90-040 8-4-94 SUBMITTAL DATE:

ELEVATION	AREA	VOLUME	CUM. VOLUME
583.00	902		
		1717	1717
584.00	2483		
		7710	9427
586.00	5227		
		12794	22221
588.00	7567		
		18178	40399
590.00	10611		
		3251	43651
590.50	11066		

```
*****************************************
*                                       *
*  MULTIPLE ORIFICES =  2               *
*                                       *
*  RECTANGULAR ORIFICE                  *
*   6 in W X 6 in H   ELEV= 582.32      *
*                                       *
*  Outlet Pipe =  60.3 ft - 42 in pipe  *
*  UFL= 582.32  LFL= 581.59   n= .013    *
*                                       *
*  RECTANGULAR ORIFICE                  *
*   36 in W X 6 in H   ELEV= 584.82     *
*                                       *
*  Outlet Pipe =  60.3 ft - 42 in pipe  *
*  UFL= 582.32  LFL= 581.59   n= .013    *
*                                       *
*  Overflow Structure =  Standpipe      *
*  DIAM= 42 in   STANDPIPE ELEV= 590.01 *
*                                       *
*****************************************
```

90-040 8-4-94 SUBMITTAL DATE:

MI	INFLOW	STORAGE	OUTFLOW	NET DET.	ELEV.
1	174.23	174.23	48.15	126.08	583.07
2	348.45	474.33	52.10	422.43	583.25
3	522.68	945.11	60.37	884.73	583.52
4	696.90	1581.63	71.39	1510.24	583.88
5	871.13	2381.37	84.02	2297.34	584.15
6	1045.35	3342.69	92.31	3250.38	584.40
7	1219.58	4469.96	99.27	4370.69	584.69
8	1393.80	5764.49	106.87	5657.62	585.02
9	1568.03	7225.65	157.50	7068.15	585.39
10	1742.25	8810.40	371.70	8438.70	585.74
11	1916.48	10355.18	492.38	9862.80	586.07
12	2090.70	11953.50	577.47	11376.03	586.39
13	2264.93	13640.96	631.43	13009.52	586.56
14	2439.15	15448.67	684.44	14764.23	586.83
15	2613.38	17377.61	736.81	16640.79	587.13
16	2787.60	19428.39	788.77	18639.66	587.44
17	2787.60	21427.26	840.30	20586.96	587.74
18	2787.60	23374.56	887.54	22487.02	588.03
19	2787.60	25274.60	935.15	24345.44	588.33
20	2787.60	27133.77	958.37	26174.40	588.43
21	2615.38	28787.78	986.00	27801.78	588.61
22	2439.15	30240.93	1009.91	29231.02	588.77
23	2264.93	31495.95	1030.44	30465.51	588.91
24	2090.70	32556.21	1047.85	31508.36	589.02
25	1916.48	33424.84	1062.32	32362.51	589.12
26	1742.25	34104.76	1074.00	33030.74	589.19
27	1568.03	34598.76	1083.10	33515.67	589.24
28	1393.80	34909.47	1089.63	33819.85	589.28
29	1219.58	35039.43	1093.70	33945.72	589.29
30	1045.35	34991.07	1095.39	33895.68	589.28
31	871.13	34766.81	1094.72	33672.09	589.26
32	696.90	34368.99	1091.73	33277.26	589.22
33	522.68	33799.94	1086.42	32713.52	589.15
34	348.45	33061.97	1078.80	31983.17	589.07
35	174.23	32157.40	1068.85	31088.55	588.98
36	0.00	31088.55	1056.52	30032.03	588.86

PEAK OUTFLOW= 18.26 CFS AT 30 MINUTES

MA

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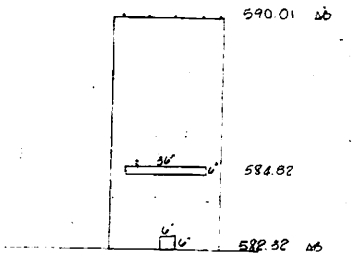
441-1211 278-1211

Mallard Pointe
Plat two

DRAWN ltg DATE Aug 4, 1994
CHECKED DATE
FIELD BOOK
PROJECT # 92040
JOB ORDER #

1/1



N.T.S.

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PROJECT NAME Mallard Pointe
PROJECT #/JOB ORDER # 90040
DATE Rev. 8/26/90
DESIGNER Tdz
PAGE 1

Rev. 8/30/90 Tdz

Detention Calculations (per Ord #1562, 3-3-88)

Existing Information

21.86 Acre Sub - design basin for 25 yr. storm

21.86 x 2.31 (undev.) 50.50 cfs
21.86 x 3.26 (dev.) 71.26 cfs

Differential runoff (req'd stor.) 20.76 cfs.

20.76 x (30 min x 60 sec) = 37,368 c.f.

(100 yr. 20.76 x 1.28 * = 26.57 cfs
26.57 x 1800 = 47,826 c.f.)

(*4.17 (100 yr. P.I.) ÷ 3.26 = 1.28)

Design Information

Actual area to Basin = 14.25 Ac

→ Max. allowable release from site = 50.50 cfs.

21.86 - 14.25 = 7.61 Ac @ (Dev. C) 3.26 = 24.81 cfs.

* 50.50 - 24.81 = 25.69 cfs can go straight through basin *

14.25 (ac.) @ 3.26 = 46.46 cf - 25.69 (allowable release) = 20.77 max stor an

~~Sediment Info. Eq. = 3420 c.f.~~
~~37,368 + 3420 = 40,788 c.f.~~

~~(100 yr. 20.77 x 1.28 (100 yr. differential) = 26.58 x 1800 = 47844 + 3420 = 51264 c.f.~~

~~Grade Basin to 580.0~~ - storage for detention starts @ "581.3."

11

8/26/20

2

Rev. 8/30/90

Elev.	Area	Stor.	Accum Stor (w/out sed.)	Accum Stor (w/ sediment)	
~~580~~	~~2208~~	0			
81	2845	2556		~~2556~~	
81.3	3064		(0)	3442	
82	3576	3210	3324	5766	
83	4256	3916	6240	9682	
84	4937	4596	10,836	14,278	
85	5626	5282	16,118	19,560	
86	6315	5970	22,088	25,530	
87	7178	6746	28334	32,276	
88	8040	7609	36443	39885	
25 yr	88.2	8224	1626 38069		Normal HW
89	8959	8500	44943	48385	
100 yr	89.4	9327	3657 48600		100 yr HW
590	9878	9418	54361	57803	

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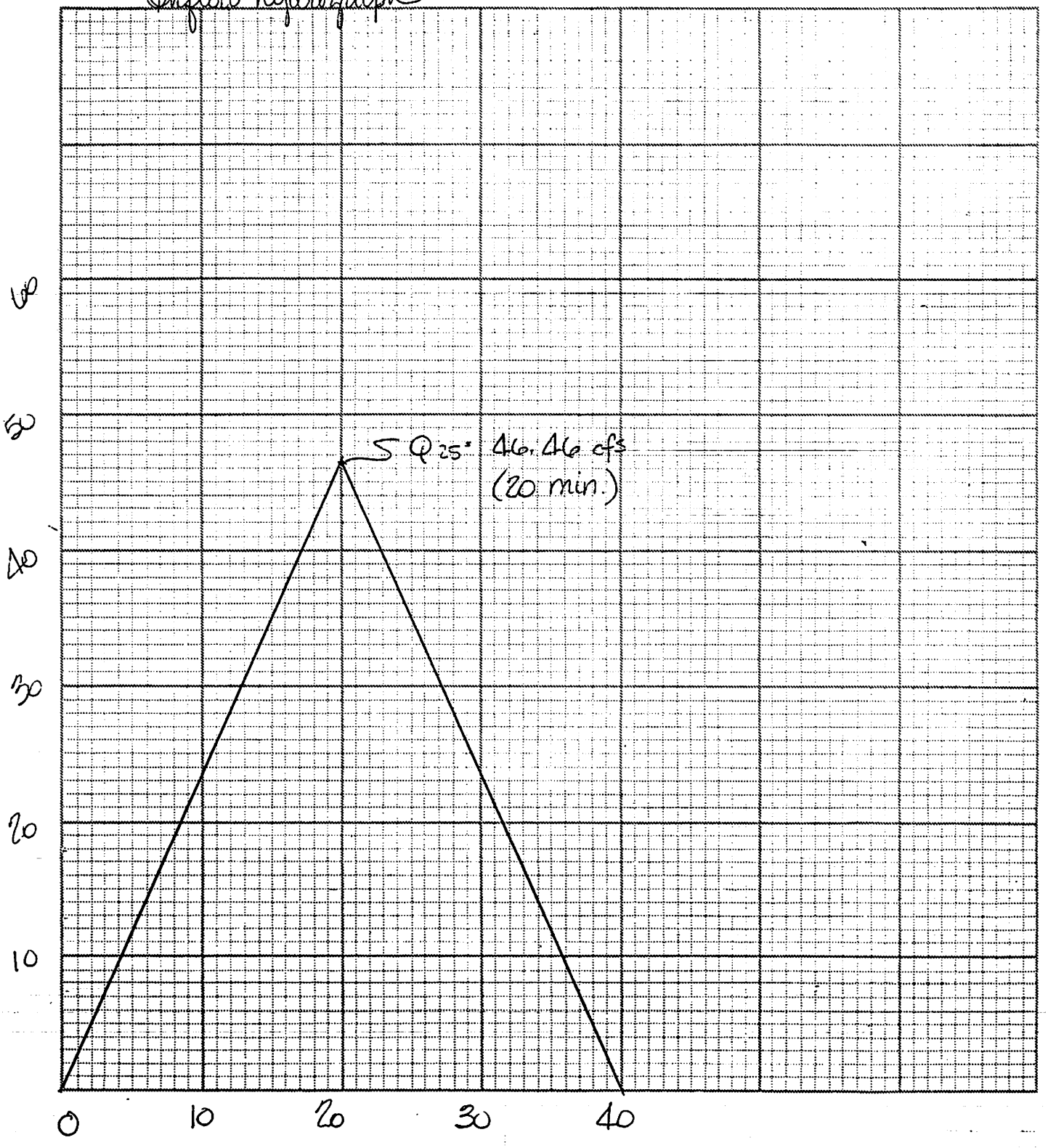
DATE 8/24/90

DESIGNER _____

PAGE 3 1

Inflow hydrograph



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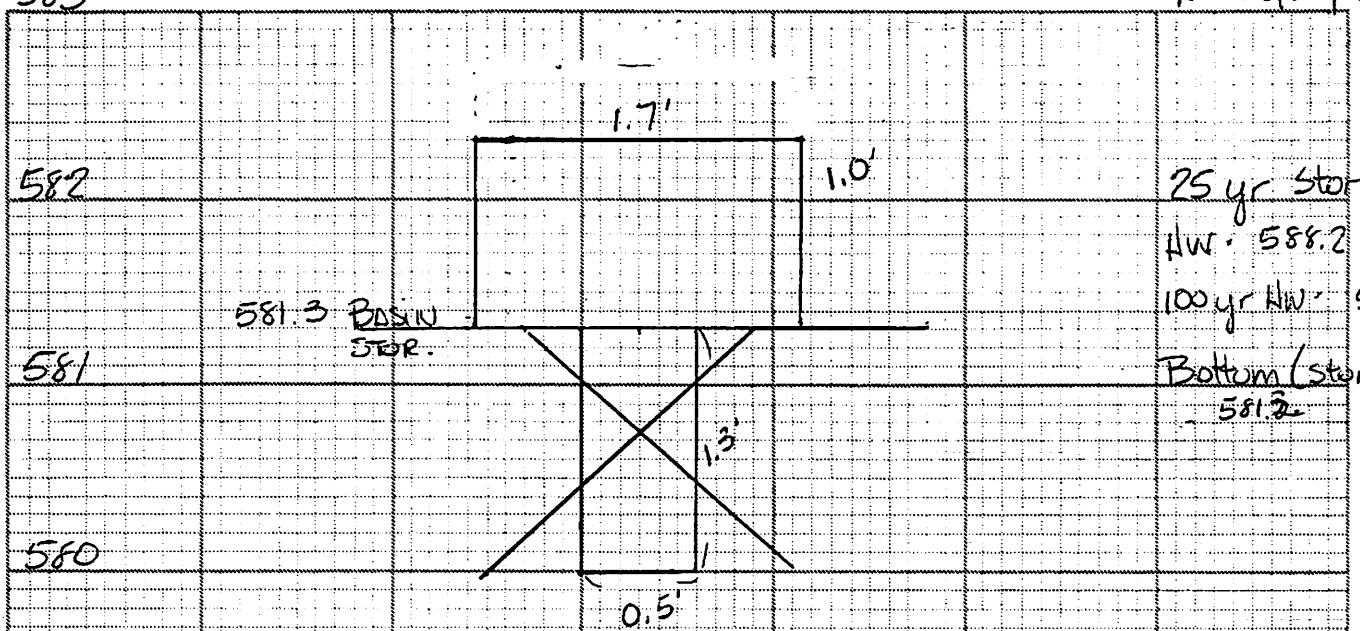
DATE
DESIGNER
PAGE 4

Opening for 25 yr. Release =

Rev. 8/30/90 Lthy



25 yr Storm
HW. 588.2
100 yr HW. 589.4
Bottom (stor.) 581.2

$Q = Ca\sqrt{2gh}$

① 583.0

$Q = 0.6(1.7)\sqrt{2(64.4)(1.2)}$
$Q = 8.97$ cfs

② 584.0

$Q = 0.6(1.7)\sqrt{64.4(2.2)}$
$Q = 12.14$ cfs

③ 585.0

$Q = 0.6(1.7)\sqrt{64.4(3.2)}$
$Q = 14.64$

④ 586.0

$Q = 16.78$

⑤ 587.0

$Q = 18.66$ cfs

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Opening (cont.)

⑥ 588.0

Q = 20.38

⑦ 588.2

Q = 0.6(1.7) $\sqrt{64.4(6.4)}$

Q = 20.71 cfs

$2S/\Delta t + O$

$\frac{2(\text{stor}) \times 24}{1.98 \times .0167}$

(Y_{60} = .0167 min)

ROUTING CHART

Elev.	Accum Area (A^c)	Outflow	$2S/\Delta t + O$
580	↓	↓	↓
581			
581.3			
582	.05		
583	.14	8.97	212.2
584	.25	12.14	375.0
585	.37	14.64	551.7
586	.51	16.78	757.1
587	.66	18.66	976.7
588	.84	20.38	1240
588.2	.87	20.71	1,284
589	1.03		
589.4	1.12		
590	1.25		

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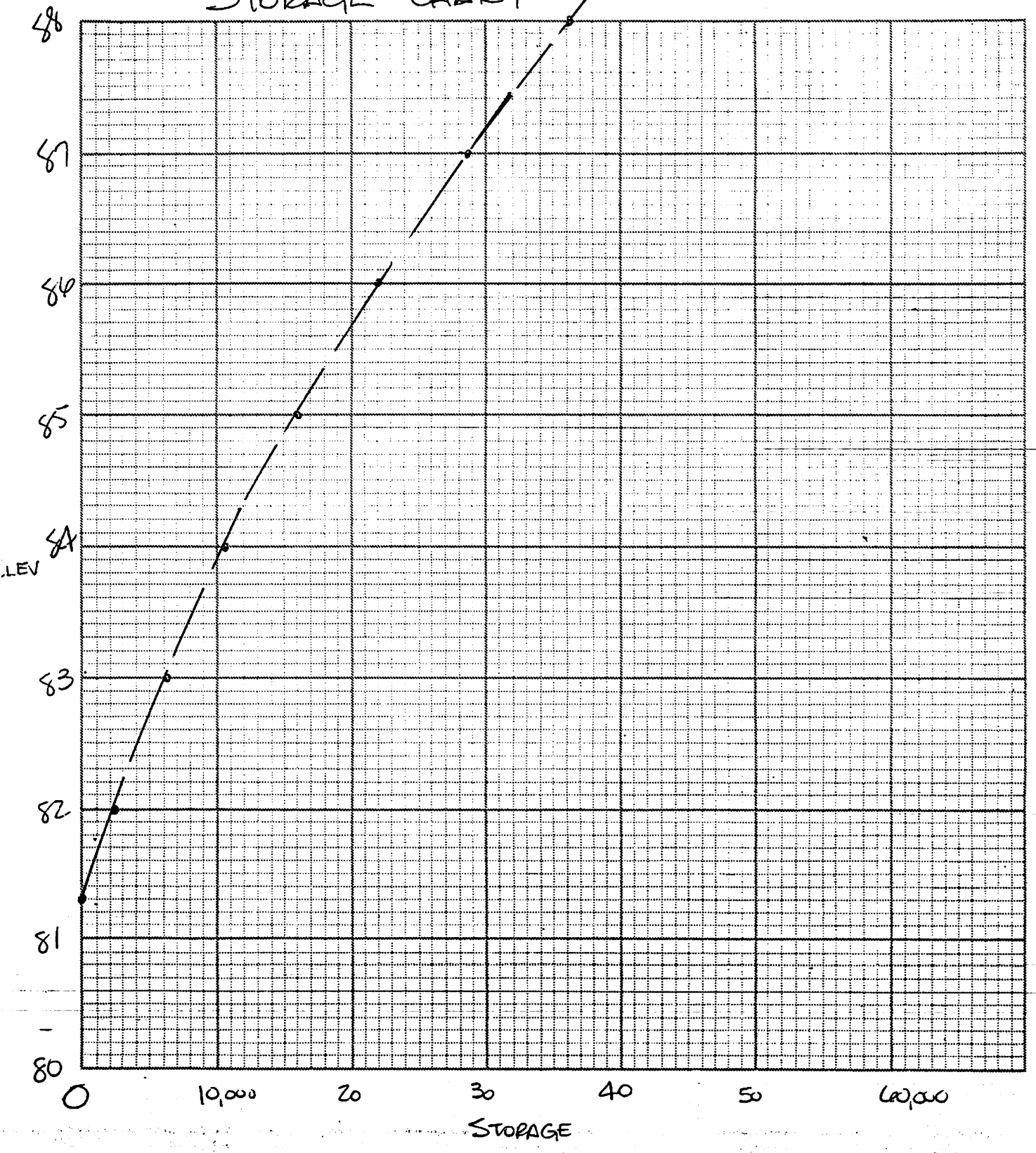
DATE _____

DESIGNER _____

PAGE 6 1

STORAGE CHART



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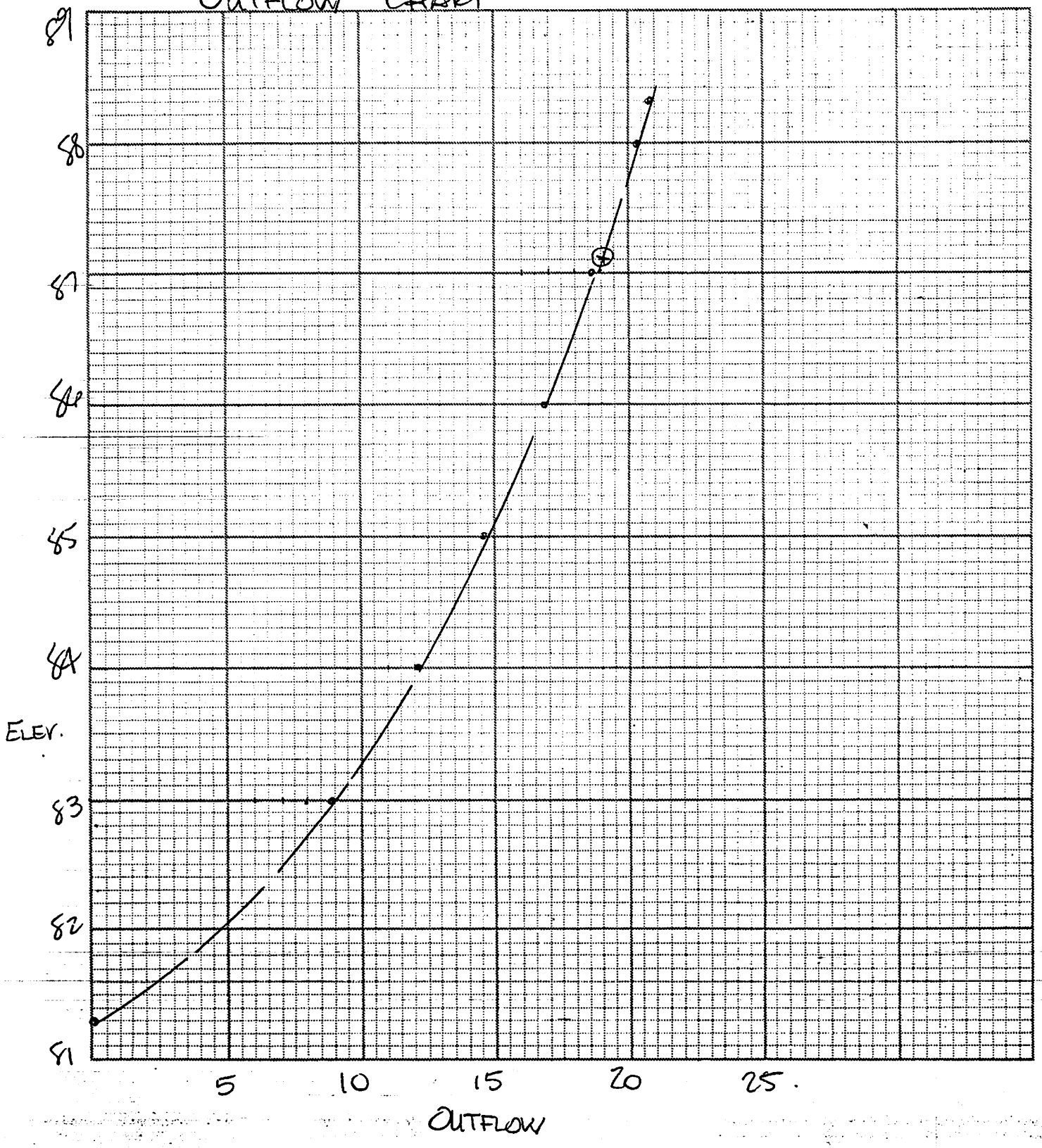
OUTFLOW CHART



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PROJECT #/JOB ORDER # _____

DATE _____

DESIGNER _____

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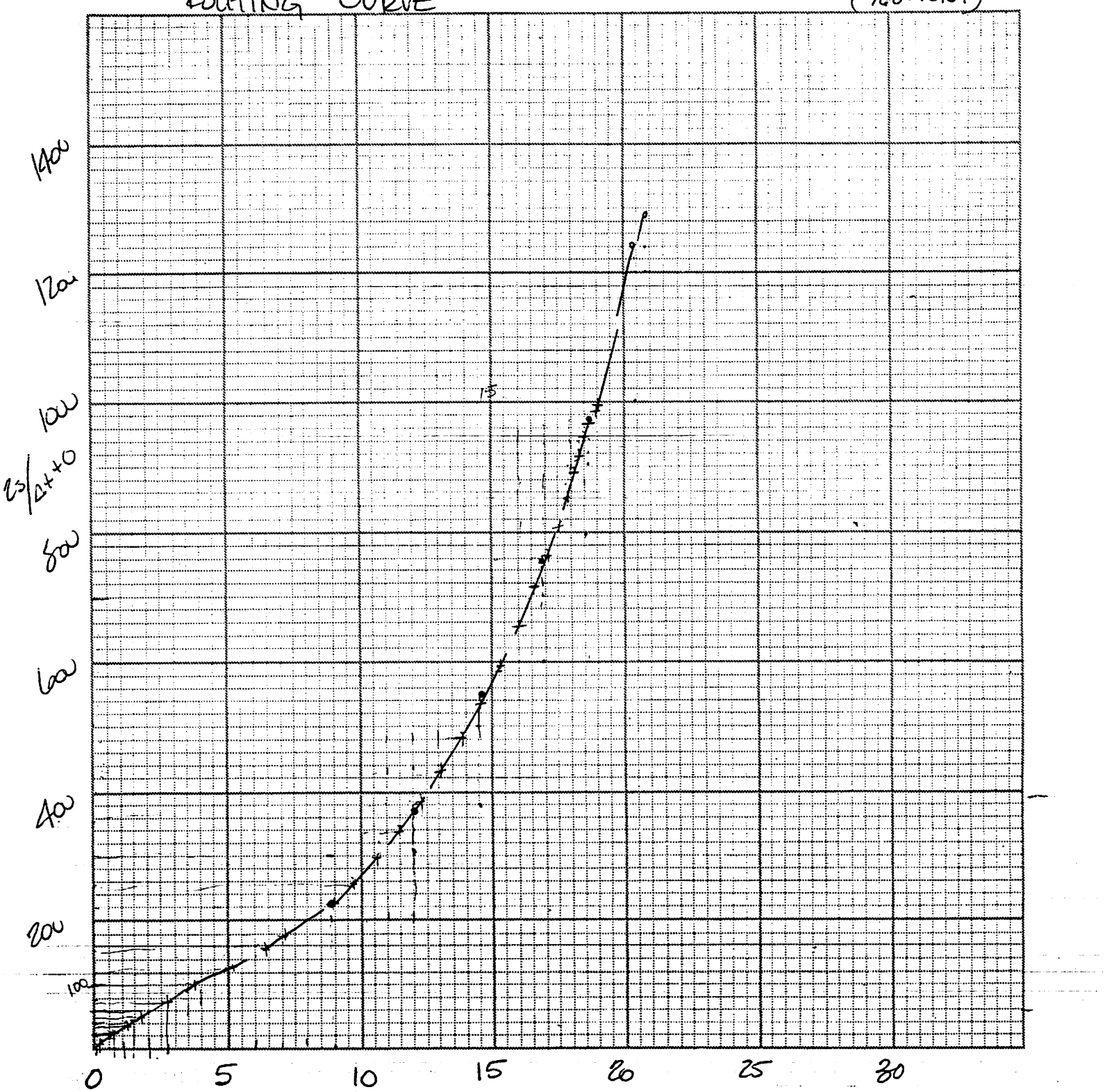
EQUATION = $2S/\Delta t + O = 2 \text{ stor.} \times 24/1.98 \times .0167$ +, -

ROUTING CURVE

(1/60 = .0167)



Design Pond Routing

1	2	3	4	5	6	7	8	9
Line	Time	I_1	$I_1 + I_2$	$\frac{2S_1}{t} - O_1$	$\frac{2S_2}{t} + O_2$	Elev	Outflow O_2	Storage S_2
1	0	0						
2	1	2.32	2.32	0	2.32		.1	
3	2	4.64	8.96	2.12	11.08		.3	
4	3	6.96	11.60	10.48	22.08		.6	
5	4	9.28	16.24	20.88	37.12		1.2	
6	5	11.60	20.88	34.72	55.6		1.8	
7	6	13.92	25.52	52.0	77.52		2.7	
8	7	16.24	30.16	72.12	102.28		3.8	
9	8	18.56	34.80	94.68	129.48		5.2	
10	9	20.88	39.44	119.08	158.52		6.4	
11	10	23.20	44.08	145.72	189.8		7.1	
12	11	25.52	48.72	175.60	224.32		9.0	
13	12	27.84	53.36	206.32	259.68		9.7	
14	13	30.16	58.00	240.28	298.28		10.6	
15	14	32.48	62.64	277.08	339.72		11.5	
16	15	34.80	67.28	316.72	384.00		12.3	
17	16	37.12	71.92	359.40	431.32		13.0	
18	17	39.44	76.56	405.32	481.88		13.9	
19	18	41.76	81.20	454.08	535.28		14.5	
20	19	44.08	85.84	506.28	592.12		15.2	
21	20	46.46	90.54	561.72	652.26		16.0	
22	21	44.08	90.54	620.20	710.80		16.5	
23	22	41.76	85.84	677.80	763.64		17.1	
24	23	39.44	81.20	729.44	810.64		17.6	

B

Design Pond Routing

1	2	3	4	5	6	7	8	9
Line	Time	I_1	$I_1 + I_2$	$\frac{2S_1}{t} - O_1$	$\frac{2S_2}{t} + O_2$	Elev	Outflow O_2	Storage S_2
1	24	37.12	76.56	775.44	852.00		17.8	
2	25	34.80	71.92	816.4	888.32		18.1	
3	26	32.48	67.28	852.12	919.40		18.3	
4	27	30.16	62.64	882.8	945.44		18.5	
5	28	27.84	58.00	908.44	966.44		18.6	
6	29	25.52	53.36	929.24	982.60		19.0	
7	30	23.20	48.72	944.6	993.32		19.1	
8	31	20.88	39.44	955.12	994.56	587.1	19.1	← S PEAK
9	32	18.56	34.80	956.36	991.16		19.1	
10	33	16.24	30.16	952.96	983.12		19.0	
11	34	13.92	25.52	945.12	970.64		18.8	
12	35	11.60	20.88	933.04	953.92		18.5	
13				916.92				
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								

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PROJECT NAME Mallard Pointe

PROJECT #/JOB ORDER #

DATE 7-27-90

DESIGNER TDS

PAGE

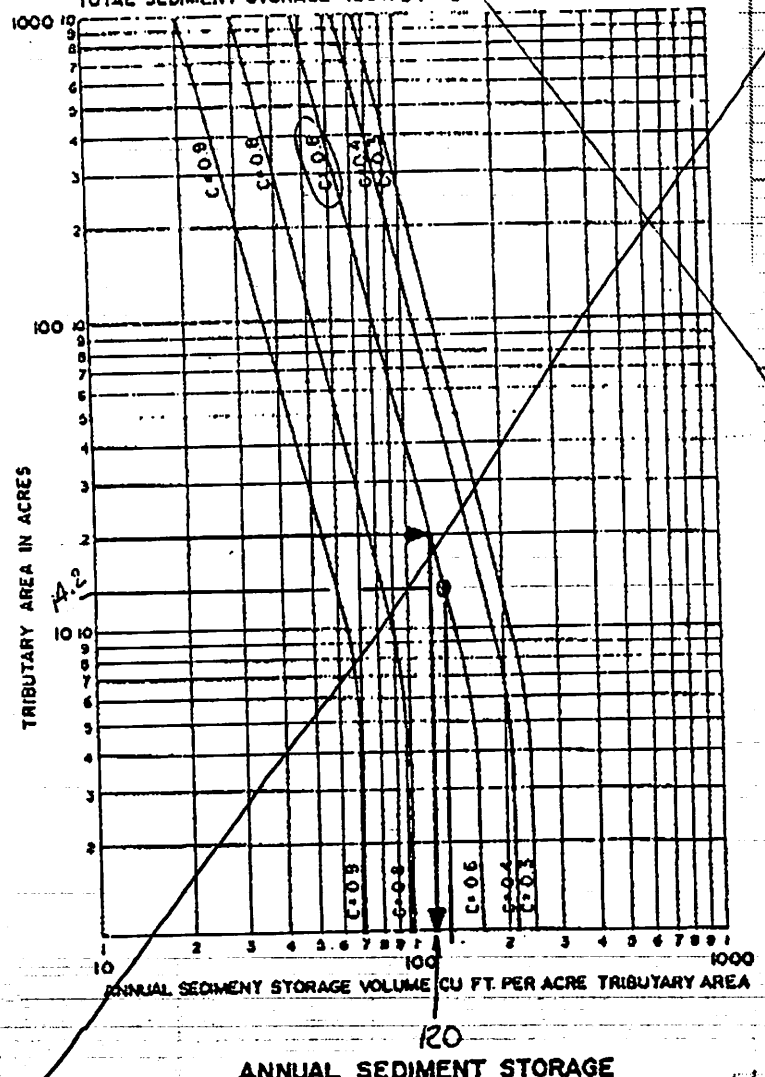
Rev. 8/26/90 1.1

Sediment Storage

Rev. 8/30/90 corrected

7/27/90

FIGURE 1



Total Area to Basin;
14.25 Ac

C = 0.6

Sed. stor = ~~150~~ 120 cu. ft./Ac/yr.

~~150~~ 120 x 14.25 = ~~2,137.5~~ 1710 cf/yr.

~~2138~~ 1710 x 5 = ~~10,690~~ 8550 cf

* ~~2138~~ 1710 x 2 = ~~4276~~ 3420 cf. *

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OUTFLOW STRUCTURE

Known Info

14.25 Δ^c (to Basin) @ 3.26 = 46.46
@ 4.17 = 59.42

*25 yr. H.W = 588.2

100 yr. HW = 589.4

Top of Dam =

$Q = CLH^{3/2}$

Q = quantity
C = constant (3.0)
L = perimeter
H = head

① $46.46 = 3.0(11.0)H^{3/2}$

$46.46/33 = H^{3/2}$

$1.2' = H$ (588.2 + 1.2 = 589.4)

Use 42" inside dia. structure.

(Circ. = πd = $3.142 \times 3.5 = 11.0$)

$59.42 = 33(H^{3/2})$

$1.8 = H^{3/2}$

$1.5' = H$ (588.2 + 1.5 = 589.7)

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DATE _____

DESIGNER _____

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EMERGENCY SPILLWAY

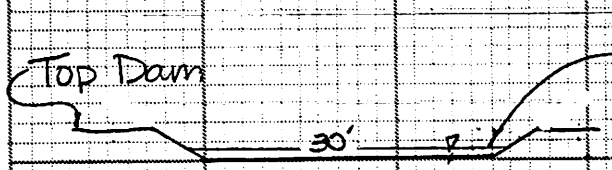
Total Q to Basin

14.25 Ac @ 4.17 (100 yr storm) = 59.42 cfs

100 yr HW = 589.4

$Q = CLH^{3/2}$

Q = quantity (59.42)
C = constant (3.0)
L = length
H = Head



590.9 (Top of Dam)
590.11 (HW thru E.S.)
589.4 (Elev of E.S.)

30' W x 0.5' deep

$59.42 = 3.0(33.16)(H^{3/2})$

$59.42 / 33.16 = H^{3/2}$

$0.71' = H$

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PROJECT NAME: Mallard Pointe
PROJECT #/JOB ORDER #: 90040
DATE: 4-26-93
DESIGNER: T. Dietz
PAGE: 1

Detention Check -

1. Using As-built Information =

   42" Pipe
   60.3' Long
   Upper ℄ 582.26   Top = 590.01
   Lower ℄ 581.62
   Orifice - 1.2' H × 1.8' W (14.4" H × 21.6" W)

2. Calc. Existing Release =

   $Q = ca\sqrt{2gh}$

   $Q = 0.6\,(2.16)\,\sqrt{2(32.2)(7.15)}$

   $Q = 27.81$ cfs.

   $A = 1.2 \times 1.8 = 2.16$

   $H = 582.26 + 0.6 =$
   $582.86 - 590.01 = 7.15'$

3. Revise opening =

   Hold 1.2' h.
   adjust width

   $Q = ca\sqrt{2gh}$

   $20.71\text{ cfs} = 0.6(a)\sqrt{2(32.2)(7.15)}$

   $1.6^{\#} = a$

   $1.6/1.2 = 1.34'$ wide

4. Time of Concentration =

   $T_c = L/V(60) = \dfrac{L = 1109}{1.18(60)}$ (Lot 87 to AI 13 to FE 3)   V = 1.18 (from chart) $T_c = 15.7$ min (16 min

90040 4-26-93 SUBMITTAL DATE:

ELEVATION	AREA	VOLUME	CUM. VOLUME
582.30	3780		
		2812	2812
583.00	4256		
		4596	7409
584.00	4937		
		5281	12690
585.00	5626		
		5970	18661
586.00	6315		
		6746	25407
587.00	7178		
		7609	33016
588.00	8040		
		8499	41516
589.00	8959		
		9418	50934
590.00	9878		

```
*******************************************
*                                         *
*  RECTANGULAR ORIFICE                    *
*   21.6 in W X 14.4 in H   ELEV= 582.26  *
*                                         *
*  Outlet Pipe -  60.3 ft - 42 in pipe    *
*  UFL= 582.26  LFL= 581.62   n= .013     *
*                                         *
*  Overflow Structure -  Standpipe        *
*  DIAM= 42 in   STANDPIPE ELEV= 590.01   *
*                                         *
*******************************************
```

Existing Field Condition
(orifice opening - 18"w x 1.2'H.)

90040 4-26-93 SUBMITTAL DATE:

MIN	INFLOW	STORAGE	OUTFLOW	NET DET.	ELEV.
1	174.23	174.23	2.24	171.98	582.34
2	348.45	520.43	6.69	513.74	582.43
3	522.68	1036.42	19.31	1017.11	582.55
4	696.90	1714.01	44.56	1669.45	582.72
5	871.13	2540.58	86.31	2454.27	582.91
6	1045.35	3499.62	147.43	3352.19	583.12
7	1219.58	4571.77	222.92	4348.85	583.33
8	1393.80	5742.65	312.63	5430.02	583.57
9	1568.03	6998.05	534.35	6463.69	583.79
10	1742.25	8205.94	613.24	7592.70	584.03
11	1916.48	9509.18	687.62	8821.56	584.27
12	2090.70	10912.26	752.64	10159.62	584.52
13	2264.93	12424.55	817.58	11606.96	584.79
14	2439.15	14046.11	882.46	13163.65	585.08
15	2613.38	15777.03	945.10	14831.92	585.36
16	2787.60	17619.52	1002.84	16616.68	585.66
17	2787.60	19404.28	1061.14	18343.14	585.95
18	2787.60	21130.74	1114.62	20016.12	586.20
19	2787.60	22803.72	1159.60	21644.12	586.44
20	2787.60	24431.72	1200.74	23230.98	586.68
21	2613.38	25844.36	1239.54	24604.82	586.88
22	2439.15	27043.97	1272.17	25771.80	587.05
23	2264.93	28036.73	1298.30	26738.43	587.17
24	2090.70	28829.13	1317.84	27511.29	587.28
25	1916.48	29427.76	1333.27	28094.50	587.35
26	1742.25	29836.75	1344.78	28491.97	587.41
27	1568.03	30060.00	1352.58	28707.42	587.43
28	1393.80	30101.22	1356.78	28744.44	587.44
29	1219.58	29964.01	1357.51	28606.51	587.42
30	1045.35	29651.86	1354.82	28297.04	587.38
31	871.13	29168.17	1348.76	27819.40	587.32
32	696.90	28516.30	1339.36	27176.94	587.23
33	522.68	27699.62	1326.62	26373.00	587.13
34	348.45	26721.45	1310.49	25410.96	587.00
35	174.23	25585.19	1290.93	24294.26	586.83
36	0.00	24294.26	1264.87	23029.39	586.65

PEAK OUTFLOW= 22.63 CFS AT 29 MINUTES

St. Charles Co. Calc.
w/ Existing Condition
1.2' H x 1.8' W

90040 4-26-93 SUBMITTAL DATE:

ELEVATION	AREA	VOLUME	CUM. VOLUME
582.30	3780		
		2812	2812
583.00	4256		
		4596	7409
584.00	4937		
		5281	12690
585.00	5626		
		5970	18661
586.00	6315		
		6746	25407
587.00	7178		
		7609	33016
588.00	8040		
		8499	41516
589.00	8959		
		9418	50934
590.00	9878		

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*****************************************
*                                       *
*  RECTANGULAR ORIFICE                  *
*   16.08 in W X 14.4 in H   ELEV= 582.26
*                                       *
*  Outlet Pipe -  60.3 ft - 42 in pipe  *
*  UFL= 582.26  LFL= 581.62   n= .013   *
*                                       *
*  Overflow Structure -  Standpipe      *
*  DIAM= 42 in   STANDPIPE ELEV= 590.01 *
*                                       *
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*Revised orifice opening (1.34' w x 1.2' H.)

90040 4-26-93 SUBMITTAL DATE:

MIN	INFLOW	STORAGE	OUTFLOW	NET DET.	ELEV.
1	174.23	174.23	1.67	172.55	582.34
2	348.45	521.00	4.99	516.01	582.43
3	522.68	1038.69	14.45	1024.24	582.55
4	696.90	1721.14	33.47	1687.67	582.72
5	871.13	2558.80	65.22	2493.57	582.92
6	1045.35	3538.92	112.23	3426.69	583.13
7	1219.58	4646.27	170.69	4475.58	583.36
8	1393.80	5869.38	241.74	5627.64	583.61
9	1568.03	7195.67	409.68	6785.98	583.86
10	1742.25	8528.23	473.34	8054.89	584.12
11	1916.48	9971.37	530.62	9440.74	584.38
12	2090.70	11531.44	583.17	10948.27	584.67
13	2264.93	13213.19	635.42	12577.77	584.98
14	2439.15	15016.92	687.45	14329.47	585.27
15	2613.38	16942.84	733.88	16208.97	585.59
16	2787.60	18996.57	780.25	18216.32	585.93
17	2787.60	21003.92	826.91	20177.01	586.22
18	2787.60	22964.61	866.33	22098.28	586.51
19	2787.60	24885.88	902.25	23983.63	586.79
20	2787.60	26771.23	936.16	25835.08	587.06
21	2613.38	28448.46	967.47	27480.99	587.27
22	2439.15	29920.14	992.09	28928.05	587.46
23	2264.93	31192.98	1013.25	30179.73	587.63
24	2090.70	32270.43	1031.19	31239.24	587.77
25	1916.48	33155.72	1046.15	32109.57	587.88
26	1742.25	33851.82	1058.27	32793.55	587.97
27	1568.03	34361.58	1067.70	33293.87	588.03
28	1393.80	34687.67	1074.15	33613.52	588.07
29	1219.58	34833.10	1078.05	33755.04	588.09
30	1045.35	34800.39	1079.77	33720.62	588.08
31	871.13	34591.75	1079.35	33512.39	588.06
32	696.90	34209.29	1076.82	33132.47	588.01
33	522.68	33655.15	1072.18	32582.97	587.94
34	348.45	32931.42	1064.81	31866.62	587.85
35	174.23	32040.85	1054.90	30985.94	587.73
36	0.00	30985.94	1042.59	29943.35	587.60

PEAK OUTFLOW= 18 CFS AT 30 MINUTES

St. Charles Co Calc.
w/ rev'd opening @ orifice
1.2' h x 1.34' w