RIDGETOP EST. ADDN.
DETENTION Report

Detention for this site will be provided using a dry basin in approximately the same location as the existing basin constructed for Ft. Zumwalt Elementary School. Therefore, detention for both sites will be satisfied in this basin.

FT. Zumwalt Elem.
Developed Area = 5.3 Ac
Differential:
15yr. 5.3 (3.85 - 1.87) = 10.49 c.f.s
25yr. 5.3 (4.75 - 2.31) = 12.93 c.f.s.

RIDGETOP EST. ADDN.
Total Area = 8.66 Ac
Differential:
8.66 (2.64 - 1.87) = 6.67 c.f.s.
8.66 (3.26 - 2.31) = 8.23 c.f.s.

Total Differential 15yr. - 10.49 + 6.67 = 17.16
25yr. - 12.93 + 8.23 = 21.16

Run off to Basin Q_{15} = 22.48 Q_{25} = 27.76

Allowable Discharge: 15yr (22.48 - 17.16) = 5.32 c.f.s.
25yr (27.76 - 21.16) = 6.60 c.f.s.

Outflow Structure - Use std. area inlet w/ four sides open and a 8"W x 11"h slot at elev. 539.00
Top - 543.12 Sill = 542.20
Results (see attached routing) Qout
15yr. 5.32 @ 541.62
25yr. 5.78 @ 542.19

100yr. (Q_{100}) = 22.48 (1.58) = 35.52 c.f.s. $35.52 = 3(11.67)\, h^{3/2}$
100yr. H.W = 542.20 + 1.01 = 543.21 (Low flow blocked) $1.01 = h$

Min. Top of Berm = (100yr. H.W.) 543.21 +1 = 544.21

Actual Top of Berm = 544.50
This will allow 0.25 for sediment storage (attached)
since area @ 542 = 10,695 sq.ft x 0.25 = 2674 Cu. Ft.

Paved swale in detention basin to be
5' wide and 6" deep:

F.E 108 (control) Demand Q = 15.88 s_o = .0185
n = .014

@ depth 0.43' a = 2.15 wp = 5.86

$$Q = \frac{1.486}{.014}\left(\frac{2.15}{5.86}\right)^{2/3}(.0185)^{1/2}(2.15)$$
$$= 15.91 \text{ c.f.s.}$$

[illegible] EST ADDN 3-1-95 SUBMITTAL DATE:

ELEVATION	AREA	VOLUME	CUM. VOLUME
538.00	0		
		7400	
540.00	7400		7400
		18095	
542.00	10695		25495
		25110	
544.00	14415		50605

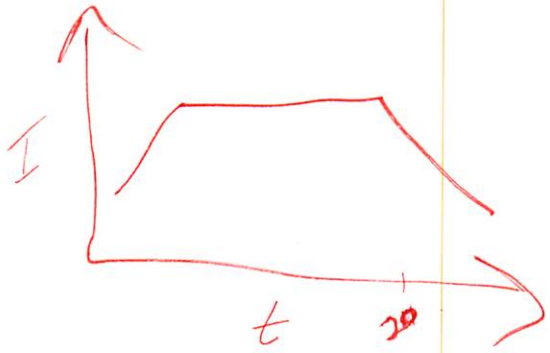
15 YR

```
**********************************************
*                                            *
*  RECTANGULAR ORIFICE                       *
*   8 in W X 11 in H   ELEV= 538             *
*                                            *
*  Outlet Pipe -  60 ft - 24 in pipe         *
*  UFL= 534.3  LFL= 533.1   n= .013          *
*                                            *
**********************************************
```

RIDGETOP EST ADDN 3-1-95 SUBMITTAL DATE:

MIN	INFLOW	STORAGE	OUTFLOW	NET DET.	ELEV.
1	337.20	337.20	0.00	337.20	538.09
2	674.40	1011.60	2.86	1008.74	538.27
3	1011.60	2020.34	14.81	2005.53	538.54
4	1348.80	3354.33	41.50	3312.83	538.90
5	1348.80	4661.63	88.11	4573.52	539.24
6	1348.80	5922.32	158.30	5764.02	539.56
7	1348.80	7112.82	188.21	6924.61	539.87
8	1348.80	8273.41	213.38	8060.03	540.07
9	1348.80	9408.83	228.08	9180.75	540.20
10	1348.80	10529.55	236.67	10292.89	540.32
11	1348.80	11641.69	244.89	11396.80	540.44
12	1348.80	12745.60	252.79	12492.81	540.56
13	1348.80	13841.61	260.39	13581.22	540.68
14	1348.80	14930.02	267.73	14662.29	540.80
15	1348.80	16011.09	274.83	15736.27	540.92
16	1348.80	17085.07	281.70	16803.37	541.04
17	1348.80	18152.17	288.36	17863.81	541.16
18	1348.80	19212.61	294.84	18917.77	541.27
19	1348.80	20266.57	301.13	19965.44	541.39
20	1348.80	21314.24	307.27	21006.97	541.50
21	1011.60	22018.57	313.25	21705.33	541.58
22	674.40	22379.73	317.19	22062.54	541.62
23	337.20	22399.74	319.19	22080.55	541.62
24	0.00	22080.55	319.29	21761.26	541.59
25	0.00	21761.26	317.50	21443.76	541.55

PEAK OUTFLOW= 5.32 CFS AT 24 MINUTES



25 YR

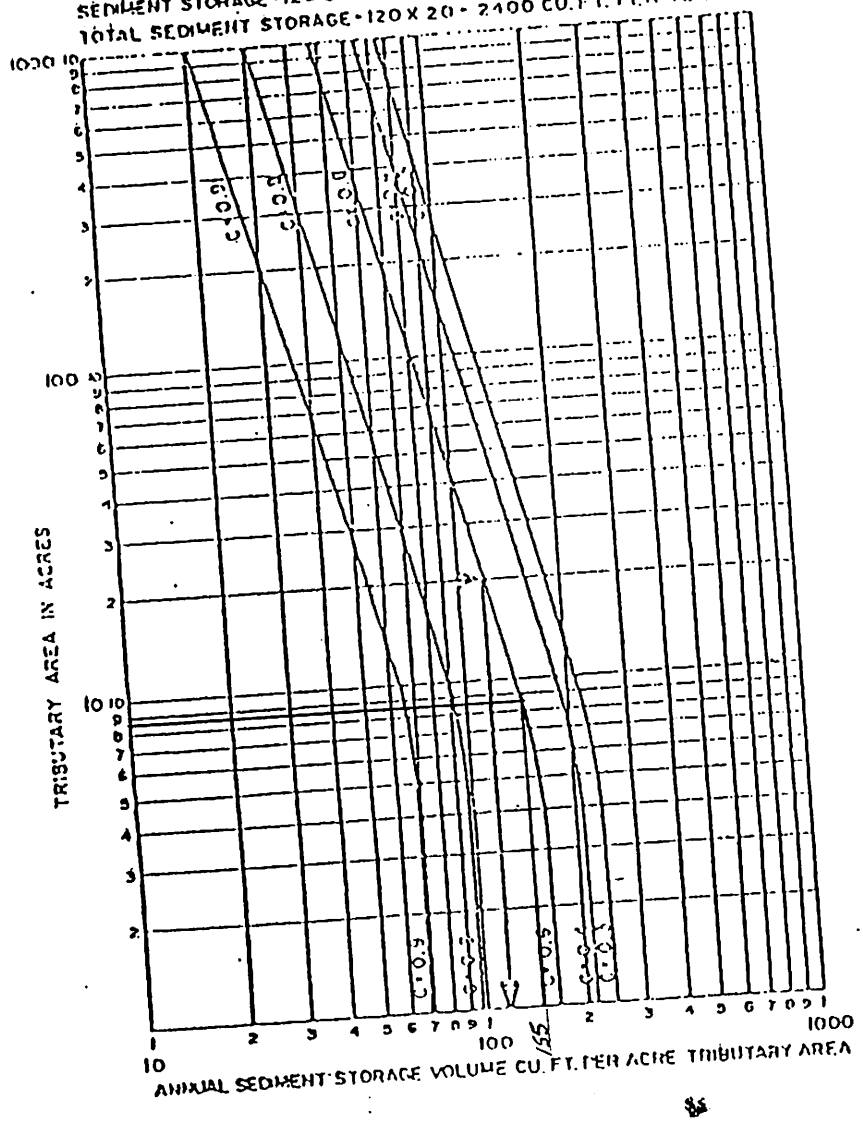
```
*****************************************
*                                       *
*  RECTANGULAR ORIFICE                  *
*   8 in W X 11 in H   ELEV= 538        *
*                                       *
*  Outlet Pipe -  60 ft - 24 in pipe    *
*  UFL= 534.3  LFL= 533.1   n= .013     *
*                                       *
*****************************************
```

RIDGETOP EST ADDN 3-1-95 SUBMITTAL DATE:

MIN	INFLOW	STORAGE	OUTFLOW	NET DET.	ELEV.
1	416.40	416.40	0.00	416.40	538.11
2	832.80	1249.20	3.93	1245.27	538.34
3	1249.20	2494.47	20.31	2474.17	538.67
4	1665.60	4139.77	56.87	4082.90	539.10
5	1665.60	5748.50	144.18	5604.32	539.51
6	1665.60	7269.92	184.48	7085.44	539.92
7	1665.60	8751.04	216.63	8534.41	540.13
8	1665.60	10200.01	231.75	9968.26	540.28
9	1665.60	11633.86	242.52	11391.34	540.44
10	1665.60	13056.94	252.75	12804.19	540.60
11	1665.60	14469.79	262.51	14207.28	540.75
12	1665.60	15872.88	271.86	15601.02	540.91
13	1665.60	17266.62	280.84	16985.78	541.06
14	1665.60	18651.38	289.49	18361.89	541.21
15	1665.60	20027.49	297.83	19729.66	541.36
16	1665.60	21395.26	305.90	21089.36	541.51
17	1665.60	22754.96	313.71	22441.25	541.66
18	1665.60	24106.85	321.29	23785.56	541.81
19	1665.60	25451.16	328.66	25122.51	541.96
20	1665.60	26788.11	335.82	26452.29	542.08
21	1249.20	27701.49	341.41	27360.08	542.15
22	832.80	28192.88	344.80	27848.08	542.19
23	416.40	28264.48	346.62	27917.87	542.19
24	0.00	27917.87	346.87	27571.00	542.17
25	0.00	27571.00	345.59	27225.41	542.14

PEAK OUTFLOW= 5.78 CFS AT 24 MINUTES

EXAMPLE:
TRIBUTARY AREA = 20 ACRES
RATIONAL METHOD RUNOFF COEFFICIENT "C" = 0.6
SEDIMENT STORAGE = 120 CU. FT. PER ACRE PER YEAR
TOTAL SEDIMENT STORAGE = 120 X 20 = 2400 CU. FT. PER YEAR.



ANNUAL SEDIMENT STORAGE

FIG. 1

Drainage Area 8.52 Ac

2yr. Volume = 8.52 (155) (2) = 2,641 Cu. Ft.

STORAGE REQUIRED FOR Q_{100}

9.75 cfs x 1.39 x 30 min. x 60 sec. = 24,394.5 c.f.

EMERGENCY SPILLWAY

$$Q100 = CLH^{3/2}$$

$$19.5 = 3 \times 10 \times H^{3/2}$$

$$.65 = H^{3/2}$$

$$.75' = H$$

Normal Water Level = 541.15

Extreme Water Level = 543.05

Post-it® Fax Note 7671	Date 2-28-95	# of pages ▶ 2
To Jim Noe	From Jim Kunza	
Co./Dept. SCES	Co. City of O'Fallon	
Phone #	Phone # 240-2000	
Fax # 947-~~6567~~ 2448	Fax # 978-4144	

FT. ZUMWALT ELEMENTARY SCHOOL
HYDRAULIC COMPUTATIONS FOR DETENTION
PR&S Job No. [redacted]

Total Area of Site — 20 Acres

Area of Initial Development — 5.3 Acres

DIFFERENTIAL RUNOFF (Q_{15})

Undeveloped	5.3 Acres @ 1.7 cfs/ac =	9.01 cfs
Developed	5.3 Acres @ 3.54 cfs/ac =	18.76 cfs
Differential		9.75 cfs

STORAGE REQUIRED FOR Q_{15}

$$9.75 \text{ cfs} \times 30 \text{ min} \times 60 \frac{\text{sec}}{\text{min}} = 17{,}554 \text{ cfs}$$

With the site being an elementary school, it was decided to locate the detention basin on the west side of the existing drainage channel. The size of the basin will be based on the differential runoff for the inital development. Future construction will require either enlarging or reloccating the detention basin.

Area Above Retention Basin is 8.25 Acres

Runoff Based on 1.7 cfs/ac = 8.25 ac x 1.7 crs/ac = 14.02 cfs

Allowable release rate through outfall pipe =

$$14.02 \text{ cfs} - 9.75 \text{ cfs} = 4.27 \text{ cfs}$$

Pipe size 10" PVC

$$Q = Ca\ \sqrt{2gh}$$
$$4.27 = 0.6 \times .545\ \sqrt{2 \times 32.2 \times h}$$
$$h = 2.65'$$

Elevation	Area sf	Aug Area sf	Volume cf	Acc. Volume cf
			0	0
538.5	5250	5500	2750	2750
539.0	5750	6375	6375	9125
540.0	7000	8078	9290	18415
541.15	9156	9953	8460	26875
542.0	10750			