

## Hydraulic Calculations by HydraCALC

Carolina Fire Protection, Inc.  
4055 Hodges Chapel Road  
Dunn, NC 28334  
910-892-1700

*Handwritten signature*  
30-811-24

Job Name : Antioch Cfurch pendent Area 2  
Drawing : Office  
Location : Erwin, NC  
Remote Area : 1  
Contract : 24J961  
Data File : pendent.WXF

Hydraulic Design Information Sheet

Name - Antioch Church Remote area 2 Date - 12/27/24  
 Location - Erwin, NC  
 Building - Office System No. - 1  
 Contractor - Carolina Fire Protection, Inc. Contract No. - 24J961  
 Calculated By - Mark Ford Drawing No. -  
 Construction: (X) Combustible (X) Non-Combustible Ceiling Height - Varies  
 Occupancy - Office

S (X) NFPA 13 (X) Lt. Haz. Ord.Haz.Gp. ( ) 1 ( ) 2 ( ) 3 ( ) Ex.Haz.  
 Y ( ) NFPA 231 ( ) NFPA 231C ( ) Figure Curve

S Other

T Specific Ruling Made By Date

M	Area of Sprinkler Operation	- 1015	System Type	Sprinkler/Nozzle
	Density	- .10	(X) Wet	Make Victaulic
D	Area Per Sprinkler	- 168	( ) Dry	Model Pendent
E	Elevation at Highest Outlet	- 9.667	( ) Deluge	Size 1/2"
S	Hose Allowance - Inside	- n/a	( ) Preaction	K-Factor 5.6
I	Rack Sprinkler Allowance	- n/a	( ) Other	Temp.Rat.155
G	Hose Allowance - Outside	- 100		

N Note

Calculation Flow Required - 203.16 Press Required - 30.1 TEST  
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 6-3-22		Cap. -
T	Time of Test - 10:15 am	Rated Cap.-	Elev.-
E	Static Press - 46	@ Press -	
R	Residual Press - 42	Elev. -	Well
	Flow - 579		Proof Flow
S	Elevation - 0		

U Location - See attached

P Source of Information - CFP

C	Commodity	Class	Location
O	Storage Ht.	Area	Aisle W.
M	Storage Method:	%	Palletized % Rack
	( ) Single Row	( ) Conven. Pallet	( ) Auto. Storage ( ) Encap.
S R	( ) Double Row	( ) Slave Pallet	( ) Solid Shelf ( ) Non
T A	( ) Mult. Row		( ) Open Shelf

R K Flue Spacing Clearance:Storage to Ceiling  
 A Longitudinal Transverse

E Horizontal Barriers Provided:

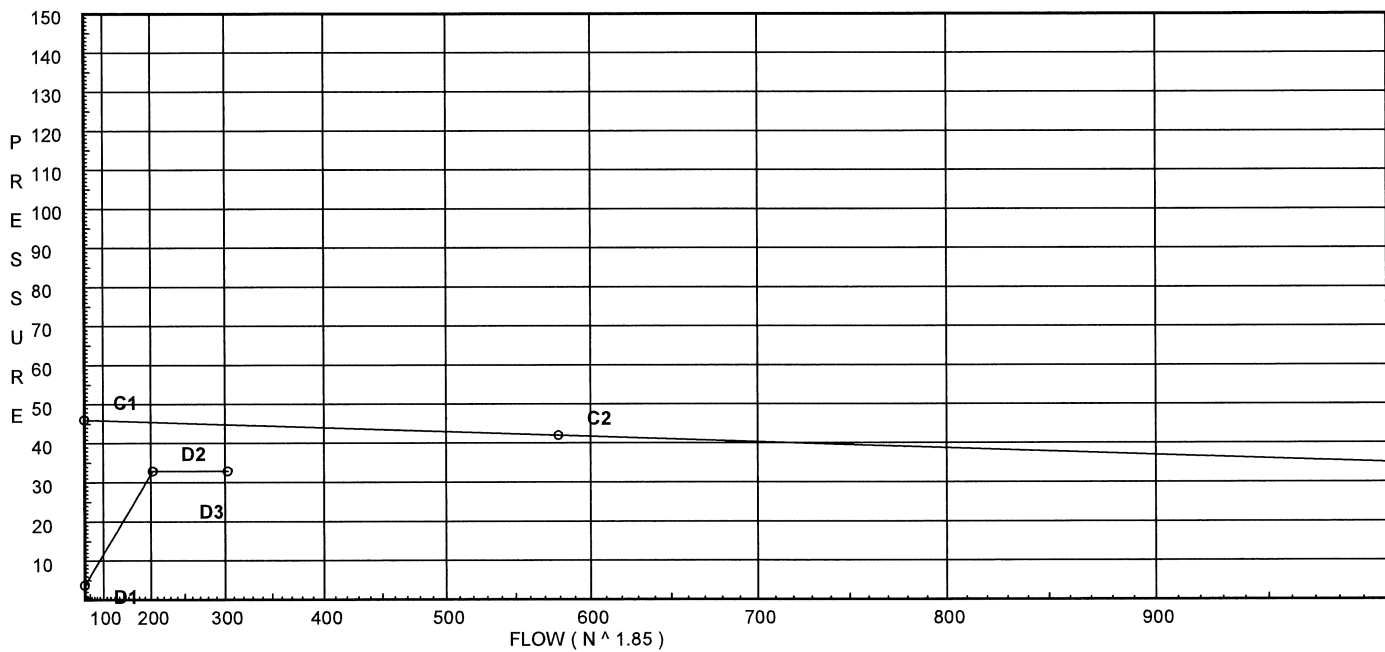
# Water Supply Curve

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City Water Supply:  
C1 - Static Pressure : 46  
C2 - Residual Pressure: 42  
C2 - Residual Flow : 579

Demand:  
D1 - Elevation : 3.754  
D2 - System Flow : 203.163  
D2 - System Pressure : 32.899  
Hose ( Demand ) : 100  
D3 - System Demand : 303.163  
Safety Margin : 11.893



**Fittings Used Summary**

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Fitting Legend		½	¾	1	1¼	1½	2	2½	3	3½	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	
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	
Rcr	Reliable Riser Check										7.1		13.7									
T	NFPA 13 90° Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121	

**Units Summary**

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

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

# Flow Summary - NFPA

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## SUPPLY ANALYSIS

<i>Node at Source</i>	<i>Static Pressure</i>	<i>Residual Pressure</i>	<i>Flow</i>	<i>Available Pressure</i>	<i>Total Demand</i>	<i>Required Pressure</i>
TEST	46.0	42	579.0	44.792	303.16	32.899

## 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>	
F1	20.583		12.51			
1	23.167		12.11			
2	22.667		12.4			
3	22.25		12.65			
4	21.833		12.91			
5	21.417		13.16			
F2	20.583		12.5			
6	23.167		12.1			
7	22.667		12.4			
8	22.25		12.65			
9	21.833		12.91			
10	21.417		13.16			
F3	20.583		12.49			
11	22.667		12.29			
12	22.25		12.54			
13	21.833		12.78			
F4	20.583		12.46			
F5	20.583		12.42			
F6	20.583		12.34			
F7	20.583		12.25			
F8	20.583		12.1			
F9	20.583		12.02			
F10	20.583		12.02			
F11	20.583		13.97			
F12	20.583		13.97			
M1	20.583		12.02			
N1	17.667		14.92			
N2	17.667		14.93			
N3	17.667		14.94			
N4	17.667		14.95			
N5	17.667		14.96			
N6	17.667		14.98			
N7	17.667		15.01			
N8	17.667		15.05			
N9	17.667		15.1			
N10	17.667		15.16			
N11	17.667		15.21			
N12	17.667		15.26			
15A	8.667	5.6	9.11	16.9	0.1	60
16A	8.667	5.6	9.07	16.86	0.1	60
17A	8.667	5.6	8.95	16.75	0.1	120
18A	8.667	5.6	8.92	16.73	0.1	120

# Flow Summary - NFPA

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## NODE ANALYSIS (cont.)

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>	
19A	8.667	5.6	8.93	16.73	0.1	120
20A	8.667	5.6	9.0	16.8	0.1	168
21A	9.667	5.6	9.68	17.42	0.1	60
22A	8.667	5.6	9.35	17.13	0.1	168
23A	8.667	5.6	9.19	16.97	0.1	120
24A	8.667	5.6	9.15	16.94	0.1	120
25A	8.667	5.6	9.15	16.94	0.1	120
26A	8.667	5.6	9.21	16.99	0.1	120
M3	9.667		14.72			
15	9.667		13.35			
16	9.667		13.29			
17	9.667		13.11			
18	9.667		13.07			
19	9.667		13.08			
20	9.667		13.19			
M5	9.667		14.58			
22	9.667		13.71			
23	9.667		13.46			
24	9.667		13.4			
25	9.667		13.4			
26	9.667		13.49			
M2	9.667		15.06			
M4	9.667		14.62			
M6	9.667		15.47			
M7	9.667		15.53			
M8	9.667		15.72			
M9	9.667		15.78			
M10	9.667		18.29			
M11	9.667		18.37			
N13	17.667		15.39			
M12	8.0		19.61			
BASR	1.0		30.1	100.0		
TEST	0.0		32.9			

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
F1 to 1	20.583 23.167		14.85	1.5	E T	4.95 9.9	80.500 14.850 95.350	120 0.0075	12.507 -1.119 0.718		Vel = 2.14	
1 to 2	23.167 22.667		0.0	1.5			10.000 10.000	120 0.0074	12.106 0.217 0.074		Vel = 2.14	
2 to 3	22.667 22.250		0.0	1.5			10.000 10.000	120 0.0075	12.397 0.181 0.075		Vel = 2.14	
3 to 4	22.250 21.833		0.0	1.5			10.000 10.000	120 0.0075	12.653 0.181 0.075		Vel = 2.14	
4 to 5	21.833 21.417		0.0	1.5			10.000 10.000	120 0.0075	12.909 0.180 0.075		Vel = 2.14	
5 to N1	21.417 17.667		0.0	1.5	E T	4.95 9.9	3.167 14.850 18.017	120 0.0075	13.164 1.624 0.136		Vel = 2.14	
N1			0.0 14.85						14.924		K Factor = 3.84	
F2 to 6	20.583 23.167		14.88	1.5	E T	4.95 9.9	80.500 14.850 95.350	120 0.0076	12.503 -1.119 0.721		Vel = 2.15	
6 to 7	23.167 22.667		0.0	1.5			10.000 10.000	120 0.0075	12.105 0.217 0.075		Vel = 2.15	
7 to 8	22.667 22.250		0.0	1.5			10.000 10.000	120 0.0075	12.397 0.181 0.075		Vel = 2.15	
8 to 9	22.250 21.833		0.0	1.5			10.000 10.000	120 0.0075	12.653 0.181 0.075		Vel = 2.15	
9 to 10	21.833 21.417		0.0	1.5			10.000 10.000	120 0.0076	12.909 0.180 0.076		Vel = 2.15	
10 to N2	21.417 17.667		0.0	1.5	E T	4.95 9.9	3.167 14.850 18.017	120 0.0075	13.165 1.624 0.136		Vel = 2.15	
N2			0.0 14.88						14.925		K Factor = 3.85	
F3 to 11	20.583 22.667		13.90	1.5	E T	4.95 9.9	90.500 14.850 105.350	120 0.0067	12.490 -0.903 0.703		Vel = 2.01	
11 to 12	22.667 22.250		0.0	1.5			10.000 10.000	120 0.0066	12.290 0.181 0.066		Vel = 2.01	
12 to 13	22.250 21.833		0.0	1.5			10.000 10.000	120 0.0066	12.537 0.181 0.066		Vel = 2.01	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
13 to N3	21.833 17.667		0.0 13.9	1.5 1.682	E T	4.95 9.9	38.500 14.850 53.350	120 0.0067	12.784 1.804 0.356		Vel = 2.01	
N3			0.0 13.90						14.944		K Factor = 3.60	
F4 to N4	20.583 17.667		13.99 13.99	1.5 1.682	2E 2T	9.9 19.799	152.000 29.699 181.699	120 0.0067	12.464 1.263 1.224		Vel = 2.02	
N4			0.0 13.99						14.951		K Factor = 3.62	
F5 to N5	20.583 17.667		15.78 15.78	1.5 1.682			152.000 152.000	120 0.0084	12.420 1.263 1.280		Vel = 2.28	
N5			0.0 15.78						14.963		K Factor = 4.08	
F6 to N6	20.583 17.667		16.41 16.41	1.5 1.682			152.000 152.000	120 0.0090	12.345 1.263 1.375		Vel = 2.37	
N6			0.0 16.41						14.983		K Factor = 4.24	
F7 to N7	20.583 17.667		17.19 17.19	1.5 1.682			152.000 152.000	120 0.0099	12.248 1.263 1.500		Vel = 2.48	
N7			0.0 17.19						15.011		K Factor = 4.44	
F8 to N8	20.583 17.667		18.34 18.34	1.5 1.682			152.000 152.000	120 0.0111	12.098 1.263 1.691		Vel = 2.65	
N8			0.0 18.34						15.052		K Factor = 4.73	
F9 to M9	20.583 9.667		-11.91 -11.91	1.5 1.682	4E 2T	19.799 19.799	152.000 39.598 191.598	120 -0.0050	12.016 4.728 -0.959		Vel = 1.72	
M9			0.0 -11.91						15.785		K Factor = -3.00	
F10 to M10	20.583 9.667		15.42 15.42	1.5 1.682	4E 2T	19.799 19.799	152.000 39.598 191.598	120 0.0081	12.021 4.728 1.545		Vel = 2.23	
M10			0.0 15.42						18.294		K Factor = 3.61	
F11 to N11	20.583 17.667		-2.35 -2.35	1.5 1.682	E 2T	4.95 19.799	73.500 24.749 98.249	120 -0.0003	13.971 1.263 -0.025		Vel = 0.34	
N11			0.0 -2.35						15.209		K Factor = -0.60	
F12 to N12	20.583 17.667		2.35 2.35	1.5 1.682	E 2T	4.95 19.799	73.500 24.749 98.249	120 0.0002	13.971 1.263 0.024		Vel = 0.34	



# Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
			0.0									
N12			2.35						15.258		K Factor =	0.60
F1 to F2	20.583 20.583		-14.85	3 3.26			12.500 12.500	120 -0.0003	12.507 0.0 -0.004		Vel =	0.57
F2 to F3	20.583 20.583		-14.88	3 3.26			12.083 12.083	120 -0.0011	12.503 0.0 -0.013		Vel =	1.14
F3 to F4	20.583 20.583		-13.90	3 3.26			12.000 12.000	120 -0.0022	12.490 0.0 -0.026		Vel =	1.68
F4 to F5	20.583 20.583		-13.99	3 3.26			12.000 12.000	120 -0.0037	12.464 0.0 -0.044		Vel =	2.21
F5 to F6	20.583 20.583		-15.79	3 3.26			13.000 13.000	120 -0.0058	12.420 0.0 -0.075		Vel =	2.82
F6 to F7	20.583 20.583		-16.40	3 3.26			11.500 11.500	120 -0.0084	12.345 0.0 -0.097		Vel =	3.45
F7 to F8	20.583 20.583		-17.19	3 3.26			13.000 13.000	120 -0.0115	12.248 0.0 -0.150		Vel =	4.11
F8 to M1	20.583 20.583		-18.34	3 3.26			5.250 5.250	120 -0.0156	12.098 0.0 -0.082		Vel =	4.82
M1 to F9	20.583 20.583		128.85	3 3.26			7.417 7.417	120 0	12.016 0.0 0.0		Vel =	0.13
F9 to F10	20.583 20.583		11.91	3 3.26			12.500 12.500	120 0.0004	12.016 0.0 0.005		Vel =	0.59
			0.0									
F10			15.42						12.021		K Factor =	4.45
F11 to F12	20.583 20.583		2.35	3 3.26			12.000 12.000	120 0	13.971 0.0 0.0		Vel =	0.09
			0.0									
F12			2.35						13.971		K Factor =	0.63
N1 to N2	17.667 17.667		14.85	4 4.26			12.500 12.500	120 0.0001	14.924 0.0 0.001		Vel =	0.33
N2 to N3	17.667 17.667		14.88	4 4.26	2E	26.334	37.083 26.334 63.417	120 0.0003	14.925 0.0 0.019		Vel =	0.67
N3 to N4	17.667 17.667		13.90	4 4.26			12.000 12.000	120 0.0006	14.944 0.0 0.007		Vel =	0.98

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
N4 to N5	17.667 17.667		13.99 57.62	4 4.26			12.000 12.000	120 0.0010	14.951 0.0 0.012		Vel = 1.30	
N5 to N6	17.667 17.667		15.79 73.41	4 4.26			13.000 13.000	120 0.0015	14.963 0.0 0.020		Vel = 1.65	
N6 to N7	17.667 17.667		16.40 89.81	4 4.26			12.000 12.000	120 0.0023	14.983 0.0 0.028		Vel = 2.02	
N7 to N8	17.667 17.667		17.19 107.0	4 4.26			13.000 13.000	120 0.0032	15.011 0.0 0.041		Vel = 2.41	
N8 to N9	17.667 17.667		18.34 125.34	4 4.26			12.667 12.667	120 0.0042	15.052 0.0 0.053		Vel = 2.82	
N9 to N10	17.667 17.667		0.0 125.34	4 4.26			12.500 12.500	120 0.0042	15.105 0.0 0.053		Vel = 2.82	
N10 to N11	17.667 17.667		0.0 125.34	4 4.26			12.250 12.250	120 0.0042	15.158 0.0 0.051		Vel = 2.82	
N11 to N12	17.667 17.667		-2.34 123.0	4 4.26			12.000 12.000	120 0.0041	15.209 0.0 0.049		Vel = 2.77	
N12 to N13	17.667 17.667		2.34 125.34	4 4.26	2E	26.334	5.167 26.334 31.501	120 0.0042	15.258 0.0 0.133		Vel = 2.82	
N13			0.0 125.34						15.391		K Factor = 31.95	
15A to 15	8.667 9.667	5.60	16.90 16.9	1 1.049	T Eq	5.0 43.0	1.000 48.000 49.000	120 0.0953	9.110 -0.433 4.671		Vel = 6.27	
15			0.0 16.90						13.348		K Factor = 4.63	
16A to 16	8.667 9.667	5.60	16.86 16.86	1 1.049	T Eq	5.0 43.0	1.000 48.000 49.000	120 0.0949	9.070 -0.433 4.651		Vel = 6.26	
16			0.0 16.86						13.288		K Factor = 4.63	
17A to 17	8.667 9.667	5.60	16.75 16.75	1 1.049	T Eq	5.0 43.0	1.000 48.000 49.000	120 0.0938	8.948 -0.433 4.594		Vel = 6.22	
17			0.0 16.75						13.109		K Factor = 4.63	
18A to 18	8.667 9.667	5.60	16.73 16.73	1 1.049	T Eq	5.0 43.0	1.000 48.000 49.000	120 0.0935	8.921 -0.433 4.581		Vel = 6.21	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
18			0.0 16.73						13.069		K Factor = 4.63	
19A to 19	8.667 9.667	5.60	16.73	1	T Eqv	5.0 43.0	1.000 48.000 49.000	120	8.926 -0.433 4.583		Vel = 6.21	
19			0.0 16.73						13.076		K Factor = 4.63	
20A to 20	8.667 9.667	5.60	16.80	1	T Eqv	5.0 43.0	1.000 48.000 49.000	120	9.000 -0.433 4.618		Vel = 6.24	
20			0.0 16.80						13.185		K Factor = 4.63	
21A to M4	9.667 9.667	5.60	17.42	1	T Eqv	5.0 43.0	1.000 48.000 49.000	120	9.681 0.0 4.941		Vel = 6.47	
M4			0.0 17.42						14.622		K Factor = 4.56	
22A to 22	8.667 9.667	5.60	17.13	1	T Eqv	5.0 43.0	1.000 48.000 49.000	120	9.353 -0.433 4.786		Vel = 6.36	
22			0.0 17.13						13.706		K Factor = 4.63	
23A to 23	8.667 9.667	5.60	16.97	1	T Eqv	5.0 43.0	1.000 48.000 49.000	120	9.186 -0.433 4.707		Vel = 6.30	
23			0.0 16.97						13.460		K Factor = 4.63	
24A to 24	8.667 9.667	5.60	16.94	1	T Eqv	5.0 43.0	1.000 48.000 49.000	120	9.146 -0.433 4.687		Vel = 6.29	
24			0.0 16.94						13.400		K Factor = 4.63	
25A to 25	8.667 9.667	5.60	16.94	1	T Eqv	5.0 43.0	1.000 48.000 49.000	120	9.147 -0.433 4.688		Vel = 6.29	
25			0.0 16.94						13.402		K Factor = 4.63	
26A to 26	8.667 9.667	5.60	16.99	1	T Eqv	5.0 43.0	1.000 48.000 49.000	120	9.206 -0.433 4.716		Vel = 6.31	
26			0.0 16.99						13.489		K Factor = 4.63	
M3 to 15	9.667 9.667		-62.50	1.5	T	9.9	2.833 9.900 12.733	120	14.716 0.0 -1.368		Vel = 9.02	
15 to 16	9.667 9.667		16.90	1.5			1.000	120	13.348 0.0 -0.060		Vel = 6.58	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
16 to 17	9.667 9.667		16.86 -28.74	1.5 1.682			7.000 7.000	120 -0.0256	13.288 0.0 -0.179		Vel = 4.15	
17 to 18	9.667 9.667		16.76 -11.98	1.5 1.682			8.000 8.000	120 -0.0050	13.109 0.0 -0.040		Vel = 1.73	
18 to 19	9.667 9.667		16.72 4.74	1.5 1.682			8.000 8.000	120 0.0009	13.069 0.0 0.007		Vel = 0.68	
19 to 20	9.667 9.667		16.73 21.47	1.5 1.682			7.333 7.333	120 0.0149	13.076 0.0 0.109		Vel = 3.10	
20 to M6	9.667 9.667		16.80 38.27	1.5 1.682	T	9.9	42.750 9.900 52.650	120 0.0434	13.185 0.0 2.284		Vel = 5.53	
M6			0.0 38.27						15.469		K Factor = 9.73	
M5 to 22	9.667 9.667		-48.92 -48.92	1.5 1.682	T	9.9	2.833 9.900 12.733	120 -0.0683	14.576 0.0 -0.870		Vel = 7.06	
22 to 23	9.667 9.667		17.12 -31.8	1.5 1.682			8.000 8.000	120 -0.0308	13.706 0.0 -0.246		Vel = 4.59	
23 to 24	9.667 9.667		16.98 -14.82	1.5 1.682			8.000 8.000	120 -0.0075	13.460 0.0 -0.060		Vel = 2.14	
24 to 25	9.667 9.667		16.93 2.11	1.5 1.682			8.000 8.000	120 0.0002	13.400 0.0 0.002		Vel = 0.30	
25 to 26	9.667 9.667		16.94 19.05	1.5 1.682			7.333 7.333	120 0.0119	13.402 0.0 0.087		Vel = 2.75	
26 to M7	9.667 9.667		16.99 36.04	1.5 1.682	T	9.9	42.750 9.900 52.650	120 0.0388	13.489 0.0 2.043		Vel = 5.20	
M7			0.0 36.04						15.532		K Factor = 9.14	
M1 to M2	20.583 9.667		-128.85 -128.85	2.5 2.635	E T	8.237 16.474	11.917 24.711 36.628	120 -0.0460	12.016 4.728 -1.686		Vel = 7.58	
M2 to M3	9.667 9.667		0.0 -128.85	2.5 2.635			7.417 7.417	120 -0.0461	15.058 0.0 -0.342		Vel = 7.58	
M3 to M4	9.667 9.667		62.50 -66.35	2.5 2.635			7.000 7.000	120 -0.0134	14.716 0.0 -0.094		Vel = 3.90	
M4 to M5	9.667 9.667		17.43 -48.92	2.5 2.635			6.000 6.000	120 -0.0077	14.622 0.0 -0.046		Vel = 2.88	

# Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
M5			0.0 -48.92						14.576		K Factor = -12.81	
M6 to M7	9.667 9.667		38.27 38.27	2.5 2.635			13.000 13.000	120 0.0048	15.469 0.0 0.063		Vel = 2.25	
M7 to M8	9.667 9.667		36.04 74.31	2.5 2.635			11.250 11.250	120 0.0167	15.532 0.0 0.188		Vel = 4.37	
M8 to M9	9.667 9.667		-31.16 43.15	2.5 2.635			10.750 10.750	120 0.0060	15.720 0.0 0.065		Vel = 2.54	
M9			0.0 43.15						15.785		K Factor = 10.86	
M8 to M10	9.667 9.667		31.17 31.17	1.5 1.682	2T	19.799	67.000 19.799 86.799	120 0.0297	15.720 0.0 2.574		Vel = 4.50	
M10			0.0 31.17						18.294		K Factor = 7.29	
M9 to M11	9.667 9.667		31.23 31.23	1.5 1.682	2T	19.799	67.000 19.799 86.799	120 0.0298	15.785 0.0 2.585		Vel = 4.51	
M11			0.0 31.23						18.370		K Factor = 7.29	
M10 to M11	9.667 9.667		46.59 46.59	2.5 2.635			10.750 10.750	120 0.0071	18.294 0.0 0.076		Vel = 2.74	
M11 to M12	9.667 8		31.23 77.82	2.5 2.635	E T	8.237 16.474	4.000 24.711 28.711	120 0.0181	18.370 0.722 0.520		Vel = 4.58	
M12			0.0 77.82						19.612		K Factor = 17.57	
N13 to M12	17.667 8		125.34 125.34	4 4.26			8.000 8.000	120 0.0042	15.391 4.187 0.034		Vel = 2.82	
M12 to BASR	8 1		77.82 203.16	4 4.26	2E Rcr	26.334 9.349	8.667 35.683 44.350	120 0.0103	19.612 10.032 0.456		** Fixed Loss = 7 Vel = 4.57	
BASR to TEST	1 0	H100	100.00 303.16	6 6.16	3E T G	60.252 43.037 4.304	770.000 107.593 877.593	140 0.0027	30.100 0.433 2.366		Vel = 3.26	
TEST			0.0 303.16						32.899		K Factor = 52.85	