



**THOROUGHNBRED ENGINEERING**  
GEORGETOWN      LEXINGTON      JEFFERSONVILLE

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## **DETENTION POND ANALYSIS**

**CROSSROADS CENTRE LOT'S #2-#5  
(CURRENTLY OWNED BY PARIS DEVELOPMENT COMPANY INC.)**

**PROJECT LOCATION  
NORTHWEST CORNER OF ARLINGTON DRIVE AND EVERGREEN DRIVE  
(NO STREET ADDRESS)**

**APPLICANT  
DAN CUMMINS**

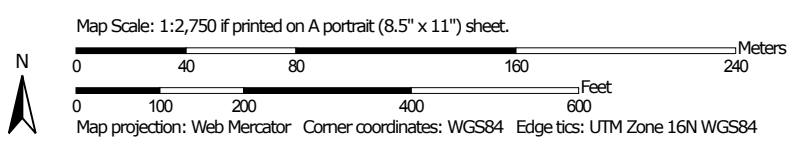
**ENGINEERING FIRM  
THOROUGHNBRED ENGINEERING  
110 E. MAIN ST. SUITE 206  
GEORGETOWN, KY 40324**

**JULY 2018**

Soil Map—Bourbon and Nicholas Counties, Kentucky




Soil Map may not be valid at this scale.





## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

### Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

### Water Features



Streams and Canals

### Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

### Background



Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Bourbon and Nicholas Counties, Kentucky

Survey Area Data: Version 14, Oct 3, 2017

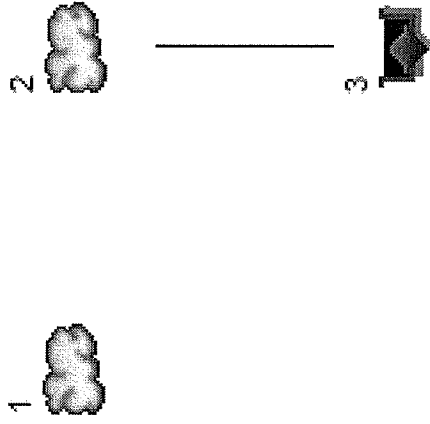
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 25, 2014—Feb 16, 2017

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

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
McC	McAfee silt loam, 6 to 12 percent slopes	23.7	57.6%
No	Nolin silt loam, 0 to 2 percent slopes, frequently flooded	2.1	5.0%
uBlmB	Bluegrass-Maury silt loams, 2 to 6 percent slopes	15.3	37.3%
<b>Totals for Area of Interest</b>		<b>41.1</b>	<b>100.0%</b>



**Legend**

Hyd.	Origin	Description
1	SCS Runoff	Pre
2	SCS Runoff	Post
3	Reservoir	Detention

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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	-----	-----	-----	-----	-----	6.23	11.30	-----	19.29	Pre
2	SCS Runoff	-----	-----	-----	-----	-----	21.88	32.30	-----	47.16	Post
3	Reservoir	2	-----	-----	-----	-----	4.53	10.12	-----	15.98	Detention

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	6.23	1	732	26,122	---	-----	-----	Pre
2	SCS Runoff	21.88	1	718	47,437	---	-----	-----	Post
3	Reservoir	4.53	1	728	47,414	2	860.47	19,208	Detention
Dan Cummins.gpw					Return Period: 10 Year		Monday, Jul 16 2018, 9:00 AM		

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Jul 16 2018, 9:0 AM

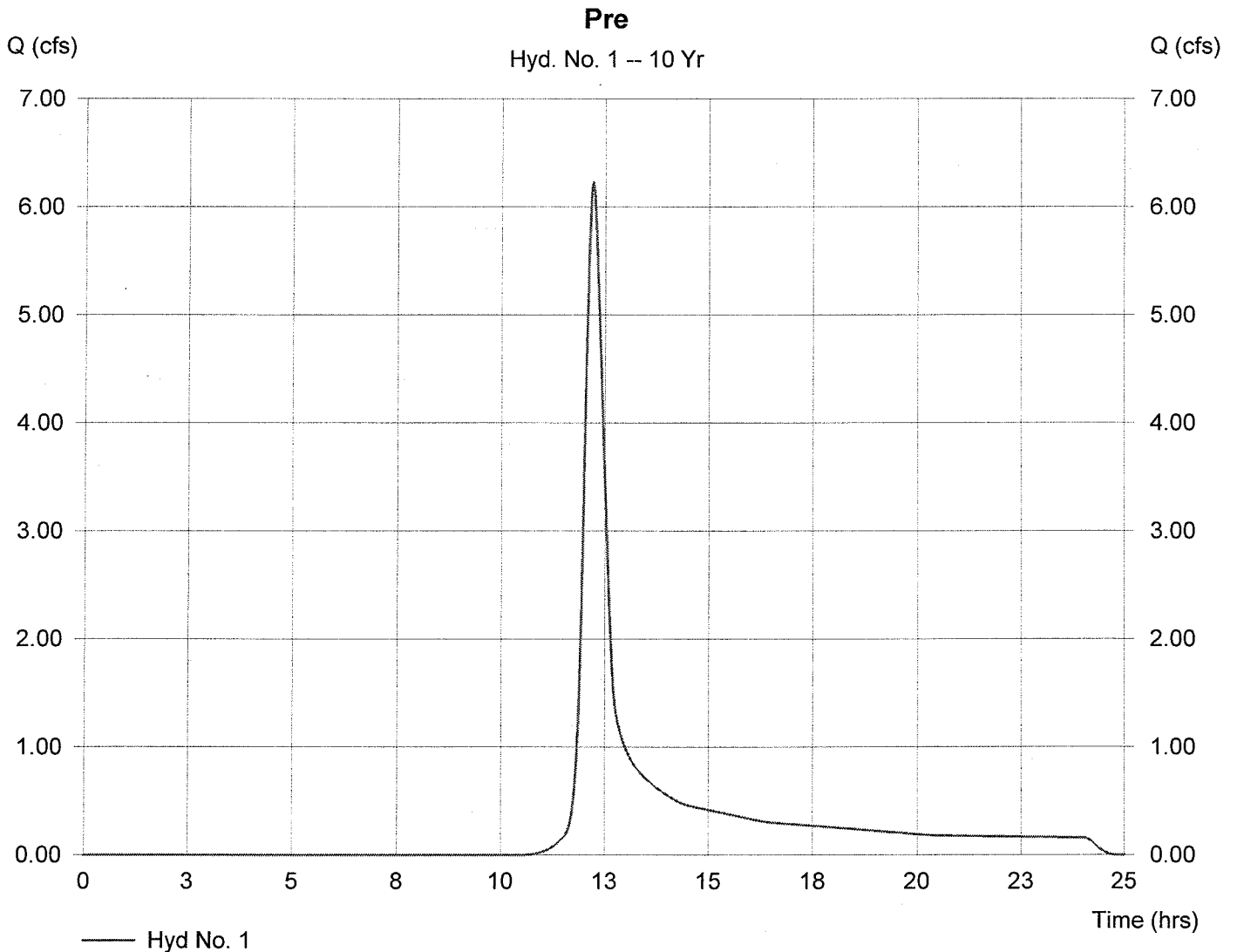
## Hyd. No. 1

Pre

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 4.80 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 4.25 in  
Storm duration = 24 hrs

Peak discharge = 6.23 cfs  
Time interval = 1 min  
Curve number = 70  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 28.8 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 26,122 cuft



# TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

Pre

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
<b>Sheet Flow</b>				
Manning's n-value	= 0.170	0.011	0.011	
Flow length (ft)	= 200.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.20	0.00	0.00	
Land slope (%)	= 1.00	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 24.88</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 24.88</b>
<b>Shallow Concentrated Flow</b>				
Flow length (ft)	= 375.00	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	
<b>Travel Time (min)</b>	<b>= 3.87</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 3.87</b>
<b>Channel Flow</b>				
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	
<b>Travel Time (min)</b>	<b>= 0.00</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 0.00</b>
<b>Total Travel Time, Tc</b> .....				<b>28.80 min</b>

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Jul 16 2018, 9:0 AM

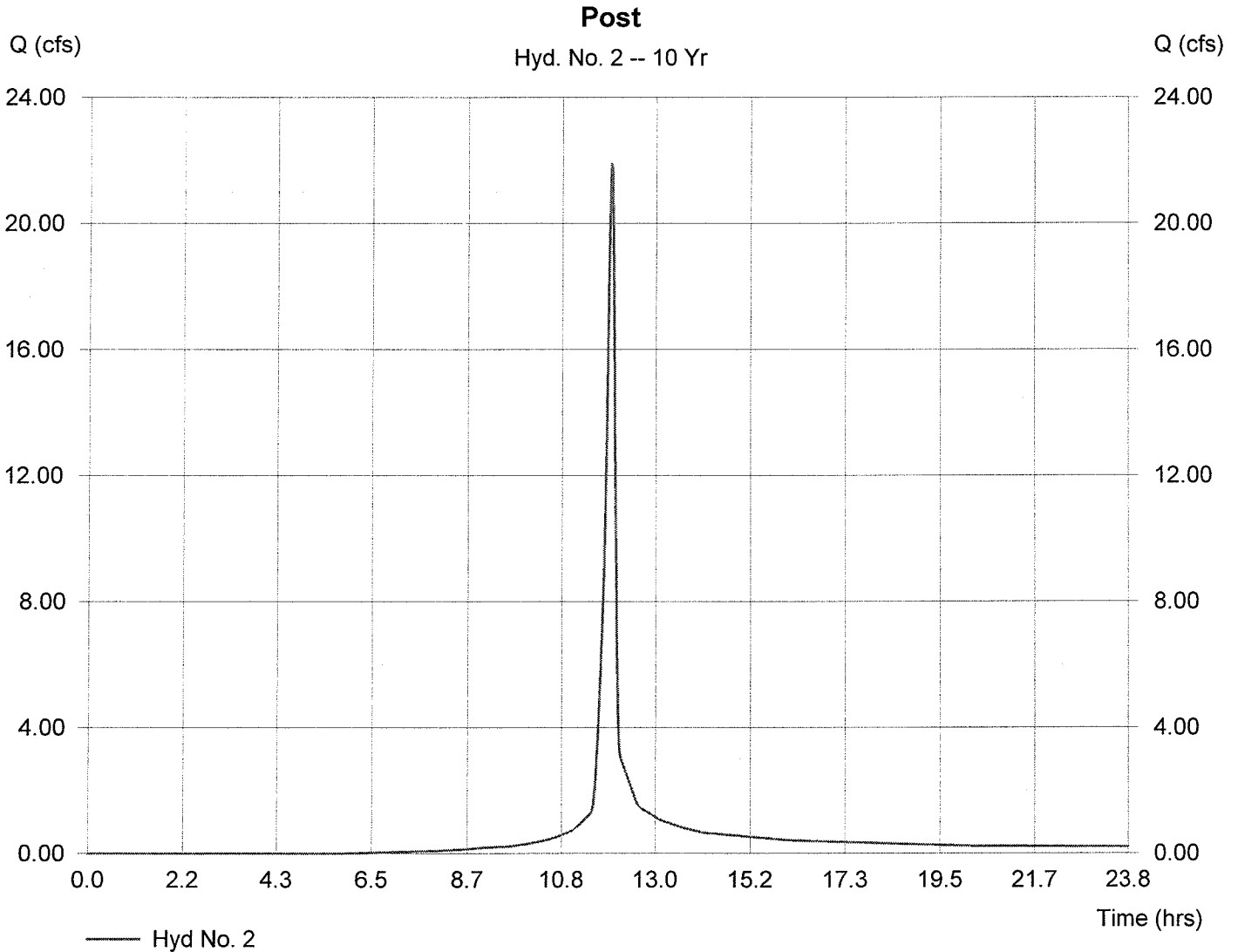
## Hyd. No. 2

Post

Hydrograph type = SCS Runoff  
 Storm frequency = 10 yrs  
 Drainage area = 4.80 ac  
 Basin Slope = 0.0 %  
 Tc method = TR55  
 Total precip. = 4.25 in  
 Storm duration = 24 hrs

Peak discharge = 21.88 cfs  
 Time interval = 1 min  
 Curve number = 86.2  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 6.8 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 47,437 cuft



# TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve

Hyd. No. 2

Post

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
<b>Sheet Flow</b>				
Manning's n-value	= 0.011	0.011	0.011	
Flow length (ft)	= 100.0	100.0	0.0	
Two-year 24-hr precip. (in)	= 3.20	3.20	0.00	
Land slope (%)	= 0.50	1.00	0.00	
<b>Travel Time (min)</b>	<b>= 2.11</b>	<b>+ 1.60</b>	<b>+ 0.00</b>	<b>= 3.71</b>
<b>Shallow Concentrated Flow</b>				
Flow length (ft)	= 375.00	0.00	0.00	
Watercourse slope (%)	= 1.00	0.00	0.00	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	= 2.03	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 3.07</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 3.07</b>
<b>Channel Flow</b>				
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	
<b>Travel Time (min)</b>	<b>= 0.00</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 0.00</b>
<b>Total Travel Time, Tc</b> .....				<b>6.80 min</b>

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Jul 16 2018, 9:0 AM

## Hyd. No. 3

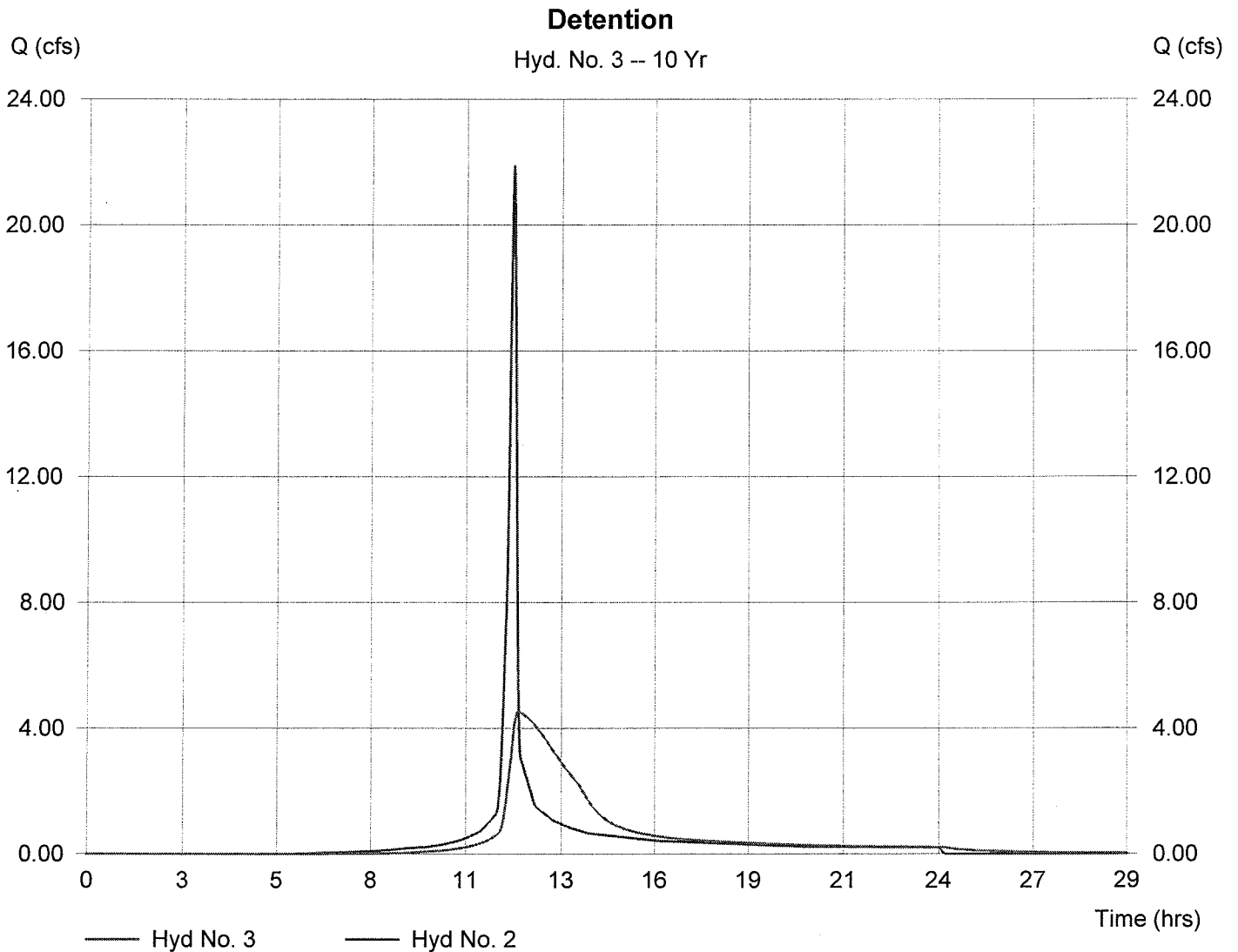
Detention

Hydrograph type = Reservoir  
 Storm frequency = 10 yrs  
 Inflow hyd. No. = 2  
 Reservoir name = Detention

Peak discharge = 4.53 cfs  
 Time interval = 1 min  
 Max. Elevation = 860.47 ft  
 Max. Storage = 19,208 cuft

Storage Indication method used.

Hydrograph Volume = 47,414 cuft



# Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Jul 16 2018, 9:0 AM

## Pond No. 1 - Detention

### 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	858.00	6,200	0	0
1.00	859.00	7,387	6,794	6,794
2.00	860.00	8,657	8,022	14,816
3.00	861.00	9,994	9,326	24,141
4.00	862.00	11,389	10,692	34,833
5.00	863.00	12,833	12,111	46,944
6.00	864.00	14,330	13,582	60,525

### Culvert / Orifice Structures

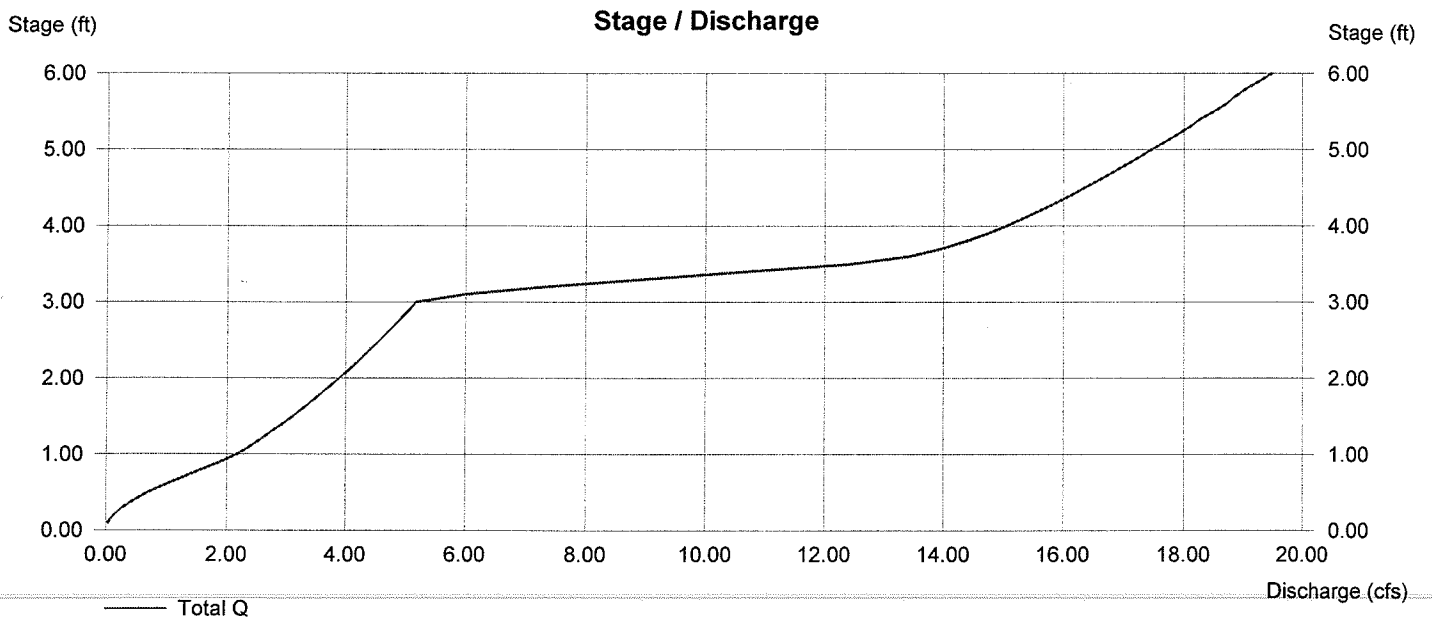
	[A]	[B]	[C]	[D]
Rise (in)	= 18.00	12.00	0.00	0.00
Span (in)	= 18.00	12.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 858.00	858.00	0.00	0.00
Length (ft)	= 32.00	0.50	0.00	0.00
Slope (%)	= 4.00	0.50	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	Yes	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 8.00	0.00	0.00	0.00
Crest El. (ft)	= 861.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	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 Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	11.30	1	732	45,719	---	----	-----	Pre
2	SCS Runoff	32.30	1	718	71,562	---	----	-----	Post
3	Reservoir	10.12	1	726	71,538	2	861.37	28,086	Detention

Dan Cummins.gpw

Return Period: 25 Year

Monday, Jul 16 2018, 9:02 AM

# Hydrograph Plot

Hydraflow Hydrographs by Intellisolve

Monday, Jul 16 2018, 9:2 AM

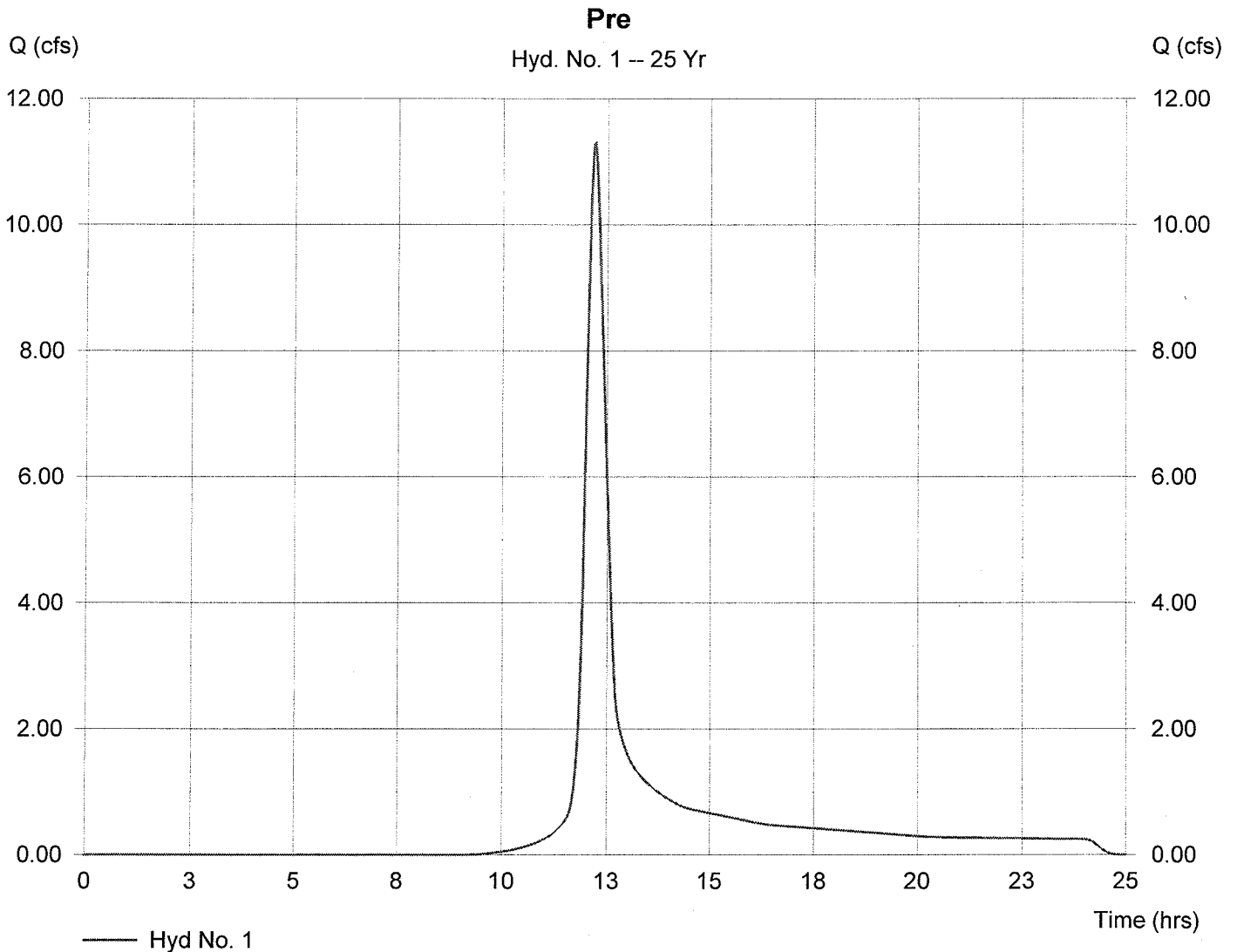
## Hyd. No. 1

Pre

Hydrograph type = SCS Runoff  
 Storm frequency = 25 yrs  
 Drainage area = 4.80 ac  
 Basin Slope = 0.0 %  
 Tc method = TR55  
 Total precip. = 5.77 in  
 Storm duration = 24 hrs

Peak discharge = 11.30 cfs  
 Time interval = 1 min  
 Curve number = 70  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 28.8 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 45,719 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Jul 16 2018, 9:2 AM

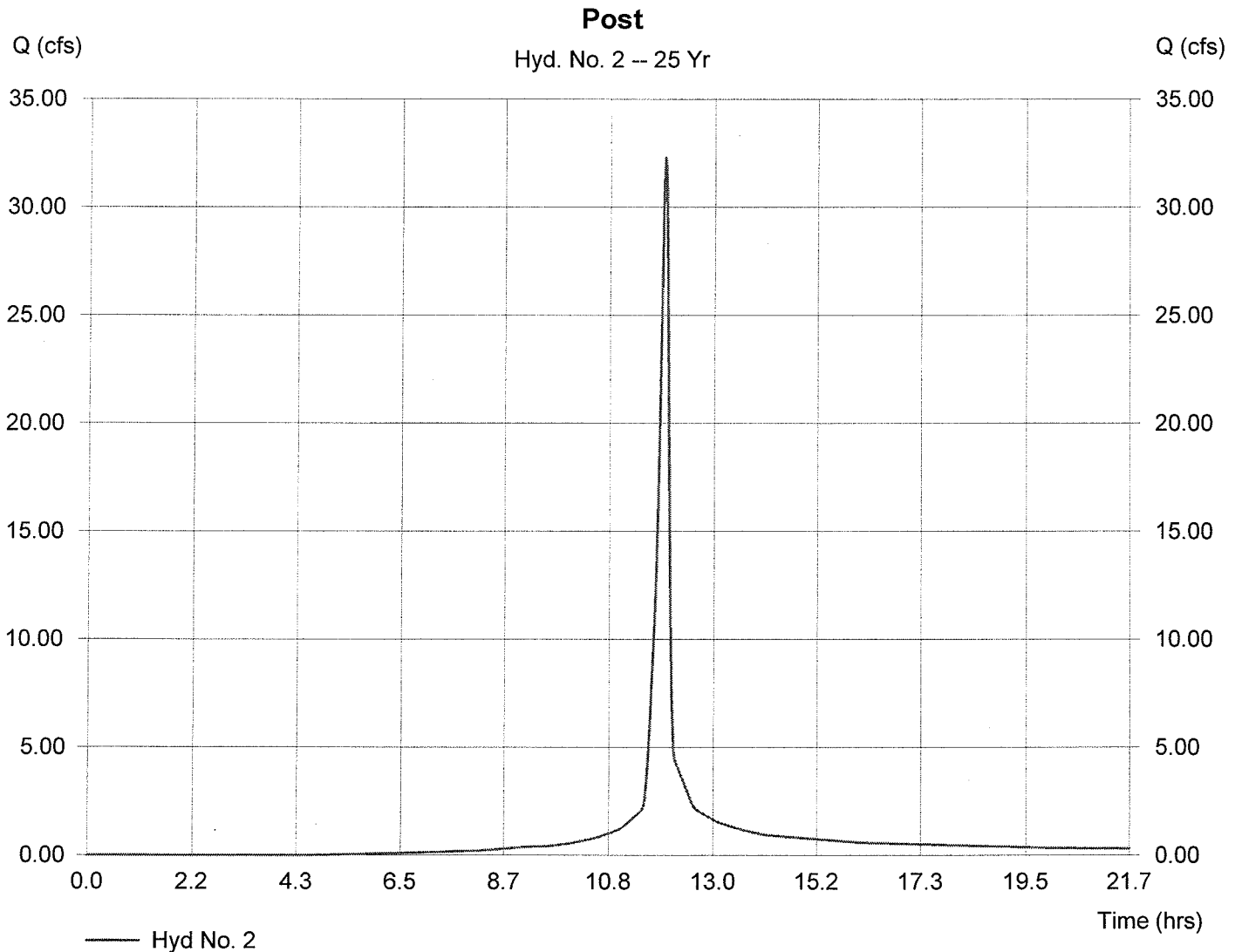
## Hyd. No. 2

Post

Hydrograph type = SCS Runoff  
 Storm frequency = 25 yrs  
 Drainage area = 4.80 ac  
 Basin Slope = 0.0 %  
 Tc method = TR55  
 Total precip. = 5.77 in  
 Storm duration = 24 hrs

Peak discharge = 32.30 cfs  
 Time interval = 1 min  
 Curve number = 86.2  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 6.8 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 71,562 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Jul 16 2018, 9:2 AM

## Hyd. No. 3

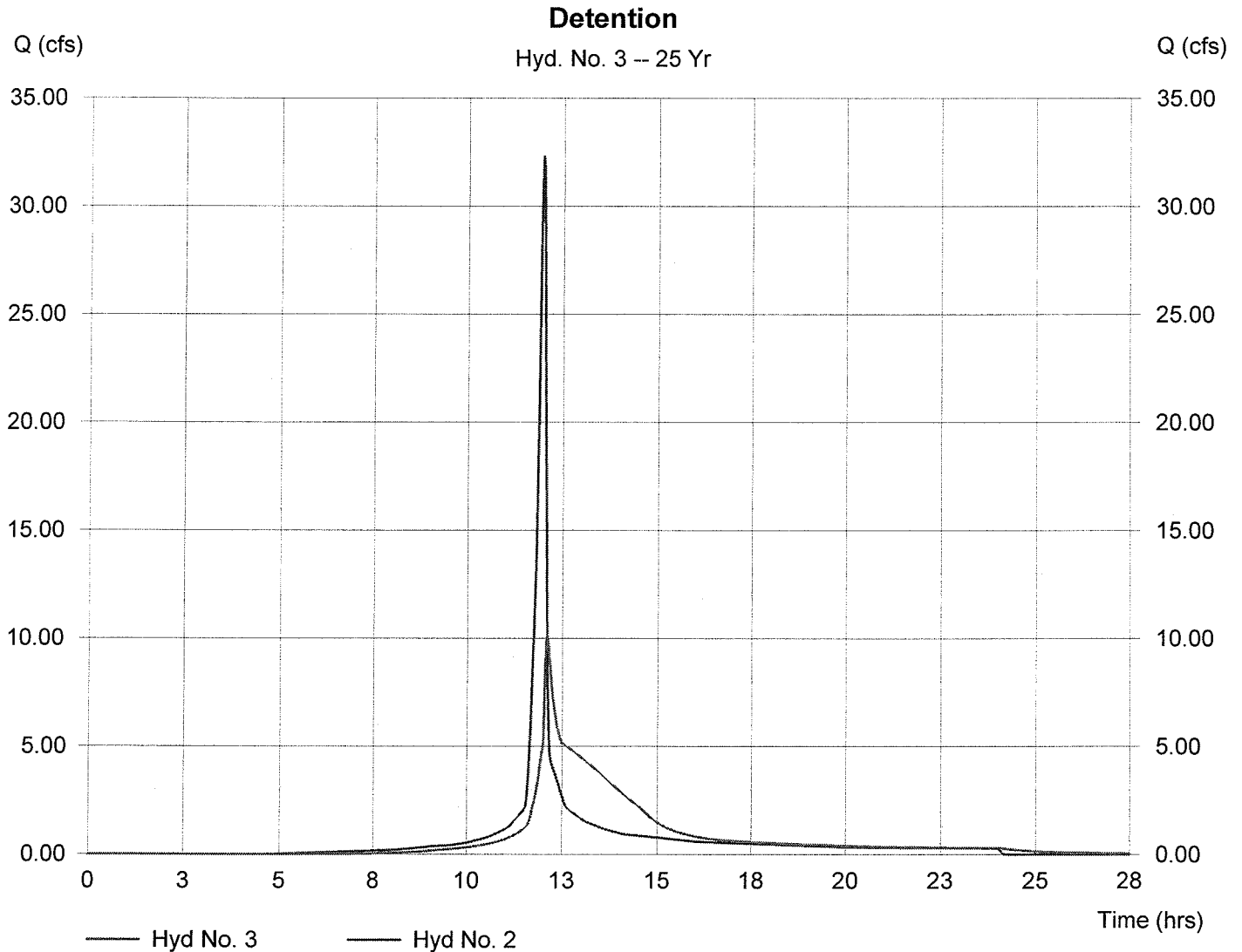
Detention

Hydrograph type = Reservoir  
Storm frequency = 25 yrs  
Inflow hyd. No. = 2  
Reservoir name = Detention

Peak discharge = 10.12 cfs  
Time interval = 1 min  
Max. Elevation = 861.37 ft  
Max. Storage = 28,086 cuft

Storage Indication method used.

Hydrograph Volume = 71,538 cuft



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	SCS Runoff	19.29	1	731	77,038	---	----	----	Pre
2	SCS Runoff	47.16	1	718	107,138	---	----	----	Post
3	Reservoir	15.98	1	726	107,113	2	862.35	39,027	Detention

Dan Cummins.gpw	Return Period: 100 Year	Monday, Jul 16 2018, 9:02 AM
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# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Jul 16 2018, 9:2 AM

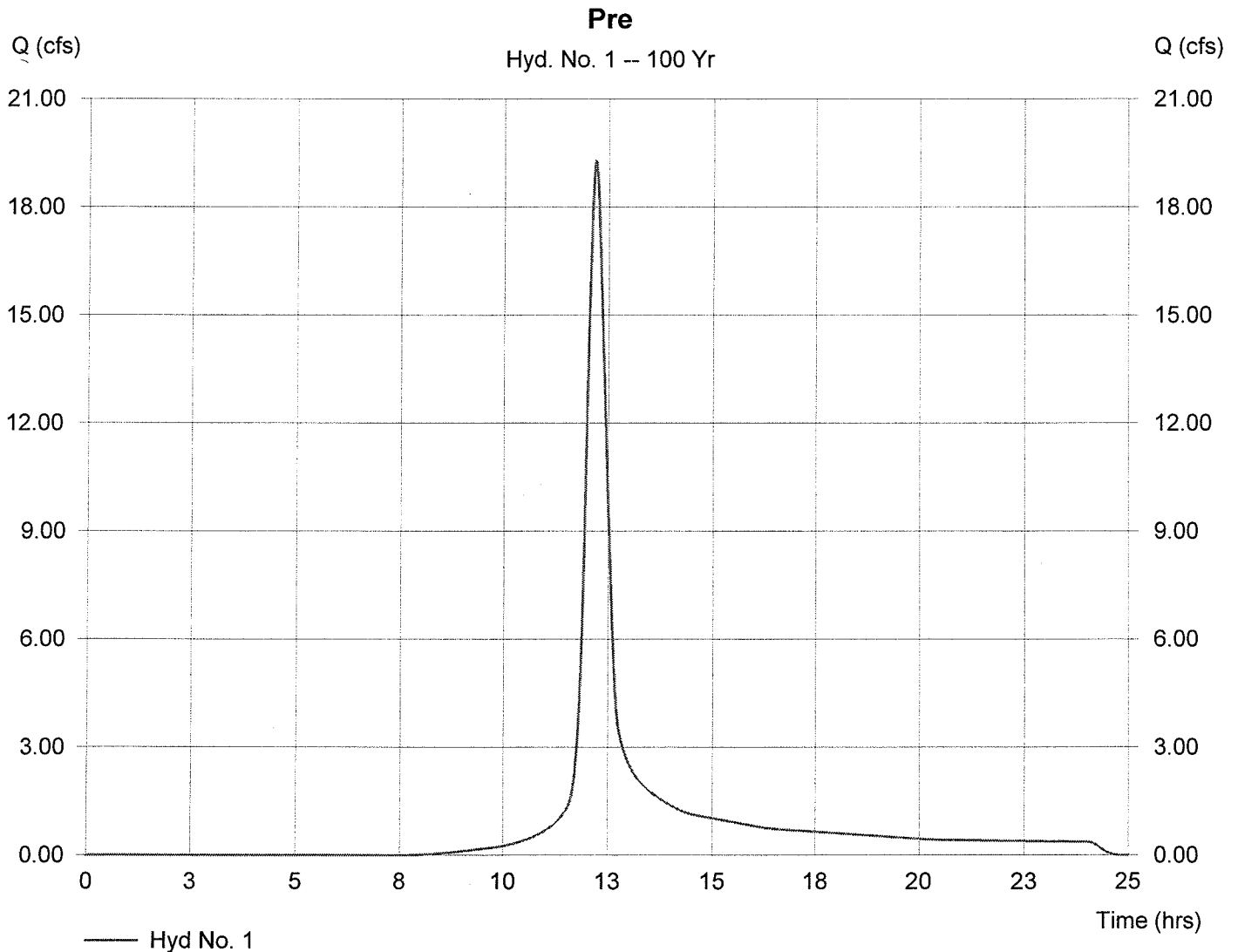
## Hyd. No. 1

Pre

Hydrograph type = SCS Runoff  
 Storm frequency = 100 yrs  
 Drainage area = 4.80 ac  
 Basin Slope = 0.0 %  
 Tc method = TR55  
 Total precip. = 7.95 in  
 Storm duration = 24 hrs

Peak discharge = 19.29 cfs  
 Time interval = 1 min  
 Curve number = 70  
 Hydraulic length = 0 ft  
 Time of conc. (Tc) = 28.8 min  
 Distribution = Type II  
 Shape factor = 484

Hydrograph Volume = 77,038 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Jul 16 2018, 9:2 AM

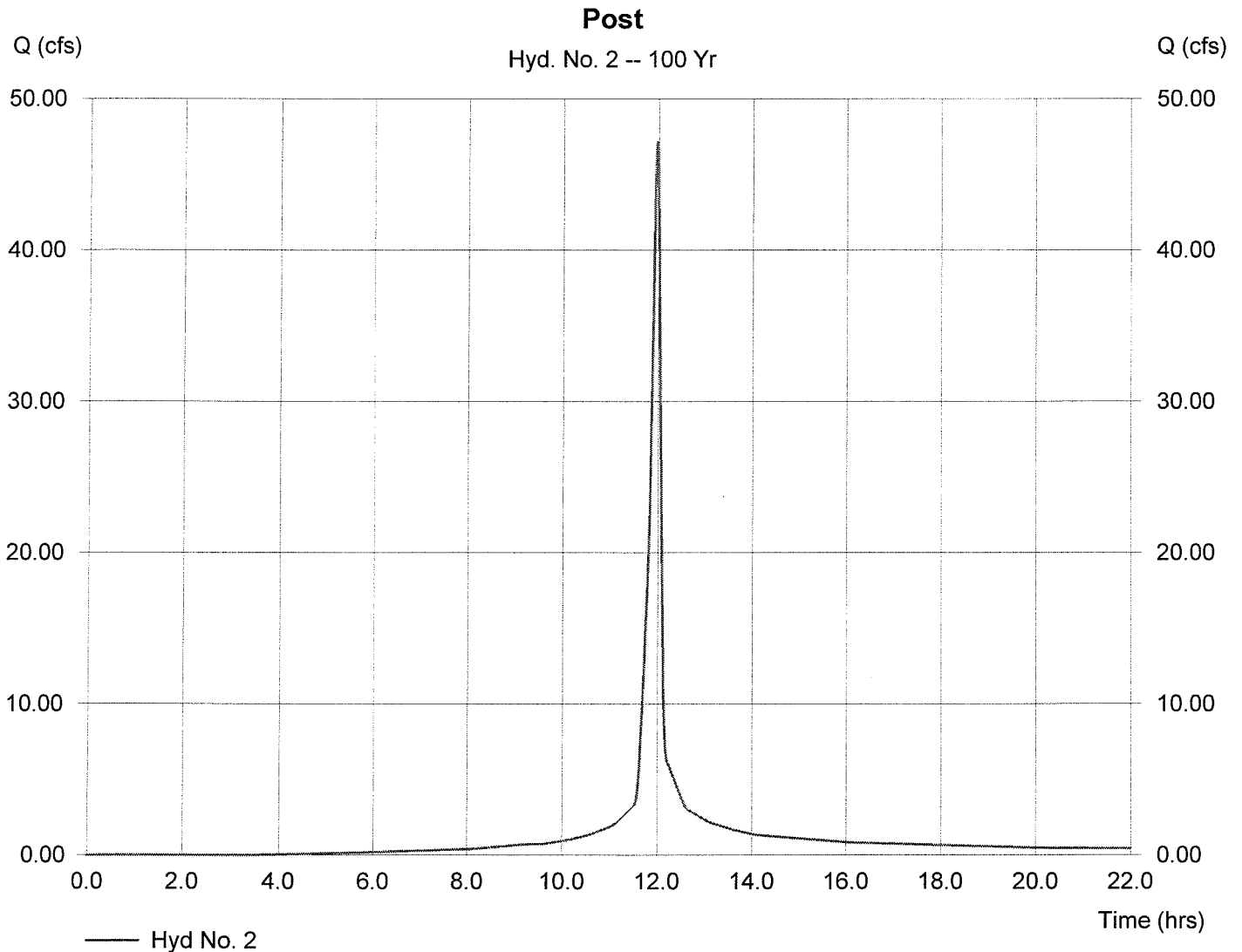
## Hyd. No. 2

Post

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 4.80 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 7.95 in  
Storm duration = 24 hrs

Peak discharge = 47.16 cfs  
Time interval = 1 min  
Curve number = 86.2  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 6.8 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 107,138 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Jul 16 2018, 9:2 AM

## Hyd. No. 3

Detention

Hydrograph type = Reservoir  
 Storm frequency = 100 yrs  
 Inflow hyd. No. = 2  
 Reservoir name = Detention

Peak discharge = 15.98 cfs  
 Time interval = 1 min  
 Max. Elevation = 862.35 ft  
 Max. Storage = 39,027 cuft

Storage Indication method used.

Hydrograph Volume = 107,113 cuft

