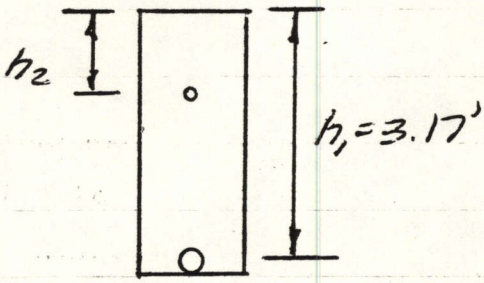
9-27-89

EFFOX DETENTION

Allowable Discharge = 3.62 c.f.s.

Use 8" ϕ opening at base of Inlet Structure



$$Q_1 = aC\sqrt{2gh_1}$$

$$Q_1 = 0.35 \times 0.60\sqrt{2 \times 32.2 \times 3.17}$$

$$= 3.00 \text{ c.f.s.}$$

$\therefore Q_2 = 3.62 \text{ c.f.s.} - 3.00 \text{ c.f.s.} = 0.62 \text{ c.f.s.}$

Solve for h_2 using 4" ϕ opening:

$$h_2 = Q_2^2 / a^2 c^2 2g$$

$$= 0.62^2 / 0.087^2 \times 0.60^2 \times 2 \times 32.2$$

$$= 2.17'$$

$\therefore$ Install 8" ϕ opening at El = 711.50 and 4" ϕ opening at El = 712.66

RATIONAL METHOD OF

RETENTION BASIN DESIGN OF STORAGE VOLUME

(30 acres or less)

Calculate 10 yr. existing flow qo=ACi

Drainage area, A= 1.80 acres

X

Runoff coefficient, C= Gravel= 0.50 Grass= 0.35
1.30 Ac @ 0.35 + 0.50 Ac @ 0.50 = 0.39

X

Calculate intensity, i

i = a/b + tc

a = 170

b = 23

tc = 10

$i = \frac{170}{23+10}$

i = 5.15

=

The allowable release rate, qo, is 3.62 c.f.s.

Calculate the 50 yr. proposed flow Qo=ACI max

Drainage area, A= 1.80 acres

Runoff coefficient, C= Gravel= 0.50 Roof=0.90 Grass=0.35
0.71 Ac @ 0.50 + 0.86 Ac @ 0.90 + 0.23 Ac @ 0.35 = 0.67

Calculate maximum time of concentration, TC max

a= 250
b= 27

$$Tcmax = \sqrt{\frac{A \times C \times a \times b}{\frac{2 \times qo}{3} - \frac{qo^2 \times tc}{6 \times C \times A \times a}}} - b$$

$$Tcmax = \sqrt{\frac{1.80 \times 0.67 \times 250 \times 27}{\frac{2 \times 3.62}{3} - \frac{3.62^2 \times 10}{0.67 \times 1.80 \times 250 \times 6}}} - 27$$

Tcmax = 32

Calculate maximum intensity, I max

$$Imax = \frac{a}{b+Tcmax}$$

a= 250
b= 27

Tcmax = [32]

$$Imax = \frac{250}{27+[32]}$$

Imax =

A = [1.80] acre

x

C = [0.67]

x

Imax = [4.24]

=

[5.11] c.f.s

The flow at maximum duration, Qo is

CALCULATE STORAGE VOLUME NEEDED

$$Vol = 60 \times Qo \times Tcmax - \frac{2 \times qo \times (TCmax + tc) \times 60}{3} + \frac{qo^2 \times tc \times 60}{6 \times Qo}$$

$$Vol = 60 \times [5.11] \times [32] - \frac{2 \times [3.62] \times ([32] + [10]) \times 60}{3} + \frac{[3.62]^2 \times [10] \times 60}{6 \times [5.11]}$$

Vol = [3986] cubic feet

Storm Sewer Design for EFFox ADDITION By R. ROTHERT

Abercrombie & Associates Q=AcI Runoff Coefficient (c) As-Noted Date 11-13-92

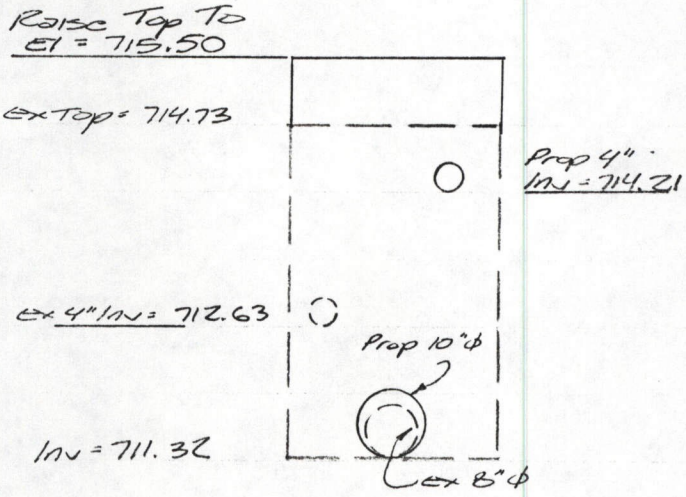
n=0.015

Street	From	To	Dist. ft.	Time (Min.) Inc.	Time (Min.) Total	Area (Acres) Inc.	Area (Acres) Total	Runoff (Q) C.F.S.	Grade %	Size in.	Cap. C.F.S.	Vel. f.p.s.
C=0.68	A	B	65'		10.0		0.72	2.52	6.00	12"	7.4	9.5 t=0.11
C=0.68	B	EX	68'		10.11	0.50	1.22	4.26	4.00	12"	6.0	7.7 t=0.15
C=0.68	Check	EX 12" C			10.26	0.38	1.60	5.56	4.00	12"	6.0	7.7
C=0.90	C	D	100		5.0		0.05	0.27	1.00	12"	3.0	3.9 t=0.43
	D	E	220		5.43	0.49	0.54	2.91	1.20	12"	3.3	4.2 t=0.87
	E	F	130		6.30	0.31	0.85	4.43	1.00	15"	5.4	4.5 t=0.48
	F	G	143		10.0	1.0	1.85	8.57	1.40	18"	11.0	6.1

11-17-92

EFFOX SITE
DETENTION Discharge

Allowable Discharge = 6.31 cfs



Remove Ex 8"ϕ and
replace with 10"ϕ

Add additional 4"ϕ
at Inv = 714.20

Check Discharge:

Prop 10"ϕ : $Q = .0.55 \times 0.6\sqrt{2 \times 32.2 \times 3.76}$ = 5.14 cfs

Ex 4"ϕ : $Q = 0.09 \times 0.6\sqrt{2 \times 32.2 \times 2.70}$ = 0.71 cfs

Prop 4"ϕ : $Q = 0.09 \times 0.6\sqrt{2 \times 32.2 \times 1.12}$ = 0.46 cfs

Total = 6.31 c.f.s.

RATIONAL METHOD OF

RETENTION BASIN DESIGN OF STORAGE VOLUME

(30 acres or less)

Calculate 10 yr. existing flow qo=ACi

Drainage area, A= 3.5 acres

X

Runoff coefficient, C= 0.35

X

Calculate intensity, i

i = a/b + tc

a = 170

b = 23

tc = 10

$i = \frac{170}{23+10}$

i = 5.15

=

The allowable release rate, qo, is 6.31 c.f.s.

Calculate the 50 yr. proposed flow Qo=ACI max

Drainage area, A= 3.5 acres

Runoff coefficient, C= 0.78

Calculate maximum time of concentration, TC max

a= 250
b= 27

$$Tcmax = \sqrt{\frac{A \times C \times a \times b}{\frac{2 \times qo}{3} - \frac{qo^2 \times tc}{6 \times C \times A \times a}}} - b$$

$$Tcmax = \sqrt{\frac{3.5 \times 0.78 \times 250 \times 27}{\frac{2 \times 6.31}{3} - \frac{6.31^2 \times 10}{0.78 \times 3.5 \times 250 \times 6}}} - 27$$

Tcmax = 40.0

Calculate maximum intensity, I max

$$Imax = \frac{a}{b+Tcmax}$$

a= 250
b= 27

Tcmax = 40

$$Imax = \frac{250}{27+40}$$

Imax =

A = 3.5 acre

x

C = 0.78

x

Imax = 3.73

=

10.19 c.f.s

The flow at maximum duration, Qo is

CALCULATE STORAGE VOLUME NEEDED

$$Vol = 60 \times Qo \times Tcmax - \frac{2 \times qo \times (TCmax + tc) \times 60}{3} + \frac{qo^2 \times tc \times 60}{6 \times Qo}$$

$$Vol = 60 \times 10.19 \times 40 - \frac{2 \times 6.31 \times (40 + 10) \times 60}{3} + \frac{6.31^2 \times 10 \times 60}{6 \times 11.58}$$

Vol = 12,180 cubic feet