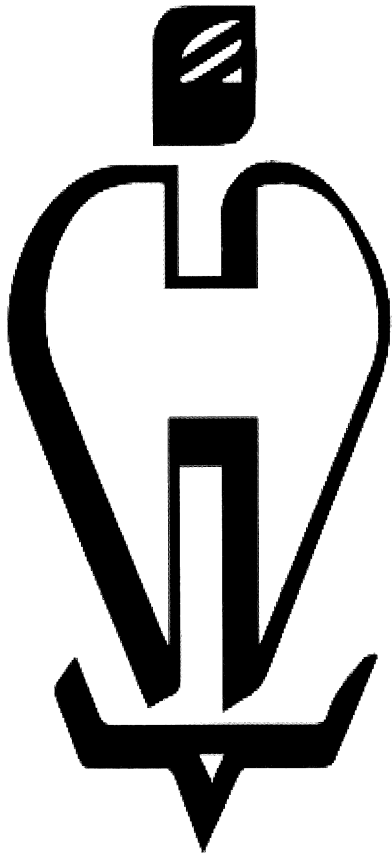


Job Name	: Lillington FD
Drawing	: OFFICE
Location	: Lillington, NC
Remote Area	: 1
Contract	: 25C999
Data File	: Project1 Area OFFICE-Manual.WXF

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

Hydraulic Calculations by HydracALC



Hydraulic Design Information Sheet

Name - Lillington FD
Location - Lillington, NC
Building - OFFICE
Contractor - Carolina Fire Protection
Calculated By - Austin Lee
Construction: () Combustible (X) Non-Combustible
Occupancy - LIGHT

System No. - 1
Contract No. - 25C999
Drawing No. -
Ceiling Height - VARIES

S (X) NFPA 13 (X) Lt. Haz. Ord. Haz. Gp. () 1 () 2 () 3 () Ex. Haz.
Y () NFPA 231 () NFPA 231C () Figure
S Other
T Specific Ruling
E Made By Date

M Area of Sprinkler Operation - 1152 System Type Sprinkler/Nozzle Make VICTAULIC
D Density - 0.1 (X) Wet
Area Per Sprinkler - 225 () Dry Model V2708
E Elevation at Highest Outlet - 10.9 () Deluge Size 1/2"
S Hose Allowance - Inside () Preacton K-Factor 5.6
I Rack Sprinkler Allowance - () Other Temp. Rat. 155
N Hose Allowance - Outside - 100

Calculation Flow Required - 354.074 Press Required - 54.385 TEST
Summary C-Factor Used: 120 Overhead 150 Underground

W Water Flow Test: Pump Data: Tank or Reservoir: Cap. -
A Date of Test - 02-25-2025 Rated Cap. - Elev. -
E Static Press - 103 @ Press -
R Residual Press - 94 Elev. -
S Flow - 1694 Well
U Elevation - 0 Proof Flow

Location - Lillington, NC
Source of Information - Austin Lee & Wayne Dunn

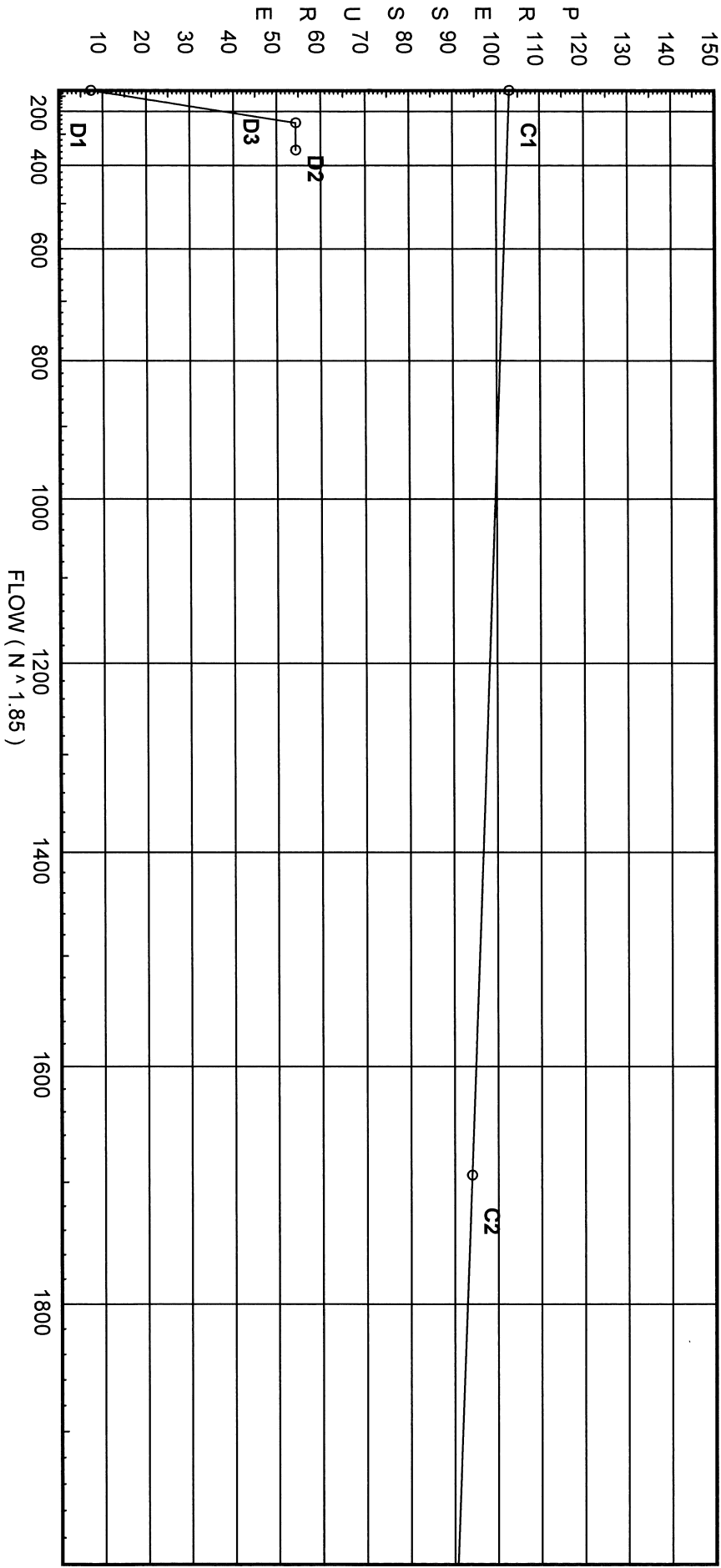
C Commodity Class Location Aisle W. Palletized % Rack
O Storage Ht. Solid Piled
M Storage Method: Solid Piled
M () Single Row () Conven. Pallet () Auto. Storage () Encap.
S () Double Row () Slave Pallet () Solid Shelf () Non
T () Mult. Row () Open Shelf
O C
R K Fine Spacing Clearance: Storage to Ceiling
A Longitudinal Transverse
E Horizontal Barriers Provided:

Water Supply Curve

Carolina Fire Protection
Lillington FD

City Water Supply:
C1 - Static Pressure : 103
C2 - Residual Pressure: 94
C2 - Residual Flow : 1694

Demand:
D1 - Elevation : 7.363
D2 - System Flow : 254.074
D2 - System Pressure : 54.385
Hose (Demand) : 100
D3 - System Demand : 354.074
Safety Margin : 48.118



Fittings Used Summary

Carolina Fire Protection
Lillington FD

Page 3
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	0	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
Zoe	Coil C300 Vert	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.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	103.0	94	1694.0	102.503	354.07	54.385

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
10A	10.0	5.6	16.31	22.61	225
10	11.83		24.36		
7	11.83		24.71		
8	11.83		24.75		
6	11.83		26.33		
73	11.83		37.05		
N1	15.56		37.31		
22	15.56		38.67		
TOR	5.56		43.23		
BOR	0.42		49.89		
UG1	-7.0		53.16		
TEST	-7.0		54.39	100.0	
9	11.83		24.13		
11	11.83		24.24		
70	11.83		25.03		
F1	15.56		23.89		
14	19.5		23.85		
13	19.5		33.93		
9A	10.0	5.6	16.14	22.5	225
11A	10.0	5.6	16.29	22.6	225
8A	10.0	5.6	16.56	22.79	225
7A	10.0	5.6	16.97	23.07	225
5A	10.0	5.6	16.86	22.99	225
5	11.83		24.81		
71	11.83		25.01		
4	11.83		24.81		
3	11.83		25.0		
2	11.83		25.45		
1	11.83		27.36		
72	11.83		36.94		
4A	10.0	5.6	17.02	23.11	225
3A	10.0	5.6	17.05	23.12	225
2A	10.0	5.6	17.3	23.29	225
6A	10.0	5.6	18.07	23.81	225
1A	10.0	5.6	18.64	24.18	225

Node1	Elev1	K	Qa	Nom	Fitting	Eqiv	Len	Pipe	Cfact	Pt	Pe	Notes
Node2	Elev2	Fact	Qt	Act	or			Fings	Pf/Ft	Pf		*****

10A	10	5.60	22.61	1	T	5.0	43.0	6.190	120	16.306	-0.793	Vel = 8.39
to	10		22.61	1.049	Eqi			48.000	0.1633	8.851		
10	11.830		0.0	1.5	T	9.9		11.250	120	24.364	0.0	
to	7		22.61	1.682				9.900	0.0164	0.346	0.0	Vel = 3.26
7	11.830		23.07	1.5				0.670	120	24.710	0.0	
to	8		45.68	1.682				0.670	0.0612	0.041	0.0	Vel = 6.60
8	11.830		22.79	1.5				12.450	120	24.751	0.0	
to	6		68.47	1.682				12.450	0.1271	1.583	0.0	Vel = 9.89
6	11.830		23.81	1.5	T	9.9		38.610	120	26.334	0.0	
to	6		92.28	1.682				48.510	0.2210	10.719	0.0	Vel = 13.32
73	11.830		95.16	3	2E	18.815		18.370	120	37.053	-1.615	
to	N1		187.44	3.26	T	20.159		38.974	0.0326	1.872	-1.615	Vel = 7.20
N1	15.560		187.44	3.26				57.344			1.872	
15.560			66.63	3	T	20.159		3.580	120	37.310	0.0	
to	22		254.07	3.26				20.159	0.0574	1.362	0.0	Vel = 9.77
22	15.560		0.0	4	E	13.167		1.330	120	38.672	4.331	
to	TOR		254.07	4.26				14.497	0.0156	0.226	4.331	Vel = 5.72
TOR	5.560		0.0	4	E	13.167		13.130	120	43.229	6.109	
to	TOR		254.07	4.26	Zce	0.0		22.516	0.0156	0.555	6.109	** Fixed Loss = 3.883
BOR	.420		0.0	6	Eqi	0.0		35.646			0.555	Vel = 5.72
to	BOR		254.07	6.09		21.583		9.750	150	49.893	3.214	
UG1	-7		254.07	6.09		31.333		21.583	0.0018	0.057	3.214	Vel = 2.80
UG1	-7		0.0	6	2E	43.166		479.460	150	53.164	0.0	
to	TEST		254.07	6.09	3T	138.748		675.249	0.0018	1.221	0.0	Vel = 2.80
TEST	100.00		354.07							54.385		Qa = 100.00 K Factor = 48.01
9	11.830		22.50	1.5				6.780	120	24.126	0.0	
to	11		22.5	1.682				6.780	0.0162	0.110	0.0	Vel = 3.25
11	11.830		22.60	1.5	T	9.9		3.580	120	24.236	0.0	
to	70		45.1	1.682				13.480	0.0588	0.792	0.0	Vel = 6.51
70	11.830		21.53	2.5	2E	16.474		18.300	120	25.028	-1.615	
to	F1		66.63	2.635		34.774		16.474	0.0136	0.472	-1.615	Vel = 3.92
F1	15.560		0.0	1.5	T	9.9		3.940	120	23.885	-1.706	
to	14		66.63	1.682				13.840	0.1210	1.674	-1.706	Vel = 9.62
14	19.500		0.0	1.5	2E	9.9		73.390	120	23.853	0.0	
to	13		66.63	1.682				83.290	0.1210	10.077	0.0	Vel = 9.62

Node1 to Node2	Elev1	K	Qa	Qt	Act	Eqv or Fitting	Len	Pipe Ftngs Total	Cfact	Pf/Ft	Pf	Pe	Notes	*****	*****
----------------------	-------	---	----	----	-----	----------------------	-----	------------------------	-------	-------	----	----	-------	-------	-------

13	19.500	0.0	1.5	T	9.9	3.940	120	33.930	1.706	1.674	0.1210	1.674	Vel = 9.62	N1	N1
		66.63	1.682			13.840		9.900							
		0.0													
		66.63				37.310							K Factor = 10.91	N1	9A
	10	5.60	22.50	1	5.0	6.230	120	16.143	-0.793	8.776	0.1618	8.776	Vel = 8.35	9	to 9
			22.5	1.049		54.230		48.000							
			0.0												
		22.50				24.126							K Factor = 4.58	9	11A
	10	5.60	22.60	1	5.0	5.530	120	16.292	-0.793	8.737	0.1632	8.737	Vel = 8.39	11	to 11
			22.6	1.049		53.530		48.000							
			0.0												
		22.60				24.236							K Factor = 4.59	11	8A
	10	5.60	22.79	1	5.0	6.220	120	16.560	-0.793	8.984	0.1657	8.984	Vel = 8.46	8	to 8
			22.79	1.049		54.220		48.000							
			0.0												
		22.79				24.751							K Factor = 4.58	8	7A
	10	5.60	23.07	1	5.0	2.390	120	16.966	-0.793	8.537	0.1694	8.537	Vel = 8.56	7	to 7
			23.07	1.049		50.390		48.000							
			0.0												
		23.07				24.710							K Factor = 4.64	7	5A
	10	5.60	22.99	1	5.0	3.870	120	16.861	-0.793	8.738	0.1685	8.738	Vel = 8.53	5	to 5
			22.99	1.049		51.870		48.000							
			-1.46	1.5	T	9.9		3.580	120	24.806		0.0			
			21.53	1.682		13.480		9.900							
			0.0												
		21.53				11.950							Vel = 1.27	71	to 71
			2.5			11.950	120	25.008	0.020		0.0017	0.020			
			0.0												
		21.53				25.028							K Factor = 4.30	70	to 70
			1.46	1.5		7.750	120	24.806	0.001	0.001	0.0001	0.001	Vel = 0.21	4	to 4
			1.46	1.682		7.750									
			23.11	1.5		10.030	120	24.807	0.192	0.0	0.0191	0.192	Vel = 3.55	4	to 3
			24.57	1.682		10.030									
			23.12	1.5		6.990	120	24.999	0.0						
			47.69	1.682		6.990							Vel = 6.89	2	to 2
			23.29	1.5		14.000	120	25.454	0.455	0.0	0.1360	1.904	Vel = 10.25	2	to 1
			70.98	1.682		14.000									

Final Calculations : Hazen-Williams

Carolina Fire Protection
Lillington FD

Node1 Elev1	K	Qa	Nom	Fitting or Eqiv	Len	Pipe Fngs	Cfact	Pf/Ft	Pf	Pe	Notes
Node2 Elev2	Fact	Qt	Act			Total					*****

1	11.830	24.18	1.5	T	9.9	31.070	120	27.358	0.0	9.584	Vel = 13.74
to						9.900					
72	11.830	95.16	1.682			40.970	0.2339	9.584	0.0		
72	11.830	0.0	3			11.950	120	36.942	0.0		
to						11.950					
73	11.830	95.16	3.26			11.950	0.0093	0.111	0.0		Vel = 3.66
73	11.830	95.16	0.0								
73	11.830	95.16									
4A	10	5.60	23.11	1	T	2.450	120	17.025	-0.793	8.575	Vel = 8.58
to						48.000					
4	11.830	23.11	1.049	Eq	43.0	50.450	0.1700	8.575			
4	11.830	23.11	0.0								
4	11.830	23.11									
3A	10	5.60	23.12	1	T	3.370	120	17.049	-0.793	8.743	Vel = 8.58
to						48.000					
3	11.830	23.12	1.049	Eq	43.0	51.370	0.1702	8.743			
3	11.830	23.12	0.0								
3	11.830	23.12									
2A	10	5.60	23.29	1	T	3.880	120	17.298	-0.793	8.949	Vel = 8.65
to						48.000					
2	11.830	23.29	1.049	Eq	43.0	51.880	0.1725	8.949			
2	11.830	23.29	0.0								
2	11.830	23.29									
6A	10	5.60	23.81	1	T	2.390	120	18.075	-0.793	9.052	Vel = 8.84
to						48.000					
6	11.830	23.81	1.049	Eq	43.0	50.390	0.1796	9.052			
6	11.830	23.81	0.0								
6	11.830	23.81									
1A	10	5.60	24.18	1	T	3.430	120	18.643	-0.793	9.508	Vel = 8.98
to						48.000					
1	11.830	24.18	1.049	Eq	43.0	51.430	0.1849	9.508			
1	11.830	24.18	0.0								
1	11.830	24.18									



Flow Test for Hydrant 4311 444

Start Time: 2024-08-16 11:02:19
End Time: 2024-08-16 11:03:05
Tested By: Roberts III, James L.

Test Hydrant

Static Pressure:	70.0
Residual Pressure:	69.0
Desired Pressure:	20.0
Volume at Desired Pressure:	11096.0

Flow Hydrants

ID	Downstream Hydrant	Port Diameter	Friction Coefficient	Pitot Pressure	Flow (Calculated)
		2.5	0.900000000000000000000002	64.0	1342.0



