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 #7 Calc 6th Floor Guestroom
Building	:	7 of 8
Location	:	Portland ME
System	:	Area #7
Contract	:	4396CME
Data File	:	6th Floor Area #7 Guest Room Calc.WXF

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HYDRAULIC CALCULATIONS
for

Project name: Courtyard by Marriott
Location: Portland ME
Drawing no: 7 of 8
Date: 6-5-13

Design

Remote area number: Area #7
Remote area location: 6th 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: 9
In-rack demand: - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 264.21 - GPM @ 99.08 - 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 : 8.691

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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		
701	62.0	5.6	8.28	na	16.11	0.1		
750	62.0	5.6	8.16	na	16.0	0.1		
702	62.0	5.6	9.22	na	17.0	0.1		
751	62.0	5.6	9.15	na	16.94	0.1		
703	62.0	5.6	13.73	na	20.75	0.1	150	7.0
704	62.0	5.6	12.63	na	19.9	0.1	160	7.0
705	62.0	5.6	13.11	na	20.27	0.1	150	7.0
706	62.0	4.2	14.51	na	16.0	0.1	100	7.0
707	62.0	5.6	14.37	na	21.23	0.1	150	7.0
721	62.58		9.02	na				
755	62.58		9.02	na				
722	62.58		10.1	na				
756	62.58		10.28	na				
723	62.58		13.58	na				
728	62.58		20.63	na				
724	62.58		12.73	na				
725	62.58		14.59	na				
726	62.58		14.76	na				
727	62.58		16.59	na				
730	62.58		20.13	na				
729	62.58		26.41	na				
731	62.58		27.38	na				
732	62.58		31.47	na				
821	62.58		32.53	na				
822	62.58		34.44	na				
823	62.58		36.35	na				
824	62.58		38.84	na				
825	62.58		41.71	na				
733	62.58		47.72	na				
6FL	62.58		65.79	na				
5FL	52.25		70.34	na				
4FL	42.25		74.74	na				
3FL	32.25		79.14	na				
2FL	22.25		83.54	na				
ST03	11.67		88.38	na				
ST02	11.67		88.44	na				
1FL	11.67		88.46	na	50.0			
TOR	11.67		88.48	na				
BOR	2.0		92.74	na				
SPG	2.0		97.76	na				
TEST	0.0		99.08	na	50.0			

The maximum velocity is 18.62 and it occurs in the pipe between nodes 723 and 728

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	**
701	16.11	1.049	1E	2.0	4.420	8.279		K [illegible]
to		120.0	1T	5.0	7.000	-0.251		
721	16.11	0.0872		0.0	11.420	0.996		Vel = 5.98
	0.0							
	16.11					9.024		K Factor = 5.36
750	16.00	1.049	1E	2.0	5.920	8.163		K Factor = 5.60
to		120.0	1T	5.0	7.000	-0.251		
755	16.0	0.0861		0.0	12.920	1.113		Vel = 5.94
	0.0							
	16.00					9.025		K Factor = 5.33
702	17.00	1.049	1E	2.0	4.790	9.215		K Factor = 5.60
to		120.0	1T	5.0	7.000	-0.251		
722	17.0	0.0964		0.0	11.790	1.136		Vel = 6.31
	0.0							
	17.00					10.100		K Factor = 5.35
751	16.94	1.049	2E	4.0	5.420	9.151		K Factor = 5.60
to		120.0	1T	5.0	9.000	-0.251		
756	16.94	0.0957		0.0	14.420	1.380		Vel = 6.29
	0.0							
	16.94					10.280		K Factor = 5.28
703	20.75	1.049		0.0	0.750	13.728		K Factor = 5.60
to		120.0		0.0	0.0	-0.251		
723	20.75	0.1400		0.0	0.750	0.105		Vel = 7.70
	0.0							
	20.75					13.582		K Factor = 5.63
704	19.90	1.049	1E	2.0	0.750	12.629		K Factor = 5.60
to		120.0		0.0	2.000	-0.251		
724	19.9	0.1287		0.0	2.750	0.354		Vel = 7.39
	0.0							
	19.90					12.732		K Factor = 5.58
705	20.27	1.049	1E	2.0	5.960	13.108		K Factor = 5.60
to		120.0	1T	5.0	7.000	-0.251		
725	20.27	0.1334		0.0	12.960	1.729		Vel = 7.52
	0.0							
	20.27					14.586		K Factor = 5.31
706	16.00	1.049	1T	5.0	0.750	14.514		K Factor = 4.20
to		120.0		0.0	5.000	-0.251		
726	16.0	0.0861		0.0	5.750	0.495		Vel = 5.94
	0.0							
	16.00					14.758		K Factor = 4.16
707	21.23	1.049	2E	4.0	8.000	14.371		K Factor = 5.60
to		120.0	1T	5.0	9.000	-0.251		
727	21.23	0.1453		0.0	17.000	2.470		Vel = 7.88
	0.0							
	21.23					16.590		K Factor = 5.21
721	16.11	1.049		0.0	0.010	9.024		
to		120.0		0.0	0.0	0.0		
755	16.11	0.1000		0.0	0.010	0.001		Vel = 5.98

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755	16.00	1.38		0.0	13.080	9.025		
to		120.0		0.0	0.0	0.0		
722	32.11	0.0822		0.0	13.080	1.075		Vel = 6.89
722	17.00	1.38		0.0	1.000	10.100		
to		120.0		0.0	0.0	0.0		
756	49.11	0.1800		0.0	1.000	0.180		Vel = 10.53
756	16.94	1.38		0.0	10.580	10.280		
to		120.0		0.0	0.0	0.0		
723	66.05	0.3121		0.0	10.580	3.302		Vel = 14.17
723	20.75	1.38		0.0	13.630	13.582		
to		120.0		0.0	0.0	0.0		
728	86.8	0.5172		0.0	13.630	7.050		Vel = 18.62
728	0.0	1.38	1T	6.0	5.170	20.632		
to		120.0		0.0	6.000	0.0		
729	86.8	0.5173		0.0	11.170	5.778		Vel = 18.62
	0.0							
	86.80					26.410		K Factor = 16.89
724	19.90	1.049		0.0	14.380	12.732		
to		120.0		0.0	0.0	0.0		
725	19.9	0.1289		0.0	14.380	1.854		Vel = 7.39
725	20.28	1.38		0.0	1.380	14.586		
to		120.0		0.0	0.0	0.0		
726	40.18	0.1246		0.0	1.380	0.172		Vel = 8.62
726	16.00	1.38		0.0	7.920	14.758		
to		120.0		0.0	0.0	0.0		
727	56.18	0.2313		0.0	7.920	1.832		Vel = 12.05
727	21.22	1.38		0.0	8.460	16.590		
to		120.0		0.0	0.0	0.0		
730	77.4	0.4184		0.0	8.460	3.540		Vel = 16.60
730	0.0	1.38	1T	6.0	11.330	20.130		
to		120.0		0.0	6.000	0.0		
731	77.4	0.4185		0.0	17.330	7.252		Vel = 16.60
	0.0							
	77.40					27.382		K Factor = 14.79
729	86.80	2.157		0.0	16.540	26.410		
to		120.0		0.0	0.0	0.0		
731	86.8	0.0588		0.0	16.540	0.972		Vel = 7.62
731	77.41	2.157	1X	10.461	10.920	27.382		
to		120.0		0.0	10.461	0.0		
732	164.21	0.1911		0.0	21.381	4.086		Vel = 14.42
732	0.0	2.157		0.0	5.540	31.468		
to		120.0		0.0	0.0	0.0		
821	164.21	0.1912		0.0	5.540	1.059		Vel = 14.42
821	0.0	2.157		0.0	10.000	32.527		
to		120.0		0.0	0.0	0.0		
822	164.21	0.1911		0.0	10.000	1.911		Vel = 14.42
822	0.0	2.157		0.0	10.000	34.438		
to		120.0		0.0	0.0	0.0		
823	164.21	0.1911		0.0	10.000	1.911		Vel = 14.42

Final Calculations - Hazen-Williams

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823	0.0	2.157		0.0	13.040	36.349		
to		120.0		0.0	0.0	0.0		
824	164.21	0.1911		0.0	13.040	2.492		Vel = 14.42
824	0.0	2.157		0.0	15.000	38.841		
to		120.0		0.0	0.0	0.0		
825	164.21	0.1911		0.0	15.000	2.867		Vel = 14.42
825	0.0	2.157	1V	4.307	27.130	41.708		
to		120.0		0.0	4.307	0.0		
733	164.21	0.1911		0.0	31.437	6.007		Vel = 14.42
733	0.0	2.635	4V	23.613	167.000	47.715		
to		120.0	1X	14.827	83.744	0.0		
6FL	164.21	0.0721	1T	16.474	250.744	18.079		Vel = 9.66
			1S	19.22				
			1B	9.61				
6FL	0.0	4.26		0.0	10.330	65.794		
to		120.0		0.0	0.0	4.474		
5FL	164.21	0.0069		0.0	10.330	0.071		Vel = 3.70
5FL	0.0	4.26		0.0	10.000	70.339		
to		120.0		0.0	0.0	4.331		
4FL	164.21	0.0070		0.0	10.000	0.070		Vel = 3.70
4FL	0.0	4.26		0.0	10.000	74.740		
to		120.0		0.0	0.0	4.331		
3FL	164.21	0.0069		0.0	10.000	0.069		Vel = 3.70
3FL	0.0	4.26		0.0	10.000	79.140		
to		120.0		0.0	0.0	4.331		
2FL	164.21	0.0070		0.0	10.000	0.070		Vel = 3.70
2FL	0.0	4.26	2V	17.907	19.500	83.541		
to		120.0		0.0	17.907	4.582		
ST03	164.21	0.0070		0.0	37.407	0.260		Vel = 3.70
ST03	0.0	6.357	1X	31.433	9.500	88.383		
to		120.0	1B	12.573	44.006	0.0		
ST02	164.21	0.0010		0.0	53.506	0.053		Vel = 1.66
ST02	0.0	6.357		0.0	24.790	88.436		
to		120.0		0.0	0.0	0.0		
1FL	164.21	0.0010		0.0	24.790	0.024		Vel = 1.66
1FL	50.00	6.357	1V	12.573	1.540	88.460		Qa = 50
to		120.0		0.0	12.573	0.0		
TOR	214.21	0.0016		0.0	14.113	0.023		Vel = 2.17
TOR	0.0	6.357	1X	31.433	9.670	88.483		
to		120.0		0.0	31.433	4.188		
BOR	214.21	0.0016		0.0	41.103	0.067		Vel = 2.17
BOR	0.0	6.357	1V	12.573	2.000	92.738		
to		120.0		0.0	12.573	5.000		* * Fixed Loss = 5
SPG	214.21	0.0016		0.0	14.573	0.023		Vel = 2.17
SPG	0.0	6.16	3E	60.252	210.000	97.761		
to		140.0	1T	43.037	107.593	0.866		
TEST	214.21	0.0014	1G	4.304	317.593	0.451		Vel = 2.31
	50.00							Qa = 50.00

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	264.21					99.078		K

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