

SECTION SEVEN: FIRE PROTECTION

A. Applicable Codes, Standards and Documents:

1. UFC 3-600-01, 8 August, 2016, Fire Protection for Facilities, Engineering, Design and Construction.
2. NFPA 13 - 2013 edition - Installation of Sprinkler Systems.
3. NFPA 72 – 2013 edition, National Fire Alarm Code.
4. NFPA 101 – 2015 edition, Safety to Life From Fire in Buildings and Structures.
5. IBC – 2015 edition – International Building Code.
6. Base Facility Design Standard – Hill Air Force Base, 19 March 2014

B. Fire Detection and Alarm:

1. **General Scope of Work:** The existing building is protected throughout by an existing, addressable fire alarm system with Siemens MXL FACP. The existing fire alarm system will be expanded as required for the 2nd floor addition. New addressable notification appliances will be provided above and below the new floor level. Existing fire alarm initiating devices in existing portions of the building not undergoing remodel will remain. New portions of the fire alarm system will meet all applicable requirements of UFC 3-600-01, NFPA 72 and Hill AFB Standards.
2. **Fire Alarm Control Equipment:**
 - a. FACP: Existing Siemens MXL FACP is located at the north building entrance. FACP location is outside the 2nd floor addition and will remain. FACP programming to be updated as required for the addition of new fire alarm initiating devices
 - b. Existing Monaco fire alarm radio transceiver is mounted adjacent to existing FACP to remain. Existing equipment has sufficient capacity for minor remodel/expansion proposed. All Monaco reporting zones to remain as currently constituted.
3. **Initiating Devices:**
 - a. Fire sprinkler protection is provided at roof deck at location of 2nd floor addition. Existing fire sprinkler system to be extended to protect below new 2nd floor level.. Existing valve supervisory and water flow switches (connected to existing Siemens FACP for monitoring) to remain.
4. **Notification Appliances:**
 - a. Existing notification appliances throughout building (except remodel areas) to remain. Existing notification appliances incorporate visible (strobe) and audible (horns) signals.
 - b. Add and/or relocate notification appliances for 2nd floor addition. Number, location and candela rating of existing/new notification appliances to conform to all applicable requirements of NFPA 72 and the following:
 - i. Visible (strobes) and audible (horns) signals to be provided through mezzanine addition and restroom remodel area.
 - ii. Visible (strobes) and audible (horns) signals throughout building to be synchronized.

- iii. Visible signals (strobes) to be clear and shall meet intensity requirements specified in NFPA 72 for space protected.
 - iv. Audible signals (horns) will be sufficient to provide a sound level of 15 dB above average ambient sound levels throughout all areas.
 - c. All new or relocated notification appliance to be connected to existing fire alarm system for power and control. Add supervised, 24VDC power supplies as required to power new notification appliances
- 5. **Protected Premise Fire Safety Interfaces**
 - a. All existing protected premise fire safety functions that are part of the existing fire alarm system (fan shutdown, fire door release, etc.) to remain.
- 6. **Interface with Base Fire Reporting System** – Existing Monaco fire alarm transceiver to remain. All Monaco reporting zones to remain as currently constituted.

C. Fire Sprinkler System:

- 1 **General Scope of Work** – The existing building is protected throughout by existing fire sprinkler systems which will be remodeled/expanded as required to meet all applicable requirements of UFC 3-600-01, NFPA 13 and Hill AFB Standards. Add and/or relocate existing fire sprinklers as required to accommodate the 2nd floor addition.
- 2. **Wet-pipe Fire Sprinkler System Remodel/Expansion**
 - a. System Extent – Existing building is protected throughout by wet-pipe fire sprinkler systems. Existing fire sprinkler system were designed in accordance with the pipe schedule method on NFPA 13. Existing fire sprinklers at roof deck of existing building were installed prior to 1950 and exceed 50 years of age. Funding to replace fire sprinklers at room deck is not provided for this project. Existing fire sprinklers at roof deck will not be replaced and will remain in service.
 - b. System Zoning –Existing fire sprinkler system is divided into the following distinct zones. A riser for each zone is provided along the east or west wall of the existing building
 - Zone 1: Northwest building quadrant
 - Zone 2: Northeast building quadrant
 - Zone 3: Southeast building quadrant
 - Zone 4: Southwest building quadrant
 - c. 2nd Floor Expansion –
 - i. Demolish existing fire sprinkler and piping in Offices 140, 141, 142 and 143 as required to facilitate 2nd floor addition.
 - ii. Install new fire sprinklers below 2nd floor addition including remodeled offices 140, 141, 142 and 143. New fire sprinklers to be supplied by connection to existing 4” cross main at roof deck near northwest corner of 2nd floor addition. Fire sprinkler system protecting below 2nd floor to be designed in accordance with the hydraulic calculation method of NFPA 13.

- iii. Occupancy Classification – Remodeled offices will meet requirements for classification as HC-1 as defined by FM Global Data Sheet 3-26 (or light hazard as defined by NFPA 13). New work areas below 2nd floor addition will meet requirements for classification as HC-2 as defined by FM Global Data Sheet 3-26 (ordinary hazard group 2 as defined by NFPA 13).
- iv. Required Fire Sprinkler Design Density:
 HC-1 - 0.10 gpm/sq. ft over 1,500 sq ft (or largest room/area)
 HC-2 – 0.20 gpm/sq ft over 2,500 sq ft (or largest room/area)
- v. Hose Allowance:
 HC-1 – 100 gpm
 HC-2 – 250 gpm
- vi. Maximum Fire Sprinkler Spacing
 HC-1 – 225 sq ft per sprinkler
 HC-2 – 130 sq ft per sprinkler
- vii. Hydraulic Design: Hydraulic calculations for work areas below 2nd floor addition are provided in Appendix A.
- d. Piping – All new interior piping used for the fire sprinkler system shall be black steel schedule 40 piping conforming to ASTM A53A.
- e. Fittings – New fittings shall be threaded, flanged or grooved.
- f. Piping Supports – New piping shall be supported from building structure. Hanger components shall be of ferrous materials and be listed for fire protection service. A minimum of 1 hanger will be provided per length of pipe with a maximum distance of 12’ between hangers for piping 1” and 1-1/4” nominal diameter and 15’ between hangers for piping 2” and greater nominal diameter.
- g. Sway Bracing – The existing building is located in seismic zone. Sway bracing will be provided on all new fire sprinkler piping. Bracing will conform to the requirements of NFPA 13.

D. Fire Protection Water Supply

1. **Water Distribution System** – New fire sprinklers to be supplied by existing, 6” riser for northwest quadrant of Building 265 located on the west wall approximately 150’ west of 2nd floor addition. Existing riser is supplied from high pressure water system for east flight line.
2. **Available Water Pressure and Flow** – Fire hydrant flow testing for high pressure water system is not possible (no fire hydrants). Available water pressures and flow from the high pressure water system at Building 265 are estimated to be:
 - a. Static Pressure: 130psi
 - b. Residual Pressure: 120 psi
 - c. Flow: 2,000 gpm
3. **Required Water Pressure and Flow:**
 - a. Required Pressure at Connection to HP Water System: 95.5 psi
 - b. Required Flow at POC: 1126.7 gpm (includes 250 gpm hose allowance)
 - c. Estimated available Pressure at POC at 1126.7 gpm: 126.5 psi
 - f. Pressure Margin: 31 psi (33%)

Complete fire sprinkler hydraulic calculations are contained in appendix A of this narrative

**APPENDIX A
HYDRAULIC CALCULATIONS
(NEW PIPING BELOW 2ND LEVEL)**

SPRINKLER SYSTEM HYDRAULIC ANALYSIS

DATE: 1/4/2017 AIR FORCE BASE\BUILDING 265\2016 MEZZANINE ADDITION\RA1.SDF
 JOB TITLE: HAFB BUILDING 265 2ND FLOOR ADDITION

WATER SUPPLY DATA

SOURCE NODE TAG	STATIC PRESS. (PSI)	RESID. PRESS. (PSI)	FLOW @ (GPM)	AVAIL. PRESS. (PSI)	TOTAL @ DEMAND (GPM)	REQ'D PRESS. (PSI)
A	130.0	120.0	2000.0	126.5	1126.7	95.5

Required pressure is 31.1 psi (25%) less than available pressure.

AGGREGATE FLOW ANALYSIS:

TOTAL FLOW AT SOURCE	1126.7 GPM
TOTAL HOSE STREAM ALLOWANCE AT SOURCE	250.0 GPM
OTHER HOSE STREAM ALLOWANCES	0.0 GPM
TOTAL DISCHARGE FROM ACTIVE SPRINKLERS	876.7 GPM

NODE ANALYSIS DATA

NODE TAG	ELEVATION (FT)	NODE TYPE	PRESSURE (PSI)	DISCHARGE (GPM)	AREA (FT^2)	DENSITY	
						REQ. (GPM/FT^2)	ACT.
A	0.0	SOURCE	95.5	876.7	- - -	- - -	- - -
B	1.0	- - -	91.5	- - -	- - -	- - -	- - -
C	2.0	- - -	91.0	- - -	- - -	- - -	- - -
D	2.0	- - -	81.0	- - -	- - -	- - -	- - -
1	4.0	- - -	80.1	- - -	- - -	- - -	- - -
2	20.0	- - -	72.7	- - -	- - -	- - -	- - -
3	20.0	- - -	68.2	- - -	- - -	- - -	- - -
4	24.0	- - -	63.6	- - -	- - -	- - -	- - -
5	24.0	- - -	59.4	- - -	- - -	- - -	- - -
6	10.0	- - -	53.9	- - -	- - -	- - -	- - -
7	10.0	- - -	50.6	- - -	- - -	- - -	- - -
8	10.0	- - -	50.2	- - -	- - -	- - -	- - -
9	10.0	- - -	34.9	- - -	- - -	- - -	- - -
10	10.0	- - -	28.0	- - -	- - -	- - -	- - -
11	10.0	- - -	23.4	- - -	- - -	- - -	- - -
12	10.0	- - -	20.8	- - -	- - -	- - -	- - -
13	10.0	- - -	18.8	- - -	- - -	- - -	- - -
14	10.0	- - -	17.4	- - -	- - -	- - -	- - -
15	10.0	- - -	16.7	- - -	- - -	- - -	- - -
16	10.0	- - -	16.2	- - -	- - -	- - -	- - -
17	10.0	- - -	16.1	- - -	- - -	- - -	- - -
101	11.5	K= 8.00	33.9	46.6	106.0	0.200	0.439
102	11.5	K= 8.00	28.0	42.4	106.0	0.200	0.400
103	11.5	K= 8.00	22.7	38.1	106.0	0.200	0.359
104	11.5	K= 8.00	35.6	47.7	106.0	0.200	0.450
105	11.5	K= 8.00	30.7	44.3	106.0	0.200	0.418
106	11.5	K= 5.60	27.0	29.1	150.0	0.100	0.194
107	11.5	K= 8.00	27.6	42.1	106.0	0.200	0.397

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NODE ANALYSIS DATA

NODE TAG	ELEVATION (FT)	NODE TYPE	PRESSURE (PSI)	DISCHARGE (GPM)	AREA (FT^2)	DENSITY	
						REQ. (GPM/FT^2)	ACT.
108	11.5	K= 8.00	22.2	37.7	106.0	0.200	0.355
109	11.5	K= 8.00	19.3	35.1	106.0	0.200	0.331
110	11.5	K= 8.00	16.5	32.5	106.0	0.200	0.306
111	11.5	K= 5.60	14.4	21.2	150.0	0.100	0.142
112	11.5	K= 8.00	15.9	31.9	106.0	0.200	0.301
113	11.5	K= 8.00	13.6	29.5	106.0	0.200	0.278
114	11.5	K= 5.60	12.1	19.5	150.0	0.100	0.130
115	11.5	K= 8.00	16.1	32.1	106.0	0.200	0.303
116	11.5	K= 8.00	12.8	28.7	106.0	0.200	0.270
117	11.5	K= 8.00	14.5	30.5	106.0	0.200	0.287
118	11.5	K= 8.00	11.5	27.1	106.0	0.200	0.256
119	11.5	K= 8.00	11.7	27.3	106.0	0.200	0.258
120	11.5	K= 8.00	9.9	25.2	106.0	0.200	0.238
121	11.5	K= 5.60	8.5	16.4	150.0	0.100	0.109
122	11.5	K= 8.00	12.8	28.6	106.0	0.200	0.270
123	11.5	K= 8.00	10.1	25.5	106.0	0.200	0.240
124	11.5	K= 8.00	10.8	26.3	106.0	0.200	0.249
125	11.5	K= 8.00	9.2	24.3	106.0	0.200	0.229
126	11.5	K= 5.60	7.9	15.7	150.0	0.100	0.105
127	10.5	K= 8.00	10.8	26.3	106.0	0.200	0.248
128	10.5	K= 8.00	8.8	23.8	106.0	0.200	0.224
129	10.5	K= 8.00	7.0	21.2	106.0	0.200	0.200

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PIPE DATA

PIPE TAG	END	ELEV.	NOZ.	PT	DISC.	Q (GPM)	DIA (IN)	LENGTH	PRESS.
	NODES	(FT)	(K)	(PSI)	(GPM)	VEL (FPS)	HW (C)	(FT)	SUM.
							FL/FT		(PSI)
	Pipe: 1					876.7	6.280	PL 150.00	PF 3.5
A		0.0	SRCE	95.5	(N/A)	9.1	140	FTG TG	PE -0.4
B		1.0	0.0	91.5	0.0		0.017	TL 202.00	PV
	Pipe: 2					876.6	6.065	PL 1.00	PF 0.0
B		1.0	0.0	91.5	0.0	9.7	120	FTG ----	PE -0.4
C		2.0	0.0	91.0	0.0		0.028	TL 1.00	PV
	Pipe: 3							FIXED PRESSURE LOSS DEVICE	
C		2.0	0.0	91.0	0.0		10.0 psi,	876.6 gpm	
D		2.0	0.0	81.0	0.0				
	Pipe: 4					876.6	6.065	PL 2.00	PF 0.1
D		2.0	0.0	81.0	0.0	9.7	120	FTG ----	PE -0.9
1		4.0	0.0	80.1	0.0		0.028	TL 2.00	PV
	Pipe: 5					876.6	6.065	PL 16.00	PF 0.4
1		4.0	0.0	80.1	0.0	9.7	120	FTG ----	PE -6.9
2		20.0	0.0	72.7	0.0		0.028	TL 16.00	PV
	Pipe: 6					876.6	6.065	PL 150.00	PF 4.5
2		20.0	0.0	72.7	0.0	9.7	120	FTG E	PE 0.0
3		20.0	0.0	68.2	0.0		0.028	TL 164.00	PV
	Pipe: 7					876.6	4.026	PL 4.00	PF 2.8
3		20.0	0.0	68.2	0.0	22.1	120	FTG E	PE -1.7
4		24.0	0.0	63.6	0.0		0.203	TL 14.00	PV
	Pipe: 8					876.6	4.026	PL 1.00	PF 4.3
4		24.0	0.0	63.6	0.0	22.1	120	FTG T	PE 0.0
5		24.0	0.0	59.4	0.0		0.203	TL 21.00	PV
	Pipe: 9					876.6	4.026	PL 17.00	PF 11.6
5		24.0	0.0	59.4	0.0	22.1	120	FTG 2ET	PE 6.1
6		10.0	0.0	53.9	0.0		0.203	TL 57.00	PV
	Pipe: 10					248.1	2.469	PL 3.50	PF 3.3
6		10.0	0.0	53.9	0.0	16.6	120	FTG T	PE 0.0
7		10.0	0.0	50.6	0.0		0.212	TL 15.50	PV
	Pipe: 11					127.0	2.469	PL 6.50	PF 0.4
7		10.0	0.0	50.6	0.0	8.5	120	FTG ----	PE 0.0
8		10.0	0.0	50.2	0.0		0.062	TL 6.50	PV
	Pipe: 12					628.5	2.469	PL 4.00	PF 19.0
6		10.0	0.0	53.9	0.0	42.1	120	FTG T	PE 0.0
9		10.0	0.0	34.9	0.0		1.186	TL 16.00	PV

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PIPE TAG	END	ELEV.	NOZ.	PT	DISC.	Q (GPM)	DIA (IN)	LENGTH	PRESS.		
NODES	(FT)	(K)	(PSI)	(GPM)	VEL (FPS)	HW (C)	FL/FT	(FT)	SUM.	(PSI)	
	Pipe: 13					548.8	2.469	PL	7.50	PF	6.9
9	10.0	0.0	34.9	0.0	36.8	120	FTG	----	PE	0.0	
10	10.0	0.0	28.0	0.0		0.922	TL	7.50	PV		
	Pipe: 14					459.9	2.469	PL	7.00	PF	4.7
10	10.0	0.0	28.0	0.0	30.8	120	FTG	----	PE	0.0	
11	10.0	0.0	23.4	0.0		0.665	TL	7.00	PV		
	Pipe: 15					379.1	2.469	PL	5.50	PF	2.6
11	10.0	0.0	23.4	0.0	25.4	120	FTG	----	PE	0.0	
12	10.0	0.0	20.8	0.0		0.465	TL	5.50	PV		
	Pipe: 16					318.3	2.469	PL	6.00	PF	2.0
12	10.0	0.0	20.8	0.0	21.3	120	FTG	----	PE	0.0	
13	10.0	0.0	18.8	0.0		0.337	TL	6.00	PV		
	Pipe: 17					260.7	2.469	PL	6.00	PF	1.4
13	10.0	0.0	18.8	0.0	17.5	120	FTG	----	PE	0.0	
14	10.0	0.0	17.4	0.0		0.233	TL	6.00	PV		
	Pipe: 18					191.8	2.469	PL	5.50	PF	0.7
14	10.0	0.0	17.4	0.0	12.8	120	FTG	----	PE	0.0	
15	10.0	0.0	16.7	0.0		0.132	TL	5.50	PV		
	Pipe: 19					137.7	2.469	PL	6.00	PF	0.4
15	10.0	0.0	16.7	0.0	9.2	120	FTG	----	PE	0.0	
16	10.0	0.0	16.2	0.0		0.071	TL	6.00	PV		
	Pipe: 20					71.3	2.469	PL	7.00	PF	0.1
16	10.0	0.0	16.2	0.0	4.8	120	FTG	----	PE	0.0	
17	10.0	0.0	16.1	0.0		0.021	TL	7.00	PV		
	Pipe: 21					127.0	1.380	PL	6.00	PF	15.7
8	10.0	0.0	50.2	0.0	27.2	120	FTG	ET	PE	-0.6	
101	11.5	8.0	33.9	46.6		1.046	TL	15.00	PV		
	Pipe: 22					80.4	1.380	PL	13.00	PF	5.8
101	11.5	8.0	33.9	46.6	17.3	120	FTG	----	PE	0.0	
102	11.5	8.0	28.0	42.4		0.449	TL	13.00	PV		
	Pipe: 23					38.1	1.049	PL	12.50	PF	5.4
102	11.5	8.0	28.0	42.4	14.1	120	FTG	----	PE	0.0	
103	11.5	8.0	22.7	38.1		0.428	TL	12.50	PV		
	Pipe: 24					121.1	1.380	PL	6.00	PF	14.4
7	10.0	0.0	50.6	0.0	26.0	120	FTG	ET	PE	-0.6	
104	11.5	8.0	35.6	47.7		0.958	TL	15.00	PV		

SPRINKLER SYSTEM HYDRAULIC ANALYSIS

DATE: 1/4/2017 AIR FORCE BASE\BUILDING 265\2016 MEZZANINE ADDITION\RA1.SDF
 JOB TITLE: HAFB BUILDING 265 2ND FLOOR ADDITION

PIPE TAG	END	ELEV.	NOZ.	PT	DISC.	Q (GPM)	DIA (IN)	LENGTH	PRESS.		
NODES	(FT)	(K)	(PSI)	(GPM)	VEL (FPS)	HW (C)	FL/FT	(FT)	SUM.	(PSI)	
	Pipe: 25					73.4	1.380	PL	13.00	PF	4.9
104	11.5	8.0	35.6	47.7	15.7	120	FTG	----	PE	0.0	
105	11.5	8.0	30.7	44.3		0.379	TL	13.00	PV		
	Pipe: 26					29.1	1.049	PL	12.00	PF	3.6
105	11.5	8.0	30.7	44.3	10.8	120	FTG	E	PE	0.0	
106	11.5	5.6	27.0	29.1		0.260	TL	14.00	PV		
	Pipe: 27					79.7	1.380	PL	6.00	PF	6.6
9	10.0	0.0	34.9	0.0	17.1	120	FTG	ET	PE	-0.6	
107	11.5	8.0	27.6	42.1		0.442	TL	15.00	PV		
	Pipe: 28					37.7	1.049	PL	13.00	PF	5.5
107	11.5	8.0	27.6	42.1	14.0	120	FTG	----	PE	0.0	
108	11.5	8.0	22.2	37.7		0.420	TL	13.00	PV		
	Pipe: 29					88.8	1.380	PL	6.00	PF	8.1
10	10.0	0.0	28.0	0.0	19.1	120	FTG	ET	PE	-0.6	
109	11.5	8.0	19.3	35.1		0.540	TL	15.00	PV		
	Pipe: 30					53.7	1.380	PL	13.00	PF	2.8
109	11.5	8.0	19.3	35.1	11.5	120	FTG	----	PE	0.0	
110	11.5	8.0	16.5	32.5		0.213	TL	13.00	PV		
	Pipe: 31					21.2	1.049	PL	12.50	PF	2.1
110	11.5	8.0	16.5	32.5	7.9	120	FTG	E	PE	0.0	
111	11.5	5.6	14.4	21.2		0.145	TL	14.50	PV		
	Pipe: 32					80.9	1.380	PL	6.00	PF	6.8
11	10.0	0.0	23.4	0.0	17.3	120	FTG	ET	PE	-0.6	
112	11.5	8.0	15.9	31.9		0.454	TL	15.00	PV		
	Pipe: 33					49.0	1.380	PL	13.00	PF	2.3
112	11.5	8.0	15.9	31.9	10.5	120	FTG	----	PE	0.0	
113	11.5	8.0	13.6	29.5		0.179	TL	13.00	PV		
	Pipe: 34					19.5	1.049	PL	11.50	PF	1.4
113	11.5	8.0	13.6	29.5	7.2	120	FTG	----	PE	0.0	
114	11.5	5.6	12.1	19.5		0.124	TL	11.50	PV		
	Pipe: 35					60.8	1.380	PL	6.00	PF	4.0
12	10.0	0.0	20.8	0.0	13.0	120	FTG	ET	PE	-0.6	
115	11.5	8.0	16.1	32.1		0.268	TL	15.00	PV		
	Pipe: 36					28.7	1.049	PL	13.00	PF	3.3
115	11.5	8.0	16.1	32.1	10.6	120	FTG	----	PE	0.0	
116	11.5	8.0	12.8	28.7		0.253	TL	13.00	PV		

SPRINKLER SYSTEM HYDRAULIC ANALYSIS

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PIPE TAG	END	ELEV.	NOZ.	PT	DISC.	Q (GPM)	DIA (IN)	LENGTH	PRESS.		
NODES	(FT)	(K)	(PSI)	(GPM)	VEL (FPS)	HW (C)	FL/FT	(FT)	SUM.		
									(PSI)		
Pipe: 37						57.6	1.380	PL	6.00	PF	3.6
13	10.0	0.0	18.8	0.0	12.4	120	FTG	ET	PE	-0.6	
117	11.5	8.0	14.5	30.5		0.242	TL	15.00	PV		
Pipe: 38						27.1	1.049	PL	13.00	PF	3.0
117	11.5	8.0	14.5	30.5	10.1	120	FTG	----	PE	0.0	
118	11.5	8.0	11.5	27.1		0.229	TL	13.00	PV		
Pipe: 39						68.9	1.380	PL	6.00	PF	5.1
14	10.0	0.0	17.4	0.0	14.8	120	FTG	ET	PE	-0.6	
119	11.5	8.0	11.7	27.3		0.337	TL	15.00	PV		
Pipe: 40						41.6	1.380	PL	13.00	PF	1.7
119	11.5	8.0	11.7	27.3	8.9	120	FTG	----	PE	0.0	
120	11.5	8.0	9.9	25.2		0.133	TL	13.00	PV		
Pipe: 41						16.4	1.049	PL	13.50	PF	1.4
120	11.5	8.0	9.9	25.2	6.1	120	FTG	E	PE	0.0	
121	11.5	5.6	8.5	16.4		0.090	TL	15.50	PV		
Pipe: 42						54.1	1.380	PL	6.00	PF	3.2
15	10.0	0.0	16.7	0.0	11.6	120	FTG	ET	PE	-0.6	
122	11.5	8.0	12.8	28.6		0.215	TL	15.00	PV		
Pipe: 43						25.5	1.049	PL	13.00	PF	2.6
122	11.5	8.0	12.8	28.6	9.5	120	FTG	----	PE	0.0	
123	11.5	8.0	10.1	25.5		0.203	TL	13.00	PV		
Pipe: 44						66.4	1.380	PL	6.00	PF	4.7
16	10.0	0.0	16.2	0.0	14.2	120	FTG	ET	PE	-0.6	
124	11.5	8.0	10.8	26.3		0.315	TL	15.00	PV		
Pipe: 45						40.1	1.380	PL	13.00	PF	1.6
124	11.5	8.0	10.8	26.3	8.6	120	FTG	----	PE	0.0	
125	11.5	8.0	9.2	24.3		0.124	TL	13.00	PV		
Pipe: 46						15.7	1.049	PL	14.00	PF	1.3
125	11.5	8.0	9.2	24.3	5.8	120	FTG	E	PE	0.0	
126	11.5	5.6	7.9	15.7		0.084	TL	16.00	PV		
Pipe: 47						71.3	1.380	PL	5.00	PF	5.0
17	10.0	0.0	16.1	0.0	15.3	120	FTG	ET	PE	-0.2	
127	10.5	8.0	10.8	26.3		0.359	TL	14.00	PV		
Pipe: 48						45.0	1.380	PL	13.00	PF	2.0
127	10.5	8.0	10.8	26.3	9.6	120	FTG	----	PE	0.0	
128	10.5	8.0	8.8	23.8		0.153	TL	13.00	PV		

SPRINKLER SYSTEM HYDRAULIC ANALYSIS

DATE: 1/4/2017 AIR FORCE BASE\BUILDING 265\2016 MEZZANINE ADDITION\RA1.SDF
 JOB TITLE: HAFB BUILDING 265 2ND FLOOR ADDITION

PIPE TAG	Q (GPM)	DIA (IN)	LENGTH	PRESS.
END ELEV. NOZ. PT DISC. VEL (FPS) HW (C) (FT) SUM.				
NODES (FT) (K) (PSI) (GPM) FL/FT (PSI)				
Pipe: 49	21.2	1.049	PL 12.50	PF 1.8
128 10.5 8.0 8.8 23.8 7.9 120 FTG ----				PE 0.0
129 10.5 8.0 7.0 21.2 0.145 TL 12.50				PV

NOTES (HASS):

(1) Calculations were performed by the HASS 8.6 computer program in accordance with NFPA13 (2016) under license no. 50010207 granted by HRS Systems, Inc. 208 Southside Square Petersburg, TN 37144 (931) 659-9760

(2) The system has been calculated to provide an average imbalance at each node of 0.002 gpm and a maximum imbalance at any node of 0.118 gpm.

(3) Total pressure at each node is used in balancing the system. Maximum water velocity is 42.1 ft/sec at pipe 12.

(4) Items listed in bold print on the cover sheet are automatically transferred from the calculation report.

(5) PIPE FITTINGS TABLE

Pipe Table Name: STANDARD.PIP

PAGE: A MATERIAL: S40 HWC: 120

Diameter (in)	Equivalent Fitting Lengths in Feet									
	E	T	L	C	B	G	A	D	N	
	Ell	Tee	Lng	Ell	ChkVlv	BfyVlv	GatVlv	AlmChk	DPVlv	NP Tee
1.049	2.00	5.00	2.00	5.00	6.00	1.00	10.00	2.00	5.00	
1.380	3.00	6.00	2.00	7.00	6.00	1.00	10.00	10.00	6.00	
2.469	6.00	12.00	4.00	14.00	7.00	1.00	10.00	10.00	12.00	
4.026	10.00	20.00	6.00	22.00	12.00	2.00	20.00	20.00	20.00	
6.065	14.00	30.00	9.00	32.00	10.00	3.00	28.00	28.00	30.00	

SPRINKLER SYSTEM HYDRAULIC ANALYSIS

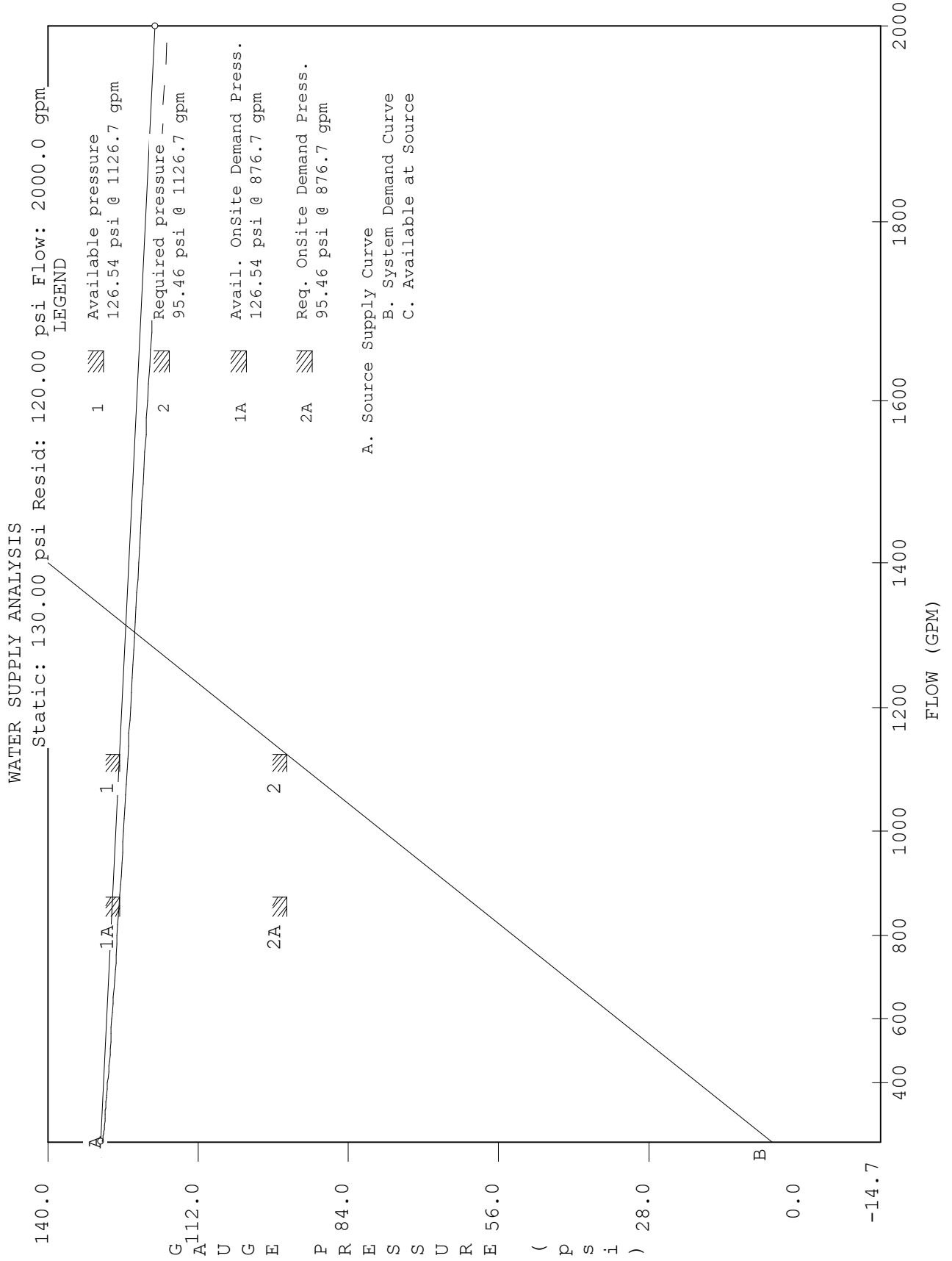
DATE: 1/4/2017 AIR FORCE BASE\BUILDING 265\2016 MEZZANINE ADDITION\RA1.SDF
 JOB TITLE: HAFB BUILDING 265 2ND FLOOR ADDITION

PAGE: D MATERIAL: DIRON HWC: 140

Diameter (in)	Equivalent Fitting Lengths in Feet						
	E Ell	T Tee	L Lng	C Ell	B ChkVlv	G BfyVlv	N GatVlv NP Tee
6.280	22.00	47.00	14.00	51.00	16.00	5.00	47.00

SPRINKLER SYSTEM HYDRAULIC ANALYSIS

DATE: 1/4/2017 AIR FORCE BASE \ BUILDING 265 \ 2016 MEZZANINE ADDITION \ RA1.SDF
 JOB TITLE: HAFB BUILDING 265 2ND FLOOR ADDITION



Dashed Lines indicate extrapolated values from Test Results
 The pressures are based on hose stream deduction at the source

