City of Puyallup
Development & Permitting Services
ISSUED PERMIT
Building | Planning
Engineering | Public Works
Fire | Traffic

SPRINX
FIRE PROTECTION
EST. 1999

2709 Jahn Ave NW, Suite H2, Gig Harbor WA 98335
Ph. (253) 853-7780– www.SprinxFire.com

Expires DEC 31, 25
WASHINGTON STATE CERTIFICATE OF COMPETENCY FIRE SPRINKLER SYSTEMS
Joseph G. Faulkner
9491-0699-CEG Level 3
Sprinx Fire Protection, Inc.
SPRINFP011LS
Signature 01/18/2025 Date

Hydraulic Calculations

SPRINX FIRE PROTECTION INC.
2709 JAHN AVE NW SUITE H2
GIG HARBOR, WA 98335
253-853-7780

Job Name	:	ETC Building H Area 1
Drawing	:	FP-3.0
Location	:	2902 E PIONEER PUYALLUP, WA 98372
Remote Area	:	RA#1
Contract	:	24-093CM
Data File	:	ETC Building H Area 1.WXF

HYDRAULIC CALCULATIONS
for

JOB NAME East Town Crossing Building H
Location 2902 E PIONEER PUYALLUP, WA 98372
Drawing # FP-3.0
Contract # 24-093CM
Date 01/06/2025

DESIGN
Remote area # RA#1
Remote area location UNIT 307 - LIVING ROOM
Occupancy classification RESIDENTIAL NFPA 13R
Density 0.05 - Gpm/SqFt
Area of application 256 - SqFt
Coverage/sprinkler 256 16'X16' - SqFt
Type of sprinkler calculated VIKING VK468 RESIDENTIAL PENDENT K=4.9
 # Sprinklers calculated 4
In-rack demand N/A - GPM
Hose streams N/A - GPM
Total water required (including hose streams) 54.1457 - GPM @ 31.2676 - Psi
Type of system WET-CPVC
Volume of system (dry or pre-action) N/A - Gal

WATER SUPPLY INFORMATION
Test date 4/16/2024
Location 2902 E PIONEER
Source of info CITY OF PUYALLUP WATER DIVISON

CONTRACTOR INFO SPRINX FIRE PROTECTION
Address 2709 JAHN AVE. / SUITE H2 / GIG HARBOR
Phone # 253-853-7780
Name of designer ALEXANDER J PARADIS
Authority having jurisdiction CITY OF PUYALLUP
NOTES:

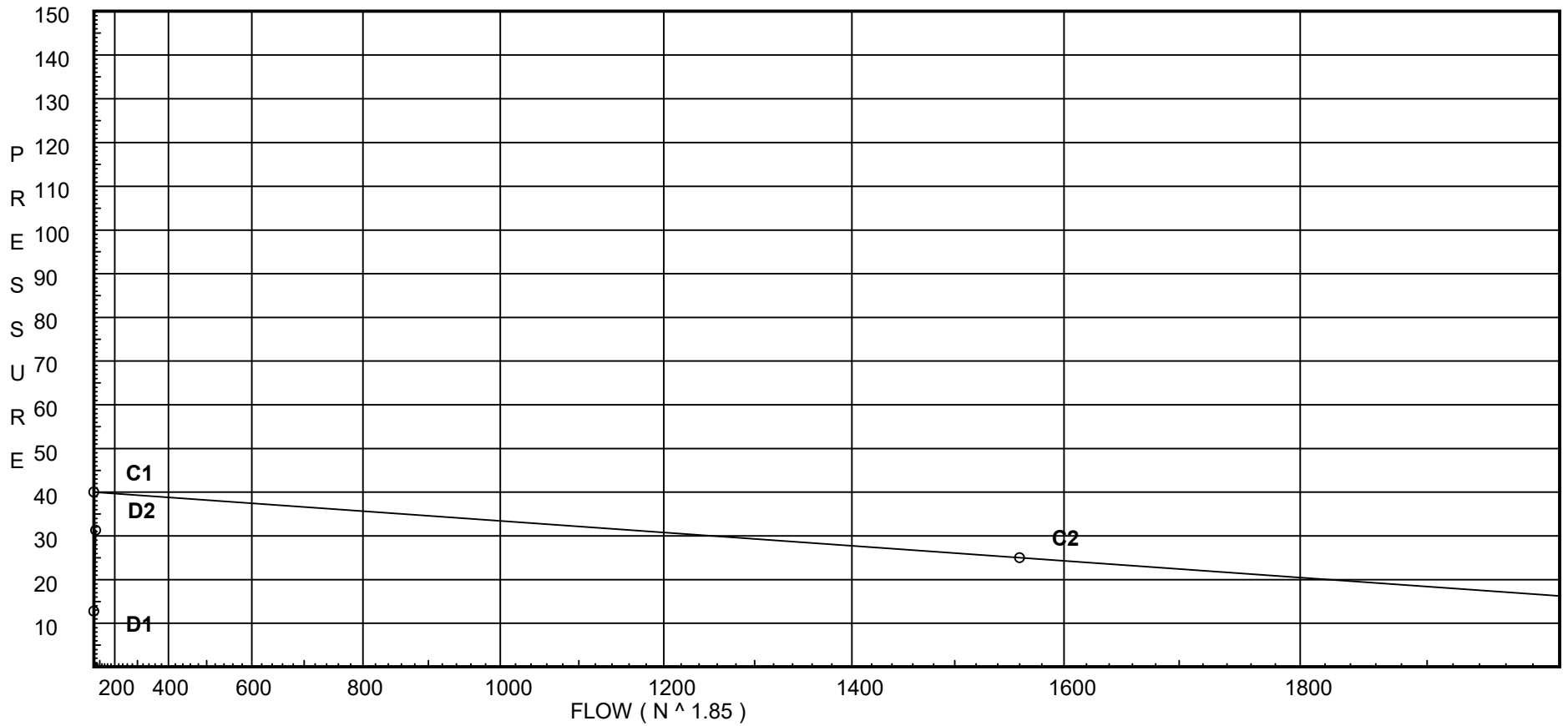
Water Supply Curve

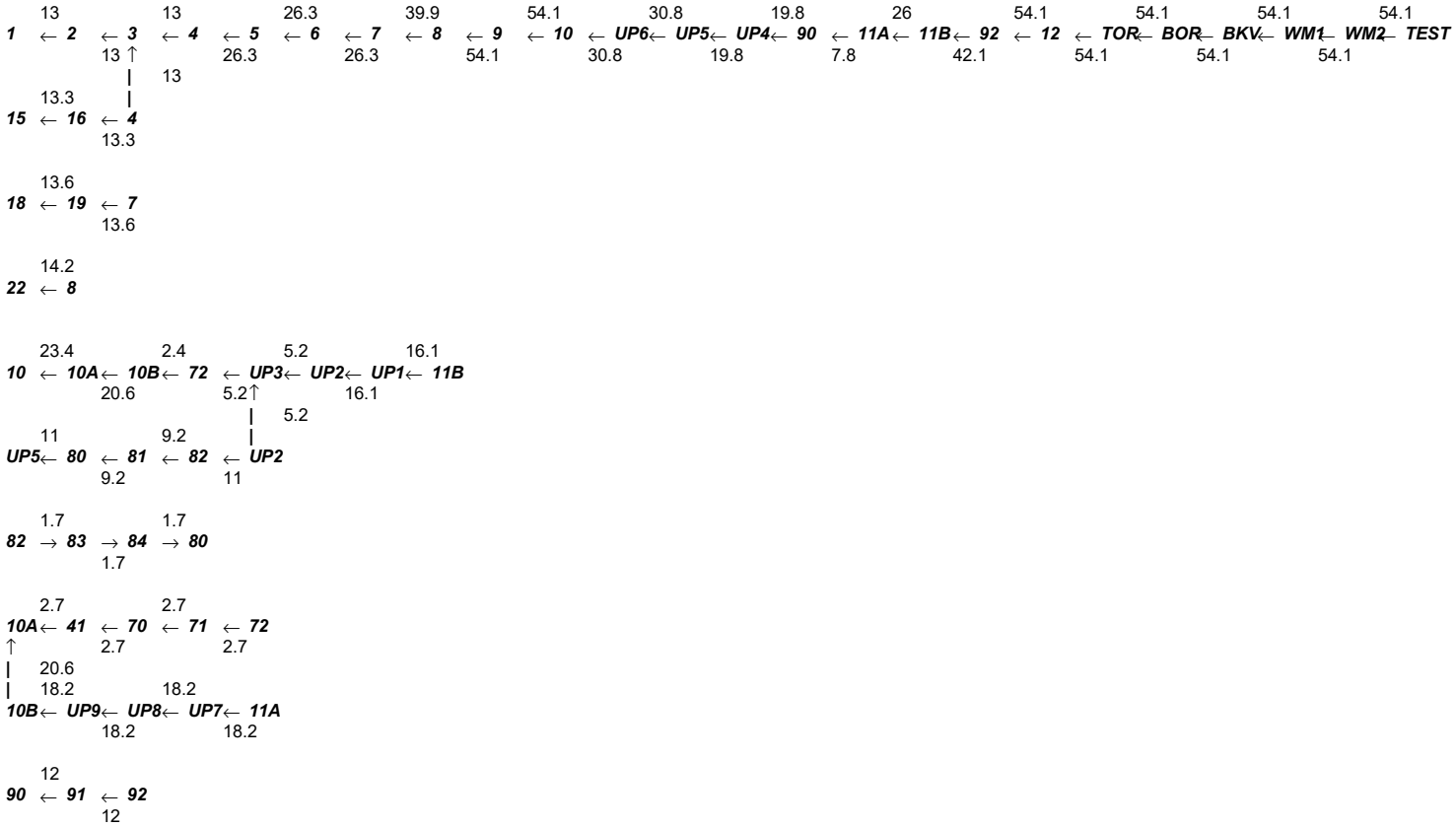
SPRINX FIRE PROTECTION INC.
ETC Building H Area 1

Date 01/06/2025

City Water Supply:
- C1 - Static Pressure : 40
- C2 - Residual Pressure: 25
- C2 - Residual Flow : 1560

Demand:
- D1 - Elevation : 12.776
- D2 - System Flow : 54.146
- D2 - System Pressure : 31.268
- Hose (Demand) : _____
- D3 - System Demand : 54.146
- Safety Margin : 8.702




1 2 3 4 5 6 7 8 9 10 UP6 UP5 UP4 90 11A 11B 92 12 TOR BOR BKV WM1 WM2 TEST
15 16 4
18 19 7
22 8
10 10A 10B 72 UP3 UP2 UP1 11B
UP5 80 81 82 UP2
82 83 84 80
10A 41 70 71 72
10B UP9 UP8 UP7 11A
90 91 92

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
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
R *	CPVC Coupling Tee - Run	1	1	1	1	1	1	2	2	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
Ziw	Wilkins 350AST	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.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	40.0	25	1560.0	39.97	54.15	31.268

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
1	106.5	4.9	7.04	13.0	0.05	256
2	107.0		7.05			
3	107.0		7.53			
4	107.0		7.63			
5	107.0		7.7			
6	107.0		7.95			
7	107.0		7.96			
8	107.0		8.03			
9	107.0		8.15			
10	107.0		8.46			
UP6	107.0		8.56			
UP5	96.75		13.09			
UP4	86.5		17.61			
90	86.5		17.89			
11A	86.5		17.9			
11B	86.5		18.04			
92	86.5		18.45			
12	86.5		18.84			
TOR	86.5		20.12			
BOR	80.0		23.66			
BKV	77.0		31.25			
WM1	77.0		31.26			
WM2	77.0		31.27			
TEST	77.0		31.27			
15	106.5	4.9	7.35	13.29	0.05	256
16	107.0		7.31			
18	106.5	4.9	7.72	13.62	0.05	256
19	107.0		7.75			
22	105.5	4.9	8.45	14.24	0.05	256
10A	107.0		8.8			
10B	107.0		8.85			
72	107.0		8.85			
UP3	107.0		8.88			
UP2	96.75		13.32			
UP1	86.5		17.82			
80	96.75		13.19			
81	96.75		13.2			
82	96.75		13.21			
83	96.75		13.21			
84	96.75		13.2			
41	107.0		8.81			
70	107.0		8.82			

NODE ANALYSIS (cont.)

Node Tag	*Elevation*	*Node Type*	*Pressure at Node*	*Discharge at Node*	*Notes*
71	107.0		8.84		
UP9	107.0		8.89		
UP8	96.75		13.36		
UP7	86.5		17.87		
91	86.5		18.18		

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
1	106.500	4.90	13.00	1	N	7.0	0.500	150	7.040	
to							7.000		-0.217	
2	107		13.0	1.101			7.500	0.0307	0.230	Vel = 4.38
2	107		0.0	1	O	5.0	10.500	150	7.053	
to							5.000		0.0	
3	107		13.0	1.101			15.500	0.0307	0.476	Vel = 4.38
3	107		0.0	1.25	R	1.0	9.640	150	7.529	
to							1.000		0.0	
4	107		13.0	1.394			10.640	0.0097	0.103	Vel = 2.73
4	107		13.29	1.25	R	1.0	1.000	150	7.632	
to							1.000		0.0	
5	107		26.29	1.394			2.000	0.0360	0.072	Vel = 5.53
5	107		0.0	1.25	R	1.0	5.750	150	7.704	
to							1.000		0.0	
6	107		26.29	1.394			6.750	0.0357	0.241	Vel = 5.53
6	107		0.0	2	R	1.0	1.170	150	7.945	
to							1.000		0.0	
7	107		26.29	2.003			2.170	0.0060	0.013	Vel = 2.68
7	107		13.61	2	R	1.0	4.670	150	7.958	
to							1.000		0.0	
8	107		39.9	2.003			5.670	0.0134	0.076	Vel = 4.06
8	107		14.25	2	2R	2.0	2.830	150	8.034	
to							2.000		0.0	
9	107		54.15	2.003			4.830	0.0232	0.112	Vel = 5.51
9	107		0.0	2	O	10.0	3.580	150	8.146	
to							10.000		0.0	
10	107		54.15	2.003			13.580	0.0233	0.316	Vel = 5.51
10	107		-23.37	2	N	11.0	1.170	150	8.462	
to							11.000		0.0	
UP6	107		30.78	2.003			12.170	0.0082	0.100	Vel = 3.13
UP6	107		0.0	2	R	1.0	10.250	150	8.562	
to							1.000		4.439	
UP5	96.750		30.78	2.003			11.250	0.0083	0.093	Vel = 3.13
UP5	96.750		-10.99	2	N	11.0	10.250	150	13.094	
to							11.000		4.439	
UP4	86.500		19.79	2.003			21.250	0.0036	0.077	Vel = 2.01
UP4	86.500		0.0	2	2O	20.0	49.670	150	17.610	
to					9R	9.0	29.000		0.0	
90	86.500		19.79	2.003			78.670	0.0036	0.285	Vel = 2.01
90	86.500		-12.00	2	2R	2.0	11.580	150	17.895	
to							2.000		0.0	
11A	86.500		7.79	2.003			13.580	0.0006	0.008	Vel = 0.79
11A	86.500		18.22	2	R	1.0	11.250	150	17.903	
to					O	10.0	11.000		0.0	
11B	86.500		26.01	2.003			22.250	0.0060	0.134	Vel = 2.65
11B	86.500		16.14	2	5R	5.0	23.500	150	18.037	
to							5.000		0.0	
92	86.500		42.15	2.003			28.500	0.0146	0.417	Vel = 4.29

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
92	86.500		12.00	2	O	10.0	6.420	150	18.454	
to							10.000		0.0	
12	86.500		54.15	2.003			16.420	0.0233	0.383	Vel = 5.51
12	86.500		0.0	2	3R	3.0	19.010	150	18.837	
to					3N	33.0	36.000		0.0	
TOR	86.500		54.15	2.003			55.010	0.0233	1.281	Vel = 5.51
TOR	86.500		0.0	2	B	8.183	9.500	120	20.118	
to					S	15.003	23.186		2.815	
BOR	80		54.15	2.203			32.686	0.0222	0.725	Vel = 4.56
BOR	80		0.0	6	T	43.037	72.080	140	23.658	
to					3E	60.252	103.289		7.577	* * Fixed Loss = 6.278
BKV	77		54.15	6.16	Ziw	0.0	175.369	0.0001	0.019	Vel = 0.58
BKV	77		0.0	6	T	43.037	40.000	140	31.254	
to					G	4.304	47.341		0.0	
WM1	77		54.15	6.16			87.341	0.0001	0.010	Vel = 0.58
WM1	77		0.0	8	T	55.354	75.000	140	31.264	
to							55.354		0.0	
WM2	77		54.15	8.27			130.354	0	0.004	Vel = 0.32
WM2	77		0.0	8			4.000	140	31.268	
to									0.0	
TEST	77		54.15	8.27			4.000	0	0.0	Vel = 0.32
			0.0							
TEST			54.15						31.268	K Factor = 9.68
15	106.500	4.90	13.29	1	O	5.0	0.500	150	7.354	
to							5.000		-0.217	
16	107		13.29	1.101			5.500	0.0320	0.176	Vel = 4.48
16	107		0.0	1	O	5.0	5.000	150	7.313	
to							5.000		0.0	
4	107		13.29	1.101			10.000	0.0319	0.319	Vel = 4.48
			0.0							
4			13.29						7.632	K Factor = 4.81
18	106.500	4.90	13.62	1	N	7.0	0.500	150	7.721	
to							7.000		-0.217	
19	107		13.62	1.101			7.500	0.0335	0.251	Vel = 4.59
19	107		0.0	1	O	5.0	1.100	150	7.755	
to							5.000		0.0	
7	107		13.62	1.101			6.100	0.0333	0.203	Vel = 4.59
			0.0							
7			13.62						7.958	K Factor = 4.83
22	105.500	4.90	14.24	1	O	5.0	1.500	150	8.447	
to							5.000		-0.650	
8	107		14.24	1.101			6.500	0.0365	0.237	Vel = 4.80
			0.0							
8			14.24						8.034	K Factor = 5.02
10	107		23.37	2	9R	9.0	49.670	150	8.462	
to					O	10.0	19.000		0.0	
10A	107		23.37	2.003			68.670	0.0049	0.338	Vel = 2.38

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
10A	107		-2.73	2	2R	2.0	11.580	150	8.800	
to							2.000		0.0	
10B	107		20.64	2.003			13.580	0.0040	0.054	Vel = 2.10
10B	107		-18.21	2	2R	2.0	11.170	150	8.854	
to							2.000		0.0	
72	107		2.43	2.003			13.170	0.0001	0.001	Vel = 0.25
72	107		2.73	2	8R	8.0	50.830	150	8.855	
to					2O	20.0	39.000		0.0	
UP3	107		5.16	2.003	N	11.0	89.830	0.0003	0.027	Vel = 0.53
UP3	107		0.0	2	R	1.0	10.250	150	8.882	
to							1.000		4.439	
UP2	96.750		5.16	2.003			11.250	0.0003	0.003	Vel = 0.53
UP2	96.750		10.98	2	N	11.0	10.250	150	13.324	
to							11.000		4.439	
UP1	86.500		16.14	2.003			21.250	0.0025	0.053	Vel = 1.64
UP1	86.500		0.0	2	8R	8.0	50.830	150	17.816	
to					3O	30.0	38.000		0.0	
11B	86.500		16.14	2.003			88.830	0.0025	0.221	Vel = 1.64
			0.0							
11B			16.14						18.037	K Factor = 3.80
UP5	96.750		10.99	2	2O	20.0	50.830	150	13.094	
to					9R	9.0	29.000		0.0	
80	96.750		10.99	2.003			79.830	0.0012	0.097	Vel = 1.12
80	96.750		-1.75	2	2R	2.0	11.580	150	13.191	
to							2.000		0.0	
81	96.750		9.24	2.003			13.580	0.0009	0.012	Vel = 0.94
81	96.750		0.0	2	2R	2.0	11.250	150	13.203	
to							2.000		0.0	
82	96.750		9.24	2.003			13.250	0.0009	0.012	Vel = 0.94
82	96.750		1.75	2	8R	8.0	51.000	150	13.215	
to					2O	20.0	39.000		0.0	
UP2	96.750		10.99	2.003	N	11.0	90.000	0.0012	0.109	Vel = 1.12
			0.0							
UP2			10.99						13.324	K Factor = 3.01
82	96.750		-1.75	1.25	4R	4.0	23.500	150	13.215	
to					O	6.0	10.000		0.0	
83	96.750		-1.75	1.394			33.500	-0.0002	-0.008	Vel = 0.37
83	96.750		0.0	1.25	4R	4.0	22.830	150	13.207	
to					O	6.0	10.000		0.0	
84	96.750		-1.75	1.394			32.830	-0.0002	-0.008	Vel = 0.37
84	96.750		0.0	1.25	4R	4.0	23.500	150	13.199	
to					O	6.0	10.000		0.0	
80	96.750		-1.75	1.394			33.500	-0.0002	-0.008	Vel = 0.37
			0.0							
80			-1.75						13.191	K Factor = -0.48
10A	107		2.73	1.25	4R	4.0	19.000	150	8.800	
to							4.000		0.0	
41	107		2.73	1.394			23.000	0.0006	0.013	Vel = 0.57

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
41	107		0.0	1.25	O	6.0	4.500	150	8.813	
to							6.000		0.0	
70	107		2.73	1.394			10.500	0.0006	0.006	Vel = 0.57
70	107		0.0	1.25	4R	4.0	22.830	150	8.819	
to					O	6.0	10.000		0.0	
71	107		2.73	1.394			32.830	0.0005	0.017	Vel = 0.57
71	107		0.0	1.25	4R	4.0	23.500	150	8.836	
to					O	6.0	10.000		0.0	
72	107		2.73	1.394			33.500	0.0006	0.019	Vel = 0.57
			0.0							
72			2.73						8.855	K Factor = 0.92
10B	107		18.21	2	N	11.0	0.670	150	8.854	
to							11.000		0.0	
UP9	107		18.21	2.003			11.670	0.0031	0.036	Vel = 1.85
UP9	107		0.0	2	R	1.0	10.250	150	8.890	
to							1.000		4.439	
UP8	96.750		18.21	2.003			11.250	0.0031	0.035	Vel = 1.85
UP8	96.750		0.0	2	N	11.0	10.250	150	13.364	
to							11.000		4.439	
UP7	86.500		18.21	2.003			21.250	0.0031	0.066	Vel = 1.85
UP7	86.500		0.0	2	O	10.0	1.000	150	17.869	
to							10.000		0.0	
11A	86.500		18.21	2.003			11.000	0.0031	0.034	Vel = 1.85
			0.0							
11A			18.21						17.903	K Factor = 4.30
90	86.500		12.00	1.25	4R	4.0	24.000	150	17.895	
to					O	6.0	10.000		0.0	
91	86.500		12.0	1.394			34.000	0.0084	0.284	Vel = 2.52
91	86.500		0.0	1.25	4R	4.0	22.830	150	18.179	
to					O	6.0	10.000		0.0	
92	86.500		12.0	1.394			32.830	0.0084	0.275	Vel = 2.52
			0.0							
92			12.00						18.454	K Factor = 2.79

SPRINX FIRE PROTECTION EST. 1999

2709 Jahn Ave NW, Suite H2, Gig Harbor WA 98335
Ph. (253) 853-7780– www.SprinxFire.com

Expires DEC 31, 25

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE SPRINKLER SYSTEMS

Joseph G. Faulkner
9491-0699-CEG Level 3
Sprinx Fire Protection, Inc.
SPRINFP011LS

Signature 01/18/2025 Date

Hydraulic Calculations

SPRINX FIRE PROTECTION INC.
2709 JAHN AVE NW SUITE H2
GIG HARBOR, WA 98335
253-853-7780

Job Name	:	ETC Building H Area 2
Drawing	:	FP-3.0
Location	:	2902 E PIONEER PUYALLUP, WA 98372
Remote Area	:	RA#2
Contract	:	24-093CM
Data File	:	ETC Building H Area 2.WXF

HYDRAULIC CALCULATIONS
for

JOB NAME East Town Crossing Building H
Location 2902 E PIONEER PUYALLUP, WA 98372
Drawing # FP-3.0
Contract # 24-093CM
Date 01/06/2025

DESIGN

Remote area # RA#2
Remote area location UNIT 307 - BEDROOM
Occupancy classification RESIDENTIAL NFPA 13R
Density 0.05 - Gpm/SqFt
Area of application 324 - SqFt
Coverage/sprinkler 324 - SqFt
Type of sprinkler calculated VIKING VK468 RESIDENTIAL PENDENT K=4.9
 # Sprinklers calculated 1
In-rack demand N/A - GPM
Hose streams N/A - GPM
Total water required (including hose streams) 17.0024 - GPM @ 33.3682 - Psi
Type of system WET-CPVC
Volume of system (dry or pre-action) N/A - Gal

WATER SUPPLY INFORMATION

Test date 4/16/2024
Location 2902 E PIONEER
Source of info SPRINX FIRE PROTECTION

CONTRACTOR INFO SPRINX FIRE PROTECTION
Address 2709 JAHN AVE. / SUITE H2 / GIG HARBOR
Phone # 253-853-7780
Name of designer ALEXANDER J PARADIS
Authority having jurisdiction CITY OF PUYALLUP
NOTES:

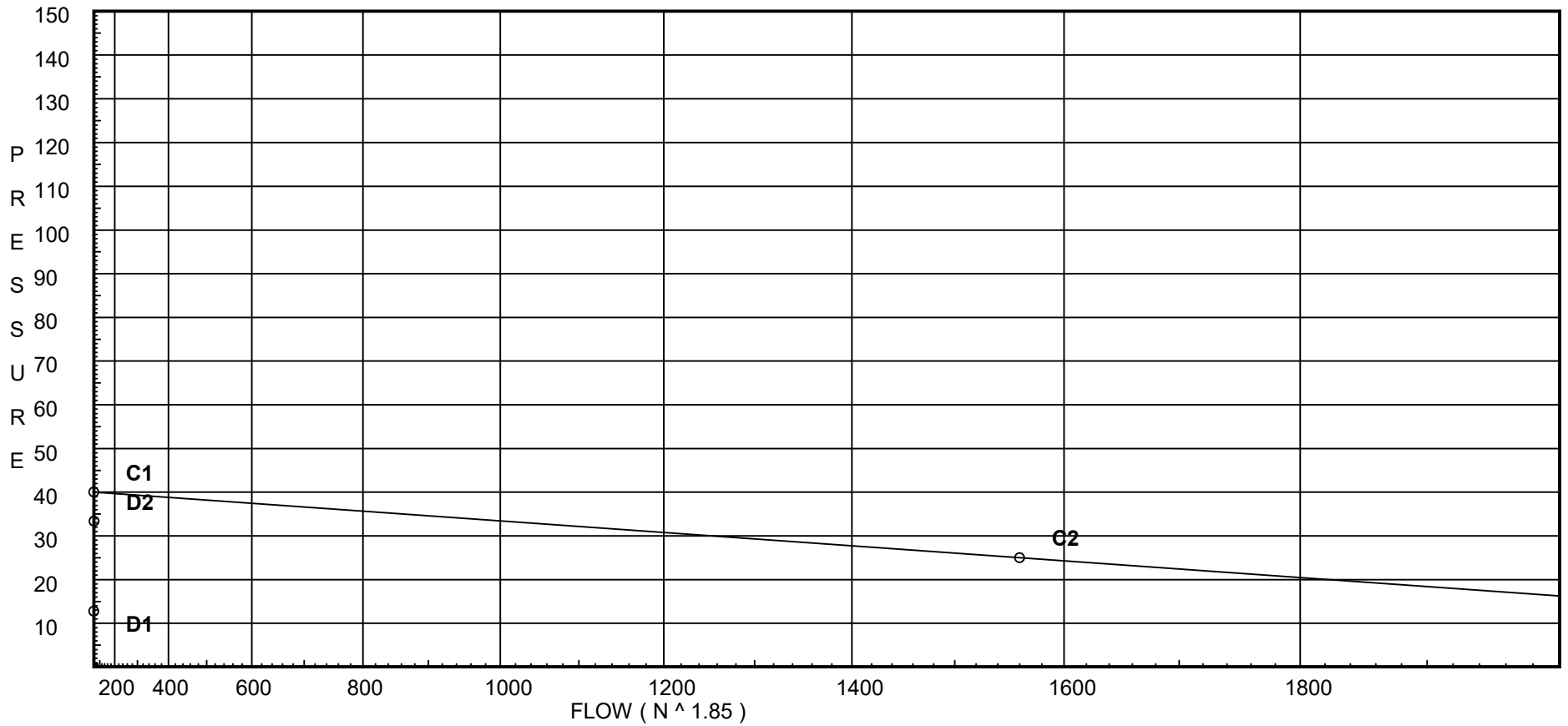
Water Supply Curve

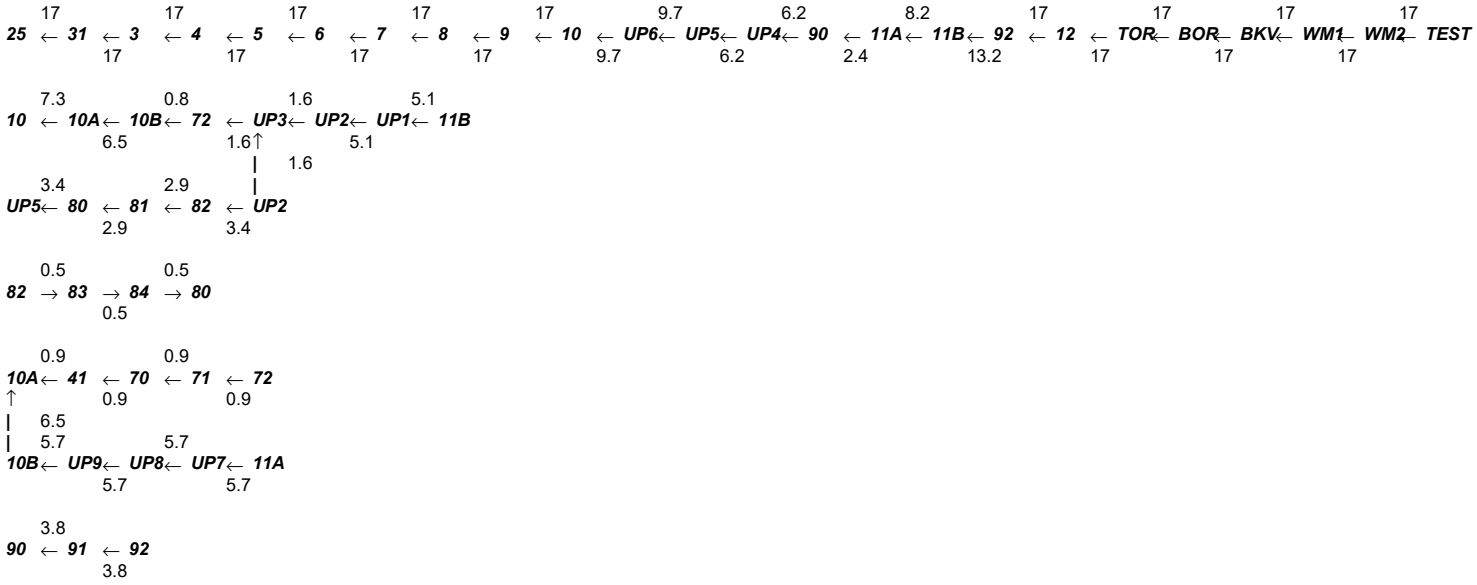
SPRINX FIRE PROTECTION INC.
ETC Building H Area 2

Date 01/06/2025

City Water Supply:
- C1 - Static Pressure : 40
- C2 - Residual Pressure: 25
- C2 - Residual Flow : 1560

Demand:
- D1 - Elevation : 12.776
- D2 - System Flow : 17.002
- D2 - System Pressure : 33.368
- Hose (Demand) : _____
- D3 - System Demand : 17.002
- Safety Margin : 6.628




25 31 3 4 5 6 7 8 9 10 UP6 UP5 UP4 90 11A 11B 92 12 TOR BOR BKV WM1 WM2 TEST
10 10A 10B 72 UP3 UP2 UP1 11B
UP5 80 81 82 UP2
82 83 84 80
10A 41 70 71 72
10B UP9 UP8 UP7 11A
90 91 92

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
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
R *	CPVC Coupling Tee - Run	1	1	1	1	1	1	2	2	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
Ziw	Wilkins 350AST	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.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	40.0	25	1560.0	39.996	17.0	33.368

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
25	106.5	4.9	12.04	17.0	0.05	324
31	107.0		12.1			
3	107.0		12.81			
4	107.0		12.98			
5	107.0		13.01			
6	107.0		13.12			
7	107.0		13.12			
8	107.0		13.14			
9	107.0		13.15			
10	107.0		13.19			
UP6	107.0		13.2			
UP5	96.75		17.65			
UP4	86.5		22.1			
90	86.5		22.13			
11A	86.5		22.13			
11B	86.5		22.15			
92	86.5		22.2			
12	86.5		22.24			
TOR	86.5		22.39			
BOR	80.0		25.29			
BKV	77.0		33.37			
WM1	77.0		33.37			
WM2	77.0		33.37			
TEST	77.0		33.37			
10A	107.0		13.23			
10B	107.0		13.23			
72	107.0		13.23			
UP3	107.0		13.24			
UP2	96.75		17.68			
UP1	86.5		22.12			
80	96.75		17.66			
81	96.75		17.66			
82	96.75		17.66			
83	96.75		17.66			
84	96.75		17.66			
41	107.0		13.23			
70	107.0		13.23			
71	107.0		13.23			
UP9	107.0		13.24			
UP8	96.75		17.68			
UP7	86.5		22.13			
91	86.5		22.16			

NODE ANALYSIS (cont.)

Node Tag	*Elevation*	*Node Type*	*Pressure at Node*	*Discharge at Node*	*Notes*

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*******	Notes	******
25	106.500	4.90	17.00	1	O	5.0	0.500	150	12.040			
to							5.000		-0.217			
31	107		17.0	1.101			5.500	0.0505	0.278	Vel = 5.73		
31	107		0.0	1	N	7.0	6.000	150	12.101			
to					R	1.0	8.000		0.0			
3	107		17.0	1.101			14.000	0.0504	0.705	Vel = 5.73		
3	107		0.0	1.25	R	1.0	9.640	150	12.806			
to							1.000		0.0			
4	107		17.0	1.394			10.640	0.0160	0.170	Vel = 3.57		
4	107		0.0	1.25	R	1.0	1.000	150	12.976			
to							1.000		0.0			
5	107		17.0	1.394			2.000	0.0160	0.032	Vel = 3.57		
5	107		0.0	1.25	R	1.0	5.750	150	13.008			
to							1.000		0.0			
6	107		17.0	1.394			6.750	0.0160	0.108	Vel = 3.57		
6	107		0.0	2	R	1.0	1.170	150	13.116			
to							1.000		0.0			
7	107		17.0	2.003			2.170	0.0028	0.006	Vel = 1.73		
7	107		0.0	2	R	1.0	4.670	150	13.122			
to							1.000		0.0			
8	107		17.0	2.003			5.670	0.0026	0.015	Vel = 1.73		
8	107		0.0	2	2R	2.0	2.830	150	13.137			
to							2.000		0.0			
9	107		17.0	2.003			4.830	0.0027	0.013	Vel = 1.73		
9	107		0.0	2	O	10.0	3.580	150	13.150			
to							10.000		0.0			
10	107		17.0	2.003			13.580	0.0027	0.037	Vel = 1.73		
10	107		-7.34	2	N	11.0	1.170	150	13.187			
to							11.000		0.0			
UP6	107		9.66	2.003			12.170	0.0010	0.012	Vel = 0.98		
UP6	107		0.0	2	R	1.0	10.250	150	13.199			
to							1.000		4.439			
UP5	96.750		9.66	2.003			11.250	0.0010	0.011	Vel = 0.98		
UP5	96.750		-3.45	2	N	11.0	10.250	150	17.649			
to							11.000		4.439			
UP4	86.500		6.21	2.003			21.250	0.0004	0.009	Vel = 0.63		
UP4	86.500		0.0	2	2O	20.0	49.670	150	22.097			
to					9R	9.0	29.000		0.0			
90	86.500		6.21	2.003			78.670	0.0004	0.034	Vel = 0.63		
90	86.500		-3.76	2	2R	2.0	11.580	150	22.131			
to							2.000		0.0			
11A	86.500		2.45	2.003			13.580	0.0001	0.001	Vel = 0.25		
11A	86.500		5.72	2	R	1.0	11.250	150	22.132			
to					O	10.0	11.000		0.0			
11B	86.500		8.17	2.003			22.250	0.0007	0.016	Vel = 0.83		
11B	86.500		5.06	2	5R	5.0	23.500	150	22.148			
to							5.000		0.0			
92	86.500		13.23	2.003			28.500	0.0017	0.048	Vel = 1.35		

Node1 / to / Node2	Elev1 / Elev2	K Fact	Qa / Qt	Nom / Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt / Pe / Pf	******* Notes ******
92	86.500		3.77	2	O	10.0	6.420	150	22.196	
to							10.000		0.0	
12	86.500		17.0	2.003			16.420	0.0027	0.045	Vel = 1.73
12	86.500		0.0	2	3R	3.0	19.010	150	22.241	
to					3N	33.0	36.000		0.0	
TOR	86.500		17.0	2.003			55.010	0.0027	0.151	Vel = 1.73
TOR	86.500		0.0	2	B	8.183	9.500	120	22.392	
to					S	15.003	23.186		2.815	
BOR	80		17.0	2.203			32.686	0.0026	0.085	Vel = 1.43
BOR	80		0.0	6	T	43.037	72.080	140	25.292	
to					3E	60.252	103.289		8.073	* * Fixed Loss = 6.773
BKV	77		17.0	6.16	Ziw	0.0	175.369	0	0.002	Vel = 0.18
BKV	77		0.0	6	T	43.037	40.000	140	33.367	
to					G	4.304	47.341		0.0	
WM1	77		17.0	6.16			87.341	0	0.001	Vel = 0.18
WM1	77		0.0	8	T	55.354	75.000	140	33.368	
to							55.354		0.0	
WM2	77		17.0	8.27			130.354	0	0.0	Vel = 0.10
WM2	77		0.0	8			4.000	140	33.368	
to									0.0	
TEST	77		17.0	8.27			4.000	0	0.0	Vel = 0.10
			0.0							
TEST			17.00						33.368	K Factor = 2.94
10	107		7.34	2	9R	9.0	49.670	150	13.187	
to					O	10.0	19.000		0.0	
10A	107		7.34	2.003			68.670	0.0006	0.040	Vel = 0.75
10A	107		-0.86	2	2R	2.0	11.580	150	13.227	
to							2.000		0.0	
10B	107		6.48	2.003			13.580	0.0004	0.006	Vel = 0.66
10B	107		-5.72	2	2R	2.0	11.170	150	13.233	
to							2.000		0.0	
72	107		0.76	2.003			13.170	0	0.0	Vel = 0.08
72	107		0.86	2	8R	8.0	50.830	150	13.233	
to					2O	20.0	39.000		0.0	
UP3	107		1.62	2.003	N	11.0	89.830	0	0.003	Vel = 0.16
UP3	107		0.0	2	R	1.0	10.250	150	13.236	
to							1.000		4.439	
UP2	96.750		1.62	2.003			11.250	0.0001	0.001	Vel = 0.16
UP2	96.750		3.45	2	N	11.0	10.250	150	17.676	
to							11.000		4.439	
UP1	86.500		5.07	2.003			21.250	0.0003	0.007	Vel = 0.52
UP1	86.500		0.0	2	8R	8.0	50.830	150	22.122	
to					3O	30.0	38.000		0.0	
11B	86.500		5.07	2.003			88.830	0.0003	0.026	Vel = 0.52
			0.0							
11B			5.07						22.148	K Factor = 1.08
UP5	96.750		3.45	2	2O	20.0	50.830	150	17.649	
to					9R	9.0	29.000		0.0	
80	96.750		3.45	2.003			79.830	0.0001	0.011	Vel = 0.35

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
80	96.750		-0.55	2	2R	2.0	11.580	150	17.660	
to							2.000		0.0	
81	96.750		2.9	2.003			13.580	0.0001	0.002	Vel = 0.30
81	96.750		0.0	2	2R	2.0	11.250	150	17.662	
to							2.000		0.0	
82	96.750		2.9	2.003			13.250	0.0001	0.001	Vel = 0.30
82	96.750		0.55	2	8R	8.0	51.000	150	17.663	
to					2O	20.0	39.000		0.0	
UP2	96.750		3.45	2.003	N	11.0	90.000	0.0001	0.013	Vel = 0.35
			0.0							
UP2			3.45						17.676	K Factor = 0.82
82	96.750		-0.55	1.25	4R	4.0	23.500	150	17.663	
to					O	6.0	10.000		0.0	
83	96.750		-0.55	1.394			33.500	0	-0.001	Vel = 0.12
83	96.750		0.0	1.25	4R	4.0	22.830	150	17.662	
to					O	6.0	10.000		0.0	
84	96.750		-0.55	1.394			32.830	0	0.0	Vel = 0.12
84	96.750		0.0	1.25	4R	4.0	23.500	150	17.662	
to					O	6.0	10.000		0.0	
80	96.750		-0.55	1.394			33.500	-0.0001	-0.002	Vel = 0.12
			0.0							
80			-0.55						17.660	K Factor = -0.13
10A	107		0.86	1.25	4R	4.0	19.000	150	13.227	
to							4.000		0.0	
41	107		0.86	1.394			23.000	0	0.001	Vel = 0.18
41	107		0.0	1.25	O	6.0	4.500	150	13.228	
to							6.000		0.0	
70	107		0.86	1.394			10.500	0.0001	0.001	Vel = 0.18
70	107		0.0	1.25	4R	4.0	22.830	150	13.229	
to					O	6.0	10.000		0.0	
71	107		0.86	1.394			32.830	0.0001	0.002	Vel = 0.18
71	107		0.0	1.25	4R	4.0	23.500	150	13.231	
to					O	6.0	10.000		0.0	
72	107		0.86	1.394			33.500	0.0001	0.002	Vel = 0.18
			0.0							
72			0.86						13.233	K Factor = 0.24
10B	107		5.72	2	N	11.0	0.670	150	13.233	
to							11.000		0.0	
UP9	107		5.72	2.003			11.670	0.0004	0.005	Vel = 0.58
UP9	107		0.0	2	R	1.0	10.250	150	13.238	
to							1.000		4.439	
UP8	96.750		5.72	2.003			11.250	0.0004	0.004	Vel = 0.58
UP8	96.750		0.0	2	N	11.0	10.250	150	17.681	
to							11.000		4.439	
UP7	86.500		5.72	2.003			21.250	0.0004	0.008	Vel = 0.58
UP7	86.500		0.0	2	O	10.0	1.000	150	22.128	
to							10.000		0.0	
11A	86.500		5.72	2.003			11.000	0.0004	0.004	Vel = 0.58

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*******	Notes	******
			0.0									
11A			5.72						22.132	K Factor =	1.22	
90	86.500		3.77	1.25	4R	4.0	24.000	150	22.131			
to					O	6.0	10.000		0.0			
91	86.500		3.77	1.394			34.000	0.0010	0.033	Vel =	0.79	
91	86.500		0.0	1.25	4R	4.0	22.830	150	22.164			
to					O	6.0	10.000		0.0			
92	86.500		3.77	1.394			32.830	0.0010	0.032	Vel =	0.79	
			0.0									
92			3.77						22.196	K Factor =	0.80	

SPRINX
FIRE PROTECTION
EST. 1999

2709 Jahn Ave NW, Suite H2, Gig Harbor WA 98335
Ph. (253) 853-7780– www.SprinxFire.com

Expires DEC 31, 25

WASHINGTON STATE CERTIFICATE OF COMPETENCY FIRE SPRINKLER SYSTEMS

Joseph G. Faulkner
9491-0699-CEG Level 3
Sprinx Fire Protection, Inc.
SPRINFP011LS

Signature 01/18/2025 Date

Hydraulic Calculations

SPRINX FIRE PROTECTION INC.
2709 JAHN AVE NW SUITE H2
GIG HARBOR, WA 98335
253-853-7780

Job Name	:	ETC Building H Area 3
Drawing	:	FP-3.0
Location	:	2902 E PIONEER PUYALLUP, WA 98372
Remote Area	:	RA#3
Contract	:	24-093CM
Data File	:	ETC Building H Area 3.WXF

HYDRAULIC CALCULATIONS
for

JOB NAME East Town Crossing Building H
Location 2902 E PIONEER PUYALLUP, WA 98372
Drawing # FP-3.0
Contract # 24-093CM
Date 01/06/2025

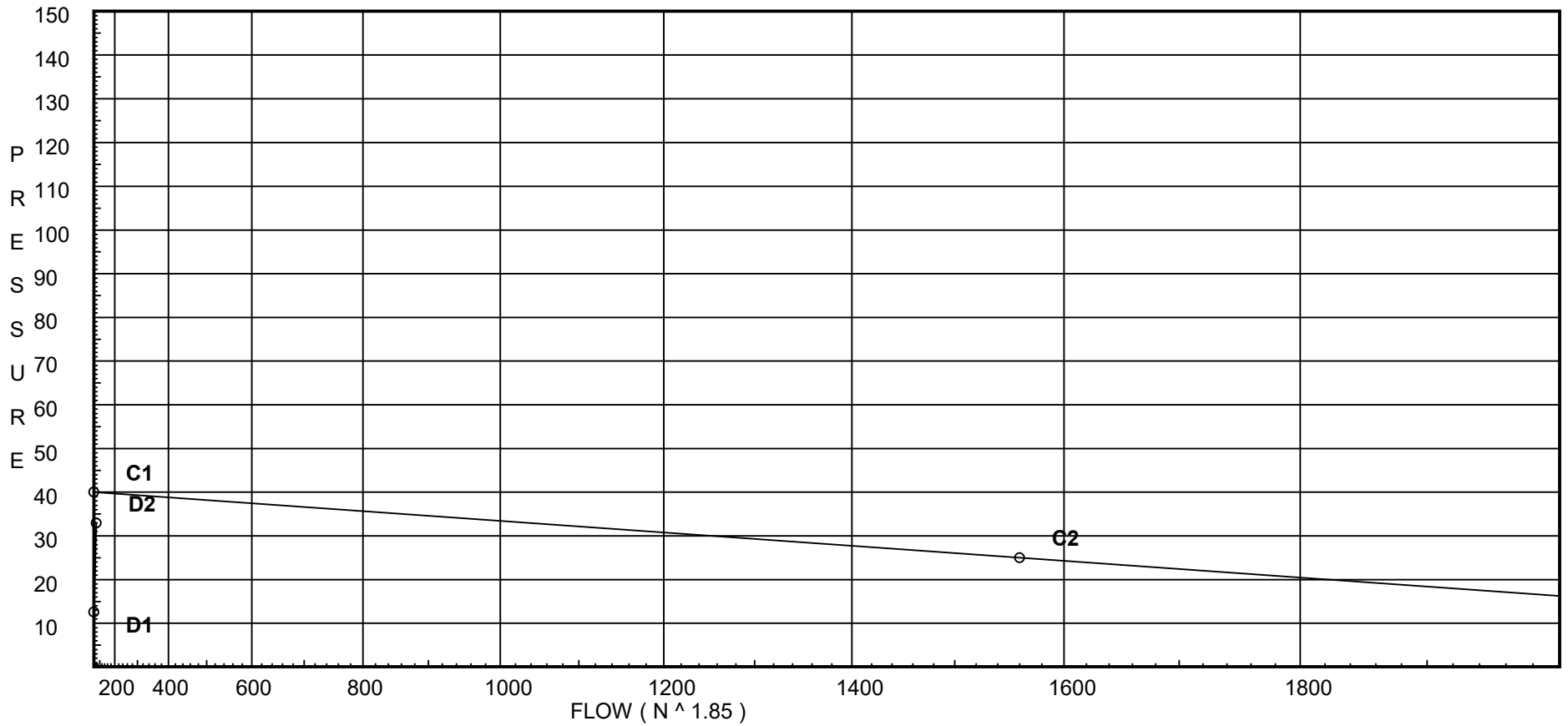
DESIGN
Remote area # RA#3
Remote area location STAIRWELL
Occupancy classification LIGHT HAZARD
Density 0.10 - Gpm/SqFt
Area of application 273 - SqFt
Coverage/sprinkler 4 HEADS - SqFt
Type of sprinkler calculated VIKING VK178 QR CHROME DRY HORIZONTAL SIDEWALL
 # Sprinklers calculated 4
In-rack demand N/A - GPM
Hose streams N/A - GPM
Total water required (including hose streams) 62.9317 - GPM @ 32.9567 - Psi
Type of system WET-CPVC
Volume of system (dry or pre-action) N/A - Gal

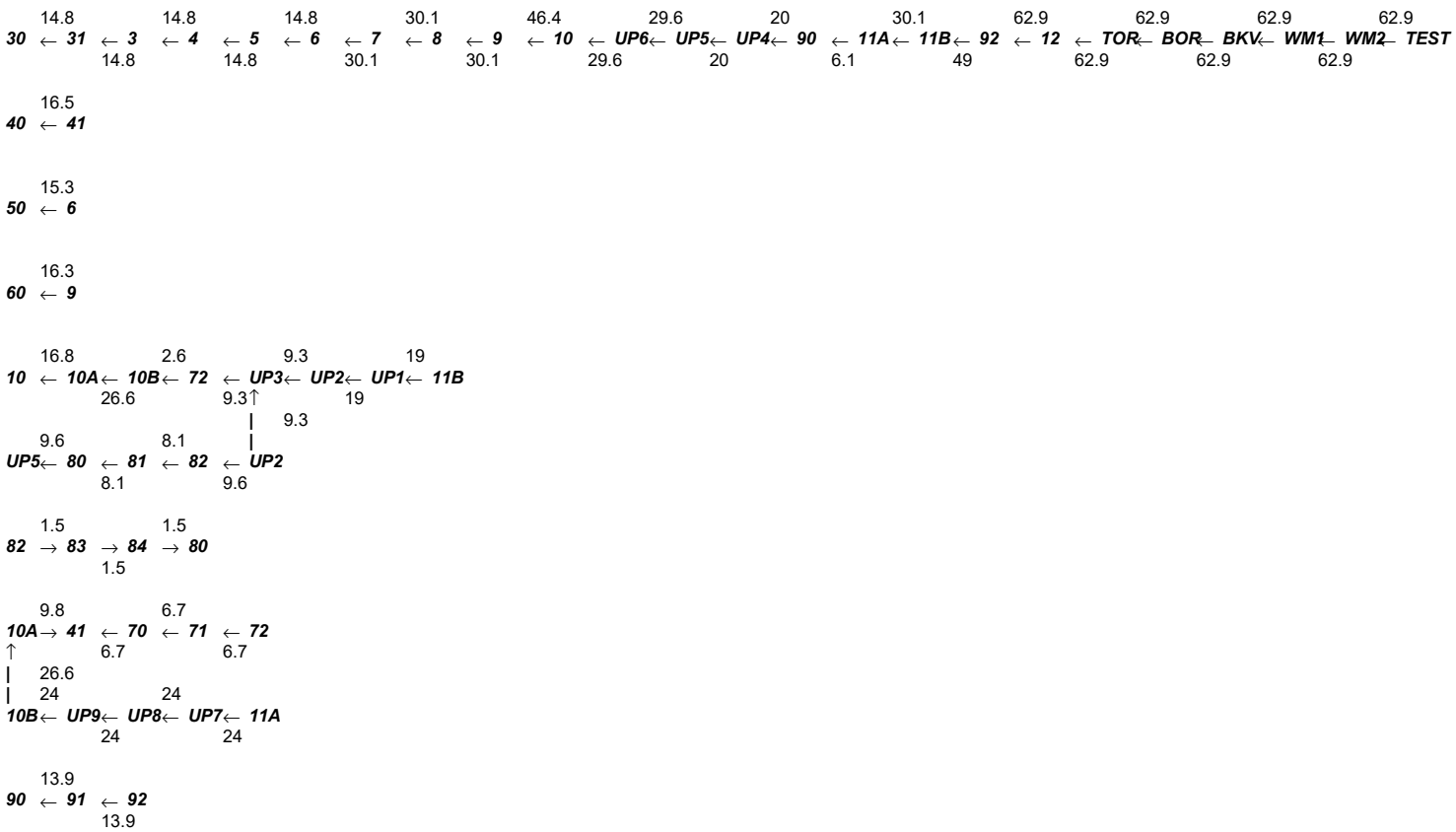
WATER SUPPLY INFORMATION
Test date 4/16/2024
Location 2902 E PIONEER
Source of info CITY OF PUYALLUP WATER DIVISON

CONTRACTOR INFO SPRINX FIRE PROTECTION
Address 2709 JAHN AVE. / SUITE H2 / GIG HARBOR
Phone # 253-853-7780
Name of designer ALEXANDER J PARADIS
Authority having jurisdiction CITY OF PUYALLUP
NOTES:

City Water Supply:
- C1 - Static Pressure : 40
- C2 - Residual Pressure: 25
- C2 - Residual Flow : 1560

Demand:
- D1 - Elevation : 12.560
- D2 - System Flow : 62.932
- D2 - System Pressure : 32.957
- Hose (Demand) : _____
- D3 - System Demand : 62.932
- Safety Margin : 7.004




30 ← 31 ← 3 ← 4 ← 5 ← 6 ← 7 ← 8 ← 9 ← 10 ← UP6 ← UP5 ← UP4 ← 90 ← 11A ← 11B ← 92 ← 12 ← TOR ← BOR ← BKV ← WM1 ← WM2 ← TEST
14.8 14.8 14.8 30.1 46.4 29.6 20 30.1 62.9 62.9 62.9 62.9
14.8 14.8 30.1 30.1 29.6 20 6.1 49 62.9 62.9 62.9
40 ← 41
16.5
50 ← 6
15.3
60 ← 9
16.3
10 ← 10A ← 10B ← 72 ← UP3 ← UP2 ← UP1 ← 11B
16.8 2.6 9.3 19
26.6 9.3 19
9.3
UP5 ← 80 ← 81 ← 82 ← UP2
9.6 8.1
8.1 9.6
82 → 83 → 84 → 80
1.5 1.5
1.5
10A → 41 ← 70 ← 71 ← 72
9.8 6.7
6.7 6.7
26.6
24 24
10B ← UP9 ← UP8 ← UP7 ← 11A
24 24
90 ← 91 ← 92
13.9
13.9

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
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
R *	CPVC Coupling Tee - Run	1	1	1	1	1	1	2	2	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
Ziw	Wilkins 350AST	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.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	40.0	25	1560.0	39.96	62.93	32.957

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
30	106.0	5.6	7.0	14.82	0.1	140
31	107.0		8.2			
3	107.0		8.75			
4	107.0		8.88			
5	107.0		8.9			
6	107.0		8.99			
7	107.0		9.01			
8	107.0		9.05			
9	107.0		9.09			
10	107.0		9.33			
UP6	107.0		9.42			
UP5	96.75		13.94			
UP4	86.5		18.46			
90	86.5		18.75			
11A	86.5		18.76			
11B	86.5		18.93			
92	86.5		19.48			
12	86.5		19.99			
TOR	86.5		21.68			
BOR	80.0		25.45			
BKV	77.0		32.94			
WM1	77.0		32.95			
WM2	77.0		32.96			
TEST	77.0		32.96			
40	106.0	5.6	8.73	16.55	0.1	98
50	106.0	5.6	7.44	15.27	0.1	140
60	106.0	5.6	8.47	16.3	0.1	98
10A	107.0		9.51			
10B	107.0		9.59			
72	107.0		9.59			
UP3	107.0		9.67			
UP2	96.75		14.12			
UP1	86.5		18.63			
80	96.75		14.02			
81	96.75		14.03			
82	96.75		14.04			
83	96.75		14.03			
84	96.75		14.03			
41	107.0		9.37			
70	107.0		9.4			
71	107.0		9.5			
UP9	107.0		9.65			

NODE ANALYSIS (cont.)

Node Tag	*Elevation*	*Node Type*	*Pressure at Node*	*Discharge at Node*	*Notes*
UP8	96.75		14.15		
UP7	86.5		18.7		
91	86.5		19.12		

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*******	Notes	******
30	106	5.60	14.82	1	4N	28.0	12.920	150	7.000			
to					R	1.0	29.000		-0.433			
31	107		14.82	1.101			41.920	0.0391	1.637	Vel = 4.99		
31	107		0.0	1	N	7.0	5.920	150	8.204			
to					R	1.0	8.000		0.0			
3	107		14.82	1.101			13.920	0.0391	0.544	Vel = 4.99		
3	107		0.0	1.25	R	1.0	9.640	150	8.748			
to							1.000		0.0			
4	107		14.82	1.394			10.640	0.0124	0.132	Vel = 3.12		
4	107		0.0	1.25	R	1.0	1.000	150	8.880			
to							1.000		0.0			
5	107		14.82	1.394			2.000	0.0120	0.024	Vel = 3.12		
5	107		0.0	1.25	R	1.0	5.750	150	8.904			
to							1.000		0.0			
6	107		14.82	1.394			6.750	0.0124	0.084	Vel = 3.12		
6	107		15.27	2	R	1.0	1.170	150	8.988			
to							1.000		0.0			
7	107		30.09	2.003			2.170	0.0078	0.017	Vel = 3.06		
7	107		0.0	2	R	1.0	4.670	150	9.005			
to							1.000		0.0			
8	107		30.09	2.003			5.670	0.0079	0.045	Vel = 3.06		
8	107		0.0	2	2R	2.0	2.830	150	9.050			
to							2.000		0.0			
9	107		30.09	2.003			4.830	0.0079	0.038	Vel = 3.06		
9	107		16.30	2	O	10.0	3.580	150	9.088			
to							10.000		0.0			
10	107		46.39	2.003			13.580	0.0175	0.237	Vel = 4.72		
10	107		-16.77	2	N	11.0	1.170	150	9.325			
to							11.000		0.0			
UP6	107		29.62	2.003			12.170	0.0076	0.093	Vel = 3.02		
UP6	107		0.0	2	R	1.0	10.250	150	9.418			
to							1.000		4.439			
UP5	96.750		29.62	2.003			11.250	0.0076	0.086	Vel = 3.02		
UP5	96.750		-9.63	2	N	11.0	10.250	150	13.943			
to							11.000		4.439			
UP4	86.500		19.99	2.003			21.250	0.0037	0.079	Vel = 2.04		
UP4	86.500		0.0	2	2O	20.0	49.670	150	18.461			
to					9R	9.0	29.000		0.0			
90	86.500		19.99	2.003			78.670	0.0037	0.290	Vel = 2.04		
90	86.500		-13.88	2	2R	2.0	11.580	150	18.751			
to							2.000		0.0			
11A	86.500		6.11	2.003			13.580	0.0004	0.005	Vel = 0.62		
11A	86.500		23.98	2	R	1.0	11.250	150	18.756			
to					O	10.0	11.000		0.0			
11B	86.500		30.09	2.003			22.250	0.0079	0.175	Vel = 3.06		
11B	86.500		18.96	2	5R	5.0	23.500	150	18.931			
to							5.000		0.0			
92	86.500		49.05	2.003			28.500	0.0194	0.553	Vel = 4.99		

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
92	86.500		13.88	2	O	10.0	6.420	150	19.484	
to							10.000		0.0	
12	86.500		62.93	2.003			16.420	0.0308	0.506	Vel = 6.41
12	86.500		0.0	2	3R	3.0	19.010	150	19.990	
to					3N	33.0	36.000		0.0	
TOR	86.500		62.93	2.003			55.010	0.0308	1.692	Vel = 6.41
TOR	86.500		0.0	2	B	8.183	9.500	120	21.682	
to					S	15.003	23.186		2.815	
BOR	80		62.93	2.203			32.686	0.0292	0.956	Vel = 5.30
BOR	80		0.0	6	T	43.037	72.080	140	25.453	
to					3E	60.252	103.289		7.460	* * Fixed Loss = 6.161
BKV	77		62.93	6.16	Ziw	0.0	175.369	0.0001	0.026	Vel = 0.68
BKV	77		0.0	6	T	43.037	40.000	140	32.939	
to					G	4.304	47.341		0.0	
WM1	77		62.93	6.16			87.341	0.0001	0.013	Vel = 0.68
WM1	77		0.0	8	T	55.354	75.000	140	32.952	
to							55.354		0.0	
WM2	77		62.93	8.27			130.354	0	0.004	Vel = 0.38
WM2	77		0.0	8			4.000	140	32.956	
to									0.0	
TEST	77		62.93	8.27			4.000	0.0002	0.001	Vel = 0.38
			0.0							
TEST			62.93						32.957	K Factor = 10.96
40	106	5.60	16.55	1	2N	14.0	3.500	150	8.730	
to					O	5.0	19.000		-0.433	
41	107		16.55	1.101			22.500	0.0479	1.077	Vel = 5.58
			0.0							
41			16.55						9.374	K Factor = 5.41
50	106	5.60	15.27	1	4N	28.0	13.080	150	7.435	
to					2R	2.0	35.000		-0.433	
6	107		15.27	1.101	O	5.0	48.080	0.0413	1.986	Vel = 5.15
			0.0							
6			15.27						8.988	K Factor = 5.09
60	106	5.60	16.30	1	2N	14.0	3.500	150	8.472	
to					O	5.0	19.000		-0.433	
9	107		16.3	1.101			22.500	0.0466	1.049	Vel = 5.49
			0.0							
9			16.30						9.088	K Factor = 5.41
10	107		16.76	2	9R	9.0	49.670	150	9.325	
to					O	10.0	19.000		0.0	
10A	107		16.76	2.003			68.670	0.0027	0.183	Vel = 1.71
10A	107		9.84	2	2R	2.0	11.580	150	9.508	
to							2.000		0.0	
10B	107		26.6	2.003			13.580	0.0063	0.085	Vel = 2.71
10B	107		-23.99	2	2R	2.0	11.170	150	9.593	
to							2.000		0.0	
72	107		2.61	2.003			13.170	0.0001	0.001	Vel = 0.27

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
72	107		6.71	2	8R	8.0	50.830	150	9.594	
to					2O	20.0	39.000		0.0	
UP3	107		9.32	2.003	N	11.0	89.830	0.0009	0.081	Vel = 0.95
UP3	107		0.0	2	R	1.0	10.250	150	9.675	
to							1.000		4.439	
UP2	96.750		9.32	2.003			11.250	0.0009	0.010	Vel = 0.95
UP2	96.750		9.64	2	N	11.0	10.250	150	14.124	
to							11.000		4.439	
UP1	86.500		18.96	2.003			21.250	0.0033	0.071	Vel = 1.93
UP1	86.500		0.0	2	8R	8.0	50.830	150	18.634	
to					3O	30.0	38.000		0.0	
11B	86.500		18.96	2.003			88.830	0.0033	0.297	Vel = 1.93
			0.0							
11B			18.96						18.931	K Factor = 4.36
UP5	96.750		9.64	2	2O	20.0	50.830	150	13.943	
to					9R	9.0	29.000		0.0	
80	96.750		9.64	2.003			79.830	0.0010	0.077	Vel = 0.98
80	96.750		-1.54	2	2R	2.0	11.580	150	14.020	
to							2.000		0.0	
81	96.750		8.1	2.003			13.580	0.0007	0.009	Vel = 0.82
81	96.750		0.0	2	2R	2.0	11.250	150	14.029	
to							2.000		0.0	
82	96.750		8.1	2.003			13.250	0.0007	0.009	Vel = 0.82
82	96.750		1.54	2	8R	8.0	51.000	150	14.038	
to					2O	20.0	39.000		0.0	
UP2	96.750		9.64	2.003	N	11.0	90.000	0.0010	0.086	Vel = 0.98
			0.0							
UP2			9.64						14.124	K Factor = 2.57
82	96.750		-1.53	1.25	4R	4.0	23.500	150	14.038	
to					O	6.0	10.000		0.0	
83	96.750		-1.53	1.394			33.500	-0.0002	-0.006	Vel = 0.32
83	96.750		0.0	1.25	4R	4.0	22.830	150	14.032	
to					O	6.0	10.000		0.0	
84	96.750		-1.53	1.394			32.830	-0.0002	-0.006	Vel = 0.32
84	96.750		0.0	1.25	4R	4.0	23.500	150	14.026	
to					O	6.0	10.000		0.0	
80	96.750		-1.53	1.394			33.500	-0.0002	-0.006	Vel = 0.32
			0.0							
80			-1.53						14.020	K Factor = -0.41
10A	107		-9.84	1.25	4R	4.0	19.000	150	9.508	
to							4.000		0.0	
41	107		-9.84	1.394			23.000	-0.0058	-0.134	Vel = 2.07
41	107		16.55	1.25	O	6.0	4.500	150	9.374	
to							6.000		0.0	
70	107		6.71	1.394			10.500	0.0029	0.030	Vel = 1.41
70	107		0.0	1.25	4R	4.0	22.830	150	9.404	
to					O	6.0	10.000		0.0	
71	107		6.71	1.394			32.830	0.0029	0.094	Vel = 1.41

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*******	Notes	******
71	107		0.0	1.25	4R	4.0	23.500	150	9.498			
to					O	6.0	10.000		0.0			
72	107		6.71	1.394			33.500	0.0029	0.096	Vel = 1.41		
			0.0									
72			6.71						9.594	K Factor = 2.17		
10B	107		23.99	2	N	11.0	0.670	150	9.593			
to							11.000		0.0			
UP9	107		23.99	2.003			11.670	0.0051	0.060	Vel = 2.44		
UP9	107		0.0	2	R	1.0	10.250	150	9.653			
to							1.000		4.439			
UP8	96.750		23.99	2.003			11.250	0.0052	0.059	Vel = 2.44		
UP8	96.750		0.0	2	N	11.0	10.250	150	14.151			
to							11.000		4.439			
UP7	86.500		23.99	2.003			21.250	0.0052	0.110	Vel = 2.44		
UP7	86.500		0.0	2	O	10.0	1.000	150	18.700			
to							10.000		0.0			
11A	86.500		23.99	2.003			11.000	0.0051	0.056	Vel = 2.44		
			0.0									
11A			23.99						18.756	K Factor = 5.54		
90	86.500		13.88	1.25	4R	4.0	24.000	150	18.751			
to					O	6.0	10.000		0.0			
91	86.500		13.88	1.394			34.000	0.0110	0.373	Vel = 2.92		
91	86.500		0.0	1.25	4R	4.0	22.830	150	19.124			
to					O	6.0	10.000		0.0			
92	86.500		13.88	1.394			32.830	0.0110	0.360	Vel = 2.92		
			0.0									
92			13.88						19.484	K Factor = 3.14		

Gray & Osborne, Inc.
CONSULTING ENGINEERS

MEMORANDUM

TO:	BRIAN JOHNSON, WATER SYSTEM SPECIALIST
FROM:	KERRI SIDEBOTTOM, P.E.
DATE:	APRIL 16, 2024
SUBJECT:	EAST TOWN CROSSING ADDITIONAL FIRE FLOW AVAILABILITY CITY OF PUYALLUP, PIERCE COUNTY, WASHINGTON G&O #21415.19

Per your request, I have analyzed the available fire flow at the proposed East Town Crossing development, in the central part of the City's water service area. Fire flow at this location was previously analyzed in a memo from Gray & Osborne, dated February 14, 2024. The Developer has proposed a Revised Water Piping Plan for the site, which has been analyzed in this memo. The setup of the hydraulic model and the assumptions used to determine the static pressure and available fire flow are noted as follows.

- The available fire flows and pressures are measured at 14 nodes, corresponding to the proposed hydrants within the development, as shown in the attached figure.

- Water system demands are based on projected 2038 demands and reservoirs are depleted of fire suppression and equalizing storage, as established in the *2019 Water System Plan* (WSP), approved by the Department of Health (DOH). The City's water model was updated in 2021 to reflect additional system improvements since the WSP was developed.

- All pump stations are idle, and the Salmon Springs source is operating at 1,100 gallons per minute (gpm).

The development is located in Zone 1, which is supplied by Maplewood Springs and the 15th Avenue SE Reservoirs. The system was modeled as-is, with the proposed piping indicated on the attached figure. The model was run for two different scenarios, all of which include new 8-inch piping. The new piping for Scenario 1 includes the Phase 1 piping shown on the attached figure in pink. Scenario 2 includes additional piping for Phase 2 of the development is shown in orange on the attached figure.

The available pressure under 2038 peak hour demands at the hydrants is included in Table 1.

TABLE 1

Peak Hour Pressure

Node	Hydrant	Elevation, feet	Peak Hour Pressure, psi
J2238	J	71	41
J2240	L	72	41
J2242	M	72	40
J2244	N	76	39
J2246	H	76	39
J2248	I	76	41
J2250	F	73	40
J2252	D	69	42
J2254	C	67	43
J2256	B	66	43
J2258	A	66	43
J2260	E	72	41
J2274	G	75	39
J2276	K	71	41

The peak hour pressures within the development are essentially the same under either of the proposed scenarios, and the looping does not appreciably impact the pressures.

SCENARIO 1

Scenario 1 includes the piping planned for Phase 1, shown in pink on the attached figure. The piping includes 8-inch mains, mostly dead-ends, extending from the existing 8-inch main running from north to south through the site, as well as a connection to the 16-inch main on Shaw Road, to the west. Part of the existing 8-inch main will be replaced during construction of the development.

Available fire flow was modeled at 12 of the proposed hydrants in the development; Hydrants A through L. The hydrants are located on 8-inch pipes throughout the development, many of which are dead-ends. The results of this modeling are included in Table 2. The modeled fire flow is available at any hydrant individually, but not simultaneously.

TABLE 2

Modeled Fire Flow Availability, Scenario 1

Node	Hydrant	Available Fire Flow, gpm	Residual Pressure at Available Fire Flow, psi	Minimum System Pressure at Available Fire Flow, psi
J2238	J	2,140(1)	25	25
J2240	L	1,560(1)	23	23
J2246	H	1,560(1)	22	22
J2248	I	2,580(1)	23	23
J2250	F	1,560(1)	25	25
J2252	D	2,170(1)	28	28
J2254	C	1,920(1)	29	28
J2256	B	2,230(1)	26	26
J2258	A	1,560(1)	28	28
J2260	E	1,560(1)	23	23
J2274	G	1,560(1)	25	25
J2276	K	1,560(1)	27	27

(1) Limited by maximum system-wide velocity of 10 feet per second.

Fire flow to all of the hydrants is limited by the 10-fps maximum velocity through the existing and proposed 8-inch pipes in this scenario.

SCENARIO 2

Scenario 2 includes the piping indicated for Phases 1 and 2, shown in pink and orange on the attached figure. The piping includes 8-inch pipes extending from the existing 8-inch main running from north to south through the site, a connection to the existing 16-inch main on Shaw Road to the west, and improved looping as compared with Scenario 1.

Available fire flow was measured at the 14 proposed hydrants in the development; Hydrants A through N. The hydrants are located on 8-inch pipes throughout the development. The results of this modeling are included in Table. The modeled fire flow is available at any hydrant individually, but not simultaneously.

TABLE 3

Modeled Fire Flow Availability, Scenario 2

Node	Hydrant	Available Fire Flow, gpm	Residual Pressure at Available Fire Flow, psi	Minimum System Pressure at Available Fire Flow, psi
J2238	J	2,430(1)	25	25
J2240	L	2,340(1)	21	21
J2242	M	2,320(2)	20	20
J2244	N	2,120(2)	20	20
J2246	H	2,330(1)	20	20
J2248	I	2,540(1)	24	24
J2250	F	1,560(1)	26	26
J2252	D	2,230(1)	28	28
J2254	C	1,980(1)	29	28
J2256	B	2,340(1)	26	26
J2258	A	1,560(1)	38	38
J2260	E	1,560(1)	23	23
J2274	G	1,980(1)	25	25
J2276	K	2,040(1)	25	25

(1) Limited by maximum system-wide velocity of 10 fps.
(2) Limited by minimum system-wide pressure of 20 psi at all service locations.

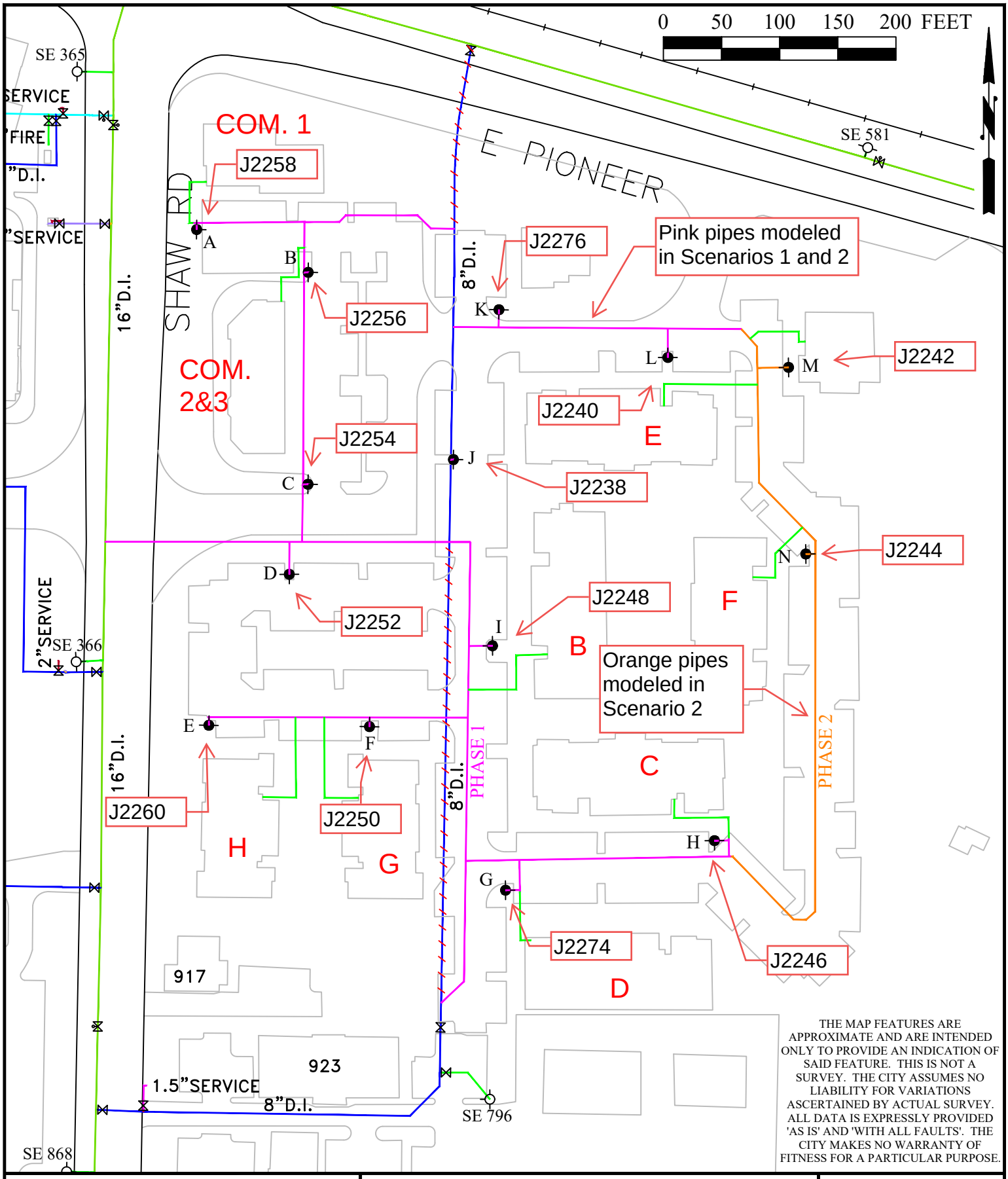
Fire flow to the hydrants is limited by the 10-fps maximum velocity through the existing and proposed 8-inch pipes.

It should be noted that the dead-end 8-inch mains within the proposed site can only provide 1,560 gpm, due to the City's 10-fps velocity limitation considered for the fire flow analysis. Therefore, if 1,500 gpm is required at the hydrant, located on a dead-end main, there is essentially no additional flow available for the sprinkler system supplied by the same dead-end main. This impacts Hydrants A, E, and F in both scenarios, and additionally Hydrants G and H in Scenario 1 only.

The Department of Health and City Standards for water distribution systems are to meet the peak hourly demand of the system while providing a minimum pressure of 30 psi, system-wide. Under peak daily demand with a fire flow, the system is designed to maintain a minimum pressure of 20 psi, system-wide. Although the peak hourly demand pressure may currently be higher than these standards, the Developer must recognize that

the City may not provide pressure higher than 30 psi in the future. The flows and pressures determined in this memo are based on the approximate hydrant elevation at ground level. The Developer may design their sprinkler system for whatever pressure they wish, however they must recognize and be responsible for conditions when the pressure may be less than currently exists.

KS/sr



THE MAP FEATURES ARE APPROXIMATE AND ARE INTENDED ONLY TO PROVIDE AN INDICATION OF SAID FEATURE. THIS IS NOT A SURVEY. THE CITY ASSUMES NO LIABILITY FOR VARIATIONS ASCERTAINED BY ACTUAL SURVEY. ALL DATA IS EXPRESSLY PROVIDED 'AS IS' AND 'WITH ALL FAULTS'. THE CITY MAKES NO WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

CITY OF PUYALLUP
PUBLIC WORKS
WATER DIVISION

HYDRAULIC MODEL FOR EAST TOWN CROSSING

SCALE AS SHOWN

04/10/2024

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