Inspections Division
Date: 03/22/16

. . . Fire Protection by Computer Design

HAMPSHIRE FIRE PROTECTION
8 N. WENTWORTH AVE.
LONDONDERRY, NH 03053
603-432-8221

Job Name	:	PARK DANFORTH - 5TH FLOOR
Building	:	2016 ADDITION, 5TH FLOOR
Location	:	PORTLAND, ME
System	:	5
Contract	:	4737CME
Data File	:	PD5TH.wxf

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Hydraulic Design Information Sheet

Name - PARK DANFORTH, 5TH FLOOR Date - 2-12-15
Location - PORTLAND, ME
Building - 2016 ADDITION, 5TH FLOOR System No. - 5
Contractor - PC CONSTRUCTION Contract No. - 4737CME
Calculated By - BENOIT Drawing No. - 9
Construction: ( ) Combustible (X) Non-Combustible Ceiling Height - 8-0
Occupancy - ELDERY APARTMENTS

SYSTEM DESIGN

(X) NFPA 13 (X) Lt. Haz. Ord.Haz.Gp. ( ) 1 ( ) 2 ( ) 3 ( ) Ex.Haz.
( ) NFPA 231 ( ) NFPA 231C ( ) Figure Curve
Other
Specific Ruling Made By Date

Area of Sprinkler Operation	- 1500	System Type	Sprinkler/Nozzle
Density	- .1	(X) Wet	Make RELIABLE
Area Per Sprinkler	- 148	( ) Dry	Model F1FR
Elevation at Highest Outlet	- 61	( ) Deluge	Size 1/2
Hose Allowance - Inside	- 0	( ) Preaction	K-Factor 5.6
Rack Sprinkler Allowance	- 0	( ) Other	Temp.Rat.
Hose Allowance - Outside	- 100		

Note

Calculation Summary: Flow Required - 320.7 Press Required - 49.0 AT TEST
C-Factor Used: 120 Overhead 140 Underground

WATER SUPPLY

Water Flow Test:
Date of Test - 10-25-14
Time of Test - 10 AM
Static Press - 62
Residual Press - 60
Flow - 992
Elevation - 0

Pump Data:
Rated Cap.- 1000
@ Press - 70
Elev. - 0

Tank or Reservoir:
Cap. -
Elev.-

Well
Proof Flow

Location - SEE SITE PLAN

Source of Information - PORTLAND WATER DEPT., MEANS DIVISION

COMMODITY STORAGE

Commodity Class Location
Storage Ht. Area Aisle W.
Storage Method: Solid Piled % Palletized % Rack

( ) Single Row ( ) Conven. Pallet ( ) Auto. Storage ( ) Encap.
( ) Double Row ( ) Slave Pallet ( ) Solid Shelf ( ) Non
( ) Mult. Row ( ) Open Shelf

Flue Spacing Clearance:Storage to Ceiling
Longitudinal Transverse

Horizontal Barriers Provided:

Water Supply Curve C

HAMPSHIRE FIRE PROTECTION
PARK DANFORTH - 5TH FLOOR

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City Water Supply:
- C1 - Static Pressure : 62
- C2 - Residual Pressure: 60
- C2 - Residual Flow : 992

City Water Adjusted to Pump Inlet for Pf - Elev - Hose Flow
- A1 - Adjusted Static: 59.998
- A2 - Adj Resid : 55.899 @ 1000
- A3 - Adj Resid : 51.615 @ 1500

Pump Data:
- P1 - Pump Churn Pressure : 88.2
- P2 - Pump Rated Pressure : 70
- P2 - Pump Rated Flow : 1000
- P3 - Pump Pressure @ Max Flow : 45.5
- P3 - Pump Max Flow : 1500
- City Residual Flow @ 0 = 6348.24
- City Residual Flow @ 20 = 5143.10
- City Water @ 150% of Pump = 57.70

Demand:
- D1 - Elevation : 22.521
- D2 - System Flow : 220.694
- D2 - System Pressure : 134.273
- Hose (Demand) : _____
- D3 - System Demand : 220.694
- Hose (Adj City) : 100
- Safety Margin : 12.715

Fittings Used Summary

HAMPSHIRE FIRE PROTECTION
PARK DANFORTH - 5TH FLOOR

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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	NFPA 13 Butterfly Valve	0	0	2.25	2	2.5	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
I	90' Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
J	90'Tee-Branch Grv Vic #20	0	0	4.5	6	8	8.5	10.8	13	17	16	21	25	33	41	50	65	78	88	98	120
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Pressure / Flow Summary - STANDARD

HAMPSHIRE FIRE PROTECTION
PARK DANFORTH - 5TH FLOOR

Date 1-29-1

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
1	61.0	5.6	7.79	na	15.63	0.1	148	7.0
2	61.0	5.6	8.94	na	16.75	0.1	148	7.0
3	61.0	5.6	12.12	na	19.49	0.1	148	7.0
4	61.0	5.6	11.38	na	18.89	0.1	148	7.0
4T	61.0		12.6	na				
4U	61.0		12.84	na				
4V	61.0		15.24	na				
5	61.0	5.6	16.47	na	22.72	0.1	148	7.0
6	61.0	5.6	19.84	na	24.94	0.1	148	7.0
7	61.0	5.6	19.55	na	24.76	0.1	148	7.0
8	61.0	5.6	9.0	na	16.8	0.1	168	9.0
9	61.0	5.6	9.79	na	17.52	0.1	168	9.0
10	61.0	5.6	11.33	na	18.85	0.1	148	7.0
9T	61.0		10.56	na				
10T	61.0		12.15	na				
11	61.0	5.6	18.9	na	24.34	0.1	148	7.0
A	61.0		20.46	na				
B	61.0		20.5	na				
C	61.0		21.11	na				
D	61.0		21.48	na				
E	61.0		22.89	na				
F	61.0		58.65	na				
G	61.0		91.5	na				
5FC	61.0		106.3	na				
S3	57.0		108.07	na				
SB	17.0		126.49	na				
SE	9.0		130.49	na				
SF	9.0		130.92	na				
TOR	9.0		131.05	na				
BOR	2.0		134.17	na				
DISC	2.0		134.27	na				
SUCT	2.0		59.66	na				
BF1	2.0		59.67	na				
BF2	2.0		64.67	na				
FLG	1.0		65.12	na				
HOSE	5.0		63.44	na	100.0			
TEST	9.0		61.75	na				

The maximum velocity is 28.78 and it occurs in the pipe between nodes 11 and E

Final Calculations - Hazen-Williams

HAMPSHIRE FIRE PROTECTION
PARK DANFORTH - 5TH FLOOR

Date 1-29-1

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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 ******
1	15.63	1.049	2E	4.0	10.000	7.788		K Factor = 5.60
to		120.0		0.0	4.000	0.0		
2	15.63	0.0825		0.0	14.000	1.155		Vel = 5.80
2	16.75	1.049		0.0	10.000	8.943		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
3	32.38	0.3172		0.0	10.000	3.172		Vel = 12.02
3	19.49	1.049	T	5.0	6.000	12.115		K Factor = 5.60
to		120.0		0.0	5.000	0.0		
A	51.87	0.7585		0.0	11.000	8.344		Vel = 19.26
	0.0							
	51.87					20.459		K Factor = 11.47
4	18.89	1.049	T	5.0	5.500	11.375		K Factor = 5.60
to		120.0		0.0	5.000	0.0		
4T	18.89	0.1170		0.0	10.500	1.229		Vel = 7.01
4T	0.0	1.049		0.0	2.000	12.604		
to		120.0		0.0	0.0	0.0		
4U	18.89	0.1170		0.0	2.000	0.234		Vel = 7.01
4U	0.0	1.049	E	2.0	13.500	12.838		
to		120.0	T	5.0	7.000	0.0		
4V	18.89	0.1171		0.0	20.500	2.400		Vel = 7.01
4V	0.0	1.049		0.0	10.500	15.238		
to		120.0		0.0	0.0	0.0		
5	18.89	0.1170		0.0	10.500	1.229		Vel = 7.01
5	22.72	1.049	T	5.0	3.000	16.467		K Factor = 5.60
to		120.0		0.0	5.000	0.0		
B	41.61	0.5048		0.0	8.000	4.038		Vel = 15.45
	0.0							
	41.61					20.505		K Factor = 9.19
6	24.94	1.049	T	5.0	1.500	19.838		K Factor = 5.60
to		120.0		0.0	5.000	0.0		
C	24.94	0.1958		0.0	6.500	1.273		Vel = 9.26
	0.0							
	24.94					21.111		K Factor = 5.43
7	24.76	1.049	T	5.0	5.000	19.545		K Factor = 5.60
to		120.0		0.0	5.000	0.0		
D	24.76	0.1931		0.0	10.000	1.931		Vel = 9.19
	0.0							
	24.76					21.476		K Factor = 5.34
8	16.80	1.049	E	2.0	14.500	9.000		K Factor = 5.60
to		120.0		0.0	2.000	0.0		
9T	16.8	0.0942		0.0	16.500	1.555		Vel = 6.24
	0.0							
	16.80					10.555		K Factor = 5.17
9	17.52	1.049	T	5.0	2.500	9.791		K Factor = 5.60
to		120.0		0.0	5.000	0.0		
9T	17.52	0.1019		0.0	7.500	0.764		Vel = 6.50
	0.0							
	17.52					10.555		K Factor = 5.39

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 ******
10	18.85	1.049	T	5.0	2.000	11.329		K Factor = 5.60
to		120.0		0.0	5.000	0.0		
10T	18.85	0.1167		0.0	7.000	0.817		Vel = 7.00
	0.0							
	18.85					12.146		K Factor = 5.41
9T	34.32	1.049		0.0	4.500	10.555		
to		120.0		0.0	0.0	0.0		
10T	34.32	0.3536		0.0	4.500	1.591		Vel = 12.74
10T	18.85	1.049		0.0	8.500	12.146		
to		120.0		0.0	0.0	0.0		
11	53.17	0.7942		0.0	8.500	6.751		Vel = 19.74
11	24.35	1.049		0.0	2.500	18.897		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
E	77.52	1.5956		0.0	2.500	3.989		Vel = 28.78
	0.0							
	77.52					22.886		K Factor = 16.20
A	51.87	2.157		0.0	2.000	20.459		
to		120.0		0.0	0.0	0.0		
B	51.87	0.0230		0.0	2.000	0.046		Vel = 4.55
B	41.61	2.157		0.0	9.000	20.505		
to		120.0		0.0	0.0	0.0		
C	93.48	0.0673		0.0	9.000	0.606		Vel = 8.21
C	24.94	2.157		0.0	3.500	21.111		
to		120.0		0.0	0.0	0.0		
D	118.42	0.1043		0.0	3.500	0.365		Vel = 10.40
D	24.76	2.157		0.0	9.500	21.476		
to		120.0		0.0	0.0	0.0		
E	143.18	0.1484		0.0	9.500	1.410		Vel = 12.57
E	77.51	2.157	I	4.307	104.000	22.886		
to		120.0		0.0	4.307	0.0		
F	220.69	0.3302		0.0	108.307	35.766		Vel = 19.38
F	0.0	2.157	J	10.461	89.000	58.652		
to		120.0		0.0	10.461	0.0		
G	220.69	0.3302		0.0	99.461	32.844		Vel = 19.38
G	0.0	2.157	3I	12.922	11.000	91.496		
to		120.0	B	7.384	33.843	0.0		
5FC	220.69	0.3302	S	13.537	44.843	14.809		Vel = 19.38
5FC	0.0	4.26		0.0	3.000	106.305		
to		120.0		0.0	0.0	1.732		
S3	220.69	0.0120		0.0	3.000	0.036		Vel = 4.97
S3	0.0	4.26	I	9.217	45.000	108.073		
to		120.0	J	21.067	46.084	17.324		
SB	220.69	0.0120	B	15.8	91.084	1.094		Vel = 4.97
SB	0.0	4.26	I	9.217	14.000	126.491		
to		120.0	J	21.067	30.284	3.465		
SE	220.69	0.0120		0.0	44.284	0.531		Vel = 4.97
SE	0.0	4.26	J	21.067	15.000	130.487		
to		120.0		0.0	21.067	0.0		
SF	220.69	0.0120		0.0	36.067	0.433		Vel = 4.97

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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 ******
SF	0.0	6.357	3I	37.72	40.000	130.920		
to		120.0		0.0	37.720	0.0		
TOR	220.69	0.0017		0.0	77.720	0.133		Vel = 2.23
TOR	0.0	6.357	J	31.433	7.000	131.053		
to		120.0	B	12.573	44.006	3.032		
BOR	220.69	0.0017		0.0	51.006	0.087		Vel = 2.23
BOR	0.0	6.357	B	12.573	6.000	134.172		
to		120.0	S	40.235	52.808	0.0		
DISC	220.69	0.0017		0.0	58.808	0.101		Vel = 2.23
	0.0							
	220.69					134.273		K Factor = 19.05
System Demand Pressure						134.273		
Safety Margin						12.715		
Continuation Pressure						146.988		
Pressure @ Pump Outlet						146.988		
Pressure From Pump Curve						-87.326		
Pressure @ Pump Inlet						59.662		
SUCT	0.0	8.249	G	4.698	10.000	59.662		
to		120.0		0.0	4.698	0.0		
BF1	220.69	0.0005		0.0	14.698	0.007		Vel = 1.32
BF1	0.0	8.249		0.0	1.000	59.669		
to		120.0		0.0	0.0	5.000		* * Fixed Loss = 5
BF2	220.69	0.0010		0.0	1.000	0.001		Vel = 1.32
BF2	0.0	8.249	2I	30.537	5.000	64.670		
to		120.0		0.0	30.537	0.433		
FLG	220.69	0.0005		0.0	35.537	0.017		Vel = 1.32
FLG	0.0	8.27	T	55.354	90.000	65.120		
to		140.0	G	6.326	61.680	-1.732		
HOSE	220.69	0.0003		0.0	151.680	0.053		Vel = 1.32
HOSE	100.00	12.34	E	42.195	280.000	63.441		Qa = 100
to		140.0	T	93.767	145.339	-1.732		
TEST	320.69	0.0001	G	9.377	425.339	0.043		Vel = 0.86
	0.0							
	320.69					61.752		K Factor = 40.81