Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 08/01/13

. . . Fire Protection by Computer Design

Hampshire Fire Protection
8 N Wentworth Ave
Londonderry, NH 03053
603-432-8221

Job Name	:	Courtyard by Marriott Area #2 Calc Porte Cochere
Building	:	2 of 8
Location	:	Portland ME
System	:	Area #2
Contract	:	4396CME
Data File	:	1st Floor Area #2 Porte Cochere Calc.WXF

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HYDRAULIC CALCULATIONS
for

Project name: Courtyard by Marriott
Location: Portland ME
Drawing no: 2 of 8
Date: 6-5-13

Design

Remote area number: Area #2
Remote area location: 1st Floor Porte Cochere
Occupancy classification: Ordinary Hazard I
Density: .15 - Gpm/SqFt
Area of application: 932 - SqFt
Coverage per sprinkler: Varies - SqFt
Type of sprinklers calculated: QR Recessed Dry Pendent
No. of sprinklers calculated: 9
In-rack demand: - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 454.76 - GPM @ 83.34 - Psi
Type of system: Wet
Volume of dry or preaction system: N/A - Gal

Water supply information

Date: 5-11-13
Location: Commercial St & Maple St
Source: Portland Water

Name of contractor: Hampshire Fire
Address: N Wentworth Ave Londonderry NH 03053
Phone number: 603-432-8221
Name of designer: E Vance Wooten
Authority having jurisdiction: Portland
Notes: (Include peaking information or gridded systems here.) Area reduced for QR Sprinklers and ceiling height 0f 11'-5"

Water Supply Curve C

Hampshire Fire Protection
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City Water Supply:
C1 - Static Pressure : 108
C2 - Residual Pressure: 102
C2 - Residual Flow : 1537

Demand:
D1 - Ele
D2 - Sys
D2 - Sys
Hose (I
D3 - Sys
Safety Margin : 24.027

RESURGAM CITY OF PORTLAND, MAINE
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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
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6				3
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	6				
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
X	90'Tee-BranchFirelock002	0	0	0	0	0	8.5	10.8	13	0	16	21	25	33	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		
201	11.42	5.6	11.26	na	18.79	0.15		
202	11.42	5.6	12.02	na	19.41	0.15		
203	11.42	5.6	15.45	na	22.01	0.15		
204	11.42	5.6	23.42	na	27.1	0.15		
205	11.42	5.6	11.37	na	18.88	0.15	106.25	7.0
206	11.42	5.6	12.13	na	19.5	0.15	130	7.0
207	11.42	5.6	15.58	na	22.11	0.15	130	7.0
208	11.42	5.6	23.63	na	27.22	0.15	130	7.0
209	11.42	5.6	28.19	na	29.73	0.15	130	7.0
221	11.83		12.19	na				
222	11.83		13.01	na				
223	11.83		16.74	na				
224	11.83		25.41	na				
225	11.83		12.3	na				
226	11.83		13.13	na				
227	11.83		16.9	na				
228	11.83		25.64	na				
229	11.83		29.64	na				
230	11.83		29.27	na				
231	11.83		29.53	na				
232	11.83		30.85	na				
132	12.67		60.34	na				
1FL	11.67		72.21	na	100.0			
TOR	11.67		72.25	na				
BOR	2.0		76.57	na				
SPG	2.0		81.61	na				
TEST	0.0		83.34	na	150.0			

The maximum velocity is 22.46 and it occurs in the pipe between nodes 227 and 228

Final Calculations - Hazen-Williams - 2007

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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	**
201	18.79	1.049	1E	2.0	2.500	11.263		K Factor = 5.60
to		120.0	1T	5.0	7.000	-0.178		
221	18.79	0.1160		0.0	9.500	1.102		Vel = 6.98
	0.0							
	18.79					12.187		K Factor = 5.38
202	19.41	1.049	1E	2.0	2.500	12.016		K Factor = 5.60
to		120.0	1T	5.0	7.000	-0.178		
222	19.41	0.1232		0.0	9.500	1.170		Vel = 7.21
	0.0							
	19.41					13.008		K Factor = 5.38
203	22.01	1.049	1E	2.0	2.500	15.446		K Factor = 5.60
to		120.0	1T	5.0	7.000	-0.178		
223	22.01	0.1555		0.0	9.500	1.477		Vel = 8.17
	0.0							
	22.01					16.745		K Factor = 5.38
204	27.10	1.049	1E	2.0	2.500	23.422		K Factor = 5.60
to		120.0	1T	5.0	7.000	-0.178		
224	27.1	0.2283		0.0	9.500	2.169		Vel = 10.06
	0.0							
	27.10					25.413		K Factor = 5.38
205	18.88	1.049	1E	2.0	2.500	11.366		K Factor = 5.60
to		120.0	1T	5.0	7.000	-0.178		
225	18.88	0.1169		0.0	9.500	1.111		Vel = 7.01
	0.0							
	18.88					12.299		K Factor = 5.38
206	19.50	1.049	1E	2.0	2.500	12.125		K Factor = 5.60
to		120.0	1T	5.0	7.000	-0.178		
226	19.5	0.1242		0.0	9.500	1.180		Vel = 7.24
	0.0							
	19.50					13.127		K Factor = 5.38
207	22.11	1.049	1E	2.0	2.500	15.585		K Factor = 5.60
to		120.0	1T	5.0	7.000	-0.178		
227	22.11	0.1566		0.0	9.500	1.488		Vel = 8.21
	0.0							
	22.11					16.895		K Factor = 5.38
208	27.22	1.049	1E	2.0	2.500	23.627		K Factor = 5.60
to		120.0	1T	5.0	7.000	-0.178		
228	27.22	0.2302		0.0	9.500	2.187		Vel = 10.10
	0.0							
	27.22					25.636		K Factor = 5.38
209	29.73	1.049	1T	5.0	1.000	28.189		K Factor = 5.60
to		120.0		0.0	5.000	-0.178		
229	29.73	0.2710		0.0	6.000	1.626		Vel = 11.04
	0.0							
	29.73					29.637		K Factor = 5.46
221	18.79	1.049		0.0	7.080	12.187		
to		120.0		0.0	0.0	0.0		
222	18.79	0.1160		0.0	7.080	0.821		Vel = 6.98

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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	**
222	19.42	1.049		0.0	8.670	13.008		
to		120.0		0.0	0.0	0.0		
223	38.21	0.4310		0.0	8.670	3.737		Vel = 14.18
223	22.00	1.049		0.0	8.670	16.745		
to		120.0		0.0	0.0	0.0		
224	60.21	0.9998		0.0	8.670	8.668		Vel = 22.35
224	27.11	1.38	1T	6.0	1.380	25.413		
to		120.0		0.0	6.000	0.0		
230	87.32	0.5230		0.0	7.380	3.860		Vel = 18.73
	0.0							
	87.32					29.273		K Factor = 16.14
225	18.88	1.049		0.0	7.080	12.299		
to		120.0		0.0	0.0	0.0		
226	18.88	0.1169		0.0	7.080	0.828		Vel = 7.01
226	19.50	1.049		0.0	8.670	13.127		
to		120.0		0.0	0.0	0.0		
227	38.38	0.4346		0.0	8.670	3.768		Vel = 14.25
227	22.11	1.049		0.0	8.670	16.895		
to		120.0		0.0	0.0	0.0		
228	60.49	1.0082		0.0	8.670	8.741		Vel = 22.46
228	27.22	1.38	1T	6.0	1.380	25.636		
to		120.0		0.0	6.000	0.0		
231	87.71	0.5274		0.0	7.380	3.892		Vel = 18.81
	0.0							
	87.71					29.528		K Factor = 16.14
229	29.73	1.38	1E	3.0	8.000	29.637		
to		120.0	1T	6.0	9.000	0.0		
232	29.73	0.0713		0.0	17.000	1.212		Vel = 6.38
	0.0							
	29.73					30.849		K Factor = 5.35
230	87.32	2.635		0.0	11.380	29.273		
to		120.0		0.0	0.0	0.0		
231	87.32	0.0224		0.0	11.380	0.255		Vel = 5.14
231	87.70	2.635	1V	5.903	10.380	29.528		
to		120.0		0.0	5.903	0.0		
232	175.02	0.0811		0.0	16.283	1.321		Vel = 10.30
232	29.74	2.635	3V	17.71	213.130	30.849		
to		120.0	3X	44.48	62.190	-0.364		
132	204.76	0.1085		0.0	275.320	29.859		Vel = 12.05
132	0.0	2.635	3V	17.71	42.380	60.344		
to		120.0	1T	16.474	63.014	0.433		
1FL	204.76	0.1085	1S	19.22	105.394	11.430		Vel = 12.05
			1B	9.61				
1FL	100.00	6.357	1V	12.573	1.540	72.207		Qa = 100
to		120.0		0.0	12.573	0.0		
TOR	304.76	0.0031		0.0	14.113	0.044		Vel = 3.08
TOR	0.0	6.357	1X	31.433	9.670	72.251		
to		120.0		0.0	31.433	4.188		
BOR	304.76	0.0031		0.0	41.103	0.128		Vel = 3.08

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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	**
BOR	0.0	6.357	1V	12.573	2.000	76.567		
to		120.0		0.0	12.573	5.000		* * Fixed Loss = 5
SPG	304.76	0.0031		0.0	14.573	0.045		Vel = 3.08
SPG	0.0	6.16	3E	60.252	210.000	81.612		
to		140.0	1T	43.037	107.593	0.866		
TEST	304.76	0.0027	1G	4.304	317.593	0.865		Vel = 3.28
	150.00							Qa = 150.00
	454.76					83.343		K Factor = 49.81