

# **STORMWATER MANAGEMENT REPORT**

## **PROPOSED MULTI FAMILY/RETAIL DEVELOPMENT**

**1369 SOUTH AVENUE**  
**Block 624 Lot 12**  
**City of Plainfield, Union County, New Jersey**

prepared for

**1369 South Plainfield, LLC**  
**951 Madison Avenue**  
**Lakewood, New Jersey 08701**

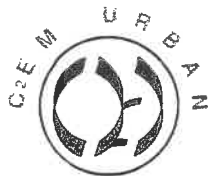
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OCT 30 2019

PLANNING DIVISION

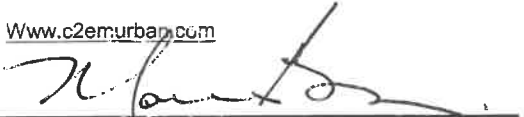
September 25, 2019

391 Littleton Avenue ● Newark ● New Jersey 07103



**C2EM URBAN, LLC**  
Consulting Engineers

973 420 0666 ● Fax 973 624 9045 ● [www.c2emurban.com](http://www.c2emurban.com)

  
MAURICE A. BROWN, PE NJ 24GE02991900  
NY 062747  
PA 038759  
MD40283

## STORMWATER MANAGEMENT PLAN

<b>Land Development Project Name:</b>	Proposed Multi-Family/Retail Development 1369 South Avenue City of Plainfield, Union County, New Jersey
<b>Block/Lot:</b>	Block 624                      Lot: 12
<b>Applicant's Name:</b>	1369 South Plainfield LLC.
<b>Project Description:</b>	<p>The project entails the construction of a new mixed use building consisting of 24 units of residential housing on the upper floors and retail spaces along the ground floor of the structure . In addition, various onsite and off tract improvements will be constructed including on site surface parking spaces, curbing and walkways, stormwater management system, site lighting and landscaping. The new building will be five stories high with a footprint area of approximately 6,088 sf.</p>
<b>Existing Condition:</b>	<p>The area the existing lot is 18,184 sf. and is wholly comprised of impervious surfaces {building 381 sf (2.1%); concrete walkway and pavement 811 sf (4.5%); concrete paver surface 3,623 sf (19.9% and stone pavement surface 13,369 sf. (73.5%) }. The lot has a 115 ft. frontage along South Avenue.</p> <p>The site slopes moderately from the back to the front toward South Avenue. Runoff from the site occurs essentially sheet flow to the street. There are storm sewer and curb inlets on South Avenue within the vicinity of the site.</p>

The stormwater management plan proposed for the site is consistent with the requirements of the New Jersey Storm Water Management Rules NJAC 7: 8 – 5, which require non-structural stormwater management strategies to be incorporated into the site design of major developments.

Per NJAC 7:8 – 5.4 the main focus of the nonstructural stormwater management measures provided for the project should be as follows:

- Control erosion
- Encourage and control infiltration and groundwater recharge
- Control storm water runoff quantity.

Technically, this project is exempt from the requirements of groundwater recharge provision as the project is located within an urban redevelopment area. It is also exempt from the water quality provisions because the increase in impervious coverage does not exceed the threshold of 0.25 acres (there is actually a decrease in the impervious coverage).

The goal of the stormwater management plan under this project is to provide a system that retains the post construction runoff from the developed site so that there is no increase in the peak runoff rates or volume from the site resulting from the proposed development. Further the goal of the stormwater management plan per NJAC 7:8-5.4.3.iii is to ensure that the post construction peak run off rates for the 2, 10 and 100 year storm events do not exceed 50, 75, and 80 percent, respectively, of the pre-construction peak run-off rates.

The plan for the site consists of the following:

1. The site is divided into three (3) separate drainage areas (DA's) as

follows:

DA-1	Roof	6,088 sf. (0.140 Ac.)
DA-2	Parking and Landscaped at the rear of the tract	9,977 sf. (0.229 Ac.)
DA-3	Parking Area along the front entering d'way	2,119 sf. (0.049 Ac.)

Drainage areas DA-1, and DA-2 are connected to the StormWater Management System (SWMS) either by direct piping or by sheet to inlets that are directly connected to the SWMS. DA-3 is unconnected.

The SWMS consists of 3 barrels of 40 ft. long 24 inch perforated HDPE pipe in a 13' wide x 3' deep stone filled trench with a total storage of 2,100 ft<sup>3</sup>. An outlet structure with a 5" dia. orifice and 18" weir controls the outlet from the SWMS to a 12" pipe that connects to an inlet along the entrance drive to the site. This inlet receives sheet flow from the parking lot (DA-3). This terminal inlet discharges to the existing storm sewer on South Avenue by a 12" RCP that connects this inlet to the existing storm manhole located in the sidewalk at the front of the site.

A summary of the peak runoff rates is presented below showing that the levels of the runoff rates for the developed site was well below the pre-construction rates.

**SUMMARY OF PEAK RUN OFF RATES (cfs) AND RUN OFF VOLUME (ft<sup>3</sup>)**

	2YR	10YR	100YR
<b>EXISTING</b>			
Peak Run-off (cfs)	1.229	1.584	2.172
Volume (ft <sup>3</sup> )	1106	1426	1955
<b>PROPOSED</b>			
<b>Connected to Storage DA1-DA6</b>			
Thru SWMS			
Peak Run-off (cfs)	0.008	0.012	0.373
Volume (ft <sup>3</sup> )	1170	1553	2152
Storage Used (ft <sup>3</sup> )	1164	1541	2049
<b>Un-connected to Storage</b>			
Peak Run-off (cfs)	0.156	0.202	0.276
Volume (ft <sup>3</sup> )			
Peak Run-off (cfs)			
Volume (ft <sup>3</sup> )			
<b>Total Peak Run-off (cfs)</b>	<b>0.164</b>	<b>0.214</b>	<b>0.649</b>
<b>Post Construction Run-off vs Pre-construction Run-off</b>	<b>13.34%</b>	<b>13.51%</b>	<b>29.88%</b>



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www.c2emurban.com

JOB 1364 SOUTH AVE.

SHEET NO. \_\_\_\_\_ OF \_\_\_\_\_

CALCULATED BY \_\_\_\_\_ DATE \_\_\_\_\_

CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_

SCALE \_\_\_\_\_

## EXISTING CONDITIONS - SITE COVERAGE

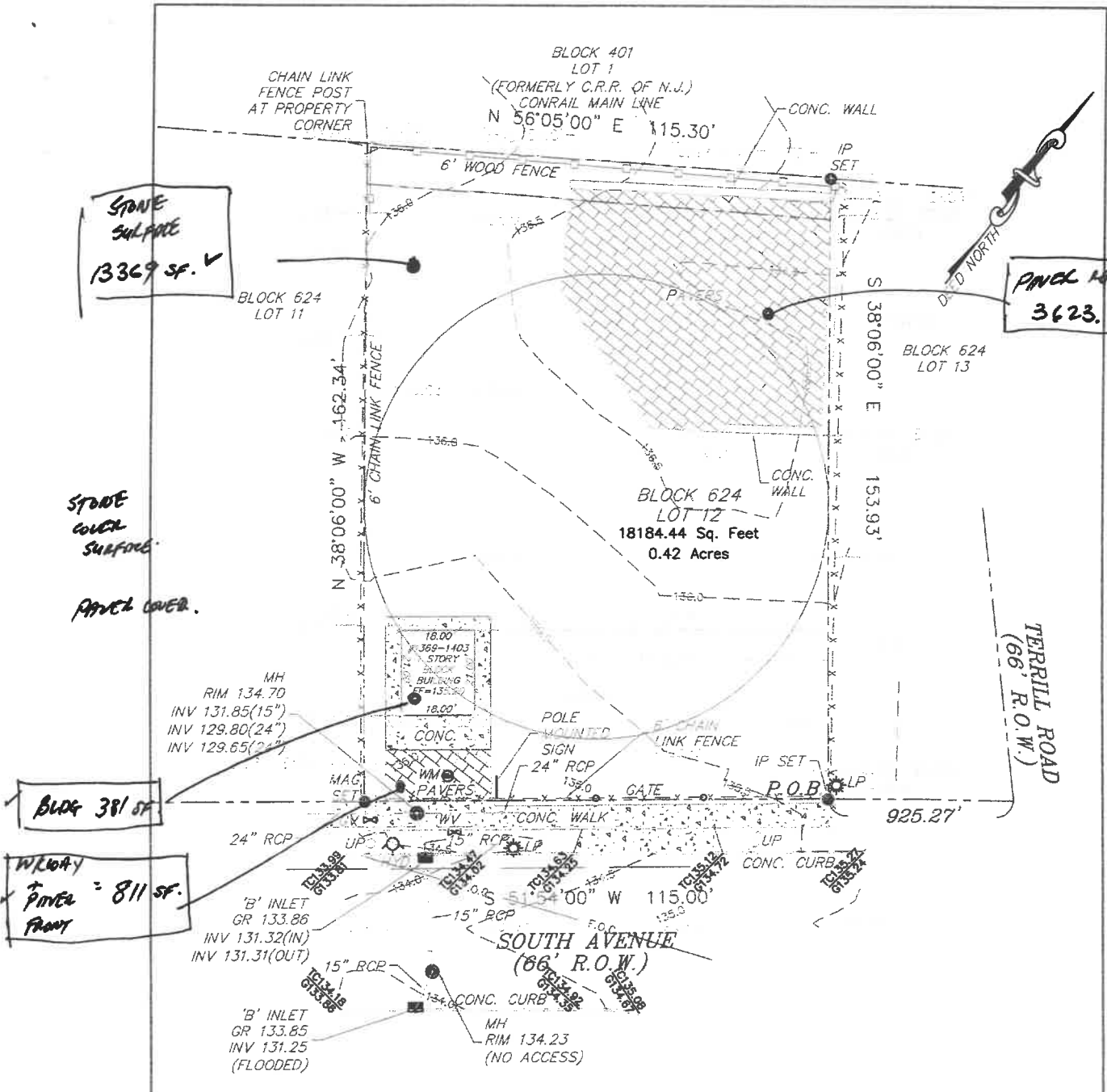
Total Site Area = 18184.14 SF. (0.40 ACRES)

Category	Area (SF)	Run Off Coeff.	Run Off Coeff.
BUILDING	381 SF	(0.021)	0.87
CONC PAVT.	811 SF	(0.045)	0.87
PAVED SURF.	3623 SF	(0.199)	0.87
STONE SURFACE	13369 SF	(0.735)	0.74

Soil Type	UR.	URBAN LAND	K SAT.
	H&B	HAZARDOUS - CLEAN LAND H&B R&W	0.06 to 0.6 1/4% C

Composite C. Existing = 
$$\frac{(381 + 811 + 3623) \times 0.87 + (13369 \times 0.74)}{18184}$$

= 0.7744



STONE  
SULFATE  
13369 SF. ✓

PAVEL MAR.  
3623. ✓

STONE  
COVER  
SURFACE  
  
PAVEL COVER.

BUDG 381 SF

WALKWAY  
+  
PAVEL = 811 SF.  
FRONT

- NOTES:
- 1 SURVEY PERFORMED WITHOUT BENEFIT OF A TITLE REPORT. SUBJECT TO RESTRICTIONS OR EASEMENTS THAT AN ACCURATE TITLE SEARCH WOULD ENCLOSE.
  - 2 PROPERTY BASED ON DEED BOOK 6023 PAGE 781.
  - 3 LOT AND BLOCK NUMBERS REFER TO THE CITY OF PLAINFIELD TAX MAPS, SHEET No. 38.
  - 5 UNDERGROUND UTILITIES SHOWN HEREON ARE BASED ON EXISTING MARK-OUT AT TIME OF SURVEY.
  - 6 ELEVATIONS SHOWN HEREON REFERENCE NAVD 1989 DATUM AND WERE OBTAINED USING GPS OBSERVATIONS.
  - 7 DIMENSIONS SHOWN HEREON ARE NOT TO BE USED FOR CONSTRUCTION PURPOSES. ALL CONTRACTORS ARE TO VERIFY BUILDING DIMENSIONS PRIOR TO CONSTRUCTION.

THIS CERTIFICATION IS MADE ONLY TO THE HEREON PARTIES FOR PURCHASE AND/OR MORTGAGE OF HEREIN DELINEATED PROPERTY BY BELOW NAMED PURCHASER. NO RESPONSIBILITY OF LIABILITY IS ASSUMED BY SURVEYOR FOR USE OF SURVEY FOR ANY OTHER PURPOSE INCLUDING, BUT NOT LIMITED TO, USE OF SURVEY FOR SURVEY AFFIDAVIT, RESALE OF PROPERTY, OR TO ANY OTHER PERSON NOT LISTED IN THE CERTIFICATION, EITHER DIRECTLY OR INDIRECTLY. THE CERTIFICATION ON THIS PLAN IS NULL AND VOID IF FULL PAYMENT IS NOT RECEIVED FOR THE INFORMATION AND SERVICES SHOWN HEREON.

I HEREBY CERTIFY TO THE BEST OF MY KNOWLEDGE AND BELIEF THAT THIS SURVEY IS IN ACCORDANCE WITH THE CURRENT STATE OF N.J. LAWS AND REGULATIONS FOR A LAND SURVEY.

1369-1403 SOUTH AVENUE, LLC

PLAN OF SURVEY WITH TOPOGRAPHY  
OF TAX MAP LOT 12 IN BLOCK 624

SITUATED IN  
CITY OF PLAINFIELD  
UNION COUNTY, NEW JERSEY



PROFESSIONAL LAND SURVEYOR N.J. LIC. NO. 43276  
CERTIFICATE OF AUTHORIZATION No. 246A26193500

# Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

EXISTING SITE.  
1  
1/20



# Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Rational	—	—	1.229	—	—	1.584	—	—	2.172	DA-1 Existing Site - Existing Condi

# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

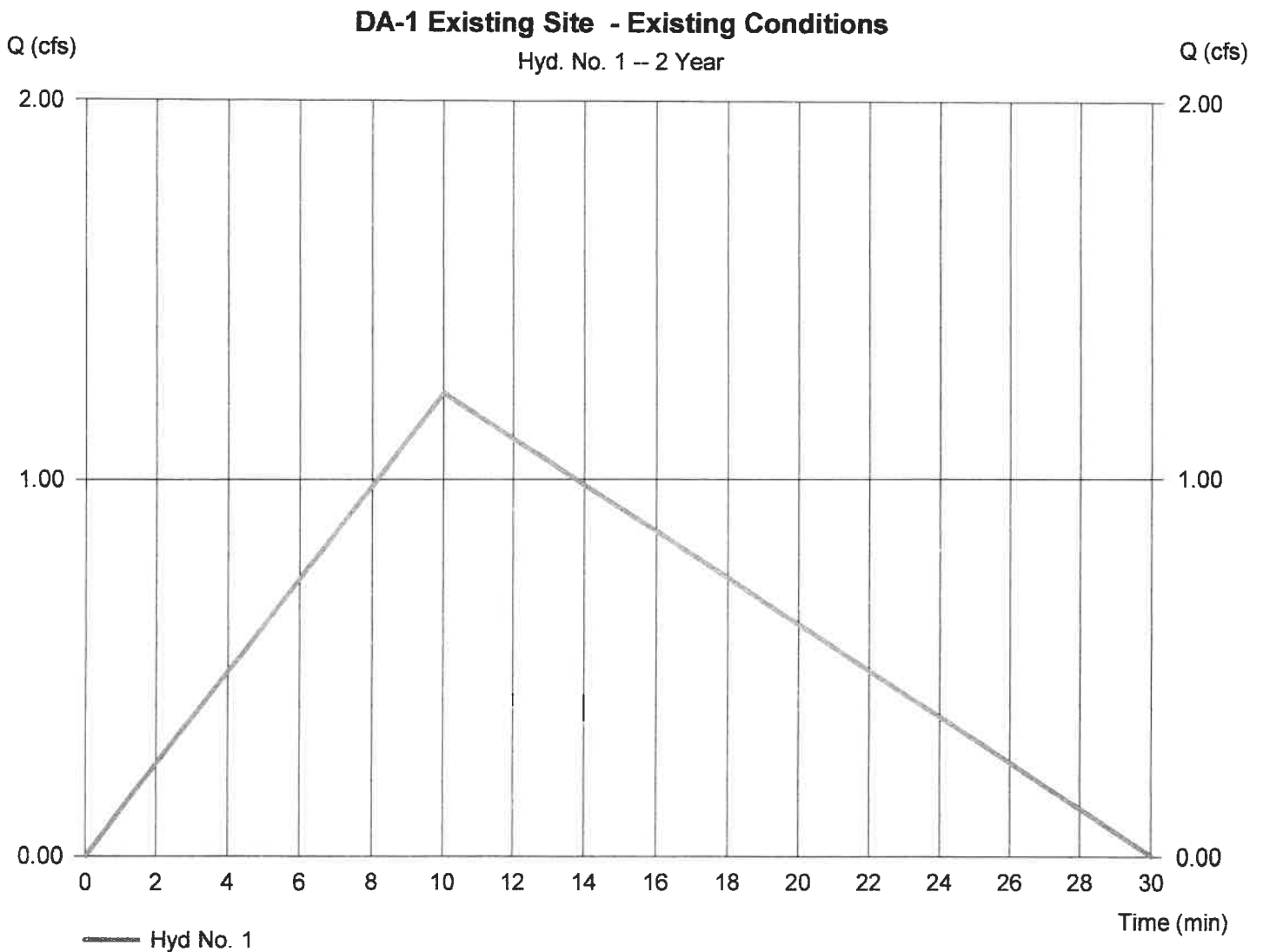
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	1.229	1	10	1,106	----	----	----	DA-1 Existing Site - Existing Condi
NPS-DP-Existing Conditions - 1369 south.gpw								Return Period: 2 Year	Thursday, 09 / 26 / 2019

# Hydrograph Report

## Hyd. No. 1

DA-1 Existing Site - Existing Conditions

Hydrograph type	= Rational	Peak discharge	= 1.229 cfs
Storm frequency	= 2 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,106 cuft
Drainage area	= 0.420 ac	Runoff coeff.	= 0.77
Intensity	= 3.800 in/hr	Tc by User	= 10.00 min
IDF Curve	= plainfield.IDF	Asc/Rec limb fact	= 1/2



# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

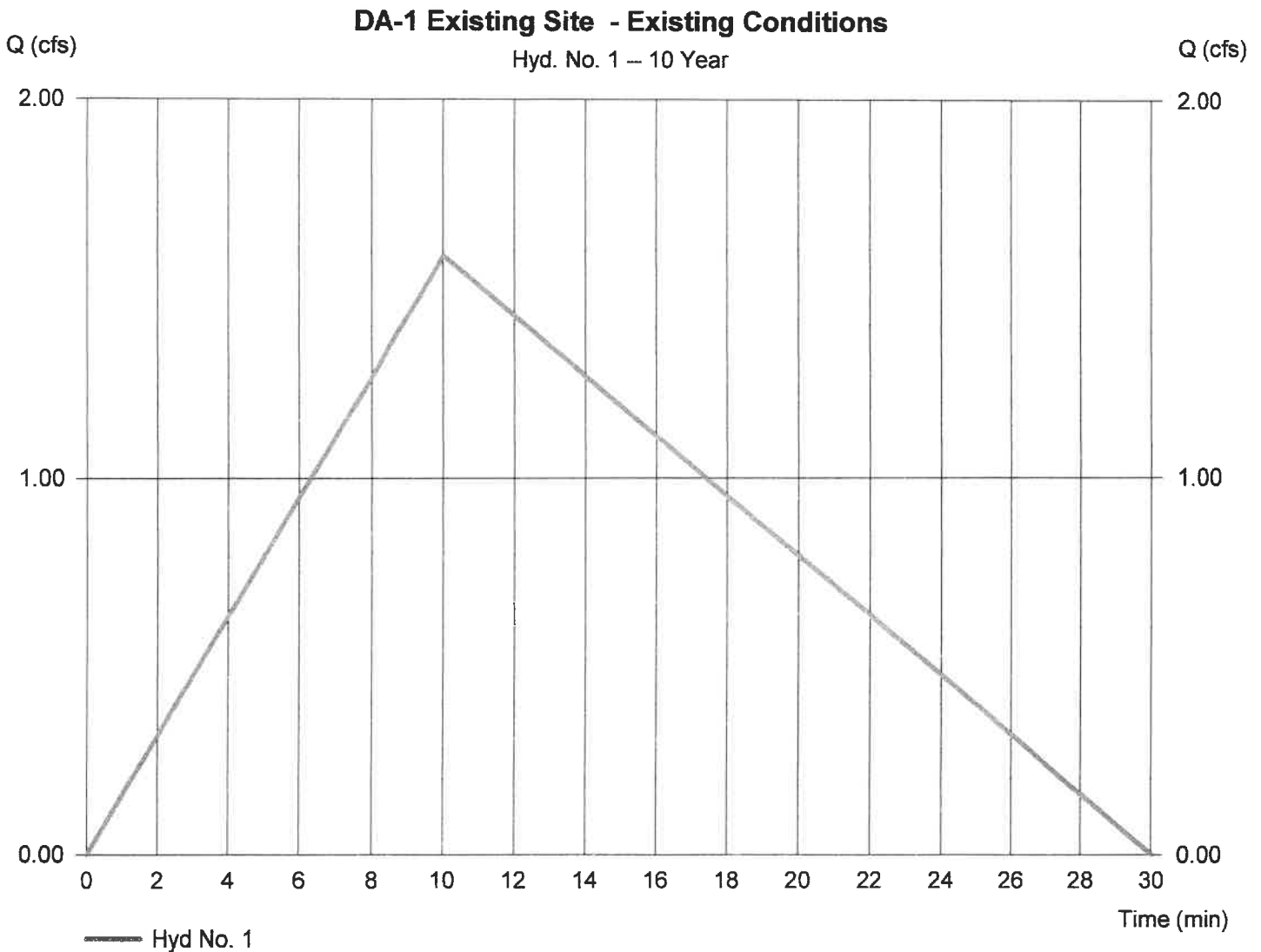
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	1.584	1	10	1,426	—	—	—	DA-1 Existing Site - Existing Condi
NPS-DP-Existing Conditions - 1369 south.gpr								Return Period: 10 Year	Thursday, 09 / 26 / 2019

# Hydrograph Report

## Hyd. No. 1

DA-1 Existing Site - Existing Conditions

Hydrograph type	= Rational	Peak discharge	= 1.584 cfs
Storm frequency	= 10 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,426 cuft
Drainage area	= 0.420 ac	Runoff coeff.	= 0.77
Intensity	= 4.899 in/hr	Tc by User	= 10.00 min
IDF Curve	= plainfield.IDF	Asc/Rec limb fact	= 1/2



# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

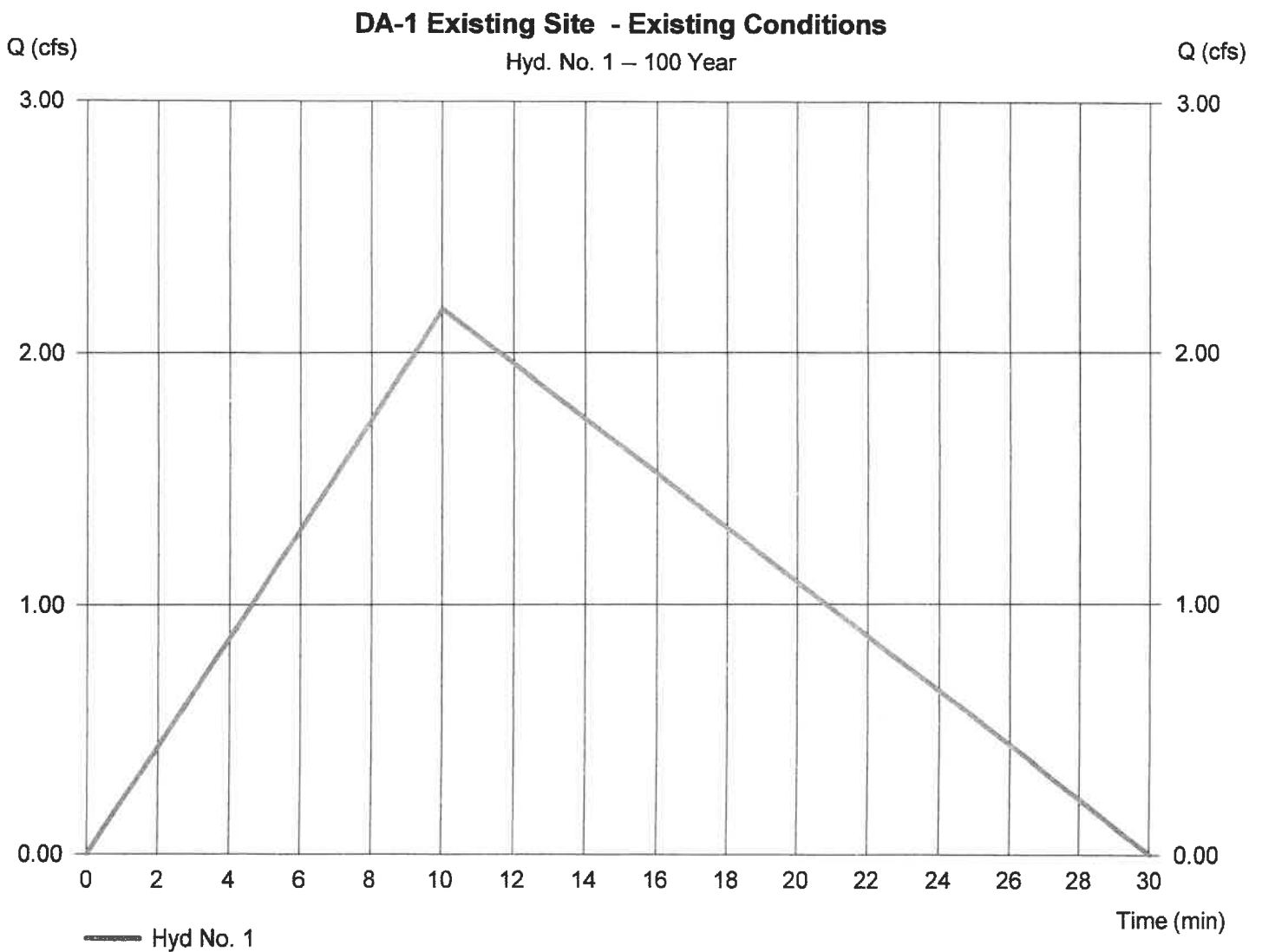
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	2.172	1	10	1,955	—	—	—	DA-1 Existing Site - Existing Condi
NPS-DP-Existing Conditions - 1369 south.gp								Return Period: 100 Year	Thursday, 09 / 26 / 2019

# Hydrograph Report

## Hyd. No. 1

### DA-1 Existing Site - Existing Conditions

Hydrograph type	= Rational	Peak discharge	= 2.172 cfs
Storm frequency	= 100 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,955 cuft
Drainage area	= 0.420 ac	Runoff coeff.	= 0.77
Intensity	= 6.715 in/hr	Tc by User	= 10.00 min
IDF Curve	= plainfield.IDF	Asc/Rec limb fact	= 1/2



# Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	-----
2	42.5528	10.1000	0.8051	-----
3	0.0000	0.0000	0.0000	-----
5	41.4981	10.0000	0.7469	-----
10	43.0461	10.1000	0.7242	-----
25	46.4435	10.2000	0.7035	-----
50	49.5355	10.3000	0.6923	-----
100	52.7428	10.4000	0.6835	-----

File name: plainfield.IDF

**Intensity = B / (Tc + D)^E**

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	4.78	3.80	3.18	2.75	2.43	2.18	1.98	1.82	1.69	1.57	1.48	1.39
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	5.49	4.43	3.75	3.27	2.92	2.64	2.42	2.23	2.08	1.95	1.84	1.74
10	6.03	4.90	4.17	3.66	3.27	2.97	2.73	2.53	2.36	2.22	2.09	1.98
25	6.85	5.61	4.80	4.22	3.79	3.45	3.18	2.95	2.76	2.60	2.46	2.33
50	7.49	6.16	5.29	4.67	4.20	3.83	3.54	3.29	3.08	2.90	2.74	2.61
100	8.14	6.72	5.78	5.11	4.61	4.21	3.89	3.62	3.39	3.20	3.03	2.88

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	2.20	0.00	3.30	4.25	5.77	6.80	7.95
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10





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973 420 0666 fax 973 624 9045

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JOB 1369 So. Ave. Puro  
 SHEET NO. \_\_\_\_\_ OF \_\_\_\_\_  
 CALCULATED BY MAB. DATE \_\_\_\_\_  
 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 SCALE \_\_\_\_\_

PROPOSED  
 SURFACE COVER  
 BY TYPE

	TOTAL (SF)	DA1 CONNECTED TO SWMS	DA-1 CONNECTED TO SWMS (CF)	DA-2 UNCONNECTED (SF)
BUILDINGS	6,088	6,088		-
WALKS	915		915	-
PARKING LOT	9321		7302	2019
LANDSCAPED	1860		1760	100
	18,184	6,088	9,977	2119
	(0.418 AC)	(0.140 AC)	(0.229 AC)	(0.049 AC)



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JOB 1369 South Ave.

SHEET NO. \_\_\_\_\_ OF \_\_\_\_\_

CALCULATED BY \_\_\_\_\_ DATE \_\_\_\_\_

CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_

SCALE \_\_\_\_\_

PEAK RUN OFF RATES

2 YR 1.229 cfs @ 50% = 0.615 cfs

10 YR. 1.584 cfs @ 75% = 1.188 cfs

100 YR. 2.172 cfs @ 80% = 1.738 cfs

RUNOFF COEFF.

DA-1 RUNOFF COEFF = 0.87 ROOF.

DA-2:  $C_{comp2} = \frac{0.87(915 + 7302) + 0.2(1760)}{9977} = 0.75$

DA-3  $C_{comp3} = \frac{2019 \times 0.87 + 100 \times 0.2}{2119} = 0.84$

DA-2 9,977 SF

N 56°05'00" E

115.30'

6 FT. WOOD PRIVACY FENCE ALONG REAR PROP LINE TYP.

SITE LIGHT WALL MTD. TYP.

115'-4"

CAR OVERHANG LINE

15' RY. SETBACK LINE

8@9'-72'-0"

SNOW STORAGE AREA

COMPACT CARS

SNOW STORAGE AREA

UNDERGROUND STORMWATER STORAGE TRENCH  
2,100 CF VOLUME  
SEE DWG C8.2 FOR DETAILS

CONTROLLED OUTLET  
C8.1  
GR. = 134.20  
INV. = 131.15  
BOT = 134.20

C8.2  
GR. = 134.20  
INV. = 131.67  
BOT = 134.20

EXIST'G. CONC. SIDEWALK ENTRY.

PRIVATE ENCLOSURE AND REAR STORAGE CONC.

RESIDENTIAL USE:  
15 - Br Units @

RETAIL USE:  
3,770 SF GROSS ST

TOTAL EXPECTED FLD  
(TOTAL FLD IS LESS THAN NOT REQUIRED FOR THIS PROJ)

4 FT. METAL DECORATIVE FENCE ALONG SIDE PROP LINE

162.34'

N 38°06'00" W

162'-4"

11@9'-99'-0"

6@9'-54'-0"

NEW BITUMINOUS CONCRETE PAVEMENT  
2" COMPRESSIVE CRSE  
4" HMA STABIL BASE CRSE  
4" CGA BASE CRSE

SITE LIGHT WALL MTD. TYP.

RESIDENTIAL USE:  
15 - Br Units @

RETAIL USE:  
3,770 SF GROSS ST

TOTAL EXPECTED FLD  
(TOTAL FLD IS LESS THAN NOT REQUIRED FOR THIS PROJ)

S 38°06'00" E

154'-0"

DA 3.  
2,195 SF

DA 1 ROOF  
6,088 SF

EXIST'G. ST. LN  
RIP = 134.30  
INV. = 131.66 (15)  
INV. = 129.99 (24)  
INV. = 128.66 (24)

8'-0"

8'-0"

9'-0"

PROPOSED 6 STORY MIXED USE BUILDING  
BLOCK 624, LOT 12  
AREA 6,088 SF (FOOTPRINT)

3'-0"

5 FT SETBACK LINE

4' HIGH MAS. SCREEN WALL. MATCH BLDG. FRONT FACADE

LIMIT OF CURB AND SWALK IMPROVEMENT

EXIST'G. CONC. S'WALK TO BE REPLACED AS DIRECTED BY CITY ENGINEER. TYP

CONSTRUCT NEW 20' WIDE CONC. DWAY APRON AND

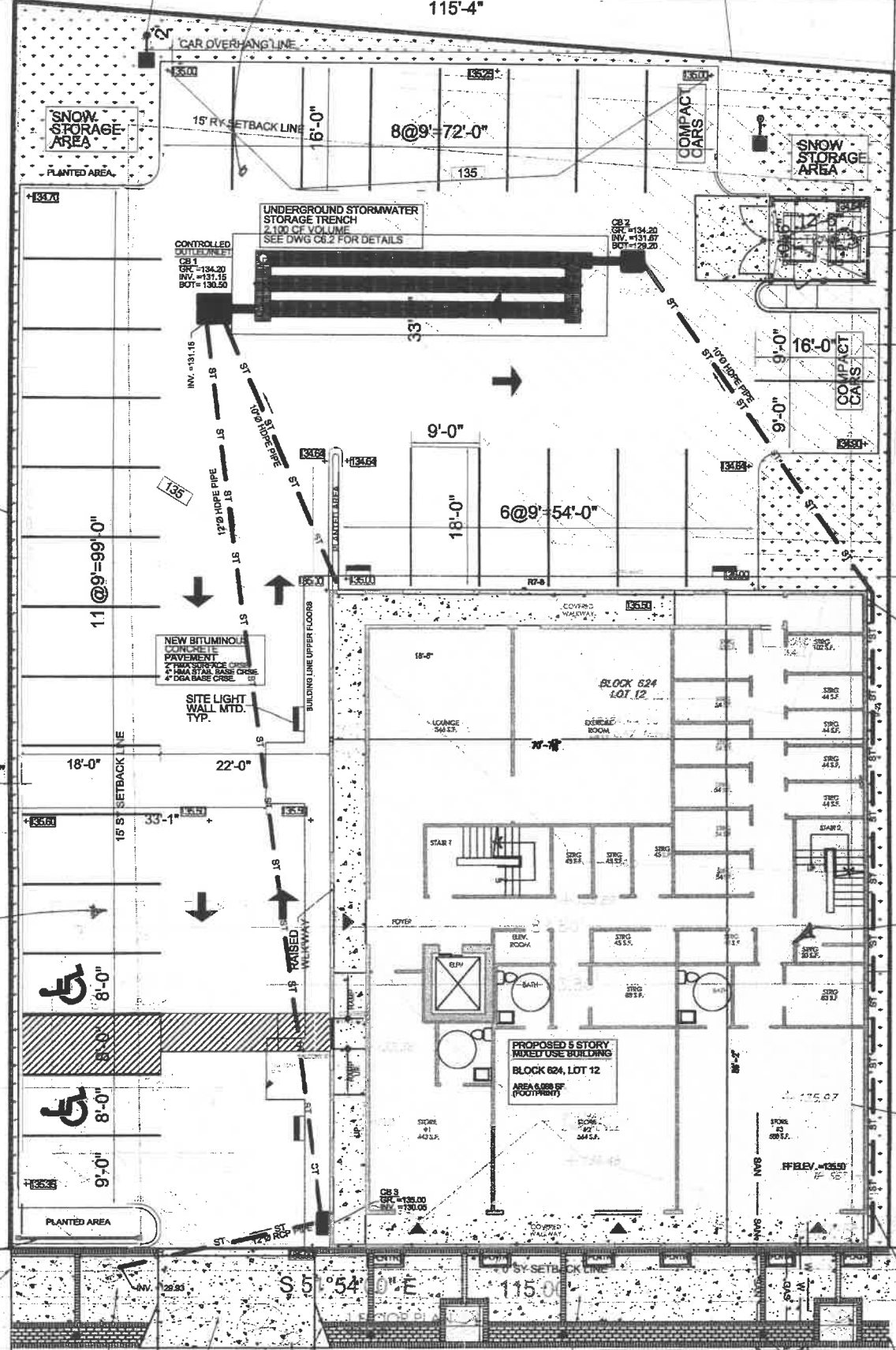
NEW CONC. WALK TO BLDG. LINE TYP.

REMOVE EXIST'G. LIGHT POLE

REMOVE EXIST'G. DWAY APRON AND CONSTRUCT CONC. S'WALK AND GRANITE BLK. CURB TO MATCH EXIST'G.

DECORATIVE POLE MTD. STREET LIGHT TYP.

LIMIT OF CURB AND SWALK IMPROV.



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        Hydrograph No. 3, Combine, <no description>..... 6

        Hydrograph No. 4, Reservoir, <no description>..... 7

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        Hydrograph No. 2, Mod. Rational, DA-2 Connected Parking Lot + Landscaped..... 18

        Hydrograph No. 3, Combine, <no description>..... 19

        Hydrograph No. 4, Reservoir, <no description>..... 20

        Hydrograph No. 5, Rational, DA3 -UNCONNECTED..... 21

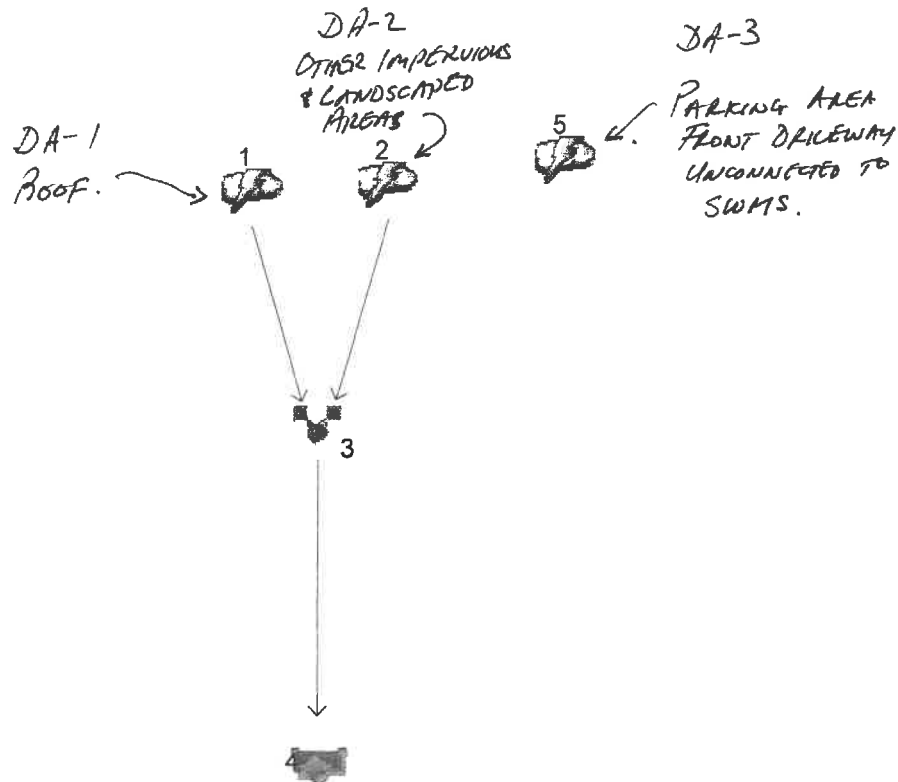
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**CURB AND IMPROVEMENT**

<u>LOT 12</u>	<u>EXISTING</u>	<u>PROPOSED</u>
TOTAL LOT AREA sf. (%)	18,184 (100%)	18,184 (100%)
AREA OF PROPERTY COVERED BY BUILDINGS sf. (impervious)	381 (2.1%)	6,088 (33.5%)
AREA OF PROPERTY COVERED BY PARKING, WALKS, D'WAYS, COMPACTED GRAVEL/STONE, PAVED SURFACES, sf. (impervious)	17,803 (97.9%)	10,322 (56.8%)
AREA OF PROPERTY COVERED BY PLANTING, LANDSCAPING, sf. (PERVIOUS SURFACES)	-	1,774 (9.7%)

# Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10



### Legend

Hyd. Origin	Description
1	Mod. Rational DA-1 Connected Roof
2	Mod. Rational DA-2 Connected Parking Lot + Landscaped
3	Combine <no description>
4	Reservoir <no description>
5	Rational DA3 -UNCONNECTED

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Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Mod. Rational	---	---	0.267	---	---	0.357	---	---	0.534	DA-1 Connected Roof
2	Mod. Rational	---	---	0.359	---	---	0.529	---	---	0.747	DA-2 Connected Parking Lot + Lands
3	Combine	1, 2	---	0.626	---	---	0.886	---	---	1.281	<no description>
4	Reservoir	3	---	0.008	---	---	0.012	---	---	0.373	<no description>
5	Rational	---	---	0.156	---	---	0.202	---	---	0.276	DA3 -UNCONNECTED

# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Mod. Rational	0.267	1	10	482	---	---	---	DA-1 Connected Roof
2	Mod. Rational	0.359	1	10	692	---	---	---	DA-2 Connected Parking Lot + Lands
3	Combine	0.626	1	10	1,170	1, 2	---	---	<no description>
4	Reservoir	0.008	1	42	363	3	131.65	1,164	<no description>
5	Rational	0.156	1	10	141	---	---	---	DA3 -UNCONNECTED



# Hydrograph Report

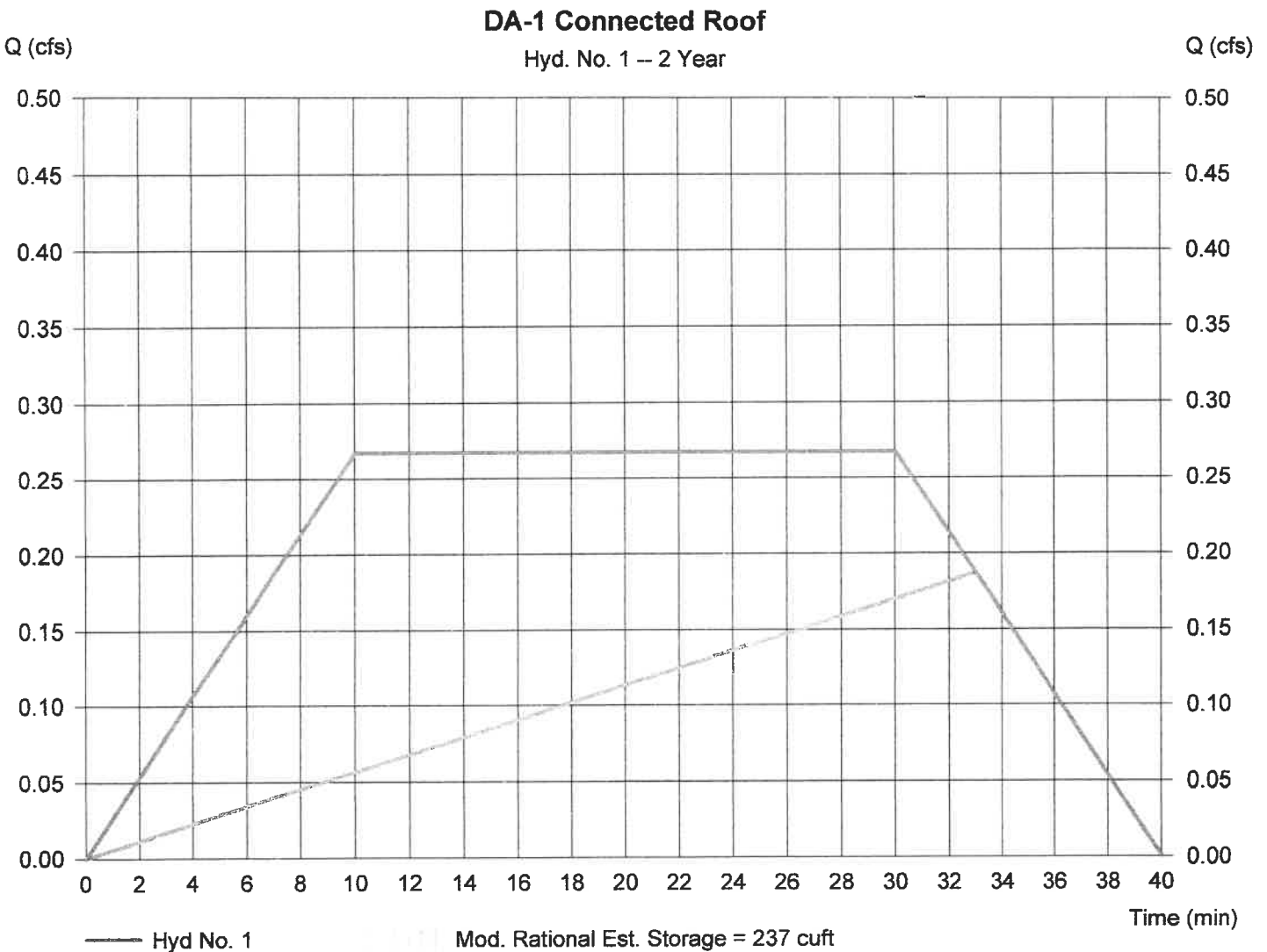
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

Thursday, 09 / 26 / 2019

## Hyd. No. 1

### DA-1 Connected Roof

Hydrograph type	= Mod. Rational	Peak discharge	= 0.267 cfs
Storm frequency	= 2 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 482 cuft
Drainage area	= 0.141 ac	Runoff coeff.	= 0.87
Intensity	= 2.175 in/hr	Tc by User	= 10.00 min
IDF Curve	= plainfield.IDF	Storm duration	= 3.0 x Tc
Target Q	= 0.200 cfs	Est. Req'd Storage	= 237 cuft

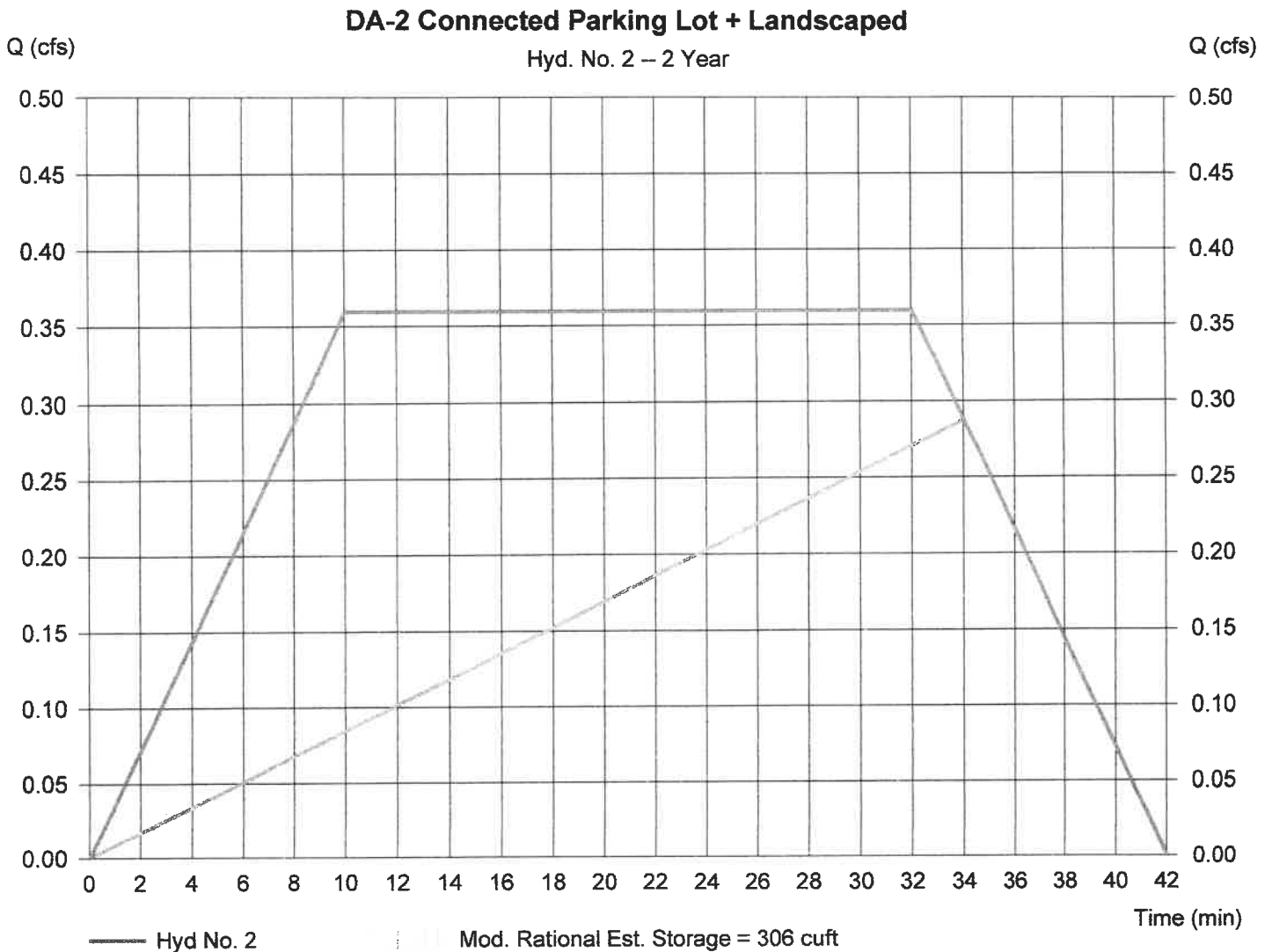


# Hydrograph Report

## Hyd. No. 2

### DA-2 Connected Parking Lot + Landscaped

Hydrograph type	= Mod. Rational	Peak discharge	= 0.359 cfs
Storm frequency	= 2 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 692 cuft
Drainage area	= 0.229 ac	Runoff coeff.	= 0.75
Intensity	= 2.091 in/hr	Tc by User	= 10.00 min
IDF Curve	= plainfield.IDF	Storm duration	= 3.2 x Tc
Target Q	=0.300 cfs	Est. Req'd Storage	=306 cuft



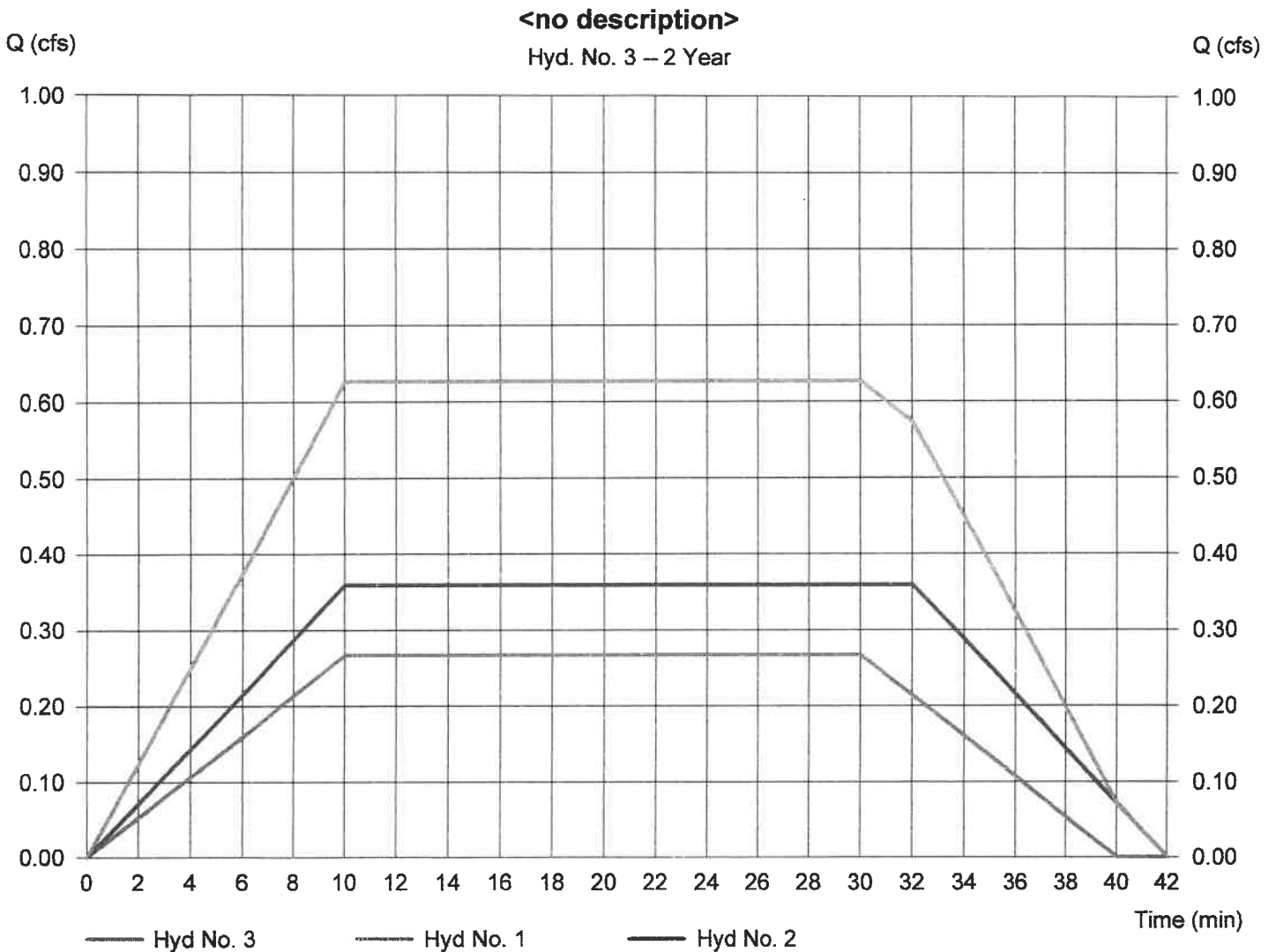
# Hydrograph Report

## Hyd. No. 3

<no description>

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Time interval = 1 min  
Inflow hyds. = 1, 2

Peak discharge = 0.626 cfs  
Time to peak = 10 min  
Hyd. volume = 1,170 cuft  
Contrib. drain. area = 0.370 ac



# Hydrograph Report

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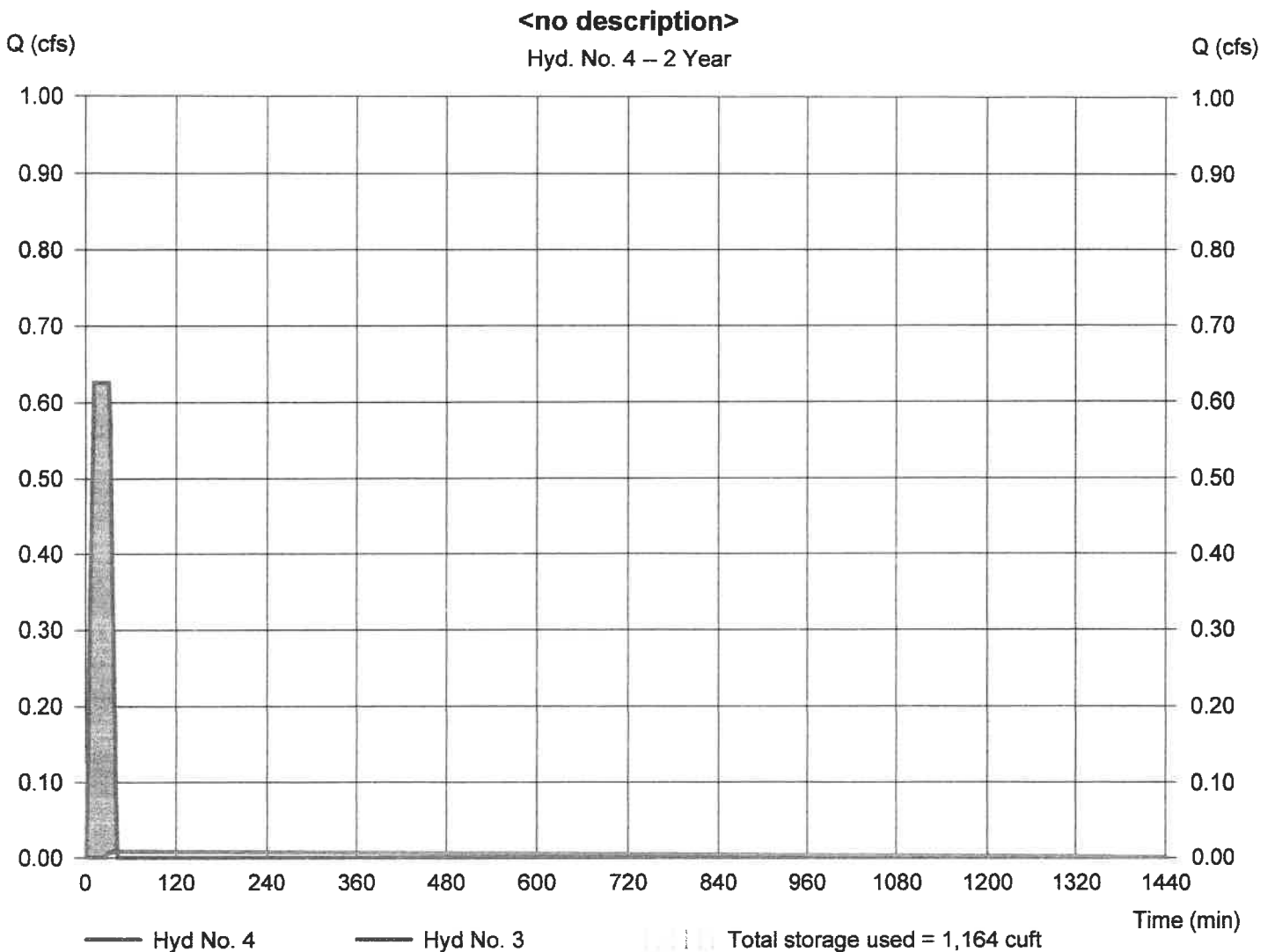
Thursday, 09 / 26 / 2019

## Hyd. No. 4

<no description>

Hydrograph type	= Reservoir	Peak discharge	= 0.008 cfs
Storm frequency	= 2 yrs	Time to peak	= 42 min
Time interval	= 1 min	Hyd. volume	= 363 cuft
Inflow hyd. No.	= 3 - <no description>	Max. Elevation	= 131.65 ft
Reservoir name	= REV-UG-BED w/P 24IN. PIPE	Max. Storage	= 1,164 cuft

Storage Indication method used.



# Pond Report

## Pond No. 3 - REV-UG-BED w/P 24IN. PIPE -2 BAR

### Pond Data

UG Chambers -Invert elev. = 130.50 ft, Rise x Span = 2.00 x 2.00 ft, Barrel Len = 40.00 ft, No. Barrels = 3, Slope = 0.00%, Headers = No  
 Encasement -Invert elev. = 130.00 ft, Width = 13.00 ft, Height = 3.00 ft, Voids = 40.00%

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	130.00	n/a	0	0
0.30	130.30	n/a	187	187
0.60	130.60	n/a	192	378
0.90	130.90	n/a	215	594
1.20	131.20	n/a	226	819
1.50	131.50	n/a	230	1,049
1.80	131.80	n/a	230	1,279
2.10	132.10	n/a	226	1,505
2.40	132.40	n/a	215	1,720
2.70	132.70	n/a	192	1,912
3.00	133.00	n/a	187	2,099

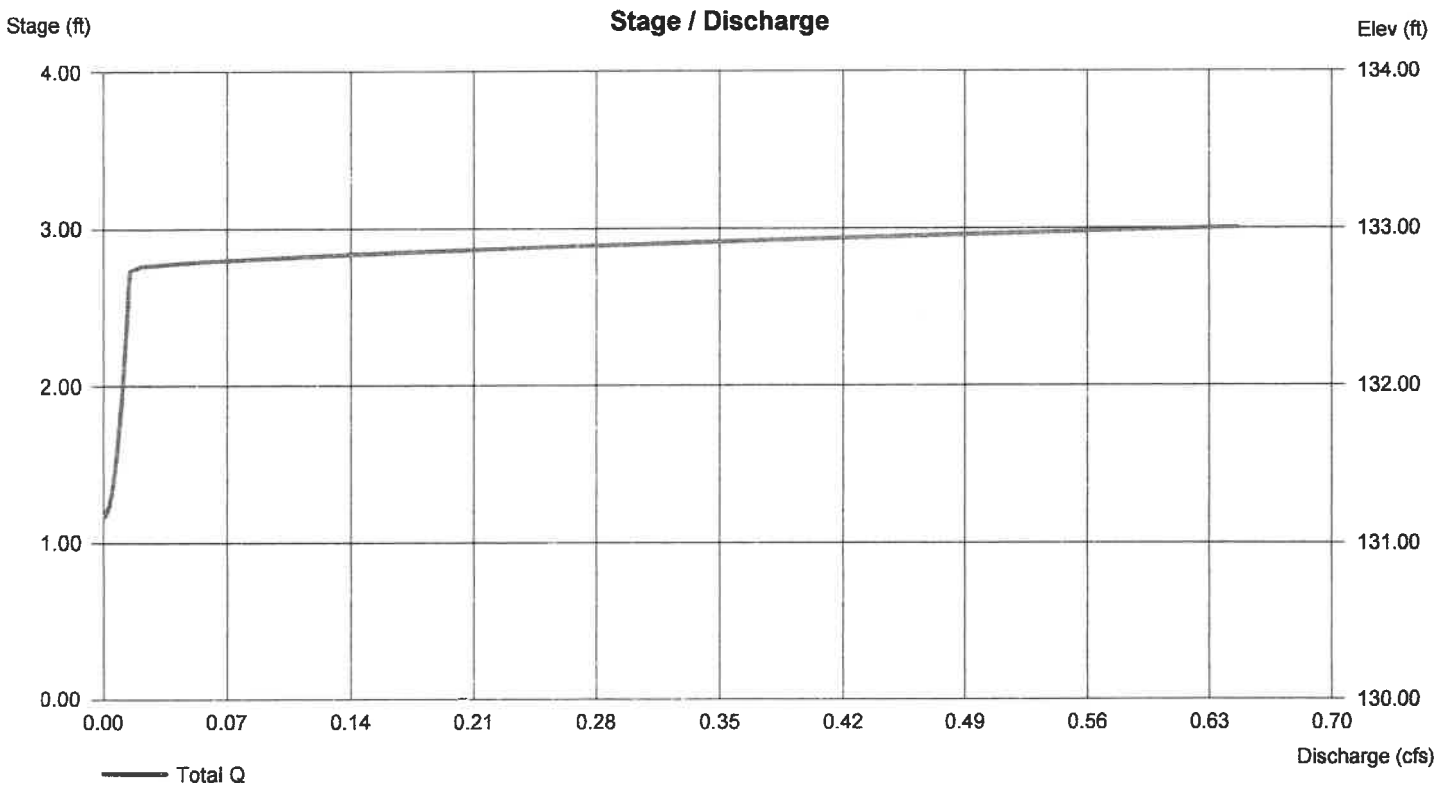
### Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.67	0.00	0.00	0.00
Span (in)	= 0.67	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 131.15	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 1.50	0.00	0.00	0.00
Crest El. (ft)	= 132.75	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (ic).

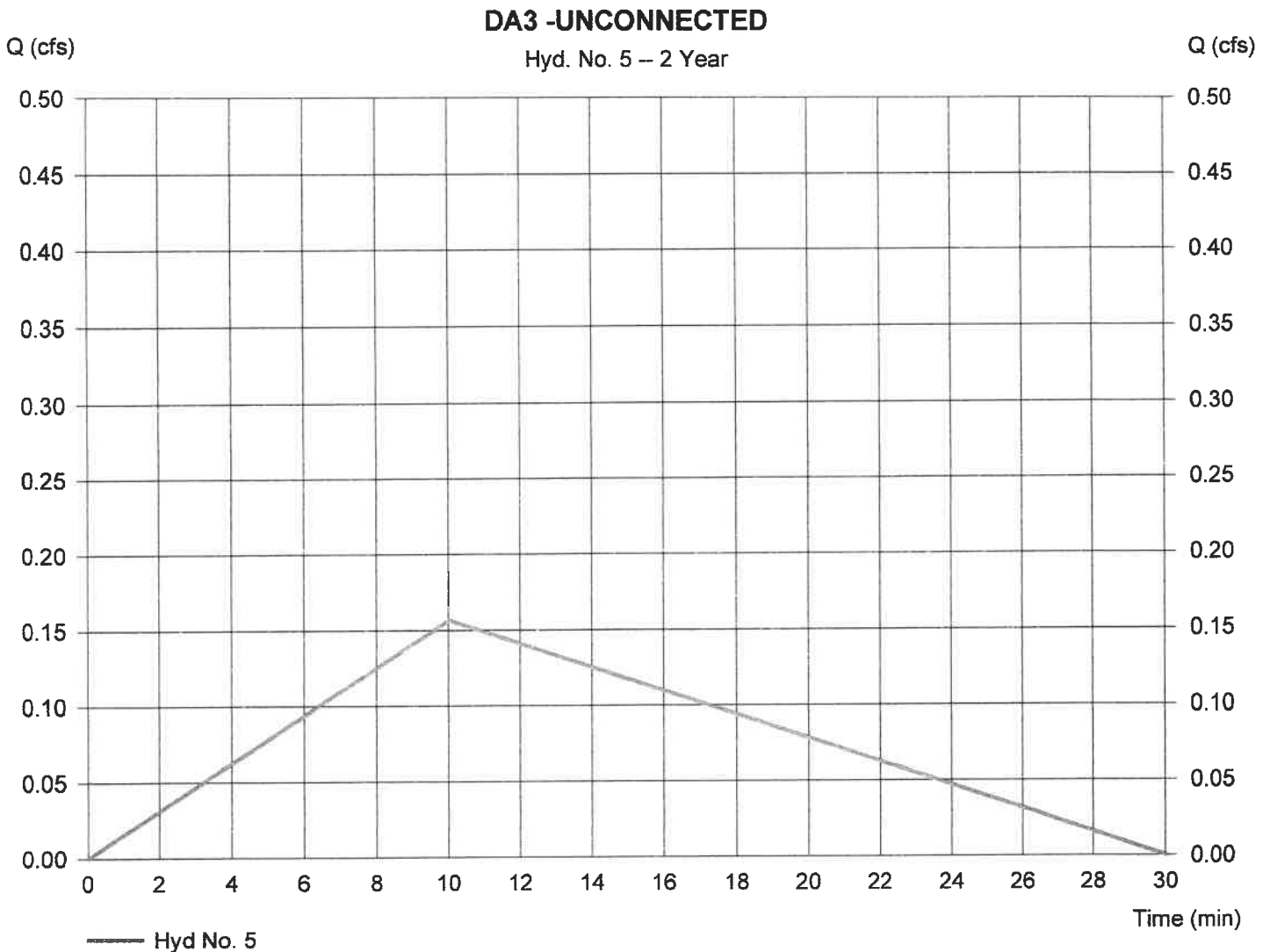


# Hydrograph Report

## Hyd. No. 5

### DA3 -UNCONNECTED

Hydrograph type	= Rational	Peak discharge	= 0.156 cfs
Storm frequency	= 2 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 141 cuft
Drainage area	= 0.049 ac	Runoff coeff.	= 0.84
Intensity	= 3.800 in/hr	Tc by User	= 10.00 min
IDF Curve	= plainfield.IDF	Asc/Rec limb fact	= 1/2



# Hydrograph Summary Report

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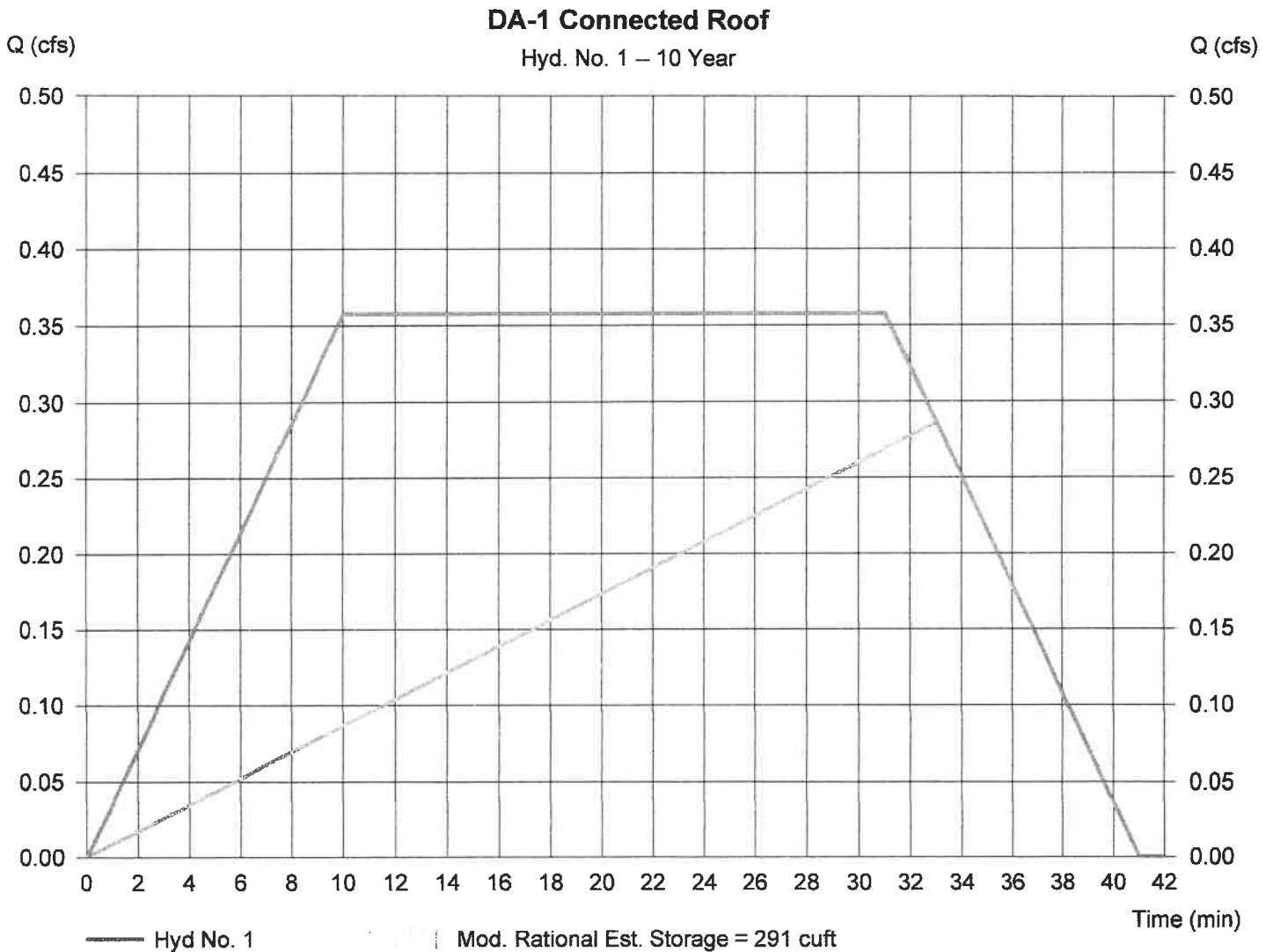
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Mod. Rational	0.357	1	10	667	---	---	---	DA-1 Connected Roof
2	Mod. Rational	0.529	1	10	891	---	---	---	DA-2 Connected Parking Lot + Lands
3	Combine	0.886	1	10	1,553	1, 2	---	---	<no description>
4	Reservoir	0.012	1	41	746	3	132.15	1,541	<no description>
5	Rational	0.202	1	10	181	---	---	---	DA3 -UNCONNECTED

# Hydrograph Report

## Hyd. No. 1

### DA-1 Connected Roof

Hydrograph type	= Mod. Rational	Peak discharge	= 0.357 cfs
Storm frequency	= 10 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 667 cuft
Drainage area	= 0.141 ac	Runoff coeff.	= 0.87
Intensity	= 2.913 in/hr	Tc by User	= 10.00 min
IDF Curve	= plainfield.IDF	Storm duration	= 3.1 x Tc
Target Q	=0.300 cfs	Est. Req'd Storage	=291 cuft



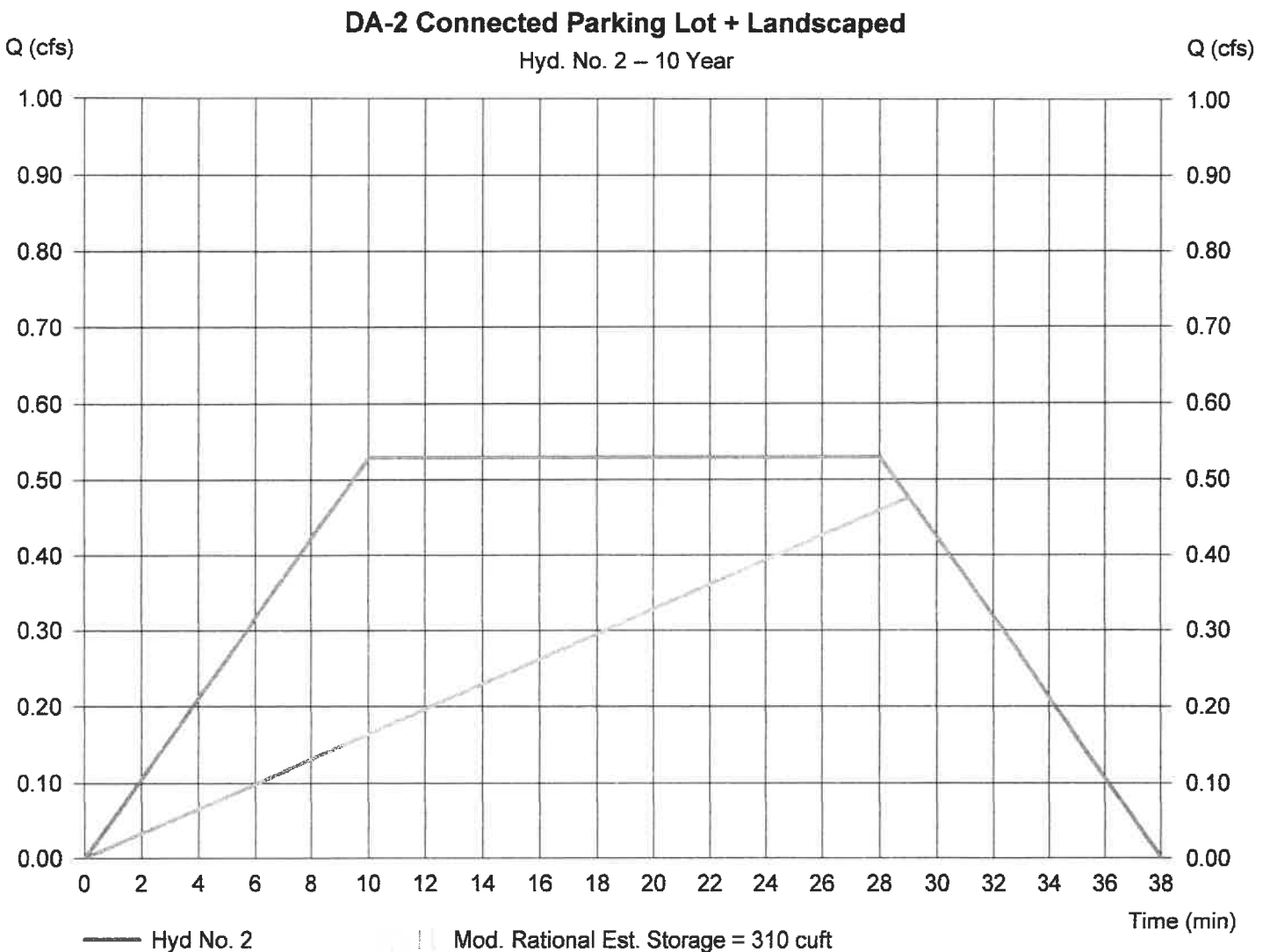


# Hydrograph Report

## Hyd. No. 2

### DA-2 Connected Parking Lot + Landscaped

Hydrograph type	= Mod. Rational	Peak discharge	= 0.529 cfs
Storm frequency	= 10 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 891 cuft
Drainage area	= 0.229 ac	Runoff coeff.	= 0.75
Intensity	= 3.077 in/hr	Tc by User	= 10.00 min
IDF Curve	= plainfield.IDF	Storm duration	= 2.8 x Tc
Target Q	=0.500 cfs	Est. Req'd Storage	=310 cuft

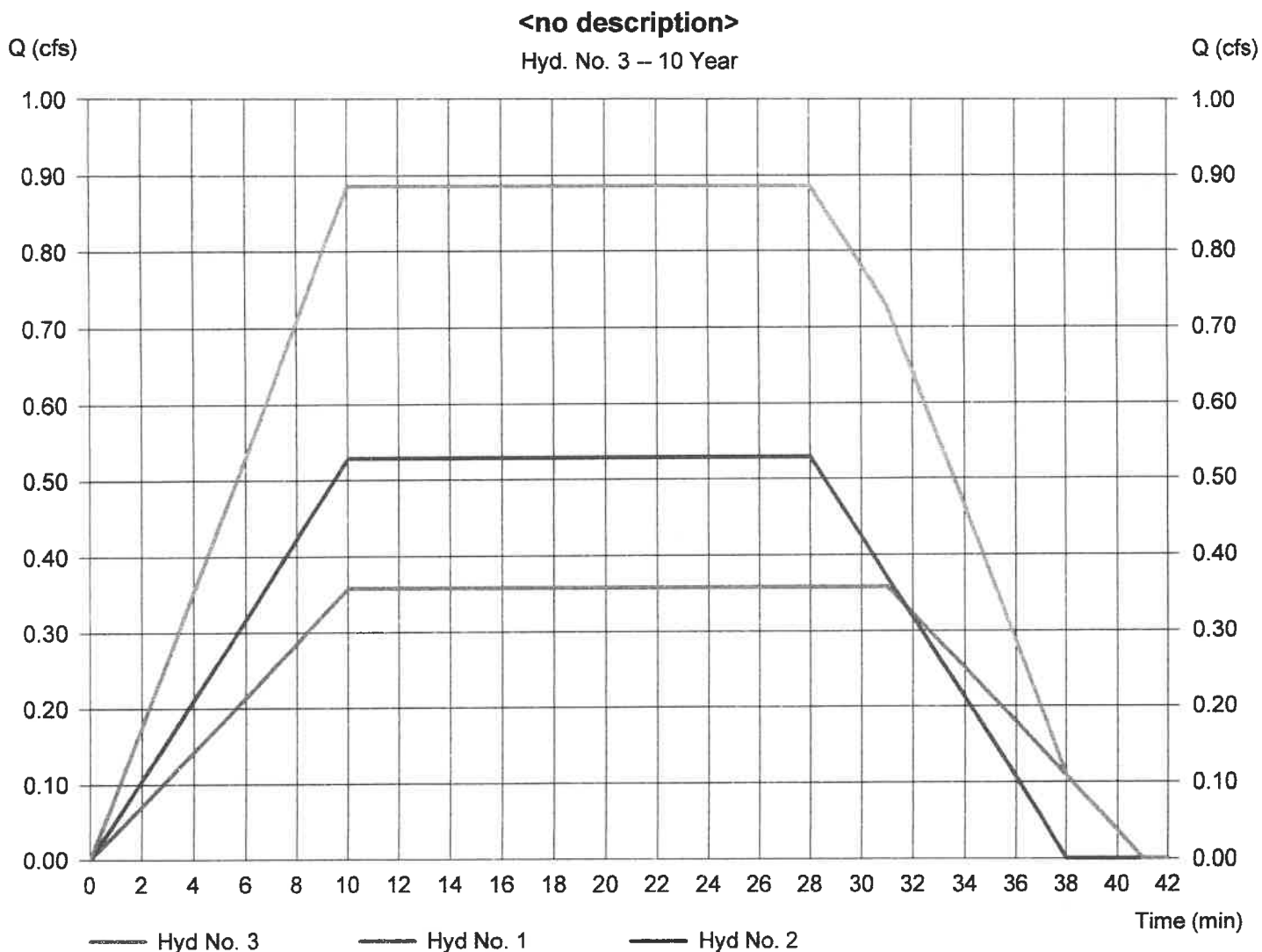


# Hydrograph Report

## Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 0.886 cfs
Storm frequency	= 10 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,553 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.370 ac



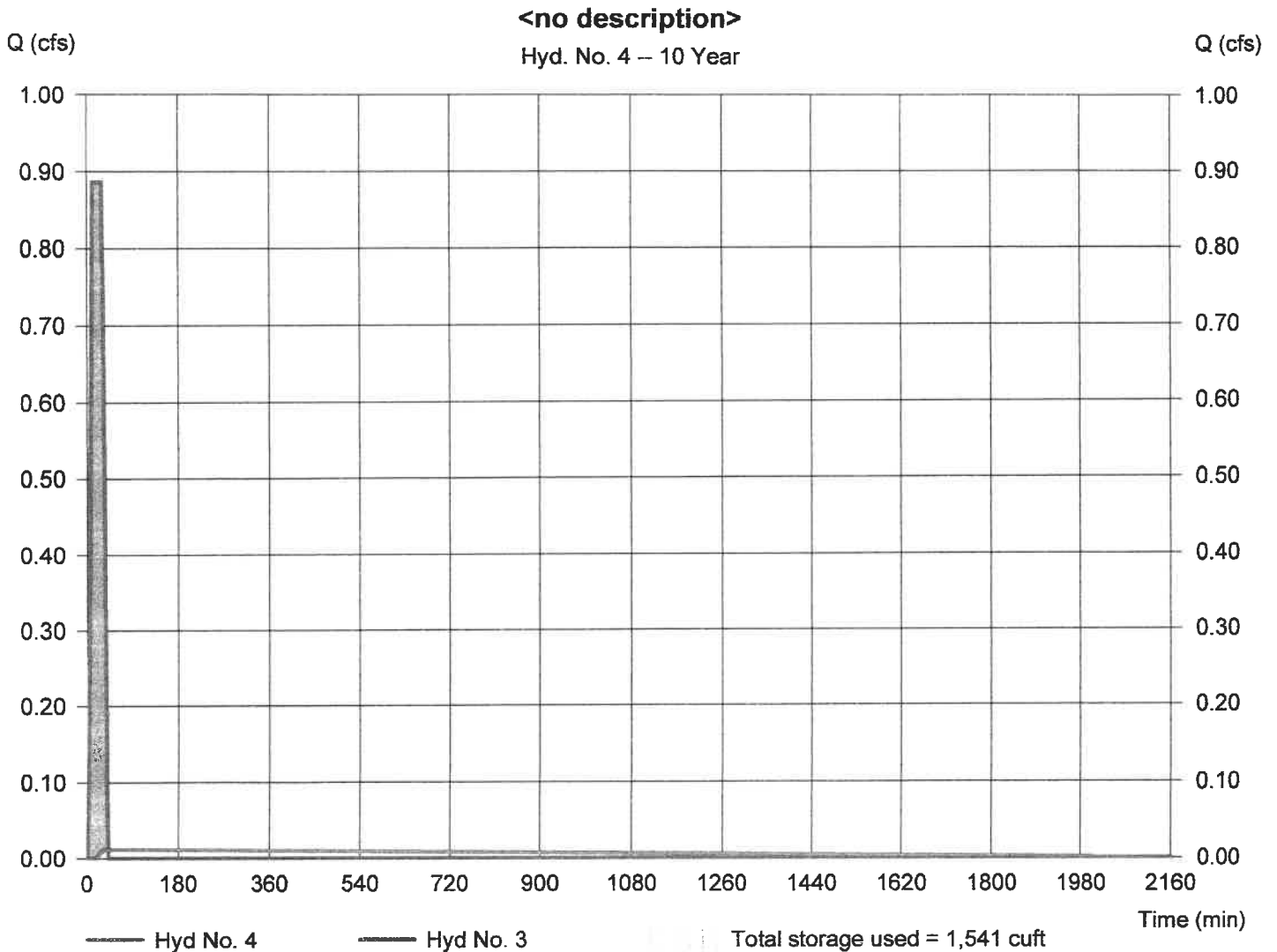
# Hydrograph Report

## Hyd. No. 4

<no description>

Hydrograph type	= Reservoir	Peak discharge	= 0.012 cfs
Storm frequency	= 10 yrs	Time to peak	= 41 min
Time interval	= 1 min	Hyd. volume	= 746 cuft
Inflow hyd. No.	= 3 - <no description>	Max. Elevation	= 132.15 ft
Reservoir name	= REV-UG-BED w/P 24IN. PIPE MANHOLE	Max. Storage	= 1,541 cuft

Storage Indication method used.

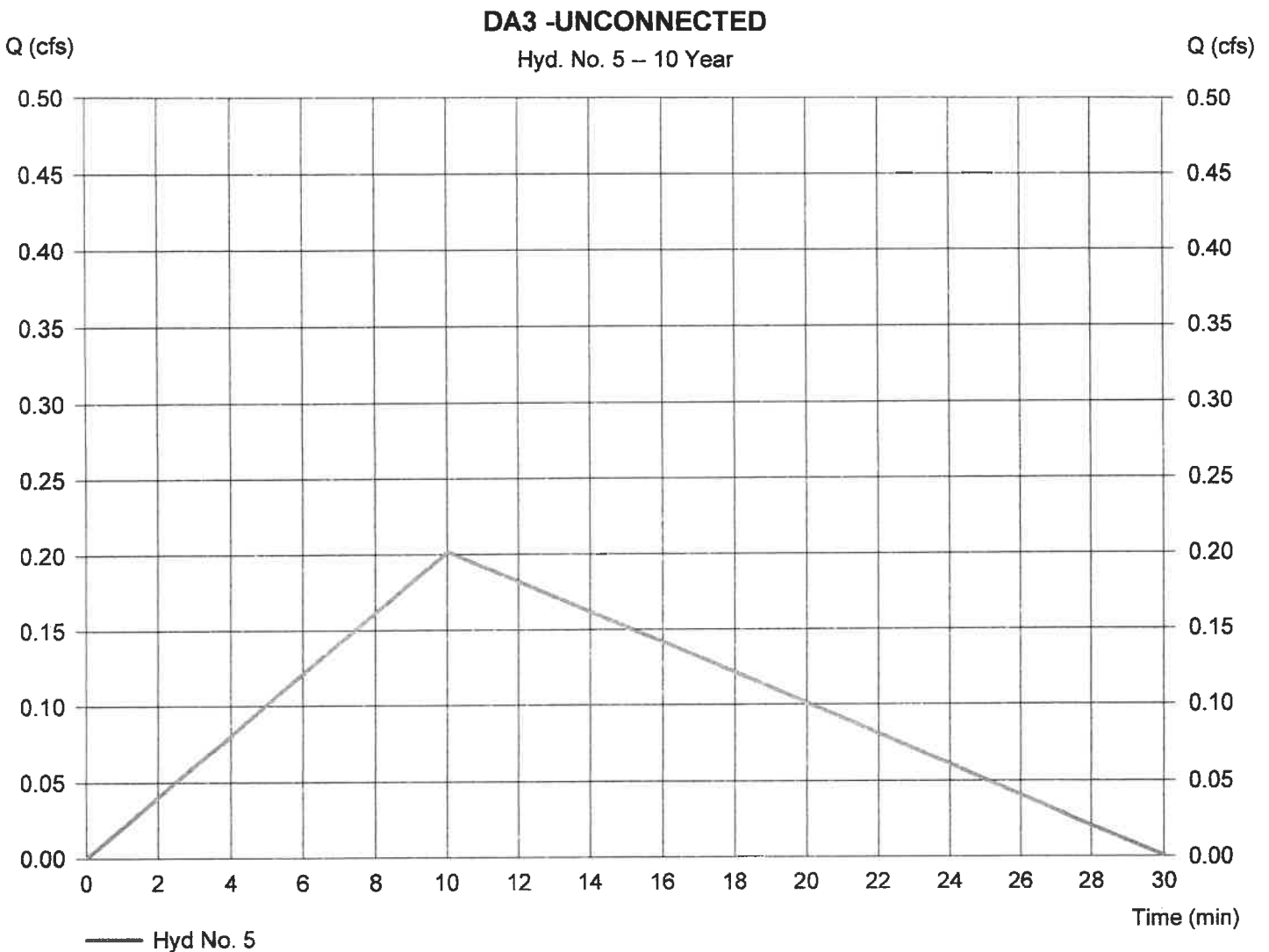


# Hydrograph Report

## Hyd. No. 5

### DA3 -UNCONNECTED

Hydrograph type	= Rational	Peak discharge	= 0.202 cfs
Storm frequency	= 10 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 181 cuft
Drainage area	= 0.049 ac	Runoff coeff.	= 0.84
Intensity	= 4.899 in/hr	Tc by User	= 10.00 min
IDF Curve	= plainfield.IDF	Asc/Rec limb fact	= 1/2



# Hydrograph Summary Report

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Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Mod. Rational	0.534	1	10	900	---	---	---	DA-1 Connected Roof
2	Mod. Rational	0.747	1	10	1,260	---	---	---	DA-2 Connected Parking Lot + Lands
3	Combine	1.281	1	10	2,152	1, 2	---	---	<no description>
4	Reservoir	0.373	1	35	1,345	3	132.92	2,049	<no description>
5	Rational	0.276	1	10	249	---	---	---	DA3 -UNCONNECTED

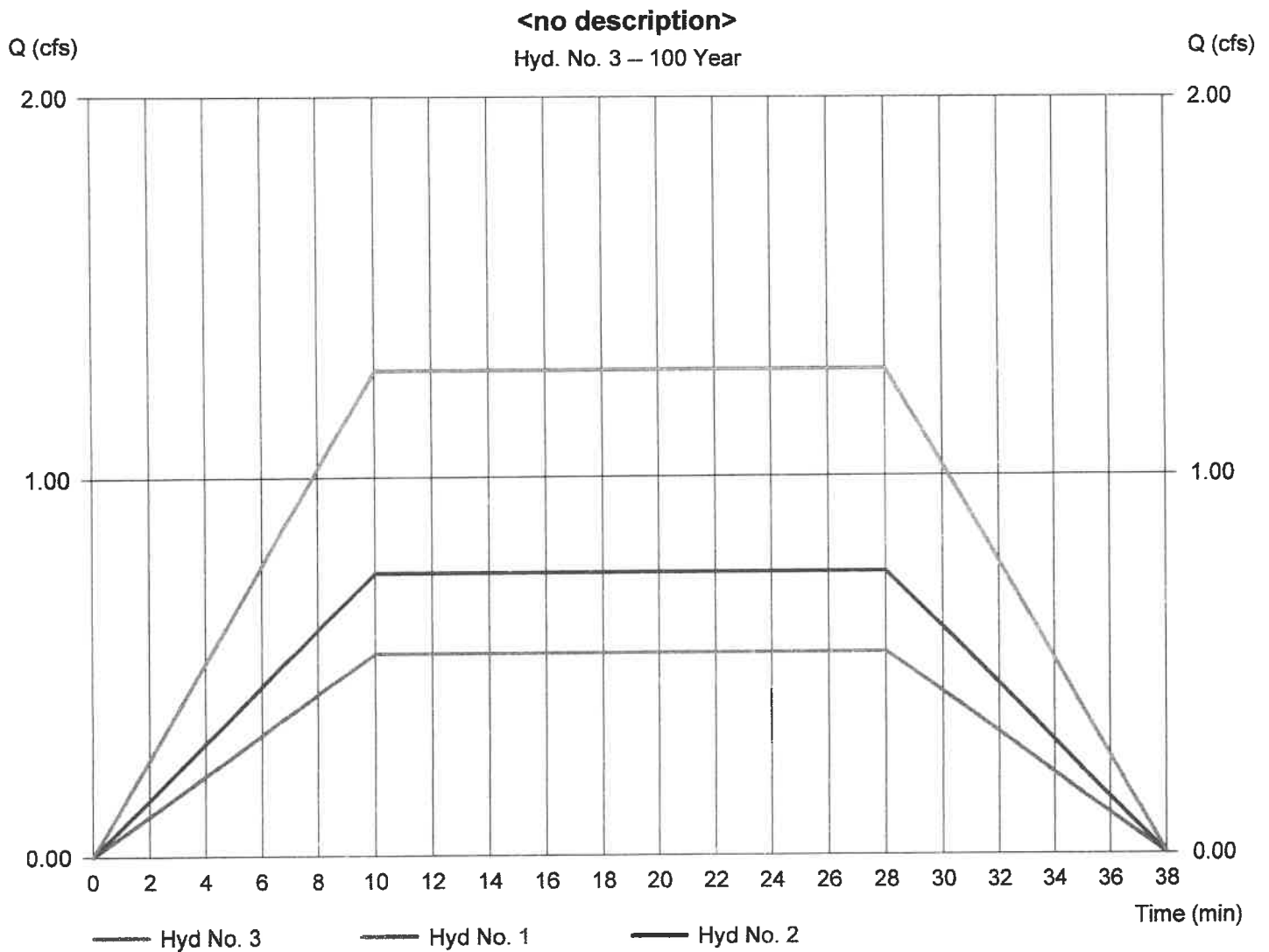
# Hydrograph Report

## Hyd. No. 3

<no description>

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Time interval = 1 min  
Inflow hyds. = 1, 2

Peak discharge = 1.281 cfs  
Time to peak = 10 min  
Hyd. volume = 2,152 cuft  
Contrib. drain. area = 0.370 ac

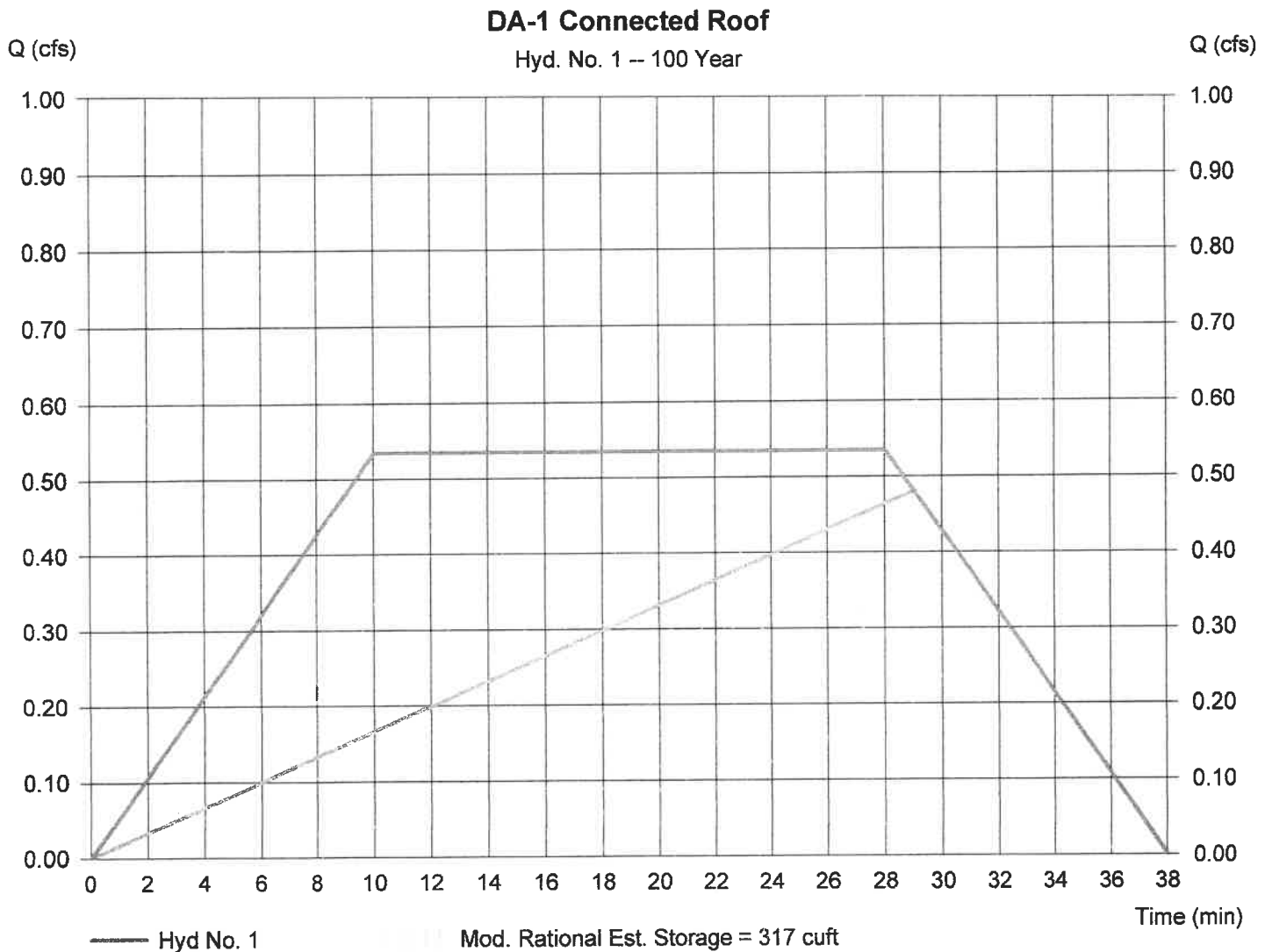


# Hydrograph Report

## Hyd. No. 1

### DA-1 Connected Roof

Hydrograph type	= Mod. Rational	Peak discharge	= 0.534 cfs
Storm frequency	= 100 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 900 cuft
Drainage area	= 0.141 ac	Runoff coeff.	= 0.87
Intensity	= 4.351 in/hr	Tc by User	= 10.00 min
IDF Curve	= plainfield.IDF	Storm duration	= 2.8 x Tc
Target Q	=0.500 cfs	Est. Req'd Storage	=317 cuft

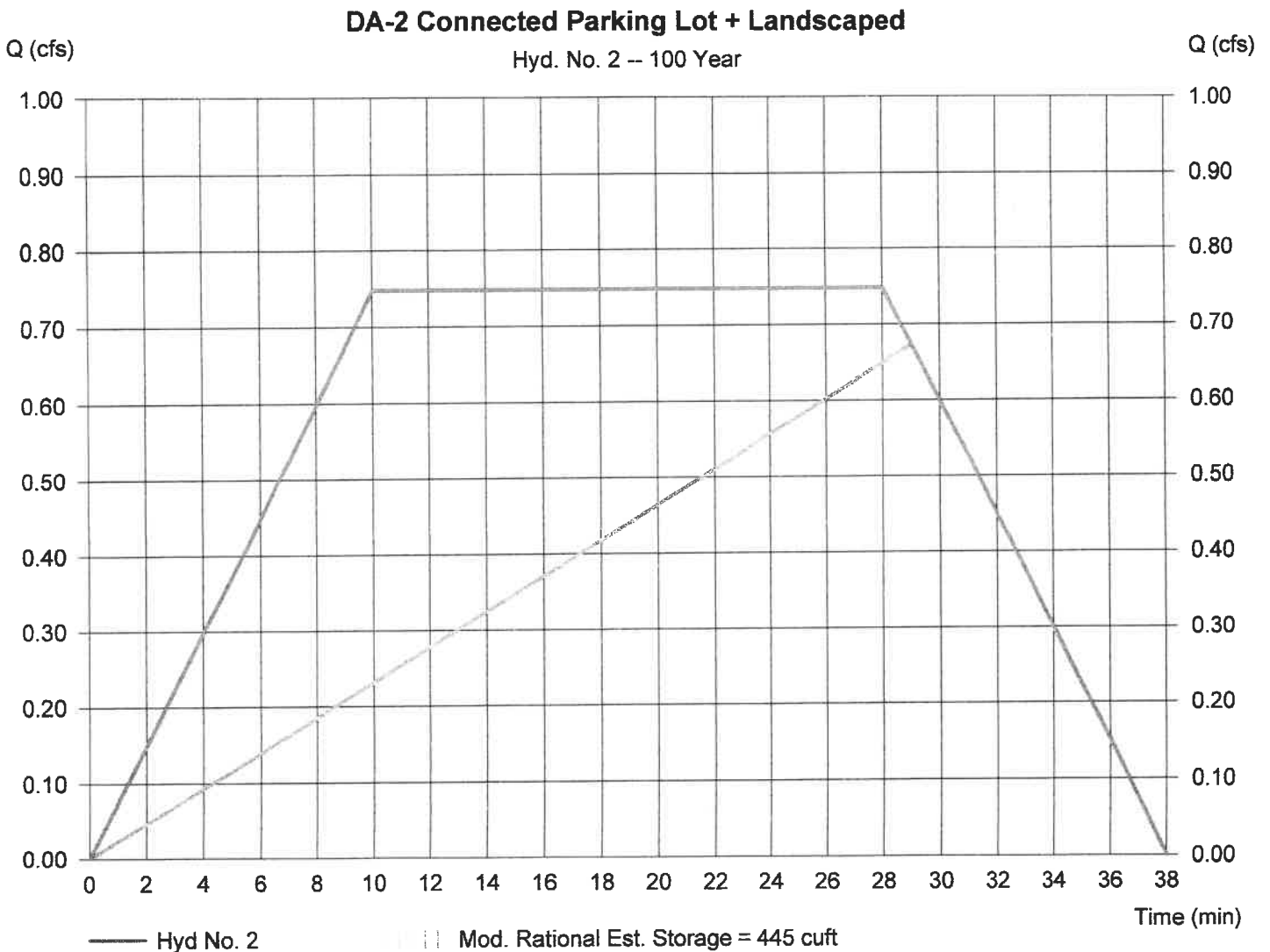


# Hydrograph Report

## Hyd. No. 2

### DA-2 Connected Parking Lot + Landscaped

Hydrograph type	= Mod. Rational	Peak discharge	= 0.747 cfs
Storm frequency	= 100 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,260 cuft
Drainage area	= 0.229 ac	Runoff coeff.	= 0.75
Intensity	= 4.351 in/hr	Tc by User	= 10.00 min
IDF Curve	= plainfield.IDF	Storm duration	= 2.8 x Tc
Target Q	=0.700 cfs	Est. Req'd Storage	=445 cuft





# Hydrograph Report

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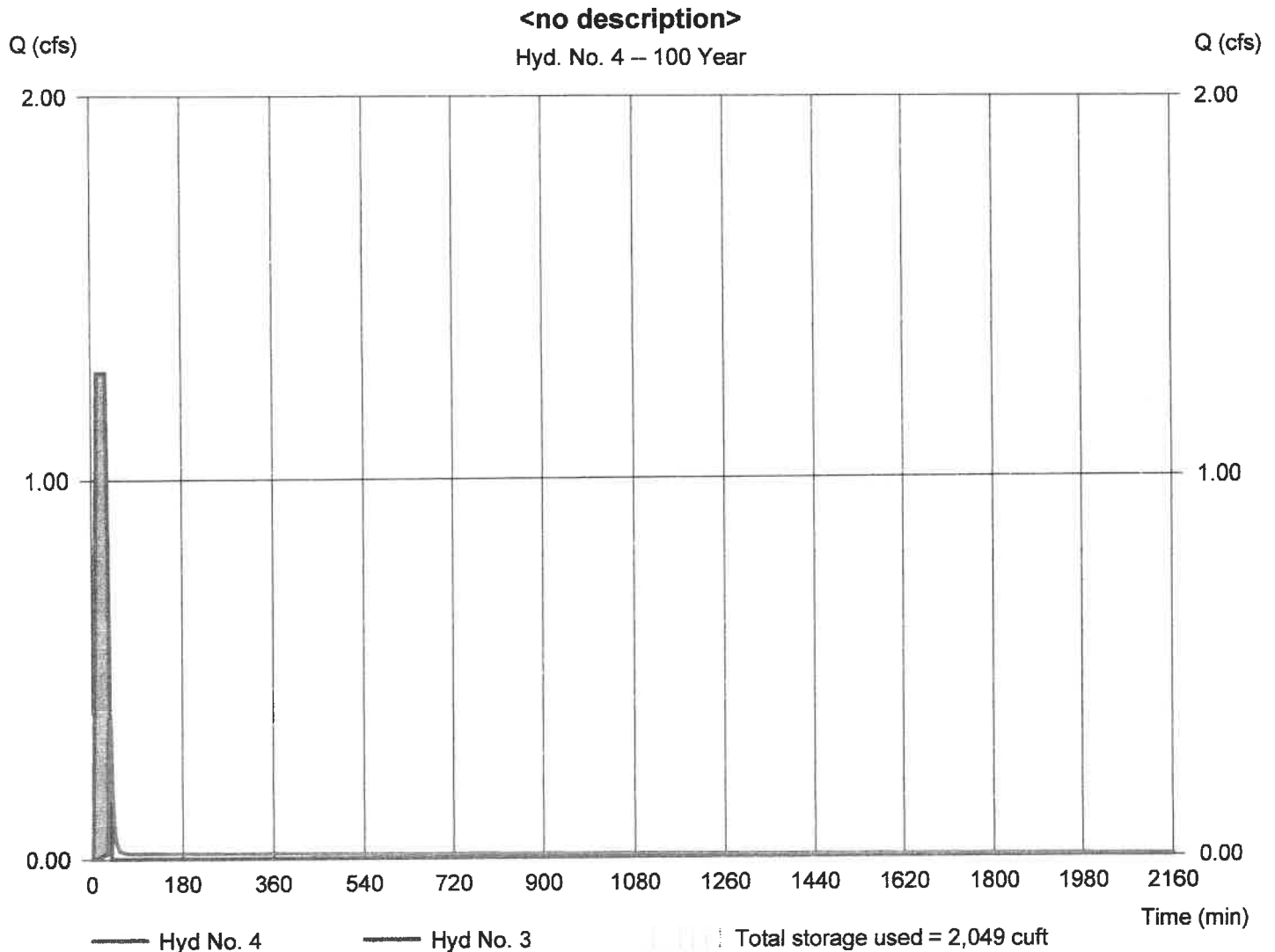
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## Hyd. No. 4

<no description>

Hydrograph type	= Reservoir	Peak discharge	= 0.373 cfs
Storm frequency	= 100 yrs	Time to peak	= 35 min
Time interval	= 1 min	Hyd. volume	= 1,345 cuft
Inflow hyd. No.	= 3 - <no description>	Max. Elevation	= 132.92 ft
Reservoir name	= REV-UG-BED w/P 24IN. PIPE	Max Storage	= 2,049 cuft

Storage Indication method used.



# Hydrograph Report

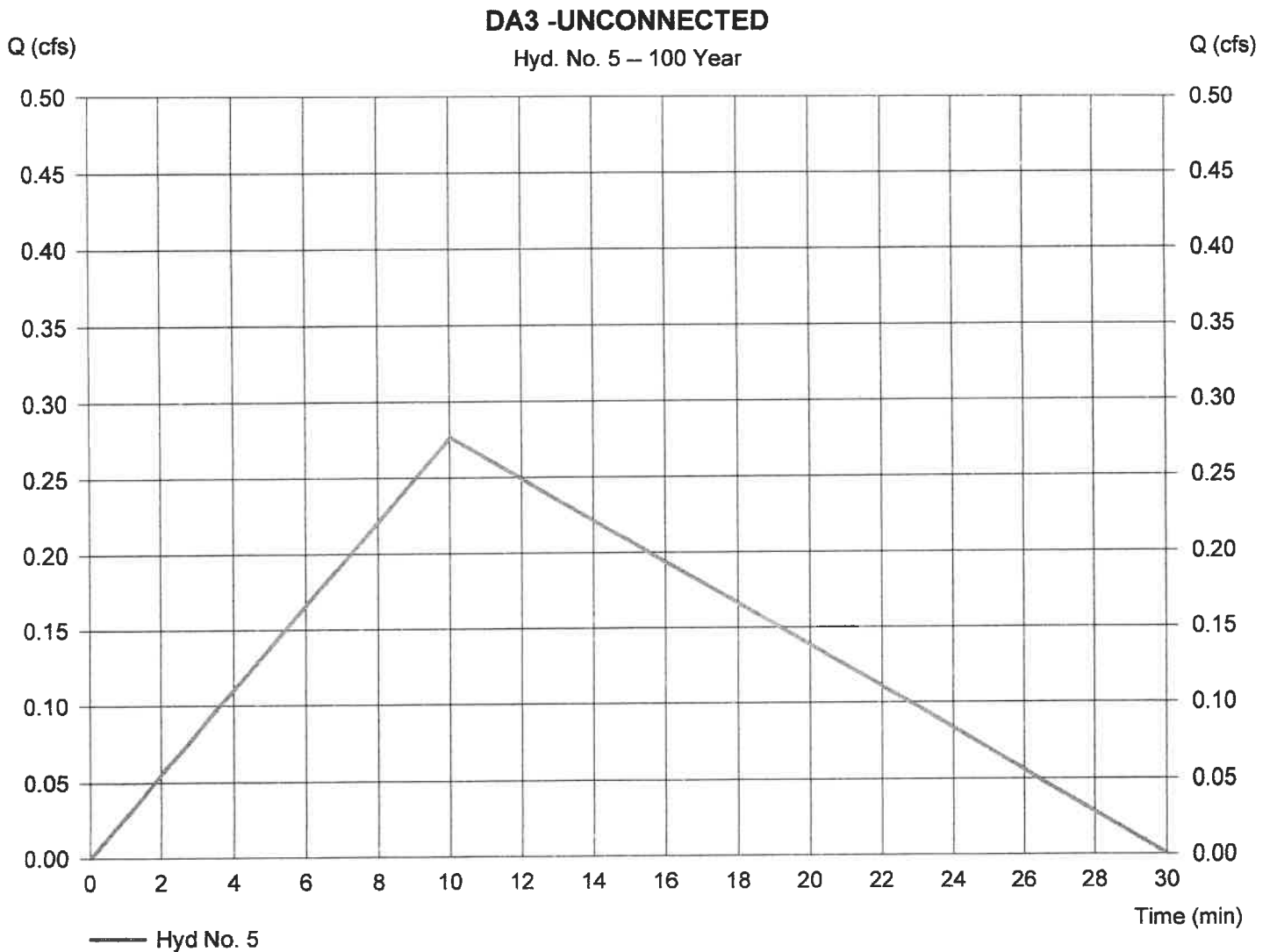
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## Hyd. No. 5

### DA3 -UNCONNECTED

Hydrograph type	= Rational	Peak discharge	= 0.276 cfs
Storm frequency	= 100 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 249 cuft
Drainage area	= 0.049 ac	Runoff coeff.	= 0.84
Intensity	= 6.715 in/hr	Tc by User	= 10.00 min
IDF Curve	= plainfield.IDF	Asc/Rec limb fact	= 1/2



# Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. v10

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Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	----
2	42.5528	10.1000	0.8051	----
3	0.0000	0.0000	0.0000	----
5	41.4981	10.0000	0.7469	----
10	43.0461	10.1000	0.7242	----
25	46.4435	10.2000	0.7035	----
50	49.5355	10.3000	0.6923	----
100	52.7428	10.4000	0.6835	----

File name: plainfield.IDF

**Intensity = B / (Tc + D)^E**

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	4.78	3.80	3.18	2.75	2.43	2.18	1.98	1.82	1.69	1.57	1.48	1.39
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	5.49	4.43	3.75	3.27	2.92	2.64	2.42	2.23	2.08	1.95	1.84	1.74
10	6.03	4.90	4.17	3.66	3.27	2.97	2.73	2.53	2.36	2.22	2.09	1.98
25	6.85	5.61	4.80	4.22	3.79	3.45	3.18	2.95	2.76	2.60	2.46	2.33
50	7.49	6.16	5.29	4.67	4.20	3.83	3.54	3.29	3.08	2.90	2.74	2.61
100	8.14	6.72	5.78	5.11	4.61	4.21	3.89	3.62	3.39	3.20	3.03	2.88

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	2.20	0.00	3.30	4.25	5.77	6.80	7.95
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10