadow; ☐ Forested; ☐ Agricultural; ☐ Transportation; ☐ Institutional (school, hospital, nursing home, etc.); ☐ Residential; ☐ Commercial; ☑ Industrial; ☐ Recreational; ☐ Quarry/Mining

☐ Other Please Describe:

5. My project will utilize:

☑ septic system; ☐ existing public sewer; ☐ new public sewer; ☐ agricultural waste facility;

☐ existing private well; ☐ new private well; ☑ existing public water supply;

☐ new public water supply, if new have you applied for a certificate of public convenience and necessity from DPH? ☐ Yes ☐ No

6. My project will contain this percentage of built up area (buildings, parking, road/driveway, pool): ☑ Less than or equal to 20% ☐ Greater than 20% to 50% ☐ Greater than 50%

Step: 4 Applicants Contact Information:

Name: KEVIN SOLLI, P.E.

E-mail address: KEVIN@SOLLILLC.COM

Telephone: (203) 880 - 5455

Fax number: (203) 880 - 9695

Step 5: Please provide the following if available:

Project name: PROPOSED SITE DEVELOPMENT & RESTC

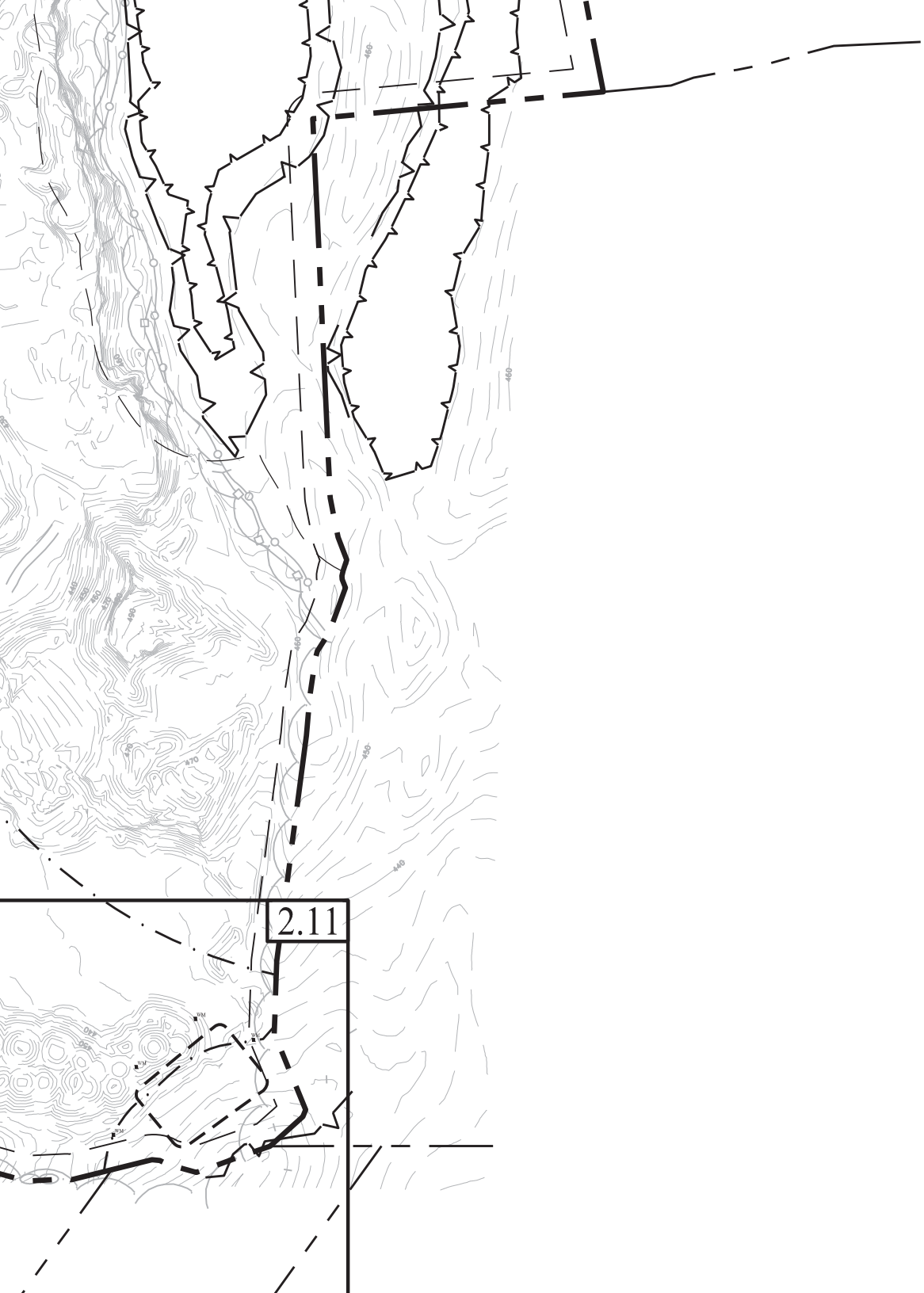
Project site address: 64 CAMBRIDGE DRIVE & 4 INDEPENDENCE

Town: MONROE, CONNECTICUT

Project site nearest intersection: ENTERPRISE DRIVE AND CAMBRIDGE DRI

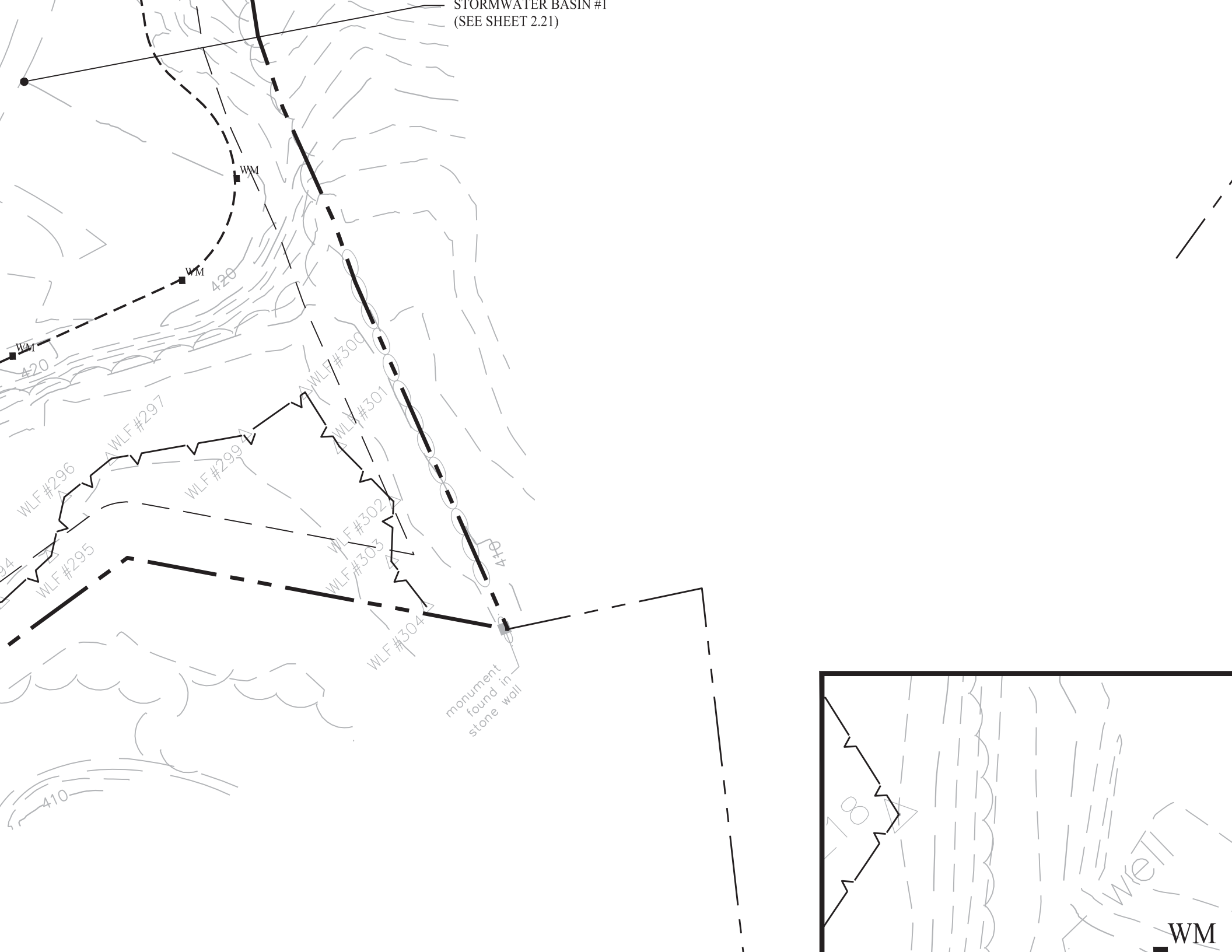
Project site latitude and longitude: 41 deg 21' 09" N, 73 deg 14' 49" W

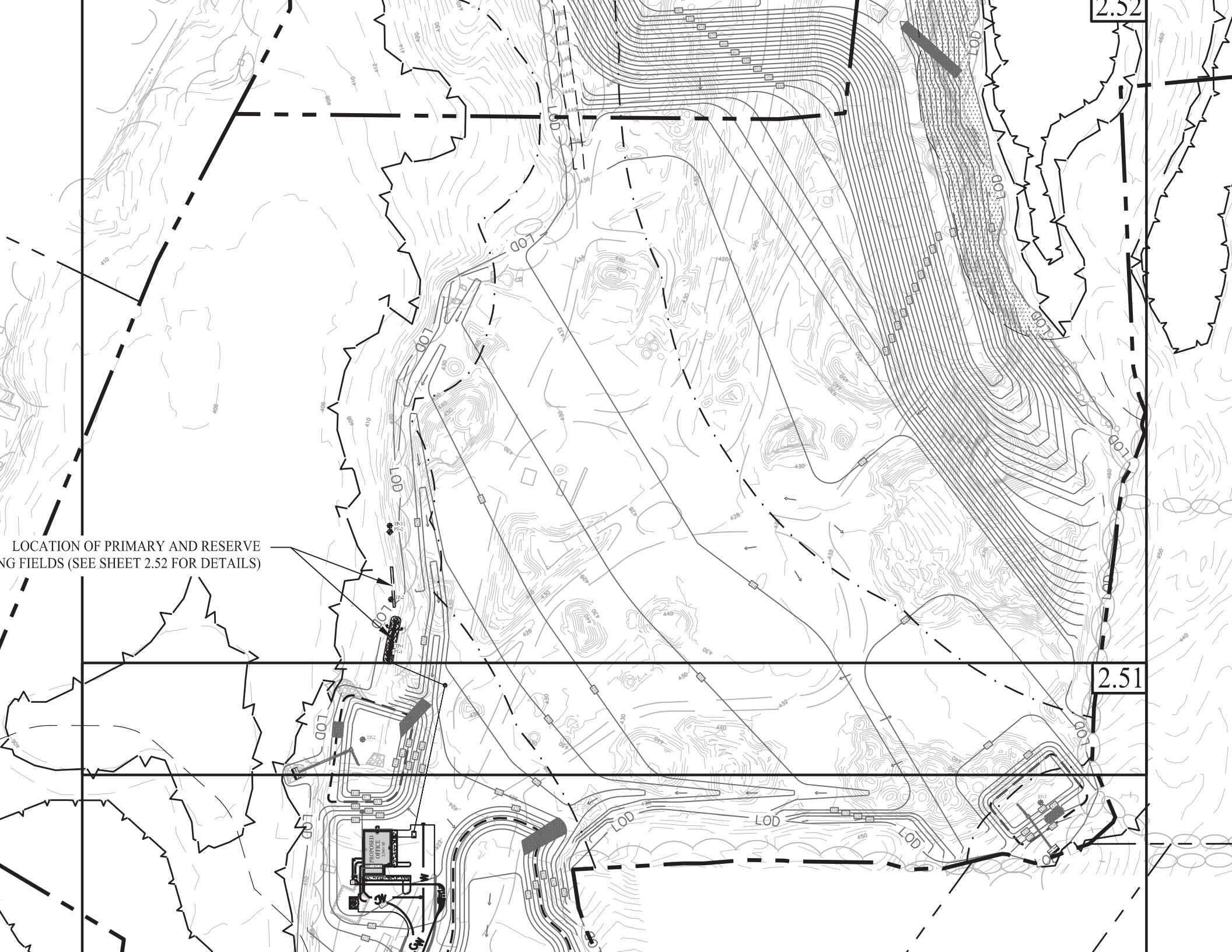
E-mail completed form to dph.swpmail@ct.gov

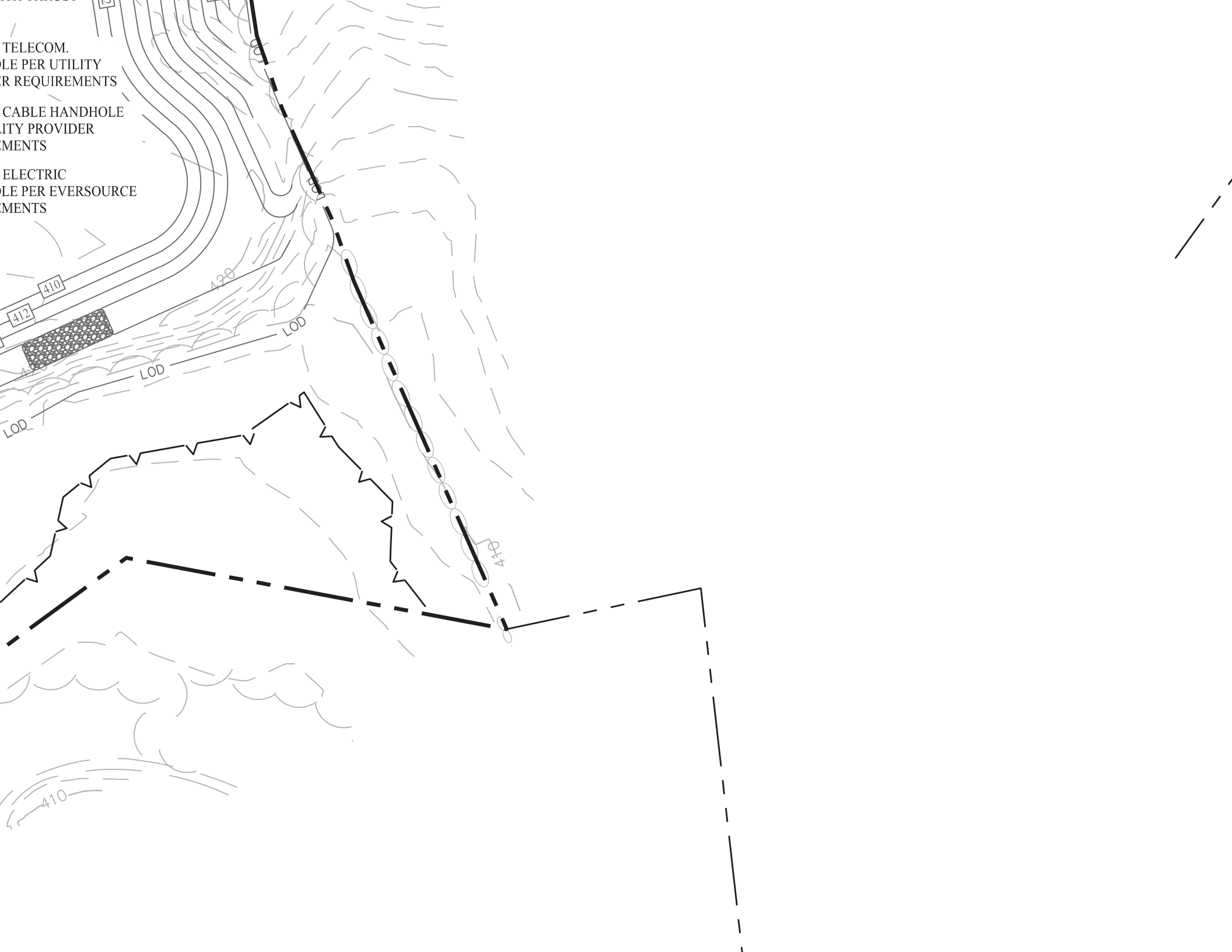


WE	
LOT AREA	
WETLANDS OI	
UPLAND REVI	
WETLANDS TO	
UPLAND REVI	
TOTAL REGUL	

LEGEND


STORMWATER BASIN #1
(SEE SHEET 2.21)
WM
WM
WM
420
420
WLF#296
WLF#297
WLF#299
WLF#300
WLF#301
WLF#302
WLF#303
WLF#304
WLF#295
410
410
monument
found in
stone wall
WM
wet


2.52
2.51
LOCATION OF PRIMARY AND RESERVE
NG FIELDS (SEE SHEET 2.52 FOR DETAILS)
LOD
TP-1
TP-2
TP-3
PROPOSED
OFFICE


TELECOM.
LE PER UTILITY
R REQUIREMENTS
CABLE HANDHOLE
ITY PROVIDER
MENTS
ELECTRIC
LE PER EVERSOURCE
MENTS
410
412
420
LOD
LOD
LOD
410
410

ATE LOCATION OF
ON TEST HOLE