

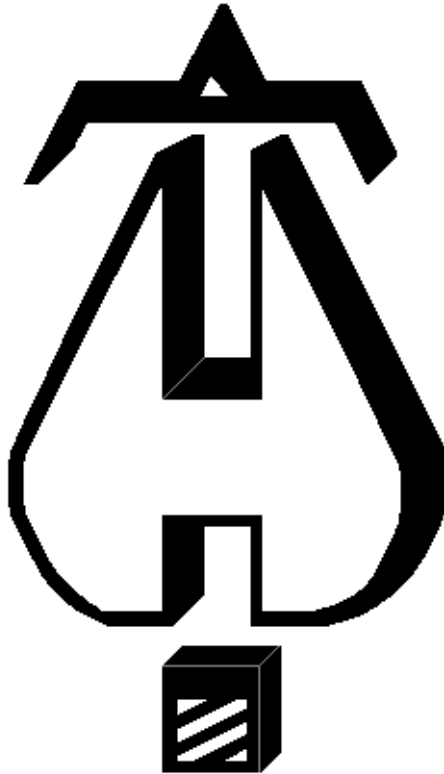


1731 Round Rock Drive, Raleigh, NC 27615 • (919) 872-3250 • fax (919) 877-5775 • www.flsamerica.com

Fairway Pointe – BLDG 17

FIRE SPRINKLER HYDRAULIC CALCULATIONS

7/2/2020



Hydraulic calculations using HydraCALC

Fire & Life Safety America
1731 Roundrock Drive
Raleigh, NC 27615
919-872-3250

Job Name : FAIRWAY POINTE - BUILDING 17 - 3RD Floor Breezeway
Drawing : FP4
Location : FAIRWAY POINTE DRIVE, ANDERSON CREEK, NC
Remote Area : 1
Contract : 3rd FLOOR BREEZ
Data File : FAIRWAY POINTE - BLD 17 - 3RD FLR BREEZEWAY.WXF

HYDRAULIC CALCULATIONS
for

Project name: FAIRWAY POINTE - BUILDING 17
Location: FAIRWAY POINTE DRIVE, ANDERSON CREEK, NC
Drawing no: FP4
Date: 6/26/2020

Design

Remote area number: 1
Remote area location: LIGHT
Occupancy classification: .1
Density: 4 heads - Gpm/SqFt
Area of application: VARIES - SqFt
Coverage per sprinkler: 225 - SqFt
Type of sprinklers calculated: DRY SIDEWALLS
No. of sprinklers calculated: 4
In-rack demand: - GPM
Hose streams: - GPM
Total water required (including hose streams): 69.499 - GPM @ 63.600 - Psi
Type of system: WET
Volume of dry or preaction system: - Gal

Water supply information

Date: 6/24/2020
Location: GALLERY DR.
Source: Fire & Life Safety America

Name of contractor: FIRE & LIFE SAFETY AMERICA
Address: 1761 ROUND ROCK DR, RALEIGH, NC
Phone number: 919-872-3250
Name of designer: R. COLLINS
Authority having jurisdiction: HARNETT COUNTY
Notes: (Include peaking information or gridded systems here.)

Water Supply Curve C

Fire & Life Safety America
FAIRWAY POINTE - BUILDING 17 - 3RD Floor Breezeway

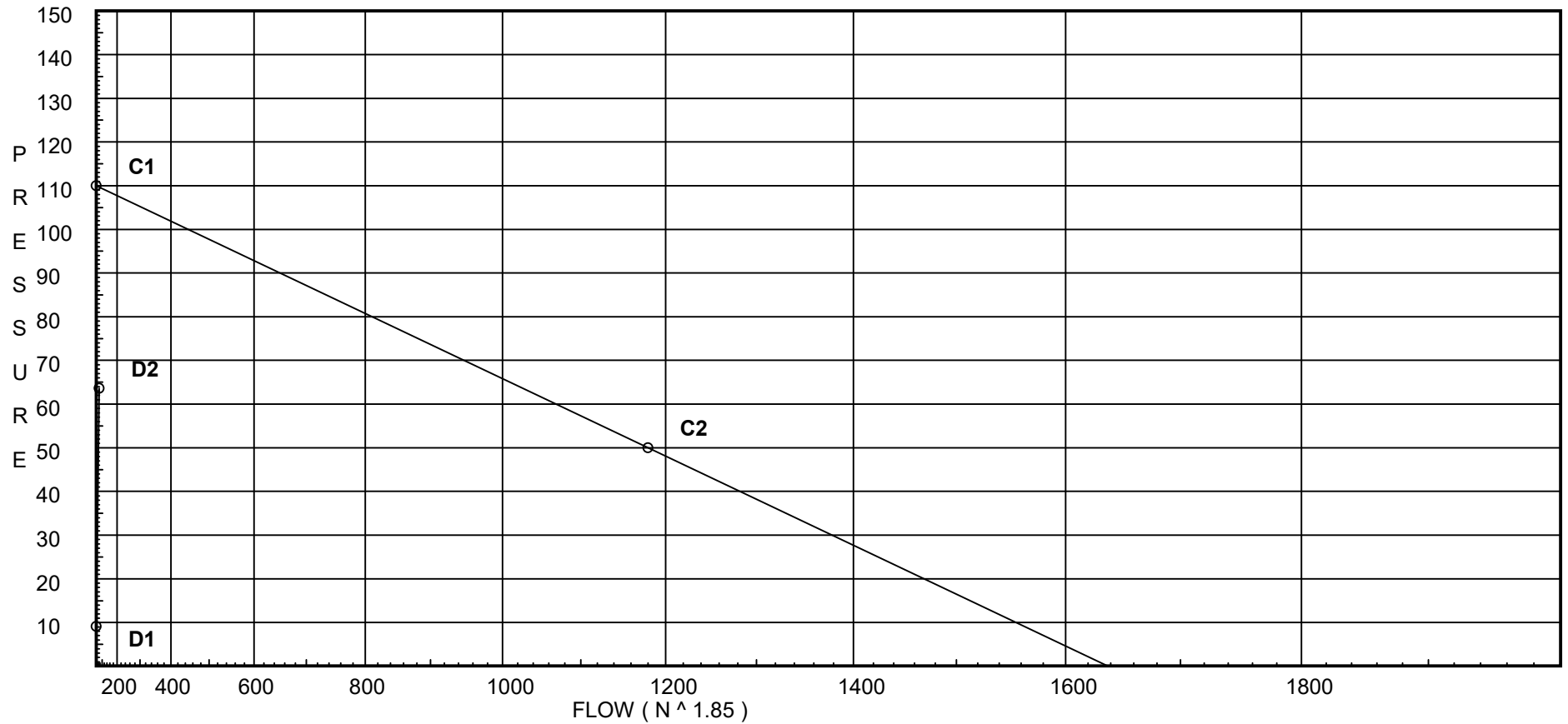
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City Water Supply:

C1 - Static Pressure : 110
C2 - Residual Pressure: 50
C2 - Residual Flow : 1180

Demand:

D1 - Elevation : 9.095
D2 - System Flow : 69.499
D2 - System Pressure : 63.600
Hose (Demand) : _____
D3 - System Demand : 69.499
Safety Margin : 46.082



Fittings Used Summary

Fire & Life Safety America
 FAIRWAY POINTE - BUILDING 17 - 3RD Floor Breezeway

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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	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
N*	CPVC 90'EI Harvel-Spears		7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O*	CPVC Tee - Branch	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

Units Summary

Diameter Units Inches
 Length Units Feet
 Flow Units US Gallons per Minute
 Pressure Units Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Flow Summary - NFPA

Fire & Life Safety America
 FAIRWAY POINTE - BUILDING 17 - 3RD Floor Breezeway

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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>
TEST	110.0	50	1180.0	109.682	69.5	63.6

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>
300	131.0	5.6	7.17	15.0	
301	131.0	5.6	9.32	17.09	
304	131.0	5.6	10.42	18.08	
306	131.0	5.6	11.92	19.33	
302	132.0		11.23		
X2	132.0		17.28		
303	132.0		16.26		
305	132.0		21.23		
D	132.0		26.0		
C	112.0		40.28		
TOR	112.0		43.61		
BKFL	105.0		49.97		
BASE	101.0		66.14		
UG1	101.0		66.57		
UG2	97.5		68.76		
UG3	110.0		63.59		
UG4	110.0		63.59		
UG5	110.0		63.6		
UGT	110.0		63.6		
TEST	110.0		63.6		

Final Calculations : Hazen-Williams

Fire & Life Safety America
 FAIRWAY POINTE - BUILDING 17 - 3RD Floor Breezeway

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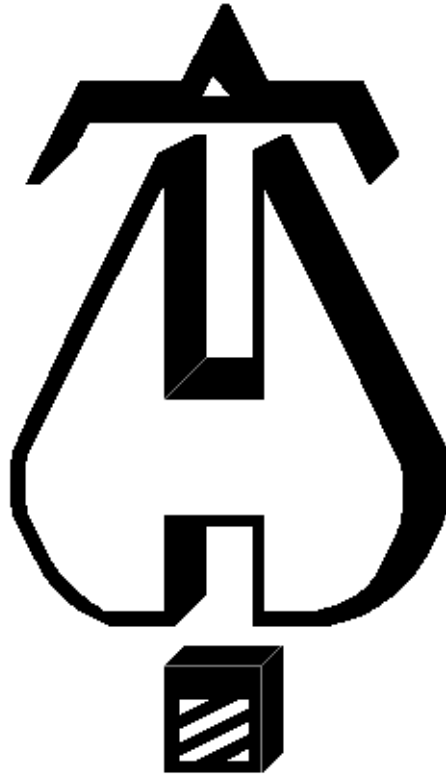
Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
300 to 302	131 132	5.60	15.00 15.0	0.75 0.874	2N 2O	14.0 6.0 0.0	16.500 20.000 36.500	150	7.175 -0.433 4.490		Vel = 8.02	
302			0.0 15.00						11.232		K Factor = 4.48	
301 to 302	131 132	5.60	17.09 17.09	0.75 0.874	N 2O	7.0 6.0 0.0	2.000 13.000 15.000	150	9.316 -0.433 2.349		Vel = 9.14	
302			0.0 17.09						11.232		K Factor = 5.10	
304 to X2	131 132	5.60	18.08 18.08	0.75 0.874	3N O	21.0 3.0 0.0	18.000 24.000 42.000	150	10.420 -0.433 7.297		Vel = 9.67	
X2			0.0 18.08						17.284		K Factor = 4.35	
306 to X2	131 132	5.60	19.33 19.33	0.75 0.874	3N	21.0 0.0 0.0	8.500 21.000 29.500	150	11.915 -0.433 5.802		Vel = 10.34	
X2			0.0 19.33						17.284		K Factor = 4.65	
302 to 303	132 132		32.09 32.09	0.75 0.874	O	3.0 0.0 0.0	7.000 3.000 10.000	150	11.232 0.0 5.024		Vel = 17.16	
303			0.0 32.09						16.256		K Factor = 7.96	
X2 to 305	132 132		37.41 37.41	0.75 0.874		0.0 0.0 0.0	5.920 0.0 5.920	150	17.284 0.0 3.949		Vel = 20.01	
305			0.0 37.41						21.233		K Factor = 8.12	
303 to 305	132 132		32.09 32.09	1 1.101	O	5.0 0.0 0.0	25.500 5.000 30.500	150	16.256 0.0 4.977		Vel = 10.81	
305 to D	132 132		37.41 69.5	1 1.101	O	5.0 0.0 0.0	2.000 5.000 7.000	150	21.233 0.0 4.771		Vel = 23.42	
D			0.0 69.50						26.004		K Factor = 13.63	
D to C	132 112		69.50 69.5	1.25 1.394	O	6.0 0.0 0.0	20.000 6.000 26.000	150	26.004 8.662 5.617		Vel = 14.61	
C			0.0 69.50						40.283		K Factor = 10.95	
C to TOR	112 112		69.50 69.5	2 2.003	3N	33.0 0.0 0.0	56.910 33.000 89.910	150	40.283 0.0 3.324		Vel = 7.08	
			0.0									

Final Calculations : Hazen-Williams

Fire & Life Safety America
 FAIRWAY POINTE - BUILDING 17 - 3RD Floor Breezeway

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TOR			69.50					43.607		K Factor = 10.52	
TOR to BKFL	112 105		69.50 69.5	2 2.067	Fsp 0.0	7.000 0.0	120	43.607 6.032		** Fixed Loss = 3 Vel = 6.64	
BKFL to BASE	105 101		0.0 69.5	2 2.067	E 0.0	5.0 5.000	120	49.974 15.732		** Fixed Loss = 14 Vel = 6.64	
BASE			0.0 69.50					66.138		K Factor = 8.55	
BASE to UG1	101 101		69.50 69.5	2 1.985	E 0.0	6.204 6.203	150	66.138 0.0		Vel = 7.21	
UG1 to UG2	101 97.500		0.0 69.5	2 1.985	E G	6.204 1.241	150	66.570 1.516		Vel = 7.21	
UG2 to UG3	97.500 110		0.0 69.5	4 4.23	E 2T G	19.223 76.893 3.845	150	68.760 -5.414 0.245		Vel = 1.59	
UG3 to UGT	110 110		-17.02 52.48	8 8.27	G T	6.326 55.354	140	63.591 0.0		Vel = 0.31	
UGT			0.0 52.48					63.596		K Factor = 6.58	
UG3 to UG4	110 110		17.02 17.02	8 8.27	4F 0.0	56.936 56.936	140	63.591 0.0		Vel = 0.10	
UG4 to UG5	110 110		0.0 17.02	8 8.27	F 2T	14.234 110.709	140	63.592 0.0		Vel = 0.10	
UG5 to UGT	110 110		0.0 17.02	8 8.27	T 0.0	55.354 55.354	140	63.596 0.0		Vel = 0.10	
UGT to TEST	110 110		52.48 69.5	8 8.27	G T	6.326 55.354	140	63.596 0.0		Vel = 0.42	
TEST			0.0 69.50					63.600		K Factor = 8.71	



Hydraulic calculations using HydraCALC

Fire & Life Safety America
1731 Roundrock Drive
Raleigh, NC 27615
919-872-3250

Job Name : FAIRWAY POINTE - BUILDING 17 - 3rd Floor Living Room
Drawing : FP4
Location : FAIRWAY POINTE DRIVE, ANDERSON CREEK, NC
Remote Area : 1
Contract : 3rd FLOOR UNIT
Data File : FAIRWAY POINTE - BLD 17 - UNIT LIVING ROOM.WXF

HYDRAULIC CALCULATIONS
for

Project name: FAIRWAY POINTE - BUILDING 17
Location: FAIRWAY POINTE DRIVE, ANDERSON CREEK, NC
Drawing no: FP4
Date: 6/26/2020

Design

Remote area number: 1
Remote area location: UNIT 4 HEAD CALC
Occupancy classification: .05
Density: 4 SPRINKL - Gpm/SqFt
Area of application: VARIES - SqFt
Coverage per sprinkler: 400 - SqFt
Type of sprinklers calculated: RESIDENTIAL
No. of sprinklers calculated: 4
In-rack demand: - GPM
Hose streams: - GPM
Total water required (including hose streams): 85.164 - GPM @ 86.413 - Psi
Type of system: WET
Volume of dry or preaction system: - Gal

Water supply information

Date: 6/26/2020
Location: GALLERY DR.
Source: Fire & Life Safety America

Name of contractor: FIRE & LIFE SAFETY AMERICA
Address: 1761 ROUND ROCK DR, RALEIGH, NC
Phone number: 919-872-3250
Name of designer: R. COLLINS
Authority having jurisdiction: HARNETT COUNTY
Notes: (Include peaking information or gridded systems here.)

Water Supply Curve C

Fire & Life Safety America
FAIRWAY POINTE - BUILDING 17 - 3rd Floor Living Room

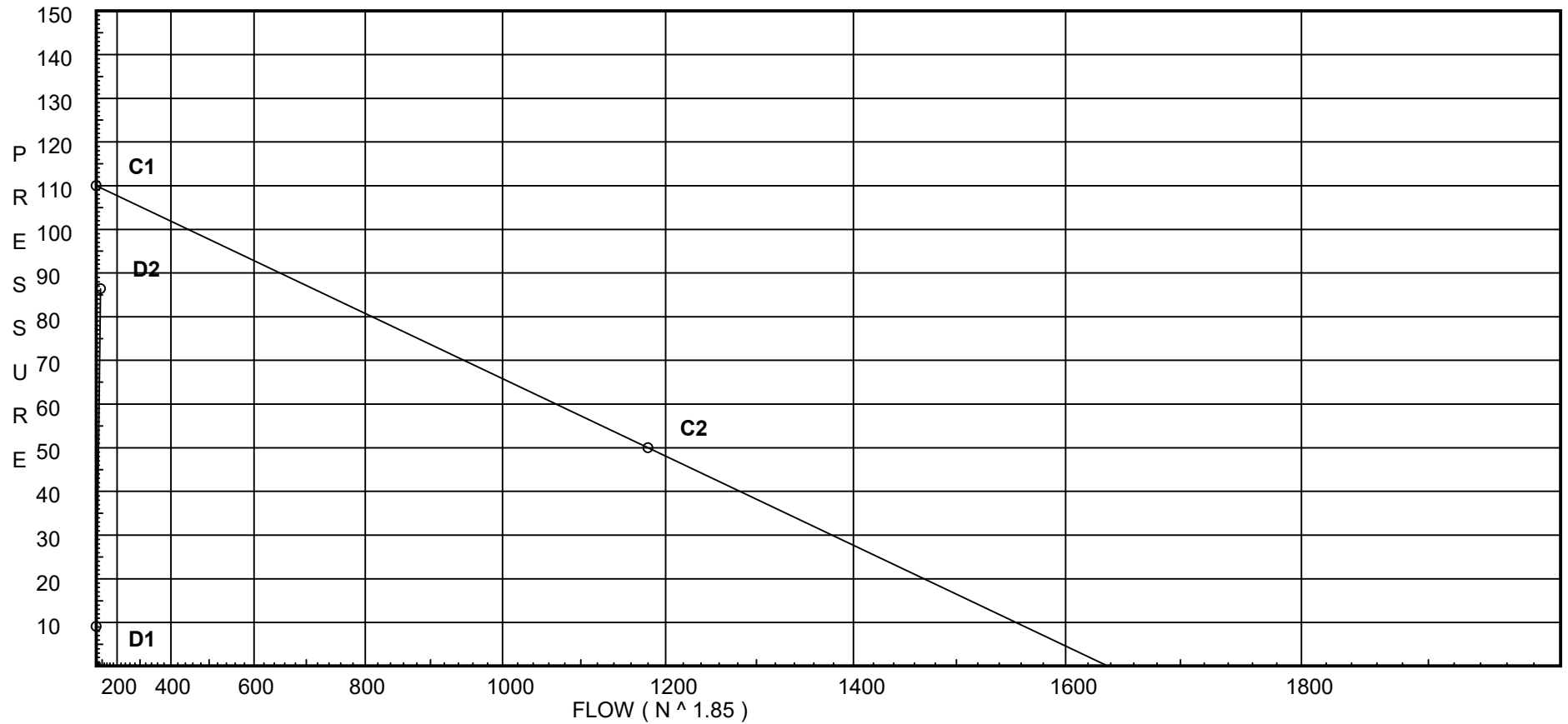
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City Water Supply:

C1 - Static Pressure : 110
C2 - Residual Pressure: 50
C2 - Residual Flow : 1180

Demand:

D1 - Elevation : 9.095
D2 - System Flow : 85.164
D2 - System Pressure : 86.413
Hose (Demand) : _____
D3 - System Demand : 85.164
Safety Margin : 23.123



Fittings Used Summary

Fire & Life Safety America
 FAIRWAY POINTE - BUILDING 17 - 3rd Floor Living Room

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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	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
N*	CPVC 90'EI Harvel-Spears		7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O*	CPVC Tee - Branch	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

Units Summary

Diameter Units Inches
 Length Units Feet
 Flow Units US Gallons per Minute
 Pressure Units Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Flow Summary - NFPA

Fire & Life Safety America
 FAIRWAY POINTE - BUILDING 17 - 3rd Floor Living Room

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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>
TEST	110.0	50	1180.0	109.536	85.16	86.413

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>
S101	131.0	4.9	16.7	20.02	
S102	131.0	4.9	19.33	21.54	
S103	131.0	4.9	18.73	21.2	
S104	131.0	4.9	20.89	22.39	
101	132.0		17.95		
102	132.0		21.78		
103	132.0		21.97		
104	132.0		24.21		
X1	132.0		25.02		
105	132.0		30.81		
106	132.0		40.69		
108	132.0		27.14		
107	132.0		35.26		
A	132.0		42.81		
B	112.0		59.65		
204	112.0		59.93		
C	112.0		60.61		
TOR	112.0		65.45		
BKFL	105.0		71.97		
BASE	101.0		88.33		
UG1	101.0		88.96		
UG2	97.5		91.46		
UG3	110.0		86.4		
UG4	110.0		86.4		
UG5	110.0		86.41		
UGT	110.0		86.41		
TEST	110.0		86.41		

Final Calculations : Hazen-Williams

Fire & Life Safety America
 FAIRWAY POINTE - BUILDING 17 - 3rd Floor Living Room

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
S101 to 101	131 132	4.90	20.02 20.02	0.75 0.874	N 0.0	7.0 7.000 8.000	150 0.2099	16.700 -0.433 1.679		Vel = 10.71	
101			0.0 20.02					17.946		K Factor = 4.73	
S102 to 102	131 132	4.90	21.54 21.54	0.75 0.874	N O 0.0	7.0 3.0 10.000 12.000	150 0.2403	19.327 -0.433 2.884		Vel = 11.52	
102			0.0 21.54					21.778		K Factor = 4.62	
S103 to 103	131 132	4.90	21.20 21.2	0.75 0.874	2N 0.0	14.0 0.0 14.000 15.750	150 0.2334	18.725 -0.433 3.676		Vel = 11.34	
103			0.0 21.20					21.968		K Factor = 4.52	
S104 to 104	131 132	4.90	22.39 22.39	0.75 0.874	N O 0.0	7.0 3.0 10.000 14.540	150 0.2583	20.888 -0.433 3.755		Vel = 11.97	
104			0.0 22.39					24.210		K Factor = 4.55	
101 to 102	132 132		20.02 20.02	0.75 0.874	N 0.0	7.0 0.0 7.000 18.250	150 0.2100	17.946 0.0 3.832		Vel = 10.71	
102 to X1	132 132		21.55 41.57	0.75 0.874	O 0.0	3.0 0.0 1.000 3.000 4.000	150 0.8108	21.778 0.0 3.243		Vel = 22.23	
X1			0.0 41.57					25.021		K Factor = 8.31	
103 to X1	132 132		21.20 21.2	0.75 0.874	O 0.0	3.0 0.0 10.080 3.000 13.080	150 0.2334	21.968 0.0 3.053		Vel = 11.34	
X1			0.0 21.20					25.021		K Factor = 4.24	
104 to X1	132 132		22.39 22.39	1 1.101		0.0 0.0 9.670 0.0 9.670	150 0.0839	24.210 0.0 0.811		Vel = 7.55	
X1 to 105	132 132		22.44 44.83	1 1.101	O 0.0	5.0 0.0 14.120 5.000 19.120	150 0.3028	25.021 0.0 5.790		Vel = 15.11	
105 to 106	132 132		0.0 44.83	1 1.101	O 0.0	5.0 0.0 27.620 5.000 32.620	150 0.3029	30.811 0.0 9.879		Vel = 15.11	
106 to A	132 132		0.0 44.83	1 1.101	O 0.0	5.0 0.0 2.000 5.000 7.000	150 0.3029	40.690 0.0 2.120		Vel = 15.11	
A			0.0 44.83					42.810		K Factor = 6.85	

Final Calculations : Hazen-Williams

Fire & Life Safety America
 FAIRWAY POINTE - BUILDING 17 - 3rd Floor Living Room

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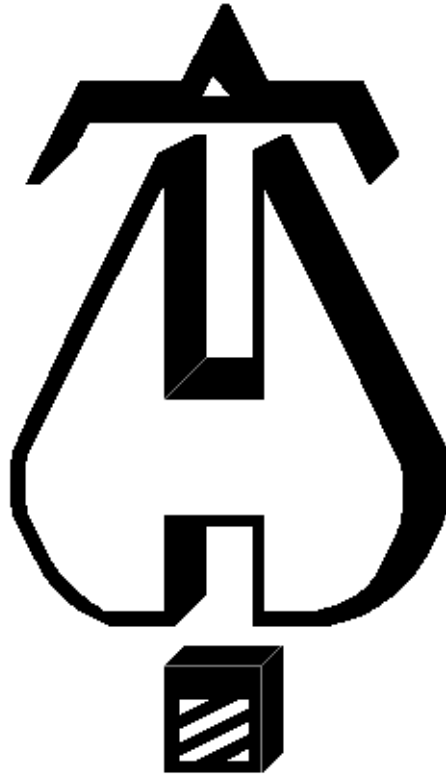
Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
X1 to 108	132 132		40.34	1	O	5.0 0.0	3.500 5.000	150	25.021 0.0			
			40.34	1.101		0.0	8.500	0.2491	2.117		Vel = 13.59	
108 to 107	132 132		0.0	1	O	5.0 0.0	27.620 5.000	150	27.138 0.0			
			40.34	1.101		0.0	32.620	0.2491	8.126		Vel = 13.59	
107 to A	132 132		0.0	1	O	5.0 0.0	25.290 5.000	150	35.264 0.0			
			40.34	1.101		0.0	30.290	0.2491	7.546		Vel = 13.59	
A			0.0 40.34						42.810		K Factor = 6.17	
A to B	132 112		85.16	1.25	O	6.0 0.0	20.000 6.000	150	42.810 8.662			
			85.16	1.394		0.0	26.000	0.3146	8.180		Vel = 17.90	
B			0.0 85.16						59.652		K Factor = 11.03	
B to 204	112 112		85.16	2		0.0 0.0	5.250 0.0	150	59.652 0.0			
			85.16	2.003		0.0	5.250	0.0539	0.283		Vel = 8.67	
204 to C	112 112		0.0	2		0.0 0.0	12.500 0.0	150	59.935 0.0			
			85.16	2.003		0.0	12.500	0.0538	0.673		Vel = 8.67	
C to TOR	112 112		0.0	2	3N	33.0 0.0	56.910 33.000	150	60.608 0.0			
			85.16	2.003		0.0	89.910	0.0538	4.841		Vel = 8.67	
TOR			0.0 85.16						65.449		K Factor = 10.53	
TOR to BKFL	112 105		85.16	2	Fsp	0.0 0.0	7.000 0.0	120	65.449 6.032		** Fixed Loss = 3	
			85.16	2.067		0.0	7.000	0.0699	0.489		Vel = 8.14	
BKFL to BASE	105 101		0.0	2	E	5.0 0.0	4.000 5.000	120	71.970 15.732		** Fixed Loss = 14	
			85.16	2.067		0.0	9.000	0.0698	0.628		Vel = 8.14	
BASE			0.0 85.16						88.330		K Factor = 9.06	
BASE to UG1	101 101		85.16	2	E	6.204 0.0	5.000 6.203	150	88.330 0.0			
			85.16	1.985		0.0	11.203	0.0563	0.631		Vel = 8.83	
UG1 to UG2	101 97.500		0.0	2	E G	6.204 1.241	10.000 7.444	150	88.961 1.516			
			85.16	1.985		0.0	17.444	0.0562	0.981		Vel = 8.83	
UG2 to UG3	97.500 110		0.0	4	E 2T G	19.223 76.893 3.845	152.000 99.961 251.961	150	91.458 -5.414 0.356			
			85.16	4.23		0.0	0.0014	0.0014	0.356		Vel = 1.94	
UG3 to UGT	110 110		-20.85	8	G T	6.326 55.354	170.000 61.680	140	86.400 0.0			
			64.31	8.27		0.0	231.680	0	0.009		Vel = 0.38	
			0.0									

Final Calculations : Hazen-Williams

Fire & Life Safety America
 FAIRWAY POINTE - BUILDING 17 - 3rd Floor Living Room

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
UGT			64.31					86.409		K Factor = 6.92	
UG3 to UG4	110 110		20.85	8	4F	56.936 0.0	516.000 56.936	140 0	86.400 0.0		Vel = 0.12
UG4 to UG5	110 110		0.0	8	F 2T	14.234 110.709	948.000 124.943	140 0	86.403 0.0		Vel = 0.12
UG5 to UGT	110 110		0.0	8	T	55.354 0.0	160.000 55.354	140 0	86.408 0.0		Vel = 0.12
UGT to TEST	110 110		64.31	8	G T	6.326 55.354	15.000 61.680	140 0.0001	86.409 0.0		Vel = 0.51
TEST			0.0 85.16						86.413		K Factor = 9.16



Hydraulic calculations using HydraCALC

Fire & Life Safety America
1731 Roundrock Drive
Raleigh, NC 27615
919-872-3250

Job Name : FAIRWAY POINTE - BUILDING 17 - Level 1 Storage
Drawing : FP2
Location : 288 GALLERY DRIVE
Remote Area : 1
Contract : 20NC1473
Data File : FAIRWAY POINTE - BLD 17 - LEVEL 1 STORAGE.WXF

HYDRAULIC CALCULATIONS
for

Project name: FAIRWAY POINTE - BUILDING 17
Location: 288 GALLERY DRIVE
Drawing no: FP2
Date: 6/26/2020

Design

Remote area number: 1
Remote area location: LEVEL 1 STORAGE
Occupancy classification: STORAGE
Density: .15 - Gpm/SqFt
Area of application: 756 - SqFt
Coverage per sprinkler: 111 - SqFt
Type of sprinklers calculated: RESIDENTIAL
No. of sprinklers calculated: 9
In-rack demand: - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 423.752 - GPM @ 69.755 - Psi
Type of system: WET
Volume of dry or preaction system: - Gal

Water supply information

Date: 6/24/2020
Location: GALLERY DRIVE
Source: Fire & Life Safety America

Name of contractor: FIRE & LIFE SAFETY AMERICA
Address: 1731 ROUND ROCK DR, RALEIGH, NC
Phone number: 919-872-3250
Name of designer: R. COLLINS
Authority having jurisdiction: HARNETT COUNTY
Notes: (Include peaking information or gridded systems here.)

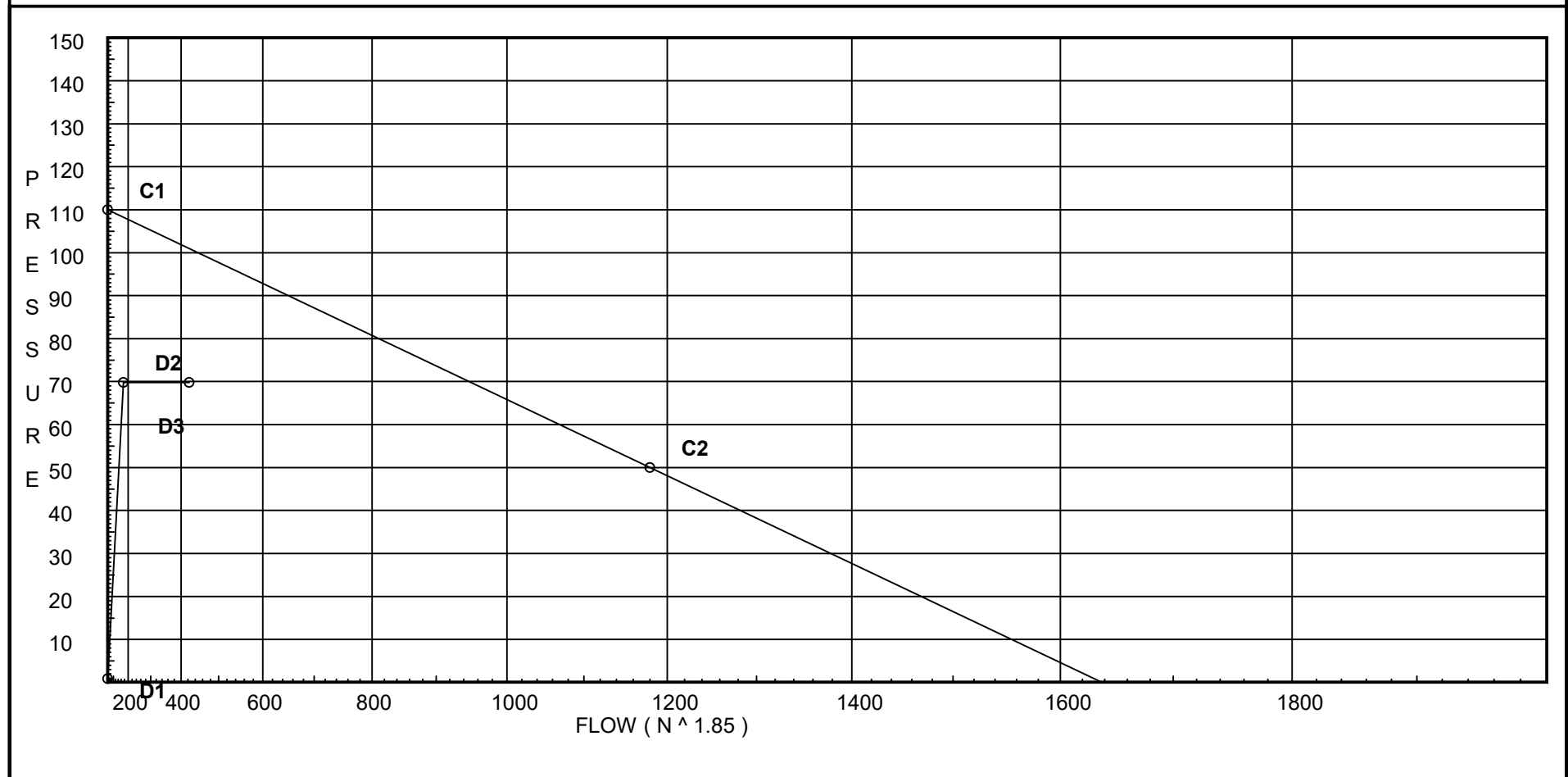
Water Supply Curve C

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City Water Supply:
C1 - Static Pressure : 110
C2 - Residual Pressure: 50
C2 - Residual Flow : 1180

Demand:
D1 - Elevation : 0.866
D2 - System Flow : 173.752
D2 - System Pressure : 69.755
Hose (Demand) : 250
D3 - System Demand : 423.752
Safety Margin : 31.223



Fittings Used Summary

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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	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
N*	CPVC 90'EI Harvel-Spears		7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O*	CPVC Tee - Branch	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

Units Summary

Diameter Units Inches
 Length Units Feet
 Flow Units US Gallons per Minute
 Pressure Units Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Flow Summary - NFPA

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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>
TEST	110.0	50	1180.0	100.978	423.75	69.755

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>
P7	112.0	5.6	8.93	16.74	
P6	112.0	5.6	8.37	16.2	
P8	112.0	5.6	8.9	16.71	
P9	112.0	5.6	9.04	16.83	
P3	112.0	5.6	12.24	19.6	
P4	112.0	5.6	13.53	20.59	
P5	112.0	5.6	14.2	21.1	
P1	112.0	5.6	16.8	22.95	
P2	112.0	5.6	16.92	23.04	
B4	112.0		9.32		
B5	112.0		9.7		
B6	112.0		9.81		
B2	112.0		14.1		
B3	112.0		15.17		
B0	112.0		17.98		
B1	112.0		18.22		
210	112.0		17.57		
207	112.0		18.0		
B	112.0		19.28		
204	112.0		19.88		
C	112.0		22.4		
TOR	112.0		40.3		
BKFL	105.0		48.16		
BASE	101.0		66.24		
UG1	101.0		68.6		
UG2	97.5		73.79		
UG3	110.0		69.71		
UG4	110.0		69.72		
UG5	110.0		69.73		
UGT	110.0		69.74		
TEST	110.0		69.75	250.0	

Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
P7 to B4	112 112	5.60	16.74 16.74	1 1.101	N 0.0	7.0 0.0 8.000	150 0.0490	8.933 0.0 0.392		Vel = 5.64	
B4			0.0 16.74					9.325		K Factor = 5.48	
P6 to B4	112 112	5.60	16.20 16.2	1 1.101	N O 0.0	7.0 5.0 20.750	150 0.0461	8.369 0.0 0.956		Vel = 5.46	
B4			0.0 16.20					9.325		K Factor = 5.31	
P8 to B5	112 112	5.60	16.71 16.71	1 1.101	N O 0.0	7.0 5.0 12.000 16.333	150 0.0487	8.899 0.0 0.796		Vel = 5.63	
B5			0.0 16.71					9.695		K Factor = 5.37	
P9 to B6	112 112	5.60	16.83 16.83	1 1.101	N O 0.0	7.0 5.0 12.000 15.666	150 0.0495	9.036 0.0 0.775		Vel = 5.67	
B6			0.0 16.83					9.811		K Factor = 5.37	
P3 to B2	112 112	5.60	19.60 19.6	1 1.101	2N O 0.0	14.0 5.0 19.000 28.333	150 0.0655	12.244 0.0 1.856		Vel = 6.60	
B2			0.0 19.60					14.100		K Factor = 5.22	
P4 to B2	112 112	5.60	20.60 20.6	1 1.101	N 0.0	7.0 0.0 7.000 8.000	150 0.0719	13.525 0.0 0.575		Vel = 6.94	
B2			0.0 20.60					14.100		K Factor = 5.49	
P5 to B3	112 112	5.60	21.10 21.1	1 1.101	N O 0.0	7.0 5.0 12.000 13.000	150 0.0752	14.195 0.0 0.977		Vel = 7.11	
B3			0.0 21.10					15.172		K Factor = 5.42	
P1 to B0	112 112	5.60	22.95 22.95	1 1.101	N O 0.0	7.0 5.0 12.000 13.500	150 0.0878	16.796 0.0 1.185		Vel = 7.73	
B0			0.0 22.95					17.981		K Factor = 5.41	
P2 to B1	112 112	5.60	23.04 23.04	1 1.101	N O 0.0	7.0 5.0 12.000 14.666	150 0.0884	16.922 0.0 1.296		Vel = 7.76	
B1			0.0 23.04					18.218		K Factor = 5.40	
B4 to B5	112 112		32.94 32.94	1.25 1.394		0.0 0.0 6.833 6.833	150 0.0541	9.325 0.0 0.370		Vel = 6.92	

Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
B5 to B6	112 112		16.70 49.64	1.25 1.394		0.0 0.0	1.000 0.0	150	9.695 0.0			
										Vel = 10.44		
B6 to 210	112 112		16.84 66.48	1.25 1.394	3O	18.0 0.0	21.000 18.000	150	9.811 0.0			
										Vel = 13.98		
			0.0 66.48							17.571	K Factor = 15.86	
B2 to B3	112 112		40.19 40.19	1.25 1.394	O	6.0 0.0	7.666 6.000	150	14.100 0.0			
										0.0784	1.072	Vel = 8.45
B3 to 207	112 112		21.10 61.29	1.25 1.394		0.0 0.0	16.500 0.0	150	15.172 0.0			
										0.1712	2.824	Vel = 12.88
			0.0 61.29								17.996	K Factor = 14.45
B0 to B1	112 112		22.95 22.95	1.25 1.394		0.0 0.0	8.500 0.0	150	17.981 0.0			
										0.0279	0.237	Vel = 4.82
B1 to 204	112 112		23.04 45.99	1.25 1.394		0.0 0.0	16.500 0.0	150	18.218 0.0			
										0.1006	1.660	Vel = 9.67
			0.0 45.99								19.878	K Factor = 10.32
210 to 207	112 112		66.48 66.48	2		0.0 0.0	12.500 0.0	150	17.571 0.0			
										0.0340	0.425	Vel = 6.77
207 to B	112 112		61.29 127.77	2		0.0 0.0	11.250 0.0	150	17.996 0.0			
										0.1140	1.283	Vel = 13.01
B to 204	112 112		0.0 127.77	2		0.0 0.0	5.250 0.0	150	19.279 0.0			
										0.1141	0.599	Vel = 13.01
204 to C	112 112		45.98 173.75	2		0.0 0.0	12.500 0.0	150	19.878 0.0			
										0.2014	2.517	Vel = 17.69
C to TOR	112 112		0.0 173.75	2	O 2N	10.0 22.0	56.910 32.000	150	22.395 0.0			
										0.2014	17.907	Vel = 17.69
			0.0 173.75								40.302	K Factor = 27.37
TOR to BKFL	112 105		173.75 173.75	2	Fsp	0.0 0.0	7.000 0.0	120	40.302 6.032			** Fixed Loss = 3
										0.2610	1.827	Vel = 16.61
BKFL to BASE	105 101		0.0 173.75	2	E	5.0 0.0	4.000 5.000	120	48.161 15.732			** Fixed Loss = 14
										0.2611	2.350	Vel = 16.61

Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
BASE			0.0 173.75					66.243		K Factor = 21.35	
BASE to UG1	101 101		173.75	2	E 6.204	5.000 0.0	150	66.243 0.0			
UG1 to UG2	101 97.500		173.75	1.985		0.0 11.203	0.2105	2.358		Vel = 18.01	
UG1 to UG2	101 97.500		0.0	2	E 6.204	10.000 1.241	150	68.601 1.516			
UG2 to UG3	97.500 110		173.75	1.985	G 0.0	7.444 17.444	0.2104	3.671		Vel = 18.01	
UG2 to UG3	97.500 110		0.0	4	E 19.223	152.000 76.893	150	73.788 -5.414			
UG3 to UGT	110 110		173.75	4.23	G 3.845	251.961	0.0053	1.332		Vel = 3.97	
UG3 to UGT	110 110		-42.54	8	G 6.326	170.000 55.354	140	69.706 0.0			
UGT			131.21	8.27		0.0 231.680	0.0001	0.031		Vel = 0.78	
UGT			0.0 131.21					69.737		K Factor = 15.71	
UG3 to UG4	110 110		42.54	8	4F 56.936	516.000 0.0	140	69.706 0.0			
UG4 to UG5	110 110		42.54	8.27		0.0 572.936	0	0.009		Vel = 0.25	
UG4 to UG5	110 110		0.0	8	F 14.234	948.000 110.709	140	69.715 0.0			
UG5 to UGT	110 110		42.54	8.27		0.0 1072.943	0	0.019		Vel = 0.25	
UG5 to UGT	110 110		0.0	8	T 55.354	160.000 0.0	140	69.734 0.0			
UGT to TEST	110 110		42.54	8.27		0.0 215.354	0	0.003		Vel = 0.25	
UGT to TEST	110 110		131.21	8	G 6.326	15.000 55.354	140	69.737 0.0			
TEST			173.75	8.27		0.0 76.680	0.0002	0.018		Vel = 1.04	
TEST			250.00 423.75					69.755		Qa = 250.00 K Factor = 50.74	

6/29/2020

Test Date: 6/24/2020

Time: 1:00 PM by FLSA

Flow Location: Hydrant on Gallery Dr.

Residual Location: Hydrant on Gallery Dr.

Flow (GPM): 1180 GPM

Static Pressure (PSI): 110

Residual Pressure (PSI): 50

Notes:

Underground is 8"

Diagram:

