Bridgewood Add'n 11/14/79

1. Channel at NE corner has a slope of 2.87% which is very steep.

2. TC of Tallowood at channel is only .5' above WS of channel.

3. Minimum pad elevation for adjacent lots should be 49.5

X EXISTING 60" x 40" CMPA under 13th st Does not have the capacity to pass 408 cfs of flow.

5. Any outlet design for pond at SE corner?

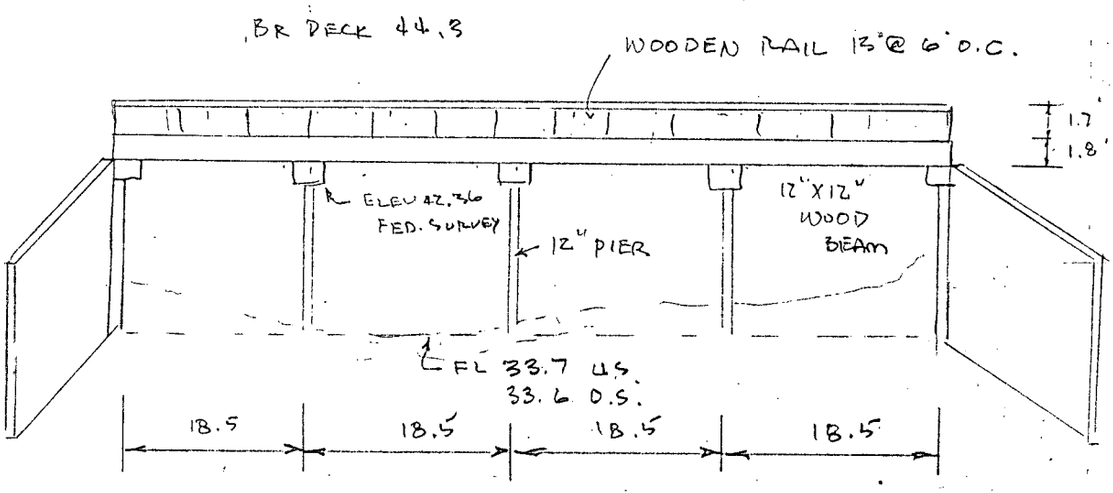
6. Reserve area for pond & drainage easement

7. Storm Water sewer at 13th & Davis to pick up water and drain to pond

10-10-79

BRIDGEWOOD ADDN. MAIN DRAINAGE

BRIDGE AT 127TH ST.



DIRT - SHORT GRASS 3" - NO WEEDS @ BRIDGE

CHANNEL - 10'-20' BOT. DIRT - 12" HIGH VEGETATION - 4 TO 8'

STEEP BANKS - SCATTERED TREES SMALL 10"-12" OR BUSHES

LITTLE COVER OUTSIDE CHANNEL GRASS - 12" WEEDS

CHANNEL VERY WINDING

SEE X-SEC. - W.S. @ ELEV. 1342.0 - W. SIDE BR. 0+00
0+72 UP STREAM

Q_a | 42 | 36.9 | 34.7 | 34.7 | 34.9 | 42 | $a = 122.15$ SF
-28 | -8 | -5 | 0 | 4 | 4 | $R = \frac{122.15}{27} = 4.52$

FL @ STA 0+72 34.8
FL @ STA 19+70 37.4 $\frac{2.6}{1898} = .00137$ FT/FT SLOPE

$Q_a = 122.15 \quad \frac{1.486}{.045} \quad 4.52^{2/3} \quad .00137^{1/2} = 408.1$ cfs $\quad V = \frac{408.1}{122.15} = 3.3$

Q_b | 42 | 36.1 | 35.4 | 33.7 | 34.2 | 35.1 | 36.6 | 42 | $a = 531.35$
-22 | -22 | -16 | 0 | 16 | 33 | 54 | 54 | $R = \frac{531.35}{76} = 6.9$

$Q_b = 531.35 \quad \frac{1.486}{.040} \quad 6.99^{2/3} \quad .00137^{1/2} = 2671.0$ cfs

$V = \frac{2671}{}$

Q_c	$\frac{42}{0}$	$\frac{38^2}{0}$	$\frac{39^3}{22}$	$\frac{39^3}{33}$	42 / 51

$a = 125.5$ SQ FT

$R = \frac{125.5}{51} = 2.46$

$Q_c = 125.5 \quad \frac{1.486}{.045} \quad 2.46^{2/3} \quad .00137^{1/2} = 279.5$ cfs

$V = \frac{279.5}{125.5} = 2.23$

$\Sigma Q = 3358.6$ cfs

$q_1 = \frac{73521}{3358.6(3358.6/779.7)^2} = 1.18$ $\quad q_2 = 1$ FIG 5

$M = \frac{2671}{3358.6} = 0.80$ $\quad K_b = 0.22$

PIER AREA $= (5.6 + 7.0 + 7.4 + 6.9 + 5.4) \times 1 = 32.3$ SQ. FT.

$\lambda = \frac{32.3}{531.55} = 0.061$ $\quad \Delta K = .23$ $m=1$ $\quad$ CORR FACTOR .95 $M = .8$

$\Delta K_p = .23 \times .95 = 0.22$

$K^* = 0.22 + 0.22 = 0.44$

$V_n = \frac{3358.6}{531.55} = 6.32$ fps

$\frac{6.32^2}{2g} = 0.62$ FT.

$h_1 = 0.44 \times 1 \times 0.62 = 0.27$ FT.

(3)

$V_{n2} = 6.32$ $\quad A_{n4} = 779$

$A_{n2} = 531.55$ $\quad A_{n1} = 153 \times .27 + 779 = 820.3$

$$1.14\left[\left(\frac{531.35}{779}\right)^2 - \left(\frac{531.35}{820.3}\right)^2\right] 0.62 = .03'$$

BACKWATER $0.27 + .03 = 0.3'$ @ STA 0+72. W.S. = 42.3

Sec.	n	$\frac{1.486}{n}$	a	p	$R=\frac{a}{p}$	$R^{2/3}$	$K=\frac{1.486}{n}ar^{2/3}$	$q=QK_1$	$V=\frac{q}{a}$	qV^2
Qa	.045	33.02	122.15	27	4.52	2.73	11011	408.1	3.34	4552
Qb	.040	49.53	531.35	76	6.99	3.66	96323	2671	5.03	67579
Qc	.045	33.02	125.5	51	2.46	1.82	7542	279.5	2.23	1390

$A_n = 779.7$ $\quad K = 114876$ $\quad Q = 3358.6$ cfs $\quad \Sigma qv^2 = 73521.$

$A_{n_2} = 531.35$

$Q_b = 2671.0$

2460 cfs REQ'D TRY W.S. = 41.5

Q_a	41.5	36.9	34.7	34.7	34.9	41.5	$a = 100.9$
	-18	-8	-5	0	4	4	

$$R = \frac{100.9}{23.7} = 4.26$$

$$Q_a = 100.9 \quad \frac{1.486}{.045} \quad 4.26^{2/3} \quad .00137^{1/2} = 324.1 \text{ cfs}$$

Q_b	41.5	34.9	36.4	36.6	38.1	41.5	$a = 340.25$
	0	0	7	32	74	74	

$$R = \frac{340.25}{74} = 4.6$$

$$Q_b = 340.25 \quad \frac{1.486}{.040} \quad 4.6^{2/3} \quad .00137^{1/2} = 1294.1 \text{ cfs}$$

TRY WS = 42.0 SAME AS FIRST TRIAL EXCEPT Q_b X-SEC IS @ 0+72 INSTEAD OF BRIDGE

$Q_a = 408.1$ cfs

Q_b	42	34.9	36.4	36.6	38.1	42	$a = 377.25$
	0	0	7	32	74	74	

$$R = \frac{377.25}{74} = 5.1$$

$$Q_b = 377.25 \quad \frac{1.486}{.040} \quad 5.1^{2/3} \quad .00137^{1/2} = 1537 \text{ cfs}$$

$Q_c = 279.5$ cfs $Q_{TOTAL} = 2193.75$ cfs.

RAISE W.S. 0.2' = 42.2

Q_a $a = 127.6$ $R = \frac{127.6}{27} = 4.73$

$$Q_a = 127.6 \quad \frac{1.486}{.045} \quad 4.73^{2/3} \quad .00137^{1/2} = 439.5 \text{ cfs}$$

Q_b $a = 392$ $R = \frac{392}{74} = 5.30$

$Q_b = 439.5 \quad \frac{1.486}{.040} \quad 5.3^{2/3} \quad .00137^{1/2} = 1837.1$ cfs

$Q_c \quad a = 136 \quad R = \frac{136}{51} = 2.67$

$Q_c = 136 \quad \frac{1.486}{.045} \quad 2.67^{2/3} \quad .00137^{1/2} = 319.9$ cfs

$Q_{TOTAL} = 2596.5$ cfs

TRY 1342.1

$Q_a \quad a = 125 \quad R = \frac{125}{27} = 4.63$

$Q_a = 125 \quad \frac{1.486}{.045} \quad 4.63^{2/3} \quad .00137^{1/2} = 424.4$ cfs

$Q_b \quad a = 385 \quad R = \frac{385}{74} = 5.20$

$Q_b = 385 \quad \frac{1.486}{.040} \quad 5.20^{2/3} \quad .00137^{1/2} = 1589.$ cfs

$Q_c \quad a = 131 \quad R = \frac{131}{51} = 2.57$

$Q_c = 131 \quad \frac{1.486}{.045} \quad 2.57^{2/3} \quad .00137^{1/2} = 300.4$ cfs

WS 1342.1 Q_{TOTAL} 2313.8 cfs

USE W.S. = 1342.2 @ 2596.5 cfs

$Q = 70150 \times .00137^{1/2} = 2596.5$ cfs

$q_1 = \frac{47377}{2596.5\left(2596.5 \div 6556\right)^2} = 1.16$

$M = \frac{Q_b}{Q} = \frac{1837.1}{2596.5} = 0.71$

$q_2 = 1.10$ USE 1.2

TRIAL #2 W.S. 1542.6 @ STATIC (NORMAL).

	n	a	k	Q	V	QV^2
Q_a	.045	127.6	11874	439.5	3.44	5201
Q_b	.040	392	49633	1837.1	4.69	40409
Q_c	.045	136	8643	319.9	2.35	1767

$K_T = 70150$ $Q_a = 2596.5$ $\Sigma QV^2 = 47377$

$A_n = 655.6$

$A_{n_2} = 392$ $Q_b = 1837.1$

$K_b = 0.60$

$A_p = 26$ SQ. FT.

$J = \frac{A_p}{A_{n2}} \quad \frac{26}{392} = .066$

$\Delta K = 0.08$ CORR TO M = .92

$\Delta K_p = .08 \times 0.92 = .07$

$K^* = 0.60 + .07 = 0.67$

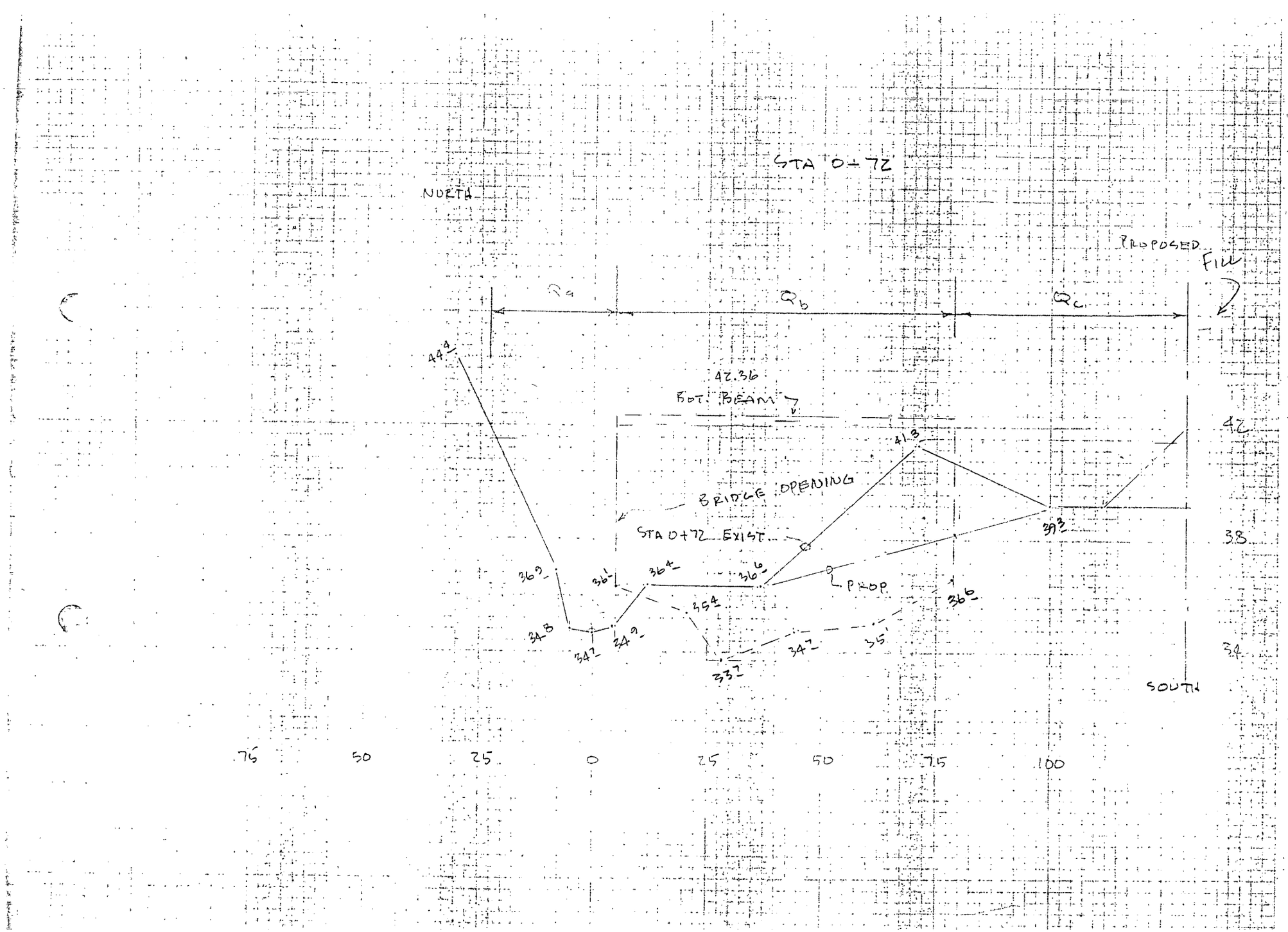
$V_{n2} = \frac{2596.5}{392} = 6.62$ FPS

$\frac{V^2_{n2}}{2g} = \frac{6.62^2}{64.4} = 0.68$ FT.

$K = 0.67 \times 1.2 \times 0.68 = 0.55$

$1.16\left[\left(\frac{392}{655.6}\right)^2 - \left(\frac{392}{740.1}\right)^2\right] 0.68 = 0.06$

$h_1 = 0.55 + .06 = \underline{0.61 \text{ FT}}$ W.S @ STA 0+72 1342.8


STA 0+72
NORTH
PROPOSED FILL
Q_a
Q_b
Q_c
44.4
42.36
BOT. BEAM
41.3
42
BRIDGE OPENING
STA 0+72 EXIST.
39.3
38
36.9
36.1
36.4
36.6
PROP
35.4
36.6
34.8
34.7
34.9
34.7
35
33.7
34
SOUTH
75
50
25
0
25
50
75
100

BACKWATER COMPUTATION WORK SHEET

Project: BRIDGEWOOD ADDN

Page 1

Computed by: K. HILL Date 10-29-79

Checked by: _____ Date _____

Q = 2600 cfs n = .045 c = 33.02

Mile or Sec. No.	Reach Length	Est. W.S. Elev.	Area	2/3 r	S1/2 = 0.01 V1	S1/2 = 0.01 Q1	S	Mean S	hf	V	Q	V²Q	hv	hv Diff.	H	Comp. Elev.
0+72		1342.8														1342.8
3+60	288	1343.0	725	2.44	0.81	587.25	.00196	.00098	.28	3.59	2600		0.20		.48	1343.28
3+60	288	1343.2	760	2.52	0.83	630.8	.00170	.000849	.24	3.42	2600		0.18		0.42	1343.22
5+80	220	1343.4	745	2.29	0.76	563.3	.00213	.00192	.42	3.51	2613		0.19	—	0.42	1343.72
5+80	220	1343.6	786	2.37	0.78	613.1	.00180	.00175	.39	3.31	2600		0.17	—	.39	1343.61
9+90	410	1344.5	863	2.19	0.72	624.4	.00175	.00184	.75	3.01	2600		0.14	.04	.79	1344.40
11+70	180	1344.8	632	2.02	0.67	423.4	.00377	.00276	.50	4.11	2600		0.26	-.06	.44	1344.84
14+90	320	1345.1	901	1.93	0.64	576.6	.00203	.0029	.93	2.89	2600		0.13	.13	1.06	1345.9
14+90	320	1345.5	1030	2.11	0.70	721.0	.00130	.00254	.81	2.52	2600		0.10	.16	.97	1345.81

$V = C r^{2/3} S^{1/2}$ $C = \frac{1.486}{n}$ $S = (0.01 \frac{Q}{Q_1})^2$ $V = V_1 \frac{Q}{Q_1}$ $h_v = \frac{V^2}{64.4}$ $H = h_v \text{ Diff.} + h_f$

SWT Form 49-C
Rev 18 Dec 61

10-29-79

BRIDGEWOOD

STA 3+60 W.S. 43.2

NORTH									SOUTH
43.2	42	40	38	36	35	36	38	40	43.2
-90	-80	-50	-20	-10	0	10	20	80	100

$a = 760 \quad R = \frac{760}{190} = 4.0 \quad R^{2/3} = 2.52$

STA 5+80 W.S. 43.6

43.6	41.5	40	38	36	35.3	36	38	40	41.5	43.6
-80	-70	-45	-12	-8	0	8	12	35	125	135

$a = 786 \quad R = \frac{786}{215} = 3.66 \quad R^{2/3} = 2.37$

STA 9+90 W.S. 44.5

44.5	43.5	42	40	38	36.5	38	40	42	44.5
-180	-170	-130	-10	-5	0	5	10	75	85

$a = 863 \quad R = \frac{863}{265} = 3.25 \quad R^{2/3} = 2.19$

STA 11+70 WS 44.8

44.8	44	41.8	38.6	37.4	37.9	41.1	41.5	43	44.8
-40	-28	-9	-6	0	5	10	70	170	180

$a = 632 \quad R = \frac{632}{220} = 2.87 \quad R^{2/3} = 2.02$

STA 14+90 W.S. 45.5

45.5	44	42	40	37.6	40	42	44	45.5
-200	-190	-40	-15	0	15	45	120	135

$a = 1030 \quad R = \frac{1030}{335} = 3.07 \quad R^{2/3} = 2.11$

10-31-79

BRIDGEWOOD ADDN - DRAINAGE FROM NE COR THRU POND

DA #1 33.3 Ac N of RR, 3.7 Ac S. of RR. TO ℄ TALLOW OC
TOTAL DA = 37 Ac.

$L = 2850 = 0.54$ mi. $\quad F = 83 - 47 = 36'$

$$T_c = \left(\frac{11.9 \times 0.54^3}{36}\right)^{0.385} = 0.32 \text{ HRS} = 19.2 \text{ MIN.} \qquad i_{100} = 8.16$$

$Q_{100} = 37 \times 0.4 \times 8.16 = 120.8$ cfs

ADD 5.3 Ac TO DA #1 TO S. SIDE OF POND 42.3 Ac

$L = 3250 = 0.62$ mi. $\quad E = 83 - 43 = 40'$

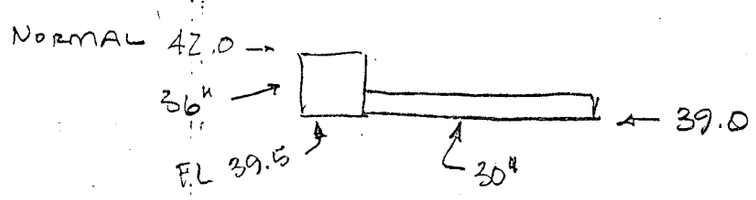
$$T_c = \left(\frac{11.9 \times .62^3}{40}\right)^{0.385} = 0.36 \text{ HRS} = 21.7 \text{ MIN} \qquad i_{100} = 7.78$$
$$i_2 = 3.51$$

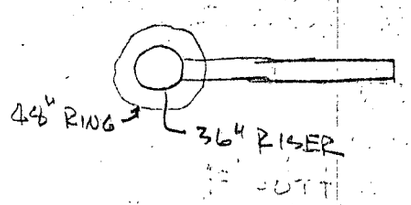
$Q_{100} = 42.3 \times 0.4 \times 7.78 = 131.6$ cfs

$Q_2 = 42.3 \times 0.4 \times 3.51 = 59.4$ cfs

RUN INFLOW - OUTFLOW - 2YR 6 HR STORM 2.5"

DISCHARGE THRU 36" RISER PIPE 24" OUTFLOW





$Q = C L H^{3/2}$

$L = 9.4'$ FOR 36" DIAM. PIPE

$C = 3.33$

	HEAD			OUTFLOW PIPE HW
$Q = 3.33 \times 9.4 \times$	$0.4^{1.5}$	=	7.9 cfs	2.9
"	0.5	=	11.1 cfs	
"	0.6	=	14.5 cfs	
"	0.7	=	18.3 cfs	
"	0.8	=	22.4 cfs	
"	0.9	=	26.7 cfs	
"	1.0	=	31.3 cfs	3.5
"	1.2	=	41.1 cfs	3.7 PIPE CONTROL

USE 30" OUT FLOW PIPE 23 cfs @ 2.9' HW
33 cfs @ 3.5' HW
35 cfs @ 3.7'

WEIR FLOW INTO RISER CONTROLS

STORAGE	ELEV
0	42
30	42.5
.63 AC.FT.	43

RUNOFF 2.5" 2YR 6HR RAINFALL CN = 85

1.26"/Ac $(1.26 \times 42.3) \div 12 = 4.44$ Ac/Ft.

FLOW THRU SPILLWAY

$Q = 3.087 \; C \; H^{3/2}$

$Q = 3.087 \; 35 \; 0.2^{3/2} = 9.7$ cfs + 35 cfs PIPE

TOTAL 44.7 @ ELEV 1343.2

$Q = 3.087 \; 35 \; 1.0^{3/2} = 108.1$ cfs + 36 PIPE = 144 cfs ±

@ ELEV 1344.0

10-31-79

CONCULSIONS FROM INFLOW-OUTFLOW HYDROGRAPH

2YR 6HR STORM FLOOD ROUTED THRU POND WITH 35' WIDE SPILLWAY, 36" RISER PIPE, 30" OVERFLO PIPE WILL CREST AT 1343.35 - 0.35' THRU SPILLWA

RAISE SPILLWAY TO CONTAIN 2YR STORM THEN MAX STORAGE 151.26 AC FT — HIGH WTR 1343.95
SET EL OF SPILLWAY AT 1344.0 AND 2YR STORM WILL NOT DISCHARGE THRU EMERGENCY SPILLWAY

FOR FINAL DESIGN TRY TO INCREASE STORAGE BELOW SPILLWAY

$Q = 3.087 \times 35 \times .92^{3/2} = 95.3$ cfs THRU SPILLWAY @ 1344.92 (.92' DEEP)

36 cfs MAX PIPE FLOW

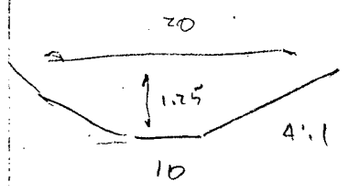
$Q_{100} = 131.6$ 131.3 cfs DISCHARGE @ 1344.92 W.S

RUN BACKWATER PROFILE THRU POND

Q_{100} W.S. @ MAIN CHANNEL S. OF POND 43.7

USE 2-42" RCP ACROSS RAMBLEWOOD @ 131.6 cfs 1.0' HEAD US W.S. 1344.7

NORMAL CHANNEL FLOW



$a = 14.75$ $R = \frac{14.75}{20} = .74$

$Q = 14.75 \quad \frac{1.486}{.035} \quad .92^{2/3} \quad .0287^{1/2} = 129.4$ cfs

Plotting Coefficients for Development of Commons Inflow Hydrograph:

POND NE COR. OF ADDN. 10-31-79

Ordinate Plotting Value	= 1 Unit of Flow X	Unit of Flow Coefficient	Unit of Time Coefficient	X 1 Unit of Time =	Abcissa Plotting Value
	USE 1.0				
0 cfs	0.99	0	0	2.7	0
		2	1.4		3.8
		4	2.5		6.8
		5	2.95		8.0
		7	3.75		10.1
		10	4.5		12.2
		55	10.6		28.6
		58	11.2		30.2
		59	11.7		31.6
		60	13.4		36.2
59.4		59	15.15		40.9
		58	15.85		42.8
		55	16.75		45.2
		20	24.5		66.2
		18	25.2		68.0
		16	26.2		70.7
		14	27.75		74.9
		12	29.90		80.7
		10	32.95		89.0
		8	37.5		101.3
		7	41.0		110.7
		6	47.5		128.3
		0	100		270

2.5" RAIN 1.26" RUNOFF

$\frac{1.26 \times 42.3}{12} = 4.44$ AC FT RUN OFF

$\frac{59.4 \text{ } Q_2 \text{ PEAK}}{60} = 0.99$ cfs/UNIT OF FLOW

$\frac{4.44 \text{ AC FT}}{1196.5} = .00371$

$\frac{.00371 \times 12}{.022} \times 60 = 2.70$ MIN/UNIT OF TIME

BACKWATER COMPUTATION WORK SHEET

Project: BRIDGEWOOD ADDITION - THRU POND NE COR ADDN. **Page** 1 of 1

CHANNEL N. OF TALLOWOOD 10' BOT 4:1 SIDE

0.287% SLOPE

Computed by: K HILL **Date** 10-31-79

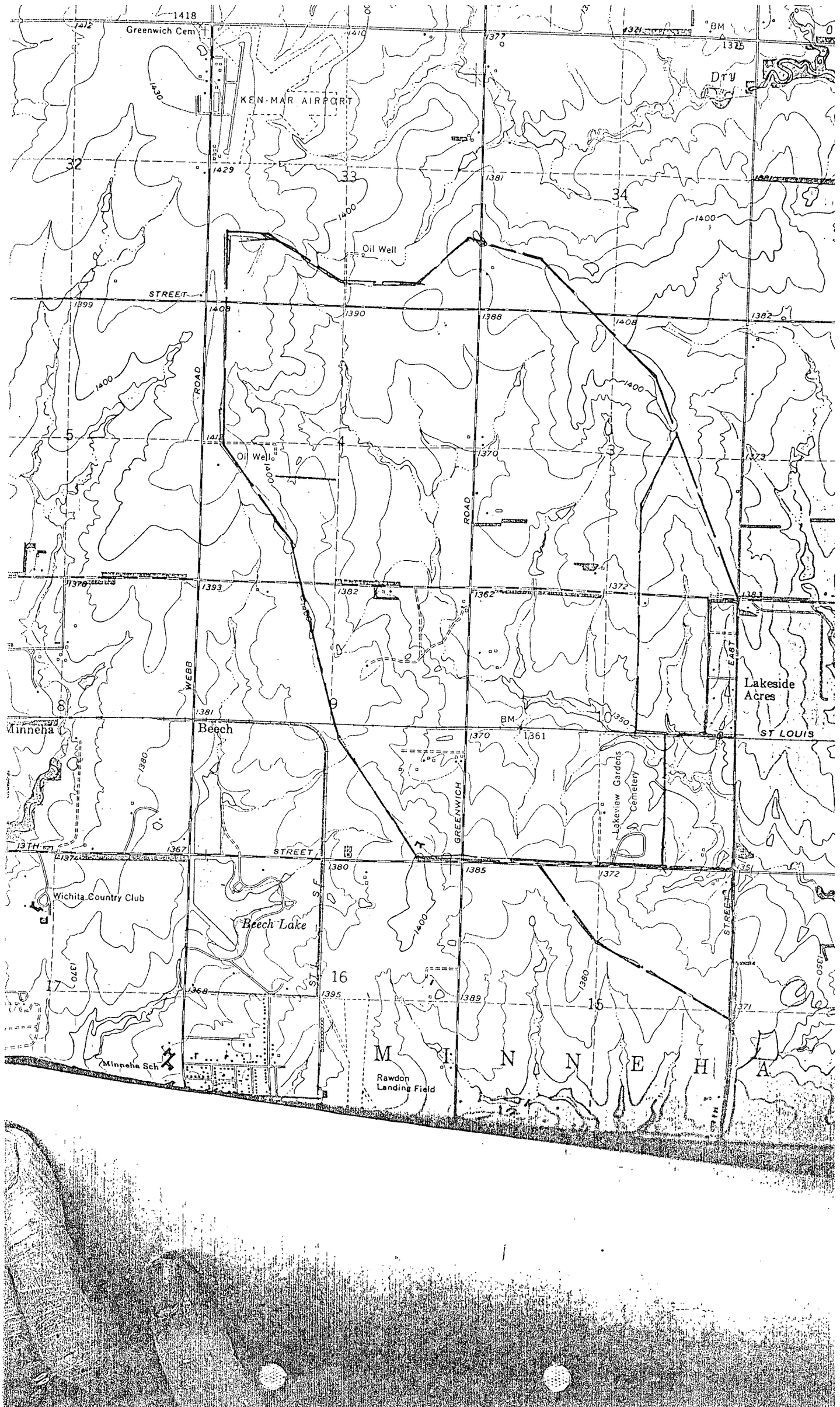
Checked by: _____ **Date** _____

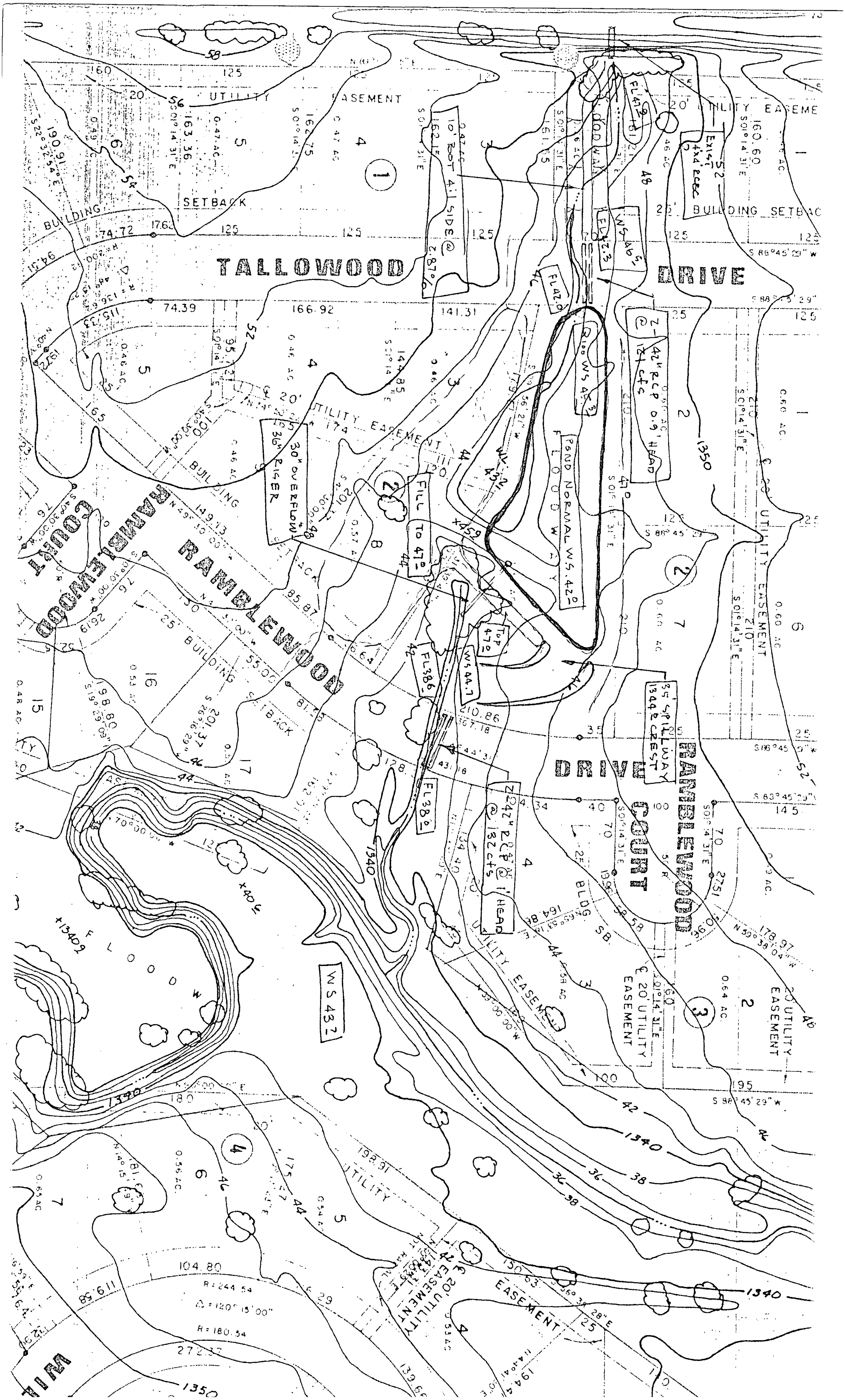
Q = 131.6 cfs **n =** .035 **c =** 42.46

Mile or Sec. No.	Reach Length	Est. W.S. Elev.	Area	2/3 r	S1/2 = 0.01 V / Q	S	Mean S	hf	V	Q	V^2Q	h_v	h_v Diff.	H	Comp. Elev.
D+00		1344.7		N.	LINE RAMBLEWOOD										1344.7
+50	50	1344.8	60	1.2	.51 / 30.6	.001605		.09	2.19	131.6		.07	—	.16	1344.86 ✓
1+00	50	1345.0	39	.94	.40 / 15.6	.00712	.00448	.22	3.37	131.6		.18	-.06	.16	1345.02 ✓
1+20	20	1345.1	187	3.4	1.44 / 269.28	.00003	.00358	.07	0.70	131.6		—	.18	.25	1345.27 ✓
4+00	280	1345.3	90	2.1	.69 / 80.1	.00027	.00015	.04	1.46	131.6		.03	-.01	.03	1345.30 ✓
REDUCE FLOW THRU CULVERTS @ TALLOWOOD TO 120.8 cfs															
USE 2-42" RCP H = 0.9' S = 0.3 WS 1345.3 + .3 + .9															1346.5 ✓
D+00	N. LINE TALLOWOOD														1346.5
0+50	50	1346.60	61.7	1.52	.65 / 40.1	.0009	.0009	.04	1.96	120.8		.06	—	.10	1346.6 ✓
1+50	100	1348.35	19.8	.98	.42 / 8.32	.0211	.011	1.1	6.10	120.8		0.58	-.26	.84	1347.44
1+30	80	1347.28	18.8	.96	.41 / 7.70	.0246	.0128	1.02	6.43	120.6		0.64	-.29	.73	1347.33 ✓
										NORMAL FLOW 1.25' DEEP					

$V = C r^{2/3} S^{1/2}$ $C = \frac{1.486}{n}$ $S = (0.01 \frac{Q}{Q_1})^2$ $V = V_1 \frac{Q}{Q_1}$ $h_v = \frac{V^2}{64.4}$ $H = h_v \text{ Diff.} + h_f$

SWT Form 49-C
Rev 18 Dec 61


Greenwich Cem
KEN-MAR AIRPORT
Oil Well
Oil Well
STREET
ROAD
ROAD
WEBB
EAST
Lakeside Acres
ST LOUIS
Minneha
Beech
BM
Lakeview Gardens Cemetery
GREENWICH
13TH STREET
Wichita Country Club
Beech Lake
S.F.
Minneha Sch
Rawdon Landing Field
MINNEHA
Dry
32
33
34
5
4
3
8
9
10
16
17
15



TALLOWOOD DRIVE
RAMBLEWOOD DRIVE
RAMBLEWOOD COURT
UTILITY EASEMENT
20' UTILITY EASEMENT
25' BUILDING SETBACK
BUILDING SETBACK
10' BOT 4:1 SIDE @ 2.87%
EXIST. 4x4 RCBC
FL 41.9
FL 42.3
WS 46.5
FL 42.0
42" RCP 0.9' HEAD @ 121 cfs
R 100 WS 45.3
POND NORMAL W.S. 42.0
W.V. 43.2
FLOOD WAY
30" OVERFLOW 36" RISER
FILL TO 47.0
x 45.9
TOP 47.0
WS 44.7
FL 38.6
FL 38.0
35' SPILLWAY 1344.0 CREST
42" RCP @ 132 cfs 1' HEAD
WS 43.2
+1340.9
x 40.4
1350
1340
R = 244.54
Δ = 120° 15' 00"
R = 180.54
S 88° 45' 29" W
N 50° 38' 04" W
S 01° 14' 31" E
0.60 AC.
0.64 AC.
0.56 AC.

11-2-79

BRIDGEWOOD ADDN

DRAINAGE CHANNEL @ NW COR. OF ADDN.

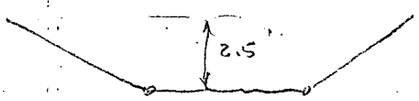
D.A. = 159 Ac $L = 6000' = 1.14$ MI. $F = 95 - 47 = 48'$

$$T_c = \left(\frac{11.9 \times 1.14^3}{48}\right)^{0.385} = .68 \text{ HRS} = 40.8 \text{ MIN}$$ $i_{100} = 5.34$

$Q_{100} = 159 \times 0.4 \times 5.34 = 339.6$ cfs

CHANNEL FLOW

20' BOTTOM 4:1 SIDE SLOPE 0.55% GRADE



$a = 81.25$ $R = \frac{81.25}{45} = 1.8$

$$Q = 81.25 \quad \frac{1.486}{.035} \quad 1.8^{2/3} \quad .0055^{1/2} = 378.6 \text{ cfs}$$

TRY 2.4' DEPTH

$a = 71.04$ $R = \frac{71.04}{39.2} = 1.81$

$$Q = 71.04 \quad \frac{1.486}{.035} \quad 1.81^{2/3} \quad .0055^{1/2} = 332.2 \text{ cfs}$$

DEPTH OF FLOW @ 340 cfs 2.45' ±

NOTE "C" 0.4 JUSTIFIED BY POND UPSTREAM WHICH WILL PROVIDE SOME STORAGE.

BACKWATER COMPUTATION WORK SHEET

Project: BRIDGEWOOD ADDN CHANNEL @ UW CDR.
20 BOTTOM - 4:1 SIDES - 0.55% GRADE
SEE ATTACHED PROFILE AND X-SEC.

Page 1 of 1

Computed by: K. Hill Date 11-2-79

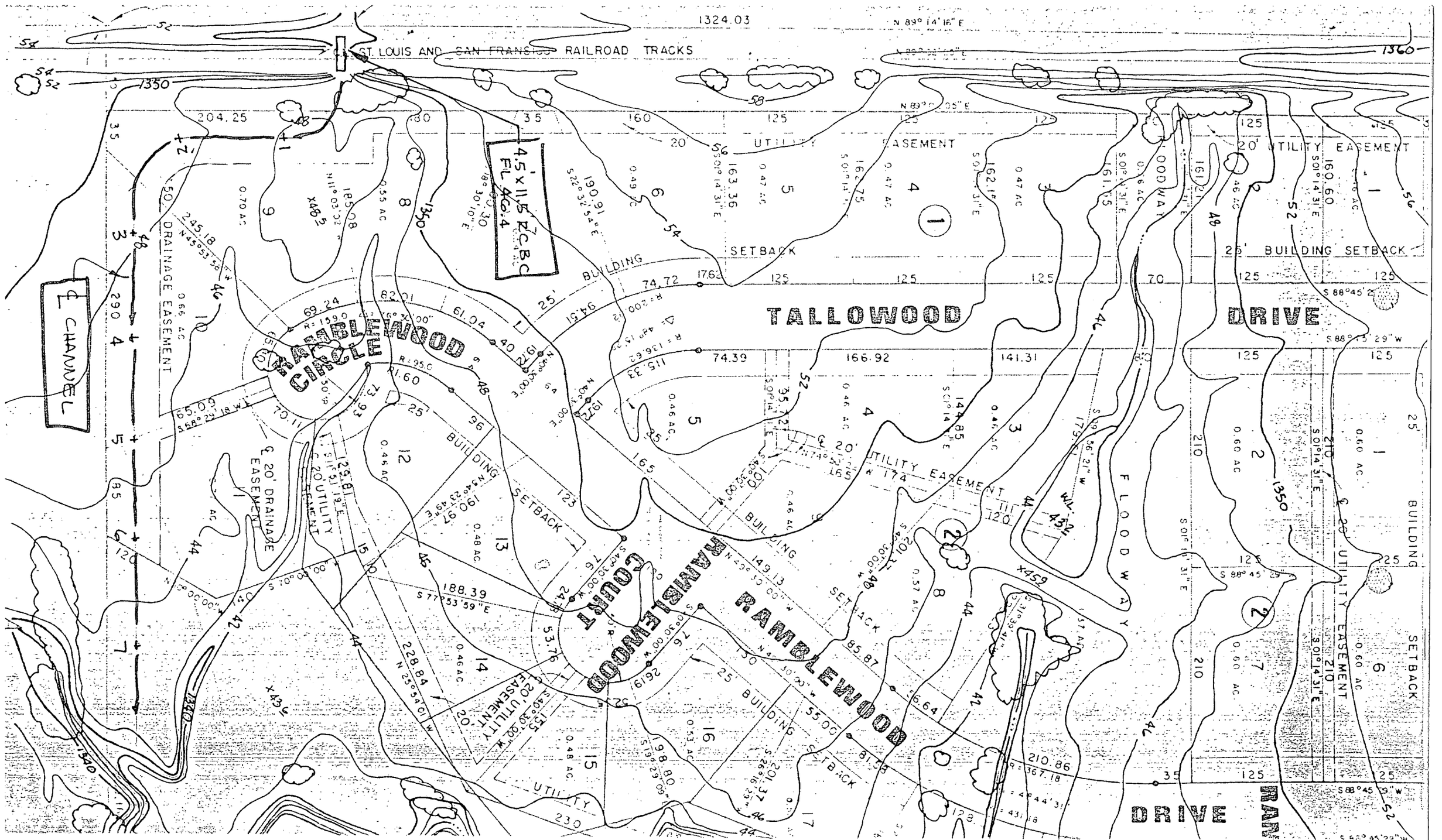
Checked by: _____ Date _____

Q = 340 cfs n = .035 c = 42.46

Mile or Sec. No.	Reach Length	Est. W.S. Elev.	Area	2/3 r	S1/2 = 0.01 Q1	Q	S	Mean S	hf	V	Q	V^2Q	h_v	h_v Diff.	H	Comp. Elev.
6+20																1345.8
5+00	120	1346.5	88.4	1.62	.69	61.0	.0031		.37	3.85	340		.23		0.60	1346.4
4+00	100	1346.7	81.3	1.48	.63	51.2	.0044	.0038	.38	4.18	340		.27	-.02	0.36	1346.76
3+00	100	1347.25	81.3	1.48	.63	51.2	.0044	.0044	.44	4.18	340		.27	—	.44	1347.20
				NORMAL FLOW			2.45	DEEP @ 340 cfs								
			0400													

$V = C r^{2/3} S^{1/2}$ $C = \frac{1.486}{n}$ $S = (0.01 \frac{Q}{Q_1})^2$ $V = V_1 \frac{Q}{Q_1}$ $h_v = \frac{V^2 Q}{64.4Q}$ H = h_v Diff. + h_f

SWT Form 49-C
Rev 18 Dec 61


1324.03
N 89° 14' 16" E
ST. LOUIS AND SAN FRANCISCO RAILROAD TRACKS
1360
1350
204.25
4.5' x 11.5' R.C.B.C.
FL. 466.4
UTILITY EASEMENT
20' UTILITY EASEMENT
SETBACK
25' BUILDING SETBACK
TALLOWOOD DRIVE
BLUEWOOD CIRCLE
CIR.
RADIUS
DRAINAGE EASEMENT
℄ CHANNEL
℄ 20' DRAINAGE EASEMENT
20' UTILITY EASEMENT
BUILDING SETBACK
RAMBLEWOOD COURT
RAMBLEWOOD DRIVE
FLOODWAY
S 88° 45' 29" W
S 01° 14' 31" E
N 01° 14' 31" W
0.70 AC
0.55 AC
0.66 AC
0.46 AC
0.47 AC
0.48 AC
0.53 AC
0.57 AC
0.60 AC
245.18
N 45° 53' 58" E
185.08
N 11° 03' 02" E
190.91
S 22° 32' 54" E
163.36
162.75
162.15
161.55
160.60
74.72
94.51
82.01
69.24
61.04
74.39
166.92
141.31
115.33
95.00
81.60
70.11
65.00
S 58° 21' 18" W
125.81
S 11° 53' 19" E
190.97
N 34° 23' 49" E
188.39
S 7° 53' 59" E
228.84
N 25° 54' 01" W
198.80
S 19° 29' 08" W
201.37
S 26° 16' 23" W
149.13
N 29° 30' 00" W
85.87
81.56
55.00
53.76
210.86
R = 367.18
Δ = 32° 44' 31"
= 431.18
175.36
S 01° 14' 31" E
W.L. 432
X 452
X 435
X 462
X 466
X 440
X 174
X 120
X 230

11-6-79.

BRIDGEWOOD - DRAINAGE S'E CORNER

DA = 128.7 Ac L = 2920' = 0.553 MI. F = 74 - 42 = 32

$T_c = \left(\frac{11.9 \times 0.553^3}{32}\right)^{0.385}$ = .34 HRS = 20.7 MIN. i_{100} = 7.93

Q_{100} = 128.7 x 0.4 x 7.93 = 408.2 cfs TO S. SIDE 13TH

DA TO POND DAM N OF 13TH

DA = 140.65 L = 3370' = 0.64 MI. F = 74 - 40 = 34

$T_c = \left(\frac{11.9 \times 0.64^3}{34}\right)^{0.385}$ = .40 HRS = 23.9 MIN. i_{100} = 7.49

Q_{100} = 140.65 x 0.4 x 7.49 = 421.4 cfs TO POND DAM

DA ACROSS 12TH BELOW POND

DA = 153.35 L = 3570 = .68 MI. F = 74 - 34 = 40

$T_c = \left(\frac{11.9 \times .68^3}{40}\right)^{0.385}$ = .40 HRS = 23.9 MIN. i_{100} = 7.49

Q_{100} = 153.35 x 0.4 x 7.49 = 459.4 cfs

TRY 60' WIDE SPILLWAY 4:1 SIDE SLOPES

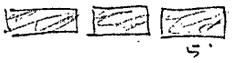
$Q = 3.087\ L\ H^{3/2} = 3.087 \times 60 \times 2^{3/2}$ = 523.9 cfs @ 2' DEPTH

421.4 cfs REQ

RUN BACKWATER PROFILE FROM 12TH TO 13TH

USE 60' SPILLWAY F.L. 1340.0

USE 3 OPENING 4' HIGH X 5' WIDE RCBC ACROSS 127 TH



$Q = 32 cfs/Ft$ @ 5' HW (45° WING WALLS K. DOT. HANDBOOK)

$32 \times 15 = 480 cfs$ @ 5' HW

F.L. 1334.0 + 5' = 1339.0 W.S. @ W. SIDE 127TH

CHECK CRITICAL DEPTH THRU STILLWAY @ 460 cfs

$K_c' = \frac{Q}{b^{5/2}} = \frac{460}{60^{5/2}} = .0165$

$\frac{D_c}{b} = .02 \qquad \frac{D_c}{60} = .02 \quad D_c = 1.2'$ ELEV 1341.20

CHECK CRITICAL DEPTH @ STA 64+30 $Q = 421 cfs$
ASSUME 30' CHANNEL 4:1 SIDES

$K_c' = \frac{421}{30^{5/2}} = .045$

$\frac{D_c}{b} = .056 \qquad \frac{D_c}{30} = .056 \quad D_c = 1.7'$ ELEV 1343?

BACKWATER COMPUTATION WORK SHEET

Project: BRIDGEWOOD ADDN. - THRU POND SEGOR.

Page 1 1

Computed by: K.R.H. Date 11-6-79

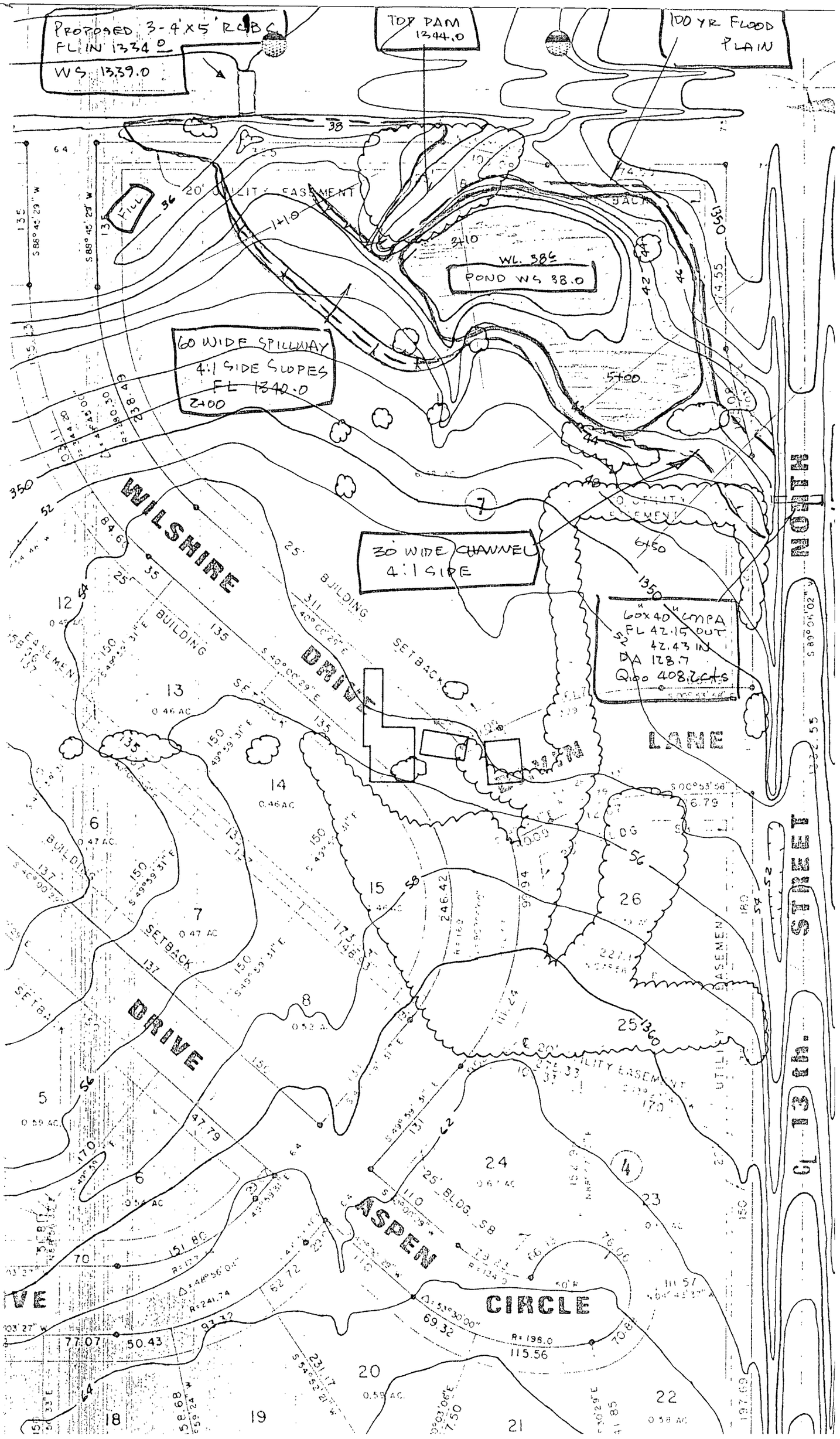
Checked by: _____ Date _____

Q = 460 cfs n = .013 c = 42.46

Mile or Sec. No.	Reach Length	Est. W.S. Elev.	Area	2/3 r	S1/2 = 0.01 Q1	Q	S	Mean S	hf	V	Q	V^2Q	h_v	h_v Diff.	H	Comp. Elev.
0+00		1339.0		THRU		3-4'	x5 BC	BC.								1339.0
0+80	80	1339.5	80	.97	.41	32.9	.01955	.01955	1.56	5.73	460		.50		2.06	
1+10	110	1340.0	106.5	1.24	.52	55.38	.0069	.0069	.76	4.32	460		.29		1.05	1340.05
2+00	90	1341.2	77.8	1.04	.46	35.79	.0165	.0117	1.06	5.91	460		.54	-.13	.93	1340.98
2+00	CHECK CRITICAL	DEPTH	Dc	= 1.2'	ELEV.	1341.2	CONTROLS						.46			1341.2
FLOW	ABOVE	DAM	42	1.0	cfs											
3+10	110	1341.5	205	4.74	2.01	412.05	.0001	.0001	.01	2.05	421		.06	.40	.41	1341.61
5+00	190	1341.7	255	5.2	2.20	561	.000056	.000056	.01	1.65	421		.04	.02	.03	1341.64
6+30	130	1344.0	76	1.40	.59	44.8	.0056	.00404	.53	5.54	421		.48	-.22	0.30	42.44
6+30	CHECK CRITICAL	DEPTH	Dc	= 1.7	ELEV	1343.7										1303.7

$V = Cr^{2/3}S^{1/2}$ $C = \frac{1.486}{n}$ $S = (0.01\frac{Q}{Q1})^2$ $V = V1\frac{Q}{Q1}$ $h_v = \frac{V^2}{64.40}Q$ H = h_v Diff. + hf

SWT Form 49-C
Rev 18 Dec 61


PROPOSED 3-4'X5' RCBC
FL IN 1334.0
WS 13,39.0
TOP PAM
1344.0
100 YR FLOOD PLAIN
20' UTILITY EASEMENT
FILL
WL 38±
POND WS 38.0
60 WIDE SPILLWAY
4:1 SIDE SLOPES
FL 1340.0
30' WIDE CHANNEL
4:1 SIDE
60'x40' "L" MPA
FL 42.15 OUT
42.43 IN
DA 128.7
Q100 408.2 cfs
WILSHIRE
DRIVE
ASPEN
CIRCLE
LANE
STREET
BUILDING
SETBACK
EASEMENT
UTILITY EASEMENT
S 89° 45' 29" W
S 89° 04' 02" W
S 40° 00' 29" E
S 49° 59' 31" E
R=198.0
115.56
69.32
0.59 AC
0.46 AC
0.47 AC
0.53 AC
0.67 AC
0.58 AC

BRIDGEWOOD ADDN.
STORM SEWER PRELIMINARY DESIGN

DA # 1 9.23 Ac L = 1500' = .28 mi. F = 60 - 36 = 24

$T_c = \left(\frac{11.9 \times .28^3}{24}\right)^{0.385}$ = .18 HRS = 10.8 MIN. USE 15 MIN.

$I_2 = 4.06$
$I_{100} = 8.98$

$Q_2 = 9.23 \times 0.4 \times 4.06 = 15$ cfs

$Q_{100} = 9.23 \times 0.4 \times 8.98 = 33.2$ cfs + 24.1 cfs DA # 2 & 7 = 57

USE 2 - 30" PIPES @ 0.5%

GUTTER FLOW

$Q = .56 \frac{32}{.018} .005^{1/2} .5^{\frac{2}{3}}$ = 11.08 cfs @ 0.5% USE MIN. GRADE 0.5

DA # 2 9.72 Ac L = 1250 = .24 mi. F = 61 - 46 = 15'

$T_c = \left(\frac{11.9 \times 0.24^3}{15}\right)^{0.385}$ = .176 HRS = 10.6 MIN. USE 15 MIN.

$Q_2 = 9.72 \times 0.4 \times 4.06 = 15.8$ cfs
$Q_{100} = 9.72 \times 0.4 \times 8.98 = 34.9$ cfs

DA #3 5.72 Ac USE 15 MIN Tc

$Q_2 = 5.72 \times 0.4 \times 4.06 = 9.3$ cfs

$Q_{100} = 5.72 \times 0.4 \times 8.98 = 20.5$ cfs

USE 30" PIPE @ 0.3% Q = 20.5 cfs

DA #4 5.54 Ac USE 15 MIN Tc

$Q_2 = 5.54 \times 0.4 \times 4.06 = 9.0$ cfs

$Q_{100} = 5.54 \times 0.4 \times 8.98 = 19.9$ cfs

USE 18" PIPE @ 1.1% HAZEN WILLIAMS DEPTH OF FLOW .91' C=120
A = 1.12 SQ FT.

$V = \frac{Q}{A} = \frac{9}{1.12} = 4.04$ fps

DA #5 1.21 Ac USE 15 MIN Tc

$Q_2 = 1.21 \times 0.4 \times 4.06 = 2.0$ cfs

DA #6 1.83 Ac USE 15 MIN Tc

$Q_2 = 1.83 \times 0.4 \times 4.06 = 3.0$ cfs

USE ONE INLET EACH SIDE OF ST. TO COLLECT 2YR STORM FROM DA 5 AND 6

DA # 7 2.69 Ac. USE 15 MIN. Tc

$Q_2 = 2.69 \times 0.4 \times 4.06 = 4.4$ cfs

$Q_{100} = 2.69 \times 0.4 \times 8.98 = 9.7$ cfs.

DA # 8 4.02 Ac USE 15 MIN Tc

$Q_2 = 4.02 \times 0.4 \times 4.06 = 6.5$ cfs

$Q_{100} = 4.02 \times 0.4 \times 8.98 = 14.4$ cfs

9.7 + 14.4 − 5 − 5 = 14.1 cfs Q100 BETWEEN DA 7 AND 8
USE ONE INLET EACH SIDE - CAPACITY 8 cfs EA.
2 yr STORM 4.5 cfs MAX

DA # 9 3.50 Ac USE 15 MIN Tc.

$Q_2 = 3.50 \times 0.4 \times 4.06 = 5.7$ cfs

$Q_{100} = 3.50 \times 0.4 \times 8.98 = 12.6$ cfs

DA # 10 1.1 Ac + DA # 2 9.72 = 10.82 Ac. TOTAL

$Q_{100} = 10.82 \times 0.4 \times 8.98 = 38.9$ cfs

38.9 − 14.8 = 24.1 cfs THRU PIPE @ 127TH AND ASPEN

$Q_2 = 1.1 \times 0.4 \times 4.06 = 1.8$ cfs