Mead, Talerman & Costa, LLC
Attorneys at Law

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Newburyport, MA 01950
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www.mtclawyers.com

March 19, 2021

By Hand

Bonnie Sontag, Chair
Planning Board
City of Newburyport
City Hall
60 Pleasant Street
Newburyport, Massachusetts 01950

Re: Revised Plans for Request for Special Permit for Court of Lane and Subdivision Approval; 27 Hancock Street, Newburyport, MA (the "27 Hancock"), Assessor's Map: 25 Lot 43; and

Special Permit for Court or Lane; 21-25 Hancock Street, Newburyport, MA (21 Hancock Street), Assessor's Map 25 Lot 42

Dear Chair and Members of the Board;

Reference is made to the above-captioned matter and our prior filing regarding same. In that connection, this firm represents Caswell Development, LLC the purchaser of both 27 Hancock and 21 Hancock (the "Applicant"), which is proposing to construct a Lane which is currently laid out as a right of way by deed and which will serve both properties.

While initial application materials were filed with the Planning Board in mid-February, the Applicant concurrently has Special Permit Applications filed with the Zoning Board of Appeals (the "ZBA") and received their feedback at recent meetings. Subsequently, the Applicant has incorporated this feedback as well as comments from the City's Planning Department, Peer Reivew Engineer, and other staff including the Chair of the Parks Commission, Manager of Parks, Project Manager of the Rail Trail, and head of the Tree Commission into its plans.

As a result, attached hereto are updated plans being submitted to reflect these changes. Accordingly, please find the attached; updated Landscape Plan with caliper and diameter of the proposed trees now included, updated civil engineering plans including stormwater report and updated architectural plans.

Respectfully submitted,
Caswell Development, LLC
By Its Attorney

L.L.M. by B.W.G.
Lisa L. Mead

Millis Office
730 Main Street, Suite 1F
Millis, MA 02054
Phone 508.376.8400

COURTS & LANES SPECIAL PERMIT
21-27 HANCOCK STREET
LEAVITT COURT IMPROVEMENTS

NEWBURYPORT, MASSACHUSETTS
PREPARED FOR:
CASWELL DEVELOPMENT
24 GRAF ROAD
NEWBURYPORT MA

"PLANNING BOARD APPROVAL UNDER SECTION XV SITE PLAN REVIEW"
CITY OF NEWBURYPORT PLANNING BOARD

DATE

LEGEND OF SYMBOLS & ABBREVIATIONS:

EXISTING:		PROPOSED:
	PROPERTY LINE	
	BORDERING VEGETATED WETLAND	N/A
	BUFFER ZONE TO RESOURCE AREA	N/A
102	INTERMEDIATE CONTOUR	102
110	INDEX CONTOUR	110
EP	EDGE OF PAVEMENT	EP
BB	BITUMINOUS BERM	BB
VGC	VERTICAL GRANITE CURB	VGC
SGC	SLOPED GRANITE CURB	SGC
CC	CONCRETE CURB	CC
	GUARD RAIL	
	DRAIN	
	SEWER	
	WATER	
	UNDERGROUND ELECTRIC	
	OVERHEAD WIRE	
	TELEPHONE	
	NATURAL GAS	
	CHAIN LINK FENCE	
	WOOD FENCE	
	SILT FENCE	
	HAY BALES	
	TREE LINE	
	RETAINING WALL	
	STONE WALL	
SB(SET)	STONE BOUND	SB(SET)
CB(SET)	CONCRETE BOUND	CB(SET)
IP(SET)	IRON PIPE	IP(SET)
DH(SET)	DRILL HOLE	DH(SET)
#A-11	WETLAND FLAG	N/A
×	SPOT ELEVATION	103x5
	CATCH BASIN	
DW	DRY WELL	DW
D	DRAIN MANHOLE	D
S	SEWER MANHOLE	S
E	ELECTRIC MANHOLE	E
M	UTILITY MANHOLE	M
	FIRE HYDRANT	
GV	GATE VALVE	GV
	LIGHT	
	UTILITY POLE	
	GUY WIRE	
	WELL	
PMW1	MONITORING WELL	PMW1
T-1	TEST PIT	N/A
	PERCOLATION TEST	N/A
T.B.M.	BENCH MARK	N/A
	TRAFFIC FLOW DIRECTION	
	DRAINAGE FLOW DIRECTION	

OWNER REFERENCES

21-25 HANCOCK STREET

OWNER: G&S MASSACHUSETTS REALTY TRUST

DEED
REFERENCE: BK 34044, PG 272

ASSESSORS: MAP 25, PARCEL 42

PLAN REF: LOTS 1, 3, 5, 7 & LEVITT COURT AS SHOWN ON PLAN RECORDED IN BOOK 2342 PAGE 600

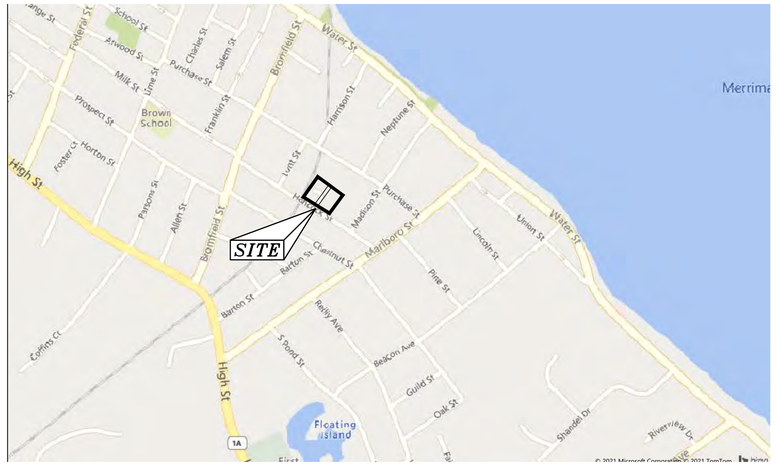
27 HANCOCK STREET

OWNER: WILLIAM & JOYCE COLBY

DEED
REFERENCE: BK 7229, PG 301

ASSESSORS: MAP 25, PARCEL 43

PLAN REF: LOTS 1, 3, 5, 7 & LEVITT COURT AS SHOWN ON PLAN RECORDED IN BOOK 2342 PAGE 600



LOCUS PLAN
SCALE: 1"=500'±

ROADWAY CONSTRUCTION WAIVERS

6.8.1 - (TABLES) MINIMUM RIGHT OF WAY WIDTH OF 40' REQUIRED. LEVITT COURT IS AN EXISTING 25' PRIVATE WAY TO BE IMPROVED.

6.8.1- (TABLES) PROVIDE CUL-DE-SAC OR T / Y TURNAROUND. NO CUL-DE-SAC OR TURNAROUND PROPOSED. ALL BUILDINGS TO INCLUDE FIRE SUPPRESSION SPRINKLER SYSTEM AND TOTAL ROAD LENGTH ONLY 150'. TURN AROUND PROVIDED FOR BACKING OF CARS OUT OF TWO DRIVEWAYS AT AND OF LEAVITT COURT.

6.8.1- (TABLES) CURB RADIUS OF 25 FEET AT INTERSECTION. 12 FEET IS PROPOSED AT INTERSECTION WITH HANCOCK STREET .

6.9 CURBING - 6" VERTICAL GRANITE REQUIRED, GRANITE CURBING ONLY PROVIDED AT THE INTERSECTION WITH HANCOCK STREET.

6.11.1 SIDEWALKS - SIDEWALK REQUIRED ON ONE SIDE OF ROAD - NO SIDEWALKS PROPOSED.

PRIVATE MAINTENANCE NOTE -THE ROADWAY, UTILITIES AND DRAINAGE FACILITIES TO BE PRIVATELY MAINTAINED IN ACCORDANCE WITH THE HOMEOWNERS ASSOCIATION AGREEMENT.

WATER DISTRICT:
THE SUBJECT PROPERTY RESIDES IN THE CITY OF NEWBURYPORT WATER DISTRICT

SHEET INDEX:

ZONING MATRIX: RESIDENCE 2

21 HANCOCK STREET	REQUIRED (INDUSTRIAL SERVICE - 607)	EXISTING (INDUSTRIAL SERVICE - 607)	REQUIRED (TWO-FAMILY - 102)	PROPOSED (TWO-FAMILY - 102)
MINIMUM LOT AREA	50,000 SQUARE FEET	16,228 SQUARE FEET	15,000 SQUARE FEET	16,228 SQUARE FEET
MINIMUM LOT FRONTAGE	200 FEET	96.52 FEET	120 FEET	96.52 FEET
FRONT SETBACK	60 FEET	124.1 FEET	25 FEET	25.0 FEET
SIDE SETBACK (R)	50 FEET	18.3 FEET OVER	20 FEET	21.0 FEET
SIDE SETBACK (L)	50 FEET	5.9 FEET	20 FEET	25.8 FEET
REAR SETBACK	60 FEET	3.8 FEET	25 FEET	25.7 FEET
MAXIMUM LOT COVERAGE(%)	30.0%	22.3%	25.0%	22.5%
MAXIMUM HEIGHT	35 FEET	12 FEET	35 FEET	25 FEET
MINIMUM OPEN SPACE	N/A	46.7%	40.0%	67.0%
MINIMUM PARKING REQUIRED	?	4+	4	4+

27 HANCOCK STREET	REQUIRED (SINGLE-FAMILY - 101)	EXISTING (SINGLE-FAMILY - 101)	REQUIRED (TWO-FAMILY - 102)	PROPOSED (TWO-FAMILY - 102)
MINIMUM LOT AREA	10,000 SQUARE FEET	16,400 SQUARE FEET	15,000 SQUARE FEET	16,400 SQUARE FEET
MINIMUM LOT FRONTAGE	90 FEET	95.92 FEET	120 FEET	267.40 FEET *
FRONT SETBACK	25 FEET	58.1 FEET	25 FEET	11.7 FEET
SIDE SETBACK (R)	10 FEET	50.7 FEET	20 FEET	31.5 FEET
SIDE SETBACK (L)	10 FEET	5.7 FEET	20 FEET	24.5 FEET
REAR SETBACK	25 FEET	91.1 FEET	25 FEET	25.6 FEET
MAXIMUM LOT COVERAGE(%)	25.0%	5.0%	25.0%	24.7%
MAXIMUM HEIGHT	35 FEET	22 FEET	35 FEET	25 FEET
MINIMUM OPEN SPACE	40.0%	90.7%	40.0%	64.7%
MINIMUM PARKING REQUIRED	2	0	4	4+

NORTH

Design Consultants Inc.
Somerville - Quincy - Newburyport
www.dci-ma.com

DEVELOPER:
CASWELL DEVELOPMENT
24 GRAF ROAD
NEWBURYPORT MA

ARCHITECT:
GRAF ARCHITECTS
2 LIBERTY STREET
NEWBURYPORT MA

SURVEYOR
WINTER GEC
44 MERRIMAC ST. UNIT 312
NEWBURYPORT, MA

PROJECT TEAM

21-27 HANCOCK
NEWBURYPORT, MA.
PROJECT INFO

REV	DESCRIPTION	DATE
1	PLAN UPDATE	03/19/2021

COMMONWEALTH OF MASSACHUSETTS
STEPHEN B. SAWYER
CIVIL
No. 49644
REGISTERED PROFESSIONAL ENGINEER

STAMP:

TITLE SHEET
SHEET NAME:

T1
SHT NO:

DR BY: GS
CHK BY: SS
PROJ NO: 20-087
DATE: 02-17-2021
SCALE: NOT TO SCALE

P:\2020 Projects\2020-087 Leavitt Ct Newburyport\Dwg_ENGINEERING\20-087_TTL_SHET.dwg

PIPE MATERIALS:

(TO BE CONFIRMED WITH MECHANICAL ENGINEER)

SEWER: PVC ASTM D3034-SDR 35. (SIZE AS NOTED)

WATER: DOMESTIC: CONCRETE LINED DUCTILE IRON PIPE (SIZE AS NOTED)

FIRE: CONCRETE LINED DUCTILE IRON PIPE (SIZE AS NOTED)

ALL WATER LINES SHALL HAVE A MINIMUM OF 5 FEET OF COVER.

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NEWBURYPORT MA

SURVEYOR
WINTER GEC
44 MERRIMAC ST. UNIT 312
NEWBURYPORT, MA

PROJECT TEAM

21-27 HANCOCK
NEWBURYPORT, MA.

PROJECT INFO

REV	DESCRIPTION	DATE
1	PLAN UPDATE	03/19/2021

COMMONWEALTH OF MASSACHUSETTS
STEPHEN B. SAWYER
CIVIL
No. 52426
REGISTERED PROFESSIONAL ENGINEER

STAMP:

SITE LAYOUT & UTILITIES PLAN

SHEET NAME:

C1

SHT NO:

DR BY:	GS
CHK BY:	SS
PROJ NO:	PLAN
DATE:	12/14/2020
SCALE:	1"=10'

P:\2020 Projects\2020-087 Leavitt Ct Newburyport\Dwg_ENGINEERING\20-087_LAYT_MATL.dwg

RAIN GARDEN 9/D1
BOTTOM=27.68
RIM(8")=28.18

* ALL GUTTERS TO BE PIPED TO INFILTRATION CHAMBERS.
* *THE PROJECT REDUCES IMPERVIOUS SURFACES AND AS SUCH REDUCES OFFSITE STORMWATER FLOW FROM THE PROPERTY

PERFORATE PIPE 9/D1
INV(12")=25.18
TOS=26.68
BOS=24.68

SWALE

SWALE

GARAGE FLOOR EL.=29.79

FF=32.45
BF=23.70

2-STORY 2-FAMILY HOME

GARAGE FLOOR EL.=30.75

FF=32.45
BF=23.70

FF=31.85
BF=23.10

GARAGE FLOOR EL.=30.10

2-STORY 2-FAMILY HOME

FF=31.85

GARAGE FLOOR EL.=30.10

5/D2 (3) CULTEC R-330XLHD
TOS=27.00
TOC=26.00
BOC=25.50
BOS=24.50

7/D1 DRYWELL
RIM=28.82

BITUMINOUS PAVED DRIVE

APPROXIMATE EDGE OF BRUSH PAVEMENT EXTENDS BEYOND)

STONE AND MORTAR RETAINING WALL

WOOD FENCE

WIRE FENCE

SHED

WOOD RAMP

BRICK

GRASS

CONC.

GRANITE CURB

CONC. CURB

BITUMINOUS PATH

"CLIPPER CITY RAIL TRAIL"

N/F CITY OF NEWBURYPORT BOOK 25956 PAGE 191

MAP 25 LOT 9 BOOK 16564 PAGE 469

N/F PHYLLIS R. SMITH 50 NOMINEE TRUST MAP 25 LOT 8 BOOK 15177 PAGE 582

N/F PHYLLIS R. SMITH MAP 25 LOT 4 BOOK 33816 PAGE 418

N 89°49'13" W 95.04'

N 01°30'07" E 96.52'

N 00°49'47" E 96.52'

S 02°00'53" W 96.16'

RIM: 34.5
INV: 27.2

100+00

STA 100+00.00
DESIGN SPEED = 20 mi/h

HANCOCK STREET

0 20 50 100
SCALE: 1" = 20'

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GRAF ARCHITECTS
2 LIBERTY STREET
NEWBURYPORT MA

SURVEYOR
WINTER GEC
44 MERRIMAC ST. UNIT 312
NEWBURYPORT, MA

PROJECT TEAM

21-27 HANCOCK
NEWBURYPORT, MA.

PROJECT INFO

REV	DESCRIPTION	DATE
1	PLAN UPDATE	03/19/2021

COMMONWEALTH OF MASSACHUSETTS
STEPHEN B. SAWYER
No. 52626
REGISTERED PROFESSIONAL ENGINEER

STAMP:

GRADING & DRAINAGE PLAN

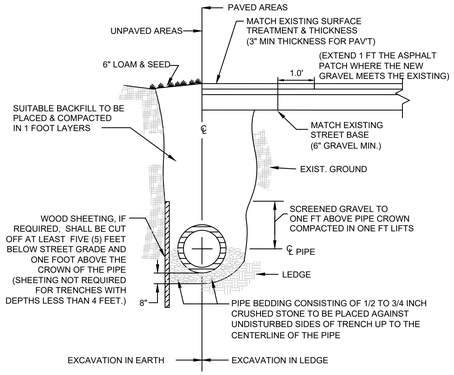
SHEET NAME:

C2

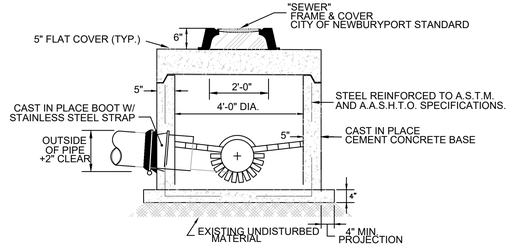
SHT NO:

DR BY: GS
CHK BY: SS
PROJ NO: 20-087
DATE: 02/17/2021
SCALE: 1"=10'

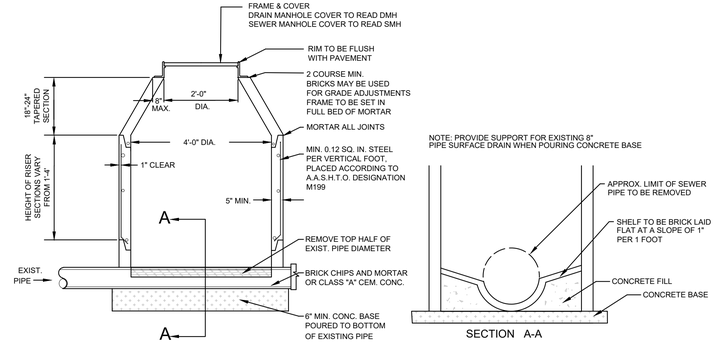
P:\2020 Projects\2020-087 Leavitt Ct Newburyport\Dwg_ENGINEERING\20-087_GRAD_DRAN.dwg



1 UTILITY TRENCH
NOT TO SCALE



2 PRECAST CONCRETE SEWER MANHOLE
NOT TO SCALE



3 MANHOLE OVER EXISTING PIPE
NOT TO SCALE

"PLANNING BOARD APPROVAL UNDER SECTION XV SITE PLAN REVIEW"
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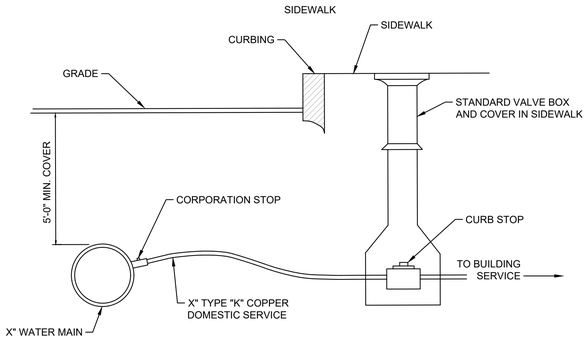
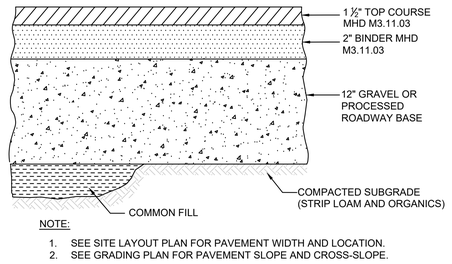
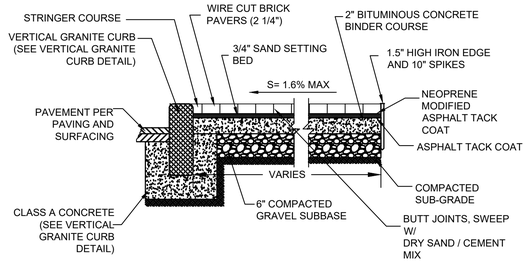
DATE



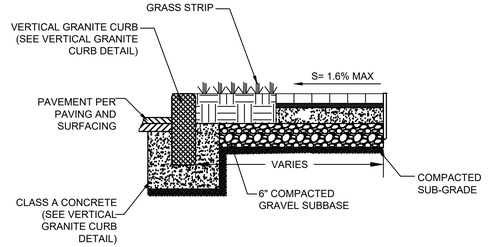
4 COPPER WATER SERVICE CONNECTION
NOT TO SCALE



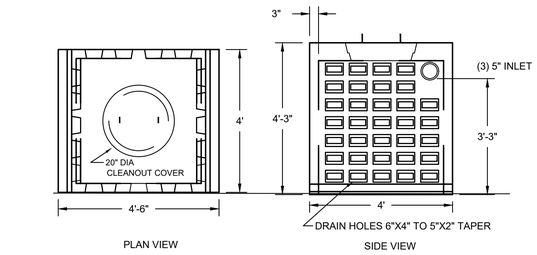
5 BITUMINOUS CONCRETE PAVEMENT
NOT TO SCALE



6 BRICK SIDEWALK
NOT TO SCALE

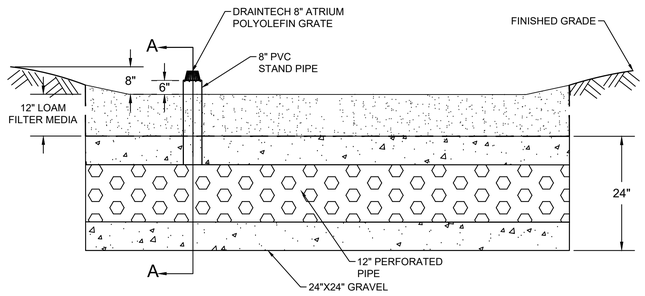


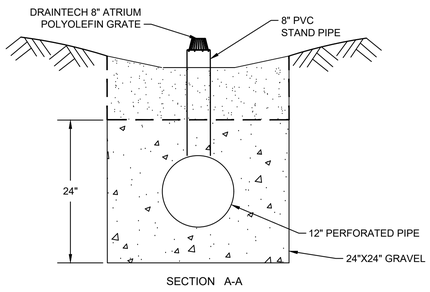
7 BRICK SIDEWALK & GRASS STRIP
NOT TO SCALE



NOTES:
1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
2. DESIGNED FOR AASHTO HS-20 LOADING, 1 TO 3 FT COVER.

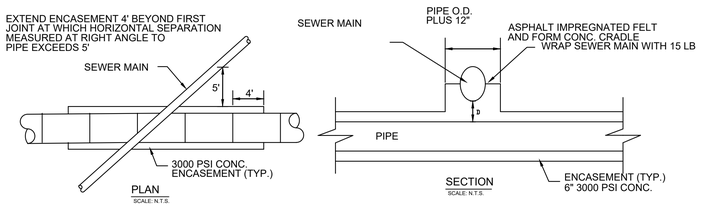
8 DRY WELL 300 GALLON
NOT TO SCALE



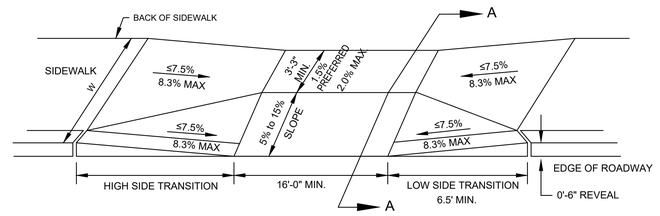


SECTION A-A

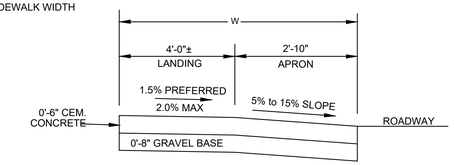
9 RAIN GARDEN
NOT TO SCALE



11 CONCRETE ENCASEMENT DETAIL
NOT TO SCALE



LEGEND
W = SIDEWALK WIDTH



SECTION A-A

10 DRIVEWAY WITH TIPDOWNS
NOT TO SCALE

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www.dci-ma.com

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24 GRAF ROAD
NEWBURYPORT MA

ARCHITECT:
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2 LIBERTY STREET
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SURVEYOR
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NEWBURYPORT, MA

PROJECT TEAM

21-27 HANCOCK
NEWBURYPORT, MA.

PROJECT INFO

REV	DESCRIPTION	DATE
1	PLAN UPDATE	03/19/2021

COMMONWEALTH OF MASSACHUSETTS
STEPHEN B. SAWYER
No. 49067
REGISTERED PROFESSIONAL ENGINEER

STAMP:

CONSTRUCTION DETAILS

SHEET NAME:

D1

SHT NO:

DR BY:	MCH
CHK BY:	SBS
PROJ NO:	20-087
DATE:	02/17/2021
SCALE:	NOT TO SCALE

P:\2020 Projects\2020-087 Leavitt Ct Newburyport\Dwg_ENGINEERING\20-087_CVL_DETL.dwg

"PLANNING BOARD APPROVAL UNDER SECTION XV SITE PLAN REVIEW"
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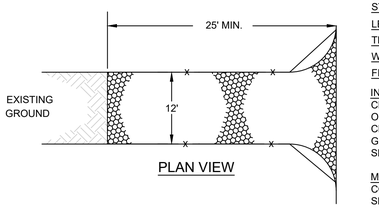
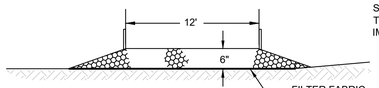
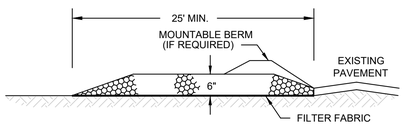
DATE



PLAN VIEW



SECTION



PROFILE

CONSTRUCTION SPECIFICATIONS

STONE SIZE - SEE GRADATION TABLE

LENGTH - 25 FOOT MINIMUM.

THICKNESS - SIX (6) INCHES (MINIMUM).

WIDTH - 12' MINIMUM

FILTER FABRIC - MIRAFI 600X OR APPROVED EQUAL.

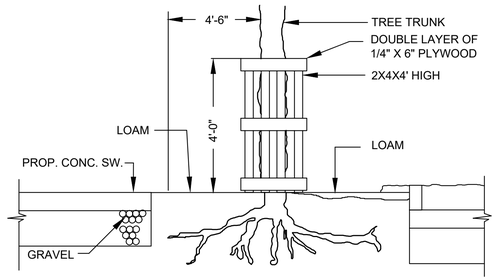
INSTALLATION - THE AREA OF THE ENTRANCE SHOULD BE CLEARED OF ALL VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL. A ROAD STABILIZATION FILTER CLOTH CAN BE PLACED ON THE SUBGRADE PRIOR TO THE GRAVEL PLACEMENT TO PREVENT PUMPING. THE GRAVEL SHALL BE PLACED TO THE SPECIFIED DIMENSIONS.

MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS WILL REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR ADDITIONAL LENGTH AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.

CRUSHED STONE GRADATION TABLE

SIEVE SIZE	% PASSING BY WEIGHT
2 inches	100
1 1/2 inches	90-100
1 inch	20-60
3/4 inch	0-15
3/8 inch	0-5

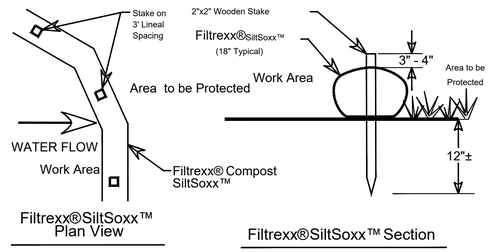
1 CONSTRUCTION ENTRANCE
NOT TO SCALE



NOTES:

1. RESTRICT PASSAGE OF CONSTRUCTION EQUIPMENT THAT WILL INJURE EXPOSED OR UNDISTURBED TREE ROOTS OR OTHER PARTS OF THE TREE.
2. TREE ROOTS LOCATED LOWER THAN 10" BELOW FINISH GRADE WITHIN TREE PROTECTION WORKING AREA SHALL BE CUT ONLY IF NECESSARY.
3. PROVIDE 2X4X4' HIGH WOOD FRAME CAGE WITH HORIZONTAL PLYWOOD PLANKING AS PROTECTION FOR THE TREE DURING CONSTRUCTION OR AS DIRECTED BY THE ENGINEER.

2 EXISTING TREE PROTECTION
NOT TO SCALE

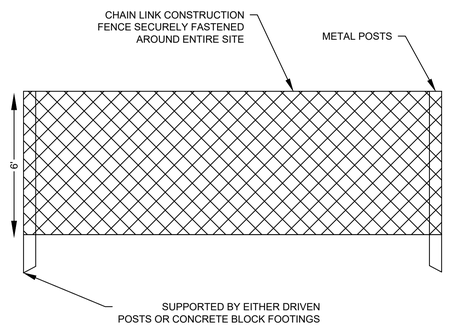


NOTES

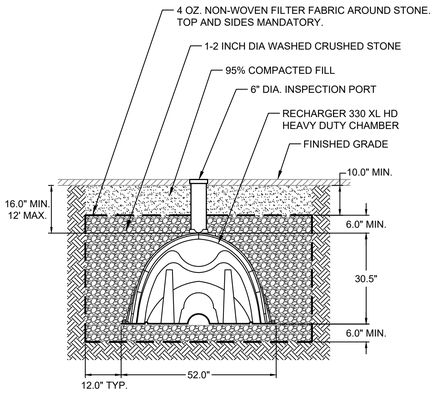
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
2. SILTSOXX™ COMPOST/JSOIL/SEED FILL TO MEET APPLICATION REQUIREMENTS.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

FILTREXX ® SILTSOXX™

3 SILT SOCK
NOT TO SCALE



4 CONSTRUCTION FENCE
NOT TO SCALE

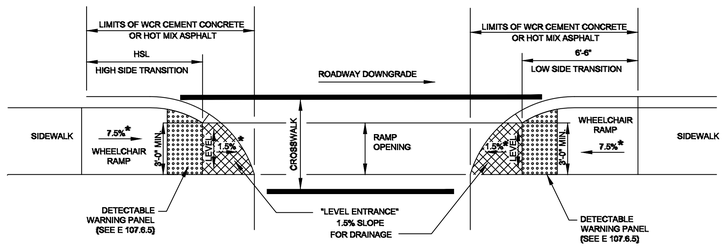


GENERAL NOTES

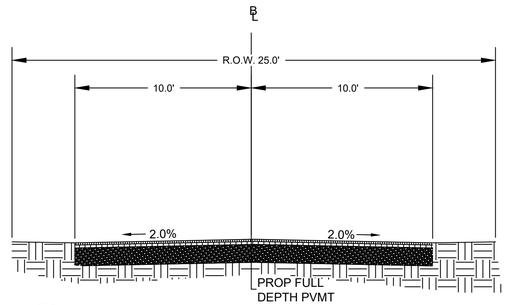
RECHARGER 330XL HD BY CULTEC, INC. OF BROOKFIELD, CT.
STORAGE PROVIDED = 11.32 CF/FT PER DESIGN UNIT.
REFER TO CULTEC, INC.'S CURRENT RECOMMENDED INSTALLATION GUIDELINES.
USE RECHARGER 330XL HD HEAVY DUTY FOR TRAFFIC

ALL RECHARGER 330XL HD HEAVY DUTY UNITS ARE MARKED WITH A COLOR STRIPE FORMED INTO THE PART ALONG THE LENGTH OF THE CHAMBER.
ALL RECHARGER 330XL HD CHAMBERS MUST BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS.

5 CULTEC R-330XLHD RECHARGER
NOT TO SCALE



6 WCR
NOT TO SCALE



7 ROADWAY CROSS-SECTION
NOT TO SCALE

NORTH

Design Consultants Inc.
Somerville - Quincy - Newburyport
www.dci-ma.com

DEVELOPER:
CASWELL DEVELOPMENT
24 GRAF ROAD
NEWBURYPORT MA

ARCHITECT:
GRAF ARCHITECTS
2 LIBERTY STREET
NEWBURYPORT MA

SURVEYOR
WINTER GEC
44 MERRIMAC ST. UNIT 312
NEWBURYPORT, MA

PROJECT TEAM

21-27 HANCOCK
NEWBURYPORT, MA.

PROJECT INFO

REV	DESCRIPTION	DATE
1	PLAN UPDATE	03/19/2021

STAMP: COMMONWEALTH OF MASSACHUSETTS — STEPHEN B. SAWYER — CIVIL — No. 52626 — REGISTERED PROFESSIONAL ENGINEER

CONSTRUCTION DETAILS

SHEET NAME:

D2

SHT NO:

DR BY: MCH
CHK BY: SBS
PROJ NO: 20-087
DATE: 02/17/2021
SCALE: NOT TO SCALE

P:\2020 Projects\2020-087 Leavitt Ct Newburyport\Dwg_ENGINEERING\20-087_CIVL_DETL.dwg

DEMOLISH 1-STORY GARAGE

DEMOLISH AND REMOVE SHED

SILT SOCK 3/D2

REMOVE BIT. CONCRETE PAVEMENT

RENOVATE 2-STORY HOUSE

REMOVE

4/D2 CONSTRUCTION FENCE

CONSTRUCTION 1/D2 ENTRANCES

2/D2 EXISTING TREE PROTECTION

HANCOCK STREET

"PLANNING BOARD APPROVAL UNDER SECTION XV SITE PLAN REVIEW"
CITY OF NEWBURYPORT PLANNING BOARD

DATE

0 10 20 30 40
SCALE: 1" = 10'

NORTH

Design Consultants Inc.
Somerville - Quincy - Newburyport
www.dci-ma.com

DEVELOPER:
CASWELL DEVELOPMENT
24 GRAF ROAD
NEWBURYPORT MA

ARCHITECT:
GRAF ARCHITECTS
2 LIBERTY STREET
NEWBURYPORT MA

SURVEYOR
WINTER GEC
44 MERRIMAC ST. UNIT 312
NEWBURYPORT, MA

PROJECT TEAM

21-27 HANCOCK
NEWBURYPORT, MA.

PROJECT INFO

REV	DESCRIPTION	DATE
1	PLAN UPDATE	03/19/2021

COMMONWEALTH OF MASSACHUSETTS
STEPHEN B. SAWYER
No. 34611
REGISTERED PROFESSIONAL ENGINEER

STAMP:

EROSION CONTROL PLAN

SHEET NAME:

D3

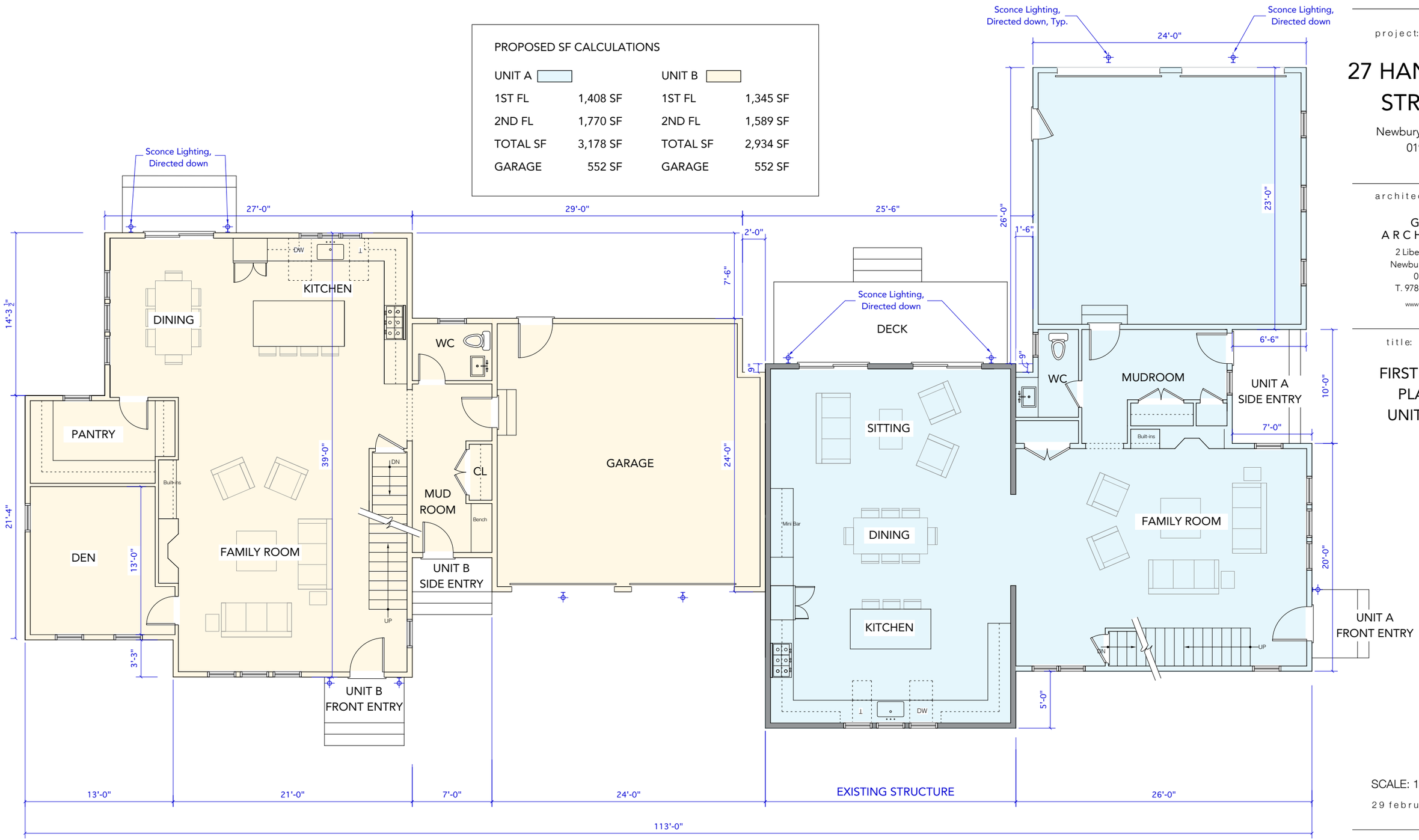
SHT NO:

DR BY: GS
CHK BY: SS
PROJ NO: 20-087
DATE: 02/17/2021
SCALE: 1"=10'

P:\2020 Projects\2020-087 Leavitt Ct Newburyport\Dwg_ENGINEERING\20-087_EROS_CNTL.dwg

PROPOSED SF CALCULATIONS

UNIT A		UNIT B	
1ST FL	1,408 SF	1ST FL	1,345 SF
2ND FL	1,770 SF	2ND FL	1,589 SF
TOTAL SF	3,178 SF	TOTAL SF	2,934 SF
GARAGE	552 SF	GARAGE	552 SF



1 First Floor Plan
SCALE: 1/8" = 1'-0"

project:

27 HANCOCK STREET

Newburyport, MA
01950

architect:

GRAF ARCHITECTS
2 Liberty Street
Newburyport, MA
01950
T. 978 499 9442
www.grafarch.com

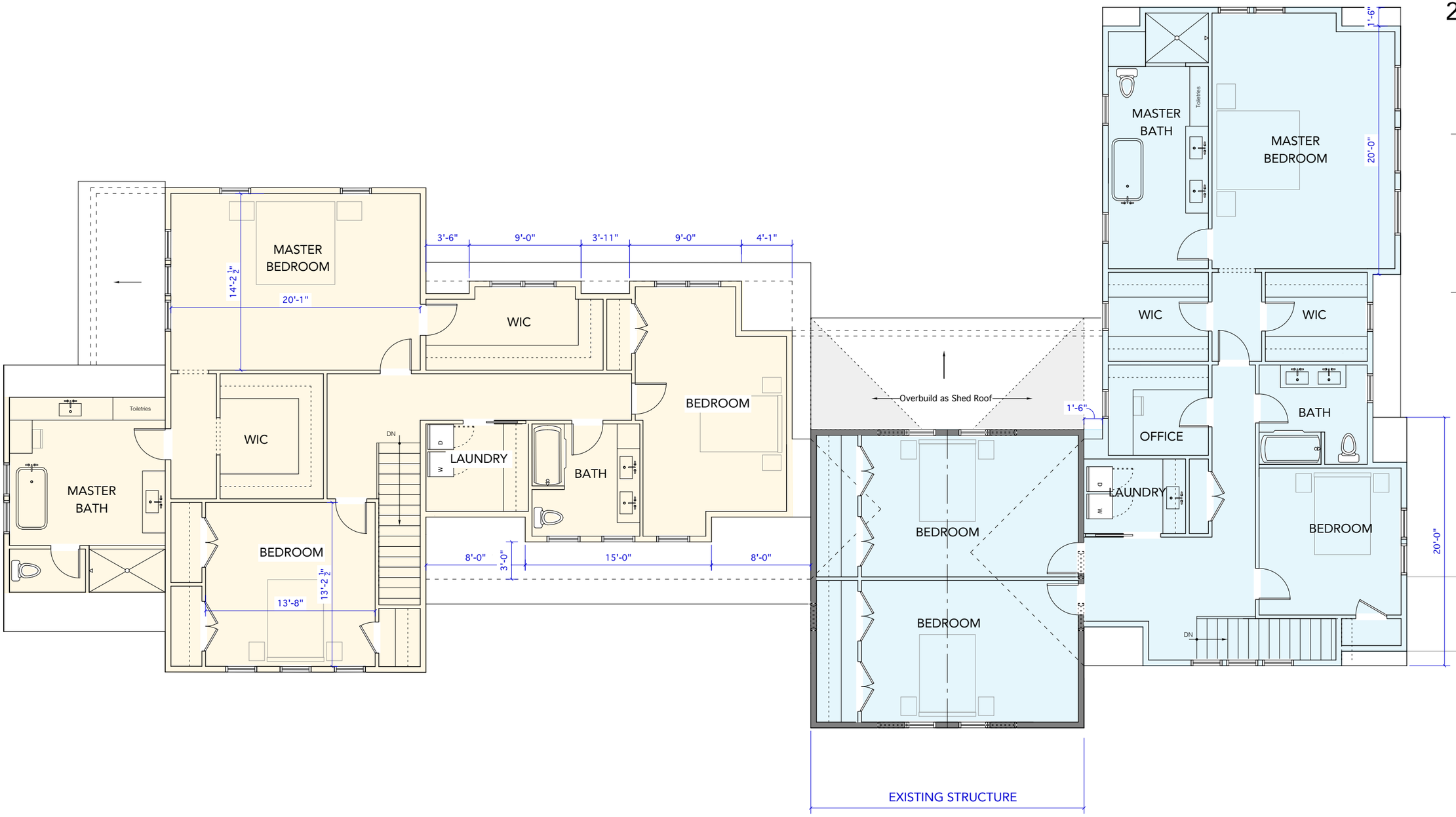
title:

FIRST FLOOR PLANS - UNITS A+B

SCALE: 1/8" = 1'-0"

29 february 2021

A01



1 Second Floor Plan
SCALE: 1/8" = 1'-0"

project:

27 HANCOCK STREET

Newburyport, MA
01950

architect:

GRAF ARCHITECTS
2 Liberty Street
Newburyport, MA
01950
T. 978 499 9442
www.grafarch.com

title:

SECOND FLOOR PLANS - UNITS A+B

SCALE: 1/8" = 1'-0"

29 february 2021

A02

1 South Exterior Elevation - UNIT A (HANCOCK ST)
SCALE: 1/8" = 1'-0"

2 West Exterior Elevation - UNIT A+B (LEAVITT COURT)
SCALE: 1/8" = 1'-0"

project:

27 HANCOCK STREET

Newburyport, MA
01950

architect:

GRAF ARCHITECTS
2 Liberty Street
Newburyport, MA
01950
T. 978 499 9442
www.grafarch.com

title:

EXTERIOR ELEVATIONS UNITS A+B

SCALE: 1/8" = 1'-0"

29 february 2021

A03

1 North Exterior Elevation - UNIT B
SCALE: 1/8" = 1'-0"

2 East Exterior Elevation - UNITS A+B
SCALE: 1/8" = 1'-0"

project:

27 HANCOCK STREET

Newburyport, MA
01950

architect:

GRAF ARCHITECTS
2 Liberty Street
Newburyport, MA
01950
T. 978 499 9442
www.grafarch.com

title:

EXTERIOR ELEVATIONS UNITS A+B

SCALE: 1/8" = 1'-0"

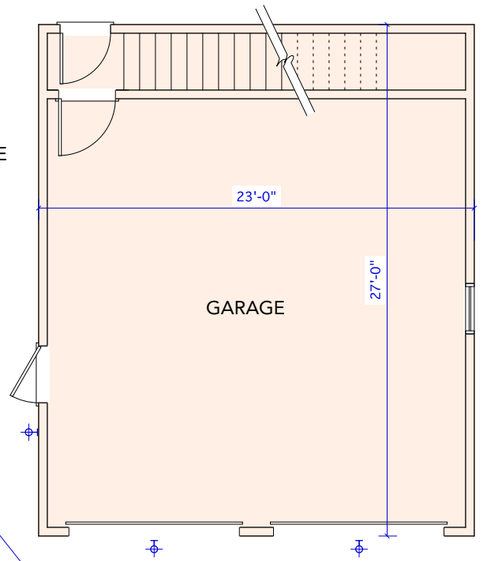
29 february 2021

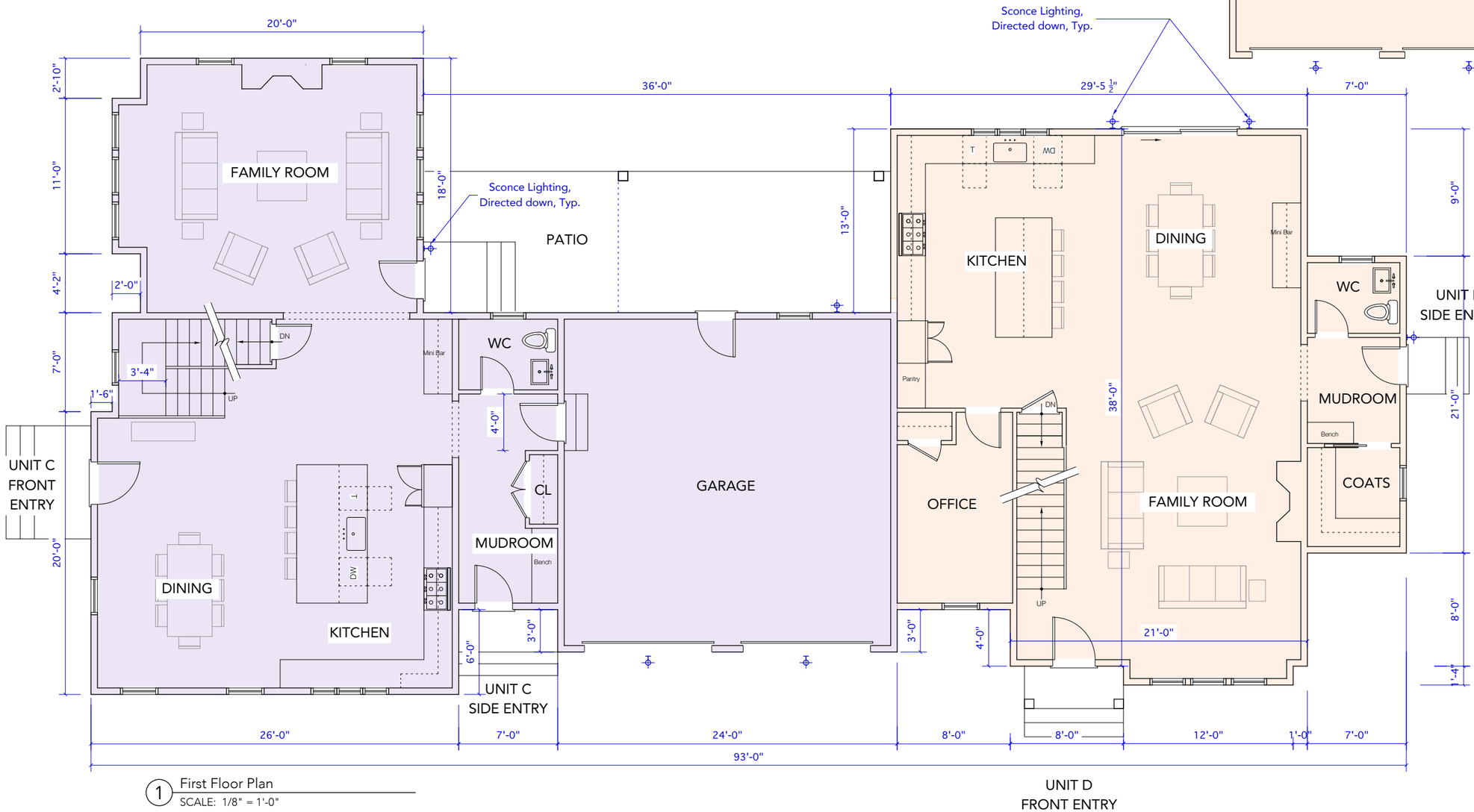
A04

PROPOSED SF CALCULATIONS

UNIT C		UNIT D	
1ST FL	1,221 SF	1ST FL	1,239 SF
2ND FL	1,732 SF	2ND FL	1,242 SF
TOTAL SF	2,953 SF	3RD FL	781 SF
GARAGE	576 SF	TOTAL SF	3,262 SF
		GARAGE	621 SF

NOTE: SEE SITE PLAN FOR GARAGE LOCATION





1 First Floor Plan
SCALE: 1/8" = 1'-0"

project:

21-25 HANCOCK STREET

Newburyport, MA
01950

architect:

GRAF ARCHITECTS
2 Liberty Street
Newburyport, MA
01950
T. 978 499 9442
www.grafarch.com

title:

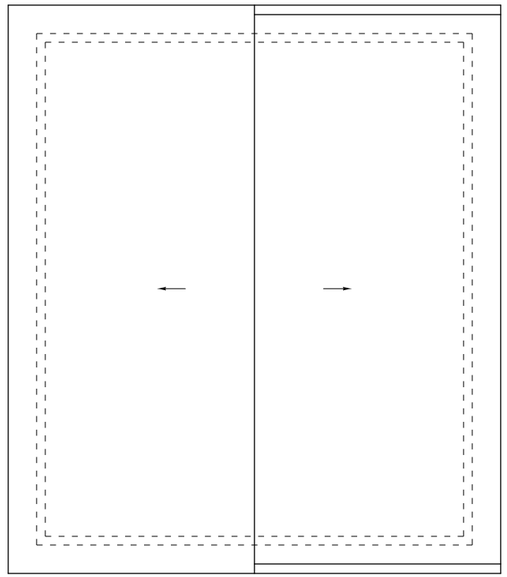
FIRST FLOOR PLANS - UNITS C+D

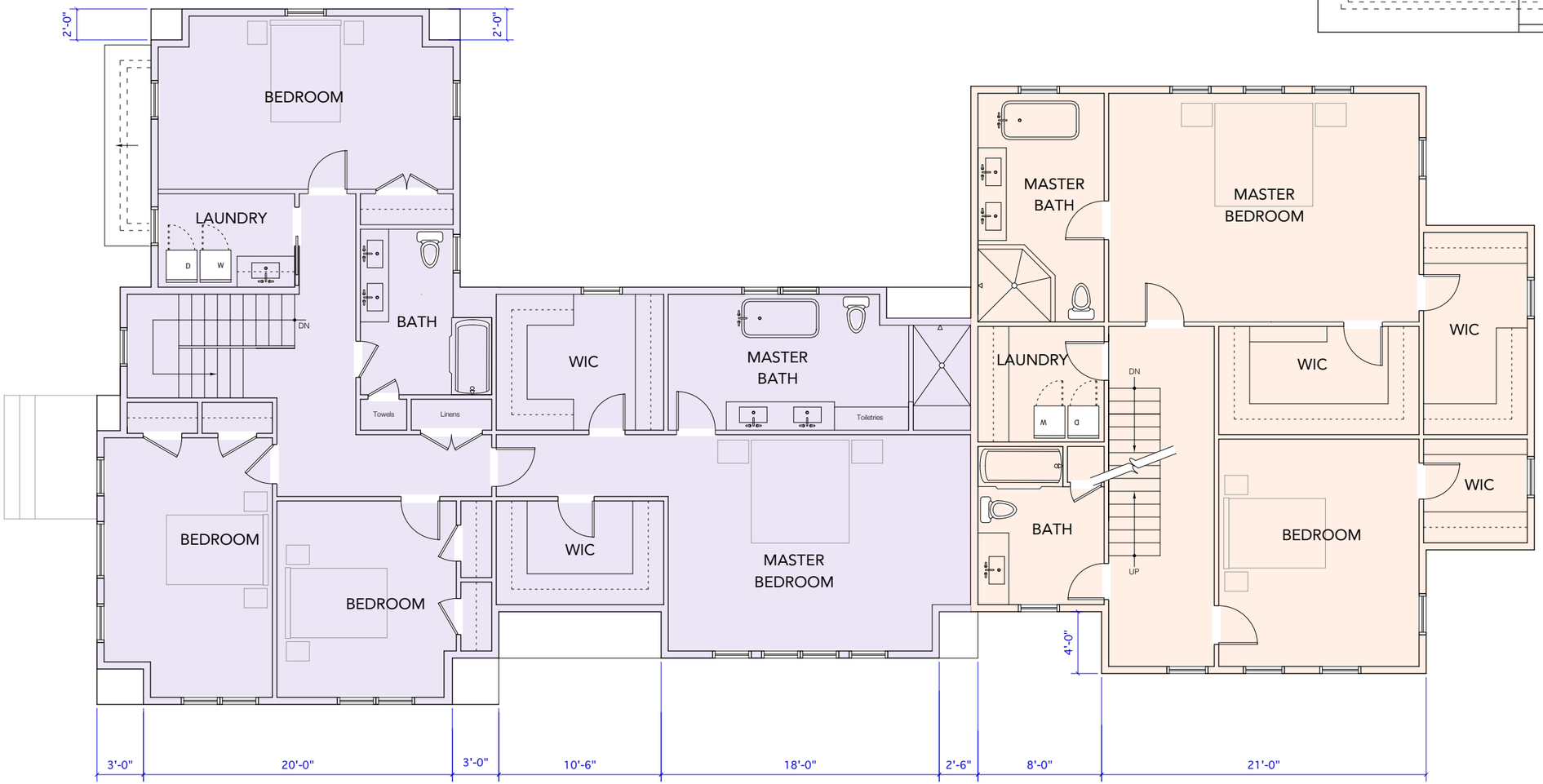
SCALE: 1/8" = 1'-0"

29 february 2021

A05

21-25 Hancock A05 Plans Units C+D 3/1/21, 12:33 PM
2.29.21





1 Second Floor Plan
SCALE: 1/8" = 1'-0"

project:

21-25 HANCOCK STREET

Newburyport, MA
01950

architect:

GRAF
ARCHITECTS

2 Liberty Street
Newburyport, MA
01950
T. 978 499 9442

www.grafarch.com

title:

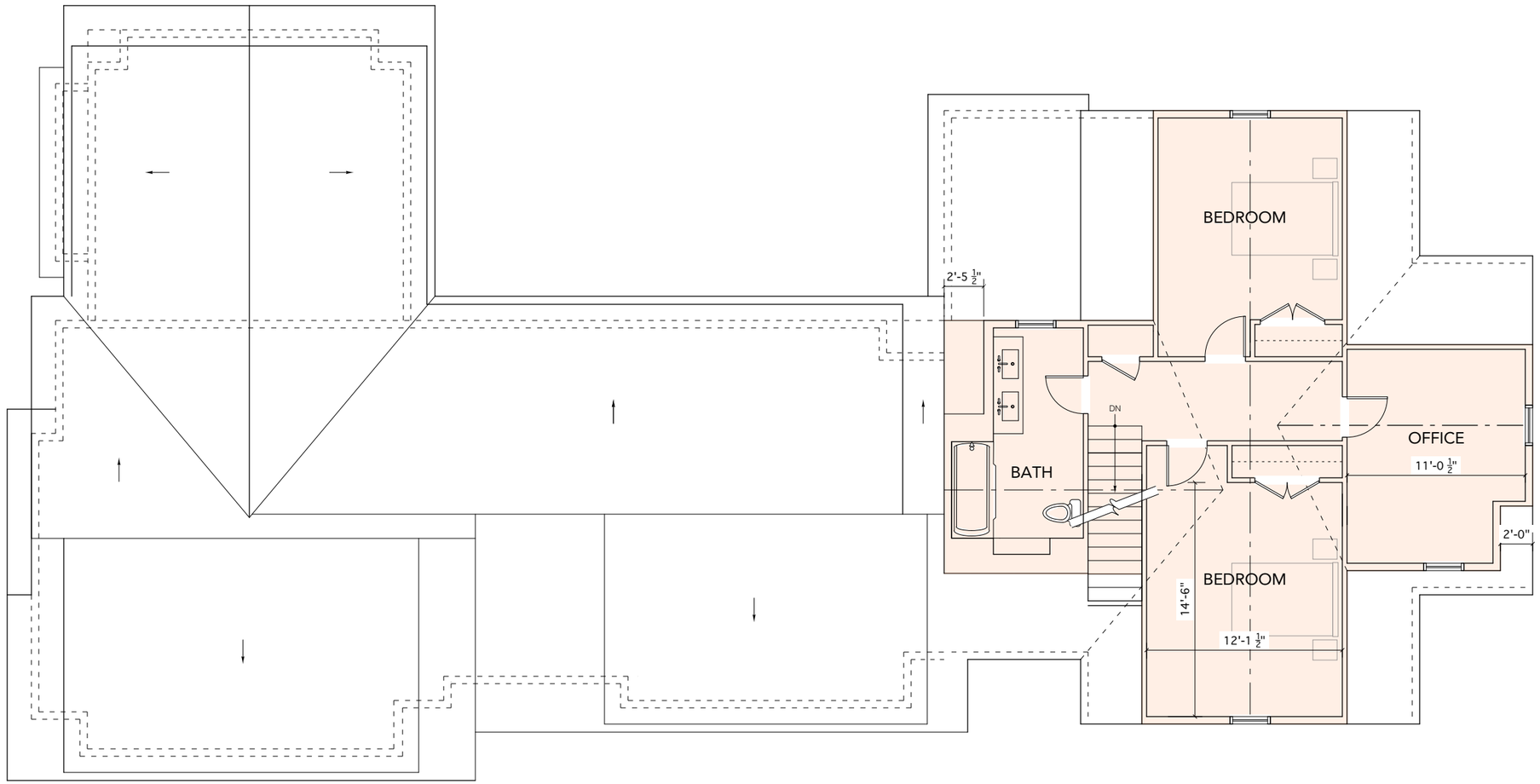
SECOND FLOOR PLANS - UNITS C+D

SCALE: 1/8" = 1'-0"

29 february 2021

A06

21-25 Hancock A05 Plans Units C+D 3/1/21, 12:33 PM
2.29.21



1 Third Floor Plan
SCALE: 1/8" = 1'-0"

project:

21-25 HANCOCK STREET

Newburyport, MA
01950

architect:

GRAF ARCHITECTS
2 Liberty Street
Newburyport, MA
01950
T. 978 499 9442
www.grafarch.com

title:

THIRD FLOOR PLAN - UNIT D

SCALE: 1/8" = 1'-0"

29 february 2021

A07

21-25 Hancock A05 Plans Units C+D 3/1/21, 12:33 PM
2.29.21

1 Exterior Elevation - UNIT C (HANCOCK ST)
SCALE: 1/8" = 1'-0"

2 Exterior Elevation - LEAVITT COURT
SCALE: 1/8" = 1'-0"

project:

21-25 HANCOCK STREET

Newburyport, MA
01950

architect:

GRAF ARCHITECTS
2 Liberty Street
Newburyport, MA
01950
T. 978 499 9442
www.grafarch.com

title:

EXTERIOR ELEVATIONS UNITS C+D

SCALE: 1/8" = 1'-0"

29 february 2021

A08

1 Exterior Elevation - REAR
SCALE: 1/8" = 1'-0"

3 Exterior Elevation - RAIL TRAIL
SCALE: 1/8" = 1'-0"

project:

21-25 HANCOCK STREET

Newburyport, MA
01950

architect:

GRAF
ARCHITECTS
2 Liberty Street
Newburyport, MA
01950
T. 978 499 9442
www.grafarch.com

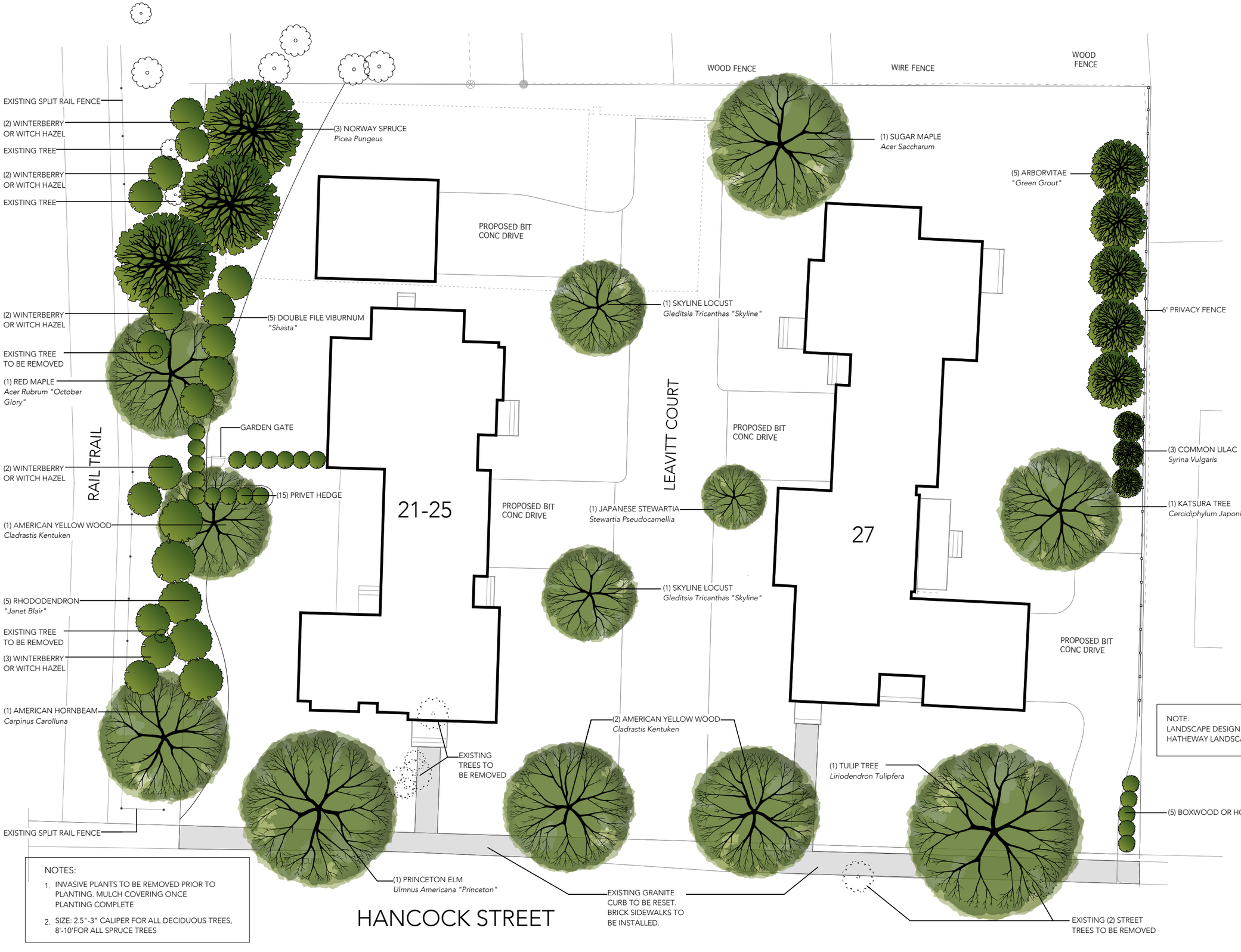
title:

EXTERIOR ELEVATIONS UNITS C+D

SCALE: 1/8" = 1'-0"

29 february 2021

A09



NOTES:

1. INVASIVE PLANTS TO BE REMOVED PRIOR TO PLANTING. MULCH COVERING ONCE PLANTING COMPLETE
2. SIZE: 2.5"-3" CALIPER FOR ALL DECIDUOUS TREES, 8'-10'FOR ALL SPRUCE TREES

NOTE:
LANDSCAPE DESIGN AS PER HATHEWAY LANDSCAPE CO.

project:

21-27 HANCOCK STREET

Newburyport, MA
01950

architect:

GRAF ARCHITECTS
2 Liberty Street
Newburyport, MA
01950
T. 978 499 9442
www.grafarch.com

title:

LANDSCAPE PLAN

SCALE: 1/8" = 1'-0"

17 march 2021

L01

STORMWATER MANAGEMENT ANALYSIS

FOR

21-27 HANCOCK STREET, NEWBURYPORT, MA

Prepared for:
Jay Caswell
Caswell Development
24 Graf Road
Newburyport, MA

Prepared by:
Design Consultants, Inc.
120 Middlesex Avenue, Suite 20
Somerville, Massachusetts 02145

Project No. 2020-087
February, 2021
REVISED: March, 2021

Design Consultants Inc.
Somerville - Newburyport
www.dci-ma.com

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

Caswell Development is proposing to redevelop the site located at 21 and 27 Hancock Street, Newburyport, MA with the construction of two 2-family townhomes. The following report addresses the hydrologic calculations and stormwater management design proposed at the site.

2.0 EXISTING CONDITION

The limit of work for the project is the parcels of land shown in the Town of Newburyport's Assessor's Database as Map 25, Parcels 42 and 43. These two parcels are identified as 27 Hancock Street and 21-25 Hancock Street, with Leavitt Court, currently a "paper street" running between the two parcels and currently providing access to the single-family home located at 27 Hancock Street. The 21-25 Hancock Street parcel is approximately 16,228 SF of area and the 27 Hancock Street parcel is approximately 16,400 SF. Therefor the total area of the two parcels is 0.49 acres (32,628 SF). The total subject site, including the Leavitt Court area is 0.85 acres (36,954 SF).

The 27 Hancock Street parcel currently consists of a single-family home surrounded by a paved driveway, lawn area, landscaping and some wooded area. The 21-25 Hancock Street parcel currently consists of a large automobile garage with three garage bays, also with paved driveway access, some surrounding lawn area and plenty of surrounding wooded area in the rear. The existing site is 43.2% impervious.

2.1 Existing Hydrology

For the design purposes of this study, due to limits of available survey information, the drainage areas have been defined by the parcel boundaries. Within these parcel boundaries, there are two design discharge points located at the site, consisting of two catchment areas within the property, neither of which currently have any sort of a present stormwater system.

The first design discharge point is located in the northern corner of the site, where it abuts the Clipper City Rail Trail. The second design discharge point is at the east corner of the site where it drains to neighboring property. The two catchment areas are divided by a highpoint the runs through the center of the site, dividing it into two drainage areas.

Design Point 1, located at the connection with the rail trail property, drains into a small ravine-like area as it flows offsite. The area that drains to Design Point 2, drains across as somewhat low sloping grass area in the rear of the property as it flows offsite and enters the neighbor's yard.

2.2 FEMA Flood Insurance Rate Map

According to the FEMA Flood Insurance Rate Map Number 25009C0136G, with an effective date of July 16, 2014, the site is located within a Zone X, which is "areas determined to be outside the 0.2% annual chance floodplain." (*See Appendix C: FEMA Flood Insurance Rate Map*)

2.3 Soils

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, the soils across the entire site is classified as Merrimac Fine Sandy Loam, 0 to 3 percent slopes. This soil classification is recognized as part of Hydrologic Soil Group A, which was used for the purposes of hydrologic calculations across the entire site. (*See Appendix D: Soils Information*)

3.0 PROPOSED CONDITION

The project proposes the redevelopment of the site at 21-27 Hancock Street with the construction of two 2-family townhomes, each with driveway access from either directly off Hancock Street or from Leavitt Court, which is proposed to be constructed as a paved 20' wide roadway. There will also be a side driveway proposed for access to one of the townhomes. The proposed site will include 7,924 SF of roof area, along with 6,456 SF of paved roadway and driveway area. The rest of the site will consist of landscaping/lawn or wooded area. The proposed site is 39.5% impervious. This is a 4% decrease in impervious area.

3.1 Proposed Hydrology

In the proposed design, there are still two design points, both of which are in the same locations as discussed above in the existing hydrology. These design points and their drainage areas are addressed below:

Design Point 1 – Rail Trail

- 10S – This subcatchment consists of the lawn area, and the rear section of the roof area that drains to the northern corner where it flows to the Clipper City Rail Trail.
- 20S – This subcatchment consists of the proposed roadway surface and the center lawn and landscaping area, as well as the roof areas that drain toward the inner section of the site. This drainage area flows to a raingarden at the rear of the roadway. This raingarden is proposed to be 8" deep and will include an 8" overflow outlet that will drain to a 12" perforated pipe set below the raingarden. This 12" pipe will be set in 2' x 2' of crushed stone. Any resulting overflow from this perforated pipe will be directed to the north where it will drain to Design Point 1.

Design Point 2 – Eastern Abutters

- 30S – This subcatchment consists of the driveway that drains to a 300 gallon drywell, along with the adjacent lawn area and walkway. This drywell includes an overflow via the rim that releases any excess flow.
- 40S – This subcatchment includes all of the lawn area and roof area on the eastern portion of the property that drains directly across down the topography to the northern corner of the property.
- 41S-This subcatchment consists solely of the portion of the roof that would drain directly to the eastern abutters. The runoff from this roof surface (Shown on the Drainage Area Plan – C401) is directed, via gutters and downspouts, to an infiltration system consisting of three Cultec R-330XLHD recharge chambers that will hold and infiltrate the roof runoff. Any excess will be directed via and overflow weir to Design Point 2 along with the rest of the runoff from subcatchment 40S.

See hydrologic model below for summarized hydrologic calculations of offsite flow rates and volumes for the two separate design points and the totals. See Appendix B: Existing and Proposed Drainage Areas for detailed layouts of the above discussed drainage areas.

4.0 HYDROLOGIC MODEL

The hydrologic model was developed in HydroCAD. Both existing and proposed conditions are modeled for the 2-year, 10-year, 25-year, and 100-year 24-hour storm events. HydroCAD allows for variable rainfall intensity throughout the storm duration, peaking near the middle of the Type III, 24-hour storm. The drainage areas' time of concentration (t_c) has been calculated for each

catchment area. It should be noted that they are all below six minutes for this site, which is below the recommended by the HydroCAD program, but has been requested in this review. Complete calculations, performed using the HydroCAD software, are included in the appendix.

Table 4.1: Hydrological Calculation Summary

		Design Point 1		**Design Point 2**		**Total**	
Rainfall Event		*Existing*	**Proposed**	*Existing*	**Proposed**	*Existing*	**Proposed**
2 Yr	Rate (cfs)	*0.80*	0.43	*0.00*	0.00	*0.80*	0.43
	Volume (cf)	*2,088*	488	*87*	0	*2,175*	488
10 Yr	Rate (cfs)	*1.64*	1.10	*0.13*	0.13	*1.68*	1.21
	Volume (cf)	*4,249*	1,992	*645*	266	*4,892*	2,258
25 Yr	Rate (cfs)	*2.34*	1.80	*0.40*	0.33	*2.61*	1.98
	Volume (cf)	*6,105*	3,575	*1,358*	722	*7,463*	4,297
100 Yr	Rate (cfs)	*3.81*	3.42	*1.20*	1.12	*4.77*	4.56
	Volume (cf)	*10,179*	7,587	*3,371*	1,978	*13,551*	9,565

5.0 CONCLUSION

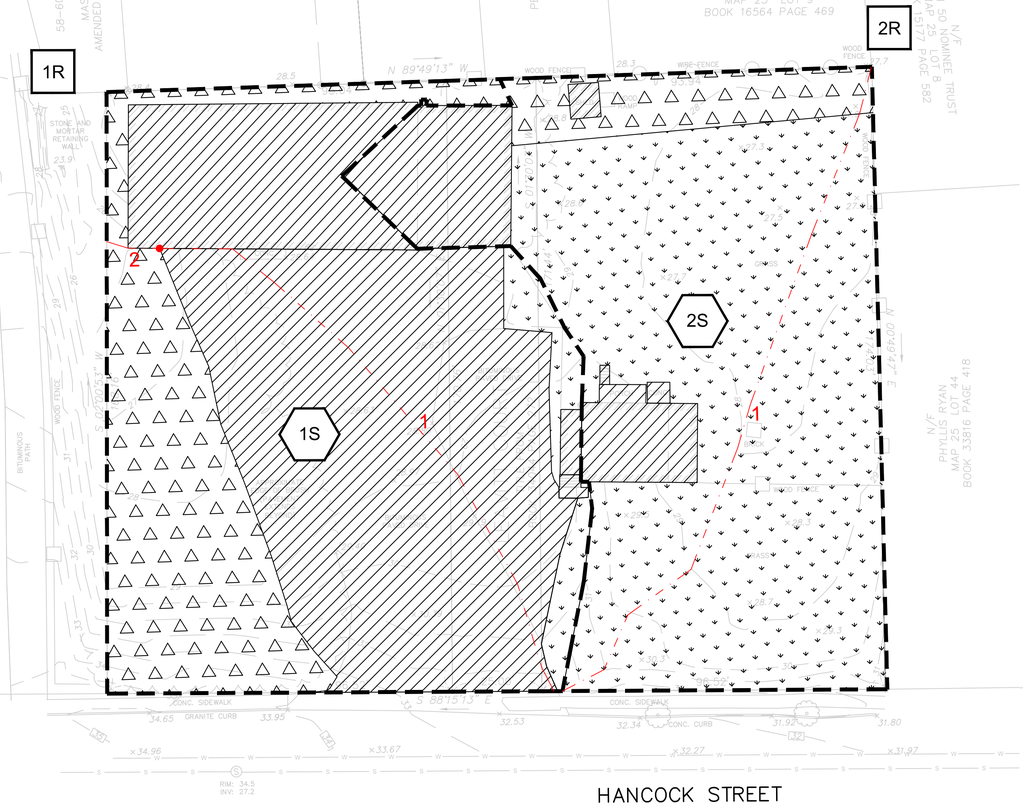
Based on DCI's analysis of the existing and proposed conditions, the proposed site conditions meet the stormwater management criteria set. Design point runoff volumes have been decreased for the 2-year, 10-year, 25-year and 100-year storm events. Peak flow rates are decreased for the 2-year and 10-year, 25-year and 100-year storm event. DCI concludes that the proposed redevelopment at 21-27 Hancock Street, Newburyport, MA adheres to all applicable stormwater management policies.

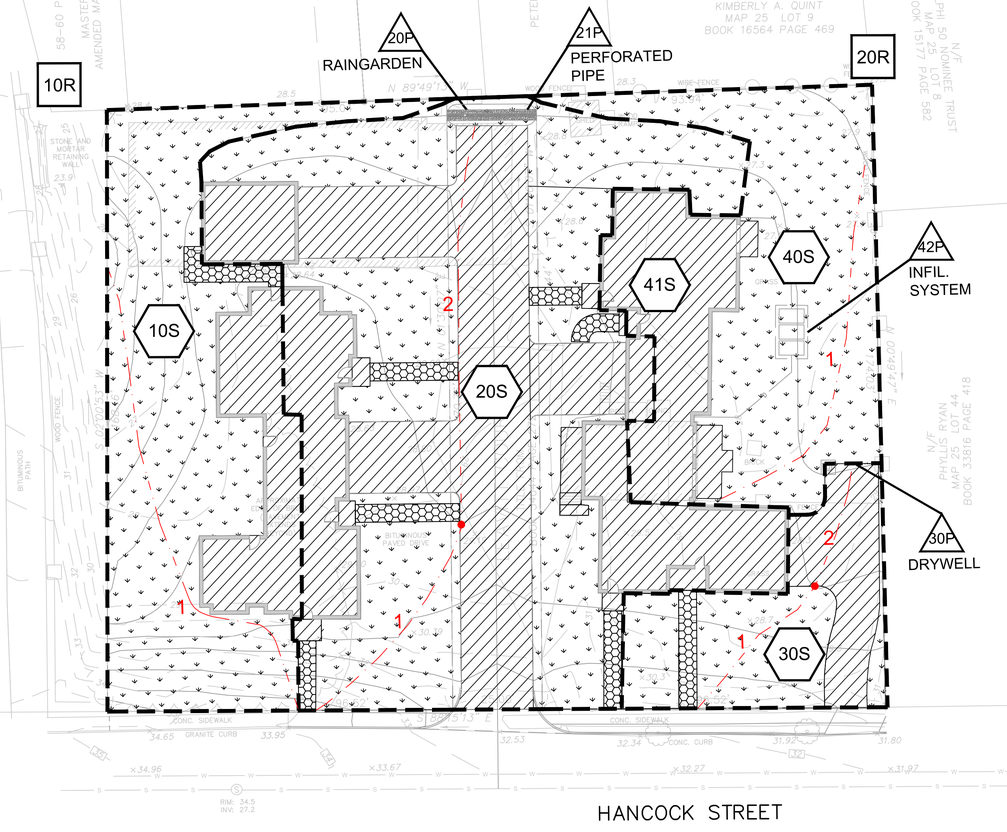
Appendix A

SITE PLANS

Appendix B

EXISTING & PROPOSED DRAINAGE AREAS





EXISTING

PROPOSED

LEGEND

- IMPERVIOUS AREA
- WOODED AREA
- LANDSCAPE
- PERMEABLE PAVERS
- 1S — SUBCATCHMENT
- 1P — POND
- 1R — DESIGN POINT
- DRAINAGE AREA BOUNDARY
- TIME OF CONCENTRATION

NORTH

Design Consultants Inc.
Somerville - Quincy - Newburyport
www.dci-ma.com

DEVELOPER:
CASWELL DEVELOPMENT
24 GRAF ROAD
NEWBURYPORT MA

ARCHITECT:
GRAF ARCHITECTS
2 LIBERTY STREET
NEWBURYPORT MA

SURVEYOR
WINTER GEC
44 MERRIMAC ST. UNIT 312
NEWBURYPORT, MA

PROJECT TEAM

21-27 HANCOCK
NEWBURYPORT, MA.

PROJECT INFO

REV	DESCRIPTION	DATE
1	REVISION	3/16/21

STAMP:

DRAINAGE AREA PLAN

SHEET NAME:

C401

SHT NO:

DR BY: MCH
CHK BY: SBS
PROJ NO: 20-067
DATE: 12/9/2020
SCALE: 1"=20'

P:\2020 Projects\2020-087 Leavitt Ct Newburyport_Drainage\20-087 DR.dwg

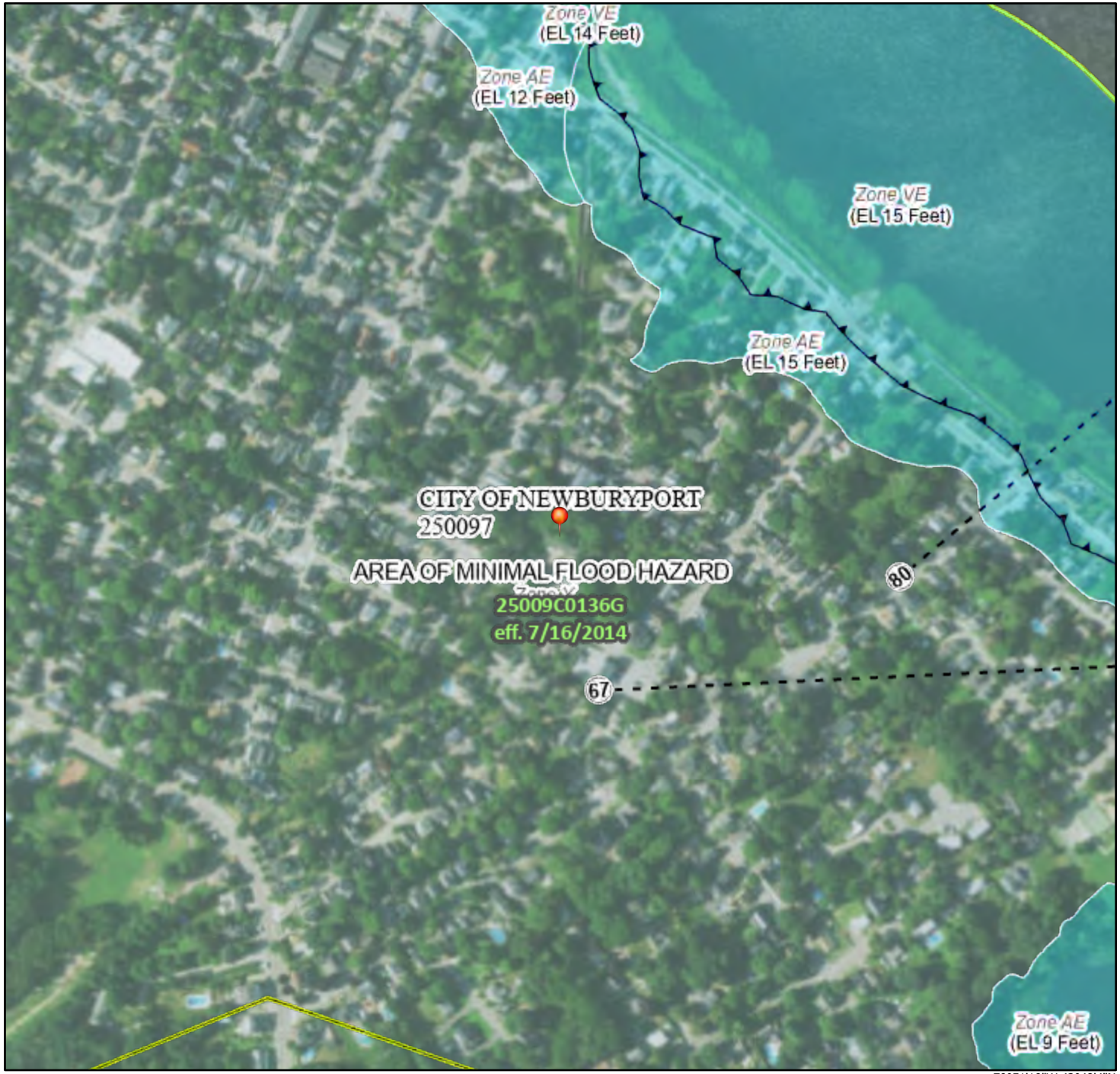
Appendix C

FEMA FLOOD INSURANCE RATE MAP

National Flood Hazard Layer FIRMette

FEMA

70°51'56"W 42°48'30"N



70°51'19"W 42°48'4"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

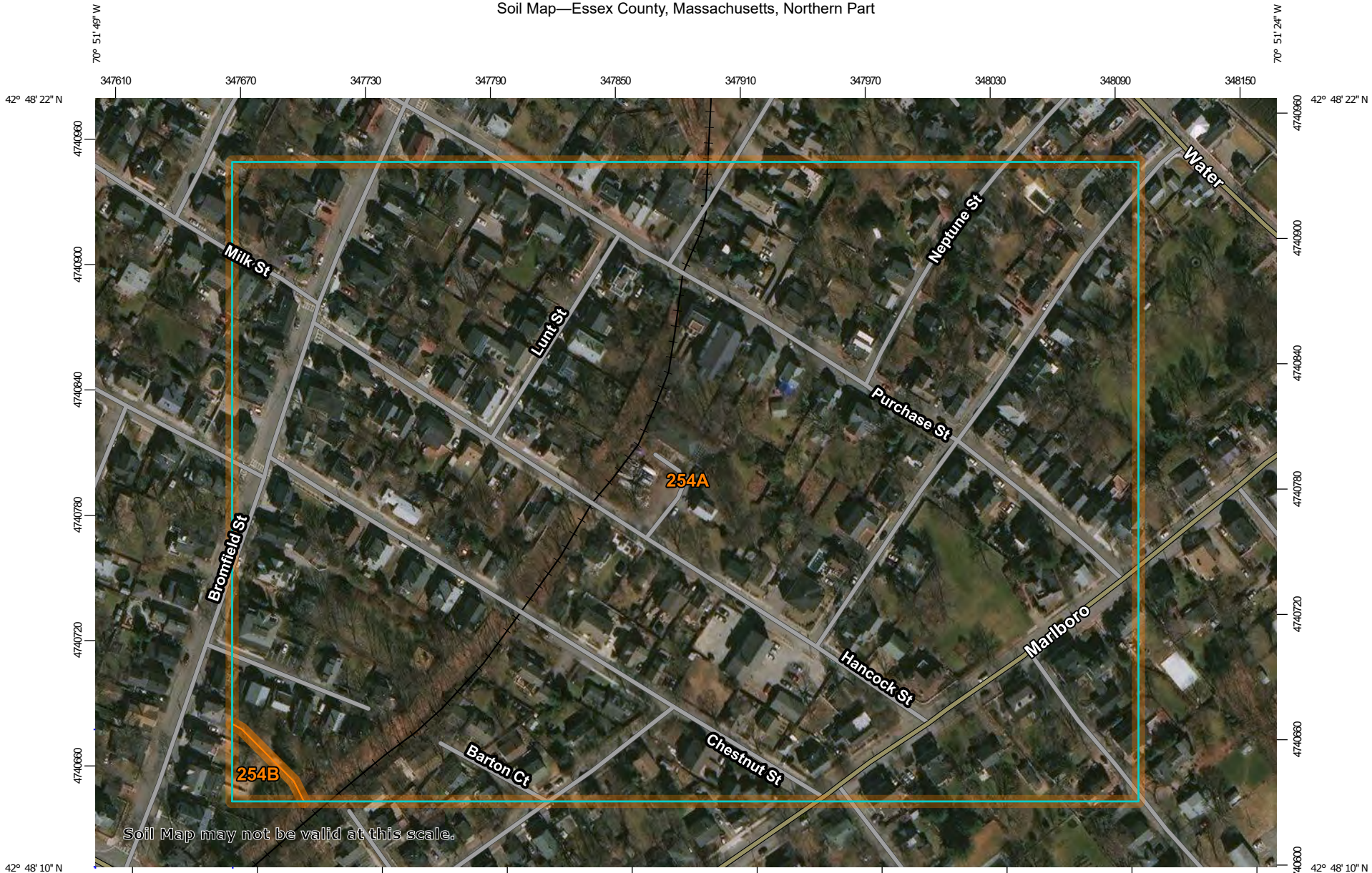
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/29/2021 at 2:47 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix D

SOILS INFORMATION



Map Scale: 1:2,590 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 16, Jun 9, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Sep 12, 2016

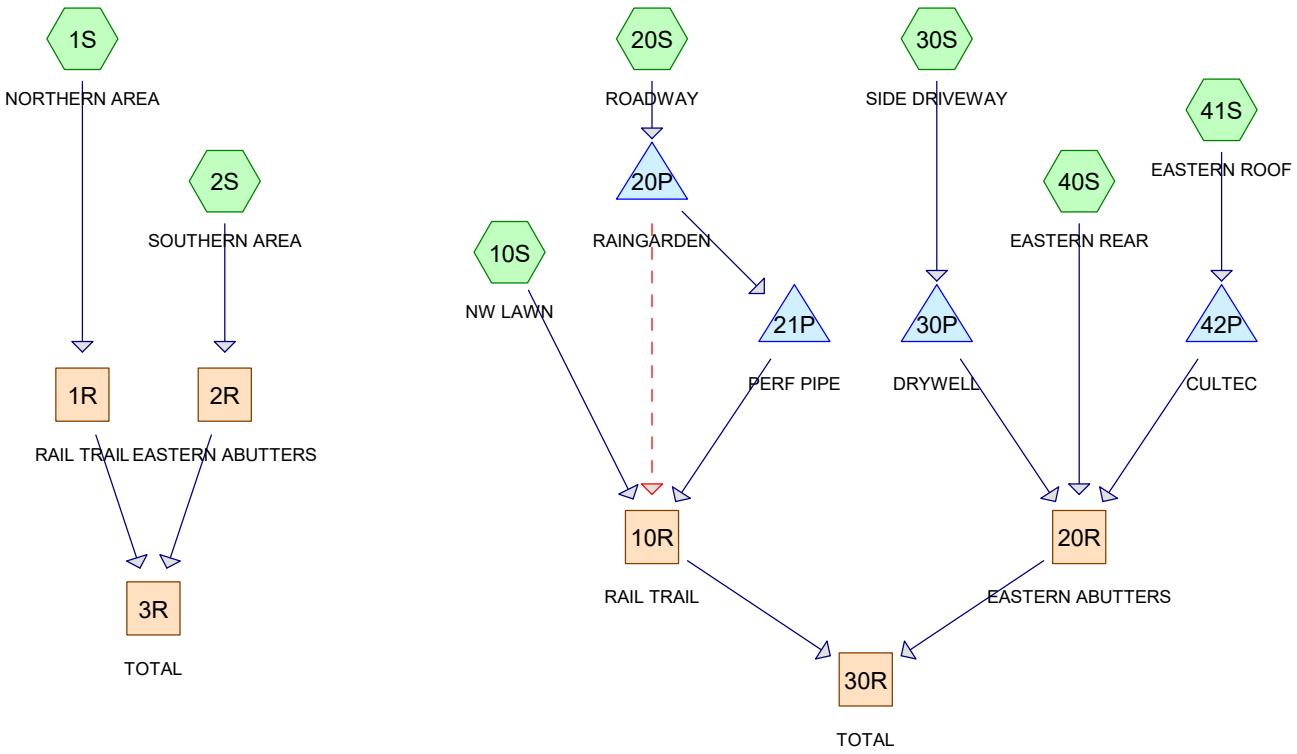
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	32.9	99.4%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	0.2	0.6%
Totals for Area of Interest		**33.1**	**100.0%**

Appendix E

EXISTING AND PROPOSED HYDROLOGY



Subcat Reach Pond Link

Routing Diagram for 20-087 DR
Prepared by Design Consultants, Inc., Printed 3/19/2021

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
35,415	39	>75% Grass cover, Good, HSG A (1S, 2S, 10S, 20S, 30S, 40S)
17,090	98	Paved parking, HSG A (1S, 2S, 20S, 30S)
167	55	Permable pavers (10S)
644	55	Permeable pavers (20S)
166	55	Permeablea pavers (30S)
13,230	98	Roofs, HSG A (1S, 2S, 10S, 20S, 41S)
229	98	Unconnected pavement, HSG A (20S)
6,958	43	Woods/grass comb., Fair, HSG A (1S, 2S)

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
72,922	HSG A	1S, 2S, 10S, 20S, 30S, 40S, 41S
0	HSG B	
0	HSG C	
0	HSG D	
977	Other	10S, 20S, 30S

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
35,415	0	0	0	0	35,415	>75% Grass cover, Good	
17,090	0	0	0	0	17,090	Paved parking	
0	0	0	0	167	167	Permable pavers	
0	0	0	0	644	644	Permeable pavers	
0	0	0	0	166	166	Permeablea pavers	
13,230	0	0	0	0	13,230	Roofs	
229	0	0	0	0	229	Unconnected pavement	
6,958	0	0	0	0	6,958	Woods/grass comb., Fair	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: NORTHERN AREA Runoff Area=19,866 sf 68.28% Impervious Runoff Depth>1.26"
Flow Length=191' Tc=0.9 min CN=80 Runoff=0.80 cfs 2,088 cf

Subcatchment 2S: SOUTHERN AREA Runoff Area=17,081 sf 13.91% Impervious Runoff Depth>0.06"
Flow Length=201' Slope=0.0210 '/' Tc=3.3 min CN=48 Runoff=0.00 cfs 87 cf

Subcatchment 10S: NW LAWN Runoff Area=8,603 sf 18.59% Impervious Runoff Depth>0.09"
Flow Length=143' Slope=0.0560 '/' Tc=1.4 min CN=50 Runoff=0.00 cfs 67 cf

Subcatchment 20S: ROADWAY Runoff Area=16,890 sf 56.04% Impervious Runoff Depth>0.87"
Flow Length=179' Tc=1.3 min CN=73 Runoff=0.45 cfs 1,219 cf

Subcatchment 30S: SIDE DRIVEWAY Runoff Area=3,030 sf 37.76% Impervious Runoff Depth>0.40"
Flow Length=82' Tc=0.7 min CN=62 Runoff=0.03 cfs 102 cf

Subcatchment 40S: EASTERN REAR Runoff Area=6,029 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=110' Slope=0.0230 '/' Tc=1.7 min CN=39 Runoff=0.00 cfs 0 cf

Subcatchment 41S: EASTERN ROOF Runoff Area=2,400 sf 100.00% Impervious Runoff Depth>2.73"
Tc=1.0 min CN=98 Runoff=0.19 cfs 546 cf

Reach 1R: RAIL TRAIL Inflow=0.80 cfs 2,088 cf
Outflow=0.80 cfs 2,088 cf

Reach 2R: EASTERN ABUTTERS Inflow=0.00 cfs 87 cf
Outflow=0.00 cfs 87 cf

Reach 3R: TOTAL Inflow=0.80 cfs 2,175 cf
Outflow=0.80 cfs 2,175 cf

Reach 10R: RAIL TRAIL Inflow=0.43 cfs 488 cf
Outflow=0.43 cfs 488 cf

Reach 20R: EASTERN ABUTTERS Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 30R: TOTAL Inflow=0.43 cfs 488 cf
Outflow=0.43 cfs 488 cf

Pond 20P: RAINGARDEN Peak Elev=28.41' Storage=77 cf Inflow=0.45 cfs 1,219 cf
Discarded=0.03 cfs 654 cf Primary=0.17 cfs 385 cf Secondary=0.32 cfs 180 cf Outflow=0.51 cfs 1,219 cf

Pond 21P: PERF PIPE Peak Elev=25.38' Storage=22 cf Inflow=0.17 cfs 385 cf
Discarded=0.01 cfs 143 cf Primary=0.16 cfs 241 cf Outflow=0.18 cfs 385 cf

Pond 30P: DRYWELL Peak Elev=27.64' Storage=41 cf Inflow=0.03 cfs 102 cf
Discarded=0.00 cfs 81 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 81 cf

Pond 42P: CULTEC Peak Elev=26.08' Storage=141 cf Inflow=0.19 cfs 546 cf
Discarded=0.03 cfs 546 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 546 cf

Summary for Subcatchment 1S: NORTHERN AREA

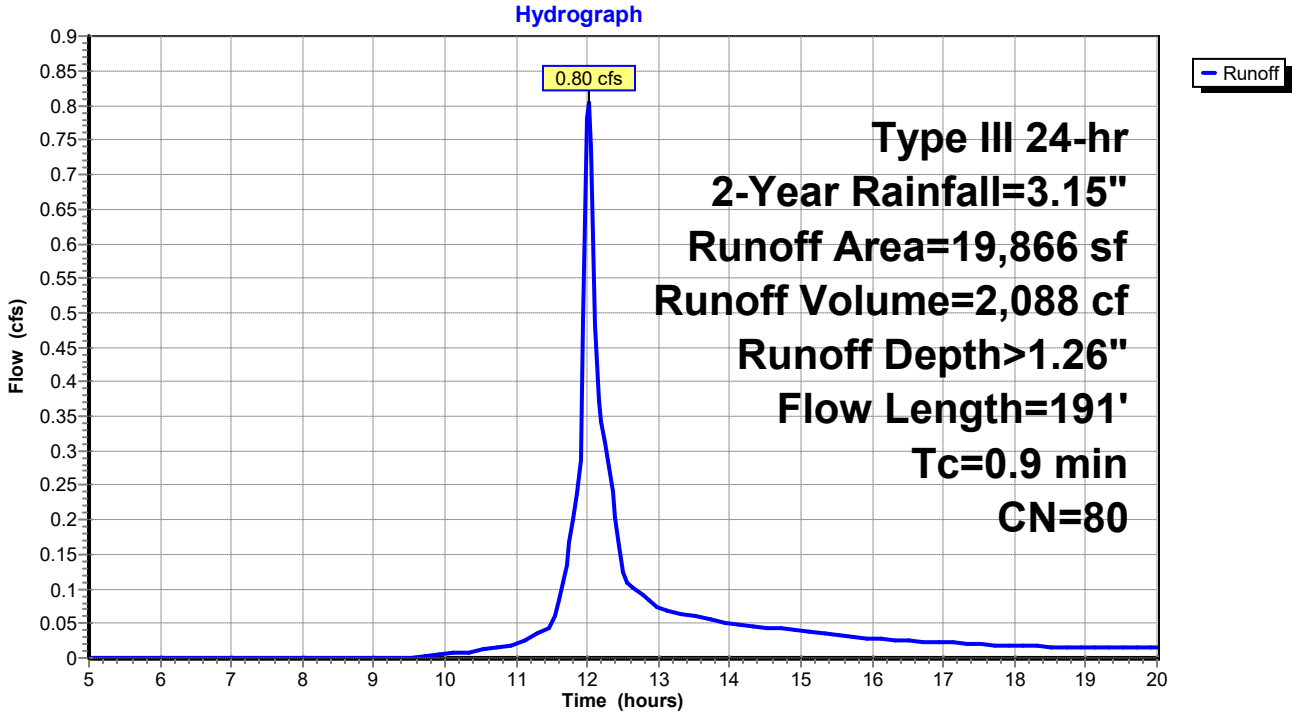
Runoff = 0.80 cfs @ 12.02 hrs, Volume= 2,088 cf, Depth> 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
10,583	98	Paved parking, HSG A
2,982	98	Roofs, HSG A
5,437	43	Woods/grass comb., Fair, HSG A
864	39	>75% Grass cover, Good, HSG A
19,866	80	Weighted Average
6,301		31.72% Pervious Area
13,565		68.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	176	0.0340	3.74		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.1	15	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.9	191	Total			

Subcatchment 1S: NORTHERN AREA



Summary for Subcatchment 2S: SOUTHERN AREA

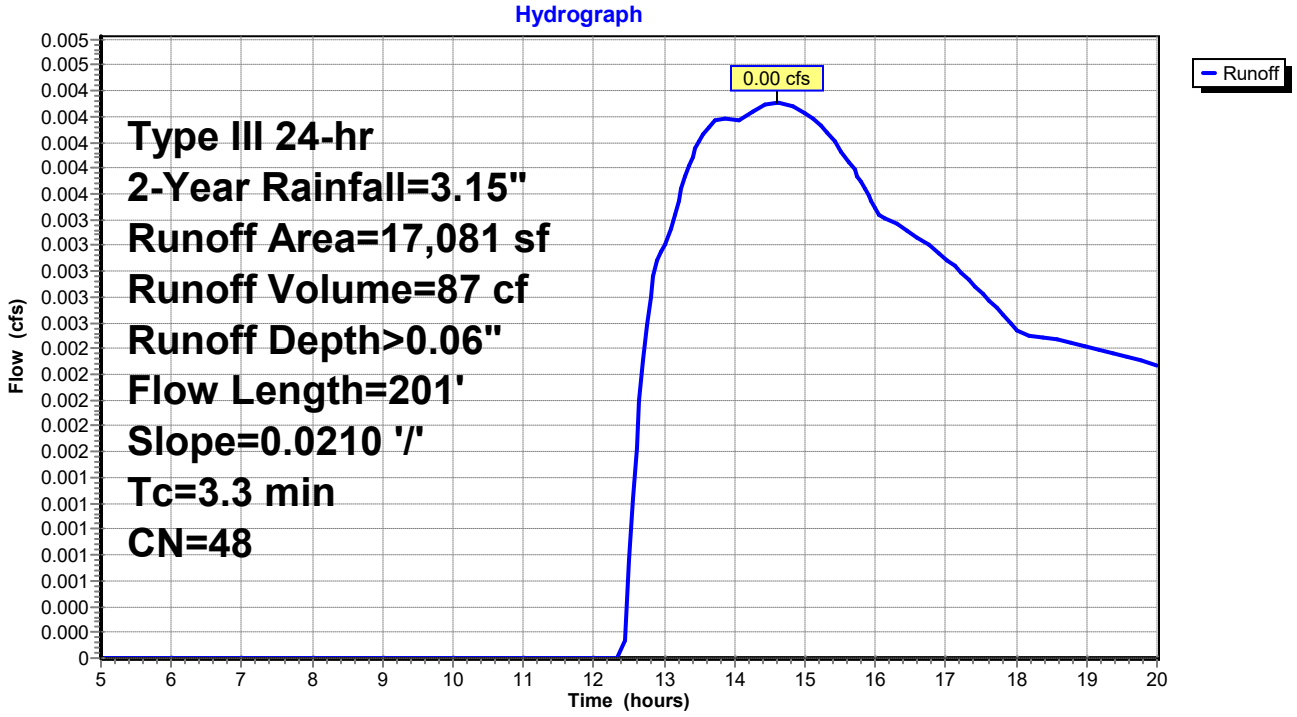
Runoff = 0.00 cfs @ 14.60 hrs, Volume= 87 cf, Depth> 0.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
52	98	Paved parking, HSG A
2,324	98	Roofs, HSG A
1,521	43	Woods/grass comb., Fair, HSG A
13,184	39	>75% Grass cover, Good, HSG A
17,081	48	Weighted Average
14,705		86.09% Pervious Area
2,376		13.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	201	0.0210	1.01		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 2S: SOUTHERN AREA



Summary for Subcatchment 10S: NW LAWN

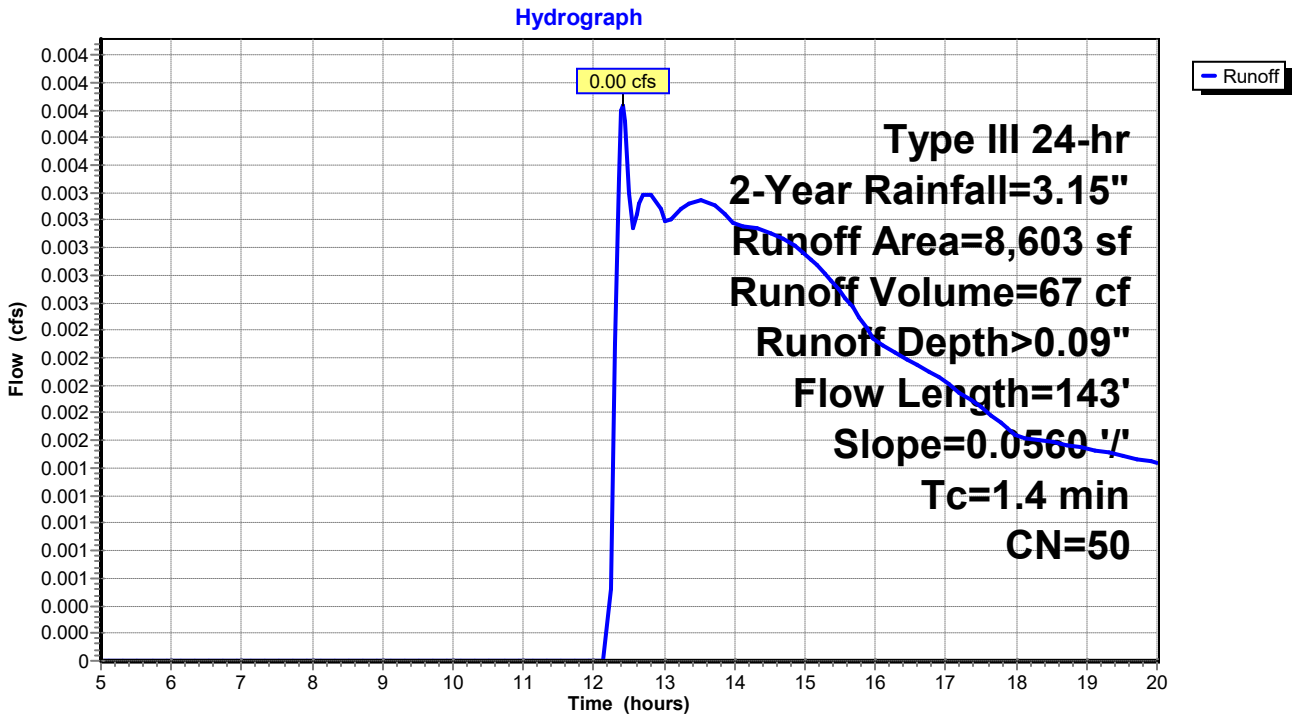
Runoff = 0.00 cfs @ 12.42 hrs, Volume= 67 cf, Depth> 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

	Area (sf)	CN	Description
	6,837	39	>75% Grass cover, Good, HSG A
	1,599	98	Roofs, HSG A
*	167	55	Permable pavers
	8,603	50	Weighted Average
	7,004		81.41% Pervious Area
	1,599		18.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	143	0.0560	1.66		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 10S: NW LAWN



Summary for Subcatchment 20S: ROADWAY

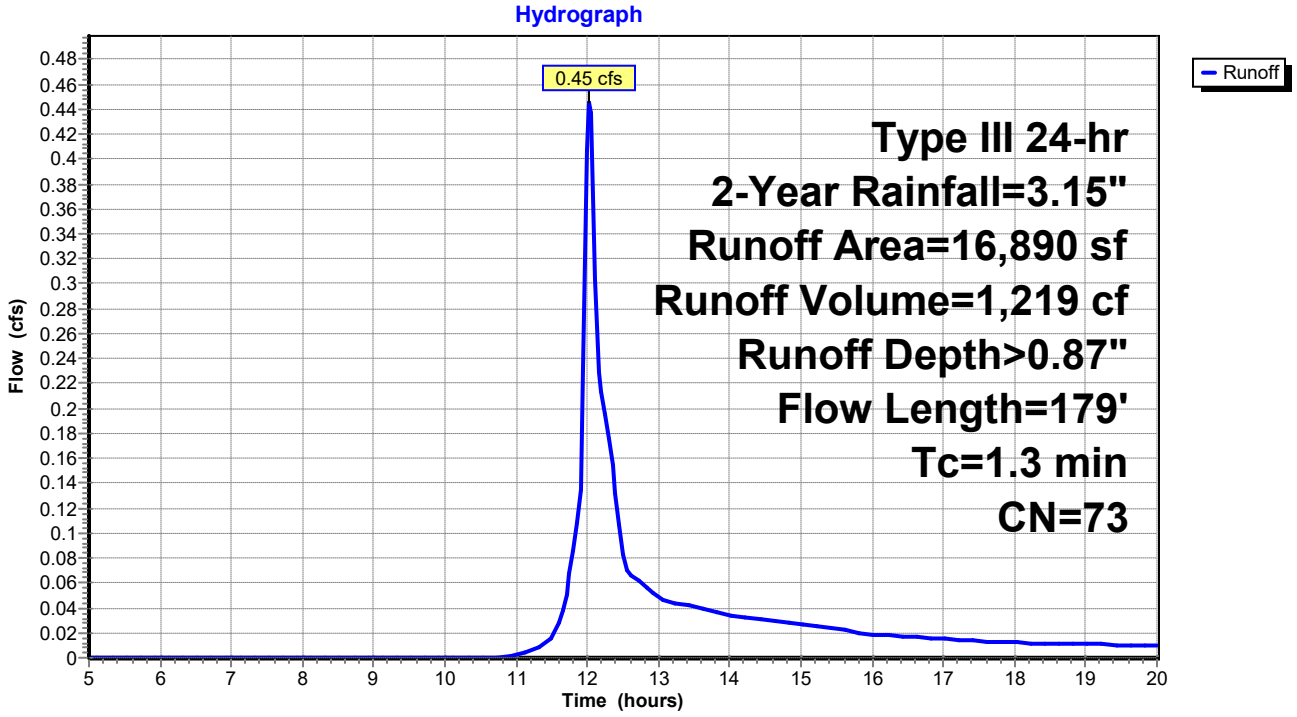
Runoff = 0.45 cfs @ 12.03 hrs, Volume= 1,219 cf, Depth> 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

	Area (sf)	CN	Description
	5,311	98	Paved parking, HSG A
	229	98	Unconnected pavement, HSG A
	6,781	39	>75% Grass cover, Good, HSG A
	3,925	98	Roofs, HSG A
*	644	55	Permeable pavers
	16,890	73	Weighted Average
	7,425		43.96% Pervious Area
	9,465		56.04% Impervious Area
	229		2.42% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	67	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.7	112	0.0160	2.57		**Shallow Concentrated Flow, Road** Paved Kv= 20.3 fps
1.3	179	Total			

Subcatchment 20S: ROADWAY



Summary for Subcatchment 30S: SIDE DRIVEWAY

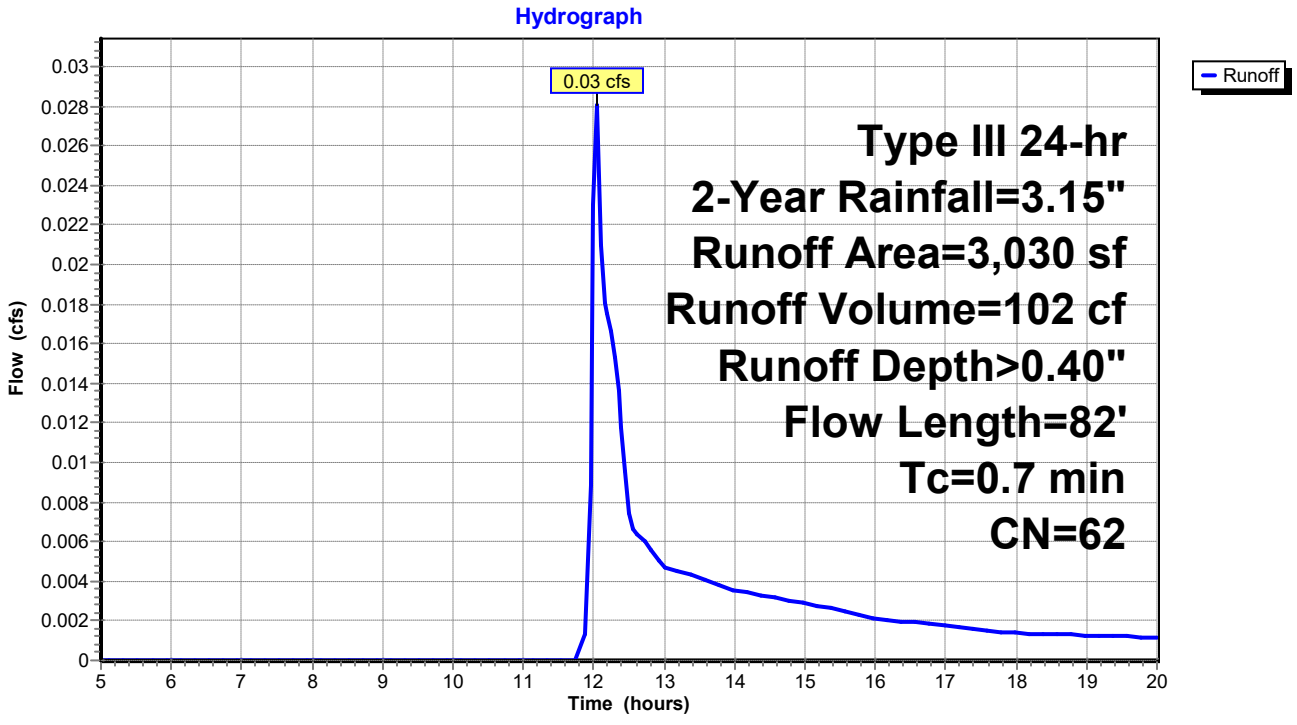
Runoff = 0.03 cfs @ 12.05 hrs, Volume= 102 cf, Depth> 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

	Area (sf)	CN	Description
	1,144	98	Paved parking, HSG A
	1,720	39	>75% Grass cover, Good, HSG A
*	166	55	Permeablea pavers
	3,030	62	Weighted Average
	1,886		62.24% Pervious Area
	1,144		37.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0520	1.60		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.2	34	0.0290	3.46		**Shallow Concentrated Flow, Driveway** Paved Kv= 20.3 fps
0.7	82	Total			

Subcatchment 30S: SIDE DRIVEWAY



Summary for Subcatchment 40S: EASTERN REAR

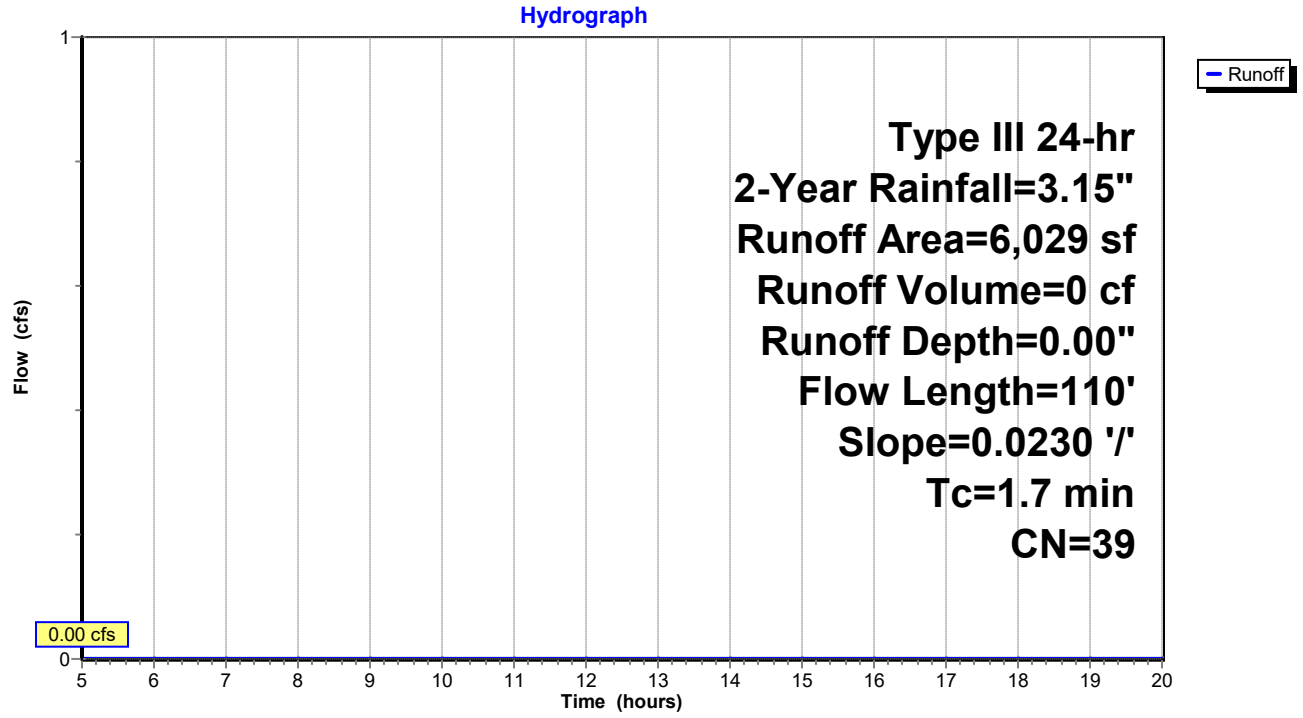
Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
6,029	39	>75% Grass cover, Good, HSG A
6,029		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	110	0.0230	1.06		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 40S: EASTERN REAR



Summary for Subcatchment 41S: EASTERN ROOF

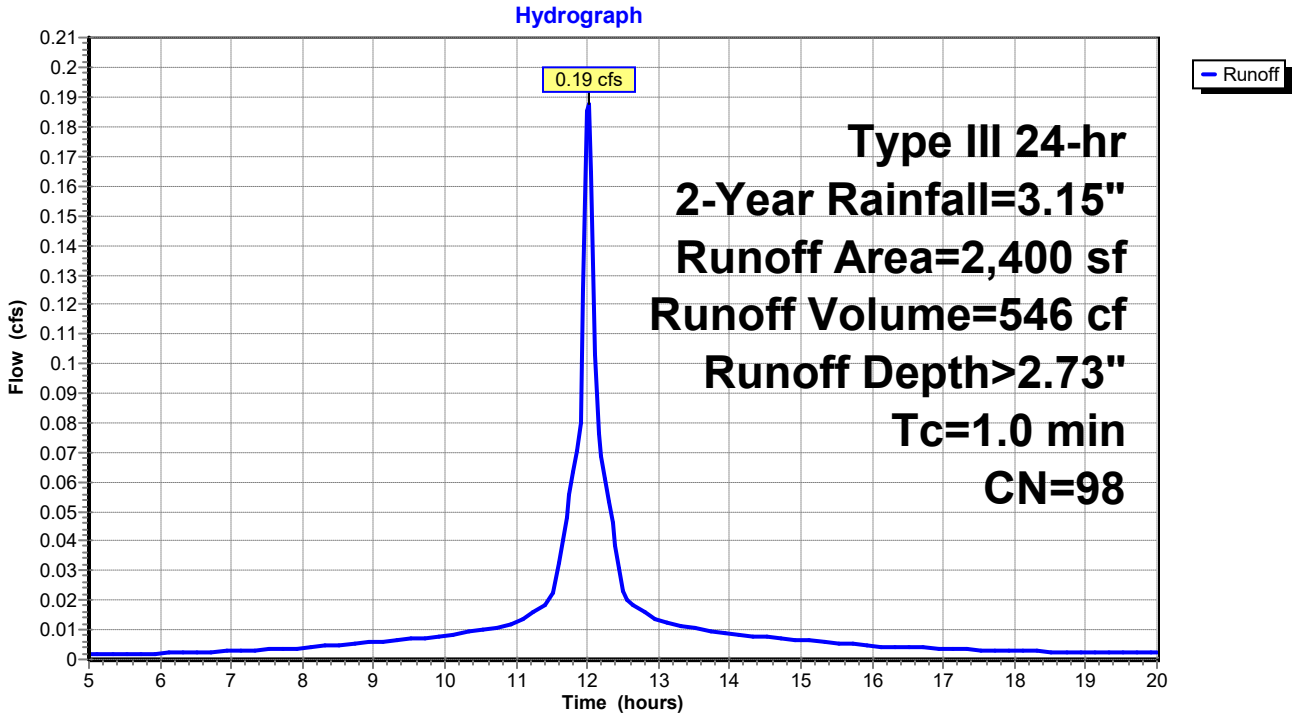
Runoff = 0.19 cfs @ 12.01 hrs, Volume= 546 cf, Depth> 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.15"

Area (sf)	CN	Description
2,400	98	Roofs, HSG A
2,400		100.00% Impervious Area

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

Subcatchment 41S: EASTERN ROOF

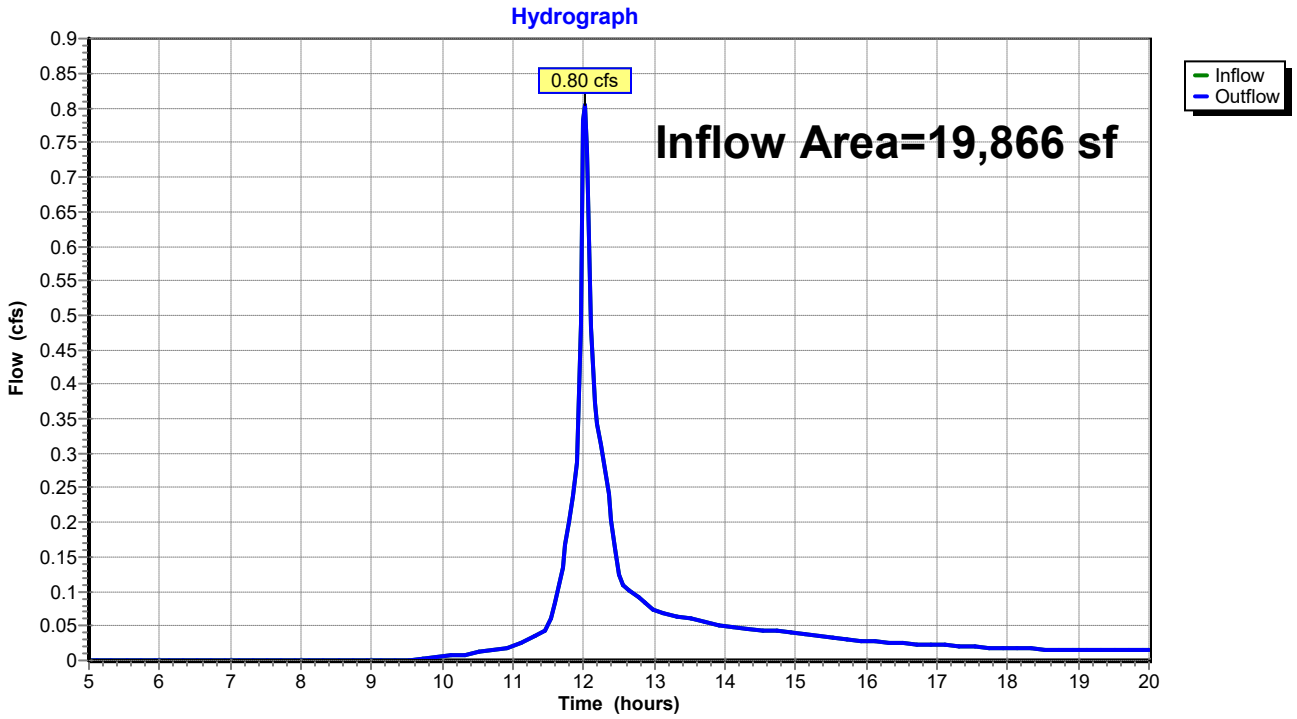


Summary for Reach 1R: RAIL TRAIL

Inflow Area = 19,866 sf, 68.28% Impervious, Inflow Depth > 1.26" for 2-Year event
Inflow = 0.80 cfs @ 12.02 hrs, Volume= 2,088 cf
Outflow = 0.80 cfs @ 12.02 hrs, Volume= 2,088 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 1R: RAIL TRAIL

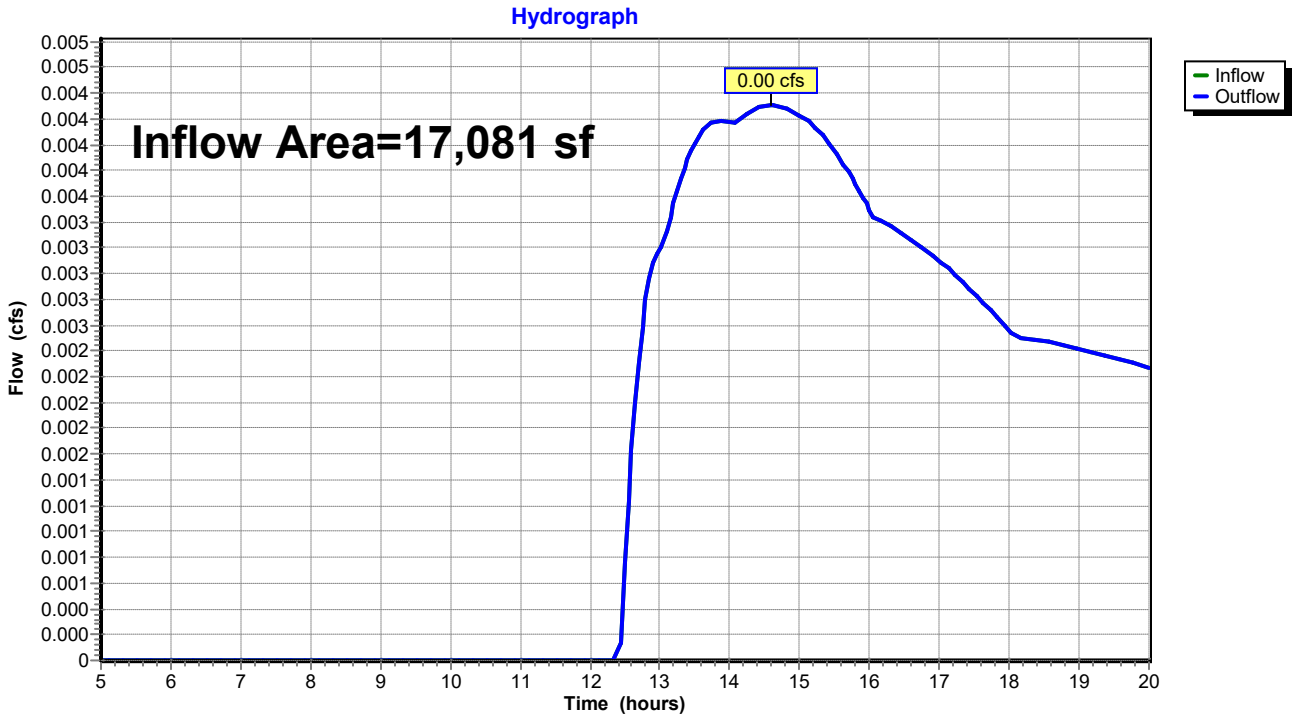


Summary for Reach 2R: EASTERN ABUTTERS

Inflow Area = 17,081 sf, 13.91% Impervious, Inflow Depth > 0.06" for 2-Year event
Inflow = 0.00 cfs @ 14.60 hrs, Volume= 87 cf
Outflow = 0.00 cfs @ 14.60 hrs, Volume= 87 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 2R: EASTERN ABUTTERS

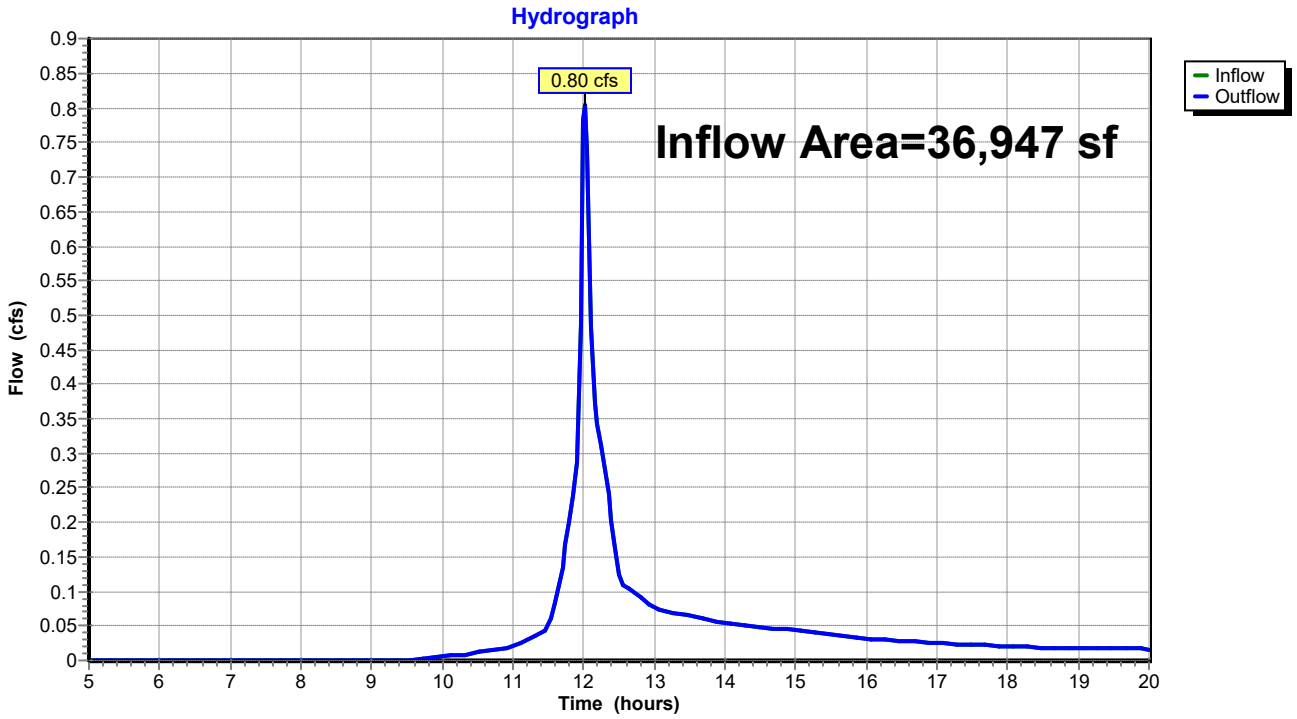


Summary for Reach 3R: TOTAL

Inflow Area = 36,947 sf, 43.15% Impervious, Inflow Depth > 0.71" for 2-Year event
Inflow = 0.80 cfs @ 12.02 hrs, Volume= 2,175 cf
Outflow = 0.80 cfs @ 12.02 hrs, Volume= 2,175 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 3R: TOTAL

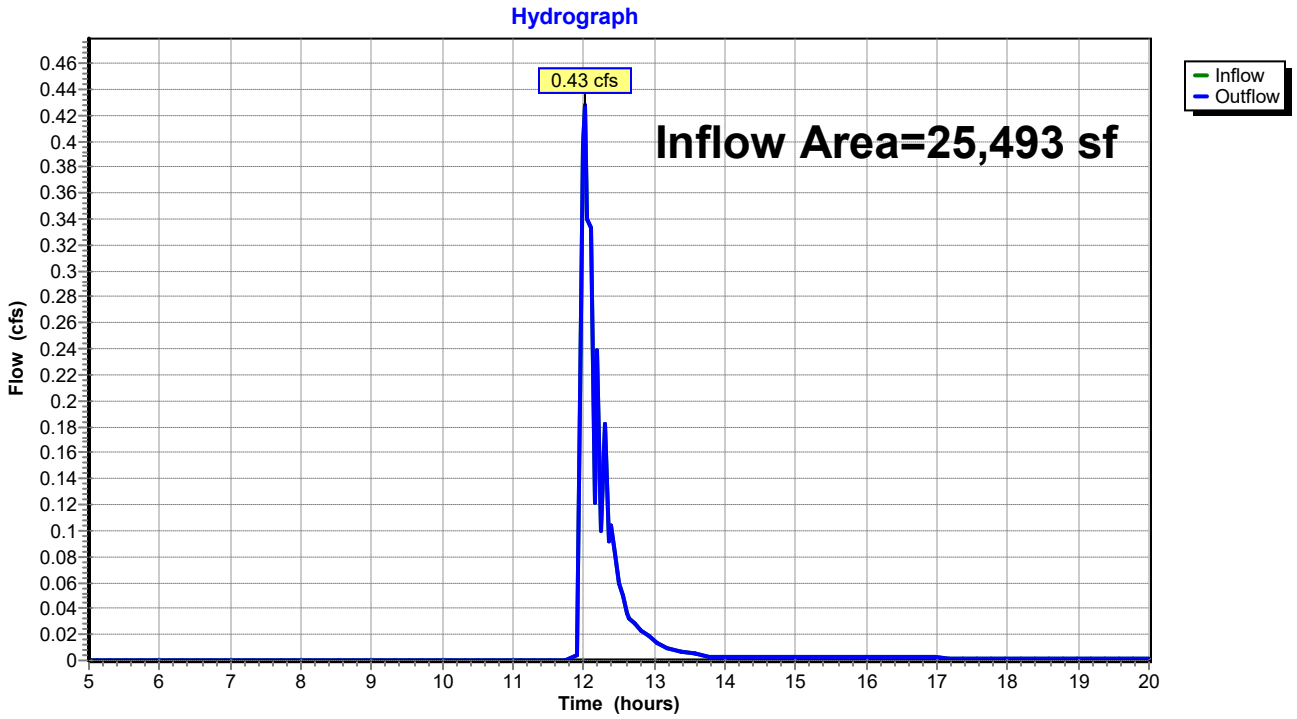


Summary for Reach 10R: RAIL TRAIL

Inflow Area = 25,493 sf, 43.40% Impervious, Inflow Depth > 0.23" for 2-Year event
Inflow = 0.43 cfs @ 12.02 hrs, Volume= 488 cf
Outflow = 0.43 cfs @ 12.02 hrs, Volume= 488 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 10R: RAIL TRAIL

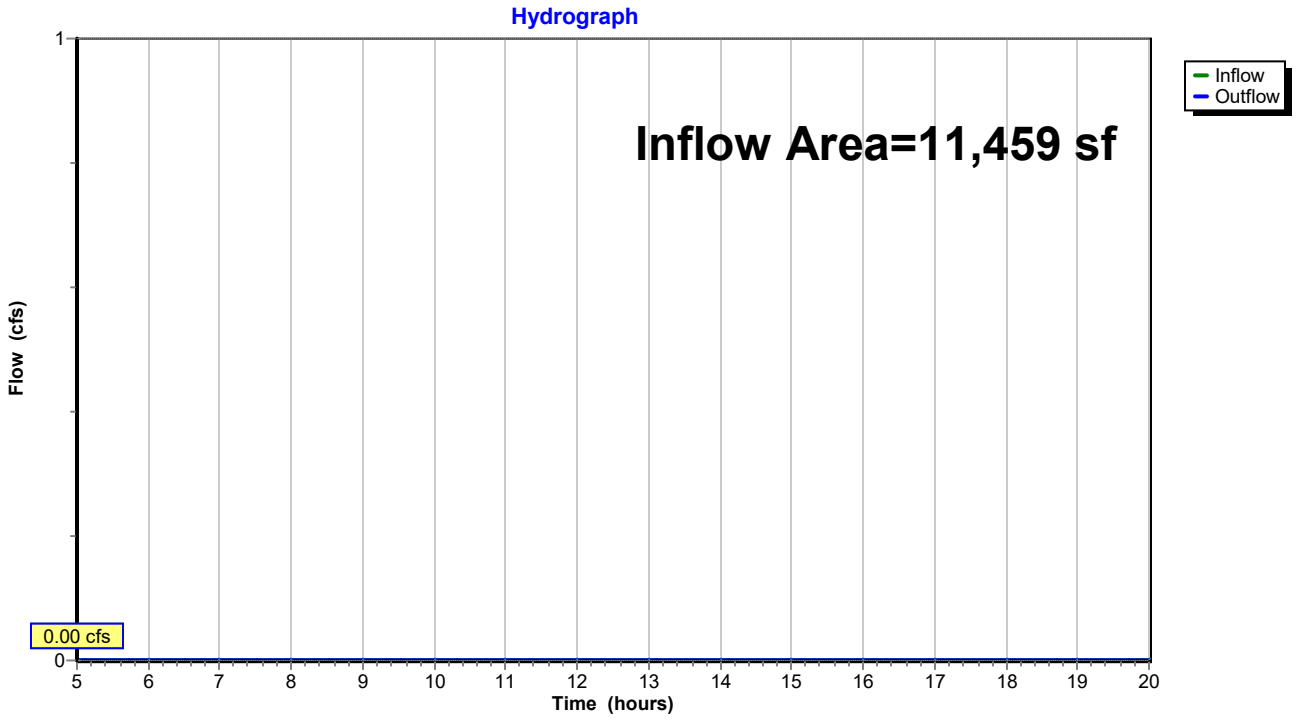


Summary for Reach 20R: EASTERN ABUTTERS

Inflow Area = 11,459 sf, 30.93% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 20R: EASTERN ABUTTERS

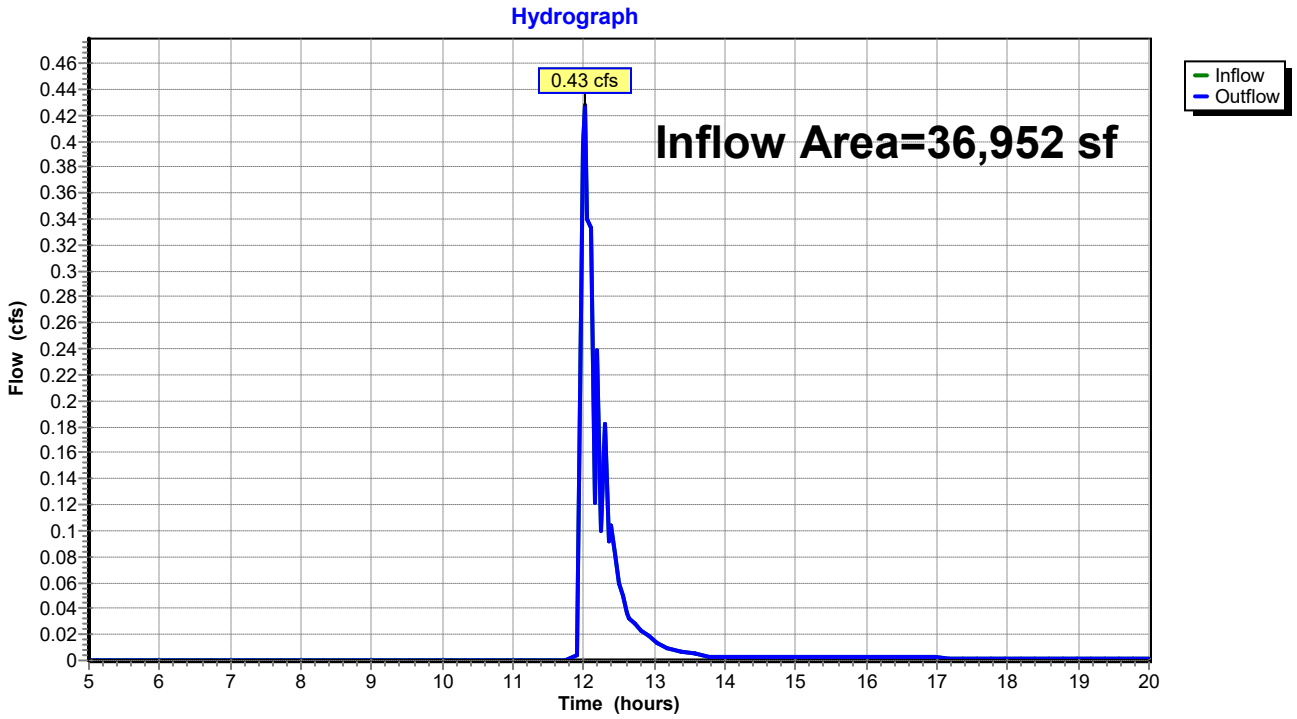


Summary for Reach 30R: TOTAL

Inflow Area = 36,952 sf, 39.53% Impervious, Inflow Depth > 0.16" for 2-Year event
Inflow = 0.43 cfs @ 12.02 hrs, Volume= 488 cf
Outflow = 0.43 cfs @ 12.02 hrs, Volume= 488 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 30R: TOTAL



Summary for Pond 20P: RAINGARDEN

Inflow Area = 16,890 sf, 56.04% Impervious, Inflow Depth > 0.87" for 2-Year event
Inflow = 0.45 cfs @ 12.03 hrs, Volume= 1,219 cf
Outflow = 0.51 cfs @ 12.01 hrs, Volume= 1,219 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.03 cfs @ 12.00 hrs, Volume= 654 cf
Primary = 0.17 cfs @ 12.01 hrs, Volume= 385 cf
Secondary = 0.32 cfs @ 12.01 hrs, Volume= 180 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 28.41' @ 12.01 hrs Surf.Area= 142 sf Storage= 77 cf

Plug-Flow detention time= 15.9 min calculated for 1,215 cf (100% of inflow)
Center-of-Mass det. time= 15.7 min (833.7 - 818.0)

Volume	Invert	Avail.Storage	Storage Description
#1	27.68'	77 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
27.68	89	51.0	0	0	89
28.35	142	57.0	77	77	152

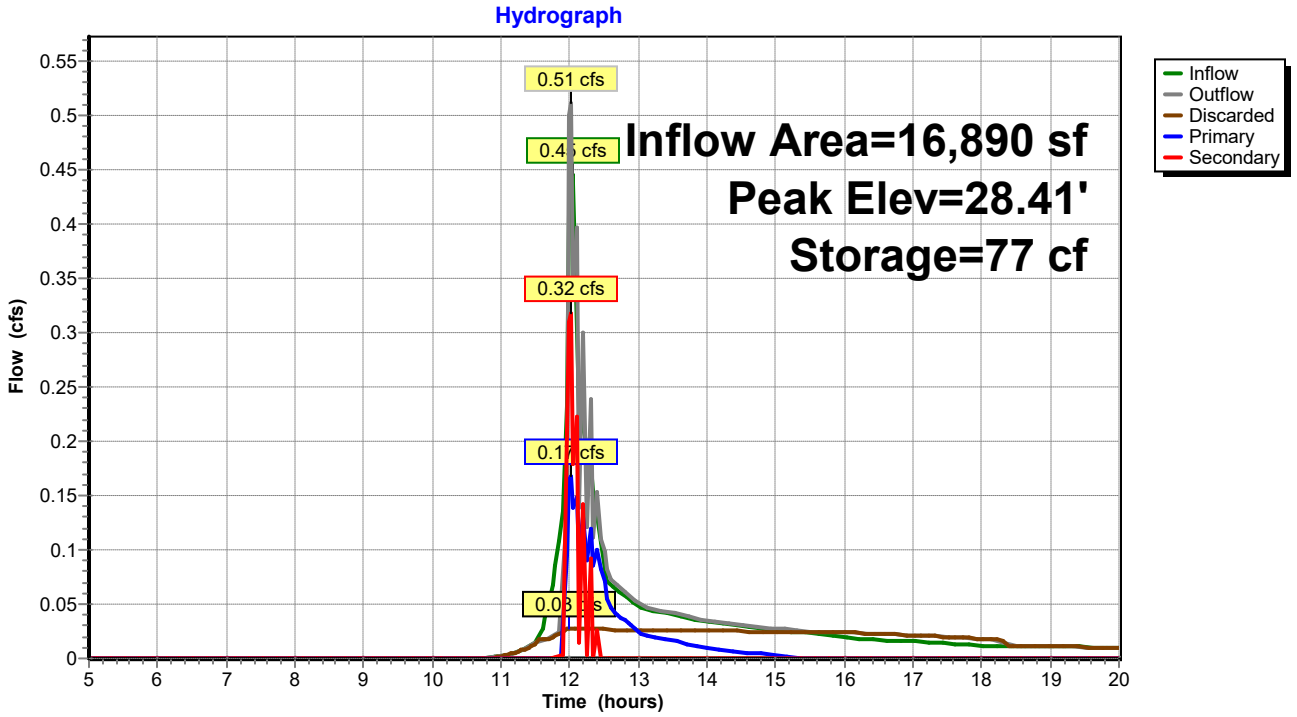
Device	Routing	Invert	Outlet Devices
#1	Discarded	27.68'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	28.18'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Secondary	28.34'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.03 cfs @ 12.00 hrs HW=28.40' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.16 cfs @ 12.01 hrs HW=28.40' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.16 cfs @ 1.59 fps)

Secondary OutFlow Max=0.28 cfs @ 12.01 hrs HW=28.40' (Free Discharge)
↑—**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.28 cfs @ 0.79 fps)

Pond 20P: RAINGARDEN



Summary for Pond 21P: PERF PIPE

Inflow Area = 16,890 sf, 56.04% Impervious, Inflow Depth = 0.27" for 2-Year event
Inflow = 0.17 cfs @ 12.01 hrs, Volume= 385 cf
Outflow = 0.18 cfs @ 12.05 hrs, Volume= 385 cf, Atten= 0%, Lag= 2.6 min
Discarded = 0.01 cfs @ 11.95 hrs, Volume= 143 cf
Primary = 0.16 cfs @ 12.05 hrs, Volume= 241 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 25.38' @ 12.06 hrs Surf.Area= 75 sf Storage= 22 cf

Plug-Flow detention time= 6.0 min calculated for 383 cf (100% of inflow)
Center-of-Mass det. time= 6.0 min (762.8 - 756.8)

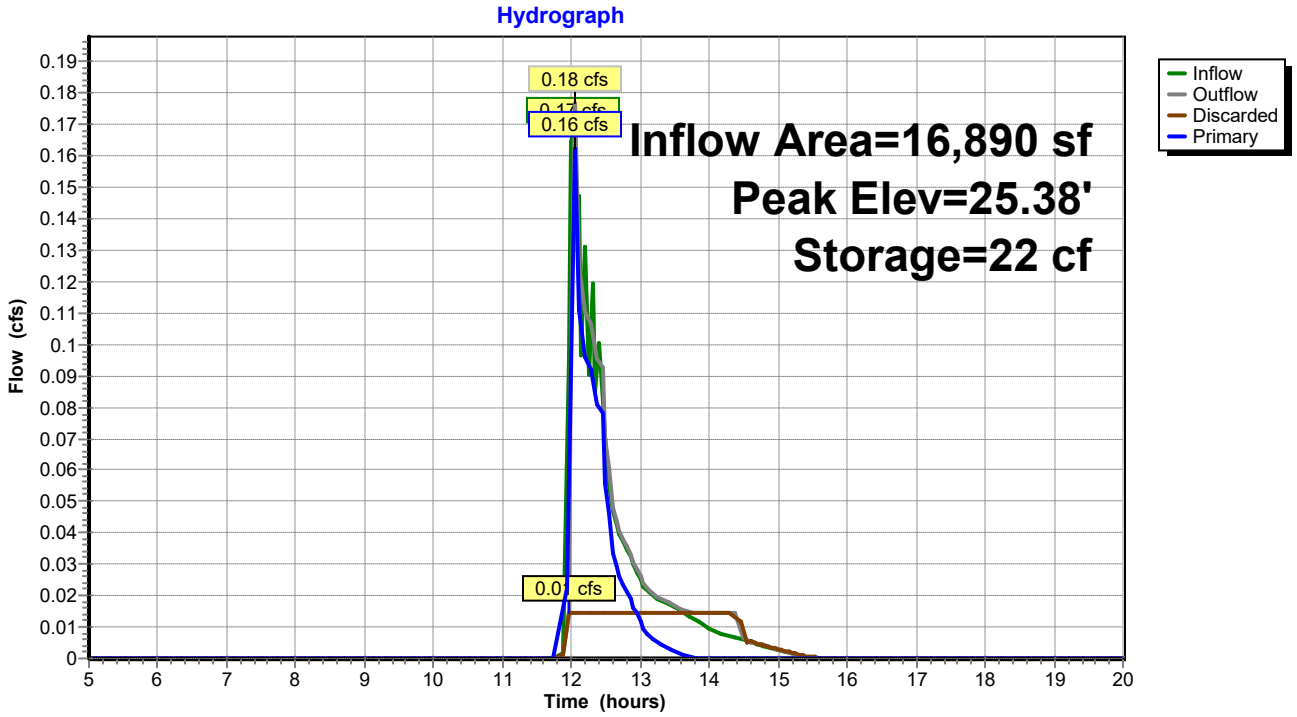
Volume	Invert	Avail.Storage	Storage Description
#1	25.18'	20 cf	**12.0" Round Pipe Storage** Inside #2 L= 25.0'
#2	24.68'	52 cf	**3.00'W x 25.00'L x 2.00'H Prismatoid** 150 cf Overall - 20 cf Embedded = 130 cf x 40.0% Voids
		72 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.68'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	25.18'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.01 cfs @ 11.95 hrs HW=24.93' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.16 cfs @ 12.05 hrs HW=25.37' (Free Discharge)
2=Orifice/Grate (Orifice Controls 0.16 cfs @ 1.49 fps)

Pond 21P: PERF PIPE



Summary for Pond 30P: DRYWELL

Inflow Area = 3,030 sf, 37.76% Impervious, Inflow Depth > 0.40" for 2-Year event
Inflow = 0.03 cfs @ 12.05 hrs, Volume= 102 cf
Outflow = 0.00 cfs @ 11.95 hrs, Volume= 81 cf, Atten= 90%, Lag= 0.0 min
Discarded = 0.00 cfs @ 11.95 hrs, Volume= 81 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 27.64' @ 15.19 hrs Surf.Area= 14 sf Storage= 41 cf

Plug-Flow detention time= 165.5 min calculated for 80 cf (79% of inflow)
Center-of-Mass det. time= 107.3 min (958.0 - 850.7)

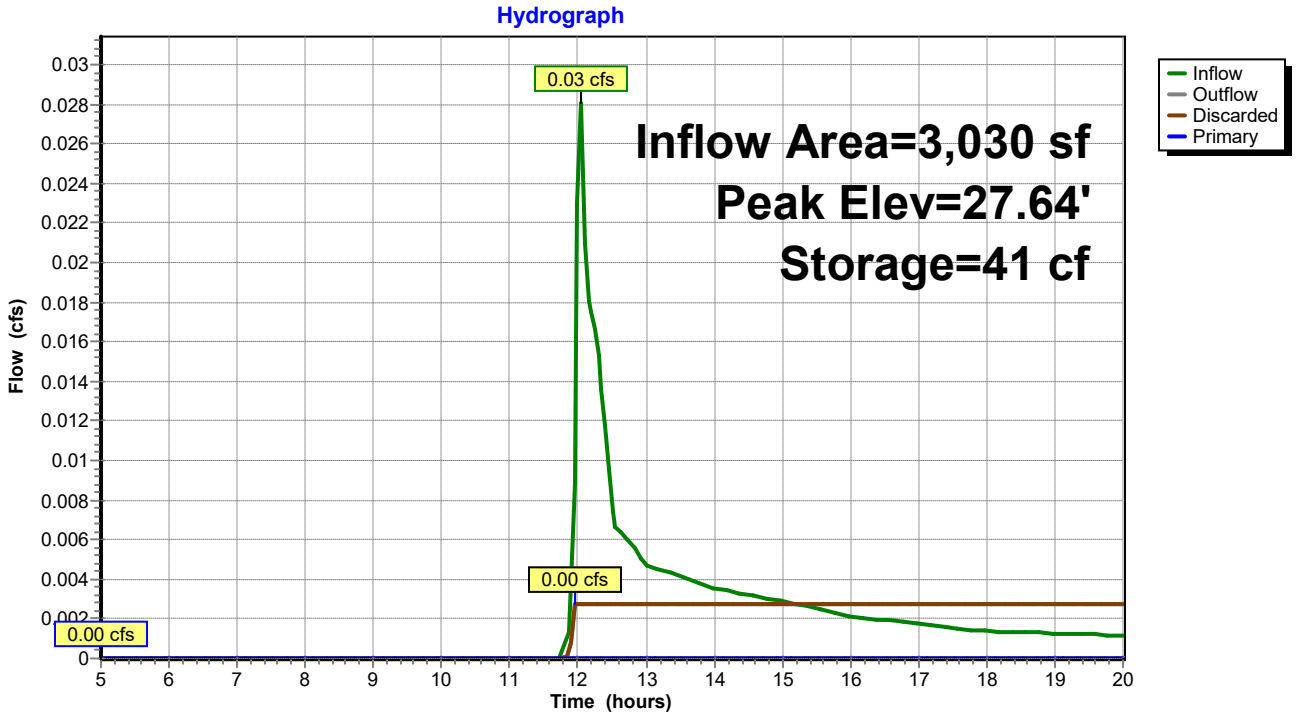
Volume	Invert	Avail.Storage	Storage Description
#1	24.82'	58 cf	**3.60'W x 4.00'L x 4.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.82'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	27.82'	**5.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	28.00'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 11.95 hrs HW=24.88' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=24.82' (Free Discharge)
├**2=Orifice/Grate** (Controls 0.00 cfs)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Pond 30P: DRYWELL



Summary for Pond 42P: CULTEC

Inflow Area = 2,400 sf,100.00% Impervious, Inflow Depth > 2.73" for 2-Year event
Inflow = 0.19 cfs @ 12.01 hrs, Volume= 546 cf
Outflow = 0.03 cfs @ 11.65 hrs, Volume= 546 cf, Atten= 83%, Lag= 0.0 min
Discarded = 0.03 cfs @ 11.65 hrs, Volume= 546 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 26.08' @ 12.44 hrs Surf.Area= 168 sf Storage= 141 cf

Plug-Flow detention time= 24.5 min calculated for 544 cf (100% of inflow)
Center-of-Mass det. time= 24.1 min (759.1 - 735.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.50'	229 cf	**16.00'W x 10.50'L x 4.54'H Field A** 763 cf Overall - 190 cf Embedded = 573 cf x 40.0% Voids
#2A	25.50'	190 cf	**Cultec R-330XLHD** x 3 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		419 cf	Total Available Storage

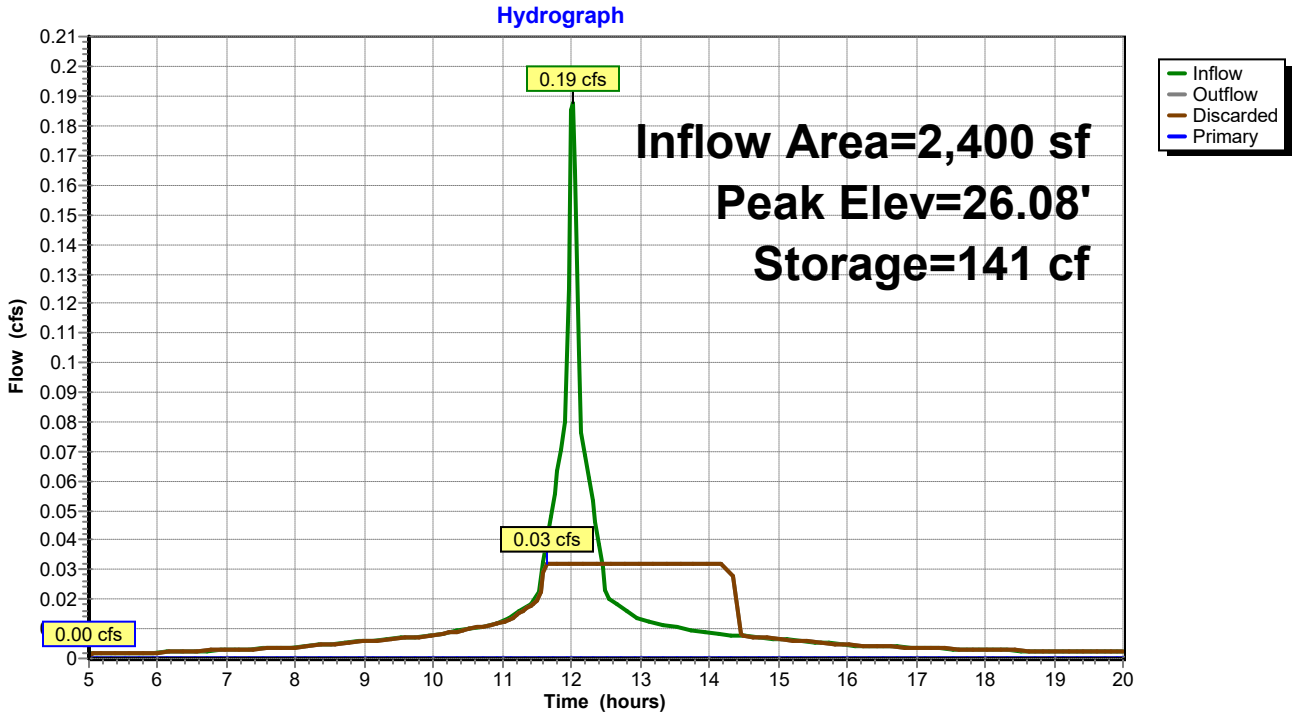
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	26.99'	**4.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#2	Discarded	24.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 11.65 hrs HW=24.56' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=24.50' (Free Discharge)
↑**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 42P: CULTEC



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: NORTHERN AREA Runoff Area=19,866 sf 68.28% Impervious Runoff Depth>2.57"
Flow Length=191' Tc=0.9 min CN=80 Runoff=1.64 cfs 4,249 cf

Subcatchment 2S: SOUTHERN AREA Runoff Area=17,081 sf 13.91% Impervious Runoff Depth>0.45"
Flow Length=201' Slope=0.0210 '/' Tc=3.3 min CN=48 Runoff=0.13 cfs 645 cf

Subcatchment 10S: NW LAWN Runoff Area=8,603 sf 18.59% Impervious Runoff Depth>0.54"
Flow Length=143' Slope=0.0560 '/' Tc=1.4 min CN=50 Runoff=0.10 cfs 391 cf

Subcatchment 20S: ROADWAY Runoff Area=16,890 sf 56.04% Impervious Runoff Depth>1.99"
Flow Length=179' Tc=1.3 min CN=73 Runoff=1.06 cfs 2,799 cf

Subcatchment 30S: SIDE DRIVEWAY Runoff Area=3,030 sf 37.76% Impervious Runoff Depth>1.21"
Flow Length=82' Tc=0.7 min CN=62 Runoff=0.11 cfs 306 cf

Subcatchment 40S: EASTERN REAR Runoff Area=6,029 sf 0.00% Impervious Runoff Depth>0.13"
Flow Length=110' Slope=0.0230 '/' Tc=1.7 min CN=39 Runoff=0.00 cfs 65 cf

Subcatchment 41S: EASTERN ROOF Runoff Area=2,400 sf 100.00% Impervious Runoff Depth>4.26"
Tc=1.0 min CN=98 Runoff=0.29 cfs 853 cf

Reach 1R: RAIL TRAIL Inflow=1.64 cfs 4,249 cf
Outflow=1.64 cfs 4,249 cf

Reach 2R: EASTERN ABUTTERS Inflow=0.13 cfs 645 cf
Outflow=0.13 cfs 645 cf

Reach 3R: TOTAL Inflow=1.68 cfs 4,894 cf
Outflow=1.68 cfs 4,894 cf

Reach 10R: RAIL TRAIL Inflow=1.10 cfs 1,992 cf
Outflow=1.10 cfs 1,992 cf

Reach 20R: EASTERN ABUTTERS Inflow=0.13 cfs 266 cf
Outflow=0.13 cfs 266 cf

Reach 30R: TOTAL Inflow=1.21 cfs 2,258 cf
Outflow=1.21 cfs 2,258 cf

Pond 20P: RAINGARDEN Peak Elev=28.46' Storage=77 cf Inflow=1.06 cfs 2,799 cf
Discarded=0.03 cfs 877 cf Primary=0.25 cfs 1,080 cf Secondary=0.79 cfs 807 cf Outflow=1.07 cfs 2,764 cf

Pond 21P: PERF PIPE Peak Elev=25.42' Storage=24 cf Inflow=0.25 cfs 1,080 cf
Discarded=0.01 cfs 286 cf Primary=0.23 cfs 794 cf Outflow=0.25 cfs 1,080 cf

Pond 30P: DRYWELL Peak Elev=28.02' Storage=46 cf Inflow=0.11 cfs 306 cf
Discarded=0.00 cfs 86 cf Primary=0.13 cfs 177 cf Outflow=0.13 cfs 263 cf

Pond 42P: CULTEC Peak Elev=27.01' Storage=254 cf Inflow=0.29 cfs 853 cf
Discarded=0.03 cfs 829 cf Primary=0.05 cfs 23 cf Outflow=0.09 cfs 853 cf

Summary for Subcatchment 1S: NORTHERN AREA

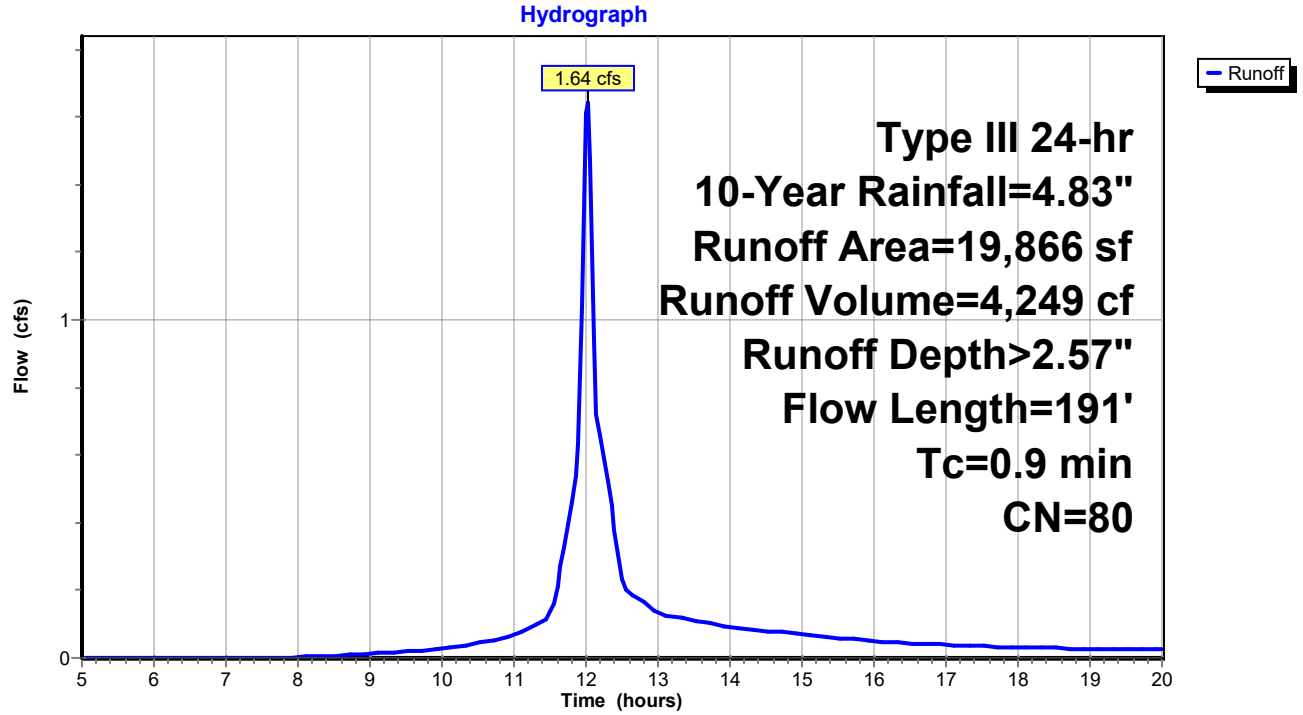
Runoff = 1.64 cfs @ 12.02 hrs, Volume= 4,249 cf, Depth> 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
10,583	98	Paved parking, HSG A
2,982	98	Roofs, HSG A
5,437	43	Woods/grass comb., Fair, HSG A
864	39	>75% Grass cover, Good, HSG A
19,866	80	Weighted Average
6,301		31.72% Pervious Area
13,565		68.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	176	0.0340	3.74		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.1	15	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.9	191	Total			

Subcatchment 1S: NORTHERN AREA



Summary for Subcatchment 2S: SOUTHERN AREA

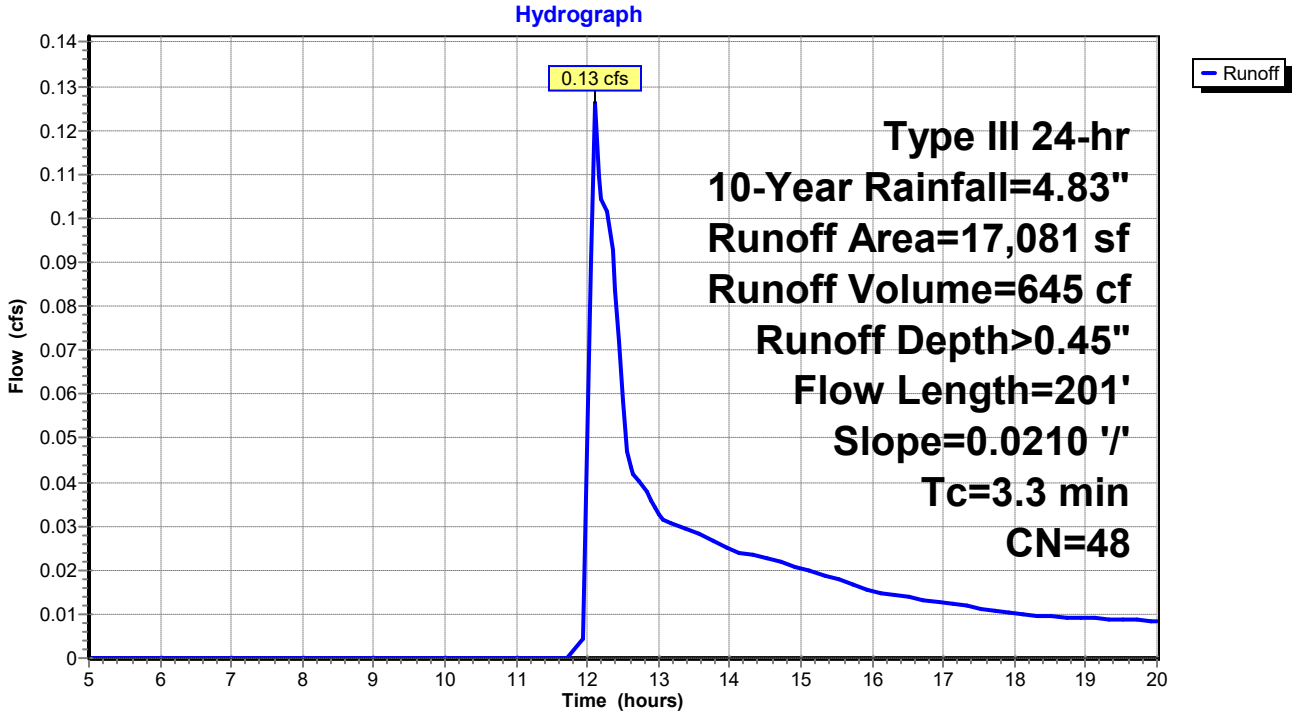
Runoff = 0.13 cfs @ 12.11 hrs, Volume= 645 cf, Depth> 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
52	98	Paved parking, HSG A
2,324	98	Roofs, HSG A
1,521	43	Woods/grass comb., Fair, HSG A
13,184	39	>75% Grass cover, Good, HSG A
17,081	48	Weighted Average
14,705		86.09% Pervious Area
2,376		13.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	201	0.0210	1.01		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 2S: SOUTHERN AREA



Summary for Subcatchment 10S: NW LAWN

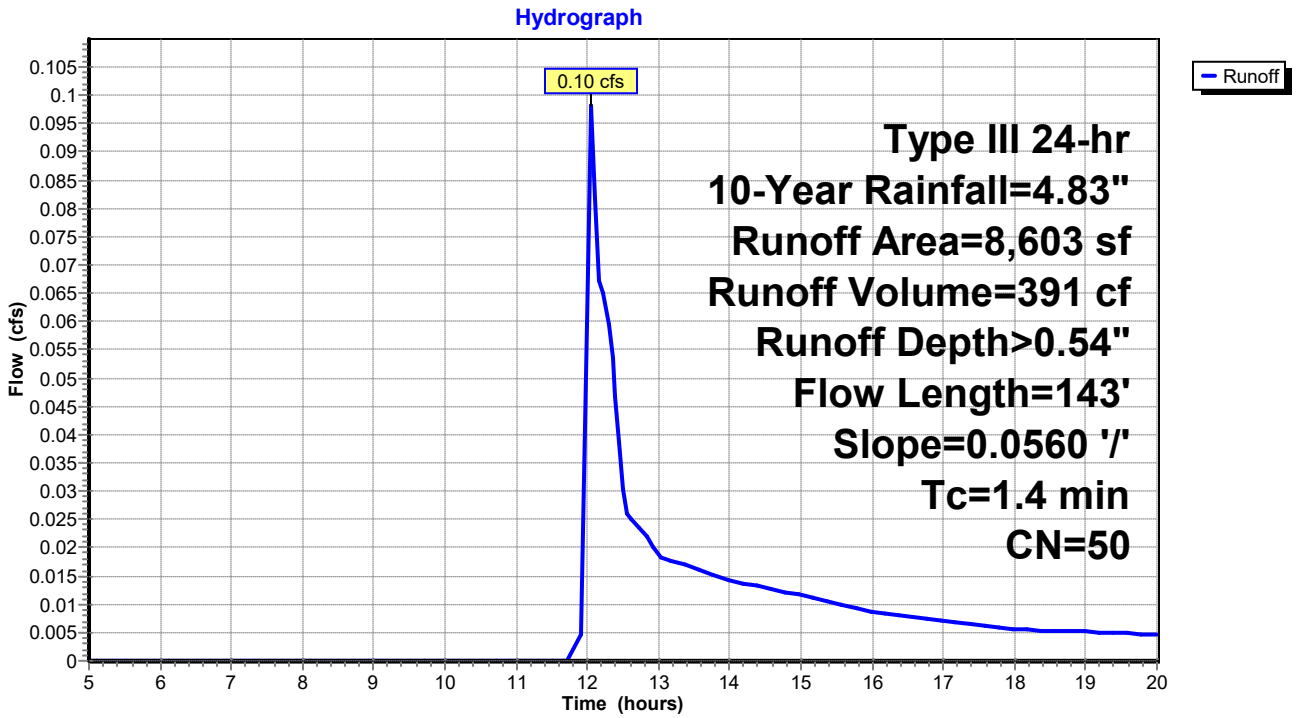
Runoff = 0.10 cfs @ 12.06 hrs, Volume= 391 cf, Depth> 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

	Area (sf)	CN	Description
	6,837	39	>75% Grass cover, Good, HSG A
	1,599	98	Roofs, HSG A
*	167	55	Permable pavers
	8,603	50	Weighted Average
	7,004		81.41% Pervious Area
	1,599		18.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	143	0.0560	1.66		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 10S: NW LAWN



Summary for Subcatchment 20S: ROADWAY

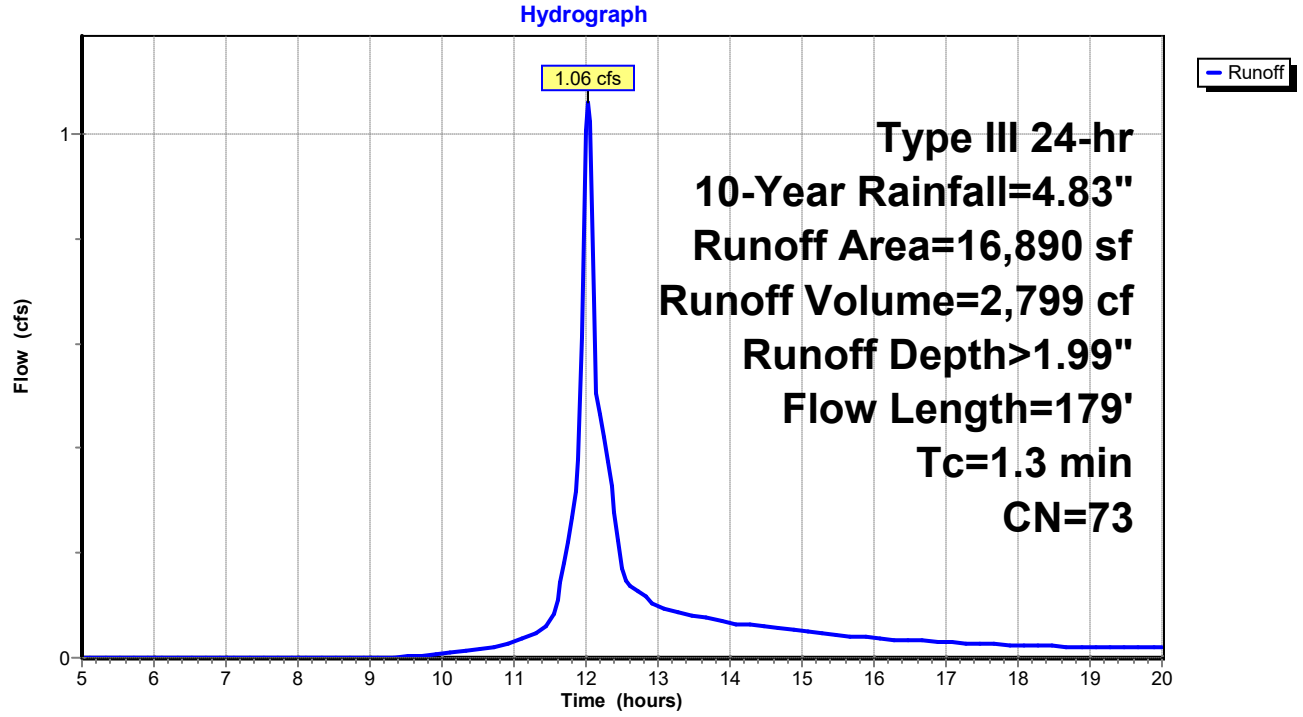
Runoff = 1.06 cfs @ 12.03 hrs, Volume= 2,799 cf, Depth> 1.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

	Area (sf)	CN	Description
	5,311	98	Paved parking, HSG A
	229	98	Unconnected pavement, HSG A
	6,781	39	>75% Grass cover, Good, HSG A
	3,925	98	Roofs, HSG A
*	644	55	Permeable pavers
	16,890	73	Weighted Average
	7,425		43.96% Pervious Area
	9,465		56.04% Impervious Area
	229		2.42% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	67	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.7	112	0.0160	2.57		**Shallow Concentrated Flow, Road** Paved Kv= 20.3 fps
1.3	179	Total			

Subcatchment 20S: ROADWAY



Summary for Subcatchment 30S: SIDE DRIVEWAY

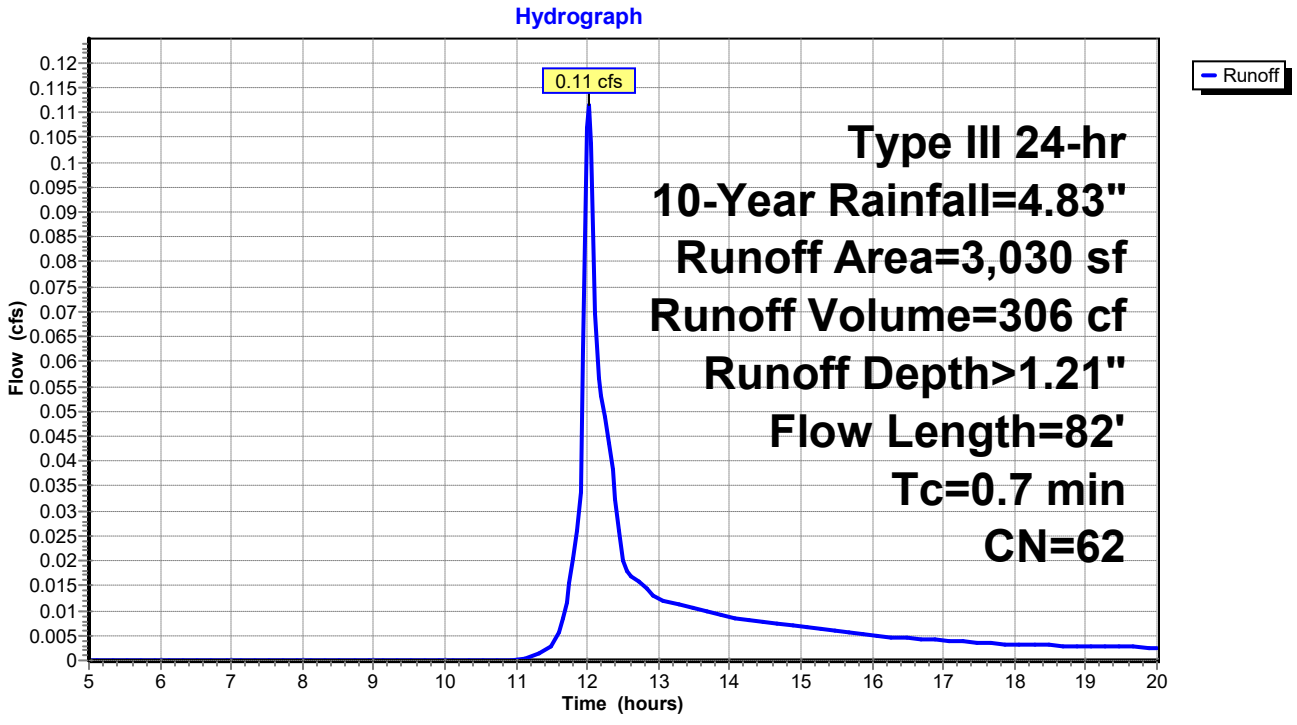
Runoff = 0.11 cfs @ 12.02 hrs, Volume= 306 cf, Depth> 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

	Area (sf)	CN	Description
	1,144	98	Paved parking, HSG A
	1,720	39	>75% Grass cover, Good, HSG A
*	166	55	Permeablea pavers
	3,030	62	Weighted Average
	1,886		62.24% Pervious Area
	1,144		37.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0520	1.60		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.2	34	0.0290	3.46		**Shallow Concentrated Flow, Driveway** Paved Kv= 20.3 fps
0.7	82	Total			

Subcatchment 30S: SIDE DRIVEWAY



Summary for Subcatchment 40S: EASTERN REAR

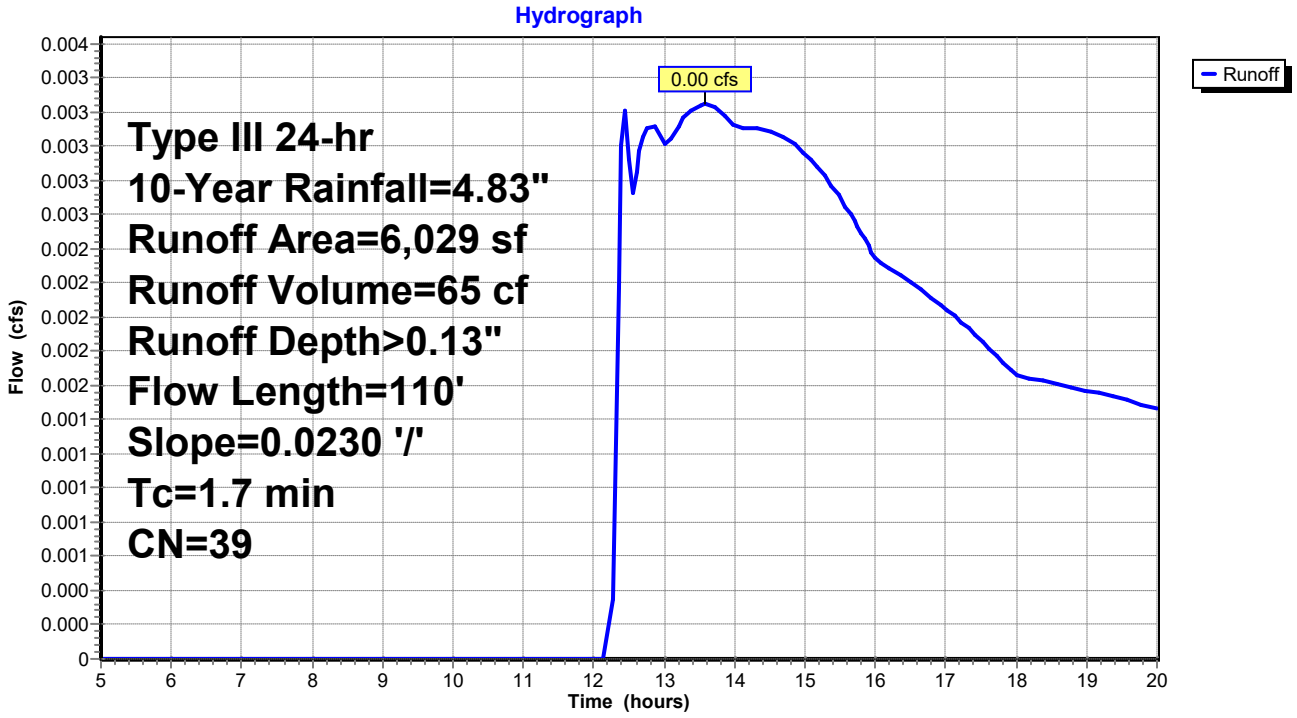
Runoff = 0.00 cfs @ 13.58 hrs, Volume= 65 cf, Depth> 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
6,029	39	>75% Grass cover, Good, HSG A
6,029		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	110	0.0230	1.06		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 40S: EASTERN REAR



Summary for Subcatchment 41S: EASTERN ROOF

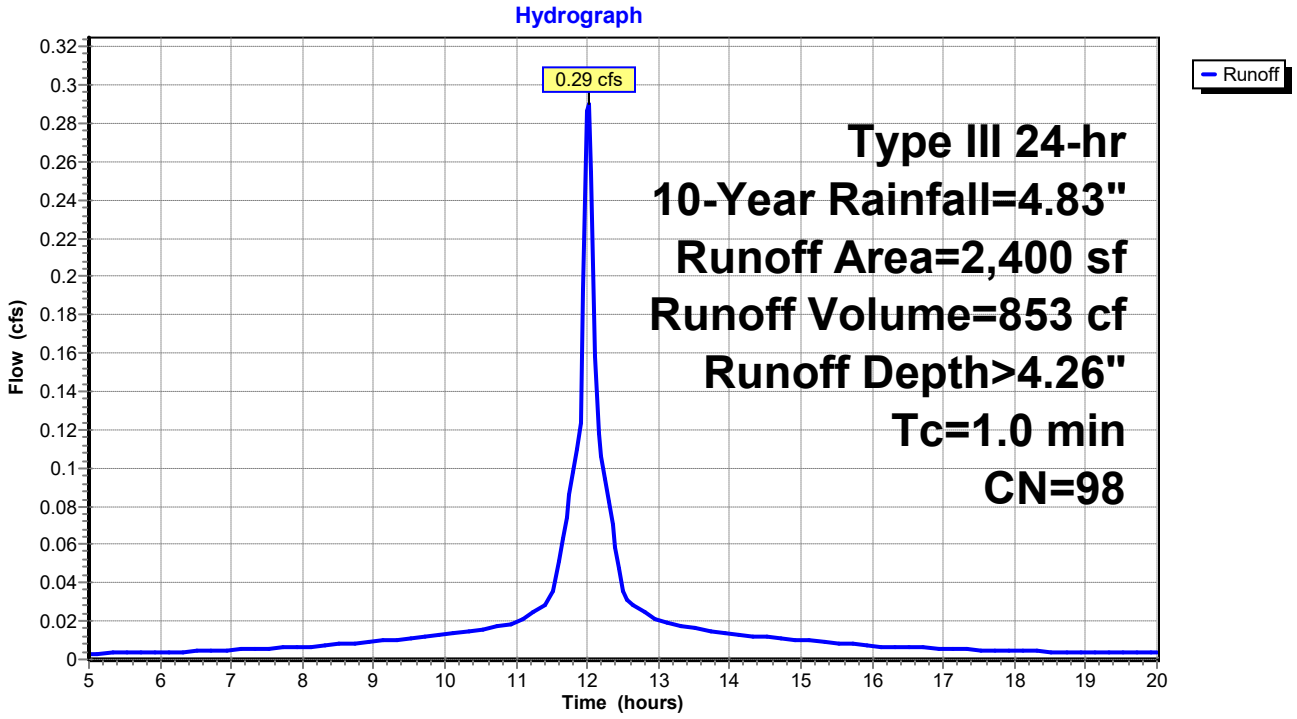
Runoff = 0.29 cfs @ 12.01 hrs, Volume= 853 cf, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (sf)	CN	Description
2,400	98	Roofs, HSG A
2,400		100.00% Impervious Area

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

Subcatchment 41S: EASTERN ROOF

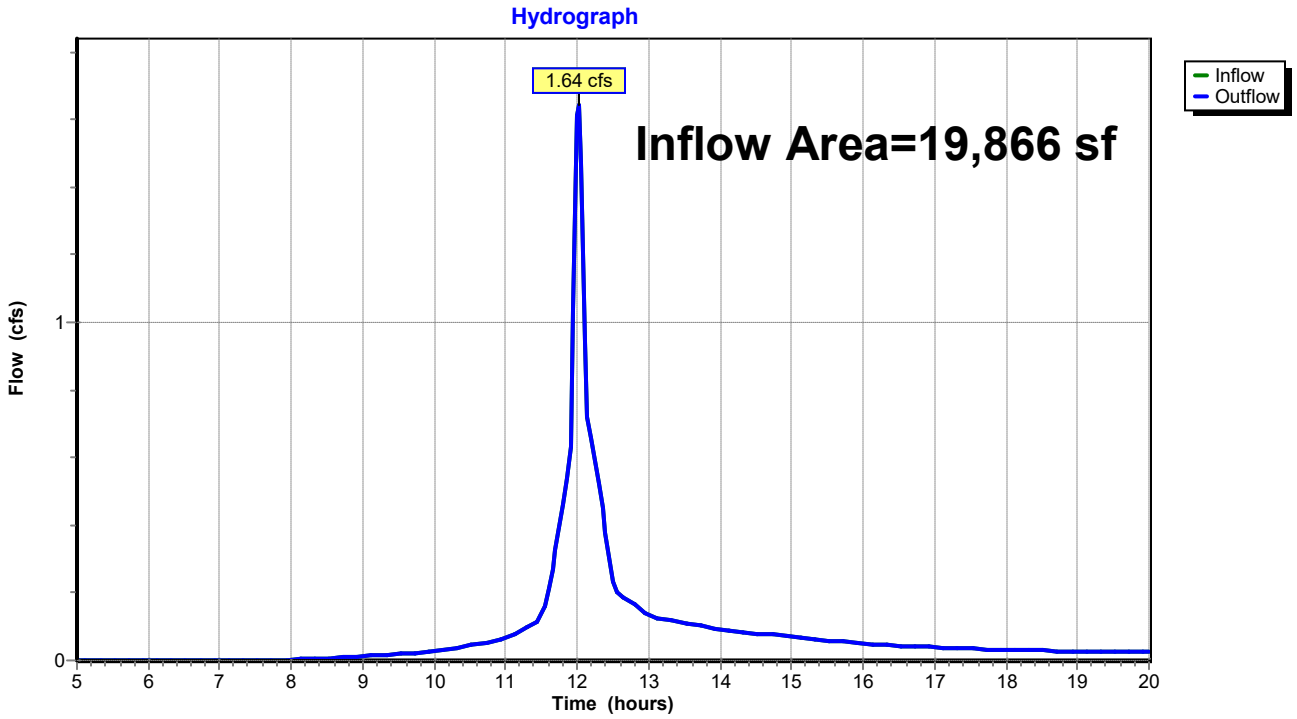


Summary for Reach 1R: RAIL TRAIL

Inflow Area = 19,866 sf, 68.28% Impervious, Inflow Depth > 2.57" for 10-Year event
Inflow = 1.64 cfs @ 12.02 hrs, Volume= 4,249 cf
Outflow = 1.64 cfs @ 12.02 hrs, Volume= 4,249 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 1R: RAIL TRAIL

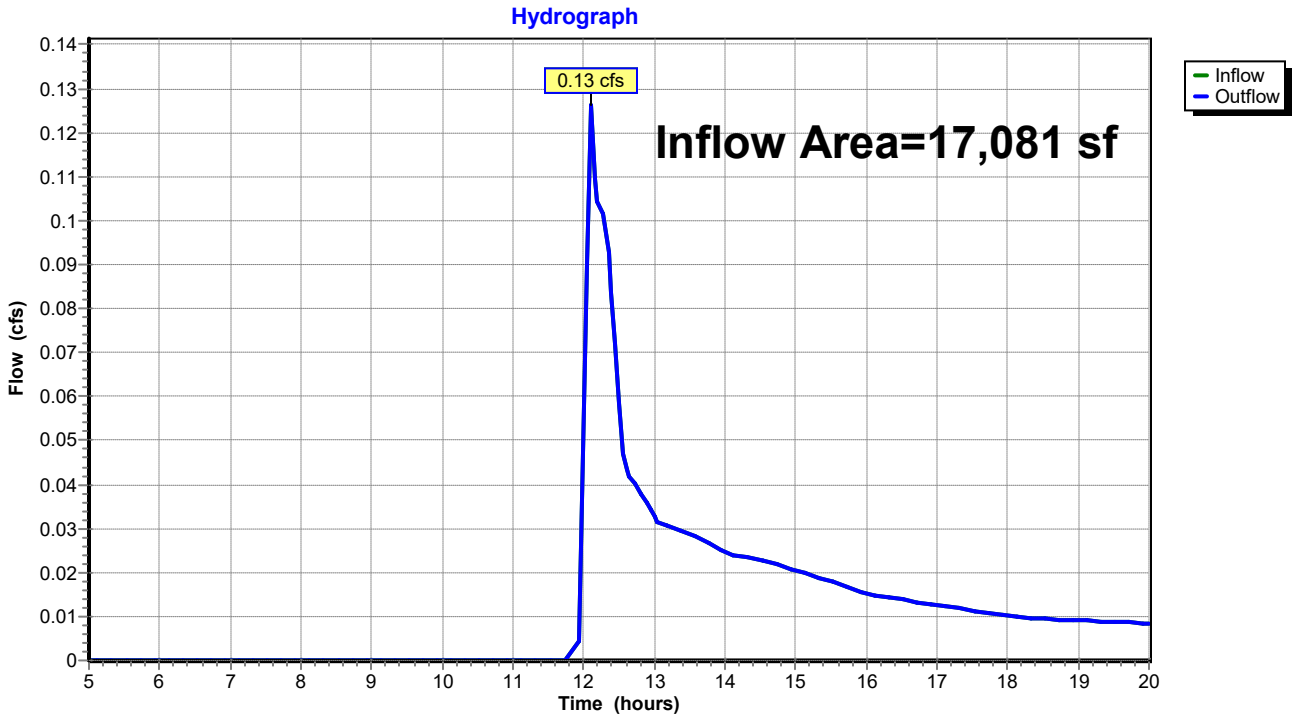


Summary for Reach 2R: EASTERN ABUTTERS

Inflow Area = 17,081 sf, 13.91% Impervious, Inflow Depth > 0.45" for 10-Year event
Inflow = 0.13 cfs @ 12.11 hrs, Volume= 645 cf
Outflow = 0.13 cfs @ 12.11 hrs, Volume= 645 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 2R: EASTERN ABUTTERS

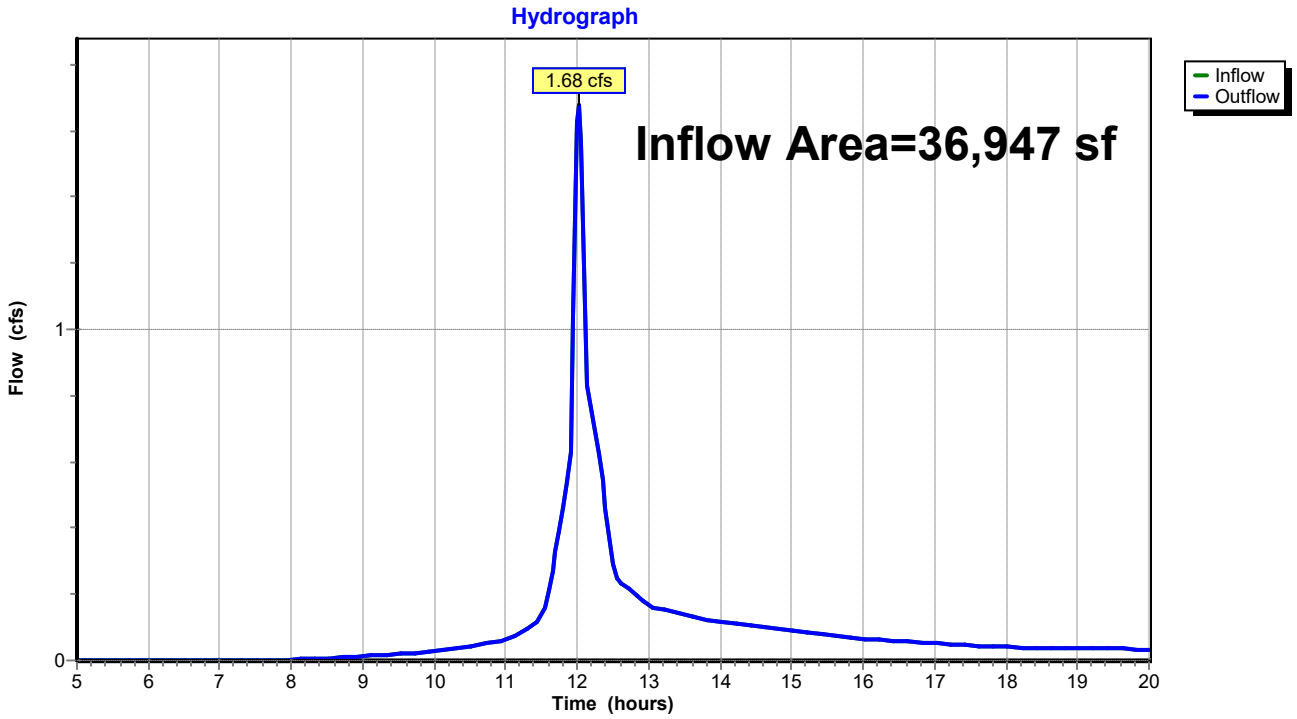


Summary for Reach 3R: TOTAL

Inflow Area = 36,947 sf, 43.15% Impervious, Inflow Depth > 1.59" for 10-Year event
Inflow = 1.68 cfs @ 12.02 hrs, Volume= 4,894 cf
Outflow = 1.68 cfs @ 12.02 hrs, Volume= 4,894 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 3R: TOTAL

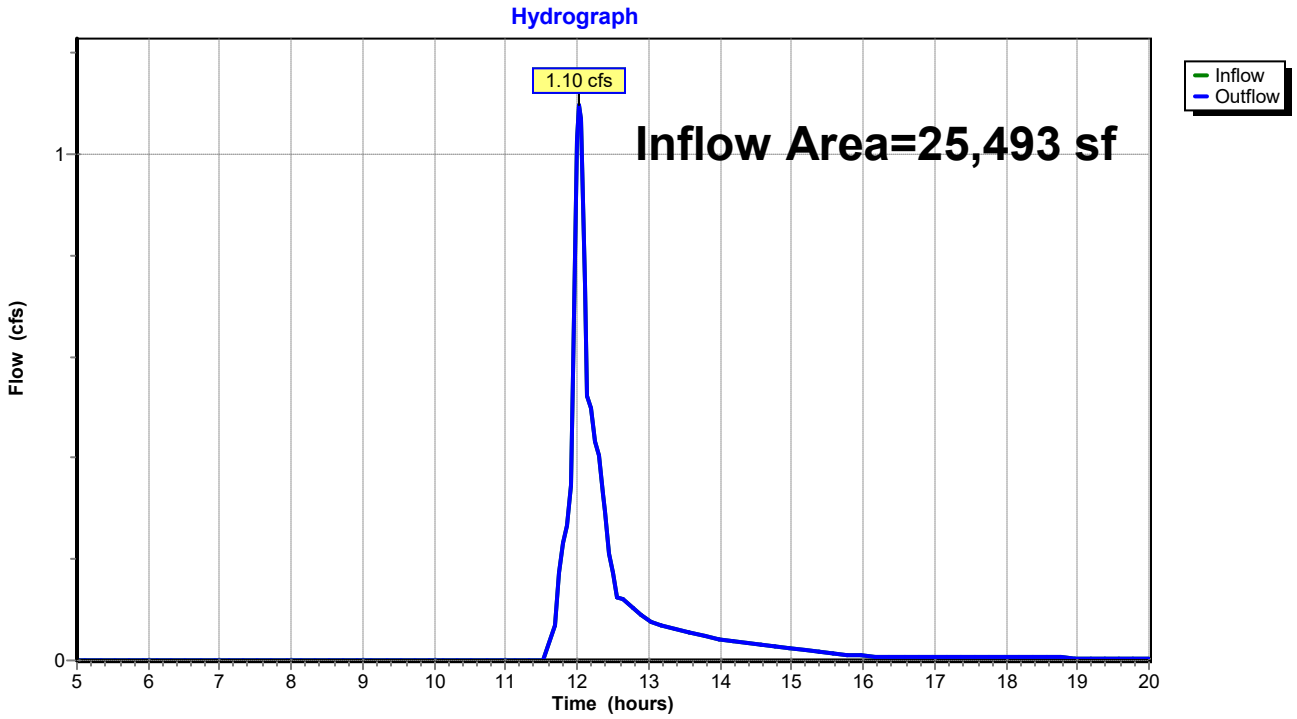


Summary for Reach 10R: RAIL TRAIL

Inflow Area = 25,493 sf, 43.40% Impervious, Inflow Depth > 0.94" for 10-Year event
Inflow = 1.10 cfs @ 12.03 hrs, Volume= 1,992 cf
Outflow = 1.10 cfs @ 12.03 hrs, Volume= 1,992 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 10R: RAIL TRAIL

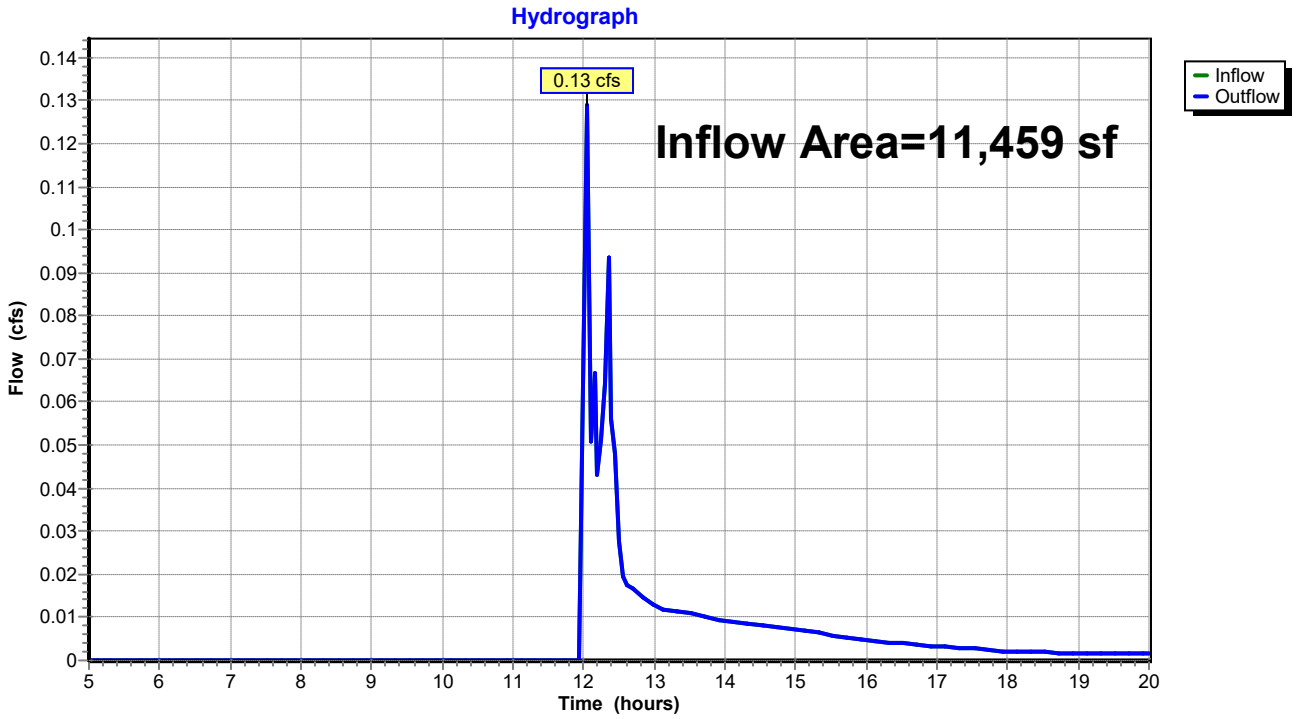


Summary for Reach 20R: EASTERN ABUTTERS

Inflow Area = 11,459 sf, 30.93% Impervious, Inflow Depth > 0.28" for 10-Year event
Inflow = 0.13 cfs @ 12.06 hrs, Volume= 266 cf
Outflow = 0.13 cfs @ 12.06 hrs, Volume= 266 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 20R: EASTERN ABUTTERS

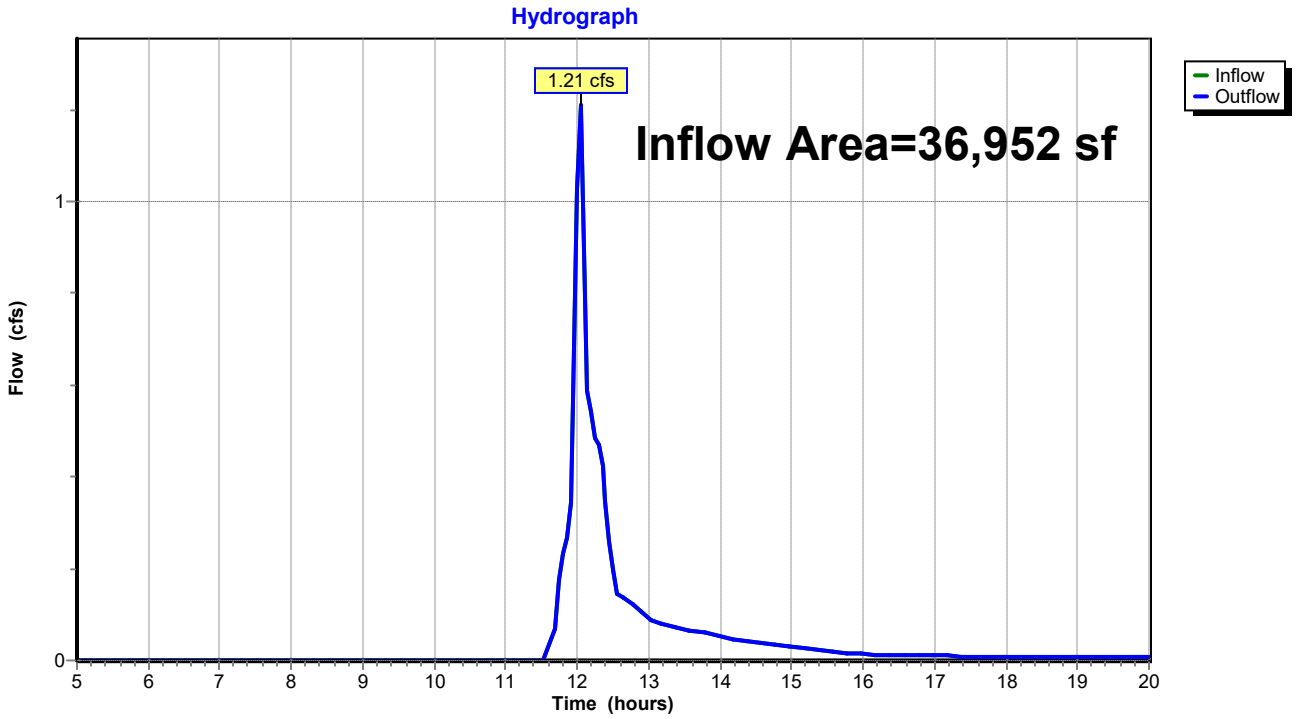


Summary for Reach 30R: TOTAL

Inflow Area = 36,952 sf, 39.53% Impervious, Inflow Depth > 0.73" for 10-Year event
Inflow = 1.21 cfs @ 12.04 hrs, Volume= 2,258 cf
Outflow = 1.21 cfs @ 12.04 hrs, Volume= 2,258 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 30R: TOTAL



Summary for Pond 20P: RAINGARDEN

Inflow Area = 16,890 sf, 56.04% Impervious, Inflow Depth > 1.99" for 10-Year event
Inflow = 1.06 cfs @ 12.03 hrs, Volume= 2,799 cf
Outflow = 1.07 cfs @ 12.02 hrs, Volume= 2,764 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.03 cfs @ 11.70 hrs, Volume= 877 cf
Primary = 0.25 cfs @ 12.02 hrs, Volume= 1,080 cf
Secondary = 0.79 cfs @ 12.02 hrs, Volume= 807 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 28.46' @ 12.02 hrs Surf.Area= 142 sf Storage= 77 cf

Plug-Flow detention time= 11.4 min calculated for 2,754 cf (98% of inflow)
Center-of-Mass det. time= 6.5 min (805.8 - 799.2)

Volume	Invert	Avail.Storage	Storage Description
#1	27.68'	77 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
27.68	89	51.0	0	0	89
28.35	142	57.0	77	77	152

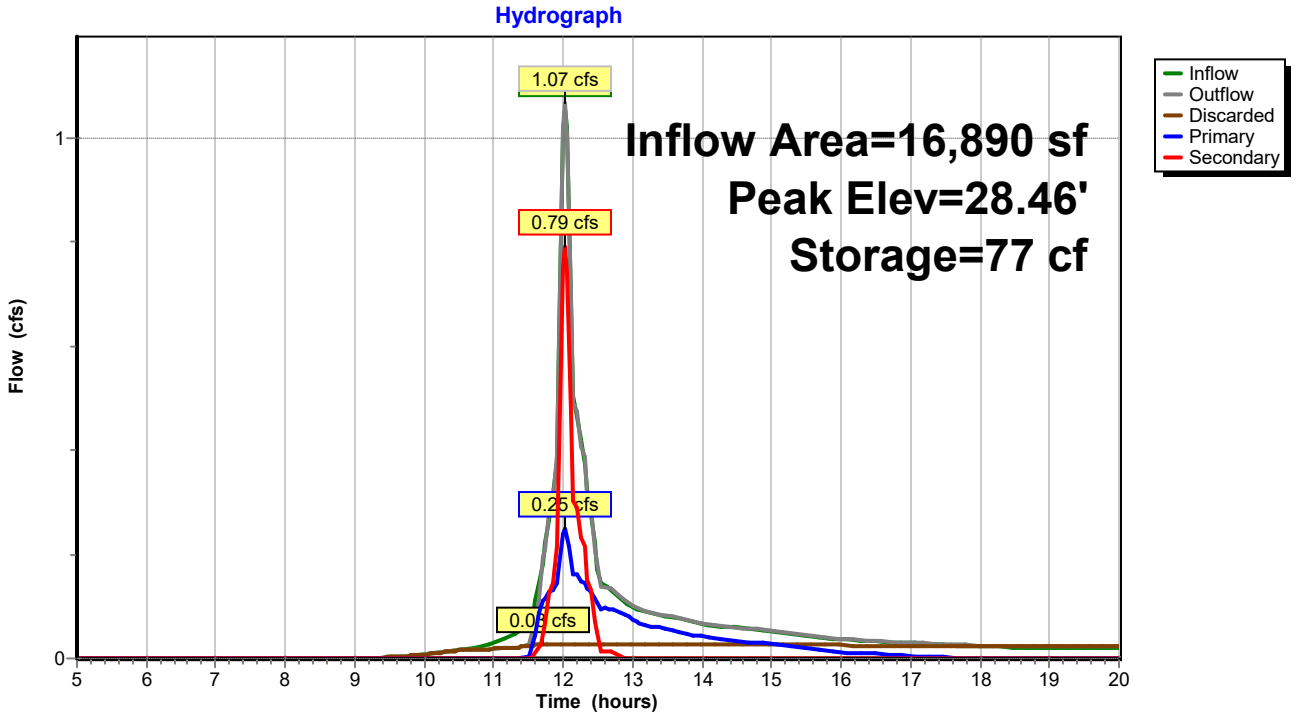
Device	Routing	Invert	Outlet Devices
#1	Discarded	27.68'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	28.18'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Secondary	28.34'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.03 cfs @ 11.70 hrs HW=28.36' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.24 cfs @ 12.02 hrs HW=28.45' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.24 cfs @ 1.78 fps)

Secondary OutFlow Max=0.75 cfs @ 12.02 hrs HW=28.45' (Free Discharge)
↑—**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.75 cfs @ 1.10 fps)

Pond 20P: RAINGARDEN



Summary for Pond 21P: PERF PIPE

Inflow Area = 16,890 sf, 56.04% Impervious, Inflow Depth = 0.77" for 10-Year event
Inflow = 0.25 cfs @ 12.02 hrs, Volume= 1,080 cf
Outflow = 0.25 cfs @ 12.04 hrs, Volume= 1,080 cf, Atten= 0%, Lag= 0.8 min
Discarded = 0.01 cfs @ 11.60 hrs, Volume= 286 cf
Primary = 0.23 cfs @ 12.04 hrs, Volume= 794 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 25.42' @ 12.04 hrs Surf.Area= 75 sf Storage= 24 cf

Plug-Flow detention time= 4.9 min calculated for 1,076 cf (100% of inflow)
Center-of-Mass det. time= 4.9 min (790.4 - 785.5)

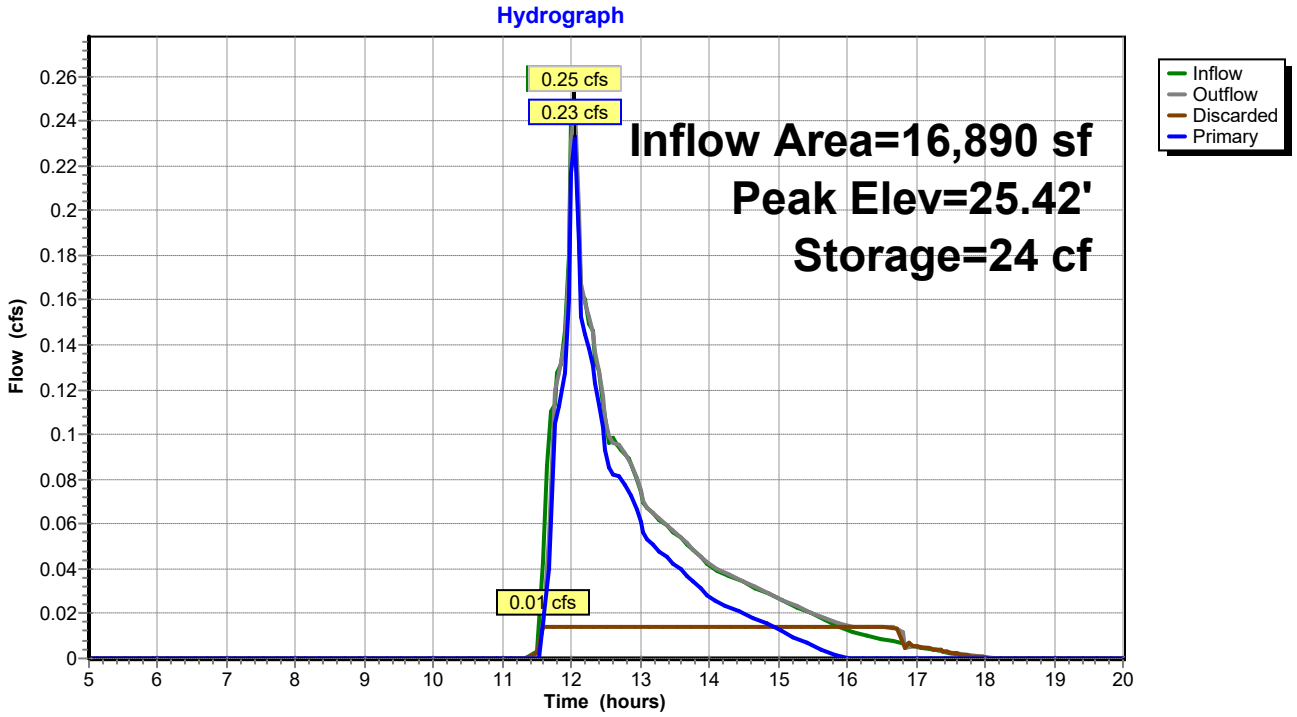
Volume	Invert	Avail.Storage	Storage Description
#1	25.18'	20 cf	**12.0" Round Pipe Storage** Inside #2 L= 25.0'
#2	24.68'	52 cf	**3.00'W x 25.00'L x 2.00'H Prismatoid** 150 cf Overall - 20 cf Embedded = 130 cf x 40.0% Voids
		72 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.68'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	25.18'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.01 cfs @ 11.60 hrs HW=24.78' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.23 cfs @ 12.04 hrs HW=25.41' (Free Discharge)
2=Orifice/Grate (Orifice Controls 0.23 cfs @ 1.64 fps)

Pond 21P: PERF PIPE



Summary for Pond 30P: DRYWELL

Inflow Area = 3,030 sf, 37.76% Impervious, Inflow Depth > 1.21" for 10-Year event
Inflow = 0.11 cfs @ 12.02 hrs, Volume= 306 cf
Outflow = 0.13 cfs @ 12.06 hrs, Volume= 263 cf, Atten= 0%, Lag= 2.1 min
Discarded = 0.00 cfs @ 11.55 hrs, Volume= 86 cf
Primary = 0.13 cfs @ 12.06 hrs, Volume= 177 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 28.02' @ 12.05 hrs Surf.Area= 14 sf Storage= 46 cf

Plug-Flow detention time= 60.8 min calculated for 262 cf (86% of inflow)
Center-of-Mass det. time= 18.8 min (840.3 - 821.5)

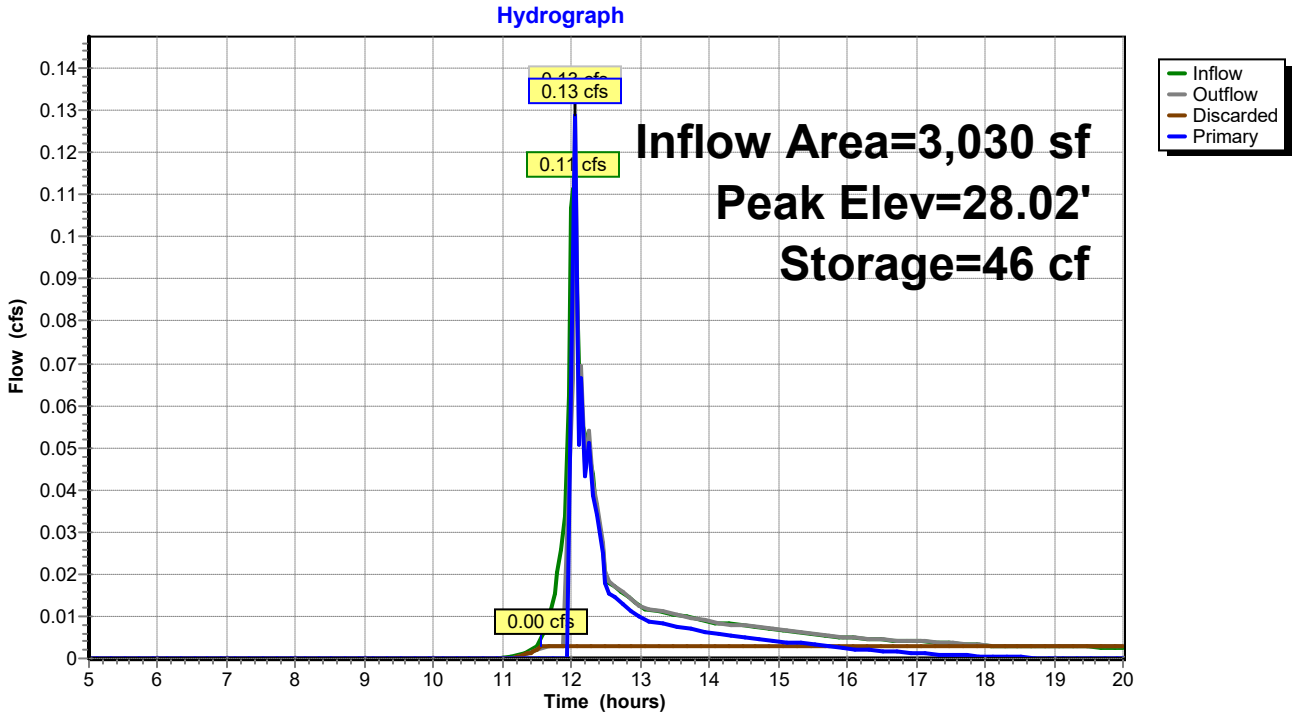
Volume	Invert	Avail.Storage	Storage Description
#1	24.82'	58 cf	**3.60'W x 4.00'L x 4.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.82'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	27.82'	**5.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	28.00'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 11.55 hrs HW=24.86' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.11 cfs @ 12.06 hrs HW=28.01' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.09 cfs @ 1.50 fps)
└**3=Orifice/Grate** (Weir Controls 0.01 cfs @ 0.38 fps)

Pond 30P: DRYWELL



Summary for Pond 42P: CULTEC

Inflow Area = 2,400 sf,100.00% Impervious, Inflow Depth > 4.26" for 10-Year event
Inflow = 0.29 cfs @ 12.01 hrs, Volume= 853 cf
Outflow = 0.09 cfs @ 12.35 hrs, Volume= 853 cf, Atten= 71%, Lag= 20.2 min
Discarded = 0.03 cfs @ 11.55 hrs, Volume= 829 cf
Primary = 0.05 cfs @ 12.35 hrs, Volume= 23 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 27.01' @ 12.35 hrs Surf.Area= 168 sf Storage= 254 cf

Plug-Flow detention time= 49.1 min calculated for 852 cf (100% of inflow)
Center-of-Mass det. time= 48.8 min (780.4 - 731.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.50'	229 cf	**16.00'W x 10.50'L x 4.54'H Field A** 763 cf Overall - 190 cf Embedded = 573 cf x 40.0% Voids
#2A	25.50'	190 cf	**Cultec R-330XLHD** x 3 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		419 cf	Total Available Storage

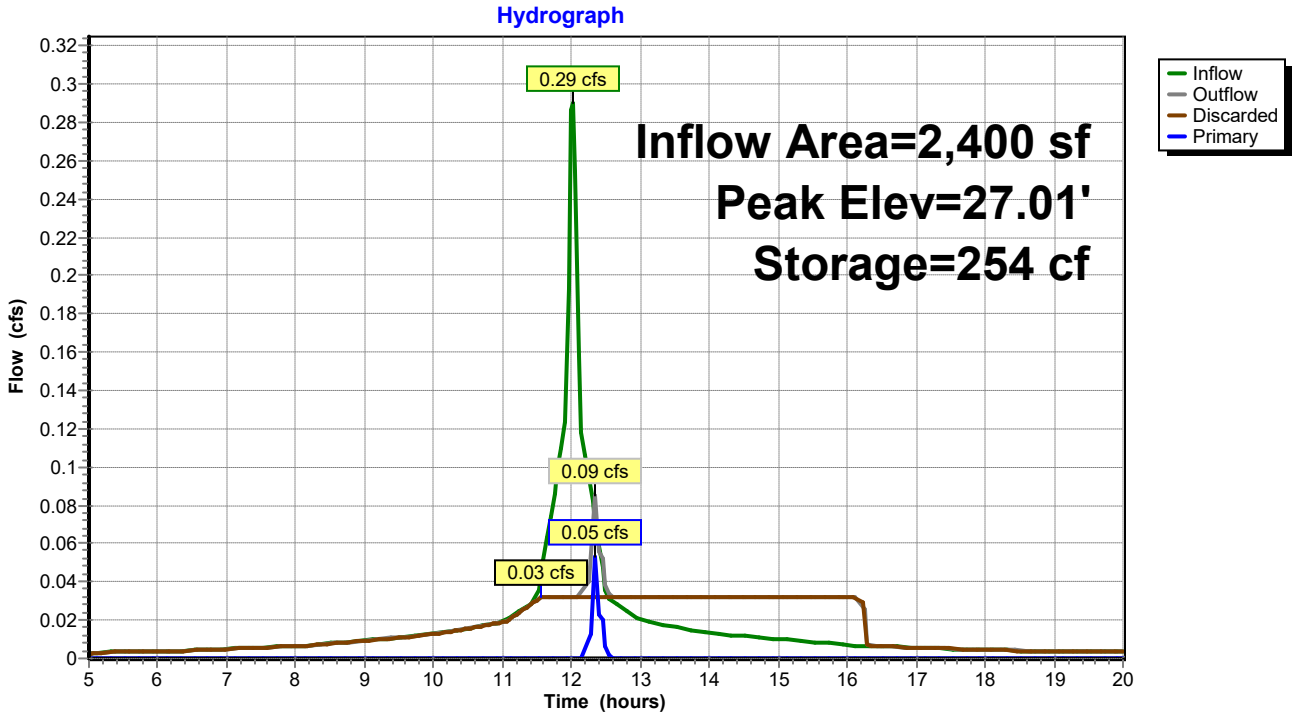
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	26.99'	**4.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#2	Discarded	24.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 11.55 hrs HW=24.55' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.04 cfs @ 12.35 hrs HW=27.01' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.04 cfs @ 0.48 fps)

Pond 42P: CULTEC



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: NORTHERN AREA Runoff Area=19,866 sf 68.28% Impervious Runoff Depth>3.69"
Flow Length=191' Tc=0.9 min CN=80 Runoff=2.34 cfs 6,105 cf

Subcatchment 2S: SOUTHERN AREA Runoff Area=17,081 sf 13.91% Impervious Runoff Depth>0.95"
Flow Length=201' Slope=0.0210 '/' Tc=3.3 min CN=48 Runoff=0.40 cfs 1,358 cf

Subcatchment 10S: NW LAWN Runoff Area=8,603 sf 18.59% Impervious Runoff Depth>1.09"
Flow Length=143' Slope=0.0560 '/' Tc=1.4 min CN=50 Runoff=0.26 cfs 783 cf

Subcatchment 20S: ROADWAY Runoff Area=16,890 sf 56.04% Impervious Runoff Depth>3.00"
Flow Length=179' Tc=1.3 min CN=73 Runoff=1.61 cfs 4,226 cf

Subcatchment 30S: SIDE DRIVEWAY Runoff Area=3,030 sf 37.76% Impervious Runoff Depth>2.02"
Flow Length=82' Tc=0.7 min CN=62 Runoff=0.19 cfs 510 cf

Subcatchment 40S: EASTERN REAR Runoff Area=6,029 sf 0.00% Impervious Runoff Depth>0.42"
Flow Length=110' Slope=0.0230 '/' Tc=1.7 min CN=39 Runoff=0.03 cfs 209 cf

Subcatchment 41S: EASTERN ROOF Runoff Area=2,400 sf 100.00% Impervious Runoff Depth>5.47"
Tc=1.0 min CN=98 Runoff=0.37 cfs 1,095 cf

Reach 1R: RAIL TRAIL Inflow=2.34 cfs 6,105 cf
Outflow=2.34 cfs 6,105 cf

Reach 2R: EASTERN ABUTTERS Inflow=0.40 cfs 1,358 cf
Outflow=0.40 cfs 1,358 cf

Reach 3R: TOTAL Inflow=2.61 cfs 7,462 cf
Outflow=2.61 cfs 7,462 cf

Reach 10R: RAIL TRAIL Inflow=1.80 cfs 3,575 cf
Outflow=1.80 cfs 3,575 cf

Reach 20R: EASTERN ABUTTERS Inflow=0.33 cfs 722 cf
Outflow=0.33 cfs 722 cf

Reach 30R: TOTAL Inflow=1.98 cfs 4,297 cf
Outflow=1.98 cfs 4,297 cf

Pond 20P: RAINGARDEN Peak Elev=28.50' Storage=77 cf Inflow=1.61 cfs 4,226 cf
Discarded=0.03 cfs 976 cf Primary=0.32 cfs 1,706 cf Secondary=1.26 cfs 1,486 cf Outflow=1.61 cfs 4,169 cf

Pond 21P: PERF PIPE Peak Elev=25.45' Storage=26 cf Inflow=0.32 cfs 1,706 cf
Discarded=0.01 cfs 401 cf Primary=0.31 cfs 1,306 cf Outflow=0.32 cfs 1,706 cf

Pond 30P: DRYWELL Peak Elev=28.04' Storage=46 cf Inflow=0.19 cfs 510 cf
Discarded=0.00 cfs 93 cf Primary=0.20 cfs 374 cf Outflow=0.20 cfs 467 cf

Pond 42P: CULTEC Peak Elev=27.05' Storage=258 cf Inflow=0.37 cfs 1,095 cf
Discarded=0.03 cfs 955 cf Primary=0.21 cfs 139 cf Outflow=0.24 cfs 1,095 cf

Summary for Subcatchment 1S: NORTHERN AREA

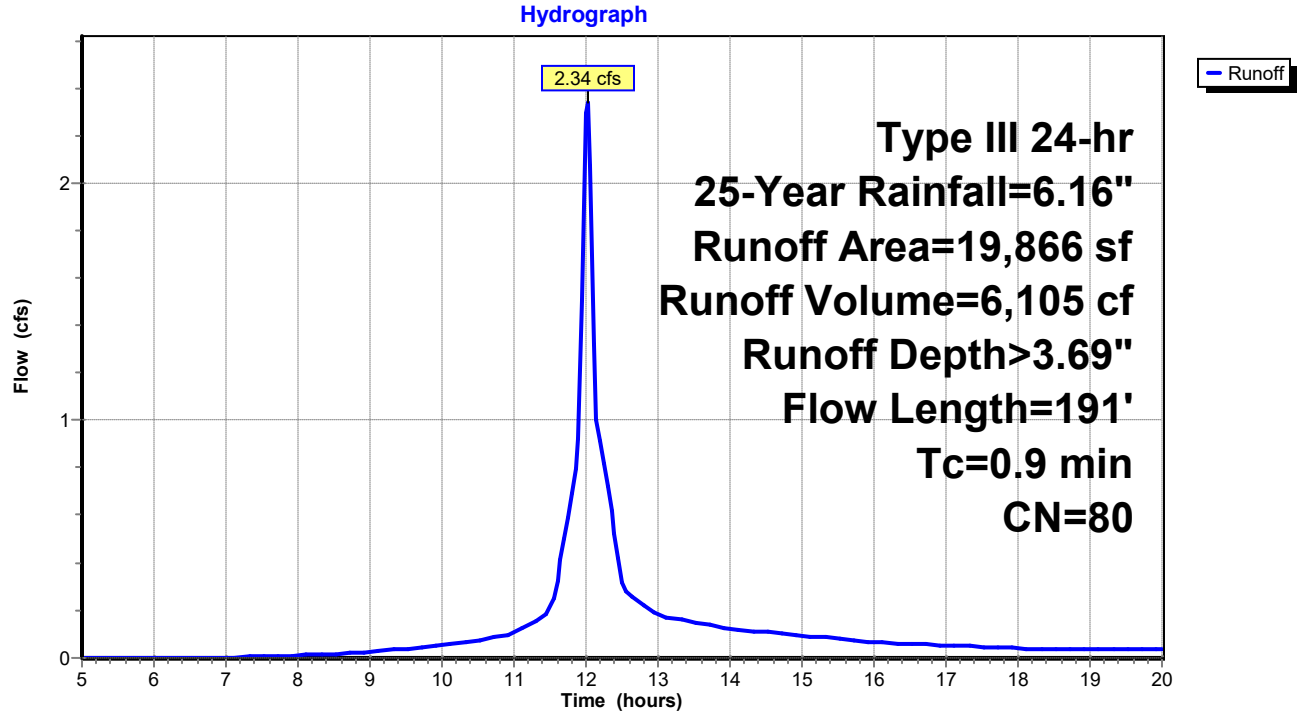
Runoff = 2.34 cfs @ 12.01 hrs, Volume= 6,105 cf, Depth> 3.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
10,583	98	Paved parking, HSG A
2,982	98	Roofs, HSG A
5,437	43	Woods/grass comb., Fair, HSG A
864	39	>75% Grass cover, Good, HSG A
19,866	80	Weighted Average
6,301		31.72% Pervious Area
13,565		68.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	176	0.0340	3.74		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.1	15	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.9	191	Total			

Subcatchment 1S: NORTHERN AREA



Summary for Subcatchment 2S: SOUTHERN AREA

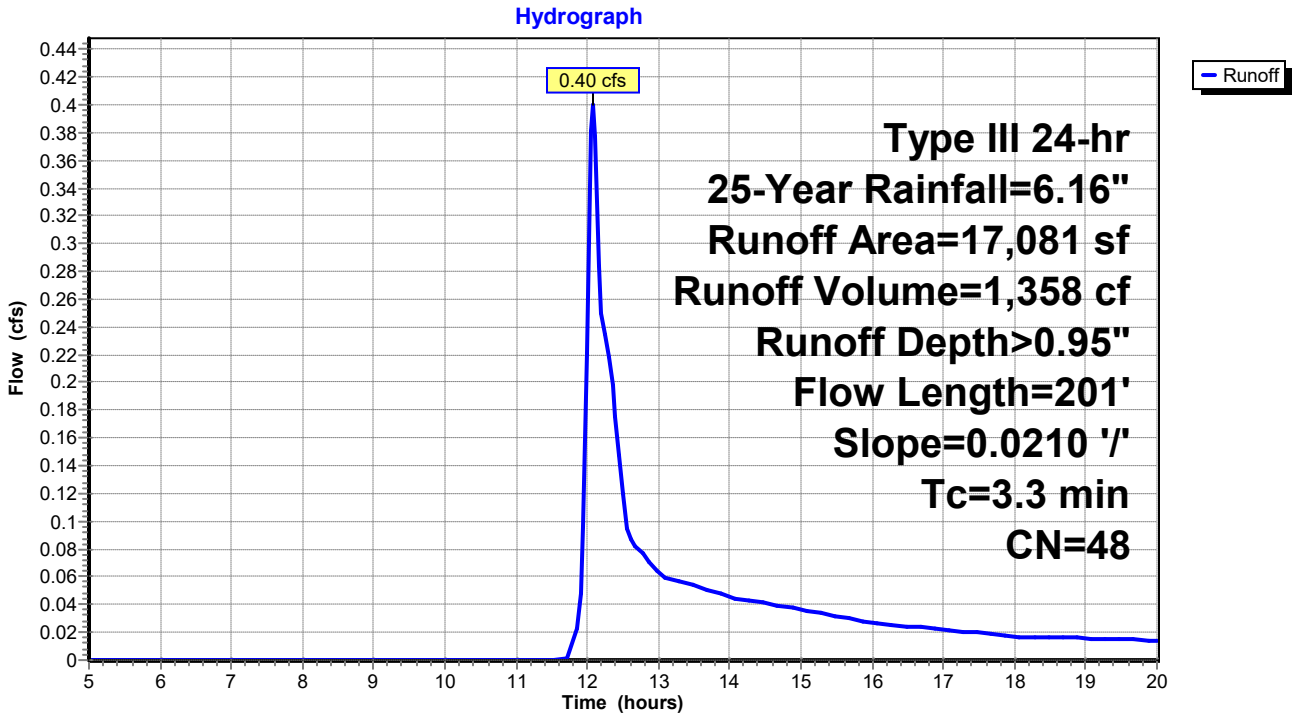
Runoff = 0.40 cfs @ 12.07 hrs, Volume= 1,358 cf, Depth> 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
52	98	Paved parking, HSG A
2,324	98	Roofs, HSG A
1,521	43	Woods/grass comb., Fair, HSG A
13,184	39	>75% Grass cover, Good, HSG A
17,081	48	Weighted Average
14,705		86.09% Pervious Area
2,376		13.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	201	0.0210	1.01		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 2S: SOUTHERN AREA



Summary for Subcatchment 10S: NW LAWN

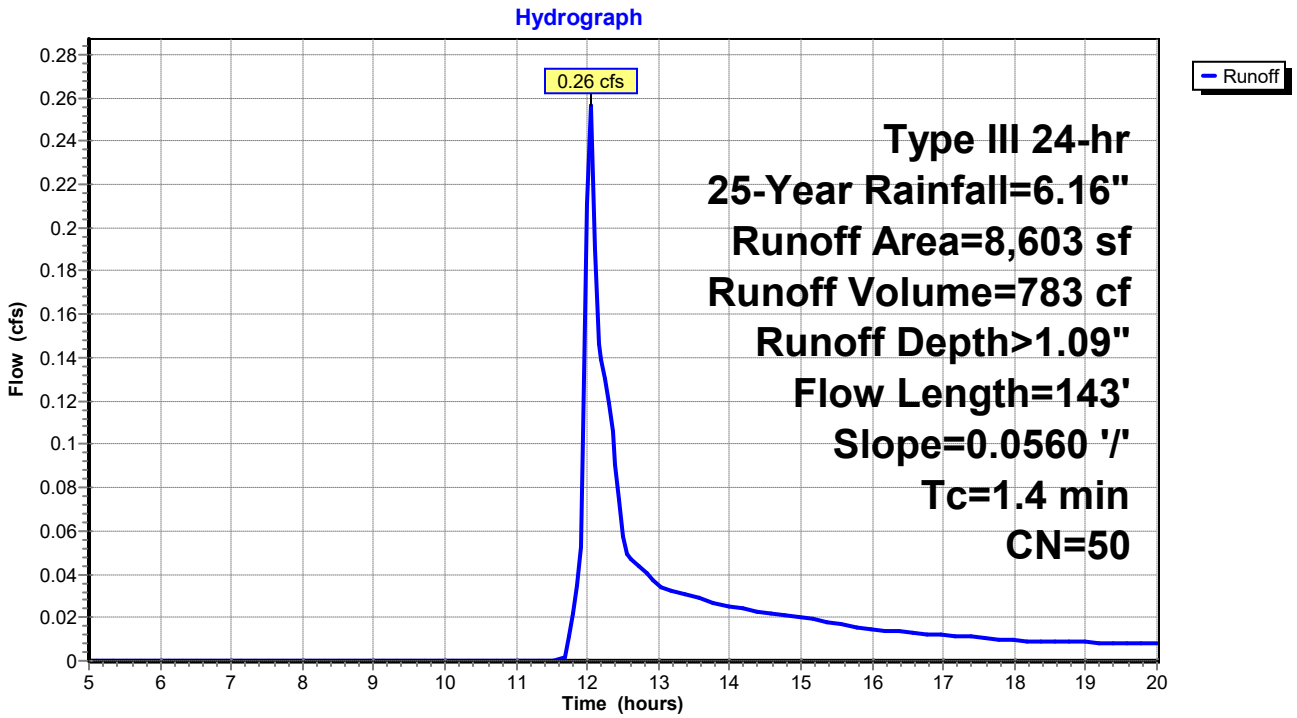
Runoff = 0.26 cfs @ 12.05 hrs, Volume= 783 cf, Depth> 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

	Area (sf)	CN	Description
	6,837	39	>75% Grass cover, Good, HSG A
	1,599	98	Roofs, HSG A
*	167	55	Permable pavers
	8,603	50	Weighted Average
	7,004		81.41% Pervious Area
	1,599		18.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	143	0.0560	1.66		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 10S: NW LAWN



Summary for Subcatchment 20S: ROADWAY

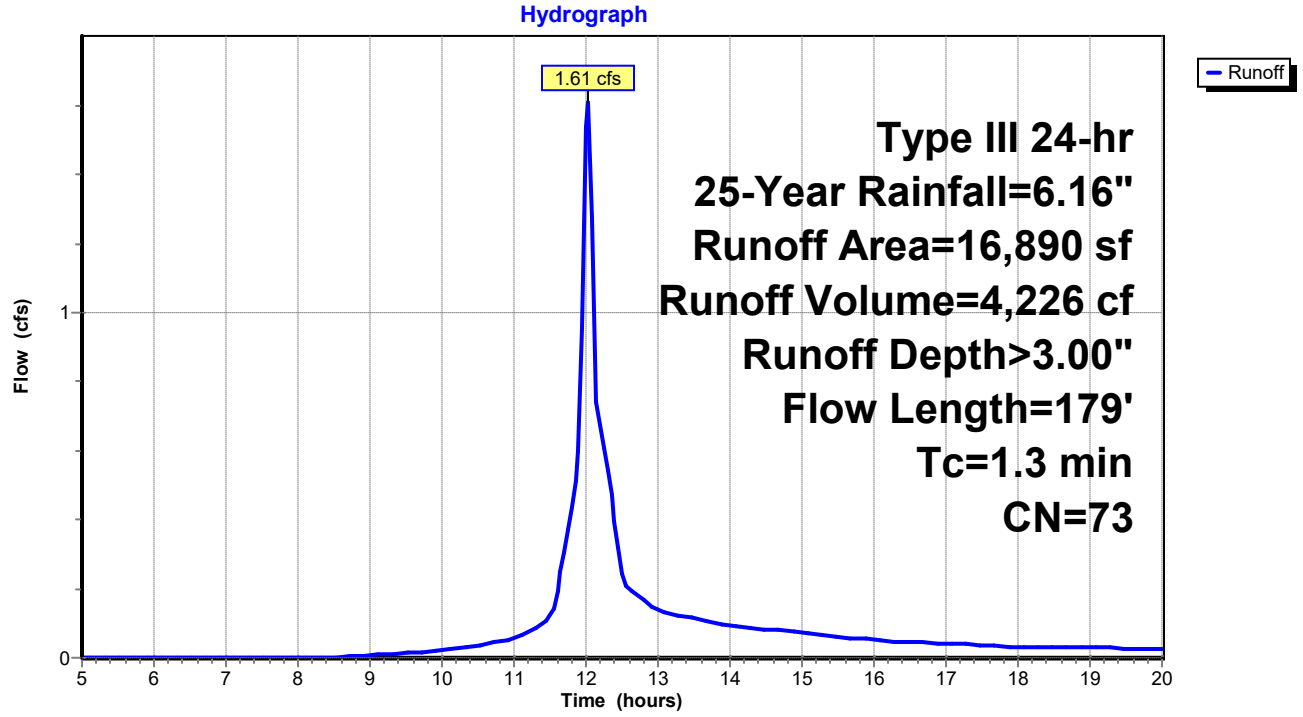
Runoff = 1.61 cfs @ 12.02 hrs, Volume= 4,226 cf, Depth> 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

	Area (sf)	CN	Description
	5,311	98	Paved parking, HSG A
	229	98	Unconnected pavement, HSG A
	6,781	39	>75% Grass cover, Good, HSG A
	3,925	98	Roofs, HSG A
*	644	55	Permeable pavers
	16,890	73	Weighted Average
	7,425		43.96% Pervious Area
	9,465		56.04% Impervious Area
	229		2.42% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	67	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.7	112	0.0160	2.57		**Shallow Concentrated Flow, Road** Paved Kv= 20.3 fps
1.3	179	Total			

Subcatchment 20S: ROADWAY



Summary for Subcatchment 30S: SIDE DRIVEWAY

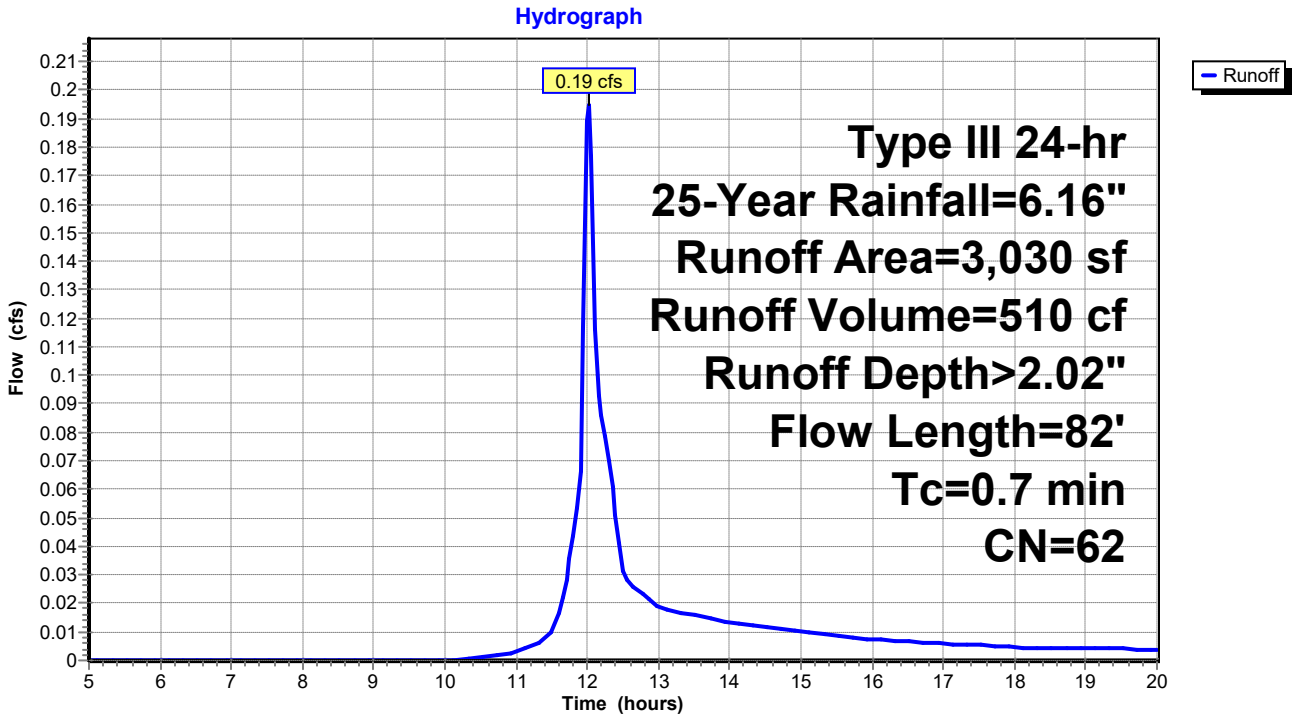
Runoff = 0.19 cfs @ 12.02 hrs, Volume= 510 cf, Depth> 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

	Area (sf)	CN	Description
	1,144	98	Paved parking, HSG A
	1,720	39	>75% Grass cover, Good, HSG A
*	166	55	Permeablea pavers
	3,030	62	Weighted Average
	1,886		62.24% Pervious Area
	1,144		37.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0520	1.60		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.2	34	0.0290	3.46		**Shallow Concentrated Flow, Driveway** Paved Kv= 20.3 fps
0.7	82	Total			

Subcatchment 30S: SIDE DRIVEWAY



Summary for Subcatchment 40S: EASTERN REAR

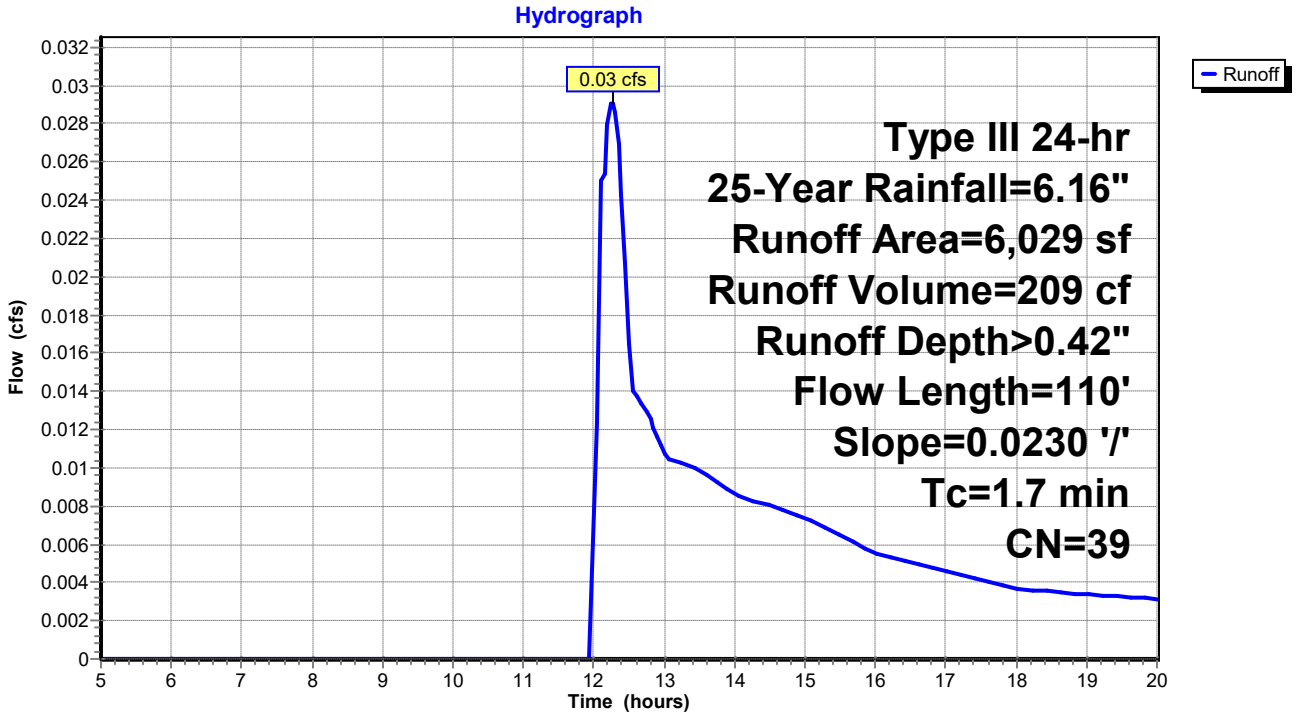
Runoff = 0.03 cfs @ 12.26 hrs, Volume= 209 cf, Depth> 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
6,029	39	>75% Grass cover, Good, HSG A
6,029		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	110	0.0230	1.06		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 40S: EASTERN REAR



Summary for Subcatchment 41S: EASTERN ROOF

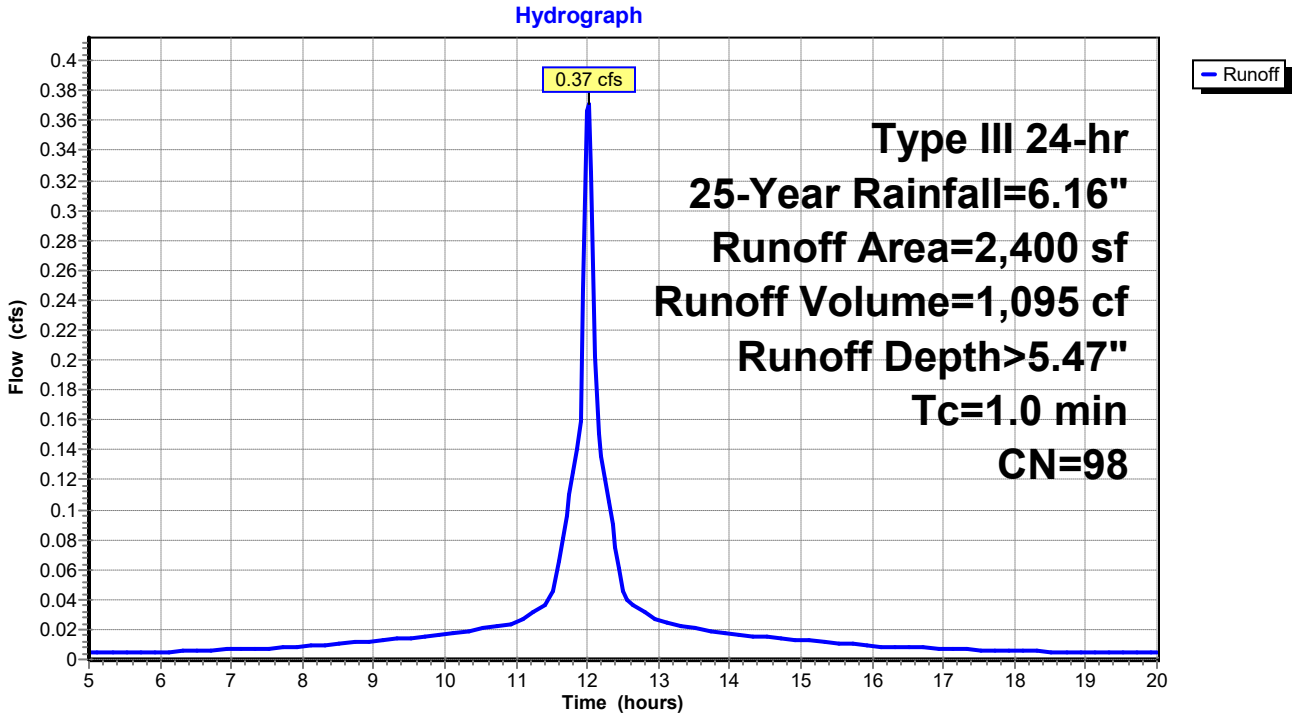
Runoff = 0.37 cfs @ 12.01 hrs, Volume= 1,095 cf, Depth> 5.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.16"

Area (sf)	CN	Description
2,400	98	Roofs, HSG A
2,400		100.00% Impervious Area

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

Subcatchment 41S: EASTERN ROOF

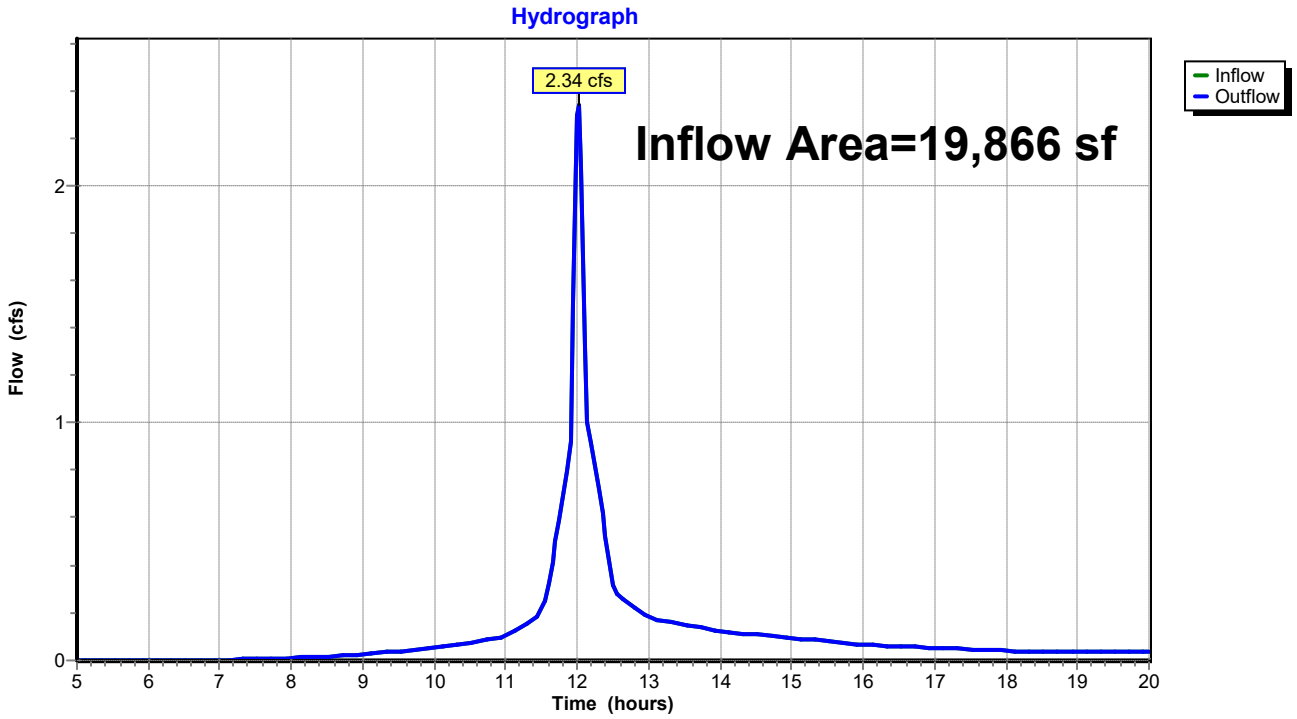


Summary for Reach 1R: RAIL TRAIL

Inflow Area = 19,866 sf, 68.28% Impervious, Inflow Depth > 3.69" for 25-Year event
Inflow = 2.34 cfs @ 12.01 hrs, Volume= 6,105 cf
Outflow = 2.34 cfs @ 12.01 hrs, Volume= 6,105 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 1R: RAIL TRAIL

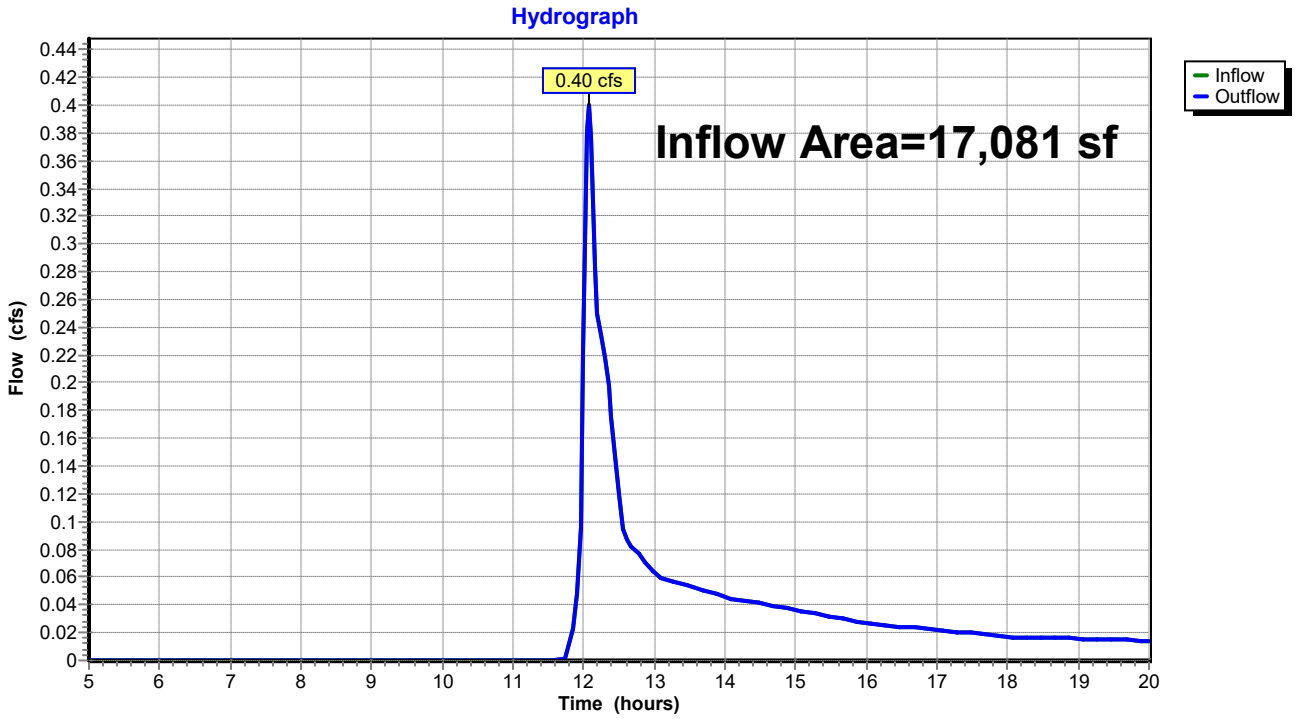


Summary for Reach 2R: EASTERN ABUTTERS

Inflow Area = 17,081 sf, 13.91% Impervious, Inflow Depth > 0.95" for 25-Year event
Inflow = 0.40 cfs @ 12.07 hrs, Volume= 1,358 cf
Outflow = 0.40 cfs @ 12.07 hrs, Volume= 1,358 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 2R: EASTERN ABUTTERS

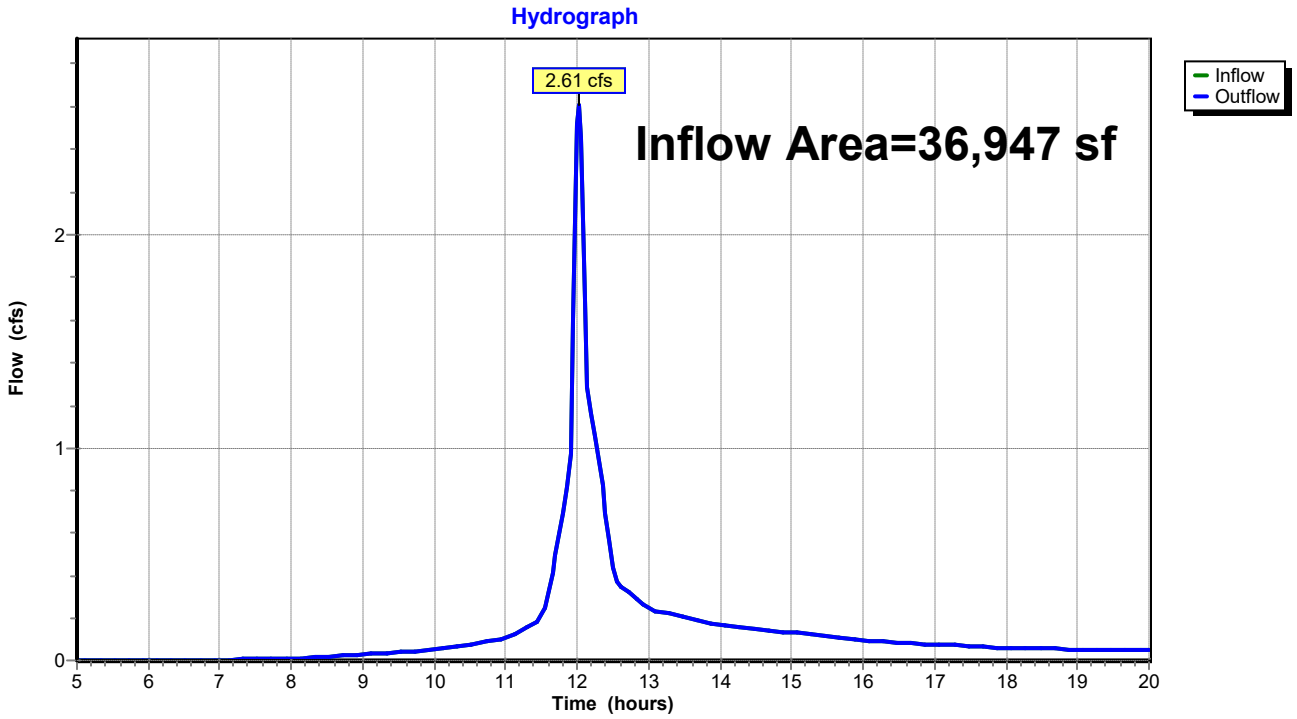


Summary for Reach 3R: TOTAL

Inflow Area = 36,947 sf, 43.15% Impervious, Inflow Depth > 2.42" for 25-Year event
Inflow = 2.61 cfs @ 12.02 hrs, Volume= 7,462 cf
Outflow = 2.61 cfs @ 12.02 hrs, Volume= 7,462 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 3R: TOTAL

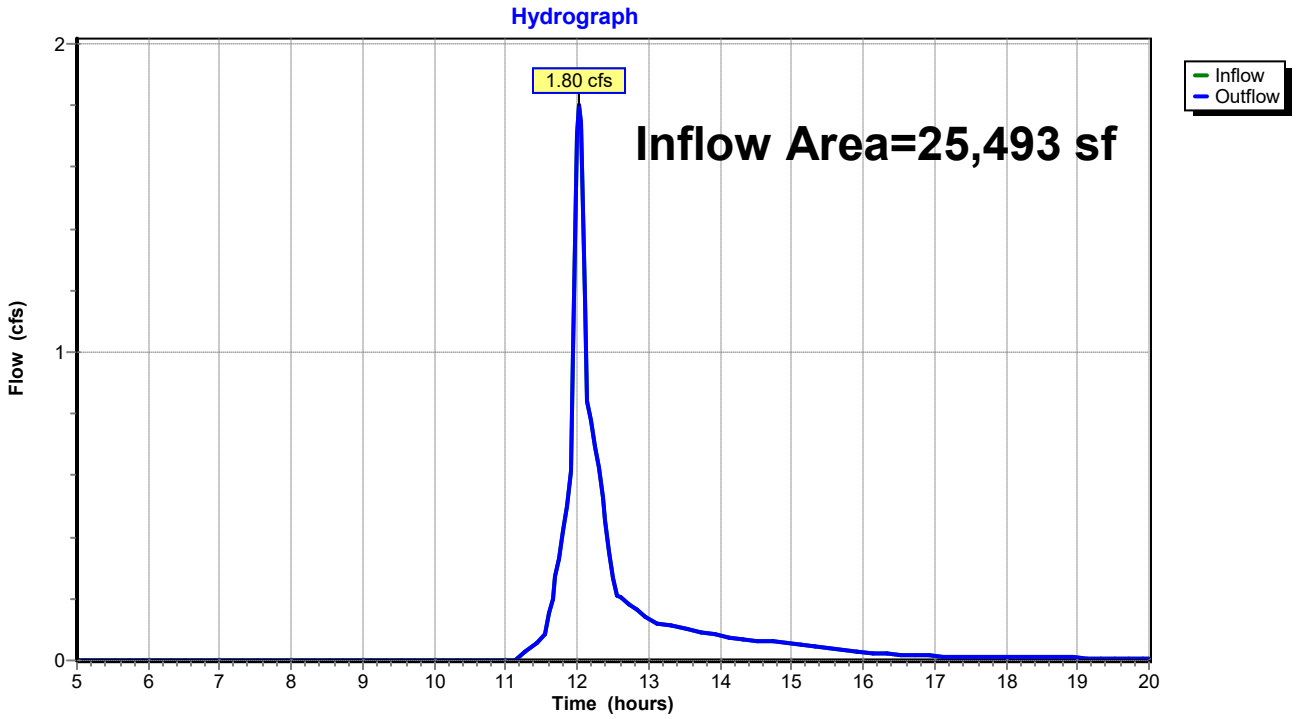


Summary for Reach 10R: RAIL TRAIL

Inflow Area = 25,493 sf, 43.40% Impervious, Inflow Depth > 1.68" for 25-Year event
Inflow = 1.80 cfs @ 12.03 hrs, Volume= 3,575 cf
Outflow = 1.80 cfs @ 12.03 hrs, Volume= 3,575 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 10R: RAIL TRAIL

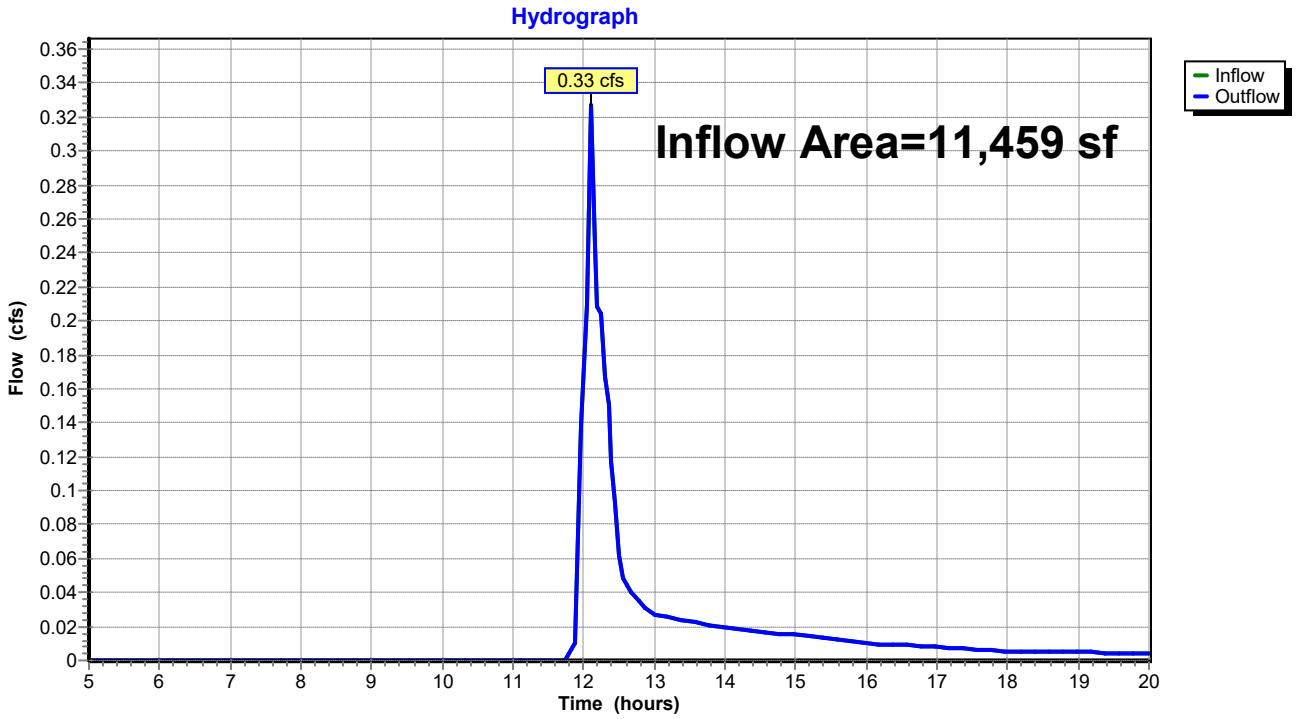


Summary for Reach 20R: EASTERN ABUTTERS

Inflow Area = 11,459 sf, 30.93% Impervious, Inflow Depth > 0.76" for 25-Year event
Inflow = 0.33 cfs @ 12.10 hrs, Volume= 722 cf
Outflow = 0.33 cfs @ 12.10 hrs, Volume= 722 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 20R: EASTERN ABUTTERS

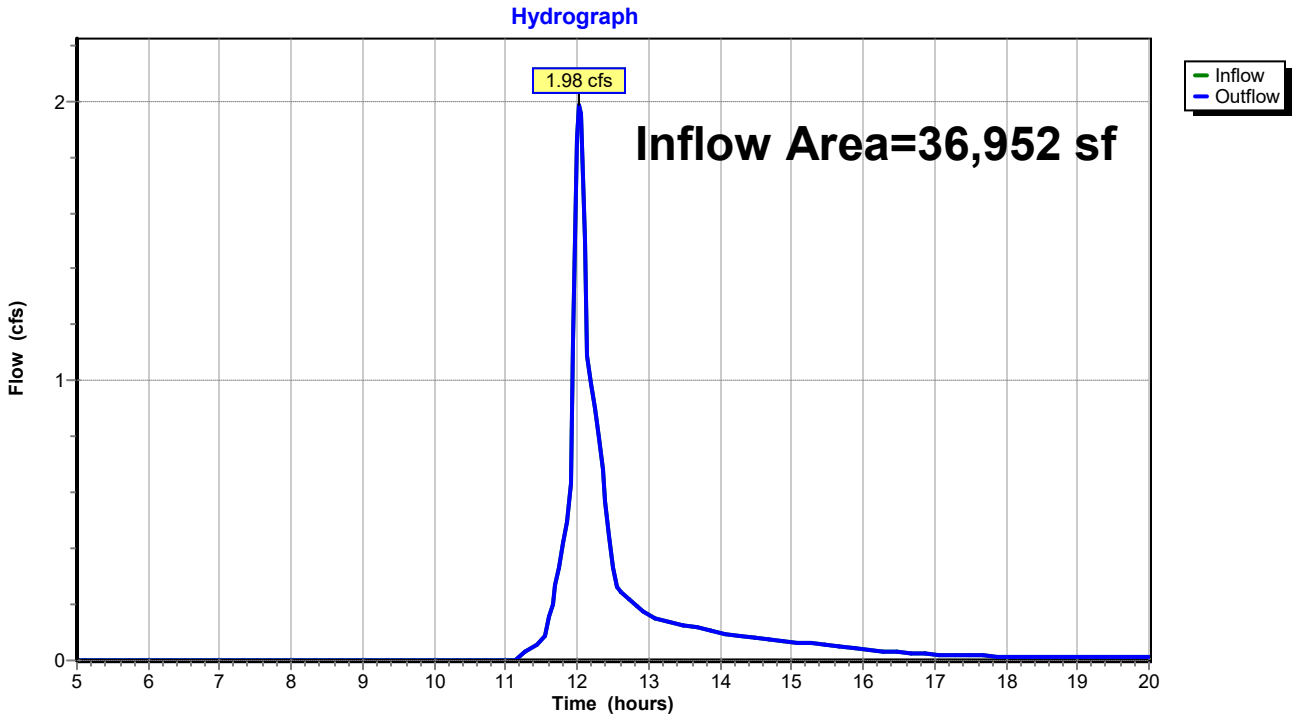


Summary for Reach 30R: TOTAL

Inflow Area = 36,952 sf, 39.53% Impervious, Inflow Depth > 1.40" for 25-Year event
Inflow = 1.98 cfs @ 12.03 hrs, Volume= 4,297 cf
Outflow = 1.98 cfs @ 12.03 hrs, Volume= 4,297 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 30R: TOTAL



Summary for Pond 20P: RAINGARDEN

Inflow Area = 16,890 sf, 56.04% Impervious, Inflow Depth > 3.00" for 25-Year event
Inflow = 1.61 cfs @ 12.02 hrs, Volume= 4,226 cf
Outflow = 1.61 cfs @ 12.02 hrs, Volume= 4,169 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.03 cfs @ 11.60 hrs, Volume= 976 cf
Primary = 0.32 cfs @ 12.02 hrs, Volume= 1,706 cf
Secondary = 1.26 cfs @ 12.02 hrs, Volume= 1,486 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 28.50' @ 12.02 hrs Surf.Area= 142 sf Storage= 77 cf

Plug-Flow detention time= 8.9 min calculated for 4,169 cf (99% of inflow)
Center-of-Mass det. time= 3.5 min (793.5 - 789.9)

Volume	Invert	Avail.Storage	Storage Description
#1	27.68'	77 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
27.68	89	51.0	0	0	89
28.35	142	57.0	77	77	152

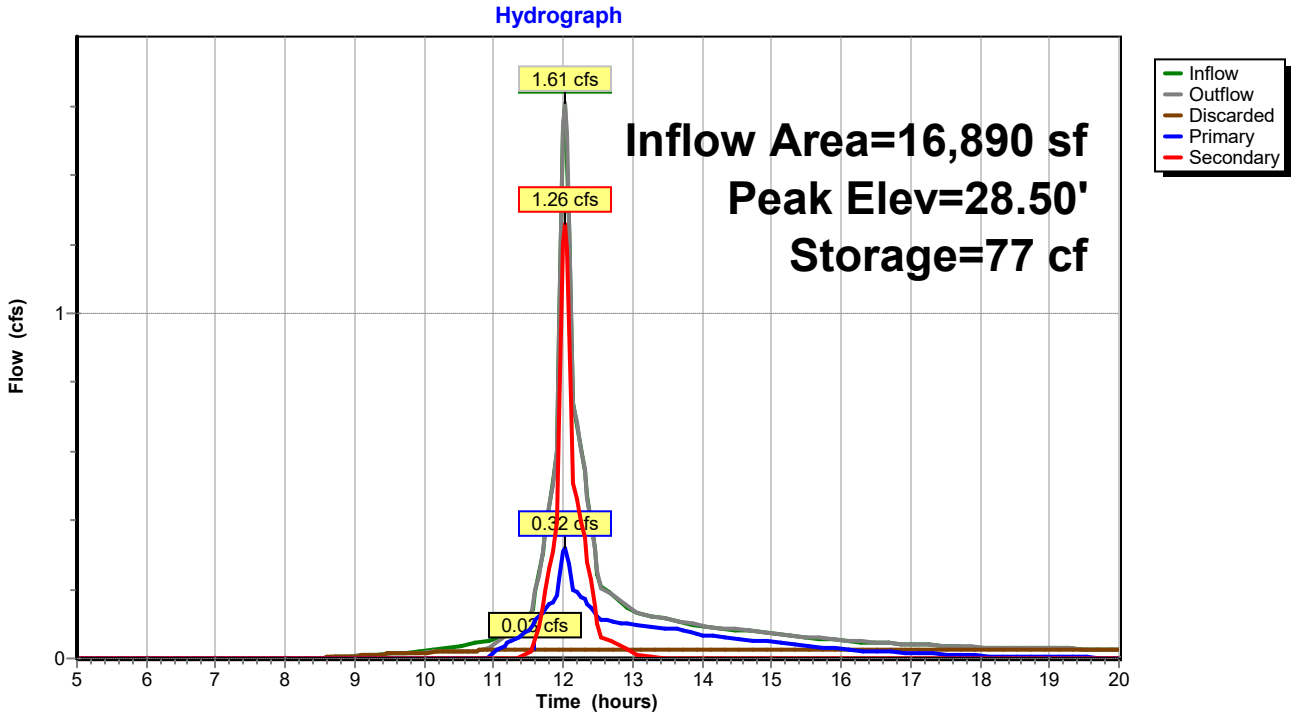
Device	Routing	Invert	Outlet Devices
#1	Discarded	27.68'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	28.18'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Secondary	28.34'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.03 cfs @ 11.60 hrs HW=28.36' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.31 cfs @ 12.02 hrs HW=28.50' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.31 cfs @ 1.91 fps)

Secondary OutFlow Max=1.20 cfs @ 12.02 hrs HW=28.50' (Free Discharge)
↑—**3=Sharp-Crested Rectangular Weir** (Weir Controls 1.20 cfs @ 1.29 fps)

Pond 20P: RAINGARDEN



Summary for Pond 21P: PERF PIPE

Inflow Area = 16,890 sf, 56.04% Impervious, Inflow Depth > 1.21" for 25-Year event
Inflow = 0.32 cfs @ 12.02 hrs, Volume= 1,706 cf
Outflow = 0.32 cfs @ 12.03 hrs, Volume= 1,706 cf, Atten= 0%, Lag= 0.7 min
Discarded = 0.01 cfs @ 11.05 hrs, Volume= 401 cf
Primary = 0.31 cfs @ 12.03 hrs, Volume= 1,306 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 25.45' @ 12.03 hrs Surf.Area= 75 sf Storage= 26 cf

Plug-Flow detention time= 4.4 min calculated for 1,706 cf (100% of inflow)
Center-of-Mass det. time= 4.4 min (805.3 - 800.9)

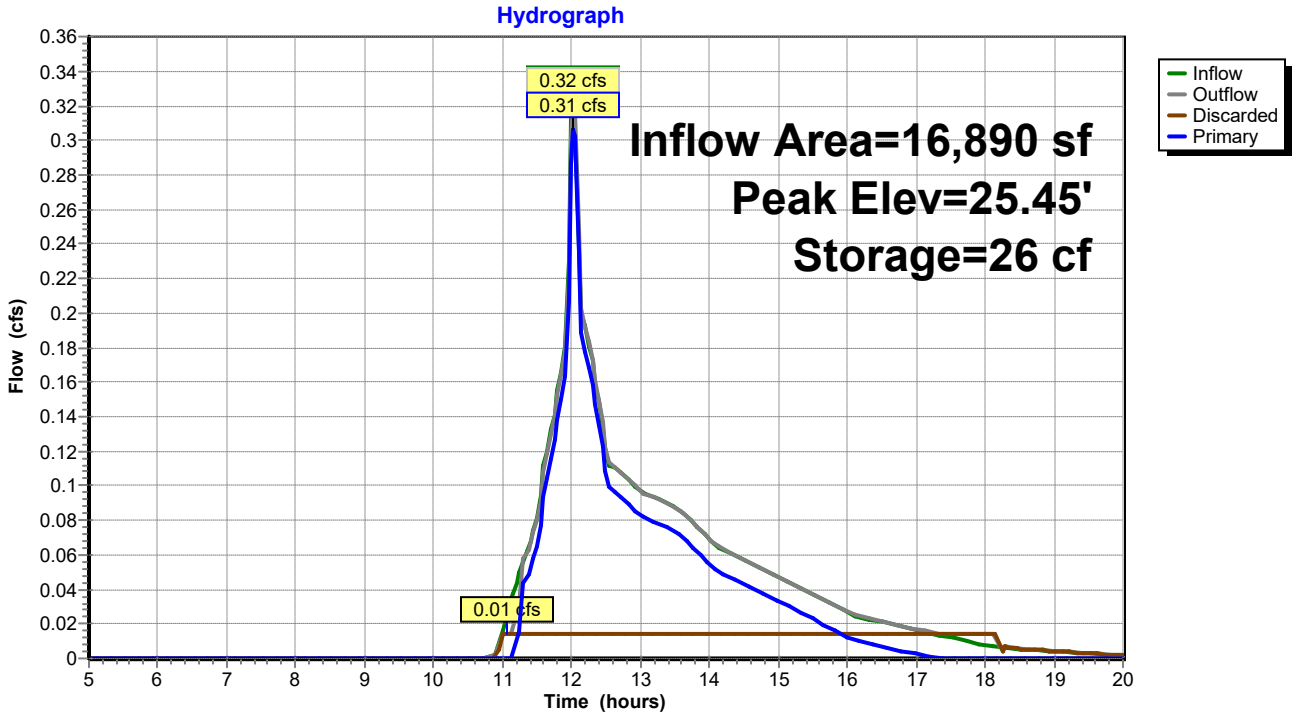
Volume	Invert	Avail.Storage	Storage Description
#1	25.18'	20 cf	**12.0" Round Pipe Storage** Inside #2 L= 25.0'
#2	24.68'	52 cf	**3.00'W x 25.00'L x 2.00'H Prismatoid** 150 cf Overall - 20 cf Embedded = 130 cf x 40.0% Voids
		72 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.68'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	25.18'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.01 cfs @ 11.05 hrs HW=24.74' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.30 cfs @ 12.03 hrs HW=25.45' (Free Discharge)
2=Orifice/Grate (Orifice Controls 0.30 cfs @ 1.76 fps)

Pond 21P: PERF PIPE



Summary for Pond 30P: DRYWELL

Inflow Area = 3,030 sf, 37.76% Impervious, Inflow Depth > 2.02" for 25-Year event
Inflow = 0.19 cfs @ 12.02 hrs, Volume= 510 cf
Outflow = 0.20 cfs @ 12.04 hrs, Volume= 467 cf, Atten= 0%, Lag= 1.2 min
Discarded = 0.00 cfs @ 11.05 hrs, Volume= 93 cf
Primary = 0.20 cfs @ 12.04 hrs, Volume= 374 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 28.04' @ 12.04 hrs Surf.Area= 14 sf Storage= 46 cf

Plug-Flow detention time= 39.0 min calculated for 467 cf (92% of inflow)
Center-of-Mass det. time= 10.6 min (820.4 - 809.8)

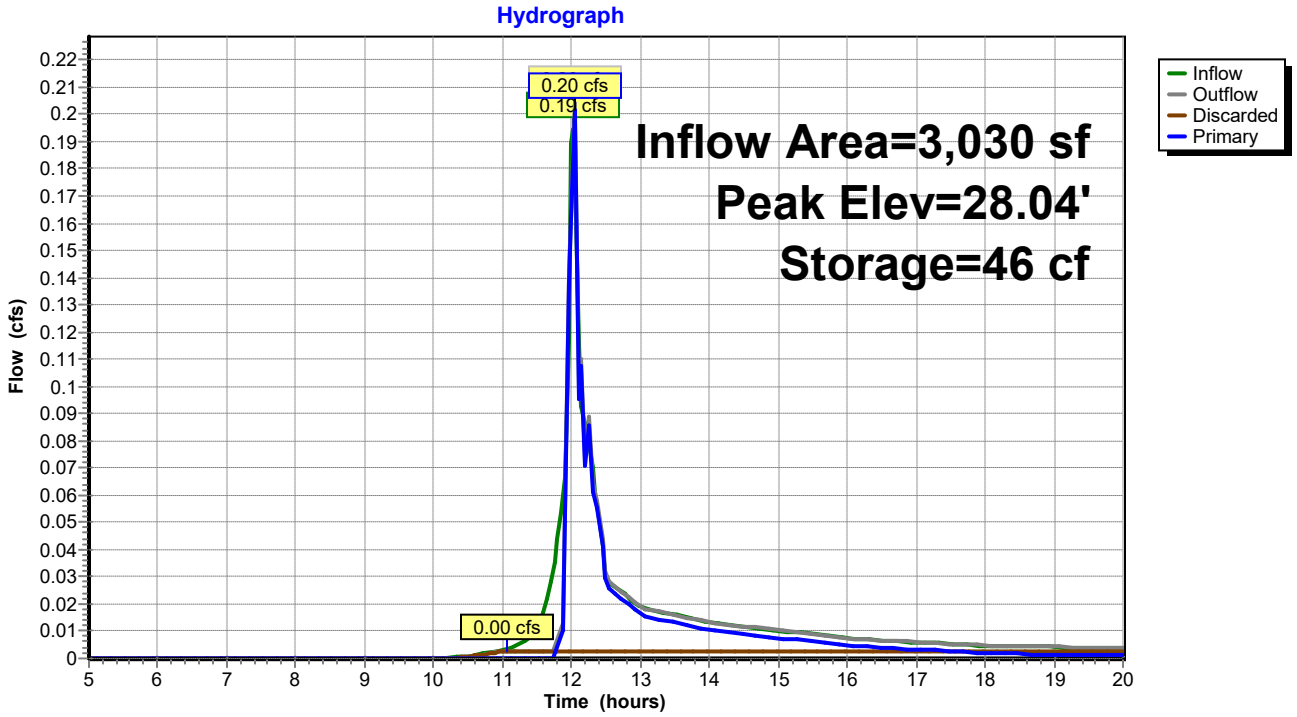
Volume	Invert	Avail.Storage	Storage Description
#1	24.82'	58 cf	**3.60'W x 4.00'L x 4.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.82'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	27.82'	**5.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	28.00'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 11.05 hrs HW=24.86' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.18 cfs @ 12.04 hrs HW=28.04' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.12 cfs @ 1.59 fps)
└**3=Orifice/Grate** (Weir Controls 0.07 cfs @ 0.65 fps)

Pond 30P: DRYWELL



Summary for Pond 42P: CULTEC

Inflow Area = 2,400 sf,100.00% Impervious, Inflow Depth > 5.47" for 25-Year event
Inflow = 0.37 cfs @ 12.01 hrs, Volume= 1,095 cf
Outflow = 0.24 cfs @ 12.11 hrs, Volume= 1,095 cf, Atten= 34%, Lag= 5.8 min
Discarded = 0.03 cfs @ 11.30 hrs, Volume= 955 cf
Primary = 0.21 cfs @ 12.11 hrs, Volume= 139 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 27.05' @ 12.10 hrs Surf.Area= 168 sf Storage= 258 cf

Plug-Flow detention time= 46.0 min calculated for 1,091 cf (100% of inflow)
Center-of-Mass det. time= 45.5 min (775.9 - 730.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.50'	229 cf	**16.00'W x 10.50'L x 4.54'H Field A** 763 cf Overall - 190 cf Embedded = 573 cf x 40.0% Voids
#2A	25.50'	190 cf	**Cultec R-330XLHD** x 3 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		419 cf	Total Available Storage

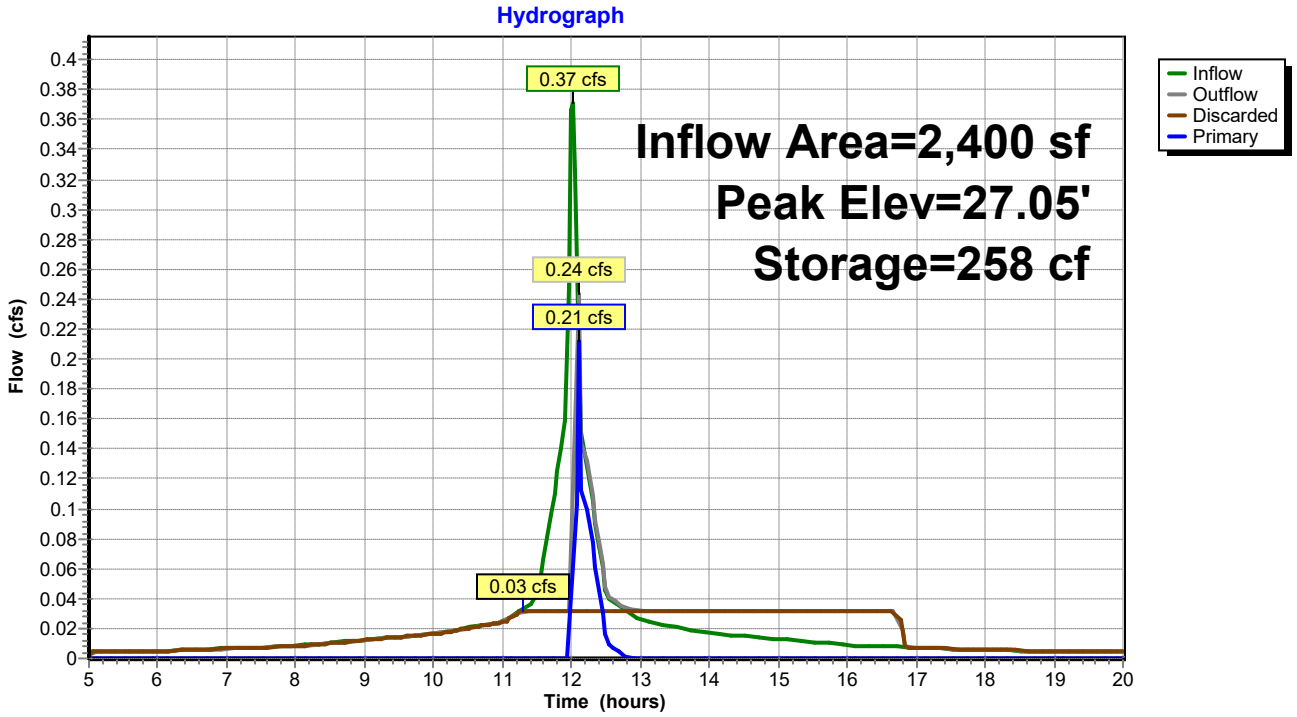
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	26.99'	**4.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#2	Discarded	24.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 11.30 hrs HW=24.55' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.18 cfs @ 12.11 hrs HW=27.05' (Free Discharge)
↑**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.18 cfs @ 0.78 fps)

Pond 42P: CULTEC



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: NORTHERN AREA Runoff Area=19,866 sf 68.28% Impervious Runoff Depth>6.15"
Flow Length=191' Tc=0.9 min CN=80 Runoff=3.81 cfs 10,179 cf

Subcatchment 2S: SOUTHERN AREA Runoff Area=17,081 sf 13.91% Impervious Runoff Depth>2.37"
Flow Length=201' Slope=0.0210 '/' Tc=3.3 min CN=48 Runoff=1.20 cfs 3,371 cf

Subcatchment 10S: NW LAWN Runoff Area=8,603 sf 18.59% Impervious Runoff Depth>2.60"
Flow Length=143' Slope=0.0560 '/' Tc=1.4 min CN=50 Runoff=0.69 cfs 1,861 cf

Subcatchment 20S: ROADWAY Runoff Area=16,890 sf 56.04% Impervious Runoff Depth>5.31"
Flow Length=179' Tc=1.3 min CN=73 Runoff=2.81 cfs 7,468 cf

Subcatchment 30S: SIDE DRIVEWAY Runoff Area=3,030 sf 37.76% Impervious Runoff Depth>3.99"
Flow Length=82' Tc=0.7 min CN=62 Runoff=0.39 cfs 1,008 cf

Subcatchment 40S: EASTERN REAR Runoff Area=6,029 sf 0.00% Impervious Runoff Depth>1.40"
Flow Length=110' Slope=0.0230 '/' Tc=1.7 min CN=39 Runoff=0.22 cfs 702 cf

Subcatchment 41S: EASTERN ROOF Runoff Area=2,400 sf 100.00% Impervious Runoff Depth>8.00"
Tc=1.0 min CN=98 Runoff=0.54 cfs 1,599 cf

Reach 1R: RAIL TRAIL Inflow=3.81 cfs 10,179 cf
Outflow=3.81 cfs 10,179 cf

Reach 2R: EASTERN ABUTTERS Inflow=1.20 cfs 3,371 cf
Outflow=1.20 cfs 3,371 cf

Reach 3R: TOTAL Inflow=4.76 cfs 13,551 cf
Outflow=4.76 cfs 13,551 cf

Reach 10R: RAIL TRAIL Inflow=3.42 cfs 7,587 cf
Outflow=3.42 cfs 7,587 cf

Reach 20R: EASTERN ABUTTERS Inflow=1.12 cfs 1,978 cf
Outflow=1.12 cfs 1,978 cf

Reach 30R: TOTAL Inflow=4.56 cfs 9,565 cf
Outflow=4.56 cfs 9,565 cf

Pond 20P: RAINGARDEN Peak Elev=28.58' Storage=77 cf Inflow=2.81 cfs 7,468 cf
Discarded=0.03 cfs 1,128 cf Primary=0.47 cfs 2,965 cf Secondary=2.31 cfs 3,313 cf Outflow=2.81 cfs 7,406 cf

Pond 21P: PERF PIPE Peak Elev=25.52' Storage=29 cf Inflow=0.47 cfs 2,965 cf
Discarded=0.01 cfs 536 cf Primary=0.46 cfs 2,414 cf Outflow=0.47 cfs 2,949 cf

Pond 30P: DRYWELL Peak Elev=28.09' Storage=47 cf Inflow=0.39 cfs 1,008 cf
Discarded=0.00 cfs 106 cf Primary=0.39 cfs 858 cf Outflow=0.39 cfs 965 cf

Pond 42P: CULTEC Peak Elev=27.13' Storage=267 cf Inflow=0.54 cfs 1,599 cf
Discarded=0.03 cfs 1,182 cf Primary=0.54 cfs 417 cf Outflow=0.58 cfs 1,599 cf

Summary for Subcatchment 1S: NORTHERN AREA

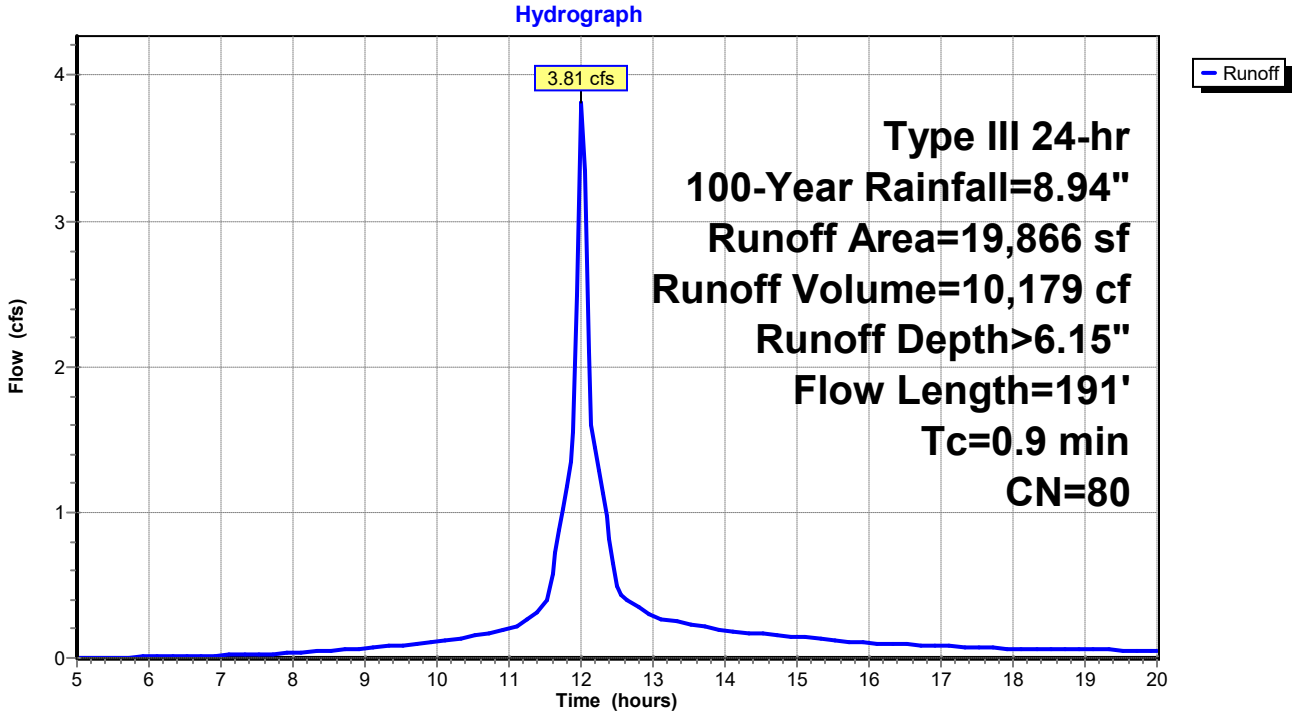
Runoff = 3.81 cfs @ 12.01 hrs, Volume= 10,179 cf, Depth> 6.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
10,583	98	Paved parking, HSG A
2,982	98	Roofs, HSG A
5,437	43	Woods/grass comb., Fair, HSG A
864	39	>75% Grass cover, Good, HSG A
19,866	80	Weighted Average
6,301		31.72% Pervious Area
13,565		68.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	176	0.0340	3.74		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.1	15	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.9	191	Total			

Subcatchment 1S: NORTHERN AREA



Summary for Subcatchment 2S: SOUTHERN AREA

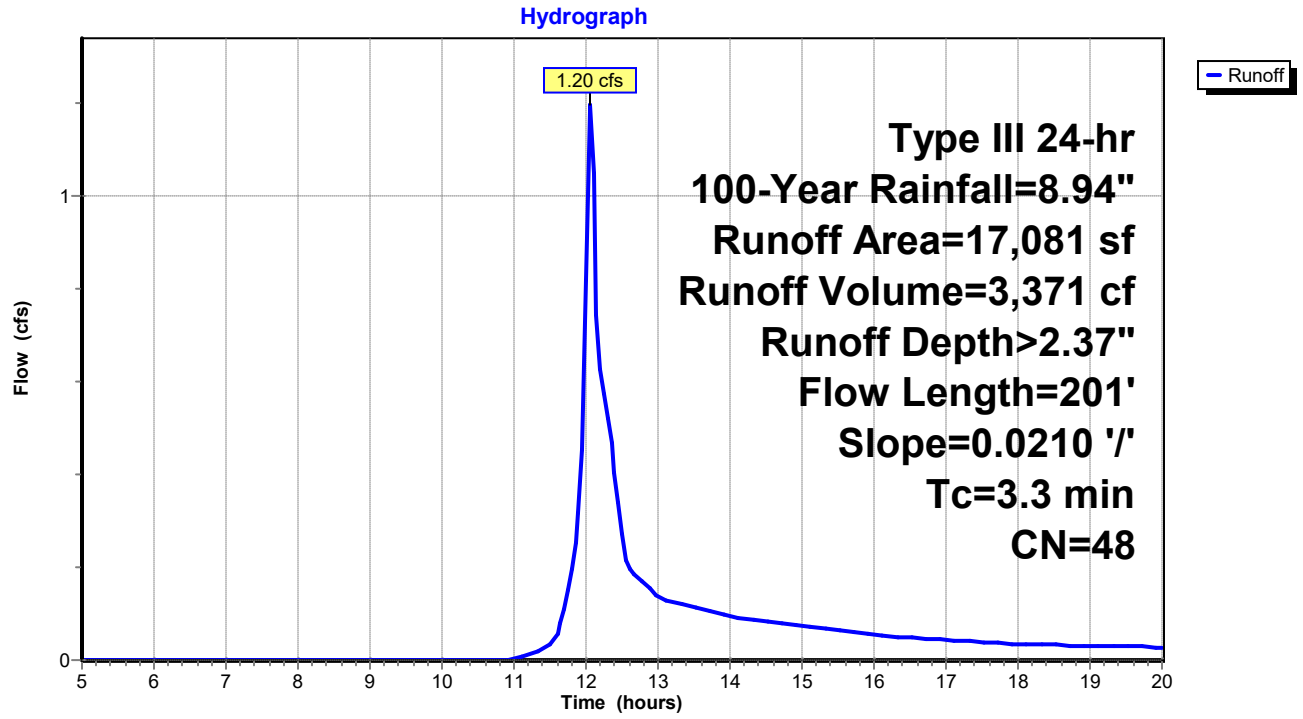
Runoff = 1.20 cfs @ 12.06 hrs, Volume= 3,371 cf, Depth> 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
52	98	Paved parking, HSG A
2,324	98	Roofs, HSG A
1,521	43	Woods/grass comb., Fair, HSG A
13,184	39	>75% Grass cover, Good, HSG A
17,081	48	Weighted Average
14,705		86.09% Pervious Area
2,376		13.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	201	0.0210	1.01		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 2S: SOUTHERN AREA



Summary for Subcatchment 10S: NW LAWN

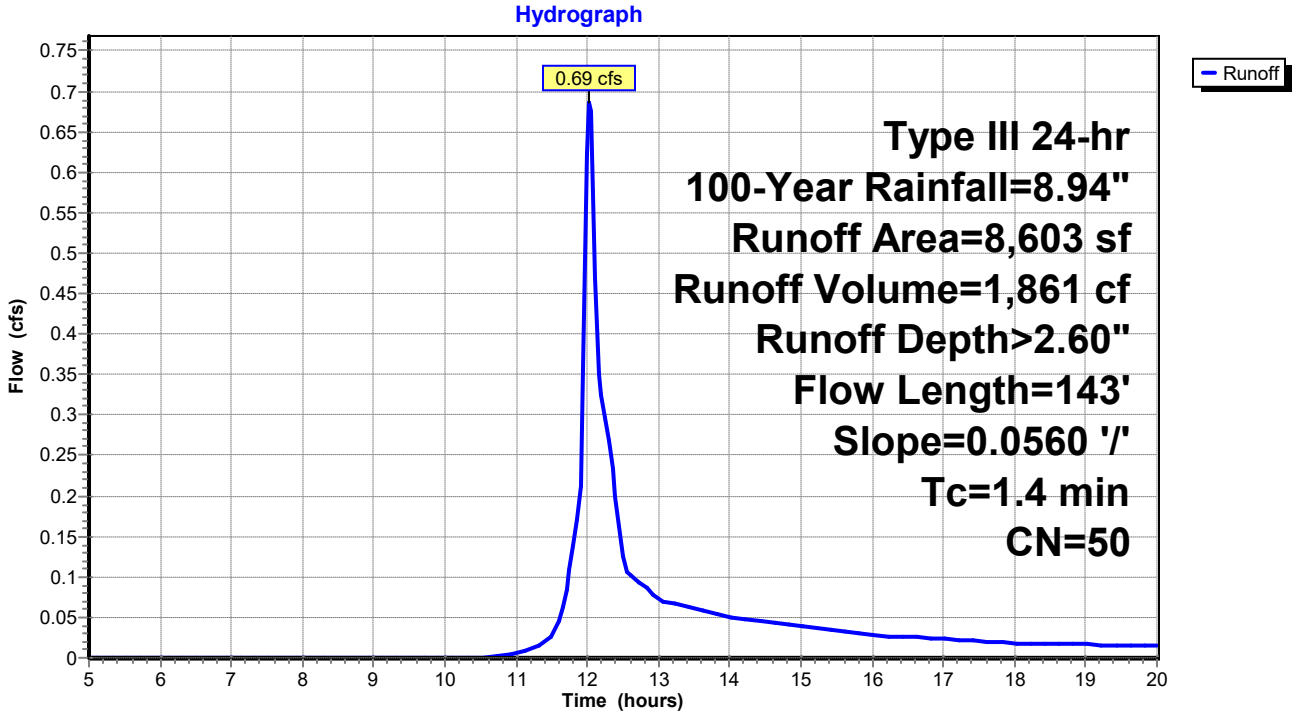
Runoff = 0.69 cfs @ 12.04 hrs, Volume= 1,861 cf, Depth> 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

	Area (sf)	CN	Description
	6,837	39	>75% Grass cover, Good, HSG A
	1,599	98	Roofs, HSG A
*	167	55	Permable pavers
	8,603	50	Weighted Average
	7,004		81.41% Pervious Area
	1,599		18.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	143	0.0560	1.66		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 10S: NW LAWN



Summary for Subcatchment 20S: ROADWAY

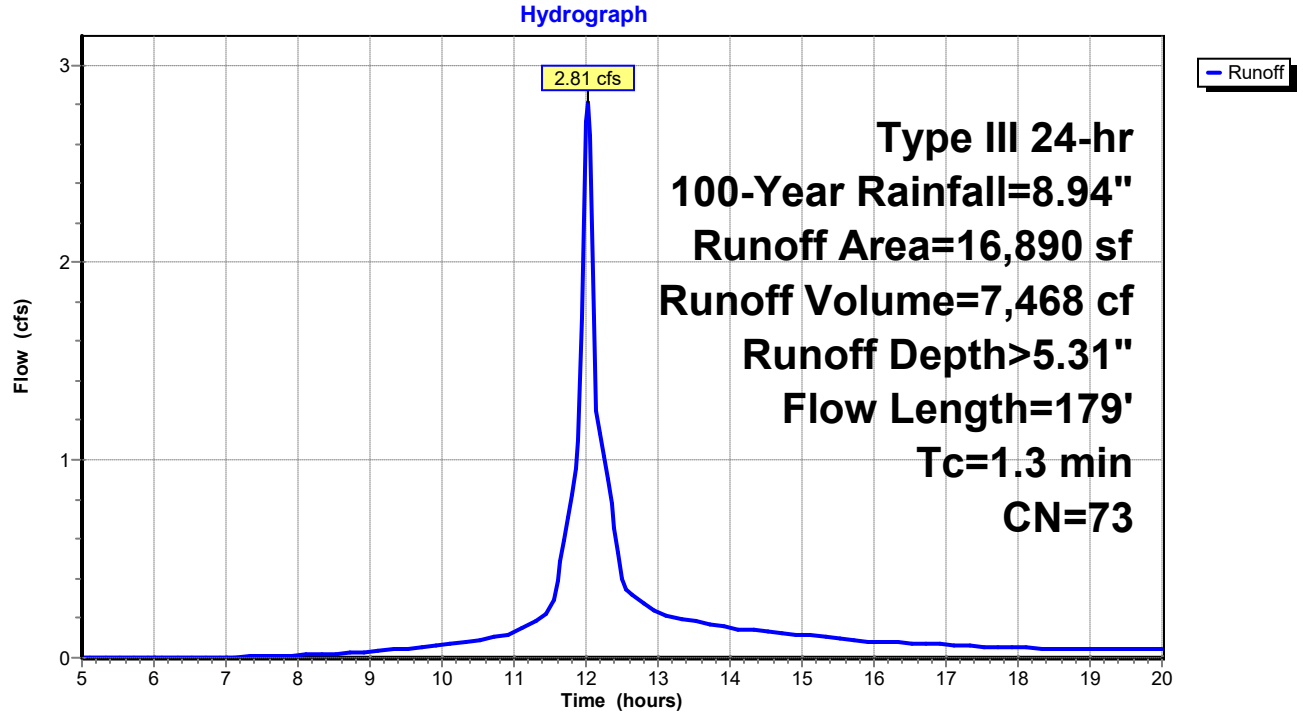
Runoff = 2.81 cfs @ 12.02 hrs, Volume= 7,468 cf, Depth> 5.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

	Area (sf)	CN	Description
	5,311	98	Paved parking, HSG A
	229	98	Unconnected pavement, HSG A
	6,781	39	>75% Grass cover, Good, HSG A
	3,925	98	Roofs, HSG A
*	644	55	Permeable pavers
	16,890	73	Weighted Average
	7,425		43.96% Pervious Area
	9,465		56.04% Impervious Area
	229		2.42% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	67	0.0670	1.81		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.7	112	0.0160	2.57		**Shallow Concentrated Flow, Road** Paved Kv= 20.3 fps
1.3	179	Total			

Subcatchment 20S: ROADWAY



Summary for Subcatchment 30S: SIDE DRIVEWAY

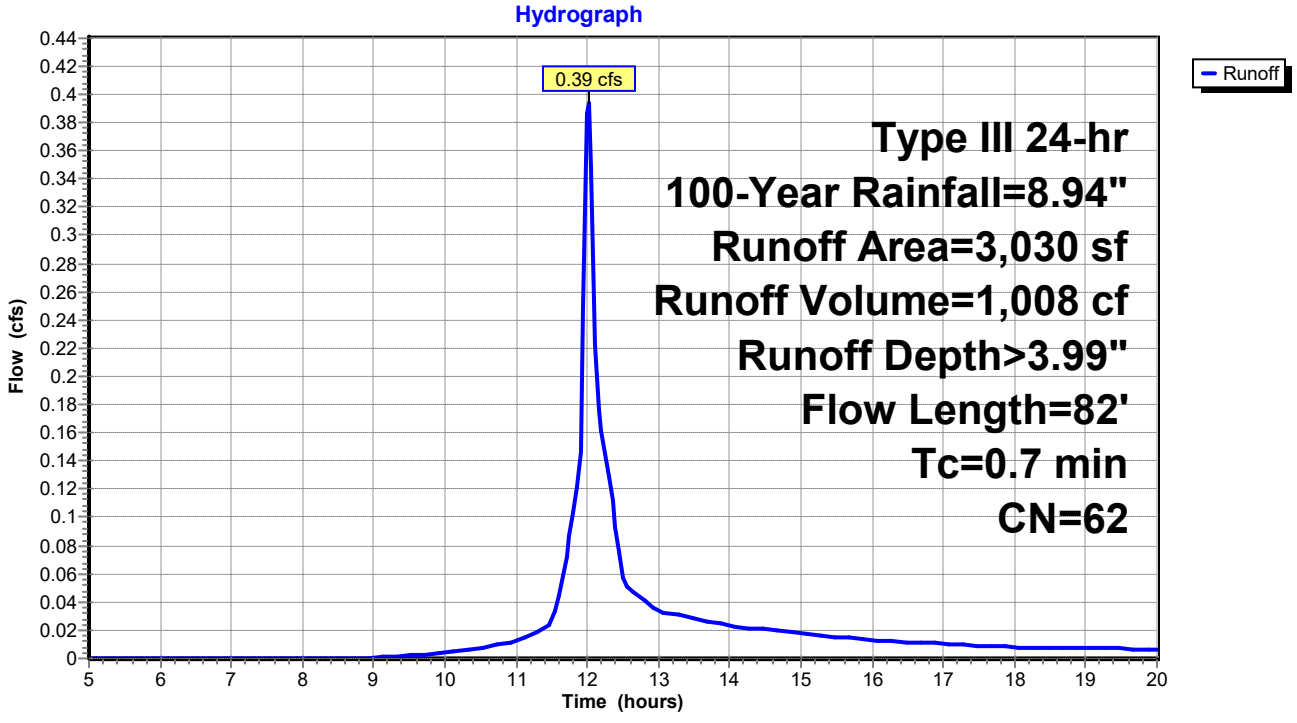
Runoff = 0.39 cfs @ 12.01 hrs, Volume= 1,008 cf, Depth> 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

	Area (sf)	CN	Description
	1,144	98	Paved parking, HSG A
	1,720	39	>75% Grass cover, Good, HSG A
*	166	55	Permeablea pavers
	3,030	62	Weighted Average
	1,886		62.24% Pervious Area
	1,144		37.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	48	0.0520	1.60		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps
0.2	34	0.0290	3.46		**Shallow Concentrated Flow, Driveway** Paved Kv= 20.3 fps
0.7	82	Total			

Subcatchment 30S: SIDE DRIVEWAY



Summary for Subcatchment 40S: EASTERN REAR

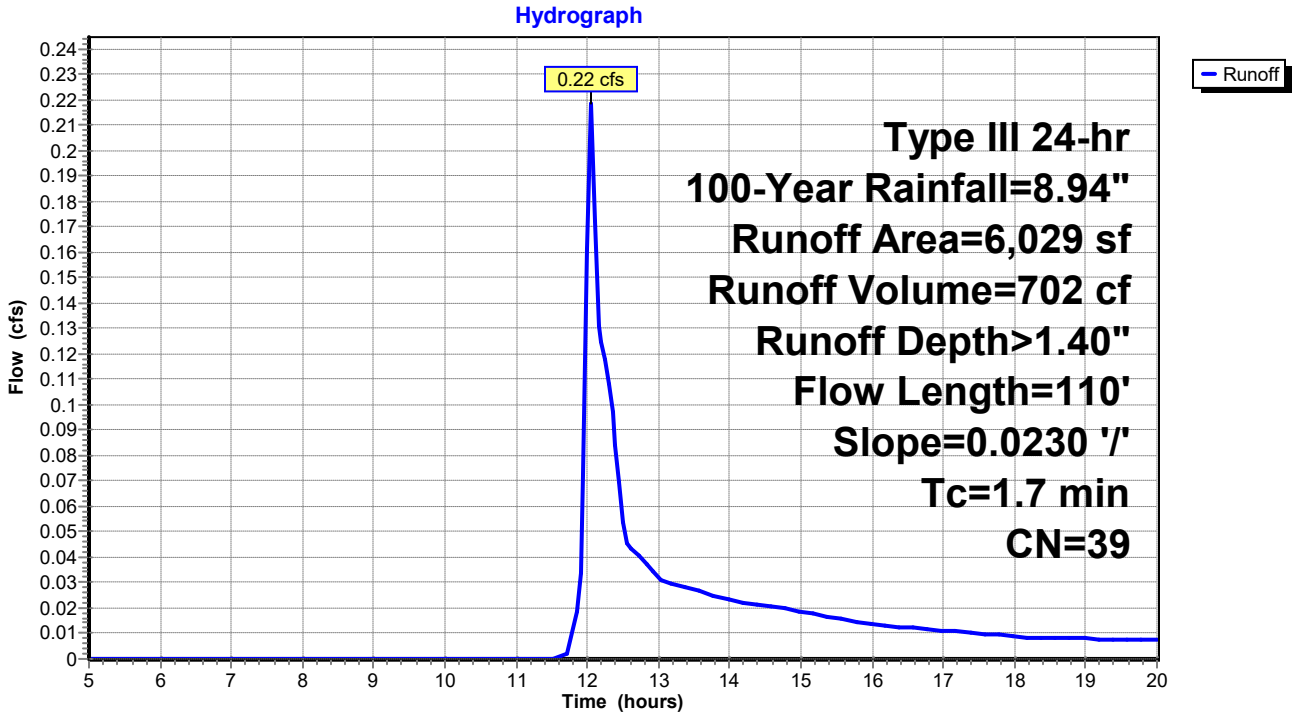
Runoff = 0.22 cfs @ 12.05 hrs, Volume= 702 cf, Depth> 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
6,029	39	>75% Grass cover, Good, HSG A
6,029		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	110	0.0230	1.06		**Shallow Concentrated Flow, Grass** Short Grass Pasture Kv= 7.0 fps

Subcatchment 40S: EASTERN REAR



Summary for Subcatchment 41S: EASTERN ROOF

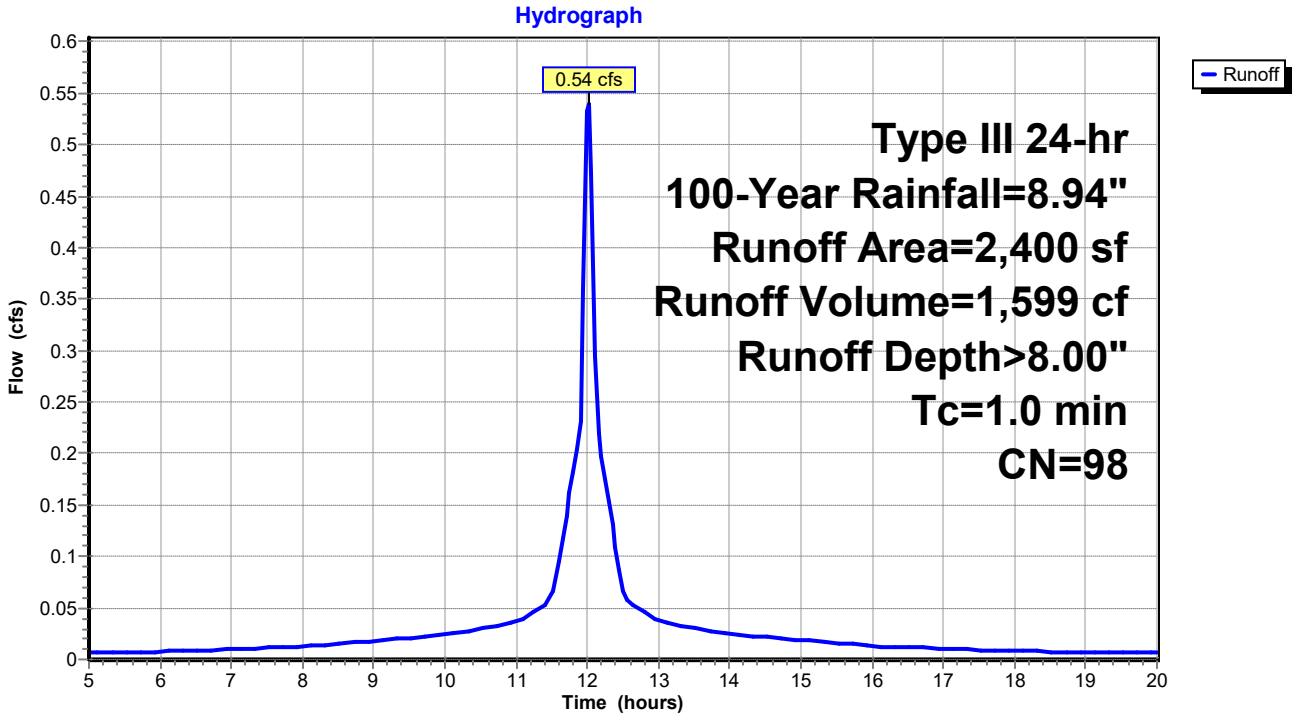
Runoff = 0.54 cfs @ 12.01 hrs, Volume= 1,599 cf, Depth> 8.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.94"

Area (sf)	CN	Description
2,400	98	Roofs, HSG A
2,400		100.00% Impervious Area

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

Subcatchment 41S: EASTERN ROOF

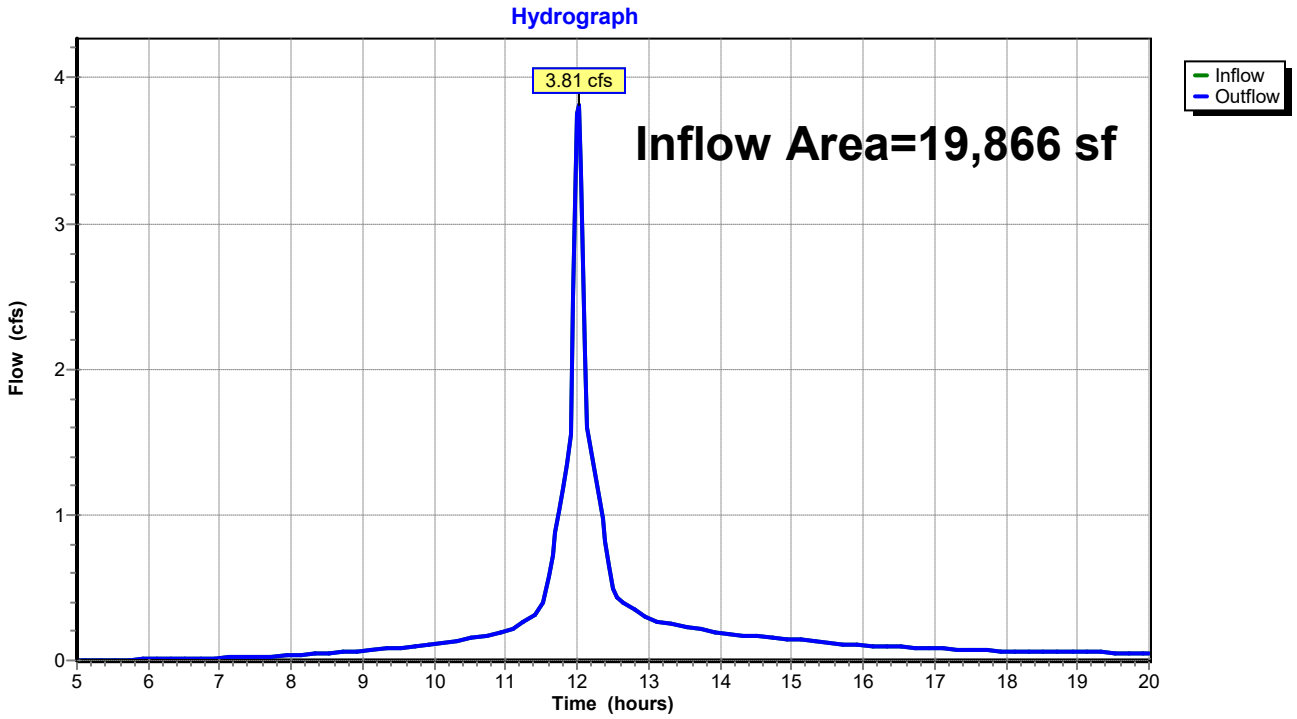


Summary for Reach 1R: RAIL TRAIL

Inflow Area = 19,866 sf, 68.28% Impervious, Inflow Depth > 6.15" for 100-Year event
Inflow = 3.81 cfs @ 12.01 hrs, Volume= 10,179 cf
Outflow = 3.81 cfs @ 12.01 hrs, Volume= 10,179 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 1R: RAIL TRAIL

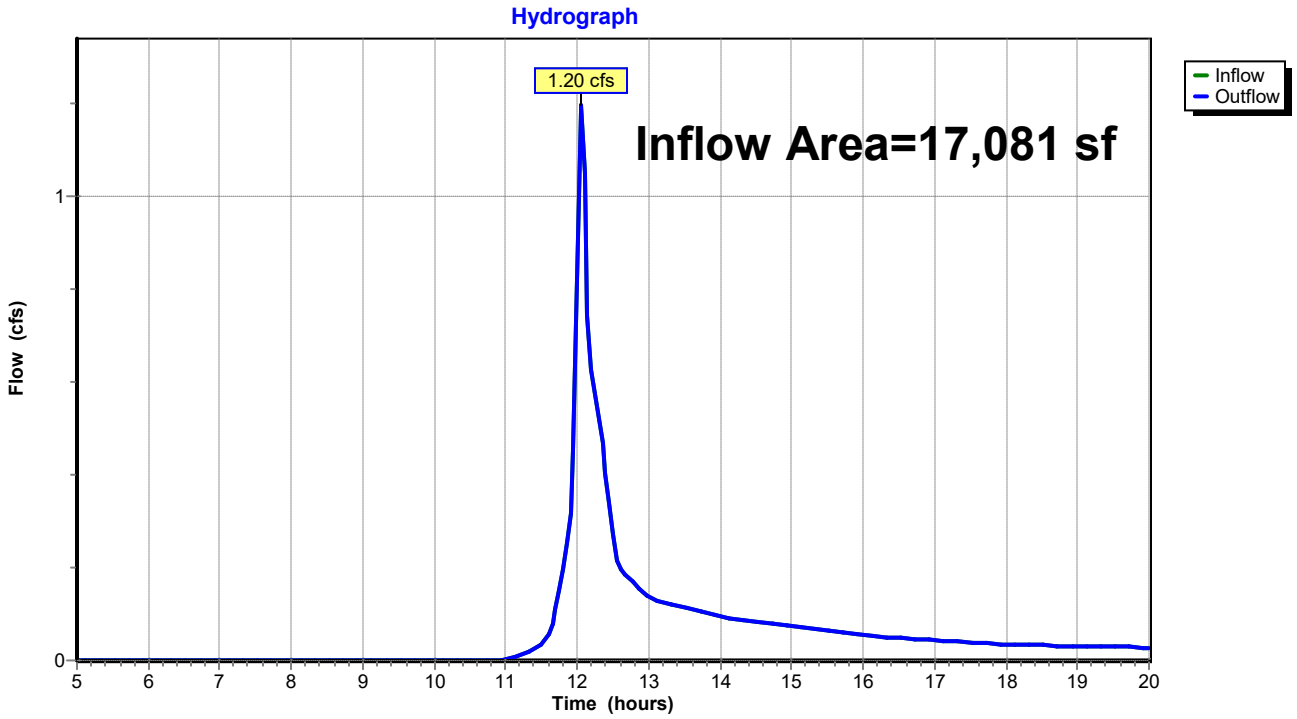


Summary for Reach 2R: EASTERN ABUTTERS

Inflow Area = 17,081 sf, 13.91% Impervious, Inflow Depth > 2.37" for 100-Year event
Inflow = 1.20 cfs @ 12.06 hrs, Volume= 3,371 cf
Outflow = 1.20 cfs @ 12.06 hrs, Volume= 3,371 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 2R: EASTERN ABUTTERS

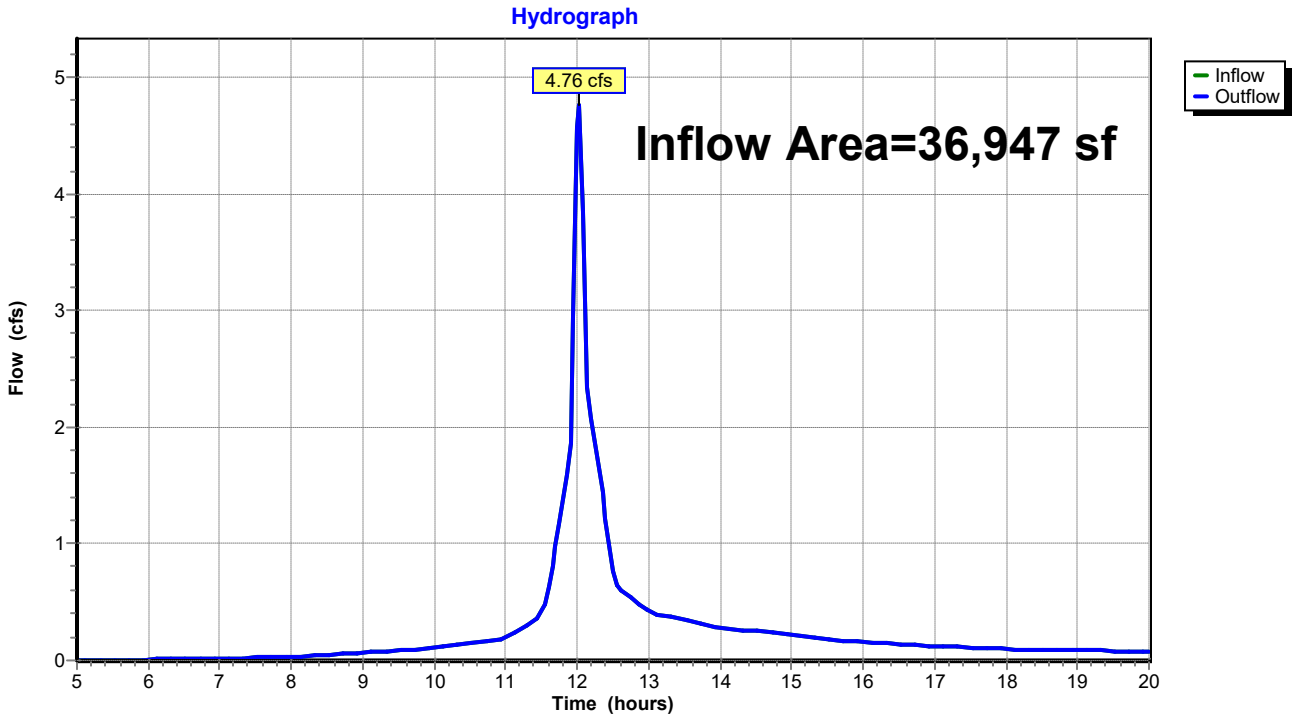


Summary for Reach 3R: TOTAL

Inflow Area = 36,947 sf, 43.15% Impervious, Inflow Depth > 4.40" for 100-Year event
Inflow = 4.76 cfs @ 12.02 hrs, Volume= 13,551 cf
Outflow = 4.76 cfs @ 12.02 hrs, Volume= 13,551 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 3R: TOTAL

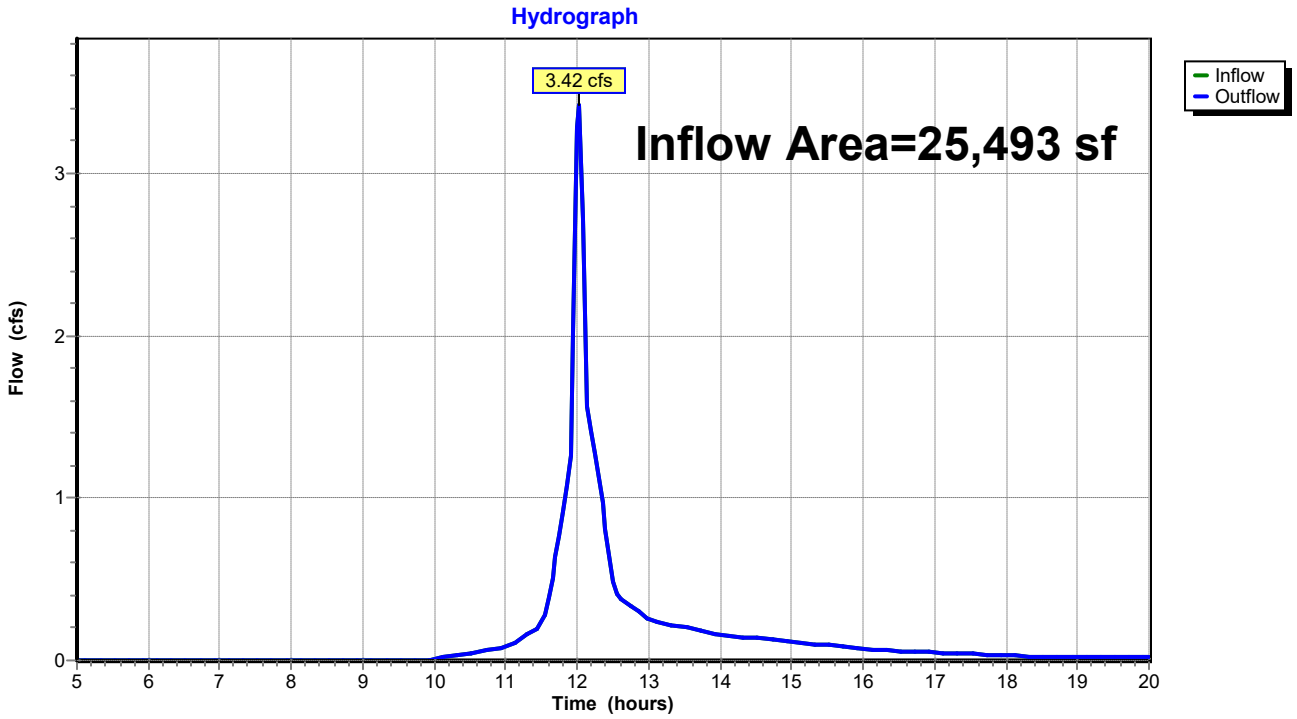


Summary for Reach 10R: RAIL TRAIL

Inflow Area = 25,493 sf, 43.40% Impervious, Inflow Depth > 3.57" for 100-Year event
Inflow = 3.42 cfs @ 12.03 hrs, Volume= 7,587 cf
Outflow = 3.42 cfs @ 12.03 hrs, Volume= 7,587 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 10R: RAIL TRAIL

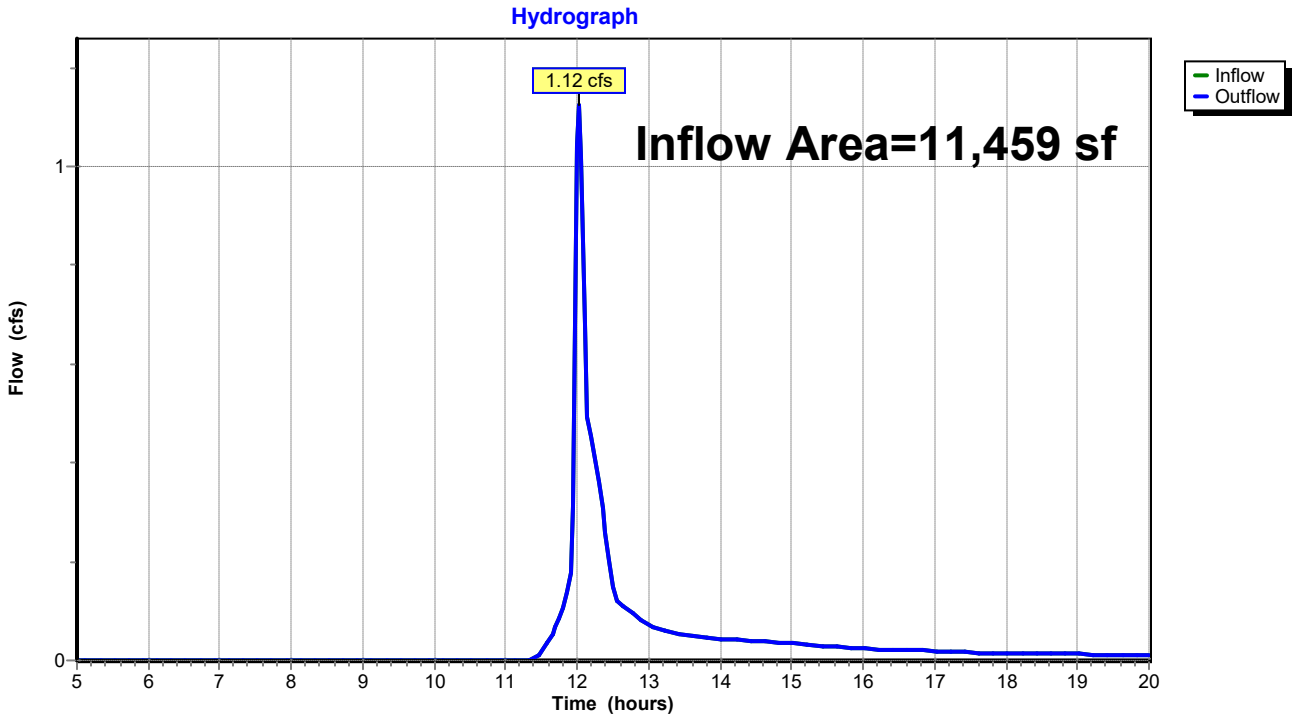


Summary for Reach 20R: EASTERN ABUTTERS

Inflow Area = 11,459 sf, 30.93% Impervious, Inflow Depth > 2.07" for 100-Year event
Inflow = 1.12 cfs @ 12.02 hrs, Volume= 1,978 cf
Outflow = 1.12 cfs @ 12.02 hrs, Volume= 1,978 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 20R: EASTERN ABUTTERS

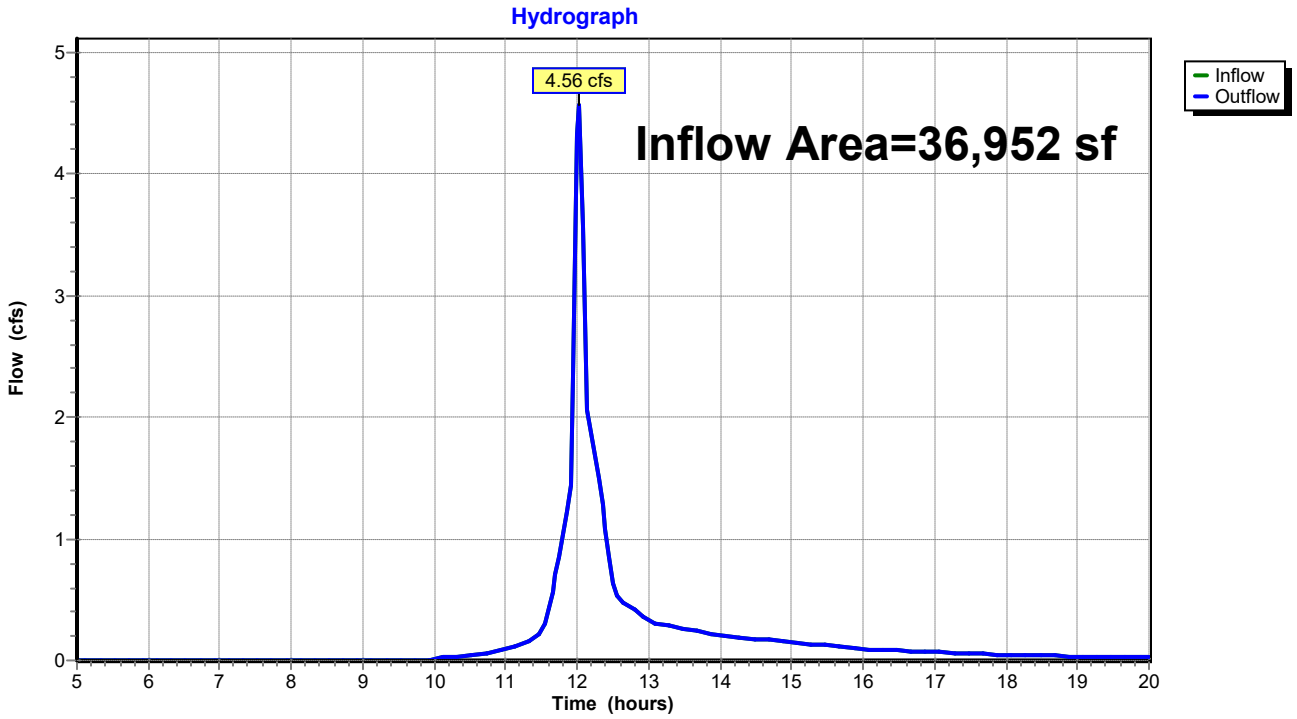


Summary for Reach 30R: TOTAL

Inflow Area = 36,952 sf, 39.53% Impervious, Inflow Depth > 3.11" for 100-Year event
Inflow = 4.56 cfs @ 12.02 hrs, Volume= 9,565 cf
Outflow = 4.56 cfs @ 12.02 hrs, Volume= 9,565 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach 30R: TOTAL



Summary for Pond 20P: RAINGARDEN

Inflow Area = 16,890 sf, 56.04% Impervious, Inflow Depth > 5.31" for 100-Year event
Inflow = 2.81 cfs @ 12.02 hrs, Volume= 7,468 cf
Outflow = 2.81 cfs @ 12.02 hrs, Volume= 7,406 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.03 cfs @ 11.15 hrs, Volume= 1,128 cf
Primary = 0.47 cfs @ 12.02 hrs, Volume= 2,965 cf
Secondary = 2.31 cfs @ 12.02 hrs, Volume= 3,313 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 28.58' @ 12.02 hrs Surf.Area= 142 sf Storage= 77 cf

Plug-Flow detention time= 6.0 min calculated for 7,381 cf (99% of inflow)
Center-of-Mass det. time= 2.6 min (779.3 - 776.7)

Volume	Invert	Avail.Storage	Storage Description
#1	27.68'	77 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
27.68	89	51.0	0	0	89
28.35	142	57.0	77	77	152

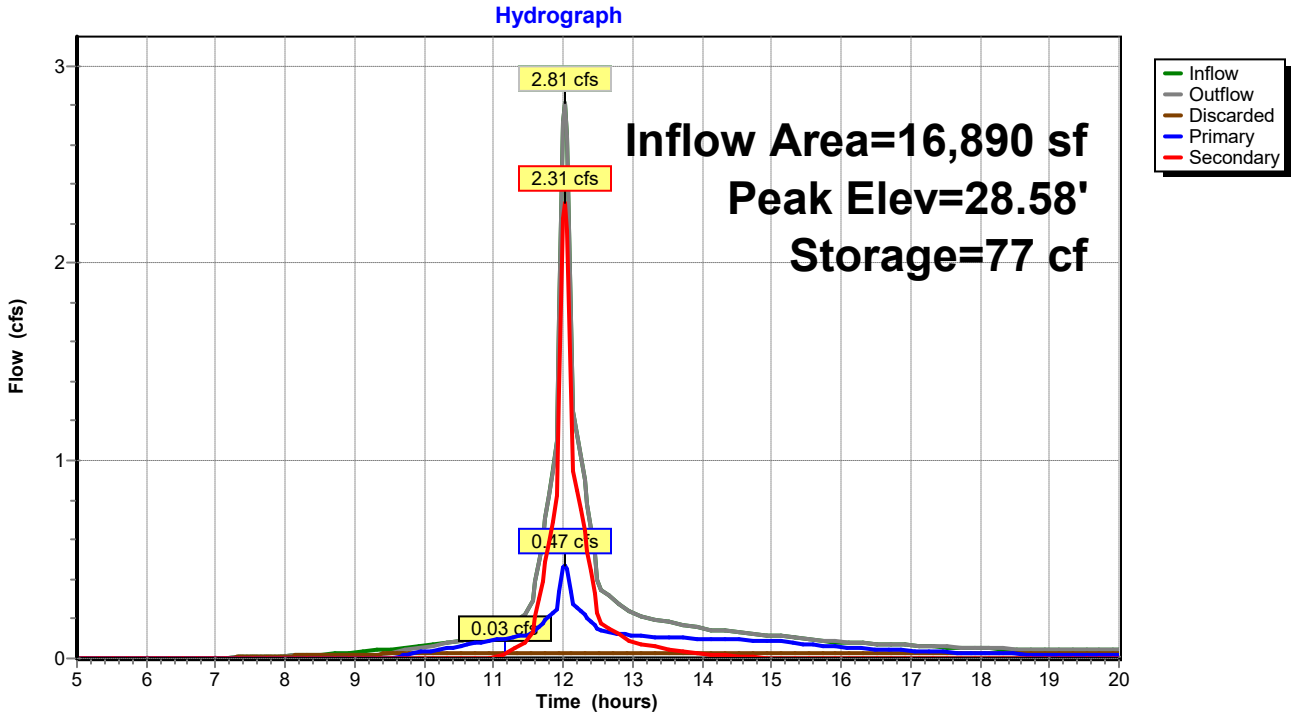
Device	Routing	Invert	Outlet Devices
#1	Discarded	27.68'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	28.18'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Secondary	28.34'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.03 cfs @ 11.15 hrs HW=28.35' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.46 cfs @ 12.02 hrs HW=28.57' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.46 cfs @ 2.14 fps)

Secondary OutFlow Max=2.19 cfs @ 12.02 hrs HW=28.57' (Free Discharge)
↑—**3=Sharp-Crested Rectangular Weir** (Weir Controls 2.19 cfs @ 1.58 fps)

Pond 20P: RAINGARDEN



Summary for Pond 21P: PERF PIPE

Inflow Area = 16,890 sf, 56.04% Impervious, Inflow Depth > 2.11" for 100-Year event
Inflow = 0.47 cfs @ 12.02 hrs, Volume= 2,965 cf
Outflow = 0.47 cfs @ 12.03 hrs, Volume= 2,949 cf, Atten= 0%, Lag= 0.5 min
Discarded = 0.01 cfs @ 9.75 hrs, Volume= 536 cf
Primary = 0.46 cfs @ 12.03 hrs, Volume= 2,414 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 25.52' @ 12.03 hrs Surf.Area= 75 sf Storage= 29 cf

Plug-Flow detention time= 3.9 min calculated for 2,949 cf (99% of inflow)
Center-of-Mass det. time= 1.9 min (811.6 - 809.7)

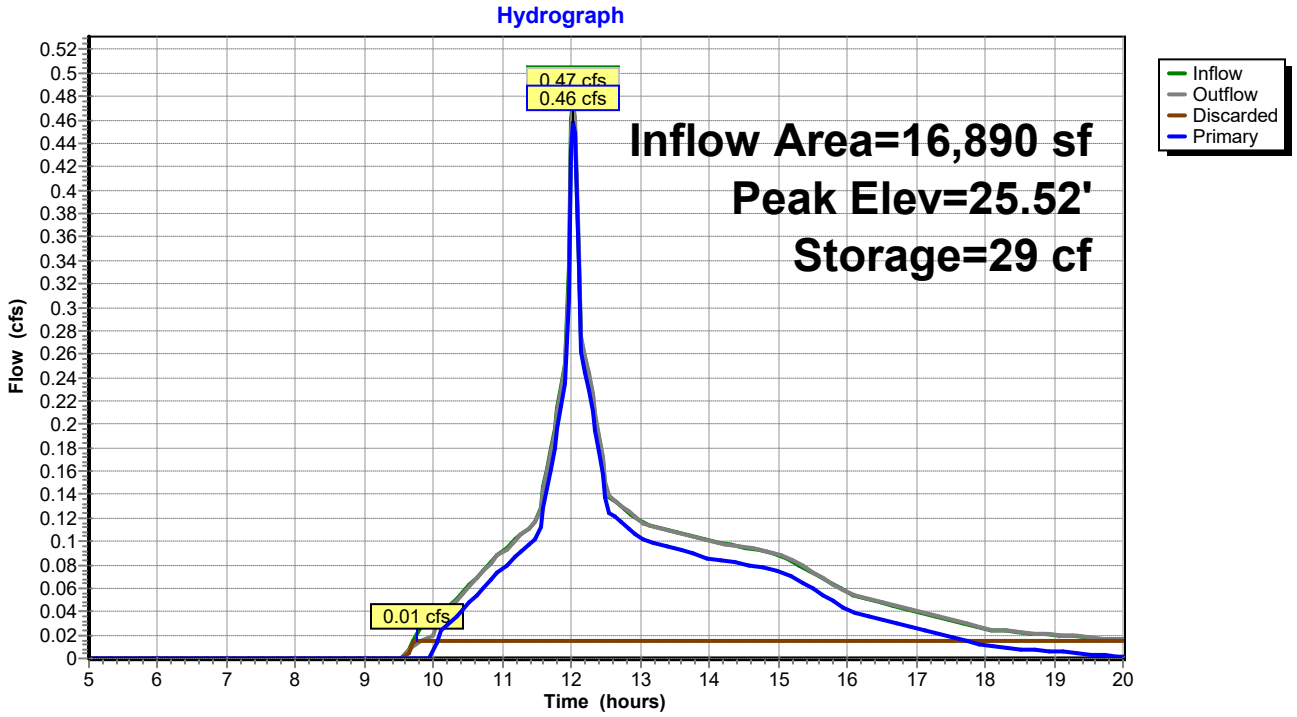
Volume	Invert	Avail.Storage	Storage Description
#1	25.18'	20 cf	**12.0" Round Pipe Storage** Inside #2 L= 25.0'
#2	24.68'	52 cf	**3.00'W x 25.00'L x 2.00'H Prismatoid** 150 cf Overall - 20 cf Embedded = 130 cf x 40.0% Voids
		72 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.68'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	25.18'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.01 cfs @ 9.75 hrs HW=24.72' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.44 cfs @ 12.03 hrs HW=25.51' (Free Discharge)
2=Orifice/Grate (Orifice Controls 0.44 cfs @ 1.96 fps)

Pond 21P: PERF PIPE



Summary for Pond 30P: DRYWELL

Inflow Area = 3,030 sf, 37.76% Impervious, Inflow Depth > 3.99" for 100-Year event
Inflow = 0.39 cfs @ 12.01 hrs, Volume= 1,008 cf
Outflow = 0.39 cfs @ 12.01 hrs, Volume= 965 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 9.75 hrs, Volume= 106 cf
Primary = 0.39 cfs @ 12.01 hrs, Volume= 858 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 28.09' @ 12.02 hrs Surf.Area= 14 sf Storage= 47 cf

Plug-Flow detention time= 22.3 min calculated for 961 cf (95% of inflow)
Center-of-Mass det. time= 6.5 min (801.0 - 794.4)

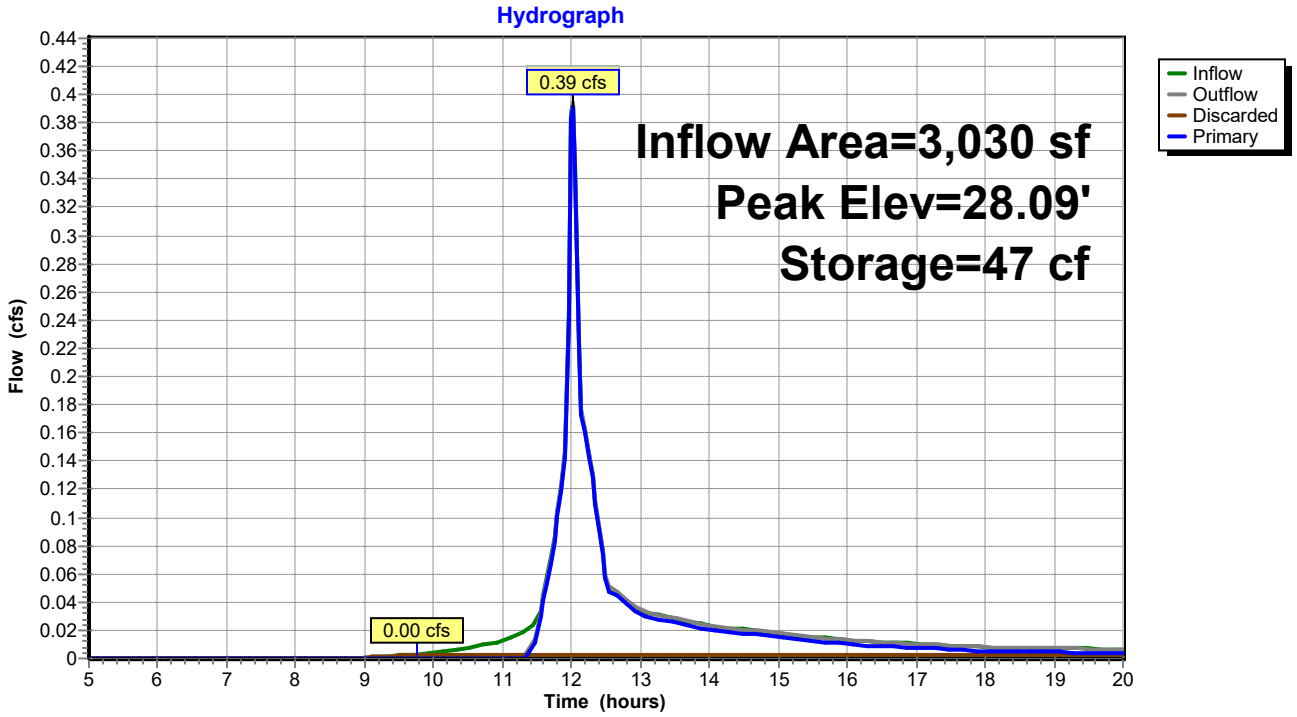
Volume	Invert	Avail.Storage	Storage Description
#1	24.82'	58 cf	**3.60'W x 4.00'L x 4.00'H Prismatoid**

Device	Routing	Invert	Outlet Devices
#1	Discarded	24.82'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	27.82'	**5.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	28.00'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 9.75 hrs HW=24.86' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.37 cfs @ 12.01 hrs HW=28.08' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 0.16 cfs @ 1.75 fps)
└**3=Orifice/Grate** (Weir Controls 0.21 cfs @ 0.95 fps)

Pond 30P: DRYWELL



Summary for Pond 42P: CULTEC

Inflow Area = 2,400 sf,100.00% Impervious, Inflow Depth > 8.00" for 100-Year event
Inflow = 0.54 cfs @ 12.01 hrs, Volume= 1,599 cf
Outflow = 0.58 cfs @ 12.02 hrs, Volume= 1,599 cf, Atten= 0%, Lag= 0.5 min
Discarded = 0.03 cfs @ 10.75 hrs, Volume= 1,182 cf
Primary = 0.54 cfs @ 12.02 hrs, Volume= 417 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 27.13' @ 12.02 hrs Surf.Area= 168 sf Storage= 267 cf

Plug-Flow detention time= 42.4 min calculated for 1,593 cf (100% of inflow)
Center-of-Mass det. time= 41.9 min (771.1 - 729.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	24.50'	229 cf	**16.00'W x 10.50'L x 4.54'H Field A** 763 cf Overall - 190 cf Embedded = 573 cf x 40.0% Voids
#2A	25.50'	190 cf	**Cultec R-330XLHD** x 3 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		419 cf	Total Available Storage

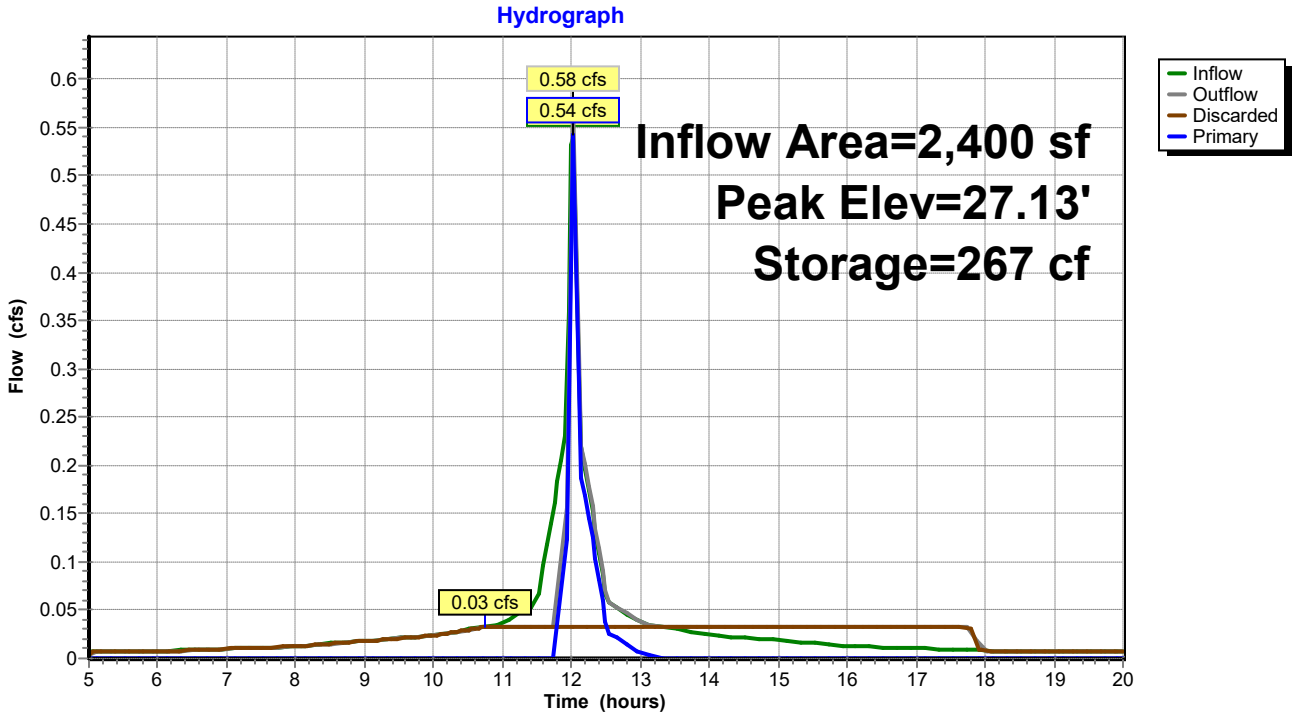
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	26.99'	**4.0' long Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#2	Discarded	24.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 10.75 hrs HW=24.55' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.47 cfs @ 12.02 hrs HW=27.10' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.47 cfs @ 1.08 fps)

Pond 42P: CULTEC



Appendix F

OPERATION & MAINTENANCE PLAN

Operation & Maintenance Plan (Permanent BMPs)

FOR

21-27 Hancock Street, Newburyport, MA

Date: February, 2021

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Owner/Operator: Jay Caswell
Caswell Development
24 Graf Road
Newburyport, MA

Inspection and Maintenance Schedule

Facility personnel will inspect the stormwater management system on a routine basis not less than once per month for the first six (6) months of operation and annually thereafter. The estimated cost for this inspection and maintenance schedule is $1,200/yr. Refer to project design and as-built plans for stormwater systems and landscaped area locations. Inspection and maintenance shall be performed as follows:

1. Landscaped Areas:

Landscaped areas shall be inspected and maintained on a regular basis. Areas that may be subject to erosion will be stabilized and reseeded immediately. Inspect soil and repair eroded areas monthly. Re-plant void areas as needed. Remove litter and debris monthly. Remove and replace dead vegetation twice per year in spring and fall. Replace soil media if ponding is witnessed more than 48 hours after rainfall event.

2. Roof Drains:

Inspections: The downspout inlets on the roof of the building will need periodic maintenance to ensure proper function. The required interval for this maintenance will vary by season; however, downspout inlets should be inspected for debris before the rainy season. When trees and other deciduous vegetation shed leaves that drop into the gutters, this will inhibit the flow of water and possibly clog downspouts. The leaves and/or debris must be removed in order for the system to work as designed.

Maintenance: Debris, such as leaves and trash, shall be removed by hand. Sediments shall be swept and collected or vacuumed.

3. Infiltration Chambers:

Inspections: During first year visually inspect after each major storm (>1.5") and again 72 hours later to verify exfiltration is occurring as designed. Note if water remains in basin after 72 hours. After first year visually inspect twice per year. Infiltration Systems shall be inspected for accumulation of silt, sediment, standing water, or debris on an annual basis. Debris and sediment shall be removed. Inspect overflow outlet of chambers and level spreader at gravel basin. Basin should be inspected for excessive erosion or any additional necessary changes. Down gradient of gravel basin and level spreader should also be inspected for excess erosion.

Inspection & Maintenance procedure is as follows: The inspection port is a 24" manhole cover with a frame. Removing the manhole cover will provide access to the Chamber below. From the surface, through this access, the sediment may be measured at this location. A stadia rod may be used to measure the depth of sediment, if any, in this row. If the depth of sediment is in excess of 3 inches (76 mm), then this row should be cleaned with high pressure water through a culvert cleaning nozzle. This would be carried out through an upstream structure. CCTV inspection of this row can be deployed through this access port to determine if any sediment has accumulated in the inlet row.

Inspection & Maintenance of Chamber Outfall and Level Spreader: When infiltration chambers are inspected, the chambers outfall and level spreader should be inspected for evidence of any standing water, debris or accumulation of sediment. The area around the level spreader and outfall should additionally be inspected for excessive erosion or scouring that could indicate any need for changes.

4. Rain Gardens

Inspections & Maintenance:
Following construction, inspect site following rain events. Add/replace vegetation in any eroded areas. Water to promote plant growth and survival, especially during the first two years and during dry spells.

Monthly:

- prune and weed swale to maintain appearance
- remove accumulated trash and debris
- replace mulch as needed

Annually:

- Inspect inflow area for sediment accumulation. Remove accumulated sediment or debris.
- Inspect site for erosion as well as sediment and mulch which have been moved around in the garden. Add/replace vegetation in any eroded areas.
- Inspect rain garden for dead or dying vegetation. Replace vegetation as needed.
- Test planting bed for pH. If the pH is below 5.2, limestone should be applied. If the pH is above 8.0, iron sulfate and sulfur should be applied.

Every 2 to 3 years:

- Remove and replace mulch

Stormwater System Inspection Report

General Information			
Location: 21-27 Hancock Street, Newburyport			
Date of Inspection		Start/End Time	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Purpose of Inspection			
Weather Information			
Has it rained since the last inspection? ❑Yes ❑No			
Weather at time of this inspection?			

Site-Specific Stormwater Devices: (See above for inspection frequency)

	Description	Installed and Operating Properly?	Corrective Action Needed	Date for Corrective Action/Responsible Person
1		❑Yes ❑No		
2		❑Yes ❑No		
3		❑Yes ❑No		
4		❑Yes ❑No		
5		❑Yes ❑No		
6		❑Yes ❑No		
7		❑Yes ❑No		
8		❑Yes ❑No		

Overall Site Issues

	Description		Corrective Action	Date for Corrective Action/Responsible Person
1	Are all slopes properly stabilized?	❑Yes ❑No		
2	Are natural resource areas (e.g., streams, wetlands, etc.) being subjected to erosion?	❑Yes ❑No		
3	Are discharge points free of sediment deposits?	❑Yes ❑No		

Certification Statement:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name:

Signature:

Date: