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 #4 Calc 5th Floor Guestroom
Building	:	6 of 8
Location	:	Portland ME
System	:	Area #4
Contract	:	4396CME
Data File	:	5th Floor Area #4 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 #4
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: 3
In-rack demand: - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 187.30 - GPM @ 90.03 - 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 : 17.852

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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
401	52.0	8	25.0	na	40.0	0.1
402	52.0	4.2	32.04	na	23.77	0.1
403	52.0	4.2	31.38	na	23.53	0.1
421	52.75		28.33	na		
422	52.75		33.57	na		
423	52.75		33.97	na		
626	52.75		41.95	na		
622	52.75		42.4	na		
623	52.75		43.28	na		
624	52.75		43.95	na		
627	52.75		44.61	na		
628	52.75		47.83	na		
5FL	52.25		61.98	na		
4FL	42.25		66.33	na		
3FL	32.25		70.68	na		
2FL	22.25		75.04	na		
ST03	11.67		79.7	na		
ST02	11.67		79.72	na		
1FL	11.67		79.72	na	50.0	
TOR	11.67		79.73	na		
BOR	2.0		83.95	na		
SPG	2.0		88.96	na		
TEST	0.0		90.03	na	50.0	

The maximum velocity is 18.73 and it occurs in the pipe between nodes 423 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	**
401	40.00	1.049	2E	4.0	3.790	25.000		K [illegible]
to		120.0		0.0	4.000	-0.325		
421	40.0	0.4692		0.0	7.790	3.655		Vel = 14.85
	0.0							
	40.00					28.330		K Factor = 7.52
402	23.78	1.049	1T	5.0	3.330	32.044		K Factor = 4.20
to		120.0	1E	2.0	7.000	-0.325		
422	23.78	0.1792		0.0	10.330	1.851		Vel = 8.83
	0.0							
	23.78					33.570		K Factor = 4.10
403	23.53	1.049	2E	4.0	7.630	31.376		K Factor = 4.20
to		120.0	1T	5.0	9.000	-0.325		
423	23.53	0.1757		0.0	16.630	2.922		Vel = 8.73
	0.0							
	23.53					33.973		K Factor = 4.04
421	40.00	1.049		0.0	11.170	28.330		
to		120.0		0.0	0.0	0.0		
422	40.0	0.4691		0.0	11.170	5.240		Vel = 14.85
422	23.78	1.38		0.0	1.380	33.570		
to		120.0		0.0	0.0	0.0		
423	63.78	0.2920		0.0	1.380	0.403		Vel = 13.68
423	23.52	1.38	1T	6.0	9.250	33.973		
to		120.0		0.0	6.000	0.0		
626	87.3	0.5228		0.0	15.250	7.973		Vel = 18.73
626	0.0	2.157		0.0	7.580	41.946		
to		120.0		0.0	0.0	0.0		
622	87.3	0.0594		0.0	7.580	0.450		Vel = 7.66
622	0.0	2.157		0.0	14.880	42.396		
to		120.0		0.0	0.0	0.0		
623	87.3	0.0594		0.0	14.880	0.884		Vel = 7.66
623	0.0	2.157		0.0	11.250	43.280		
to		120.0		0.0	0.0	0.0		
624	87.3	0.0594		0.0	11.250	0.668		Vel = 7.66
624	0.0	2.157		0.0	11.170	43.948		
to		120.0		0.0	0.0	0.0		
627	87.3	0.0594		0.0	11.170	0.663		Vel = 7.66
627	0.0	2.157	1V	4.307	49.960	44.611		
to		120.0		0.0	4.307	0.0		
628	87.3	0.0594		0.0	54.267	3.223		Vel = 7.66
628	0.0	2.157	4V	17.229	173.630	47.834		
to		120.0	1X	10.461	60.918	0.217		
5FL	87.3	0.0594	1T	12.307	234.548	13.928		Vel = 7.66
			1S	13.537				
			1B	7.384				
5FL	0.0	4.26		0.0	10.000	61.979		
to		120.0		0.0	0.0	4.331		
4FL	87.3	0.0022		0.0	10.000	0.022		Vel = 1.97
4FL	0.0	4.26		0.0	10.000	66.332		
to		120.0		0.0	0.0	4.331		
3FL	87.3	0.0022		0.0	10.000	0.022		Vel = 1.97

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3FL	0.0	4.26		0.0	10.000	70.685		
to		120.0		0.0	0.0	4.331		
2FL	87.3	0.0021		0.0	10.000	0.021		Vel = 1.97
2FL	0.0	4.26	2V	17.907	19.500	75.037		
to		120.0		0.0	17.907	4.582		
ST03	87.3	0.0022		0.0	37.407	0.081		Vel = 1.97
ST03	0.0	6.357	1X	31.433	9.500	79.700		
to		120.0	1B	12.573	44.006	0.0		
ST02	87.3	0.0003		0.0	53.506	0.017		Vel = 0.88
ST02	0.0	6.357		0.0	24.790	79.717		
to		120.0		0.0	0.0	0.0		
1FL	87.3	0.0003		0.0	24.790	0.007		Vel = 0.88
1FL	50.00	6.357	1V	12.573	1.540	79.724		Qa = 50
to		120.0		0.0	12.573	0.0		
TOR	137.3	0.0007		0.0	14.113	0.010		Vel = 1.39
TOR	0.0	6.357	1X	31.433	9.670	79.734		
to		120.0		0.0	31.433	4.188		
BOR	137.3	0.0007		0.0	41.103	0.030		Vel = 1.39
BOR	0.0	6.357	1V	12.573	2.000	83.952		
to		120.0		0.0	12.573	5.000		* * Fixed Loss = 5
SPG	137.3	0.0007		0.0	14.573	0.010		Vel = 1.39
SPG	0.0	6.16	3E	60.252	210.000	88.962		
to		140.0	1T	43.037	107.593	0.866		
TEST	137.3	0.0006	1G	4.304	317.593	0.198		Vel = 1.48
	50.00							Qa = 50.00
	187.30					90.026		K Factor = 19.74