

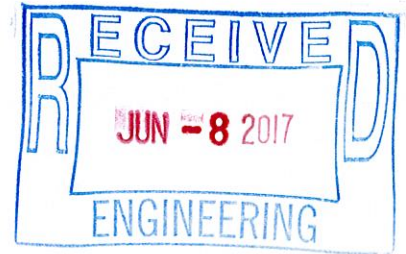
CALCULATIONS

for

Flying Machine Brewery

CITY OF WILMINGTON
NORTH CAROLINA

June 2017



Charles D. Cazier
6.7.17

Prepared By:

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PN 2016-027

Final SW Calcs
7/17/2017
SWP 2017029
KAC

Total Drainage Area	
sq. ft.	acres
55,382	1.27

Impervious Area		
Land Use	sq. ft.	acres
buildings	15,325	0.35
parking/asphalt	21,331	0.49
Concrete (Sidewalks, Dumpster Pad, Loading Area)	4,378	0.10
Future/Outparcel	1,066	0.02
Total	42,100	0.97

% impervious = 0.760
= 76.0%

say 76.0%

Stormwater Calculations:

$$C_{PRE} = 0.2$$

$$C_{POST} = (\% \text{ imp.})(.95) + (1 - \% \text{ imp.})(.2)$$

$$= 0.78$$

$$I_1 = 5.10 \text{ in/hr}$$

$$I_{10} = 7.23 \text{ in/hr}$$

Flow for 10 year, 24 hour Storm (Q₁₀):

$$Q_{PRE} = (C_{PRE}) \times (I_{10}) \times (\text{Area})$$

$$= 1.84 \text{ cfs}$$

$$Q_{POST} = (C_{POST}) \times (I_{10}) \times (\text{Area})$$

$$= 7.17 \text{ cfs}$$

Detention Pond Design:

Pond Size:

	Elevation (ft.)	Surface Area (sq. ft.)
Normal Pool	16.00	4,370
Flood Pool	17.50	5,675
Top of Bank	20.50	7,130
Bottom of Pool	10.00	823

State Surface Area Requirement at normal pool:

Pond side slopes =	3 : 1
Depth below N.P. =	3.50 ft. ✓
SA/DA =	0.0760 (Interpolated)
(Chart for 90% TSS Removal for Wet Detention Pond without Vegetative Filter)	
Required SA = (SA/DA) x (Total Drainage Area)	
=	4,209 sq. ft. ✓

Provided Storage Volume:

$$\text{Vol.} = \frac{[(\text{Normal pool SA} + \text{Flood Pool SA}) / 2] \times (\text{F.P. elev.} - \text{N.P. elev.})}{1}$$

$$= 7,534 \text{ cu. ft.} \checkmark$$

Average Depth Calculation:

$$d = \frac{[0.25 \times (1 + \text{BVS SA/NP SA})] + \{[(\text{BVS SA} + \text{Btm SA})/2] \times (\text{D/BVS SA})\}}{1}$$

$$= 3.83 \text{ ft} \checkmark$$

Bottom of Veg Shelf whole pond = 3,679.00 sf ✓

State Volume Required for Storage of first 1.5" of runoff:

$$R_v = .05 + .009(\% \text{ imp})$$

$$= 0.734157$$

$$V = (\text{Design rainfall})(R_v)(\text{Drainage Area})$$

$$= 5,082 \text{ cu. ft.} \checkmark$$

Main Pond Volume:		
Bottom SA =	823 sq. ft. ✓	el 10.00
Btm Veg Shelf SA =	2,701 sq. ft. ✓	el 15.50
Normal Pool SA =	3,258 sq. ft. ✓	el 16.00
Vol. = [(NP SA + BVS SA) / 2] x (NP el. - BVS el.) + [(Bottom. SA + BVS SA) / 2] x (Bottom. el. - BVS el.)		
= 11,181 cu. ft. ✓		

Forebay Volume:		
Bottom SA =	125 sq. ft.	el 11.00
Normal Pool SA =	1,112 sq. ft.	el 16.00
Vol. = [(NP SA + BVS SA) / 2] x (NP el. - BVS el.) + [(Bottom. SA + BVS SA) / 2] x (Bottom. el. - BVS el.)		
= 3,093 cu. ft. ✓		

Forebay:

Required Volume

Vol. = 20% of Pond Volume (MPV + FV)
= 2,855 cu. ft. ✓

Provided Volume

Vol. =
= 3,093 cu. ft. ✓

21.67% ✓

Outlet Structure Design:

* Additional flow from Ground Water Table=

0 cfs

Flow for 2-day drawdown:

for Required Volume
Q = (Required Vol. / 172,800 sec.) + Gw flow
= 0.029 cfs

Flow for 5-day drawdown:

for Required Volume
Q = (Required Vol. / 432,000 sec) + Gw flow
= 0.012 cfs

Required Area of Pipe for 2-day drawdown:

A = Q / [Cd x SQRT(2 x g x h)]
Cd = 0.6
g = 32.2 ft./s ²
h = (F.P. elev. - N.P. elev.) / 3
= 0.5 ft.
A = 0.0086 sq. ft.

Required Area of Pipe for 5-day drawdown:

A = Q / [Cd x SQRT(2 x g x h)]
Cd = 0.6
g = 32.2 ft./s ²
h = (F.P. elev. - N.P. elev.) / 3
= 0.5 ft.
A = 0.0035 sq. ft.

Diameter of Pipe for 2-day drawdown:

DIA. = SQRT[(A x 4) / pi]
= 0.1049 ft.
= 1.26 in.

Diameter of Pipe for 5-day drawdown:

DIA. = SQRT[(A x 4) / pi]
= 0.0663 ft.
= 0.80 in.

*Use: 1.25" diameter pipe

Drawdown time 1.25" pipe =	2.03 days	✓
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A =	0.008522
Q =	0.029015
T =	175162.5 sec
	2.03 days

WATERSHED DATA

BEFORE DEVELOPMENT

WATERSHED AREA	1.27 ACRES
HYDRAULIC LENGTH	553 FT
CHANGE IN HEIGHT	12.5 FT
RUNOFF COEF. 'C'	0.2
TIME OF CONCENTR	5.00 MIN
INTENSITY (2YR)	5.88 IN/HR

Qa = 1.49 CFS

Qa = PRE-DEVELOPED PEAK DISCHARGE

AFTER DEVELOPMENT

WATERSHED AREA	1.27 ACRES
HYDRAULIC LENGTH	553 FT
CHANGE IN HEIGHT	12.5 FT
RUNOFF COEF. 'C'	0.78
TIME OF CONCENTR	5.00 MIN
INTENSITY (2YR)	5.88 IN/HR

Qp = 5.82 CFS

Qp = POST-DEVELOPED PEAK DISCHARGE

COMPUTE DEPTH OF RUNOFF

P = 4.5 INCHES 2yr, 24hr PRECIPITATION
CN = 89

S = (1000/CN)-10
S = 1.24

Depth (D) = (P-0.2S)^2/(P+0.8S)
D = 3.30 IN - 2yr, 24hr RUNOFF DEPTH

SET VOLUME AND COMPUTE TIME TO PEAK

Tp = [(43.5)(D)(Area)] / Qp
Tp = 31.25 MINUTES

Storage Volume Req'd = (Qp-Qa)*Tp*1.39*60
= 11,289 cu. ft.

CALCULATE Ks AND b

SET NORMAL ELEVATION AT = 16.00 feet

CONTOUR	CONTOUR AREA (sq ft)	INCR VOL (cu ft)	S		Z		Z est (ft)
			ACCUM VOL (cu ft)	STAGE (ft)	In S	In Z	
16.00	4,370	0	0	0	0	0	0
16.50	5,192	2,391	2,391	0.5	7.7793	-0.69314718	0.50
17.50	5,675	5,434	7,824	1.5	8.9650	0.4055	1.49
18.50	6,159	5,917	13,741	2.5	9.5281	0.9163	2.49
19.50	6,644	6,402	20,143	3.5	9.9106	1.2528	3.53
20.50	7,130	6,887	27,030	4.5	10.2047	1.5041	4.62

Regression Output:

==> Ks = 5073
b = 1.09

X Coefficient 8.53

**CHAINSAW METHOD FOR
RISER BARREL ROUTING**

STORM DATA

Qa = 1.49 cfs
Qp = 5.82 cfs
Tp = 31.3 min
dT = 2 min

* Infiltration rate = in/hr

BASIN DATA

Ks = 5073
b = 1.09
Zo = 16.00 ft
Normal water elev = 16.00 ft

Box Weir Length = 10 ft
Cw = 3.0
Zcr = 19.70 ft

Peak Outflow = 0.97 cfs
Peak Stage = 18.21 ft
Maximum Storage = 12,060 cu ft

Control Holes:

State Orifice: Dia = 1.25 in
Inv = 16.00 ft
Weir: L = 4 in
Inv = 17.50 ft

Dd = 18 in
Cd = 0.59
Zi = 15.50 ft

Time (min)	Inflow (cfs)	Storage (cu ft)	Stage (ft)	Outflow (cfs)	W Riser (cfs)	Barrel (cfs)	Orifice (cfs)	City Weir (cfs)	IFStore (cu ft)	Infiltrate (cf)
0	0.0	0	16.00	0.00	0	1.396762	0	0.00	0.0	0.0
2	0.1	0	16.00	0	0.00	1.396762	0	0.00	0.0	0.0
4	0.2	7	16.00	0.00	0.00	1.4	0.00	0.00	7.0	0.0
6	0.5	35	16.01	0.00	0.00	1.4	0.00	0.00	34.9	0.0
8	0.9	97	16.03	0.00	0.00	1.5	0.00	0.00	96.5	0.0
10	1.4	203	16.05	0.00	0.00	1.6	0.00	0.00	203.4	0.0
12	1.9	365	16.09	0.01	0.00	1.8	0.01	0.00	365.2	0.0
14	2.4	589	16.14	0.01	0.00	2.0	0.01	0.00	589.2	0.0
16	3.0	880	16.20	0.02	0.00	2.3	0.02	0.00	880.4	0.0
18	3.6	1241	16.28	0.02	0.00	2.7	0.02	0.00	1241.1	0.0
20	4.2	1671	16.36	0.02	0.00	3.2	0.02	0.00	1670.9	0.0
22	4.7	2166	16.46	0.03	0.00	3.7	0.03	0.00	2166.4	0.0
24	5.1	2722	16.57	0.03	0.00	4.3	0.03	0.00	2721.7	0.0
26	5.4	3328	16.68	0.03	0.00	5.1	0.03	0.00	3328.4	0.0
28	5.7	3976	16.80	0.03	0.00	5.9	0.03	0.00	3975.9	0.0
30	5.8	4652	16.92	0.04	0.00	6.7	0.04	0.00	4652.2	0.0
32	5.8	5344	17.05	0.04	0.00	7.5	0.04	0.00	5343.9	0.0
34	5.7	6037	17.17	0.04	0.00	8.0	0.04	0.00	6037.0	0.0
36	5.5	6718	17.29	0.04	0.00	8.5	0.04	0.00	6717.6	0.0
38	5.2	7372	17.41	0.05	0.00	9.0	0.05	0.00	7372.2	0.0
40	4.8	7988	17.52	0.05	0.00	9.4	0.05	0.00	7988.2	0.0
42	4.4	8556	17.61	0.15	0.00	9.8	0.05	0.10	8556.3	0.0
44	4.1	9067	17.70	0.29	0.00	10.1	0.05	0.24	9067.0	0.0
46	3.7	9519	17.78	0.44	0.00	10.3	0.05	0.39	9518.7	0.0
48	3.4	9914	17.85	0.58	0.00	10.6	0.05	0.52	9913.6	0.0
50	3.2	10256	17.90	0.66	0.00	10.7	0.05	0.60	10256.2	0.0
52	2.9	10556	17.96	0.72	0.00	10.9	0.06	0.66	10556.3	0.0
54	2.7	10819	18.00	0.77	0.00	11.0	0.06	0.71	10818.6	0.0
56	2.5	11047	18.04	0.81	0.00	11.2	0.06	0.75	11047.1	0.0
58	2.3	11245	18.07	0.84	0.00	11.3	0.06	0.79	11245.1	0.0
60	2.1	11416	18.10	0.87	0.00	11.4	0.06	0.81	11415.5	0.0
62	1.9	11561	18.12	0.90	0.00	11.4	0.06	0.84	11560.9	0.0
64	1.8	11684	18.15	0.91	0.00	11.5	0.06	0.86	11683.5	0.0
66	1.6	11786	18.16	0.93	0.00	11.6	0.06	0.87	11785.5	0.0
68	1.5	11869	18.18	0.94	0.00	11.6	0.06	0.88	11868.8	0.0
70	1.4	11935	18.19	0.95	0.00	11.6	0.06	0.89	11935.0	0.0
72	1.3	11986	18.20	0.96	0.00	11.7	0.06	0.90	11985.7	0.0
74	1.2	12022	18.20	0.96	0.00	11.7	0.06	0.91	12022.3	0.0
76	1.1	12046	18.21	0.97	0.00	11.7	0.06	0.91	12046.3	0.0
78	1.0	12059	18.21	0.97	0.00	11.7	0.06	0.91	12058.6	0.0
80	0.9	12060	18.21	0.97	0.00	11.7	0.06	0.91	12060.5	0.0
82	0.8	12053	18.21	0.97	0.00	11.7	0.06	0.91	12052.9	0.0
84	0.8	12037	18.20	0.97	0.00	11.7	0.06	0.91	12036.7	0.0
86	0.7	12013	18.20	0.96	0.00	11.7	0.06	0.90	12012.9	0.0
88	0.7	11982	18.20	0.96	0.00	11.7	0.06	0.90	11982.1	0.0
90	0.6	11945	18.19	0.95	0.00	11.6	0.06	0.89	11945.0	0.0
92	0.6	11902	18.18	0.95	0.00	11.6	0.06	0.89	11902.4	0.0
94	0.5	11855	18.17	0.94	0.00	11.6	0.06	0.88	11854.8	0.0

96	0.5	11803	18.17	0.93	0.00	11.6	0.06	0.87	11802.7	0.0
98	0.4	11747	18.16	0.92	0.00	11.5	0.06	0.87	11746.8	0.0
100	0.4	11687	18.15	0.92	0.00	11.5	0.06	0.86	11687.3	0.0
102	0.4	11625	18.14	0.91	0.00	11.5	0.06	0.85	11624.9	0.0
104	0.3	11560	18.12	0.90	0.00	11.4	0.06	0.84	11559.8	0.0
106	0.3	11492	18.11	0.88	0.00	11.4	0.06	0.83	11492.5	0.0
108	0.3	11423	18.10	0.87	0.00	11.4	0.06	0.82	11423.2	0.0
110	0.3	11352	18.09	0.86	0.00	11.3	0.06	0.80	11352.3	0.0
112	0.2	11280	18.08	0.85	0.00	11.3	0.06	0.79	11280.0	0.0
114	0.2	11207	18.07	0.84	0.00	11.3	0.06	0.78	11206.7	0.0
116	0.2	11133	18.05	0.83	0.00	11.2	0.06	0.77	11132.6	0.0
118	0.2	11058	18.04	0.81	0.00	11.2	0.06	0.76	11057.8	0.0
120	0.2	10983	18.03	0.80	0.00	11.1	0.06	0.74	10982.7	0.0
122	0.2	10907	18.01	0.79	0.00	11.1	0.06	0.73	10907.3	0.0
124	0.1	10832	18.00	0.77	0.00	11.1	0.06	0.72	10831.9	0.0
126	0.1	10757	17.99	0.76	0.00	11.0	0.06	0.70	10756.6	0.0
128	0.1	10682	17.98	0.74	0.00	11.0	0.06	0.69	10681.6	0.0
130	0.1	10607	17.96	0.73	0.00	10.9	0.06	0.67	10607.1	0.0
132	0.1	10533	17.95	0.72	0.00	10.9	0.06	0.66	10533.0	0.0
134	0.1	10460	17.94	0.70	0.00	10.9	0.06	0.65	10459.7	0.0
136	0.1	10387	17.93	0.69	0.00	10.8	0.06	0.63	10387.1	0.0
138	0.1	10315	17.91	0.67	0.00	10.8	0.05	0.62	10315.3	0.0
140	0.1	10245	17.90	0.66	0.00	10.7	0.05	0.60	10244.6	0.0
142	0.1	10175	17.89	0.64	0.00	10.7	0.05	0.59	10174.9	0.0
144	0.1	10106	17.88	0.62	0.00	10.7	0.05	0.57	10106.3	0.0
146	0.1	10039	17.87	0.61	0.00	10.6	0.05	0.55	10039.0	0.0
148	0.1	9973	17.86	0.59	0.00	10.6	0.05	0.54	9973.0	0.0
150	0.0	9908	17.85	0.58	0.00	10.6	0.05	0.52	9908.3	0.0
152	0.0	9845	17.83	0.56	0.00	10.5	0.05	0.51	9845.0	0.0
154	0.0	9783	17.82	0.54	0.00	10.5	0.05	0.49	9783.2	0.0
156	0.0	9724	17.81	0.52	0.00	10.4	0.05	0.46	9723.5	0.0
158	0.0	9666	17.80	0.49	0.00	10.4	0.05	0.44	9666.2	0.0
160	0.0	9611	17.79	0.47	0.00	10.4	0.05	0.42	9611.1	0.0
162	0.0	9558	17.79	0.45	0.00	10.4	0.05	0.40	9558.2	0.0
164	0.0	9507	17.78	0.44	0.00	10.3	0.05	0.38	9507.2	0.0
166	0.0	9458	17.77	0.42	0.00	10.3	0.05	0.37	9458.2	0.0
168	0.0	9411	17.76	0.40	0.00	10.3	0.05	0.35	9411.0	0.0
170	0.0	9366	17.75	0.39	0.00	10.2	0.05	0.33	9365.6	0.0
172	0.0	9322	17.74	0.37	0.00	10.2	0.05	0.32	9321.8	0.0
174	0.0	9280	17.74	0.36	0.00	10.2	0.05	0.31	9279.5	0.0
176	0.0	9239	17.73	0.34	0.00	10.2	0.05	0.29	9238.8	0.0
178	0.0	9200	17.72	0.33	0.00	10.1	0.05	0.28	9199.6	0.0
180	0.0	9162	17.72	0.32	0.00	10.1	0.05	0.27	9161.7	0.0
182	0.0	9125	17.71	0.31	0.00	10.1	0.05	0.26	9125.1	0.0
184	0.0	9090	17.71	0.30	0.00	10.1	0.05	0.24	9089.7	0.0
186	0.0	9056	17.70	0.29	0.00	10.1	0.05	0.23	9055.6	0.0
188	0.0	9023	17.69	0.28	0.00	10.0	0.05	0.22	9022.6	0.0
190	0.0	8991	17.69	0.27	0.00	10.0	0.05	0.21	8990.7	0.0
192	0.0	8960	17.68	0.26	0.00	10.0	0.05	0.21	8959.9	0.0
194	0.0	8930	17.68	0.25	0.00	10.0	0.05	0.20	8930.0	0.0
196	0.0	8901	17.67	0.24	0.00	10.0	0.05	0.19	8901.1	0.0
198	0.0	8873	17.67	0.23	0.00	9.9	0.05	0.18	8873.2	0.0
200	0.0	8846	17.66	0.22	0.00	9.9	0.05	0.17	8846.1	0.0
202	0.0	8820	17.66	0.22	0.00	9.9	0.05	0.17	8819.9	0.0
204	0.0	8794	17.65	0.21	0.00	9.9	0.05	0.16	8794.4	0.0

WATERSHED DATA

BEFORE DEVELOPMENT

WATERSHED AREA	1.27 ACRES
HYDRAULIC LENGTH	553 FT
CHANGE IN HEIGHT	12.5 FT
RUNOFF COEF. 'C'	0.2
TIME OF CONCENTR	5.00 MIN
INTENSITY (10YR)	7.23 IN/HR

Qa = 1.84 CFS

Qa = PRE-DEVELOPED PEAK DISCHARGE

AFTER DEVELOPMENT

WATERSHED AREA	1.27 ACRES
HYDRAULIC LENGTH	553 FT
CHANGE IN HEIGHT	12.5 FT
RUNOFF COEF. 'C'	0.78
TIME OF CONCENTR	5.00 MIN
INTENSITY (10YR)	7.23 IN/HR

Qp = 7.16 CFS

Qp = POST-DEVELOPED PEAK DISCHARGE

COMPUTE DEPTH OF RUNOFF

P = 7 INCHES 10yr, 24hr PRECIPITATION
CN = 89

S = (1000/CN)-10
S = 1.24

Depth (D) = (P-0.2S)^2/(P+0.8S)
D = 5.71 IN - 10yr, 24hr RUNOFF DEPTH

SET VOLUME AND COMPUTE TIME TO PEAK

Tp = [(43.5)(D)(Area)] / Qp
Tp = 44.03 MINUTES

Storage Volume Req'd = (Qp-Qa)*Tp*1.39*60
= 19,556 cu. ft.

CALCULATE Ks AND b

SET NORMAL ELEVATION AT = 16.00 feet

CONTOUR	CONTOUR AREA (sq ft)	INCR VOL (cu ft)	S ACCUM VOL (cu ft)	Z STAGE (ft)	ln S	ln Z	Z est (ft)
16.00	4,370	0	0	0	0	0	0
16.50	5,192	2,391	2,391	0.5	7.7793	-0.69314718	0.50
17.50	5,675	5,434	7,824	1.5	8.9650	0.4055	1.49
18.50	6,159	5,917	13,741	2.5	9.5281	0.9163	2.49
19.50	6,644	6,402	20,143	3.5	9.9106	1.2528	3.53
20.50	7,130	6,887	27,030	4.5	10.2047	1.5041	4.62

Regression Output:

==> Ks = 5073
b = 1.09

X Coefficient 8.53

**CHAINSAW METHOD FOR
RISER BARREL ROUTING**

STORM DATA

Qa = 1.84 cfs
Qp = 7.16 cfs
Tp = 44.0 min
dT = 2 min

* Infiltration rate = in/hr

BASIN DATA

Ks = 5073
b = 1.09
Zo = 16.00 ft
Normal water elev = 16.00 ft

Box Weir Length = 10 ft
Cw = 3.0
Zcr = 19.70 ft

Dd = 18 in
Cd = 0.59
Zi = 15.50 ft

Peak Outflow = 1.64 cfs
Peak Stage = 19.26 ft
Maximum Storage = 18,476 cu ft

Control Holes:

State Orifice: Dia = 1.25 in
Inv = 16.00 ft
Weir: L = 4 in
Inv = 17.50 ft

Time (min)	Inflow (cfs)	Storage (cu ft)	Stage (ft)	Outflow (cfs)	W Riser (cfs)	Barrel (cfs)	Orifice (cfs)	City Weir (cfs)	IFStore (cu ft)	Infiltrate (cf)
0	0.0	0	16.00	0.00	0	1.396762	0	0.00	0.0	0.0
2	0.0	0	16.00	0	0.00	1.396762	0	0.00	0.0	0.0
4	0.1	4	16.00	0.00	0.00	1.4	0.00	0.00	4.4	0.0
6	0.3	22	16.01	0.00	0.00	1.4	0.00	0.00	21.7	0.0
8	0.6	61	16.02	0.00	0.00	1.5	0.00	0.00	60.5	0.0
10	0.9	129	16.03	0.00	0.00	1.5	0.00	0.00	128.6	0.0
12	1.2	233	16.06	0.00	0.00	1.7	0.00	0.00	233.2	0.0
14	1.6	381	16.09	0.01	0.00	1.8	0.01	0.00	380.8	0.0
16	2.1	577	16.14	0.01	0.00	2.0	0.01	0.00	577.0	0.0
18	2.6	827	16.19	0.01	0.00	2.3	0.01	0.00	826.5	0.0
20	3.1	1133	16.25	0.02	0.00	2.6	0.02	0.00	1133.0	0.0
22	3.6	1499	16.33	0.02	0.00	3.0	0.02	0.00	1499.0	0.0
24	4.1	1926	16.41	0.02	0.00	3.4	0.02	0.00	1925.8	0.0
26	4.6	2413	16.51	0.03	0.00	4.0	0.03	0.00	2413.2	0.0
28	5.1	2960	16.61	0.03	0.00	4.6	0.03	0.00	2960.2	0.0
30	5.5	3564	16.72	0.03	0.00	5.4	0.03	0.00	3564.3	0.0
32	5.9	4222	16.85	0.04	0.00	6.2	0.04	0.00	4221.9	0.0
34	6.3	4928	16.97	0.04	0.00	7.1	0.04	0.00	4928.2	0.0
36	6.6	5678	17.11	0.04	0.00	7.7	0.04	0.00	5677.6	0.0
38	6.8	6463	17.25	0.04	0.00	8.3	0.04	0.00	6463.5	0.0
40	7.0	7278	17.39	0.05	0.00	8.9	0.05	0.00	7278.5	0.0
42	7.1	8115	17.54	0.07	0.00	9.5	0.05	0.02	8114.7	0.0
44	7.2	8961	17.68	0.26	0.00	10.0	0.05	0.21	8961.5	0.0
46	7.1	9790	17.82	0.54	0.00	10.5	0.05	0.49	9790.0	0.0
48	7.0	10580	17.96	0.73	0.00	10.9	0.06	0.67	10580.2	0.0
50	6.8	11336	18.09	0.86	0.00	11.3	0.06	0.80	11335.5	0.0
52	6.6	12053	18.21	0.97	0.00	11.7	0.06	0.91	12053.4	0.0
54	6.3	12729	18.32	1.06	0.00	12.0	0.06	1.00	12728.9	0.0
56	5.9	13357	18.42	1.14	0.00	12.3	0.06	1.08	13356.8	0.0
58	5.6	13934	18.52	1.21	0.00	12.6	0.06	1.14	13933.9	0.0
60	5.3	14462	18.61	1.27	0.00	12.8	0.06	1.20	14462.0	0.0
62	5.0	14945	18.69	1.32	0.00	13.0	0.07	1.25	14944.6	0.0
64	4.7	15385	18.76	1.36	0.00	13.2	0.07	1.29	15384.7	0.0
66	4.4	15785	18.83	1.40	0.00	13.4	0.07	1.33	15785.2	0.0
68	4.2	16149	18.88	1.43	0.00	13.6	0.07	1.37	16148.7	0.0
70	3.9	16478	18.94	1.46	0.00	13.7	0.07	1.40	16477.5	0.0
72	3.7	16774	18.99	1.49	0.00	13.8	0.07	1.42	16774.0	0.0
74	3.5	17040	19.03	1.51	0.00	13.9	0.07	1.45	17040.2	0.0
76	3.3	17278	19.07	1.54	0.00	14.0	0.07	1.47	17278.1	0.0
78	3.1	17489	19.10	1.55	0.00	14.1	0.07	1.48	17489.3	0.0
80	2.9	17676	19.13	1.57	0.00	14.2	0.07	1.50	17675.7	0.0
82	2.8	17839	19.16	1.58	0.00	14.2	0.07	1.51	17838.9	0.0
84	2.6	17980	19.18	1.60	0.00	14.3	0.07	1.52	17980.2	0.0
86	2.5	18101	19.20	1.61	0.00	14.4	0.07	1.53	18101.1	0.0
88	2.3	18203	19.22	1.61	0.00	14.4	0.07	1.54	18202.9	0.0
90	2.2	18287	19.23	1.62	0.00	14.4	0.07	1.55	18286.8	0.0
92	2.1	18354	19.24	1.63	0.00	14.5	0.07	1.55	18354.0	0.0
94	1.9	18405	19.25	1.63	0.00	14.5	0.07	1.56	18405.5	0.0

96	1.8	18442	19.26	1.63	0.00	14.5	0.07	1.56	18442.3	0.0
98	1.7	18465	19.26	1.63	0.00	14.5	0.07	1.56	18465.5	0.0
100	1.6	18476	19.26	1.64	0.00	14.5	0.07	1.56	18475.9	0.0
102	1.5	18474	19.26	1.64	0.00	14.5	0.07	1.56	18474.3	0.0
104	1.4	18462	19.26	1.63	0.00	14.5	0.07	1.56	18461.6	0.0
106	1.4	18438	19.26	1.63	0.00	14.5	0.07	1.56	18438.5	0.0
108	1.3	18406	19.25	1.63	0.00	14.5	0.07	1.56	18405.7	0.0
110	1.2	18364	19.24	1.63	0.00	14.5	0.07	1.55	18363.8	0.0
112	1.1	18314	19.24	1.62	0.00	14.4	0.07	1.55	18313.6	0.0
114	1.1	18255	19.23	1.62	0.00	14.4	0.07	1.55	18255.5	0.0
116	1.0	18190	19.22	1.61	0.00	14.4	0.07	1.54	18190.1	0.0
118	1.0	18118	19.21	1.61	0.00	14.4	0.07	1.53	18118.0	0.0
120	0.9	18040	19.19	1.60	0.00	14.3	0.07	1.53	18039.7	0.0
122	0.8	17956	19.18	1.59	0.00	14.3	0.07	1.52	17955.6	0.0
124	0.8	17866	19.16	1.59	0.00	14.3	0.07	1.51	17866.1	0.0
126	0.8	17772	19.15	1.58	0.00	14.2	0.07	1.51	17771.7	0.0
128	0.7	17673	19.13	1.57	0.00	14.2	0.07	1.50	17672.8	0.0
130	0.7	17570	19.12	1.56	0.00	14.1	0.07	1.49	17569.7	0.0
132	0.6	17463	19.10	1.55	0.00	14.1	0.07	1.48	17462.7	0.0
134	0.6	17352	19.08	1.54	0.00	14.1	0.07	1.47	17352.2	0.0
136	0.6	17239	19.06	1.53	0.00	14.0	0.07	1.46	17238.6	0.0
138	0.5	17122	19.04	1.52	0.00	14.0	0.07	1.45	17122.0	0.0
140	0.5	17003	19.02	1.51	0.00	13.9	0.07	1.44	17002.8	0.0
142	0.5	16881	19.00	1.50	0.00	13.9	0.07	1.43	16881.2	0.0
144	0.4	16758	18.98	1.49	0.00	13.8	0.07	1.42	16757.5	0.0
146	0.4	16632	18.96	1.48	0.00	13.8	0.07	1.41	16631.9	0.0
148	0.4	16505	18.94	1.47	0.00	13.7	0.07	1.40	16504.6	0.0
150	0.4	16376	18.92	1.45	0.00	13.7	0.07	1.39	16375.8	0.0
152	0.3	16246	18.90	1.44	0.00	13.6	0.07	1.37	16245.7	0.0
154	0.3	16115	18.88	1.43	0.00	13.5	0.07	1.36	16114.5	0.0
156	0.3	15982	18.86	1.42	0.00	13.5	0.07	1.35	15982.4	0.0
158	0.3	15849	18.84	1.41	0.00	13.4	0.07	1.34	15849.5	0.0
160	0.3	15716	18.81	1.39	0.00	13.4	0.07	1.33	15716.0	0.0
162	0.3	15582	18.79	1.38	0.00	13.3	0.07	1.31	15582.0	0.0
164	0.2	15448	18.77	1.37	0.00	13.3	0.07	1.30	15447.7	0.0
166	0.2	15313	18.75	1.35	0.00	13.2	0.07	1.29	15313.1	0.0
168	0.2	15179	18.73	1.34	0.00	13.1	0.07	1.27	15178.5	0.0
170	0.2	15044	18.70	1.33	0.00	13.1	0.07	1.26	15043.9	0.0
172	0.2	14909	18.68	1.31	0.00	13.0	0.07	1.25	14909.5	0.0
174	0.2	14775	18.66	1.30	0.00	13.0	0.07	1.23	14775.3	0.0
176	0.2	14641	18.64	1.28	0.00	12.9	0.06	1.22	14641.4	0.0
178	0.2	14508	18.62	1.27	0.00	12.8	0.06	1.21	14507.9	0.0
180	0.2	14375	18.59	1.26	0.00	12.8	0.06	1.19	14375.0	0.0
182	0.1	14243	18.57	1.24	0.00	12.7	0.06	1.18	14242.7	0.0
184	0.1	14111	18.55	1.23	0.00	12.7	0.06	1.16	14111.0	0.0
186	0.1	13980	18.53	1.21	0.00	12.6	0.06	1.15	13980.1	0.0
188	0.1	13850	18.51	1.20	0.00	12.5	0.06	1.13	13850.0	0.0
190	0.1	13721	18.49	1.18	0.00	12.5	0.06	1.12	13720.9	0.0
192	0.1	13593	18.46	1.17	0.00	12.4	0.06	1.11	13592.6	0.0
194	0.1	13465	18.44	1.15	0.00	12.4	0.06	1.09	13465.4	0.0
196	0.1	13339	18.42	1.14	0.00	12.3	0.06	1.08	13339.2	0.0
198	0.1	13214	18.40	1.12	0.00	12.3	0.06	1.06	13214.1	0.0
200	0.1	13090	18.38	1.11	0.00	12.2	0.06	1.05	13090.2	0.0
202	0.1	12968	18.36	1.09	0.00	12.1	0.06	1.03	12967.5	0.0
204	0.1	12846	18.34	1.08	0.00	12.1	0.06	1.02	12846.1	0.0

WATERSHED DATA

BEFORE DEVELOPMENT

WATERSHED AREA	1.27 ACRES
HYDRAULIC LENGTH	553 FT
CHANGE IN HEIGHT	12.5 FT
RUNOFF COEF. 'C'	0.2
TIME OF CONCENTR	5.00 MIN
INTENSITY (25YR)	8.15 IN/HR

Qa = 2.07 CFS

Qa = PRE-DEVELOPED PEAK DISCHARGE

AFTER DEVELOPMENT

WATERSHED AREA	1.27 ACRES
HYDRAULIC LENGTH	553 FT
CHANGE IN HEIGHT	12.5 FT
RUNOFF COEF. 'C'	0.78
TIME OF CONCENTR	5.00 MIN
INTENSITY (25YR)	8.15 IN/HR

Qp = 8.07 CFS

Qp = POST-DEVELOPED PEAK DISCHARGE

COMPUTE DEPTH OF RUNOFF

P = 8.05 INCHES 25yr, 24hr PRECIPITATION
CN = 89

S = (1000/CN)-10
S = 1.24

Depth (D) = (P-0.2S)*2/(P+0.8S)
D = 6.74 IN - 25yr, 24hr RUNOFF DEPTH

SET VOLUME AND COMPUTE TIME TO PEAK

Tp = [(43.5)(D)(Area)] / Qp
Tp = 46.09 MINUTES

Storage Volume Req'd = (Qp-Qa)*Tp*1.39*60
= 23,077 cu. ft.

CALCULATE Ks AND b

SET NORMAL ELEVATION AT = 16.00 feet

CONTOUR	CONTOUR AREA (sq ft)	INCR VOL (cu ft)	S ACCUM VOL (cu ft)	Z STAGE (ft)	In S	In Z	Z est (ft)
16.00	4,370	0	0	0	0	0	0
16.50	5,192	2,391	2,391	0.5	7.7793	-0.69314718	0.50
17.50	5,675	5,434	7,824	1.5	8.9650	0.4055	1.49
18.50	6,159	5,917	13,741	2.5	9.5281	0.9163	2.49
19.50	6,644	6,402	20,143	3.5	9.9106	1.2528	3.53
20.50	7,130	6,887	27,030	4.5	10.2047	1.5041	4.62

Regression Output:

==> Ks = 5073
b = 1.09

X Coefficient 8.53

CHAINSAW METHOD FOR
RISER BARREL ROUTING

STORM DATA

Qa = 2.07 cfs
Qp = 8.07 cfs
Tp = 46.1 min
dT = 2 min

* Infiltration rate = in/hr

BASIN DATA

Ks = 5073
b = 1.09
Zo = 16.00 ft
Normal water elev = 16.00 ft

Box Weir Length = 10 ft
Cw = 3.0
Zcr = 19.70 ft

Dd = 18 in
Cd = 0.59
Zi = 15.50 ft

Peak Outflow = 2.04 cfs
Peak Stage = 19.73 ft
Maximum Storage = 21,408 cu ft

Control Holes:

State Orifice: Dia = 1.25 in
Inv = 16.00 ft
Weir: L = 4 in
Inv = 17.50 ft

Time (min)	Inflow (cfs)	Storage (cu ft)	Stage (ft)	Outflow (cfs)	W Riser (cfs)	Barrel (cfs)	Orifice (cfs)	City Weir (cfs)	IFStore (cu ft)	Infiltrate (cf)
0	0.0	0	16.00	0.00	0	1.396762	0	0.00	0.0	0.0
2	0.0	0	16.00	0	0.00	1.396762	0	0.00	0.0	0.0
4	0.1	4	16.00	0.00	0.00	1.4	0.00	0.00	4.5	0.0
6	0.3	22	16.01	0.00	0.00	1.4	0.00	0.00	22.4	0.0
8	0.6	62	16.02	0.00	0.00	1.5	0.00	0.00	62.3	0.0
10	0.9	132	16.04	0.00	0.00	1.5	0.00	0.00	132.5	0.0
12	1.3	240	16.06	0.00	0.00	1.7	0.00	0.00	240.5	0.0
14	1.7	393	16.10	0.01	0.00	1.8	0.01	0.00	393.2	0.0
16	2.2	596	16.14	0.01	0.00	2.0	0.01	0.00	596.5	0.0
18	2.7	856	16.20	0.02	0.00	2.3	0.02	0.00	856.6	0.0
20	3.2	1175	16.26	0.02	0.00	2.6	0.02	0.00	1174.9	0.0
22	3.7	1557	16.34	0.02	0.00	3.0	0.02	0.00	1557.2	0.0
24	4.3	2005	16.43	0.02	0.00	3.5	0.02	0.00	2004.5	0.0
26	4.8	2517	16.53	0.03	0.00	4.1	0.03	0.00	2517.4	0.0
28	5.4	3095	16.64	0.03	0.00	4.8	0.03	0.00	3095.4	0.0
30	5.9	3737	16.76	0.03	0.00	5.6	0.03	0.00	3736.5	0.0
32	6.4	4438	16.88	0.04	0.00	6.4	0.04	0.00	4438.0	0.0
34	6.8	5196	17.02	0.04	0.00	7.3	0.04	0.00	5195.6	0.0
36	7.2	6004	17.17	0.04	0.00	8.0	0.04	0.00	6004.2	0.0
38	7.5	6858	17.32	0.05	0.00	8.6	0.05	0.00	6857.7	0.0
40	7.7	7749	17.47	0.05	0.00	9.2	0.05	0.00	7749.3	0.0
42	7.9	8671	17.63	0.18	0.00	9.8	0.05	0.13	8671.1	0.0
44	8.0	9600	17.79	0.47	0.00	10.4	0.05	0.42	9599.8	0.0
46	8.1	10507	17.95	0.71	0.00	10.9	0.06	0.66	10507.3	0.0
48	8.0	11391	18.10	0.87	0.00	11.4	0.06	0.81	11390.8	0.0
50	7.9	12251	18.24	1.00	0.00	11.8	0.06	0.94	12251.3	0.0
52	7.8	13083	18.38	1.11	0.00	12.2	0.06	1.04	13083.4	0.0
54	7.5	13881	18.51	1.20	0.00	12.6	0.06	1.14	13880.7	0.0
56	7.2	14637	18.64	1.28	0.00	12.9	0.06	1.22	14636.7	0.0
58	6.8	15345	18.75	1.36	0.00	13.2	0.07	1.29	15345.2	0.0
60	6.5	16001	18.86	1.42	0.00	13.5	0.07	1.35	16001.5	0.0
62	6.1	16605	18.96	1.48	0.00	13.8	0.07	1.41	16605.2	0.0
64	5.8	17160	19.05	1.53	0.00	14.0	0.07	1.46	17159.7	0.0
66	5.4	17668	19.13	1.57	0.00	14.2	0.07	1.50	17668.2	0.0
68	5.1	18134	19.21	1.61	0.00	14.4	0.07	1.54	18133.5	0.0
70	4.9	18558	19.28	1.64	0.00	14.5	0.07	1.57	18558.3	0.0
72	4.6	18945	19.34	1.67	0.00	14.7	0.07	1.60	18945.1	0.0
74	4.3	19296	19.40	1.70	0.00	14.8	0.07	1.63	19296.1	0.0
76	4.1	19614	19.45	1.73	0.00	14.9	0.07	1.65	19613.6	0.0
78	3.9	19900	19.49	1.75	0.00	15.0	0.07	1.67	19899.5	0.0
80	3.7	20156	19.53	1.77	0.00	15.1	0.08	1.69	20155.8	0.0
82	3.5	20384	19.57	1.78	0.00	15.2	0.08	1.71	20384.3	0.0
84	3.3	20587	19.60	1.80	0.00	15.3	0.08	1.72	20586.5	0.0
86	3.1	20764	19.63	1.81	0.00	15.4	0.08	1.73	20764.2	0.0
88	2.9	20919	19.66	1.82	0.00	15.4	0.08	1.75	20918.7	0.0
90	2.8	21052	19.68	1.83	0.00	15.5	0.08	1.75	21051.5	0.0
92	2.6	21164	19.69	1.84	0.00	15.5	0.08	1.76	21163.9	0.0
94	2.5	21257	19.71	1.87	0.03	15.5	0.08	1.77	21257.1	0.0

96	2.3	21329	19.72	1.94	0.09	15.6	0.08	1.77	21328.9	0.0
98	2.2	21376	19.73	2.00	0.15	15.6	0.08	1.78	21376.2	0.0
100	2.1	21401	19.73	2.03	0.18	15.6	0.08	1.78	21401.3	0.0
102	2.0	21408	19.73	2.04	0.19	15.6	0.08	1.78	21407.9	0.0
104	1.9	21400	19.73	2.03	0.17	15.6	0.08	1.78	21399.7	0.0
106	1.8	21380	19.73	2.00	0.15	15.6	0.08	1.78	21379.8	0.0
108	1.7	21351	19.72	1.97	0.12	15.6	0.08	1.78	21350.8	0.0
110	1.6	21315	19.72	1.93	0.08	15.6	0.08	1.77	21314.6	0.0
112	1.5	21272	19.71	1.89	0.04	15.5	0.08	1.77	21272.3	0.0
114	1.4	21224	19.70	1.85	0.01	15.5	0.08	1.77	21224.5	0.0
116	1.3	21171	19.70	1.84	0.00	15.5	0.08	1.76	21171.0	0.0
118	1.3	21110	19.69	1.84	0.00	15.5	0.08	1.76	21109.7	0.0
120	1.2	21040	19.67	1.83	0.00	15.5	0.08	1.75	21040.3	0.0
122	1.1	20963	19.66	1.82	0.00	15.4	0.08	1.75	20963.1	0.0
124	1.1	20879	19.65	1.82	0.00	15.4	0.08	1.74	20878.8	0.0
126	1.0	20788	19.63	1.81	0.00	15.4	0.08	1.74	20787.9	0.0
128	0.9	20691	19.62	1.81	0.00	15.3	0.08	1.73	20690.7	0.0
130	0.9	20588	19.60	1.80	0.00	15.3	0.08	1.72	20587.8	0.0
132	0.8	20480	19.59	1.79	0.00	15.3	0.08	1.71	20479.5	0.0
134	0.8	20366	19.57	1.78	0.00	15.2	0.08	1.71	20366.3	0.0
136	0.8	20249	19.55	1.77	0.00	15.2	0.08	1.70	20248.6	0.0
138	0.7	20127	19.53	1.76	0.00	15.1	0.08	1.69	20126.6	0.0
140	0.7	20001	19.51	1.75	0.00	15.1	0.07	1.68	20000.7	0.0
142	0.6	19871	19.49	1.74	0.00	15.0	0.07	1.67	19871.2	0.0
144	0.6	19738	19.47	1.73	0.00	15.0	0.07	1.66	19738.5	0.0
146	0.6	19603	19.44	1.72	0.00	14.9	0.07	1.65	19602.7	0.0
148	0.5	19464	19.42	1.71	0.00	14.9	0.07	1.64	19464.3	0.0
150	0.5	19323	19.40	1.70	0.00	14.8	0.07	1.63	19323.3	0.0
152	0.5	19180	19.38	1.69	0.00	14.8	0.07	1.62	19180.1	0.0
154	0.5	19035	19.35	1.68	0.00	14.7	0.07	1.61	19034.9	0.0
156	0.4	18888	19.33	1.67	0.00	14.7	0.07	1.60	18887.9	0.0
158	0.4	18739	19.31	1.66	0.00	14.6	0.07	1.58	18739.3	0.0
160	0.4	18589	19.28	1.64	0.00	14.5	0.07	1.57	18589.2	0.0
162	0.4	18438	19.26	1.63	0.00	14.5	0.07	1.56	18438.0	0.0
164	0.3	18286	19.23	1.62	0.00	14.4	0.07	1.55	18285.6	0.0
166	0.3	18132	19.21	1.61	0.00	14.4	0.07	1.54	18132.4	0.0
168	0.3	17978	19.18	1.59	0.00	14.3	0.07	1.52	17978.4	0.0
170	0.3	17824	19.16	1.58	0.00	14.2	0.07	1.51	17823.8	0.0
172	0.3	17669	19.13	1.57	0.00	14.2	0.07	1.50	17668.8	0.0
174	0.3	17513	19.11	1.56	0.00	14.1	0.07	1.49	17513.4	0.0
176	0.2	17358	19.08	1.54	0.00	14.1	0.07	1.47	17357.8	0.0
178	0.2	17202	19.06	1.53	0.00	14.0	0.07	1.46	17202.0	0.0
180	0.2	17046	19.03	1.52	0.00	13.9	0.07	1.45	17046.4	0.0
182	0.2	16891	19.01	1.50	0.00	13.9	0.07	1.43	16890.8	0.0
184	0.2	16735	18.98	1.49	0.00	13.8	0.07	1.42	16735.4	0.0
186	0.2	16580	18.96	1.47	0.00	13.7	0.07	1.40	16580.3	0.0
188	0.2	16426	18.93	1.46	0.00	13.7	0.07	1.39	16425.7	0.0
190	0.2	16271	18.90	1.45	0.00	13.6	0.07	1.38	16271.5	0.0
192	0.2	16118	18.88	1.43	0.00	13.5	0.07	1.36	16117.9	0.0
194	0.1	15965	18.85	1.42	0.00	13.5	0.07	1.35	15964.9	0.0
196	0.1	15813	18.83	1.40	0.00	13.4	0.07	1.33	15812.6	0.0
198	0.1	15661	18.80	1.39	0.00	13.4	0.07	1.32	15661.1	0.0
200	0.1	15510	18.78	1.37	0.00	13.3	0.07	1.31	15510.4	0.0
202	0.1	15361	18.76	1.36	0.00	13.2	0.07	1.29	15360.6	0.0
204	0.1	15212	18.73	1.34	0.00	13.2	0.07	1.28	15211.8	0.0

WATERSHED DATA

BEFORE DEVELOPMENT

WATERSHED AREA	1.27 ACRES
HYDRAULIC LENGTH	553 FT
CHANGE IN HEIGHT	12.5 FT
RUNOFF COEF. 'C'	0.2
TIME OF CONCENTR	5.00 MIN
INTENSITY (50YR)	8.87 IN/HR

Qa = 2.25 CFS

Qa = PRE-DEVELOPED PEAK DISCHARGE

AFTER DEVELOPMENT

WATERSHED AREA	1.27 ACRES
HYDRAULIC LENGTH	553 FT
CHANGE IN HEIGHT	12.5 FT
RUNOFF COEF. 'C'	0.78
TIME OF CONCENTR	5.00 MIN
INTENSITY (50YR)	8.87 IN/HR

Qp = 8.79 CFS

Qp = POST-DEVELOPED PEAK DISCHARGE

COMPUTE DEPTH OF RUNOFF

P = 9 INCHES 50yr, 24hr PRECIPITATION
CN = 89

S = (1000/CN)-10
S = 1.24

Depth (D) = (P-0.2S)²/(P+0.8S)
D = 7.67 IN - 50yr, 24hr RUNOFF DEPTH

SET VOLUME AND COMPUTE TIME TO PEAK

Tp = [(43.5)(D)(Area)] / Qp
Tp = 48.22 MINUTES

Storage Volume Req'd = (Qp-Qa)*Tp*1.39*60
= 26,277 cu. ft.

CALCULATE Ks AND b

SET NORMAL ELEVATION AT = 16.00 feet

CONTOUR	CONTOUR AREA (sq ft)	INCR VOL (cu ft)	S ACCUM VOL (cu ft)	Z STAGE (ft)	ln S	ln Z	Z est (ft)
16.00	4,370	0	0	0	0	0	0
16.50	5,192	2,391	2,391	0.5	7.7793	-0.69314718	0.50
17.50	5,675	5,434	7,824	1.5	8.9650	0.4055	1.49
18.50	6,159	5,917	13,741	2.5	9.5281	0.9163	2.49
19.50	6,644	6,402	20,143	3.5	9.9106	1.2528	3.53
20.50	7,130	6,887	27,030	4.5	10.2047	1.5041	4.62

Regression Output:

==> Ks = 5073
b = 1.09

X Coefficient 8.53

**CHAINSAW METHOD FOR
RISER BARREL ROUTING**

STORM DATA

Qa = 2.25 cfs
Qp = 8.79 cfs
Tp = 48.2 min
dT = 2 min

* Infiltration rate = in/hr

BASIN DATA

Ks = 5073
b = 1.09
Zo = 16.00 ft
Normal water elev = 16.00 ft

Peak Outflow = 3.91 cfs

Peak Stage = 19.86 ft
Maximum Storage = 22,227 cu ft

Box Weir Length = 10 ft
Cw = 3.0
Zcr = 19.70 ft

Control Holes:

State Orifice: Dia = 1.25 in
Inv = 16.00 ft

Weir: L = 4 in
Inv = 17.50 ft

Dd = 18 in
Cd = 0.59
Zi = 15.50 ft

Time (min)	Inflow (cfs)	Storage (cu ft)	Stage (ft)	Outflow (cfs)	W Riser (cfs)	Barrel (cfs)	Orifice (cfs)	City Weir (cfs)	IFStore (cu ft)	Infiltrate (cf)
0	0.0	0	16.00	0.00	0	1.396762	0	0.00	0.0	0.0
2	0.0	0	16.00	0	0.00	1.396762	0	0.00	0.0	0.0
4	0.1	4	16.00	0.00	0.00	1.4	0.00	0.00	4.5	0.0
6	0.3	22	16.01	0.00	0.00	1.4	0.00	0.00	22.3	0.0
8	0.6	62	16.02	0.00	0.00	1.5	0.00	0.00	62.0	0.0
10	0.9	132	16.04	0.00	0.00	1.5	0.00	0.00	131.9	0.0
12	1.3	240	16.06	0.00	0.00	1.7	0.00	0.00	239.7	0.0
14	1.7	392	16.10	0.01	0.00	1.8	0.01	0.00	392.2	0.0
16	2.2	596	16.14	0.01	0.00	2.0	0.01	0.00	595.8	0.0
18	2.7	856	16.20	0.02	0.00	2.3	0.02	0.00	855.7	0.0
20	3.2	1177	16.26	0.02	0.00	2.6	0.02	0.00	1176.7	0.0
22	3.8	1562	16.34	0.02	0.00	3.0	0.02	0.00	1562.1	0.0
24	4.4	2014	16.43	0.02	0.00	3.5	0.02	0.00	2014.4	0.0
26	4.9	2535	16.53	0.03	0.00	4.1	0.03	0.00	2534.8	0.0
28	5.5	3123	16.64	0.03	0.00	4.8	0.03	0.00	3123.4	0.0
30	6.0	3779	16.76	0.03	0.00	5.6	0.03	0.00	3779.0	0.0
32	6.6	4499	16.90	0.04	0.00	6.5	0.04	0.00	4499.4	0.0
34	7.0	5281	17.04	0.04	0.00	7.4	0.04	0.00	5281.3	0.0
36	7.5	6120	17.19	0.04	0.00	8.1	0.04	0.00	6120.4	0.0
38	7.8	7011	17.34	0.05	0.00	8.7	0.05	0.00	7011.1	0.0
40	8.2	7947	17.51	0.05	0.00	9.4	0.05	0.00	7947.3	0.0
42	8.4	8922	17.68	0.25	0.00	10.0	0.05	0.19	8921.8	0.0
44	8.6	9904	17.84	0.58	0.00	10.5	0.05	0.52	9903.9	0.0
46	8.7	10869	18.01	0.78	0.00	11.1	0.06	0.72	10869.4	0.0
48	8.8	11825	18.17	0.94	0.00	11.6	0.06	0.88	11824.8	0.0
50	8.8	12767	18.33	1.07	0.00	12.0	0.06	1.01	12766.8	0.0
52	8.7	13690	18.48	1.18	0.00	12.5	0.06	1.12	13689.7	0.0
54	8.5	14587	18.63	1.28	0.00	12.9	0.06	1.21	14586.8	0.0
56	8.2	15451	18.77	1.37	0.00	13.3	0.07	1.30	15450.9	0.0
58	7.9	16275	18.91	1.45	0.00	13.6	0.07	1.38	16275.0	0.0
60	7.6	17053	19.03	1.52	0.00	13.9	0.07	1.45	17052.6	0.0
62	7.2	17777	19.15	1.58	0.00	14.2	0.07	1.51	17777.4	0.0
64	6.8	18448	19.26	1.63	0.00	14.5	0.07	1.56	18448.2	0.0
66	6.4	19067	19.36	1.68	0.00	14.7	0.07	1.61	19067.3	0.0
68	6.1	19638	19.45	1.73	0.00	14.9	0.07	1.65	19637.6	0.0
70	5.8	20162	19.53	1.77	0.00	15.1	0.08	1.69	20162.2	0.0
72	5.5	20644	19.61	1.80	0.00	15.3	0.08	1.73	20643.5	0.0
74	5.2	21084	19.68	1.83	0.00	15.5	0.08	1.76	21084.2	0.0
76	4.9	21487	19.75	2.16	0.30	15.6	0.08	1.78	21486.7	0.0
78	4.7	21817	19.80	2.82	0.93	15.7	0.08	1.81	21817.2	0.0
80	4.4	22038	19.83	3.37	1.47	15.8	0.08	1.82	22037.8	0.0
82	4.2	22163	19.85	3.72	1.81	15.9	0.08	1.83	22162.6	0.0
84	4.0	22218	19.86	3.88	1.97	15.9	0.08	1.83	22217.9	0.0
86	3.8	22227	19.86	3.91	2.00	15.9	0.08	1.83	22227.5	0.0
88	3.6	22209	19.86	3.85	1.94	15.9	0.08	1.83	22208.7	0.0
90	3.4	22173	19.86	3.75	1.84	15.9	0.08	1.83	22173.0	0.0
92	3.2	22127	19.85	3.62	1.71	15.8	0.08	1.83	22127.3	0.0
94	3.0	22076	19.84	3.48	1.57	15.8	0.08	1.82	22076.1	0.0

96	2.9	22022	19.83	3.33	1.43	15.8	0.08	1.82	22021.9	0.0
98	2.7	21966	19.82	3.18	1.29	15.8	0.08	1.82	21966.3	0.0
100	2.6	21910	19.81	3.04	1.15	15.8	0.08	1.81	21910.1	0.0
102	2.4	21854	19.80	2.90	1.02	15.8	0.08	1.81	21853.9	0.0
104	2.3	21798	19.80	2.77	0.89	15.7	0.08	1.81	21797.9	0.0
106	2.2	21742	19.79	2.65	0.77	15.7	0.08	1.80	21742.3	0.0
108	2.1	21687	19.78	2.53	0.66	15.7	0.08	1.80	21687.0	0.0
110	2.0	21632	19.77	2.42	0.55	15.7	0.08	1.79	21632.1	0.0
112	1.9	21577	19.76	2.32	0.45	15.7	0.08	1.79	21577.5	0.0
114	1.8	21523	19.75	2.22	0.36	15.6	0.08	1.79	21522.9	0.0
116	1.7	21468	19.74	2.13	0.27	15.6	0.08	1.78	21468.2	0.0
118	1.6	21413	19.73	2.05	0.19	15.6	0.08	1.78	21413.1	0.0
120	1.5	21357	19.73	1.98	0.12	15.6	0.08	1.78	21357.3	0.0
122	1.4	21300	19.72	1.91	0.06	15.6	0.08	1.77	21300.3	0.0
124	1.3	21241	19.71	1.86	0.02	15.5	0.08	1.77	21241.5	0.0
126	1.3	21180	19.70	1.84	0.00	15.5	0.08	1.76	21179.7	0.0
128	1.2	21112	19.69	1.84	0.00	15.5	0.08	1.76	21112.0	0.0
130	1.1	21037	19.67	1.83	0.00	15.5	0.08	1.75	21036.9	0.0
132	1.1	20955	19.66	1.82	0.00	15.4	0.08	1.75	20954.9	0.0
134	1.0	20866	19.65	1.82	0.00	15.4	0.08	1.74	20866.3	0.0
136	1.0	20772	19.63	1.81	0.00	15.4	0.08	1.73	20771.6	0.0
138	0.9	20671	19.62	1.80	0.00	15.3	0.08	1.73	20671.3	0.0
140	0.9	20566	19.60	1.80	0.00	15.3	0.08	1.72	20565.7	0.0
142	0.8	20455	19.58	1.79	0.00	15.2	0.08	1.71	20455.2	0.0
144	0.8	20340	19.56	1.78	0.00	15.2	0.08	1.70	20340.1	0.0
146	0.7	20221	19.54	1.77	0.00	15.2	0.08	1.70	20220.9	0.0
148	0.7	20098	19.52	1.76	0.00	15.1	0.08	1.69	20097.7	0.0
150	0.7	19971	19.50	1.75	0.00	15.1	0.07	1.68	19971.0	0.0
152	0.6	19841	19.48	1.74	0.00	15.0	0.07	1.67	19841.0	0.0
154	0.6	19708	19.46	1.73	0.00	15.0	0.07	1.66	19707.9	0.0
156	0.6	19572	19.44	1.72	0.00	14.9	0.07	1.65	19572.0	0.0
158	0.5	19434	19.42	1.71	0.00	14.9	0.07	1.64	19433.6	0.0
160	0.5	19293	19.39	1.70	0.00	14.8	0.07	1.63	19292.9	0.0
162	0.5	19150	19.37	1.69	0.00	14.8	0.07	1.62	19150.2	0.0
164	0.5	19005	19.35	1.68	0.00	14.7	0.07	1.60	19005.5	0.0
166	0.4	18859	19.32	1.67	0.00	14.6	0.07	1.59	18859.1	0.0
168	0.4	18711	19.30	1.65	0.00	14.6	0.07	1.58	18711.3	0.0
170	0.4	18562	19.28	1.64	0.00	14.5	0.07	1.57	18562.1	0.0
172	0.4	18412	19.25	1.63	0.00	14.5	0.07	1.56	18411.7	0.0
174	0.4	18260	19.23	1.62	0.00	14.4	0.07	1.55	18260.4	0.0
176	0.3	18108	19.20	1.61	0.00	14.4	0.07	1.53	18108.2	0.0
178	0.3	17955	19.18	1.59	0.00	14.3	0.07	1.52	17955.3	0.0
180	0.3	17802	19.15	1.58	0.00	14.2	0.07	1.51	17801.9	0.0
182	0.3	17648	19.13	1.57	0.00	14.2	0.07	1.50	17648.0	0.0
184	0.3	17494	19.10	1.55	0.00	14.1	0.07	1.48	17493.8	0.0
186	0.3	17339	19.08	1.54	0.00	14.1	0.07	1.47	17339.4	0.0
188	0.2	17185	19.05	1.53	0.00	14.0	0.07	1.46	17184.9	0.0
190	0.2	17030	19.03	1.51	0.00	13.9	0.07	1.44	17030.4	0.0
192	0.2	16876	19.00	1.50	0.00	13.9	0.07	1.43	16876.1	0.0
194	0.2	16722	18.98	1.49	0.00	13.8	0.07	1.42	16721.9	0.0
196	0.2	16568	18.95	1.47	0.00	13.7	0.07	1.40	16568.1	0.0
198	0.2	16415	18.93	1.46	0.00	13.7	0.07	1.39	16414.6	0.0
200	0.2	16262	18.90	1.44	0.00	13.6	0.07	1.38	16261.6	0.0
202	0.2	16109	18.88	1.43	0.00	13.5	0.07	1.36	16109.1	0.0
204	0.2	15957	18.85	1.42	0.00	13.5	0.07	1.35	15957.3	0.0

WATERSHED DATA

BEFORE DEVELOPMENT

WATERSHED AREA	1.27 ACRES
HYDRAULIC LENGTH	553 FT
CHANGE IN HEIGHT	12.5 FT
RUNOFF COEF. 'C'	0.2
TIME OF CONCENTR	5.00 MIN
INTENSITY (50YR)	8.87 IN/HR

Qa = 2.25 CFS

Qa = PRE-DEVELOPED PEAK DISCHARGE

AFTER DEVELOPMENT

WATERSHED AREA	1.27 ACRES
HYDRAULIC LENGTH	553 FT
CHANGE IN HEIGHT	12.5 FT
RUNOFF COEF. 'C'	0.78
TIME OF CONCENTR	5.00 MIN
INTENSITY (50YR)	8.87 IN/HR

Qp = 8.79 CFS

Qp = POST-DEVELOPED PEAK DISCHARGE

COMPUTE DEPTH OF RUNOFF

P = 9 INCHES 50yr, 24hr PRECIPITATION
CN = 89

S = (1000/CN)-10
S = 1.24

Depth (D) = (P-0.2S)²/(P+0.8S)
D = 7.67 IN - 50yr, 24hr RUNOFF DEPTH

SET VOLUME AND COMPUTE TIME TO PEAK

Tp = [(43.5)(D)(Area)] / Qp
Tp = 48.22 MINUTES

Storage Volume Req'd = (Qp-Qa)*Tp*1.39*60
= 28,277 cu. ft.

CALCULATE Ks AND b

SET NORMAL ELEVATION AT = 16.00 feet

CONTOUR	CONTOUR AREA (sq ft)	INCR VOL (cu ft)	S		Z		Z est (ft)
			ACCUM VOL (cu ft)	STAGE (ft)	In S	In Z	
16.00	4,370	0	0	0	0	0	0
16.50	5,192	2,391	2,391	0.5	7.7793	-0.69314718	0.50
17.50	5,675	5,434	7,824	1.5	8.9650	0.4055	1.49
18.50	6,159	5,917	13,741	2.5	9.5281	0.9163	2.49
19.50	6,644	6,402	20,143	3.5	9.9106	1.2528	3.53
20.50	7,130	6,887	27,030	4.5	10.2047	1.5041	4.62

Regression Output:

==> Ks = 5073
b = 1.09

X Coefficient 8.53

**CHAINSAW METHOD FOR
RISER BARREL ROUTING**

STORM DATA

Qa = 2.25 cfs
Qp = 8.79 cfs
Tp = 48.2 min
dT = 2 min

* Infiltration rate = in/hr

BASIN DATA

Ks = 5073
b = 1.09
Zo = 16.00 ft
Normal water elev = 16.00 ft

Peak Outflow = 3.91 cfs

Peak Stage = 20.48 ft

Maximum Storage = 26,157 cu ft

Control Holes:

State Orifice: Dia = 0.00 in

Inv = 16.00 ft

Weir: L = 120 in

Inv = 20.35 ft

Box Weir Length = 0 ft
Cw = 3.0
Zcr = 19.70 ft
Dd = 18 in
Cd = 0.59
Zi = 15.50 ft

Time (min)	Inflow (cfs)	Storage (cu ft)	Stage (ft)	Outflow (cfs)	W Riser (cfs)	Barrel (cfs)	Orifice (cfs)	City Weir (cfs)	IFStore (cu ft)	Infiltrate (cf)
0	0.0	0	16.00	0.00	0	1.396762	0	0.00	0.0	0.0
2	0.0	0	16.00	0	0.00	1.396762	0	0.00	0.0	0.0
4	0.1	4	16.00	0.00	0.00	1.4	0.00	0.00	4.5	0.0
6	0.3	22	16.01	0.00	0.00	1.4	0.00	0.00	22.3	0.0
8	0.6	62	16.02	0.00	0.00	1.5	0.00	0.00	62.0	0.0
10	0.9	132	16.04	0.00	0.00	1.5	0.00	0.00	132.0	0.0
12	1.3	240	16.06	0.00	0.00	1.7	0.00	0.00	240.0	0.0
14	1.7	393	16.10	0.00	0.00	1.8	0.00	0.00	393.1	0.0
16	2.2	598	16.14	0.00	0.00	2.0	0.00	0.00	597.6	0.0
18	2.7	859	16.20	0.00	0.00	2.3	0.00	0.00	858.9	0.0
20	3.2	1182	16.26	0.00	0.00	2.6	0.00	0.00	1181.7	0.0
22	3.8	1569	16.34	0.00	0.00	3.1	0.00	0.00	1569.4	0.0
24	4.4	2024	16.43	0.00	0.00	3.6	0.00	0.00	2024.3	0.0
26	4.9	2548	16.53	0.00	0.00	4.1	0.00	0.00	2547.7	0.0
28	5.5	3140	16.64	0.00	0.00	4.8	0.00	0.00	3139.6	0.0
30	6.0	3799	16.77	0.00	0.00	5.6	0.00	0.00	3798.9	0.0
32	6.6	4523	16.90	0.00	0.00	6.5	0.00	0.00	4523.4	0.0
34	7.0	5310	17.04	0.00	0.00	7.4	0.00	0.00	5309.8	0.0
36	7.5	6154	17.19	0.00	0.00	8.1	0.00	0.00	6153.6	0.0
38	7.8	7049	17.35	0.00	0.00	8.8	0.00	0.00	7049.5	0.0
40	8.2	7991	17.52	0.00	0.00	9.4	0.00	0.00	7991.2	0.0
42	8.4	8972	17.68	0.00	0.00	10.0	0.00	0.00	8971.8	0.0
44	8.6	9983	17.86	0.00	0.00	10.6	0.00	0.00	9983.4	0.0
46	8.7	11018	18.03	0.00	0.00	11.2	0.00	0.00	11018.0	0.0
48	8.8	12067	18.21	0.00	0.00	11.7	0.00	0.00	12066.9	0.0
50	8.8	13121	18.39	0.00	0.00	12.2	0.00	0.00	13121.2	0.0
52	8.7	14172	18.56	0.00	0.00	12.7	0.00	0.00	14172.1	0.0
54	8.5	15211	18.73	0.00	0.00	13.2	0.00	0.00	15210.6	0.0
56	8.2	16228	18.90	0.00	0.00	13.6	0.00	0.00	16228.1	0.0
58	7.9	17216	19.06	0.00	0.00	14.0	0.00	0.00	17216.3	0.0
60	7.6	18167	19.21	0.00	0.00	14.4	0.00	0.00	18167.3	0.0
62	7.2	19074	19.36	0.00	0.00	14.7	0.00	0.00	19074.0	0.0
64	6.8	19934	19.50	0.00	0.00	15.1	0.00	0.00	19934.2	0.0
66	6.4	20749	19.63	0.00	0.00	15.4	0.00	0.00	20749.3	0.0
68	6.1	21522	19.75	0.00	0.00	15.6	0.00	0.00	21521.6	0.0
70	5.8	22253	19.87	0.00	0.00	15.9	0.00	0.00	22253.3	0.0
72	5.5	22947	19.98	0.00	0.00	16.1	0.00	0.00	22946.7	0.0
74	5.2	23604	20.08	0.00	0.00	16.4	0.00	0.00	23603.6	0.0
76	4.9	24226	20.18	0.00	0.00	16.6	0.00	0.00	24226.1	0.0
78	4.7	24816	20.27	0.00	0.00	16.8	0.00	0.00	24815.9	0.0
80	4.4	25375	20.36	0.10	0.00	16.9	0.00	0.10	25374.7	0.0
82	4.2	25892	20.44	2.25	0.00	17.1	0.00	2.25	25891.8	0.0
84	4.0	26124	20.48	3.69	0.00	17.2	0.00	3.69	26123.6	0.0
86	3.8	26157	20.48	3.91	0.00	17.2	0.00	3.91	26156.5	0.0
88	3.6	26138	20.48	3.78	0.00	17.2	0.00	3.78	26137.8	0.0
90	3.4	26111	20.48	3.60	0.00	17.2	0.00	3.60	26110.7	0.0
92	3.2	26083	20.47	3.42	0.00	17.2	0.00	3.42	26083.0	0.0
94	3.0	26056	20.47	3.24	0.00	17.2	0.00	3.24	26055.9	0.0

Flying Machine Brewery
Wet Detention Spillway Routing
50-year Storm

96	2.9	26030	20.46	3.08	0.00	17.2	0.00	3.08	26029.8	0.0
98	2.7	26005	20.46	2.92	0.00	17.1	0.00	2.92	26004.5	0.0
100	2.6	25980	20.46	2.77	0.00	17.1	0.00	2.77	25980.1	0.0
102	2.4	25957	20.45	2.63	0.00	17.1	0.00	2.63	25956.6	0.0
104	2.3	25934	20.45	2.49	0.00	17.1	0.00	2.49	25933.9	0.0
106	2.2	25912	20.45	2.37	0.00	17.1	0.00	2.37	25912.0	0.0
108	2.1	25891	20.44	2.24	0.00	17.1	0.00	2.24	25890.9	0.0
110	2.0	25871	20.44	2.13	0.00	17.1	0.00	2.13	25870.5	0.0
112	1.9	25851	20.44	2.02	0.00	17.1	0.00	2.02	25850.8	0.0
114	1.8	25832	20.43	1.92	0.00	17.1	0.00	1.92	25831.8	0.0
116	1.7	25813	20.43	1.82	0.00	17.1	0.00	1.82	25813.5	0.0
118	1.6	25796	20.43	1.73	0.00	17.1	0.00	1.73	25795.8	0.0
120	1.5	25779	20.43	1.64	0.00	17.1	0.00	1.64	25778.7	0.0
122	1.4	25762	20.42	1.55	0.00	17.1	0.00	1.55	25762.2	0.0
124	1.3	25746	20.42	1.48	0.00	17.1	0.00	1.48	25746.3	0.0
126	1.3	25731	20.42	1.40	0.00	17.1	0.00	1.40	25731.0	0.0
128	1.2	25716	20.42	1.33	0.00	17.0	0.00	1.33	25716.2	0.0
130	1.1	25702	20.41	1.26	0.00	17.0	0.00	1.26	25701.9	0.0
132	1.1	25688	20.41	1.20	0.00	17.0	0.00	1.20	25688.0	0.0
134	1.0	25675	20.41	1.14	0.00	17.0	0.00	1.14	25674.7	0.0
136	1.0	25662	20.41	1.08	0.00	17.0	0.00	1.08	25661.9	0.0
138	0.9	25649	20.41	1.02	0.00	17.0	0.00	1.02	25649.4	0.0
140	0.9	25637	20.40	0.97	0.00	17.0	0.00	0.97	25637.5	0.0
142	0.8	25626	20.40	0.92	0.00	17.0	0.00	0.92	25625.9	0.0
144	0.8	25615	20.40	0.88	0.00	17.0	0.00	0.88	25614.7	0.0
146	0.7	25604	20.40	0.83	0.00	17.0	0.00	0.83	25604.0	0.0
148	0.7	25594	20.40	0.79	0.00	17.0	0.00	0.79	25593.6	0.0
150	0.7	25584	20.39	0.75	0.00	17.0	0.00	0.75	25583.5	0.0
152	0.6	25574	20.39	0.71	0.00	17.0	0.00	0.71	25573.8	0.0
154	0.6	25564	20.39	0.68	0.00	17.0	0.00	0.68	25564.5	0.0
156	0.6	25555	20.39	0.64	0.00	17.0	0.00	0.64	25555.4	0.0
158	0.5	25547	20.39	0.61	0.00	17.0	0.00	0.61	25546.7	0.0
160	0.5	25538	20.39	0.58	0.00	17.0	0.00	0.58	25538.3	0.0
162	0.5	25530	20.39	0.55	0.00	17.0	0.00	0.55	25530.2	0.0
164	0.5	25522	20.39	0.52	0.00	17.0	0.00	0.52	25522.3	0.0
166	0.4	25515	20.38	0.50	0.00	17.0	0.00	0.50	25514.8	0.0
168	0.4	25507	20.38	0.47	0.00	17.0	0.00	0.47	25507.4	0.0
170	0.4	25500	20.38	0.45	0.00	17.0	0.00	0.45	25500.4	0.0
172	0.4	25494	20.38	0.42	0.00	17.0	0.00	0.42	25493.6	0.0
174	0.4	25487	20.38	0.40	0.00	17.0	0.00	0.40	25487.0	0.0
176	0.3	25481	20.38	0.38	0.00	17.0	0.00	0.38	25480.6	0.0
178	0.3	25475	20.38	0.36	0.00	17.0	0.00	0.36	25474.5	0.0
180	0.3	25469	20.38	0.35	0.00	17.0	0.00	0.35	25468.6	0.0
182	0.3	25463	20.38	0.33	0.00	17.0	0.00	0.33	25462.9	0.0
184	0.3	25457	20.37	0.31	0.00	17.0	0.00	0.31	25457.3	0.0
186	0.3	25452	20.37	0.30	0.00	17.0	0.00	0.30	25452.0	0.0
188	0.2	25447	20.37	0.28	0.00	17.0	0.00	0.28	25446.9	0.0
190	0.2	25442	20.37	0.27	0.00	17.0	0.00	0.27	25441.9	0.0
192	0.2	25437	20.37	0.25	0.00	17.0	0.00	0.25	25437.1	0.0
194	0.2	25432	20.37	0.24	0.00	17.0	0.00	0.24	25432.5	0.0
196	0.2	25428	20.37	0.23	0.00	17.0	0.00	0.23	25428.0	0.0
198	0.2	25424	20.37	0.22	0.00	17.0	0.00	0.22	25423.7	0.0
200	0.2	25420	20.37	0.21	0.00	17.0	0.00	0.21	25419.5	0.0
202	0.2	25415	20.37	0.20	0.00	17.0	0.00	0.20	25415.5	0.0
204	0.2	25412	20.37	0.19	0.00	17.0	0.00	0.19	25411.6	0.0

WATERSHED DATA

BEFORE DEVELOPMENT

WATERSHED AREA	1.27 ACRES
HYDRAULIC LENGTH	553 FT
CHANGE IN HEIGHT	12.5 FT
RUNOFF COEF. 'C'	0.2
TIME OF CONCENTR	5.00 MIN
INTENSITY (100YR)	9.60 IN/HR

Qa = 2.44 CFS

Qa = PRE-DEVELOPED PEAK DISCHARGE

AFTER DEVELOPMENT

WATERSHED AREA	1.27 ACRES
HYDRAULIC LENGTH	553 FT
CHANGE IN HEIGHT	12.5 FT
RUNOFF COEF. 'C'	0.78
TIME OF CONCENTR	5.00 MIN
INTENSITY (100YR)	9.60 IN/HR

Qp = 9.51 CFS

Qp = POST-DEVELOPED PEAK DISCHARGE

COMPUTE DEPTH OF RUNOFF

P = 10 INCHES 100yr, 24hr PRECIPITATION
CN = 89

S = (1000/CN)-10
S = 1.24

Depth (D) = (P-0.2S)^2/(P+0.8S)
D = 8.66 IN - 100yr, 24hr RUNOFF DEPTH

SET VOLUME AND COMPUTE TIME TO PEAK

Tp = [(43.5)(D)(Area)] / Qp
 Tp = 50.28 MINUTES

Storage Volume Req'd = (Qp-Qa)*Tp*1.39*60
 = 29,655 cu. ft.

CALCULATE Ks AND b

SET NORMAL ELEVATION AT = 16.00 feet

CONTOUR	CONTOUR AREA (sq ft)	INCR VOL (cu ft)	S		Z		Z est (ft)
			ACCUM VOL (cu ft)	STAGE (ft)	ln S	ln Z	
16.00	4,370	0	0	0	0	0	0
16.50	5,192	2,391	2,391	0.5	7.7793	-0.69314718	0.50
17.50	5,675	5,434	7,824	1.5	8.9650	0.4055	1.49
18.50	6,159	5,917	13,741	2.5	9.5281	0.9163	2.49
19.50	6,644	6,402	20,143	3.5	9.9106	1.2528	3.53
20.50	7,130	6,887	27,030	4.5	10.2047	1.5041	4.62

Regression Output:

==> Ks = 5073
 b = 1.09

X Coefficient 8.53

**CHAINSAW METHOD FOR
RISER BARREL ROUTING**

STORM DATA

Qa = 2.44 cfs
Qp = 9.51 cfs
Tp = 50.3 min
dT = 2 min

* Infiltration rate = in/hr

BASIN DATA

Ks = 5073
b = 1.09
Zo = 16.00 ft
Normal water elev = 16.00 ft

Box Weir Length = 10 ft
Cw = 3.0
Zcr = 19.70 ft

Peak Outflow = 5.54 cfs
Peak Stage = 19.94 ft
Maximum Storage = 22,723 cu ft

Control Holes:

State Orifice: Dia = 1.25 in
Inv = 16.00 ft
Weir: L = 4 in
Inv = 17.50 ft

Time (min)	Inflow (cfs)	Storage (cu ft)	Stage (ft)	Outflow (cfs)	W Riser (cfs)	Barrel (cfs)	Orifice (cfs)	City Weir (cfs)	IFStore (cu ft)	Infiltrate (cf)
0	0.0	0	16.00	0.00	0	1.396762	0	0.00	0.0	0.0
2	0.0	0	16.00	0	0.00	1.396762	0	0.00	0.0	0.0
4	0.1	4	16.00	0.00	0.00	1.4	0.00	0.00	4.4	0.0
6	0.3	22	16.01	0.00	0.00	1.4	0.00	0.00	22.2	0.0
8	0.6	62	16.02	0.00	0.00	1.5	0.00	0.00	61.8	0.0
10	0.9	131	16.04	0.00	0.00	1.5	0.00	0.00	131.5	0.0
12	1.3	239	16.06	0.00	0.00	1.7	0.00	0.00	239.1	0.0
14	1.7	392	16.10	0.01	0.00	1.8	0.01	0.00	391.5	0.0
16	2.2	595	16.14	0.01	0.00	2.0	0.01	0.00	595.3	0.0
18	2.7	856	16.20	0.02	0.00	2.3	0.02	0.00	855.9	0.0
20	3.3	1178	16.26	0.02	0.00	2.6	0.02	0.00	1178.4	0.0
22	3.8	1567	16.34	0.02	0.00	3.0	0.02	0.00	1566.6	0.0
24	4.4	2023	16.43	0.02	0.00	3.6	0.02	0.00	2023.3	0.0
26	5.0	2550	16.53	0.03	0.00	4.1	0.03	0.00	2550.3	0.0
28	5.6	3148	16.65	0.03	0.00	4.8	0.03	0.00	3148.0	0.0
30	6.2	3816	16.77	0.03	0.00	5.7	0.03	0.00	3816.2	0.0
32	6.7	4553	16.91	0.04	0.00	6.6	0.04	0.00	4553.3	0.0
34	7.3	5356	17.05	0.04	0.00	7.5	0.04	0.00	5356.4	0.0
36	7.7	6222	17.21	0.04	0.00	8.2	0.04	0.00	6222.1	0.0
38	8.2	7146	17.37	0.05	0.00	8.8	0.05	0.00	7145.5	0.0
40	8.6	8121	17.54	0.07	0.00	9.5	0.05	0.02	8121.2	0.0
42	8.9	9140	17.71	0.31	0.00	10.1	0.05	0.26	9140.3	0.0
44	9.1	10169	17.89	0.64	0.00	10.7	0.05	0.58	10169.3	0.0
46	9.3	11190	18.06	0.84	0.00	11.2	0.06	0.78	11190.4	0.0
48	9.5	12211	18.23	0.99	0.00	11.8	0.06	0.93	12211.0	0.0
50	9.5	13227	18.40	1.12	0.00	12.3	0.06	1.06	13227.3	0.0
52	9.5	14234	18.57	1.24	0.00	12.7	0.06	1.18	14233.5	0.0
54	9.4	15223	18.73	1.34	0.00	13.2	0.07	1.28	15222.6	0.0
56	9.2	16187	18.89	1.44	0.00	13.6	0.07	1.37	16187.2	0.0
58	9.0	17120	19.04	1.52	0.00	14.0	0.07	1.45	17119.9	0.0
60	8.7	18013	19.19	1.60	0.00	14.3	0.07	1.53	18013.5	0.0
62	8.3	18861	19.33	1.67	0.00	14.6	0.07	1.59	18861.0	0.0
64	7.9	19656	19.45	1.73	0.00	15.0	0.07	1.65	19656.0	0.0
66	7.5	20395	19.57	1.78	0.00	15.2	0.08	1.71	20395.4	0.0
68	7.1	21080	19.68	1.83	0.00	15.5	0.08	1.76	21080.4	0.0
70	6.8	21714	19.78	2.59	0.71	15.7	0.08	1.80	21714.2	0.0
72	6.4	22214	19.86	3.87	1.96	15.9	0.08	1.83	22214.3	0.0
74	6.1	22520	19.91	4.83	2.90	16.0	0.08	1.85	22519.7	0.0
76	5.8	22671	19.93	5.35	3.41	16.0	0.08	1.86	22670.7	0.0
78	5.5	22723	19.94	5.54	3.59	16.1	0.08	1.87	22722.5	0.0
80	5.2	22717	19.94	5.52	3.57	16.1	0.08	1.87	22717.2	0.0
82	5.0	22681	19.94	5.39	3.45	16.0	0.08	1.86	22681.0	0.0
84	4.7	22629	19.93	5.21	3.27	16.0	0.08	1.86	22628.7	0.0
86	4.5	22568	19.92	5.00	3.06	16.0	0.08	1.86	22568.5	0.0
88	4.2	22505	19.91	4.78	2.85	16.0	0.08	1.85	22504.7	0.0
90	4.0	22440	19.90	4.57	2.64	16.0	0.08	1.85	22439.7	0.0
92	3.8	22375	19.89	4.36	2.44	15.9	0.08	1.84	22374.7	0.0
94	3.6	22310	19.88	4.16	2.24	15.9	0.08	1.84	22310.4	0.0

96	3.4	22247	19.87	3.97	2.05	15.9	0.08	1.84	22247.0	0.0
98	3.3	22185	19.86	3.78	1.87	15.9	0.08	1.83	22184.8	0.0
100	3.1	22124	19.85	3.61	1.70	15.8	0.08	1.83	22123.8	0.0
102	3.0	22064	19.84	3.44	1.54	15.8	0.08	1.82	22063.9	0.0
104	2.8	22005	19.83	3.29	1.39	15.8	0.08	1.82	22005.2	0.0
106	2.7	21948	19.82	3.14	1.24	15.8	0.08	1.82	21947.5	0.0
108	2.5	21891	19.81	2.99	1.10	15.8	0.08	1.81	21890.8	0.0
110	2.4	21835	19.80	2.86	0.97	15.7	0.08	1.81	21835.1	0.0
112	2.3	21780	19.79	2.73	0.85	15.7	0.08	1.80	21780.1	0.0
114	2.2	21726	19.78	2.61	0.74	15.7	0.08	1.80	21725.8	0.0
116	2.1	21672	19.78	2.50	0.63	15.7	0.08	1.80	21672.1	0.0
118	2.0	21619	19.77	2.40	0.52	15.7	0.08	1.79	21618.8	0.0
120	1.9	21566	19.76	2.30	0.43	15.6	0.08	1.79	21565.8	0.0
122	1.8	21513	19.75	2.20	0.34	15.6	0.08	1.79	21512.9	0.0
124	1.7	21460	19.74	2.12	0.26	15.6	0.08	1.78	21459.8	0.0
126	1.6	21406	19.73	2.04	0.18	15.6	0.08	1.78	21406.4	0.0
128	1.5	21352	19.72	1.97	0.12	15.6	0.08	1.78	21352.2	0.0
130	1.4	21297	19.72	1.91	0.06	15.6	0.08	1.77	21296.9	0.0
132	1.4	21240	19.71	1.86	0.02	15.5	0.08	1.77	21239.7	0.0
134	1.3	21179	19.70	1.84	0.00	15.5	0.08	1.76	21179.5	0.0
136	1.2	21114	19.69	1.84	0.00	15.5	0.08	1.76	21113.6	0.0
138	1.2	21041	19.67	1.83	0.00	15.5	0.08	1.75	21040.5	0.0
140	1.1	20961	19.66	1.82	0.00	15.4	0.08	1.75	20960.6	0.0
142	1.1	20874	19.65	1.82	0.00	15.4	0.08	1.74	20874.4	0.0
144	1.0	20782	19.63	1.81	0.00	15.4	0.08	1.74	20782.2	0.0
146	0.9	20684	19.62	1.80	0.00	15.3	0.08	1.73	20684.4	0.0
148	0.9	20582	19.60	1.80	0.00	15.3	0.08	1.72	20581.5	0.0
150	0.9	20474	19.58	1.79	0.00	15.3	0.08	1.71	20473.7	0.0
152	0.8	20361	19.57	1.78	0.00	15.2	0.08	1.71	20361.5	0.0
154	0.8	20245	19.55	1.77	0.00	15.2	0.08	1.70	20245.1	0.0
156	0.7	20125	19.53	1.76	0.00	15.1	0.08	1.69	20124.8	0.0
158	0.7	20001	19.51	1.75	0.00	15.1	0.07	1.68	20000.9	0.0
160	0.7	19874	19.49	1.74	0.00	15.0	0.07	1.67	19873.7	0.0
162	0.6	19743	19.47	1.74	0.00	15.0	0.07	1.66	19743.4	0.0
164	0.6	19610	19.45	1.72	0.00	14.9	0.07	1.65	19610.4	0.0
166	0.6	19475	19.42	1.71	0.00	14.9	0.07	1.64	19474.8	0.0
168	0.5	19337	19.40	1.70	0.00	14.8	0.07	1.63	19336.8	0.0
170	0.5	19197	19.38	1.69	0.00	14.8	0.07	1.62	19196.7	0.0
172	0.5	19055	19.36	1.68	0.00	14.7	0.07	1.61	19054.6	0.0
174	0.5	18911	19.33	1.67	0.00	14.7	0.07	1.60	18910.8	0.0
176	0.4	18765	19.31	1.66	0.00	14.6	0.07	1.59	18765.4	0.0
178	0.4	18619	19.29	1.65	0.00	14.6	0.07	1.57	18618.7	0.0
180	0.4	18471	19.26	1.64	0.00	14.5	0.07	1.56	18470.7	0.0
182	0.4	18322	19.24	1.62	0.00	14.4	0.07	1.55	18321.6	0.0
184	0.4	18172	19.21	1.61	0.00	14.4	0.07	1.54	18171.7	0.0
186	0.3	18021	19.19	1.60	0.00	14.3	0.07	1.53	18020.9	0.0
188	0.3	17870	19.16	1.59	0.00	14.3	0.07	1.51	17869.5	0.0
190	0.3	17718	19.14	1.57	0.00	14.2	0.07	1.50	17717.6	0.0
192	0.3	17565	19.12	1.56	0.00	14.1	0.07	1.49	17565.2	0.0
194	0.3	17413	19.09	1.55	0.00	14.1	0.07	1.48	17412.6	0.0
196	0.3	17260	19.07	1.53	0.00	14.0	0.07	1.46	17259.8	0.0
198	0.2	17107	19.04	1.52	0.00	14.0	0.07	1.45	17107.0	0.0
200	0.2	16954	19.02	1.51	0.00	13.9	0.07	1.44	16954.1	0.0
202	0.2	16801	18.99	1.49	0.00	13.8	0.07	1.42	16801.4	0.0
204	0.2	16649	18.97	1.48	0.00	13.8	0.07	1.41	16649.0	0.0

WATERSHED DATA

BEFORE DEVELOPMENT

WATERSHED AREA	1.27 ACRES
HYDRAULIC LENGTH	553 FT
CHANGE IN HEIGHT	12.5 FT
RUNOFF COEF. 'C'	0.2
TIME OF CONCENTR	5.00 MIN
INTENSITY (100YR)	9.60 IN/HR

Qa = 2.44 CFS

Qa = PRE-DEVELOPED PEAK DISCHARGE

AFTER DEVELOPMENT

WATERSHED AREA	1.27 ACRES
HYDRAULIC LENGTH	553 FT
CHANGE IN HEIGHT	12.5 FT
RUNOFF COEF. 'C'	0.78
TIME OF CONCENTR	5.00 MIN
INTENSITY (100YR)	9.60 IN/HR

Qp = 9.51 CFS

Qp = POST-DEVELOPED PEAK DISCHARGE

COMPUTE DEPTH OF RUNOFF

P = 10 INCHES 100yr, 24hr PRECIPITATION
CN = 89

S = (1000/CN)-10
S = 1.24

Depth (D) = (P-0.2S)^2/(P+0.8S)
D = 8.66 IN - 100yr, 24hr RUNOFF DEPTH

SET VOLUME AND COMPUTE TIME TO PEAK

Tp = [(43.5)(D)(Area)] / Qp
Tp = 50.28 MINUTES

Storage Volume Req'd = (Qp-Qa)*Tp*1.39*60
= 29,655 cu. ft.

CALCULATE Ks AND b

SET NORMAL ELEVATION AT = 16.00 feet

CONTOUR	CONTOUR AREA (sq ft)	INCR VOL (cu ft)	S		Z		Z est (ft)
			ACCUM VOL (cu ft)	STAGE (ft)	In S	In Z	
16.00	4,370	0	0	0	0	0	0
16.50	5,192	2,391	2,391	0.5	7.7793	-0.69314718	0.50
17.50	5,675	5,434	7,824	1.5	8.9650	0.4055	1.49
18.50	6,159	5,917	13,741	2.5	9.5281	0.9163	2.49
19.50	6,644	6,402	20,143	3.5	9.9106	1.2528	3.53
20.50	7,130	6,887	27,030	4.5	10.2047	1.5041	4.62

Regression Output:

==> Ks = 5073
b = 1.09

X Coefficient 8.53

**CHAINSAW METHOD FOR
RISER BARREL ROUTING**

STORM DATA

Qa = 2.44 cfs
Qp = 9.51 cfs
Tp = 50.3 min
dT = 2 min

* Infiltration rate = in/hr

BASIN DATA

Ks = 5073
b = 1.09
Zo = 16.00 ft
Normal water elev = 16.00 ft

Peak Outflow = 5.58 cfs

Peak Stage = 20.52 ft
Maximum Storage = 26,387 cu ft

Control Holes:

State Orifice: Dia = 0.00 in

Inv = 16.00 ft

Weir: L = 120 in

Inv = 20.35 ft

Dd = 18 in
Cd = 0.59
Zi = 15.50 ft

Time (min)	Inflow (cfs)	Storage (cu ft)	Stage (ft)	Outflow (cfs)	W Riser (cfs)	Barrel (cfs)	Orifice (cfs)	City Weir (cfs)	IFStore (cu ft)	Infiltrate (cf)
0	0.0	0	16.00	0.00	0	1.396762	0	0.00	0.0	0.0
2	0.0	0	16.00	0	0.00	1.396762	0	0.00	0.0	0.0
4	0.1	4	16.00	0.00	0.00	1.4	0.00	0.00	4.4	0.0
6	0.3	22	16.01	0.00	0.00	1.4	0.00	0.00	22.2	0.0
8	0.6	62	16.02	0.00	0.00	1.5	0.00	0.00	61.8	0.0
10	0.9	132	16.04	0.00	0.00	1.5	0.00	0.00	131.6	0.0
12	1.3	239	16.06	0.00	0.00	1.7	0.00	0.00	239.4	0.0
14	1.7	392	16.10	0.00	0.00	1.8	0.00	0.00	392.4	0.0
16	2.2	597	16.14	0.00	0.00	2.0	0.00	0.00	597.1	0.0
18	2.7	859	16.20	0.00	0.00	2.3	0.00	0.00	859.2	0.0
20	3.3	1184	16.26	0.00	0.00	2.6	0.00	0.00	1183.5	0.0
22	3.8	1574	16.34	0.00	0.00	3.1	0.00	0.00	1573.9	0.0
24	4.4	2033	16.43	0.00	0.00	3.6	0.00	0.00	2033.2	0.0
26	5.0	2563	16.54	0.00	0.00	4.2	0.00	0.00	2563.1	0.0
28	5.6	3164	16.65	0.00	0.00	4.9	0.00	0.00	3164.3	0.0
30	6.2	3836	16.77	0.00	0.00	5.7	0.00	0.00	3836.2	0.0
32	6.7	4577	16.91	0.00	0.00	6.6	0.00	0.00	4577.3	0.0
34	7.3	5385	17.06	0.00	0.00	7.5	0.00	0.00	5384.9	0.0
36	7.7	6255	17.21	0.00	0.00	8.2	0.00	0.00	6255.4	0.0
38	8.2	7184	17.37	0.00	0.00	8.9	0.00	0.00	7184.0	0.0
40	8.6	8165	17.55	0.00	0.00	9.5	0.00	0.00	8165.3	0.0
42	8.9	9193	17.72	0.00	0.00	10.1	0.00	0.00	9192.6	0.0
44	9.1	10259	17.90	0.00	0.00	10.7	0.00	0.00	10259.1	0.0
46	9.3	11357	18.09	0.00	0.00	11.3	0.00	0.00	11356.8	0.0
48	9.5	12478	18.28	0.00	0.00	11.9	0.00	0.00	12477.7	0.0
50	9.5	13613	18.47	0.00	0.00	12.4	0.00	0.00	13613.0	0.0
52	9.5	14754	18.66	0.00	0.00	13.0	0.00	0.00	14754.1	0.0
54	9.4	15892	18.84	0.00	0.00	13.5	0.00	0.00	15892.0	0.0
56	9.2	17018	19.03	0.00	0.00	13.9	0.00	0.00	17017.9	0.0
58	9.0	18123	19.21	0.00	0.00	14.4	0.00	0.00	18123.1	0.0
60	8.7	19199	19.38	0.00	0.00	14.8	0.00	0.00	19199.2	0.0
62	8.3	20238	19.55	0.00	0.00	15.2	0.00	0.00	20238.5	0.0
64	7.9	21234	19.71	0.00	0.00	15.5	0.00	0.00	21233.5	0.0
66	7.5	22180	19.86	0.00	0.00	15.9	0.00	0.00	22180.3	0.0
68	7.1	23079	20.00	0.00	0.00	16.2	0.00	0.00	23079.4	0.0
70	6.8	23933	20.13	0.00	0.00	16.5	0.00	0.00	23933.2	0.0
72	6.4	24744	20.26	0.00	0.00	16.7	0.00	0.00	24744.0	0.0
74	6.1	25514	20.38	0.49	0.00	17.0	0.00	0.49	25513.9	0.0
76	5.8	26186	20.49	4.11	0.00	17.2	0.00	4.11	26185.9	0.0
78	5.5	26387	20.52	5.58	0.00	17.3	0.00	5.58	26386.7	0.0
80	5.2	26376	20.52	5.50	0.00	17.3	0.00	5.50	26376.3	0.0
82	5.0	26342	20.51	5.24	0.00	17.2	0.00	5.24	26342.2	0.0
84	4.7	26308	20.51	4.98	0.00	17.2	0.00	4.98	26307.6	0.0
86	4.5	26274	20.50	4.74	0.00	17.2	0.00	4.74	26274.0	0.0
88	4.2	26242	20.50	4.50	0.00	17.2	0.00	4.50	26241.5	0.0
90	4.0	26210	20.49	4.28	0.00	17.2	0.00	4.28	26210.1	0.0
92	3.8	26180	20.49	4.07	0.00	17.2	0.00	4.07	26179.8	0.0
94	3.6	26151	20.48	3.87	0.00	17.2	0.00	3.87	26150.5	0.0

Flying Machine Brewery
 Wet Detention Spillway Routing
 100-year Storm

96	3.4	26122	20.48	3.68	0.00	17.2	0.00	3.68	26122.2	0.0
98	3.3	26095	20.48	3.50	0.00	17.2	0.00	3.50	26094.8	0.0
100	3.1	26068	20.47	3.32	0.00	17.2	0.00	3.32	26068.4	0.0
102	3.0	26043	20.47	3.16	0.00	17.2	0.00	3.16	26042.9	0.0
104	2.8	26018	20.46	3.00	0.00	17.1	0.00	3.00	26018.2	0.0
106	2.7	25994	20.46	2.86	0.00	17.1	0.00	2.86	25994.3	0.0
108	2.5	25971	20.46	2.72	0.00	17.1	0.00	2.72	25971.2	0.0
110	2.4	25949	20.45	2.58	0.00	17.1	0.00	2.58	25948.9	0.0
112	2.3	25927	20.45	2.45	0.00	17.1	0.00	2.45	25927.4	0.0
114	2.2	25907	20.45	2.33	0.00	17.1	0.00	2.33	25906.6	0.0
116	2.1	25886	20.44	2.22	0.00	17.1	0.00	2.22	25886.5	0.0
118	2.0	25867	20.44	2.11	0.00	17.1	0.00	2.11	25867.0	0.0
120	1.9	25848	20.44	2.01	0.00	17.1	0.00	2.01	25848.2	0.0
122	1.8	25830	20.43	1.91	0.00	17.1	0.00	1.91	25830.0	0.0
124	1.7	25812	20.43	1.81	0.00	17.1	0.00	1.81	25812.5	0.0
126	1.6	25796	20.43	1.73	0.00	17.1	0.00	1.73	25795.5	0.0
128	1.5	25779	20.43	1.64	0.00	17.1	0.00	1.64	25779.1	0.0
130	1.4	25763	20.42	1.56	0.00	17.1	0.00	1.56	25763.3	0.0
132	1.4	25748	20.42	1.48	0.00	17.1	0.00	1.48	25748.0	0.0
134	1.3	25733	20.42	1.41	0.00	17.1	0.00	1.41	25733.1	0.0
136	1.2	25719	20.42	1.34	0.00	17.1	0.00	1.34	25718.8	0.0
138	1.2	25705	20.41	1.28	0.00	17.0	0.00	1.28	25705.0	0.0
140	1.1	25692	20.41	1.21	0.00	17.0	0.00	1.21	25691.6	0.0
142	1.1	25679	20.41	1.15	0.00	17.0	0.00	1.15	25678.7	0.0
144	1.0	25666	20.41	1.10	0.00	17.0	0.00	1.10	25666.2	0.0
146	0.9	25654	20.41	1.04	0.00	17.0	0.00	1.04	25654.1	0.0
148	0.9	25642	20.40	0.99	0.00	17.0	0.00	0.99	25642.5	0.0
150	0.9	25631	20.40	0.94	0.00	17.0	0.00	0.94	25631.2	0.0
152	0.8	25620	20.40	0.90	0.00	17.0	0.00	0.90	25620.3	0.0
154	0.8	25610	20.40	0.86	0.00	17.0	0.00	0.86	25609.7	0.0
156	0.7	25600	20.40	0.81	0.00	17.0	0.00	0.81	25599.5	0.0
158	0.7	25590	20.40	0.77	0.00	17.0	0.00	0.77	25589.7	0.0
160	0.7	25580	20.39	0.74	0.00	17.0	0.00	0.74	25580.2	0.0
162	0.6	25571	20.39	0.70	0.00	17.0	0.00	0.70	25571.0	0.0
164	0.6	25562	20.39	0.67	0.00	17.0	0.00	0.67	25562.1	0.0
166	0.6	25553	20.39	0.63	0.00	17.0	0.00	0.63	25553.5	0.0
168	0.5	25545	20.39	0.60	0.00	17.0	0.00	0.60	25545.1	0.0
170	0.5	25537	20.39	0.57	0.00	17.0	0.00	0.57	25537.1	0.0
172	0.5	25529	20.39	0.55	0.00	17.0	0.00	0.55	25529.3	0.0
174	0.5	25522	20.39	0.52	0.00	17.0	0.00	0.52	25521.8	0.0
176	0.4	25515	20.38	0.49	0.00	17.0	0.00	0.49	25514.6	0.0
178	0.4	25508	20.38	0.47	0.00	17.0	0.00	0.47	25507.5	0.0
180	0.4	25501	20.38	0.45	0.00	17.0	0.00	0.45	25500.7	0.0
182	0.4	25494	20.38	0.43	0.00	17.0	0.00	0.43	25494.2	0.0
184	0.4	25488	20.38	0.41	0.00	17.0	0.00	0.41	25487.8	0.0
186	0.3	25482	20.38	0.39	0.00	17.0	0.00	0.39	25481.7	0.0
188	0.3	25476	20.38	0.37	0.00	17.0	0.00	0.37	25475.8	0.0
190	0.3	25470	20.38	0.35	0.00	17.0	0.00	0.35	25470.0	0.0
192	0.3	25464	20.38	0.33	0.00	17.0	0.00	0.33	25464.5	0.0
194	0.3	25459	20.38	0.32	0.00	17.0	0.00	0.32	25459.1	0.0
196	0.3	25454	20.37	0.30	0.00	17.0	0.00	0.30	25453.9	0.0
198	0.2	25449	20.37	0.29	0.00	17.0	0.00	0.29	25448.9	0.0
200	0.2	25444	20.37	0.27	0.00	17.0	0.00	0.27	25444.1	0.0
202	0.2	25439	20.37	0.26	0.00	17.0	0.00	0.26	25439.4	0.0
204	0.2	25435	20.37	0.25	0.00	17.0	0.00	0.25	25434.9	0.0

LOCATION		AREA		RUNOFF COEFF. C	RAIN INT. I (in/hr)	FLOW Q=CIA (C.F.S. REQ'D)	PIPE DATA								
FROM	TO	SUB TOTAL (Acre)	TOTAL (Acre)				N	LENGTH (ft)	S %	SIZE (in)	VEL. (fps)	Q AVAIL. (cfs)	HI INV.	LOW INV.	ELEV. HEAD (ft)
CI #1	CI #2		0.44	0.90	7.23	2.86	0.012	70	0.71%	15	2.3	5.93	17.65	17.15	0.50
CI #2	POND	0.61	1.05	0.90	7.23	6.83	0.012	24	6.87%	18	3.9	29.92	17.15	15.50	1.65
DRIVEWAY PIPE			0.92	0.78	7.23	5.19	0.012	30	7.40%	18	2.9	31.04	17.75	15.53	2.22

POND	SDMH No1		1.27	0.78	7.23	7.16	0.012	15	10.00%	18	4.1	36.08	15.75	14.25	1.50
SDMH No1	DI No 1		1.27	0.78	7.23	7.16	0.012	50	2.50%	18	4.1	18.04	14.25	13.00	1.25
DI No 1	FES		1.27	0.78	7.23	7.16	0.012	55	0.91%	18	4.1	10.88	13.00	12.50	0.50

50 Year Calculations

LOCATION		AREA		RUNOFF COEFF. C	RAIN INT. I (in/hr)	FLOW Q=CIA (C.F.S. REQ'D)	PIPE DATA								
FROM	TO	SUB TOTAL (Acre)	TOTAL (Acre)				N	LENGTH (ft)	S %	SIZE (in)	VEL. (fps)	Q AVAIL. (cfs)	HI INV.	LOW INV.	ELEV. HEAD (ft)
CI #1	CI #2		0.44	0.90	8.87	3.51	0.012	70	0.71%	15	2.9	5.93	17.65	17.15	0.50
CI #2	POND	0.61	1.05	0.90	8.87	8.38	0.012	24	6.87%	18	4.7	29.92	17.15	15.50	1.65
DRIVEWAY PIPE			0.92	0.78	8.87	6.37	0.012	30	7.40%	18	3.6	31.04	17.75	15.53	2.22

POND	SDMH No1		1.27	0.78	8.87	8.79	0.012	15	10.00%	18	5.0	36.08	15.75	14.25	1.50
SDMH No1	DI No 1		1.27	0.78	8.87	8.79	0.012	50	2.50%	18	5.0	18.04	14.25	13.00	1.25
DI No 1	FES		1.27	0.78	8.87	8.79	0.012	55	0.91%	18	5.0	10.88	13.00	12.50	0.50

Energy Dissipator Sizing

Required Zone 1 for a 18"
4.5' x 6' x 12"

Minimum Provided Zone 1 18"
5' x 10' x 12"