

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

Dean & Allyn, Inc.  
116 Lewiston Road  
Gray, ME 04039  
(207) 657-5646

Job Name : 1576 Forest Avenue  
Drawing : 2 of 2  
Location : 1576 Forest Avenue  
Remote Area : Area 1  
Contract : C171418  
Data File : Dry System - Area 1.WXF

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**HYDRAULIC CALCULATIONS**  
**for**

**Project name:** Moran's Market Renovations

**Location:** 1576 Forest Avenue

**Drawing no:** 2 of 2

**Date:** 11/14/2017

**Design**

**Remote area number:** Area 1

**Remote area location:** First Floor Retail

**Occupancy classification:** Ordinary Hazard Group II

**Density:** 0.20 - Gpm/SqFt

**Area of application:** 960 - SqFt

**Coverage per sprinkler:** 130 - SqFt

**Type of sprinklers calculated:** Reliable F1FR56 Pendent

**No. of sprinklers calculated:** 10

**In-rack demand:** - GPM

**Hose streams:** 250 - GPM

**Total water required (including hose streams):** 233.362 - GPM @ 57.055 - Psi

**Type of system:** DRY

**Volume of dry or preaction system:** 98.20 - Gal

**Water supply information**

**Date:** 10/14/2016

**Location:** Forest Avenue - Hydrant #01652

**Source:** Portland Water District

**Name of contractor:** Dean & Allyn, Inc.

**Address:** 116 Lewiston Road / / Gray, ME 04039

**Phone number:** (207) 657-5646

**Name of designer:** Chris Stewart

**Authority having jurisdiction:**

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

# Water Supply Curve C

Dean & Allyn, Inc.  
1576 Forest Avenue

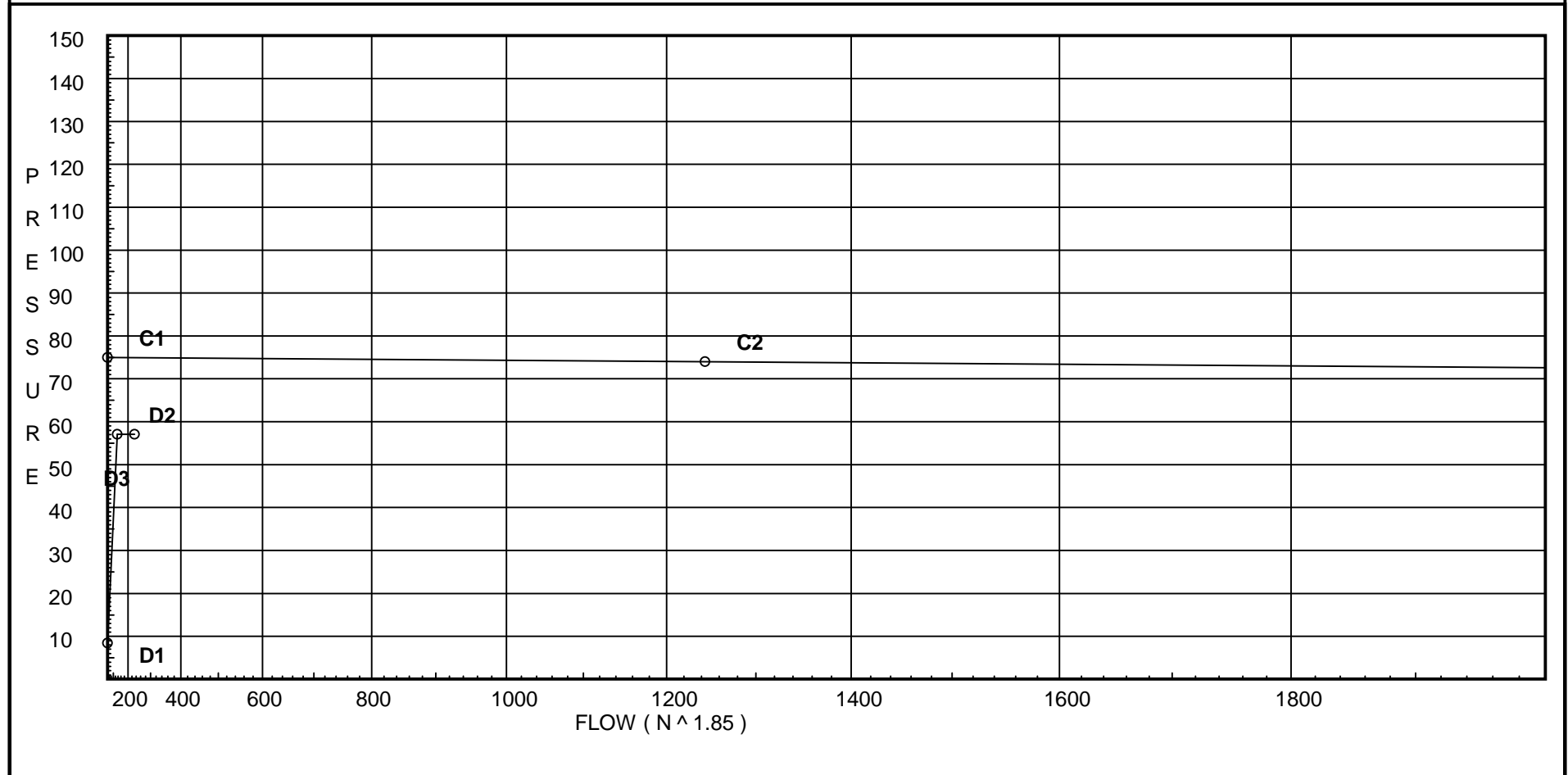
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### City Water Supply:

C1 - Static Pressure : 75  
C2 - Residual Pressure: 74  
C2 - Residual Flow : 1244

### Demand:

D1 - Elevation : 8.445  
D2 - System Flow : 133.362  
D2 - System Pressure : 57.055  
Hose ( Demand ) : 100  
D3 - System Demand : 233.362  
Safety Margin : 17.900



# Fittings Used Summary

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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
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
Dge	Dry Gem DPV-1							2.2	4.9		8.9		22								
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
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
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

## Unit 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.
A	27.5	5.6	7.0	na	14.82	0.1	88	7.0
B	27.0		7.63	na				
C	27.5	5.6	7.0	na	14.82	0.1	40	7.0
D	27.0		7.63	na				
301	27.0	K = K @ B	7.63	na	14.82			
302	27.0	K = K @ D	9.68	na	16.69			
303	27.0	K = K @ D	10.57	na	17.44			
304	27.0	K = K @ D	12.57	na	19.02			
305	27.0	K = K @ D	14.32	na	20.3			
306	28.5	5.6	16.61	na	22.82	0.1	118	7.0
307	28.5	5.6	15.83	na	22.28	0.1	160	7.0
30A	28.5		18.32	na				
30	27.0		24.91	na				
31	27.0		37.33	na				
32	27.0		41.3	na				
33	16.08		48.02	na				
34	16.08		50.08	na				
TR3	8.71		55.59	na				
BR3	2.0		59.29	na				
FF	1.5		59.59	na				
UG1	1.5		59.65	na				
TEST	7.5		57.06	na	100.0			

The maximum velocity is 16.74 and it occurs in the pipe between nodes 30A and 30

EOD

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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	*****
A to B	27.500 27	5.60	14.82 14.82	1 1.049	T	5.0 0.0	0.500 5.000 5.500	120	7.000 0.217 0.410		Vel = 5.50	
B			0.0 14.82						7.627		K Factor = 5.37	
C to D	27.500 27	5.60	14.82 14.82	1 1.049	T	5.0 0.0	0.500 5.000 5.500	120	7.000 0.217 0.410		Vel = 5.50	
D			0.0 14.82						7.627		K Factor = 5.37	
301 to 302	27 27	5.36	14.82 14.82	1 1.049	4E	5.71 0.0	13.870 5.710 19.580	100	7.627 0.0 2.050		K = K @ B Vel = 5.50	
302 to 303	27 27	5.36	16.68 31.5	1.25 1.38		0.0 0.0	8.000 0.0 8.000	100	9.677 0.0 0.889		K = K @ D Vel = 6.76	
303 to 304	27 27	5.36	17.44 48.94	1.25 1.38		0.0 0.0	8.000 0.0 8.000	100	10.566 0.0 2.009		K = K @ D Vel = 10.50	
304 to 305	27 27	5.36	19.03 67.97	1.5 1.61		0.0 0.0	8.000 0.0 8.000	100	12.575 0.0 1.741		K = K @ D Vel = 10.71	
305 to 30	27 27	5.36	20.29 88.26	1.5 1.61	E	2.855 0.0	27.160 2.855 30.015	100	14.316 0.0 10.591		K = K @ D Vel = 13.91	
30			0.0 88.26						24.907		K Factor = 17.68	
306 to 30A	28.500 28.500	5.60	22.82 22.82	1 1.049	T	3.568 0.0	3.790 3.568 7.358	100	16.605 0.0 1.713		Vel = 8.47	
30A			0.0 22.82						18.318		K Factor = 5.33	
307 to 30A	28.500 28.500	5.60	22.28 22.28	1 1.049	E T	1.427 3.568	6.200 4.995 11.195	100	15.826 0.0 2.492		Vel = 8.27	
30A to 30	28.500 27		22.82 45.1	1 1.049	T	3.568 0.0	3.670 3.568 7.238	100	18.318 0.650 5.939		Vel = 16.74	
30 to 31	27 27		88.26 133.36	2 2.067	E T	3.568 7.137	44.710 10.705 55.415	100	24.907 0.0 12.427		Vel = 12.75	
31 to 32	27 27		0.0 133.36	2 2.067	E	3.568 0.0	14.120 3.568 17.688	100	37.334 0.0 3.966		Vel = 12.75	
32 to 33	27 16.080		0.0 133.36	2.5 2.635	E T	5.879 11.758	11.290 17.636 28.926	100	41.300 4.729 1.989		Vel = 7.85	
33 to 34	16.080 16.080		0.0 133.36	2.5 2.635	T	11.758 0.0	18.290 11.757 30.047	100	48.018 0.0 2.066		Vel = 7.85	

# 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	*****
34 to TR3	16.080 8.710		0.0 133.36	3 3.26	7E 2F 47.0 5.755 0.0	42.080 52.754 94.834	100 0.0244	50.084 3.192 2.312		Vel = 5.13	
TR3 to BR3	8.710 2		0.0 133.36	3 3.26	Dge B T 4.7 9.592 14.388	3.750 28.679 32.429	100 0.0244	55.588 2.906 0.791		Vel = 5.13	
BR3 to FF	2 1.500		0.0 133.36	4 4.26	E 13.167 0.0 0.0	5.600 13.167 18.767	120 0.0047	59.285 0.217 0.088		Vel = 3.00	
FF to UG1	1.500 1.500		0.0 133.36	6 6.16	E T 20.084 43.037 0.0	40.000 63.121 103.121	140 0.0006	59.590 0.0 0.061		Vel = 1.44	
UG1 to TEST	1.500 7.500		0.0 133.36	16 16.41	E T G 82.4 166.859 16.48	175.000 265.740 440.740	140 0	59.651 -2.599 0.003		Vel = 0.20	
TEST			100.00 233.36					57.055		Qa = 100.00 K Factor = 30.89	