Hydraulic Calculations by HydraCALC

ABL Fire Protection
300 Hoke Street
Raleigh, NC 27601
919-291-7460

Job Name	:	ILC Dover- Interior Renovation and Addition
Drawing	:	
Location	:	Lillington, NC
Remote Area	:	1
Contract	:	
Data File	:	ILC Dover Calcs.WXF

HYDRAULIC CALCULATIONS
for

JOB NAME ILC Dover
Location Lillington, NC
Drawing #
Contract #
Date

DESIGN

Remote area # 1
Remote area location Corridor
Occupancy classification Light Hazard
Density .10 - Gpm/SqFt
Area of application 900 - SqFt
Coverage/sprinkler 130 - SqFt
Type of sprinkler calculated Quick Response Pendent
 # Sprinklers calculated 12
In-rack demand - GPM
Hose streams 100 - GPM
Total water required (including hose streams) 362.743 - GPM @ 70574 - Psi
Type of system
Volume of system (dry or pre-action) - Gal

WATER SUPPLY INFORMATION

Test date 12-16-24
Location Closest Private Hydrant
Source of info Andrew King Engineering

CONTRACTOR INFO ABL Fire Protection
Address 300 Hoke St.; Raleigh. NC 27601
Phone # 919-291-7460
Name of designer Art Lamson
Authority having jurisdiction Harnett County
NOTES:

text1(35) - invisible

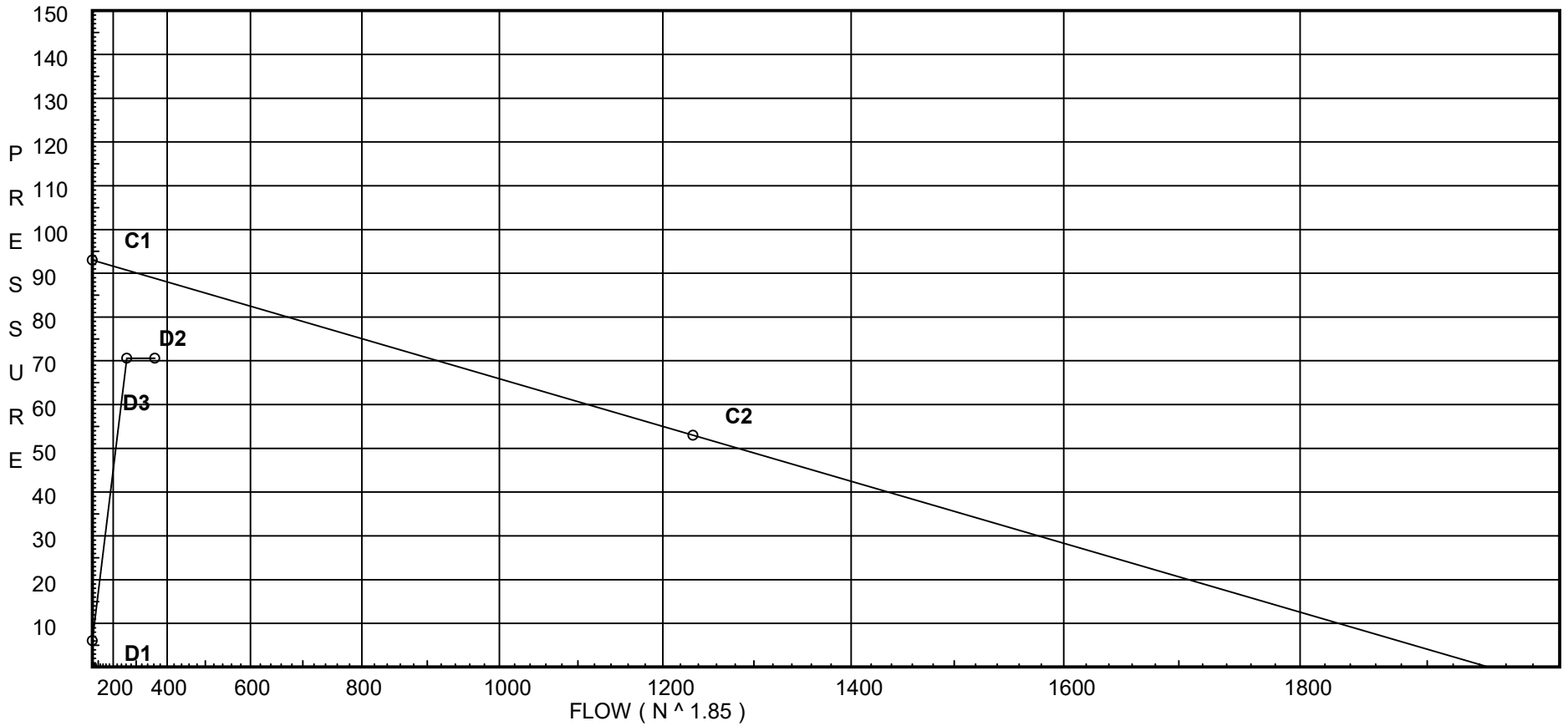
Water Supply Curve

ABL Fire Protection
ILC Dover- Interior Renovation and Addition

Date 12/18/24

City Water Supply:
- C1 - Static Pressure : 93
- C2 - Residual Pressure: 53
- C2 - Residual Flow : 1234

Demand:
- D1 - Elevation : 6.063
- D2 - System Flow : 262.743
- D2 - System Pressure : 70.574
- Hose (Demand) : 100
- D3 - System Demand : 362.743
- Safety Margin : 18.273



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
A	Alarm Rel E1 & E3							7.7	21.5		17		27	29							
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
Zwc	Watts 709	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	93.0	53	1234.0	88.847	362.74	70.574

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
S2	9.0	5.6	7.0	14.82	0.1 130
S5	9.0	5.6	7.0	14.82	0.1 130
1	10.0	4.4	14.48	16.74	K=K @ EQ1
2	10.0	4.4	15.42	17.27	K=K @ EQ1
3	10.0	4.4	18.98	19.16	K=K @ EQ1
4	10.0	4.4	17.84	18.58	K=K @ EQ1
5	10.0	4.35	17.9	18.41	K=K @ EQ2
6	10.0	4.35	19.02	18.98	K=K @ EQ2
7	10.0	4.35	22.33	20.57	K=K @ EQ2
8	10.0	4.35	22.22	20.51	K=K @ EQ2
9	9.0	5.6	11.0	18.57	0.1 130
10	10.0	4.35	11.59	14.82	K=K @ EQ2
11	10.0	4.35	17.38	18.15	K=K @ EQ2
12	10.0	4.35	19.35	19.15	K=K @ EQ2
13	10.0	4.35	22.18	20.5	K=K @ EQ2
14	10.0	4.35	24.03	21.34	K=K @ EQ2
C1	10.0		23.8		
C2	10.0		23.92		
C3	10.0		25.87		
C4	10.0		28.15		
C5	10.0		30.86		
A1	19.0		53.94		
A2	19.0		53.94		
A3	19.0		53.96		
A4	19.0		53.99		
A5	19.0		54.03		
A6	19.0		54.11		
A7	19.0		54.21		
A8	19.0		54.35		
A9	19.0		54.53		
TOR	2.0		62.11		
BOR	2.0		63.29		
BASE	0.0		68.06	100.0	
TEST	-4.0		70.57		
B1	19.0		38.29		
B2	19.0		38.29		
B3	19.0		38.28		
B4	19.0		38.25		
B5	19.0		38.2		
B6	19.0		38.13		
CON1	19.0		38.09		
B7	19.0		38.11		

NODE ANALYSIS (cont.)

Node Tag	*Elevation*	*Node Type*	*Pressure at Node*	*Discharge at Node*	*Notes*
B8	19.0		38.12		

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 ******
S2	9	5.60	14.82	1	T	5.0	1.000	120	7.000	
to							5.000		3.898	
EQ1	0		14.82	1.049			6.000	0.0747	0.448	Vel = 5.50
			0.0							
EQ1			14.82						11.346	K Factor = 4.40
S5	9	5.60	14.82	1	E	2.0	2.250	120	7.000	
to					T	5.0	7.000		3.898	
EQ2	0		14.82	1.049			9.250	0.0747	0.691	Vel = 5.50
			0.0							
EQ2			14.82						11.589	K Factor = 4.35
1	10	4.4	16.74	1			10.000	120	14.481	K = K @ EQ1
to									0.0	
2	10		16.74	1.049			10.000	0.0936	0.936	Vel = 6.21
2	10	4.4	17.27	1	T	5.0	5.250	120	15.417	K = K @ EQ1
to							5.000		0.0	
3	10		34.01	1.049			10.250	0.3475	3.562	Vel = 12.63
3	10	4.4	37.74	1.25	E	3.0	4.250	120	18.979	K = K @ EQ1
to					T	6.0	9.000		0.0	
C1	10		71.75	1.38			13.250	0.3637	4.819	Vel = 15.39
			0.0							
C1			71.75						23.798	K Factor = 14.71
4	10	4.4	18.58	1	T	5.0	5.000	120	17.843	K = K @ EQ1
to							5.000		0.0	
3	10		18.58	1.049			10.000	0.1136	1.136	Vel = 6.90
			0.0							
3			18.58						18.979	K Factor = 4.26
5	10	4.35	18.41	1			10.000	120	17.899	K = K @ EQ2
to									0.0	
6	10		18.41	1.049			10.000	0.1117	1.117	Vel = 6.83
6	10	4.35	18.98	1			8.000	120	19.016	K = K @ EQ2
to									0.0	
7	10		37.39	1.049			8.000	0.4141	3.313	Vel = 13.88
7	10	4.35	20.57	1.25	T	6.0	0.500	120	22.329	K = K @ EQ2
to							6.000		0.0	
C2	10		57.96	1.38			6.500	0.2451	1.593	Vel = 12.43
			0.0							
C2			57.96						23.922	K Factor = 11.85
8	10	4.35	20.51	1	T	5.0	7.500	120	22.217	K = K @ EQ2
to							5.000		0.0	
C2	10		20.51	1.049			12.500	0.1364	1.705	Vel = 7.61
			0.0							
C2			20.51						23.922	K Factor = 4.19
9	9	5.60	18.57	1	E	2.0	7.000	120	11.001	
to							2.000		-0.433	
10	10		18.57	1.049			9.000	0.1134	1.021	Vel = 6.89
10	10	4.35	14.82	1	E	2.0	15.250	120	11.589	K = K @ EQ2
to							2.000		0.0	
11	10		33.39	1.049			17.250	0.3359	5.794	Vel = 12.40

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 ******
11	10	4.35	18.15	1.25			10.000	120	17.383	K = K @ EQ2
to									0.0	
12	10		51.54	1.38			10.000	0.1971	1.971	Vel = 11.06
12	10	4.35	19.14	1.25			8.000	120	19.354	K = K @ EQ2
to									0.0	
13	10		70.68	1.38			8.000	0.3538	2.830	Vel = 15.16
13	10	4.35	20.50	1.25	T	6.0	0.500	120	22.184	K = K @ EQ2
to							6.000		0.0	
C3	10		91.18	1.38			6.500	0.5666	3.683	Vel = 19.56
			0.0							
C3			91.18						25.867	K Factor = 17.93
14	10	4.35	21.34	1	T	5.0	7.500	120	24.034	K = K @ EQ2
to							5.000		0.0	
C3	10		21.34	1.049			12.500	0.1466	1.833	Vel = 7.92
			0.0							
C3			21.34						25.867	K Factor = 4.20
C1	10		71.75	2			3.000	120	23.798	
to									0.0	
C2	10		71.75	2.157			3.000	0.0413	0.124	Vel = 6.30
C2	10		78.47	2			12.000	120	23.922	
to									0.0	
C3	10		150.22	2.157			12.000	0.1621	1.945	Vel = 13.19
C3	10		112.52	2			5.000	120	25.867	
to									0.0	
C4	10		262.74	2.157			5.000	0.4560	2.280	Vel = 23.07
C4	10		0.0	2.5			15.750	120	28.147	
to									0.0	
C5	10		262.74	2.635			15.750	0.1720	2.709	Vel = 15.46
C5	10		0.0	2.5	E	8.237	40.000	120	30.856	
to					T	16.474	24.711		-3.898	
CON1	19		262.74	2.635			64.711	0.1720	11.132	Vel = 15.46
			0.0							
CON1			262.74						38.090	K Factor = 42.57
A1	19		28.92	4			13.330	120	53.940	
to									0.0	
A2	19		28.92	4.26			13.330	0.0003	0.004	Vel = 0.65
A2	19		28.94	4			13.330	120	53.944	
to									0.0	
A3	19		57.86	4.26			13.330	0.0010	0.013	Vel = 1.30
A3	19		28.95	4			13.330	120	53.957	
to									0.0	
A4	19		86.81	4.26			13.330	0.0021	0.028	Vel = 1.95
A4	19		29.02	4			13.330	120	53.985	
to									0.0	
A5	19		115.83	4.26			13.330	0.0037	0.049	Vel = 2.61
A5	19		29.11	4			13.330	120	54.034	
to									0.0	
A6	19		144.94	4.26			13.330	0.0056	0.074	Vel = 3.26

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 ******
A6	19		29.26	4			13.330	120	54.108	
to									0.0	
A7	19		174.2	4.26			13.330	0.0077	0.103	Vel = 3.92
A7	19		29.38	4			13.330	120	54.211	
to									0.0	
A8	19		203.58	4.26			13.330	0.0104	0.138	Vel = 4.58
A8	19		29.49	4			13.330	120	54.349	
to									0.0	
A9	19		233.07	4.26			13.330	0.0133	0.177	Vel = 5.25
A9	19		29.67	4			13.330	120	54.526	
to									7.363	
TOR	2		262.74	4.26			13.330	0.0165	0.220	Vel = 5.91
TOR	2		0.0	4	A	22.384	20.000	120	62.109	
to					G	2.633	51.351		0.0	
BOR	2		262.74	4.26	T	26.334	71.351	0.0166	1.183	Vel = 5.91
BOR	2		0.0	6	Zwc	0.0	6.000	120	63.292	
to					E	17.603	17.603		4.714	* * Fixed Loss = 3.848
BASE	0		262.74	6.357			23.603	0.0024	0.056	Vel = 2.66
BASE	0	H100	100.00	6	3E	60.252	100.000	140	68.062	
to					T	43.037	107.593		1.732	
TEST	-4		362.74	6.16	G	4.304	207.593	0.0038	0.780	Vel = 3.91
			0.0							
TEST			362.74						70.574	K Factor = 43.18
B1	19		-28.92	4			13.330	120	38.295	
to									0.0	
B2	19		-28.92	4.26			13.330	-0.0003	-0.004	Vel = 0.65
B2	19		-28.94	4			13.330	120	38.291	
to									0.0	
B3	19		-57.86	4.26			13.330	-0.0011	-0.014	Vel = 1.30
B3	19		-28.95	4			13.330	120	38.277	
to									0.0	
B4	19		-86.81	4.26			13.330	-0.0021	-0.028	Vel = 1.95
B4	19		-29.02	4			13.330	120	38.249	
to									0.0	
B5	19		-115.83	4.26			13.330	-0.0037	-0.049	Vel = 2.61
B5	19		-29.11	4			13.330	120	38.200	
to									0.0	
B6	19		-144.94	4.26			13.330	-0.0055	-0.073	Vel = 3.26
B6	19		-29.26	4			4.750	120	38.127	
to									0.0	
CON1	19		-174.2	4.26			4.750	-0.0078	-0.037	Vel = 3.92
CON1	19		262.75	4			8.580	120	38.090	
to									0.0	
B7	19		88.55	4.26			8.580	0.0022	0.019	Vel = 1.99
B7	19		-29.38	4			13.330	120	38.109	
to									0.0	
B8	19		59.17	4.26			13.330	0.0011	0.014	Vel = 1.33
B8	19		-29.50	4			13.330	120	38.123	
to									8.229	
B9	0		29.67	4.26			13.330	0.0003	0.004	Vel = 0.67

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							
B9			29.67						46.356	K Factor = 4.36
A1	19		-28.92	1.25	4T	24.0	207.000	120	53.940	
to							24.000		0.0	
B1	19		-28.92	1.38			231.000	-0.0677	-15.645	Vel = 6.20
			0.0							
B1			-28.92						38.295	K Factor = -4.67
A2	19		-28.93	1.25	4T	24.0	207.000	120	53.944	
to							24.000		0.0	
B2	19		-28.93	1.38			231.000	-0.0678	-15.653	Vel = 6.21
			0.0							
B2			-28.93						38.291	K Factor = -4.68
A3	19		-28.96	1.25	4T	24.0	207.000	120	53.957	
to							24.000		0.0	
B3	19		-28.96	1.38			231.000	-0.0679	-15.680	Vel = 6.21
			0.0							
B3			-28.96						38.277	K Factor = -4.68
A4	19		-29.02	1.25	4T	24.0	207.000	120	53.985	
to							24.000		0.0	
B4	19		-29.02	1.38			231.000	-0.0681	-15.736	Vel = 6.22
			0.0							
B4			-29.02						38.249	K Factor = -4.69
A5	19		-29.11	1.25	4T	24.0	207.000	120	54.034	
to							24.000		0.0	
B5	19		-29.11	1.38			231.000	-0.0685	-15.834	Vel = 6.24
			0.0							
B5			-29.11						38.200	K Factor = -4.71
A6	19		-29.26	1.25	4T	24.0	207.000	120	54.108	
to							24.000		0.0	
B6	19		-29.26	1.38			231.000	-0.0692	-15.981	Vel = 6.28
			0.0							
B6			-29.26						38.127	K Factor = -4.74
A7	19		-29.38	1.25	4T	24.0	207.000	120	54.211	
to							24.000		0.0	
B7	19		-29.38	1.38			231.000	-0.0697	-16.102	Vel = 6.30
			0.0							
B7			-29.38						38.109	K Factor = -4.76
A8	19		-29.50	1.25	4T	24.0	207.000	120	54.349	
to							24.000		0.0	
B8	19		-29.5	1.38			231.000	-0.0702	-16.226	Vel = 6.33
			0.0							
B8			-29.50						38.123	K Factor = -4.78
A9	19		-29.67	1.25	4T	24.0	207.000	120	54.526	
to							24.000		8.229	
B9	0		-29.67	1.38			231.000	-0.0710	-16.399	Vel = 6.36
			0.0							
B9			-29.67						46.356	K Factor = -4.36

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	******