

Hydraulic Calculations

for

Project Name: V. KAUR AFH

Location: 921 9TH ST NW, , PUYALLUP WA 98371

Drawing Name: 80303 V. Kaur AFH R00 FP1 Fire Sprinkler Plan

Calculation Date: 1/28/2022

Design

Remote Area Number: 1
Remote Area Location: BEDROOM A
Occupancy Classification: Residential 13D
Commodity Classification: N/A

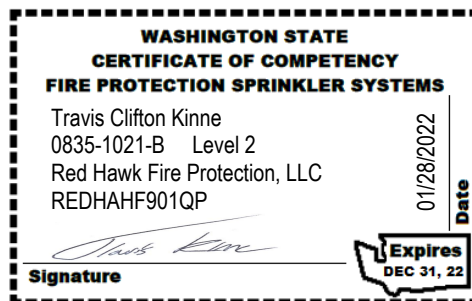
Density: 0.050gpm/ft²
Area of Application: 179.00ft² (Actual 178.49ft²)
Coverage per Sprinkler: 256.00ft²
Type of sprinklers calculated: Pendent
No. of sprinklers calculated: 2
No. of nozzles calculated: 0

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 0.0 gpm at Node: 1 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 1: 26.18 @ 24.817 (Safety Margin = 0.039 psi)
Type of System: WET
Volume of Dry or PreAction System: N/A

Name of Contractor: RED HAWK FIRE PROTECTION
Address: 801 VALLEY AVENUE NW, PUYALLUP, WA 98371
Phone Number: 253-840-9900
Name of designer: CASEY PRENDERGAST
Authority Having Jurisdiction:

Notes:

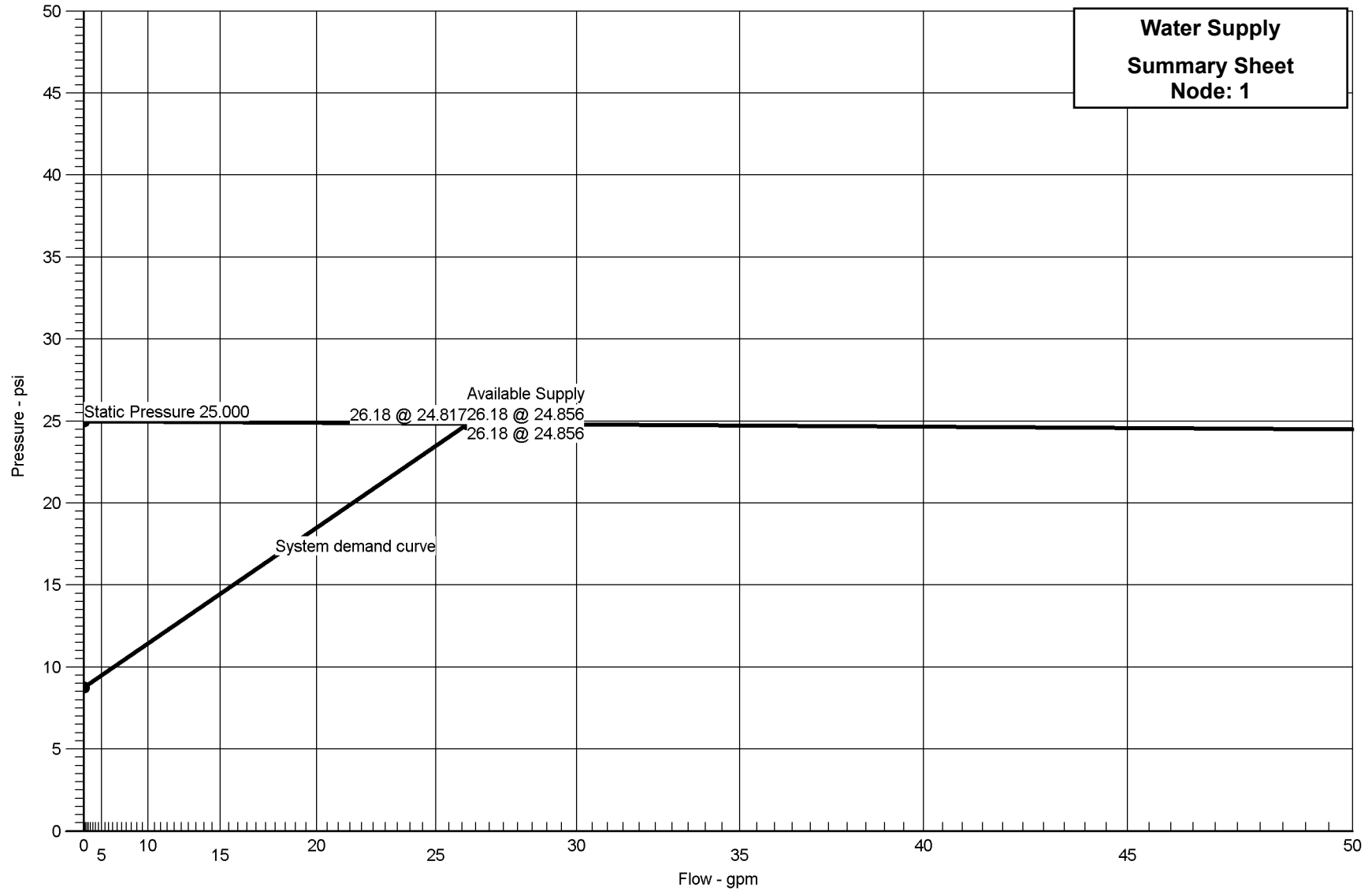


Hydraulic Graph

Job Name: V. KAUR AFH
Remote Area Number: 1

N 1.85

Date: 1/28/2022





Summary Of Outflowing Devices

Job Number: 80303 - REMOTE AREA 1

Report Description: Residential 13D (1)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
⇒ Sprinkler	10	12.96	12.80	4.9	7.000		
Sprinkler	100	13.22	12.80	4.9	7.276		

⇒ Most Demanding Sprinkler Data

Supply Analysis

Node	Name	Static (psi)	Residual (psi)	@ Flow (gpm)	Available (psi)	@ Total Demand (gpm)	Required Pressure (psi)
1	Water Supply	25.000	24.856	26.18	24.856	26.18	24.817

Node Analysis

Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes
1	-1-4	Supply	24.817	26.18	
10	18-11½	Sprinkler	7.000	12.96	
100	18-11½	Sprinkler	7.276	13.22	
2	-0-3½		24.343		
11	19-6		7.231		
12	19-6		8.285		
13	19-6		9.107		
14	19-6		9.369		
15	19-6		9.684		
16	19-6		10.051		
17	19-6		10.163		
18	9-6		14.879		
20	19-6		7.217		
21	19-6		8.428		
32	9-6		14.879		

Pipe Information									
Node 1	Elev 1 (Foot)	K-Factor	Flow added this step (q)	Nominal ID	Fittings & Devices	Length (Foot)	C Factor	Total(Pt)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
Node 2	Elev 2 (Foot)		Total Flow (Q)	Actual ID	Equiv. Length (Foot)	Fitting (Foot)	Pf Friction Loss Per Unit (psi)	Elev(Pe)	
						Total (Foot)		Friction(Pf)	
10	18-11½	4.9	12.96	1	(See Notes)	3-3	150	7.000	••••• Route 1 ••••• Sprinkler, E(7-0), T(5-0)
11	19-6		12.96	1.1010		12-0	0.030510	-0.235	
						15-3		0.466	
11	19-6		2.14	1	(See Notes)	13-0½	150	7.231	Flow (q) from Route 6 Tr(1-0), E(7-0), T(5-0)
12	19-6		15.10	1.1010		13-0	0.040458		
						26-0½		1.054	
12	19-6			1	(See Notes)	18-7½	150	8.285	T(5-0) E(7-0), 2Tr(1-0)
21	19-6		4.54	1.1010		14-0	0.004386		
						32-7½		0.143	
21	19-6		11.08	1	(See Notes)	9-9	150	8.428	Flow (q) from Route 2 Tr(1-0), C(5-0)
13	19-6		15.62	1.1010		6-0	0.043095		
						15-9		0.679	
13	19-6		10.56	1	(See Notes)	12-9	150	9.107	Flow (q) from Route 7 Tr(1-0), T(5-0)
16	19-6		16.99	1.1010		6-0	0.050337		
						18-9		0.944	
16	19-6		9.19	1	(See Notes)	0-0	150	10.051	Flow (q) from Route 3 b(1-0)
17	19-6		26.18	1.1010		1-0	0.111985		
						1-0		0.112	
17	19-6			1½	(See Notes)	11-10½	150	10.163	E(9-0), Z
18	9-6		26.18	1.5980		9-0	0.018249	4.335	
						20-10½		0.381	
18	9-6			1½		0-0	150	14.879	
32	9-6		26.18	1.5980			0.018249		
						0-0		0.000	
32	9-6			1½	(See Notes)	17-11½	150	14.879	2E(9-0), 2T(8-0), 2f(-0.000), 3 Tr(1-0), BFP(-4.216)
2	-0-3½		26.18	1.5980		37-0	0.018249	4.245	
						54-11½		5.219	
2	-0-3½			1½	(See Notes)	1-0½	120	24.343	Water Supply
1	-1-4		26.18	1.6100			0.026589	0.447	
						1-0½		0.027	
			0.00					24.817	Hose Allowance At Source
1			26.18						Total(Pt) Route 1

Pipe Information									
Node 1	Elev 1 (Foot)	K-Factor	Flow added this step (q)	Nominal ID	Fittings & Devices	Length (Foot)	C Factor	Total(Pt)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
						Fitting (Foot)	Pf Friction Loss Per Unit (psi)	Elev(Pe)	
Node 2	Elev 2 (Foot)		Total Flow (Q)	Actual ID	Equiv. Length (Foot)	Total (Foot)			
100	18-11½	4.9	13.22	1	(See Notes)	0-6½	150	7.276	***** Route 2 ***** Sprinkler, T(5-0)
20	19-6		13.22	1.1010		5-0	0.031622	-0.235	
						5-6½		0.175	
20	19-6			1	(See Notes)	34-1	150	7.217	2T(5-0), 2Tr(1-0), E(7-0)
						19-0	0.022822		
21	19-6		11.08	1.1010		53-1		1.212	
								8.428	Total(Pt) Route 2
15	19-6		5.72 + 3.47	1	(See Notes)	15-9	150	9.684	***** Route 3 ***** Flow (q) from Route 4 and 5 2Tr(1-0), T(5-0)
16	19-6		9.19	1.1010		7-0	0.016138		
						22-9		0.367	
								10.051	Total(Pt) Route 3
13	19-6		10.56	1	(See Notes)	6-3	150	9.107	***** Route 4 ***** C(5-0), Flow (q) from Route 7 T(5-0)
14	19-6		9.19	1.1010		10-0	0.016138		
						16-3		0.262	
14	19-6			1	(See Notes)	34-9	150	9.369	2Tr(1-0), 2T(5-0)
						12-0	0.006720		
15	19-6		5.72	1.1010		46-9		0.314	
								9.684	Total(Pt) Route 4
14	19-6			1	(See Notes)	89-2½	150	9.369	***** Route 5 ***** T(5-0) 2T(5-0), 7Tr(1-0), E(7-0)
						29-0	0.002658		
15	19-6		3.47	1.1010		118-2½		0.314	
								9.684	Total(Pt) Route 5
20	19-6		11.08	1	(See Notes)	8-1½	150	7.217	***** Route 6 ***** Flow (q) from Route 2 T(5-0)
						5-0	0.001086		
11	19-6		2.14	1.1010		13-1½		0.014	
								7.231	Total(Pt) Route 6
12	19-6		4.54	1	(See Notes)	28-4½	150	8.285	***** Route 7 ***** Flow (q) from Route 1 4Tr(1-0), E(7-0)
						11-0	0.020864		
13	19-6		10.56	1.1010		39-4½		0.822	
								9.107	Total(Pt) Route 7

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
Multiplying Factor	0.713	1.16	1.33	1.51

Fittings Legend

ALV	Alarm Valve	AngV	Angle Valve	b	Bushing
BaIV	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 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				

Hydraulic Calculations

for

Project Name: V. KAUR AFH

Location: 921 9TH ST NW, , PUYALLUP WA 98371

Drawing Name: 80303 V. Kaur AFH R00 FP1 Fire Sprinkler Plan

Calculation Date: 1/28/2022

Design

Remote Area Number: 2
Remote Area Location: BASEMENT
Occupancy Classification: Residential 13D
Commodity Classification: N/A

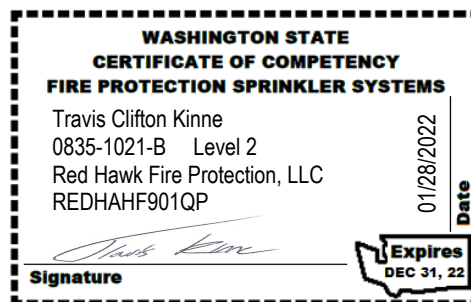
Density 0.050gpm/ft²
Area of Application: 350.00ft²
Coverage per Sprinkler: 160.00ft²
Type of sprinklers calculated: Sidewall
No. of sprinklers calculated: 2
No. of nozzles calculated: 0

In-rack Demand: N/A gpm at Node: N/A
Hose Streams: 0.0 gpm at Node: 1 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):
From Water Supply at Node 1: 24.33 @ 17.702 (Safety Margin = 7.172 psi)
Type of System: WET
Volume of Dry or PreAction System: N/A

Name of Contractor: RED HAWK FIRE PROTECTION
Address: 801 VALLEY AVENUE NW, PUYALLUP, WA 98371
Phone Number: 253-840-9900
Name of designer: CASEY PRENDERGAST
Authority Having Jurisdiction:

Notes:





Summary Of Outflowing Devices

Job Number: 80303 - REMOTE AREA 2
Report Description: Residential 13D (2)

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
⇒ Sprinkler	30	11.64	8.00	4.4	7.000		
Sprinkler	31	12.69	8.00	4.4	8.317		

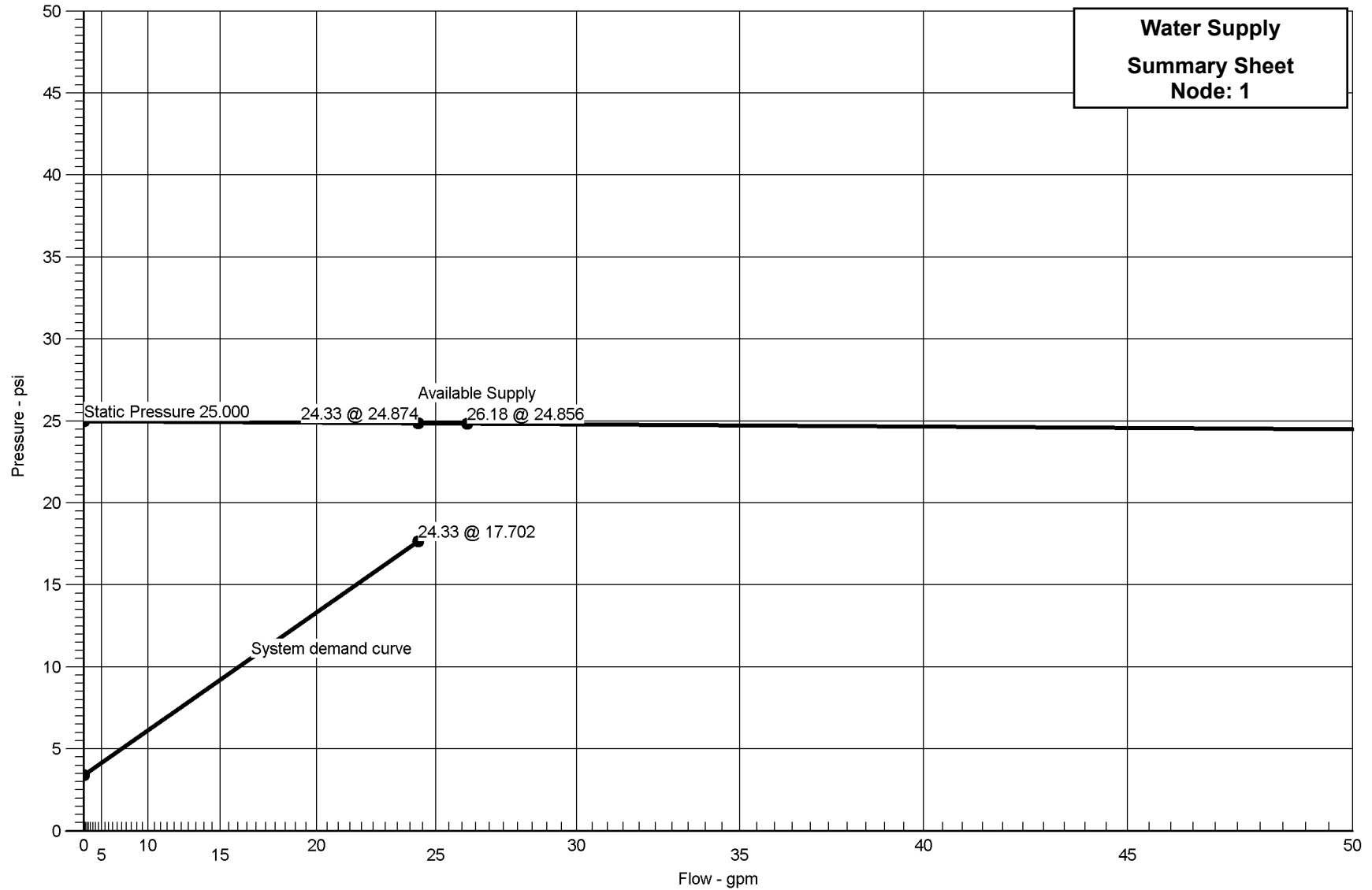
⇒ Most Demanding Sprinkler Data

Hydraulic Graph

Job Name: V. KAUR AFH
Remote Area Number: 2

N 1.85

Date: 1/28/2022



Supply Analysis							
Node	Name	Static (psi)	Residual (psi)	@ Flow (gpm)	Available (psi)	@ Total Demand (gpm)	Required Pressure (psi)
1	Water Supply	25.000	24.856	26.18	24.874	24.33	17.702
Node Analysis							
Node Number	Elevation (Foot)	Node Type	Pressure at Node (psi)	Discharge at Node (gpm)	Notes		
1	-1-4	Supply	17.702	24.33			
30	6-7½	Sprinkler	7.000	11.64			
31	6-7½	Sprinkler	8.317	12.69			
2	-0-3½		17.231				
18	9-6		8.665				
32	9-6		8.665				
200	6-7½		8.415				

Pipe Information									
Node 1	Elev 1 (Foot)	K-Factor	Flow added this step (q)	Nominal ID	Fittings & Devices	Length (Foot)	C Factor	Total(Pt)	Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value.
						Fitting (Foot)	Pf Friction Loss Per Unit (psi)	Elev(Pe)	
Node 2	Elev 2 (Foot)		Total Flow (Q)	Actual ID	Equiv. Length (Foot)	Total (Foot)		Friction(Pf)	
30	6-7½	4.4	11.64	1	(See Notes)	37-8	150	7.000	
31	6-7½		11.64	1.1010		15-0	0.025002		
						52-8		1.317	
31	6-7½	4.4	12.69	1	(See Notes)	0-0	150	8.317	Sprinkler, 2E(7-0), Tr(1-0)
200	6-7½		24.33	1.1010		1-0	0.097778		
						1-0		0.098	
200	6-7½			1½	(See Notes)	52-11	150	8.415	3E(9-0), 7Tr(1-0), 2T(8-0), 2f(- 0.000), BFP(-4.178)
2	-0-3½		24.33	1.5980		50-0	0.015934	2.999	
						102-11		5.818	
2	-0-3½			1½	(See Notes)	1-0½	120	17.231	Water Supply
							0.023216	0.447	
1	-1-4		24.33	1.6100		1-0½		0.024	
								17.702	Total(Pt) Route 1

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
Multiplying Factor	0.713	1.16	1.33	1.51

Fittings Legend

ALV	Alarm Valve	AngV	Angle Valve	b	Bushing
BaIV	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 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				