Wabash Plat 4

15 year – 20 minute storm: 3.85

100 year – 20 minute storm: 6.08

2 YEAR

Existing flow = 30.5 acres x 1.33 cfs = 40.57

Acreage
Industrial =14.12 acres @ 2.73 = 38.55
Residential = 19.03 ac. @ 2.35 = 44.72
Undeveloped = 2.65 ac. @ 1.33 = 3.50
86.77 = Developed Runoff

Required Detention = 86.77 – 40.57 = 46.20 cfs

Flow to Basin
Industrial = 9.15 ac. @ 2.73 = 24.97
Residential = 12.42 ac. @ 2.35 = 29.19
54.16 cfs

Allowable Discharge = 7.96 cfs

15 YEAR

Existing flow = 30.5 acres x 1.87 cfs = 57.0

Acreage
Industrial = 14.12 acres @ 3.85 = 54.36
Residential = 19.03 ac. @ 3.30 = 62.80
Undeveloped = 2.65 ac. @ 1.87 = 4.96
122.12 cfs - Developed Runoff

Required Detention = 122.12 – 57.0 cfs = 65.12 cfs

Flow to Basin
Industrial = 9.15 ac.@ 3.85 = 35.23 cfs
Residential = 12.42 ac. @ 3.30 = 40.99 cfs
76.22 cfs

Allowable Discharge = 11.1 cfs

100 YEAR

Existing flow = 30.5 acres x 2.95 cfs = 89.98

Acreage
Industrial = 14.12 acres @ 6.08 = 85.85
Residential = 19.03 ac. @ 5.21= 99.15
Undeveloped = 2.65 ac. @ 2.95 = 7.82
192.82 cfs - Developed Runoff

Required Detention = 102.84 cfs

Flow to Basin
Industrial = 9.15 @ 6.08 = 55.63
Residential = 12.42 @ 5.21 = 64.71
120.34 cfs

Allowable Discharge = 17.5 cfs

TIMES OF CONCENTRATION:

As shown in Figure A,

Tc= T1 + T2 + T3

T1 = (overland flow) = 2.3 min. x 2 = 4.6 min.
T2 = (pipe flow) = 10.3 min x 0.2 = 2.06 min.
T3 = (swale flow) = 1.2 min. x 0.2 = 0.24 min.
Therefore, Tc => **use 3 min.**

ROUTING CALCULATIONS AND RESULTS:

A St. Charles County program "BASIN" was utilized in routing the design storms through the basin. As found in the routing calculations, the results are as follows:

2 year – 20 minute storm
Peak release rate = 7.52 cfs < 7.96 cfs (permitted release rate)
15 year – 20 minute storm
Peak release rate = 10.8 cfs < 11.1 cfs (permitted release rate)
100 year – 20 minute storm
Peak release rate = 16.25 cfs < 17.5 cfs (permitted release rate)

WABASH HILLS (SOUTH BASIN) SUBMITTAL DATE:

ELEVATION	AREA	VOLUME	CUM. VOLUME
503.00	0		
		1140	1140
504.00	2281		
		12856	13996
506.00	10576		
		24162	38159
508.00	13587		
		30411	68570
510.00	16824		
		37112	105682
512.00	20288		
		44266	149948
514.00	23978		

```
*******************************************
*                                         *
*  MULTIPLE ORIFICES -  2                 *
*                                         *
*  RECTANGULAR ORIFICE                    *
*   4 in W X 24 in H   ELEV= 503          *
*                                         *
*  CIRCULAR ORIFICE                       *
*  DIAM= 12 in   ELEV= 510                *
*                                         *
*  Outlet Pipe -  84.12 ft - 42 in pipe   *
*  UFL= 502.8  LFL= 501.75   n= .013      *
*                                         *
*  Overflow Structure -  Standpipe        *
*  DIAM= 60 in   STANDPIPE ELEV= 513.5    *
*                                         *
*******************************************
```

WABASH HILLS (SOUTH BASIN) SUBMITTAL DATE:

MIN	INFLOW	STORAGE	OUTFLOW	NET DET.	ELEV.
1	1524.40	1524.40	0.00	1524.40	504.06
2	3048.80	4573.20	56.73	4516.47	504.53
3	4573.20	9089.67	97.94	8991.73	505.22
4	4573.20	13564.93	216.39	13348.54	505.90
5	4573.20	17921.74	269.84	17651.90	506.30
6	4573.20	22225.10	297.12	21927.98	506.66
7	4573.20	26501.18	319.14	26182.04	507.01
8	4573.20	30755.24	339.63	30415.61	507.36
9	4573.20	34988.81	358.87	34629.94	507.71
10	4573.20	39203.14	377.04	38826.10	508.04
11	4573.20	43399.30	393.75	43005.55	508.32
12	4573.20	47578.75	406.92	47171.83	508.59
13	4573.20	51745.03	419.63	51325.40	508.87
14	4573.20	55898.60	431.93	55466.67	509.14
15	4573.20	60039.87	443.85	59596.02	509.41
16	4573.20	64169.22	455.43	63713.79	509.68
17	4573.20	68287.00	466.69	67820.31	509.95
18	4573.20	72393.53	477.65	71915.86	510.18
19	4573.20	76489.06	493.15	75995.93	510.40
20	4573.20	80569.13	524.32	80044.81	510.62
21	3048.80	83093.61	566.55	82527.06	510.75
22	1524.40	84051.46	594.31	83457.16	510.80
23	0.00	83457.16	604.86	82852.29	510.77
24	0.00	82852.29	598.28	82254.01	510.74

PEAK OUTFLOW= 10.08 CFS AT 23 MINUTES

15 year

```
*******************************************
*                                         *
*  MULTIPLE ORIFICES -  2                 *
*                                         *
*  RECTANGULAR ORIFICE                    *
*   4 in W X 24 in H   ELEV= 503          *
*                                         *
*  CIRCULAR ORIFICE                       *
*  DIAM= 12 in   ELEV= 510                *
*                                         *
*  Outlet Pipe -  84.12 ft - 42 in pipe   *
*  UFL= 502.8  LFL= 501.75   n= .013      *
*                                         *
*  Overflow Structure -  Standpipe        *
*  DIAM= 60 in   STANDPIPE ELEV= 513.5    *
*                                         *
*******************************************
```

WABASH HILLS (SOUTH BASIN) SUBMITTAL DATE:

MIN	INFLOW	STORAGE	OUTFLOW	NET DET.	ELEV.
1	2406.80	2406.80	0.00	2406.80	504.20
2	4813.60	7220.40	68.10	7152.30	504.94
3	7220.40	14372.70	139.99	14232.71	506.02
4	7220.40	21453.11	278.26	21174.85	506.59
5	7220.40	28395.25	315.37	28079.88	507.17
6	7220.40	35300.28	348.39	34951.90	507.73
7	7220.40	42172.30	378.39	41793.90	508.24
8	7220.40	49014.30	403.15	48611.15	508.69
9	7220.40	55831.55	423.93	55407.62	509.13
10	7220.40	62628.02	443.68	62184.34	509.58
11	7220.40	69404.75	462.54	68942.21	510.02
12	7220.40	76162.61	480.51	75682.10	510.38
13	7220.40	82902.50	521.16	82381.35	510.74
14	7220.40	89601.74	592.35	89009.40	511.10
15	7220.40	96229.80	700.70	95529.10	511.45
16	7220.40	102749.50	759.72	101989.80	511.80
17	7220.40	109210.20	810.01	108400.20	512.12
18	7220.40	115620.60	851.92	114768.70	512.41
19	7220.40	121989.10	886.71	121102.40	512.70
20	7220.40	128322.70	919.34	127403.40	512.98
21	4813.60	132217.00	950.19	131266.80	513.16
22	2406.80	133673.60	968.43	132705.20	513.22 H.W.
23	0.00	132705.20	975.11	131730.10	513.18
24	0.00	131730.10	970.59	130759.50	513.13

PEAK OUTFLOW= 16.25 CFS AT 23 MINUTES

100 year

```
*******************************************
*                                         *
*  MULTIPLE ORIFICES -  2                 *
*                                         *
*  RECTANGULAR ORIFICE                    *
*   4 in W X 24 in H   ELEV= 503          *
*                                         *
*  CIRCULAR ORIFICE                       *
*  DIAM= 12 in   ELEV= 510                *
*                                         *
*  Outlet Pipe -  84.12 ft - 42 in pipe   *
*  UFL= 502.8  LFL= 501.75   n= .013      *
*                                         *
*  Overflow Structure -  Standpipe        *
*  DIAM= 60 in   STANDPIPE ELEV= 513.5    *
*                                         *
*******************************************
```

WABASH HILLS (SOUTH BASIN) SUBMITTAL DATE:

MIN	INFLOW	STORAGE	OUTFLOW	NET DET.	ELEV.
1	1083.20	1083.20	0.00	1083.20	503.95
2	2166.40	3249.60	48.13	3201.47	504.32
3	3249.60	6451.07	78.91	6372.16	504.81
4	3249.60	9621.76	127.03	9494.73	505.30
5	3249.60	12744.33	223.22	12521.11	505.77
6	3249.60	15770.71	260.53	15510.18	506.13
7	3249.60	18759.78	285.45	18474.33	506.37
8	3249.60	21723.93	301.48	21422.45	506.61
9	3249.60	24672.05	316.62	24355.43	506.86
10	3249.60	27605.03	330.99	27274.04	507.10
11	3249.60	30523.64	344.70	30178.94	507.34
12	3249.60	33428.54	357.82	33070.72	507.58
13	3249.60	36320.32	370.42	35949.90	507.82
14	3249.60	39199.50	382.56	38816.95	508.04
15	3249.60	42066.55	393.73	41672.83	508.23
16	3249.60	44922.43	402.77	44519.67	508.42
17	3249.60	47769.28	411.58	47357.69	508.60
18	3249.60	50607.29	420.19	50187.11	508.79
19	3249.60	53436.71	428.59	53008.12	508.98
20	3249.60	56257.72	436.81	55820.91	509.16
21	2166.40	57987.31	444.85	57542.46	509.27
22	1083.20	58625.66	449.71	58175.96	509.32
23	0.00	58175.96	451.48	57724.48	509.29
24	0.00	57724.48	450.22	57274.26	509.26

PEAK OUTFLOW= 7.52 CFS AT 23 MINUTES

2 year

SHEET 1 of 1

Project: Wabash Hills (south)

Date: 7-21-04 Project No:

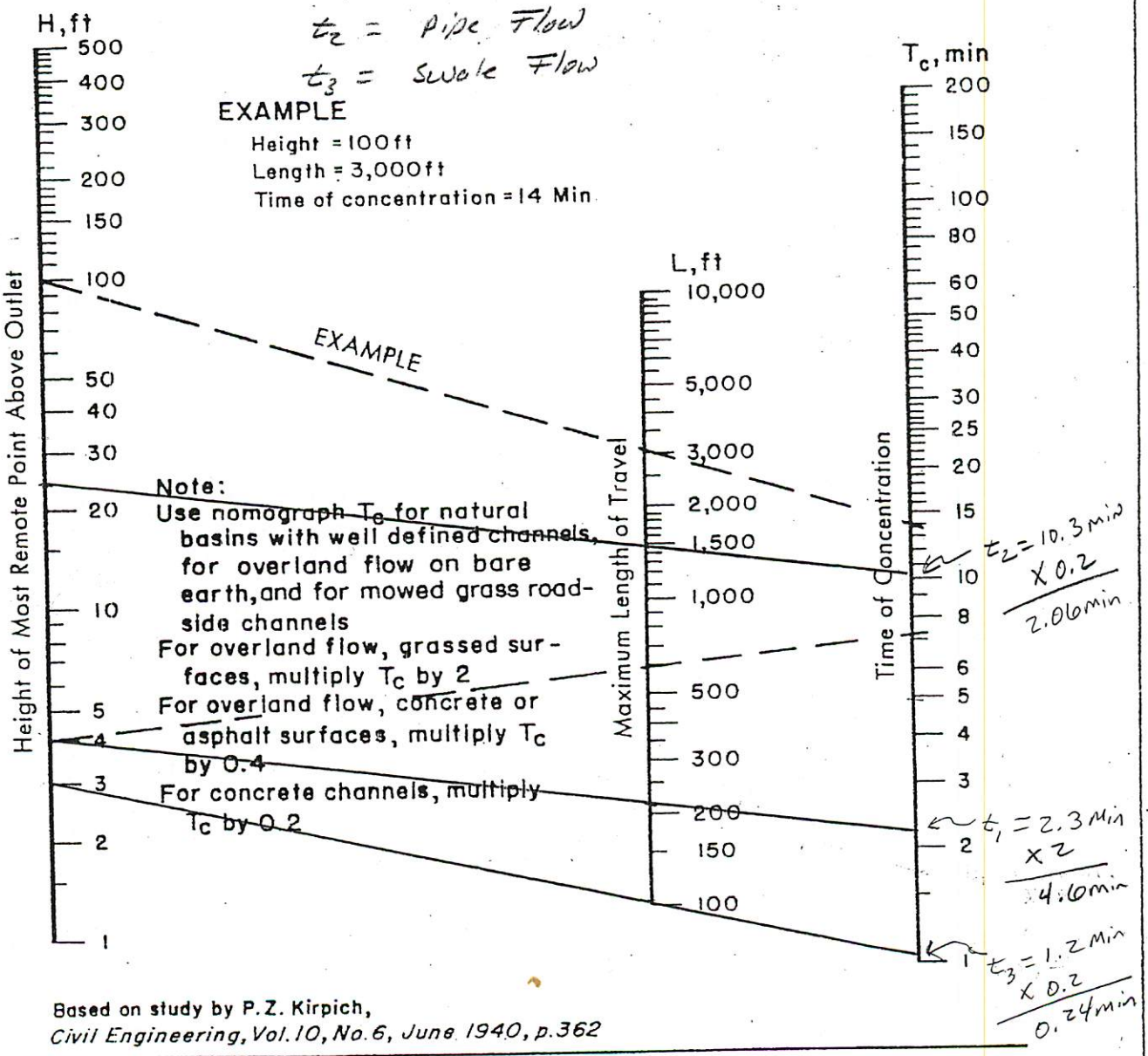
Designed: JAC Checked:

$t_c = t_1 + t_2 + t_3$

t_1 = overland Flow

t_2 = pipe Flow

t_3 = swale Flow



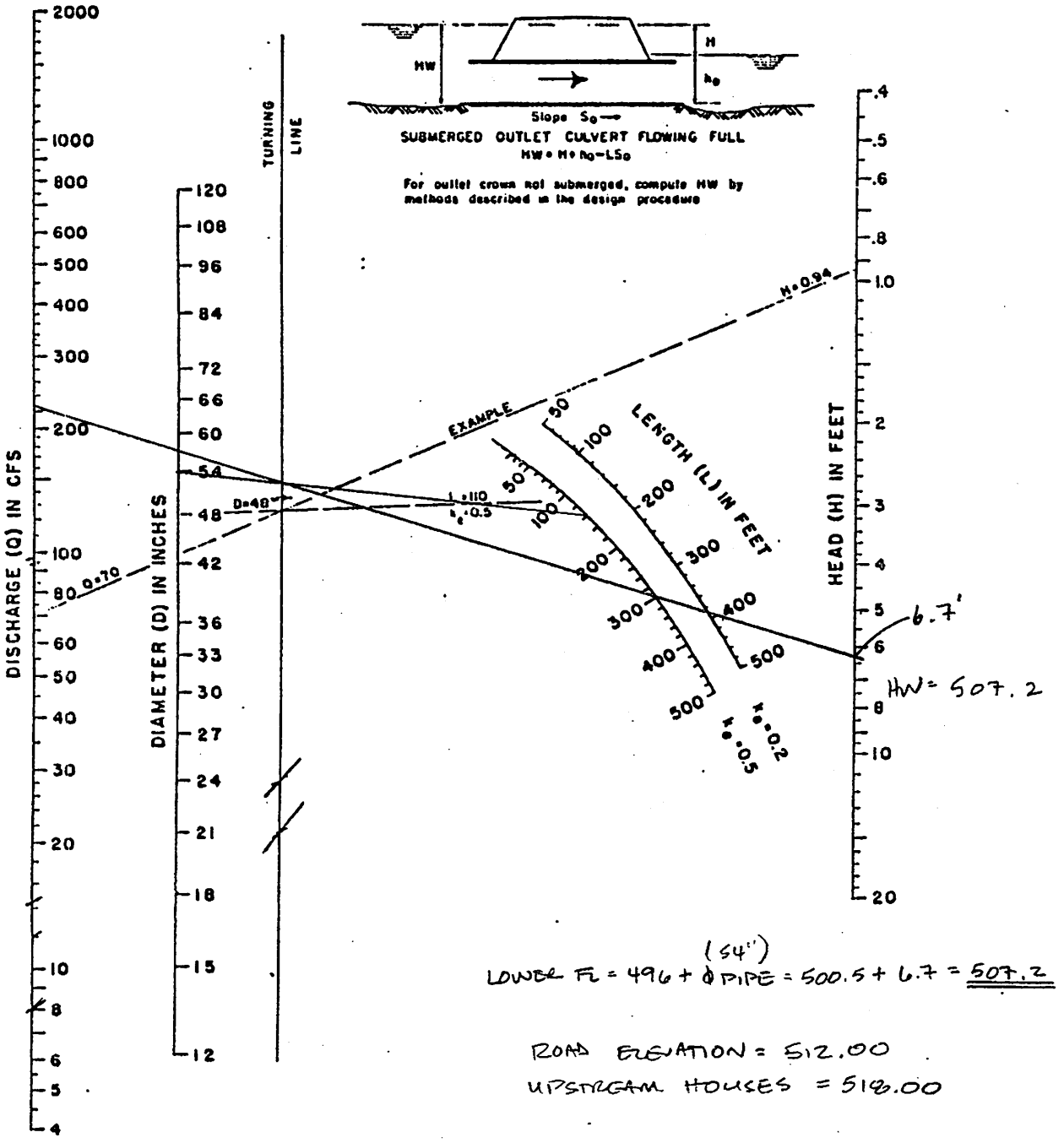
Based on study by P.Z. Kirpich,
Civil Engineering, Vol. 10, No. 6, June 1940, p. 362

$t_c = t_1 + t_2 + t_3 = 2.06 + 4.6 + 0.24 = 2.76$ min $\Rightarrow$ Use 3 Min

$t_c = 3$ Min

WABASH HILLS SUBDIVISION
10/30/03

CHART 9

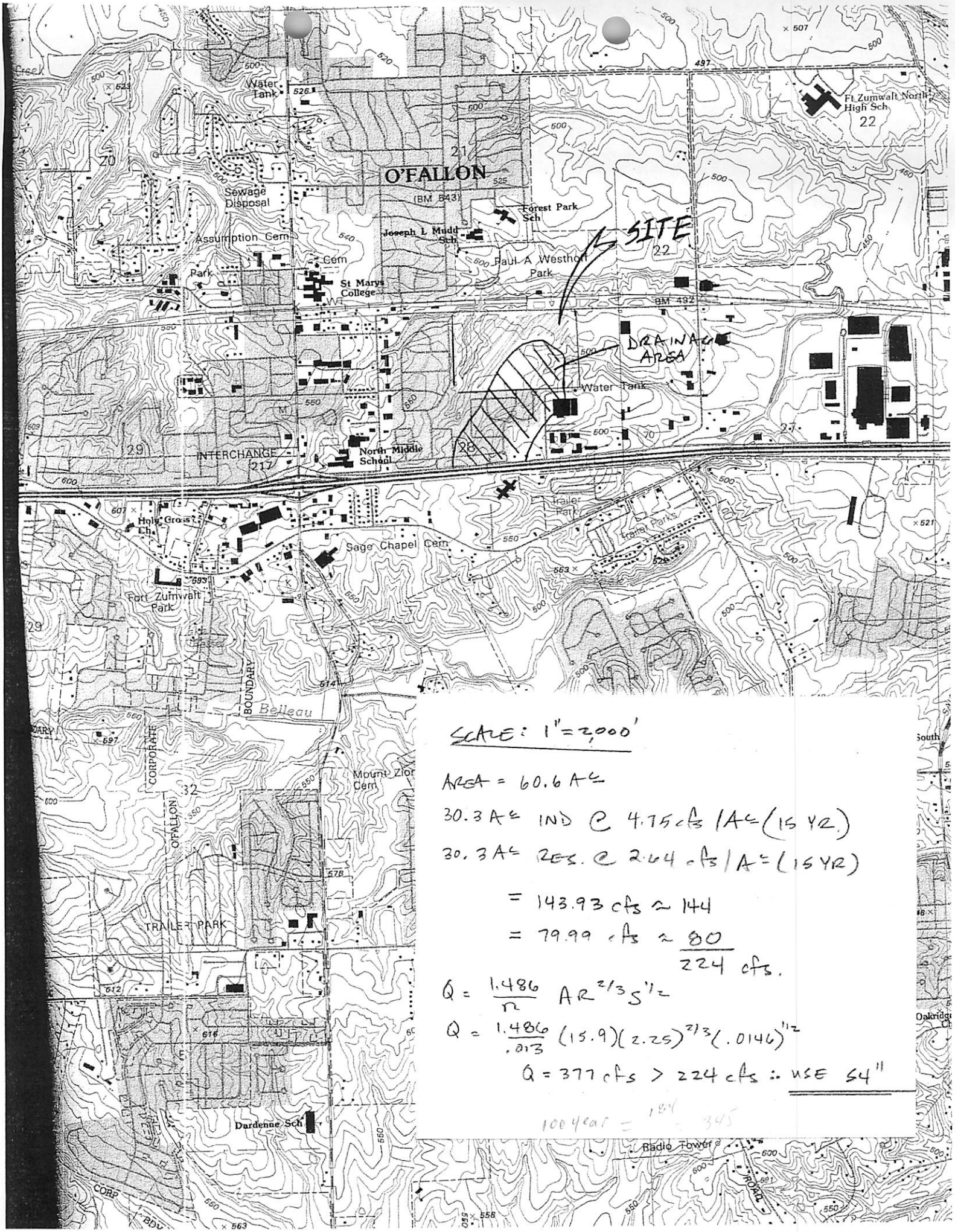


(54")
LOWER FL = 496 + Ø PIPE = 500.5 + 6.7 = 507.2

ROAD ELEVATION = 512.00
UPSTREAM HOUSES = 518.00

HEAD FOR CONCRETE PIPE CULVERTS FLOWING FULL n = 0.012

BUREAU OF PUBLIC ROADS JAN. 1963



SCALE: 1" = 2,000'

AREA = 60.6 Ac

30.3 Ac IND @ 4.75 cfs/Ac (15 YR.)

30.3 Ac RES. @ 2.64 cfs/Ac (15 YR)

= 143.93 cfs ≃ 144

= 79.99 cfs ≃ 80

224 cfs.

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$$Q = \frac{1.486}{.013} (15.9)(2.25)^{2/3}(.0146)^{1/2}$$

Q = 377 cfs > 224 cfs ∴ USE 54"

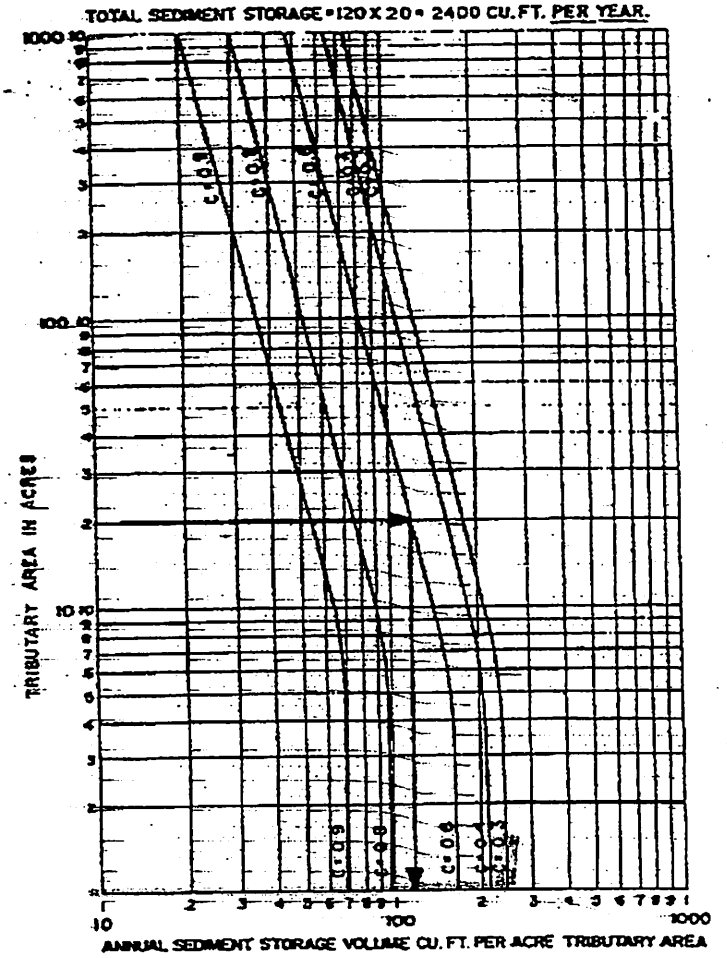
100 year = 184 = 345

Wabash Hills

CHART A1

2 YEAR SEDIMENT STORAGE REQUIRED

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.

South Basin → 21.5 Acres X 120 CF/Acre = 2580 CF
× 2 years
5,160 CF

North Basin → 13 Acres × 150 CF/Acre
= 1950 CF/year
× 2 year
3,900 CF