

**. . . Fire Protection by Computer Design**

FREEDOM FIRE PROTECTION INC.  
209 QUAKER RIDGE ROAD  
CASCO, MAINE 04015  
207-627-4109

Job Name : DANFORTH ON HIGH CONDOS HC3  
Building : 81 DANFORTH STREET  
Location : PORTLAND, MAINE 04101  
System : #1 AREA #3  
Contract :  
Data File : DANFORTH ON HIGH CONDOS HC3.WXF

Hydraulic Design Information Sheet

Name - DANFORTH ON HIGH CONDOS Date - 10/24/12  
Location - PORTLAND, MAINE 04101  
Building - 81 DANFORTH STREET System No. - #1 AREA #3  
Contractor - Contract No. -  
Calculated By - MIKE NOBLIT Drawing No. - FP-2  
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height - VARIES  
Occupancy - PARKING GARAGE

S (X) NFPA 13 ( ) Lt. Haz. Ord.Haz.Gp. (X) 1 ( ) 2 ( ) 3 ( ) Ex.Haz.  
Y ( ) NFPA 231 ( ) NFPA 231C ( ) Figure Curve

S Other

T Specific Ruling

Made By

Date

E

M	Area of Sprinkler Operation	- 1950	System Type	Sprinkler/Nozzle
	Density	- .15	( ) Wet	Make TYCO
D	Area Per Sprinkler	- 130	(X) Dry	Model TY-FRB
E	Elevation at Highest Outlet	- 9'-0"	( ) Deluge	Size 1/2"
S	Hose Allowance - Inside	-	( ) Preaction	K-Factor 5.6
I	Rack Sprinkler Allowance	-	( ) Other	Temp.Rat.155
G	Hose Allowance - Outside	- 250		

N

Note

Calculation Flow Required - 691.088 Press Required - 52.534 At Test  
Summary C-Factor Used: 100 Overhead 140 Underground

W Water Flow Test:

Pump Data:

Tank or Reservoir:

A Date of Test - 3/26/2008

Cap. -

T Time of Test -

Rated Cap.-

Elev.-

E Static Press - 81

@ Press -

R Residual Press - 0

Elev. -

Well

Flow - 1644

Proof Flow

S Elevation - -2'-0"

U

P Location -

P

L Source of Information - PORTLAND WATER DISTRICT

Y

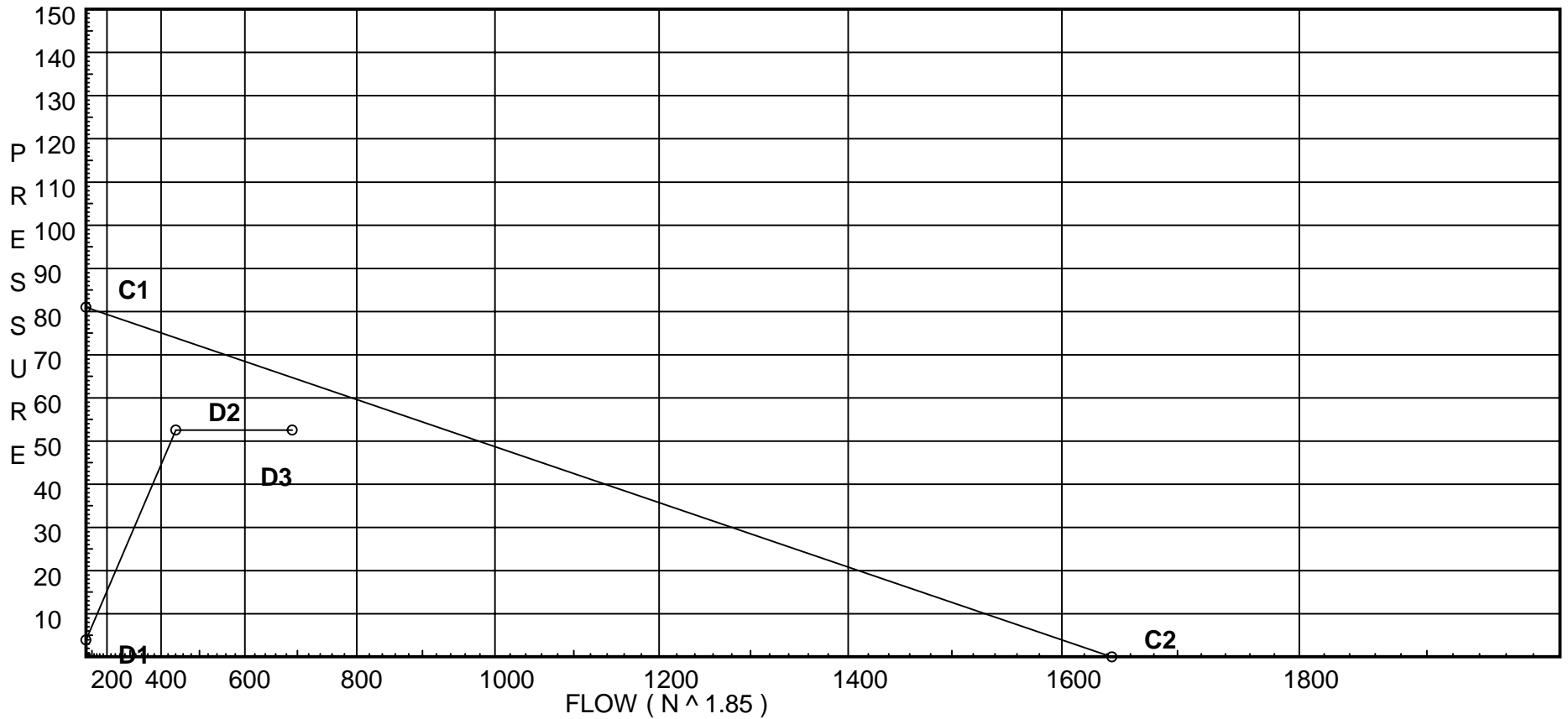
# Water Supply Curve (C)

FREEDOM FIRE PROTECTION INC.  
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City Water Supply:  
C1 - Static Pressure : 81  
C2 - Residual Pressure: 0  
C2 - Residual Flow : 1644

Demand:  
D1 - Elevation : 3.898  
D2 - System Flow : 441.088  
D2 - System Pressure : 52.534  
Hose ( Adj City ) :  
Hose ( Demand ) : 250  
D3 - System Demand : 691.088  
Safety Margin : 12.165



# Fittings Used Summary

FREEDOM FIRE PROTECTION INC.  
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## Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
B	Generic Butterfly Valve	0	0	0	0	0	0	7	10	0	12	9	10	12	19	21	0	0	0	0	0
D	Generic Dry Pipe Valve	0	0	0	0	0	0	9.5	17	0	28	0	47	0	0	0	0	0	0	0	0
E	90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
T	90' Flow Thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Zac	Ames 2000SS	Fitting generates a Fixed Loss Based on Flow																			

Pressure / Flow Summary - STANDARD

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
301	9.0	5.6	22.24	na	26.41	0.15	130	7.0
302	9.0	5.6	18.75	na	24.25	0.15	130	7.0
303	9.0	5.6	15.95	na	22.37	0.15	130	7.0
64	8.33		17.19	na				
63	8.33		20.14	na				
62	8.33		23.16	na				
304	9.0	5.6	21.16	na	25.76	0.15	130	7.0
305	9.0	5.6	17.83	na	23.65	0.15	130	7.0
306	9.0	5.6	15.16	na	21.81	0.15	130	7.0
67	8.33		16.36	na				
66	8.33		19.17	na				
65	8.33		22.06	na				
307	9.0	5.6	20.45	na	25.33	0.15	130	7.0
308	9.0	5.6	17.24	na	23.26	0.15	130	7.0
309	9.0	5.6	14.44	na	21.28	0.15	130	7.0
70	8.33		15.45	na				
69	8.33		18.55	na				
68	8.33		21.33	na				
310	9.0	5.6	20.16	na	25.14	0.15	130	7.0
311	9.0	5.6	15.95	na	22.36	0.15	130	7.0
312	9.0	5.6	13.85	na	20.84	0.15	130	7.0
313	9.0	5.6	13.53	na	20.6	0.15	130	7.0
74	8.33		14.63	na				
73	8.33		14.97	na				
72	8.33		17.19	na				
71	8.33		21.63	na				
315	9.0	5.6	19.12	na	24.48	0.15	130	7.0
75	8.33		19.96	na				
314	8.33	5.6	22.83	na	26.76	0.15	130	7.0
317	9.0	5.6	15.47	na	22.03	0.15	130	7.0
318	9.0	5.6	12.41	na	19.73	0.15	130	7.0
319	9.0	5.6	12.13	na	19.5	0.15	130	7.0
61	8.33		13.15	na				
60	8.33		13.46	na				
59	8.33		16.69	na				
316	8.33	5.6	20.8	na	25.54	0.15	130	7.0
58	8.33		25.72	na				
57	8.33		25.78	na				
56	8.33		26.0	na				
55	8.33		26.44	na				
54	8.33		27.35	na				
53	8.33		28.71	na				
52	8.33		38.23	na				
51	8.33		40.27	na				
50	5.42		43.98	na				
1	5.42		45.86	na				
0	2.0		51.53	na				
TEST	0.0		52.53	na	250.0			

The maximum velocity is 16.95 and it occurs in the pipe between nodes 53 and 52

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	***** Notes *****
301 to 62	26.41	1.049 100	1E 1.427	0.660 1.427	22.235 0.290		K Factor = 5.60
	26.41	0.3052	0.0	2.087	0.637		Vel = 9.80
	0.0 26.41					23.162	K Factor = 5.49
302 to 63	24.25	1.049 100	1T 3.568	0.660 3.568	18.750 0.290		K Factor = 5.60
	24.25	0.2604	0.0	4.228	1.101		Vel = 9.00
	0.0 24.25					20.141	K Factor = 5.40
303 to 64	22.37	1.049 100	1T 3.568	0.660 3.568	15.950 0.290		K Factor = 5.60
	22.37	0.2245	0.0	4.228	0.949		Vel = 8.30
64 to 63	0.0	1.049 100	0.0	13.166 0.0	17.189 0.0		
	22.37	0.2242	0.0	13.166	2.952		Vel = 8.30
63 to 62	24.24	1.38 100	0.0	13.166 0.0	20.141 0.0		
	46.61	0.2295	0.0	13.166	3.021		Vel = 10.00
62 to 53	26.41	1.38 100	1T 4.282	6.250 4.282	23.162 0.0		
	73.02	0.5264	0.0	10.532	5.544		Vel = 15.66
	0.0 73.02					28.706	K Factor = 13.63
304 to 65	25.76	1.049 100	1E 1.427	0.660 1.427	21.159 0.290		K Factor = 5.60
	25.76	0.2913	0.0	2.087	0.608		Vel = 9.56
	0.0 25.76					22.057	K Factor = 5.48
305 to 66	23.65	1.049 100	1T 3.568	0.660 3.568	17.833 0.290		K Factor = 5.60
	23.65	0.2486	0.0	4.228	1.051		Vel = 8.78
	0.0 23.65					19.174	K Factor = 5.40
306 to 67	21.81	1.049 100	1T 3.568	0.660 3.568	15.162 0.290		K Factor = 5.60
	21.81	0.2140	0.0	4.228	0.905		Vel = 8.10
67 to 66	0.0	1.049 100	0.0	13.166 0.0	16.357 0.0		
	21.81	0.2140	0.0	13.166	2.817		Vel = 8.10
66 to 65	23.64	1.38 100	0.0	13.166 0.0	19.174 0.0		
	45.45	0.2190	0.0	13.166	2.883		Vel = 9.75

Final Calculations - Standard

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
65 to 54	25.76 71.21	1.38 100 0.5026	1T	4.282 0.0 0.0	6.250 4.282 10.532	22.057 0.0 5.293		Vel = 15.27	
	0.0 71.21					27.350		K Factor = 13.62	
307 to 68	25.33 25.33	1.049 100 0.2822	1E	1.427 0.0 0.0	0.660 1.427 2.087	20.452 0.290 0.589		Vel = 9.40	
	0.0 25.33					21.331		K Factor = 5.48	
308 to 69	23.26 23.26	1.049 100 0.2410	1T	3.568 0.0 0.0	0.660 3.568 4.228	17.245 0.290 1.019		Vel = 8.63	
	0.0 23.26					18.554		K Factor = 5.40	
309 to 70	21.28 21.28	1.049 100 0.2046	2E	2.855 0.0 0.0	0.660 2.855 3.515	14.443 0.290 0.719		Vel = 7.90	
70 to 69	0.0 21.28	1.049 100 0.2045		0.0 0.0 0.0	15.166 0.0 15.166	15.452 0.0 3.102		Vel = 7.90	
69 to 68	23.26 44.54	1.38 100 0.2109		0.0 0.0 0.0	13.166 0.0 13.166	18.554 0.0 2.777		Vel = 9.55	
68 to 55	25.32 69.86	1.38 100 0.4850	1T	4.282 0.0 0.0	6.250 4.282 10.532	21.331 0.0 5.108		Vel = 14.99	
	0.0 69.86					26.439		K Factor = 13.59	
310 to 71	25.14 25.14	1.049 100 0.2784	1T	3.568 0.0 0.0	0.660 3.568 4.228	20.161 0.290 1.177		Vel = 9.33	
	0.0 25.14					21.628		K Factor = 5.41	
311 to 72	22.36 22.36	1.049 100 0.2242	1T	3.568 0.0 0.0	0.660 3.568 4.228	15.949 0.290 0.948		Vel = 8.30	
	0.0 22.36					17.187		K Factor = 5.39	
312 to 73	20.84 20.84	1.049 100 0.1968	1T	3.568 0.0 0.0	0.660 3.568 4.228	13.850 0.290 0.832		Vel = 7.74	

Final Calculations - Standard

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
	0.0 20.84					14.972		K Factor = 5.39	
313 to 74	20.60	1.049 100	1T	3.568 0.0	0.660 3.568	13.531 0.290		K Factor = 5.60	
74 to 73	20.6	0.1925 1.38 100		0.0 0.0	4.228 6.660	0.814 14.635		Vel = 7.65	
73 to 72	20.6	0.0506 1.38 100		0.0 0.0	6.660 0.0	0.337 0.0		Vel = 4.42	
72 to 71	20.84	0.1846 1.38 100		0.0 0.0	12.000 0.0	14.972 0.0		Vel = 8.89	
71 to 56	22.36	0.4101 1.38 100		0.0 0.0	10.830 0.0	17.187 0.0		Vel = 13.69	
	25.15	1.61 100	1T	5.71 0.0	6.500 5.710	21.628 0.0		Vel = 14.02	
	88.95	0.3580		0.0	12.210	4.371			
	0.0 88.95					25.999		K Factor = 17.44	
315 to 75	24.48	1.049 100	1E	1.427 0.0	0.660 1.427	19.116 0.290		K Factor = 5.60	
75 to 314	24.48	0.2655 1.049 100		0.0 0.0	2.087 10.830	0.554 19.960		Vel = 9.09	
314 to 57	24.48	0.2651 1.38 100		0.0 0.0	10.830 4.282	2.871 22.831		Vel = 9.09	
	26.76	0.2733	1T	4.282 0.0	6.500 4.282	22.831 0.0		K Factor = 5.60	
	51.24			0.0	10.782	2.947		Vel = 10.99	
	0.0 51.24					25.778		K Factor = 10.09	
317 to 59	22.03	1.049 100	1T	3.568 0.0	0.660 3.568	15.474 0.290		K Factor = 5.60	
	22.03	0.2181		0.0	4.228	0.922		Vel = 8.18	
	0.0 22.03					16.686		K Factor = 5.39	
318 to 60	19.73	1.049 100	1T	3.568 0.0	0.660 3.568	12.414 0.290		K Factor = 5.60	
	19.73	0.1779		0.0	4.228	0.752		Vel = 7.32	
	0.0 19.73					13.456		K Factor = 5.38	
319 to 61	19.50	1.049 100	1T	3.568 0.0	0.660 3.568	12.125 0.290		K Factor = 5.60	
	19.5	0.1741		0.0	4.228	0.736		Vel = 7.24	



Final Calculations - Standard

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
61	0.0	1.38		6.660	13.151				
to		100		0.0	0.0				
60	19.5	0.0458		6.660	0.305		Vel =	4.18	
60	19.73	1.38	2E	4.282	15.083	13.456			
to		100		0.0	4.282	0.0			
59	39.23	0.1668		0.0	19.365	3.230	Vel =	8.41	
59	22.03	1.38		0.0	10.830	16.686			
to		100		0.0	0.0	0.0			
316	61.26	0.3803		0.0	10.830	4.119	Vel =	13.14	
316	25.54	1.61	2E	5.71	8.660	20.805	K Factor =	5.60	
to		100		0.0	5.710	0.0			
58	86.8	0.3421		0.0	14.370	4.916	Vel =	13.68	
58	0.0	3.26		0.0	5.166	25.721			
to		100		0.0	0.0	0.0			
57	86.8	0.0110		0.0	5.166	0.057	Vel =	3.34	
57	51.24	3.26		0.0	8.500	25.778			
to		100		0.0	0.0	0.0			
56	138.04	0.0260		0.0	8.500	0.221	Vel =	5.31	
56	88.95	3.26		0.0	6.750	25.999			
to		100		0.0	0.0	0.0			
55	226.99	0.0652		0.0	6.750	0.440	Vel =	8.72	
55	69.87	3.26		0.0	8.500	26.439			
to		100		0.0	0.0	0.0			
54	296.86	0.1072		0.0	8.500	0.911	Vel =	11.41	
54	71.21	3.26		0.0	8.500	27.350			
to		100		0.0	0.0	0.0			
53	368.07	0.1595		0.0	8.500	1.356	Vel =	14.15	
53	73.02	3.26	1E	6.714	36.000	28.706			
to		100		0.0	6.714	0.0			
52	441.09	0.2229		0.0	42.714	9.521	Vel =	16.95	
52	0.0	4.26	1E	9.397	5.483	38.227			
to		100	1T	18.795	28.192	0.0			
51	441.09	0.0606		0.0	33.675	2.040	Vel =	9.93	
51	0.0	4.26	1B	11.277	2.916	40.267			
to		100	1D	26.313	37.589	1.260			
50	441.09	0.0606		0.0	40.505	2.454	Vel =	9.93	
50	0.0	4.026	1E	10.0	3.000	43.981			
to		120	1T	20.0	30.000	0.0			
1	441.09	0.0569		0.0	33.000	1.878	Vel =	11.12	
1	0.0	4.026	1Zac	0.0	3.420	45.859			
to		140		0.0	0.0	5.527	* Fixed loss =	4.046	
0	441.09	0.0430		0.0	3.420	0.147	Vel =	11.12	

Hyd. Ref. Point	Qa  Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
0	0.0	6.16	0.0	25.000	51.533				
to		140	0.0	0.0	0.866				
TEST	441.09	0.0054	0.0	25.000	0.135		Vel = 4.75		
	250.00						Qa = 250.00		
	691.09				52.534		K Factor = 95.35		