

City of Portland, Maine - Building or Use Permit Application

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

Job No: 2011-04-713-CH OF USE 2012-50683-FSS	Date Applied: 11/30/2012	CBL: 159- B-022-001	
Location of Construction: 422 OCEAN AVE	Owner Name: SECOND CHANCE PROPERTIES LLC	Owner Address: 179 PLEASANT AVE PORTLAND, ME 04103	Phone:
Business Name:	Contractor Name: ADG Builders, LLC	Contractor Address:	Phone: 207-318-2368
Lessee/Buyer's Name:	Phone:	Permit Type: Fire Suppression System	Zone: R-3
Past Use: Change of use to single family from church - 2011- 04-713	Proposed Use: Single family - install sprinkler system	Cost of Work: \$17,000.00	CEO District:
		Fire Dept: 11/30/12 <input checked="" type="checkbox"/> Approved w/ conditions <input type="checkbox"/> Denied <input type="checkbox"/> N/A	Inspection: Use Group: Type:
		Signature: <i>[Signature]</i> (58)	Signature:
Proposed Project Description: Install sprinkler system		Pedestrian Activities District (P.A.D.)	

Permit Taken By: Brad	Zoning Approval		
<p>1. This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.</p> <p>2. Building Permits do not include plumbing, septic or electrical work.</p> <p>3. Building permits are void if work is not started within six (6) months of the date of issuance. False informatin may invalidate a building permit and stop all work.</p>	Special Zone or Reviews <input type="checkbox"/> Shoreland <input type="checkbox"/> Wetlands <input type="checkbox"/> Flood Zone <input type="checkbox"/> Subdivision <input type="checkbox"/> Site Plan ___ Maj ___ Min ___ MM Date: <i>OK 11/30/12</i> <i>ARU</i>	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 Dist 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>ARU</i>

SCANNED

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

DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK



CITY OF PORTLAND BUILDING PERMIT

This is to certify that
ADG Builders
70 B Hunts Hill RD
GRAY, ME 04039

For installation at
422 OCEAN AVE
Single-family home

Job ID: **2011-04-713-CH OF USE**

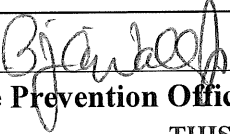
CBL: **159- B-022-001**

has permission to **install NFPA 13D sprinkler system**

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


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

SCANNED

BUILDING PERMIT INSPECTION PROCEDURES

Please call 874-8703 or 874-8693 (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.**

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.



PORTLAND MAINE

Strengthening a Remarkable City, Building a Community for Life • www.portlandmaine.gov

Director of Planning and Urban Development
Jeff Levine

Job ID: 2011-04-713-CH OF USE
install NFPA 13D sprinkler system

For installation at:
422 OCEAN AVE
Single-family home

CBL: 159- B-022-001

Conditions of Approval:

Fire

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

All control valves shall be supervised in accordance with NFPA 13D. Pad locks shall only be installed on valves designed to be secured in the open position by pad lock.

A copy of the required state sprinkler permit with RMS signoff shall be provided prior to the final inspection.

uponor

11/30/12

RE: Church Remodel
422 Ocean Ave
Portland, ME

To whom it may concern,

On 3/22/12 Uponor Fire Safety received plans and a design request for a fire sprinkler system located in Portland ME. The design request for stated that the project was located at 305 Commercial St. in Poland, ME when in fact the correct address was 422 Ocean Ave in Portland, ME. All of the plans and calculations that were submitted to the State Fire Marshal's office reflect the 305 address.

I have made the State fire Marshal aware of the address change and have also submitted the signed permit to him so that he can make the adjustments before the project is closed.

The static pressure for the project was taken at the jobsite so the calculations and piping configuration will remain unaffected by this correction.

If you have any questions, please contact me at my number listed below.

Thank you

Dan Hubbard, SET IV



Fire Safety Supervisor
Uponor North America
952-997-5325

Uponor North America

5925 148th Street West
Apple Valley, MN 55124
USA

Tel: (800) 321-4739
Fax: (952) 891-2008
Web: www.uponor-usa.com



State of Maine
Department of Public Safety



Fire Sprinkler System Permit

9961

CHURCH

Located at: ~~305 COMMERCIAL STREET~~
In the Town of: Poland *Portland*
Occupancy/Use: RESIDENTIAL
Type of System: NFPA 13D

→ 422 Ocean Ave

Permission is hereby given to:

ADG Builders*
70 B Hunts Hill Road
Gray, ME 04039
Contractor License # 857

to begin installation according to plans submittal approved by the Office of State Fire Marshal.
The submittal is filed under log # 2121141 , 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 4/26/2012 for a fee paid of \$75.00

This permit will expire at midnight on Tuesday, October 23, 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

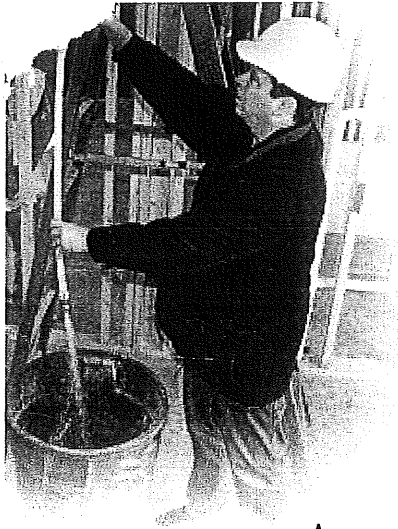
The type of Fire Department Connection and its location is to be according to the Local Fire Department

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: _____



Uponor

FIRE SAFETY SYSTEMS AQUASAFE™ FLOW TEST VERIFICATION

FORM

AquaSAFE™ Flow Test Verification Form

Alliance
Member ID: In training / 857
Company Name: ADC Builders
Contact: Allyn Gee
Phone: 207-318-2368
Fax: _____
Job Name: Church Renovation
Project Number: 120322-41L
Job Address: 422 Ocean Ave
City: Portland, ME
State, ZIP: Maine 04102

Important: Installing contractor must submit this completed form. Failure to do so nullifies the system warranty. E-mail or fax completed form to the Uponor Fire Safety Design Department at technical.services@uponor.com or 952.997.1731. For questions, contact Uponor Technical Services at 888.594.7726 or technical.services@uponor.com.

Color of test orifice used: White

Static pressure (not flowing) reading at incoming water supply into home or at main shutoff: 92 psi

Residual pressure (flowing) reading at incoming water supply into home or at main shutoff: _____

What time of day was the flow test taken? 9:30 AM

Flow test method used? Bucket Flow Meter

Flow test gpm: 21

How many gallons of water did the design predict as required? 18

Did the test meet or exceed design flow? Yes No

Which sprinkler did you flow? Number: H-50

Location of head: Third Floor

Date left in service with all valves open: _____

For designs not provided by Uponor, complete the following information.

Designer's Name: Uponor
Company: _____
Phone: 800-321-4739
Fax: 952-997-1731

Is the warning sign permanently attached close to the main shutoff valve? Yes No

Was this system required by code? Yes No

Test Witnessed and Verified by:

Name	Signature	Occupation	Date
<u>Richard Davidson</u>	<u>[Signature]</u>	<u>Plumber</u>	<u>4/26/2012</u>
<u>Bob Thompson</u>	<u>[Signature]</u>	<u>Well</u>	<u>4/26/2012</u>
<u>Allyn Gee</u>	<u>[Signature]</u>	<u>ADC</u>	<u>4/26/2012</u>

Additional Explanations and Notes _____

R-3

Fire Permit # 9961

2011-04-713-Cow
child 2012-506P3

Entire 11/30/12

One- or Two-family Fire Sprinkler 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.

159 B022

(15)

Installation address: 422 Ocean Ave

Building owner: Eric Rand Phone: 329-3299

Installer: ADG Builders LLC Phone: 318-2368

Lic# 857

Total sq/ft of building floor space per unit: 6608 Single-family home

or

Sq/ft of sprinklered floor space per unit: 6384 ~~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 State Sprinkler Permit plans:

Additional cost to the owner for the home fire sprinkler system for each dwelling unit minus costs necessary for domestic needs (See below): **A=** one Dwelling

Attach cost breakdown: A City plumbing permit has been pulled:

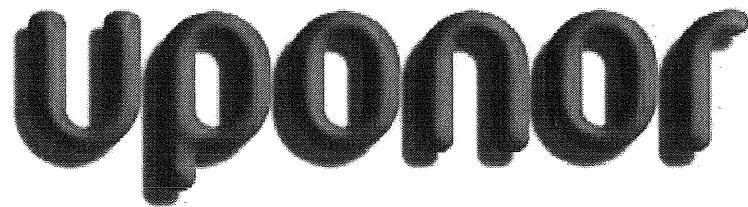
RECEIVED
NOV 30 2012
Dept. of Building Inspections
City of Portland Maine

COST OF WORK: 16,180.00
(A times number of units)

NO FEE REQUIRED

Additional information and Frequently asked questions about home fire sprinkler systems may be found at 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.



AquaSAFE™ FIRE SAFETY SYSTEM

Uponor
5925 148th Street West

Apple Valley, MN 55124
800-321-4739

Job Name : Church - Two Head Calculation (H.50 & H.54)
Drawing : RESIDENTIAL
Location : 305 COMMERCIAL STREET PORTLAND ME
Remote Area : 1
Contract : 120322-411
Data File : 120322-41 Church.wx2

HYDRAULIC DESIGN INFORMATION SHEET

Name - Church Date - 4/1/2012
Location - PORTLAND ME
Building - RESIDENTIAL System No. - 1
Contractor - ADG BUILDERS Contract No. - 120322-411
Calculated By - DAN HUBBARD SET Drawing No. - F100
Construction: (X) Combustible () Non-Combustible Ceiling Height VARIES
OCCUPANCY - RESIDENTIAL

S Type of Calculation: ()NFPA 13 Residential ()NFPA 13R (X)NFPA 13D
Y Number of Sprinklers Flowing: ()1 (X)2 ()4 ()
S ()Other
T ()Specific Ruling Made by Date
E
M Listed Flow at Start Point - 18 Gpm System Type
Listed Pres. at Start Point - 17.52Psi (X) Wet () Dry
D MAXIMUM LISTED SPACING 16 x 16 () Deluge () PreAction
E Domestic Flow Added - 0 Gpm Sprinkler or Nozzle
S Additional Flow Added - Gpm Make RELIABLE Model RFC43-S2
I Elevation at Highest Outlet - 140 Feet Size 3/8 K-Factor 4.3
G Note: Temperature Rating 155
N

Calculation Gpm Required 35.9984 Psi Required 73.13 At Ref Pt STR
Summary C-Factor Used: Overhead 150 Underground 150

W Water Flow Test: Pump Data: Tank or Reservoir:
A Date of Test - x Rated Cap. Cap.
T Time of Test - x @ Psi Elev.
E Static (Psi) - 92 Elev.
R Residual (Psi) - 87 Other Well
Flow (Gpm) - 300 Proof Flow Gpm
S Elevation - 100

P Location: x
P
L Source of Information: x
Y

Water Supply Curve (C)

Uponor
Church - Two Head Calculation (H.50 & H.54)

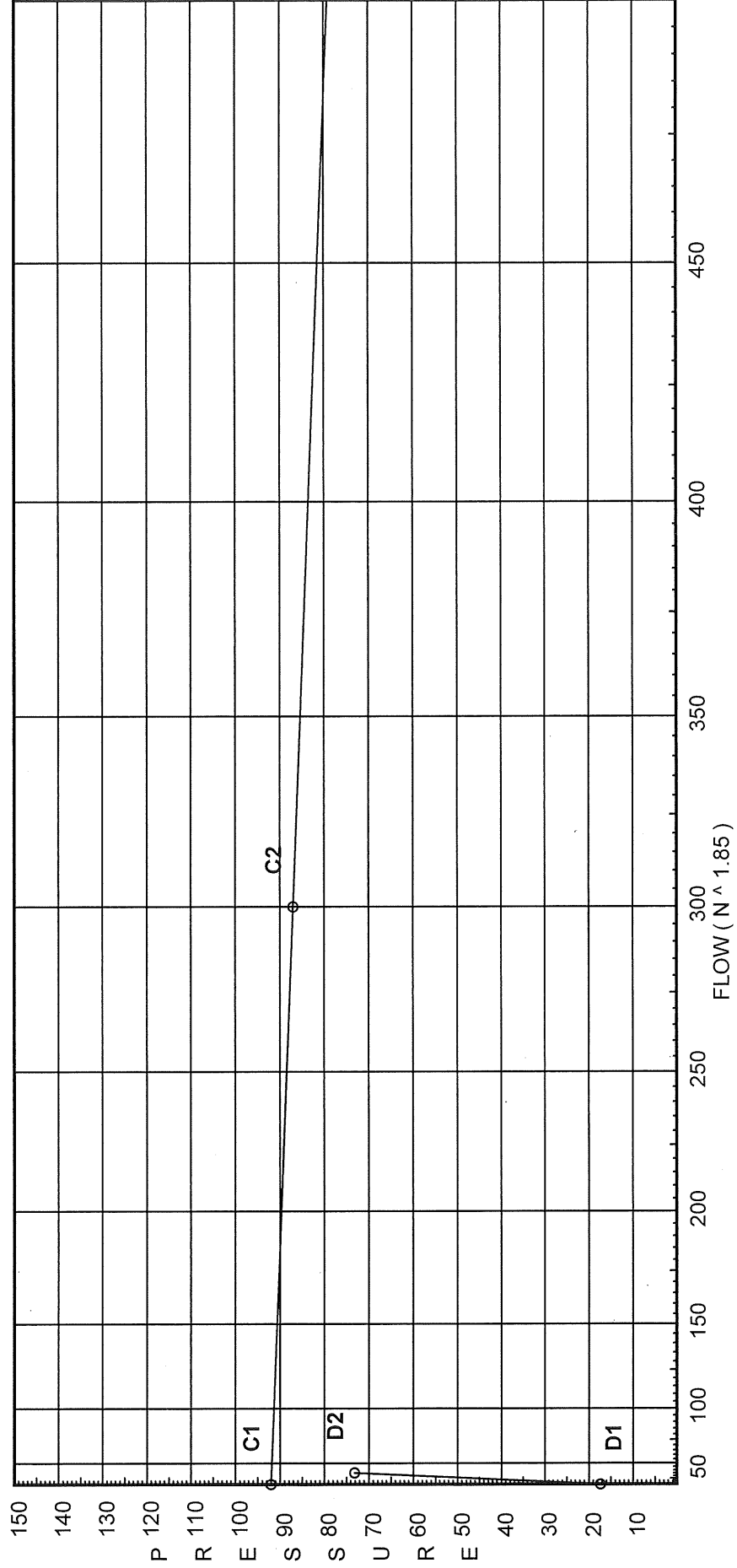
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City Water Supply:

C1 - Static Pressure : 92
C2 - Residual Pressure: 87
C2 - Residual Flow : 300

Demand:

D1 - Elevation : 17.324
D2 - System Flow : 35.9984
D2 - System Pressure : 73.133
Hose (Adj City) : _____
Hose (Demand) : _____
D3 - System Demand : 35.9984
Safety Margin : 18.768



Fittings Used Summary

Uponsor Church - Two Head Calculation (H.50 & H.54)

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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
E 90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
G Generic Gate Valve	1	1	1	1	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Ucp Aquapex Coupling	1	2	2	1.63	2.88	1.63	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uel Aquapex 90 Elbow	3	5	6	9.8	12.06	12.28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utb Aquapex Tee - Branch	2	6	6	9.08	12.88	13.22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utr Aquapex Tee - Run	1	2	2	1.64	2.39	2.39	0	0	0	0	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

Flow Summary - NFPA 2007

Uponor
Church - Two Head Calculation (H.50 & H.54)

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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>
STR	92.0	87	300.0	91.901	36.0	73.133

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.50	140.0	4.3	17.52	18.0	
T.92	140.0		21.43		
T.90	140.0		24.94		
T.81	128.0		31.19		
T.68	118.0		36.44		
T.60	108.0		41.82		
H.2	108.0		43.11		
H.10	108.0		44.07		
T.64	108.0		44.29		
T.65	108.0		45.87		
S.1	104.0		54.91		
MTR	100.0		61.44		
STR	100.0		73.13		
H.54	140.0	4.3	17.52	18.0	
T.97	140.0		21.43		
T.99	140.0		24.82		
T.88	128.0		31.18		
T.80	118.0		36.41		
T.67	108.0		43.06		
H.55	140.0		21.43		
H.51	140.0		21.43		
T100	140.0		25.44		
H.58	140.0		25.72		
T.98	140.0		26.09		
T.87	128.0		32.36		
T.76	118.0		37.23		
T.62	108.0		41.93		
T.63	108.0		41.99		
H.9	108.0		42.27		
H.11	108.0		43.0		
H.14	108.0		43.67		
H.15	108.0		43.84		
T.89	140.0		25.44		
H.48	140.0		25.82		
T.91	140.0		26.1		
T.83	128.0		32.37		
T.70	118.0		37.28		
H.59	140.0		25.44		
H.57	140.0		25.44		
T.96	140.0		25.44		
T.95	140.0		25.44		
H.53	140.0		25.44		

Flow Summary - NFPA 2007

Uponor
Church - Two Head Calculation (H.50 & H.54)

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Date 4/5/2012

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>
H.49	140.0		25.44		
H.56	140.0		26.09		
T.94	140.0		26.09		
T.93	140.0		26.09		
H.52	140.0		26.09		
T.86	128.0		32.37		
H.44	128.0		32.37		
H.41	128.0		32.37		
T.82	128.0		32.37		
H.45	128.0		32.37		
H.47	128.0		32.37		
H.43	128.0		32.37		
H.40	128.0		32.37		
H.38	128.0		32.37		
T.77	118.0		37.45		
H.33	118.0		37.49		
T.78	118.0		37.56		
T.79	118.0		37.57		
H.32	118.0		37.7		
T.75	118.0		37.75		
T.69	118.0		37.41		
H.22	118.0		37.44		
H.25	118.0		37.51		
H.24	118.0		37.54		
H.21	118.0		37.59		
H.29	118.0		37.68		
H.27	118.0		37.42		
H.28	118.0		37.43		
H.6	108.0		41.82		
H.8	108.0		41.83		
H.5	108.0		41.84		
T.61	108.0		41.86		
T.72	118.0		37.54		
T.84	128.0		33.21		
H.42	128.0		33.21		
T.85	128.0		33.21		
T.73	118.0		37.54		
T.66	108.0		41.88		
H.13	108.0		41.89		
H.4	108.0		41.86		
H.3	108.0		41.86		
H.1	108.0		41.87		
H.7	108.0		41.87		
H.12	108.0		41.87		
H.16	108.0		41.88		
H.19	108.0		41.88		
H.18	108.0		41.88		
H.17	108.0		41.88		
T.71	118.0		37.54		
H.20	118.0		37.54		
H.23	118.0		37.54		

Flow Summary - NFPA 2007

Uponor
Church - Two Head Calculation (H.50 & H.54)

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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>
H.30	118.0		37.54		
T.74	118.0		37.54		
H.26	118.0		37.54		
H.31	118.0		37.54		
H.36	118.0		37.54		
H.37	118.0		37.54		
H.34	118.0		37.54		
H.39	128.0		33.21		
H.46	128.0		33.21		
H.35	118.0		37.57		

Final Calculations - Hazen-Williams

Uponor
Church - Two Head Calculation (H.50 & H.54)

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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	*****
H.50 to T.92	17.54	0.86 150.0	1Utr 1Utb	2.0 6.0	14.000 8.000	17.520 0.0			K Factor = 4.30	
T.92 to T.90	17.54	0.1778		0.0	22.000	3.912			Vel = 9.69	
T.92 to T.90	0.36	0.86 150.0	1Utb 1Utr	6.0 2.0	11.000 8.000	21.432 0.0				
T.90 to T.81	17.9	0.1845		0.0	19.000	3.506			Vel = 9.89	
T.90 to T.81	-7.66	0.86 150.0	1Ucp	2.0 0.0	14.000 2.000	24.938 5.197				
T.81 to T.68	10.24	0.0657		0.0	16.000	1.051			Vel = 5.66	
T.81 to T.68	0.0	0.86 150.0	1Ucp	2.0 0.0	12.000 2.000	31.186 4.331				
T.68 to T.60	10.24	0.0656		0.0	14.000	0.919			Vel = 5.66	
T.68 to T.60	0.0	0.86 150.0	1Utb	6.0 0.0	10.000 6.000	36.436 4.331				
T.60 to H.2	10.24	0.0656		0.0	16.000	1.050			Vel = 5.66	
T.60 to H.2	-1.05	0.86 150.0	1Utr	2.0 0.0	22.000 2.000	41.817 0.0				
H.2 to H.10	9.19	0.0537		0.0	24.000	1.289			Vel = 5.08	
H.2 to H.10	0.0	0.86 150.0	1Utr	2.0 0.0	16.000 2.000	43.106 0.0				
H.10 to T.64	9.19	0.0537		0.0	18.000	0.967			Vel = 5.08	
H.10 to T.64	0.0	0.86 150.0	1Utr	2.0 0.0	2.000 2.000	44.073 0.0				
T.64 to T.65	9.19	0.0538		0.0	4.000	0.215			Vel = 5.08	
T.64 to T.65	9.39	0.86 150.0	1Utb	6.0 0.0	2.000 6.000	44.288 0.0				
T.65 to S.1	18.58	0.1978		0.0	8.000	1.582			Vel = 10.26	
T.65 to S.1	17.42	0.86 150.0	1T 1Utr	2.871 2.0	6.000 4.871	45.870 1.732				
S.1 to MTR	36.0	0.6722		0.0	10.871	7.308			Vel = 19.88	
S.1 to MTR	0.0	1.051 150.0	2E	6.101 0.0	1.000 6.101	54.910 4.732			* Fixed loss = 3	
MTR to STR	36.0	0.2531		0.0	7.101	1.797			Vel = 13.31	
MTR to STR	0.0	1.051 150.0	1E 1T	3.05 7.626	34.000 12.201	61.439 0.0				
STR	36.0	0.2531	1G	1.525	46.201	11.694			Vel = 13.31	
	0.0 36.00					73.133			K Factor = 4.21	
H.50 to H.54	0.46	0.86 150.0	1Utr	2.0 0.0	12.000 2.000	17.520 0.0				
H.54 to T.97	0.46	0.0002		0.0	14.000	0.003			Vel = 0.25	
H.54 to T.97	18.00	0.86 150.0	1Utb	6.0 0.0	14.000 6.000	17.523 0.0			K Factor = 4.30	
T.97 to T.99	18.46	0.1953		0.0	20.000	3.906			Vel = 10.20	
T.97 to T.99	-0.36	0.86 150.0	1Utb	6.0 0.0	12.000 6.000	21.429 0.0				
T.99 to T.88	18.1	0.1883		0.0	18.000	3.390			Vel = 10.00	
T.99 to T.88	-7.96	0.86 150.0	1Ucp 1Utr	2.0 2.0	14.000 4.000	24.819 5.197				
T.88	10.14	0.0645		0.0	18.000	1.161			Vel = 5.60	

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftg's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
T.88 to T.80	0.0 10.14	0.86 150.0 0.0644	1Ucp	2.0 0.0 0.0	12.000 2.000 14.000	31.177 4.331 0.902			Vel = 5.60	
T.80 to T.67	0.0 10.14	0.86 150.0 0.0645		0.0 0.0 0.0	36.000 0.0 36.000	36.410 4.331 2.321			Vel = 5.60	
T.67 to T.65	7.28 17.42	0.86 150.0 0.1755	1Utb 1Utr	6.0 2.0 0.0	8.000 8.000 16.000	43.062 0.0 2.808			Vel = 9.62	
	0.0 17.42					45.870			K Factor = 2.57	
T.97 to H.55	0.36 0.36	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	21.429 0.0 0.0			Vel = 0.20	
H.55 to H.51	0.0 0.36	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	21.429 0.0 0.002			Vel = 0.20	
H.51 to T.92	0.0 0.36	0.86 150.0 0.0003	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	21.431 0.0 0.001			Vel = 0.20	
	0.0 0.36					21.432			K Factor = 0.08	
T.99 to T100	7.96 7.96	0.86 150.0 0.0413	1Utr	2.0 0.0 0.0	13.000 2.000 15.000	24.819 0.0 0.619			Vel = 4.40	
T100 to H.58	-0.02 7.94	0.86 150.0 0.0410	1Utb	6.0 0.0 0.0	1.000 6.000 7.000	25.438 0.0 0.287			Vel = 4.39	
H.58 to T.98	0.0 7.94	0.86 150.0 0.0410	1Utr	2.0 0.0 0.0	7.000 2.000 9.000	25.725 0.0 0.369			Vel = 4.39	
T.98 to T.87	-0.13 7.81	0.86 150.0 0.0398	1Utb	6.0 0.0 0.0	21.000 6.000 27.000	26.094 5.197 1.074			Vel = 4.31	
T.87 to T.76	-0.21 7.6	0.86 150.0 0.0379	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	32.365 4.331 0.530			Vel = 4.20	
T.76 to T.62	-3.79 3.81	0.86 150.0 0.0105	1Utb 1Utr	6.0 2.0 0.0	27.000 8.000 35.000	37.226 4.331 0.369			Vel = 2.10	
T.62 to T.63	1.05 4.86	0.86 150.0 0.0168	1Utr	2.0 0.0 0.0	2.000 2.000 4.000	41.926 0.0 0.067			Vel = 2.68	
T.63 to H.9	4.53 9.39	0.86 150.0 0.0560	1Utr	2.0 0.0 0.0	3.000 2.000 5.000	41.993 0.0 0.280			Vel = 5.19	
H.9 to H.11	0.0 9.39	0.86 150.0 0.0559	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	42.273 0.0 0.727			Vel = 5.19	

Final Calculations - Hazen-Williams

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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	*****
H.11 to H.14	0.0 9.39	0.86 150.0 0.0560	1Utr 2.0 0.0 0.0	10.000 2.000 12.000	43.000 0.0 0.672		Vel = 5.19		
H.14 to H.15	0.0 9.39	0.86 150.0 0.0560	0.0 0.0 0.0	3.000 0.0 3.000	43.672 0.0 0.168		Vel = 5.19		
H.15 to T.64	0.0 9.39	0.86 150.0 0.0560	1Utr 2.0 0.0 0.0	6.000 2.000 8.000	43.840 0.0 0.448		Vel = 5.19		
	0.0 9.39				44.288		K Factor = 1.41		
T.90 to T.89	7.66 7.66	0.86 150.0 0.0385	1Utr 2.0 0.0 0.0	11.000 2.000 13.000	24.938 0.0 0.500		Vel = 4.23		
T.89 to H.48	0.03 7.69	0.86 150.0 0.0386	1Utr 2.0 1Utb 6.0 0.0	2.000 8.000 10.000	25.438 0.0 0.386		Vel = 4.25		
H.48 to T.91	0.0 7.69	0.86 150.0 0.0387	1Utr 2.0 0.0 0.0	5.000 2.000 7.000	25.824 0.0 0.271		Vel = 4.25		
T.91 to T.83	0.13 7.82	0.86 150.0 0.0399	1Utb 6.0 0.0 0.0	21.000 6.000 27.000	26.095 5.197 1.076		Vel = 4.32		
T.83 to T.70	0.20 8.02	0.86 150.0 0.0418	1Utr 2.0 0.0 0.0	12.000 2.000 14.000	32.368 4.331 0.585		Vel = 4.43		
T.70 to T.63	-3.49 4.53	0.86 150.0 0.0145	1Utb 6.0 1Utr 2.0 0.0	18.000 8.000 26.000	37.284 4.331 0.378		Vel = 2.50		
	0.0 4.53				41.993		K Factor = 0.70		
T100 to H.59	0.02 0.02	0.86 150.0 0.0	0.0 0.0 0.0	17.000 0.0 17.000	25.438 0.0 0.0		Vel = 0.01		
H.59 to H.57	0.0 0.02	0.86 150.0 0.0	1Utr 2.0 0.0 0.0	10.000 2.000 12.000	25.438 0.0 0.0		Vel = 0.01		
H.57 to T.96	0.0 0.02	0.86 150.0 0.0	1Utr 2.0 1Uel 6.0 0.0	9.000 8.000 17.000	25.438 0.0 0.0		Vel = 0.01		
T.96 to T.95	0.0 0.02	0.86 150.0 0.0	1Uel 6.0 0.0 0.0	1.000 6.000 7.000	25.438 0.0 0.0		Vel = 0.01		
T.95 to H.53	0.0 0.02	0.86 150.0 0.0	0.0 0.0 0.0	3.000 0.0 3.000	25.438 0.0 0.0		Vel = 0.01		
H.53 to H.49	0.0 0.02	0.86 150.0 0.0	1Utr 2.0 0.0 0.0	12.000 2.000 14.000	25.438 0.0 0.0		Vel = 0.01		

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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	*****
H.49 to T.89	0.0 0.02	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	18.000 2.000 20.000	25.438 0.0 0.0				Vel = 0.01
	0.0 0.02					25.438				K Factor = 0
T.98 to H.56	0.13 0.13	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	3.000 2.000 5.000	26.094 0.0 0.0				Vel = 0.07
H.56 to T.94	0.0 0.13	0.86 150.0 0.0	1Utr 1Uel	2.0 6.0 0.0	9.000 8.000 17.000	26.094 0.0 0.0				Vel = 0.07
T.94 to T.93	0.0 0.13	0.86 150.0 0.0	1Uel	6.0 0.0 0.0	1.000 6.000 7.000	26.094 0.0 0.0				Vel = 0.07
T.93 to H.52	0.0 0.13	0.86 150.0 0.0		0.0 0.0 0.0	3.000 0.0 3.000	26.094 0.0 0.0				Vel = 0.07
H.52 to T.91	0.0 0.13	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	8.000 2.000 10.000	26.094 0.0 0.001				Vel = 0.07
	0.0 0.13					26.095				K Factor = 0.03
T.87 to T.86	0.21 0.21	0.86 150.0 0.0001	2Utb	12.0 0.0 0.0	7.000 12.000 19.000	32.365 0.0 0.001				Vel = 0.12
T.86 to H.44	-0.08 0.13	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	32.366 0.0 0.0				Vel = 0.07
H.44 to H.41	0.0 0.13	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	32.366 0.0 0.001				Vel = 0.07
H.41 to T.82	0.0 0.13	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	4.000 2.000 6.000	32.367 0.0 0.0				Vel = 0.07
T.82 to T.83	0.08 0.21	0.86 150.0 0.0001	2Utb	12.0 0.0 0.0	7.000 12.000 19.000	32.367 0.0 0.001				Vel = 0.12
	0.0 0.21					32.368				K Factor = 0.04
T.86 to H.45	0.08 0.08	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	32.366 0.0 0.0				Vel = 0.04
H.45 to H.47	0.0 0.08	0.86 150.0 0.0		0.0 0.0 0.0	17.000 0.0 17.000	32.366 0.0 0.0				Vel = 0.04
H.47 to H.43	0.0 0.08	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	32.366 0.0 0.0				Vel = 0.04

Final Calculations - Hazen-Williams

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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	*****
H.43 to H.40	0.0 0.08	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	17.000 2.000 19.000	32.366 0.0 0.001			Vel = 0.04	
H.40 to H.38	0.0 0.08	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	13.000 2.000 15.000	32.367 0.0 0.0			Vel = 0.04	
H.38 to T.82	0.0 0.08	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	32.367 0.0 0.0			Vel = 0.04	
	0.0 0.08					32.367			K Factor = 0.01	
T.76 to T.77	3.79 3.79	0.86 150.0 0.0105	2Utb	12.0 0.0 0.0	9.000 12.000 21.000	37.226 0.0 0.220			Vel = 2.09	
T.77 to H.33	1.02 4.81	0.86 150.0 0.0160	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	37.446 0.0 0.048			Vel = 2.66	
H.33 to T.78	0.0 4.81	0.86 150.0 0.0162	1Utr	2.0 0.0 0.0	2.000 2.000 4.000	37.494 0.0 0.065			Vel = 2.66	
T.78 to T.79	-0.34 4.47	0.86 150.0 0.0140		0.0 0.0 0.0	1.000 0.0 1.000	37.559 0.0 0.014			Vel = 2.47	
T.79 to H.32	0.34 4.81	0.86 150.0 0.0162	1Utr	2.0 0.0 0.0	6.000 2.000 8.000	37.573 0.0 0.130			Vel = 2.66	
H.32 to T.75	0.0 4.81	0.86 150.0 0.0163	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	37.703 0.0 0.049			Vel = 2.66	
T.75 to T.67	2.47 7.28	0.86 150.0 0.0350	2Utb	12.0 0.0 0.0	16.000 12.000 28.000	37.752 4.331 0.979			Vel = 4.02	
	0.0 7.28					43.062			K Factor = 1.11	
T.70 to T.69	3.49 3.49	0.86 150.0 0.0090	2Utb	12.0 0.0 0.0	2.000 12.000 14.000	37.284 0.0 0.126			Vel = 1.93	
T.69 to H.22	-1.01 2.48	0.86 150.0 0.0047	1Utr	2.0 0.0 0.0	4.000 2.000 6.000	37.410 0.0 0.028			Vel = 1.37	
H.22 to H.25	0.0 2.48	0.86 150.0 0.0048		0.0 0.0 0.0	14.000 0.0 14.000	37.438 0.0 0.067			Vel = 1.37	
H.25 to H.24	0.0 2.48	0.86 150.0 0.0048	1Utr	2.0 0.0 0.0	6.000 2.000 8.000	37.505 0.0 0.038			Vel = 1.37	
H.24 to H.21	0.0 2.48	0.86 150.0 0.0047	1Utr	2.0 0.0 0.0	8.000 2.000 10.000	37.543 0.0 0.047			Vel = 1.37	

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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	*****
H.21 to H.29	0.0 2.48	0.86 150.0 0.0048	1Utr	2.0 0.0 0.0	16.000 2.000 18.000	37.590 0.0 0.086			Vel = 1.37	
H.29 to T.75	0.0 2.48	0.86 150.0 0.0048	1Utr	2.0 0.0 0.0	14.000 2.000 16.000	37.676 0.0 0.076			Vel = 1.37	
	0.0 2.48					37.752			K Factor = 0.40	
T.69 to H.27	1.02	0.86 150.0 0.0009	1Utr	2.0 0.0 0.0	8.000 2.000 10.000	37.410 0.0 0.009			Vel = 0.56	
H.27 to H.28	0.0 1.02	0.86 150.0 0.0009	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	37.419 0.0 0.012			Vel = 0.56	
H.28 to T.77	0.0 1.02	0.86 150.0 0.0009	1Utr	2.0 0.0 0.0	14.000 2.000 16.000	37.431 0.0 0.015			Vel = 0.56	
	0.0 1.02					37.446			K Factor = 0.17	
T.60 to H.6	1.05	0.86 150.0 0.0010	1Utr	2.0 0.0 0.0	3.000 2.000 5.000	41.817 0.0 0.005			Vel = 0.58	
H.6 to H.8	0.0 1.05	0.86 150.0 0.0010		0.0 0.0 0.0	7.000 0.0 7.000	41.822 0.0 0.007			Vel = 0.58	
H.8 to H.5	0.0 1.05	0.86 150.0 0.0009	1Utr	2.0 0.0 0.0	13.000 2.000 15.000	41.829 0.0 0.014			Vel = 0.58	
H.5 to T.61	0.0 1.05	0.86 150.0 0.0010	1Utr	2.0 0.0 0.0	14.000 2.000 16.000	41.843 0.0 0.016			Vel = 0.58	
T.61 to T.72	-0.44 0.61	0.86 150.0 0.0003	1Utr	2.0 0.0 0.0	27.000 2.000 29.000	41.859 -4.331 0.010			Vel = 0.34	
T.72 to T.84	-0.30 0.31	0.86 150.0 0.0001	1Utb	6.0 0.0 0.0	13.000 6.000 19.000	37.538 -4.331 0.002			Vel = 0.17	
T.84 to H.42	-0.11 0.2	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	6.000 2.000 8.000	33.209 0.0 0.001			Vel = 0.11	
H.42 to T.85	0.0 0.2	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	33.210 0.0 0.0			Vel = 0.11	
T.85 to T.73	0.11 0.31	0.86 150.0 0.0001	1Utb	6.0 0.0 0.0	14.000 6.000 20.000	33.210 4.331 0.002			Vel = 0.17	
T.73 to T.66	0.30 0.61	0.86 150.0 0.0004	1Utb 1Utr	6.0 2.0 0.0	21.000 8.000 29.000	37.543 4.331 0.011			Vel = 0.34	

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Church - Two Head Calculation (H.50 & H.54)

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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	*****
T.66 to H.13	0.44 1.05	0.86 150.0 0.0009	1Utr	2.0 0.0 0.0	6.000 2.000 8.000	41.885 0.0 0.007			Vel = 0.58	
H.13 to T.62	0.0 1.05	0.86 150.0 0.0010	1Utr	2.0 0.0 0.0	33.000 2.000 35.000	41.892 0.0 0.034			Vel = 0.58	
	0.0 1.05					41.926			K Factor = 0.16	
T.61 to H.4	0.44 0.44	0.86 150.0 0.0002	1Utb	6.0 0.0 0.0	2.000 6.000 8.000	41.859 0.0 0.002			Vel = 0.24	
H.4 to H.3	0.0 0.44	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	13.000 2.000 15.000	41.861 0.0 0.002			Vel = 0.24	
H.3 to H.1	0.0 0.44	0.86 150.0 0.0002	1Utr	2.0 0.0 0.0	10.000 2.000 12.000	41.863 0.0 0.003			Vel = 0.24	
H.1 to H.7	0.0 0.44	0.86 150.0 0.0002	1Utr	2.0 0.0 0.0	17.000 2.000 19.000	41.866 0.0 0.003			Vel = 0.24	
H.7 to H.12	0.0 0.44	0.86 150.0 0.0002	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	41.869 0.0 0.003			Vel = 0.24	
H.12 to H.16	0.0 0.44	0.86 150.0 0.0002	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	41.872 0.0 0.003			Vel = 0.24	
H.16 to H.19	0.0 0.44	0.86 150.0 0.0002	1Utr	2.0 0.0 0.0	14.000 2.000 16.000	41.875 0.0 0.003			Vel = 0.24	
H.19 to H.18	0.0 0.44	0.86 150.0 0.0001		0.0 0.0 0.0	7.000 0.0 7.000	41.878 0.0 0.001			Vel = 0.24	
H.18 to H.17	0.0 0.44	0.86 150.0 0.0002	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	41.879 0.0 0.003			Vel = 0.24	
H.17 to T.66	0.0 0.44	0.86 150.0 0.0002	1Utr	2.0 0.0 0.0	10.000 2.000 12.000	41.882 0.0 0.003			Vel = 0.24	
	0.0 0.44					41.885			K Factor = 0.07	
T.72 to T.71	0.30 0.3	0.86 150.0 0.0002	2Utb	12.0 0.0 0.0	1.000 12.000 13.000	37.538 0.0 0.002			Vel = 0.17	
T.71 to H.20	-0.14 0.16	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	19.000 2.000 21.000	37.540 0.0 0.0			Vel = 0.09	
H.20 to H.23	0.0 0.16	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	37.540 0.0 0.001			Vel = 0.09	

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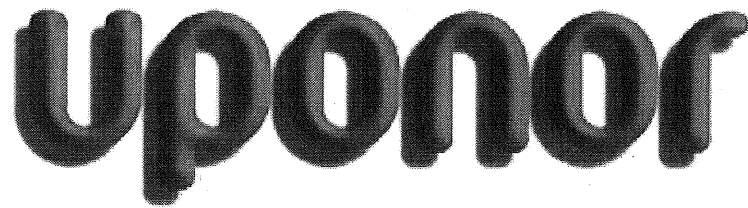
Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
H.23 to H.30	0.0 0.16	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	37.541 0.0 0.0			Vel = 0.09	
H.30 to T.74	0.0 0.16	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	37.541 0.0 0.001			Vel = 0.09	
T.74 to T.73	0.14 0.3	0.86 150.0 0.0001	2Utb	12.0 0.0 0.0	4.000 12.000 16.000	37.542 0.0 0.001			Vel = 0.17	
	0.0 0.30					37.543			K Factor = 0.05	
T.71 to H.26	0.14 0.14	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	7.000 2.000 9.000	37.540 0.0 0.0			Vel = 0.08	
H.26 to H.31	0.0 0.14	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	37.540 0.0 0.0			Vel = 0.08	
H.31 to H.36	0.0 0.14	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	17.000 2.000 19.000	37.540 0.0 0.001			Vel = 0.08	
H.36 to H.37	0.0 0.14	0.86 150.0 0.0		0.0 0.0 0.0	10.000 0.0 10.000	37.541 0.0 0.0			Vel = 0.08	
H.37 to H.34	0.0 0.14	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	37.541 0.0 0.0			Vel = 0.08	
H.34 to T.74	0.0 0.14	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	9.000 2.000 11.000	37.541 0.0 0.001			Vel = 0.08	
	0.0 0.14					37.542			K Factor = 0.02	
T.84 to H.39	0.11 0.11	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	33.209 0.0 0.001			Vel = 0.06	
H.39 to H.46	0.0 0.11	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	26.000 2.000 28.000	33.210 0.0 0.0			Vel = 0.06	
H.46 to T.85	0.0 0.11	0.86 150.0 0.0		0.0 0.0 0.0	9.000 0.0 9.000	33.210 0.0 0.0			Vel = 0.06	
	0.0 0.11					33.210			K Factor = 0.02	
T.78 to H.35	0.34 0.34	0.67 150.0 0.0004	1Utr 1Utb	2.0 6.0 0.0	11.000 8.000 19.000	37.559 0.0 0.008			Vel = 0.31	
H.35 to T.79	0.0 0.34	0.67 150.0 0.0004	1Utb	6.0 0.0 0.0	10.000 6.000 16.000	37.567 0.0 0.006			Vel = 0.31	

Final Calculations - Hazen-Williams

Uponor
Church - Two Head Calculation (H.50 & H.54)

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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	*****
	0.0 0.34								
					37.573			K Factor =	0.06



AquaSAFE™ FIRE SAFETY SYSTEM

Uponor
5925 148th Street West

Apple Valley, MN 55124
800-321-4739

Job Name : Church - Multi Head Calculation (H.53 , H.49 & H.48)
Drawing : RESIDENTIAL
Location : 305 COMMERCIAL STREET PORTLAND ME
Remote Area : 1
Contract : 120322-41
Data File : 120322-41 Church.wx4

HYDRAULIC DESIGN INFORMATION SHEET

Name - Church Date - 4/1/2012
Location - PORTLAND ME
Building - RESIDENTIAL System No. - 1
Contractor - ADG BUILDERS Contract No. - 120322-411
Calculated By - DAN HUBBARD SET Drawing No. - F100
Construction: (X) Combustible () Non-Combustible Ceiling Height VARIES
OCCUPANCY - RESIDENTIAL

S Type of Calculation: ()NFPA 13 Residential ()NFPA 13R (X)NFPA 13D
Y Number of Sprinklers Flowing: ()1 ()2 ()4 ()
S ()Other
T ()Specific Ruling Made by Date

E
M Listed Flow at Start Point - 13 Gpm System Type
Listed Pres. at Start Point - 9.14 Psi (X) Wet () Dry
D MAXIMUM LISTED SPACING 16 x 16 () Deluge () PreAction
E Domestic Flow Added - 0 Gpm Sprinkler or Nozzle
S Additional Flow Added - Gpm Make RELIABLE Model RFC43
I Elevation at Highest Outlet - 140 Feet Size 3/8 K-Factor 4.3
G Note: Temperature Rating 155
N

Calculation Gpm Required 40.8421 Psi Required 68.24 At Ref Pt STR
Summary C-Factor Used: Overhead 150 Underground 150

W Water Flow Test: Pump Data: Tank or Reservoir:
A Date of Test - x Rated Cap. Cap.
T Time of Test - x @ Psi Elev.
E Static (Psi) - 92 Elev.
R Residual (Psi) - 87 Other Well
Flow (Gpm) - 300 Proof Flow Gpm
S Elevation - 100

P Location: x
P
L Source of Information: x
Y

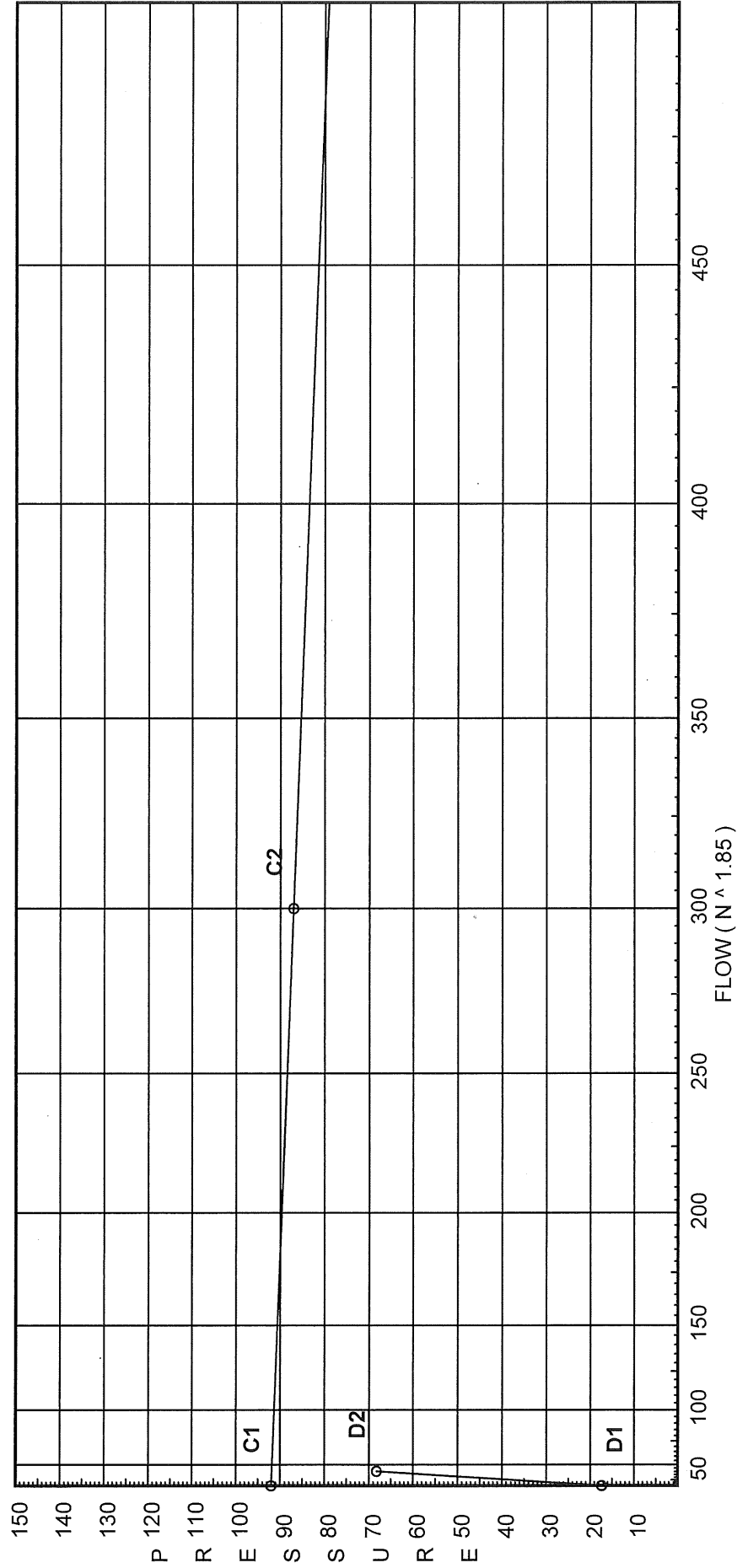
Water Supply Curve (C)

Uponsor
Church - Multi Head Calculation (H.53 , H.49 & H.48)

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City Water Supply:
C1 - Static Pressure : 92
C2 - Residual Pressure: 87
C2 - Residual Flow : 300

Demand:
D1 - Elevation : 17.324
D2 - System Flow : 40.8421
D2 - System Pressure : 68.240
Hose (Adj City) : _____
Hose (Demand) : _____
D3 - System Demand : 40.8421
Safety Margin : 23.634



Fittings Used Summary

Uponsor Church - Multi Head Calculation (H.53 , H.49 & H.48)

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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
E 90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
G Generic Gate Valve	1	1	1	1	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Ucp Aquapex Coupling	1	2	2	1.63	2.88	1.63	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uel Aquapex 90 Elbow	3	5	6	9.8	12.06	12.28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utb Aquapex Tee - Branch	2	6	6	9.08	12.88	13.22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utr Aquapex Tee - Run	1	2	2	1.64	2.39	2.39	0	0	0	0	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

Flow Summary - NFPA 2007

Uponor
Church - Multi Head Calculation (H.53 , H.49 & H.48)

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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>
STR	92.0	87	300.0	91.875	40.84	68.24

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.53	140.0	4.3	9.14	13.0	
T.95	140.0		9.36		
T.96	140.0		9.89		
H.57	140.0		11.17		
H.59	140.0		12.07		
T100	140.0		13.35		
T.99	140.0		13.79		
T.88	128.0		20.15		
T.80	118.0		25.39		
T.67	108.0		32.06		
T.65	108.0		35.51		
S.1	104.0		46.47		
MTR	100.0		53.47		
STR	100.0		68.24		
H.49	140.0	4.3	9.18	13.03	
T.89	140.0		11.85		
T.90	140.0		13.36		
T.81	128.0		19.64		
T.68	118.0		24.92		
T.60	108.0		30.33		
H.2	108.0		31.96		
H.10	108.0		33.18		
T.64	108.0		33.46		
H.48	140.0	4.3	11.86	14.81	
T.91	140.0		12.9		
T.83	128.0		20.17		
T.70	118.0		25.45		
T.63	108.0		30.4		
H.9	108.0		30.78		
H.11	108.0		31.74		
H.14	108.0		32.64		
H.15	108.0		32.86		
H.52	140.0		13.06		
T.93	140.0		13.1		
T.94	140.0		13.22		
H.56	140.0		13.48		
T.98	140.0		13.56		
T.87	128.0		20.19		
T.76	118.0		25.38		
T.62	108.0		30.33		
H.58	140.0		13.44		
T.92	140.0		13.54		

Flow Summary - NFPA 2007

Uponsor
Church - Multi Head Calculation (H.53 , H.49 & H.48)

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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>
H.50	140.0		13.57		
H.54	140.0		13.59		
T.97	140.0		13.62		
H.51	140.0		13.55		
H.55	140.0		13.61		
T.82	128.0		20.18		
H.41	128.0		20.18		
H.44	128.0		20.18		
T.86	128.0		20.18		
H.38	128.0		20.18		
H.40	128.0		20.18		
H.43	128.0		20.18		
H.47	128.0		20.18		
H.45	128.0		20.18		
T.77	118.0		25.72		
H.33	118.0		25.79		
T.78	118.0		25.89		
T.79	118.0		25.91		
H.32	118.0		26.12		
T.75	118.0		26.19		
T.69	118.0		25.66		
H.22	118.0		25.7		
H.25	118.0		25.8		
H.24	118.0		25.86		
H.21	118.0		25.94		
H.29	118.0		26.07		
H.27	118.0		25.67		
H.28	118.0		25.69		
H.35	118.0		25.9		
H.13	108.0		30.33		
T.66	108.0		30.33		
H.17	108.0		30.33		
H.18	108.0		30.33		
H.19	108.0		30.33		
H.16	108.0		30.33		
H.12	108.0		30.33		
H.7	108.0		30.33		
H.1	108.0		30.33		
H.3	108.0		30.33		
H.4	108.0		30.33		
T.61	108.0		30.33		
H.5	108.0		30.33		
H.8	108.0		30.33		
H.6	108.0		30.33		
T.72	118.0		26.0		
T.71	118.0		26.0		
H.20	118.0		26.0		
H.23	118.0		26.0		
H.30	118.0		26.0		
T.74	118.0		26.0		
T.73	118.0		26.0		

Flow Summary - NFPA 2007

Uponor
Church - Multi Head Calculation (H.53 , H.49 & H.48)

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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>
H.26	118.0		26.0		
H.31	118.0		26.0		
H.36	118.0		26.0		
H.37	118.0		26.0		
H.34	118.0		26.0		
T.84	128.0		21.67		
H.39	128.0		21.67		
H.46	128.0		21.67		
T.85	128.0		21.67		
H.42	128.0		21.67		

Final Calculations - Hazen-Williams

Uponor
Church - Multi Head Calculation (H.53 , H.49 & H.48)

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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	*****
H.53 to T.95	11.01	0.86 150.0		0.0 0.0	3.000 0.0	9.140 0.0		K Factor = 4.30	
T.95 to T.96	11.01	0.0750 150.0	1Uel	6.0 0.0	1.000 6.000	9.365 0.0		Vel = 6.08	
T.96 to H.57	0.0	0.86 150.0	1Utr 1Uel	2.0 6.0	9.000 8.000	9.891 0.0		Vel = 6.08	
H.57 to H.59	11.01	0.0751 150.0		0.0 0.0	17.000 2.000	1.277 0.0		Vel = 6.08	
H.59 to T100	0.0	0.86 150.0	1Utr	2.0 0.0	10.000 0.0	11.168 0.0		Vel = 6.08	
T100 to T.99	11.01	0.0751 150.0		0.0 0.0	17.000 2.000	1.277 0.0		Vel = 6.08	
T.99 to T.88	-4.38	0.86 150.0	1Utr	2.0 0.0	13.000 2.000	13.346 0.0		Vel = 3.66	
T.88 to T.80	6.63	0.0293 150.0	1Ucp 1Utr	2.0 2.0	14.000 4.000	13.786 5.197		Vel = 5.62	
T.80 to T.67	10.18	0.0649 150.0	1Ucp	2.0 0.0	12.000 2.000	20.152 4.331		Vel = 5.62	
T.67 to T.65	0.0	0.86 150.0		0.0 0.0	36.000 0.0	25.392 4.331		Vel = 5.62	
T.65 to S.1	10.18	0.0649 150.0	1Utb 1Utr	6.0 2.0	8.000 8.000	32.059 0.0		Vel = 10.75	
S.1 to MTR	19.46	0.2154 150.0	1T 1Utr	2.871 2.0	6.000 4.871	35.506 1.732		Vel = 22.56	
MTR to STR	40.84	0.8491 150.0	2E 1T	6.101 7.626	1.000 12.201	46.469 0.0		* Fixed loss = 3 Vel = 15.10	
STR	0.0	0.3197 150.0	1E 1G	3.05 1.525	34.000 46.201	53.471 14.769		Vel = 15.10	
	40.84					68.240		K Factor = 4.94	
H.53 to H.49	1.99	0.86 150.0	1Utr	2.0 0.0	12.000 2.000	9.140 0.0		Vel = 1.10	
H.49 to T.89	1.99	0.0031 150.0		0.0 0.0	14.000 2.000	0.044 0.0		K Factor = 4.30	
T.89 to T.90	13.03	0.86 150.0	1Utr	2.0 0.0	18.000 2.000	9.184 0.0		Vel = 8.30	
T.90	15.02	0.1335 150.0		0.0 0.0	20.000 2.000	2.669 0.0		Vel = 7.70	

Final Calculations - Hazen-Williams

Uponor
Church - Multi Head Calculation (H.53 , H.49 & H.48)

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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	*****
T.90 to T.81	-3.54 10.4	0.86 150.0 0.0676	1Ucp	2.0 0.0 0.0	14.000 2.000 16.000	13.365 5.197 1.082			Vel = 5.74	
T.81 to T.68	0.0 10.4	0.86 150.0 0.0676	1Ucp	2.0 0.0 0.0	12.000 2.000 14.000	19.644 4.331 0.946			Vel = 5.74	
T.68 to T.60	0.0 10.4	0.86 150.0 0.0676	1Utb	6.0 0.0 0.0	10.000 6.000 16.000	24.921 4.331 1.081			Vel = 5.74	
T.60 to H.2	0.02 10.42	0.86 150.0 0.0679	1Utr	2.0 0.0 0.0	22.000 2.000 24.000	30.333 0.0 1.629			Vel = 5.76	
H.2 to H.10	0.0 10.42	0.86 150.0 0.0679	1Utr	2.0 0.0 0.0	16.000 2.000 18.000	31.962 0.0 1.222			Vel = 5.76	
H.10 to T.64	0.0 10.42	0.86 150.0 0.0678	1Utr	2.0 0.0 0.0	2.000 2.000 4.000	33.184 0.0 0.271			Vel = 5.76	
T.64 to T.65	10.96 21.38	0.86 150.0 0.2564	1Utb	6.0 0.0 0.0	2.000 6.000 8.000	33.455 0.0 2.051			Vel = 11.81	
	0.0 21.38					35.506			K Factor = 3.59	
T.89 to H.48	1.08 1.08	0.86 150.0 0.0010	1Utr 1Utb	2.0 6.0 0.0	2.000 8.000 10.000	11.853 0.0 0.010			Vel = 0.60	
H.48 to T.91	14.81 15.89	0.86 150.0 0.1481	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	11.863 0.0 1.037			K Factor = 4.30 Vel = 8.78	
T.91 to T.83	-4.75 11.14	0.86 150.0 0.0768	1Utb	6.0 0.0 0.0	21.000 6.000 27.000	12.900 5.197 2.073			Vel = 6.15	
T.83 to T.70	-0.71 10.43	0.86 150.0 0.0680	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	20.170 4.331 0.952			Vel = 5.76	
T.70 to T.63	-4.51 5.92	0.86 150.0 0.0238	1Utb 1Utr	6.0 2.0 0.0	18.000 8.000 26.000	25.453 4.331 0.620			Vel = 3.27	
T.63 to H.9	5.04 10.96	0.86 150.0 0.0744	1Utr	2.0 0.0 0.0	3.000 2.000 5.000	30.404 0.0 0.372			Vel = 6.05	
H.9 to H.11	0.0 10.96	0.86 150.0 0.0744	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	30.776 0.0 0.967			Vel = 6.05	
H.11 to H.14	0.0 10.96	0.86 150.0 0.0745	1Utr	2.0 0.0 0.0	10.000 2.000 12.000	31.743 0.0 0.894			Vel = 6.05	
H.14 to H.15	0.0 10.96	0.86 150.0 0.0743		0.0 0.0 0.0	3.000 0.0 3.000	32.637 0.0 0.223			Vel = 6.05	

Final Calculations - Hazen-Williams

Uponor
Church - Multi Head Calculation (H.53 , H.49 & H.48)

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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	*****
H.15 to T.64	0.0 10.96	0.86 150.0 0.0744	1Utr	2.0 0.0 0.0	6.000 2.000 8.000	32.860 0.0 0.595				Vel = 6.05
	0.0 10.96						33.455			K Factor = 1.89
T.91 to H.52	4.74 4.74	0.86 150.0 0.0158	1Utr	2.0 0.0 0.0	8.000 2.000 10.000	12.900 0.0 0.158				Vel = 2.62
H.52 to T.93	0.0 4.74	0.86 150.0 0.0157		0.0 0.0 0.0	3.000 0.0 3.000	13.058 0.0 0.047				Vel = 2.62
T.93 to T.94	0.0 4.74	0.86 150.0 0.0159	1Uel	6.0 0.0 0.0	1.000 6.000 7.000	13.105 0.0 0.111				Vel = 2.62
T.94 to H.56	0.0 4.74	0.86 150.0 0.0158	1Utr 1Uel	2.0 6.0 0.0	9.000 8.000 17.000	13.216 0.0 0.269				Vel = 2.62
H.56 to T.98	0.0 4.74	0.86 150.0 0.0158	1Utr	2.0 0.0 0.0	3.000 2.000 5.000	13.485 0.0 0.079				Vel = 2.62
T.98 to T.87	4.38 9.12	0.86 150.0 0.0531	1Utb	6.0 0.0 0.0	21.000 6.000 27.000	13.564 5.197 1.433				Vel = 5.04
T.87 to T.76	0.72 9.84	0.86 150.0 0.0609	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	20.194 4.331 0.853				Vel = 5.43
T.76 to T.62	-4.78 5.06	0.86 150.0 0.0178	1Utb 1Utr	6.0 2.0 0.0	27.000 8.000 35.000	25.378 4.331 0.624				Vel = 2.79
T.62 to T.63	-0.02 5.04	0.86 150.0 0.0177	1Utr	2.0 0.0 0.0	2.000 2.000 4.000	30.333 0.0 0.071				Vel = 2.78
	0.0 5.04						30.404			K Factor = 0.91
T100 to H.58	4.38 4.38	0.86 150.0 0.0136	1Utb	6.0 0.0 0.0	1.000 6.000 7.000	13.346 0.0 0.095				Vel = 2.42
H.58 to T.98	0.0 4.38	0.86 150.0 0.0137	1Utr	2.0 0.0 0.0	7.000 2.000 9.000	13.441 0.0 0.123				Vel = 2.42
	0.0 4.38						13.564			K Factor = 1.19
T.90 to T.92	3.54 3.54	0.86 150.0 0.0092	1Utb 1Utr	6.0 2.0 0.0	11.000 8.000 19.000	13.365 0.0 0.175				Vel = 1.96
T.92 to H.50	-2.25 1.29	0.86 150.0 0.0015	1Utr 1Utb	2.0 6.0 0.0	14.000 8.000 22.000	13.540 0.0 0.032				Vel = 0.71

Final Calculations - Hazen-Williams

Uponor
Church - Multi Head Calculation (H.53 , H.49 & H.48)

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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	*****
H.50 to H.54	0.0 1.29	0.86 150.0 0.0014	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	13.572 0.0 0.020			Vel = 0.71	
H.54 to T.97	0.0 1.29	0.86 150.0 0.0014	1Utb	6.0 0.0 0.0	14.000 6.000 20.000	13.592 0.0 0.028			Vel = 0.71	
T.97 to T.99	2.25 3.54	0.86 150.0 0.0092	1Utb	6.0 0.0 0.0	12.000 6.000 18.000	13.620 0.0 0.166			Vel = 1.96	
	0.0 3.54									K Factor = 0.95
T.92 to H.51	2.25 2.25	0.86 150.0 0.0040	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	13.540 0.0 0.012			Vel = 1.24	
H.51 to H.55	0.0 2.25	0.86 150.0 0.0040	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	13.552 0.0 0.056			Vel = 1.24	
H.55 to T.97	0.0 2.25	0.86 150.0 0.0040	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	13.608 0.0 0.012			Vel = 1.24	
	0.0 2.25									K Factor = 0.61
T.83 to T.82	0.71 0.71	0.86 150.0 0.0005	2Utb	12.0 0.0 0.0	7.000 12.000 19.000	20.170 0.0 0.009			Vel = 0.39	
T.82 to H.41	-0.25 0.46	0.86 150.0 0.0002	1Utr	2.0 0.0 0.0	4.000 2.000 6.000	20.179 0.0 0.001			Vel = 0.25	
H.41 to H.44	0.0 0.46	0.86 150.0 0.0002	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	20.180 0.0 0.003			Vel = 0.25	
H.44 to T.86	0.0 0.46	0.86 150.0 0.0003	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	20.183 0.0 0.002			Vel = 0.25	
T.86 to T.87	0.25 0.71	0.86 150.0 0.0005	2Utb	12.0 0.0 0.0	7.000 12.000 19.000	20.185 0.0 0.009			Vel = 0.39	
	0.0 0.71									K Factor = 0.16
T.82 to H.38	0.26 0.26	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	20.179 0.0 0.001			Vel = 0.14	
H.38 to H.40	0.0 0.26	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	13.000 2.000 15.000	20.180 0.0 0.001			Vel = 0.14	
H.40 to H.43	0.0 0.26	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	17.000 2.000 19.000	20.181 0.0 0.001			Vel = 0.14	

Final Calculations - Hazen-Williams

Uponor
Church - Multi Head Calculation (H.53 , H.49 & H.48)

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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	*****
H.43 to H.47	0.0 0.26	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	20.182 0.0 0.001			Vel = 0.14	
H.47 to H.45	0.0 0.26	0.86 150.0 0.0001		0.0 0.0 0.0	17.000 0.0 17.000	20.183 0.0 0.002			Vel = 0.14	
H.45 to T.86	0.0 0.26	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	20.185 0.0 0.0			Vel = 0.14	
	0.0 0.26					20.185			K Factor = 0.06	
T.76 to T.77	4.78 4.78	0.86 150.0 0.0160	2Utb	12.0 0.0 0.0	9.000 12.000 21.000	25.378 0.0 0.337			Vel = 2.64	
T.77 to H.33	1.34 6.12	0.86 150.0 0.0253	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	25.715 0.0 0.076			Vel = 3.38	
H.33 to T.78	0.0 6.12	0.86 150.0 0.0253	1Utr	2.0 0.0 0.0	2.000 2.000 4.000	25.791 0.0 0.101			Vel = 3.38	
T.78 to T.79	-0.43 5.69	0.86 150.0 0.0220		0.0 0.0 0.0	1.000 0.0 1.000	25.892 0.0 0.022			Vel = 3.14	
T.79 to H.32	0.43 6.12	0.86 150.0 0.0254	1Utr	2.0 0.0 0.0	6.000 2.000 8.000	25.914 0.0 0.203			Vel = 3.38	
H.32 to T.75	0.0 6.12	0.86 150.0 0.0253	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	26.117 0.0 0.076			Vel = 3.38	
T.75 to T.67	3.17 9.29	0.86 150.0 0.0548	2Utb	12.0 0.0 0.0	16.000 12.000 28.000	26.193 4.331 1.535			Vel = 5.13	
	0.0 9.29					32.059			K Factor = 1.64	
T.70 to T.69	4.51 4.51	0.86 150.0 0.0144	2Utb	12.0 0.0 0.0	2.000 12.000 14.000	25.453 0.0 0.202			Vel = 2.49	
T.69 to H.22	-1.35 3.16	0.86 150.0 0.0075	1Utr	2.0 0.0 0.0	4.000 2.000 6.000	25.655 0.0 0.045			Vel = 1.75	
H.22 to H.25	0.0 3.16	0.86 150.0 0.0074		0.0 0.0 0.0	14.000 0.0 14.000	25.700 0.0 0.104			Vel = 1.75	
H.25 to H.24	0.0 3.16	0.86 150.0 0.0075	1Utr	2.0 0.0 0.0	6.000 2.000 8.000	25.804 0.0 0.060			Vel = 1.75	
H.24 to H.21	0.0 3.16	0.86 150.0 0.0075	1Utr	2.0 0.0 0.0	8.000 2.000 10.000	25.864 0.0 0.075			Vel = 1.75	

Final Calculations - Hazen-Williams

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Church - Multi Head Calculation (H.53 , H.49 & H.48)

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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	*****
H.21 to H.29	0.0 3.16	0.86 150.0 0.0075	1Utr	2.0 0.0 0.0	16.000 2.000 18.000	25.939 0.0 0.135			Vel = 1.75	
H.29 to T.75	0.0 3.16	0.86 150.0 0.0074	1Utr	2.0 0.0 0.0	14.000 2.000 16.000	26.074 0.0 0.119			Vel = 1.75	
	0.0 3.16					26.193			K Factor = 0.62	
T.69 to H.27	1.35 1.35	0.86 150.0 0.0015	1Utr	2.0 0.0 0.0	8.000 2.000 10.000	25.655 0.0 0.015			Vel = 0.75	
H.27 to H.28	0.0 1.35	0.86 150.0 0.0015	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	25.670 0.0 0.020			Vel = 0.75	
H.28 to T.77	0.0 1.35	0.86 150.0 0.0016	1Utr	2.0 0.0 0.0	14.000 2.000 16.000	25.690 0.0 0.025			Vel = 0.75	
	0.0 1.35					25.715			K Factor = 0.27	
T.78 to H.35	0.43 0.43	0.67 150.0 0.0006	1Utr 1Utb	2.0 6.0 0.0	11.000 8.000 19.000	25.892 0.0 0.012			Vel = 0.39	
H.35 to T.79	0.0 0.43	0.67 150.0 0.0006	1Utb	6.0 0.0 0.0	10.000 6.000 16.000	25.904 0.0 0.010			Vel = 0.39	
	0.0 0.43					25.914			K Factor = 0.08	
T.62 to H.13	0.02 0.02	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	33.000 2.000 35.000	30.333 0.0 0.0			Vel = 0.01	
H.13 to T.66	0.0 0.02	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	6.000 2.000 8.000	30.333 0.0 0.0			Vel = 0.01	
T.66 to H.17	-0.01 0.01	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	10.000 2.000 12.000	30.333 0.0 0.0			Vel = 0.01	
H.17 to H.18	0.0 0.01	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	30.333 0.0 0.0			Vel = 0.01	
H.18 to H.19	0.0 0.01	0.86 150.0 0.0		0.0 0.0 0.0	7.000 0.0 7.000	30.333 0.0 0.0			Vel = 0.01	
H.19 to H.16	0.0 0.01	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	14.000 2.000 16.000	30.333 0.0 0.0			Vel = 0.01	
H.16 to H.12	0.0 0.01	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	30.333 0.0 0.0			Vel = 0.01	

Final Calculations - Hazen-Williams

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Church - Multi Head Calculation (H.53 , H.49 & H.48)

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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	*****
H.12 to H.7	0.0 0.01	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	30.333 0.0 0.0				Vel = 0.01
H.7 to H.1	0.0 0.01	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	17.000 2.000 19.000	30.333 0.0 0.0				Vel = 0.01
H.1 to H.3	0.0 0.01	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	10.000 2.000 12.000	30.333 0.0 0.0				Vel = 0.01
H.3 to H.4	0.0 0.01	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	13.000 2.000 15.000	30.333 0.0 0.0				Vel = 0.01
H.4 to T.61	0.0 0.01	0.86 150.0 0.0	1Utb	6.0 0.0 0.0	2.000 6.000 8.000	30.333 0.0 0.0				Vel = 0.01
T.61 to H.5	0.01 0.02	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	14.000 2.000 16.000	30.333 0.0 0.0				Vel = 0.01
H.5 to H.8	0.0 0.02	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	13.000 2.000 15.000	30.333 0.0 0.0				Vel = 0.01
H.8 to H.6	0.0 0.02	0.86 150.0 0.0		0.0 0.0 0.0	7.000 0.0 7.000	30.333 0.0 0.0				Vel = 0.01
H.6 to T.60	0.0 0.02	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	3.000 2.000 5.000	30.333 0.0 0.0				Vel = 0.01
	0.0 0.02					30.333				K Factor = 0
T.61 to T.72	-0.01 -0.01	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	27.000 2.000 29.000	30.333 -4.331 0.0				Vel = 0.01
T.72 to T.71	0.0 -0.01	0.86 150.0 0.0	2Utb	12.0 0.0 0.0	1.000 12.000 13.000	26.002 0.0 0.0				Vel = 0.01
T.71 to H.20	0.01 0.0	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	19.000 2.000 21.000	26.002 0.0 0.0				Vel = 0
H.20 to H.23	0.0 0.0	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	26.002 0.0 0.0				Vel = 0
H.23 to H.30	0.0 0.0	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	26.002 0.0 0.0				Vel = 0
H.30 to T.74	0.0 0.0	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	26.002 0.0 0.0				Vel = 0
T.74 to T.73	-0.01 -0.01	0.86 150.0 0.0	2Utb	12.0 0.0 0.0	4.000 12.000 16.000	26.002 0.0 0.0				Vel = 0.01

Final Calculations - Hazen-Williams

Uponor
Church - Multi Head Calculation (H.53 , H.49 & H.48)

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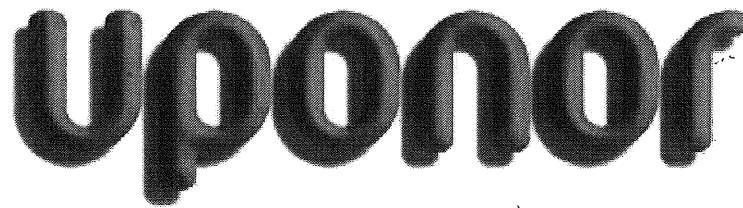
Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
T.73 to T.66	0.0 -0.01	0.86 150.0 0.0	1Utb 1Utr	6.0 2.0 0.0	21.000 8.000 29.000	26.002 4.331 0.0				Vel = 0.01
	0.0 -0.01					30.333				K Factor = 0
T.71 to H.26	0.0 0.0	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	7.000 2.000 9.000	26.002 0.0 0.0				Vel = 0
H.26 to H.31	0.0 0.0	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	26.002 0.0 0.0				Vel = 0
H.31 to H.36	0.0 0.0	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	17.000 2.000 19.000	26.002 0.0 0.0				Vel = 0
H.36 to H.37	0.0 0.0	0.86 150.0 0.0		0.0 0.0 0.0	10.000 0.0 10.000	26.002 0.0 0.0				Vel = 0
H.37 to H.34	0.0 0.0	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	26.002 0.0 0.0				Vel = 0
H.34 to T.74	0.0 0.0	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	9.000 2.000 11.000	26.002 0.0 0.0				Vel = 0
	0.0 0.0					26.002				K Factor = 0
T.72 to T.84	-0.01 -0.01	0.86 150.0 0.0	1Utb	6.0 0.0 0.0	13.000 6.000 19.000	26.002 -4.331 0.0				Vel = 0.01
T.84 to H.39	0.01 0.0	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	21.671 0.0 0.0				Vel = 0
H.39 to H.46	0.0 0.0	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	26.000 2.000 28.000	21.671 0.0 0.0				Vel = 0
H.46 to T.85	0.0 0.0	0.86 150.0 0.0		0.0 0.0 0.0	9.000 0.0 9.000	21.671 0.0 0.0				Vel = 0
T.85 to H.42	0.0 0.0	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	21.671 0.0 0.0				Vel = 0
H.42 to T.84	0.0 0.0	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	6.000 2.000 8.000	21.671 0.0 0.0				Vel = 0
	0.0 0.0					21.671				K Factor = 0
T.73 to T.85	0.01 0.01	0.86 150.0 0.0	1Utb	6.0 0.0 0.0	14.000 6.000 20.000	26.002 -4.331 0.0				Vel = 0.01

Final Calculations - Hazen-Williams

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Church - Multi Head Calculation (H.53 , H.49 & H.48)

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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	*****
	0.0 0.01				21.671			K Factor = 0	



AquaSAFE™ FIRE SAFETY SYSTEM

Uponor
5925 148th Street West

Apple Valley, MN 55124
800-321-4739

Job Name : Church - One Head Calculation (H.50)
Drawing : RESIDENTIAL
Location : 305 COMMERCIAL STREET PORTLAND ME
Remote Area : 1
Contract : 120322-41
Data File : 120322-41 Church.wx1

HYDRAULIC DESIGN INFORMATION SHEET

Name - Church Date - 4/1/2012
Location - PORTLAND ME
Building - RESIDENTIAL System No. - 1
Contractor - ADG BUILDERS Contract No. - 120322-411
Calculated By - DAN HUBBARD SET Drawing No. - F100
Construction: (X) Combustible () Non-Combustible Ceiling Height VARIES
OCCUPANCY - RESIDENTIAL

S Type of Calculation: ()NFPA 13 Residential ()NFPA 13R (X)NFPA 13D
Y Number of Sprinklers Flowing: (X)1 ()2 ()4 ()
S ()Other
T ()Specific Ruling Made by Date
E
M Listed Flow at Start Point - 18 Gpm System Type
Listed Pres. at Start Point - 17.52Psi (X) Wet () Dry
D MAXIMUM LISTED SPACING 16 x 16 () Deluge () PreAction
E Domestic Flow Added - 0 Gpm Sprinkler or Nozzle
S Additional Flow Added - Gpm Make RELIABLE Model RFC43-S2
I Elevation at Highest Outlet - 140 Feet Size 3/8 K-Factor 4.3
G Note: Temperature Rating 155
N

Calculation Gpm Required 18 Psi Required 47.95 At Ref Pt STR
Summary C-Factor Used: Overhead 150 Underground 150

W Water Flow Test: Pump Data: Tank or Reservoir:
A Date of Test - x Rated Cap. Cap.
T Time of Test - x @ Psi Elev.
E Static (Psi) - 92 Elev.
R Residual (Psi) - 87 Other Well
Flow (Gpm) - 300 Proof Flow Gpm
S Elevation - 100

P Location: x
P
L Source of Information: x
Y

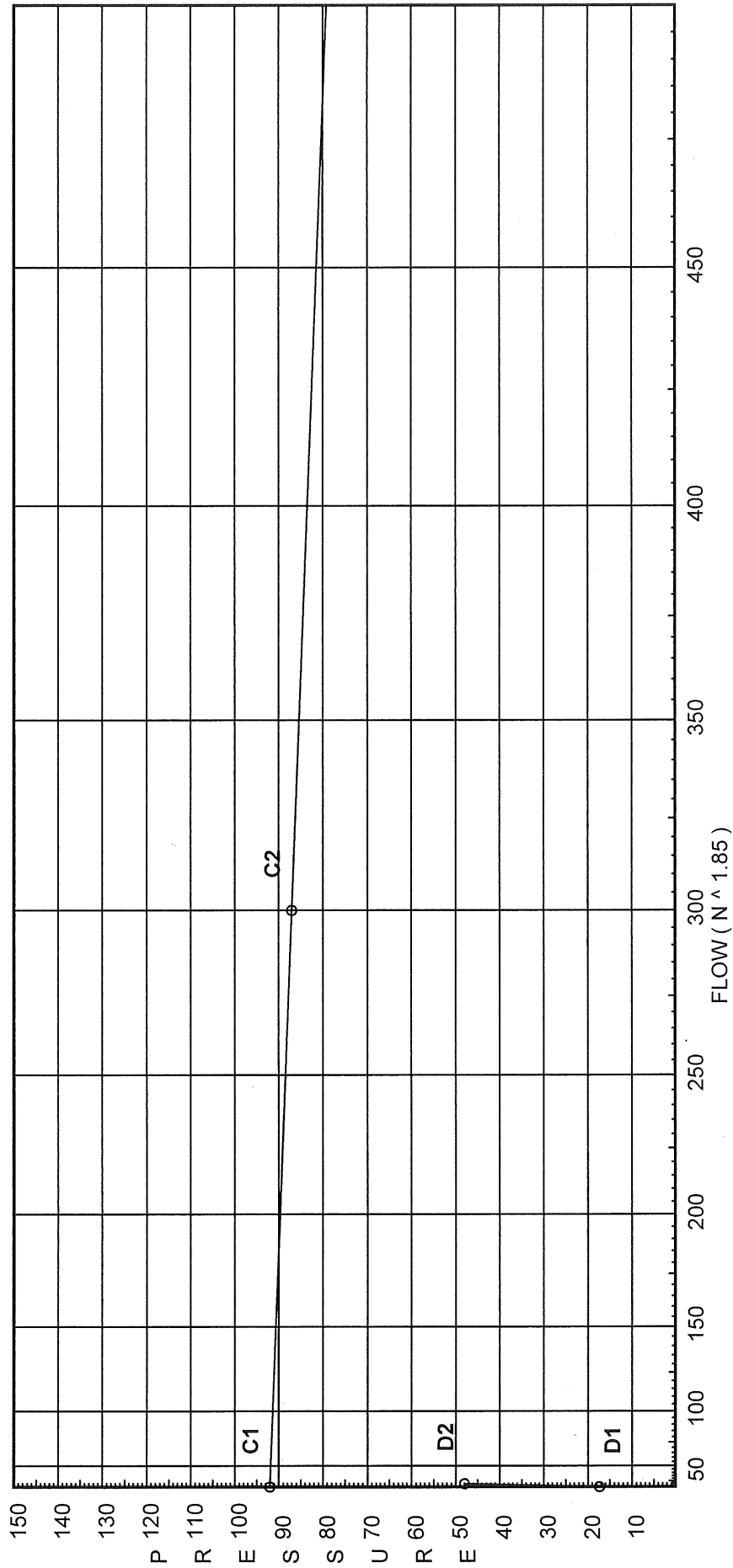
Water Supply Curve (C)

Uponor
Church - One Head Calculation (H.50)

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City Water Supply:
C1 - Static Pressure : 92
C2 - Residual Pressure: 87
C2 - Residual Flow : 300

Demand:
D1 - Elevation : 17.324
D2 - System Flow : 17.9985
D2 - System Pressure : 47.945
Hose (Adj City) : _____
Hose (Demand) : _____
D3 - System Demand : 17.9985
Safety Margin : 44.027



Fittings Used Summary

Uponor Church - One Head Calculation (H.50)

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
E 90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
G Generic Gate Valve	1	1	1	1	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Ucp Aquapex Coupling	1	2	2	1.63	2.88	1.63	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uel Aquapex 90 Elbow	3	5	6	9.8	12.06	12.28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utb Aquapex Tee - Branch	2	6	6	9.08	12.88	13.22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utr Aquapex Tee - Run	1	2	2	1.64	2.39	2.39	0	0	0	0	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

Flow Summary - NFPA 2007

Uponor
Church - One Head Calculation (H.50)

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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>
STR	92.0	87	300.0	91.973	18.0	47.945

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.50	140.0	4.3	17.52	18.0	
T.92	140.0		18.91		
T.90	140.0		19.89		
T.81	128.0		25.38		
T.68	118.0		29.96		
T.60	108.0		34.59		
H.2	108.0		34.94		
H.10	108.0		35.21		
T.64	108.0		35.27		
T.65	108.0		35.71		
S.1	104.0		39.47		
MTR	100.0		44.7		
STR	100.0		47.94		
H.54	140.0		18.1		
T.97	140.0		18.93		
T.99	140.0		19.86		
T.88	128.0		25.38		
T.80	118.0		29.96		
T.67	108.0		34.93		
H.51	140.0		18.91		
H.55	140.0		18.92		
T100	140.0		20.03		
H.58	140.0		20.11		
T.98	140.0		20.21		
T.87	128.0		25.71		
T.76	118.0		30.18		
T.62	108.0		34.62		
T.63	108.0		34.64		
H.9	108.0		34.71		
H.11	108.0		34.92		
H.14	108.0		35.1		
H.15	108.0		35.15		
T.89	140.0		20.03		
H.48	140.0		20.14		
T.91	140.0		20.21		
T.83	128.0		25.71		
T.70	118.0		30.2		
H.49	140.0		20.03		
H.53	140.0		20.03		
T.95	140.0		20.03		
T.96	140.0		20.03		
H.57	140.0		20.03		

NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
H.59	140.0		20.03		
H.56	140.0		20.21		
T.94	140.0		20.21		
T.93	140.0		20.21		
H.52	140.0		20.21		
T.86	128.0		25.71		
H.44	128.0		25.71		
H.41	128.0		25.71		
T.82	128.0		25.71		
H.45	128.0		25.71		
H.47	128.0		25.71		
H.43	128.0		25.71		
H.40	128.0		25.71		
H.38	128.0		25.71		
T.77	118.0		30.24		
H.33	118.0		30.26		
T.78	118.0		30.28		
T.79	118.0		30.28		
H.32	118.0		30.32		
T.75	118.0		30.33		
T.69	118.0		30.24		
H.22	118.0		30.24		
H.25	118.0		30.26		
H.24	118.0		30.27		
H.21	118.0		30.28		
H.29	118.0		30.31		
H.27	118.0		30.24		
H.28	118.0		30.24		
H.6	108.0		34.59		
H.8	108.0		34.59		
H.5	108.0		34.59		
T.61	108.0		34.6		
T.72	118.0		30.27		
T.84	128.0		25.94		
H.39	128.0		25.94		
H.46	128.0		25.94		
T.85	128.0		25.94		
T.73	118.0		30.27		
T.66	108.0		34.61		
H.13	108.0		34.61		
H.4	108.0		34.6		
H.3	108.0		34.6		
H.1	108.0		34.6		
H.7	108.0		34.6		
H.12	108.0		34.6		
H.16	108.0		34.6		
H.19	108.0		34.6		
H.18	108.0		34.6		
H.17	108.0		34.6		
T.71	118.0		30.27		
H.20	118.0		30.27		

Flow Summary - NFPA 2007

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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>
H.23	118.0		30.27		
H.30	118.0		30.27		
T.74	118.0		30.27		
H.26	118.0		30.27		
H.31	118.0		30.27		
H.36	118.0		30.27		
H.37	118.0		30.27		
H.34	118.0		30.27		
H.42	128.0		25.94		
H.35	118.0		30.28		

Final Calculations - Hazen-Williams

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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	*****
H.50 to T.92	10.02	0.86 150.0	1Utr 2.0 1Utb 6.0	14.000 8.000	17.520 0.0			K Factor = 4.30	
T.92 to T.90	10.02	0.0631 150.0	1Utb 6.0 1Utr 2.0	22.000 8.000	1.388 0.0			Vel = 5.53	
T.90 to T.81	-1.03	0.86 150.0	1Utb 6.0 1Utr 2.0	11.000 8.000	18.908 0.0			Vel = 4.97	
T.81 to T.68	8.99	0.0516 150.0	1Ucp 2.0 0.0	14.000 2.000	19.888 5.197			Vel = 2.83	
T.68 to T.60	-3.87	0.86 150.0	1Ucp 2.0 0.0	12.000 2.000	25.378 4.331			Vel = 2.83	
T.60 to H.2	5.12	0.0182 150.0	1Utb 6.0 0.0	10.000 6.000	29.964 4.331			Vel = 2.83	
H.2 to H.10	0.0	0.86 150.0	1Utr 2.0 0.0	16.000 2.000	34.945 0.0			Vel = 2.54	
H.10 to T.64	4.59	0.0149 150.0	1Utr 2.0 0.0	24.000 2.000	0.358 0.0			Vel = 2.54	
T.64 to T.65	0.0	0.86 150.0	1Utr 2.0 0.0	2.000 2.000	35.213 0.0			Vel = 2.54	
T.65 to S.1	4.59	0.0150 150.0	1Utb 6.0 0.0	4.000 6.000	0.060 0.0			Vel = 5.13	
S.1 to MTR	4.70	0.86 150.0	1Utb 6.0 0.0	2.000 6.000	35.273 0.0			Vel = 9.94	
MTR to STR	9.29	0.0549 150.0	1T 2.871 1Utr 2.0	6.000 4.871	35.712 1.732			Vel = 6.66	* Fixed loss = 3
STR	18.0	0.1865 150.0	0.0	10.871	2.027			Vel = 6.66	
	0.0	1.051 150.0	2E 6.101 0.0	1.000 6.101	39.471 4.732				
	18.0	0.0703 150.0	0.0	7.101	0.499				
	0.0	1.051 150.0	1E 3.05 1T 7.626	34.000 12.201	44.702 0.0				
	18.0	0.0702 150.0	1G 1.525 0.0	46.201	3.243				
	0.0	0.86 150.0	1Utr 2.0 0.0	12.000 2.000	17.520 0.0			K Factor = 2.60	
H.50 to H.54	7.98	0.86 150.0	1Utr 2.0 0.0	12.000 2.000	17.520 0.0			Vel = 4.41	
H.54 to T.97	7.98	0.0414 150.0	0.0	14.000	0.579			Vel = 4.41	
T.97 to T.99	0.0	0.86 150.0	1Utb 6.0 0.0	14.000 6.000	18.099 0.0			Vel = 4.41	
T.99 to T.88	7.98	0.0414 150.0	0.0	20.000	0.828			Vel = 4.98	
	1.03	0.86 150.0	1Utb 6.0 0.0	12.000 6.000	18.927 0.0			Vel = 4.98	
	9.01	0.0518 150.0	0.0	18.000	0.933			Vel = 2.79	
	-3.95	0.86 150.0	1Ucp 2.0 1Utr 2.0	14.000 4.000	19.860 5.197				
	5.06	0.0179 150.0	0.0	18.000	0.322				

Final Calculations - Hazen-Williams

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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	*****
T.88 to T.80	0.0 5.06	0.86 150.0 0.0179	1Ucp	2.0 0.0 0.0	12.000 2.000 14.000	25.379 4.331 0.250			Vel = 2.79	
T.80 to T.67	0.0 5.06	0.86 150.0 0.0178		0.0 0.0 0.0	36.000 0.0 36.000	29.960 4.331 0.642			Vel = 2.79	
T.67 to T.65	3.65 8.71	0.86 150.0 0.0487	1Utb 1Utr	6.0 2.0 0.0	8.000 8.000 16.000	34.933 0.0 0.779			Vel = 4.81	
	0.0 8.71					35.712			K Factor = 1.46	
T.92 to H.51	1.03 1.03	0.86 150.0 0.0010	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	18.908 0.0 0.003			Vel = 0.57	
H.51 to H.55	0.0 1.03	0.86 150.0 0.0009	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	18.911 0.0 0.013			Vel = 0.57	
H.55 to T.97	0.0 1.03	0.86 150.0 0.0010	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	18.924 0.0 0.003			Vel = 0.57	
	0.0 1.03					18.927			K Factor = 0.24	
T.99 to T100	3.95 3.95	0.86 150.0 0.0113	1Utr	2.0 0.0 0.0	13.000 2.000 15.000	19.860 0.0 0.169			Vel = 2.18	
T100 to H.58	0.02 3.97	0.86 150.0 0.0114	1Utb	6.0 0.0 0.0	1.000 6.000 7.000	20.029 0.0 0.080			Vel = 2.19	
H.58 to T.98	0.0 3.97	0.86 150.0 0.0113	1Utr	2.0 0.0 0.0	7.000 2.000 9.000	20.109 0.0 0.102			Vel = 2.19	
T.98 to T.87	-0.07 3.9	0.86 150.0 0.0110	1Utb	6.0 0.0 0.0	21.000 6.000 27.000	20.211 5.197 0.298			Vel = 2.15	
T.87 to T.76	-0.10 3.8	0.86 150.0 0.0105	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	25.706 4.331 0.147			Vel = 2.10	
T.76 to T.62	-1.90 1.9	0.86 150.0 0.0029	1Utb 1Utr	6.0 2.0 0.0	27.000 8.000 35.000	30.184 4.331 0.103			Vel = 1.05	
T.62 to T.63	0.53 2.43	0.86 150.0 0.0045	1Utr	2.0 0.0 0.0	2.000 2.000 4.000	34.618 0.0 0.018			Vel = 1.34	
T.63 to H.9	2.27 4.7	0.86 150.0 0.0156	1Utr	2.0 0.0 0.0	3.000 2.000 5.000	34.636 0.0 0.078			Vel = 2.60	
H.9 to H.11	0.0 4.7	0.86 150.0 0.0155	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	34.714 0.0 0.201			Vel = 2.60	

Final Calculations - Hazen-Williams

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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	*****
H.11 to H.14	0.0 4.7	0.86 150.0 0.0156	1Utr	2.0 0.0	10.000 2.000	34.915 0.0				
				0.0	12.000	0.187		Vel =	2.60	
H.14 to H.15	0.0 4.7	0.86 150.0 0.0153		0.0 0.0	3.000 0.0	35.102 0.0				
				0.0	3.000	0.046		Vel =	2.60	
H.15 to T.64	0.0 4.7	0.86 150.0 0.0156	1Utr	2.0 0.0	6.000 2.000	35.148 0.0				
				0.0	8.000	0.125		Vel =	2.60	
	0.0 4.70					35.273		K Factor =	0.79	
T.90 to T.89	3.86 3.86	0.86 150.0 0.0108	1Utr	2.0 0.0	11.000 2.000	19.888 0.0				
				0.0	13.000	0.141		Vel =	2.13	
T.89 to H.48	-0.02 3.84	0.86 150.0 0.0107	1Utr 1Utb	2.0 6.0	2.000 8.000	20.029 0.0				
				0.0	10.000	0.107		Vel =	2.12	
H.48 to T.91	0.0 3.84	0.86 150.0 0.0107	1Utr	2.0 0.0	5.000 2.000	20.136 0.0				
				0.0	7.000	0.075		Vel =	2.12	
T.91 to T.83	0.07 3.91	0.86 150.0 0.0111	1Utb	6.0 0.0	21.000 6.000	20.211 5.197				
				0.0	27.000	0.299		Vel =	2.16	
T.83 to T.70	0.10 4.01	0.86 150.0 0.0116	1Utr	2.0 0.0	12.000 2.000	25.707 4.331				
				0.0	14.000	0.162		Vel =	2.21	
T.70 to T.63	-1.75 2.26	0.86 150.0 0.0040	1Utb 1Utr	6.0 2.0	18.000 8.000	30.200 4.331				
				0.0	26.000	0.105		Vel =	1.25	
	0.0 2.26					34.636		K Factor =	0.38	
T.89 to H.49	0.02 0.02	0.86 150.0 0.0	1Utr	2.0 0.0	18.000 2.000	20.029 0.0				
				0.0	20.000	0.0		Vel =	0.01	
H.49 to H.53	0.0 0.02	0.86 150.0 0.0	1Utr	2.0 0.0	12.000 2.000	20.029 0.0				
				0.0	14.000	0.0		Vel =	0.01	
H.53 to T.95	0.0 0.02	0.86 150.0 0.0		0.0 0.0	3.000 0.0	20.029 0.0				
				0.0	3.000	0.0		Vel =	0.01	
T.95 to T.96	0.0 0.02	0.86 150.0 0.0	1Uel	6.0 0.0	1.000 6.000	20.029 0.0				
				0.0	7.000	0.0		Vel =	0.01	
T.96 to H.57	0.0 0.02	0.86 150.0 0.0	1Utr 1Uel	2.0 6.0	9.000 8.000	20.029 0.0				
				0.0	17.000	0.0		Vel =	0.01	
H.57 to H.59	0.0 0.02	0.86 150.0 0.0	1Utr	2.0 0.0	10.000 2.000	20.029 0.0				
				0.0	12.000	0.0		Vel =	0.01	

Final Calculations - Hazen-Williams

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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	*****
H.59 to T100	0.0 0.02	0.86 150.0 0.0		0.0 0.0 0.0	17.000 0.0 17.000	20.029 0.0 0.0			Vel = 0.01	
	0.0 0.02					20.029			K Factor = 0	
T.98 to H.56	0.06 0.06	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	3.000 2.000 5.000	20.211 0.0 0.0			Vel = 0.03	
H.56 to T.94	0.0 0.06	0.86 150.0 0.0	1Utr 1Uel	2.0 6.0 0.0	9.000 8.000 17.000	20.211 0.0 0.0			Vel = 0.03	
T.94 to T.93	0.0 0.06	0.86 150.0 0.0	1Uel	6.0 0.0 0.0	1.000 6.000 7.000	20.211 0.0 0.0			Vel = 0.03	
T.93 to H.52	0.0 0.06	0.86 150.0 0.0		0.0 0.0 0.0	3.000 0.0 3.000	20.211 0.0 0.0			Vel = 0.03	
H.52 to T.91	0.0 0.06	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	8.000 2.000 10.000	20.211 0.0 0.0			Vel = 0.03	
	0.0 0.06					20.211			K Factor = 0.01	
T.87 to T.86	0.10 0.1	0.86 150.0 0.0	2Utb	12.0 0.0 0.0	7.000 12.000 19.000	25.706 0.0 0.0			Vel = 0.06	
T.86 to H.44	-0.03 0.07	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	25.706 0.0 0.0			Vel = 0.04	
H.44 to H.41	0.0 0.07	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	25.706 0.0 0.001			Vel = 0.04	
H.41 to T.82	0.0 0.07	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	4.000 2.000 6.000	25.707 0.0 0.0			Vel = 0.04	
T.82 to T.83	0.03 0.1	0.86 150.0 0.0	2Utb	12.0 0.0 0.0	7.000 12.000 19.000	25.707 0.0 0.0			Vel = 0.06	
	0.0 0.10					25.707			K Factor = 0.02	
T.86 to H.45	0.04 0.04	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	25.706 0.0 0.0			Vel = 0.02	
H.45 to H.47	0.0 0.04	0.86 150.0 0.0		0.0 0.0 0.0	17.000 0.0 17.000	25.706 0.0 0.0			Vel = 0.02	
H.47 to H.43	0.0 0.04	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	25.706 0.0 0.0			Vel = 0.02	

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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	*****
H.43 to H.40	0.0 0.04	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	17.000 2.000 19.000	25.706 0.0 0.001			Vel = 0.02	
H.40 to H.38	0.0 0.04	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	13.000 2.000 15.000	25.707 0.0 0.0			Vel = 0.02	
H.38 to T.82	0.0 0.04	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	25.707 0.0 0.0			Vel = 0.02	
	0.0 0.04					25.707			K Factor = 0.01	
T.76 to T.77	1.90 1.9	0.86 150.0 0.0029	2Utb	12.0 0.0 0.0	9.000 12.000 21.000	30.184 0.0 0.061			Vel = 1.05	
T.77 to H.33	0.51 2.41	0.86 150.0 0.0047	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	30.245 0.0 0.014			Vel = 1.33	
H.33 to T.78	0.0 2.41	0.86 150.0 0.0045	1Utr	2.0 0.0 0.0	2.000 2.000 4.000	30.259 0.0 0.018			Vel = 1.33	
T.78 to T.79	-0.17 2.24	0.86 150.0 0.0040		0.0 0.0 0.0	1.000 0.0 1.000	30.277 0.0 0.004			Vel = 1.24	
T.79 to H.32	0.17 2.41	0.86 150.0 0.0045	1Utr	2.0 0.0 0.0	6.000 2.000 8.000	30.281 0.0 0.036			Vel = 1.33	
H.32 to T.75	0.0 2.41	0.86 150.0 0.0043	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	30.317 0.0 0.013			Vel = 1.33	
T.75 to T.67	1.23 3.64	0.86 150.0 0.0097	2Utb	12.0 0.0 0.0	16.000 12.000 28.000	30.330 4.331 0.272			Vel = 2.01	
	0.0 3.64					34.933			K Factor = 0.62	
T.70 to T.69	1.75 1.75	0.86 150.0 0.0025	2Utb	12.0 0.0 0.0	2.000 12.000 14.000	30.200 0.0 0.035			Vel = 0.97	
T.69 to H.22	-0.51 1.24	0.86 150.0 0.0013	1Utr	2.0 0.0 0.0	4.000 2.000 6.000	30.235 0.0 0.008			Vel = 0.68	
H.22 to H.25	0.0 1.24	0.86 150.0 0.0014		0.0 0.0 0.0	14.000 0.0 14.000	30.243 0.0 0.019			Vel = 0.68	
H.25 to H.24	0.0 1.24	0.86 150.0 0.0012	1Utr	2.0 0.0 0.0	6.000 2.000 8.000	30.262 0.0 0.010			Vel = 0.68	
H.24 to H.21	0.0 1.24	0.86 150.0 0.0013	1Utr	2.0 0.0 0.0	8.000 2.000 10.000	30.272 0.0 0.013			Vel = 0.68	

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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	*****
H.21 to H.29	0.0 1.24	0.86 150.0 0.0013	1Utr	2.0 0.0 0.0	16.000 2.000 18.000	30.285 0.0 0.024		Vel = 0.68	
H.29 to T.75	0.0 1.24	0.86 150.0 0.0013	1Utr	2.0 0.0 0.0	14.000 2.000 16.000	30.309 0.0 0.021		Vel = 0.68	
	0.0 1.24					30.330		K Factor = 0.23	
T.69 to H.27	0.51 0.51	0.86 150.0 0.0003	1Utr	2.0 0.0 0.0	8.000 2.000 10.000	30.235 0.0 0.003		Vel = 0.28	
H.27 to H.28	0.0 0.51	0.86 150.0 0.0002	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	30.238 0.0 0.003		Vel = 0.28	
H.28 to T.77	0.0 0.51	0.86 150.0 0.0002	1Utr	2.0 0.0 0.0	14.000 2.000 16.000	30.241 0.0 0.004		Vel = 0.28	
	0.0 0.51					30.245		K Factor = 0.09	
T.60 to H.6	0.53 0.53	0.86 150.0 0.0002	1Utr	2.0 0.0 0.0	3.000 2.000 5.000	34.587 0.0 0.001		Vel = 0.29	
H.6 to H.8	0.0 0.53	0.86 150.0 0.0003		0.0 0.0 0.0	7.000 0.0 7.000	34.588 0.0 0.002		Vel = 0.29	
H.8 to H.5	0.0 0.53	0.86 150.0 0.0003	1Utr	2.0 0.0 0.0	13.000 2.000 15.000	34.590 0.0 0.004		Vel = 0.29	
H.5 to T.61	0.0 0.53	0.86 150.0 0.0002	1Utr	2.0 0.0 0.0	14.000 2.000 16.000	34.594 0.0 0.004		Vel = 0.29	
T.61 to T.72	-0.22 0.31	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	27.000 2.000 29.000	34.598 -4.331 0.003		Vel = 0.17	
T.72 to T.84	-0.15 0.16	0.86 150.0 0.0001	1Utb	6.0 0.0 0.0	13.000 6.000 19.000	30.270 -4.331 0.001		Vel = 0.09	
T.84 to H.39	-0.11 0.05	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	25.940 0.0 0.0		Vel = 0.03	
H.39 to H.46	0.0 0.05	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	26.000 2.000 28.000	25.940 0.0 0.0		Vel = 0.03	
H.46 to T.85	0.0 0.05	0.86 150.0 0.0		0.0 0.0 0.0	9.000 0.0 9.000	25.940 0.0 0.0		Vel = 0.03	
T.85 to T.73	0.11 0.16	0.86 150.0 0.0	1Utb	6.0 0.0 0.0	14.000 6.000 20.000	25.940 4.331 0.001		Vel = 0.09	

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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	*****
T.73	0.15	0.86	1Utb	6.0	21.000	30.272			
to		150.0	1Utr	2.0	8.000	4.331			
T.66	0.31	0.0001		0.0	29.000	0.003	Vel =	0.17	
T.66	0.22	0.86	1Utr	2.0	6.000	34.606			
to		150.0		0.0	2.000	0.0			
H.13	0.53	0.0002		0.0	8.000	0.002	Vel =	0.29	
H.13	0.0	0.86	1Utr	2.0	33.000	34.608			
to		150.0		0.0	2.000	0.0			
T.62	0.53	0.0003		0.0	35.000	0.010	Vel =	0.29	
	0.0								
	0.53					34.618	K Factor =	0.09	
T.61	0.22	0.86	1Utb	6.0	2.000	34.598			
to		150.0		0.0	6.000	0.0			
H.4	0.22	0.0001		0.0	8.000	0.001	Vel =	0.12	
H.4	0.0	0.86	1Utr	2.0	13.000	34.599			
to		150.0		0.0	2.000	0.0			
H.3	0.22	0.0001		0.0	15.000	0.001	Vel =	0.12	
H.3	0.0	0.86	1Utr	2.0	10.000	34.600			
to		150.0		0.0	2.000	0.0			
H.1	0.22	0.0		0.0	12.000	0.0	Vel =	0.12	
H.1	0.0	0.86	1Utr	2.0	17.000	34.600			
to		150.0		0.0	2.000	0.0			
H.7	0.22	0.0001		0.0	19.000	0.002	Vel =	0.12	
H.7	0.0	0.86	1Utr	2.0	12.000	34.602			
to		150.0		0.0	2.000	0.0			
H.12	0.22	0.0		0.0	14.000	0.0	Vel =	0.12	
H.12	0.0	0.86	1Utr	2.0	11.000	34.602			
to		150.0		0.0	2.000	0.0			
H.16	0.22	0.0001		0.0	13.000	0.001	Vel =	0.12	
H.16	0.0	0.86	1Utr	2.0	14.000	34.603			
to		150.0		0.0	2.000	0.0			
H.19	0.22	0.0001		0.0	16.000	0.001	Vel =	0.12	
H.19	0.0	0.86		0.0	7.000	34.604			
to		150.0		0.0	0.0	0.0			
H.18	0.22	0.0		0.0	7.000	0.0	Vel =	0.12	
H.18	0.0	0.86	1Utr	2.0	15.000	34.604			
to		150.0		0.0	2.000	0.0			
H.17	0.22	0.0001		0.0	17.000	0.001	Vel =	0.12	
H.17	0.0	0.86	1Utr	2.0	10.000	34.605			
to		150.0		0.0	2.000	0.0			
T.66	0.22	0.0001		0.0	12.000	0.001	Vel =	0.12	
	0.0								
	0.22					34.606	K Factor =	0.04	
T.72	0.15	0.86	2Utb	12.0	1.000	30.270			
to		150.0		0.0	12.000	0.0			
T.71	0.15	0.0001		0.0	13.000	0.001	Vel =	0.08	
T.71	-0.07	0.86	1Utr	2.0	19.000	30.271			
to		150.0		0.0	2.000	0.0			
H.20	0.08	0.0		0.0	21.000	0.0	Vel =	0.04	

Final Calculations - Hazen-Williams

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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	*****
H.20 to H.23	0.0 0.08	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	30.271 0.0 0.0			Vel = 0.04	
H.23 to H.30	0.0 0.08	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	30.271 0.0 0.0			Vel = 0.04	
H.30 to T.74	0.0 0.08	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	30.271 0.0 0.0			Vel = 0.04	
T.74 to T.73	0.07 0.15	0.86 150.0 0.0001	2Utb	12.0 0.0 0.0	4.000 12.000 16.000	30.271 0.0 0.001			Vel = 0.08	
	0.0 0.15					30.272			K Factor = 0.03	
T.71 to H.26	0.07 0.07	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	7.000 2.000 9.000	30.271 0.0 0.0			Vel = 0.04	
H.26 to H.31	0.0 0.07	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	30.271 0.0 0.0			Vel = 0.04	
H.31 to H.36	0.0 0.07	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	17.000 2.000 19.000	30.271 0.0 0.0			Vel = 0.04	
H.36 to H.37	0.0 0.07	0.86 150.0 0.0		0.0 0.0 0.0	10.000 0.0 10.000	30.271 0.0 0.0			Vel = 0.04	
H.37 to H.34	0.0 0.07	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	30.271 0.0 0.0			Vel = 0.04	
H.34 to T.74	0.0 0.07	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	9.000 2.000 11.000	30.271 0.0 0.0			Vel = 0.04	
	0.0 0.07					30.271			K Factor = 0.01	
T.84 to H.42	0.10 0.1	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	6.000 2.000 8.000	25.940 0.0 0.0			Vel = 0.06	
H.42 to T.85	0.0 0.1	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	25.940 0.0 0.0			Vel = 0.06	
	0.0 0.10					25.940			K Factor = 0.02	
T.78 to H.35	0.17 0.17	0.67 150.0 0.0001	1Utr 1Utb	2.0 6.0 0.0	11.000 8.000 19.000	30.277 0.0 0.002			Vel = 0.15	
H.35 to T.79	0.0 0.17	0.67 150.0 0.0001	1Utb	6.0 0.0 0.0	10.000 6.000 16.000	30.279 0.0 0.002			Vel = 0.15	

Final Calculations - Hazen-Williams

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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	*****
	0.0 0.17								
					30.281			K Factor =	0.03