JUNIPER VILLAGE
BUILDING 100

1208 North Main Steet
Lillington, North Carolina

Hydraulic Calculations

Wayne Automatic Fire Sprinklers Job Number: 1020001

Wayne Automatic Fire Sprinklers, Inc.
4370 Motorsport Drive, Concord NC 28027 - 8977

Hydrant Flow Test Report

LOCATION: JUNIPER VILLAGE APTS PARKER LANE & NORTH MAIN ST. DATE: 3-20-24

TEST MADE BY: PJAMES TIME: 8:30 AM

REPRESENTATIVE OF: LILLINGTON FIRE DEPT.

WITNESS: JAMEY

STATE PURPOSE OF TEST:

CONSUMPTION RATE DURING TEST:

IF PUMPS AFFECT TEST, INDICATE PUMPS OPERATING:

TEST #225

FLOW HYDRANTS: #224 A1 A2 FLOW A3 A4

Size Nozzle: 2.5"

Pilot Reading: 40 psi

Discharge Coefficient: .9 Total GPM

GPM: 1060

STATIC P 80 psi RESIDUAL B 68 psi

PROJECTED RESULTS: At 20 psi Residual _____gpm, or At _psi Residual_____gpm

REMARKS:

LOCATION MAP: Show line sizes and distance to next cross connected line. Show valves and Hydrant branch size. Indicate North. Show flowing hydrants – Label A1, A2, A3, A4. Show location of Static and Residual – Label B.

Indicate B. Hydrant:_____ Sprinkler:_____Other (Identify): _____

WAYNE

Automatic Fire Sprinklers, Inc.

Hydraulic Calculations

Wayne Automatic
Fire Sprinklers, Inc.
4370 Motorsport Drive
Concord, NC 28027
704-782-3032

Job Name	:	Juniper Village- Building 100 - 3rd Floor - Unit C2 - Common - DA 1.1
Sheet Number	:	FP1.2
Location	:	Building 100
Design Area	:	Design Area 1.1
Contract	:	102001
Data File	:	Building 100- 3rd Floor - Unit C2 - Common DA 1.1.WXF

HYDRAULIC CALCULATIONS
for

Project name: Juniper Villiage
Location: Building 100
Drawing no: FP1.2
Date: 4-5-2024

Design

Remote area number: Design Area 1.1
Remote area location: Building 100 - 3rd Floor - Unit C2 Common Area
Occupancy classification: NFPA 13R
Density: .05 - Gpm/SqFt
Area of application: 4 Sprinklers - SqFt
Coverage per sprinkler: 256 - SqFt
Type of sprinklers calculated: Reliable Mod. F1 Res 44 Residential HSW
No. of sprinklers calculated: 4
In-rack demand: - GPM
Hose streams: - GPM
Total water required (including hose streams): 151.8 - GPM @ 67.2 - Psi
Type of system: Wet Residential NFPA 13R
Volume of dry or preaction system: - Gal

Water supply information

Date: 3-20-2024
Location: North Main Street (Hydrant 224)
Source: Lillington Fire Department

Name of contractor: Wayne Automatic Fire Sprinklers
Address: 4370 Motorsport Drive / Concord, NC
Phone number: 407-877-5514
Name of designer: Donald Hawkins
Authority having jurisdiction: Town of Lillington
Notes: (Include peaking information for gridded systems here.)
(1) The Finished Floor Elevation is 169'. For clarity the Finished Floor elevation on the hydraulic calculations is shown as 0'-0"
(2) A domestic demand of 86 was added at node point DD1 as required by NFPA 13R Section 9.6.

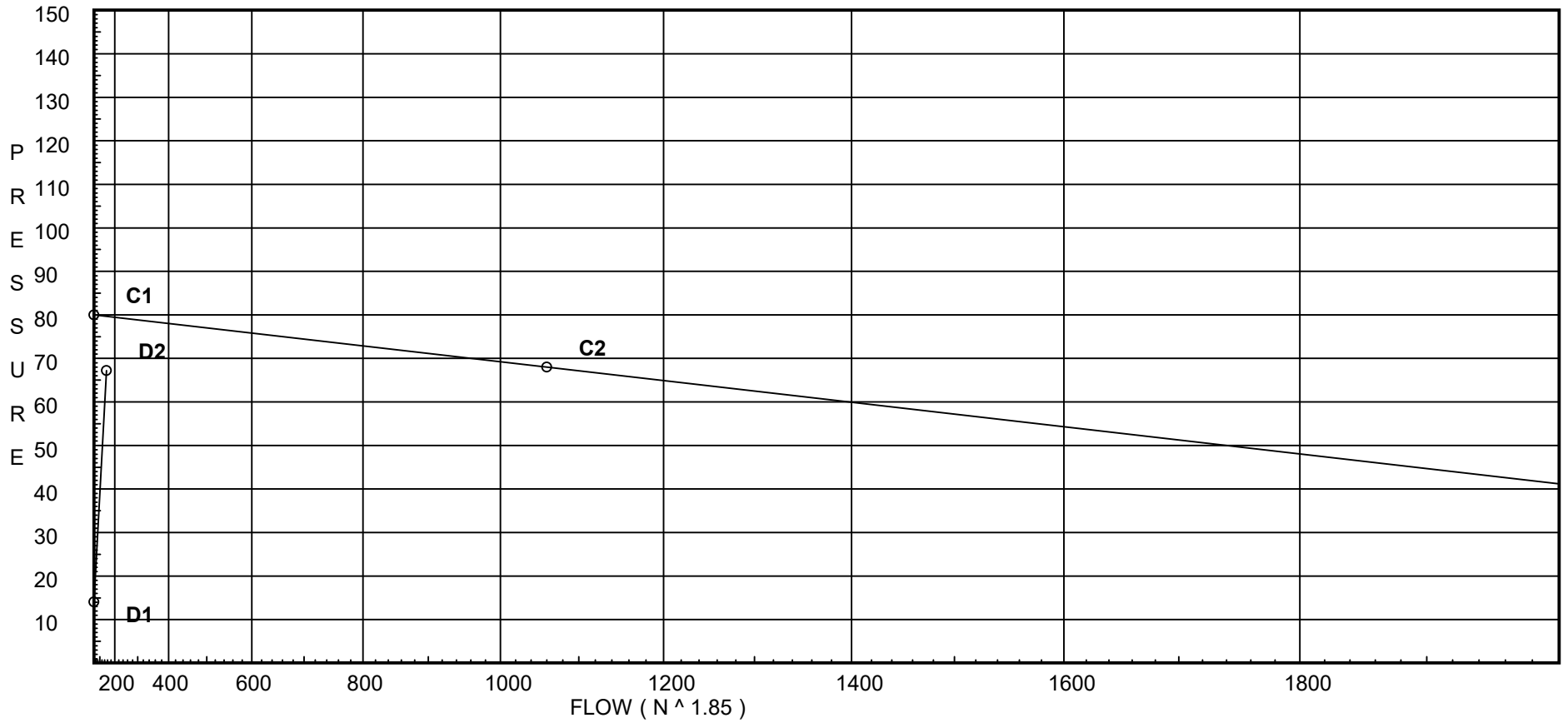
Water Supply Curve C

Wayne Automatic
Juniper Village- Building 100 - 3rd Floor - Unit C2 - Common - DA 1.1

Date 4-5-2024

City Water Supply:
- C1 - Static Pressure : 80
- C2 - Residual Pressure: 68
- C2 - Residual Flow : 1060

Demand:
- D1 - Elevation : 14.076
- D2 - System Flow : 151.794
- D2 - System Pressure : 67.240
- Hose (Demand) : _____
- D3 - System Demand : 151.794
- Safety Margin : 12.431



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
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
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
L	NFPA 13 Long Turn Elbow	1	1	2	2	2	3	4	5	5	6	8	9	13	16	18	24	27	30	34	40
T	NFPA 13 Tee Branch	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
U *	CPVC 90' Elbow Tyco	0	4	5	6	7	9	12	13	0	0	0	0	0	0	0	0	0	0	0	0
V *	CPVC Tee Branch Tyco	0	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
Z	Generic Flow Switch	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Zai	Ames 4000SS	Fitting generates a Fixed Loss Based on Flow																			

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.

Pressure / Flow Summary - STANDARD

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
J1	27.5	4.4	13.47	na	16.15	0.05	256	13.3
J2	27.5	4.4	15.45	na	17.29	0.05	256	13.3
J3	27.5	4.4	13.73	na	16.3	0.05	256	13.3
J4	27.5	4.4	13.3	na	16.05	0.05	256	13.3
11	19.25		18.77	na				
15	19.25		20.39	na				
32	19.25		21.93	na				
12	19.25		20.98	na				
16	19.25		22.4	na				
13	19.25		19.06	na				
14	19.25		18.58	na				
25	19.25		19.23	na				
26	19.25		20.56	na				
22	19.25		25.02	na				
27	19.25		25.02	na				
28	19.25		30.71	na				
200	19.25		41.02	na				
202	19.25		34.1	na				
203	19.25		34.28	na				
201	19.25		37.8	na				
101	9.25		45.81	na				
100	9.25		46.99	na				
102	9.25		48.0	na				
TR	1.0		53.63	na				
BR	-3.0		55.86	na				
UG1	-3.0		55.87	na				
BFD1	2.0		53.75	na				
BFS1	2.0		63.72	na	86.0			
DD1	-3.0		65.94	na				
M1	-3.0		66.29	na				
M2	-3.0		66.29	na				
M3	-3.0		66.28	na				
M4	-3.0		66.29	na				
M5	-3.0		66.29	na				
CC1	-10.0		69.34	na				
CC2	-10.0		69.34	na				
TEST	-5.0		67.24	na				

The maximum velocity is 17.88 and it occurs in the pipe between nodes 16 and 202

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
J1	16.15	0.874	U	4.0	8.250	13.473		K Factor = 4.40
to		150.0		0.0	4.000	3.573		
11	16.15	0.1411		0.0	12.250	1.728		Vel = 8.64
	0.0							
	16.15					18.774		K Factor = 3.73
J2	17.29	0.874	U	4.0	8.250	15.448		K Factor = 4.40
to		150.0		0.0	4.000	3.573		
12	17.29	0.1601		0.0	12.250	1.961		Vel = 9.25
	0.0							
	17.29					20.982		K Factor = 3.77
J3	16.30	0.874	U	4.0	8.250	13.729		K Factor = 4.40
to		150.0		0.0	4.000	3.573		
13	16.3	0.1435		0.0	12.250	1.758		Vel = 8.72
	0.0							
	16.30					19.060		K Factor = 3.73
J4	16.05	0.874	U	4.0	8.250	13.300		K Factor = 4.40
to		150.0		0.0	4.000	3.573		
14	16.05	0.1393		0.0	12.250	1.707		Vel = 8.58
	0.0							
	16.05					18.580		K Factor = 3.72
11	16.15	0.874	V	3.0	8.420	18.774		
to		150.0		0.0	3.000	0.0		
15	16.15	0.1411		0.0	11.420	1.611		Vel = 8.64
15	0.0	0.874		0.0	10.920	20.385		
to		150.0		0.0	0.0	0.0		
32	16.15	0.1410		0.0	10.920	1.540		Vel = 8.64
32	0.0	0.874		0.0	3.330	21.925		
to		150.0		0.0	0.0	0.0		
16	16.15	0.1411		0.0	3.330	0.470		Vel = 8.64
	0.0							
	16.15					22.395		K Factor = 3.41
12	17.29	0.874	U	4.0	1.830	20.982		
to		150.0	V	3.0	7.000	0.0		
16	17.29	0.1600		0.0	8.830	1.413		Vel = 9.25
16	16.15	0.874	V	3.0	18.580	22.395		
to		150.0		0.0	3.000	0.0		
202	33.44	0.5423		0.0	21.580	11.702		Vel = 17.88
	0.0							
	33.44					34.097		K Factor = 5.73
13	16.30	0.874	U	4.0	3.420	19.060		
to		150.0	V	3.0	7.000	0.0		
26	16.3	0.1435		0.0	10.420	1.495		Vel = 8.72
	0.0							
	16.30					20.555		K Factor = 3.60
14	16.05	0.874	V	3.0	1.670	18.580		
to		150.0		0.0	3.000	0.0		
25	16.05	0.1394		0.0	4.670	0.651		Vel = 8.58

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
25	0.0	0.874	V	3.0	6.500	19.231		
to		150.0		0.0	3.000	0.0		
26	16.05	0.1394		0.0	9.500	1.324		Vel = 8.58
26	16.30	0.874		0.0	8.750	20.555		
to		150.0		0.0	0.0	0.0		
27	32.35	0.5098		0.0	8.750	4.461		Vel = 17.30
	0.0							
	32.35					25.016		K Factor = 6.47
22	0.0	0.874	U	4.0	10.750	25.016		
to		150.0	2V	6.0	10.000	0.0		
27	0.0	0.0		0.0	20.750	0.0		Vel = 0
27	32.35	0.874		0.0	11.170	25.016		
to		150.0		0.0	0.0	0.0		
28	32.35	0.5099		0.0	11.170	5.696		Vel = 17.30
28	0.0	0.874	V	3.0	4.000	30.712		
to		150.0		0.0	3.000	0.0		
203	32.35	0.5099		0.0	7.000	3.569		Vel = 17.30
	0.0							
	32.35					34.281		K Factor = 5.53
200	-25.79	1.101		0.0	63.580	41.024		
to		150.0		0.0	0.0	0.0		
202	-25.79	-0.1089		0.0	63.580	-6.927		Vel = 8.69
202	33.44	1.101		0.0	16.000	34.097		
to		150.0		0.0	0.0	0.0		
203	7.65	0.0115		0.0	16.000	0.184		Vel = 2.58
203	32.35	1.101	V	5.0	9.330	34.281		
to		150.0		0.0	5.000	0.0		
201	40.0	0.2453		0.0	14.330	3.515		Vel = 13.48
	0.0							
	40.00					37.796		K Factor = 6.51
201	40.00	1.101	V	5.0	10.000	37.796		
to		150.0		0.0	5.000	4.331		
101	40.0	0.2453		0.0	15.000	3.679		Vel = 13.48
	0.0							
	40.00					45.806		K Factor = 5.91
200	25.79	1.101	V	5.0	10.000	41.024		
to		150.0		0.0	5.000	4.331		
100	25.79	0.1089		0.0	15.000	1.634		Vel = 8.69
	0.0							
	25.79					46.989		K Factor = 3.76
101	40.00	2.003		0.0	88.920	45.806		
to		150.0		0.0	0.0	0.0		
100	40.0	0.0133		0.0	88.920	1.183		Vel = 4.07
100	25.79	2.003		0.0	30.420	46.989		
to		150.0		0.0	0.0	0.0		
102	65.79	0.0334		0.0	30.420	1.016		Vel = 6.70
102	0.0	2.003	5U	45.0	16.500	48.005		
to		150.0		0.0	45.000	3.573		
TR	65.79	0.0334		0.0	61.500	2.054		Vel = 6.70

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							
	65.79					53.632		K Factor = 8.98
TR	65.79	2.003	Z	6.482	8.250	53.632		
to		150.0		0.0	6.482	1.732		
BR	65.79	0.0335		0.0	14.732	0.493		Vel = 6.70
BR	0.0	4.28	L	10.75	4.000	55.857		
to		140.0		0.0	10.750	0.0		
UG1	65.79	0.0009		0.0	14.750	0.014		Vel = 1.47
	0.0							
	65.79					55.871		K Factor = 8.80
UG1	65.79	4.24	2L	23.335	32.580	55.871		
to		150.0		0.0	23.335	-2.166		
BFD1	65.79	0.0009		0.0	55.915	0.049		Vel = 1.49
BFD1	0.0	4.026	Zai	0.0	10.000	53.754		
to		120.0		0.0	0.0	9.950		* * Fixed Loss = 9.95
BFS1	65.79	0.0017		0.0	10.000	0.017		Vel = 1.66
BFS1	86.00	4.24		0.0	13.000	63.721		Qa = 86.00
to		150.0		0.0	0.0	2.166		
DD1	151.79	0.0040		0.0	13.000	0.052		Vel = 3.45
DD1	0.0	4.24	G	3.889	40.250	65.939		
to		150.0	T	38.891	42.780	0.0		
M3	151.79	0.0041		0.0	83.030	0.338		Vel = 3.45
	0.0							
	151.79					66.277		K Factor = 18.64
M1	-89.75	7.98		0.0	31.580	66.295		
to		150.0		0.0	0.0	0.0		
M2	-89.75	-0.0001		0.0	31.580	-0.003		Vel = 0.58
M2	0.0	7.98	2F	27.183	193.580	66.292		
to		150.0		0.0	27.182	0.0		
M3	-89.75	-0.0001		0.0	220.762	-0.015		Vel = 0.58
M3	151.79	7.98	F	13.591	287.750	66.277		
to		150.0		0.0	13.592	0.0		
M4	62.04	0.0		0.0	301.342	0.011		Vel = 0.40
M4	0.0	7.98	T	52.855	76.670	66.288		
to		150.0		0.0	52.855	0.0		
M5	62.04	0.0		0.0	129.525	0.004		Vel = 0.40
M5	0.0	11.68	F	17.661	422.000	66.292		
to		150.0		0.0	17.661	0.0		
M1	62.04	0.0		0.0	439.661	0.003		Vel = 0.19
M1	89.75	11.68	T	81.513	372.830	66.295		
to		150.0	G	8.151	89.664	3.032		
CC1	151.79	0.0		0.0	462.494	0.013		Vel = 0.45
CC1	0.0	19.76		0.0	321.000	69.340		
to		150.0		0.0	0.0	0.0		
CC2	151.79	0.0		0.0	321.000	0.001		Vel = 0.16
CC2	0.0	6.08	G	4.038	65.000	69.341		
to		140.0	L	12.115	16.153	-2.166		
TEST	151.79	0.0008		0.0	81.153	0.065		Vel = 1.68

Final Calculations - Hazen-Williams

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								
	151.79				67.240		K Factor = 18.51		

WAYNE

Automatic Fire Sprinklers, Inc.

Hydraulic Calculations

Wayne Automatic
Fire Sprinklers, Inc.
4370 Motorsport Drive
Concord, NC 28027
704-782-3032

Job Name	:	Juniper Village- Building 100 - 3rd Floor - Corridor - DA 1.2
Sheet Number	:	FP1.2
Location	:	Building 100
Design Area	:	Design Area 1.2
Contract	:	102001
Data File	:	Building 100- 3rd Floor - Corridor - DA 1.2.WXF

HYDRAULIC CALCULATIONS
for

Project name: Juniper Villiage
Location: Building 100
Drawing no: FP1.2
Date: 4-5-2024

Design

Remote area number: Design Area 1.2
Remote area location: Building 100 - 3rd Floor - Corridor
Occupancy classification: NFPA 13R
Density: .10 - Gpm/SqFt
Area of application: 4 Sprinklers - SqFt
Coverage per sprinkler: 122 - SqFt
Type of sprinklers calculated: Reliable Mod F3QR Dry HSW
No. of sprinklers calculated: 4
In-rack demand: - GPM
Hose streams: - GPM
Total water required (including hose streams): 158.3 - GPM @ 65.2 - Psi
Type of system: Wet Residential NFPA 13R
Volume of dry or preaction system: - Gal

Water supply information

Date: 3-20-2024
Location: North Main Street (Hydrant 224)
Source: Lillington Fire Department

Name of contractor: Wayne Automatic Fire Sprinklers
Address: 4370 Motorsport Drive / Concord, NC
Phone number: 407-877-5514
Name of designer: Donald Hawkins
Authority having jurisdiction: Town of Lillington
Notes: (Include peaking information for gridded systems here.)
(1) The Finished Floor Elevation is 169'. For clarity the Finished Floor elevation on the hydraulic calculations is shown as 0'-0"
(2) A domestic demand of 86 was added at node point DD1 as required by NFPA 13R Section 9.6.

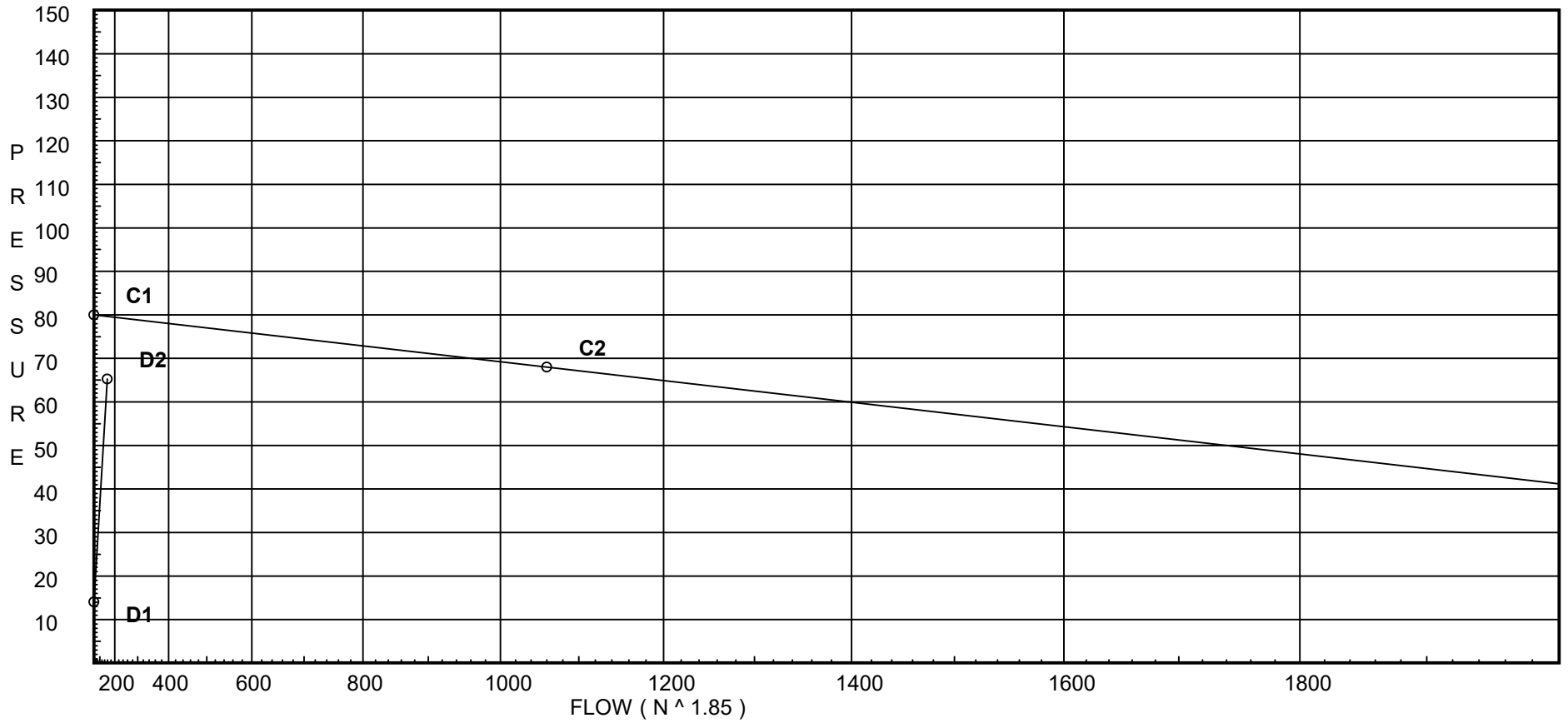
Water Supply Curve C

Wayne Automatic
Juniper Village- Building 100 - 3rd Floor - Corridor - DA 1.2

Date 4-5-2024

City Water Supply:
- C1 - Static Pressure : 80
- C2 - Residual Pressure: 68
- C2 - Residual Flow : 1060

Demand:
- D1 - Elevation : 14.076
- D2 - System Flow : 158.267
- D2 - System Pressure : 65.249
- Hose (Demand) : _____
- D3 - System Demand : 158.267
- Safety Margin : 14.395



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
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
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
L	NFPA 13 Long Turn Elbow	1	1	2	2	2	3	4	5	5	6	8	9	13	16	18	24	27	30	34	40
T	NFPA 13 Tee Branch	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
U *	CPVC 90' Elbow Tyco	0	4	5	6	7	9	12	13	0	0	0	0	0	0	0	0	0	0	0	0
V *	CPVC Tee Branch Tyco	0	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
Z	Generic Flow Switch	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Zai	Ames 4000SS	Fitting generates a Fixed Loss Based on Flow																			

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.

Pressure / Flow Summary - STANDARD

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
K1	27.5	5.6	7.0	na	14.82	0.1	122	7.0
K2	27.5	5.6	8.11	na	15.94	0.1	122	7.0
K3	27.5	5.6	11.53	na	19.01	0.1	122	7.0
K4	27.5	5.6	16.13	na	22.49	0.1	122	7.0
21	19.25		13.01	na				
25	19.25		14.03	na				
26	19.25		15.17	na				
33	19.25		15.64	na				
22	19.25		13.37	na				
27	19.25		16.22	na				
23	19.25		17.44	na				
28	19.25		21.41	na				
24	19.25		22.63	na				
29	19.25		27.32	na				
200	19.25		38.4	na				
202	19.25		31.16	na				
203	19.25		29.33	na				
201	19.25		33.86	na				
101	9.25		42.92	na				
100	9.25		44.44	na				
102	9.25		45.65	na				
TR	1.0		51.67	na				
BR	-3.0		53.99	na				
UG1	-3.0		54.0	na				
BFD1	2.0		51.9	na				
BFS1	2.0		61.69	na	86.0			
DD1	-3.0		63.91	na				
M1	-3.0		64.3	na				
M2	-3.0		64.3	na				
M3	-3.0		64.28	na				
M4	-3.0		64.29	na				
M5	-3.0		64.29	na				
CC1	-10.0		67.34	na				
CC2	-10.0		67.34	na				
TEST	-5.0		65.25	na				

The maximum velocity is 26.62 and it occurs in the pipe between nodes 28 and 203

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
K1	14.82	0.874	U	4.0	13.250	7.000		K Factor = 5.60
to		150.0	V	3.0	7.000	3.573		
21	14.82	0.1202		0.0	20.250	2.435		Vel = 7.93
	0.0							
	14.82					13.008		K Factor = 4.11
K2	15.94	0.874	U	4.0	8.250	8.107		K Factor = 5.60
to		150.0		0.0	4.000	3.573		
22	15.94	0.1377		0.0	12.250	1.687		Vel = 8.52
	0.0							
	15.94					13.367		K Factor = 4.36
K3	19.01	0.874	U	4.0	8.250	11.529		K Factor = 5.60
to		150.0		0.0	4.000	3.573		
23	19.01	0.1908		0.0	12.250	2.337		Vel = 10.17
	0.0							
	19.01					17.439		K Factor = 4.55
K4	22.49	0.874	V	3.0	8.250	16.131		K Factor = 5.60
to		150.0		0.0	3.000	3.573		
24	22.49	0.2603		0.0	11.250	2.928		Vel = 12.03
	0.0							
	22.49					22.632		K Factor = 4.73
21	14.82	0.874	U	4.0	4.500	13.008		
to		150.0		0.0	4.000	0.0		
25	14.82	0.1202		0.0	8.500	1.022		Vel = 7.93
25	0.0	0.874	V	3.0	6.500	14.030		
to		150.0		0.0	3.000	0.0		
26	14.82	0.1202		0.0	9.500	1.142		Vel = 7.93
26	0.0	0.874		0.0	3.920	15.172		
to		150.0		0.0	0.0	0.0		
33	14.82	0.1204		0.0	3.920	0.472		Vel = 7.93
33	0.0	0.874		0.0	4.830	15.644		
to		150.0		0.0	0.0	0.0		
27	14.82	0.1203		0.0	4.830	0.581		Vel = 7.93
	0.0							
	14.82					16.225		K Factor = 3.68
22	15.94	0.874	U	4.0	10.750	13.367		
to		150.0	2V	6.0	10.000	0.0		
27	15.94	0.1377		0.0	20.750	2.858		Vel = 8.52
27	14.82	0.874		0.0	11.170	16.225		
to		150.0		0.0	0.0	0.0		
28	30.76	0.4645		0.0	11.170	5.188		Vel = 16.45
	0.0							
	30.76					21.413		K Factor = 6.65
23	19.01	0.874	U	4.0	10.830	17.439		
to		150.0	2V	6.0	10.000	0.0		
28	19.01	0.1908		0.0	20.830	3.974		Vel = 10.17
28	30.77	0.874	V	3.0	4.000	21.413		
to		150.0		0.0	3.000	0.0		
203	49.78	1.1316		0.0	7.000	7.921		Vel = 26.62

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									
	49.78					29.334		K Factor = 9.19		
24	22.49	0.874	U	4.0	11.000	22.632				
to		150.0	V	3.0	7.000	0.0				
29	22.49	0.2603		0.0	18.000	4.685		Vel = 12.03		
29	0.0	0.874	V	3.0	4.750	27.317				
to		150.0		0.0	3.000	0.0				
203	22.49	0.2603		0.0	7.750	2.017		Vel = 12.03		
	0.0									
	22.49					29.334		K Factor = 4.15		
200	-26.43	1.101		0.0	63.580	38.403				
to		150.0		0.0	0.0	0.0				
202	-26.43	-0.1140		0.0	63.580	-7.245		Vel = 8.91		
202	0.0	1.101		0.0	16.000	31.158				
to		150.0		0.0	0.0	0.0				
203	-26.43	-0.1140		0.0	16.000	-1.824		Vel = 8.91		
203	72.27	1.101	V	5.0	9.330	29.334				
to		150.0		0.0	5.000	0.0				
201	45.84	0.3156		0.0	14.330	4.522		Vel = 15.45		
	0.0									
	45.84					33.856		K Factor = 7.88		
201	45.84	1.101	V	5.0	10.000	33.856				
to		150.0		0.0	5.000	4.331				
101	45.84	0.3156		0.0	15.000	4.734		Vel = 15.45		
	0.0									
	45.84					42.921		K Factor = 7.00		
200	26.43	1.101	V	5.0	10.000	38.403				
to		150.0		0.0	5.000	4.331				
100	26.43	0.1139		0.0	15.000	1.709		Vel = 8.91		
	0.0									
	26.43					44.443		K Factor = 3.96		
101	45.84	2.003		0.0	88.920	42.921				
to		150.0		0.0	0.0	0.0				
100	45.84	0.0171		0.0	88.920	1.522		Vel = 4.67		
100	26.43	2.003		0.0	30.420	44.443				
to		150.0		0.0	0.0	0.0				
102	72.27	0.0397		0.0	30.420	1.209		Vel = 7.36		
102	0.0	2.003	5U	45.0	16.500	45.652				
to		150.0		0.0	45.000	3.573				
TR	72.27	0.0397		0.0	61.500	2.444		Vel = 7.36		
	0.0									
	72.27					51.669		K Factor = 10.05		
TR	72.27	2.003	Z	6.482	8.250	51.669				
to		150.0		0.0	6.482	1.732				
BR	72.27	0.0398		0.0	14.732	0.586		Vel = 7.36		
BR	0.0	4.28	L	10.75	4.000	53.987				
to		140.0		0.0	10.750	0.0				
UG1	72.27	0.0012		0.0	14.750	0.017		Vel = 1.61		

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							
	72.27					54.004		K Factor = 9.83
UG1	72.27	4.24	2L	23.335	32.580	54.004		
to		150.0		0.0	23.335	-2.166		
BFD1	72.27	0.0010		0.0	55.915	0.058		Vel = 1.64
BFD1	0.0	4.026	Zai	0.0	10.000	51.896		
to		120.0		0.0	0.0	9.775		* * Fixed Loss = 9.775
BFS1	72.27	0.0020		0.0	10.000	0.020		Vel = 1.82
BFS1	86.00	4.24		0.0	13.000	61.691		Qa = 86.00
to		150.0		0.0	0.0	2.166		
DD1	158.27	0.0043		0.0	13.000	0.056		Vel = 3.60
DD1	0.0	4.24	G	3.889	40.250	63.913		
to		150.0	T	38.891	42.780	0.0		
M3	158.27	0.0044		0.0	83.030	0.365		Vel = 3.60
	0.0							
	158.27					64.278		K Factor = 19.74
M1	-93.58	7.98		0.0	31.580	64.298		
to		150.0		0.0	0.0	0.0		
M2	-93.58	-0.0001		0.0	31.580	-0.003		Vel = 0.60
M2	0.0	7.98	2F	27.183	193.580	64.295		
to		150.0		0.0	27.182	0.0		
M3	-93.58	-0.0001		0.0	220.762	-0.017		Vel = 0.60
M3	158.27	7.98	F	13.591	287.750	64.278		
to		150.0		0.0	13.592	0.0		
M4	64.69	0.0		0.0	301.342	0.012		Vel = 0.41
M4	0.0	7.98	T	52.855	76.670	64.290		
to		150.0		0.0	52.855	0.0		
M5	64.69	0.0		0.0	129.525	0.005		Vel = 0.41
M5	0.0	11.68	F	17.661	422.000	64.295		
to		150.0		0.0	17.661	0.0		
M1	64.69	0.0		0.0	439.661	0.003		Vel = 0.19
M1	93.58	11.68	T	81.513	372.830	64.298		
to		150.0	G	8.151	89.664	3.032		
CC1	158.27	0.0		0.0	462.494	0.014		Vel = 0.47
CC1	0.0	19.76		0.0	321.000	67.344		
to		150.0		0.0	0.0	0.0		
CC2	158.27	0.0		0.0	321.000	0.001		Vel = 0.17
CC2	0.0	6.08	G	4.038	65.000	67.345		
to		140.0	L	12.115	16.153	-2.166		
TEST	158.27	0.0009		0.0	81.153	0.070		Vel = 1.75
	0.0							
	158.27					65.249		K Factor = 19.59

WAYNE

Automatic Fire Sprinklers, Inc.

Hydraulic Calculations

Wayne Automatic
Fire Sprinklers, Inc.
4370 Motorsport Drive
Concord, NC 28027
704-782-3032

Job Name	:	Juniper Village- Building 100 - 2nd Floor - Unit C2 - Common - DA 1.3
Sheet Number	:	FP1.2
Location	:	Building 100
Design Area	:	Design Area 1.3
Contract	:	102001
Data File	:	Building 100- 2nd Floor - Unit C2 - Common DA 1.3.WXF

HYDRAULIC CALCULATIONS
for

Project name: Juniper Villiage
Location: Building 100
Drawing no: FP1.2
Date: 4-5-2024

Design

Remote area number: Design Area 1.3
Remote area location: Building 100 - 2nd Floor - Unit C2 Common Area
Occupancy classification: NFPA 13R
Density: .05 - Gpm/SqFt
Area of application: 3 Sprinklers - SqFt
Coverage per sprinkler: 256, 400 - SqFt
Type of sprinklers calculated: Reliable Mod. F1Res 49 Residential Pendents
No. of sprinklers calculated: 3
In-rack demand: - GPM
Hose streams: - GPM
Total water required (including hose streams): 136.4 - GPM @ 50.6 - Psi
Type of system: Wet Residential NFPA 13R
Volume of dry or preaction system: - Gal

Water supply information

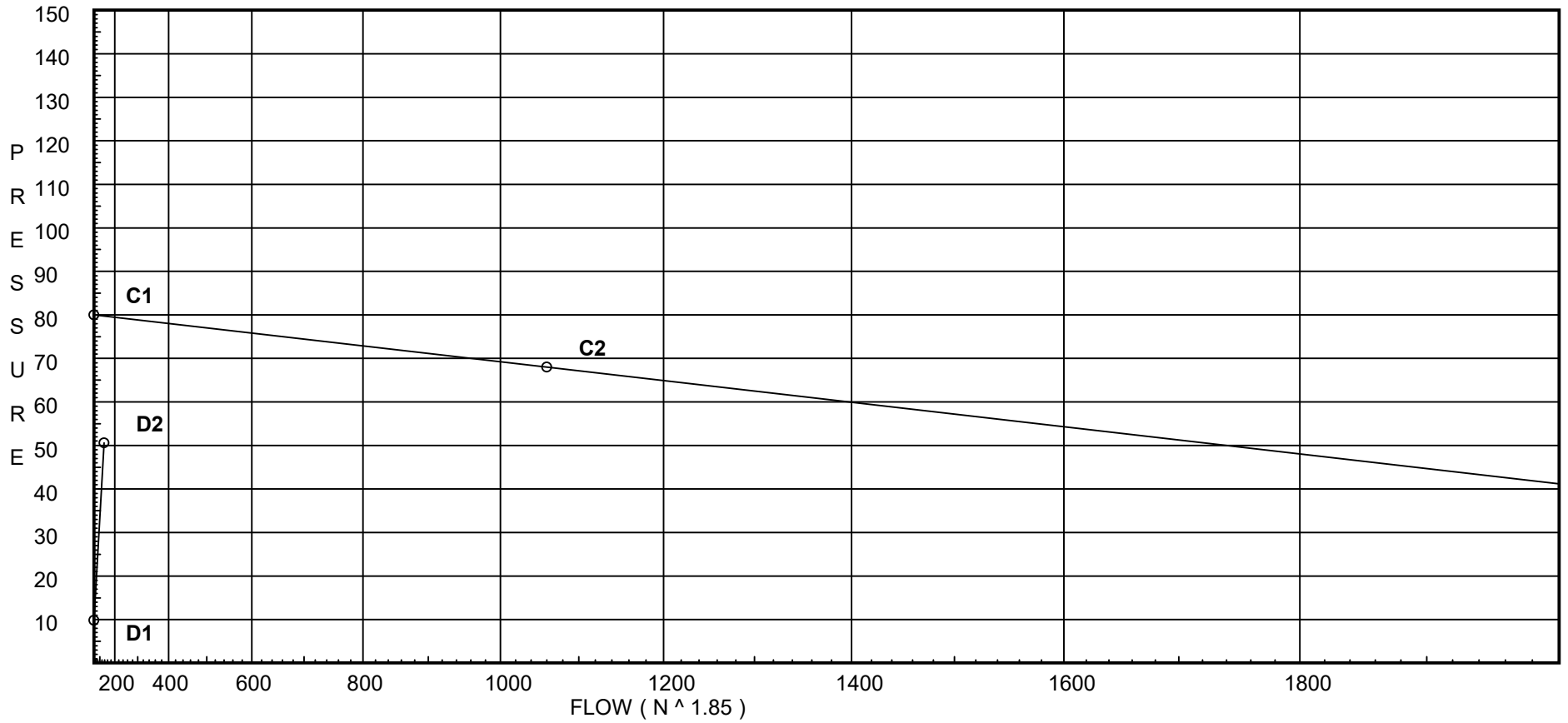
Date: 3-20-2024
Location: North Main Street (Hydrant 224)
Source: Lillington Fire Department

Name of contractor: Wayne Automatic Fire Sprinklers
Address: 4370 Motorsport Drive / Concord, NC
Phone number: 407-877-5514
Name of designer: Donald Hawkins
Authority having jurisdiction: Town of Lillington
Notes: (Include peaking information for gridded systems here.)
(1) The Finished Floor Elevation is 169'. For clarity the Finished Floor elevation on the hydraulic calculations is shown as 0'-0"
(2) A domestic demand of 86 was added at node point DD1 as required by NFPA 13R Section 9.6.

Water Supply Curve C

City Water Supply:
- C1 - Static Pressure : 80
- C2 - Residual Pressure: 68
- C2 - Residual Flow : 1060

Demand:
- D1 - Elevation : 9.853
- D2 - System Flow : 136.415
- D2 - System Pressure : 50.580
- Hose (Demand) : _____
- D3 - System Demand : 136.415
- Safety Margin : 29.150



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
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
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
L	NFPA 13 Long Turn Elbow	1	1	2	2	2	3	4	5	5	6	8	9	13	16	18	24	27	30	34	40
T	NFPA 13 Tee Branch	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
U *	CPVC 90' Elbow Tyco	0	4	5	6	7	9	12	13	0	0	0	0	0	0	0	0	0	0	0	0
V *	CPVC Tee Branch Tyco	0	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
Z	Generic Flow Switch	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Zai	Ames 4000SS	Fitting generates a Fixed Loss Based on Flow																			

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.

Pressure / Flow Summary - STANDARD

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
L1	17.75	4.9	8.83	na	14.56	0.05	256	7.0
L2	17.75	4.9	10.43	na	15.83	0.05	256	7.0
L3	17.75	4.9	16.7	na	20.02	0.05	400	16.7
31	19.25		8.82	na				
15	19.25		9.12	na				
32	19.25		10.4	na				
16	19.25		11.91	na				
33	19.25		17.2	na				
27	19.25		18.22	na				
28	19.25		20.56	na				
200	19.25		26.05	na				
202	19.25		21.71	na				
203	19.25		22.03	na				
201	19.25		24.15	na				
101	9.25		30.69	na				
100	9.25		31.4	na				
102	9.25		32.02	na				
TR	1.0		36.85	na				
BR	-3.0		38.89	na				
UG1	-3.0		38.89	na				
BFD1	2.0		36.76	na				
BFS1	2.0		47.18	na				
DD1	-3.0		49.36	na	86.0			
M1	-3.0		49.65	na				
M2	-3.0		49.65	na				
M3	-3.0		49.63	na				
M4	-3.0		49.64	na				
M5	-3.0		49.65	na				
CC1	-10.0		52.69	na				
CC2	-10.0		52.69	na				
TEST	-5.0		50.58	na				

The maximum velocity is 16.25 and it occurs in the pipe between nodes 32 and 16

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
L1	14.56	0.874	U	4.0	1.500	8.833		K Factor = 4.90
to		150.0		0.0	4.000	-0.650		
31	14.56	0.1165		0.0	5.500	0.641		Vel = 7.79
	0.0							
	14.56					8.824		K Factor = 4.90
L2	15.83	0.874	V	3.0	1.500	10.434		K Factor = 4.90
to		150.0		0.0	3.000	-0.650		
32	15.83	0.1360		0.0	4.500	0.612		Vel = 8.47
	0.0							
	15.83					10.396		K Factor = 4.91
L3	20.02	0.874	U	4.0	1.500	16.700		K Factor = 4.90
to		150.0		0.0	4.000	-0.650		
33	20.02	0.2100		0.0	5.500	1.155		Vel = 10.71
	0.0							
	20.02					17.205		K Factor = 4.83
31	14.56	0.874		0.0	2.580	8.824		
to		150.0		0.0	0.0	0.0		
15	14.56	0.1163		0.0	2.580	0.300		Vel = 7.79
15	0.0	0.874		0.0	10.920	9.124		
to		150.0		0.0	0.0	0.0		
32	14.56	0.1165		0.0	10.920	1.272		Vel = 7.79
32	15.83	0.874		0.0	3.330	10.396		
to		150.0		0.0	0.0	0.0		
16	30.39	0.4544		0.0	3.330	1.513		Vel = 16.25
16	0.0	0.874	V	3.0	18.580	11.909		
to		150.0		0.0	3.000	0.0		
202	30.39	0.4542		0.0	21.580	9.802		Vel = 16.25
	0.0							
	30.39					21.711		K Factor = 6.52
33	20.02	0.874		0.0	4.830	17.205		
to		150.0		0.0	0.0	0.0		
27	20.02	0.2099		0.0	4.830	1.014		Vel = 10.71
27	0.0	0.874		0.0	11.170	18.219		
to		150.0		0.0	0.0	0.0		
28	20.02	0.2099		0.0	11.170	2.345		Vel = 10.71
28	0.0	0.874	V	3.0	4.000	20.564		
to		150.0		0.0	3.000	0.0		
203	20.02	0.2100		0.0	7.000	1.470		Vel = 10.71
	0.0							
	20.02					22.034		K Factor = 4.26
200	-20.03	1.101		0.0	63.580	26.048		
to		150.0		0.0	0.0	0.0		
202	-20.03	-0.0682		0.0	63.580	-4.337		Vel = 6.75
202	30.39	1.101		0.0	16.000	21.711		
to		150.0		0.0	0.0	0.0		
203	10.36	0.0202		0.0	16.000	0.323		Vel = 3.49
203	20.03	1.101	V	5.0	9.330	22.034		
to		150.0		0.0	5.000	0.0		
201	30.39	0.1475		0.0	14.330	2.113		Vel = 10.24

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							
	30.39					24.147		K Factor = 6.18
201	30.39	1.101	V	5.0	10.000	24.147		
to		150.0		0.0	5.000	4.331		
101	30.39	0.1475		0.0	15.000	2.213		Vel = 10.24
	0.0							
	30.39					30.691		K Factor = 5.49
200	20.03	1.101	V	5.0	10.000	26.048		
to		150.0		0.0	5.000	4.331		
100	20.03	0.0682		0.0	15.000	1.023		Vel = 6.75
	0.0							
	20.03					31.402		K Factor = 3.57
101	30.39	2.003		0.0	88.920	30.691		
to		150.0		0.0	0.0	0.0		
100	30.39	0.0080		0.0	88.920	0.711		Vel = 3.09
100	20.02	2.003		0.0	30.420	31.402		
to		150.0		0.0	0.0	0.0		
102	50.41	0.0204		0.0	30.420	0.622		Vel = 5.13
102	0.0	2.003	5U	45.0	16.500	32.024		
to		150.0		0.0	45.000	3.573		
TR	50.41	0.0204		0.0	61.500	1.255		Vel = 5.13
	0.0							
	50.41					36.852		K Factor = 8.30
TR	50.41	2.003	Z	6.482	8.250	36.852		
to		150.0		0.0	6.482	1.732		
BR	50.41	0.0204		0.0	14.732	0.301		Vel = 5.13
BR	0.0	4.28	L	10.75	4.000	38.885		
to		140.0		0.0	10.750	0.0		
UG1	50.41	0.0006		0.0	14.750	0.009		Vel = 1.12
	0.0							
	50.41					38.894		K Factor = 8.08
UG1	50.41	4.24	2L	23.335	32.580	38.894		
to		150.0		0.0	23.335	-2.166		
BFD1	50.41	0.0005		0.0	55.915	0.030		Vel = 1.15
BFD1	0.0	4.026	Zai	0.0	10.000	36.758		
to		120.0		0.0	0.0	10.417		* * Fixed Loss = 10.417
BFS1	50.41	0.0010		0.0	10.000	0.010		Vel = 1.27
BFS1	0.0	4.24		0.0	13.000	47.185		
to		150.0		0.0	0.0	2.166		
DD1	50.41	0.0005		0.0	13.000	0.006		Vel = 1.15
DD1	86.01	4.24	G	3.889	40.250	49.357		Qa = 86.00
to		150.0	T	38.891	42.780	0.0		
M3	136.42	0.0033		0.0	83.030	0.277		Vel = 3.10
	0.0							
	136.42					49.634		K Factor = 19.36
M1	-80.66	7.98		0.0	31.580	49.649		
to		150.0		0.0	0.0	0.0		
M2	-80.66	-0.0001		0.0	31.580	-0.002		Vel = 0.52

Final Calculations - Hazen-Williams

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
M2	0.0	7.98	2F	27.183	193.580	49.647		
to		150.0		0.0	27.182	0.0		
M3	-80.66	-0.0001		0.0	220.762	-0.013		Vel = 0.52
M3	136.42	7.98	F	13.591	287.750	49.634		
to		150.0		0.0	13.592	0.0		
M4	55.76	0.0		0.0	301.342	0.009		Vel = 0.36
M4	0.0	7.98	T	52.855	76.670	49.643		
to		150.0		0.0	52.855	0.0		
M5	55.76	0.0		0.0	129.525	0.004		Vel = 0.36
M5	0.0	11.68	F	17.661	422.000	49.647		
to		150.0		0.0	17.661	0.0		
M1	55.76	0.0		0.0	439.661	0.002		Vel = 0.17
M1	80.66	11.68	T	81.513	372.830	49.649		
to		150.0	G	8.151	89.664	3.032		
CC1	136.42	0.0		0.0	462.494	0.011		Vel = 0.41
CC1	0.0	19.76		0.0	321.000	52.692		
to		150.0		0.0	0.0	0.0		
CC2	136.42	0.0		0.0	321.000	0.0		Vel = 0.14
CC2	0.0	6.08	G	4.038	65.000	52.692		
to		140.0	L	12.115	16.153	-2.166		
TEST	136.42	0.0007		0.0	81.153	0.054		Vel = 1.51
	0.0							
	136.42					50.580		K Factor = 19.18