Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 10/17/16

AquaSAFE™ FIRE SAFETY SYSTEM

Uponor
5925 148th Street West

Apple Valley, MN 55124
800-321-4739

Job Name	:	TOWLE RESIDENCE - Two Head Calculation (H.11 & H.12)
Drawing	:	RESIDENTIAL
Location	:	1637 WASHINGTON AVE EXT PORTLAND ME 04103
Remote Area	:	1
Contract	:	20201F
Data File	:	20201F Towle Residence.wx2

RESURGAM CITY OF PORTLAND, MAINE
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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: ( )1 (X)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 - 7.04 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 LF SENJU SPRINKLER Model RC-RES
I Elevation at Highest Outlet - 109 Feet Size 7/16 K-Factor 4.9
G Note: Temperature Rating 162
N

Calculation Summary Gpm Required 26.133 Psi Required 51.82 At Ref Pt STR
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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Page
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City Water Supply:
- C1 - Static Pressure : 76
- C2 - Residual Pressure: 71
- C2 - Residual Flow : 300

Demand:
- D1 - Elevation : 3.898
- D2 - System Flow : 26.133
- D2 - System Pressure : 51.816
- Hose (Demand) : _____
- D3 - System Demand : 26.133
- Safety Margin : 24.130

Fittings Used Summary

Uponor
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Page
Date

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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			
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

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SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
STR	76.0	71	300.0	75.945	26.13	51.816

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
H.11	109.0	4.9	7.04	13.0	
T.27	109.0		7.97		
T.25	109.0		10.75		
H.10	109.0		12.83		
T.23	109.0		17.47		
H.7	109.0		19.45		
H.8	109.0		20.06		
T.19	109.0		20.61		
T.21	109.0		21.71		
H.9	109.0		30.79		
T.22	109.0		32.37		
S.1	104.0		38.54		
MTR	100.0		44.49		
STR	100.0		51.82		
H.12	109.0	4.9	7.18	13.13	
T.26	109.0		17.72		
T.14	119.0		13.48		
H.2	119.0		14.96		
H.1	119.0		15.31		
T.13	119.0		16.56		
T.16	119.0		13.56		
H.6	119.0		14.64		
T.17	119.0		14.72		
H.3	119.0		15.47		
H.4	119.0		13.51		
T.15	119.0		13.52		
H.5	119.0		13.53		

Final Calculations - Hazen-Williams

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TOWLE RESIDENCE - Two Head Calculation (H.11 & H.12)

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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	******* Not
H.11	10.53	0.671	Utr	2.0	2.000	7.040		K Factor = 4.90
to		150.0		0.0	2.000	0.0		
T.27	10.53	0.2318		0.0	4.000	0.927		Vel = 9.55
T.27	0.0	0.671	Utr	2.0	10.000	7.967		
to		150.0		0.0	2.000	0.0		
T.25	10.53	0.2318		0.0	12.000	2.781		Vel = 9.55
T.25	0.0	0.671	Utr	2.0	7.000	10.748		
to		150.0		0.0	2.000	0.0		
H.10	10.53	0.2318		0.0	9.000	2.086		Vel = 9.55
H.10	0.0	0.671	Utb	17.0	1.000	12.834		
to		150.0	Utr	2.0	19.000	0.0		
T.23	10.53	0.2318		0.0	20.000	4.635		Vel = 9.55
T.23	-5.68	0.671	Utb	17.0	19.000	17.469		
to		150.0		0.0	17.000	0.0		
H.7	4.85	0.0551		0.0	36.000	1.984		Vel = 4.40
H.7	0.0	0.671	Utr	2.0	9.000	19.453		
to		150.0		0.0	2.000	0.0		
H.8	4.85	0.0552		0.0	11.000	0.607		Vel = 4.40
H.8	0.0	0.671	Utr	2.0	8.000	20.060		
to		150.0		0.0	2.000	0.0		
T.19	4.85	0.0551		0.0	10.000	0.551		Vel = 4.40
T.19	0.0	0.671	Utb	17.0	3.000	20.611		
to		150.0		0.0	17.000	0.0		
T.21	4.85	0.0552		0.0	20.000	1.103		Vel = 4.40
T.21	9.20	0.671	Utb	17.0	4.000	21.714		
to		150.0	Utr	2.0	19.000	0.0		
H.9	14.05	0.3946		0.0	23.000	9.076		Vel = 12.75
H.9	0.0	0.671	Utr	2.0	2.000	30.790		
to		150.0		0.0	2.000	0.0		
T.22	14.05	0.3948		0.0	4.000	1.579		Vel = 12.75
T.22	12.08	0.862	T	7.528	8.000	32.369		
to		150.0		0.0	2.904	2.166		
S.1	26.13	0.3675		0.0	10.904	4.007		Vel = 14.37
S.1	0.0	0.995	2E	4.673	2.000	38.542		
to		150.0		0.0	4.673	4.732		* * Fixed Loss = 3
MTR	26.13	0.1827		0.0	6.673	1.219		Vel = 10.78
MTR	0.0	0.911	E	1.521	20.000	44.493		
to		150.0	T	3.801	6.082	0.0		
STR	26.13	0.2808	G	0.76	26.082	7.323		Vel = 12.86
	0.0							
	26.13					51.816		K Factor = 3.63
H.11	2.47	0.671		0.0	9.000	7.040		
to		150.0		0.0	0.0	0.0		
H.12	2.47	0.0158		0.0	9.000	0.142		Vel = 2.24
H.12	13.13	0.671	Utb	17.0	3.000	7.182		K Factor = 4.90
to		150.0	Utr	2.0	19.000	0.0		
T.26	15.6	0.4791		0.0	22.000	10.541		Vel = 14.15
T.26	-3.51	0.671	2Utb	34.0	15.000	17.723		
to		150.0		0.0	34.000	0.0		
T.22	12.09	0.2989		0.0	49.000	14.646		Vel = 10.97

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	0.0							
	12.09					32.369		K Factor = 2.13
T.23	5.69	0.862		0.0	15.570	17.469		
to		150.0		0.0	0.0	-4.331		
T.14	5.69	0.0218		0.0	15.570	0.340		Vel = 3.13
T.14	-0.65	0.671	Utb	17.0	8.000	13.478		
to		150.0		0.0	17.000	0.0		
H.2	5.04	0.0592		0.0	25.000	1.480		Vel = 4.57
H.2	0.0	0.671	Utr	2.0	4.000	14.958		
to		150.0		0.0	2.000	0.0		
H.1	5.04	0.0592		0.0	6.000	0.355		Vel = 4.57
H.1	0.0	0.671	Utb	17.0	4.000	15.313		
to		150.0		0.0	17.000	0.0		
T.13	5.04	0.0591		0.0	21.000	1.242		Vel = 4.57
T.13	4.16	0.862		0.0	15.538	16.555		
to		150.0		0.0	0.0	4.331		
T.21	9.2	0.0533		0.0	15.538	0.828		Vel = 5.06
	0.0							
	9.20					21.714		K Factor = 1.97
T.26	3.51	0.862		0.0	18.719	17.723		
to		150.0		0.0	0.0	-4.331		
T.16	3.51	0.0090		0.0	18.719	0.168		Vel = 1.93
T.16	0.65	0.671	Utb	17.0	7.000	13.560		
to		150.0	Utr	2.0	19.000	0.0		
H.6	4.16	0.0416		0.0	26.000	1.082		Vel = 3.77
H.6	0.0	0.671		0.0	2.000	14.642		
to		150.0		0.0	0.0	0.0		
T.17	4.16	0.0415		0.0	2.000	0.083		Vel = 3.77
T.17	0.0	0.671	Utr	2.0	16.000	14.725		
to		150.0		0.0	2.000	0.0		
H.3	4.16	0.0416		0.0	18.000	0.749		Vel = 3.77
H.3	0.0	0.671	Utb	17.0	7.000	15.474		
to		150.0	Utr	2.0	19.000	0.0		
T.13	4.16	0.0416		0.0	26.000	1.081		Vel = 3.77
	0.0							
	4.16					16.555		K Factor = 1.02
T.14	0.65	0.671	Utb	17.0	6.000	13.478		
to		150.0	Utr	2.0	19.000	0.0		
H.4	0.65	0.0014		0.0	25.000	0.034		Vel = 0.59
H.4	0.0	0.671	Utr	2.0	3.000	13.512		
to		150.0		0.0	2.000	0.0		
T.15	0.65	0.0014		0.0	5.000	0.007		Vel = 0.59
T.15	0.0	0.671	Utr	2.0	9.000	13.519		
to		150.0		0.0	2.000	0.0		
H.5	0.65	0.0013		0.0	11.000	0.014		Vel = 0.59
H.5	0.0	0.671	Utb	17.0	3.000	13.533		
to		150.0		0.0	17.000	0.0		
T.16	0.65	0.0014		0.0	20.000	0.027		Vel = 0.59

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	0.0								
	0.65					13.560		K Factor =	0.18