Alliance Fire Protection, LLC
130 w 9th Ave. Suite 101
North Kansas City, MO 64116

Phone: 913-888-0647
Fax: 913-888-0618

May 26th, 2023

To: City of Lee's Summit
Attn: Plans Reviewer

TRANSMITTAL

Project: Paragon Star #2
3201 NW Paragon Pkwy. Lee's Summit MO.
The following items are being sent:

	Plans		Samples	X	Hydraulic Calculations
	Specifications	X	Shop Drawings		Other
	Change Order		AHJ Approved Plans		

COPIES	DATE	DESCRIPTION
1	5/25/2023	Hydraulic Calcs for Dry System
1	5/25/2023	FP Shop Drawings for Dry System

THESE ARE TRANSMITTED as checked below:

X	For Approval	X	For Review and Comment
	For Your Use		For Your Information
	As Requested		Other

Please respond to 913-888-0647 or KHull@afpsprink.com with questions or comments.

REMARKS:

Copy To File: NC 1376

Signed:

Karl Hull, ***Project Manager***

Hydraulic Summary

Job Number: NC-1376
Report Description: Light Hazard (3 2nd Floor SW)

Job

Job Number: NC-1376	Designer: DB
Job Name: Paragon Star #9	State Certification/License Number:
Address 1:	AHJ:
Address 2:	Job Site/Building:
Address 3:	Drawing Name: NC-1376 Paragon Star #2 draw

System

Most Demanding Sprinkler Data: 5.6 K-Factor 15.40 at 7.563

Hose Allowance At Source: 100.00

Additional Hose Supplies

Node	Flow(gpm)

Total Hose Streams: 100.00

System Flow Demand	Total Water Required (Including Hose Allowance)
147.29	247.29

Maximum Pressure Unbalance In Loops: 0.000

Maximum Velocity Above Ground: 17.04 between nodes 780 and 807

Maximum Velocity Under Ground	
0.85 between nodes 1 and 3	

Volume capacity of Wet Pipes	Volume capacity of Dry Pipes
1237.66 gal	

Remote Area(s)

Occupancy	Job Suffix
Light Hazard	

Density	Area of Application
0.100 gpm/ft²	1500.00 ft² (Actual 1102.60 ft²)

Number Of Sprinklers Calculated	Number Of Nozzles Calculated	Coverage Per Sprinkler
8	0	154.00 ft²

AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area

5-24-23

Supplies

Node	Name	Hose Flow (gpm)	Static (psi)	Residual (psi)	@	Flow (gpm)	Available (psi)	@	Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1	Water Supply	100.00	166.000	68.000		2200.00	164.281		247.29	106.232	58.050

Contractor

	Contractor Number	Contact Name	Contact Title
	1	Derek Bisoglio	Design

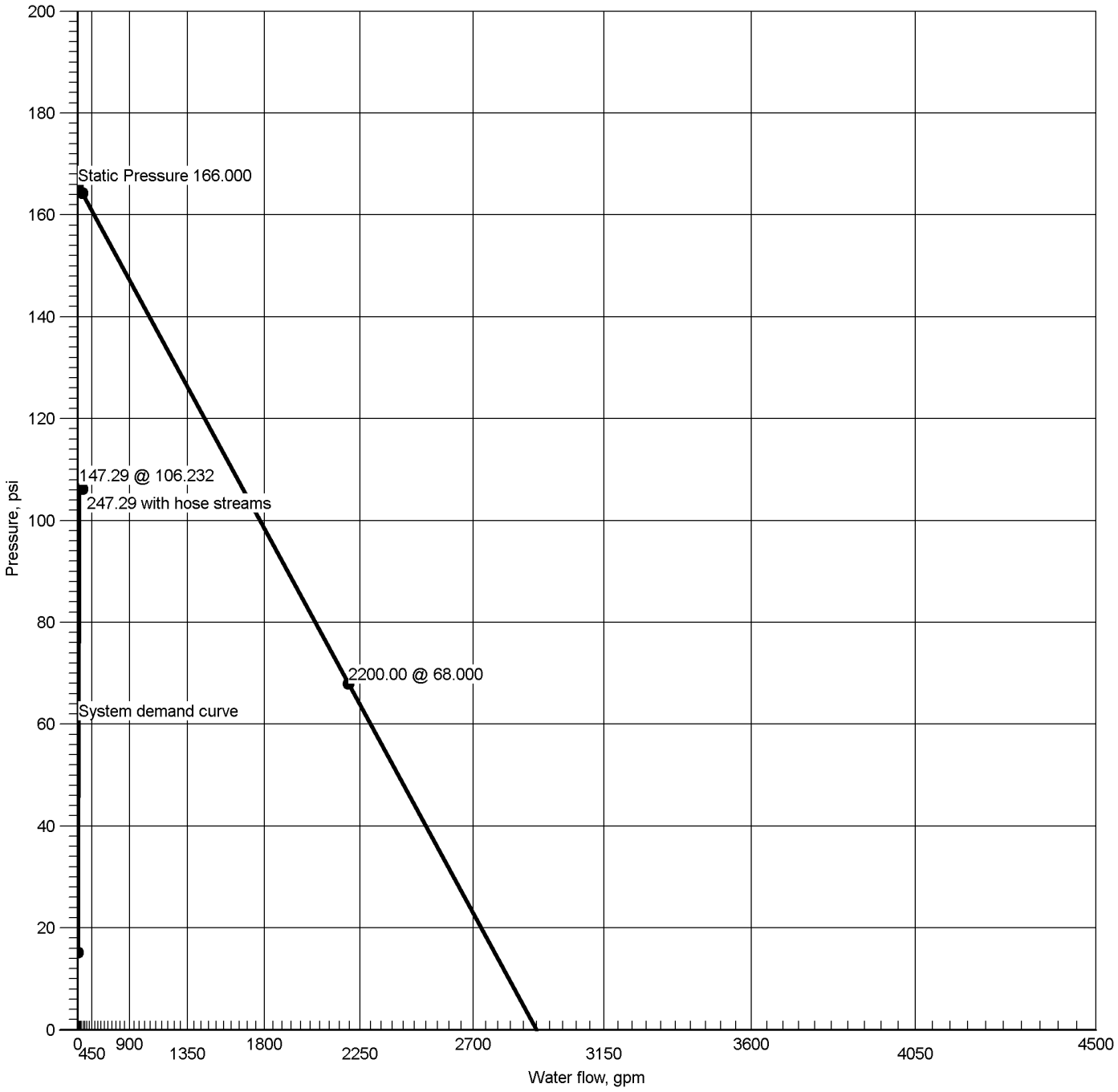
Name of Contractor:	Phone	Extension
Alliance Fire Protection	816-679-8021	

Address 1	FAX
130 w 9th Ave. Suite 100	

Address 2	E-mail
North Kansas City, MO 64116	dbisoglio@afpsprink.com

Address 3	Web-Site

Water Supply at Node 1



Hydraulic Graph	Water Supply at Node 1
Static: Pressure	166.000
Residual: Pressure	68.000 @ 2200.00
Available Pressure at System Demand	164.281 @ 247.29
Required Pressure at System Demand	106.232 @ 147.29
Required Pressure at System Demand (Including Hose Allowance at Source)	106.232 @ 247.29

Summary Of Outflowing Devices

Job Number: NC-1376
Report Description: Light Hazard (3 2nd Floor SW)

Device	Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)			
Sprinkler 1656	22.42	15.40	5.6	16.032			
Sprinkler 1657	20.08	15.40	5.6	12.860			
Sprinkler 1658	20.18	15.40	5.6	12.984			
Sprinkler 1659	21.15	15.40	5.6	14.265			
Sprinkler 1700	16.08	15.40	5.6	8.248			
Sprinkler 1701	16.34	15.40	5.6	8.509			
Sprinkler 1702	15.64	15.40	5.6	7.803			

⇨ Most Demanding Sprinkler Data

Node Analysis

Job Number: NC-1376
Report Description: Light Hazard (3 2nd Floor SW)

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
1	-4'-0	S	106.232	147.29	
1656	31'-2	Spr(-16.032)	16.032	22.42	
1657	31'-2	Spr(-12.860)	12.860	20.08	
1658	31'-2	Spr(-12.984)	12.984	20.18	
1659	31'-2	Spr(-14.265)	14.265	21.15	
1700	31'-2	Spr(-8.248)	8.248	16.08	
1701	31'-2	Spr(-8.509)	8.509	16.34	
1702	31'-2	Spr(-7.803)	7.803	15.64	
1703	31'-2	Spr(-7.563)	7.563	15.40	
3	1'-6		103.831		
74	6'-4½	T(18'-8½)	98.630		
121	8'-6	PO(9'-11), BOR	97.670		
122	14'-0½	E(9'-4½)	95.164		
164	15'-0½	PO(7'-5)	90.833		
171	29'-11	PO(5'-0)	79.976		
184	15'-0½	PO(7'-5)	91.491		
231	29'-11	PO(7'-5)	70.725		
262	29'-11	T(7'-5)	78.560		
264	29'-11	PO(7'-5)	79.980		
273	15'-0½	PO(7'-5)	90.831		
293	15'-0½	PO(7'-5)	90.967		
373	29'-11	PO(7'-5)	79.987		
374	29'-11	T(18'-8½)	80.069		
377	29'-11	T(18'-8½)	70.714		
380	15'-0½	T(18'-8½)	90.718		
381	15'-0½	PO(7'-5)	90.827		
395	29'-11	PO(7'-5)	70.755		
400	15'-0½	PO(7'-5)	90.720		
437	29'-11	PO(7'-5)	70.692		
479	29'-11	PO(5'-0)	79.316		
494	15'-0½	PO(7'-5)	90.825		
514	15'-0½	PO(7'-5)	90.723		
555	29'-11	PO(9'-11)	70.594		
591	29'-11	PO(9'-11)	79.022		
596	15'-0½	PO(7'-5)	90.824		
616	15'-0½	PO(7'-5)	90.724		
660	29'-11	PO(5'-0)	70.417		
693	29'-11	PO(7'-5)	78.817		
698	15'-0½	PO(7'-5)	90.824		
719	15'-0½	PO(7'-5)	90.724		
767	15'-0½	T(7'-5)	90.815		
770	15'-0½	T(7'-5)	90.810		
780	29'-11	PO(7'-5)	70.203		
781	15'-0½	T(7'-5)	90.766		
784	15'-0½	T(7'-5)	90.762		
807	29'-11	PO(5'-0)	17.579		
808	29'-11	PO(5'-0)	14.221		
809	29'-11	T(7'-5)	14.033		
810	29'-11	PO(5'-0)	14.352		
811	29'-11	PO(5'-0)	15.709		
817	29'-11	PO(7'-5)	78.707		
901	29'-11	PO(5'-0)	9.333		
902	29'-11	PO(5'-0)	9.610		
903	29'-11	T(7'-5)	10.189		
904	29'-11	PO(5'-0)	8.861		
905	29'-11	PO(5'-0)	8.606		

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
• • • • • Route 1 • • • • •								
SP	1.0490	15.40	5.72	120		0.080240	1'-3	Pf 0.501
1703	31'-2	15.40	5.6	7.563		Sprinkler,	5'-0	Pe 0.542
905	29'-11			8.606		PO(5'-0)	6'-3	Pv
BL	1.4420	15.40	3.03	120		0.017037	15'-0	Pf 0.256
905	29'-11			8.606				Pe -0.000
904	29'-11			8.861			15'-0	Pv
BL	1.4420	31.04	6.10	120		0.062321	13'-10½	Pf 1.327
904	29'-11	15.64		8.861		Flow (q) from Route 2	7'-5	Pe
903	29'-11			10.189		T(7'-5)	21'-3½	Pv
BL	1.4420	63.46	12.47	120		0.233957	9'-0	Pf 3.844
903	29'-11	32.42		10.189		Flow (q) from Route 3	7'-5	Pe
809	29'-11			14.033		T(7'-5)	16'-5	Pv
BL	1.4420	19.22	3.78	120		0.025680	12'-5	Pf 0.319
809	29'-11			14.033				Pe
810	29'-11			14.352			12'-5	Pv
BL	1.4420	39.40	7.74	120		0.096873	14'-0	Pf 1.356
810	29'-11	20.18		14.352		Flow (q) from Route 6		Pe
811	29'-11			15.709			14'-0	Pv
BL	1.4420	60.55	11.90	120		0.214504	286'-3	Pf 62.998
811	29'-11	21.15		15.709		Flow (q) from Route 7	7'-5	Pe
817	29'-11			78.707		PO(7'-5)	293'-8½	Pv
CM	2.7050	60.55	3.38	120		0.010022	11'-0	Pf 0.110
817	29'-11			78.707				Pe
693	29'-11			78.817			11'-0	Pv
CM	2.7050	76.51	4.27	120		0.015447	13'-3	Pf 0.205
693	29'-11	15.95		78.817		Flow (q) from Route 5		Pe
591	29'-11			79.022			13'-3	Pv
CM	2.7050	95.08	5.31	120		0.023090	12'-9	Pf 0.294
591	29'-11	18.57		79.022		Flow (q) from Route 17		Pe
479	29'-11			79.316			12'-9	Pv
CM	2.7050	110.78	6.18	120		0.030635	5'-10½	Pf 0.753
479	29'-11	15.70		79.316		Flow (q) from Route 18	18'-8½	Pe
374	29'-11			80.069		T(18'-8½)	24'-7	Pv
CM	2.7050	147.29	8.22	120		0.051897	43'-6	Pf 4.200
374	29'-11	36.52		80.069		Flow (q) from Route 9	37'-5	Pe 6.449
380	15'-0½			90.718		2E(9'-4½), T(18'-8½)	80'-11	Pv
CM	2.7050	137.83	7.69	120		0.045896	5'-5	Pf 0.249
380	15'-0½			90.718				Pe
293	15'-0½			90.967			5'-5	Pv
CM	2.7050	140.66	7.85	120		0.047656	11'-0	Pf 0.524
293	15'-0½	2.83		90.967		Flow (q) from Route 10		Pe
184	15'-0½			91.491			11'-0	Pv
CM	2.7050	147.29	8.22	120		0.051897	34'-4	Pf 3.239
184	15'-0½	6.63		91.491		Flow (q) from Route 21	28'-1	Pe 0.434
122	14'-0½			95.164		3E(9'-4½)	62'-5	Pv
FR	3.3340	147.29	5.41	120		0.018748	5'-6½	Pf 0.104
122	14'-0½			95.164				Pe 2.402
121	8'-6			97.670		BOR	5'-6½	Pv
FR	3.3340	147.29	5.41	120		0.018748	2'-1½	Pf 0.040
121	8'-6			97.670				Pe 0.920
74	6'-4½			98.630		f(-0.000)	2'-1½	Pv
FR	3.2600	147.29	5.66	120		0.020914	4'-10½	Pf 3.087
74	6'-4½			98.630			13'-5½	Pe 2.115
3	1'-6			103.831		BFP(-2.704), BV(13'-5½)	18'-4	Pv
UG	8.3900	147.29	0.85	140		0.000157	69'-2	Pf 0.016
3	1'-6			103.831			30'-6½	Pe 2.384
1	-4'-0			106.232		E(30'-6½), S	99'-8½	Pv
		100.00				Hose Allowance At Source		
1		247.29						
• • • • • Route 2 • • • • •								
SP	1.0490	15.64	5.81	120		0.082600	1'-3	Pf 0.516
1702	31'-2	15.64	5.6	7.803		Sprinkler,	5'-0	Pe 0.542
904	29'-11			8.861		PO(5'-0)	6'-3	Pv
• • • • • Route 3 • • • • •								

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
SP	1.0490	16.08	5.97	120	0.086946	1'-3	Pf 0.543
1700	31'-2	16.08	5.6	8.248	Sprinkler,	5'-0	Pe 0.542
901	29'-11			9.333	PO(5'-0)	6'-3	Pv
BL	1.4420	16.08	3.16	120	0.018461	15'-0	Pf 0.277
901	29'-11			9.333			Pe
902	29'-11			9.610		15'-0	Pv
BL	1.4420	32.42	6.37	120	0.067523	1'-1½	Pf 0.578
902	29'-11	16.34		9.610	Flow (q) from Route 4	7'-5	Pe
903	29'-11			10.189	T(7'-5)	8'-7	Pv
• • • • • Route 4 • • • • •							
SP	1.0490	16.34	6.06	120	0.089488	1'-3	Pf 0.559
1701	31'-2	16.34	5.6	8.509	Sprinkler,	5'-0	Pe 0.542
902	29'-11			9.610	PO(5'-0)	6'-3	Pv
• • • • • Route 5 • • • • •							
SP	1.0490	20.08	7.45	120	0.131120	1'-3	Pf 0.820
1657	31'-2	20.08	5.6	12.860	Sprinkler,	5'-0	Pe 0.542
808	29'-11			14.221	PO(5'-0)	6'-3	Pv
BL	1.4420	64.32	12.64	120	0.239844	14'-0	Pf 3.358
808	29'-11	44.24		14.221	Flow (q) from Route 15		Pe
807	29'-11			17.579		14'-0	Pv
BL	1.4420	86.74	17.04	120	0.417081	118'-9	Pf 52.624
807	29'-11	22.42		17.579	Flow (q) from Route 8	7'-5	Pe
780	29'-11			70.203	PO(7'-5)	126'-2	Pv
CM	2.7050	86.74	4.84	120	0.019486	11'-0	Pf 0.214
780	29'-11			70.203			Pe
660	29'-11			70.417		11'-0	Pv
BL	1.4420	15.95	3.13	120	0.018187	447'-0	Pf 8.400
660	29'-11			70.417	PO(7'-5)	14'-10½	Pe
693	29'-11			78.817	PO(7'-5)	461'-10½	Pv
• • • • • Route 6 • • • • •							
SP	1.0490	20.18	7.49	120	0.132286	1'-3	Pf 0.827
1658	31'-2	20.18	5.6	12.984	Sprinkler,	5'-0	Pe 0.542
810	29'-11			14.352	PO(5'-0)	6'-3	Pv
• • • • • Route 7 • • • • •							
SP	1.0490	21.15	7.85	120	0.144316	1'-3	Pf 0.902
1659	31'-2	21.15	5.6	14.265	Sprinkler,	5'-0	Pe 0.542
811	29'-11			15.709	PO(5'-0)	6'-3	Pv
• • • • • Route 8 • • • • •							
SP	1.0490	22.42	8.32	120	0.160785	1'-3	Pf 1.005
1656	31'-2	22.42	5.6	16.032	Sprinkler,	5'-0	Pe 0.542
807	29'-11			17.579	PO(5'-0)	6'-3	Pv
• • • • • Route 9 • • • • •							
CM	2.7050	70.79	3.95	120	0.013379	13'-3	Pf 0.177
660	29'-11	15.95		70.417	Flow (q) from Route 5		Pe
555	29'-11			70.594		13'-3	Pv
CM	2.7050	52.22	2.92	120	0.007620	12'-9	Pf 0.097
555	29'-11			70.594			Pe
437	29'-11			70.692		12'-9	Pv
CM	2.7050	36.52	2.04	120	0.003932	5'-7½	Pf 0.022
437	29'-11			70.692			Pe
377	29'-11			70.714		5'-7½	Pv
CM	2.7050	17.15	0.96	120	0.000971	23'-9½	Pf 0.041
377	29'-11			70.714	T(18'-8½)	18'-8½	Pe
395	29'-11			70.755		42'-6	Pv
BL	1.4420	17.15	3.37	120	0.020786	425'-7	Pf 9.232
395	29'-11			70.755	PO(7'-5)	18'-7	Pe
373	29'-11			79.987	E(3'-8½), PO(7'-5)	444'-2	Pv
CM	2.7050	36.52	2.04	120	0.003932	2'-1½	Pf 0.082
373	29'-11	19.37		79.987	Flow (q) from Route 13	18'-8½	Pe
374	29'-11			80.069	T(18'-8½)	20'-10	Pv
• • • • • Route 10 • • • • •							
BL	1.4420	1.57	0.31	120	0.000248	18'-11	Pf 0.005
784	15'-0½	2.34		90.762	Flow (q) from Route 16		Pe
781	15'-0½			90.766		18'-11	Pv
BL	1.4420	2.34	0.46	120	0.000520	83'-11½	Pf 0.044
781	15'-0½	0.77		90.766	Flow (q) from Route 11		Pe
770	15'-0½			90.810		83'-11½	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
BL	1.4420	1.56	0.31	120	0.000247	19'-4	Pf 0.005
770	15'-0½			90.810			Pe
767	15'-0½			90.815		19'-4	Pv
BL	1.4420	2.34	0.46	120	0.000520	9'-5½	Pf 0.009
767	15'-0½	0.77		90.815	Flow (q) from Route 12	7'-5	Pe
698	15'-0½			90.824	PO(7'-5)	16'-11	Pv
CM	2.7050	2.34	0.13	120	0.000024	11'-0	Pf 0.000
698	15'-0½			90.824			Pe
596	15'-0½			90.824		11'-0	Pv
CM	2.7050	4.73	0.26	120	0.000090	11'-0	Pf 0.001
596	15'-0½	2.40		90.824	Flow (q) from Route 19		Pe
494	15'-0½			90.825		11'-0	Pv
CM	2.7050	7.16	0.40	120	0.000193	12'-0	Pf 0.002
494	15'-0½	2.42		90.825	Flow (q) from Route 20		Pe
381	15'-0½			90.827		12'-0	Pv
CM	2.7050	9.47	0.53	120	0.000324	11'-0	Pf 0.004
381	15'-0½	2.31		90.827	Flow (q) from Route 22		Pe
273	15'-0½			90.831		11'-0	Pv
BL	1.4420	2.83	0.56	120	0.000743	168'-9½	Pf 0.136
273	15'-0½			90.831	PO(7'-5)	14'-10½	Pe
293	15'-0½			90.967	PO(7'-5)	183'-7½	Pv
• • • • • Route 11 • • • • •							
BL	1.4420	0.77	0.15	120	0.000067	40'-10	Pf 0.005
784	15'-0½	2.34		90.762	T(7'-5), Flow (q) from Route 16	29'-8½	Pe
781	15'-0½			90.766	3T(7'-5)	70'-7	Pv
• • • • • Route 12 • • • • •							
BL	1.4420	0.77	0.15	120	0.000067	41'-3	Pf 0.005
770	15'-0½			90.810	T(7'-5)	29'-8½	Pe
767	15'-0½			90.815	3T(7'-5)	71'-0	Pv
• • • • • Route 13 • • • • •							
CM	2.7050	19.37	1.08	120	0.001217	8'-10½	Pf 0.011
377	29'-11	17.15		70.714	Flow (q) from Route 9		Pe
231	29'-11			70.725		8'-10½	Pv
BL	1.4420	19.37	3.81	120	0.026045	274'-10	Pf 7.835
231	29'-11			70.725	PO(7'-5)	26'-0	Pe
262	29'-11			78.560	3E(3'-8½), T(7'-5)	300'-10	Pv
BL	1.4420	9.97	1.96	120	0.007626	178'-9	Pf 1.420
262	29'-11			78.560		7'-5	Pe
264	29'-11			79.980	PO(7'-5)	186'-2	Pv
CM	2.7050	19.37	1.08	120	0.001217	6'-6	Pf 0.008
264	29'-11	9.40		79.980	Flow (q) from Route 14		Pe
373	29'-11			79.987		6'-6	Pv
• • • • • Route 14 • • • • •							
BL	1.4420	9.40	1.85	120	0.006833	188'-9	Pf 1.417
262	29'-11			78.560	T(7'-5)	18'-7	Pe
171	29'-11			79.976	E(3'-8½), PO(7'-5)	207'-4	Pv
CM	2.7050	9.40	0.52	120	0.000319	10'-0	Pf 0.003
171	29'-11			79.976			Pe
264	29'-11			79.980		10'-0	Pv
• • • • • Route 15 • • • • •							
BL	1.4420	44.24	8.69	120	0.120008	1'-7	Pf 0.188
809	29'-11	19.22		14.033	Flow (q) from Route 1		Pe
808	29'-11			14.221		1'-7	Pv
• • • • • Route 16 • • • • •							
CM	2.7050	9.47	0.53	120	0.000324	5'-7	Pf 0.002
380	15'-0½	137.83		90.718	Flow (q) from Route 1		Pe
400	15'-0½			90.720		5'-7	Pv
CM	2.7050	7.16	0.40	120	0.000193	12'-0	Pf 0.002
400	15'-0½			90.720			Pe
514	15'-0½			90.723		12'-0	Pv
CM	2.7050	4.73	0.26	120	0.000090	11'-0	Pf 0.001
514	15'-0½			90.723			Pe
616	15'-0½			90.724		11'-0	Pv
CM	2.7050	2.34	0.13	120	0.000024	11'-0	Pf 0.000
616	15'-0½			90.724			Pe
719	15'-0½			90.724		11'-0	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
BL	1.4420	2.34	0.46	120		0.000520	50'-6½	Pf 0.038
719	15'-0½			90.724		PO(7'-5)	22'-3½	Pe
784	15'-0½			90.762		4E(3'-8½)	72'-10	Pv
• • • • • Route 17 • • • • •								
BL	1.5300	18.57	3.24	120		0.018052	447'-0	Pf 8.427
555	29'-11			70.594		PO(9'-11)	19'-10	Pe
591	29'-11			79.022		PO(9'-11)	466'-10	Pv
• • • • • Route 18 • • • • •								
BL	1.4420	15.70	3.08	120		0.017657	458'-9	Pf 8.625
437	29'-11			70.692		PO(7'-5)	29'-8½	Pe
479	29'-11			79.316		4E(3'-8½), PO(7'-5)	488'-5½	Pv
• • • • • Route 19 • • • • •								
BL	1.4420	2.40	0.47	120		0.000547	168'-9½	Pf 0.100
616	15'-0½			90.724		PO(7'-5)	14'-10½	Pe
596	15'-0½			90.824		PO(7'-5)	183'-7½	Pv
• • • • • Route 20 • • • • •								
BL	1.4420	2.42	0.48	120		0.000557	168'-9½	Pf 0.102
514	15'-0½			90.723		PO(7'-5)	14'-10½	Pe
494	15'-0½			90.825		PO(7'-5)	183'-7½	Pv
• • • • • Route 21 • • • • •								
CM	2.7050	6.63	0.37	120		0.000168	11'-0	Pf 0.002
273	15'-0½	2.83		90.831		Flow (q) from Route 10		Pe
164	15'-0½			90.833			11'-0	Pv
BL	1.4420	6.63	1.30	120		0.003588	168'-9½	Pf 0.659
164	15'-0½			90.833		PO(7'-5)	14'-10½	Pe
184	15'-0½			91.491		PO(7'-5)	183'-7½	Pv
• • • • • Route 22 • • • • •								
BL	1.4420	2.31	0.45	120		0.000509	180'-7½	Pf 0.107
400	15'-0½			90.720		PO(7'-5)	29'-8½	Pe
381	15'-0½			90.827		4E(3'-8½), PO(7'-5)	210'-4	Pv

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

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

C Value Multiplier

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

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SN	Swing Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	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 Summary

Job Number: NC-1376
Report Description: Light Hazard (2 Dry Walkway)

Job

Job Number: NC-1376	Designer: DB
Job Name: Paragon Star #9	State Certification/License Number:
Address 1:	AHJ:
Address 2:	Job Site/Building:
Address 3:	Drawing Name: NC-1376 Paragon Star #2 draw

System

Most Demanding Sprinkler Data: 5.6 K-Factor 18.20 at 10.563

Hose Allowance At Source: 100.00

Additional Hose Supplies

Node	Flow(gpm)

Total Hose Streams: 100.00

System Flow Demand	Total Water Required (Including Hose Allowance)
241.30	341.30

Maximum Pressure Unbalance In Loops: 0.000

Maximum Velocity Above Ground: 21.19 between nodes 125 and 391

Maximum Velocity Under Ground	
1.40 between nodes 1 and 3	

Volume capacity of Wet Pipes	Volume capacity of Dry Pipes
1237.66 gal	66.14 gal

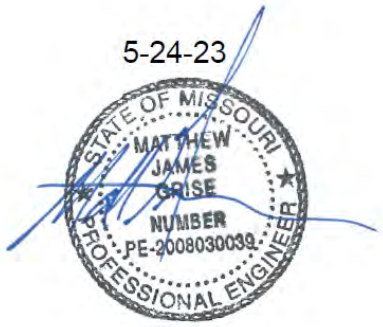
Remote Area(s)

Occupancy	Job Suffix
Light Hazard	

Density	Area of Application
0.100 gpm/ft²	1950.00 ft² (Actual 2039.92 ft²)

Number Of Sprinklers Calculated	Number Of Nozzles Calculated	Coverage Per Sprinkler
12	0	182.00 ft²

AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area



Supplies

Node	Name	Hose Flow (gpm)	Static (psi)	Residual (psi)	@ Flow (gpm)	Available (psi)	@ Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1	Water Supply	100.00	166.000	68.000	2200.00	162.881	341.30	93.563	69.318

Contractor

	Contractor Number	Contact Name	Contact Title
	1	Derek Bisoglio	Design

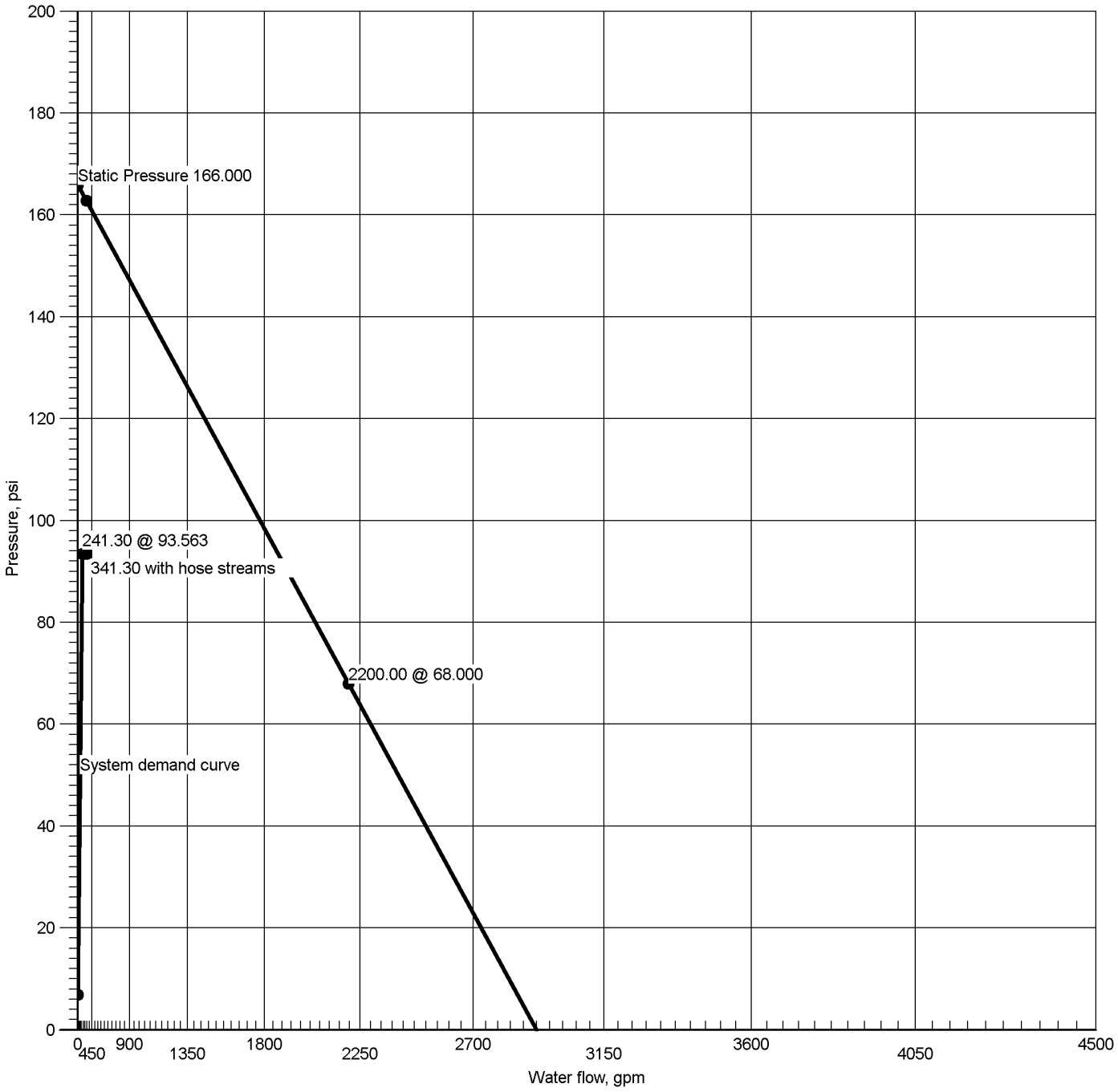
Name of Contractor:	Phone	Extension
Alliance Fire Protection	816-679-8021	

Address 1	FAX
130 w 9th Ave. Suite 100	

Address 2	E-mail
North Kansas City, MO 64116	dbisoglio@afpsprink.com

Address 3	Web-Site

Water Supply at Node 1



Hydraulic Graph	Water Supply at Node 1
Static: Pressure	166.000
Residual: Pressure	68.000 @ 2200.00
Available Pressure at System Demand	162.881 @ 341.30
Required Pressure at System Demand	93.563 @ 241.30
Required Pressure at System Demand (Including Hose Allowance at Source)	93.563 @ 341.30

Summary Of Outflowing Devices

Job Number: NC-1376
Report Description: Light Hazard (2 Dry Walkway)

Device	Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)			
Sprinkler 1320	19.51	18.20	5.6	12.142			
Sprinkler 1321	19.85	18.20	5.6	12.567			
Sprinkler 1322	21.05	18.20	5.6	14.125			
Sprinkler 1333	21.72	18.20	5.6	15.045			
Sprinkler 1334	22.09	18.20	5.6	15.564			
Sprinkler 1335	23.40	18.20	5.6	17.468			
Sprinkler 1411	18.51	18.20	5.6	10.921			
Sprinkler 1412	18.83	18.20	5.6	11.306			
Sprinkler 1413	19.97	18.20	5.6	12.718			
Sprinkler 1541	**18.20**	**18.20**	**5.6**	**10.563**			
Sprinkler 1542	18.52	18.20	5.6	10.936			
Sprinkler 1543	19.64	18.20	5.6	12.305			

⇨ Most Demanding Sprinkler Data

Node Analysis

Job Number: NC-1376
Report Description: Light Hazard (2 Dry Walkway)

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
1	-4'-0	S	93.563	241.30	
1320	12'-0	Spr(-12.142)	12.142	19.51	
1321	12'-0	Spr(-12.567)	12.567	19.85	
1322	12'-0	Spr(-14.125)	14.125	21.05	
1333	12'-0	Spr(-15.045)	15.045	21.72	
1334	12'-0	Spr(-15.564)	15.564	22.09	
1335	12'-0	Spr(-17.468)	17.468	23.40	
1411	12'-0	Spr(-10.921)	10.921	18.51	
1412	12'-0	Spr(-11.306)	11.306	18.83	
1413	12'-0	Spr(-12.718)	12.718	19.97	
1541	12'-0	Spr(-10.563)	10.563	18.20	
1542	12'-0	Spr(-10.936)	10.936	18.52	
1543	12'-0	Spr(-12.305)	12.305	19.64	
3	1'-6		91.139		
74	6'-4½	T(18'-8½)	83.018		
111	14'-3½	E(5'-10½)	74.461		
114	7'-3½	DPV	78.764		
125	14'-3½	E(4'-4½)	42.793		
383	14'-3½	PO(3'-7)	16.149		
386	14'-3½	PO(3'-7)	16.735		
388	14'-3½	PO(3'-7)	18.883		
391	14'-3½	PO(5'-3½)	21.140		
501	14'-3½	PO(3'-7)	12.868		
504	14'-3½	PO(3'-7)	13.349		
508	14'-3½	PO(3'-7)	15.111		
510	14'-3½	PO(5'-3½)	16.963		
621	14'-3½	PO(3'-7)	11.487		
624	14'-3½	PO(3'-7)	11.923		
627	14'-3½	PO(3'-7)	13.520		
629	14'-3½	PO(5'-3½)	15.201		
736	14'-3½	PO(3'-7)	11.081		
739	14'-3½	PO(3'-7)	11.504		
742	14'-3½	PO(3'-7)	13.053		
744	14'-3½	PO(5'-3½)	14.682		

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
• • • • • Route 1 • • • • •								
DR	1.0490	18.20	6.76	100		0.153142	3'-5½	Pf 1.512
1541	12'-0	18.20	5.6	10.563		Sprinkler,	6'-5	Pe -0.994
736	14'-3½			11.081		2E(1'-5), PO(3'-7)	9'-10½	Pv
BL	1.4420	18.20	3.58	100		0.032517	13'-0	Pf 0.423
736	14'-3½			11.081				Pe
739	14'-3½			11.504			13'-0	Pv
BL	1.4420	36.72	7.21	100		0.119130	13'-0	Pf 1.549
739	14'-3½	18.52		11.504		Flow (q) from Route 3		Pe
742	14'-3½			13.053			13'-0	Pv
BL	1.4420	56.36	11.07	100		0.263214	0'-10½	Pf 1.629
742	14'-3½	19.64		13.053		Flow (q) from Route 6	5'-3½	Pe
744	14'-3½			14.682		PO(5'-3½)	6'-2½	Pv
CM	2.1570	56.36	4.95	100		0.037036	14'-0	Pf 0.518
744	14'-3½			14.682				Pe
629	14'-3½			15.201			14'-0	Pv
CM	2.1570	113.67	9.98	100		0.135590	13'-0	Pf 1.763
629	14'-3½	57.31		15.201		Flow (q) from Route 2		Pe
510	14'-3½			16.963			13'-0	Pv
CM	2.1570	174.08	15.28	100		0.298318	14'-0	Pf 4.176
510	14'-3½	60.41		16.963		Flow (q) from Route 5		Pe
391	14'-3½			21.140			14'-0	Pv
CM	2.1570	241.30	21.19	100		0.545782	26'-6	Pf 21.654
391	14'-3½	67.22		21.140		Flow (q) from Route 10	13'-2	Pe
125	14'-3½			42.793		3E(4'-4½)	39'-8	Pv
CM	2.6350	241.30	14.20	100		0.205906	147'-11	Pf 31.667
125	14'-3½			42.793			5'-10½	Pe
111	14'-3½			74.461		E(5'-10½)	153'-9½	Pv
FR	2.7050	241.30	13.47	100		0.181224	7'-0	Pf 1.269
111	14'-3½			74.461				Pe 3.035
114	7'-3½			78.764		DPV	7'-0	Pv
FR	2.7050	241.30	13.47	120		0.129339	1'-9	Pf 3.857
114	7'-3½			78.764			28'-1	Pe 0.396
74	6'-4½			83.018		E(9'-4½), T(18'-8½)	29'-10	Pv
FR	3.2600	241.30	9.27	120		0.052121	4'-10½	Pf 6.007
74	6'-4½			83.018			13'-5½	Pe 2.115
3	1'-6			91.139		BFP(-5.052), BV(13'-5½)	18'-4	Pv
UG	8.3900	241.30	1.40	140		0.000392	69'-2	Pf 0.039
3	1'-6			91.139			30'-6½	Pe 2.384
1	-4'-0			93.563		E(30'-6½), S	99'-8½	Pv
		100.00				Hose Allowance At Source		
1		341.30						
• • • • • Route 2 • • • • •								
DR	1.0490	18.51	6.87	100		0.157943	3'-5½	Pf 1.560
1411	12'-0	18.51	5.6	10.921		Sprinkler,	6'-5	Pe -0.994
621	14'-3½			11.487		2E(1'-5), PO(3'-7)	9'-10½	Pv
BL	1.4420	18.51	3.64	100		0.033536	13'-0	Pf 0.436
621	14'-3½			11.487				Pe
624	14'-3½			11.923			13'-0	Pv
BL	1.4420	37.34	7.33	100		0.122861	13'-0	Pf 1.597
624	14'-3½	18.83		11.923		Flow (q) from Route 4		Pe
627	14'-3½			13.520			13'-0	Pv
BL	1.4420	57.31	11.26	100		0.271432	0'-10½	Pf 1.680
627	14'-3½	19.97		13.520		Flow (q) from Route 8	5'-3½	Pe
629	14'-3½			15.201		PO(5'-3½)	6'-2½	Pv
• • • • • Route 3 • • • • •								
DR	1.0490	18.52	6.87	100		0.158142	3'-5½	Pf 1.562
1542	12'-0	18.52	5.6	10.936		Sprinkler,	6'-5	Pe -0.994
739	14'-3½			11.504		2E(1'-5), PO(3'-7)	9'-10½	Pv
• • • • • Route 4 • • • • •								
DR	1.0490	18.83	6.99	100		0.163089	3'-5½	Pf 1.611
1412	12'-0	18.83	5.6	11.306		Sprinkler,	6'-5	Pe -0.994
624	14'-3½			11.923		2E(1'-5), PO(3'-7)	9'-10½	Pv
• • • • • Route 5 • • • • •								
DR	1.0490	19.51	7.24	100		0.174207	3'-5½	Pf 1.720
1320	12'-0	19.51	5.6	12.142		Sprinkler,	6'-5	Pe -0.994
501	14'-3½			12.868		2E(1'-5), PO(3'-7)	9'-10½	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
BL	1.4420	19.51	3.83	100	0.036990	13'-0	Pf 0.481
501	14'-3½			12.868			Pe
504	14'-3½			13.349		13'-0	Pv
BL	1.4420	39.36	7.73	100	0.135497	13'-0	Pf 1.761
504	14'-3½	19.85		13.349	Flow (q) from Route 7		Pe
508	14'-3½			15.111		13'-0	Pv
BL	1.4420	60.41	11.87	100	0.299263	0'-10½	Pf 1.852
508	14'-3½	21.05		15.111	Flow (q) from Route 9	5'-3½	Pe
510	14'-3½			16.963	PO(5'-3½)	6'-2½	Pv
• • • • • Route 6 • • • • •							
DR	1.0490	19.64	7.29	100	0.176368	3'-5½	Pf 1.742
1543	12'-0	19.64	5.6	12.305	Sprinkler,	6'-5	Pe -0.994
742	14'-3½			13.053	2E(1'-5), PO(3'-7)	9'-10½	Pv
• • • • • Route 7 • • • • •							
DR	1.0490	19.85	7.37	100	0.179843	3'-5½	Pf 1.776
1321	12'-0	19.85	5.6	12.567	Sprinkler,	6'-5	Pe -0.994
504	14'-3½			13.349	2E(1'-5), PO(3'-7)	9'-10½	Pv
• • • • • Route 8 • • • • •							
DR	1.0490	19.97	7.41	100	0.181844	3'-5½	Pf 1.796
1413	12'-0	19.97	5.6	12.718	Sprinkler,	6'-5	Pe -0.994
627	14'-3½			13.520	2E(1'-5), PO(3'-7)	9'-10½	Pv
• • • • • Route 9 • • • • •							
DR	1.0490	21.05	7.81	100	0.200383	3'-5½	Pf 1.979
1322	12'-0	21.05	5.6	14.125	Sprinkler,	6'-5	Pe -0.994
508	14'-3½			15.111	2E(1'-5), PO(3'-7)	9'-10½	Pv
• • • • • Route 10 • • • • •							
DR	1.0490	21.72	8.06	100	0.212418	3'-5½	Pf 2.098
1333	12'-0	21.72	5.6	15.045	Sprinkler,	6'-5	Pe -0.994
383	14'-3½			16.149	2E(1'-5), PO(3'-7)	9'-10½	Pv
BL	1.4420	21.72	4.27	100	0.045103	13'-0	Pf 0.586
383	14'-3½			16.149			Pe
386	14'-3½			16.735		13'-0	Pv
BL	1.4420	43.81	8.61	100	0.165181	13'-0	Pf 2.147
386	14'-3½	22.09		16.735	Flow (q) from Route 11		Pe
388	14'-3½			18.883		13'-0	Pv
BL	1.4420	67.22	13.21	100	0.364616	0'-10½	Pf 2.257
388	14'-3½	23.40		18.883	Flow (q) from Route 12	5'-3½	Pe
391	14'-3½			21.140	PO(5'-3½)	6'-2½	Pv
• • • • • Route 11 • • • • •							
DR	1.0490	22.09	8.20	100	0.219193	3'-5½	Pf 2.165
1334	12'-0	22.09	5.6	15.564	Sprinkler,	6'-5	Pe -0.994
386	14'-3½			16.735	2E(1'-5), PO(3'-7)	9'-10½	Pv
• • • • • Route 12 • • • • •							
DR	1.0490	23.40	8.69	100	0.243882	3'-5½	Pf 2.408
1335	12'-0	23.40	5.6	17.468	Sprinkler,	6'-5	Pe -0.994
388	14'-3½			18.883	2E(1'-5), PO(3'-7)	9'-10½	Pv

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

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

C Value Multiplier

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

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SN	Swing Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	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 Summary

Job Number: NC-1376
Report Description: Ordinary Group II (1 1st Floor SW)

Job

Job Number: NC-1376	Designer: DB
Job Name: Paragon Star #9	State Certification/License Number:
Address 1:	AHJ:
Address 2:	Job Site/Building:
Address 3:	Drawing Name: NC-1376 Paragon Star #2 draw

System

Most Demanding Sprinkler Data: 5.6 K-Factor 22.00 at 15.434

Hose Allowance At Source: 250.00

Additional Hose Supplies

Node	Flow(gpm)

Total Hose Streams: 250.00

System Flow Demand	Total Water Required (Including Hose Allowance)
235.05	485.05

Maximum Pressure Unbalance In Loops: 0.000

Maximum Velocity Above Ground: 13.12 between nodes 122 and 184

Maximum Velocity Under Ground	
1.36 between nodes 1 and 3	

Volume capacity of Wet Pipes	Volume capacity of Dry Pipes
1237.66 gal	

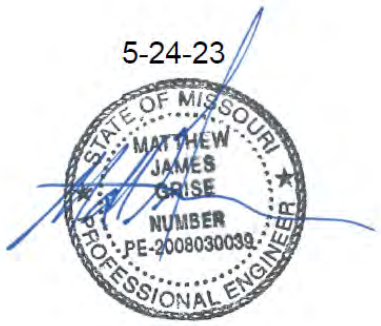
Remote Area(s)

Occupancy	Job Suffix
Ordinary Group II	

Density	Area of Application
0.200 gpm/ft²	1500.00 ft² (Actual 1097.54 ft²)

Number Of Sprinklers Calculated	Number Of Nozzles Calculated	Coverage Per Sprinkler
10	0	110.00 ft²

AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area



Supplies

Node	Name	Hose Flow (gpm)	Static (psi)	Residual (psi)	@ Flow (gpm)	Available (psi)	@ Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1	Water Supply	250.00	166.000	68.000	2200.00	160.024	485.05	125.350	34.674

Contractor

	Contractor Number	Contact Name	Contact Title
	1	Derek Bisoglio	Design

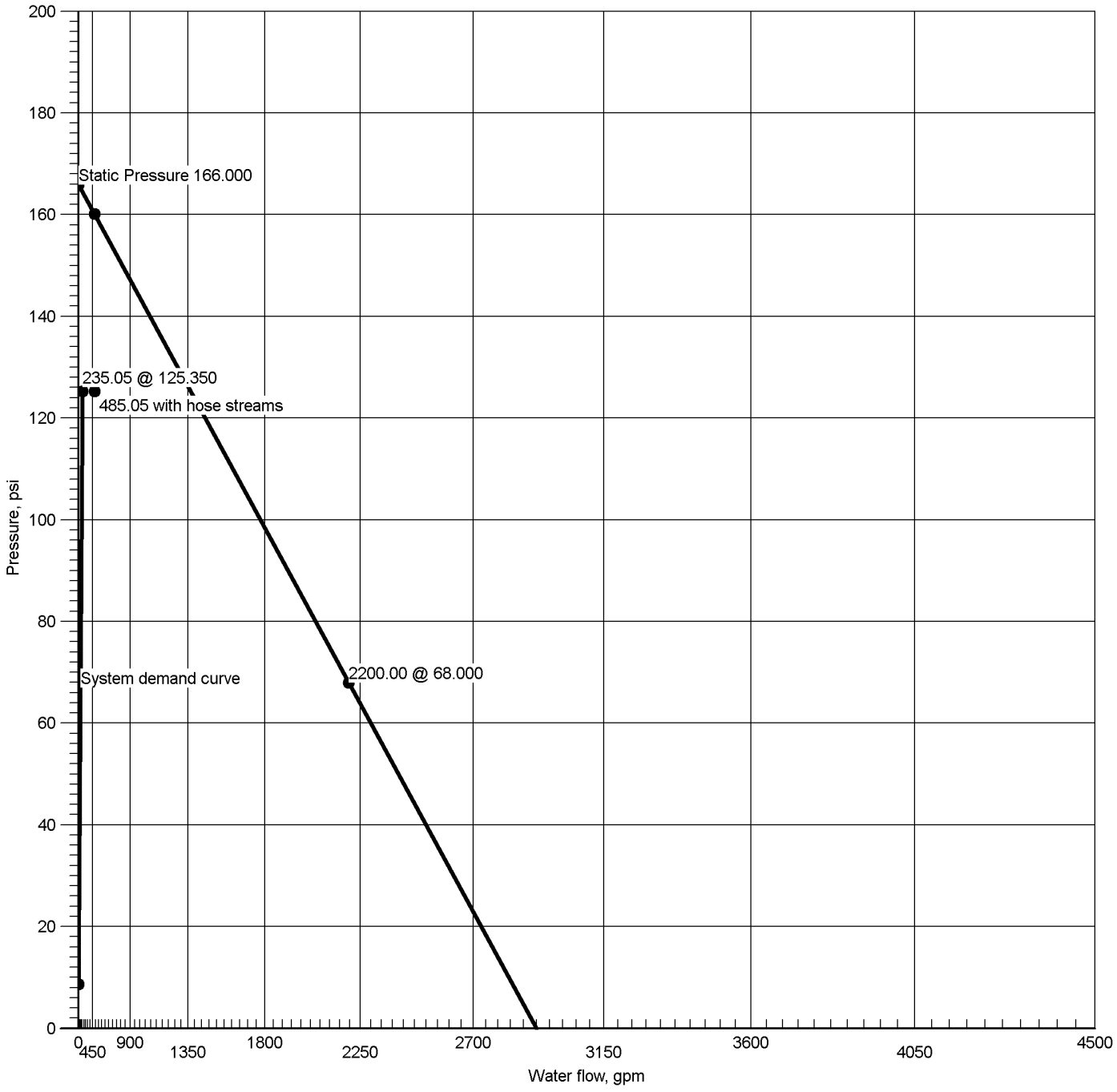
Name of Contractor:	Phone	Extension
Alliance Fire Protection	816-679-8021	

Address 1	FAX
130 w 9th Ave. Suite 100	

Address 2	E-mail
North Kansas City, MO 64116	dbisoglio@afpsprink.com

Address 3	Web-Site

Water Supply at Node 1



Hydraulic Graph	Water Supply at Node 1
Static: Pressure	166.000
Residual: Pressure	68.000 @ 2200.00
Available Pressure at System Demand	160.024 @ 485.05
Required Pressure at System Demand	125.350 @ 235.05
Required Pressure at System Demand (Including Hose Allowance at Source)	125.350 @ 485.05

Summary Of Outflowing Devices

Job Number: NC-1376
Report Description: Ordinary Group II (1 1st Floor SW)

Device	Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)			
Sprinkler 1508	24.90	22.00	5.6	19.773			
Sprinkler 1509	24.72	22.00	5.6	19.493			
Sprinkler 1510	24.72	22.00	5.6	19.492			
Sprinkler 1511	24.75	22.00	5.6	19.527			
Sprinkler 1512	24.85	22.00	5.6	19.685			
Sprinkler 1581	22.40	22.00	5.6	15.995			
Sprinkler 1582	22.06	22.00	5.6	15.524			
Sprinkler 1583	**22.00**	**22.00**	**5.6**	**15.434**			
Sprinkler 1584	22.08	22.00	5.6	15.543			

⇨ Most Demanding Sprinkler Data

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
616	15'-0½	PO(7'-5)	101.429		
631	15'-0½	PO(7'-5)	26.411		
660	29'-11	PO(5'-0)	44.328		
693	29'-11	PO(7'-5)	83.047		
698	15'-0½	PO(7'-5)	101.667		
710	15'-0½	PO(5'-0)	34.068		
712	15'-0½	PO(7'-5)	32.201		
716	15'-0½	PO(7'-5)	30.594		
719	15'-0½	PO(7'-5)	101.430		
727	15'-0½	PO(5'-0)	21.456		
728	15'-0½	PO(7'-5)	21.189		
729	15'-0½	PO(5'-0)	21.161		
730	15'-0½	PO(5'-0)	21.160		
731	15'-0½	PO(5'-0)	21.197		
732	15'-0½	PO(5'-0)	21.364		
733	15'-0½	PO(7'-5)	21.539		
738	15'-0½	PO(13'-7½)	25.973		
767	15'-0½	T(7'-5)	101.646		
770	15'-0½	T(7'-5)	101.635		
780	29'-11	PO(7'-5)	44.371		
781	15'-0½	T(7'-5)	101.531		
784	15'-0½	T(7'-5)	101.520		
817	29'-11	PO(7'-5)	83.004		
846	15'-0½	PO(5'-0)	17.466		
847	15'-0½	T(7'-5)	17.897		
848	15'-0½	PO(5'-0)	16.968		
849	15'-0½	PO(5'-0)	16.872		
850	15'-0½	PO(5'-0)	16.987		
851	15'-0½	T(7'-5)	18.102		
852	15'-0½	PO(5'-0)	17.724		
1	-4'-0	S	125.350	235.05	
1508	16'-2	Spr(-19.773)	19.773	24.90	
1509	16'-2	Spr(-19.493)	19.493	24.72	
1510	16'-2	Spr(-19.492)	19.492	24.72	
1511	16'-2	Spr(-19.527)	19.527	24.75	
1512	16'-2	Spr(-19.685)	19.685	24.85	
1581	16'-2	Spr(-15.995)	15.995	22.40	
1582	16'-2	Spr(-15.524)	15.524	22.06	
1583	16'-2	Spr(-15.434)	15.434	22.00	
1584	16'-2	Spr(-15.543)	15.543	22.08	
1585	16'-2	Spr(-16.239)	16.239	22.57	
3	1'-6		122.928		
74	6'-4½	T(18'-8½)	115.038		
121	8'-6	PO(9'-11), BOR	114.024		
122	14'-0½	E(9'-4½)	111.375		
164	15'-0½	PO(7'-5)	101.688		
170	15'-0½	PO(7'-5)	37.103		
171	29'-11	PO(5'-0)	84.567		
184	15'-0½	PO(7'-5)	103.252		
194	15'-0½	PO(7'-5)	27.020		
231	29'-11	PO(7'-5)	43.461		
262	29'-11	T(7'-5)	78.273		
264	29'-11	PO(7'-5)	84.581		
273	15'-0½	PO(7'-5)	101.684		
276	15'-0½	PO(7'-5)	26.995		
293	15'-0½	PO(7'-5)	102.008		
298	15'-0½	PO(7'-5)	37.129		
373	29'-11	PO(7'-5)	84.617		
374	29'-11	T(18'-8½)	84.997		
377	29'-11	T(18'-8½)	43.413		
380	15'-0½	T(18'-8½)	101.417		
381	15'-0½	PO(7'-5)	101.675		

Node Analysis

Job Number: NC-1376
Report Description: Ordinary Group II (1 1st Floor SW)

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
382	15'-0½	T(18'-8½)	37.337		
390	15'-0½	PO(7'-5)	35.546		
395	29'-11	PO(7'-5)	39.714		
400	15'-0½	PO(7'-5)	101.422		
411	15'-0½	PO(5'-0)	26.902		
437	29'-11	PO(7'-5)	43.720		
479	29'-11	PO(5'-0)	83.655		
494	15'-0½	PO(7'-5)	101.670		
497	15'-0½	PO(7'-5)	34.851		
514	15'-0½	PO(7'-5)	101.427		
523	15'-0½	PO(7'-5)	26.706		
555	29'-11	PO(9'-11)	44.141		
591	29'-11	PO(9'-11)	83.234		
596	15'-0½	PO(7'-5)	101.668		
605	15'-0½	PO(7'-5)	34.386		

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
• • • • • Route 1 • • • • •								
SP	1.0490	22.00	8.17	120		0.155224	1'-1½	Pf 0.951
1583	16'-2	22.00	5.6	15.434		Sprinkler,	5'-0	Pe 0.488
849	15'-0½			16.872		PO(5'-0)	6'-1½	Pv
BL	1.4420	10.44	2.05	120		0.008305	11'-6	Pf 0.096
849	15'-0½			16.872				Pe
848	15'-0½			16.968			11'-6	Pv
BL	1.4420	32.51	6.39	120		0.067868	6'-3	Pf 0.930
848	15'-0½	22.06		16.968		Flow (q) from Route 2	7'-5	Pe
847	15'-0½			17.897		T(7'-5)	13'-8½	Pv
BL	1.4420	54.90	10.79	120		0.178963	10'-11½	Pf 3.292
847	15'-0½	22.40		17.897		Flow (q) from Route 4	7'-5	Pe
728	15'-0½			21.189		PO(7'-5)	18'-4½	Pv
BL	2.2030	82.60	6.95	120		0.048369	5'-6	Pf 0.267
728	15'-0½	27.69		21.189		Flow (q) from Route 6		Pe
727	15'-0½			21.456			5'-6	Pv
BL	2.2030	107.50	9.05	120		0.078754	88'-9	Pf 9.138
727	15'-0½	24.90		21.456		Flow (q) from Route 10	27'-3½	Pe
716	15'-0½			30.594		4E(6'-10)	116'-0½	Pv
BL	2.2030	90.62	7.63	120		0.057419	28'-0	Pf 1.608
716	15'-0½			30.594				Pe
712	15'-0½			32.201			28'-0	Pv
BL	2.2030	107.50	9.05	120		0.078754	10'-0½	Pf 1.866
712	15'-0½	16.88		32.201		Flow (q) from Route 22	13'-7½	Pe
710	15'-0½			34.068		PO(13'-7½)	23'-8½	Pv
CM	2.7050	107.50	6.00	120		0.028980	11'-0	Pf 0.319
710	15'-0½			34.068				Pe
605	15'-0½			34.386			11'-0	Pv
CM	2.7050	131.78	7.36	120		0.042240	11'-0	Pf 0.465
605	15'-0½	24.28		34.386		Flow (q) from Route 26		Pe
497	15'-0½			34.851			11'-0	Pv
CM	2.7050	156.34	8.73	120		0.057945	12'-0	Pf 0.695
497	15'-0½	24.56		34.851		Flow (q) from Route 3		Pe
390	15'-0½			35.546			12'-0	Pv
CM	2.7050	179.85	10.04	120		0.075089	5'-1½	Pf 1.790
390	15'-0½	23.51		35.546		Flow (q) from Route 28	18'-8½	Pe
382	15'-0½			37.337		T(18'-8½)	23'-10	Pv
CM	2.7050	235.05	13.12	120		0.123207	52'-11	Pf 8.827
382	15'-0½	55.20		37.337		Flow (q) from Route 15	18'-8½	Pe -6.449
395	29'-11			39.714		2E(9'-4½)	71'-7½	Pv
BL	1.4420	40.32	7.92	120		0.101095	425'-7	Pf 44.902
395	29'-11			39.714		PO(7'-5)	18'-7	Pe
373	29'-11			84.617		E(3'-8½), PO(7'-5)	444'-2	Pv
CM	2.7050	83.70	4.67	120		0.018239	2'-1½	Pf 0.380
373	29'-11	43.38		84.617		Flow (q) from Route 19	18'-8½	Pe
374	29'-11			84.997		T(18'-8½)	20'-10	Pv
CM	2.7050	235.05	13.12	120		0.123207	43'-6	Pf 9.972
374	29'-11	151.35		84.997		Flow (q) from Route 11	37'-5	Pe 6.449
380	15'-0½			101.417		2E(9'-4½), T(18'-8½)	80'-11	Pv
CM	2.7050	219.94	12.28	120		0.108958	5'-5	Pf 0.591
380	15'-0½			101.417				Pe
293	15'-0½			102.008			5'-5	Pv
CM	2.7050	224.46	12.53	120		0.113137	11'-0	Pf 1.245
293	15'-0½	4.52		102.008		Flow (q) from Route 16		Pe
184	15'-0½			103.252			11'-0	Pv
CM	2.7050	235.05	13.12	120		0.123207	34'-4	Pf 7.689
184	15'-0½	10.59		103.252		Flow (q) from Route 32	28'-1	Pe 0.434
122	14'-0½			111.375		3E(9'-4½)	62'-5	Pv
FR	3.3340	235.05	8.64	120		0.044509	5'-6½	Pf 0.247
122	14'-0½			111.375				Pe 2.402
121	8'-6			114.024		BOR	5'-6½	Pv
FR	3.3340	235.05	8.64	120		0.044509	2'-1½	Pf 0.094
121	8'-6			114.024				Pe 0.920
74	6'-4½			115.038		f(-0.000)	2'-1½	Pv
FR	3.2600	235.05	9.03	120		0.049650	4'-10½	Pf 5.775
74	6'-4½			115.038			13'-5½	Pe 2.115
3	1'-6			122.928		BFP(-4.866), BV(13'-5½)	18'-4	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
UG	8.3900	235.05	1.36	140	0.000374	69'-2	Pf 0.037
3	1'-6			122.928		30'-6½	Pe 2.384
1	-4'-0			125.350	E(30'-6½), S	99'-8½	Pv
		250.00			Hose Allowance At Source		
1		485.05					
• • • • • Route 2 • • • • •							
SP	1.0490	22.06	8.19	120	0.156064	1'-1½	Pf 0.956
1582	16'-2	22.06	5.6	15.524	Sprinkler,	5'-0	Pe 0.488
848	15'-0½			16.968	PO(5'-0)	6'-1½	Pv
• • • • • Route 3 • • • • •							
SP	1.0490	22.08	8.20	120	0.156238	1'-1½	Pf 0.957
1584	16'-2	22.08	5.6	15.543	Sprinkler,	5'-0	Pe 0.488
850	15'-0½			16.987	PO(5'-0)	6'-1½	Pv
BL	1.4420	33.63	6.61	120	0.072284	8'-0	Pf 1.114
850	15'-0½	11.56		16.987	Flow (q) from Route 23	7'-5	Pe
851	15'-0½			18.102	T(7'-5)	15'-5	Pv
BL	1.4420	56.20	11.04	120	0.186863	10'-11½	Pf 3.437
851	15'-0½	22.57		18.102	Flow (q) from Route 5	7'-5	Pe
733	15'-0½			21.539	PO(7'-5)	18'-4½	Pv
BL	2.2030	127.55	10.74	120	0.108060	27'-4½	Pf 4.434
733	15'-0½	71.35		21.539	Flow (q) from Route 8	13'-7½	Pe
738	15'-0½			25.973	PO(13'-7½)	41'-0½	Pv
CM	2.7050	127.55	7.12	120	0.039764	11'-0	Pf 0.437
738	15'-0½			25.973			Pe
631	15'-0½			26.411		11'-0	Pv
CM	2.7050	103.27	5.77	120	0.026904	11'-0	Pf 0.296
631	15'-0½			26.411			Pe
523	15'-0½			26.706		11'-0	Pv
BL	1.4420	24.56	4.82	120	0.040395	186'-9	Pf 8.145
523	15'-0½			26.706	PO(7'-5)	14'-10½	Pe
497	15'-0½			34.851	PO(7'-5)	201'-7½	Pv
• • • • • Route 4 • • • • •							
SP	1.0490	22.40	8.31	120	0.160441	1'-1½	Pf 0.983
1581	16'-2	22.40	5.6	15.995	Sprinkler,	5'-0	Pe 0.488
846	15'-0½			17.466	PO(5'-0)	6'-1½	Pv
BL	1.4420	22.40	4.40	120	0.034067	5'-3	Pf 0.432
846	15'-0½			17.466		7'-5	Pe
847	15'-0½			17.897	T(7'-5)	12'-8	Pv
• • • • • Route 5 • • • • •							
SP	1.0490	22.57	8.38	120	0.162704	1'-1½	Pf 0.997
1585	16'-2	22.57	5.6	16.239	Sprinkler,	5'-0	Pe 0.488
852	15'-0½			17.724	PO(5'-0)	6'-1½	Pv
BL	1.4420	22.57	4.43	120	0.034547	3'-6	Pf 0.378
852	15'-0½			17.724		7'-5	Pe
851	15'-0½			18.102	T(7'-5)	10'-11½	Pv
• • • • • Route 6 • • • • •							
SP	1.0490	24.72	9.18	120	0.192638	1'-1½	Pf 1.180
1510	16'-2	24.72	5.6	19.492	Sprinkler,	5'-0	Pe 0.488
730	15'-0½			21.160	PO(5'-0)	6'-1½	Pv
BL	2.2030	2.97	0.25	120	0.000103	9'-0	Pf 0.001
730	15'-0½			21.160			Pe
729	15'-0½			21.161		9'-0	Pv
BL	2.2030	27.69	2.33	120	0.006406	4'-6	Pf 0.029
729	15'-0½	24.72		21.161	Flow (q) from Route 7		Pe
728	15'-0½			21.189		4'-6	Pv
• • • • • Route 7 • • • • •							
SP	1.0490	24.72	9.18	120	0.192646	1'-1½	Pf 1.180
1509	16'-2	24.72	5.6	19.493	Sprinkler,	5'-0	Pe 0.488
729	15'-0½			21.161	PO(5'-0)	6'-1½	Pv
• • • • • Route 8 • • • • •							
SP	1.0490	24.75	9.19	120	0.192957	1'-1½	Pf 1.182
1511	16'-2	24.75	5.6	19.527	Sprinkler,	5'-0	Pe 0.488
731	15'-0½			21.197	PO(5'-0)	6'-1½	Pv
BL	2.2030	46.50	3.91	120	0.016709	10'-0	Pf 0.167
731	15'-0½	21.75		21.197	Flow (q) from Route 21		Pe
732	15'-0½			21.364		10'-0	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
BL	2.2030	71.35	6.01	120	0.036890	4'-9	Pf 0.176
732	15'-0½	24.85		21.364	Flow (q) from Route 9		Pe
733	15'-0½			21.539		4'-9	Pv
• • • • • Route 9 • • • • •							
SP	1.0490	24.85	9.22	120	0.194403	1'-1½	Pf 1.191
1512	16'-2	24.85	5.6	19.685	Sprinkler,	5'-0	Pe 0.488
732	15'-0½			21.364	PO(5'-0)	6'-1½	Pv
• • • • • Route 10 • • • • •							
SP	1.0490	24.90	9.24	120	0.195201	1'-1½	Pf 1.196
1508	16'-2	24.90	5.6	19.773	Sprinkler,	5'-0	Pe 0.488
727	15'-0½			21.456	PO(5'-0)	6'-1½	Pv
• • • • • Route 11 • • • • •							
BL	1.4420	35.95	7.06	120	0.081758	458'-9	Pf 39.935
437	29'-11	151.35		43.720	PO(7'-5), Flow (q) from Route 14	29'-8½	Pe
479	29'-11			83.655	4E(3'-8½), PO(7'-5)	488'-5½	Pv
CM	2.7050	151.35	8.45	120	0.054572	5'-10½	Pf 1.342
479	29'-11	115.40		83.655	Flow (q) from Route 12	18'-8½	Pe
374	29'-11			84.997	T(18'-8½)	24'-7	Pv
• • • • • Route 12 • • • • •							
CM	2.7050	115.40	6.44	120	0.033043	12'-9	Pf 0.421
437	29'-11	151.35		43.720	Flow (q) from Route 14		Pe
555	29'-11			44.141		12'-9	Pv
CM	2.7050	72.84	4.07	120	0.014104	13'-3	Pf 0.187
555	29'-11			44.141			Pe
660	29'-11			44.328		13'-3	Pv
BL	1.4420	36.44	7.16	120	0.083832	447'-0	Pf 38.719
660	29'-11			44.328	PO(7'-5)	14'-10½	Pe
693	29'-11			83.047	PO(7'-5)	461'-10½	Pv
CM	2.7050	72.84	4.07	120	0.014104	13'-3	Pf 0.187
693	29'-11	36.40		83.047	Flow (q) from Route 13		Pe
591	29'-11			83.234		13'-3	Pv
CM	2.7050	115.40	6.44	120	0.033043	12'-9	Pf 0.421
591	29'-11	42.56		83.234	Flow (q) from Route 29		Pe
479	29'-11			83.655		12'-9	Pv
• • • • • Route 13 • • • • •							
CM	2.7050	36.40	2.03	120	0.003908	11'-0	Pf 0.043
660	29'-11	36.44		44.328	Flow (q) from Route 12		Pe
780	29'-11			44.371		11'-0	Pv
BL	1.4420	36.40	7.15	120	0.083646	447'-0	Pf 38.633
780	29'-11			44.371	PO(7'-5)	14'-10½	Pe
817	29'-11			83.004	PO(7'-5)	461'-10½	Pv
CM	2.7050	36.40	2.03	120	0.003908	11'-0	Pf 0.043
817	29'-11			83.004			Pe
693	29'-11			83.047		11'-0	Pv
• • • • • Route 14 • • • • •							
CM	2.7050	194.73	10.87	120	0.086982	23'-9½	Pf 3.698
395	29'-11	40.32		39.714	Flow (q) from Route 1	18'-8½	Pe
377	29'-11			43.413	T(18'-8½)	42'-6	Pv
CM	2.7050	151.35	8.45	120	0.054572	5'-7½	Pf 0.307
377	29'-11			43.413			Pe
437	29'-11			43.720		5'-7½	Pv
• • • • • Route 15 • • • • •							
CM	2.7050	27.56	1.54	120	0.002336	11'-0	Pf 0.026
170	15'-0½	27.56		37.103	Flow (q) from Route 25		Pe
298	15'-0½			37.129		11'-0	Pv
CM	2.7050	55.20	3.08	120	0.008444	5'-10½	Pf 0.208
298	15'-0½	27.64		37.129	Flow (q) from Route 27	18'-8½	Pe
382	15'-0½			37.337	T(18'-8½)	24'-7	Pv
• • • • • Route 16 • • • • •							
BL	1.4420	2.50	0.49	120	0.000590	18'-11	Pf 0.011
784	15'-0½	3.73		101.520	Flow (q) from Route 24		Pe
781	15'-0½			101.531		18'-11	Pv
BL	1.4420	3.73	0.73	120	0.001235	83'-11½	Pf 0.104
781	15'-0½	1.23		101.531	Flow (q) from Route 17		Pe
770	15'-0½			101.635		83'-11½	Pv
BL	1.4420	2.49	0.49	120	0.000587	19'-4	Pf 0.011
770	15'-0½			101.635			Pe
767	15'-0½			101.646		19'-4	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
BL	1.4420	3.73	0.73	120	0.001235	9'-5½	Pf 0.021
767	15'-0½	1.23		101.646	Flow (q) from Route 18	7'-5	Pe
698	15'-0½			101.667	PO(7'-5)	16'-11	Pv
CM	2.7050	3.73	0.21	120	0.000058	11'-0	Pf 0.001
698	15'-0½			101.667			Pe
596	15'-0½			101.668		11'-0	Pv
CM	2.7050	7.56	0.42	120	0.000213	11'-0	Pf 0.002
596	15'-0½	3.83		101.668	Flow (q) from Route 30		Pe
494	15'-0½			101.670		11'-0	Pv
CM	2.7050	11.42	0.64	120	0.000458	12'-0	Pf 0.005
494	15'-0½	3.87		101.670	Flow (q) from Route 31		Pe
381	15'-0½			101.675		12'-0	Pv
CM	2.7050	15.11	0.84	120	0.000768	11'-0	Pf 0.008
381	15'-0½	3.68		101.675	Flow (q) from Route 33		Pe
273	15'-0½			101.684		11'-0	Pv
BL	1.4420	4.52	0.89	120	0.001764	168'-9½	Pf 0.324
273	15'-0½			101.684	PO(7'-5)	14'-10½	Pe
293	15'-0½			102.008	PO(7'-5)	183'-7½	Pv
• • • • • Route 17 • • • • •							
BL	1.4420	1.23	0.24	120	0.000158	40'-10	Pf 0.011
784	15'-0½	3.73		101.520	T(7'-5), Flow (q) from Route 24	29'-8½	Pe
781	15'-0½			101.531	3T(7'-5)	70'-7	Pv
• • • • • Route 18 • • • • •							
BL	1.4420	1.23	0.24	120	0.000160	41'-3	Pf 0.011
770	15'-0½			101.635	T(7'-5)	29'-8½	Pe
767	15'-0½			101.646	3T(7'-5)	71'-0	Pv
• • • • • Route 19 • • • • •							
CM	2.7050	43.38	2.42	120	0.005406	8'-10½	Pf 0.048
377	29'-11	151.35		43.413	Flow (q) from Route 14		Pe
231	29'-11			43.461		8'-10½	Pv
BL	1.4420	43.38	8.52	120	0.115717	274'-10	Pf 34.812
231	29'-11			43.461	PO(7'-5)	26'-0	Pe
262	29'-11			78.273	3E(3'-8½), T(7'-5)	300'-10	Pv
BL	1.4420	22.33	4.39	120	0.033884	178'-9	Pf 6.308
262	29'-11			78.273		7'-5	Pe
264	29'-11			84.581	PO(7'-5)	186'-2	Pv
CM	2.7050	43.38	2.42	120	0.005406	6'-6	Pf 0.035
264	29'-11	21.04		84.581	Flow (q) from Route 20		Pe
373	29'-11			84.617		6'-6	Pv
• • • • • Route 20 • • • • •							
BL	1.4420	21.04	4.13	120	0.030359	188'-9	Pf 6.294
262	29'-11			78.273	T(7'-5)	18'-7	Pe
171	29'-11			84.567	E(3'-8½), PO(7'-5)	207'-4	Pv
CM	2.7050	21.04	1.17	120	0.001418	10'-0	Pf 0.014
171	29'-11			84.567			Pe
264	29'-11			84.581		10'-0	Pv
• • • • • Route 21 • • • • •							
BL	2.2030	21.75	1.83	120	0.004098	9'-0	Pf 0.037
730	15'-0½	2.97		21.160	Flow (q) from Route 6		Pe
731	15'-0½			21.197		9'-0	Pv
• • • • • Route 22 • • • • •							
BL	1.4420	16.88	3.32	120	0.020184	49'-11	Pf 1.608
716	15'-0½			30.594	PO(7'-5)	29'-8½	Pe
712	15'-0½			32.201	2T(7'-5), PO(7'-5)	79'-8	Pv
• • • • • Route 23 • • • • •							
BL	1.4420	11.56	2.27	120	0.010017	11'-6	Pf 0.115
849	15'-0½	10.44		16.872	Flow (q) from Route 1		Pe
850	15'-0½			16.987		11'-6	Pv
• • • • • Route 24 • • • • •							
CM	2.7050	15.11	0.84	120	0.000768	5'-7	Pf 0.004
380	15'-0½	219.94		101.417	Flow (q) from Route 1		Pe
400	15'-0½			101.422		5'-7	Pv
CM	2.7050	11.42	0.64	120	0.000458	12'-0	Pf 0.005
400	15'-0½			101.422			Pe
514	15'-0½			101.427		12'-0	Pv
CM	2.7050	7.56	0.42	120	0.000213	11'-0	Pf 0.002
514	15'-0½			101.427			Pe
616	15'-0½			101.429		11'-0	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	2.7050	3.73	0.21	120	0.000058	11'-0	Pf 0.001
616	15'-0½			101.429			Pe
719	15'-0½			101.430		11'-0	Pv
BL	1.4420	3.73	0.73	120	0.001235	50'-6½	Pf 0.090
719	15'-0½			101.430	PO(7'-5)	22'-3½	Pe
784	15'-0½			101.520	4E(3'-8½)	72'-10	Pv
• • • • • Route 25 • • • • •							
CM	2.7050	55.20	3.08	120	0.008444	11'-0	Pf 0.093
411	15'-0½			26.902			Pe
276	15'-0½			26.995		11'-0	Pv
CM	2.7050	27.56	1.54	120	0.002336	11'-0	Pf 0.026
276	15'-0½			26.995			Pe
194	15'-0½			27.020		11'-0	Pv
BL	1.4420	27.56	5.41	120	0.050009	186'-9	Pf 10.083
194	15'-0½			27.020	PO(7'-5)	14'-10½	Pe
170	15'-0½			37.103	PO(7'-5)	201'-7½	Pv
• • • • • Route 26 • • • • •							
BL	1.4420	24.28	4.77	120	0.039559	186'-9	Pf 7.976
631	15'-0½			26.411	PO(7'-5)	14'-10½	Pe
605	15'-0½			34.386	PO(7'-5)	201'-7½	Pv
• • • • • Route 27 • • • • •							
BL	1.4420	27.64	5.43	120	0.050263	186'-9	Pf 10.134
276	15'-0½			26.995	PO(7'-5)	14'-10½	Pe
298	15'-0½			37.129	PO(7'-5)	201'-7½	Pv
• • • • • Route 28 • • • • •							
CM	2.7050	78.71	4.39	120	0.016279	12'-0	Pf 0.195
523	15'-0½	24.56		26.706	Flow (q) from Route 3		Pe
411	15'-0½			26.902		12'-0	Pv
BL	1.4420	23.51	4.62	120	0.037267	198'-6	Pf 8.645
411	15'-0½			26.902	PO(7'-5)	33'-5½	Pe
390	15'-0½			35.546	T(7'-5), 3E(3'-8½), PO(7'-5)	231'-11½	Pv
• • • • • Route 29 • • • • •							
BL	1.5300	42.56	7.43	120	0.083740	447'-0	Pf 39.093
555	29'-11			44.141	PO(9'-11)	19'-10	Pe
591	29'-11			83.234	PO(9'-11)	466'-10	Pv
• • • • • Route 30 • • • • •							
BL	1.4420	3.83	0.75	120	0.001297	168'-9½	Pf 0.238
616	15'-0½			101.429	PO(7'-5)	14'-10½	Pe
596	15'-0½			101.668	PO(7'-5)	183'-7½	Pv
• • • • • Route 31 • • • • •							
BL	1.4420	3.87	0.76	120	0.001323	168'-9½	Pf 0.243
514	15'-0½			101.427	PO(7'-5)	14'-10½	Pe
494	15'-0½			101.670	PO(7'-5)	183'-7½	Pv
• • • • • Route 32 • • • • •							
CM	2.7050	10.59	0.59	120	0.000398	11'-0	Pf 0.004
273	15'-0½	4.52		101.684	Flow (q) from Route 16		Pe
164	15'-0½			101.688		11'-0	Pv
BL	1.4420	10.59	2.08	120	0.008517	168'-9½	Pf 1.564
164	15'-0½			101.688	PO(7'-5)	14'-10½	Pe
184	15'-0½			103.252	PO(7'-5)	183'-7½	Pv
• • • • • Route 33 • • • • •							
BL	1.4420	3.68	0.72	120	0.001207	180'-7½	Pf 0.254
400	15'-0½			101.422	PO(7'-5)	29'-8½	Pe
381	15'-0½			101.675	4E(3'-8½), PO(7'-5)	210'-4	Pv

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

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

C Value Multiplier

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

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SN	Swing Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	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 Reducing Valve
PrV	Pressure Relief Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap

DRY SYSTEM HEADS TO BE GOOSENECKED FOR DROP INSTALL

FDC PER AHJ REQUIRMENTS
RISER ROOM 8" UND

UP TO 2ND

B First Floor East
0-1/8 " = 1 Foot

UPRIGHTS ON 1" SPRIGS, HEADS
0-10" FROM DECK

UPRIGHTS ON SPRIGS 0-10" FROM DECK
DRY PENDENTS BELOW TYP. FOR ALL OVERHANG AREAS ON 1ST FLOOR

DN FROM 2ND

UPRIGHTS ON SPRIGS 0-10" FROM DECK
DRY PENDENTS BELOW TYP. FOR ALL OVERHANG AREAS ON 1ST FLOOR

A First Floor West
0-1/8 " = 1 Foot

Supply Flow Test Data	
Test Conducted By	Lees Summit
Date of Test	5-5-23
Location	Paragon Parkway Lees Summit
Static Pressure	166.000
Residual Pressure:	68.000
Flow	2200.00

KEY PLAN
- NOT TO SCALE -

1: 8" NEW FIRE LINE BY OTHERS. HYDROSTATIC & FLUSHING INSPECTIONS PREFORMED PER NFPA AND AHJ STANDARDS. NFPA INSPECTION FORMS TO BE FILLED OUT BY INSTALLING CONTRACTOR.

2: 8" SPLIT FLANGE & BOLT PACK ATTACHED TO FIRELINE ABOVEGROUND SPIGOT FLANGE TERMINATING 1'-6" ABOVE FINISHED FLOOR.

3: 8" X 3" CONCENTRIC REDUCER.

4: 3" DERRINGER 30 BFP DOUBLE CHECK DETECTOR. PER AHJ STANDARDS. ALARM WIRING AND MONITORING BY OTHERS.

5: 3" GRV CHECK VALVE, 4" 30 DEGREE STORZ FDC PER AHJ REQUIRMENTS, 1/2" BALL DRIP OFF DRAIN T PIPED TO EXTERIOR

6: 2-1/2" DRY PIPE VALVE TYCO DPV-1, 2-1/2" SUPPLY TO DRY SYSTEM WALKWAY. RISER MOUNT OIL-LESS AIR COMPRESSOR, WIRING BY OTHERS. (70 GAL. CAPACITY)

7: 3" FLUSHING T WITH CAP.

8: 3" FLOW SWITCH. ALARM WIRING AND MONITORING BY OTHERS.

9: WATER PRESSURE GAUGE ASSEMBLY.

10: 1-1/4" GROOVED AGF TEST N DRAIN WITH 1/2" PRV & K5.6 ORIFICE.

11: 1-1/4" GALVANIZED 45 ON SYSTEM DRAIN PIPED TO EXTERIOR.

12: GENERAL INFORMATION SIGNAGE. INSTALL VALVE ID SIGNS.

13: SPARE HEAD BOX WITH WRENCH PER NFPA13 6.2.9.

14: MANUAL AIR VENT NEAR HIGHEST POINT IN SYSTEM PER NFPA13 8.16.6 (1" GLOBE VALVE WITH PLUG).

Riser
0½ " = 1 Foot

NOTES:
1. SEE FIGURE 3 PART 3 FOR TRIM ARRANGEMENT WITH BILL OF MATERIALS AND COMPONENT PART NUMBERS.
2. TRIM SHOWN FULLY ASSEMBLED; COMPONENTS SUCH AS GAUGES AND SWITCHES MAY REQUIRE ASSEMBLY IN TRIM AT INSTALLATION.

1" INCH NPT CONNECTION FOR LOCAL SPRINKLER
1/2 INCH NPT CONNECTION FOR SYSTEM AIR SUPPLY
ALARM TEST VALVE (NORMALLY CLOSED)
SYSTEM WATER SUPPLY PRESSURE GAUGE
SYSTEM AIR SUPPLY PRESSURE GAUGE
3/4 INCH NPT CONNECTION TO DRAIN
LOW BODY DRAIN VALVE (NORMALLY CLOSED)
2-1/2 INCH (DN65) or 3 INCH (DN80) MODEL DPV-1 DRY PIPE VALVE (SHO ONLY)
MAIN DRAIN VALVE (NORMALLY CLOSED)
SYSTEM SHUT-OFF VALVE (NORMALLY OPEN)
1-1/4 INCH NPT CONNECTION TO DRAIN
1-1/4 INCH NPT CONNECTION TO DRAIN
DRIP FUNNEL
LOW AIR PRESSURE ALARM SWITCH
SYSTEM RISER CHECK VALVE (NORMALLY OPEN)
WATERFLOW PRESSURE ALARM SWITCH
GROOVED COUPLING
1/2 INCH NPT CONNECTION FOR OPTIONAL ACCELERATOR
AUTOMATIC DRAIN VALVE

FIGURE 3 - PART 1 OF 3
2-1/2 AND 3 INCH (DN65 AND DN80) MODEL DPV-1 DRY PIPE VALVE
PRE-TRIMMED ASSEMBLY

#1

#1: 3/8" TOP BEAM CLAMP, 3/8" ALL THREAD ROD, SPLIT HANGER RING.PIPE IS MAINLY HUNG WITH THIS HANGER.

Hydraulic Information	
Remote Area 1 1st Floor SW	
OCCUPANCY CLASSIFICATION	Ordinary Group II
DENSITY (gpm/ft²)	0.20 for 1500.00 ft² (Actual 1097.54 ft²)
QUICK RESPONSE REDUCTION	17'-0 Ceiling (29.5%) 1057.50 ft²
TOTAL HOSE STREAMS	250.00
TOTAL HEADS FLOWING	10
K-FACTOR	5.6
TOTAL WATER REQUIRED	485.05
TOTAL PRESSURE REQUIRED	125.350
BASE of RISER (gpm)	235.05
BASE of RISER (psi)	114.024
SAFETY MARGIN (psi)	+34.674 (21.7%)

Hydraulic Information	
Remote Area 2 Dry Walkway	
OCCUPANCY CLASSIFICATION	Light Hazard
DENSITY (gpm/ft²)	0.10 for 1950.00 ft² (Actual 2039.92 ft²)
TOTAL HOSE STREAMS	100.00
TOTAL HEADS FLOWING	12
K-FACTOR	5.6
TOTAL WATER REQUIRED	341.30
TOTAL PRESSURE REQUIRED	93.563
BASE of RISER (gpm)	0.00
BASE of RISER (psi)	83.018
SAFETY MARGIN (psi)	+69.318 (42.6%)

FOGEL ANDERSON
EST. 1917

SEAL:
5-24-23
STATE OF MISSOURI
MATTHEW JAMES ZEISE
NUMBER PE-2009030059
PROFESSIONAL ENGINEER

Building Construction Type:
Non-combustible obstructed construction

Ordinary Hazard 2 & light in 1st floor retail
Light hazard on 2nd floor

Sprinkler Legend

Symbol	Manufacturer	SIN	Model	Quantity	K-Factor	Type	Size	Response	Finish	Temperature	Note
○	Viking	VK300	Microfast	576	5.6	Upright	½	Quick	Brass	175 °F	1" Sprig
⋈	Tyco	TY3255	DS-1	48	5.6	Pendent	1	Quick	Chrome	175 °F	Dry head
▶	Viking	VK305	Microfast	9	5.6	Sidewall	½	Quick	Chrome	155 °F	
●	Viking	VK4621		14	5.6	Pendent	½	Quick	Brass	175 °F	White Coverplate
				Total = 647							

1. FIRE SPRINKLER DESIGN PER NFPA 13 2016 EDITION.
2. OWNER SHALL MAINTAIN SYSTEM PER NFPA 25.
3. ALL MATERIALS USED SHALL COMPLY WITH SPECIFIED REQUIREMENTS.
4. CONTINUOUS CENTRAL MONITORING OF ALARM COMPONENTS PER NFPA 72 SHALL BE BY OTHERS.
5. ALL ALARM AND ELECTRICAL WORK ASSOCIATED WITH INSTALLED COMPONENTS SHALL BE BY OTHERS.
6. ALL UNDERGROUND WORK BY OTHERS. FIRE LINE SHALL BE FLUSHED PER NFPA 24 REQUIREMENTS OVER AND ABOVE LOCAL WATER JURISDICTION REQUIREMENTS. NFPA TEST PAPERS FILLED OUT AND SIGNED BY INSTALLER SHALL BE SUBMITTED TO GENERAL CONTRACTOR PRIOR TO THE ABOVEGROUND SYSTEM BEING PUT INTO SERVICE.
7. ANY PAINTING OF PIPE BY OTHERS.
8. CONDITIONING OF BUILDING ENVELOPE TO PREVENT WATER FREEZING IN PIPES SHALL BE BY OTHERS BEFORE AND AFTER OCCUPANCY.
9. ANY LABELING OF PIPE BY OTHERS.
10. 6" & 8" PIPE WITH GROOVED ENDS SHOULD BE SCHEDULE 10. 4"-1 1/2" SHOULD BE SCHEDULE 7 EDDY FLOW.
11. PIPE WITH THREADED ENDS SHALL BE SCHEDULE 40.

REVISIONS:

SCALE: 1/8 = 1'

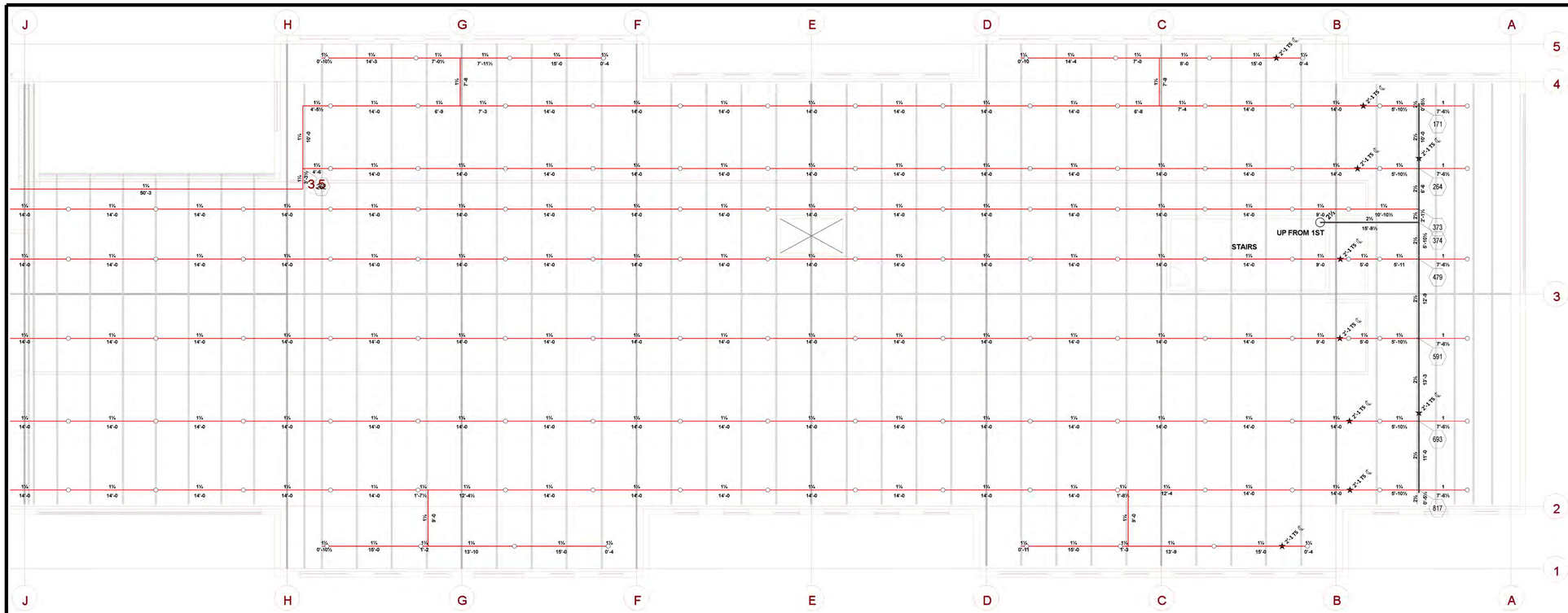
Alliance FIRE PROTECTION
130 W 9th Ave. Suite 101
North Kansas City, MO 64116
PH: 913-888-0647 FAX: 913-888-0618
WWW.AFPSPRINK.COM

PLOT DATE: 05/24/23 FILE NAME: NC-1376 Paragon Star #2 draw

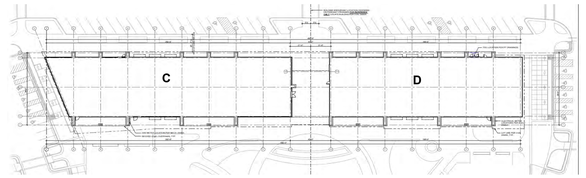
DRAWN BY: DB
DATE: 5-24-23
JOB #: NC 1376
SHEET NO: 1 OF 2

JOB NAME:
Paragon Star BLD 2 Lot 9
3201 NW Paragon Parkway Lee's Summit MO

CONTRACTOR:
Fogel-Anderson
1212 E 8th St, Kansas City, MO 64106

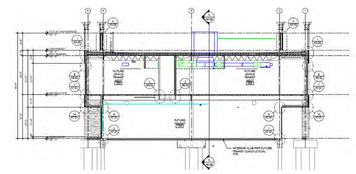


D Second Floor East
0-1/8 " = 1 Foot



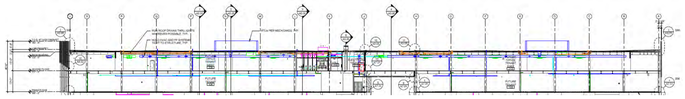
KEY PLAN
- NOT TO SCALE -

Second Floor Light Hazard

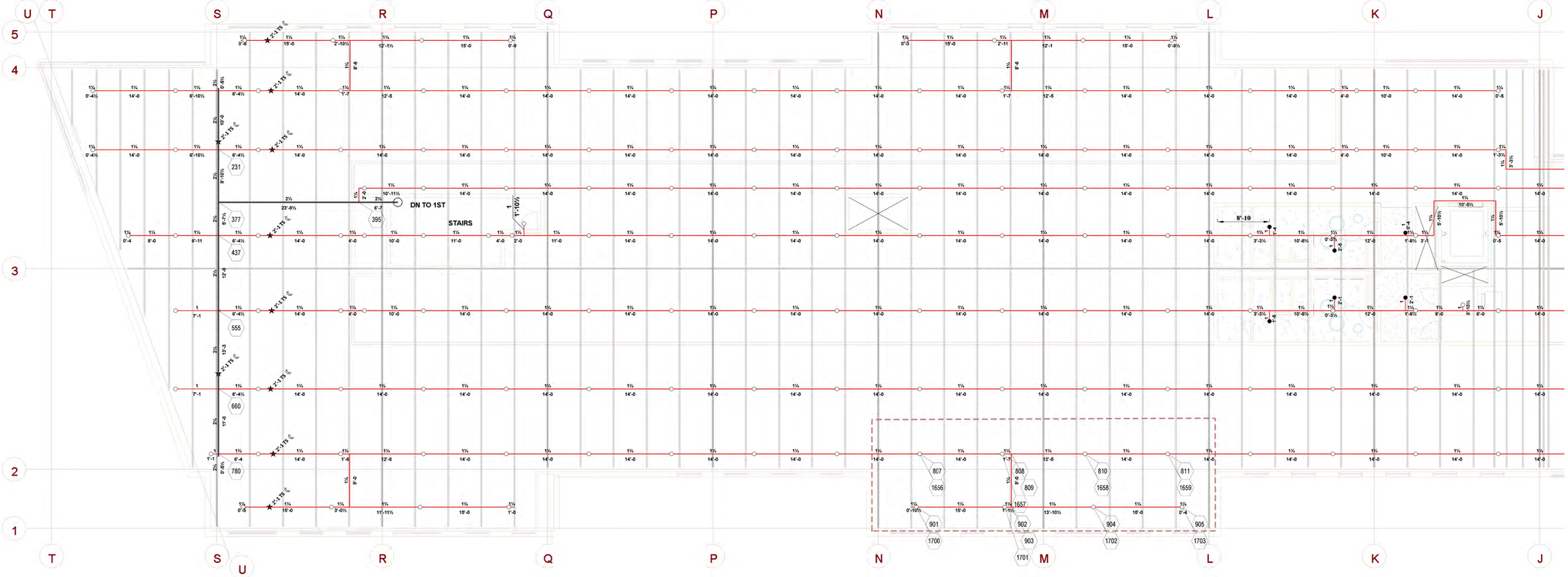


SECTION VIEW
- NOT TO SCALE -

UPRIGHTS ON 1" SPRIGS, HEADS 0-10" FROM DECK



SECTION VIEW
- NOT TO SCALE -



C Second Floor West
0-1/8 " = 1 Foot

#1: 3/8" TOP BEAM CLAMP, 3/8" ALL THREAD ROD, SPLIT HANGER RING.PIPE IS MAINLY HUNG WITH THIS HANGER.

Hydraulic Information	
Remote Area 3 2nd Floor SW	
OCCUPANCY CLASSIFICATION	Light Hazard
DENSITY (gpm/ft²)	0.10 for 1500.00 ft² (Actual 1102.60 ft²)
QUICK RESPONSE REDUCTION	15'-0 Ceiling (32.5%) 1012.50 ft²
TOTAL HOSE STREAMS	100.00
TOTAL HEADS FLOWING	8
K-FACTOR	5.6
TOTAL WATER REQUIRED	247.29
TOTAL PRESSURE REQUIRED	106.232
BASE of RISER (gpm)	147.29
BASE of RISER (psi)	97.670
SAFETY MARGIN (psi)	+58.050 (35.3%)

FOGEL ANDERSON
EST. 1917

SEAL:
5-24-23
COMMONWEALTH OF MISSOURI
MATTHEW JAMES ROUSE
NUMBER PE-2009030081
PROFESSIONAL ENGINEER

Building Construction Type:
Non-combustible obstructed construction

Ordinary Hazard 2 & light in 1st floor retail
Light hazard on 2nd floor

Sprinkler Legend

Symbol	Manufacturer	SIN	Model	Quantity	K-Factor	Type	Size	Response	Finish	Temperature	Note
	Viking	VK300	Microfast	576	5.6	Upright	½	Quick	Brass	175 °F	1" Sprig
	Tyco	TY3255	DS-1	48	5.6	Pendent	1	Quick	Chrome	175 °F	Dry head
	Viking	VK305	Microfast	9	5.6	Sidewall	½	Quick	Chrome	155 °F	
	Viking	VK4621		14	5.6	Pendent	½	Quick	Brass	175 °F	White Coverplate
				Total = 647							

1. FIRE SPRINKLER DESIGN PER NFPA 13 2016 EDITION.
2. OWNER SHALL MAINTAIN SYSTEM PER NFPA 25.
3. ALL MATERIALS USED SHALL COMPLY WITH SPECIFIED REQUIREMENTS.
4. CONTINUOUS CENTRAL MONITORING OF ALARM COMPONENTS PER NFPA 72 SHALL BE BY OTHERS.
5. ALL ALARM AND ELECTRICAL WORK ASSOCIATED WITH INSTALLED COMPONENTS SHALL BE BY OTHERS.
6. ALL UNDERGROUND WORK BY OTHERS. FIRE LINE SHALL BE FLUSHED PER NFPA 24 REQUIREMENTS OVER AND ABOVE LOCAL WATER JURISDICTION REQUIREMENTS. NFPA TEST PAPERS FILLED OUT AND SIGNED BY INSTALLER SHALL BE SUBMITTED TO GENERAL CONTRACTOR PRIOR TO THE ABOVEGROUND SYSTEM BEING PUT INTO SERVICE.
7. ANY PAINTING OF PIPE BY OTHERS.
8. CONDITIONING OF BUILDING ENVELOPE TO PREVENT WATER FREEZING IN PIPES SHALL BE BY OTHERS BEFORE AND AFTER OCCUPANCY.
9. ANY LABELING OF PIPE BY OTHERS.
10. 6" & 8" PIPE WITH GROOVED ENDS SHOULD BE SCHEDULE 10. 4"-1 1/2" SHOULD BE SCHEDULE 7 EDDY FLOW.
11. PIPE WITH THREADED ENDS SHALL BE SCHEDULE 40.

REVISIONS:

SCALE: 1/8 = 1'
1" 2" 8'

Alliance FIRE PROTECTION
130 W 9th Ave. Suite 101
North Kansas City, MO 64116
PH: 913-888-0647 FAX: 913-888-0618
WWW.AFPSPRINK.COM

PLOT DATE: 05/24/23 FILE NAME: NC-1376 Paragon Star #2 draw

DRAWN BY: DB
DATE: 5-24-23
JOB #: NC 1376
SHEET NO: 2 OF 2

JOB NAME:
Paragon Star BLD 2 Lot 9
3201 NW Paragon Parkway Lee's Summit MO

CONTRACTOR:
Fogel-Anderson
1212 E 8th St, Kansas City, MO 64106