

. . . Fire Protection by Computer Design

DEAN & ALLYN, INC.
116 LEWISTON ROAD
GRAY, MAINE 04039
207-657-5646

Job Name : 10 EXCHANGE ST 4TH FLOOR LOFT AREA 4-5
Building : FOURTH FLOOR-APT. 409 LOFT
Location : 10 EXCHANGE STREET PORTLAND MAINE
System : 4-5.WX5
Contract : C161341
Data File : 10 EXCHANGE ST 4TH FLOOR Area 4-5.WX5

Hydraulic Design Information Sheet

Name - 10 EXCHANGE STREET Date - 07/20/2016
 Location - 10 EXCHANGE STREET PORTLAND MAINE
 Building - FOURTH FLOOR-APT. 409 LOFT System No. - 4-5.WX5
 Contractor - DEAN & ALLYN, INC. Contract No. - C161341
 Calculated By - T. CLARKE Drawing No. - FP-101
 Construction: (X) Combustible () Non-Combustible Ceiling Height - 12'
 Occupancy - APARTMENT BUILDING

S (X) NFPA 13 (X) Lt. Haz. Ord.Haz.Gp. () 1 () 2 () 3 () Ex.Haz.
 Y () NFPA 231 () NFPA 231C () Figure Curve

S Other

T Specific Ruling Made By Date

M	Area of Sprinkler Operation	- 4 HEADS	System Type	Sprinkler/Nozzle
	Density	- 0.10	(X) Wet	Make RELIABLE
D	Area Per Sprinkler	- VARIES	() Dry	Model FIRES58
E	Elevation at Highest Outlet	- 60	() Deluge	Size 1/2"X1/2"
S	Hose Allowance - Inside	- 100	() Preaction	K-Factor 5.8
I	Rack Sprinkler Allowance	- 0	() Other	Temp.Rat.155F
G	Hose Allowance - Outside	- 0		

N Note CUSHION 24.0 PSI

Calculation Flow Required - 188.2 Press Required - 68.8 AT TEST
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 06/28/2016		Cap. -
T	Time of Test - 6:00 AM	Rated Cap.-	Elev.-
E	Static Press - 93	@ Press -	
R	Residual Press - 86	Elev. -	Well
S	Flow - 1500		Proof Flow
U	Elevation - 20		

P Location - CORNER OF EXCHANGE STREET AND FORE STREET

L Source of Information - PORTLAND WATER DIST.

C	Commodity N/A	Class	Location
O	Storage Ht.	Area	Aisle W.
M	Storage Method:	%	Palletized % Rack
	() Single Row	() Conven. Pallet	() Auto. Storage () Encap.
S	() Double Row	() Slave Pallet	() Solid Shelf () Non
T	() Mult. Row		() Open Shelf

R	K	Flue Spacing	Clearance:Storage to Ceiling
A		Longitudinal	Transverse

E Horizontal Barriers Provided:

Fittings Used Summary

DEAN & ALLYN, INC.
10 EXCHANGE ST 4TH FLOOR LOFT AREA 4-5

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Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24	
Bvca	B Fly Vic 705						6	6	7		8	12	14	16	18	19						
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	
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	
J	90'Tee-Branch Grv Vic #20	0	0	4.5	6	8	8.5	10.8	13	17	16	21	25	33	41	50	65	78	88	98	120	
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	
U	45' Ell Firelock #003	0	0	0	0	0	1.8	2.2	2.6	0	3.4	4.2	5	5	0	0	0	0	0	0	0	
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	
Y	Mechanical Tee	2	4	5	6	8	10.5	12.5	15.5	0	22	0	0	0	0	0	0	0	0	0	0	
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

Fittings Used Summary

for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Pressure / Flow Summary - STANDARD

DEAN & ALLYN, INC.
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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
417	60.0	4.9	15.82	na	19.49	0.1	50	8.16
418	60.0	5.8	16.12	na	23.28	0.1	130	13.2
419	60.0	4.9	17.37	na	20.42	0.1	50	8.16
420	61.333	5.8	18.6	na	25.01	0.1	225	18.6
44	59.12		36.14	na				
45	57.58		37.76	na				
46	56.29		39.45	na				
47	55.83		40.34	na				
FCV4	54.5		46.51	na	100.0			
FCV3	45.0		51.1	na				
TR	6.75		70.23	na				
BR	2.917		72.38	na				
FF	2.917		76.11	na				
UG	2.917		76.19	na				
TEST	20.0		68.82	na				

The maximum velocity is 13.9 and it occurs in the pipe between nodes 420 and 44

Final Calculations - Hazen-Williams - 2007

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
417 to 418	19.49	1.38 120.0		0.0	9.000	15.822			K Factor = 4.90	
418 to 419	19.49	0.0327		0.0	9.000	0.294			Vel = 4.18	
418 to 419	23.28	1.38 120.0		0.0	0.0	16.116			K Factor = 5.80	
419 to 420	42.77	0.1397		0.0	9.000	1.257			Vel = 9.17	
419 to 420	20.43	1.61 120.0	E	4.0	9.292	17.373			K Factor = 4.90	
420 to 44	63.2	0.1357		0.0	13.292	1.804			Vel = 9.96	
420 to 44	25.01	1.61 120.0	3E 3T	12.0 24.0	29.917 36.000	18.600 0.958			K Factor = 5.80	
44 to 45	88.21	0.2516		0.0	65.917	16.582			Vel = 13.90	
44 to 45	0.0	2.635 120.0	2V 2U	11.807 6.041	23.760 17.848	36.140 0.667				
45 to 46	88.21	0.0229		0.0	41.608	0.951			Vel = 5.19	
45 to 46	0.0	2.635 120.0	4V	23.613	25.990	37.758				
46 to 47	88.21	0.0228		0.0	23.613	0.559			Vel = 5.19	
46 to 47	0.0	2.635 120.0	2V X	11.807 14.827	3.490 26.634	39.449 0.199				
47 to FCV4	88.21	0.0228		0.0	30.124	0.689			Vel = 5.19	
47 to FCV4	0.0	2.635 120.0	S Fsp Y Bvca 7V	19.22 0.0 17.161 8.237 41.323	27.580 85.941 113.521	40.337 3.576 2.592			** Fixed Loss = 3	
FCV4 to FCV3	100.00	4.26 120.0	2I J	18.434 21.067	14.542 39.501	46.505 4.114			Qa = 100	
FCV3 to TR	188.21	0.0090		0.0	54.043	0.484			Vel = 4.24	
FCV3 to TR	0.0	4.26 120.0	18I	165.905	120.667	51.103				
TR to BR	188.21	0.0089		0.0	165.905	16.566			Vel = 4.24	
TR to BR	0.0	4.26 120.0	Bvca S	10.534 28.968	6.000 48.719	70.232 1.660				
BR to FF	188.21	0.0090		9.217	54.719	0.490			Vel = 4.24	
BR to FF	0.0	6.357 120.0	I Zca	12.573 0.0	4.417 12.573	72.382 3.710			** Fixed Loss = 3.71	
FF to UG	188.21	0.0012		0.0	16.990	0.021			Vel = 1.90	
FF to UG	0.0	6.16 140.0	G T	4.304 43.037	20.000 47.341	76.113 0.0				
UG to TEST	188.21	0.0011		0.0	67.341	0.076			Vel = 2.03	
UG to TEST	0.0	10.22 100.0	T G	39.29 3.929	100.000 43.218	76.189 -7.399				
TEST	188.21	0.0002		0.0	143.218	0.025			Vel = 0.74	
	0.0 188.21					68.815			K Factor = 22.69	

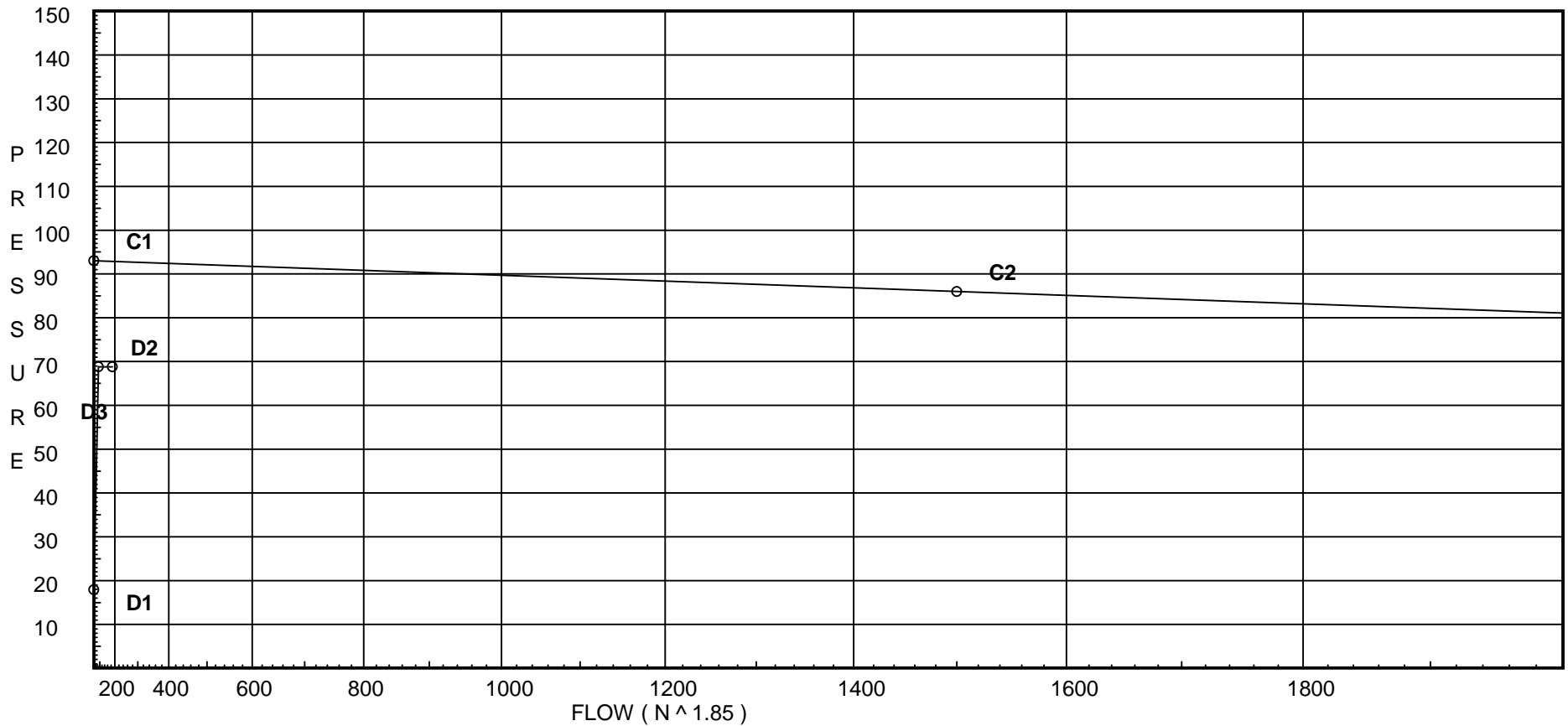
Water Supply Curve C

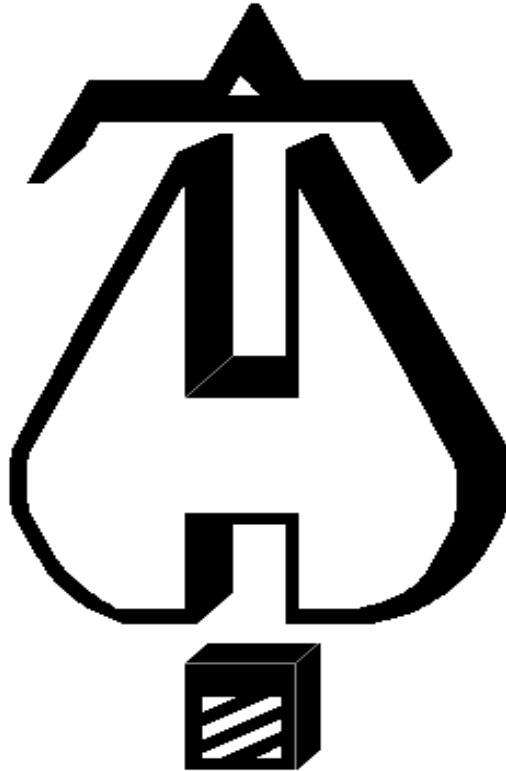
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City Water Supply:
C1 - Static Pressure : 93
C2 - Residual Pressure: 86
C2 - Residual Flow : 1500

Demand:
D1 - Elevation : 17.901
D2 - System Flow : 88.212
D2 - System Pressure : 68.815
Hose (Demand) : 100
D3 - System Demand : 188.212
Safety Margin : 24.034





. . . Fire Protection by Computer Design

DEAN & ALLYN, INC.
116 LEWISTON ROAD
GRAY, MAINE 04039
207-657-5646

Job Name : 10 EXCHANGE ST 4TH FLOOR LOFT AREA 4-6
Building : FOURTH FLOOR-APT. 404 LOFT
Location : 10 EXCHANGE STREET PORTLAND MAINE
System : 4-6.WX6
Contract : C161341
Data File : 10 EXCHANGE ST 4TH FLOOR Area 4-6.WX6

Hydraulic Design Information Sheet

Name - 10 EXCHANGE STREET Date - 07/20/2016
 Location - 10 EXCHANGE STREET PORTLAND MAINE
 Building - FOURTH FLOOR-APT. 404 LOFT System No. - 4-6.WX6
 Contractor - DEAN & ALLYN, INC. Contract No. - C161341
 Calculated By - T. CLARKE Drawing No. - FP-101
 Construction: (X) Combustible () Non-Combustible Ceiling Height - 12'
 Occupancy - APARTMENT BUILDING

S (X) NFPA 13 (X) Lt. Haz. Ord.Haz.Gp. () 1 () 2 () 3 () Ex.Haz.
 Y () NFPA 231 () NFPA 231C () Figure Curve

S Other

T Specific Ruling Made By Date

M	Area of Sprinkler Operation	- 4 HEADS	System Type	Sprinkler/Nozzle
	Density	- 0.10	(X) Wet	Make RELIABLE
D	Area Per Sprinkler	- VARIES	() Dry	Model FIRES58
E	Elevation at Highest Outlet	- 63.583	() Deluge	Size 1/2"X1/2"
S	Hose Allowance - Inside	- 100	() Preaction	K-Factor 5.8
I	Rack Sprinkler Allowance	- 0	() Other	Temp.Rat.155F
G	Hose Allowance - Outside	- 0		

N Note CUSHION 18.2 PSI

Calculation Flow Required - 210.9 Press Required - 74.6 AT TEST
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 06/28/2016		Cap. -
T	Time of Test - 6:00 AM	Rated Cap.-	Elev.-
E	Static Press - 93	@ Press -	
R	Residual Press - 86	Elev. -	Well
S	Flow - 1500		Proof Flow
U	Elevation - 20		

P Location - CORNER OF EXCHANGE STREET AND FORE STREET

L Source of Information - PORTLAND WATER DIST.

C	Commodity N/A	Class	Location
O	Storage Ht.	Area	Aisle W.
M	Storage Method:	%	Palletized % Rack
	() Single Row	() Conven. Pallet	() Auto. Storage () Encap.
S	() Double Row	() Slave Pallet	() Solid Shelf () Non
T	() Mult. Row		() Open Shelf

R K Flue Spacing Clearance:Storage to Ceiling
 A Longitudinal Transverse

E Horizontal Barriers Provided:

Fittings Used Summary

DEAN & ALLYN, INC.
10 EXCHANGE ST 4TH FLOOR LOFT AREA 4-6

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Date 07/20/2016

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24	
Bvca	B Fly Vic 705						6	6	7		8	12	14	16	18	19						
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	
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	
J	90'Tee-Branch Grv Vic #20	0	0	4.5	6	8	8.5	10.8	13	17	16	21	25	33	41	50	65	78	88	98	120	
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	
U	45' Ell Firelock #003	0	0	0	0	0	1.8	2.2	2.6	0	3.4	4.2	5	5	0	0	0	0	0	0	0	
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	
Y	Mechanical Tee	2	4	5	6	8	10.5	12.5	15.5	0	22	0	0	0	0	0	0	0	0	0	0	
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

Fittings Used Summary

for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Pressure / Flow Summary - STANDARD

DEAN & ALLYN, INC.
10 EXCHANGE ST 4TH FLOOR LOFT AREA 4-6

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
421	51.667	5.8	26.56	na	29.89	0.1	296	25.0
422	57.167	5.8	26.05	na	29.6	0.1	296	25.0
423	60.0	4.9	26.78	na	25.36	0.1	50	7.0
424A	63.583	5.8	20.23	na	26.08	0.1	144	7.6
424	63.583		31.06	na				
48	63.583		31.15	na				
49	54.667		43.21	na				
44	59.12		43.17	na				
45	57.58		43.84	na				
46	56.29		44.4	na				
47	55.83		44.6	na				
FCV4	54.5		52.13	na	100.0			
FCV3	45.0		56.85	na				
TR	6.75		76.58	na				
BR	2.917		78.84	na				
FF	2.917		81.89	na				
UG	2.917		81.98	na				
TEST	20.0		74.61	na				

The maximum velocity is 17.48 and it occurs in the pipe between nodes 48 and 49

Final Calculations - Hazen-Williams - 2007

DEAN & ALLYN, INC.
10 EXCHANGE ST 4TH FLOOR LOFT AREA 4-6

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
421 to 422	29.89	1.38 120.0	4E	12.0 0.0	14.000 12.000	26.556 -2.382			K Factor = 5.80	
422 to 423	29.89	0.0720		0.0	26.000	1.871			Vel = 6.41	
422 to 423	29.60	1.38 120.0		0.0 0.0	7.625 0.0	26.045 -1.227			K Factor = 5.80	
423 to 48	59.49	0.2572		0.0	7.625	1.961			Vel = 12.76	
423 to 48	25.36	1.61 120.0	2E T	8.0 8.0	9.292 16.000	26.779 -1.552			K Factor = 4.90	
48	84.85	0.2341		0.0	25.292	5.921			Vel = 13.37	
	0.0 84.85						31.148		K Factor = 15.20	
424A to 424	26.08	1.049 120.0	3E 3T	6.0 15.0	29.917 21.000	20.225 0.0			K Factor = 5.80	
424 to 48	26.08	0.2127		0.0	50.917	10.830			Vel = 9.68	
424 to 48	0.0	1.61 120.0		0.0 0.0	3.500 0.0	31.055 0.0				
48 to 49	26.08	0.0266		0.0	3.500	0.093			Vel = 4.11	
48 to 49	84.85	1.61 120.0	E T	4.0 8.0	9.333 12.000	31.148 3.862				
49 to 47	110.93	0.3843		0.0	21.333	8.199			Vel = 17.48	
49 to 47	0.0	2.635 120.0	4V	23.613 0.0	30.583 23.613	43.209 -0.504				
47	110.93	0.0349		0.0	54.196	1.891			Vel = 6.53	
	0.0 110.93						44.596		K Factor = 16.61	
44 to 45	0.0	2.635 120.0	2V 2U	11.807 6.041	23.760 17.848	43.171 0.667				
45 to 46	0.0	0.0		0.0	41.608	0.0			Vel = 0	
45 to 46	0.0	2.635 120.0	4V	23.613 0.0	25.990 23.613	43.838 0.559				
46 to 47	0.0	0.0		0.0	49.603	0.0			Vel = 0	
46 to 47	0.0	2.635 120.0	2V X	11.807 14.827	3.490 26.634	44.397 0.199				
47 to FCV4	0.0	0.0		0.0	30.124	0.0			Vel = 0	
47 to FCV4	110.93	2.635 120.0	S Fsp	19.22 0.0	27.580 85.941	44.596 3.576			* * Fixed Loss = 3	
FCV4 to FCV3	110.93	0.0349	Y Bvca 7V	17.161 8.237 41.323	113.521	3.962			Vel = 6.53	
FCV4 to FCV3	100.00	4.26 120.0	2I J	18.434 21.067	14.542 39.501	52.134 4.114			Qa = 100	
FCV3 to TR	210.93	0.0110		0.0	54.043	0.597			Vel = 4.75	
FCV3 to TR	0.0	4.26 120.0	18I	165.905 0.0	120.667 165.905	56.845 16.566				
TR to BR	210.93	0.0110		0.0	286.572	3.165			Vel = 4.75	
TR to BR	0.0	4.26 120.0	Bvca S	10.534 28.968	6.000 48.719	76.576 1.660				
BR	210.93	0.0110	I	9.217	54.719	0.604			Vel = 4.75	

Final Calculations - Hazen-Williams

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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	*****
BR	0.0	6.357	I	12.573	4.417	78.840			
to		120.0	Zca	0.0	12.573	3.020		** Fixed Loss = 3.02	
FF	210.93	0.0016		0.0	16.990	0.027		Vel = 2.13	
FF	0.0	6.16	G	4.304	20.000	81.887			
to		140.0	T	43.037	47.341	0.0			
UG	210.93	0.0014		0.0	67.341	0.093		Vel = 2.27	
UG	0.0	10.22	T	39.29	100.000	81.980			
to		100.0	G	3.929	43.218	-7.399			
TEST	210.93	0.0002		0.0	143.218	0.031		Vel = 0.82	
	0.0								
	210.93					74.612		K Factor = 24.42	

Water Supply Curve C

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10 EXCHANGE ST 4TH FLOOR LOFT AREA 4-6

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City Water Supply:
C1 - Static Pressure : 93
C2 - Residual Pressure: 86
C2 - Residual Flow : 1500

Demand:
D1 - Elevation : 16.097
D2 - System Flow : 110.929
D2 - System Pressure : 74.612
Hose (Demand) : 100
D3 - System Demand : 210.929
Safety Margin : 18.202

