

APPENDIX 1

**REVISION TO: Kensington Road Drainage Analysis PHASE 3 City of Avondale Estates, Georgia.
Date August 31, 2011**

Clark Patterson Lee (CPL) has provided the following revision to the 'Graded Pond', conceptualized and presented in the above noted report. This revision includes the redesign of the concept pond so that the pond will not extend beyond several property boundaries, but rather be contained within two identified residential properties as shown on the Map provided.

Since the submittal of the original 2011 report by CPL, an independent party has designed and built a pond at the south corner of the church parking lot, to serve a portion of that parking lot. The existing pond does not have capacity to accommodate additional flows other than to serve its 1.25 acre drainage area. In addition, the existing pond's inadequate size for additional flows and its configuration, means that no part of it will be suitable for reuse at the proposed pond. It is recommended that the existing pond be demolished to make way for the proposed pond.

The original conceptual graded pond had a total storage volume of 116,905 cubic feet, and the revised graded pond has a total storage of 156,474 cubic feet. This additional storage has presented the opportunity to eliminate the previously planned Phase 2 supplemental underground storage system. In addition the revised pond will provide a considerable amount of Water Quality storage, while further reducing flows throughout the overall drainage basin.

The proposed pond can provided Water Quality storage for approximately 13 acres of developed property with a Curve Number of 91; or 82 percent impervious surfaces. This means that under the revised pond design the following existing sub-basins draining to the pond can be treated for Water Quality based on the Georgia Stormwater Management Manual guidelines;

A-1	8.9 ac
A-2a	1.1 ac
B-2	1.9 ac
<u>B-3a</u>	<u>0.3 ac</u>
Total	12.2 ac

Note that sub-basin B-1 is 3.1 acres, which would exceed the approximate 13 acre limit; however with a detailed pond design and basin analysis, it may be possible to accommodate sub-basin B-1.

HYDROLOGIC & HYDRAULIC ANALYSIS AND RESULTS (REVISED)

In the original study, Sub-Basins A-1, A-2a, B-1 and B-3a drained to the graded pond. Sub-Basin B-2, draining from the church parking lot area, was originally intended to bypass the graded pond in phase one, and intercepted by the underground system for phase two. The revised graded pond with wall will receive runoff from all Sub-Basins A-1, A-2a, B-1, B-2 and B-3a. Note the remaining Sub-Basins, A-2b and B-3b continue to bypass the pond, remaining undetained. The junction of Study Points A and B remain the primary location for analyzing detained flows in this study.

The following table is provided as a revision to the equivalent table provided in the original study.

Table 1 (Revised): Sub-Basin Areas to Ponds

Sub-Basin	Area (ac)	SCS CN
Phase 1 – Graded Pond w/ Wall		
A-1	8.9	80
A-2a	1.1	64
B-1	3.5	83
B-2	1.9	92
B-3a	0.3	61
Phase 2 – Underground Pond		
NOT REQUIRED		
Basin A & B Undetained Areas		
A-2b	1.2	64
B-3b	2.9	64

Refer to the Maps Section of the Appendix

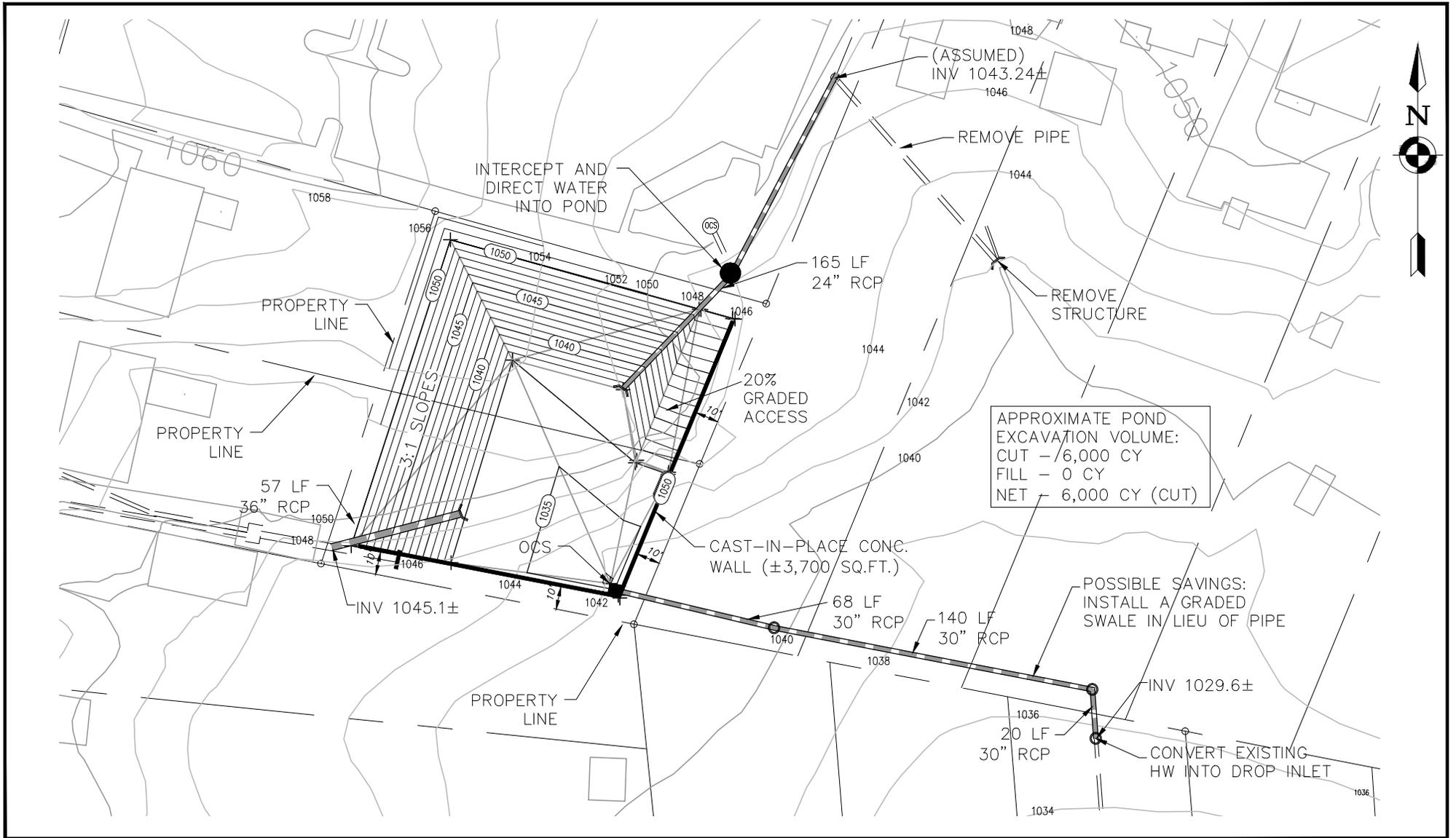
The proposed location of the graded pond is south of the church parking lot and lies within two residential properties. The proposed pond revision comprises two sides of cast-in-place concrete walls with an integrated outlet control structure; the walls are offset 10 feet from the adjacent property lines for constructability purposes. The remaining two sides of the pond have 3:1 slopes and the pond maintains the 20% access ramp which was provided in the original concept design.

The total volume available in the revised graded pond is 156,474 cubic feet with a bottom and top elevation of 1034.0 and 1050.0, respectively (16-foot depth). Approximately 228 feet of new pipe will connect the pond outlet control structure to the receiving headwall.

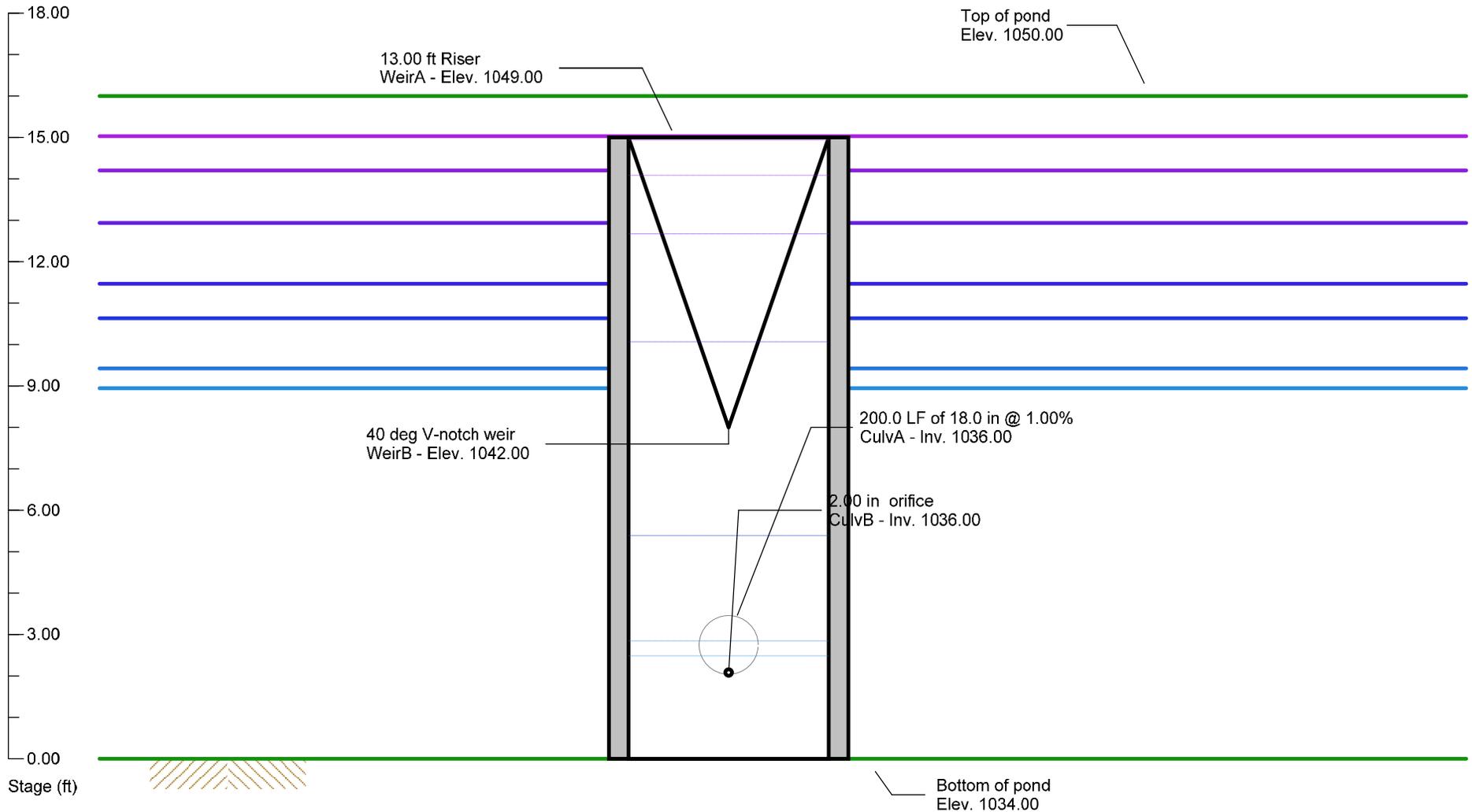
Table 2 (Revised) : Detention Phase 1 - Pond Flow Summary

	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Graded Pond Inflow (cfs)	31.62	44.31	54.08	67.31	77.31	84.01
Graded Pond Outflow (cfs)	2.52	10.7	17.87	20.88	22.24	23.01

Refer to the Results Section of the Appendix



Pond No. 8 - Graded Pond A



Front View
NTS - Looking Downstream

Inflow hydrograph = 24. Combine - *** A1, A2a, B1, B2, B3a

Hydrograph Return Period Recap

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	-----	13.04	16.46	-----	23.57	29.04	36.44	42.03	45.77	A-1
2	SCS Runoff	-----	0.583	0.889	-----	1.590	2.171	3.000	3.652	4.103	A-2a
3	SCS Runoff	-----	0.636	0.970	-----	1.734	2.368	3.273	3.984	4.476	A-2b
4	SCS Runoff	-----	9.671	11.91	-----	16.47	19.93	24.56	28.04	30.35	B-1
5	SCS Runoff	-----	7.633	8.944	-----	11.55	13.49	16.06	17.98	19.26	B-2
6	SCS Runoff	-----	0.224	0.347	-----	0.627	0.859	1.191	1.453	1.631	B-3a
7	SCS Runoff	-----	1.916	2.875	-----	5.037	6.822	9.404	11.45	12.85	B-3b
8	SCS Runoff	-----	1.361	2.216	-----	4.327	6.121	8.713	10.77	12.19	C-1
9	SCS Runoff	-----	4.521	6.192	-----	9.837	12.81	16.97	20.20	22.38	D-1
10	SCS Runoff	-----	8.189	11.14	-----	17.56	22.73	29.99	35.59	39.37	D-2
11	SCS Runoff	-----	3.056	3.931	-----	5.815	7.291	9.304	10.84	11.86	E-1
12	SCS Runoff	-----	4.997	6.531	-----	9.830	12.46	16.08	18.84	20.70	E-2
13	SCS Runoff	-----	1.301	1.869	-----	3.132	4.162	5.614	6.773	7.563	F-1
15	Combine	1, 2, 3,	14.26	18.32	-----	26.89	33.58	42.71	49.67	54.34	Study Point A
16	Combine	4, 5, 6,	18.52	22.92	-----	32.10	39.20	48.87	56.22	61.16	Study Point B
17	Combine	7, 8, 15, 16	27.87	35.69	-----	52.58	65.94	84.37	98.52	108.07	Study Point C
18	Combine	9, 10,	12.42	16.96	-----	26.87	34.80	45.89	54.54	60.40	Study Point D
19	Combine	11, 12, 17,	44.62	58.71	-----	89.39	113.82	147.64	173.67	191.26	Study Point E
20	Combine	18, 13, 19	45.85	60.58	-----	92.53	117.98	153.25	180.41	198.77	Study Point F
24	Combine	1, 2, 4, 5, 6,	25.50	31.62	-----	44.31	54.08	67.31	77.31	84.01	*** A1, A2a, B1, B2, B3a
25	Reservoir	24	1.082	2.515	-----	10.70	17.87	20.88	22.24	23.01	Routed GRADED POND
26	Combine	3, 7, 25	2.664	3.952	-----	12.13	20.78	29.69	34.67	37.55	*** A & B w/ PH 1 GRADED POND
27	Combine	8, 26	3.800	5.848	-----	14.40	26.07	38.34	44.97	49.01	C w/ PH 1 GRADED POND
28	Combine	9, 10,	12.42	16.96	-----	26.87	34.80	45.89	54.54	60.40	Study Point D
29	Combine	11, 12, 27,	22.43	31.07	-----	50.25	69.79	103.04	123.38	135.83	E w/ PH 1 GRADED POND
30	Combine	28, 13, 29	23.67	32.83	-----	53.15	73.07	107.42	129.54	142.67	F w/ PH 1 GRADED POND
32	Combine	15, 16,	27.27	34.55	-----	49.95	61.98	78.44	91.00	99.46	*** A+B UNDET
34	SCS Runoff	-----	31.92	42.37	-----	64.83	82.62	107.15	125.97	138.65	Downstream Basin
35	Combine	20, 34	59.96	80.46	-----	125.03	160.69	210.27	248.53	274.42	Basin at Creek
36	Combine	30, 34,	42.87	58.37	-----	96.55	132.02	177.79	209.75	230.97	Basin at Creek w/ Upstream Detentio
38	SCS Runoff	-----	26.95	38.31	-----	63.49	83.96	112.75	135.26	150.68	G-1

Hydrograph Return Period Recap

Hydranow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

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	
39	SCS Runoff	-----	10.91	15.97	-----	27.31	36.62	49.78	60.17	67.30	H-1
40	SCS Runoff	-----	3.689	4.847	-----	7.362	9.354	12.10	14.19	15.61	I-1
41	SCS Runoff	-----	2.184	3.207	-----	5.502	7.385	10.12	12.26	13.73	J1
42	SCS Runoff	-----	28.66	39.17	-----	62.07	80.43	105.98	125.78	139.26	J-2
43	SCS Runoff	-----	0.528	0.793	-----	1.390	1.882	2.594	3.159	3.545	J-3
44	Combine	41, 42, 43	30.14	41.22	-----	65.75	85.51	113.07	134.38	148.82	Total J
45	SCS Runoff	-----	3.318	4.921	-----	8.527	11.49	15.73	19.10	21.40	K-1
46	SCS Runoff	-----	2.111	3.101	-----	5.318	7.139	9.781	11.86	13.27	K-2
47	SCS Runoff	-----	13.61	18.23	-----	28.27	36.36	47.57	56.20	62.02	K-3
48	Combine	45, 46, 47	18.97	26.10	-----	42.01	54.94	73.01	87.02	96.52	Total K
49	SCS Runoff	-----	6.312	8.864	-----	14.49	19.05	25.44	30.41	33.80	L-1
50	SCS Runoff	-----	13.17	18.04	-----	28.66	37.32	49.45	58.83	65.19	M-1
51	SCS Runoff	-----	1.751	2.769	-----	5.101	7.046	9.845	12.10	13.66	N-1
52	SCS Runoff	-----	10.69	14.04	-----	21.32	27.10	35.04	41.12	45.21	N-2
53	Combine	51, 52	12.41	16.78	-----	26.42	34.14	44.87	53.15	58.75	Total N
54	SCS Runoff	-----	6.933	8.843	-----	12.84	15.94	20.15	23.33	25.47	O-1
55	SCS Runoff	-----	113.63	146.25	-----	215.19	268.91	342.12	397.75	435.05	P-1
57	Combine	30, 38,	47.02	66.44	-----	110.47	152.54	212.22	252.39	279.25	Study Point G w/ PH 1 GRADED PO
58	Combine	39, 57	57.93	82.41	-----	137.78	188.86	262.00	312.46	346.34	Study Point H w/ PH 1 GRADED PO
59	Combine	40, 58	61.45	87.01	-----	144.70	197.59	273.21	325.57	360.82	Study Point I w/ PH 1 GRADED PON
60	Combine	44, 59	89.94	125.95	-----	207.33	279.96	381.48	454.78	504.14	Study Point J w/ PH 1 GRADED PON
61	Combine	48, 60	106.91	149.95	-----	245.96	329.75	448.52	534.29	592.24	Study Point K w/ PH 1 GRADED PON
62	Combine	49, 61	112.09	157.16	-----	258.19	346.08	470.64	560.94	621.82	Study Point L w/ PH 1 GRADED PON
63	Combine	50, 62	124.58	174.43	-----	285.40	381.24	516.84	616.55	684.11	Study Point M w/ PH 1 GRADED PO
64	Combine	53, 63	136.37	190.20	-----	309.72	412.36	559.75	668.21	741.12	Study Point N w/ PH 1 GRADED PO
65	Combine	54, 64	141.98	197.27	-----	320.49	425.41	577.72	688.96	763.72	Study Point O - w/ PH 1 GRADED PO
66	Combine	55, 65	254.28	342.31	-----	533.53	690.81	914.32	1079.60	1190.57	Study Point P - w/ PH 1 GRADED PO

Pond Report

Pond No. 8 - Graded Pond A

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1034.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1034.00	00	0	0
2.00	1036.00	5,436	3,624	3,624
4.00	1038.00	7,420	12,803	16,427
6.00	1040.00	8,731	16,132	32,559
8.00	1042.00	10,113	18,825	51,384
10.00	1044.00	11,566	21,661	73,044
12.00	1046.00	13,091	24,639	97,683
14.00	1048.00	14,687	27,760	125,443
16.00	1050.00	16,362	31,031	156,474

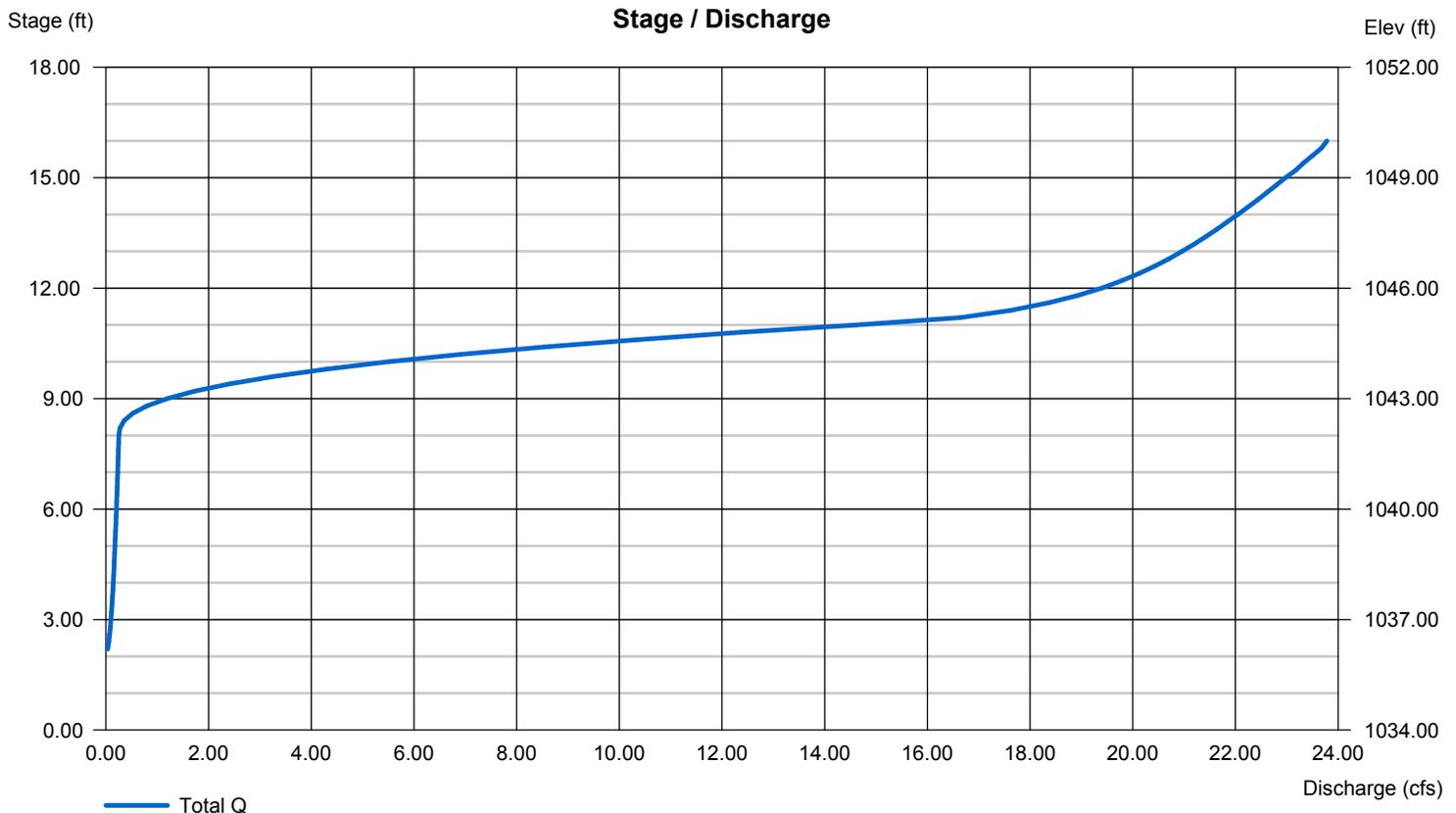
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	2.00	0.00	0.00
Span (in)	= 18.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1036.00	1036.00	0.00	0.00
Length (ft)	= 200.00	0.00	0.00	0.00
Slope (%)	= 1.00	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	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 13.00	0.00	0.00	0.00
Crest El. (ft)	= 1049.00	1042.00	0.00	0.00
Weir Coeff.	= 3.33	0.92	3.33	3.33
Weir Type	= 1	40 degV	---	---
Multi-Stage	= Yes	Yes	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).



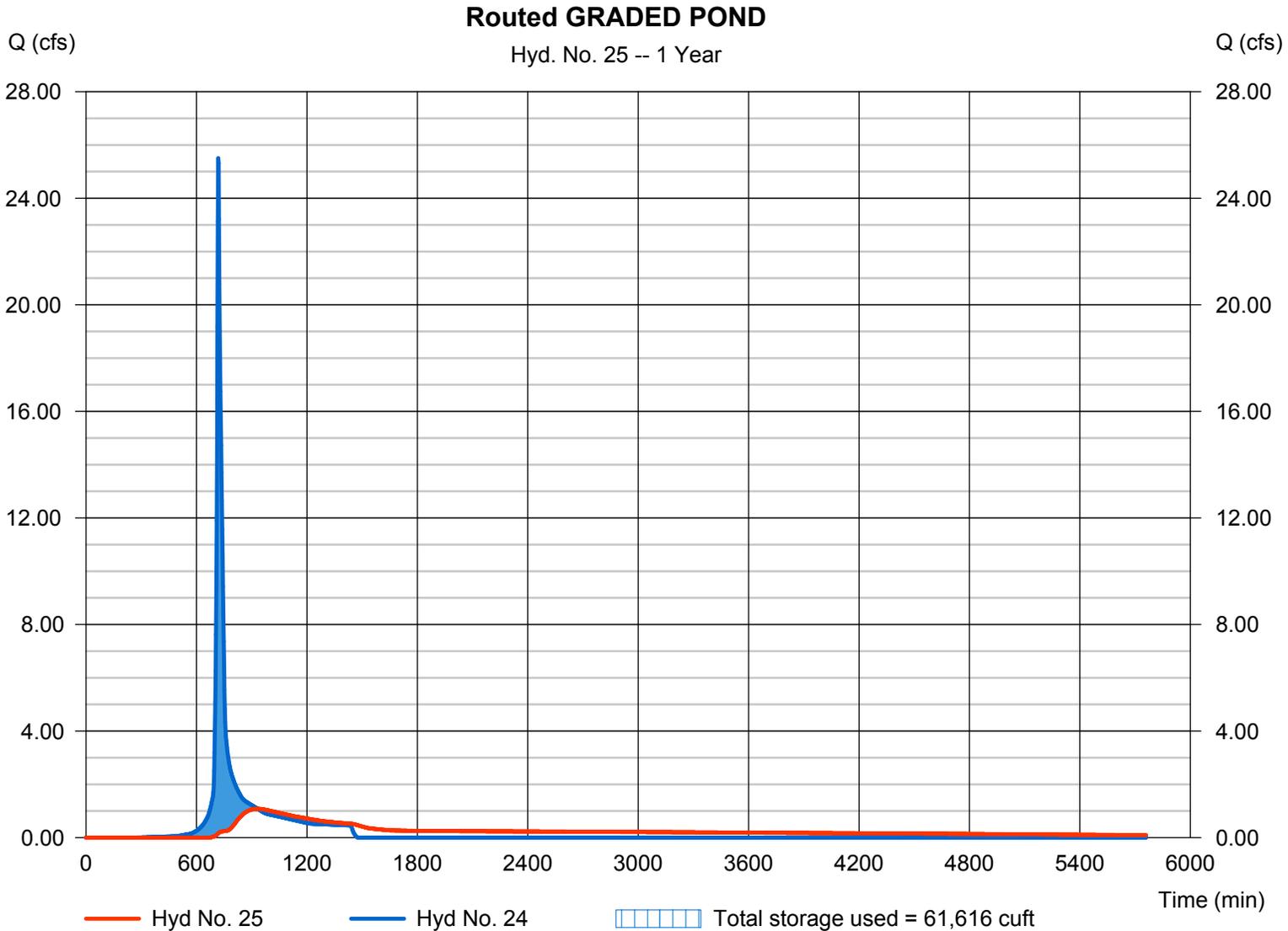
Hydrograph Report

Hyd. No. 25

Routed GRADED POND

Hydrograph type	= Reservoir	Peak discharge	= 1.082 cfs
Storm frequency	= 1 yrs	Time to peak	= 932 min
Time interval	= 2 min	Hyd. volume	= 80,843 cuft
Inflow hyd. No.	= 24 - *** A1, A2a, B1, B2, B3a	Max. Elevation	= 1042.94 ft
Reservoir name	= Graded Pond A	Max. Storage	= 61,616 cuft

Storage Indication method used.



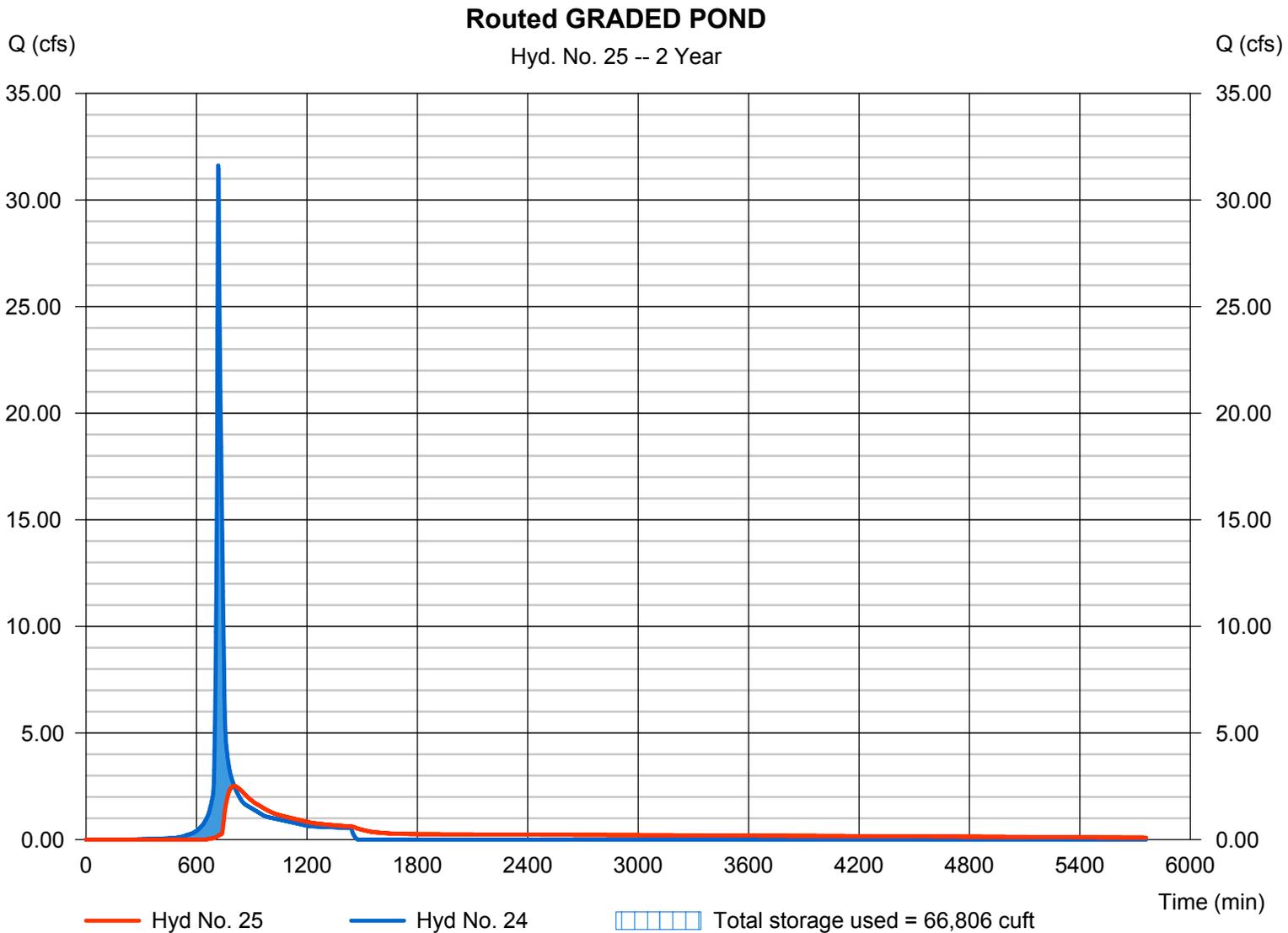
Hydrograph Report

Hyd. No. 25

Routed GRADED POND

Hydrograph type	= Reservoir	Peak discharge	= 2.515 cfs
Storm frequency	= 2 yrs	Time to peak	= 806 min
Time interval	= 2 min	Hyd. volume	= 102,315 cuft
Inflow hyd. No.	= 24 - *** A1, A2a, B1, B2, B3a	Max. Elevation	= 1043.42 ft
Reservoir name	= Graded Pond A	Max. Storage	= 66,806 cuft

Storage Indication method used.



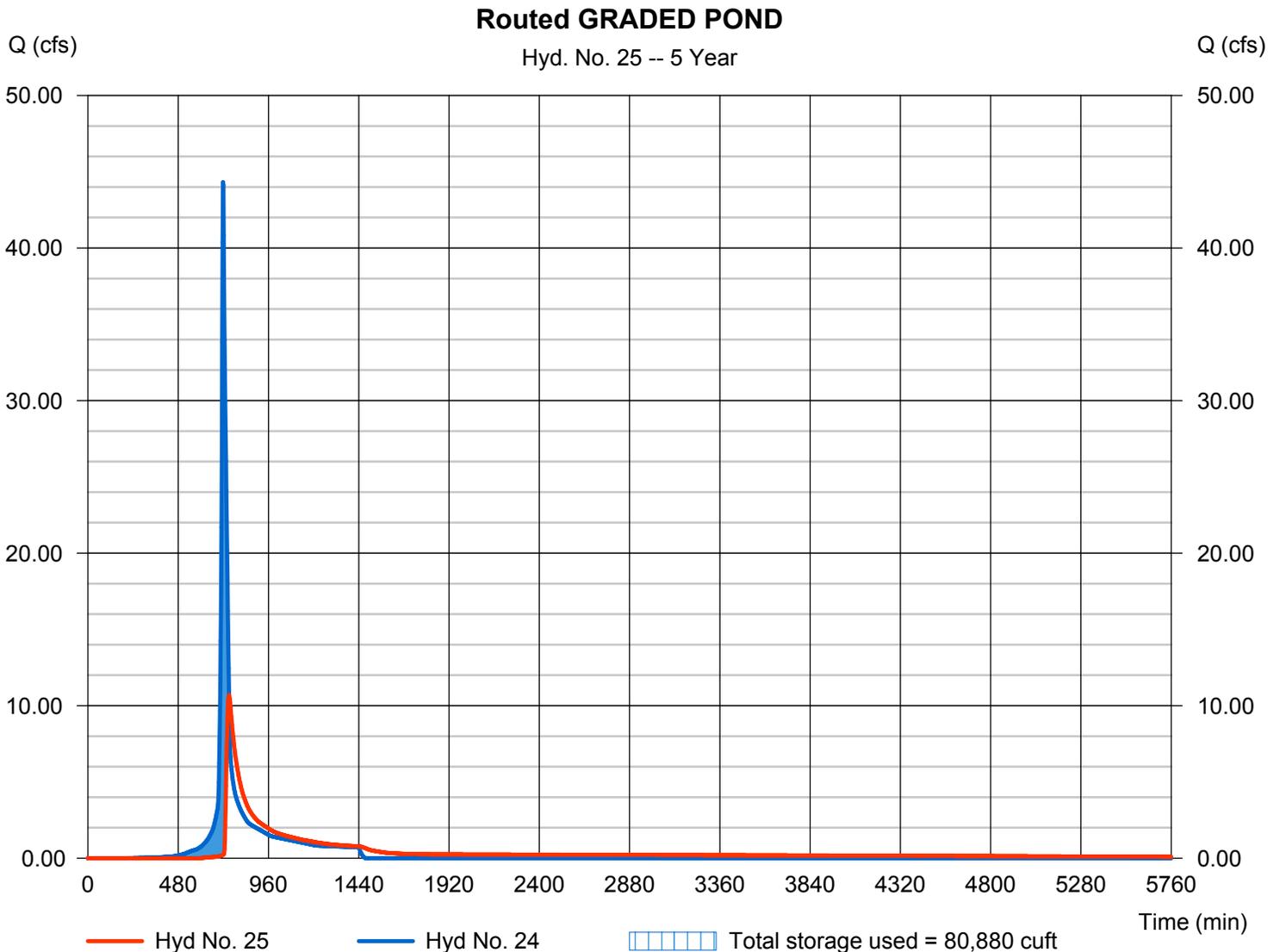
Hydrograph Report

Hyd. No. 25

Routed GRADED POND

Hydrograph type	= Reservoir	Peak discharge	= 10.70 cfs
Storm frequency	= 5 yrs	Time to peak	= 750 min
Time interval	= 2 min	Hyd. volume	= 147,469 cuft
Inflow hyd. No.	= 24 - *** A1, A2a, B1, B2, B3a	Max. Elevation	= 1044.64 ft
Reservoir name	= Graded Pond A	Max. Storage	= 80,880 cuft

Storage Indication method used.



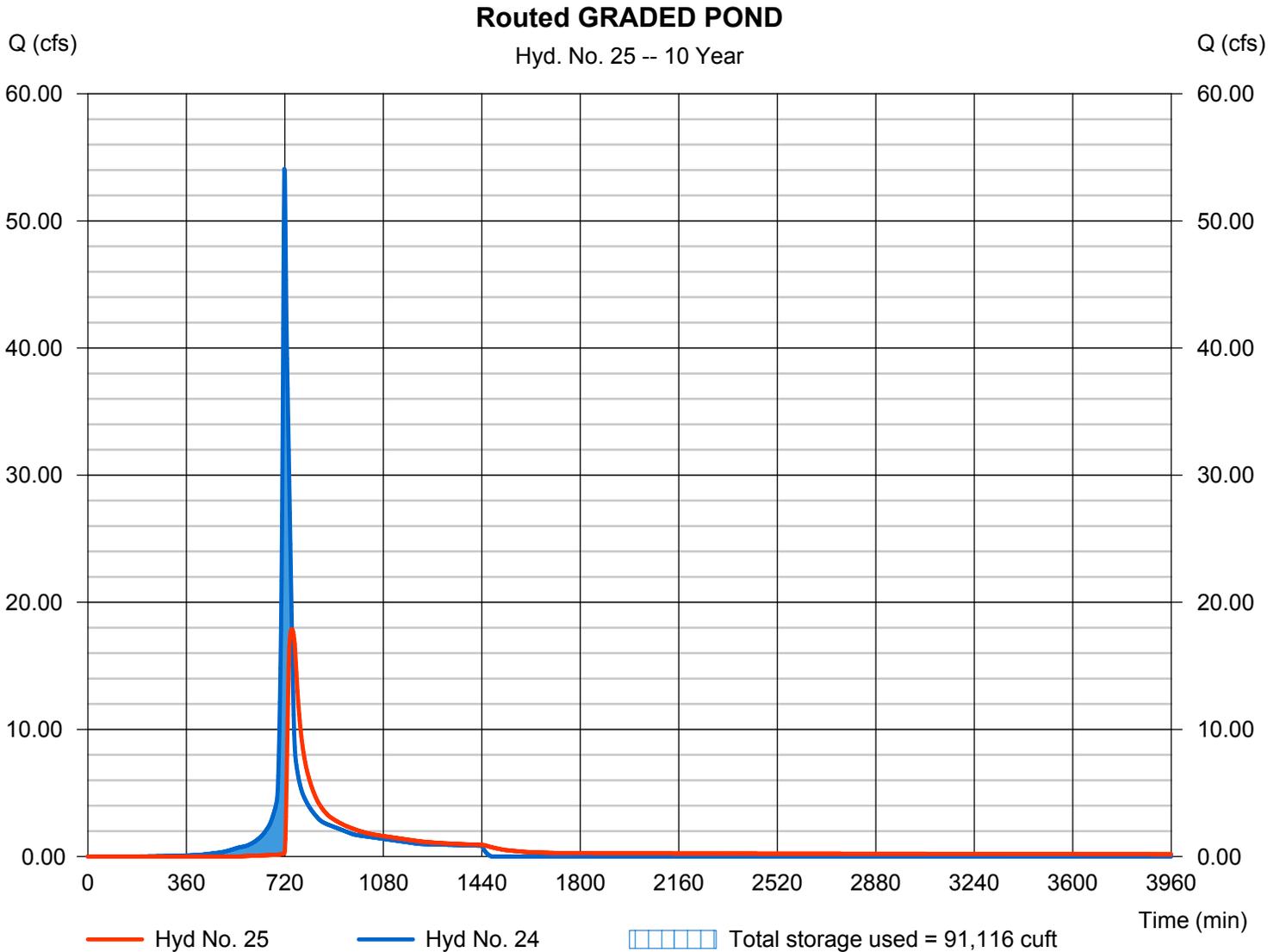
Hydrograph Report

Hyd. No. 25

Routed GRADED POND

Hydrograph type	= Reservoir	Peak discharge	= 17.87 cfs
Storm frequency	= 10 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 182,733 cuft
Inflow hyd. No.	= 24 - *** A1, A2a, B1, B2, B3a	Max. Elevation	= 1045.47 ft
Reservoir name	= Graded Pond A	Max. Storage	= 91,116 cuft

Storage Indication method used.



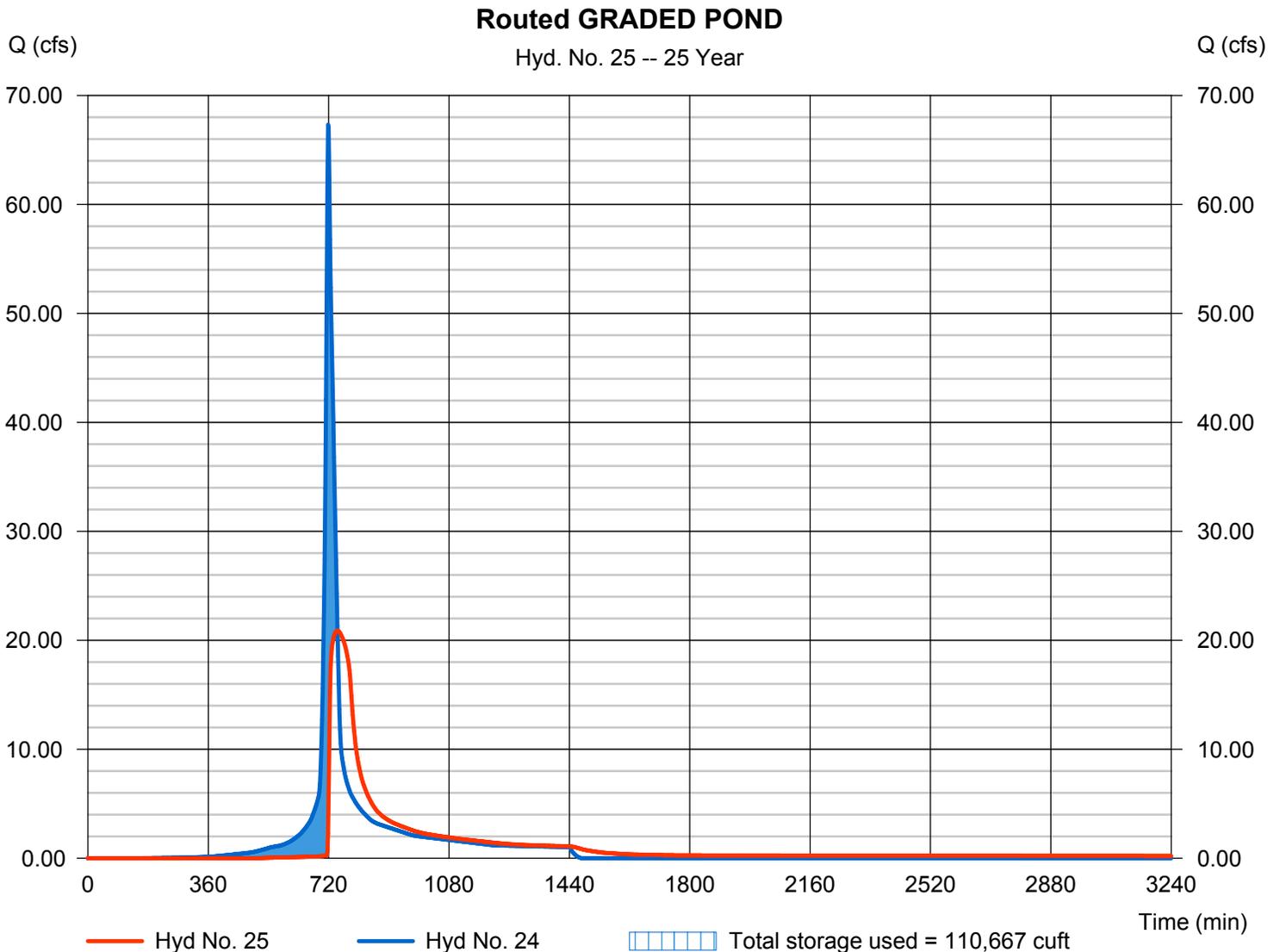
Hydrograph Report

Hyd. No. 25

Routed GRADED POND

Hydrograph type	= Reservoir	Peak discharge	= 20.88 cfs
Storm frequency	= 25 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 231,033 cuft
Inflow hyd. No.	= 24 - *** A1, A2a, B1, B2, B3a	Max. Elevation	= 1046.94 ft
Reservoir name	= Graded Pond A	Max. Storage	= 110,667 cuft

Storage Indication method used.



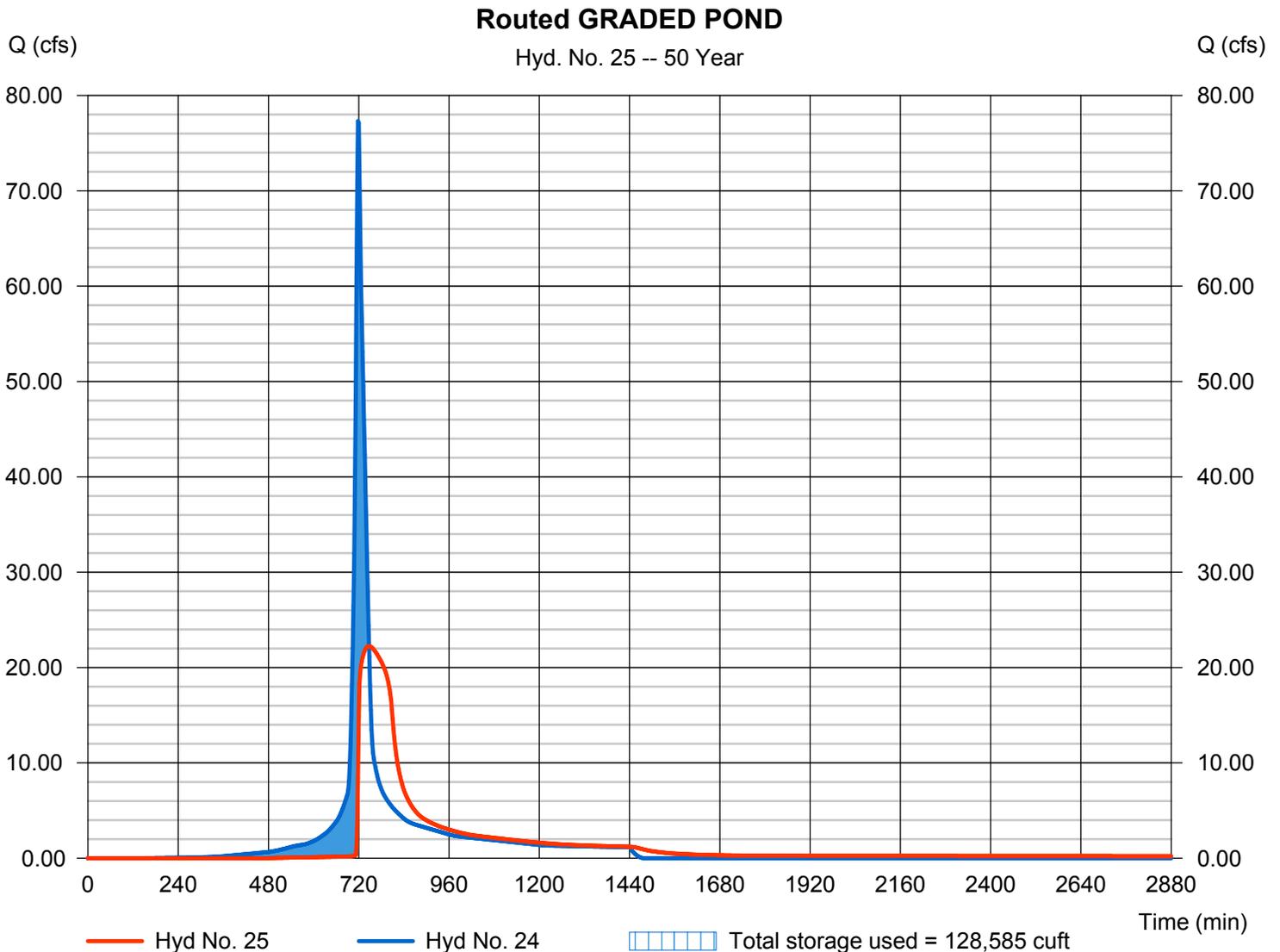
Hydrograph Report

Hyd. No. 25

Routed GRADED POND

Hydrograph type	= Reservoir	Peak discharge	= 22.24 cfs
Storm frequency	= 50 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 267,980 cuft
Inflow hyd. No.	= 24 - *** A1, A2a, B1, B2, B3a	Max. Elevation	= 1048.21 ft
Reservoir name	= Graded Pond A	Max. Storage	= 128,585 cuft

Storage Indication method used.



Hydrograph Report

Hyd. No. 25

Routed GRADED POND

Hydrograph type	= Reservoir	Peak discharge	= 23.01 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 292,882 cuft
Inflow hyd. No.	= 24 - *** A1, A2a, B1, B2, B3a	Max. Elevation	= 1049.03 ft
Reservoir name	= Graded Pond A	Max. Storage	= 141,407 cuft

Storage Indication method used.

