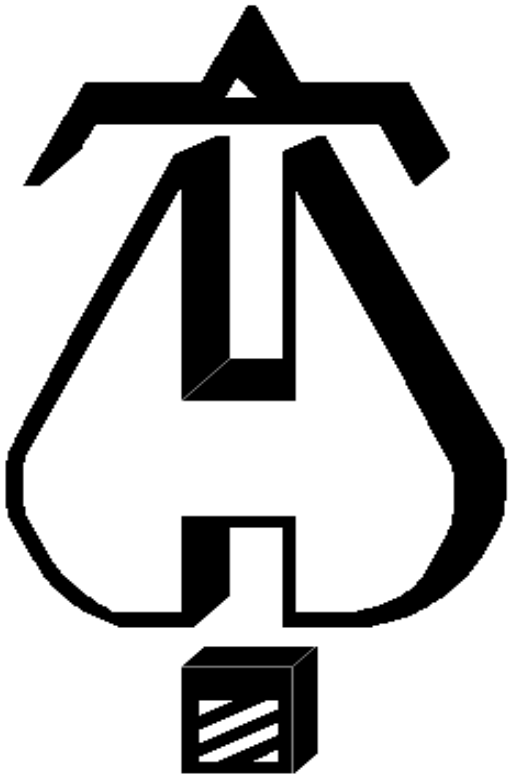


. . . Fire Protection by Computer Design

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

Job Name	:	C171418 1576 Forest Ave
Drawing	:	1 of 2
Location	:	1576 Forest Avenue
Remote Area	:	Area 3
Contract	:	C171418
Data File	:	Wet System - Area 3.WXF

HYDRAULIC CALCULATIONS
for

Project name: Moran's Market Renovations
Location: 1576 Forest Avenue
Drawing no: 1 of 2
Date: 11/14/2017

Design

Remote area number: Area 3
Remote area location: First Floor Kitchen
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: 15
In-rack demand: - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 688.575 - GPM @ 60.045 - Psi
Type of system: Wet
Volume of dry or preaction system: N/A - Gal

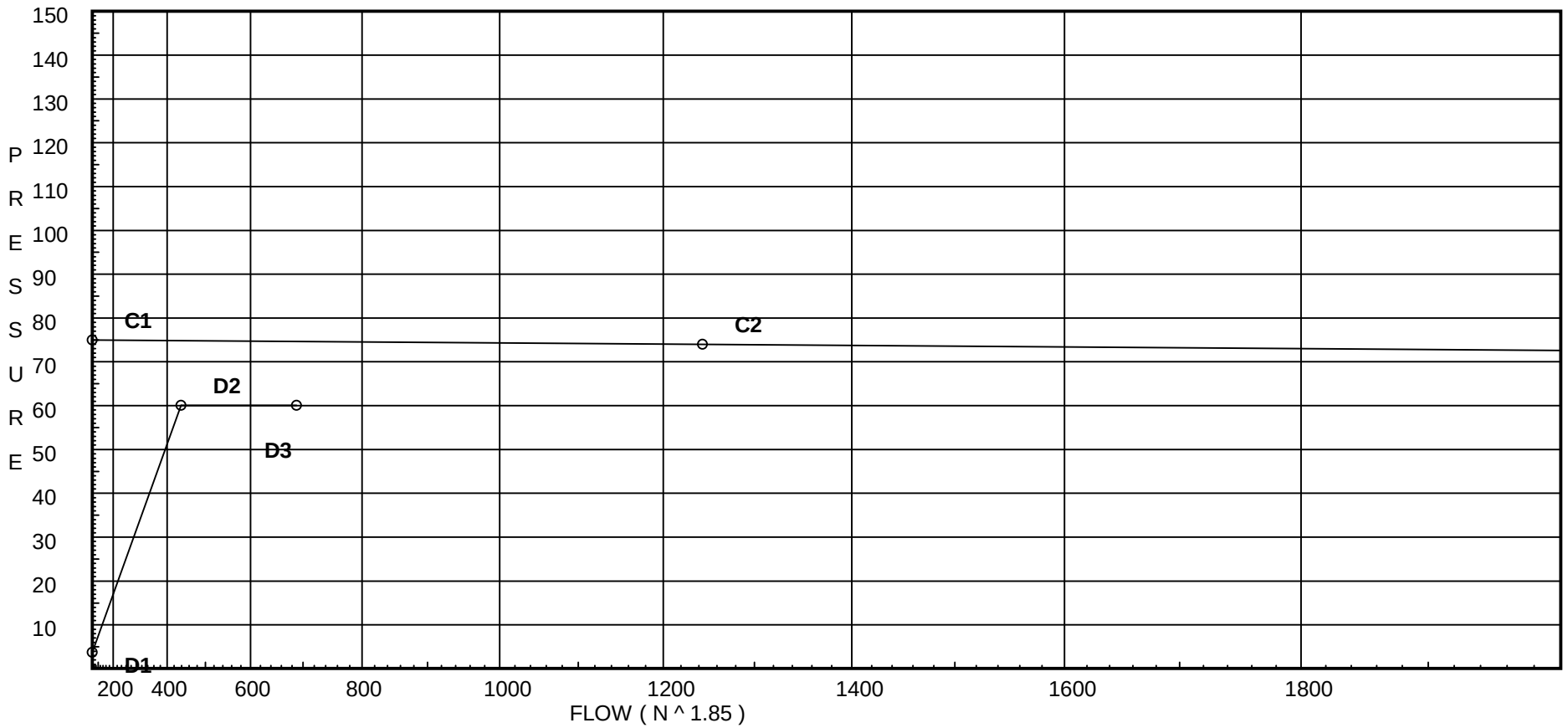
Water supply information

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.)

City Water Supply:
- C1 - Static Pressure : 75
- C2 - Residual Pressure: 74
- C2 - Residual Flow : 1244

Demand:
- D1 - Elevation : 3.716
- D2 - System Flow : 438.575
- D2 - System Pressure : 60.045
- Hose (Demand) : 250
- D3 - System Demand : 688.575
- Safety Margin : 14.620



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
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
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
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
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
Zca	Colt C200 Horz Butt	Fitting generates a Fixed Loss Based on Flow																			

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

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
DP03	15.37	5.6	16.58	na	22.8	0.2	114	7.0
EQ03	16.08		16.71	na				
DP02	15.37	5.6	7.0	na	14.82	0.2	57	7.0
EQ02	16.08		7.12	na				
DP01	15.37	5.6	11.03	na	18.6	0.2	93	7.0
EQ01	16.08		11.37	na				
123	13.08	5.6	14.99	na	21.68	0.2	71	7.0
124	13.08		15.87	na				
125	16.08		22.27	na				
126	16.08		22.49	na				
127	16.08		37.3	na				
128	16.08		41.72	na				
129	6.25		47.85	na				
130	6.25		49.31	na				
TR2	4.0		51.86	na				
BR2	1.5		59.2	na				
FF	1.5		62.07	na				
UG1	1.5		62.62	na				
TEST	7.5		60.05	na	250.0			
131	13.08	5.6	15.72	na	22.2	0.2	71	7.0
132	16.08	5.6	18.37	na	24.0	0.2	120	7.0
133	16.08		19.94	na				
134	16.08	5.6	18.76	na	24.25	0.2	59	7.0
135	16.08	5.6	21.4	na	25.9	0.2	120	7.0
136	16.08	5.6	29.96	na	30.65	0.2	100	7.0
137	16.08	5.6	32.83	na	32.09	0.2	100	7.0
138	16.08	5.6	34.7	na	32.99	0.2	119	7.0
139	16.08	5.6	34.07	na	32.69	0.2	60	7.0
140	16.08	5.6	36.65	na	33.9	0.2	77	7.0
141	16.08	K = K @ EQ02	29.53	na	30.18			
142	16.08		32.58	na				
143	16.08	K = K @ EQ01	33.82	na	32.08			
144	16.08		38.62	na				
145	16.08		44.2	na				
146	16.08		44.48	na				
147	16.08	5.6	32.3	na	31.83	0.2	57	7.0
148	16.08		44.18	na				
149	15.33	5.6	30.64	na	31.0	0.2	42	7.0
150	16.08	K = K @ EQ03	35.3	na	33.14			
151	16.08		41.21	na				
152	16.08		42.8	na				

The maximum velocity is 24.72 and it occurs in the pipe between nodes 140 and 127

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 ******
DP03	15.370	5.60	22.80	1	E	2.0	0.670	120	16.576	
to						0.0	2.000		-0.308	
EQ03	16.080		22.8	1.049		0.0	2.670	0.1663	0.444	Vel = 8.46
			0.0							
EQ03			22.80						16.712	K Factor = 5.58
DP02	15.370	5.60	14.82	1	T	5.0	0.670	120	7.000	
to						0.0	5.000		-0.308	
EQ02	16.080		14.82	1.049		0.0	5.670	0.0748	0.424	Vel = 5.50
			0.0							
EQ02			14.82						7.116	K Factor = 5.56
DP01	15.370	5.60	18.60	1	T	5.0	0.670	120	11.032	
to						0.0	5.000		-0.308	
EQ01	16.080		18.6	1.049		0.0	5.670	0.1139	0.646	Vel = 6.90
			0.0							
EQ01			18.60						11.370	K Factor = 5.52
123	13.080	5.60	21.68	1		0.0	5.850	120	14.988	
to						0.0	0.0		0.0	
124	13.080		21.68	1.049		0.0	5.850	0.1511	0.884	Vel = 8.05
124	13.080		22.21	1	T	5.0	4.830	120	15.872	
to					2E	4.0	9.000		-1.299	
125	16.080		43.89	1.049		0.0	13.830	0.5569	7.702	Vel = 16.29
125	16.080		48.25	1.5		0.0	0.790	120	22.275	
to						0.0	0.0		0.0	
126	16.080		92.14	1.61		0.0	0.790	0.2722	0.215	Vel = 14.52
126	16.080		25.90	1.5	2T	16.0	6.350	120	22.490	
to					3E	12.0	28.000		0.0	
127	16.080		118.04	1.61		0.0	34.350	0.4312	14.812	Vel = 18.60
127	16.080		66.59	2	T	10.0	5.120	120	37.302	
to						0.0	10.000		0.0	
128	16.080		184.63	2.067		0.0	15.120	0.2921	4.417	Vel = 17.65
128	16.080		95.73	3	J	17.471	9.830	120	41.719	
to						0.0	17.471		4.257	
129	6.250		280.36	3.26		0.0	27.301	0.0688	1.879	Vel = 10.78
129	6.250		0.0	4	4I	36.868	40.790	120	47.855	
to						0.0	36.868		0.0	
130	6.250		280.36	4.26		0.0	77.658	0.0187	1.452	Vel = 6.31
130	6.250		158.22	4	2I	18.434	18.500	120	49.307	
to						0.0	18.434		0.974	
TR2	4		438.58	4.26		0.0	36.934	0.0428	1.580	Vel = 9.87
TR2	4		0.0	4	B	15.8	5.000	120	51.861	
to					S	28.968	71.102		4.083	* Fixed Loss = 3
BR2	1.500		438.58	4.26	Fsp	0.0	76.102	0.0428	3.255	Vel = 9.87
					T	26.334				
BR2	1.500		0.0	6	2E	35.205	8.000	120	59.199	
to					Zca	0.0	35.205		2.611	* Fixed Loss = 2.611
FF	1.500		438.58	6.357		0.0	43.205	0.0061	0.264	Vel = 4.43
FF	1.500		0.0	6	E	20.084	40.000	140	62.074	
to					T	43.037	63.121		0.0	
UG1	1.500		438.58	6.16		0.0	103.121	0.0053	0.550	Vel = 4.72

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 ******
UG1	1.500		0.0	16	E	82.4	175.000	140	62.624	
to					T	166.859	265.740		-2.599	
TEST	7.500		438.58	16.41	G	16.48	440.740	0	0.020	Vel = 0.67
			250.00							Qa = 250.00
TEST			688.58						60.045	K Factor = 88.86
131	13.080	5.60	22.20	1		0.0	0.950	120	15.722	
to						0.0	0.0		0.0	
124	13.080		22.2	1.049		0.0	0.950	0.1579	0.150	Vel = 8.24
			0.0							
124			22.20						15.872	K Factor = 5.57
132	16.080	5.60	24.00	1	E	2.0	6.600	120	18.367	
to						0.0	2.000		0.0	
133	16.080		24.0	1.049		0.0	8.600	0.1823	1.568	Vel = 8.91
133	16.080		24.25	1.25	T	6.0	7.400	120	19.935	
to						0.0	6.000		0.0	
125	16.080		48.25	1.38		0.0	13.400	0.1746	2.340	Vel = 10.35
			0.0							
125			48.25						22.275	K Factor = 10.22
134	16.080	5.60	24.25	1	T	5.0	1.330	120	18.758	
to						0.0	5.000		0.0	
133	16.080		24.25	1.049		0.0	6.330	0.1859	1.177	Vel = 9.00
			0.0							
133			24.25						19.935	K Factor = 5.43
135	16.080	5.60	25.90	1		0.0	5.210	120	21.396	
to						0.0	0.0		0.0	
126	16.080		25.9	1.049		0.0	5.210	0.2100	1.094	Vel = 9.61
			0.0							
126			25.90						22.490	K Factor = 5.46
136	16.080	5.60	30.65	1		0.0	10.000	120	29.962	
to						0.0	0.0		0.0	
137	16.080		30.65	1.049		0.0	10.000	0.2867	2.867	Vel = 11.38
137	16.080	5.60	32.09	1.25	E	3.0	3.580	120	32.829	
to						0.0	3.000		0.0	
138	16.080		62.74	1.38		0.0	6.580	0.2837	1.867	Vel = 13.46
138	16.080	5.60	32.98	1.25	T	6.0	5.330	120	34.696	
to						0.0	6.000		0.0	
128	16.080		95.72	1.38		0.0	11.330	0.6199	7.023	Vel = 20.53
			0.0							
128			95.72						41.719	K Factor = 14.82
139	16.080	5.60	32.69	1		0.0	8.000	120	34.068	
to						0.0	0.0		0.0	
140	16.080		32.69	1.049		0.0	8.000	0.3230	2.584	Vel = 12.14
140	16.080	5.60	33.90	1		0.0	0.540	120	36.652	
to						0.0	0.0		0.0	
127	16.080		66.59	1.049		0.0	0.540	1.2037	0.650	Vel = 24.72
			0.0							
127			66.59						37.302	K Factor = 10.90

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 ******
141	16.080	5.55	30.18	1	E	2.0	3.950	120	29.526	K = K @ EQ02
to					T	5.0	7.000		0.0	
142	16.080		30.18	1.049		0.0	10.950	0.2785	3.050	Vel = 11.20
142	16.080		31.83	1.25		0.0	4.470	120	32.576	
to						0.0	0.0		0.0	
143	16.080		62.01	1.38		0.0	4.470	0.2776	1.241	Vel = 13.30
143	16.080	5.52	32.07	1.25		0.0	8.000	120	33.817	K = K @ EQ01
to						0.0	0.0		0.0	
144	16.080		94.08	1.38		0.0	8.000	0.6004	4.803	Vel = 20.18
144	16.080		0.0	1.5	T	8.0	11.670	120	38.620	
to						0.0	8.000		0.0	
145	16.080		94.08	1.61		0.0	19.670	0.2834	5.575	Vel = 14.83
145	16.080		64.14	2.5		0.0	4.290	120	44.195	
to						0.0	0.0		0.0	
146	16.080		158.22	2.635		0.0	4.290	0.0674	0.289	Vel = 9.31
146	16.080		0.0	4	5I	46.085	20.000	120	44.484	
to					J	21.067	67.152		4.257	
130	6.250		158.22	4.26		0.0	87.152	0.0065	0.566	Vel = 3.56
			0.0							
130			158.22						49.307	K Factor = 22.53
147	16.080	5.60	31.83	1		0.0	0.900	120	32.300	
to						0.0	0.0		0.0	
142	16.080		31.83	1.049		0.0	0.900	0.3067	0.276	Vel = 11.82
			0.0							
142			31.83						32.576	K Factor = 5.58
145	16.080		-64.13	2.5		0.0	1.000	120	44.195	
to						0.0	0.0		0.0	
148	16.080		-64.13	2.635		0.0	1.000	-0.0130	-0.013	Vel = 3.77
			0.0							
148			-64.13						44.182	K Factor = -9.65
149	15.330	5.60	31.00	1	3E	6.0	11.040	120	30.638	
to						0.0	6.000		-0.325	
150	16.080		31.0	1.049		0.0	17.040	0.2927	4.988	Vel = 11.51
150	16.080	5.58	33.13	1.25		0.0	20.000	120	35.301	K = K @ EQ03
to						0.0	0.0		0.0	
151	16.080		64.13	1.38		0.0	20.000	0.2955	5.910	Vel = 13.76
151	16.080		0.0	1.5	T	8.0	3.420	120	41.211	
to						0.0	8.000		0.0	
152	16.080		64.13	1.61		0.0	11.420	0.1395	1.593	Vel = 10.11
152	16.080		0.0	2	4E	20.0	13.370	120	42.804	
to						0.0	20.000		0.0	
148	16.080		64.13	2.067		0.0	33.370	0.0413	1.378	Vel = 6.13
			0.0							
148			64.13						44.182	K Factor = 9.65