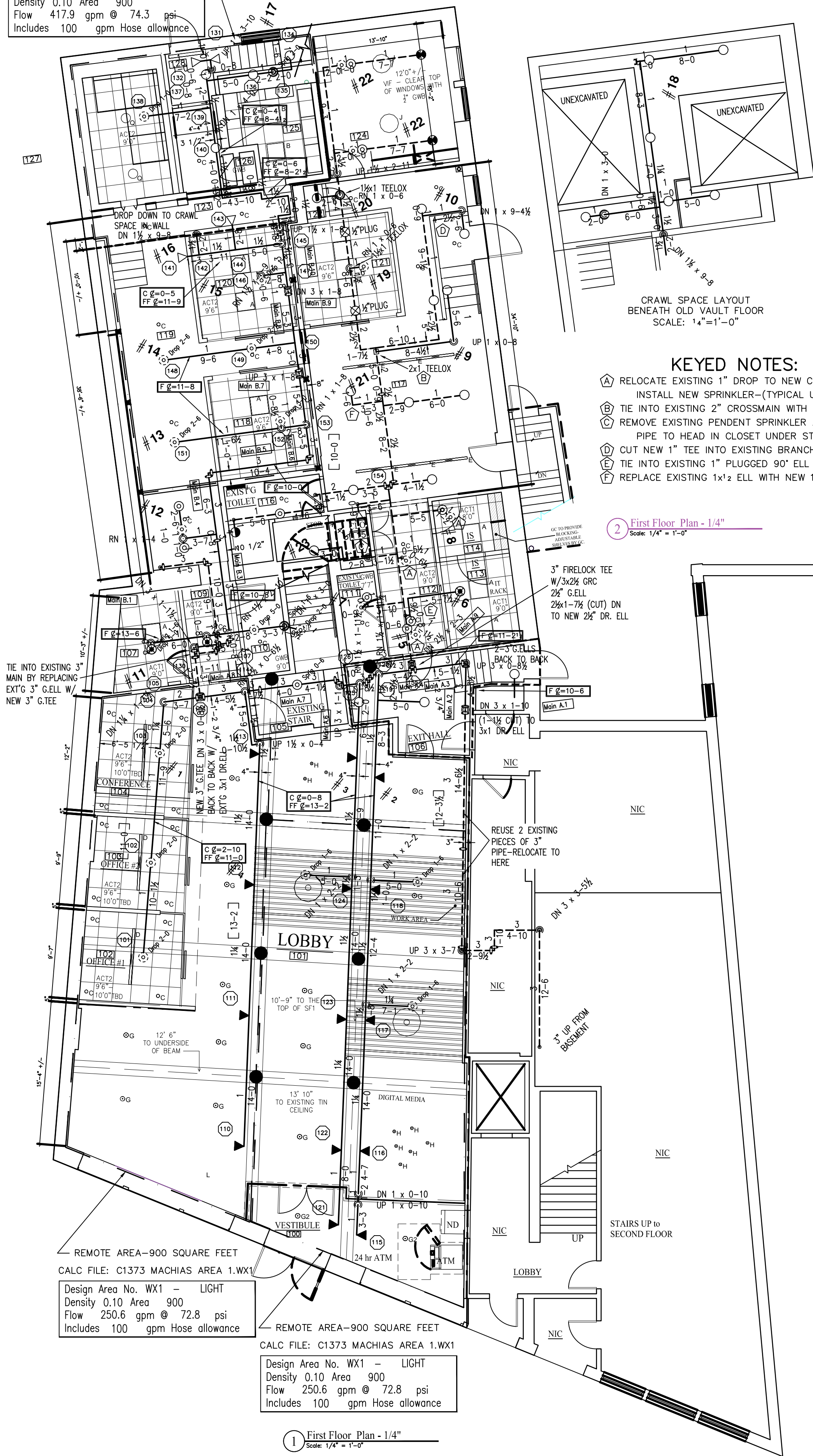


REMOTE AREA-900 SQUARE FEET  
CALC FILE: C1373 MACHIAS AREA 3.WX3  
Design Area No. WX3 - LIGHT  
Density 0.10 Area 900  
Flow 417.9 gpm @ 74.3 psi  
Includes 100 gpm Hose allowance



- KEYED NOTES:**
- (A) RELOCATE EXISTING 1" DROP TO NEW CEILING TILE AS SHOWN. INSTALL NEW SPRINKLER-(TYPICAL UNLESS NOTED).
  - (B) TIE INTO EXISTING 2" CROSSMAIN WITH A 2X1 TEELOX.
  - (C) REMOVE EXISTING PENDENT SPRINKLER AND 1" DROP. RUN NEW PIPE TO HEAD IN CLOSET UNDER STAIRS.
  - (D) CUT NEW 1" TEE INTO EXISTING BRANCHLINE.
  - (E) TIE INTO EXISTING 1" PLUGGED 90° ELL.
  - (F) REPLACE EXISTING 1x2 ELL WITH NEW 1" ELL.

2 First Floor Plan - 1/4"  
Scale: 1/4" = 1'-0"

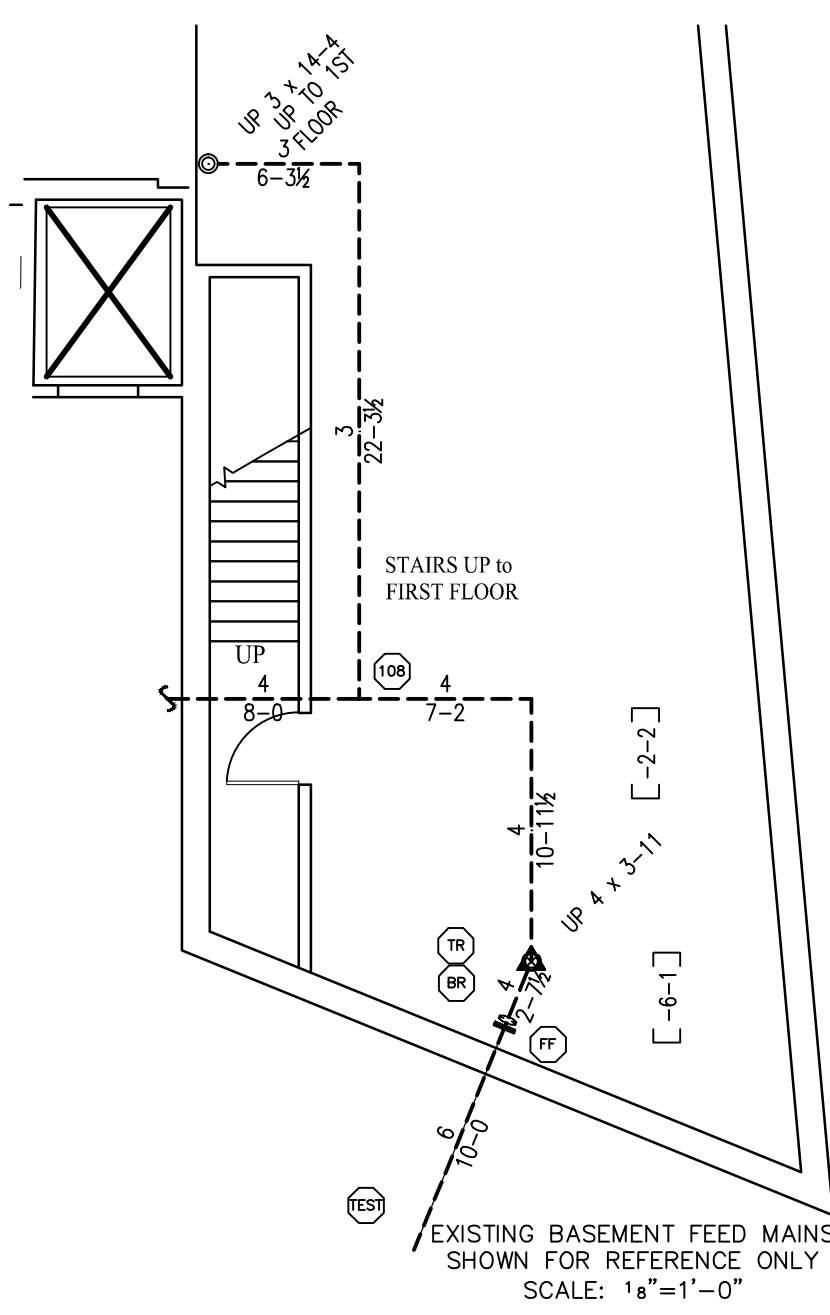
TIE INTO EXISTING MAIN BY REPLACING EXIST'G 3" G.E.LL W/ NEW 3" G.TEE

3" FIRELOCK TEE W/ 3/4" GRO. 2 1/2" G.E.LL 2 1/2" x 1-7/8" (CUT) DN TO NEW 2 1/2" DR. ELL

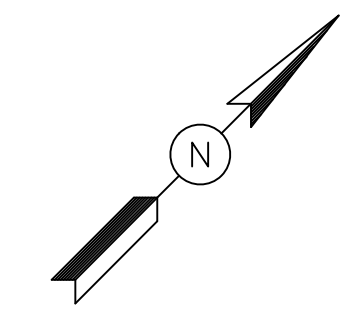
REUSE 2 EXISTING PIECES OF 3" PIPE-RELOCATE TO HERE

3" UP FROM BASEMENT

STAIRS UP TO SECOND FLOOR



EXISTING BASEMENT FEED MAINS SHOWN FOR REFERENCE ONLY  
SCALE: 1/4" = 1'-0"



**LEGEND:**

- UPRIGHT SPRINKLER ON A BRANCH LINE
- ⊙ UPRIGHT SPRINKLER ON A 1" SPRIG
- ⊖ RECESSED PENDENT SPRINKLER ON A 1" DROP
- △ HORIZONTAL SIDEWALL SPRINKLER
- RISE OR DROP
- GROOVED RIGID COUPLING
- ⊗ HYDRAULIC REFERENCE POINT
- ⊗-X' CEILING HEIGHT
- HANGER

- F ⊘ = X'-X" FINISHED FLOOR TO PIPE CENTERLINE
- C ⊘ = X'-X" CEILING TO PIPE CENTERLINE
- CTE CONNECT TO EXISTING
- - - EXISTING PIPE SHOWN DOTTED
- NEW PIPE SHOWN SOLID

**GENERAL NOTES:**

ALL 1" TO 2" THREADED PIPE IS TO BE SCH. 40 BLACK STEEL U/N.  
ALL 2" TO 3" GROOVED PIPE IS TO BE SCH. 10 BLACK STEEL U/N.  
ALL THREADED PIPE FITTINGS ARE TO BE BLACK CAST IRON, CLASS 125 U/N.  
DIMENSIONS SHOWN ON THREADED PIPE ARE CENTER TO CENTER U/N.  
DIMENSIONS SHOWN ON GROOVED PIPE ARE "CUT" LENGTHS U/N.  
PENDENT SPRINKLERS IN ACOUSTIC TILE CEILINGS ARE TO BE CENTERED IN TILES UNLESS NOTED.  
SUFFICIENT HEAT TO PREVENT FREEZING OF THE WET PIPE SPRINKLER SYSTEM IS REQUIRED TO BE FURNISHED BY THE BUYER/OWNER.

**SCOPE OF WORK:**

REWORK EXISTING WET PIPE SYSTEM OF AUTOMATIC SPRINKLERS IN RENOVATED BANK SPACE TO ACCOMMODATE NEW PARTITION LAYOUT. SYSTEM IS DESIGNED IN ACCORDANCE WITH NFPA-13, STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS, 2016 EDITION, FOR LIGHT HAZARD OCCUPANCY. SYSTEM IS HYDRAULICALLY CALCULATED TO PROVIDE A DENSITY OF 0.10 GPM PER SQUARE FOOT OVER THE MOST REMOTE 900 SQUARE FEET, WITH A HOSE ALLOWANCE OF 100 GPM.

FIRE PROTECTION SUBCONTRACTOR: DEAN & ALLYN, INC.  
STATE OF MAINE CONTRACTOR'S LICENSE NUMBER FSC262  
EXPIRATION DATE: JUNE 30, 2017

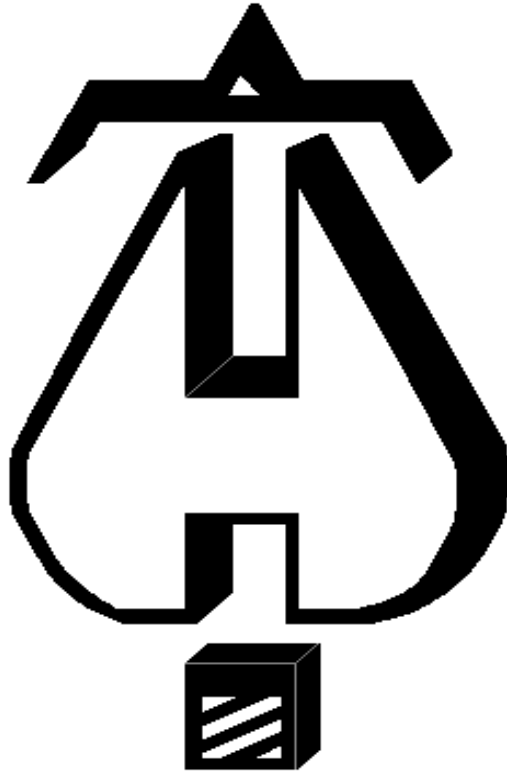
WORKING DRAWINGS PREPARED BY:  
THEODORE E. CLARKE  
NICET LEVEL IV  
CERTIFICATION #71654  
STATE OF MAINE RMS LICENSE NUMBER RMS208  
EXPIRATION DATE: JUNE 30, 2017

**DEAN & ALLYN, INC.**  
FIRE PROTECTION • SPECIAL HAZARD  
116 LEWISTON ROAD, GRAY, MAINE 04039  
(207)657-5646 FAX:(207)657-5647

- 28 RELIABLE MODEL F1FR56 BRASS UPRIGHT  
155° QUICK RESPONSE, STANDARD COVERAGE  
K=5.6, 1/2" NPT, SIN RA1425
- 27 RELIABLE MODEL F1FR56 RECESSED PENDENT  
155° QUICK RESPONSE, STANDARD COVERAGE  
WHITE, K=5.6, 1/2" NPT, SIN RA1414
- 4 RELIABLE MODEL F1FR56 HORIZONTAL SIDEWALL  
155° QUICK RESPONSE, STANDARD COVERAGE  
WHITE, K=5.6, 1/2" NPT, SIN RA1435
- 14 RELIABLE MODEL F1FR 90EC HORIZONTAL SIDEWALL  
155° QUICK RESPONSE, EXTENDED COVERAGE  
WHITE, K=8.0, 3/4" NPT, SIN R4862

1 First Floor Plan - 1/4"  
Scale: 1/4" = 1'-0"

		DANA A. STEWART NICET IV - #064544		DRAWING TITLE: <b>OVERALL SPRINKLER LAYOUT</b>		REV. 0	
DATE	SURVEYED BY	TEC	10/17/16	JOB:		NO. OF SPRINKLERS SHOWN ON THIS SHEET	
APPROVED BY	DRAWN BY	TEC	10/31/16	MACHIAS SAVINGS BANK		73	
	CHECKED BY	DAS		193 MIDDLE STREET		NO. OF SPRINKLERS ON JOB	
	AT DEAN & ALLYN, INC			PORTLAND, MAINE 04101		73	
	SCALE 1/8"=1'-0" U/N			CONTRACT WITH: CAP SERVICES, LLC		CONTRACT NO.	
	SHEET NO. FP-001			49 BRUCE HILL ROAD, CUMBERLAND, MAINE 04021		C161373	
REVISIONS	DATE						



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

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

Job Name : C1373 Machias Bank Area 1  
Drawing : FP-002  
Location : 193 Middle Street, Portland, Maine  
Remote Area : Area 1.wx1  
Contract : C1373  
Data File : C1373 Machias Bank Area 1.WX1

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**HYDRAULIC CALCULATIONS**  
**for**

**Project name:** Machias Savings Bank  
**Location:** 193 Middle Street, Portland, Maine  
**Drawing no:** FP-002  
**Date:** 10-14-2016

**Design**

**Remote area number:** Area 1.wx1  
**Remote area location:** Bank Lobby  
**Occupancy classification:** Light Hazard  
**Density:** 0.1 - Gpm/SqFt  
**Area of application:** 900 - SqFt  
**Coverage per sprinkler:** 320 - SqFt  
**Type of sprinklers calculated:** K=8.0  
**No. of sprinklers calculated:** 7  
**In-rack demand:** N/A - GPM  
**Hose streams:** 100 - GPM  
**Total water required (including hose streams):** 350.622 - GPM @ 72.8563 - Psi  
**Type of system:** Wet  
**Volume of dry or preaction system:** N/A - Gal

**Water supply information**

**Date:** 06/28/2016  
**Location:** Corner of Middle Street and Exchange Street  
**Source:** Portland Water District

**Name of contractor:** DEAN & ALLYN, INC.  
**Address:** 116 LEWISTON ROAD / / GRAY, MAINE 04039  
**Phone number:** 207-657-5646  
**Name of designer:** T Clarke  
**Authority having jurisdiction:** Maine State Fire Marshal's Office  
**Notes: (Include peaking information or gridded systems here.)** Safety Margin: 19.6 PSI

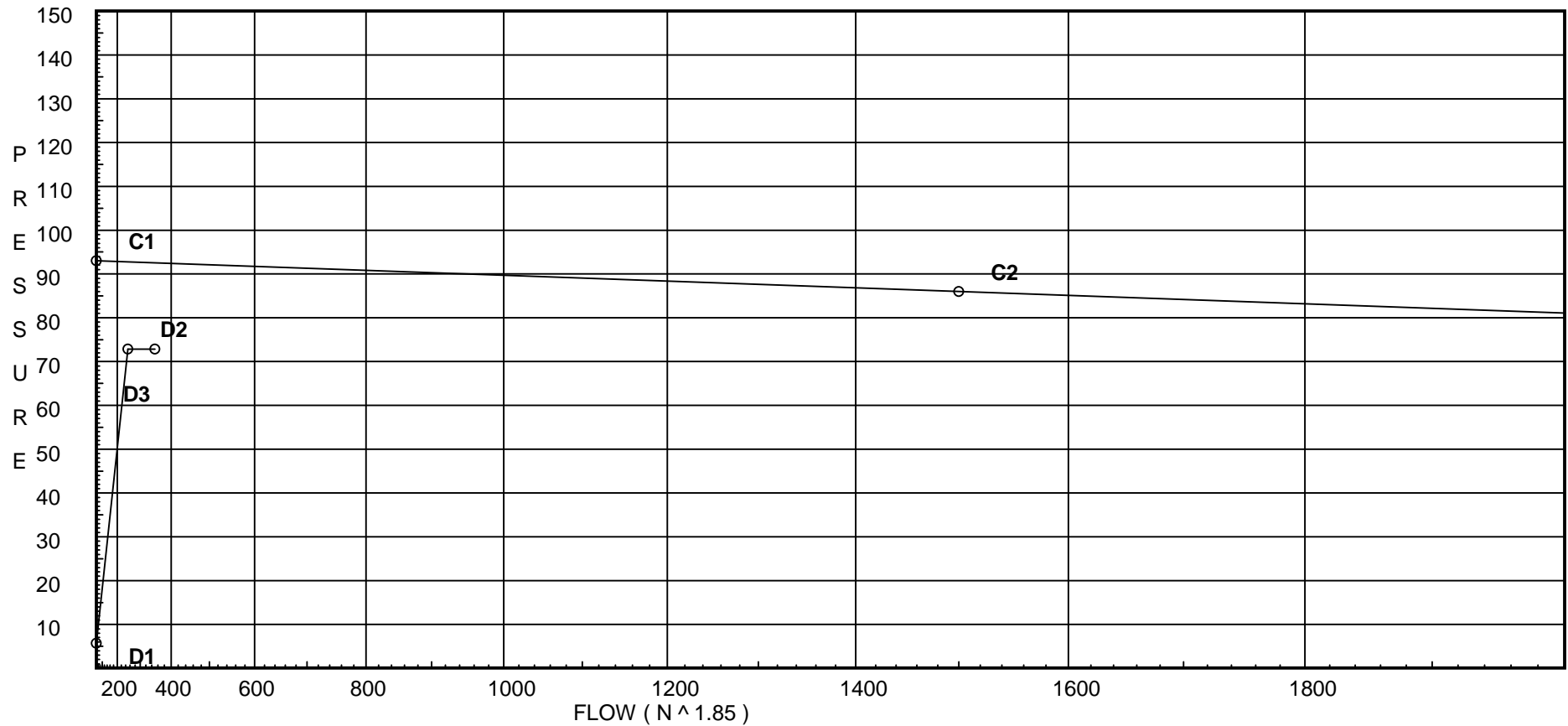
# Water Supply Curve C

DEAN & ALLYN, INC.  
C1373 Machias Bank Area 1

Page 2  
Date 10-14-2016

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

Demand:  
D1 - Elevation : 5.704  
D2 - System Flow : 250.622  
D2 - System Pressure : 72.856  
Hose ( Demand ) : 100  
D3 - System Demand : 350.622  
Safety Margin : 19.668



# Fittings Used Summary

DEAN & ALLYN, INC.  
C1373 Machias Bank Area 1

Page 3  
Date 10-14-2016

## Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24	
Aty	Alarm Tyco AV-1								14		23		24	23								
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	
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.

# Pressure / Flow Summary - STANDARD

DEAN & ALLYN, INC.  
C1373 Machias Bank Area 1

Page 4  
Date 10-14-2016

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
DP01	9.0	5.6	7.17	na	15.0	0.1	150	7.0
EQ01	11.0		6.61	na				
DP02	9.0	5.6	7.17	na	15.0	0.1	150	7.0
EQ02	11.0		6.84	na				
101	11.0	K = K @ EQ01	26.91	na	30.25			
102	11.0	K = K @ EQ02	29.74	na	31.27			
103	11.0	K = K @ EQ02	41.98	na	37.15			
104	11.0		47.55	na				
105	12.29		49.81	na				
106	12.29		50.1	na				
107	12.29		50.15	na				
108	-2.17		72.1	na				
TR	-2.17		72.77	na				
BR	-6.083		75.23	na				
FF	-6.083		75.27	na				
CITY	-6.08		75.45	na	100.0			
TEST	0.0		72.86	na				
110	13.17	8	16.0	na	32.0	0.1	320	16.0
111	13.17	8	20.35	na	36.09	0.1	320	16.0
112	13.17	8	24.97	na	39.97	0.1	320	16.0
113	13.17	8	30.09	na	43.89	0.1	320	16.0
114	13.17		43.66	na				

The maximum velocity is 23.95 and it occurs in the pipe between nodes 113 and 114



Final Calculations - Hazen-Williams - 2007

DEAN & ALLYN, INC.  
C1373 Machias Bank Area 1

Page 5  
Date 10-14-2016

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
DP01 to EQ01	15.00 15.0	1.049 120.0 0.0762	E 2.0 0.0 0.0	2.000 2.000 4.000	7.175 -0.866 0.305		K Factor = 5.60 Vel = 5.57		
	0.0 15.00					6.614	K Factor = 5.83		
DP02 to EQ02	15.00 15.0	1.049 120.0 0.0764	T 5.0 0.0 0.0	2.000 5.000 7.000	7.175 -0.866 0.535		K Factor = 5.60 Vel = 5.57		
	0.0 15.00					6.844	K Factor = 5.73		
101 to 102	30.25 30.25	1.049 120.0 0.2798	0.0 0.0 0.0	10.140 0.0 10.140	26.907 0.0 2.837		K Factor @ node EQ01 Vel = 11.23		
102 to 103	31.28 61.53	1.049 120.0 1.0405	0.0 0.0 0.0	11.760 0.0 11.760	29.744 0.0 12.236		K Factor @ node EQ02 Vel = 22.84		
103 to 104	37.15 98.68	1.38 120.0 0.6558	E 3.0 0.0 0.0	5.500 3.000 8.500	41.980 0.0 5.574		K Factor @ node EQ02 Vel = 21.17		
104 to 105	0.0 98.68	1.38 120.0 0.6557	E 3.0 0.0 0.0	1.290 3.000 4.290	47.554 -0.559 2.813		Vel = 21.17		
105 to 106	0.0 98.68	2.157 120.0 0.0746	0.0 0.0 0.0	3.930 0.0 3.930	49.808 0.0 0.293		Vel = 8.66		
106 to 107	0.0 98.68	3.26 120.0 0.0100	0.0 0.0 0.0	4.810 0.0 4.810	50.101 0.0 0.048		Vel = 3.79		
107 to 108	151.94 250.62	3.26 120.0 0.0559	14E 131.707 T 20.159 0.0	128.660 151.866 280.526	50.149 6.263 15.683		Vel = 9.63		
108 to TR	0.0 250.62	4.26 120.0 0.0152	2E 26.334 0.0 0.0	18.125 26.334 44.459	72.095 0.0 0.676		Vel = 5.64		
TR to BR	0.0 250.62	4.26 120.0 0.0152	G 2.633 Aty 30.284 E 13.167	3.917 46.084 50.001	72.771 1.695 0.759		Vel = 5.64		
BR to FF	0.0 250.62	4.26 120.0 0.0152	0.0 0.0 0.0	2.958 0.0 2.958	75.225 0.0 0.045		Vel = 5.64		
FF to CITY	0.0 250.62	6.16 140.0 0.0019	E 20.084 G 4.304 T 43.037	30.000 67.425 97.425	75.270 -0.001 0.184		Vel = 2.70		
CITY to TEST	100.00 350.62	12.24 140.0 0.0001	T 90.124 0.0 0.0	200.000 90.124 290.124	75.453 -2.633 0.036		Qa = 100 Vel = 0.96		
	0.0 350.62					72.856	K Factor = 41.08		

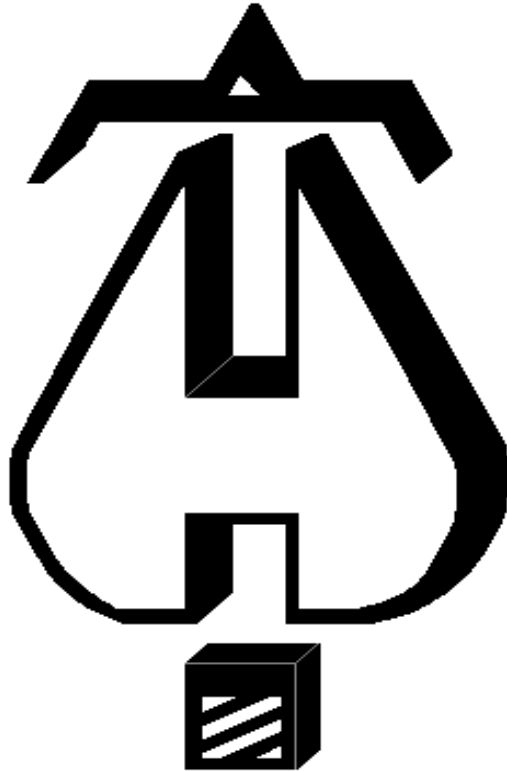
# Final Calculations - Hazen-Williams

DEAN & ALLYN, INC.  
C1373 Machias Bank Area 1

Page 6  
Date 10-14-2016

Hyd. Ref. Point	Qa  Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
110	32.00	1.049		0.0	14.000	16.000			K Factor = 8.00	
to		120.0		0.0	0.0	0.0				
111	32.0	0.3104		0.0	14.000	4.346			Vel = 11.88	
111	36.09	1.38		0.0	14.000	20.346			K Factor = 8.00	
to		120.0		0.0	0.0	0.0				
112	68.09	0.3301		0.0	14.000	4.621			Vel = 14.61	
112	39.97	1.61		0.0	14.000	24.967			K Factor = 8.00	
to		120.0		0.0	0.0	0.0				
113	108.06	0.3662		0.0	14.000	5.127			Vel = 17.03	
113	43.89	1.61	3E	12.0	7.720	30.094			K Factor = 8.00	
to		120.0		0.0	12.000	0.0				
114	151.95	0.6879		0.0	19.720	13.565			Vel = 23.95	
114	0.0	1.61	T	8.0	0.880	43.659				
to		120.0		0.0	8.000	0.381				
107	151.95	0.6880		0.0	8.880	6.109			Vel = 23.95	
	0.0									
	151.95					50.149			K Factor = 21.46	





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

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

Job Name : C1373 Machias Bank Area 2  
Drawing : FP-002  
Location : 193 Middle Street, Portland, Maine  
Remote Area : Area 2.wx2  
Contract : C1373  
Data File : C1373 Machias Bank Area 2.WX2

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**HYDRAULIC CALCULATIONS**  
**for**

**Project name:** Machias Savings Bank  
**Location:** 193 Middle Street, Portland, Maine  
**Drawing no:** FP-002  
**Date:** 10-14-2016

**Design**

**Remote area number:** Area 2.wx2  
**Remote area location:** Bank Lobby  
**Occupancy classification:** Light Hazard  
**Density:** 0.1 - Gpm/SqFt  
**Area of application:** 900 - SqFt  
**Coverage per sprinkler:** 256 - SqFt  
**Type of sprinklers calculated:** K=8.0  
**No. of sprinklers calculated:** 8  
**In-rack demand:** N/A - GPM  
**Hose streams:** 100 - GPM  
**Total water required (including hose streams):** 383.9 - GPM @ 72.5 - Psi  
**Type of system:** Wet  
**Volume of dry or preaction system:** N/A - Gal

**Water supply information**

**Date:** 06/28/2016  
**Location:** Corner of Middle Street and Exchange Street  
**Source:** Portland Water District

**Name of contractor:** DEAN & ALLYN, INC.  
**Address:** 116 LEWISTON ROAD / / GRAY, MAINE 04039  
**Phone number:** 207-657-5646  
**Name of designer:** T Clarke  
**Authority having jurisdiction:** Maine State Fire Marshal's Office  
**Notes: (Include peaking information or gridded systems here.)** Safety Margin: 19.9 PSI

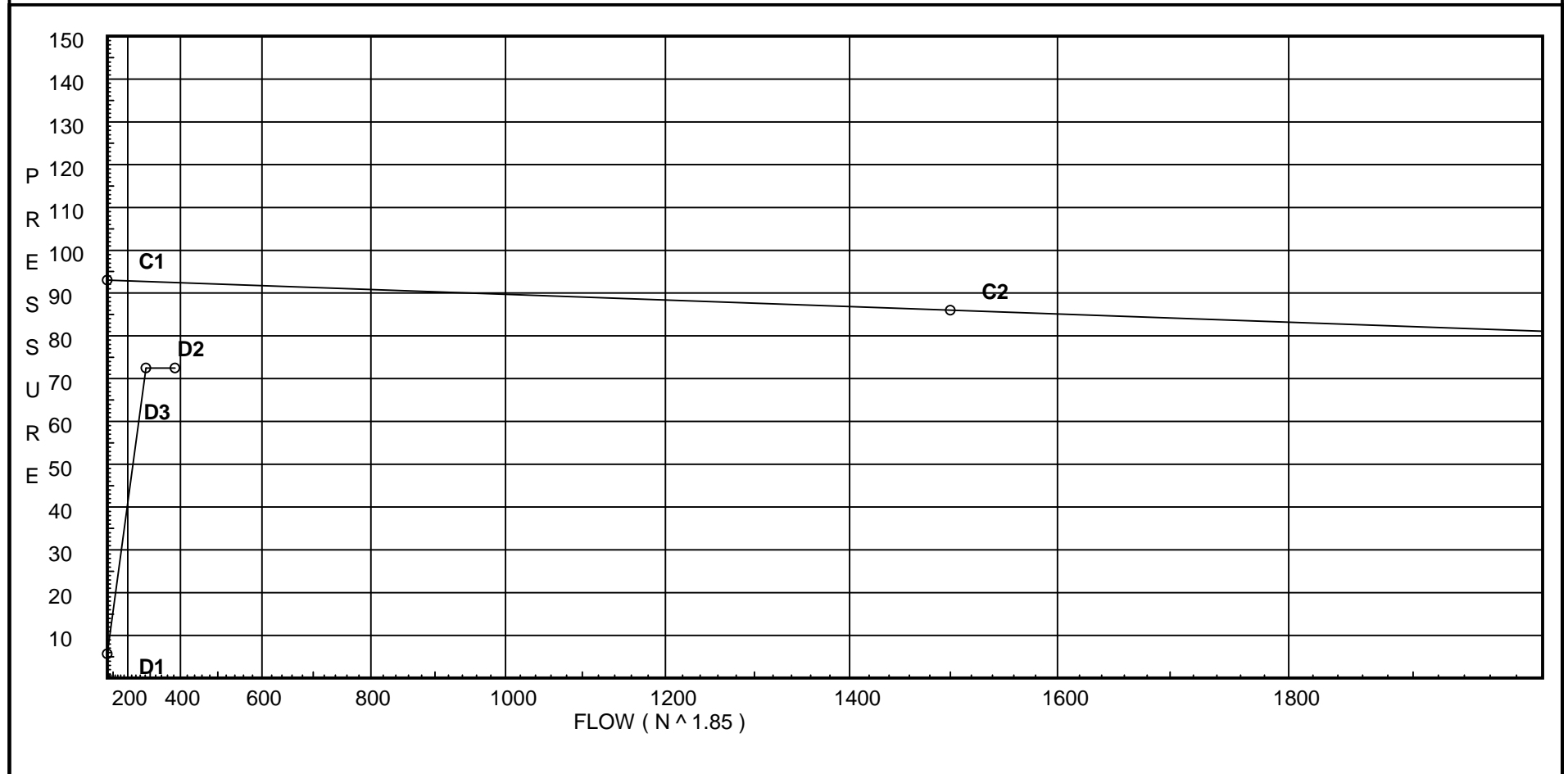
# Water Supply Curve C

DEAN & ALLYN, INC.  
C1373 Machias Bank Area 2

Page 2  
Date 10-14-2016

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

Demand:  
D1 - Elevation : 5.704  
D2 - System Flow : 283.898  
D2 - System Pressure : 72.459  
Hose ( Demand ) : 100  
D3 - System Demand : 383.898  
Safety Margin : 19.979



# Fittings Used Summary

DEAN & ALLYN, INC.  
C1373 Machias Bank Area 2

Page 3  
Date 10-14-2016

## Fitting Legend

Abbrev.	Name	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	
Aty	Alarm Tyco AV-1								14		23		24	23								
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	
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.

# Pressure / Flow Summary - STANDARD

DEAN & ALLYN, INC.  
C1373 Machias Bank Area 2

Page 4  
Date 10-14-2016

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
115	13.17	8	13.1	na	28.96	0.1	256	13.1
116	13.17	8	17.92	na	33.86	0.1	256	13.1
117	13.17	8	21.9	na	37.44	0.1	256	13.1
118	13.17	8	26.36	na	41.07	0.1	256	13.1
119	13.17		42.2	na				
120	11.58		48.65	na				
108	-2.17		71.26	na				
TR	-2.17		72.11	na				
BR	-6.083		74.76	na				
FF	-6.083		74.82	na				
CITY	-6.08		75.05	na	100.0			
TEST	0.0		72.46	na				
121	13.17	8	15.07	na	31.06	0.1	256	13.1
122	13.17	8	17.43	na	33.39	0.1	256	13.1
123	13.17	8	21.6	na	37.18	0.1	256	13.1
124	13.17	8	26.18	na	40.93	0.1	256	13.1
125	13.17		42.06	na				
126	11.58		48.61	na				

The maximum velocity is 22.47 and it occurs in the pipe between nodes 124 and 125

Final Calculations - Hazen-Williams - 2007

DEAN & ALLYN, INC.  
C1373 Machias Bank Area 2

Page 5  
Date 10-14-2016

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
115 to 116	28.96	1.049 120.0	4E	8.0 0.0	10.670 8.000	13.100 0.0			K Factor = 8.00	
116 to 117	28.96	0.2580		0.0	18.670	4.817			Vel = 10.75	
116 to 117	33.86	1.38 120.0		0.0 0.0	14.000 0.0	17.917 0.0			K Factor = 8.00	
117 to 118	62.82	0.2844		0.0	14.000	3.982			Vel = 13.48	
117 to 118	37.44	1.61 120.0		0.0 0.0	14.000 0.0	21.899 0.0			K Factor = 8.00	
118 to 119	100.26	0.3187		0.0	14.000	4.462			Vel = 15.80	
118 to 119	41.07	1.61 120.0	E	4.0 0.0	22.320 4.000	26.361 0.0			K Factor = 8.00	
119 to 120	141.33	0.6017		0.0	26.320	15.836			Vel = 22.27	
119 to 120	0.0	1.61 120.0	T	8.0 0.0	1.580 8.000	42.197 0.689				
120 to 108	141.33	0.6016		0.0	9.580	5.763			Vel = 22.27	
120 to 108	142.57	3.26 120.0	11E T	103.484 20.159	112.900 123.643	48.649 5.955				
108 to TR	283.9	0.0704		0.0	236.543	16.655			Vel = 10.91	
108 to TR	0.0	4.26 120.0	2E	26.334 0.0	18.125 26.334	71.259 0.0				
TR to BR	283.9	0.0191		0.0	44.459	0.851			Vel = 6.39	
TR to BR	0.0	4.26 120.0	G Aty	2.633 30.284	3.917 46.084	72.110 1.695				
BR to FF	283.9	0.0191	E	13.167	50.001	0.956			Vel = 6.39	
BR to FF	0.0	4.26 120.0		0.0 0.0	2.958 0.0	74.761 0.0				
FF to CITY	283.9	0.0193		0.0	2.958	0.057			Vel = 6.39	
FF to CITY	0.0	6.16 140.0	E G	20.084 4.304	30.000 67.425	74.818 -0.001				
CITY to TEST	283.9	0.0024	T	43.037	97.425	0.232			Vel = 3.06	
CITY to TEST	100.00	12.24 140.0	T	90.124 0.0	200.000 90.124	75.049 -2.633			Qa = 100	
TEST to 0.0	383.9	0.0001		0.0	290.124	0.043			Vel = 1.05	
0.0 to 383.90	0.0 383.90					72.459			K Factor = 45.10	
121 to 122	31.06	1.049 120.0		0.0 0.0	8.000 0.0	15.075 0.0			K Factor = 8.00	
122 to 123	31.06	0.2938		0.0	8.000	2.350			Vel = 11.53	
122 to 123	33.40	1.38 120.0		0.0 0.0	14.000 0.0	17.425 0.0			K Factor = 8.00	
123 to 124	64.46	0.2983		0.0	14.000	4.176			Vel = 13.83	
123 to 124	37.18	1.61 120.0		0.0 0.0	14.000 0.0	21.601 0.0			K Factor = 8.00	
124 to 125	101.64	0.3269		0.0	14.000	4.577			Vel = 16.02	
124 to 125	40.93	1.61 120.0	E	4.0 0.0	21.980 4.000	26.178 0.0			K Factor = 8.00	
125 to 126	142.57	0.6114		0.0	25.980	15.885			Vel = 22.47	
125 to 126	0.0	1.61 120.0	T	8.0 0.0	1.580 8.000	42.063 0.689				
126 to 126	142.57	0.6114		0.0	9.580	5.857			Vel = 22.47	

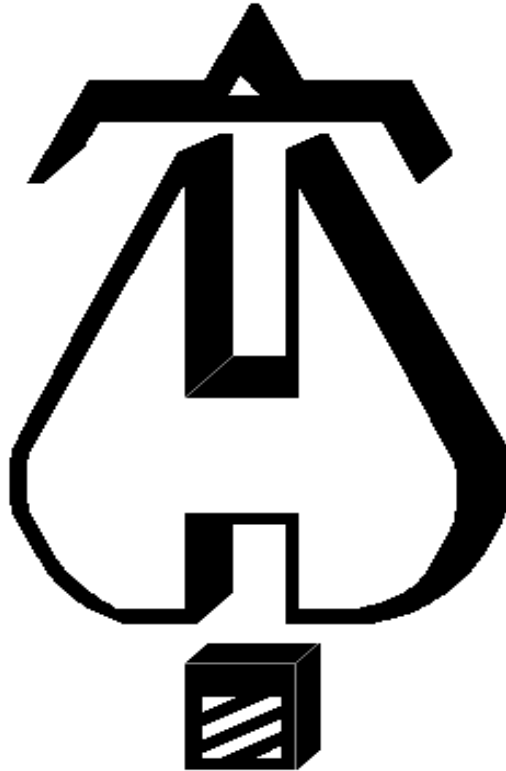
# Final Calculations - Hazen-Williams

DEAN & ALLYN, INC.  
C1373 Machias Bank Area 2

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Date 10-14-2016

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
126	0.0	3.26	0.0	2.030	48.609				
to		120.0	0.0	0.0	0.0				
120	142.57	0.0197	0.0	2.030	0.040		Vel = 5.48		
	0.0								
	142.57				48.649		K Factor = 20.44		





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

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

Job Name : C1373 Machias Bank Area 3  
Drawing : FP-003  
Location : 193 Middle Street, Portland, Maine  
Remote Area : Area 3.wx3  
Contract : C1373  
Data File : C1373 Machias Bank Area 3.WX3

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**HYDRAULIC CALCULATIONS**  
**for**

**Project name:** Machias Savings Bank  
**Location:** 193 Middle Street, Portland, Maine  
**Drawing no:** FP-003  
**Date:** 10-14-2016

**Design**

**Remote area number:** Area 3.wx3  
**Remote area location:** Bank Offices  
**Occupancy classification:** Light Hazard  
**Density:** 0.1 - Gpm/SqFt  
**Area of application:** 900 - SqFt  
**Coverage per sprinkler:** 150 - SqFt  
**Type of sprinklers calculated:** K=5.6  
**No. of sprinklers calculated:** 14  
**In-rack demand:** N/A - GPM  
**Hose streams:** 100 - GPM  
**Total water required (including hose streams):** 417.9 - GPM @ 74.3 - Psi  
**Type of system:** Wet  
**Volume of dry or preaction system:** N/A - Gal

**Water supply information**

**Date:** 06/28/2016  
**Location:** Corner of Middle Street and Exchange Street  
**Source:** Portland Water District

**Name of contractor:** DEAN & ALLYN, INC.  
**Address:** 116 LEWISTON ROAD / / GRAY, MAINE 04039  
**Phone number:** 207-657-5646  
**Name of designer:** T Clarke  
**Authority having jurisdiction:** Maine State Fire Marshal's Office  
**Notes: (Include peaking information or gridded systems here.)** Safety Margin: 17.9 PSI

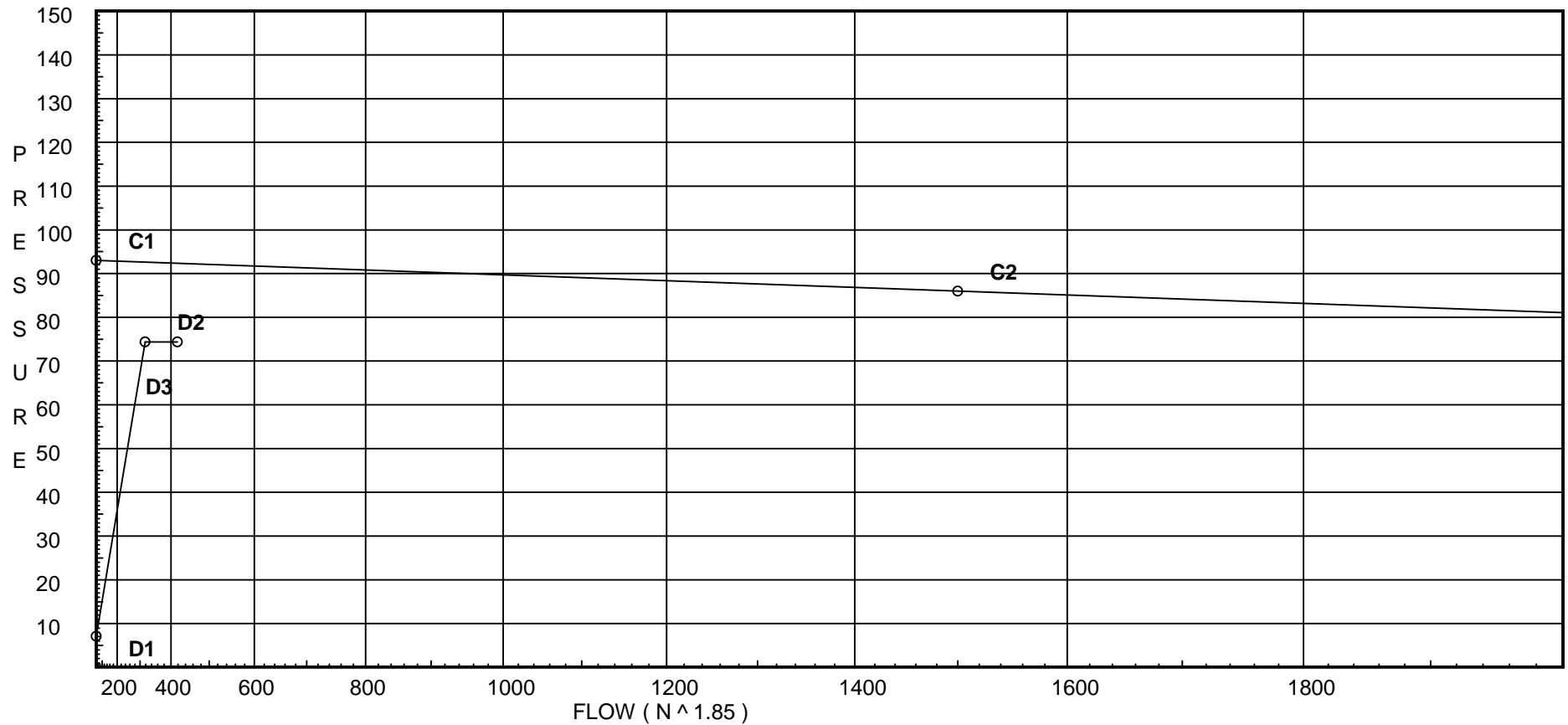
# Water Supply Curve C

DEAN & ALLYN, INC.  
C1373 Machias Bank Area 3

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Date 10-19-2016

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

Demand:  
D1 - Elevation : 7.092  
D2 - System Flow : 317.982  
D2 - System Pressure : 74.372  
Hose ( Demand ) : 100  
D3 - System Demand : 417.982  
Safety Margin : 17.970



# Fittings Used Summary

DEAN & ALLYN, INC.  
C1373 Machias Bank Area 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	
Aty	Alarm Tyco AV-1							14			23		24	23								
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	
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	
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	

## 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.  
C1373 Machias Bank Area 3

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Date 10-19-2016

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
131	16.375	5.6	7.0	na	14.82	0.1	140	7.0
132	12.542	5.6	9.56	na	17.31	0.1	50	7.0
134	5.0	5.6	8.87	na	16.68	0.15	75	7.0
135A	11.0	5.6	7.26	na	15.09	0.15	75	7.0
135	9.0		8.67	na				
136	9.0	5.6	9.33	na	17.11	0.1	50	7.0
137	9.0		11.3	na				
138	8.5	5.6	10.49	na	18.14	0.1	150	7.0
139	9.0		11.93	na				
140	9.0	5.6	13.28	na	20.41	0.1	100	7.0
141	11.667	5.6	28.33	na	29.8	0.1	150	7.0
142	12.333		30.28	na				
143	12.333	5.6	28.33	na	29.81	0.1	120	7.0
144	12.333		30.42	na				
145	12.333		32.69	na				
146	10.167	5.6	29.16	na	30.24	0.1	150	7.0
147	10.667		33.5	na				
148	11.667	5.6	23.09	na	26.91	0.1	150	7.0
149A	11.667	5.6	24.48	na	27.71	0.1	150	7.0
149	12.333		25.62	na				
150	12.333		33.69	na				
151	11.667	5.6	22.95	na	26.83	0.1	150	7.0
152A	11.667	5.6	23.49	na	27.14	0.1	150	7.0
152	12.333		25.92	na				
153	10.667		35.89	na				
130	11.75		38.8	na				
106	12.375		43.25	na				
107	12.375		43.67	na				
155	11.208		48.8	na				
108	-2.17		72.86	na				
TR	-2.17		73.72	na				
BR	-6.083		76.6	na				
FF	-6.083		76.67	na				
CITY	-6.08		76.96	na	100.0			
TEST	0.0		74.37	na				

The maximum velocity is 20.28 and it occurs in the pipe between nodes 149 and 150

Final Calculations - Hazen-Williams - 2007

DEAN & ALLYN, INC.  
C1373 Machias Bank Area 3

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Date 10-19-2016

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	*****
131	14.82	1.049	3E	6.0	6.000	7.000			K Factor = 5.60	
to		120.0		0.0	6.000	1.660				
132	14.82	0.0748		0.0	12.000	0.897			Vel = 5.50	
132	17.31	1.049		0.0	0.667	9.557			K Factor = 5.60	
to		120.0		0.0	0.0	1.534				
137	32.13	0.3118		0.0	0.667	0.208			Vel = 11.93	
	0.0									
	32.13					11.299			K Factor = 9.56	
134	16.68	1.049	2E	4.0	7.500	8.868			K Factor = 5.60	
to		120.0	T	5.0	9.000	-1.732				
135	16.68	0.0929		0.0	16.500	1.533			Vel = 6.19	
	0.0									
	16.68					8.669			K Factor = 5.67	
135A	15.09	1.049	T	5.0	2.000	7.262			K Factor = 5.60	
to		120.0		0.0	5.000	0.866				
135	15.09	0.0773		0.0	7.000	0.541			Vel = 5.60	
135	16.68	1.049		0.0	2.167	8.669				
to		120.0		0.0	0.0	0.0				
136	31.77	0.3064		0.0	2.167	0.664			Vel = 11.79	
136	17.10	1.38	T	6.0	5.000	9.333			K Factor = 5.60	
to		120.0		0.0	6.000	0.0				
137	48.87	0.1787		0.0	11.000	1.966			Vel = 10.48	
137	32.13	1.61		0.0	2.917	11.299				
to		120.0		0.0	0.0	0.0				
139	81.0	0.2149		0.0	2.917	0.627			Vel = 12.77	
	0.0									
	81.00					11.926			K Factor = 23.46	
138	18.14	1.049	E	2.0	8.167	10.495			K Factor = 5.60	
to		120.0	T	5.0	7.000	-0.217				
139	18.14	0.1087		0.0	15.167	1.648			Vel = 6.73	
139	81.00	1.61		0.0	4.333	11.926				
to		120.0		0.0	0.0	0.0				
140	99.14	0.3123		0.0	4.333	1.353			Vel = 15.62	
140	20.41	1.682	6E	29.699	21.333	13.279			K Factor = 5.60	
to		120.0	3F	7.425	37.124	-1.444				
145	119.55	0.3567		0.0	58.457	20.854			Vel = 17.26	
	0.0									
	119.55					32.689			K Factor = 20.91	
141	29.80	1.049	E	2.0	6.250	28.326			K Factor = 5.60	
to		120.0		0.0	2.000	-0.288				
142	29.8	0.2721		0.0	8.250	2.245			Vel = 11.06	
142	0.0	1.61		0.0	3.917	30.283				
to		120.0		0.0	0.0	0.0				
144	29.8	0.0337		0.0	3.917	0.132			Vel = 4.70	
	0.0									
	29.80					30.415			K Factor = 5.40	
143	29.81	1.049	T	5.0	2.667	28.328			K Factor = 5.60	
to		120.0		0.0	5.000	0.0				
144	29.81	0.2722		0.0	7.667	2.087			Vel = 11.07	

# Final Calculations - Hazen-Williams

DEAN & ALLYN, INC.  
C1373 Machias Bank Area 3

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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	*****
144	29.80	1.61	E	4.0	6.667	30.415				
to		120.0	T	8.0	12.000	0.0				
145	59.61	0.1218		0.0	18.667	2.274		Vel =	9.39	
145	119.55	3.26		0.0	3.125	32.689				
to		120.0		0.0	0.0	0.722				
147	179.16	0.0301		0.0	3.125	0.094		Vel =	6.89	
	0.0									
	179.16					33.505		K Factor =	30.95	
146	30.24	1.049	3E	6.0	5.333	29.155		K Factor =	5.60	
to		120.0	T	5.0	11.000	-0.217				
147	30.24	0.2796		0.0	16.333	4.567		Vel =	11.23	
147	179.16	3.26	2I	13.44	9.250	33.505				
to		120.0		0.0	13.440	-0.722				
150	209.4	0.0401		0.0	22.690	0.910		Vel =	8.05	
	0.0									
	209.40					33.693		K Factor =	36.08	
148	26.91	1.049	E	2.0	10.500	23.094		K Factor =	5.60	
to		120.0		0.0	2.000	-0.288				
149	26.91	0.2254		0.0	12.500	2.817		Vel =	9.99	
	0.0									
	26.91					25.623		K Factor =	5.32	
149A	27.71	1.049	T	5.0	1.000	24.484		K Factor =	5.60	
to		120.0		0.0	5.000	-0.288				
149	27.71	0.2378		0.0	6.000	1.427		Vel =	10.29	
149	26.91	1.049	T	5.0	4.667	25.623				
to		120.0		0.0	5.000	0.0				
150	54.62	0.8348		0.0	9.667	8.070		Vel =	20.28	
150	209.40	3.26	2I	13.44	10.500	33.693				
to		120.0		0.0	13.440	0.722				
153	264.02	0.0615		0.0	23.940	1.473		Vel =	10.15	
	0.0									
	264.02					35.888		K Factor =	44.07	
151	26.83	1.049	E	2.0	12.542	22.946		K Factor =	5.60	
to		120.0		0.0	2.000	-0.288				
152	26.83	0.2240		0.0	14.542	3.257		Vel =	9.96	
	0.0									
	26.83					25.915		K Factor =	5.27	
152A	27.14	1.049	2E	4.0	2.875	23.486		K Factor =	5.60	
to		120.0	T	5.0	9.000	-0.288				
152	27.14	0.2288		0.0	11.875	2.717		Vel =	10.08	
152	26.82	1.049	E	2.0	4.333	25.915				
to		120.0	T	5.0	7.000	0.722				
153	53.96	0.8163		0.0	11.333	9.251		Vel =	20.03	
153	264.02	3.26	2I	13.44	25.500	35.888				
to		120.0		0.0	13.440	-0.469				
130	317.98	0.0869		0.0	38.940	3.382		Vel =	12.22	
130	0.0	3.26	3I	20.159	16.750	38.801				
to		120.0	J	17.471	37.630	-0.271				
106	317.98	0.0868		0.0	54.380	4.722		Vel =	12.22	



# Final Calculations - Hazen-Williams

DEAN & ALLYN, INC.  
C1373 Machias Bank Area 3

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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	*****
106 to 107	0.0 317.98	3.26 120.0 0.0869		0.0 0.0 0.0	4.833 0.0 4.833	43.252 0.0 0.420			Vel = 12.22	
107 to 155	0.0 317.98	3.26 120.0 0.0869	5I	33.599 0.0 0.0	19.583 33.599 53.182	43.672 0.505 4.619			Vel = 12.22	
155 to 108	0.0 317.98	3.26 120.0 0.0868	14I Y	94.077 20.831 0.0	95.500 114.908 210.408	48.796 5.794 18.272			Vel = 12.22	
108 to TR	0.0 317.98	4.26 120.0 0.0236	2I	18.434 0.0 0.0	18.125 18.434 36.559	72.862 0.0 0.863			Vel = 7.16	
TR to BR	0.0 317.98	4.26 120.0 0.0236	G Aty E	2.633 30.284 13.167	3.917 46.084 50.001	73.725 1.695 1.180			Vel = 7.16	
BR to FF	0.0 317.98	4.26 120.0 0.0233		0.0 0.0 0.0	2.958 0.0 2.958	76.600 0.0 0.069			Vel = 7.16	
FF to CITY	0.0 317.98	6.16 140.0 0.0029	E G T	20.084 4.304 43.037	30.000 67.425 97.425	76.669 -0.001 0.287			Vel = 3.42	
CITY to TEST	100.00 417.98	12.24 140.0 0.0002	T	90.124 0.0 0.0	200.000 90.124 290.124	76.955 -2.633 0.050			Qa = 100 Vel = 1.14	
	0.0 417.98					74.372			K Factor = 48.47	