ENGINEERING

PLANNING

SURVEYING

1998

December 4, 1998

Mr. Frank Godwin
City of O'Fallon
138 South Main Street
O'Fallon, MO 63366

Re: Avondale Heights – Phase One
Bax Project No. 95-7230

Dear Frank:

This letter is to address concerns with the As-Built Detention Basin. The original report for this basin is dated April 13, 1996. As the attached calculations show, the basin volume is greater than the proposed basin to the 525 elevation. The 25 and 100 year outflow rates are also slightly lower.

Please call with any questions.

Sincerely,

Andy Johns

BAX ENGINEERING CO., INC.
1052 South Cloverleaf Drive
St. Peters, MO 63376-6445
314-928-5552 FAX 928-1718
e-mail: baxeng@msn.com

POND-2 Version: 5.20
S/N:

avondale hieghts
volume as determined from as-built contours

11-10-98

CALCULATED 12-04-1998 12:06:17
DISK FILE: C:\WINDOWS\DESKTOP\PONDPA~1\7230ASBT.VOL

Planimeter scale: 1 inch = 1 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	* Volume (acre-ft)	Volume Sum (acre-ft)
522.00	44,310.00	1.02	0.00	0.00	0.00
523.00	47,586.00	1.09	3.16	1.05	1.05
524.00	55,680.00	1.28	3.55	1.18	2.24
525.00	63,477.00	1.46	4.10	1.37	3.61

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

Outlet Structure File: 7230ASBT.STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
AVONDALE - O'FALLON
DETENTION ANALYSIS
PREPARED BY: BAX ENGINEERING CO., INC.
APRIL 13, 1996
****

***** COMPOSITE OUTFLOW SUMMARY ****

Elevation (ft)	Q (cfs)	Contributing Structures
522.00	0.0	1
522.20	0.1	1
522.40	0.4	1
522.60	0.7	1
522.80	1.1	1
523.00	1.5	1
523.20	2.0	1
523.40	2.3	2
523.60	2.5	2
523.80	2.7	2
524.00	2.9	2
524.20	3.1	2
524.40	3.3	2
524.60	3.5	2
524.80	3.7	2
525.00	3.8	3 +2

Outlet Structure File: 7230ASBT.STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
AVONDALE - O'FALLON
DETENTION ANALYSIS
PREPARED BY: BAX ENGINEERING CO., INC.
APRIL 13, 1996
****

Outlet Structure File: C:\WINDOWS\DESKTOP\PONDPA~1\7230ASBT.STR
Planimeter Input File: C:\WINDOWS\DESKTOP\PONDPA~1\7230ASBT.VOL
Rating Table Output File: C:\WINDOWS\DESKTOP\PONDPA~1\7230ASBT.PND

Min. Elev.(ft) = 522 Max. Elev.(ft) = 525 Incr.(ft) = .2

Additional elevations (ft) to be included in table:
* *

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
WEIR-VR	3		->	3
WEIR-VR	1		->	1
ORIFICE	2	? 1	->	A

Outflow rating table summary was stored in file:
C:\WINDOWS\DESKTOP\PONDPA~1\7230ASBT.PND

Outlet Structure File: 7230ASBT.STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
AVONDALE - O'FALLON
DETENTION ANALYSIS
PREPARED BY: BAX ENGINEERING CO., INC.
APRIL 13, 1996
****

>>>>>> Structure No. 3 <<<<<<
(Input Data)

WEIR-VR
Weir - Vertical Rectangular

E1 elev.(ft)?	525.00
E2 elev.(ft)?	526
Weir coefficient?	3
Weir elev.(ft)?	525.00
Length (ft)?	11.67
Contracted/Suppressed (C/S)?	S

Outlet Structure File: 7230ASBT.STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
AVONDALE - O'FALLON
DETENTION ANALYSIS
PREPARED BY: BAX ENGINEERING CO., INC.
APRIL 13, 1996
****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

WEIR-VR
Weir - Vertical Rectangular

E1 elev.(ft)?	522.0
E2 elev.(ft)?	525
Weir coefficient?	3
Weir elev.(ft)?	522.0
Length (ft)?	.5
Contracted/Suppressed (C/S)?	S

Outlet Structure File: 7230ASBT.STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
AVONDALE - O'FALLON
DETENTION ANALYSIS
PREPARED BY: BAX ENGINEERING CO., INC.
APRIL 13, 1996
****

›››››› Structure No. 2 ‹‹‹‹‹‹
(Input Data)

ORIFICE
Orifice - Based on Area and Datum Elevation

E1 elev.(ft)?	523.0000
E2 elev.(ft)?	525.001
Orifice coeff.?	0.6
Invert elev.(ft)?	522.00
Datum elev.(ft) ?	522.5000
Orifice area (sq ft)?	.5

Outlet Structure File: 7230ASBT.STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
AVONDALE - O'FALLON
DETENTION ANALYSIS
PREPARED BY: BAX ENGINEERING CO., INC.
APRIL 13, 1996
****

Outflow Rating Table for Structure #3
WEIR-VR Weir - Vertical Rectangular

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
522.00	0.0	E < Inv.El.= 525
522.20	0.0	E < Inv.El.= 525
522.40	0.0	E < Inv.El.= 525
522.60	0.0	E < Inv.El.= 525
522.80	0.0	E < Inv.El.= 525
523.00	0.0	E < Inv.El.= 525
523.20	0.0	E < Inv.El.= 525
523.40	0.0	E < Inv.El.= 525
523.60	0.0	E < Inv.El.= 525
523.80	0.0	E < Inv.El.= 525
524.00	0.0	E < Inv.El.= 525
524.20	0.0	E < Inv.El.= 525
524.40	0.0	E < Inv.El.= 525
524.60	0.0	E < Inv.El.= 525
524.80	0.0	E < Inv.El.= 525
525.00	0.0	H =0.0

C = 3 L (ft) = 11.67
H (ft) = Table elev. - Invert elev. (525 ft)
Q (cfs) = C * L * (H**1.5) -- Suppressed Weir

Outlet Structure File: 7230ASBT.STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
AVONDALE - O'FALLON
DETENTION ANALYSIS
PREPARED BY: BAX ENGINEERING CO., INC.
APRIL 13, 1996
****

Outflow Rating Table for Structure #1
WEIR-VR Weir - Vertical Rectangular

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
522.00	0.0	H =0.0
522.20	0.1	H =.2
522.40	0.4	H =.4
522.60	0.7	H =.6
522.80	1.1	H =.8
523.00	1.5	H =1.0
523.20	2.0	H =1.2
523.40	2.5	H =1.4
523.60	3.0	H =1.6
523.80	3.6	H =1.8
524.00	4.2	H =2.0
524.20	4.9	H =2.2
524.40	5.6	H =2.4
524.60	6.3	H =2.6
524.80	7.0	H =2.8
525.00	0.0	E = or > E2=525

C = 3 L (ft) = .5
H (ft) = Table elev. - Invert elev. (522 ft)
Q (cfs) = C * L * (H**1.5) -- Suppressed Weir

Outlet Structure File: 7230ASBT.STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
AVONDALE - O'FALLON
DETENTION ANALYSIS
PREPARED BY: BAX ENGINEERING CO., INC.
APRIL 13, 1996
****

Outflow Rating Table for Structure #2
ORIFICE Orifice - Based on Area and Datum Elevation

Elevation (ft)	Q (cfs)	Computation Messages
522.00	0.0	E < E1=523.0000
522.20	0.0	E < E1=523.0000
522.40	0.0	E < E1=523.0000
522.60	0.0	E < E1=523.0000
522.80	0.0	E < E1=523.0000
523.00	1.7	H =.5
523.20	2.0	H =.7
523.40	2.3	H =.9
523.60	2.5	H =1.1
523.80	2.7	H =1.3
524.00	2.9	H =1.5
524.20	3.1	H =1.7
524.40	3.3	H =1.9
524.60	3.5	H =2.1
524.80	3.7	H =2.3
525.00	3.8	H =2.5

C = .6 A = .5 sq.ft.
H (ft) = Table elev. - Datum elev. (522.5 ft)
Q (cfs) = C * A * sqr(2g * H)

Outlet Structure File: 7230ASBT.STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
AVONDALE - O'FALLON
DETENTION ANALYSIS
PREPARED BY: BAX ENGINEERING CO., INC.
APRIL 13, 1996
****

Outflow Rating Table A
Table A = 1 ? 2

Elevation (ft)	Q (cfs)	Contributing Structures
522.00	0.0	1
522.20	0.1	1
522.40	0.4	1
522.60	0.7	1
522.80	1.1	1
523.00	1.5	1
523.20	2.0	1
523.40	2.3	2
523.60	2.5	2
523.80	2.7	2
524.00	2.9	2
524.20	3.1	2
524.40	3.3	2
524.60	3.5	2
524.80	3.7	2
525.00	3.8	2

****
*
* AVONDALE - O'FALLON
* DETENTION ANALYSIS
* PREPARED BY: BAX ENGINEERING
* APRIL 13, 1996 as-builts 11-10-98
*
****

Inflow Hydrograph: C:\WINDOWS\DESKTOP\PONDPA~1\7230-25 .HYD
Rating Table file: C:\WINDOWS\DESKTOP\PONDPA~1\7230ASBT.PND

----INITIAL CONDITIONS----
Elevation = 522.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA			INTERMEDIATE ROUTING COMPUTATIONS	
ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)	2S/t (cfs)	2S/t + O (cfs)
522.00	0.0	0.000	0.0	0.0
522.20	0.1	0.205	297.0	297.1
522.40	0.4	0.413	598.3	598.7
522.60	0.7	0.624	903.8	904.5
522.80	1.1	0.838	1213.8	1214.9
523.00	1.5	1.055	1528.2	1529.7
523.20	2.0	1.277	1850.1	1852.1
523.40	2.3	1.506	2182.4	2184.7
523.60	2.5	1.743	2525.3	2527.8
523.80	2.7	1.987	2879.2	2881.9
524.00	2.9	2.239	3244.1	3247.0
524.20	3.1	2.498	3619.6	3622.7
524.40	3.3	2.764	4005.3	4008.6
524.60	3.5	3.037	4401.2	4404.7
524.80	3.7	3.318	4807.7	4811.4
525.00	3.8	3.605	5224.7	5228.5

Time increment (t) = 1.0 min.

Pond File: C:\WINDOWS\DESKTOP\PONDPA~1\7230ASBT.PND
Inflow Hydrograph: C:\WINDOWS\DESKTOP\PONDPA~1\7230-25 .HYD
Outflow Hydrograph: C:\WINDOWS\DESKTOP\PONDPA~1\7230-A25.HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	0.00	-----	0.0	0.0	0.00	522.00
1.0	32.40	32.4	32.4	32.4	0.01	522.02
2.0	64.70	97.1	129.4	129.5	0.04	522.09
3.0	97.10	161.8	291.0	291.2	0.10	522.20
4.0	96.90	194.0	484.4	485.0	0.29	522.32
5.0	96.90	193.8	677.3	678.2	0.48	522.45
6.0	96.90	193.8	869.7	871.1	0.67	522.58
7.0	96.90	193.8	1061.7	1063.5	0.90	522.70
8.0	96.90	193.8	1253.2	1255.5	1.15	522.83
9.0	96.90	193.8	1444.2	1447.0	1.39	522.95
10.0	96.90	193.8	1634.7	1638.0	1.67	523.07
11.0	96.90	193.8	1824.6	1828.5	1.96	523.19
12.0	96.90	193.8	2014.1	2018.4	2.15	523.30
13.0	96.90	193.8	2203.2	2207.9	2.31	523.41
14.0	96.90	193.8	2392.2	2397.0	2.42	523.52
15.0	96.90	193.8	2580.9	2586.0	2.53	523.63
16.0	96.90	193.8	2769.4	2774.7	2.64	523.74
17.0	96.90	193.8	2957.8	2963.2	2.74	523.84
18.0	96.90	193.8	3145.9	3151.6	2.85	523.95
19.0	96.90	193.8	3333.8	3339.7	2.95	524.05
20.0	89.20	186.1	3513.8	3519.9	3.05	524.15
21.0	56.80	146.0	3653.5	3659.8	3.12	524.22
22.0	24.40	81.2	3728.4	3734.7	3.16	524.26
23.0	0.00	24.4	3746.5	3752.8	3.17	524.27
24.0	0.00	0.0	3740.2	3746.5	3.16	524.26
25.0	0.00	0.0	3733.8	3740.2	3.16	524.26
26.1	0.00	0.0	3727.5	3733.8	3.16	524.26
27.1	0.00	0.0	3721.2	3727.5	3.15	524.25
28.1	0.00	0.0	3714.9	3721.2	3.15	524.25
29.1	0.00	0.0	3708.6	3714.9	3.15	524.25

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: C:\WINDOWS\DESKTOP\PONDPA~1\7230ASBT.PND
Inflow Hydrograph: C:\WINDOWS\DESKTOP\PONDPA~1\7230-25 .HYD
Outflow Hydrograph: C:\WINDOWS\DESKTOP\PONDPA~1\7230-A25.HYD

Starting Pond W.S. Elevation = 522.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow	=	97.10 cfs
Peak Outflow	=	3.17 cfs
Peak Elevation	=	524.27 ft

***** Summary of Approximate Peak Storage *****

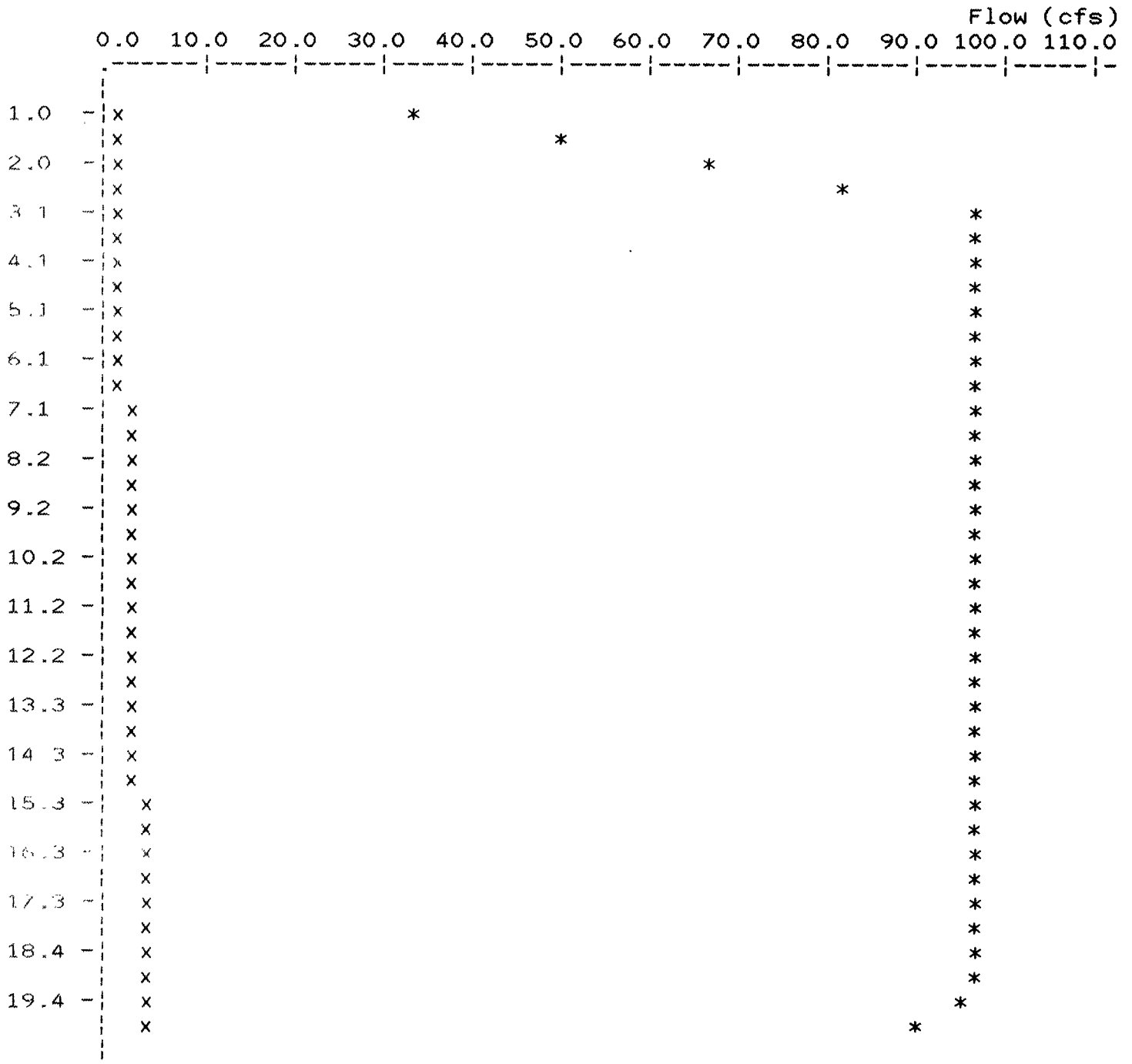
Initial Storage	=	0.00 ac-ft
Peak Storage From Storm	=	2.59 ac-ft
Total Storage in Pond	=	2.59 ac-ft

Return Freq: 25 years

Pond File: C:\WINDOWS\DESKTOP\PONDPA~1\7230ASBT.PND
Inflow Hydrograph: C:\WINDOWS\DESKTOP\PONDPA~1\7230-25 .HYD
Outflow Hydrograph: C:\WINDOWS\DESKTOP\PONDPA~1\7230-A25.HYD

EXECUTED: 12-04-1998 13:12:41

Peak Inflow = 97.10 cfs
Peak Outflow = 3.17 cfs
Peak Elevation = 524.27 ft



x File: C:\WINDOWS\DESKTOP\PONDPA~1\7230-A25.HYD Qmax = 3.2 cfs
* File: C:\WINDOWS\DESKTOP\PONDPA~1\7230-25 .HYD Qmax = 97.1 cfs

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*****************************************
*                                       *
*          AVONDALE - O'FALLON          *
*           DETENTION ANALYSIS          *
*      PREPARED BY: BAX ENGINEERING     *
*  APRIL 13, 1996  as-builts 11-10-98   *
*                                       *
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Inflow Hydrograph: C:\WINDOWS\DESKTOP\PONDPA~1\7230-100.HYD
Rating Table file: C:\WINDOWS\DESKTOP\PONDPA~1\7230ASBT.PND

----INITIAL CONDITIONS----
Elevation = 522.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
522.00	0.0	0.000
522.20	0.1	0.205
522.40	0.4	0.413
522.60	0.7	0.624
522.80	1.1	0.838
523.00	1.5	1.055
523.20	2.0	1.277
523.40	2.3	1.506
523.60	2.5	1.743
523.80	2.7	1.987
524.00	2.9	2.239
524.20	3.1	2.498
524.40	3.3	2.764
524.60	3.5	3.037
524.80	3.7	3.318
525.00	3.8	3.605

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
297.0	297.1
598.3	598.7
903.8	904.5
1213.8	1214.9
1528.2	1529.7
1850.1	1852.1
2182.4	2184.7
2525.3	2527.8
2879.2	2881.9
3244.1	3247.0
3619.6	3622.7
4005.3	4008.6
4401.2	4404.7
4807.7	4811.4
5224.7	5228.5

Time increment (t) = 1.0 min.

Pond File: C:\WINDOWS\DESKTOP\PONDPA~1\7230ASBT.PND
Inflow Hydrograph: C:\WINDOWS\DESKTOP\PONDPA~1\7230-100.HYD
Outflow Hydrograph: C:\WINDOWS\DESKTOP\PONDPA~1\7230-A00.HYD

INFLOW HYDROGRAPH | ROUTING COMPUTATIONS

TIME (min)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	0.00	-----	0.0	0.0	0.00	522.00
1.0	41.40	41.4	41.4	41.4	0.01	522.03
2.0	82.80	124.2	165.5	165.6	0.06	522.11
3.0	124.20	207.0	372.1	372.5	0.17	522.25
4.0	124.00	248.2	619.5	620.3	0.42	522.41
5.0	124.00	248.0	866.1	867.5	0.66	522.58
6.0	124.00	248.0	1112.2	1114.1	0.97	522.74
7.0	124.00	248.0	1357.6	1360.2	1.28	522.89
8.0	124.00	248.0	1602.4	1605.6	1.62	523.05
9.0	124.00	248.0	1846.4	1850.4	2.00	523.20
10.0	124.00	248.0	2090.0	2094.4	2.22	523.35
11.0	124.00	248.0	2333.2	2338.0	2.39	523.49
12.0	124.00	248.0	2576.1	2581.2	2.53	523.63
13.0	124.00	248.0	2818.8	2824.1	2.67	523.77
14.0	124.00	248.0	3061.2	3066.8	2.80	523.90
15.0	124.00	248.0	3303.3	3309.2	2.93	524.03
16.0	124.00	248.0	3545.2	3551.3	3.06	524.16
17.0	124.00	248.0	3786.8	3793.2	3.19	524.29
18.0	124.00	248.0	4028.2	4034.8	3.31	524.41
19.0	124.00	248.0	4269.3	4276.2	3.44	524.54
20.0	114.10	238.1	4500.3	4507.4	3.55	524.65
21.0	72.70	186.8	4679.8	4687.1	3.64	524.74
22.0	31.20	103.9	4776.4	4783.7	3.69	524.79
23.0	0.00	31.2	4800.2	4807.6	3.70	524.80
24.0	0.00	0.0	4792.8	4800.2	3.69	524.79
25.0	0.00	0.0	4785.4	4792.8	3.69	524.79
26.1	0.00	0.0	4778.0	4785.4	3.69	524.79
27.1	0.00	0.0	4770.7	4778.0	3.68	524.78
28.1	0.00	0.0	4763.3	4770.7	3.68	524.78
29.1	0.00	0.0	4756.0	4763.3	3.68	524.78

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: C:\WINDOWS\DESKTOP\PONDPA~1\7230ASBT.PND
Inflow Hydrograph: C:\WINDOWS\DESKTOP\PONDPA~1\7230-100.HYD
Outflow Hydrograph: C:\WINDOWS\DESKTOP\PONDPA~1\7230-A00.HYD

Starting Pond W.S. Elevation = 522.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow	=	124.20 cfs
Peak Outflow	=	3.70 cfs
Peak Elevation	=	524.80 ft

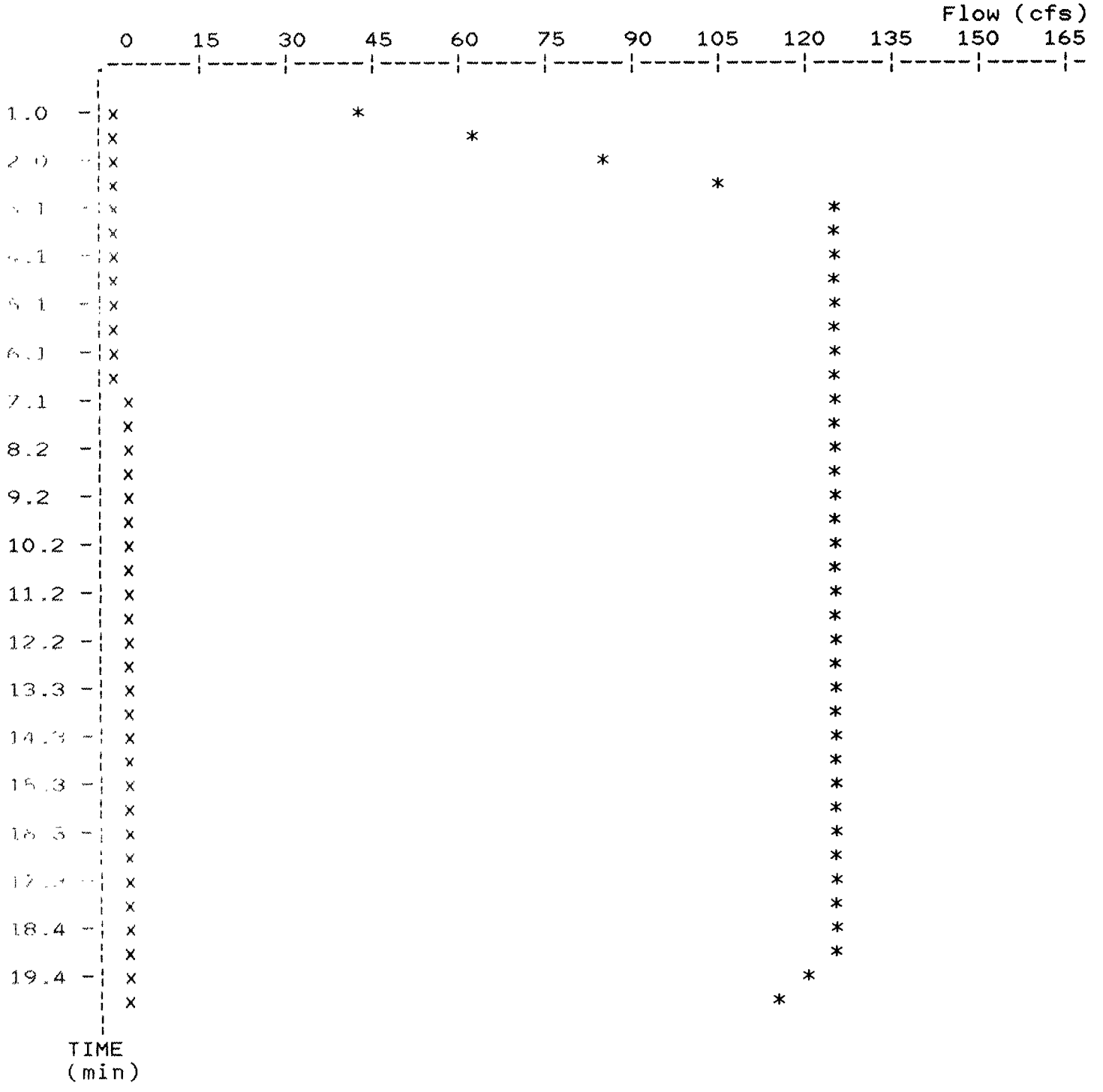
***** Summary of Approximate Peak Storage *****

Initial Storage	=	0.00 ac-ft
Peak Storage From Storm	=	3.32 ac-ft
Total Storage in Pond	=	3.32 ac-ft

Return Freq: 100 years

Pond File: C:\WINDOWS\DESKTOP\PONDPA~1\7230ASBT.PND
Inflow Hydrograph: C:\WINDOWS\DESKTOP\PONDPA~1\7230-100.HYD
Outflow Hydrograph: C:\WINDOWS\DESKTOP\PONDPA~1\7230-A00.HYD
EXECUTED: 12-04-1998 13:12:41

Peak Inflow = 124.20 cfs
Peak Outflow = 3.70 cfs
Peak Elevation = 524.80 ft



x File: C:\WINDOWS\DESKTOP\PONDPA~1\7230-A00.HYD Qmax = 3.7 cfs
* File: C:\WINDOWS\DESKTOP\PONDPA~1\7230-100.HYD Qmax = 124.2 cfs