

PRESTIGE FITNESS CLUB	
4422 Kalani Dr	
Diamond Head MS	

Drainage Calculations - Modified Rational Method
Predevelopment Condition
2 Year Frequency

Q= CIA			Factor	Area, sf	Acres
	Undeveloped Area		0.2	83,055	1.91
	Building/ Paving		0.95	0	0.00
				83,055	1.91
C	Weighted C Factor		0.20		
L	Hydraulic Length, L	425	feet		
	Slope, in %, S	2.824			0.028235
	Runoff Coefficient, C	0.20			
	Time of Concentration	Tc	37.8	minutes	
		10.70385	6.172558	0.8138	
i	I, intensity from Region 1		3.06		
	Time to Peak	D	0.630787	hrs	
		a	2.815		
		b	0.282		
		c	-0.899		
A	Area, Acres		1.907		
	Q2 Flow, cfs	C*I*A	1.17	cfs	

Q2 Predev Flow	1.17 cfs
-----------------------	-----------------

PRESTIGE FITNESS CLUB
4422 Kalani Dr
Diamond Head MS

Drainage Calculations - Modified Rational Method
Postdevelopment Condition
2 Year Frequency

Q= CIA			Factor	Area, sf	Acres
	Undeveloped Green Area		0.2	17,541	0.40
	Building/ Paving		0.95	65,514	1.50
				83,055	1.91
C	Weighted C Factor		0.79		
L	Hydraulic Length, L	452.7	feet		
	Slope, in %, S	1.9881			0.019881
	Runoff Coefficient, C	0.792			
	Time of Concentration	Tc	8.8	minutes	
		10.97188	1.302503	0.872492	
i	I, intensity from Region 1		6.03		
	D	0.146279			
	a	2.815			
	b	0.282			
	c	-0.899			
A	Area, Acres	1.907			
	Q2 Flow, cfs	C*I*A	9.11	cfs	

Q2 Postdev Flow	9.11 cfs
------------------------	-----------------

Q2 Allowable Flow- Undeveloped Flow =	1.17 cfs
--	-----------------

PRESTIGE FITNESS CLUB
4422 Kalani Dr
Diamond Head MS

Drainage Calculations - Modified Rational Method
Storage Requirements for a 2 Year Frequency Storm Event

$$i = a(D + b)^c$$

$$q = CiA$$

$$\text{Max Storage Volume} = (D \times q) - (.5 \times Q_{10})$$

$$\text{Allowable Flow} \times (D + T_c)$$

Storm Duration (D)	Time	i	q, cfs	Max. Storage Volume, cf	Max. Storage Volume, ac-ft
10	min	5.79	8.73	4,584	0.105
20	min	4.36	6.57	6,883	0.158
30	min	3.51	5.30	8,184	0.188
40	min	2.95	4.45	8,987	0.206
50	min	2.55	3.85	9,500	0.218
60	min	2.25	3.40	9,830	0.226
70	min	2.02	3.04	10,034	0.230
80	min	1.83	2.76	10,149	0.233
90	min	1.67	2.53	10,196	0.234
100	min	1.55	2.33	10,191	0.234
110	min	1.44	2.17	10,146	0.233
120	min	1.34	2.02	10,069	0.231
130	min	1.26	1.90	9,964	0.229
140	min	1.19	1.79	9,837	0.226
150	min	1.12	1.69	9,691	0.222
160	min	1.06	1.61	9,529	0.219
170	min	1.01	1.53	9,353	0.215
180	min	0.97	1.46	9,165	0.210
190	min	0.92	1.40	8,967	0.206
200	min	0.89	1.34	8,759	0.201
210	min	0.85	1.28	8,543	0.196
1440	min	0.16	0.24	0.0	0

PRESTIGE FITNESS CLUB	
4422 Kalani Dr	
Diamond Head MS	

Drainage Calculations - Modified Rational Method
Predevelopment Condition
5 Year Frequency

Q= CIA			Factor	Area, sf	Acres
	Undeveloped Area		0.2	83,055	1.91
	Building/ Paving		0.95	0	0.00
				83,055	1.91
C	Weighted C Factor		0.20		
L	Hydraulic Length, L	425	feet		
	Slope, in %, S	2.824			0.028235
	Runoff Coefficient, C	0.20			
	Time of Concentration	Tc	37.8	minutes	
		10.70385	6.172558	0.8138	
i	I, intensity from Region 1		3.66		
	Time to Peak	D	0.630787	hrs	
		a	3.536		
		b	0.33		
		c	-0.851		
A	Area, Acres		1.907		
	Q5 Flow, cfs	C*I*A	1.40	cfs	

Q5 Predev Flow	1.40 cfs
-----------------------	-----------------

PRESTIGE FITNESS CLUB
4422 Kalani Dr
Diamond Head MS

Drainage Calculations - Modified Rational Method
Postdevelopment Condition
5 Year Frequency

Q= CIA			Factor	Area, sf	Acres
	Undeveloped Green Area		0.2	17,541	0.40
	Building/ Paving		0.95	65,514	1.50
				83,055	1.91
C	Weighted C Factor		0.79		
L	Hydraulic Length, L	452.7	feet		
	Slope, in %, S	1.9881			0.019881
	Runoff Coefficient, C	0.792			
	Time of Concentration	Tc	8.8	minutes	
		10.97188	1.302503	0.872492	
i	I, intensity from Region 1		6.65		
	D	0.146279			
	a	3.536			
	b	0.33			
	c	-0.851			
A	Area, Acres	1.907			
	Q5 Flow, cfs	C*I*A	10.03	cfs	

Q5 Postdev Flow	10.03 cfs
------------------------	------------------

Q5 Allowable Flow- Undeveloped Flow =	1.40 cfs
--	-----------------

PRESTIGE FITNESS CLUB
4422 Kalani Dr
Diamond Head MS

Drainage Calculations - Modified Rational Method
Storage Requirements for a 5 Year Frequency Storm Event

$$i = a(D + b)^c$$

$$q = CiA$$

$$\text{Max Storage Volume} = (D \times q) - (.5 \times Q_{10})$$

$$\text{Allowable Flow} \times (D + T_c)$$

Storm Duration (D)	Time	i	q, cfs	Max. Storage Volume, cf	Max. Storage Volume, ac-ft
10	min	6.41	9.68	5,023	0.115
20	min	5.01	7.57	7,878	0.181
30	min	4.14	6.25	9,634	0.221
40	min	3.55	5.35	10,804	0.248
50	min	3.11	4.69	11,617	0.267
60	min	2.77	4.19	12,195	0.280
70	min	2.51	3.79	12,607	0.289
80	min	2.29	3.46	12,899	0.296
90	min	2.11	3.19	13,098	0.301
100	min	1.96	2.96	13,226	0.304
110	min	1.83	2.77	13,295	0.305
120	min	1.72	2.60	13,318	0.306
130	min	1.62	2.45	13,301	0.305
140	min	1.54	2.32	13,251	0.304
150	min	1.46	2.20	13,173	0.302
160	min	1.39	2.10	13,071	0.300
170	min	1.33	2.00	12,948	0.297
180	min	1.27	1.92	12,806	0.294
190	min	1.22	1.84	12,648	0.290
200	min	1.17	1.77	12,476	0.286
210	min	1.13	1.70	12,291	0.282
1440	min	0.23	0.35	0.0	0

PRESTIGE FITNESS CLUB	
4422 Kalani Dr	
Diamond Head MS	

Drainage Calculations - Modified Rational Method
Predevelopment Condition
10 Year Frequency

Q= CIA			Factor	Area, sf	Acres
	Undeveloped Area		0.2	83,055	1.91
	Building/ Paving		0.95	0	0.00
				83,055	1.91
C	Weighted C Factor		0.20		
L	Hydraulic Length, L	425	feet		
	Slope, in %, S	2.824			0.028235
	Runoff Coefficient, C	0.20			
	Time of Concentration	Tc	37.8	minutes	
		10.70385	6.172558	0.8138	
i	I, intensity from Region 1		4.09		
	Time to Peak	D	0.630787	hrs	
		a	4.016		
		b	0.347		
		c	-0.826		
A	Area, Acres		1.907		
	Q10 Flow, cfs	C*I*A	1.56	cfs	

Q10 Predev Flow	1.56 cfs
------------------------	-----------------

PRESTIGE FITNESS CLUB
4422 Kalani Dr
Diamond Head MS

Drainage Calculations - Modified Rational Method
Postdevelopment Condition
10 Year Frequency

Q= CIA			Factor	Area, sf	Acres
	Undeveloped Green Area		0.2	17,541	0.40
	Building/ Paving		0.95	65,514	1.50
				83,055	1.91
C	Weighted C Factor		0.79		
L	Hydraulic Length, L	452.7	feet		
	Slope, in %, S	1.9881			0.019881
	Runoff Coefficient, C	0.792			
	Time of Concentration	Tc	8.8	minutes	
		10.97188	1.302503	0.872492	
i	I, intensity from Region 1		7.20		
	D	0.146279			
	a	4.016			
	b	0.347			
	c	-0.826			
A	Area, Acres	1.907			
	Q10 Flow, cfs	C*I*A	10.87	cfs	

Q10 Postdev Flow 10.87 cfs

Q10 Allowable Flow- Undeveloped Flow = 1.56 cfs

PRESTIGE FITNESS CLUB
4422 Kalani Dr
Diamond Head MS

Drainage Calculations - Modified Rational Method
Storage Requirements for a 10 Year Frequency Storm Event

$$i = a(D + b)^c$$

$$q = CiA$$

$$\text{Max Storage Volume} = (D \times q) - (.5 \times Q_{10})$$

$$\text{Allowable Flow} \times (D + T_c)$$

Storm Duration (D)	Time	i	q, cfs	Max. Storage Volume, cf	Max. Storage Volume, ac-ft
10	min	6.96	10.51	5,427	0.125
20	min	5.52	8.33	8,652	0.199
30	min	4.61	6.95	10,700	0.246
40	min	3.97	5.99	12,102	0.278
50	min	3.50	5.29	13,106	0.301
60	min	3.14	4.74	13,843	0.318
70	min	2.85	4.30	14,390	0.330
80	min	2.62	3.95	14,796	0.340
90	min	2.42	3.65	15,095	0.347
100	min	2.25	3.40	15,309	0.351
110	min	2.11	3.18	15,455	0.355
120	min	1.98	3.00	15,544	0.357
130	min	1.88	2.83	15,586	0.358
140	min	1.78	2.68	15,588	0.358
150	min	1.69	2.55	15,556	0.357
160	min	1.61	2.44	15,495	0.356
170	min	1.54	2.33	15,408	0.354
180	min	1.48	2.23	15,299	0.351
190	min	1.42	2.15	15,169	0.348
200	min	1.37	2.07	15,022	0.345
210	min	1.32	1.99	14,858	0.341
1440	min	0.29	0.43	0.0	0

PRESTIGE FITNESS CLUB	
4422 Kalani Dr	
Diamond Head MS	

Drainage Calculations - Modified Rational Method
Predevelopment Condition
25 Year Frequency

Q= CIA			Factor	Area, sf	Acres
	Undeveloped Area		0.2	83,055	1.91
	Building/ Paving		0.95	0	0.00
				83,055	1.91
C	Weighted C Factor		0.20		
L	Hydraulic Length, L	425	feet		
	Slope, in %, S	2.824			0.028235
	Runoff Coefficient, C	0.20			
	Time of Concentration	Tc	37.8	minutes	
		10.70385	6.172558	0.8138	
i	I, intensity from Region 1		4.70		
	Time to Peak	D	0.630787	hrs	
		a	4.611		
		b	0.346		
		c	-0.798		
A	Area, Acres		1.907		
	Q25 Flow, cfs	C*I*A	1.79	cfs	

Q25 Predev Flow	1.79 cfs
------------------------	-----------------

PRESTIGE FITNESS CLUB
4422 Kalani Dr
Diamond Head MS

Drainage Calculations - Modified Rational Method
Postdevelopment Condition
25 Year Frequency

Q= CIA			Factor	Area, sf	Acres
	Undeveloped Green Area		0.2	17,541	0.40
	Building/ Paving		0.95	65,514	1.50
				83,055	1.91
C	Weighted C Factor		0.79		
L	Hydraulic Length, L	452.7	feet		
	Slope, in %, S	1.9881			0.019881
	Runoff Coefficient, C	0.792			
	Time of Concentration	Tc	8.8	minutes	
		10.97188	1.302503	0.872492	
i	I, intensity from Region 1		8.12		
	D	0.146279			
	a	4.611			
	b	0.346			
	c	-0.798			
A	Area, Acres	1.907			
	Q25 Flow, cfs	C*I*A	12.25	cfs	

Q25 Postdev Flow 12.25 cfs

Q25 Allowable Flow- Undeveloped Flow = 1.79 cfs

PRESTIGE FITNESS CLUB
4422 Kalani Dr
Diamond Head MS

Drainage Calculations - Modified Rational Method
Storage Requirements for a 25 Year Frequency Storm Event

$$i = a(D + b)^c$$

$$q = CiA$$

$$\text{Max Storage Volume} = (D \times q) - (.5 \times Q_{10})$$

$$\text{Allowable Flow} \times (D + T_c)$$

Storm Duration (D)	Time	i	q, cfs	Max. Storage Volume, cf	Max. Storage Volume, ac-ft
10	min	7.86	11.86	6,108	0.140
20	min	6.28	9.47	9,823	0.226
30	min	5.27	7.95	12,231	0.281
40	min	4.56	6.89	13,914	0.319
50	min	4.04	6.10	15,144	0.348
60	min	3.64	5.49	16,069	0.369
70	min	3.31	5.00	16,774	0.385
80	min	3.05	4.60	17,317	0.398
90	min	2.83	4.27	17,733	0.407
100	min	2.64	3.98	18,049	0.414
110	min	2.48	3.74	18,284	0.420
120	min	2.33	3.52	18,453	0.424
130	min	2.21	3.34	18,565	0.426
140	min	2.10	3.17	18,629	0.428
150	min	2.00	3.02	18,652	0.428
160	min	1.91	2.89	18,639	0.428
170	min	1.83	2.77	18,595	0.427
180	min	1.76	2.65	18,524	0.425
190	min	1.69	2.55	18,428	0.423
200	min	1.63	2.46	18,310	0.420
210	min	1.57	2.38	18,172	0.417
1440	min	0.36	0.54	0.0	0

PRESTIGE FITNESS CLUB	
4422 Kalani Dr	
Diamond Head MS	

Drainage Calculations - Modified Rational Method
Predevelopment Condition
50 Year Frequency

Q= CIA			Factor	Area, sf	Acres
	Undeveloped Area		0.2	83,055	1.91
	Building/ Paving		0.95	0	0.00
				83,055	1.91
C	Weighted C Factor		0.20		
L	Hydraulic Length, L	425	feet		
	Slope, in %, S	2.824			0.028235
	Runoff Coefficient, C	0.20			
	Time of Concentration	Tc	37.8	minutes	
		10.70385	6.172558	0.8138	
i	I, intensity from Region 1		5.17		
	Time to Peak	D	0.630787	hrs	
		a	5.097		
		b	0.351		
		c	-0.783		
A	Area, Acres		1.907		
	50 Flow, cfs	C*I*A	1.97	cfs	

Q50 Predev Flow	1.97 cfs
------------------------	-----------------

PRESTIGE FITNESS CLUB
4422 Kalani Dr
Diamond Head MS

Drainage Calculations - Modified Rational Method
Postdevelopment Condition
50 Year Frequency

Q= CIA			Factor	Area, sf	Acres
	Undeveloped Green Area		0.2	17,541	0.40
	Building/ Paving		0.95	65,514	1.50
				83,055	1.91
C	Weighted C Factor		0.79		
L	Hydraulic Length, L	452.7	feet		
	Slope, in %, S	1.9881			0.019881
	Runoff Coefficient, C	0.792			
	Time of Concentration	Tc	8.8	minutes	
		10.97188	1.302503	0.872492	
i	I, intensity from Region 1		8.81		
	D	0.146279			
	a	5.097			
	b	0.351			
	c	-0.783			
A	Area, Acres	1.907			
	Q50 Flow, cfs	C*I*A	13.29	cfs	

Q50 Postdev Flow 13.29 cfs

Q50 Allowable Flow- Undeveloped Flow = 1.97 cfs

PRESTIGE FITNESS CLUB
4422 Kalani Dr
Diamond Head MS

Drainage Calculations - Modified Rational Method
Storage Requirements for a 50 Year Frequency Storm Event

$$i = a(D + b)^c$$

$$q = CiA$$

$$\text{Max Storage Volume} = (D \times q) - (.5 \times Q_{10})$$

$$\text{Allowable Flow} \times (D + T_c)$$

Storm Duration (D)	Time	i	q, cfs	Max. Storage Volume, cf	Max. Storage Volume, ac-ft
10	min	8.54	12.88	6,619	0.152
20	min	6.86	10.35	10,722	0.246
30	min	5.78	8.73	13,418	0.308
40	min	5.03	7.59	15,327	0.352
50	min	4.46	6.74	16,739	0.384
60	min	4.03	6.08	17,814	0.409
70	min	3.68	5.55	18,647	0.428
80	min	3.39	5.11	19,298	0.443
90	min	3.15	4.75	19,808	0.455
100	min	2.94	4.44	20,207	0.464
110	min	2.76	4.17	20,513	0.471
120	min	2.61	3.94	20,744	0.476
130	min	2.47	3.73	20,912	0.480
140	min	2.35	3.55	21,025	0.483
150	min	2.24	3.39	21,092	0.484
160	min	2.15	3.24	21,118	0.485
170	min	2.06	3.11	21,108	0.485
180	min	1.98	2.98	21,067	0.484
190	min	1.90	2.87	20,997	0.482
200	min	1.84	2.77	20,902	0.480
210	min	1.77	2.68	20,784	0.477
1440	min	0.42	0.63162	0.0	0.000

PRESTIGE FITNESS CLUB	
4422 Kalani Dr	
Diamond Head MS	

Drainage Calculations - Modified Rational Method
Predevelopment Condition
100 Year Frequency

Q= CIA			Factor	Area, sf	Acres
	Undeveloped Area		0.2	83,055	1.91
	Building/ Paving		0.95	0	0.00
				83,055	1.91
C	Weighted C Factor		0.20		
L	Hydraulic Length, L	425	feet		
	Slope, in %, S	2.8235			0.028235
	Runoff Coefficient, C	0.20			
	Time of Concentration	Tc	37.8	minutes	
		10.70385	6.172558	0.8138	
i	I, intensity from Region 1		5.64		
	Time to Peak	D	0.630787	hrs	
		a	5.487		
		b	0.334		
		c	-0.759		
A	Area, Acres		1.907		
	Q10 Flow, cfs	C*I*A	2.15	cfs	

Q100 Predev Flow	2.15 cfs
-------------------------	-----------------

PRESTIGE FITNESS CLUB
4422 Kalani Dr
Diamond Head MS

Drainage Calculations - Modified Rational Method
Postdevelopment Condition
100 Year Frequency

Q= CIA			Factor	Area, sf	Acres
	Undeveloped Green Area		0.2	17,541	0.40
	Building/ Paving		0.95	65,514	1.50
				83,055	1.91
C	Weighted C Factor		0.79		
L	Hydraulic Length, L	452.7	feet		
	Slope, in %, S	1.9881			0.019881
	Runoff Coefficient, C	0.792			
	Time of Concentration	Tc	8.8	minutes	
		10.97188	1.302503	0.872492	
i	I, intensity from Region 1		9.57		
	D	0.146279			
	a	5.487			
	b	0.334			
	c	-0.759			
A	Area, Acres	1.907			
	Q100 Flow, cfs	C*I*A	14.45	cfs	

Q100 Postdev Flow 14.45 cfs

Q100 Allowable Flow- Undeveloped Flow = 2.15 cfs

PRESTIGE FITNESS CLUB
4422 Kalani Dr
Diamond Head MS

Drainage Calculations - Modified Rational Method
Storage Requirements for a 100 Year Frequency Storm Event

$$i = a(D + b)^c$$

$$q = CiA$$

$$\text{Max Storage Volume} = (D \times q) - (.5 \times Q10)$$

$$\text{Allowable Flow} \times (D + Tc)$$

Storm Duration (D)	Time	i	q, cfs	Max. Storage Volume, cf	Max. Storage Volume, ac-ft
10	min	9.28	14.00	7,190	0.165
20	min	7.46	11.26	11,653	0.268
30	min	6.30	9.51	14,608	0.335
40	min	5.48	8.28	16,720	0.384
50	min	4.88	7.36	18,301	0.420
60	min	4.41	6.65	19,521	0.448
70	min	4.03	6.09	20,479	0.470
80	min	3.72	5.62	21,242	0.488
90	min	3.46	5.23	21,851	0.502
100	min	3.24	4.89	22,338	0.513
110	min	3.05	4.60	22,726	0.522
120	min	2.88	4.35	23,031	0.529
130	min	2.74	4.13	23,266	0.534
140	min	2.61	3.93	23,441	0.538
150	min	2.49	3.76	23,564	0.541
160	min	2.38	3.60	23,642	0.543
170	min	2.29	3.45	23,681	0.544
180	min	2.20	3.32	23,684	0.544
190	min	2.12	3.20	23,655	0.543
200	min	2.05	3.09	23,598	0.542
210	min	1.98	2.99	23,515	0.540
1440	min	0.49	0.73	0.0	0

PRESTIGE FITNESS CLUB
4422 Kalani Dr
Diamond Head MS

Discharge End Area Calculations $Q = cA(2gh)^{1/2}$

Allowable Run Off, Q	2.15 CFS	per pipe
Friction Factor, c	0.98	
Acceleration, g	32.2 ft/ft/sec	
Height above Invert, H ft	0.26 ft	
End Area, Sq ft	0.54	
Square Inches	77.21 "	
Diameter, Inches	9.92 "	

Use 10" Diameter Orifice Plate in Terminal CB