

DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK



# CITY OF PORTLAND BUILDING PERMIT

This is to certify that MAINLEY PLUMBING & HEATING  
of 674 Main St, Gorham, ME 04038

For installation at 67 QUEBEC ST

Job ID: 2011-05-997-ALTR

CBL: 914-M-013-001

has permission to install an NFPA 13D sprinkler system in a two-family home  
provided that the person or persons, firm or corporation accepting this permit shall comply with all of the provisions of  
the Statues 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.

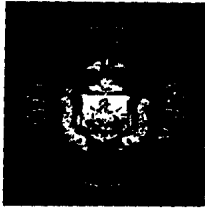
Notification of inspection and written permission procured  
before this building or part thereof is lathed or otherwise  
closed-in. 48 HOUR NOTICE IS REQUIRED.

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

*Bj. [Signature]*  
Fire Prevention Officer

*(58)*  
Code Enforcement Officer / Plan Reviewer

THIS CARD MUST BE POSTED ON THE STREET SIDE OF THE PROPERTY  
PENALTY FOR REMOVING THIS CARD



# PORTLAND MAINE

*Strengthening a Remarkable City, Building a Community for Life • [www.portlandmaine.gov](http://www.portlandmaine.gov)*

Director of Planning and Urban Development  
Penny St. Louis

Job ID: 2011-05-997-ALTR  
Install NFPA 13D sprinkler system in a  
two-family home

For installation at:  
67 QUEBEC ST

CBL: 014- M-013-001

## Conditions of Approval:

### **Fire**

The sprinkler system shall be installed in accordance with NFPA 13D.

**City of Portland, Maine - Building or Use Permit Application**

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

Job No: 2011-05-997-ALTR 2011-11616	Date Applied: 10/19/2011	CBL: 014-M-013-001	
Location of Construction: 67 QUEBEC ST	Owner Name: MICHEAL FRANKEL	Owner Address: 67 QUEBEC ST PORTLAND, ME, 04102	Phone:
Business Name:	Contractor Name: Mainely Plumbing & Heating	Contractor Address: 674 Main St, Gorham, ME 04038	Phone: 854-4969
Lessee/Buyer's Name:	Phone:	Permit Type: FAFS	Zone: R-6
Past Use: <b>Two family dwelling</b>	Proposed Use: <b>Two family dwelling - to install sprinkler system</b>	Cost of Work: <b>\$14,000.00</b>	CEO District:
		Fire Dept: <input checked="" type="checkbox"/> Approved w/ conditions <input type="checkbox"/> Denied <input type="checkbox"/> N/A	Inspection: Use Group: Type:
		Signature: <i>[Signature]</i> (SB)	Signature:
Proposed Project Description: 67 Quebec St		Pedestrian Activities District (P.A.D.)	
Permit Taken By: Lannie		<b>Zoning Approval</b>	

Special Zone or Reviews	Zoning Appeal	Historic Preservation
<input type="checkbox"/> Shoreland	<input type="checkbox"/> Variance	<input checked="" type="checkbox"/> Not in Dist or Landmark
<input type="checkbox"/> Wetlands	<input type="checkbox"/> Miscellaneous	<input type="checkbox"/> Does not Require Review
<input type="checkbox"/> Flood Zone	<input type="checkbox"/> Conditional Use	<input type="checkbox"/> Requires Review
<input type="checkbox"/> Subdivision	<input type="checkbox"/> Interpretation	<input type="checkbox"/> Approved
<input type="checkbox"/> Site Plan	<input type="checkbox"/> Approved	<input type="checkbox"/> Approved w/Conditions
<input type="checkbox"/> Maj <input type="checkbox"/> Min <input type="checkbox"/> MM	<input type="checkbox"/> Denied	<input type="checkbox"/> Denied
Date: <i>OK - 10/20/11</i>	Date:	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

14-M-13  
30/9/1  
150

2011-05-995  
2011-11616 Child 2 unit

### One- or Two-family Fire Sprinkler Permit

R-6

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.

Installation address: 67 Quebec St - Portland

Building owner: Michael Frankel Phone: \_\_\_\_\_

Installer: Marnely Plg + Htg Phone: 854-4969

Total sq/ft of building floor space per unit: \_\_\_\_\_  Single-family home

Sq/ft of sprinklered floor space per unit: 3098 Total  Two-family home

Is this a multipurpose piping system?  Y  N Sprinkler piping uses Pex?  Y /  N

Water supply:  Municipal Water  Well pump  Stored water  Other

Include electronic copy of approved ~~plans~~ Sprinkler Permit plans:

Additional cost to the owner for the new fire sprinkler system for each dwelling unit minus costs necessary for domestic needs (see below): **A=** \_\_\_\_\_

Attach cost breakdown  A City plumbing permit has been pulled:



COST OF WORK: \$ 13,833  
(A times number of units)

NO FEE REQUIRED

RECEIVED

OCT 19 2011

Dept of Building Inspections  
City of Portland, Maine

Additional information and Frequently asked questions about home fire sprinkler systems may be found at [www.portlandmaine.gov/fireprevention](http://www.portlandmaine.gov/fireprevention).

Sprinkler system cost must deduct costs that would have been incurred if the system did not provide sprinkler service. In a well pump system it would include the difference between the well pump to be installed and the one that would have been installed if there were no sprinkler demand on the system. Includes additional piping and valves that are required only because of NFPA Standard 13D, and not already required for domestic needs. Includes cost of sprinkler heads and additional installation costs.

10/27/11



State of Maine  
Department of Public Safety



Fire Sprinkler System Permit

# 9707

FRANKEL

Located at: 67 Quebec Street  
In the Town of: Portland  
Occupancy/Use: RESIDENTIAL  
Type of System: NFPA 13D

Permission is hereby given to:

**Mainely Plg & Htg Inc.**

674 Main Street  
Gorham, ME 040382622  
Contractor License # 471

to begin installation according to plans submittal approved by the Office of State Fire Marshal. The submittal is filed under log # 2111377, and no departure from the application submittal shall be made without prior approval in writing. This permit is issued under the provisions of Title 32, Chapter 20, Section 12004-I. Nothing herein shall excuse the holder of this permit from failure to comply with local ordinances, zoning laws, or other pertinent legal restrictions. This permit shall be displayed at the construction site or be made readily available.

This permit was issued on 10/18/2011 for a fee paid of \$25.00

*This permit will expire at midnight on Sunday, April 15, 2012*

The expiration date applies only if the installation has not begun by that date and no permission has been granted to extend the date. Once installation begins, then the permit is valid for however long it takes to complete the installation, assuming that the work is fairly continuous.

John E. Morris  
Commissioner

*The type of Fire Department Connection and its location is to be according to the Local Fire Department*

Within 30 days of the completion of a new fire sprinkler system or an addition to an existing fire sprinkler system, a fire sprinkler system contractor shall provide to the Office of State Fire Marshal a copy of this permit signed and dated by the certified Responsible Managing Supervisor representing that the fire sprinkler system has been installed according to specifications of the approved plan to the best of the supervisor's knowledge, information, and belief. This requirement is part of the sprinkler law, and neglect of this duty is grounds to not renew the contractor's license to do work in the State of Maine. All renewed sprinkler licenses are good for two years and expire on a June 30th.

Job completed, tested and verified by date of \_\_\_\_\_

RMS for this job: Hubbard Daniel P

RMS Signature: \_\_\_\_\_

# PLUMBING APPLICATION

Department of Health and Human Services  
Division of Environmental Health

## PROPERTY ADDRESS

Town or Plantation	Portland
Street	67 Quebec St.
Subdivision Lot #	

## PROPERTY OWNERS NAME

Last: Frankel	First: Michael
Applicant Name: Mainely P&H	
Mailing Address of Owner/Applicant (if Different): 674 Main St. Gorham, Me. 04038	

**Caution: Permit Required**

Plumbing shall not be installed until a Permit is attached here by the Local Plumbing Inspector. The Permit shall authorize the owner or installer to install the plumbing in accordance with this application and the Maine Plumbing Rules.

## Owner/Applicant Statement

I certify that the information submitted is correct to the best of my knowledge and understand that any falsification is reason for the Local Plumbing Inspectors to deny a Permit.

*[Signature]* 10/4/11  
Signature of Owner/Applicant Date

## Caution: Inspection Required

I have inspected the installation authorized above and found it to be in compliance with the Maine Plumbing Rules.

Local Plumbing Inspector Signature

Date Approved

## PERMIT INFORMATION

<b>This Application is for</b> 1. <input type="checkbox"/> NEW PLUMBING 2. <input checked="" type="checkbox"/> RELOCATED PLUMBING	<b>Type of Structure To Be Served:</b> 1. <input type="checkbox"/> SINGLE FAMILY DWELLING 2. <input type="checkbox"/> MODULAR OR MOBILE HOME 3. <input checked="" type="checkbox"/> MULTIPLE FAMILY DWELLING 4. <input type="checkbox"/> OTHER - SPECIFY _____	<b>Plumbing To Be Installed By:</b> 1. <input checked="" type="checkbox"/> MASTER PLUMBER 2. <input type="checkbox"/> OIL BURNERMAN 3. <input type="checkbox"/> MFG'D. HOUSING DEALER/MECHANIC 4. <input type="checkbox"/> PUBLIC UTILITY EMPLOYEE 5. <input type="checkbox"/> PROPERTY OWNER  LICENSE # <u>CO90011586</u>
---	--	---

Hook-Up & Piping Relocation Maximum of 1 Hook-Up	Number	Column 2 Type of Fixture	Number	Column 1 Type of Fixture
<input type="checkbox"/> <b>HOOK-UP:</b> to public sewer in those cases where the connection is not regulated and inspected by the local Sanitary District.  <b>OR</b> <input type="checkbox"/> <b>HOOK-UP:</b> to an existing subsurface wastewater disposal system.	2	Hosebib / Silcock	1	Bath'tub (and Shower)
		Floor Drain	1	Shower (Separate)
<input type="checkbox"/> <b>PIPING RELOCATION:</b> of sanitary lines, drains, and piping without new fixtures.		Urinal	1	Sink
		Drinking Fountain	2	Wash Basin
<b>OR</b> <input type="checkbox"/> <b>TRANSFER FEE</b> [\$6.00]		Indirect Waste	2	Water Closet (Toilet)
		Water Treatment Softener, Filter, etc.	1	Clothes Washer
		Grease / Oil Separator	1	Dish Washer
		Roof Drain		Garbage Disposal
		Bidet	1	Laundry Tub
		Other: _____	2	Water Heater
	2	Fixtures (Subtotal) Column 2	12	Fixtures (Subtotal) Column 1
			2	Fixtures (Subtotal) Column 2
			14	<b>Total Fixtures</b>
			140	Fixture Fee
			-	Transfer Fee
			-	Hook-Up & Relocation Fee
			140	<b>Permit Fee (Total)</b>

**SEE PERMIT FEE SCHEDULE FOR CALCULATING FEE**

+ \$10  
150



**Fire Sprinkler Assemblies**

Part Number	Description	Quantity	Unit	Unit Cost	Total Cost
Q74300BR	RFC43 (165oF) Flat Concealed Sprinkler	3	EA	50.00	150.00
Q74355CP	RFC43 CCP (165oF) Concealed Sprinkler Assembly	28	EA	102.30	2,864.40

**Sprinkler Cabinets**

Part Number	Description	Quantity	Unit	Unit Cost	Total Cost
Q7503000	Sprinkler Cabinet without Sprinkler Heads	1	EA	80.30	80.30

**Uponor AquaPEX Tubing**

Part Number	Description	Quantity	Unit	Unit Cost	Total Cost
F1040500	1/2" Uponor AquaPEX White, 100-ft. coil	13.98	EA	68.55	958.33
F1061250	1 1/4" Uponor AquaPEX White, 100-ft. coil	0.35	EA	421.20	147.42
F1061500	1 1/2" Uponor AquaPEX White, 100-ft. coil	0.27	EA	495.95	133.91

**ProPEX Rings**

Part Number	Description	Quantity	Unit	Unit Cost	Total Cost
Q4690512	ProPEX Ring with Stop, 1/2"	171	EA	0.20	34.20
Q4691000	ProPEX Ring with Stop, 1"	4	EA	0.63	2.52
Q4691250	ProPEX Ring with Stop, 1 1/4"	5	EA	1.10	5.50
Q4691500	ProPEX Ring with Stop, 1 1/2"	1	EA	1.45	1.45

**Miscellaneous**

Part Number	Description	Quantity	Unit	Unit Cost	Total Cost
	3/4" BRASS PLUG	1	EA	1.20	1.20

**Supports**

Part Number	Description	Quantity	Unit	Unit Cost	Total Cost
F7050750	Tube Talon (1/2", 5/8", 3/4" PEX), 100/bag	5	EA	24.15	120.75

**Manifolds**

Part Number	Description	Quantity	Unit	Unit Cost	Total Cost
LF2811050	1" Copper Branch Manifold with 1/2" ProPEX LF outlets, 6 outlets	1	EA	94.35	94.35
LF2821050	1" Copper Branch Manifold with 1/2" ProPEX LF outlets, 8 outlets	2	EA	118.80	237.60

# Uponor, Inc

5925 148th Street West  
Apple Valley, MN 55124

"GOLF"

## Estimate Details

MainSystemFP Per Unit (Qty. 1)

### ProPEX Adapters

Part Number	Description	Quantity	Unit	Unit Cost	Total Cost
LF4511010	ProPEX LF Brass Sweat Adapter, 1" PEX x 1" Copper	4	EA	14.05	56.20

### ProPEX Tees

Part Number	Description	Quantity	Unit	Unit Cost	Total Cost
LF4705050	ProPEX LF Brass Tee, 1/2" PEX x 1/2" PEX x 1/2" PEX	12	EA	9.75	117.00
	1" UL/FM BALL VLV FULL PORT	1	EA	0.00	0.00

### Finishes

Part Number	Description	Quantity	Unit	Unit Cost	Total Cost
Q70643WH	Concealed Flat Cover Plate, White	28	EA	26.00	728.00

### Tools \*See Cover Page\*

Part Number	Description	Quantity	Unit	Unit Cost	Total Cost
	In-line Flow Test Kit - *See Tools on Cover Page*	1	EA	0.00	0.00
	Concealed Sprinkler Wrench for RFC43 Heads, Flat Cover Plate - *See Tools on Cover Page*	1	EA	0.00	0.00

Unit Price \$ 5,733.13

Labour approx 4,500.00

3/4" Water main  
So have to add  
Storage tank + Pump

Design Fee

\$ 2,900

\$ 13,133 00

\$ 700 00

\$ 13,833 00

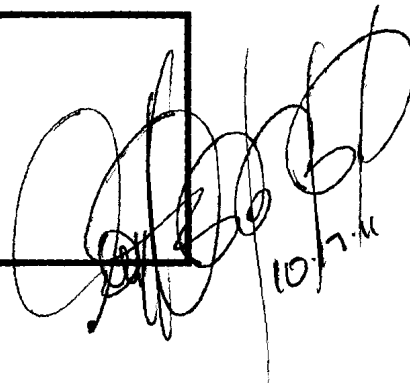


# Uponor

AQUASAFE® Fire Safety System

Uponor  
5925 148th Street West

Apple Valley, MN 55124  
800-321-4739



Handwritten signature and date: 10.17.11

Job Name : FRANKEL - One Head Calculation (H.1)  
Drawing : RESIDENTIAL  
Location : 67 QUEBEC ST PORTLAND ME 04101  
Remote Area : NETWORK  
Contract : 111011-42N  
Data File : 111011-42N Frankel Residence.wx1

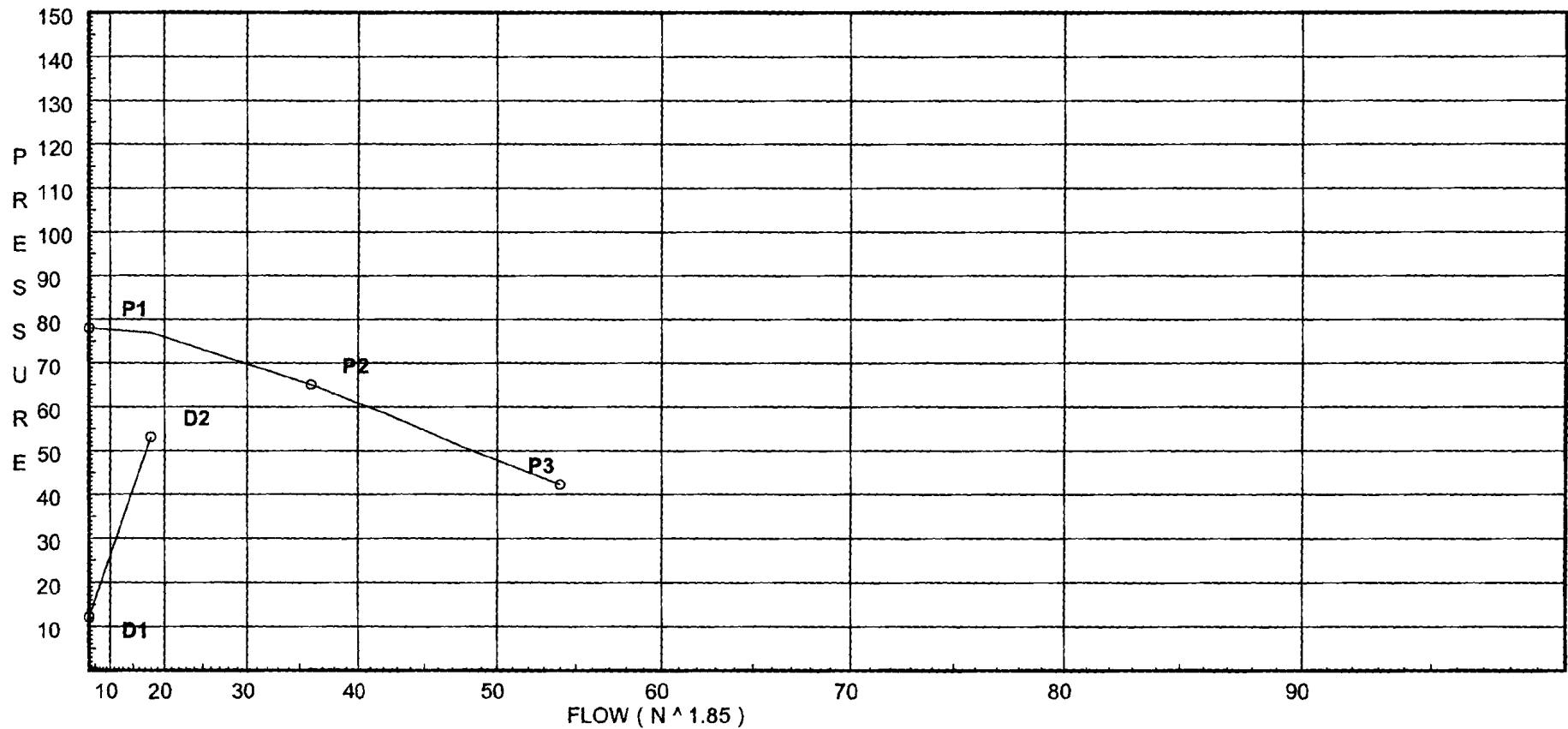
# Water Supply Curve (C)

Uponor  
FRANKEL - One Head Calculation (H.1)

Page 2  
Date 10/17/2011

Pump Data:  
P1 - Pump Churn Pressure : 78  
P2 - Pump Rated Pressure : 65  
P2 - Pump Rated Flow : 36  
P3 - Pump Pressure @ Max Flow : 42.25  
P3 - Pump Max Flow : 54

Demand:  
D1 - Elevation : 12.127  
D2 - System Flow : 17.9985  
D2 - System Pressure : 53.033  
Hose ( Adj City ) : \_\_\_\_\_  
Hose ( Demand ) : \_\_\_\_\_  
D3 - System Demand : 17.9985  
Safety Margin : 23.887



**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>
PUMP	See Information on Pump Curve			76.92	0.0	53.033

**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>
H.1	128.0	4.3	17.52	18.0	
H.4	108.0		43.33		
M.31	128.0		32.86		
T.29	108.0		43.38		
H.2	108.0		43.39		
T.30	108.0		43.05		
T.32	128.0		32.75		
H.3	128.0		32.8		
H.8	108.0		43.37		
H.7	108.0		43.4		
H.5	108.0		43.38		
H.12	128.0		32.72		
M.36	108.0		43.46		
T.37	108.0		43.49		
H.13	108.0		42.75		
T.44	118.0		37.95		
H.10	128.0		32.7		
H.27	118.0		37.66		
H.6	128.0		32.81		
H.9	108.0		42.75		
T.34	128.0		31.93		
H.17	108.0		43.25		
T.33	108.0		42.75		
H.28	118.0		37.6		
H.14	108.0		43.37		
H.16	108.0		42.75		
H.15	108.0		43.09		
T.35	108.0		42.52		
H.18	108.0		43.37		
H.11	128.0		31.09		
T.38	128.0		31.87		
T.39	108.0		42.75		
H.19	108.0		43.19		
T.40	118.0		37.9		
H.20	118.0		37.97		
T.41	118.0		37.7		
M.43	118.0		37.95		
H.23	118.0		37.81		
H.21	118.0		37.84		
H.24	118.0		37.84		
H.22	118.0		36.2		

Initial Calculations - Hazen-Williams

Uponor  
FRANKEL - One Head Calculation (H.1)

Page 6  
Date 10/17/2011

Hyd. Ref. Point	Qa  Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
H.1 to H.22	4.02 4.02	0.475 150.0 0.2101	42U	42.0 0.0	26.000 42.300 68.300	17.520 4.331 14.348			K Factor = 4.30 Vel = 7.28	
	0.0 4.02						36.199		K Factor = 0.67	
H.4 to H.2	0.23 0.23	0.475 150.0 0.0010	42U	42.0 0.0	15.000 42.300 57.300	43.327 0.0 0.060			Vel = 0.42	
	0.0 0.23						43.387		K Factor = 0.03	
M.31 to H.1	4.97 4.97	0.475 150.0 -0.3106	1T 21U	1.219 21.0 0.0	27.000 22.369 49.369	32.856 0.0 -15.336			Vel = 9.00	
	0.0 4.97						17.520		K Factor = 1.19	
T.29 to H.2	0.12 0.12	0.475 150.0 0.0003	1R 21U 1Utr	1.0 21.0 1.0	7.000 23.150 30.150	43.377 0.0 0.010			Vel = 0.22	
	0.0 0.12						43.387		K Factor = 0.02	
H.1 to M.31	-4.97 -4.97	0.475 150.0 0.3106	21U 1T	21.0 1.219 0.0	27.000 22.369 49.369	17.520 0.0 15.336			Vel = 9.00	
	0.0 -4.97						32.856		K Factor = -0.87	
H.2 to H.7	0.08 0.08	0.475 150.0 0.0002	42U	42.0 0.0	23.000 42.300 65.300	43.387 0.0 0.011			Vel = 0.14	
	0.0 0.08						43.398		K Factor = 0.01	
H.1 to H.11	4.03 4.03	0.475 150.0 0.2110	42U	42.0 0.0	22.000 42.300 64.300	17.520 0.0 13.570			Vel = 7.30	
	0.0 4.03						31.090		K Factor = 0.72	
T.30 to H.4	0.75 0.75	0.475 150.0 0.0094	1R 21U 1Utr	1.0 21.0 1.0	6.000 23.150 29.150	43.054 0.0 0.273			Vel = 1.36	
	0.0 0.75						43.327		K Factor = 0.11	
T.32 to H.3	0.29 0.29	0.475 150.0 0.0016	1R 21U 1Utr	1.0 21.0 1.0	9.000 23.150 32.150	32.750 0.0 0.052			Vel = 0.53	
	0.0 0.29						32.802		K Factor = 0.05	
M.31 to H.3	0.28 0.28	0.475 150.0 -0.0016	1T 21U	1.219 21.0 0.0	12.000 22.369 34.369	32.856 0.0 -0.054			Vel = 0.51	

circulations - Hazen-Williams

Uponsor  
FRANKEL - One Head Calculation (H.1)

Page 8  
Date 10/17/2011

Hyd. Ref. Point	Qa  Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
	0.0 -11.07					32.856			K Factor = -1.93	
H.12 to H.6	0.27 0.27	0.475 150.0 0.0014	42U or 42.0	42.0 0.0 0.0	20.000 42.300 62.300	32.719 0.0 0.087			Vel = 0.49	
	0.0 0.27					32.806			K Factor = 0.05	
H.10 to H.25	0.70 0.7	0.475 150.0 0.0083	42U or 42.0	42.0 0.0 0.0	24.000 42.300 66.300	32.701 4.331 0.553			Vel = 1.27	
	0.0 0.70					37.585			K Factor = 0.11	
H.27 to H.11	-1.50 -1.5	0.475 150.0 -0.0337	42U or 42.0	42.0 0.0 0.0	24.000 42.300 66.300	37.658 -4.331 -2.237			Vel = 2.72	
	0.0 -1.50					31.090			K Factor = -0.27	
M.36 to H.5	-0.30 -0.3	0.475 150.0 -0.0017	1T or 21U	1.219 21.0 0.0	23.000 22.369 45.369	43.460 0.0 -0.079			Vel = 0.54	
	0.0 -0.30					43.381			K Factor = -0.05	
H.6 to M.31	-0.28 -0.28	0.475 150.0 0.0015	21U or 1T	21.0 1.219 0.0	11.000 22.369 33.369	32.806 0.0 0.050			Vel = 0.51	
	0.0 -0.28					32.856			K Factor = -0.05	
H.10 to T.32	0.29 0.29	0.475 150.0 0.0016	21U or 1R	21.0 1.0 2.0	6.000 24.150 30.150	32.701 0.0 0.049			Vel = 0.53	
	0.0 0.29					32.750			K Factor = 0.05	
M.36 to H.4	-0.34 -0.34	0.475 150.0 -0.0022	1T or 21U	1.219 21.0 0.0	37.000 22.369 59.369	43.460 0.0 -0.133			Vel = 0.62	
	0.0 -0.34					43.327			K Factor = -0.05	
H.9 to T.33	0.03 0.03	0.475 150.0 0.0	21U or 1R	21.0 1.0 1.0	7.000 23.150 30.150	42.750 0.0 0.001			Vel = 0.05	
	0.0 0.03					42.751			K Factor = 0	
H.10 to T.34	-1.28 -1.28	0.475 150.0 -0.0254	21U or 1R	21.0 1.0 1.0	7.000 23.150 30.150	32.701 0.0 -0.767			Vel = 2.32	
T.34 to H.11	0.0 -1.28	0.475 150.0 -0.0255	1R or 21U	1.0 21.0 0.0	11.000 22.150 33.150	31.934 0.0 -0.844			Vel = 2.32	

Final Calculations - Hazen-Williams

Uponor  
FRANKEL - One Head Calculation (H.1)

Page 10  
Date 10/17/2011

Hyd. Ref. Point	Qa  Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
T.35 to H.13	0.68  0.68	0.475 150.0 0.0078	1R 21U 1Utb	1.0 21.0 2.0	5.000 24.150 29.150	42.524 0.0 0.227			Vel = 1.23	
	0.0 0.68					42.751			K Factor = 0.10	
H.18 to H.5	0.09  0.09	0.475 150.0 0.0002	42U	42.0 0.0 0.0	22.000 42.300 64.300	43.369 0.0 0.012			Vel = 0.16	
	0.0 0.09					43.381			K Factor = 0.01	
H.11 to T.38	1.25  1.25	0.475 150.0 0.0242	21U 1R 1Utr	21.0 1.0 1.0	9.000 23.150 32.150	31.090 0.0 0.778			Vel = 2.26	
	0.0 1.25					31.868			K Factor = 0.22	
T.37 to M.36	-3.08  -3.08	1.054 150.0 -0.0026	1Utb	9.08 0.0 0.0	2.000 9.080 11.080	43.489 0.0 -0.029			Vel = 1.13	
	0.0 -3.08					43.460			K Factor = -0.47	
H.17 to H.8	0.30  0.3	0.475 150.0 0.0018	42U	42.0 0.0 0.0	23.000 42.300 65.300	43.251 0.0 0.117			Vel = 0.54	
	0.0 0.30					43.368			K Factor = 0.05	
T.38 to H.12	1.25  1.25	0.475 150.0 0.0242	1R 21U 1Utb	1.0 21.0 2.0	11.000 24.150 35.150	31.868 0.0 0.851			Vel = 2.26	
	0.0 1.25					32.719			K Factor = 0.22	
H.15 to M.36	0.81  0.81	0.475 150.0 0.0108	21U 1T	21.0 1.219 0.0	12.000 22.369 34.369	43.089 0.0 0.371			Vel = 1.47	
	0.0 0.81					43.460			K Factor = 0.12	
H.14 to M.36	0.36  0.36	0.475 150.0 0.0024	21U 1T	21.0 1.219 0.0	14.000 22.369 36.369	43.373 0.0 0.087			Vel = 0.65	
	0.0 0.36					43.460			K Factor = 0.05	
T.39 to H.13	0.04  0.04	0.475 150.0 0.0	1R 21U 1Utb	1.0 21.0 2.0	10.000 24.150 34.150	42.750 0.0 0.001			Vel = 0.07	
	0.0 0.04					42.751			K Factor = 0.01	
M.36 to H.18	-0.31  -0.31	0.475 150.0 -0.0019	1T 21U	1.219 21.0 0.0	26.000 22.369 48.369	43.460 0.0 -0.091			Vel = 0.56	

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
	0.0									
	0.13					37.946			K Factor = 0.02	
T.41 to H.21	0.48	0.475 150.0	1R 21U	1.0 21.0	10.000 23.150	37.703 0.0				
	0.48	0.0042	1Utr	1.0	33.150	0.139			Vel = 0.87	
	0.0									
	0.48					37.842			K Factor = 0.08	
M.43 to H.20	-0.13	0.475 150.0	1T 21U	1.219 21.0	41.000 22.369	37.946 0.0				
	-0.13	0.0004		0.0	63.369	0.023			Vel = 0.24	
	0.0									
	-0.13					37.969			K Factor = -0.02	
H.23 to H.21	0.15	0.475 150.0	42U	42.0 0.0	21.000 42.300	37.812 0.0				
	0.15	0.0005		0.0	63.300	0.030			Vel = 0.27	
H.21 to M.43	-0.47	0.475 150.0	21U 1T	21.0 1.219	32.000 22.369	37.842 0.0				
	-0.32	0.0019		0.0	54.369	0.104			Vel = 0.58	
	0.0									
	-0.32					37.946			K Factor = -0.05	
H.24 to T.40	0.32	0.475 150.0	21U 1R	21.0 1.0	11.000 22.150	37.840 0.0				
	0.32	0.0019		0.0	33.150	0.063			Vel = 0.58	
	0.0									
	0.32					37.903			K Factor = 0.05	
H.22 to H.23	1.32	0.475 150.0	42U	42.0 0.0	18.000 42.300	36.199 0.0				
	1.32	0.0267		0.0	60.300	1.613			Vel = 2.39	
	0.0									
	1.32					37.812			K Factor = 0.21	
M.43 to H.22	-1.63	0.475 150.0	1T 21U	1.219 21.0	22.000 22.369	37.946 0.0				
	-1.63	-0.0394		0.0	44.369	-1.747			Vel = 2.95	
	0.0									
	-1.63					36.199			K Factor = -0.27	
H.26 to H.22	-1.08	0.475 150.0	42U	42.0 0.0	29.000 42.300	37.504 0.0				
	-1.08	-0.0183		0.0	71.300	-1.305			Vel = 1.96	
	0.0									
	-1.08					36.199			K Factor = -0.18	
M.43 to H.21	0.32	0.475 150.0	1T 21U	1.219 21.0	32.000 22.369	37.946 0.0				
	0.32	-0.0019		0.0	54.369	-0.104			Vel = 0.58	
	0.0									
	0.32					37.842			K Factor = 0.05	
M.43 to H.23	-0.47	0.475 150.0	1T 21U	1.219 21.0	11.000 22.369	37.946 0.0				
	-0.47	-0.0040		0.0	33.369	-0.134			Vel = 0.85	

Final Calculations - Hazen-Williams

Uponor  
FRANKEL - One Head Calculation (H.1)

Page 14  
Date 10/17/2011

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
	0.0 0.51					37.679		K Factor = 0.08	
H.25 to T.46	0.49	0.475 150.0	21U 21.0 1R 1.0	9.000 22.150	37.585 0.0				
	0.49	0.0042	0.0	31.150	0.131			Vel = 0.89	
	0.0 0.49					37.716		K Factor = 0.08	
H.26 to H.28	0.30	0.475 150.0	42U 42.0 0.0	13.000 42.300	37.504 0.0				
	0.3	0.0017	0.0	55.300	0.095			Vel = 0.54	
	0.0 0.30					37.599		K Factor = 0.05	
H.26 to H.25	0.27	0.475 150.0	42U 42.0 0.0	15.000 42.300	37.504 0.0				
	0.27	0.0014	0.0	57.300	0.081			Vel = 0.49	
	0.0 0.27					37.585		K Factor = 0.04	
H.27 to M.43	0.61	0.475 150.0	21U 21.0 1T 1.219	23.000 22.369	37.658 0.0				
	0.61	0.0063	0.0	45.369	0.288			Vel = 1.10	
	0.0 0.61					37.946		K Factor = 0.10	
H.27 to H.28	-0.24	0.475 150.0	42U 42.0 0.0	11.000 42.300	37.658 0.0				
	-0.24	-0.0011	0.0	53.300	-0.059			Vel = 0.43	
	0.0 -0.24					37.599		K Factor = -0.04	
H.19 to H.27	-1.13	0.475 150.0	42U 42.0 0.0	18.000 42.300	43.193 -4.331				
	-1.13	-0.0200	0.0	60.300	-1.204			Vel = 2.05	
	0.0 -1.13					37.658		K Factor = -0.18	
S.1 to XO1	18.00	1.054 150.0	0.0 0.0	1.000 0.0	46.162 6.732			* Fixed loss = 5	
	18.0	0.0700	0.0	1.000	0.070			Vel = 6.62	
XO1 to PUMP	0.0	1.054 150.0	0.0 0.0	1.000 0.0	52.964 0.0				
	18.0	0.0690	0.0	1.000	0.069			Vel = 6.62	
	0.0 18.00					53.033		K Factor = 2.47	