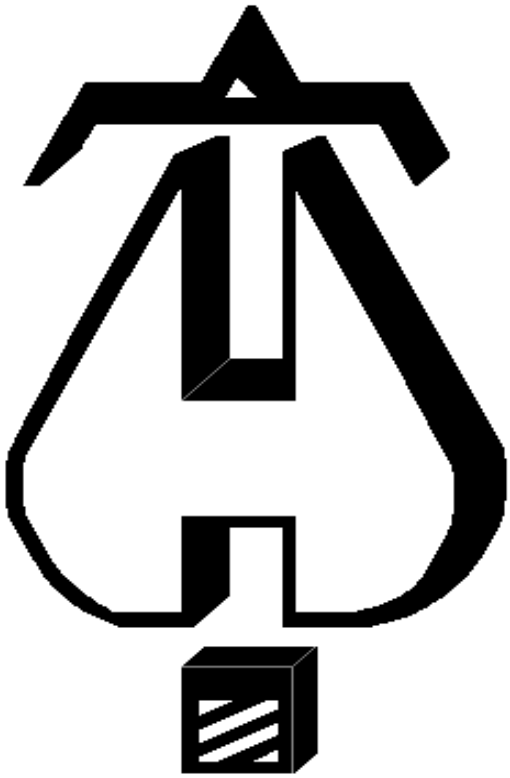


. . . Fire Protection by Computer Design

Reliable Fire Protection LLC
32 Partin Rd.
Dunn, NC 28334
Robert Lawley
NICET Level III #103122

Job Name	:	DRY HSW 3RD FLR BREEZEWAY- THE GROVES
Building	:	3 BEDROOM NEW RESIDENTIAL
Location	:	1585 E. CORNELIUS HARNETT BOULEVARD
System	:	1
Contract	:	21-208
Data File	:	BREEZEWAY - DRY HSW 3RD FLR 5.6K.WXF

HYDRAULIC DESIGN INFORMATION SHEET

Name - THE GROVE APARTMENTS AT 421 Date - 01-07-22
Location - 1585 E. CORNELIUS HARNETT BOULEVARD
Building - 3 BEDROOM NEW RESIDENTIAL System No. - 1
Contractor - HATCHERS CREEK, LLC Contract No. - 21-208
Calculated By - ROBERT LAWLEY Drawing No. - FP1
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height VARIES
OCCUPANCY - RESIDENTIAL NFPA 13R 2013

SYSTEM DESIGN

Type of Calculation: ( )NFPA 13 Residential (X)NFPA 13R ( )NFPA 13D
Number of Sprinklers Flowing: ( )1 ( )2 ( )4 (X)3
( )Other
( )Specific Ruling Made by Date

Listed Flow at Start Point - 15 Gpm System Type
Listed Pres. at Start Point - 7 Psi (X) Wet ( ) Dry
MAXIMUM LISTED SPACING 14 x 14 ( ) Deluge ( ) PreAction
Domestic Flow Added - 0 Gpm Sprinkler or Nozzle
Additional Flow Added - 0 Gpm Make TYCO Model DS-1
Elevation at Highest Outlet - 28.333Feet Size 1/2 K-Factor 5.6
Note:SAFETY MARGIN: 5.25 PSI Temperature Rating 155*

Calculation Summary — Gpm Required 165.856 Psi Required 53.530 At Test
C-Factor Used: Overhead 150 Underground 150

WATER SUPPLY

Water Flow Test:	Pump Data:	Tank or Reservoir:
Date of Test - 07-01-20	Rated Cap.	Cap.
Time of Test - 10:00 AM	@ Psi	Elev.
Static (Psi) - 59	Elev.	
Residual (Psi) - 53	Other	Well
Flow (Gpm) - 1000		Proof Flow Gpm
Elevation - 0		

Location: US 421

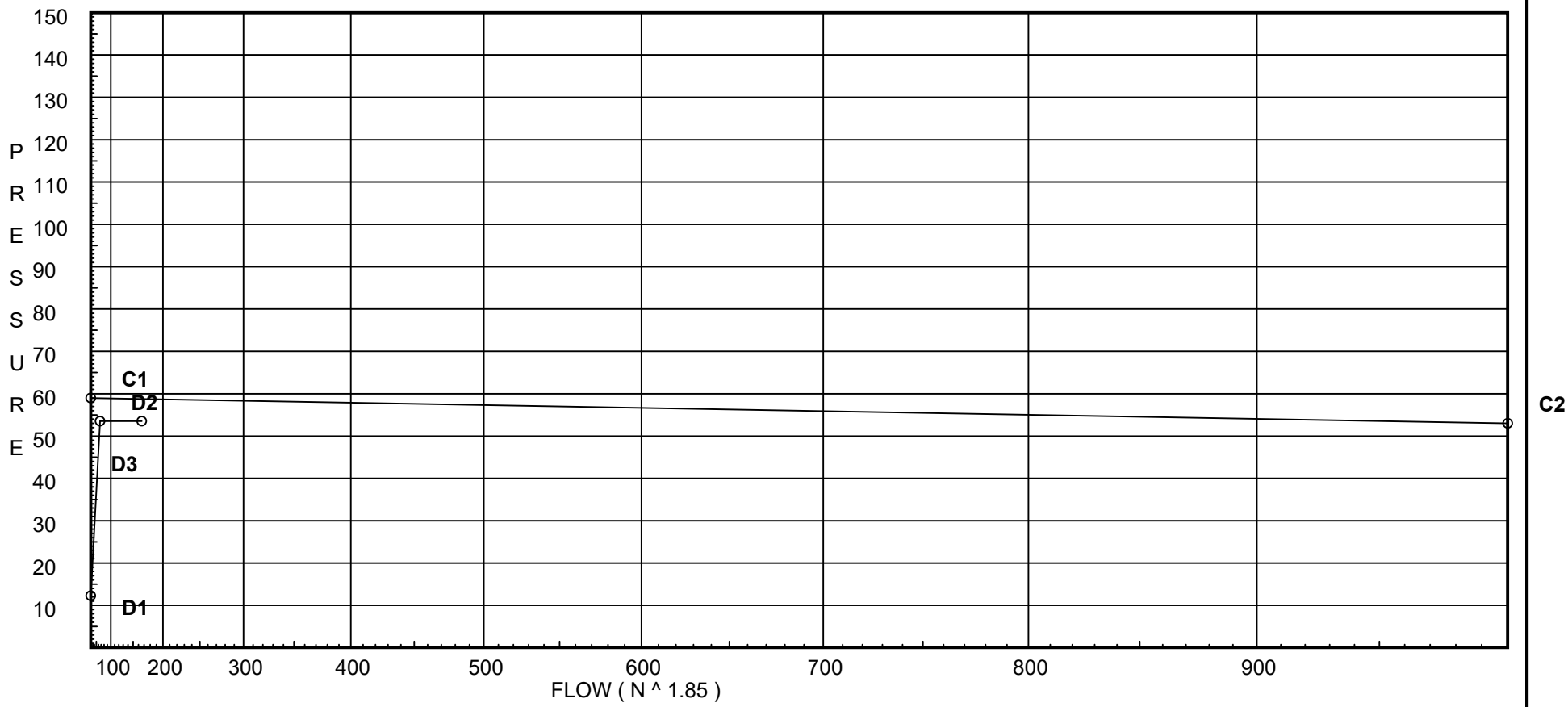
Source of Information: 4D SITE SOLUTIONS, INC.

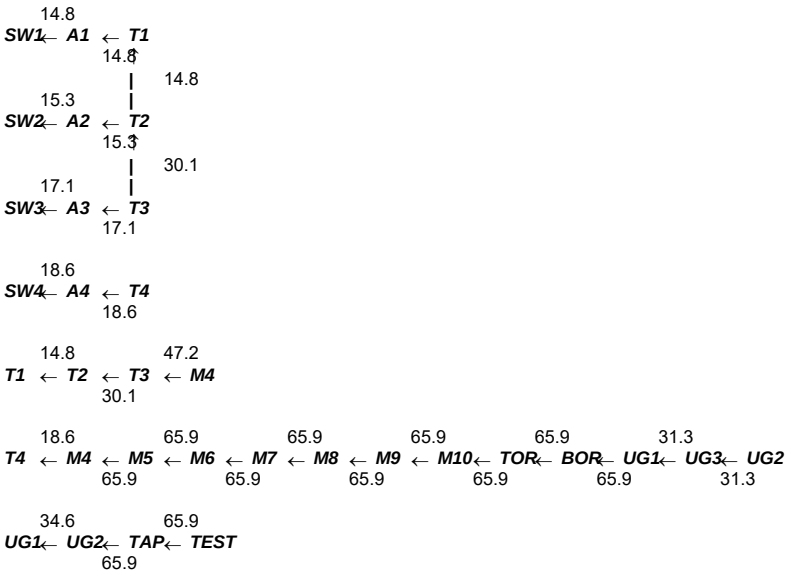
Water Supply Curve C

Reliable Fire Protection LLC
DRY HSW 3RD FLR BREEZEWAY- THE GROVES

City Water Supply:
- C1 - Static Pressure : 59
- C2 - Residual Pressure: 53
- C2 - Residual Flow : 1000

Demand:
- D1 - Elevation : 12.271
- D2 - System Flow : 65.856
- D2 - System Pressure : 53.530
- Hose (Demand) : 100
- D3 - System Demand : 165.856
- Safety Margin : 5.254

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SW1 ← A1 ← T1
14.8
14.8
15.3
SW2 ← A2 ← T2
15.3
30.1
17.1
SW3 ← A3 ← T3
17.1
18.6
SW4 ← A4 ← T4
18.6
14.8
47.2
T1 ← T2 ← T3 ← M4
30.1
18.6
65.9
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65.9
65.9
31.3
T4 ← M4 ← M5 ← M6 ← M7 ← M8 ← M9 ← M10 ← TOR ← BOR ← UG1 ← UG3 ← UG2
65.9
65.9
65.9
65.9
65.9
31.3
34.6
65.9
UG1 ← UG2 ← TAP ← TEST
65.9

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
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
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
N *	CPVC 90'Ell Harvel-Spears		7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O *	CPVC Tee - Branch	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
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
Zwb	Watts 009	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.

Pressure / Flow Summary - STANDARD

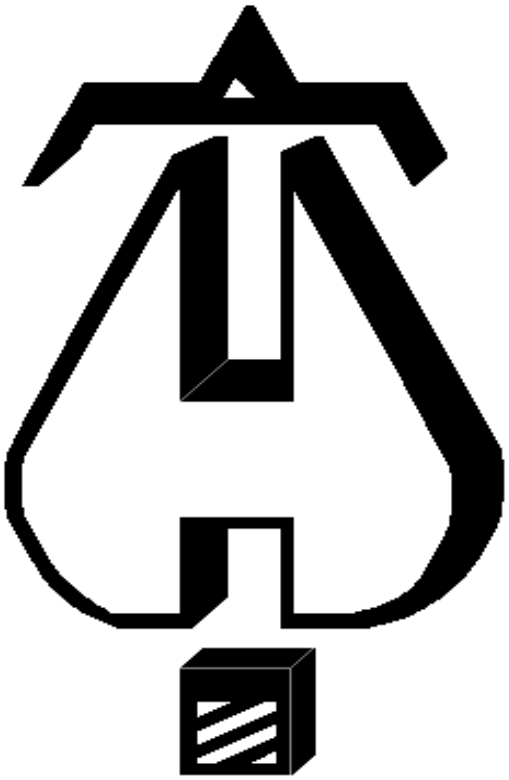
Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
SW1	28.333	5.6	7.0	na	14.82	0.1	144	7.0
A1	28.333		7.45	na				
SW2	28.333	5.6	7.49	na	15.33	0.1	144	7.0
A2	28.333		7.97	na				
SW3	28.333	5.6	9.31	na	17.09	0.1	144	7.0
A3	28.333		9.9	na				
SW4	28.333	5.6	11.06	na	18.62	0.1	144	7.0
A4	28.333		11.74	na				
T1	29.167		7.52	na				
T2	29.167		8.07	na				
T3	29.167		10.1	na				
T4	29.167		12.05	na				
M4	29.167		12.97	na				
M5	29.167		13.41	na				
M6	29.167		14.06	na				
M7	19.167		18.72	na				
M8	9.167		23.39	na				
M9	9.167		24.0	na				
M10	9.167		25.03	na				
TOR	9.5		27.83	na				
BOR	1.0		35.95	na				
UG1	0.0		53.51	na				
UG3	0.0		53.52	na				
UG2	0.0		53.52	na				
TAP	0.0		53.53	na				
TEST	0.0		53.53	na	100.0			

The maximum velocity is 15.92 and it occurs in the pipe between nodes T3 and M4

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
SW1	28.333	5.60	14.82	1	1T	5.0	1.000	120	7.000	
to						0.0	5.000		0.0	
A1	28.333		14.82	1.049		0.0	6.000	0.0747	0.448	Vel = 5.50
A1	28.333		0.0	1	1T	5.0	0.833	120	7.448	
to						0.0	5.000		-0.361	
T1	29.167		14.82	1.049		0.0	5.833	0.0747	0.436	Vel = 5.50
			0.0							
T1			14.82						7.523	K Factor = 5.40
SW2	28.333	5.60	15.33	1	1T	5.0	1.000	120	7.490	
to						0.0	5.000		0.0	
A2	28.333		15.33	1.049		0.0	6.000	0.0795	0.477	Vel = 5.69
A2	28.333		0.0	1	1T	5.0	0.833	120	7.967	
to						0.0	5.000		-0.361	
T2	29.167		15.33	1.049		0.0	5.833	0.0795	0.464	Vel = 5.69
			0.0							
T2			15.33						8.070	K Factor = 5.40
SW3	28.333	5.60	17.09	1	1T	5.0	1.000	120	9.314	
to						0.0	5.000		0.0	
A3	28.333		17.09	1.049		0.0	6.000	0.0973	0.584	Vel = 6.34
A3	28.333		0.0	1	1T	5.0	0.833	120	9.898	
to						0.0	5.000		-0.361	
T3	29.167		17.09	1.049		0.0	5.833	0.0972	0.567	Vel = 6.34
			0.0							
T3			17.09						10.104	K Factor = 5.38
SW4	28.333	5.60	18.62	1	1T	5.0	1.000	120	11.060	
to						0.0	5.000		0.0	
A4	28.333		18.62	1.049		0.0	6.000	0.1140	0.684	Vel = 6.91
A4	28.333		0.0	1	1T	5.0	0.833	120	11.744	
to						0.0	5.000		-0.361	
T4	29.167		18.62	1.049		0.0	5.833	0.1140	0.665	Vel = 6.91
			0.0							
T4			18.62						12.048	K Factor = 5.36
*										
T1	29.167		14.82	1		0.0	14.000	150	7.523	
to						0.0	0.0		0.0	
T2	29.167		14.82	1.101		0.0	14.000	0.0391	0.547	Vel = 4.99
T2	29.167		15.32	1		0.0	14.000	150	8.070	
to						0.0	0.0		0.0	
T3	29.167		30.14	1.101		0.0	14.000	0.1453	2.034	Vel = 10.16
T3	29.167		17.09	1	1O	5.0	3.583	150	10.104	
to						0.0	5.000		0.0	
M4	29.167		47.23	1.101		0.0	8.583	0.3336	2.863	Vel = 15.92
			0.0							
M4			47.23						12.967	K Factor = 13.12
T4	29.167		18.62	1	1O	5.0	10.417	150	12.048	
to						0.0	5.000		0.0	
M4	29.167		18.62	1.101		0.0	15.417	0.0596	0.919	Vel = 6.27
			0.0							

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
M4			18.62						12.967	K Factor = 5.17
*										
M4	29.167		65.86	2	1O	10.0	3.375	150	12.967	
to						0.0	10.000		0.0	
M5	29.167		65.86	2.003		0.0	13.375	0.0335	0.448	Vel = 6.71
M5	29.167		0.0	2	1N	11.0	8.167	150	13.415	
to						0.0	11.000		0.0	
M6	29.167		65.86	2.003		0.0	19.167	0.0334	0.641	Vel = 6.71
M6	29.167		0.0	2		0.0	10.000	150	14.056	
to						0.0	0.0		4.331	
M7	19.167		65.86	2.003		0.0	10.000	0.0335	0.335	Vel = 6.71
M7	19.167		0.0	2		0.0	10.000	150	18.722	
to						0.0	0.0		4.331	
M8	9.167		65.86	2.003		0.0	10.000	0.0335	0.335	Vel = 6.71
M8	9.167		0.0	2	1O	10.0	8.167	150	23.388	
to						0.0	10.000		0.0	
M9	9.167		65.86	2.003		0.0	18.167	0.0335	0.608	Vel = 6.71
M9	9.167		0.0	2	1O	10.0	20.833	150	23.996	
to						0.0	10.000		0.0	
M10	9.167		65.86	2.003		0.0	30.833	0.0334	1.031	Vel = 6.71
M10	9.167		0.0	2	4N	44.0	43.917	150	25.027	
to						0.0	44.000		-0.144	
TOR	9.500		65.86	2.003		0.0	87.917	0.0335	2.942	Vel = 6.71
			0.0							
TOR			65.86						27.825	K Factor = 12.49
*										
TOR	9.500		65.86	2	1Fsp	0.0	10.000	150	27.825	
to					1N	11.0	33.039		6.681	* * Fixed Loss = 3
BOR	1		65.86	2.003	1B	7.779	43.039	0.0335	1.441	Vel = 6.71
					1S	14.261				
			0.0							
BOR			65.86						35.947	K Factor = 10.98
*										
BOR	1		65.86	2	3E	19.447	91.042	150	35.947	
to					1T	12.965	32.412		13.433	* * Fixed Loss = 13
UG1	0		65.86	2.003	1Zwb	0.0	123.454	0.0335	4.131	Vel = 6.71
UG1	0		-34.58	8	4F	54.365	745.000	150	53.511	
to					1G	6.041	60.405		0.0	
UG3	0		31.28	7.98		0.0	805.405	0	0.008	Vel = 0.20
UG3	0		0.0	8	1T	52.855	1.000	150	53.519	
to					1G	6.041	58.895		0.0	
UG2	0		31.28	7.98		0.0	59.895	0	0.001	Vel = 0.20
			0.0							
UG2			31.28						53.520	K Factor = 4.28
UG1	0		34.57	8	4F	54.365	600.000	150	53.511	
to					2G	12.081	119.302		0.0	
UG2	0		34.57	7.98	1T	52.855	719.302	0	0.009	Vel = 0.22
			0.0							

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
UG2			34.57						53.520	K Factor = 4.73
*										
UG2	0		65.86	8	1G	6.041	185.000	150	53.520	
to					1T	52.855	58.895		0.0	
TAP	0		65.86	7.98		0.0	243.895	0	0.010	Vel = 0.42
TAP	0		0.0	20		0.0	170.000	140	53.530	
to						0.0	0.0		0.0	
TEST	0		65.86	20.57		0.0	170.000	0	0.0	Vel = 0.06
			100.00							Qa = 100.00
TEST			165.86						53.530	K Factor = 22.67



. . . Fire Protection by Computer Design

Reliable Fire Protection LLC
32 Partin Rd.
Dunn, NC 28334
Robert Lawley
NICET Level III #103122

Job Name	:	SSP 3RD FLR COMMON AREA - THE GROVES
Building	:	3 BEDROOM NEW RESIDENTIAL
Location	:	1585 E. CORNELIUS HARNETT BOULEVARD
System	:	1
Contract	:	21-208
Data File	:	COMMON AREA 3 HEADS - SSP 3RD FLR 5.8K.WXF

HYDRAULIC DESIGN INFORMATION SHEET

Name - THE GROVE APARTMENTS AT 421 Date - 01-07-22
Location - 1585 E. CORNELIUS HARNETT BOULEVARD
Building - 3 BEDROOM NEW RESIDENTIAL System No. - 1
Contractor - HATCHERS CREEK, LLC Contract No. - 21-208
Calculated By - ROBERT LAWLEY Drawing No. - FP1
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height VARIES
OCCUPANCY - RESIDENTIAL NFPA 13R 2013

SYSTEM DESIGN

Type of Calculation: ( )NFPA 13 Residential (X)NFPA 13R ( )NFPA 13D
Number of Sprinklers Flowing: ( )1 ( )2 ( )4 (X)3
( )Other
( )Specific Ruling Made by Date

Listed Flow at Start Point - 20 Gpm System Type
Listed Pres. at Start Point - 11.6 Psi (X) Wet ( ) Dry
MAXIMUM LISTED SPACING 20 x 20 ( ) Deluge ( ) PreAction
Domestic Flow Added - 0 Gpm Sprinkler or Nozzle
Additional Flow Added - 0 Gpm Make TYCO Model LFII
Elevation at Highest Outlet - 28.333Feet Size 1/2 K-Factor 5.8
Note:SAFETY MARGIN: 7.21 PSI Temperature Rating 155*

Calculation Summary: Gpm Required 157.032 Psi Required 51.599 At Test
C-Factor Used: Overhead 150 Underground 150

WATER SUPPLY

Water Flow Test:		Pump Data:		Tank or Reservoir:	
Date of Test	- 07-01-20	Rated Cap.		Cap.	
Time of Test	- 10:00 AM	@ Psi		Elev.	
Static (Psi)	- 59	Elev.			
Residual (Psi)	- 53	Other			Well
Flow (Gpm)	- 1000			Proof Flow Gpm	
Elevation	- 0				

Location: US 421

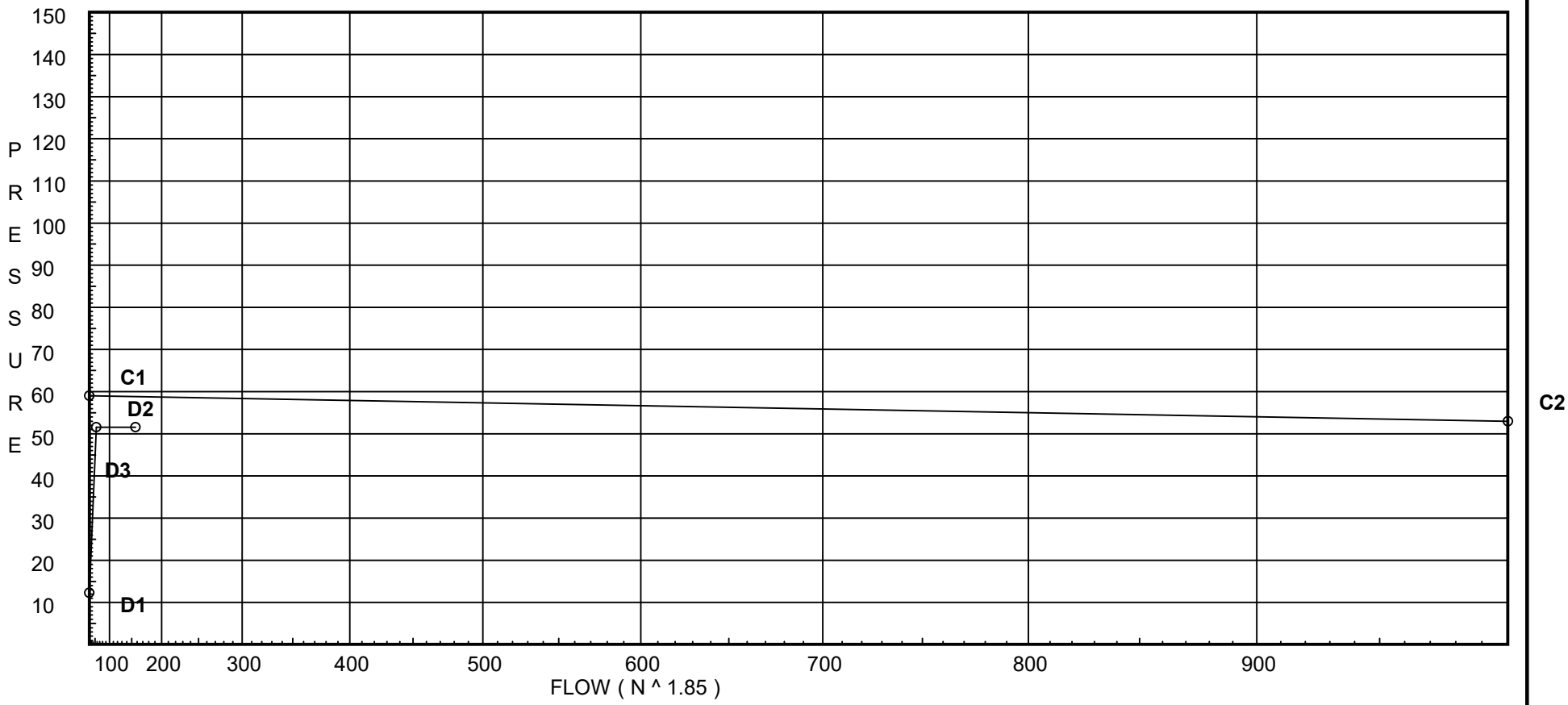
Source of Information: 4D SITE SOLUTIONS, INC.

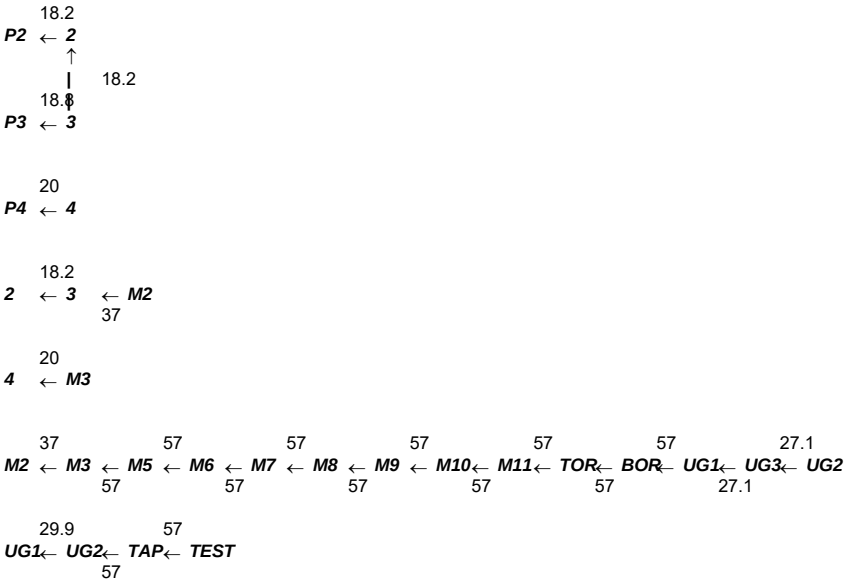
Water Supply Curve C

Reliable Fire Protection LLC
SSP 3RD FLR COMMON AREA - THE GROVES

City Water Supply:
- C1 - Static Pressure : 59
- C2 - Residual Pressure: 53
- C2 - Residual Flow : 1000

Demand:
- D1 - Elevation : 12.271
- D2 - System Flow : 57.032
- D2 - System Pressure : 51.599
- Hose (Demand) : 100
- D3 - System Demand : 157.032
- Safety Margin : 7.206

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M10
M11
TOR
BOR
UG1
UG3
UG2
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57
57
27.1
29.9
57
UG1
UG2
TAP
TEST
57

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
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
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
N *	CPVC 90'Ell Harvel-Spears		7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O *	CPVC Tee - Branch	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
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
Zwb	Watts 009	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.

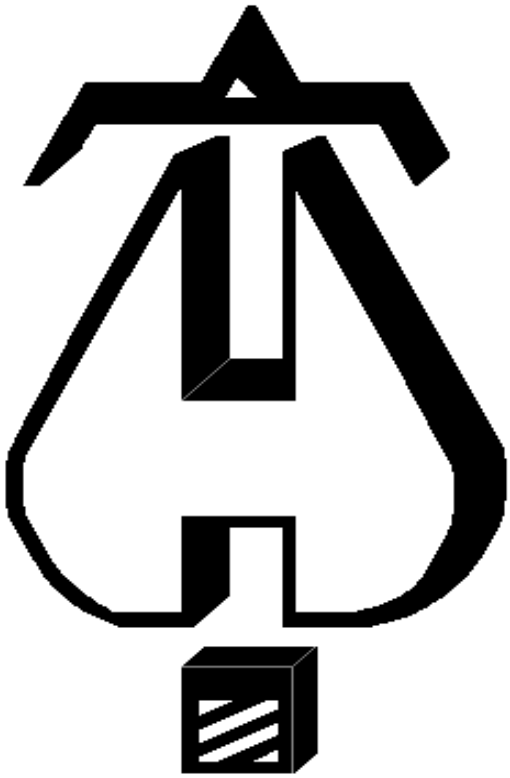
Pressure / Flow Summary - STANDARD

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
P2	28.333	5.8	9.87	na	18.22	0.05	324	9.6
P3	28.333	5.8	10.52	na	18.81	0.05	324	9.6
P4	28.333	5.8	11.89	na	20.0	0.05	400	11.6
2	29.167		9.96	na				
3	29.167		10.63	na				
4	29.167		12.58	na				
M2	29.167		13.72	na				
M3	29.167		13.83	na				
M5	29.167		14.27	na				
M6	29.167		14.74	na				
M7	19.167		19.32	na				
M8	9.167		24.17	na				
M9	9.167		24.66	na				
M10	9.167		25.15	na				
M11	9.167		25.47	na				
TOR	9.5		27.48	na				
BOR	1.0		34.99	na				
UG1	0.0		51.58	na				
UG3	0.0		51.59	na				
UG2	0.0		51.59	na				
TAP	0.0		51.6	na				
TEST	0.0		51.6	na	100.0			

The maximum velocity is 12.48 and it occurs in the pipe between nodes 3 and M2

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
P2	28.333	5.80	18.22	1	1N	7.0	0.833	150	9.869	
to						0.0	7.000		-0.361	
2	29.167		18.22	1.101		0.0	7.833	0.0572	0.448	Vel = 6.14
			0.0							
2			18.22						9.956	K Factor = 5.77
P3	28.333	5.80	18.81	1	1N	7.0	0.833	150	10.519	
to						0.0	7.000		-0.361	
3	29.167		18.81	1.101		0.0	7.833	0.0608	0.476	Vel = 6.34
			0.0							
3			18.81						10.634	K Factor = 5.77
P4	28.333	5.80	20.00	1	1N	7.0	3.375	150	11.891	
to					1O	5.0	12.000		-0.361	
4	29.167		20.0	1.101		0.0	15.375	0.0680	1.046	Vel = 6.74
			0.0							
4			20.00						12.576	K Factor = 5.64
*										
2	29.167		18.22	1		0.0	11.833	150	9.956	
to						0.0	0.0		0.0	
3	29.167		18.22	1.101		0.0	11.833	0.0573	0.678	Vel = 6.14
3	29.167		18.81	1	1N	7.0	7.500	150	10.634	
to						0.0	7.000		0.0	
M2	29.167		37.03	1.101		0.0	14.500	0.2127	3.084	Vel = 12.48
			0.0							
M2			37.03						13.718	K Factor = 10.00
*										
4	29.167		20.00	1	1N	7.0	11.458	150	12.576	
to						0.0	7.000		0.0	
M3	29.167		20.0	1.101		0.0	18.458	0.0680	1.255	Vel = 6.74
			0.0							
M3			20.00						13.831	K Factor = 5.38
*										
M2	29.167		37.03	2		0.0	9.875	150	13.718	
to						0.0	0.0		0.0	
M3	29.167		37.03	2.003		0.0	9.875	0.0114	0.113	Vel = 3.77
M3	29.167		20.00	2	1N	11.0	6.083	150	13.831	
to						0.0	11.000		0.0	
M5	29.167		57.03	2.003		0.0	17.083	0.0257	0.439	Vel = 5.81
			0.0							
M5			57.03						14.270	K Factor = 15.10
*										
M5	29.167		57.03	2	1O	10.0	8.167	150	14.270	
to						0.0	10.000		0.0	
M6	29.167		57.03	2.003		0.0	18.167	0.0256	0.465	Vel = 5.81
M6	29.167		0.0	2		0.0	10.000	150	14.735	
to						0.0	0.0		4.331	
M7	19.167		57.03	2.003		0.0	10.000	0.0257	0.257	Vel = 5.81
M7	19.167		0.0	2	1O	10.0	10.000	150	19.323	
to						0.0	10.000		4.331	
M8	9.167		57.03	2.003		0.0	20.000	0.0256	0.513	Vel = 5.81

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
M8	9.167		0.0	2	1N	11.0	8.167	150	24.167	
to						0.0	11.000		0.0	
M9	9.167		57.03	2.003		0.0	19.167	0.0256	0.491	Vel = 5.81
M9	9.167		0.0	2		0.0	19.000	150	24.658	
to						0.0	0.0		0.0	
M10	9.167		57.03	2.003		0.0	19.000	0.0257	0.488	Vel = 5.81
M10	9.167		0.0	2	1N	11.0	1.833	150	25.146	
to						0.0	11.000		0.0	
M11	9.167		57.03	2.003		0.0	12.833	0.0256	0.329	Vel = 5.81
M11	9.167		0.0	2	4O	40.0	43.917	150	25.475	
to						0.0	40.000		-0.144	
TOR	9.500		57.03	2.003		0.0	83.917	0.0256	2.151	Vel = 5.81
			0.0							
TOR			57.03						27.482	K Factor = 10.88
*										
TOR	9.500		57.03	2	1Fsp	0.0	10.000	150	27.482	
to					1B	7.779	22.039		6.681	* * Fixed Loss = 3
BOR	1		57.03	2.003	1S	14.261	32.039	0.0257	0.822	Vel = 5.81
			0.0							
BOR			57.03						34.985	K Factor = 9.64
*										
BOR	1		57.03	2	3E	19.447	91.042	150	34.985	
to					1T	12.965	32.412		13.433	* * Fixed Loss = 13
UG1	0		57.03	2.003	1Zwb	0.0	123.454	0.0256	3.166	Vel = 5.81
UG1	0		-29.94	8	4F	54.365	745.000	150	51.584	
to					1G	6.041	60.405		0.0	
UG3	0		27.09	7.98		0.0	805.405	0	0.007	Vel = 0.17
UG3	0		0.0	8	1T	52.855	1.000	150	51.591	
to					1G	6.041	58.895		0.0	
UG2	0		27.09	7.98		0.0	59.895	0	0.0	Vel = 0.17
			0.0							
UG2			27.09						51.591	K Factor = 3.77
UG1	0		29.94	8	4F	54.365	600.000	150	51.584	
to					2G	12.081	119.302		0.0	
UG2	0		29.94	7.98	1T	52.855	719.302	0	0.007	Vel = 0.19
			0.0							
UG2			29.94						51.591	K Factor = 4.17
*										
UG2	0		57.03	8	1G	6.041	185.000	150	51.591	
to					1T	52.855	58.895		0.0	
TAP	0		57.03	7.98		0.0	243.895	0	0.008	Vel = 0.37
TAP	0		0.0	20		0.0	170.000	140	51.599	
to						0.0	0.0		0.0	
TEST	0		57.03	20.57		0.0	170.000	0	0.0	Vel = 0.06
			100.00							Qa = 100.00
TEST			157.03						51.599	K Factor = 21.86



. . . Fire Protection by Computer Design

Reliable Fire Protection LLC
32 Partin Rd.
Dunn, NC 28334
Robert Lawley
NICET Level III #103122

Job Name	:	SSP 3RD FLR BEDROOM - THE GROVES
Building	:	3 BEDROOM NEW RESIDENTIAL
Location	:	1585 E. CORNELIUS HARNETT BOULEVARD
System	:	1
Contract	:	21-208
Data File	:	BEDROOM 1 HEAD - SSP 3RD FLR 5.8K.WXF

HYDRAULIC DESIGN INFORMATION SHEET

Name - THE GROVE APARTMENTS AT 421 Date - 01-07-22
Location - 1585 E. CORNELIUS HARNETT BOULEVARD
Building - 3 BEDROOM NEW RESIDENTIAL System No. - 1
Contractor - HATCHERS CREEK, LLC Contract No. - 21-208
Calculated By - ROBERT LAWLEY Drawing No. - FP1
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height VARIES
OCCUPANCY - RESIDENTIAL NFPA 13R 2013

SYSTEM DESIGN

Type of Calculation: ( )NFPA 13 Residential (X)NFPA 13R ( )NFPA 13D
Number of Sprinklers Flowing: (X)1 ( )2 ( )4 ( )
( )Other
( )Specific Ruling Made by Date

Listed Flow at Start Point - 20 Gpm System Type
Listed Pres. at Start Point - 11.6 Psi (X) Wet ( ) Dry
MAXIMUM LISTED SPACING 20 x 20 ( ) Deluge ( ) PreAction
Domestic Flow Added - 0 Gpm Sprinkler or Nozzle
Additional Flow Added - 0 Gpm Make TYCO Model LFII
Elevation at Highest Outlet - 28.333Feet Size 1/2 K-Factor 5.8
Note:SAFETY MARGIN: 14.58 PSI Temperature Rating 155*

Calculation Summary — Gpm Required 120.008 | Psi Required 44.299 | At Test
C-Factor Used: Overhead 150 Underground 150

WATER SUPPLY

Water Flow Test:	Pump Data:	Tank or Reservoir:
Date of Test - 07-01-20	Rated Cap.	Cap.
Time of Test - 10:00 AM	@ Psi	Elev.
Static (Psi) - 59	Elev.	
Residual (Psi) - 53	Other	Well
Flow (Gpm) - 1000		Proof Flow Gpm
Elevation - 0		

Location: US 421

Source of Information: 4D SITE SOLUTIONS, INC.

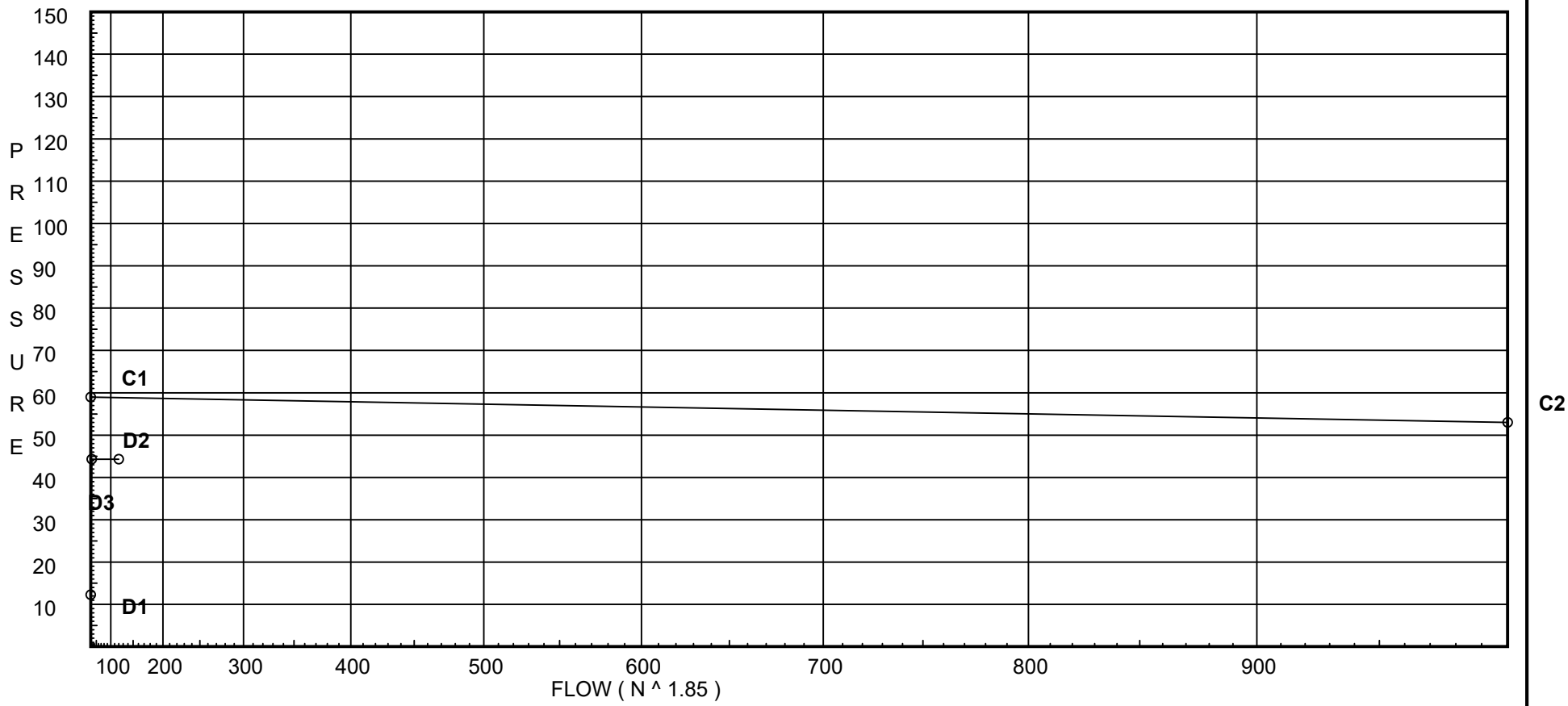
Water Supply Curve C

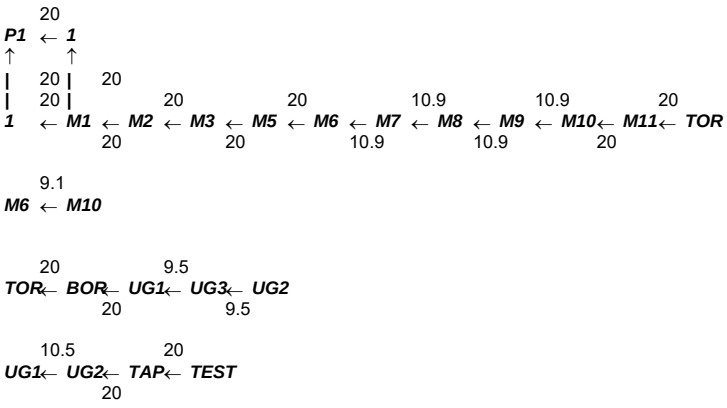
Reliable Fire Protection LLC
SSP 3RD FLR BEDROOM - THE GROVES

Date 12-16-21

City Water Supply:
- C1 - Static Pressure : 59
- C2 - Residual Pressure: 53
- C2 - Residual Flow : 1000

Demand:
- D1 - Elevation : 12.271
- D2 - System Flow : 20.008
- D2 - System Pressure : 44.299
- Hose (Demand) : 100
- D3 - System Demand : 120.008
- Safety Margin : 14.582




20
P1 ← 1
20 20
1 ← M1 ← M2 ← M3 ← M5 ← M6 ← M7 ← M8 ← M9 ← M10 ← M11 ← TOR
20 20 10.9 10.9 20
9.1
M6 ← M10
20 9.5
TOR ← BOR ← UG1 ← UG3 ← UG2
20 9.5
10.5 20
UG1 ← UG2 ← TAP ← TEST
20

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
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
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
N *	CPVC 90'Ell Harvel-Spears		7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O *	CPVC Tee - Branch	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
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
Zwb	Watts 009	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.

Pressure / Flow Summary - STANDARD

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
P1	28.333	5.8	11.9	na	20.01	0.05	400	11.9
1	29.167		12.51	na				
M1	29.167		14.4	na				
M2	29.167		14.45	na				
M3	29.167		14.48	na				
M5	29.167		14.54	na				
M6	29.167		14.61	na				
M7	19.167		18.96	na				
M8	9.167		23.3	na				
M9	9.167		23.32	na				
M10	9.167		23.34	na				
M11	9.167		23.39	na				
TOR	9.5		23.57	na				
BOR	1.0		30.41	na				
UG1	0.0		44.3	na				
UG3	0.0		44.3	na				
UG2	0.0		44.3	na				
TAP	0.0		44.3	na				
TEST	0.0		44.3	na	100.0			

The maximum velocity is 6.74 and it occurs in the pipe between nodes P1 and 1

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
P1	28.333	5.80	20.01	1	1N	7.0	2.250	150	11.900	
to					1O	5.0	12.000		-0.361	
1	29.167		20.01	1.101		0.0	14.250	0.0681	0.970	Vel = 6.74
			0.0							
1			20.01						12.509	K Factor = 5.66
*										
1	29.167		20.01	1	1O	5.0	22.833	150	12.509	
to						0.0	5.000		0.0	
M1	29.167		20.01	1.101		0.0	27.833	0.0681	1.895	Vel = 6.74
			0.0							
M1			20.01						14.404	K Factor = 5.27
*										
M1	29.167		20.01	2		0.0	11.417	150	14.404	
to						0.0	0.0		0.0	
M2	29.167		20.01	2.003		0.0	11.417	0.0037	0.042	Vel = 2.04
M2	29.167		0.0	2		0.0	9.875	150	14.446	
to						0.0	0.0		0.0	
M3	29.167		20.01	2.003		0.0	9.875	0.0037	0.037	Vel = 2.04
M3	29.167		0.0	2	1O	10.0	6.083	150	14.483	
to						0.0	10.000		0.0	
M5	29.167		20.01	2.003		0.0	16.083	0.0037	0.059	Vel = 2.04
			0.0							
M5			20.01						14.542	K Factor = 5.25
*										
M5	29.167		20.01	2	1N	11.0	8.167	150	14.542	
to						0.0	11.000		0.0	
M6	29.167		20.01	2.003		0.0	19.167	0.0037	0.071	Vel = 2.04
M6	29.167		-9.13	2		0.0	10.000	150	14.613	
to						0.0	0.0		4.331	
M7	19.167		10.88	2.003		0.0	10.000	0.0012	0.012	Vel = 1.11
M7	19.167		0.0	2		0.0	10.000	150	18.956	
to						0.0	0.0		4.331	
M8	9.167		10.88	2.003		0.0	10.000	0.0012	0.012	Vel = 1.11
M8	9.167		0.0	2	1O	10.0	8.167	150	23.299	
to						0.0	10.000		0.0	
M9	9.167		10.88	2.003		0.0	18.167	0.0012	0.022	Vel = 1.11
M9	9.167		0.0	2		0.0	19.000	150	23.321	
to						0.0	0.0		0.0	
M10	9.167		10.88	2.003		0.0	19.000	0.0012	0.023	Vel = 1.11
M10	9.167		9.13	2	1O	10.0	1.833	150	23.344	
to						0.0	10.000		0.0	
M11	9.167		20.01	2.003		0.0	11.833	0.0036	0.043	Vel = 2.04
M11	9.167		0.0	2	4N	44.0	43.917	150	23.387	
to						0.0	44.000		-0.144	
TOR	9.500		20.01	2.003		0.0	87.917	0.0037	0.325	Vel = 2.04
			0.0							
TOR			20.01						23.568	K Factor = 4.12

*

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
M6	29.167		9.13	2	2N	22.0	47.167	150	14.613	
to					1O	10.0	32.000		8.662	
M10	9.167		9.13	2.003		0.0	79.167	0.0009	0.069	Vel = 0.93
			0.0							
M10			9.13						23.344	K Factor = 1.89
*										
TOR	9.500		20.01	2	1Fsp	0.0	10.000	150	23.568	
to					1N	11.0	33.039		6.681	* * Fixed Loss = 3
BOR	1		20.01	2.003	1B	7.779	43.039	0.0037	0.159	Vel = 2.04
					1S	14.261				
			0.0							
BOR			20.01						30.408	K Factor = 3.63
*										
BOR	1		20.01	2	3E	19.447	91.042	150	30.408	
to					1T	12.965	32.412		13.433	* * Fixed Loss = 13
UG1	0		20.01	2.003	1Zwb	0.0	123.454	0.0037	0.456	Vel = 2.04
UG1	0		-10.51	8	4F	54.365	745.000	150	44.297	
to					1G	6.041	60.405		0.0	
UG3	0		9.5	7.98		0.0	805.405	0	0.001	Vel = 0.06
UG3	0		0.0	8	1T	52.855	1.000	150	44.298	
to					1G	6.041	58.895		0.0	
UG2	0		9.5	7.98		0.0	59.895	0	0.0	Vel = 0.06
			0.0							
UG2			9.50						44.298	K Factor = 1.43
UG1	0		10.50	8	4F	54.365	600.000	150	44.297	
to					2G	12.081	119.302		0.0	
UG2	0		10.5	7.98	1T	52.855	719.302	0	0.001	Vel = 0.07
			0.0							
UG2			10.50						44.298	K Factor = 1.58
*										
UG2	0		20.01	8	1G	6.041	185.000	150	44.298	
to					1T	52.855	58.895		0.0	
TAP	0		20.01	7.98		0.0	243.895	0	0.001	Vel = 0.13
TAP	0		0.0	20		0.0	170.000	140	44.299	
to						0.0	0.0		0.0	
TEST	0		20.01	20.57		0.0	170.000	0	0.0	Vel = 0.02
			100.00							Qa = 100.00
TEST			120.01						44.299	K Factor = 18.03

4D SITE SOLUTIONS, INC

ENGINEERING SURVEYING GPS CONSTRUCTION LAYOUT

FIRE HYDRANT FLOW TEST

TEST DATE	MAIN SIZE	PROJECT
07/01/2020	20	1622-The Grove

PURPOSE OF TEST	PERSONS PERFORMING TEST
Fire flow	Scott Brown & Jimmy Holland

HYDRANT FLOW DATA

FH ID	FH LOCATION
	residual hydrant - near center of site along US 421

STATIC	RESID	PITOT	TIME	OR SIZE	FLOW
59 psi	53 psi		10 am		1,000 gpm

ADDITIONAL OBERSERVATIONS

flow hydrant is near intersection of Cedar Grove School Rd and US 421

Pressure at 500 gpm is 57 psi

CONDITION OF FLOW HYDRANT

NUMBER OF OUTLETS	OUTLET SIZES	BODY APPEARANCE
3		GOOD

FH SHUT OFF COMPLETELY?

YES

OTHER OBSERVATIONS ON THE HYDRANT

residual hydrant assembly leaked up from the ground during testing. Leak stopped when the fire hydrant was shut off

409 CHICAGO DRIVE, SUITE 112 • FAYETTEVILLE, NORTH CAROLINA 28306
PHONE: (910) 426-6777 • FAX: (910) 426-5777
WWW.4DSITESOLUTIONS.COM