



## AquaSAFE™ FIRE SAFETY SYSTEM

Uponor  
5925 148th Street West

Apple Valley, MN 55124  
800-321-4739

Job Name : TOWLE RESIDENCE - One Head Calculation (H.6)  
Drawing : RESIDENTIAL  
Location : 1637 WASHINGTON AVE EXT PORTLAND ME 04103  
Remote Area : 1  
Contract : 20201F  
Data File : 20201F Towle Residence.wx1

HYDRAULIC DESIGN INFORMATION SHEET

Name - TOWLE RESIDENCE Date - 7/5/16  
Location - PORTLAND ME 04103  
Building - RESIDENTIAL System No. - 1  
Contractor - MARK NIGRO SERVICES Contract No. - 20201F  
Calculated By - PATRICK BROWN Drawing No. - F100  
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height 9  
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 - 17 Gpm System Type  
Listed Pres. at Start Point - 12 Psi (X) Wet ( ) Dry  
D MAXIMUM LISTED SPACING 18 x 18 ( ) Deluge ( ) PreAction  
E Domestic Flow Added - 0 Gpm Sprinkler or Nozzle  
S Additional Flow Added - Gpm Make LF SENJU SPRINKLER Model RC-RES  
I Elevation at Highest Outlet - 119 Feet Size 7/16 K-Factor 4.9  
G Note: Temperature Rating 162  
N

Calculation Gpm Required 17 Psi Required 40.42 At Ref Pt STR  
Summary C-Factor Used: Overhead 150 Underground 150

W Water Flow Test: Pump Data:  
A Date of Test - 6/28/16 Rated Cap.  
T Time of Test - NOON @ Psi  
E Static (Psi) - 76 Elev.  
R Residual (Psi) - 71 Other  
Flow (Gpm) - 300  
S Elevation - 100

P Location: STREET  
P  
L Source of Information: WATER AUTHORITY  
Y

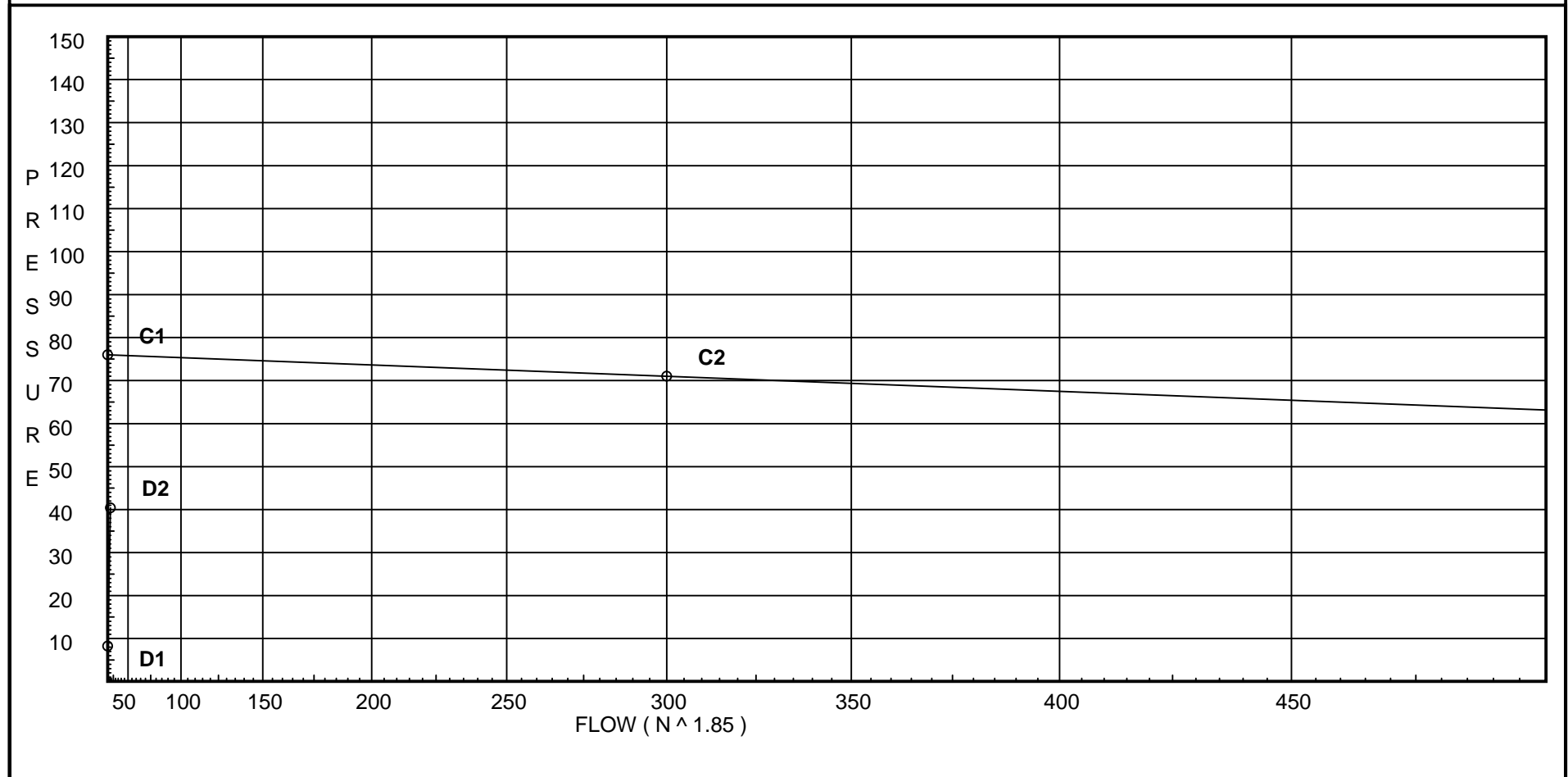
# Water Supply Curve C

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City Water Supply:  
C1 - Static Pressure : 76  
C2 - Residual Pressure: 71  
C2 - Residual Flow : 300

Demand:  
D1 - Elevation : 8.229  
D2 - System Flow : 16.974  
D2 - System Pressure : 40.416  
Hose ( Demand ) : \_\_\_\_\_  
D3 - System Demand : 16.974  
Safety Margin : 35.559



# Fittings Used Summary

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## Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
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
Utb *	Aquapex Tee - Branch	2	17	14	9	12	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utr *	Aquapex Tee - Run	1	2	2	4	2	1	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

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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	76.0	71	300.0	75.975	16.97	40.416

**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.6	119.0	4.9	12.0	16.97	
T.16	119.0		16.97		
T.26	109.0		21.99		
T.22	109.0		27.87		
S.1	104.0		31.84		
MTR	100.0		37.12		
STR	100.0		40.42		
T.17	119.0		12.25		
H.3	119.0		14.46		
T.13	119.0		17.66		
T.21	109.0		22.61		
H.9	109.0		27.09		
H.5	119.0		17.19		
T.15	119.0		17.31		
H.4	119.0		17.36		
T.14	119.0		17.63		
T.23	109.0		21.99		
H.7	109.0		22.28		
H.8	109.0		22.37		
T.19	109.0		22.45		
H.2	119.0		17.64		
H.1	119.0		17.64		
H.12	109.0		21.99		
H.11	109.0		21.99		
T.27	109.0		21.99		
T.25	109.0		21.99		
H.10	109.0		21.99		

# 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.6 to T.16	9.50 9.5	0.671 150.0 0.1913	Utb Utr	17.0 2.0 0.0	7.000 19.000 26.000	12.000 0.0 4.973			K Factor = 4.90 Vel = 8.62	
T.16 to T.26	-2.00 7.5	0.862 150.0 0.0365		0.0 0.0 0.0	18.719 0.0 18.719	16.973 4.331 0.683			Vel = 4.12	
T.26 to T.22	-0.12 7.38	0.671 150.0 0.1201	2Utb	34.0 0.0 0.0	15.000 34.000 49.000	21.987 0.0 5.883			Vel = 6.70	
T.22 to S.1	9.59 16.97	0.862 150.0 0.1654	T	7.528 0.0 0.0	8.000 2.904 10.904	27.870 2.166 1.803			Vel = 9.33	
S.1 to MTR	0.0 16.97	0.995 150.0 0.0823	2E	4.673 0.0 0.0	2.000 4.673 6.673	31.839 4.732 0.549			** Fixed Loss = 3 Vel = 7.00	
MTR to STR	0.0 16.97	0.911 150.0 0.1264	E T G	1.521 3.801 0.76	20.000 6.082 26.082	37.120 0.0 3.296			Vel = 8.35	
	0.0 16.97					40.416			K Factor = 2.67	
H.6 to T.17	7.48 7.48	0.671 150.0 0.1230		0.0 0.0 0.0	2.000 0.0 2.000	12.000 0.0 0.246			Vel = 6.79	
T.17 to H.3	0.0 7.48	0.671 150.0 0.1229	Utr	2.0 0.0 0.0	16.000 2.000 18.000	12.246 0.0 2.213			Vel = 6.79	
H.3 to T.13	0.0 7.48	0.671 150.0 0.1230	Utb Utr	17.0 2.0 0.0	7.000 19.000 26.000	14.459 0.0 3.197			Vel = 6.79	
T.13 to T.21	0.40 7.88	0.862 150.0 0.0400		0.0 0.0 0.0	15.538 0.0 15.538	17.656 4.331 0.622			Vel = 4.33	
T.21 to H.9	1.71 9.59	0.671 150.0 0.1948	Utb Utr	17.0 2.0 0.0	4.000 19.000 23.000	22.609 0.0 4.481			Vel = 8.70	
H.9 to T.22	0.0 9.59	0.671 150.0 0.1950	Utr	2.0 0.0 0.0	2.000 2.000 4.000	27.090 0.0 0.780			Vel = 8.70	
	0.0 9.59					27.870			K Factor = 1.82	
T.16 to H.5	2.00 2.0	0.671 150.0 0.0107	Utb	17.0 0.0 0.0	3.000 17.000 20.000	16.973 0.0 0.215			Vel = 1.81	
H.5 to T.15	0.0 2.0	0.671 150.0 0.0107	Utr	2.0 0.0 0.0	9.000 2.000 11.000	17.188 0.0 0.118			Vel = 1.81	
T.15 to H.4	0.0 2.0	0.671 150.0 0.0106	Utr	2.0 0.0 0.0	3.000 2.000 5.000	17.306 0.0 0.053			Vel = 1.81	

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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	*****
H.4 to T.14	0.0 2.0	0.671 150.0 0.0107	Utb Utr	17.0 2.0 0.0	6.000 19.000 25.000	17.359 0.0 0.268		Vel = 1.81	
T.14 to T.23	-0.40 1.6	0.862 150.0 0.0021		0.0 0.0 0.0	15.570 0.0 15.570	17.627 4.331 0.033		Vel = 0.88	
T.23 to H.7	0.11 1.71	0.671 150.0 0.0080	Utb	17.0 0.0 0.0	19.000 17.000 36.000	21.991 0.0 0.289		Vel = 1.55	
H.7 to H.8	0.0 1.71	0.671 150.0 0.0080	Utr	2.0 0.0 0.0	9.000 2.000 11.000	22.280 0.0 0.088		Vel = 1.55	
H.8 to T.19	0.0 1.71	0.671 150.0 0.0080	Utr	2.0 0.0 0.0	8.000 2.000 10.000	22.368 0.0 0.080		Vel = 1.55	
T.19 to T.21	0.0 1.71	0.671 150.0 0.0080	Utb	17.0 0.0 0.0	3.000 17.000 20.000	22.448 0.0 0.161		Vel = 1.55	
	0.0 1.71					22.609		K Factor = 0.36	
T.14 to H.2	0.40 0.4	0.671 150.0 0.0006	Utb Utr	17.0 0.0 0.0	8.000 17.000 25.000	17.627 0.0 0.014		Vel = 0.36	
H.2 to H.1	0.0 0.4	0.671 150.0 0.0005	Utr	2.0 0.0 0.0	4.000 2.000 6.000	17.641 0.0 0.003		Vel = 0.36	
H.1 to T.13	0.0 0.4	0.671 150.0 0.0006	Utb	17.0 0.0 0.0	4.000 17.000 21.000	17.644 0.0 0.012		Vel = 0.36	
	0.0 0.40					17.656		K Factor = 0.10	
T.26 to H.12	0.11 0.11	0.671 150.0 0.0	Utb Utr	17.0 2.0 0.0	3.000 19.000 22.000	21.987 0.0 0.001		Vel = 0.10	
H.12 to H.11	0.0 0.11	0.671 150.0 0.0		0.0 0.0 0.0	9.000 0.0 9.000	21.988 0.0 0.0		Vel = 0.10	
H.11 to T.27	0.0 0.11	0.671 150.0 0.0002	Utr	2.0 0.0 0.0	2.000 2.000 4.000	21.988 0.0 0.001		Vel = 0.10	
T.27 to T.25	0.0 0.11	0.671 150.0 0.0	Utr	2.0 0.0 0.0	10.000 2.000 12.000	21.989 0.0 0.0		Vel = 0.10	
T.25 to H.10	0.0 0.11	0.671 150.0 0.0001	Utr	2.0 0.0 0.0	7.000 2.000 9.000	21.989 0.0 0.001		Vel = 0.10	
H.10 to T.23	0.0 0.11	0.671 150.0 0.0	Utb Utr	17.0 2.0 0.0	1.000 19.000 20.000	21.990 0.0 0.001		Vel = 0.10	

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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 0.11				21.991			K Factor = 0.02	