



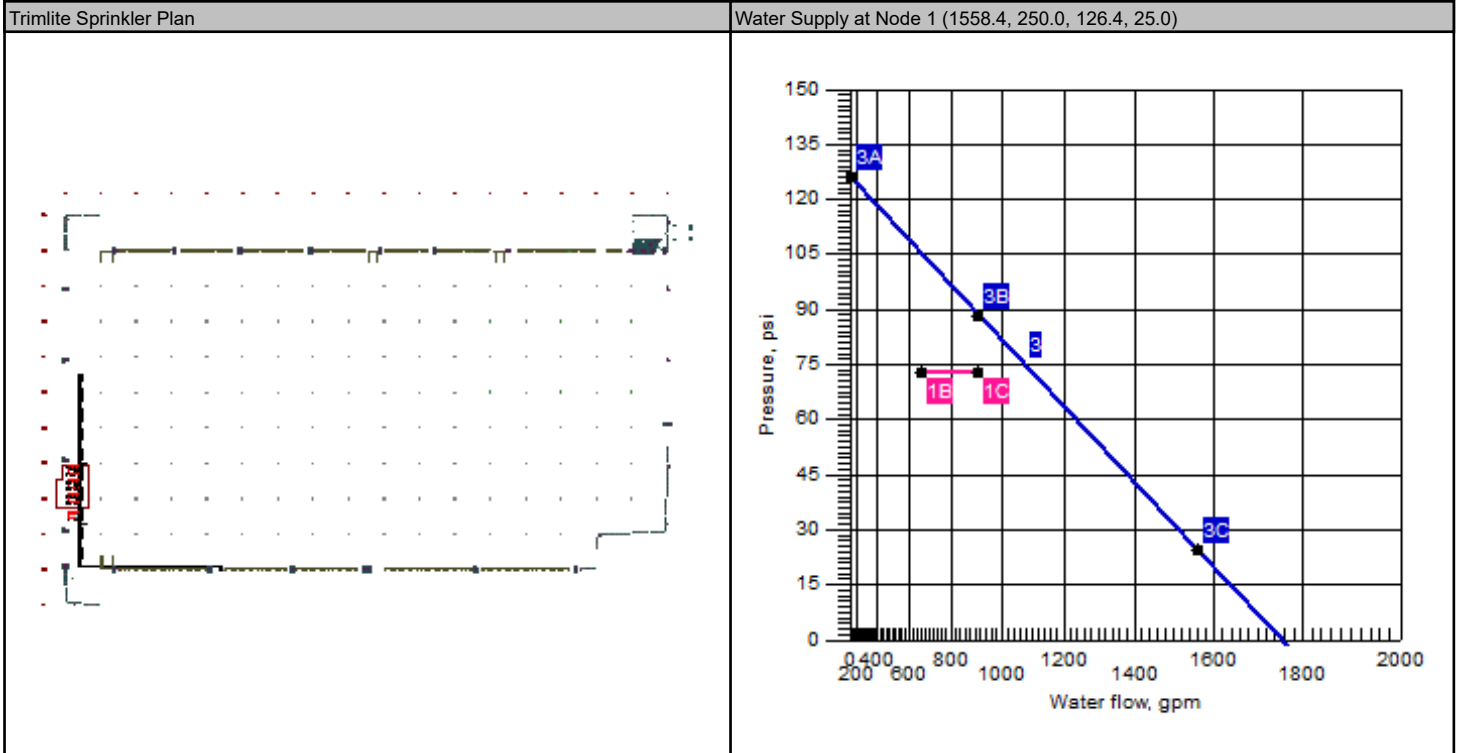
Hydraulic Overview

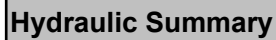
Job Number: 1 - Paint booth
Report Description: Extra Hazard Group II

Job		
Job Number 1	Designer John DeMartino	
Job Name: Prologis - Riverfront Industrial Park	Phone 425-481-7669	FAX
Address 1 1601 INDUSTRIAL PARKWAY, SUITE 104	State Certification/License Number 9794-1091-CG	
Address 2	AHJ PUYALLUP	
Address 3 PUYALLUP, WA 98371	Job Site/Building PROLOGIS - RIVERFRONT INDUSTRIAL PARK	

System		
Density 0.40gpm/ft ²	Area of Application 2500.00ft ² (Actual 1635.00ft ²)	
Most Demanding Sprinkler Data 5.6 K-Factor 36.3 at 42.1	Hose Streams 250.0	
Coverage Per Sprinkler 90.83ft ²	Number Of Sprinklers Calculated 18	Number Of Nozzles Calculated 0
System Pressure Demand 73.5	System Flow Demand 661.6	
Total Demand 911.6 @ 73.5	Pressure Result +15.3 (17.2%)	

Supplies						Check Point Gauges			
<u>Node</u>	<u>Name</u>	<u>Flow(gpm)</u>	<u>Hose Flow(gpm)</u>	<u>Static(psi)</u>	<u>Residual(psi)</u>	<u>Identifier</u>	<u>Pressure(psi)</u>	<u>K-Factor(K)</u>	<u>Flow(gpm)</u>
1	Water Supply	1558.4	250.0	126.4	25.0	BOR (1)	73.5	77.16	661.6





Report Description: Extra Hazard Group II

Job Number 1	Designer John DeMartino
Job Name: Prologis - Riverfront Industrial Park	State Certification/License Number 9794-1091-CG
Address 1 1601 INDUSTRIAL PARKWAY, SUITE 104	AHJ PUYALLUP
Address 2	Job Site/Building PROLOGIS - RIVERFRONT INDUSTRIAL PARK
Address 3 PUYALLUP, WA 98371	Drawing Name Trimlite Sprinkler Plan

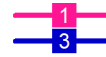
Most Demanding Sprinkler Data 5.6 K-Factor 36.3 at 42.1		Occupancy Extra Hazard Group II		Job Suffix Paint booth
Hose Allowance At Source 250.0		Density 0.40gpm/ft²		Area of Application 2500.00ft² (Actual 1635.00ft²)
Additional Hose Supplies <u>Node</u>		Number Of Sprinklers Calculated 18	Number Of Nozzles Calculated 0	Coverage Per Sprinkler 90.83ft²
Flow(gpm)		AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area Left: 73.5 Right: 73.5		
Total Hose Streams 250.0				
System Flow Demand 661.6	Total Water Required (Including Hose Allowance) 911.6			
Maximum Pressure Unbalance In Loops 0.0				
Maximum Velocity Above Ground 21.1 between nodes 4 and 6				
Maximum Velocity Under Ground				
Volume capacity of Wet Pipes 820.4gal		Volume capacity of Dry Pipes		

Node	Name	Hose Flow (gpm)	Static (psi)	Residual (psi)	@	Flow (gpm)	Available (psi)	@	Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1	Water Supply	250.0	126.4	25.0		1558.4	88.8		911.6	73.5	15.3

	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 1



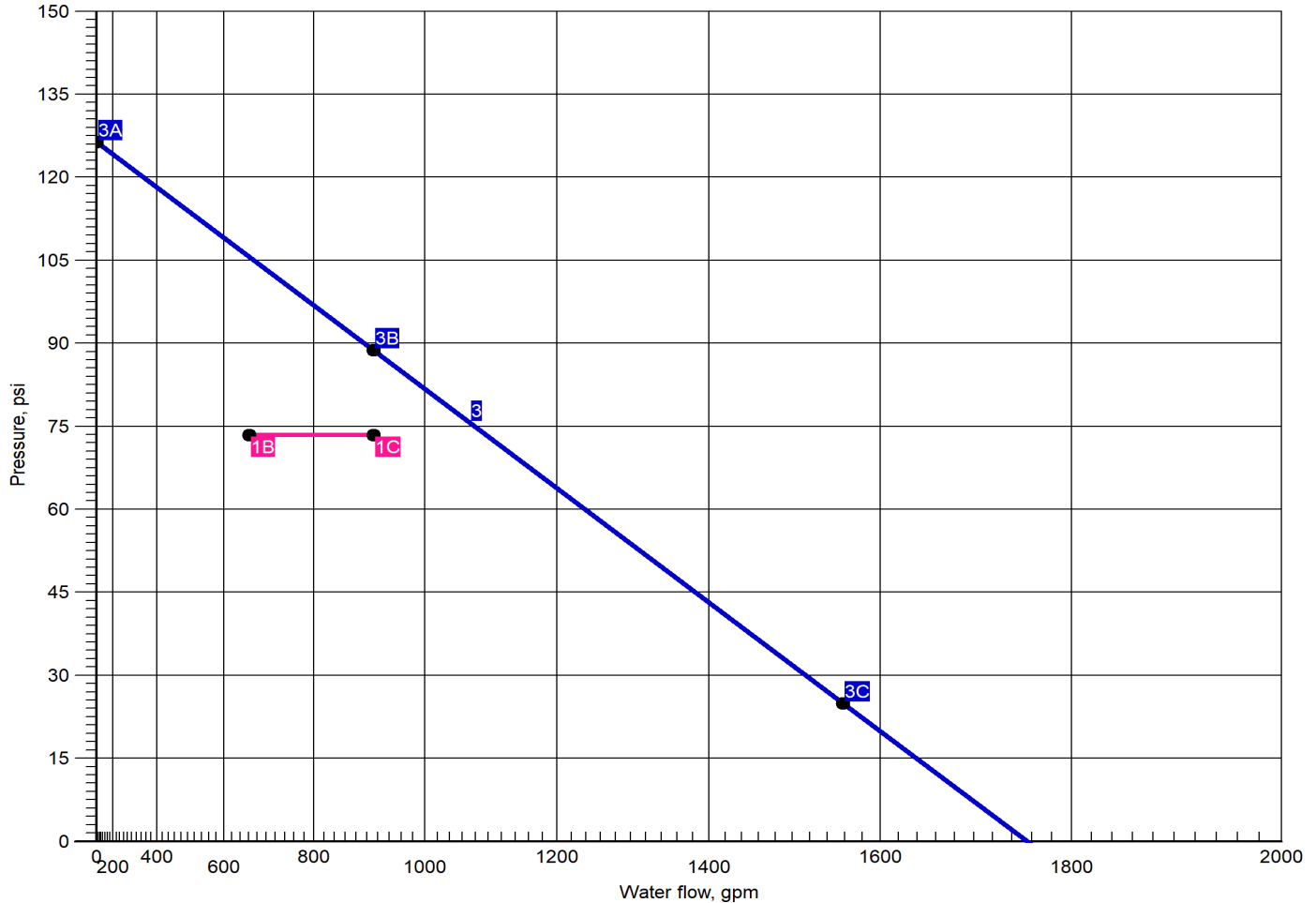
System Demand
Available Water Supply

Job Name: Prologis - Riverfront Industrial Park

Job Number: 1 - Paint booth

Report Description: Extra Hazard Group II

Remote Area Number:



Curve	Data Point	Hydraulic Calculation Results	Additional Data
1	1B 1C	Required Pressure at System Demand: 73.5 @ 661.6 Required Pressure at System Demand (Including Hose Allowance at Source): 73.5 @ 911.6	Available Flow @ 20 PSI: 1599.4
3	3A 3B 3C	Available Static Pressure at Water Supply at Node 1: 126.4 Available Residual Pressure at System Demand: 88.8 @ 911.6 Available Residual Pressure & Flow at Water Supply at Node 1: 25.0 @ 1558.4	



Summary Of Outflowing Devices

Job Number: 1 - Paint booth
Report Description: Extra Hazard Group II

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)			
Sprinkler	101	37.4	36.3	5.6	44.5			
Sprinkler	102	36.8	36.3	5.6	43.2			
Sprinkler	103	36.7	36.3	5.6	42.9			
Sprinkler	105	37.1	36.3	5.6	43.9			
Sprinkler	106	36.6	36.3	5.6	42.7			
Sprinkler	107	36.5	36.3	5.6	42.4			
Sprinkler	108	37.2	36.3	5.6	44.2			
Sprinkler	109	36.7	36.3	5.6	42.9			
Sprinkler	110	36.6	36.3	5.6	42.6			
Sprinkler	112	37.0	36.3	5.6	43.6			
Sprinkler	113	36.5	36.3	5.6	42.4			
Sprinkler	114	36.3	36.3	5.6	42.1			
Sprinkler	115	37.2	36.3	5.6	44.2			
Sprinkler	116	36.7	36.3	5.6	42.9			
Sprinkler	117	36.6	36.3	5.6	42.6			
Sprinkler	119	37.0	36.3	5.6	43.6			
Sprinkler	120	36.5	36.3	5.6	42.4			
⇒ Sprinkler	121	36.3	36.3	5.6	42.1			

⇒ Most Demanding Sprinkler Data



Node Analysis

Job Number: 1 - Paint booth
Report Description: Extra Hazard Group II

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
1	0-0	S, BOR	73.5	661.6	
101	10-0	Spr(-44.5)	44.5	37.4	
102	10-0	Spr(-43.2)	43.2	36.8	
103	10-0	Spr(-42.9)	42.9	36.7	
105	10-0	Spr(-43.9)	43.9	37.1	
106	10-0	Spr(-42.7)	42.7	36.6	
107	10-0	Spr(-42.4)	42.4	36.5	
108	10-0	Spr(-44.2)	44.2	37.2	
109	10-0	Spr(-42.9)	42.9	36.7	
110	10-0	Spr(-42.6)	42.6	36.6	
112	10-0	Spr(-43.6)	43.6	37.0	
113	10-0	Spr(-42.4)	42.4	36.5	
114	10-0	Spr(-42.1)	42.1	36.3	
115	10-0	Spr(-44.2)	44.2	37.2	
116	10-0	Spr(-42.9)	42.9	36.7	
117	10-0	Spr(-42.6)	42.6	36.6	
119	10-0	Spr(-43.6)	43.6	37.0	
120	10-0	Spr(-42.4)	42.4	36.5	
121	10-0	Spr(-42.1)	42.1	36.3	
4	20-0	PO(10-0)	58.4	0.0	
5	10-0	E(4-0)	46.6	0.0	
6	20-0	T(10-0)	44.5	0.0	
7	10-0	E(4-0)	46.2	0.0	
10	20-0	PO(10-0)	58.4	0.0	
11	10-0	E(4-0)	46.5	0.0	
12	20-0	T(10-0)	44.4	0.0	
13	10-0	E(4-0)	46.1	0.0	
16	20-0	PO(10-0)	58.6	0.0	
17	10-0	E(4-0)	46.5	0.0	
18	20-0	T(10-0)	44.4	0.0	
19	10-0	E(4-0)	46.1	0.0	
37	20-0	PO(30-0)	64.5	0.0	



Hydraulic Analysis

Job Number: 1 - Paint booth
Report Description: Extra Hazard Group II

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	
Route 1								
BL	1.610	36.3	5.7	120		0.048750	6-0	Pf 0.3
121	10-0	36.3	5.6	42.1		Sprinkler		Pe
120	10-0			42.4			6-0	Pv
BL	1.610	72.8	11.5	120		0.176309	7-1	Pf 1.2
120	10-0	36.5	5.6	42.4		Sprinkler		Pe
119	10-0			43.6			7-1	Pv
BL	1.610	109.8	17.3	120		0.377066	2-5½	Pf 2.4
119	10-0	37.0	5.6	43.6		Sprinkler,	4-0	Pe
19	10-0			46.1		E(4-0)	6-5½	Pv
BL	2.067	109.8	10.5	120		0.111674	19-1	Pf 2.7
19	10-0			46.1			5-0	Pe -4.3
18	20-0			44.4		E(5-0)	24-1	Pv
BL	2.067	220.3	21.1	120		0.404945	19-11	Pf 14.1
18	20-0	110.5		44.4		Flow (q) from Route 4	15-0	Pe
16	20-0			58.6		E(5-0), PO(10-0)	34-11	Pv
CM	6.065	661.6	7.3	120		0.016381	305-7½	Pf 6.0
16	20-0	441.3		58.6		Flow (q) from Route 2	58-0	Pe
37	20-0			64.5		2E(14-0), PO(30-0)	363-7½	Pv
FR	8.249	661.6	4.0	120		0.003663	19-1½	Pf 0.3
37	20-0			64.5			66-11½	Pe 8.7
1	0-0			73.5		f, sCV(52-10), BV(14-1), S, BOR	86-1	Pv
		250.0				Hose Allowance At Source		
1		911.6						
Route 2								
BL	1.610	36.3	5.7	120		0.048762	6-0	Pf 0.3
114	10-0	36.3	5.6	42.1		Sprinkler		Pe
113	10-0			42.4			6-0	Pv
BL	1.610	72.8	11.5	120		0.176353	7-1	Pf 1.2
113	10-0	36.5	5.6	42.4		Sprinkler		Pe
112	10-0			43.6			7-1	Pv
BL	1.610	109.8	17.3	120		0.377161	2-5	Pf 2.4
112	10-0	37.0	5.6	43.6		Sprinkler,	4-0	Pe
13	10-0			46.1		E(4-0)	6-5	Pv
BL	2.067	109.8	10.5	120		0.111702	19-1	Pf 2.7
13	10-0			46.1			5-0	Pe -4.3
12	20-0			44.4		E(5-0)	24-1	Pv
BL	2.067	220.3	21.1	120		0.405047	19-6½	Pf 14.0
12	20-0	110.5		44.4		Flow (q) from Route 5	15-0	Pe
10	20-0			58.4		E(5-0), PO(10-0)	34-6½	Pv
CM	6.065	441.3	4.9	120		0.007745	19-7½	Pf 0.2
10	20-0	221.0		58.4		Flow (q) from Route 3		Pe
16	20-0			58.6			19-7½	Pv
Route 3								
BL	1.610	36.5	5.7	120		0.049054	6-0	Pf 0.3
107	10-0	36.5	5.6	42.4		Sprinkler		Pe
106	10-0			42.7			6-0	Pv
BL	1.610	73.0	11.5	120		0.177407	7-1	Pf 1.3
106	10-0	36.6	5.6	42.7		Sprinkler		Pe
105	10-0			43.9			7-1	Pv
BL	1.610	110.2	17.4	120		0.379414	1-10½	Pf 2.2
105	10-0	37.1	5.6	43.9		Sprinkler,	4-0	Pe
7	10-0			46.2		E(4-0)	5-10½	Pv
BL	2.067	110.2	10.5	120		0.112369	19-1	Pf 2.7
7	10-0			46.2			5-0	Pe -4.3
6	20-0			44.5		E(5-0)	24-1	Pv
BL	2.067	221.0	21.1	120		0.407475	18-11½	Pf 13.8
6	20-0	110.9		44.5		Flow (q) from Route 6	15-0	Pe
4	20-0			58.4		E(5-0), PO(10-0)	33-11½	Pv
CM	6.065	221.0	2.5	120		0.002155	20-0	Pf 0.0
4	20-0			58.4				Pe
10	20-0			58.4			20-0	Pv
Route 4								
BL	1.610	36.6	5.8	120		0.049309	6-5	Pf 0.3
117	10-0	36.6	5.6	42.6		Sprinkler		Pe
116	10-0			42.9			6-5	Pv



Hydraulic Analysis

Job Number: 1 - Paint booth
Report Description: Extra Hazard Group II

Pipe Type	Diameter	Flow	Velocity	HWC	Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Eq. Length	Summary
Upstream					Fittings	Total Length	
BL	1.610	73.3	11.5	120	0.178368	7-1	Pf 1.3
116	10-0	36.7	5.6	42.9	Sprinkler		Pe
115	10-0			44.2		7-1	Pv
BL	1.610	110.5	17.4	120	0.381494	2-0½	Pf 2.3
115	10-0	37.2	5.6	44.2	Sprinkler,	4-0	Pe
17	10-0			46.5	E(4-0)	6-0½	Pv
BL	2.067	110.5	10.6	120	0.112985	10-0	Pf 2.3
17	10-0			46.5		10-0	Pe -4.3
18	20-0			44.4	T(10-0)	20-0	Pv
Route 5							
BL	1.610	36.6	5.8	120	0.049321	6-5	Pf 0.3
110	10-0	36.6	5.6	42.6	Sprinkler		Pe
109	10-0			42.9		6-5	Pv
BL	1.610	73.3	11.5	120	0.178413	7-1	Pf 1.3
109	10-0	36.7	5.6	42.9	Sprinkler		Pe
108	10-0			44.2		7-1	Pv
BL	1.610	110.5	17.4	120	0.381591	2-0	Pf 2.3
108	10-0	37.2	5.6	44.2	Sprinkler,	4-0	Pe
11	10-0			46.5	E(4-0)	6-0	Pv
BL	2.067	110.5	10.6	120	0.113014	10-0	Pf 2.3
11	10-0			46.5		10-0	Pe -4.3
12	20-0			44.4	T(10-0)	20-0	Pv
Route 6							
BL	1.610	36.7	5.8	120	0.049618	6-5	Pf 0.3
103	10-0	36.7	5.6	42.9	Sprinkler		Pe
102	10-0			43.2		6-5	Pv
BL	1.610	73.5	11.6	120	0.179487	7-1	Pf 1.3
102	10-0	36.8	5.6	43.2	Sprinkler		Pe
101	10-0			44.5		7-1	Pv
BL	1.610	110.9	17.5	120	0.383886	1-5½	Pf 2.1
101	10-0	37.4	5.6	44.5	Sprinkler,	4-0	Pe
5	10-0			46.6	E(4-0)	5-5½	Pv
BL	2.067	110.9	10.6	120	0.113694	10-0	Pf 2.3
5	10-0			46.6		10-0	Pe -4.3
6	20-0			44.5	T(10-0)	20-0	Pv

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

C Value Multiplier

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

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



Hydraulic Analysis

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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		Units Legend		Fittings Legend	
AO	Arm-Over	Diameter	Inch	ALV	Alarm Valve
BL	Branch Line	Elevation	Foot	AngV	Angle Valve
CM	Cross Main	Flow	gpm	b	Bushing
DN	Drain	Discharge	gpm	BaV	Ball Valve
DR	Drop	Velocity	fps	BFP	Backflow Preventer
DY	Dynamic	Pressure	psi	BV	Butterfly Valve
FM	Feed Main	Length	Foot	C	Cross Flow Turn 90°
FR	Feed Riser	Friction Loss	psi/Foot	cplg	Coupling
MS	Miscellaneous	HWC	Hazen-Williams Constant	Cr	Cross Run
OR	Outrigger	Pt	Total pressure at a point in a pipe	CV	Check Valve
RN	Riser Nipple	Pn	Normal pressure at a point in a pipe	DeV	Deluge Valve
SN	Swing Nipple	Pf	Pressure loss due to friction between points	DPV	Dry Pipe Valve
SP	Sprig	Pe	Pressure due to elevation difference between indicated points	E	90° Elbow
ST	Stand Pipe	Pv	Velocity pressure at a point in a pipe	EE	45° Elbow
UG	Underground			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 Relief Valve
				PRV	Pressure Reducing Valve
				red	Reducer/Adapter
				S	Supply
				sCV	Swing Check Valve
				SFx	Seismic Flex
				Spr	Sprinkler
				St	Strainer
				T	Tee Flow Turn 90°
				Tr	Tee Run
				U	Union
				WirF	Wirsbo
				WMV	Water Meter Valve
				Z	Cap