Storm Calculations

For

STONEBRIAR SUBDIVISION

City of North Ridgeville – Lorain County

CALCULATED BY:

POLARIS ENGINEERING & SURVEYING, INC.
34600 Chardon Road, Suite D
Willoughby Hills, Ohio 44094
(440) 944-4433 (440) 944-3722 fax
Contact: Dustin R. Keeney, P.E.

June, 2004

RECEIVED
JUN 21 2004

Detention Calculations

For

STONEBRIAR SUBDIVISION

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June, 2004

DETENTION POND SUMMARY

Pond "A"

Year Storm	1	5	10 Critical Storm	25	50	100
Onsite Predev. Peak (CFS)	0.97 (1 yr)	3.15	4.35	5.98	7.71	8.43
Total Offsite Peak (CFS)	N/A	N/A	N/A	N/A	N/A	N/A
Postdev. Pond Inflow Peak (CFS)	4.17	8.96	11.29	14.34	17.57	18.88
Postdev. Pond Outflow Peak (CFS)	0.23	0.79	0.95	1.06	1.67	2.23
Total Allowable Outflow (CFS)	0.97	0.97 (1 yr)	0.97 (1 yr)	5.98	7.71	8.43
HWL Elevation	770.27	770.87	771.23	771.73	772.14	772.24
Storage (AC.-FT.)	0.268	0.467	0.596	0.792	0.959	1.001

(Flood Routing)

DETENTION POND SUMMARY

Pond "B"

Year Storm	1	5	10 Critical Storm	25	50	100
Onsite Predev. Peak (CFS)	1.14 (1 yr)	3.70	5.10	6.99	8.99	9.82
Total Offsite Peak (CFS)	N/A	N/A	N/A	N/A	N/A	N/A
Postdev. Pond Inflow Peak (CFS)	4.29	9.22	11.62	14.76	18.08	19.44
Postdev. Pond Outflow Peak (CFS)	0.28	0.91	1.09	1.23	2.75	3.72
Total Allowable Outflow (CFS)	1.14	1.14 (1 yr)	1.14 (1 yr)	6.99	8.99	9.82
HWL Elevation	770.09	770.87	771.32	771.95	772.29	772.42
Storage (AC.-FT.)	0.260	0.465	0.598	0.792	0.913	0.959

(Flood Routing)

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	1.97	6	756	0.448	----	------	------	Total Predevelopment Onsite
2	SCS Runoff	8.46	6	732	0.862	----	------	------	Total Postdevelopment Onsite
3	SCS Runoff	0.97	6	756	0.221	----	------	------	Pre. to Pond A
4	SCS Runoff	4.17	6	732	0.425	----	------	------	Post. to Pond A
5	Reservoir	0.23	6	1002	0.365	4	770.27	0.268	Flood Route Pond A
6	SCS Runoff	1.14	6	744	0.222	----	------	------	Pre. to Pond B
7	SCS Runoff	4.29	6	732	0.437	----	------	------	Post. to Pond B
8	Reservoir	0.28	6	942	0.379	7	770.09	0.260	Flood Route Pond B
10	SCS Runoff	3.87	6	774	1.224	----	------	------	Offsite

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	6.38	6	750	1.108	----	------	------	Total Predevelopment Onsite
2	SCS Runoff	18.18	6	732	1.745	----	------	------	Total Postdevelopment Onsite
3	SCS Runoff	3.15	6	750	0.546	----	------	------	Pre. to Pond A
4	SCS Runoff	8.96	6	732	0.860	----	------	------	Post. to Pond A
5	Reservoir	0.79	6	834	0.679	4	770.87	0.467	Flood Route Pond A
6	SCS Runoff	3.70	6	744	0.548	----	------	------	Pre. to Pond B
7	SCS Runoff	9.22	6	732	0.885	----	------	------	Post. to Pond B
8	Reservoir	0.91	6	816	0.689	7	770.87	0.465	Flood Route Pond B
10	SCS Runoff	14.43	6	762	3.315	----	------	------	Offsite

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	8.82	6	750	1.456	----	------	------	Total Predevelopment Onsite
2	SCS Runoff	22.91	6	732	2.182	----	------	------	Total Postdevelopment Onsite
3	SCS Runoff	4.35	6	750	0.717	----	------	------	Pre. to Pond A
4	SCS Runoff	11.29	6	732	1.075	----	------	------	Post. to Pond A
5	Reservoir	0.95	6	834	0.829	4	771.23	0.596	Flood Route Pond A
6	SCS Runoff	5.10	6	744	0.720	----	------	------	Pre. to Pond B
7	SCS Runoff	11.62	6	732	1.107	----	------	------	Post. to Pond B
8	Reservoir	1.09	6	822	0.870	7	771.32	0.598	Flood Route Pond B
10	SCS Runoff	20.76	6	762	4.453	----	------	------	Offsite

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	12.13	6	750	1.927	----	------	------	Total Predevelopment Onsite
2	SCS Runoff	29.09	6	726	2.753	----	------	------	Total Postdevelopment Onsite
3	SCS Runoff	5.98	6	750	0.949	----	------	------	Pre. to Pond A
4	SCS Runoff	14.34	6	726	1.357	----	------	------	Post. to Pond A
5	Reservoir	1.06	6	846	1.012	4	771.73	0.792	Flood Route Pond A
6	SCS Runoff	6.99	6	744	0.953	----	------	------	Pre. to Pond B
7	SCS Runoff	14.76	6	726	1.397	----	------	------	Post. to Pond B
8	Reservoir	1.23	6	828	1.081	7	771.95	0.792	Flood Route Pond B
10	SCS Runoff	29.66	6	762	6.014	----	------	------	Offsite

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	15.64	6	750	2.430	----	------	------	Total Predevelopment Onsite
2	SCS Runoff	35.65	6	726	3.348	----	------	------	Total Postdevelopment Onsite
3	SCS Runoff	7.71	6	750	1.198	----	------	------	Pre. to Pond A
4	SCS Runoff	17.57	6	726	1.650	----	------	------	Post. to Pond A
5	Reservoir	1.67	6	810	1.206	4	772.14	0.959	Flood Route Pond A
6	SCS Runoff	8.99	6	744	1.202	----	------	------	Pre. to Pond B
7	SCS Runoff	18.08	6	726	1.698	----	------	------	Post. to Pond B
8	Reservoir	2.75	6	774	1.304	7	772.29	0.913	Flood Route Pond B
10	SCS Runoff	39.38	6	762	7.702	----	------	------	Offsite

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	17.10	6	750	2.640	----	------	------	Total Predevelopment Onsite
2	SCS Runoff	38.32	6	726	3.591	----	------	------	Total Postdevelopment Onsite
3	SCS Runoff	8.43	6	750	1.301	----	------	------	Pre. to Pond A
4	SCS Runoff	18.88	6	726	1.769	----	------	------	Post. to Pond A
5	Reservoir	2.23	6	786	1.293	4	772.24	1.001	Flood Route Pond A
6	SCS Runoff	9.82	6	744	1.305	----	------	------	Pre. to Pond B
7	SCS Runoff	19.44	6	726	1.821	----	------	------	Post. to Pond B
8	Reservoir	3.72	6	762	1.401	7	772.42	0.959	Flood Route Pond B
10	SCS Runoff	43.44	6	762	8.408	----	------	------	Offsite

POLARIS ENGINEERING & SURVEYING
34600 CHARDON ROAD SUITE D
WILLOUGHBY HILLS, OHIO 44094
(440) 944 - 4433 F (440) 944 - 3722

PROJECT STONEBRIAR SUBD.

PROJECT NO. 03535 SHEET NO. ____ OF ____

CALCULATED BY ____ DATE ____

CHECKED BY ____ DATE ____

SUBJECT DETENTION

(1) PRE DEVELOPMENT ONSITE

PROJECT SITE = 17.27 Ac.

SOIL TYPES - CIA, CHILI, Hydrologic Group B
Om, OLMSTED, " " B/D
JtA, JIMTOWN, " " C
HsA, HASKINS, " " C
Ln, LORAIN, " " C/D
Mn, MINER, Hydrologic Group D

EXISTING CONDITIONS - SITE IS BRUSH, GRASS, WEEDS MIXTURE - FAIR CONDITION

B SOILS → A = 5.22 Ac. CN = 62
B/D & C SOILS → A = 9.42 Ac. CN = 74
C/D SOILS → A = 0.77 Ac. CN = 77
D SOILS → A = 1.86 Ac. CN = 80

$$CN = \frac{(5.22)(62) + (9.42)(74) + (0.77)(77) + (1.86)(80)}{17.27}$$

CN = 71.2

T_c SEE NEXT PAGE

TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

Total Predevelopment Onsite

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	300.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.30		0.00		0.00		
Land slope (%)	=	1.20		0.00		0.00		
Travel Time (min)	=	**49.73**	+	**0.00**	+	**0.00**	=	**49.73**
Shallow Concentrated Flow								
Flow length (ft)	=	195.00		0.00		0.00		
Watercourse slope (%)	=	0.70		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.35		0.00		0.00		
Travel Time (min)	=	**2.41**	+	**0.00**	+	**0.00**	=	**2.41**
Channel Flow								
X sectional flow area (sqft)	=	7.00		0.00		0.00		
Wetted perimeter (ft)	=	12.20		0.00		0.00		
Channel slope (%)	=	0.15		0.00		0.00		
Manning's n-value	=	0.035		0.015		0.015		
Velocity (ft/s)	=	1.14		0.00		0.00		
Flow length (ft)	=	360.0		0.0		0.0		
Travel Time (min)	=	**5.28**	+	**0.00**	+	**0.00**	=	**5.28**

Total Travel Time, Tc ..... 57.41 min

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

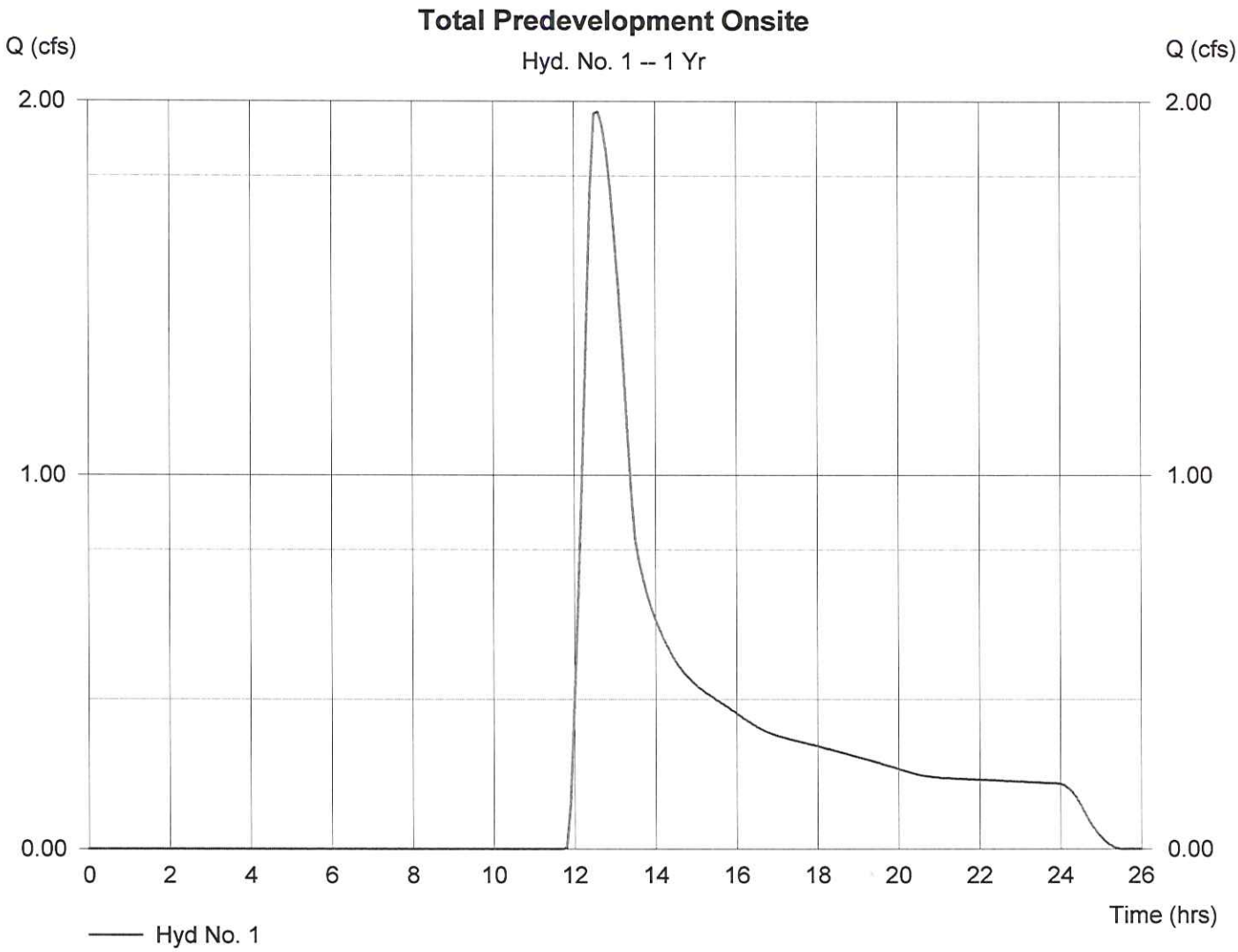
Friday, Jun 18 2004, 11:39 AM

Hyd. No. 1

Total Predevelopment Onsite

Hydrograph type	= SCS Runoff	Peak discharge	= 1.97 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Drainage area	= 17.270 ac	Curve number	= 71.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 57.40 min
Total precip.	= 2.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 0.448 acft



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PROJECT STONEBRIAR SUBD.

PROJECT NO. 03535 SHEET NO. ____ OF ____

CALCULATED BY ____ DATE ____

CHECKED BY ____ DATE ____

SUBJECT DETENTION

(2) POST DEVELOPMENT ONSITE

PROJECT SITE = 17.27 Ac.

PROPOSED CONDITIONS –

		Soil Types			
		B	B/D & C	C/D	D
AREA IN LOTS	= 11.77 Ac.	3.23	6.46	0.50	1.58
AREA IN R/W	= 2.62 Ac.	0.71	1.41	0.21	0.29
AREA IN OPEN	= 1.61 Ac.	–	1.61	–	–
AREA IN BLOCK	= 1.27 Ac.	1.27	–	–	–
TOT.	= 17.27 Ac.				

$$CN = \frac{(3.23)(71)+(6.46)(81)+(0.50)(83)+(.58)(86)+(.71)(83)+(1.41)(88)+(.21)(90)+(.29)(91)+(1.61)(74)+(1.27)(75)}{17.27}$$

CN = 79.4

T_c

Longest T_c TO EITHER POND

T_c TO POND A = 20 MIN.

T_c TO POND B = 21 MIN.

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

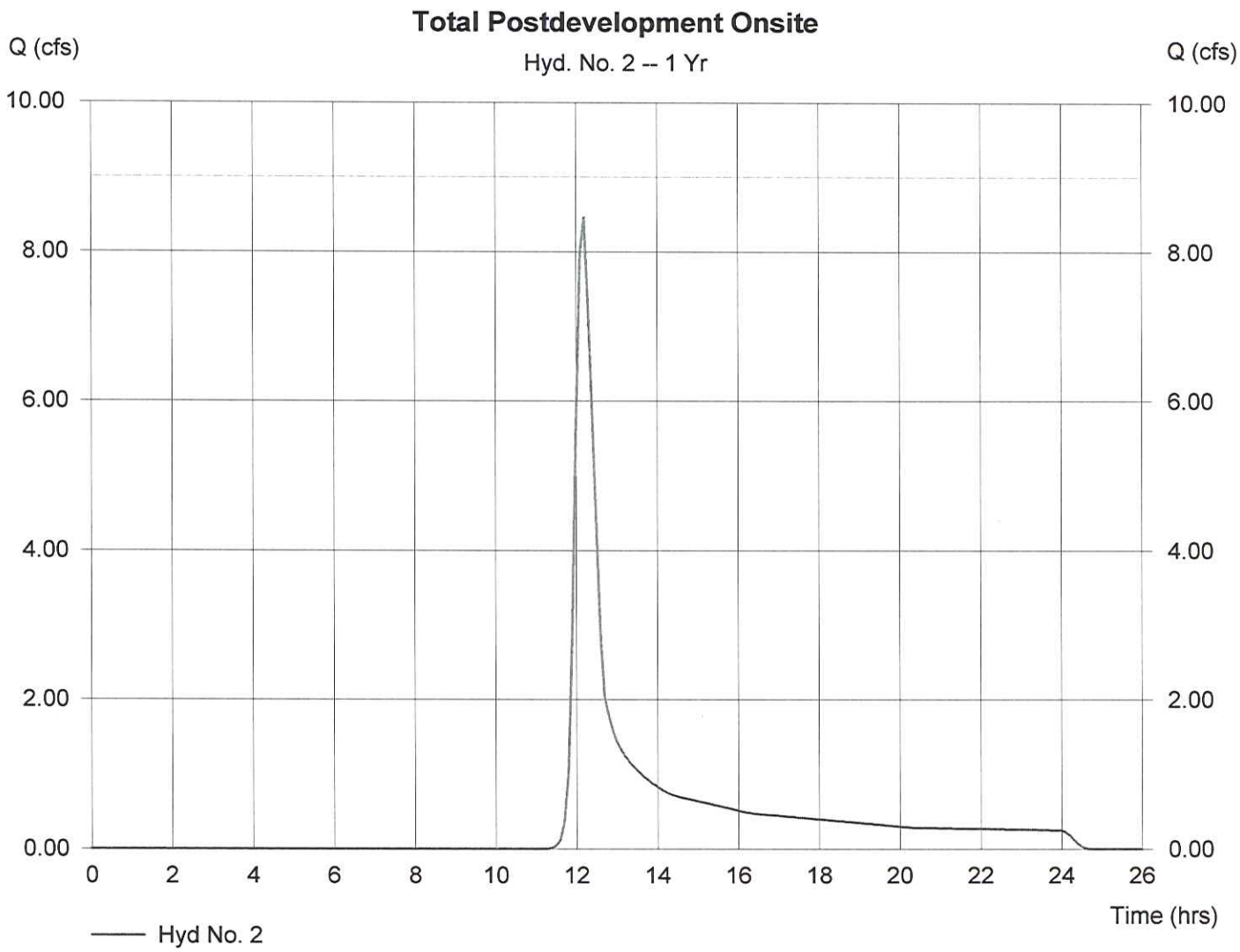
Friday, Jun 18 2004, 11:41 AM

Hyd. No. 2

Total Postdevelopment Onsite

Hydrograph type	= SCS Runoff	Peak discharge	= 8.46 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Drainage area	= 17.270 ac	Curve number	= 79.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 21.00 min
Total precip.	= 2.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 0.862 acft



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PROJECT STONEBRIAR SUBD.

PROJECT NO. 03535 SHEET NO. ____ OF ____

CALCULATED BY ____ DATE ____

CHECKED BY ____ DATE ____

SUBJECT DETENTION

CRITICAL STORM

1 YEAR PREDEVELOPMENT VOLUME = 0.448 AC. FT.

1 YEAR POSTDEVELOPMENT VOLUME = 0.862 AC. FT.

$$\text{CRITICAL STORM} = \frac{0.862 - 0.448}{0.448}$$

$$= 92.4\% \text{ INCREASE}$$

10 YEAR CRITICAL STORM

THE PREVIOUS TWO (2) HYDROGRAPHS WERE CALCULATED ONLY TO DETERMINE THE CRITICAL STORM OF THE ENTIRE SUBJECT PROPERTY.

THE REMAINING HYDROGRAPHS SHOW THE PROJECT AREA DIVIDED INTO THE NORTH AND SOUTH AREAS ASSOCIATED WITH PONDS A & B AS NOTED.

(SEE FOLLOWING HYDROGRAPHS)

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PROJECT NO. 03535 SHEET NO. ____ OF ____

CALCULATED BY ____ DATE ____

CHECKED BY ____ DATE ____

SUBJECT DETENTION

PROJECT SITE AREA TO POND A

AREA = 8.51 ACRES

(3) PRE CN = 71.2 , PRE T_c = 57.4 MIN.

(4) POST CN = 79.4 , POST T_c = 20 MIN.

(5) ROUTE POND A

PROJECT SITE AREA TO POND B

AREA = 8.76 AC.

(6) PRE CN = 71.2, PRE T_c = 45.6 MIN.

(7) POST CN = 79.4, POST T_c = 21 MIN.

(8) ROUTE POND B

TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

Pre. to Pond A

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	300.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.30		0.00		0.00		
Land slope (%)	=	1.20		0.00		0.00		
Travel Time (min)	=	**49.73**	+	**0.00**	+	**0.00**	=	**49.73**
Shallow Concentrated Flow								
Flow length (ft)	=	195.00		0.00		0.00		
Watercourse slope (%)	=	0.70		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.35		0.00		0.00		
Travel Time (min)	=	**2.41**	+	**0.00**	+	**0.00**	=	**2.41**
Channel Flow								
X sectional flow area (sqft)	=	7.00		0.00		0.00		
Wetted perimeter (ft)	=	12.20		0.00		0.00		
Channel slope (%)	=	0.15		0.00		0.00		
Manning's n-value	=	0.035		0.015		0.015		
Velocity (ft/s)	=	1.14		0.00		0.00		
Flow length (ft)	=	360.0		0.0		0.0		
Travel Time (min)	=	**5.28**	+	**0.00**	+	**0.00**	=	**5.28**

Total Travel Time, Tc ..... 57.41 min

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

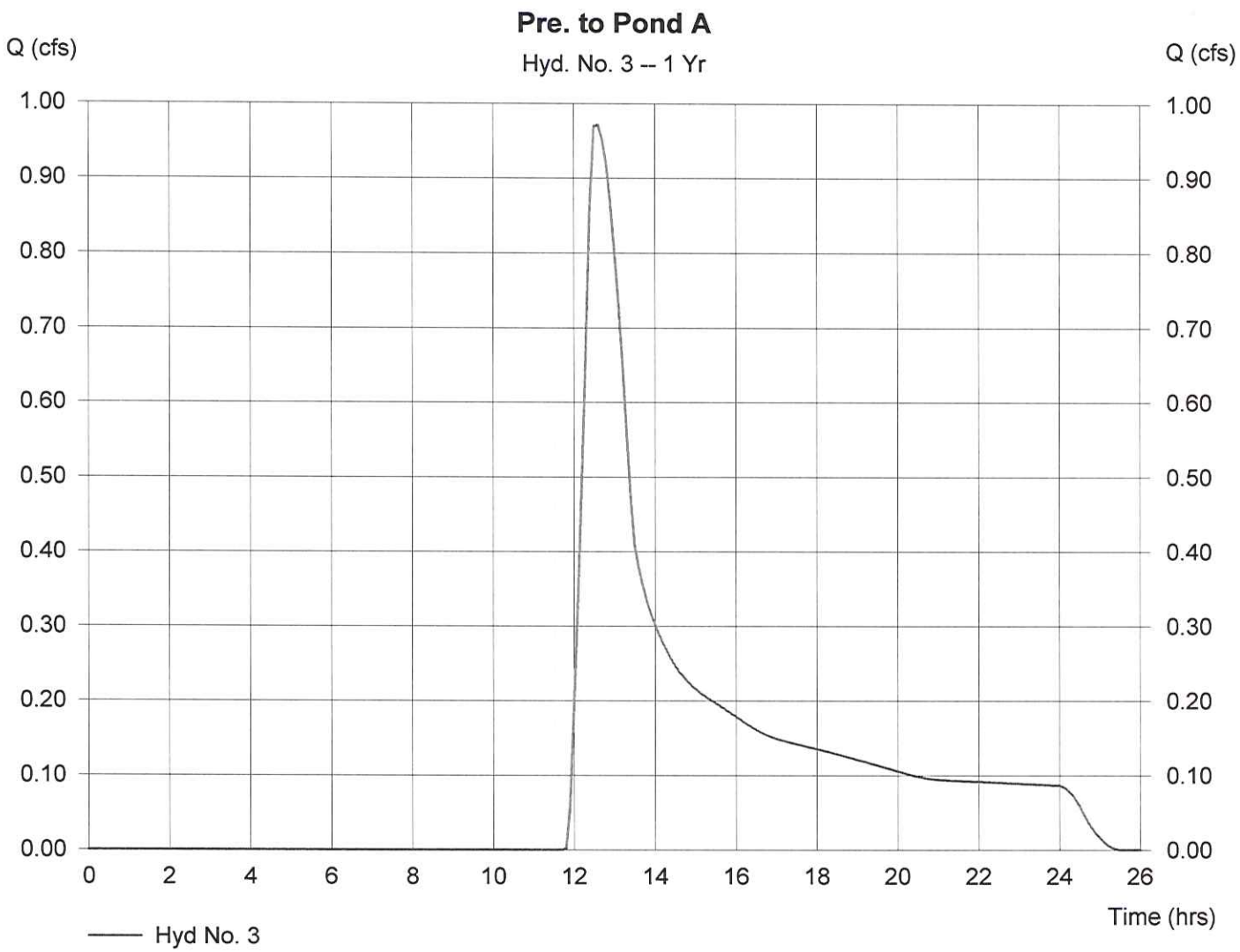
Friday, Jun 18 2004, 10:58 AM

Hyd. No. 3

Pre. to Pond A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.97 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Drainage area	= 8.510 ac	Curve number	= 71.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 57.40 min
Total precip.	= 2.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 0.221 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

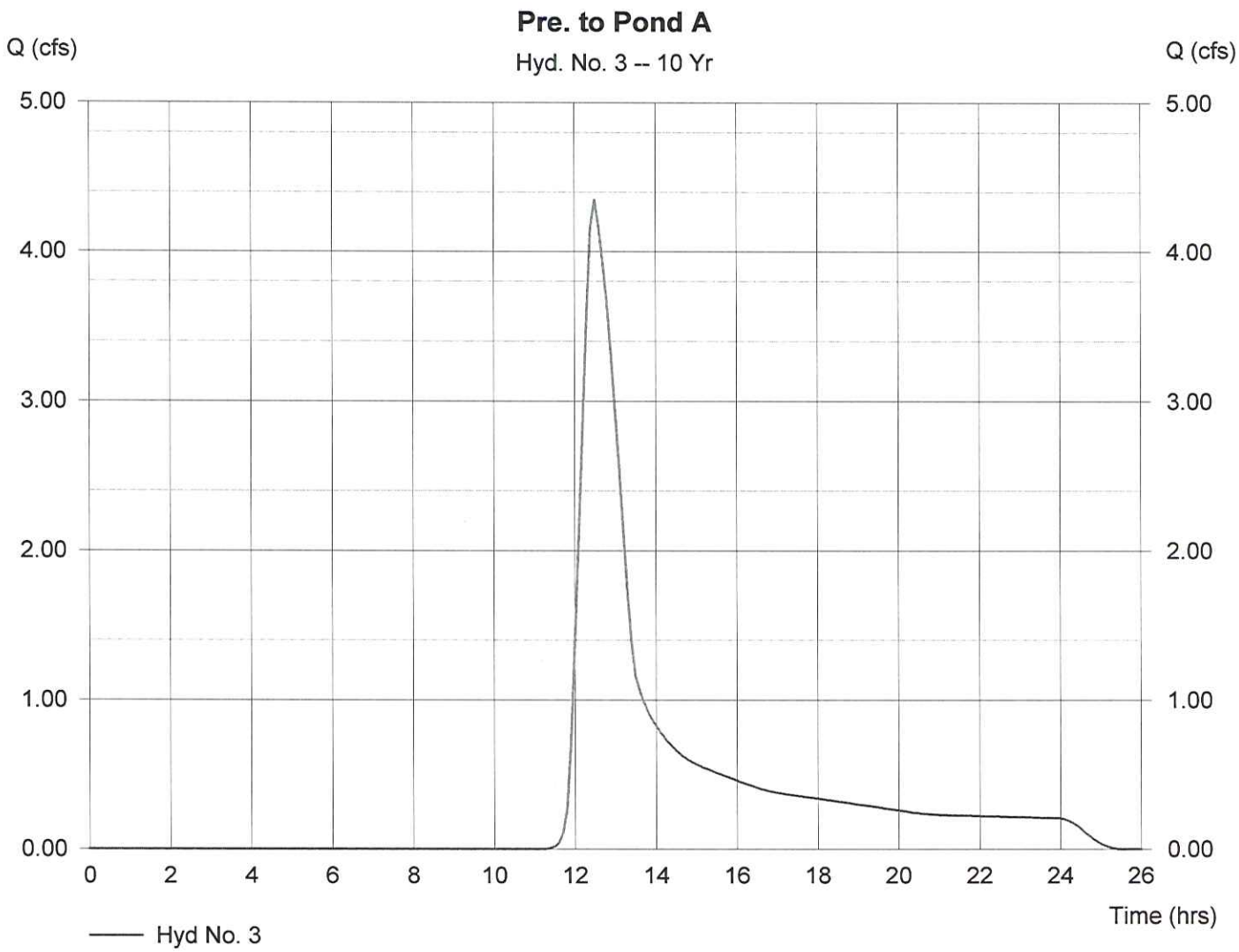
Friday, Jun 18 2004, 11:13 AM

Hyd. No. 3

Pre. to Pond A

Hydrograph type	= SCS Runoff	Peak discharge	= 4.35 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Drainage area	= 8.510 ac	Curve number	= 71.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 57.40 min
Total precip.	= 3.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 0.717 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

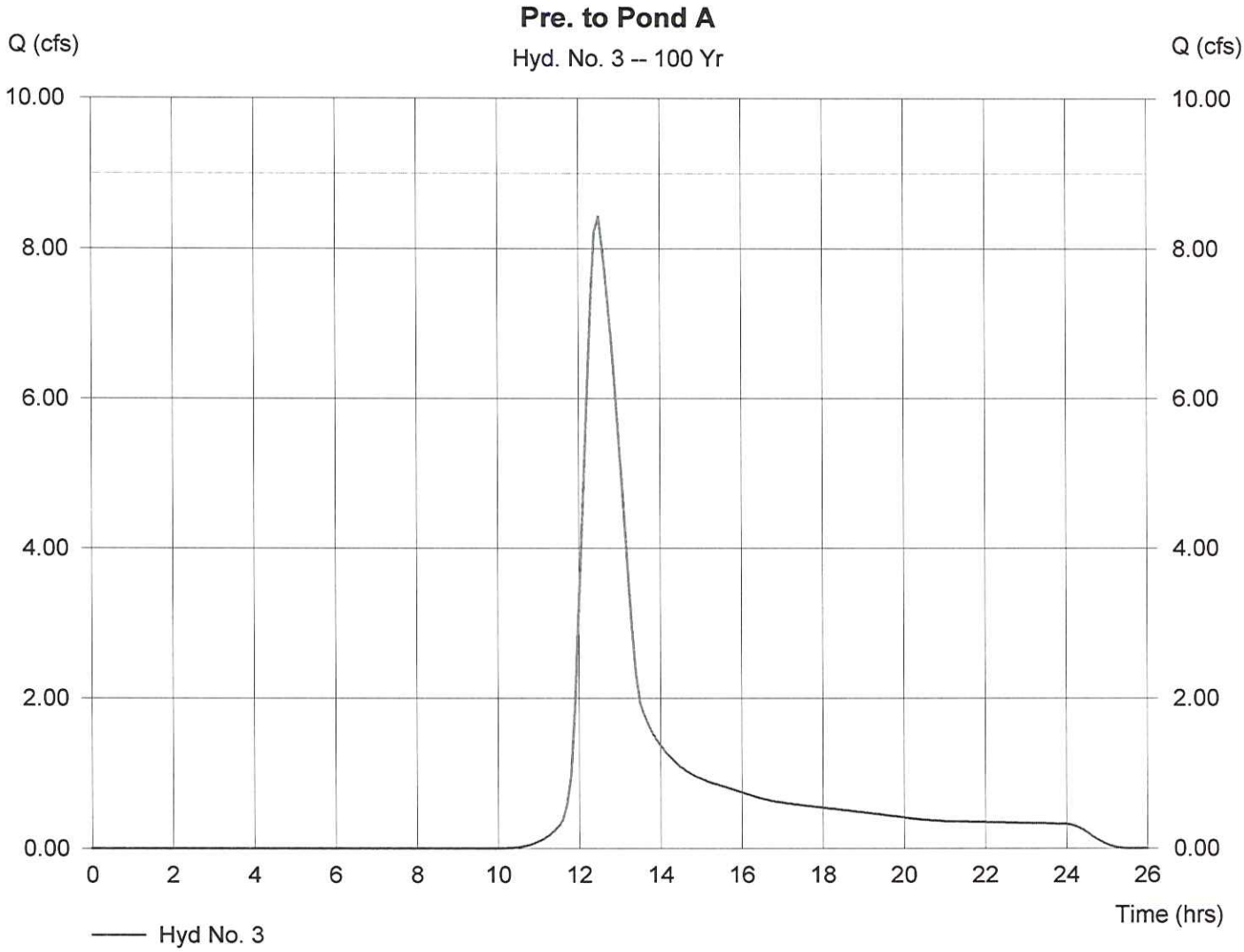
Friday, Jun 18 2004, 11:26 AM

Hyd. No. 3

Pre. to Pond A

Hydrograph type	= SCS Runoff	Peak discharge	= 8.43 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 8.510 ac	Curve number	= 71.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 57.40 min
Total precip.	= 4.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1.301 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

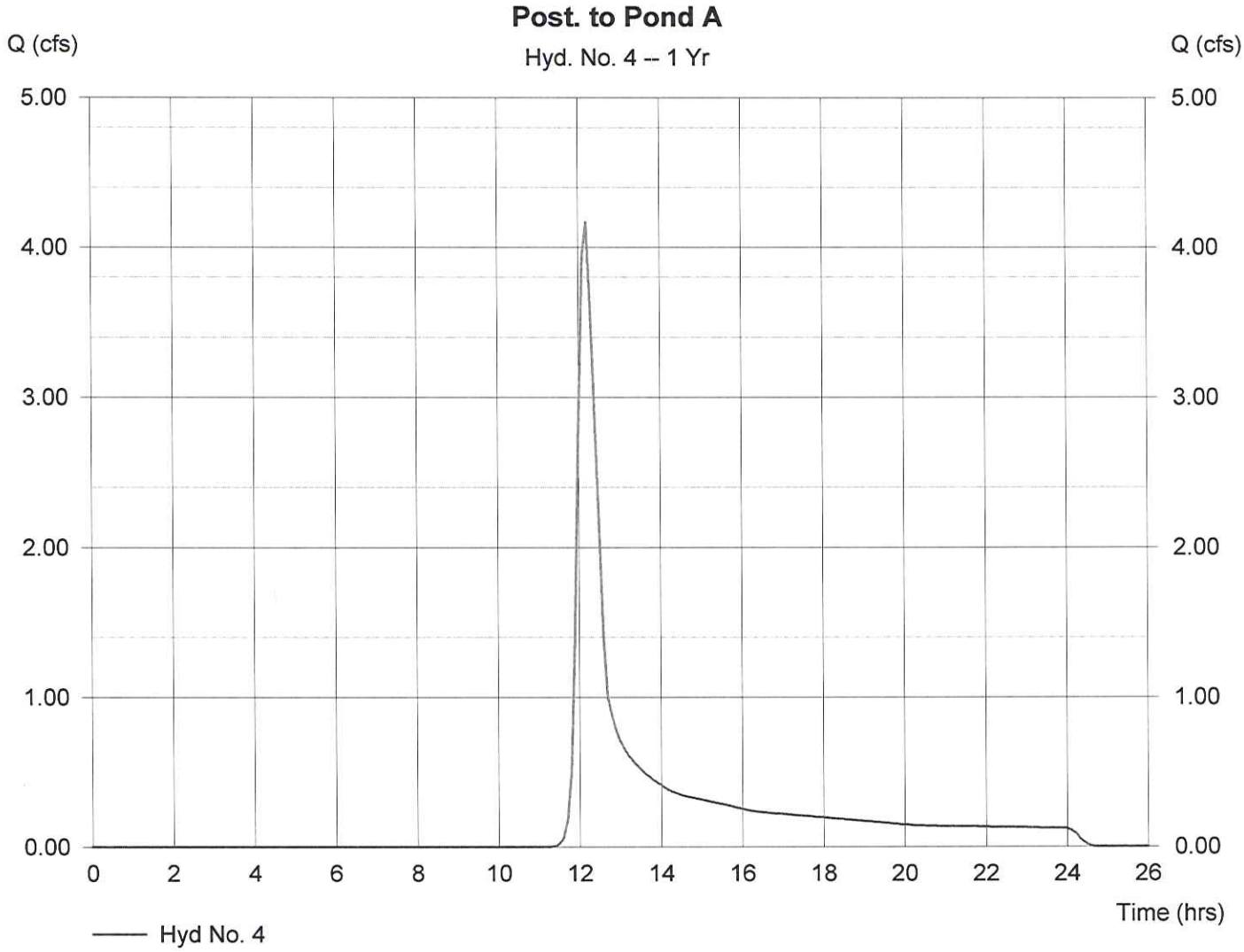
Friday, Jun 18 2004, 10:59 AM

Hyd. No. 4

Post. to Pond A

Hydrograph type	= SCS Runoff	Peak discharge	= 4.17 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Drainage area	= 8.510 ac	Curve number	= 79.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 20.00 min
Total precip.	= 2.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 0.425 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

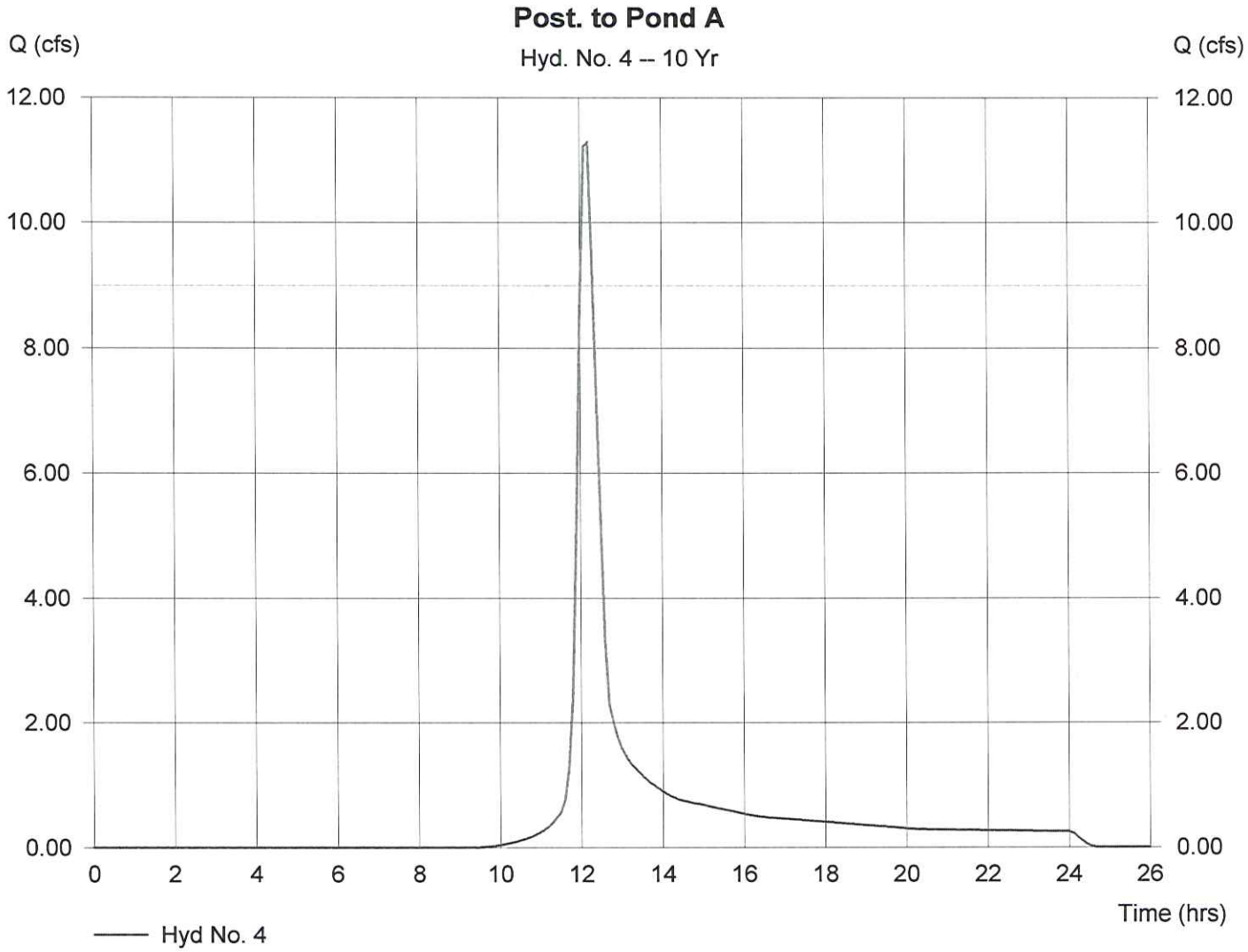
Friday, Jun 18 2004, 11:13 AM

Hyd. No. 4

Post. to Pond A

Hydrograph type	= SCS Runoff	Peak discharge	= 11.29 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Drainage area	= 8.510 ac	Curve number	= 79.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 20.00 min
Total precip.	= 3.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1.075 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

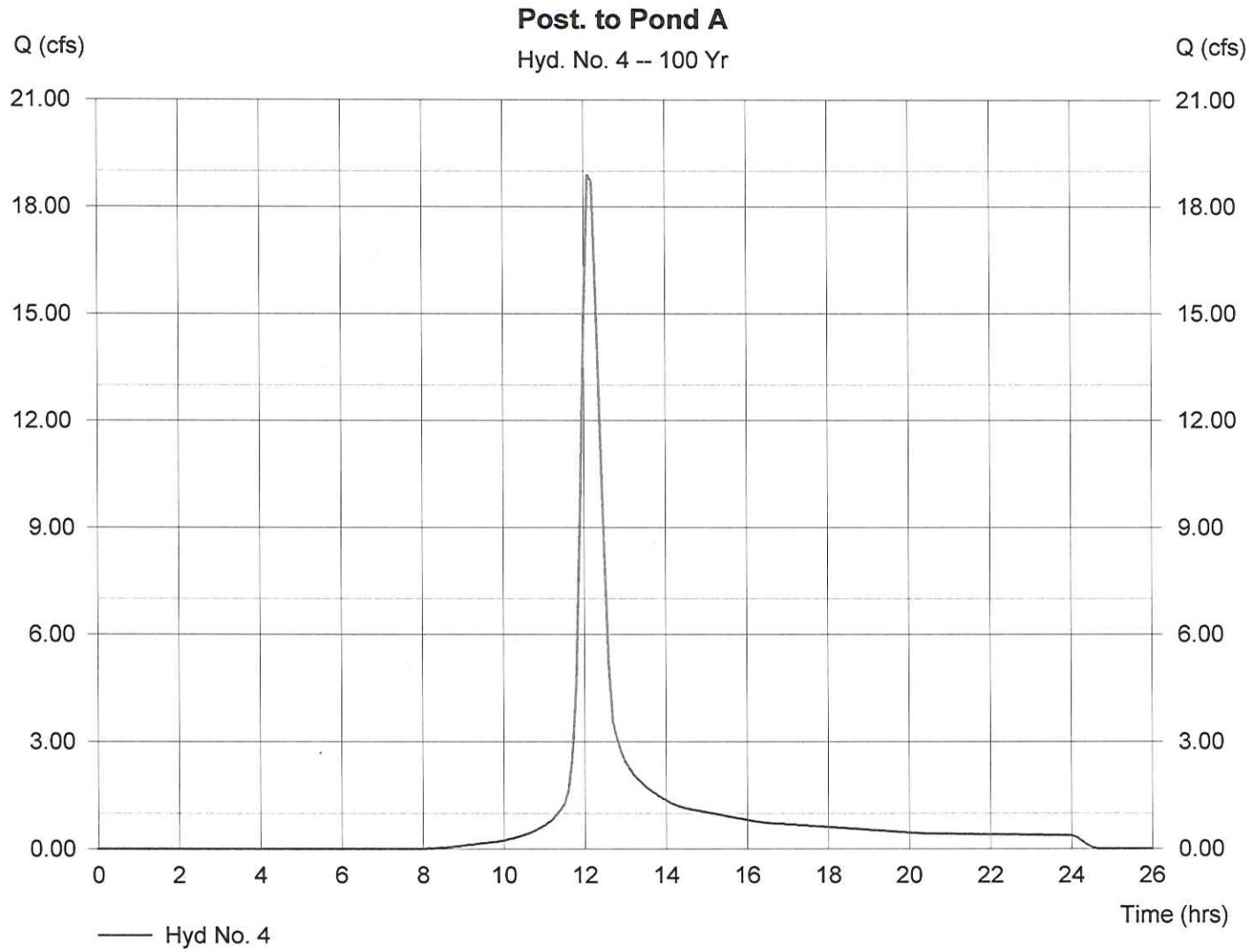
Friday, Jun 18 2004, 11:27 AM

Hyd. No. 4

Post. to Pond A

Hydrograph type	= SCS Runoff	Peak discharge	= 18.88 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 8.510 ac	Curve number	= 79.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 20.00 min
Total precip.	= 4.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1.769 acft



Pond Report

Hydraflow Hydrographs by Intelisolve

Friday, Jun 18 2004, 11:33 AM

Pond No. 1 - Pond A

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 (acft)	Total storage (acft)
0.00	768.68	00	0.000	0.000
0.32	769.00	1,900	0.007	0.007
1.32	770.00	13,160	0.173	0.180
2.32	771.00	15,520	0.329	0.509
3.32	772.00	18,050	0.385	0.894
4.32	773.00	20,640	0.444	1.338

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 12.00	1.50	6.00	0.00
Span (in)	= 12.00	1.50	6.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 768.68	768.68	770.02	0.00
Length (ft)	= 12.00	0.00	0.00	0.00
Slope (%)	= 0.20	0.00	0.00	0.00
N-Value	= .015	.015	.015	.000
Orif. Coeff.	= 0.60	0.60	0.60	0.00
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.14	0.00	0.00	0.00
Crest El. (ft)	= 772.00	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. = 770.92 ft

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

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0.000	768.68	0.00	0.00	0.00	---	0.00	---	---	---	---	0.00
0.32	0.007	769.00	0.00	0.00	0.00	---	0.00	---	---	---	---	0.00
1.32	0.180	770.00	0.00	0.00	0.00	---	0.00	---	---	---	---	0.00
2.32	0.509	771.00	0.28	0.02	0.26	---	0.00	---	---	---	---	0.27
3.32	0.894	772.00	1.01	0.06	0.95	---	0.00	---	---	---	---	1.01
4.32	1.338	773.00	5.32	0.02	0.30	---	5.00	---	---	---	---	5.32

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Jun 18 2004, 11:0 AM

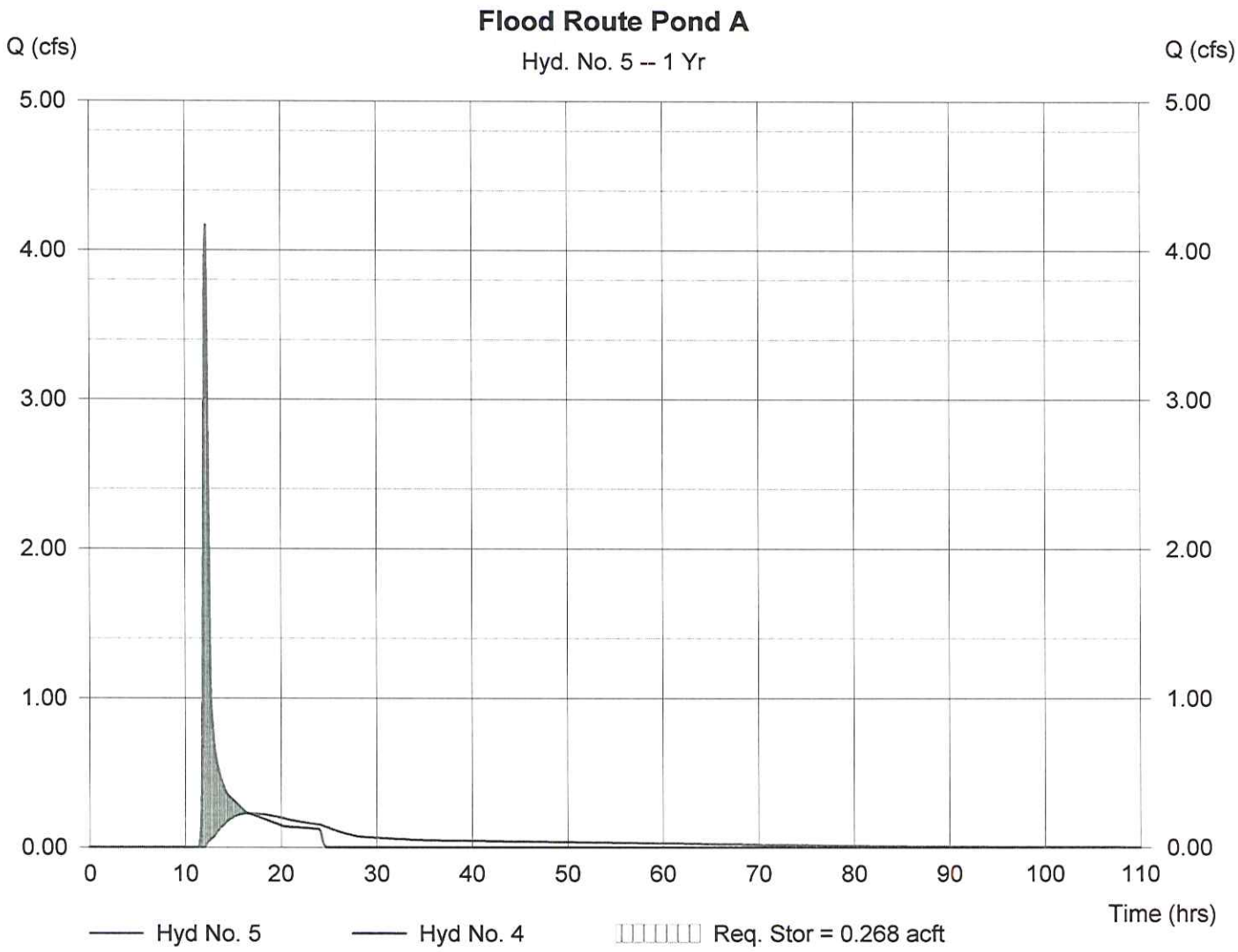
Hyd. No. 5

Flood Route Pond A

Hydrograph type	= Reservoir	Peak discharge	= 0.23 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Inflow hyd. No.	= 4	Max. Elevation	= 770.27 ft
Reservoir name	= Pond A	Max. Storage	= 0.268 acft

Storage Indication method used.

Hydrograph Volume = 0.365 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Jun 18 2004, 11:14 AM

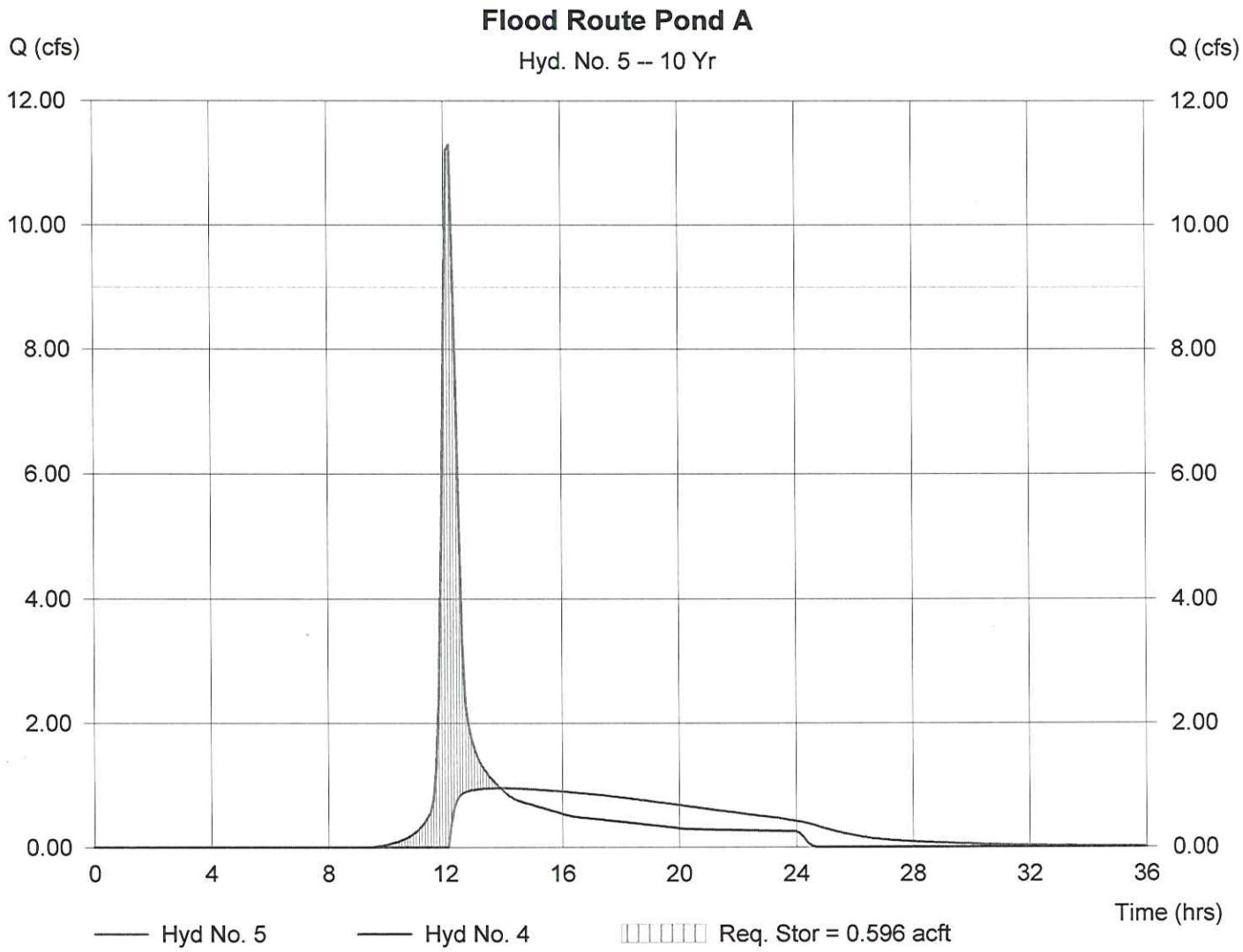
Hyd. No. 5

Flood Route Pond A

Hydrograph type	= Reservoir	Peak discharge	= 0.95 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Inflow hyd. No.	= 4	Max. Elevation	= 771.23 ft
Reservoir name	= Pond A	Max. Storage	= 0.596 acft

Storage Indication method used.

Hydrograph Volume = 0.829 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Jun 18 2004, 11:27 AM

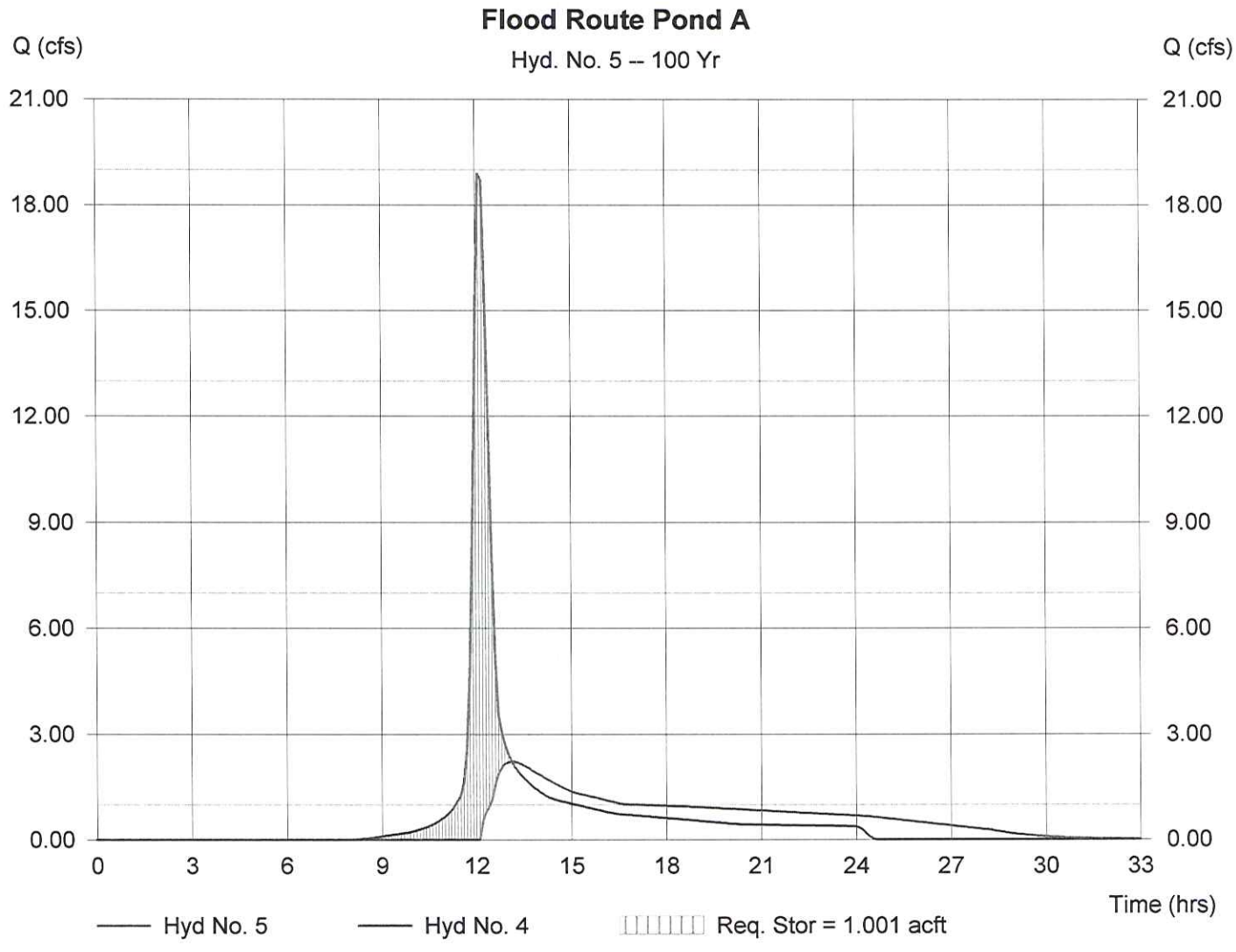
Hyd. No. 5

Flood Route Pond A

Hydrograph type	= Reservoir	Peak discharge	= 2.23 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Inflow hyd. No.	= 4	Max. Elevation	= 772.24 ft
Reservoir name	= Pond A	Max. Storage	= 1.001 acft

Storage Indication method used.

Hydrograph Volume = 1.293 acft



TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve

Hyd. No. 6

Pre. to Pond B

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.011		0.011		
Flow length (ft)	=	300.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	2.30		0.00		0.00		
Land slope (%)	=	1.90		0.00		0.00		
Travel Time (min)	=	**41.38**	+	**0.00**	+	**0.00**	=	**41.38**
Shallow Concentrated Flow								
Flow length (ft)	=	175.00		0.00		0.00		
Watercourse slope (%)	=	1.30		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.84		0.00		0.00		
Travel Time (min)	=	**1.59**	+	**0.00**	+	**0.00**	=	**1.59**
Channel Flow								
X sectional flow area (sqft)	=	7.00		0.00		0.00		
Wetted perimeter (ft)	=	12.20		0.00		0.00		
Channel slope (%)	=	0.15		0.00		0.00		
Manning's n-value	=	0.035		0.015		0.015		
Velocity (ft/s)	=	1.14		0.00		0.00		
Flow length (ft)	=	180.0		0.0		0.0		
Travel Time (min)	=	**2.64**	+	**0.00**	+	**0.00**	=	**2.64**

Total Travel Time, Tc ..... 45.60 min

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

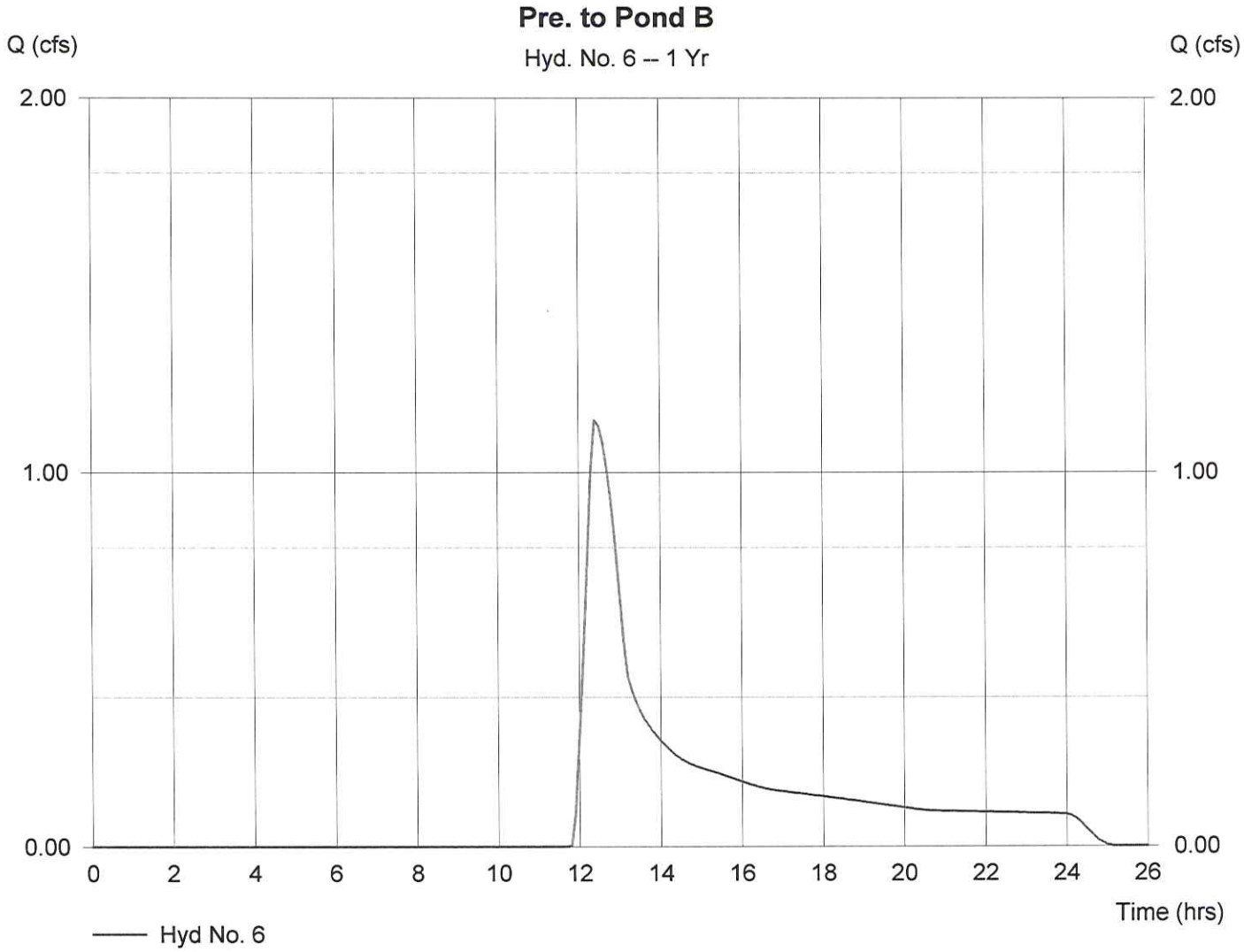
Friday, Jun 18 2004, 11:2 AM

Hyd. No. 6

Pre. to Pond B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.14 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Drainage area	= 8.760 ac	Curve number	= 71.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 45.60 min
Total precip.	= 2.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 0.222 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

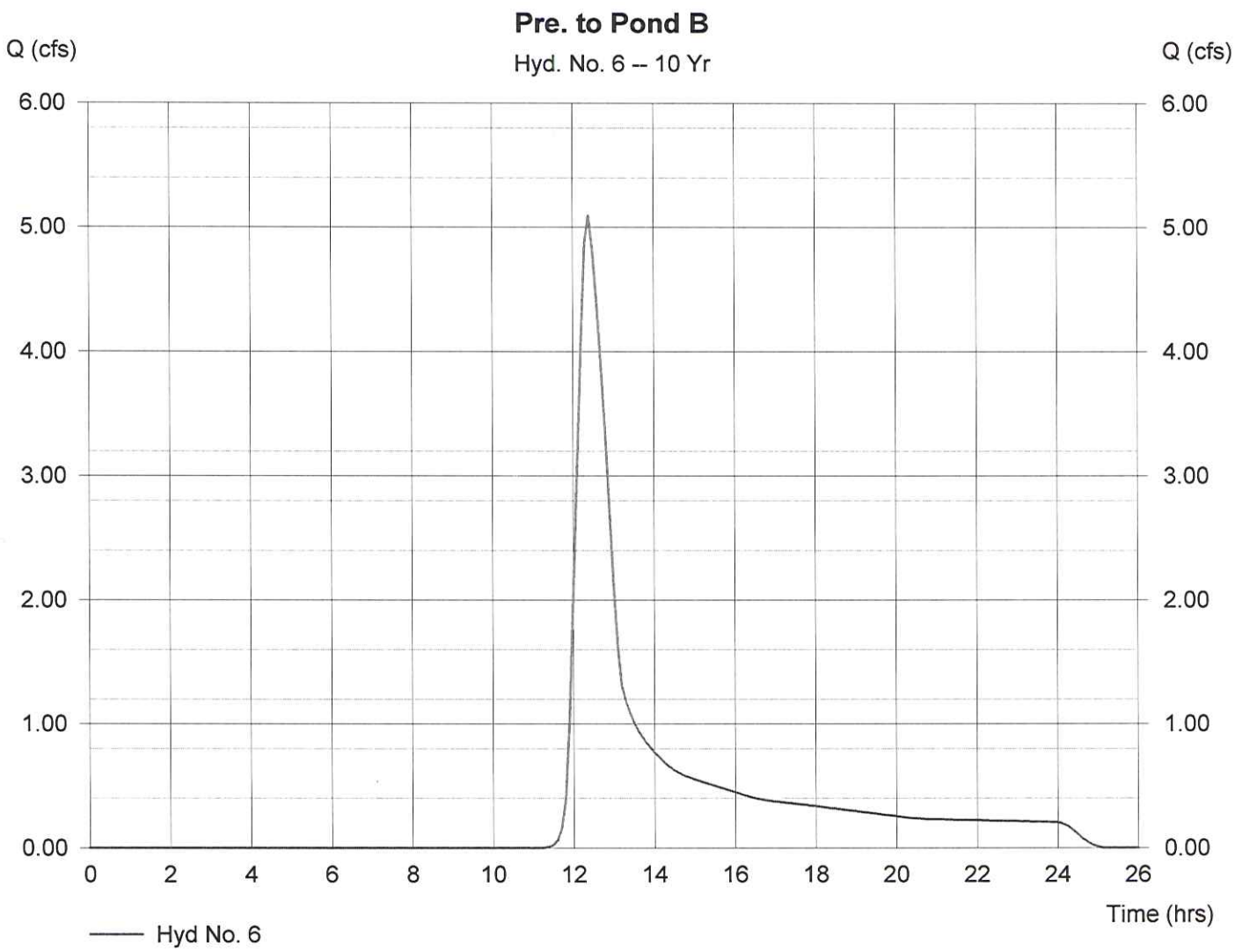
Friday, Jun 18 2004, 11:14 AM

Hyd. No. 6

Pre. to Pond B

Hydrograph type	= SCS Runoff	Peak discharge	= 5.10 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Drainage area	= 8.760 ac	Curve number	= 71.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 45.60 min
Total precip.	= 3.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 0.720 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

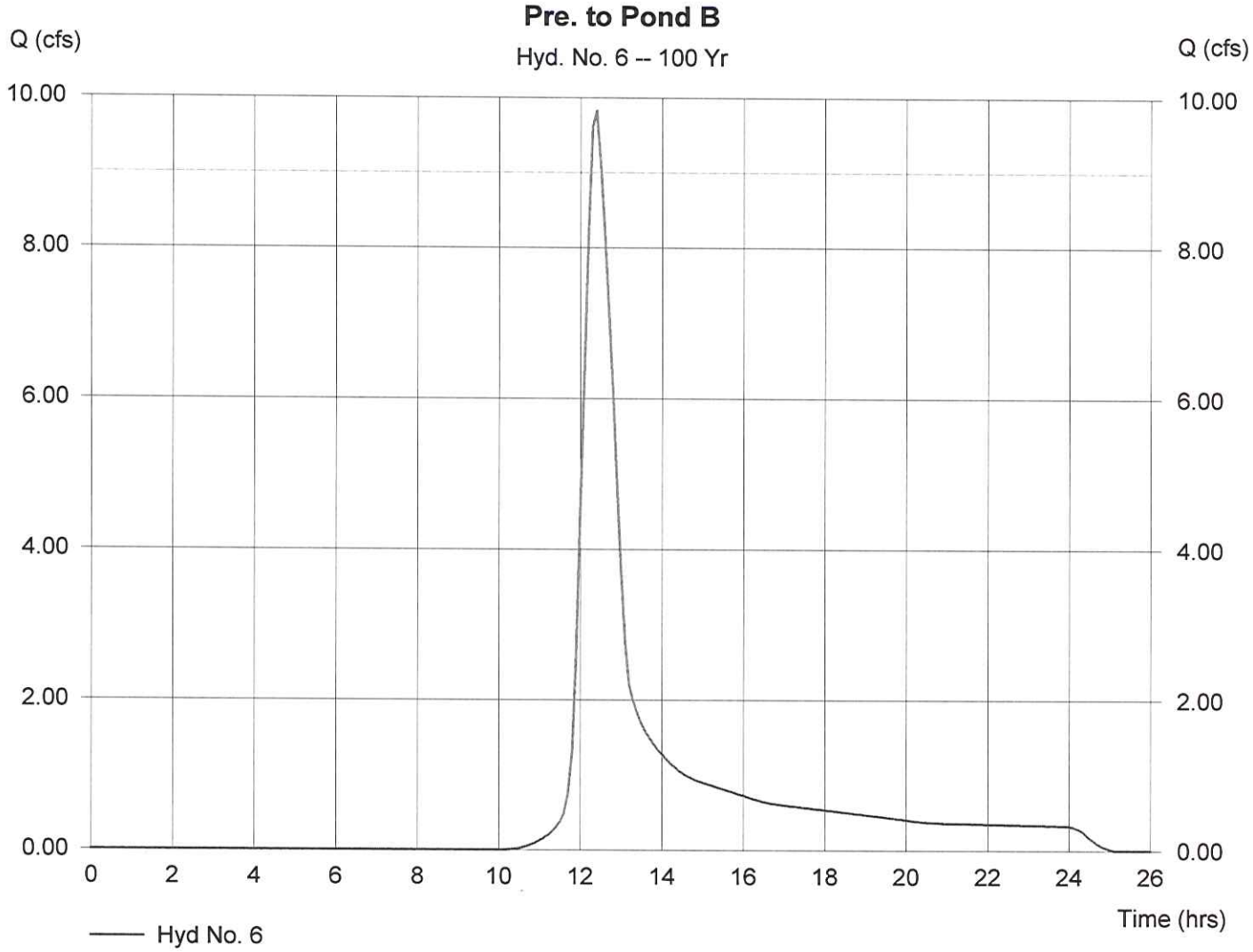
Friday, Jun 18 2004, 11:27 AM

Hyd. No. 6

Pre. to Pond B

Hydrograph type	= SCS Runoff	Peak discharge	= 9.82 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 8.760 ac	Curve number	= 71.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 45.60 min
Total precip.	= 4.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1.305 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

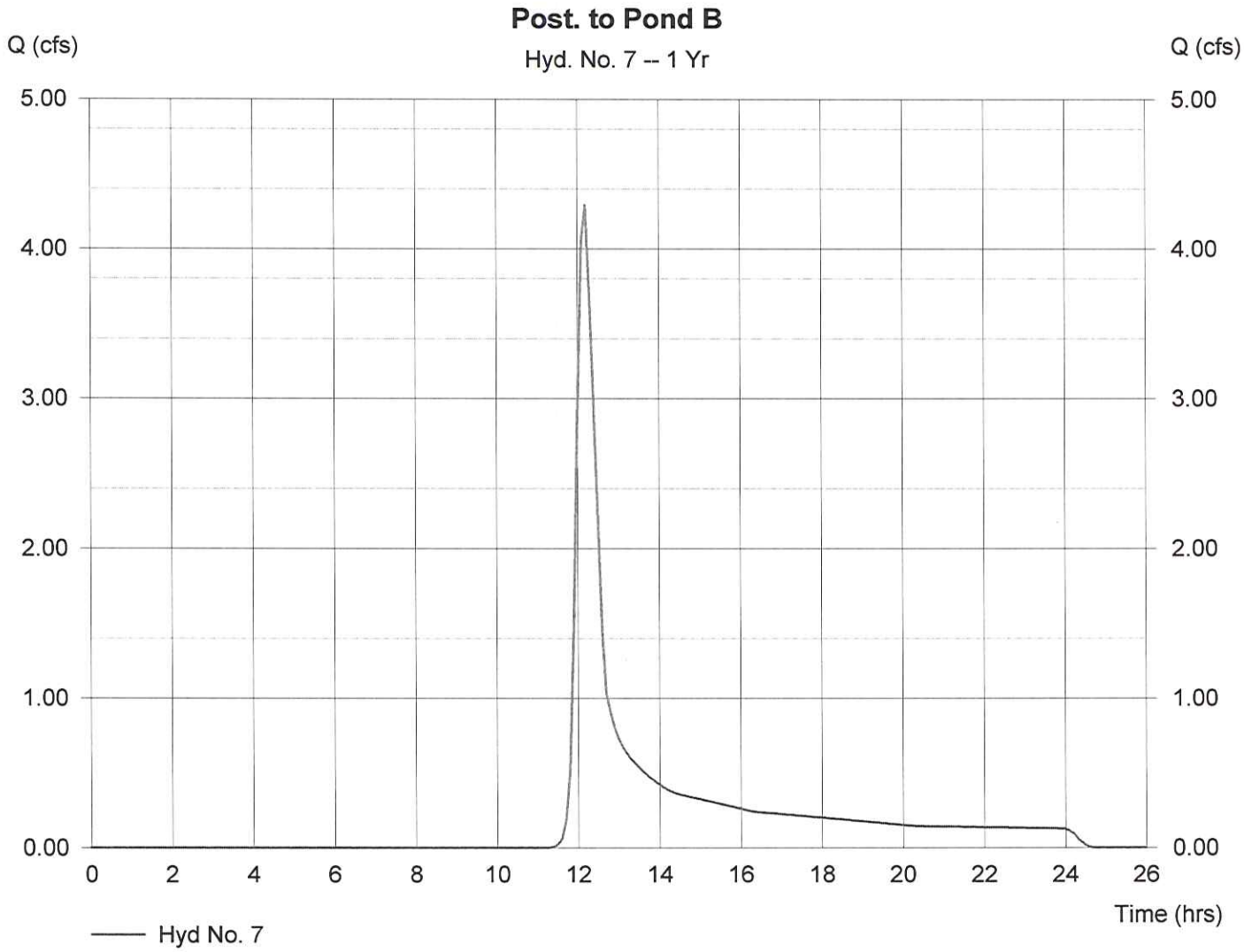
Friday, Jun 18 2004, 11:2 AM

Hyd. No. 7

Post. to Pond B

Hydrograph type	= SCS Runoff	Peak discharge	= 4.29 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Drainage area	= 8.760 ac	Curve number	= 79.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 21.00 min
Total precip.	= 2.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 0.437 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

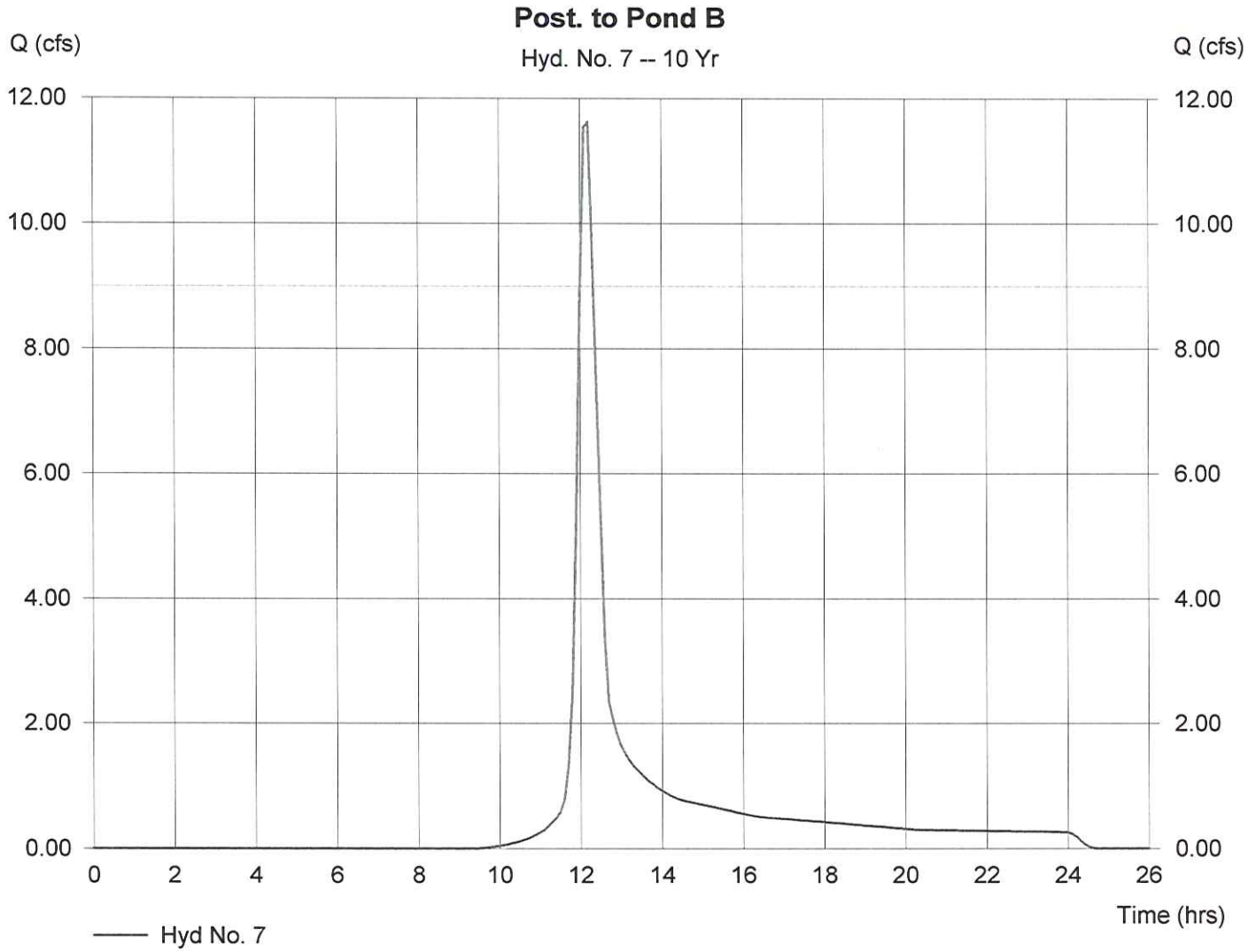
Friday, Jun 18 2004, 11:14 AM

Hyd. No. 7

Post. to Pond B

Hydrograph type	= SCS Runoff	Peak discharge	= 11.62 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Drainage area	= 8.760 ac	Curve number	= 79.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 21.00 min
Total precip.	= 3.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1.107 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

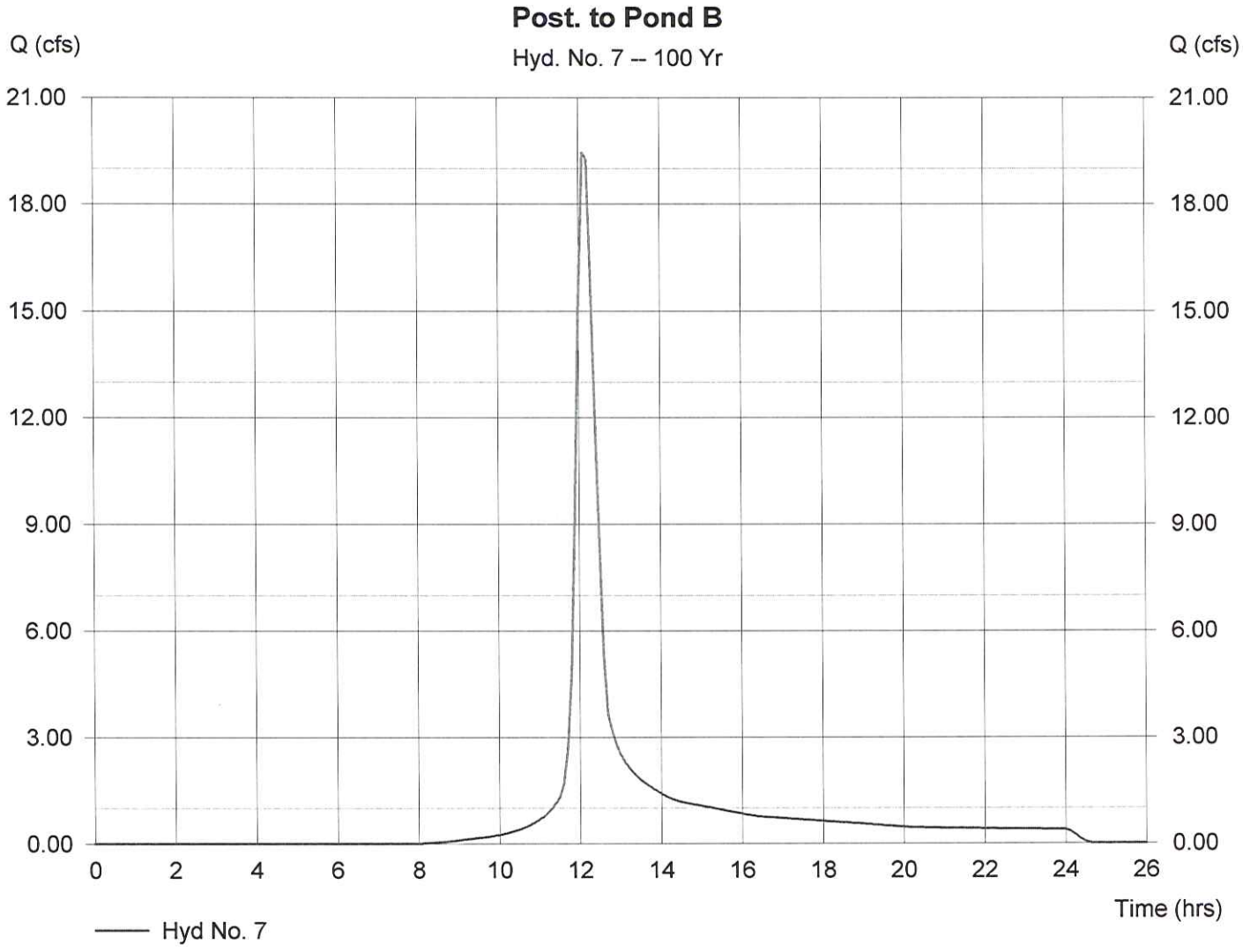
Friday, Jun 18 2004, 11:27 AM

Hyd. No. 7

Post. to Pond B

Hydrograph type	= SCS Runoff	Peak discharge	= 19.44 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 8.760 ac	Curve number	= 79.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 21.00 min
Total precip.	= 4.60 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 1.821 acft



Pond Report

Hydraflow Hydrographs by Intelisolve

Friday, Jun 18 2004, 11:34 AM

Pond No. 2 - Pond B

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 (acft)	Total storage (acft)
0.00	768.54	00	0.000	0.000
0.46	769.00	6,875	0.036	0.036
1.46	770.00	10,520	0.200	0.236
2.46	771.00	12,420	0.263	0.499
3.46	772.00	14,470	0.309	0.808
4.46	773.00	16,630	0.357	1.165

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 12.00	1.50	6.00	0.00
Span (in)	= 12.00	1.50	6.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 768.54	768.54	769.80	0.00
Length (ft)	= 11.00	0.00	0.00	0.00
Slope (%)	= 0.40	0.00	0.00	0.00
N-Value	= .015	.015	.015	.000
Orif. Coeff.	= 0.60	0.60	0.60	0.00
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.14	0.00	0.00	0.00
Crest El. (ft)	= 772.00	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. = 770.72 ft

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

Stage / Storage / Discharge Table

Stage ft	Storage acft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0.000	768.54	0.00	0.00	0.00	---	0.00	---	---	---	---	0.00
0.46	0.036	769.00	0.00	0.00	0.00	---	0.00	---	---	---	---	0.00
1.46	0.236	770.00	0.00	0.00	0.00	---	0.00	---	---	---	---	0.00
2.46	0.499	771.00	0.51	0.03	0.48	---	0.00	---	---	---	---	0.51
3.46	0.808	772.00	1.10	0.06	1.03	---	0.00	---	---	---	---	1.10
4.46	1.165	773.00	5.57	0.02	0.32	---	5.23	---	---	---	---	5.56

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Jun 18 2004, 11:2 AM

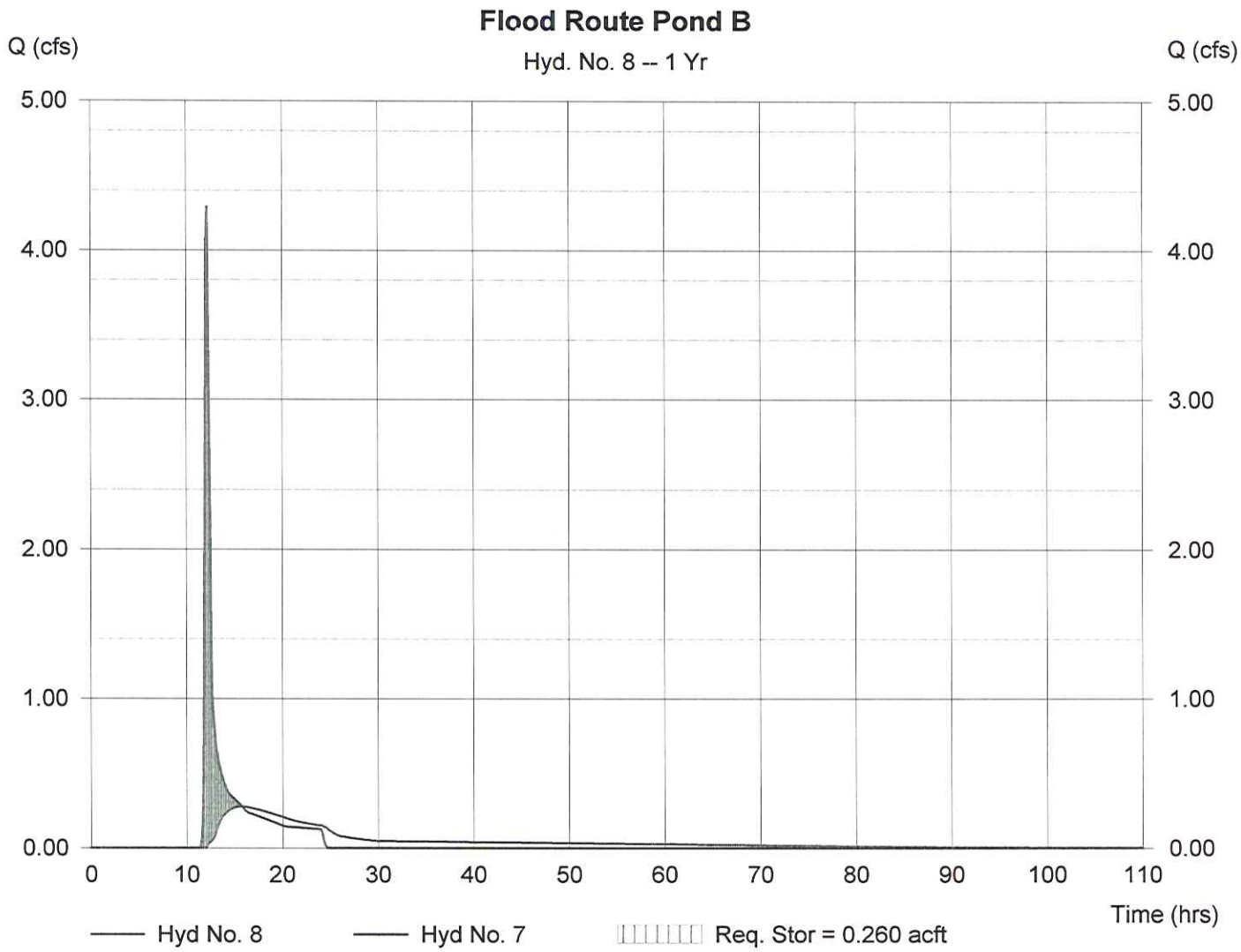
Hyd. No. 8

Flood Route Pond B

Hydrograph type	= Reservoir	Peak discharge	= 0.28 cfs
Storm frequency	= 1 yrs	Time interval	= 6 min
Inflow hyd. No.	= 7	Max. Elevation	= 770.09 ft
Reservoir name	= Pond B	Max. Storage	= 0.260 acft

Storage Indication method used.

Hydrograph Volume = 0.379 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Jun 18 2004, 11:14 AM

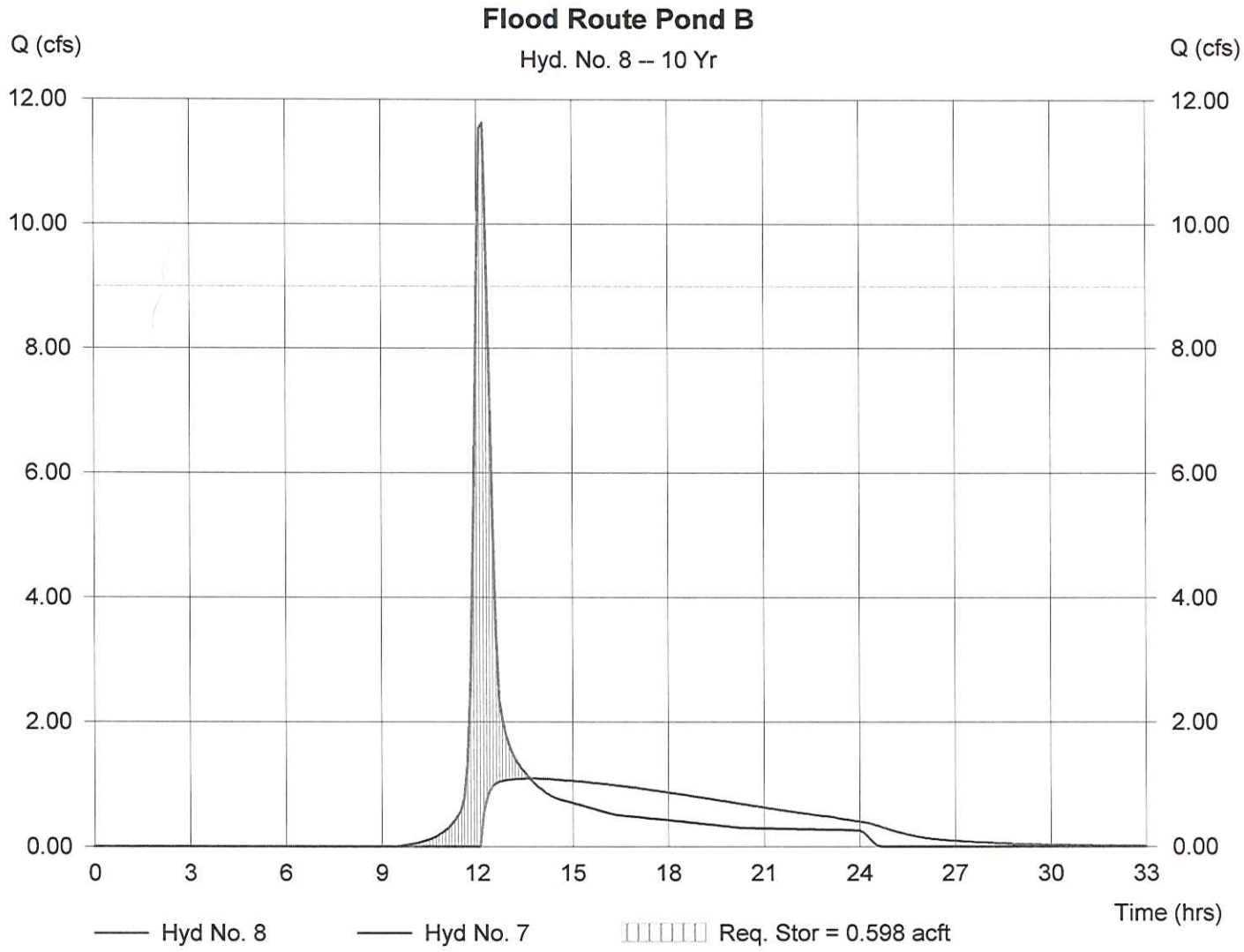
Hyd. No. 8

Flood Route Pond B

Hydrograph type	= Reservoir	Peak discharge	= 1.09 cfs
Storm frequency	= 10 yrs	Time interval	= 6 min
Inflow hyd. No.	= 7	Max. Elevation	= 771.32 ft
Reservoir name	= Pond B	Max. Storage	= 0.598 acft

Storage Indication method used.

Hydrograph Volume = 0.870 acft



Hydrograph Plot

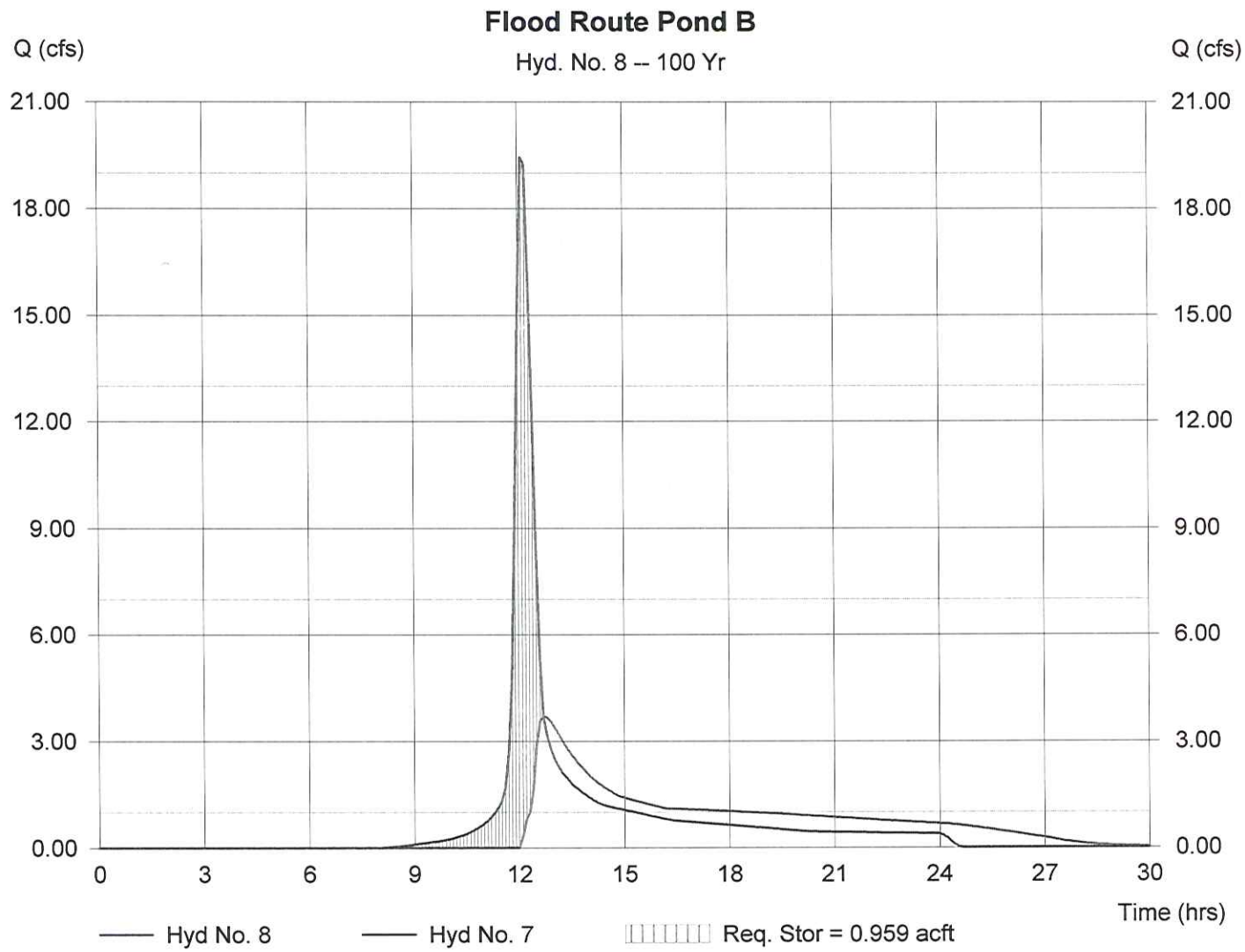
Hydraflow Hydrographs by Intelisolve

Friday, Jun 18 2004, 11:27 AM

Hyd. No. 8

Flood Route Pond B

Hydrograph type	= Reservoir	Peak discharge	= 3.72 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Inflow hyd. No.	= 7	Max. Elevation	= 772.42 ft
Reservoir name	= Pond B	Max. Storage	= 0.959 acft

Storage Indication method used.

Hydrograph Volume = 1.401 acft