
PRELIMINARY DRAINAGE REPORT

FOR

GOLDEN INN

SANTA BARBARA, CALIFORNIA

DATE: NOV. 21, 2012
UPDATE: MARCH 13, 2013

PREPARED BY:



EDA Job Number: 2-3583-200

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Exp 09/30/2013

**GOLDEN INN
SANTA BARBARA, CALIFORNIA**

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INTRODUCTION:

The Golden Inn project is located at the southeasterly corner of Mission Drive (Hwy 135) and Refugio Road in Santa Ynez, California. The site slopes toward an existing swale near the easterly 1/3 of the site then southerly. The site has an average slope of 5%±. Offsite drainage enters the site from an existing 24 inch culvert crossing Highway 246 (Mission Drive). The off-site storm water will pass through the site in an existing swale without detention. The swale will remain grass lined to allow some bio-filtration of the off-site water. The site is proposed to be developed as a senior care center. The project will include drainage basins to offset the increase peak runoff and to allow some groundwater recharge.

PROCEDURE:

Determine the existing runoff from the site prior to development. Collect the runoff from the developed portions of the site, rout the drainage through a detention basin with the outlet sized to allow no more than the existing flow to leave the site. Use the Santa Barbara Urban Hydrograph (SBUH) to determine the site runoff.

Site area is 7.34 acres. The easterly portion of the site will drain to a proposed basin on the east side of an existing drainage swale. The westerly portion of the site and some offsite drainage from Highway 246 will drain to a basin on the westerly side of the existing drainage swale. The existing site is soil type D, open land-good, use $cn=80$ for the existing condition. The portion of Highway 246 that will drain through the site is paved, use a $cn=98$. The total area draining through basin no. 1 will be 5.25 acres. Of this area 2.88 acres will be impervious post development. The total area draining through basin no. 2 will be 2.15 acres. Of this area 0.1 acres is impervious pre development and 1.14 acres will be impervious post development. For the impervious surface, use a $cn=98$, for the remaining pervious areas a $cn=80$. For areas with pervious and impervious portions calculate the cn value using a weighted average. Use a cn of 90 for area 1 post development. Use a cn of 81 for area 2 pre development and a cn of 90 for post developed.

Use a rainfall distribution for a 24 hour, Type 1 storm.

The drainage basin will serve two purposes. First the basins will have metered outlets to maintain the runoff in the post developed condition the same or less than in the existing condition. Second the basins will allow a portion of the drainage to have additional contact time with the soil to allow for infiltration of drainage into the soil.

Basins Provided:

Basin No. 1 is shown on shown on the preliminary grading plan on the easterly side of the existing drainage swale through the site. The bottom elevation is 593.0, the top elevation is 596.0, the lower outlet weir 1 has an elevation of 593.70 and has a width of 2.25 feet, the upper outlet weir has an elevation of 595.20 and has a width of 1.50 feet. This configuration will allow

Basin No. 1 to moderate the maximum flow leaving the basin to the same or less than the natural condition.

Basin No. 2 is shown on the preliminary grading plan on the westerly side of the existing drainage swale through the site. The bottom elevation is 593.0, the top elevation is 596.0, the lower outlet weir has an elevation of 593.70 and has a width of 0.75 feet. The upper outlet weir has an elevation of 595.0 and has a width of 0.65 feet. This configuration will allow the Basin No. 2 to moderate the maximum flow leaving the basin to the same or less than the natural.

For a tabular representation of the basin flows see Table 1 below.

Table 1 Basin Summary

Basin No. 1	Flow rates Q (cfs), Storage Volume V (cu. Ft.)					
	2yr	5yr	10yr	25yr	50yr	100yr
Per-Developed runoff:	2.68	5.48	7.47	10.05	11.95	13.81
Post-Developed runoff:	7.61	12.55	15.79	19.82	22.72	25.53
Basin Outflow:	1.68	5.22	7.23	9.63	11.4	13.32
Basin WSE:	594.14	594.63	595.86	595.1	595.26	595.4
Basin Volume:	11,110	16,706	19,448	11,468	24,490	26,348
Basin No. 1						
Per-Developed runoff:	1.18	2.35	3.18	4.24	5.02	5.79
Post-Developed runoff:	6.07	5.08	6.39	8.03	9.21	10.35
Basin Outflow:	1.08	2.31	3.08	4.17	4.97	5.74
Basin WSE:	594.41	594.88	595.1	595.34	595.5	595.64
Basin Volume:	4,360	9,331	7,402	8,594	9,395	10,144

WATER QUALITY:

To extend the contact time of the drainage within the drainage basins set the low flow outlet 0.7 feet above the bottom of the basins. This will allow more contact time before the drainage exits the basins and will keep a percentage in the basin to infiltrate.

RECOMMENDATIONS:

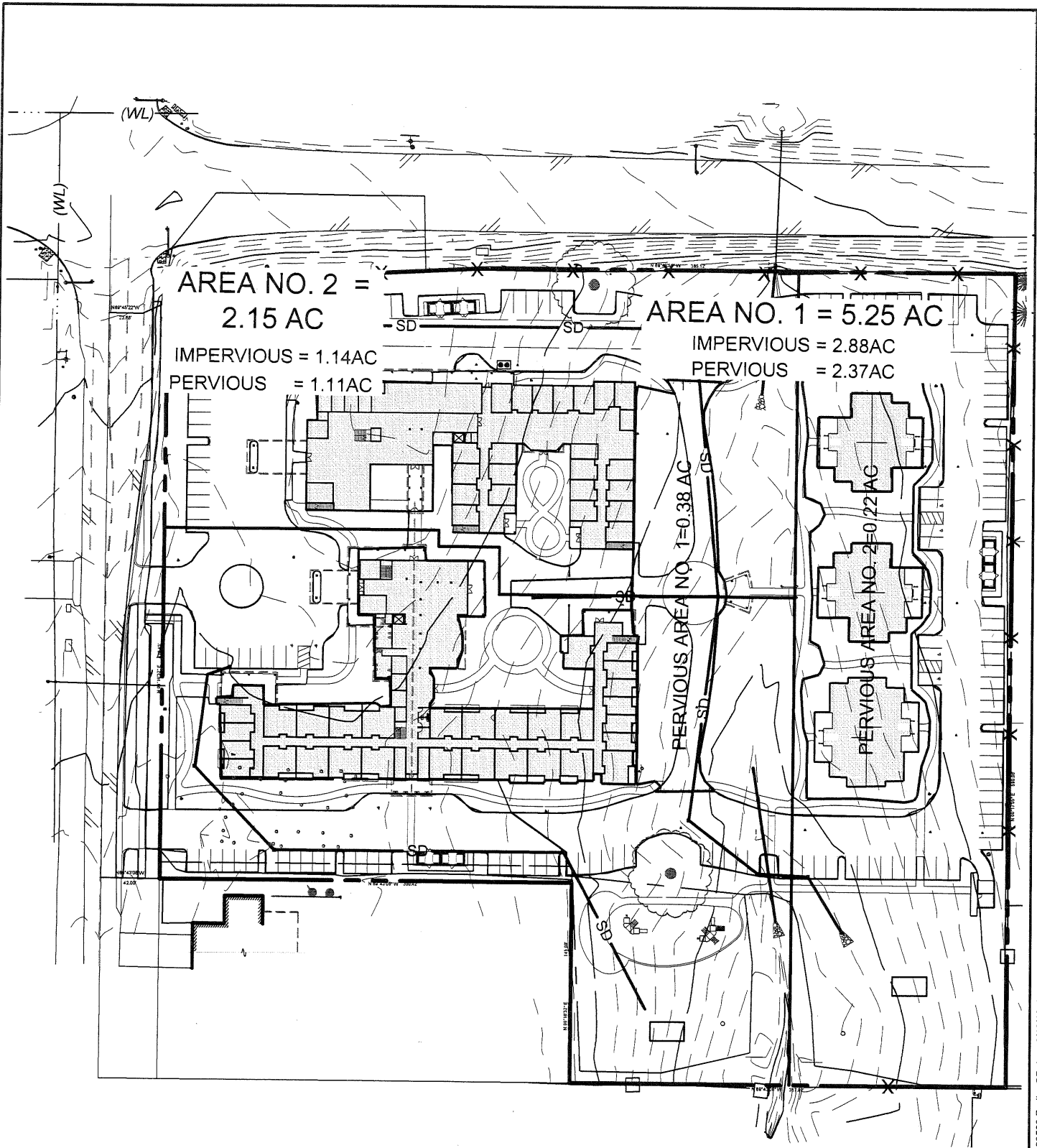
Install the drainage system to collect the runoff and pass it through the drainage basin as shown on the Preliminary Grading Plan. As much as reasonable allow the drainage from parking areas to pass through grass areas prior to entering the storm drain culverts. Use two basins as shown on the preliminary grading plan. Set the basin outlets above the bottom of the basins to allow for additional contact time for the drainage to infiltrate into the soil.

CONCLUSION:

The drainage basins described above and on the preliminary grading plan will retard the drainage flow out of the basin enough that the Post-Development flows leaving the site will be the same as or less than the existing peak flow from the Pre-Development condition. The basin will have a bottom elevation of 593.0 and a top of 596.0. The drainage basins will also allow for additional contact time between the drainage and the soil to encourage infiltration of the drainage into the soil.

APPENDIX I

WATERSHED MAP



AREA NO. 2 =
2.15 AC

IMPERVIOUS = 1.14AC
PERVIOUS = 1.11AC

AREA NO. 1 = 5.25 AC

IMPERVIOUS = 2.88AC
PERVIOUS = 2.37AC

PERVIOUS AREA NO. 1=0.38 AC

PERVIOUS AREA NO. 2=0.22 AC

IMPERVIOUS SITE AREA 3.95 AC
IMPERVIOUS OFF-SITE AREA 0.12 AC
PERVIOUS AREA NO. 1- 0.38 AC
PERVIOUS AREA NO. 2- 0.22 AC

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SCALE: 1"=100'

Drainage Exhibit

The Golden Inn
Hwy. 246 & Refugio Rd.
Santa Ynez, Ca.

APPENDIX II

RAINFALL CALCULATIONS

Pond Report

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

Wednesday, 03 / 13 / 2013

Pond No. 2 - Basin 2

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Beginning Elevation = 593.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	593.00	2,348	0	0
0.20	593.20	2,552	490	490
0.40	593.40	2,762	531	1,021
0.60	593.60	2,978	574	1,595
0.80	593.80	3,201	618	2,213
1.00	594.00	3,430	663	2,876
1.20	594.20	3,665	710	3,586
1.40	594.40	3,906	757	4,343
1.60	594.60	4,154	806	5,149
1.80	594.80	4,408	856	6,005
2.00	595.00	4,668	908	6,913
2.20	595.20	4,935	960	7,873
2.40	595.40	5,208	1,014	8,887
2.60	595.60	5,487	1,069	9,957
2.80	595.80	5,773	1,126	11,083
3.00	596.00	6,064	1,184	12,267

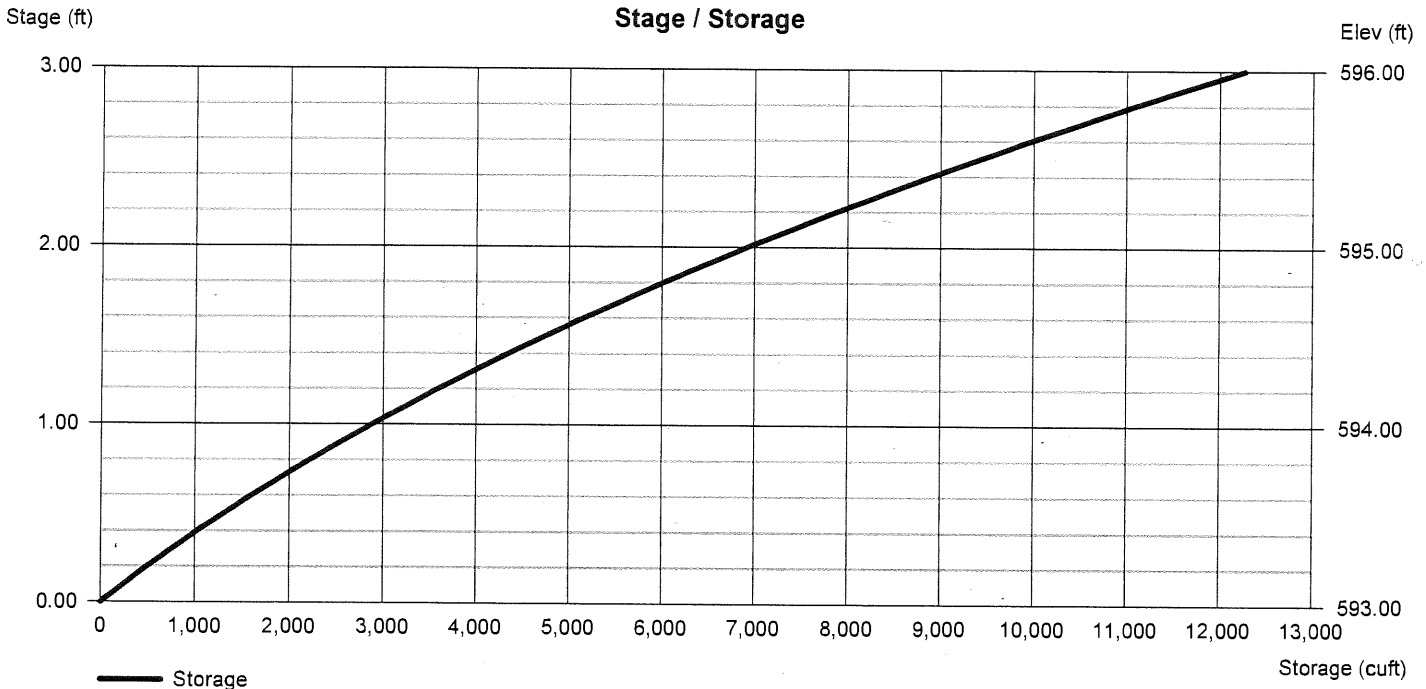
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	Inactive	0.00	0.00
Span (in)	= 8.00	0.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 593.50	0.00	0.00	0.00
Length (ft)	= 1.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.65	0.70	0.00	0.00
Crest El. (ft)	= 595.00	593.70	0.00	0.00
Weir Coeff.	= 2.60	2.60	3.33	3.33
Weir Type	= Broad	Broad	---	---
Multi-Stage	= No	No	No	No
Exfil. (in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

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



Pond Report

Pond No. 2 - Basin 2

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Beginning Elevation = 593.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	593.00	2,348	0	0
0.20	593.20	2,552	490	490
0.40	593.40	2,762	531	1,021
0.60	593.60	2,978	574	1,595
0.80	593.80	3,201	618	2,213
1.00	594.00	3,430	663	2,876
1.20	594.20	3,665	710	3,586
1.40	594.40	3,906	757	4,343
1.60	594.60	4,154	806	5,149
1.80	594.80	4,408	856	6,005
2.00	595.00	4,668	908	6,913
2.20	595.20	4,935	960	7,873
2.40	595.40	5,208	1,014	8,887
2.60	595.60	5,487	1,069	9,957
2.80	595.80	5,773	1,126	11,083
3.00	596.00	6,064	1,184	12,267

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	Inactive	0.00	0.00
Span (in)	= 8.00	0.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 593.50	0.00	0.00	0.00
Length (ft)	= 1.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.65	0.70	0.00	0.00
Crest El. (ft)	= 595.00	593.70	0.00	0.00
Weir Coeff.	= 2.60	2.60	3.33	3.33
Weir Type	= Broad	Broad	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	593.00	0.00	---	---	---	0.00	0.00	---	---	---	---	0.000
0.20	490	593.20	0.00	---	---	---	0.00	0.00	---	---	---	---	0.000
0.40	1,021	593.40	0.00	---	---	---	0.00	0.00	---	---	---	---	0.000
0.60	1,595	593.60	0.00	---	---	---	0.00	0.00	---	---	---	---	0.000
0.80	2,213	593.80	0.00	---	---	---	0.00	0.06	---	---	---	---	0.058
1.00	2,876	594.00	0.00	---	---	---	0.00	0.30	---	---	---	---	0.299
1.20	3,586	594.20	0.00	---	---	---	0.00	0.64	---	---	---	---	0.643
1.40	4,343	594.40	0.00	---	---	---	0.00	1.07	---	---	---	---	1.066
1.60	5,149	594.60	0.00	---	---	---	0.00	1.55	---	---	---	---	1.554
1.80	6,005	594.80	0.00	---	---	---	0.00	2.10	---	---	---	---	2.100
2.00	6,913	595.00	0.00	---	---	---	0.00	2.70	---	---	---	---	2.698
2.20	7,873	595.20	0.00	---	---	---	0.15	3.34	---	---	---	---	3.495
2.40	8,887	595.40	0.00	---	---	---	0.43	4.03	---	---	---	---	4.462
2.60	9,957	595.60	0.00	---	---	---	0.79	4.77	---	---	---	---	5.552
2.80	11,083	595.80	0.00	---	---	---	1.21	5.54	---	---	---	---	6.748
3.00	12,267	596.00	0.00	---	---	---	1.69	6.35	---	---	---	---	8.038

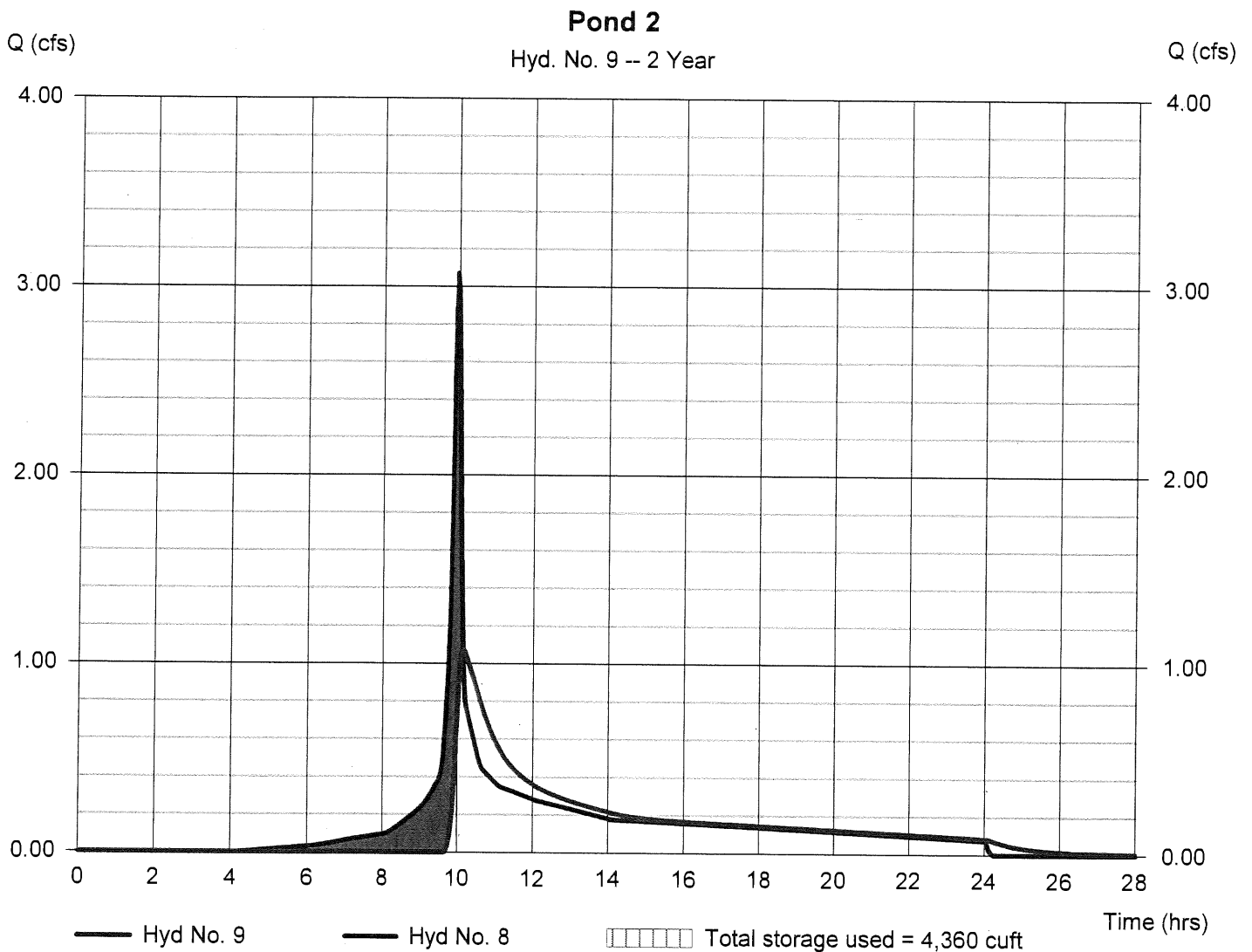
Hydrograph Report

Hyd. No. 9

Pond 2

Hydrograph type	= Reservoir	Peak discharge	= 1.075 cfs
Storm frequency	= 2 yrs	Time to peak	= 10.17 hrs
Time interval	= 2 min	Hyd. volume	= 12,355 cuft
Inflow hyd. No.	= 8 - pond-2 option-2-post dev	Max. Elevation	= 594.41 ft
Reservoir name	= Basin 2	Max. Storage	= 4,360 cuft

Storage Indication method used.



Hydrograph Report

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

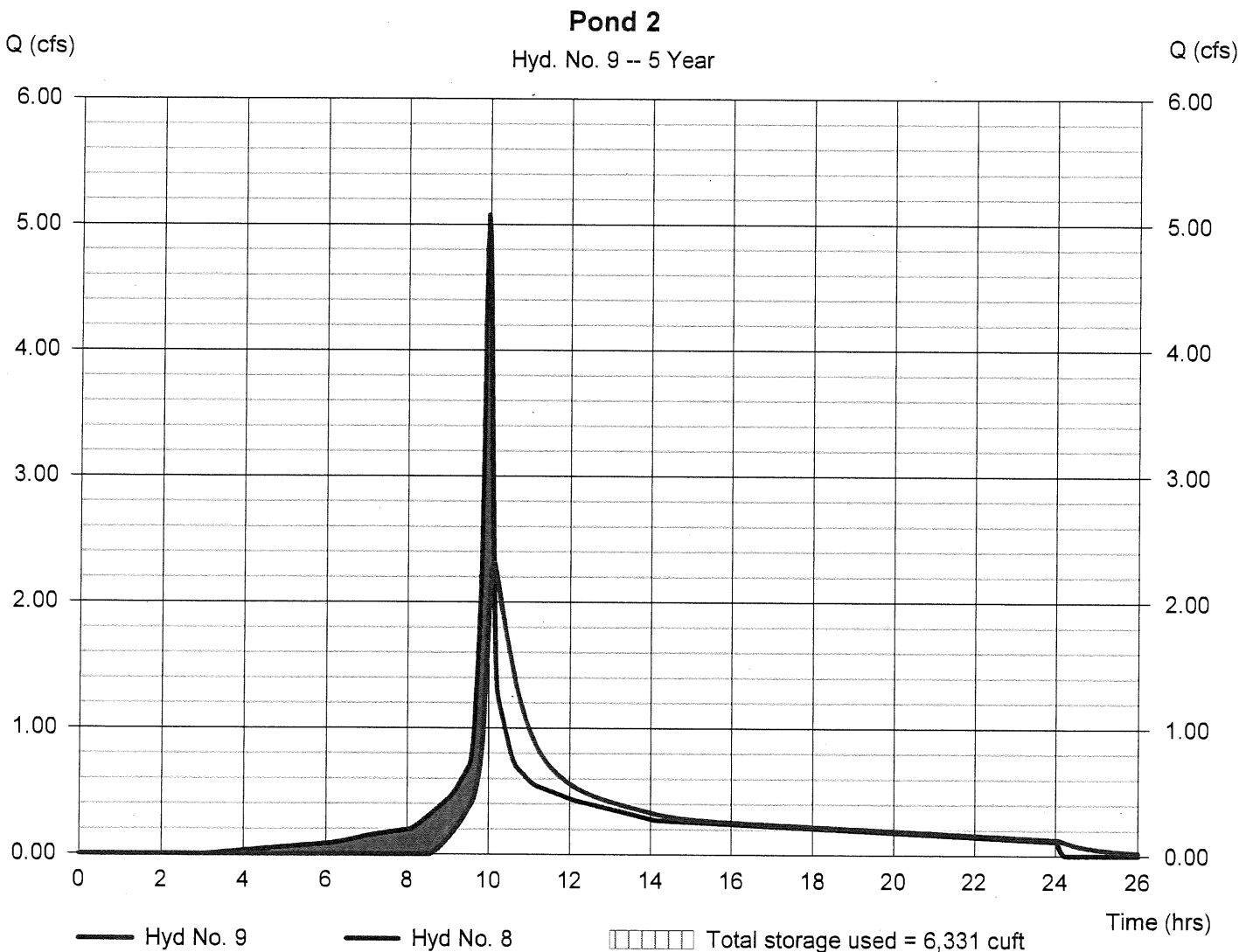
Wednesday, 03 / 13 / 2013

Hyd. No. 9

Pond 2

Hydrograph type	= Reservoir	Peak discharge	= 2.309 cfs
Storm frequency	= 5 yrs	Time to peak	= 10.10 hrs
Time interval	= 2 min	Hyd. volume	= 21,608 cuft
Inflow hyd. No.	= 8 - pond-2 option-2-post dev	Max. Elevation	= 594.88 ft
Reservoir name	= Basin 2	Max. Storage	= 6,331 cuft

Storage Indication method used.



Hydrograph Report

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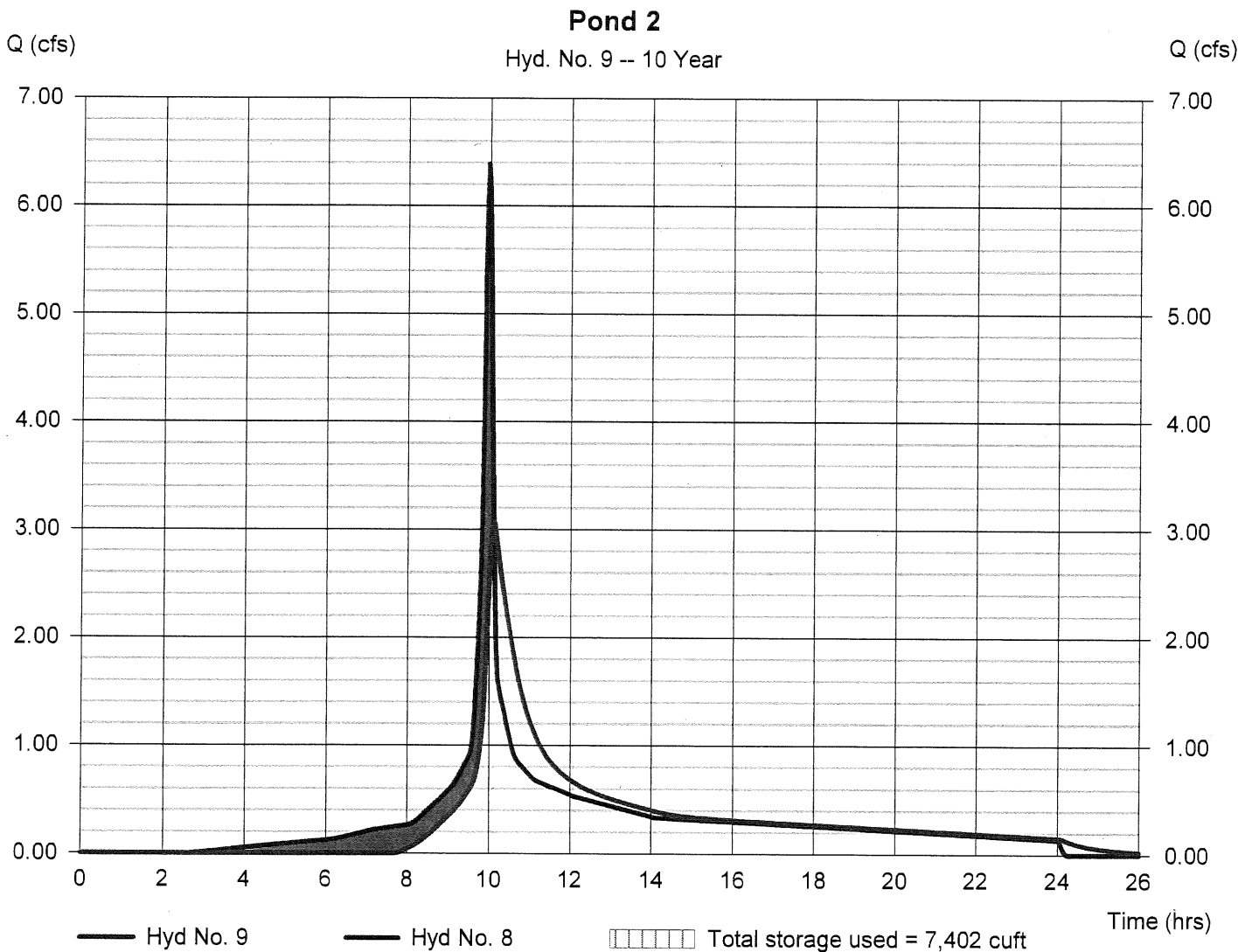
Wednesday, 03 / 13 / 2013

Hyd. No. 9

Pond 2

Hydrograph type	= Reservoir	Peak discharge	= 3.076 cfs
Storm frequency	= 10 yrs	Time to peak	= 10.10 hrs
Time interval	= 2 min	Hyd. volume	= 27,810 cuft
Inflow hyd. No.	= 8 - pond-2 option-2-post dev	Max. Elevation	= 595.10 ft
Reservoir name	= Basin 2	Max. Storage	= 7,402 cuft

Storage Indication method used.



Hydrograph Report

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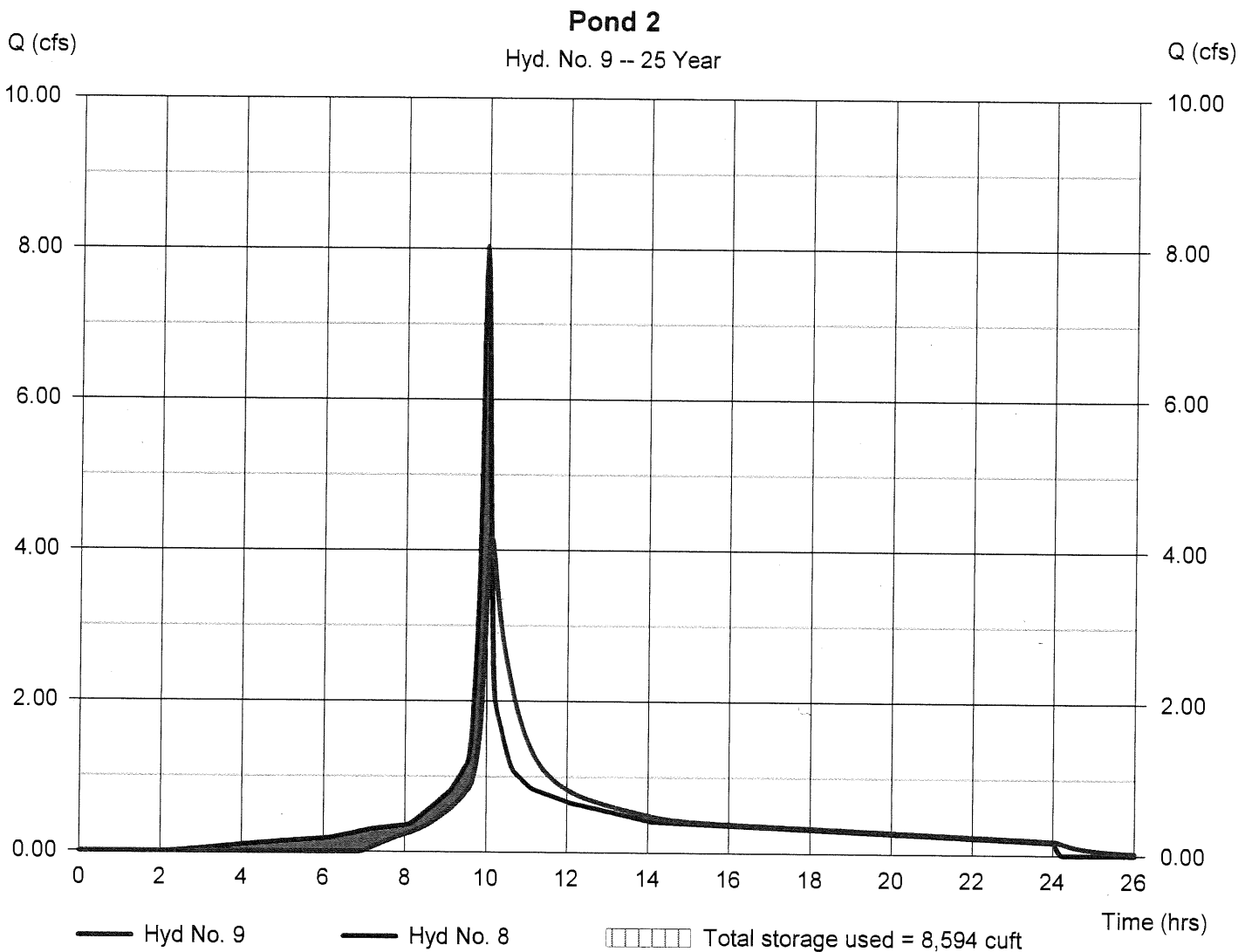
Wednesday, 03 / 13 / 2013

Hyd. No. 9

Pond 2

Hydrograph type	= Reservoir	Peak discharge	= 4.169 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.10 hrs
Time interval	= 2 min	Hyd. volume	= 35,675 cuft
Inflow hyd. No.	= 8 - pond-2 option-2-post dev	Max. Elevation	= 595.34 ft
Reservoir name	= Basin 2	Max. Storage	= 8,594 cuft

Storage Indication method used.



Hydrograph Report

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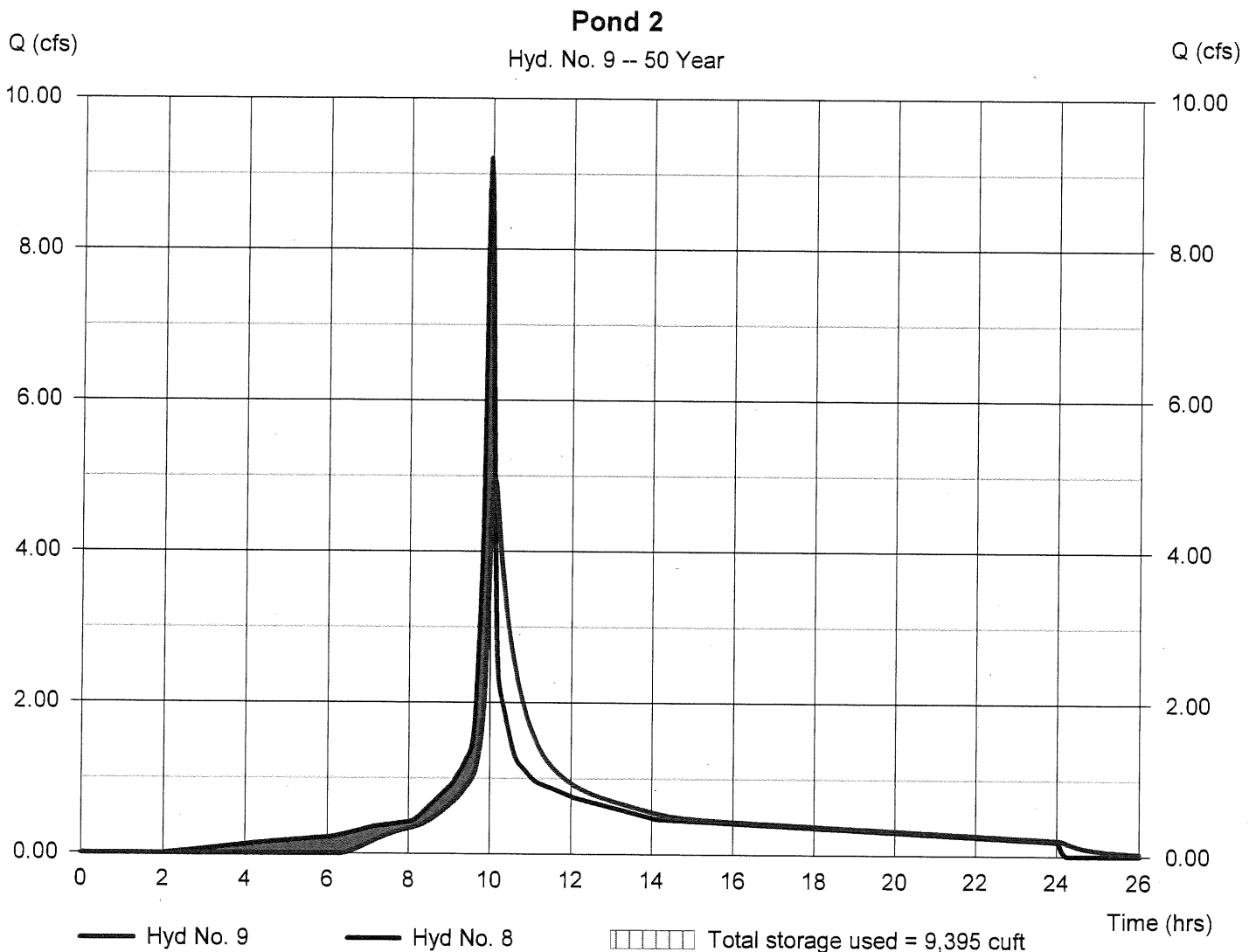
Wednesday, 03 / 13 / 2013

Hyd. No. 9

Pond 2

Hydrograph type	= Reservoir	Peak discharge	= 4.966 cfs
Storm frequency	= 50 yrs	Time to peak	= 10.10 hrs
Time interval	= 2 min	Hyd. volume	= 41,390 cuft
Inflow hyd. No.	= 8 - pond-2 option-2-post dev	Max. Elevation	= 595.50 ft
Reservoir name	= Basin 2	Max. Storage	= 9,395 cuft

Storage Indication method used.



Hydrograph Report

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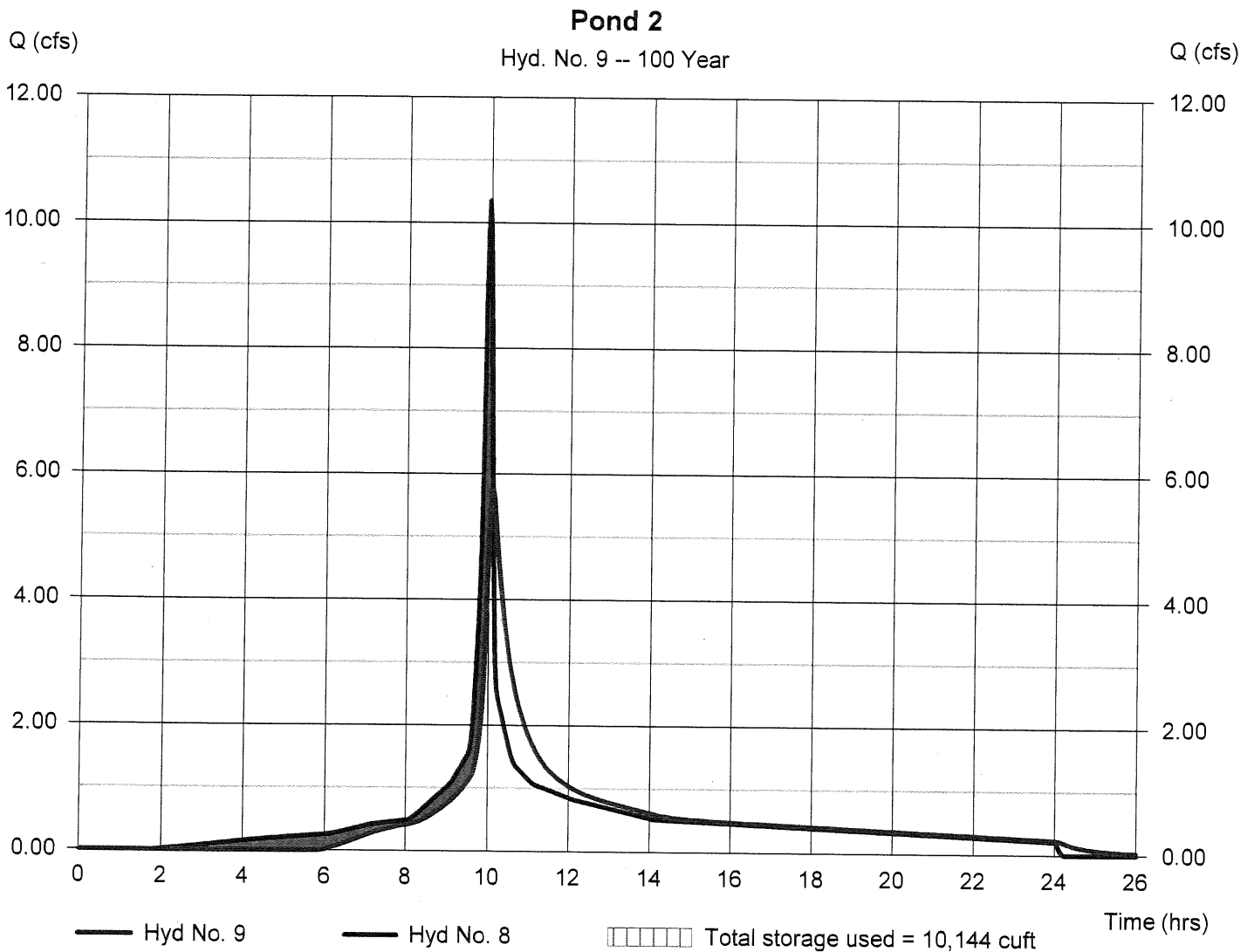
Wednesday, 03 / 13 / 2013

Hyd. No. 9

Pond 2

Hydrograph type	= Reservoir	Peak discharge	= 5.743 cfs
Storm frequency	= 100 yrs	Time to peak	= 10.10 hrs
Time interval	= 2 min	Hyd. volume	= 46,977 cuft
Inflow hyd. No.	= 8 - pond-2 option-2-post dev	Max. Elevation	= 595.64 ft
Reservoir name	= Basin 2	Max. Storage	= 10,144 cuft

Storage Indication method used.



Hydrograph Report

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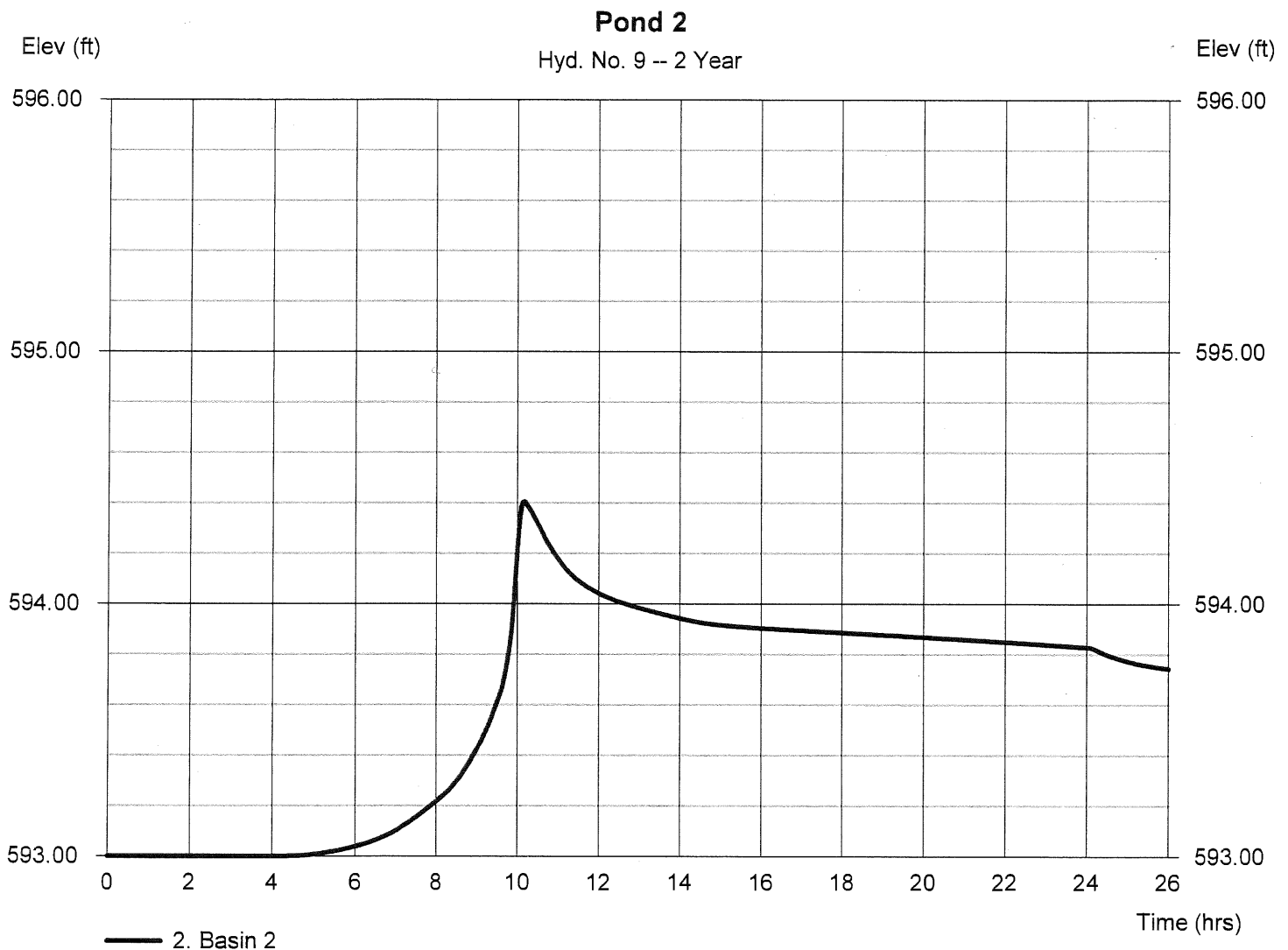
Wednesday, 03 / 13 / 2013

Hyd. No. 9

Pond 2

Hydrograph type	= Reservoir	Peak discharge	= 1.075 cfs
Storm frequency	= 2 yrs	Time to peak	= 10.17 hrs
Time interval	= 2 min	Hyd. volume	= 12,355 cuft
Inflow hyd. No.	= 8 - pond-2 option-2-post dev	Max. Elevation	= 594.41 ft
Reservoir name	= Basin 2	Max. Storage	= 4,360 cuft

Storage Indication method used.



Hydrograph Report

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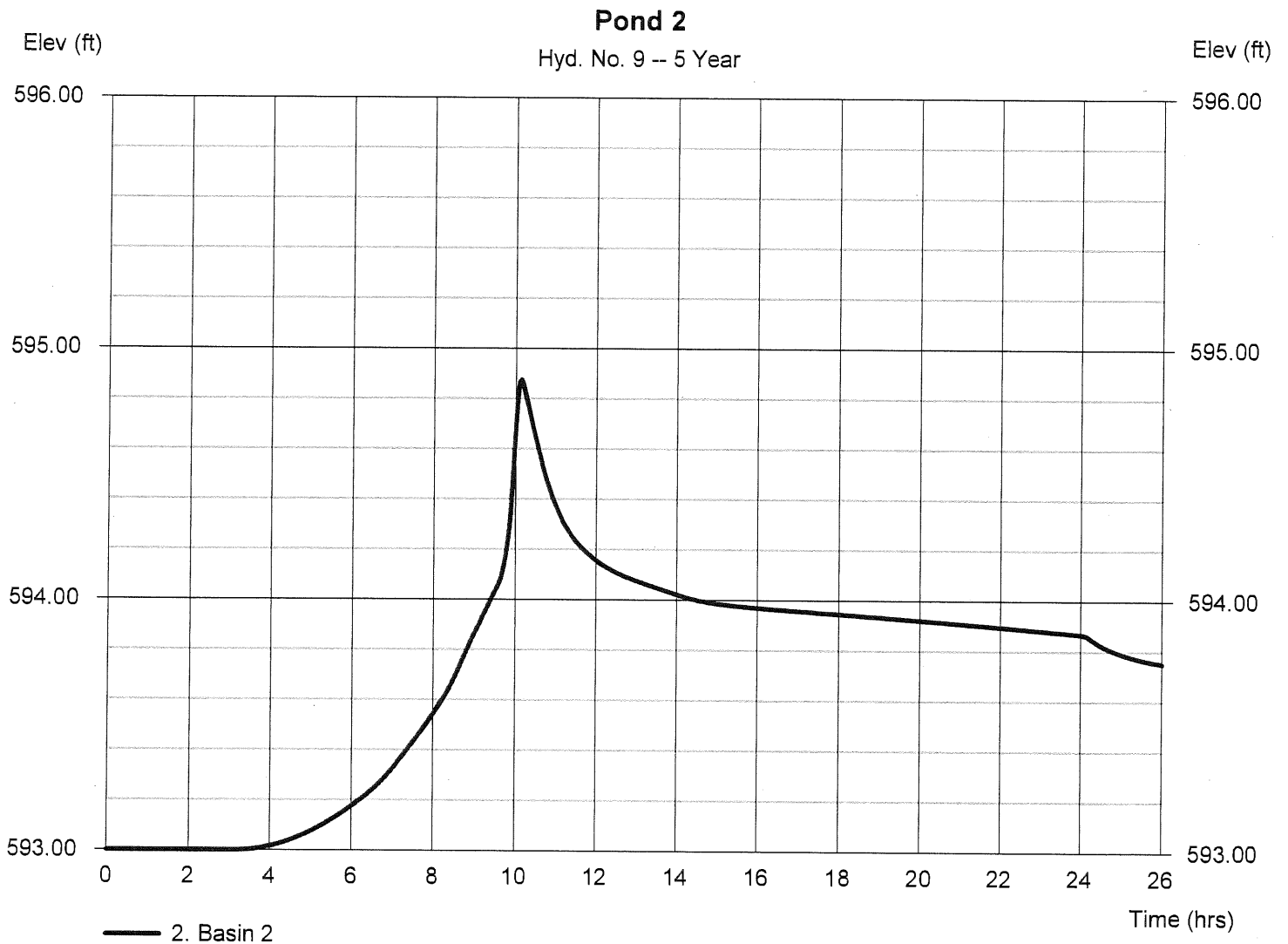
Wednesday, 03 / 13 / 2013

Hyd. No. 9

Pond 2

Hydrograph type	= Reservoir	Peak discharge	= 2.309 cfs
Storm frequency	= 5 yrs	Time to peak	= 10.10 hrs
Time interval	= 2 min	Hyd. volume	= 21,608 cuft
Inflow hyd. No.	= 8 - pond-2 option-2-post dev	Max. Elevation	= 594.88 ft
Reservoir name	= Basin 2	Max. Storage	= 6,331 cuft

Storage Indication method used.



Hydrograph Report

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

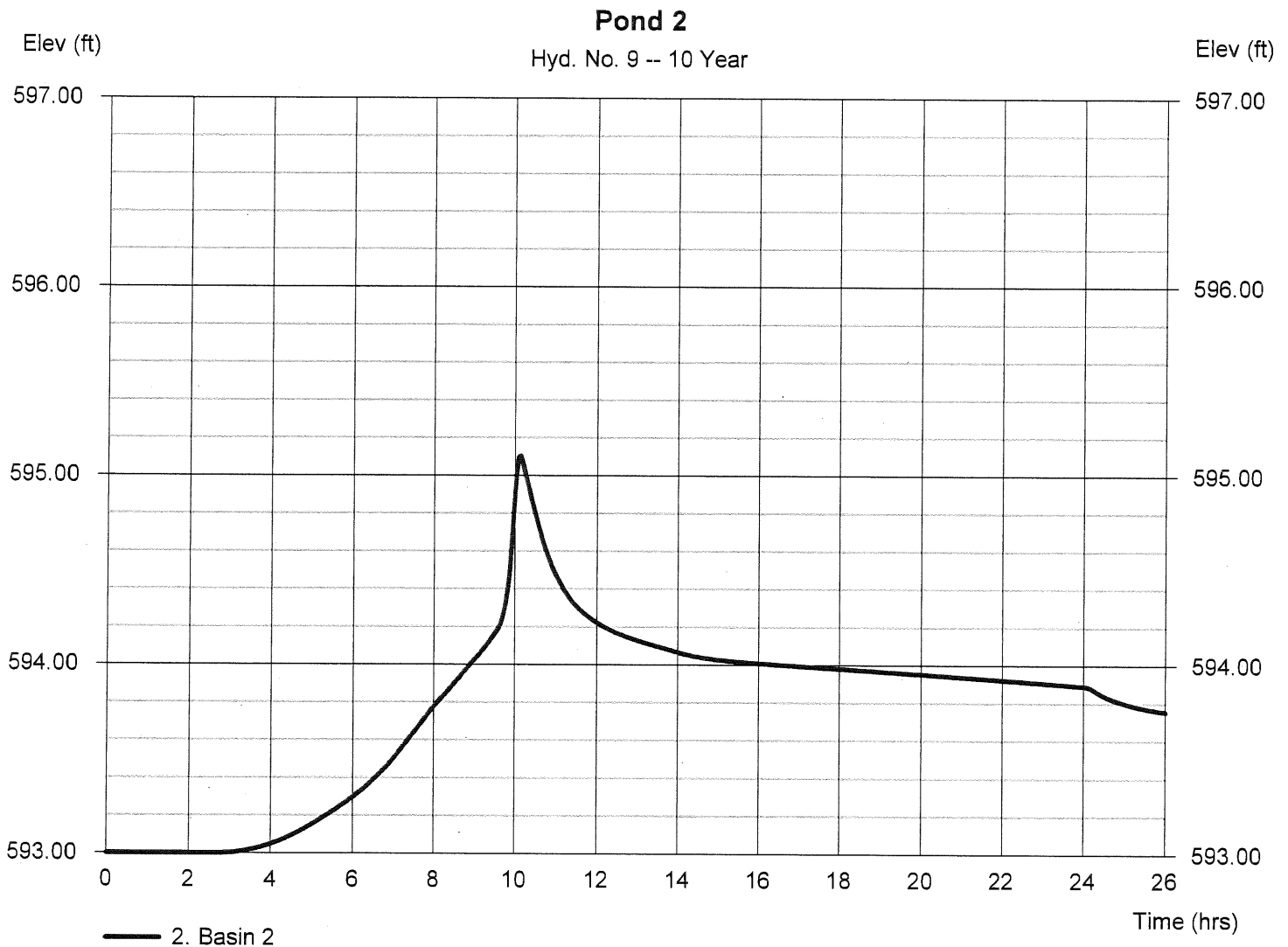
Wednesday, 03 / 13 / 2013

Hyd. No. 9

Pond 2

Hydrograph type	= Reservoir	Peak discharge	= 3.076 cfs
Storm frequency	= 10 yrs	Time to peak	= 10.10 hrs
Time interval	= 2 min	Hyd. volume	= 27,810 cuft
Inflow hyd. No.	= 8 - pond-2 option-2-post dev	Max. Elevation	= 595.10 ft
Reservoir name	= Basin 2	Max. Storage	= 7,402 cuft

Storage Indication method used.



Hydrograph Report

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

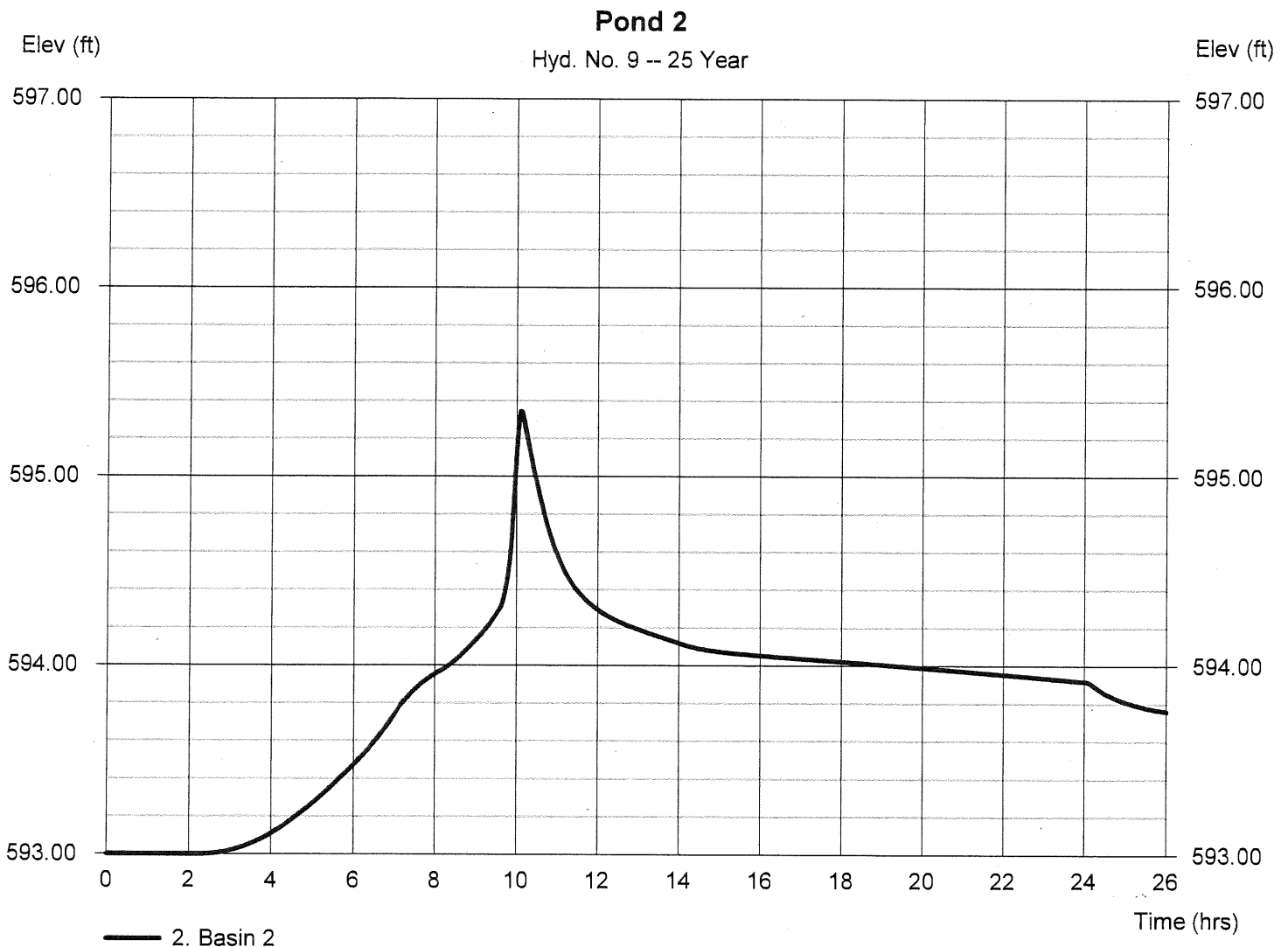
Wednesday, 03 / 13 / 2013

Hyd. No. 9

Pond 2

Hydrograph type	= Reservoir	Peak discharge	= 4.169 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.10 hrs
Time interval	= 2 min	Hyd. volume	= 35,675 cuft
Inflow hyd. No.	= 8 - pond-2 option-2-post dev	Max. Elevation	= 595.34 ft
Reservoir name	= Basin 2	Max. Storage	= 8,594 cuft

Storage Indication method used.



Hydrograph Report

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

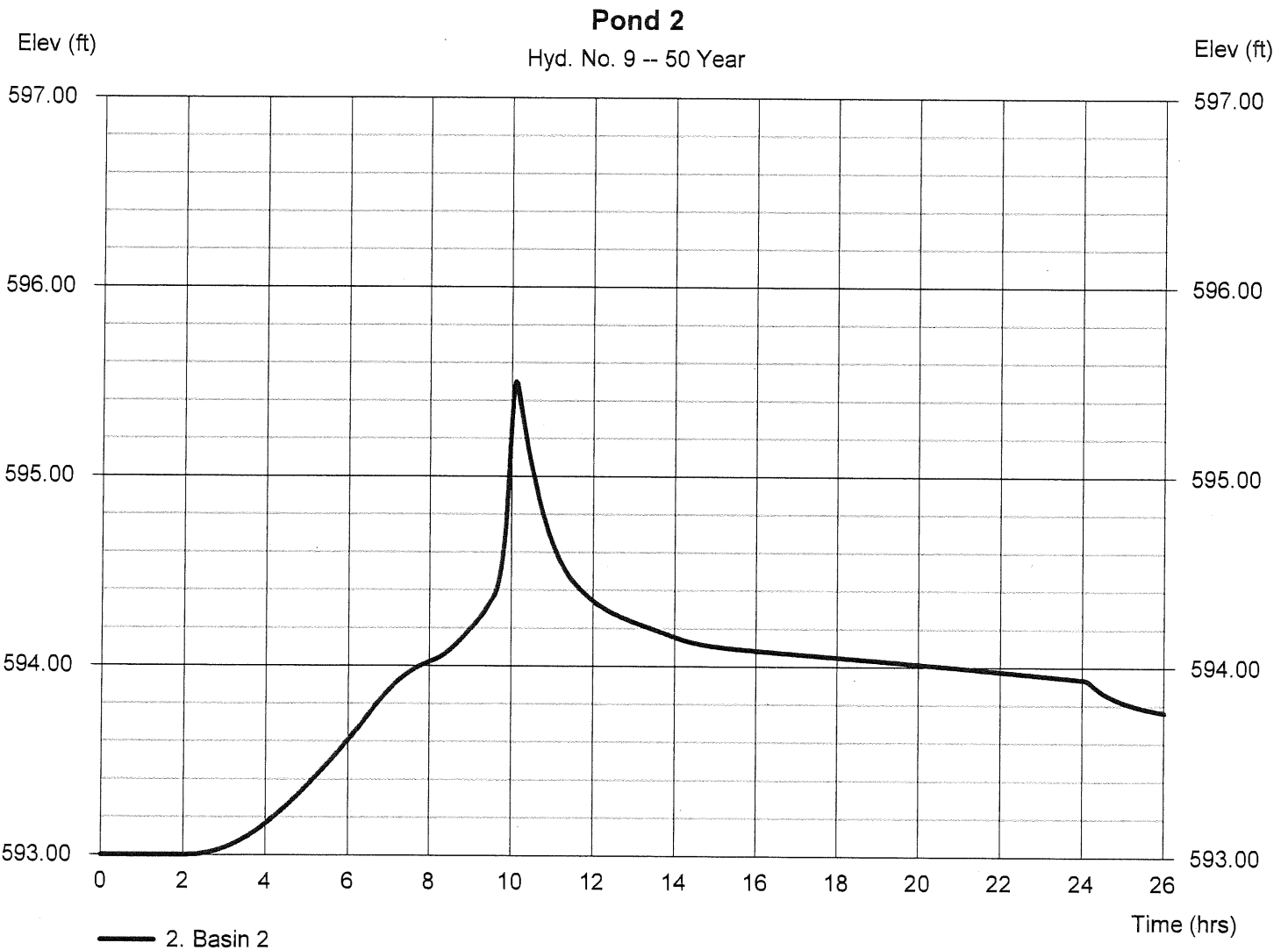
Wednesday, 03 / 13 / 2013

Hyd. No. 9

Pond 2

Hydrograph type	= Reservoir	Peak discharge	= 4.966 cfs
Storm frequency	= 50 yrs	Time to peak	= 10.10 hrs
Time interval	= 2 min	Hyd. volume	= 41,390 cuft
Inflow hyd. No.	= 8 - pond-2 option-2-post dev	Max. Elevation	= 595.50 ft
Reservoir name	= Basin 2	Max. Storage	= 9,395 cuft

Storage Indication method used.



Hydrograph Report

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

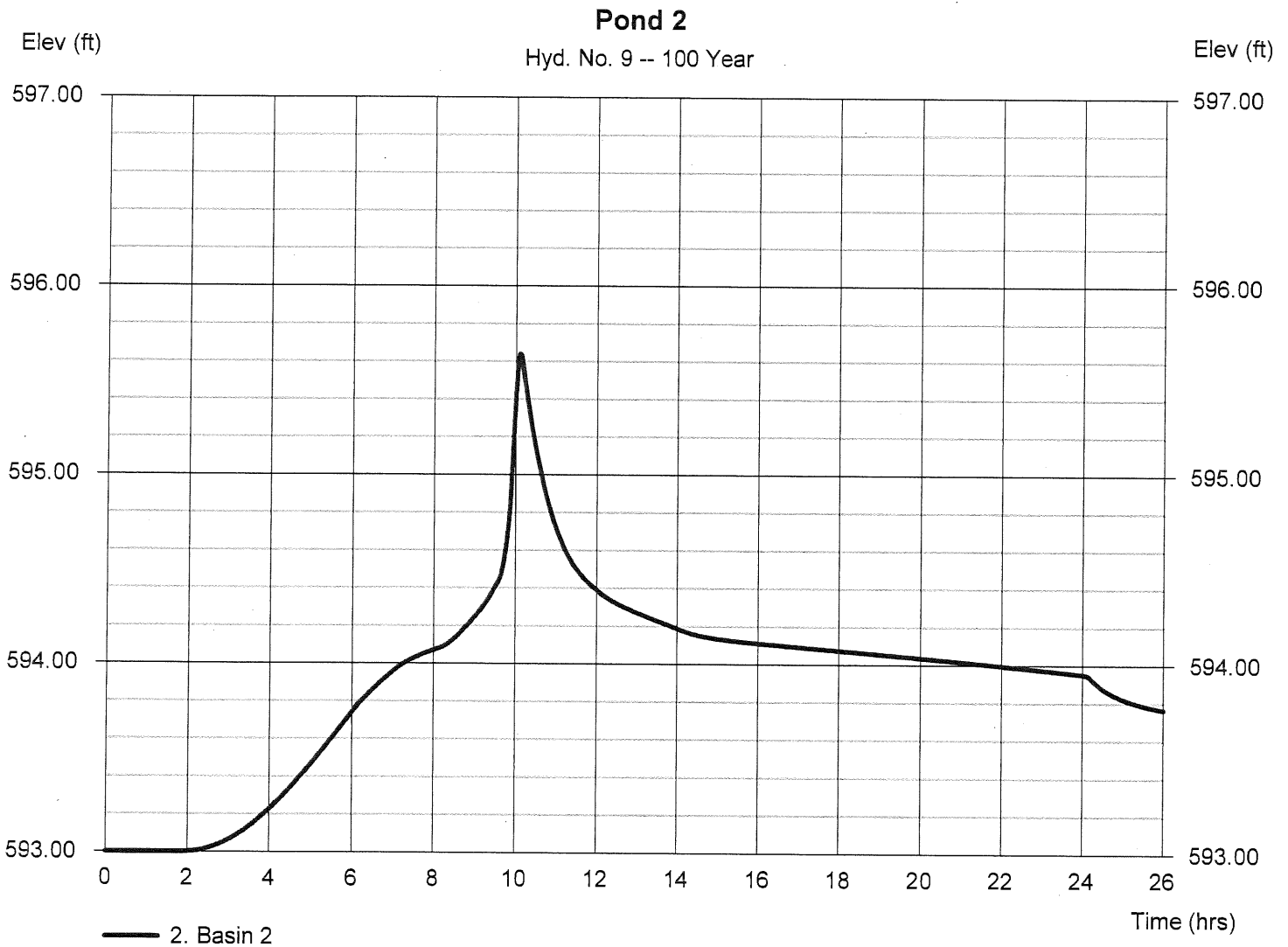
Wednesday, 03 / 13 / 2013

Hyd. No. 9

Pond 2

Hydrograph type	= Reservoir	Peak discharge	= 5.743 cfs
Storm frequency	= 100 yrs	Time to peak	= 10.10 hrs
Time interval	= 2 min	Hyd. volume	= 46,977 cuft
Inflow hyd. No.	= 8 - pond-2 option-2-post dev	Max. Elevation	= 595.64 ft
Reservoir name	= Basin 2	Max. Storage	= 10,144 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Basin 1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 593.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	593.00	8,707	0	0
1.00	594.00	10,624	9,649	9,649
1.20	594.20	11,027	2,165	11,813
1.40	594.40	11,436	2,246	14,059
1.60	594.60	11,851	2,328	16,388
1.80	594.80	12,272	2,412	18,800
2.00	595.00	12,699	2,497	21,296
2.20	595.20	12,133	2,483	23,779
2.40	595.40	13,573	2,569	26,348

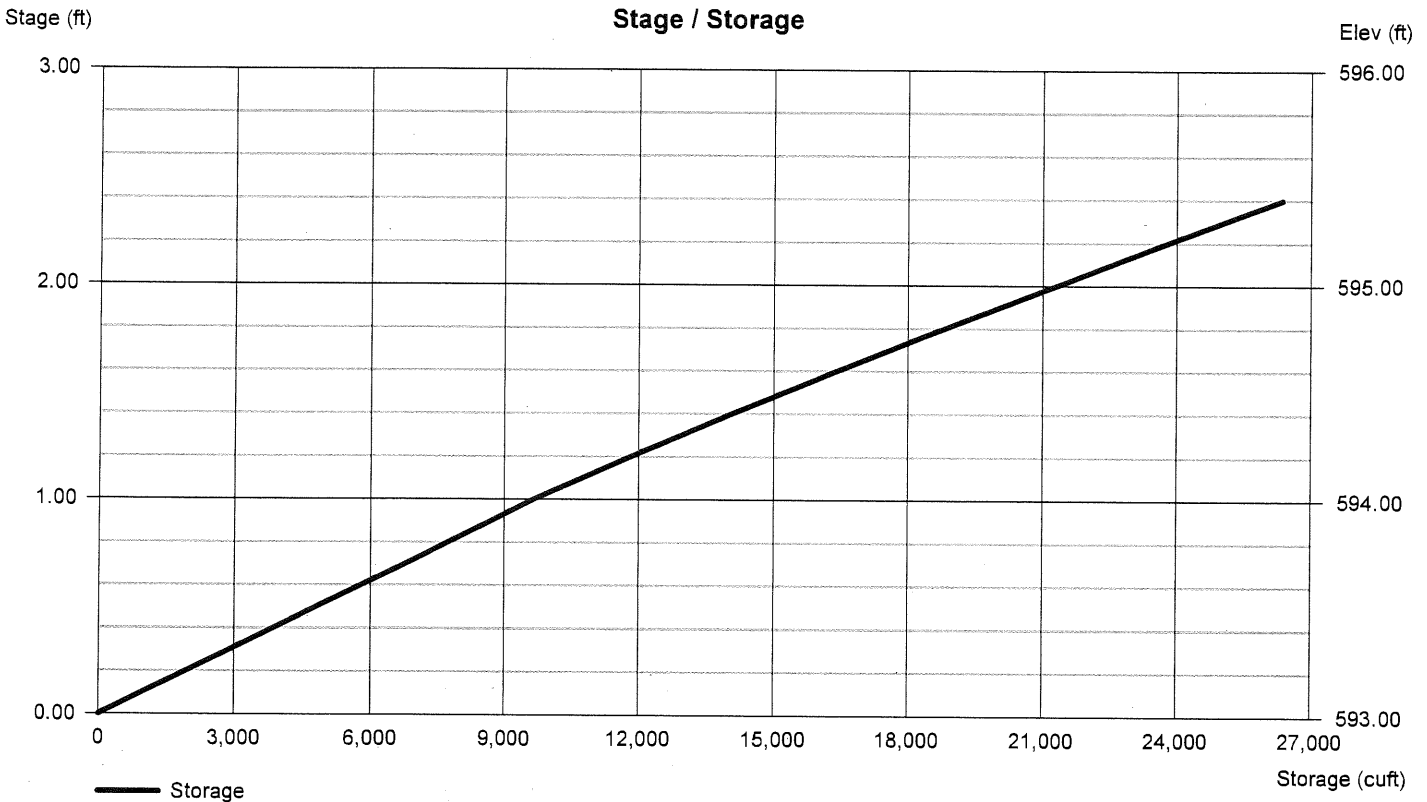
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	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)	= 593.00	0.00	0.00	0.00
Length (ft)	= 35.00	0.00	0.00	0.00
Slope (%)	= 4.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 1.50	2.25	0.00	0.00
Crest El. (ft)	= 595.20	593.70	0.00	0.00
Weir Coeff.	= 2.60	2.60	3.33	3.33
Weir Type	= Broad	Broad	---	---
Multi-Stage	= No	No	No	No
Exfil. (in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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



Pond Report

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

Wednesday, 03 / 13 / 2013

Pond No. 1 - Basin 1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 593.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	593.00	8,707	0	0
1.00	594.00	10,624	9,649	9,649
1.20	594.20	11,027	2,165	11,813
1.40	594.40	11,436	2,246	14,059
1.60	594.60	11,851	2,328	16,388
1.80	594.80	12,272	2,412	18,800
2.00	595.00	12,699	2,497	21,296
2.20	595.20	12,133	2,483	23,779
2.40	595.40	13,573	2,569	26,348

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	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)	= 593.00	0.00	0.00	0.00
Length (ft)	= 35.00	0.00	0.00	0.00
Slope (%)	= 4.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 1.50	2.25	0.00	0.00
Crest El. (ft)	= 595.20	593.70	0.00	0.00
Weir Coeff.	= 2.60	2.60	3.33	3.33
Weir Type	= Broad	Broad	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	593.00	0.00	---	---	---	0.00	0.00	---	---	---	---	0.000
1.00	9,649	594.00	0.00	---	---	---	0.00	0.96	---	---	---	---	0.961
1.20	11,813	594.20	0.00	---	---	---	0.00	2.07	---	---	---	---	2.068
1.40	14,059	594.40	0.00	---	---	---	0.00	3.43	---	---	---	---	3.426
1.60	16,388	594.60	0.00	---	---	---	0.00	4.99	---	---	---	---	4.995
1.80	18,800	594.80	0.00	---	---	---	0.00	6.75	---	---	---	---	6.749
2.00	21,296	595.00	0.00	---	---	---	0.00	8.67	---	---	---	---	8.671
2.20	23,779	595.20	0.00	---	---	---	0.00	10.75	---	---	---	---	10.75
2.40	26,348	595.40	0.00	---	---	---	0.35	12.97	---	---	---	---	13.32

TR55 Tc Worksheet

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

Hyd. No. 10

Pond 1-opt-2-pre-dev

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
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)	= 2.83	0.00	0.00	
Land slope (%)	= 5.00	0.00	0.00	
Travel Time (min)	= 25.33	+ 0.00	+ 0.00	= 25.33
Shallow Concentrated Flow				
Flow length (ft)	= 200.00	0.00	0.00	
Watercourse slope (%)	= 2.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=2.28	0.00	0.00	
Travel Time (min)	= 1.46	+ 0.00	+ 0.00	= 1.46
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	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				26.80 min

TR55 Tc Worksheet

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

Hyd. No. 11

Pond 1 opt 2 post dev

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.013	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 2.83	0.00	0.00	
Land slope (%)	= 1.00	0.00	0.00	
Travel Time (min)	= 1.94	+ 0.00	+ 0.00	= 1.94
Shallow Concentrated Flow				
Flow length (ft)	= 400.00	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	
Travel Time (min)	= 3.28	+ 0.00	+ 0.00	= 3.28
Channel Flow				
X sectional flow area (sqft)	= 0.78	0.00	0.00	
Wetted perimeter (ft)	= 3.14	0.00	0.00	
Channel slope (%)	= 0.50	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=2.76	0.00	0.00	
Flow length (ft)	{{0}}150.0	0.0	0.0	
Travel Time (min)	= 0.90	+ 0.00	+ 0.00	= 0.90
Total Travel Time, Tc				6.10 min

Hydrograph Report

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

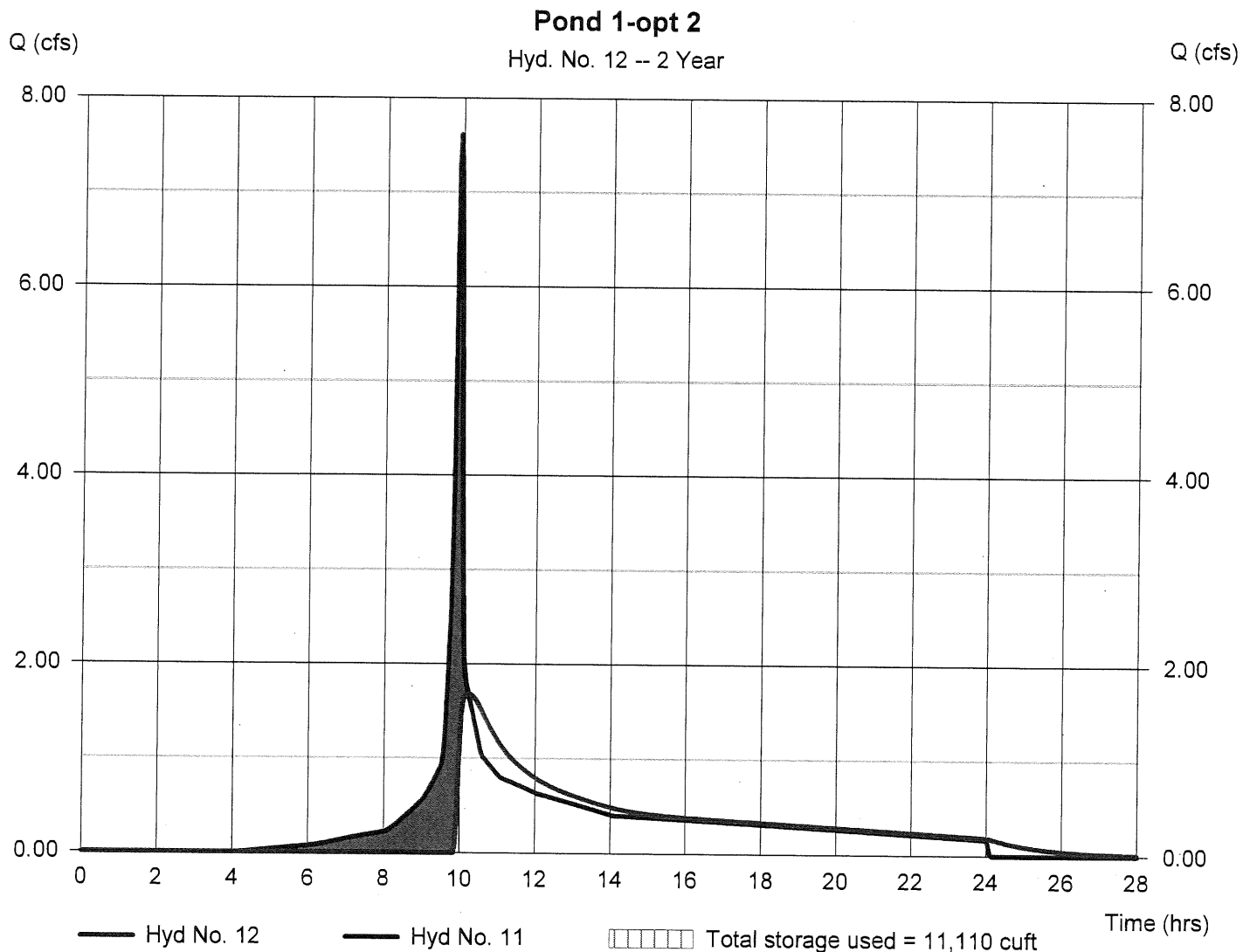
Wednesday, 03 / 13 / 2013

Hyd. No. 12

Pond 1-opt 2

Hydrograph type	= Reservoir	Peak discharge	= 1.679 cfs
Storm frequency	= 2 yrs	Time to peak	= 10.23 hrs
Time interval	= 2 min	Hyd. volume	= 25,912 cuft
Inflow hyd. No.	= 11 - Pond 1 opt 2 post dev	Max. Elevation	= 594.14 ft
Reservoir name	= Basin 1	Max. Storage	= 11,110 cuft

Storage Indication method used.



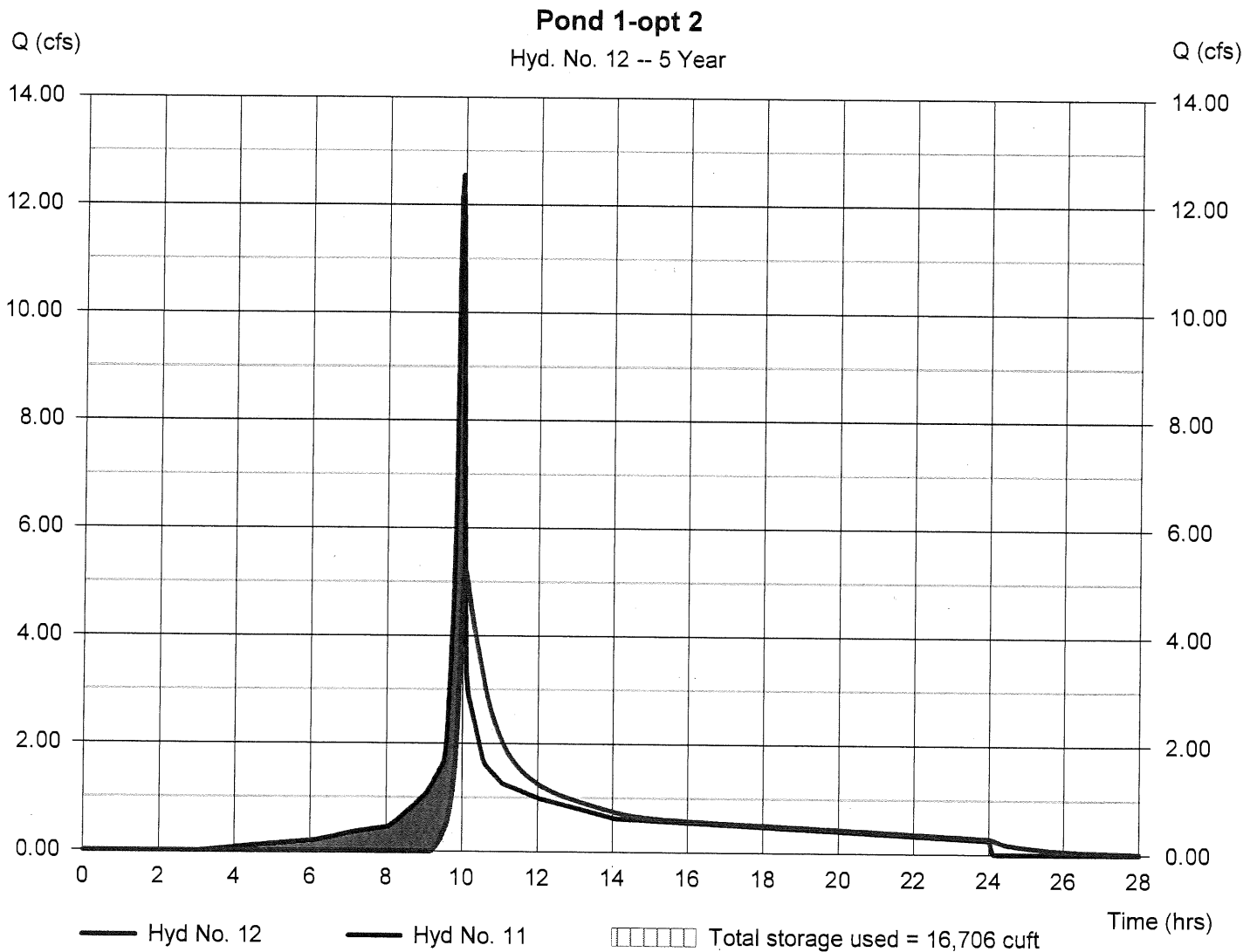
Hydrograph Report

Hyd. No. 12

Pond 1-opt 2

Hydrograph type	= Reservoir	Peak discharge	= 5.216 cfs
Storm frequency	= 5 yrs	Time to peak	= 10.07 hrs
Time interval	= 2 min	Hyd. volume	= 47,092 cuft
Inflow hyd. No.	= 11 - Pond 1 opt 2 post dev	Max. Elevation	= 594.63 ft
Reservoir name	= Basin 1	Max. Storage	= 16,706 cuft

Storage Indication method used.



Hydrograph Report

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

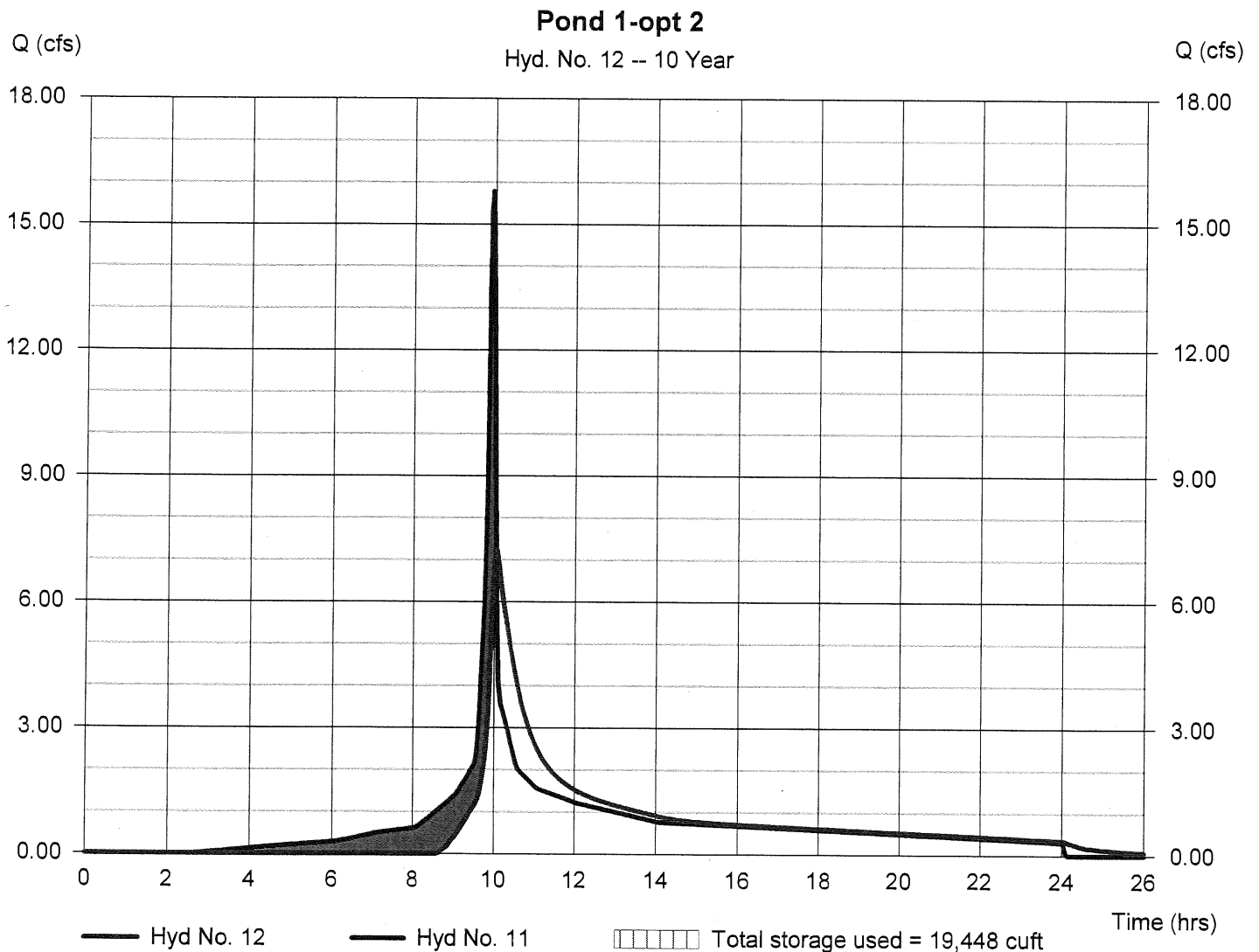
Wednesday, 03 / 13 / 2013

Hyd. No. 12

Pond 1-opt 2

Hydrograph type	= Reservoir	Peak discharge	= 7.233 cfs
Storm frequency	= 10 yrs	Time to peak	= 10.03 hrs
Time interval	= 2 min	Hyd. volume	= 61,291 cuft
Inflow hyd. No.	= 11 - Pond 1 opt 2 post dev	Max. Elevation	= 594.86 ft
Reservoir name	= Basin 1	Max. Storage	= 19,448 cuft

Storage Indication method used.



Hydrograph Report

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

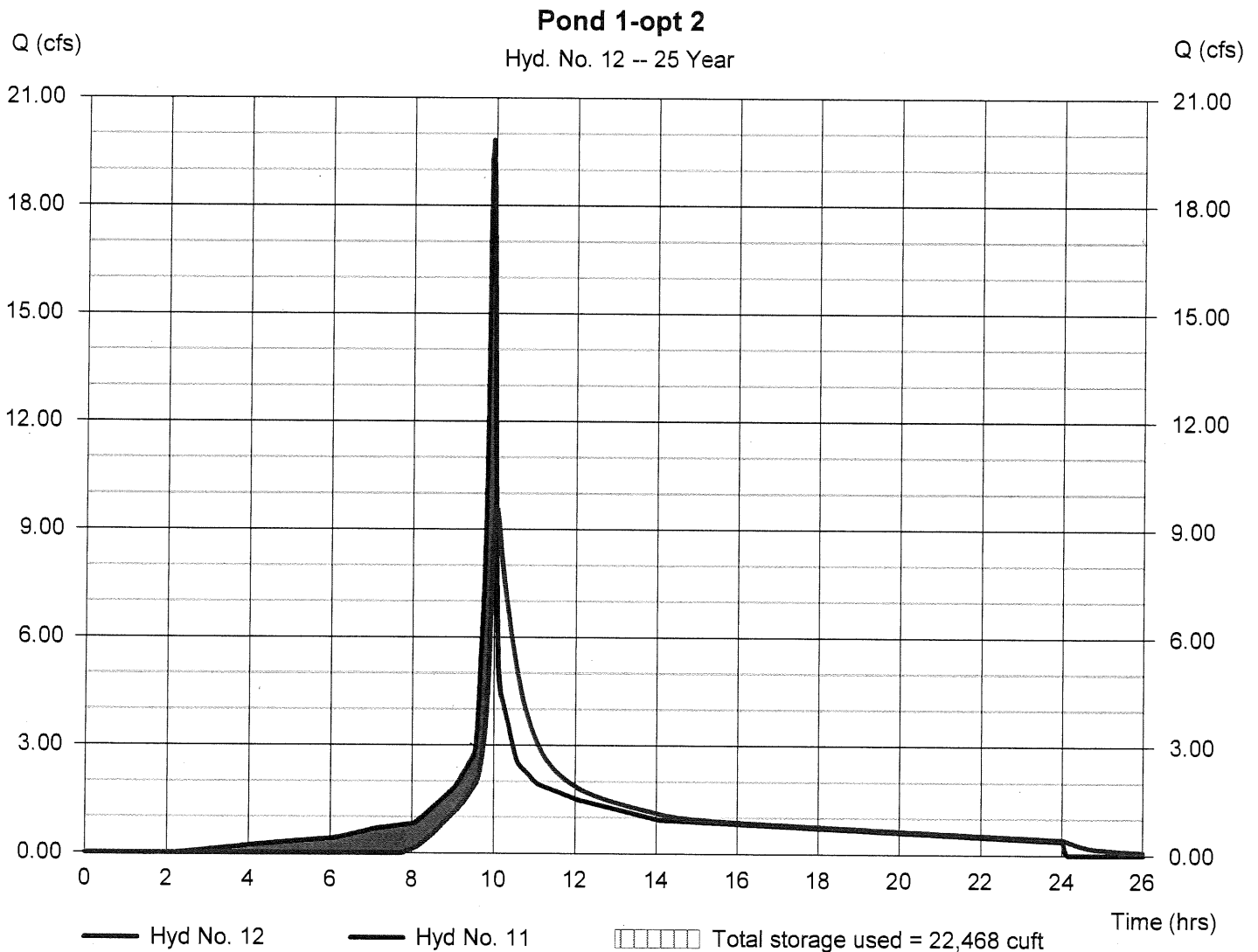
Wednesday, 03 / 13 / 2013

Hyd. No. 12

Pond 1-opt 2

Hydrograph type	= Reservoir	Peak discharge	= 9.633 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.03 hrs
Time interval	= 2 min	Hyd. volume	= 79,297 cuft
Inflow hyd. No.	= 11 - Pond 1 opt 2 post dev	Max. Elevation	= 595.10 ft
Reservoir name	= Basin 1	Max. Storage	= 22,468 cuft

Storage Indication method used.



Hydrograph Report

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

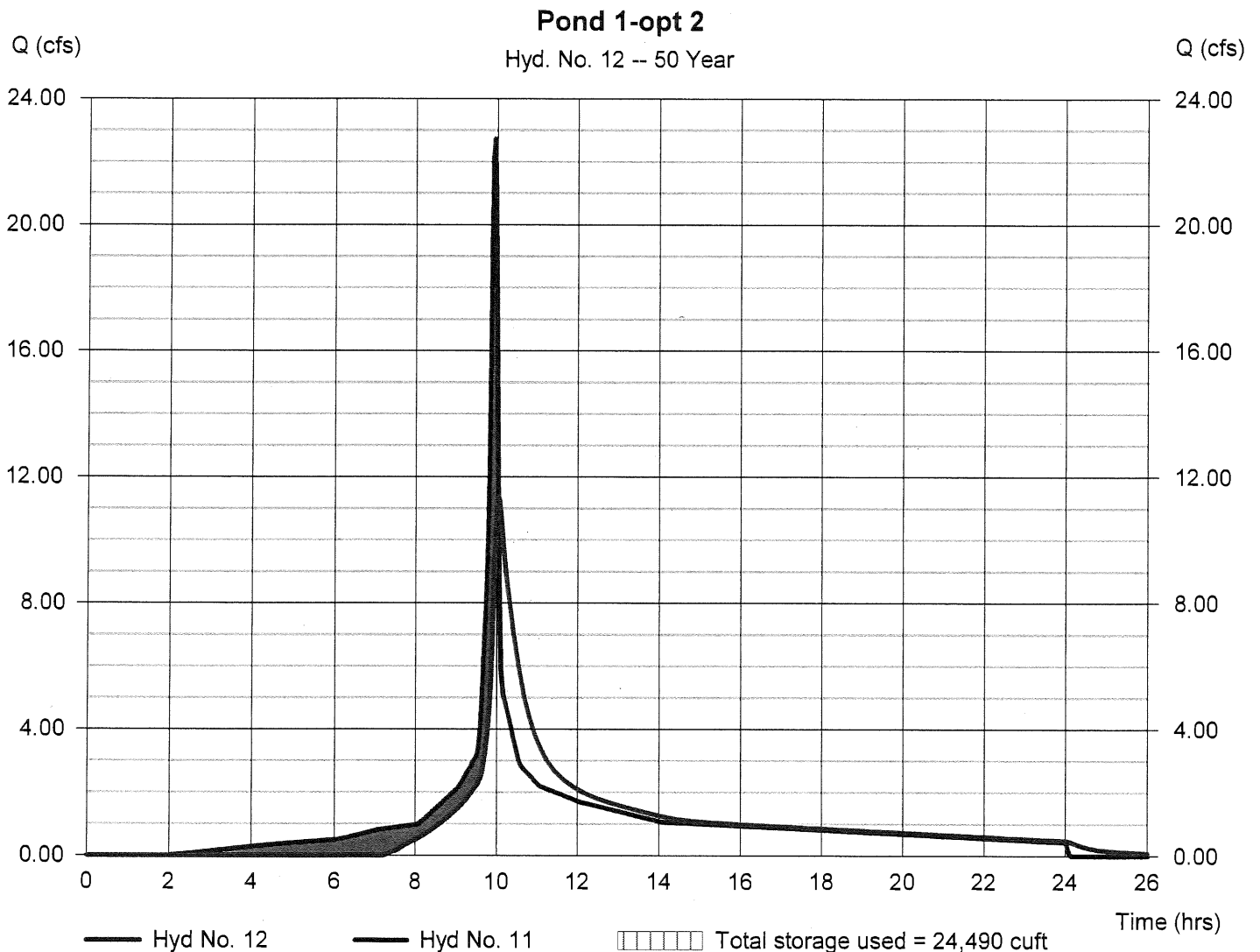
Wednesday, 03 / 13 / 2013

Hyd. No. 12

Pond 1-opt 2

Hydrograph type	= Reservoir	Peak discharge	= 11.40 cfs
Storm frequency	= 50 yrs	Time to peak	= 10.03 hrs
Time interval	= 2 min	Hyd. volume	= 92,380 cuft
Inflow hyd. No.	= 11 - Pond 1 opt 2 post dev	Max. Elevation	= 595.26 ft
Reservoir name	= Basin 1	Max. Storage	= 24,490 cuft

Storage Indication method used.



Hydrograph Report

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

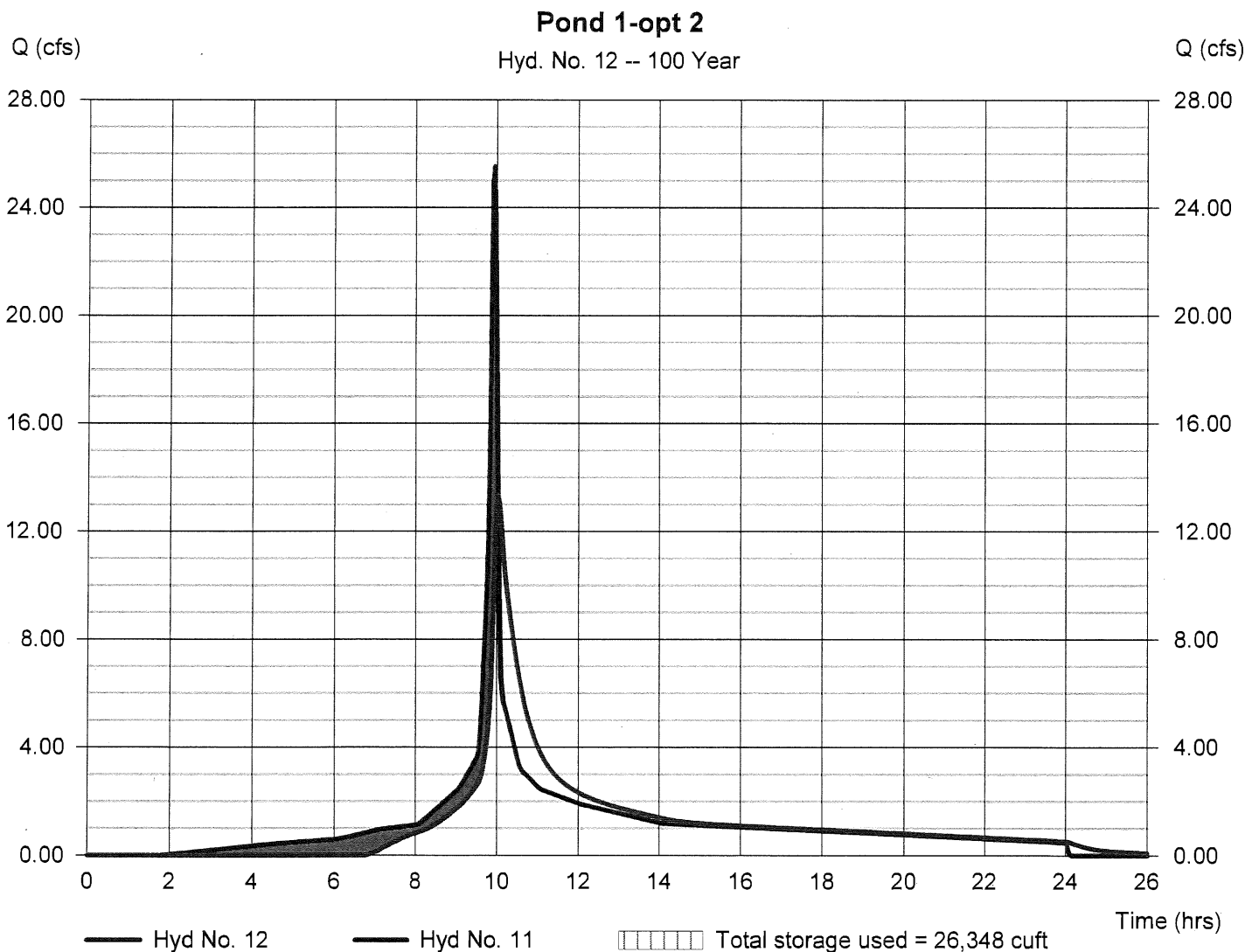
Wednesday, 03 / 13 / 2013

Hyd. No. 12

Pond 1-opt 2

Hydrograph type	= Reservoir	Peak discharge	= 13.32 cfs
Storm frequency	= 100 yrs	Time to peak	= 10.03 hrs
Time interval	= 2 min	Hyd. volume	= 105,169 cuft
Inflow hyd. No.	= 11 - Pond 1 opt 2 post dev	Max. Elevation	= 595.40 ft
Reservoir name	= Basin 1	Max. Storage	= 26,348 cuft

Storage Indication method used.



Hydrograph Report

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

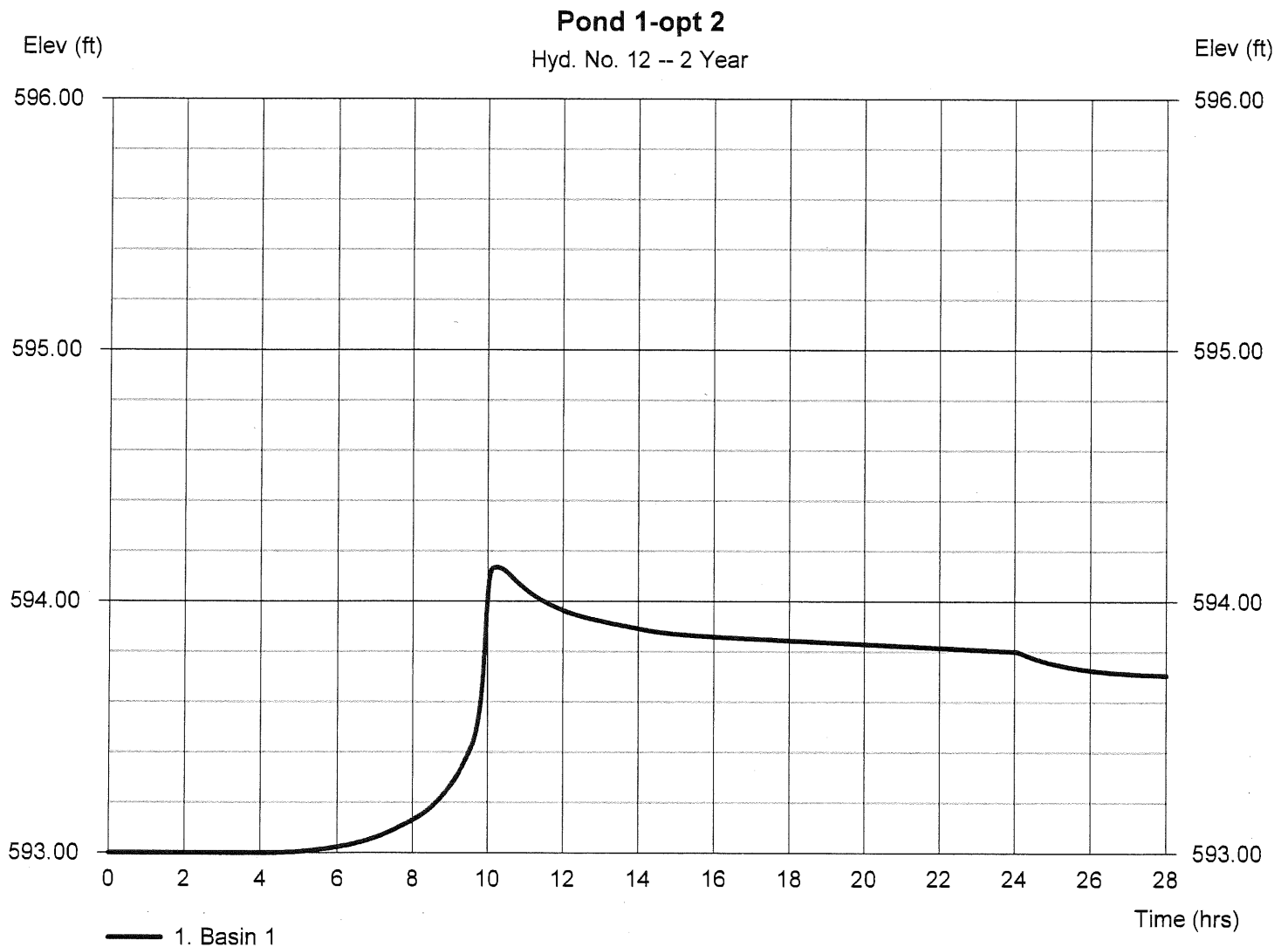
Wednesday, 03 / 13 / 2013

Hyd. No. 12

Pond 1-opt 2

Hydrograph type	= Reservoir	Peak discharge	= 1.679 cfs
Storm frequency	= 2 yrs	Time to peak	= 10.23 hrs
Time interval	= 2 min	Hyd. volume	= 25,912 cuft
Inflow hyd. No.	= 11 - Pond 1 opt 2 post dev	Max. Elevation	= 594.14 ft
Reservoir name	= Basin 1	Max. Storage	= 11,110 cuft

Storage Indication method used.



Hydrograph Report

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

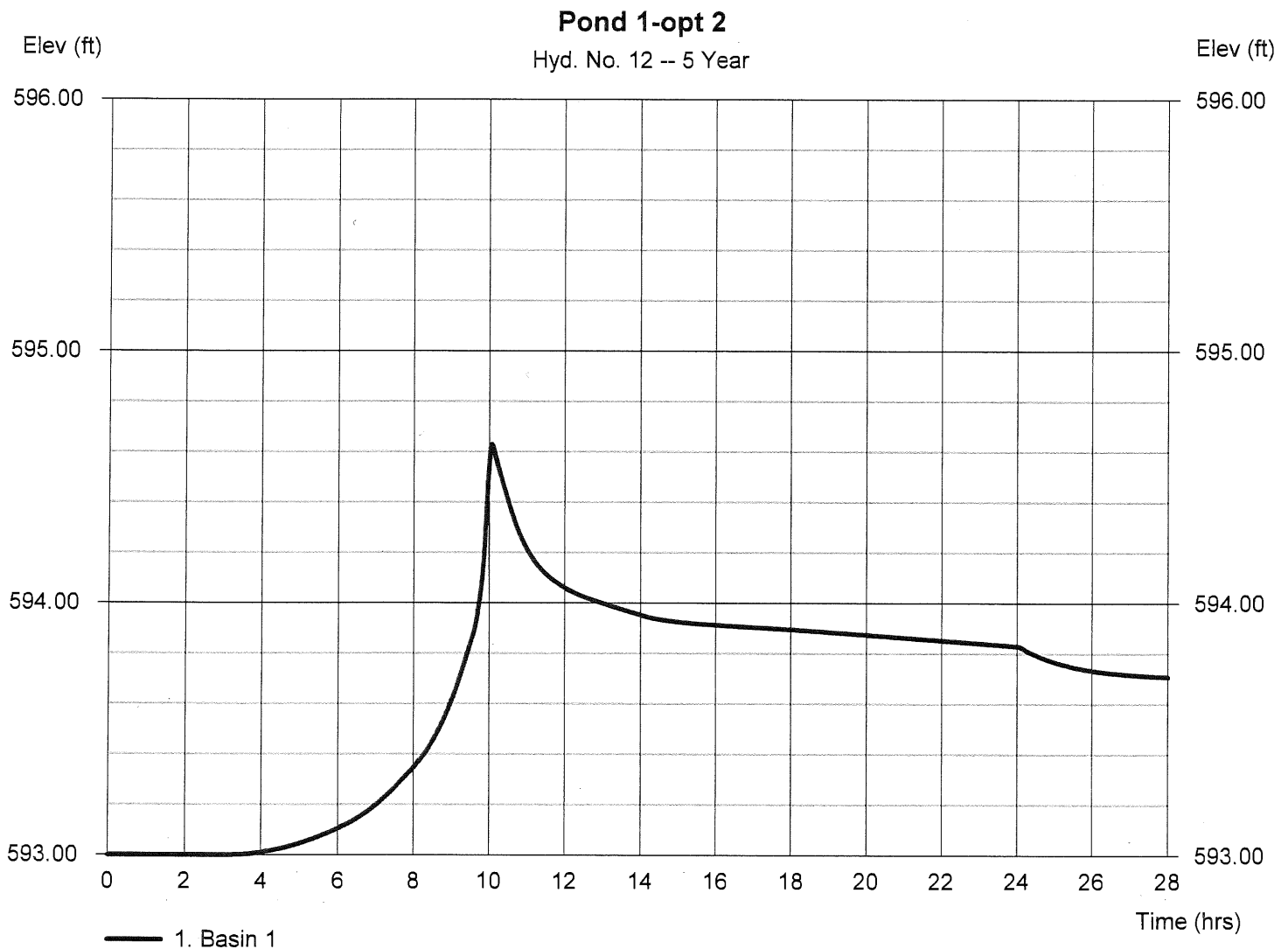
Wednesday, 03 / 13 / 2013

Hyd. No. 12

Pond 1-opt 2

Hydrograph type	= Reservoir	Peak discharge	= 5.216 cfs
Storm frequency	= 5 yrs	Time to peak	= 10.07 hrs
Time interval	= 2 min	Hyd. volume	= 47,092 cuft
Inflow hyd. No.	= 11 - Pond 1 opt 2 post dev	Max. Elevation	= 594.63 ft
Reservoir name	= Basin 1	Max. Storage	= 16,706 cuft

Storage Indication method used.



Hydrograph Report

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

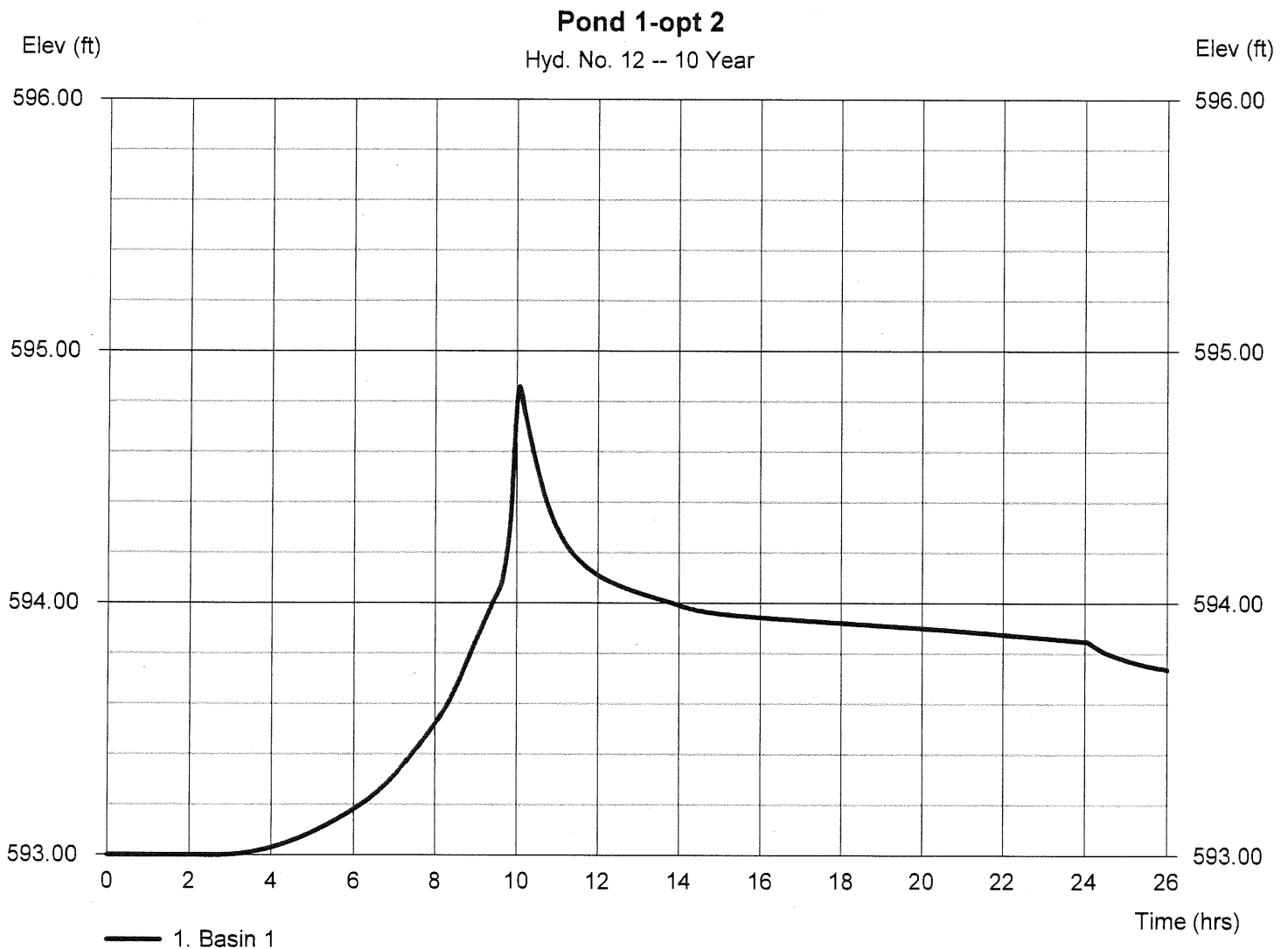
Wednesday, 03 / 13 / 2013

Hyd. No. 12

Pond 1-opt 2

Hydrograph type	= Reservoir	Peak discharge	= 7.233 cfs
Storm frequency	= 10 yrs	Time to peak	= 10.03 hrs
Time interval	= 2 min	Hyd. volume	= 61,291 cuft
Inflow hyd. No.	= 11 - Pond 1 opt 2 post dev	Max. Elevation	= 594.86 ft
Reservoir name	= Basin 1	Max. Storage	= 19,448 cuft

Storage Indication method used.



Hydrograph Report

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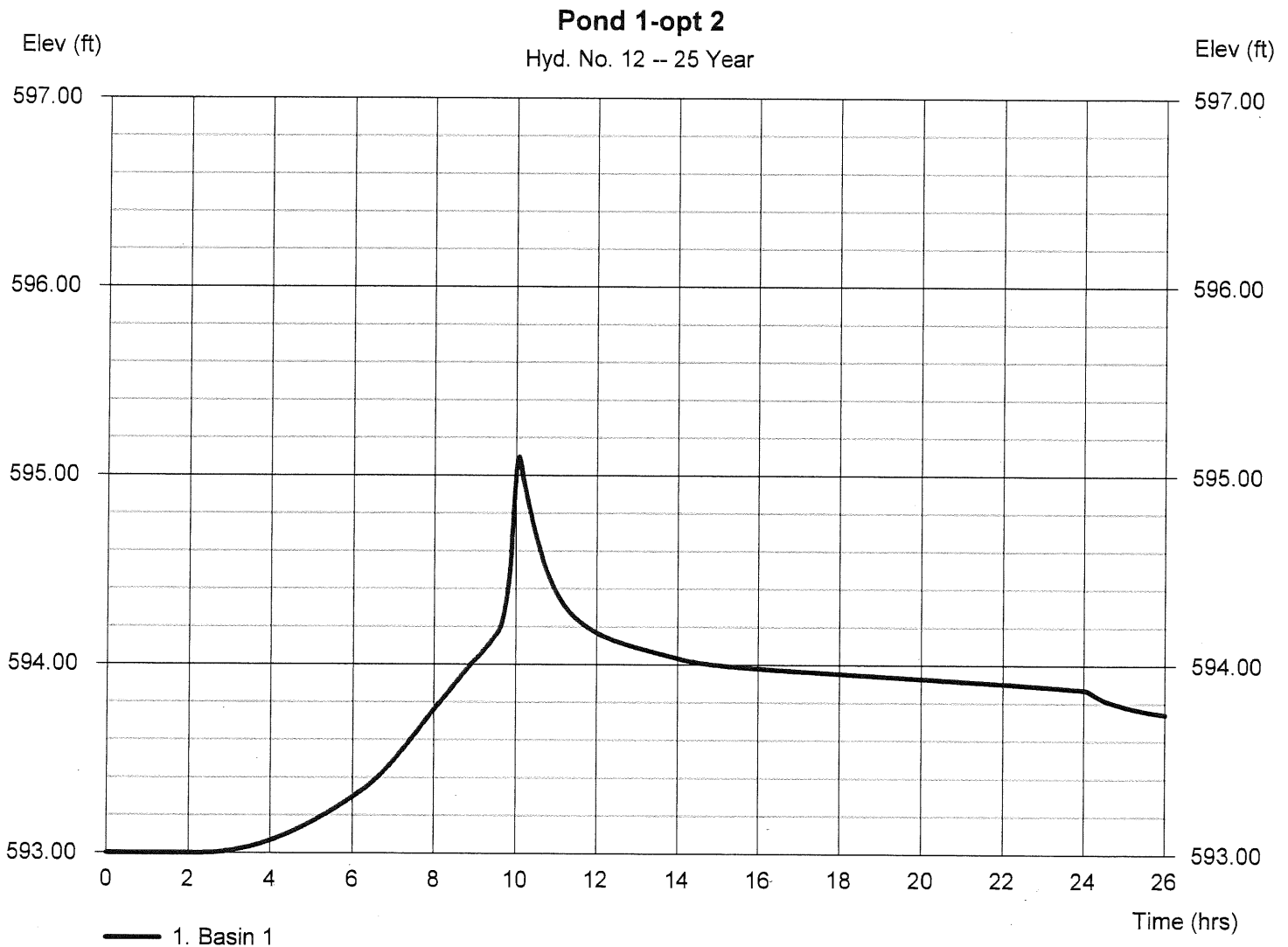
Wednesday, 03 / 13 / 2013

Hyd. No. 12

Pond 1-opt 2

Hydrograph type	= Reservoir	Peak discharge	= 9.633 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.03 hrs
Time interval	= 2 min	Hyd. volume	= 79,297 cuft
Inflow hyd. No.	= 11 - Pond 1 opt 2 post dev	Max. Elevation	= 595.10 ft
Reservoir name	= Basin 1	Max. Storage	= 22,468 cuft

Storage Indication method used.



Hydrograph Report

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

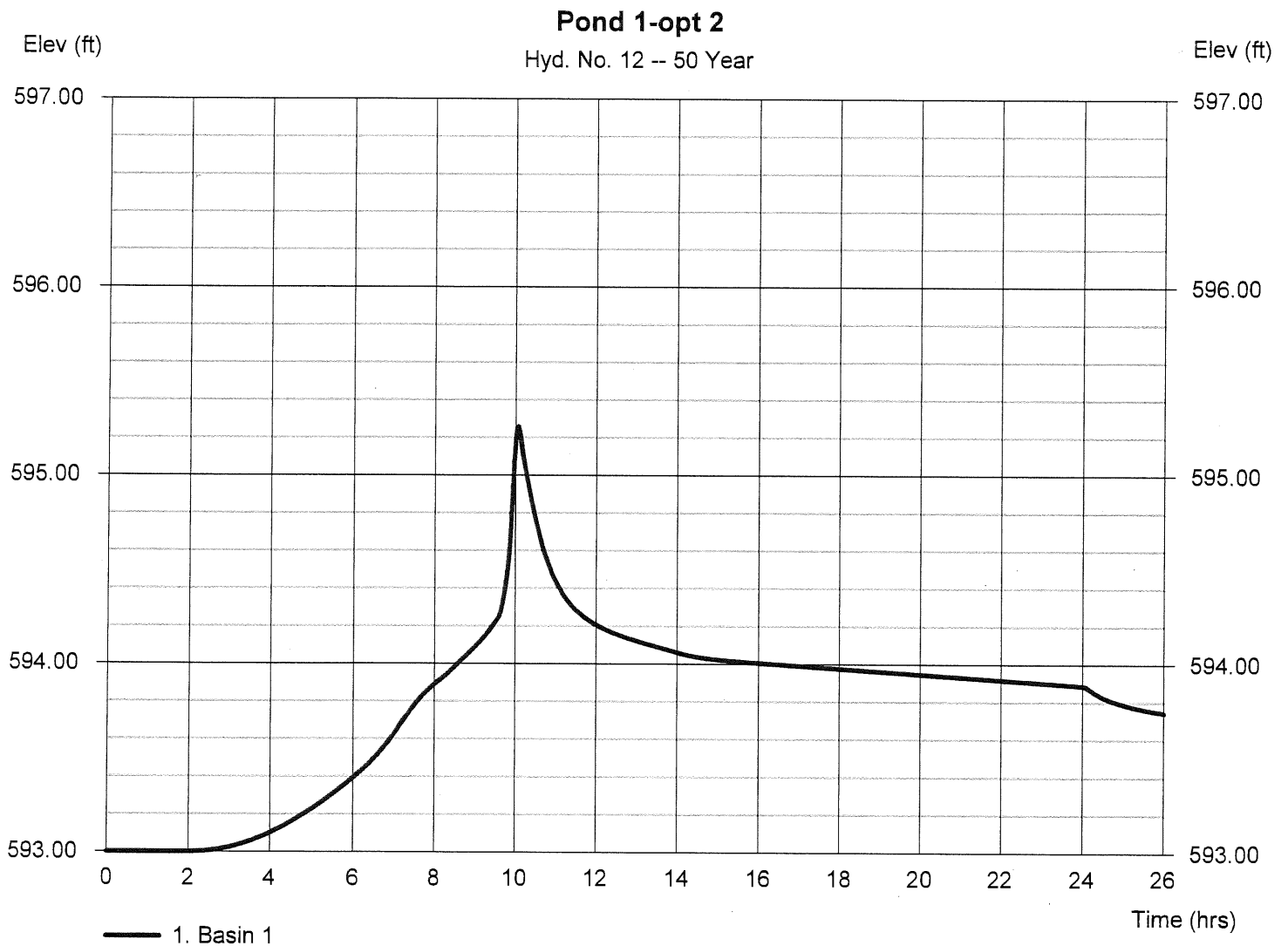
Wednesday, 03 / 13 / 2013

Hyd. No. 12

Pond 1-opt 2

Hydrograph type	= Reservoir	Peak discharge	= 11.40 cfs
Storm frequency	= 50 yrs	Time to peak	= 10.03 hrs
Time interval	= 2 min	Hyd. volume	= 92,380 cuft
Inflow hyd. No.	= 11 - Pond 1 opt 2 post dev	Max. Elevation	= 595.26 ft
Reservoir name	= Basin 1	Max. Storage	= 24,490 cuft

Storage Indication method used.



Hydrograph Report

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

Wednesday, 03 / 13 / 2013

Hyd. No. 12

Pond 1-opt 2

Hydrograph type	= Reservoir	Peak discharge	= 13.32 cfs
Storm frequency	= 100 yrs	Time to peak	= 10.03 hrs
Time interval	= 2 min	Hyd. volume	= 105,169 cuft
Inflow hyd. No.	= 11 - Pond 1 opt 2 post dev	Max. Elevation	= 595.40 ft
Reservoir name	= Basin 1	Max. Storage	= 26,348 cuft

Storage Indication method used.

