

... 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

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 of 11'-5"

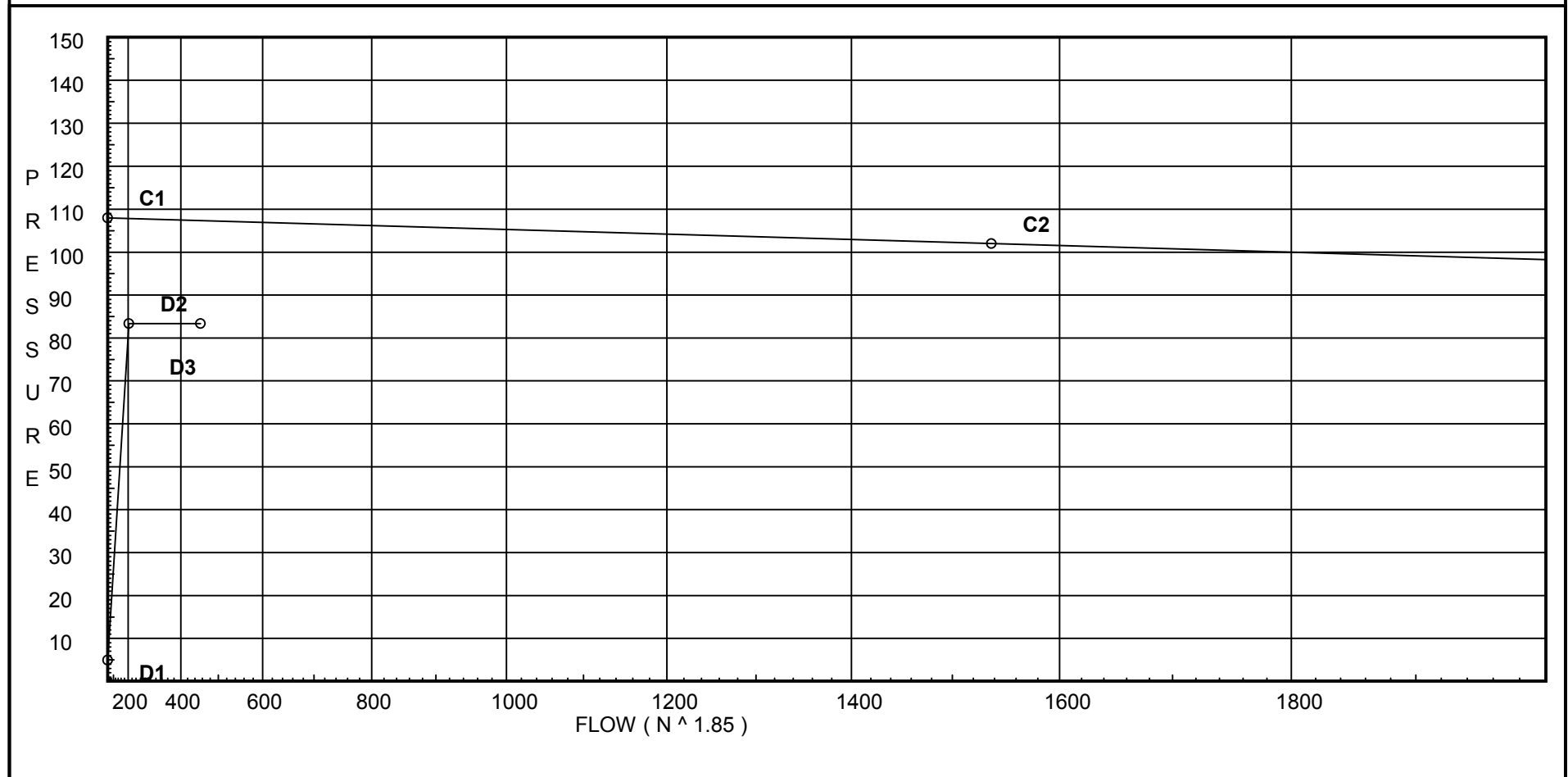
Water Supply Curve C

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

Demand:
D1 - Elevation : 4.946
D2 - System Flow : 204.756
D2 - System Pressure : 83.343
Hose (Demand) : 250
D3 - System Demand : 454.756
Safety Margin : 24.027



Fittings Used Summary

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Fitting Legend

Abbrev.	Name	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
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	Area	Press Req.
201	11.42	5.6	11.26	na	18.79	0.15	80.58	7.0
202	11.42	5.6	12.02	na	19.41	0.15	98.58	7.0
203	11.42	5.6	15.45	na	22.01	0.15	98.58	7.0
204	11.42	5.6	23.42	na	27.1	0.15	98.58	7.0
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	*****	Notes	*****
201 to 221	18.79	1.049 120.0	1E 1T	2.0 5.0 0.0	2.500 7.000 9.500	11.263 -0.178			K Factor = 5.60	
	18.79	0.1160				1.102			Vel = 6.98	
	0.0 18.79						12.187		K Factor = 5.38	
202 to 222	19.41	1.049 120.0	1E 1T	2.0 5.0 0.0	2.500 7.000 9.500	12.016 -0.178			K Factor = 5.60	
	19.41	0.1232				1.170			Vel = 7.21	
	0.0 19.41						13.008		K Factor = 5.38	
203 to 223	22.01	1.049 120.0	1E 1T	2.0 5.0 0.0	2.500 7.000 9.500	15.446 -0.178			K Factor = 5.60	
	22.01	0.1555				1.477			Vel = 8.17	
	0.0 22.01						16.745		K Factor = 5.38	
204 to 224	27.10	1.049 120.0	1E 1T	2.0 5.0 0.0	2.500 7.000 9.500	23.422 -0.178			K Factor = 5.60	
	27.1	0.2283				2.169			Vel = 10.06	
	0.0 27.10						25.413		K Factor = 5.38	
205 to 225	18.88	1.049 120.0	1E 1T	2.0 5.0 0.0	2.500 7.000 9.500	11.366 -0.178			K Factor = 5.60	
	18.88	0.1169				1.111			Vel = 7.01	
	0.0 18.88						12.299		K Factor = 5.38	
206 to 226	19.50	1.049 120.0	1E 1T	2.0 5.0 0.0	2.500 7.000 9.500	12.125 -0.178			K Factor = 5.60	
	19.5	0.1242				1.180			Vel = 7.24	
	0.0 19.50						13.127		K Factor = 5.38	
207 to 227	22.11	1.049 120.0	1E 1T	2.0 5.0 0.0	2.500 7.000 9.500	15.585 -0.178			K Factor = 5.60	
	22.11	0.1566				1.488			Vel = 8.21	
	0.0 22.11						16.895		K Factor = 5.38	
208 to 228	27.22	1.049 120.0	1E 1T	2.0 5.0 0.0	2.500 7.000 9.500	23.627 -0.178			K Factor = 5.60	
	27.22	0.2302				2.187			Vel = 10.10	
	0.0 27.22						25.636		K Factor = 5.38	
209 to 229	29.73	1.049 120.0	1T	5.0 0.0 0.0	1.000 5.000 6.000	28.189 -0.178			K Factor = 5.60	
	29.73	0.2710				1.626			Vel = 11.04	
	0.0 29.73						29.637		K Factor = 5.46	
221 to 222	18.79	1.049 120.0		0.0 0.0 0.0	7.080 0.0 7.080	12.187 0.0				
	18.79	0.1160				0.821			Vel = 6.98	

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftg's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
222	19.42	1.049		0.0	8.670	13.008				
to 223	38.21	120.0 0.4310		0.0	0.0	0.0				
223	22.00	1.049		0.0	8.670	16.745				
to 224	60.21	120.0 0.9998		0.0	0.0	0.0				Vel = 14.18
224	27.11	1.38	1T	6.0	1.380	25.413				
to 230	87.32	120.0 0.5230		0.0	6.000	0.0				
	0.0				7.380	3.860				Vel = 18.73
	87.32						29.273			K Factor = 16.14
225	18.88	1.049		0.0	7.080	12.299				
to 226	18.88	120.0 0.1169		0.0	0.0	0.0				
226	19.50	1.049		0.0	8.670	13.127				
to 227	38.38	120.0 0.4346		0.0	0.0	0.0				
227	22.11	1.049		0.0	8.670	16.895				
to 228	60.49	120.0 1.0082		0.0	0.0	0.0				
228	27.22	1.38	1T	6.0	1.380	25.636				
to 231	87.71	120.0 0.5274		0.0	6.000	0.0				
	0.0				7.380	3.892				Vel = 18.81
	87.71						29.528			K Factor = 16.14
229	29.73	1.38	1E	3.0	8.000	29.637				
to 232	29.73	120.0 0.0713	1T	6.0	9.000	0.0				
	0.0			0.0	17.000	1.212				Vel = 6.38
	29.73						30.849			K Factor = 5.35
230	87.32	2.635		0.0	11.380	29.273				
to 231	87.32	120.0 0.0224		0.0	0.0	0.0				
231	87.70	2.635	1V	5.903	10.380	29.528				
to 232	175.02	120.0 0.0811		0.0	5.903	0.0				
				0.0	16.283	1.321				Vel = 10.30
232	29.74	2.635	3V	17.71	213.130	30.849				
to 132	204.76	120.0 0.1085	3X	44.48	62.190	-0.364				
				0.0	275.320	29.859				Vel = 12.05
132	0.0	2.635	3V	17.71	42.380	60.344				
to 1FL	204.76	120.0 0.1085	1T	16.474	63.014	0.433				
			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 TOR	304.76	120.0 0.0031		0.0	12.573	0.0				
				0.0	14.113	0.044				Vel = 3.08
TOR	0.0	6.357	1X	31.433	9.670	72.251				
to BOR	304.76	120.0 0.0031		0.0	31.433	4.188				
				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	*****	Notes	*****
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	