Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 06/17/15

. . . Fire Protection by Computer Design

HIGH TECH FIRE PROTECTION
84 HACKETT MILLS ROAD
P.O. BOX 156
POLAND, ME 04274
207-998-2551

Job Name	:	420 Fore Street, Wharf Level #3
Drawing	:	
Location	:	420 Fore Street Portland Maine
Remote Area	:	3
Contract	:	
Data File	:	WHARF STREET CALCS.WXF

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HYDRAULIC CALCULATIONS
for

Project name: 420 Fore Street, Wharf Level
Location: 420 Fore Street Portland Maine
Drawing no:
Date: 5/22/2015

Design

Remote area number: 3
Remote area location: Wharf Street Level
Occupancy classification: Ordinary Hazard 2
Density: .2 - Gpm/SqFt
Area of application: 930 - SqFt
Coverage per sprinkler: 100 - SqFt
Type of sprinklers calculated: Commercial
No. of sprinklers calculated: 11
In-rack demand: - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 538 - GPM @ 86 - Psi
Type of system: Wet System
Volume of dry or preaction system: 0 - Gal

Water supply information

Date: 05-11-2013
Location: Corner Of Union Street And Fore Street
Source: Portland Water District

Name of contractor: HIGH TECH FIRE PROTECTION
Address: P.O. BOX 156 / / MINOT, ME 04258
Phone number: 207-998-2551
Name of designer: Ed Pennell
Authority having jurisdiction: State of Maine / Portland Fire Department
Notes: (Include peaking information or gridded systems here.)

Water Supply Curve (C)

HIGH TECH FIRE PROTECTION
420 Fore Street, Wharf Level #3

City Water Supply:
C1 - Static Pressure : 101
C2 - Residual Pressure: 99
C2 - Residual Flow : 1342

Demand:
D1 - Ele
D2 - Sy
D2 - Sy
Hose (
D3 - Sy
Safety Margin : 14.768

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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	1				4
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	2				
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	2				1
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																		
G	NFPA 13 Gate Valve	0	0	0	0	1	1	1	1	1	2	2	3	4	5	6				3
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
V	90' Ell Firelock #001	0	0	0	0	0	3.5	4.3	5	0	6.8	8.5	10	13	0	0	0	0	0	0	0

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

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density		
W3	14.5	5.6	20.11	na	25.11	0.2		
W4	14.5	5.6	22.09	na	26.32	0.2		
W18	14.5		23.52	na				
W5	14.5	5.6	18.37	na	24.0	0.2		
W6	14.5	5.6	19.66	na	24.83	0.2	120	7.0
W7	14.5	5.6	20.55	na	25.39	0.2	120	7.0
W20	14.5		22.55	na				
W8	14.5	5.6	20.9	na	25.6	0.2	120	7.0
W9	14.5	5.6	22.96	na	26.83	0.2	120	7.0
W22	14.5		24.43	na				
W10	14.5	5.6	22.05	na	26.29	0.2	120	7.0
W11	14.5	5.6	24.21	na	27.55	0.2	120	7.0
W24	14.5		25.76	na				
W2	14.5	5.6	24.75	na	27.86	0.2	120	7.0
W17	14.5		24.76	na				
W25	14.5		24.88	na				
W19	14.5	5.6	25.0	na	28.0	0.2	120	7.0
W21	14.5		25.72	na				
W23	14.5		27.11	na				
C3	6.4		38.27	na				
C4	6.4		41.31	na				
C5	5.75		49.92	na				
C6	5.75		51.26	na				
TOR	2.0		68.11	na				
BOR	2.0		76.4	na				
H1	10.0		75.02	na				
H2	10.0		78.33	na				
H3	10.0		78.5	na				
H4	10.0		80.34	na	250.0			
TEST	0.0		85.86	na				

The maximum velocity is 16.93 and it occurs in the pipe between nodes W23 and C3

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	**
W3	25.11	1.049		0.0	10.000	20.112		K Factor = [illegible]
to		120.0		0.0	0.0	0.0		
W4	25.11	0.1983		0.0	10.000	1.983		Vel = 9.32
W4	26.33	1.38	1E	3.0	4.250	22.095		K Factor = 5.60
to		120.0		0.0	3.000	0.0		
W18	51.44	0.1964		0.0	7.250	1.424		Vel = 11.03
W18	0.0	1.38	1T	6.0	0.330	23.519		
to		120.0		0.0	6.000	0.0		
W17	51.44	0.1965		0.0	6.330	1.244		Vel = 11.03
	0.0							
	51.44					24.763		K Factor = 10.34
W5	24.00	1.049		0.0	7.100	18.367		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
W6	24.0	0.1824		0.0	7.100	1.295		Vel = 8.91
W6	24.83	1.38		0.0	5.000	19.662		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
W7	48.83	0.1784		0.0	5.000	0.892		Vel = 10.47
W7	25.39	1.38	1E	3.0	2.150	20.554		K Factor = 5.60
to		120.0		0.0	3.000	0.0		
W20	74.22	0.3872		0.0	5.150	1.994		Vel = 15.92
W20	0.0	1.38	1T	6.0	0.330	22.548		
to		120.0		0.0	6.000	0.0		
W19	74.22	0.3872		0.0	6.330	2.451		Vel = 15.92
	0.0							
	74.22					24.999		K Factor = 14.84
W8	25.60	1.049		0.0	10.000	20.902		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
W9	25.6	0.2055		0.0	10.000	2.055		Vel = 9.50
W9	26.83	1.38	1E	3.0	4.250	22.957		K Factor = 5.60
to		120.0		0.0	3.000	0.0		
W22	52.43	0.2036		0.0	7.250	1.476		Vel = 11.25
W22	0.0	1.38	1T	6.0	0.330	24.433		
to		120.0		0.0	6.000	0.0		
W21	52.43	0.2036		0.0	6.330	1.289		Vel = 11.25
	0.0							
	52.43					25.722		K Factor = 10.34
W10	26.29	1.049		0.0	10.000	22.047		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
W11	26.29	0.2159		0.0	10.000	2.159		Vel = 9.76
W11	27.56	1.38	1E	3.0	4.250	24.206		K Factor = 5.60
to		120.0		0.0	3.000	0.0		
W24	53.85	0.2138		0.0	7.250	1.550		Vel = 11.55
W24	0.0	1.38	1T	6.0	0.330	25.756		
to		120.0		0.0	6.000	0.0		
W23	53.85	0.2139		0.0	6.330	1.354		Vel = 11.55
	0.0							
	53.85					27.110		K Factor = 10.34
W2	27.86	2.635		0.0	6.000	24.746		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
W17	27.86	0.0028		0.0	6.000	0.017		Vel = 1.64

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W17	51.43	2.635		0.0	6.300	24.763		
to		120.0		0.0	0.0	0.0		
W25	79.29	0.0187		0.0	6.300	0.118		Vel = 4.66
W25	0.0	2.635		0.0	6.300	24.881		
to		120.0		0.0	0.0	0.0		
W19	79.29	0.0187		0.0	6.300	0.118		Vel = 4.66
W19	102.22	2.635		0.0	8.330	24.999		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
W21	181.51	0.0868		0.0	8.330	0.723		Vel = 10.68
W21	52.44	2.635		0.0	10.000	25.722		
to		120.0		0.0	0.0	0.0		
W23	233.95	0.1388		0.0	10.000	1.388		Vel = 13.76
W23	53.84	2.635	1T	16.474	4.660	27.110		
to		120.0	2E	16.474	32.948	3.508		
C3	287.79	0.2036		0.0	37.608	7.656		Vel = 16.93
	0.0							
	287.79					38.274		K Factor = 46.52
C3	287.79	2.635	1V	5.903	9.000	38.274		
to		120.0		0.0	5.903	0.0		
C4	287.79	0.2036		0.0	14.903	3.034		Vel = 16.93
C4	0.0	2.635	2V	11.807	29.100	41.308		
to		120.0		0.0	11.807	0.282		
C5	287.79	0.2036		0.0	40.907	8.328		Vel = 16.93
C5	0.0	2.635	1V	5.903	0.670	49.918		
to		120.0		0.0	5.903	0.0		
C6	287.79	0.2036		0.0	6.573	1.338		Vel = 16.93
C6	0.0	2.635	1V	5.903	28.100	51.256		
to		120.0	1T	16.474	31.987	4.624		* Fixed loss = 3
TOR	287.79	0.2036	1B	9.61	60.087	12.233		Vel = 16.93
			1Fsp	0.0				
TOR	0.0	2.635	1E	8.237	3.000	68.113		
to		120.0		0.0	8.237	6.000		* Fixed loss = 6
BOR	287.79	0.2036		0.0	11.237	2.288		Vel = 16.93
BOR	0.0	2.635	1E	8.237	2.000	76.401		
to		120.0		0.0	8.237	-3.465		
H1	287.79	0.2036		0.0	10.237	2.084		Vel = 16.93
H1	0.0	2.635	1E	8.237	8.000	75.020		
to		120.0		0.0	8.237	0.0		
H2	287.79	0.2036		0.0	16.237	3.306		Vel = 16.93
H2	0.0	6.14	1T	22.732	15.000	78.326		
to		100.0		0.0	22.732	0.0		
H3	287.79	0.0046		0.0	37.732	0.175		Vel = 3.12
H3	0.0	6.14	1T	22.732	375.000	78.501		
to		100.0		0.0	22.732	0.0		
H4	287.79	0.0046		0.0	397.732	1.843		Vel = 3.12
H4	250.00	6.14	1E	10.608	45.000	80.344		Qa = 250
to		100.0	1G	2.273	35.613	4.331		
TEST	537.79	0.0147	1T	22.732	80.613	1.189		Vel = 5.83

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	0.0							
	537.79					85.864		K Factor = 58.04