

STORM WATER MANAGEMENT CALCULATIONS

FOR

PROPOSED SUBDIVISION

“THE BEST SUBDIVISION”

***Township of Neptune
Monmouth County
New Jersey***

Block 617, Lots 39

Project No. 17040

September 11, 2018

***PREPARED BY
Landmark Surveying & Engineering, inc.
813 Main Street
Avon-by-the-Sea, New Jersey 07717
(732) 775-8558***



***DANIEL W. CARUSO, P.E.
NJPE GE35687***

TABLE OF CONTENTS

<u>COVER SHEET</u>	1
<u>TABLE OF CONTENTS</u>	2
<u>DESIGN SUMMARY</u>	3
<u>DESIGN FLOW SUMMARY CHART</u>	4
<u>FLOW SCHEMATIC</u>	5
<hr/>	
<u>EXISTING CONDITIONS</u>	6 - 10
<u>PROPOSED CONDITIONS</u> <u>FLOW TO REAR OF THE PROPERTY</u>	11 - 15
<u>PROPOSED CONDITIONS</u> <u>FLOW TO FRONT OF THE PROPERTY</u>	16 - 20
<u>PROPOSED CONDITIONS</u> <u>FLOW TO INFILTRATOR SYSTEMS</u>	21 - 22
<u>PROPOSED CONDITIONS</u> <u>DWELLING INFILTRATORS</u>	23 - 34
<u>PROPOSED CONDITIONS</u> <u>BUILDING INFILTRATORS</u>	35 - 46

DESIGN SUMMARY

Drainage design calculations for the proposed subdivision are presented herein. The SCS TR-55 method was used throughout to determine the quantity of storm water run-off from the site. The (2 yr., 10 yr., & 100 yr.) storm events were analyzed using the NRCS New Jersey 24 Hour Rainfall Frequency data.

The proposed subdivision project consists of a total lot size of 78,595 s.f. (1.80Ac.). We are proposing 3 residential dwelling lots and 1 commercial lot. Our proposed subdivision is disturbing 43,540 s.f. (0.99 Ac.) of the property for the proposed improvements. There will only be an increase of impervious coverage; including buildings and sidewalks, of 7,257 s.f. (16.66%)

Our drainage analysis was broken down as follows: existing conditions flow to the rear of the property and three proposed drainage areas; drainage flow that continues to flow to the rear of the property, drainage flow that will drain to the front of the property and drainage flow that will be captured by under ground infiltrators.

Our drainage analysis will include an area of 65,665 s.f. (1.51Ac.) Based on the topography of the rear of the property, this area is wetlands and is the lowest point of the wetland area. Any run-off that flows to this area will remain in the wetlands and not leave our property. We analyzed the run-off from our proposed project that will flow towards rear wetlands area and calculated to see if the increase run-off will in fact remain on the property. Our analysis of the run-off flow to the rear will remain on our property.

We analyzed the proposed drainage flow to the front of the property and calculated the flows as outlined in the drainage summary chart. There will be a small increase in flow from existing conditions for the 2 yr. and 10 yr. storm events leaving our property and flowing to the front.

We are proposing an infiltration system to capture the run-off from the proposed buildings. This system will capture the 2yr., 10yr. and 100yr. storm events and infiltrate the run-off back into the ground.

We have included a design summary chart outlining the existing and proposed flows for this project

Design Flow Summary Chart

<i>STORM EVENTS</i>	<i>2 yr.</i>	<i>10 yr.</i>	<i>100 yr</i>
<i>EXISTING CONDITIONS</i>	<i>0.04</i>	<i>0.59</i>	<i>3.02</i>
<i>PROPOSED CONDITIONS FLOWING TO THE REAR OF THE PROPERTY</i>	<i>0.08</i>	<i>0.53</i>	<i>2.13</i>
<i>(THE FLOW TO THE REAR OF THE PROPERTY WILL NOT LEAVE OUR PROPERTY)</i>			
<i>PROPOSED CONDITIONS FLOWING TO THE FRONT OF THE PROPERTY</i>	<i>0.39</i>	<i>0.94</i>	<i>2.24</i>
<i>(THE INCREASE IN FLOW TO THE FRONT OF THE PROPERTY WILL NOT ADVERSELY AFFECT THE EXISTING DRAINAGE SYSTEM ALONG THE PROPERTY FRONTAGE)</i>			
<i>FLOWING TO THE INFILTRATOR SYSTEM</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>

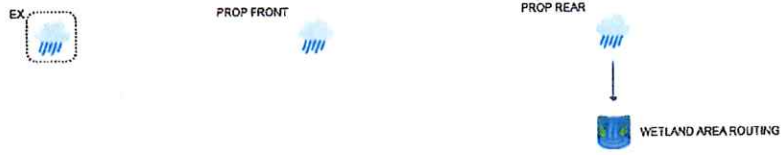
There will be no adverse impact to adjoining property from this project.

Basin Model

Hydrology Studio v 2.0.0.53

Project Name:

09-11-2018



EXISTING CONDITIONS

TR55 Worksheet

Project Name:

Hydrology Studio v 2.0.0.53

09-11-2018

EX NRCS Runoff

Hyd. No. 1

Description	Segments			Tc (min)
	A	B	C	
Sheet Flow				
Description	LAWN	WOOD		
Manning's n	0.240	0.400	0.013	
Flow Length (ft)	55	45		
2-yr, 24-hr Precip. (in)	3.4000	3.4000	3.4000	
Land Slope (%)	2	2		
Travel Time (min)	8.58	11.00	0.00	19.58
Shallow Concentrated Flow				
Flow Length (ft)	126	25	75	
Watercourse Slope (%)	1.19	4	1.2	
Surface Description	Unpaved	Unpaved	Unpaved	
Average Velocity (ft/s)	1.76	3.23	1.77	
Travel Time (min)	1.19	0.13	0.71	2.03
Channel Flow				
X-sectional Flow Area (sqft)				
Wetted Perimeter (ft)				
Channel Slope (%)				
Manning's n	0.013	0.013	0.013	
Velocity (ft/s)				
Flow Length (ft)				
Travel Time (min)	0.00	0.00	0.00	0.00
Total Travel Time				21.61 min

Hydrograph Report

Project Name:

Hydrology Studio v 2.0.0.53

09-11-2018

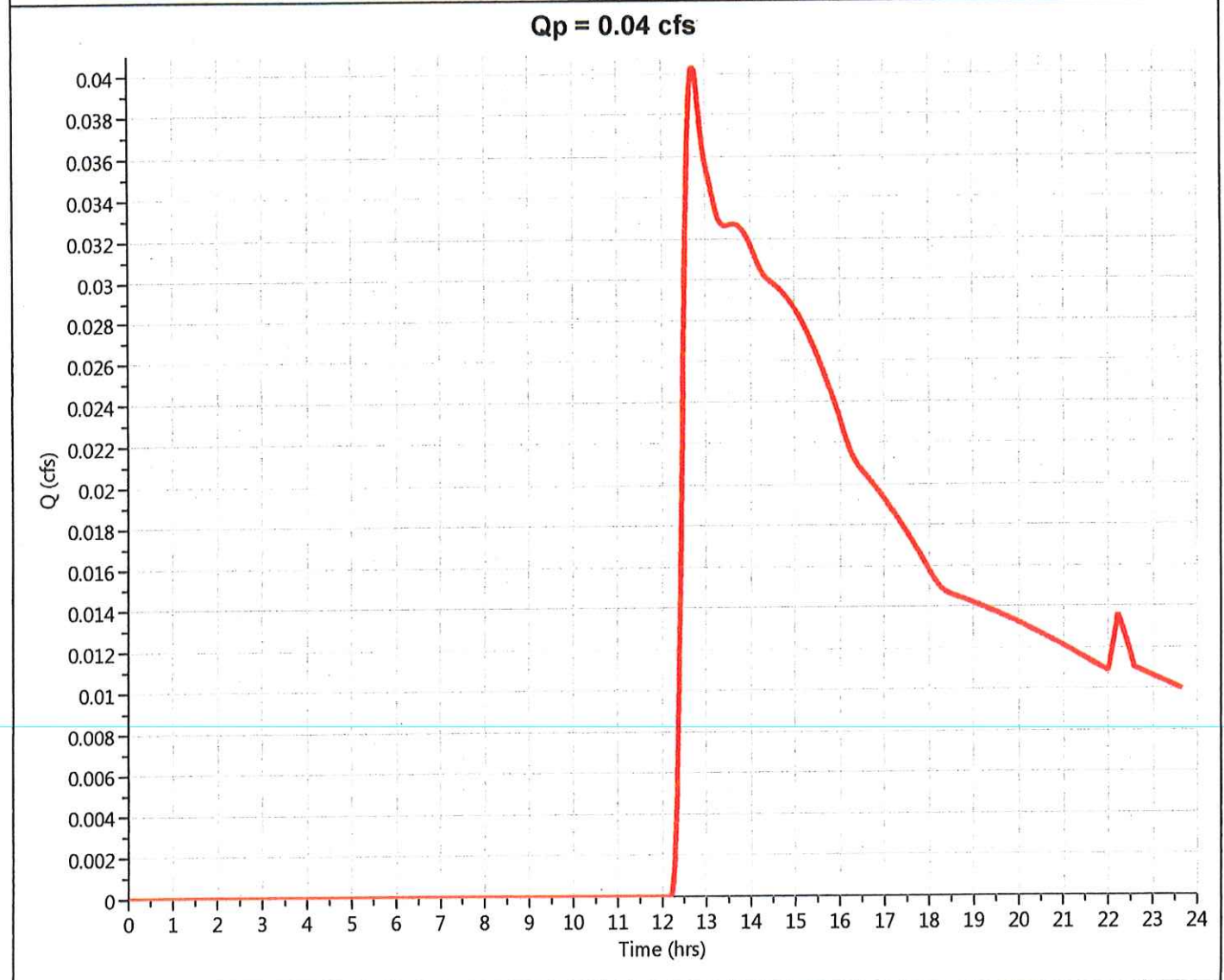
EX

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.040 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.70 hrs
Time Interval	= 1 min	Runoff Volume	= 815 cuft
Drainage Area	= 1.5 ac	Curve Number	= 49*
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 21.61 min
Total Rainfall	= 3.4000 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Composite CN Worksheet

AREA (ac)	CN	DESCRIPTION
1.26	45	WOODED
0.18	61	GRASS
0.07	98	IMPREV
1.5	49	Weighted Average



Hydrograph Report

Project Name:

Hydrology Studio v 2.0.0.53

09-11-2018

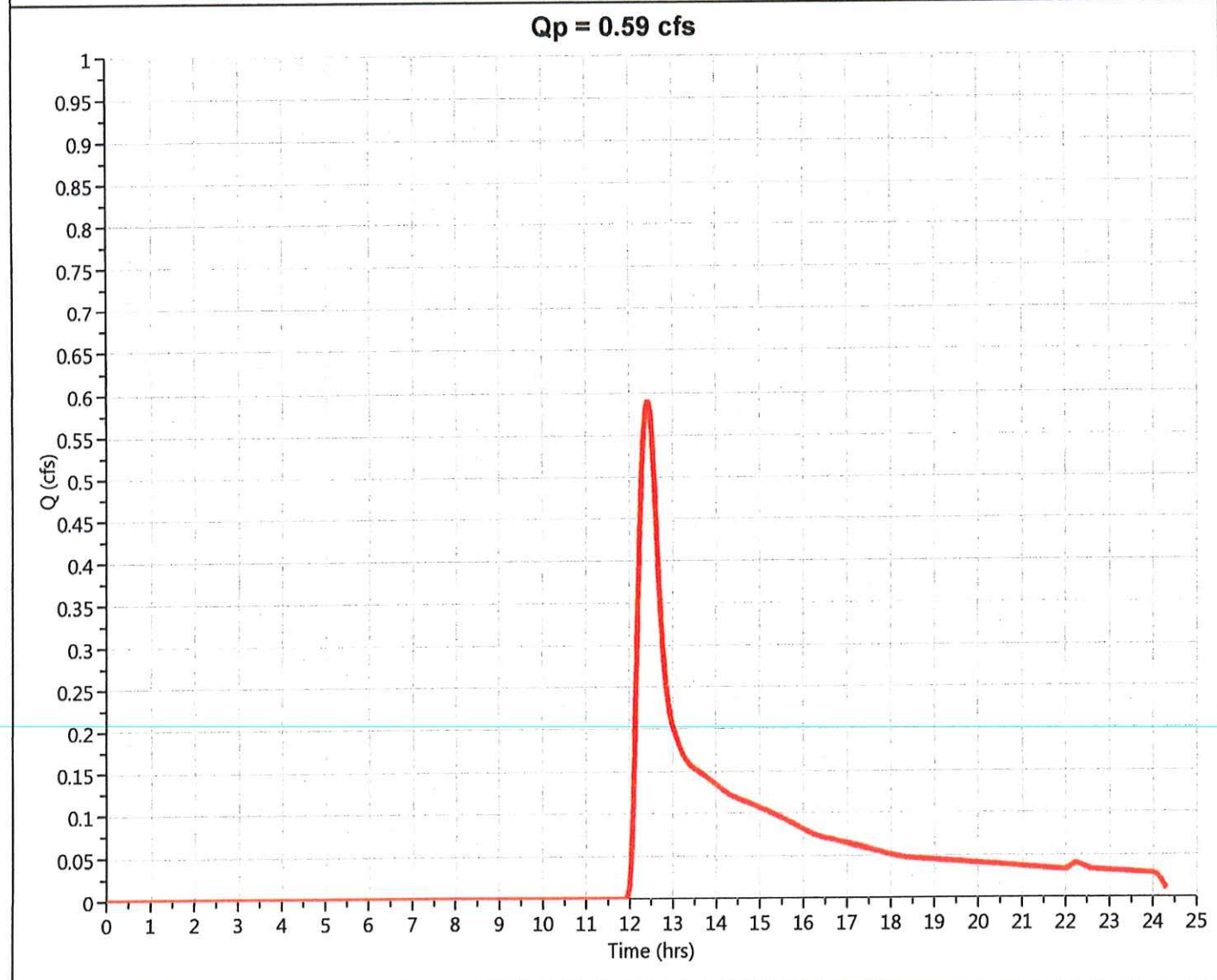
EX

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.591 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.40 hrs
Time Interval	= 1 min	Runoff Volume	= 3,952 cuft
Drainage Area	= 1.5 ac	Curve Number	= 49*
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 21.61 min
Total Rainfall	= 5.2000 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Composite CN Worksheet

AREA (ac)	CN	DESCRIPTION
1.26	45	WOODED
0.18	61	GRASS
0.07	98	IMPREV
1.5	49	Weighted Average



Hydrograph Report

Project Name:

Hydrology Studio v 2.0.0.53

09-11-2018

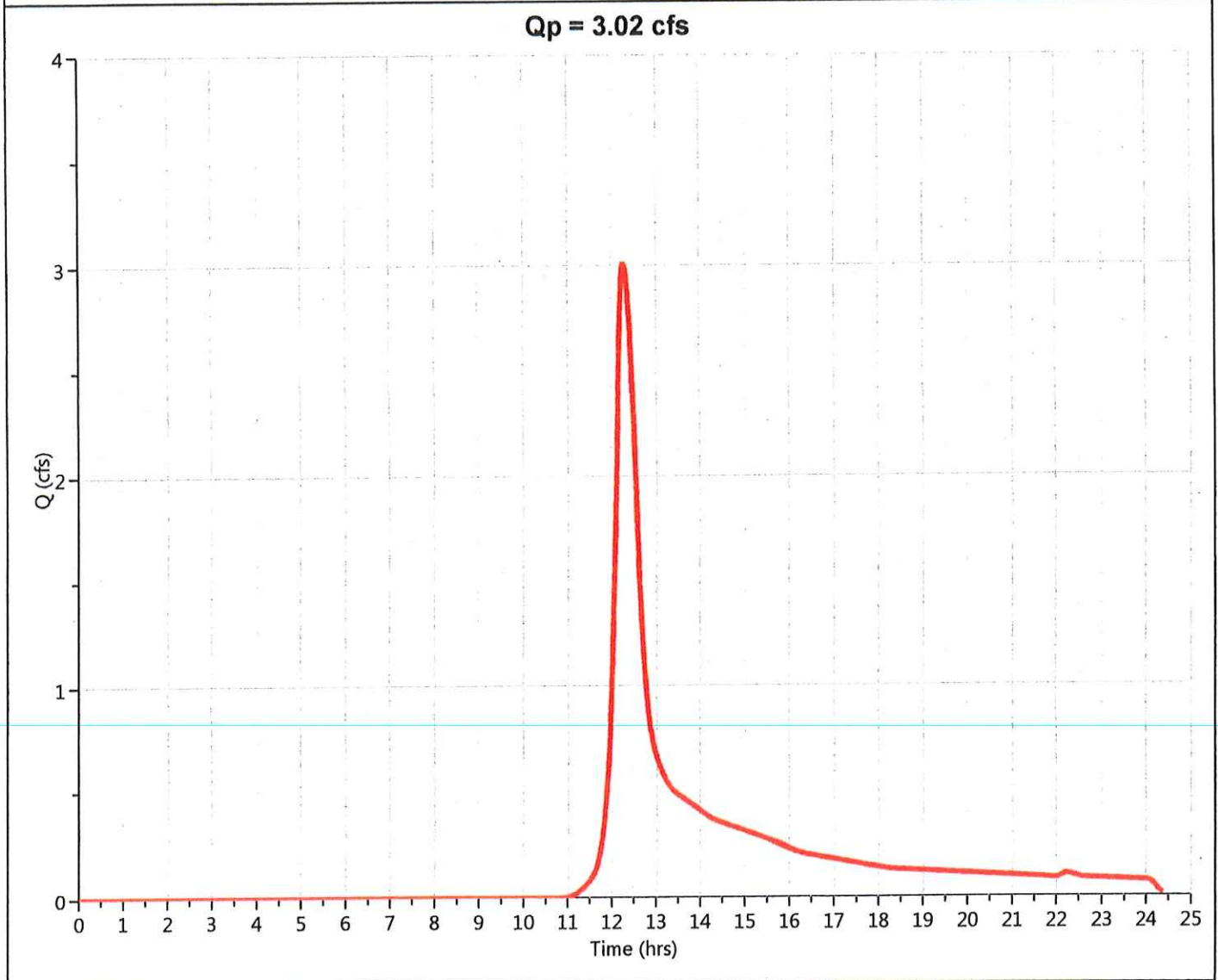
EX

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.021 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.28 hrs
Time Interval	= 1 min	Runoff Volume	= 14,836 cuft
Drainage Area	= 1.5 ac	Curve Number	= 49*
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 21.61 min
Total Rainfall	= 8.9000 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Composite CN Worksheet

AREA (ac)	CN	DESCRIPTION
1.26	45	WOODED
0.18	61	GRASS
0.07	98	IMPREV
1.5	49	Weighted Average



***PROPOSED CONDITIONS
FLOW TO REAR OF THE PROPERTY***

TR55 Worksheet

Project Name:

Hydrology Studio v 2.0.0.53

09-11-2018

PROP REAR NRCS Runoff

Hyd. No. 2

Description	Segments			Tc (min)
	A	B	C	
Sheet Flow				
Description	LAWN			
Manning's n	0.240	0.013	0.013	
Flow Length (ft)	100			
2-yr, 24-hr Precip. (in)	3.4000	3.4000	3.4000	
Land Slope (%)	.8			
Travel Time (min)	19.97	0.00	0.00	19.97
Shallow Concentrated Flow				
Flow Length (ft)	64	22	64	
Watercourse Slope (%)	1.25	4.55	3.13	
Surface Description	Unpaved	Unpaved	Unpaved	
Average Velocity (ft/s)	1.8	3.44	2.85	
Travel Time (min)	0.59	0.11	0.37	1.07
Channel Flow				
X-sectional Flow Area (sqft)				
Wetted Perimeter (ft)				
Channel Slope (%)				
Manning's n	0.013	0.013	0.013	
Velocity (ft/s)				
Flow Length (ft)				
Travel Time (min)	0.00	0.00	0.00	0.00
Total Travel Time				21.04 min

Hydrograph Report

Project Name:

Hydrology Studio v 2.0.0.53

09-11-2018

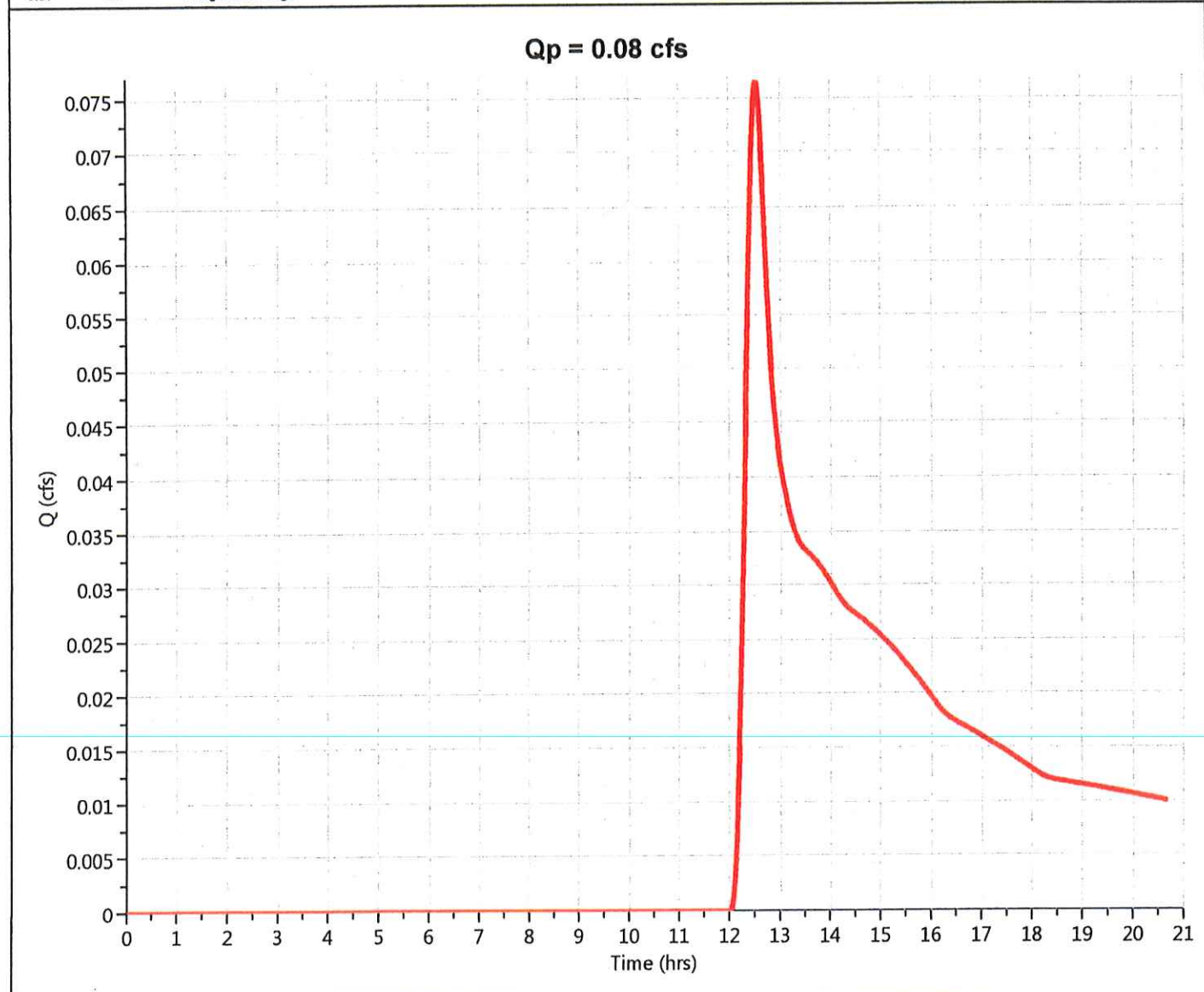
PROP REAR

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.077 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.53 hrs
Time Interval	= 1 min	Runoff Volume	= 804 cuft
Drainage Area	= 0.87 ac	Curve Number	= 53*
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 21.04 min
Total Rainfall	= 3.4000 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Composite CN Worksheet

AREA (ac)	CN	DESCRIPTION
0.44	61	GRASS
0.43	45	WOODED
0.87	53	Weighted Average



Hydrograph Report

Project Name:

Hydrology Studio v 2.0.0.53

09-11-2018

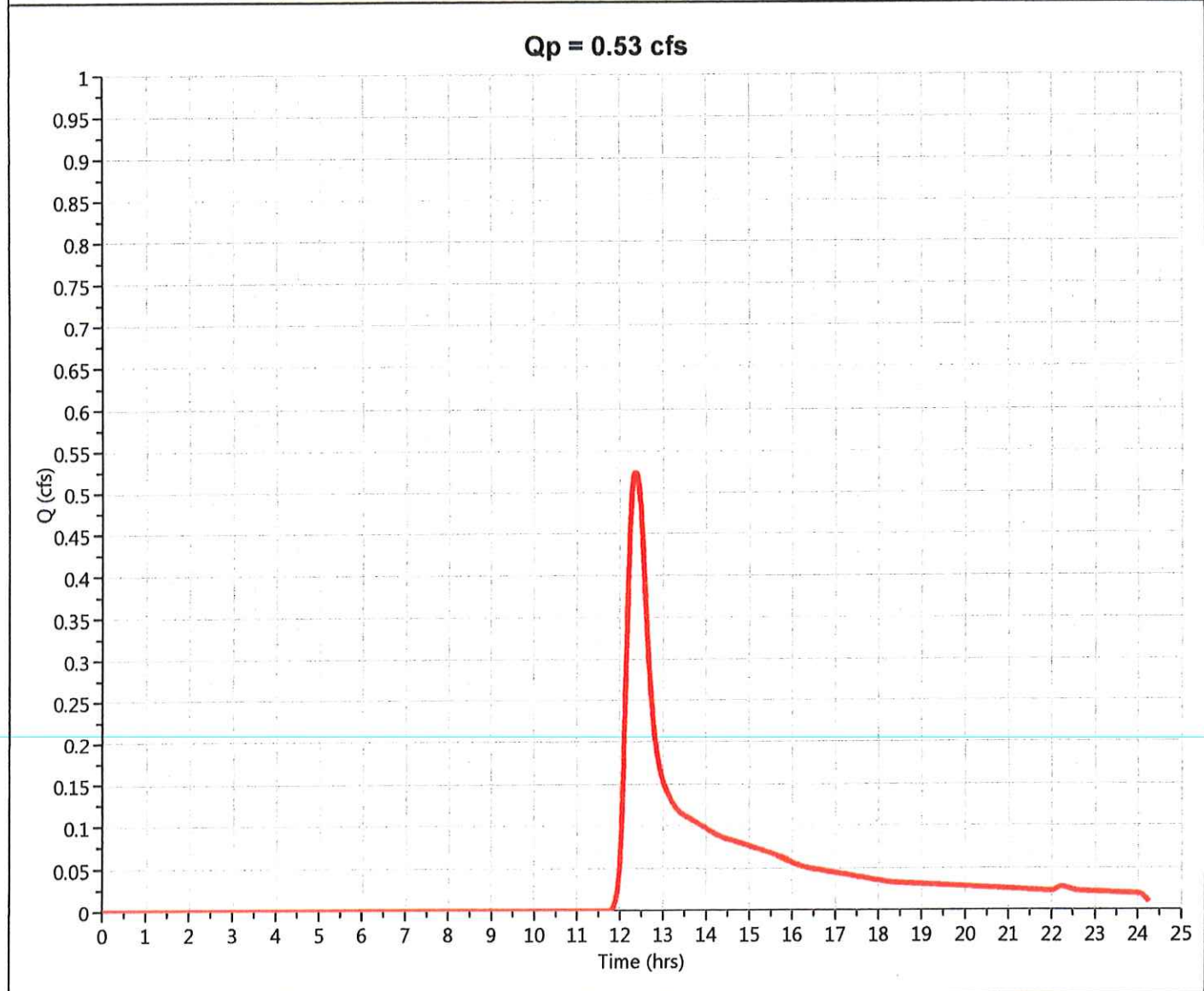
PROP REAR

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.526 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.35 hrs
Time Interval	= 1 min	Runoff Volume	= 3,045 cuft
Drainage Area	= 0.87 ac	Curve Number	= 53*
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 21.04 min
Total Rainfall	= 5.2000 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Composite CN Worksheet

AREA (ac)	CN	DESCRIPTION
0.44	61	GRASS
0.43	45	WOODED
0.87	53	Weighted Average



Hydrograph Report

Project Name:

Hydrology Studio v 2.0.0.53

09-11-2018

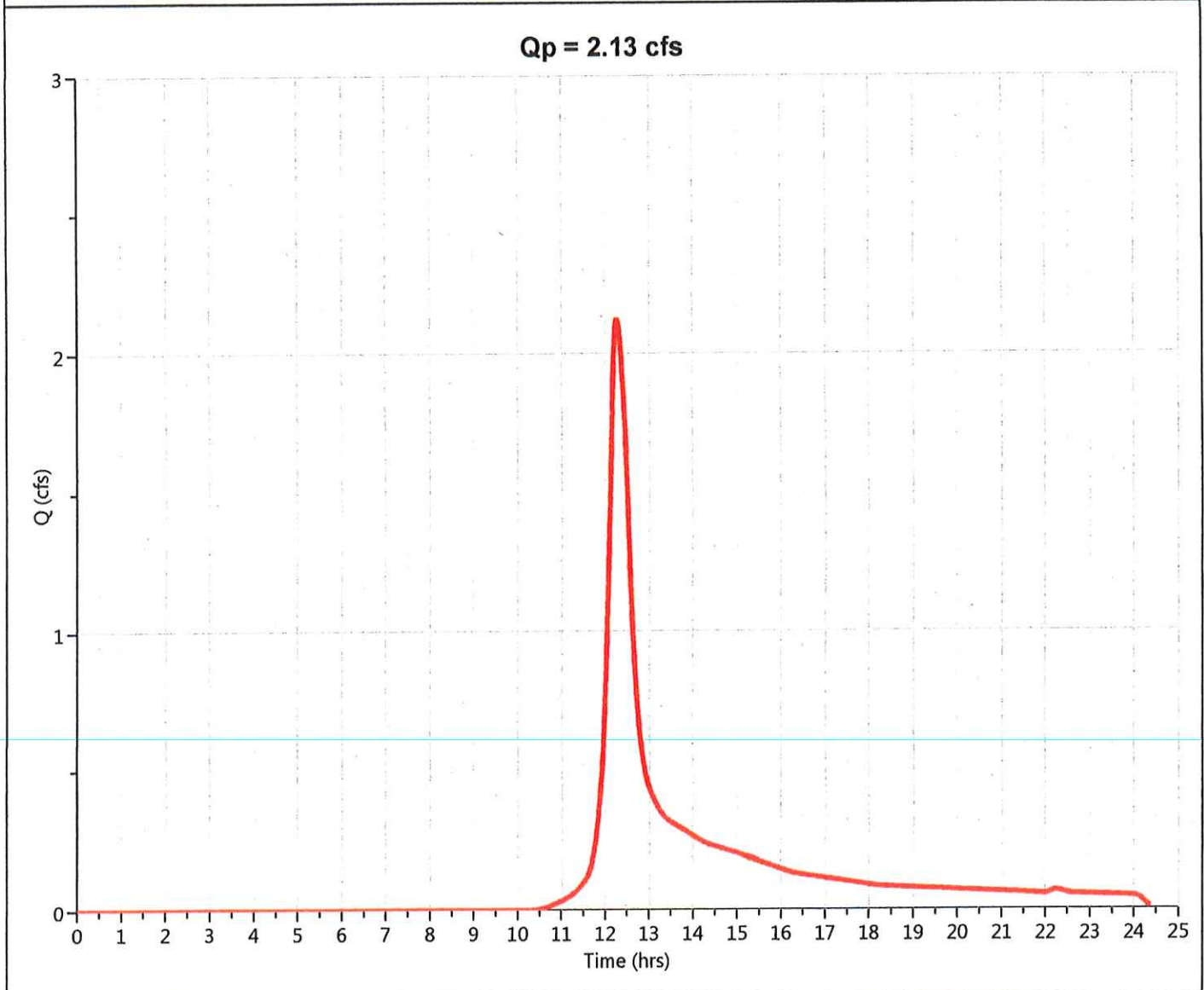
PROP REAR

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.128 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.27 hrs
Time Interval	= 1 min	Runoff Volume	= 10,124 cuft
Drainage Area	= 0.87 ac	Curve Number	= 53*
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 21.04 min
Total Rainfall	= 8.9000 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Composite CN Worksheet

AREA (ac)	CN	DESCRIPTION
0.44	61	GRASS
0.43	45	WOODED
0.87	53	Weighted Average



15

***PROPOSED CONDITIONS
FLOW TO THE FRONT OF THE PROPERTY***

TR55 Worksheet

Project Name:

Hydrology Studio v 2.0.0.53

09-11-2018

PROP FRONT NRCS Runoff

Hyd. No. 4

Description	Segments			Tc (min)
	A	B	C	
Sheet Flow				
Description	GRASS			
Manning's n	0.240	0.013	0.013	
Flow Length (ft)	90			
2-yr, 24-hr Precip. (in)	3.4000	2.2800	2.2800	
Land Slope (%)	1.11			
Travel Time (min)	16.10	0.00	0.00	16.10
Shallow Concentrated Flow				
Flow Length (ft)				
Watercourse Slope (%)				
Surface Description	Paved	Paved	Paved	
Average Velocity (ft/s)				
Travel Time (min)	0.00	0.00	0.00	0.00
Channel Flow				
X-sectional Flow Area (sqft)				
Wetted Perimeter (ft)				
Channel Slope (%)				
Manning's n	0.013	0.013	0.013	
Velocity (ft/s)				
Flow Length (ft)				
Travel Time (min)	0.00	0.00	0.00	0.00
Total Travel Time				16.1 min

Hydrograph Report

Project Name:

Hydrology Studio v 2.0.0.53

09-11-2018

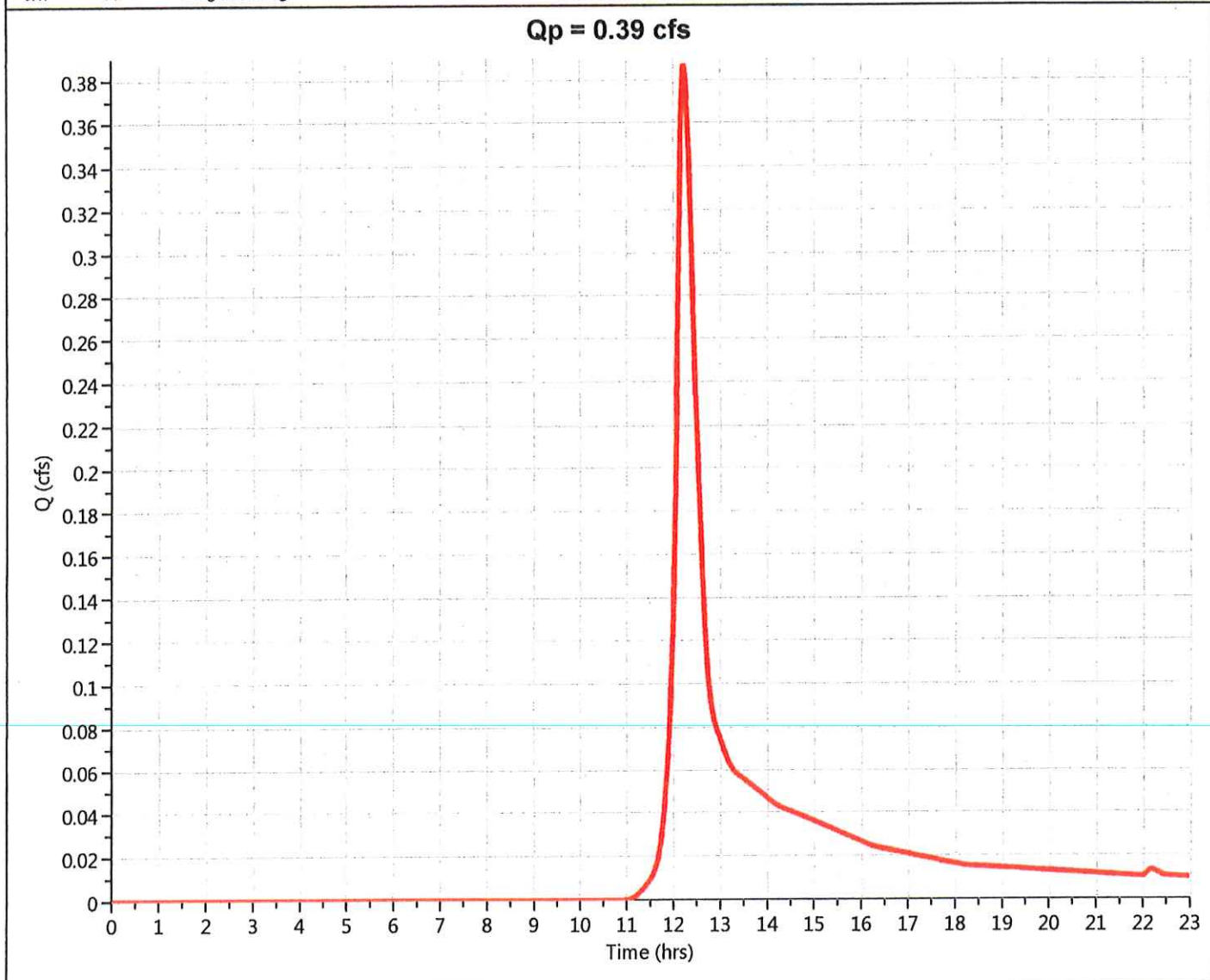
PROP FRONT

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.387 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Runoff Volume	= 1,729 cuft
Drainage Area	= 0.47 ac	Curve Number	= 71*
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 16.1 min
Total Rainfall	= 3.4000 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Composite CN Worksheet

AREA (ac)	CN	DESCRIPTION
0.26	61	GRASS
0.07	98	SIDEWALK/CONCRETE
0.14	76	PAVERS
0.47	71	Weighted Average



Hydrograph Report

Project Name:

Hydrology Studio v 2.0.0.53

09-11-2018

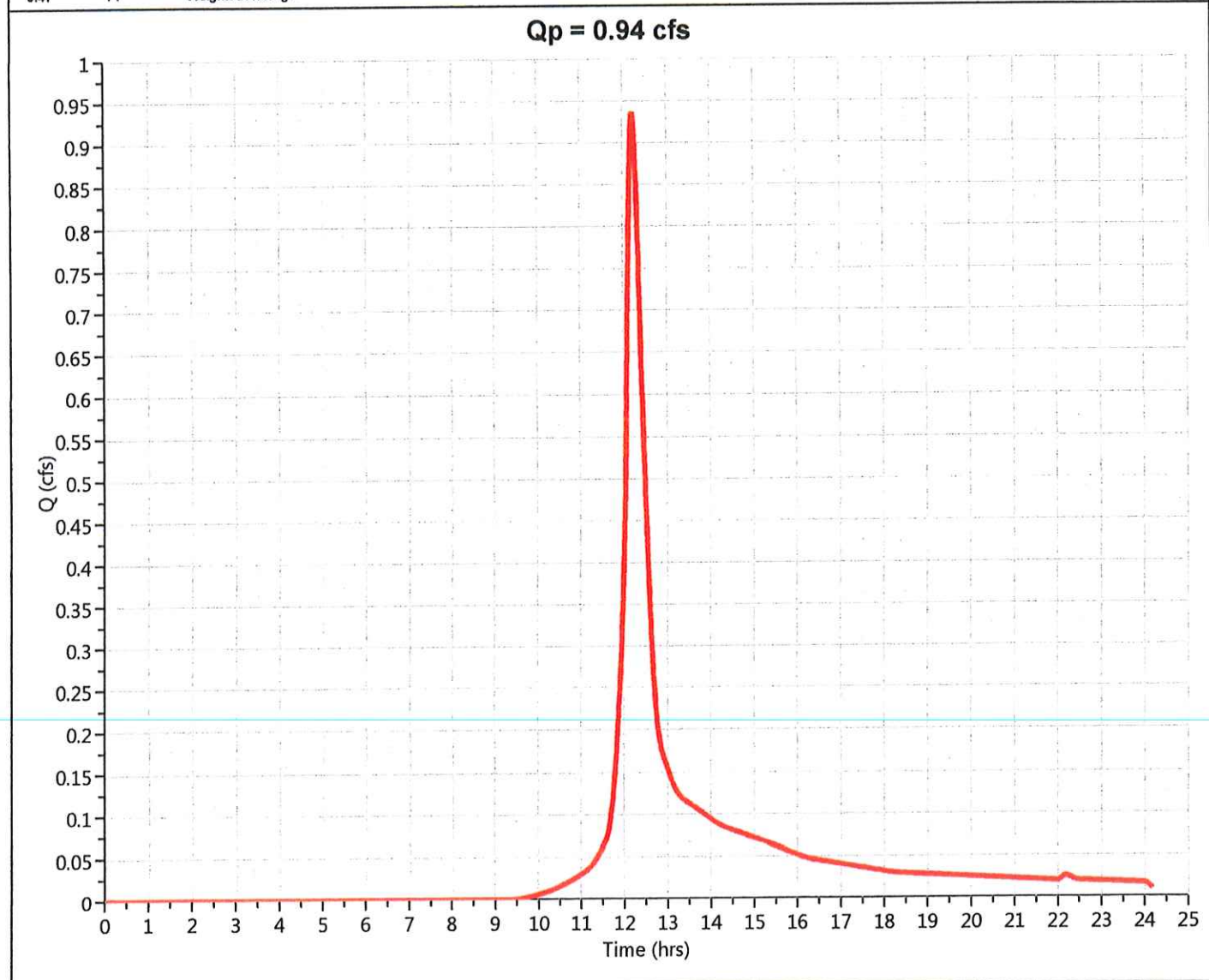
PROP FRONT

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.937 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 3,919 cuft
Drainage Area	= 0.47 ac	Curve Number	= 71*
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 16.1 min
Total Rainfall	= 5.2000 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Composite CN Worksheet

AREA (ac)	CN	DESCRIPTION
0.28	61	GRASS
0.07	98	SIDEWALK/CONCRETE
0.14	76	PAVERS
0.47	71	Weighted Average



Hydrograph Report

Project Name:

Hydrology Studio v 2.0.0.53

09-11-2018

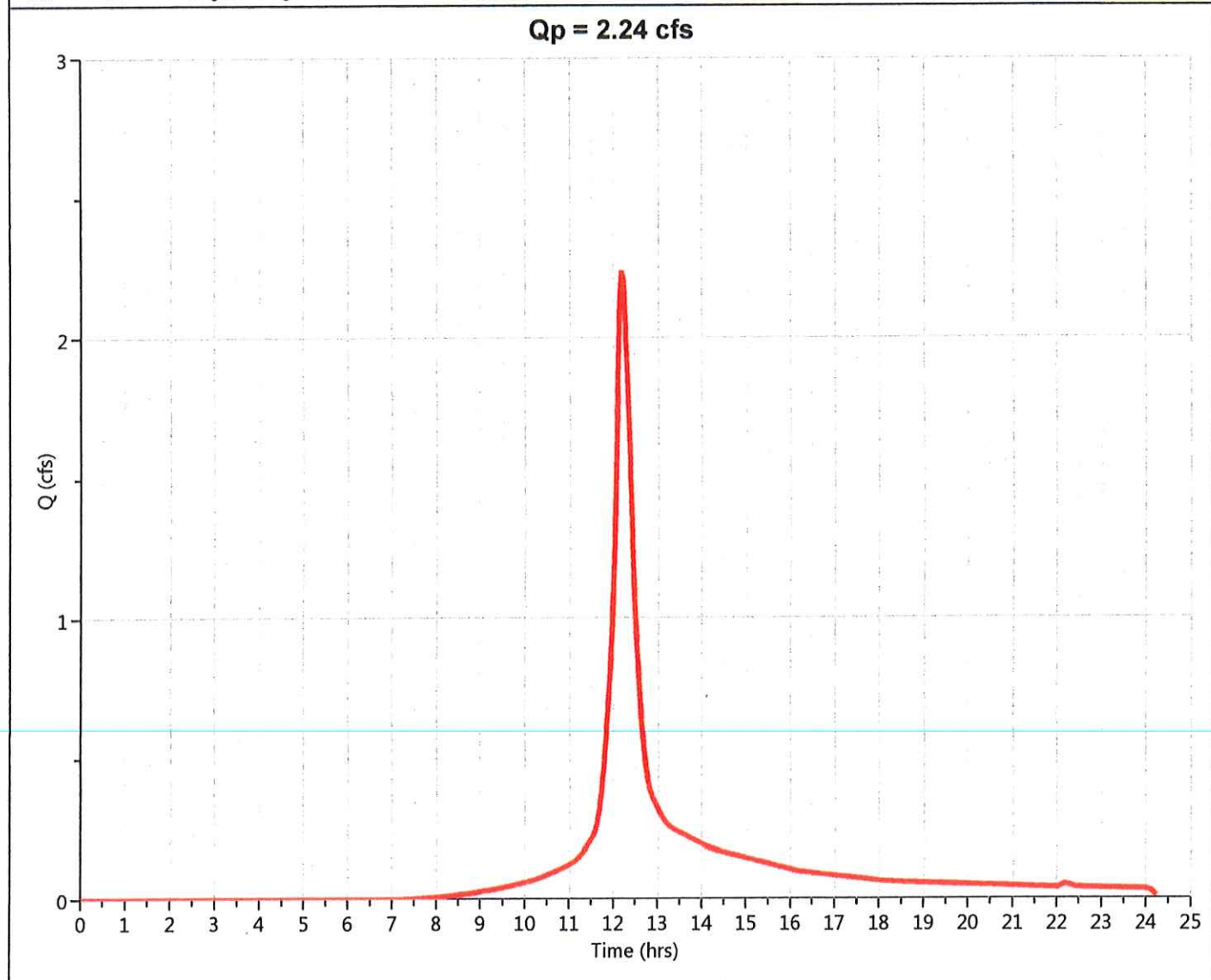
PROP FRONT

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.243 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 9,276 cuft
Drainage Area	= 0.47 ac	Curve Number	= 71*
Tc Method	= TR55 (See Worksheet)	Time of Conc. (Tc)	= 16.1 min
Total Rainfall	= 8.9000 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Composite CN Worksheet

AREA (ac)	CN	DESCRIPTION
0.26	61	GRASS
0.07	98	SIDEWALK/CONCRETE
0.14	76	PAVERS
0.47	71	Weighted Average



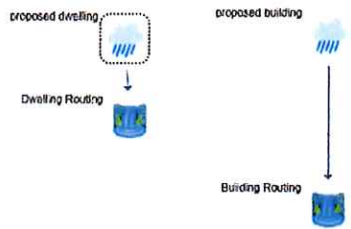
***PROPOSED CONDITIONS
FLOW TO INFILTRATOR SYSTEMS***

Basin Model

Hydrology Studio v 2.0.0.53

Project Name:

09-11-2018



***PROPOSED CONDITIONS
DWELLING INFILTRATORS***

Hydrograph Report

Project Name:

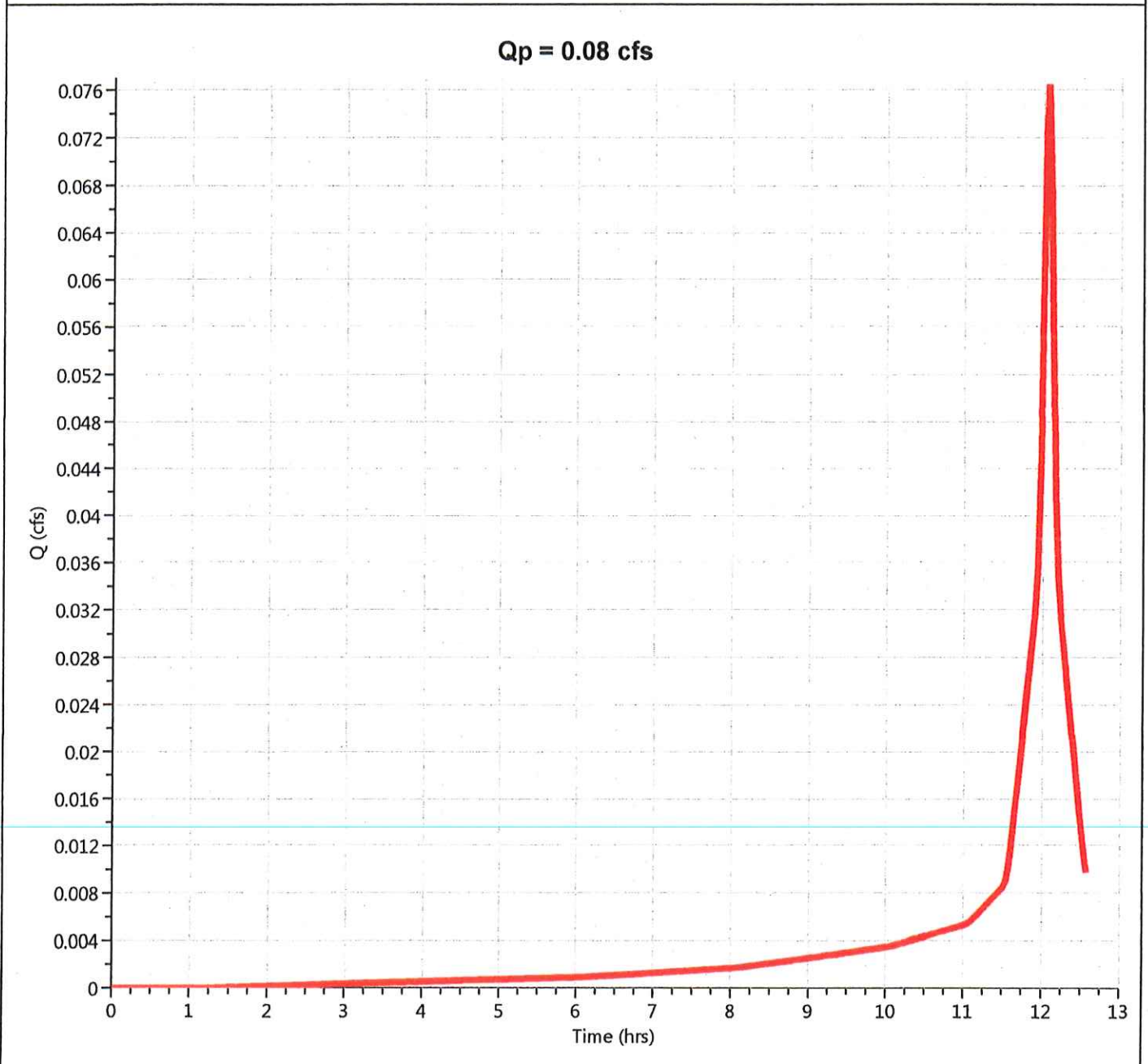
Hydrology Studio v 2.0.0.53

09-11-2018

proposed dwelling

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.076 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 259 cuft
Drainage Area	= 0.024 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.4000 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Design Storm Report

Custom Storm filename:

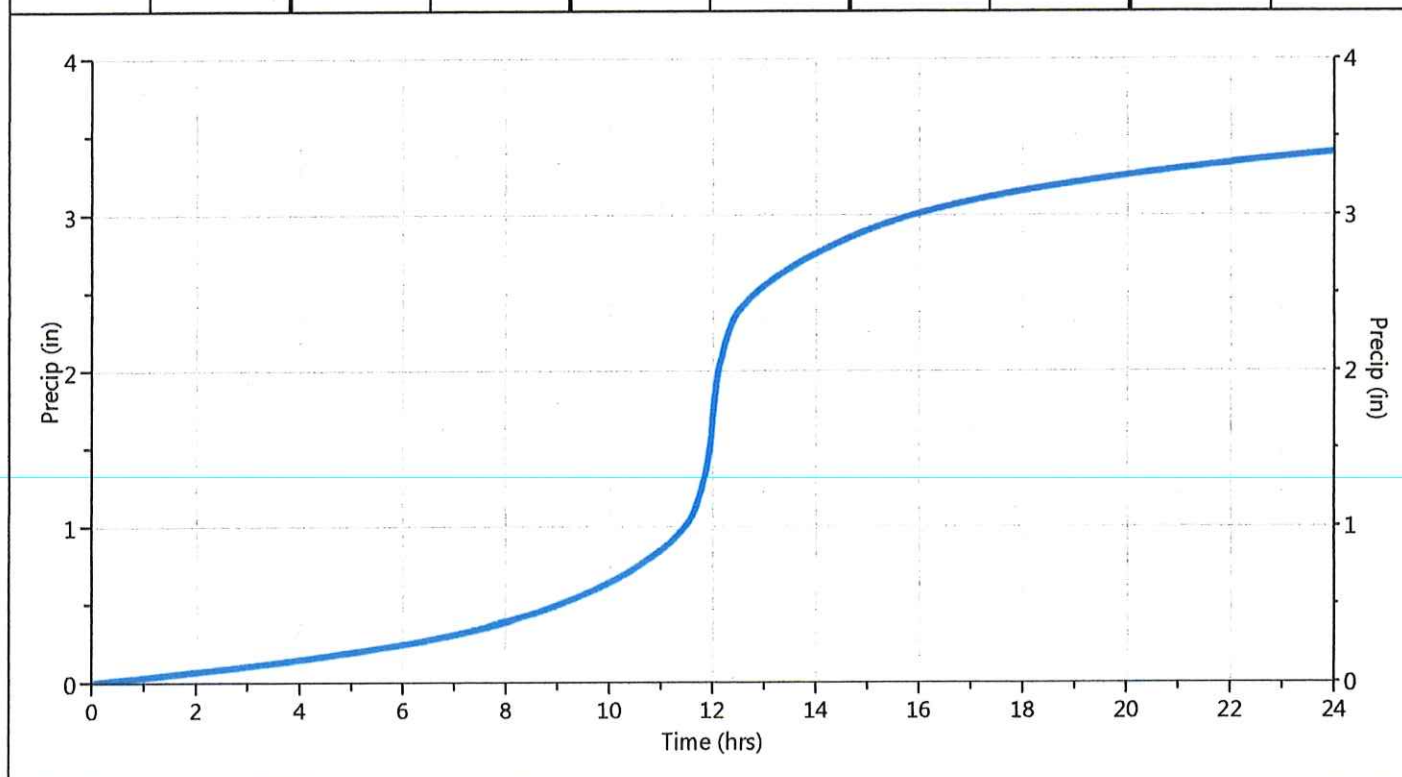
Hydrology Studio v 2.0.0.54

09-13-2018

Storm Distribution: NRCS/SCS - Type III

Storm Duration	Total Rainfall Volume (in)							
	1-yr	√ 2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
24 hrs	0.00	3.40	0.00	0.00	5.20	6.50	0.00	8.90

Incremental Rainfall Distribution, 2-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.00	0.0082	11.37	0.0119	11.73	0.0351	12.10	0.0673	12.47	0.0185
11.03	0.0084	11.40	0.0123	11.77	0.0384	12.13	0.0518	12.50	0.0151
11.07	0.0088	11.43	0.0126	11.80	0.0417	12.17	0.0484	12.53	0.0133
11.10	0.0091	11.47	0.0130	11.83	0.0451	12.20	0.0451	12.57	0.0130
11.13	0.0095	11.50	0.0133	11.87	0.0484	12.23	0.0417	12.60	0.0126
11.17	0.0098	11.53	0.0151	11.90	0.0517	12.27	0.0384	12.63	0.0123
11.20	0.0102	11.57	0.0185	11.93	0.0674	12.30	0.0351	12.67	0.0119
11.23	0.0105	11.60	0.0218	11.97	0.0952	12.33	0.0318	12.70	0.0116
11.27	0.0109	11.63	0.0251	12.00	0.1231	12.37	0.0284	12.73	0.0112
11.30	0.0112	11.67	0.0284	12.03	0.1229	12.40	0.0251	12.77	0.0109
11.33	0.0116	11.70	0.0318	12.07	0.0952	12.43	0.0218	12.80	0.0105



Hydrograph Report

Project Name:

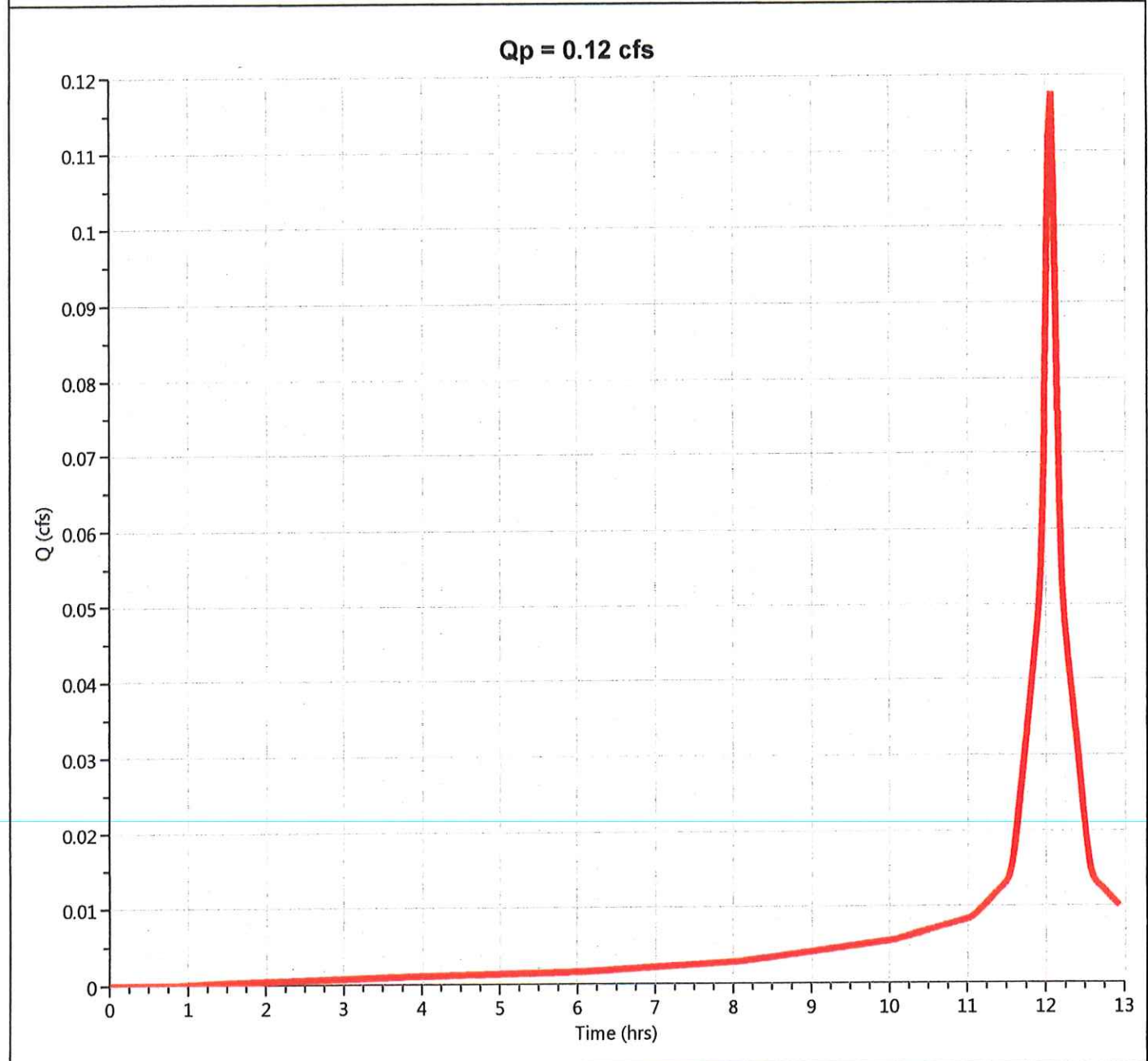
Hydrology Studio v 2.0.0.53

09-11-2018

proposed dwelling

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.118 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 405 cuft
Drainage Area	= 0.024 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.2000 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Design Storm Report

Custom Storm filename:

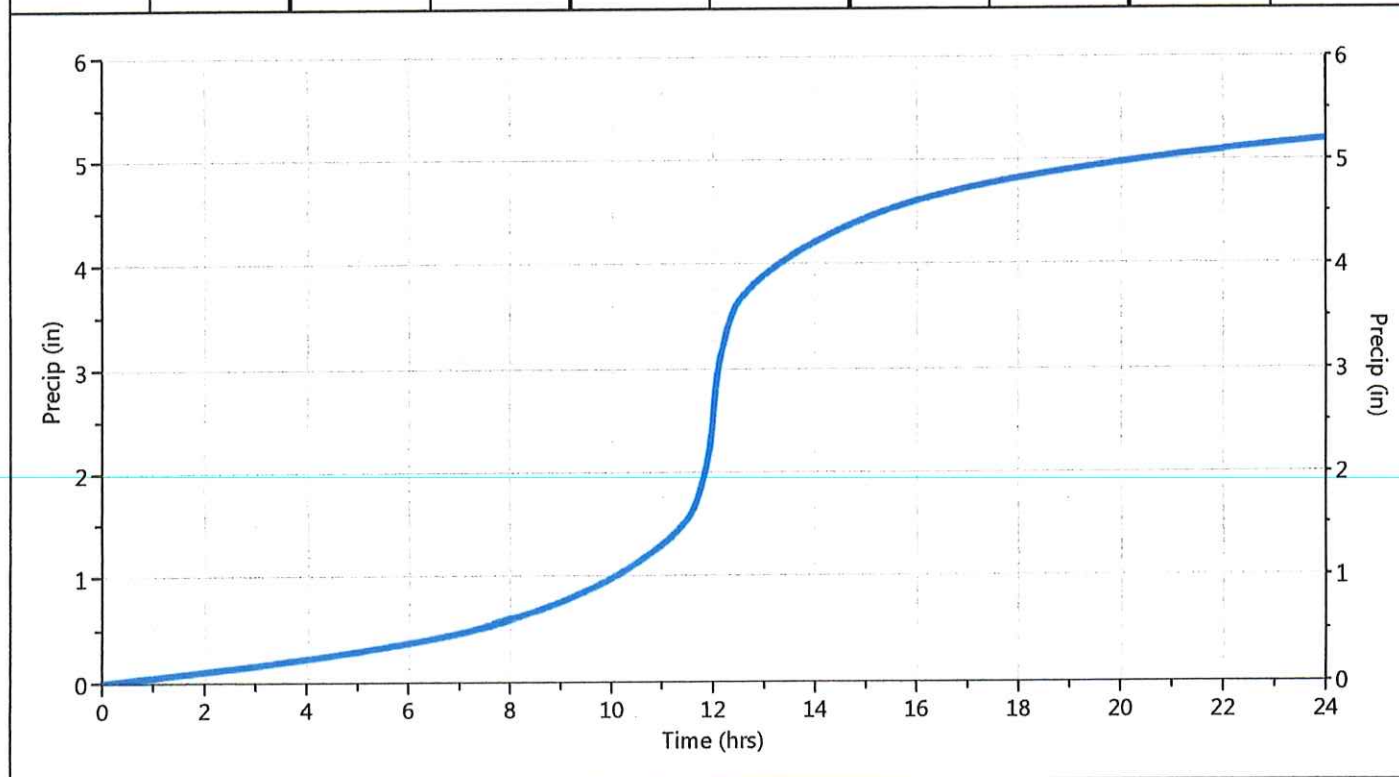
Hydrology Studio v 2.0.0.54

09-13-2018

Storm Distribution: NRCS/SCS - Type III

Storm Duration	Total Rainfall Volume (in)							
	1-yr	2-yr	3-yr	5-yr	√ 10-yr	25-yr	50-yr	100-yr
24 hrs	0.00	3.40	0.00	0.00	5.20	6.50	0.00	8.90

Incremental Rainfall Distribution, 10-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.00	0.0126	11.37	0.0182	11.73	0.0537	12.10	0.1030	12.47	0.0283
11.03	0.0129	11.40	0.0188	11.77	0.0588	12.13	0.0793	12.50	0.0232
11.07	0.0135	11.43	0.0193	11.80	0.0638	12.17	0.0740	12.53	0.0203
11.10	0.0140	11.47	0.0198	11.83	0.0689	12.20	0.0689	12.57	0.0198
11.13	0.0145	11.50	0.0204	11.87	0.0740	12.23	0.0638	12.60	0.0193
11.17	0.0150	11.53	0.0231	11.90	0.0791	12.27	0.0588	12.63	0.0188
11.20	0.0156	11.57	0.0283	11.93	0.1031	12.30	0.0537	12.67	0.0182
11.23	0.0161	11.60	0.0333	11.97	0.1456	12.33	0.0486	12.70	0.0177
11.27	0.0166	11.63	0.0384	12.00	0.1882	12.37	0.0435	12.73	0.0172
11.30	0.0172	11.67	0.0435	12.03	0.1880	12.40	0.0384	12.77	0.0166
11.33	0.0177	11.70	0.0486	12.07	0.1456	12.43	0.0333	12.80	0.0161



Hydrograph Report

Project Name:

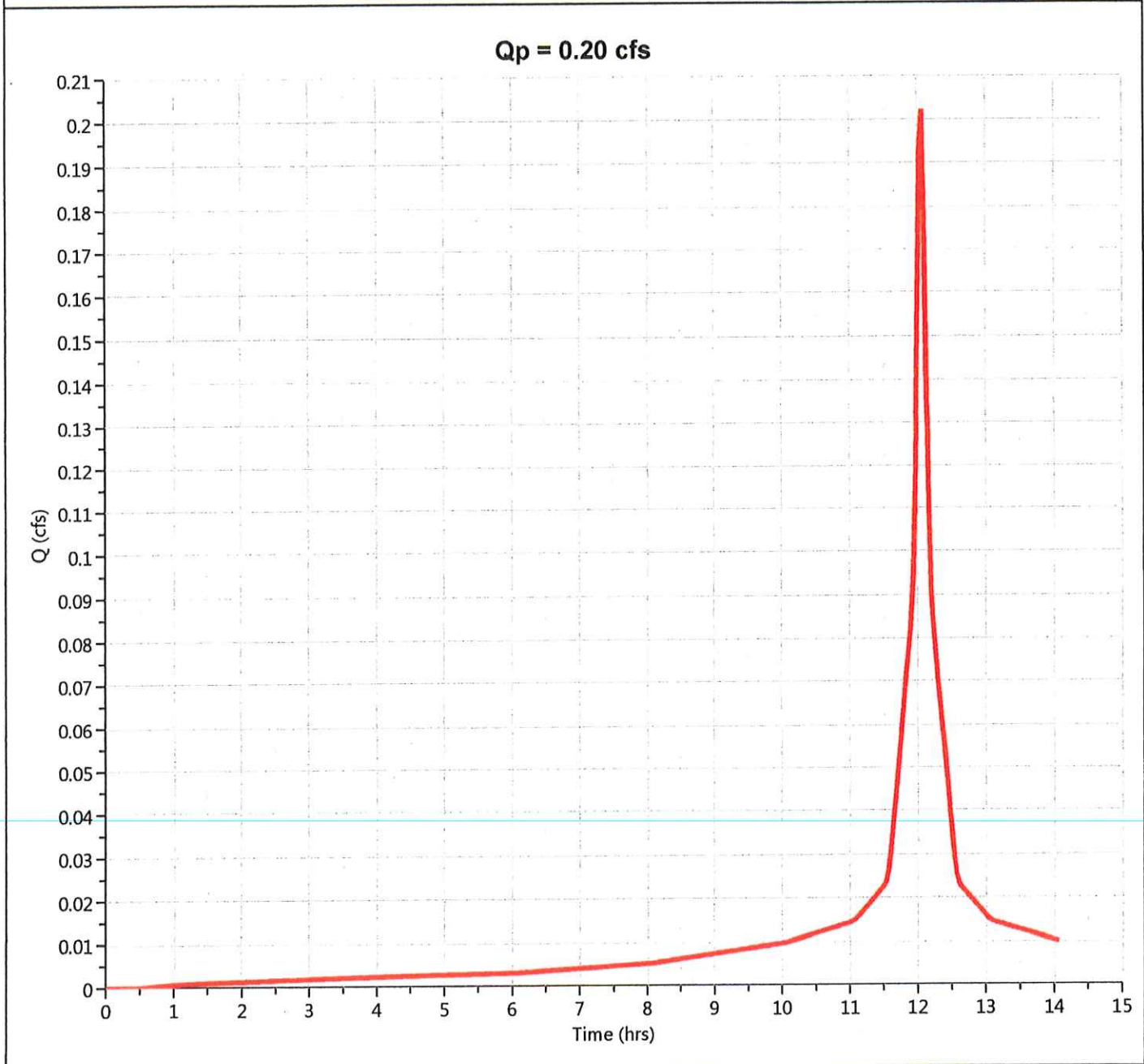
Hydrology Studio v 2.0.0.53

09-11-2018

proposed dwelling

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.202 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 707 cuft
Drainage Area	= 0.024 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.9000 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Design Storm Report

Custom Storm filename:

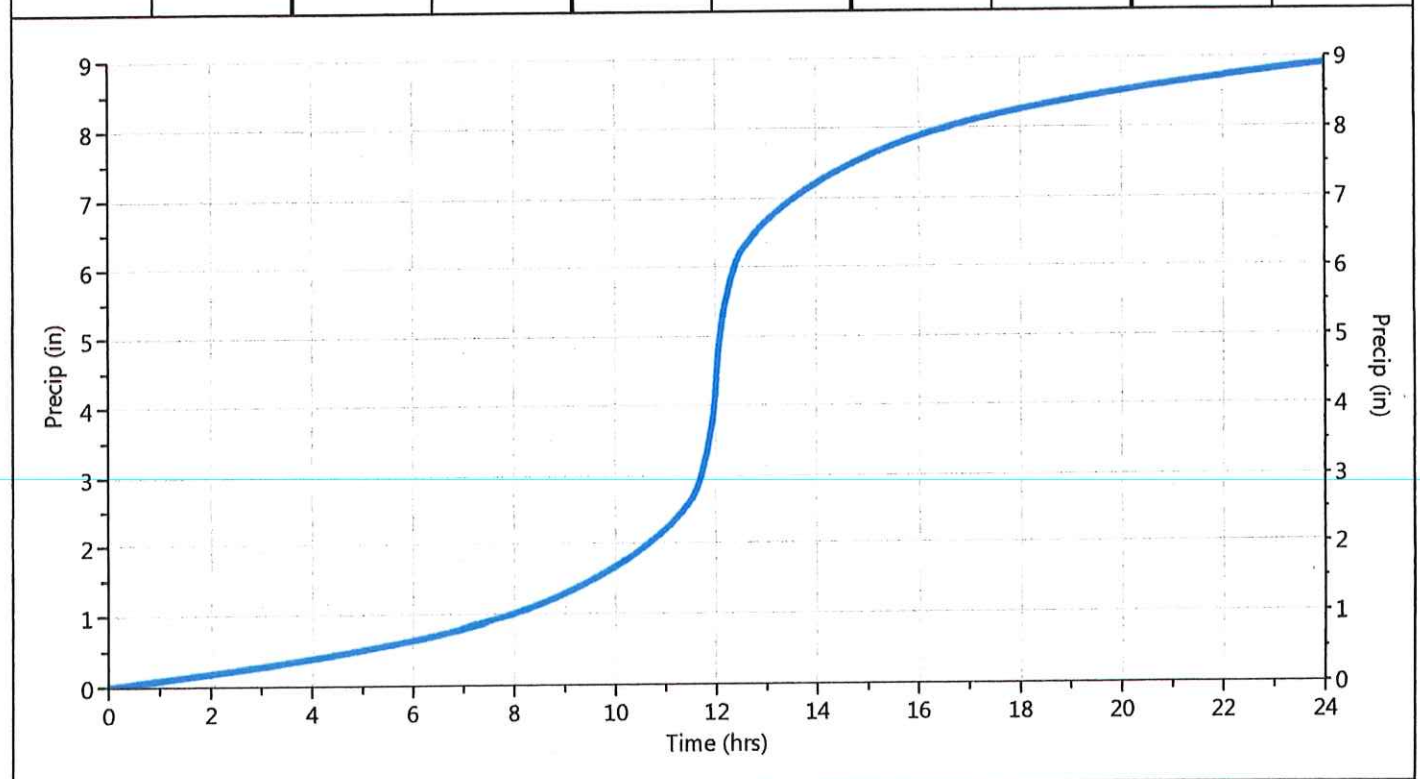
Hydrology Studio v 2.0.0.53

09-11-2018

Storm Distribution: NRCS/SCS - Type III

Storm Duration	Total Rainfall Volume (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	√ 100-yr
24 hrs	0.00	3.40	0.00	0.00	5.20	6.50	0.00	8.90

Incremental Rainfall Distribution, 100-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.00	0.0215	11.37	0.0312	11.73	0.0919	12.10	0.1762	12.47	0.0484
11.03	0.0221	11.40	0.0321	11.77	0.1006	12.13	0.1356	12.50	0.0397
11.07	0.0230	11.43	0.0330	11.80	0.1093	12.17	0.1267	12.53	0.0348
11.10	0.0239	11.47	0.0339	11.83	0.1180	12.20	0.1180	12.57	0.0339
11.13	0.0248	11.50	0.0348	11.87	0.1267	12.23	0.1093	12.60	0.0330
11.17	0.0258	11.53	0.0396	11.90	0.1354	12.27	0.1006	12.63	0.0321
11.20	0.0267	11.57	0.0484	11.93	0.1765	12.30	0.0919	12.67	0.0312
11.23	0.0276	11.60	0.0571	11.97	0.2492	12.33	0.0832	12.70	0.0303
11.27	0.0285	11.63	0.0658	12.00	0.3222	12.37	0.0745	12.73	0.0294
11.30	0.0294	11.67	0.0745	12.03	0.3218	12.40	0.0658	12.77	0.0285
11.33	0.0303	11.70	0.0832	12.07	0.2492	12.43	0.0571	12.80	0.0276



Pond Report

Project Name:

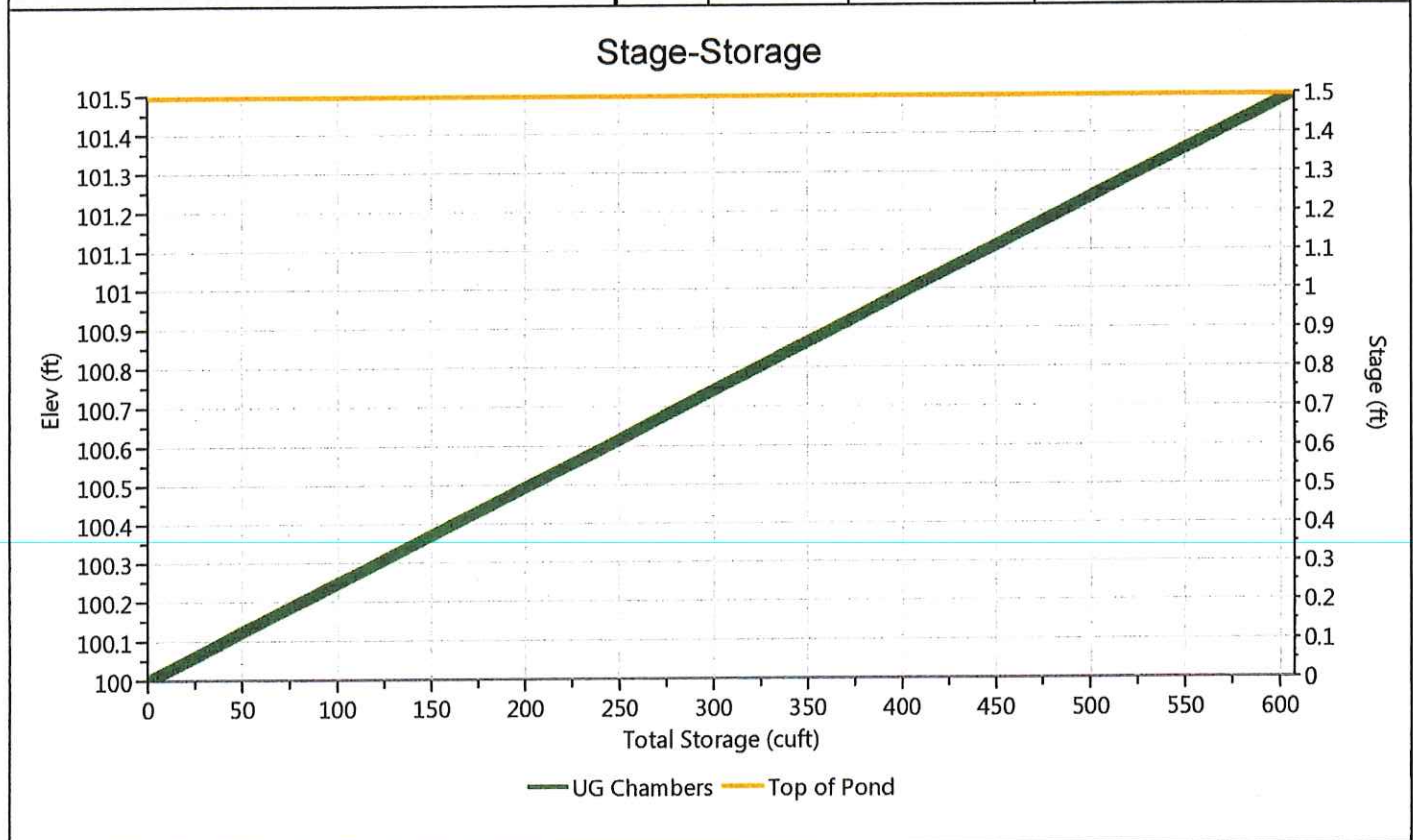
Hydrology Studio v 2.0.0.54

09-13-2018

dwelling

Stage-Storage

Underground Chambers			Stage / Storage Table				
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)	
Invert Elev Down, ft	100.00	0.00	100.00	n/a	0.000	0.000	
Chamber Rise, ft	1.50	0.08	100.08	n/a	30.4	30.4	
Chamber Shape	Box	0.15	100.15	n/a	30.4	60.8	
Chamber Span, ft	1.50	0.23	100.23	n/a	30.4	91.1	
Barrel Length, ft	27.00	0.30	100.30	n/a	30.4	122	
No. Barrels	10	0.38	100.38	n/a	30.4	152	
Barrel Slope, %	0.00	0.45	100.45	n/a	30.4	182	
Headers, y/n	No	0.53	100.53	n/a	30.4	213	
Stone Encasement, y/n	No	0.60	100.60	n/a	30.4	243	
Encasement Bottom Elevation, ft	100.00	0.68	100.68	n/a	30.4	273	
Encasement Width per Chamber, ft	1.50	0.75	100.75	n/a	30.4	304	
Encasement Depth, ft	1.50	0.82	100.83	n/a	30.4	334	
Encasement Voids, %	95.50	0.90	100.90	n/a	30.4	365	
		0.97	100.98	n/a	30.4	395	
		1.05	101.05	n/a	30.4	425	
		1.13	101.13	n/a	30.4	456	
		1.20	101.20	n/a	30.4	486	
		1.28	101.28	n/a	30.4	516	
		1.35	101.35	n/a	30.4	547	
		1.43	101.43	n/a	30.4	577	
		1.50	101.50	n/a	30.4	608	



Pond Report

Project Name:

Hydrology Studio v 2.0.0.54

09-13-2018

dwelling

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	100.00	0.000												0.00
0.08	100.08	30.4												0.00
0.15	100.15	60.8												0.00
0.23	100.23	91.1												0.00
0.30	100.30	122												0.00
0.38	100.38	152												0.00
0.45	100.45	182												0.00
0.53	100.53	213												0.00
0.60	100.60	243												0.00
0.68	100.68	273												0.00
0.75	100.75	304												0.00
0.82	100.83	334												0.00
0.90	100.90	365												0.00
0.97	100.98	395												0.00
1.05	101.05	425												0.00
1.13	101.13	456												0.00
1.20	101.20	486												0.00
1.28	101.28	516												0.00
1.35	101.35	547												0.00
1.43	101.43	577												0.00
1.50	101.50	608												0.00

Suffix key: lc = inlet control, oc = outlet control, s = submerged weir

Hydrograph Report

Project Name:

Hydrology Studio v 2.0.0.54

09-13-2018

Dwelling Routing

Hyd. No. 3

Hydrograph Type	= Pond Route	Peak Flow	= 0.00 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 1 - proposed dwelling	Max. Elevation	= 100.53 ft
Pond Name	= dwelling	Max. Storage	= 216 cuft

Pond Routing by Storage Indication Method

Qp = 0.00 cfs

Hydrograph Report

Project Name:

Hydrology Studio v 2.0.0.54

09-13-2018

Dwelling Routing

Hyd. No. 3

Hydrograph Type	= Pond Route	Peak Flow	= 0.00 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 1 - proposed dwelling	Max. Elevation	= 100.83 ft
Pond Name	= dwelling	Max. Storage	= 338 cuft

Pond Routing by Storage Indication Method

Qp = 0.00 cfs

Hydrograph Report

Project Name:

Hydrology Studio v 2.0.0.54

09-13-2018

Dwelling Routing

Hyd. No. 3

Hydrograph Type	= Pond Route	Peak Flow	= 0.00 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 1 - proposed dwelling	Max. Elevation	= 101.46 ft
Pond Name	= dwelling	Max. Storage	= 589 cuft

Pond Routing by Storage Indication Method

Qp = 0.00 cfs

***PROPOSED CONDITIONS
BUILDING INFILTRATORS***

Hydrograph Report

Project Name:

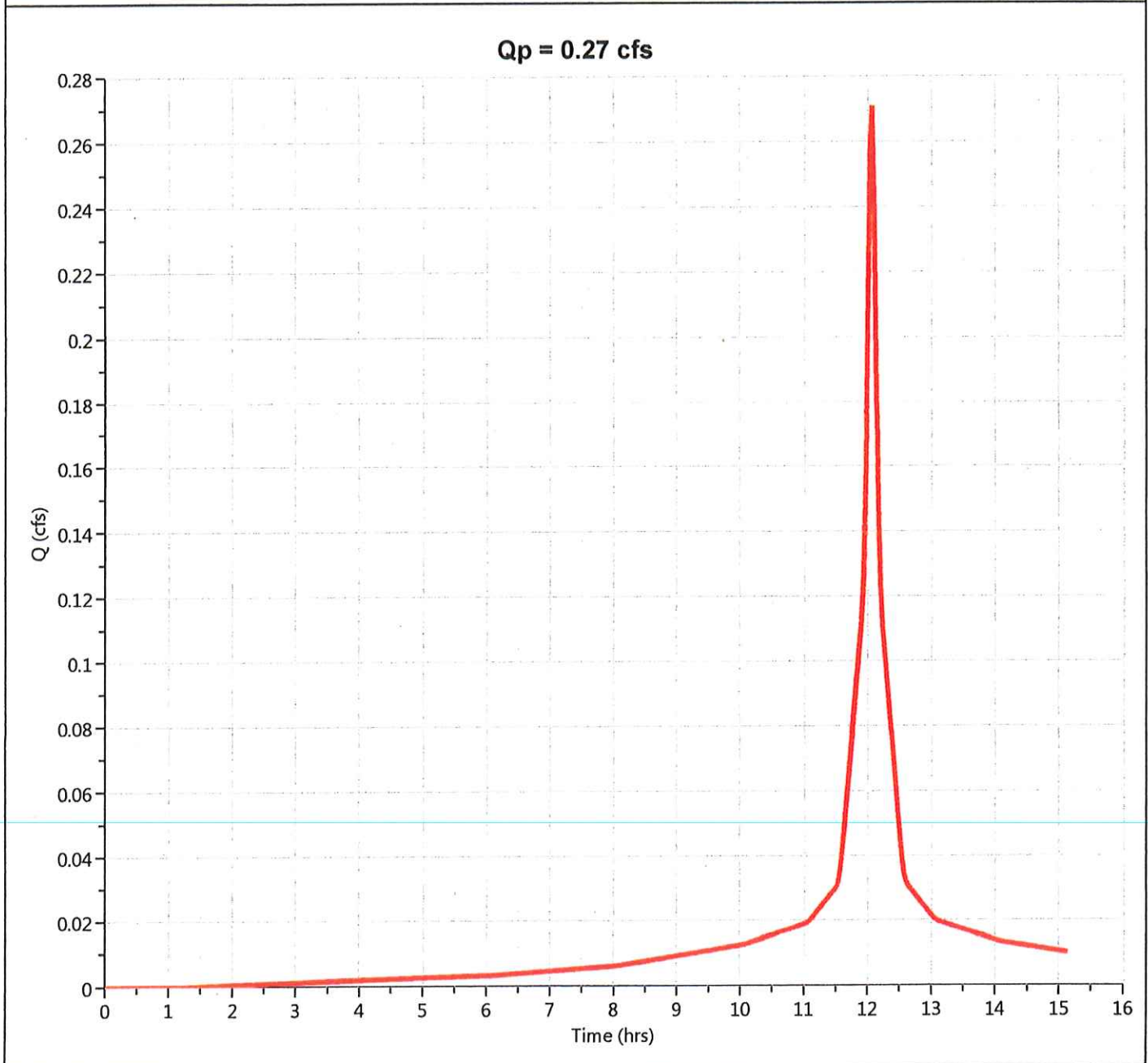
Hydrology Studio v 2.0.0.54

09-13-2018

proposed building

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.271 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 916 cuft
Drainage Area	= 0.085 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.4000 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



30

Design Storm Report

Custom Storm filename:

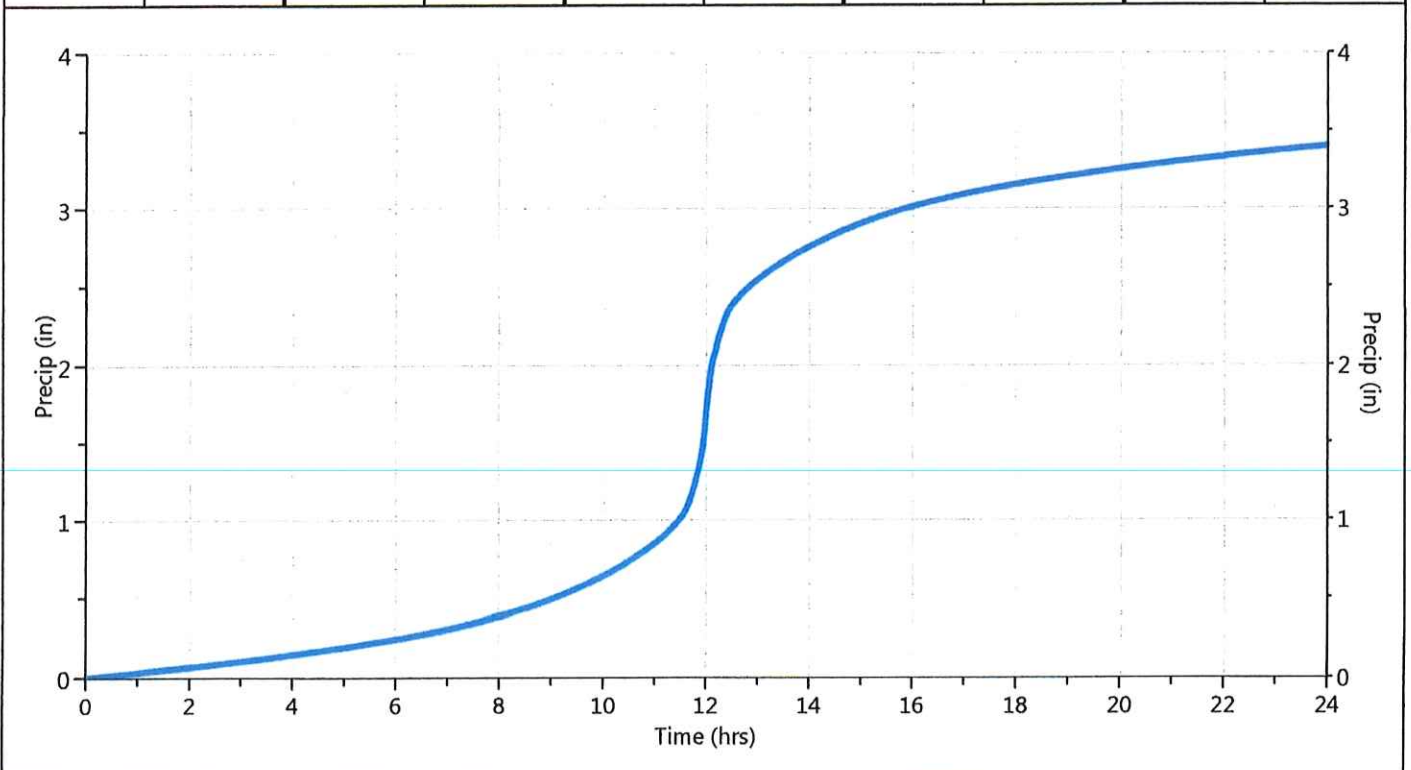
Hydrology Studio v 2.0.0.54

09-13-2018

Storm Distribution: NRCS/SCS - Type III

Storm Duration	Total Rainfall Volume (in)							
	1-yr	√ 2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
24 hrs	0.00	3.40	0.00	0.00	5.20	6.50	0.00	8.90

Incremental Rainfall Distribution, 2-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.00	0.0082	11.37	0.0119	11.73	0.0351	12.10	0.0673	12.47	0.0185
11.03	0.0084	11.40	0.0123	11.77	0.0384	12.13	0.0518	12.50	0.0151
11.07	0.0088	11.43	0.0126	11.80	0.0417	12.17	0.0484	12.53	0.0133
11.10	0.0091	11.47	0.0130	11.83	0.0451	12.20	0.0451	12.57	0.0130
11.13	0.0095	11.50	0.0133	11.87	0.0484	12.23	0.0417	12.60	0.0126
11.17	0.0098	11.53	0.0151	11.90	0.0517	12.27	0.0384	12.63	0.0123
11.20	0.0102	11.57	0.0185	11.93	0.0674	12.30	0.0351	12.67	0.0119
11.23	0.0105	11.60	0.0218	11.97	0.0952	12.33	0.0318	12.70	0.0116
11.27	0.0109	11.63	0.0251	12.00	0.1231	12.37	0.0284	12.73	0.0112
11.30	0.0112	11.67	0.0284	12.03	0.1229	12.40	0.0251	12.77	0.0109
11.33	0.0116	11.70	0.0318	12.07	0.0952	12.43	0.0218	12.80	0.0105



Hydrograph Report

Project Name:

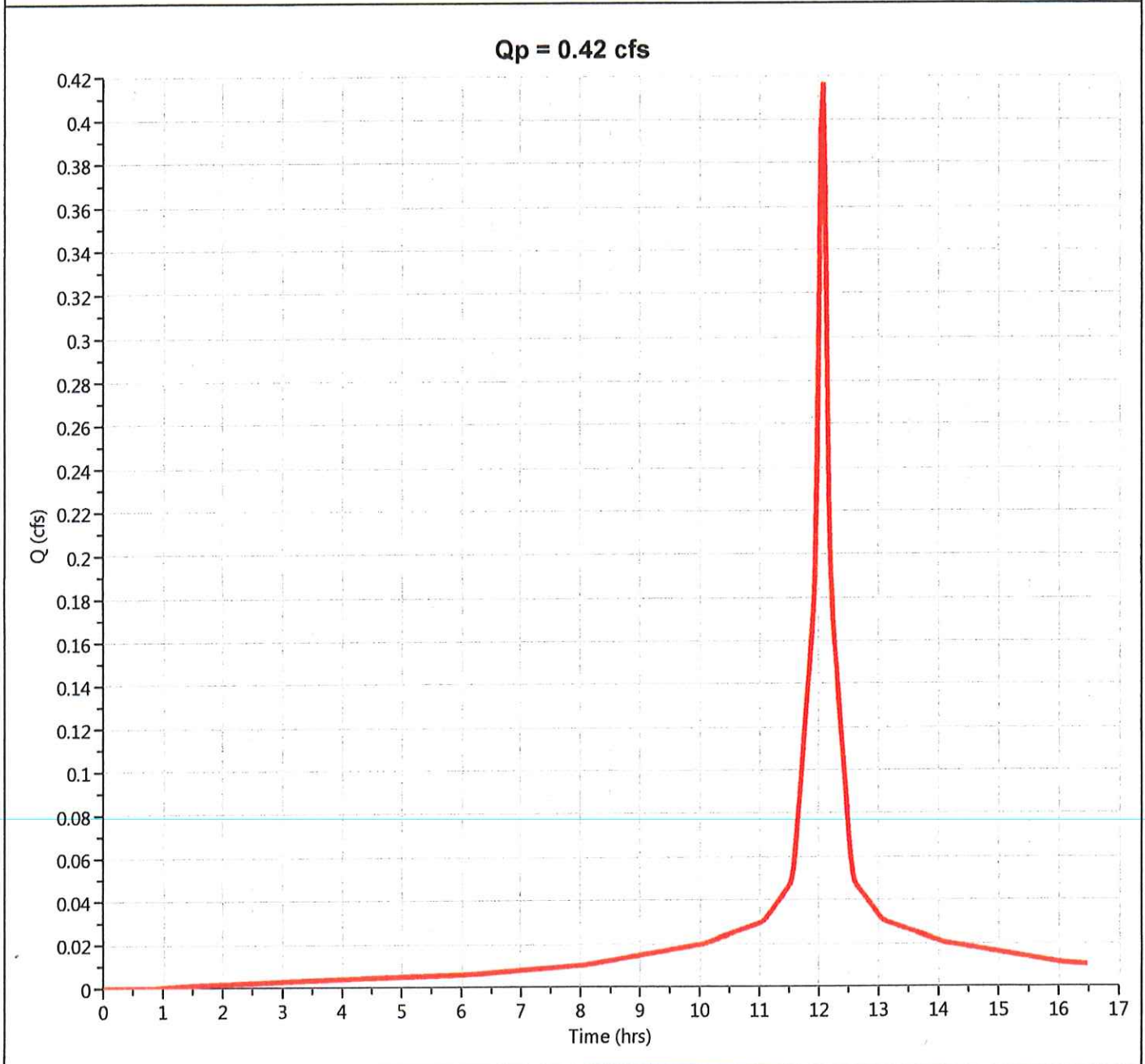
Hydrology Studio v 2.0.0.54

09-13-2018

proposed building

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.417 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 1,436 cuft
Drainage Area	= 0.085 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.2000 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Design Storm Report

Custom Storm filename:

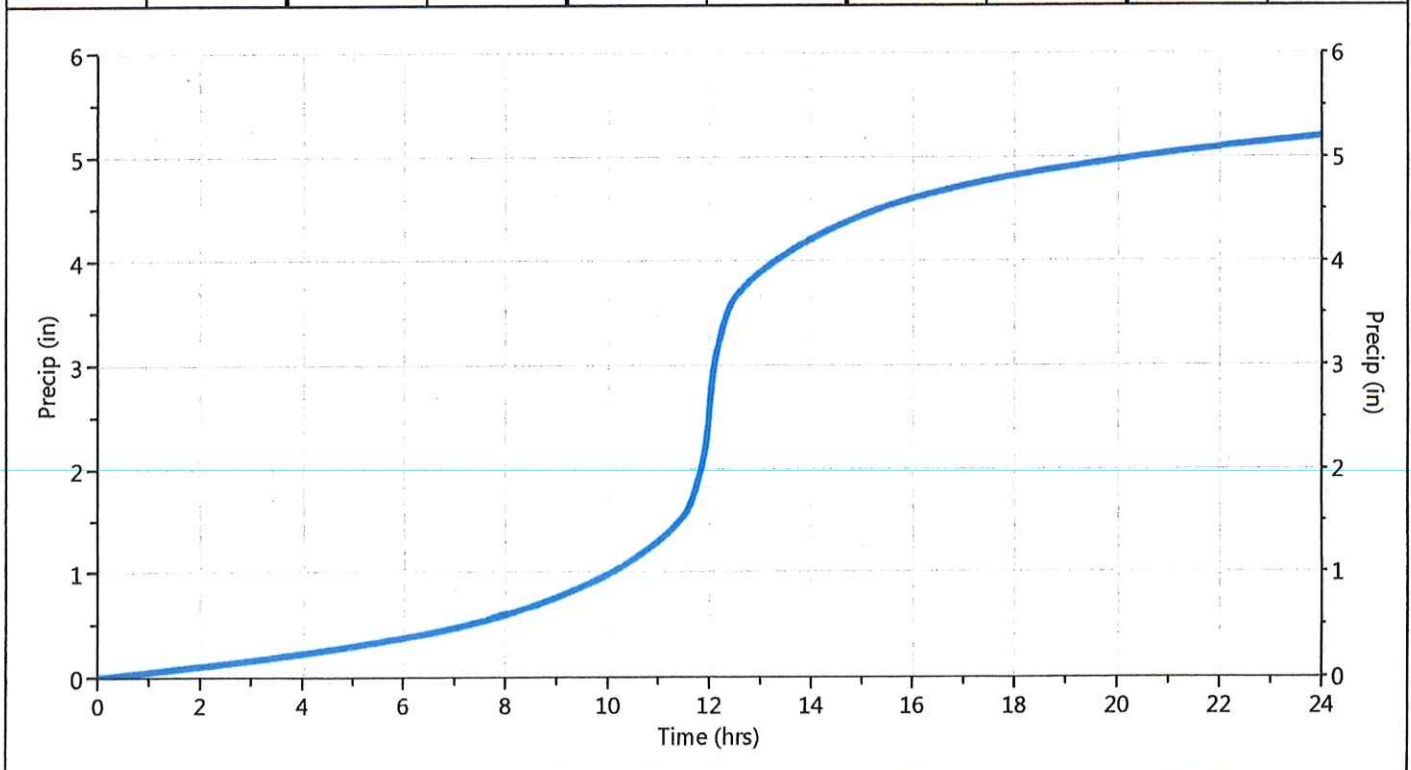
Hydrology Studio v 2.0.0.54

09-13-2018

Storm Distribution: NRCS/SCS - Type III

Storm Duration	Total Rainfall Volume (in)							
	1-yr	2-yr	3-yr	5-yr	√ 10-yr	25-yr	50-yr	100-yr
24 hrs	0.00	3.40	0.00	0.00	5.20	6.50	0.00	8.90

Incremental Rainfall Distribution, 10-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.00	0.0126	11.37	0.0182	11.73	0.0537	12.10	0.1030	12.47	0.0283
11.03	0.0129	11.40	0.0188	11.77	0.0588	12.13	0.0793	12.50	0.0232
11.07	0.0135	11.43	0.0193	11.80	0.0638	12.17	0.0740	12.53	0.0203
11.10	0.0140	11.47	0.0198	11.83	0.0689	12.20	0.0689	12.57	0.0198
11.13	0.0145	11.50	0.0204	11.87	0.0740	12.23	0.0638	12.60	0.0193
11.17	0.0150	11.53	0.0231	11.90	0.0791	12.27	0.0588	12.63	0.0188
11.20	0.0156	11.57	0.0283	11.93	0.1031	12.30	0.0537	12.67	0.0182
11.23	0.0161	11.60	0.0333	11.97	0.1456	12.33	0.0486	12.70	0.0177
11.27	0.0166	11.63	0.0384	12.00	0.1882	12.37	0.0435	12.73	0.0172
11.30	0.0172	11.67	0.0435	12.03	0.1880	12.40	0.0384	12.77	0.0166
11.33	0.0177	11.70	0.0486	12.07	0.1456	12.43	0.0333	12.80	0.0161



Hydrograph Report

Project Name:

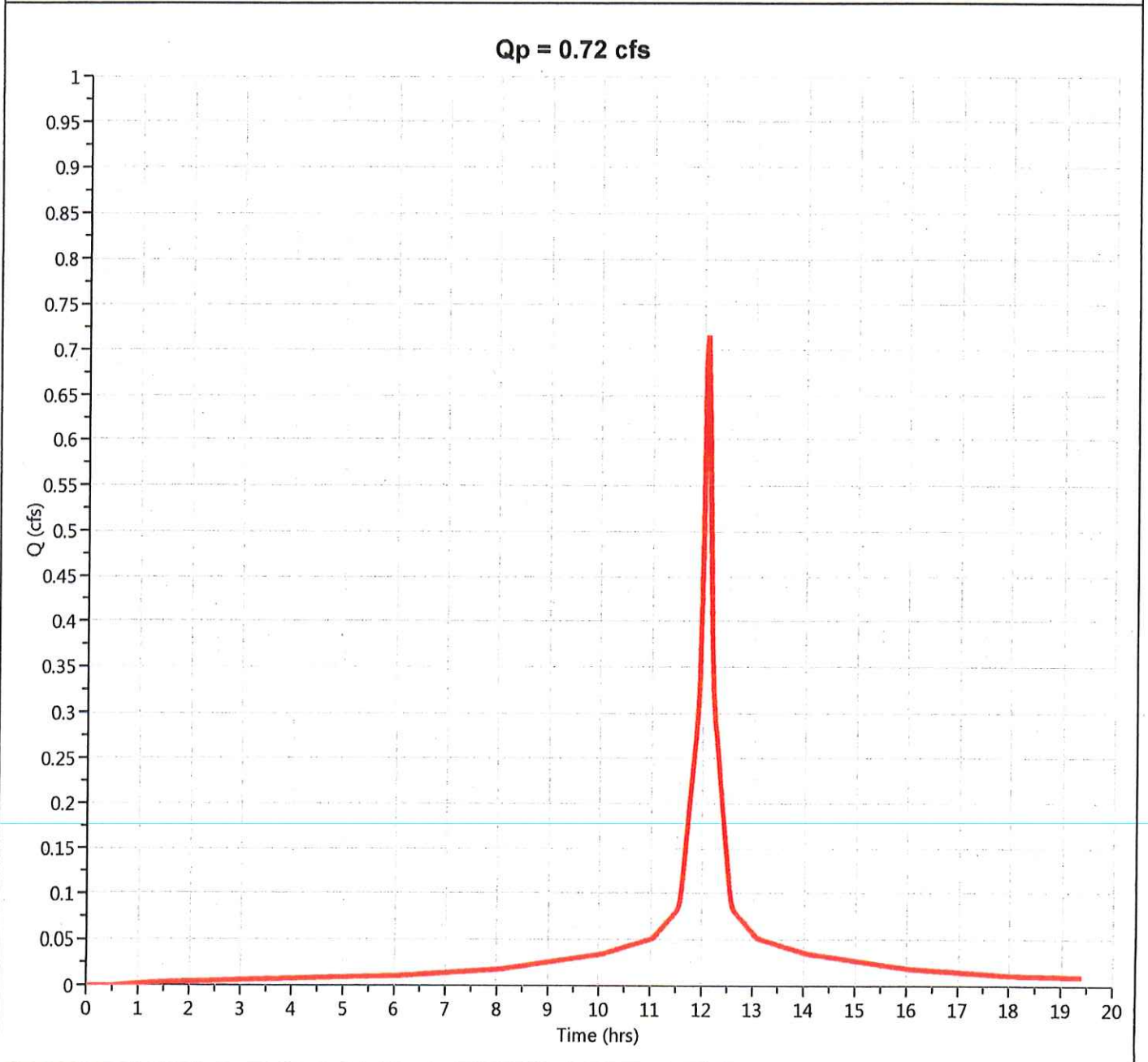
Hydrology Studio v 2.0.0.54

09-13-2018

proposed building

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.716 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 2,505 cuft
Drainage Area	= 0.085 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.9000 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Design Storm Report

Custom Storm filename:

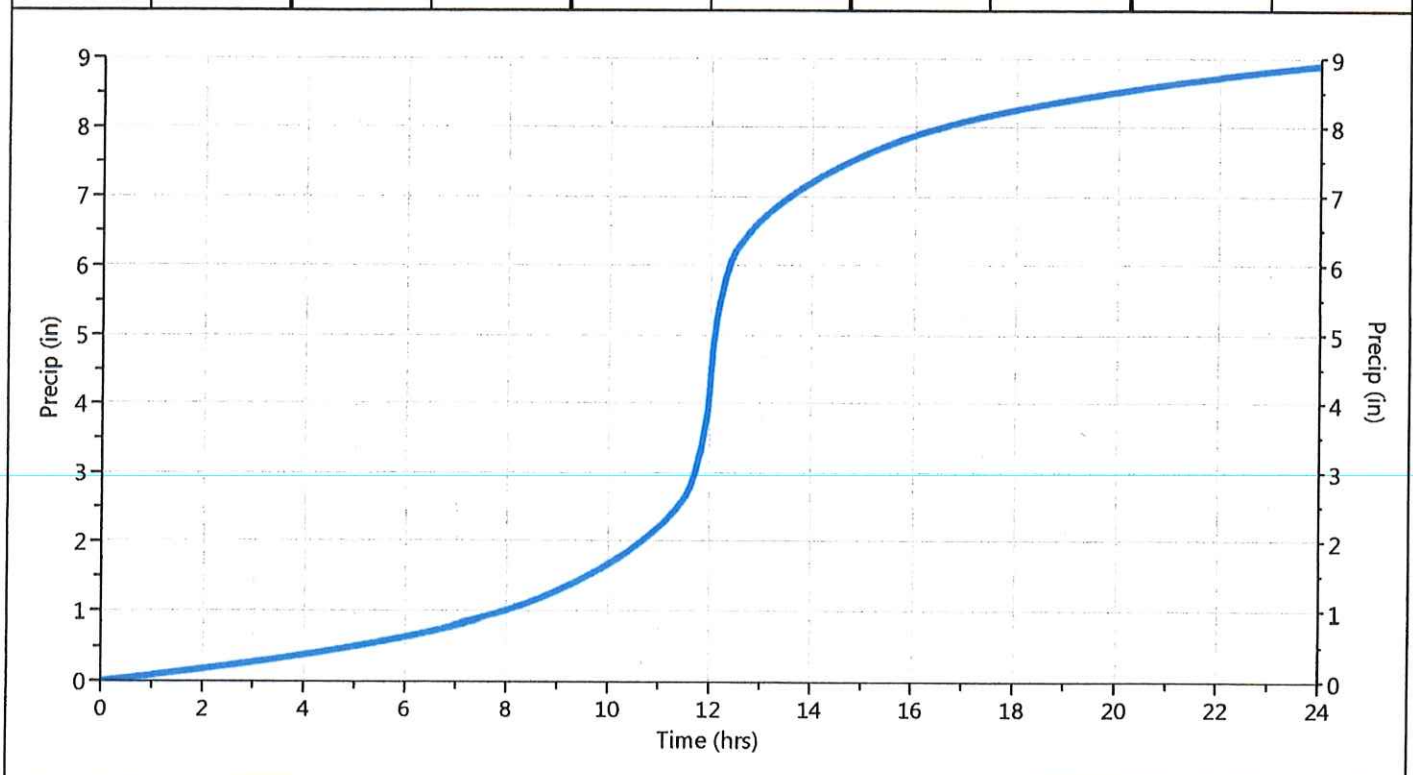
Hydrology Studio v 2.0.0.54

09-13-2018

Storm Distribution: NRCS/SCS - Type III

Storm Duration	Total Rainfall Volume (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	√ 100-yr
24 hrs	0.00	3.40	0.00	0.00	5.20	6.50	0.00	8.90

Incremental Rainfall Distribution, 100-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.00	0.0215	11.37	0.0312	11.73	0.0919	12.10	0.1762	12.47	0.0484
11.03	0.0221	11.40	0.0321	11.77	0.1006	12.13	0.1356	12.50	0.0397
11.07	0.0230	11.43	0.0330	11.80	0.1093	12.17	0.1267	12.53	0.0348
11.10	0.0239	11.47	0.0339	11.83	0.1180	12.20	0.1180	12.57	0.0339
11.13	0.0248	11.50	0.0348	11.87	0.1267	12.23	0.1093	12.60	0.0330
11.17	0.0258	11.53	0.0396	11.90	0.1354	12.27	0.1006	12.63	0.0321
11.20	0.0267	11.57	0.0484	11.93	0.1765	12.30	0.0919	12.67	0.0312
11.23	0.0276	11.60	0.0571	11.97	0.2492	12.33	0.0832	12.70	0.0303
11.27	0.0285	11.63	0.0658	12.00	0.3222	12.37	0.0745	12.73	0.0294
11.30	0.0294	11.67	0.0745	12.03	0.3218	12.40	0.0658	12.77	0.0285
11.33	0.0303	11.70	0.0832	12.07	0.2492	12.43	0.0571	12.80	0.0276



Pond Report

Project Name:

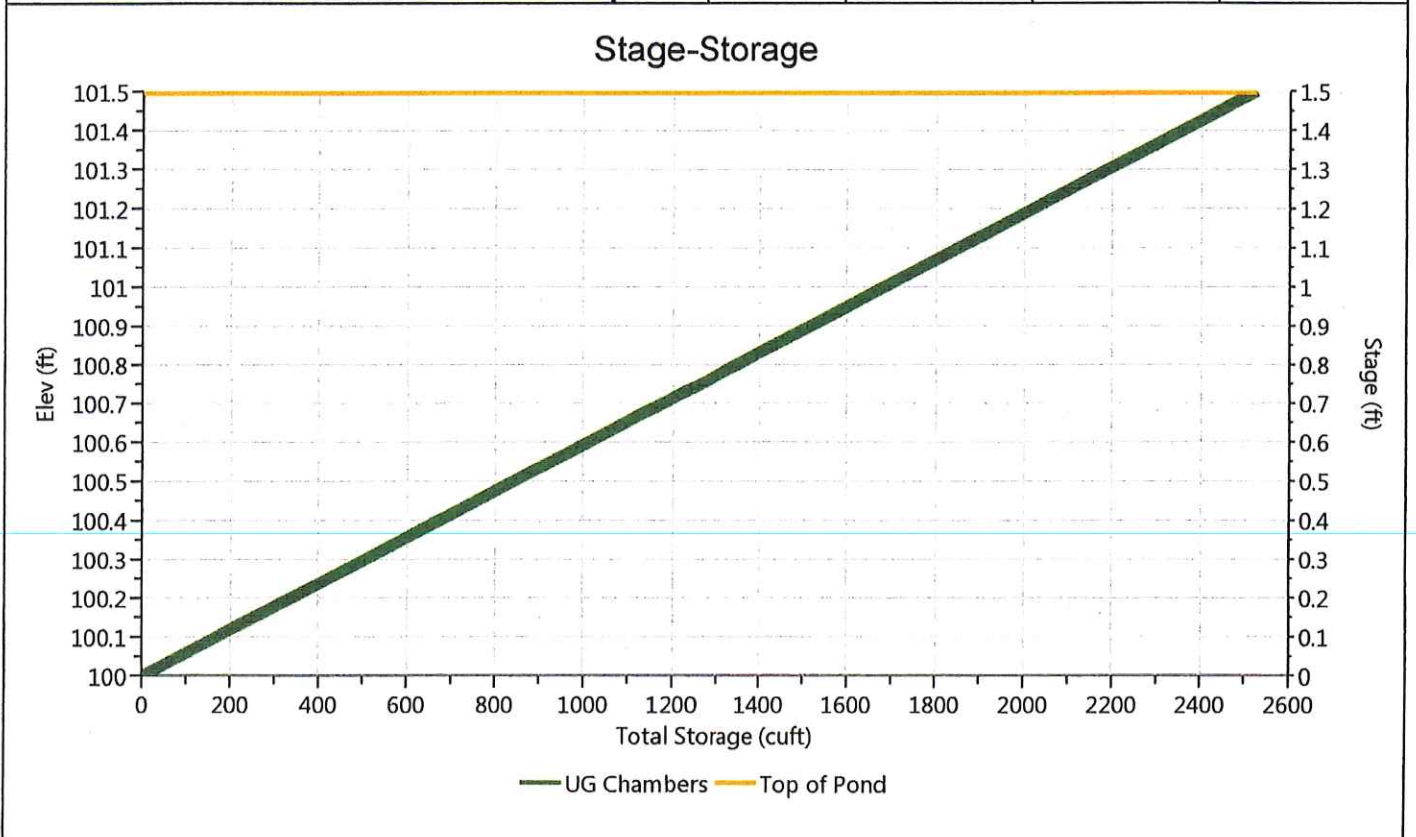
Hydrology Studio v 2.0.0.54

09-13-2018

building infiltrators

Stage-Storage

Underground Chambers			Stage / Storage Table				
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)	
Invert Elev Down, ft	100.00	0.00	100.00	n/a	0.000	0.000	
Chamber Rise, ft	1.50	0.08	100.08	n/a	126	126	
Chamber Shape	Box	0.15	100.15	n/a	126	253	
Chamber Span, ft	1.50	0.23	100.23	n/a	126	379	
Barrel Length, ft	51.00	0.30	100.30	n/a	126	505	
Barrel Slope, %	0.00	0.38	100.38	n/a	126	631	
No. Barrels	22	0.45	100.45	n/a	126	758	
Barrel Slope, %	0.00	0.53	100.53	n/a	126	884	
Headers, y/n	No	0.60	100.60	n/a	126	1,010	
Stone Encasement, y/n	No	0.68	100.68	n/a	126	1,136	
Encasement Bottom Elevation, ft	100.00	0.75	100.75	n/a	126	1,263	
Encasement Width per Chamber, ft	1.50	0.82	100.83	n/a	126	1,389	
Encasement Depth, ft	1.50	0.90	100.90	n/a	126	1,515	
Encasement Voids, %	95.50	0.97	100.98	n/a	126	1,641	
		1.05	101.05	n/a	126	1,768	
		1.13	101.13	n/a	126	1,894	
		1.20	101.20	n/a	126	2,020	
		1.28	101.28	n/a	126	2,146	
		1.35	101.35	n/a	126	2,273	
		1.43	101.43	n/a	126	2,399	
		1.50	101.50	n/a	126	2,525	



Pond Report

Project Name:

Hydrology Studio v 2.0.0.54

09-13-2018

building infiltrators

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	100.00	0.000												0.00
0.08	100.08	126												0.00
0.15	100.15	253												0.00
0.23	100.23	379												0.00
0.30	100.30	505												0.00
0.38	100.38	631												0.00
0.45	100.45	758												0.00
0.53	100.53	884												0.00
0.60	100.60	1,010												0.00
0.68	100.68	1,136												0.00
0.75	100.75	1,263												0.00
0.82	100.83	1,389												0.00
0.90	100.90	1,515												0.00
0.97	100.98	1,641												0.00
1.05	101.05	1,768												0.00
1.13	101.13	1,894												0.00
1.20	101.20	2,020												0.00
1.28	101.28	2,146												0.00
1.35	101.35	2,273												0.00
1.43	101.43	2,399												0.00
1.50	101.50	2,525												0.00

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Hydrograph Report

Project Name:

Hydrology Studio v 2.0.0.54

09-13-2018

Building Routing

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.00 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 2 - proposed building	Max. Elevation	= 100.54 ft
Pond Name	= building infiltrators	Max. Storage	= 916 cuft

Pond Routing by Storage Indication Method

Qp = 0.00 cfs

Hydrograph Report

Project Name:

Hydrology Studio v 2.0.0.54

09-13-2018

Building Routing

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.00 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 2 - proposed building	Max. Elevation	= 100.85 ft
Pond Name	= building infiltrators	Max. Storage	= 1,436 cuft

Pond Routing by Storage Indication Method

Qp = 0.00 cfs

Hydrograph Report

Project Name:

Hydrology Studio v 2.0.0.54

09-13-2018

Building Routing

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.00 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 2 - proposed building	Max. Elevation	= 101.49 ft
Pond Name	= building infiltrators	Max. Storage	= 2,505 cuft

Pond Routing by Storage Indication Method

Qp = 0.00 cfs