

1. VOLUME REQUIRED

FREQUENCY = 5 YEAR

PRESENT CONDITION
T_d = 20 DESIGN TIME
C = 0.36
I = 4.9 IN/HR
A = 2.54 AC.
Q = C*I*A = 4.48 CFS

PROPOSED CONDITION
T_d = 10 DESIGN TIME
C = 0.90
I = 6.2 IN/HR
A = 2.49 AC.
Q = C*I*A = 13.89 CFS

MAX. RELEASE RATE = PRESENT CONDITION - DIRECT DISCHARGE
MAX. RELEASE RATE = 4.39 - 1.51 + 0.28 = 3.16 CFS

TIME	INTENSITY	DISCHARGE	INFLOW	OUTFLOW	STORAGE	
10	6.2	12.67	7,602	1,896	5,706	
15	5.5	11.24	10,116	2,370	7,746	
20	4.9	10.01	12,012	2,844	9,168	
30	4.1	8.38	15,084	3,792	11,292	
40	3.4	6.95	16,680	4,740	11,940	
50	2.9	5.92	17,760	5,688	12,072	
60	2.6	5.31	19,116	6,636	12,480	***MAX.***
70	2.3	4.70	19,740	7,584	12,156	

FREQUENCY = 10 YEAR

PRESENT CONDITION
T_d = 20 DESIGN TIME
C = 0.36
I = 5.8 IN/HR
A = 2.54 AC.
Q = C*I*A = 5.30 CFS

PROPOSED CONDITION
T_d = 10 DESIGN TIME
C = 0.90
I = 7.3 IN/HR
A = 2.49 AC.
Q = C*I*A = 16.36 CFS

MAX. RELEASE RATE = PRESENT CONDITION - DIRECT DISCHARGE
MAX. RELEASE RATE = 5.20 - 1.77 + 0.33 = 3.76 CFS

TIME	INTENSITY	DISCHARGE	INFLOW	OUTFLOW	STORAGE	
10	7.3	14.91	8,946	3,384	5,562	
15	6.5	13.28	11,952	2,820	9,132	
20	5.8	11.85	14,220	3,384	10,836	
30	4.8	9.81	17,658	4,512	13,146	
40	4.0	8.17	19,608	5,640	13,968	
50	3.5	7.15	21,450	6,768	14,682	***MAX.***
60	3.0	6.13	22,068	7,896	14,172	
70	2.7	5.52	23,184	9,024	14,160	

FREQUENCY = 25 YEAR

PRESENT CONDITION
T_d = 20 DESIGN TIME
C = 0.36
I = 6.7 IN/HR
A = 2.54 AC.
Q = C*I*A = 6.13 CFS

PROPOSED CONDITION
T_d = 10 DESIGN TIME
C = 0.90
I = 8.3 IN/HR
A = 2.49 AC.
Q = C*I*A = 18.60 CFS

MAX. RELEASE RATE = PRESENT CONDITION - DIRECT DISCHARGE
MAX. RELEASE RATE = 6.01 - 2.02 + 0.37 = 4.36 CFS

TIME	INTENSITY	DISCHARGE	INFLOW	OUTFLOW	STORAGE	
10	8.3	16.96	10,176	2,616	7,560	
15	7.4	15.12	13,608	3,270	10,338	
20	6.7	13.69	16,428	3,924	12,504	
30	5.5	11.24	20,232	5,232	15,000	
40	4.6	9.40	22,560	6,540	16,020	
50	4.0	8.17	24,510	7,848	16,662	
60	3.5	7.15	25,740	9,156	16,584	
70	3.2	6.54	27,468	10,464	17,004	***MAX.***
80	2.9	5.92	28,416	11,772	16,644	

FREQUENCY = 100 YEAR

PRESENT CONDITION
T_d = 20 DESIGN TIME
C = 0.36
I = 8.3 IN/HR
A = 2.54 AC.
Q = C*I*A = 7.59 CFS

PROPOSED CONDITION
T_d = 10 DESIGN TIME
C = 0.90
I = 9.8 IN/HR
A = 2.49 AC.
Q = C*I*A = 21.96 CFS

MAX. RELEASE RATE = PRESENT CONDITION - DIRECT DISCHARGE
MAX. RELEASE RATE = 7.44 - 2.38 + 0.44 = 5.50 CFS

TIME	INTENSITY	DISCHARGE	INFLOW	OUTFLOW	STORAGE	
10	9.8	20.02	12,012	3,300	8,712	
15	9.0	18.39	16,551	4,125	12,426	
20	16.96	16.96	20,352	4,950	15,402	
30	14.10	14.10	25,380	6,600	18,780	
40	11.85	11.85	28,440	8,250	20,190	
50	10.22	10.22	30,660	9,900	20,760	
60	9.19	9.19	33,084	11,550	21,534	
70	8.38	8.38	35,196	13,200	21,996	
80	7.97	7.97	38,256	14,850	23,406	
90	7.35	7.35	39,690	16,500	23,190	
100	6.95	6.95	41,700	18,150	23,550	MAX.

2. POND VOLUME

OUTFALL ELEVATION	AREA (FT ²)	AVE. AREA (FT ²)	INC. DEPTH (FT)	VOLUME (FT ³)	CUM. VOLUME (FT ³)
539	-0-		-0-	-0-	-0-
540	14,933	7,466	1.0	7,466	7,466
541	17,598	16,265	1.0	16,265	23,731
542	20,439	19,018	1.0	19,018	42,749

3. ALLOWABLE DISCHARGE

A. PREDEVELOPMENT FLOW:
Q = C*I*A = (0.36)(4.9)(2.49) = 4.39 CFS

B. PLUS: OFFSITE RANCH TRAIL R.O.W. PASS THRU:
Q = C*I*A = (0.90)(6.2)(0.05) = 0.28 CFS

C. MINUS: ONSITE UNDETAINED DRAINAGE AREA 7 & 8
Q = C*I*A = (0.90)(6.2)(0.16 + 0.11) = 1.51 CFS

D. TOTAL ALLOWABLE POND DISCHARGE:
4.39 + 0.28 - 1.51 = 3.16 CFS

A. PREDEVELOPMENT FLOW:
Q = C*I*A = (0.36)(5.8)(2.49) = 5.20 CFS

B. PLUS: OFFSITE RANCH TRAIL R.O.W. PASS THRU:
Q = C*I*A = (0.90)(7.3)(0.05) = 0.33 CFS

C. MINUS: ONSITE UNDETAINED DRAINAGE AREA 7 & 8
Q = C*I*A = (0.90)(7.3)(0.16 + 0.11) = 1.77 CFS

D. TOTAL ALLOWABLE POND DISCHARGE:
5.20 + 0.33 - 1.77 = 3.76 CFS

A. PREDEVELOPMENT FLOW:
Q = C*I*A = (0.36)(6.7)(2.49) = 6.01 CFS

B. PLUS: OFFSITE RANCH TRAIL R.O.W. PASS THRU:
Q = C*I*A = (0.90)(8.3)(0.05) = 0.37 CFS

C. MINUS: ONSITE UNDETAINED DRAINAGE AREA 7 & 8
Q = C*I*A = (0.90)(8.3)(0.16 + 0.11) = 2.02 CFS

D. TOTAL ALLOWABLE POND DISCHARGE:
6.01 + 0.37 - 2.02 = 4.36 CFS

A. PREDEVELOPMENT FLOW:
Q = C*I*A = (0.36)(8.3)(2.49) = 7.44 CFS

B. PLUS: OFFSITE RANCH TRAIL R.O.W. PASS THRU:
Q = C*I*A = (0.90)(9.8)(0.05) = 0.44 CFS

C. MINUS: ONSITE UNDETAINED DRAINAGE AREA 7 & 8
Q = C*I*A = (0.90)(9.8)(0.16 + 0.11) = 2.38 CFS

D. TOTAL ALLOWABLE POND DISCHARGE:
7.44 + 0.44 - 2.38 = 5.50 CFS

4. WATER SURFACE ELEVATION

REQUIRED STORAGE = 12,480 FT³

STORAGE @ W.S. 540 = 7,466 FT³

12,480 - 7,466 CF = $\frac{5,014}{16,265}$ = 0.31'

5 YR. STORAGE ELEVATION ACHIEVED AT: 540.31'

REQUIRED STORAGE = 14,682 FT³

STORAGE @ W.S. 540 = 7,466 FT³

14,682 - 7,466 CF = $\frac{7,216}{16,265}$ = 0.44'

10 YR. STORAGE ELEVATION ACHIEVED AT: 540.44'

REQUIRED STORAGE = 17,004 FT³

STORAGE @ W.S. 540 = 7,466 FT³

17,004 - 7,466 CF = $\frac{9,538}{16,265}$ = 0.59'

25 YR. STORAGE ELEVATION ACHIEVED AT: 540.59'

REQUIRED STORAGE = 23,550 FT³

STORAGE @ W.S. 540 = 7,466 FT³

23,550 - 7,466 CF = $\frac{16,084}{16,265}$ = 0.99'

100 YR. STORAGE ELEVATION ACHIEVED AT: 540.99'

1	09/16/09	INITIAL SUBMITTAL TO THE CITY OF ROCKWALL
2	10/15/09	REVISED SUBMITTAL TO THE CITY OF ROCKWALL

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY DAVID W. WALLS, P.E. 93086



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DETENTION CALCULATIONS
RANCH TRAIL CORNERS
LOT 20, BLOCK A - RAINBO ACRES ADDITION
N.E.C. HORIZON ROAD (F.M. 3097) AND RANCH TRAIL DR.
CITY OF ROCKWALL, ROCKWALL COUNTY, TEXAS

DESIGN	DRAWN	CHECKED	SCALE	DATE	FILE	SHEET
Walls	-	Martinez	1" = 50'	08/15/09	9005	C-06