

RESIDENTIAL SPRINKLER SYSTEM  
HYDRAULICS CALCULATION REPORT

FOR  
Copperberry NORTH BLD  
Puyallup  
4002 10th St Se

Date: 5/18/2023  
File No:  
Data File Name: Copperberry NORTH BLD.rdf

SPRINKLER SPACING

324.0 sq. ft./spklr.(max)      Max. Dist. Bet. Spklrs:      18.0 ft.  
Min. Dist. Bet. Spklrs: 8.0      Max. Dist. Spklr. to Wall: 9.0 ft.

SPRINKLER SPECIFICATIONS

Mfr: Reliable Descr: RA0616    RFC49 Fl Conc .Pend.(18x18) K=4.90  
Calculated K Factor for Arm-Overs & Drops:  
    1.0 ft. x 1.101 in. Drop:      K=4.84 (Incl. 1 Tee)  
    0.0 ft. x 1.101 in. Arm-Over: K=4.82 (Incl. 1 Tee & 1 Ell)

PIPE SPECIFICATIONS

Type: CPVC S-40 HWC: 150

WATER SUPPLY

Source:    Test Date:    By:  
Static: 60.0 psi Resid: 20.0 psi Flow: 750.0 gpm  
Public Main Size: 10 in  
Domestic Demand: 0.0 gpm at node number 0

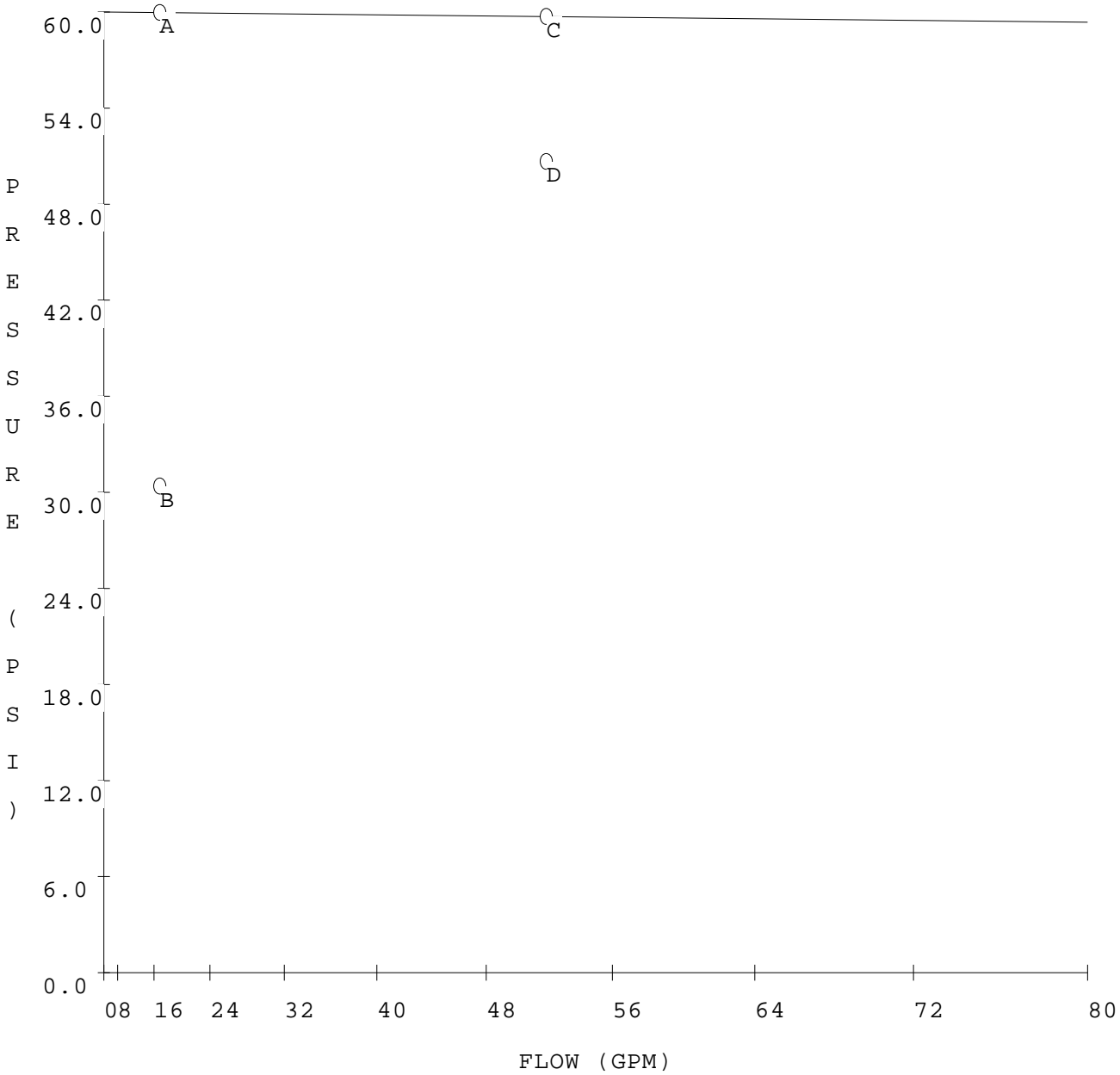
SPRINKLER DEMAND

No.Spklrs. Flowing	Min Spklr. Flow	Press. (psi)	Node No.	Total Flow	Avail. Press.	Req'd Press.
1	17.0	12.3	1	17.0	60.0	30.4
3	17.0	12.3	1	52.0	59.7	50.7

REVIEWING AUTHORITY

City of Puyallup

WATER SUPPLY CURVE



Static = 60.0 psi, Residual = 20.0 psi @ 750 gpm

(1 sprinkler flowing)

(3 sprinklers flowing)

A = Available Water Supply  
60.0 psi @ 17.0 gpm

C = Available Water Supply  
59.7 psi @ 52.0 gpm

B = Required Water Supply  
30.4 psi @ 17.0 gpm

D = Required Water Supply  
50.7 psi @ 52.0 gpm

RESULTS OF ANALYSIS

NFPA NODE & PIPE DATA

1 Sprinkler Flowing

Node Tag	Elevation (FT)	Node Type	Pressure (PSI)	Discharge (GPM)	Notes
1	10.0	K= 4.84	12.3	17.0	
2	10.0	- - - -	13.1	- - -	
3	10.0	- - - -	13.2	- - -	
4	10.0	- - - -	13.0	- - -	
5	10.0	- - - -	14.5	- - -	
6	10.0	- - - -	15.1	- - -	
7	0.0	- - - -	20.0	- - -	
8	0.0	- - - -	25.1	- - -	
9	0.0	- - - -	25.4	- - -	
10	0.0	SOURCE	30.4	- - -	
11	10.0	- - - -	13.9	- - -	

Pipe Tag	K-fac	AF	AF to	L	C	(Pt)	Notes		
Frm Node	El (ft)	PT	(q)	node/	Nom ID	Fit	F	(Pe)	
To Node	El (ft)	PT	TF(Q)	disch	Act ID		T	FL/FT	(Pf)
Pipe: 1	4.84						13.00	150	13.0
4	10.0	13.0	17.0	Disch	1.000	R: 1	1.00		0.0
1	10.0	12.3	17.0		1.101		14.00	0.050	0.7
Pipe: 2	0.00						10.00	150	13.2
3	10.0	13.2	7.5	4	1.000	R: 1	1.00		0.0
2	10.0	13.1	7.5		1.101		11.00	0.011	0.1
Pipe: 3	0.00						1.00	150	13.0
4	10.0	13.0	0.0		1.000	R: 1	1.00		-0.0
2	10.0	13.1	7.5		1.101		2.00	0.011	0.0
Pipe: 4	0.00					6R: 6	50.00	150	13.9
11	10.0	13.9	7.5	2	1.000	B: 5	11.00		0.0
3	10.0	13.2	7.5		1.101		61.00	0.011	0.7
Pipe: 5	0.00					2B:10	35.00	150	14.5
5	10.0	14.5	7.5	3	1.000	2L:10	22.00		0.0
11	10.0	13.9	7.5		1.101	2R: 2	57.00	0.011	0.6
Pipe: 6	0.00					R: 1	5.00	150	15.1
6	10.0	15.1	7.5	4	1.000	B: 5	6.00		0.0
5	10.0	14.5	17.0	11	1.101		11.00	0.050	0.6
Pipe: 7	0.00						10.00	150	20.0
7	0.0	20.0	17.0	5	1.000	3R: 3	3.00		4.3
6	10.0	15.1	17.0		1.101		13.00	0.050	0.7
Pipe: 8	0.00						1.00	150	25.1
8	0.0	25.1	17.0	6	1.000	----	0.00		0.0
7	0.0	20.0	17.0		1.101		1.00	0.050	5.1
Fixed Pressure Loss Device: 5.00 psi									
Pipe: 9	0.00					B:10	80.00	150	25.4
9	0.0	25.4	17.0	7	2.000	2L:18	28.00		0.0
8	0.0	25.1	17.0		2.003		108.00	0.003	0.3

Pipe: 10	SOURCE		1.00	150	30.4				
10	0.0	30.4	17.0	8	2.000	----	0.00	0.0	
9	0.0	25.4	17.0		2.003		1.00	0.003	5.0

Fixed Pressure Loss Device: 5.00 psi

Pipe: 11	0.00	17.0	1	5R: 5	65.00	150	14.5		
5	10.0	14.5	-7.5	2	1.000	3B:15	20.00	0.0	
4	10.0	13.0	9.5		1.101		85.00	0.017	1.5

RESULTS OF ANALYSIS

NFPA NODE & PIPE DATA

3 Sprinklers Flowing

Node Tag	Elevation (FT)	Node Type	Pressure (PSI)	Discharge (GPM)	Notes
1	10.0	K= 4.84	12.3	17.0	
2	10.0	K= 4.84	13.0	17.4	
3	10.0	K= 4.84	13.1	17.5	
4	10.0	- - - -	13.0	- - -	
5	10.0	- - - -	24.0	- - -	
6	10.0	- - - -	28.4	- - -	
7	0.0	- - - -	37.9	- - -	
8	0.0	- - - -	43.3	- - -	
9	0.0	- - - -	45.6	- - -	
10	0.0	SOURCE	50.7	- - -	
11	10.0	- - - -	18.7	- - -	

Pipe Tag	K-fac	AF	AF to	L	C	(Pt)	Notes		
Frm Node	El (ft)	PT	(q)	node/	Nom ID	Fit	F	(Pe)	
To Node	El (ft)	PT	TF(Q)	disch	Act ID		T	FL/FT	(Pf)
Pipe: 1	4.84						13.00	150	13.0
4	10.0	13.0	17.0	Disch	1.000	R: 1	1.00		0.0
1	10.0	12.3	17.0		1.101		14.00	0.050	0.7
Pipe: 2	4.84		17.4	Disch			10.00	150	13.1
3	10.0	13.1	-11.3	4	1.000	R: 1	1.00		0.0
2	10.0	13.0	6.2		1.101		11.00	0.008	0.1
Pipe: 3	4.84		17.4	Disch			1.00	150	13.0
4	10.0	13.0	-6.2	3	1.000	R: 1	1.00		-0.0
2	10.0	13.0	11.3		1.101		2.00	0.024	0.0
Pipe: 4	4.84		17.5	Disch		6R: 6	50.00	150	18.7
11	10.0	18.7	6.2	2	1.000	B: 5	11.00		0.0
3	10.0	13.1	23.7		1.101		61.00	0.093	5.7
Pipe: 5	0.00					2B:10	35.00	150	24.0
5	10.0	24.0	23.7	3	1.000	2L:10	22.00		0.0
11	10.0	18.7	23.7		1.101	2R: 2	57.00	0.093	5.3
Pipe: 6	0.00		28.3	4		R: 1	5.00	150	28.4
6	10.0	28.4	23.7	11	1.000	B: 5	6.00		0.0
5	10.0	24.0	52.0		1.101		11.00	0.398	4.4
Pipe: 7	0.00						10.00	150	37.9
7	0.0	37.9	52.0	5	1.000	3R: 3	3.00		4.3

6	10.0	28.4	52.0		1.101		13.00	0.398	5.2
Pipe: 8		0.00					1.00	150	43.3
8	0.0	43.3	52.0	6	1.000	----	0.00		0.0
7	0.0	37.9	52.0		1.101		1.00	0.398	5.4
Fixed Pressure Loss Device:							5.0 psi		
Pipe: 9		0.00				B:10	80.00	150	45.6
9	0.0	45.6	52.0	7	2.000	2L:18	28.00		0.0
8	0.0	43.3	52.0		2.003		108.00	0.022	2.3
Pipe: 10		SOURCE					1.00	150	50.7
10	0.0	50.7	52.0	8	2.000	----	0.00		0.0
9	0.0	45.6	52.0		2.003		1.00	0.022	5.0
Fixed Pressure Loss Device:							5.0 psi		
Pipe: 11		0.00	11.3	2		5R: 5	65.00	150	24.0
5	10.0	24.0	17.0	1	1.000	3B:15	20.00		0.0
4	10.0	13.0	28.3		1.101		85.00	0.129	11.0

Legend:

PT - Total Pressure at Node C - Hazen-Williams Coefficient  
 Fl - Flow rate (gpm) FL/FT - Friction Loss per Foot  
 L - Pipe Length Pt - Total Pressure Loss  
 F - Fitting Length Pe - Elevation Pressure Loss  
 T - Total Length of Pipe Pf - Friction Pressure Loss

Fitting Code Letters:

E=45 Ell, L=90 Ell, B=TeeBch, R=TeeRun, C=Couplg, S=SwgChk, G=GatVlv, X= X, Y= Y,  
 The maximum velocity of water flow occurs in pipe 1  
 at 5.73 ft/s with 1 sprinkler flowing.  
 The maximum velocity of water flow occurs in pipe 6  
 at 17.51 ft/s with 3 sprinklers flowing.

PIPE FITTINGS TABLE

Pipe Table Name: standard

PAGE: C MATERIAL: CPVC S-40 HWC: 150

Diameter (in)	Equivalent Fitting Lengths in Feet										
	E	L	B	R	C	S	G	X	Y	Z	
1.101	1.00	5.00	5.00	1.00	1.00	8.00	2.00	0.00	0.00	0.00	
2.003	2.00	9.00	10.00	1.00	1.00	17.00	3.00	0.00	0.00	0.00	

A negative value for flow rate indicates the direction of flow is from the second pipe node  
 A Fixed Pressure Loss Device calculates as a positive friction loss  
 A Fire Pump calculates as a negative friction loss

Sprinkler system has been hydraulically calculated with the  
 HASS HOUSE 2021.0.01 computer program (License No. )  
 to provide an average imbalance of 0.011 gpm at each node and  
 a maximum imbalance of 0.12 gpm with one sprinkler  
 flowing, and 0.010 gpm at each node and maximum imbalance  
 of 0.05 gpm with 3 sprinklers flowing in accordance  
 with NFPA 13 and 13D or 13R.

The minimum source pressure is 20.0 psi with a minimum required pressure of 50.7 psi and a 30 minute flow of 1559 gallons.

The minimum pressure at any node is 12.3 psi at node 1.

Under full flow conditions the available pressure is 60.0 psi and a 30 minute flow of 0 gallons. of 60.0 psi

The minimum pressure at any node is 15.6 psi at node 1.

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