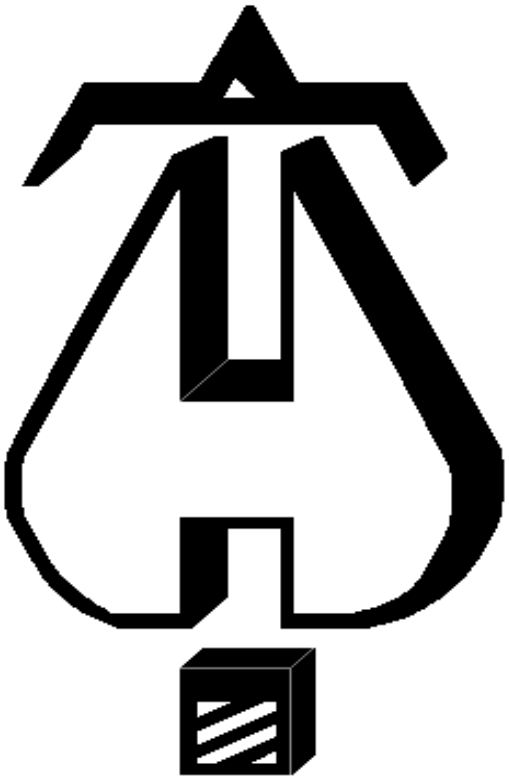


. . . Fire Protection by Computer Design

High Tech Fire Protection
84 Hackett Mills Road Poland
P.O. Box 154 Minot, ME
Poland, ME 04274
207-998-2551

Job Name	:	409 CUMBERLAND AVE APARTMENT COMPLEX 3rd FLOOR UNIT 316 3B
Drawing	:	FP-02
Location	:	3rd Floor Unit 316
Remote Area	:	3B
Contract	:	101513-1
Data File	:	Calc #3B 3rd floor unit 316.WXF

HYDRAULIC CALCULATIONS
for

Project name: 409 CUMBERLAND AVE APARTMENT COMPLEX
Location: 3rd Floor Unit 316
Drawing no: FP-02
Date: 1-23-14

Design

Remote area number: 3B
Remote area location: 3rd Floor Unit 316
Occupancy classification: Light Hazard/ Residential
Density: .1 - Gpm/SqFt
Area of application: 472 - SqFt
Coverage per sprinkler: 224 - SqFt
Type of sprinklers calculated: quick response residential pendent
No. of sprinklers calculated: 4
In-rack demand: n/a - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 196 - GPM @ 70 - Psi
Type of system: wet system
Volume of dry or preaction system: n/a - Gal

Water supply information

Date: 5-19-05
Location: Corner of Cumberland ave and Mechanic Street
Source: City of Portland

Name of contractor: High Tech Fire Protection
Address: 84 Hackett Mills Road Poland / P.O. Box 154 Minot, ME / Pola
Phone number: 207-998-2551
Name of designer: Ed Poulin
Authority having jurisdiction: State of Maine / City of Portland
Notes: (Include peaking information or gridded systems here.)

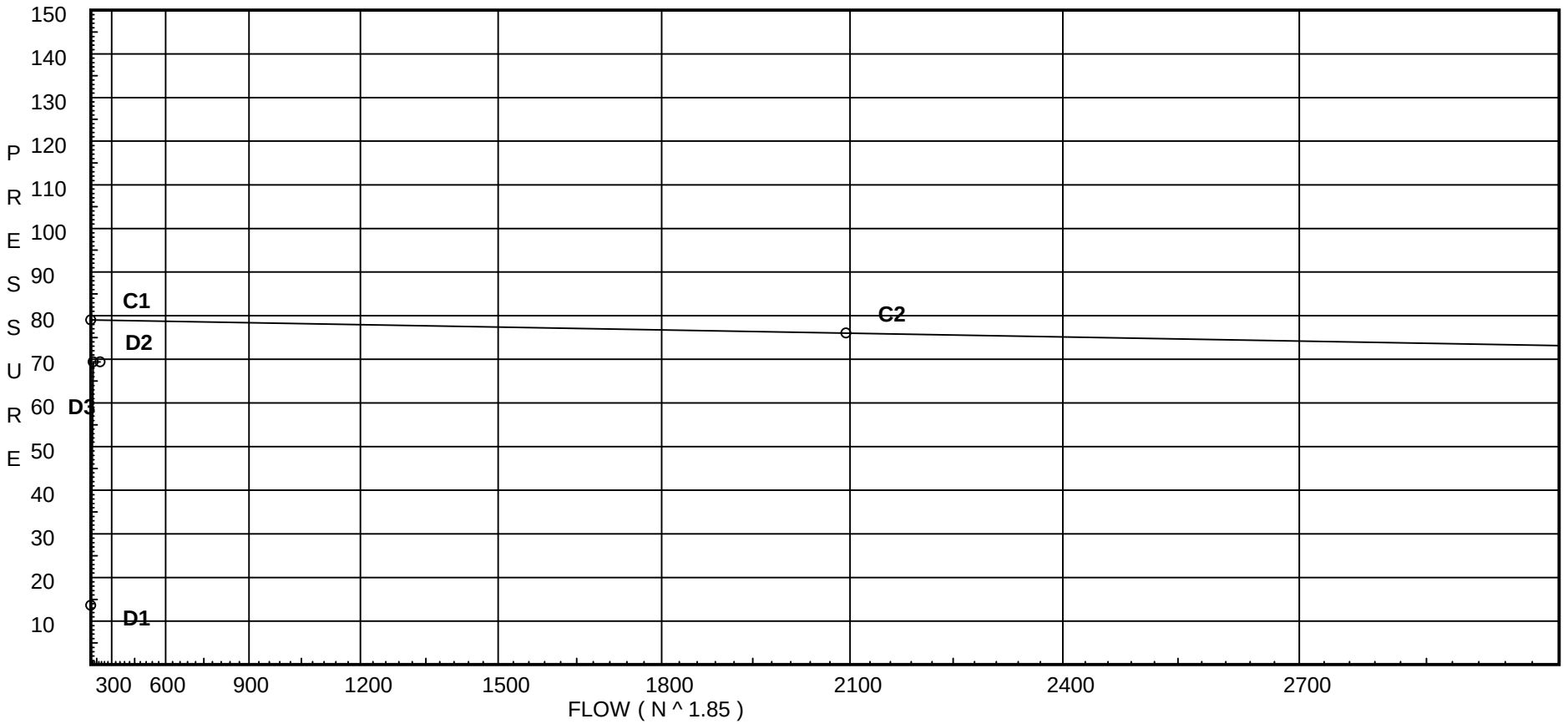
Water Supply Curve (C)

High Tech Fire Protection
409 CUMBERLAND AVE APARTMENT COMPLEX 3rd FLOOR UNIT 316 3B

Date 1-23-14

City Water Supply:
- C1 - Static Pressure : 79
- C2 - Residual Pressure: 76
- C2 - Residual Flow : 2094

Demand:
- D1 - Elevation : 13.643
- D2 - System Flow : 95.942
- D2 - System Pressure : 69.426
- Hose (Demand) : 100
- D3 - System Demand : 195.942
- Safety Margin : 9.537



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	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
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
N *	CPVC 90'Ell Harvel-Spears		7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O *	CPVC Tee - Branch	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
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
Zia	Wilkins 350	Fitting generates a Fixed Loss Based on Flow																			

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

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
DP1	-1.0	5.8	11.42	na	19.6	0.1	196	7.0
DP2	-1.0	5.8	14.92	na	22.4	0.1	224	7.0
300	46.5	K = K @ EQ01	13.89	na	21.56			
301	46.5	K = K @ EQ02	14.94	na	22.4			
302	46.5	K = K @ EQ02	19.01	na	25.27			
303	46.5		19.09	na				
304	46.5	K = K @ EQ02	21.26	na	26.72			
305	46.0		31.48	na				
332	46.0		32.15	na				
352	46.0		34.36	na				
353	46.0		42.25	na				
SA3	46.0		48.18	na				
SA0	8.9		64.42	na				
TOR	8.9		64.62	na				
BOR	3.0		70.23	na				
BASE	0.0		75.81	na				
HS1	10.0		71.51	na				
HS2	12.0		70.68	na				
HS3	12.0		70.68	na	100.0			
TEST	15.0		69.43	na				

The maximum velocity is 20.17 and it occurs in the pipe between nodes 304 and 305

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
DP1	19.60	1.101	1N	7.0	0.500	11.420		K Factor = 5.80
to		150.0		0.0	7.000	-0.433		
EQ01	19.6	0.0655		0.0	7.500	0.491		Vel = 6.60
	0.0							
	19.60					11.478		K Factor = 5.79
DP2	22.40	1.101	1O	5.0	0.500	14.916		K Factor = 5.80
to		150.0		0.0	5.000	-0.433		
EQ02	22.4	0.0838		0.0	5.500	0.461		Vel = 7.55
	0.0							
	22.40					14.944		K Factor = 5.79
300	21.56	1.101	1N	7.0	6.500	13.888		K Factor @ node EQ01
to		150.0		0.0	7.000	0.0		
301	21.56	0.0782		0.0	13.500	1.056		Vel = 7.27
301	22.40	1.101	1O	5.0	9.200	14.944		K Factor @ node EQ02
to		150.0		0.0	5.000	0.0		
303	43.96	0.2921		0.0	14.200	4.148		Vel = 14.81
	0.0							
	43.96					19.092		K Factor = 10.06
302	25.27	1.101		0.0	0.750	19.013		K Factor @ node EQ02
to		150.0		0.0	0.0	0.0		
303	25.27	0.1053		0.0	0.750	0.079		Vel = 8.52
303	43.96	1.394		0.0	10.100	19.092		
to		150.0		0.0	0.0	0.0		
304	69.23	0.2145		0.0	10.100	2.166		Vel = 14.55
304	26.71	1.394	1O	6.0	11.500	21.258		K Factor @ node EQ02
to		150.0	1N	8.0	14.000	0.217		
305	95.94	0.3922		0.0	25.500	10.001		Vel = 20.17
	0.0							
	95.94					31.476		K Factor = 17.10
305	95.94	2.003		0.0	10.000	31.476		
to		150.0		0.0	0.0	0.0		
332	95.94	0.0671		0.0	10.000	0.671		Vel = 9.77
332	0.0	2.003		0.0	33.000	32.147		
to		150.0		0.0	0.0	0.0		
352	95.94	0.0671		0.0	33.000	2.215		Vel = 9.77
352	0.0	2.003	1N	11.0	93.500	34.362		
to		150.0	1T	12.965	23.965	0.0		
353	95.94	0.0671		0.0	117.465	7.885		Vel = 9.77
353	0.0	2.157	1B	7.384	4.000	42.247		
to		120.0	1Fsp	0.0	37.535	3.000		* Fixed loss = 3
SA3	95.94	0.0707	1S	13.537	41.535	2.937		Vel = 8.42
			1T	12.307				
			1V	4.307				
SA3	0.0	4.26	3V	26.861	36.500	48.184		
to		120.0		0.0	26.861	16.068		
SA0	95.94	0.0026		0.0	63.361	0.163		Vel = 2.16
SA0	0.0	4.26	3V	26.861	31.500	64.415		
to		120.0	1X	21.067	47.928	0.0		
TOR	95.94	0.0026		0.0	79.428	0.205		Vel = 2.16

Final Calculations - Hazen-Williams

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
TOR	0.0	4.26	1B	15.8	4.000	64.620		
to		120.0	1Fsp	0.0	15.800	5.555		* Fixed loss = 3
BOR	95.94	0.0026		0.0	19.800	0.051		Vel = 2.16
BOR	0.0	4.26	1Zia	0.0	2.000	70.226		
to		120.0	1E	13.167	39.501	5.478		* Fixed loss = 4.178
BASE	95.94	0.0026	1T	26.334	41.501	0.106		Vel = 2.16
BASE	0.0	6.16	1G	4.304	25.000	75.810		
to		140.0	1T	43.037	67.425	-4.331		
HS1	95.94	0.0003	1E	20.084	92.425	0.030		Vel = 1.03
HS1	0.0	6.16	1T	43.037	80.000	71.509		
to		140.0		0.0	43.037	-0.866		
HS2	95.94	0.0003		0.0	123.037	0.039		Vel = 1.03
HS2	0.0	12.46	1T	52.745	20.000	70.682		
to		100.0		0.0	52.745	0.0		
HS3	95.94	0.0		0.0	72.745	0.002		Vel = 0.25
HS3	100.00	6.16	1G	4.304	10.000	70.684		Qa = 100
to		140.0	1E	20.084	24.388	-1.299		
TEST	195.94	0.0012		0.0	34.388	0.041		Vel = 2.11
	0.0							
	195.94					69.426		K Factor = 23.52