

Job Name : Discovery Animal Hospital

Address : 1921 NE Trails Edge Blvd. - Lee's Summit, MO

Date : 7/1/2025

Sprinkler Contractor : Goal Fire Protection, LLC

Area Info :

Area Design : Per NFPA-13, 2016

System Type : Wet System

Design Criteria :

Density: **0.10** gpm/sq. ft. Operating Area: **1000** sq. ft.
Max. Area Per Sprinkler: **225** Total Sprinklers Operating: **11** Sprinkler K Factor: **5.6**
Outside Hose Allowance: **100**

Calculation Summary :

GPM Required : 249.82	PSI Required : 69.79	@ Base of Riser
GPM Required : 349.82	PSI Required : 72.97	@ Connection to City Main

Area Safety Margin: **38.9** PSI **34** %

Water Supply :

Flow Test :

Date : 6-3-2025

Static : **115** PSI

Residual : **70** PSI

Flow : **1501** GPM

Elevation : Same as F.F.

Location of Flow Test : Looped City Main

Source of Flow Test : Goal Fire Protection

Notes :

7-2-2025



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

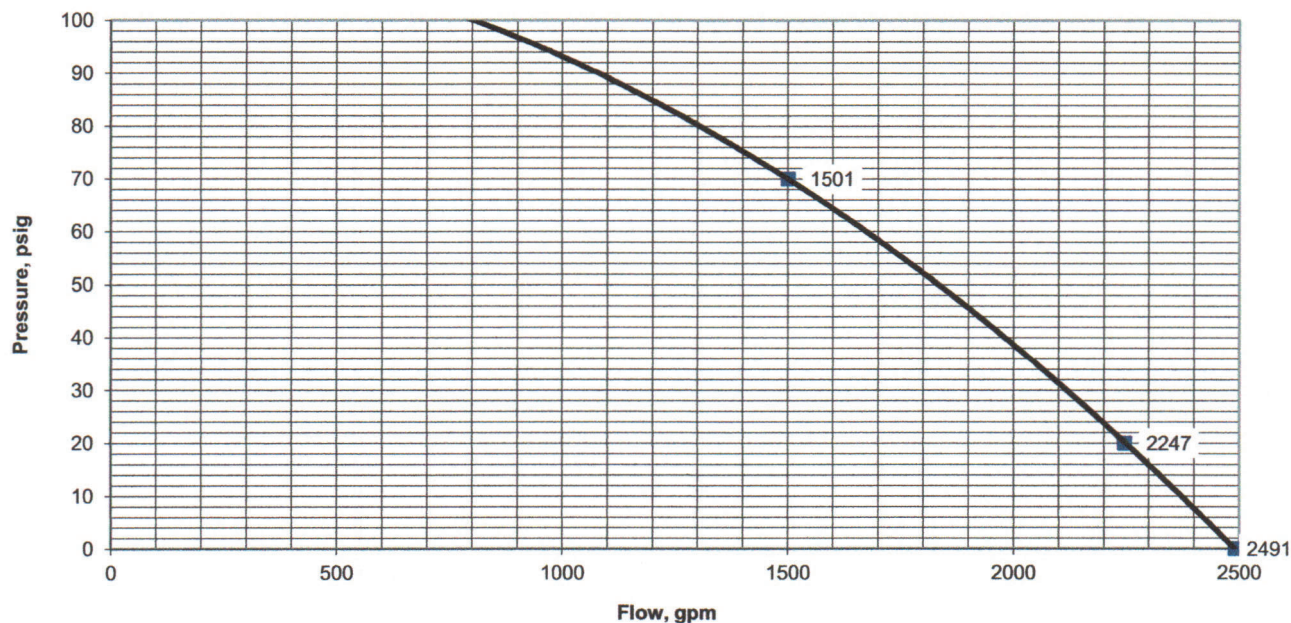
RESIDUAL: 70 PSI

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)



Water Supply Curve

Discovery Animal Hospital

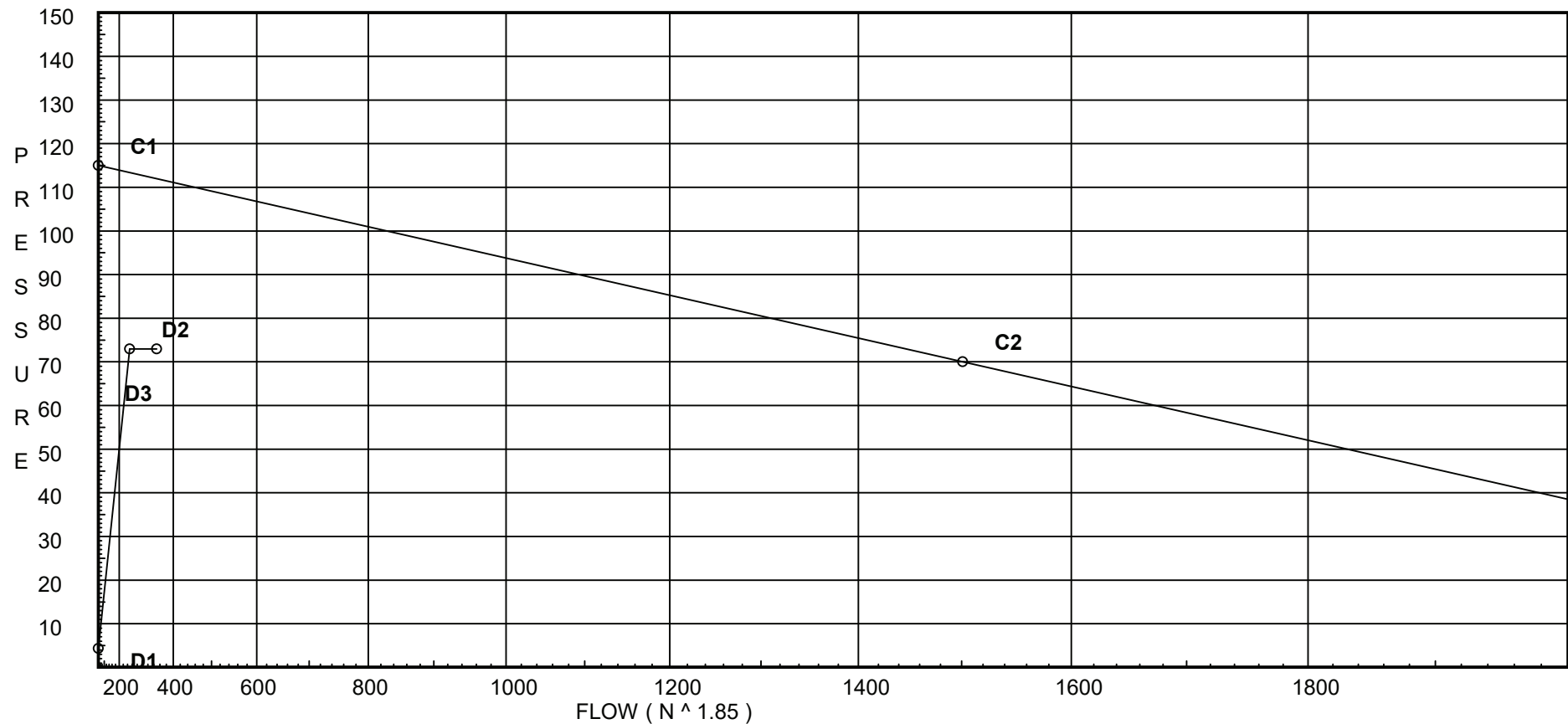
Page 1
Date

City Water Supply:

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

Demand:

D1 - Elevation : 4.309
D2 - System Flow : 249.818
D2 - System Pressure : 72.972
Hose (Demand) : 100
D3 - System Demand : 349.818
Safety Margin : 38.987



Fittings Used Summary

Discovery Animal Hospital

Page 2
Date

Fitting Legend		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
Abbrev.	Name																				
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
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
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.

Discovery Animal Hospital

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	115.0	70	1501.0	111.959	349.82	72.972

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
H101	9.95	5.6	16.22	22.56	0.1	220
1X	11.75		20.81			
H102	9.95	5.6	15.75	22.23	0.1	220
2X	11.75		20.19			
H103	9.95	5.6	15.52	22.06	0.1	220
3X	11.75		19.89			
H104	9.95	5.6	15.52	22.06	0.1	220
4X	11.75		19.89			
H105	9.0	5.6	15.84	22.29	0.1	220
5X	10.75		20.33			
H106	9.95	5.6	15.43	22.0	0.1	220
6X	11.75		19.78			
B1	10.5		30.75			
101	13.75		21.41			
102	13.75		20.75			
103	13.75		20.43			
104	13.75		20.43			
105	13.75		20.62			
106	13.75		21.64			
H107	9.95	5.6	17.92	23.71	0.1	220
7X	11.75		23.03			
H108	9.95	5.6	17.35	23.33	0.1	220
8X	11.75		22.28			
H109	9.95	5.6	17.31	23.3	0.1	220
9X	11.75		22.22			
H110	9.95	5.6	17.44	23.38	0.1	220
10X	11.75		22.39			
H111	9.95	5.6	16.74	22.91	0.1	220
11X	11.75		21.48			
B2	10.5		31.18			
107	13.75		23.76			
108	13.75		22.97			
109	13.75		22.91			
110	13.75		23.09			
111	13.75		23.79			
B3	10.5		32.26			
B4	10.5		32.52			
B5	10.5		32.92			
B6	10.5		33.05			
A1	10.5		35.38			
A2	10.5		35.65			
A3	10.5		37.39			

NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
A4	10.5		38.56		
A5	10.5		40.49		
A6	10.5		43.7		
A7	10.5		45.32		
TOR	10.5		50.71		
BFP	4.0		61.78		
UG	1.0		69.8	100.0	
HOSE	0.0		72.95		
TEST	0.0		72.97		

Final Calculations : Hazen-Williams

Discovery Animal Hospital										Page 5		
										Date		
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 1X	9.950 11.750	5.60	22.56 22.56	1 1.049			33.000 33.000	120 0.1625	16.224 -0.780 5.364		Vel = 8.37	
1X to 101	11.750 13.750		0.0 22.56	1 1.049	T E	5.0 2.0	2.000 7.000 9.000	120 0.1626	20.808 -0.866 1.463		Vel = 8.37	
101			0.0 22.56						21.405		K Factor = 4.88	
H102 to 2X	9.950 11.750	5.60	22.23 22.23	1 1.049			33.000 33.000	120 0.1582	15.753 -0.780 5.221		Vel = 8.25	
2X to 102	11.750 13.750		0.0 22.23	1 1.049	T E	5.0 2.0	2.000 7.000 9.000	120 0.1581	20.194 -0.866 1.423		Vel = 8.25	
102			0.0 22.23						20.751		K Factor = 4.88	
H103 to 3X	9.950 11.750	5.60	22.06 22.06	1 1.049			33.000 33.000	120 0.1560	15.520 -0.780 5.149		Vel = 8.19	
3X to 103	11.750 13.750		0.0 22.06	1 1.049	T E	5.0 2.0	2.000 7.000 9.000	120 0.1560	19.889 -0.866 1.404		Vel = 8.19	
103			0.0 22.06						20.427		K Factor = 4.88	
H104 to 4X	9.950 11.750	5.60	22.06 22.06	1 1.049			33.000 33.000	120 0.1561	15.524 -0.780 5.150		Vel = 8.19	
4X to 104	11.750 13.750		0.0 22.06	1 1.049	T E	5.0 2.0	2.000 7.000 9.000	120 0.1561	19.894 -0.866 1.405		Vel = 8.19	
104			0.0 22.06						20.433		K Factor = 4.88	
H105 to 5X	9 10.750	5.60	22.29 22.29	1 1.049			33.000 33.000	120 0.1590	15.839 -0.758 5.246		Vel = 8.27	
5X to 105	10.750 13.750		0.0 22.29	1 1.049	T E	5.0 2.0	3.000 7.000 10.000	120 0.1590	20.327 -1.299 1.590		Vel = 8.27	
105			0.0 22.29						20.618		K Factor = 4.91	
H106 to 6X	9.950 11.750	5.60	22.00 22.0	1 1.049			33.000 33.000	120 0.1552	15.434 -0.780 5.122		Vel = 8.17	
6X to 106	11.750 13.750		0.0 22.0	1 1.049	3E T	6.0 5.0	6.610 11.000 17.610	120 0.1553	19.776 -0.866 2.734		Vel = 8.17	
106			0.0 22.00						21.644		K Factor = 4.73	

Final Calculations : Hazen-Williams

Discovery Animal Hospital										Page 6		
										Date		
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	*****
B1 to 101	10.500 13.750		-64.55 -64.55	1.25 1.442	2T	14.864	18.030 14.864 32.894	120 -0.2414	30.754 -1.408 -7.941		Vel = 12.68	
101 to 102	13.750 13.750		22.56 -41.99	1.25 1.442			6.000 6.000	120 -0.1090	21.405 0.0 -0.654		Vel = 8.25	
102 to 103	13.750 13.750		22.22 -19.77	1.25 1.442			12.000 12.000	120 -0.0270	20.751 0.0 -0.324		Vel = 3.88	
103 to 104	13.750 13.750		22.06 2.29	1.25 1.442			12.000 12.000	120 0.0005	20.427 0.0 0.006		Vel = 0.45	
104 to 105	13.750 13.750		22.07 24.36	1.25 1.442			4.650 4.650	120 0.0398	20.433 0.0 0.185		Vel = 4.79	
105 to 106	13.750 13.750		22.29 46.65	1.25 1.442			7.750 7.750	120 0.1324	20.618 0.0 1.026		Vel = 9.16	
106 to A1	13.750 10.500		22.00 68.65	1.25 1.442	T E	7.432 3.716	34.440 11.148 45.588	120 0.2705	21.644 1.408 12.332		Vel = 13.49	
			0.0 68.65						35.384		K Factor = 11.54	
H107 to 7X	9.950 11.750	5.60	23.71 23.71	1 1.049			33.000 33.000	120 0.1783	17.923 -0.780 5.883		Vel = 8.80	
7X to 107	11.750 13.750		0.0 23.71	1 1.049	T E	5.0 2.0	2.000 7.000 9.000	120 0.1782	23.026 -0.866 1.604		Vel = 8.80	
			0.0 23.71						23.764		K Factor = 4.86	
H108 to 8X	9.950 11.750	5.60	23.33 23.33	1 1.049			33.000 33.000	120 0.1730	17.349 -0.780 5.708		Vel = 8.66	
8X to 108	11.750 13.750		0.0 23.33	1 1.049	T E	5.0 2.0	2.000 7.000 9.000	120 0.1730	22.277 -0.866 1.557		Vel = 8.66	
			0.0 23.33						22.968		K Factor = 4.87	
H109 to 9X	9.950 11.750	5.60	23.30 23.3	1 1.049			33.000 33.000	120 0.1726	17.306 -0.780 5.695		Vel = 8.65	
9X to 109	11.750 13.750		0.0 23.3	1 1.049	T E	5.0 2.0	2.000 7.000 9.000	120 0.1724	22.221 -0.866 1.552		Vel = 8.65	
			0.0 23.30						22.907		K Factor = 4.87	

Final Calculations : Hazen-Williams

Page 7
Date

Discovery Animal Hospital

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	*****
H110 to 10X	9.950 11.750	5.60	23.38 23.38	1 1.049			33.000 33.000	120 0.1738	17.438 -0.780 5.735		Vel = 8.68	
10X to 110	11.750 13.750		0.0 23.38	1 1.049	T E	5.0 2.0	2.000 7.000 9.000	120 0.1737	22.393 -0.866 1.563		Vel = 8.68	
110			0.0 23.38						23.090		K Factor = 4.87	
H111 to 11X	9.950 11.750	5.60	22.91 22.91	1 1.049			33.000 33.000	120 0.1673	16.736 -0.780 5.522		Vel = 8.50	
11X to 111	11.750 13.750		0.0 22.91	1 1.049	3E T	6.0 5.0	8.000 11.000 19.000	120 0.1673	21.478 -0.866 3.178		Vel = 8.50	
111			0.0 22.91						23.790		K Factor = 4.70	
B2 to 107	10.500 13.750		-55.83 -55.83	1.25 1.442	T E	7.432 3.716	21.400 11.148 32.548	120 -0.1846	31.179 -1.408 -6.007		Vel = 10.97	
107 to 108	13.750 13.750		23.71 -32.12	1.25 1.442			12.000 12.000	120 -0.0663	23.764 0.0 -0.796		Vel = 6.31	
108 to 109	13.750 13.750		23.33 -8.79	1.25 1.442			10.000 10.000	120 -0.0061	22.968 0.0 -0.061		Vel = 1.73	
109 to 110	13.750 13.750		23.29 14.5	1.25 1.442			12.000 12.000	120 0.0152	22.907 0.0 0.183		Vel = 2.85	
110 to 111	13.750 13.750		23.39 37.89	1.25 1.442			7.770 7.770	120 0.0901	23.090 0.0 0.700		Vel = 7.44	
111 to A2	13.750 10.500		22.91 60.8	1.25 1.442	T E	7.432 3.716	37.220 11.148 48.368	120 0.2161	23.790 1.408 10.453		Vel = 11.94	
A2			0.0 60.80						35.651		K Factor = 10.18	
B3 to A3	10.500 10.500		24.69 24.69	1.25 1.442	2T 4E	14.864 14.864	96.230 29.728 125.958	120 0.0408	32.255 0.0 5.140		Vel = 4.85	
A3			0.0 24.69						37.395		K Factor = 4.04	
B4 to A4	10.500 10.500		26.47 26.47	1.25 1.442	3T 3E	22.296 11.148	96.650 33.444 130.094	120 0.0464	32.519 0.0 6.037		Vel = 5.20	
A4			0.0 26.47						38.556		K Factor = 4.26	
B5 to A5	10.500 10.500		31.14 31.14	1.25 1.442	3T E	22.296 3.716	94.890 26.012 120.902	120 0.0627	32.915 0.0 7.578		Vel = 6.12	

Final Calculations : Hazen-Williams

Discovery Animal Hospital										Page 8	
										Date	
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			0.0 31.14					40.493		K Factor =	4.89
B6 to A6	10.500 10.500		38.07 38.07	1.25 1.442	2T 2E 14.864 7.432	94.900 22.296 117.196	120 0.0909	33.049 0.0 10.656		Vel =	7.48
A6			0.0 38.07					43.705		K Factor =	5.76
B1 to B2	10.500 10.500		64.55 64.55	2 2.157		12.500 12.500	120 0.0340	30.754 0.0 0.425		Vel =	5.67
B2 to B3	10.500 10.500		55.83 120.38	2 2.157		10.000 10.000	120 0.1076	31.179 0.0 1.076		Vel =	10.57
B3 to B4	10.500 10.500		-24.70 95.68	2 2.157		3.750 3.750	120 0.0704	32.255 0.0 0.264		Vel =	8.40
B4 to B5	10.500 10.500		-26.47 69.21	2 2.157		10.250 10.250	120 0.0386	32.519 0.0 0.396		Vel =	6.08
B5 to B6	10.500 10.500		-31.14 38.07	2 2.157		10.500 10.500	120 0.0128	32.915 0.0 0.134		Vel =	3.34
B6			0.0 38.07					33.049		K Factor =	6.62
A1 to A2	10.500 10.500		68.65 68.65	2 2.157		7.000 7.000	120 0.0381	35.384 0.0 0.267		Vel =	6.03
A2 to A3	10.500 10.500		60.79 129.44	2 2.157		14.170 14.170	120 0.1231	35.651 0.0 1.744		Vel =	11.36
A3 to A4	10.500 10.500		24.70 154.14	2 2.157		6.830 6.830	120 0.1700	37.395 0.0 1.161		Vel =	13.53
A4 to A5	10.500 10.500		26.46 180.6	2 2.157		8.500 8.500	120 0.2279	38.556 0.0 1.937		Vel =	15.86
A5 to A6	10.500 10.500		31.14 211.74	2 2.157		10.500 10.500	120 0.3059	40.493 0.0 3.212		Vel =	18.59
A6 to A7	10.500 10.500		38.08 249.82	2 2.157		3.900 3.900	120 0.4154	43.705 0.0 1.620		Vel =	21.93
A7 to TOR	10.500 10.500		0.0 249.82	2 2.157	E 6.153	6.810 6.153 12.963	120 0.4153	45.325 0.0 5.384		Vel =	21.93
TOR to BFP	10.500 4		0.0 249.82	2 2.157	E Fsp 6.153 0.0	6.500 6.153 12.653	120 0.4153	50.709 5.815 5.255		* * Fixed Loss = 3 Vel =	21.93

Final Calculations : Hazen-Williams

Page 9
Date

Discovery Animal Hospital

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	*****
BFP to UG	4 1		0.0 249.82	2.5 2.635	Zcb	0.0	3.000 3.000	120 0.1570	61.779 7.547 0.471		* * Fixed Loss = 6.248 Vel = 14.70	
UG to HOSE	1 0	H100	100.00 349.82	4 4.1	G E T	2.907 14.534 29.067	60.000 46.508 106.508	140 0.0255	69.797 0.433 2.716		Vel = 8.50	
HOSE to TEST	0 0		0.0 349.82	4			1.000 1.000	140 0.0260	72.946 0.0 0.026		Vel = 8.50	
TEST			0.0 349.82						72.972		K Factor = 40.95	