

... **Fire Protection by Computer Design**

EASTERN FIRE PROTECTION  
AUBURN, ME  
207-784-1507

Job Name : LUMINATO CONDOMINIUMS  
Drawing : 2 OF 3  
Location : PORTLAND MAINE  
Remote Area : FIRST FLOOR  
Contract : AU-5537-16  
Data File : 5537 LUMINATO - BASEMENT DRY SYSTEM 1950 SQ FT.WXF

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**HYDRAULIC CALCULATIONS**  
*for*

**Project name:** LUMINATO CONDOMINIUMS  
**Location:** PORTLAND MAINE  
**Drawing no:** 2 OF 3  
**Date:** 11-23-16

**Design**

**Remote area number:** FIRST FLOOR  
**Remote area location:** FIRST FLOOR  
**Occupancy classification:** LIGHT HAZARD  
**Density:** .15 - Gpm/SqFt  
**Area of application:** 1950 - SqFt  
**Coverage per sprinkler:** 120 - SqFt  
**Type of sprinklers calculated:** RELIABLE F3QR DRY PENDENT R5714  
**No. of sprinklers calculated:** 23  
**In-rack demand:** - GPM  
**Hose streams:** 250 - GPM  
**Total water required (including hose streams):** 783.102 - GPM @ 80.856 - Psi  
**Type of system:** DRY  
**Volume of dry or preaction system:** 395 - Gal

**Water supply information**

**Date:** 07-06-16  
**Location:** SEE PLOT PLAN  
**Source:** PORTLAND WATER DISTRICT

**Name of contractor:** EASTERN FIRE PROTECTION  
**Address:** 170 KITTYHAWK AVE  
**Phone number:** 207-784-1507  
**Name of designer:** GRD  
**Authority having jurisdiction:** MAINE STATE FIRE MARSHAL  
**Notes:** (Include peaking information or gridded systems here.)

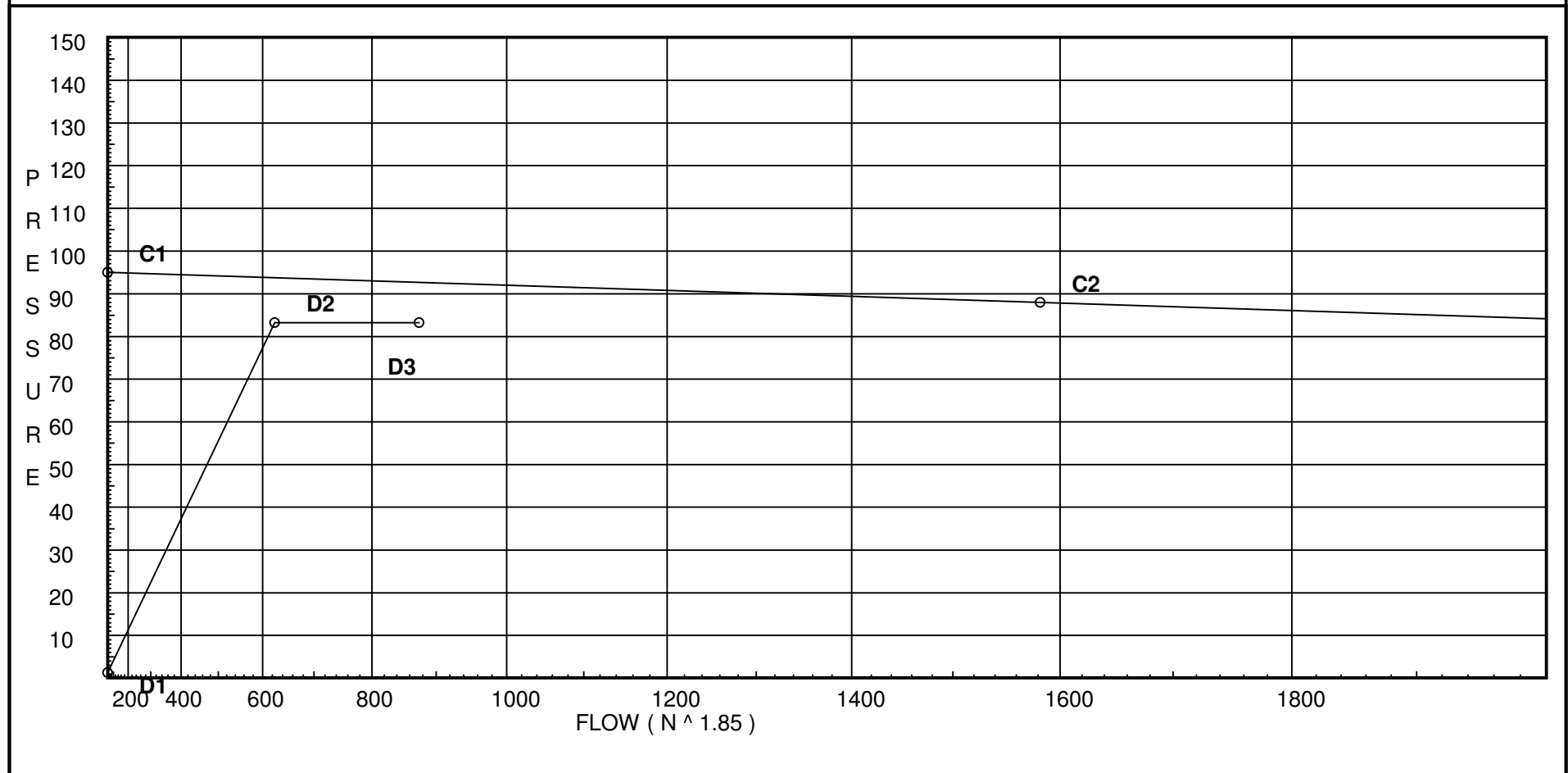
# Water Supply Curve C

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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City Water Supply:  
C1 - Static Pressure : 95  
C2 - Residual Pressure: 88  
C2 - Residual Flow : 1582

Demand:  
D1 - Elevation : 1.299  
D2 - System Flow : 624.329  
D2 - System Pressure : 83.261  
Hose ( Demand ) : 250  
D3 - System Demand : 874.329  
Safety Margin : 9.402



# Fittings Used Summary

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Fitting Legend		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
D	Dry Rel D										28		47								
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
I	90' Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
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
Zma	Maxim M200 Horz Butt	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.

**SUPPLY ANALYSIS**

<b>Node at Source</b>	<b>Static Pressure</b>	<b>Residual Pressure</b>	<b>Flow</b>	<b>Available Pressure</b>	<b>Total Demand</b>	<b>Required Pressure</b>
TEST	95.0	88	1582.0	92.663	874.33	83.261

**NODE ANALYSIS**

<b>Node Tag</b>	<b>Elevation</b>	<b>Node Type</b>	<b>Pressure at Node</b>	<b>Discharge at Node</b>	<b>Notes</b>
DP01	0.0	5.6	10.33	18.0	
1	47.5	5.6	17.87	23.67	
2	47.5	5.6	20.6	25.42	
3	47.5	5.6	22.62	26.64	
4	47.5	5.6	18.18	23.88	
5	47.5	5.6	21.58	26.02	
6	47.5	5.6	23.66	27.24	
8	47.5	5.6	20.78	25.53	
9	47.5	5.6	24.51	27.72	
11	47.5	5.6	23.85	27.35	
12	47.5	5.6	28.08	29.67	
14	47.5	5.6	28.67	29.99	
15	47.5	5.6	33.69	32.5	
7	47.5		25.51		
10	47.5		27.82		
13	47.5		31.83		
16	47.5		38.14		
17	46.0		47.2		
20	42.0	5.6	7.0	14.82	
21	44.0	5.6	7.52	15.36	
22	46.0	5.6	7.8	15.64	
23	47.5	5.6	9.41	17.18	
24	47.5	5.6	10.55	18.19	
25	47.5	5.6	12.51	19.81	
26	47.5	5.6	11.21	18.75	
27	47.5	5.6	12.99	20.19	
29	47.5	5.6	12.62	19.9	
30	47.5	5.6	14.61	21.41	
32	47.5	5.6	18.0	23.76	
34	47.5	5.6	25.88	28.49	
36	47.5	5.6	30.85	31.1	
38	47.5	5.6	37.11	34.12	
28	47.5		13.86		
31	47.5		15.58		
33	47.5		18.35		
35	47.5		26.37		
37	47.5		31.42		
39	47.5		37.79		
40	47.0		47.01		

**NODE ANALYSIS (cont.)**

<b>Node Tag</b>	<b>Elevation</b>	<b>Node Type</b>	<b>Pressure at Node</b>	<b>Discharge at Node</b>	<b>Notes</b>
TOR2	47.0		66.55		
BOR2	42.5		74.49		
BASE	40.5		81.66		
TEST	39.0		83.26	250.0	

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
DP01 to EQ01	0 0	5.60	18.00 18.0	1 1.049	T 0.0	3.568 3.568	100	10.332 0.0			
EQ01			0.0 18.00			0.0 4.568	0.1500	0.685	Vel =	6.68	
EQ01								11.017	K Factor =	5.42	
1 to 2	47.500 47.500	5.60	23.67 23.67	1 1.049	0.0 0.0	11.000 0.0	100	17.865 0.0			
2 to 3	47.500 47.500	5.60	25.42 49.09	1.25 1.38	0.0 0.0	8.000 8.000	100	20.604 0.0	Vel =	8.79	
3 to 7	47.500 47.500	5.60	26.64 75.73	1.5 1.61	E 0.0	2.855 2.855	100	22.624 0.0			
7			0.0 75.73			0.0 10.855	0.2658	2.885	Vel =	11.93	
7								25.509	K Factor =	14.99	
4 to 5	47.500 47.500	5.60	23.88 23.88	1 1.049	E 0.0	1.427 1.427	100	18.184 0.0			
5 to 6	47.500 47.500	5.60	26.02 49.9	1.25 1.38	0.0 0.0	8.000 8.000	100	21.582 0.0	Vel =	8.86	
6 to 7	47.500 47.500	5.60	27.24 77.14	1.5 1.61	T 0.0	5.71 5.710	100	23.664 0.0			
7			0.0 77.14			0.0 6.710	0.2750	1.845	Vel =	12.16	
7								25.509	K Factor =	15.27	
8 to 9	47.500 47.500	5.60	25.53 25.53	1 1.049	0.0 0.0	13.000 0.0	100	20.784 0.0			
9 to 10	47.500 47.500	5.60	27.72 53.25	1.25 1.38	T 0.0	4.282 4.282	100	24.507 0.0	Vel =	9.48	
10			0.0 53.25			0.0 11.282	0.2935	3.311	Vel =	11.42	
10								27.818	K Factor =	10.10	
11 to 12	47.500 47.500	5.60	27.35 27.35	1 1.049	0.0 0.0	13.000 0.0	100	23.847 0.0			
12 to 13	47.500 47.500	5.60	29.67 57.02	1.25 1.38	T 0.0	4.282 4.282	100	28.075 0.0	Vel =	10.15	
13			0.0 57.02			0.0 11.282	0.3331	3.758	Vel =	12.23	
13								31.833	K Factor =	10.11	
14 to 15	47.500 47.500	5.60	29.99 29.99	1 1.049	0.0 0.0	13.000 0.0	100	28.674 0.0			
15						0.0 13.000	0.3857	5.014	Vel =	11.13	

# Final Calculations - Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
15 to 16	47.500 47.500	5.60	32.50 62.49	1.25 1.38	T 0.0 0.0	4.282 4.282 11.282	100 0.3946	33.688 0.0 4.452		Vel = 13.40	
16			0.0 62.49					38.140		K Factor = 10.12	
7 to 10	47.500 47.500		152.86 152.86	2 2.067	0.0 0.0 0.0	8.000 0.0 8.000	100 0.2886	25.509 0.0 2.309		Vel = 14.62	
10 to 13	47.500 47.500		53.26 206.12	2 2.067	0.0 0.0 0.0	8.000 0.0 8.000	100 0.5019	27.818 0.0 4.015		Vel = 19.71	
13 to 16	47.500 47.500		57.01 263.13	2 2.067	0.0 0.0 0.0	8.000 0.0 8.000	100 0.7884	31.833 0.0 6.307		Vel = 25.16	
16 to 17	47.500 46		62.49 325.62	2.5 2.469	E T 0.0	4.282 8.564 17.096	100 0.4921	38.140 0.650 8.413		Vel = 21.82	
17 to 40	46 47		0.0 325.62	4 4.26	0.0 0.0 0.0	7.000 0.0 7.000	100 0.0346	47.203 -0.433 0.242		Vel = 7.33	
40			0.0 325.62					47.012		K Factor = 47.49	
20 to 21	42 44	5.60	14.82 14.82	1 1.049	3E 0.0 0.0	4.282 4.282 13.282	100 0.1047	7.000 -0.866 1.390		Vel = 5.50	
21 to 22	44 46	5.60	15.36 30.18	1.25 1.38	E 0.0 0.0	2.141 2.141 11.141	100 0.1026	7.524 -0.866 1.143		Vel = 6.47	
22 to 23	46 47.500	5.60	15.64 45.82	1.5 1.61	3E 0.0 0.0	8.564 8.564 21.564	100 0.1049	7.801 -0.650 2.263		Vel = 7.22	
23 to 24	47.500 47.500	5.60	17.18 63.0	1.5 1.61	0.0 0.0 0.0	6.000 0.0 6.000	100 0.1892	9.414 0.0 1.135		Vel = 9.93	
24 to 25	47.500 47.500	5.60	18.19 81.19	1.5 1.61	0.0 0.0 0.0	6.500 0.0 6.500	100 0.3023	10.549 0.0 1.965		Vel = 12.80	
25 to 28	47.500 47.500	5.60	19.81 101.0	2 2.067	E 0.0 0.0	3.568 3.568 10.068	100 0.1341	12.514 0.0 1.350		Vel = 9.66	
28			0.0 101.00					13.864		K Factor = 27.13	
26 to 27	47.500 47.500	5.60	18.75 18.75	1 1.049	0.0 0.0 0.0	11.000 0.0 11.000	100 0.1619	11.214 0.0 1.781		Vel = 6.96	



# Final Calculations - Hazen-Williams

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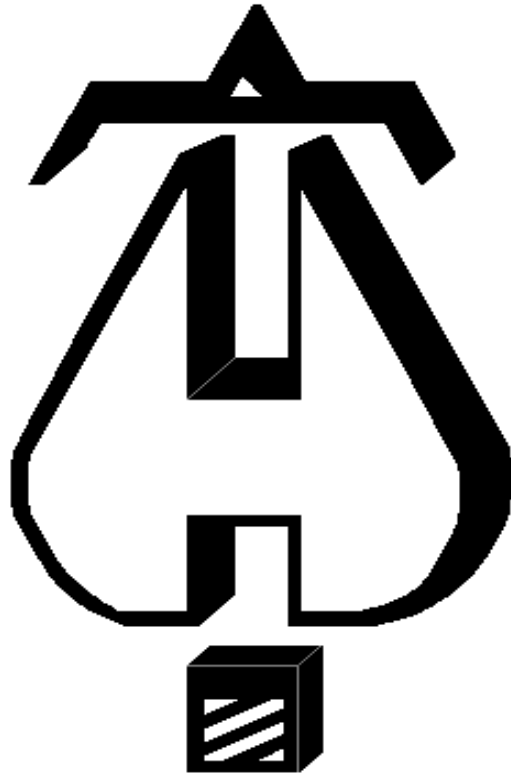
Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
27 to 28	47.500 47.500	5.60	20.19 38.94	1.25 1.38	T 0.0 0.0	4.282 4.282 5.282	100 0.1645	12.995 0.0 0.869		Vel = 8.35	
28			0.0 38.94					13.864		K Factor = 10.46	
29 to 30	47.500 47.500	5.60	19.90 19.9	1 1.049	0.0 0.0 0.0	11.000 0.0 11.000	100 0.1806	12.624 0.0 1.987		Vel = 7.39	
30 to 31	47.500 47.500	5.60	21.40 41.3	1.25 1.38	T 0.0 0.0	4.282 4.282 5.282	100 0.1835	14.611 0.0 0.969		Vel = 8.86	
31			0.0 41.30					15.580		K Factor = 10.46	
32 to 33	47.500 47.500	5.60	23.76 23.76	1.25 1.38	T 0.0 0.0	4.282 4.282 5.282	100 0.0661	18.000 0.0 0.349		Vel = 5.10	
33			0.0 23.76					18.349		K Factor = 5.55	
34 to 35	47.500 47.500	5.60	28.49 28.49	1.25 1.38	T 0.0 0.0	4.282 4.282 5.282	100 0.0922	25.878 0.0 0.487		Vel = 6.11	
35			0.0 28.49					26.365		K Factor = 5.55	
36 to 37	47.500 47.500	5.60	31.10 31.1	1.25 1.38	T 0.0 0.0	4.282 4.282 5.282	100 0.1085	30.848 0.0 0.573		Vel = 6.67	
37			0.0 31.10					31.421		K Factor = 5.55	
38 to 39	47.500 47.500	5.60	34.12 34.12	1.25 1.38	T 0.0 0.0	4.282 4.282 5.282	100 0.1287	37.113 0.0 0.680		Vel = 7.32	
39			0.0 34.12					37.793		K Factor = 5.55	
28 to 31	47.500 47.500		139.94 139.94	2 2.067	0.0 0.0 0.0	7.000 0.0 7.000	100 0.2451	13.864 0.0 1.716		Vel = 13.38	
31 to 33	47.500 47.500		41.30 181.24	2 2.067	0.0 0.0 0.0	7.000 0.0 7.000	100 0.3956	15.580 0.0 2.769		Vel = 17.33	
33 to 35	47.500 47.500		23.76 205.0	2 2.067	2E 0.0 0.0	7.137 9.000 7.137 16.137	100 0.4967	18.349 0.0 8.016		Vel = 19.60	
35 to 37	47.500 47.500		28.49 233.49	2 2.067	0.0 0.0 0.0	8.000 0.0 8.000	100 0.6320	26.365 0.0 5.056		Vel = 22.32	

# Final Calculations - Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
37 to 39	47.500 47.500		31.10 264.59	2 2.067		8.000 0.0 8.000	100 0.7965	31.421 0.0 6.372		Vel = 25.30	
39 to 40	47.500 47		34.12 298.71	2.5 2.469	2E T	8.564 8.564 0.0	4.330 17.128 21.458	100 37.793 0.217 9.002		Vel = 20.02	
40 to TOR2	47 47		325.62 624.33	4 4.26	4I T	26.313 18.795 0.0	124.500 45.108 169.608	100 47.012 0.0 19.538		Vel = 14.05	
TOR2 to BOR2	47 42.500		0.0 624.33	4 4.26	G D T	1.879 26.313 18.795	5.000 46.987 51.987	100 66.550 1.949 5.989		Vel = 14.05	
BOR2 to BASE	42.500 40.500		0.0 624.33	4 4.26	E Zma	13.167 0.0 0.0	2.000 13.167 15.167	120 74.488 5.929 1.247		** Fixed Loss = 5.063 Vel = 14.05	
BASE to TEST	40.500 39		0.0 624.33	6 6.16	E T G	20.084 43.037 4.304	25.000 67.425 92.425	140 81.664 0.650 0.947		Vel = 6.72	
TEST			250.00 874.33					83.261		Qa = 250.00 K Factor = 95.82	



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AUBURN, ME  
207-784-1507

Job Name : LUMINATO CONDOMINIUMS  
Drawing : 2 OF 3  
Location : PORTLAND MAINE  
Remote Area : FIRST FLOOR  
Contract : AU-5537-16  
Data File : 5537 LUMINATO - FIRST FLOOR DRY SYSTEM 1950 SQ FT.WXF

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**HYDRAULIC CALCULATIONS**  
*for*

**Project name:** LUMINATO CONDOMINIUMS  
**Location:** PORTLAND MAINE  
**Drawing no:** 2 OF 3  
**Date:** 11-23-16

**Design**

**Remote area number:** FIRST FLOOR  
**Remote area location:** FIRST FLOOR  
**Occupancy classification:** LIGHT HAZARD  
**Density:** .15 - Gpm/SqFt  
**Area of application:** 1950 - SqFt  
**Coverage per sprinkler:** 120 - SqFt  
**Type of sprinklers calculated:** RELIABLE F3QR DRY PENDENT R5714  
**No. of sprinklers calculated:** 23  
**In-rack demand:** - GPM  
**Hose streams:** 250 - GPM  
**Total water required (including hose streams):** 783.102 - GPM @ 80.856 - Psi  
**Type of system:** DRY  
**Volume of dry or preaction system:** 395 - Gal

**Water supply information**

**Date:** 07-06-16  
**Location:** SEE PLOT PLAN  
**Source:** PORTLAND WATER DISTRICT

**Name of contractor:** EASTERN FIRE PROTECTION  
**Address:** 170 KITTYHAWK AVE  
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**Name of designer:** GRD  
**Authority having jurisdiction:** MAINE STATE FIRE MARSHAL  
**Notes:** (Include peaking information or gridded systems here.)

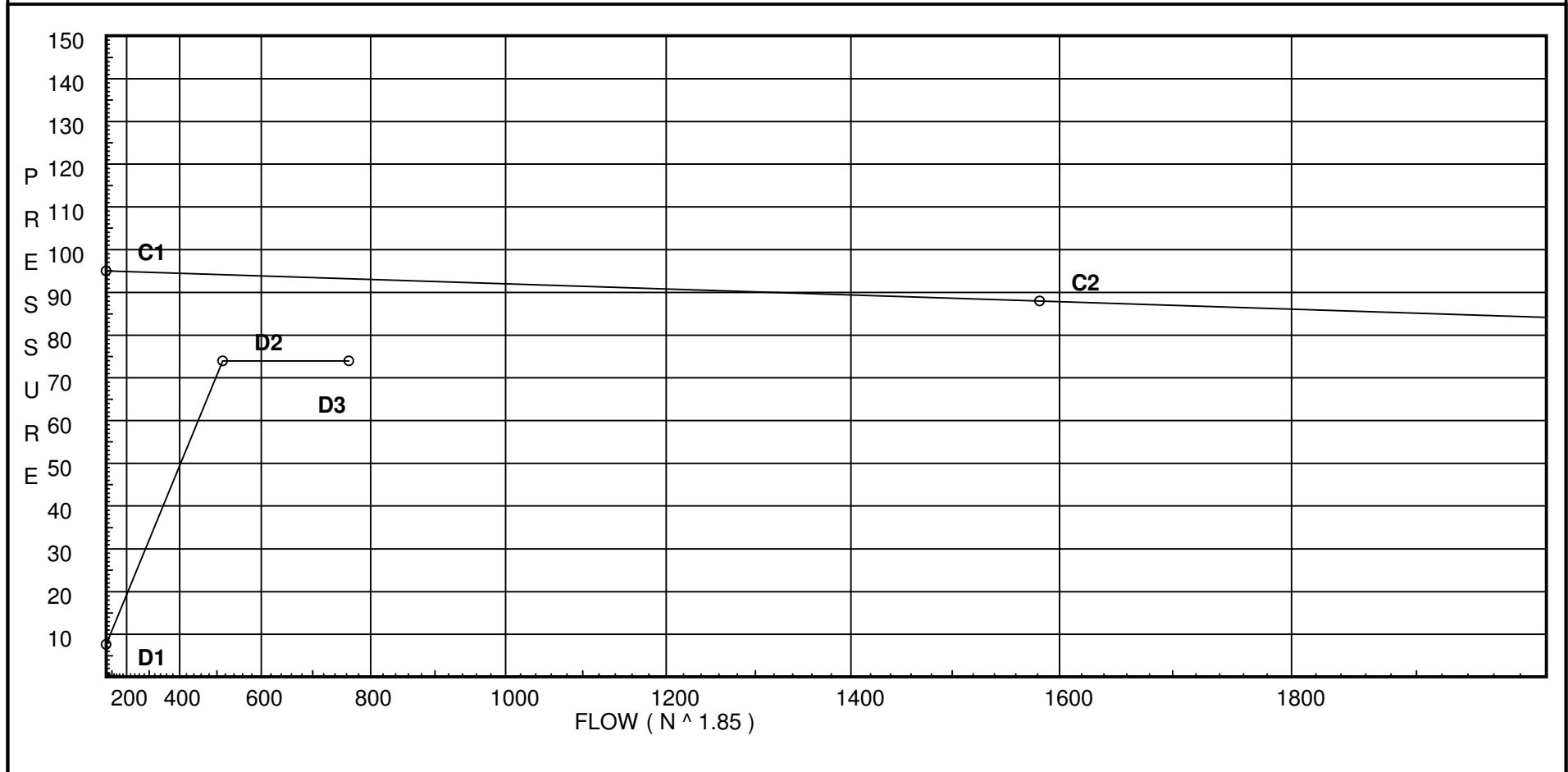
# Water Supply Curve C

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City Water Supply:  
C1 - Static Pressure : 95  
C2 - Residual Pressure: 88  
C2 - Residual Flow : 1582

Demand:  
D1 - Elevation : 7.653  
D2 - System Flow : 513.985  
D2 - System Pressure : 73.953  
Hose ( Demand ) : 250  
D3 - System Demand : 763.985  
Safety Margin : 19.226



# Fittings Used Summary

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Date

Fitting Legend		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
D	Dry Rel D										28		47								
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
I	90' Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
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
Zma	Maxim M200 Horz Butt	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.

**SUPPLY ANALYSIS**

<i>Node at Source</i>	<i>Static Pressure</i>	<i>Residual Pressure</i>	<i>Flow</i>	<i>Available Pressure</i>	<i>Total Demand</i>	<i>Required Pressure</i>
TEST	95.0	88	1582.0	93.179	763.98	73.953

**NODE ANALYSIS**

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>
DP01	0.0	5.6	10.33	18.0	
100	56.67	5.42	23.13	26.08	K=K @ EQ01
101	56.67	5.42	26.71	28.03	K=K @ EQ01
102	56.67	5.42	14.02	20.31	K=K @ EQ01
103	56.67	5.42	15.15	21.11	K=K @ EQ01
104	56.67	5.42	16.26	21.86	K=K @ EQ01
105	56.67	5.42	19.06	23.68	K=K @ EQ01
106	56.67	5.42	21.81	25.32	K=K @ EQ01
107	56.67	5.42	26.21	27.76	K=K @ EQ01
108	56.67	5.42	14.86	20.91	K=K @ EQ01
109	56.67	5.42	16.05	21.73	K=K @ EQ01
110	56.67	5.42	17.22	22.5	K=K @ EQ01
111	56.67	5.42	18.83	23.53	K=K @ EQ01
112	56.67	5.42	21.67	25.25	K=K @ EQ01
113	56.67	5.42	26.2	27.76	K=K @ EQ01
115	56.67	5.42	11.65	18.51	K=K @ EQ01
117	56.67	5.42	11.02	18.0	K=K @ EQ01
118	56.67		14.01		
119	56.67	5.42	14.16	20.41	K=K @ EQ01
120	56.67	5.42	15.1	21.08	K=K @ EQ01
121	56.67	5.42	17.35	22.59	K=K @ EQ01
122	56.67	5.42	20.94	24.82	K=K @ EQ01
123	56.67	5.42	22.55	25.75	K=K @ EQ01
124	56.67	5.42	24.81	27.01	K=K @ EQ01
150	57.83		29.11		
151	57.83		29.12		
152	57.83		29.3		
153	57.83		29.81		
154	57.83		41.58		
175	57.83		44.24		
75	47.0		51.94		
TOR2	47.0		60.81		
BOR2	42.5		66.93		
BASE	40.5		72.64		
TEST	39.0		73.95	250.0	

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
DP01 to EQ01	0 0	5.60	18.00 18.0	1 1.049	T 0.0	3.568 0.0 4.568	100 0.1500	10.332 0.0 0.685		Vel = 6.68	
EQ01			0.0 18.00					11.017		K Factor = 5.42	
100 to 101	56.670 56.670	5.42	26.08 26.08	1 1.049	0.0 0.0	12.000 0.0 12.000	100 0.2980	23.134 0.0 3.576		K = K @ EQ01 Vel = 9.68	
101 to 150	56.670 57.830	5.42	28.03 54.11	1.25 1.38	E T 0.0	2.141 4.282 9.593	100 0.3023	26.710 -0.502 2.900		K = K @ EQ01 Vel = 11.61	
150			0.0 54.11					29.108		K Factor = 10.03	
102 to 103	56.670 56.670	5.42	20.31 20.31	1 1.049	0.0 0.0	6.000 0.0 6.000	100 0.1875	14.024 0.0 1.125		K = K @ EQ01 Vel = 7.54	
103 to 104	56.670 56.670	5.42	21.11 41.42	1.25 1.38	0.0 0.0	6.000 0.0 6.000	100 0.1843	15.149 0.0 1.106		K = K @ EQ01 Vel = 8.88	
104 to 105	56.670 56.670	5.42	21.86 63.28	1.5 1.61	2E 0.0	5.71 0.0 14.710	100 0.1907	16.255 0.0 2.805		K = K @ EQ01 Vel = 9.97	
105 to 106	56.670 56.670	5.42	23.68 86.96	1.5 1.61	0.0 0.0	8.000 0.0 8.000	100 0.3432	19.060 0.0 2.746		K = K @ EQ01 Vel = 13.70	
106 to 107	56.670 56.670	5.42	25.32 112.28	1.5 1.61	0.0 0.0	8.000 0.0 8.000	100 0.5508	21.806 0.0 4.406		K = K @ EQ01 Vel = 17.69	
107 to 151	56.670 57.830	5.42	27.76 140.04	2 2.067	E T 0.0	3.568 7.137 13.875	100 0.2454	26.212 -0.502 3.405		K = K @ EQ01 Vel = 13.39	
151			0.0 140.04					29.115		K Factor = 25.95	
108 to 109	56.670 56.670	5.42	20.91 20.91	1 1.049	0.0 0.0	6.000 0.0 6.000	100 0.1980	14.863 0.0 1.188		K = K @ EQ01 Vel = 7.76	
109 to 110	56.670 56.670	5.42	21.72 42.63	1.25 1.38	0.0 0.0	6.000 0.0 6.000	100 0.1945	16.051 0.0 1.167		K = K @ EQ01 Vel = 9.14	
110 to 111	56.670 56.670	5.42	22.51 65.14	1.5 1.61	0.0 0.0	8.000 0.0 8.000	100 0.2011	17.218 0.0 1.609		K = K @ EQ01 Vel = 10.27	
111 to 112	56.670 56.670	5.42	23.53 88.67	1.5 1.61	0.0 0.0	8.000 0.0 8.000	100 0.3558	18.827 0.0 2.846		K = K @ EQ01 Vel = 13.97	



# Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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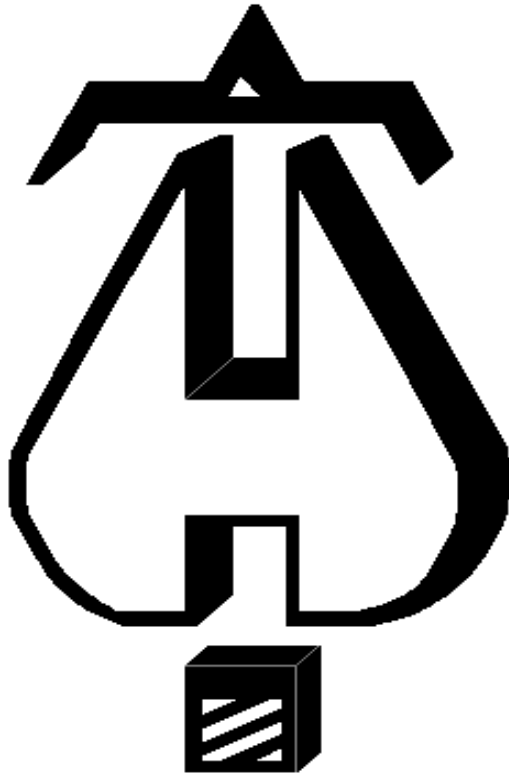
Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
112 to 113	56.670 56.670	5.42	25.24 113.91	1.5 1.61	0.0 0.0	8.000 0.0	100 0.5658	21.673 0.0 4.526	K = K @ EQ01 Vel = 17.95		
113 to 152	56.670 57.830	5.42	27.76 141.67	2 2.067	E T 3.568 7.137 0.0	3.670 10.705 14.375	100 0.2507	26.199 -0.502 3.604	K = K @ EQ01 Vel = 13.55		
152			0.0 141.67					29.301	K Factor = 26.17		
115 to 118	56.670 56.670	5.42	18.51 18.51	1 1.049	2E T 2.855 3.568 0.0	8.500 6.423 14.923	100 0.1579	11.649 0.0 2.357	K = K @ EQ01 Vel = 6.87		
118			0.0 18.51					14.006	K Factor = 4.95		
117 to 118	56.670 56.670	5.42	18.00 18.0	1 1.049	2E T 2.855 3.568 0.0	13.500 6.423 19.923	100 0.1500	11.017 0.0 2.989	K = K @ EQ01 Vel = 6.68		
118 to 119	56.670 56.670		18.51 36.51	1.25 1.38	0.0 0.0 0.0	1.080 0.0 1.080	100 0.1463	14.006 0.0 0.158	Vel = 7.83		
119 to 120	56.670 56.670	5.42	20.41 56.92	1.5 1.61	0.0 0.0 0.0	6.000 0.0 6.000	100 0.1567	14.164 0.0 0.940	K = K @ EQ01 Vel = 8.97		
120 to 121	56.670 56.670	5.42	21.07 77.99	1.5 1.61	0.0 0.0 0.0	8.000 0.0 8.000	100 0.2808	15.104 0.0 2.246	K = K @ EQ01 Vel = 12.29		
121 to 122	56.670 56.670	5.42	22.59 100.58	1.5 1.61	0.0 0.0 0.0	8.000 0.0 8.000	100 0.4492	17.350 0.0 3.594	K = K @ EQ01 Vel = 15.85		
122 to 123	56.670 56.670	5.42	24.82 125.4	2 2.067	0.0 0.0 0.0	8.000 0.0 8.000	100 0.2001	20.944 0.0 1.601	K = K @ EQ01 Vel = 11.99		
123 to 124	56.670 56.670	5.42	25.75 151.15	2 2.067	0.0 0.0 0.0	8.000 0.0 8.000	100 0.2828	22.545 0.0 2.262	K = K @ EQ01 Vel = 14.45		
124 to 153	56.670 57.830	5.42	27.01 178.16	2 2.067	E T 3.568 7.137 0.0	3.670 10.705 14.375	100 0.3832	24.807 -0.502 5.508	K = K @ EQ01 Vel = 17.03		
153			0.0 178.16					29.813	K Factor = 32.63		
150 to 151	57.830 57.830		54.11 54.11	4 4.26	0.0 0.0 0.0	6.000 0.0 6.000	100 0.0012	29.108 0.0 0.007	Vel = 1.22		
151 to 152	57.830 57.830		140.04 194.15	4 4.26	0.0 0.0 0.0	14.000 0.0 14.000	100 0.0133	29.115 0.0 0.186	Vel = 4.37		

# Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
152 to 153	57.830 57.830		141.67 335.82	4 4.26		14.000 0.0 14.000	100 0.0366	29.301 0.0 0.512		Vel = 7.56	
153 to 154	57.830 57.830		178.16 513.98	4 4.26	11l 72.359 0.0	74.000 72.360 146.360	100 0.0804	29.813 0.0 11.765		Vel = 11.57	
154 to 175	57.830 57.830		0.0 513.98	4 4.26	2l 13.156 0.0	20.000 13.157 33.157	100 0.0804	41.578 0.0 2.666		Vel = 11.57	
175 to 75	57.830 47		0.0 513.98	4 4.26	l 6.578 18.795 T	12.000 25.373 37.373	100 0.0804	44.244 4.690 3.004		Vel = 11.57	
75 to TOR2	47 47		0.0 513.98	4 4.26	3l 19.734 37.589 2T	53.000 57.324 110.324	100 0.0804	51.938 0.0 8.869		Vel = 11.57	
TOR2 to BOR2	47 42.500		0.0 513.98	4 4.26	G 1.879 D 26.313 T 18.795	5.000 46.987 51.987	100 0.0804	60.807 1.949 4.179		Vel = 11.57	
BOR2 to BASE	42.500 40.500		0.0 513.98	4 4.26	E 13.167 Zma 0.0	2.000 13.167 15.167	120 0.0574	66.935 4.837 0.870		** Fixed Loss = 3.971 Vel = 11.57	
BASE to TEST	40.500 39		0.0 513.98	6 6.16	E 20.084 T 43.037 G 4.304	25.000 67.425 92.425	140 0.0072	72.642 0.650 0.661		Vel = 5.53	
TEST			250.00 763.98					73.953		Qa = 250.00 K Factor = 88.84	



... **Fire Protection by Computer Design**

EASTERN FIRE PROTECTION  
AUBURN, ME  
207-784-1507

Job Name : LUMINATO CONDOMINIUMS  
Drawing : 2 OF 3  
Location : PORTLAND MAINE  
Remote Area : THIRD FLOOR  
Contract : AU-5537-16  
Data File : 5537 LUMINATO - SECOND FLOOR 900 SQ FT.WXF

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**HYDRAULIC CALCULATIONS**  
*for*

**Project name:** LUMINATO CONDOMINIUMS  
**Location:** PORTLAND MAINE  
**Drawing no:** 2 OF 3  
**Date:** 11-23-16

**Design**

**Remote area number:** THIRD FLOOR  
**Remote area location:** THIRD FLOOR  
**Occupancy classification:** LIGHT HAZARD  
**Density:** .10 - Gpm/SqFt  
**Area of application:** 1068 - SqFt  
**Coverage per sprinkler:** 196 - SqFt  
**Type of sprinklers calculated:** RELIABLE KFR-CCS UPRIGHT RA4445  
**No. of sprinklers calculated:** 10  
**In-rack demand:** - GPM  
**Hose streams:** 100 - GPM  
**Total water required (including hose streams):** 280.374 - GPM @ 86.937 - Psi  
**Type of system:** WET  
**Volume of dry or preaction system:** N/A - Gal

**Water supply information**

**Date:** 07-06-16  
**Location:** SEE PLOT PLAN  
**Source:** PORTLAND WATER DISTRICT

**Name of contractor:** EASTERN FIRE PROTECTION  
**Address:** 170 KITTYHAWK AVE  
**Phone number:** 207-784-1507  
**Name of designer:** GRD

**Authority having jurisdiction:** MAINE STATE FIRE MARSHAL

**Notes:** (Include peaking information or gridded systems here.) DESIGN CRITERIA PER RELIABLE BULLETIN 044 REV C.

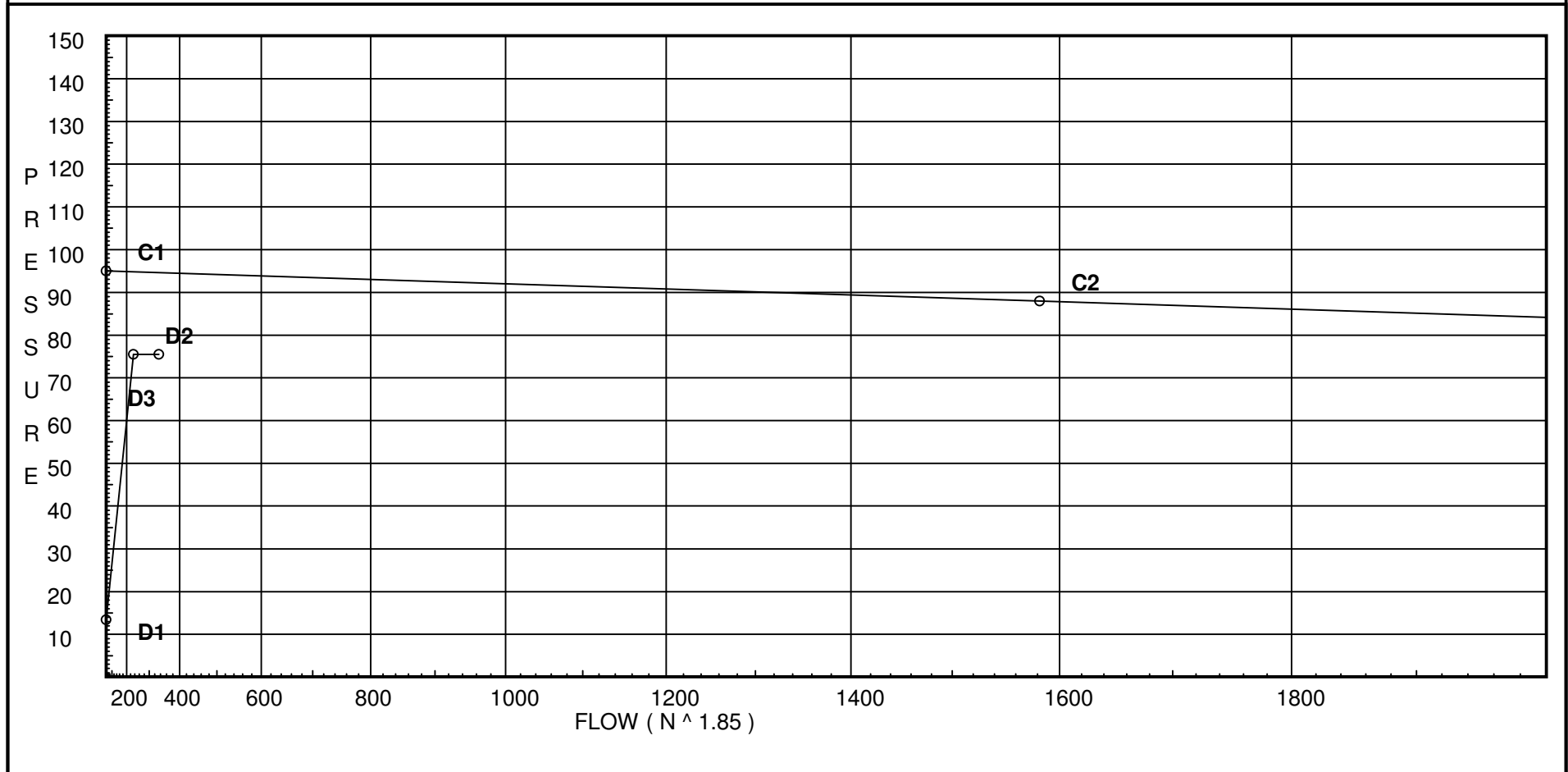
# Water Supply Curve C

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Date

City Water Supply:  
C1 - Static Pressure : 95  
C2 - Residual Pressure: 88  
C2 - Residual Flow : 1582

Demand:  
D1 - Elevation : 13.426  
D2 - System Flow : 234.055  
D2 - System Pressure : 75.510  
Hose ( Demand ) : 100  
D3 - System Demand : 334.055  
Safety Margin : 19.096



# Fittings Used Summary

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Fitting Legend		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
Abbrev.	Name																				
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
I	90° Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
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
Zma	Maxim M200 Horz Butt	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.

**SUPPLY ANALYSIS**

<b>Node at Source</b>	<b>Static Pressure</b>	<b>Residual Pressure</b>	<b>Flow</b>	<b>Available Pressure</b>	<b>Total Demand</b>	<b>Required Pressure</b>
TEST	95.0	88	1582.0	94.606	334.06	75.51

**NODE ANALYSIS**

<b>Node Tag</b>	<b>Elevation</b>	<b>Node Type</b>	<b>Pressure at Node</b>	<b>Discharge at Node</b>	<b>Notes</b>
SP01	0.0	5.6	9.0	16.8	
SP02	0.0	5.6	7.0	14.82	
260	70.0	5.51	9.3	16.8	K=K @ EQ01
261	70.0	5.51	9.99	17.41	K=K @ EQ01
262	70.0	5.51	8.66	16.21	K=K @ EQ02
263	70.0	5.51	8.44	16.0	K=K @ EQ02
264	70.0		8.71		
265	70.0	5.51	8.95	16.48	K=K @ EQ02
266	70.0	5.51	8.93	16.46	K=K @ EQ02
267	70.0		9.73		
268	70.0		11.41		
269	70.0		16.36		
270	70.0	5.51	16.55	22.41	K=K @ EQ01
271	70.0	5.51	11.69	18.84	K=K @ EQ01
272	70.0	5.51	12.55	19.52	K=K @ EQ01
273	70.0	5.51	14.63	21.08	K=K @ EQ01
275	70.0	5.51	22.51	26.14	K=K @ EQ02
277	70.0	5.51	23.51	26.71	K=K @ EQ02
274	70.0		17.38		
276	70.0		23.26		
278	70.0		23.68		
214	70.0		34.51		
250	70.0		45.15		
FCV2	66.67		50.2		
SP2	66.67		56.77		
SP1	47.5		65.85		
TOR1	47.5		67.61		
BOR1	42.5		70.8		
BASE	40.5		74.71		
TEST	39.0		75.51	100.0	

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
SP01 to EQ01	0 0	5.60	16.80 16.8	1 1.101	O 0.0	5.0 5.000 6.000	150 0.0493	9.000 0.0 0.296		Vel = 5.66	
EQ01			0.0 16.80					9.296		K Factor = 5.51	
SP02 to EQ02	0 0	5.60	14.82 14.82	1 1.101	O 0.0	5.0 5.000 6.000	150 0.0390	7.000 0.0 0.234		Vel = 4.99	
EQ02			0.0 14.82					7.234		K Factor = 5.51	
260 to 261	70 70	5.51	16.80 16.8	1 1.101	0.0 0.0	14.000 0.0 14.000	150 0.0493	9.296 0.0 0.690		K = K @ EQ01 Vel = 5.66	
261 to 268	70 70	5.51	17.41 34.21	1.25 1.394	2N 0.0	16.0 16.000 24.500	150 0.0582	9.986 0.0 1.426		K = K @ EQ01 Vel = 7.19	
268			0.0 34.21					11.412		K Factor = 10.13	
262 to 264	70 70	5.51	16.21 16.21	1 1.101	0.0 0.0	1.000 0.0 1.000	150 0.0460	8.661 0.0 0.046		K = K @ EQ02 Vel = 5.46	
264			0.0 16.21					8.707		K Factor = 5.49	
263 to 264	70 70	5.51	16.00 16.0	1 1.101	O 0.0	5.0 5.000 6.000	150 0.0450	8.437 0.0 0.270		K = K @ EQ02 Vel = 5.39	
264 to 265	70 70		16.21 32.21	1.25 1.394	0.0 0.0	4.670 0.0 4.670	150 0.0520	8.707 0.0 0.243		Vel = 6.77	
265 to 267	70 70	5.51	16.48 48.69	1.25 1.394	O 0.0	6.0 6.000 7.000	150 0.1119	8.950 0.0 0.783		K = K @ EQ02 Vel = 10.24	
267			0.0 48.69					9.733		K Factor = 15.61	
266 to 267	70 70	5.51	16.46 16.46	1 1.101	N O 0.0	7.0 5.0 12.000 17.000	150 0.0475	8.926 0.0 0.807		K = K @ EQ02 Vel = 5.55	
267 to 268	70 70		48.69 65.15	1.25 1.394	O 0.0	6.0 6.000 8.760	150 0.1917	9.733 0.0 1.679		Vel = 13.70	
268 to 269	70 70		34.21 99.36	1.5 1.598	O 0.0	8.0 8.000 23.000	150 0.2152	11.412 0.0 4.949		Vel = 15.89	
269 to 270	70 70		0.0 99.36	2 2.003	0.0 0.0	2.580 0.0 2.580	150 0.0717	16.361 0.0 0.185		Vel = 10.12	



# Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Date

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
270 to 274	70 70	5.51	22.42 121.78	2 2.003		0.0 0.0 0.0	8.000 0.0 8.000	150 0.1044	16.546 0.0 0.835	K = K @ EQ01 Vel = 12.40		
274			0.0 121.78						17.381	K Factor = 29.21		
271 to 272	70 70	5.51	18.84 18.84	1 1.101		0.0 0.0 0.0	14.000 0.0 14.000	150 0.0609	11.692 0.0 0.853	K = K @ EQ01 Vel = 6.35		
272 to 273	70 70	5.51	19.52 38.36	1.25 1.394	2N	16.0 0.0	13.000 16.000 29.000	150 0.0719	12.545 0.0 2.086	K = K @ EQ01 Vel = 8.06		
273 to 274	70 70	5.51	21.08 59.44	1.25 1.394	O	6.0 0.0 0.0	11.000 6.000 17.000	150 0.1618	14.631 0.0 2.750	K = K @ EQ01 Vel = 12.50		
274			0.0 59.44						17.381	K Factor = 14.26		
275 to 276	70 70	5.51	26.14 26.14	1 1.101	O	5.0 0.0 0.0	1.670 5.000 6.670	150 0.1117	22.513 0.0 0.745	K = K @ EQ02 Vel = 8.81		
276			0.0 26.14						23.258	K Factor = 5.42		
277 to 278	70 70	5.51	26.71 26.71	1.5 1.598	O	8.0 0.0 0.0	1.000 8.000 9.000	150 0.0189	23.507 0.0 0.170	K = K @ EQ02 Vel = 4.27		
278			0.0 26.71						23.677	K Factor = 5.49		
274 to 276	70 70		181.21 181.21	2 2.003	2N	22.0 0.0 0.0	5.000 22.000 27.000	150 0.2177	17.381 0.0 5.877	Vel = 18.45		
276 to 278	70 70		26.14 207.35	2 2.003		0.0 0.0 0.0	1.500 0.0 1.500	150 0.2793	23.258 0.0 0.419	Vel = 21.11		
278 to 214	70 70		26.71 234.06	2 2.003	O	10.0 0.0 0.0	21.000 10.000 31.000	150 0.3495	23.677 0.0 10.834	Vel = 23.83		
214 to 250	70 70		0.0 234.06	2.5 2.635	3I T	37.34 24.894 0.0	53.500 62.234 115.734	150 0.0919	34.511 0.0 10.638	Vel = 13.77		
250 to FCV2	70 66.670		0.0 234.06	2.5 2.635	2I	16.474 0.0 0.0	9.500 16.474 25.974	120 0.1389	45.149 1.442 3.608	Vel = 13.77		
FCV2 to SP2	66.670 66.670		0.0 234.06	2.5 2.635	B S T	9.61 19.22 16.474	2.000 45.304 47.304	120 0.1389	50.199 0.0 6.570	Vel = 13.77		
SP2 to SP1	66.670 47.500		0.0 234.06	4 4.26	T	26.334 0.0 0.0	31.500 26.334 57.834	120 0.0134	56.769 8.303 0.774	Vel = 5.27		

# Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Date

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
SP1 to TOR1	47.500 47.500		0.0 234.06	4 4.26	9I	82.953 0.0 131.953	120 0.0134	65.846 0.0 1.766		Vel = 5.27	
TOR1 to BOR1	47.500 42.500		0.0 234.06	4 4.26	B S T	15.8 28.968 26.334 76.102	120 0.0134	67.612 2.166 1.018		Vel = 5.27	
BOR1 to BASE	42.500 40.500		0.0 234.06	4 4.26	E Zma	13.167 0.0 13.167 18.167	120 0.0134	70.796 3.666 0.244		* * Fixed Loss = 2.8 Vel = 5.27	
BASE to TEST	40.500 39		0.0 234.06	6 6.16	E T G	20.084 43.037 4.304 92.425	140 0.0017	74.706 0.650 0.154		Vel = 2.52	
TEST			100.00 334.06					75.510		Qa = 100.00 K Factor = 38.44	



**... Fire Protection by Computer Design**

EASTERN FIRE PROTECTION  
AUBURN, ME  
207-784-1507

Job Name : LUMINATO CONDOMINIUMS  
Drawing : 2 OF 3  
Location : PORTLAND MAINE  
Remote Area : THIRD FLOOR  
Contract : AU-5537-16  
Data File : 5537 LUMINATO - THIRD FLOOR 900 SQ FT.WXF

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**HYDRAULIC CALCULATIONS**  
**for**

**Project name:** LUMINATO CONDOMINIUMS  
**Location:** PORTLAND MAINE  
**Drawing no:** 2 OF 3  
**Date:** 11-23-16

**Design**

**Remote area number:** THIRD FLOOR  
**Remote area location:** THIRD FLOOR  
**Occupancy classification:** LIGHT HAZARD  
**Density:** .10 - Gpm/SqFt  
**Area of application:** 1068 - SqFt  
**Coverage per sprinkler:** 196 - SqFt  
**Type of sprinklers calculated:** RELIABLE KFR-CCS UPRIGHT RA4445  
**No. of sprinklers calculated:** 10  
**In-rack demand:** - GPM  
**Hose streams:** 100 - GPM  
**Total water required (including hose streams):** 280.374 - GPM @ 86.937 - Psi  
**Type of system:** WET  
**Volume of dry or preaction system:** N/A - Gal

**Water supply information**

**Date:** 07-06-16  
**Location:** SEE PLOT PLAN  
**Source:** PORTLAND WATER DISTRICT

**Name of contractor:** EASTERN FIRE PROTECTION  
**Address:** 170 KITTYHAWK AVE  
**Phone number:** 207-784-1507  
**Name of designer:** GRD

**Authority having jurisdiction:** MAINE STATE FIRE MARSHAL

**Notes: (Include peaking information or gridded systems here.)**

REMOTE AREA HAS BEEN MODIFIED IN ACCORDANCE NFPA13 (2016) SECTION 11.2.3.2.3.1

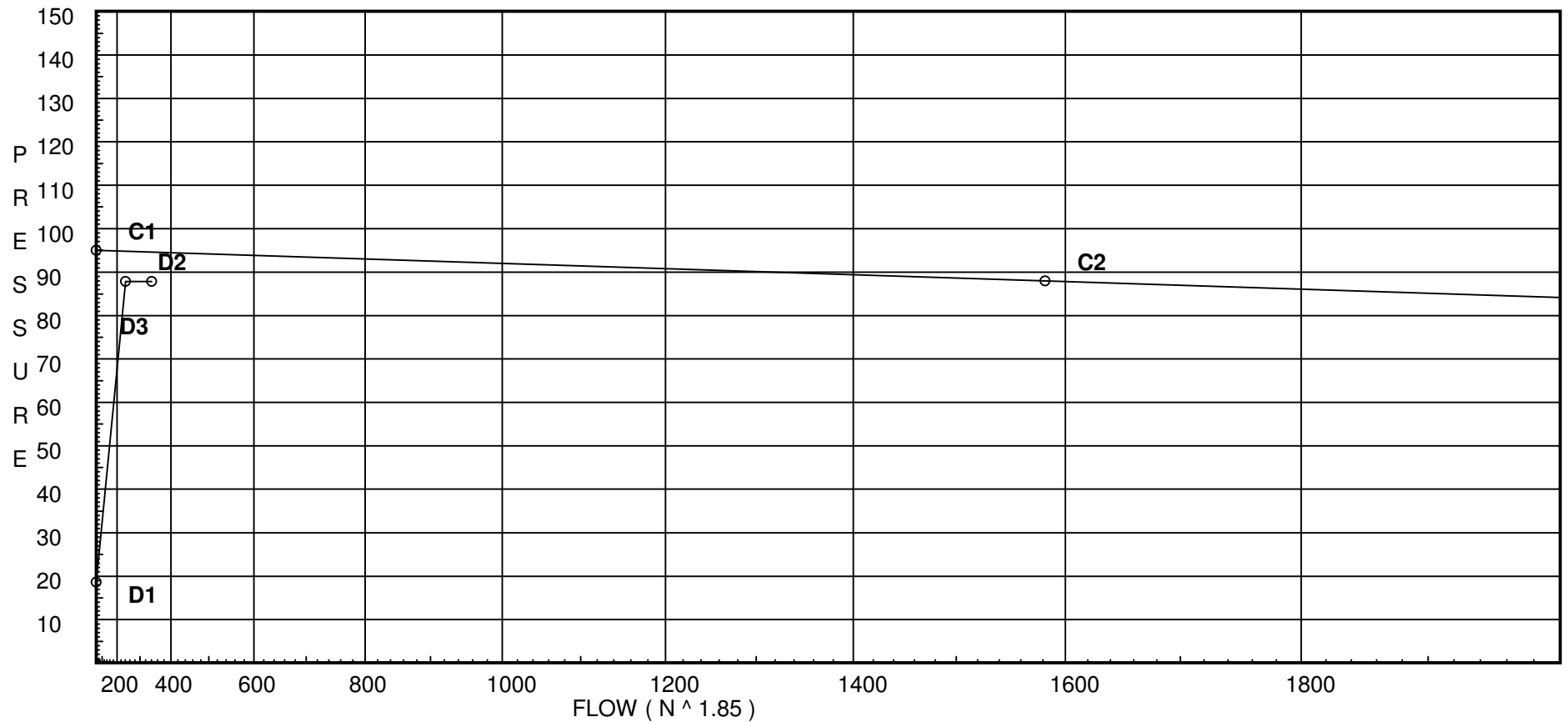
# Water Supply Curve C

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Date

City Water Supply:  
C1 - Static Pressure : 95  
C2 - Residual Pressure: 88  
C2 - Residual Flow : 1582

Demand:  
D1 - Elevation : 18.623  
D2 - System Flow : 241.04  
D2 - System Pressure : 87.865  
Hose ( Demand ) : 100  
D3 - System Demand : 341.04  
Safety Margin : 6.725



# Fittings Used Summary

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Date

Fitting Legend		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
Abbrev.	Name																				
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
I	90° Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
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
Zma	Maxim M200 Horz Butt	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.

**SUPPLY ANALYSIS**

<b>Node at Source</b>	<b>Static Pressure</b>	<b>Residual Pressure</b>	<b>Flow</b>	<b>Available Pressure</b>	<b>Total Demand</b>	<b>Required Pressure</b>
TEST	95.0	88	1582.0	94.59	341.04	87.865

**NODE ANALYSIS**

<b>Node Tag</b>	<b>Elevation</b>	<b>Node Type</b>	<b>Pressure at Node</b>	<b>Discharge at Node</b>	<b>Notes</b>
SP01	0.0	5.6	9.0	16.8	
SP02	0.0	5.6	7.0	14.82	
360	82.0	5.51	9.3	16.8	K=K @ EQ01
361	82.0	5.51	10.43	17.79	K=K @ EQ01
362	80.5	5.51	9.53	17.0	K=K @ EQ02
363	80.5	5.51	9.28	16.78	K=K @ EQ02
364	80.5		9.58		
365	80.5	5.51	9.85	17.28	K=K @ EQ02
366	80.5	5.51	9.82	17.26	K=K @ EQ02
367	80.5		10.7		
368	80.5		12.53		
369	82.0		17.17		
370	82.0	5.51	17.37	22.96	K=K @ EQ01
371	82.0	5.51	12.3	19.32	K=K @ EQ01
372	82.0	5.51	13.19	20.01	K=K @ EQ01
373	82.0	5.51	15.37	21.61	K=K @ EQ01
375	82.0	5.51	23.69	26.81	K=K @ EQ02
377	82.0	5.51	24.74	27.4	K=K @ EQ02
374	82.0		18.25		
376	82.0		24.47		
378	82.0		24.92		
314	82.0		40.41		
350	81.5		51.73		
FCV3	79.0		56.63		
SP3	79.0		63.56		
SP1	47.5		78.02		
TOR1	47.5		79.89		
BOR1	42.5		83.13		
BASE	40.5		87.05		
TEST	39.0		87.87	100.0	

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
SP01 to EQ01	0 0	5.60	16.80 16.8	1 1.101	O	5.0 0.0 0.0	1.000 5.000 6.000	150	9.000 0.0			
			0.0						0.296	Vel =	5.66	
EQ01			16.80						9.296	K Factor =	5.51	
SP02 to EQ02	0 0	5.60	14.82 14.82	1 1.101	O	5.0 0.0 0.0	1.000 5.000 6.000	150	7.000 0.0			
			0.0						0.234	Vel =	4.99	
EQ02			14.82						7.234	K Factor =	5.51	
360 to 361	82 82	5.51	16.80 16.8	1 1.101	N	7.0 0.0 0.0	16.000 7.000 23.000	150	9.296 0.0	K = K @ EQ01		
									1.133	Vel =	5.66	
361 to 368	82 80.500	5.51	17.79 34.59	1.25 1.394	2N	16.0 0.0 0.0	8.500 16.000 24.500	150	10.429 0.650	K = K @ EQ01		
			0.0						1.456	Vel =	7.27	
368			34.59						12.535	K Factor =	9.77	
362 to 364	80.500 80.500	5.51	17.00 17.0	1 1.101		0.0 0.0 0.0	1.000 0.0 1.000	150	9.529 0.0	K = K @ EQ02		
			0.0						0.051	Vel =	5.73	
364			17.00						9.580	K Factor =	5.49	
363 to 364	80.500 80.500	5.51	16.78 16.78	1 1.101	O	5.0 0.0 0.0	1.000 5.000 6.000	150	9.285 0.0	K = K @ EQ02		
									0.295	Vel =	5.65	
364 to 365	80.500 80.500		17.01 33.79	1.25 1.394		0.0 0.0 0.0	4.670 0.0 4.670	150	9.580 0.0			
									0.265	Vel =	7.10	
365 to 367	80.500 80.500	5.51	17.28 51.07	1.25 1.394	O	6.0 0.0 0.0	1.000 6.000 7.000	150	9.845 0.0	K = K @ EQ02		
			0.0						0.856	Vel =	10.74	
367			51.07						10.701	K Factor =	15.61	
366 to 367	80.500 80.500	5.51	17.26 17.26	1 1.101	N O	7.0 5.0 0.0	5.000 12.000 17.000	150	9.820 0.0	K = K @ EQ02		
									0.881	Vel =	5.82	
367 to 368	80.500 80.500		51.08 68.34	1.25 1.394	O	6.0 0.0 0.0	2.760 6.000 8.760	150	10.701 0.0			
									1.834	Vel =	14.37	
368 to 369	80.500 82		34.59 102.93	1.5 1.598	O	8.0 0.0 0.0	15.000 8.000 23.000	150	12.535 -0.650			
									5.283	Vel =	16.47	
369 to 370	82 82		0.0 102.93	2 2.003		0.0 0.0 0.0	2.580 0.0 2.580	150	17.168 0.0			
									0.198	Vel =	10.48	



# Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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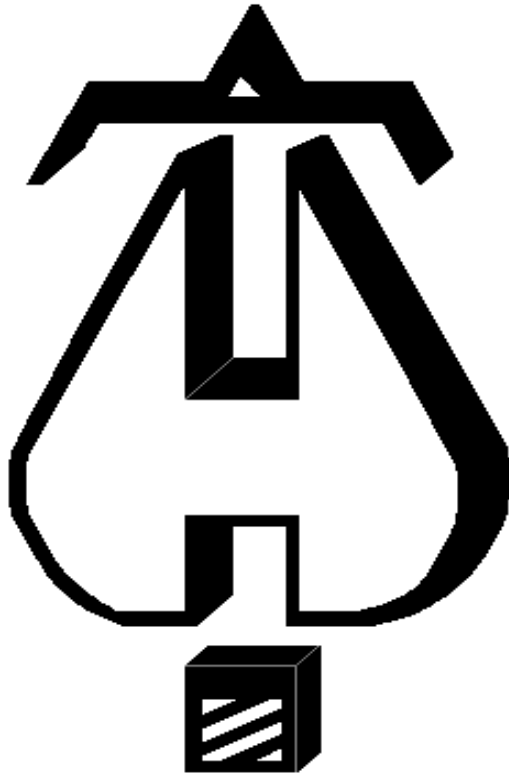
Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
370 to 374	82 82	5.51	22.96 125.89	2 2.003		0.0 0.0 0.0	8.000 0.0 8.000	150 0.1109	17.366 0.0 0.887	K = K @ EQ01 Vel = 12.82		
374			0.0 125.89						18.253	K Factor = 29.47		
371 to 372	82 82	5.51	19.32 19.32	1 1.101		0.0 0.0 0.0	14.000 0.0 14.000	150 0.0639	12.295 0.0 0.894	K = K @ EQ01 Vel = 6.51		
372 to 373	82 82	5.51	20.01 39.33	1.25 1.394	2N	16.0 0.0	13.000 16.000 29.000	150 0.0753	13.189 0.0 2.185	K = K @ EQ01 Vel = 8.27		
373 to 374	82 82	5.51	21.61 60.94	1.25 1.394	O	6.0 0.0 0.0	11.000 6.000 17.000	150 0.1694	15.374 0.0 2.879	K = K @ EQ01 Vel = 12.81		
374			0.0 60.94						18.253	K Factor = 14.26		
375 to 376	82 82	5.51	26.81 26.81	1 1.101	O	5.0 0.0 0.0	1.670 5.000 6.670	150 0.1169	23.692 0.0 0.780	K = K @ EQ02 Vel = 9.03		
376			0.0 26.81						24.472	K Factor = 5.42		
377 to 378	82 82	5.51	27.40 27.4	1.5 1.598	O	8.0 0.0 0.0	1.000 8.000 9.000	150 0.0199	24.736 0.0 0.179	K = K @ EQ02 Vel = 4.38		
378			0.0 27.40						24.915	K Factor = 5.49		
374 to 376	82 82		186.83 186.83	2 2.003	2N	22.0 0.0 0.0	5.000 22.000 27.000	150 0.2303	18.253 0.0 6.219	Vel = 19.02		
376 to 378	82 82		26.81 213.64	2 2.003		0.0 0.0 0.0	1.500 0.0 1.500	150 0.2953	24.472 0.0 0.443	Vel = 21.75		
378 to 314	82 82		27.40 241.04	2 2.003	N O	11.0 10.0 0.0	21.000 21.000 42.000	150 0.3690	24.915 0.0 15.499	Vel = 24.54		
314 to 350	82 81.500		0.0 241.04	2.5 2.635	3N T	36.0 24.894 0.0	53.500 60.894 114.394	150 0.0971	40.414 0.217 11.102	Vel = 14.18		
350 to FCV3	81.500 79		0.0 241.04	2.5 2.635	2I	16.474 0.0 0.0	9.500 16.474 25.974	120 0.1466	51.733 1.083 3.809	Vel = 14.18		
FCV3 to SP3	79 79		0.0 241.04	2.5 2.635	B S T	9.61 19.22 16.474	2.000 45.304 47.304	120 0.1467	56.625 0.0 6.938	Vel = 14.18		
SP3 to SP1	79 47.500		0.0 241.04	4 4.26	T	26.334 0.0 0.0	31.500 26.334 57.834	120 0.0141	63.563 13.643 0.817	Vel = 5.43		

# Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
SP1 to TOR1	47.500 47.500		0.0 241.04	4 4.26	9I	82.953 0.0 131.953	120 0.0141	78.023 0.0 1.865		Vel = 5.43	
TOR1 to BOR1	47.500 42.500		0.0 241.04	4 4.26	B S T	15.8 28.968 26.334 76.102	120 0.0141	79.888 2.166 1.075		Vel = 5.43	
BOR1 to BASE	42.500 40.500		0.0 241.04	4 4.26	E Zma	13.167 0.0 13.167 18.167	120 0.0141	83.129 3.666 0.257		* * Fixed Loss = 2.8 Vel = 5.43	
BASE to TEST	40.500 39		0.0 241.04	6 6.16	E T G	20.084 43.037 4.304 92.425	140 0.0018	87.052 0.650 0.163		Vel = 2.59	
TEST			100.00 341.04					87.865		Qa = 100.00 K Factor = 36.38	



... **Fire Protection by Computer Design**

EASTERN FIRE PROTECTION  
AUBURN, ME  
207-784-1507

Job Name : LUMINATO CONDOMINIUMS  
Drawing : 3 OF 3  
Location : PORTLAND MAINE  
Remote Area : FOURTH FLOOR  
Contract : AU-5537-16  
Data File : 5537 LUMINATO - FOURTH FLOOR 900 SQ FT.WXF

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**HYDRAULIC CALCULATIONS**  
*for*

**Project name:** LUMINATO CONDOMINIUMS  
**Location:** PORTLAND MAINE  
**Drawing no:** 3 OF 3  
**Date:** 12-5-16

**Design**

**Remote area number:** FOURTH FLOOR  
**Remote area location:** FOURTH FLOOR  
**Occupancy classification:** LIGHT HAZARD  
**Density:** .10 - Gpm/SqFt  
**Area of application:** 921 - SqFt  
**Coverage per sprinkler:** 168 - SqFt  
**Type of sprinklers calculated:** RELIABLE F1FR56 PENDENT K5.6 RA1414  
**No. of sprinklers calculated:** 9  
**In-rack demand:** - GPM  
**Hose streams:** 100 - GPM  
**Total water required (including hose streams):** 298.207 - GPM @ 85.516 - Psi  
**Type of system:** WET  
**Volume of dry or preaction system:** N/A - Gal

**Water supply information**

**Date:** 07-06-16  
**Location:** SEE PLOT PLAN  
**Source:** PORTLAND WATER DISTRICT

**Name of contractor:** EASTERN FIRE PROTECTION  
**Address:** 170 KITTYHAWK AVE  
**Phone number:** 207-784-1507  
**Name of designer:** GRD

**Authority having jurisdiction:** MAINE STATE FIRE MARSHAL

**Notes: (Include peaking information or gridded systems here.)**

REMOTE AREA HAS BEEN MODIFIED IN ACCORDANCE NFPA13 (2016) SECTION 11.2.3.2.3.1

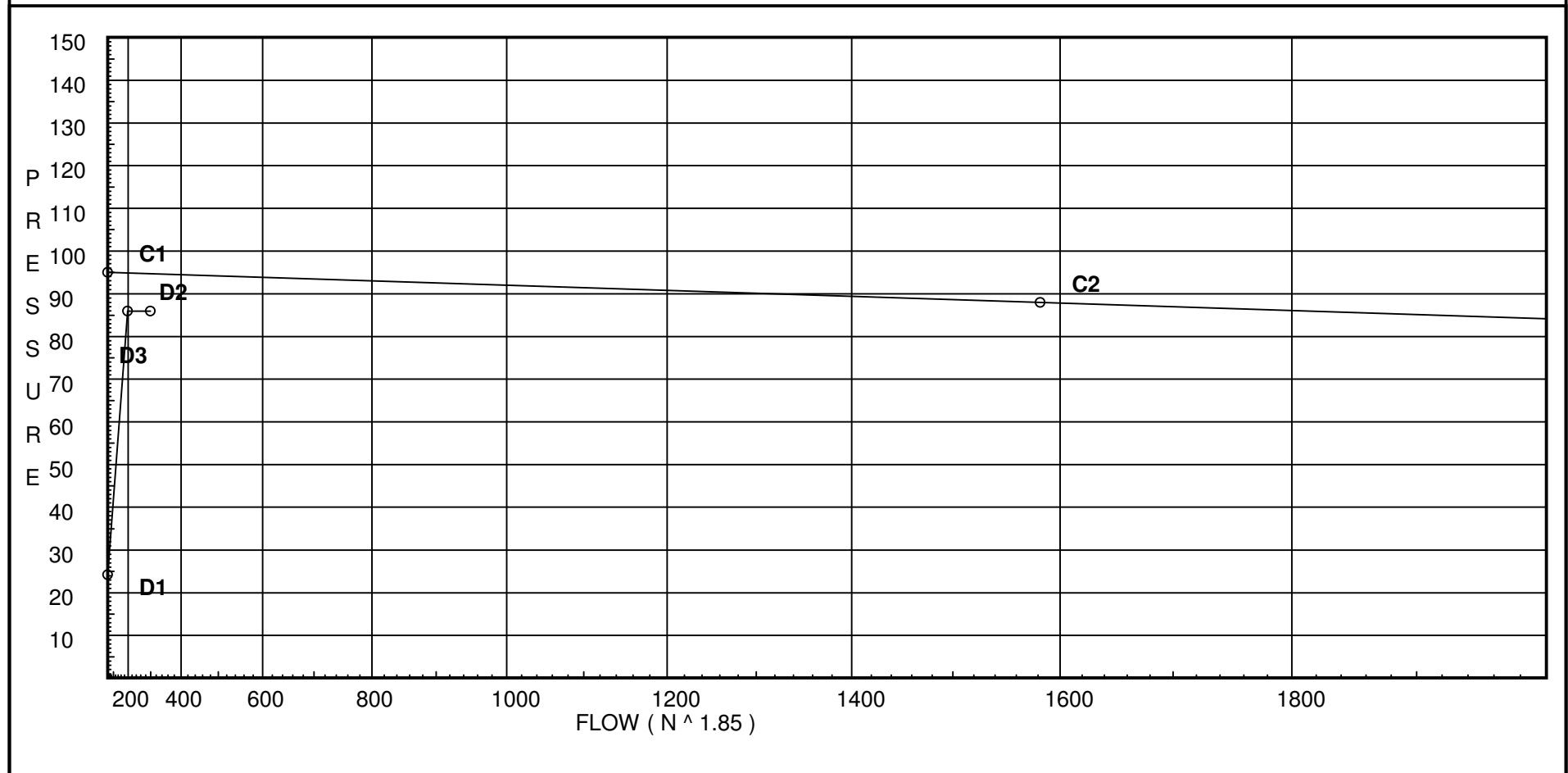
# Water Supply Curve C

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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City Water Supply:  
C1 - Static Pressure : 95  
C2 - Residual Pressure: 88  
C2 - Residual Flow : 1582

Demand:  
D1 - Elevation : 24.254  
D2 - System Flow : 198.207  
D2 - System Pressure : 85.979  
Hose ( Demand ) : 100  
D3 - System Demand : 298.207  
Safety Margin : 8.701



# Fittings Used Summary

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Fitting Legend		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
Abbrev.	Name																				
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
I	90° Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
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
Zma	Maxim M200 Horz Butt	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.

**SUPPLY ANALYSIS**

<b>Node at Source</b>	<b>Static Pressure</b>	<b>Residual Pressure</b>	<b>Flow</b>	<b>Available Pressure</b>	<b>Total Demand</b>	<b>Required Pressure</b>
TEST	95.0	88	1582.0	94.681	298.21	85.979

**NODE ANALYSIS**

<b>Node Tag</b>	<b>Elevation</b>	<b>Node Type</b>	<b>Pressure at Node</b>	<b>Discharge at Node</b>	<b>Notes</b>
SP01	0.0	5.6	9.0	16.8	
SP02	0.0	5.6	7.0	14.82	
460	95.0	5.51	9.3	16.8	K=K @ EQ01
461	95.0	5.51	9.87	17.31	K=K @ EQ01
462	95.0		10.22		
463	94.0	5.51	8.64	16.19	K=K @ EQ02
464	94.0	5.51	9.01	16.53	K=K @ EQ02
465	94.0	5.51	8.66	16.21	K=K @ EQ02
466	94.0		9.06		
467	95.0		10.72		
468	95.0	5.51	15.97	22.02	K=K @ EQ01
470	95.0	5.51	18.64	23.79	K=K @ EQ01
472	95.0	5.51	17.38	22.97	K=K @ EQ01
473	95.0	5.51	17.77	23.23	K=K @ EQ01
474	95.0	5.51	17.66	23.15	K=K @ EQ01
475	95.0		18.19		
469	95.33		18.45		
471	95.33		18.96		
476	95.33		19.72		
412	94.33		37.88		
450	93.83		48.92		
FCV4	91.33		52.65		
SP4	91.33		57.48		
SP1	47.5		77.16		
TOR1	47.5		78.46		
BOR1	42.5		81.37		
BASE	40.5		85.22		
TEST	39.0		85.98	100.0	

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
SP01 to EQ01	0 0	5.60	16.80 16.8	1 1.101	O	5.0 0.0 0.0	1.000 5.000 6.000	150	9.000 0.0			
			0.0						0.296	Vel =	5.66	
EQ01			16.80						9.296	K Factor =	5.51	
SP02 to EQ02	0 0	5.60	14.82 14.82	1 1.101	O	5.0 0.0 0.0	1.000 5.000 6.000	150	7.000 0.0			
			0.0						0.234	Vel =	4.99	
EQ02			14.82						7.234	K Factor =	5.51	
460 to 462	95 95	5.51	16.80 16.8	1 1.101	N	7.0 0.0 0.0	11.750 7.000 18.750	150	9.296 0.0	K = K @ EQ01		
			0.0						0.924	Vel =	5.66	
462			16.80						10.220	K Factor =	5.26	
461 to 462	95 95	5.51	17.31 17.31	1 1.101	O	5.0 0.0 0.0	1.750 5.000 6.750	150	9.868 0.0	K = K @ EQ01		
			0.0						0.352	Vel =	5.83	
462 to 467	95 95		16.80 34.11	1.25 1.394		0.0 0.0 0.0	8.580 0.0 8.580	150	10.220 0.0			
			0.0						0.496	Vel =	7.17	
467			34.11						10.716	K Factor =	10.42	
463 to 464	94 94	5.51	16.19 16.19	1 1.101		0.0 0.0 0.0	8.000 0.0 8.000	150	8.640 0.0	K = K @ EQ02		
			0.0						0.368	Vel =	5.46	
464 to 466	94 94	5.51	16.53 32.72	1.25 1.394		0.0 0.0 0.0	1.000 0.0 1.000	150	9.008 0.0	K = K @ EQ02		
			0.0						0.054	Vel =	6.88	
466			32.72						9.062	K Factor =	10.87	
465 to 466	94 94	5.51	16.21 16.21	1 1.101	O	5.0 0.0 0.0	3.750 5.000 8.750	150	8.658 0.0	K = K @ EQ02		
			0.0						0.404	Vel =	5.46	
466 to 467	94 95		32.72 48.93	1.25 1.394	O N	6.0 8.0 0.0	4.500 14.000 18.500	150	9.062 -0.433			
			0.0						0.1128	Vel =	10.29	
467 to 468	95 95		34.11 83.04	1.5 1.598	2N	18.0 0.0 0.0	16.000 18.000 34.000	150	10.716 0.0			
			0.0						0.1544	Vel =	13.28	
468 to 469	95 95.330	5.51	22.02 105.06	1.5 1.598	O	8.0 0.0 0.0	3.000 8.000 11.000	150	15.966 -0.143	K = K @ EQ01		
			0.0						0.2386	Vel =	16.81	
469			105.06						18.448	K Factor =	24.46	



# Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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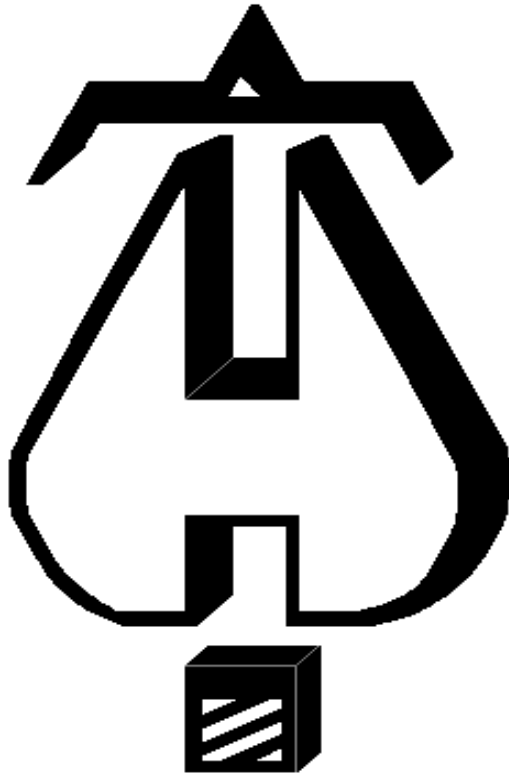
Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
470 to 471	95 95.330	5.51	23.79 23.79	1.25 1.394	O 0.0 0.0	6.0 0.0 15.750	150 0.0298	18.638 -0.143 0.469	K = K @ EQ01 Vel = 5.00		
471			0.0 23.79					18.964	K Factor = 5.46		
472 to 473	95 95	5.51	22.97 22.97	1.25 1.394	0.0 0.0 0.0	14.000 0.0 14.000	150 0.0279	17.384 0.0 0.390	K = K @ EQ01 Vel = 4.83		
473 to 475	95 95	5.51	23.23 46.2	1.5 1.598	0.0 0.0 0.0	8.000 0.0 8.000	150 0.0522	17.774 0.0 0.418	K = K @ EQ01 Vel = 7.39		
475			0.0 46.20					18.192	K Factor = 10.83		
474 to 475	95 95	5.51	23.15 23.15	1 1.101	O 0.0 0.0	5.0 0.0 6.000	150 0.0893	17.656 0.0 0.536	K = K @ EQ01 Vel = 7.80		
475 to 476	95 95.330		46.21 69.36	1.25 1.394	O 0.0 0.0	6.0 0.0 7.750	150 0.2151	18.192 -0.143 1.667	Vel = 14.58		
476			0.0 69.36					19.716	K Factor = 15.62		
469 to 471	95.330 95.330		105.06 105.06	2 2.003	0.0 0.0 0.0	6.500 0.0 6.500	150 0.0794	18.448 0.0 0.516	Vel = 10.70		
471 to 476	95.330 95.330		23.79 128.85	2 2.003	0.0 0.0 0.0	6.500 0.0 6.500	150 0.1157	18.964 0.0 0.752	Vel = 13.12		
476 to 412	95.330 94.330		69.36 198.21	2 2.003	3N O 0.0	33.0 10.0 69.000	150 0.2570	19.716 0.433 17.730	Vel = 20.18		
412 to 450	94.330 93.830		0.0 198.21	2.5 2.635	3N T 0.0	36.0 16.474 105.974	120 0.1021	37.879 0.217 10.822	Vel = 11.66		
450 to FCV4	93.830 91.330		0.0 198.21	2.5 2.635	2I 0.0	16.474 0.0 25.974	120 0.1021	48.918 1.083 2.653	Vel = 11.66		
FCV4 to SP4	91.330 91.330		0.0 198.21	2.5 2.635	B S T	9.61 19.22 16.474	120 0.1021	52.654 0.0 4.830	Vel = 11.66		
SP4 to SP1	91.330 47.500		0.0 198.21	4 4.26	T 0.0	26.334 0.0 70.164	120 0.0098	57.484 18.983 0.691	Vel = 4.46		
SP1 to TOR1	47.500 47.500		0.0 198.21	4 4.26	9I 0.0	82.953 0.0 131.953	120 0.0098	77.158 0.0 1.298	Vel = 4.46		

# Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Date

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TOR1 to BOR1	47.500 42.500		0.0 198.21	4 4.26	B S T	15.8 28.968 26.334	5.000 71.102 76.102	120 2.166 0.749		Vel = 4.46	
BOR1 to BASE	42.500 40.500		0.0 198.21	4 4.26	E Zma	13.167 0.0 0.0	5.000 13.167 18.167	120 3.666 0.179		** Fixed Loss = 2.8 Vel = 4.46	
BASE to TEST	40.500 39		0.0 198.21	6 6.16	E T G	20.084 43.037 4.304	25.000 67.425 92.425	140 0.650 0.113		Vel = 2.13	
TEST			100.00 298.21					85.979		Qa = 100.00 K Factor = 32.16	



... **Fire Protection by Computer Design**

EASTERN FIRE PROTECTION  
AUBURN, ME  
207-784-1507

Job Name : LUMINATO CONDOMINIUMS  
Drawing : 3 OF 3  
Location : PORTLAND MAINE  
Remote Area : FIFTH FLOOR  
Contract : AU-5537-16  
Data File : 5537 LUMINATO - FIFTH FLOOR 900 SQ FT.WXF

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**HYDRAULIC CALCULATIONS**  
*for*

**Project name:** LUMINATO CONDOMINIUMS  
**Location:** PORTLAND MAINE  
**Drawing no:** 3 OF 3  
**Date:** 12-5-16

**Design**

**Remote area number:** FIFTH FLOOR  
**Remote area location:** FIFTH FLOOR  
**Occupancy classification:** LIGHT HAZARD  
**Density:** .10 - Gpm/SqFt  
**Area of application:** 928 - SqFt  
**Coverage per sprinkler:** 196/120 - SqFt  
**Type of sprinklers calculated:** RELIABLE F1FR56 PENDENT K5.6 RA1414  
**No. of sprinklers calculated:** 11  
**In-rack demand:** - GPM  
**Hose streams:** 100 - GPM  
**Total water required (including hose streams):** 342.431 - GPM @ 80.849 - Psi  
**Type of system:** WET  
**Volume of dry or preaction system:** N/A - Gal

**Water supply information**

**Date:** 07-06-16  
**Location:** SEE PLOT PLAN  
**Source:** PORTLAND WATER DISTRICT

**Name of contractor:** EASTERN FIRE PROTECTION  
**Address:** 170 KITTYHAWK AVE  
**Phone number:** 207-784-1507  
**Name of designer:** GRD

**Authority having jurisdiction:** MAINE STATE FIRE MARSHAL

**Notes: (Include peaking information or gridded systems here.)**

REMOTE AREA HAS BEEN MODIFIED IN ACCORDANCE NFPA13 (2016) SECTION 11.2.3.2.3.1

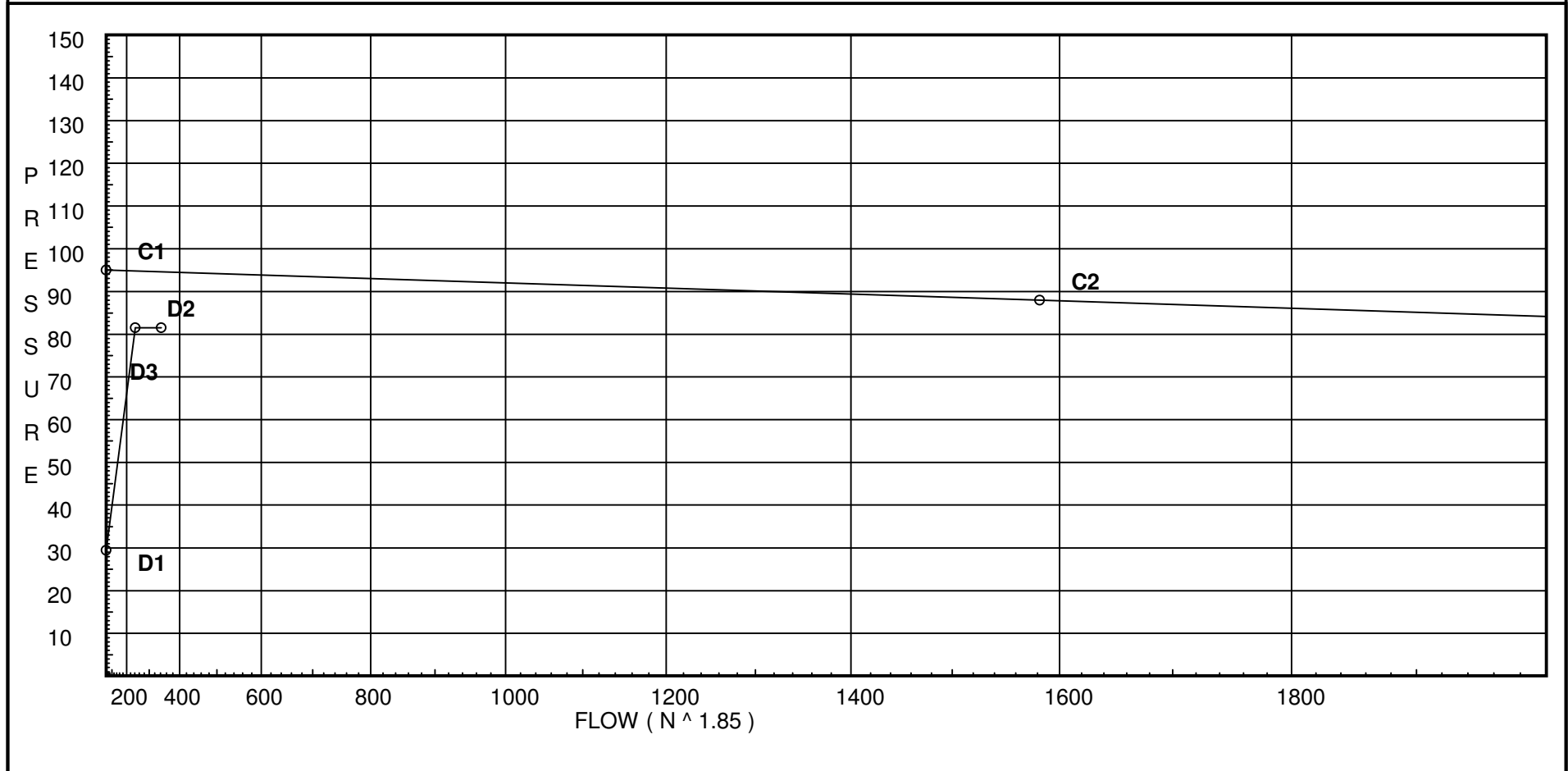
# Water Supply Curve C

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Date

City Water Supply:  
C1 - Static Pressure : 95  
C2 - Residual Pressure: 88  
C2 - Residual Flow : 1582

Demand:  
D1 - Elevation : 29.451  
D2 - System Flow : 242.431  
D2 - System Pressure : 81.521  
Hose ( Demand ) : 100  
D3 - System Demand : 342.431  
Safety Margin : 13.066



# Fittings Used Summary

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Date

Fitting Legend		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
Abbrev.	Name																				
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
I	90° Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
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
Zma	Maxim M200 Horz Butt	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.

**SUPPLY ANALYSIS**

<b>Node at Source</b>	<b>Static Pressure</b>	<b>Residual Pressure</b>	<b>Flow</b>	<b>Available Pressure</b>	<b>Total Demand</b>	<b>Required Pressure</b>
TEST	95.0	88	1582.0	94.587	342.43	81.521

**NODE ANALYSIS**

<b>Node Tag</b>	<b>Elevation</b>	<b>Node Type</b>	<b>Pressure at Node</b>	<b>Discharge at Node</b>	<b>Notes</b>
SP01	0.0	5.6	12.25	19.6	
SP02	0.0	5.6	7.0	14.82	
560	107.0	5.51	12.64	19.6	K=K @ EQ01
561	107.0	5.51	13.58	20.31	K=K @ EQ01
562	105.17	5.51	11.87	18.98	K=K @ EQ02
563	105.17	5.51	12.35	19.36	K=K @ EQ02
564	105.17	5.6	11.68	19.14	
565	105.17	5.51	11.72	18.85	K=K @ EQ02
566	105.17		12.25		
563A	105.17		12.85		
567	107.0		14.24		
568	107.0	5.51	17.66	23.17	K=K @ EQ01
569	107.0		18.2		
571	107.0	5.51	19.79	24.52	K=K @ EQ01
572	107.0		20.58		
573	107.0	5.51	21.31	25.43	K=K @ EQ02
575	107.0	5.51	23.39	26.64	K=K @ EQ02
576	107.0	5.51	23.0	26.43	K=K @ EQ01
577	107.0		23.68		
570	107.0		22.12		
574	107.0		23.16		
578	107.0		24.7		
515A	107.0		33.74		
515	106.67		35.68		
550	106.17		40.83		
FCV5	103.67		43.12		
SP5	103.67		46.12		
SP1	47.5		71.62		
TOR1	47.5		73.51		
BOR1	42.5		76.76		
BASE	40.5		80.71		
TEST	39.0		81.52	100.0	

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
SP01 to EQ01	0 0	5.60	19.60 19.6	1 1.101	O	5.0 0.0 0.0	1.000 5.000 6.000	150 0.0655	12.250 0.0 0.393			Vel = 6.60
EQ01			0.0 19.60						12.643		K Factor = 5.51	
SP02 to EQ02	0 0	5.60	14.82 14.82	1 1.101	O	5.0 0.0 0.0	1.000 5.000 6.000	150 0.0390	7.000 0.0 0.234			Vel = 4.99
EQ02			0.0 14.82						7.234		K Factor = 5.51	
560 to 561	107 107	5.51	19.60 19.6	1 1.101	N	7.0 0.0 0.0	7.250 7.000 14.250	150 0.0655	12.643 0.0 0.934		K = K @ EQ01	Vel = 6.60
561 to 567	107 107	5.51	20.31 39.91	1.25 1.394		0.0 0.0 0.0	8.580 0.0 8.580	150 0.0775	13.577 0.0 0.665		K = K @ EQ01	Vel = 8.39
567			0.0 39.91						14.242		K Factor = 10.58	
562 to 563	105.170 105.170	5.51	18.98 18.98	1 1.101		0.0 0.0 0.0	7.750 0.0 7.750	150 0.0617	11.869 0.0 0.478		K = K @ EQ02	Vel = 6.40
563 to 563A	105.170 105.170	5.51	19.35 38.33	1.25 1.394	O	6.0 0.0 0.0	1.000 6.000 7.000	150 0.0719	12.347 0.0 0.503		K = K @ EQ02	Vel = 8.06
563A			0.0 38.33						12.850		K Factor = 10.69	
564 to 566	105.170 105.170	5.60	19.14 19.14	1 1.101	O	5.0 0.0 0.0	4.000 5.000 9.000	150 0.0627	11.685 0.0 0.564			Vel = 6.45
566			0.0 19.14						12.249		K Factor = 5.47	
565 to 566	105.170 105.170	5.51	18.85 18.85	1 1.101	O	5.0 0.0 0.0	3.750 5.000 8.750	150 0.0609	11.716 0.0 0.533		K = K @ EQ02	Vel = 6.35
566 to 563A	105.170 105.170		19.15 38.0	1.25 1.394	O	6.0 0.0 0.0	2.500 6.000 8.500	150 0.0707	12.249 0.0 0.601			Vel = 7.99
563A to 567	105.170 107		38.33 76.33	1.25 1.394	O	6.0 0.0 0.0	2.500 6.000 8.500	150 0.2571	12.850 -0.793 2.185			Vel = 16.05
567 to 569	107 107		39.91 116.24	1.5 1.598		0.0 0.0 0.0	13.750 0.0 13.750	150 0.2876	14.242 0.0 3.955			Vel = 18.59
569			0.0 116.24						18.197		K Factor = 27.25	



# Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Date

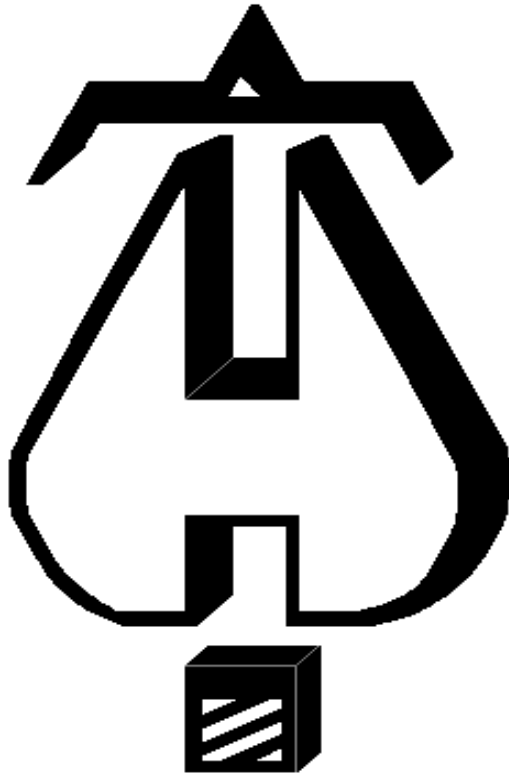
Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
568 to 569	107 107	5.51	23.17 23.17	1 1.101	O	5.0 0.0	1.000 5.000	150 0.0893	17.661 0.0 0.536	K = K @ EQ01 Vel = 7.81		
569 to 570	107 107		116.24 139.41	1.5 1.598	O	8.0 0.0	1.750 8.000	150 0.4026	18.197 0.0 3.925	Vel = 22.30		
570			0.0 139.41						22.122	K Factor = 29.64		
571 to 572	107 107	5.51	24.52 24.52	1 1.101	O	5.0 0.0	3.000 5.000	150 0.0992	19.789 0.0 0.794	K = K @ EQ01 Vel = 8.26		
572 to 573	107 107		0.0 24.52	1.25 1.394		0.0 0.0	23.250 0.0	150 0.0314	20.583 0.0 0.731	Vel = 5.15		
573 to 574	107 107	5.51	25.43 49.95	1.25 1.394	O	6.0 0.0	9.750 6.000	150 0.1173	21.314 0.0 1.847	K = K @ EQ02 Vel = 10.50		
574			0.0 49.95						23.161	K Factor = 10.38		
575 to 577	107 107	5.51	26.64 26.64	1.25 1.394		0.0 0.0	8.000 0.0	150 0.0366	23.386 0.0 0.293	K = K @ EQ02 Vel = 5.60		
577			0.0 26.64						23.679	K Factor = 5.47		
576 to 577	107 107	5.51	26.43 26.43	1 1.101	O	5.0 0.0	1.000 5.000	150 0.1140	22.995 0.0 0.684	K = K @ EQ01 Vel = 8.91		
577 to 578	107 107		26.64 53.07	1.25 1.394	O	6.0 0.0	1.750 6.000	150 0.1312	23.679 0.0 1.017	Vel = 11.16		
578			0.0 53.07						24.696	K Factor = 10.68		
570 to 574	107 107		139.41 139.41	2 2.003		0.0 0.0	7.750 0.0	150 0.1341	22.122 0.0 1.039	Vel = 14.19		
574 to 578	107 107		49.95 189.36	2 2.003		0.0 0.0	6.500 0.0	150 0.2362	23.161 0.0 1.535	Vel = 19.28		
578 to 515A	107 107		53.07 242.43	2 2.003	O	10.0 0.0	14.250 10.000	150 0.3729	24.696 0.0 9.044	Vel = 24.68		
515A to 515	107 106.670		0.0 242.43	3 3.26	3I	20.159 0.0	14.000 20.159	120 0.0526	33.740 0.143 1.796	Vel = 9.32		
515 to 550	106.670 106.170		0.0 242.43	3 3.26	3I T	20.159 20.159	53.500 40.318	120 0.0526	35.679 0.217 4.932	Vel = 9.32		

# Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Date

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
550 to FCV5	106.170 103.670		0.0 242.43	3 3.26	2I 13.44 0.0	9.500 13.440	120 0.0526	40.828 1.083 1.206		Vel = 9.32	
FCV5 to SP5	103.670 103.670		0.0 242.43	3 3.26	B 13.44 S 21.503 T 20.159	2.000 55.102 57.102	120 0.0526	43.117 0.0 3.002		Vel = 9.32	
SP5 to SP1	103.670 47.500		0.0 242.43	4 4.26	T 26.334 0.0	56.170 26.334	120 0.0143	46.119 24.327 1.179		Vel = 5.46	
SP1 to TOR1	47.500 47.500		0.0 242.43	4 4.26	9I 82.953 0.0	49.000 82.953	120 0.0143	71.625 0.0 1.885		Vel = 5.46	
TOR1 to BOR1	47.500 42.500		0.0 242.43	4 4.26	B 15.8 S 28.968 T 26.334	5.000 71.102 76.102	120 0.0143	73.510 2.166 1.086		Vel = 5.46	
BOR1 to BASE	42.500 40.500		0.0 242.43	4 4.26	E 13.167 Zma 0.0 Eq 0.0	5.000 14.484 19.484	120 0.0143	76.762 3.666 0.279		** Fixed Loss = 2.8 Vel = 5.46	
BASE to TEST	40.500 39		0.0 242.43	6 6.16	E 20.084 T 43.037 G 4.304	25.000 67.425 92.425	140 0.0018	80.707 0.650 0.164		Vel = 2.61	
TEST			100.00 342.43					81.521		Qa = 100.00 K Factor = 37.93	



... **Fire Protection by Computer Design**

EASTERN FIRE PROTECTION  
AUBURN, ME  
207-784-1507

Job Name : LUMINATO CONDOMINIUMS  
Drawing : 3 OF 3  
Location : PORTLAND MAINE  
Remote Area : SIXTH FLOOR  
Contract : AU-5537-16  
Data File : 5537 LUMINATO - SIXTH FLOOR PENDENTS 900 SQ FT.WXF

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**HYDRAULIC CALCULATIONS**  
*for*

**Project name:** LUMINATO CONDOMINIUMS  
**Location:** PORTLAND MAINE  
**Drawing no:** 3 OF 3  
**Date:** 12-2-16

**Design**

**Remote area number:** SIXTH FLOOR  
**Remote area location:** SIXTH FLOOR  
**Occupancy classification:** LIGHT HAZARD  
**Density:** .10 - Gpm/SqFt  
**Area of application:** 955 - SqFt  
**Coverage per sprinkler:** 196/100 - SqFt  
**Type of sprinklers calculated:** RELIABLE F1FR56 K5.6 PENDENT RA1414  
**No. of sprinklers calculated:** 11  
**In-rack demand:** - GPM  
**Hose streams:** 100 - GPM  
**Total water required (including hose streams):** 305.06 - GPM @ 88.844 - Psi  
**Type of system:** WET  
**Volume of dry or preaction system:** N/A - Gal

**Water supply information**

**Date:** 07-06-16  
**Location:** SEE PLOT PLAN  
**Source:** PORTLAND WATER DISTRICT

**Name of contractor:** EASTERN FIRE PROTECTION  
**Address:** 170 KITTYHAWK AVE  
**Phone number:** 207-784-1507  
**Name of designer:** GRD

**Authority having jurisdiction:** MAINE STATE FIRE MARSHAL

**Notes: (Include peaking information or gridded systems here.)**

REMOTE AREA HAS BEEN MODIFIED IN ACCORDANCE NFPA13 (2016) SECTION 11.2.3.2.3.1

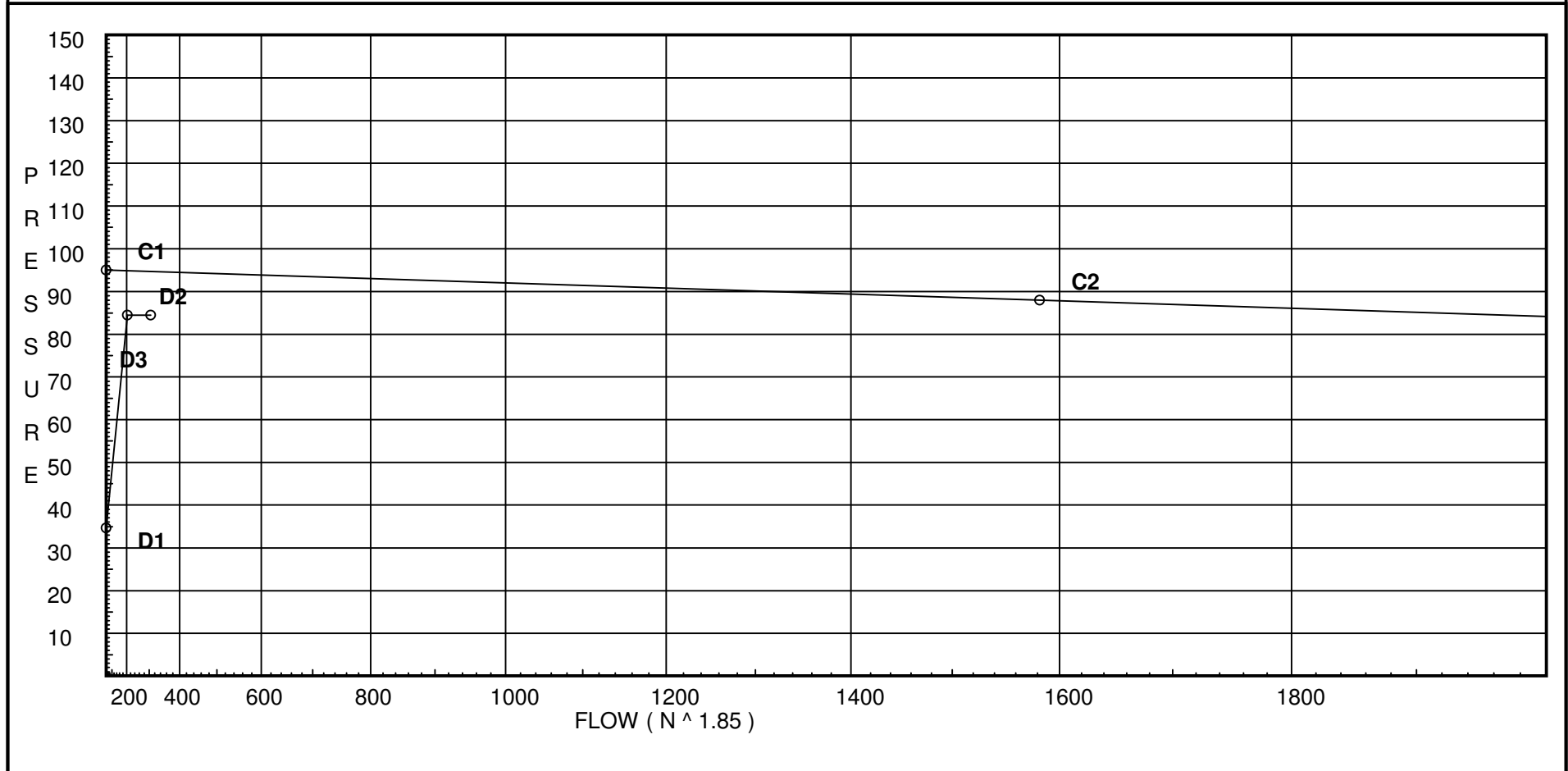
# Water Supply Curve C

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

Page 2  
Date

City Water Supply:  
C1 - Static Pressure : 95  
C2 - Residual Pressure: 88  
C2 - Residual Flow : 1582

Demand:  
D1 - Elevation : 34.683  
D2 - System Flow : 205.061  
D2 - System Pressure : 84.456  
Hose ( Demand ) : 100  
D3 - System Demand : 305.061  
Safety Margin : 10.211



# Fittings Used Summary

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Date

Fitting Legend		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
Abbrev.	Name																				
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
I	90° Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
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
Zca	Colt C200 Horz Butt	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.

**SUPPLY ANALYSIS**

<b>Node at Source</b>	<b>Static Pressure</b>	<b>Residual Pressure</b>	<b>Flow</b>	<b>Available Pressure</b>	<b>Total Demand</b>	<b>Required Pressure</b>
TEST	95.0	88	1582.0	94.667	305.06	84.456

**NODE ANALYSIS**

<b>Node Tag</b>	<b>Elevation</b>	<b>Node Type</b>	<b>Pressure at Node</b>	<b>Discharge at Node</b>	<b>Notes</b>
SP01	0.0	5.6	12.25	19.6	
SP02	0.0	5.6	7.0	14.82	
660	119.08	5.51	13.42	20.19	K=K @ EQ01
661	119.08	5.51	13.96	20.59	K=K @ EQ01
663	119.08	5.51	14.74	21.16	K=K @ EQ01
665	119.08	5.51	15.96	22.02	K=K @ EQ01
662	119.08		14.39		
664	119.08		15.19		
666	119.08		16.45		
668	119.08	5.51	10.84	18.14	K=K @ EQ02
669	119.08	5.51	9.38	16.87	K=K @ EQ02
670	119.08	5.51	9.53	17.0	K=K @ EQ02
671	119.08		11.03		
672	119.08	5.51	8.79	16.34	K=K @ EQ02
673	119.08	5.51	9.07	16.59	K=K @ EQ02
674	119.08	5.51	9.02	16.54	K=K @ EQ02
675	119.08		9.43		
676	119.08		11.42		
677	119.08	5.51	12.64	19.6	K=K @ EQ01
678	119.08		13.1		
604	120.667		19.23		
609	120.667		19.86		
610	120.667		31.76		
650	119.0		39.03		
FCV6	116.75		40.89		
SP6	116.75		43.09		
SP1	47.5		74.08		
TOR1	47.5		75.47		
BOR1	42.5		78.43		
BASE	40.5		83.69		
TEST	39.0		84.46	100.0	

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
SP01 to EQ01	0 0	5.60	19.60 19.6	1 1.101	O	5.0 0.0 0.0	1.000 5.000 6.000	150 0.0655	12.250 0.0 0.393		Vel = 6.60	
EQ01			0.0 19.60						12.643		K Factor = 5.51	
SP02 to EQ02	0 0	5.60	14.82 14.82	1 1.101	O	5.0 0.0 0.0	1.000 5.000 6.000	150 0.0390	7.000 0.0 0.234		Vel = 4.99	
EQ02			0.0 14.82						7.234		K Factor = 5.51	
660 to 662	119.080 119.080	5.51	20.19 20.19	1 1.101		0.0 0.0 0.0	14.000 0.0 14.000	150 0.0693	13.418 0.0 0.970		K = K @ EQ01 Vel = 6.80	
662			0.0 20.19						14.388		K Factor = 5.32	
661 to 662	119.080 119.080	5.51	20.59 20.59	1 1.101	O	5.0 0.0 0.0	1.000 5.000 6.000	150 0.0718	13.957 0.0 0.431		K = K @ EQ01 Vel = 6.94	
662			0.0 20.59						14.388		K Factor = 5.43	
663 to 664	119.080 119.080	5.51	21.16 21.16	1 1.101	O	5.0 0.0 0.0	1.000 5.000 6.000	150 0.0757	14.740 0.0 0.454		K = K @ EQ01 Vel = 7.13	
664			0.0 21.16						15.194		K Factor = 5.43	
665 to 666	119.080 119.080	5.51	22.02 22.02	1 1.101	O	5.0 0.0 0.0	1.000 5.000 6.000	150 0.0813	15.963 0.0 0.488		K = K @ EQ01 Vel = 7.42	
666			0.0 22.02						16.451		K Factor = 5.43	
662 to 664	119.080 119.080		40.79 40.79	1.25 1.394		0.0 0.0 0.0	10.000 0.0 10.000	150 0.0806	14.388 0.0 0.806		Vel = 8.57	
664 to 666	119.080 119.080		21.16 61.95	1.5 1.598		0.0 0.0 0.0	14.000 0.0 14.000	150 0.0898	15.194 0.0 1.257		Vel = 9.91	
666 to 604	119.080 120.667		22.02 83.97	1.5 1.598	O	8.0 0.0 0.0	14.000 8.000 22.000	150 0.1576	16.451 -0.687 3.467		Vel = 13.43	
604			0.0 83.97						19.231		K Factor = 19.15	
668 to 671	119.080 119.080	5.51	18.14 18.14	1.25 1.394		0.0 0.0 0.0	10.500 0.0 10.500	150 0.0180	10.845 0.0 0.189		K = K @ EQ02 Vel = 3.81	
			0.0									



# Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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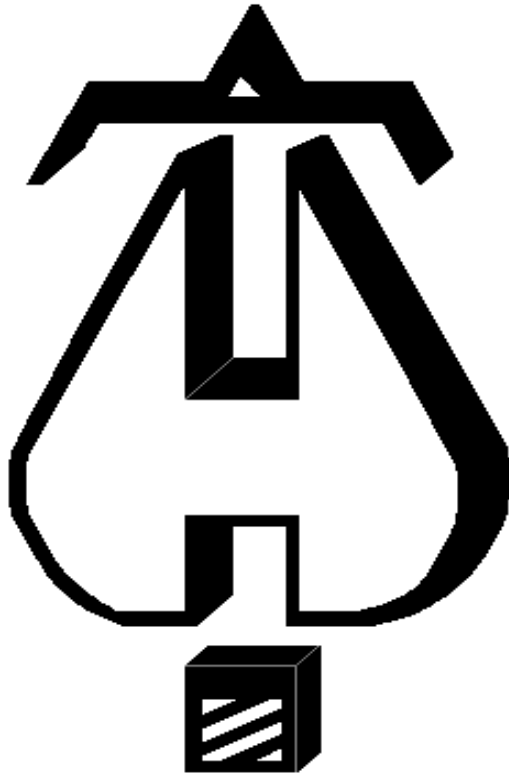
Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
671			18.14					11.034		K Factor = 5.46	
669 to 670	119.080 119.080	5.51	16.87	1		3.000 0.0 0.0	150	9.380 0.0		K = K @ EQ02	
670 to 671	119.080 119.080	5.51	16.87	1.101		3.000 0.0 22.000	0.0497	0.149 0.0		Vel = 5.68	
670 to 671	119.080 119.080	5.51	17.00	1.25	2N O	16.0 6.0 26.330	150	9.529 0.0		K = K @ EQ02	
671 to 676	119.080 119.080		33.87	1.394		0.0 0.0 6.000	0.0572	1.505 0.0		Vel = 7.12	
671 to 676	119.080 119.080		18.15	1.5		0.0 0.0 6.000	150	11.034 0.0			
676			52.02	1.598		0.0 0.0 6.000	0.0650	0.390		Vel = 8.32	
676			0.0 52.02					11.424		K Factor = 15.39	
672 to 673	119.080 119.080	5.51	16.34	1		6.000 0.0 0.0	150	8.794 0.0		K = K @ EQ02	
673 to 675	119.080 119.080	5.51	16.34	1.101		6.000 0.0 0.500	0.0468	0.281 0.0		Vel = 5.51	
673 to 675	119.080 119.080	5.51	16.59	1.25	O	6.0 0.0 6.500	150	9.075 0.0		K = K @ EQ02	
675			32.93	1.394		0.0 0.0 6.500	0.0542	0.352		Vel = 6.92	
675			0.0 32.93					9.427		K Factor = 10.73	
674 to 675	119.080 119.080	5.51	16.54	1	O	5.0 0.0 5.000	150	9.020 0.0		K = K @ EQ02	
675 to 676	119.080 119.080		16.54	1.101		0.0 0.0 3.330	0.0479	0.407 0.0		Vel = 5.57	
675 to 676	119.080 119.080		32.93	1.25	O N	6.0 8.0 14.000	150	9.427 0.0			
676 to 678	119.080 119.080		49.47	1.394		0.0 0.0 7.500	0.1152	1.997 0.0		Vel = 10.40	
676 to 678	119.080 119.080		52.02	1.5		0.0 0.0 7.500	150	11.424 0.0			
678			101.49	1.598		0.0 0.0 7.500	0.2237	1.678		Vel = 16.24	
678			0.0 101.49					13.102		K Factor = 28.04	
677 to 678	119.080 119.080	5.51	19.60	1	O	5.0 0.0 5.000	150	12.643 0.0		K = K @ EQ01	
678 to 609	119.080 120.667		19.6	1.101		0.0 0.0 7.000	0.0656	0.459 -0.687		Vel = 6.60	
678 to 609	119.080 120.667		101.49	1.5	O	8.0 0.0 8.000	150	13.102 -0.687			
609			121.09	1.598		0.0 0.0 24.000	0.3102	7.445		Vel = 19.37	
609			0.0 121.09					19.860		K Factor = 27.17	
604 to 609	120.667 120.667		83.97	2		12.000 0.0 0.0	150	19.231 0.0			
609 to 610	120.667 120.667		83.97	2.003		0.0 0.0 12.000	0.0524	0.629		Vel = 8.55	
609 to 610	120.667 120.667		121.09	2	2N O	22.0 10.0 32.000	150	19.860 0.0			
610			205.06	2.003		0.0 0.0 43.500	0.2737	11.904		Vel = 20.88	

# Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
610 to 650	120.667 119		0.0 205.06	2.5 2.635	2N T 24.0 24.894 0.0	42.000 48.894 90.894	150 0.0720	31.764 0.722 6.541		Vel = 12.06	
650 to FCV6	119 116.750		0.0 205.06	3 3.26	2I 13.44 0.0 0.0	9.500 13.440 22.940	120 0.0386	39.027 0.974 0.885		Vel = 7.88	
FCV6 to SP6	116.750 116.750		0.0 205.06	3 3.26	B S T 13.44 21.503 20.159	2.000 55.102 57.102	120 0.0386	40.886 0.0 2.203		Vel = 7.88	
SP6 to SP1	116.750 47.500		0.0 205.06	4 4.26	T 26.334 0.0 0.0	69.250 26.334 95.584	120 0.0105	43.089 29.992 1.002		Vel = 4.62	
SP1 to TOR1	47.500 47.500		0.0 205.06	4 4.26	9I 82.953 0.0 0.0	49.000 82.953 131.953	120 0.0105	74.083 0.0 1.383		Vel = 4.62	
TOR1 to BOR1	47.500 42.500		0.0 205.06	4 4.26	B S T 15.8 28.968 26.334	5.000 71.102 76.102	120 0.0105	75.466 2.166 0.797		Vel = 4.62	
BOR1 to BASE	42.500 40.500		0.0 205.06	4 4.26	E Zca 0.0 0.0	5.000 13.167 13.167 18.167	120 0.0105	78.429 5.066 0.191		** Fixed Loss = 4.2 Vel = 4.62	
BASE to TEST	40.500 39		0.0 205.06	6 6.16	E T G 20.084 43.037 4.304	25.000 67.425 92.425	140 0.0013	83.686 0.650 0.120		Vel = 2.21	
TEST			100.00 305.06					84.456		Qa = 100.00 K Factor = 33.19	



... **Fire Protection by Computer Design**

EASTERN FIRE PROTECTION  
AUBURN, ME  
207-784-1507

Job Name : LUMINATO CONDOMINIUMS  
Drawing : STEEL/ WOOD STRUCTURE  
Location : PORTLAND, MAINE  
Remote Area : 1 OF 1  
Contract : 5537  
Data File : 5537 LUMINATO - STANDPIPE.WXF

HYDRAULIC DESIGN INFORMATION SHEET

Name - LUMINATO CONDOMINIUMS

Date - 12-2-16

Location - PORTLAND, MAINE

Building - STEEL/ WOOD STRUCTURE

System No. - 1 OF 1

Contractor - EASTERN FIRE PROTECTION

Contract No. - 5537

Calculated By - GRD

Drawing No. - 1 OF 3

Occupancy - LIGHT HAZARD

S (X)NFPA 14 Number of Standpipes (X)1 ( )2 ( )3 ( )4 ( )

Y ( )Other

S (X)Specific Ruling

Made by CON DOC LS1.1 Date 8-25-16

T

E Flow at Top Most Outlet - 250 Gpm

System Type

M Pres. at Top Most Outlet - 100 Psi

(X) Wet ( ) Dry

Flow For Ea. Additional Standpipe - 250 Gpm

D Total Additional Flow - 500 Gpm

E Elevation at Highest Outlet - 126.17 Feet

S Hose Valve Connection ( )1 1/2" (X)2 1/2"

I Class Service (X)I ( )II ( )III

G Note:

N

Calculation Gpm Required 500

Psi Required 158.270 At PMP

Summary C-Factor Used:

Overhead 120

Underground 120

W Water Flow Test:

Pump Data:

Tank or Reservoir:

A Date of Test - N/A

Cap.

T Time of Test - N/A

Rated Cap. 1500

Elev.

E Static (Psi) - N/A

@ Psi 170

R Residual (Psi) - N/A

Elev. 40.50

Well

Flow (Gpm) - N/A

Proof Flow Gpm

S Elevation -

U

P Location: FIRE DEPT CONNECTION LOCATED ADJECENT TO SPRINKLER ROOM

P

L Source of Information: PORTLAND FIRE DEPT

Y

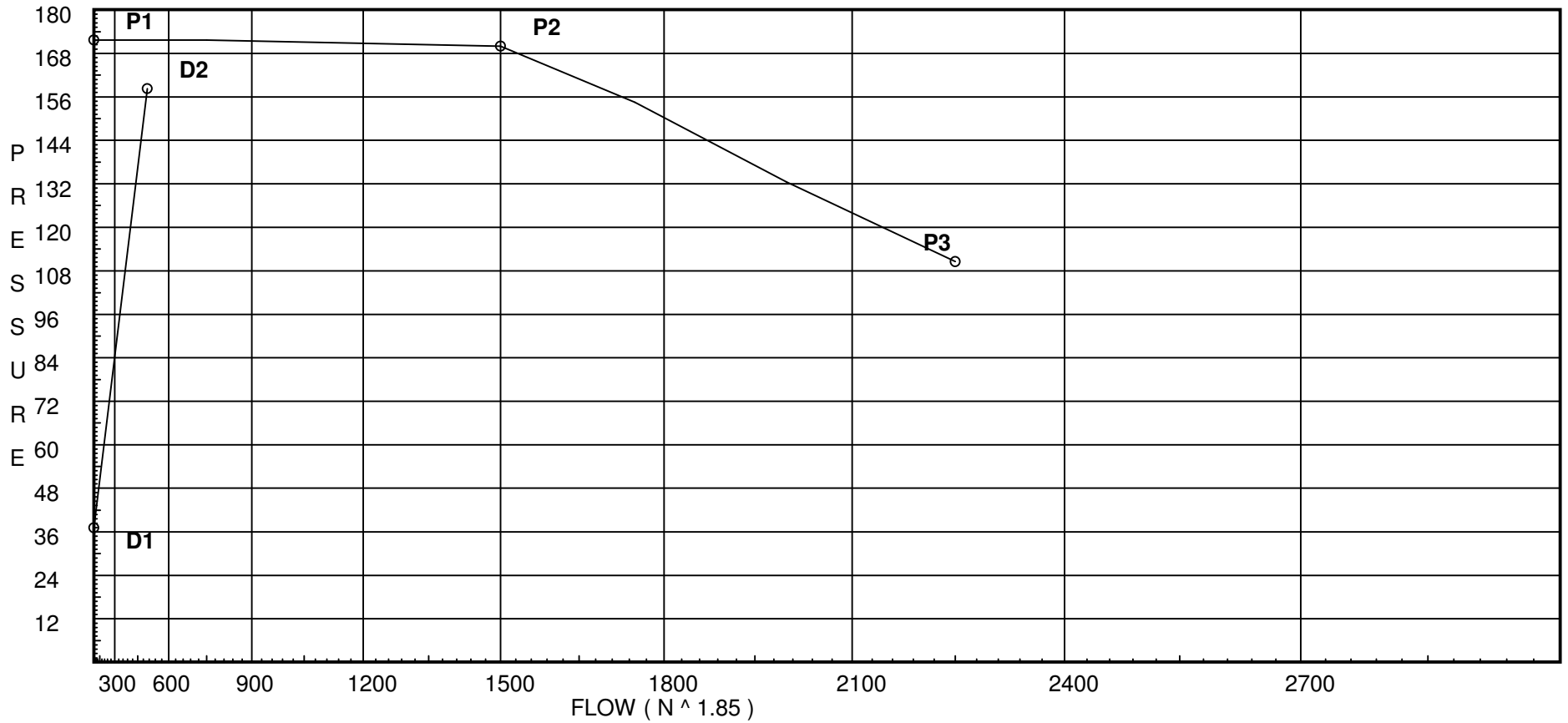
# Water Supply Curve C

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Pump Data:  
 P1 - Pump Churn Pressure : 171.7  
 P2 - Pump Rated Pressure : 170  
 P2 - Pump Rated Flow : 1500  
 P3 - Pump Pressure @ Max Flow : 110.5  
 P3 - Pump Max Flow : 2250

Demand:  
 D1 - Elevation : 37.104  
 D2 - System Flow : 500  
 D2 - System Pressure : 158.270  
 Hose ( Demand ) : \_\_\_\_\_  
 D3 - System Demand : 500  
 Safety Margin : 13.425



# Fittings Used Summary

EASTERN FIRE PROTECTION  
LUMINATO CONDOMINIUMS

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Fitting Legend		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
Abbrev.	Name																				
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
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
I	90' Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
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

## 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.

**SUPPLY ANALYSIS**

<b>Node at Source</b>	<b>Static Pressure</b>	<b>Residual Pressure</b>	<b>Flow</b>	<b>Available Pressure</b>	<b>Total Demand</b>	<b>Required Pressure</b>
PMP	See Information on Pump Curve			171.695	500.0	158.27

**NODE ANALYSIS**

<b>Node Tag</b>	<b>Elevation</b>	<b>Node Type</b>	<b>Pressure at Node</b>	<b>Discharge at Node</b>	<b>Notes</b>
SP01	0.0	5.6	7.0	14.82	
HV1	126.17		100.0	250.0	
HV2	113.5		105.68	250.0	
SP7	126.17		102.85		
SP6	116.75		107.13		
SPB	47.5		142.33		
TOR1	47.5		146.96		
BOR1	42.5		153.27		
PMP	40.5		158.27		

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
SP01 to EQ01	0 0	5.60	14.82 14.82	1 1.101	O 0.0	5.0 5.000	150 6.000	7.000 0.0			
			0.0					0.234	Vel =	4.99	
EQ01			14.82					7.234	K Factor =	5.51	
HV1 to SP7	126.170 126.170	250.00	250.00	2.5 2.469	T G 0.0	12.0 1.0 13.000	120 13.250	100.000 0.0			
			0.0					2.854	Vel =	16.75	
SP7			250.00					102.854	K Factor =	24.65	
HV2 to SP6	113.500 116.750	250.00	250.00	2.5 2.469	T G 0.0	12.0 1.0 13.000	120 13.250	105.679 -1.408			
			0.0					2.855	Vel =	16.75	
SP6			250.00					107.126	K Factor =	24.15	
SP7 to SP6	126.170 116.750		250.00	4 4.26		0.0 0.0 12.670	120 0.0152	102.854 4.080			
			250.0			0.0		0.192	Vel =	5.63	
SP6 to SPB	116.750 47.500		250.00	4 4.26	T 0.0	26.334 26.334	120	107.126 29.992			
			500.0			0.0	0.0545	5.211	Vel =	11.25	
SPB to TOR1	47.500 47.500		0.0	4 4.26	4l 0.0	36.868 36.868	120	142.329 0.0			
			500.0			0.0	0.0545	4.626	Vel =	11.25	
TOR1 to BOR1	47.500 42.500		0.0	4 4.26	B S T	15.8 28.968 26.334	120	146.955 2.166			
			500.0			76.102	0.0545	4.148	Vel =	11.25	
BOR1 to PMP	42.500 40.500		0.0	4 4.26	4l S 0.0	36.868 28.968 75.836	120	153.269 0.866			
			500.0			0.0	0.0545	4.135	Vel =	11.25	
PMP			0.0					158.270	K Factor =	39.74	