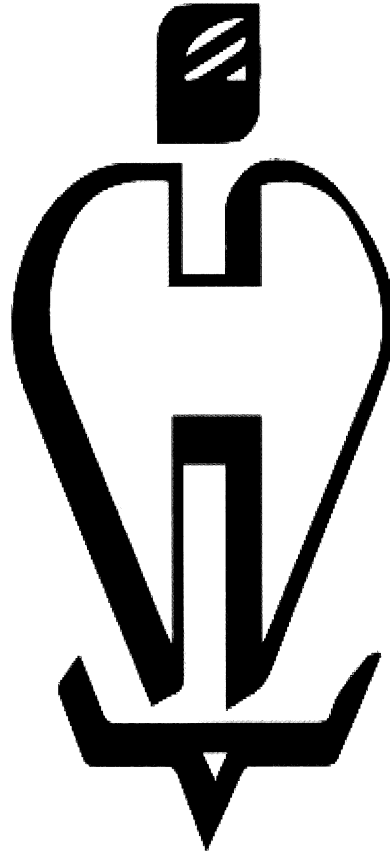


Job Name : Lillington FD
Drawing : Truck Bay
Location : Lillington, NC
Remote Area : 1
Contract : 25C999
Data File : Project1 Area TRUCK BAY-Manual.WXF

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 - Truck Bay
Contractor - Carolina Fire Protection
Calculated By - Austin Lee
Construction: () Combustible (X) Non-Combustible
Occupancy - ORDINARY HAZARD 2
System No. - 1
Contract No. - 25C999
Drawing No. -
Ceiling Height - VARIES
Date - 03-31-2025

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

M Area of Sprinkler Operation - 1565
System Type
Sprinkler/Nozzle
Density
Area Per Sprinkler
Elevation at Highest Outlet - 19.5
Hose Allowance - Inside
Rack Sprinkler Allowance
Hose Allowance - Outside - 250
N Note

Calculation Flow Required - 643.476 Press Required - 60.808 TEST
Summary C-Factor Used: 120 Overhead 150 Underground

M Water Flow Test:
A Date of Test - 02/25/2025
T Time of Test - 11AM
E Static Press - 103
R Residual Press - 94
S Flow
Elevation - 1694
U Location - Lillington, NC
P Source of Information - Austin Lee & Wayne Dunn
Y

C Commodity
O Storage Ht.
M Storage Method: Solid Piled
M Class
Area
Palletized
%
Location
Rack

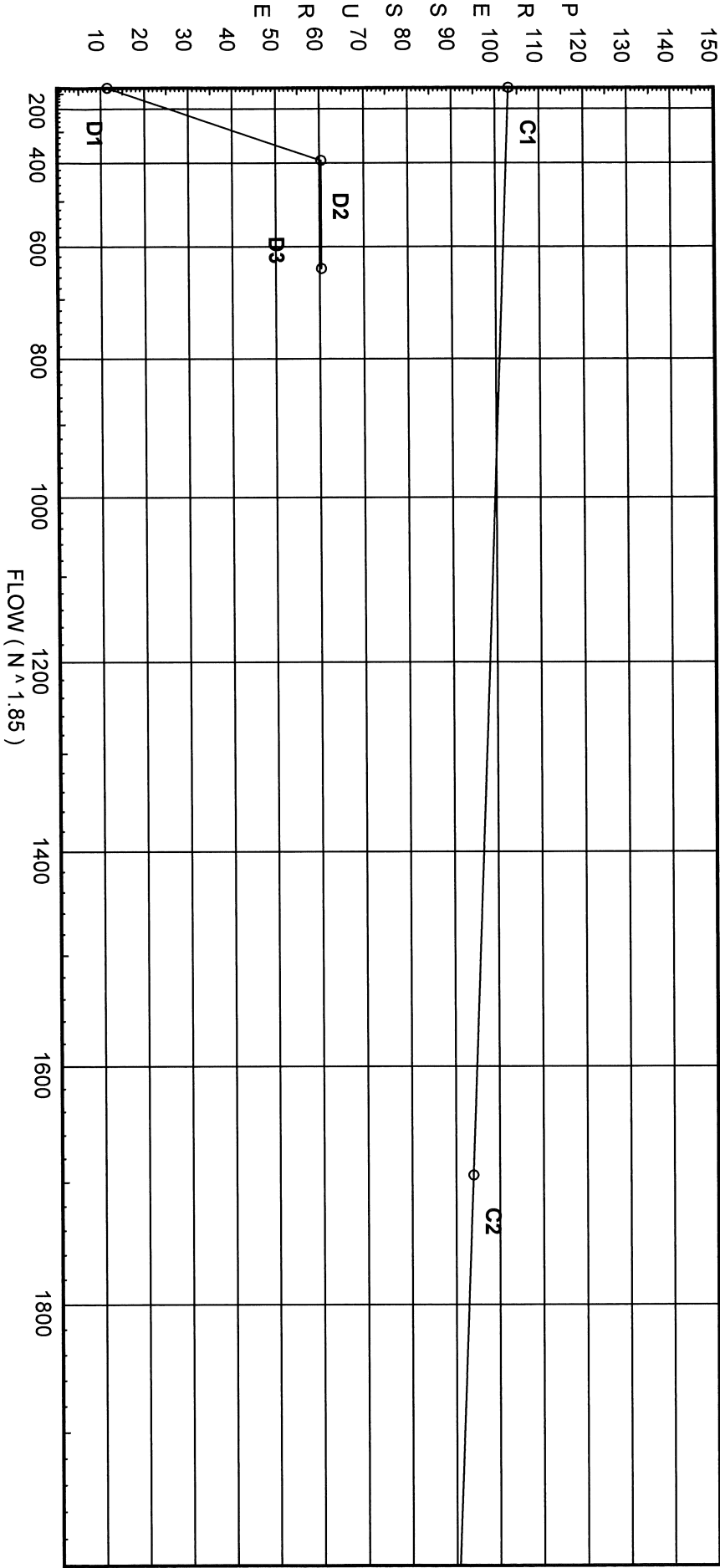
S () Single Row () Conven. Pallet () Auto. Storage () Encap.
R () Double Row () Slave Pallet () Solid Shelf () Non
T A () Mult. Row () Open Shelf
O C
R K
A
G
E
Horizontal Barriers Provided:
Clearance: Storage to Ceiling
Longitudinal
Transverse

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 : 11.477
D2 - System Flow : 393.476
D2 - System Pressure : 60.364
Hose (Demand) : 250
D3 - System Demand : 643.476
Safety Margin : 41.134



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
Zce	Coit 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	101.498	643.48	60.364

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
103	19.5	5.6	21.56	26.0	0.2
102	19.5	5.6	21.69	26.08	0.2
101	19.5	5.6	22.31	26.45	0.2
30	19.5		27.55		
N7	17.79		30.27		
N6	17.79		30.33		
N5	17.79		30.51		
N4	17.79		30.9		
N3	17.79		31.43		
N2	17.79		32.24		
N1	17.79		35.32		
13	19.5		33.48		
14	19.5		26.9		
F1	16.25		27.21		
F2	16.25		27.11		
F3	16.25		26.83		
F4	16.25		26.37		
F5	16.25		25.64		
F6	16.25		25.3		
F7	16.25		25.18		
18	19.5		22.49		
105	19.5	5.6	21.87	26.19	0.2
104	19.5	5.6	21.57	26.01	0.2
25	19.5		22.59		
110	19.5	5.6	21.97	26.25	0.2
109	19.5	5.6	21.66	26.06	0.2
108	19.5	5.6	21.64	26.05	0.2
107	19.5	5.6	21.78	26.13	0.2
106	19.5	5.6	22.39	26.5	0.2
31	19.5		27.62		
32	19.5		22.88		
115	19.5	5.6	22.24	26.41	0.2
114	19.5	5.6	21.92	26.22	0.2
113	19.5	5.6	21.9	26.21	0.2
112	19.5	5.6	22.02	26.28	0.2
111	19.5	5.6	22.63	26.64	0.2
38	19.5		27.82		
39	19.5		25.61		
40	19.5		29.51		
41	19.5		26.08		
42	19.5		30.04		
43	19.5		26.42		

Flow Summary - NFPA

Carolina Fire Protection
Lillington FD

NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
44	19.5		30.78		
22	17.79		38.38		
TOR	17.79		39.34		
BOR	5.04		52.28		
UG1	-7.0		57.62		
TEST	-7.0		60.36	250.0	

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

103	to	19.5	5.60	20.33	1.682	10.000	120	21.556	0.0	0.135	0.0135	Vel = 2.94
102	to	19.5	5.60	26.08	1.5	10.000	120	21.691	0.0	0.619	0.0619	Vel = 6.70
101	to	19.5	5.60	26.45	1.5	E	4.95	31.780	4.950	36.730	0.1427	Vel = 10.52
30	to	19.5		0.0	1.5	T	9.9	3.940	9.900	120	27.552	Vel = 10.52
N7	to	17.79		0.0	3			11.000	13.840	0.1427	1.975	Vel = 10.52
N7	to	17.79		72.86	1.682			11.000	120	30.268	0.0	
N6	to	17.790		72.86	3.26	11.000		0.0056	0.062	0.0	30.268	Vel = 2.80
N6	to	17.790		72.76	3	9.000		120	30.330	0.0	30.330	
N5	to	17.790		145.62	3.26	9.000		0.0204	0.184	0.0	30.514	Vel = 5.60
N5	to	17.790		72.46	3	9.000		120	30.514	0.0	30.514	
N4	to	17.790		218.08	3.26	9.000		0.0432	0.389	0.0	0.389	Vel = 8.38
N4	to	17.790		39.89	3	9.000		120	30.903	0.0	30.903	
N3	to	17.790		257.97	3.26	9.000		0.0590	0.531	0.0	0.531	Vel = 9.92
N3	to	17.790		40.20	3	10.500		120	31.434	0.0	31.434	
N2	to	17.790		298.17	3.26	10.500		0.0771	0.810	0.0	0.810	Vel = 11.46
N2	to	17.790		42.36	3	20.159		11.040	20.159	120	32.244	
N1	to	17.790		340.53	3.26	31.199		0.0986	3.075	0.0	3.075	Vel = 13.09
N1	to	17.790		52.95	3	20.159		3.580	20.159	120	35.319	
22	to	17.790		393.48	3.26	23.739		0.1288	3.057	0.0	3.057	Vel = 15.12
22				0.0				38.376				K Factor = 63.52
N1	to	17.790		-52.95	1.5	T	9.9	3.940	9.900	120	35.319	
13	to	19.5		-52.95	1.682	13.840		-0.0790	-1.094	-0.741	35.319	Vel = 7.65
13	to	19.5		0.0	1.5	ZE	9.9	73.390	9.900	120	33.484	
14	to	19.5		-52.95	1.682	83.290		-0.0791	-6.586	0.0	-6.586	Vel = 7.65
14	to	19.5		0.0	1.5	T	9.9	3.940	9.900	120	26.898	
F1	to	16.250		-52.95	1.682	13.840		-0.0790	-1.094	1.408	26.898	Vel = 7.65
F1	to	16.250		0.0	2.5	12.000		120	27.212	0.0	27.212	
F2	to	16.250		-52.95	2.635	12.000		-0.0089	-0.107	0.0	-0.107	Vel = 3.12
F2	to	16.250		-42.35	2.5	10.500		120	27.105	0.0	27.105	
F3	to	16.250		-95.3	2.635	10.500		-0.0264	-0.277	0.0	-0.277	Vel = 5.61

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

F3	to	F4	16.250	-40.21	2.5	9.000	120	26.828	0.0	0.0	26.374	Vel = 7.97
F4	to	F4	16.250	-39.89	2.5	9.000	120	26.374	0.0	0.0	26.374	Vel = 7.97
F5	to	F5	16.250	-175.4	2.635	9.000	120	26.374	0.0	0.0	26.374	Vel = 10.32
F5	to	F5	16.250	59.29	2.5	9.000	120	25.641	0.0	0.0	25.641	Vel = 10.32
F6	to	F6	16.250	-116.11	2.635	9.000	120	0.0	0.0	0.0	0.0	Vel = 6.83
F6	to	F6	16.250	58.24	2.5	11.000	120	25.299	0.0	0.0	25.299	Vel = 6.83
F7	to	F7	16.250	-57.87	2.635	11.000	120	0.0	0.0	0.0	0.0	Vel = 3.40
F7	to	F7	16.250	0.0	1.5	9.9	120	3.940	9.900	-1.408	25.184	Vel = 3.40
18	to	18	19.5	-57.87	1.682	13.840	120	9.900	-0.0932	-1.290	-1.408	Vel = 8.36
18	to	18	19.5	0.0	1.5	4.95	120	1.610	4.950	0.0	22.486	Vel = 8.36
105	to	105	19.500	-57.87	1.682	6.560	120	4.950	-0.0931	-0.611	0.0	Vel = 8.36
105	to	105	19.500	5.60	26.19	1.5	120	10.000	0.0	0.0	21.875	Vel = 8.36
104	to	104	19.5	-31.68	1.682	10.000	120	10.000	-0.0306	-0.306	0.0	Vel = 4.57
104	to	104	19.5	26.01	1.5	10.000	120	21.569	0.0	0.0	21.569	Vel = 4.57
103	to	103	19.5	-5.67	1.682	10.000	120	10.000	-0.0013	-0.013	0.0	Vel = 0.82
103	to	103	16.250	-5.67	0.0		21.556					K Factor = -1.22
F6	to	F6	16.250	-58.23	1.5	9.9	120	3.940	9.900	-1.408	25.299	Vel = 8.41
25	to	25	19.5	-58.23	1.682	13.840	120	9.900	-0.0943	-1.305	-1.408	Vel = 8.41
25	to	25	19.5	0.0	1.5	4.95	120	1.610	4.950	0.0	22.586	Vel = 8.41
110	to	110	19.5	-58.23	1.682	6.560	120	4.950	-0.0942	-0.618	0.0	Vel = 8.41
110	to	110	19.5	26.24	1.5	10.000	120	21.968	0.0	0.0	21.968	Vel = 8.41
109	to	109	19.5	-31.99	1.682	10.000	120	10.000	-0.0311	-0.311	0.0	Vel = 4.62
109	to	109	19.5	26.07	1.5	10.000	120	21.657	0.0	0.0	21.657	Vel = 4.62
108	to	108	19.5	-5.92	1.682	10.000	120	10.000	-0.0014	-0.014	0.0	Vel = 0.85
108	to	108	19.5	26.05	1.5	10.000	120	21.643	0.0	0.0	21.643	Vel = 0.85
107	to	107	19.5	20.13	1.682	10.000	120	10.000	0.0132	0.132	0.0	Vel = 2.91
107	to	107	19.5	26.13	1.5	10.000	120	21.775	0.0	0.0	21.775	Vel = 2.91
106	to	106	19.5	46.26	1.682	10.000	120	10.000	0.0616	0.616	0.0	Vel = 6.68
106	to	106	19.5	26.50	1.5	4.95	120	31.780	0.0	0.0	22.391	Vel = 6.68
31	to	31	19.5	72.76	1.682	36.730	120	4.950	0.1423	5.228	0.0	Vel = 10.51
31	to	31	19.5	0.0	1.5	9.9	120	3.940	0.0	0.0	27.619	Vel = 10.51
N6	to	N6	17.790	72.76	1.682	13.840	0.1423	1.970	0.741	0.741	0.741	Vel = 10.51

Node1 to Node2	Elev1	K	Qa	Act Norm	Equiv or Fitting	Len	Pipe Fngs Total	Cfact	Pf/Ft	Pf	Notes	*****

N6	to F5	16.250	-59.30	1.5	T	9.9	3.940	120	25.641	-1.408	-1.349	Vel = 8.56
							9.900					
	32	19.5	0.0	1.5	E	4.95	1.610	120	22.884	0.0	0.0	Vel = 8.56
	to 115	19.500	-59.3	1.682			6.560		-0.0976	-0.640	0.0	Vel = 8.56
							4.950					
115	to 114	19.500	5.60	26.42	1.5		10.000	120	22.244	0.0	0.0	Vel = 4.75
							10.000		-0.0327	-0.327	0.0	Vel = 4.75
114	to 113	19.5	5.60	26.21	1.5		10.000	120	21.917	0.0	0.0	Vel = 0.96
							10.000		-0.0017	-0.017	0.0	Vel = 0.96
113	to 112	19.5	5.60	26.21	1.5		10.000	120	21.900	0.0	0.0	Vel = 2.82
							10.000		0.0125	0.125	0.0	Vel = 2.82
112	to 111	19.5	5.60	26.28	1.5		10.000	120	22.025	0.0	0.0	Vel = 6.62
							10.000		0.0605	0.605	0.0	Vel = 6.62
111	to 111	19.5	45.82	1.682			10.000					
							31.780	120	22.630	0.0	0.0	
111	to 38	19.5	5.60	26.64	1.5	E	4.95					
							36.730	120	27.819	0.0	0.0	Vel = 10.46
	38	19.5	0.0	1.5	T	9.9	3.940	120	27.819	0.741	1.954	Vel = 10.46
	to N5	17.790	72.46	1.682			13.840		0.1412	0.1412	1.954	Vel = 10.46
							9.900					
N5	to F4	16.250	39.89	1.5	T	9.9	3.940	120	26.374	-1.408	0.648	Vel = 5.76
							9.900					
39	to 39	19.5	39.89	1.682			13.840	120	25.614	0.0	0.0	Vel = 5.76
							73.390	120	25.614	0.0	0.0	Vel = 5.76
40	to 40	19.5	39.89	1.682			83.290	120	29.515	0.0	3.901	Vel = 5.76
							9.900					
40	to N4	17.790	39.89	1.682			13.840		0.0467	0.0467	0.647	Vel = 5.76
							9.900					
N4	to F3	16.250	40.21	1.5	T	9.9	3.940	120	26.828	-1.408	0.658	Vel = 5.81
							9.900					
41	to 41	19.5	40.21	1.682			13.840	120	26.078	0.0	3.958	Vel = 5.81
							73.390	120	26.078	0.0	3.958	Vel = 5.81
42	to 42	19.5	40.21	1.682			83.290	120	30.036	0.0	0.741	Vel = 5.81
							9.900					
42	to N3	17.790	40.21	1.682			13.840		0.0475	0.0475	0.657	Vel = 5.81
							9.900					

Final Calculations : Hazen-Williams

Carolina Fire Protection
Lillington FD

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

N3			40.21					31.434					K Factor = 7.17
F2	16.250		42.35	1.5	T	9.9	3.940	120	27.105				
to							9.900						
43	19.5		42.35	1.682			13.840		0.0524	0.725			Vel = 6.11
43	19.5		0.0	1.5	2E	9.9	73.390	120	26.422				
to							9.900			0.0			
44	19.5		42.35	1.682			83.290		0.0523	4.357			Vel = 6.11
44	19.5		0.0	1.5	T	9.9	3.940	120	30.779				
to							9.900			0.741			Vel = 6.11
N2	17.790		42.35	1.682			13.840		0.0523	0.724			
N2			0.0							32.244			K Factor = 7.46
22	17.790		393.48	4	T	26.334	1.330	120	38.376				
to							26.334		0.0				
TOR	17.790		393.48	4.26			27.664		0.0350	0.969			Vel = 8.86
TOR	17.790		0.0	4	E	13.167	13.130	120	39.345				
to							0.0			11.686			* Fixed Loss = 6.164
BOR	5.04		393.48	4.26	Eq	0.0	35.646		0.0350	1.247			Vel = 8.86
BOR	5.04		0.0	6	E	21.583	9.750	150	52.278				
to							21.583			5.215			
UG1	-7		393.48	6.09			31.333		0.0041	0.127			Vel = 4.33
UG1	-7		0.0	6	2E	43.166	479.460	150	57.620				
to							138.748			0.0			
TEST	-7		393.48	6.09	3T	138.748	675.249		0.0041	2.744			Vel = 4.33
TEST			250.00										Qa = 250.00
TEST			643.48							60.364			K Factor = 82.82



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



4313G006

Flow Hydrant

4313C005

Hydrant's missing

Test Hydrant
4313C004

Lillington, B19

Wentworthville Bunnlevel, C1

CAUTION BROWN RD - 1155

4311399 2886

GREGORY VILLAGE DR