Hydraulic Overview

Job Number: 11-137
Report Description: Light Hazard (Dry Attic Calc #2)

Job

Job Number 11-137	Design Engineer Franklin Callfas
Job Name: Wallowa Medical Hospital	Phone (541) 848-1798 FAX
Address 1 Wallowa County Health Care District	State Certification/License Number
Address 2 Enterprise, Oregon, 97828	AHJ
Address 3	Job Site/Building

System

Density 0.100gpm/ft²	Area of Application 1500.00ft² (Actual 448.60ft²)
Most Demanding Sprinkler Data 8 K-Factor 38.03 at 22.600	Hose Streams 100.00
Coverage Per Sprinkler 180.00ft²	Number Of Sprinklers Calculated 7
System Pressure Demand 64.824	System Flow Demand 270.14
Total Demand 370.14 @ 64.824	Pressure Result +12.906 (16.6%)

Supplies

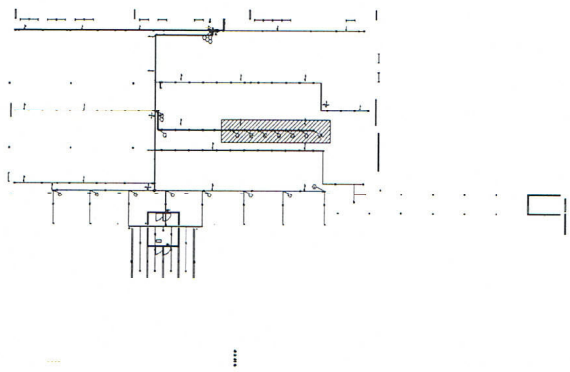
Node	Name	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
59	Water Supply	1200.00	100.00	80.000	60.000

Check Point Gauges

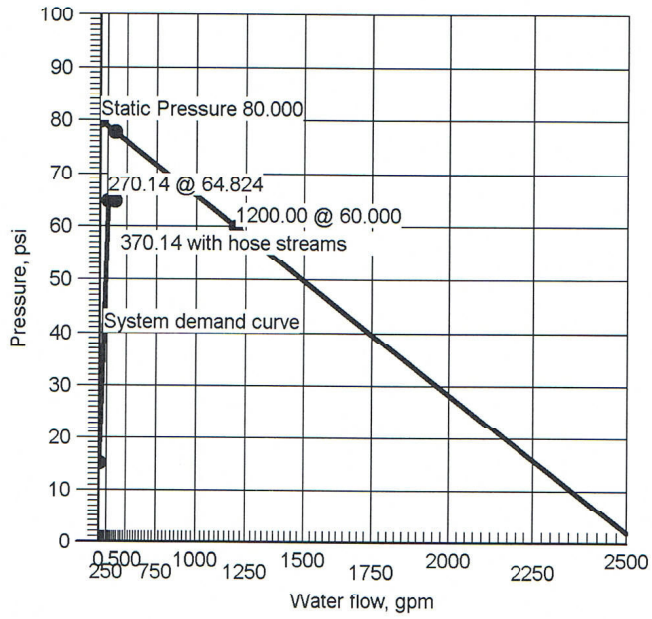
Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)

REGISTERED PROFESSIONAL ENGINEER
84637PE
OREGON
Nov. 19 2110
FRANKLIN D. CALLFAS
Expires _____

Wallowa Rev-0b



Water Supply at Node 59 (1200.00, 100.00, 80.000, 60.000)



Hydraulic Summary

Job

Job Number: 11-137	Design Engineer: Franklin Callfas
Job Name: Wallowa Medical Hospital	State Certification/License Number:
Address 1: Wallowa County Health Care District	AHJ:
Address 2: Enterprise, Oregon, 97828	Job Site/Building:
Address 3:	Drawing Name: Wallowa Rev-0b

System

Most Demanding Sprinkler Data: 8 K-Factor 38.03 at 22.600	
Hose Allowance At Source: 100.00	
Additional Hose Supplies: Node / Flow(gpm)	
Total Hose Streams: 100.00	
System Flow Demand: 270.14	Total Water Required (Including Hose Allowance): 370.14
Maximum Pressure Unbalance In Loops: 0.000	
Maximum Velocity Above Ground: 15.89 between nodes 24 and 207	
Maximum Velocity Under Ground: 6.20 between nodes 59 and 58	
Volume capacity of Wet Pipes: 213.45gal	Volume capacity of Dry Pipes: 259.11gal

Remote Area(s)

Occupancy: Light Hazard (Dry Attic Calc #2)	Job Suffix:
Density: 0.100gpm/ft²	Area of Application: 1500.00ft² (Actual 448.60ft²)
Number Of Sprinklers Calculated: 7	Coverage Per Sprinkler: 180.00ft²
AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area	

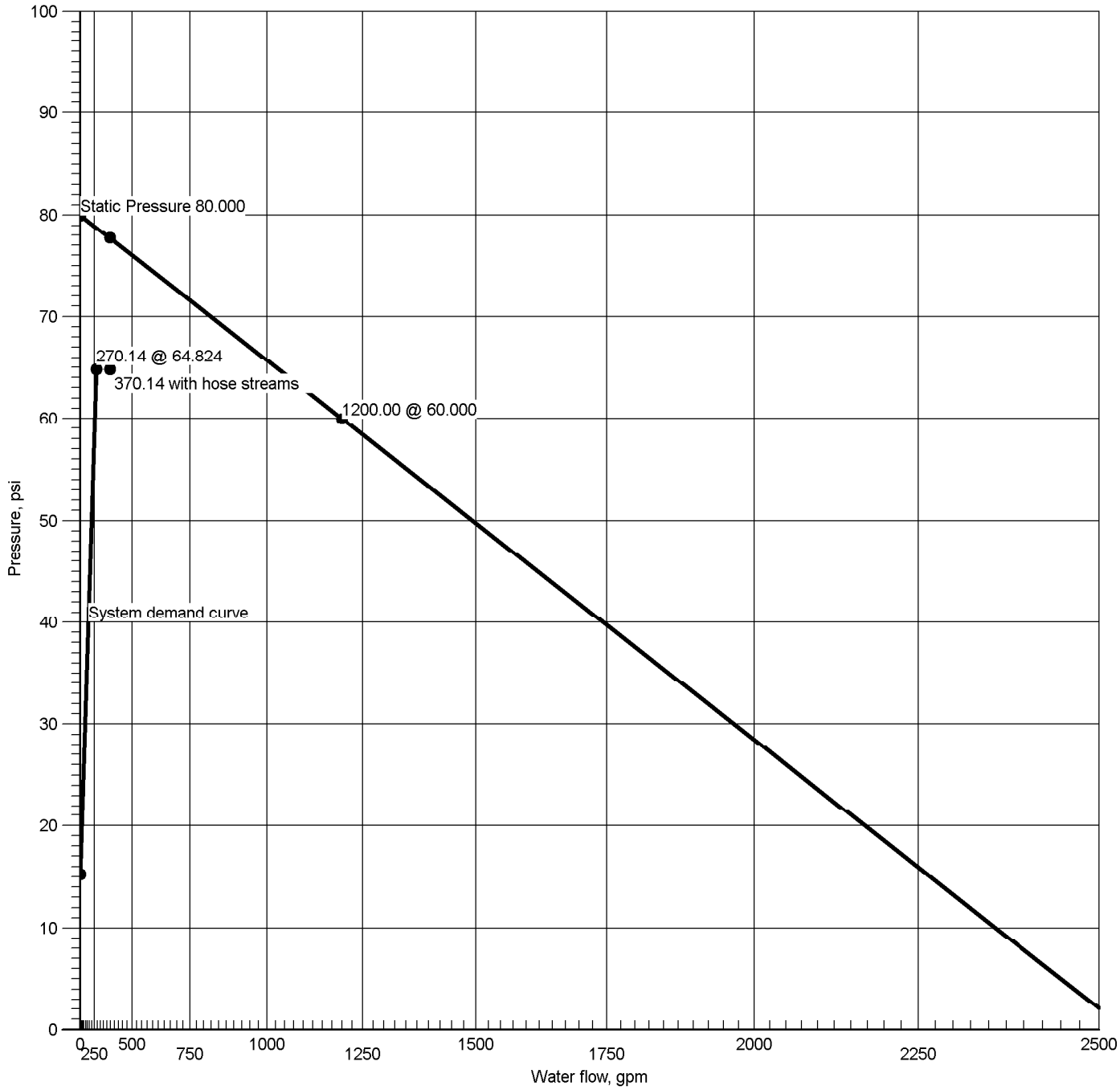
Supplies

Node	Name	Hose Flow (gpm)	Static (psi)	Residual (psi)	@	Flow (gpm)	Available (psi)	@	Total Demand (gpm)	Required (psi)	Safety Margin (psi)
59	Water Supply	100.00	80.000	60.000		1200.00	77.730		370.14	64.824	12.906

Contractor

	Contractor Number	Contact Name	Contact Title
Name of Contractor:		Phone	Extension
Address 1		FAX	
Address 2		E-mail	
Address 3		Web-Site	

Water Supply at Node 59



Hydraulic Graph	Water Supply at Node 59
Static: Pressure	80.000
Residual: Pressure	60.000 @ 1200.00
Available Pressure at Time of Test	77.730 @ 370.14
System Demand	64.824 @ 270.14
System Demand (Including Hose Allowance at Source)	64.824 @ 370.14

Summary Of Outflowing Devices

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Report Description: Light Hazard (Dry Attic Calc #2)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	**201**	**38.03**	**38.03**	**8**	**22.600**		
Sprinkler	202	38.06	38.03	8	22.632		
Sprinkler	203	38.15	38.03	8	22.740		
Sprinkler	204	38.34	38.03	8	22.964		
Sprinkler	205	38.65	38.03	8	23.345		
Sprinkler	206	39.13	38.03	8	23.921		
Sprinkler	207	39.79	38.03	8	24.734		

Most Demanding Sprinkler Data

Node Analysis

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Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
59	-3'-0	S	64.824	270.14	
201	32'-4	Spr(-22.600)	22.600	38.03	
202	32'-3¾	Spr(-22.632)	22.632	38.06	
203	32'-3¾	Spr(-22.740)	22.740	38.15	
204	32'-3½	Spr(-22.964)	22.964	38.34	
205	32'-3½	Spr(-23.345)	23.345	38.65	
206	32'-3½	Spr(-23.921)	23.921	39.13	
207	32'-3¼	Spr(-24.734)	24.734	39.79	
9	12'-8½	T(20'-2)	50.870		
24	32'-3	LtE(5'-6)	31.491		
25	24'-0	T(14'-4½)	37.976		
41	12'-9½	T(20'-2)	44.850		
57	3'-1	BFP(-5.000)	60.669		
58	0'-0		62.078		
531	12'-10½	PO(6'-0)	44.814		
532	12'-10¾	PO(6'-0)	44.799		
546	12'-10½	PO(6'-0)	44.808		

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
• • • • • Route 1 • • • • •								
CM	2.6350	38.03	2.24	120		0.004816	6'-0	Pf 0.029
201	32'-4	38.03	8	22.600		Sprinkler		Pe 0.003
202	32'-3¾			22.632			6'-0	Pv
CM	2.6350	76.09	4.48	120		0.017374	6'-0	Pf 0.104
202	32'-3¾	38.06	8	22.632		Sprinkler		Pe 0.003
203	32'-3¾			22.740			6'-0	Pv
CM	2.6350	114.24	6.72	120		0.036847	6'-0	Pf 0.221
203	32'-3¾	38.15	8	22.740		Sprinkler		Pe 0.003
204	32'-3½			22.964			6'-0	Pv
CM	2.6350	152.58	8.98	120		0.062936	6'-0	Pf 0.378
204	32'-3½	38.34	8	22.964		Sprinkler		Pe 0.003
205	32'-3½			23.345			6'-0	Pv
CM	2.6350	191.23	11.25	120		0.095571	6'-0	Pf 0.573
205	32'-3½	38.65	8	23.345		Sprinkler		Pe 0.003
206	32'-3½			23.921			6'-0	Pv
CM	2.6350	230.36	13.55	120		0.134862	6'-0	Pf 0.809
206	32'-3½	39.13	8	23.921		Sprinkler		Pe 0.003
207	32'-3¼			24.734			6'-0	Pv
CM	2.6350	270.14	15.89	120		0.181092	31'-8¾	Pf 6.740
207	32'-3¼	39.79	8	24.734		Sprinkler,	5'-6	Pe 0.017
24	32'-3			31.491		LtE(5'-6)	37'-2½	Pv
CM	3.2600	270.14	10.38	100		0.089994	13'-2	Pf 2.910
24	32'-3			31.491			19'-2	Pe 3.576
25	24'-0			37.976		LtE(4'-9½), T(14'-4½)	32'-4	Pv
FR	3.2600	270.14	10.38	120		0.064229	11'-2½	Pf 2.015
25	24'-0			37.976			20'-2	Pe 4.859
41	12'-9½			44.850		T(20'-2)	31'-4½	Pv
CM	3.2600	270.14	10.38	120		0.064229	59'-6¾	Pf 5.984
41	12'-9½			44.850			33'-7¼	Pe 0.037
9	12'-8½			50.870		2LtE(6'-8¾), T(20'-2)	93'-2	Pv
FR	4.2600	270.14	6.08	100		0.024455	6'-3¼	Pf 5.630
9	12'-8½			50.870			19'-5¾	Pe 4.169
57	3'-1			60.669		DPV(8'-2½), BV(11'-3¼), BFP(-5.000)	25'-9	Pv
FR	4.2600	270.14	6.08	100		0.024455	3'-1	Pf 0.075
57	3'-1			60.669				Pe 1.333
58	0'-0			62.078			3'-1	Pv
UG	4.2200	270.14	6.20	140		0.013740	88'-3	Pf 1.442
58	0'-0			62.078			16'-8¾	Pe 1.304
59	-3'-0			64.824		E(16'-8¾), S	104'-11¾	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}}\right)^{4.87} = \text{Factor}$$

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

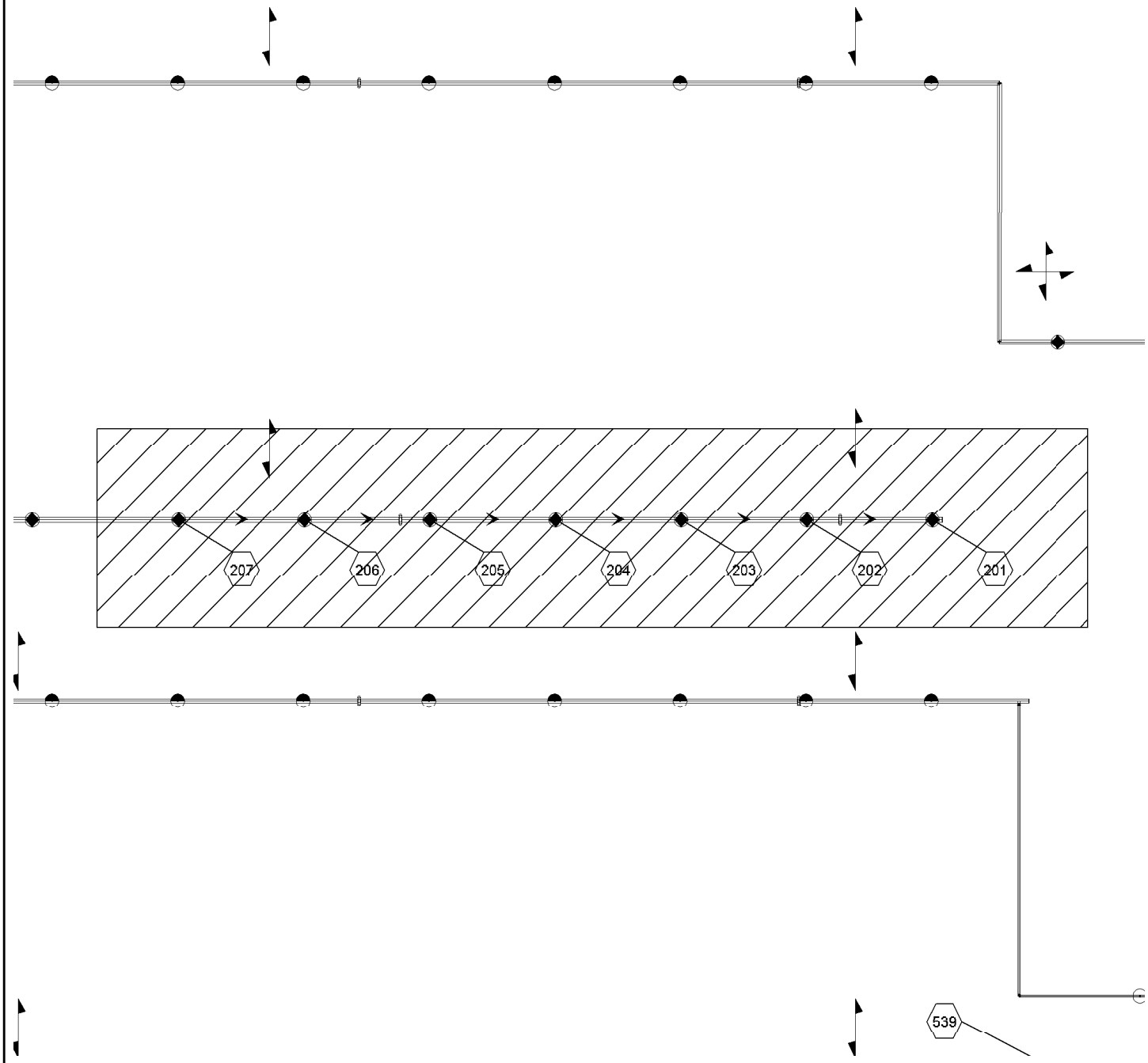
Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DelV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
fd	Flex Drop
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Ho	Hose
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PRV	Pressure Reducing Valve
PrV	Pressure Relief Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap

Flow Diagram (Current View)