



**Bates &
Associates, Inc.**

Civil Engineering · Land Surveying · Landscape Architecture

91 W. Colt Square Dr. Suite 3 / Fayetteville, AR 72703
PH: 479-442-9350 * FAX: 479-521-9350

DRAINAGE REPORT

FOR

MEMCO

BA No. 13-352

**CORNER OF EMMA AND HUNTSVILLE
SPRINGDALE, ARKANSAS**

FEBRUARY 19, 2014

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PROJECT OWNER:

MEMCO Safety
296 Carlton Road
Hollister, MO 65672

PROJECT LOCATION:

This project is located on the NW corner of Emma Avenue and Huntsville Road. See the attached vicinity map for a more detailed location.

PROJECT DESCRIPTION:

The existing site is approximately 4.7 acres and is an undeveloped grass covered industrial lot. The proposed improvements to the site are to add a warehouse & parking lot. See the site plan for details.

SITE DRAINAGE:

This project is a small part of a large basin that flows into Spring Creek, thence into Osage Creek and finally into the Illinois River. Currently the site is undeveloped and is a grass covered industrial lot. The majority of the runoff sheet flows to the west into a small swale that directs the runoff to Emma and a smaller portion sheet flows to the east onto Huntsville Avenue.

The soil type for the drainage basin found on the Washington County Arkansas Soil Survey is Taloka Complex which is in Hydrologic Soil Group D. Group D soils have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (0-0.05 in/hr).

This property is not located inside the 100-year flood plain as shown by the National Flood Insurance Program's Flood Insurance Rate Map for Washington County, Arkansas (Map No. 05143C0090 F, May 16, 2008).

AREA DRAINAGE PROBLEMS:

We are aware that Spring Creek may have some drainage issues downstream of this property.

DRAINAGE DESIGN:

A runoff curve number for the onsite drainage area was computed for each basin, based on the soil classification, ground cover, and the development in the area. The curve numbers were selected from the Springdale Drainage Manual for pre-development and post-development conditions. See the attached report for composite curve number calculations and see the drainage area map for locations.

Composite calculated curve numbers (HSG D):

Open Space - good condition:	80
Impervious area:	98

Pre developed basin 1, 2 & 3: 80

Post developed basin 1: 80

Post developed basin 2: 84

Post developed basin 2a: 93

Post developed basin 3: 83

The 2-year through 100-year frequency storm events for pre- and post- development peak flows were calculated using the drainage program Hydraflow Hydrographs (SCS Method).

SUMMARY OF RUNOFF:

Basin 1 & 3

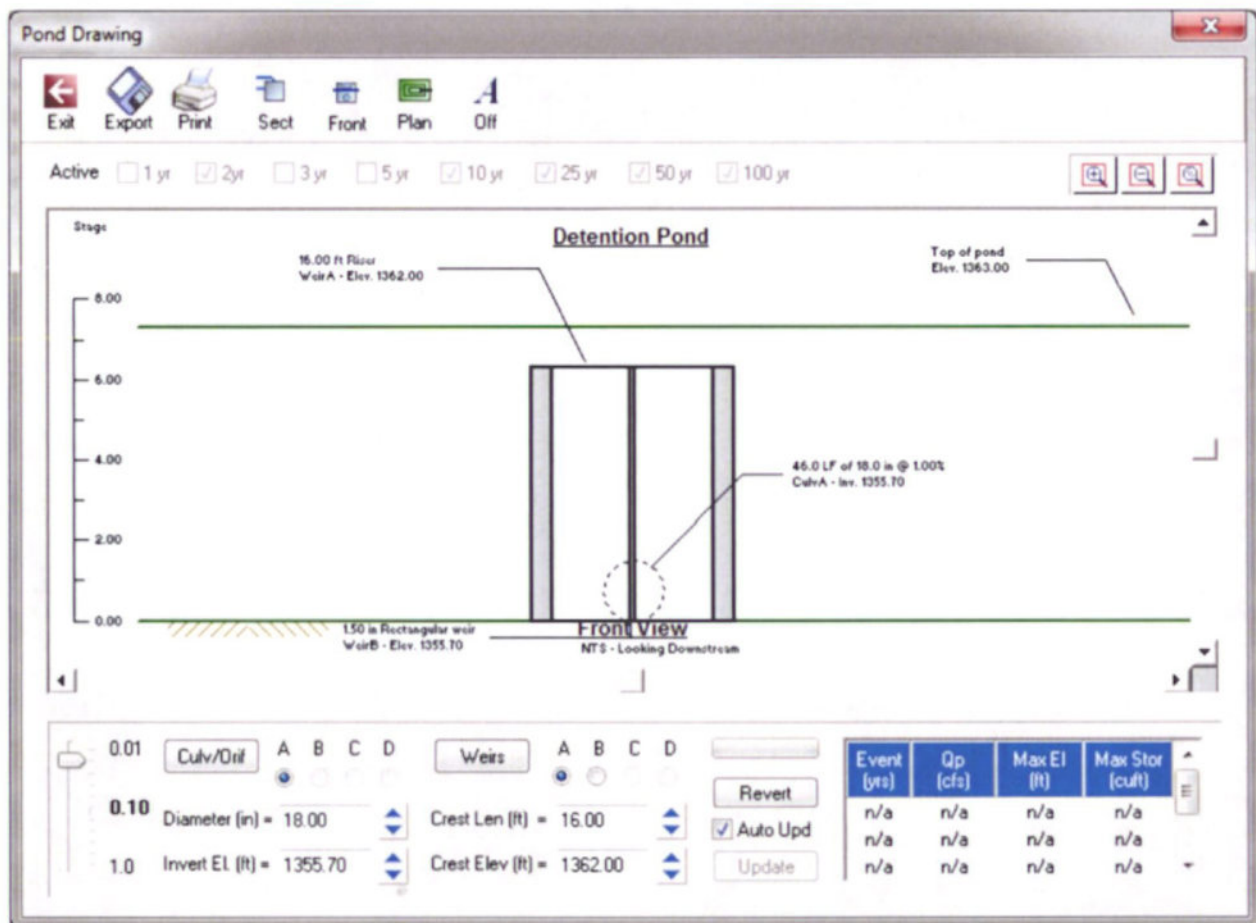
Basin 1 leaves the site at the northwest corner into a channel and Basin 3 leaves the site on the east side through a storm drainage system. Then both combine together approximately 450' north of the site and cross under Huntsville Road into a large natural channel. The post-developed peak runoff will decrease due to the construction of a detention pond.

Design Storm	Peak Flow in CFS		
	Pre-Dev.	Detained Post Dev.	Difference
2-yr	2.83	3.05	+0.22
10-yr	5.04	4.73	-0.31
25-yr	6.17	5.59	-0.58
50-yr	7.30	6.39	-0.91
100-yr	8.15	6.99	-1.16

DETENTION:

The pond berm is 3' wide and the top of berm is at elevation 1363.0. The finish floor elevation is 1364.0 and the 100 year WSEL in the pond is 1361.42. This provides 2.58 feet of freeboard to the finish floor and 1.58 feet of freeboard to the top of the berm. The release structure consists of an outlet structure and a 18" cnp that release directly into the storm drainage system along Huntsville. See the grading plan for details.

Design Storm	Storage Cu. Ft	Elevation
2-yr	13,056	1359.17
10-yr	20,987	1360.19
25-yr	25,036	1360.64
50-yr	29,110	1361.09
100-yr	32,169	1361.42



Basin 2

The post-developed peak runoff will have a significant decrease due to the majority of the runoff being diverted to the detention pond.

Design Storm	Peak Flow in CFS		
	Pre-Dev.	Post Dev.	Difference
2-yr	6.76	2.45	-4.31
10-yr	12.11	4.04	-8.07
25-yr	14.84	4.83	-10.01
50-yr	17.58	5.62	-11.96
100-yr	19.64	6.21	-13.43

STORM SEWER DESIGN:

Storm sewer calculations and profiles will be provide in the final drainage report.

EROSION AND SEDIMENT CONTROL:

See SWPPP and Erosion Control Plan for details.

CONCLUSION:

Improvements to the site will consist of the addition of a buildings and parking lot. The addition will replace some of the green space with impervious area and will increase the peak runoff from the site. Therefore, detention is proposed to reduce the peak runoff to pre developed conditions.

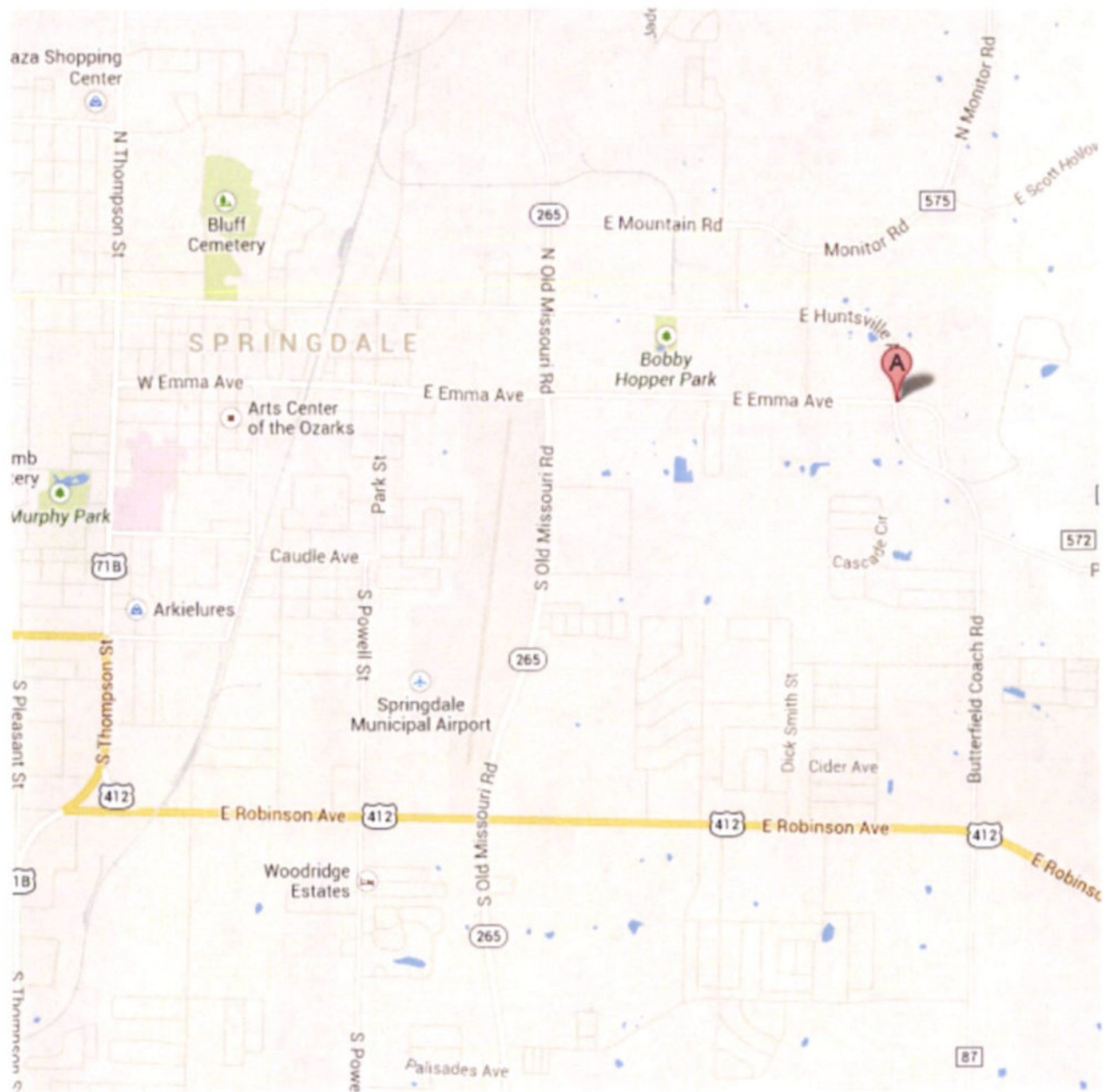
CERTIFICATION:

I, Geoffrey H Bates, Registered Professional Engineer No. 9810 in the State of Arkansas, hereby certify that the drainage studies, reports, calculations, designs, and specifications contained in this report have been prepared in accordance with the requirements of the City of Springdale. Further, I hereby acknowledge that the review of the drainage studies, reports, calculations, designs, and specifications by the City of Springdale or its representatives cannot and does not relieve me from any professional responsibility or liability."

Sincerely,

A handwritten signature in cursive script that reads "Geoffrey Bates". The signature is written in dark ink and is positioned above the printed name.

Geoffrey H. Bates, P.E.
President of Engineering



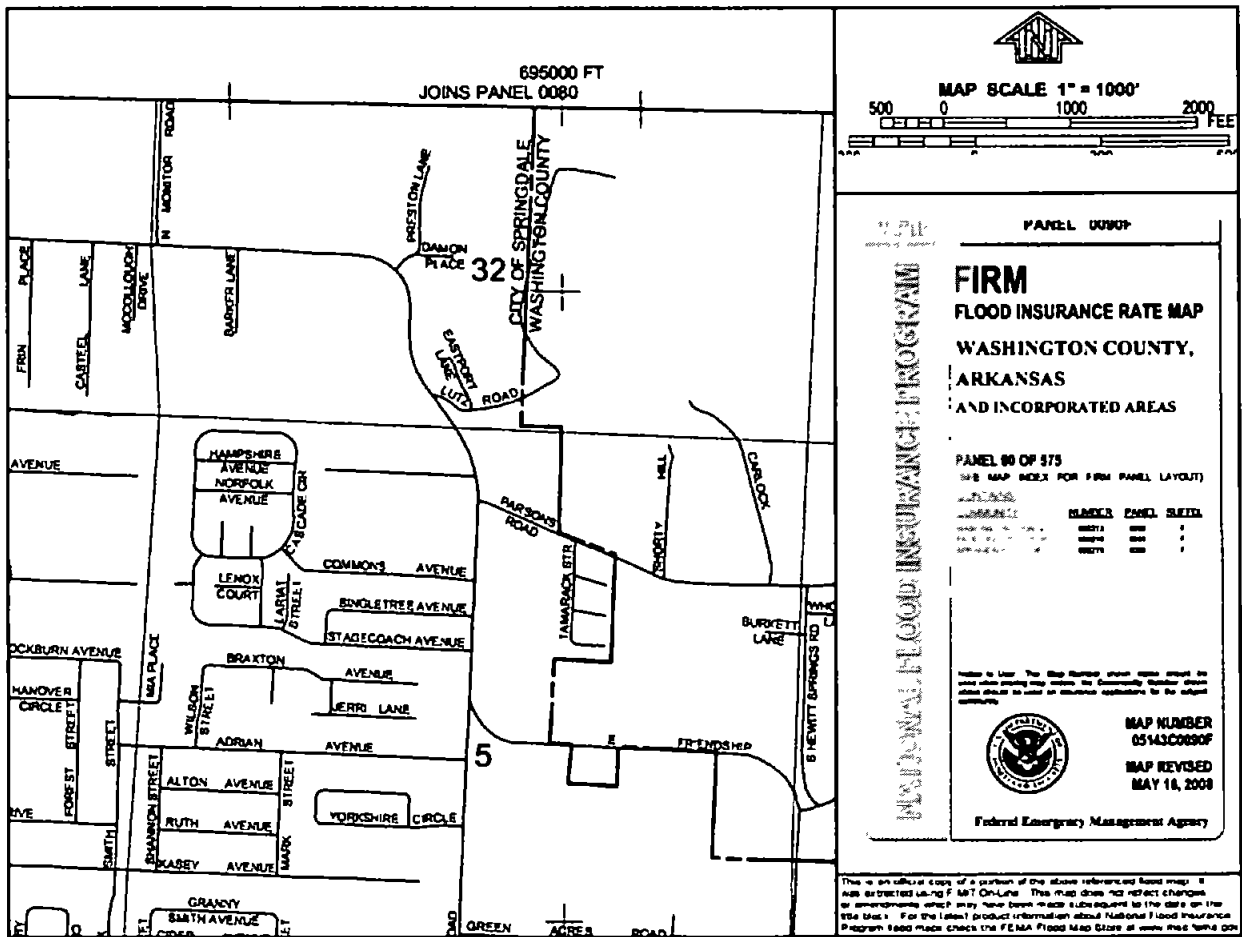
VICINITY MAP



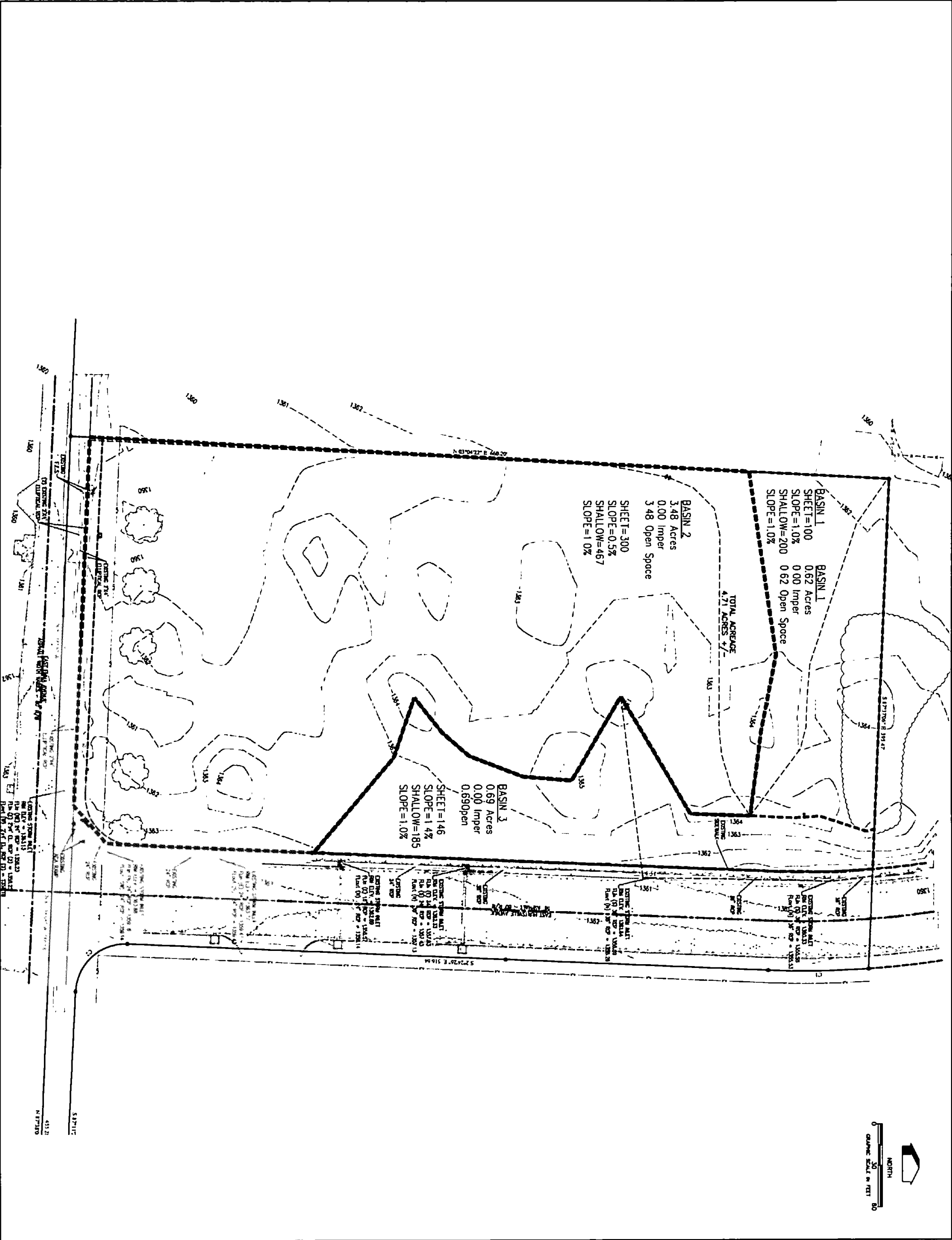
AERIAL PHOTOGRAPH



SOILS MAP



FEMA FIRM PANEL



01

13-302

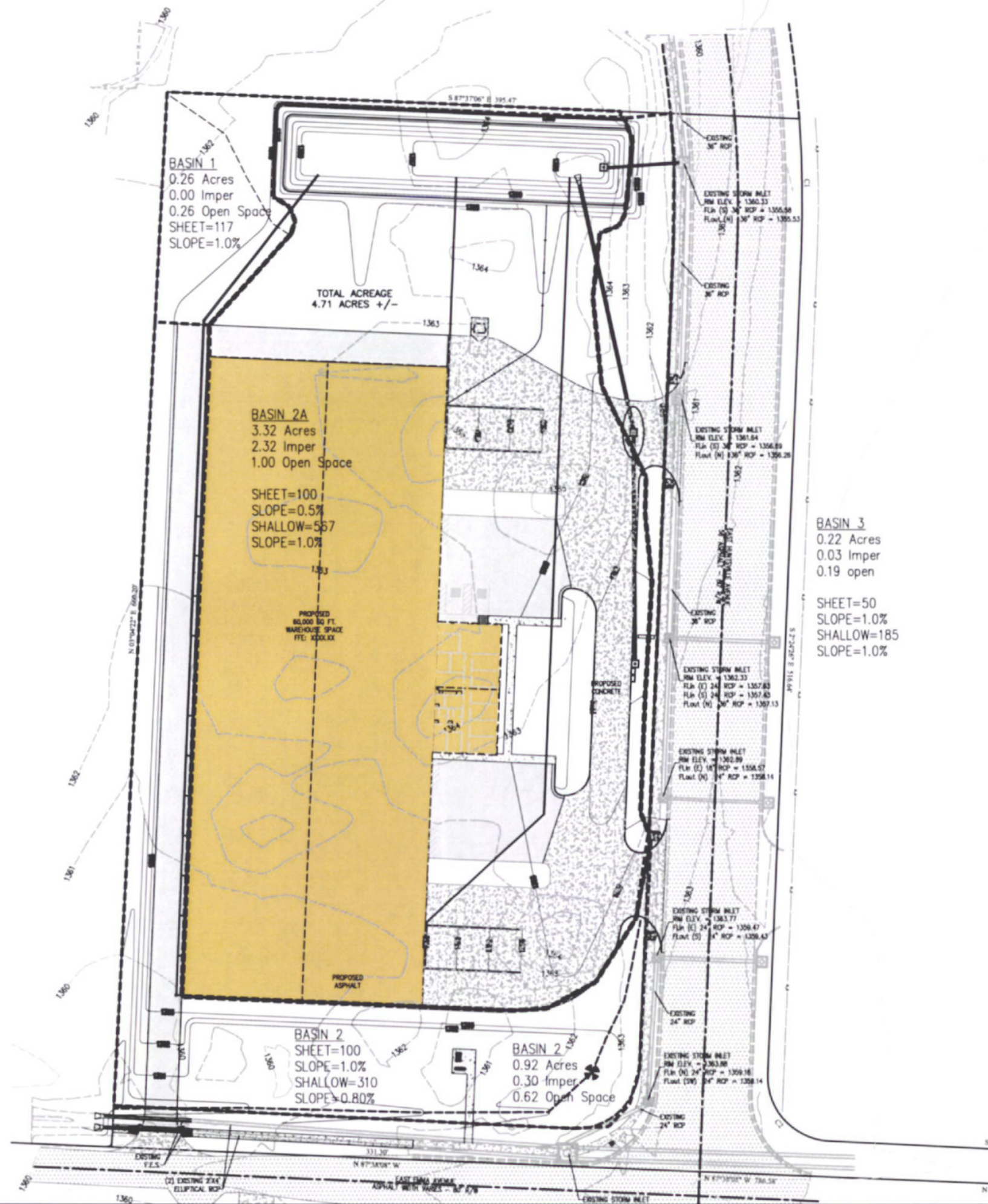
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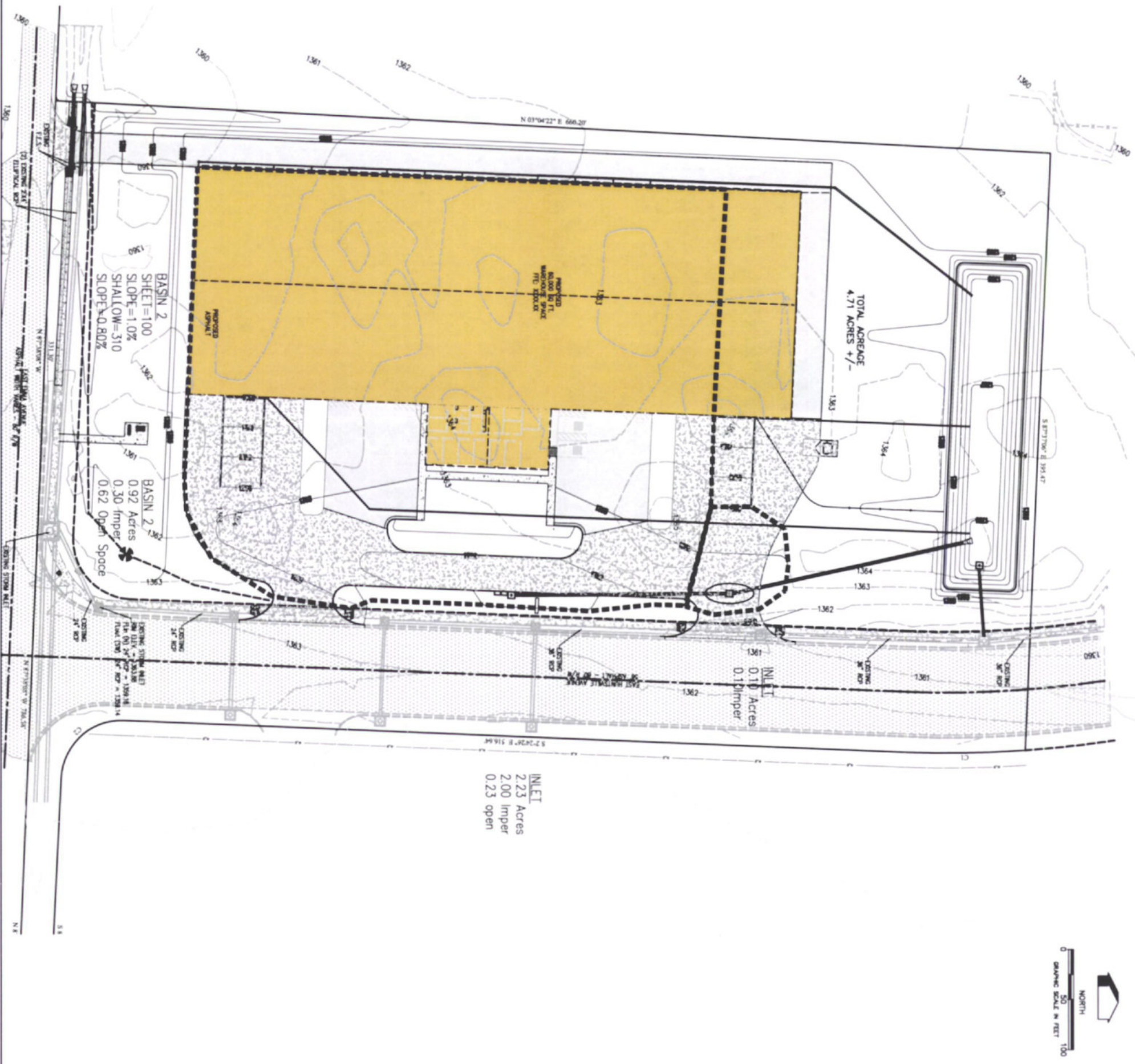
MEMCO SAFETY, INC
LARGE SCALE DEVELOPMENT PLAN
PRE DEVELOPED DRAINAGE MAP
SPRINGDALE, ARKANSAS

REVISIONS	DATE
REVISION PER TECHNICAL PLAT REVIEW 01-09-2014	01-09-2014
REVISION PER TECHNICAL PLAT REVIEW 01-13-2014	01-13-2014

REGISTERED PROFESSIONAL ENGINEER
NO. 8810
DOUGLAS H. BATES
Arkansas
12/1/09

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DRAWN BY: J. YOUNG ENGINEER: G. BATES



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MEMCO SAFETY, INC
LARGE SCALE DEVELOPMENT PLAN
INLET DRAINAGE MAP
SPRINGDALE, ARKANSAS

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PRE & POST DEVELOPED
RUNOFF CALCULATIONS

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MEMCO.gpw

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Hydrograph Return Period Recap

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	SCS Runoff	-----	-----	1 34	-----	-----	2.38	2 92	3 45	3 86	Pre Developed Basin 1
2	SCS Runoff	-----	-----	6 76	-----	-----	12.11	14.84	17 58	19.64	Pre Developed Basin 2
3	SCS Runoff	-----	-----	1.49	-----	-----	2 65	3.25	3 84	4.29	Pre Developed Basin 3
4	SCS Runoff	-----	-----	0 56	-----	-----	1.00	1.22	1 45	1.62	Post Developed Basin 1
5	SCS Runoff	-----	-----	2 45	-----	-----	4.04	4.83	5.62	6.21	Post Developed Basin 2
6	SCS Runoff	-----	-----	10 61	-----	-----	16.24	19.02	21 80	23.87	Post Developed Basin 2a
7	SCS Runoff	-----	-----	0 51	-----	-----	0.89	1.08	1.27	1.41	Post Developed Basin 3
8	Reservoir	6	-----	2 57	-----	-----	3 78	4.34	4.88	5.34	Basin 2a detained
9	Combine	4, 7, 8	-----	3 05	-----	-----	4.73	5.59	6.39	6.99	Basin 1 Post Dev Combined flow nort
10	Combine	1, 3,	-----	2 83	-----	-----	5.04	6.17	7.30	8.15	Basin 1 Pre Dev Combined flow north

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

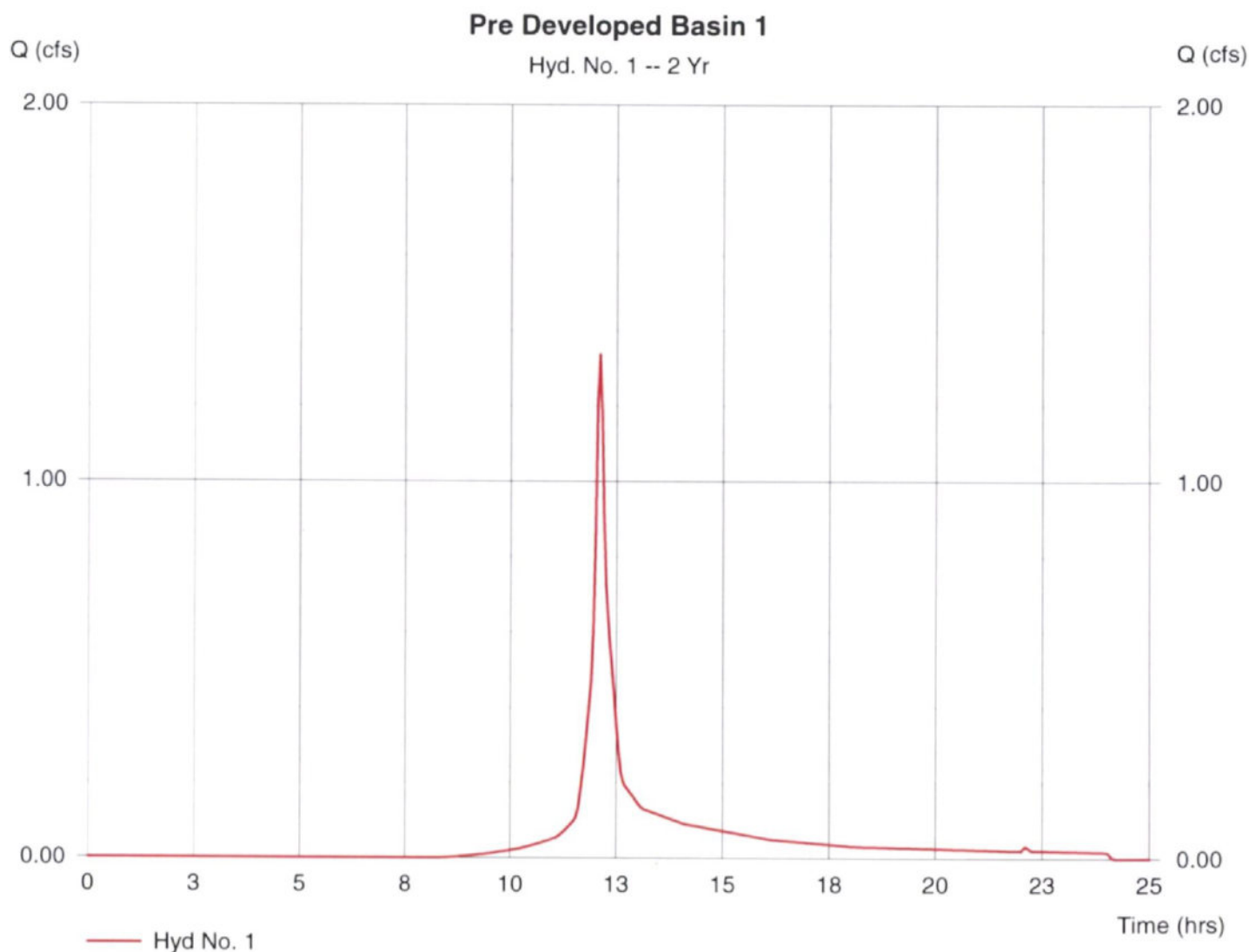
Hyd. No. 1

Pre Developed Basin 1

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Drainage area = 0.620 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 4.08 in
 Storm duration = 24 hrs

Peak discharge = 1.34 cfs
 Time interval = 3 min
 Curve number = 80
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 4,448 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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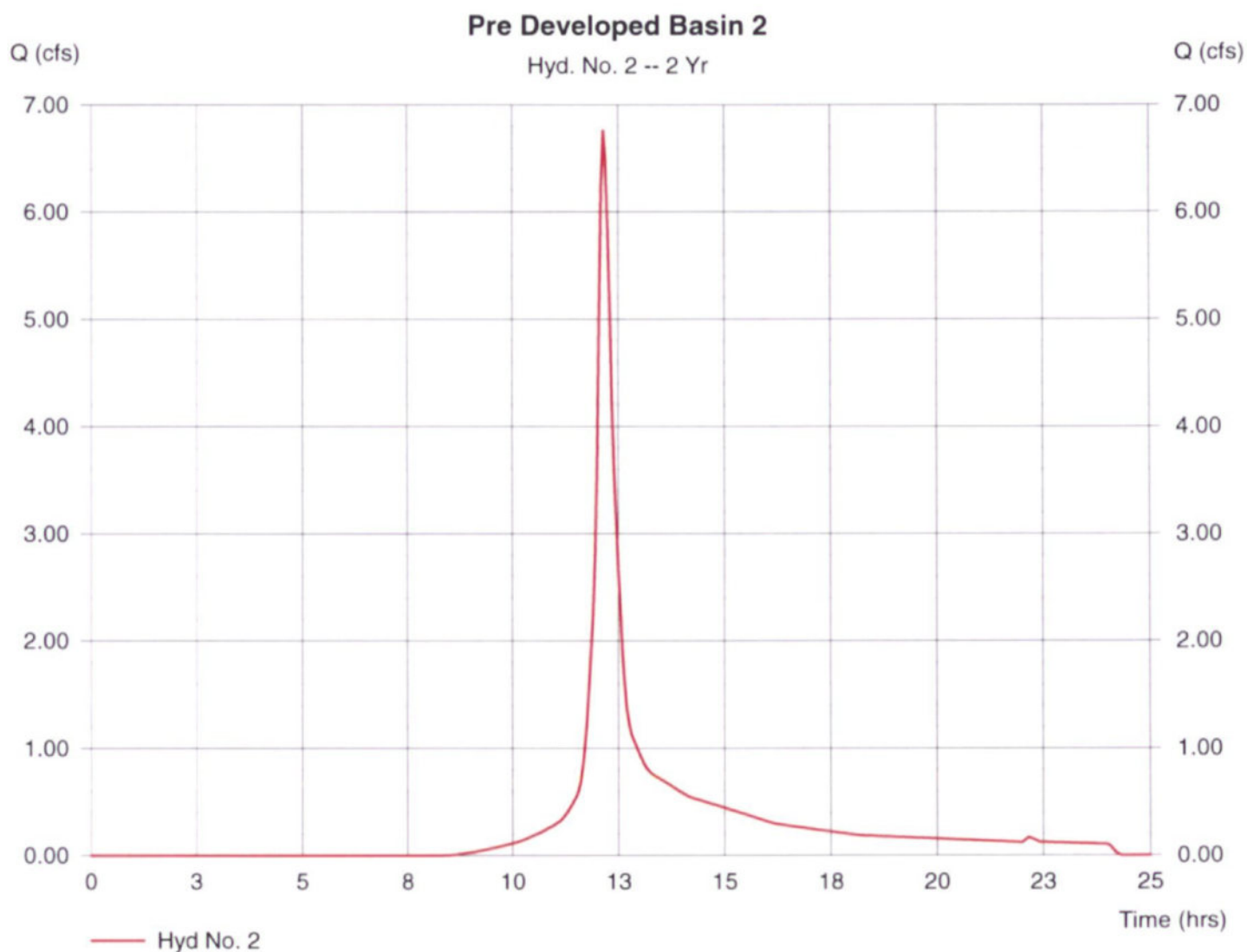
Hyd. No. 2

Pre Developed Basin 2

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Drainage area = 3.480 ac
 Basin Slope = 0.0 %
 Tc method = TR55
 Total precip. = 4.08 in
 Storm duration = 24 hrs

Peak discharge = 6.76 cfs
 Time interval = 3 min
 Curve number = 80
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 10.60 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 26,629 cuft



TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

Pre Developed Basin 2

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.015	0.011	0.011	
Flow length (ft)	= 300.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 4.07	0.00	0.00	
Land slope (%)	= 0.50	0.00	0.00	
Travel Time (min)	= 5.77	+	0.00	+
Shallow Concentrated Flow				
Flow length (ft)	= 467.00	0.00	0.00	
Watercourse slope (%)	= 1.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 1.61	0.00	0.00	
Travel Time (min)	= 4.82	+	0.00	+
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	= 0.00	+	0.00	+
Total Travel Time, Tc				10.60 min

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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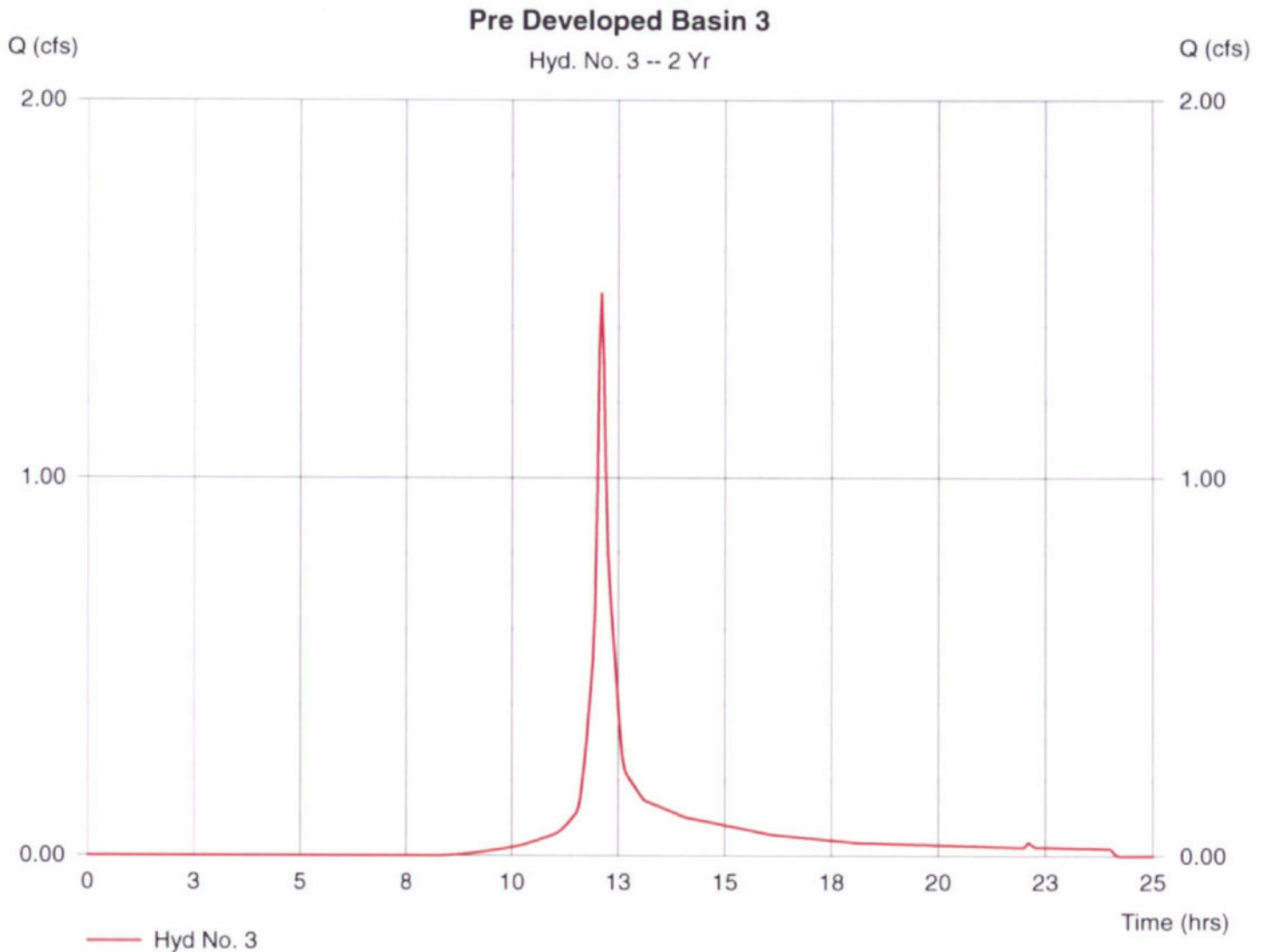
Hyd. No. 3

Pre Developed Basin 3

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Drainage area = 0.690 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 4.08 in
 Storm duration = 24 hrs

Peak discharge = 1.49 cfs
 Time interval = 3 min
 Curve number = 80
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 4,950 cuft



Hydrograph Plot

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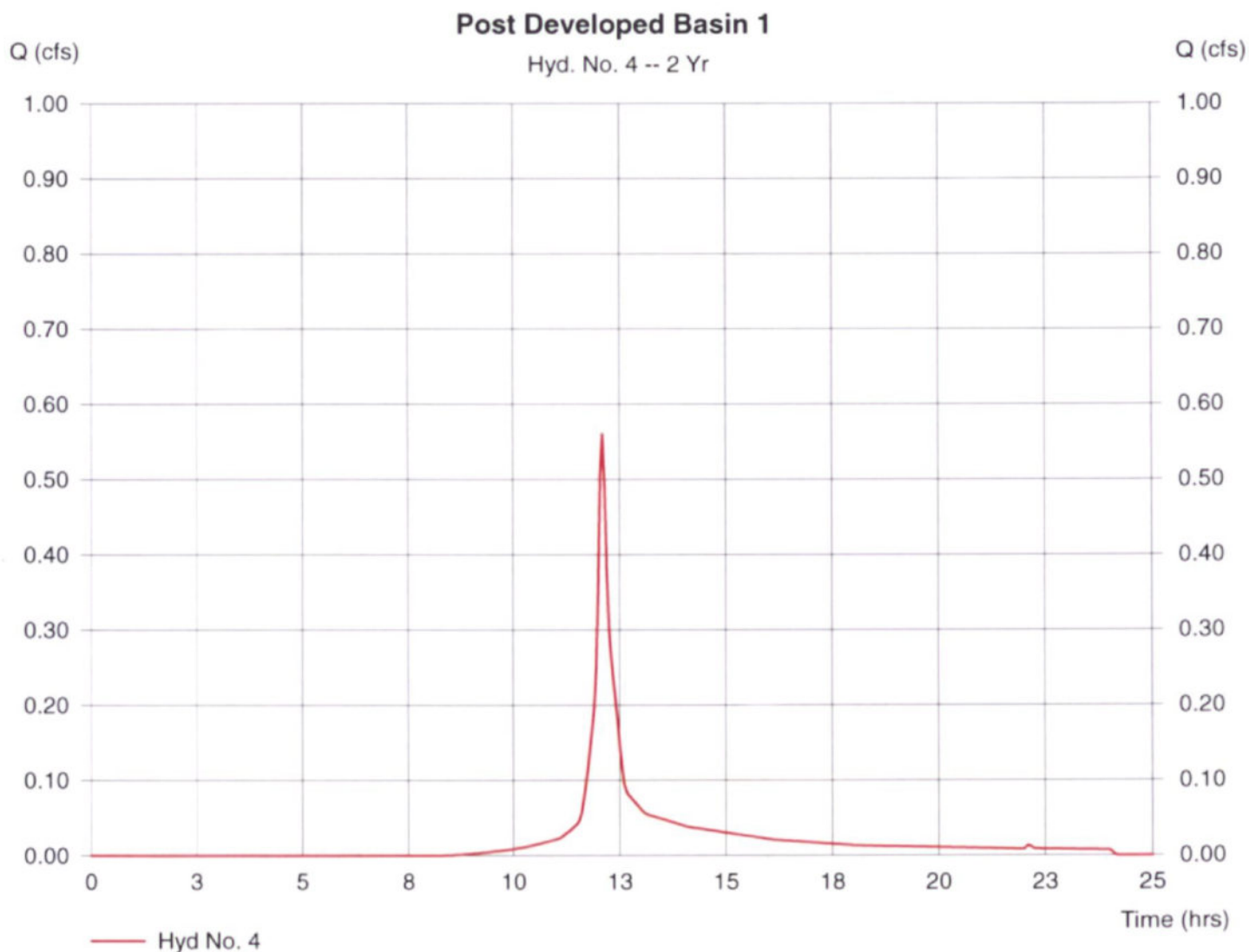
Hyd. No. 4

Post Developed Basin 1

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Drainage area = 0.260 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 4.08 in
Storm duration = 24 hrs

Peak discharge = 0.56 cfs
Time interval = 3 min
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 1,865 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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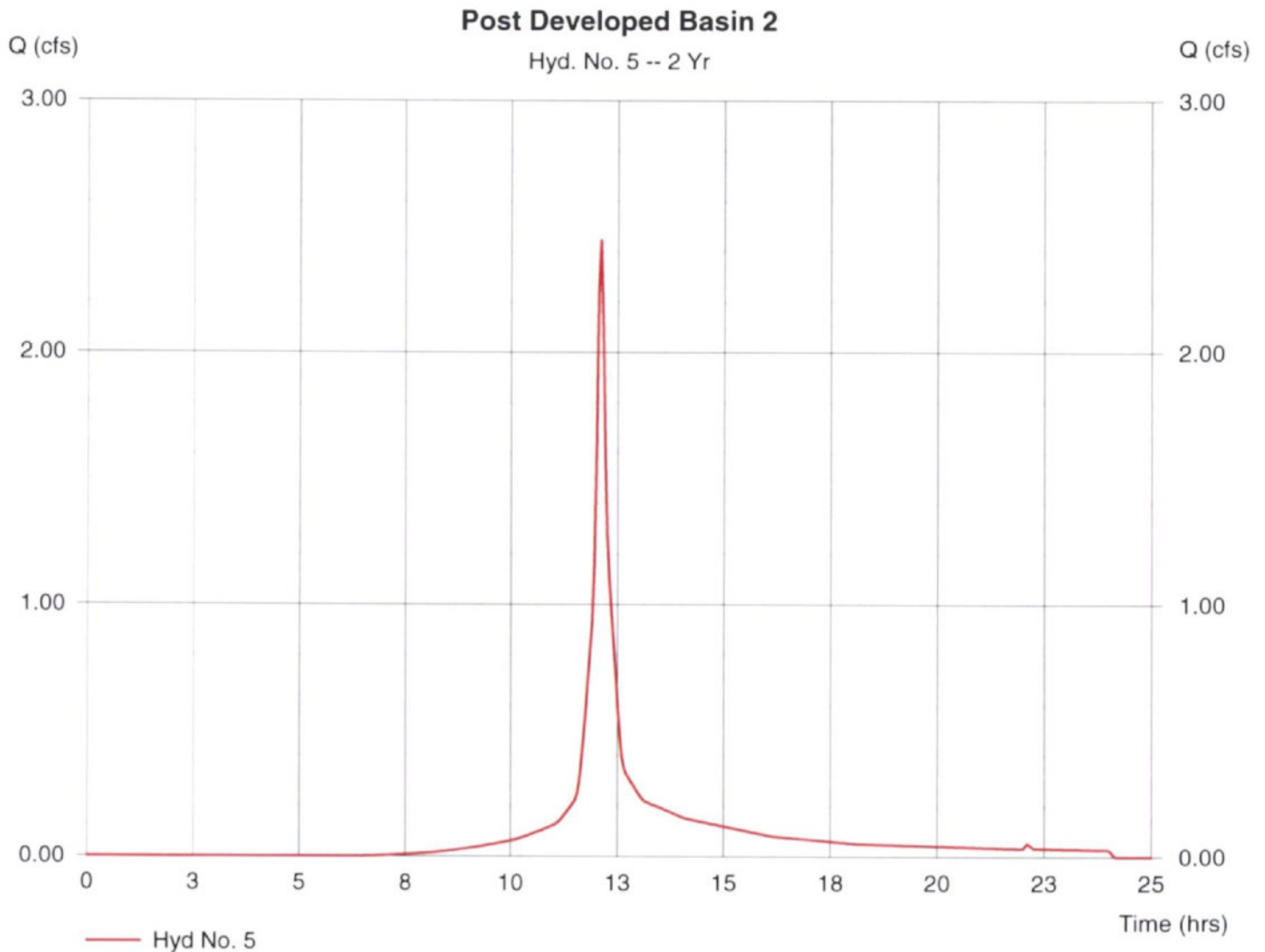
Hyd. No. 5

Post Developed Basin 2

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Drainage area = 0.920 ac
 Basin Slope = 0.0 %
 Tc method = TR55
 Total precip. = 4.08 in
 Storm duration = 24 hrs

Peak discharge = 2.45 cfs
 Time interval = 3 min
 Curve number = 86
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.40 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 8,199 cuft



TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve

Hyd. No. 5

Post Developed Basin 2

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.015	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 4.07	0.00	0.00	
Land slope (%)	= 0.50	0.00	0.00	
Travel Time (min)	= 2.40	+ 0.00	+ 0.00	= 2.40
Shallow Concentrated Flow				
Flow length (ft)	= 286.00	0.00	0.00	
Watercourse slope (%)	= 1.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 1.61	0.00	0.00	
Travel Time (min)	= 2.95	+ 0.00	+ 0.00	= 2.95
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				5.40 min

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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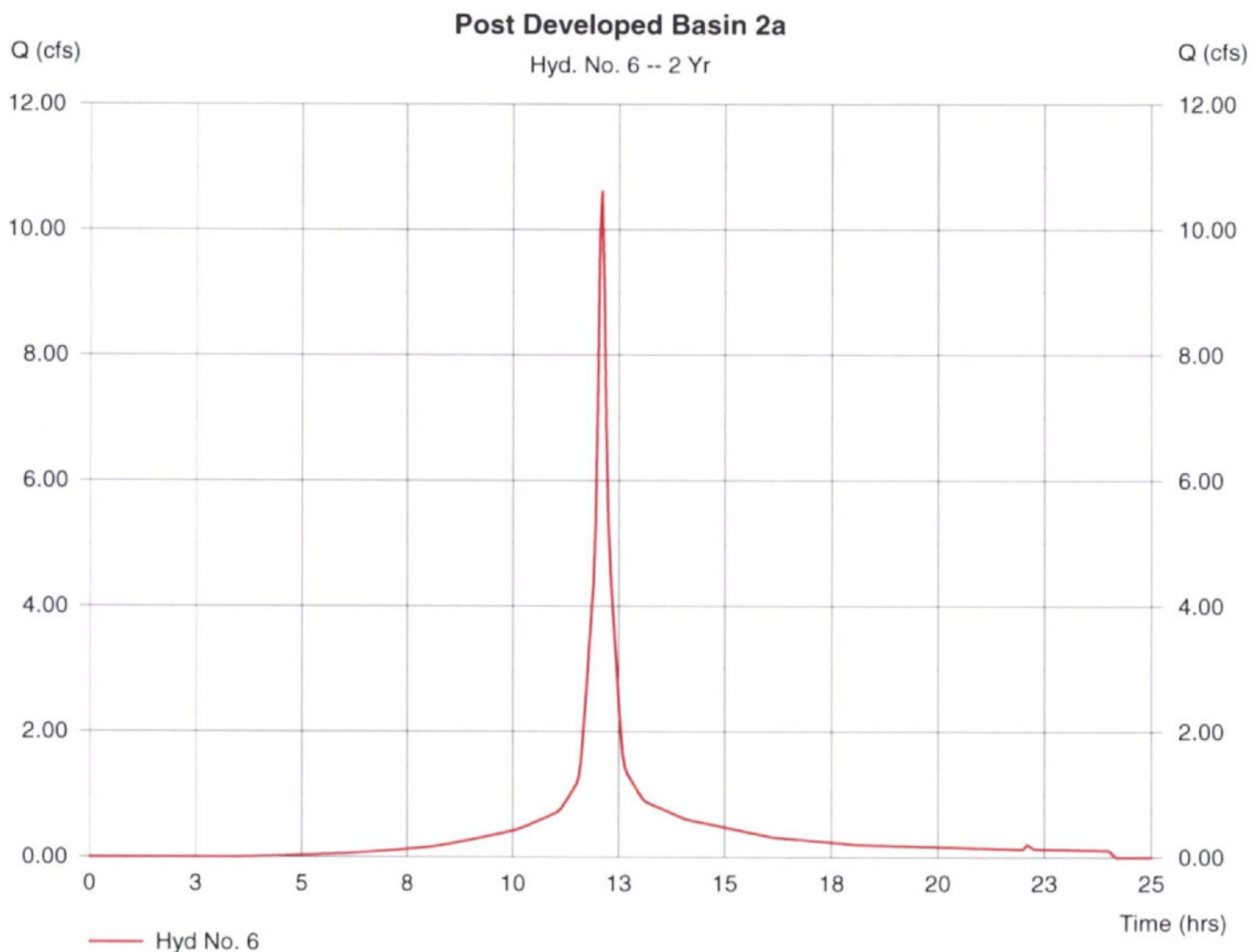
Hyd. No. 6

Post Developed Basin 2a

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Drainage area = 3.320 ac
 Basin Slope = 0.0 %
 Tc method = TR55
 Total precip. = 4.08 in
 Storm duration = 24 hrs

Peak discharge = 10.61 cfs
 Time interval = 3 min
 Curve number = 93
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.40 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 37,259 cuft



TR55 Tc Worksheet

Hydraflow Hydrographs by Intellisolve

Hyd. No. 6

Post Developed Basin 2a

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
Sheet Flow							
Manning's n-value	= 0.015	0.011	0.011				
Flow length (ft)	= 100.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 4.07	0.00	0.00				
Land slope (%)	= 0.50	0.00	0.00				
Travel Time (min)	= 2.40	+	0.00	+	0.00	=	2.40
Shallow Concentrated Flow							
Flow length (ft)	= 286.00	0.00	0.00				
Watercourse slope (%)	= 1.00	0.00	0.00				
Surface description	= Unpaved	Paved	Paved				
Average velocity (ft/s)	= 1.61	0.00	0.00				
Travel Time (min)	= 2.95	+	0.00	+	0.00	=	2.95
Channel Flow							
X sectional flow area (sqft)	= 0.00	0.00	0.00				
Wetted perimeter (ft)	= 0.00	0.00	0.00				
Channel slope (%)	= 0.00	0.00	0.00				
Manning's n-value	= 0.015	0.015	0.015				
Velocity (ft/s)	= 0.00	0.00	0.00				
Flow length (ft)	= 0.0	0.0	0.0				
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc					5.40 min		

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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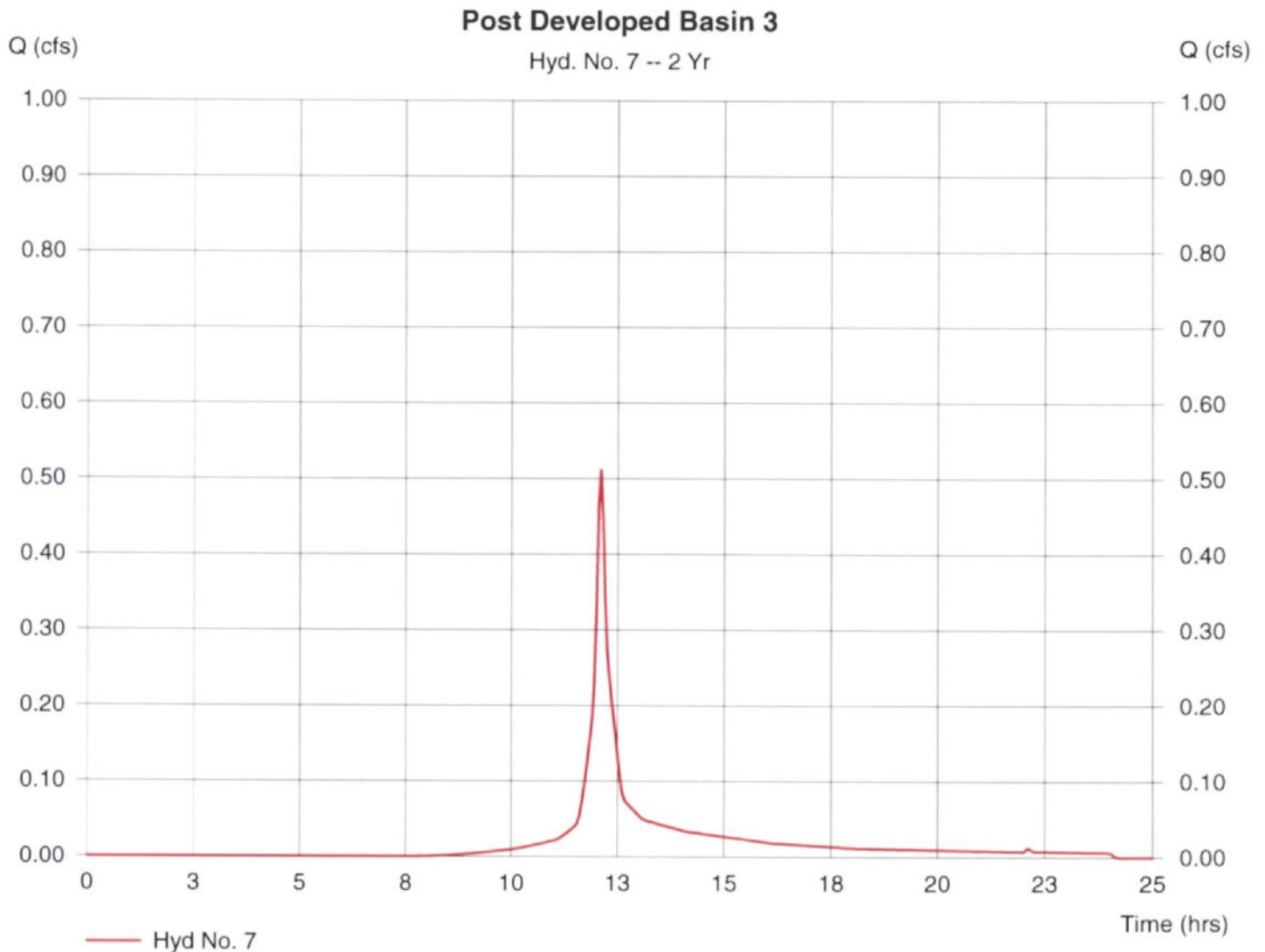
Hyd. No. 7

Post Developed Basin 3

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Drainage area = 0.220 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 4.08 in
 Storm duration = 24 hrs

Peak discharge = 0.51 cfs
 Time interval = 3 min
 Curve number = 82
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 1,701 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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Hyd. No. 8

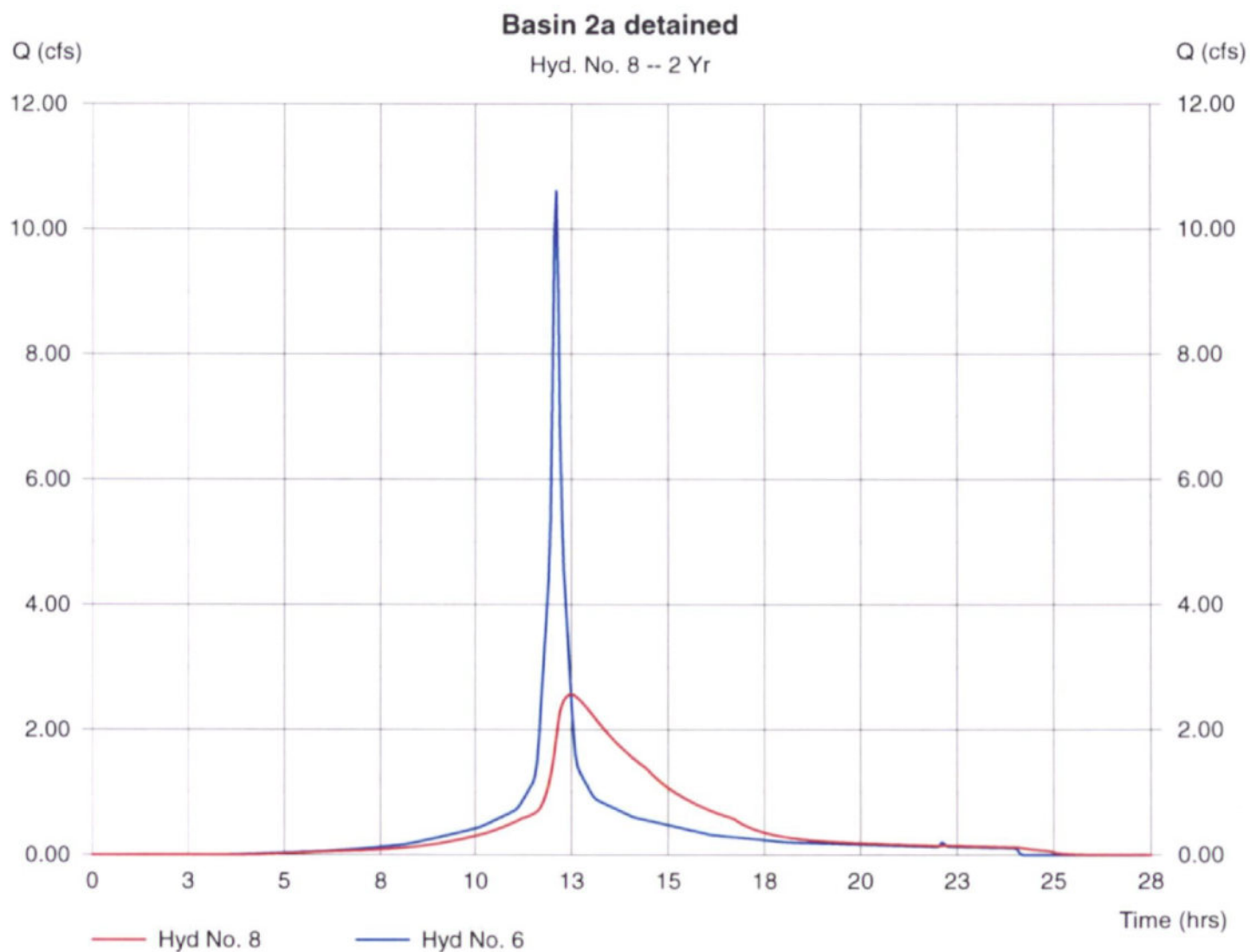
Basin 2a detained

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Inflow hyd. No. = 6
Reservoir name = Detention Pond

Peak discharge = 2.57 cfs
Time interval = 3 min
Max. Elevation = 1359.17 ft
Max. Storage = 13,056 cuft

Storage Indication method used.

Hydrograph Volume = 37,254 cuft



Pond Report

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Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

Pond No. 1 - Detention Pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1355.70	100	0	0
0.30	1356.00	462	84	84
1.30	1357.00	2,657	1,560	1,644
2.30	1358.00	5,414	4,036	5,679
3.30	1359.00	6,793	6,104	11,783
4.30	1360.00	8,240	7,517	19,299
5.30	1361.00	9,765	9,003	28,302
6.30	1362.00	8,479	9,122	37,424
7.30	1363.00	13,025	10,752	48,176

Culvert / Orifice Structures

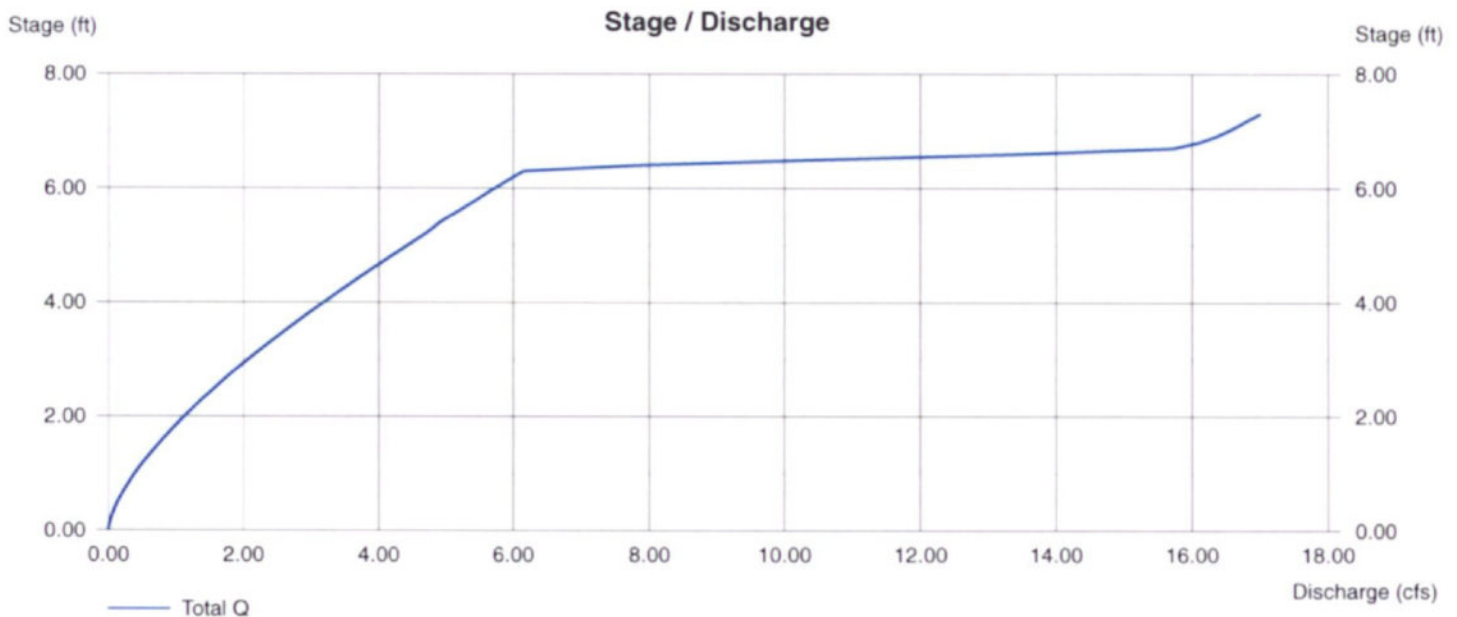
	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1355.70	0.00	0.00	0.00
Length (ft)	= 46.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	0.00
N-Value	= .024	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 16.00	0.13	0.00	0.00
Crest El. (ft)	= 1362.00	1355.70	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Riser	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

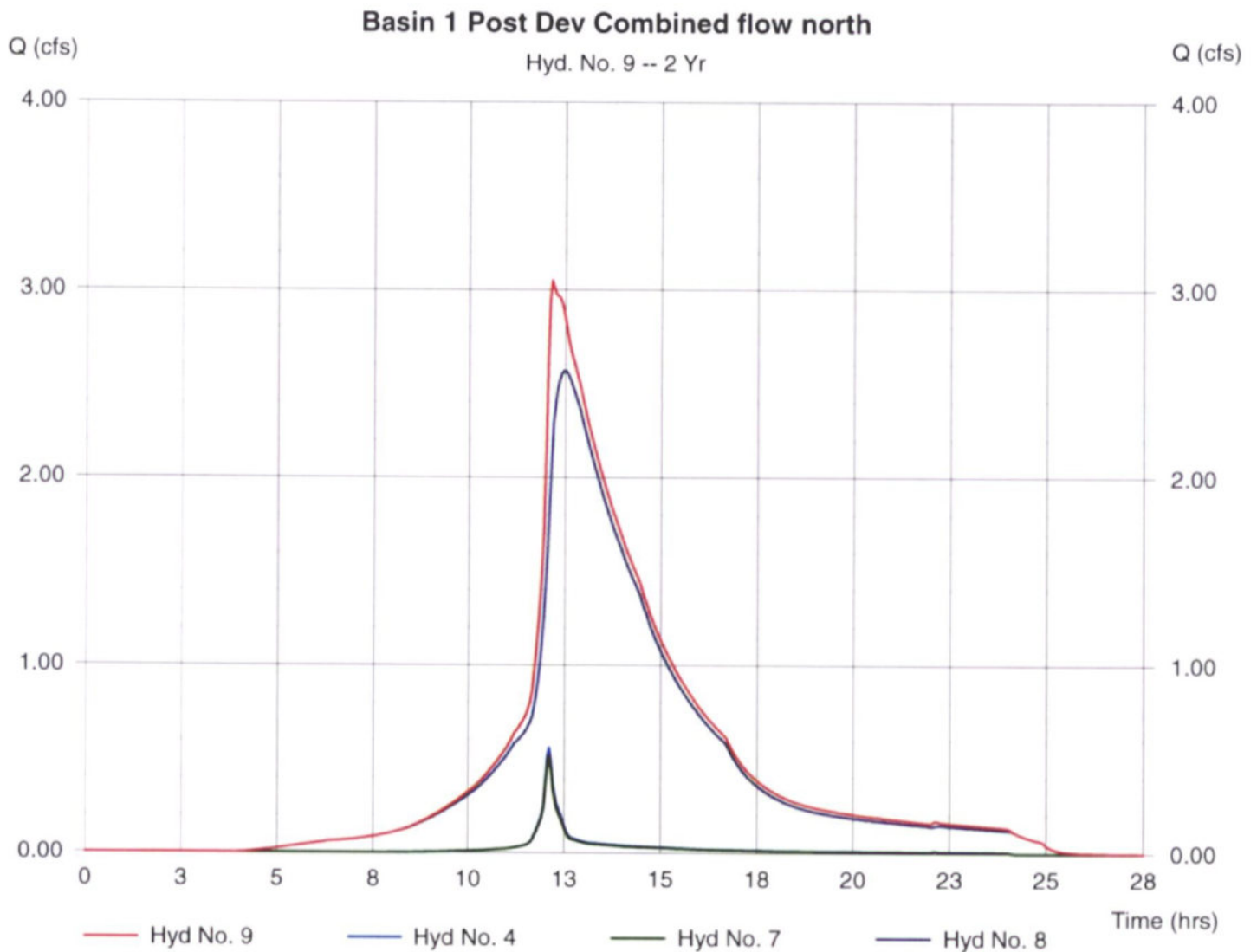
Hyd. No. 9

Basin 1 Post Dev Combined flow north

Hydrograph type = Combine
Storm frequency = 2 yrs
Inflow hyds. = 4, 7, 8

Peak discharge = 3.05 cfs
Time interval = 3 min

Hydrograph Volume = 40,820 cuft



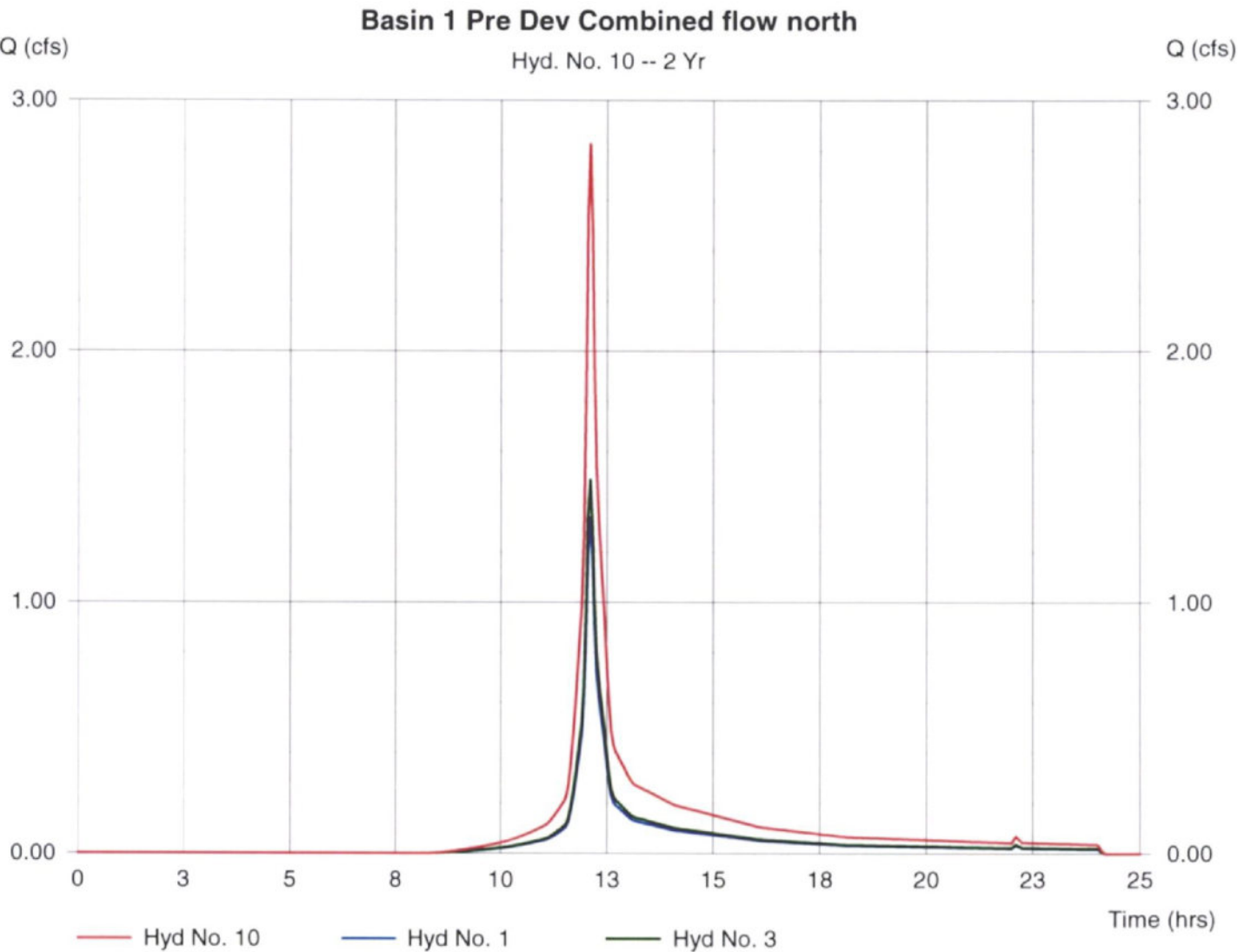
Hydrograph Plot

Hyd. No. 10

Basin 1 Pre Dev Combined flow north

Hydrograph type	= Combine	Peak discharge	= 2.83 cfs
Storm frequency	= 2 yrs	Time interval	= 3 min
Inflow hyds.	= 1, 3		

Hydrograph Volume = 9,397 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

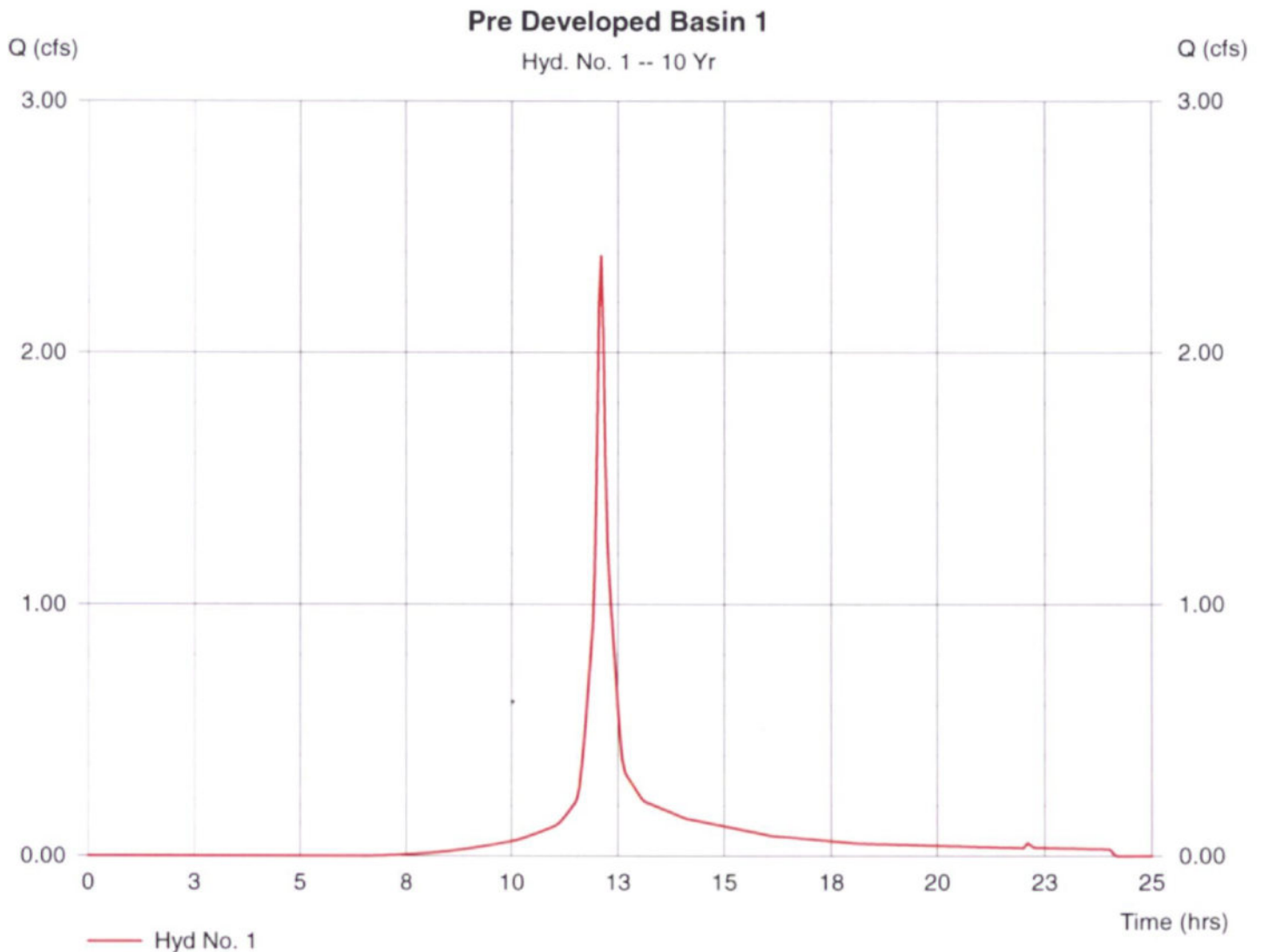
Hyd. No. 1

Pre Developed Basin 1

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Drainage area = 0.620 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 6.00 in
 Storm duration = 24 hrs

Peak discharge = 2.38 cfs
 Time interval = 3 min
 Curve number = 80
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 7,978 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

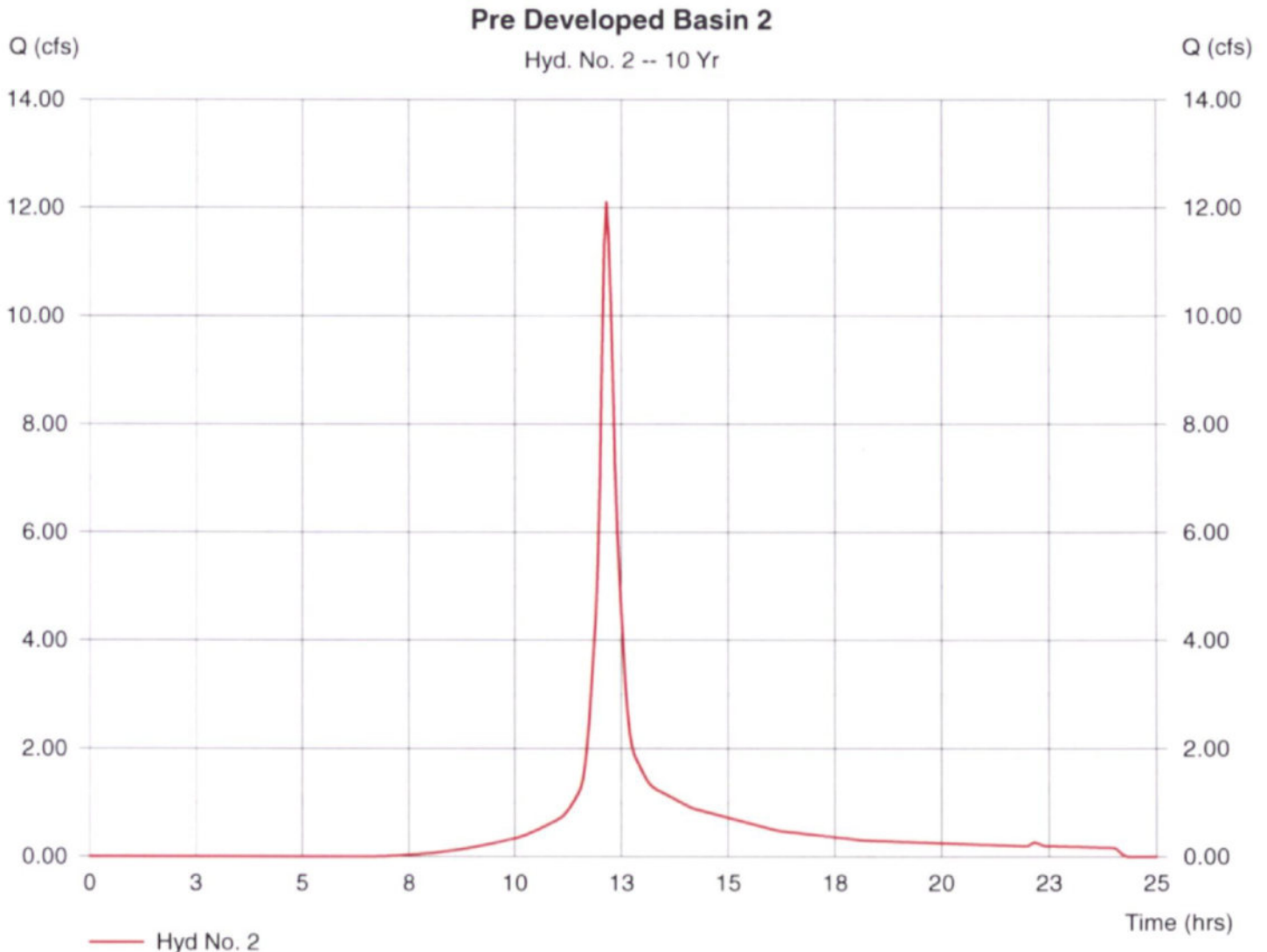
Hyd. No. 2

Pre Developed Basin 2

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Drainage area = 3.480 ac
 Basin Slope = 0.0 %
 Tc method = TR55
 Total precip. = 6.00 in
 Storm duration = 24 hrs

Peak discharge = 12.11 cfs
 Time interval = 3 min
 Curve number = 80
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 10.60 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 47,766 cuft



TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

Pre Developed Basin 2

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
Sheet Flow							
Manning's n-value	= 0.015	0.011	0.011				
Flow length (ft)	= 300.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 4.07	0.00	0.00				
Land slope (%)	= 0.50	0.00	0.00				
Travel Time (min)	= 5.77	+	0.00	+	0.00	=	5.77
Shallow Concentrated Flow							
Flow length (ft)	= 467.00	0.00	0.00				
Watercourse slope (%)	= 1.00	0.00	0.00				
Surface description	= Unpaved	Paved	Paved				
Average velocity (ft/s)	= 1.61	0.00	0.00				
Travel Time (min)	= 4.82	+	0.00	+	0.00	=	4.82
Channel Flow							
X sectional flow area (sqft)	= 0.00	0.00	0.00				
Wetted perimeter (ft)	= 0.00	0.00	0.00				
Channel slope (%)	= 0.00	0.00	0.00				
Manning's n-value	= 0.015	0.015	0.015				
Velocity (ft/s)	= 0.00	0.00	0.00				
Flow length (ft)	= 0.0	0.0	0.0				
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc					10.60 min		

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

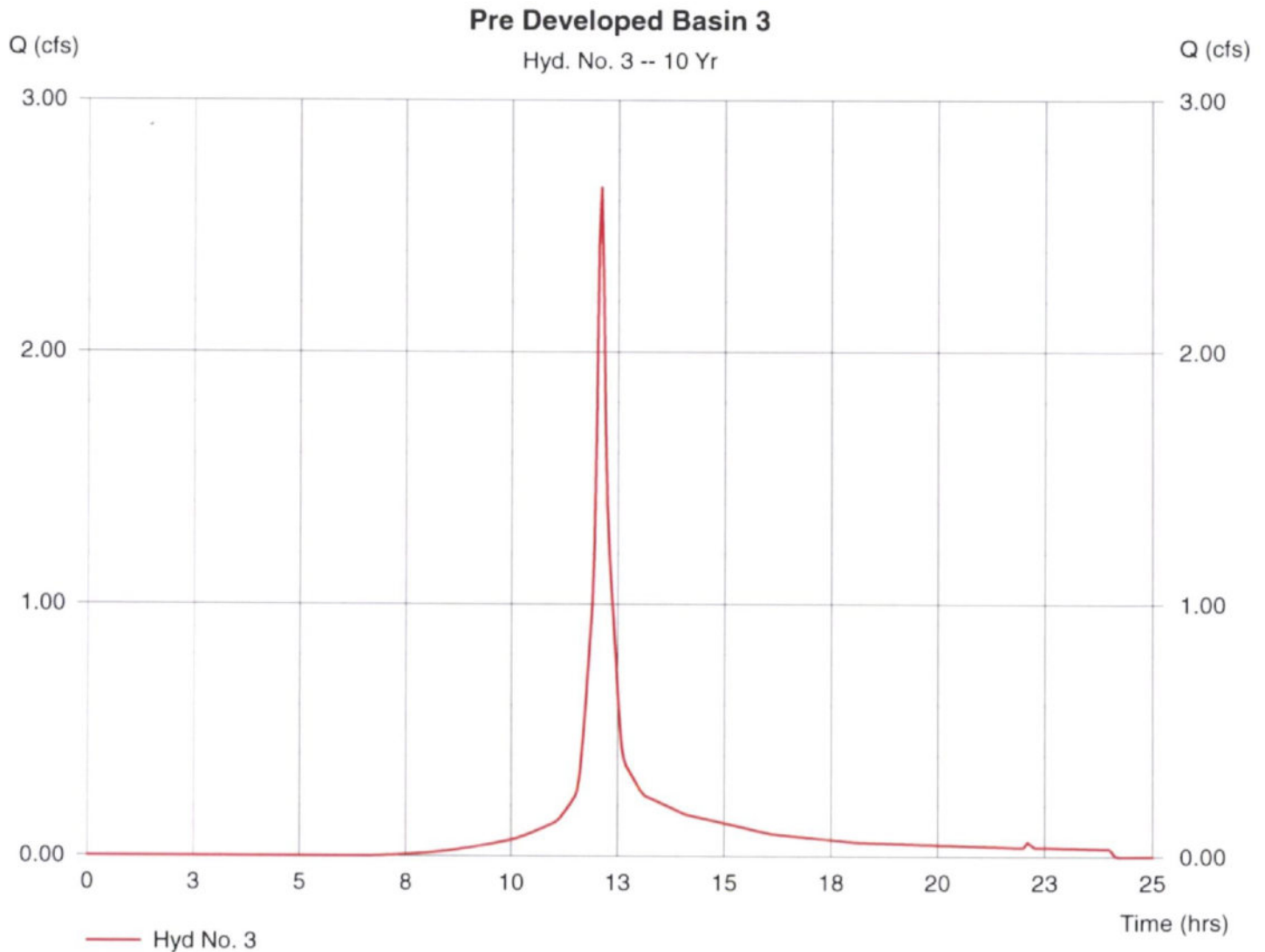
Hyd. No. 3

Pre Developed Basin 3

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Drainage area = 0.690 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 6.00 in
 Storm duration = 24 hrs

Peak discharge = 2.65 cfs
 Time interval = 3 min
 Curve number = 80
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 8,879 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

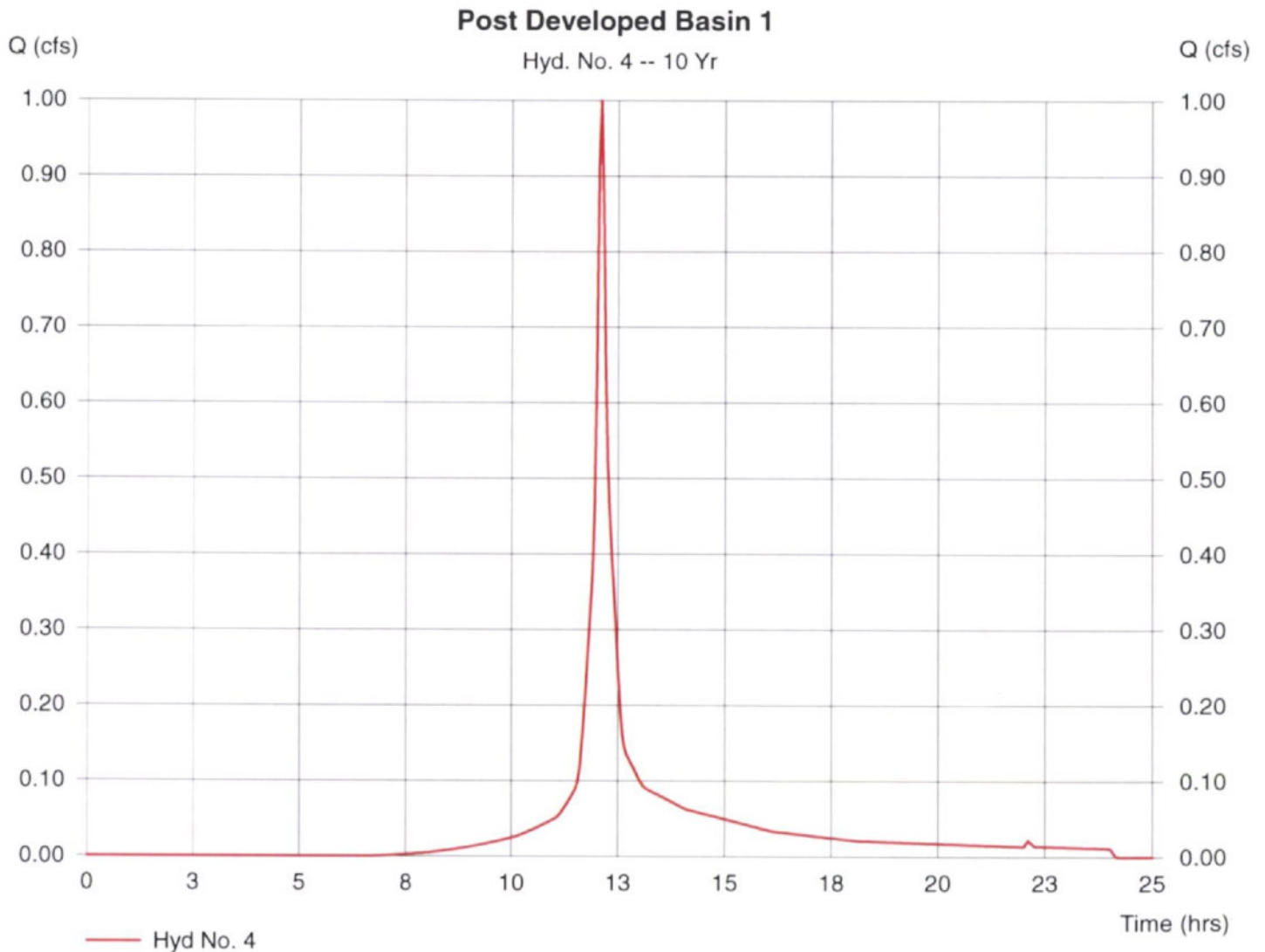
Hyd. No. 4

Post Developed Basin 1

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Drainage area = 0.260 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 6.00 in
 Storm duration = 24 hrs

Peak discharge = 1.00 cfs
 Time interval = 3 min
 Curve number = 80
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 3,346 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

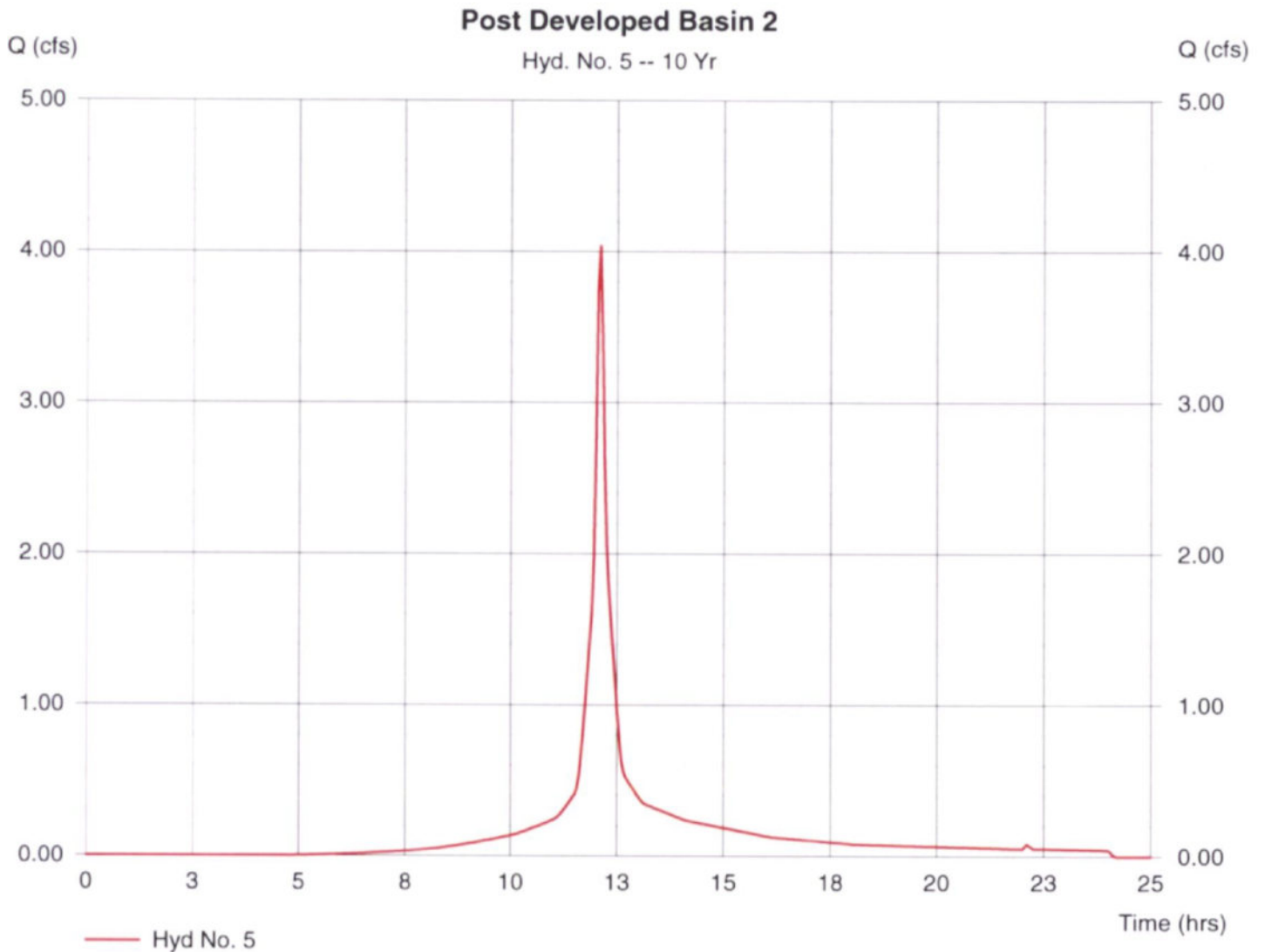
Hyd. No. 5

Post Developed Basin 2

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Drainage area = 0.920 ac
 Basin Slope = 0.0 %
 Tc method = TR55
 Total precip. = 6.00 in
 Storm duration = 24 hrs

Peak discharge = 4.04 cfs
 Time interval = 3 min
 Curve number = 86
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.40 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 13,805 cuft



TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve

Hyd. No. 5

Post Developed Basin 2

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>		
Sheet Flow						
Manning's n-value	= 0.015	0.011	0.011			
Flow length (ft)	= 100.0	0.0	0.0			
Two-year 24-hr precip. (in)	= 4.07	0.00	0.00			
Land slope (%)	= 0.50	0.00	0.00			
Travel Time (min)	= 2.40	+	0.00	+	0.00	= 2.40
Shallow Concentrated Flow						
Flow length (ft)	= 286.00	0.00	0.00			
Watercourse slope (%)	= 1.00	0.00	0.00			
Surface description	= Unpaved	Paved	Paved			
Average velocity (ft/s)	= 1.61	0.00	0.00			
Travel Time (min)	= 2.95	+	0.00	+	0.00	= 2.95
Channel Flow						
X sectional flow area (sqft)	= 0.00	0.00	0.00			
Wetted perimeter (ft)	= 0.00	0.00	0.00			
Channel slope (%)	= 0.00	0.00	0.00			
Manning's n-value	= 0.015	0.015	0.015			
Velocity (ft/s)	= 0.00	0.00	0.00			
Flow length (ft)	= 0.0	0.0	0.0			
Travel Time (min)	= 0.00	+	0.00	+	0.00	= 0.00
Total Travel Time, Tc					5.40 min	

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

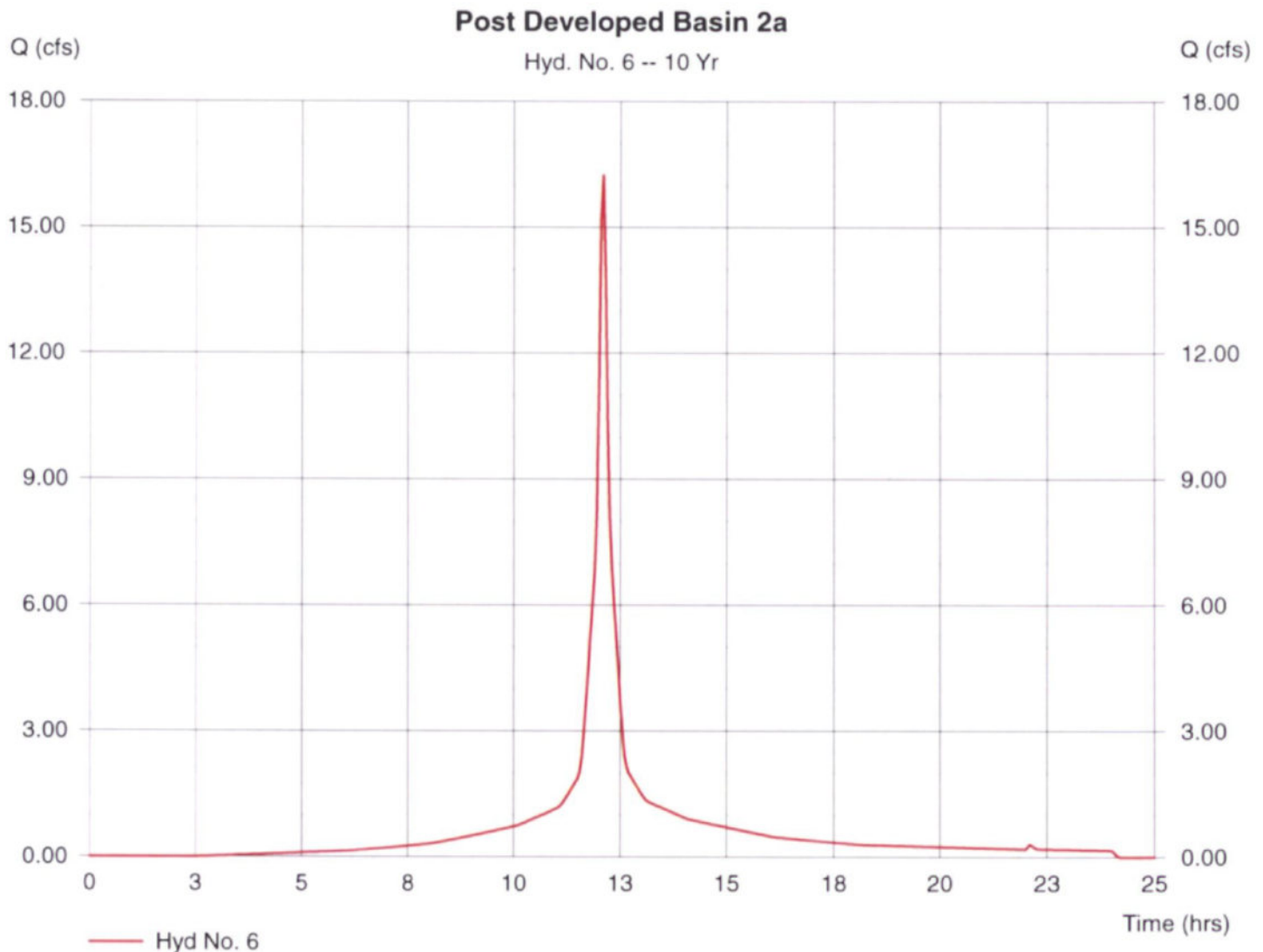
Hyd. No. 6

Post Developed Basin 2a

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 3.320 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 6.00 in
Storm duration = 24 hrs

Peak discharge = 16.24 cfs
Time interval = 3 min
Curve number = 93
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.40 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 58,555 cuft



TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve

Hyd. No. 6

Post Developed Basin 2a

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
Sheet Flow							
Manning's n-value	= 0.015	0.011	0.011				
Flow length (ft)	= 100.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 4.07	0.00	0.00				
Land slope (%)	= 0.50	0.00	0.00				
Travel Time (min)	= 2.40	+	0.00	+	0.00	=	2.40
Shallow Concentrated Flow							
Flow length (ft)	= 286.00	0.00	0.00				
Watercourse slope (%)	= 1.00	0.00	0.00				
Surface description	= Unpaved	Paved	Paved				
Average velocity (ft/s)	= 1.61	0.00	0.00				
Travel Time (min)	= 2.95	+	0.00	+	0.00	=	2.95
Channel Flow							
X sectional flow area (sqft)	= 0.00	0.00	0.00				
Wetted perimeter (ft)	= 0.00	0.00	0.00				
Channel slope (%)	= 0.00	0.00	0.00				
Manning's n-value	= 0.015	0.015	0.015				
Velocity (ft/s)	= 0.00	0.00	0.00				
Flow length (ft)	= 0.0	0.0	0.0				
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc					5.40 min		

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

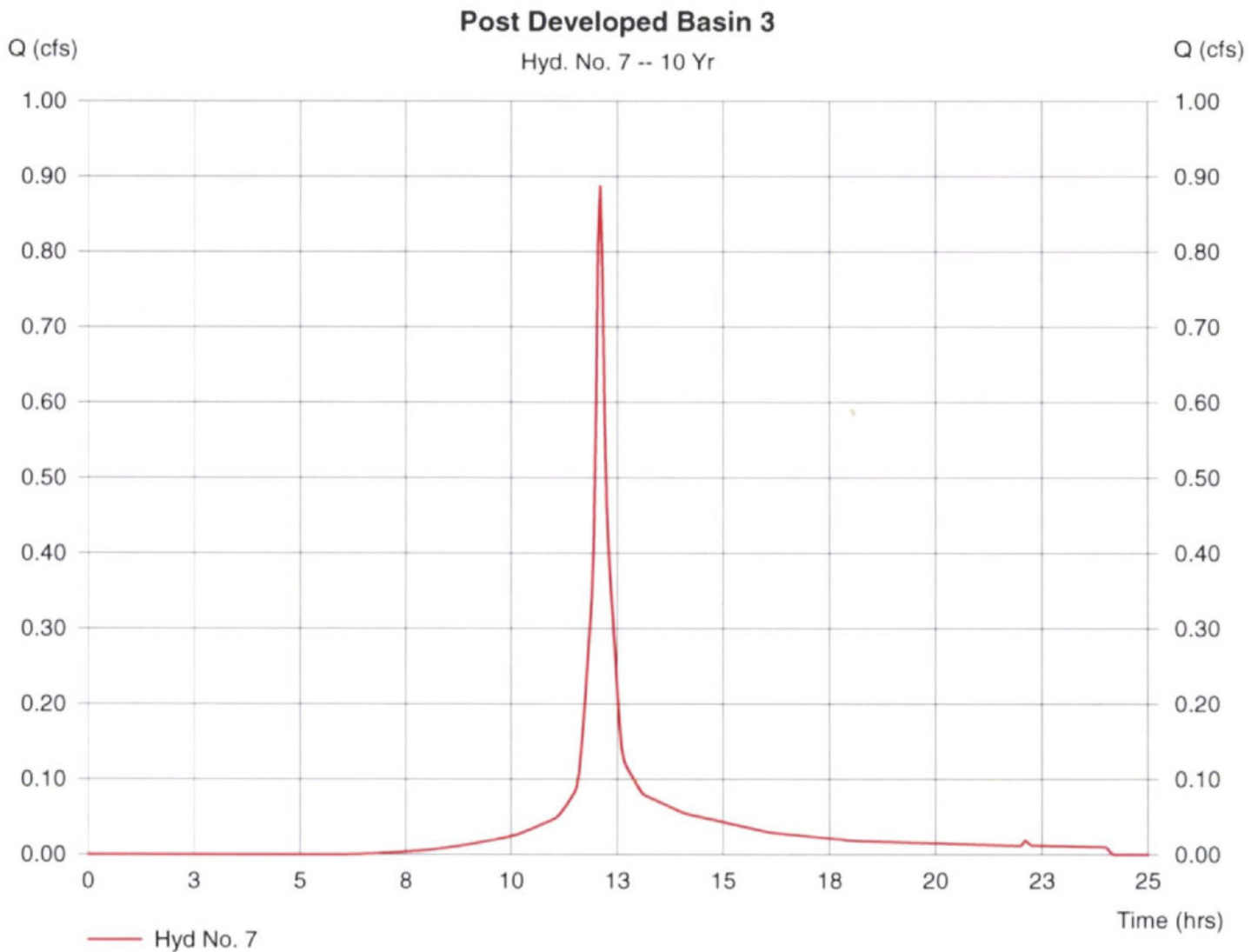
Hyd. No. 7

Post Developed Basin 3

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Drainage area = 0.220 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 6.00 in
 Storm duration = 24 hrs

Peak discharge = 0.89 cfs
 Time interval = 3 min
 Curve number = 82
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 2,985 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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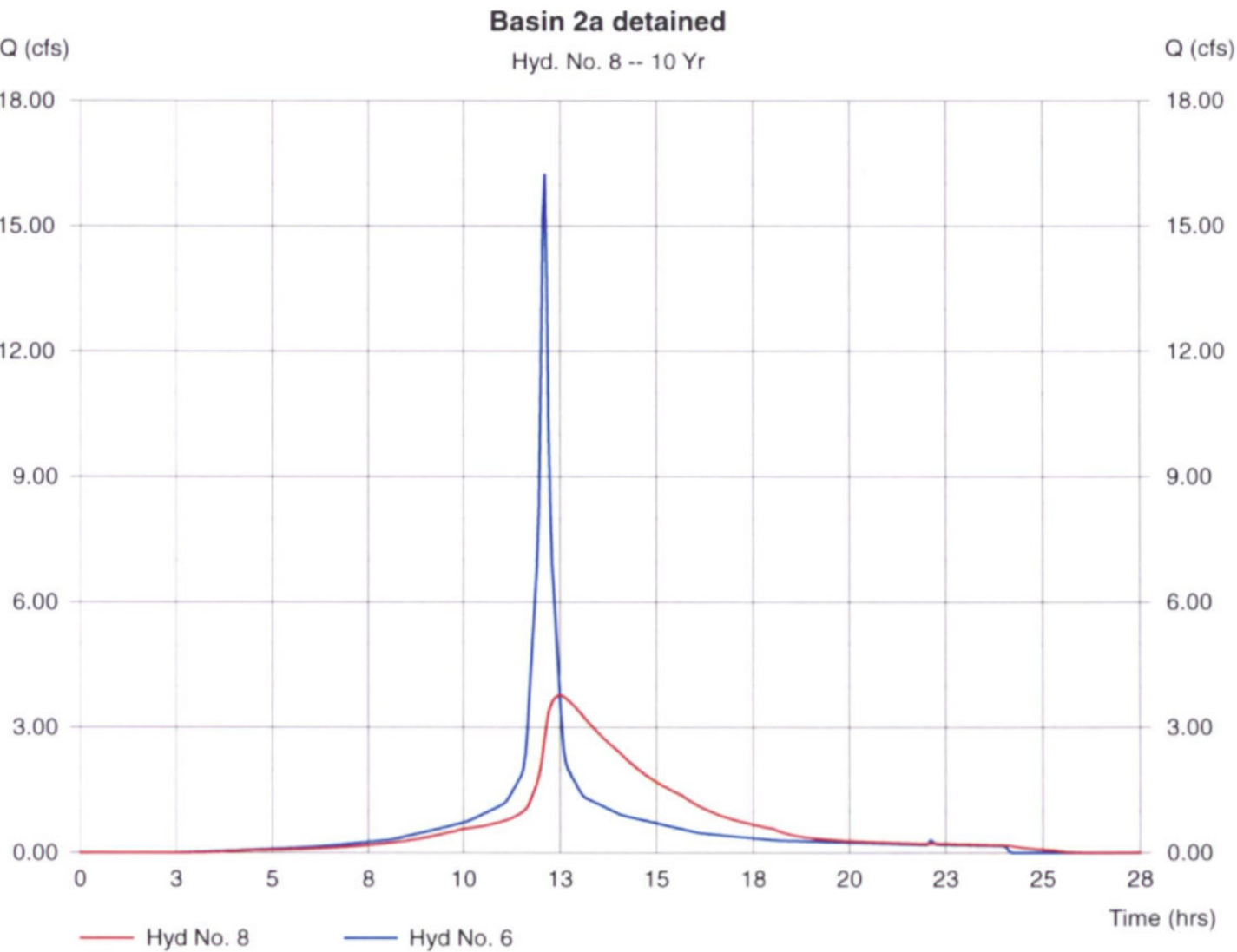
Hyd. No. 8

Basin 2a detained

Hydrograph type	=	Reservoir	Peak discharge	=	3.78 cfs
Storm frequency	=	10 yrs	Time interval	=	3 min
Inflow hyd. No.	=	6	Max. Elevation	=	1360.19 ft
Reservoir name	=	Detention Pond	Max. Storage	=	20,987 cuft

Storage Indication method used.

Hydrograph Volume = 58,550 cuft



Pond Report

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

Pond No. 1 - Detention Pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1355.70	100	0	0
0.30	1356.00	462	84	84
1.30	1357.00	2,657	1,560	1,644
2.30	1358.00	5,414	4,036	5,679
3.30	1359.00	6,793	6,104	11,783
4.30	1360.00	8,240	7,517	19,299
5.30	1361.00	9,765	9,003	28,302
6.30	1362.00	8,479	9,122	37,424
7.30	1363.00	13,025	10,752	48,176

Culvert / Orifice Structures

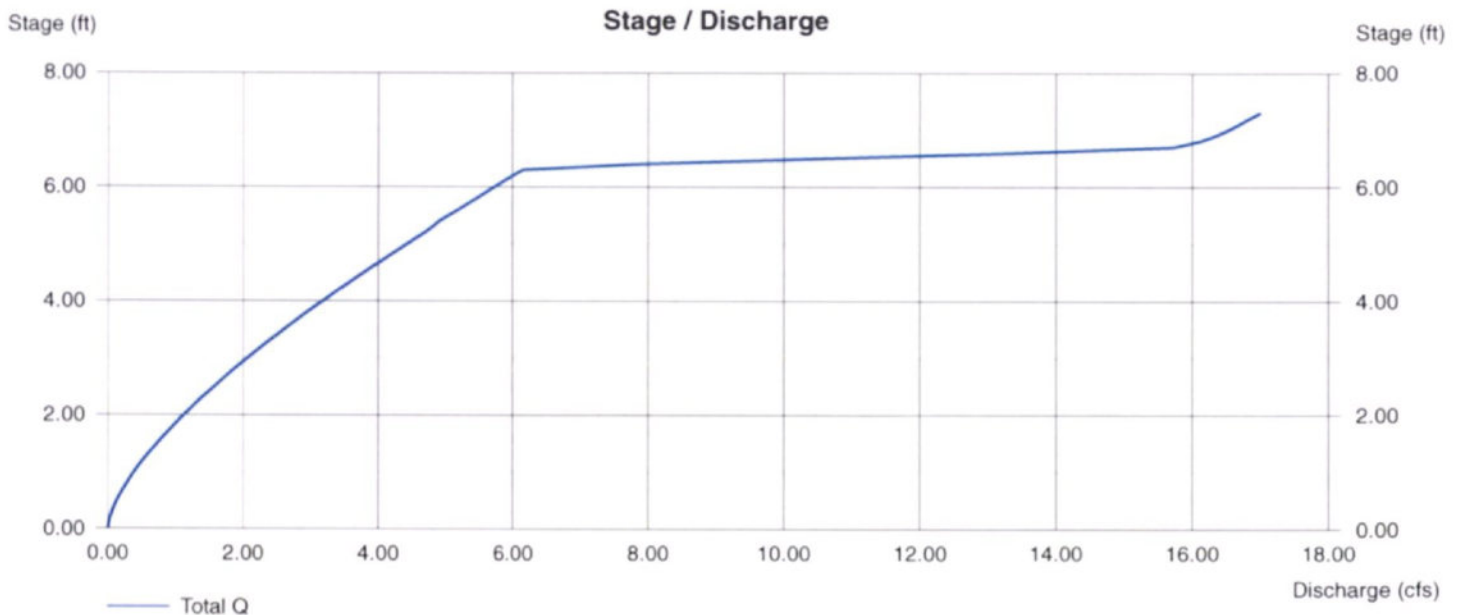
	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1355.70	0.00	0.00	0.00
Length (ft)	= 46.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	0.00
N-Value	= .024	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 16.00	0.13	0.00	0.00
Crest El. (ft)	= 1362.00	1355.70	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Riser	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

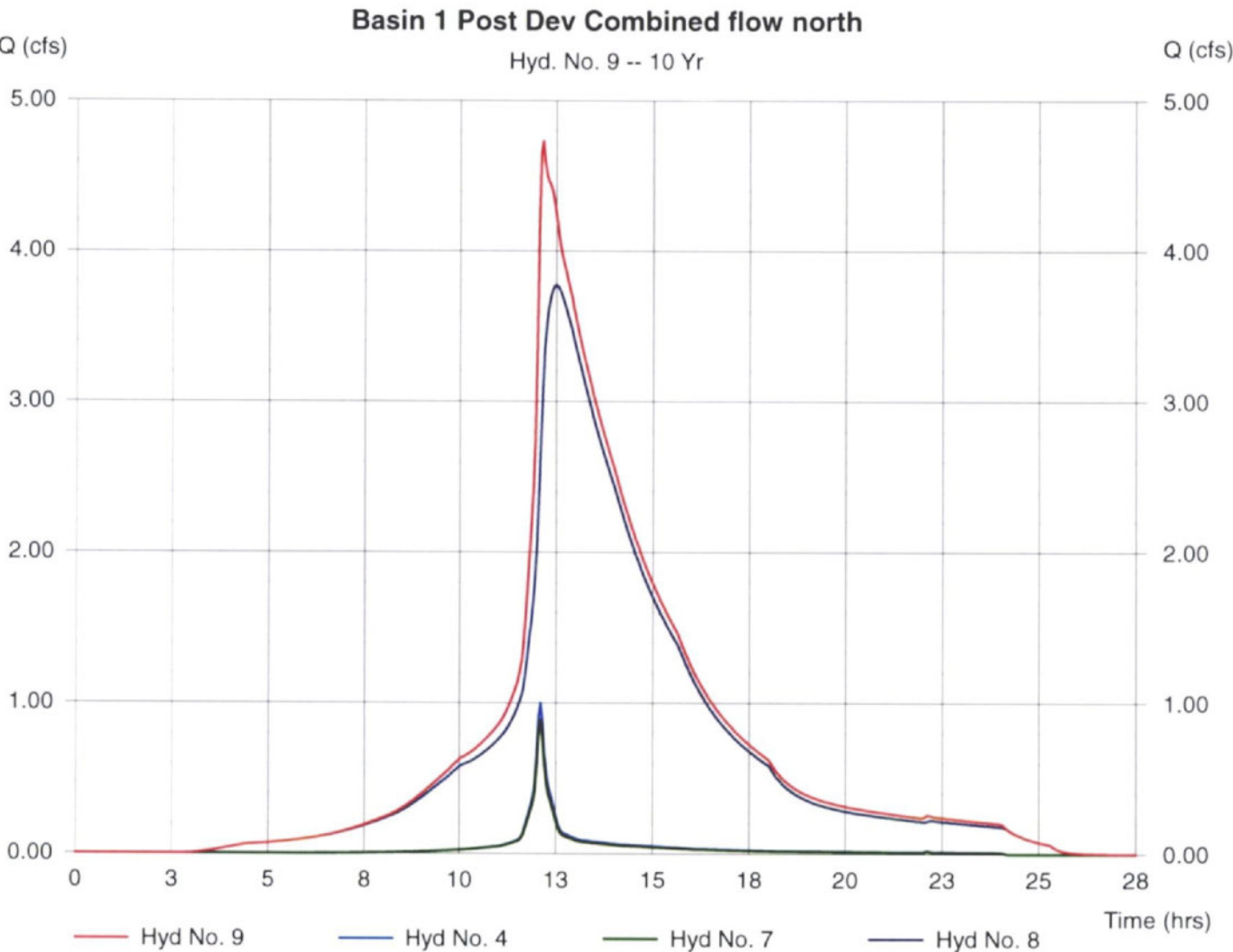
Wednesday, Feb 19 2014, 3:16 PM

Hyd. No. 9

Basin 1 Post Dev Combined flow north

Hydrograph type	= Combine	Peak discharge	= 4.73 cfs
Storm frequency	= 10 yrs	Time interval	= 3 min
Inflow hyds.	= 4, 7, 8		

Hydrograph Volume = 64,880 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

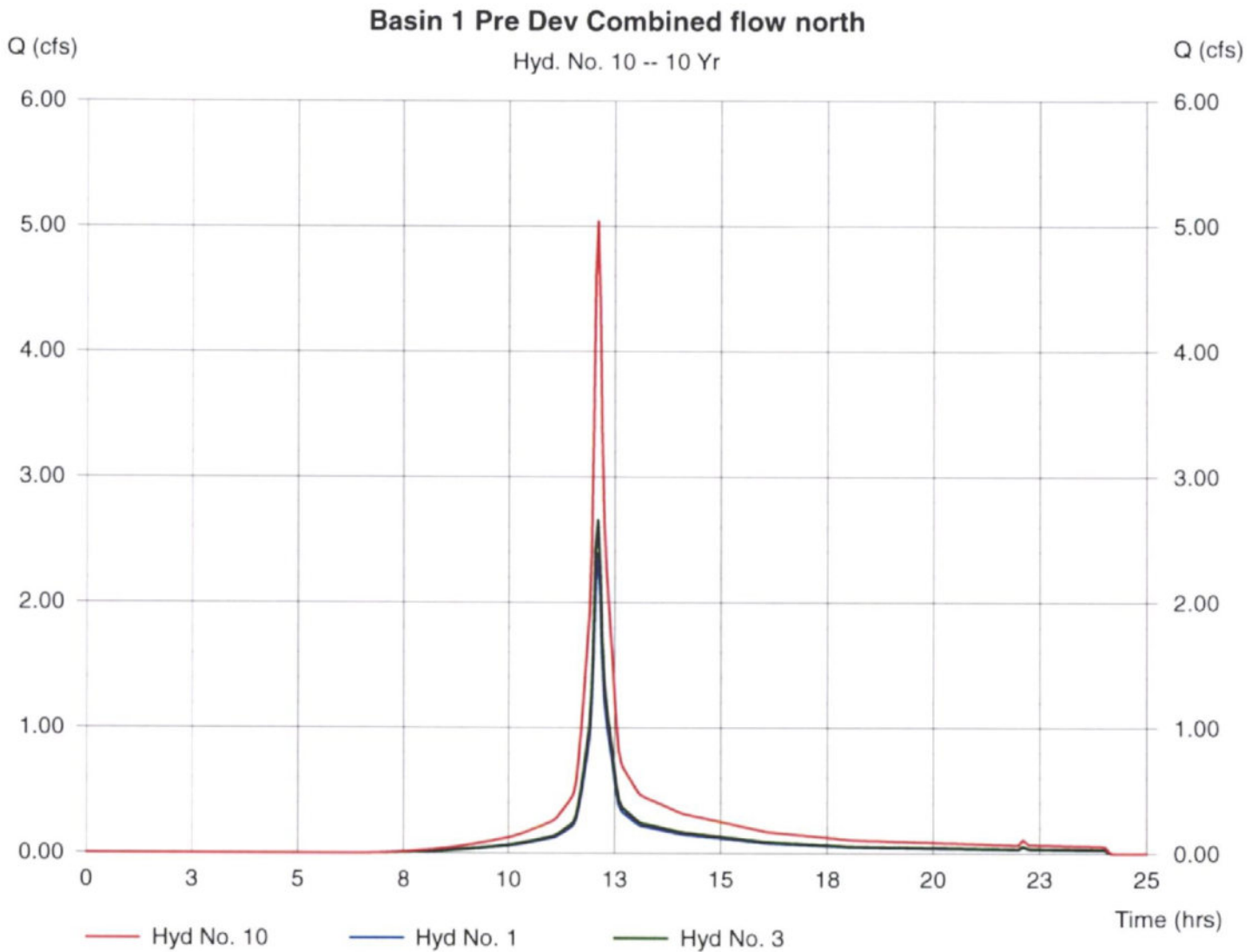
Hyd. No. 10

Basin 1 Pre Dev Combined flow north

Hydrograph type = Combine
Storm frequency = 10 yrs
Inflow hyds. = 1, 3

Peak discharge = 5.04 cfs
Time interval = 3 min

Hydrograph Volume = 16,857 cuft



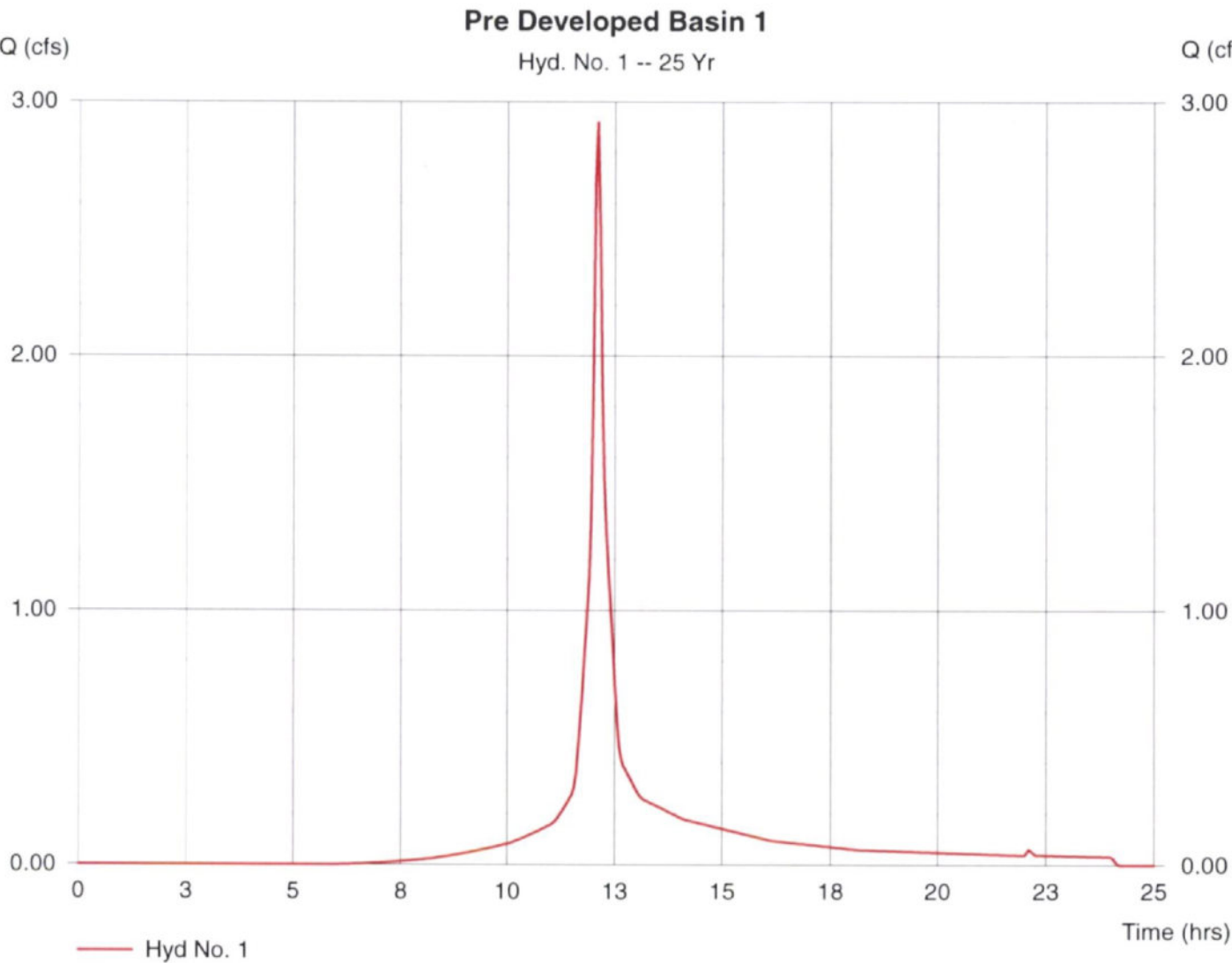
Hydrograph Plot

Hyd. No. 1

Pre Developed Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.92 cfs
Storm frequency	=	25 yrs	Time interval	=	3 min
Drainage area	=	0.620 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.96 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

Hydrograph Volume = 9,827 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

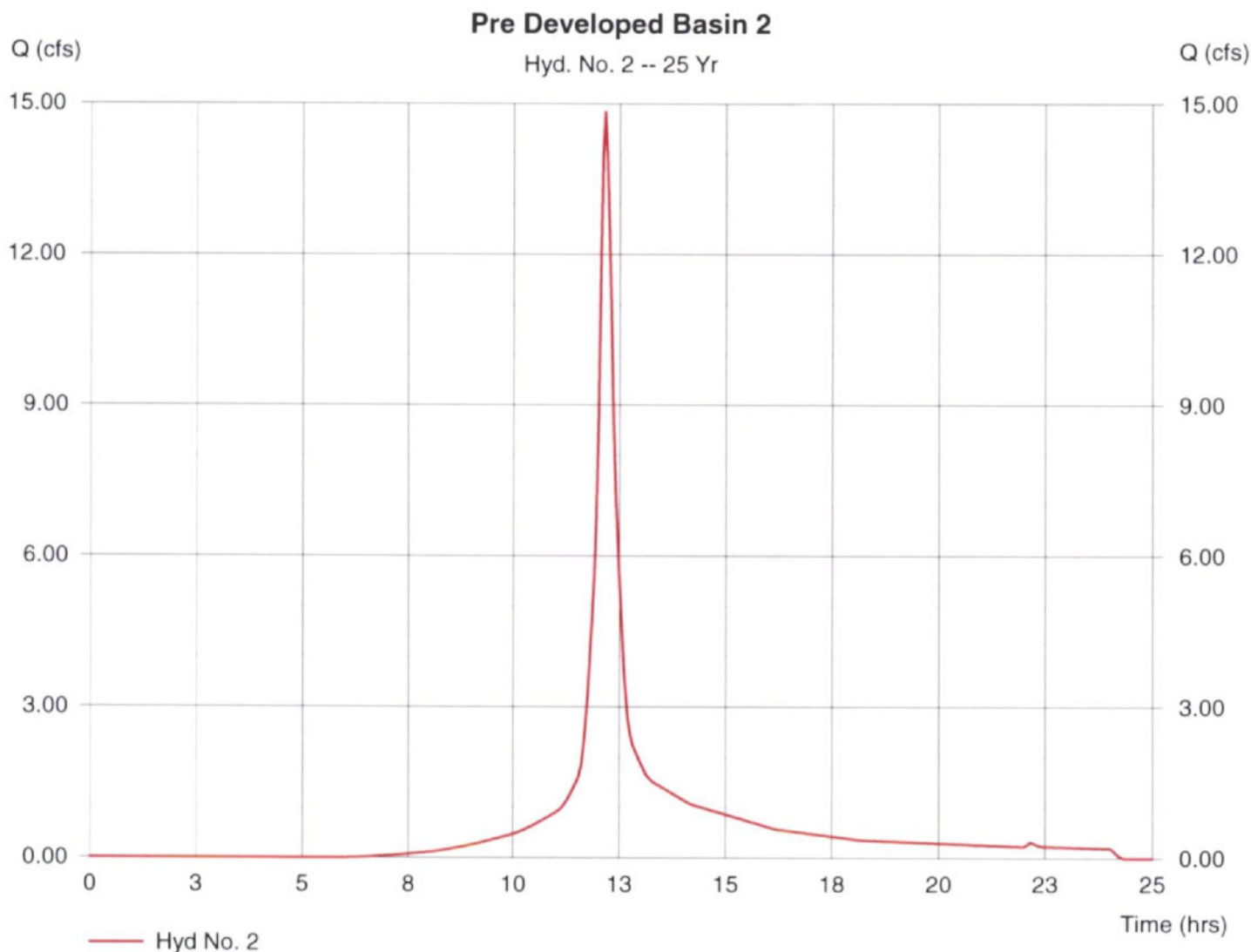
Hyd. No. 2

Pre Developed Basin 2

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Drainage area = 3.480 ac
 Basin Slope = 0.0 %
 Tc method = TR55
 Total precip. = 6.96 in
 Storm duration = 24 hrs

Peak discharge = 14.84 cfs
 Time interval = 3 min
 Curve number = 80
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 10.60 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 58,836 cuft



Pre Developed Basin 2

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.015	0.011	0.011	
Flow length (ft)	= 300.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 4.07	0.00	0.00	
Land slope (%)	= 0.50	0.00	0.00	
Travel Time (min)	= 5.77	+ 0.00	+ 0.00	= 5.77
Shallow Concentrated Flow				
Flow length (ft)	= 467.00	0.00	0.00	
Watercourse slope (%)	= 1.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 1.61	0.00	0.00	
Travel Time (min)	= 4.82	+ 0.00	+ 0.00	= 4.82
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				10.60 min

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

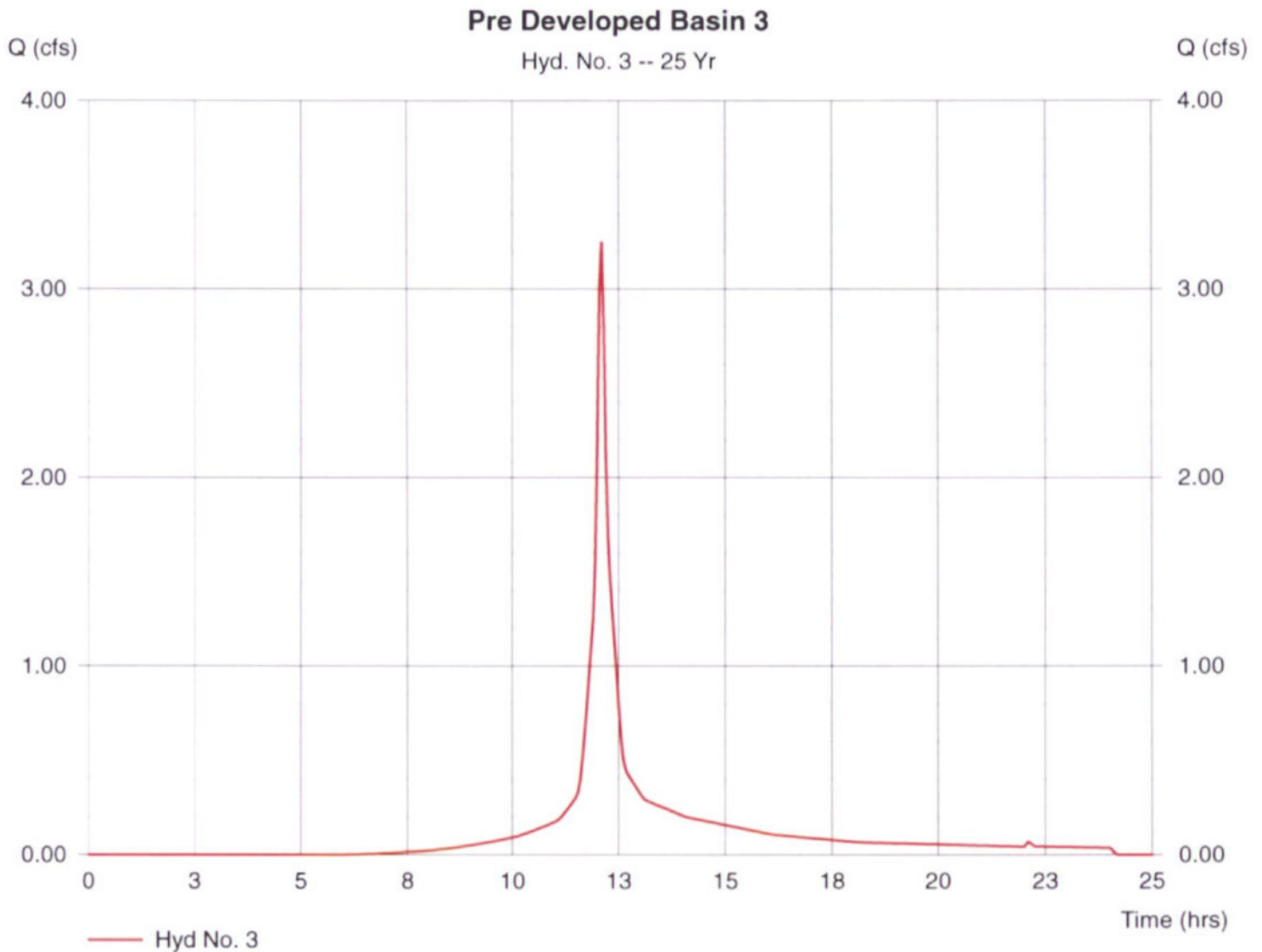
Hyd. No. 3

Pre Developed Basin 3

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Drainage area = 0.690 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 6.96 in
 Storm duration = 24 hrs

Peak discharge = 3.25 cfs
 Time interval = 3 min
 Curve number = 80
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 10,937 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

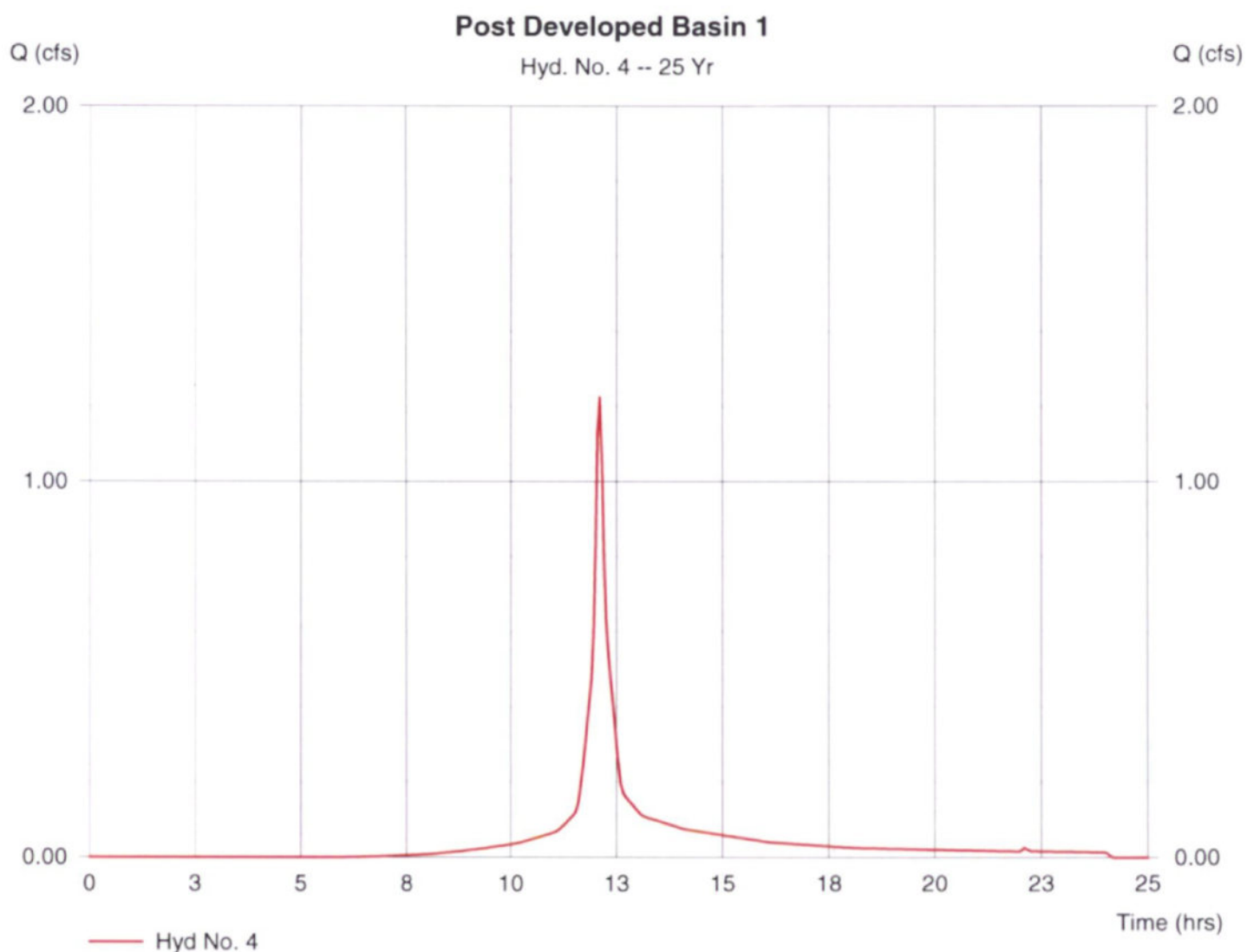
Hyd. No. 4

Post Developed Basin 1

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Drainage area = 0.260 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 6.96 in
 Storm duration = 24 hrs

Peak discharge = 1.22 cfs
 Time interval = 3 min
 Curve number = 80
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 4,121 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

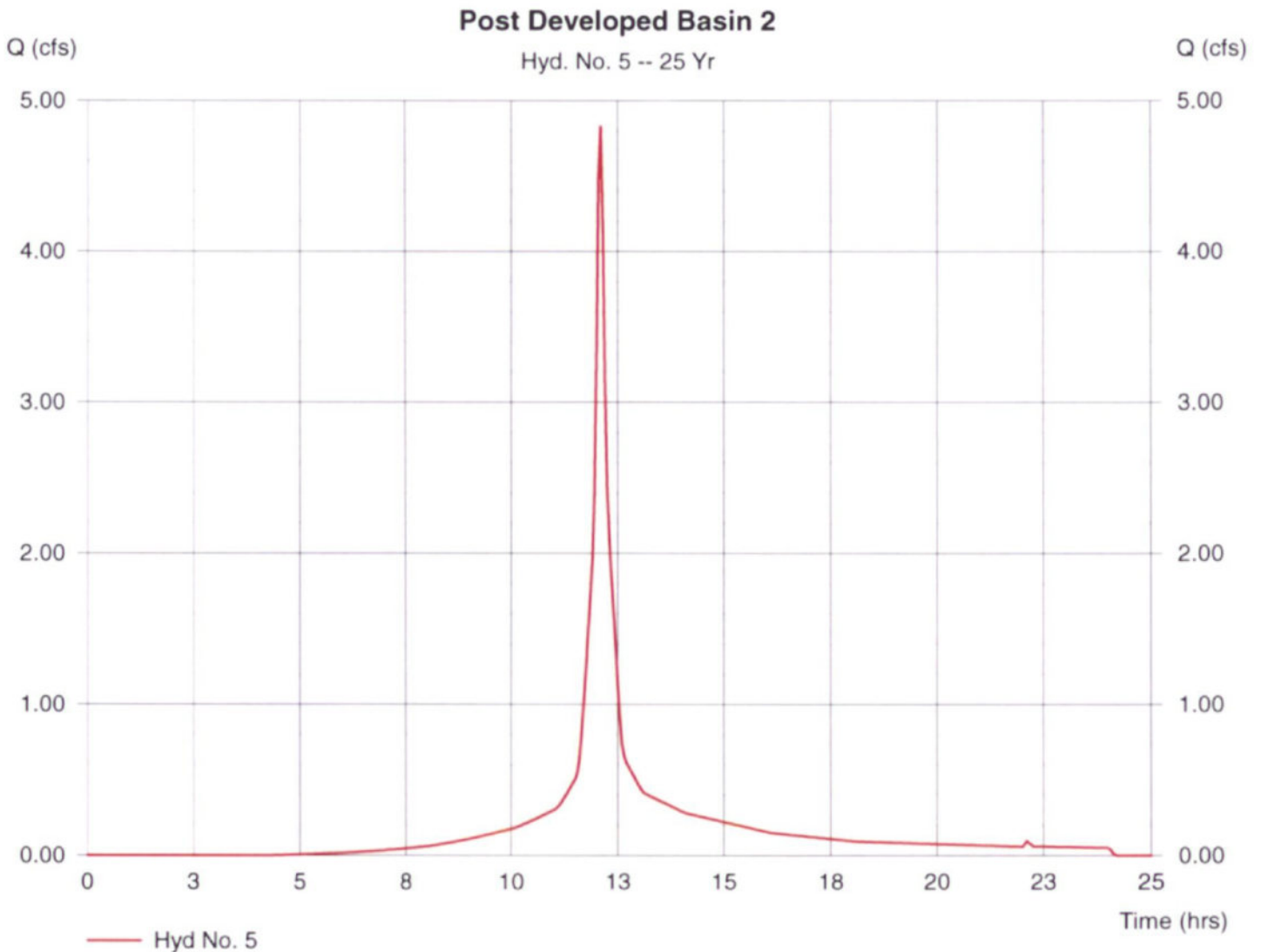
Hyd. No. 5

Post Developed Basin 2

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Drainage area = 0.920 ac
 Basin Slope = 0.0 %
 Tc method = TR55
 Total precip. = 6.96 in
 Storm duration = 24 hrs

Peak discharge = 4.83 cfs
 Time interval = 3 min
 Curve number = 86
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.40 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 16,679 cuft



Post Developed Basin 2

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.015	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 4.07	0.00	0.00	
Land slope (%)	= 0.50	0.00	0.00	
Travel Time (min)	= 2.40	+ 0.00	+ 0.00	= 2.40
Shallow Concentrated Flow				
Flow length (ft)	= 286.00	0.00	0.00	
Watercourse slope (%)	= 1.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 1.61	0.00	0.00	
Travel Time (min)	= 2.95	+ 0.00	+ 0.00	= 2.95
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				5.40 min

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

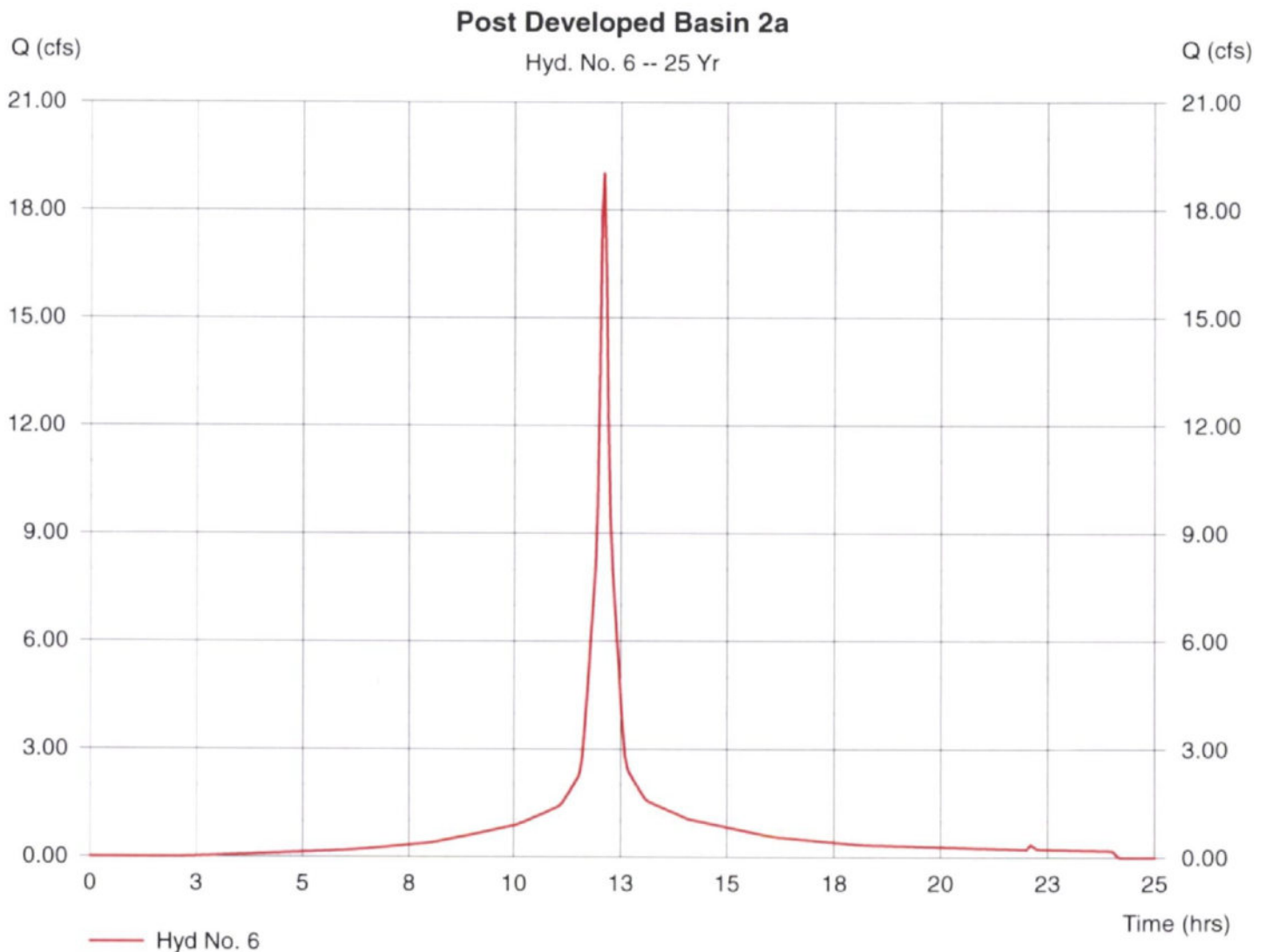
Hyd. No. 6

Post Developed Basin 2a

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Drainage area = 3.320 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 6.96 in
Storm duration = 24 hrs

Peak discharge = 19.02 cfs
Time interval = 3 min
Curve number = 93
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.40 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 69,278 cuft



TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve

Hyd. No. 6

Post Developed Basin 2a

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
Sheet Flow							
Manning's n-value	= 0.015	0.011	0.011				
Flow length (ft)	= 100.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 4.07	0.00	0.00				
Land slope (%)	= 0.50	0.00	0.00				
Travel Time (min)	= 2.40	+	0.00	+	0.00	=	2.40
Shallow Concentrated Flow							
Flow length (ft)	= 286.00	0.00	0.00				
Watercourse slope (%)	= 1.00	0.00	0.00				
Surface description	= Unpaved	Paved	Paved				
Average velocity (ft/s)	= 1.61	0.00	0.00				
Travel Time (min)	= 2.95	+	0.00	+	0.00	=	2.95
Channel Flow							
X sectional flow area (sqft)	= 0.00	0.00	0.00				
Wetted perimeter (ft)	= 0.00	0.00	0.00				
Channel slope (%)	= 0.00	0.00	0.00				
Manning's n-value	= 0.015	0.015	0.015				
Velocity (ft/s)	= 0.00	0.00	0.00				
Flow length (ft)	= 0.0	0.0	0.0				
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc					5.40 min		

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

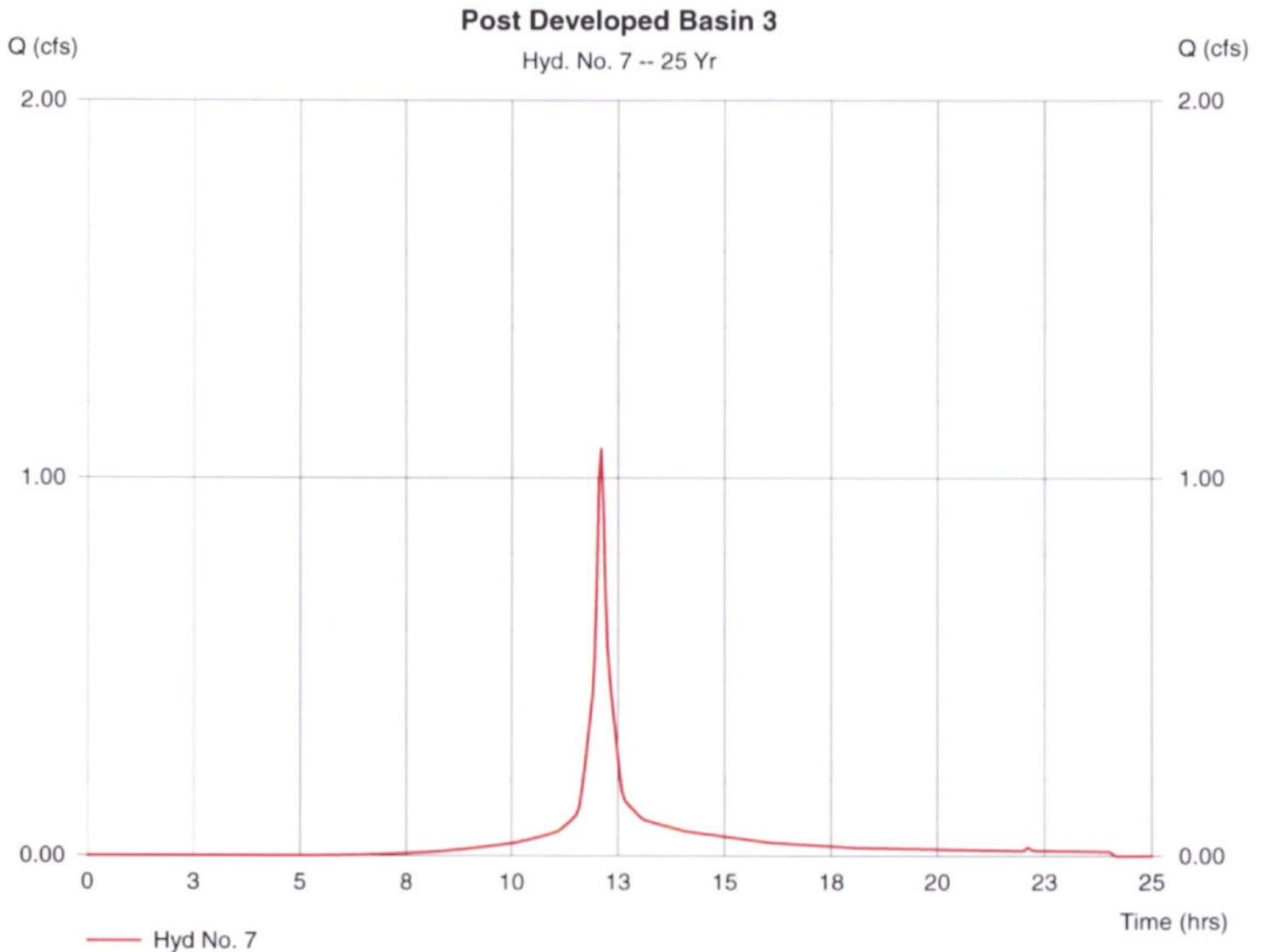
Hyd. No. 7

Post Developed Basin 3

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Drainage area = 0.220 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 6.96 in
 Storm duration = 24 hrs

Peak discharge = 1.08 cfs
 Time interval = 3 min
 Curve number = 82
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 3,653 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

Hyd. No. 8

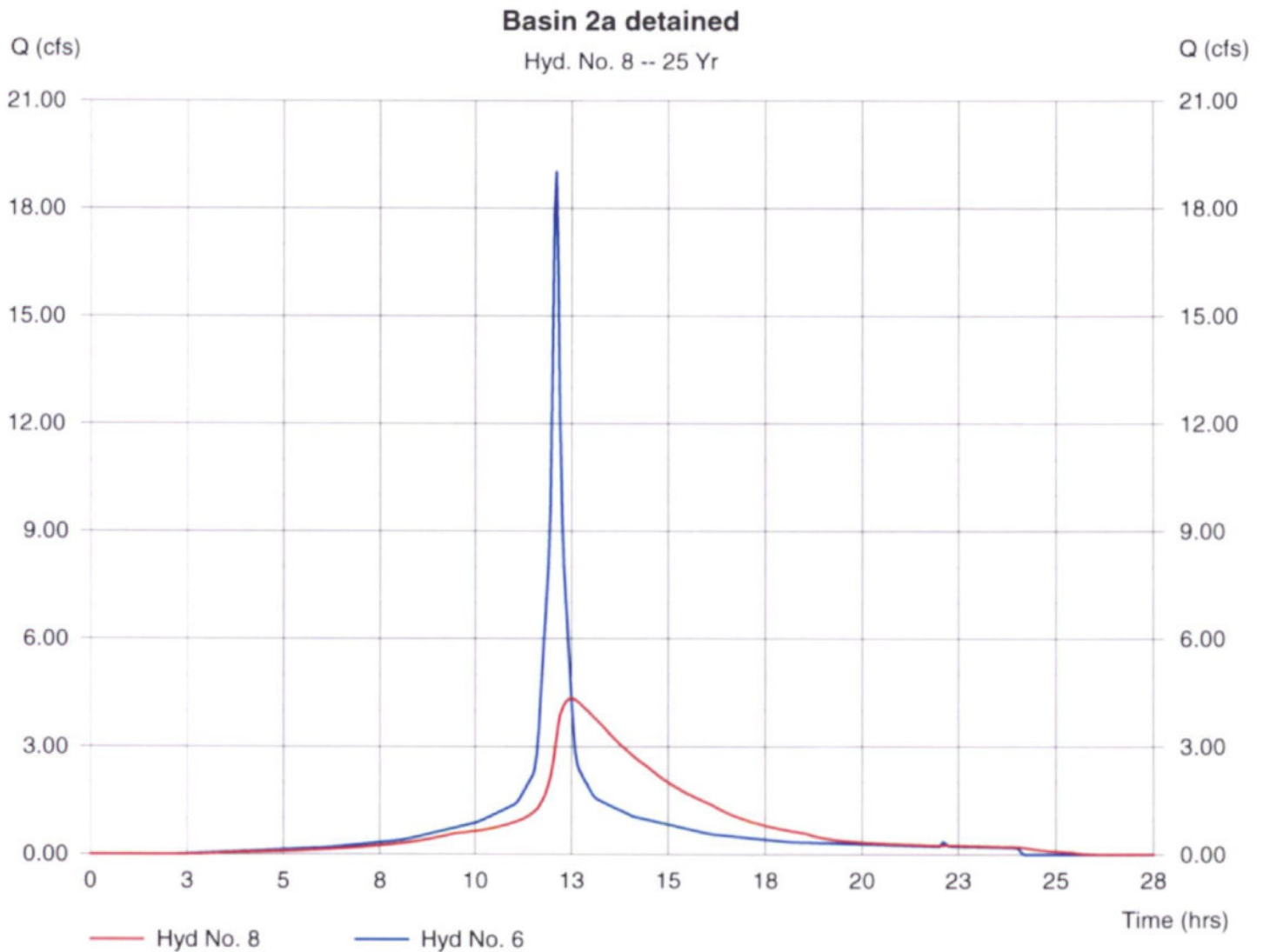
Basin 2a detained

Hydrograph type = Reservoir
Storm frequency = 25 yrs
Inflow hyd. No. = 6
Reservoir name = Detention Pond

Peak discharge = 4.34 cfs
Time interval = 3 min
Max. Elevation = 1360.64 ft
Max. Storage = 25,036 cuft

Storage Indication method used.

Hydrograph Volume = 69,273 cuft



Pond Report

41

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

Pond No. 1 - Detention Pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1355.70	100	0	0
0.30	1356.00	462	84	84
1.30	1357.00	2,657	1,560	1,644
2.30	1358.00	5,414	4,036	5,679
3.30	1359.00	6,793	6,104	11,783
4.30	1360.00	8,240	7,517	19,299
5.30	1361.00	9,765	9,003	28,302
6.30	1362.00	8,479	9,122	37,424
7.30	1363.00	13,025	10,752	48,176

Culvert / Orifice Structures

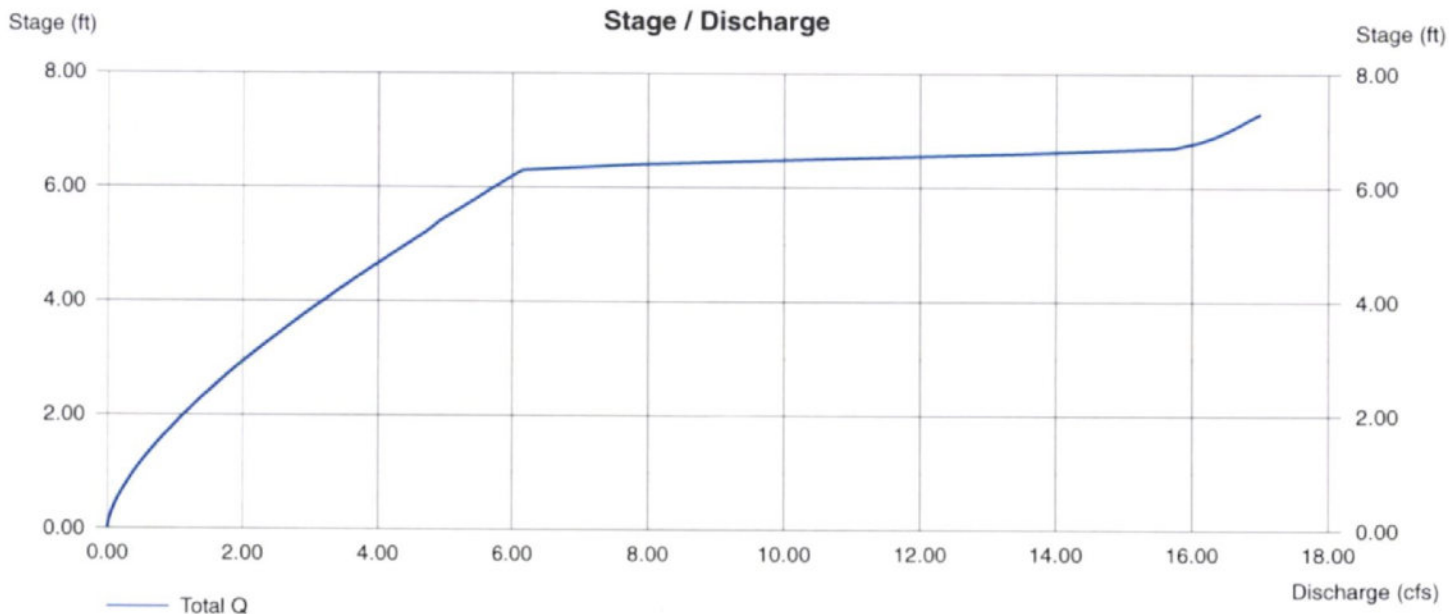
	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1355.70	0.00	0.00	0.00
Length (ft)	= 46.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	0.00
N-Value	= .024	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 16.00	0.13	0.00	0.00
Crest El. (ft)	= 1362.00	1355.70	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Riser	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

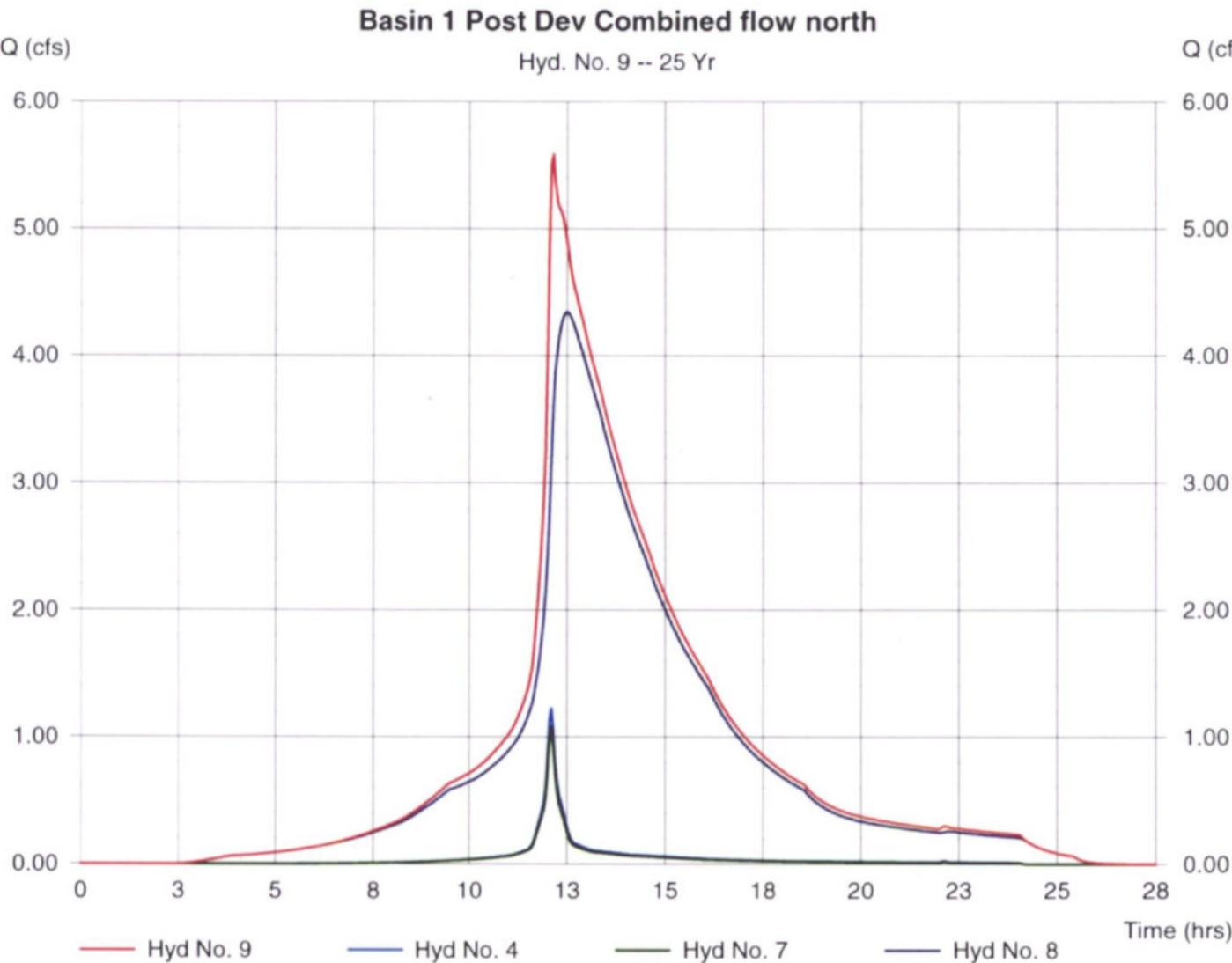
Wednesday, Feb 19 2014, 3:16 PM

Hyd. No. 9

Basin 1 Post Dev Combined flow north

Hydrograph type	= Combine	Peak discharge	= 5.59 cfs
Storm frequency	= 25 yrs	Time interval	= 3 min
Inflow hyds.	= 4, 7, 8		

Hydrograph Volume = 77,046 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

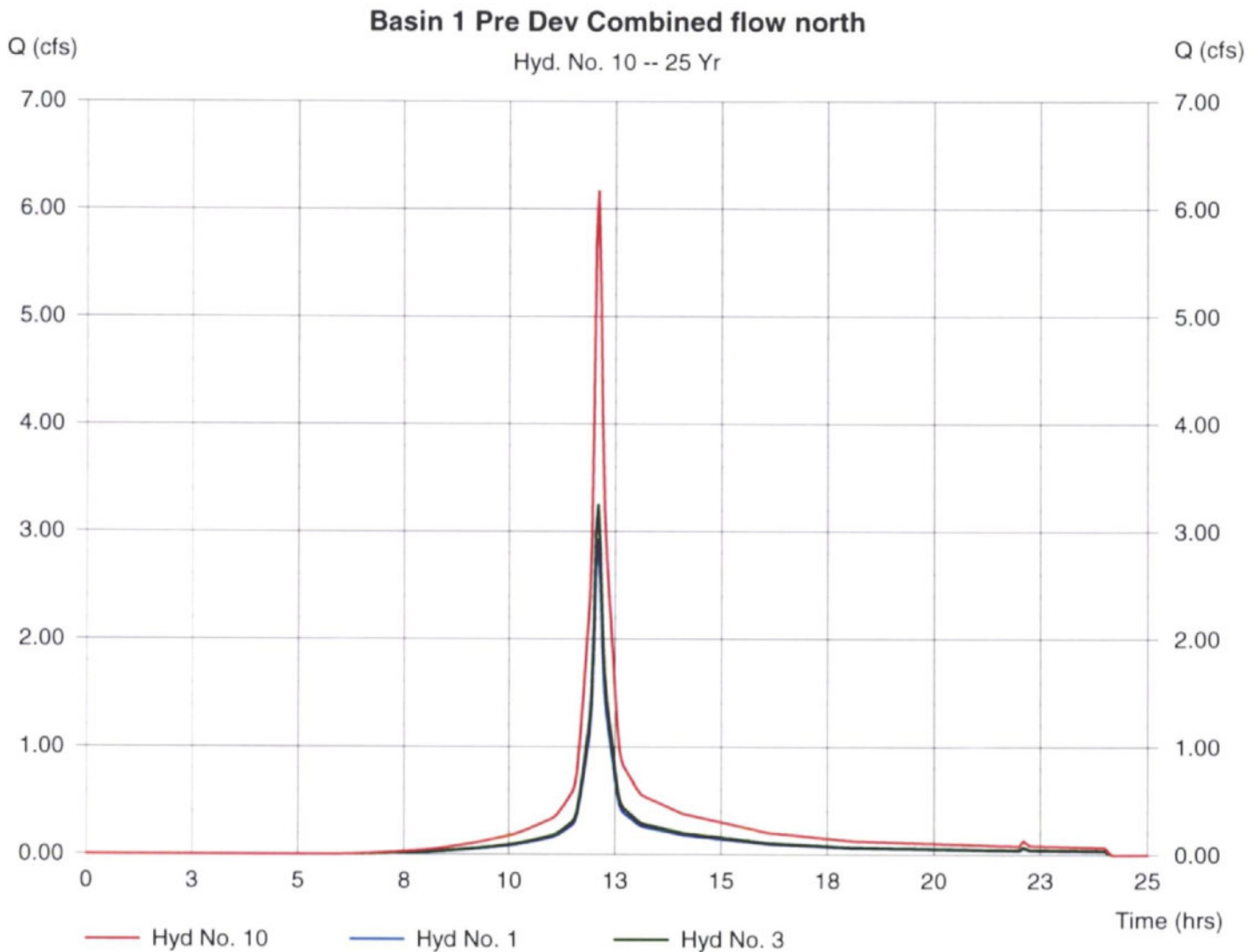
Hyd. No. 10

Basin 1 Pre Dev Combined flow north

Hydrograph type = Combine
Storm frequency = 25 yrs
Inflow hyds. = 1, 3

Peak discharge = 6.17 cfs
Time interval = 3 min

Hydrograph Volume = 20,764 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

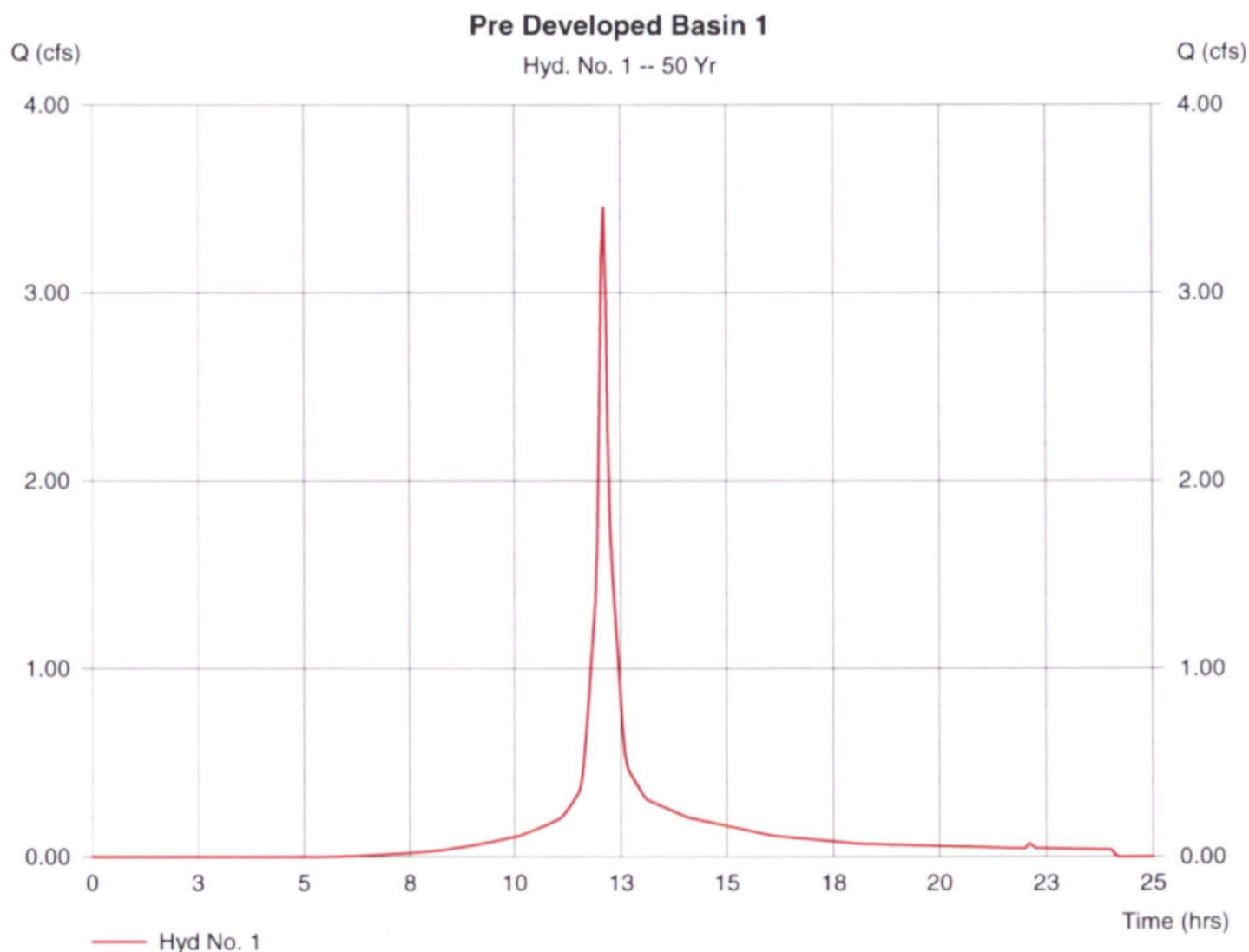
Hyd. No. 1

Pre Developed Basin 1

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Drainage area = 0.620 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 7.92 in
 Storm duration = 24 hrs

Peak discharge = 3.45 cfs
 Time interval = 3 min
 Curve number = 80
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 11,710 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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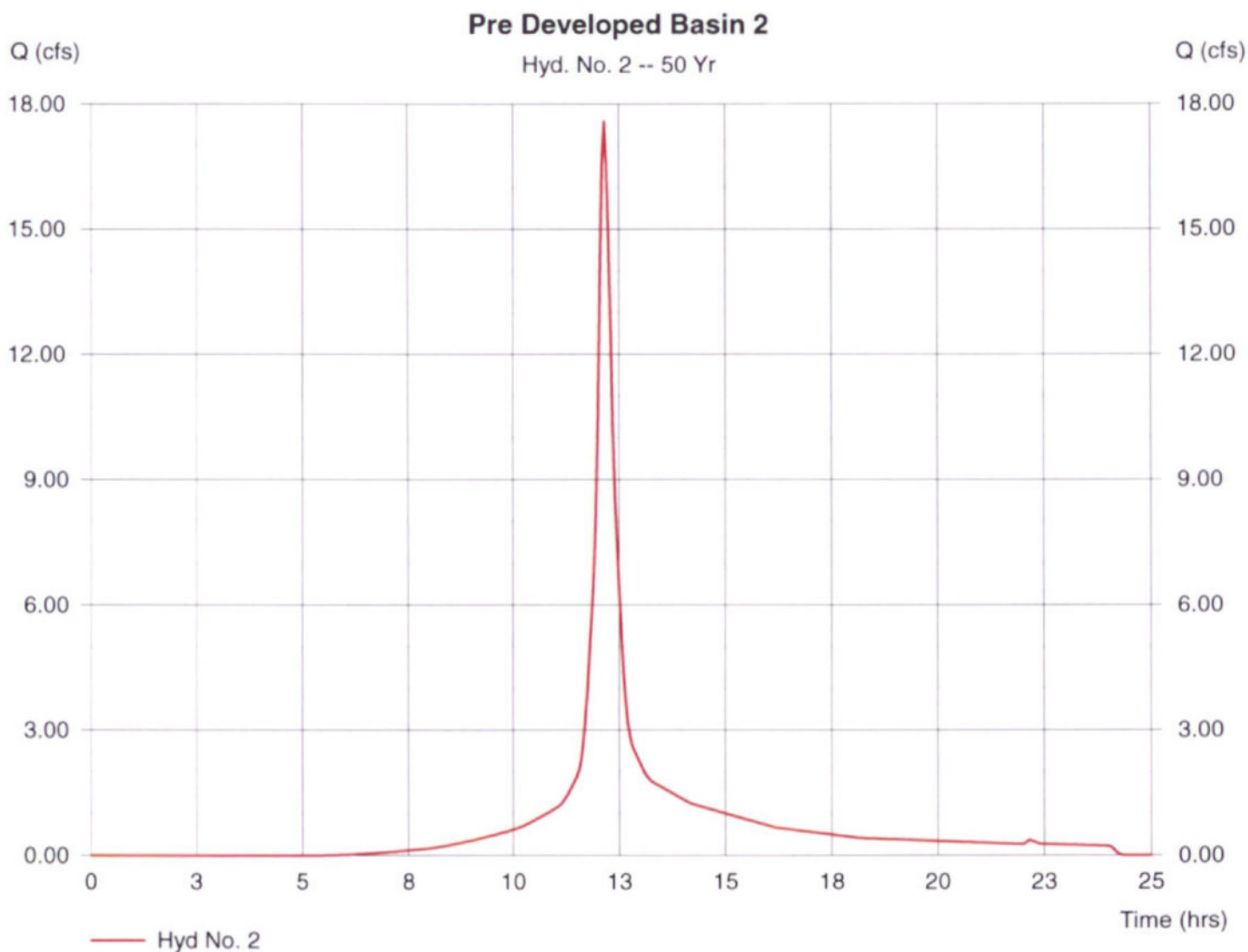
Hyd. No. 2

Pre Developed Basin 2

Hydrograph type = SCS Runoff
Storm frequency = 50 yrs
Drainage area = 3.480 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 7.92 in
Storm duration = 24 hrs

Peak discharge = 17.58 cfs
Time interval = 3 min
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.60 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 70,110 cuft



TR55 Tc Worksheet

Hydraflow Hydrographs by Intelsolve

Hyd. No. 2

Pre Developed Basin 2

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.015	0.011	0.011	
Flow length (ft)	= 300.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 4.07	0.00	0.00	
Land slope (%)	= 0.50	0.00	0.00	
Travel Time (min)	= 5.77	+	0.00	+
Shallow Concentrated Flow				
Flow length (ft)	= 467.00	0.00	0.00	
Watercourse slope (%)	= 1.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 1.61	0.00	0.00	
Travel Time (min)	= 4.82	+	0.00	+
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	= 0.00	+	0.00	+
Total Travel Time, Tc				10.60 min

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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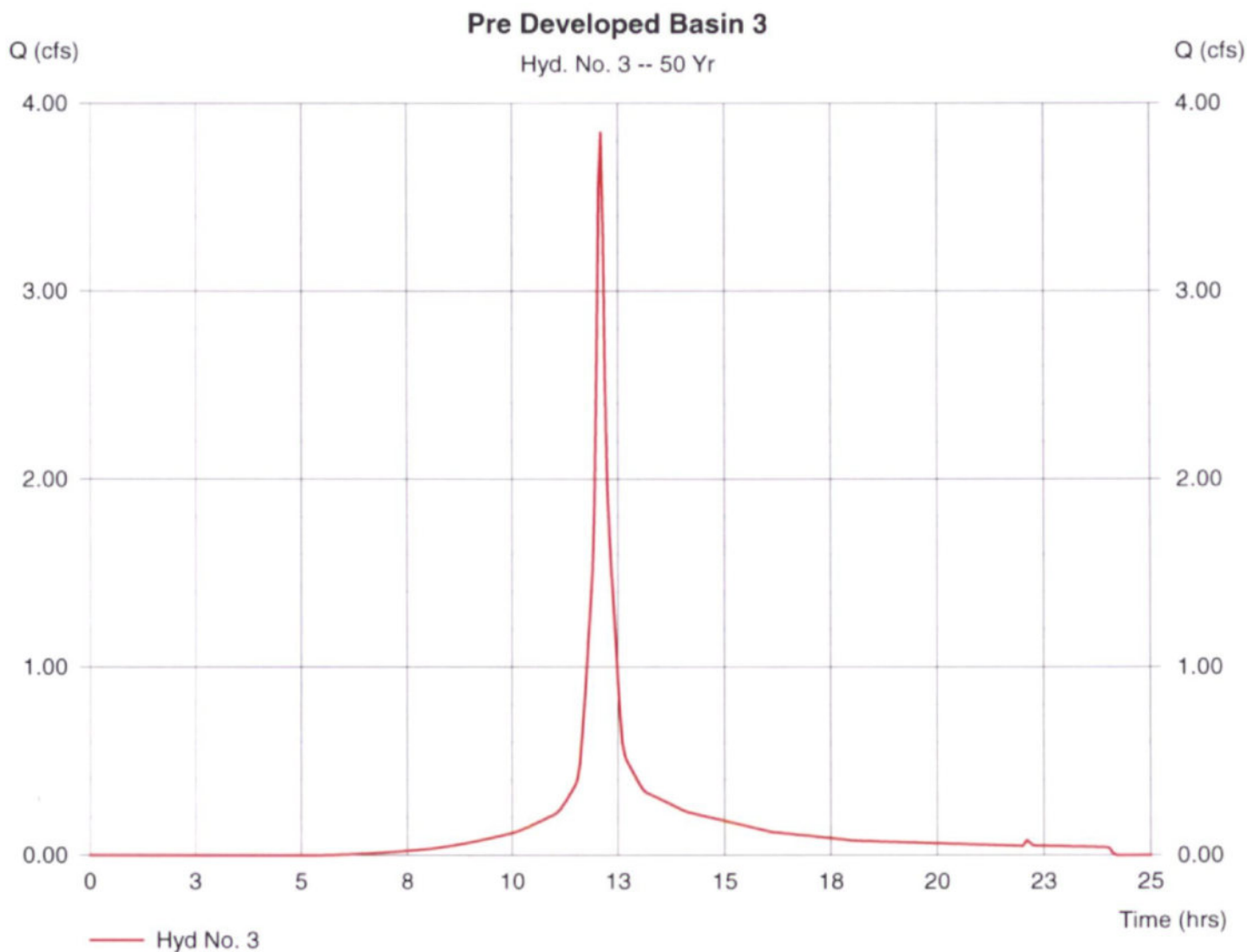
Hyd. No. 3

Pre Developed Basin 3

Hydrograph type = SCS Runoff
Storm frequency = 50 yrs
Drainage area = 0.690 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 7.92 in
Storm duration = 24 hrs

Peak discharge = 3.84 cfs
Time interval = 3 min
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 13,032 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

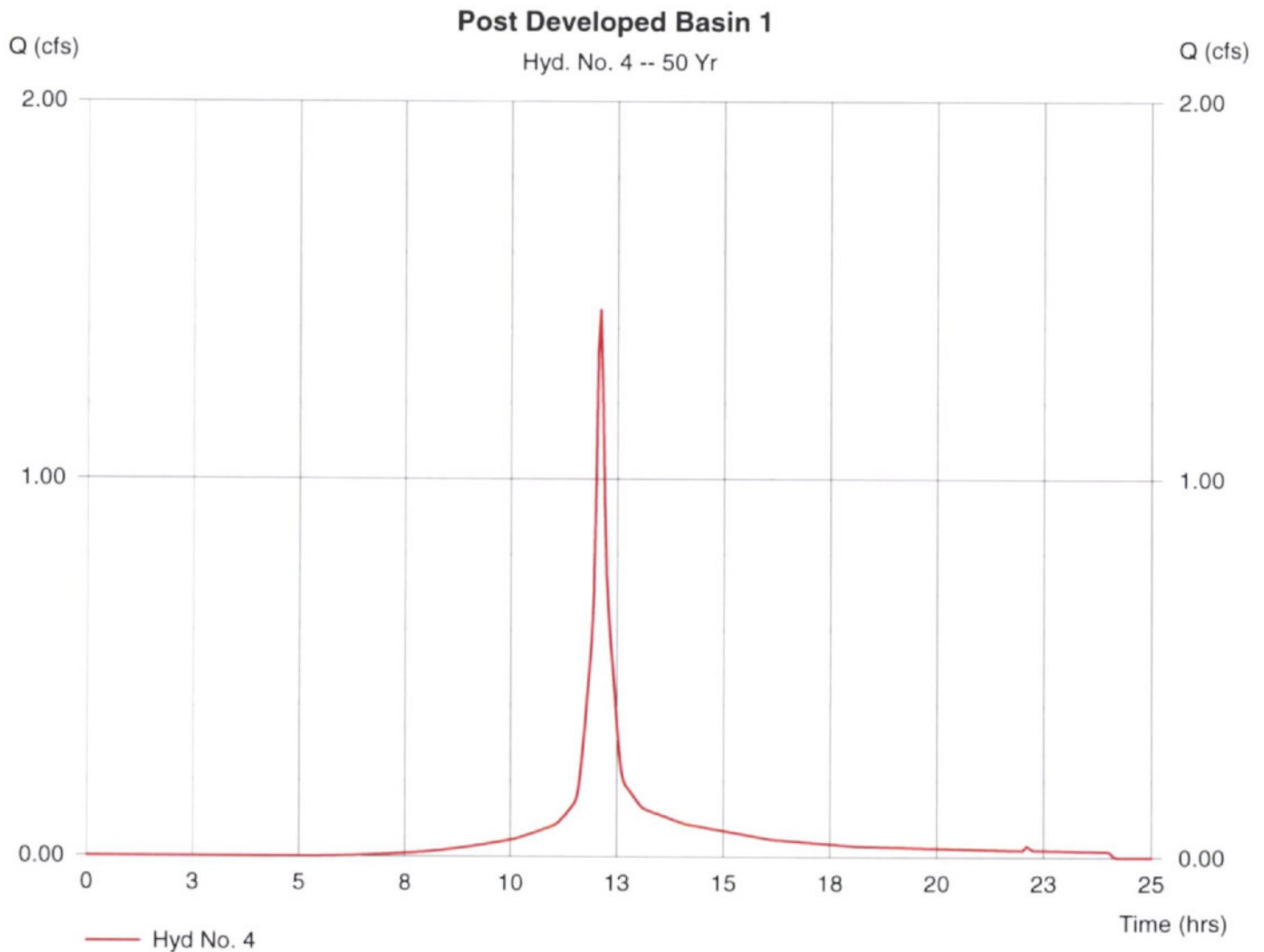
Hyd. No. 4

Post Developed Basin 1

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Drainage area = 0.260 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 7.92 in
 Storm duration = 24 hrs

Peak discharge = 1.45 cfs
 Time interval = 3 min
 Curve number = 80
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 4,911 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

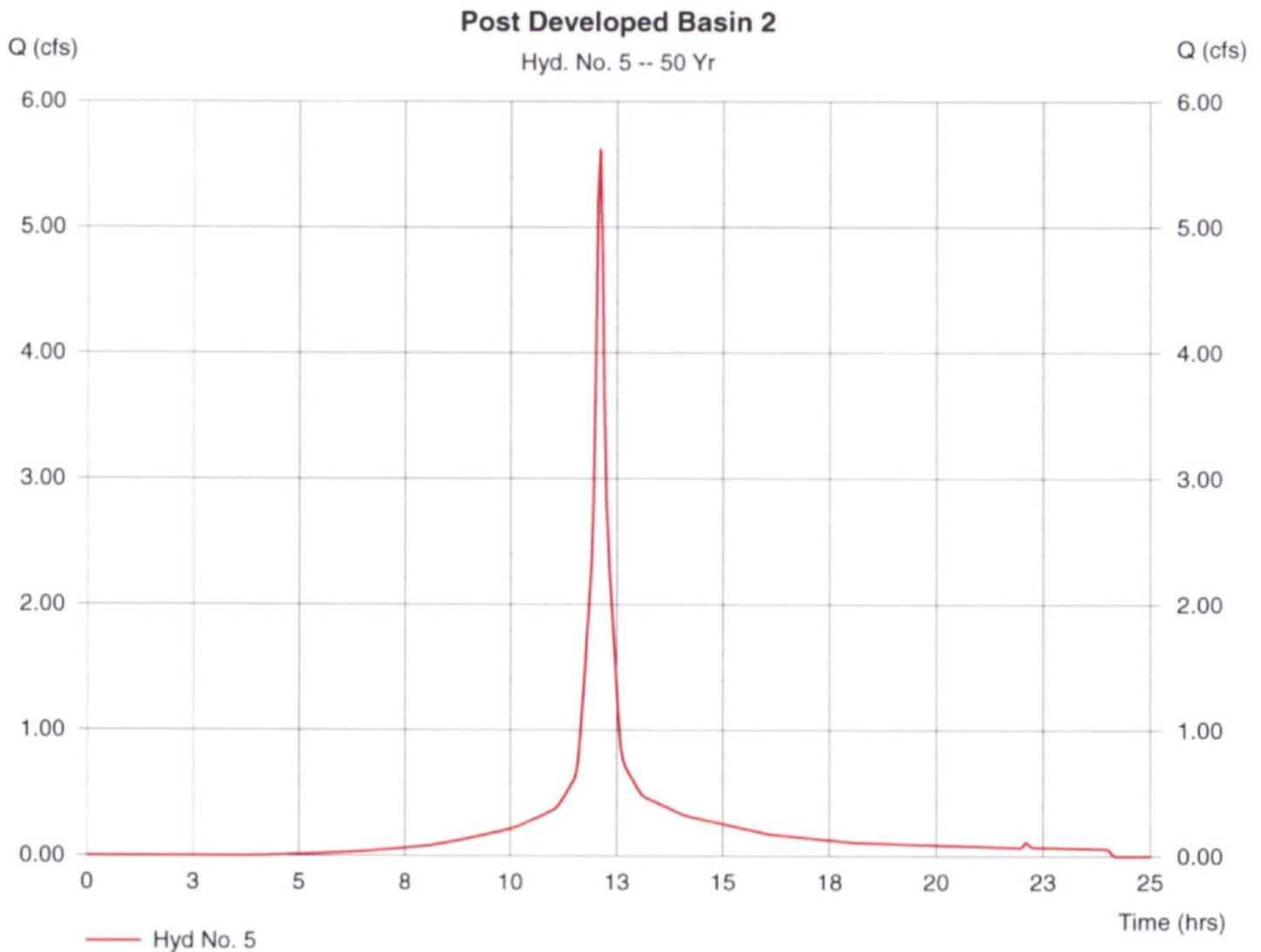
Hyd. No. 5

Post Developed Basin 2

Hydrograph type = SCS Runoff
Storm frequency = 50 yrs
Drainage area = 0.920 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 7.92 in
Storm duration = 24 hrs

Peak discharge = 5.62 cfs
Time interval = 3 min
Curve number = 86
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.40 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 19,580 cuft



<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
--------------------	----------	----------	----------	---------------

Manning's n-value	= 0.015	0.011	0.011
Flow length (ft)	= 100.0	0.0	0.0
Two-year 24-hr precip. (in)	= 4.07	0.00	0.00
Land slope (%)	= 0.50	0.00	0.00

Flow length (ft)	= 286.00	0.00	0.00
Watercourse slope (%)	= 1.00	0.00	0.00
Surface description	= Unpaved	Paved	Paved
Average velocity (ft/s)	= 1.61	0.00	0.00

X sectional flow area (sqft)	= 0.00	0.00	0.00
Wetted perimeter (ft)	= 0.00	0.00	0.00
Channel slope (%)	= 0.00	0.00	0.00
Manning's n-value	= 0.015	0.015	0.015
Velocity (ft/s)	= 0.00	0.00	0.00
Flow length (ft)	= 0.0	0.0	0.0

Total Travel Time, Tc 5.40 min

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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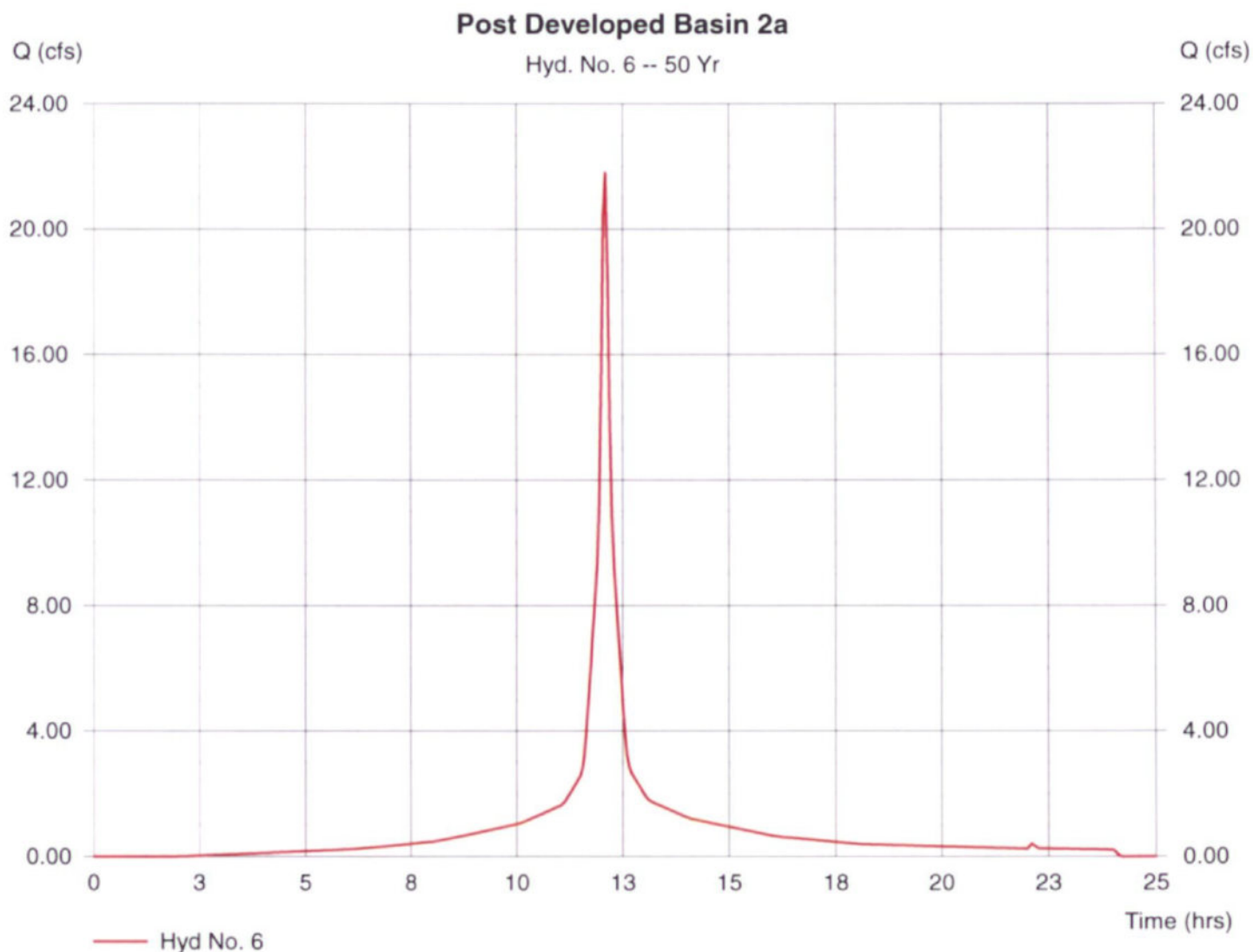
Hyd. No. 6

Post Developed Basin 2a

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Drainage area = 3.320 ac
 Basin Slope = 0.0 %
 Tc method = TR55
 Total precip. = 7.92 in
 Storm duration = 24 hrs

Peak discharge = 21.80 cfs
 Time interval = 3 min
 Curve number = 93
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.40 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 80,029 cuft



TR55 Tc Worksheet

Hydraflow Hydrographs by Intellisolve

Hyd. No. 6

Post Developed Basin 2a

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
Sheet Flow							
Manning's n-value	= 0.015	0.011	0.011				
Flow length (ft)	= 100.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 4.07	0.00	0.00				
Land slope (%)	= 0.50	0.00	0.00				
Travel Time (min)	= 2.40	+	0.00	+	0.00	=	2.40
Shallow Concentrated Flow							
Flow length (ft)	= 286.00	0.00	0.00				
Watercourse slope (%)	= 1.00	0.00	0.00				
Surface description	= Unpaved	Paved	Paved				
Average velocity (ft/s)	= 1.61	0.00	0.00				
Travel Time (min)	= 2.95	+	0.00	+	0.00	=	2.95
Channel Flow							
X sectional flow area (sqft)	= 0.00	0.00	0.00				
Wetted perimeter (ft)	= 0.00	0.00	0.00				
Channel slope (%)	= 0.00	0.00	0.00				
Manning's n-value	= 0.015	0.015	0.015				
Velocity (ft/s)	= 0.00	0.00	0.00				
Flow length (ft)	= 0.0	0.0	0.0				
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc					5.40 min		

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

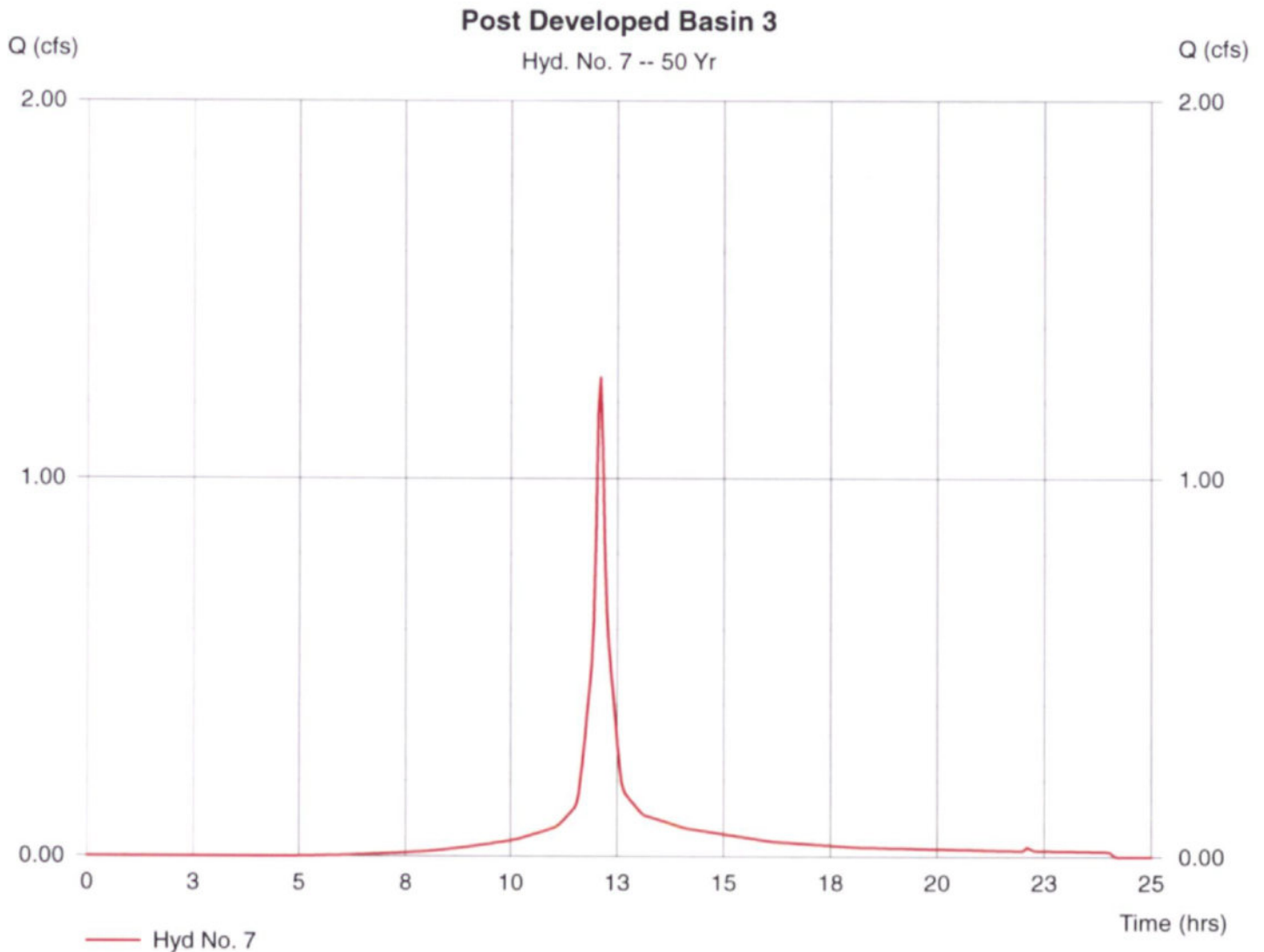
Hyd. No. 7

Post Developed Basin 3

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Drainage area = 0.220 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 7.92 in
 Storm duration = 24 hrs

Peak discharge = 1.27 cfs
 Time interval = 3 min
 Curve number = 82
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 4,330 cuft



Hydrograph Plot

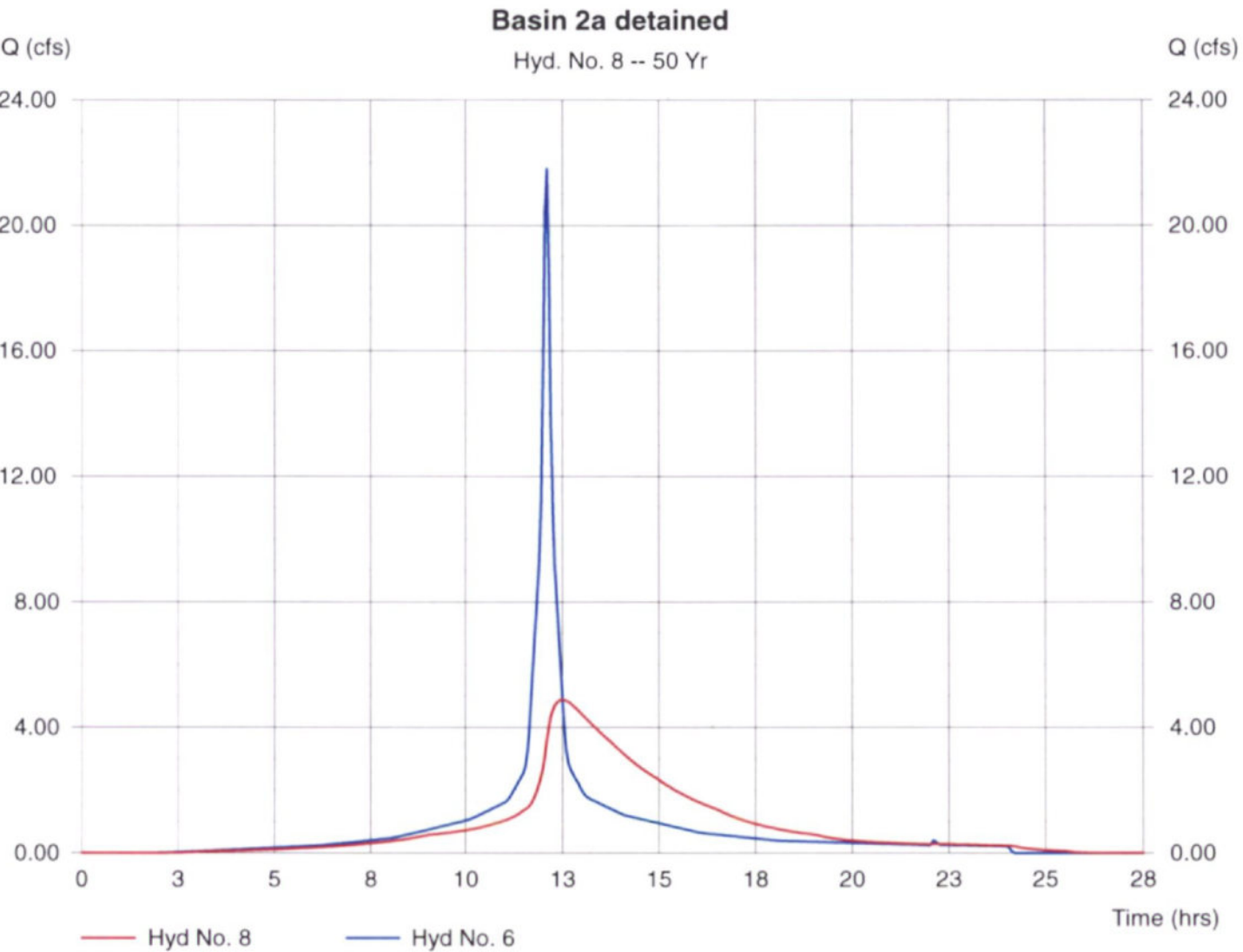
Hyd. No. 8

Basin 2a detained

Hydrograph type	=	Reservoir	Peak discharge	=	4.88 cfs
Storm frequency	=	50 yrs	Time interval	=	3 min
Inflow hyd. No.	=	6	Max. Elevation	=	1361.09 ft
Reservoir name	=	Detention Pond	Max. Storage	=	29,110 cuft

Storage Indication method used.

Hydrograph Volume = 80,024 cuft



Pond Report

55

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

Pond No. 1 - Detention Pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1355.70	100	0	0
0.30	1356.00	462	84	84
1.30	1357.00	2,657	1,560	1,644
2.30	1358.00	5,414	4,036	5,679
3.30	1359.00	6,793	6,104	11,783
4.30	1360.00	8,240	7,517	19,299
5.30	1361.00	9,765	9,003	28,302
6.30	1362.00	8,479	9,122	37,424
7.30	1363.00	13,025	10,752	48,176

Culvert / Orifice Structures

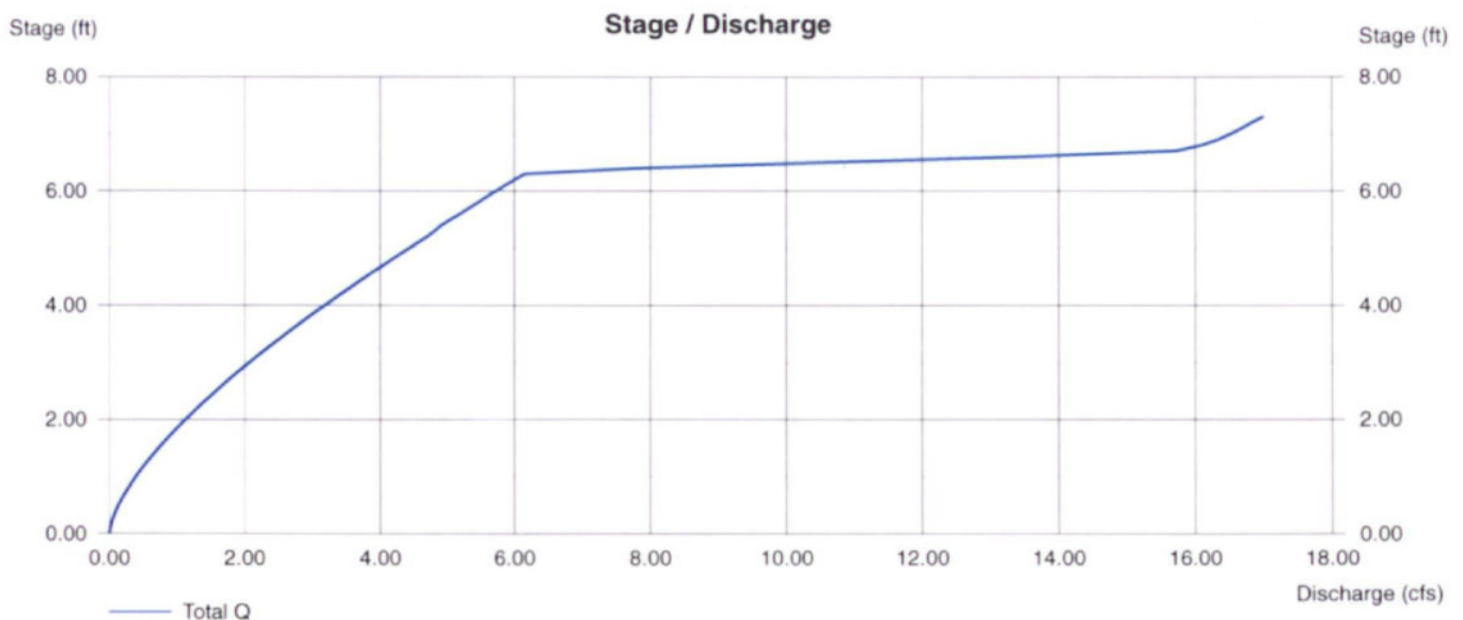
	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1355.70	0.00	0.00	0.00
Length (ft)	= 46.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	0.00
N-Value	= .024	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 16.00	0.13	0.00	0.00
Crest El. (ft)	= 1362.00	1355.70	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Riser	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

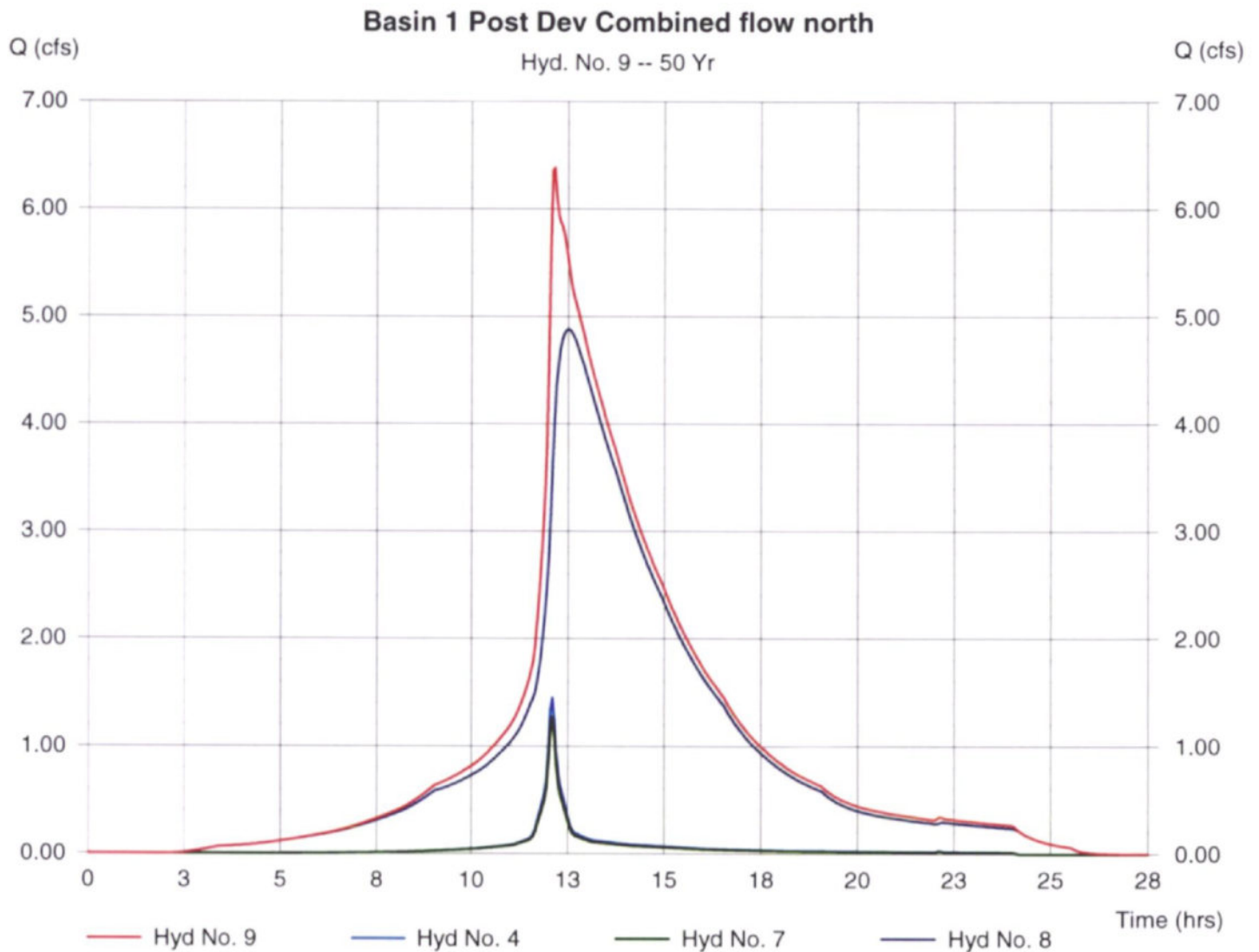
Hyd. No. 9

Basin 1 Post Dev Combined flow north

Hydrograph type = Combine
Storm frequency = 50 yrs
Inflow hyds. = 4, 7, 8

Peak discharge = 6.39 cfs
Time interval = 3 min

Hydrograph Volume = 89,265 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

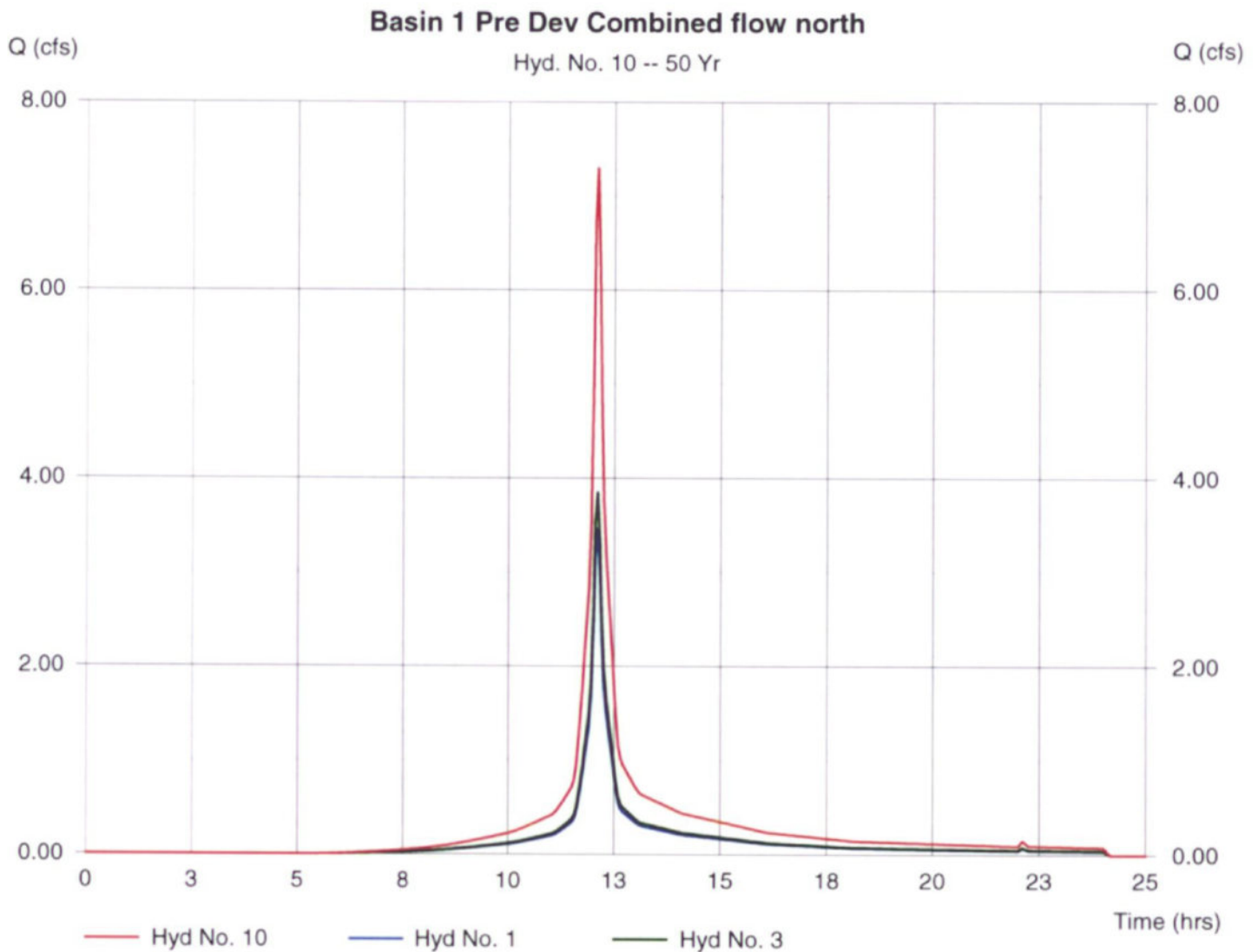
Hyd. No. 10

Basin 1 Pre Dev Combined flow north

Hydrograph type = Combine
Storm frequency = 50 yrs
Inflow hyds. = 1, 3

Peak discharge = 7.30 cfs
Time interval = 3 min

Hydrograph Volume = 24,743 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

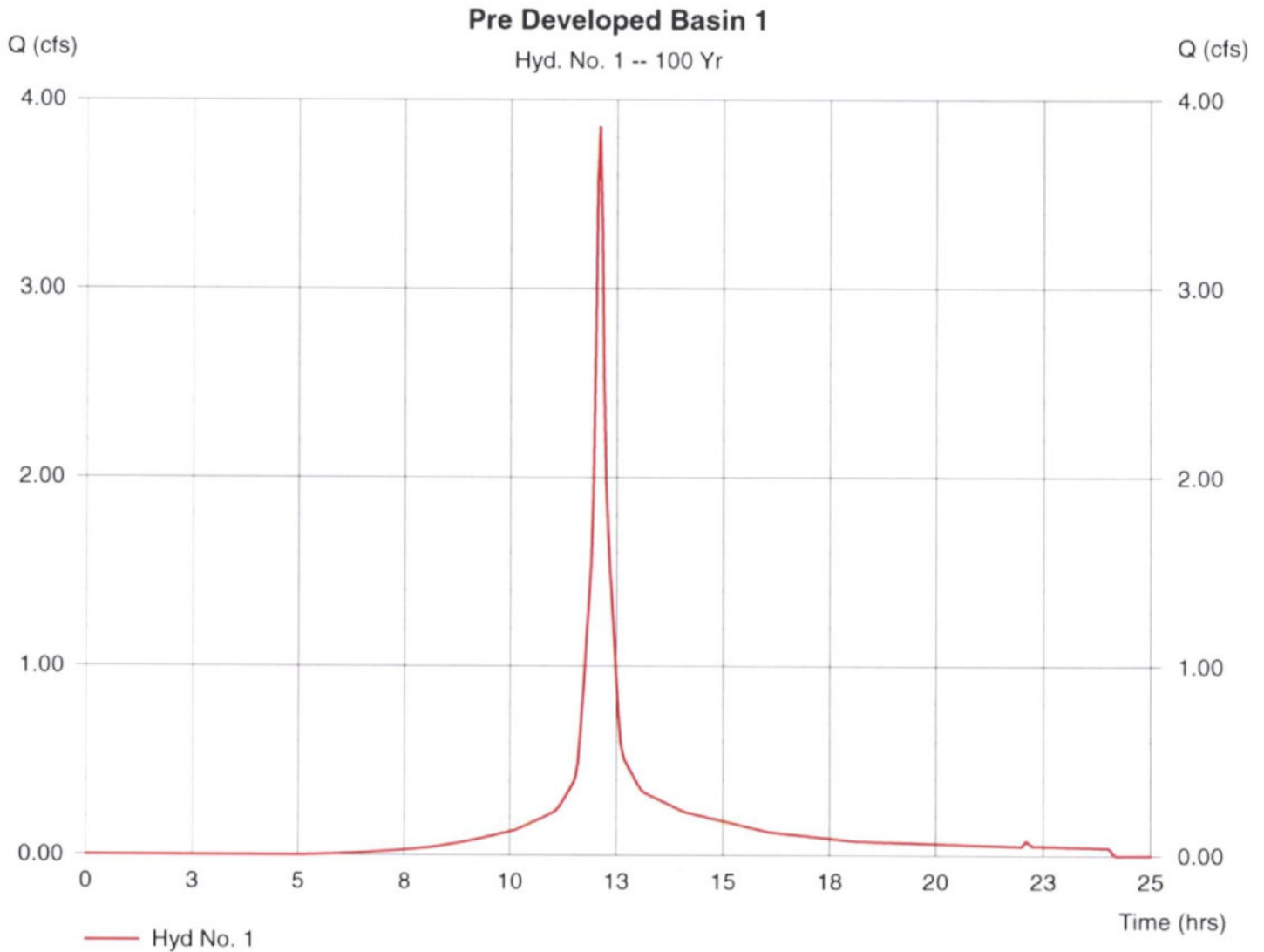
Hyd. No. 1

Pre Developed Basin 1

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Drainage area = 0.620 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 8.64 in
 Storm duration = 24 hrs

Peak discharge = 3.86 cfs
 Time interval = 3 min
 Curve number = 80
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 13,139 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

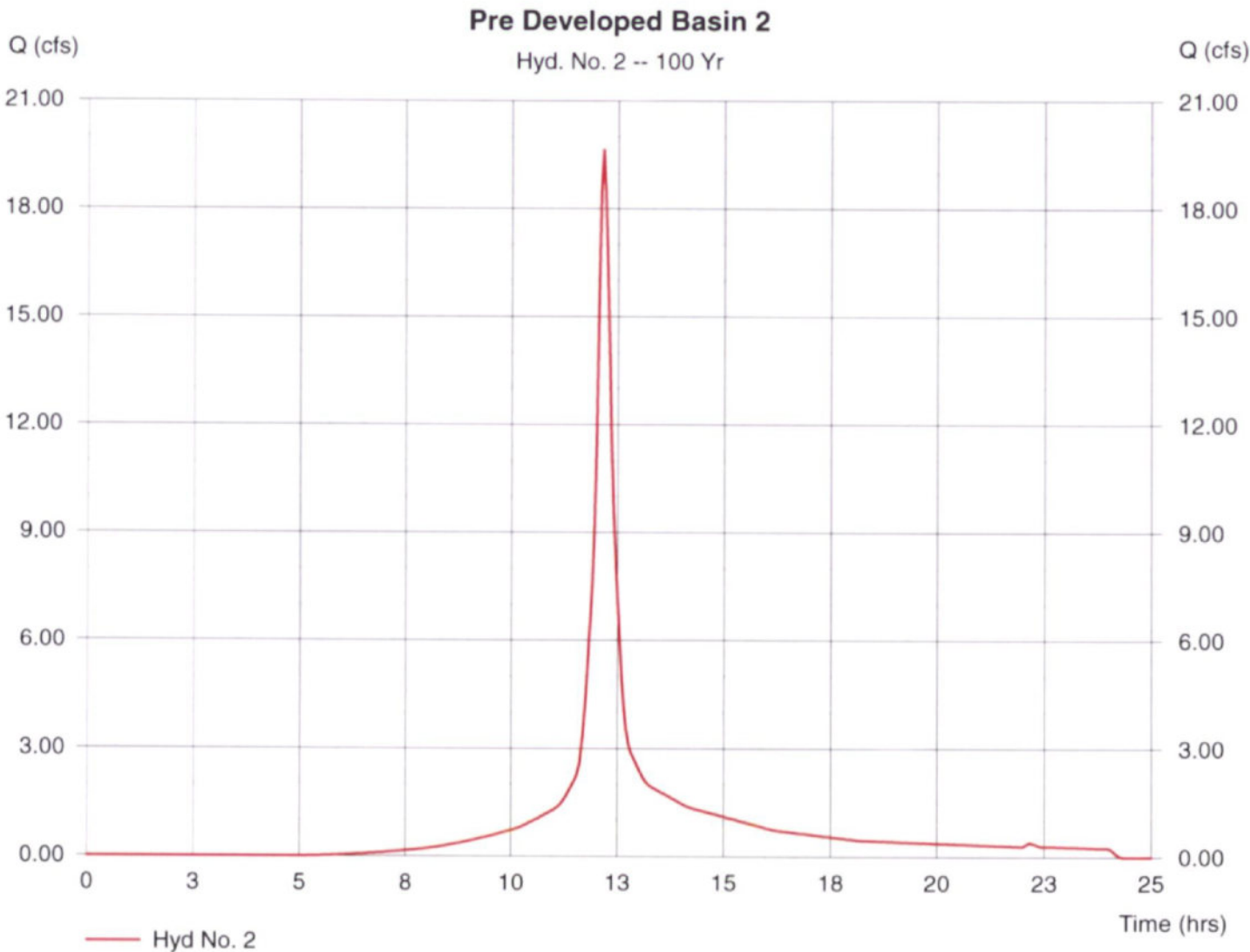
Hyd. No. 2

Pre Developed Basin 2

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 3.480 ac
Basin Slope = 0.0 %
Tc method = TR55
Total precip. = 8.64 in
Storm duration = 24 hrs

Peak discharge = 19.64 cfs
Time interval = 3 min
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.60 min
Distribution = Type III
Shape factor = 484

Hydrograph Volume = 78,667 cuft



TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

Pre Developed Basin 2

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
Sheet Flow							
Manning's n-value	= 0.015	0.011	0.011				
Flow length (ft)	= 300.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 4.07	0.00	0.00				
Land slope (%)	= 0.50	0.00	0.00				
Travel Time (min)	= 5.77	+	0.00	+	0.00	=	5.77
Shallow Concentrated Flow							
Flow length (ft)	= 467.00	0.00	0.00				
Watercourse slope (%)	= 1.00	0.00	0.00				
Surface description	= Unpaved	Paved	Paved				
Average velocity (ft/s)	= 1.61	0.00	0.00				
Travel Time (min)	= 4.82	+	0.00	+	0.00	=	4.82
Channel Flow							
X sectional flow area (sqft)	= 0.00	0.00	0.00				
Wetted perimeter (ft)	= 0.00	0.00	0.00				
Channel slope (%)	= 0.00	0.00	0.00				
Manning's n-value	= 0.015	0.015	0.015				
Velocity (ft/s)	= 0.00	0.00	0.00				
Flow length (ft)	= 0.0	0.0	0.0				
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc					10.60 min		

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

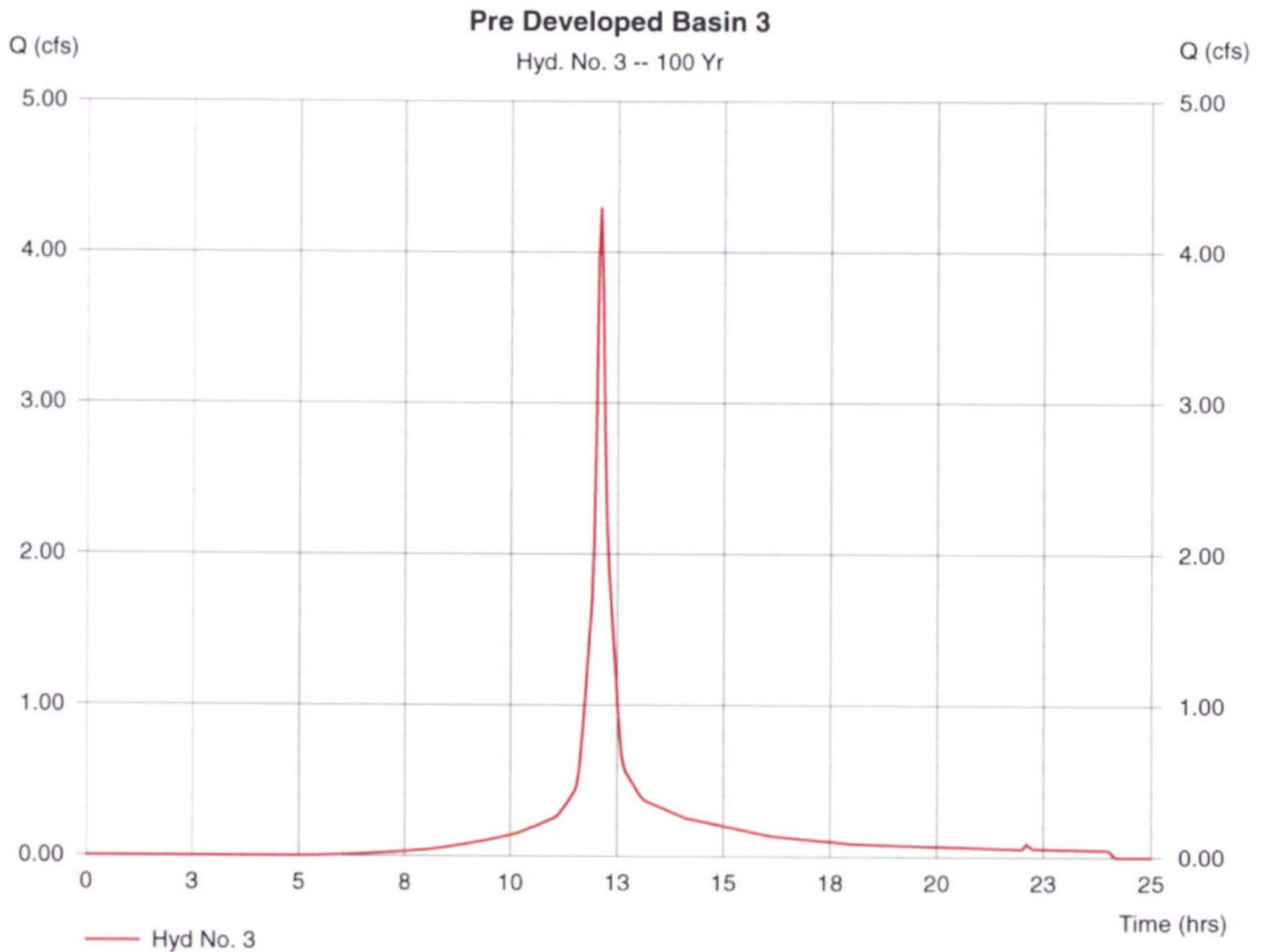
Hyd. No. 3

Pre Developed Basin 3

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Drainage area = 0.690 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 8.64 in
 Storm duration = 24 hrs

Peak discharge = 4.29 cfs
 Time interval = 3 min
 Curve number = 80
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 14,623 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

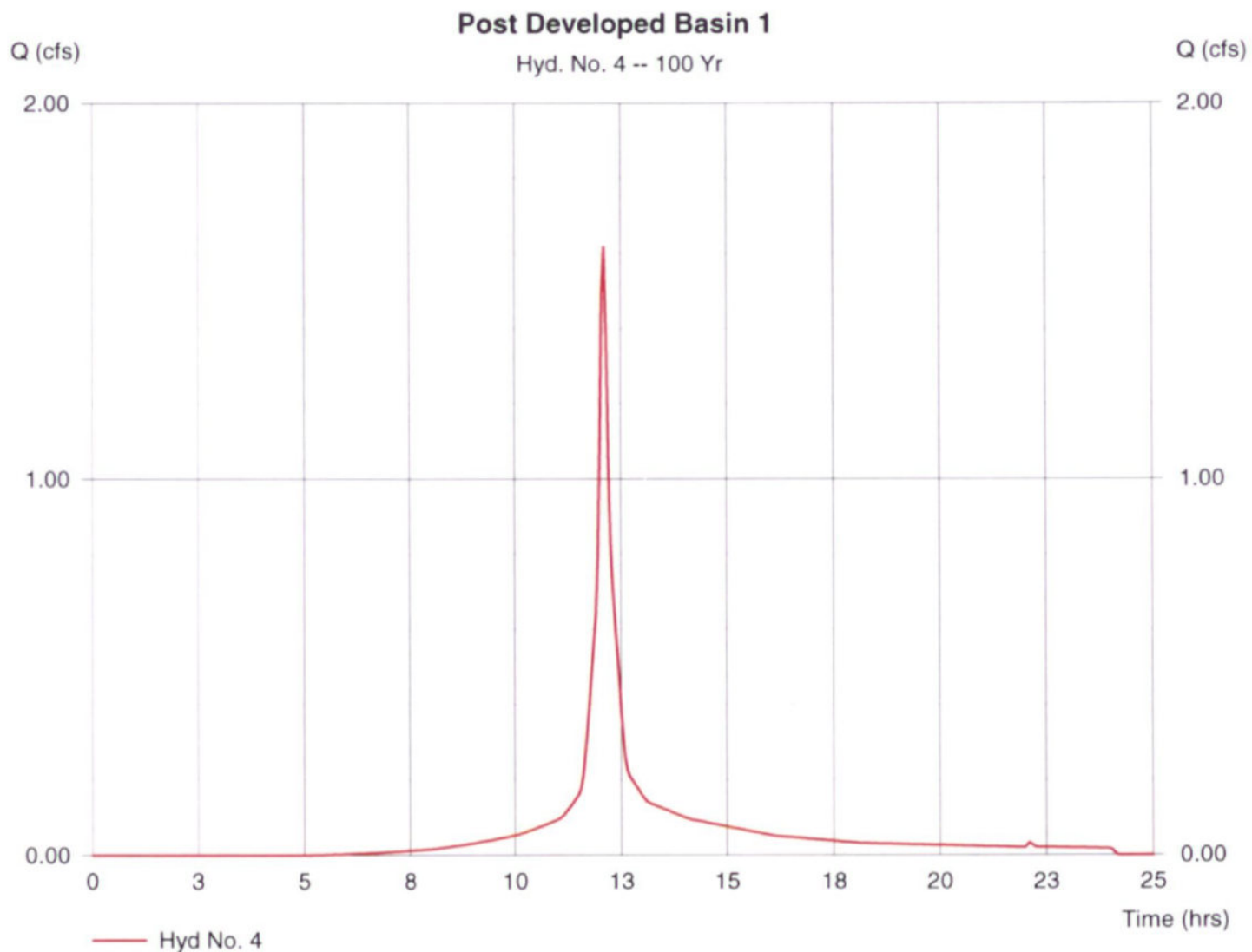
Hyd. No. 4

Post Developed Basin 1

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Drainage area = 0.260 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 8.64 in
 Storm duration = 24 hrs

Peak discharge = 1.62 cfs
 Time interval = 3 min
 Curve number = 80
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 5,510 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

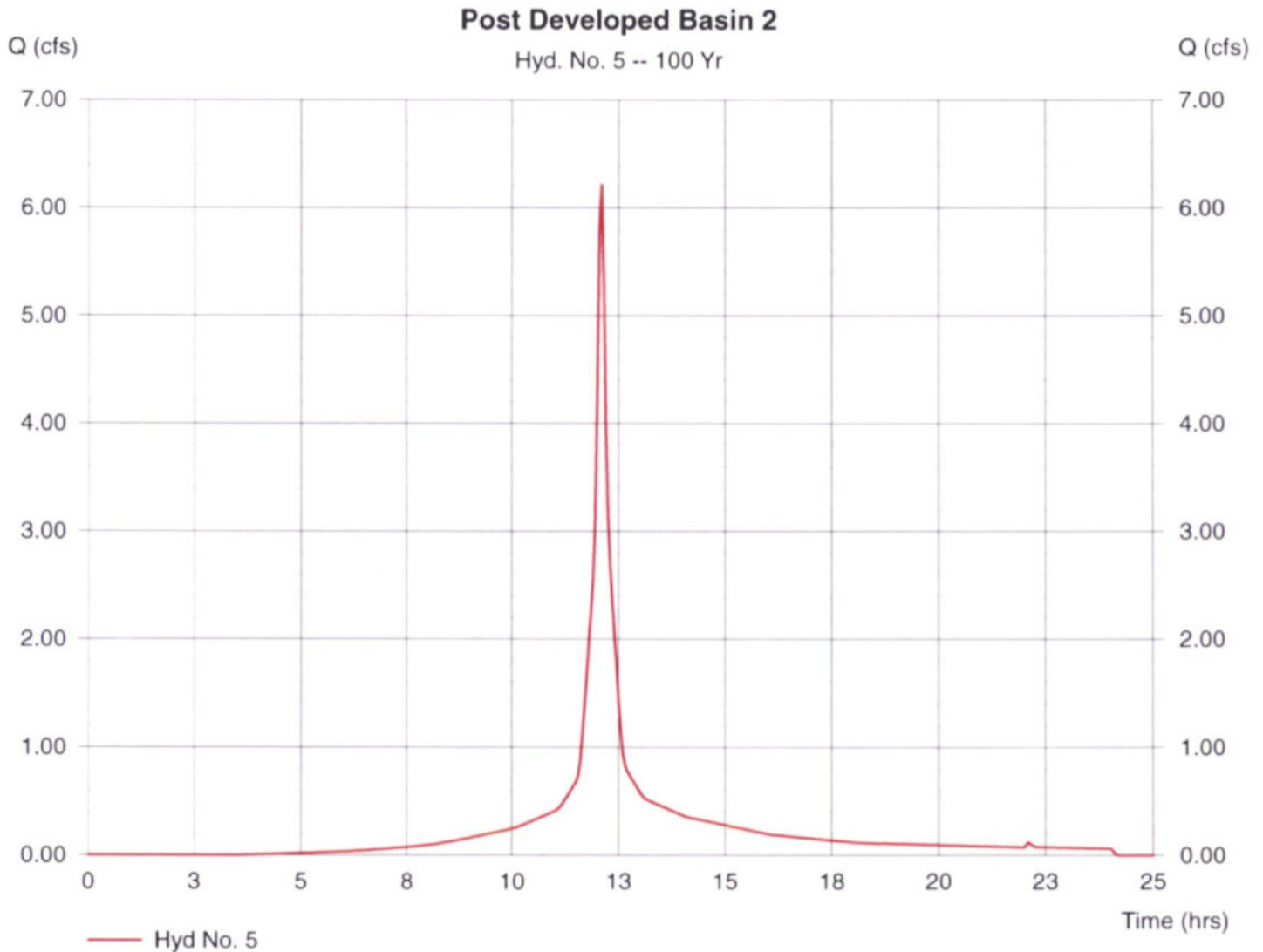
Hyd. No. 5

Post Developed Basin 2

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Drainage area = 0.920 ac
 Basin Slope = 0.0 %
 Tc method = TR55
 Total precip. = 8.64 in
 Storm duration = 24 hrs

Peak discharge = 6.21 cfs
 Time interval = 3 min
 Curve number = 86
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.40 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 21,769 cuft



Post Developed Basin 2

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
Sheet Flow							
Manning's n-value	= 0.015	0.011	0.011				
Flow length (ft)	= 100.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 4.07	0.00	0.00				
Land slope (%)	= 0.50	0.00	0.00				
Travel Time (min)	= 2.40	+	0.00	+	0.00	=	2.40
Shallow Concentrated Flow							
Flow length (ft)	= 286.00	0.00	0.00				
Watercourse slope (%)	= 1.00	0.00	0.00				
Surface description	= Unpaved	Paved	Paved				
Average velocity (ft/s)	= 1.61	0.00	0.00				
Travel Time (min)	= 2.95	+	0.00	+	0.00	=	2.95
Channel Flow							
X sectional flow area (sqft)	= 0.00	0.00	0.00				
Wetted perimeter (ft)	= 0.00	0.00	0.00				
Channel slope (%)	= 0.00	0.00	0.00				
Manning's n-value	= 0.015	0.015	0.015				
Velocity (ft/s)	= 0.00	0.00	0.00				
Flow length (ft)	= 0.0	0.0	0.0				
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc							5.40 min

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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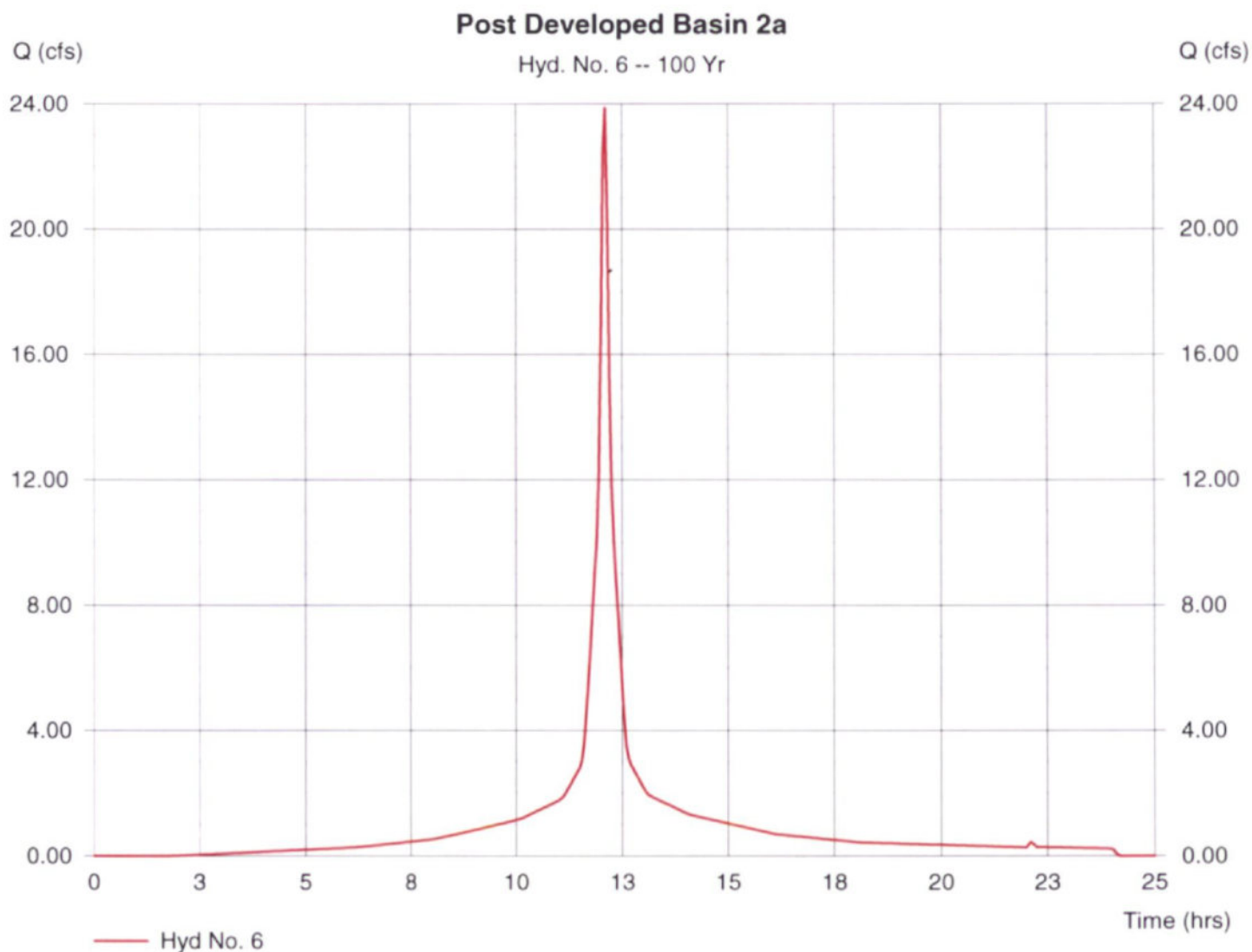
Hyd. No. 6

Post Developed Basin 2a

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Drainage area = 3.320 ac
 Basin Slope = 0.0 %
 Tc method = TR55
 Total precip. = 8.64 in
 Storm duration = 24 hrs

Peak discharge = 23.87 cfs
 Time interval = 3 min
 Curve number = 93
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.40 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 88,106 cuft



TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve

Hyd. No. 6

Post Developed Basin 2a

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
Sheet Flow							
Manning's n-value	= 0.015	0.011	0.011				
Flow length (ft)	= 100.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 4.07	0.00	0.00				
Land slope (%)	= 0.50	0.00	0.00				
Travel Time (min)	= 2.40	+	0.00	+	0.00	=	2.40
Shallow Concentrated Flow							
Flow length (ft)	= 286.00	0.00	0.00				
Watercourse slope (%)	= 1.00	0.00	0.00				
Surface description	= Unpaved	Paved	Paved				
Average velocity (ft/s)	= 1.61	0.00	0.00				
Travel Time (min)	= 2.95	+	0.00	+	0.00	=	2.95
Channel Flow							
X sectional flow area (sqft)	= 0.00	0.00	0.00				
Wetted perimeter (ft)	= 0.00	0.00	0.00				
Channel slope (%)	= 0.00	0.00	0.00				
Manning's n-value	= 0.015	0.015	0.015				
Velocity (ft/s)	= 0.00	0.00	0.00				
Flow length (ft)	= 0.0	0.0	0.0				
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc							5.40 min

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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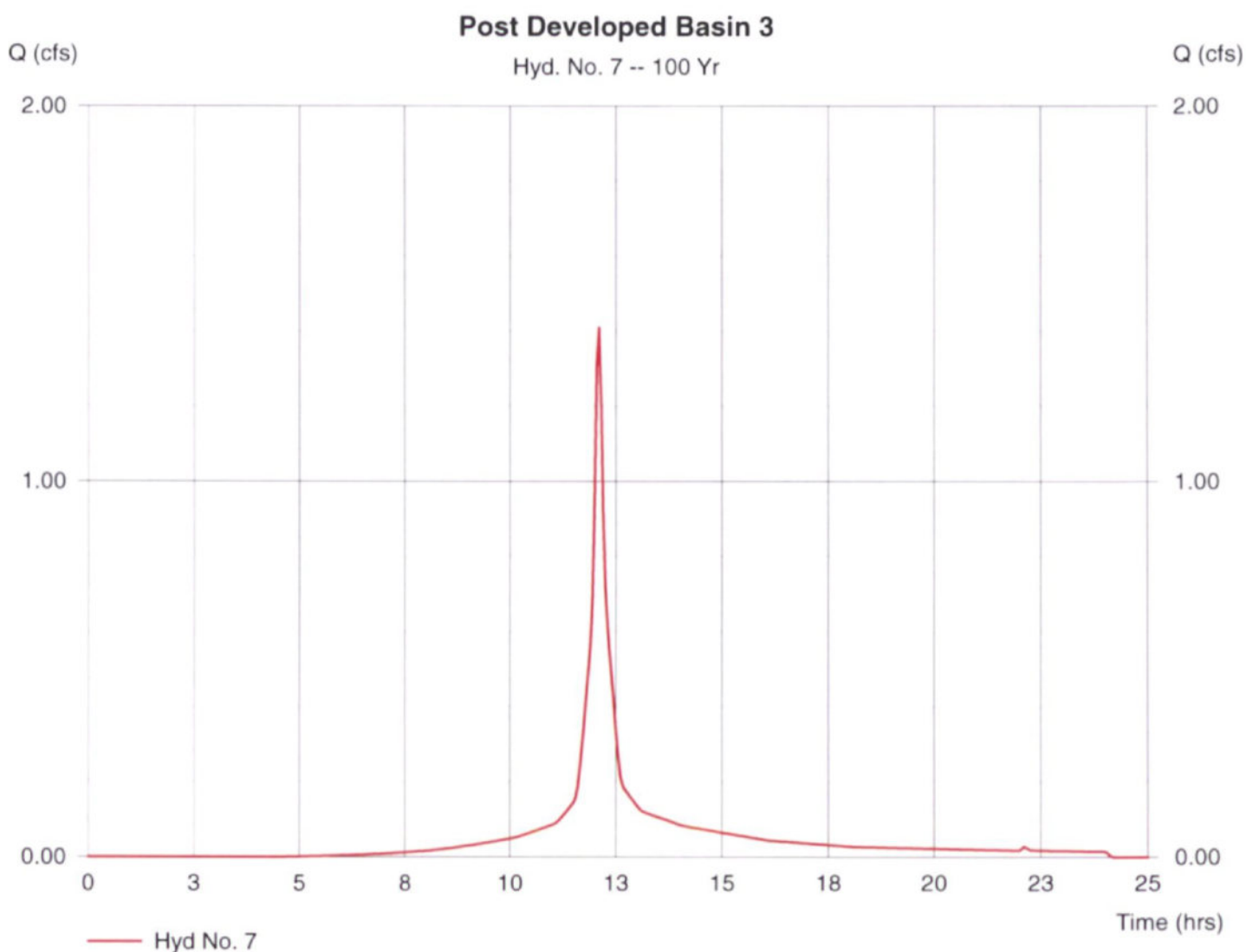
Hyd. No. 7

Post Developed Basin 3

Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Drainage area = 0.220 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 8.64 in
 Storm duration = 24 hrs

Peak discharge = 1.41 cfs
 Time interval = 3 min
 Curve number = 82
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

Hydrograph Volume = 4,844 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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Hyd. No. 8

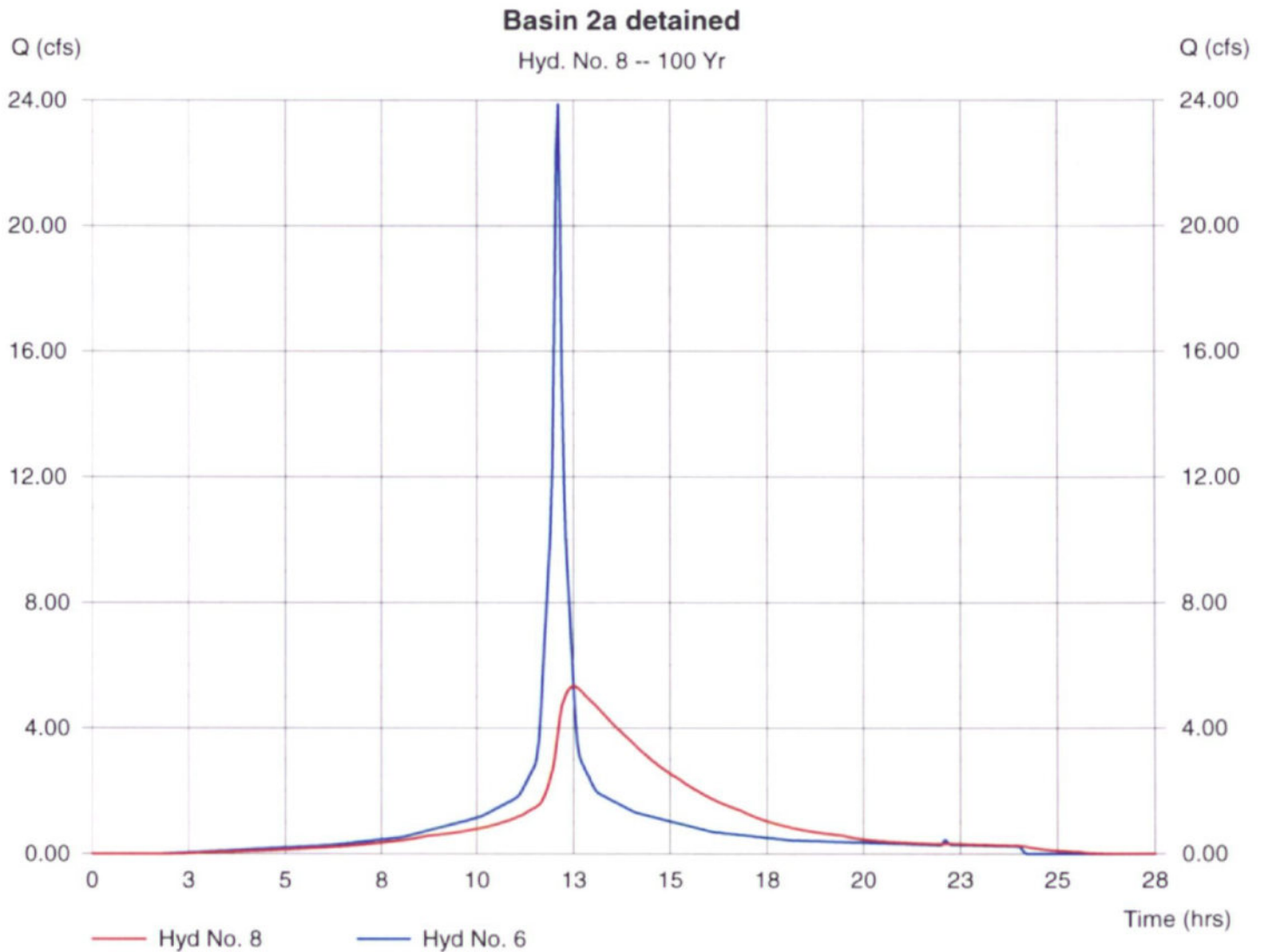
Basin 2a detained

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Inflow hyd. No. = 6
 Reservoir name = Detention Pond

Peak discharge = 5.34 cfs
 Time interval = 3 min
 Max. Elevation = 1361.42 ft
 Max. Storage = 32,169 cuft

Storage Indication method used.

Hydrograph Volume = 88,100 cuft



Pond Report

69

Hydraflow Hydrographs by Intelisolve

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Pond No. 1 - Detention Pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1355.70	100	0	0
0.30	1356.00	462	84	84
1.30	1357.00	2,657	1,560	1,644
2.30	1358.00	5,414	4,036	5,679
3.30	1359.00	6,793	6,104	11,783
4.30	1360.00	8,240	7,517	19,299
5.30	1361.00	9,765	9,003	28,302
6.30	1362.00	8,479	9,122	37,424
7.30	1363.00	13,025	10,752	48,176

Culvert / Orifice Structures

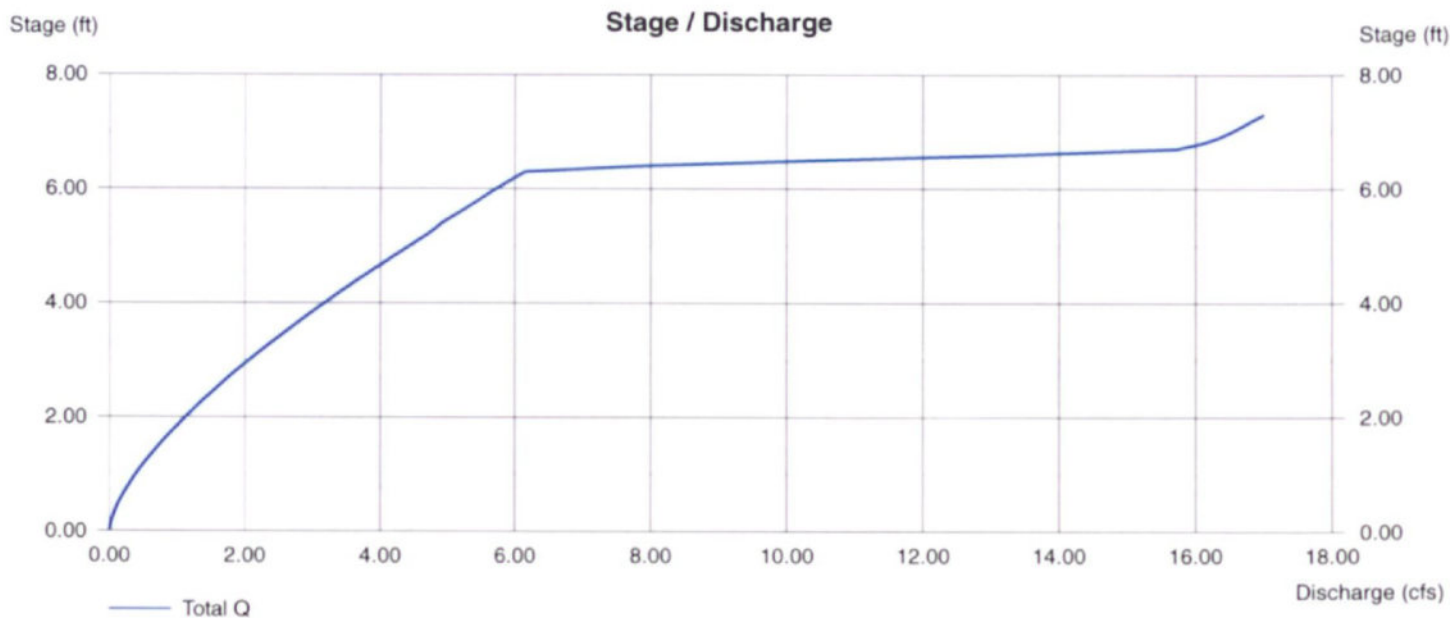
	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1355.70	0.00	0.00	0.00
Length (ft)	= 46.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	0.00
N-Value	= .024	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 16.00	0.13	0.00	0.00
Crest El. (ft)	= 1362.00	1355.70	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Riser	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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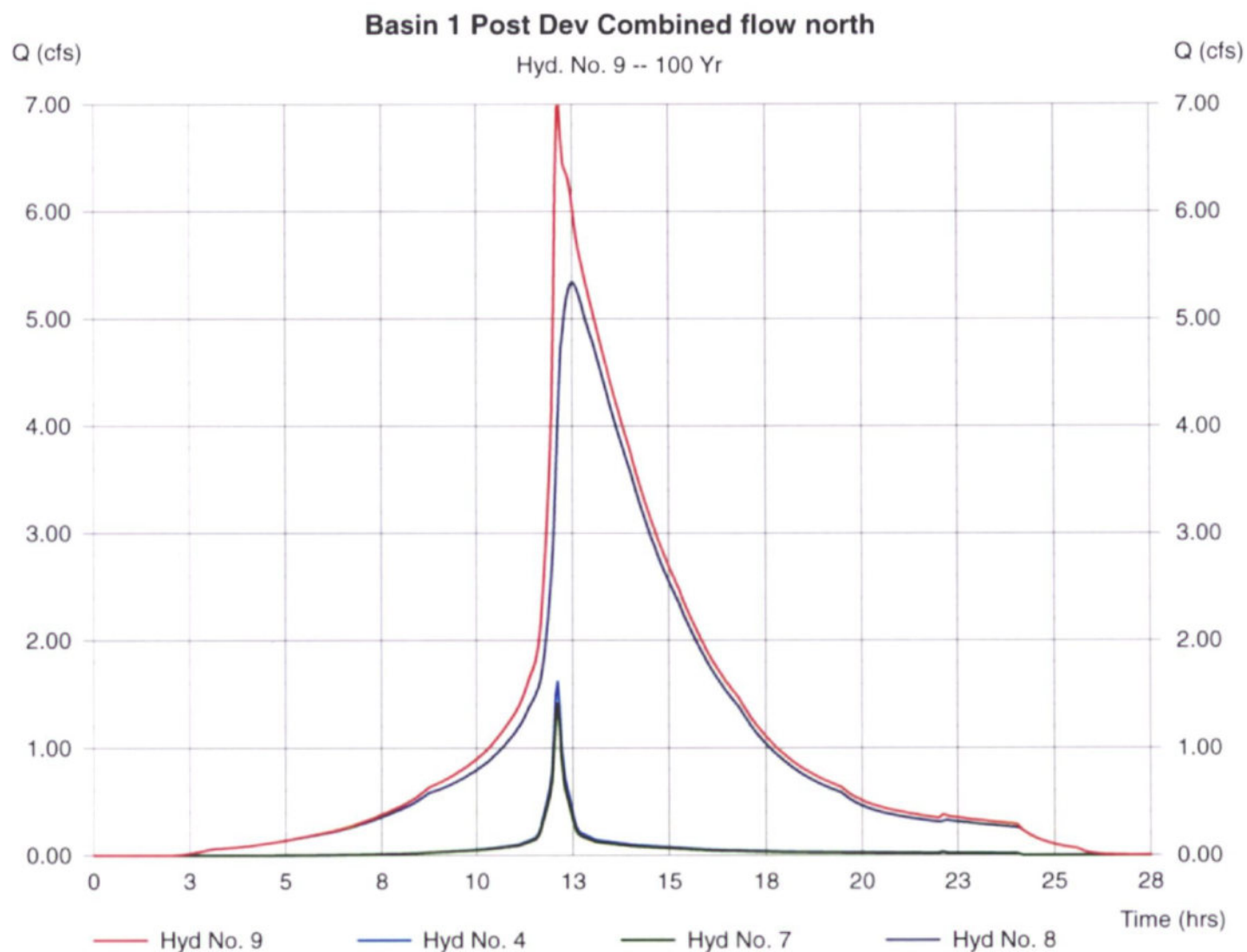
Hyd. No. 9

Basin 1 Post Dev Combined flow north

Hydrograph type = Combine
Storm frequency = 100 yrs
Inflow hyds. = 4, 7, 8

Peak discharge = 6.99 cfs
Time interval = 3 min

Hydrograph Volume = 98,454 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Feb 19 2014, 3:16 PM

Hyd. No. 10

Basin 1 Pre Dev Combined flow north

Hydrograph type = Combine

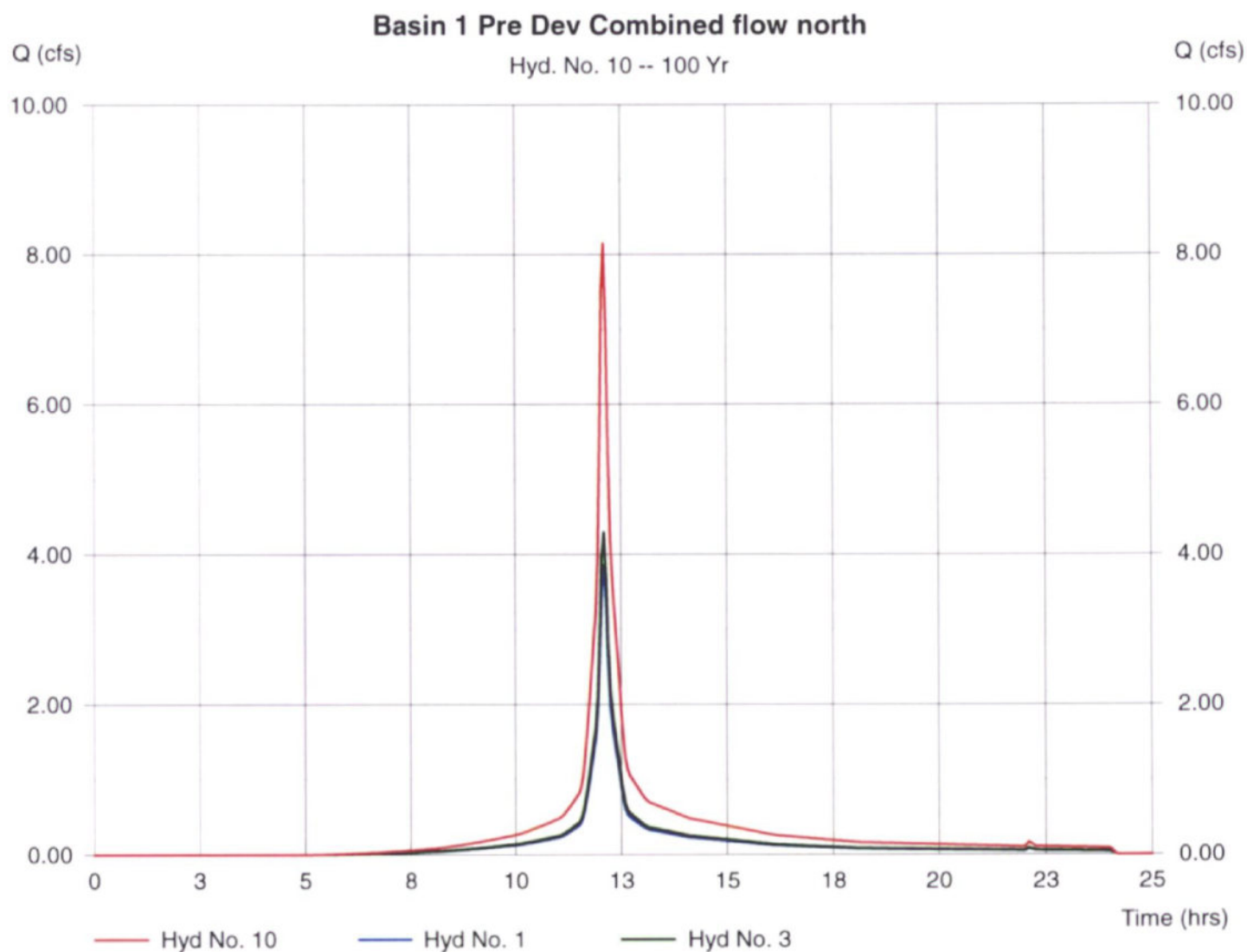
Storm frequency = 100 yrs

Inflow hyds. = 1, 3

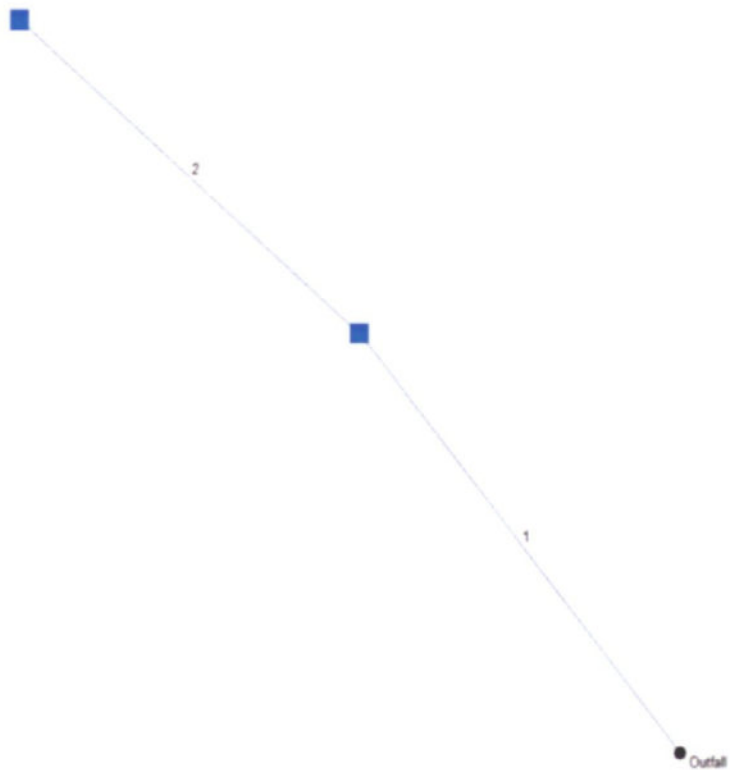
Peak discharge = 8.15 cfs

Time interval = 3 min

Hydrograph Volume = 27,762 cuft



Hydraflow Plan View



Project File: MEMCO.stm

No. Lines: 2

02-19-2014

Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	162.0	0.10	2.33	0.90	0.09	2.10	10.0	10.4	8.3	17.46	17.77	6.44	24	0.62	1357.00	1356.00	1358.61	1357.61	1361.90	1363.00	
2	1	144.0	2.23	2.23	0.90	2.01	2.01	10.0	10.0	8.4	16.95	18.85	5.49	24	0.69	1358.00	1357.00	1359.85	1359.13	1361.50	1361.90	
Project File MEMCO.stm																Number of lines: 2				Run Date: 02-19-2014		
NOTES: Intensity = 70.24 / (Inlet time + 11.40) ^ 0.69; Return period = 100 Yrs																						

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)		Depr (in)
1		0.76	0.00	0.76	0.00	DrGrt	0.0	0.00	4.00	1.50	1.50	Sag	2.00	0.050	0.050	0.000	0.15	7.87	0.15	7.87	0.00	Off
2		16.95	0.00	16.95	0.00	Curb	2.0	11.50	0.00	0.00	0.00	Sag	2.00	0.020	0.020	0.000	0.62	30.92	0.95	30.92	4.00	Off

Project File: MEMCO.stm

Number of lines: 2

Run Date: 02-19-2014

NOTES: Inlet N-Values = 0.016, Intensity = 70.24 / (Inlet time + 11.40) ^ 0.69, Return period = 100 Yrs, * Indicates Known Q added

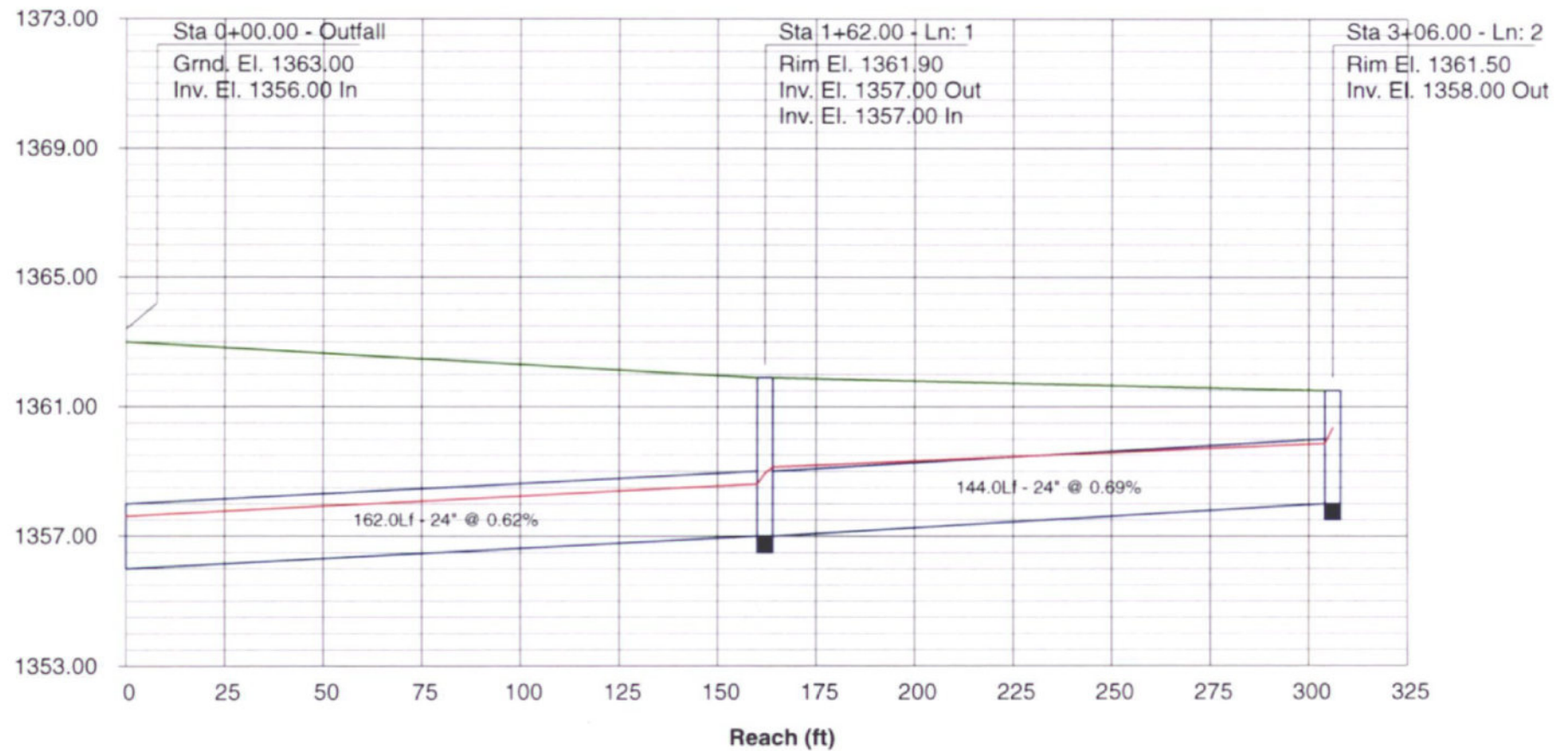
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream								Len (ft)	Upstream								Check		JL coeff (K)	Minor loss (ft)
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
1	24	17.46	1356.00	1357.61	1.61	2.71	6.45	0.65	1358.26	0.617	162	1357.00	1358.61	1.61	2.71	6.44	0.65	1359.26	0.616	0.617	0.999	0.50	0.32
2	24	16.95	1357.00	1359.13	2.00	3.14	5.40	0.45	1359.58	0.562	144	1358.00	1359.85	1.85	3.03	5.59	0.49	1360.33	0.487	0.524	0.755	1.00	0.49
Project File: MEMCO.stm												Number of lines: 2							Run Date: 02-19-2014				

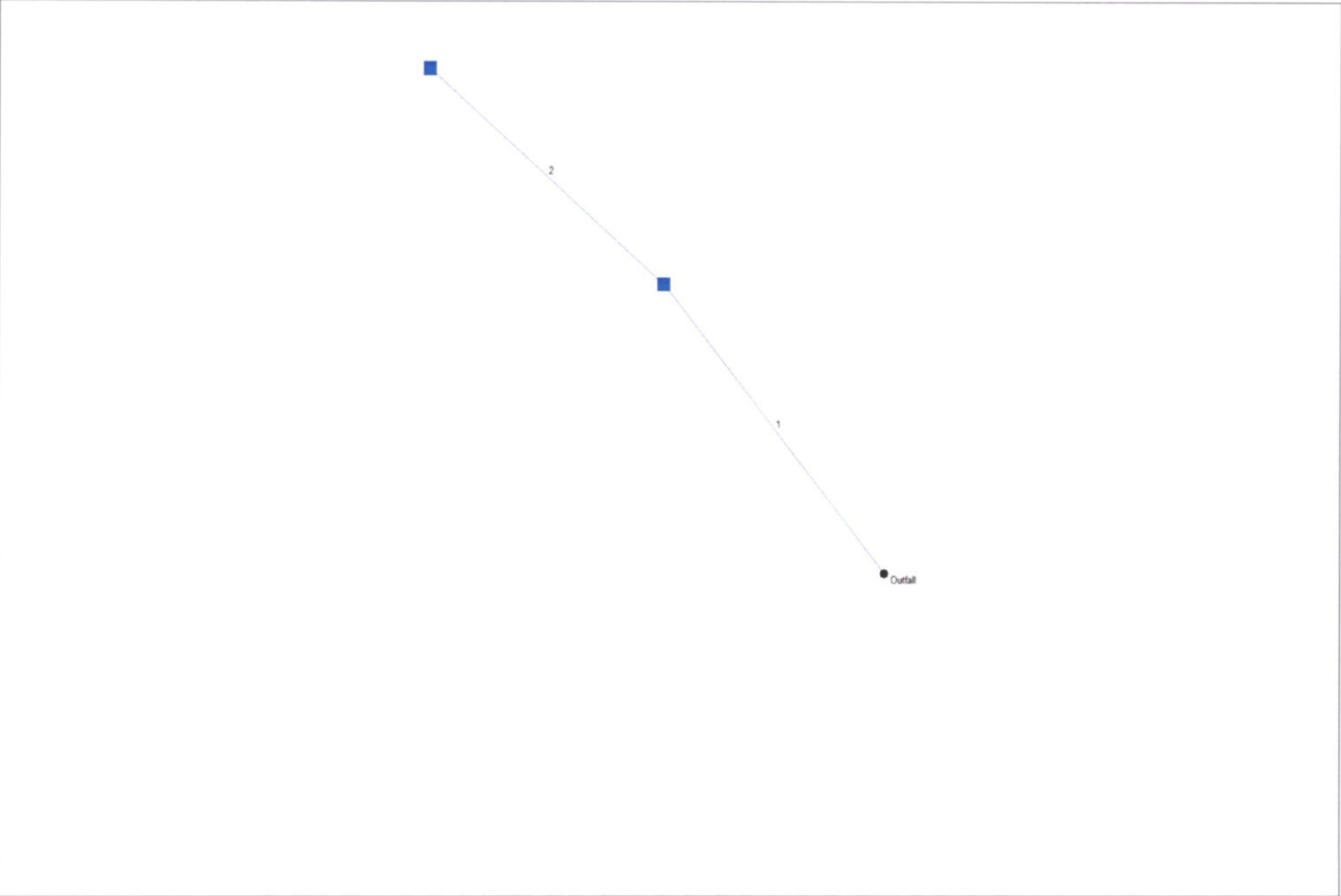
Storm Sewer Profile

Proj. file: MEMCO.stm

Elev. (ft)



Hydraflow Plan View



Project File: MEMCO.stm	No. Lines: 2	02-19-2014
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Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
1	End	162.0	0 10	2 33	0 90	0 09	2 10	10.0	10.6	5.9	12.28	17.77	6.04	24	0 62	1357 00	1356 00	1358.25	1357.22	1361.90	1363.00	
2	1	144 0	2.23	2.23	0 90	2 01	2 01	10 0	10 0	6.0	12 00	18.85	4.95	24	0 69	1358 00	1357 00	1359 23	1358 85	1361 50	1361 90	
Project File: MEMCO.stm																Number of lines: 2				Run Date: 02-19-2014		
NOTES: Intensity = 69.21 / (Inlet time + 13.40) ^ 0.78, Return period = 10 Yrs																						

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp line No
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1		0.54	0.00	0.54	0.00	DrGrt	0 0	0 00	4.00	1 50	1.50	Sag	2.00	0.050	0 050	0 000	0 12	6.66	0.12	6.66	0 00	Off
2		12 00	0.00	12.00	0 00	Curb	2 0	11 50	0 00	0 00	0.00	Sag	2.00	0.020	0 020	0 000	0 49	24.53	0.82	24 53	4 00	Off

Project File MEMCO.stm

Number of lines. 2

Run Date: 02-19-2014

NOTES: Inlet N-Values = 0.016 ; Intensity = 69.21 / (Inlet time + 13.40) ^ 0.78, Return period = 10 Yrs , * Indicates Known Q added

Hydraulic Grade Line Computations

Line	Size (In)	Q (cfs)	Downstream								Len (ft)	Upstream								Check		JL coeff (K)	Minor loss (ft)
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
1	24	12.28	1356.00	1357.22	1.22	2.01	6.10	0.58	1357.80	0.590	162	1357.00	1358.25	1.25**	2.06	5.97	0.55	1358.80	0.583	0.586	0.950	0.50	0.28
2	24	12.00	1357.00	1358.85	1.85	3.03	3.95	0.24	1359.09	0.244	144	1358.00	1359.23	1.23**	2.02	5.94	0.55	1359.78	0.583	0.413	n/a	1.00	n/a
Project File MEMCO.stm														Number of lines: 2				Run Date: 02-19-2014					
Notes : ** Critical depth.. j-Line contains hyd jump																							