

Job Name : The Discovery at Discovery - Lot 7
Address : 1920 NE Discovery Ave. - Lee's summit, Mo

Date : 8/6/2025
Sprinkler Contractor : Goal Fire Protection, LLC

Area Info :

Calculation Summary :

<u>Area #1</u> : Unit, 3 rd Floor
<u>Area #2</u> : Unit, 3 rd Floor
<u>Area #3</u> : Unit, 3 rd Floor
<u>Area #4</u> : Unit, 2 nd Floor
<u>Area #5</u> : Unit, 2 nd Floor
<u>Area #6</u> : Shell Space
<u>Area #7</u> : Parking Garage

Water Supply :

Flow Test :

Date : 6-3-2025

Static : 115 PSI

Residual : 70 PSI

Flow : 1501 GPM

Elevation : Same as 1st F.F.

Location of Flow Test : Looped City Main

Source of Flow Test : Goal Fire Protection

Notes :



WATER FLOW TEST REPORT



Property Name: Discovery Park

City, State: Lee's Summit, MO

Conducted by:

Wyatt Porter

HYDRANT # & LOCATION Ramp

DATE: 6/3/2025

WITNESS BY N/A

DAY OR WEEK:

TIME OF DAY: 8:30

WEATHER: Cloudy

WATER SUPPLIED BY:

PURPOSE OF TEST: Annual Inspection & Flow Rate

DATA

FLOW HYDRANT(S)

	A1	A2	A3
SIZE OPENING:	2.5	0	0
COEFFICIENT:	0.9	0	0
PITOT READING:	80	0	0
GPM:	1501	0	0

TOTAL FLOW DURING TEST: 1501 GPM

STATIC READING: 115 PSI

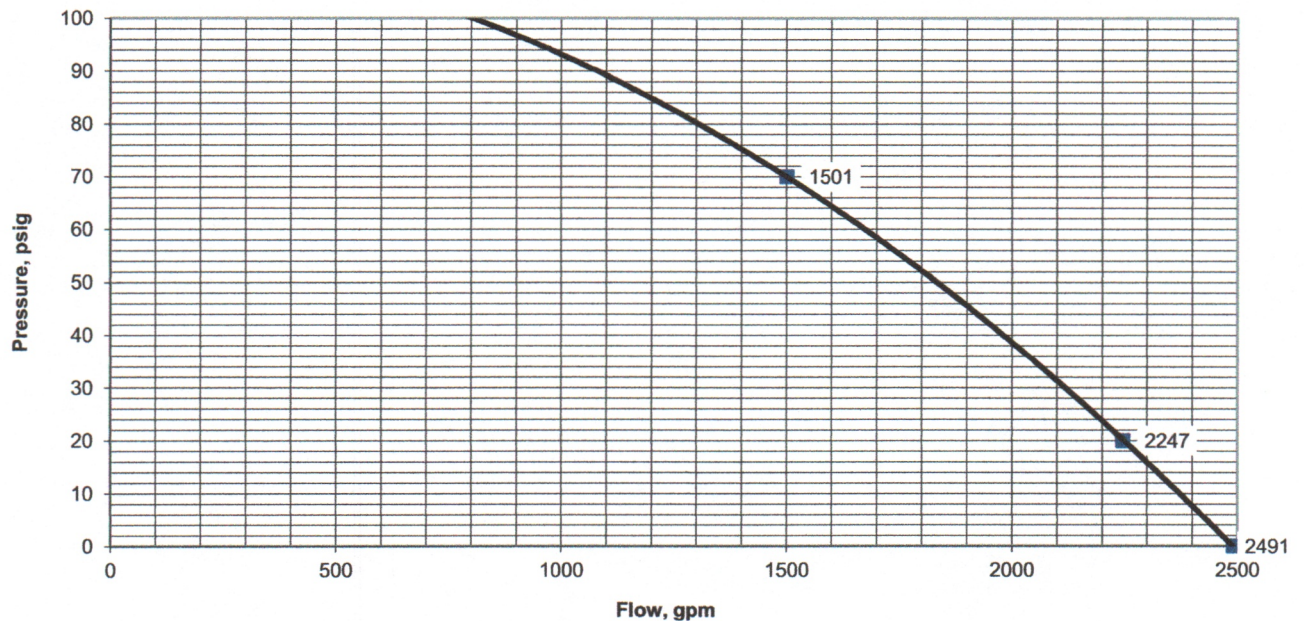
RESIDUAL: 70 PSI

RESULTS: AT 20 PSI RESIDUAL 2247 GPM

AT 0 PSI 2491 GPM

ESTIMATED CONSUMPTION: 1501 GAL.

REMARKS: Coefficient Per NFPA 291 (Smooth & Rounded Hydrant Butt = 0.90) (Square & Sharp Hydrant Butt = 0.80)
(Square Butt Projecting Into Hydrant Barrell 0.70) (Smooth & Rounded Hydrant Butt **FM GLOBAL** = 0.80)



Job Name : **The Discovery at Discovery - Lot 7**
Address : **1920 NE Discovery Ave. - Lee's summit, Mo**

Date : **8/6/2025**
Sprinkler Contractor : **Goal Fire Protection, LLC**

Area Info : **Area #1 - Unit, 3rd Floor**
Area Design : **Per NFPA-13R, 2016**

Design Criteria :
Gpm for head: **17.0** Psi for head: **15.0**
Total Sprinklers Operating: **2** Sprinkler K Factor: **4.4**
Outside Hose Allowance: **100**

Calculation Summary :

GPM Required : 45.54	PSI Required : 81.83	@ Base of Riser
GPM Required : 145.54	PSI Required : 82.28	@ Connection to City Main

Area Safety Margin: **32.1** PSI **28** %

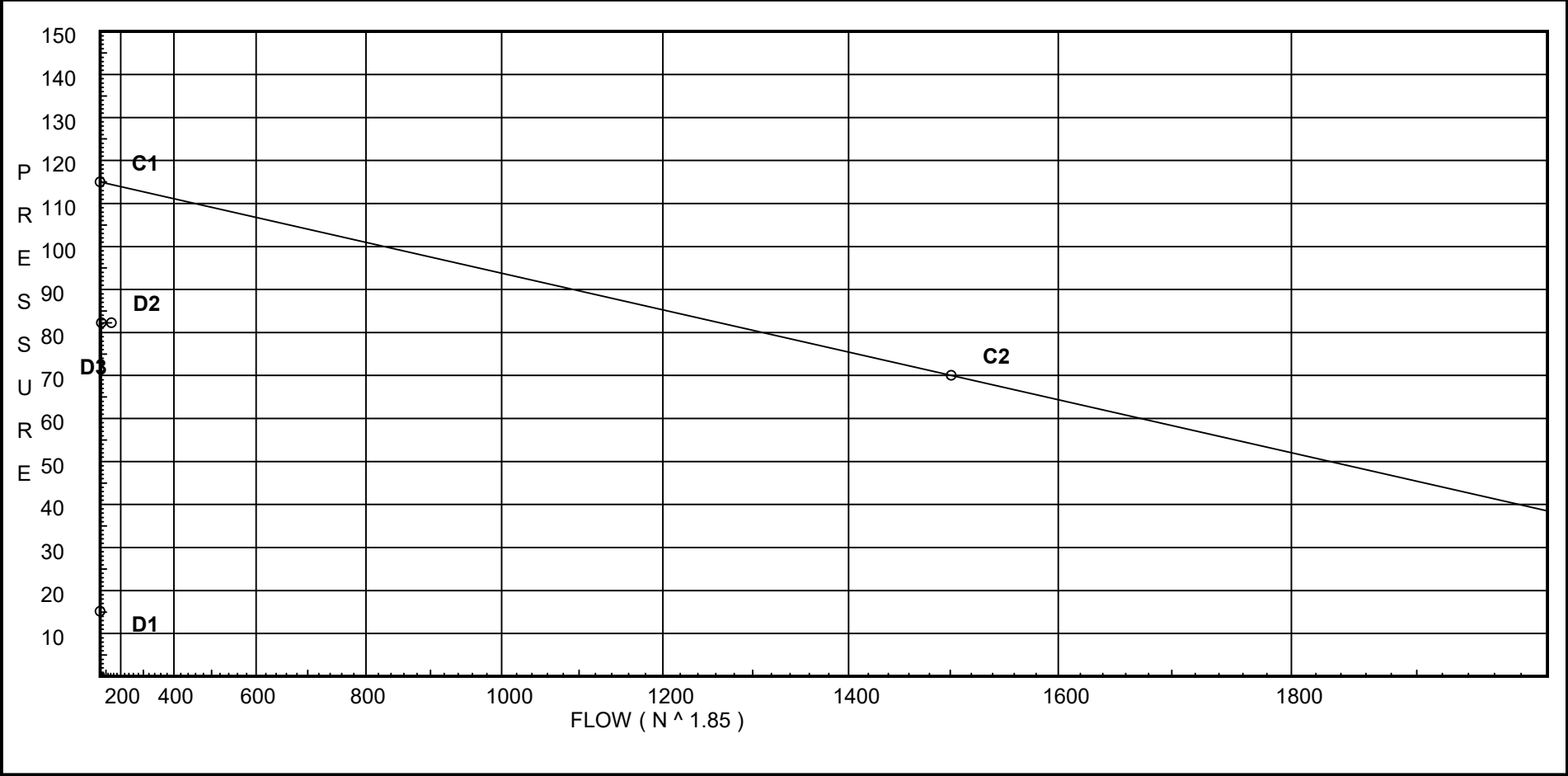
Notes :

Water Supply Curve

The Village at Discovery - Lot 7 Area #1

City Water Supply:
C1 - Static Pressure : 115
C2 - Residual Pressure: 70
C2 - Residual Flow : 1501

Demand:
D1 - Elevation : 15.158
D2 - System Flow : 45.536
D2 - System Pressure : 82.281
Hose (Demand) : 100
D3 - System Demand : 145.536
Safety Margin : 32.119



Fittings Used Summary

The Village at Discovery - Lot 7 Area #1

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
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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
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' Ell	0	4	5	6	7	9	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O *	CPVC Branch Tee	0	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
Zcb	Colt C200 Vert Butt	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.

Flow Summary - NFPA

The Village at Discovery - Lot 7 Area #1

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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	115.0	70	1501.0	114.4	145.54	82.281

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>	
H101	35.0	4.4	26.16	22.5	0.1	170
101A	35.0		26.61			
101B	26.0		31.69			
H102	35.0	4.4	27.4	23.03	0.1	230
102A	35.0		27.87			
102B	26.0		33.0			
101C	26.0		32.57			
H402	26.0		33.87			
102C	26.0		33.92			
A3	26.0		39.19			
A4	26.0		40.17			
A5	26.0		40.48			
A6	26.0		42.06			
A7	26.0		43.64			
A8	26.0		50.03			
A9	26.0		50.87			
A10	26.0		52.07			
A11	26.0		60.8			
A12	26.0		62.54			
A13	12.85		68.47			
TOR1	11.67		70.61			
BOR1	4.0		74.11			
BOR2	4.0		74.17			
UG	1.0		81.84			
HOSE	0.0		82.28	100.0		
TEST	0.0		82.28			

Final Calculations : Hazen-Williams

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The Village at Discovery - Lot 7 Area #1

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	*****
H101 to 101A	35 35	4.40	22.50 22.5	1 1.101	O	5.0	0.300 5.000 5.300	150 0.0847	26.160 0.0 0.449		Vel = 7.58	
101A to 101B	35 26		0.0 22.5	1 1.101	N	5.0	9.000 5.000 14.000	150 0.0846	26.609 3.898 1.185		Vel = 7.58	
101B to 101C	26 26		0.0 22.5	1 1.101	O	5.0	5.400 5.000 10.400	150 0.0846	31.692 0.0 0.880		Vel = 7.58	
101C			0.0 22.50						32.572		K Factor = 3.94	
H102 to 102A	35 35	4.40	23.03 23.03	1 1.101	O	5.0	0.300 5.000 5.300	150 0.0883	27.400 0.0 0.468		Vel = 7.76	
102A to 102B	35 26		0.0 23.03	1 1.101	N	5.0	9.000 5.000 14.000	150 0.0884	27.868 3.898 1.237		Vel = 7.76	
102B to 102C	26 26		0.0 23.03	1 1.101	O	5.0	5.400 5.000 10.400	150 0.0884	33.003 0.0 0.919		Vel = 7.76	
102C			0.0 23.03						33.922		K Factor = 3.95	
101C to H402	26 26		22.50 22.5	1 1.101			15.350 15.350	150 0.0846	32.572 0.0 1.299		Vel = 7.58	
H402 to 102C	26 26		0.0 22.5	1 1.101			0.600 0.600	150 0.0850	33.871 0.0 0.051		Vel = 7.58	
102C to A3	26 26		23.04 45.54	1 1.101	O	5.0	11.900 5.000 16.900	150 0.3117	33.922 0.0 5.268		Vel = 15.35	
A3			0.0 45.54						39.190		K Factor = 7.27	
A3 to A4	26 26		45.54 45.54	1.25 1.394			9.950 9.950	150 0.0989	39.190 0.0 0.984		Vel = 9.57	
A4 to A5	26 26		0.0 45.54	1.25 1.394			3.100 3.100	150 0.0987	40.174 0.0 0.306		Vel = 9.57	
A5 to A6	26 26		0.0 45.54	1.25 1.394			16.000 16.000	150 0.0988	40.480 0.0 1.581		Vel = 9.57	
A6 to A7	26 26		0.0 45.54	1.25 1.394			16.000 16.000	150 0.0988	42.061 0.0 1.581		Vel = 9.57	
A7 to A8	26 26		0.0 45.54	1.25 1.394			64.700 64.700	150 0.0988	43.642 0.0 6.392		Vel = 9.57	

Final Calculations : Hazen-Williams

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The Village at Discovery - Lot 7 Area #1

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	*****
A8 to A9	26 26		0.0 45.54	1.25 1.394			8.450 8.450	150 0.0988	50.034 0.0 0.835		Vel = 9.57	
A9 to A10	26 26		0.0 45.54	1.25 1.394			12.150 12.150	150 0.0988	50.869 0.0 1.201		Vel = 9.57	
A10 to A11	26 26		0.0 45.54	1.25 1.394			88.400 88.400	150 0.0988	52.070 0.0 8.734		Vel = 9.57	
A11 to A12	26 26		0.0 45.54	1.25 1.394	20	12.0	5.550 12.000 17.550	150 0.0988	60.804 0.0 1.734		Vel = 9.57	
A12 to A13	26 12.850		0.0 45.54	2 2.157			13.150 13.150	120 0.0178	62.538 5.695 0.234		Vel = 4.00	
A13			0.0 45.54						68.467		K Factor = 5.50	
A13 to TOR1	12.850 11.67		45.54 45.54	2 2.157	3E	18.46	73.300 18.460 91.760	120 0.0178	68.467 0.511 1.635		Vel = 4.00	
TOR1			0.0 45.54						70.613		K Factor = 5.42	
TOR1 to BOR1	11.67 4		45.54 45.54	2.5 2.635	B E	9.61 8.237	8.850 17.847 26.697	120 0.0067	70.613 3.322 0.179		Vel = 2.68	
BOR1 to BOR2	4 4		0.0 45.54	3 3.26	T	20.159	1.750 20.159 21.909	120 0.0024	74.114 0.0 0.053		Vel = 1.75	
BOR2 to UG	4 1		0.0 45.54	3 3.26	Zcb	0.0	3.000 3.000	120 0.0023	74.167 7.665 0.007		** Fixed Loss = 6.366 Vel = 1.75	
UG to HOSE	1 0		0.0 45.54	6 6.16	G E T	4.304 20.084 43.037	30.000 67.425 97.425	140 0.0001	81.839 0.433 0.008		Vel = 0.49	
HOSE to TEST	0 0	H100	100.00 145.54	6 6.16			1.000 1.000	140 0.0010	82.280 0.0 0.001		Vel = 1.57	
TEST			0.0 145.54						82.281		K Factor = 16.04	

Job Name : **The Discovery at Discovery - Lot 7**
Address : **1920 NE Discovery Ave. - Lee's summit, Mo**

Date : **8/6/2025**
Sprinkler Contractor : **Goal Fire Protection, LLC**

Area Info : **Area #2 - Unit, 3rd Floor**
Area Design : **Per NFPA-13R, 2016**

Design Criteria :
Gpm for head: **17.0** Psi for head: **15.0**
Total Sprinklers Operating: **3** Sprinkler K Factor: **4.4**
Outside Hose Allowance: **100**

Calculation Summary :

GPM Required : 67.39	PSI Required : 103.05	@ Base of Riser
GPM Required : 167.39	PSI Required : 103.50	@ Connection to City Main

Area Safety Margin: **10.7** PSI **9** %

Notes :

Water Supply Curve

The Village at Discovery - Lot 7 Area #2

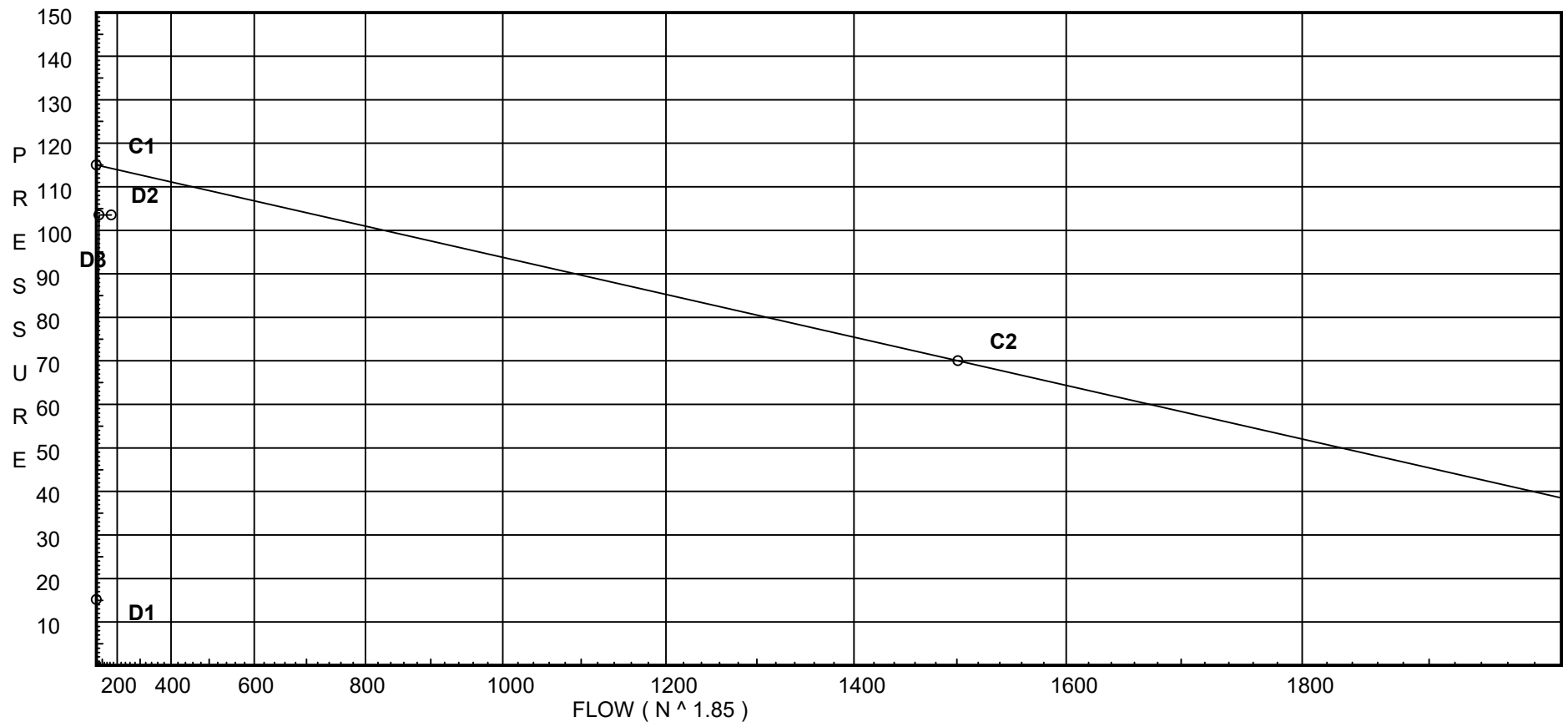
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City Water Supply:

C1 - Static Pressure : 115
C2 - Residual Pressure: 70
C2 - Residual Flow : 1501

Demand:

D1 - Elevation : 15.158
D2 - System Flow : 67.394
D2 - System Pressure : 103.508
Hose (Demand) : 100
D3 - System Demand : 167.394
Safety Margin : 10.714



Fittings Used Summary

The Village at Discovery - Lot 7 Area #2

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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
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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
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' Ell	0	4	5	6	7	9	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O *	CPVC Branch Tee	0	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
Zcb	Colt C200 Vert Butt	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.

Flow Summary - NFPA

The Village at Discovery - Lot 7 Area #2

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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	115.0	70	1501.0	114.222	167.39	103.508

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>	
H201	35.0	4.4	27.2	22.95	0.1	170
201A	35.0		27.66			
201B	26.0		32.79			
201C	26.0		33.58			
H202	35.0	4.4	23.69	21.42	0.1	200
202A	35.0		24.1			
202B	26.0		29.08			
H203	35.0	4.4	27.4	23.03	0.1	230
203A	35.0		27.87			
202C	26.0		30.0			
203B	26.0		33.0			
A2	26.0		34.92			
A3	26.0		34.94			
A4	26.0		35.21			
A5	26.0		35.3			
A6	26.0		38.56			
A7	26.0		41.83			
A8	26.0		55.03			
A9	26.0		56.76			
A10	26.0		59.23			
A11	26.0		77.27			
A12	26.0		80.86			
A13	12.85		87.03			
TOR1	11.67		90.92			
BOR1	4.0		94.61			
BOR2	4.0		94.72			
UG	1.0		103.06			
HOSE	0.0		103.51	100.0		
TEST	0.0		103.51			

Final Calculations : Hazen-Williams

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The Village at Discovery - Lot 7 Area #2

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	*****
H201 to 201A	35 35	4.40	22.95 22.95	1 1.101	O	5.0	0.300 5.000 5.300	150 0.0877	27.200 0.0 0.465		Vel = 7.73	
201A to 201B	35 26		0.0 22.95	1 1.101	N	5.0	9.000 5.000 14.000	150 0.0877	27.665 3.898 1.228		Vel = 7.73	
201B to 201C	26 26		0.0 22.95	1 1.101	O	5.0	3.950 5.000 8.950	150 0.0877	32.791 0.0 0.785		Vel = 7.73	
201C to A2	26 26		0.0 22.95	1 1.101	O	5.0	10.330 5.000 15.330	150 0.0878	33.576 0.0 1.346		Vel = 7.73	
A2			0.0 22.95						34.922		K Factor = 3.88	
H202 to 202A	35 35	4.40	21.42 21.42	1 1.101	O	5.0	0.300 5.000 5.300	150 0.0774	23.688 0.0 0.410		Vel = 7.22	
202A to 202B	35 26		0.0 21.42	1 1.101	N	5.0	9.000 5.000 14.000	150 0.0772	24.098 3.898 1.081		Vel = 7.22	
202B to 202C	26 26		0.0 21.42	1 1.101	O	5.0	6.900 5.000 11.900	150 0.0771	29.077 0.0 0.918		Vel = 7.22	
202C			0.0 21.42						29.995		K Factor = 3.91	
H203 to 203A	35 35	4.40	23.03 23.03	1 1.101	O	5.0	0.300 5.000 5.300	150 0.0883	27.400 0.0 0.468		Vel = 7.76	
203A to 203B	35 26		0.0 23.03	1 1.101	O	5.0	9.000 5.000 14.000	150 0.0884	27.868 3.898 1.237		Vel = 7.76	
203B			0.0 23.03						33.003		K Factor = 4.01	
202C to 203B	26 26		21.42 21.42	1 1.101	2N	10.0	28.950 10.000 38.950	150 0.0772	29.995 0.0 3.008		Vel = 7.22	
203B to A5	26 26		23.03 44.45	1 1.101	O	5.0	2.700 5.000 7.700	150 0.2981	33.003 0.0 2.295		Vel = 14.98	
A5			0.0 44.45						35.298		K Factor = 7.48	
A2 to A3	26 26		22.95 22.95	1.25 1.394			0.500 0.500	150 0.0280	34.922 0.0 0.014		Vel = 4.82	
A3 to A4	26 26		0.0 22.95	1.25 1.394			9.950 9.950	150 0.0277	34.936 0.0 0.276		Vel = 4.82	
A4 to A5	26 26		0.0 22.95	1.25 1.394			3.100 3.100	150 0.0277	35.212 0.0 0.086		Vel = 4.82	

Final Calculations : Hazen-Williams

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The Village at Discovery - Lot 7 Area #2

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	*****
A5 to A6	26 26		44.44 67.39	1.25 1.394		16.000	150	35.298 0.0 3.265		Vel = 14.17	
A6 to A7	26 26		0.0 67.39	1.25 1.394		16.000	150	38.563 0.0 3.265		Vel = 14.17	
A7 to A8	26 26		0.0 67.39	1.25 1.394		64.700	150	41.828 0.0 13.203		Vel = 14.17	
A8 to A9	26 26		0.0 67.39	1.25 1.394		8.450	150	55.031 0.0 1.725		Vel = 14.17	
A9 to A10	26 26		0.0 67.39	1.25 1.394		12.150	150	56.756 0.0 2.479		Vel = 14.17	
A10 to A11	26 26		0.0 67.39	1.25 1.394		88.400	150	59.235 0.0 18.039		Vel = 14.17	
A11 to A12	26 26		0.0 67.39	1.25 1.394	20 12.0	5.550 12.000 17.550	150	77.274 0.0 3.581		Vel = 14.17	
A12 to A13	26 12.850		0.0 67.39	2 2.157		13.150	120	80.855 5.695 0.484		Vel = 5.92	
A13			0.0 67.39					87.034		K Factor = 7.22	
A13 to TOR1	12.850 11.67		67.39 67.39	2 2.157	3E 18.46	73.300 18.460 91.760	120	87.034 0.511 3.377		Vel = 5.92	
TOR1			0.0 67.39					90.922		K Factor = 7.07	
TOR1 to BOR1	11.67 4		67.39 67.39	2.5 2.635	B E 9.61 8.237	8.850 17.847 26.697	120	90.922 3.322 0.370		Vel = 3.96	
BOR1 to BOR2	4 4		0.0 67.39	3 3.26	T 20.159	1.750 20.159 21.909	120	94.614 0.0 0.108		Vel = 2.59	
BOR2 to UG	4 1		0.0 67.39	3 3.26	Zcb 0.0	3.000	120	94.722 8.321 0.015		** Fixed Loss = 7.022 Vel = 2.59	
UG to HOSE	1 0		0.0 67.39	6 6.16	G E T 4.304 20.084 43.037	30.000 67.425 97.425	140	103.058 0.433 0.016		Vel = 0.73	
HOSE to TEST	0 0	H100	100.00 167.39	6 6.16		1.000	140	103.507 0.0 0.001		Vel = 1.80	
TEST			0.0 167.39					103.508		K Factor = 16.45	

Job Name : The Discovery at Discovery - Lot 7
Address : 1920 NE Discovery Ave. - Lee's summit, Mo

Date : 8/6/2025
Sprinkler Contractor : Goal Fire Protection, LLC

Area Info : Area #3 - Unit, 3rd Floor
Area Design : Per NFPA-13R, 2016

Design Criteria :
Gpm for head: 17.0 Psi for head: 15.0
Total Sprinklers Operating: 4 Sprinkler K Factor: 4.4
Outside Hose Allowance: 100

Calculation Summary :

GPM Required :71.12	PSI Required :89.74	@ Base of Riser
GPM Required :171.12	PSI Required :90.19	@ Connection to City Main

Area Safety Margin: 23.9 PSI 21 %

Notes :

Water Supply Curve

The Village at Discovery - Lot 7 Area #3

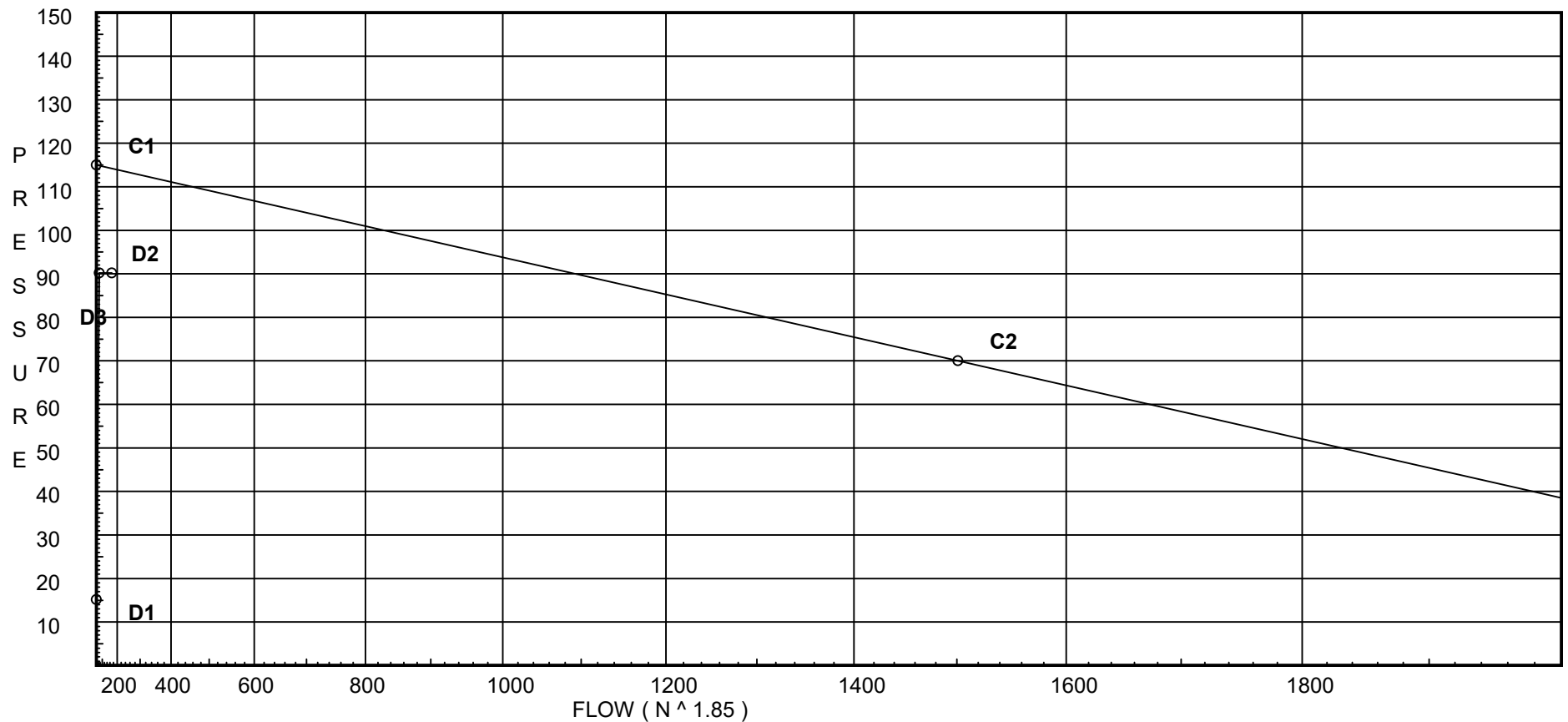
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City Water Supply:

C1 - Static Pressure : 115
C2 - Residual Pressure: 70
C2 - Residual Flow : 1501

Demand:

D1 - Elevation : 15.158
D2 - System Flow : 71.12
D2 - System Pressure : 90.194
Hose (Demand) : 100
D3 - System Demand : 171.12
Safety Margin : 23.996



Fittings Used Summary

The Village at Discovery - Lot 7 Area #3

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Date

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
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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
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' Ell	0	4	5	6	7	9	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O *	CPVC Branch Tee	0	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
Zcb	Colt C200 Vert Butt	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.

Flow Summary - NFPA

The Village at Discovery - Lot 7 Area #3

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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	115.0	70	1501.0	114.19	171.12	90.194

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>	
H301	35.0	4.4	15.0	17.04	0.1	170
301A	35.0		15.27			
301B	26.0		19.87			
H302	35.0	4.4	15.63	17.4	0.1	170
203A	35.0		15.91			
203B	26.0		20.55			
H303	35.0	4.4	16.39	17.81	0.1	170
303A	35.0		16.68			
303B	26.0		21.35			
H304	35.0	4.4	18.39	18.87	0.1	170
304A	35.0		18.71			
304B	26.0		23.46			
A1	26.0		20.55			
A2	26.0		20.73			
A3	26.0		20.74			
A4	26.0		20.9			
A5	26.0		20.95			
A6	26.0		21.89			
A7	26.0		23.93			
A8	26.0		38.52			
A9	26.0		40.42			
A10	26.0		43.16			
A11	26.0		63.09			
A12	26.0		67.05			
A13	12.85		73.28			
TOR1	11.67		77.52			
BOR1	4.0		81.25			
BOR2	4.0		81.37			
UG	1.0		89.74			
HOSE	0.0		90.19	100.0		
TEST	0.0		90.19			

Final Calculations : Hazen-Williams

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Date

The Village at Discovery - Lot 7 Area #3

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	*****
H301 to 301A	35 35	4.40	17.04	1	O	5.0	0.300 5.000 5.300	150	15.000 0.0			
			17.04	1.101				0.0506	0.268	Vel =	5.74	
301A to 301B	35 26		0.0	1	N	5.0	9.000 5.000 14.000	150	15.268 3.898			
			17.04	1.101				0.0506	0.708	Vel =	5.74	
301B to A1	26 26		0.0	1	O N	5.0 5.0	3.330 10.000 13.330	150	19.874 0.0			
			17.04	1.101				0.0506	0.675	Vel =	5.74	
A1			0.0 17.04						20.549	K Factor =	3.76	
H302 to 203A	35 35	4.40	17.40	1	O	5.0	0.300 5.000 5.300	150	15.634 0.0			
			17.4	1.101				0.0526	0.279	Vel =	5.86	
203A to 203B	35 26		0.0	1	O	5.0	9.000 5.000 14.000	150	15.913 3.898			
			17.4	1.101				0.0526	0.736	Vel =	5.86	
203B to A5	26 26		0.0	1	O	5.0	2.700 5.000 7.700	150	20.547 0.0			
			17.4	1.101				0.0525	0.404	Vel =	5.86	
A5			0.0 17.40						20.951	K Factor =	3.80	
H303 to 303A	35 35	4.40	17.81	1	O	5.0	0.300 5.000 5.300	150	16.392 0.0			
			17.81	1.101				0.0551	0.292	Vel =	6.00	
303A to 303B	35 26		0.0	1	N	5.0	9.000 5.000 14.000	150	16.684 3.898			
			17.81	1.101				0.0549	0.768	Vel =	6.00	
303B to A6	26 26		0.0	1	O	5.0	4.900 5.000 9.900	150	21.350 0.0			
			17.81	1.101				0.0549	0.544	Vel =	6.00	
A6			0.0 17.81						21.894	K Factor =	3.81	
H304 to 304A	35 35	4.40	18.87	1	O	5.0	0.300 5.000 5.300	150	18.386 0.0			
			18.87	1.101				0.0611	0.324	Vel =	6.36	
304A to 304B	35 26		0.0	1	N	5.0	9.000 5.000 14.000	150	18.710 3.898			
			18.87	1.101				0.0611	0.855	Vel =	6.36	
304B to A7	26 26		0.0	1	O	5.0	2.700 5.000 7.700	150	23.463 0.0			
			18.87	1.101				0.0610	0.470	Vel =	6.36	
A7			0.0 18.87						23.933	K Factor =	3.86	
A1 to A2	26 26		17.04	1.25			11.550	150	20.549 0.0			
			17.04	1.394				0.0160	0.185	Vel =	3.58	
A2 to A3	26 26		0.0	1.25			0.500	150	20.734 0.0			
			17.04	1.394				0.0160	0.008	Vel =	3.58	

Final Calculations : Hazen-Williams

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Date

The Village at Discovery - Lot 7 Area #3

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	*****
A3 to A4	26 26		0.0 17.04	1.25 1.394			9.950 9.950	150 0.0161	20.742 0.0 0.160		Vel = 3.58	
A4 to A5	26 26		0.0 17.04	1.25 1.394			3.100 3.100	150 0.0158	20.902 0.0 0.049		Vel = 3.58	
A5 to A6	26 26		17.40 34.44	1.25 1.394			16.000 16.000	150 0.0589	20.951 0.0 0.943		Vel = 7.24	
A6 to A7	26 26		17.81 52.25	1.25 1.394			16.000 16.000	150 0.1274	21.894 0.0 2.039		Vel = 10.98	
A7 to A8	26 26		18.87 71.12	1.25 1.394			64.700 64.700	150 0.2254	23.933 0.0 14.585		Vel = 14.95	
A8 to A9	26 26		0.0 71.12	1.25 1.394			8.450 8.450	150 0.2254	38.518 0.0 1.905		Vel = 14.95	
A9 to A10	26 26		0.0 71.12	1.25 1.394			12.150 12.150	150 0.2254	40.423 0.0 2.739		Vel = 14.95	
A10 to A11	26 26		0.0 71.12	1.25 1.394			88.400 88.400	150 0.2254	43.162 0.0 19.927		Vel = 14.95	
A11 to A12	26 26		0.0 71.12	1.25 1.394	20	12.0	5.550 12.000 17.550	150 0.2254	63.089 0.0 3.956		Vel = 14.95	
A12 to A13	26 12.850		0.0 71.12	2 2.157			13.150 13.150	120 0.0407	67.045 5.695 0.535		Vel = 6.24	
A13			0.0 71.12						73.275		K Factor = 8.31	
A13 to TOR1	12.850 11.67		71.12 71.12	2 2.157	3E	18.46	73.300 18.460 91.760	120 0.0406	73.275 0.511 3.730		Vel = 6.24	
TOR1			0.0 71.12						77.516		K Factor = 8.08	
TOR1 to BOR1	11.67 4		71.12 71.12	2.5 2.635	B E	9.61 8.237	8.850 17.847 26.697	120 0.0153	77.516 3.322 0.409		Vel = 4.18	
BOR1 to BOR2	4 4		0.0 71.12	3 3.26	T	20.159	1.750 20.159 21.909	120 0.0054	81.247 0.0 0.119		Vel = 2.73	
BOR2 to UG	4 1		0.0 71.12	3 3.26	Zcb	0.0	3.000 3.000	120 0.0057	81.366 8.359 0.017		** Fixed Loss = 7.06 Vel = 2.73	
UG to HOSE	1 0		0.0 71.12	6 6.16	G E T	4.304 20.084 43.037	30.000 67.425 97.425	140 0.0002	89.742 0.433 0.018		Vel = 0.77	

Final Calculations : Hazen-Williams

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The Village at Discovery - Lot 7 Area #3

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	*****
HOSE to TEST	0 0	H100	100.00 171.12	6 6.16			1.000 1.000	140 0.0010	90.193 0.0 0.001		Vel = 1.84	
TEST			0.0 171.12						90.194		K Factor = 18.02	

Job Name : **The Discovery at Discovery - Lot 7**
Address : **1920 NE Discovery Ave. - Lee's summit, Mo**

Date : **8/6/2025**
Sprinkler Contractor : **Goal Fire Protection, LLC**

Area Info : **Area #4 - Unit, 2nd Floor**
Area Design : **Per NFPA-13R, 2016**

Design Criteria :
Gpm for head: **17.0** Psi for head: **12.0**
Total Sprinklers Operating: **3** Sprinkler K Factor: **4.9**
Outside Hose Allowance: **100**

Calculation Summary :

GPM Required : 54.17	PSI Required : 67.85	@ Base of Riser
GPM Required : 154.17	PSI Required : 68.29	@ Connection to City Main

Area Safety Margin: **16.0** PSI **40** %

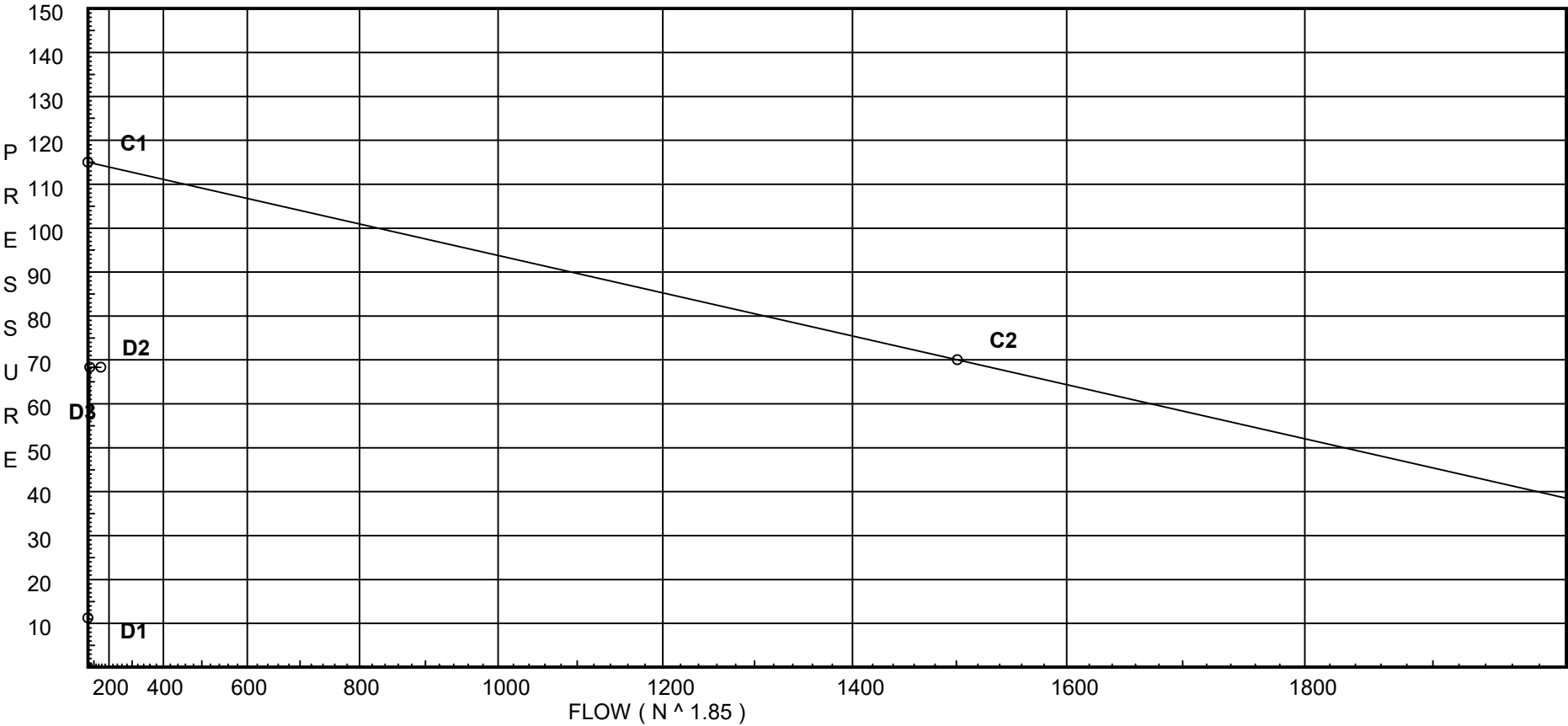
Notes :

Water Supply Curve

The Village at Discovery - Lot 7 Area #4

City Water Supply:
C1 - Static Pressure : 115
C2 - Residual Pressure: 70
C2 - Residual Flow : 1501

Demand:
D1 - Elevation : 11.261
D2 - System Flow : 54.166
D2 - System Pressure : 68.295
Hose (Demand) : 100
D3 - System Demand : 154.166
Safety Margin : 46.038



Fittings Used Summary

The Village at Discovery - Lot 7 Area #4

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Date

Fitting Legend																					
Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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
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
O *	CPVC Branch Tee	0	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
Zcb	Colt C200 Vert Butt	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.

The Village at Discovery - Lot 7 Area #4

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	115.0	70	1501.0	114.332	154.17	68.295

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>	
DP01	25.0	4.9	12.04	17.0	0.1	170
EQ01	26.0		11.88			
H401	26.0	4.93	11.88	17.0	K=K @ EQ01	
101C	26.0		12.01			
H402	26.0	4.93	12.78	17.64	K=K @ EQ01	
102C	26.0		12.89			
H403	26.0	4.93	15.67	19.53	K=K @ EQ01	
A3	26.0		16.07			
A4	26.0		16.66			
A5	26.0		17.08			
A6	26.0		19.26			
A7	26.0		21.44			
A8	26.0		30.25			
A9	26.0		31.41			
A10	26.0		33.06			
A11	26.0		45.1			
A12	26.0		47.49			
A13	12.85		53.51			
TOR1	11.67		56.27			
BOR1	4.0		59.84			
BOR2	4.0		59.92			
UG	1.0		67.85			
HOSE	0.0		68.29	100.0		
TEST	0.0		68.29			

Final Calculations : Hazen-Williams

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Date

The Village at Discovery - Lot 7 Area #4

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	*****
DP01 to EQ01	25 26	4.90	17.00 17.0	1 1.101	O 5.0	0.400 5.000 5.400	150 0.0504	12.037 -0.433 0.272		Vel = 5.73	
EQ01			0.0 17.00					11.876		K Factor = 4.93	
H401 to 101C	26 26	4.93	17.00 17.0	1 1.101		2.600 2.600	150 0.0500	11.876 0.0 0.130		K = K @ EQ01 Vel = 5.73	
101C to H402	26 26		0.0 17.0	1 1.101		15.350 15.350	150 0.0504	12.006 0.0 0.774		Vel = 5.73	
H402 to 102C	26 26	4.93	17.64 34.64	1 1.101		0.600 0.600	150 0.1867	12.780 0.0 0.112		K = K @ EQ01 Vel = 11.67	
102C to A3	26 26		0.0 34.64	1 1.101	O 5.0	11.900 5.000 16.900	150 0.1879	12.892 0.0 3.176		Vel = 11.67	
A3			0.0 34.64					16.068		K Factor = 8.64	
H403 to A4	26 26	4.93	19.53 19.53	1 1.101	O 5.0	10.150 5.000 15.150	150 0.0651	15.674 0.0 0.987		K = K @ EQ01 Vel = 6.58	
A4			0.0 19.53					16.661		K Factor = 4.78	
A3 to A4	26 26		34.64 34.64	1.25 1.394		9.950 9.950	150 0.0596	16.068 0.0 0.593		Vel = 7.28	
A4 to A5	26 26		19.53 54.17	1.25 1.394		3.100 3.100	150 0.1361	16.661 0.0 0.422		Vel = 11.39	
A5 to A6	26 26		0.0 54.17	1.25 1.394		16.000 16.000	150 0.1362	17.083 0.0 2.179		Vel = 11.39	
A6 to A7	26 26		0.0 54.17	1.25 1.394		16.000 16.000	150 0.1362	19.262 0.0 2.180		Vel = 11.39	
A7 to A8	26 26		0.0 54.17	1.25 1.394		64.700 64.700	150 0.1362	21.442 0.0 8.813		Vel = 11.39	
A8 to A9	26 26		0.0 54.17	1.25 1.394		8.450 8.450	150 0.1362	30.255 0.0 1.151		Vel = 11.39	
A9 to A10	26 26		0.0 54.17	1.25 1.394		12.150 12.150	150 0.1361	31.406 0.0 1.654		Vel = 11.39	
A10 to A11	26 26		0.0 54.17	1.25 1.394		88.400 88.400	150 0.1362	33.060 0.0 12.041		Vel = 11.39	

Final Calculations : Hazen-Williams

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The Village at Discovery - Lot 7 Area #4

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	*****
A11 to A12	26 26		0.0 54.17	1.25 1.394	20	12.0	5.550 12.000 17.550	150 0.1362	45.101 0.0 2.391		Vel = 11.39	
A12 to A13	26 12.850		0.0 54.17	2 2.157			13.150 13.150	120 0.0246	47.492 5.695 0.323		Vel = 4.76	
A13			0.0 54.17						53.510		K Factor = 7.41	
A13 to TOR1	12.850 11.67		54.17 54.17	2 2.157	3E	18.46	73.300 18.460 91.760	120 0.0246	53.510 0.511 2.253		Vel = 4.76	
TOR1			0.0 54.17						56.274		K Factor = 7.22	
TOR1 to BOR1	11.67 4		54.17 54.17	2.5 2.635	B E	9.61 8.237	8.850 17.847 26.697	120 0.0093	56.274 3.322 0.248		Vel = 3.19	
BOR1 to BOR2	4 4		0.0 54.17	3 3.26	T	20.159	1.750 20.159 21.909	120 0.0033	59.844 0.0 0.072		Vel = 2.08	
BOR2 to UG	4 1		0.0 54.17	3 3.26	Zcb	0.0	3.000 3.000	120 0.0033	59.916 7.924 0.010		** Fixed Loss = 6.625 Vel = 2.08	
UG to HOSE	1 0		0.0 54.17	6 6.16	G E T	4.304 20.084 43.037	30.000 67.425 97.425	140 0.0001	67.850 0.433 0.011		Vel = 0.58	
HOSE to TEST	0 0	H100	100.00 154.17	6 6.16			1.000 1.000	140 0.0010	68.294 0.0 0.001		Vel = 1.66	
TEST			0.0 154.17						68.295		K Factor = 18.66	

Job Name : **The Discovery at Discovery - Lot 7**
Address : **1920 NE Discovery Ave. - Lee's summit, Mo**

Date : **8/6/2025**
Sprinkler Contractor : **Goal Fire Protection, LLC**

Area Info : **Area #5 - Unit, 2nd Floor**
Area Design : **Per NFPA-13R, 2016**

Design Criteria :
Gpm for head: **17.0** Psi for head: **12.0**
Total Sprinklers Operating: **4** Sprinkler K Factor: **4.9**
Outside Hose Allowance: **100**

Calculation Summary :

GPM Required : 73.52	PSI Required : 66.01	@ Base of Riser
GPM Required : 173.52	PSI Required : 66.46	@ Connection to City Main

Area Safety Margin: **47.7** PSI **42** %

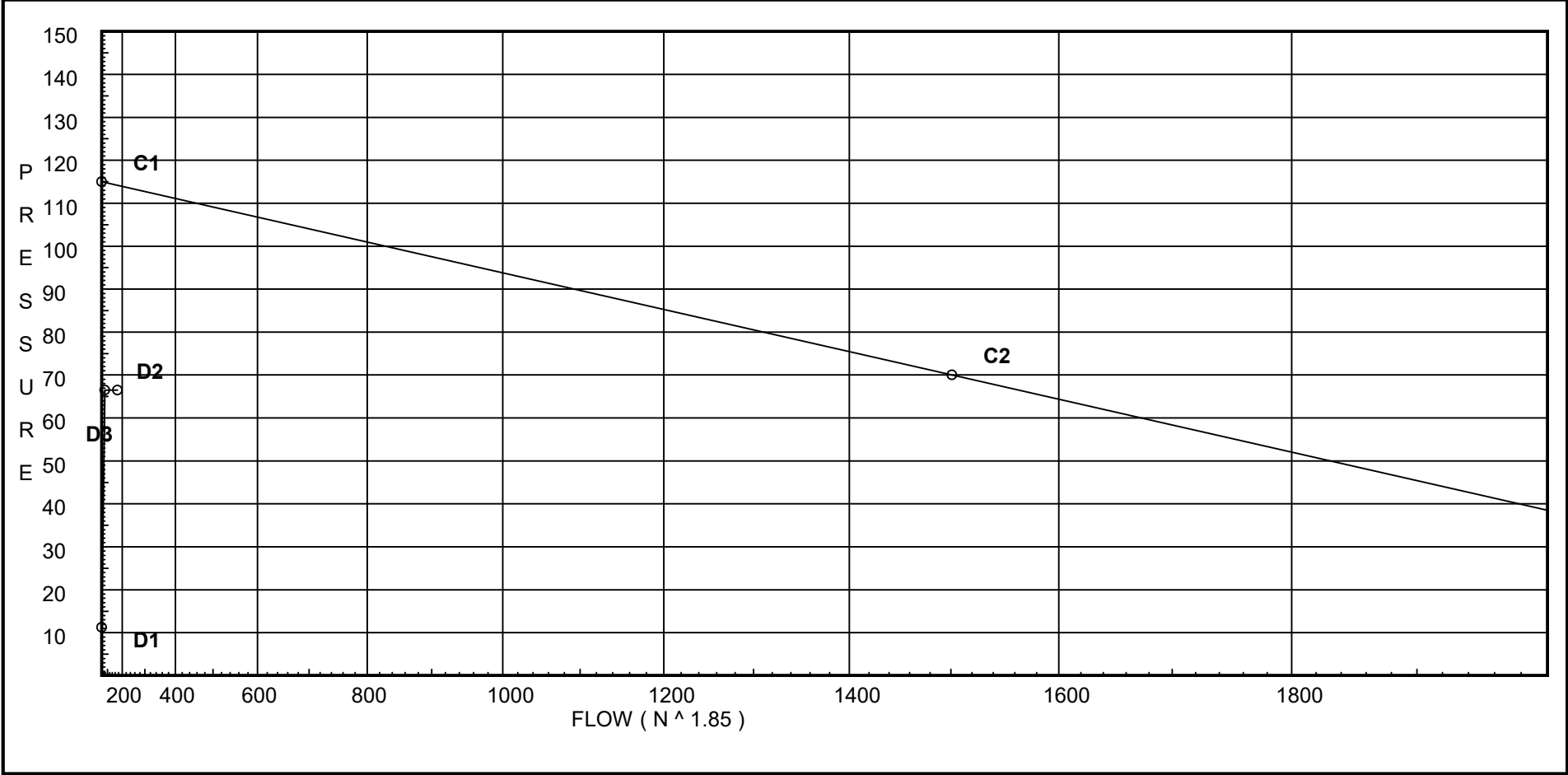
Notes :

Water Supply Curve

The Village at Discovery - Lot 7 Area #5

City Water Supply:
C1 - Static Pressure : 115
C2 - Residual Pressure: 70
C2 - Residual Flow : 1501

Demand:
D1 - Elevation : 11.261
D2 - System Flow : 73.523
D2 - System Pressure : 66.463
Hose (Demand) : 100
D3 - System Demand : 173.523
Safety Margin : 47.706



Fittings Used Summary

The Village at Discovery - Lot 7 Area #5

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
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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
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
O *	CPVC Branch Tee	0	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
Zcb	Colt C200 Vert Butt	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.

The Village at Discovery - Lot 7 Area #5

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	115.0	70	1501.0	114.169	173.52	66.463

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
DP01	25.0	4.9	12.04	17.0	0.1	170
EQ01	26.0		11.88			
H501	26.0	4.93	14.6	18.85		K=K @ EQ01
H502	26.0	4.93	11.88	17.0		K=K @ EQ01
H503	26.0	4.93	12.78	17.64		K=K @ EQ01
H504	26.0	4.93	16.5	20.04		K=K @ EQ01
A8	26.0		15.92			
A9	26.0		16.08			
A10	26.0		17.7			
A11	26.0		38.89			
A12	26.0		43.09			
A13	12.85		49.36			
TOR1	11.67		53.84			
BOR1	4.0		57.59			
BOR2	4.0		57.72			
UG	1.0		66.01			
HOSE	0.0		66.46	100.0		
TEST	0.0		66.46			

Final Calculations : Hazen-Williams

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The Village at Discovery - Lot 7 Area #5

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	*****
DP01 to EQ01	25 26	4.90	17.00 17.0	1 1.101	O 5.0	0.400 5.000 5.400	150 0.0504	12.037 -0.433 0.272		Vel = 5.73	
EQ01			0.0 17.00					11.876		K Factor = 4.93	
H501 to A8	26 26	4.93	18.85 18.85	1 1.101	O 5.0	16.650 5.000 21.650	150 0.0610	14.597 0.0 1.320		K = K @ EQ01 Vel = 6.35	
A8			0.0 18.85					15.917		K Factor = 4.72	
H502 to H503	26 26	4.93	17.00 17.0	1 1.101		18.000 18.000	150 0.0503	11.876 0.0 0.906		K = K @ EQ01 Vel = 5.73	
H503 to A9	26 26	4.93	17.64 34.64	1 1.101	O 5.0	12.550 5.000 17.550	150 0.1880	12.782 0.0 3.299		K = K @ EQ01 Vel = 11.67	
A9			0.0 34.64					16.081		K Factor = 8.64	
H504 to A10	26 26	4.93	20.04 20.04	1 1.101	O 5.0	12.550 5.000 17.550	150 0.0683	16.499 0.0 1.198		K = K @ EQ01 Vel = 6.75	
A10			0.0 20.04					17.697		K Factor = 4.76	
A8 to A9	26 26		18.85 18.85	1.25 1.394		8.450 8.450	150 0.0194	15.917 0.0 0.164		Vel = 3.96	
A9 to A10	26 26		34.63 53.48	1.25 1.394		12.150 12.150	150 0.1330	16.081 0.0 1.616		Vel = 11.24	
A10 to A11	26 26		20.04 73.52	1.25 1.394		88.400 88.400	150 0.2397	17.697 0.0 21.191		Vel = 15.46	
A11 to A12	26 26		0.0 73.52	1.25 1.394	2O 12.0	5.550 12.000 17.550	150 0.2397	38.888 0.0 4.207		Vel = 15.46	
A12 to A13	26 12.850		0.0 73.52	2 2.157		13.150 13.150	120 0.0432	43.095 5.695 0.568		Vel = 6.45	
A13			0.0 73.52					49.358		K Factor = 10.46	
A13 to TOR1	12.850 11.67		73.52 73.52	2 2.157	3E 18.46	73.300 18.460 91.760	120 0.0432	49.358 0.511 3.966		Vel = 6.45	
TOR1			0.0 73.52					53.835		K Factor = 10.02	
TOR1 to BOR1	11.67 4		73.52 73.52	2.5 2.635	B E 9.61 8.237	8.850 17.847 26.697	120 0.0163	53.835 3.322 0.435		Vel = 4.33	

Final Calculations : Hazen-Williams

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The Village at Discovery - Lot 7 Area #5

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	*****
BOR1 to BOR2	4 4		0.0 73.52	3 3.26	T	20.159 20.159 21.909	120 0.0058	57.592 0.0 0.127		Vel = 2.83	
BOR2 to UG	4 1		0.0 73.52	3 3.26	Zcb	0.0 3.000 3.000	120 0.0057	57.719 8.274 0.017		* * Fixed Loss = 6.974 Vel = 2.83	
UG to HOSE	1 0		0.0 73.52	6 6.16	G E T	4.304 20.084 43.037	30.000 67.425 97.425	140 0.0002	66.010 0.433 0.019	Vel = 0.79	
HOSE to TEST	0 0	H100	100.00 173.52	6 6.16		1.000 1.000	140 0.0010	66.462 0.0 0.001		Vel = 1.87	
TEST			0.0 173.52					66.463		K Factor = 21.28	

Job Name : **The Discovery at Discovery - Lot 7**
Address : **1920 NE Discovery Ave. - Lee's summit, Mo**

Date : **8/6/2025**
Sprinkler Contractor : **Goal Fire Protection, LLC**

Area Info : **Area #6 - Shell Space**
Area Design : **Per NFPA-13, 2016**
System Type : **Wet System**

Design Criteria :
Density: **0.20** gpm/sq. ft. Operating Area: **1500** sq. ft.
Max. Area Per Sprinkler: **130** Total Sprinklers Operating: **16** Sprinkler K Factor: **5.6**
Outside Hose Allowance: **250**

Calculation Summary :

GPM Required : 425.84	PSI Required : 88.86	@ Base of Riser
GPM Required : 675.84	PSI Required : 89.79	@ Connection to City Main

Area Safety Margin: **14.9** PSI **14** %

Notes :

Water Supply Curve

The Village at Discovery - Lot 7 - Area #6

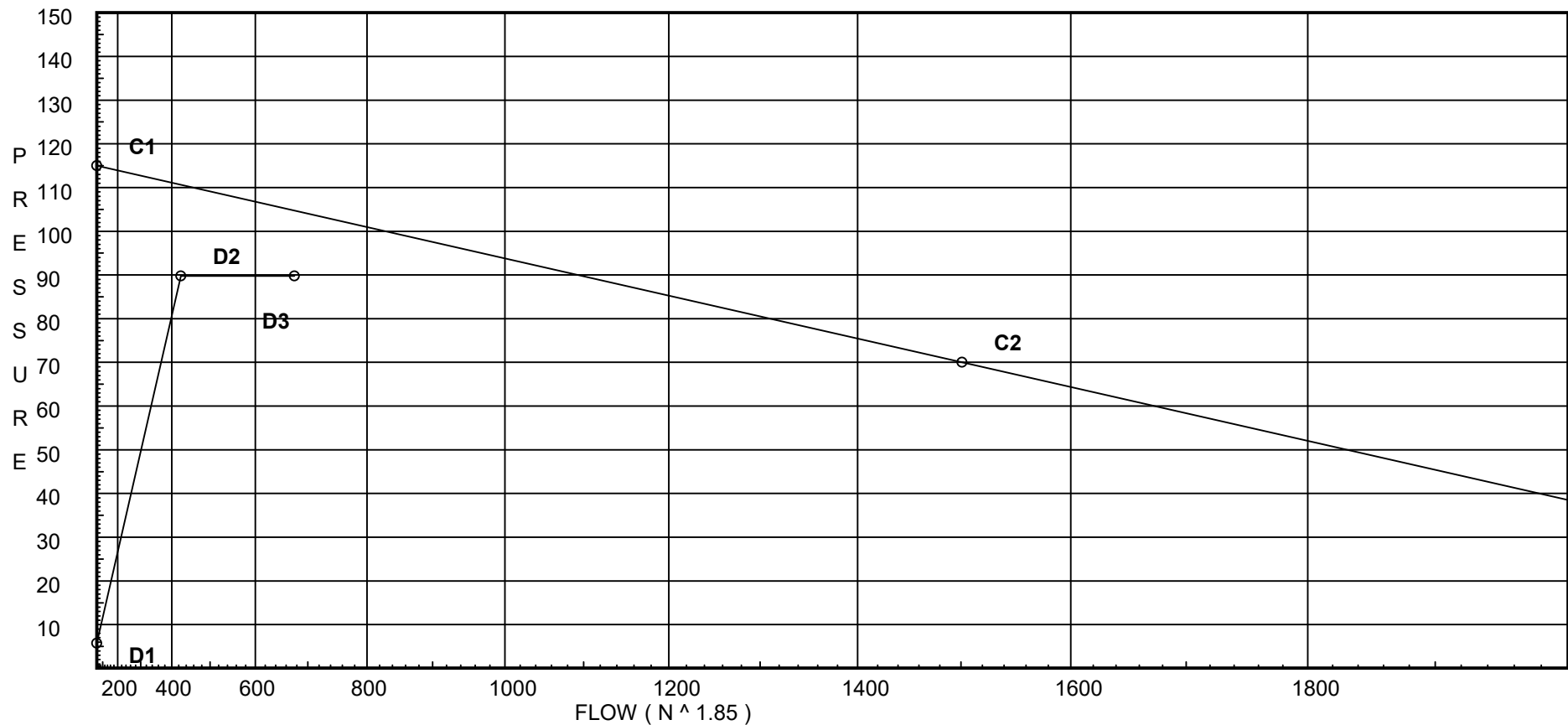
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City Water Supply:

C1 - Static Pressure : 115
C2 - Residual Pressure: 70
C2 - Residual Flow : 1501

Demand:

D1 - Elevation : 5.739
D2 - System Flow : 425.844
D2 - System Pressure : 89.798
Hose (Demand) : 250
D3 - System Demand : 675.844
Safety Margin : 14.919



Fittings Used Summary

The Village at Discovery - Lot 7 - Area #6

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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
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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
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
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
Zcb	Colt C200 Vert Butt	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.

The Village at Discovery - Lot 7 - Area #6

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	115.0	70	1501.0	104.717	675.84	89.798

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
SP02	14.25	5.6	18.37	24.0	0.2	120
EQ02	13.25		19.35			
SP01	14.25	5.6	18.37	24.0	0.2	120
EQ01	13.25		19.89			
H601	13.25	5.38	19.89	24.0	K=K @ EQ01	
H602	13.25	5.38	20.2	24.19	K=K @ EQ01	
H603	13.25	5.38	21.33	24.85	K=K @ EQ01	
H604	13.25	5.38	24.31	26.53	K=K @ EQ01	
H606	13.25	5.46	29.34	29.55	K=K @ EQ02	
H605	13.25	5.38	30.46	29.7	K=K @ EQ01	
606	13.25		30.94			
H607	13.25	5.38	20.04	24.09	K=K @ EQ01	
H608	13.25	5.38	20.35	24.28	K=K @ EQ01	
H609	13.25	5.38	21.49	24.94	K=K @ EQ01	
H610	13.25	5.38	24.48	26.62	K=K @ EQ01	
H611	13.25	5.46	31.21	30.48	K=K @ EQ02	
H612	13.25	5.38	32.03	30.45	K=K @ EQ01	
H613	13.25	5.38	22.96	25.78	K=K @ EQ01	
H614	13.25	5.38	23.32	25.98	K=K @ EQ01	
H615	13.25	5.38	24.44	26.6	K=K @ EQ01	
H616	13.25	5.38	26.69	27.8	K=K @ EQ01	
BA1	13.25		32.65			
BA2	13.25		32.66			
BA3	13.25		32.89			
BA4	13.25		33.04			
BA5	13.25		33.86			
BA6	13.25		50.26			
BX	11.67		62.48			
TOR2	11.67		71.21			
BOR2	4.0		81.66			
UG	1.0		88.86			
HOSE	0.0		89.79	250.0		
TEST	0.0		89.8			

Final Calculations : Hazen-Williams

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The Village at Discovery - Lot 7 - Area #6

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	*****
SP02 to EQ02	14.25 13.25	5.60	24.00 24.0	1 1.049	E	2.0	1.000 2.000 3.000	120 0.1823	18.367 0.433 0.547		Vel = 8.91	
EQ02			0.0 24.00						19.347		K Factor = 5.46	
SP01 to EQ01	14.25 13.25	5.60	24.00 24.0	1 1.049	T	5.0	1.000 5.000 6.000	120 0.1823	18.367 0.433 1.094		Vel = 8.91	
EQ01			0.0 24.00						19.894		K Factor = 5.38	
H601 to H602	13.25 13.25	5.38	24.00 24.0	1.25 1.442			8.000 8.000	120 0.0388	19.894 0.0 0.310		K = K @ EQ01 Vel = 4.71	
H602 to H603	13.25 13.25	5.38	24.19 48.19	1.25 1.442			8.000 8.000	120 0.1406	20.204 0.0 1.125		K = K @ EQ01 Vel = 9.47	
H603 to H604	13.25 13.25	5.38	24.85 73.04	1.25 1.442			9.810 9.810	120 0.3034	21.329 0.0 2.976		K = K @ EQ01 Vel = 14.35	
H604 to BA1	13.25 13.25	5.38	26.52 99.56	1.25 1.442	T	7.432	8.080 7.432 15.512	120 0.5382	24.305 0.0 8.349		K = K @ EQ01 Vel = 19.56	
BA1			0.0 99.56						32.654		K Factor = 17.42	
H606 to 606	13.25 13.25	5.46	29.55 29.55	1 1.049	T	5.0	1.000 5.000 6.000	120 0.2680	29.336 0.0 1.608		K = K @ EQ02 Vel = 10.97	
606			0.0 29.55						30.944		K Factor = 5.31	
H605 to 606	13.25 13.25	5.38	29.70 29.7	1.25 1.442			8.470 8.470	120 0.0574	30.458 0.0 0.486		K = K @ EQ01 Vel = 5.83	
606 to BA2	13.25 13.25		29.55 59.25	1.25 1.442	T	7.432	0.920 7.432 8.352	120 0.2061	30.944 0.0 1.721		Vel = 11.64	
BA2			0.0 59.25						32.665		K Factor = 10.37	
H607 to H608	13.25 13.25	5.38	24.09 24.09	1.25 1.442			8.000 8.000	120 0.0390	20.043 0.0 0.312		K = K @ EQ01 Vel = 4.73	
H608 to H609	13.25 13.25	5.38	24.28 48.37	1.25 1.442			8.000 8.000	120 0.1415	20.355 0.0 1.132		K = K @ EQ01 Vel = 9.50	
H609 to H610	13.25 13.25	5.38	24.94 73.31	1.25 1.442			9.810 9.810	120 0.3055	21.487 0.0 2.997		K = K @ EQ01 Vel = 14.40	
H610 to BA3	13.25 13.25	5.38	26.62 99.93	1.25 1.442	T	7.432	8.080 7.432 15.512	120 0.5419	24.484 0.0 8.406		K = K @ EQ01 Vel = 19.63	

Final Calculations : Hazen-Williams

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The Village at Discovery - Lot 7 - Area #6

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	*****
BA3			0.0 99.93						32.890		K Factor = 17.42	
H611 to BA3	13.25 13.25	5.46	30.48	1	T	5.0	0.920 5.000 5.920	120	31.210 0.0 1.680		K = K @ EQ02	
				1.049				0.2838			Vel = 11.31	
BA3			0.0 30.48						32.890		K Factor = 5.31	
H612 to BA4	13.25 13.25	5.38	30.45	1.25	T	7.432	9.390 7.432 16.822	120	32.032 0.0 1.012		K = K @ EQ01	
				1.442				0.0602			Vel = 5.98	
BA4			0.0 30.45						33.044		K Factor = 5.30	
H613 to H614	13.25 13.25	5.38	25.78	1.25			8.000	120	22.963 0.0 0.353		K = K @ EQ01	
H614 to H615	13.25 13.25	5.38	25.99	1.25			7.000	120	23.316 0.0 1.124		K = K @ EQ01	
H615 to H616	13.25 13.25	5.38	26.60	1.25			6.500	120	24.440 0.0 2.246		K = K @ EQ01	
H616 to BA5	13.25 13.25	5.38	27.79	1.25	T	7.432	4.400 7.432 11.832	120	26.686 0.0 7.172		K = K @ EQ01	
			106.16	1.442				0.6062			Vel = 20.86	
BA5			0.0 106.16						33.858		K Factor = 18.24	
BA1 to BA2	13.25 13.25		99.56	3			1.000	120	32.654 0.0 0.011			
BA2 to BA3	13.25 13.25		99.56	3.26			1.000	0.0110			Vel = 3.83	
BA2 to BA3	13.25 13.25		59.25	3			9.390	120	32.665 0.0 0.225			
BA3 to BA4	13.25 13.25		158.81	3.26			9.390	0.0240			Vel = 6.10	
BA3 to BA4	13.25 13.25		130.42	3			2.110	120	32.890 0.0 0.154			
BA4 to BA5	13.25 13.25		289.23	3.26			2.110	0.0730			Vel = 11.12	
BA4 to BA5	13.25 13.25		30.45	3			9.280	120	33.044 0.0 0.814			
BA5 to BA6	13.25 13.25		319.68	3.26			9.280	0.0877			Vel = 12.29	
BA5 to BA6	13.25 13.25		106.16	3	T	20.159	89.880 20.159 110.039	120	33.858 0.0 16.404			
BA6 to BX	13.25 11.67		425.84	3.26			18.815	0.1491			Vel = 16.37	
BA6 to BX	13.25 11.67		0.0	3	2E	18.815	58.590 18.815 77.405	120	50.262 0.684 11.539			
			425.84	3.26				0.1491			Vel = 16.37	
BX			0.0 425.84						62.485		K Factor = 53.87	
BX to TOR2	11.67 11.67		425.84	3	T E	20.159 9.408	28.940 29.567 58.507	120	62.485 0.0 8.722			
			425.84	3.26				0.1491			Vel = 16.37	

Final Calculations : Hazen-Williams

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The Village at Discovery - Lot 7 - Area #6

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	*****
TOR2			0.0 425.84						71.207		K Factor = 50.46	
TOR2 to BOR2	11.67 4		425.84	3	B E	13.44 9.408	25.000 22.848	120	71.207 3.322			
BOR2 to UG	4 1		425.84	3.26			47.848	0.1491	7.132		Vel = 16.37	
BOR2 to UG	4 1		0.0	3	Zcb	0.0	3.000	120	81.661 6.752		* * Fixed Loss = 5.452	
UG to HOSE	1 0		425.84	3.26			3.000	0.1490	0.447		Vel = 16.37	
UG to HOSE	1 0		0.0	6	G E	4.304 20.084	30.000 67.425	140	88.860 0.433			
HOSE to TEST	0 0		425.84	6.16	T	43.037	97.425	0.0051	0.493		Vel = 4.58	
HOSE to TEST	0 0	H250	250.00	6			1.000	140	89.786 0.0			
TEST	0		675.84	6.16			1.000	0.0120	0.012		Vel = 7.28	
TEST			0.0 675.84						89.798		K Factor = 71.32	

Job Name : **The Discovery at Discovery - Lot 7**
Address : **1920 NE Discovery Ave. - Lee's summit, Mo**

Date : **8/6/2025**
Sprinkler Contractor : **Goal Fire Protection, LLC**

Area Info : **Area #7 - Parking Garage**
Area Design : **Per NFPA-13, 2016**
System Type : **Wet System**

Design Criteria :
Density: **0.15** gpm/sq. ft. Operating Area: **1000** sq. ft.
Max. Area Per Sprinkler: **130** Total Sprinklers Operating: **10** Sprinkler K Factor: **5.6**
Outside Hose Allowance: **250**

Calculation Summary :

GPM Required : 214.63	PSI Required : 84.00	@ Base of Riser
GPM Required : 464.63	PSI Required : 84.57	@ Connection to City Main

Area Safety Margin: **25.2** PSI **23** %

Notes :

Water Supply Curve

The Village at Discovery - Lot 7 Area #7

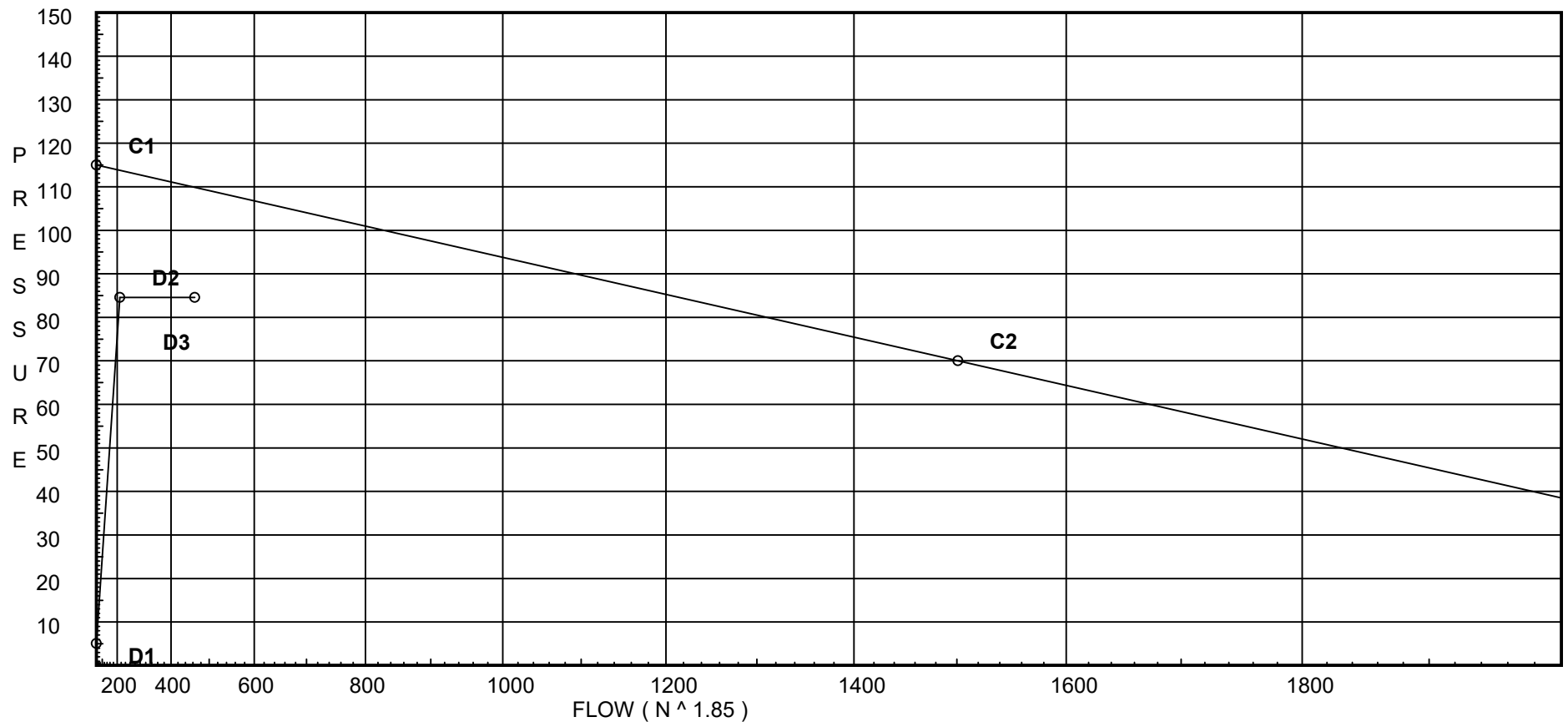
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City Water Supply:

C1 - Static Pressure : 115
C2 - Residual Pressure: 70
C2 - Residual Flow : 1501

Demand:

D1 - Elevation : 5.054
D2 - System Flow : 214.63
D2 - System Pressure : 84.578
Hose (Demand) : 250
D3 - System Demand : 464.63
Safety Margin : 25.281



Fittings Used Summary

The Village at Discovery - Lot 7 Area #7

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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
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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
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
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
Zcb	Colt C200 Vert Butt	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.

The Village at Discovery - Lot 7 Area #7

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	115.0	70	1501.0	109.859	464.63	84.578

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
DP01	10.67	5.6	12.13	19.5	0.15	130
EQ01	11.67		12.44			
H701	11.67	5.53	12.44	19.5	K=K @ EQ01	
H702	11.67	5.53	12.7	19.71	K=K @ EQ01	
H703	11.67	5.53	13.66	20.44	K=K @ EQ01	
H704	11.67	5.53	15.54	21.8	K=K @ EQ01	
H705	11.67	5.53	12.8	19.78	K=K @ EQ01	
H706	11.67	5.53	13.07	19.99	K=K @ EQ01	
H707	11.67	5.53	14.06	20.73	K=K @ EQ01	
H708	11.67	5.53	15.99	22.11	K=K @ EQ01	
H709	11.67	5.53	20.72	25.17	K=K @ EQ01	
H710	11.67	5.53	21.1	25.4	K=K @ EQ01	
BB1	11.67		20.15			
BB2	11.67		20.73			
BB3	11.67		23.02			
BX	11.67		71.53			
TOR2	11.67		73.99			
BOR2	4.0		79.32			
UG	1.0		84.0			
HOSE	0.0		84.57	250.0		
TEST	0.0		84.58			

Final Calculations : Hazen-Williams

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The Village at Discovery - Lot 7 Area #7

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	*****
DP01 to EQ01	10.67 11.67	5.60	19.50 19.5	1 1.049	T 5.0	1.000 5.000 6.000	120 0.1242	12.125 -0.433 0.745		Vel = 7.24	
EQ01			0.0 19.50					12.437		K Factor = 5.53	
H701 to H702	11.67 11.67	5.53	19.50 19.5	1.25 1.442		10.000 10.000	120 0.0264	12.437 0.0 0.264		K = K @ EQ01 Vel = 3.83	
H702 to H703	11.67 11.67	5.53	19.71 39.21	1.25 1.442		10.000 10.000	120 0.0960	12.701 0.0 0.960		K = K @ EQ01 Vel = 7.70	
H703 to H704	11.67 11.67	5.53	20.43 59.64	1.25 1.442		9.000 9.000	120 0.2086	13.661 0.0 1.877		K = K @ EQ01 Vel = 11.72	
H704 to BB1	11.67 11.67	5.53	21.80 81.44	1.25 1.442	T 7.432	5.000 7.432 12.432	120 0.3711	15.538 0.0 4.614		K = K @ EQ01 Vel = 16.00	
BB1			0.0 81.44					20.152		K Factor = 18.14	
H705 to H706	11.67 11.67	5.53	19.78 19.78	1.25 1.442		10.000 10.000	120 0.0271	12.803 0.0 0.271		K = K @ EQ01 Vel = 3.89	
H706 to H707	11.67 11.67	5.53	20.00 39.78	1.25 1.442		10.000 10.000	120 0.0986	13.074 0.0 0.986		K = K @ EQ01 Vel = 7.81	
H707 to H708	11.67 11.67	5.53	20.73 60.51	1.25 1.442		9.000 9.000	120 0.2142	14.060 0.0 1.928		K = K @ EQ01 Vel = 11.89	
H708 to BB2	11.67 11.67	5.53	22.11 82.62	1.25 1.442	T 7.432	5.000 7.432 12.432	120 0.3811	15.988 0.0 4.738		K = K @ EQ01 Vel = 16.23	
BB2			0.0 82.62					20.726		K Factor = 18.15	
H709 to H710	11.67 11.67	5.53	25.17 25.17	1.25 1.442		9.000 9.000	120 0.0422	20.724 0.0 0.380		K = K @ EQ01 Vel = 4.94	
H710 to BB3	11.67 11.67	5.53	25.40 50.57	1.25 1.442	T 7.432	5.000 7.432 12.432	120 0.1538	21.104 0.0 1.912		K = K @ EQ01 Vel = 9.93	
BB3			0.0 50.57					23.016		K Factor = 10.54	
BB1 to BB2	11.67 11.67		81.44 81.44	2 2.157		11.000 11.000	120 0.0522	20.152 0.0 0.574		Vel = 7.15	
BB2 to BB3	11.67 11.67		82.62 164.06	2 2.157		12.000 12.000	120 0.1908	20.726 0.0 2.290		Vel = 14.40	
BB3 to BX	11.67 11.67		50.57 214.63	2 2.157		154.690 154.690	120 0.3136	23.016 0.0 48.516		Vel = 18.84	

Final Calculations : Hazen-Williams

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The Village at Discovery - Lot 7 Area #7

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	*****
BX			0.0 214.63						71.532		K Factor = 25.38	
BX to TOR2	11.67 11.67		214.63 214.63	3 3.26	T E	20.159 9.408	28.940 29.567 58.507	120 0.0420	71.532 0.0 2.456		Vel = 8.25	
TOR2			0.0 214.63						73.988		K Factor = 24.95	
TOR2 to BOR2	11.67 4		214.63 214.63	3 3.26	B E	13.44 9.408	25.000 22.848 47.848	120 0.0420	73.988 3.322 2.008		Vel = 8.25	
BOR2 to UG	4 1		0.0 214.63	3 3.26	Zcb	0.0	3.000 3.000	120 0.0420	79.318 4.557 0.126		** Fixed Loss = 3.258 Vel = 8.25	
UG to HOSE	1 0		0.0 214.63	6 6.16	G E T	4.304 20.084 43.037	30.000 67.425 97.425	140 0.0014	84.001 0.433 0.138		Vel = 2.31	
HOSE to TEST	0 0	H250	250.00 464.63	6 6.16			1.000 1.000	140 0.0060	84.572 0.0 0.006		Vel = 5.00	
TEST			0.0 464.63						84.578		K Factor = 50.52	