

. . . Fire Protection by Computer Design

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

Job Name : 10 EXCHANGE STREET THIRD FLOOR-AREA 3-1
Building : THIRD FLOOR-APT. 302
Location : 10 EXCHANGE STREET PORTLAND MAINE
System : 3-1.WX1
Contract : C161341
Data File : 10 EXCHANGE ST 3RD FLOOR AREA 3-1.WX1

Hydraulic Design Information Sheet

Name - 10 EXCHANGE STREET Date - 07/20/2016
 Location - 10 EXCHANGE STREET PORTLAND MAINE
 Building - THIRD FLOOR-APT. 302 System No. - 3-1.WX1
 Contractor - DEAN & ALLYN, INC. Contract No. - C161341
 Calculated By - T. CLARKE Drawing No. - FP-100
 Construction: (X) Combustible () Non-Combustible Ceiling Height - 9'
 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 FIRES44
E	Elevation at Highest Outlet	- 50.667	() Deluge	Size 7/16"X1/2"
S	Hose Allowance - Inside	- 100	() Preaction	K-Factor 4.4
I	Rack Sprinkler Allowance	- 0	() Other	Temp.Rat.155F
G	Hose Allowance - Outside	- 0		

N Note CUSHION 21.9 PSI

Calculation Flow Required - 174.9 Press Required - 70.9 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 STREET THIRD FLOOR-AREA 3-1

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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	
Ball	B Ball Milw BB-SC100			2.25	2	2.5	2.25	10														
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	
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	
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	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 for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Pressure / Flow Summary - STANDARD

DEAN & ALLYN, INC.
10 EXCHANGE STREET THIRD FLOOR-AREA 3-1

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
301	50.667	4.4	15.0	na	17.04	0.1	130	15.0
302	50.667	4.4	16.77	na	18.02	0.1	160	15.0
303A	46.667	4.9	17.84	na	20.7	0.1	130	7.0
303	50.667		17.35	na				
304	50.667	4.4	19.05	na	19.2	0.1	150	15.0
31	50.667		25.68	na				
32	49.542		29.63	na				
33	49.542		38.99	na				
FCV3	45.0		53.22	na	100.0			
TR	6.75		72.02	na				
BR	2.917		74.11	na				
FF	2.917		78.23	na				
UG	2.917		78.29	na				
TEST	20.0		70.92	na				

The maximum velocity is 11.96 and it occurs in the pipe between nodes 303 and 304

Final Calculations - Hazen-Williams - 2007

DEAN & ALLYN, INC.
10 EXCHANGE STREET THIRD FLOOR-AREA 3-1

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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	*****
301 to 302	17.04	1.049 120.0	E	2.0 0.0	16.333 2.000	15.000 0.0			K Factor = 4.40	
302 to 303	17.04	0.0968		0.0	18.333	1.774			Vel = 6.33	
302 to 303	18.02	1.38 120.0		0.0 0.0	6.000 0.0	16.774 0.0			K Factor = 4.40	
303	35.06	0.0967		0.0	6.000	0.580			Vel = 7.52	
	0.0 35.06						17.354		K Factor = 8.42	
303A to 303	20.70	1.049 120.0	T	5.0 0.0	4.000 5.000	17.839 -1.732			K Factor = 4.90	
303 to 304	20.7	0.1386		0.0	9.000	1.247			Vel = 7.68	
303 to 304	35.06	1.38 120.0		0.0 0.0	7.417 0.0	17.354 0.0				
304 to 31	55.76	0.2281		0.0	7.417	1.692			Vel = 11.96	
304 to 31	19.20	1.61 120.0	E	4.0 0.0	31.625 4.000	19.046 0.0			K Factor = 4.40	
31 to 32	74.96	0.1861		0.0	35.625	6.631			Vel = 11.81	
31 to 32	0.0	1.61 120.0	2E T	8.0 8.0	2.625 16.000	25.677 0.487				
32 to 33	74.96	0.1862		0.0	18.625	3.468			Vel = 11.81	
32 to 33	0.0	1.61 120.0	5E	20.0 0.0	30.250 20.000	29.632 0.0				
33 to FCV3	74.96	0.1861		0.0	50.250	9.353			Vel = 11.81	
33 to FCV3	0.0	2.157 120.0	13E T	79.994 12.307	85.250 121.529	38.985 4.967			** Fixed Loss = 3	
FCV3	74.96	0.0448	Ball S Fsp Y	2.769 13.537 0.0 12.922	206.779	9.263			Vel = 6.58	
FCV3 to TR	100.00	4.26 120.0	18l	165.905 0.0	120.667 165.905	53.215 16.566			Qa = 100	
TR to BR	174.96	0.0078		0.0	286.572	2.239			Vel = 3.94	
TR to BR	0.0	4.26 120.0	Bvca S	10.534 28.968	6.000 48.719	72.020 1.660				
BR to FF	174.96	0.0078	I	9.217	54.719	0.428			Vel = 3.94	
BR to FF	0.0	6.357 120.0	I Zca	12.573 0.0	4.417 12.573	74.108 4.100			** Fixed Loss = 4.1	
FF to UG	174.96	0.0011		0.0	16.990	0.019			Vel = 1.77	
FF to UG	0.0	6.16 140.0	G T	4.304 43.037	20.000 47.341	78.227 0.0				
UG to TEST	174.96	0.0010		0.0	67.341	0.066			Vel = 1.88	
UG to TEST	0.0	10.22 100.0	T G	39.29 3.929	100.000 43.218	78.293 -7.399				
TEST	174.96	0.0002		0.0	143.218	0.022			Vel = 0.68	
	0.0 174.96						70.916		K Factor = 20.78	

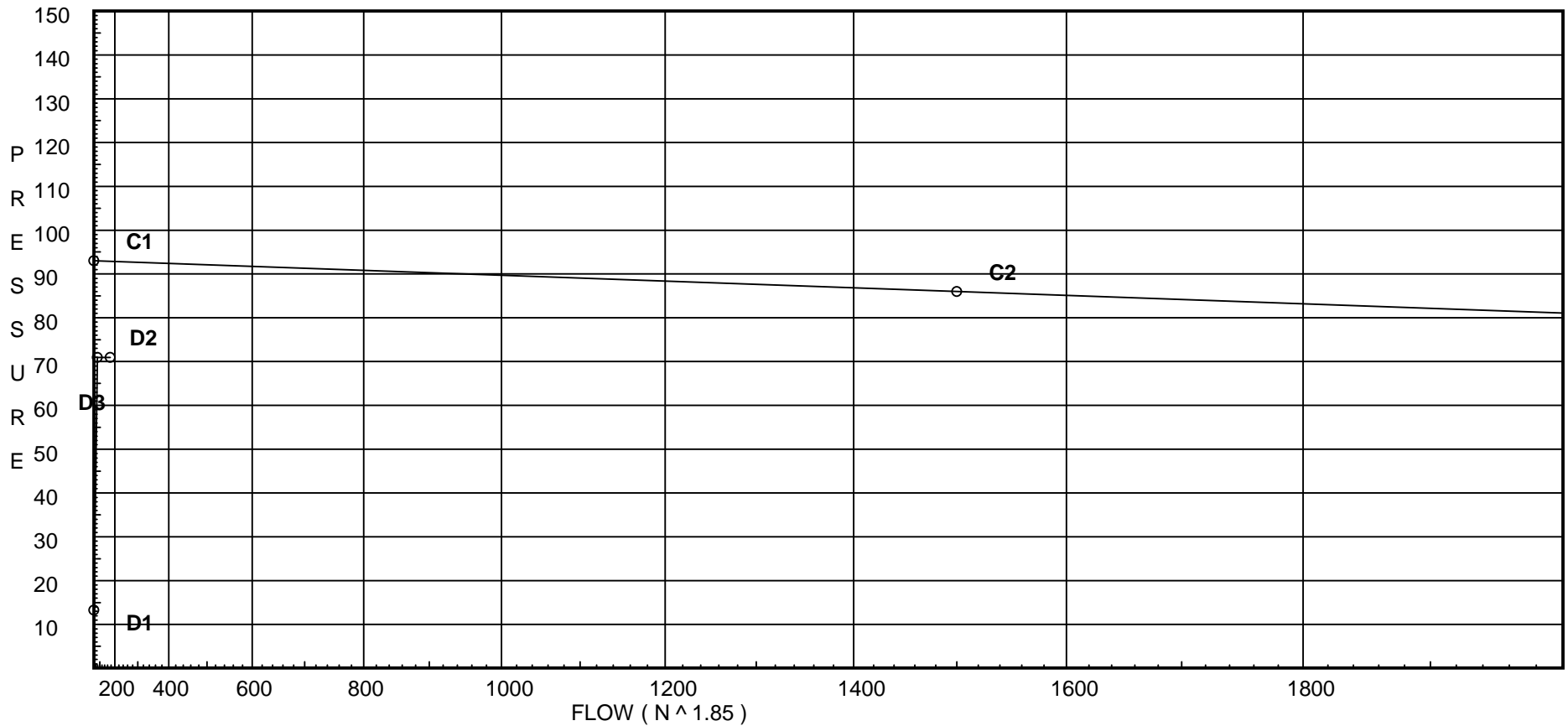
Water Supply Curve C

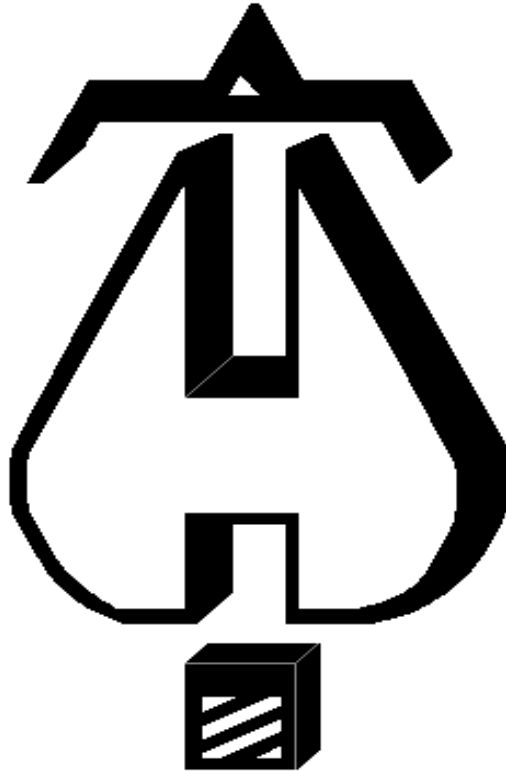
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City Water Supply:
C1 - Static Pressure : 93
C2 - Residual Pressure: 86
C2 - Residual Flow : 1500

Demand:
D1 - Elevation : 13.282
D2 - System Flow : 74.96
D2 - System Pressure : 70.916
Hose (Demand) : 100
D3 - System Demand : 174.96
Safety Margin : 21.952





. . . Fire Protection by Computer Design

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

Job Name : 10 EXCHANGE STREET THIRD FLOOR-AREA 3-2
Building : THIRD FLOOR-APT. 312
Location : 10 EXCHANGE STREET PORTLAND MAINE
System : 3-2.WX2
Contract : C161341
Data File : 10 EXCHANGE ST 3RD FLOOR AREA 3-2.WX2

Hydraulic Design Information Sheet

Name - 10 EXCHANGE STREET Date - 07/20/2016
 Location - 10 EXCHANGE STREET PORTLAND MAINE
 Building - THIRD FLOOR-APT. 312 System No. - 3-2.WX2
 Contractor - DEAN & ALLYN, INC. Contract No. - C161341
 Calculated By - T. CLARKE Drawing No. - FP-100
 Construction: (X) Combustible () Non-Combustible Ceiling Height - 9'
 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 FIRES44
E	Elevation at Highest Outlet	- 50.75	() Deluge	Size 7/16"X1/2"
S	Hose Allowance - Inside	- 100	() Preaction	K-Factor 4.4
I	Rack Sprinkler Allowance	- 0	() Other	Temp.Rat.155F
G	Hose Allowance - Outside	- 0		

N Note CUSHION 28.9 PSI

Calculation Flow Required - 175.8 Press Required - 71.9 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
	Flow - 1500		Proof Flow
S	Elevation - 20		

U 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 STREET THIRD FLOOR-AREA 3-2

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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	
Ball	B Ball Milw BB-SC100			2.25	2	2.5	2.25	10														
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	
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	
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	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 for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Pressure / Flow Summary - STANDARD

DEAN & ALLYN, INC.
10 EXCHANGE STREET THIRD FLOOR-AREA 3-2

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
305	50.75	4.4	16.8	na	18.03	0.1	180	16.8
306	50.75	4.4	17.41	na	18.36	0.1	160	13.3
307	46.583	4.9	16.23	na	19.74	0.1	80	7.0
308	46.583	4.9	16.17	na	19.7	0.1	80	7.0
309	46.583		16.99	na				
310	50.75		19.38	na				
311	50.75		21.46	na				
312	50.75		21.65	na				
31	50.667		32.73	na				
32	49.542		36.76	na				
33	49.542		39.87	na				
34	49.542		47.89	na				
FCV3	45.0		54.3	na	100.0			
TR	6.75		73.13	na				
BR	2.917		75.22	na				
FF	2.917		79.31	na				
UG	2.917		79.37	na				
TEST	20.0		72.0	na				

The maximum velocity is 16.27 and it occurs in the pipe between nodes 310 and 311

Final Calculations - Hazen-Williams - 2007

DEAN & ALLYN, INC.
10 EXCHANGE STREET THIRD FLOOR-AREA 3-2

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftn'g's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
305 to 306	18.03	1.049 120.0	T	5.0 0.0	0.667 5.000	16.800 0.0			K Factor = 4.40	
306 to 310	18.03	0.1075		0.0	5.667	0.609			Vel = 6.69	
306 to 310	18.36	1.049 120.0		0.0 0.0	5.000 0.0	17.409 0.0			K Factor = 4.40	
	36.39	0.3938		0.0	5.000	1.969			Vel = 13.51	
	0.0 36.39					19.378			K Factor = 8.27	
307 to 309	19.74	1.049 120.0	T	5.0 0.0	1.000 5.000	16.230 0.0			K Factor = 4.90	
	19.74	0.1272		0.0	6.000	0.763			Vel = 7.33	
	0.0 19.74					16.993			K Factor = 4.79	
308 to 309	19.70	1.049 120.0	T	5.0 0.0	1.500 5.000	16.170 0.0			K Factor = 4.90	
	19.7	0.1266		0.0	6.500	0.823			Vel = 7.31	
309 to 310	19.74	1.049 120.0	T	5.0 0.0	4.167 5.000	16.993 -1.805				
	39.44	0.4571		0.0	9.167	4.190			Vel = 14.64	
310 to 311	36.40	1.38 120.0		0.0 0.0	5.167 0.0	19.378 0.0				
	75.84	0.4029		0.0	5.167	2.082			Vel = 16.27	
311 to 312	0.0	1.61 120.0		0.0 0.0	1.000 0.0	21.460 0.0				
	75.84	0.1900		0.0	1.000	0.190			Vel = 11.95	
312 to 31	0.0	1.61 120.0	4E T	16.0 8.0	34.042 24.000	21.650 0.036				
	75.84	0.1902		0.0	58.042	11.040			Vel = 11.95	
31 to 32	0.0	1.61 120.0	2E T	8.0 8.0	2.625 16.000	32.726 0.487				
	75.84	0.1902		0.0	18.625	3.542			Vel = 11.95	
32 to 33	0.0	2.067 120.0	5E	25.0 0.0	30.250 25.000	36.755 0.0				
	75.84	0.0563		0.0	55.250	3.113			Vel = 7.25	
33 to 34	0.0	2.157 120.0	13E T	79.994 12.307	83.000 92.301	39.868 0.0				
	75.84	0.0458		0.0	175.301	8.023			Vel = 6.66	
34 to FCV3	0.0	2.157 120.0	Ball S	2.769 13.537	2.250 29.228	47.891 4.967			* * Fixed Loss = 3	
	75.84	0.0458	Fsp Y	0.0 12.922	31.478	1.441			Vel = 6.66	
FCV3 to TR	100.00	4.26 120.0	18l	165.905 0.0	120.667 165.905	54.299 16.566			Qa = 100	
	175.84	0.0079		0.0	286.572	2.260			Vel = 3.96	
TR to BR	0.0	4.26 120.0	Bvca S	10.534 28.968	6.000 48.719	73.125 1.660				
	175.84	0.0079	I	9.217	54.719	0.432			Vel = 3.96	
BR to FF	0.0	6.357 120.0	I Zca	12.573 0.0	4.417 12.573	75.217 4.070			* * Fixed Loss = 4.07	
	175.84	0.0011		0.0	16.990	0.019			Vel = 1.78	

Final Calculations - Hazen-Williams

DEAN & ALLYN, INC.
10 EXCHANGE STREET THIRD FLOOR-AREA 3-2

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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	*****
FF to UG	0.0 175.84	6.16 140.0 0.0010	G T	4.304 43.037 0.0	20.000 47.341 67.341	79.306 0.0 0.066		Vel = 1.89	
UG to TEST	0.0 175.84	10.22 100.0 0.0002	T G	39.29 3.929 0.0	100.000 43.218 143.218	79.372 -7.399 0.023		Vel = 0.69	
	0.0 175.84					71.996		K Factor = 20.72	

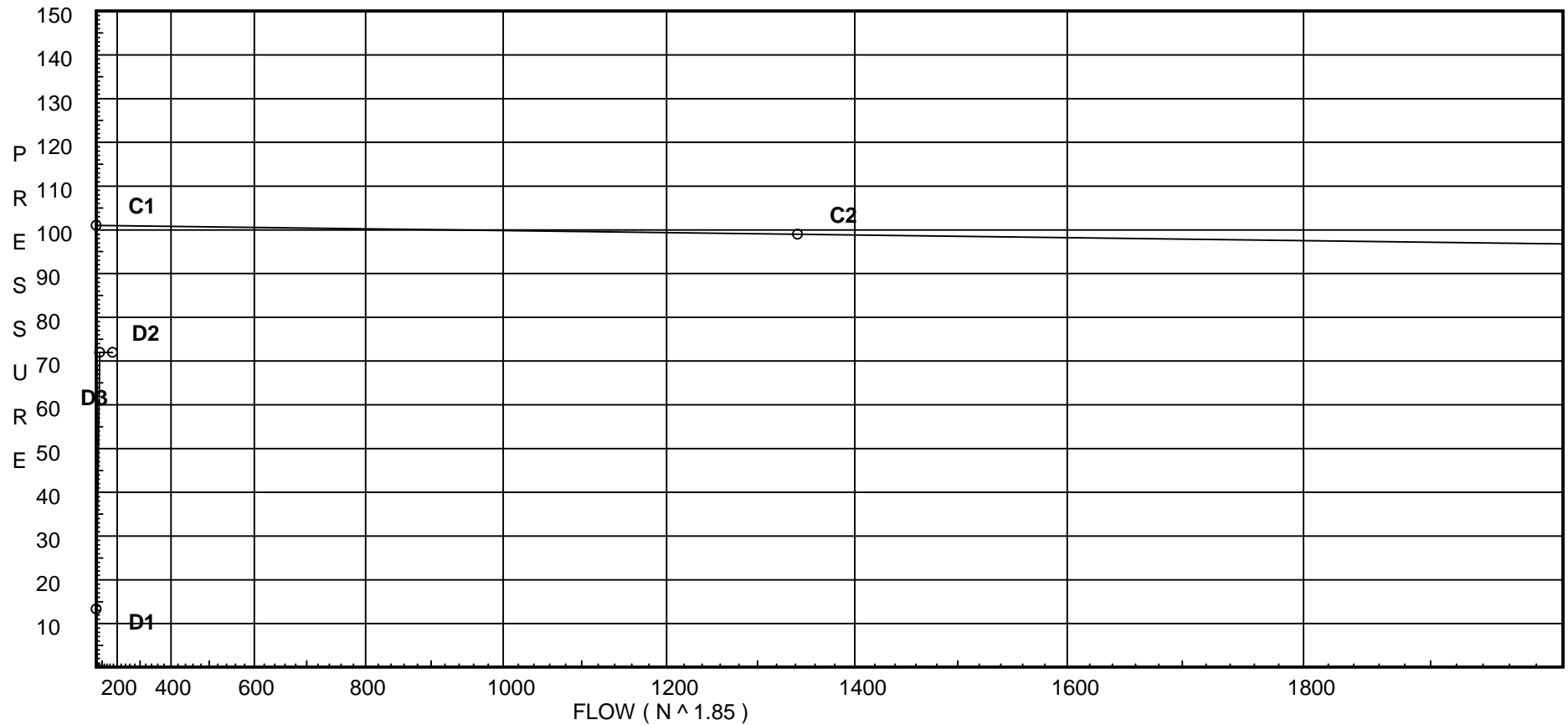
Water Supply Curve C

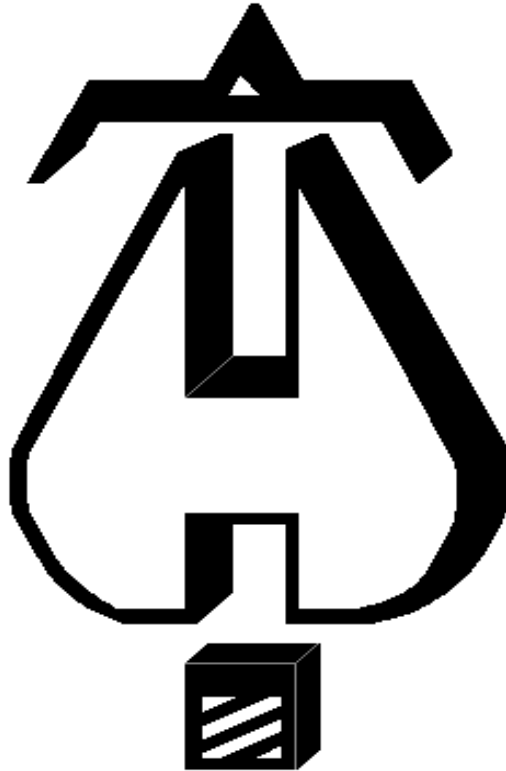
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City Water Supply:
C1 - Static Pressure : 101
C2 - Residual Pressure: 99
C2 - Residual Flow : 1342

Demand:
D1 - Elevation : 13.318
D2 - System Flow : 75.838
D2 - System Pressure : 71.996
Hose (Demand) : 100
D3 - System Demand : 175.838
Safety Margin : 28.958





. . . Fire Protection by Computer Design

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

Job Name : 10 EXCHANGE STREET THIRD FLOOR-AREA 3-3
Building : THIRD FLOOR-APT. 302
Location : 10 EXCHANGE STREET PORTLAND MAINE
System : 3-3.WX4
Contract : C161341
Data File : 10 EXCHANGE ST 3RD FLOOR AREA 3.WX4

Hydraulic Design Information Sheet

Name - 10 EXCHANGE STREET Date - 07/20/2016
 Location - 10 EXCHANGE STREET PORTLAND MAINE
 Building - THIRD FLOOR-APT. 302 System No. - 3-3.WX4
 Contractor - DEAN & ALLYN, INC. Contract No. - C161341
 Calculated By - T. CLARKE Drawing No. - FP-100
 Construction: (X) Combustible () Non-Combustible Ceiling Height - 9'
 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 FIRES44
E	Elevation at Highest Outlet	- 50.75	() Deluge	Size 7/16"X1/2"
S	Hose Allowance - Inside	- 100	() Preaction	K-Factor 4.4
I	Rack Sprinkler Allowance	- 0	() Other	Temp.Rat.155F
G	Hose Allowance - Outside	- 0		

N Note CUSHION 18.7 PSI

Calculation Flow Required - 174.5 Press Required - 74.1 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 STREET THIRD FLOOR-AREA 3-3

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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	
Ball	B Ball Milw BB-SC100			2.25	2	2.5	2.25	10														
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	
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28	
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	
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	
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 for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Pressure / Flow Summary - STANDARD

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
315	45.25	4.4	13.3	na	16.05	0.1	160	13.3
316	45.25	4.9	13.56	na	18.04	0.1	80	7.0
317	45.25	4.4	13.73	na	16.31	0.1	160	13.3
318	45.25	4.4	30.16	na	24.16	0.1	230	27.4
319	45.25		34.49	na				
35	45.25		48.94	na				
34	45.0		50.52	na				
FCV3	45.0		56.44	na	100.0			
TR	6.75		75.24	na				
BR	2.917		77.33	na				
FF	2.917		81.45	na				
UG	2.917		81.51	na				
TEST	20.0		74.13	na				

The maximum velocity is 18.71 and it occurs in the pipe between nodes 317 and 318

Final Calculations - Hazen-Williams - 2007

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
315 to 316	16.05	1.049 120.0		0.0	3.000	13.300			K Factor = 4.40	
316 to 317	16.05	0.0867		0.0	3.000	0.260			Vel = 5.96	
316 to 317	18.04	1.049 120.0		0.0	0.500	13.560			K Factor = 4.90	
317 to 318	34.09	0.3480		0.0	0.500	0.174			Vel = 12.66	
317 to 318	16.31	1.049 120.0	2F E	2.0 2.0	18.833 4.000	13.734 0.0			K Factor = 4.40	
318 to 319	50.4	0.7193		0.0	22.833	16.424			Vel = 18.71	
318 to 319	24.16	1.61 120.0	2E	8.0 0.0	15.500 8.000	30.158 0.0			K Factor = 4.40	
319 to 35	74.56	0.1843		0.0	23.500	4.331			Vel = 11.75	
319 to 35	0.0	1.61 120.0	5E 2T	20.0 16.0	42.417 36.000	34.489 0.0				
35 to 34	74.56	0.1843		0.0	78.417	14.453			Vel = 11.75	
35 to 34	0.0	2.157 120.0	T	12.307 0.0	20.917 12.307	48.942 0.108				
34 to FCV3	74.56	0.0444		0.0	33.224	1.474			Vel = 6.55	
34 to FCV3	0.0	2.157 120.0	Ball S	2.769 13.537	18.167 47.688	50.524 3.000			** Fixed Loss = 3	
FCV3 to TR	74.56	0.0444	Fsp Y 3E	0.0 12.922 18.46	65.855	2.921			Vel = 6.55	
FCV3 to TR	100.00	4.26 120.0	18l	165.905 0.0	120.667 165.905	56.445 16.566			Qa = 100	
TR to BR	174.56	0.0078		0.0	286.572	2.230			Vel = 3.93	
TR to BR	0.0	4.26 120.0	Bvca S	10.534 28.968	6.000 48.719	75.241 1.660				
BR to FF	174.56	0.0078	I	9.217	54.719	0.426			Vel = 3.93	
BR to FF	0.0	6.357 120.0	I Zca	12.573 0.0	4.417 12.573	77.327 4.100			** Fixed Loss = 4.1	
FF to UG	174.56	0.0011		0.0	16.990	0.019			Vel = 1.76	
FF to UG	0.0	6.16 140.0	G T	4.304 43.037	20.000 47.341	81.446 0.0				
UG to TEST	174.56	0.0010		0.0	67.341	0.065			Vel = 1.88	
UG to TEST	0.0	10.22 100.0	T G	39.29 3.929	100.000 43.218	81.511 -7.399				
TEST	174.56	0.0002		0.0	143.218	0.022			Vel = 0.68	
	0.0									
	174.56					74.134			K Factor = 20.27	

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 : 10.936
D2 - System Flow : 74.56
D2 - System Pressure : 74.134
Hose (Demand) : 100
D3 - System Demand : 174.56
Safety Margin : 18.735

