PRELIMINARY DRAINAGE REPORT

for

FERRINI RANCH SUBDIVISION

Monterey County, California

Prepared by:

Whitson Engineers
9699 Blue Larkspur Lane, Suite 105
Monterey, California 93940
(831) 649-5225
FAX: (831) 373-5065

February 11, 2010
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Project #1376.00

PRELIMINARY DRAINAGE REPORT
for
FERRINI RANCH SUBDIVISION
MONTEREY COUNTY, CALIFORNIA

This report is intended to outline the procedures used in determine the existing and proposed storm water runoff characteristics of the Ferrini Ranch Subdivision along State Route 68 in Monterey County, and the projects ability to mitigate the increase of storm water flows due to the proposed development.

Project Overview

The Ferrini Ranch Subdivision (APN 161-011-019, -030, -039, -057, -058, -059, -078 and 161-031-016 & -017) encompasses approximately 870 acres of land lying southeasterly of State Route 68 from San Benancio Road on the south to River Road to the north and bifurcated by Toro Regional Park. The overall project boundary is included on Exhibit A. The project area is currently undeveloped and is used for cattle grazing.

The proposed subdivision consists of 212 residential lots (178.1 acres), open space/common area parcels (600.4 acres), road parcels (43.1 ac), an inclusionary housing parcel (13.4 acres), and an AG/Industrial parcel (34.7 acres).

Watershed Summary

A Watershed Map showing the proposed development and its relationship to the watersheds is included as Exhibit A. The primary drainage basins involving this project are identified as Watershed A, B, C, D, E, F and G on the map. The land within these Watersheds is predominantly hilly with slopes varying from 30 to over 50 percent.

All of the watersheds flow northwesterly towards Highway 68 and El Toro Creek.

Table 1: Watershed Area

	On-site (acres)	Total (acres)
Watershed A	160	355
Watershed B	80	90
Watershed C	80	90
Watershed D	75	100
Watershed E	70	100
Watershed F	75	105
Watershed G	235	250

Methodology

For purposes of this drainage report the 10 year pre-development runoff rate and volume was compared to the 100 year post-development runoff rate and volume. In order to avoid mitigating portions of the watershed that will be unaffected by the development, only the areas to be developed with impervious surfaces were used to determine this differential.

The Rational Method was used to compare runoff rates and volumes. These calculations were

carried out utilizing Monterey County Water Resources Agency (MCWRA) guidelines and in accordance with Monterey County Department of Public Works Plate Number 25.

Table 2 indicates the drainage areas, Table 3 the runoff coefficients for pre and post development and Table 4 the rainfall intensities used for the preparation of this report. Runoff rates and volumes were calculated and compared for times of concentration between 10 minutes and 330 minutes, at 10 minute intervals. The time of concentration which generated the largest difference between the 10 year pre-development and 100-year post-development volume was used to size the detention area. See Table 5 for required detention volumes.

Table 2: Drainage Areas

	Used for this study (acres)
Watershed A	12.8
Watershed B	9.0
Watershed C	5.8
Watershed D	8.9
Watershed E	12.4
Watershed F	3.3
Watershed G	5.8

The above drainage areas are based on the assumption that the impervious width of the proposed roads will be approximately 21' and the impervious area of each standard lot will be approximately 10,000 square feet. It was assumed that the size of the affordable housing lots ranged from 600 square feet to 2,500 square feet. See Watershed Impervious Area Calculation Worksheet in Appendix A for detailed calculations of areas within each watershed.

Table 3: Runoff Coefficients

	Used for this study
Pervious Areas	0.25
Impervious Areas	0.95

Table 4: Rainfall Intensity †

	Used for this study (inches/hr)
2-year	0.4
10-year	0.59
100-year	0.89

† The above rainfall intensities are based on Monterey County Department of Public Works Plate Number 25.

Table 5: Required Detention Volume by Watershed

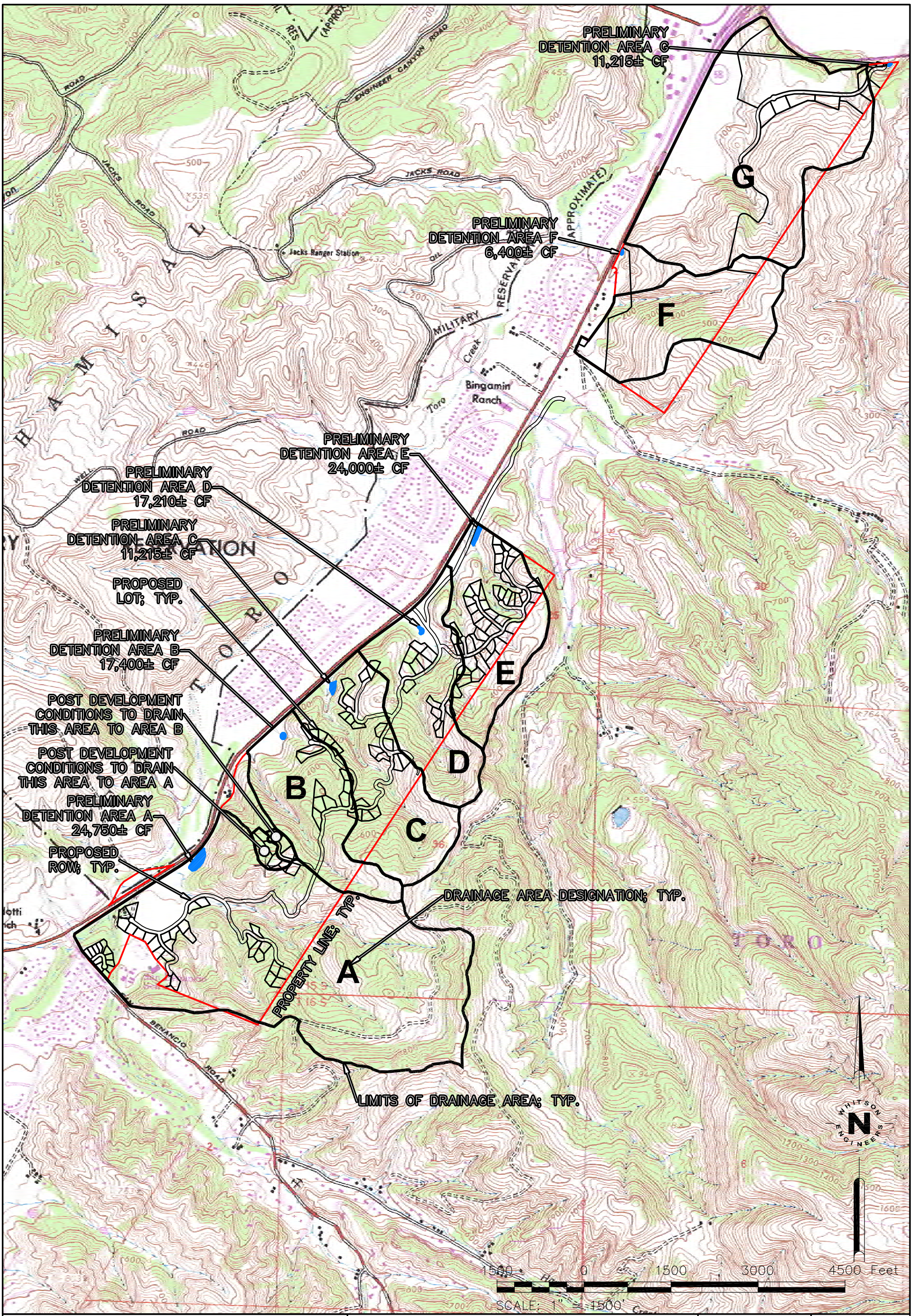
	Volume (ac-ft)	Volume (CF)
Watershed A	0.57	24,748
Watershed B	0.40	17,401
Watershed C	0.26	11,214
Watershed D	0.40	17,208
Watershed E	0.55	23,975
Watershed F	0.15	6,380
Watershed G	0.26	11,214

Appendix A includes the calculations and results for the information contained above. These calculations are preliminary only, and are intended to demonstrate the potential project impacts and facilitate mitigations at the approval stage of the project. Final design calculations will be completed at the time of preparation of the improvement plans for the drainage improvements required.

Summary

The required detention volumes listed in Table 5 quantify the total volume of additional storm water runoff generated by the development within each watershed. It is anticipated that the project will be required to store approximately 2.6 acre-feet of storm water in total to attenuate additional runoff generate by project within Watersheds A through G. Where practical, the storm water runoff from the impervious site development will be conveyed directly to detention basin(s) within its respective watershed. Detention basins shall be sited to minimize trees loss, environmental impacts (i.e. erosion or biological impacts) and grading. However, there may be portions of the development where it is not practical to convey project runoff directly to a basin. All storm drain outfalls within the development that are not conveyed directly to a detention basin shall be appropriately stabilized to reduce the potential for downstream erosion. Ultimately, the final drainage plans and improvements will need to insure that the total required detention volume within the project area is capable of attenuating the post development runoff to a 10 year pre-development level prior to leaving the site.

The size and location of the basins shown on the Tentative Map are schematic only and illustrate that the site has ample opportunity to facilitate and attenuate the increase in storm water runoff. Final design and supporting calculations of the facilities will be subject to the review and approval of the Monterey County Water Resources Agency and the Monterey County Public Works Department. The actual sizes of the detention basins will be field measured and submitted to the Monterey County Water Resources Agency to verify compliance with the required total volume.



WE WHITSON ENGINEERS
9699 Blue Larkspur Lane ▪ Suite 105 ▪ Monterey, CA 93940
831 649-5225 ▪ Fax 831 373-5065
CIVIL ENGINEERING ▪ LAND SURVEYING ▪ PROJECT MANAGEMENT

WATERSHED MAP

MONTEREY COUNTY CALIFORNIA

EXHIBIT A

DRAWING PATH: T:\Monterey Projects\1376\Docs\Hydrology\Hydrology.dwg

DATE:	MARCH 2, 2010
SCALE:	1" = 1500'
DRAWN:	MB
CHECKED:	KWM
PROJECT No.:	1376.00

SHEET 1 OF 1

APPENDIX A – Calculations and Results

Watershed Impervious Area Calculation Worksheet								
Watershed	Number of Lots	Impervious Area Per Lot (Sq. Ft.)	Total Impervious Lot Area (Sq. Ft.)	Road Paved Width (ft)	Total Road Length (ft)	Total Road Paved Area (Sq. Ft.)	Total Impervious Area (Sq. Ft.)	Total Impervious Area (Acres)
A	37.5	10,000	375,000	21	8,600	180,600	555,600	12.8
B	28.5	10,000	285,000	21	5,100	107,100	392,100	9.0
C	17.5	10,000	175,000	21	3,650	76,650	251,650	5.8
D	25.5	10,000	255,000	21	6,250	131,250	386,250	8.9
E	43	10,000	430,000	21	5,200	109,200	539,200	12.4
F	66	See Below	88,000	21	2,565	53,865	141,865	3.3
G	20	10,000	200,000	21	2,450	51,450	251,450	5.8

Drainage Area F Impervious Lot Area			
Lot Type	Number of Lots	Impervious Area Per Lot (Sq. Ft.)	Impervious Lot Area (Sq. Ft.)
Medium	17	800	13,600
Affordable	26	650	16,900
Market	23	2,500	57,500
Total	66	n/a	88,000

Project Name:	**Ferrini Ranch - Watershed A**
Project No.	1376.00
Calculations by	mb
Date:	2/10/2010

10 year Pre-Development Runoff

Tc	12	minutes		
C	0.25		←	Fixed at 0.25 if used within MC
A	12.8	acres		
I (2 yr)	0.40	in/hr	←	Per Monterey County Plate No. 25
I (10 yr)	0.59	in/hr		
It	1.32	in/hr		
Q 10 pre	**4.24**	**cfs**		

100 year Post-Development Runoff

Ap	-	acres		Area of Pervious Surface
Cp	0.25			Runoff Coeficient of pervious surface
Ai	12.8	acres		Area if Impervious Surface
Ci	0.95			Runoff Coeficient of impervious surface
Tc	12	minutes		
Weighted C	0.95			
Total A	12.80	acres		
I (2 yr)	0.40	in/hr	←	Per Monterey County Plate No. 25
I (100 yr)	0.89	in/hr		
It	1.99	in/hr		
Q 100 post	**24.16**	**cfs**		

10 year Pre-Development Outfall

Tc	Q	Qout
Min	cfs	cf
10	4.24	2543
20	4.24	5086
30	4.24	7629
40	4.24	10172
50	4.24	12715
60	4.24	15258
90	4.24	22886
120	4.24	30515
150	4.24	38144
180	4.24	45773
210	4.24	53401
240	4.24	61030
270	4.24	68659
300	4.24	76288
330	4.24	83917

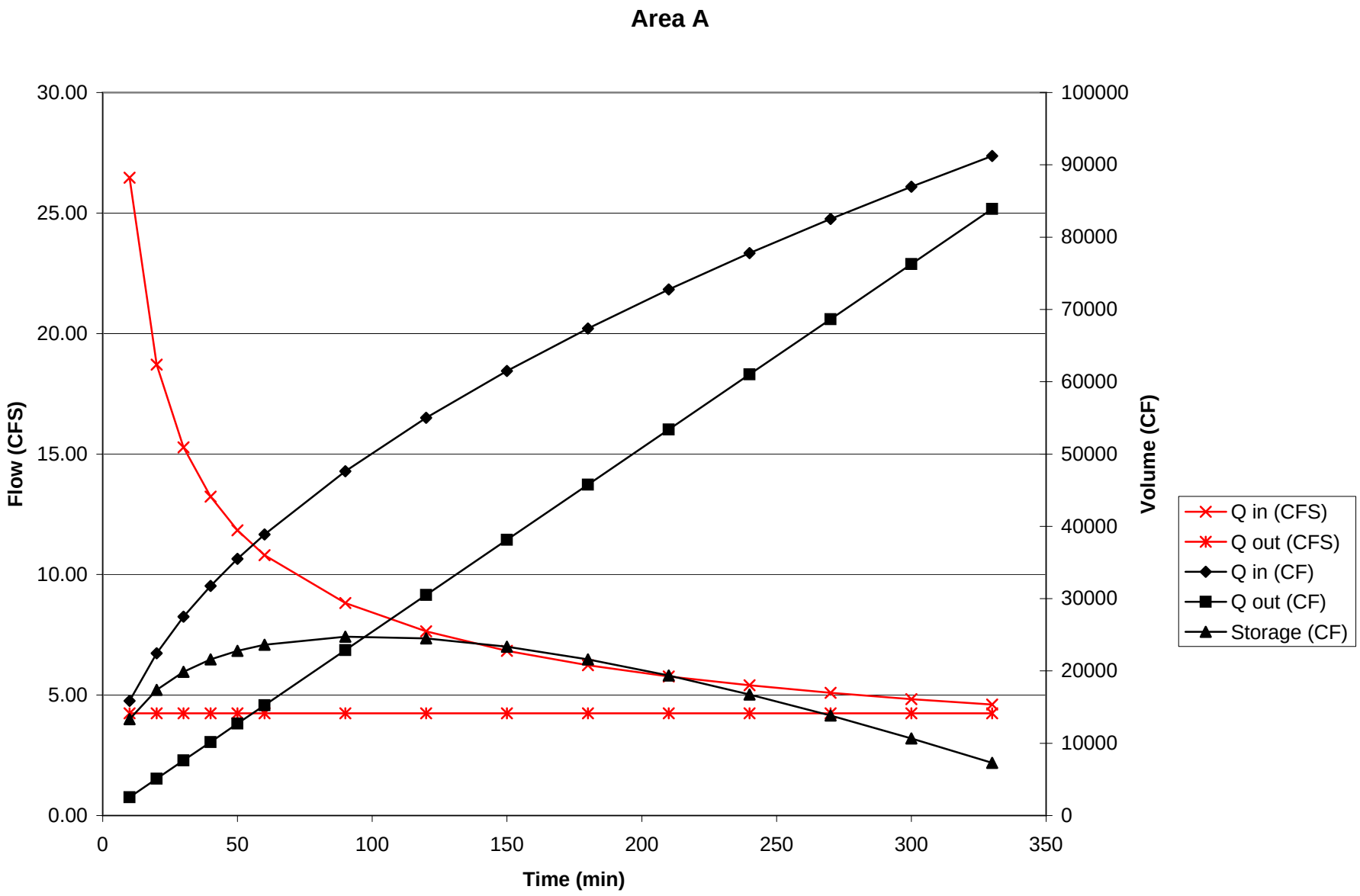
100 year Post-Development Inflow

Tc	I 100yr	Q	Qin
Min	in/hr	cfs	cf
10	2.18	26.46	15878
20	1.54	18.71	22455
30	1.26	15.28	27502
40	1.09	13.23	31756
50	0.97	11.83	35505
60	0.89	10.80	38893
90	0.73	8.82	47634
120	0.63	7.64	55003
150	0.56	6.83	61496
180	0.51	6.24	67365
210	0.47	5.77	72763
240	0.44	5.40	77787
270	0.42	5.09	82505
300	0.40	4.83	86968
330	0.38	4.61	91213

Storage Requirement

Qin	Qout	S = (Qin - Qout)
15878	2543	13335
22455	5086	17369
27502	7629	19873
31756	10172	21585
35505	12715	22790
38893	15258	23636
47634	22886	24748
55003	30515	24488
61496	38144	23352
67365	45773	21593
72763	53401	19361
77787	61030	16756
82505	68659	13846
86968	76288	10680
91213	83917	7296

Detention Required:	**24748 cf**
	0.57 ac-ft


Area A
Flow (CFS)
Volume (CF)
Time (min)
30.00
25.00
20.00
15.00
10.00
5.00
0.00
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
0
50
100
150
200
250
300
350
Q in (CFS)
Q out (CFS)
Q in (CF)
Q out (CF)
Storage (CF)

Project Name:	**Ferrini Ranch - Area B**
Project No.	1376.00
Calculations by	mb
Date:	2/10/2010

10 year Pre-Development Runoff

Tc	12	minutes		
C	0.25		←	Fixed at 0.25 if used within MC
A	9.0	acres		
I (2 yr)	0.40	in/hr	←	Per Monterey County Plate No. 25
I (10 yr)	0.59	in/hr		
It	1.32	in/hr		
Q 10 pre	**2.98**	**cfs**		

100 year Post-Development Runoff

Ap	-	acres		Area of Pervious Surface
Cp	0.25			Runoff Coeficient of pervious surface
Ai	9.0	acres		Area if Impervious Surface
Ci	0.95			Runoff Coeficient of impervious surface
Tc	12	minutes		
Weighted C	0.95			
Total A	9.00	acres		
I (2 yr)	0.40	in/hr	←	Per Monterey County Plate No. 25
I (100 yr)	0.89	in/hr		
It	1.99	in/hr		
Q 100 post	**16.99**	**cfs**		

10 year Pre-Development Outfall

Tc	Q	Qout
Min	cfs	cf
10	2.98	1788
20	2.98	3576
30	2.98	5364
40	2.98	7152
50	2.98	8940
60	2.98	10728
90	2.98	16092
120	2.98	21456
150	2.98	26820
180	2.98	32184
210	2.98	37548
240	2.98	42912
270	2.98	48276
300	2.98	53640
330	2.98	59004

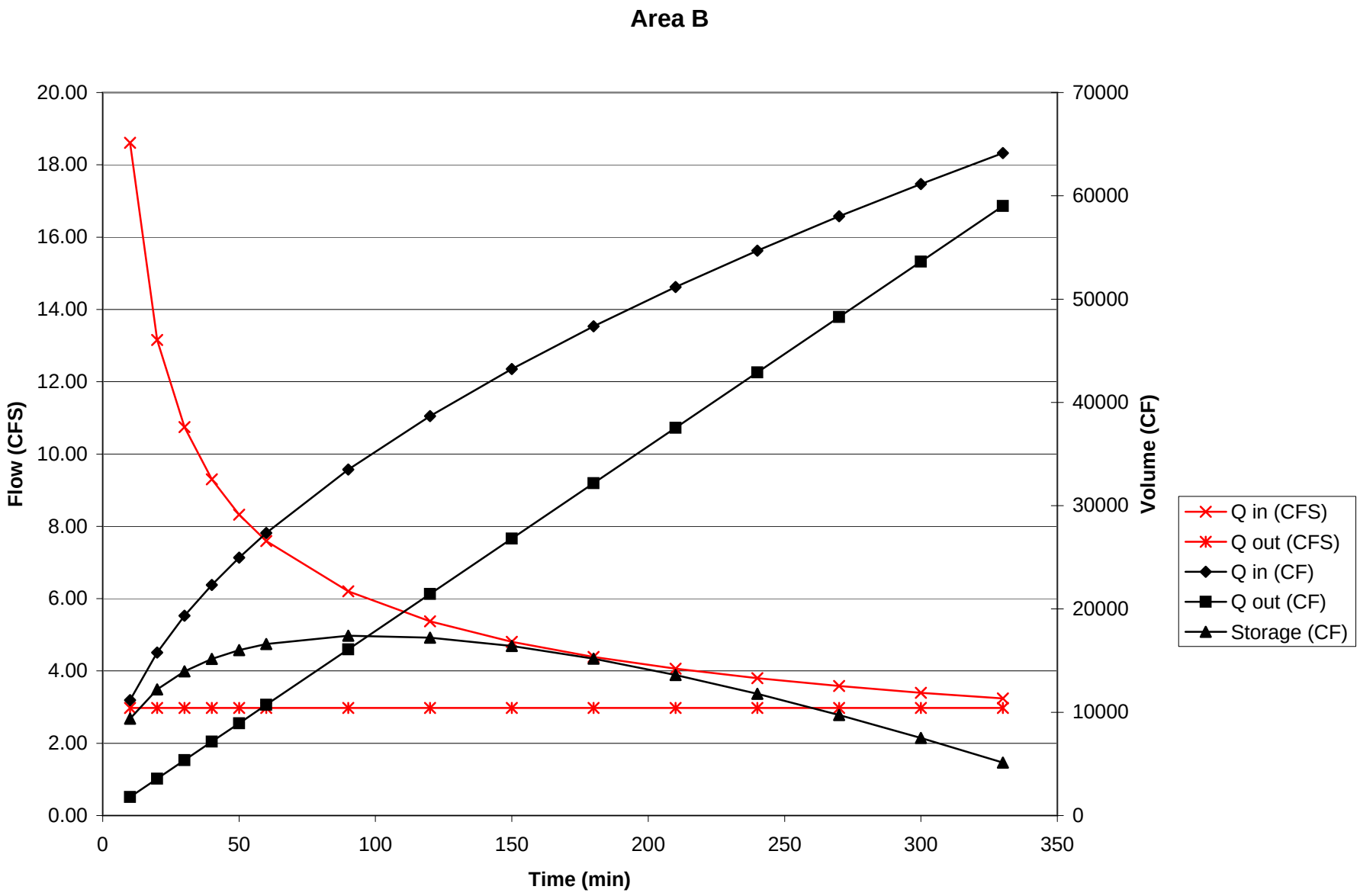
100 year Post-Development Inflow

Tc	I 100yr	Q	Qin
Min	in/hr	cfs	cf
10	2.18	18.61	11164
20	1.54	13.16	15789
30	1.26	10.74	19337
40	1.09	9.30	22329
50	0.97	8.32	24964
60	0.89	7.60	27347
90	0.73	6.20	33493
120	0.63	5.37	38674
150	0.56	4.80	43239
180	0.51	4.39	47366
210	0.47	4.06	51161
240	0.44	3.80	54694
270	0.42	3.58	58011
300	0.40	3.40	61149
330	0.38	3.24	64134

Storage Requirement

Qin	Qout	S = (Qin - Qout)
11164	1788	9376
15789	3576	12213
19337	5364	13973
22329	7152	15177
24964	8940	16024
27347	10728	16619
33493	16092	17401
38674	21456	17218
43239	26820	16419
47366	32184	15182
51161	37548	13613
54694	42912	11782
58011	48276	9736
61149	53640	7510
64134	59004	5130

Detention Required:	**17401 cf**
	0.40 ac-ft


Area B
Flow (CFS)
Volume (CF)
Time (min)
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
70000
60000
50000
40000
30000
20000
10000
0
0
50
100
150
200
250
300
350
Q in (CFS)
Q out (CFS)
Q in (CF)
Q out (CF)
Storage (CF)

Project Name:	**Ferrini Ranch - Area C**
Project No.	1376.00
Calculations by	mb
Date:	2/10/2010

10 year Pre-Development Runoff

Tc	12	minutes		
C	0.25		←	Fixed at 0.25 if used within MC
A	5.8	acres		
I (2 yr)	0.40	in/hr	←	Per Monterey County Plate No. 25
I (10 yr)	0.59	in/hr		
It	1.32	in/hr		
Q 10 pre	**1.92**	**cfs**		

100 year Post-Development Runoff

Ap	-	acres		Area of Pervious Surface
Cp	0.25			Runoff Coeficient of pervious surface
Ai	5.8	acres		Area if Impervious Surface
Ci	0.95			Runoff Coeficient of impervious surface
Tc	12	minutes		
Weighted C	0.95			
Total A	5.80	acres		
I (2 yr)	0.40	in/hr	←	Per Monterey County Plate No. 25
I (100 yr)	0.89	in/hr		
It	1.99	in/hr		
Q 100 post	**10.95**	**cfs**		

10 year Pre-Development Outfall

Tc	Q	Qout
Min	cfs	cf
10	1.92	1152
20	1.92	2305
30	1.92	3457
40	1.92	4609
50	1.92	5761
60	1.92	6914
90	1.92	10370
120	1.92	13827
150	1.92	17284
180	1.92	20741
210	1.92	24198
240	1.92	27654
270	1.92	31111
300	1.92	34568
330	1.92	38025

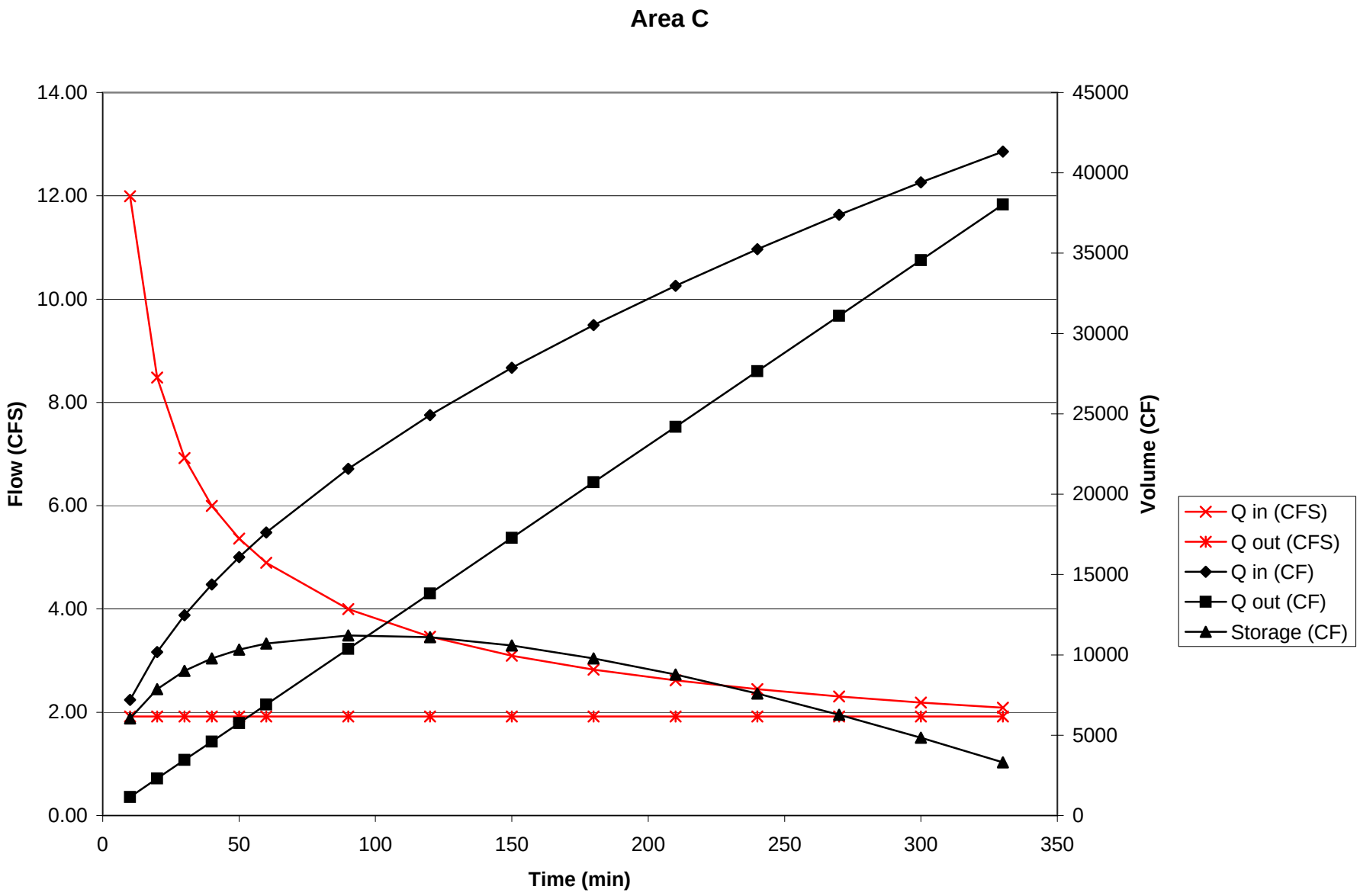
100 year Post-Development Inflow

Tc	I 100yr	Q	Qin
Min	in/hr	cfs	cf
10	2.18	11.99	7195
20	1.54	8.48	10175
30	1.26	6.92	12462
40	1.09	6.00	14390
50	0.97	5.36	16088
60	0.89	4.90	17624
90	0.73	4.00	21584
120	0.63	3.46	24923
150	0.56	3.10	27865
180	0.51	2.83	30525
210	0.47	2.62	32971
240	0.44	2.45	35247
270	0.42	2.31	37385
300	0.40	2.19	39407
330	0.38	2.09	41331

Storage Requirement

Qin	Qout	S = (Qin - Qout)
7195	1152	6043
10175	2305	7870
12462	3457	9005
14390	4609	9781
16088	5761	10327
17624	6914	10710
21584	10370	11214
24923	13827	11096
27865	17284	10581
30525	20741	9784
32971	24198	8773
35247	27654	7593
37385	31111	6274
39407	34568	4840
41331	38025	3306

Detention Required:	**11214 cf**
	0.26 ac-ft


Area C
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Flow (CFS)
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
Volume (CF)
0
50
100
150
200
250
300
350
Time (min)
Q in (CFS)
Q out (CFS)
Q in (CF)
Q out (CF)
Storage (CF)

Project Name:	**Ferrini Ranch - Area D**
Project No.	1376.00
Calculations by	mb
Date:	2/10/2010

10 year Pre-Development Runoff

Tc	12	minutes		
C	0.25		←	Fixed at 0.25 if used within MC
A	8.9	acres		
I (2 yr)	0.40	in/hr	←	Per Monterey County Plate No. 25
I (10 yr)	0.59	in/hr		
It	1.32	in/hr		
Q 10 pre	**2.95**	**cfs**		

100 year Post-Development Runoff

Ap	-	acres		Area of Pervious Surface
Cp	0.25			Runoff Coeficient of pervious surface
Ai	8.9	acres		Area if Impervious Surface
Ci	0.95			Runoff Coeficient of impervious surface
Tc	12	minutes		
Weighted C	0.95			
Total A	8.90	acres		
I (2 yr)	0.40	in/hr	←	Per Monterey County Plate No. 25
I (100 yr)	0.89	in/hr		
It	1.99	in/hr		
Q 100 post	**16.80**	**cfs**		

10 year Pre-Development Outfall

Tc	Q	Qout
Min	cfs	cf
10	2.95	1768
20	2.95	3536
30	2.95	5304
40	2.95	7073
50	2.95	8841
60	2.95	10609
90	2.95	15913
120	2.95	21218
150	2.95	26522
180	2.95	31826
210	2.95	37131
240	2.95	42435
270	2.95	47739
300	2.95	53044
330	2.95	58348

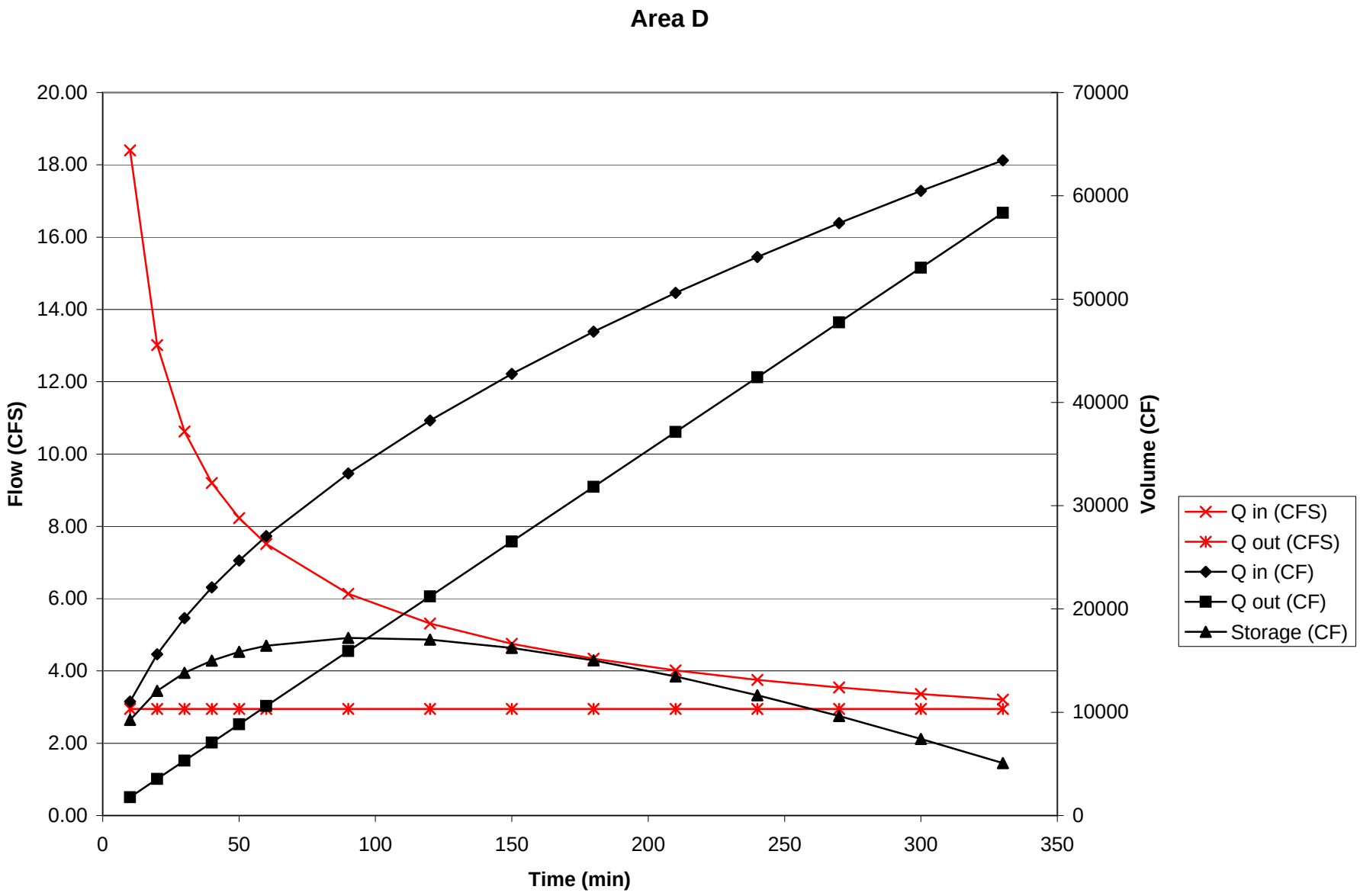
100 year Post-Development Inflow

Tc	I 100yr	Q	Qin
Min	in/hr	cfs	cf
10	2.18	18.40	11040
20	1.54	13.01	15613
30	1.26	10.62	19122
40	1.09	9.20	22081
50	0.97	8.23	24687
60	0.89	7.51	27043
90	0.73	6.13	33121
120	0.63	5.31	38245
150	0.56	4.75	42759
180	0.51	4.34	46840
210	0.47	4.02	50593
240	0.44	3.76	54086
270	0.42	3.54	57367
300	0.40	3.36	60470
330	0.38	3.20	63421

Storage Requirement

Qin	Qout	S = (Qin - Qout)
11040	1768	9272
15613	3536	12077
19122	5304	13818
22081	7073	15008
24687	8841	15846
27043	10609	16434
33121	15913	17208
38245	21218	17027
42759	26522	16237
46840	31826	15014
50593	37131	13462
54086	42435	11651
57367	47739	9627
60470	53044	7426
63421	58348	5073

Detention Required:	**17208 cf**
	0.40 ac-ft


Area D
Flow (CFS)
Volume (CF)
Time (min)
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
70000
60000
50000
40000
30000
20000
10000
0
0
50
100
150
200
250
300
350
Q in (CFS)
Q out (CFS)
Q in (CF)
Q out (CF)
Storage (CF)

Project Name:	**Ferrini Ranch - Area E**
Project No.	1376.00
Calculations by	mb
Date:	2/10/2010

10 year Pre-Development Runoff

Tc	12	minutes		
C	0.25		←	Fixed at 0.25 if used within MC
A	12.4	acres		
I (2 yr)	0.40	in/hr	←	Per Monterey County Plate No. 25
I (10 yr)	0.59	in/hr		
It	1.32	in/hr		
Q 10 pre	**4.11**	**cfs**		

100 year Post-Development Runoff

Ap	-	acres		Area of Pervious Surface
Cp	0.25			Runoff Coeficient of pervious surface
Ai	12.4	acres		Area if Impervious Surface
Ci	0.95			Runoff Coeficient of impervious surface
Tc	12	minutes		
Weighted C	0.95			
Total A	12.40	acres		
I (2 yr)	0.40	in/hr	←	Per Monterey County Plate No. 25
I (100 yr)	0.89	in/hr		
It	1.99	in/hr		
Q 100 post	**23.40**	**cfs**		

10 year Pre-Development Outfall

Tc	Q	Qout
Min	cfs	cf
10	4.11	2463
20	4.11	4927
30	4.11	7390
40	4.11	9854
50	4.11	12317
60	4.11	14781
90	4.11	22171
120	4.11	29562
150	4.11	36952
180	4.11	44342
210	4.11	51733
240	4.11	59123
270	4.11	66513
300	4.11	73904
330	4.11	81294

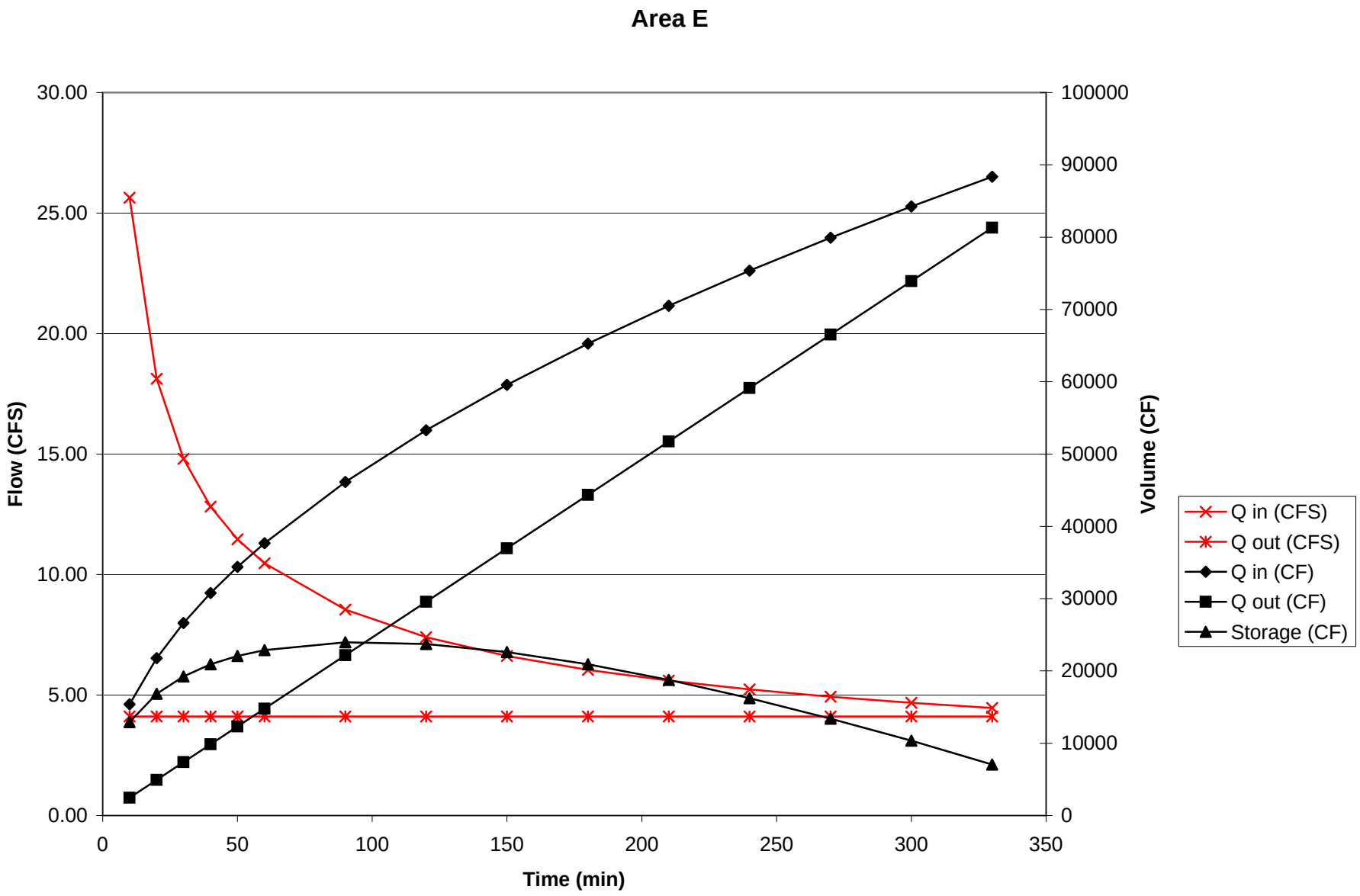
100 year Post-Development Inflow

Tc	I 100yr	Q	Qin
Min	in/hr	cfs	cf
10	2.18	25.64	15382
20	1.54	18.13	21753
30	1.26	14.80	26642
40	1.09	12.82	30764
50	0.97	11.47	34395
60	0.89	10.47	37678
90	0.73	8.55	46146
120	0.63	7.40	53285
150	0.56	6.62	59574
180	0.51	6.04	65260
210	0.47	5.59	70489
240	0.44	5.23	75356
270	0.42	4.93	79927
300	0.40	4.68	84250
330	0.38	4.46	88363

Storage Requirement

Qin	Qout	S = (Qin - Qout)
15382	2463	12918
21753	4927	16826
26642	7390	19252
30764	9854	20910
34395	12317	22078
37678	14781	22897
46146	22171	23975
53285	29562	23723
59574	36952	22622
65260	44342	20918
70489	51733	18756
75356	59123	16233
79927	66513	13413
84250	73904	10347
88363	81294	7068

Detention Required:	**23975 cf**
	0.55 ac-ft


Area E
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Flow (CFS)
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
Volume (CF)
0
50
100
150
200
250
300
350
Time (min)
Q in (CFS)
Q out (CFS)
Q in (CF)
Q out (CF)
Storage (CF)

Project Name:	**Ferrini Ranch - Area F**
Project No.	1376.00
Calculations by	mb
Date:	2/10/2010

10 year Pre-Development Runoff

Tc	12	minutes		
C	0.25		←	Fixed at 0.25 if used within MC
A	3.3	acres		
I (2 yr)	0.40	in/hr	←	Per Monterey County Plate No. 25
I (10 yr)	0.59	in/hr		
It	1.32	in/hr		
Q 10 pre	**1.09**	**cfs**		

100 year Post-Development Runoff

Ap	-	acres		Area of Pervious Surface
Cp	0.25			Runoff Coeficient of pervious surface
Ai	3.3	acres		Area if Impervious Surface
Ci	0.95			Runoff Coeficient of impervious surface
Tc	12	minutes		
Weighted C	0.95			
Total A	3.30	acres		
I (2 yr)	0.40	in/hr	←	Per Monterey County Plate No. 25
I (100 yr)	0.89	in/hr		
It	1.99	in/hr		
Q 100 post	**6.23**	**cfs**		

10 year Pre-Development Outfall

Tc	Q	Qout
Min	cfs	cf
10	1.09	656
20	1.09	1311
30	1.09	1967
40	1.09	2622
50	1.09	3278
60	1.09	3934
90	1.09	5900
120	1.09	7867
150	1.09	9834
180	1.09	11801
210	1.09	13768
240	1.09	15734
270	1.09	17701
300	1.09	19668
330	1.09	21635

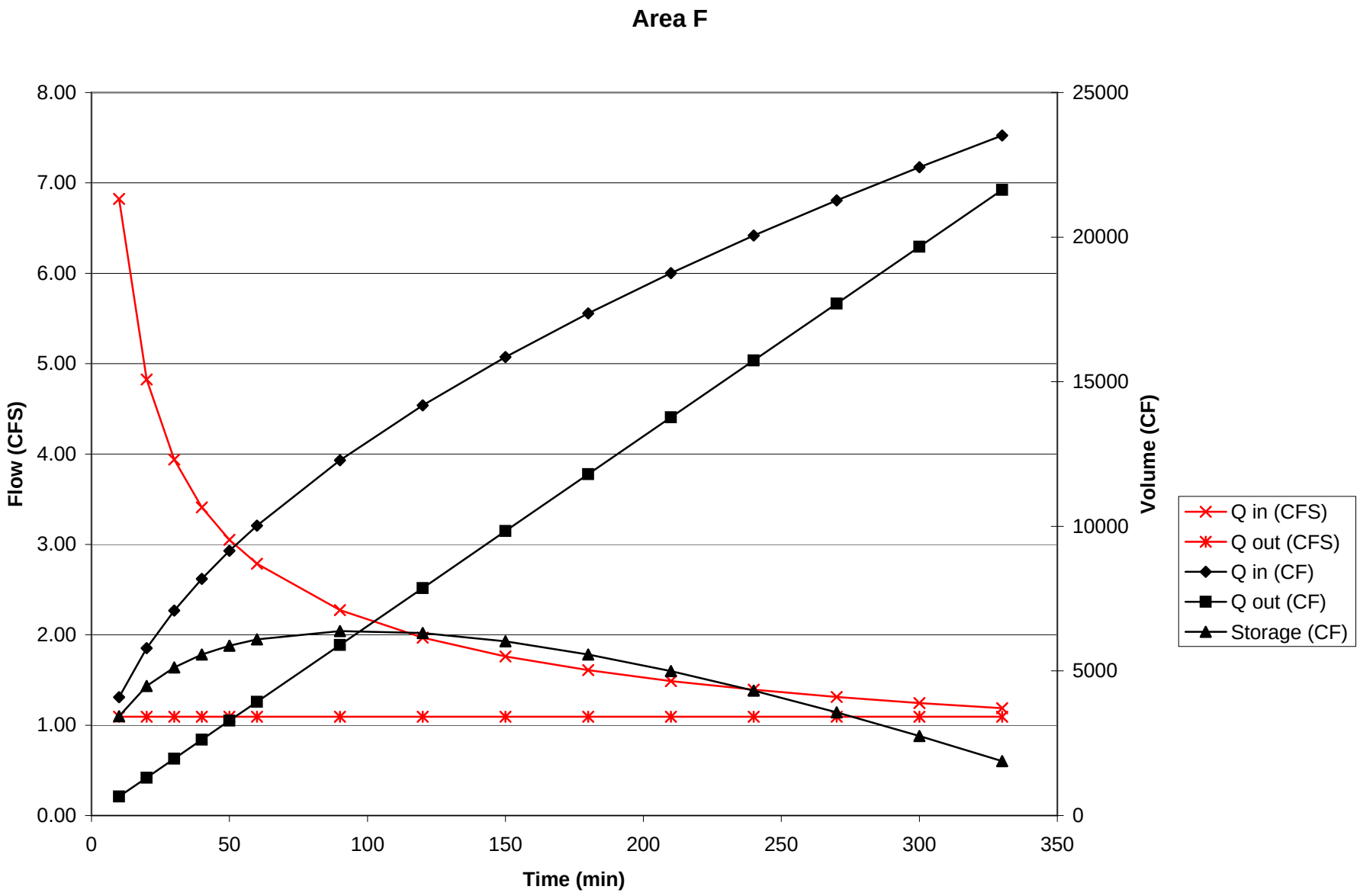
100 year Post-Development Inflow

Tc	I 100yr	Q	Qin
Min	in/hr	cfs	cf
10	2.18	6.82	4094
20	1.54	4.82	5789
30	1.26	3.94	7090
40	1.09	3.41	8187
50	0.97	3.05	9154
60	0.89	2.79	10027
90	0.73	2.27	12281
120	0.63	1.97	14181
150	0.56	1.76	15854
180	0.51	1.61	17368
210	0.47	1.49	18759
240	0.44	1.39	20054
270	0.42	1.31	21271
300	0.40	1.25	22421
330	0.38	1.19	23516

Storage Requirement

Qin	Qout	S = (Qin - Qout)
4094	656	3438
5789	1311	4478
7090	1967	5123
8187	2622	5565
9154	3278	5876
10027	3934	6094
12281	5900	6380
14181	7867	6313
15854	9834	6020
17368	11801	5567
18759	13768	4992
20054	15734	4320
21271	17701	3570
22421	19668	2754
23516	21635	1881

Detention Required:	**6380 cf**
	0.15 ac-ft


Area F
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Flow (CFS)
25000
20000
15000
10000
5000
0
Volume (CF)
0
50
100
150
200
250
300
350
Time (min)
Q in (CFS)
Q out (CFS)
Q in (CF)
Q out (CF)
Storage (CF)

Project Name:	**Ferrini Ranch - Area G**
Project No.	1376.00
Calculations by	mb
Date:	2/10/2010

10 year Pre-Development Runoff

Tc	12	minutes		
C	0.25		←	Fixed at 0.25 if used within MC
A	5.8	acres		
I (2 yr)	0.40	in/hr	←	Per Monterey County Plate No. 25
I (10 yr)	0.59	in/hr		
It	1.32	in/hr		
Q 10 pre	**1.92**	**cfs**		

100 year Post-Development Runoff

Ap	-	acres		Area of Pervious Surface
Cp	0.25			Runoff Coeficient of pervious surface
Ai	5.8	acres		Area if Impervious Surface
Ci	0.95			Runoff Coeficient of impervious surface
Tc	12	minutes		
Weighted C	0.95			
Total A	5.80	acres		
I (2 yr)	0.40	in/hr	←	Per Monterey County Plate No. 25
I (100 yr)	0.89	in/hr		
It	1.99	in/hr		
Q 100 post	**10.95**	**cfs**		

10 year Pre-Development Outfall

Tc	Q	Qout
Min	cfs	cf
10	1.92	1152
20	1.92	2305
30	1.92	3457
40	1.92	4609
50	1.92	5761
60	1.92	6914
90	1.92	10370
120	1.92	13827
150	1.92	17284
180	1.92	20741
210	1.92	24198
240	1.92	27654
270	1.92	31111
300	1.92	34568
330	1.92	38025

100 year Post-Development Inflow

Tc	I 100yr	Q	Qin
Min	in/hr	cfs	cf
10	2.18	11.99	7195
20	1.54	8.48	10175
30	1.26	6.92	12462
40	1.09	6.00	14390
50	0.97	5.36	16088
60	0.89	4.90	17624
90	0.73	4.00	21584
120	0.63	3.46	24923
150	0.56	3.10	27865
180	0.51	2.83	30525
210	0.47	2.62	32971
240	0.44	2.45	35247
270	0.42	2.31	37385
300	0.40	2.19	39407
330	0.38	2.09	41331

Storage Requirement

Qin	Qout	S = (Qin - Qout)
7195	1152	6043
10175	2305	7870
12462	3457	9005
14390	4609	9781
16088	5761	10327
17624	6914	10710
21584	10370	11214
24923	13827	11096
27865	17284	10581
30525	20741	9784
32971	24198	8773
35247	27654	7593
37385	31111	6274
39407	34568	4840
41331	38025	3306

Detention Required:	**11214 cf**
	0.26 ac-ft