

. . . Fire Protection by Computer Design

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

Job Name : OAK STREET LOFTS HC4
Building : 72 OAK STREET
Location : PORTLAND, MAINE 04101
System : #1 AREA #4
Contract :
Data File : OAK STREET LOFTS HC4.WXF

Hydraulic Design Information Sheet

Name - OAK STREET LOFTS Date - 6/14/11
Location - PORTLAND, MAINE 04101
Building - 72 OAK STREET System No. - #1 AREA #4
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	- 11'-8"	() 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 - 720 Press Required - 53.816 At Test
Summary C-Factor Used: 100 Overhead 140 Underground

W Water Flow Test:

Pump Data:

Tank or Reservoir:

A Date of Test - 5/7/10

Cap. -

T Time of Test -

Rated Cap.-

Elev.-

E Static Press - 66

@ Press -

R Residual Press - 62

Elev. -

Well

Flow - 1186

Proof Flow

S Elevation - 0

U

P Location -

P

L Source of Information - PORTLAND WATER DISTRICT

Y

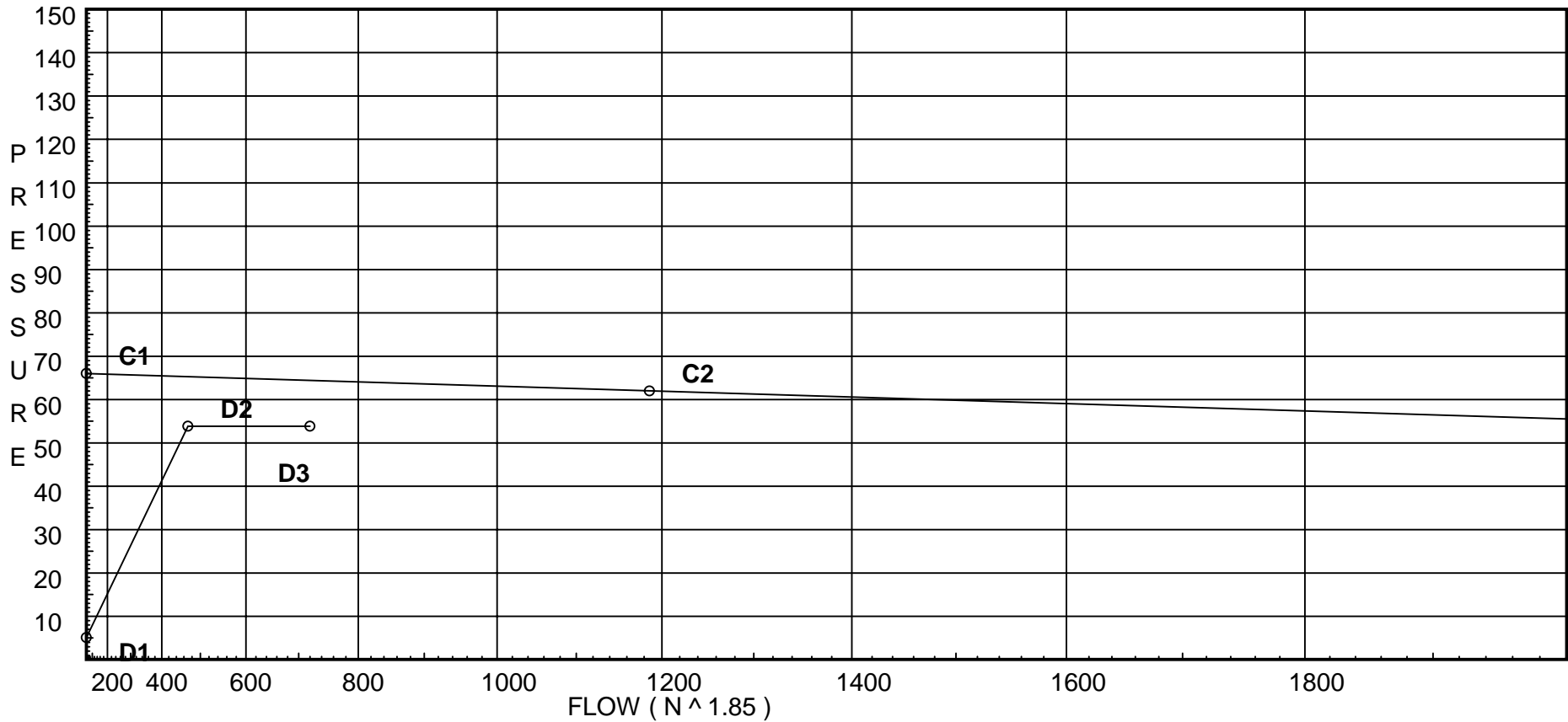
Water Supply Curve (C)

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City Water Supply:
C1 - Static Pressure : 66
C2 - Residual Pressure: 62
C2 - Residual Flow : 1186

Demand:
D1 - Elevation : 5.071
D2 - System Flow : 470.118
D2 - System Pressure : 53.816
Hose (Adj City) :
Hose (Demand) : 250
D3 - System Demand : 720.118
Safety Margin : 10.595



Fittings Used Summary

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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.
401	11.708	5.6	24.26	na	27.58	0.15	130	7.0
402	11.708	5.6	22.35	na	26.48	0.15	130	7.0
403	11.708	5.6	21.86	na	26.18	0.15	130	7.0
54	10.708		23.56	na				
53	10.708		24.11	na				
52	10.708		26.15	na				
51	10.708		29.31	na				
404	11.708	5.6	20.9	na	25.6	0.15	130	7.0
405	11.708	5.6	16.45	na	22.71	0.15	130	7.0
406	11.708	5.6	14.02	na	20.97	0.15	130	7.0
407	11.708	5.6	12.44	na	19.75	0.15	130	7.0
408	11.708	5.6	12.13	na	19.5	0.15	130	7.0
59	10.708		13.29	na				
58	10.708		13.63	na				
57	10.708		15.3	na				
56	10.708		17.88	na				
55	10.708		22.6	na				
409	11.708	5.6	22.09	na	26.32	0.15	130	7.0
410	11.708	5.6	18.8	na	24.28	0.15	130	7.0
411	11.708	5.6	17.32	na	23.31	0.15	130	7.0
412	11.708	5.6	16.74	na	22.91	0.15	130	7.0
63	10.708		18.16	na				
62	10.708		18.78	na				
61	10.708		20.36	na				
60	10.708		23.85	na				
413	11.708	5.6	21.1	na	25.73	0.15	130	7.0
414	11.708	5.6	17.95	na	23.73	0.15	130	7.0
415	11.708	5.6	16.54	na	22.77	0.15	130	7.0
416	11.708	5.6	15.98	na	22.39	0.15	130	7.0
67	10.708		17.36	na				
66	10.708		17.95	na				
65	10.708		19.47	na				
64	10.708		22.81	na				
417	11.708	5.6	19.08	na	24.46	0.15	130	7.0
418	11.708	5.6	16.21	na	22.55	0.15	130	7.0
419	11.708	5.6	14.93	na	21.64	0.15	130	7.0
420	11.708	5.6	14.42	na	21.26	0.15	130	7.0
50	10.708		15.71	na				
49	10.708		16.25	na				
48	10.708		17.63	na				
47	10.708		20.67	na				
46	10.708		24.58	na				
45	10.708		24.82	na				
44	10.708		25.95	na				
43	10.708		28.14	na				
42	10.708		29.47	na				
41	10.708		35.31	na				
40	10.708		38.91	na				
2	4.42		44.62	na				
1	0.0		50.97	na				
TEST	0.0		53.82	na	250.0			

The maximum velocity is 22.94 and it occurs in the pipe between nodes 43 and 42

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 *****
401 to 52	27.58	1.049 100	1T	3.568 0.0	0.830 3.568	24.260 0.433	K Factor = 5.60
	27.58	0.3306		0.0	4.398	1.454	Vel = 10.24
	0.0						
	27.58					26.147	K Factor = 5.39
402 to 53	26.48	1.049 100	1T	3.568 0.0	0.750 3.568	22.355 0.433	K Factor = 5.60
	26.48	0.3064		0.0	4.318	1.323	Vel = 9.83
	0.0						
	26.48					24.111	K Factor = 5.39
403 to 54	26.18	1.049 100	1T	3.568 0.0	0.660 3.568	21.857 0.433	K Factor = 5.60
	26.18	0.2999		0.0	4.228	1.268	Vel = 9.72
54 to 53	0.0	1.61 100		0.0 0.0	14.830 0.0	23.558 0.0	
	26.18	0.0373		0.0	14.830	0.553	Vel = 4.13
53 to 52	26.48	1.61 100		0.0 0.0	15.000 0.0	24.111 0.0	
	52.66	0.1357		0.0	15.000	2.036	Vel = 8.30
52 to 51	27.58	1.61 100	1T	5.71 0.0	5.000 5.710	26.147 0.0	
	80.24	0.2958		0.0	10.710	3.168	Vel = 12.65
51 to 42	0.0	2.635 100		0.0 0.0	5.660 0.0	29.315 0.0	
	80.24	0.0269		0.0	5.660	0.152	Vel = 4.72
	0.0						
	80.24					29.467	K Factor = 14.78
404 to 55	25.60	1.049 100	1T	3.568 0.0	0.830 3.568	20.897 0.433	K Factor = 5.60
	25.6	0.2879		0.0	4.398	1.266	Vel = 9.50
	0.0						
	25.60					22.596	K Factor = 5.39
405 to 56	22.71	1.049 100	1T	3.568 0.0	0.750 3.568	16.450 0.433	K Factor = 5.60
	22.71	0.2307		0.0	4.318	0.996	Vel = 8.43
	0.0						
	22.71					17.879	K Factor = 5.37
406 to 57	20.97	1.049 100	1T	3.568 0.0	0.660 3.568	14.024 0.433	K Factor = 5.60
	20.97	0.1991		0.0	4.228	0.842	Vel = 7.78
	0.0						

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	*****
	20.97					15.299		K Factor = 5.36	
407 to 58	19.75	1.049 100	1T	3.568 0.0	0.660 3.568	12.443 0.433		K Factor = 5.60	
	19.75	0.1783		0.0	4.228	0.754		Vel = 7.33	
	0.0 19.75					13.630		K Factor = 5.35	
408 to 59	19.50	1.049 100	1T	3.568 0.0	0.660 3.568	12.125 0.433		K Factor = 5.60	
	19.5	0.1741		0.0	4.228	0.736		Vel = 7.24	
59 to 58	0.0	1.38 100		0.0 0.0	7.330 0.0	13.294 0.0			
	19.5	0.0458		0.0	7.330	0.336		Vel = 4.18	
58 to 57	19.75	1.38 100		0.0 0.0	10.000 0.0	13.630 0.0			
	39.25	0.1669		0.0	10.000	1.669		Vel = 8.42	
57 to 56	20.98	1.61 100		0.0 0.0	14.830 0.0	15.299 0.0			
	60.23	0.1740		0.0	14.830	2.580		Vel = 9.49	
56 to 55	22.71	1.61 100		0.0 0.0	15.000 0.0	17.879 0.0			
	82.94	0.3145		0.0	15.000	4.717		Vel = 13.07	
55 to 43	25.60	1.61 100	1T	5.71 0.0	5.000 5.710	22.596 0.0			
	108.54	0.5173		0.0	10.710	5.540		Vel = 17.11	
	0.0 108.54					28.136		K Factor = 20.46	
409 to 60	26.32	1.049 100	1T	3.568 0.0	0.830 3.568	22.088 0.433		K Factor = 5.60	
	26.32	0.3031		0.0	4.398	1.333		Vel = 9.77	
	0.0 26.32					23.854		K Factor = 5.39	
410 to 61	24.28	1.049 100	1T	3.568 0.0	0.750 3.568	18.801 0.433		K Factor = 5.60	
	24.28	0.2612		0.0	4.318	1.128		Vel = 9.01	
	0.0 24.28					20.362		K Factor = 5.38	
411 to 62	23.31	1.049 100	1T	3.568 0.0	0.660 3.568	17.324 0.433		K Factor = 5.60	
	23.31	0.2420		0.0	4.228	1.023		Vel = 8.65	
	0.0 23.31					18.780		K Factor = 5.38	

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
412 to 63	22.91	1.049 100	1T	3.568 0.0	0.660 3.568	16.739 0.433		K Factor = 5.60	
63 to 62	22.91	0.2346		0.0	4.228	0.992		Vel = 8.50	
63 to 62	0.0	1.38 100		0.0 0.0	10.000 0.0	18.164 0.0			
62 to 61	22.91	0.0616		0.0	10.000	0.616		Vel = 4.91	
62 to 61	23.31	1.61 100		0.0 0.0	14.830 0.0	18.780 0.0			
61 to 60	46.22	0.1067		0.0	14.830	1.582		Vel = 7.28	
61 to 60	24.28	1.61 100		0.0 0.0	15.000 0.0	20.362 0.0			
60 to 44	70.5	0.2328		0.0	15.000	3.492		Vel = 11.11	
60 to 44	26.32	1.61 100		0.0 0.0	5.000 0.0	23.854 0.0			
	96.82	0.4188		0.0	5.000	2.094		Vel = 15.26	
	0.0 96.82					25.948		K Factor = 19.01	
413 to 64	25.73	1.049 100	1T	3.568 0.0	0.830 3.568	21.103 0.433		K Factor = 5.60	
	25.73	0.2906		0.0	4.398	1.278		Vel = 9.55	
	0.0 25.73					22.814		K Factor = 5.39	
414 to 65	23.73	1.049 100	1T	3.568 0.0	0.750 3.568	17.954 0.433		K Factor = 5.60	
	23.73	0.2501		0.0	4.318	1.080		Vel = 8.81	
	0.0 23.73					19.467		K Factor = 5.38	
415 to 66	22.77	1.049 100	1T	3.568 0.0	0.660 3.568	16.539 0.433		K Factor = 5.60	
	22.77	0.2320		0.0	4.228	0.981		Vel = 8.45	
	0.0 22.77					17.953		K Factor = 5.37	
416 to 67	22.39	1.049 100	1T	3.568 0.0	0.660 3.568	15.979 0.433		K Factor = 5.60	
	22.39	0.2247		0.0	4.228	0.950		Vel = 8.31	
67 to 66	0.0	1.38 100		0.0 0.0	10.000 0.0	17.362 0.0			
66 to 66	22.39	0.0591		0.0	10.000	0.591		Vel = 4.80	
66 to 65	22.77	1.61 100		0.0 0.0	14.830 0.0	17.953 0.0			
	45.16	0.1021		0.0	14.830	1.514		Vel = 7.12	

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
65	23.73	1.61		15.000		19.467			
to		100		0.0		0.0			
64	68.89	0.2231		15.000		3.347		Vel = 10.86	
64	25.72	1.61		5.000		22.814			
to		100		0.0		0.0			
45	94.61	0.4012		5.000		2.006		Vel = 14.91	
	0.0								
	94.61					24.820		K Factor = 18.99	
417	24.46	1.049	1T	3.568	0.830	19.076		K Factor = 5.60	
to		100		0.0	3.568	0.433			
47	24.46	0.2644		0.0	4.398	1.163		Vel = 9.08	
	0.0								
	24.46					20.672		K Factor = 5.38	
418	22.55	1.049	1T	3.568	0.750	16.213		K Factor = 5.60	
to		100		0.0	3.568	0.433			
48	22.55	0.2277		0.0	4.318	0.983		Vel = 8.37	
	0.0								
	22.55					17.629		K Factor = 5.37	
419	21.64	1.049	1T	3.568	0.660	14.926		K Factor = 5.60	
to		100		0.0	3.568	0.433			
49	21.64	0.2110		0.0	4.228	0.892		Vel = 8.03	
	0.0								
	21.64					16.251		K Factor = 5.37	
420	21.26	1.049	1T	3.568	0.660	14.418		K Factor = 5.60	
to		100		0.0	3.568	0.433			
50	21.26	0.2041		0.0	4.228	0.863		Vel = 7.89	
50	0.0	1.38		0.0	10.000	15.714			
to		100		0.0	0.0	0.0			
49	21.26	0.0537		0.0	10.000	0.537		Vel = 4.56	
49	21.64	1.61		0.0	14.830	16.251			
to		100		0.0	0.0	0.0			
48	42.9	0.0929		0.0	14.830	1.378		Vel = 6.76	
48	22.55	1.61		0.0	15.000	17.629			
to		100		0.0	0.0	0.0			
47	65.45	0.2029		0.0	15.000	3.043		Vel = 10.31	
47	24.46	1.61	1T	5.71	5.000	20.672			
to		100		0.0	5.710	0.0			
46	89.91	0.3651		0.0	10.710	3.910		Vel = 14.17	
46	0.0	2.635		0.0	7.166	24.582			
to		100		0.0	0.0	0.0			
45	89.91	0.0332		0.0	7.166	0.238		Vel = 5.29	

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
45	94.61	2.635		9.000	24.820				
to		100		0.0	0.0				
44	184.52	0.1253		9.000	1.128		Vel = 10.86		
44	96.82	2.635		8.000	25.948				
to		100		0.0	0.0				
43	281.34	0.2735		8.000	2.188		Vel = 16.55		
43	108.54	2.635		2.660	28.136				
to		100		0.0	0.0				
42	389.88	0.5004		2.660	1.331		Vel = 22.94		
42	80.24	4.26	1T	18.795	67.000	29.467			
to		100		0.0	18.795	0.0			
41	470.12	0.0682		0.0	85.795	5.847	Vel = 10.58		
41	0.0	4.26	3E	28.192	24.500	35.314			
to		100		0.0	28.192	0.0			
40	470.12	0.0682		0.0	52.692	3.591	Vel = 10.58		
40	0.0	4.26	1B	11.277	6.288	38.905			
to		100	1D	26.313	37.589	2.723			
2	470.12	0.0682		0.0	43.877	2.991	Vel = 10.58		
2	0.0	4.026	1Zac	0.0	3.416	44.619			
to		120		0.0	0.0	6.134	* Fixed loss = 4.22		
1	470.12	0.0641		0.0	3.416	0.219	Vel = 11.85		
1	0.0	4.1	1E	14.534	50.000	50.972			
to		140		0.0	14.534	0.0			
TEST	470.12	0.0441		0.0	64.534	2.844	Vel = 11.42		
	250.00						Qa = 250.00		
	720.12				53.816		K Factor = 98.16		