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STORMWATER DETENTION ANALYSIS
PREPARED BY: BAX ENGINEERING CO., INC.
HIGHWAY 'K' SHOPPING CENTER - O'FALLON
BAX PROJECT NO. **96-9176**
NOVEMBER 6, 1997

INTRODUCTION:

The tract of land is presently an undeveloped site located in the City of O'Fallon, Missouri. It is proposed that the tract, consisting of 8.06 acres, be developed into a retail/commercial facility. A stormwater detention basin shall be constructed near the southwest corner of the site. This basin will provide detention for the development when considering the increased runoff for the entire site. The storage volume and outflow rates shall be proportioned to insure that the peak rate of runoff leaving the site under post-developed conditions is less than or equal to the peak rate of runoff leaving the site under pre-developed conditions for the 25 year-20 minute design storm. The basin was also analyzed for the 2, 15 and 100 year frequency - 20 minute duration storms.

GENERAL SITE DATA AND RUNOFF CALCULATIONS:

The pre-developed P.I. factors to be used for the analysis are:

2 year - 5% impervious	1.15 cfs/ac.
15 year - 5% impervious	1.87 cfs/ac.
25 year - 5% impervious	2.31 cfs/ac.
100 year - 5% impervious	2.95 cfs/ac.

The post-developed P.I. factors to be used for the analysis are:

2 year - 100% impervious	2.39 cfs/ac.
15 year - 100% impervious	3.85 cfs/ac.
25 year - 100% impervious	4.75 cfs/ac.
100 year - 100% impervious	6.08 cfs/ac.

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TIME OF CONCENTRATION:

Of the inflows to the basin, the most remote point lies to the northeast. Flows will travel approximately 140 feet overland and 460 feet across pavement to the detention basin. Time of concentration is estimated as follows:

T(overland) : L = 140 feet
Elevation difference = 528 - 516 = 12 feet
T(overland) = 1.8 minutes : See figure 1

T(pavement) : L = 460 feet
Elevation difference = 516 - 504 = 12 feet
T(pavement) = 1.5 minutes : See figure 1

Total: 3.3 minutes >> use 3.0 min.

REQUIRED ATTENUATION:

= IMPERVIOUS AREA x [PI(post) - PI(pre)]

25 year-20 minute storm

4.12 x [4.75 - 2.31] = 10.05 cfs

BASIN PEAK INFLOWS:

Inflows to the basin have been estimated from the drainage area map.

25 year-20 minute storm

Q(imperv.)	2.70 x 4.75 =	12.83 cfs
Q(perv.)	1.12 x 2.31 =	2.59 cfs
	Total	15.42 cfs

2 year-20 minute storm:	7.74 cfs
15 year-20 minute storm:	12.49 cfs
100 year-20 minute storm:	19.72 cfs

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PERMITTED RELEASE RATE:

The permitted release rate of the basin is found by subtracting the required attenuation from the peak inflow to the basin for the design storm.

25 year-20 minute storm
Permitted release rate:
15.42 cfs - 10.05 cfs = 5.37 cfs

STORM ROUTING CALCULATIONS AND RESULTS:

A computer program was used in routing the design 25 year-20 minute storm through the basin. As found in the routing calculations, the results are as follows:

20 MIN STORM	PERMITTED RELEASE RATE	CALCULATED RELEASE RATE	PEAK ELEVATION
2 YR	-	4.38 cfs	502.96
15 YR	-	5.07 cfs	504.13
25 YR	5.37 cfs	5.35 cfs	504.70

As shown above, the calculated release rate is significantly less than the permitted release rate as required for the detention basin.

CHECK 100 YEAR OUTFLOW:

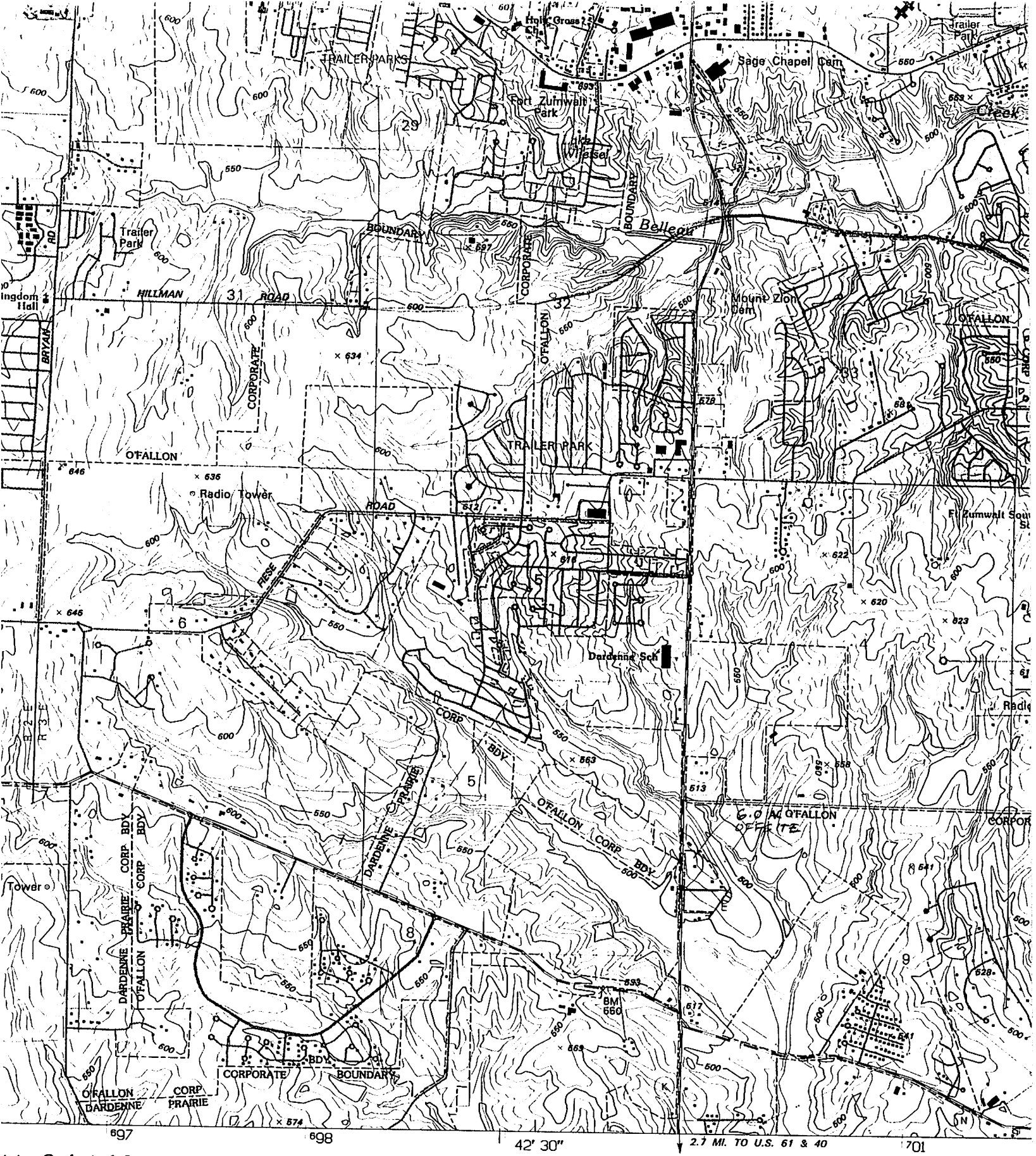
WEIR FLOW : Q = C x L x H (3/2)

where 100-YEAR FLOW Q = 19.72 cfs
C = 3.32
60" standpipe L = 15.71 ft
H = 0.52 ft

sill = 504.75
100 yr h/w = 505.27

SUMMARY

25 year-20min H.W.		504.70
100 year-20min H.W.		505.27
Low Flow Slot	0.6' wide x 0.8' high	
Low Flow Slot Elevation		499.00
60" Standpipe sill		504.75
Top Of Berm		506.33



tates Geological Survey

\A

methods from aerial photographs
. Revised from aerial photographs
. Map edited 1994

)jection

)ordinate system, east zone
Mercator grid ticks, zone 15, shown in blue
\D 27)

NAD 83) is shown by dashed corner tics
[AD 27 and 83 for 7.5 minute

MN
GN
1°27'
26 MILS
1 ½ °
27 MILS

SCALE 1:24000

1 .5 0 KILOMETERS 1
1000 0 METERS 1000
1 .5 0 MILES
1000 0 1000 2000 3000 4000 5000 6000 FEET

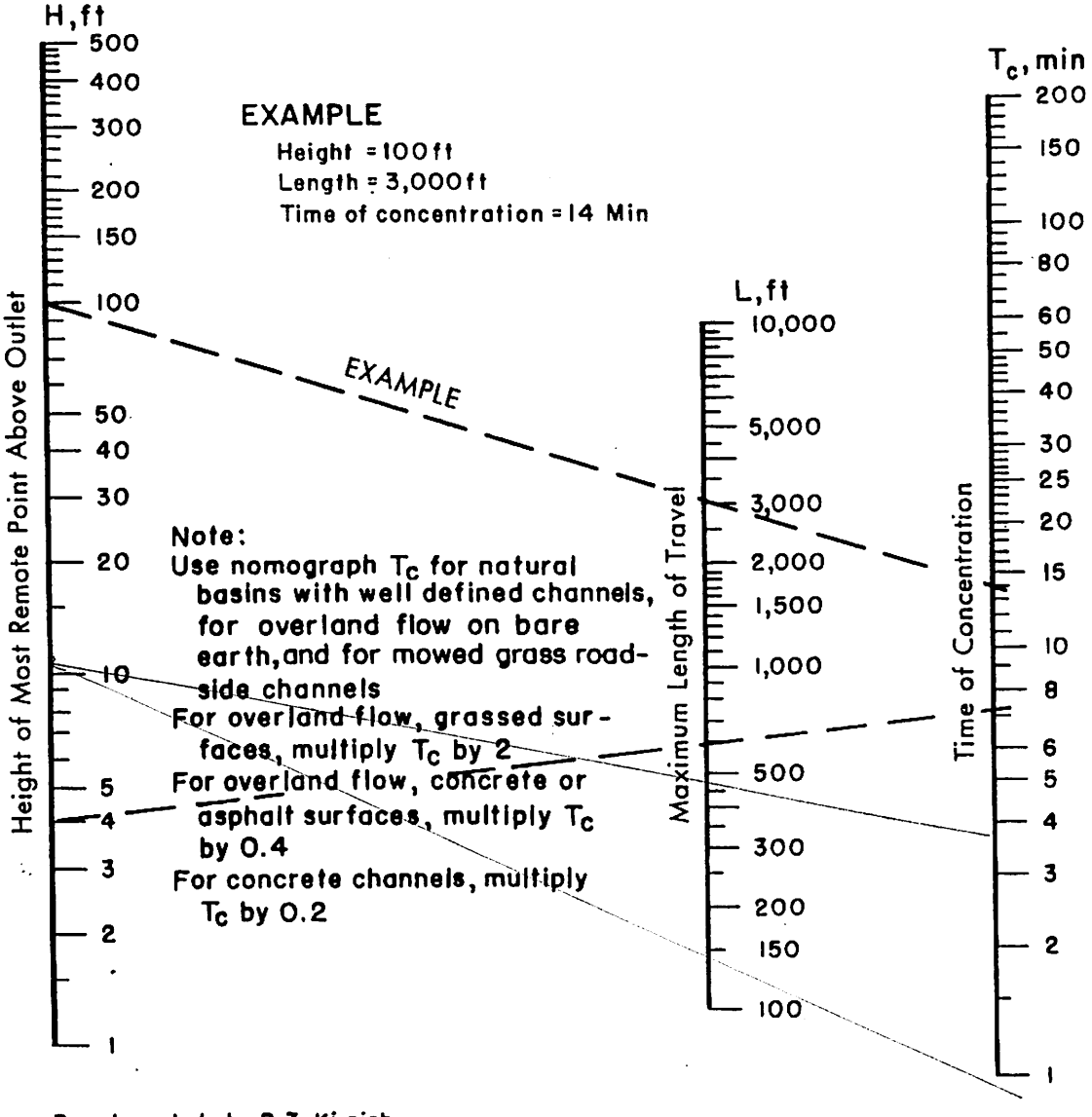
BAX ENGINEERING

SHEET 1 of 1

Project: HWY "K" SHOPPING CENTER

Date: 11-6-97 Project No: 97-9167

Designed: ADI Checked: _____



Based on study by P. Z. Kirpich,
Civil Engineering, Vol. 10, No. 6, June 1940, p. 362

OVERLAND

UFL 528
LFL 516 ΔH = 12
L = 444'

$T_c = 0.9 \times 2 = 1.8$

PAVEMENT

UFL 516
LFL 504 ΔH 12
L = 460'

$T_c = 3.8 \times .4 = 1.52$

TOTAL 3.32 USE 3

1052 South Cloverleaf Drive
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POND-2 Version: 5.17
S/N:

HIGHWAY 'K' SHOPPING CENTER

CALCULATED 11-04-1997 15:50:45
DISK FILE: 9176 .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)
499.00	0.00	0.00	0.00	0.00	0.00
500.00	120.00	0.00	0.00	0.00	0.00
502.00	2,071.00	0.05	0.06	0.04	0.04
504.00	5,032.00	0.12	0.24	0.16	0.20
506.00	8,298.00	0.19	0.45	0.30	0.50

* 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: 9176 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
HIGHWAY 'K' SHOPPING CENTER
DETENTION ANALYSIS
PREPARED BY: BAX ENGINEERING CO., INC.
NOVEMBER 6, 1997
****

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

Elevation (ft)	Q (cfs)	Contributing Structures
499.00	0.0	1
499.20	0.2	1
499.40	0.5	1
499.60	0.8	1
499.80	1.3	1
500.00	1.8	2
500.20	2.1	2
500.40	2.3	2
500.60	2.5	2
500.80	2.7	2
501.00	2.9	2
501.20	3.1	2
501.40	3.3	2
501.60	3.4	2
501.80	3.6	2
502.00	3.7	2
502.20	3.9	2
502.40	4.0	2
502.60	4.1	2
502.80	4.3	2
503.00	4.4	2
503.20	4.5	2
503.40	4.6	2
503.60	4.7	2
503.80	4.8	2
504.00	5.0	2
504.20	5.1	2
504.40	5.2	2
504.60	5.3	2
504.80	5.4	2
505.00	5.5	2
505.20	5.6	2
505.40	5.7	2
505.60	5.8	2
505.80	5.8	2
506.00	5.9	2

Outlet Structure File: 9176 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

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HIGHWAY 'K' SHOPPING CENTER
DETENTION ANALYSIS
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NOVEMBER 6, 1997
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Outlet Structure File: 9176 .STR
Planimeter Input File: 9176 .VOL
Rating Table Output File: 9176 .PND

Min. Elev.(ft) = 499 Max. Elev.(ft) = 506 Incr.(ft) = .2

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

****
SYSTEM CONNECTIVITY
****

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

Outflow rating table summary was stored in file:
9176 .PND

Outlet Structure File: 9176 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

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HIGHWAY 'K' SHOPPING CENTER
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NOVEMBER 6, 1997
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>>>>>> Structure No. 1 <<<<<<
(Input Data)

WEIR-VR
Weir - Vertical Rectangular

E1 elev.(ft)?	499
E2 elev.(ft)?	506.001
Weir coefficient?	3
Weir elev.(ft)?	499.00
Length (ft)?	.600000
Contracted/Suppressed (C/S)?	S

Outlet Structure File: 9176 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

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HIGHWAY 'K' SHOPPING CENTER
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>>>>>> Structure No. 2 <<<<<<
(Input Data)

ORIFICE
Orifice - Based on Area and Datum Elevation

E1 elev.(ft)?	499.80
E2 elev.(ft)?	506.001
Orifice coeff.?	0.6
Invert elev.(ft)?	499.000
Datum elev.(ft) ?	499.4000
Orifice area (sq ft)?	0.48000

Outlet Structure File: 9176 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
HIGHWAY 'K' SHOPPING CENTER
DETENTION ANALYSIS
PREPARED BY: BAX ENGINEERING CO., INC.
NOVEMBER 6, 1997
****

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

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

Elevation (ft)	Q (cfs)	Computation Messages
499.00	0.0	H =0.0
499.20	0.2	H =.2
499.40	0.5	H =.4
499.60	0.8	H =.6
499.80	1.3	H =.8
500.00	1.8	H =1.0
500.20	2.4	H =1.2
500.40	3.0	H =1.4
500.60	3.6	H =1.6
500.80	4.3	H =1.8
501.00	5.1	H =2.0
501.20	5.9	H =2.2
501.40	6.7	H =2.4
501.60	7.5	H =2.6
501.80	8.4	H =2.8
502.00	9.4	H =3.0
502.20	10.3	H =3.2
502.40	11.3	H =3.4
502.60	12.3	H =3.6
502.80	13.3	H =3.8
503.00	14.4	H =4.0
503.20	15.5	H =4.2
503.40	16.6	H =4.4
503.60	17.8	H =4.6
503.80	18.9	H =4.8
504.00	20.1	H =5.0
504.20	21.3	H =5.2
504.40	22.6	H =5.4
504.60	23.9	H =5.6
504.80	25.1	H =5.8
505.00	26.5	H =6.0
505.20	27.8	H =6.2
505.40	29.1	H =6.4
505.60	30.5	H =6.6

Outlet Structure File: 9176 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

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

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

Elevation (ft)	Q (cfs)	Computation Messages
505.80	31.9	H =6.8
506.00	33.3	H =7.0

C = 3 L (ft) = .6
H (ft) = Table elev. - Invert elev. (499 ft)
Q (cfs) = C * L * (H**1.5) -- Suppressed Weir

Outlet Structure File: 9176 .STR

POND-2 Version: 5.17 S/N:
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HIGHWAY 'K' SHOPPING CENTER
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NOVEMBER 6, 1997
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Outflow Rating Table for Structure #2
ORIFICE Orifice - Based on Area and Datum Elevation

Elevation (ft)	Q (cfs)	Computation Messages
499.00	0.0	E < E1=499.80
499.20	0.0	E < E1=499.80
499.40	0.0	E < E1=499.80
499.60	0.0	E < E1=499.80
499.80	1.5	H =.4
500.00	1.8	H =.6
500.20	2.1	H =.8
500.40	2.3	H =1.0
500.60	2.5	H =1.2
500.80	2.7	H =1.4
501.00	2.9	H =1.6
501.20	3.1	H =1.8
501.40	3.3	H =2.0
501.60	3.4	H =2.2
501.80	3.6	H =2.4
502.00	3.7	H =2.6
502.20	3.9	H =2.8
502.40	4.0	H =3.0
502.60	4.1	H =3.2
502.80	4.3	H =3.4
503.00	4.4	H =3.6
503.20	4.5	H =3.8
503.40	4.6	H =4.0
503.60	4.7	H =4.2
503.80	4.8	H =4.4
504.00	5.0	H =4.6
504.20	5.1	H =4.8
504.40	5.2	H =5.0
504.60	5.3	H =5.2
504.80	5.4	H =5.4
505.00	5.5	H =5.6
505.20	5.6	H =5.8
505.40	5.7	H =6.0
505.60	5.8	H =6.2

Outlet Structure File: 9176 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

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

Elevation (ft)	Q (cfs)	Computation Messages
505.80	5.8	H =6.4
506.00	5.9	H =6.6

C = .6 A = .48 sq.ft.
H (ft) = Table elev. - Datum elev. (499.4 ft)
Q (cfs) = C * A * sqr(2g * H)

Outlet Structure File: 9176 .STR

POND-2 Version: 5.17 S/N:
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NOVEMBER 6, 1997
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Outflow Rating Table A
Table A = 1 ? 2

Elevation (ft)	Q (cfs)	Contributing Structures
499.00	0.0	1
499.20	0.2	1
499.40	0.5	1
499.60	0.8	1
499.80	1.3	1
500.00	1.8	2
500.20	2.1	2
500.40	2.3	2
500.60	2.5	2
500.80	2.7	2
501.00	2.9	2
501.20	3.1	2
501.40	3.3	2
501.60	3.4	2
501.80	3.6	2
502.00	3.7	2
502.20	3.9	2
502.40	4.0	2
502.60	4.1	2
502.80	4.3	2
503.00	4.4	2
503.20	4.5	2
503.40	4.6	2
503.60	4.7	2
503.80	4.8	2
504.00	5.0	2
504.20	5.1	2
504.40	5.2	2
504.60	5.3	2
504.80	5.4	2
505.00	5.5	2
505.20	5.6	2
505.40	5.7	2
505.60	5.8	2
505.80	5.8	2
506.00	5.9	2

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* HIGHWAY 'K' SHOPPING CENTER *
* DETENTION ANALYSIS *
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* NOVEMBER 6, 1997 *
*
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Inflow Hydrograph: 9176-002.HYD
Rating Table file: 9176 .PND

----INITIAL CONDITIONS----
Elevation = 499.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
499.00	0.0	0.000
499.20	0.2	0.000
499.40	0.5	0.000
499.60	0.8	0.000
499.80	1.3	0.000
500.00	1.8	0.001
500.20	2.4	0.002
500.40	3.0	0.003
500.60	3.6	0.005
500.80	2.7	0.007
501.00	2.9	0.010
501.20	3.1	0.014
501.40	3.3	0.020
501.60	3.4	0.026
501.80	3.6	0.033
502.00	3.7	0.042
502.20	3.9	0.052
502.40	4.0	0.063
502.60	4.1	0.076
502.80	4.3	0.089
503.00	4.4	0.104
503.20	4.5	0.120
503.40	4.6	0.138
503.60	4.7	0.157
503.80	4.8	0.178
504.00	5.0	0.200
504.20	5.1	0.224
504.40	5.2	0.249
504.60	5.3	0.276
504.80	5.4	0.304
505.00	5.5	0.333

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
0.0	0.2
0.1	0.6
0.3	1.1
0.7	2.0
1.3	3.1
2.4	4.8
4.2	7.2
6.7	10.3
10.3	13.0
15.0	17.9
20.9	24.0
28.4	31.7
37.5	40.9
48.3	51.9
61.1	64.8
75.7	79.6
91.9	95.9
109.8	113.9
129.6	133.9
151.2	155.6
174.8	179.3
200.4	205.0
228.2	232.9
258.3	263.1
290.6	295.6
325.1	330.2
361.6	366.8
400.1	405.4
440.6	446.0
483.3	488.8

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
505.20	5.6	0.364
505.40	5.7	0.396
505.60	5.8	0.430
505.80	5.8	0.466
506.00	5.9	0.503

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
528.1	533.7
575.2	580.9
624.6	630.4
676.3	682.1
730.4	736.3

Time increment (t) = 1.0 min.

Pond File: 9176 .PND
Inflow Hydrograph: 9176-002.HYD
Outflow Hydrograph: 91760002.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	499.00
1.0	2.60	2.6	-0.5	2.6	1.57	499.91
2.0	5.20	7.8	1.2	7.3	3.02	500.41
3.0	7.70	12.9	8.6	14.1	2.75	500.85
4.0	7.70	15.4	17.8	24.0	3.10	501.20
5.0	7.70	15.4	26.6	33.2	3.32	501.43
6.0	7.70	15.4	35.2	42.0	3.42	501.62
7.0	7.70	15.4	43.4	50.6	3.58	501.78
8.0	7.70	15.4	51.5	58.8	3.65	501.91
9.0	7.70	15.4	59.4	66.9	3.73	502.03
10.0	7.70	15.4	67.2	74.8	3.84	502.14
11.0	7.70	15.4	74.7	82.6	3.92	502.24
12.0	7.70	15.4	82.2	90.1	3.96	502.33
13.0	7.70	15.4	89.6	97.6	4.01	502.42
14.0	7.70	15.4	96.9	105.0	4.05	502.50
15.0	7.70	15.4	104.1	112.3	4.09	502.58
16.0	7.70	15.4	111.2	119.5	4.16	502.66
17.0	7.70	15.4	118.1	126.6	4.23	502.73
18.0	7.70	15.4	124.9	133.5	4.30	502.80
19.0	7.70	15.4	131.7	140.3	4.33	502.86
20.0	7.70	15.4	138.4	147.1	4.36	502.92
21.0	5.10	12.8	142.4	151.2	4.38	502.96
22.0	2.50	7.6	141.3	150.0	4.37	502.95
23.0	0.00	2.5	135.1	143.8	4.35	502.89
24.0	0.00	0.0	126.4	135.1	4.31	502.81
25.0	0.00	0.0	118.0	126.4	4.23	502.73
26.0	0.00	0.0	109.7	118.0	4.14	502.64
27.0	0.00	0.0	101.6	109.7	4.08	502.55
28.0	0.00	0.0	93.5	101.6	4.03	502.46
29.0	0.00	0.0	85.5	93.5	3.99	502.37
30.0	0.00	0.0	77.7	85.5	3.94	502.27

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

Pond File: 9176 .PND
Inflow Hydrograph: 9176-002.HYD
Outflow Hydrograph: 91760002.HYD

Starting Pond W.S. Elevation = 499.00 ft

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

Peak Inflow	=	7.70 cfs
Peak Outflow	=	4.38 cfs
Peak Elevation	=	502.96 ft

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

Initial Storage	=	0.00 ac-ft
Peak Storage From Storm	=	0.10 ac-ft
Total Storage in Pond	=	0.10 ac-ft

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*
* HIGHWAY 'K' SHOPPING CENTER *
* DETENTION ANALYSIS *
* PREPARED BY: BAX ENGINEERING CO., INC. *
* NOVEMBER 6, 1997 *
*
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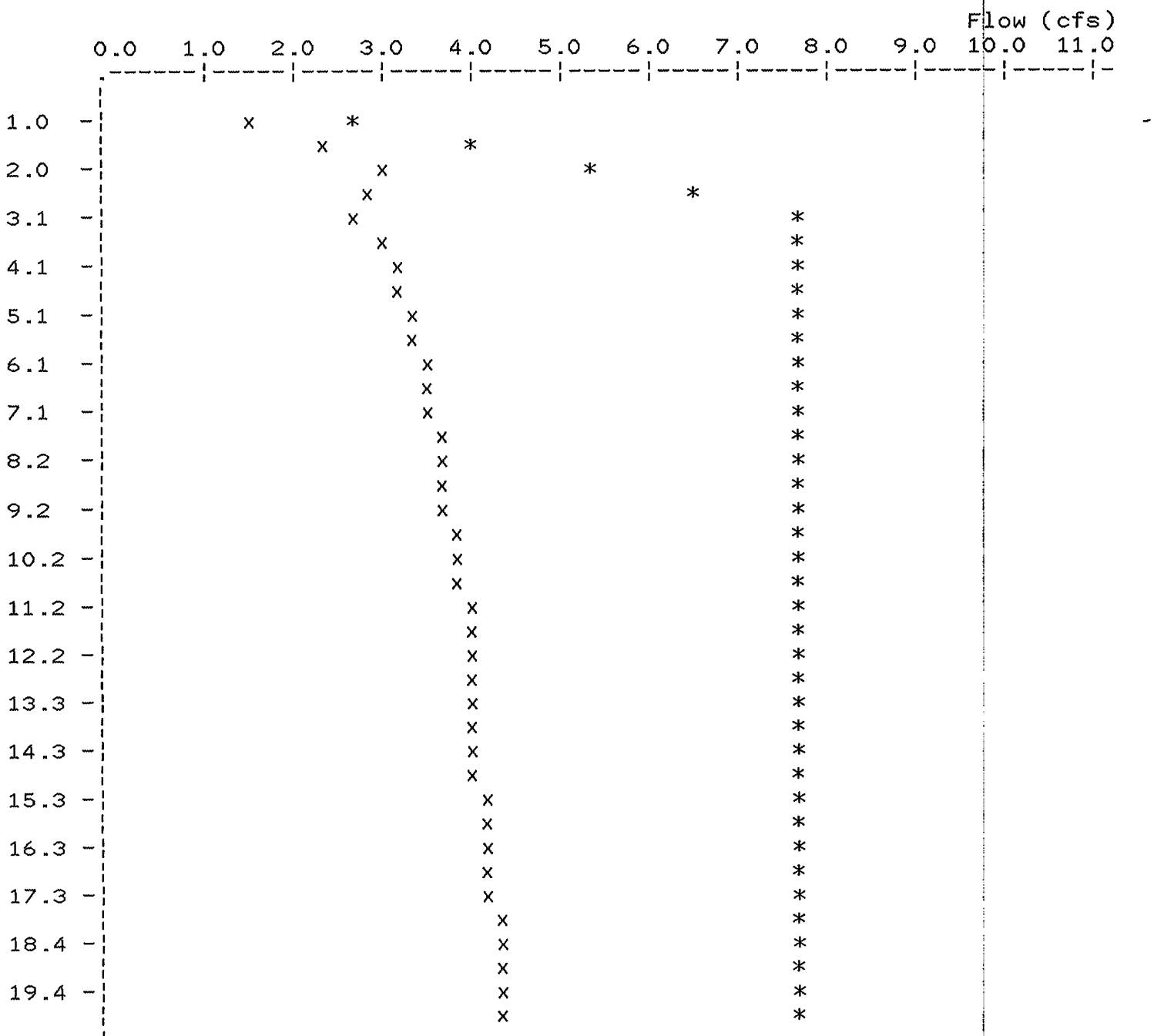
Pond File: 9176 .PND
Inflow Hydrograph: 9176-002.HYD
Outflow Hydrograph: 91760002.HYD

EXECUTED: 11-04-1997
15:45:43

Peak Inflow = 7.70 cfs
Peak Outflow = 4.38 cfs
Peak Elevation = 502.96 ft



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*
* HIGHWAY 'K' SHOPPING CENTER *
* DETENTION ANALYSIS *
* PREPARED BY: BAX ENGINEERING CO., INC. *
* NOVEMBER 6, 1997 *
*
****

Inflow Hydrograph: 9176-015.HYD
Rating Table file: 9176 .PND

----INITIAL CONDITIONS----
Elevation = 499.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
499.00	0.0	0.000
499.20	0.2	0.000
499.40	0.5	0.000
499.60	0.8	0.000
499.80	1.3	0.000
500.00	1.8	0.001
500.20	2.4	0.002
500.40	3.0	0.003
500.60	3.6	0.005
500.80	2.7	0.007
501.00	2.9	0.010
501.20	3.1	0.014
501.40	3.3	0.020
501.60	3.4	0.026
501.80	3.6	0.033
502.00	3.7	0.042
502.20	3.9	0.052
502.40	4.0	0.063
502.60	4.1	0.076
502.80	4.3	0.089
503.00	4.4	0.104
503.20	4.5	0.120
503.40	4.6	0.138
503.60	4.7	0.157
503.80	4.8	0.178
504.00	5.0	0.200
504.20	5.1	0.224
504.40	5.2	0.249
504.60	5.3	0.276
504.80	5.4	0.304
505.00	5.5	0.333

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
0.0	0.2
0.1	0.6
0.3	1.1
0.7	2.0
1.3	3.1
2.4	4.8
4.2	7.2
6.7	10.3
10.3	13.0
15.0	17.9
20.9	24.0
28.4	31.7
37.5	40.9
48.3	51.9
61.1	64.8
75.7	79.6
91.9	95.9
109.8	113.9
129.6	133.9
151.2	155.6
174.8	179.3
200.4	205.0
228.2	232.9
258.3	263.1
290.6	295.6
325.1	330.2
361.6	366.8
400.1	405.4
440.6	446.0
483.3	488.8

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
505.20	5.6	0.364
505.40	5.7	0.396
505.60	5.8	0.430
505.80	5.8	0.466
506.00	5.9	0.503

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
528.1	533.7
575.2	580.9
624.6	630.4
676.3	682.1
730.4	736.3

Time increment (t) = 1.0 min.

Pond File: 9176 .PND
Inflow Hydrograph: 9176-015.HYD
Outflow Hydrograph: 91760015.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	499.00
1.0	4.22	4.2	-0.2	4.2	2.19	500.13
2.0	8.43	12.7	6.8	12.5	2.86	500.76
3.0	12.49	20.9	21.3	27.7	3.20	501.30
4.0	12.49	25.0	39.3	46.3	3.50	501.70
5.0	12.49	25.0	56.9	64.3	3.70	501.99
6.0	12.49	25.0	74.0	81.9	3.91	502.23
7.0	12.49	25.0	91.0	99.0	4.02	502.43
8.0	12.49	25.0	107.7	116.0	4.12	502.62
9.0	12.49	25.0	124.1	132.7	4.29	502.79
10.0	12.49	25.0	140.4	149.1	4.37	502.94
11.0	12.49	25.0	156.5	165.3	4.44	503.08
12.0	12.49	25.0	172.4	181.4	4.51	503.22
13.0	12.49	25.0	188.3	197.4	4.57	503.34
14.0	12.49	25.0	204.0	213.2	4.63	503.46
15.0	12.49	25.0	219.6	229.0	4.69	503.57
16.0	12.49	25.0	235.1	244.6	4.74	503.68
17.0	12.49	25.0	250.5	260.1	4.79	503.78
18.0	12.49	25.0	265.7	275.5	4.88	503.88
19.0	12.49	25.0	280.8	290.7	4.97	503.97
20.0	12.49	25.0	295.7	305.7	5.03	504.06
21.0	8.27	20.8	306.3	316.4	5.06	504.12
22.0	4.05	12.3	308.5	318.6	5.07	504.13
23.0	0.00	4.1	302.5	312.6	5.05	504.10
24.0	0.00	0.0	292.4	302.5	5.02	504.04
25.0	0.00	0.0	282.5	292.4	4.98	503.98
26.0	0.00	0.0	272.6	282.5	4.92	503.92
27.0	0.00	0.0	262.9	272.6	4.86	503.86
28.0	0.00	0.0	253.3	262.9	4.80	503.80
29.0	0.00	0.0	243.8	253.3	4.77	503.74
30.0	0.00	0.0	234.3	243.8	4.74	503.67

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

Pond File: 9176 .PND
Inflow Hydrograph: 9176-015.HYD
Outflow Hydrograph: 91760015.HYD

Starting Pond W.S. Elevation = 499.00 ft

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

Peak Inflow	=	12.49 cfs
Peak Outflow	=	5.07 cfs
Peak Elevation	=	504.13 ft

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

Initial Storage	=	0.00 ac-ft
Peak Storage From Storm	=	0.22 ac-ft
Total Storage in Pond	=	0.22 ac-ft

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**********************************************
*                                            *
*       HIGHWAY 'K' SHOPPING CENTER          *
*            DETENTION ANALYSIS              *
*  PREPARED BY: BAX ENGINEERING CO., INC.    *
*             NOVEMBER 6, 1997               *
*                                            *
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Pond File: 9176 .PND
Inflow Hydrograph: 9176-015.HYD
Outflow Hydrograph: 91760015.HYD

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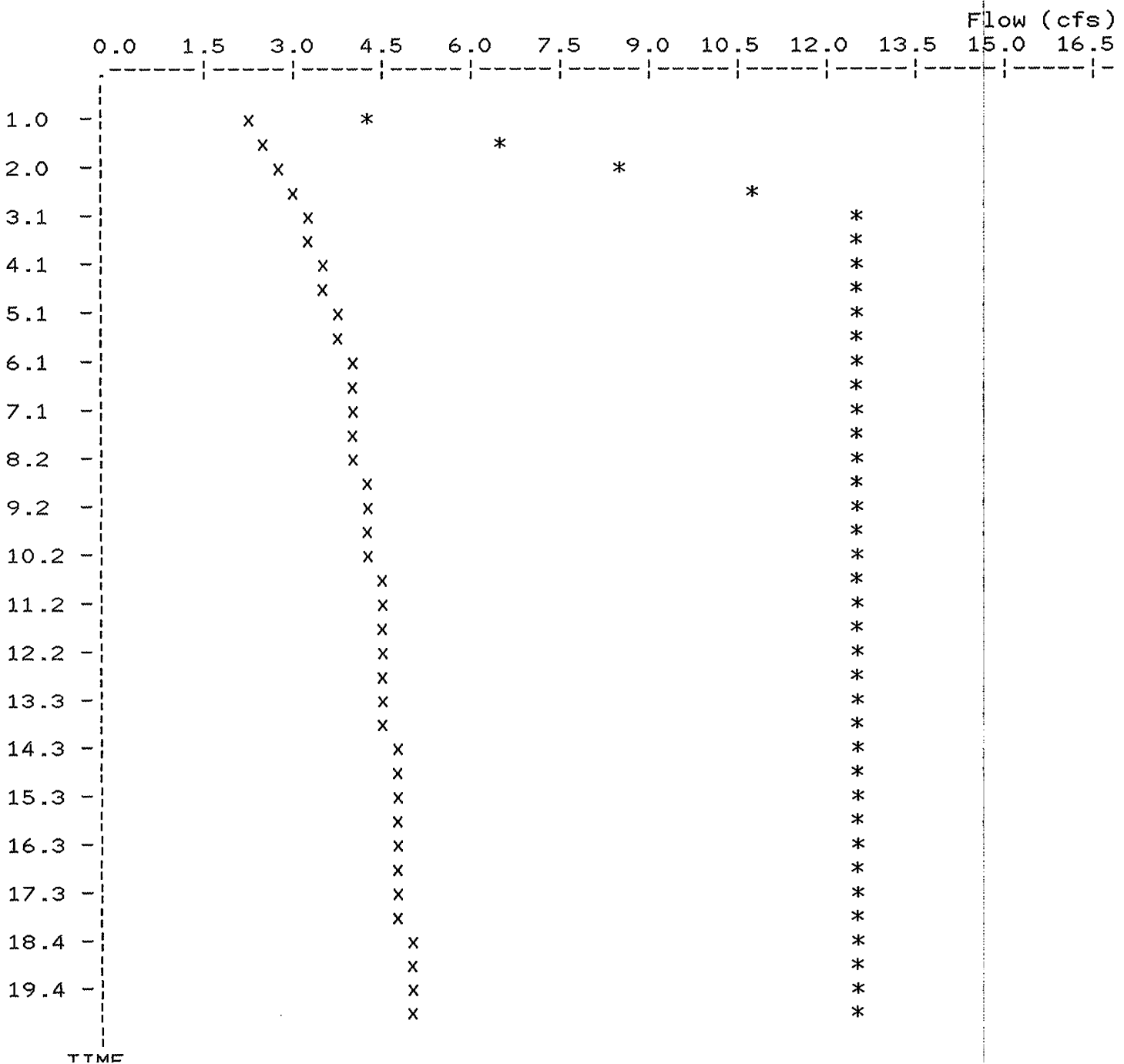
15:45:43

Peak Inflow = 12.49 cfs
Peak Outflow = 5.07 cfs
Peak Elevation = 504.13 ft



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*                                           *
*       HIGHWAY 'K' SHOPPING CENTER         *
*            DETENTION ANALYSIS             *
*  PREPARED BY: BAX ENGINEERING CO., INC.   *
*             NOVEMBER 6, 1997              *
*                                           *
*********************************************
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Inflow Hydrograph: 9176-025.HYD
Rating Table file: 9176 .PND

----INITIAL CONDITIONS----
Elevation = 499.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
499.00	0.0	0.000
499.20	0.2	0.000
499.40	0.5	0.000
499.60	0.8	0.000
499.80	1.3	0.000
500.00	1.8	0.001
500.20	2.4	0.002
500.40	3.0	0.003
500.60	3.6	0.005
500.80	2.7	0.007
501.00	2.9	0.010
501.20	3.1	0.014
501.40	3.3	0.020
501.60	3.4	0.026
501.80	3.6	0.033
502.00	3.7	0.042
502.20	3.9	0.052
502.40	4.0	0.063
502.60	4.1	0.076
502.80	4.3	0.089
503.00	4.4	0.104
503.20	4.5	0.120
503.40	4.6	0.138
503.60	4.7	0.157
503.80	4.8	0.178
504.00	5.0	0.200
504.20	5.1	0.224
504.40	5.2	0.249
504.60	5.3	0.276
504.80	5.4	0.304
505.00	5.5	0.333

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
0.0	0.2
0.1	0.6
0.3	1.1
0.7	2.0
1.3	3.1
2.4	4.8
4.2	7.2
6.7	10.3
10.3	13.0
15.0	17.9
20.9	24.0
28.4	31.7
37.5	40.9
48.3	51.9
61.1	64.8
75.7	79.6
91.9	95.9
109.8	113.9
129.6	133.9
151.2	155.6
174.8	179.3
200.4	205.0
228.2	232.9
258.3	263.1
290.6	295.6
325.1	330.2
361.6	366.8
400.1	405.4
440.6	446.0
483.3	488.8

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
505.20	5.6	0.364
505.40	5.7	0.396
505.60	5.8	0.430
505.80	5.8	0.466
506.00	5.9	0.503

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
528.1	533.7
575.2	580.9
624.6	630.4
676.3	682.1
730.4	736.3

Time increment (t) = 1.0 min.

Pond File: 9176 .PND
Inflow Hydrograph: 9176-025.HYD
Outflow Hydrograph: 91760025.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	499.00
1.0	5.21	5.2	0.2	5.2	2.50	500.23
2.0	10.41	15.6	10.2	15.8	2.82	500.92
3.0	15.42	25.8	29.3	36.0	3.35	501.49
4.0	15.42	30.8	52.8	60.2	3.66	501.93
5.0	15.42	30.8	75.8	83.7	3.93	502.25
6.0	15.42	30.8	98.5	106.7	4.06	502.52
7.0	15.42	30.8	120.9	129.4	4.26	502.76
8.0	15.42	30.8	143.0	151.7	4.38	502.96
9.0	15.42	30.8	164.8	173.8	4.48	503.15
10.0	15.42	30.8	186.6	195.7	4.56	503.33
11.0	15.42	30.8	208.1	217.4	4.64	503.49
12.0	15.42	30.8	229.5	238.9	4.72	503.64
13.0	15.42	30.8	250.8	260.3	4.79	503.78
14.0	15.42	30.8	271.8	281.6	4.91	503.91
15.0	15.42	30.8	292.6	302.6	5.02	504.04
16.0	15.42	30.8	313.3	323.4	5.08	504.16
17.0	15.42	30.8	333.8	344.1	5.14	504.28
18.0	15.42	30.8	354.3	364.7	5.19	504.39
19.0	15.42	30.8	374.6	385.1	5.25	504.49
20.0	15.42	30.8	394.9	405.5	5.30	504.60
21.0	10.21	25.6	409.8	420.5	5.34	504.67
22.0	5.00	15.2	414.3	425.0	5.35	504.70
23.0	0.00	5.0	408.7	419.3	5.33	504.67
24.0	0.00	0.0	398.0	408.7	5.31	504.62
25.0	0.00	0.0	387.5	398.0	5.28	504.56
26.0	0.00	0.0	377.0	387.5	5.25	504.51
27.0	0.00	0.0	366.5	377.0	5.23	504.45
28.0	0.00	0.0	356.1	366.5	5.20	504.40
29.0	0.00	0.0	345.8	356.1	5.17	504.34
30.0	0.00	0.0	335.5	345.8	5.14	504.29

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

Pond File: 9176 .PND
Inflow Hydrograph: 9176-025.HYD
Outflow Hydrograph: 91760025.HYD

Starting Pond W.S. Elevation = 499.00 ft

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

Peak Inflow	=	15.42 cfs
Peak Outflow	=	5.35 cfs
Peak Elevation	=	504.70 ft

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

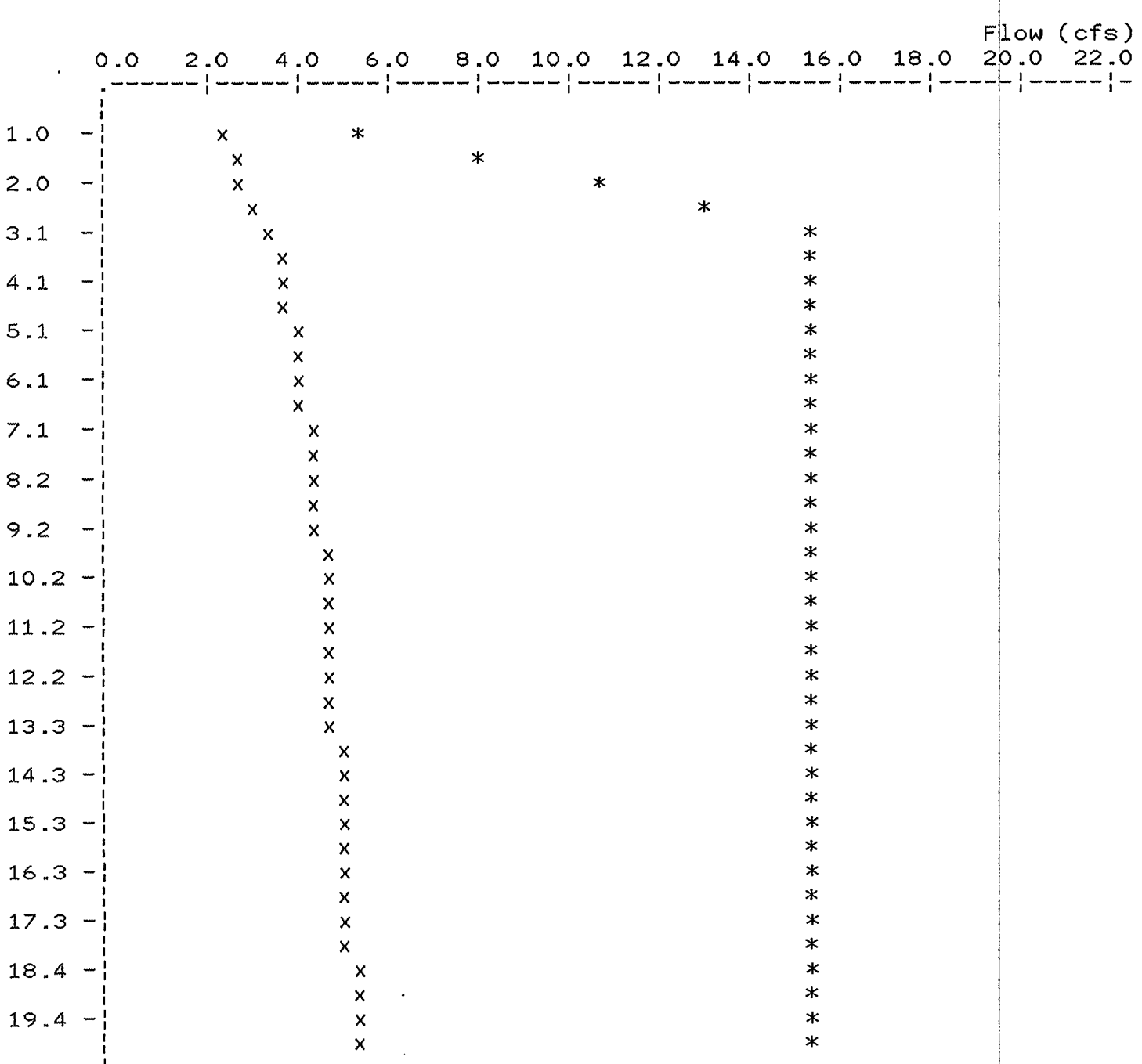
Initial Storage	=	0.00 ac-ft
Peak Storage From Storm	=	0.29 ac-ft
Total Storage in Pond	=	0.29 ac-ft

****
*
* HIGHWAY 'K' SHOPPING CENTER *
* DETENTION ANALYSIS *
* PREPARED BY: BAX ENGINEERING CO., INC. *
* NOVEMBER 6, 1997 *
*
****

Pond File: 9176 .PND
Inflow Hydrograph: 9176-025.HYD
Outflow Hydrograph: 91760025.HYD

EXECUTED: 11-04-1997
15:45:43

Peak Inflow = 15.42 cfs
Peak Outflow = 5.35 cfs
Peak Elevation = 504.70 ft



...Y K SHOPPING CENTER 11-10-97 ADJ

9176

UPP STR	LOW STR	L	DIA	UPPER FL LN	LOWER FL LN	PS	UPPER ST EL	DEPTH HY GR	UPPER HY EL	LOWER HY EL	HYDR GRADE	FR HEAD	VEL	VEL HEAD	JUNC LOSS	TURN LOSS	CURVE LOSS	STR GRADE	INL CAP	DR AREA	PI	Q	TQ	PIPE CAP		REMARKS
mh6	ep5	374.38	30	505.12	499.50	1.50	513.13	5.51	502.19	502.00	.00040	0.14	1.61	0.04	0.05	0.00	0.00		0.00	3.00	2.64	7.92	7.92	50.25		1
gi2	mh1	318.91	12	508.15	504.96	1.00	514.80	5.65	506.59	505.96	.00170	0.55	1.88	0.06	0.08	0.00	0.00		0.00	0.38	3.85	1.48	1.48	3.56		2
ai10	mh1	10.44	30	505.12	504.96	1.53	513.44	5.82	507.51	507.46	.00040	0.00	1.61	0.04	0.05	0.00	0.00		0.00	3.00	2.64	7.92	7.92	50.78		3
mh1	gi9	111.77	30	504.96	503.29	1.49	511.94	4.48	505.91	505.79	.00050	0.06	1.91	0.06	0.02	0.04	0.00		0.00	0.00	0.00	0.00	9.40	50.14		4
gi9	gi8	184.00	30	503.29	500.53	1.50	510.00	4.21	503.24	503.03	.00080	0.15	2.37	0.09	0.06	0.00	0.00		2.00	0.58	3.85	2.21	11.61	50.24		5
gi8	ep7	68.48	30	500.53	499.50	1.50	504.10	1.07	502.18	502.00	.00130	0.09	2.99	0.14	0.09	0.00	0.00		2.00	0.80	3.85	3.08	14.69	50.30		6