HYDRAULIC DESIGN INFORMATION SHEET

Name - 91 State St. Apartments — Date - 6-10-13
Location - Second Floor
Building - — System No. - 1 of 1
Contractor - Residential Fire Protection — Contract No. - C13014
Calculated By - — Drawing No. - 1 of 1
Construction: (X) Combustible ( ) Non-Combustible — Ceiling Height 9'-0"
OCCUPANCY - Residential

SYSTEM

Type of Calculation: ( )NFPA 13 Residential (X)NFPA 13R ( )NFPA 13D
Number of Sprinklers Flowing: ( )1 ( )2 (X)4 ( )
( )Other
( )Specific Ruling — Made by — Date

DESIGN

Listed Flow at Start Point	- 13	Gpm	System Type
Listed Pres. at Start Point	- 10.6	Psi	(X) Wet ( ) Dry
MAXIMUM LISTED SPACING	16 x 16		( ) Deluge ( ) PreAction
Domestic Flow Added	-	Gpm	Sprinkler or Nozzle
Additional Flow Added	- 100	Gpm	Make Viking Model VK486
Elevation at Highest Outlet	- 35	Feet	Size 1/2" K-Factor 4.0
Note:Safety Margin: 19.836			Temperature Rating 155

Calculation Summary — Gpm Required 147.246 — Psi Required 49.091 — At Test
C-Factor Used: — Overhead 120 — Underground 150

WATER SUPPLY

Water Flow Test:		Pump Data:	Tank or Reservoir:
Date of Test	- 6-03-13	Rated Cap.	Cap.
Time of Test	-	@ Psi	Elev.
Static (Psi)	- 69	Elev.	
Residual (Psi)	- 65	Other	Well
Flow (Gpm)	- 1277		Proof Flow Gpm
Elevation	- -5		

Location:

Source of Information:

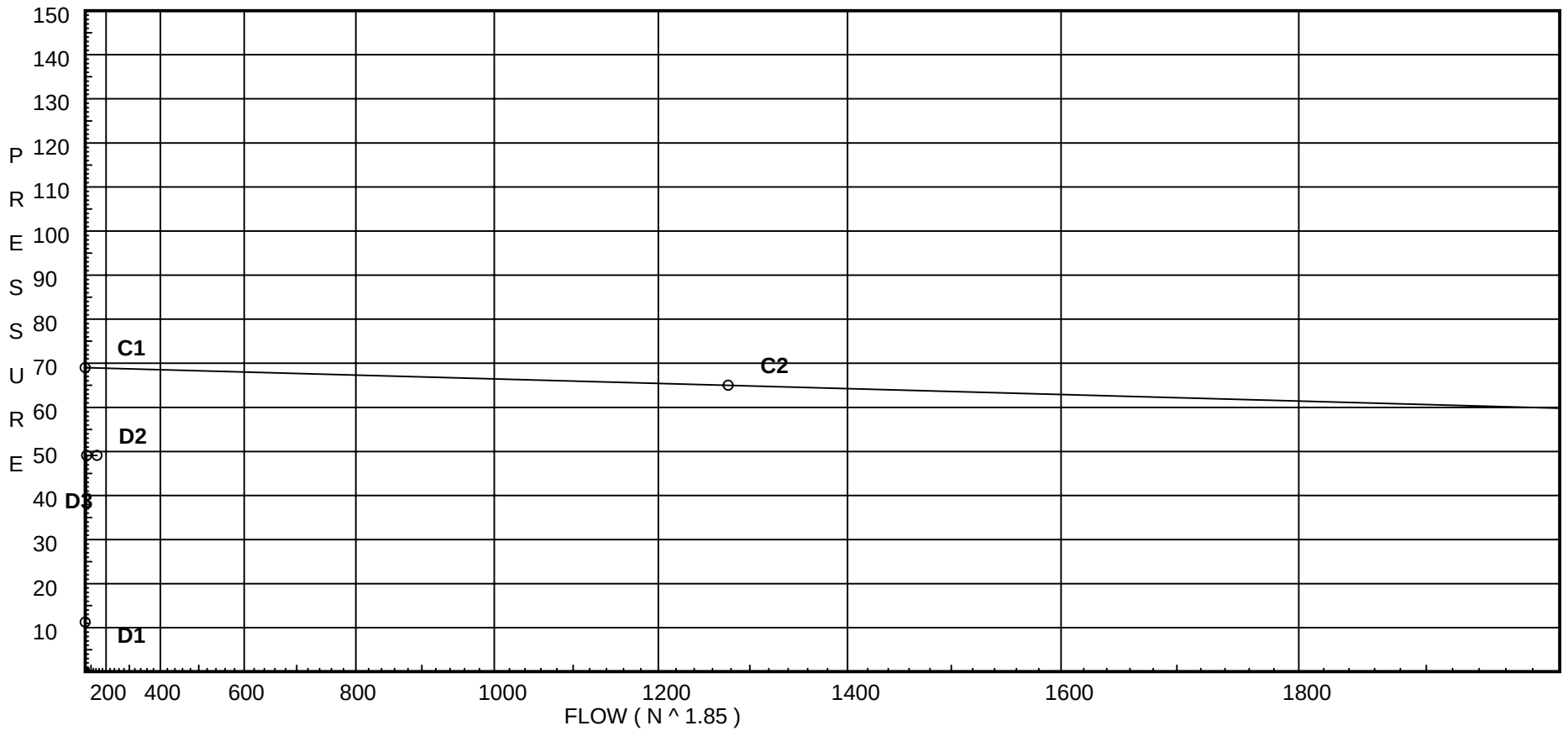
Water Supply Curve (C)

RESIDENTIAL FIRE PROTECTION
91 State St 2nd floor 4 head

Date 6-10-13

City Water Supply:
- C1 - Static Pressure : 69
- C2 - Residual Pressure: 65
- C2 - Residual Flow : 1277

Demand:
- D1 - Elevation : 11.261
- D2 - System Flow : 47.246
- D2 - System Pressure : 49.091
- Hose (Adj City) : _____
- Hose (Demand) : 100
- D3 - System Demand : 147.246
- Safety Margin : 19.836



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
E	90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
G	Generic Gate Valve	0	0	1	1	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T	90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Z	Generic Flow Switch	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Zaa	Ames 2000B	Fitting generates a Fixed Loss Based on Flow																			

Pressure / Flow Summary - STANDARD

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
1	26.0	4	9.0	na	12.0	0.1	120	9.0
2	26.0	4	9.71	na	12.46	0.1	120	9.0
3	26.0	4	7.84	na	11.2	0.1	110	7.6
4	26.0	4	8.38	na	11.58	0.1	110	7.6
10	0.0		24.94	na				
11	0.0		21.23	na				
20	0.0		27.58	na				
21	0.0		25.2	na				
30	0.0		31.22	na				
31	0.0		28.39	na				
40	0.0		33.04	na				
41	0.0		32.64	na				
42	0.0		33.06	na				
43	0.0		33.49	na				
50	0.0		35.33	na				
51	0.0		36.24	na				
TR	1.0		38.68	na				
BR	0.0		45.93	na				
UG1	0.0		49.04	na				
UG2	-5.0		51.2	na	100.0			
TEST	0.0		49.09	na				

The maximum velocity is 10.14 and it occurs in the pipe between nodes 51 and TR

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
1	12.00	1.049		0.0	14.000	9.000		K Factor = 4.00
to		120		0.0	0.0	0.0		
2	12.0	0.0506		0.0	14.000	0.708		Vel = 4.45
2	12.46	1.049	1T	5.0	16.000	9.708		K Factor = 4.00
to		120		0.0	5.000	11.261		
10	24.46	0.1889		0.0	21.000	3.967		Vel = 9.08
	0.0							
	24.46					24.936		K Factor = 4.90
3	11.20	1.049		0.0	12.000	7.845		K Factor = 4.00
to		120		0.0	0.0	0.0		
4	11.2	0.0445		0.0	12.000	0.534		Vel = 4.16
4	11.58	1.049	1T	5.0	4.600	8.379		K Factor = 4.00
to		120		0.0	5.000	11.261		
11	22.78	0.1656		0.0	9.600	1.590		Vel = 8.46
	0.0							
	22.78					21.230		K Factor = 4.94
10	24.46	1.049	1T	5.0	9.000	24.936		
to		120		0.0	5.000	0.0		
20	24.46	0.1889		0.0	14.000	2.644		Vel = 9.08
	0.0							
	24.46					27.580		K Factor = 4.66
11	22.78	1.049	1E	2.0	17.000	21.230		
to		120	1T	5.0	7.000	0.0		
21	22.78	0.1656		0.0	24.000	3.974		Vel = 8.46
	0.0							
	22.78					25.204		K Factor = 4.54
20	24.46	1.049	1E	2.0	12.250	27.580		
to		120	1T	5.0	7.000	0.0		
30	24.46	0.1889		0.0	19.250	3.636		Vel = 9.08
	0.0							
	24.46					31.216		K Factor = 4.38
21	22.78	1.049	1E	2.0	12.250	25.204		
to		120	1T	5.0	7.000	0.0		
31	22.78	0.1656		0.0	19.250	3.188		Vel = 8.46
	0.0							
	22.78					28.392		K Factor = 4.28
30	24.46	1.38	1T	6.0	30.750	31.216		
to		120		0.0	6.000	0.0		
40	24.46	0.0497		0.0	36.750	1.826		Vel = 5.25
	0.0							
	24.46					33.042		K Factor = 4.26
31	22.78	1.38	1T	6.0	91.500	28.392		
to		120		0.0	6.000	0.0		
41	22.78	0.0435		0.0	97.500	4.246		Vel = 4.89
	0.0							
	22.78					32.638		K Factor = 3.99
40	4.44	1.38		0.0	6.500	33.042		
to		120		0.0	0.0	0.0		
42	4.44	0.0022		0.0	6.500	0.014		Vel = 0.95

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
	0.0							
	4.44					33.056		K Factor = 0.77
41	22.78	1.38	1T	6.0	3.600	32.638		
to		120		0.0	6.000	0.0		
42	22.78	0.0435		0.0	9.600	0.418		Vel = 4.89
42	4.45	1.38	2T	12.0	40.600	33.056		
to		120		0.0	12.000	0.0		
51	27.23	0.0606		0.0	52.600	3.185		Vel = 5.84
	0.0							
	27.23					36.241		K Factor = 4.52
40	20.02	1.38		0.0	13.100	33.042		
to		120		0.0	0.0	0.0		
43	20.02	0.0343		0.0	13.100	0.449		Vel = 4.29
43	0.0	1.38	2T	12.0	41.600	33.491		
to		120		0.0	12.000	0.0		
50	20.02	0.0343		0.0	53.600	1.838		Vel = 4.29
50	0.0	1.38	2E	6.0	20.600	35.329		
to		120		0.0	6.000	0.0		
51	20.02	0.0343		0.0	26.600	0.912		Vel = 4.29
51	27.23	1.38	1T	6.0	11.100	36.241		
to		120		0.0	6.000	-0.433		
TR	47.25	0.1679		0.0	17.100	2.871		Vel = 10.14
TR	0.0	1.38	1Z	3.0	7.000	38.679		
to		120	1Zaa	0.0	3.000	5.571		* Fixed loss = 5.138
BR	47.25	0.1678		0.0	10.000	1.678		Vel = 10.14
BR	0.0	1.72	1G	0.617	75.000	45.928		
to		150	1T	6.174	6.792	0.0		
UG1	47.25	0.0380		0.0	81.792	3.109		Vel = 6.52
UG1	0.0	12.34	1T	93.767	75.000	49.037		
to		140		0.0	93.767	2.166		
UG2	47.25	0.0		0.0	168.767	0.0		Vel = 0.13
UG2	100.00	6.16		0.0	75.000	51.203		Qa = 100
to		140		0.0	0.0	-2.166		
TEST	147.25	0.0007		0.0	75.000	0.054		Vel = 1.59
	0.0							
	147.25					49.091		K Factor = 21.02