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, 24

WASHINGTON STATE CERTIFICATE OF COMPETENCY FIRE SPRINKLER SYSTEMS

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

Signature 12/16/2024 Date

Hydraulic Calculations

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

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

HYDRAULIC CALCULATIONS
for

JOB NAME East Town Crossing Building G
Location 2902 E PIONEER PUYALLUP, WA 98372
Drawing # FP-3.0
Contract # 24-093CM
Date 12/03/2024

DESIGN

Remote area # RA#1
Remote area location UNIT 301 - 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) 54.1676 - GPM @ 31.5888 - 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

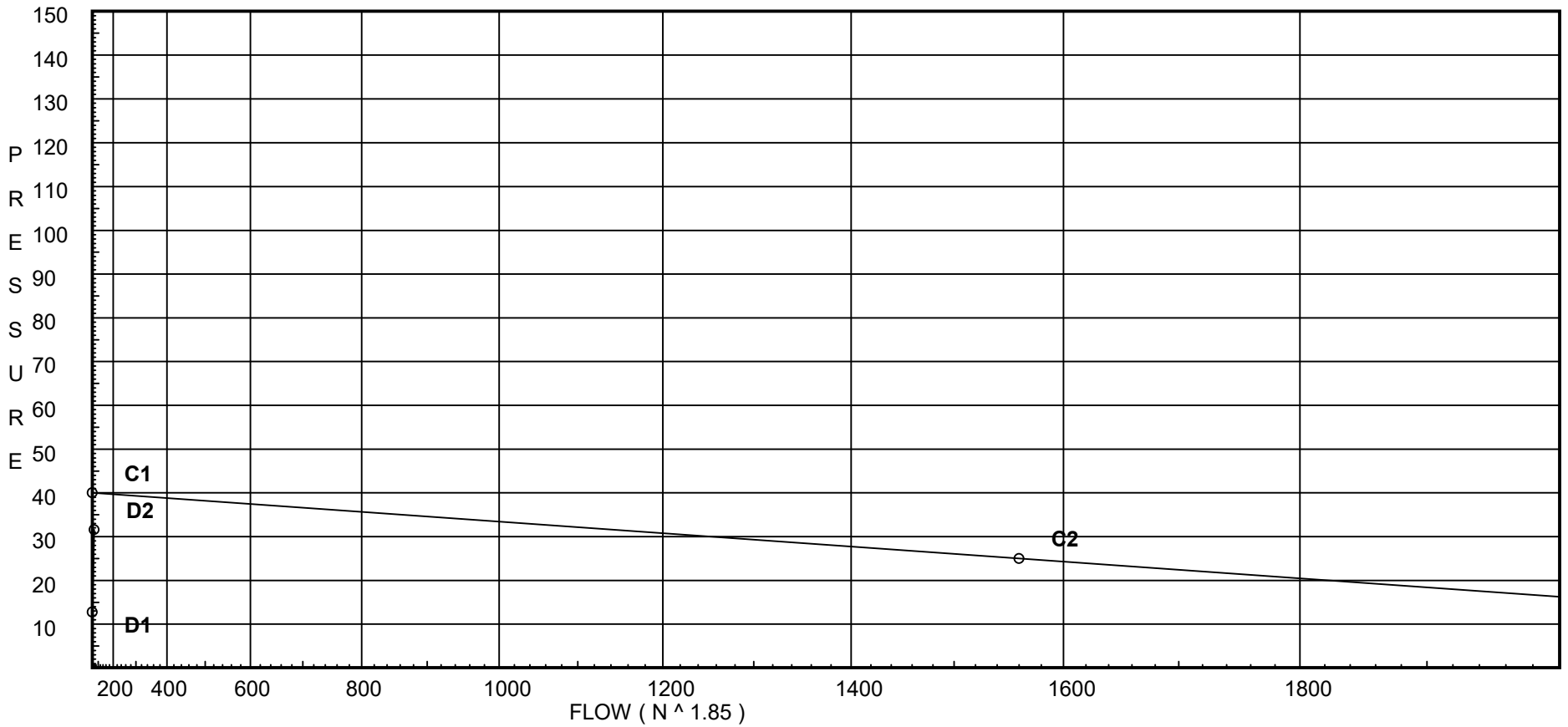
CONTRACTOR INFO SPRINX FIRE PROTECTION
Address 2709 JAHN AVE. / SUITE H2 / GIG HARBOR
Phone # 253-853-7780
Name of designer ALEXANDER J PARADIS
Authority having jurisdiction CITY OF PUYALLUP
NOTES:

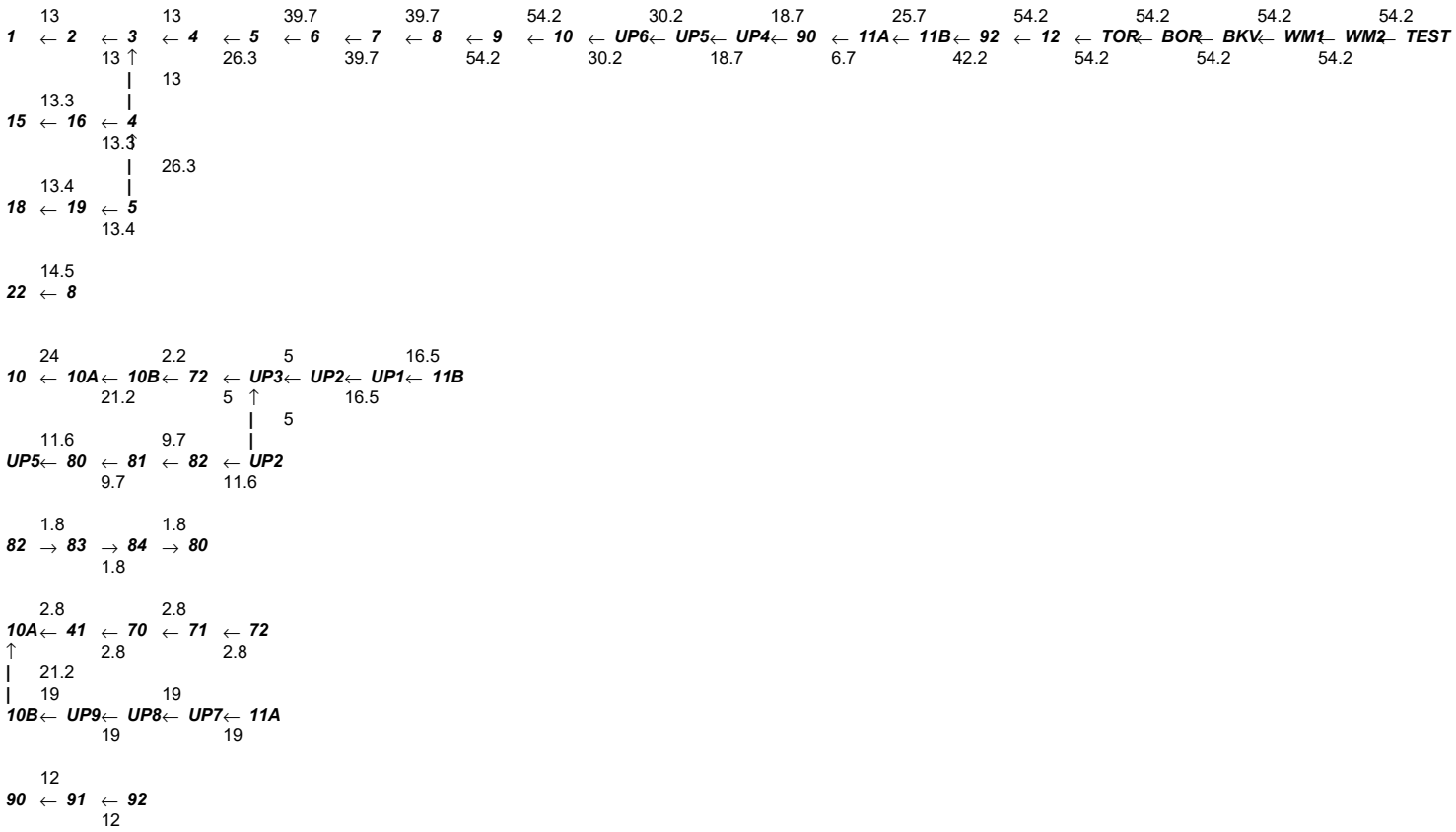
Water Supply Curve

SPRINX FIRE PROTECTION INC.
ETC Building G Area 1

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

Demand:
- D1 - Elevation : 12.776
- D2 - System Flow : 54.168
- D2 - System Pressure : 31.589
- Hose (Demand) : _____
- D3 - System Demand : 54.168
- Safety Margin : 8.381





Fittings Used Summary

SPRINX FIRE PROTECTION INC.
ETC Building G Area 1

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.

Flow Summary - NFPA

SPRINX FIRE PROTECTION INC.
ETC Building G Area 1

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	40.0	25	1560.0	39.97	54.17	31.589

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		8.22			
7	107.0		8.25			
8	107.0		8.32			
9	107.0		8.44			
10	107.0		8.75			
UP6	107.0		8.85			
UP5	96.75		13.38			
UP4	86.5		17.89			
90	86.5		18.22			
11A	86.5		18.23			
11B	86.5		18.36			
92	86.5		18.78			
12	86.5		19.16			
TOR	86.5		20.44			
BOR	80.0		23.98			
BKV	77.0		31.58			
WM1	77.0		31.59			
WM2	77.0		31.59			
TEST	77.0		31.59			
15	106.5	4.9	7.35	13.29	0.05	256
16	107.0		7.31			
18	106.5	4.9	7.48	13.4	0.05	256
19	107.0		7.51			
22	105.5	4.9	8.73	14.48	0.05	256
10A	107.0		9.11			
10B	107.0		9.16			
72	107.0		9.16			
UP3	107.0		9.19			
UP2	96.75		13.63			
UP1	86.5		18.13			
80	96.75		13.48			
81	96.75		13.5			
82	96.75		13.51			
83	96.75		13.5			
84	96.75		13.49			
41	107.0		9.12			
70	107.0		9.13			

NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
71	107.0		9.14		
UP9	107.0		9.2		
UP8	96.75		13.68		
UP7	86.5		18.19		
91	86.5		18.5		

Final Calculations : Hazen-Williams

SPRINX FIRE PROTECTION INC.
ETC Building G Area 1

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		13.40	1.25	R	1.0	5.750	150	7.704	
to							1.000		0.0	
6	107		39.69	1.394			6.750	0.0766	0.517	Vel = 8.34
6	107		0.0	2	R	1.0	1.170	150	8.221	
to							1.000		0.0	
7	107		39.69	2.003			2.170	0.0134	0.029	Vel = 4.04
7	107		0.0	2	R	1.0	4.670	150	8.250	
to							1.000		0.0	
8	107		39.69	2.003			5.670	0.0131	0.074	Vel = 4.04
8	107		14.48	2	2R	2.0	2.830	150	8.324	
to							2.000		0.0	
9	107		54.17	2.003			4.830	0.0232	0.112	Vel = 5.52
9	107		0.0	2	O	10.0	3.580	150	8.436	
to							10.000		0.0	
10	107		54.17	2.003			13.580	0.0233	0.317	Vel = 5.52
10	107		-23.96	2	N	11.0	1.170	150	8.753	
to							11.000		0.0	
UP6	107		30.21	2.003			12.170	0.0079	0.096	Vel = 3.08
UP6	107		0.0	2	R	1.0	10.250	150	8.849	
to							1.000		4.439	
UP5	96.750		30.21	2.003			11.250	0.0080	0.090	Vel = 3.08
UP5	96.750		-11.55	2	N	11.0	10.250	150	13.378	
to							11.000		4.439	
UP4	86.500		18.66	2.003			21.250	0.0032	0.069	Vel = 1.90
UP4	86.500		0.0	2	2O	20.0	73.670	150	17.886	
to					9R	9.0	29.000		0.0	
90	86.500		18.66	2.003			102.670	0.0032	0.333	Vel = 1.90
90	86.500		-11.96	2	2R	2.0	11.580	150	18.219	
to							2.000		0.0	
11A	86.500		6.7	2.003			13.580	0.0005	0.007	Vel = 0.68
11A	86.500		18.98	2	R	1.0	11.250	150	18.226	
to					O	10.0	11.000		0.0	
11B	86.500		25.68	2.003			22.250	0.0058	0.130	Vel = 2.61
11B	86.500		16.54	2	5R	5.0	23.500	150	18.356	
to							5.000		0.0	
92	86.500		42.22	2.003			28.500	0.0147	0.419	Vel = 4.30

Final Calculations : Hazen-Williams

SPRINX FIRE PROTECTION INC.
ETC Building G Area 1

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		11.95	2	O	10.0	6.420	150	18.775	
to							10.000		0.0	
12	86.500		54.17	2.003			16.420	0.0233	0.383	Vel = 5.52
12	86.500		0.0	2	3R	3.0	19.010	150	19.158	
to					3N	33.0	36.000		0.0	
TOR	86.500		54.17	2.003			55.010	0.0233	1.282	Vel = 5.52
TOR	86.500		0.0	2	B	8.183	9.500	120	20.440	
to					S	15.003	23.186		2.815	
BOR	80		54.17	2.203			32.686	0.0222	0.725	Vel = 4.56
BOR	80		0.0	6	T	43.037	72.080	140	23.980	
to					3E	60.252	103.289		7.577	* * Fixed Loss = 6.278
BKV	77		54.17	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	31.576	
to					G	4.304	47.341		0.0	
WM1	77		54.17	6.16			87.341	0.0001	0.010	Vel = 0.58
WM1	77		0.0	8	T	55.354	36.000	140	31.586	
to							55.354		0.0	
WM2	77		54.17	8.27			91.354	0	0.003	Vel = 0.32
WM2	77		0.0	8			6.000	140	31.589	
to									0.0	
TEST	77		54.17	8.27			6.000	0	0.0	Vel = 0.32
			0.0							
TEST			54.17						31.589	K Factor = 9.64
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	13.40	1	N	7.0	0.500	150	7.479	
to							7.000		-0.217	
19	107		13.4	1.101			7.500	0.0325	0.244	Vel = 4.52
19	107		0.0	1	O	5.0	1.100	150	7.506	
to							5.000		0.0	
5	107		13.4	1.101			6.100	0.0325	0.198	Vel = 4.52
			0.0							
5			13.40						7.704	K Factor = 4.83
22	105.500	4.90	14.48	1	O	5.0	1.500	150	8.730	
to							5.000		-0.650	
8	107		14.48	1.101			6.500	0.0375	0.244	Vel = 4.88
			0.0							
8			14.48						8.324	K Factor = 5.02
10	107		23.95	2	9R	9.0	49.670	150	8.753	
to					O	10.0	19.000		0.0	
10A	107		23.95	2.003			68.670	0.0052	0.354	Vel = 2.44

Final Calculations : Hazen-Williams

SPRINX FIRE PROTECTION INC.
ETC Building G Area 1

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		-2.79	2	2R	2.0	11.580	150	9.107	
to							2.000		0.0	
10B	107		21.16	2.003			13.580	0.0041	0.055	Vel = 2.15
10B	107		-18.97	2	2R	2.0	11.170	150	9.162	
to							2.000		0.0	
72	107		2.19	2.003			13.170	0.0001	0.001	Vel = 0.22
72	107		2.79	2	8R	8.0	50.830	150	9.163	
to					2O	20.0	39.000		0.0	
UP3	107		4.98	2.003	N	11.0	89.830	0.0003	0.026	Vel = 0.51
UP3	107		0.0	2	R	1.0	10.250	150	9.189	
to							1.000		4.439	
UP2	96.750		4.98	2.003			11.250	0.0003	0.003	Vel = 0.51
UP2	96.750		11.56	2	N	11.0	10.250	150	13.631	
to							11.000		4.439	
UP1	86.500		16.54	2.003			21.250	0.0026	0.056	Vel = 1.68
UP1	86.500		0.0	2	8R	8.0	50.830	150	18.126	
to					3O	30.0	38.000		0.0	
11B	86.500		16.54	2.003			88.830	0.0026	0.230	Vel = 1.68
			0.0							
11B			16.54						18.356	K Factor = 3.86
UP5	96.750		11.56	2	2O	20.0	50.830	150	13.378	
to					9R	9.0	29.000		0.0	
80	96.750		11.56	2.003			79.830	0.0013	0.107	Vel = 1.18
80	96.750		-1.84	2	2R	2.0	11.580	150	13.485	
to							2.000		0.0	
81	96.750		9.72	2.003			13.580	0.0010	0.013	Vel = 0.99
81	96.750		0.0	2	2R	2.0	11.250	150	13.498	
to							2.000		0.0	
82	96.750		9.72	2.003			13.250	0.0010	0.013	Vel = 0.99
82	96.750		1.84	2	8R	8.0	51.000	150	13.511	
to					2O	20.0	39.000		0.0	
UP2	96.750		11.56	2.003	N	11.0	90.000	0.0013	0.120	Vel = 1.18
			0.0							
UP2			11.56						13.631	K Factor = 3.13
82	96.750		-1.84	1.25	4R	4.0	23.500	150	13.511	
to					O	6.0	10.000		0.0	
83	96.750		-1.84	1.394			33.500	-0.0003	-0.009	Vel = 0.39
83	96.750		0.0	1.25	4R	4.0	22.830	150	13.502	
to					O	6.0	10.000		0.0	
84	96.750		-1.84	1.394			32.830	-0.0003	-0.009	Vel = 0.39
84	96.750		0.0	1.25	4R	4.0	23.500	150	13.493	
to					O	6.0	10.000		0.0	
80	96.750		-1.84	1.394			33.500	-0.0002	-0.008	Vel = 0.39
			0.0							
80			-1.84						13.485	K Factor = -0.50
10A	107		2.79	1.25	4R	4.0	19.000	150	9.107	
to							4.000		0.0	
41	107		2.79	1.394			23.000	0.0006	0.013	Vel = 0.59

Final Calculations : Hazen-Williams

SPRINX FIRE PROTECTION INC.
ETC Building G Area 1

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	9.120	
to							6.000		0.0	
70	107		2.79	1.394			10.500	0.0006	0.006	Vel = 0.59
70	107		0.0	1.25	4R	4.0	22.830	150	9.126	
to					O	6.0	10.000		0.0	
71	107		2.79	1.394			32.830	0.0005	0.018	Vel = 0.59
71	107		0.0	1.25	4R	4.0	23.500	150	9.144	
to					O	6.0	10.000		0.0	
72	107		2.79	1.394			33.500	0.0006	0.019	Vel = 0.59
			0.0							
72			2.79						9.163	K Factor = 0.92
10B	107		18.97	2	N	11.0	0.670	150	9.162	
to							11.000		0.0	
UP9	107		18.97	2.003			11.670	0.0034	0.040	Vel = 1.93
UP9	107		0.0	2	R	1.0	10.250	150	9.202	
to							1.000		4.439	
UP8	96.750		18.97	2.003			11.250	0.0033	0.037	Vel = 1.93
UP8	96.750		0.0	2	N	11.0	10.250	150	13.678	
to							11.000		4.439	
UP7	86.500		18.97	2.003			21.250	0.0034	0.072	Vel = 1.93
UP7	86.500		0.0	2	O	10.0	1.000	150	18.189	
to							10.000		0.0	
11A	86.500		18.97	2.003			11.000	0.0034	0.037	Vel = 1.93
			0.0							
11A			18.97						18.226	K Factor = 4.44
90	86.500		11.95	1.25	4R	4.0	24.000	150	18.219	
to					O	6.0	10.000		0.0	
91	86.500		11.95	1.394			34.000	0.0083	0.283	Vel = 2.51
91	86.500		0.0	1.25	4R	4.0	22.830	150	18.502	
to					O	6.0	10.000		0.0	
92	86.500		11.95	1.394			32.830	0.0083	0.273	Vel = 2.51
			0.0							
92			11.95						18.775	K Factor = 2.76

City of Puyallup
Development & Permitting Services
ISSUED PERMIT

Building	Planning
Engineering	Public Works
Fire	Traffic

SPRINX
FIRE PROTECTION
EST. 1999

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Expires DEC 31, 24

WASHINGTON STATE CERTIFICATE OF COMPETENCY FIRE SPRINKLER SYSTEMS

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

Signature 12/16/2024 Date

Hydraulic Calculations

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

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

HYDRAULIC CALCULATIONS
for

JOB NAME East Town Crossing Building G
Location 2902 E PIONEER PUYALLUP, WA 98372
Drawing # FP-3.0
Contract # 24-093CM
Date 12/03/2024

DESIGN

Remote area # RA#2
Remote area location UNIT 301 - 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 @ 33.3715 - 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

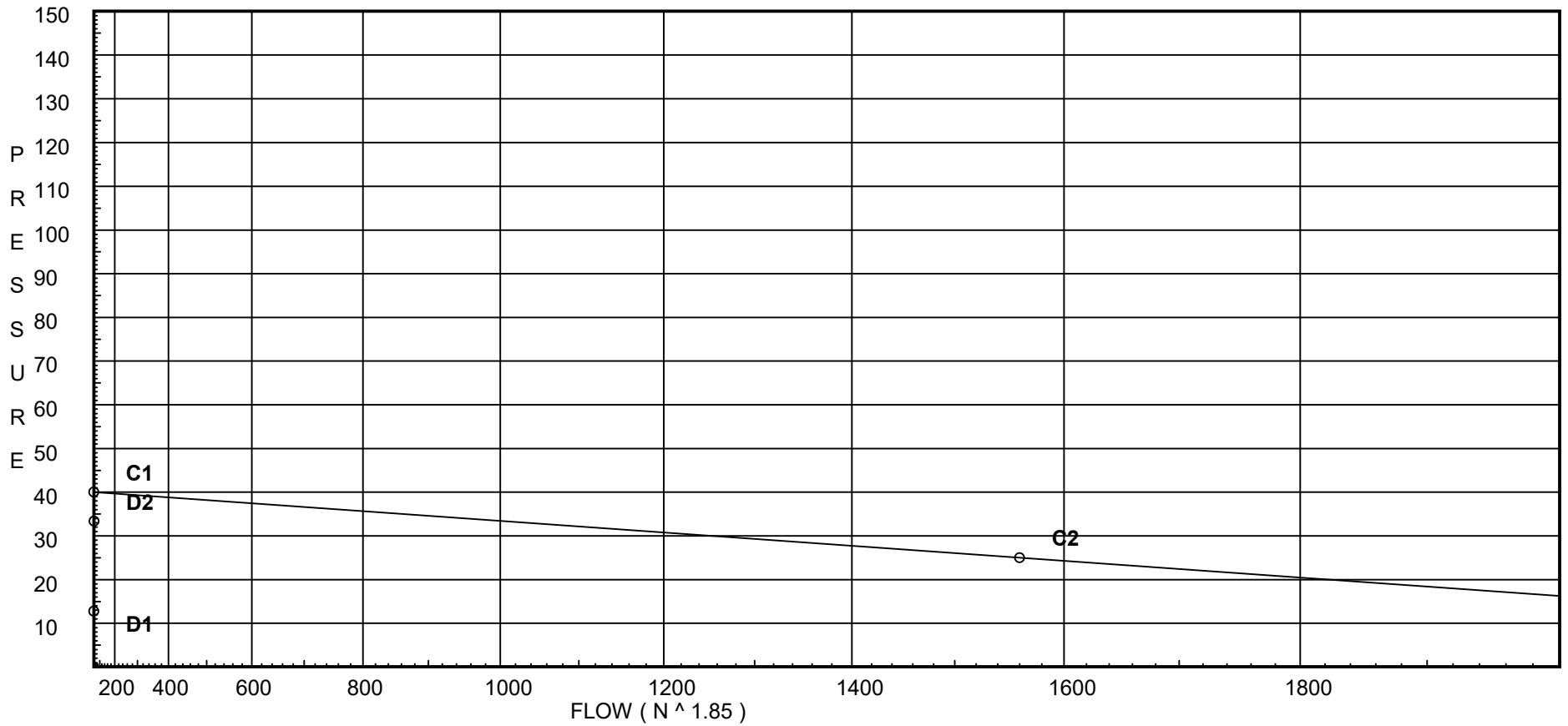
CONTRACTOR INFO SPRINX FIRE PROTECTION
Address 2709 JAHN AVE. / SUITE H2 / GIG HARBOR
Phone # 253-853-7780
Name of designer ALEXANDER J PARADIS
Authority having jurisdiction CITY OF PUYALLUP
NOTES:

Water Supply Curve

SPRINX FIRE PROTECTION INC.
ETC Building G Area 2

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

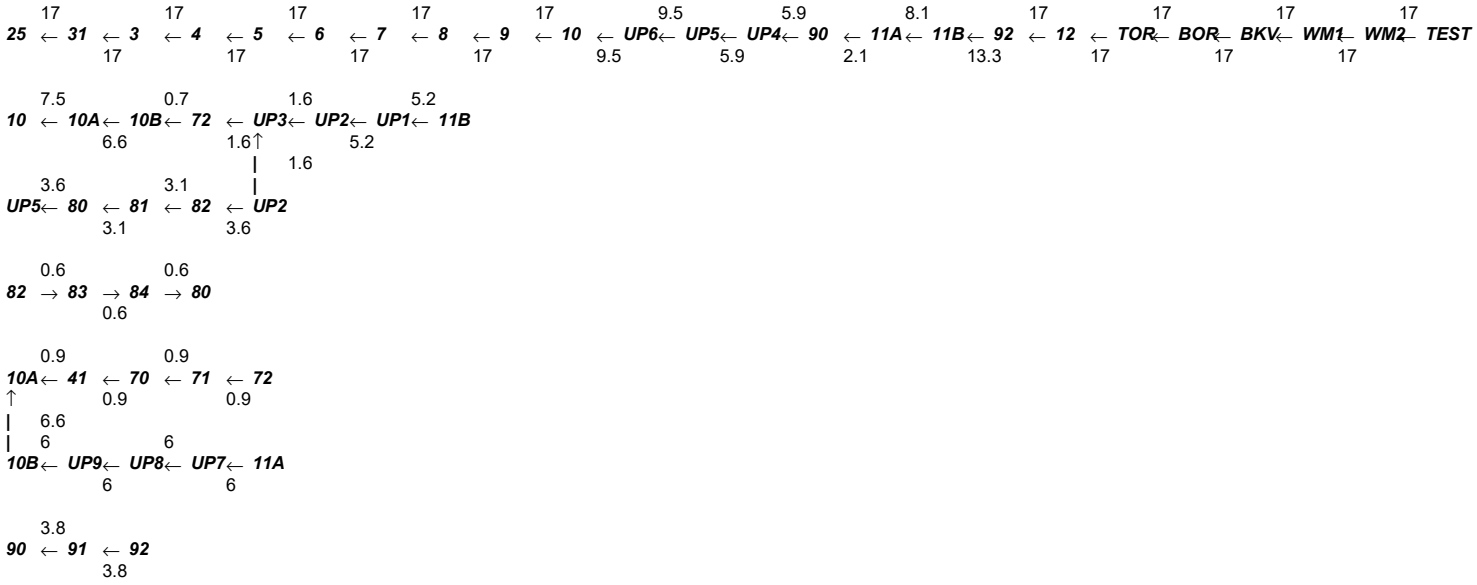
Demand:
- D1 - Elevation : 12.776
- D2 - System Flow : 17.002
- D2 - System Pressure : 33.372
- Hose (Demand) : _____
- D3 - System Demand : 17.002
- Safety Margin : 6.625



Flow Diagram

SPRINX FIRE PROTECTION INC.
ETC Building G Area 2

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



Fittings Used Summary

SPRINX FIRE PROTECTION INC.
ETC Building G Area 2

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.

Flow Summary - NFPA

SPRINX FIRE PROTECTION INC.
ETC Building G Area 2

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	33.372

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		22.14			
11B	86.5		22.15			
92	86.5		22.2			
12	86.5		22.24			
TOR	86.5		22.4			
BOR	80.0		25.3			
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		13.24			
72	107.0		13.24			
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		22.17			

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		-7.52	2	N	11.0	1.170	150	13.187	
to							11.000		0.0	
UP6	107		9.48	2.003			12.170	0.0010	0.012	Vel = 0.97
UP6	107		0.0	2	R	1.0	10.250	150	13.199	
to							1.000		4.439	
UP5	96.750		9.48	2.003			11.250	0.0009	0.010	Vel = 0.97
UP5	96.750		-3.62	2	N	11.0	10.250	150	17.648	
to							11.000		4.439	
UP4	86.500		5.86	2.003			21.250	0.0004	0.009	Vel = 0.60
UP4	86.500		0.0	2	2O	20.0	73.670	150	22.096	
to					9R	9.0	29.000		0.0	
90	86.500		5.86	2.003			102.670	0.0004	0.039	Vel = 0.60
90	86.500		-3.76	2	2R	2.0	11.580	150	22.135	
to							2.000		0.0	
11A	86.500		2.1	2.003			13.580	0.0001	0.001	Vel = 0.21
11A	86.500		5.96	2	R	1.0	11.250	150	22.136	
to					O	10.0	11.000		0.0	
11B	86.500		8.06	2.003			22.250	0.0007	0.015	Vel = 0.82
11B	86.500		5.19	2	5R	5.0	23.500	150	22.151	
to							5.000		0.0	
92	86.500		13.25	2.003			28.500	0.0017	0.049	Vel = 1.35

Final Calculations : Hazen-Williams

SPRINX FIRE PROTECTION INC.
ETC Building G Area 2

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		3.75	2	O	10.0	6.420	150	22.200	
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	22.245	
to					3N	33.0	36.000		0.0	
TOR	86.500		17.0	2.003			55.010	0.0027	0.150	Vel = 1.73
TOR	86.500		0.0	2	B	8.183	9.500	120	22.395	
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	25.295	
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	33.370	
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	36.000	140	33.371	
to							55.354		0.0	
WM2	77		17.0	8.27			91.354	0	0.001	Vel = 0.10
WM2	77		0.0	8			6.000	140	33.372	
to									0.0	
TEST	77		17.0	8.27			6.000	0	0.0	Vel = 0.10
			0.0							
TEST			17.00						33.372	K Factor = 2.94
10	107		7.52	2	9R	9.0	49.670	150	13.187	
to					O	10.0	19.000		0.0	
10A	107		7.52	2.003			68.670	0.0006	0.042	Vel = 0.77
10A	107		-0.88	2	2R	2.0	11.580	150	13.229	
to							2.000		0.0	
10B	107		6.64	2.003			13.580	0.0004	0.006	Vel = 0.68
10B	107		-5.95	2	2R	2.0	11.170	150	13.235	
to							2.000		0.0	
72	107		0.69	2.003			13.170	0	0.0	Vel = 0.07
72	107		0.87	2	8R	8.0	50.830	150	13.235	
to					2O	20.0	39.000		0.0	
UP3	107		1.56	2.003	N	11.0	89.830	0	0.003	Vel = 0.16
UP3	107		0.0	2	R	1.0	10.250	150	13.238	
to							1.000		4.439	
UP2	96.750		1.56	2.003			11.250	0.0001	0.001	Vel = 0.16
UP2	96.750		3.63	2	N	11.0	10.250	150	17.678	
to							11.000		4.439	
UP1	86.500		5.19	2.003			21.250	0.0003	0.007	Vel = 0.53
UP1	86.500		0.0	2	8R	8.0	50.830	150	22.124	
to					3O	30.0	38.000		0.0	
11B	86.500		5.19	2.003			88.830	0.0003	0.027	Vel = 0.53
			0.0							
11B			5.19						22.151	K Factor = 1.10
UP5	96.750		3.63	2	2O	20.0	50.830	150	17.648	
to					9R	9.0	29.000		0.0	
80	96.750		3.63	2.003			79.830	0.0002	0.013	Vel = 0.37

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		-0.58	2	2R	2.0	11.580	150	17.661	
to							2.000		0.0	
81	96.750		3.05	2.003			13.580	0.0001	0.001	Vel = 0.31
81	96.750		0.0	2	2R	2.0	11.250	150	17.662	
to							2.000		0.0	
82	96.750		3.05	2.003			13.250	0.0002	0.002	Vel = 0.31
82	96.750		0.58	2	8R	8.0	51.000	150	17.664	
to					2O	20.0	39.000		0.0	
UP2	96.750		3.63	2.003	N	11.0	90.000	0.0002	0.014	Vel = 0.37
			0.0							
UP2			3.63						17.678	K Factor = 0.86
82	96.750		-0.58	1.25	4R	4.0	23.500	150	17.664	
to					O	6.0	10.000		0.0	
83	96.750		-0.58	1.394			33.500	0	-0.001	Vel = 0.12
83	96.750		0.0	1.25	4R	4.0	22.830	150	17.663	
to					O	6.0	10.000		0.0	
84	96.750		-0.58	1.394			32.830	0	-0.001	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		-0.58	1.394			33.500	0	-0.001	Vel = 0.12
			0.0							
80			-0.58						17.661	K Factor = -0.14
10A	107		0.88	1.25	4R	4.0	19.000	150	13.229	
to							4.000		0.0	
41	107		0.88	1.394			23.000	0	0.001	Vel = 0.18
41	107		0.0	1.25	O	6.0	4.500	150	13.230	
to							6.000		0.0	
70	107		0.88	1.394			10.500	0.0001	0.001	Vel = 0.18
70	107		0.0	1.25	4R	4.0	22.830	150	13.231	
to					O	6.0	10.000		0.0	
71	107		0.88	1.394			32.830	0.0001	0.002	Vel = 0.18
71	107		0.0	1.25	4R	4.0	23.500	150	13.233	
to					O	6.0	10.000		0.0	
72	107		0.88	1.394			33.500	0.0001	0.002	Vel = 0.18
			0.0							
72			0.88						13.235	K Factor = 0.24
10B	107		5.96	2	N	11.0	0.670	150	13.235	
to							11.000		0.0	
UP9	107		5.96	2.003			11.670	0.0004	0.005	Vel = 0.61
UP9	107		0.0	2	R	1.0	10.250	150	13.240	
to							1.000		4.439	
UP8	96.750		5.96	2.003			11.250	0.0004	0.005	Vel = 0.61
UP8	96.750		0.0	2	N	11.0	10.250	150	17.684	
to							11.000		4.439	
UP7	86.500		5.96	2.003			21.250	0.0004	0.008	Vel = 0.61
UP7	86.500		0.0	2	O	10.0	1.000	150	22.131	
to							10.000		0.0	
11A	86.500		5.96	2.003			11.000	0.0005	0.005	Vel = 0.61

Final Calculations : Hazen-Williams

SPRINX FIRE PROTECTION INC.
ETC Building G Area 2

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			5.96						22.136	K Factor = 1.27
90	86.500		3.75	1.25	4R	4.0	24.000	150	22.135	
to					O	6.0	10.000		0.0	
91	86.500		3.75	1.394			34.000	0.0010	0.033	Vel = 0.79
91	86.500		0.0	1.25	4R	4.0	22.830	150	22.168	
to					O	6.0	10.000		0.0	
92	86.500		3.75	1.394			32.830	0.0010	0.032	Vel = 0.79
			0.0							
92			3.75						22.200	K Factor = 0.80

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, 24

WASHINGTON STATE CERTIFICATE OF COMPETENCY FIRE SPRINKLER SYSTEMS

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

Signature 12/16/2024 Date

Hydraulic Calculations

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

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

HYDRAULIC CALCULATIONS
for

JOB NAME East Town Crossing Building G
Location 2902 E PIONEER PUYALLUP, WA 98372
Drawing # FP-3.0
Contract # 24-093CM
Date 12/03/2024

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) 62.9428 - GPM @ 33.3041 - 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

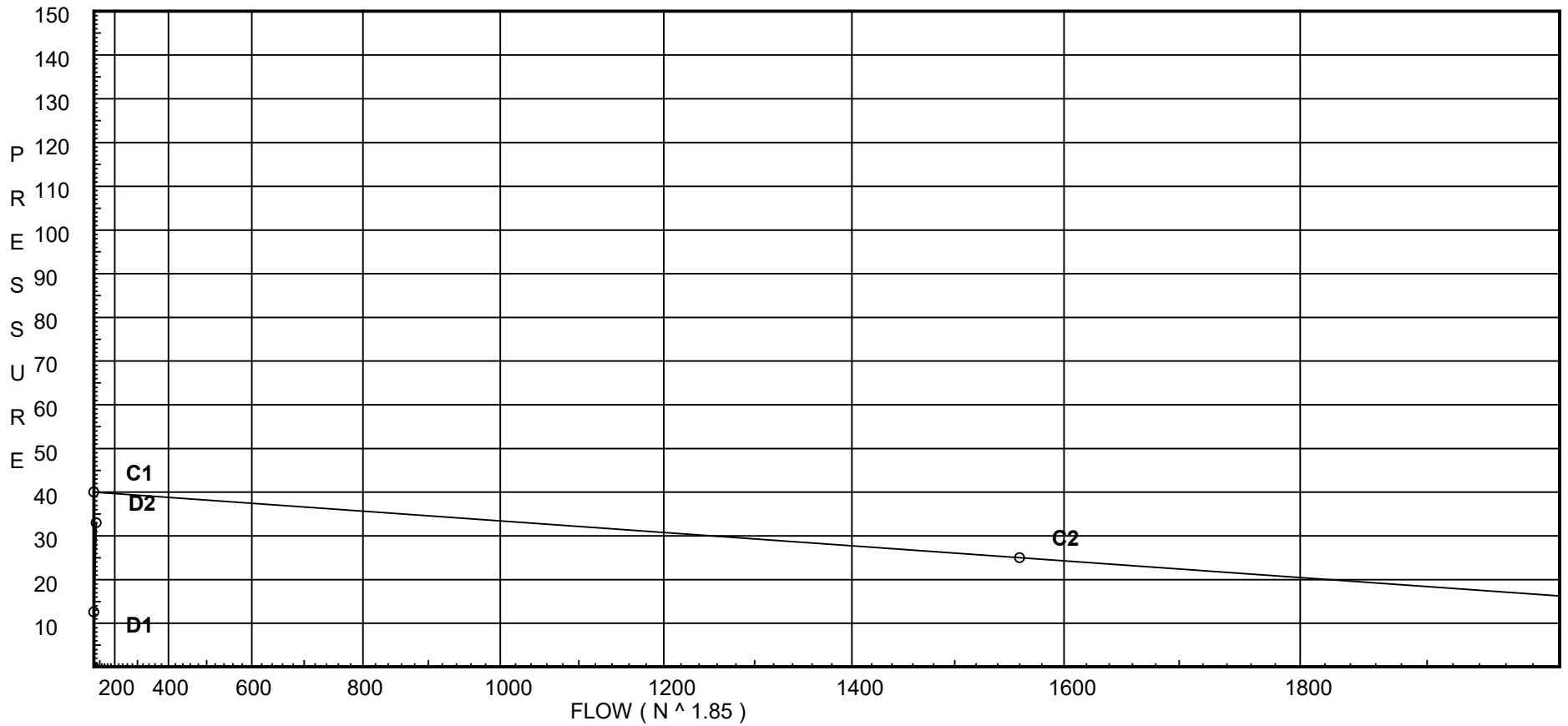
CONTRACTOR INFO SPRINX FIRE PROTECTION
Address 2709 JAHN AVE. / SUITE H2 / GIG HARBOR
Phone # 253-853-7780
Name of designer ALEXANDER J PARADIS
Authority having jurisdiction CITY OF PUYALLUP
NOTES:

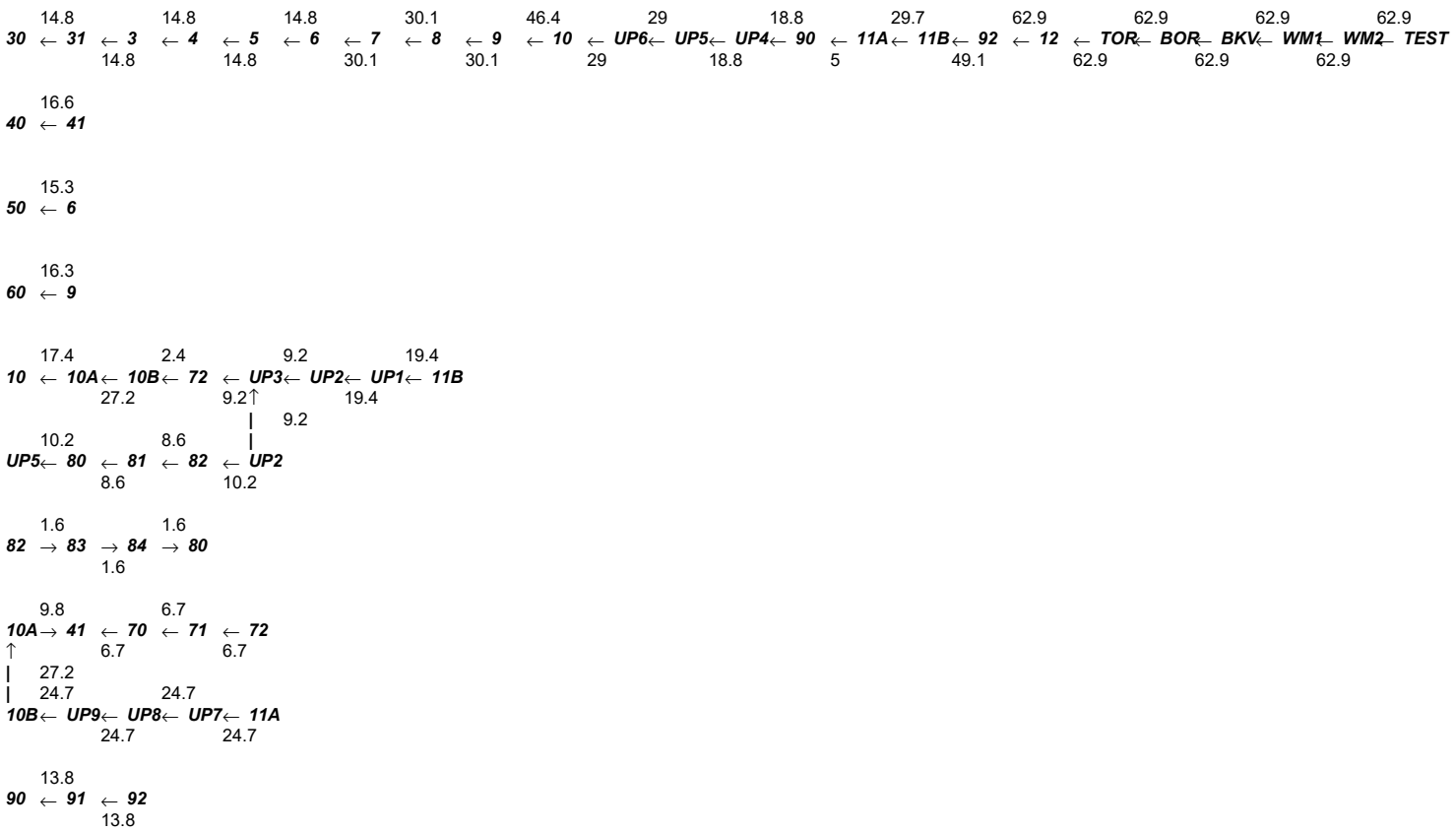
Water Supply Curve

SPRINX FIRE PROTECTION INC.
ETC Building G Area 3

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

Demand:
- D1 - Elevation : 12.560
- D2 - System Flow : 62.943
- D2 - System Pressure : 32.986
- Hose (Demand) : _____
- D3 - System Demand : 62.943
- Safety Margin : 6.975





Fittings Used Summary

SPRINX FIRE PROTECTION INC.
ETC Building G Area 3

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.

Flow Summary - NFPA

SPRINX FIRE PROTECTION INC.
ETC Building G Area 3

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	40.0	25	1560.0	39.96	62.94	32.986

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		9.41			
UP5	96.75		13.94			
UP4	86.5		18.45			
90	86.5		18.78			
11A	86.5		18.79			
11B	86.5		18.96			
92	86.5		19.51			
12	86.5		20.02			
TOR	86.5		21.71			
BOR	80.0		25.48			
BKV	77.0		32.97			
WM1	77.0		32.98			
WM2	77.0		32.99			
TEST	77.0		32.99			
40	106.0	5.6	8.74	16.56	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		9.52			
10B	107.0		9.61			
72	107.0		9.61			
UP3	107.0		9.69			
UP2	96.75		14.14			
UP1	86.5		18.65			
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		9.39			
70	107.0		9.42			
71	107.0		9.51			
UP9	107.0		9.67			

NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
UP8	96.75		14.17		
UP7	86.5		18.73		
91	86.5		19.16		

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		-17.37	2	N	11.0	1.170	150	9.325	
to							11.000		0.0	
UP6	107		29.02	2.003			12.170	0.0074	0.090	Vel = 2.95
UP6	107		0.0	2	R	1.0	10.250	150	9.415	
to							1.000		4.439	
UP5	96.750		29.02	2.003			11.250	0.0074	0.083	Vel = 2.95
UP5	96.750		-10.19	2	N	11.0	10.250	150	13.937	
to							11.000		4.439	
UP4	86.500		18.83	2.003			21.250	0.0033	0.070	Vel = 1.92
UP4	86.500		0.0	2	2O	20.0	73.670	150	18.446	
to					9R	9.0	29.000		0.0	
90	86.500		18.83	2.003			102.670	0.0033	0.339	Vel = 1.92
90	86.500		-13.84	2	2R	2.0	11.580	150	18.785	
to							2.000		0.0	
11A	86.500		4.99	2.003			13.580	0.0003	0.004	Vel = 0.51
11A	86.500		24.74	2	R	1.0	11.250	150	18.789	
to					O	10.0	11.000		0.0	
11B	86.500		29.73	2.003			22.250	0.0077	0.171	Vel = 3.03
11B	86.500		19.38	2	5R	5.0	23.500	150	18.960	
to							5.000		0.0	
92	86.500		49.11	2.003			28.500	0.0194	0.554	Vel = 5.00

Final Calculations : Hazen-Williams

SPRINX FIRE PROTECTION INC.
ETC Building G Area 3

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		13.83	2	O	10.0	6.420	150	19.514	
to							10.000		0.0	
12	86.500		62.94	2.003			16.420	0.0308	0.505	Vel = 6.41
12	86.500		0.0	2	3R	3.0	19.010	150	20.019	
to					3N	33.0	36.000		0.0	
TOR	86.500		62.94	2.003			55.010	0.0308	1.693	Vel = 6.41
TOR	86.500		0.0	2	B	8.183	9.500	120	21.712	
to					S	15.003	23.186		2.815	
BOR	80		62.94	2.203			32.686	0.0293	0.957	Vel = 5.30
BOR	80		0.0	6	T	43.037	72.080	140	25.484	
to					3E	60.252	103.289		7.460	* * Fixed Loss = 6.161
BKV	77		62.94	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	32.970	
to					G	4.304	47.341		0.0	
WM1	77		62.94	6.16			87.341	0.0001	0.012	Vel = 0.68
WM1	77		0.0	8	T	55.354	36.000	140	32.982	
to							55.354		0.0	
WM2	77		62.94	8.27			91.354	0	0.004	Vel = 0.38
WM2	77		0.0	8			6.000	140	32.986	
to									0.0	
TEST	77		62.94	8.27			6.000	0	0.0	Vel = 0.38
			0.0							
TEST			62.94						32.986	K Factor = 10.96
40	106	5.60	16.56	1	2N	14.0	3.500	150	8.741	
to					O	5.0	19.000		-0.433	
41	107		16.56	1.101			22.500	0.0480	1.080	Vel = 5.58
			0.0							
41			16.56						9.388	K Factor = 5.40
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		17.36	2	9R	9.0	49.670	150	9.325	
to					O	10.0	19.000		0.0	
10A	107		17.36	2.003			68.670	0.0028	0.195	Vel = 1.77
10A	107		9.81	2	2R	2.0	11.580	150	9.520	
to							2.000		0.0	
10B	107		27.17	2.003			13.580	0.0066	0.089	Vel = 2.77
10B	107		-24.73	2	2R	2.0	11.170	150	9.609	
to							2.000		0.0	
72	107		2.44	2.003			13.170	0.0001	0.001	Vel = 0.25

Final Calculations : Hazen-Williams

SPRINX FIRE PROTECTION INC.
ETC Building G Area 3

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		6.75	2	8R	8.0	50.830	150	9.610	
to					2O	20.0	39.000		0.0	
UP3	107		9.19	2.003	N	11.0	89.830	0.0009	0.078	Vel = 0.94
UP3	107		0.0	2	R	1.0	10.250	150	9.688	
to							1.000		4.439	
UP2	96.750		9.19	2.003			11.250	0.0009	0.010	Vel = 0.94
UP2	96.750		10.19	2	N	11.0	10.250	150	14.137	
to							11.000		4.439	
UP1	86.500		19.38	2.003			21.250	0.0035	0.074	Vel = 1.97
UP1	86.500		0.0	2	8R	8.0	50.830	150	18.650	
to					3O	30.0	38.000		0.0	
11B	86.500		19.38	2.003			88.830	0.0035	0.310	Vel = 1.97
			0.0							
11B			19.38						18.960	K Factor = 4.45
UP5	96.750		10.19	2	2O	20.0	50.830	150	13.937	
to					9R	9.0	29.000		0.0	
80	96.750		10.19	2.003			79.830	0.0011	0.084	Vel = 1.04
80	96.750		-1.62	2	2R	2.0	11.580	150	14.021	
to							2.000		0.0	
81	96.750		8.57	2.003			13.580	0.0008	0.011	Vel = 0.87
81	96.750		0.0	2	2R	2.0	11.250	150	14.032	
to							2.000		0.0	
82	96.750		8.57	2.003			13.250	0.0008	0.010	Vel = 0.87
82	96.750		1.62	2	8R	8.0	51.000	150	14.042	
to					2O	20.0	39.000		0.0	
UP2	96.750		10.19	2.003	N	11.0	90.000	0.0011	0.095	Vel = 1.04
			0.0							
UP2			10.19						14.137	K Factor = 2.71
82	96.750		-1.62	1.25	4R	4.0	23.500	150	14.042	
to					O	6.0	10.000		0.0	
83	96.750		-1.62	1.394			33.500	-0.0002	-0.007	Vel = 0.34
83	96.750		0.0	1.25	4R	4.0	22.830	150	14.035	
to					O	6.0	10.000		0.0	
84	96.750		-1.62	1.394			32.830	-0.0002	-0.007	Vel = 0.34
84	96.750		0.0	1.25	4R	4.0	23.500	150	14.028	
to					O	6.0	10.000		0.0	
80	96.750		-1.62	1.394			33.500	-0.0002	-0.007	Vel = 0.34
			0.0							
80			-1.62						14.021	K Factor = -0.43
10A	107		-9.81	1.25	4R	4.0	19.000	150	9.520	
to							4.000		0.0	
41	107		-9.81	1.394			23.000	-0.0057	-0.132	Vel = 2.06
41	107		16.56	1.25	O	6.0	4.500	150	9.388	
to							6.000		0.0	
70	107		6.75	1.394			10.500	0.0029	0.030	Vel = 1.42
70	107		0.0	1.25	4R	4.0	22.830	150	9.418	
to					O	6.0	10.000		0.0	
71	107		6.75	1.394			32.830	0.0029	0.095	Vel = 1.42

Final Calculations : Hazen-Williams

SPRINX FIRE PROTECTION INC.
ETC Building G Area 3

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	9.513	
to					O	6.0	10.000		0.0	
72	107		6.75	1.394			33.500	0.0029	0.097	Vel = 1.42
			0.0							
72			6.75						9.610	K Factor = 2.18
10B	107		24.73	2	N	11.0	0.670	150	9.609	
to							11.000		0.0	
UP9	107		24.73	2.003			11.670	0.0054	0.063	Vel = 2.52
UP9	107		0.0	2	R	1.0	10.250	150	9.672	
to							1.000		4.439	
UP8	96.750		24.73	2.003			11.250	0.0055	0.062	Vel = 2.52
UP8	96.750		0.0	2	N	11.0	10.250	150	14.173	
to							11.000		4.439	
UP7	86.500		24.73	2.003			21.250	0.0055	0.117	Vel = 2.52
UP7	86.500		0.0	2	O	10.0	1.000	150	18.729	
to							10.000		0.0	
11A	86.500		24.73	2.003			11.000	0.0055	0.060	Vel = 2.52
			0.0							
11A			24.73						18.789	K Factor = 5.71
90	86.500		13.84	1.25	4R	4.0	24.000	150	18.785	
to					O	6.0	10.000		0.0	
91	86.500		13.84	1.394			34.000	0.0109	0.371	Vel = 2.91
91	86.500		0.0	1.25	4R	4.0	22.830	150	19.156	
to					O	6.0	10.000		0.0	
92	86.500		13.84	1.394			32.830	0.0109	0.358	Vel = 2.91
			0.0							
92			13.84						19.514	K Factor = 3.13

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.

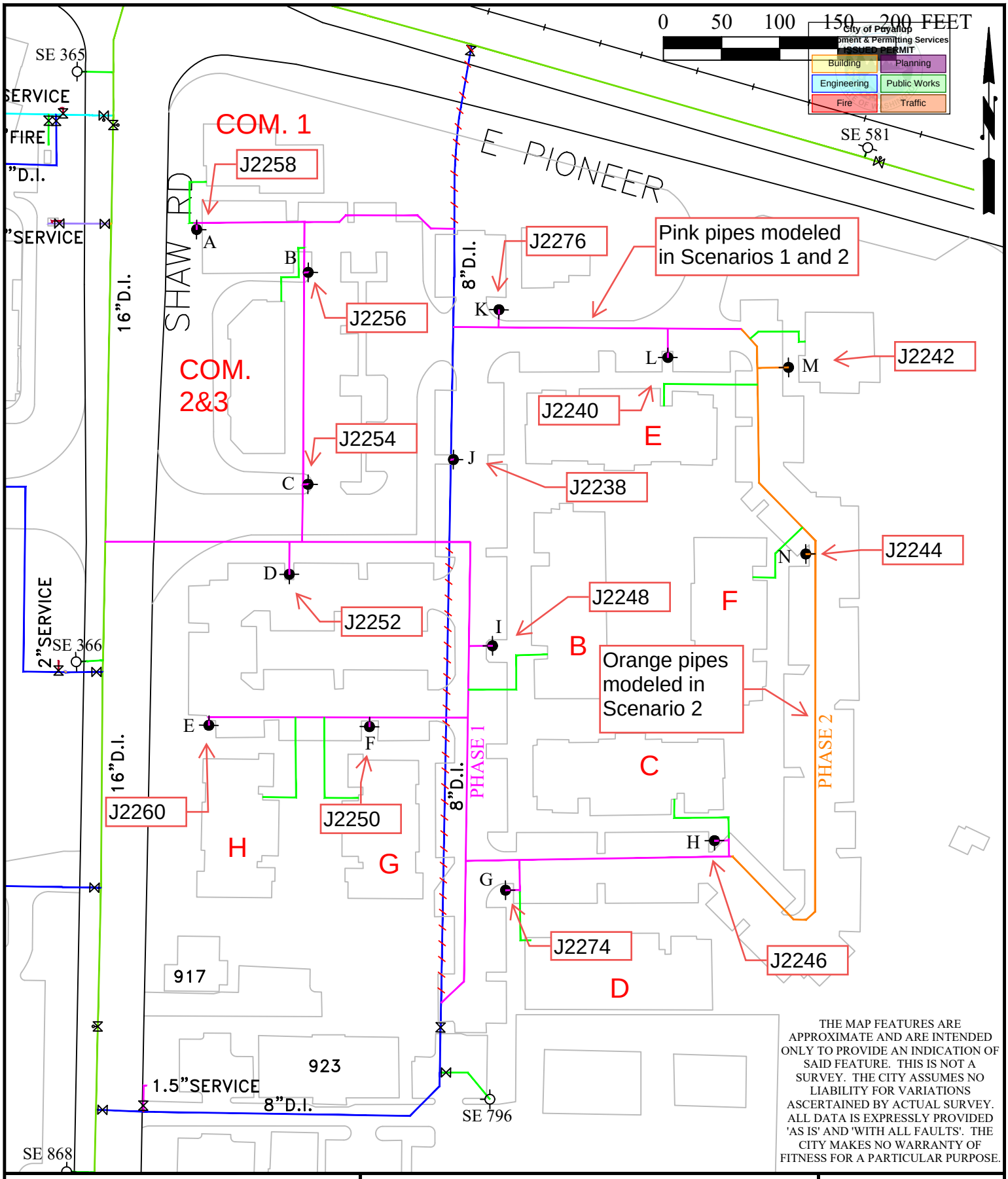
Fire flow to the hydrants is limited by the 10-fps maximum velocity through the existing and proposed 8-inch pipes.

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



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CITY OF PUYALLUP
PUBLIC WORKS
WATER DIVISION

HYDRAULIC MODEL FOR EAST TOWN CROSSING

SCALE AS SHOWN

04/10/2024

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