Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 05/02/17

. . . 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	:	Brick South Catering Area #2
Drawing	:	FP-02 REVISED
Location	:	Thompsons Point
Remote Area	:	#2
Contract	:	
Data File	:	Catering area 2 REVISED NOT STEEL PROTECTION.WXF

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HYDRAULIC CALCULATIONS
for

Project name: Brick South Catering Area #2
Location: Thompsons Point
Drawing no: FP-02 REVISED
Date: 1-16-17

Design

Remote area number: #2
Remote area location: Catering Area
Occupancy classification: Ordinary Hazard 1
Density: .15 - Gpm/SqFt
Area of application: 1500 - SqFt
Coverage per sprinkler: 120 - SqFt
Type of sprinklers calculated: quick response pendent
No. of sprinklers calculated: 15
In-rack demand: n/a - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 565 - GPM @ 73 - Psi
Type of system: Wet System
Volume of dry or preaction system: n/a - Gal

Water supply information

Date: 9-13-15
Location: Sewall Road
Source: Portland Water District

Name of contractor: HIGH TECH FIRE PROTECTION
Address: 84 HACKETT MILLS ROAD / P.O. BOX 156 / POLAND, ME 04274
Phone number: 207-998-2551
Name of designer: Ed Poulin
Authority having jurisdiction: State of Maine / City of Portland
Notes: (Include peaking information or gridded systems here.)

Water Supply Curve (C)

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City Water Supply:
- C1 - Static Pressure : 98
- C2 - Residual Pressure: 92
- C2 - Residual Flow : 1519

Demand:
- D1 - Elevation : 13.426
- D2 - System Flow : 314.592
- D2 - System Pressure : 72.667
- Hose (Demand) : 250
- D3 - System Demand : 564.592
- Safety Margin : 24.371

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			
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
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	7	8	10	11	13
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	3.5	3.5	4.3	5	0	6.8	8.5	10	13	0	0	0	0	0	0	0
X	90'Tee-BranchFirelock002	0	0	0	0	8	8.5	10.8	13	0	16	21	25	33	0	0	0	0	0	0	0
Zib	Wilkins 350A	Fitting generates a Fixed Loss Based on Flow																			

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	Area	
DP1	-1.0	5.6	10.33	na	18.0	0.15	120	7.0
DP2	-1.0	5.6	10.33	na	18.0	0.15	120	7.0
100	12.0	K = K @ EQ01	10.22	na	18.0			
101	12.0	K = K @ EQ01	10.82	na	18.52			
102	12.0		11.61	na				
103	12.0	K = K @ EQ02	12.04	na	19.24			
104	12.0	K = K @ EQ02	12.91	na	19.92			
105	12.0	K = K @ EQ02	14.44	na	21.07			
106	12.0	K = K @ EQ02	16.85	na	22.76			
110	12.0	K = K @ EQ02	11.51	na	18.81			
111	12.0	K = K @ EQ02	11.63	na	18.91			
112	12.0	K = K @ EQ01	10.91	na	18.6			
113	12.0		12.61	na				
114	12.0	K = K @ EQ02	12.97	na	19.96			
115	12.0	K = K @ EQ02	14.52	na	21.13			
116	12.0	K = K @ EQ02	16.96	na	22.83			
120	12.0	K = K @ EQ02	19.89	na	24.73			
121	12.0	K = K @ EQ02	20.08	na	24.85			
122	12.0	K = K @ EQ02	20.78	na	25.27			
107	12.0		22.45	na				
117	12.0		22.62	na				
123	12.0		23.14	na				
124	12.0		32.52	na				
125	37.0		24.39	na				
126	37.0		35.81	na				
127	20.0		46.03	na				
TOR	20.0		46.68	na				
FLW	7.0		55.64	na				
BOR	0.0		62.5	na				
BASE	0.0		63.47	na				
HOSE	0.0		63.86	na	250.0			
TEST	-19.0		72.67	na				

The maximum velocity is 17.36 and it occurs in the pipe between nodes 116 and 117

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	******* Note
DP1	18.00	1.049	1E	2.0	1.000	10.332		K Factor = 5.60
to		120.0		0.0	2.000	-0.433		
EQ01	18.0	0.1070		0.0	3.000	0.321		Vel = 6.68
	0.0							
	18.00					10.220		K Factor = 5.63
DP2	18.00	1.049	1T	5.0	1.000	10.332		K Factor = 5.60
to		120.0		0.0	5.000	-0.433		
EQ02	18.0	0.1070		0.0	6.000	0.642		Vel = 6.68
	0.0							
	18.00					10.541		K Factor = 5.54
100	18.00	1.049	1T	5.0	8.000	10.220		K Factor @ node EQ01
to		120.0		0.0	5.000	0.0		
102	18.0	0.1071		0.0	13.000	1.392		Vel = 6.68
	0.0							
	18.00					11.612		K Factor = 5.28
101	18.52	1.049	1T	5.0	2.000	10.822		K Factor @ node EQ01
to		120.0		0.0	5.000	0.0		
102	18.52	0.1129		0.0	7.000	0.790		Vel = 6.88
102	18.00	1.682		0.0	10.800	11.612		
to		120.0		0.0	0.0	0.0		
103	36.52	0.0398		0.0	10.800	0.430		Vel = 5.27
103	19.24	1.682		0.0	10.000	12.042		K Factor @ node EQ02
to		120.0		0.0	0.0	0.0		
104	55.76	0.0870		0.0	10.000	0.870		Vel = 8.05
104	19.92	1.682		0.0	10.000	12.912		K Factor @ node EQ02
to		120.0		0.0	0.0	0.0		
105	75.68	0.1531		0.0	10.000	1.531		Vel = 10.93
105	21.07	1.682		0.0	10.000	14.443		K Factor @ node EQ02
to		120.0		0.0	0.0	0.0		
106	96.75	0.2412		0.0	10.000	2.412		Vel = 13.97
106	22.76	1.682	1T	9.9	5.800	16.855		K Factor @ node EQ02
to		120.0		0.0	9.900	0.0		
107	119.51	0.3565		0.0	15.700	5.597		Vel = 17.26
	0.0							
	119.51					22.452		K Factor = 25.22
110	18.81	1.682		0.0	10.800	11.506		K Factor @ node EQ02
to		120.0		0.0	0.0	0.0		
111	18.81	0.0117		0.0	10.800	0.126		Vel = 2.72
111	18.90	1.682	1V	4.331	9.000	11.632		K Factor @ node EQ02
to		120.0	1X	9.9	14.231	0.0		
113	37.71	0.0422		0.0	23.231	0.981		Vel = 5.44
	0.0							
	37.71					12.613		K Factor = 10.62
112	18.60	1.049	1E	2.0	8.000	10.907		K Factor @ node EQ01
to		120.0	1T	5.0	7.000	0.0		
113	18.6	0.1137		0.0	15.000	1.706		Vel = 6.90
113	37.71	1.682		0.0	4.000	12.613		
to		120.0		0.0	0.0	0.0		
114	56.31	0.0885		0.0	4.000	0.354		Vel = 8.13

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114	19.96	1.682		0.0	10.000	12.967		K Factor @ node EQ02
to		120.0		0.0	0.0	0.0		
115	76.27	0.1554		0.0	10.000	1.554		Vel = 11.01
115	21.13	1.682		0.0	10.000	14.521		K Factor @ node EQ02
to		120.0		0.0	0.0	0.0		
116	97.4	0.2441		0.0	10.000	2.441		Vel = 14.06
116	22.83	1.682	1T	9.9	5.800	16.962		K Factor @ node EQ02
to		120.0		0.0	9.900	0.0		
117	120.23	0.3606		0.0	15.700	5.661		Vel = 17.36
	0.0							
	120.23					22.623		K Factor = 25.28
120	24.73	1.682		0.0	10.000	19.890		K Factor @ node EQ02
to		120.0		0.0	0.0	0.0		
121	24.73	0.0193		0.0	10.000	0.193		Vel = 3.57
121	24.84	1.682		0.0	10.000	20.083		K Factor @ node EQ02
to		120.0		0.0	0.0	0.0		
122	49.57	0.0700		0.0	10.000	0.700		Vel = 7.16
122	25.27	1.682	1T	9.9	5.800	20.783		K Factor @ node EQ02
to		120.0		0.0	9.900	0.0		
123	74.84	0.1500		0.0	15.700	2.355		Vel = 10.81
	0.0							
	74.84					23.138		K Factor = 15.56
107	119.51	3.26		0.0	12.000	22.452		
to		120.0		0.0	0.0	0.0		
117	119.51	0.0142		0.0	12.000	0.171		Vel = 4.59
117	120.24	3.26		0.0	10.000	22.623		
to		120.0		0.0	0.0	0.0		
123	239.75	0.0515		0.0	10.000	0.515		Vel = 9.22
123	74.84	3.26	3V	20.159	90.000	23.138		
to		120.0		0.0	20.159	0.0		
124	314.59	0.0851		0.0	110.159	9.378		Vel = 12.09
124	0.0	3.26	1V	6.72	25.000	32.516		
to		120.0		0.0	6.720	-10.828		
125	314.59	0.0852		0.0	31.720	2.701		Vel = 12.09
125	0.0	3.26	1X	17.471	110.000	24.389		
to		120.0	1V	6.72	24.191	0.0		
126	314.59	0.0851		0.0	134.191	11.425		Vel = 12.09
126	0.0	3.26	1X	17.471	16.000	35.814		
to		120.0		0.0	17.471	7.363		
127	314.59	0.0851		0.0	33.471	2.849		Vel = 12.09
127	0.0	3.26	1V	6.72	1.000	46.026		
to		120.0		0.0	6.720	0.0		
TOR	314.59	0.0851		0.0	7.720	0.657		Vel = 12.09
TOR	0.0	4.26	1Fsp	0.0	14.000	46.683		
to		120.0		0.0	0.0	8.630		* Fixed loss = 3
FLW	314.59	0.0232		0.0	14.000	0.325		Vel = 7.08
FLW	0.0	4.26	1Zib	0.0	5.000	55.638		
to		120.0		0.0	0.0	6.744		* Fixed loss = 3.713
BOR	314.59	0.0232		0.0	5.000	0.116		Vel = 7.08

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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	*******	Note
BOR	0.0	6.16	1G	4.304	250.000	62.498			
to		140.0	2E	40.168	87.509	0.0			
BASE	314.59	0.0029	1T	43.037	337.509	0.974		Vel = 3.39	
BASE	0.0	8.27		0.0	560.000	63.472			
to		140.0		0.0	0.0	0.0			
HOSE	314.59	0.0007		0.0	560.000	0.385		Vel = 1.88	
HOSE	250.00	12.46	1G	5.275	1050.000	63.857		Qa = 250	
to		100.0	1E	23.735	81.754	8.229			
TEST	564.59	0.0005	1T	52.745	1131.754	0.581		Vel = 1.49	
	0.0								
	564.59					72.667		K Factor = 66.23	