

DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK



CITY OF PORTLAND BUILDING PERMIT



This is to certify that

DANFORTH ON HIGH LP /Freedom Fire Protection, Inc

Located at

81 DANFORTH ST

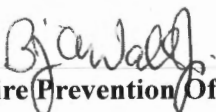
PERMIT ID: 2012-50309

CBL: 040 A016001

has permission to **install NFPA 13 sprinkler system and Class I standpipes** provided that the person or persons, firm or corporation accepting this permit shall comply with all of the provisions of the Statues of Maine and of the Ordinances of the City of Portland regulating the construction, maintenance and use of the buildings and structures, and of the application on file in the department.

Notification of inspection and written permission procured before this building or part thereof is lathed or otherwise closed-in. 48 HOUR NOTICE IS REQUIRED.

A final inspection must be completed by owner before this building or part thereof is occupied. If a certificate of occupancy is required, it must be procured prior to occupancy.


Fire Prevention Officer

58

Code Enforcement Officer / Plan Reviewer

**THIS CARD MUST BE POSTED ON THE STREET SIDE OF THE PROPERTY
THERE IS A PENALTY FOR REMOVING THIS CARD**

BUILDING PERMIT INSPECTION PROCEDURES
Please call 874-8703 (ONLY)
or email: buildinginspections@portlandmaine.gov

With the issuance of this permit, the owner, builder or their designee is required to provide adequate notice to the city of Portland Inspections Services for the following inspections. Appointments must be requested 48 to 72 hours in advance of the required inspection. The inspection date will need to be confirmed by this office.

- **Please read the conditions of approval that is attached to this permit!! Contact this office if you have any questions.**

- **Permits expire in 6 months. If the project is not started or ceases for 6 months.**

- **If the inspection requirements are not followed as stated below additional fees may be incurred due to the issuance of a "Stop Work Order" and subsequent release to continue.**

REQUIRED INSPECTIONS:

Final - Fire

The project cannot move to the next phase prior to the required inspection and approval to continue, REGARDLESS OF THE NOTICE OF CIRCUMSTANCES.

IF THE PERMIT REQUIRES A CERTIFICATE OF OCCUPANCY, IT MUST BE PAID FOR AND ISSUED TO THE OWNER OR DESIGNEE BEFORE THE SPACE MAY BE OCCUPIED.

City of Portland, Maine - Building or Use Permit

389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No: 2012-50309	Date Applied For: 11/16/2012	CBL: 040 A016001
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Location of Construction: 81 DANFORTH ST	Owner Name: DANFORTH ON HIGH LP	Owner Address: 309 CUMBERLAND AVE STE 203	Phone:
Business Name:	Contractor Name: Freedom Fire Protection, Inc	Contractor Address: 209 Quaker Ridge Road Casco	Phone (207) 627-4109
Lessee/Buyer's Name	Phone:	Permit Type: Fire Suppression Water Based	

Proposed Use: Construct 30 units elderly housing	Proposed Project Description: install NFPA 13 sprinkler system and Class I standpipes
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Dept: Zoning **Status:** Approved **Reviewer:** Marge Schmuckal **Approval Date:** 11/20/2012
Note: **Ok to Issue:**

Dept: Fire **Status:** Approved w/Conditions **Reviewer:** Ben Wallace Jr **Approval Date:** 01/28/2013
Note: **Ok to Issue:**

- 1) Both systems shall be maintained in accordance with NFPA 25, Standard for Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, 2008 edition.
- 2) System acceptance and commissioning must be coordinated with alarm and suppression system contractors and the Fire Department. Call 874-8703 to schedule.
- 3) Sprinkler fire department connection shall be two 2 ½" inlets.
- 4) Sprinkler supervision shall be provided in accordance with NFPA 101, Life Safety Code, and NFPA 72, National Fire Alarm and Signaling Code.
- 5) Sprinkler installation shall be in accordance with the City of Portland Fire Department Regulations and NFPA 13 as published. A copy of the State Sprinkler permit with RMS date and signature and the Contractor's Material and Test Certificate for Aboveground Piping (NFPA 13 figure 24.1) shall be provided prior to scheduling of the final inspection.
- 6) FD:6.5.5 Gauges for Class I and III standpipe hose connections. The Fire Department requires the installer to provide two Kochek 2 ½" NH 45 Degree Line Gauge [LG25-45] to the Fire Department for each new Class I and III standpipe.
- 7) A Knox Box is required.
- 8) A hydraulic information sign is required for the standpipe (NFPA 14:6.8).
- 9) The Standpipe system shall be installed in accordance with the City of Portland Fire Department Regulations and NFPA 14 as published. A copy of the Contractor's Material and Test Certificates (NFPA 14 figure 11.1.3(a) and (b) if pertinent) shall be provided prior to scheduling of the final inspection.
- 10) The standpipe fire department connection shall have three 2 1/2" inlets which shall be located immediately adjacent to the sprinkler FDC on the Danforth Street side of the building.. Standpipe FDC signage shall indicate the pressure required at the inlet to deliver system demand (NFPA 14:6.4.5.2).
- 11) 14:6.3.8 Signs for Room Identification, Valves, and Hose Connections. et al.
 14:6.4.5.2 Each fire department connection shall be designated by a sign having letters, at least 1 in. in height, that reads "STANDPIPE."
 14:6.4.5.2.2 A sign also shall indicate the pressure required at the inlets to deliver the system demand.
 14:6.6 Installation of signs. Signs shall be secured to a device or the building wall with corrosion-resistant chains or fasteners
- 12) This system is a manual wet standpipe. Each hose connection shall be provided with a conspicuous sign that reads "MANUAL STANDPIPE FOR FIRE DEPARTMENT USE ONLY."(14:5.4.2) Letters shall be red with a white background and shall be 2 ½" in height. (14:6.3.8.5.2)



Entered 11/16/12

Water-Based Fire Suppression System Permit

(730)

If you or the property owner owes real estate or property taxes or user charges on any property within the city, payment arrangements must be made before permits of any kind are accepted.

2012 - 07 - 4399 - Newcom (2012 50309)

C49
Affordable housing
30 resd. Apt for seniors

Installation address: 81 Danforth Street CBL: 040 A016

Exact location: (within structure) Basement, 1st, 2nd, 3rd, and 4th Floors

Type of occupancy(s) (NFPA & ICC): Residential

Building owner: Hebert Construction Danforth on High LP

Managing Supervisor (RMS): Timothy Vess License No: 348

Supervisor phone: 207-627-4109 E-mail: wwales@maine.rr.com

Installing contractor: Freedom Fire Protection License No: 295

Contractor phone: 207-671-8639 E-mail: wwales@maine.rr.com

The suppression work to be done will be: New: Renovation: Addition to existing system:

This is an amendment to an existing permit: Yes: NO: Permit no: _____

NFPA Standard this system is designed to: NFPA 13 Edition: 2010

*Non-NFPA systems are not approved for use within the City of Portland.

Download a new copy of this document from www.portlandmaine.gov/fire for every submittal. Attach all working documents and complete approved submittals as may be required by the State Fire Marshal's Office on electronic PDF's in addition to full sized plans.

Contractor shall verify location and type of all FDCs shall be approved in writing by the Fire Prevention Bureau.

COST OF WORK: <u>\$93,821.00</u>
PERMIT FEE: <u>\$960.00</u>
(\$10 PER \$1,000 + \$30 FOR THE FIRST \$1,000)
RECEIVED
NOV 16 2012
Dept. of Building Inspections City of Portland Maine

Submit all information to the Building Inspections Department, 389 Congress Street, Room 315, Portland, Maine 04101.

Prior to acceptance of any fire protection system, a complete commissioning and acceptance test must be coordinated with all fire system contractors and the Fire Department, and proper documentation of such test(s) provided.

All installation(s) must comply with NFPA and the Fire Department Technical Standard(s).

Applicant signature: William W. Wales Date: November 15, 2012



PORTLAND MAINE

Strengthening a Remarkable City, Building a Community for Life • www.portlandmaine.gov

Receipts Details:

Tender Information: Check , Check Number: 17453\$960.00

Tender Amount: 960.00

Receipt Header:

Cashier Id: bsaucier

Receipt Date: 11/16/2012

Receipt Number: 50310

Receipt Details:

Referance ID:	8764	Fee Type:	BP-FIRE
Receipt Number:	0	Payment Date:	
Transaction Amount:	960.00	Charge Amount:	960.00
Job ID: Job ID: 2012-07-4399-NEWCOM - Construct 30 units elderly housing			
Additional Comments: 81 Danforth			

Thank You for your Payment!

Freedom Fire Protection, Inc.

30 Years of Fire Protection Experience
209 Quaker Ridge Road
Casco, Maine 04015
Phone (207) 627-4109 Fax (207) 627-7340

November 15, 2012

Portland City Hall
Third Floor Room #315
Portland, Maine 04101

Attention: Captain Chris Pirone

Ref: Danforth on High
81 Danforth Street
Portland, Maine

Subject: Fire Sprinkler Plan Review

Enclosed please find for your review and comment the following sprinkler information.

- Fire Suppression System Permit
- Permit Fee check
- Freedom Fire Protections drawings FP1, FP2, and FP3
- Hydraulic Calculations
- Copy of the State Fire Marshall's sprinkler permit.
- CD Copy of Drawings and Calculations

Please get in touch with me to discuss any questions or if you need additional information.

Regards,

Mark Radziszewski

(O) 207-627-4109

(F) 207-627-7340

(C) 207-318-9992

E-mail markrad@maine.rr.com



State of Maine
Department of Public Safety
Fire Sprinkler System Permit



10318

DANFORTH ON HIGH CONDOS

Located at: 81 DANFORTH STREET
 In the Town of: Portland
 Occupancy/Use: CONDOS
 Type of System: NFPA 13R & 13

Permission is hereby given to:

Freedom Fire Protection, Inc.
 209 Quaker Ridge Road
 Casco, ME 04015
 Contractor License # **295**

to begin installation according to plans submittal approved by the Office of State Fire Marshal.
 The submittal is filed under log # **2121500** , and no departure from the application submittal shall be made without prior approval in writing. This permit is issued under the provisions of Title 32, Chapter 20, Section 12004-I. Nothing herein shall excuse the holder of this permit from failure to comply with local ordinances, zoning laws, or other pertinent legal restrictions. This permit shall be displayed at the construction site or be made readily available.

This permit was issued on **10/29/2012** for a fee paid of **\$440.00**

*This permit will expire at midnight on **Saturday, April 27, 2013***

The expiration date applies only if the installation has not begun by that date and no permission has been granted to extend the date. Once installation begins, then the permit is valid for however long it takes to complete the installation, assuming that the work is fairly continuous.

John E Morris
 John E. Morris
 Commissioner

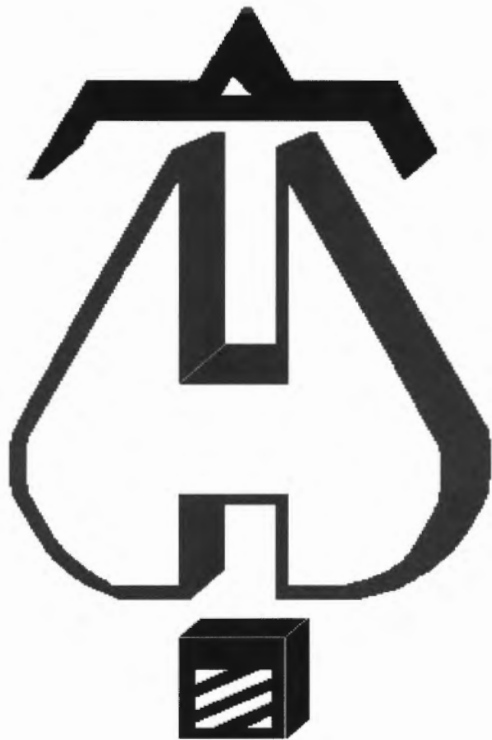
The type of Fire Department Connection and its location is to be according to the Local Fire Department

Within 30 days of the completion of a new fire sprinkler system or an addition to an existing fire sprinkler system, a fire sprinkler system contractor shall provide to the Office of State Fire Marshal a copy of this permit signed and dated by the certified Responsible Managing Supervisor representing that the fire sprinkler system has been installed according to specifications of the approved plan to the best of the supervisor's knowledge, information, and belief. This requirement is part of the sprinkler law, and neglect of this duty is grounds to not renew the contractor's license to do work in the State of Maine. All renewed sprinkler licenses are good for two years and expire on a June 30th.

Job completed, tested and verified by date of _____

RMS for this job: Vess Timothy L.

RMS Signature: _____



... 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	Specific Ruling	Made By	Date
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 Location -

P
 L Source of Information - PORTLAND WATER DISTRICT

Y

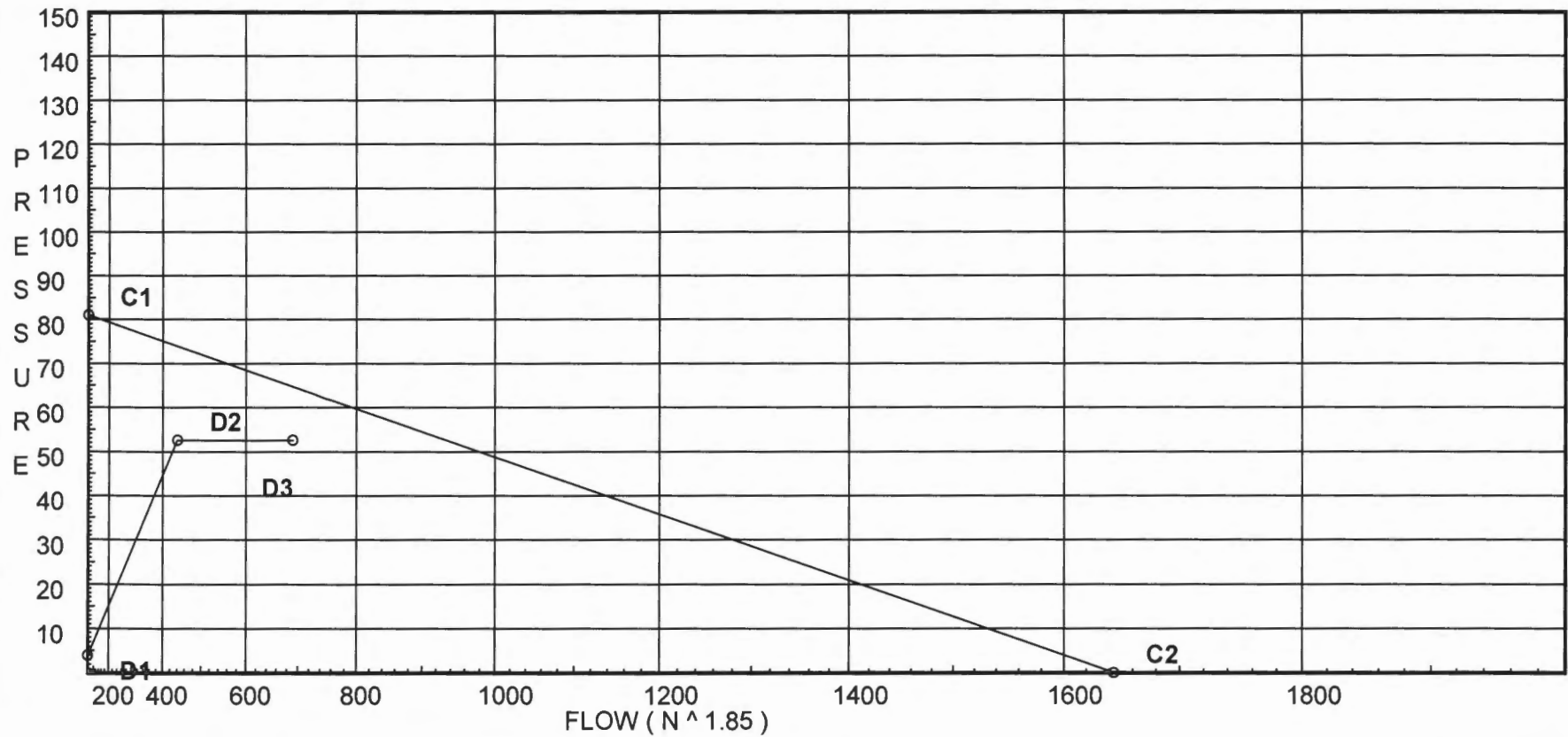
Water Supply Curve (C)

FREEDOM FIRE PROTECTION INC.
DANFORTH ON HIGH CONDOS HC3

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Date 10/24/12

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.
DANFORTH ON HIGH CONDOS HC3

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Date 10/24/12

Fitting Legend		½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24	
Abbrev.	Name																					
B	Generic Butterfly Valve	0	0	0	0	0	0	7	10	0	12	9	10	12	19	21	0	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	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

FREEDOM FIRE PROTECTION INC.
DANFORTH ON HIGH CONDOS HC3

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Date 10/24/12

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

FREEDOM FIRE PROTECTION INC.
DANFORTH ON HIGH CONDOS HC3

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Date 10/24/12

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

Final Calculations - Standard

FREEDOM FIRE PROTECTION INC.
DANFORTH ON HIGH CONDOS HC3

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Date 10/24/12

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	25.76	1.38	1T	4.282	6.250	22.057		
to		100		0.0	4.282	0.0		
54	71.21	0.5026		0.0	10.532	5.293		Vel = 15.27
	0.0							
	71.21					27.350		K Factor = 13.62
307	25.33	1.049	1E	1.427	0.660	20.452		K Factor = 5.60
to		100		0.0	1.427	0.290		
68	25.33	0.2822		0.0	2.087	0.589		Vel = 9.40
	0.0							
	25.33					21.331		K Factor = 5.48
308	23.26	1.049	1T	3.568	0.660	17.245		K Factor = 5.60
to		100		0.0	3.568	0.290		
69	23.26	0.2410		0.0	4.228	1.019		Vel = 8.63
	0.0							
	23.26					18.554		K Factor = 5.40
309	21.28	1.049	2E	2.855	0.660	14.443		K Factor = 5.60
to		100		0.0	2.855	0.290		
70	21.28	0.2046		0.0	3.515	0.719		Vel = 7.90
70	0.0	1.049		0.0	15.166	15.452		
to		100		0.0	0.0	0.0		
69	21.28	0.2045		0.0	15.166	3.102		Vel = 7.90
69	23.26	1.38		0.0	13.166	18.554		
to		100		0.0	0.0	0.0		
68	44.54	0.2109		0.0	13.166	2.777		Vel = 9.55
68	25.32	1.38	1T	4.282	6.250	21.331		
to		100		0.0	4.282	0.0		
55	69.86	0.4850		0.0	10.532	5.108		Vel = 14.99
	0.0							
	69.86					26.439		K Factor = 13.59
310	25.14	1.049	1T	3.568	0.660	20.161		K Factor = 5.60
to		100		0.0	3.568	0.290		
71	25.14	0.2784		0.0	4.228	1.177		Vel = 9.33
	0.0							
	25.14					21.628		K Factor = 5.41
311	22.36	1.049	1T	3.568	0.660	15.949		K Factor = 5.60
to		100		0.0	3.568	0.290		
72	22.36	0.2242		0.0	4.228	0.948		Vel = 8.30
	0.0							
	22.36					17.187		K Factor = 5.39
312	20.84	1.049	1T	3.568	0.660	13.850		K Factor = 5.60
to		100		0.0	3.568	0.290		
73	20.84	0.1968		0.0	4.228	0.832		Vel = 7.74

Final Calculations - Standard

FREEDOM FIRE PROTECTION INC.
DANFORTH ON HIGH CONDOS HC3

Page 7
Date 10/24/12

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 20.84				14.972		K Factor = 5.39
313 to 74	20.60 20.6	1.049 100 0.1925	1T 0.0 0.0	3.568 3.568 4.228	0.660 0.290 0.814		K Factor = 5.60 Vel = 7.65
74 to 73	0.0 20.6	1.38 100 0.0506	0.0 0.0 0.0	6.660 0.0 6.660	14.635 0.0 0.337		Vel = 4.42
73 to 72	20.84 41.44	1.38 100 0.1846	0.0 0.0 0.0	12.000 0.0 12.000	14.972 0.0 2.215		Vel = 8.89
72 to 71	22.36 63.8	1.38 100 0.4101	0.0 0.0 0.0	10.830 0.0 10.830	17.187 0.0 4.441		Vel = 13.69
71 to 56	25.15 88.95	1.61 100 0.3580	1T 0.0 0.0	5.71 5.710 12.210	6.500 0.0 4.371		Vel = 14.02
	0.0 88.95				25.999		K Factor = 17.44
315 to 75	24.48 24.48	1.049 100 0.2655	1E 0.0 0.0	1.427 1.427 2.087	0.660 0.290 0.554		K Factor = 5.60 Vel = 9.09
75 to 314	0.0 24.48	1.049 100 0.2651	0.0 0.0 0.0	10.830 0.0 10.830	19.960 0.0 2.871		Vel = 9.09
314 to 57	26.76 51.24	1.38 100 0.2733	1T 0.0 0.0	4.282 4.282 10.782	6.500 0.0 2.947		K Factor = 5.60 Vel = 10.99
	0.0 51.24				25.778		K Factor = 10.09
317 to 59	22.03 22.03	1.049 100 0.2181	1T 0.0 0.0	3.568 3.568 4.228	0.660 0.290 0.922		K Factor = 5.60 Vel = 8.18
	0.0 22.03				16.686		K Factor = 5.39
318 to 60	19.73 19.73	1.049 100 0.1779	1T 0.0 0.0	3.568 3.568 4.228	0.660 0.290 0.752		K Factor = 5.60 Vel = 7.32
	0.0 19.73				13.456		K Factor = 5.38
319 to 61	19.50 19.5	1.049 100 0.1741	1T 0.0 0.0	3.568 3.568 4.228	0.660 0.290 0.736		K Factor = 5.60 Vel = 7.24

Final Calculations - Standard

FREEDOM FIRE PROTECTION INC.
DANFORTH ON HIGH CONDOS HC3

Page 8
Date 10/24/12

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	***** Notes *****
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

Final Calculations - Standard

FREEDOM FIRE PROTECTION INC.
DANFORTH ON HIGH CONDOS HC3

Page 9
Date 10/24/12

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



... 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 HC2
Building : 81 DANFORTH STREET
Location : PORTLAND, MAINE 04101
System : #1 AREA #2
Contract :
Data File : DANFORTH ON HIGH CONDOS HC2.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 #2
Contractor - Contract No. -
Calculated By - MIKE NOBLIT Drawing No. - FP-3
Construction: (X) Combustible () Non-Combustible Ceiling Height 9'-4"
OCCUPANCY - APARTMENTS

S Type of Calculation: ()NFPA 13 Residential (X)NFPA 13R ()NFPA 13D
Y Number of Sprinklers Flowing: ()1 ()2 (X)4 ()
S ()Other
T ()Specific Ruling Made by Date
E
M Listed Flow at Start Point - 16 Gpm System Type
Listed Pres. at Start Point - 13.2 Psi (X) Wet () Dry
D MAXIMUM LISTED SPACING 16' x 16' () Deluge () PreAction
E Domestic Flow Added - Gpm Sprinkler or Nozzle
S Additional Flow Added - 100 Gpm Make TYCO Model LFII
I Elevation at Highest Outlet - 49'-4"Feet Size 1/2" K-Factor 4.4
G Note: Temperature Rating 155
N

Calculation Gpm Required 168.349 Psi Required 70.916 At Test
Summary C-Factor Used: Overhead 150 Underground 140

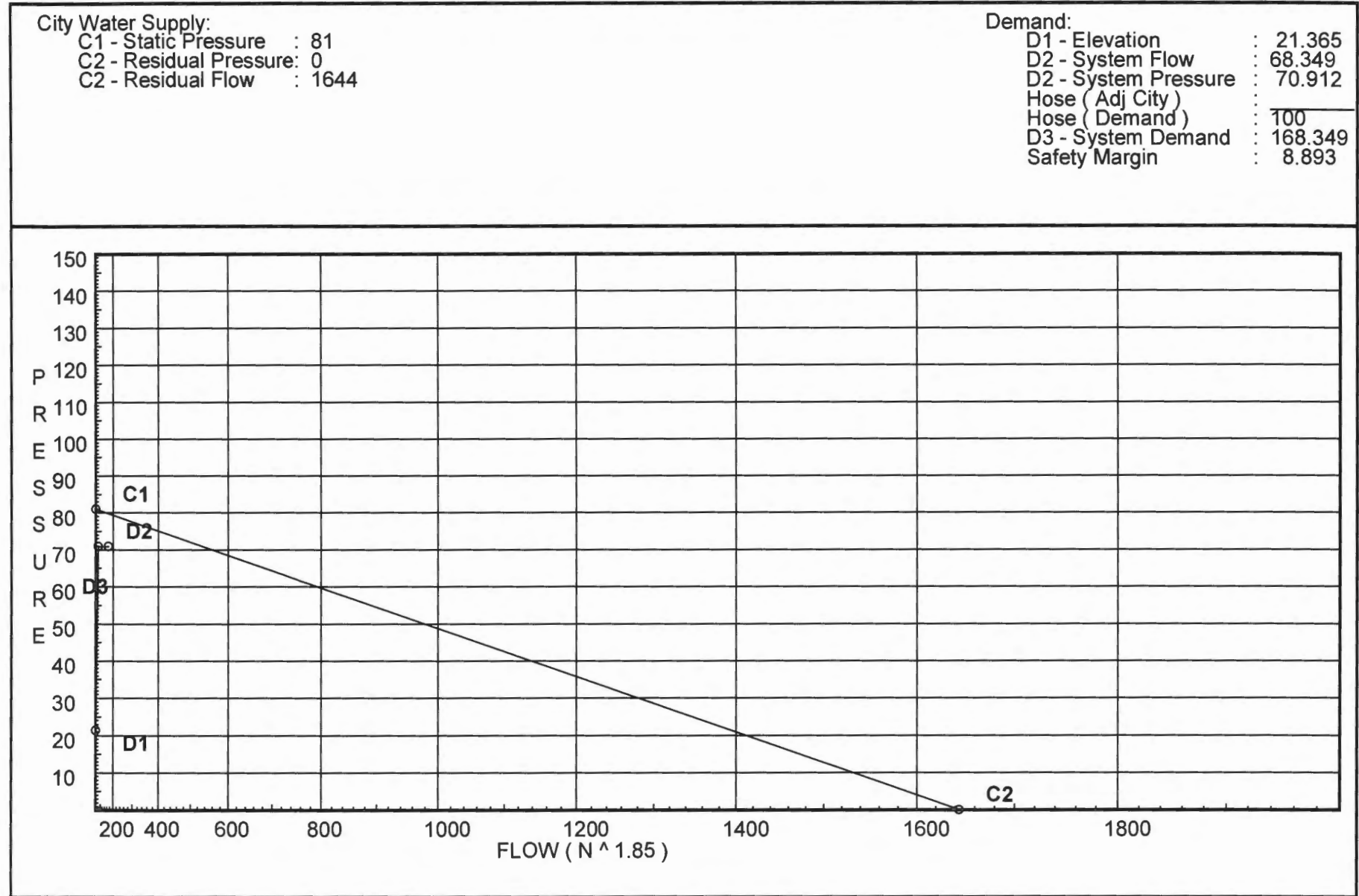
W Water Flow Test: Pump Data: Tank or Reservoir:
A Date of Test - 3/26/2008 Rated Cap. Cap.
T Time of Test - @ Psi Elev.
E Static (Psi) - 81 Elev.
R Residual (Psi) - 0 Other Well
Flow (Gpm) - 1644 Proof Flow Gpm
S Elevation - -2'-0"

P Location:
P
L Source of Information: PORTLAND WATER DISTRICT
Y

Water Supply Curve (C)

FREEDOM FIRE PROTECTION INC.
DANFORTH ON HIGH CONDOS HC2

Page 2
Date 10/24/12



Fittings Used Summary

FREEDOM FIRE PROTECTION INC.
DANFORTH ON HIGH CONDOS HC2

Page 3
Date 10/24/12

Fitting Legend		½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Abbrev.	Name																				
B	Generic Butterfly Valve	0	0	0	0	0	0	7	10	0	12	9	10	12	19	21	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

FREEDOM FIRE PROTECTION INC.
DANFORTH ON HIGH CONDOS HC2

Page 4
Date 10/24/12

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
201	49.33	4.4	15.87	na	17.53	0.1	0.001	13.2
47	49.33		16.1	na				
46	39.583		21.05	na				
202	49.33	4.4	14.04	na	16.49	0.1	0.001	13.2
49	49.33		14.24	na				
48	39.583		19.11	na				
203	49.33	4.4	13.2	na	15.99	0.1	0.001	13.2
45	49.33		13.78	na				
44	39.583		18.87	na				
43	39.583		19.44	na				
42	39.583		19.67	na				
41	39.583		21.67	na				
204	49.33	4.4	17.39	na	18.35	0.1	0.001	13.2
40	49.33		17.97	na				
39	41.583		22.45	na				
38	41.583		23.22	na				
37	41.583		25.02	na				
36	41.583		26.05	na				
35	41.583		26.97	na				
34	41.583		27.04	na				
33	41.583		34.0	na				
32	41.583		38.06	na				
31	41.583		39.14	na				
30	41.583		46.29	na				
7	31.583		51.34	na				
6	20.75		56.43	na				
5	12.25		60.67	na				
4	12.25		60.93	na				
3	9.33		62.54	na				
2	9.33		63.54	na				
1	5.42		65.28	na				
0	2.0		70.04	na				
TEST	0.0		70.91	na	100.0			

The maximum velocity is 16.85 and it occurs in the pipe between nodes 41 and 34

Final Calculations - Hazen-Williams

FREEDOM FIRE PROTECTION INC.
DANFORTH ON HIGH CONDOS HC2

Page 5
Date 10/24/12

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	***** Notes *****
201	17.53	1.101	1E	3.825	0.500	15.870	K Factor = 4.40
to		150		0.0	3.825	0.0	
47	17.53	0.0534		0.0	4.325	0.231	Vel = 5.91
47	0.0	1.101	1E	3.825	9.750	16.101	
to		150		0.0	3.825	4.221	
46	17.53	0.0533		0.0	13.575	0.724	Vel = 5.91
46	0.0	1.101	1T	9.563	2.166	21.046	
to		150		0.0	9.562	0.0	
41	17.53	0.0533		0.0	11.728	0.625	Vel = 5.91
	0.0						
	17.53					21.671	K Factor = 3.77
202	16.49	1.101	1E	3.825	0.500	14.038	K Factor = 4.40
to		150		0.0	3.825	0.0	
49	16.49	0.0476		0.0	4.325	0.206	Vel = 5.56
49	0.0	1.101	1E	3.825	9.750	14.244	
to		150		0.0	3.825	4.221	
48	16.49	0.0477		0.0	13.575	0.647	Vel = 5.56
48	0.0	1.101	1T	9.563	2.166	19.112	
to		150		0.0	9.562	0.0	
42	16.49	0.0476		0.0	11.728	0.558	Vel = 5.56
	0.0						
	16.49					19.670	K Factor = 3.72
203	15.99	1.101	3E	11.475	1.500	13.200	K Factor = 4.40
to		150		0.0	11.475	0.0	
45	15.99	0.0449		0.0	12.975	0.583	Vel = 5.39
45	0.0	1.101	1T	9.563	9.750	13.783	
to		150		0.0	9.562	4.221	
44	15.99	0.0450		0.0	19.312	0.869	Vel = 5.39
44	0.0	1.101	1T	9.563	3.000	18.873	
to		150		0.0	9.562	0.0	
43	15.99	0.0450		0.0	12.562	0.565	Vel = 5.39
43	0.0	1.101		0.0	5.166	19.438	
to		150		0.0	0.0	0.0	
42	15.99	0.0449		0.0	5.166	0.232	Vel = 5.39
42	16.48	1.101		0.0	12.000	19.670	
to		150		0.0	0.0	0.0	
41	32.47	0.1667		0.0	12.000	2.001	Vel = 10.94
41	17.53	1.101	1T	9.563	7.250	21.671	
to		150		0.0	9.562	-0.866	
34	50.0	0.3706		0.0	16.812	6.231	Vel = 16.85
	0.0						
	50.00					27.036	K Factor = 9.62

Final Calculations - Standard

FREEDOM FIRE PROTECTION INC.
DANFORTH ON HIGH CONDOS HC2

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Date 10/24/12

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	***** Notes *****
204	18.35	1.101	1T	9.563	0.500	17.391	K Factor = 4.40
to		150		0.0	9.562	0.0	
40	18.35	0.0579		0.0	10.062	0.583	Vel = 6.18
40	0.0	1.101	1T	9.563	9.750	17.974	
to		150		0.0	9.562	3.355	
39	18.35	0.0580		0.0	19.312	1.121	Vel = 6.18
39	0.0	1.101	1T	9.563	3.660	22.450	
to		150		0.0	9.562	0.0	
38	18.35	0.0580		0.0	13.222	0.767	Vel = 6.18
38	0.0	1.101	1E	3.825	27.330	23.217	
to		150		0.0	3.825	0.0	
37	18.35	0.0580		0.0	31.155	1.808	Vel = 6.18
37	0.0	1.101	1T	9.563	8.083	25.025	
to		150		0.0	9.562	0.0	
36	18.35	0.0580		0.0	17.645	1.023	Vel = 6.18
36	0.0	1.101	1T	9.563	6.330	26.048	
to		150		0.0	9.562	0.0	
35	18.35	0.0580		0.0	15.892	0.922	Vel = 6.18
35	0.0	1.598		0.0	7.000	26.970	
to		150		0.0	0.0	0.0	
34	18.35	0.0094		0.0	7.000	0.066	Vel = 2.94
34	50.00	1.598	1T	11.656	53.000	27.036	
to		150		0.0	11.656	0.0	
33	68.35	0.1077		0.0	64.656	6.964	Vel = 10.93
33	0.0	1.598	1T	11.656	26.000	34.000	
to		150		0.0	11.656	0.0	
32	68.35	0.1077		0.0	37.656	4.055	Vel = 10.93
32	0.0	1.598	1E	5.828	4.250	38.055	
to		150		0.0	5.828	0.0	
31	68.35	0.1078		0.0	10.078	1.086	Vel = 10.93
31	0.0	1.61	1T	12.089	8.583	39.141	
to		150		0.0	12.089	5.000	* Fixed loss = 5
30	68.35	0.1038		0.0	20.672	2.146	Vel = 10.77
30	0.0	2.157	1T	18.596	10.250	46.287	
to		150		0.0	18.597	4.331	
7	68.35	0.0250		0.0	28.847	0.721	Vel = 6.00
7	0.0	2.157		0.0	10.583	51.339	
to		120		0.0	0.0	4.692	
6	68.35	0.0378		0.0	10.583	0.400	Vel = 6.00
6	0.0	2.157	1E	6.153	8.500	56.431	
to		120		0.0	6.153	3.681	
5	68.35	0.0377		0.0	14.653	0.553	Vel = 6.00

Final Calculations - Standard

FREEDOM FIRE PROTECTION INC.
DANFORTH ON HIGH CONDOS HC2

Page 7
Date 10/24/12

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	***** Notes *****
5 to 4	0.0 68.35	2.157 120 0.0378	1E	6.153 0.0 0.0	0.830 6.153 6.983	60.665 0.0 0.264	Vel = 6.00
4 to 3	0.0 68.35	2.157 120 0.0377	1E	6.153 0.0 0.0	2.916 6.153 9.069	60.929 1.265 0.342	Vel = 6.00
3 to 2	0.0 68.35	2.157 120 0.0378	1E	6.153 0.0 0.0	20.330 6.153 26.483	62.536 0.0 1.000	Vel = 6.00
2 to 1	0.0 68.35	4.026 120 0.0018	1E 1B	10.0 12.0 0.0	3.166 22.000 25.166	63.536 1.693 0.046	Vel = 1.72
1 to 0	0.0 68.35	4.026 140 0.0015	1Zac	0.0 0.0 0.0	3.420 0.0 3.420	65.275 4.761 0.005	* Fixed loss = 3.28 Vel = 1.72
0 to TEST	0.0 68.35	6.16 140 0.0002		0.0 0.0 0.0	25.000 0.0 25.000	70.041 0.866 0.005	Vel = 0.74
	100.00 168.35						Qa = 100.00 K Factor = 19.99
					70.912		



... 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 HC1
Building : 81 DANFORTH STREET
Location : PORTLAND, MAINE 04101
System : #1 AREA #1
Contract :
Data File : DANFORTH ON HIGH CONDOS HC1.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 #1
Contractor - Contract No. -
Calculated By - MIKE NOBLIT Drawing No. - FP-3
Construction: (X) Combustible () Non-Combustible Ceiling Height 9'-6"
OCCUPANCY - APARTMENTS

S Type of Calculation: (X)NFPA 13 Residential (X)NFPA 13R ()NFPA 13D
Y Number of Sprinklers Flowing: ()1 ()2 (X)4 ()
S ()Other
T ()Specific Ruling Made by Date

E
M Listed Flow at Start Point - 11.1 Gpm System Type
Listed Pres. at Start Point - 7 Psi (X) Wet () Dry
D MAXIMUM LISTED SPACING 12' x 12' () Deluge () PreAction
E Domestic Flow Added - Gpm Sprinkler or Nozzle
S Additional Flow Added - 100 Gpm Make TYCO Model CC2
I Elevation at Highest Outlet - Feet Size 1/2" K-Factor 4.2
G Note: Temperature Rating 175
N

Calculation Gpm Required 160.815 Psi Required 72.822 At Test
Summary C-Factor Used: Overhead 150 Underground 140

W Water Flow Test: Pump Data: Tank or Reservoir:
A Date of Test - 3/26/2008 Rated Cap. Cap.
T Time of Test - @ Psi Elev.
E Static (Psi) - 81 Elev.
R Residual (Psi) - 0 Other Well
Flow (Gpm) - 1644 Proof Flow Gpm
S Elevation - -2'-0"

P Location:
P
L Source of Information: PORTLAND WATER DISTRICT
Y

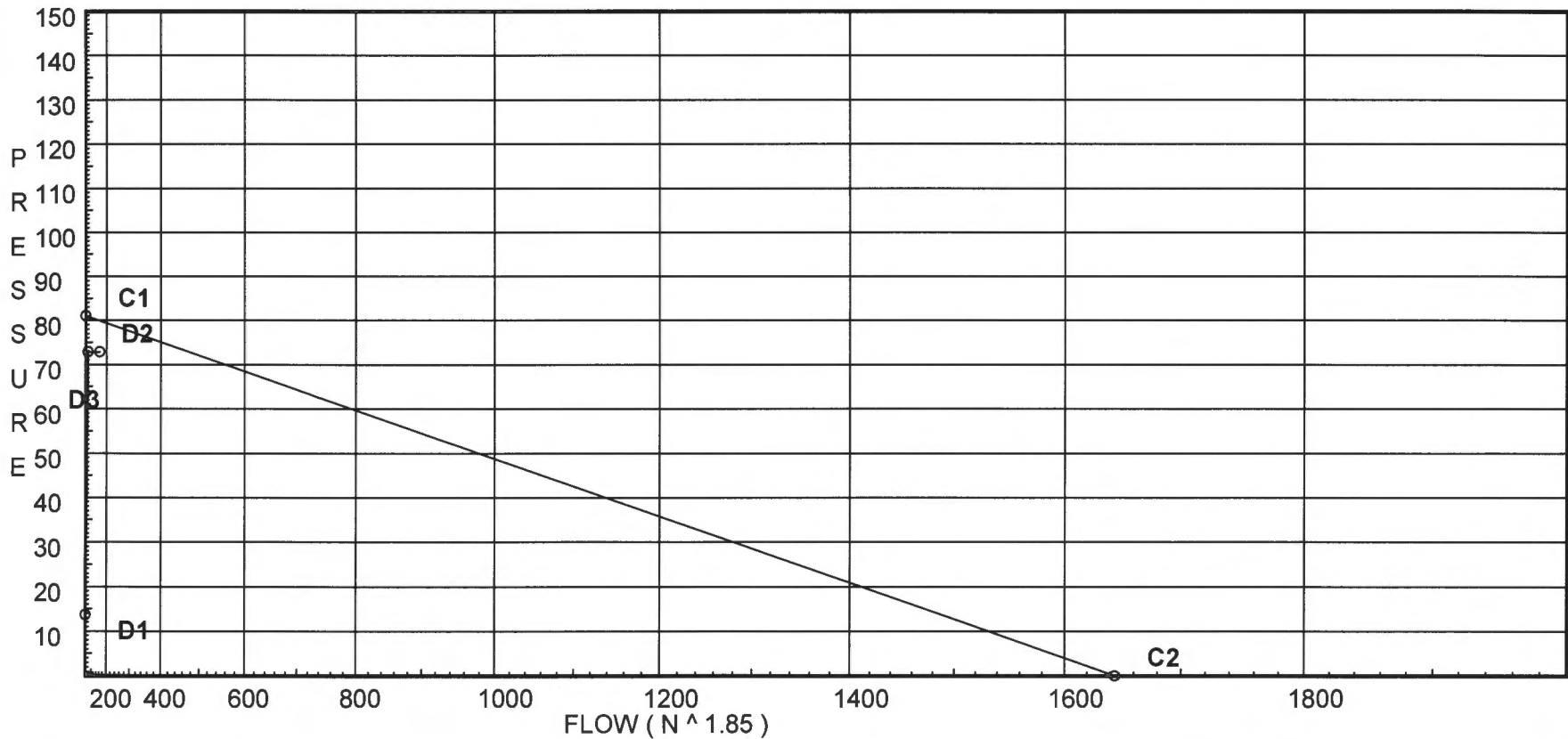
Water Supply Curve (C)

FREEDOM FIRE PROTECTION INC.
 DANFORTH ON HIGH CONDOS HC1

Page 2
 Date 10/24/12

City Water Supply:
 C1 - Static Pressure : 81
 C2 - Residual Pressure: 0
 C2 - Residual Flow : 1644

Demand:
 D1 - Elevation : 13.679
 D2 - System Flow : 60.815
 D2 - System Pressure : 72.822
 Hose (Adj City) :
 Hose (Demand) : 100
 D3 - System Demand : 160.815
 Safety Margin : 7.080



Fittings Used Summary

FREEDOM FIRE PROTECTION INC.
DANFORTH ON HIGH CONDOS HC1

Page 3
Date 10/24/12

Fitting Legend		½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Abbrev.	Name																				
B	Generic Butterfly Valve	0	0	0	0	0	0	7	10	0	12	9	10	12	19	21	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

FREEDOM FIRE PROTECTION INC.
DANFORTH ON HIGH CONDOS HC1

Page 4
Date 10/24/12

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
101	31.583	4.2	15.5	na	16.53	0.1	144	7.0
102	31.583	4.2	13.21	na	15.26	0.1	144	7.0
103	31.583	4.2	12.11	na	14.62	0.1	144	7.0
104	31.583	4.2	11.76	na	14.4	0.1	144	7.0
19	31.583		12.18	na				
18	31.583		12.55	na				
17	31.583		13.68	na				
16	31.583		15.46	na				
15	31.583		16.94	na				
14	31.583		25.85	na				
13	31.583		34.4	na				
12	31.583		36.26	na				
11	31.583		37.41	na				
10	31.583		40.3	na				
9	31.583		44.09	na				
8	31.583		46.84	na				
7	31.583		53.48	na				
6	20.75		58.49	na				
5	12.25		62.62	na				
4	12.25		62.83	na				
3	9.33		64.37	na				
2	9.33		65.18	na				
1	5.42		66.91	na				
0	2.0		71.95	na				
TEST	0.0		72.82	na	100.0			

The maximum velocity is 20.49 and it occurs in the pipe between nodes 15 and 14

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
101 to 15	16.53 16.53	1.101 150 0.0478	1T	9.563 0.0 0.0	20.500 9.562 30.062	15.498 0.0 1.438		K Factor = 4.20 Vel = 5.57	
	0.0 16.53					16.936		K Factor = 4.02	
102 to 17	15.26 15.26	1.101 150 0.0413	1T	9.563 0.0 0.0	2.000 9.562 11.562	13.205 0.0 0.477		K Factor = 4.20 Vel = 5.14	
	0.0 15.26					13.682		K Factor = 4.13	
103 to 18	14.62 14.62	1.101 150 0.0381	1T	9.563 0.0 0.0	2.000 9.562 11.562	12.114 0.0 0.440		K Factor = 4.20 Vel = 4.93	
	0.0 14.62					12.554		K Factor = 4.13	
104 to 19	14.40 14.4	1.101 150 0.0371	1T	9.563 0.0 0.0	2.000 9.562 11.562	11.755 0.0 0.429		K Factor = 4.20 Vel = 4.85	
19 to 18	0.0 14.4	1.101 150 0.0370		0.0 0.0 0.0	10.000 0.0 10.000	12.184 0.0 0.370		Vel = 4.85	
18 to 17	14.62 29.02	1.101 150 0.1354		0.0 0.0 0.0	8.330 0.0 8.330	12.554 0.0 1.128		Vel = 9.78	
17 to 16	15.26 44.28	1.101 150 0.2961	1E	3.825 0.0 0.0	2.166 3.825 5.991	13.682 0.0 1.774		Vel = 14.92	
16 to 15	0.0 44.28	1.101 150 0.2960		0.0 0.0 0.0	5.000 0.0 5.000	15.456 0.0 1.480		Vel = 14.92	
15 to 14	16.53 60.81	1.101 150 0.5325	1E	3.825 0.0 0.0	12.916 3.825 16.741	16.936 0.0 8.914		Vel = 20.49	
14 to 13	0.0 60.81	1.101 150 0.5324	1T	9.563 0.0 0.0	6.500 9.562 16.062	25.850 0.0 8.552		Vel = 20.49	
13 to 12	0.0 60.81	1.394 150 0.1687		0.0 0.0 0.0	11.000 0.0 11.000	34.402 0.0 1.856		Vel = 12.78	
12 to 11	0.0 60.81	1.394 150 0.1688		0.0 0.0 0.0	6.830 0.0 6.830	36.258 0.0 1.153		Vel = 12.78	

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	*****
11	0.0	1.394	1T	9.523	7.583	37.411			
to		150		0.0	9.523	0.0			
10	60.81	0.1687		0.0	17.106	2.886		Vel = 12.78	
10	0.0	1.598	1E	5.828	37.830	40.297			
to		150		0.0	5.828	0.0			
9	60.81	0.0868		0.0	43.658	3.789		Vel = 9.73	
9	0.0	1.598	2E	11.656	20.083	44.086			
to		150		0.0	11.656	0.0			
8	60.81	0.0868		0.0	31.739	2.754		Vel = 9.73	
8	0.0	1.682	1E	7.48	16.750	46.840			
to		150		0.0	7.479	5.000		* Fixed loss = 5	
7	60.81	0.0676		0.0	24.229	1.638		Vel = 8.78	
7	0.0	2.157		0.0	10.583	53.478			
to		120		0.0	0.0	4.692			
6	60.81	0.0303		0.0	10.583	0.321		Vel = 5.34	
6	0.0	2.157	1E	6.153	8.500	58.491			
to		120		0.0	6.153	3.681			
5	60.81	0.0304		0.0	14.653	0.446		Vel = 5.34	
5	0.0	2.157	1E	6.153	0.830	62.618			
to		120		0.0	6.153	0.0			
4	60.81	0.0305		0.0	6.983	0.213		Vel = 5.34	
4	0.0	2.157	1E	6.153	2.916	62.831			
to		120		0.0	6.153	1.265			
3	60.81	0.0304		0.0	9.069	0.276		Vel = 5.34	
3	0.0	2.157	1E	6.153	20.330	64.372			
to		120		0.0	6.153	0.0			
2	60.81	0.0304		0.0	26.483	0.805		Vel = 5.34	
2	0.0	4.026	1E	10.0	3.166	65.177			
to		120	1B	12.0	22.000	1.693			
1	60.81	0.0015		0.0	25.166	0.037		Vel = 1.53	
1	0.0	4.026	1Zac	0.0	3.420	66.907			
to		140		0.0	0.0	5.041		* Fixed loss = 3.56	
0	60.81	0.0012		0.0	3.420	0.004		Vel = 1.53	
0	0.0	6.16		0.0	25.000	71.952			
to		140		0.0	0.0	0.866			
TEST	60.81	0.0002		0.0	25.000	0.004		Vel = 0.65	
	100.00							Qa = 100.00	
	160.81				72.822			K Factor = 18.84	