

DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK



CITY OF PORTLAND BUILDING PERMIT



This is to certify that

CUMBERLAND COUNTY RECREATION
CENTER/Eastern Fire Protection Co., Inc.

PERMIT ID: 2012-65599

Located at

82 FREE ST

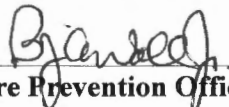
CBL: 038 D015001

has permission to **install NFPA 13 sprinkler system for Phase 1.**

provided that the person or persons, firm or corporation accepting this permit shall comply with all of the provisions of the Statutes of Maine and of the Ordinances of the City of Portland regulating the construction, maintenance and use of the buildings and structures, and of the application on file in the department.

Notification of inspection and written permission procured before this building or part thereof is lathed or otherwise closed-in. 48 HOUR NOTICE IS REQUIRED.

A final inspection must be completed by owner before this building or part thereof is occupied. If a certificate of occupancy is required, it must be procured prior to occupancy.


Fire Prevention Officer

(58)

Code Enforcement Officer / Plan Reviewer

**THIS CARD MUST BE POSTED ON THE STREET SIDE OF THE PROPERTY
THERE IS A PENALTY FOR REMOVING THIS CARD**

BUILDING PERMIT INSPECTION PROCEDURES
Please call 874-8703 (ONLY)
or email: buildinginspections@portlandmaine.gov

With the issuance of this permit, the owner, builder or their designee is required to provide adequate notice to the city of Portland Inspections Services for the following inspections. Appointments must be requested 48 to 72 hours in advance of the required inspection. The inspection date will need to be confirmed by this office.

- **Please read the conditions of approval that is attached to this permit!! Contact this office if you have any questions.**

- **Permits expire in 6 months. If the project is not started or ceases for 6 months.**

- **If the inspection requirements are not followed as stated below additional fees may be incurred due to the issuance of a "Stop Work Order" and subsequent release to continue.**

REQUIRED INSPECTIONS:

Final - Fire

The project cannot move to the next phase prior to the required inspection and approval to continue, REGARDLESS OF THE NOTICE OF CIRCUMSTANCES.

IF THE PERMIT REQUIRES A CERTIFICATE OF OCCUPANCY, IT MUST BE PAID FOR AND ISSUED TO THE OWNER OR DESIGNEE BEFORE THE SPACE MAY BE OCCUPIED.

City of Portland, Maine - Building or Use Permit

389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No: 201265599	Date Applied For: 12/12/2012	CBL: 038 D015001
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Location of Construction: 82 FREE ST	Owner Name: CUMBERLAND COUNTY RECR	Owner Address: 1 CIVIC CENTER SQ	Phone:
Business Name:	Contractor Name: Eastern Fire Protection Co., Inc.	Contractor Address: 170 Kittyhawk Ave., PO Box 1390 Au	Phone (207) 784-1507
Lessee/Buyer's Name	Phone:	Permit Type: Fire Alarm / Suppression	

Proposed Use: Cumberland County Civic Center	Proposed Project Description: install NFPA 13 sprinkler system for Phase 1.
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Dept: Zoning	Status: Approved	Reviewer: Marge Schmuckal	Approval Date: 12/12/2012
Note:	Ok to Issue: <input checked="" type="checkbox"/>		

Dept: Fire	Status: Approved w/Conditions	Reviewer: Ben Wallace Jr	Approval Date: 01/01/2013
Note: This permit covers Phase 1 sprinklers only. It does not cover installation of Class I standpipes as required by MUBEC.			Ok to Issue: <input checked="" type="checkbox"/>

- 1) Hydraulic and General Information Signs shall be provided as required by NFPA 13:24.5 and 24.6.
- 2) FDC Signs. Each fire department connection to sprinkler systems shall be designated by a sign having raised or engraved letters at least 1 in. in height on plate or fitting reading service design -- for example, AUTOSPKR., OPEN SPKR., AND STANDPIPE. A sign shall also indicate the pressure required at the inlets to deliver the greatest system demand. Complete and sign the appropriate contractor's material and test certificate(s) (see Figure 24.1) (above ground piping).
- 3) Identification of Valves. All control, drain, and test connection valves shall be provided with permanently marked weatherproof metal or rigid plastic identification signs. The identification sign shall be secured with corrosion-resistant wire, chain, or other approved means. The control valve sign shall identify the portion of the building served.
- 4) A Knox Box is required.
- 5) The entire sprinkler system shall be maintained in accordance with NFPA 25, Standard for Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, 2008 edition.
- 6) System acceptance and commissioning must be coordinated with alarm and suppression system contractors and the Fire Department. Call 874-8703 to schedule.
- 7) Fire department connection shall be two 2 1/2" inlets.
- 8) Sprinkler protection shall be maintained. Where the system is to be shut down for maintenance or repair, the system shall be checked at the end of each day to insure the system has been placed back in service.
- 9) Sprinkler supervision shall be provided in accordance with NFPA 101, Life Safety Code, and NFPA 72, National Fire Alarm and Signaling Code.
- 10) Installation shall be in accordance with the City of Portland Fire Department Regulations and NFPA 13 as published. A copy of the State Sprinkler permit with RMS date and signature and the Contractor's Material and Test Certificate for Aboveground Piping (NFPA 13 figure 24.1) shall be provided prior to scheduling of the final inspection.

City of Portland, Maine - Building or Use Permit Application

389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No: 2012-65599	Issue Date:	CBL: 038 D015001
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Location of Construction: 82 FREE ST	Owner Name: CUMBERLAND COUNTY RECR	Owner Address: 1 CIVIC CENTER SQ	Phone:
Business Name:	Contractor Name: Eastern Fire Protection Co., Inc.	Contractor Address: 170 Kittyhawk Ave., PO Box 1390 Au	Phone: (207) 784-1507
Lessee/Buyer's Name	Phone:	Permit Type: Fire Alarm / Suppression	Zone: B3
Past Use: Cumberland County Civic Center	Proposed Use: Cumberland County Civic Center	Permit Fee: \$600.00	Cost of Work: \$58,000.00
		CEO District: 2	
Proposed Project Description: Install Water-Based Fire Suppression System Permit on concourse level		FIRE DEPT: <input checked="" type="checkbox"/> Approved <input type="checkbox"/> Denied <input type="checkbox"/> N/A 4/1/13	INSPECTION: Use Group: Type:
		Signature: <i>[Signature]</i> (SR)	Signature:
PEDESTRIAN ACTIVITIES DISTRICT (P.A.D.)			
Action: <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/Conditions <input type="checkbox"/> Denied			
		Signature:	Date:

Permit Taken By: Idobson	Date Applied For: 12/12/2012	Zoning Approval		
<ol style="list-style-type: none"> This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules. Building permits do not include plumbing, septic or electrical work. Building permits are void if work is not started within six (6) months of the date of issuance. False information may invalidate a building permit and stop all work.. 		Special Zone or Reviews <input type="checkbox"/> Shoreland <input type="checkbox"/> Wetland <input type="checkbox"/> Flood Zone <input type="checkbox"/> Subdivision <input type="checkbox"/> Site Plan Maj <input type="checkbox"/> Minor <input type="checkbox"/> MM <input type="checkbox"/> Date: <i>[Signature]</i> 12/12/12	Zoning Appeal <input type="checkbox"/> Variance <input type="checkbox"/> Miscellaneous <input type="checkbox"/> Conditional Use <input type="checkbox"/> Interpretation <input type="checkbox"/> Approved <input type="checkbox"/> Denied Date:	Historic Preservation <input checked="" type="checkbox"/> Not in District or Landmark <input type="checkbox"/> Does Not Require Review <input type="checkbox"/> Requires Review <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/Conditions <input type="checkbox"/> Denied Date: <i>[Signature]</i>

CERTIFICATION

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the application is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT	ADDRESS	DATE	PHONE
RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE		DATE	PHONE

PDF E-mail 2012-65599



Water-Based Fire Suppression System Permit

If you or the property owner owes real estate or property taxes or user charges on any property within the city, payment arrangements must be made before permits of any kind are accepted.

B-3

Installation address: 80- Free St. Spring St. CBL: 38-D-15

Exact location: (within structure) See Plan

Type of occupancy(s) (NFPA & ICC): Arena

Building owner: County/City

Managing Supervisor (RMS): William Flynt License No: 095574

Supervisor phone: 207-784-1507 E-mail: FLYNTWA@EPA-CFS.COM

Installing contractor: Eastern Fire Protection License No: 101

Contractor phone: 207-784-1507 E-mail: _____

The suppression work to be done will be: New: Renovation: Addition to existing system:

This is an amendment to an existing permit: Yes: NO Permit no: _____

NFPA Standard this system is designed to: 13 Edition: 2010

*Non-NFPA systems are not approved for use within the City of Portland.

Download a new copy of this document from www.portlandmaine.gov/fire for every submittal. Attach all working documents and complete approved submittals as may be required by the State Fire Marshal's Office on electronic PDF's in addition to full sized plans.

Contractor shall verify location and type of all FDCs shall be approved in writing by the Fire Prevention Bureau.

COST OF WORK: <u>58,000</u>
PERMIT FEE: <u>\$580.00</u>
(\$10 PER \$1,000 + \$30 FOR THE FIRST \$1,000)
RECEIVED
DEC 12 2012
Dept. of Building Inspections City of Portland Maine

Submit all information to the Building Inspections Department, 389 Congress Street, Room 315, Portland, Maine 04101.

Prior to acceptance of any fire protection system, a complete commissioning and acceptance test must be coordinated with all fire system contractors and the Fire Department, and proper documentation of such test(s) provided.

All installation(s) must comply with NFPA and the Fire Department Technical Standard(s).

Applicant signature: Joseph W Derocher Date: 12-10-12



EASTERN FIRE PROTECTION

P.O. Box 1390
Kittyhawk Ave.
Auburn, ME 04210

PH # (207) 784-1507
FAX # (207) 782-0566

LETTER OF TRANSMITTAL

DATE	12-10-12	JOB NO.	A-4949
ATTENTION			
RE:	Cumberland County Civic Center Phase I		
	Portland, Me		

TO Building Inspections Dept
380 Congress St. Rm 315
Portland, Me 04101

WE ARE SENDING YOU Attached Under separate cover via _____ the following items:

- Shop drawings
- Descriptive data
- Hydraulic calculations
- Copy of letter
- Literature
- _____

QUANTITY	DRAWING NO.	DATE	DESCRIPTION	STATUS
1	1 thru 2	12-6-12	Shop DWG 30 x 42	C/E
1	SET	—	Hydraulic Calculations	C/E
1			Portland Water Based sys Permit	
1			Permit Check (USEC)	

- Status code
- A. Approved
 - B. Approved as noted
 - C. Submitted for approval
 - D. Corrected & resubmitted
 - E. For your files
 - F. Refer to remarks

Please return 1 ~~copies~~ ^{letter} each indicating your approval and/or comments.

REMARKS Please contact us if you have any questions or comments

COPY TO Cranford Corp
SFMO

SIGNED JOE Desovich



... Fire Protection by Computer Design

EASTERN FIRE PROTECTION
170 KITTY HAWK AVE.
AUBURN/LEWISTON IND. PARK
AUBURN, MAINE
207-784-1507

Job Name : CUMBERLAND COUNTY CIVIC CENTER CONCOURSE LEVEL
Drawing : 1 OF 2
Location : PORTLAND, MAINE
Remote Area : 2
Contract : 4949
Data File : 2-4949.WXF

HYDRAULIC CALCULATIONS
for

Project name: CUMBERLAND COUNTY CIVIC CENTER CONCOURSE LEVEL
Location: PORTLAND, MAINE
Drawing no: 1 OF 2
Date: 12/6/12

Design

Remote area number: 2
Remote area location: 2
Occupancy classification: ORDINARY HAZARD
Density: .15 - Gpm/SqFt
Area of application: 1125 - SqFt
Coverage per sprinkler: 130/120 - SqFt
Type of sprinklers calculated: 5.6K 200DEG. RECESSED PENDENTS
No. of sprinklers calculated: 15
In-rack demand: - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 599.2 - GPM @ 133.9 - Psi
Type of system: WET
Volume of dry or preaction system: - Gal

Water supply information

Date: 9/20/2010
Location: FREE ST PORTLAND, ME
Source: FIRE SPEC. INC.

Name of contractor: EASTERN FIRE PROTECTION
Address: 170 KITTY HAWK AVE. / AUBURN/LEWISTON IND. PARK / AUBURN, MA
Phone number: 207-784-1507
Name of designer: JWD

Authority having jurisdiction: SFMO, PORTLAND FIRE DEPT.

Notes: (Include peaking information or gridded systems here.) HYDRAULICALLY REMOTE
AREA REVISED PER NFPA#13 2010 ED. SEC.11.2.3.2.3.1
TOTAL SYSTEM DEMAND INDICATED AT PUMP OUTLET (PO)

Water Supply Curve (C)

EASTERN FIRE PROTECTION
CUMBERLAND COUNTY CIVIC CENTER CONCOURSE LEVEL

Page 2
Date

City Water Supply:

C1 - Static Pressure : 84
C2 - Residual Pressure: 73
C2 - Residual Flow : 1122

City Water Adjusted to Pump Inlet for Pf - Elev - Hose Flow

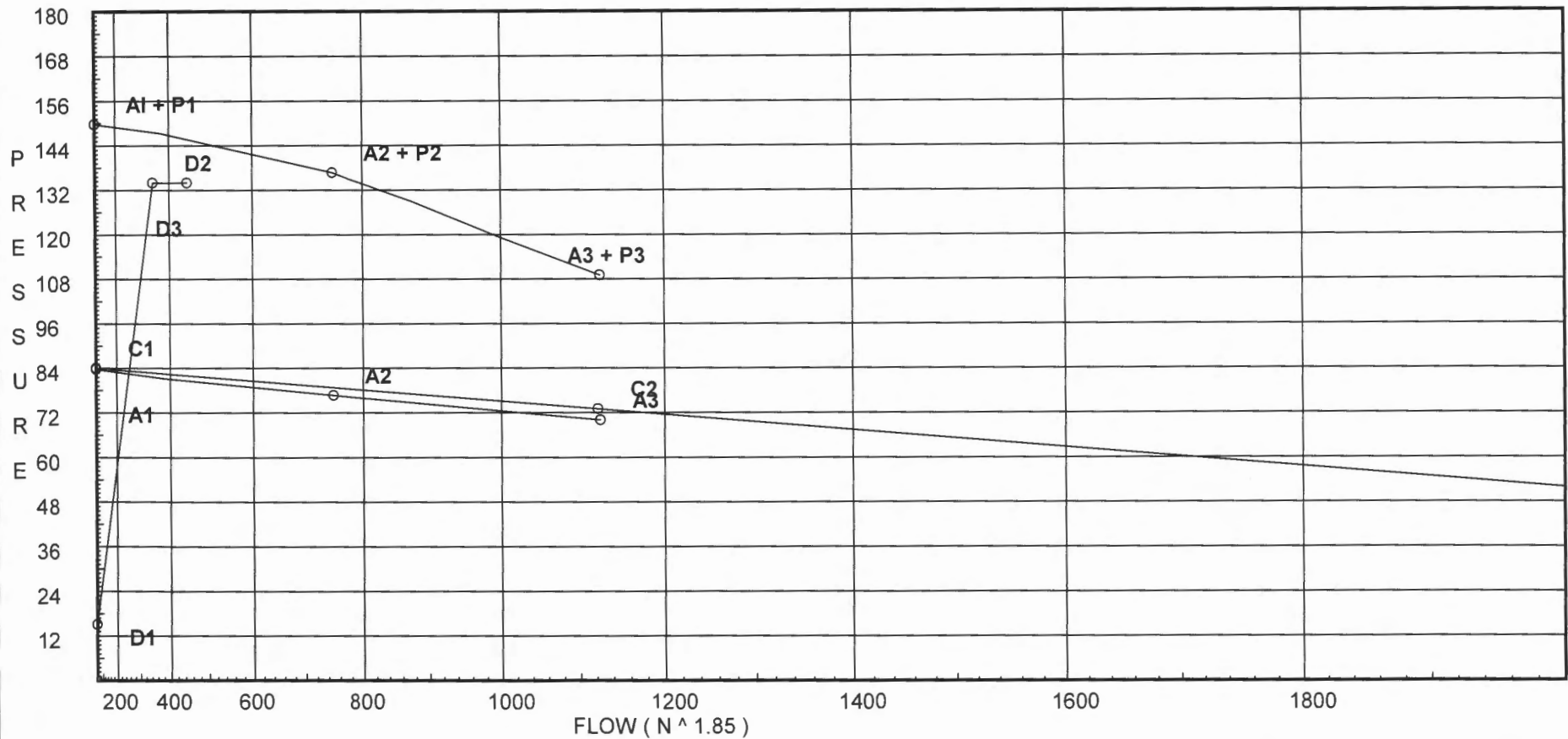
A1 - Adjusted Static: 83.734
A2 - Adj Resid : 76.68 @ 750
A3 - Adj Resid : 70.056 @ 1125

Pump Data:

P1 - Pump Churn Pressure : 66
P2 - Pump Rated Pressure : 60
P2 - Pump Rated Flow : 750
P3 - Pump Pressure @ Max Flow : 39
P3 - Pump Max Flow : 1125
City Residual Flow @ 0 = 3366.89
City Residual Flow @ 20 = 2906.64
City Water @ 150% of Pump = 72.95

Demand:

D1 - Elevation : 15.089
D2 - System Flow : 349.206
D2 - System Pressure : 133.955
Hose (Demand) : 100
D3 - System Demand : 449.206
Hose (Adj City) : 150
Safety Margin : 11.674



Fittings Used Summary

EASTERN FIRE PROTECTION
CUMBERLAND COUNTY CIVIC CENTER CONCOURSE LEVEL

Page 3
Date

Fitting Legend		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
Abbrev.	Name																				
A	Alarm Rel E1 & E3							7.7	21.5		17		27	29							
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
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	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
L	NFPA 13 Long Turn Elbow	0.5	1	2	2	3	4	5	5	6	8	9	13	16	18	24	27	30	34	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

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.

SUPPLY ANALYSIS

<i>Node at Source</i>	<i>Static Pressure</i>	<i>Residual Pressure</i>	<i>Flow</i>	<i>Available Pressure</i>	<i>Total Demand</i>	<i>Required Pressure</i>
PO	See Information on Pump Curve				449.21	133.955
TEST	84.0	73	1122.0	80.553	599.21	80.553

NODE ANALYSIS

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>
DROP	0.0	5.6	7.0	14.82	
DR	0.0	5.6	7.0	14.82	
DR3	0.0	5.6	7.0	14.82	
DR4	0.0	5.6	11.21	18.75	
DR5	0.0	5.6	7.18	15.0	
99	86.67	5.3	27.86	27.96	K=K @ LN2
100	86.67	5.3	27.89	27.98	K=K @ LN2
101	86.67		30.83		
101A	86.67	5.3	30.99	29.49	K=K @ LN2
102	86.67		38.02		
103	86.33	5.31	26.94	27.55	K=K @ LN4
104A	86.33	5.31	26.03	27.08	K=K @ LN4
104	86.33		27.95		
105	86.33		33.83		
106	86.67	5.3	8.48	15.43	K=K @ LN2
107	86.67	5.3	7.82	14.82	K=K @ LN2
108	86.67		8.53		
109	86.67	5.3	10.31	17.01	K=K @ LN2
110	85.0	5.3	14.5	20.17	K=K @ LN2
111	86.33	5.31	16.13	21.32	K=K @ LN4
112	86.33	5.31	20.59	24.08	K=K @ LN4
113	86.33		22.22		
116	85.0	5.3	13.45	19.43	K=K @ LN5
117	85.0	5.3	15.06	20.56	K=K @ LN2
118	85.0	5.3	21.49	24.56	K=K @ LN2
119	85.0		22.63		
114	85.0		35.75		
115	85.0	5.3	35.98	31.78	K=K @ LN2
120	85.83		45.41		
121	85.83		45.88		
122	85.83		46.67		
123	85.83		47.02		
124	85.83		53.04		
CT	85.83		55.1		
CW	85.83		57.86		
DB	85.83		66.2		
GA	85.83		70.11		
78	85.83		72.05		
DC	85.83		74.39		
GB	85.83		75.8		
GC	85.83		77.25		

NODE ANALYSIS (cont.)

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>
GD	85.83		77.35		
88	85.83		81.37		
DD	85.83		86.14		
DE	85.83		104.3		
DF	85.83		108.49		
GG	85.83		109.65		
DH	85.83		111.47		
K	85.83		113.32		
RT	85.83		118.62		
RB	85.83		118.63		
L	51.83		133.7	100.0	
PO	51.83		133.96		
PI	51.83		80.55		
TEST	51.83		80.55	150.0	

Final Calculations - Hazen-Williams - 2007

EASTERN FIRE PROTECTION
 CUMBERLAND COUNTY CIVIC CENTER CONCOURSE LEVEL

Page 6
 Date

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	*****
DROP to LINE	0 0	5.60	14.82 14.82	1 1.049	1E 1T	2.0 5.0 0.0	2.000 7.000 9.000	120 0.0747	7.000 0.0 0.672		Vel = 5.50	
LINE			0.0 14.82						7.672		K Factor = 5.35	
DR to LN2	0 0	5.60	14.82 14.82	1 1.049	2E 1T	4.0 5.0 0.0	2.000 9.000 11.000	120 0.0747	7.000 0.0 0.822		Vel = 5.50	
LN2			0.0 14.82						7.822		K Factor = 5.30	
DR3 to LN3	0 0	5.60	14.82 14.82	1 1.049	2E 1T	4.0 5.0 0.0	2.000 9.000 11.000	120 0.0747	7.000 0.0 0.822		Vel = 5.50	
LN3			0.0 14.82						7.822		K Factor = 5.30	
DR4 to LN4	0 0	5.60	18.75 18.75	1 1.049	2E 1T	4.0 5.0 0.0	2.000 9.000 11.000	120 0.1155	11.210 0.0 1.271		Vel = 6.96	
LN4			0.0 18.75						12.481		K Factor = 5.31	
DR5 to LN5	0 0	5.60	15.00 15.0	1 1.049	2E 1T	4.0 5.0 0.0	2.000 9.000 11.000	120 0.0764	7.175 0.0 0.840		Vel = 5.57	
LN5			0.0 15.00						8.015		K Factor = 5.30	
99 to 101	86.670 86.670	5.3	27.96 27.96	1 1.049	1T	5.0 0.0 0.0	7.290 5.000 12.290	120 0.2419	27.860 0.0 2.973		K = K @ LN2 Vel = 10.38	
101			0.0 27.96						30.833		K Factor = 5.04	
100 to 101	86.670 86.670	5.3	27.98 27.98	1 1.049	1T	5.0 0.0 0.0	7.170 5.000 12.170	120 0.2421	27.887 0.0 2.946		K = K @ LN2 Vel = 10.39	
101 to 101A	86.670 86.670		27.96 55.94	1.25 1.38		0.0 0.0 0.0	0.670 0.0 0.670	120 0.2299	30.833 0.0 0.154		Vel = 12.00	
101A to 102	86.670 86.670	5.3	29.49 85.43	1.25 1.38		0.0 0.0 0.0	14.000 14.000	120 0.5022	30.987 0.0 7.031		K = K @ LN2 Vel = 18.32	
102 to 122	86.670 85.830		0.0 85.43	1.25 1.38	1E 1T	3.0 6.0 0.0	7.500 9.000 16.500	120 0.5022	38.018 0.364 8.287		Vel = 18.32	
122			0.0 85.43						46.669		K Factor = 12.51	
103 to 104	86.330 86.330	5.31	27.55 27.55	1 1.049		0.0 0.0 0.0	4.290 0.0 4.290	120 0.2352	26.940 0.0 1.009		K = K @ LN4 Vel = 10.23	

Final Calculations - Hazen-Williams - 2007

EASTERN FIRE PROTECTION
 CUMBERLAND COUNTY CIVIC CENTER CONCOURSE LEVEL

Page 7
 Date

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	*****
104			0.0 27.55						27.949		K Factor = 5.21	
104A to 104	86.330 86.330	5.31	27.08	1	1T	5.0	3.420 5.000	120	26.030 0.0		K = K @ LN4	
104 to 105	86.330 86.330		27.08	1.049		0.0	8.420	0.2279	1.919		Vel = 10.05	
104 to 105	86.330 86.330		27.54	1		0.0	7.040 0.0	120	27.949 0.0			
105 to 121	86.330 85.830		54.62	1.049		0.0	7.040	0.8349	5.878		Vel = 20.28	
105 to 121	86.330 85.830		0.0	1	1E 1T	2.0 5.0	7.170 7.000	120	33.827 0.217			
121			0.0 54.62						45.875		K Factor = 8.06	
106 to 108	86.670 86.670	5.3	15.42	1		0.0	0.625 0.0	120	8.478 0.0		K = K @ LN2	
108			0.0 15.42						8.528		K Factor = 5.28	
107 to 108	86.670 86.670	5.3	14.82	1	1T	5.0	4.460 5.000	120	7.822 0.0		K = K @ LN2	
108 to 109	86.670 86.670		14.82	1.049		0.0	9.460	0.0746	0.706		Vel = 5.50	
108 to 109	86.670 86.670		15.42	1		0.0	6.375 0.0	120	8.528 0.0			
109 to 110	86.670 85	5.3	30.24	1.049		0.0	6.375	0.2797	1.783		Vel = 11.23	
109 to 110	86.670 85	5.3	17.01	1		0.0	5.420 0.0	120	10.311 0.723		K = K @ LN2	
110 to 111	85 86.330		47.25	1.049		0.0	5.420	0.6386	3.461		Vel = 17.54	
110 to 111	85 86.330	5.3	20.17	1.25		0.0	6.830 0.0	120	14.495 -0.576		K = K @ LN2	
111 to 113	86.330 86.330	5.31	67.42	1.38		0.0	6.830	0.3242	2.214		Vel = 14.46	
111 to 113	86.330 86.330	5.31	21.32	1.25	2E	6.0	5.290 6.000	120	16.133 0.0		K = K @ LN4	
113			0.0 88.74						6.083		Vel = 19.03	
113			0.0 88.74						22.216		K Factor = 18.83	
112 to 113	86.330 86.330	5.31	24.08	1	1T	5.0	3.875 5.000	120	20.588 0.0		K = K @ LN4	
113 to 114	86.330 85		24.08	1.049		0.0	8.875	0.1834	1.628		Vel = 8.94	
113 to 114	86.330 85		88.74	1.25	2E	6.0	9.420 6.000	120	22.216 0.576			
114			0.0 112.82						12.956		Vel = 24.20	
114			0.0 112.82						35.748		K Factor = 18.87	
116 to 117	85 85	5.3	19.43	1		0.0	13.080 0.0	120	13.450 0.0		K = K @ LN5	
117 to 119	85 85	5.3	19.43	1.049		0.0	13.080	0.1234	1.614		Vel = 7.21	
117 to 119	85 85	5.3	20.56	1	1T	5.0	11.125 5.000	120	15.064 0.0		K = K @ LN2	
119			39.99	1.049		0.0	16.125	0.4690	7.562		Vel = 14.85	

Final Calculations - Hazen-Williams - 2007

EASTERN FIRE PROTECTION
 CUMBERLAND COUNTY CIVIC CENTER CONCOURSE LEVEL

Page 8
 Date

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	*****
119			0.0 39.99						22.626		K Factor = 8.41	
118 to 119	85 85	5.3	24.56	1	1T	5.0 0.0	0.960 5.000	120	21.492 0.0		K = K @ LN2	
119 to 114	85 85		24.56	1.049		0.0	5.960	0.1903	1.134		Vel = 9.12	
119 to 114	85 85		39.99	1	1T	5.0 0.0	6.540 5.000	120	22.626 0.0			
114 to 115	85 85		64.55	1.049		0.0	11.540	1.1371	13.122		Vel = 23.96	
114 to 115	85 85		112.82	2		0.0 0.0	0.875 0.0	120	35.748 0.0			
115 to 120	85 85.830	5.3	31.78	2	1T	10.0 0.0	16.580 10.000	120	35.985 -0.359		K = K @ LN2	
120 to 121	85.830 85.830		209.15	2.067		0.0	26.580	0.3679	9.780		Vel = 20.00	
120 to 121	85.830 85.830		0.0	3		0.0 0.0	11.710 0.0	120	45.406 0.0			
121 to 122	85.830 85.830		209.15	3.26		0.0	11.710	0.0401	0.469		Vel = 8.04	
121 to 122	85.830 85.830		54.63	3		0.0 0.0	12.920 0.0	120	45.875 0.0			
122 to 123	85.830 85.830		263.78	3.26		0.0	12.920	0.0615	0.794		Vel = 10.14	
122 to 123	85.830 85.830		85.43	3		0.0 0.0	3.375 0.0	120	46.669 0.0			
123 to 124	85.830 85.830		349.21	3.26		0.0	3.375	0.1031	0.348		Vel = 13.42	
123 to 124	85.830 85.830		0.0	3	3L	20.159 0.0	38.125 20.159	120	47.017 0.0			
124 to CT	85.830 85.830		349.21	3.26		0.0	58.284	0.1033	6.019		Vel = 13.42	
124 to CT	85.830 85.830		0.0	3		0.0 0.0	20.000 0.0	120	53.036 0.0			
CT to CW	85.830 85.830		349.21	3.26		0.0	20.000	0.1033	2.066		Vel = 13.42	
CT to CW	85.830 85.830		0.0	3		0.0 0.0	26.670 0.0	120	55.102 0.0			
CW to DB	85.830 85.830		349.21	3.26		0.0	26.670	0.1033	2.754		Vel = 13.42	
CW to DB	85.830 85.830		0.0	3	5L 1T	33.599 20.159	27.000 53.758	120	57.856 0.0			
DB to GA	85.830 85.830		349.21	3.26		0.0	80.758	0.1033	8.340		Vel = 13.42	
DB to GA	85.830 85.830		0.0	3	4L	26.879 0.0	11.000 26.879	120	66.196 0.0			
GA to 78	85.830 85.830		349.21	3.26		0.0	37.879	0.1033	3.912		Vel = 13.42	
GA to 78	85.830 85.830		0.0	3	2L	13.44 0.0	5.330 13.440	120	70.108 0.0			
78 to DC	85.830 85.830		349.21	3.26		0.0	18.770	0.1033	1.939		Vel = 13.42	
78 to DC	85.830 85.830		0.0	3	1T	20.159 0.0	2.500 20.159	120	72.047 0.0			
DC to GB	85.830 85.830		349.21	3.26		0.0	22.659	0.1033	2.340		Vel = 13.42	
DC to GB	85.830 85.830		0.0	3	1L	6.72 0.0	7.000 6.720	120	74.387 0.0			
GB to GC	85.830 85.830		349.21	3.26		0.0	13.720	0.1033	1.417		Vel = 13.42	
GB to GC	85.830 85.830		0.0	3		0.0 0.0	14.000 0.0	120	75.804 0.0			
GC	85.830		349.21	3.26		0.0	14.000	0.1032	1.445		Vel = 13.42	

Final Calculations - Hazen-Williams - 2007

EASTERN FIRE PROTECTION
 CUMBERLAND COUNTY CIVIC CENTER CONCOURSE LEVEL

Page 9
 Date

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	*****
GC to GD	85.830 85.830		0.0 349.21	3 3.26		0.0 1.000	120 0.1040	77.249 0.104		Vel = 13.42	
GD to 88	85.830 85.830		0.0 349.21	3 3.26	4L 26.879 0.0	12.000 26.879 38.879	120 0.1033	77.353 0.0 4.015		Vel = 13.42	
88 to DD	85.830 85.830		0.0 349.21	3 3.26	2F 8.064 2L 13.44	24.750 21.504 46.254	120 0.1033	81.368 0.0 4.777		Vel = 13.42	
DD to DE	85.830 85.830		0.0 349.21	3 3.26	2L 13.44 2T 40.319	122.000 53.759 175.759	120 0.1033	86.145 0.0 18.151		Vel = 13.42	
DE to DF	85.830 85.830		0.0 349.21	4 4.26	2L 15.8 2T 52.668	81.000 68.468 149.468	120 0.0281	104.296 0.0 4.194		Vel = 7.86	
DF to GG	85.830 85.830		0.0 349.21	4 4.26	1T 26.334 0.0	15.000 26.334 41.334	120 0.0281	108.490 0.0 1.160		Vel = 7.86	
GG to DH	85.830 85.830		0.0 349.21	4 4.26	1L 7.9 1T 26.334	30.500 34.234 64.734	120 0.0281	109.650 0.0 1.817		Vel = 7.86	
DH to K	85.830 85.830		0.0 349.21	4 4.26	4L 31.601 1T 26.334	8.250 57.935 66.185	120 0.0281	111.467 0.0 1.857		Vel = 7.86	
K to RT	85.830 85.830		0.0 349.21	4 4.26	1A 22.384 1G 2.633 1B 15.8 1L 7.9 1T 26.334 1Fsp 0.0	6.580 75.051 81.631	120 0.0281	113.324 3.000 2.291		* Fixed loss = 3 Vel = 7.86	
RT to RB	85.830 85.830		0.0 349.21	6 6.357		0.0 4.000	120 0.0040	118.615 0.0 0.016		Vel = 3.53	
RB to L	85.830 51.830		0.0 349.21	6 6.357	3L 33.948 1T 37.72	14.000 71.668 85.668	120 0.0040	118.631 14.725 0.342		Vel = 3.53	
L to PO	51.830 51.830	H100	100.00 449.21	8 8.249	3G 14.094 1S 52.853 2L 30.537 1T 41.108	5.000 138.592 143.592	120 0.0018	133.698 0.0 0.257		Vel = 2.70	
PO			0.0 449.21					133.955		K Factor = 38.81	
System Demand Pressure								133.955			
Safety Margin								11.674			
Continuation Pressure								145.629			
Pressure @ Pump Outlet								145.629			
Pressure From Pump Curve								-65.078			
Pressure @ Pump Inlet								80.551			

Final Calculations - Hazen-Williams - 2007

EASTERN FIRE PROTECTION
 CUMBERLAND COUNTY CIVIC CENTER CONCOURSE LEVEL

Page 10
 Date

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	*****
PI to TEST	51.830 51.830		0.0 449.21	8 8.249		0.0	1.000	120	80.551			
			150.00			0.0	0.0		0.0		Vel = 2.70	
TEST			599.21						80.553		Qa = 150.00 K Factor = 66.76	



... Fire Protection by Computer Design

EASTERN FIRE PROTECTION
170 KITTY HAWK AVE.
AUBURN/LEWISTON IND. PARK
AUBURN, MAINE
207-784-1507

Job Name : CUMBERLAND COUNTY CIVIC CENTER UPPER SUITES LEVEL
Drawing : 2 OF 2
Location : PORTLAND, MAINE
Remote Area : 3
Contract : 4949
Data File : 3-4949.WXF

HYDRAULIC CALCULATIONS
for

Project name: CUMBERLAND COUNTY CIVIC CENTER UPPER SUITES LEVEL
Location: PORTLAND, MAINE
Drawing no: 2 OF 2
Date: 12/6/12

Design

Remote area number: 3
Remote area location: 3
Occupancy classification: LIGHT HAZARD
Density: .1 - Gpm/SqFt
Area of application: 1000 - SqFt
Coverage per sprinkler: 148/100 - SqFt
Type of sprinklers calculated: 5.6K 200DEG. RECESSED PENDENTS
No. of sprinklers calculated: 14
In-rack demand: - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 396.5 - GPM @ 127.4 - Psi
Type of system: WET
Volume of dry or preaction system: - Gal

Water supply information

Date: 9/20/2010
Location: FREE ST PORTLAND, ME
Source: FIRE SPEC. INC..

Name of contractor: EASTERN FIRE PROTECTION
Address: 170 KITTY HAWK AVE. / AUBURN/LEWISTON IND. PARK / AUBURN, MA
Phone number: 207-784-1507
Name of designer: JWD
Authority having jurisdiction: SFMO, PORTLAND FIRE DEPT.
Notes: (Include peaking information or gridded systems here.) HYDRAULICALLY REMOTE
AREA REVISED PER NFPA#13 2010 ED. SEC.11.2.3.2.3.1
TOTAL SYSTEM DEMAND INDICATED AT PUMP OUTLET (PO)

Water Supply Curve (C)

EASTERN FIRE PROTECTION
 CUMBERLAND COUNTY CIVIC CENTER UPPER SUITES LEVEL

Page 2
 Date

City Water Supply:

C1 - Static Pressure : 84
 C2 - Residual Pressure: 73
 C2 - Residual Flow : 1122

**City Water Adjusted to Pump Inlet
 for Pf - Elev - Hose Flow**

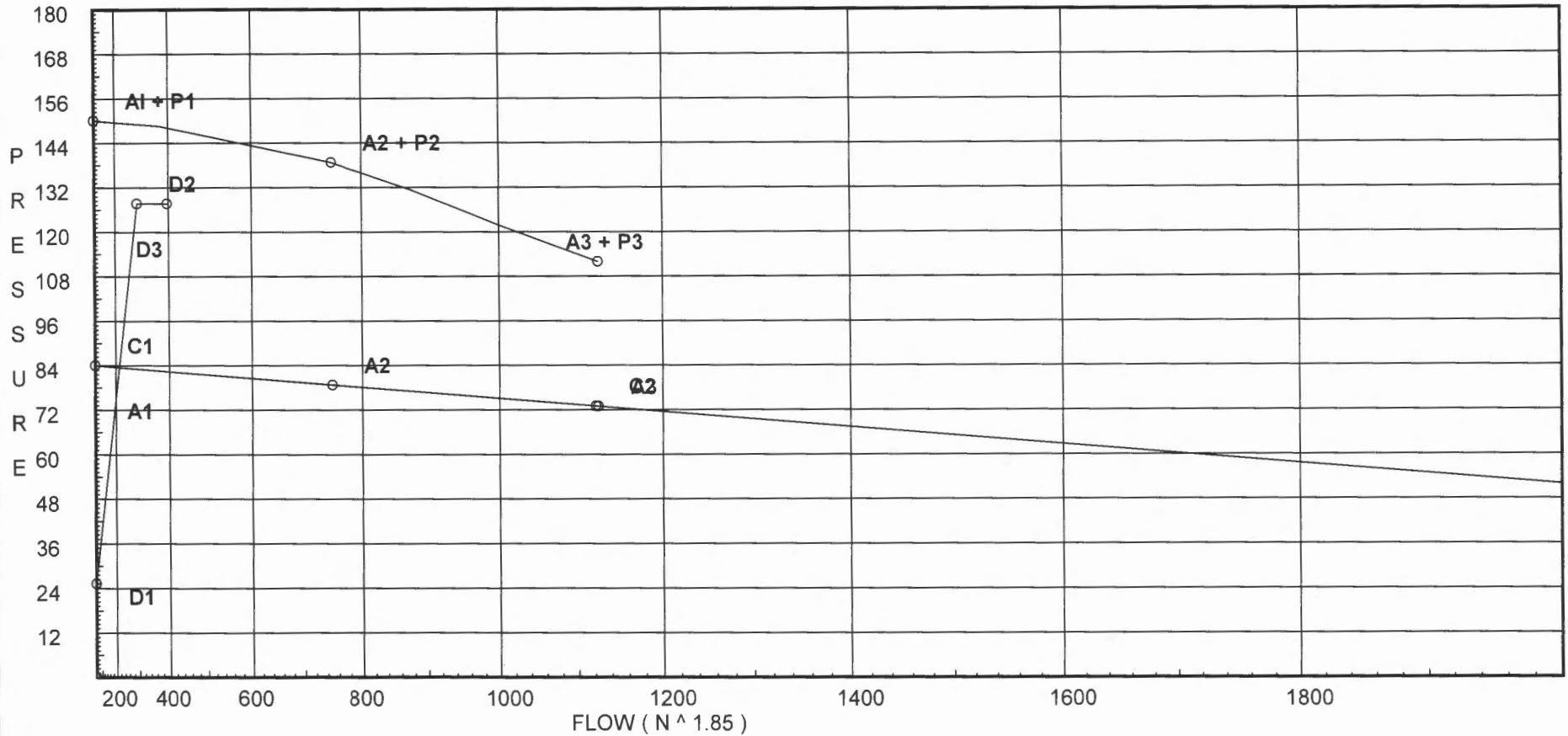
A1 - Adjusted Static: 84.000
 A2 - Adj Resid : 78.774 @ 750
 A3 - Adj Resid : 72.936 @ 1125

Pump Data:

P1 - Pump Churn Pressure : 66
 P2 - Pump Rated Pressure : 60
 P2 - Pump Rated Flow : 750
 P3 - Pump Pressure @ Max Flow : 39
 P3 - Pump Max Flow : 1125
 City Residual Flow @ 0 = 3366.89
 City Residual Flow @ 20 = 2906.64
 City Water @ 150% of Pump = 72.95

Demand:

D1 - Elevation : 25.211
 D2 - System Flow : 296.551
 D2 - System Pressure : 127.668
 Hose (Demand) : 100
 D3 - System Demand : 396.551
 Safety Margin : 20.464



Fittings Used Summary

EASTERN FIRE PROTECTION
 CUMBERLAND COUNTY CIVIC CENTER UPPER SUITES LEVEL

Page 3
 Date

Fitting Legend		½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Abbrev.	Name																				
A	Alarm Rel E1 & E3							7.7	21.5		17		27	29							
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
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	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
L	NFPA 13 Long Turn Elbow	0.5	1	2	2	2	3	4	5	5	6	8	9	13	16	18	24	27	30	34	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

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.

SUPPLY ANALYSIS

<i>Node at Source</i>	<i>Static Pressure</i>	<i>Residual Pressure</i>	<i>Flow</i>	<i>Available Pressure</i>	<i>Total Demand</i>	<i>Required Pressure</i>
PO	See Information on Pump Curve				396.55	127.668
TEST	84.0	73	1122.0	82.394	396.55	82.394

NODE ANALYSIS

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>
DROP	0.0	5.6	7.0	14.82	
DR	0.0	5.6	7.0	14.82	
DR3	0.0	5.6	7.0	14.82	
301	110.04	5.35	13.04	19.32	K=K @ LINE
302	110.375	5.3	13.58	19.52	K=K @ LN2
303	113.04	5.3	15.42	20.8	K=K @ LN2
304	111.04	5.3	16.78	21.7	K=K @ LN3
305	111.04		18.14		
306	113.04	5.3	19.49	23.39	K=K @ LN2
307	113.04	5.3	25.34	26.67	K=K @ LN2
308	110.04	5.35	7.67	14.82	K=K @ LINE
309	110.375	5.3	8.27	15.23	K=K @ LN2
310	113.04	5.3	9.18	16.05	K=K @ LN2
311	113.04	5.3	14.66	20.29	K=K @ LN2
312	113.04	5.3	18.44	22.75	K=K @ LN2
313	111.04	5.3	20.32	23.88	K=K @ LN3
315	111.04	5.3	22.68	25.23	K=K @ LN3
314	113.04		20.87		
316	113.04		23.92		
317	113.04	5.3	25.8	26.91	K=K @ LN2
318	113.04		36.2		
320	113.04		36.8		
319	113.04		37.24		
321	113.04		40.84		
322	113.04		42.48		
123	85.83		58.78		
124	85.83		63.22		
CT	85.83		64.75		
CW	85.83		66.79		
DB	85.83		72.95		
GA	85.83		75.84		
78	85.83		77.27		
DC	85.83		79.0		
GB	85.83		80.05		
GC	85.83		81.12		
GD	85.83		81.2		
88	85.83		84.16		
DD	85.83		87.69		
DE	85.83		101.11		
DF	85.83		104.21		
GG	85.83		105.06		

NODE ANALYSIS (cont.)

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>
DH	85.83		106.41		
K	85.83		107.78		
RT	85.83		112.47		
RB	85.83		112.48		
L	51.83		127.46	100.0	
PO	51.83		127.67		
PI	51.83		82.39		
TEST	51.83		82.39		

Final Calculations - Hazen-Williams - 2007

EASTERN FIRE PROTECTION
 CUMBERLAND COUNTY CIVIC CENTER UPPER SUITES LEVEL

Page 7
 Date

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 *****
311 to 312	113.040 113.040	5.3	20.28 66.38	1.25 1.38		0.0 0.0	12.000 12.000	120 0.3150	14.665 3.780	K = K @ LN2 Vel = 14.24
312 to 314	113.040 113.040	5.3	22.76 89.14	1.25 1.38		0.0 0.0	4.460 4.460	120 0.5433	18.445 2.423	K = K @ LN2 Vel = 19.12
314			0.0 89.14						20.868	K Factor = 19.51
313 to 314	111.040 113.040	5.3	23.88 23.88	1 1.049	1T	5.0 0.0	2.830 7.830	120 0.1807	20.319 -0.866 1.415	K = K @ LN3 Vel = 8.86
314			0.0 23.88						20.868	K Factor = 5.23
315 to 316	111.040 113.040	5.3	25.23 25.23	1 1.049	1T	5.0 0.0	5.540 10.540	120 0.2000	22.681 -0.866 2.108	K = K @ LN3 Vel = 9.37
316			0.0 25.23						23.923	K Factor = 5.16
314 to 316	113.040 113.040		113.02 113.02	1.25 1.38		0.0 0.0	3.625 3.625	120 0.8428	20.868 0.0 3.055	Vel = 24.24
316 to 317	113.040 113.040		25.23 138.25	1.5 1.61		0.0 0.0	3.250 3.250	120 0.5775	23.923 0.0 1.877	Vel = 21.79
317 to 318	113.040 113.040	5.3	26.91 165.16	1.5 1.61	1T	8.0 0.0	4.960 8.000 12.960	120 0.8026	25.800 0.0 10.402	K = K @ LN2 Vel = 26.03
318 to 319	113.040 113.040		0.0 165.16	3 3.26	2L 1T	13.44 20.159	6.670 33.599 40.269	120 0.0259	36.202 0.0 1.041	Vel = 6.35
319			0.0 165.16						37.243	K Factor = 27.06
320 to 319	113.040 113.040		131.40 131.4	3 3.26	1T	20.159 0.0	6.040 20.159 26.199	120 0.0169	36.800 0.0 0.443	Vel = 5.05
319 to 321	113.040 113.040		165.15 296.55	3 3.26	2L 1T	13.44 20.159	13.580 33.599 47.179	120 0.0763	37.243 0.0 3.601	Vel = 11.40
321 to 322	113.040 113.040		0.0 296.55	3 3.26	2L	13.44 0.0	8.000 13.440 21.440	120 0.0763	40.844 0.0 1.636	Vel = 11.40
322 to 123	113.040 85.830		0.0 296.55	3 3.26	2L 1T	13.44 20.159	25.500 33.599 59.099	120 0.0763	42.480 11.785 4.511	Vel = 11.40
123 to 124	85.830 85.830		0.0 296.55	3 3.26	3L	20.159 0.0	38.125 20.159 58.284	120 0.0763	58.776 0.0 4.448	Vel = 11.40

Final Calculations - Hazen-Williams - 2007

EASTERN FIRE PROTECTION
 CUMBERLAND COUNTY CIVIC CENTER UPPER SUITES LEVEL

Page 8
 Date

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	*****
124 to CT	85.830 85.830		0.0 296.55	3 3.26		20.000 0.0 20.000	120 0.0764	63.224 0.0 1.527		Vel = 11.40	
CT to CW	85.830 85.830		0.0 296.55	3 3.26		26.670 0.0 26.670	120 0.0763	64.751 0.0 2.035		Vel = 11.40	
CW to DB	85.830 85.830		0.0 296.55	3 3.26	5L 1T 33.599 20.159	27.000 53.758 80.758	120 0.0763	66.786 0.0 6.164		Vel = 11.40	
DB to GA	85.830 85.830		0.0 296.55	3 3.26	4L 26.879 0.0	11.000 26.879 37.879	120 0.0763	72.950 0.0 2.891		Vel = 11.40	
GA to 78	85.830 85.830		0.0 296.55	3 3.26	2L 13.44 0.0	5.330 13.440 18.770	120 0.0763	75.841 0.0 1.433		Vel = 11.40	
78 to DC	85.830 85.830		0.0 296.55	3 3.26	1T 20.159 0.0	2.500 20.159 22.659	120 0.0763	77.274 0.0 1.729		Vel = 11.40	
DC to GB	85.830 85.830		0.0 296.55	3 3.26	1L 6.72 0.0	7.000 6.720 13.720	120 0.0764	79.003 0.0 1.048		Vel = 11.40	
GB to GC	85.830 85.830		0.0 296.55	3 3.26		14.000 0.0 14.000	120 0.0763	80.051 0.0 1.068		Vel = 11.40	
GC to GD	85.830 85.830		0.0 296.55	3 3.26		1.000 0.0 1.000	120 0.0770	81.119 0.0 0.077		Vel = 11.40	
GD to 88	85.830 85.830		0.0 296.55	3 3.26	4L 26.879 0.0	12.000 26.879 38.879	120 0.0763	81.196 0.0 2.967		Vel = 11.40	
88 to DD	85.830 85.830		0.0 296.55	3 3.26	2F 2L 8.064 13.44	24.750 21.504 46.254	120 0.0763	84.163 0.0 3.530		Vel = 11.40	
DD to DE	85.830 85.830		0.0 296.55	3 3.26	2L 2T 13.44 40.319	122.000 53.759 175.759	120 0.0763	87.693 0.0 13.415		Vel = 11.40	
DE to DF	85.830 85.830		0.0 296.55	4 4.26	2L 2T 15.8 52.668	81.000 68.468 149.468	120 0.0207	101.108 0.0 3.100		Vel = 6.68	
DF to GG	85.830 85.830		0.0 296.55	4 4.26	1T 26.334 0.0	15.000 26.334 41.334	120 0.0207	104.208 0.0 0.857		Vel = 6.68	
GG to DH	85.830 85.830		0.0 296.55	4 4.26	1L 1T 7.9 26.334	30.500 34.234 64.734	120 0.0207	105.065 0.0 1.343		Vel = 6.68	
DH to K	85.830 85.830		0.0 296.55	4 4.26	4L 1T 31.601 26.334	8.250 57.935 66.185	120 0.0207	106.408 0.0 1.373		Vel = 6.68	

Final Calculations - Hazen-Williams - 2007

EASTERN FIRE PROTECTION
 CUMBERLAND COUNTY CIVIC CENTER UPPER SUITES LEVEL

Page 9
 Date

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	*****
K to RT	85.830 85.830		0.0 296.55	4 4.26	1A 1G 1B 1L 1T 1Fsp	22.384 2.633 15.8 7.9 26.334 0.0	6.580 75.051 81.631	120 0.0207	107.781 3.000 1.693		* Fixed loss = 3 Vel = 6.68	
RT to RB	85.830 85.830		0.0 296.55	6 6.357		0.0 0.0 0.0	4.000 0.0 4.000	120 0.0028	112.474 0.0 0.011		Vel = 3.00	
RB to L	85.830 51.830		0.0 296.55	6 6.357	3L 1T	33.948 37.72 0.0	14.000 71.668 85.668	120 0.0030	112.485 14.725 0.254		Vel = 3.00	
L to PO	51.830 51.830	H100	100.00 396.55	8 8.249	3G 1S 2L 1T	14.094 52.853 30.537 41.108	5.000 138.592 143.592	120 0.0014	127.464 0.0 0.204		Vel = 2.38	
PO			0.0 396.55						127.668		K Factor = 35.10	
System Demand Pressure									127.668			
Safety Margin									20.464			
Continuation Pressure									148.132			
Pressure @ Pump Outlet									148.132			
Pressure From Pump Curve									-65.740			
Pressure @ Pump Inlet									82.392			
PI to TEST	51.830 51.830		0.0 396.55	8 8.249		0.0 0.0 0.0	1.000 0.0 1.000	120 0.0020	82.392 0.0 0.002		Vel = 2.38	
TEST			0.0 396.55						82.394		K Factor = 43.69	