CALCULATIONS

for

Shinnwood Cottages

CITY OF WILMINGTON
NORTH CAROLINA

August 2017

NORTH CAROLINA PROFESSIONAL SEAL 032555 ENGINEER CHARLES D. CAZIER

8.4.17

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Prepared By:

Intracoastal Engineering, PLLC
5725 Oleander Dr. Suite E-7
Wilmington, North Carolina 28403
(910) 859-8983

PN 2016-039

Final SW Calcs
10/12/2017
SWP 2017045
RAC

04/27/17 PN 2016-039

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Stormwater Narrative

Shinnwood Cottages
Wilmington, NC

The Shinnwood Cottages Project is a Cluster development, which is a form of subdivision development, where housing units will be grouped together. The total site area for this development is 7.06 acres located on the North side of Greenville Loop Rd. in Wilmington, NC. The existing site is undeveloped and is mostly wooded with significant ground cover. The proposed improvements will consist of 21 housing units, associated parking and sidewalks, and an access drive. The total built-upon area for this subdivision is 24%, which includes a future allocation for any amenities that may be necessary.

Development of the site will disturb approximately 2.68 acres which includes the trenching required for the sewer extension from the manhole at Sleepy Hollow Lane and the proposed driveway apron that will be required for this development. Runoff from the site will be conveyed by vegetated swales, which will perform the water quality treatment. The existing wetlands will be used for peak flow attenuation and the existing outfall from the wetlands will be restored to improve the drainage condition. The total drainage area flowing to the wetlands is 2.37 acres. The outfall from the wetlands will be an existing ditch which releases runoff into Burnt Mill Creek, classification C;SW 18-74-63-2.

Shinnwood Cottages

August 11, 2017

Dimensions Property

Dimensions ROW

Parcel Boundaries

Elevation 2014

High : 125.45

Low : -72.448

→ → EXISTING DITCH OVERFLOW

1:4,091

0 0.0375 0.075 0.15 mi

0 0.03750.075 0.15 km

New Hanover County, NC

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NHC GIS Services
New Hanover County, NC

Worksheet for Trapezoidal Channel - 1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00480	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	3.00	ft
Discharge	5.38	ft^3/s

Results

Normal Depth	0.54	ft
Flow Area	3.09	ft^2
Wetted Perimeter	8.52	ft
Top Width	8.41	ft
Critical Depth	0.37	ft
Critical Slope	0.02058	ft/ft
Velocity	1.74	ft/s
Velocity Head	0.05	ft
Specific Energy	0.59	ft
Froude Number	0.51	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.54	ft
Critical Depth	0.37	ft
Channel Slope	0.00480	ft/ft
Critical Slope	0.02058	ft/ft

Worksheet for Trapezoidal Channel - 2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	3.00	ft
Discharge	4.49	ft^3/s

Results

Normal Depth	0.49	ft
Flow Area	2.67	ft^2
Wetted Perimeter	7.99	ft
Top Width	7.89	ft
Critical Depth	0.34	ft
Critical Slope	0.02115	ft/ft
Velocity	1.68	ft/s
Velocity Head	0.04	ft
Specific Energy	0.53	ft
Froude Number	0.51	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.49	ft
Critical Depth	0.34	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.02115	ft/ft

Worksheet for Trapezoidal Channel - 3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00640	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	3.00	ft
Discharge	1.84	ft^3/s

Results

Normal Depth	0.29	ft
Flow Area	1.29	ft^2
Wetted Perimeter	5.95	ft
Top Width	5.90	ft
Critical Depth	0.20	ft
Critical Slope	0.02436	ft/ft
Velocity	1.43	ft/s
Velocity Head	0.03	ft
Specific Energy	0.32	ft
Froude Number	0.54	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.29	ft
Critical Depth	0.20	ft
Channel Slope	0.00640	ft/ft
Critical Slope	0.02436	ft/ft

Property Area	
sq. ft.	acres
307,334	7.06

Impervious Area		
Land Use	sq. ft.	acres
buildings	36,750	0.84
parking/asphalt	23,586	0.54
Sidewalks	7,033	0.16
Future	6,391	0.15
Total	73,760	1.69

% impervious (BUA) = 0.240
= 24.0%
say 24.0%

Stormwater Calculations:

Drainage Area	
sq. ft.	acres
103,334	2.37

% impervious = 0.714
= 71.4%
say 71.0%

Time of Concentration:

Hydraulic Length (L) = 600 ft.
change in Height (H) = 2 ft.
$T_C = (L^{.5}/H)^{.555} / 128$
= 9.68 min.

C_{PRE} = 0.2
C_{POST} = (% imp.)(.95)+(1-% imp.)(.2)
= 0.74
I_{10} = 7.23 in/hr

CN = (98)(% imp.) + (50)(1-% imp.)
= 84

Flow for 10 year, 24 hour Storm (Q_{10}):

Q_{PRE} = (C_{PRE}) x (I_{10}) x (Area)
= 3.43 cfs
Q_{POST} = (C_{POST}) x (I_{10}) x (Area)
= 12.69 cfs

WATERSHED DATA

BEFORE DEVELOPMENT

WATERSHED AREA	2.37 ACRES
HYDRAULIC LENGTH	280 FT
CHANGE IN HEIGHT	3 FT
RUNOFF COEF. 'C'	0.2
TIME OF CONCENTR	5.00 MIN
INTENSITY (2YR)	5.88 IN/HR

Qa = 2.79 CFS

Qa = PRE-DEVELOPED PEAK DISCHARGE

AFTER DEVELOPMENT

WATERSHED AREA	2.37 ACRES
HYDRAULIC LENGTH	280 FT
CHANGE IN HEIGHT	3 FT
RUNOFF COEF. 'C'	0.74
TIME OF CONCENTR	5.00 MIN
INTENSITY (2YR)	5.88 IN/HR

Qp = 10.31 CFS

Qp = POST-DEVELOPED PEAK DISCHARGE

COMPUTE DEPTH OF RUNOFF

P = 4.5 INCHES 2yr, 24hr PRECIPITATION
CN = 84

S = (1000/CN)-10
S = 1.90

Depth (D) = (P-0.2S)^2/(P+0.8S)
D = 2.82 IN - 2yr, 24hr RUNOFF DEPTH

SET VOLUME AND COMPUTE TIME TO PEAK

Tp = [(43.5)(D)(Area)] / Qp
Tp = 28.16 MINUTES

Storage Volume Req'd = (Qp-Qa)*Tp*1.39*60
= 17,672 cu. ft.

CALCULATE Ks AND b

SET NORMAL ELEVATION AT = 24.00 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)
24.00	577	0	0	0	0	0	0
25.00	20,932	10,755	10,755	1.0	9.2831	0	1.00
26.00	66,130	43,531	54,286	2.0	10.9020	0.6931	2.00

Regression Output:
==> Ks = 10755
b = 2.34

X Coefficient 9.28

CHAINSAW METHOD FOR RISER BARREL ROUTING

STORM DATA

Qa =	2.79	cfs
Qp =	10.31	cfs
Tp =	28.2	min
dT =	2	min

**** Infiltration rate =*** 0 ***in/hr***

BASIN DATA

Ks =	10755	
b =	2.34	
Zo =	24.00	ft
Normal water elev =	24.00	ft
Box Weir Length =	0	ft
Cw =	0.0	
Zcr =	0.00	ft
Dd =	0	in
Cd =	0.59	
Zi =	24.00	ft

Peak Outflow =	0.00	cfs
Peak Stage =	25.42	ft
Maximum Storage =	24,269	cu ft

Control Holes:

State Orifice:	Dia =	0.00	in
	Inv =	24.00	ft
Weir:	L =	60	in
	Inv =	26.10	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	24.00	0.00	0	0	0	0.00	0.0	0.0
2	0.1	0	24.00	0	0.00	0	0	0.00	0.0	0.0
4	0.5	15	24.06	0.00	0.00	0.0	0.00	0.00	15.3	0.0
6	1.1	76	24.12	0.00	0.00	0.0	0.00	0.00	75.9	0.0
8	1.9	209	24.19	0.00	0.00	0.0	0.00	0.00	209.5	0.0
10	2.9	440	24.25	0.00	0.00	0.0	0.00	0.00	440.0	0.0
12	4.0	787	24.33	0.00	0.00	0.0	0.00	0.00	786.8	0.0
14	5.1	1263	24.40	0.00	0.00	0.0	0.00	0.00	1263.3	0.0
16	6.3	1877	24.47	0.00	0.00	0.0	0.00	0.00	1876.6	0.0
18	7.3	2627	24.55	0.00	0.00	0.0	0.00	0.00	2626.9	0.0
20	8.3	3508	24.62	0.00	0.00	0.0	0.00	0.00	3507.8	0.0
22	9.1	4506	24.69	0.00	0.00	0.0	0.00	0.00	4506.2	0.0
24	9.8	5603	24.76	0.00	0.00	0.0	0.00	0.00	5603.3	0.0
26	10.2	6775	24.82	0.00	0.00	0.0	0.00	0.00	6775.4	0.0
28	10.3	7995	24.88	0.00	0.00	0.0	0.00	0.00	7995.0	0.0
30	10.2	9232	24.94	0.00	0.00	0.0	0.00	0.00	9232.4	0.0
32	9.8	10457	24.99	0.00	0.00	0.0	0.00	0.00	10456.8	0.0
34	9.3	11638	25.03	0.00	0.00	0.0	0.00	0.00	11638.3	0.0
36	8.5	12749	25.08	0.00	0.00	0.0	0.00	0.00	12749.0	0.0
38	7.7	13768	25.11	0.00	0.00	0.0	0.00	0.00	13768.1	0.0
40	7.1	14697	25.14	0.00	0.00	0.0	0.00	0.00	14697.3	0.0
42	6.4	15545	25.17	0.00	0.00	0.0	0.00	0.00	15544.5	0.0
44	5.9	16317	25.20	0.00	0.00	0.0	0.00	0.00	16317.0	0.0
46	5.4	17021	25.22	0.00	0.00	0.0	0.00	0.00	17021.4	0.0
48	4.9	17664	25.24	0.00	0.00	0.0	0.00	0.00	17663.7	0.0
50	4.4	18249	25.25	0.00	0.00	0.0	0.00	0.00	18249.3	0.0
52	4.1	18783	25.27	0.00	0.00	0.0	0.00	0.00	18783.2	0.0
54	3.7	19270	25.28	0.00	0.00	0.0	0.00	0.00	19270.1	0.0
56	3.4	19714	25.30	0.00	0.00	0.0	0.00	0.00	19714.0	0.0
58	3.1	20119	25.31	0.00	0.00	0.0	0.00	0.00	20118.8	0.0
60	2.8	20488	25.32	0.00	0.00	0.0	0.00	0.00	20487.8	0.0
62	2.6	20824	25.33	0.00	0.00	0.0	0.00	0.00	20824.3	0.0
64	2.3	21131	25.34	0.00	0.00	0.0	0.00	0.00	21131.2	0.0
66	2.1	21411	25.34	0.00	0.00	0.0	0.00	0.00	21410.9	0.0
68	1.9	21666	25.35	0.00	0.00	0.0	0.00	0.00	21666.0	0.0
70	1.8	21899	25.36	0.00	0.00	0.0	0.00	0.00	21898.6	0.0
72	1.6	22111	25.36	0.00	0.00	0.0	0.00	0.00	22110.7	0.0
74	1.5	22304	25.37	0.00	0.00	0.0	0.00	0.00	22304.1	0.0
76	1.3	22480	25.37	0.00	0.00	0.0	0.00	0.00	22480.4	0.0
78	1.2	22641	25.38	0.00	0.00	0.0	0.00	0.00	22641.1	0.0
80	1.1	22788	25.38	0.00	0.00	0.0	0.00	0.00	22787.7	0.0
82	1.0	22921	25.38	0.00	0.00	0.0	0.00	0.00	22921.4	0.0
84	0.9	23043	25.39	0.00	0.00	0.0	0.00	0.00	23043.2	0.0
86	0.8	23154	25.39	0.00	0.00	0.0	0.00	0.00	23154.4	0.0
88	0.8	23256	25.39	0.00	0.00	0.0	0.00	0.00	23255.7	0.0
90	0.7	23348	25.39	0.00	0.00	0.0	0.00	0.00	23348.1	0.0
92	0.6	23432	25.40	0.00	0.00	0.0	0.00	0.00	23432.3	0.0
94	0.6	23509	25.40	0.00	0.00	0.0	0.00	0.00	23509.1	0.0

96	0.5	23579	25.40	0.00	0.00	0.0	0.00	0.00	23579.1	0.0
98	0.5	23643	25.40	0.00	0.00	0.0	0.00	0.00	23643.0	0.0
100	0.4	23701	25.40	0.00	0.00	0.0	0.00	0.00	23701.2	0.0
102	0.4	23754	25.40	0.00	0.00	0.0	0.00	0.00	23754.3	0.0
104	0.4	23803	25.41	0.00	0.00	0.0	0.00	0.00	23802.7	0.0
106	0.3	23847	25.41	0.00	0.00	0.0	0.00	0.00	23846.8	0.0
108	0.3	23887	25.41	0.00	0.00	0.0	0.00	0.00	23887.1	0.0
110	0.3	23924	25.41	0.00	0.00	0.0	0.00	0.00	23923.8	0.0
112	0.3	23957	25.41	0.00	0.00	0.0	0.00	0.00	23957.2	0.0
114	0.2	23988	25.41	0.00	0.00	0.0	0.00	0.00	23987.7	0.0
116	0.2	24016	25.41	0.00	0.00	0.0	0.00	0.00	24015.5	0.0
118	0.2	24041	25.41	0.00	0.00	0.0	0.00	0.00	24040.9	0.0
120	0.2	24064	25.41	0.00	0.00	0.0	0.00	0.00	24064.0	0.0
122	0.2	24085	25.41	0.00	0.00	0.0	0.00	0.00	24085.1	0.0
124	0.1	24104	25.41	0.00	0.00	0.0	0.00	0.00	24104.3	0.0
126	0.1	24122	25.41	0.00	0.00	0.0	0.00	0.00	24121.9	0.0
128	0.1	24138	25.41	0.00	0.00	0.0	0.00	0.00	24137.8	0.0
130	0.1	24152	25.41	0.00	0.00	0.0	0.00	0.00	24152.4	0.0
132	0.1	24166	25.41	0.00	0.00	0.0	0.00	0.00	24165.7	0.0
134	0.1	24178	25.41	0.00	0.00	0.0	0.00	0.00	24177.8	0.0
136	0.1	24189	25.41	0.00	0.00	0.0	0.00	0.00	24188.9	0.0
138	0.1	24199	25.42	0.00	0.00	0.0	0.00	0.00	24198.9	0.0
140	0.1	24208	25.42	0.00	0.00	0.0	0.00	0.00	24208.1	0.0
142	0.1	24217	25.42	0.00	0.00	0.0	0.00	0.00	24216.5	0.0
144	0.1	24224	25.42	0.00	0.00	0.0	0.00	0.00	24224.1	0.0
146	0.1	24231	25.42	0.00	0.00	0.0	0.00	0.00	24231.1	0.0
148	0.0	24237	25.42	0.00	0.00	0.0	0.00	0.00	24237.4	0.0
150	0.0	24243	25.42	0.00	0.00	0.0	0.00	0.00	24243.2	0.0
152	0.0	24249	25.42	0.00	0.00	0.0	0.00	0.00	24248.5	0.0
154	0.0	24253	25.42	0.00	0.00	0.0	0.00	0.00	24253.3	0.0
156	0.0	24258	25.42	0.00	0.00	0.0	0.00	0.00	24257.7	0.0
158	0.0	24262	25.42	0.00	0.00	0.0	0.00	0.00	24261.7	0.0
160	0.0	24265	25.42	0.00	0.00	0.0	0.00	0.00	24265.4	0.0
162	0.0	24269	25.42	0.00	0.00	0.0	0.00	0.00	24268.7	0.0
164	0.0	24272	25.42	0.00	0.00	0.0	0.00	0.00	24271.7	0.0
166	0.0	24274	25.42	0.00	0.00	0.0	0.00	0.00	24274.5	0.0
168	0.0	24277	25.42	0.00	0.00	0.0	0.00	0.00	24277.0	0.0
170	0.0	24279	25.42	0.00	0.00	0.0	0.00	0.00	24279.3	0.0
172	0.0	24281	25.42	0.00	0.00	0.0	0.00	0.00	24281.4	0.0
174	0.0	24283	25.42	0.00	0.00	0.0	0.00	0.00	24283.3	0.0
176	0.0	24285	25.42	0.00	0.00	0.0	0.00	0.00	24285.1	0.0
178	0.0	24287	25.42	0.00	0.00	0.0	0.00	0.00	24286.6	0.0
180	0.0	24288	25.42	0.00	0.00	0.0	0.00	0.00	24288.1	0.0
182	0.0	24289	25.42	0.00	0.00	0.0	0.00	0.00	24289.4	0.0
184	0.0	24291	25.42	0.00	0.00	0.0	0.00	0.00	24290.6	0.0
186	0.0	24292	25.42	0.00	0.00	0.0	0.00	0.00	24291.7	0.0
188	0.0	24293	25.42	0.00	0.00	0.0	0.00	0.00	24292.7	0.0
190	0.0	24294	25.42	0.00	0.00	0.0	0.00	0.00	24293.6	0.0
192	0.0	24294	25.42	0.00	0.00	0.0	0.00	0.00	24294.5	0.0
194	0.0	24295	25.42	0.00	0.00	0.0	0.00	0.00	24295.2	0.0
196	0.0	24296	25.42	0.00	0.00	0.0	0.00	0.00	24295.9	0.0
198	0.0	24297	25.42	0.00	0.00	0.0	0.00	0.00	24296.6	0.0
200	0.0	24297	25.42	0.00	0.00	0.0	0.00	0.00	24297.1	0.0
202	0.0	24298	25.42	0.00	0.00	0.0	0.00	0.00	24297.7	0.0
204	0.0	24298	25.42	0.00	0.00	0.0	0.00	0.00	24298.1	0.0

WATERSHED DATA

BEFORE DEVELOPMENT

WATERSHED AREA	2.37 ACRES
HYDRAULIC LENGTH	280 FT
CHANGE IN HEIGHT	3 FT
RUNOFF COEF. 'C'	0.2
TIME OF CONCENTR	5.00 MIN
INTENSITY (10YR)	7.23 IN/HR

Qa = 3.43 CFS

Qa = PRE-DEVELOPED PEAK DISCHARGE

AFTER DEVELOPMENT

WATERSHED AREA	2.37 ACRES
HYDRAULIC LENGTH	280 FT
CHANGE IN HEIGHT	3 FT
RUNOFF COEF. 'C'	0.74
TIME OF CONCENTR	5.00 MIN
INTENSITY (10YR)	7.23 IN/HR

Qp = 12.68 CFS

Qp = POST-DEVELOPED PEAK DISCHARGE

COMPUTE DEPTH OF RUNOFF

P = 7 INCHES 10yr, 24hr PRECIPITATION
CN = 84

S = (1000/CN)-10
S = 1.90

Depth (D) = (P-0.2S)^2/(P+0.8S)
D = 5.14 IN - 10yr, 24hr RUNOFF DEPTH

SET VOLUME AND COMPUTE TIME TO PEAK

Tp = [(43.5)(D)(Area)] / Qp
Tp = 41.79 MINUTES

Storage Volume Req'd = (Qp-Qa)*Tp*1.39*60
= 32,249 cu. ft.

CALCULATE Ks AND b

SET NORMAL ELEVATION AT = 24.00 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)
24.00	577	0	0	0	0	0	0
25.00	20,932	10,755	10,755	1.0	9.2831	0	1.00
26.00	66,130	43,531	54,286	2.0	10.9020	0.6931	2.00

Regression Output:
==> Ks = 10755
b = 2.34

X Coefficient 9.28

CHAINSAW METHOD FOR RISER BARREL ROUTING

STORM DATA

Qa =	3.43	cfs
Qp =	12.68	cfs
Tp =	41.8	min
dT =	2	min

** Infiltration rate =* 0 *in/hr*

BASIN DATA

Ks =	10755	
b =	2.34	
Zo =	24.00	ft
Normal water elev =	24.00	ft
Box Weir Length =	0	ft
Cw =	0.0	
Zcr =	0.00	ft
Dd =	0	in
Cd =	0.59	
Zi =	24.00	ft

Peak Outflow =	0.00	cfs
Peak Stage =	25.82	ft
Maximum Storage =	43,641	cu ft

Control Holes:

State Orifice:	Dia =	0.00	in
	Inv =	24.00	ft
Weir:	L =	60	in
	Inv =	26.10	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	24.00	0.00	0	0	0	0.00	0.0	0.0
2	0.1	0	24.00	0	0.00	0	0	0.00	0.0	0.0
4	0.3	9	24.05	0.00	0.00	0.0	0.00	0.00	8.6	0.0
6	0.6	43	24.09	0.00	0.00	0.0	0.00	0.00	42.7	0.0
8	1.1	119	24.15	0.00	0.00	0.0	0.00	0.00	118.8	0.0
10	1.7	252	24.20	0.00	0.00	0.0	0.00	0.00	252.3	0.0
12	2.4	457	24.26	0.00	0.00	0.0	0.00	0.00	457.3	0.0
14	3.2	746	24.32	0.00	0.00	0.0	0.00	0.00	746.5	0.0
16	4.1	1130	24.38	0.00	0.00	0.0	0.00	0.00	1130.3	0.0
18	5.0	1617	24.44	0.00	0.00	0.0	0.00	0.00	1617.4	0.0
20	5.9	2214	24.51	0.00	0.00	0.0	0.00	0.00	2214.0	0.0
22	6.9	2924	24.57	0.00	0.00	0.0	0.00	0.00	2923.6	0.0
24	7.8	3748	24.64	0.00	0.00	0.0	0.00	0.00	3747.5	0.0
26	8.7	4684	24.70	0.00	0.00	0.0	0.00	0.00	4684.3	0.0
28	9.6	5730	24.76	0.00	0.00	0.0	0.00	0.00	5729.9	0.0
30	10.3	6878	24.83	0.00	0.00	0.0	0.00	0.00	6878.0	0.0
32	11.0	8120	24.89	0.00	0.00	0.0	0.00	0.00	8119.8	0.0
34	11.6	9444	24.95	0.00	0.00	0.0	0.00	0.00	9444.5	0.0
36	12.1	10839	25.00	0.00	0.00	0.0	0.00	0.00	10839.3	0.0
38	12.4	12290	25.06	0.00	0.00	0.0	0.00	0.00	12290.0	0.0
40	12.6	13781	25.11	0.00	0.00	0.0	0.00	0.00	13780.9	0.0
42	12.7	15296	25.16	0.00	0.00	0.0	0.00	0.00	15295.6	0.0
44	12.6	16817	25.21	0.00	0.00	0.0	0.00	0.00	16817.1	0.0
46	12.4	18328	25.26	0.00	0.00	0.0	0.00	0.00	18328.2	0.0
48	12.0	19812	25.30	0.00	0.00	0.0	0.00	0.00	19812.0	0.0
50	11.5	21252	25.34	0.00	0.00	0.0	0.00	0.00	21252.2	0.0
52	10.9	22633	25.38	0.00	0.00	0.0	0.00	0.00	22633.5	0.0
54	10.3	23942	25.41	0.00	0.00	0.0	0.00	0.00	23941.8	0.0
56	9.6	25173	25.44	0.00	0.00	0.0	0.00	0.00	25172.8	0.0
58	9.1	26330	25.47	0.00	0.00	0.0	0.00	0.00	26329.5	0.0
60	8.5	27416	25.49	0.00	0.00	0.0	0.00	0.00	27416.5	0.0
62	8.0	28438	25.52	0.00	0.00	0.0	0.00	0.00	28437.9	0.0
64	7.5	29398	25.54	0.00	0.00	0.0	0.00	0.00	29397.7	0.0
66	7.1	30300	25.56	0.00	0.00	0.0	0.00	0.00	30299.6	0.0
68	6.6	31147	25.58	0.00	0.00	0.0	0.00	0.00	31147.1	0.0
70	6.2	31943	25.59	0.00	0.00	0.0	0.00	0.00	31943.5	0.0
72	5.9	32692	25.61	0.00	0.00	0.0	0.00	0.00	32691.8	0.0
74	5.5	33395	25.62	0.00	0.00	0.0	0.00	0.00	33395.0	0.0
76	5.2	34056	25.64	0.00	0.00	0.0	0.00	0.00	34055.8	0.0
78	4.9	34677	25.65	0.00	0.00	0.0	0.00	0.00	34676.7	0.0
80	4.6	35260	25.66	0.00	0.00	0.0	0.00	0.00	35260.2	0.0
82	4.3	35808	25.67	0.00	0.00	0.0	0.00	0.00	35808.5	0.0
84	4.0	36324	25.68	0.00	0.00	0.0	0.00	0.00	36323.7	0.0
86	3.8	36808	25.69	0.00	0.00	0.0	0.00	0.00	36807.8	0.0
88	3.6	37263	25.70	0.00	0.00	0.0	0.00	0.00	37262.7	0.0
90	3.3	37690	25.71	0.00	0.00	0.0	0.00	0.00	37690.2	0.0
92	3.1	38092	25.72	0.00	0.00	0.0	0.00	0.00	38091.9	0.0
94	3.0	38469	25.73	0.00	0.00	0.0	0.00	0.00	38469.4	0.0

96	2.8	38824	25.73	0.00	0.00	0.0	0.00	0.00	38824.1	0.0
98	2.6	39157	25.74	0.00	0.00	0.0	0.00	0.00	39157.4	0.0
100	2.5	39471	25.74	0.00	0.00	0.0	0.00	0.00	39470.6	0.0
102	2.3	39765	25.75	0.00	0.00	0.0	0.00	0.00	39764.9	0.0
104	2.2	40041	25.76	0.00	0.00	0.0	0.00	0.00	40041.4	0.0
106	2.0	40301	25.76	0.00	0.00	0.0	0.00	0.00	40301.3	0.0
108	1.9	40546	25.77	0.00	0.00	0.0	0.00	0.00	40545.5	0.0
110	1.8	40775	25.77	0.00	0.00	0.0	0.00	0.00	40775.0	0.0
112	1.7	40991	25.77	0.00	0.00	0.0	0.00	0.00	40990.6	0.0
114	1.6	41193	25.78	0.00	0.00	0.0	0.00	0.00	41193.2	0.0
116	1.5	41384	25.78	0.00	0.00	0.0	0.00	0.00	41383.6	0.0
118	1.4	41563	25.78	0.00	0.00	0.0	0.00	0.00	41562.5	0.0
120	1.3	41731	25.79	0.00	0.00	0.0	0.00	0.00	41730.7	0.0
122	1.2	41889	25.79	0.00	0.00	0.0	0.00	0.00	41888.6	0.0
124	1.2	42037	25.79	0.00	0.00	0.0	0.00	0.00	42037.1	0.0
126	1.1	42177	25.80	0.00	0.00	0.0	0.00	0.00	42176.6	0.0
128	1.0	42308	25.80	0.00	0.00	0.0	0.00	0.00	42307.7	0.0
130	1.0	42431	25.80	0.00	0.00	0.0	0.00	0.00	42430.9	0.0
132	0.9	42547	25.80	0.00	0.00	0.0	0.00	0.00	42546.6	0.0
134	0.9	42655	25.80	0.00	0.00	0.0	0.00	0.00	42655.4	0.0
136	0.8	42758	25.81	0.00	0.00	0.0	0.00	0.00	42757.6	0.0
138	0.8	42854	25.81	0.00	0.00	0.0	0.00	0.00	42853.6	0.0
140	0.7	42944	25.81	0.00	0.00	0.0	0.00	0.00	42943.9	0.0
142	0.7	43029	25.81	0.00	0.00	0.0	0.00	0.00	43028.7	0.0
144	0.6	43108	25.81	0.00	0.00	0.0	0.00	0.00	43108.3	0.0
146	0.6	43183	25.81	0.00	0.00	0.0	0.00	0.00	43183.2	0.0
148	0.6	43254	25.81	0.00	0.00	0.0	0.00	0.00	43253.6	0.0
150	0.5	43320	25.82	0.00	0.00	0.0	0.00	0.00	43319.7	0.0
152	0.5	43382	25.82	0.00	0.00	0.0	0.00	0.00	43381.8	0.0
154	0.5	43440	25.82	0.00	0.00	0.0	0.00	0.00	43440.2	0.0
156	0.4	43495	25.82	0.00	0.00	0.0	0.00	0.00	43495.1	0.0
158	0.4	43547	25.82	0.00	0.00	0.0	0.00	0.00	43546.6	0.0
160	0.4	43595	25.82	0.00	0.00	0.0	0.00	0.00	43595.1	0.0
162	0.4	43641	25.82	0.00	0.00	0.0	0.00	0.00	43640.6	0.0
164	0.3	43683	25.82	0.00	0.00	0.0	0.00	0.00	43683.4	0.0
166	0.3	43724	25.82	0.00	0.00	0.0	0.00	0.00	43723.6	0.0
168	0.3	43761	25.82	0.00	0.00	0.0	0.00	0.00	43761.3	0.0
170	0.3	43797	25.82	0.00	0.00	0.0	0.00	0.00	43796.8	0.0
172	0.3	43830	25.82	0.00	0.00	0.0	0.00	0.00	43830.2	0.0
174	0.2	43862	25.83	0.00	0.00	0.0	0.00	0.00	43861.5	0.0
176	0.2	43891	25.83	0.00	0.00	0.0	0.00	0.00	43891.0	0.0
178	0.2	43919	25.83	0.00	0.00	0.0	0.00	0.00	43918.6	0.0
180	0.2	43945	25.83	0.00	0.00	0.0	0.00	0.00	43944.6	0.0
182	0.2	43969	25.83	0.00	0.00	0.0	0.00	0.00	43969.1	0.0
184	0.2	43992	25.83	0.00	0.00	0.0	0.00	0.00	43992.0	0.0
186	0.2	44014	25.83	0.00	0.00	0.0	0.00	0.00	44013.6	0.0
188	0.2	44034	25.83	0.00	0.00	0.0	0.00	0.00	44033.9	0.0
190	0.1	44053	25.83	0.00	0.00	0.0	0.00	0.00	44052.9	0.0
192	0.1	44071	25.83	0.00	0.00	0.0	0.00	0.00	44070.9	0.0
194	0.1	44088	25.83	0.00	0.00	0.0	0.00	0.00	44087.7	0.0
196	0.1	44103	25.83	0.00	0.00	0.0	0.00	0.00	44103.5	0.0
198	0.1	44118	25.83	0.00	0.00	0.0	0.00	0.00	44118.3	0.0
200	0.1	44132	25.83	0.00	0.00	0.0	0.00	0.00	44132.3	0.0
202	0.1	44145	25.83	0.00	0.00	0.0	0.00	0.00	44145.4	0.0
204	0.1	44158	25.83	0.00	0.00	0.0	0.00	0.00	44157.7	0.0

WATERSHED DATA

BEFORE DEVELOPMENT

WATERSHED AREA	2.37 ACRES
HYDRAULIC LENGTH	280 FT
CHANGE IN HEIGHT	3 FT
RUNOFF COEF. 'C'	0.2
TIME OF CONCENTR	5.00 MIN
INTENSITY (25YR)	8.15 IN/HR

Qa = 3.86 CFS

Qa = PRE-DEVELOPED PEAK DISCHARGE

AFTER DEVELOPMENT

WATERSHED AREA	2.37 ACRES
HYDRAULIC LENGTH	280 FT
CHANGE IN HEIGHT	3 FT
RUNOFF COEF. 'C'	0.74
TIME OF CONCENTR	5.00 MIN
INTENSITY (25YR)	8.15 IN/HR

Qp = 14.29 CFS

Qp = POST-DEVELOPED PEAK DISCHARGE

COMPUTE DEPTH OF RUNOFF

P = 8.05 INCHES 25yr, 24hr PRECIPITATION
CN = 84

S = (1000/CN)-10
S = 1.90

Depth (D) = (P-0.2S)^2/(P+0.8S)
D = 6.14 IN - 25yr, 24hr RUNOFF DEPTH

SET VOLUME AND COMPUTE TIME TO PEAK

Tp = [(43.5)(D)(Area)] / Qp
Tp = 44.31 MINUTES

Storage Volume Req'd = (Qp-Qa)*Tp*1.39*60
= 38,545 cu. ft.

CALCULATE Ks AND b

SET NORMAL ELEVATION AT = 24.00 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)
24.00	577	0	0	0	0	0	0
25.00	20,932	10,755	10,755	1.0	9.2831	0	1.00
26.00	66,130	43,531	54,286	2.0	10.9020	0.6931	2.00

Regression Output:
==> Ks = 10755
b = 2.34

X Coefficient 9.28

CHAINSAW METHOD FOR RISER BARREL ROUTING

STORM DATA

Qa =	3.86 cfs		
Qp =	14.29 cfs	* *Infiltration rate* =	0 *in/hr*
Tp =	44.3 min		
dT =	2 min		

BASIN DATA

Ks =	10755		
b =	2.34		
Zo =	24.00 ft		
Normal water elev =	24.00 ft		
		Peak Outflow =	0.00 cfs
Box Weir Length =	0 ft	Peak Stage =	25.96 ft
Cw =	0.0	Maximum Storage =	51,881 cu ft
Zcr =	0.00 ft	Control Holes:	
		State Orifice: Dia =	0.00 in
Dd =	0 in	Inv =	24.00 ft
Cd =	0.59	Weir: L =	60 in
Zi =	24.00 ft	Inv =	26.10 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	24.00	0.00	0	0	0	0.00	0.0	0.0
2	0.1	0	24.00	0	0.00	0	0	0.00	0.0	0.0
4	0.3	9	24.05	0.00	0.00	0.0	0.00	0.00	8.6	0.0
6	0.6	43	24.09	0.00	0.00	0.0	0.00	0.00	42.9	0.0
8	1.1	119	24.15	0.00	0.00	0.0	0.00	0.00	119.3	0.0
10	1.7	254	24.20	0.00	0.00	0.0	0.00	0.00	253.6	0.0
12	2.4	460	24.26	0.00	0.00	0.0	0.00	0.00	460.3	0.0
14	3.2	752	24.32	0.00	0.00	0.0	0.00	0.00	752.4	0.0
16	4.1	1141	24.38	0.00	0.00	0.0	0.00	0.00	1141.3	0.0
18	5.1	1636	24.45	0.00	0.00	0.0	0.00	0.00	1636.5	0.0
20	6.1	2245	24.51	0.00	0.00	0.0	0.00	0.00	2245.1	0.0
22	7.1	2972	24.58	0.00	0.00	0.0	0.00	0.00	2972.2	0.0
24	8.1	3820	24.64	0.00	0.00	0.0	0.00	0.00	3820.4	0.0
26	9.1	4790	24.71	0.00	0.00	0.0	0.00	0.00	4789.8	0.0
28	10.0	5878	24.77	0.00	0.00	0.0	0.00	0.00	5878.4	0.0
30	10.9	7081	24.84	0.00	0.00	0.0	0.00	0.00	7081.3	0.0
32	11.7	8392	24.90	0.00	0.00	0.0	0.00	0.00	8391.7	0.0
34	12.5	9801	24.96	0.00	0.00	0.0	0.00	0.00	9800.5	0.0
36	13.1	11297	25.02	0.00	0.00	0.0	0.00	0.00	11296.7	0.0
38	13.6	12867	25.08	0.00	0.00	0.0	0.00	0.00	12867.3	0.0
40	14.0	14498	25.14	0.00	0.00	0.0	0.00	0.00	14498.1	0.0
42	14.2	16174	25.19	0.00	0.00	0.0	0.00	0.00	16173.6	0.0
44	14.3	17877	25.24	0.00	0.00	0.0	0.00	0.00	17877.3	0.0
46	14.2	19592	25.29	0.00	0.00	0.0	0.00	0.00	19592.4	0.0
48	14.1	21301	25.34	0.00	0.00	0.0	0.00	0.00	21301.4	0.0
50	13.7	22987	25.38	0.00	0.00	0.0	0.00	0.00	22987.4	0.0
52	13.3	24634	25.43	0.00	0.00	0.0	0.00	0.00	24633.8	0.0
54	12.7	26225	25.46	0.00	0.00	0.0	0.00	0.00	26224.7	0.0
56	12.0	27745	25.50	0.00	0.00	0.0	0.00	0.00	27745.3	0.0
58	11.3	29185	25.53	0.00	0.00	0.0	0.00	0.00	29185.0	0.0
60	10.7	30543	25.56	0.00	0.00	0.0	0.00	0.00	30542.6	0.0
62	10.1	31823	25.59	0.00	0.00	0.0	0.00	0.00	31822.9	0.0
64	9.5	33030	25.62	0.00	0.00	0.0	0.00	0.00	33030.2	0.0
66	8.9	34169	25.64	0.00	0.00	0.0	0.00	0.00	34168.7	0.0
68	8.4	35242	25.66	0.00	0.00	0.0	0.00	0.00	35242.4	0.0
70	8.0	36255	25.68	0.00	0.00	0.0	0.00	0.00	36254.8	0.0
72	7.5	37210	25.70	0.00	0.00	0.0	0.00	0.00	37209.5	0.0
74	7.1	38110	25.72	0.00	0.00	0.0	0.00	0.00	38109.9	0.0
76	6.7	38959	25.74	0.00	0.00	0.0	0.00	0.00	38958.9	0.0
78	6.3	39760	25.75	0.00	0.00	0.0	0.00	0.00	39759.5	0.0
80	5.9	40515	25.76	0.00	0.00	0.0	0.00	0.00	40514.5	0.0
82	5.6	41227	25.78	0.00	0.00	0.0	0.00	0.00	41226.5	0.0
84	5.3	41898	25.79	0.00	0.00	0.0	0.00	0.00	41897.9	0.0
86	5.0	42531	25.80	0.00	0.00	0.0	0.00	0.00	42531.0	0.0
88	4.7	43128	25.81	0.00	0.00	0.0	0.00	0.00	43128.1	0.0
90	4.4	43691	25.82	0.00	0.00	0.0	0.00	0.00	43691.1	0.0
92	4.2	44222	25.83	0.00	0.00	0.0	0.00	0.00	44222.1	0.0
94	3.9	44723	25.84	0.00	0.00	0.0	0.00	0.00	44722.8	0.0

96	3.7	45195	25.85	0.00	0.00	0.0	0.00	0.00	45194.9	0.0
98	3.5	45640	25.86	0.00	0.00	0.0	0.00	0.00	45640.2	0.0
100	3.3	46060	25.86	0.00	0.00	0.0	0.00	0.00	46060.0	0.0
102	3.1	46456	25.87	0.00	0.00	0.0	0.00	0.00	46456.0	0.0
104	2.9	46829	25.88	0.00	0.00	0.0	0.00	0.00	46829.4	0.0
106	2.8	47181	25.88	0.00	0.00	0.0	0.00	0.00	47181.5	0.0
108	2.6	47513	25.89	0.00	0.00	0.0	0.00	0.00	47513.5	0.0
110	2.5	47827	25.89	0.00	0.00	0.0	0.00	0.00	47826.6	0.0
112	2.3	48122	25.90	0.00	0.00	0.0	0.00	0.00	48121.9	0.0
114	2.2	48400	25.90	0.00	0.00	0.0	0.00	0.00	48400.3	0.0
116	2.1	48663	25.91	0.00	0.00	0.0	0.00	0.00	48662.9	0.0
118	1.9	48910	25.91	0.00	0.00	0.0	0.00	0.00	48910.5	0.0
120	1.8	49144	25.92	0.00	0.00	0.0	0.00	0.00	49144.0	0.0
122	1.7	49364	25.92	0.00	0.00	0.0	0.00	0.00	49364.2	0.0
124	1.6	49572	25.92	0.00	0.00	0.0	0.00	0.00	49571.8	0.0
126	1.5	49768	25.93	0.00	0.00	0.0	0.00	0.00	49767.6	0.0
128	1.5	49952	25.93	0.00	0.00	0.0	0.00	0.00	49952.3	0.0
130	1.4	50126	25.93	0.00	0.00	0.0	0.00	0.00	50126.4	0.0
132	1.3	50291	25.94	0.00	0.00	0.0	0.00	0.00	50290.6	0.0
134	1.2	50445	25.94	0.00	0.00	0.0	0.00	0.00	50445.4	0.0
136	1.1	50591	25.94	0.00	0.00	0.0	0.00	0.00	50591.5	0.0
138	1.1	50729	25.94	0.00	0.00	0.0	0.00	0.00	50729.2	0.0
140	1.0	50859	25.94	0.00	0.00	0.0	0.00	0.00	50859.0	0.0
142	1.0	50981	25.95	0.00	0.00	0.0	0.00	0.00	50981.5	0.0
144	0.9	51097	25.95	0.00	0.00	0.0	0.00	0.00	51096.9	0.0
146	0.9	51206	25.95	0.00	0.00	0.0	0.00	0.00	51205.8	0.0
148	0.8	51309	25.95	0.00	0.00	0.0	0.00	0.00	51308.5	0.0
150	0.8	51405	25.95	0.00	0.00	0.0	0.00	0.00	51405.3	0.0
152	0.7	51497	25.96	0.00	0.00	0.0	0.00	0.00	51496.7	0.0
154	0.7	51583	25.96	0.00	0.00	0.0	0.00	0.00	51582.8	0.0
156	0.6	51664	25.96	0.00	0.00	0.0	0.00	0.00	51664.0	0.0
158	0.6	51741	25.96	0.00	0.00	0.0	0.00	0.00	51740.5	0.0
160	0.6	51813	25.96	0.00	0.00	0.0	0.00	0.00	51812.8	0.0
162	0.5	51881	25.96	0.00	0.00	0.0	0.00	0.00	51880.9	0.0
164	0.5	51945	25.96	0.00	0.00	0.0	0.00	0.00	51945.1	0.0
166	0.5	52006	25.96	0.00	0.00	0.0	0.00	0.00	52005.6	0.0
168	0.4	52063	25.96	0.00	0.00	0.0	0.00	0.00	52062.7	0.0
170	0.4	52117	25.97	0.00	0.00	0.0	0.00	0.00	52116.6	0.0
172	0.4	52167	25.97	0.00	0.00	0.0	0.00	0.00	52167.4	0.0
174	0.4	52215	25.97	0.00	0.00	0.0	0.00	0.00	52215.3	0.0
176	0.4	52260	25.97	0.00	0.00	0.0	0.00	0.00	52260.4	0.0
178	0.3	52303	25.97	0.00	0.00	0.0	0.00	0.00	52303.0	0.0
180	0.3	52343	25.97	0.00	0.00	0.0	0.00	0.00	52343.2	0.0
182	0.3	52381	25.97	0.00	0.00	0.0	0.00	0.00	52381.0	0.0
184	0.3	52417	25.97	0.00	0.00	0.0	0.00	0.00	52416.7	0.0
186	0.3	52450	25.97	0.00	0.00	0.0	0.00	0.00	52450.4	0.0
188	0.2	52482	25.97	0.00	0.00	0.0	0.00	0.00	52482.2	0.0
190	0.2	52512	25.97	0.00	0.00	0.0	0.00	0.00	52512.1	0.0
192	0.2	52540	25.97	0.00	0.00	0.0	0.00	0.00	52540.4	0.0
194	0.2	52567	25.97	0.00	0.00	0.0	0.00	0.00	52567.0	0.0
196	0.2	52592	25.97	0.00	0.00	0.0	0.00	0.00	52592.1	0.0
198	0.2	52616	25.97	0.00	0.00	0.0	0.00	0.00	52615.8	0.0
200	0.2	52638	25.97	0.00	0.00	0.0	0.00	0.00	52638.1	0.0
202	0.2	52659	25.97	0.00	0.00	0.0	0.00	0.00	52659.2	0.0
204	0.2	52679	25.97	0.00	0.00	0.0	0.00	0.00	52679.0	0.0

WATERSHED DATA

BEFORE DEVELOPMENT

WATERSHED AREA	2.37 ACRES
HYDRAULIC LENGTH	280 FT
CHANGE IN HEIGHT	3 FT
RUNOFF COEF. 'C'	0.2
TIME OF CONCENTR	5.00 MIN
INTENSITY (100YR)	9.60 IN/HR

Qa = 4.55 CFS

Qa = PRE-DEVELOPED PEAK DISCHARGE

AFTER DEVELOPMENT

WATERSHED AREA	2.37 ACRES
HYDRAULIC LENGTH	280 FT
CHANGE IN HEIGHT	3 FT
RUNOFF COEF. 'C'	0.74
TIME OF CONCENTR	5.00 MIN
INTENSITY (100YR)	9.60 IN/HR

Qp = 16.84 CFS

Qp = POST-DEVELOPED PEAK DISCHARGE

COMPUTE DEPTH OF RUNOFF

P = 10 INCHES 100yr, 24hr PRECIPITATION
CN = 84

S = (1000/CN)-10
S = 1.90

Depth (D) = (P-0.2S)^2/(P+0.8S)
D = 8.03 IN - 100yr, 24hr RUNOFF DEPTH

SET VOLUME AND COMPUTE TIME TO PEAK

Tp = [(43.5)(D)(Area)] / Qp
Tp = 49.16 MINUTES

Storage Volume Req'd = (Qp-Qa)*Tp*1.39*60
= 50,377 cu. ft.

CALCULATE Ks AND b

SET NORMAL ELEVATION AT = 24.00 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)
24.00	577	0	0	0	0	0	0
25.00	20,932	10,755	10,755	1.0	9.2831	0	1.00
26.00	66,130	43,531	54,286	2.0	10.9020	0.6931	2.00

Regression Output:
==> Ks = 10755
b = 2.34

X Coefficient 9.28

CHAINSAW METHOD FOR RISER BARREL ROUTING

STORM DATA

Qa =	4.55 cfs	
Qp =	16.84 cfs	
Tp =	49.2 min	
dT =	2 min	

** Infiltration rate =* 0 *in/hr*

BASIN DATA

Ks =	10755	
b =	2.34	
Zo =	24.00 ft	
Normal water elev =	24.00 ft	
Box Weir Length =	0 ft	
Cw =	0.0	
Zcr =	0.00 ft	
Dd =	0 in	
Cd =	0.59	
Zi =	24.00 ft	

	Peak Outflow =	0.76 cfs
	Peak Stage =	26.17 ft
	Maximum Storage =	65,705 cu ft
Control Holes:		
State Orifice:	Dia =	0.00 in
	Inv =	24.00 ft
Weir:	L =	60 in
	Inv =	26.10 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	24.00	0.00	0	0	0	0.00	0.0	0.0
2	0.1	0	24.00	0	0.00	0	0	0.00	0.0	0.0
4	0.3	8	24.05	0.00	0.00	0.0	0.00	0.00	8.2	0.0
6	0.6	41	24.09	0.00	0.00	0.0	0.00	0.00	41.1	0.0
8	1.1	114	24.14	0.00	0.00	0.0	0.00	0.00	114.4	0.0
10	1.7	244	24.20	0.00	0.00	0.0	0.00	0.00	243.5	0.0
12	2.4	443	24.26	0.00	0.00	0.0	0.00	0.00	442.9	0.0
14	3.1	726	24.32	0.00	0.00	0.0	0.00	0.00	725.6	0.0
16	4.0	1104	24.38	0.00	0.00	0.0	0.00	0.00	1103.5	0.0
18	5.0	1587	24.44	0.00	0.00	0.0	0.00	0.00	1587.1	0.0
20	6.0	2185	24.51	0.00	0.00	0.0	0.00	0.00	2184.8	0.0
22	7.0	2903	24.57	0.00	0.00	0.0	0.00	0.00	2903.4	0.0
24	8.1	3748	24.64	0.00	0.00	0.0	0.00	0.00	3747.6	0.0
26	9.2	4720	24.70	0.00	0.00	0.0	0.00	0.00	4720.2	0.0
28	10.2	5822	24.77	0.00	0.00	0.0	0.00	0.00	5821.8	0.0
30	11.3	7051	24.83	0.00	0.00	0.0	0.00	0.00	7050.9	0.0
32	12.3	8404	24.90	0.00	0.00	0.0	0.00	0.00	8403.8	0.0
34	13.2	9875	24.96	0.00	0.00	0.0	0.00	0.00	9875.1	0.0
36	14.0	11457	25.03	0.00	0.00	0.0	0.00	0.00	11457.1	0.0
38	14.8	13141	25.09	0.00	0.00	0.0	0.00	0.00	13140.7	0.0
40	15.4	14915	25.15	0.00	0.00	0.0	0.00	0.00	14914.7	0.0
42	16.0	16767	25.21	0.00	0.00	0.0	0.00	0.00	16766.7	0.0
44	16.4	18683	25.27	0.00	0.00	0.0	0.00	0.00	18683.1	0.0
46	16.7	20649	25.32	0.00	0.00	0.0	0.00	0.00	20649.0	0.0
48	16.8	22649	25.38	0.00	0.00	0.0	0.00	0.00	22648.7	0.0
50	16.8	24666	25.43	0.00	0.00	0.0	0.00	0.00	24666.3	0.0
52	16.7	26685	25.48	0.00	0.00	0.0	0.00	0.00	26685.3	0.0
54	16.4	28689	25.52	0.00	0.00	0.0	0.00	0.00	28689.1	0.0
56	16.0	30662	25.57	0.00	0.00	0.0	0.00	0.00	30661.7	0.0
58	15.5	32587	25.61	0.00	0.00	0.0	0.00	0.00	32587.2	0.0
60	14.9	34451	25.65	0.00	0.00	0.0	0.00	0.00	34450.8	0.0
62	14.2	36239	25.68	0.00	0.00	0.0	0.00	0.00	36238.6	0.0
64	13.5	37941	25.72	0.00	0.00	0.0	0.00	0.00	37940.5	0.0
66	12.8	39555	25.75	0.00	0.00	0.0	0.00	0.00	39554.8	0.0
68	12.1	41086	25.78	0.00	0.00	0.0	0.00	0.00	41086.0	0.0
70	11.5	42538	25.80	0.00	0.00	0.0	0.00	0.00	42538.2	0.0
72	10.9	43916	25.83	0.00	0.00	0.0	0.00	0.00	43915.7	0.0
74	10.3	45222	25.85	0.00	0.00	0.0	0.00	0.00	45222.2	0.0
76	9.8	46461	25.87	0.00	0.00	0.0	0.00	0.00	46461.4	0.0
78	9.3	47637	25.89	0.00	0.00	0.0	0.00	0.00	47636.8	0.0
80	8.8	48752	25.91	0.00	0.00	0.0	0.00	0.00	48751.6	0.0
82	8.4	49809	25.93	0.00	0.00	0.0	0.00	0.00	49809.0	0.0
84	7.9	50812	25.94	0.00	0.00	0.0	0.00	0.00	50812.0	0.0
86	7.5	51763	25.96	0.00	0.00	0.0	0.00	0.00	51763.3	0.0
88	7.1	52666	25.97	0.00	0.00	0.0	0.00	0.00	52665.6	0.0
90	6.8	53521	25.99	0.00	0.00	0.0	0.00	0.00	53521.4	0.0
92	6.4	54333	26.00	0.00	0.00	0.0	0.00	0.00	54333.1	0.0
94	6.1	55103	26.01	0.00	0.00	0.0	0.00	0.00	55103.0	0.0

96	5.8	55833	26.02	0.00	0.00	0.0	0.00	0.00	55833.3	0.0
98	5.5	56526	26.03	0.00	0.00	0.0	0.00	0.00	56525.9	0.0
100	5.2	57183	26.05	0.00	0.00	0.0	0.00	0.00	57182.9	0.0
102	4.9	57806	26.05	0.00	0.00	0.0	0.00	0.00	57806.0	0.0
104	4.7	58397	26.06	0.00	0.00	0.0	0.00	0.00	58397.0	0.0
106	4.4	58958	26.07	0.00	0.00	0.0	0.00	0.00	58957.6	0.0
108	4.2	59489	26.08	0.00	0.00	0.0	0.00	0.00	59489.3	0.0
110	4.0	59994	26.09	0.00	0.00	0.0	0.00	0.00	59993.6	0.0
112	3.8	60472	26.09	0.00	0.00	0.0	0.00	0.00	60472.0	0.0
114	3.6	60926	26.10	0.00	0.00	0.0	0.00	0.00	60925.7	0.0
116	3.4	61356	26.11	0.03	0.00	0.0	0.00	0.03	61355.8	0.0
118	3.2	61761	26.11	0.06	0.00	0.0	0.00	0.06	61760.8	0.0
120	3.1	62140	26.12	0.10	0.00	0.0	0.00	0.10	62140.4	0.0
122	2.9	62495	26.12	0.15	0.00	0.0	0.00	0.15	62495.1	0.0
124	2.8	62825	26.13	0.20	0.00	0.0	0.00	0.20	62825.4	0.0
126	2.6	63132	26.13	0.24	0.00	0.0	0.00	0.24	63132.2	0.0
128	2.5	63416	26.14	0.29	0.00	0.0	0.00	0.29	63416.4	0.0
130	2.3	63679	26.14	0.33	0.00	0.0	0.00	0.33	63679.0	0.0
132	2.2	63921	26.14	0.38	0.00	0.0	0.00	0.38	63920.9	0.0
134	2.1	64143	26.15	0.42	0.00	0.0	0.00	0.42	64143.1	0.0
136	2.0	64347	26.15	0.46	0.00	0.0	0.00	0.46	64346.7	0.0
138	1.9	64533	26.15	0.49	0.00	0.0	0.00	0.49	64532.6	0.0
140	1.8	64702	26.16	0.52	0.00	0.0	0.00	0.52	64701.7	0.0
142	1.7	64855	26.16	0.56	0.00	0.0	0.00	0.56	64855.1	0.0
144	1.6	64994	26.16	0.58	0.00	0.0	0.00	0.58	64993.7	0.0
146	1.5	65118	26.16	0.61	0.00	0.0	0.00	0.61	65118.2	0.0
148	1.5	65230	26.16	0.63	0.00	0.0	0.00	0.63	65229.6	0.0
150	1.4	65329	26.17	0.65	0.00	0.0	0.00	0.65	65328.7	0.0
152	1.3	65416	26.17	0.67	0.00	0.0	0.00	0.67	65416.2	0.0
154	1.2	65493	26.17	0.69	0.00	0.0	0.00	0.69	65492.9	0.0
156	1.2	65559	26.17	0.71	0.00	0.0	0.00	0.71	65559.5	0.0
158	1.1	65617	26.17	0.72	0.00	0.0	0.00	0.72	65616.6	0.0
160	1.1	65665	26.17	0.73	0.00	0.0	0.00	0.73	65664.9	0.0
162	1.0	65705	26.17	0.74	0.00	0.0	0.00	0.74	65705.1	0.0
164	1.0	65738	26.17	0.74	0.00	0.0	0.00	0.74	65737.5	0.0
166	0.9	65763	26.17	0.75	0.00	0.0	0.00	0.75	65762.9	0.0
168	0.9	65782	26.17	0.75	0.00	0.0	0.00	0.75	65781.7	0.0
170	0.8	65794	26.17	0.76	0.00	0.0	0.00	0.76	65794.4	0.0
172	0.8	65801	26.17	0.76	0.00	0.0	0.00	0.76	65801.4	0.0
174	0.7	65803	26.17	0.76	0.00	0.0	0.00	0.76	65803.2	0.0
176	0.7	65800	26.17	0.76	0.00	0.0	0.00	0.76	65800.2	0.0
178	0.7	65793	26.17	0.76	0.00	0.0	0.00	0.76	65792.7	0.0
180	0.6	65781	26.17	0.75	0.00	0.0	0.00	0.75	65781.1	0.0
182	0.6	65766	26.17	0.75	0.00	0.0	0.00	0.75	65765.8	0.0
184	0.6	65747	26.17	0.75	0.00	0.0	0.00	0.75	65747.0	0.0
186	0.5	65725	26.17	0.74	0.00	0.0	0.00	0.74	65725.0	0.0
188	0.5	65700	26.17	0.74	0.00	0.0	0.00	0.74	65700.1	0.0
190	0.5	65673	26.17	0.73	0.00	0.0	0.00	0.73	65672.6	0.0
192	0.5	65643	26.17	0.72	0.00	0.0	0.00	0.72	65642.7	0.0
194	0.4	65611	26.17	0.72	0.00	0.0	0.00	0.72	65610.6	0.0
196	0.4	65577	26.17	0.71	0.00	0.0	0.00	0.71	65576.6	0.0
198	0.4	65541	26.17	0.70	0.00	0.0	0.00	0.70	65540.7	0.0
200	0.4	65503	26.17	0.69	0.00	0.0	0.00	0.69	65503.3	0.0
202	0.4	65464	26.17	0.68	0.00	0.0	0.00	0.68	65464.4	0.0
204	0.3	65424	26.17	0.68	0.00	0.0	0.00	0.68	65424.3	0.0