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 #5 Calc 5th Floor Guestroom
Building	:	6 of 8
Location	:	Portland ME
System	:	Area #5
Contract	:	4396CME
Data File	:	5th Floor Area #5 Guest Room Calc.WXF

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HYDRAULIC CALCULATIONS
for

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

Design

Remote area number: Area #5
Remote area location: 5th Floor Guest Room
Occupancy classification: Light Hazard
Density: .10 - Gpm/SqFt
Area of application: Room Design - SqFt
Coverage per sprinkler: Varies - SqFt
Type of sprinklers calculated: QR Recessed Pendent
No. of sprinklers calculated: 4
In-rack demand: - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 173.75 - GPM @ 81.79 - 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.) Room design method with sprinklers in remote room plus sprinklers in adjoining rooms not protected by self closing fire rated doors.

Water Supply Curve C

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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 : 26.103

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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
501	52.0	4.2	16.38	na	17.0	0.1
502	52.0	4.2	17.15	na	17.4	0.1
503	52.0	4.2	21.79	na	19.6	0.1
504	52.0	4.2	22.1	na	19.75	0.1
521	52.75		16.32	na		
522	52.75		17.41	na		
523	52.75		22.72	na		
524	52.75		23.84	na		
626	52.75		39.11	na		
622	52.75		39.44	na		
623	52.75		40.09	na		
624	52.75		40.58	na		
627	52.75		41.06	na		
628	52.75		43.42	na		
5FL	52.25		53.83	na		
4FL	42.25		58.18	na		
3FL	32.25		62.53	na		
2FL	22.25		66.87	na		
ST03	11.67		71.51	na		
ST02	11.67		71.53	na		
1FL	11.67		71.53	na	50.0	
TOR	11.67		71.54	na		
BOR	2.0		75.75	na		
SPG	2.0		80.76	na		
TEST	0.0		81.79	na	50.0	

The maximum velocity is 27.38 and it occurs in the pipe between nodes 524 and 626

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	**
501	17.00	1.049	1E	2.0	0.750	16.383		K [illegible]
to		120.0		0.0	2.000	-0.325		
521	17.0	0.0964		0.0	2.750	0.265		Vel = 6.31
	0.0							
	17.00					16.323		K Factor = 4.21
502	17.40	1.049	1T	5.0	0.750	17.154		K Factor = 4.20
to		120.0		0.0	5.000	-0.325		
522	17.4	0.1005		0.0	5.750	0.578		Vel = 6.46
	0.0							
	17.40					17.407		K Factor = 4.17
503	19.60	1.049	1E	2.0	3.000	21.786		K Factor = 4.20
to		120.0	1T	5.0	7.000	-0.325		
523	19.6	0.1254		0.0	10.000	1.254		Vel = 7.28
	0.0							
	19.60					22.715		K Factor = 4.11
504	19.75	1.049	2E	4.0	7.210	22.104		K Factor = 4.20
to		120.0	1T	5.0	9.000	-0.325		
524	19.75	0.1271		0.0	16.210	2.060		Vel = 7.33
	0.0							
	19.75					23.839		K Factor = 4.05
521	17.00	1.049		0.0	11.250	16.323		
to		120.0		0.0	0.0	0.0		
522	17.0	0.0964		0.0	11.250	1.084		Vel = 6.31
522	17.40	1.049	2E	4.0	10.960	17.407		
to		120.0		0.0	4.000	0.0		
523	34.4	0.3548		0.0	14.960	5.308		Vel = 12.77
523	19.60	1.049		0.0	1.375	22.715		
to		120.0		0.0	0.0	0.0		
524	54.0	0.8175		0.0	1.375	1.124		Vel = 20.05
524	19.75	1.049	1T	5.0	5.500	23.839		
to		120.0		0.0	5.000	0.0		
626	73.75	1.4548		0.0	10.500	15.275		Vel = 27.38
626	0.0	2.157		0.0	7.580	39.114		
to		120.0		0.0	0.0	0.0		
622	73.75	0.0434		0.0	7.580	0.329		Vel = 6.48
622	0.0	2.157		0.0	14.880	39.443		
to		120.0		0.0	0.0	0.0		
623	73.75	0.0435		0.0	14.880	0.647		Vel = 6.48
623	0.0	2.157		0.0	11.250	40.090		
to		120.0		0.0	0.0	0.0		
624	73.75	0.0435		0.0	11.250	0.489		Vel = 6.48
624	0.0	2.157		0.0	11.170	40.579		
to		120.0		0.0	0.0	0.0		
627	73.75	0.0434		0.0	11.170	0.485		Vel = 6.48
627	0.0	2.157	1V	4.307	49.960	41.064		
to		120.0		0.0	4.307	0.0		
628	73.75	0.0435		0.0	54.267	2.359		Vel = 6.48
628	0.0	2.157	4V	17.229	173.630	43.423		
to		120.0	1X	10.461	60.918	0.217		
5FL	73.75	0.0435	1T	12.307	234.548	10.193		Vel = 6.48

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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	**
			1S	13.537				
			1B	7.384				
5FL	0.0	4.26		0.0	10.000	53.833		
to		120.0		0.0	0.0	4.331		
4FL	73.75	0.0016		0.0	10.000	0.016		Vel = 1.66
4FL	0.0	4.26		0.0	10.000	58.180		
to		120.0		0.0	0.0	4.331		
3FL	73.75	0.0016		0.0	10.000	0.016		Vel = 1.66
3FL	0.0	4.26		0.0	10.000	62.527		
to		120.0		0.0	0.0	4.331		
2FL	73.75	0.0016		0.0	10.000	0.016		Vel = 1.66
2FL	0.0	4.26	2V	17.907	19.500	66.874		
to		120.0		0.0	17.907	4.582		
ST03	73.75	0.0016		0.0	37.407	0.059		Vel = 1.66
ST03	0.0	6.357	1X	31.433	9.500	71.515		
to		120.0	1B	12.573	44.006	0.0		
ST02	73.75	0.0002		0.0	53.506	0.012		Vel = 0.75
ST02	0.0	6.357		0.0	24.790	71.527		
to		120.0		0.0	0.0	0.0		
1FL	73.75	0.0002		0.0	24.790	0.005		Vel = 0.75
1FL	49.99	6.357	1V	12.573	1.540	71.532		Qa = 50
to		120.0		0.0	12.573	0.0		
TOR	123.74	0.0006		0.0	14.113	0.009		Vel = 1.25
TOR	0.0	6.357	1X	31.433	9.670	71.541		
to		120.0		0.0	31.433	4.188		
BOR	123.74	0.0006		0.0	41.103	0.024		Vel = 1.25
BOR	0.0	6.357	1V	12.573	2.000	75.753		
to		120.0		0.0	12.573	5.000		* * Fixed Loss = 5
SPG	123.74	0.0006		0.0	14.573	0.009		Vel = 1.25
SPG	0.0	6.16	3E	60.252	210.000	80.762		
to		140.0	1T	43.037	107.593	0.866		
TEST	123.74	0.0005	1G	4.304	317.593	0.163		Vel = 1.33
	50.00							Qa = 50.00
	173.74					81.791		K Factor = 19.21