IFC Design Analysis

WWYK190068 Repair Fire Suppression System, Maint Hangar B2280

Architect-Engineering Services for 100% Design

Project Number: WWYK190068
Work Order: 20435 - Amend

Tinker Air Force Base, Oklahoma
April 3, 2025

Prepared By:

HDR Engineering, Inc.
613 NW Loop 410, Suite 700
San Antonio, TX 78216

Design Professionals and Areas of Responsibility

Architectural

Structural

Mechanical

WWYK190068 - Repair Fire Suppression System Maint Hangar, B2280

TINKER AIR FORCE BASE, OKLAHOMA

Architect-Engineering Services for IFC Design Services

CLIENT PROJECT NUMBER: WWYK190068
WORK ORDER: 20435

Construction Documents
Project Manual – Issued for Construction

04/03/2025

HDR Engineering, Inc.

TPBE Firm Registration No. F-754

Electrical

Fire Protection

WWYK190068 - Repair Fire Suppression System Maint Hangar, B2280

TINKER AIR FORCE BASE, OKLAHOMA

Architect-Engineering Services for IFC Design Services

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Acronyms and Abbreviations

A	Amperes
ACCA	Air Conditioning Contractors Association
AFB	Air Force Base
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigeration and Air-Conditioning Engineers
ASTM	American Society for Testing and Materials
BTU	British thermal unit
DB	Dry Bulb
DoD	Department of Defense
FT	Feet
IBC	International Building Code
IEBC	International Existing Building Code
IN	Inches
kV	Kilovolt
kVA	Kilovolt-amps
LED	Light emitting diode
N	North
NAC	Notification Appliance Circuit
NEC	National Electrical Code
NFPA	National Fire Protection Association
TAFB	Tinker Air Force Base
TO	Technical Order
TP	Technical Paper
TSEWG	Tri-Service Executive Working Group
UFC	Unified Facilities Criteria
V	Volt
W	West
WB	Wet Bulb
WG	Water gauge
%	Percentage
§	Subsection
°F	Fahrenheit

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1 Overview

Per The Department of Air Force - Sundown Policy for foam fire Suppression Systems dated 16 November 2021, with Change 2 dated 29 December 2022, the aqueous film forming foam (AFFF) system will be demolished and replaced with a standard wet sprinkler system. AFFF agent, tanks, and associated piping and valves up to the proportioning valve will be demolished under separate contract. The existing fire alarm system will be removed and replaced, and a new fire alarm and mass notification system will be installed. Per direction from Jim Surber, Tinker Fire Protection Engineer, via email received 3/11/25, design has been updated counter to the Air Force Sundown Policy to include optical flame detection.

2 Applicable Codes and Standards

General

- IBC 2024 — International Building Code (2024) as amended by UFC 1-200-01
- IEBC 2024 — International Existing Building Code (2024) as amended by UFC 1-200-01(01 September 2019, with Change 4, 17 December 2024)
- NFPA 101 — Life Safety Code (2021)
- TAFB — Facility Standard (2020)
- UFC 1-200-01 — DoD Building Code, (01 September 2019, with Change 4, 17 December 2024)
- UFC 4-010-01 — DoD Minimum Antiterrorism Standards for Buildings, (12 Dec 2018) With Change 3 (05/24/2024)
- UFC 4-020-01 — Security Engineering Facilities Planning Manual (11 September 2008)
- UFC 4-022-01 — Security Engineering: Entry Control Facilities/Access Control Points (27 July 2017)
- UFC 4-023-07 — Design to Resist Direct Fire Weapons Effects, w/ Change 1 (1 February 2017)

Structural

- UFC 3-301-01 — Structural Engineering (01 Oct 2019) With Change 3 (3 February 2025)
- ACI 318-19 — Building Code Requirements for Structural Concrete, 2019

- ASCE 7-22 Minimum Design Loads and Associated Criteria for Buildings and Other Structures (2022)
- AISI S100-16 North American Specification for the Design of Cold-formed Steel Structural Members (2016) (Reaffirmed 2020), with Supplement 2, 2020 Edition

Architectural

- UFC 3-101-01 Architecture (12/16/2020) with Change 4(01/08/2024))

Mechanical

- ASHRAE 90.1 Energy Standard for Building Except Low-Rise Residential Buildings (2019)
- IMC International Mechanical Code (2024) as amended by UFC 3 410-01
- IPC International Plumbing Code (2024) as amended by UFC 3 420-01
- NFPA 90A Standard for the Installation of Air Conditioning and Ventilating Systems (2021)
- TAFB Facility Standard – Mechanical Attachment C
- UFC 3-400-02 Design: Engineering Weather Data (20 September 2018) with Change 2 (20 September 2024)
- UFC 3-401-01 Mechanical Engineering (1 July 2013) with Change 1 (01 October 2015)
- UFC 3-410-01 Heating, Ventilating, and Air Conditioning Systems (01 July 2013) with Change 6 (09 January 2024)
- UFC 3-420-01 Plumbing Systems (01 April 2021)

Electrical

- ASHRAE 90.1 Energy Standard for Building Except Low-Rise Residential Buildings (2019)
- NFPA 70 National Electrical Code (2023)
- TAFB Electrical Standards (1 Jan 2025)
- UFC 3-501-01 Electrical Engineering (27 Nov 2024)
- UFC 3-520-01 Interior Electrical Systems (16 Jan 2025)

Civil

- UFC 3-201-01 Civil Engineering, with Change 5 (01 Apr 2018)

Fire Protection

- TAFB Facility Standard (2020)
- IBC — International Building Code (2018) as amended by UFC 1-200-01
- IEBC — International Existing Building Code (2018) as amended by UFC 1-200-01
- TAFB ES — Tinker Air Force Base Electrical Standards (1 March 2021)
- NFPA 1 — Fire Code (2021)
- NFPA 10 — Standard for Portable Fire Extinguishers (2021)
- NFPA 13 — Standard for the Installation of Automatic Sprinkler Protection (2022)
- NFPA 51B — Standard for Fire Prevention During Welding, Cutting, and Other Hot Work (2019)
- NFPA 70 — National Electrical Code (2023)
- NFPA 72 — National Fire Alarm and Signaling Code (2022)
- NFPA 90A — Standard for the Installation of Air-Conditioning and Ventilating Systems (2021)
- NFPA 101 — Life Safety Code (2021)
- NFPA 241 — Standard for Safeguarding Construction, Alteration, and Demolition Operations (2022)
- NFPA 409 — Standard on Aircraft Hangars (2022)
- UFC 1-200-01 — DoD Building Code (08 Oct 2019 with Change 1, 1 oct 2020)
- UFC 3-600-01 — Fire Protection Engineering for Facilities (8 Aug 2016 with Change 6, 6 May 2021)
- UFC 3-601-02 — Fire Protection Systems Inspection, Testing and Maintenance (7 Oct. 2021)
- UFC 4-021-01 — Design and O&M: Mass Notification Systems (9 April 2008, Change 1, January 2010)
- UFC 4-211-01 — Aircraft Maintenance Hangars (13 April 2017 Change 3, April 20, 2021)
- AFI 32-10141 — Planning and Programming Fire Safety Deficiency Correction Projects Hangars (15 May 2019)
- USACE ECB 2018-17 — New Requirements for Visual Notification for Mass Notification Systems (25 Oct. 2018, Rev 1 14 May 2020)

- Department of Air Force – TAB 1 Sundown Policy for Foam Fire Suppression Systems dated 16 November 2021 with Change 1, 13 May 2022
- Department of Air Force – TAB 2 Exemption to UFC 1-200-01, DoD Building Code, with Change 1, UFC 3-600-01, Fire Protection Engineering for Facilities, UFC 4-211-01, Aircraft Maintenance Hangars and UFC 4-211-02, Aircraft Corrosion Control and Paint Facilities, to implement Sundown Policy for Foam Fire Suppression Systems dated 18 Jan. 2022.

3 Existing Non-Conforming Conditions

See Appendix C – Fire Protection Design Analysis and Life Safety Plans.

4 Anti-Terrorism Force Protection (AT/FP) Design Narrative

This section provides AT design criteria to this facility and summarizes how the project will comply with the minimum standards. UFC 4-010-01 Minimum Antiterrorism Standards for Buildings applies to this project. These standards apply to DoD components, to all DoD Inhabited Buildings and high occupancy family housing, and to all inhabited tenant buildings on DoD installations. Section 1-2.2.1 Major Investments triggers the minimum standards if the cost for the building renovation, modification, repairs, revitalizations, and restorations exceeds 50% of the replacement cost of the existing building.

The escalated estimated replacement cost for this facility is $82,406,582. The construction cost estimate is $2,571,062. The project does not exceed 50% of the escalated estimated replacement cost; therefore, the entire facility will not need to be brought up to ATFP standards.

5 Architectural

5.1 Design Approach

The design approach for this project will be to provide a new enclosure around the new fire protection equipment.

5.2 General Design Parameters and Assumptions

General Design Parameters and Assumptions are to construct a new enclosed space within the existing mechanical area with the same footprint as the existing storage room that is to be demolished.

5.3 Demolition

Demolition of existing fire protection equipment (see fire protection section).

Demolition of existing storage area in the southwest corner of the mechanical room. Demolish metal stud, wood paneling, openings, and acoustic ceiling tile and suspension system in their entirety. Existing pairs of doors and frames in metal framed wall and pair of doors in existing 2-hour fire-rated 12” CMU wall to be demolished. Coordinate demolition with other disciplines.

5.4 Construction

Construct new enclosure for new fire protection (and existing electrical) equipment. Wall assembly will be 6” metal stud wall framing, R-21 batt insulation, 1 layer 5/*” Type “X” gypsum board on each sides (painted), and rubber base on both sides. Rear wall of room is an existing precast concrete panel to remain. Outside corners to have 8’ tall 3” 16-gauge 304 stainless steel corner guards.

Ceiling system assembly will be cold-formed structural framing (reference structural), R-30 batt insulation 3/4” non-combustible structural concrete panel board on top side, 5/8” Type “X” moisture & mold-resistant gypsum wall board fastened to resilient channels on bottom/ceiling side. New door and door frame assembly to be galvanized, polyurethane foam-insulated, and painted. Hardware to be stainless steel.

New (Door 101) pair of fire-rated 45-minute insulated galvanized painted doors and frame to be installed in new opening in 1-hour fire-rated metal-framed gypsum board partition. New (Door 102) pair of fire-rated 90-minute vapor-proof insulated galvanized painted doors and frame to be installed in existing opening in 2-hour fire-rated 12” CMU wall.

6 Structural

6.1 Design Approach

Provide cold form walls and roof framing for new fire protection/electrical room.

6.2 General Design Parameters and Assumptions

6.2.1 Structural Loads

Dead Loads

Dead loads will be considered resulting from fixed construction, materials, and equipment. Dead loads will be determined and applied in accordance with ASCE 7-22, and other pertinent standards and vendor-supplied information.

A uniform dead load of 25 psf was assumed for ceiling joist design per TAFB Facility Standards.

Live Loads

Live loads are those loads produced by the use and occupancy of the building or structure, and do not include loads such as wind/seismic loads, rain loads, flood loads, or dead loads. Minimum uniformly distributed live loads will be as required by ASCE 7-22.

Minimum roof live loads of 20 psf. (non-reducible) per TAFB Facility Standards.

Wind Loads

Structure interior to existing building; therefore, structure designed for minimum interior wall and partition loading of 5 psf per IBC 2024 Section 1607.16.

Risk Category

Building risk category II, as defined by ASCE 7-22, shall be used for this building.

Load Combinations

Load combinations using strength design and service level combinations shall be as defined in ASCE 7-22.

Seismic

Seismic loads shall be determined in accordance with IBC 2024. The structure will be designed as Seismic Design Category (SDC) of “B” based on the seismic parameters defined in IBC 2024.

UFC 3-301-01 Chapter 4, Seismic Evaluation and Retrofit of Existing Buildings, references RP-10 as the applicable code for seismic evaluation and retrofit requirements. Per section 1.3 of RP-10, SDC B buildings are exempt from meeting the standards.

Snow Loads

Structure is located inside of B2280; therefore, snow loads will not govern.

6.2.2 Special Inspections

Special Inspections will not be required for this project in accordance with chapter 17 of IBC 2024 and the amendments/revisions of UFC 3-301-01. Per IBC 2024 Section 1704.2, “Special inspections and tests are not required for construction of a minor nature or as warranted by conditions in the jurisdiction as approved by the building official.”

6.2.3 Structural Observations

In accordance with section 1704.6.1 of IBC 2024, structural observations by a register design professional are not required for this project since the Risk Category is II.

6.3 Demolition

Reference architectural for the demolition requirements for the existing room demolition.

6.4 Construction

Provide new cold form steel framing for new fire protection/electrical room. The ceiling joist framing will consist of a ¾” thick cement bonded particle board spanning to 8” deep x 12 gage joists spaced at 16 inches on center. At the east and south sides of the room the joists will be supported by cold formed steel walls consisting of 6” x 20 gage studs

spaced at 16 inches on center. On the north and south sides of the room the joists will be supported by existing 12” CMU walls. The joists will be fastened to a rim joist with post installed adhesive anchors.

7 Mechanical

7.1 Design Approach

Provide heating/cooling to the fire alarm room using a split system heat pump to maintain a conditioned space as needed for fire alarm equipment that will reside within.

7.2 General Design Parameters and Assumptions

Basis for site criteria identified below is UFC 3-410-01 and ASHRAE Fundamentals Handbook 2021 for Outdoor Design Conditions.

Table 7-1. Site Information

Project Location	Tinker AFB, OK
WMO Station #	723540
Elevation	1291 ft
Latitude	35.42 N
Longitude	97.38 W
Climate Zone	3A (Moist)

7.2.1 Outdoor Design Conditions

Per UFC 3-410-01, the outdoor design conditions shall be based on the 1.0 percent dry bulb (DB) and corresponding mean coincident wet bulb (MCWB) for cooling, and the 99.0 percent DB for heating design conditions.

Table 7-2. Outdoor Design Conditions Table

Parameter	Value
Cooling (DB/MCWB)	97.0 °F / 73.6 °F
Heating (DB)	18.4 °F

Refer to Appendix D for the project location weather data sheet.

7.2.2 Indoor Environmental Criteria

Indoor environmental criteria are per UFC 3-410-01 and Tinker AFBI. Where conflicts arise between the applicable standards, the stricter requirement was utilized.

Table 7-3. Indoor Environmental Criteria

Area Designation	Temperature (°F)		Relative Humidity (%)	
	Minimum Winter	Maximum Summer	Minimum	Maximum
Fire Alarm Room	68	76	N/A	50

7.3 Demolition

7.3.1 Mechanical

No Scope.

7.3.2 Plumbing

No scope.

7.4 Construction

7.4.1 Mechanical

A new ductless split system heat pump will be installed to provide the room with heating and cooling needs.

7.4.2 Plumbing

New condensate piping will be provided and routed to the existing floor drain in the space.

7.5 Heating and Cooling Load Calculations

Load calculations were performed using Trace 700 software which complies with NSI/ASHRAE/ACCA Standard 183. Ventilation air will be provided in accordance with ASHRAE 62.1-2019.

Refer to Appendix D for heat load calculations.

7.6 Mechanical Systems

7.6.1 Ductless Mini-Split System

A variable capacity ductless mini-split system heat pump will be provided to ensure the fire alarm room is maintained at the correct temperature and humidity levels. The split system will consist of an indoor wall mounted ductless evaporator and an outdoor heat pump unit. The heat pump unit will be mounted outside on a new equipment pad. The system will include integral controls and space thermostat. A wall mounted space temperature sensor will be provided for BAS monitoring.

Refer to Appendix D for ductless mini-split system cutsheet.

7.6.2 Piping

Equipment drain piping will be DWV drawn temper seamless copper drainage tube per ASTM B306 with lead-free soldered joints and fittings. Copper piping will be Type K or L hard drawn.

Refrigerant piping shall be Type ACR hard drawn seamless copper tube meeting ASTM B280. Joints shall be brazed with silver solder. Fittings shall be wrought copper solder joints meeting ANSI B16.22. All piping shall be cleaned, dehydrated, pressurized with dry nitrogen, plugged, and tagged by manufacturer “for refrigeration service.”

All new condensate drain piping and refrigerant piping will be provided with cellular glass or closed-cell elastomeric insulation with an all-service jacket, self-sealing lap, and vapor barrier jacket to prevent condensation.

7.6.3 Controls

New graphics will be provided for the new mechanical equipment and will be programmed into the existing Honeywell EBI system. New metering of incoming utility services for this building is not included since these services are not being modified or replaced under this project. The contractor shall coordinate with the government for LAN drops for connection to the building automation system.

8 Electrical

8.1 Design Approach

Providing power to support the new fire protection system.

8.2 General Design Parameters and Assumptions

IAW UFC 3-520-01, 3-2.7 (a) Power for Fire Protection Systems will be provided with a dedicated Fire Alarm/Fire Protection panelboard as the design approach will require more than one circuit and will be located within the Mechanical room area, where the Service Entrance (SE) rated equipment is. There is an existing Cummins generator rated 188kVA/150kW/0.8PF, 480V/277, 3-PH located right outside the Mechanical room area. There is an existing ASCO ATS rated 400A/3P located within the cage shop area within the Mechanical room as well. The existing ATS has two feeders: one is feeding an existing panelboard ‘HD8’ and another one is feeding high bay light fixtures per site observation. The existing panelboard ‘HD8’, is rated 225A MLO, 480Y/227V, 3-PH, 4-W. Since there is an existing back-up power source, the dedicated Fire Alarm/Fire Protection panelboard will be fed from existing panelboard ‘HD8’ IAW 3-520-01, 3-2.7 (d). The existing generator is adequate to serve additional fire suppression panels.

Per Government direction (email dated 07/20/2022), the new dedicated fire alarm panel will be connected to the existing ‘Standby’ generator, and the existing generator is not required to be upgraded to ‘Emergency’. The direction received is as follows:

1. Primary power (Branch circuit): from the closest existing panel board which has enough capacity and space, and is backed up by generator IAW UFC 3-520-01

2. Secondary power (Rechargeable Batteries): capacity shall be sized IAW UFC 3-600-01.

Per Government request, verification of existing feeders and overcurrent protection was identified as follows:

1. For overcurrent protection devices verification, due to not being able to de-energize the existing panel 'HD8', the finding for the HD8 cabinet within switchgear UID #2280-SWG-38 is rated 200A based on its nameplate.
2. The overcurrent device at the generator to ATS cannot be verified nor are there shop drawings.
3. There are not any overcurrent devices within the ATS.
4. The existing conductors routed from generator to ATS is #4/0; therefore, given the assumption for the overcurrent device at the generator, is 225A for the 188kVA/480V/3PH rated Generator.
5. The existing conductors routed from existing cabinet 'HD8' from existing switchgear UID#2280-SWR-38 to ATS is #4/0 when exiting the cabinet but changes at some point to become #3/0 when entering the ATS.

   The existing conductors from ATS to existing panel 'HD8' is #3/0.

The basis of design for the new fire alarm panel load assumption will be as follows, and these loads are the worst-case scenario:

1. A Fire Alarm Control Panel or FMCU: 120V/1PH/32A, with 50A/1P circuit.
2. Booster Power Panel or NAC: 120V/1PH/6A

For Peak Demand Load analysis, based on the Generator Operation Log (Inspection List) report, the peak demand load within the last twelve consecutive months was recorded with 103kW dated on 01/11/2022 from 08/2021 (2 August logs) until 06/2022.

8.3 Demolition

8.3.1 Power

All existing power connections to existing fire alarm control panels and associated booster power panels located at a variety of locations will be disconnected, including existing conductors/conduits back to panel sources. All un-used circuit breakers will be switched to 'OFF' position, and circuit index directory will be updated to indicate as 'SPARE'. If circuit breakers are required to be removed, the circuit will be updated as 'SPACE'.

The existing feeder from ATS to existing panel HD8 and from cabinet HD8 within existing switchgear to ATS will be disconnected and removed to accommodate the peak load analysis as shown on Peak Demand Load Analysis schedule, E-601.

8.3.2 Lighting

No scope in this project.

8.4 Construction

8.4.1 Power

Power for the new fire alarm equipment will be provided from a new 15kVA, 480V-120/208V, 3-phase, 4-wire, 24-Pole, 18kIAC mini power-zone unit substation. The circuit breaker serving the fire alarm system panelboard (25A/3P) will be painted in red and provided with a locking provision as required per UFC 3-520-01, 3-2.7. A new power distribution system to the new fire alarm system from existing branch circuit panelboard 'HD8' will be provided. A locking provision will be provided on the circuit breaker serving the mini power-zone unit substation. New circuit breakers, conductors, and conduit will be provided for all electrical connections. As the result, an additional approximate 26A will be added to existing panel 'HD8' and to existing generator and switchgear UID #2280-SWR-38 as shown on new panelboard 'FA'

Based on the peak load assumption as indicated in paragraph 8.2 and peak load analysis as shown E-601, the updated demand load currently indicates approximately 220A. Therefore, the existing fuses within cabinet HD8 from existing switchgear UID #2280-SWG-38 will be required to be updated to 225A fuses minimum. Since the existing Switchgear is outdated and for liability, the design includes a separate 400A disconnect switch with 225A fuses. The disconnect switch will tap to the existing switchgear buss and will be mounted on Unistrut at the rear of the switchgear section where the existing HD8 cabinet is located. A new feeder will be provided with minimum #4/0 and will be connected to existing 400A ATS. The new feeder from busduct to the disconnect switch will not be more than 10-ft from the existing switchgear. The new disconnect switch will be located at a minimum 3-ft from the rear of the existing switchgear per manufacturer recommendation. The existing feeder from ATS to existing panelboard 'HD8' will be replaced with #4/0 minimum to accommodate the modified loads.

The additional split system provided for the new ELECTRICAL/FIRE PROTECTION room will be connected to existing panel 'A-D', which is located within the same area. New overcurrent protection device, disconnecting means, conductors and conduits will be provided to serve the equipment.

As a result, there is an increase in load at existing panel 'HD8' to approximately 26A under this scope of work. The peak demand loads indicate the panel is currently reaching approximately 220A for 225A Main Lugs Only rated panelboards. The existing panelboard 'A-D' will service the new split system. This would result in the panel increasing to 11A approximately. Currently, the existing switchgear UID #2280-SWG-38 is outdated. The peak load analysis indicates the generator is reaching its maximum demand load capacity. Our recommendation to the Government is to consider an additional equipment study and replace them in the near future to support all new work within the building.

All fire alarm conduits, conduit fitting, and junction boxes will be factory painted in red per TAFB Electrical Standard.

All un-used existing protective devices from existing panelboards will be removed and indicated as "SPARE". All "SPARE" circuits will be switched to "OFF" position and

indicated as “SPARE”. All circuit index directories within existing panelboards will be updated per specifications.

8.4.2 Lighting

No scope in this project.

8.5 Arc Flash Analysis

Arc Flash label requirements will be included in the design, per UFC 3-560-01, Figure 1-10. The electrical distribution system is existing and maintenance records do not exist. Per TSEWG, TP-15 Arc Flash Calculations, and Detailed Arc Flash Warning Labels, the existing circuit breakers cannot be verified for protection and cannot be included in an arc flash study. Since upstream existing circuit breakers cannot be credited to clear arcing faults for the purpose of an arc flash study, the requirement for the labels will be included per the guidance of the UFC and technical letter TP-15. However, the Construction Contractor will be required to provide Final short fault circuit rating and arc-flash labeling prior to procuring the new distribution electrical equipment IAW TAFB Electrical Standards, paragraph 1.2 (f) (1) thru (5).

9 Civil

There is no scope.

10 Fire Protection and Life Safety

See Appendix C – Fire Protection Design Analysis and Life Safety Plans

11 Phasing

The project will be phased such that one dock suppression system will be renovated at a time.

Phasing plan has been approved by Darrell L. Chambers, II, Production Flight Chief 569 AMXS/MXDPA via email received 26 Aug 2022.

Appendix A

Final Cost Estimate

OPINION OF PROBABLE COST OF CONSTRUCTION

Estimate For Construction / IFC

Revision 0

Repair Fire Suppression System, Maintenance Hangar B2280 "DUST OFF"
Tinker Air Force Base
Oklahoma City, Oklahoma

Date of Estimate	**April 3, 2025**
Effective Price Level Date	**April 3, 2025**
Estimated Award Date	**August 2025**
Est Construction Start	**September 2025**
Est Construction Duration	**4 Month Period of Performance**
Est Mid Point of Construction	**November 2025**

AACE, Class 2
Estimate prepared By HDR

April 3, 2025

Confidential nature of this document has been maintained according to HDR policy

ESTIMATE OF PROBABLE COST

Tinker Air Force Base
Repair Fire Suppression System, Maintenance Hangar B2280 "DUST OFF"
Oklahoma City, OK
Project # WWYK190068

Final Design Submittal

Date of Report: April 3, 2025

Prepared for 72nd ABW/CE

BASIS OF ESTIMATE

PROJECT

Tinker Air Force Base
Repair Fire Suppression System, Maintenance Hangar B2280 "DUST OFF"
Oklahoma City, OK
Project # WWYK190068

General

Status of Design:	Final Design Submittal
Design Deliverable:	Design Bid Build
Cost Basis:	2025 Q1 Adjusted for Tinker AFB, OK
Procurement:	Limited Bid Pool
Estimator:	Chester Martin - EOC HDR, Inc.

Dates

Date of Report	April 3, 2025
Scheduled Contractor Award Date:	August 2, 2025
Scheduled Construction Mobilization Date:	September 2, 2025
Scheduled Construction Completion Date:	January 1, 2026
Scheduled Midpoint of Construction Date:	November 1, 2025

Durations

Remaining Design:		Months from Date of Estimate	
Procurement & Bidding	3.00	Months from Design Completion	Assumed
Contract Award:	1.00	Month from Bidding	Assumed
Construction Commencement:	1.00	Months from Time of Award	Assumed
Construction Duration:	4.00	Months from Construction Commencement	
Mid-Point of Construction:	7.00	Months from Date of Estimate	
Phasing		None	

Markups & Factors

General Requirements %	10.74%	Based on General Requirements Detail
General Requirements /Month	$37,861	General Requirements Divided by Total Construction Months
Commissioning	2.00%	Typical for type of project
Sales Tax	8.63%	Oklahoma City, OK - Tax-Rates.org
Security Factor at Entry	2.08%	Labor factor for working inside a secure facility (Assumed 10 minutes per day)
Elevated Installation	55.00%	Labor factor for elevated installation up to 40' per RS Means Data
Working Inside Existing Facility	15.00%	Labor factor for Occupied Facility (per phasing plan) - RS Means Data
Sub-Contractor OH & P	25.00%	Per Direction From Tinker
Design Contingency		Typical for Final Design Phase
Prime Contractor Design Fee		No contractor design fee included for Design Bid Build project
Prime Home Office Overhead:	15.00%	Typical for Prime Contractor
Prime Contractor Profit:	6.00%	Profit Weighted Guideline
Bond and Insurance:	2.50%	Typical for Prime Contractor
Annual Escalation:	5.70%	Based on NAVFAC BCI 2024 Q3 Building Cost Index
Effective Escalation:	3.33%	Annual escalation adjusted from estimate date to midpoint of construction

Budgetary Tracking

PRV Amount	$	82,406,582	Project (Facility) Replacement Value
ATFP Trigger:	$	41,203,291	Anti-Terrorism Force Protection trigger if over one-half of facility replacement cost
PA Amount:	$	7,500,000	Programmed Amount
PAA Amount		Not Performed	Project Assessment Amount
Previous Estimate Amount:	$	3,180,961	August 29, 2022
Current Estimate Amount:	$	2,571,062	Refer to the attached Estimate Summary
Variance from Prior Estiamte	**$**	**(609,900)**	**Reduction in scope relating to AFFF**
Difference from PA Amt	$	4,928,938	PA Amount Minus Current Estimate
Total GBSF		82,602	Total Gross Building Square Feet
Cost per GBSF	$	31.13	Current Estimate Amount per Gross Building Square Foot

Estimate Changes

Included fire suppression demolition has been revised into three sections for clarity.
-Demolition of Under-Wing AFFF Foam Water System Sprinklers and Sprinkler Distribution Pipe.
-Demolition of Overhead AFFF Pre-action Sprinklers and Sprinkler Distribution Pipe.
-Demolition of mechanical room riser and deluge valves, main drain piping, waterflow detectors, valve supervisory switches, associated accessories, and flush existing lead-in piping to prepare for new work.

Added disposal of AFFF contaminated waste. Includes loading of truck, transportation to local hazardous waste facility, and disposal fees.

The demolition of the AFFF concentrate tanks and concentrate mixing pipe has been **removed** from this Estimate. Plans specify this work will be under a separate contract.

Updated previous estimate unit cost ($4.46/SF) for new sprinkler system. New unit cost based on extra hazard wet pipe sprinkler system from 2024 MII English Cost Book ($5.95/SF) for the large 81,000 SF area.

Updated previous estimate unit cost ($4.05/SF) for new sprinkler system. New unit cost based on cost for extra hazard wet pipe sprinkler for areas less than 2,000 SF system from 2024 MII English Cost Book ($11.56/SF) for the smaller 950 SF area.

Changed Flame Detector material cost to Det-Tronics X3301 - Online Quote Radwell.com - $9,386 + $200 for mounting bracket, accessories, and shipping.

Added Antenna and surge Suppressor to Fire Alarm & Mass Notification Systems per plans. Unit costs from Monaco quote.

Removed additional main fire alarm control panel per design team.

Fire Alarm & Mass Notification Systems unit costs for Combo Speaker/Strobe Devices, Manual Stations and Pull Stations, Fire Alarm and Mass Notification Control Panel, NAC Booster Power Supply, and Smoke detectors have been updated per Monaco quote.

Updated split system HVAC unit to RSM 238126105120 Split ductless system, cooling / heating, wall mount, 1-1/2 ton cooling.

Updated equipment pad cost, moved to concrete section.

Removed costs for Stand Pipe ($33,000). Per design team.

Added cost for fire department connections 2 each. Per plans.

Increased check valve qty from 3 to 6 per plans.

Revised cost from fire alarm demo of conduit and wire.

Steel joist material cost updated based on plans to 14 gauge (68 mil).

Deleted "New 400A MLO Panel" item. Not shown as new work on electrical plans.

Deleted "New 400A MCB Panel" item. Not shown as new work on electrical plans.

Deleted "New 400A Fuses in Switchboard" item. Not shown as new work on electrical plans.

Added 480V/400AS 225AF Disconnect Switch per plans.

Revised wire and conduit from disconnect to ATS quantity and sizes per plan.

Revised wire and conduit from ATS to panel HD8 quantity and sizes per plan.

Revised quantity of new portable fire extinguishers.

Notes

Schedule considerations used to determine Period of Performance is based Sprinkler Install being primary driver of critical path. Total estimated period of performance of construction is 3.4 months as outlined below. Contract Period of Performance based on 4 months.

40 Crew hours for mobilization, set up or 0.25 months assumed

420 Crew hours for demo and installation of fire surpession features

180 Crew hours for demolition activities, assuming 0.008 manhours per square foot of demo area utilizing 1 crews

Assume 50% of demo will overlap with the installation work - Assume 30 days, or 1 month for duration

230 Crew hours for installation activities assuming 0.022 manhours per square foor of install area, utilizing 2 crews

180 crew hours for demo 180 + 230 crew hours for installation = 420 crew hours, or 2.6 Months total time for demo & installation of new

Electrical, HVAC, and Fire Alarm work assumed to be concurrent with frie supression activities

80 Crew hours for verification, testing, and commissioning of system or 0.5 months assumed

General Requirements unit costs escalated from previous estimate date to current level date. The calculated general requirements (general conditions) have been adjusted to show updated unit costs for labor, material, and equipment. The unit costs have been escalated from the original estimate date of August 2022 (Index 7389) to the current level date of April 2025 (Index 8384) by 12.91% using NAVFAC BCI 2024 Q3.

The Subcontractor Overhead and Profit markup has been increased from 21% to 25%. This markup was increased to remain consistent with recently submitted estimates with the agreed 25% mark up.

The Wages tab has been updated using RS Means Labor 2025 Q1. Davis Bacon Wages have been updated on Wages tab.

The award date has been updated to August 2025. The Construction start date has been updated to September 2025. The construction end date has been updated to March 2026. The construction midpoint has been updated to December 2025.

The design contingency has been updated from 5% to 0% based on final design.

Updated occupied facility labor factor from 12.5% to 15% based on current RS Means data.

Detail estimate items have been escalated from previous estimate date to current level date. Direct cost items include escalation from original estimate date August 2022 (Index 7389) to the current level date of April 2025 (Index 8384) by 12.91% using NAVFAC BCI 2024 Q3.

The estimate has been escalated from the current level date to the revised midpoint of construction. Updated escalation to Midpoint from level date of April 2025 (Index 8343) to midpoint date of November 2025 (Index 8620) by 3.33% using NAVFAC BCI 2024 Q3.

Exclusions:

Demolition of AFFF Agent, Concentrate Tanks and Associated Mixing Piping up to the Proportioning Valve is Excluded. Will be demolished under separate AFCEC contract.

Owner or Contractor Design Fees

Owner Administrative Costs (SIOH)

Costs for permits, licenses, and fees are excluded.

Hazardous materials such as asbestos containing materials and lead based paint abatement has been excluded.

ESTIMATE SUMMARY

Tinker Air Force Base
Repair Fire Suppression System, Maintenance Hangar B2280 "DUST OFF"
Tinker Air Force Base
Oklahoma City, OK

Final Design Submittal

	BASE BID ITEMS	DIRECT COST TO PRIME	Repair by Maintenance (Life Cycle) (EEIC 524)	Repair by Replacement (Non-Life Cycle) (EEIC 522)	Minor Construction (EEIC 529)	Equipment (Non-RPIE)	CONTRACT COST
1	General Requirements (See Below)	$ -	$ -	$ -	$ -	$ -	$ -
2	Existing Conditions	$ -	$ -	$ -	$ -	$ -	$ -
3	Concrete	$ 3,010	$ -	$ 3,010	$ -	$ -	$ 5,488
4	Masonry	$ -	$ -	$ -	$ -	$ -	$ -
5	Metals	$ 4,153	$ -	$ 4,153	$ -	$ -	$ 7,572
6	Woods, Plastics & Composites	$ -	$ -	$ -	$ -	$ -	$ -
7	Thermal & Moisture Protection	$ 4,104	$ -	$ 4,104	$ -	$ -	$ 7,483
8	Openings	$ 9,254	$ -	$ 9,254	$ -	$ -	$ 16,874
9	Finishes	$ 36,083	$ -	$ 36,083	$ -	$ -	$ 65,796
10	Specialties	$ 8,805	$ -	$ 8,805	$ -	$ -	$ 16,055
11	Equipment	$ -	$ -	$ -	$ -	$ -	$ -
12	Furnishings	$ -	$ -	$ -	$ -	$ -	$ -
13	Special Construction	$ -	$ -	$ -	$ -	$ -	$ -
14	Conveying Equipment	$ -	$ -	$ -	$ -	$ -	$ -
21	Fire Suppression	$ 773,927	$ -	$ 773,927	$ -	$ -	$ 1,411,248
22	Plumbing	$ 2,076	$ -	$ 2,076	$ -	$ -	$ 3,786
23	HVAC	$ 7,151	$ -	$ 7,151	$ -	$ -	$ 13,041
26	Electrical	$ 82,740	$ -	$ 82,740	$ -	$ -	$ 150,876
27	Communications	$ -	$ -	$ -	$ -	$ -	$ -
28	Electronic Safety & Security	$ 478,666	$ -	$ 478,666	$ -	$ -	$ 872,843
31	Earthwork & Site Prep	$ -	$ -	$ -	$ -	$ -	$ -
32	Exterior Improvements	$ -	$ -	$ -	$ -	$ -	$ -
33	Utilities	$ -	$ -	$ -	$ -	$ -	$ -
	SUBTOTAL DIRECT COST	$ 1,409,967	$ -	$ 1,409,967	$ -	$ -	$ 2,571,062
	GENERAL REQUIREMENTS 10.74%	$ 151,443	$ -	$ 151,443	$ -	$ -	Included
	COMMISSIONING 2.00%	$ 28,199	$ -	$ 28,199	$ -	$ -	Included
	SALES TAX 8.63%	$ 55,434	$ -	$ 55,434	$ -	$ -	Included
	SECURITY FACTOR AT ENTRY 2.08%	$ 10,013	$ -	$ 10,013	$ -	$ -	Included
	LABOR FACTOR FOR ELEVATED INSTALLATION 30' to 35' 55.00%	$ 264,346	$ -	$ 264,346	$ -	$ -	Included
	LABOR FACTOR FOR WORKING IN EXISTING OCCUPIED BUILDING 15.00%	$ 72,094	$ -	$ 72,094	$ -	$ -	Included
	EFFECTIVE ESCALATION 3.33%	$ 66,217	$ -	$ 66,217	$ -	$ -	Included
	DESIGN CONTINGENCY 0.00%	$ -	$ -	$ -	$ -	$ -	Included
	PRIME CONTRACTOR DESIGN FEE (DESIGN/BUILD RFP ONLY) 0.00%	$ -	$ -	$ -	$ -	$ -	Included
	SUBTOTAL	$ 2,057,713	$ -	$ 2,057,713	$ -	$ -	Included
	PRIME CONTRACTOR HOME OFFICE OVERHEAD 15.00%	$ 308,657	$ -	$ 308,657	$ -	$ -	Included
	PRIME CONTRACTOR PROFIT 6.00%	$ 141,982	$ -	$ 141,982	$ -	$ -	Included
	BOND & INSURANCE 2.50%	$ 62,709	$ -	$ 62,709	$ -	$ -	Included
		$ -					
	TOTAL BASE BID	$ 2,571,062	$ -	$ 2,571,062	$ -	$ -	$ 2,571,062
	PERCENTAGE VALUES	100.00%	0.00%	100.00%	0.00%	0.00%	100.00%

GENERAL REQUIREMENTS ESTIMATE DETAIL

Project: Repair Fire Suppression System, Maintenance Hangar B2280 "DUST OF Final Design Submittal
Est. Type: Final Design Submittal
Date: April 3, 2025

				-	-	-	-	-	-	-	-	
01	**General Requirements**											
				Material		Labor		Equipment				
CSI Code	**Description of Work**	**Quantity**	**UOM**	**Mat'l Unit**	**Material Total**	**Labor Unit**	**Labor Total**	**Eqpt Unit**	**Eqpt Total**	**Total Unit $**	**TOTAL**	**Notes**
01 31	**Project Management & Coordination**			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Project Manager	1.00	MO	$ -	$ -	$ 9,409.26	$ 9,409.26	$ -	$ -	$ 9,409.26	$ 9,409.26	
	Superintendent & QC Manager	3.00	MO	$ -	$ -	$ 8,468.33	$ 25,404.99	$ -	$ -	$ 8,468.33	$ 25,404.99	
	Assistant Superintendent & Safety Manager	3.00	MO	$ -	$ -	$ 7,056.94	$ 21,170.83	$ -	$ -	$ 7,056.94	$ 21,170.83	
	Total People Months	6.00	MO			$ -						
	Staff Travel (Only If Non-Local Contractor Utilized)			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Meals		DY	$ 62.10	$ -	$ -	$ -	$ -	$ -	$ 62.10	$ -	
	Lodging		DY	$ 108.39	$ -	$ -	$ -	$ -	$ -	$ 108.39	$ -	
	Airfares	-	EA	$ 677.47		$ -	$ -	$ -	$ -	$ 677.47	$ -	
	Ground Transportation	-	DY	$ 107.27	$ -	$ -	$ -	$ -	$ -	$ 107.27	$ -	
01 32	**Construction Progress Documentation**			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Critical Path Schedule (By PM/Supt)	-	EA	$ -	$ -	$ 1,354.93	$ -	$ -	$ -	$ 1,354.93	$ -	
	Schedule Updates (By PM/Supt)	-	MO	$ -	$ -	$ 338.73	$ -	$ -	$ -	$ 338.73	$ -	
	Progress/Final Photos (Digital By PM/Supt)	-	MO	$ 56.46	$ -	$ 56.46	$ -	$ -	$ -	$ 112.91	$ -	
	Digital As-Built Plans	1.00	EA	$ 112.91	$ 112.91	$ 2,258.22	$ 2,258.22	$ -	$ -	$ 2,371.13	$ 2,371.13	
01 41	**Regulatory Requirements**			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Building Permits (Ranges from 0.5% to 2% of total project cost per RS Means)			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Other Permits			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
01 45	**Quality Control**			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Soil Testing & Inspections	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Concrete Testing & Inspections	-	EA	$ -	$ -	$ 5,645.55	$ -	$ -	$ -	$ 5,645.55	$ -	
	Asphalt Testing & Inspections	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Steel Testing & Inspections	-	EA	$ -	$ -	$ 564.56	$ -	$ -	$ -	$ 564.56	$ -	
	Masonry Testing & Inspections	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	HVAC Testing & Balancing (Included in HVAC Costs)	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
01 51	**Temporary Utilities**			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Temporary Water Service for Office Trailer (By Owner)	3.00	MO	$ 225.82	$ 677.47	$ -	$ -	$ -	$ -	$ 225.82	$ 677.47	
	Temporary Electricity for Office Trailer (By Owner)	3.00	MO	$ 451.64	$ 1,354.93	$ -	$ -	$ -	$ -	$ 451.64	$ 1,354.93	
	Phone & Internet Access for Office Trailer	3.00	MO	$ 338.73	$ 1,016.20	$ -	$ -	$ -	$ -	$ 338.73	$ 1,016.20	
	Temporary Toilets (With running water; Includes 6 toilets, 2 urinals, 2 handsinks)	3.00	MO	$ -	$ -	$ -	$ -	$ 5,645.55	$ 16,936.66	$ 5,645.55	$ 16,936.66	
	Temporary Heat for Building (By Owner)	3.00	MO	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Temporary Electricity for Building (By Owner)	3.00	MO	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
01 52	**Construction Facilities**			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Mobilization	1.00	EA	$ -	$ -	$ -	$ -	$ 2,258.22	$ 2,258.22	$ 2,258.22	$ 2,258.22	
	Office Trailer (40' minimum), 1 EA	3.00	MO	$ -	$ -	$ -	$ -	$ 1,500.00	$ 4,500.00	$ 1,500.00	$ 4,500.00	
	Storage Trailer, 2 EA	3.00	MO	$ -	$ -	$ -	$ -	$ 451.64	$ 1,354.93	$ 451.64	$ 1,354.93	
	Office Supplies	3.00	MO	$ 225.82	$ 677.47	$ -	$ -	$ -	$ -	$ 225.82	$ 677.47	
	Office Furniture		MO	$ -	$ -	$ -	$ -	$ 338.73	$ -	$ 338.73	$ -	
	Copier / Fax / Misc. Office Equipment	3.00	MO	$ -	$ -	$ -	$ -	$ 282.28	$ 846.83	$ 282.28	$ 846.83	
	Computer & Peripherals	3.00	MO	$ -	$ -	$ -	$ -	$ 282.28	$ 846.83	$ 282.28	$ 846.83	
	Employee's Cell Phone Allowance (Total People Months, See Above)	6.00	MO	$ -	$ -	$ -	$ -	$ 169.37	$ 1,016.20	$ 169.37	$ 1,016.20	

GENERAL REQUIREMENTS ESTIMATE DETAIL

Project: Repair Fire Suppression System, Maintenance Hangar B2280 "DUST OF Final Design Submittal
Est. Type: Final Design Submittal
Date: April 3, 2025

				-	-	-	-	-	-	-	-	
01	**General Requirements**											
				Material		Labor		Equipment				
CSI Code	**Description of Work**	**Quantity**	**UOM**	**Mat'l Unit**	**Material Total**	**Labor Unit**	**Labor Total**	**Eqpt Unit**	**Eqpt Total**	**Total Unit $**	**TOTAL**	**Notes**
01 54	**Construction Aids**			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Trucks (Uper & Safety)	6.00	MO	$ -	$ -	$ -	$ -	$ 903.29	$ 5,419.73	$ 903.29	$ 5,419.73	
	Gas, Oil, Maintenance, Parking - Company Truck	6.00	MO	$ 451.64	$ 2,709.87	$ -	$ -	$ -	$ -	$ 451.64	$ 2,709.87	
	Small Tools (2% of Labor - $480,620)	1.00	LS	$ -	$ -	$ -	$ -	$ 9,612.40	$ 9,612.40	$ 9,612.40	$ 9,612.40	
	Personal Protective Equipment (0.25% of Labor - $480620)	1.00	LS	$ -	$ -	$ -	$ -	$ 1,201.55	$ 1,201.55	$ 1,201.55	$ 1,201.55	
	First Aid Kits	3.00	MO	$ -	$ -	$ -	$ -	$ 45.16	$ 135.49	$ 45.16	$ 135.49	
	Fire Extinguishers	3.00	MO	$ -	$ -	$ -	$ -	$ 33.87	$ 101.62	$ 33.87	$ 101.62	
	Drug Testing / Employee Badges	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Ice/Water	3.00	MO	$ 169.37	$ 508.10	$ -	$ -	$ -	$ -	$ 169.37	$ 508.10	
	Plan Reproduction	1.00	LS	$ 1,500.00	$ 1,500.00	$ -	$ -	$ -	$ -	$ 1,500.00	$ 1,500.00	
	Postage / Delivery / Overnight		MO	$ 225.82	$ -	$ -	$ -	$ -	$ -	$ 225.82	$ -	
	Equipment Rental & Associated Fuel		MO	$ -	$ -	$ -	$ -	$ 564.56	$ -	$ 564.56	$ -	
	Fork-lift Equipment Rental & Associated Fuel	1.00	MO	$ -	$ -	$ -	$ -	$ 7,903.78	$ 7,903.78	$ 7,903.78	$ 7,903.78	
	Man-lift Equipment Rental & Associated Fuel		MO	$ -	$ -	$ -	$ -	$ 5,645.55	$ -	$ 5,645.55	$ -	
	Crane Rental	-	MO	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Scaffold Rental	-	MO	$ -	$ -	$ -	$ -	$ 1,693.67	$ -	$ 1,693.67	$ -	
01 55	**Vehicle Access & Parking**			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Temporary Construction Entrances/Exits	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Temporary Roads	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Temporary Ramps	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
01 56	**Temporary Barriers & Enclosures**			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Fence / Barricades (Inc (2) 24' Gates)	-	LF	$ -	$ -	$ -	$ -	$ 9.03	$ -	$ 9.03	$ -	
	Handrails / Barricades (with Trades)	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Carpet Protection/Poly/Dust Protection/Air Barriers		SF	$ 0.56	$ -	$ -	$ -	$ -	$ -	$ 0.56	$ -	
	Temporary Walkways	-		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	SWPPP & Erosion Control	-	Incl	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
01 57	**Temporary Controls**			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Temporary Security Guard	-	MO	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Video Security	-	MO	$ -	$ -	$ -	$ -	$ 733.92	$ -	$ 733.92	$ -	
01 58	**Project Identification**			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Temporary Project ID Sign	1.00	EA	$ 564.56	$ 564.56	$ -	$ -	$ -	$ -	$ 564.56	$ 564.56	
	Temporary Directional & Info Signs	2.00	EA	$ 33.87	$ 67.75	$ -	$ -	$ -	$ -	$ 33.87	$ 67.75	
	Temporary Safety Signs & Graphics	-	EA	$ 22.58	$ -	$ -	$ -	$ -	$ -	$ 22.58	$ -	
01 71	**Examination & Preparation**			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Surveying Crew, 2 Man	-	DY	$ -	$ -	$ 1,477.64	$ -	$ -	$ -	$ 1,477.64	$ -	
	Surveying Crew, 3 Man	-	DY	$ -	$ -	$ 2,371.90	$ -	$ -	$ -	$ 2,371.90	$ -	
	Surveying Crew, 4 Man	-	DY	$ -	$ -	$ 3,062.01	$ -	$ -	$ -	$ 3,062.01	$ -	
01 74	**Cleaning & Waste Management**			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
	Dumpster Rental / Dumps	10.00	LOAD	$ -	$ -	$ -	$ -	$ 733.92	$ 7,339.22	$ 733.92	$ 7,339.22	
	Progress Cleanup / Temporary Labor	120.00	HR	$ 28.23	$ 3,387.33	$ -	$ -	$ -	$ -	$ 28.23	$ 3,387.33	
	Final Cleanup		SF	$ 0.51	$ -	$ -	$ -	$ -	$ -	$ 0.51	$ -	
01 91	**Commissioning (If Applicable, Based on % of Total Project)**			-	-	-	-	-	-	-	-	
	Verification, Testing, Comissioning, Certification (Sprinklers)	1.50%		-	-	-	21,149.51	-	-	-	21,149.51	
				-	-	-	-	-	-	-	-	
				-	-	-	-	-	-	-	-	
				-	-	-	-	-	-	-	-	
				-	-	-	-	-	-	-	-	
	SUBTOTALS	**4.00**	**MO**		**12,576.58**		**79,392.81**		**59,473.47**	**37,860.71**	**151,442.86**	**151,442.86**

522 ESTIMATE DETAIL

Tinker Air Force Base
Repair Fire Suppression System, Maintenance Hangar B2280 "DUST OFF"
Tinker Air Force Base
Oklahoma City, OK

Final Design Submittal

Estimate of Probable Construction Cost

Estimate By: CM
Date: 4/3/25
Rev Date:
Reviewed By: WS
Date: 4/3/25
Rev Date:

	ESTIMATE DETAIL			Material		Labor				Equipment		Total	
CSI #	Description	Qty.	Unit	Cost / Unit	Material Cost	MH/Unit	Ave Rate	Cost / Unit	Labor Cost	Cost / Unit	Equip. Cost	Cost / Unit	TOTAL
3	Concrete												
					$ -			$ -	$ -		$ -	$ -	$ -
	Concrete Cut & Patch	100	SF	$ 5.65	$ 565	0.160	$ 79.11	$ 12.66	$ 1,266		$ -	$ 18.30	$ 1,830
					$ -			$ -	$ -		$ -	$ -	$ -
	Concrete Equipment Pads	1	EA	$ 261.00	$ 261	4.000	$ 79.11	$ 316.44	$ 316		$ -	$ 577.44	$ 577
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	SUBCONTRACTOR OH & P	25%											$ 602
	TOTAL	82,602	SF									$ 0.04	**$ 3,010**
5	Metals												
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Cold Form Steel Ceiling Framing	**385**	**SF**		$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Cold Formed Steel Joists, 8" Deep, 18" OC, 14 Ga., Material Only	270	LF	$ 6.70	$ 1,809		$ -	$ -	$ -	$ -	$ -	$ 6.70	$ 1,809
					$ -			$ -	$ -		$ -	$ -	$ -
	Cold Formed Steel Joists, 8" Deep, 18" OC, 14 Ga., Installation Only	18	EA		$ -	0.178	$ 86.71	$ 15.43	$ 278	$ -	$ -	$ 15.43	$ 278
					$ -			$ -	$ -		$ -	$ -	$ -
	Flat Steel Straps for Cold Formed Steel Joists, 16" OC Top & Bottom	540	LF	$ 0.99	$ 533	0.015	$ 86.71	$ 1.30	$ 703	$ -	$ -	$ 2.29	$ 1,235
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	SUBCONTRACTOR OH & P	25%											$ 831
	TOTAL	82,602	SF									$ 0.05	**$ 4,153**
7	Thermal & Moisture Protection												
					$ -			$ -	$ -		$ -	$ -	$ -
	Roofing				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Install Roof Curb for SSCU-1 (Mini-Split System Compressor Unit), Assumed Wood Sleepers, Pressure Treated	1	EA	$ 564.56	$ 565	8.000	$ 82.50	$ 659.98	$ 660		$ -	$ 1,224.53	$ 1,225
					$ -			$ -	$ -		$ -	$ -	$ -
	Install Roof Penetrations for SSCU-1 (Mini-Split System Compressor Unit), Including Boots	2	EA	$ 169.37	$ 339	2.000	$ 82.50	$ 164.99	$ 330		$ -	$ 334.36	$ 669
					$ -			$ -	$ -		$ -	$ -	$ -
	Insulation				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	R-13 Batt Insulation, Wall, Assumed Foil Faced	420	SF	$ 0.94	$ 394	0.007	$ 86.71	$ 0.61	$ 255	$ -	$ -	$ 1.54	$ 649
					$ -			$ -	$ -		$ -	$ -	$ -
	R-13 Batt Insulation, Ceiling, Assumed Foil Faced	385	SF	$ 0.97	$ 374	0.011	$ 86.71	$ 0.95	$ 367	$ -	$ -	$ 1.92	$ 741
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	SUBCONTRACTOR OH & P	25%											$ 821
	TOTAL	82,602	SF									$ 0.05	**$ 4,104**

522 ESTIMATE DETAIL

Tinker Air Force Base
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CSI #	Description	Qty.	Unit	Cost / Unit	Material Cost	MH/Unit	Ave Rate	Cost / Unit	Labor Cost	Cost / Unit	Equip. Cost	Cost / Unit	TOTAL
8	Openings												
					$ -			$ -	$ -		$ -	$ -	$ -
	Openings Demolition				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Remove Double Metal Doors with Frame, 6' x 7'	2	PR		$ -	0.667	$ 86.71	$ 57.83	$ 116	$ -	$ -	$ 57.83	$ 116
					$ -			$ -	$ -		$ -	$ -	$ -
	Doors, Frames, Hardware				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Hollow Metal Door, 3'-0" x 7'-0", Insulated	2	EA	$ 885.19	$ 1,770	0.941	$ 86.71	$ 81.59	$ 163	$ -	$ -	$ 966.78	$ 1,934
					$ -			$ -	$ -		$ -	$ -	$ -
	Hollow Metal Door, 3'-0" x 7'-0", Insulated, 90-Minute Rated	2	EA	$ 1,062.23	$ 2,124	0.941	$ 86.71	$ 81.59	$ 163	$ -	$ -	$ 1,143.82	$ 2,288
					$ -			$ -	$ -		$ -	$ -	$ -
	Hollow Metal Door Frame, 6'-0" x 7'-0", Galvanized	1	EA	$ 427.72	$ 428	1.333	$ 86.71	$ 115.58	$ 116	$ -	$ -	$ 543.30	$ 543
					$ -			$ -	$ -		$ -	$ -	$ -
	Hollow Metal Door Frame, 6'-0" x 7'-0", Galvanized, 90-Minute Rated	1	EA	$ 513.26	$ 513	1.333	$ 86.71	$ 115.58	$ 116	$ -	$ -	$ 628.84	$ 629
					$ -			$ -	$ -		$ -	$ -	$ -
	Add for Galvanizing	20.00%			$ 440			$ -	$ -	$ -	$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Door Hardware	2	SETS	$ 715.68	$ 1,431	2.667	$ 86.71	$ 231.24	$ 462	$ -	$ -	$ 946.92	$ 1,894
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	SUBCONTRACTOR OH & P	25%											$ 1,851
	TOTAL	82,602	SF									$ 0.11	**$ 9,254**
9	Finishes												
					$ -			$ -	$ -		$ -	$ -	$ -
	Finishes Demolition				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Remove Wall Partitions, Assumed 10' High	420	SF		$ -	0.016	$ 86.71	$ 1.35	$ 569		$ -	$ 1.35	$ 569
					$ -			$ -	$ -		$ -	$ -	$ -
	Remove Ceiling System Including Cold Formed Metal Framing and Gypsum Board (Assumed)	381	SF		$ -	0.016	$ 86.71	$ 1.35	$ 516		$ -	$ 1.35	$ 516
					$ -			$ -	$ -		$ -	$ -	$ -
	Metal Stud Wall Partitions	**420**	**SF**		$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Metal Stud Wall Partition Framing, Assumed 6" Wide x 10' Tall	420	SF	$ 1.05	$ 441	0.017	$ 86.71	$ 1.47	$ 619	$ -	$ -	$ 2.52	$ 1,060
					$ -			$ -	$ -		$ -	$ -	$ -
	Gypsum Board				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Suspended ceiling system, 2" carriers, 24" OC w/ 1-5/8" channels, 16" OC, includes carriers	360	SF	$ 0.98	$ 354	0.042	$ 82.67	$ 3.47	$ 1,250	$ -	$ -	$ 4.45	$ 1,604
	Gypsum board, on ceilings, standard, w/compound skim coat (level 5 finish), 5/8" thick	360	SF	$ 0.45	$ 163	0.026	$ 77.45	$ 2.01	$ 725	$ -	$ -	$ 2.47	$ 887
					$ -			$ -	$ -		$ -	$ -	$ -
	Fiber Cement Panel				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Wall, Assumed Both Sides	840	SF	$ 1.33	$ 1,119	0.046	$ 86.71	$ 3.99	$ 3,350	$ -	$ -	$ 5.32	$ 4,469
					$ -			$ -	$ -		$ -	$ -	$ -
	Ceiling, Assumed Both Sides	770	SF	$ 1.33	$ 1,026	0.046	$ 86.71	$ 3.99	$ 3,071	$ -	$ -	$ 5.32	$ 4,097
					$ -			$ -	$ -		$ -	$ -	$ -

522 ESTIMATE DETAIL

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CSI #	Description	Qty.	Unit	Cost / Unit	Material Cost	MH/Unit	Ave Rate	Cost / Unit	Labor Cost	Cost / Unit	Equip. Cost	Cost / Unit	TOTAL
	Rubber Wall Base, Assumed 6"	104	LF	$ 5.34	$ 555	0.025	$ 78.16	$ 1.95	$ 203	$ -	$ -	$ 7.29	$ 759
					$ -			$ -	$ -		$ -	$ -	$ -
	Painting				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Paint Fiber Cement Panel, Assumed, 3 Coats	1,610	SF	$ 0.72	$ 1,163	0.012	$ 71.98	$ 0.86	$ 1,391		$ -	$ 1.59	$ 2,554
					$ -			$ -	$ -		$ -	$ -	$ -
	Paint 3'-0" x 7'-0" Hollow Metal Door, 3 Coats	4	EA	$ 26.79	$ 107	3.990	$ 71.98	$ 287.18	$ 1,149		$ -	$ 313.98	$ 1,256
					$ -			$ -	$ -		$ -	$ -	$ -
	Paint 6--0" x 7'-0" Hollow Metal Door Frame, 3 Coats	2	EA	$ 13.40	$ 27	1.995	$ 71.98	$ 143.59	$ 287		$ -	$ 156.99	$ 314
					$ -			$ -	$ -		$ -	$ -	$ -
	Minor Patching of Ceilings or Walls to Accommodate Replacement of Fire Alarm & Mass Notification System (For estimating purposes, assumed 15% of cost of a new ceiling for removal, replacement, and patching of existing ceilings)	82,602	GBSF	$ 0.06	$ 4,663	0.001	$ 86.71	$ 0.04	$ 3,581		$ -	$ 0.10	$ 8,244
					$ -			$ -	$ -		$ -	$ -	$ -
	Paint Fire Alarm Conduit, 3/4"	1,425	LF	$ 0.42	$ 595	0.013	$ 71.98	$ 0.94	$ 1,333		$ -	$ 1.35	$ 1,929
					$ -			$ -	$ -		$ -	$ -	$ -
	Paint Circuit Breaker Red	1	EA	$ 22.58	$ 23	1.000	$ 106.68	$ 106.68	$ 107		$ -	$ 129.27	$ 129
					$ -			$ -	$ -		$ -	$ -	$ -
	Paint gypsum board ceiling	360	SF	$ 0.43	$ 154	0.013	$ 71.98	$ 0.90	$ 324		$ -	$ 1.33	$ 478
					$ -			$ -	$ -		$ -	$ -	$ -
	SUBCONTRACTOR OH & P	25%											$ 7,217
	TOTAL	82,602	SF									$ 0.44	**$ 36,083**
10	**Specialties**												
					$ -			$ -	$ -		$ -	$ -	$ -
	Fire Suppression Specialties				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Halotron® Fire Extinguisher - 15.5 lb	3	EA	$ 1,500.00	$ 4,500	0.167	$ 86.71	$ 14.45	$ 43	$ -	$ -	$ 1,514.45	$ 4,543
					$ -			$ -	$ -		$ -	$ -	$ -
	Fire Extinguisher Cabinets, Large	3	EA	$ 419.69	$ 1,259	2.000	$ 86.71	$ 173.41	$ 520	$ -	$ -	$ 593.10	$ 1,779
					$ -			$ -	$ -		$ -	$ -	$ -
	8' High Stainless Steel Corner Guards with 3" Wings	2	EA	$ 291.13	$ 582	0.800	$ 86.71	$ 69.36	$ 139	$ -	$ -	$ 360.49	$ 721
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	SUBCONTRACTOR OH & P	25%											$ 1,761
	TOTAL	82,602	SF									$ 0.11	**$ 8,805**

522 ESTIMATE DETAIL

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CSI #	Description	Qty.	Unit	Cost / Unit	Material Cost	MH/Unit	Ave Rate	Cost / Unit	Labor Cost	Cost / Unit	Equip. Cost	Cost / Unit	TOTAL
21	Fire Suppression												
					$ -			$ -	$ -		$ -	$ -	$ -
	Fire Suppression Demolition				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Demolition of Under-Wing AFFF Foam Water System Sprinklers and Distribution Pipe, components and distribution piping assumed to be in half of the facility total area	41,301	SF		$ -	0.008	$ 96.28	$ 0.72	$ 29,824		$ -	$ 0.72	$ 29,824
					$ -			$ -	$ -		$ -	$ -	$ -
	Demolition of Overhead AFFF Pre-action Sprinklers and Distribution Pipe	82,602	SF		$ -	0.008	$ 96.28	$ 0.72	$ 59,648		$ -	$ 0.72	$ 59,648
					$ -			$ -	$ -		$ -	$ -	$ -
	Demolition of mechanical room riser and deluge valves, main drain piping, waterflow detectors, valve supervisory switches, associated accessories, and flush existing lead-in piping to prepare for new work.	6,173	SF		$ -	0.008	$ 96.28	$ 0.72	$ 4,458		$ -	$ 0.72	$ 4,458
					$ -			$ -	$ -		$ -	$ -	$ -
	Remove Fire Service Main to 6" Below Slab, Abandon in Place, Grout Sab	1	EA		$ -	24.000	$ 96.28	$ 2,310.76	$ 2,311		$ -	$ 2,310.76	$ 2,311
					$ -			$ -	$ -		$ -	$ -	$ -
	Note: total quantity of debris has been assumed using quantity calculation from PACES parametric model.												
	Disposal of AFFF contaminated debris, pickup, loading of truck	17	Ton		$ -		$ -	$ -	$ -		$ -	$ 210.00	$ 3,486
	Disposal of AFFF contaminated debris, disposal charge	17	Ton		$ -		$ -	$ -	$ -		$ -	$ 155.00	$ 2,573
	Disposal of AFFF contaminated debris, Transportation, one 17 ton load, to local hazardous waste facility	13	Mile		$ -		$ -	$ -	$ -		$ -	$ 7.98	$ 104
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Fire Sprinkler System				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	New Wet Fire Sprinkler System, Aircraft Maintenance Hangar, extra hazard, >50,000 SF	81,652	SF	$ 3.83	$ 312,727	0.022	$ 96.28	$ 2.12	$ 172,955		$ -	$ 5.95	$ 485,682
					$ -			$ -	$ -		$ -	$ -	$ -
	New Wet Fire Sprinkler System, Aircraft Maintenance Hangar, extra hazard, <2,000 SF	950	SF	$ 7.44	$ 7,068	0.043	$ 96.28	$ 4.11	$ 3,904		$ -	$ 11.55	$ 10,972
					$ -			$ -	$ -		$ -	$ -	$ -
	New Fire Department Connection	2	EA	$ 1,650.00	$ 3,300	9.400	$ 96.28	$ 905.05	$ 1,810		$ -	$ 2,555.05	$ 5,110
					$ -			$ -	$ -		$ -	$ -	$ -
	Alarm Check Valves	6	EA	$ 1,468.69	$ 8,812	10.667	$ 96.28	$ 1,027.04	$ 6,162		$ -	$ 2,495.73	$ 14,974
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	SUBCONTRACTOR OH & P	25%											$ 154,785
	TOTAL	82,602	SF									$ 9.37	**$ 773,927**

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22	Plumbing												
					$ -			$ -	$ -		$ -	$ -	$ -
	Sanitary Sewer				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Condensate Piping, Assumed 1" Type K Copper	50	LF	$ 21.78	$ 1,089	0.121	$ 94.51	$ 11.44	$ 572		$ -	$ 33.22	$ 1,661
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	SUBCONTRACTOR OH & P	25%											$ 415
	TOTAL	82,602	SF									$ 0.03	**$ 2,076**
23	HVAC												
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Mini-Split System Ductless System				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
SS-1 / SSCU-1	Air Cooled Ductless Mini-Split Air Conditioning Unit, Cooling Capacity 18,100 BTU/hr., 720 CFM	1	EA	$ 3,161.80	$ 3,162	11.429	$ 92.97	$ 1,062.50	$ 1,063		$ -	$ 4,224.30	$ 4,224
					$ -			$ -	$ -		$ -	$ -	$ -
	Tube/Wiring Kits, 50'	2	EA	$ 202.14	$ 404	0.800	$ 92.97	$ 74.37	$ 149		$ -	$ 276.52	$ 553
					$ -			$ -	$ -		$ -	$ -	$ -
	Thermostat	1	EA	$ 248.08	$ 248	1.000	$ 92.97	$ 92.97	$ 93		$ -	$ 341.04	$ 341
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Thermostat Conduit	50	LF	$ 1.42	$ 71	0.062	$ 106.68	$ 6.61	$ 331		$ -	$ 8.04	$ 402
					$ -			$ -	$ -		$ -	$ -	$ -
	Thermostat Control Wiring	210	LF	$ 0.14	$ 30	0.008	$ 106.68	$ 0.81	$ 171		$ -	$ 0.96	$ 201
					$ -			$ -	$ -		$ -	$ -	$ -
	SUBCONTRACTOR OH & P	25%											$ 1,430
	TOTAL	82,602	SF									$ 0.09	**$ 7,151**

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26	Electrical												
					$ -			$ -	$ -		$ -	$ -	$ -
	Electrical Demolition				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Disconnect & Remove Electrical System & Components Serving Existing Fire Alarm System	128	MH		$ -	1.000	$ 106.68	$ 106.68	$ 13,655		$ -	$ 106.68	$ 13,655
					$ -			$ -	$ -		$ -	$ -	$ -
	Remove 200A fuse	1	EA		$ -	2.420	$ 106.68	$ 258.17	$ 258		$ -	$ 258.17	$ 258
					$ -			$ -	$ -		$ -	$ -	$ -
	Panels				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Mini-Power Zone Unit Substation (Equal to Square-D #MPZB15T2F, 15KVA, 480V - 120/208V, 3 PH, 2 W	1	EA	$ 14,238.09	$ 14,238	15.000	$ 106.68	$ 1,600.25	$ 1,600		$ -	$ 15,838.34	$ 15,838
					$ -			$ -	$ -		$ -	$ -	$ -
FA	Panel FA, 60A	1	EA	$ 2,661.37	$ 2,661	24.240	$ 106.68	$ 2,586.01	$ 2,586		$ -	$ 5,247.38	$ 5,247
					$ -			$ -	$ -		$ -	$ -	$ -
	Conduit. 3/4" EMT	100	LF	$ 1.95	$ 195	0.062	$ 106.68	$ 6.61	$ 661		$ -	$ 8.57	$ 857
					$ -			$ -	$ -		$ -	$ -	$ -
	Fittings	15%			$ 29			$ -	$ 99		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Wire, 3#10, 1#10G	420	LF	$ 0.49	$ 207	0.008	$ 106.68	$ 0.85	$ 358		$ -	$ 1.35	$ 565
					$ -			$ -	$ -		$ -	$ -	$ -
	Circuit Breaker, 25A, 3P, Locking, Painted Red	1	EA	$ 5,622.97	$ 5,623	2.000	$ 106.68	$ 213.37	$ 213		$ -	$ 5,836.34	$ 5,836
					$ -			$ -	$ -		$ -	$ -	$ -
	Surge Protection Devices	1	EA	$ 232.18	$ 232	2.999	$ 106.68	$ 319.94	$ 320		$ -	$ 552.12	$ 552
					$ -			$ -	$ -		$ -	$ -	$ -
	480V/400AS 225AF Disconnect Switch	**1**	**EA**	$ 2,093.05	$ 2,093	10.458	$ 106.68	$ 1,115.64	$ 1,116		$ -	$ 3,208.69	$ 3,209
					$ -			$ -	$ -		$ -	$ -	$ -
	Conduit & Wire From SWG to Disconnect Switch to ATS				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Conduit, 2" EMT	100	LF	$ 7.67	$ 767	0.100	$ 106.68	$ 10.67	$ 1,067		$ -	$ 18.34	$ 1,834
					$ -			$ -	$ -		$ -	$ -	$ -
	Fittings	15%			$ 115			$ -	$ 160		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Wire, 4#4/0	420	LF	$ 6.74	$ 2,831	0.032	$ 106.68	$ 3.41	$ 1,434		$ -	$ 10.15	$ 4,265
					$ -			$ -	$ -		$ -	$ -	$ -
	Wire 1#4G	105	LF	$ 1.64	$ 172	0.016	$ 106.68	$ 1.71	$ 179		$ -	$ 3.35	$ 351
					$ -			$ -	$ -		$ -	$ -	$ -
	Conduit & Wire from ATS to Panel HD8				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Conduit, 2" EMT	70	LF	$ 7.67	$ 537	0.100	$ 106.68	$ 10.67	$ 747		$ -	$ 18.34	$ 1,283
					$ -			$ -	$ -		$ -	$ -	$ -
	Fittings	15%			$ 80			$ -	$ 112		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Wire, 4#4/0	294	LF	$ 6.74	$ 1,982	0.032	$ 106.68	$ 3.41	$ 1,004		$ -	$ 10.15	$ 2,985
					$ -			$ -	$ -		$ -	$ -	$ -
	Wire 1#4G	74	LF	$ 1.64	$ 121	0.016	$ 106.68	$ 1.71	$ 125		$ -	$ 3.35	$ 246
					$ -			$ -	$ -		$ -	$ -	$ -

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Date: 4/3/25
Rev Date:

	ESTIMATE DETAIL			Material		Labor				Equipment		Total	
CSI #	Description	Qty.	Unit	Cost / Unit	Material Cost	MH/Unit	Ave Rate	Cost / Unit	Labor Cost	Cost / Unit	Equip. Cost	Cost / Unit	TOTAL
	Conduit & Wire for Sprinkler Valve Controls				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Conduit. 3/4" EMT	200	LF	$ 1.95	$ 391	0.062	$ 106.68	$ 6.61	$ 1,323		$ -	$ 8.57	$ 1,714
					$ -			$ -	$ -		$ -	$ -	$ -
	Fittings	15%			$ 59			$ -	$ 198		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Wire	630	LF	$ 0.14	$ 90	0.008	$ 106.68	$ 0.81	$ 513		$ -	$ 0.96	$ 603
					$ -			$ -	$ -		$ -	$ -	$ -
	Electrical Power for Mechanical Equipment				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Conduit, 3/4" EMT	187	LF	$ 1.95	$ 365	0.062	$ 106.68	$ 6.61	$ 1,237		$ -	$ 8.57	$ 1,602
					$ -			$ -	$ -		$ -	$ -	$ -
	Fittings	15%			$ 55			$ -	$ 186		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	Wire, 3#10	589	LF	$ 0.49	$ 290	0.008	$ 106.68	$ 0.85	$ 503		$ -	$ 1.35	$ 792
					$ -			$ -	$ -		$ -	$ -	$ -
	20A Circuit Breaker	1	EA	$ 4,498.38	$ 4,498	0.004	$ 106.68	$ 0.43	$ 0		$ -	$ 4,498.80	$ 4,499
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	SUBCONTRACTOR OH & P	25%											$ 16,548
	TOTAL	82,602	SF									$ 1.00	**$ 82,740**
28	**Electronic Safety & Security**												
					$ -			$ -	$ -		$ -	$ -	$ -
	Fire Alarm Demolition				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
SP/ST	Remove Combo Speaker / Strobe Devices	17	EA		$ -	0.905	$ 106.68	$ 96.59	$ 1,642	$ -	$ -	$ 96.59	$ 1,642
					$ -			$ -	$ -		$ -	$ -	$ -
F	Remove Manual Pull Stations	32	EA		$ -	0.800	$ 106.68	$ 85.33	$ 2,730	$ -	$ -	$ 85.33	$ 2,730
					$ -			$ -	$ -		$ -	$ -	$ -
S	Remove Smoke Detectors	2	EA		$ -	0.800	$ 106.68	$ 85.33	$ 171	$ -	$ -	$ 85.33	$ 171
					$ -			$ -	$ -		$ -	$ -	$ -
FACU	Remove Fire Alarm and Mass Notification Control Unit	6	EA		$ -	13.205	$ 106.68	$ 1,408.73	$ 8,452	$ -	$ -	$ 1,408.73	$ 8,452
					$ -			$ -	$ -		$ -	$ -	$ -
	Conduit. 3/4" EMT	1,425	LF		$ -	0.016	$ 106.68	$ 1.67	$ 2,387	$ -	$ -	$ 1.67	$ 2,387
					$ -			$ -	$ -		$ -	$ -	$ -
	Wire	4,489	LF		$ -	0.002	$ 106.68	$ 0.18	$ 814	$ -	$ -	$ 0.18	$ 814
					$ -			$ -	$ -		$ -	$ -	$ -

522 ESTIMATE DETAIL

Tinker Air Force Base
Repair Fire Suppression System, Maintenance Hangar B2280 "DUST OFF"
Tinker Air Force Base
Oklahoma City, OK

Final Design Submittal

Estimate of Probable Construction Cost

Estimate By: CM
Date: 4/3/25
Rev Date:
Reviewed By: WS
Date: 4/3/25
Rev Date:

	ESTIMATE DETAIL			Material		Labor				Equipment		Total	
CSI #	Description	Qty.	Unit	Cost / Unit	Material Cost	MH/Unit	Ave Rate	Cost / Unit	Labor Cost	Cost / Unit	Equip. Cost	Cost / Unit	TOTAL
	Fire Alarm & Mass Notification Systems				$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	New Antenna	1	EA	$ 376.44	$ 376	1.735	$ 106.68	$ 185.13	$ 185		$ -	$ 561.57	$ 562
					$ -			$ -	$ -		$ -	$ -	$ -
	Surge Suppressor	1	EA	$ 173.64	$ 174	1.194	$ 106.68	$ 127.38	$ 127		$ -	$ 301.02	$ 301
					$ -			$ -	$ -		$ -	$ -	$ -
SP/ST	Combo Speaker/Strobe Devices	77	EA	$ 104.00	$ 8,008	1.509	$ 106.68	$ 160.99	$ 12,396		$ -	$ 264.99	$ 20,404
					$ -			$ -	$ -		$ -	$ -	$ -
SP	Speaker Devices	1	EA	$ 52.63	$ 53	0.780	$ 106.68	$ 83.21	$ 83		$ -	$ 135.84	$ 136
					$ -			$ -	$ -		$ -	$ -	$ -
SP	Speaker Devices, Exterior, Waterproof	49	EA	$ 60.52	$ 2,966	0.780	$ 106.68	$ 83.21	$ 4,077		$ -	$ 143.74	$ 7,043
					$ -			$ -	$ -		$ -	$ -	$ -
ST WP	Strobe Devices, ADA Type	31	EA	$ 150.56	$ 4,667	1.194	$ 106.68	$ 127.38	$ 3,949		$ -	$ 277.94	$ 8,616
					$ -			$ -	$ -		$ -	$ -	$ -
F	Manual Station	33	EA	$ 115.18	$ 3,801	1.333	$ 106.68	$ 142.21	$ 4,693		$ -	$ 257.39	$ 8,494
					$ -			$ -	$ -		$ -	$ -	$ -
PS	Pull Station (Assumed PS is Pull Station)	1	EA	$ 115.18	$ 115	1.333	$ 106.68	$ 142.21	$ 142		$ -	$ 257.39	$ 257
					$ -			$ -	$ -		$ -	$ -	$ -
FMCU	Fire Alarm and Mass Notification Control Panel, Addressable, Up to 400 Points	1	EA	$ 12,129.98	$ 12,130	22.008	$ 106.68	$ 2,347.89	$ 2,348		$ -	$ 14,477.87	$ 14,478
					$ -			$ -	$ -		$ -	$ -	$ -
FAA	Fire Alarm Annunciator	1	EA	$ 502.86	$ 503	7.273	$ 87.43	$ 635.91	$ 636		$ -	$ 1,138.77	$ 1,139
					$ -			$ -	$ -		$ -	$ -	$ -
NAC	NAC Booster Power Supply	6	EA	$ 1,390.00	$ 8,340	3.000	$ 106.68	$ 320.05	$ 1,920		$ -	$ 1,710.05	$ 10,260
					$ -			$ -	$ -		$ -	$ -	$ -
S	Smoke Detectors, Addressable Type	2	EA	$ 137.13	$ 274	1.333	$ 106.68	$ 142.21	$ 284		$ -	$ 279.34	$ 559
					$ -			$ -	$ -		$ -	$ -	$ -
V	Flame Detector, Infrared Type Det-Tronics X3301	14	EA	$ 9,586.00	$ 134,204	1.324	$ 106.68	$ 141.21	$ 1,977		$ -	$ 9,727.21	$ 136,181
					$ -			$ -	$ -		$ -	$ -	$ -
AIM	Dual Addressable Input Module	9	EA	$ 299.21	$ 2,693	1.333	$ 106.68	$ 142.21	$ 1,280		$ -	$ 441.42	$ 3,973
					$ -			$ -	$ -		$ -	$ -	$ -
VS	Sprinkler Valve Supervisory Switch, Alarm Device	9	EA	$ 302.44	$ 2,722	1.000	$ 106.68	$ 106.68	$ 960		$ -	$ 409.13	$ 3,682
					$ -			$ -	$ -		$ -	$ -	$ -
WF	Sprinkler Water Flow Detector/Switch, Alarm Device	8	EA	$ 302.44	$ 2,420	1.000	$ 106.68	$ 106.68	$ 853		$ -	$ 409.13	$ 3,273
					$ -			$ -	$ -		$ -	$ -	$ -
TSS	Temperature Supervisory Switch	4	EA	$ 302.44	$ 1,210	1.000	$ 106.68	$ 106.68	$ 427		$ -	$ 409.13	$ 1,637
					$ -			$ -	$ -		$ -	$ -	$ -

522 ESTIMATE DETAIL

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CSI #	Description	Qty.	Unit	Cost / Unit	Material Cost	MH/Unit	Ave Rate	Cost / Unit	Labor Cost	Cost / Unit	Equip. Cost	Cost / Unit	TOTAL
FATC	Fire Alarm Terminal Cabinet	1	EA	$ 4,463.38	$ 4,463	12.030	$ 106.68	$ 1,283.40	$ 1,283		$ -	$ 5,746.78	$ 5,747
					$ -			$ -	$ -		$ -	$ -	$ -
LOC	Local Operator's Console	3	EA	$ 2,864.55	$ 8,594	13.998	$ 106.68	$ 1,493.35	$ 4,480		$ -	$ 4,357.91	$ 13,074
					$ -			$ -	$ -		$ -	$ -	$ -
ET	Emergency Textural Signs	28	EA	$ 568.78	$ 15,926	2.000	$ 106.68	$ 213.37	$ 5,974		$ -	$ 782.15	$ 21,900
					$ -			$ -	$ -		$ -	$ -	$ -
XCVR	Monaco Transceiver	1	EA	$ 752.12	$ 752	4.000	$ 106.68	$ 426.73	$ 427		$ -	$ 1,178.86	$ 1,179
					$ -			$ -	$ -		$ -	$ -	$ -
BATT	Batteries	12	EA	$ 564.56	$ 6,775	2.000	$ 106.68	$ 213.37	$ 2,560		$ -	$ 777.92	$ 9,335
					$ -			$ -	$ -		$ -	$ -	$ -
	Conduit. 3/4" EMT	7,325	LF	$ 1.42	$ 10,421	0.062	$ 106.68	$ 6.61	$ 48,450		$ -	$ 8.04	$ 58,871
					$ -			$ -	$ -		$ -	$ -	$ -
	SCP 2C/14 AWG Solid FPLR Shielded Fire Alarm Bulk Cable	23,074	LF	$ 0.36	$ 8,312	0.008	$ 106.68	$ 0.81	$ 18,791		$ -	$ 1.17	$ 27,102
					$ -			$ -	$ -		$ -	$ -	$ -
	Reprogram fire alarm system	1	EA		$ -	80.000	$ 106.68	$ 8,534.68	$ 8,535	$ -	$ -	$ 8,534.68	$ 8,535
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
					$ -			$ -	$ -		$ -	$ -	$ -
	SUBCONTRACTOR OH & P	25%											$ 95,733
	TOTAL	82,602	SF									$ 5.79	**$ 478,666**
	TOTALS DIVISIONS 2-33				**$ 642,716**				**$ 480,628**		**$ -**		**$ 1,409,967**

WAGE RATE CALCULATIONS

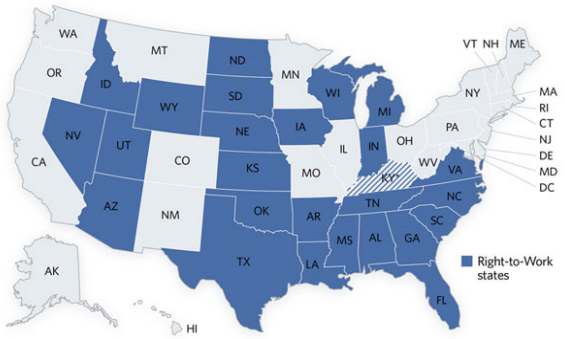
TRADE	COMPARE: DAVIS-BACON MINIMUM RATES: 2025 Q1 Davis Bacon Base Rate (wdol.gov)	2025 Q1 Davis Bacon Fringes (wdol.gov)	2025 Q1 Davis Bacon Base With Fringes	R.S. MEANS MARKET RATES: 2025 Q1 RS Means Labor Rate With Fringe	2025 RS Means Location Index	2025 RS Means Non-Union Local Rate With Fringe	TINKER RATES: Tinker AFB Historical Market Rates	SELECT: Recommended Base Rate to Use in Estimate (Higher of the 3 Rates)	ADJUST: Add Labor Burden: Workers' Comp.	Federal Unemployment	State Unemployment Rate	Social Security Tax	Builder's risk insurance	Public liability costs	Total Burden %	USE: Total Burdened Labor Rate To Use in Estimate (Without OH&P or Bond)	Crew Configurations: 2 Man crew	3 Man Crew	DB / RSM	Selected Base Minus Fringes (For MII Wage Base Rates)
	Oklahoma County, Oklahoma General Decision Number: OK20250049 03/14/2025			Non-Union National Average	Oklahoma City, Oklahoma		Tinker AFB	NON-UNION	Choose State ▼ OK	2.60%	5.20%	7.65%	0.50%	2.02%						
Asbestos & Insulation Worker	$ 16.61	$ 3.00	$ 19.61	$ 46.80	92.10	$ 43.10	$ 69.82	$ 69.82	12.47%	2.60%	5.20%	7.65%	0.50%	2.02%	30%	$ 91.07	$ 79.63	$ 75.81	0.5	$ 66.82
Rodman	$ 17.11	$ -	$ 17.11	$ 47.20	75.40	$ 35.59	$ 70.41	$ 70.41	18.85%	2.60%	5.20%	7.65%	0.50%	2.02%	37%	$ 96.34	$ 82.26	$ 77.57	0.5	$ 70.41
Cement Finisher	$ 16.75	$ -	$ 16.75	$ 42.05	76.10	$ 32.00	$ 62.73	$ 62.73	8.14%	2.60%	5.20%	7.65%	0.50%	2.02%	26%	$ 79.11	$ 73.65	$ 71.83	0.5	$ 62.73
Bricklayer	$ 26.92	$ 13.09	$ 40.01	$ 41.70	58.70	$ 24.48	$ 62.21	$ 62.21	15.58%	2.60%	5.20%	7.65%	0.50%	2.02%	34%	$ 83.08	$ 75.63	$ 73.15	1.6	$ 49.12
Common Building Laborer	$ 11.70	$ -	$ 11.70	$ 34.65	69.70	$ 24.15	$ 51.69	$ 51.69	13.94%	2.60%	5.20%	7.65%	0.50%	2.02%	32%	$ 68.19	$ 68.19	$ 68.19	0.5	$ 51.69
Lather	$ 17.11	$ -	$ 17.11	$ 44.80	68.10	$ 30.51	$ 66.83	$ 66.83	5.73%	2.60%	5.20%	7.65%	0.50%	2.02%	24%	$ 82.67	$ 75.43	$ 73.01	0.6	$ 66.83
Structural Steel Worker	$ 30.35	$ 16.64	$ 46.99	$ 46.50	75.40	$ 35.06	$ 69.37	$ 69.37	33.69%	2.60%	5.20%	7.65%	0.50%	2.02%	52%	$ 105.20	$ 86.69	$ 80.53	1.3	$ 52.73
Carpenter	$ 16.61	$ 3.00	$ 19.61	$ 44.30	68.80	$ 30.48	$ 66.09	$ 66.09	13.23%	2.60%	5.20%	7.65%	0.50%	2.02%	31%	$ 86.71	$ 77.45	$ 74.36	0.6	$ 63.09
Roofer, Composition	$ 26.30	$ 10.34	$ 36.64	$ 38.90	69.50	$ 27.04	$ 58.03	$ 58.03	24.19%	2.60%	5.20%	7.65%	0.50%	2.02%	42%	$ 82.50	$ 75.34	$ 72.96	1.4	$ 47.69
Glazier	$ 12.02	$ 2.42	$ 14.44	$ 43.45	63.60	$ 27.63	$ 64.82	$ 64.82	12.71%	2.60%	5.20%	7.65%	0.50%	2.02%	31%	$ 84.71	$ 76.45	$ 73.69	0.5	$ 62.40
Tile Layer	$ 16.61	$ 3.00	$ 19.61	$ 41.85	68.80	$ 28.79	$ 62.43	$ 62.43	7.23%	2.60%	5.20%	7.65%	0.50%	2.02%	25%	$ 78.16	$ 73.18	$ 71.51	0.7	$ 59.43
Painting, Ordinary	$ 12.42	$ -	$ 12.42	$ 37.30	64.20	$ 23.95	$ 55.64	$ 55.64	11.38%	2.60%	5.20%	7.65%	0.50%	2.02%	29%	$ 71.98	$ 70.08	$ 69.45	0.5	$ 55.64
Painter, Structural Steel	$ 12.42	$ -	$ 12.42	$ 38.50	64.20	$ 24.72	$ 57.43	$ 57.43	33.69%	2.60%	5.20%	7.65%	0.50%	2.02%	52%	$ 87.10	$ 77.65	$ 74.49	0.5	$ 57.43
Marble Setter	$ 16.61	$ 3.00	$ 19.61	$ 41.85	58.70	$ 24.57	$ 62.43	$ 62.43	7.23%	2.60%	5.20%	7.65%	0.50%	2.02%	25%	$ 78.16	$ 73.18	$ 71.51	0.8	$ 59.43
Elevator Mechanic	$ 51.11	$ 38.43	$ 89.54	$ 70.30	80.90	$ 56.87	$ 104.87	$ 104.87	33.69%	2.60%	5.20%	7.65%	0.50%	2.02%	52%	$ 159.05	$ 113.62	$ 98.47	1.6	$ 66.44
Fire Sprinkler	$ 36.54	$ 25.72	$ 62.26	$ 51.55	66.90	$ 34.49	$ 76.90	$ 76.90	7.23%	2.60%	5.20%	7.65%	0.50%	2.02%	25%	$ 96.28	$ 82.23	$ 77.55	1.8	$ 51.18
Plumber	$ 40.00	$ 15.71	$ 55.71	$ 50.60	66.90	$ 33.85	$ 75.49	$ 75.49	7.23%	2.60%	5.20%	7.65%	0.50%	2.02%	25%	$ 94.51	$ 81.35	$ 76.96	1.6	$ 59.78
Steamfitter or Pipefitter	$ 40.00	$ 15.71	$ 55.71	$ 53.70	66.90	$ 35.93	$ 80.11	$ 80.11	7.23%	2.60%	5.20%	7.65%	0.50%	2.02%	25%	$ 100.30	$ 84.24	$ 78.89	1.6	$ 64.40
Sheet Metal Worker	$ 33.38	$ 16.36	$ 49.74	$ 48.50	66.90	$ 32.45	$ 72.35	$ 72.35	10.52%	2.60%	5.20%	7.65%	0.50%	2.02%	28%	$ 92.97	$ 80.58	$ 76.45	1.5	$ 55.99
Electrician	$ 39.20	$ 12.76	$ 51.96	$ 53.15	70.00	$ 37.21	$ 85.35	$ 85.35	7.02%	2.60%	5.20%	7.65%	0.50%	2.02%	25%	$ 106.68	$ 87.43	$ 81.02	1.4	$ 72.59
Pile Driver	$ 36.84	$ 18.05	$ 54.89	$ 45.50	92.10	$ 41.91	$ 67.88	$ 67.88	12.79%	2.60%	5.20%	7.65%	0.50%	2.02%	31%	$ 88.76	$ 78.47	$ 75.04	1.3	$ 49.83
Equipment Operator, Heavy	$ 36.84	$ 18.05	$ 54.89	$ 48.80	94.70	$ 46.21	$ 72.80	$ 72.80	11.13%	2.60%	5.20%	7.65%	0.50%	2.02%	29%	$ 93.98	$ 81.09	$ 76.79	1.2	$ 54.75
Equipment Operator, Medium	$ 34.15	$ 18.05	$ 52.20	$ 46.90	94.70	$ 44.41	$ 69.97	$ 69.97	11.13%	2.60%	5.20%	7.65%	0.50%	2.02%	29%	$ 90.33	$ 79.26	$ 75.57	1.2	$ 51.92
Equipment Operator, Light	$ 26.00	$ 18.05	$ 44.05	$ 44.75	94.70	$ 42.38	$ 66.76	$ 66.76	11.13%	2.60%	5.20%	7.65%	0.50%	2.02%	29%	$ 86.18	$ 77.19	$ 74.19	1.0	$ 48.71
Truck Driver, Heavy	$ 11.60	$ -	$ 11.60	$ 40.65	94.70	$ 38.50	$ 60.64	$ 60.64	7.23%	2.60%	5.20%	7.65%	0.50%	2.02%	25%	$ 75.92	$ 72.05	$ 70.76	0.3	$ 60.64
Truck Driver, Light	$ 11.60	$ -	$ 11.60	$ 40.15	94.70	$ 38.02	$ 59.90	$ 59.90	7.23%	2.60%	5.20%	7.65%	0.50%	2.02%	25%	$ 74.99	$ 71.59	$ 70.45	0.3	$ 59.90
Skilled Worker	$ 13.00	$ 1.91	$ 14.91	$ 45.30	69.70	$ 31.57	$ 67.58	$ 67.58	13.23%	2.60%	5.20%	7.65%	0.50%	2.02%	31%	$ 88.66	$ 78.42	$ 75.01	0.5	$ 65.67
AVERAGES	$ 24.44	$ 9.38	$ 33.82	$ 45.54	$ 75.08	$ 34.29	$ 68.17	$ 68.17							31%	$ 89.76			$ 0.96	$ 58.79

INSTRUCTIONS:

1. RED FONT INDICATES USER DATA ENTRY. DON'T EDIT BLACK FONT.
2. SELECT STATE IN CELL K6.
3. DETERMINE IF PROJECT IS UNION OR NON UNION. REFER TO RIGHT TO WORK STATE MAP SHOWN TO THE RIGHT.
4. ENTER "UNION" OR "NON-UNION" FROM DROP DOWN LIST IN CELL J6.
5. ENTER CITY & STATE OR 3 DIGIT ZIP FROM RS MEANS IN CELL G5.
6. ENTER RS MEANS LOCATION INDEX FOR EACH TRADE IN COLUMN G. ENTER AS A WHOLE NUMBER, NOT A PERCENTAGE.
7. ENTER COUNTY & STATE IN CELL B5.
8. FIND DAVIS BACON PREVAILING WAGE RATE DETERMINATION AT "HTTP://WDOL.GOV".
9. COPY & PASTE DAVIS BACON PREVAILING WAGE REATE DETERMINATION BELOW.
10. SPLIT WINDOWS SCREEN WITH WAGE RATE CALCULATIONS TABLE IN UPPER HALF & DAVIS BACON IN LOWER HALF.
11. ENTER THE DAVIS BACON BASE & FRINGE RATES IN COLUMNS B & C.
12. COLUMN J WILL AUTOMATICALLY SELECT THE HIGHER OF THE DAVIS BACON RATE OR THE UNION OR NON UNION RATE.
13. COLUMN R WILL AUTOMATCALLY CALCULATE TO INCLUDE THE RATES IN COLUMN J WITH PAYROLL BURDEN ADDED.
14. COLUMNS S & T AUTOMATICALLY CALCULATE CREW RATES.
15. ALTERNATIVELY, COLUMN U AUTOMATICALLY CALCULATES THE DAVIS BACON BASE RATE DIVIDED BY THE RS MEANS BASE RATE TO USE TO EDIT RS MEANS TOTAL LABOR COSTS DIRECT FROM RS MEANS WHEN DAVIS BACON IS HIGHER.
16. TYPICALLY, NEVER USE A DAVIS BACON RATE WHEN IT IS LOWER THAN AN RS MEANS RATE, AS DAVIS BACON IS ONLY INTENDED TO BE THE "MINIMUM LEGALLY REQUIRED RATE ON FEDERAL FUNDED PROJECTS" AND THE MARKET MAY ACTUALLY PAY "MORE" THAN DAVIS BACON.

MAP 1

25 States Have Right-to-Work Laws



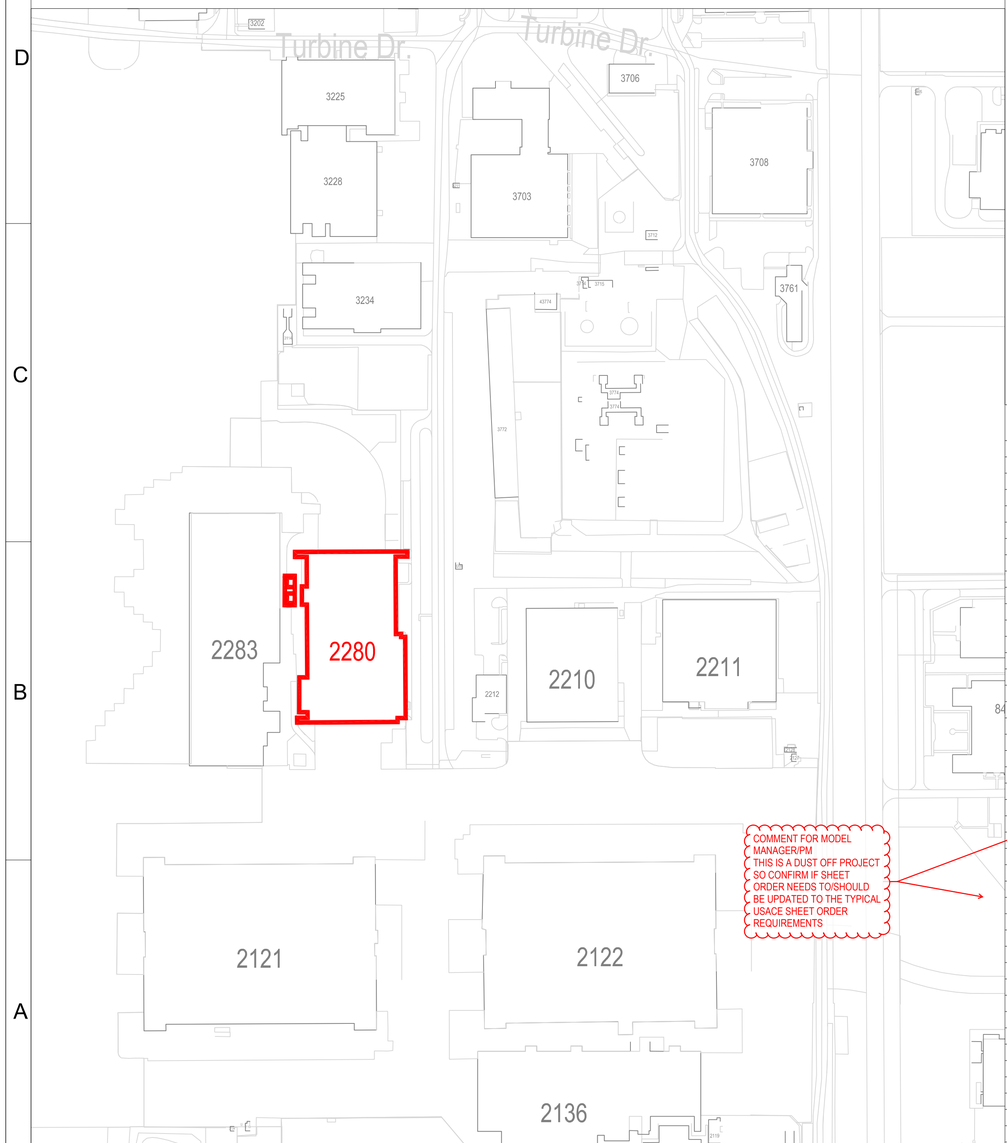
*Twelve counties in Kentucky have passed local right-to-work ordinances, and another six counties have passed preliminary right-to-work laws that await final votes.
Source: National Right to Work Committee, "State Right to Work Timeline," 2015, https://nrtwc.org/facts-issues/state-right-to-work-timeline-2/ (accessed August 28, 2015).

IB 4457 heritage.org

Variance

	Delta	Apr-25	Aug-22
Electrical - Reduction in conduit and wire, removal of unessecary panels. This results in a decrease from the previous estimate	($20,886)	$ 82,740	$ 103,626
Fire Suppression - Updated previous estimate unit cost ($4.46/SF) for new sprinkler system. New unit cost based on extra hazard wet pipe sprinkler system from 2024 MII English Cost Book ($5.95/SF) for the large 81,000 SF area. Updated previous estimate unit cost ($4.05/SF) for new sprinkler system. New unit cost based on cost for extra hazard wet pipe sprinkler for areas less than 2,000 SF system from 2024 MII English Cost Book ($11.56/SF) for the smaller 950 SF area. Previous estimate fire suppression demolition includes AFFF tank demo and $2.14/SF for the rest of the demo scope. Previous estime demo total $204,820, $2.48/SF. Current estimate includes demo for under wing system 41,301 SF at $0.72/SF. Overhead system 82,602 SF at $0.72/SF. Mechanical room 6,173 SF at 0.72/SF. Disposal of AFFF contaminated debris $6,163. Total demo cost $102,403, 1.24/SF. This results in a net increase from previous estimate.	$33,346	$ 773,927	$ 740,581
Fire Alarm - Main difference due to increase in unit cost of flame detectors from $363 to $9,586 (14 ea.) for a $129k increase. Additional increase due to updated basis of unit costs due to direct cost escalation. This results in an increase from previous estimate.	$166,381	$ 478,666	$ 312,285
Other diciplines	($1,187)		
Total direct cost increase	**$177,653**	**$ 1,409,967**	**$ 1,232,313**
GENERAL REQUIREMENTS - General requirements changed from previous estimte rate of 30% to 19%. This is due to the use of the calculated general requirements model.	($218,251)	$ 151,443	$ 369,694
COMMISSIONING - Stays at 2% Unchanged. Results in increase.	$3,553	$ 28,199	$ 24,646
SALES TAX - Stays at 8.63%, Unchanged. Results in increase.	$16,135	$ 55,434	$ 39,300
SECURITY FACTOR AT ENTRY - Stays at 2%. Unchanged. Results in decrease.	($1,752)	$ 10,013	$ 11,765
LABOR FACTOR FOR ELEVATED INSTALLATION 30' to 35' - Stays at 55%. Unchanged. Results in decrease.	($46,247)	$ 264,346	$ 310,593
LABOR FACTOR FOR WORKING IN EXISTING OCCUPIED BUILDING - Increased from previous estimate rate of 12.5% to 15%. Based on current RS Means data. This results in an increase from previous estimate.	$1,505	$ 72,094	$ 70,589
EFFECTIVE ESCALATION - Previous estimate date August 2022, midpoint August 2023, midpoint escalation rate used 13.48%. Current estimate date April 2025, midpoint Decemeber 2025, midpoint escalation rate used 3.8% Escalation to midpoint decrease from 13.48% to 3.8% due to revised assumtion of construction dates. Results in decrease.	($211,323)	$ 66,217	$ 277,540
DESIGN CONTINGENCY - Design contingency decrease from 5% to 0%. Based on final design. Results in decrease.	($116,822)		$ 116,822
Total with markups	**($395,549)**	**$ 2,057,713**	**$ 2,453,262**
PRIME CONTRACTOR HOME OFFICE OVERHEAD - Stays at 15%. Results in decrease.	($59,332)	$ 308,657	$ 367,989
PRIME CONTRACTOR PROFIT - Changed from 10% to 6% based on profit weighted guidelines. Results in decrease.	($140,143)	$ 141,982	$ 282,125
BOND & INSURANCE - Stays at 2.5%. Results in decrease.	($14,876)	$ 62,709	$ 77,584
Overall Estimate decrease (Includes removal of scope under separate AFCEC contract)	**($609,900)**	**$ 2,571,062**	**$ 3,180,961**

WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGAR B2280



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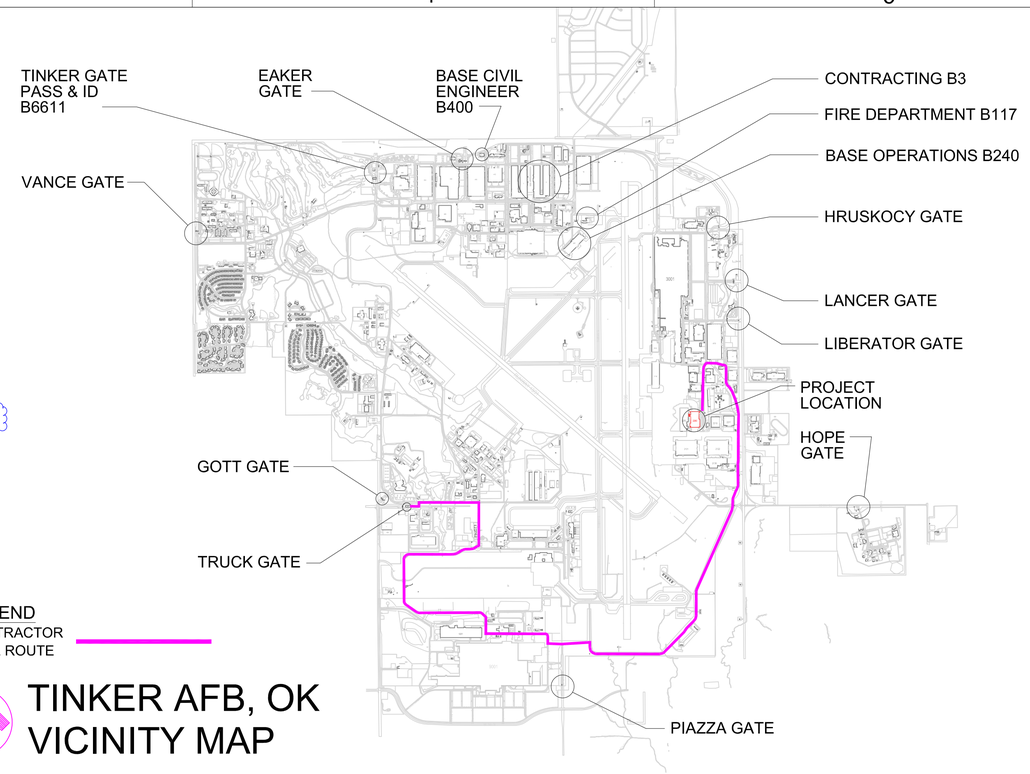
Provide sheet bookmarks



TINKER AFB, OK VICINITY MAP

PROJECT DRAWING INDEX

SHT.	SHEET TITLE
	GENERAL
G-001	GENERAL NOTES & VICINITY MAP
G-002	GENERAL PHASING PLAN
G-100	CODE ANALYSIS
G100B	LIFE SAFETY OVERALL HANGAR PLAN
G-101	LIFE SAFETY FIRST FLOOR PLAN - AREA A
G-102	LIFE SAFETY FIRST FLOOR PLAN - AREA B
G-103	LIFE SAFETY FIRST FLOOR PLAN - AREA C
G-104	LIFE SAFETY FIRST FLOOR PLAN - AREA D
G-105	LIFE SAFETY SECOND FLOOR PLAN - AREA A
G-106	LIFE SAFETY SECOND FLOOR AREA B
G-107	LIFE SAFETY MEZZANINE PLAN
G-108	LIFE SAFETY THIRD FLOOR
G-109	CODE COMPLIANT SITE PLAN
	FIRE PROTECTION
F-001	FIRE SUPPRESSION GENERAL NOTES
F-002	FIRE ALARM AND MASS NOTIFICATION - GENERAL NOTES
FD101	FIRE ALARM FIRST FLOOR PLAN AREA A - DEMOLITION
FD102	FIRE ALARM FIRST FLOOR PLAN AREA B - DEMOLITION
FD103	FIRE ALARM FIRST FLOOR PLAN AREA C - DEMOLITION
FD104	FIRE ALARM FIRST FLOOR PLAN AREA D - DEMOLITION
FD105	FIRE ALARM SECOND FLOOR PLAN - DEMOLITION
FD106	FIRE ALARM THIRD FLOOR PLAN - DEMOLITION
FD107	FIRE SUPPRESSION FIRST FLOOR PLAN AREA A - DEMOLITION
FD108	FIRE SUPPRESSION FIRST FLOOR PLAN AREA B - DEMOLITION
FD109	FIRE SUPPRESSION FIRST FLOOR PLAN AREA C - DEMOLITION
FD110	FIRE SUPPRESSION FIRST FLOOR PLAN AREA D - DEMOLITION
FD501	FIRE PROTECTION DEMOLITION PHOTOS
FA101	FIRE ALARM AND MASS NOTIFICATION PARTIAL FIRST FLOOR PLAN AREA A - NEW WORK
FA102	FIRE ALARM AND MASS NOTIFICATION PARTIAL FIRST FLOOR PLAN AREA B - NEW WORK
FA103	FIRE ALARM AND MASS NOTIFICATION PARTIAL FIRST FLOOR PLAN AREA C - NEW WORK
FA104	FIRE ALARM AND MASS NOTIFICATION PARTIAL FIRST FLOOR PLAN AREA D - NEW WORK
FA105	FIRE ALARM AND MASS NOTIFICATION SECOND FLOOR EAST & WEST - NEW WORK
FA106	FIRE ALARM AND MASS NOTIFICATION MEZZANINE PLAN EAST & WEST - NEW WORK
FA107	FIRE ALARM AND MASS NOTIFICATION THIRD FLOOR PLAN EAST & WEST - NEW WORK
FA501	FIRE ALARM AND MASS NOTIFICATION DETAILS
FA502	FIRE ALARM DETAIL - MONACO ANTENNA DETAIL
FA601	FIRE ALARM AND MASS NOTIFICATION SEQUENCE OF OPERATIONS
FA602	FIRE ALARM AND MASS NOTIFICATION RISER DIAGRAM
FX101	FIRE SUPPRESSION FIRST FLOOR PLAN AREA A - NEW WORK
FX102	FIRE SUPPRESSION FIRST FLOOR PLAN AREA B - NEW WORK
FX103	FIRE SUPPRESSION FIRST FLOOR PLAN AREA C - NEW WORK

SHT.	SHEET TITLE
FX104	FIRE SUPPRESSION FIRST FLOOR PLAN AREA D - NEW WORK
FX501	FIRE SUPPRESSION DETAILS
	ELECTRICAL
E-001	SYMBOLS, LEGEND & ABBREVIATIONS
ED101	OVERALL PLAN - DEMOLITION
ED601	ONE-LINE DIAGRAM - DEMOLITION
E-100	OVERALL PLAN - NEW WORK
E-401	FIRST FLOOR ENLARGED PLANS
E-402	SECOND FLOOR ENLARGED PLANS - DEMOLITION & NEW WORK
E-601	ONE-LINE DIAGRAM
E-602	SCHEDULES
	ARCHITECTURAL
AD101	FIRST FLOOR PLAN - DEMOLITION
A-101	FIRST FLOOR PLAN - NEW WORK
A-401	ENLARGED FLOOR PLAN - NEW WORK
A-501	DETAILS AND SCHEDULES
	STRUCTURAL
S-001	GENERAL NOTES AND STANDARD DETAILS
S-100	FIRST FLOOR PLAN - NEW WORK
S-401	ENLARGED ROOF PLAN - NEW WORK
	MECHANICAL
M-001	SYMBOLS, LEGEND & ABBREVIATIONS
M-101	OVERALL PLAN
M-401	ENLARGED PLAN - NEW WORK
M-501	DETAILS

COMMENT FOR MODEL MANAGER/PM
THIS IS A DUST OFF PROJECT SO CONFIRM IF SHEET ORDER NEEDS TO/SHOULD BE UPDATED TO THE TYPICAL USACE SHEET ORDER REQUIREMENTS

SIGNATURES

CORROSION ENGINEER: (CECE)	DATE:
CE OPERATIONS: (CECO)	DATE:
ZONE MANAGER:	DATE:
CONSTRUCTION MANAGEMENT: (CECE)	DATE:
FIRE DEPARTMENT: (CEFT)	DATE:
SAFETY:	DATE:
INDUSTRIAL HYGIENE:	DATE:
ENVIRONMENTAL:	DATE:
ASBESTOS EVALUATION:	DATE:
COMMUNICATIONS: (COMM)	DATE:
USING AGENCY:	DATE:
REVIEWED BY:	DATE:
REVIEWED BY:	DATE:
DESIGN MANAGER: (CECE)	DATE:
CHIEF DESIGN BRANCH: (CECE)	DATE:
CHIEF ENGINEER DIR: (CECE)	DATE:
BASE CIVIL ENGINEER: (CE)	DATE:

AFMC
AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY:
DRAWN BY:
CHECKED BY:
DESIGN FILE LOCATION:

SHEET TITLE
PROJECT DRAWING INDEX AND VICINITY MAP

SHEET NUMBER
G-001
SHEET OF

GENERAL PHASING NOTES:

1. THE PHASING PLAN PRESENTED IS A SUGGESTED PHASING PLAN ONLY. THE CONTRACTOR SHALL DEVELOP A FINAL PHASING PLAN THAT INCORPORATES THE USER REQUIREMENTS AND SHALL BE COORDINATED WITH AND APPROVED BY THE USER AND GOVERNMENT PRIOR TO IMPLEMENTATION.
2. NOT ALL ASPECTS OF THE SCOPE OF WORK ARE EXPLICITLY DESCRIBED IN THIS PLAN. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INCLUDE ALL WORK THAT IS REQUIRED IN THE FINAL PHASING PLAN.
3. DEMOLITION AND CONSTRUCTION ACTIVITIES WILL GENERALLY TAKE PLACE WHILE THE MAJORITY OF THE FACILITY IS OCCUPIED AND OPERATIONAL. SYSTEM OUTAGES AND CHANGEOVERS SHALL TAKE PLACE OVERNIGHT OR OVER THE WEEKEND WHEN UNOCCUPIED.
4. COORDINATE ALL SYSTEM OUTAGES AND DOWNTIME WITH GOVERNMENT A MINIMUM OF 3 WEEKS IN ADVANCE.
5. CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL EXISTING FURNITURE AND EQUIPMENT THAT IS TO REMAIN WITHIN EACH PHASE. ALL FURNITURE OR EQUIPMENT THAT NEEDS TO BE MOVED TO ACCOMMODATE THE WORK OCCURRING IN EACH PHASE SHALL BE DONE BY THE GOVERNMENT. ANY FURNITURE OR EQUIPMENT DAMAGED DURING CONSTRUCTION SHALL BE REPLACED BY THE CONTRACTOR.
6. THE MAXIMUM ALLOWABLE DOWNTIME FOR PHASE 1 AND PHASE 3 IS ONE WEEK AND PHASE 2 AND PHASE 4 IS SIX WEEKS. CONTRACTOR SHALL UTILIZE AFTER-HOURS AND WEEKEND LABOR AS NEEDED TO MEET THESE MAXIMUM DOWNTIME REQUIREMENTS.
7. PHASES 1, 2, 3, AND 4 MAY BE ACCOMPLISHED CONCURRENTLY TO REDUCE OVERALL CONSTRUCTION TIME IF ALLOWED BY THE THE GOVERNMENT.

PHASE 1 DESCRIPTION:

1. CONSISTS GENERALLY OF THE REMOVAL OF THE UNDER-WING MONITORS, ASSOCIATED ABOVE GROUND PIPING, AFFF FOAM TANKS, DELUGE VALVE, AND ASSOCIATED TRIM WITHIN SOUTH HANGAR BAY.
2. REMOVE ALL ABOVE GROUND PIPING BACK TO BUILDING'S RISER WITHIN WEST MECHANICAL ROOM. PENETRATION FROM DEMOLISHED PIPING WILL BE PATCHED AS PER PROJECT SPECIFICATION TO MAINTAIN ELECTRICAL CLASSIFICATION.
3. REMOVE UNDER WING MONITORS AFFF FOAM TANKS ASSOCIATED TRIM.
4. REMOVE EXISTING UNDER WING MONITORS DELUGE VALVES.
5. REMOVE EXISTING UNDER WING MONITORS.

PHASE 2 DESCRIPTION:

1. CONSISTS GENERALLY OF THE REMOVAL OF THE OVERHEAD FOAM WATER SPRINKLER SYSTEM, AFFF FOAM TANK, DELUGE VALVE WITHIN THE SOUTH HANGAR BAY.
2. DEMOLISH EXISTING DET-TRONICS RELEASING PANEL SERVING THE SOUTH DOCK.
3. DEMOLISH EXISTING FLAME DETECTOR AND ASSOCIATED CONDUIT WITHIN SOUTH DOCK.
4. INSTALL NEW WET SPRINKLER SYSTEM WITHIN THE SOUTH HANGER BAY.
5. INSTALL NEW NEW DET-TRONICS EAGLE QUANTUM PREMIER FIRE DETECTION/RELEASING PANEL.
6. INSTALL NEW X3301 MULTISPECTRUM IR FLAME DETECTOR WITH SOUTH HANGAR BAY.
7. FOLLOWING THE SUCCESSFUL FINAL INSPECTION OF THE OVERHEAD WET SPRINKLER SYSTEM WITH THE BASE FIRE PROTECTION ENGINEER, BASE FIRE DEPARTMENT, AND PROJECT COR CONTRACTOR MAY PROCEED TO PHASE 3.

WITHIN

PHASE 3 DESCRIPTION:

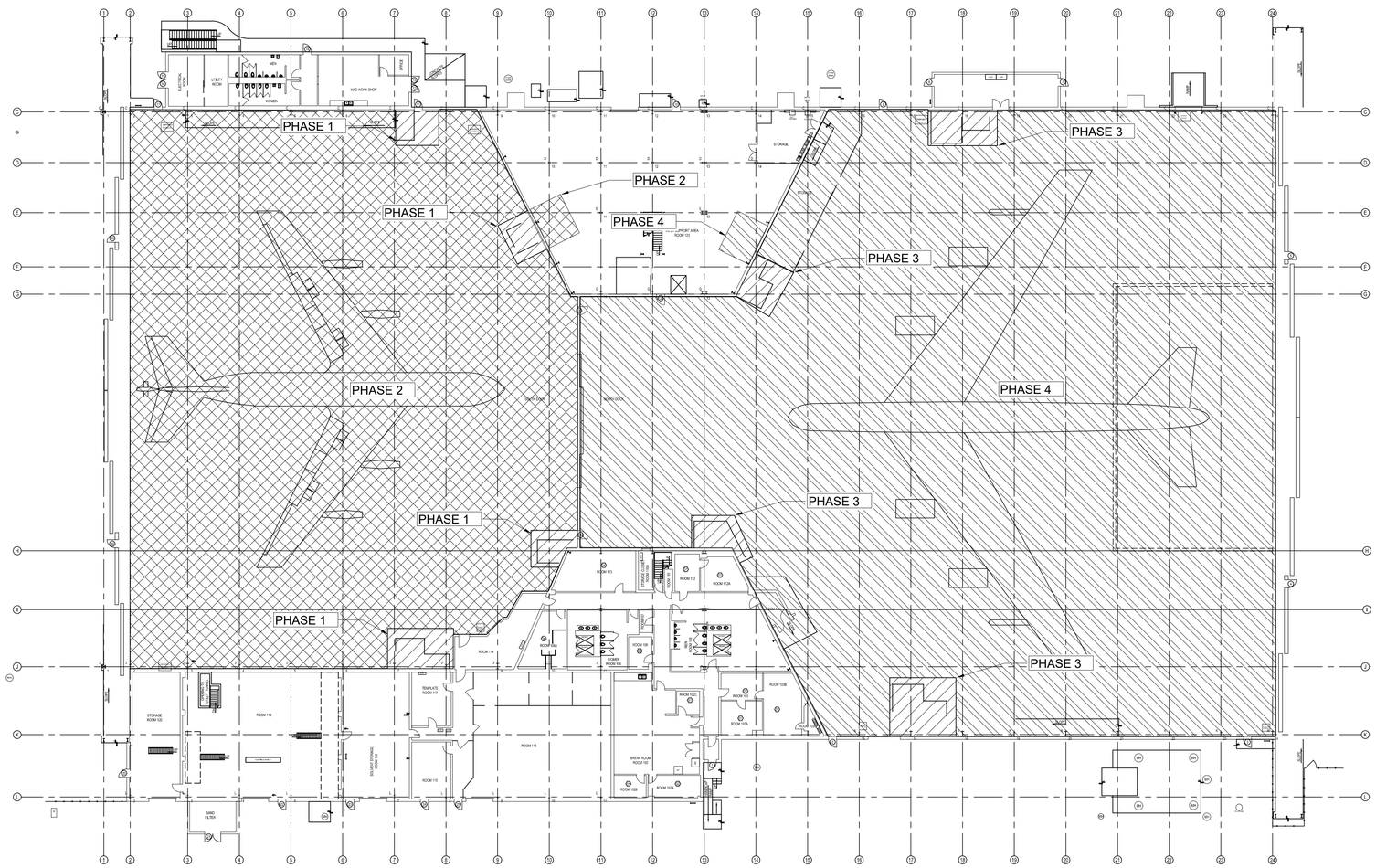
1. CONSISTS GENERALLY OF THE REMOVAL OF THE UNDER-WING MONITORS, ASSOCIATED ABOVE GROUND PIPING, AFFF FOAM TANKS, DELUGE VALVE, AND ASSOCIATED TRIM WITHIN NORTH HANGAR BAY.
2. REMOVE ALL ABOVE GROUND PIPING BACK TO BUILDING'S RISER WITHIN WEST MECHANICAL ROOM. PENETRATION FROM DEMOLISHED PIPING WILL BE PATCHED AS PER PROJECT SPECIFICATION TO MAINTAIN ELECTRICAL CLASSIFICATION.
3. REMOVE UNDER WING MONITORS AFFF FOAM TANKS ASSOCIATED TRIM.
4. REMOVE EXISTING UNDER WING MONITORS DELUGE VALVES.
5. REMOVE EXISTING UNDER WING MONITORS.

PHASE 4 DESCRIPTION:

1. CONSISTS GENERALLY OF THE REMOVAL OF THE OVERHEAD FOAM WATER SPRINKLER SYSTEM, AFFF FOAM TANK, AND DELUGE VALVE WITHIN THE NORTH HANGAR BAY.
2. DEMOLISH EXISTING DET-TRONICS RELEASING PANEL SERVING NORTH HANGAR BAY.
3. DEMOLISH EXISTING FLAME DETECTOR AND ASSOCIATED CONDUIT WITHIN DOCK ONE.
4. INSTALL NEW WET SPRINKLER SYSTEM WITHIN THE NORTH HANGER BAY.
5. INSTALL NEW NEW DET-TRONICS EAGLE QUANTUM PREMIER FIRE DETECTION/RELEASING PANEL.
6. INSTALL NEW X3301 MULTISPECTRUM IR FLAME DETECTOR WITH IN THE NORTH HANGAR BAY.

WITHIN

Has the phasing plan been updated to reflect the demolition items that will fall under a separate AFCEC contract?



Should we have a legend for the phase hashing?

Update

1 G-002 GENERAL PHASING PLAN
SCALE: N.T.S.

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: B.W.
DRAWN BY: B.W.
CHECKED BY: B.D.
DESIGN FILE LOCATION:

SHEET TITLE
GENERAL PHASING PLAN

SHEET NUMBER
G-002
SHEET OF

CODE ANALYSIS

REFERENCED CODES AND STANDARDS:

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-200-01, DOD BUILDING CODE, CHANGE 4, 17 DECEMBER 2024.
UFC 3-600-01, FIRE PROTECTION ENGINEERING FOR FACILITIES, CHANGE 6, 06 MAY 2021.
UFC 3-601-02, FIRE PROTECTION SYSTEMS INSPECTION, TESTING, AND MAINTENANCE, 07 OCTOBER 2021.
UFC 4-010-01, DOD MINIMUM ANTITERRORISM STANDARDS FOR BUILDINGS, CHANGE 3, 24 MAY 2024.
UFC 4-021-01, DESIGN AND O&M: MASS NOTIFICATION SYSTEMS, CHANGE 1, 01 JANUARY 2010.
UFC 4-211-01, AIRCRAFT MAINTENANCE HANGARS, CHANGE 3, 20 APRIL 2021.
UFC 4-211-02, AIRCRAFT CORROSION CONTROL AND PAINT FACILITIES, 1 DECEMBER 2012

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) - LATEST EDITIONS

NFPA 1, FIRE CODE, 2024 EDITION.
NFPA 10, STANDARD FOR PORTABLE FIRE EXTINGUISHERS, 2022 EDITION
NFPA 13, STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS, 2025 EDITION.
NFPA 24, STANDARD FOR THE INSTALLATION OF PRIVATE FIRE SERVICE MAINS AND THEIR APPURTENANCES, 2025 EDITION.
NFPA 70, NATIONAL ELECTRICAL CODE (NEC), 2023 EDITION.
NFPA 72, NATIONAL FIRE ALARM AND SIGNALING CODE, 2025 EDITION.
NFPA 80, STANDARD FOR FIRE DOORS AND OTHER OPENING PROTECTIVES, 2025 EDITION
NFPA 90A, STANDARD FOR THE INSTALLATION OF AIR-CONDITIONING AND VENTILATING SYSTEMS, 2024 EDITION.
NFPA 101, LIFE SAFETY CODE, 2024 EDITION.
NFPA 170, STANDARD FOR FIRE SAFETY AND EMERGENCY SYMBOLS, 2024 EDITION.
NFPA 220, STANDARD ON TYPES OF BUILDING CONSTRUCTION, 2024 EDITION.
NFPA 241, STANDARD FOR SAFEGUARDING CONSTRUCTION, ALTERATION, AND DEMOLITION OPERATIONS, 2022 EDITION.
NFPA 409, STANDARD ON AIRCRAFT HANGAR, 2022 EDITION.

OTHER REFERENCES

Do we have the updated change with leaving the flame detectors in?

ARCHITECTURAL BARRIERS ACT (ABA), N/A (WAIVER).
ASME/ANSI A13.1- SCHEME FOR THE IDENTIFICATION OF PIPING SYSTEMS.
ETL 98-8, CHANGE 1, JUNE 25, 1998
DOD SUNDOWN POLICY FOR FOAM FIRE SUPPRESSION SYSTEMS, CHANGE 1, 2022 MAY 13.
FACTORY MUTUAL DATA SHEET 3-26, FIRE PROTECTION FOR NONSTORAGE OCCUPANCIES, 2021 OCT.
INTERNATIONAL CODE COUNCIL, INTERNATIONAL BUILDING CODE (IBC), 2024 EDITION. (AS AMENDED BY UFC 1-200-01).
INTERNATIONAL CODE COUNCIL, INTERNATIONAL EXISTING BUILDING CODE (IEBC), 2024 EDITION. (AS AMENDED BY UFC 1-200-01).
US ARMY CORPS OF ENGINEERS 2018-17 ECB (25, OCT 18; WITH REV 3, 31 AUG 23. NEW REQUIREMENTS FOR VISUAL NOTIFICATION FOR MASS NOTIFICATION SYSTEMS

Verify this section number, not in 4-211-01

BUILDING DESCRIPTION (EXISTING BUILDING GENERAL INFORMATION)

• BUILDING IS CONSTRUCTED USING TYPE IB CONSTRUCTION PER IBC § 602 & TABLE 601; TYPE II (222) PER NFPA 220	
• BUILDING IS PROTECTED THROUGHOUT WITH AN AUTOMATIC SPRINKLER SYSTEM	IBC § 903.3.1.1
• IN ACCORDANCE WITH UFC 3-600-01, CHAPTER 34, WHERE WORK IS PERFORMED IN EXISTING BUILDINGS IT SHALL BE EVALUATED IN ACCORDANCE WITH CHAPTER 43 OF NFPA 101. EXISTING BUILDINGS SHALL ALSO ADHERE TO UFC 4-211-01 § 5-6.7.	
• HANGAR BAYS ARE RECEIVING A RENOVATION AND ONLY NEED TO MEET EXISTING REQUIREMENTS PER NFPA 101 § 43.4.1.3. HANGAR BAYS SHALL ALSO ADHERE TO UFC 4-211-01 § 5-6.7.	

Verify this section number, not in 4-211-01

BUILDING OCCUPANCY CLASSIFICATION

• IBC OCCUPANCY CLASSIFICATIONS - MIXED USE, NONSEPARATED OCCUPANCIES	IBC § 508.3
GROUP A-3 ASSEMBLY (ACCESSORY USE ONLY , < 10% OF BUILDING AREA)	IBC § 303 (ASSEMBLY)
GROUP B/S-1 (SUPPORT SPACES)	IBC § 304 (BUSINESS)
GROUP S-1 (AIRCRAFT HANGAR)	IBC § 311.2 (STORAGE AND REPAIR)
HANGAR CLASSIFICATION: GROUP 1 AIRCRAFT HANGAR	NFPA 409 § 4.1.1 — 6.1.1
• NFPA OCCUPANCY CLASSIFICATIONS - MULTIPLE OCCUPANCY, NONSEPARATED OCCUPANCIES	NFPA 101 § 6.1.14
EXISTING ASSEMBLY (INCIDENTAL USE)	NFPA 101 CHAP. 13 PER CHAP. 43
EXISTING BUSINESS	NFPA 101 CHAP. 39 PER CHAP. 43
SPECIAL-PURPOSE INDUSTRIAL, STORAGE (AIRCRAFT SERVICING/STORAGE HANGAR)	NFPA 101 CHAP. 40/42 PER CHAP. 43

NOTES:
- REPAIRS AND STORAGE OCCUR AT THE HANGAR
- FUELING AND DEFUELING PROCESSES ARE COMPLETED OUTSIDE OF THE HANGAR
- JET A FUEL IS USED FOR AIRCRAFT FUELING; CLASS II COMBUSTIBLE LIQUID
- HIGH HAZARD CONTENTS, SINCE FLAMMABLE LIQUID IS PRESENT (NFPA 101 §A.6.2.2.4, A.3.3.196.8.2 — A.3.3.205.8.2 FOR DEFINITION OF HIGH HAZARD CONTENTS).

Does this apply to this building?

SPECIAL DETAILED REQUIREMENTS BASED ON USE:

USE UFC 3-600-01 CHAPTER 4 IN LIEU OF IBC CHAPTER 4.	UFC 1-200-01 § 2-4
• COMPLY WITH NFPA 409 WHEN SPECIFICALLY ADDRESSED BY UFC 3-600-01, UFC 4-211-01 AND UFC 4-211-02.	
• CORROSION CONTROL FACILITIES COMPLY WITH UFC 4-211-02	
• DETAILED MEANS OF EGRESS REQUIREMENTS APPLY (SEE MEANS OF EGRESS FEATURES).	
• DETAILED PROTECTION REQUIREMENTS APPLY (SEE FIRE PROTECTION SYSTEMS).	

ALLOWABLE IBC BUILDING HEIGHT AND FLOOR AREA:

• ALLOWABLE BUILDING AREA: UNLIMITED AREA	
• ACTUAL BUILDING AREA: 131,940 SQ. FT	
• ALLOWABLE BUILDING HEIGHT AND STORIES: UNLIMITED HEIGHT, 12 STORIES	UFC 4-021-01 § 3-3.1.6 BUILDING HEIGHT AND NUMBER OF STORIES
• ACTUAL BUILDING HEIGHT AND STORIES: 99 FT 6 IN; THREE (3) STORY	

180 ft for sprinkled IB

4-211-01?

FIRE RESISTANCE REQUIREMENTS

IBC STRUCTURAL ELEMENTS:

• STRUCTURAL FRAME (INCLUDING COLUMNS, GIRDERS, AND TRUSSES)	0 HOUR	IBC TABLES 601 & 602 ALL ALLOWABLE COMBUSTIBLE MATERIALS AS DEFINED IN SECTION 603
• BEARING WALLS - EXTERIOR SEPARATION DISTANCE 10'<X<30'	0 HOUR	
• BEARING WALLS - INTERIOR	0 HOUR	
• NONBEARING WALLS - EXTERIOR SEPARATION DISTANCE 10'<X<30'	0 HOUR	
• NONBEARING WALLS & PARTITIONS - INTERIOR	0 HOUR	
• FLOOR CONSTRUCTION (INCLUDING SUPPORTING BEAMS AND JOISTS)	0 HOUR	
• ROOF CONSTRUCTION (INCLUDING SUPPORTING BEAMS AND JOISTS)	0 HOUR	

2 Hr for IB — 1 Hr for IB — 2 Hr for IB — 1 Hr for IB

Table 705.5

NFPA 101 EXIT ACCESS CORRIDORS:

• CORRIDORS PROVIDING ACCESS TO AN EXIT: NO RATING REQUIRED	NFPA 101 § 39.3.6, § 40.3.6, & § 42.3.6

INTERIOR RATED SEPARATIONS

• 1 HR FIRE BARRIER SEPARATING HANGAR BAY FROM SUPPORT AREAS	UFC 4-211-01 § 3-3.1.3
• 1 HR FIRE BARRIER SEPARATING FIRE PROTECTION EQUIPMENT ROOMS	UFC 4-211-01 § 3-6.7
• 2 HR FIRE BARRIER SEPARATING FIRE AREAS WITHIN THE HANGAR BAY	UFC 4-211-01 § 3-3.1.3
• 2 HR FIRE BARRIER SEPARATING DISSIMILAR HANGAR BAY OPERATIONS	UFC 4-211-01 § 5-3.1

DOORS

• DOORS IN FIRE BARRIERS SHALL BE RATED PER NFPA 101 TABLE 8.3.3.2.2 AND SELF-CLOSING OR AUTOMATIC-CLOSING	NFPA 101 § 8.3.3
• EXISTING DOORS IN FIRE BARRIERS HAVING A MINIMUM 3/4-HOUR FIRE PROTECTION RATING SHALL BE PERMITTED TO CONTINUE TO BE USED IN EXIT ENCLOSURES IN LIEU OF THE MINIMUM 1-HOUR FIRE PROTECTION RATING REQUIRED IN NFPA 101 TABLE 8.3.3.2.2.	NFPA 101 § 8.3.3

HORIZONTAL EXITS

• HORIZONTAL EXITS SHALL HAVE A 2-HOUR FIRE RATED / FIRE BARRIER	NFPA 101 § 7.2.4.3.1
• OUTSIDE WALLS AT AN ANGLE OF LESS THAN 90 DEGREES SHALL BE PROVIDED WITH A 1-HOUR FIRE RATING AND 3/4-HOUR OPENING PROTECTION, FOR A DISTANCE NOT TO EXCEED 10 FEET.	NFPA 101 § 7.2.4.3.4
• ALL FIRE DOOR ASSEMBLIES IN HORIZONTAL EXITS SHALL BE SELF-CLOSING OR AUTOMATIC CLOSING IN ACCORDANCE WITH NFPA 101 § 7.2.1.4	NFPA 101 § 7.2.4.3.7

Check this summary and verify it is (10) and not (9)

SHAFTS AND EXIT ENCLOSURES

• PENETRATIONS INTO, AND OPENINGS THROUGH AN EXIT ENCLOSURE, ARE LIMITED PER NFPA 101 SECTION 7.1.3.2.1 (10) TO UTILITIES SERVING THE STAIRWELL.	NFPA 101 § 7.1.3.2 (10)
• SHAFT AND STAIR ENCLOSURES SHALL HAVE NOT LESS THAN 1-HOUR FIRE RESISTANCE RATING WHEN CONNECTING LESS THAN FOUR STORIES.	IBC § 713.4

REQUIRED FIRE DAMPERS IN FIRE RATED BARRIERS

• FIRE DAMPERS ARE REQUIRED FOR ALL HVAC PENETRATIONS OF 2-HOUR FIRE RATED BARRIERS. FIRE DAMPERS NOT REQUIRED FOR FULLY DUCTED HVAC IN 1-HOUR FIRE RATED BARRIERS. FIRE DAMPERS ARE REQUIRED FOR AIR TRANSFER GRILLES.	NFPA 90A § 5.3.1.1

This NFPA 90A section is for cooling, should we reference IBC 717.5.2 instead?

INTERIOR WALL, CEILING, AND FLOOR FINISHES: NFPA 101 CHAPTER 10 TABLE A.10.2.2

GROUP	WITH SPRINKLER SYSTEM			
	EXITS	EXIT ACCESS CORRIDORS	ROOMS AND ENCLOSED SPACES	INTERIOR FINISH FLOOR
ASSEMBLY	A OR B	A OR B	A, B, OR C	CLASS I OR II
BUSINESS	A OR B	A OR B	A, B, OR C	CLASS I OR II
INDUSTRIAL	A OR B	A, B, OR C	A, B, OR C	CLASS I OR II
STORAGE	A OR B	A, B, OR C	A, B, OR C	CLASS I OR II

A only

MEANS OF EGRESS ARE EXISTING

TRAVEL DISTANCE TO AN EXIT

• ASSEMBLY, SPRINKLERED: 300 FEET	NFPA 101 § 13.2.6.3
• BUSINESS, SPRINKLERED: 300 FEET	NFPA 101 § 39.2.6.3
• STORAGE (HANGAR BAY): NOTE 1	UFC 4-211-01 § 3-3.1.9
• INDUSTRIAL HIGH HAZARD, SPRINKLERED: 75 FEET	NFPA 101 TABLE 40.2.6.1

250 ft — 13.2.6.2

NOTE 1 - TRAVEL DISTANCE DOES NOT APPLY WITHIN HANGAR BAYS. TRAVEL DISTANCE STARTS AT HANGAR BAY EXIT ACCESS; DESIGN TEAM INTERPRETATION ASSUMES TRAVEL DISTANCE LIMIT THROUGH ADJACENT BAYS DOES NOT EXCEED 400FT IN TOTAL FOR STORAGE OCCUPANCIES; THE DESIGN TEAM HAS LIMITED THE TRAVEL DISTANCE STARTING UPON LEAVING THE HANGAR BAY OF ORIGIN TO NOT EXCEED 250FT SUCH THAT THE MAX TRAVEL DISTANCE DOES NOT EXCEED 400FT. AN UNOBSTRUCTED PATH WILL BE PROVIDED TO REACH THE NEAREST EXTERIOR EXIT DISCHARGE DOOR.

COMMON PATH OF TRAVEL

• ASSEMBLY, SPRINKLERED: 20 FEET	NFPA 101 § 13.2.5.2
• BUSINESS, SPRINKLERED: 100 FEET	NFPA 101 § 39.2.5.2.1
• STORAGE, SPRINKLERED: 100 FEET	NFPA 101 TABLE 42.2.5
• INDUSTRIAL HIGH HAZARD, SPRINKLERED: PROHIBITED	NFPA 101 TABLE 40.2.5.1
• EXISTING MECHANICAL EQUIPMENT ROOMS: 150 FEET	NFPA 101 § 7.13.1(2)

DEAD-END LIMITS

• ASSEMBLY, SPRINKLERED: 20 FEET	NFPA 101 § 13.2.5.3
• BUSINESS, SPRINKLERED: 50 FEET	NFPA 101 § 39.2.5.3
• STORAGE, SPRINKLERED: 50 FEET	NFPA 101 § 42.6.3
• INDUSTRIAL HIGH HAZARD, SPRINKLERED: PROHIBITED	NFPA 101 TABLE 40.2.5.1

100 ft

REMOTENESS OF EXITS:

• IN EXISTING BUILDINGS, EXITS AND EXIT ACCESS DOORS SHALL BE REMOTELY LOCATED FROM EACH OTHER AND BE ARRANGED TO MINIMIZE THE POSSIBILITY OF BLOCKING OF MORE THAN ONE EXIT DURING A FIRE OR OTHER EMERGENCY.	NFPA 101 § 7.5.1.3.1 & § 7.5.1.3.5

MINIMUM WIDTH:

• NOT LESS THAN 28" FOR ANY MEANS OF EGRESS IN EXISTING BUILDINGS	NFPA 101 § 7.3.4.1.2
• NOT LESS THAN 28" FOR DOOR CLEAR WIDTH IN EXISTING BUILDINGS	NFPA 101 § 7.2.1.2.3.2(4)
• NOT LESS THAN 32" FOR DOOR CLEAR WIDTH IN EXISTING BUILDINGS	NFPA 101 § 7.2.1.2.3.2
• DOORS SHALL SWING IN THE DIRECTION OF TRAVEL WHERE SERVING MORE THAN 50 PERSONS.	NFPA 101 § 7.2.1.4.2
• DOORS FROM HANGAR BAYS SHALL SWING IN THE DIRECTION OF EGRESS TRAVEL.	UFC 4-211-01 § 3-3.1.9

MEANS OF EGRESS (CONTINUED):

ACCESSIBLE MEANS OF EGRESS

Review UFC 1-200-01 2-10, it might be 2021 IBC now

• PER UFC 1-200-01 § 2-10 AND § 2-11, DELETE CHAPTER 10 & 11 OF THE IBC FOR MEANS OF EGRESS AND ACCESSIBILITY. UTILIZE UFC 3-600-01 AND THE ABA. WHERE THE ABA REFERENCES THE IBC, THE 2018 EDITION WILL BE USED.	UFC 1-200-01 § 2-10 & § 2-11
• ACCESSIBLE SPACES SHALL BE PROVIDED WITH NOT LESS THAN ONE ACCESSIBLE MEANS OF EGRESS. WHERE MORE THAN ONE MEANS OF EGRESS ARE REQUIRED BY § 1006.21 OR § 1006.3 FROM ANY ACCESSIBLE SPACE, EACH ACCESSIBLE PORTION OF THE SPACE SHALL BE SERVED BY NOT LESS THAN TWO ACCESSIBLE MEANS OF EGRESS.	IBC 1009.1
• EACH REQUIRED ACCESSIBLE MEANS OF EGRESS SHALL BE CONTINUOUS TO A PUBLIC WAY AND SHALL CONSIST OF ONE OR MORE OF THE FOLLOWING (ONLY THOSE INCLUDED IN DESIGN ARE LISTED): 1. ACCESSIBLE ROUTES COMPLYING WITH IBC § 1104. 2. INTERIOR EXIT STAIRWAYS COMPLYING WITH IBC § 1009.3 & § 1023. EXCEPTIONS: 1. THE CLEAR WIDTH OF 48 INCHES BETWEEN HANDRAILS IS NOT REQUIRED IN BUILDINGS EQUIPPED THROUGHOUT BY AN AUTOMATIC SPRINKLER SYSTEM IN ACCORDANCE WITH IBC § 903.3.1.1. 2. AREAS OF REFUGE ARE NOT REQUIRED AT STAIRWAYS IN BUILDINGS EQUIPPED THROUGHOUT BY AN AUTOMATIC SPRINKLER SYSTEM INSTALLED IN ACCORDANCE WITH IBC § 903.3.1.1.	IBC § 1009.2 & § 1009.3

0.7 for high hazard stairs, is high hazard only on ground floor?

OCCUPANCY CAPACITY FACTORS:

• LEVEL COMPONENTS (DOORS) - 0.2 INCHES PER OCCUPANT FOR DOORS.	NFPA 101 TABLE 7.3.3.1
• STAIRS - 0.3 INCHES PER OCCUPANT FOR STAIRS.	NFPA 101 TABLE 7.3.3.1
• HIGH HAZARD - 0.4 INCHES PER OCCUPANT FOR HIGH HAZARD CONTENT.	NFPA 101 TABLE 7.3.3.1

OCCUPANCY LOAD FACTORS

• ASSEMBLY USE; CONFERENCE ROOMS WITH TABLES AND CHAIRS 15 SQ.FT./PERSON NET AREA	UFC 3-600-01 § 10-3.1; NFPA 101 TABLE 7.3.1.2
• STORAGE USE; 500 SQ.FT./PERSON GROSS FLOOR AREA	
• BUSINESS USE; 150 SQ.FT./PERSON GROSS FLOOR AREA	
• MECH/ELEC/UTILITIES; 500 SQ.FT./PERSON GROSS FLOOR AREA	
• AIRCRAFT HANGARS; 500 SQ.FT./PERSON GROSS FLOOR AREA	
• INDUSTRIAL SPECIAL PURPOSE USE; NA	

NOTE: SEE LIFE SAFETY DRAWINGS FOR BUILDING OCCUPANCY LOADS

FIRE DEPARTMENT VEHICLE ACCESS (UFC 3-600-01 § 9-1 AND UFC 4-211-01)

- ONE MEANS OF PAVED ALL-WEATHER GROUND ACCESS NO FARTHER THAN 33 FEET FROM AN EXTERIOR DOOR ACCESSIBLE FOR FIRE DEPARTMENT INGRESS AND WITHIN 150 FEET OF FIRE DEPARTMENT CONNECTIONS.
- KNOX VAULT 4500 OR SIMILAR AT NOSE ENDS OF EACH HANGAR BAY FOR EMERGENCY ACCESS.
- DIMENSIONS OF FIRE LANES AND TURNAROUNDS COMPLY WITH NFPA 1.

NOTES: THE BUILDING ENEVOLOPE AND FIRE HYDRANTS LOCATIONS ARE EXISTING.
SEE CODE COMPLIANCE SITE PLAN FOR ACTUAL DISTANCES.
PER GOVERNMENT'S DIRECTION, UPGRADES TO NON-CONFORMING CONDITIONS IN REGARDS TO EXISTING FIRE HYDRANT LOCATIONS ARE NOT WITHIN SCOPE OF WORK.

ACTIVE FIRE PROTECTION SYSTEMS (SHALL COMPLY WITH UFC 3-600-01 CH. 9 AND UFC 4-211-01):

FIRE ALARM AND MASS NOTIFICATION SYSTEM (MNS)

GENERAL FIRE ALARM SYSTEM REQUIREMENTS (UFC-3-600-01, UFC 4-211-01, NFPA 70, NFPA 72, ABA, UFC 4-010-01 & UFC 4-021-01)

- MONACO D-21 REPORTING TO RECEIVING DISPATCH WITH RF TRANSCEIVER
- MANUAL PULL STATION AT ALL EXIT DOORS
- A MASS NOTIFICATION SYSTEM SHALL BE PROVIDED IN ACCORDANCE WITH UFC 4-021-01.
- THE FIRE ALARM EVACUATION SIGNAL SHALL BROADCAST OVER THE MNS SYSTEM.

FIRE SUPPRESSION SYSTEMS AND WATER SUPPLY

- WATER SUPPLY FROM FOUR (4) DIESEL FIRE PUMPS ARRANGED IN PARALLEL, ONE FIRE PUMP AS THE PRIMARY AND THE OTHER THREE AS BACK-UP. THE FIRE PUMPS ARE LOCATED WITHIN BUILDING 2119. TWO FIRE PUMPS ARE RATED FOR 1500 GMP AT 120 PSI AND THE OTHER TWO FIRE PUMPS ARE RATED FOR 1500 GMP AT 100 PSI.
- SYSTEM DEMAND INCLUDES SPRINKLER SYSTEM DEMAND
- WET SPRINKLER SYSTEMS SHALL BE PROVIDED FOR THE HANGAR BAY IN ACCORDANCE WITH DOD SUNDOWN POLICY
- STANDPIPE SYSTEMS NOT REQUIRED

FIRE EXTINGUISHERS

- PORTABLE FIRE EXTINGUISHERS ARE EXISTING AND SHALL REMAIN AS CURRENTLY INSTALLED

Update (TYPICAL)

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

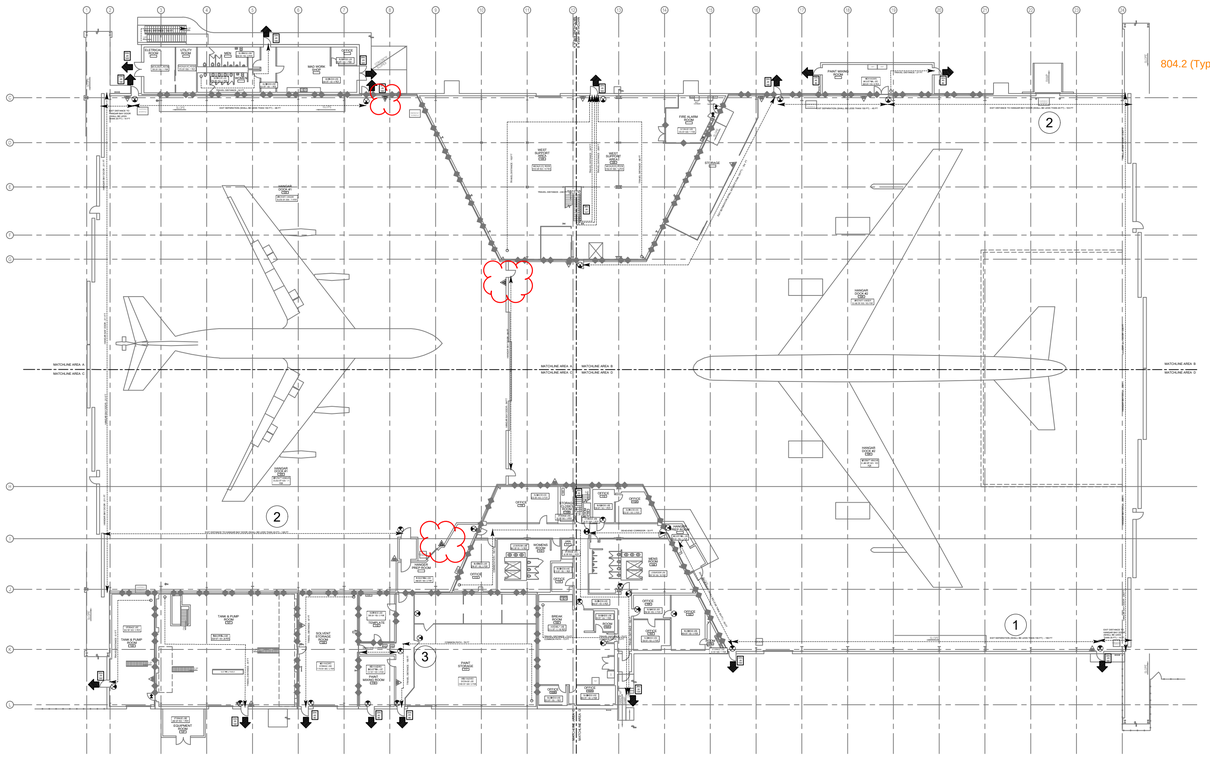
MANAGEMENT INFORMATION

ISSUE DATE:	09-15-2022
DESIGN GROUP:	HDR
DESIGNED BY:	D.E.
DRAWN BY:	J.R.M.
CHECKED BY:	J.M.
DESIGN FILE LOCATION:	

SHEET TITLE
GENERAL CODE ANALYSIS

SHEET NUMBER
G-100

SHEET – OF



804.2 (Typical)

1 G-100B LIFE SAFETY OVERALL HANGAR PLAN
SCALE: 1/32" = 1'-0"

32 16 0 32 64
SCALE: 1/32"=1'-0"

SHEET NOTES:

1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 804.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

BUILDING CODE SUMMARY

Change 4 (TYPICAL)

UFC 1-200-01 (01 SEP 2022) WITH CHANGE 3
2024 IBC AS AMENDED BY UFC 1-200-01
2024 IEBC AS AMENDED BY UFC 4-211-01
2024 NFPA 101 LIFE SAFETY CODE
UFC 3-600-01 (8 AUG 2016) WITH CHANGE 6
UFC 4-211-02 (1 DEC 2012)

BUILDING AREA

FLOOR	EXISTING AREA (GSF)
1ST FLOOR STORAGE (GROSS)	89,790
1ST FLOOR BUSINESS (GROSS)	6,950
1ST FLOOR INDUSTRIAL (GROSS)	12,780
2ND FLOOR STORAGE (GROSS)	18,730
3RD FLOOR STORAGE (GROSS)	3,690
TOTAL	131,940

OCCUPANCY:

MIXED USE / NON-SEPARATED
GROUP A-3 (IBC 303.4) AND EXISTING ASSEMBLY (NFPA 101)
GROUP B (IBC 304) AND EXISTING BUSINESS (NFPA 101)
GROUP H-3 HIGH-HAZARD GROUP (IBC 307.5) HIGH HAZARD INDUSTRIAL USE (NFPA 101)
GROUP S-1 MODERATE-HAZARD STORAGE (IBC 311.2) ORDINARY AND HIGH HAZARD STORAGE USE (NFPA 101)

OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

UFC 3-600-01 10-3.1? If so, TYPICAL

LIFE SAFETY SYMBOLS:

XX' — TRAVEL DISTANCE

EXIT DISCHARGE

EXISTING 1 HOUR FIRE BARRIER

EXISTING 2 HOUR FIRE BARRIER

XXin XXX XXX — -EXIT WIDTH, -CAPACITY FACTOR, -EXIT CAPACITY

EXIT SIGNAGE (EXISTING TO REMAIN)

PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)

NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

LIFE SAFETY DEFICIENCY KEY NOTES:

1. PER UFC 4-211-01 § 3-3.1.9: PROVIDE EXITS OR EXIT ACCESS DOORS AROUND THE ENTIRE PERIMETER OF THE HANGAR BAY AT A MAXIMUM SPACING OF 150 FEET (FT.) TRAVEL DISTANCE LIMITATIONS DO NOT APPLY IN THE HANGAR BAY. THE SCOPE OF WORK WILL NOT CORRECT THIS PRE-EXISTING NON-CONFORMING CONDITION.
2. THE EXIT EXCEEDS THE 20 FT DISTANCE BETWEEN THE HANGAR BAY DOOR AND PERSONNEL EXIT AS ALLOWED BY UFC 4-211-01 § 3-3.1.9. THIS REPRESENTS A PRE-EXISTING NON-CONFORMING CONDITION. THE SCOPE OF WORK WILL NOT CORRECT THIS PRE-EXISTING NON-CONFORMING CONDITION.
3. THE EXIT ACCESS DOOR SWING IS NOT IN THE DIRECTION OF EGRESS TRAVEL.THIS REPRESENTS A PRE-EXISTING NON-CONFORMING CONDITION PER UFC 4-211-01 § 3-3.1.9. THE SCOPE OF WORK WILL NOT CORRECT THIS PRE-EXISTING NON-CONFORMING CONDITION.

AFMC
AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

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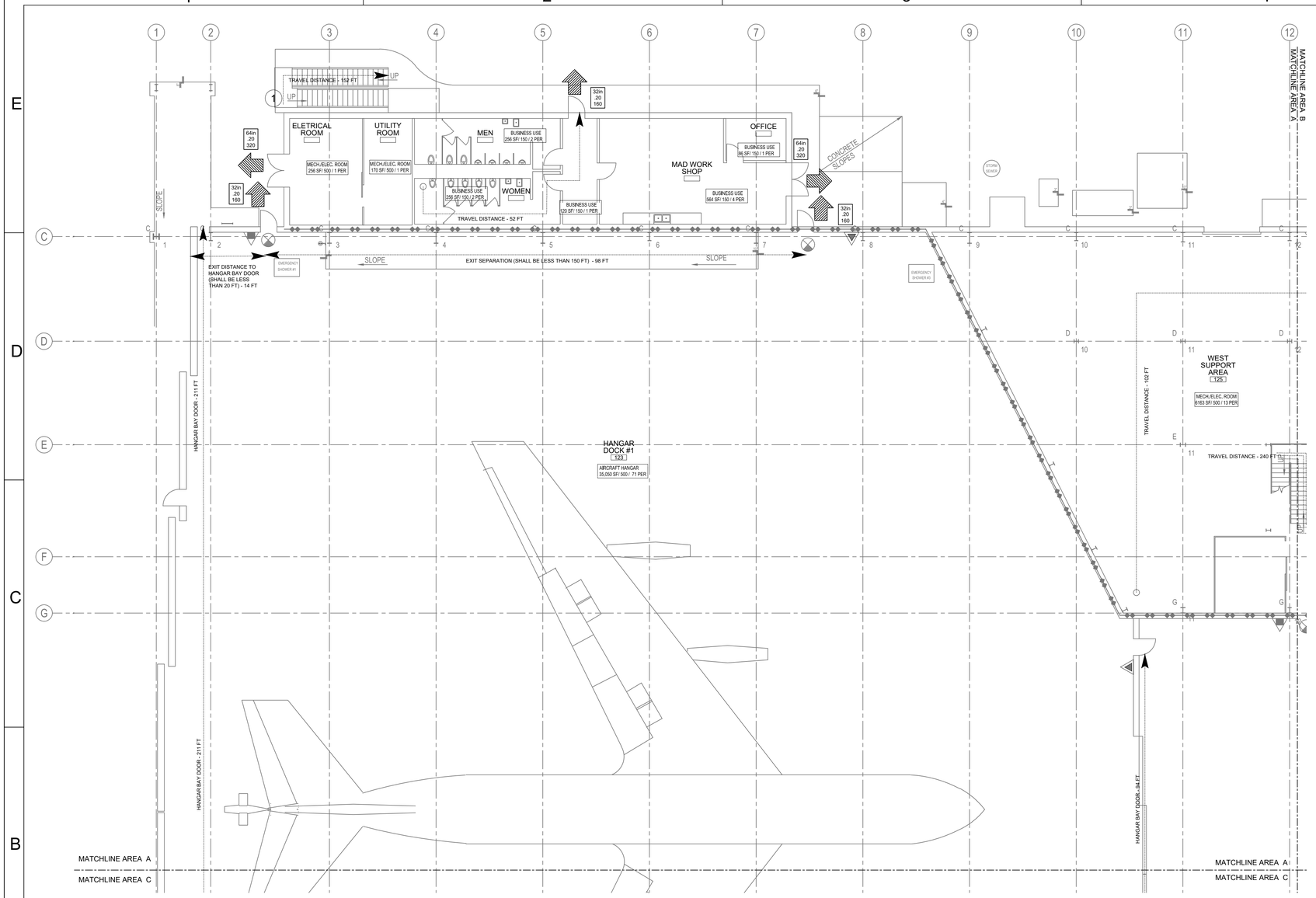
MANAGEMENT INFORMATION
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
GENERAL LIFE SAFETY OVERALL HANGAR PLAN

SHEET NUMBER
G100B
SHEET - OF



1 G-101 LIFE SAFETY FIRST FLOOR PLAN - AREA A

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

SHEET NOTES:

1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 805.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

LIFE SAFETY SYMBOLS:

- XX' — TRAVEL DISTANCE
- EXIT DISCHARGE
- EXISTING 1 HOUR FIRE BARRIER
- EXISTING 2 HOUR FIRE BARRIER
- XXin XXX XXX — -EXIT WIDTH, -CAPACITY FACTOR, -EXIT CAPACITY
- EXIT SIGNAGE (EXISTING TO REMAIN)
- PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)
- NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

KEY NOTES:

1. TRAVEL DISTANCES AND COMMON PATHS ORIGINATE FROM UPPER FLOORS, REFER TO SHEET G-105 AND G-106.

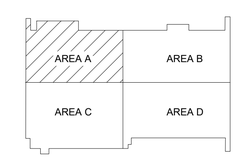
OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

PROJECT EGRESS TRAVEL DISTANCE

	ALLOWED	ACTUAL	NFPA 101 REF.
INDUSTRIAL USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	N/A	TABLE 40.2.5.1
TRAVEL DISTANCE	400 FEET (WITH SPRINKLERS)	103 FT	TABLE 40.2.6.1
DEAD-END CORRIDOR	50 FEET (WITH SPRINKLERS)	N/A	TABLE 40.2.5.1
EXISTING BUSINESS USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	N/A	39.2.5.2.1
TRAVEL DISTANCE	300 FEET (WITH SPRINKLERS)	52 FT	39.2.6.3
DEAD-END CORRIDOR	50 FEET (WITH SPRINKLERS)	N/A	39.2.5.3

Not referenced on the CA sheet



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

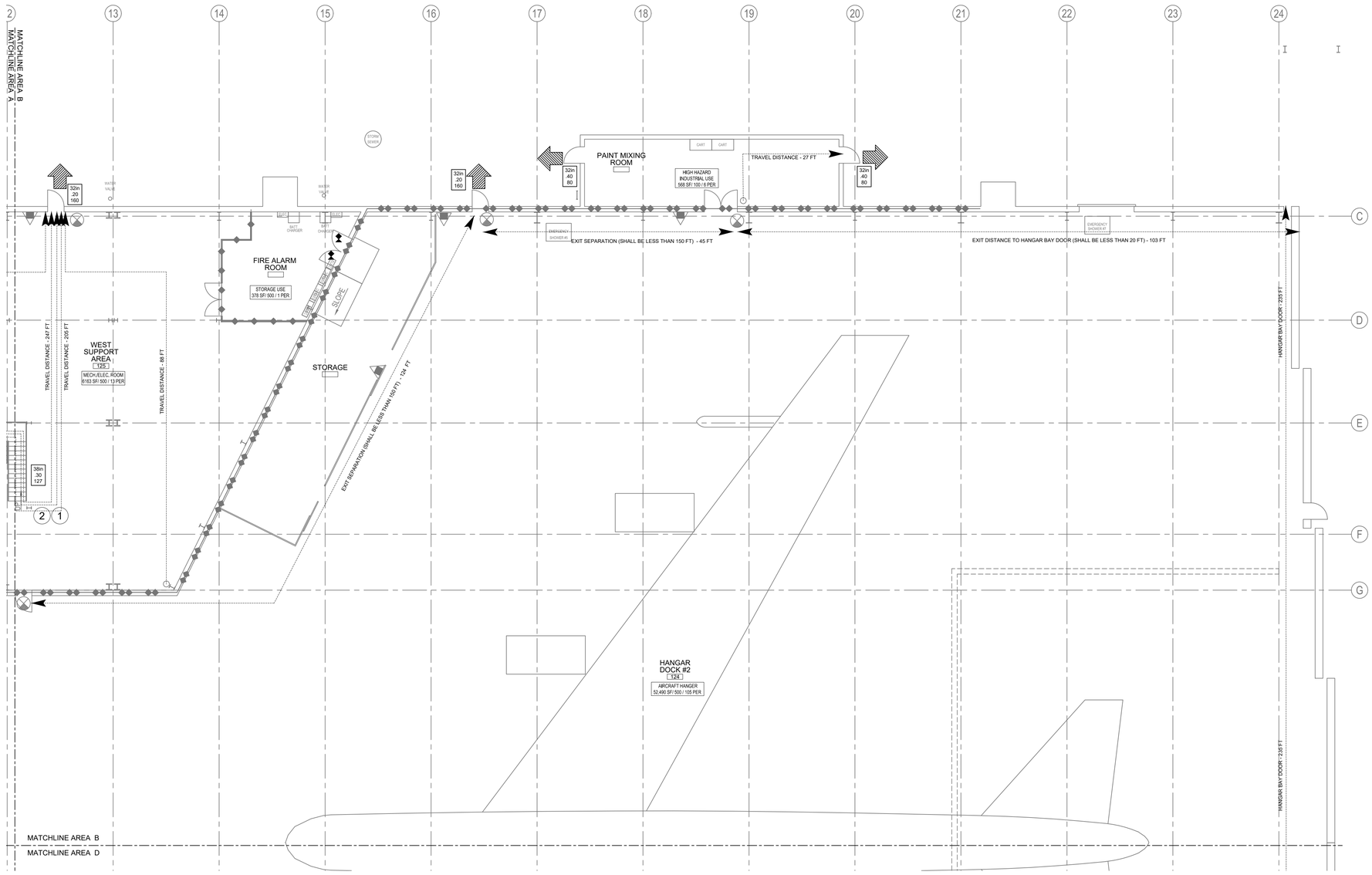
REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
LIFE SAFETY FIRST FLOOR PLAN - AREA A

SHEET NUMBER
G-101
SHEET - OF



1 G-102 LIFE SAFETY FIRST FLOOR PLAN - AREA B
SCALE: 3/32" = 1'-0"

0 8' 16' 24'
SCALE: 3/32"=1'-0"

SHEET NOTES:

1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 805.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

LIFE SAFETY SYMBOLS:

- XX' — TRAVEL DISTANCE
- EXIT DISCHARGE
- EXISTING 1 HOUR FIRE BARRIER
- EXISTING 2 HOUR FIRE BARRIER
- XXin / XXX / XXX — -EXIT WIDTH, -CAPACITY FACTOR, -EXIT CAPACITY
- EXIT SIGNAGE (EXISTING TO REMAIN)
- PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)
- NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

KEY NOTES:

1. TRAVEL DISTANCES AND COMMON PATHS ORIGINATE FROM UPPER FLOORS, REFER TO SHEET G-105 AND G-106.
2. COMMON PATH ORIGINATES FROM UPPER FLOOR, REFER TO SHEET G-105 AND G-106. THE COMMON PATH EXCEEDS THE NFPA 101 100 FT ALLOWANCE, THIS IS A EXISTING CODE NON-CONFORMING CONDITION.

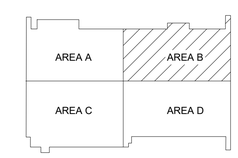
OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

PROJECT EGRESS TRAVEL DISTANCE

	ALLOWED	ACTUAL	NFPA 101 REF.
INDUSTRIAL USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	N/A	TABLE 40.2.5.1
TRAVEL DISTANCE	250 FEET (WITH SPRINKLERS)	88 FT	TABLE 40.2.6.1
DEAD-END CORRIDOR	50 FEET (WITH SPRINKLERS)	N/A	TABLE 40.2.5.1
INDUSTRIAL USE - HIGH HAZARD			
COMMON PATH	NOT ALLOWED	N/A	TABLE 40.2.5.1
TRAVEL DISTANCE	75 FEET (WITH SPRINKLERS)	27 FT	TABLE 40.2.6.1
DEAD-END CORRIDOR	NOT ALLOWED	N/A	TABLE 40.2.5.1

No FLS QC Comment



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

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DRAWN BY: J.R.M.
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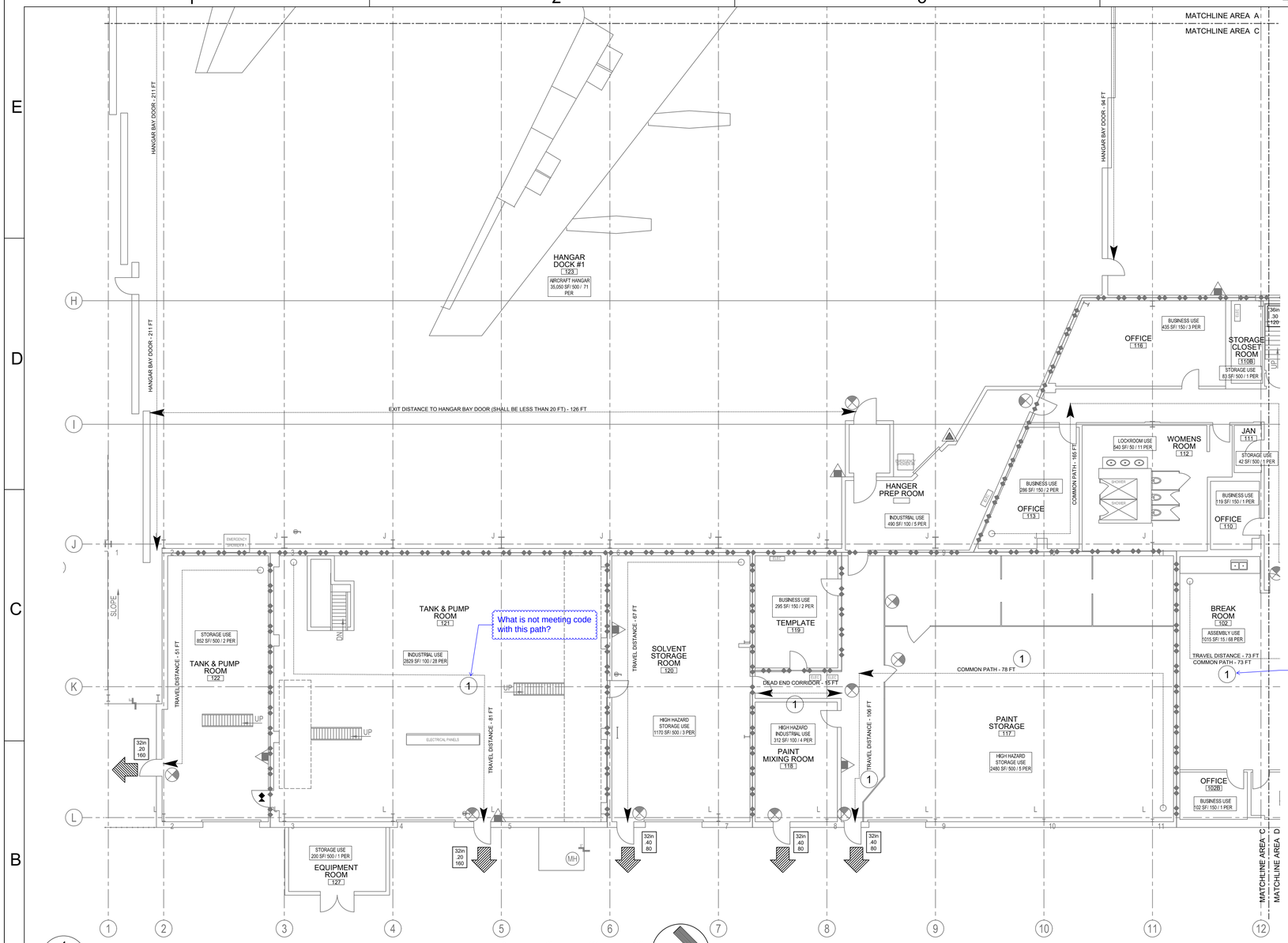
DESIGN FILE LOCATION:

SHEET TITLE
LIFE SAFETY FIRE FLOOR PLAN - AREA B

SHEET NUMBER
G-102
SHEET - OF



1 G-103 LIFE SAFETY FIRST FLOOR PLAN - AREA C

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

SHEET NOTES:

1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 805.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

LIFE SAFETY SYMBOLS:

- XX' — TRAVEL DISTANCE
- EXIT DISCHARGE
- EXISTING 1 HOUR FIRE BARRIER
- EXISTING 2 HOUR FIRE BARRIER
- XXin XXX XXX — -EXIT WIDTH, -CAPACITY FACTOR, -EXIT CAPACITY
- EXIT SIGNAGE (EXISTING TO REMAIN)
- PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)
- NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

KEY NOTES:

1. TRAVEL DISTANCES, COMMON PATH AND DEAD-END CORRIDOR EXCEEDS THE NFPA 101 ALLOWANCE, THIS IS A EXISTING CODE NON-CONFORMING CONDITION.

OCCUPANT LOAD

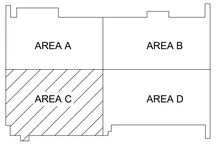
FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

PROJECT EGRESS TRAVEL DISTANCE

Add Industrial Use - Non-High Hazard

	ALLOWED	ACTUAL	NFPA 101 REF.
STORAGE USE - ORDINARY HAZARD			
COMMON PATH	100 FEET (WITH SPRINKLERS)	N/A	TABLE 42.2.5
TRAVEL DISTANCE	400 FEET (WITH SPRINKLERS)	67 FT	TABLE 42.2.6
DEAD-END CORRIDOR	100 FEET (WITH SPRINKLERS)	N/A	TABLE 42.2.5
EXISTING BUSINESS USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	38 FT	39.2.5.2.1
TRAVEL DISTANCE	300 FEET (WITH SPRINKLERS)	155 FT	39.2.6.3
DEAD-END CORRIDOR	50 FEET (WITH SPRINKLERS)	N/A	39.2.5.3

	ALLOWED	ACTUAL	NFPA 101 REF.
EXISTING ASSEMBLY USE			
COMMON PATH	75 FEET (WITH SPRINKLERS)	28 FT	13.2.5.2
TRAVEL DISTANCE	250 FEET (WITH SPRINKLERS)	64 FT	13.2.6.2(1)
DEAD-END CORRIDOR	20 FEET (WITH SPRINKLERS)	N/A	13.2.5.3
INDUSTRIAL USE - HIGH HAZARD			
COMMON PATH	NOT ALLOWED	78 FT	TABLE 40.2.5.1
TRAVEL DISTANCE	75 FEET (WITH SPRINKLERS)	106 FT	TABLE 40.2.6.1
DEAD-END CORRIDOR	NOT ALLOWED	15 FT	TABLE 40.2.5.1



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

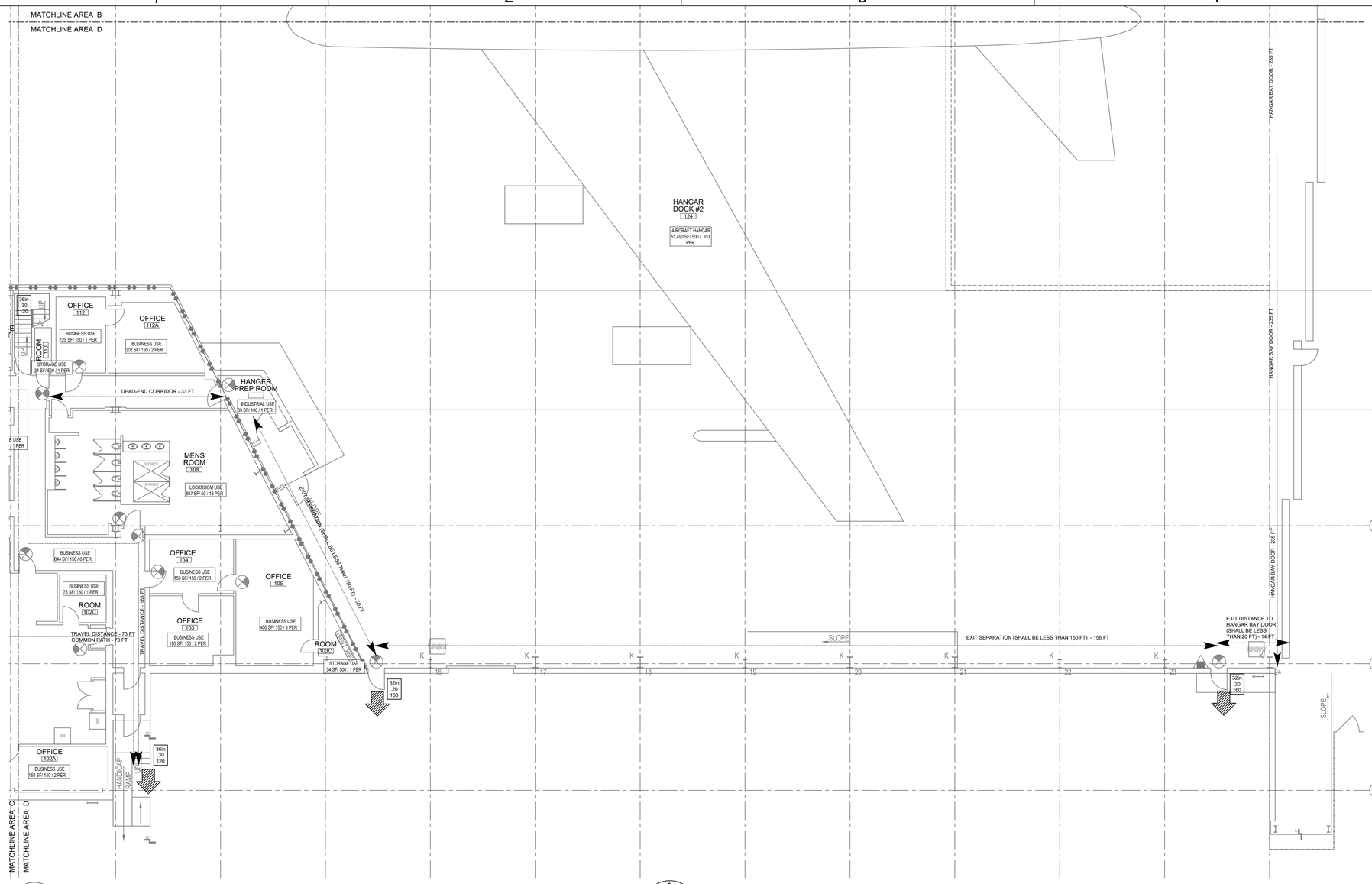
REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
LIFE SAFETY FIRST FLOOR PLAN - AREA C

SHEET NUMBER
G-103
SHEET - OF



1 G-104 LIFE SAFETY FIRST FLOOR PLAN - AREA D

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

SHEET NOTES:

1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 805.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

LIFE SAFETY SYMBOLS:

- XX' — TRAVEL DISTANCE
- EXIT DISCHARGE
- EXISTING 1 HOUR FIRE BARRIER
- EXISTING 2 HOUR FIRE BARRIER
- XXin / XXX / XXX — -EXIT WIDTH / -CAPACITY FACTOR / -EXIT CAPACITY
- EXIT SIGNAGE (EXISTING TO REMAIN)
- PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)
- NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

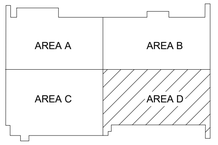
OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

PROJECT EGRESS TRAVEL DISTANCE

Add Storage use

	ALLOWED	ACTUAL	NFPA 101 REF.
EXISTING BUSINESS USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	38 FT	39.2.5.2.1
TRAVEL DISTANCE	300 FEET (WITH SPRINKLERS)	165 FT	39.2.6.3
DEAD-END CORRIDOR	50 FEET (WITH SPRINKLERS)	33 FT	39.2.5.3
EXISTING ASSEMBLY USE			
COMMON PATH	75 FEET (WITH SPRINKLERS)	73 FT	13.2.5.2
TRAVEL DISTANCE	250 FEET (WITH SPRINKLERS)	73 FT	13.2.6.2(1)
DEAD-END CORRIDOR	20 FEET (WITH SPRINKLERS)	N/A	13.2.5.3



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

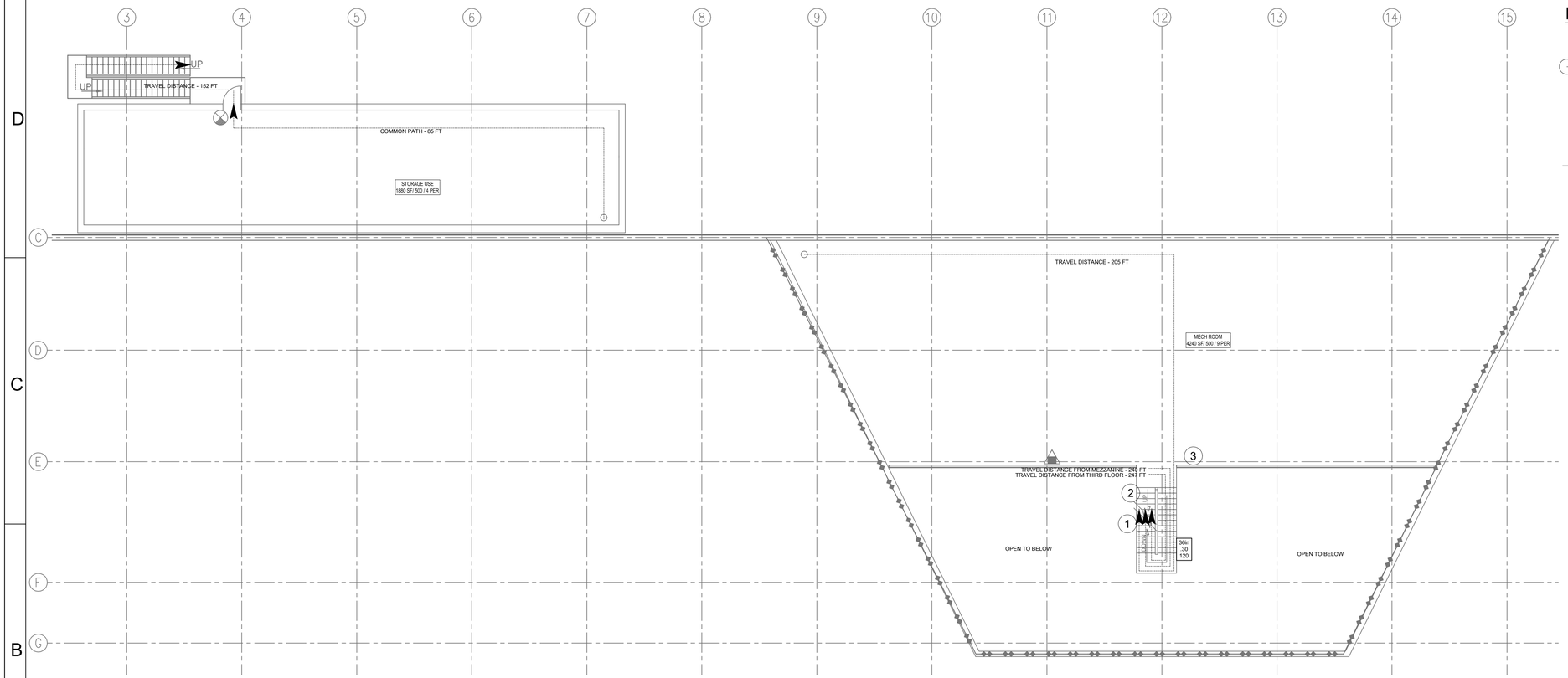
REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
LIFE SAFETY FIRST FLOOR PLAN - AREA D

SHEET NUMBER
G-104
SHEET - OF



1 G-105 LIFE SAFETY SECOND FLOOR PLAN - AREA A

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

SHEET NOTES:

1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 805.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

LIFE SAFETY SYMBOLS:

- XX' — TRAVEL DISTANCE
- EXIT DISCHARGE
- EXISTING 2 HOUR FIRE BARRIER
- XXin XXX XXX — -EXIT WIDTH / -CAPACITY FACTOR / -EXIT CAPACITY
- EXIT SIGNAGE (EXISTING TO REMAIN)
- PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)
- NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

KEY NOTES:

1. TRAVEL DISTANCES AND COMMON PATHS CONTINUE TO FIRST FLOOR, REFER TO SHEET G-102.
2. COMMON PATH ORIGINATES FROM UPPER FLOOR, REFER TO SHEET G-106. THE COMMON PATH EXCEEDS THE NFPA 101 100 FT ALLOWANCE, THIS IS A EXISTING CODE NON-CONFORMING CONDITION.
3. PER NFPA 101, TWO MEANS OF EGRESS SHALL BE PROVIDED ON SECOND AND THIRD FLOOR.

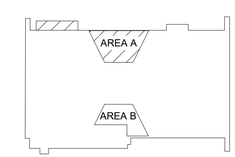
Is this being corrected or remaining as existing code non-conforming condition?

OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

PROJECT EGRESS TRAVEL DISTANCE

	ALLOWED	ACTUAL	NFPA 101 REF.
STORAGE USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	247 FT	TABLE 42.2.5
TRAVEL DISTANCE	400 FEET (WITH SPRINKLERS)	247 FT	TABLE 42.2.6
DEAD-END CORRIDOR	100 FEET (WITH SPRINKLERS)	N/A	TABLE 42.2.5



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

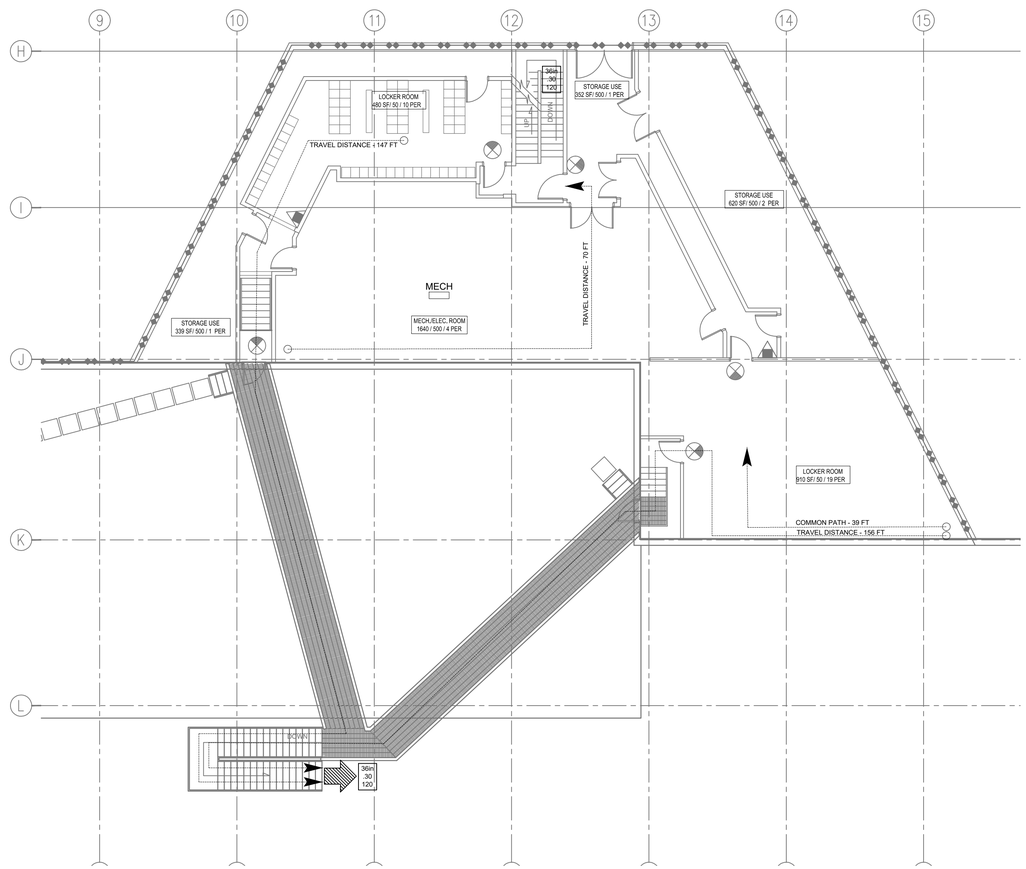
REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
GENERAL
LIFE SAFETY
SECOND FLOOR
PLAN - AREA A

SHEET NUMBER
G-105
SHEET - OF



1
G-106

LIFE SAFETY SECOND FLOOR PLAN - AREA B

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

N

SHEET NOTES:

1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 805.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.

2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

LIFE SAFETY SYMBOLS:

XX' — TRAVEL DISTANCE

EXIT DISCHARGE

EXISTING 2 HOUR FIRE BARRIER

XXin XXX XXX — -EXIT WIDTH, -CAPACITY FACTOR, -EXIT CAPACITY

EXIT SIGNAGE (EXISTING TO REMAIN)

PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)

NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

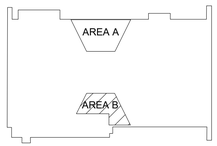
OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

PROJECT EGRESS TRAVEL DISTANCE

	ALLOWED	ACTUAL	NFPA 101 REF.
EXISTING ASSEMBLY			
COMMON PATH	75 FEET (WITH SPRINKLERS)	39 FT	13.2.5.2
TRAVEL DISTANCE	250 FEET (WITH SPRINKLERS)	156 FT	13.2.6.2(1)
DEAD-END CORRIDOR	20 FEET (WITH SPRINKLERS)	N/A	13.2.5.3

Add storage and Mech Egress information?



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

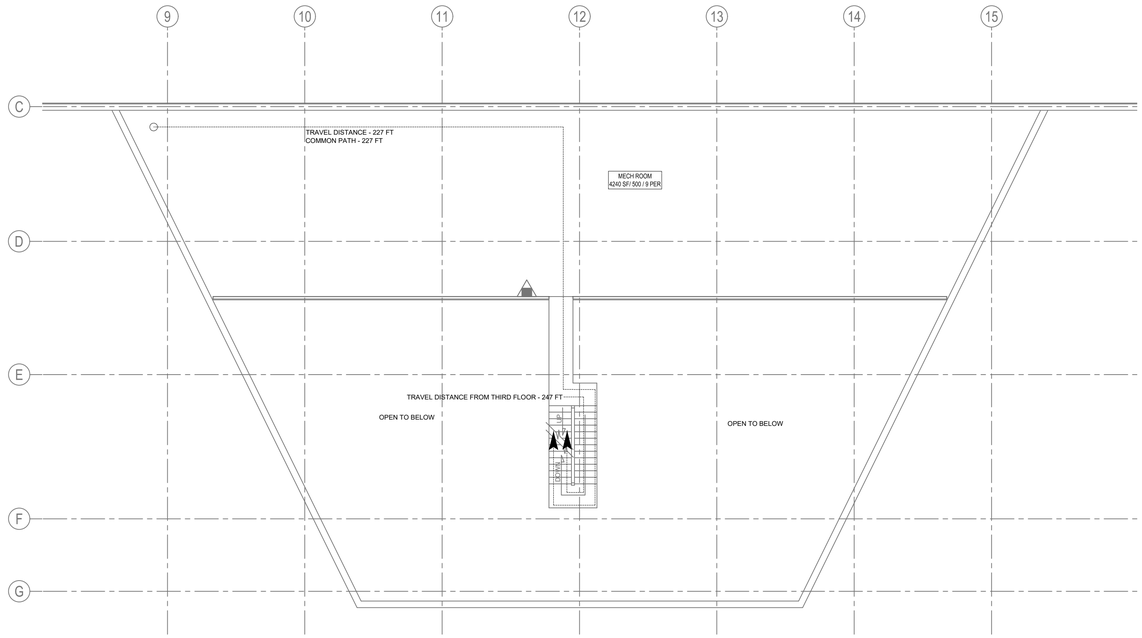
MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
LIFE SAFETY SECOND FLOOR AREA B

SHEET NUMBER
G-106

SHEET - OF

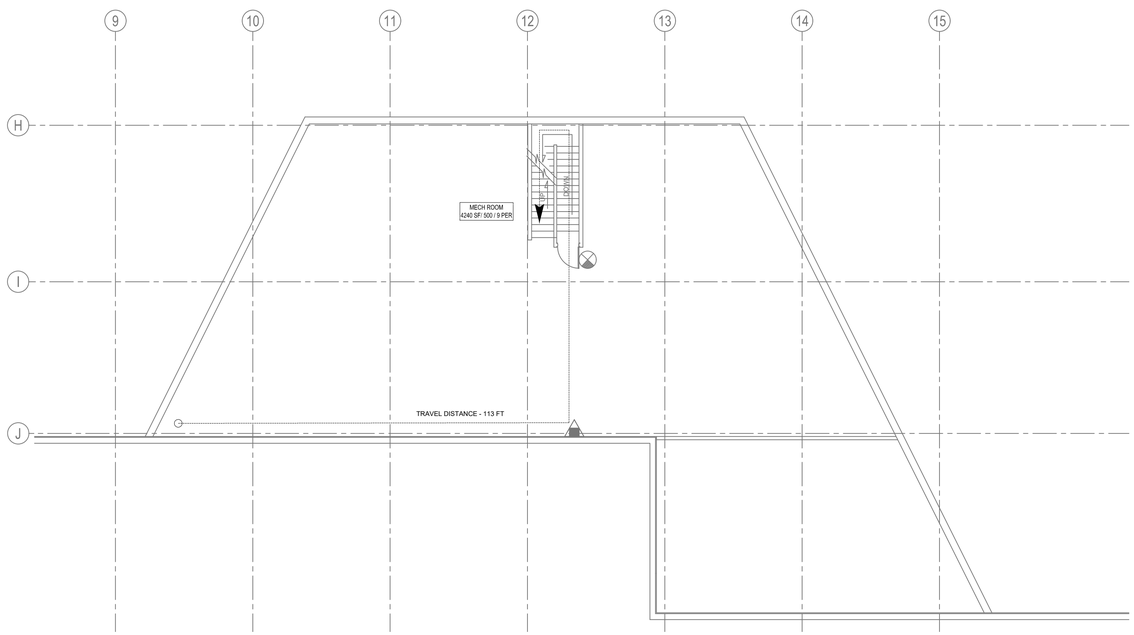


1 G-107 LIFE SAFETY MEZZANINE PLAN - AREA A

SCALE: 1/16" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"



2 G-107 LIFE SAFETY MEZZANINE FLOOR - AREA B

SCALE: 1/16" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

PROJECT EGRESS TRAVEL DISTANCE

	ALLOWED	ACTUAL	NFPA 101 REF.
STORAGE USE	Are the areas on this page storage or Mech Room per NFPA 101 7.13?		
COMMON PATH	100 FEET (WITH SPRINKLERS)	247 FT	TABLE 42.2.5
TRAVEL DISTANCE	400 FEET (WITH SPRINKLERS)	247 FT	TABLE 42.2.6
DEAD-END CORRIDOR	100 FEET (WITH SPRINKLERS)	N/A	TABLE 42.2.5

OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

SHEET NOTES:

1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 805.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

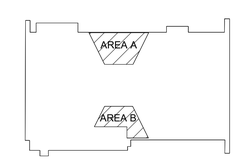
LIFE SAFETY SYMBOLS:

- XX' — TRAVEL DISTANCE
- EXIT DISCHARGE
- EXISTING 2 HOUR FIRE BARRIER
- XXin XXX XXX — -EXIT WIDTH / -CAPACITY FACTOR / -EXIT CAPACITY
- EXIT SIGNAGE (EXISTING TO REMAIN)
- PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)
- NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

KEY NOTES:

1. TRAVEL DISTANCES, COMMON PATH AND DEAD-END CORRIDOR EXCEEDS THE NFPA 101 ALLOWANCE, THIS IS A EXISTING CODE NON-CONFORMING CONDITION.

Key note not used on page, but should it be used for both areas?



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

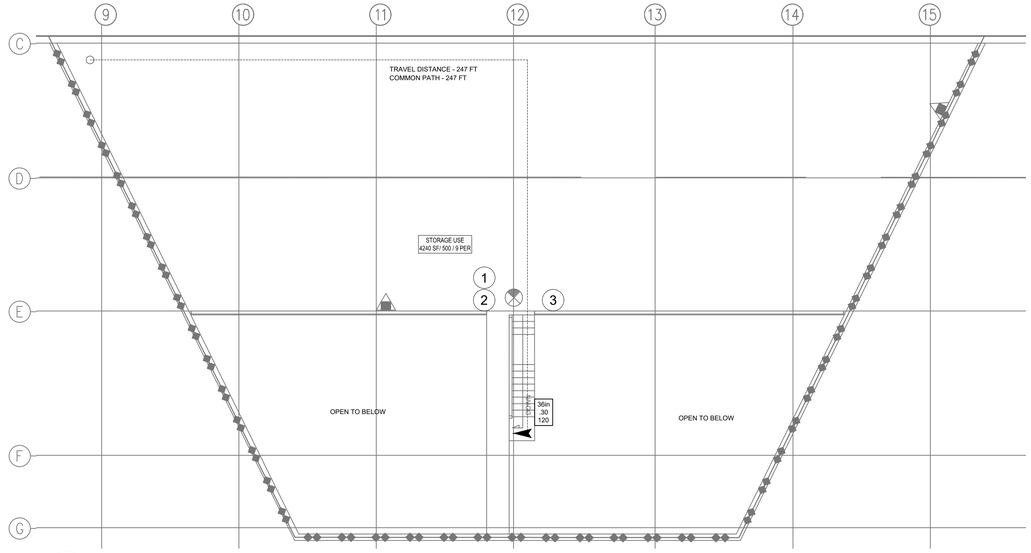
MANAGEMENT INFORMATION

ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
LIFE SAFETY MEZZANINE PLAN

SHEET NUMBER
G-107

SHEET - OF

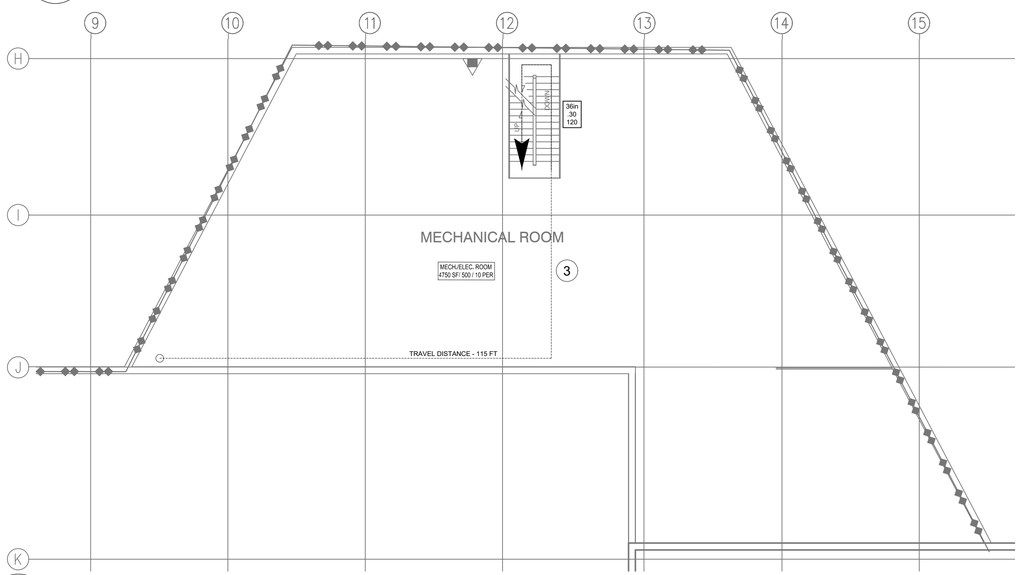


1 G-108 LIFE SAFETY THIRD FLOOR PLAN - AREA A

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"



2 G-108 LIFE SAFETY THIRD FLOOR PLAN - AREA B

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

KEY NOTES:

1. TRAVEL DISTANCES AND COMMON PATHS CONTINUE TO LOWER FLOORS, REFER TO SHEET G-102 AND G-105.
2. COMMON PATH ORIGINATES CONTINUES TO LOWER FLOOR, REFER TO SHEET G-102 AND G-105. THE COMMON PATH EXCEEDS THE NFPA 101 100 FEET ALLOWANCE, THIS IS A EXISTING NON-COMPLIANCE CONDITION.
3. PER NFPA 101, TWO MEANS OF EGRESS SHALL BE PROVIDED ON SECOND AND THIRD FLOOR.

Is this being corrected or remaining as existing code non-conforming condition?

SHEET NOTES:

1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 805.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

LIFE SAFETY SYMBOLS:

- XX' — TRAVEL DISTANCE
- EXIT DISCHARGE
- EXISTING 2 HOUR FIRE BARRIER
- XXin XXX XXX — -EXIT WIDTH, -CAPACITY FACTOR, -EXIT CAPACITY
- EXIT SIGNAGE (EXISTING TO REMAIN)
- PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)
- NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

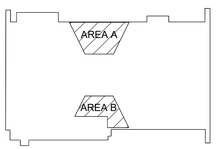
OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

PROJECT EGRESS TRAVEL DISTANCE

	ALLOWED	ACTUAL	NFPA 101 REF.
STORAGE USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	247 FT	TABLE 42.2.5
TRAVEL DISTANCE	400 FEET (WITH SPRINKLERS)	247 FT	TABLE 42.2.6
DEAD-END CORRIDOR	100 FEET (WITH SPRINKLERS)	N/A	TABLE 42.2.5

Add Mech Equipment Room Project info



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

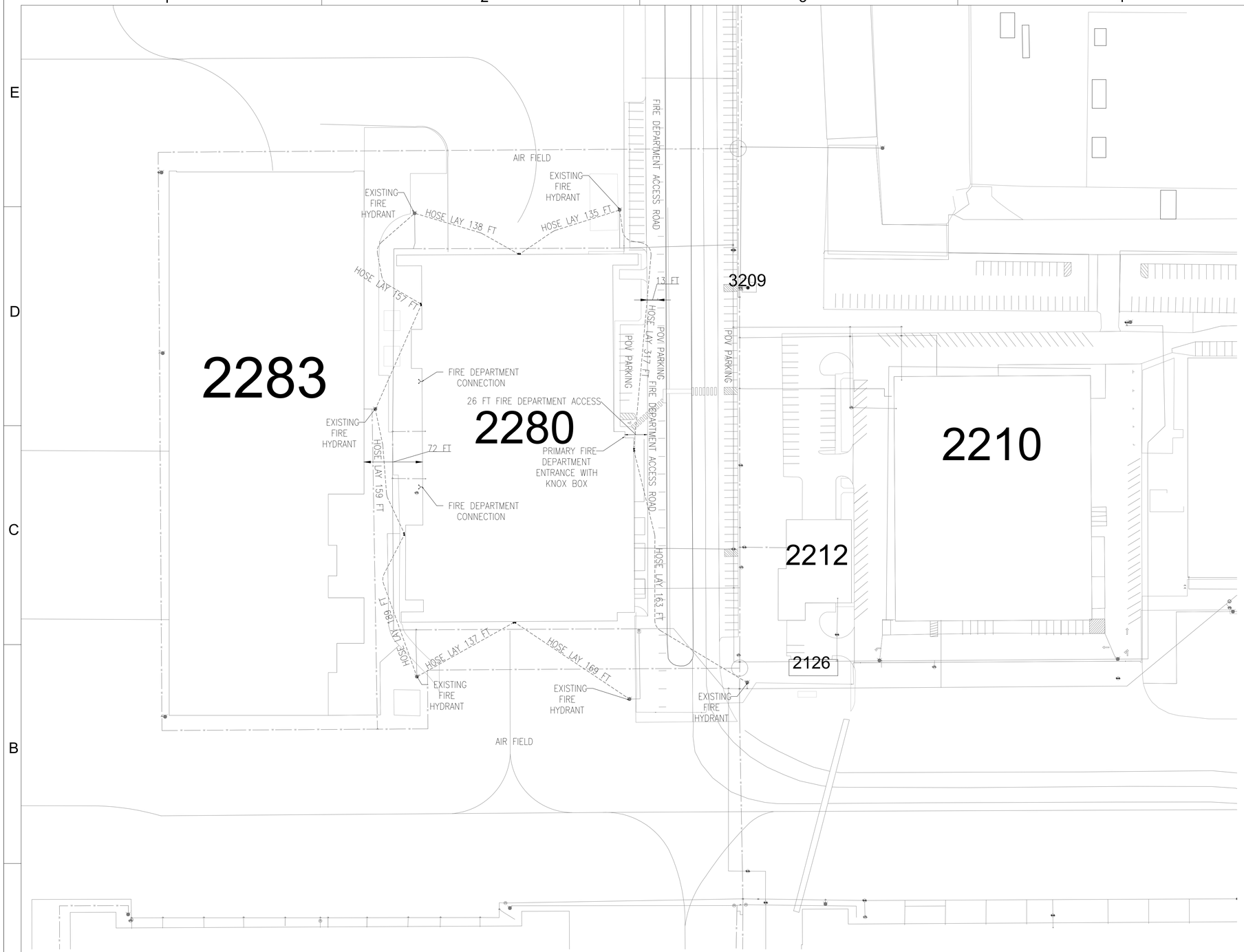
REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
LIFE SAFETY THIRD FLOOR

SHEET NUMBER
G-108
SHEET - OF



CODE COMPLIANCE LEGEND:

- FIRE HYDRANT
- FIRE DEPARTMENT CONNECTION
- W — UNDERGROUND WATER MAIN
- FIRE HOSE DISTANCE

KEY NOTES:

1. THIS IS THE FIRE CODE COMPLIANCE SITE PLAN, DIMENSIONS ARE NOT APPLICABLE FOR CIVIL CONSTRUCTION.

No FLS QC Comments

1 / G-109 CODE COMPLAINCE SITE PLAN

SCALE: 1/64" = 1'-0"

N

64 32 0 64 128

SCALE: 1/64"=1'-0"

AFMC
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DESIGN FILE LOCATION:

SHEET TITLE
CODE COMPLIANCE SITE PLAN

SHEET NUMBER
G-109

SHEET - OF

SPRINKLER SYSTEM DEMOLITION NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF EXISTING STRUCTURES SURROUNDING THE CONTRACT AREA. DAMAGE TO EXISTING STRUCTURES OR EQUIPMENT SHALL BE REPAIRED AT NO ADDITIONAL COST TO THE GOVERNMENT.
2. THE CONTRACTOR SHALL VERIFY EXISTING CONDITIONS PRIOR TO COMMENCEMENT OF WORK. THE CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER PRIOR TO REMOVAL OF MATERIAL OR EQUIPMENT NOT INDICATED ON THE DRAWINGS TO BE REMOVED.
3. REMOVE AND LEGALLY DISPOSE OF ALL ITEMS EXCEPT ITEMS INDICATED TO BE REINSTALLED, SALVAGED, OR TO REMAIN THE GOVERNMENT'S PROPERTY.

Is this still within the scope?

4. GOVERNMENT SHALL HAVE FIRST RIGHTS OF REFUSAL TO ALL FIRE PROTECTION EQUIPMENT, DEVICES, AND WIRE REMOVED AS PART OF THIS PROJECT. ITEMS NOT TAKEN BY THE GOVERNMENT SHALL BE PROPERLY DISPOSED OF BY CONTRACTOR. THIS INCLUDES DISPOSAL OF AFFF FOAM AND ASSOCIATED FOAM EQUIPMENT IN ACCORDANCE WITH BASE STANDARDS.
5. IDENTIFY AND ACCURATELY LOCATE CAPPED UTILITIES AND OTHER SUBSURFACE STRUCTURAL, ELECTRICAL, OR MECHANICAL CONDITIONS.
6. MAINTAIN EXISTING UTILITIES INDICATED TO REMAIN IN SERVICE AND PROTECT THEM AGAINST DAMAGE DURING DEMOLITION OPERATIONS.
7. CONDUCT DEMOLITION OPERATIONS AND REMOVE DEBRIS TO ENSURE MINIMUM INTERFERENCE WITH ROADS, STREETS, WALKS, AND OTHER ADJACENT OCCUPIED AND USED FACILITIES.
8. PROTECT WALLS, CEILINGS, FLOORS, AND OTHER EXISTING FINISH WORK THAT ARE TO REMAIN AND ARE EXPOSED DURING SELECTIVE DEMOLITION OPERATIONS.
9. COVER AND PROTECT FURNITURE AND EQUIPMENT THAT HAVE NOT BEEN REMOVED.
10. ERECT AND MAINTAIN DUST PROOF PARTITIONS AND TEMPORARY ENCLOSURES TO LIMIT DUST AND DIRT MIGRATION AND TO SEPARATE AREAS FROM FUMES.
11. CLEAN ADJACENT STRUCTURES AND IMPROVEMENTS OF DUST, DIRT, AND DEBRIS CAUSED BY DEMOLITION OPERATIONS. RETURN ADJACENT AREAS TO CONDITION EXISTING BEFORE START OF DEMOLITION.
12. DEMOLISH AND REMOVE CONSTRUCTION ONLY TO THE EXTENT REQUIRED BY NEW CONSTRUCTION AND AS INDICATED.
13. PROMPTLY PATCH AND REPAIR HOLES AND DAMAGED SURFACES CAUSED TO ADJACENT CONSTRUCTION BY DEMOLITION OPERATIONS, WHERE REPAIRS TO EXISTING SURFACES ARE REQUIRED, PATCH TO PRODUCE SURFACES SUITABLE FOR NEW MATERIALS. SEE GENERAL FIRE PROTECTION SHEETS FOR REQUIRED FINISHES.
14. DISPOSAL: PROMPTLY DISPOSE OF DEMOLISHED MATERIALS. DO NOT ALLOW DEMOLISHED MATERIALS TO ACCUMULATE ON SITE. TRANSPORT DEMOLISHED MATERIALS OFF GOVERNMENT'S PROPERTY AND LEGALLY DISPOSE OF THEM.
15. ALL WORK WILL BE COORDINATED WITH GOVERNMENT AND APPROVED PRIOR TO PROCEEDING WITH WORK. TINKER AFB PERSONNEL WILL PROVIDE FIRE WATCH WHILE FIRE PROTECTION SYSTEM IS OUT OF SERVICE.
16. CONTRACTOR IS RESPONSIBLE FOR UNNECESSARY DEMOLITION AT NO ADDITIONAL COST TO THE PROJECT / GOVERNMENT.
17. THE EXISTING CONDITIONS AND DEMOLITION PLANS WERE DEVELOPED BASED ON GOVERNMENT AS-BUILT DRAWINGS AND FIELD VISUAL VERIFICATION WHERE POSSIBLE. CONTRACTOR SHALL ALLOW FOR VARIANCES IN DEVICES DEPICTED ON DEMOLITIONS DRAWINGS AND UNFORESEEN CONDITIONS.
18. FOAM DISCHARGES SHALL BE TREATED AS A SPILL AND REPORTED AS SUCH IN ACCORDANCE WITH LOCAL AND EPA STANDARDS. PROVIDE TEMPORARY MEASURES TO PREVENT FOAM SOLUTION OR FOAM CONCENTRATE FROM ENTERING STORM DRAINS, TRENCH DRAINS, SANITARY SEWERS, DRAINAGE DITCHES, STREAMS AND WATER COURSES. DO NOT ALLOW FOAM CONCENTRATE OR SOLUTION TO COME IN CONTACT WITH EARTH. CONTAIN ALL DISCHARGED FOAM SOLUTION OR CONCENTRATE ON PAVED SURFACES. RELEASE OF FOAM SOLUTION OR CONCENTRATE SHALL BE REPORTED AS A SPILL TO CONTRACTING OFFICER. DISPOSAL OF FOAM CONCENTRATE, SOLUTION AND/OR DUST SHALL BE DISPOSED OF IN AN RCRA SUBTITLE C LANDFILL UNLESS LABORATORY TEST RESULTS ARE PROVIDED TO THE CONTRACTINGOFFICER FROM A DOD ELAP QSM 5.1 APPROVED LABORATORY INDICATING ABSENCE OF PERFLUOROOCTANOIC ACID (PFOA) AND PERFLUROCTANE SULFONATE(PFOS) IN WHICH CASE DISPOSAL SHALL BE AT APPROPRIATE OFF BASE FACILITIES IN PROPERLY MARKED CONTAINERS. SUBMIT WRITTEN PLAN FOR FOAM CONTAINMENT AND DISPOSAL METHOD(S) TO THE CONTRACTING OFFICER FOR APPROVAL.

Is this still within the scope?

19. PROPER COLLECTION AND OFFSITE DISPOSAL OF EXISTING AFFF FOAM SHALL BE PROVIDED BY CONTRACTOR TO ELIMINATE ENVIRONMENTAL CONCERNS.
20. IF DURING CONSTRUCTION A BUILDING OR PORTION THEREOF AFFECTED BY REMOVAL OF FIRE PROTECTION SYSTEMS OR WATER SERVICES SHALL FOLLOW REQUIREMENTS AS NOTED HEREIN. CONTRACTOR SHALL PROVIDE A MINIMUM 7 DAYS ADVANCED NOTICE TO THE CONTRACTING OFFICER AND BASE FIRE DEPARTMENT PRIOR TO ANY SHUTDOWN OR REMOVAL OF FIRE PROTECTION SYSTEM FOR AN OCCUPIED BUILDING. WHERE A FIRE PROTECTION SYSTEM IS OUT OF SERVICE FOR MORE THAN 10 HOURS IN A 24-HOUR PERIOD, THE CONTRACTOR SHALL COORDINATE BUILDING OCCUPANCY SCHEDULE WITH GOVERNMENT AND RECEIVE APPROVAL FOR THE FIRE PROTECTION SYSTEM IMPAIRMENT PLAN PREPARED BY THE CONTRACTOR IN CONJUNCTION WITH THE BASE FIRE DEPARTMENT IN ACCORDANCE WITH UFC 3-601-02 AND NFPA 25 CHAPTER 15. ALL WORK WILL BE COORDINATED WITH GOVERNMENT AND APPROVED PRIOR TO PROCEEDING WITH WORK. TINKER AFB PERSONNEL WILL PROVIDE FIRE WATCH WHILE FIRE PROTECTION SYSTEM IS OUT OF SERVICE.

SPRINKLER SYSTEM GENERAL NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR FINAL INSTALLATION DESIGN AND COORDINATION, INCLUDING HYDRAULIC CALCULATIONS. SIZING OF FIRE SUPPRESSION COMPONENTS WILL BE CONFIRMED BY CONTRACTOR. DESIGNER WILL BE A MINIMUM NICET LEVEL IV TECHNICIAN, AND LICENSED FIRE PROTECTION ENGINEER WILL OVERSEE THE INSTALLATION.
2. HANGAR DESIGN WILL FOLLOW DOD SUNDOWN POLICY (16 NOVEMBER 21 WITH CHANGE 2, 29-DECEMBER-22) FOR TIER 2 HANGAR. WHERE SUNDOWN POLICY IS SILENT, UFC 4-211-01 AND UFC 3-600-01 REQUIREMENTS WILL BE APPLICABLE.

Do we have the updated sundown policy to add here?

3. THESE DRAWINGS ARE CONCEPTUAL IN NATURE AND DEVICE PLACEMENTS ARE REPRESENTATIVE. CONTRACTOR TO VERIFY AND PROVIDE FULL DESIGN IN ACCORDANCE TO APPLICABLE CODES (UFC, ICC, NFPA, ETC.).
4. THE FIRE SPRINKLER CONTRACTOR WILL COORDINATE WITH THE FIRE ALARM CONTRACTOR AND OTHER TRADES FOR PROVISION OR CONNECTIONS BETWEEN THEIR RESPECTIVE SYSTEMS.
5. ALL MATERIALS ARE TO BE UL LISTED OR FM APPROVED FOR USE IN FIRE PROTECTION SYSTEMS.
6. COMMISSIONING, PRELIMINARY AND FINAL ACCEPTANCE TESTING WILL BE IN ACCORDANCE WITH SPECIFICATION SECTIONS 21 13 13 WET PIPE SPRINKLER SYSTEMS, FIRE PROTECTION. COORDINATE TESTING WITH OTHER TRADES AND BASE PERSONNEL PRIOR TO OPERATION. ALL FIRE SUPPRESSION AND FIRE ALARM TESTING WILL OCCUR SIMULTANEOUSLY TO EXPEDITE COMMISSIONING.
7. THE BUILDING FIRE PROTECTION WATER SUPPLY IS SERVED BY 4 EXISTING DIESEL FIRE PUMPS (1500, GPM @ 100 PSI EACH) ARRANGED IN PARALLEL LOCATED IN BUILDING 2123.
8. WHERE PIPES PASS THROUGH FIRE WALLS, FIRE BARRIERS, FIRE PARTITION, OR FLOORS, A FIRE SEAL WILL BE PLACED BETWEEN THE PIPE AND SLEEVE IN ACCORDANCE WITH SECTION 07 84 00 FIRESTOPPING.
9. SLEEVES PENETRATING CONCRETE, MASONRY WALLS OR CONCRETE FLOORS WILL BE CUT FLUSH WITH EACH SURFACE. SLEEVE SIZES AND CLEARANCE BETWEEN PIPE AND SLEEVE WILL BE IN ACCORDANCE WITH NFPA 13.
10. SPRINKLERS WILL BE SPACED IN ACCORDANCE WITH NFPA 13 OBSTRUCTION REQUIREMENTS. PROVIDE SPRINKLERS UNDER STAIRS, CATWALKS, PLATFORMS, SHED STRUCTURES, ETC. AS REQUIRED PER NFPA 13.
11. PROVIDE HEAD GUARDS IN AREAS SUBJECT TO DAMAGE OR HEADS INSTALLED LOWER THAN SEVEN FEET ABOVE FINISHED FLOOR.
12. PROVIDE HEAD GUARDS WITH WATER SHIELDS FOR ALL HEADS INSTALLED BENEATH OPEN GRATED PLATFORMS.
13. VALVES LOCATED MORE THAN EIGHT FEET ABOVE FINISHED FLOOR AND NOT READILY ACCESSIBLE FROM MEZZANINE WILL BE PROVIDED WITH CHAIN OPERATORS.
14. PROVIDE ACCESS DOORS AND SIGNAGE WHERE ACCESS IS REQUIRED TO CONCEALED SPRINKLER EQUIPMENT, VALVES, AND CONTROLS. LOCATIONS TO BE APPROVED BY CONTRACTING OFFICER.
15. PROVIDE PERMANENT LABELS ON WET-PIPE RISERS TO INDICATE WHICH ZONE EACH ONE SERVES.
16. PROVIDE PERMANENT LABELS INDICATING NORMAL OPERATING POSITION ON ALL VALVES INCLUDING, BUT NOT LIMITED TO, SECTIONAL VALVES, INSPECTOR'S TEST VALVES, AND DRAIN VALVES.

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REVISIONS

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ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
FIRE SUPPRESSION GENERAL NOTES

SHEET NUMBER
F-001
SHEET - OF

FIRE ALARM DEMOLITION NOTES:

1. THE EXISTING CONDITIONS AND DEMOLITION PLANS WERE DEVELOPED BASED ON GOVERNMENT AS BUILT DRAWINGS AND FIELD VISUAL VERIFICATION. CONTRACTOR SHALL ALLOW FOR VARIANCES IN DEVICES DEPICTED ON DEMOLITION DRAWINGS AND UNFORESEEN CONDITIONS.

2. THE DEMOLITION SCOPE OF WORK IS TO REMOVE THE EXISTING FIRE SUPPRESSION CONTROL SYSTEM AND FIRE ALARM SYSTEM IN THEIR ENTIRETY, TO INCLUDE BUT NOT LIMITED TO RSFSCU, MANUAL FOAM START STATIONS, ADDRESSABLE CONTROL RELAYS INITIATING AFFF RELEASE, OPTICAL FLAME DETECTORS, POWER SUPPLY, FACU, PULL STATIONS, SMOKE DETECTORS, DUCT SMOKE DETECTORS, FIRE ALARM NOTIFICATION DEVICES, AND ASSOCIATED WATER TIGHT AND NON-WATER TIGHT CONDUIT AND CABLE.

3. GOVERNMENT SHALL HAVE FIRST RIGHT OF REFUSAL TO ALL FIRE PROTECTION EQUIPMENT, DEVICES, AND WIRE REMOVED AS PART OF THIS PROJECT. ANYTHING NOT TAKEN BY THE GOVERNMENT SHALL BE PROPERLY DISPOSED OF BY CONTRACTOR.

Will a new RSFACU be installed?

4. THE DEMOLITION OF THE EXISTING RSFACU AND FACU SYSTEM SYSTEMS SHALL BE COORDINATED WITH THE NEW RSFACU AND FACU INSTALLATION SUCH THAT THE BUILDING REMAINS PROTECTED AT ALL TIMES UNLESS APPROVED OTHERWISE BY THE CONTRACTING OFFICER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DEVELOPING AN IMPAIRMENT PLAN IN ACCORDANCE WITH UFC 3-601-02 AND RECEIVING PLAN APPROVAL FROM THE GOVERNMENT PRIOR TO COMMENCING WORK.

5. CONTRACTOR SHALL PROTECT EXISTING CONDITIONS INCLUDING BUT NOT LIMITED TO: STRUCTURES, CEILINGS, WALLS, EQUIPMENT, UTILITIES, ETC. DAMAGE TO EXISTING CONDITIONS SHALL BE REPAIRED AT NO ADDITIONAL COST TO THE GOVERNMENT.

6. CONTRACTOR SHALL BE RESPONSIBLE FOR PATCHING AND REPAIRING FLOORS, CEILINGS, AND WALLS TO MATCH EXISTING CONDITIONS IN ALL AREAS IMPACTED BY THE DEMOLITION OF THE EXISTING RSFSCU SYSTEM AND INSTALLATION OF THE NEW RSFSCU AND FIRE SUPPRESSION CONTROLS SYSTEM.

7. THE BUILDING MAY BE OCCUPIED DURING CONSTRUCTION. THE CONTRACTOR SHALL COORDINATE WORK SCHEDULE WITH GOVERNMENT PRIOR TO COMMENCING WORK. CONTRACTOR SHALL BE RESPONSIBLE FOR WORKING AROUND OCCUPANT SCHEDULE AS DETERMINED BY THE GOVERNMENT AND MAINTAIN MINIMUM IMPACT DUE TO CONSTRUCTION.

Will a new RSFACU be installed?

FIRE ALARM AND MASS NOTIFICATION GENERAL NOTES:

1. PROVIDE A COMPLETE FIRE ALARM AND MASS NOTIFICATION SYSTEM WITH EMERGENCY VOICE COMMUNICATIONS THROUGHOUT THE ENTIRETY OF THE BUILDING 2280 AS NOTED ON DRAWINGS. INSTALL MONACO MAAP-X FIRE ALARM / MASS NOTIFICATION CONTROL UNIT, REMOTE ANNUNCIATORS (ANN), LOCAL OPERATOR CONSOLES (LOC), TEXTUAL SIGNS, AND NOTIFICATION APPLIANCE CIRCUIT (NAC) POWER SUPPLIES AS DETAILED ON DRAWINGS. PROVIDE COMPLETE OCCUPANT NOTIFICATION THROUGHOUT THE BUILDING. PROVIDE MANUAL PULL STATIONS AT ALL EXITS. PROVIDE DUCT SMOKE DETECTION AND HVAC SHUT-DOWN PER NFPA 90A. MONITOR ALL FIRE PROTECTION SYSTEMS INCLUDING BUT NOT LIMITED TO AUTOMATIC SPRINKLERS.

2. WORK SHALL BE INSTALLED IN ACCORDANCE WITH NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 70, NFPA 72, UNIFIED FACILITIES CRITERIA (UFC) 3-600-01 WITH CHANGE 6, 6 MAY 2021, UFC 4-021-01 AS AMENDED BY US ARMY CORPS OF ENGINEERS (USACE) DESIGN GUIDE FOR VISUAL NOTIFICATION FOR MASS NOTIFICATION SYSTEM, USACE ENGINEERING AND CONSTRUCTION BULLETIN (ECB) REGARDING UFC 4-021-01 ISSUED 25-OCT-18, UFC 4-010-05, INTELLIGENCE COMMUNITY TECHNICAL SPECIFICATION ICD/ICS 705, AND TINKER DESIGN STANDARDS. A CERTIFICATE OF FINAL INSPECTION SHALL BE PROVIDED BY THE CONTRACTOR AT THE COMPLETION OF THE WORK AND PRESENTED TO ENGINEER AND CONTRACTING OFFICER.

Will a new RSFACU be installed?

3. THE FIRE ALARM AND MASS NOTIFICATION CONTROL SYSTEM SHALL BE MONITORED BY AND REPORT TO THE BASE-WIDE MONACO D-21 SYSTEM. ALL NECESSARY HARDWARE, LABOR AND PROGRAMMING SHALL BE PART OF THE SCOPE OF THIS WORK. THE FA/MNS SYSTEM AND RSFSCU WILL EACH REPORT INDEPENDENTLY VIA SEPARATE TRANSCEIVERS.

4. PROVIDE SURGE PROTECTIVE DEVICES (SPDS) TO PROTECT ALL POWER SUPPLY CIRCUITS TO THE RSFSCU, INCLUDING SUBPANELS (E.G. NOTIFICATION APPLIANCE CIRCUIT (NAC) BOOSTER PANELS). SPDS SHALL BE INSTALLED IN ACCORDANCE WITH UFC 3-520-01.

5. FIRE ALARM AND MASS NOTIFICATION SYSTEM WIRING SHALL BE RUN IN MINIMUM 3/4" CONDUIT. RIGID CONDUIT SHALL BE INSTALLED IN SUPPORT AREAS OUTSIDE OF HANGER BAY. PROVIDE RIGID WATERTIGHT CONDUITS/CONNECTIONS AND NEMA 4 JUNCTION BOXES THROUGHOUT THE HANGAR BAY.

6. CONDUIT, TERMINAL, AND PULLING BOXES AND COVERS IN UNFINISHED AREAS SHALL BE PAINTED RED AND BE IDENTIFIED WITH ENGRAVED LABELS BY THE ZONE AND CIRCUIT THAT IT CONTAINS. FOR FINISHED AREAS, CONDUIT AND BOXES SHALL BE PAINTED TO MATCH THE ROOM FINISHING. THE INSIDE COVER OF JUNCTION BOX SHALL BE IDENTIFIED AS "FIRE ALARM" AND THE CONDUIT MUST HAVE PAINTED RED BANDS 3/4" WIDE AND 20' INTERVALS ON BOTH SIDES OR PENETRATIONS.

7. FIRE ALARM CONTROL UNIT/AUTONOMOUS CONTROL UNIT (FMCU/ACU).
   - 7.1. THE SECONDARY POWER SUPPLY FOR THE COMBINED FIRE ALARM AND MASS NOTIFICATION SYSTEM SHALL BE CAPABLE OF OPERATING THE SYSTEM UNDER QUIESCENT LOAD FOR A MINIMUM OF 48 HOURS WITH 15 MINUTES FOR ALARM AT MAXIMUM CONNECTED LOAD. THE SECONDARY POWER SUPPLY SHALL ALSO BE ABLE TO OPERATE THE MASS NOTIFICATION SYSTEM OR A COMBINED SYSTEM FOR 60 MINUTES AT A MAXIMUM CONNECTED LOAD IMMEDIATELY UPON LOSS OF AC POWER. BATTERIES SHALL BE SINGLE PAIR FOR SUPERVISION PURPOSES.
   - 7.2. MANUAL FIRE ALARM PULL STATIONS PER UFC 4-211-01, SECTION 3-6.19.7: WHERE REQUIRED BY THE UFC 3-600-01, PROVIDE GENERAL FIRE ALARM MANUAL PULL STATIONS THAT ARE RED IN COLOR AND LABELED "FIRE".
   - 7.3. PROVIDE A FIRE DETECTION ZONE ADDRESS FOR EACH CORRESPONDING MONITORED DEVICE, INCLUDING SPRINKLER SYSTEM WATER FLOW AND TAMPER SWITCHES.

8. PROVIDE A MANUAL INHIBIT SWITCH BAY FOR OPTICAL DETECTION THAT UPON ACTIVATION, INHIBITS OPTICAL DETECTION IN THE ASSOCIATED BAY. THIS SWITCH SHALL ILLUMINATE A NEARBY RED INDICATOR LIGHT AND PRODUCE A SUPERVISORY SIGNAL AT THE FMCU.

9. SEAL PENETRATIONS AT FIRE OR SMOKE RATED CONSTRUCTION WITH FIRESTOPPING MATERIALS APPROVED AND LISTED FOR THE RATING OF THE CONSTRUCTION TO BE PENETRATED. PROVIDE DOCUMENTATION FOR EACH PENETRATION SEALING SYSTEMS FOR VERIFICATION OF PROPER INSTALLATION.

10. PERFORM WORK ON DE-ENERGIZED SYSTEMS ONLY TO PREVENT PERSONNEL INJURY AND POTENTIAL SYSTEM FAILURE. WHERE WORK ON EXISTING SYSTEMS SHALL REQUIRE INTERRUPTION OF ELECTRICAL SERVICE, TEMPORARY PROVISIONS ACCEPTABLE TO THE OWNER SHALL BE REQUIRED.

11. THE INTENT OF SPEAKER SPACING IS TO PROVIDE COMMON INTELLIGIBILITY SCALE (CIS) SCORE TO MEET THE MINIMUM INTENT OF UFC 4-021-01. THE INSTALLING CONTRACTOR SHALL VERIFY THEIR DESIGN MEETS THIS INTENT BY PROVIDING SPEECH INTELLIGIBILITY CALCULATIONS BASED ON THEIR INSTALLED PRODUCTS THEORETICAL AND DIRECTIVITY INDEX AND BY ADDING SPEAKERS THROUGH TESTING AS REQUIRED AT NO ADDITIONAL COST TO THE GOVERNMENT.

12. REGARDING PATHWAY SURVIVABILITY AND CIRCUIT INTEGRITY FOR THE FA/MNS; SYSTEM PROVIDE SLC WIRING AS CLASS "B" IN ACCORDANCE WITH NFPA 72. AT A MINIMUM, PROVIDE ONE SLC CIRCUIT FOR EACH HANGAR BAY SO THAT IF THERE IS A WIRING FAULT SERVING A HANGAR BAY, IT SHALL NOT INTERFERE OR HINDER OPERATIONS FOR ANOTHER BAY. THIS INCLUDES MONITORING OF FIRE SUPPRESSION SYSTEMS. NAC STROBE CIRCUITS SHALL BE WIRED CLASS B, NAC SPEAKER CIRCUITS SHALL BE WIRED CLASS B, AND INITIATING DEVICE CIRCUITS FROM ADDRESSABLE MODULES SHALL BE WIRED CLASS B, ALL IN ACCORDANCE WITH NFPA 72 REQUIREMENTS.

13. ALL NEW WIRING DEVICES AND EQUIPMENT SHALL BE MOUNTED AT A MINIMUM 18" AFF WITHIN HANGAR BAY, ADJACENT AND COMMUNICATING SPACES TO HANGAR BAY AREA.

14. RACEWAYS SHALL BE INSTALLED CONCEALED IN ALL FINISHED AREAS AND EXPOSED IN UNFINISHED AREAS. EXPOSED RACEWAYS SHALL BE PAINTED TO MATCH ADJACENT SURFACES AND SHALL BE ROUTED OVERHEAD AND ALONG STRUCTURAL BEAMS.

15. ALL ELECTRICAL EQUIPMENT/DEVICES SHALL BE INSTALLED ABOVE THE HAZARDOUS CLASSIFICATION AREA AS DEFINED PER NFPA 90 AND UFC 4-211-01.

16. MODIFIED SYSTEMS, CONSTRUCTION (SHOP) DRAWINGS AND CALCULATIONS MUST BE PREPARED BY AN INDIVIDUAL THAT HAS OBTAINED NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES, FIRE ALARM SYSTEMS, LEVEL III CERTIFICATION, AT A MINIMUM. THE QFPE MUST REVIEW THE SHOP DRAWINGS, CALCULATIONS AND MATERIAL SUBMITTALS. THE SHOP DRAWINGS MUST BEAR THE REVIEW STAMP OF THE QFPE PRIOR TO SUBMITTING THE FIRE ALARM AND MASS NOTIFICATION SYSTEM SHOP DRAWINGS TO THE GOVERNMENT. (UFC 3-600-01 CHANGE 6 SECTION 9-18.2).

17. SUBMIT SHOP DRAWINGS AND CALCULATIONS TO THE GOVERNMENT FOR REVIEW, IN A MANNER AS REQUIRED PER NFPA 72 AND UFC 3-600-01. SUBMIT EQUIPMENT DATA SHEETS FOR A COMPLETE INSTALLATION OF THE FIRE ALARM SYSTEM. APPROVED SHOP DRAWINGS, DATA SHEETS, AND CALCULATIONS ARE REQUIRED PRIOR TO COMMENCEMENT OF WORK. THE FIRE ALARM AND MASS NOTIFICATION SUBMITTAL SHALL BE A COMPLETE PACKAGE, PARTIAL SUBMITTAL WILL NOT BE ACCEPTABLE.

18. THE INSTALLATION LED MNS TEXT SIGNS WILL REQUIRE REPOSITIONING OF EXISTING EXIT SIGNS IN CERTAIN INSTANCES TO ALLOW BOTH EXIT SIGNS AND LED TEXT SIGNS TO BE PLACED ABOVE DOORS AS REQUIRED BY LIFE SAFETY CODE AND UFC 4-021-01, RESPECTIVELY. THE CONTRACTOR SHALL PROVIDE LABOR AND MATERIALS REQUIRED TO REPOSITION EXIT SIGNS, FABRICATE BRACKETS, PENDENT MOUNTS ETC. SURFACE MOUNT CONDUIT SHALL NOT BE USED TO RELOCATED EXIT SIGNS IN FINISHED SPACES. WHERE EXIT SIGNS ARE RELOCATED, EXTEND CONDUITS/CONDUCTORS FOR FINAL CONNECTIONS AS REQUIRED PER TINKER AFB STANDARDS. MOUNTING OF LED TEXT SIGNS MAY REQUIRE THE FABRICATION OF CUSTOM BRACKETS AND THE USE OF CEILING PENDENT MOUNTS. ALL FABRICATED HARDWARE SHALL BE PAINTED TO MATCH WALL AND CEILING SURFACES.

19. PENETRATIONS OF FIRE AND SMOKE RATED CONSTRUCTION SHALL BE SEALED WITH FIRE STOPPING MATERIALS APPROVED AND LISTED FOR THE RATING OF THE CONSTRUCTION TO BE PENETRATED. PROVIDE DOCUMENTATION ON ALL SUCH PENETRATION SEALING SYSTEMS FOR VERIFICATION OF PROPER INSTALLATION. CONTRACTOR SHOP DRAWINGS SHALL SHOW THE LOCATION OF FIRE AND SMOKE RATED CONSTRUCTION. SHOP DRAWINGS SHALL INCLUDE FIRESTOPPING DETAILS FOR EACH TYPE OF FIRESTOPPING MATERIAL USED IN THE PROJECT. ONLY QUALIFIED CONTRACTOR AND INSTALLERS SHALL INSTALL FIRESTOPPING.

Any General Notes for flame detection installation?

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DESIGNED BY: T.W.
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CHECKED BY: B.D.
DESIGN FILE LOCATION:

SHEET TITLE
FIRE ALARM AND MASS NOTIFICATION GENERAL NOTES

SHEET NUMBER
F-002

SHEET - OF

SHEET NOTES:

1. THE DEMOLITION SCOPE OF WORK IS TO REMOVE THE EXISTING RELEASING SERVICE FIRE ALARM CONTROL SYSTEM AND FIRE ALARM SYSTEMS IN THEIR ENTIRETY. THIS INCLUDES BUT NOT LIMITED TO RSFACU, MANUAL FOAM START STATIONS, ADDRESSABLE CONTROL RELAYS, INITIATING AFFF RELEASE, OPTICAL FLAME DETECTOR, DUCT SMOKE DETECTORS, FIRE ALARM NOTIFICATION DEVICES, AND ASSOCIATED CONDUIT, BACK BOXES AND CABLE.

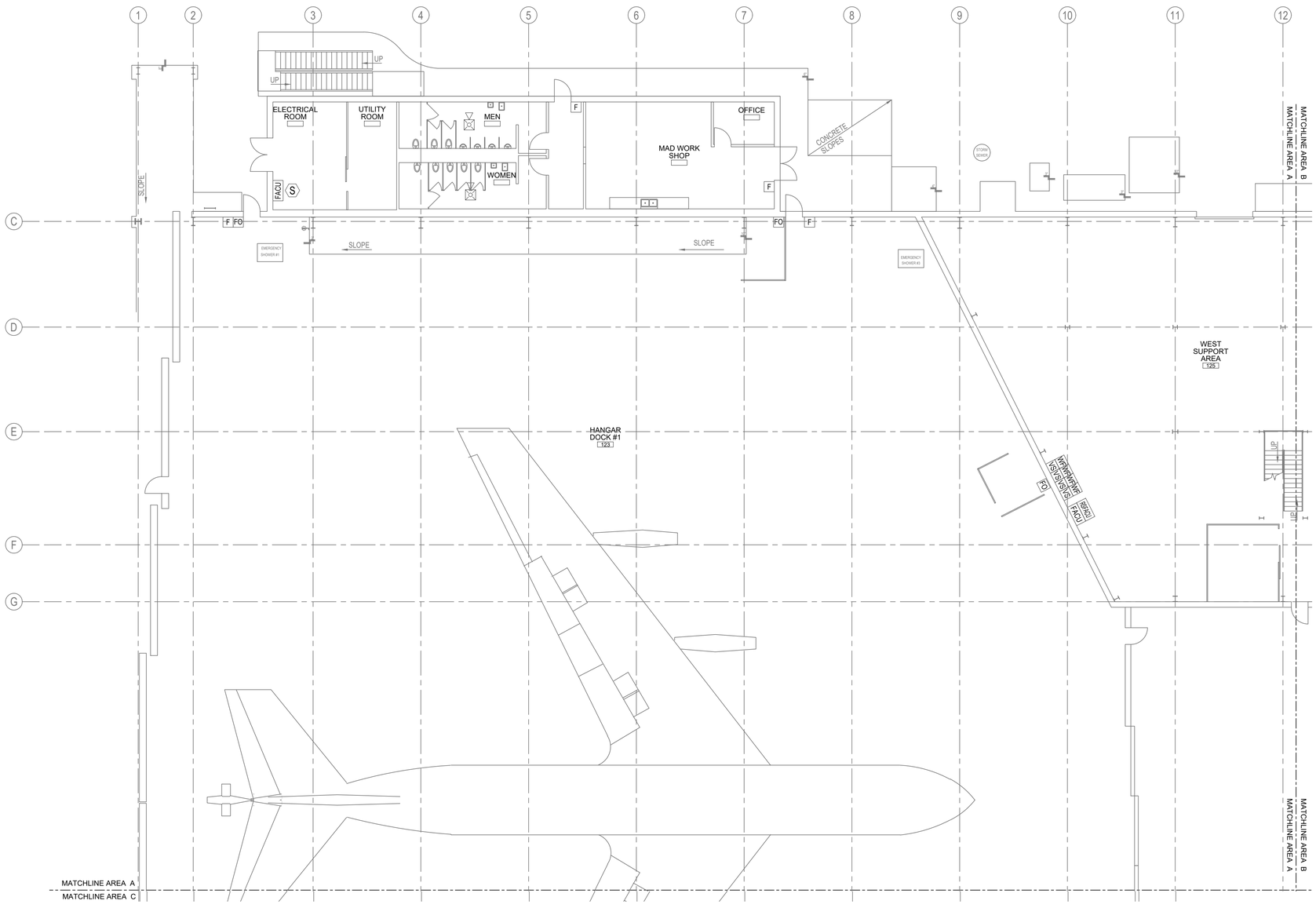
N

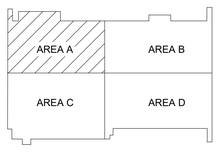
comma (TYPICAL)

FIRE ALARM DEMOLITION LEGEND:

Device not shown on drawings. (TYPICAL)

RSFACU	FIRE ALARM CONTROL UNIT WITH RELEASING SERVICE
FACU	FIRE ALARM CONTROL UNIT
NAC	NAC EXTENDER BOOSTER POWER SUPPLY
FO	MANUAL STATION, FOAM, NEMA 4
UV/IR	FLAME DETECTOR, COMBO UV/IR
RC	HEAT DETECTOR, RATE COMPENSATED
WF	WATERFLOW DETECTOR/SWITCH
PS	PRESSURE DETECTOR/SWITCH
VS	VALVE SUPERVISORY SWITCH
SOV	SOLENOID VALVE
F	MANUAL STATION, FIRE ALARM
	FIRE ALARM HORN STROBE
S	SMOKE DETECTOR





KEY PLAN

1 / FD101 FIRE ALARM FIRST FLOOR PLAN - AREA A - DEMOLITION

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE

TINKER AFB, OK

PROJECT INFORMATION

WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION

ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE

FIRE ALARM FIRST FLOOR PLAN AREA A - DEMOLITION

SHEET NUMBER

FD101

SHEET - OF

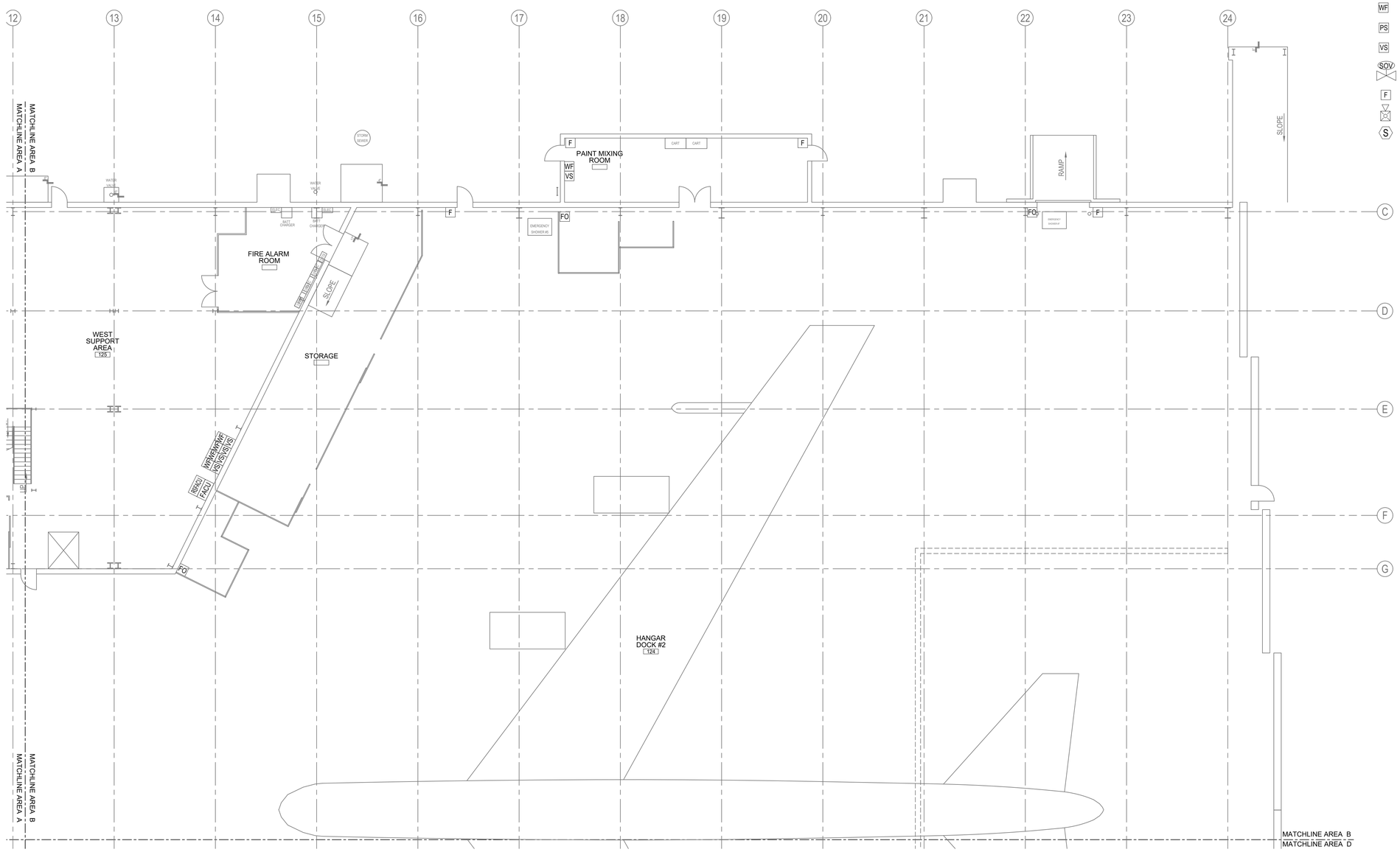
SHEET NOTES:

1. THE DEMOLITION SCOPE OF WORK IS TO REMOVE THE EXISTING RELEASING SERVICE FIRE ALARM CONTROL SYSTEM AND FIRE ALARM SYSTEMS IN THEIR ENTIRETY. THIS INCLUDES BUT NOT LIMITED TO RSFACU, MANUAL FOAM START STATIONS. ADDRESSABLE CONTROL RELAYS, INITIATING AFFF RELEASE, OPTICAL FLAME DETECTOR, DUCT SMOKE DETECTORS, FIRE ALARM NOTIFICATION DEVICES, AND ASSOCIATED CONDUIT, BACK BOXES AND CABLE.

FIRE ALARM DEMOLITION LEGEND:

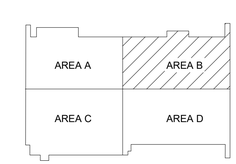
RSFACU	FIRE ALARM CONTROL UNIT WITH RELEASING SERVICE
FACU	FIRE ALARM CONTROL UNIT
NAC	NAC EXTENDER BOOSTER POWER SUPPLY
FO	MANUAL STATION, FOAM, NEMA 4
UV/IR	FLAME DETECTOR, COMBO UV/IR
RC	HEAT DETECTOR, RATE COMPENSATED
WF	WATERFLOW DETECTOR/SWITCH
PS	PRESSURE DETECTOR/SWITCH
VS	VALVE SUPERVISORY SWITCH
SOV	SOLENOID VALVE
F	MANUAL STATION, FIRE ALARM
	FIRE ALARM HORN STROBE
S	SMOKE DETECTOR

No FLS QC Comments



1
FD102
FIRE ALARM FIRST FLOOR PLAN - AREA B - DEMOLITION
SCALE: 3/32" = 1'-0"

0 8' 16' 24'
SCALE: 3/32"=1'-0"



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

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MANAGEMENT INFORMATION
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
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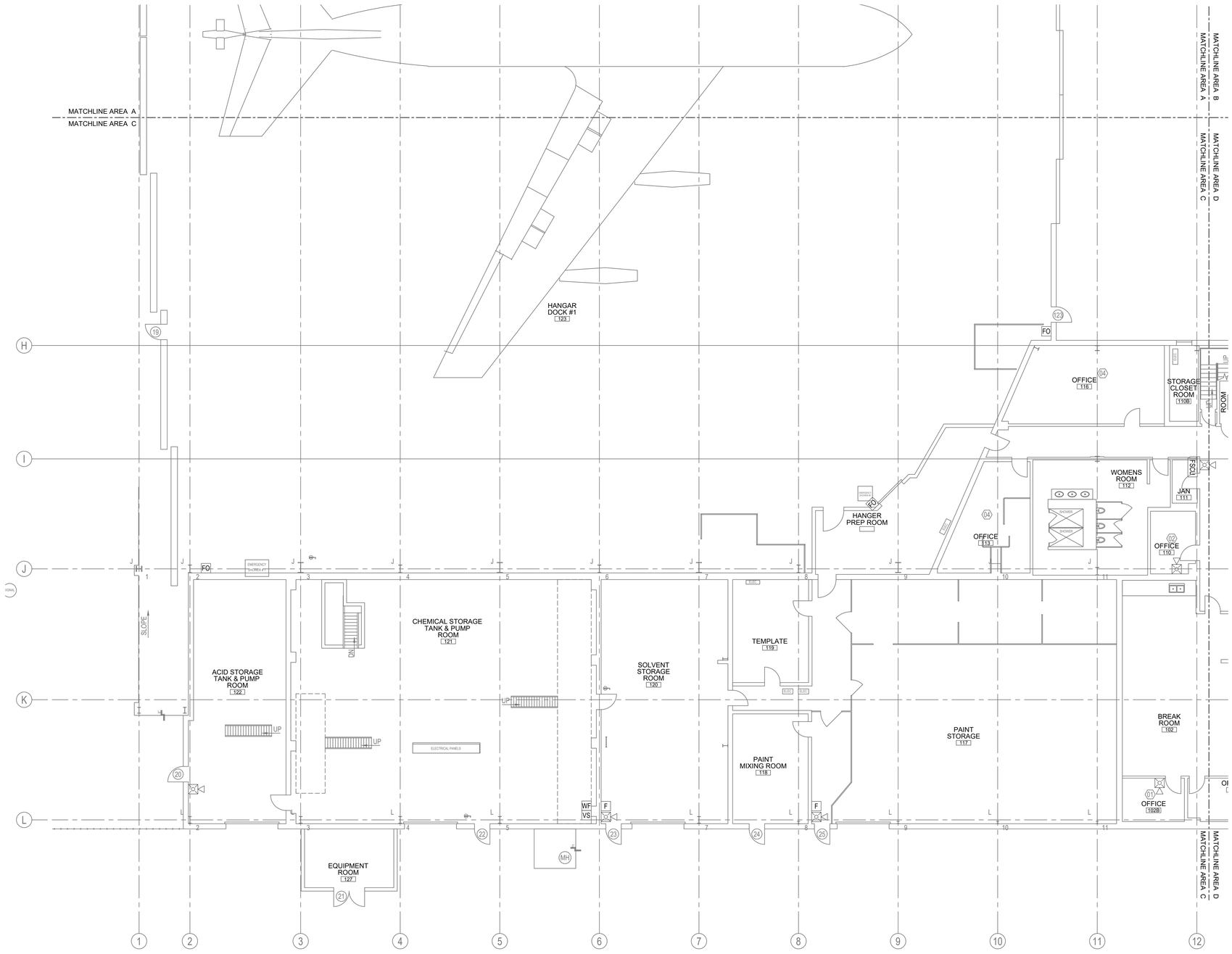
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
FIRE ALARM FIRST FLOOR PLAN AREA B - DEMOLITION

SHEET NUMBER
FD102
SHEET - OF



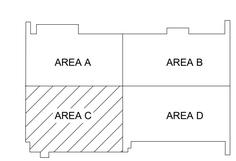
SHEET NOTES:

1. THE DEMOLITION SCOPE OF WORK IS TO REMOVE THE EXISTING RELEASING SERVICE FIRE ALARM CONTROL SYSTEM AND FIRE ALARM SYSTEMS IN THEIR ENTIRETY. THIS INCLUDES BUT NOT LIMITED TO RSFACU, MANUAL FOAM START STATIONS. ADDRESSABLE CONTROL RELAYS, INITIATING AFFF RELEASE, OPTICAL FLAME DETECTOR, DUCT SMOKE DETECTORS, FIRE ALARM NOTIFICATION DEVICES, AND ASSOCIATED CONDUIT, BACK BOXES AND CABLE.

FIRE ALARM DEMOLITION LEGEND:

RSFACU	FIRE ALARM CONTROL UNIT WITH RELEASING SERVICE
FACU	FIRE ALARM CONTROL UNIT
NAC	NAC EXTENDER BOOSTER POWER SUPPLY
FO	MANUAL STATION, FOAM, NEMA 4
UV/IR	FLAME DETECTOR, COMBO UV/IR
RC	HEAT DETECTOR, RATE COMPENSATED
PS	PRESSURE DETECTOR/SWITCH
VS	VALVE SUPERVISORY SWITCH
SOV	SOLENOID VALVE
F	MANUAL STATION, FIRE ALARM
	FIRE ALARM HORN STROBE

No FLS QC Comments



KEY PLAN

1 / FD103 FIRE ALARM FIRST FLOOR PLAN - AREA C - DEMOLITION

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE

TINKER AFB, OK

PROJECT INFORMATION

WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280

TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

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DESIGNED BY: T.W.
DRAWN BY: T.W.
CHECKED BY: B.W.
DESIGN FILE LOCATION:

SHEET TITLE

FIRE ALARM FIRST FLOOR PLAN AREA C - DEMOLITION

SHEET NUMBER

FD103

SHEET - OF

SHEET NOTES:

1. THE DEMOLITION SCOPE OF WORK IS TO REMOVE THE EXISTING RELEASING SERVICE FIRE ALARM CONTROL SYSTEM AND FIRE ALARM SYSTEMS IN THEIR ENTIRETY. THIS INCLUDES BUT NOT LIMITED TO RSFACU, MANUAL FOAM START STATIONS. ADDRESSABLE CONTROL RELAYS, INITIATING AFFF RELEASE, OPTICAL FLAME DETECTOR, DUCT SMOKE DETECTORS, FIRE ALARM NOTIFICATION DEVICES, AND ASSOCIATED CONDUIT, BACK BOXES AND CABLE.

FIRE ALARM DEMOLITION LEGEND:

RSFACU	FIRE ALARM CONTROL UNIT WITH RELEASING SERVICE
FACU	FIRE ALARM CONTROL UNIT
NAC	NAC EXTENDER BOOSTER POWER SUPPLY
FO	MANUAL STATION, FOAM, NEMA 4
UV/IR	FLAME DETECTOR, COMBO UV/IR
RC	HEAT DETECTOR, RATE COMPENSATED
WF	WATERFLOW DETECTOR/SWITCH
PS	PRESSURE DETECTOR/SWITCH
VS	VALVE SUPERVISORY SWITCH
SOV	SOLENOID VALVE
F	MANUAL STATION, FIRE ALARM
	FIRE ALARM HORN STROBE
S	SMOKE DETECTOR

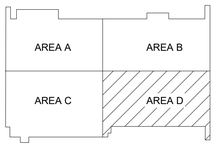
No FLS QC Comments

1 FD104 FIRE ALARM FIRST FLOOR PLAN - AREA D - DEMOLITION

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE

TINKER AFB, OK

PROJECT INFORMATION

WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280

TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

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DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

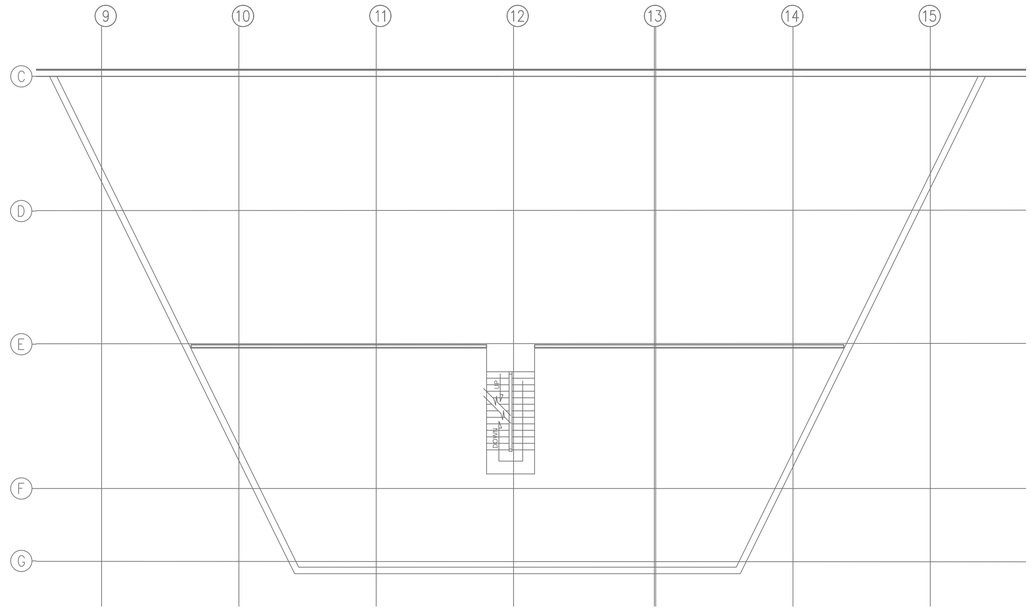
SHEET TITLE

FIRE ALARM FIRST FLOOR PLAN AREA D - DEMOLITION

SHEET NUMBER

FD104

SHEET - OF

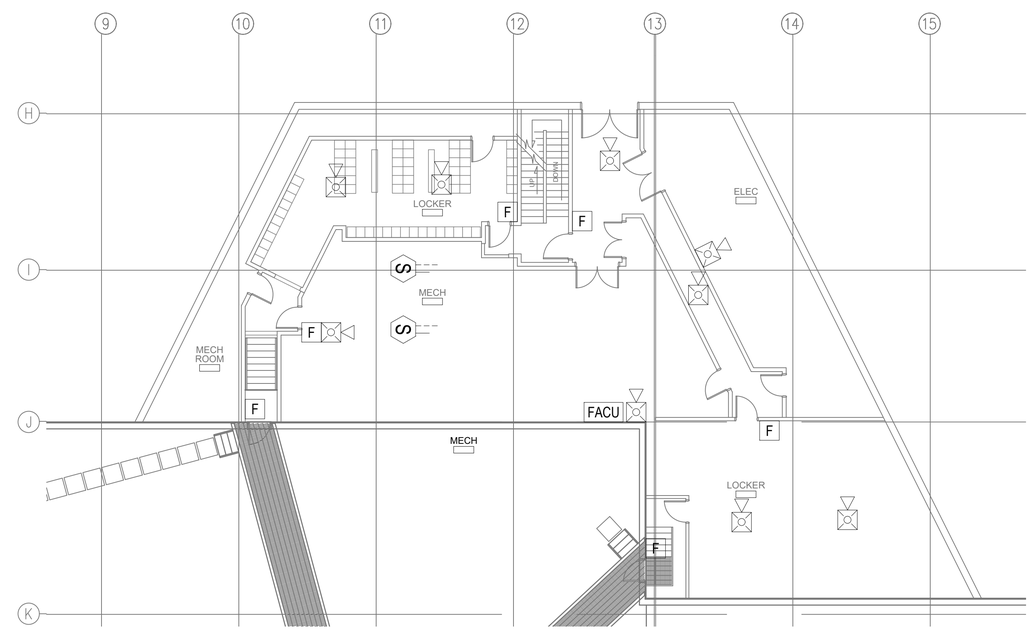


1 FD105 FIRE ALARM SECOND FLOOR PLAN AERA A - DEMOLITION

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"



2 FD105 FIRE ALARM SECOND FLOOR PLAN AREA B - DEMOLITION

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

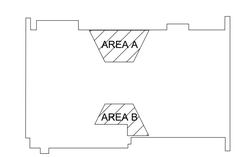
SHEET NOTES:

1. THE DEMOLITION SCOPE OF WORK IS TO REMOVE THE EXISTING RELEASING SERVICE FIRE ALARM CONTROL SYSTEM AND FIRE ALARM SYSTEMS IN THEIR ENTIRETY. THIS INCLUDES BUT NOT LIMITED TO RSFACU, MANUAL FOAM START STATIONS. ADDRESSABLE CONTROL RELAYS, INITIATING AFFF RELEASE, OPTICAL FLAME DETECTOR, DUCT SMOKE DETECTORS, FIRE ALARM NOTIFICATION DEVICES, AND ASSOCIATED CONDUIT, BACK BOXES AND CABLE.

FIRE ALARM DEMOLITION LEGEND:

RSFACU	FIRE ALARM CONTROL UNIT WITH RELEASING SERVICE
FACU	FIRE ALARM CONTROL UNIT
NAC	NAC EXTENDER BOOSTER POWER SUPPLY
FO	MANUAL STATION, FOAM, NEMA 4
UV/IR	FLAME DETECTOR, COMBO UV/IR
RC	HEAT DETECTOR, RATE COMPENSATED
WF	WATERFLOW DETECTOR/SWITCH
PS	PRESSURE DETECTOR/SWITCH
VS	VALVE SUPERVISORY SWITCH
SOV	SOLENOID VALVE
F	MANUAL STATION, FIRE ALARM
	FIRE ALARM HORN STROBE
S	SMOKE DETECTOR

No FLS QC Comments



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE

TINKER AFB, OK

PROJECT INFORMATION

WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

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ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
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DESIGN FILE LOCATION:

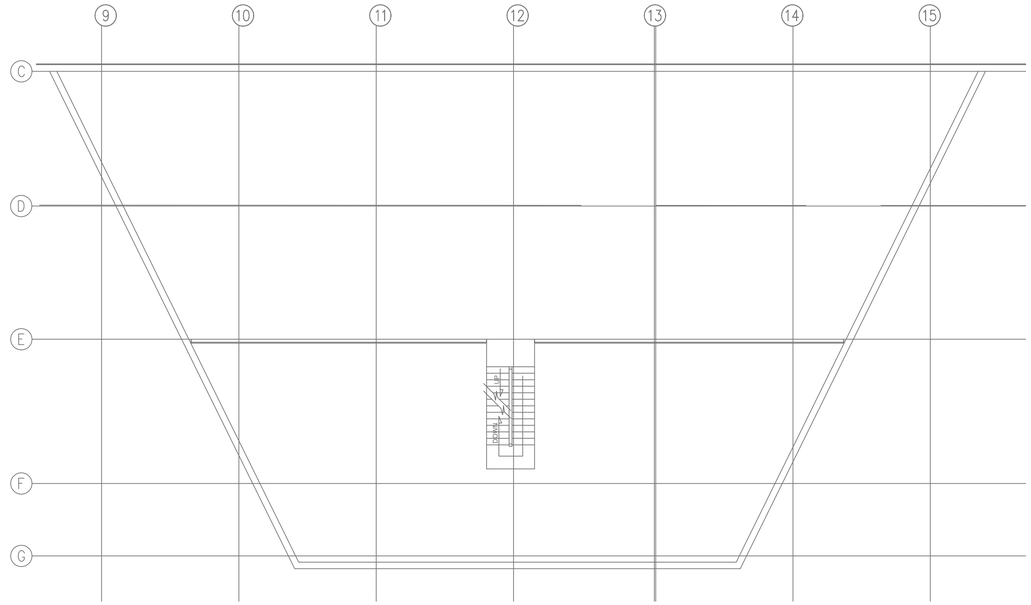
SHEET TITLE

FIRE ALARM SECOND FLOOR PLAN - DEMOLITION

SHEET NUMBER

FD105

SHEET - OF

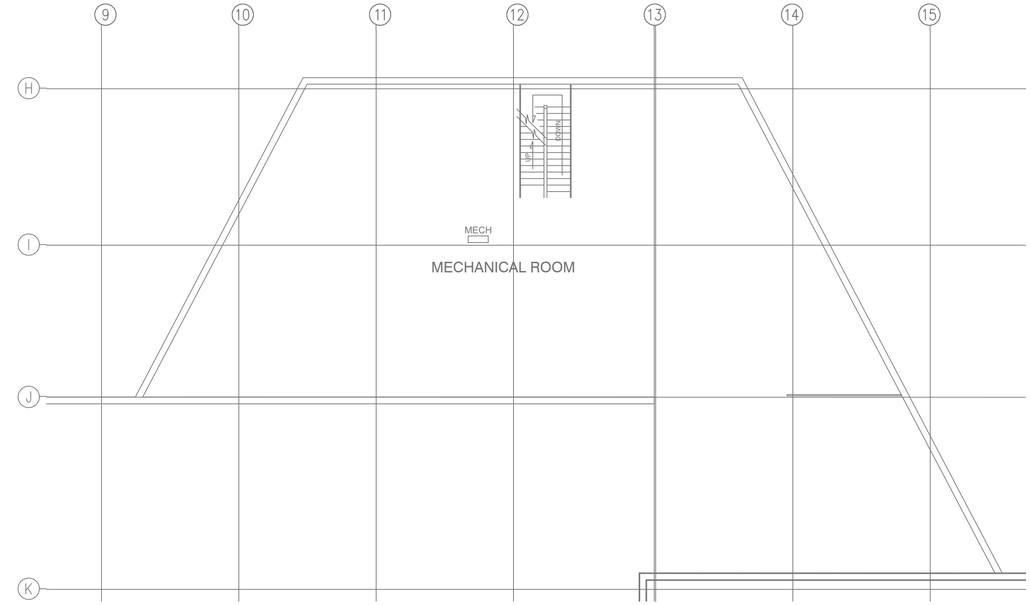


1 FD106 FIRE ALARM THIRD FLOOR PLAN AREA A - DEMOLITION

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"



2 FD106 FIRE ALARM THIRD FLOOR PLAN AREA B - DEMOLITION

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

N

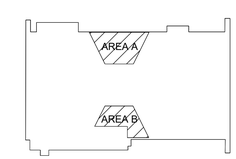
SHEET NOTES:

1. THE DEMOLITION SCOPE OF WORK IS TO REMOVE THE EXISTING RELEASING SERVICE FIRE ALARM CONTROL SYSTEM AND FIRE ALARM SYSTEMS IN THEIR ENTIRETY. THIS INCLUDES BUT NOT LIMITED TO RSFACU, MANUAL FOAM START STATIONS. ADDRESSABLE CONTROL RELAYS, INITIATING AFFF RELEASE, OPTICAL FLAME DETECTOR, DUCT SMOKE DETECTORS, FIRE ALARM NOTIFICATION DEVICES, AND ASSOCIATED CONDUIT, BACK BOXES AND CABLE.

FIRE ALARM DEMOLITION LEGEND:

RSFACU	FIRE ALARM CONTROL UNIT WITH RELEASING SERVICE
FACU	FIRE ALARM CONTROL UNIT
NAC	NAC EXTENDER BOOSTER POWER SUPPLY
FO	MANUAL STATION, FOAM, NEMA 4
UV/IR	FLAME DETECTOR, COMBO UV/IR
RC	HEAT DETECTOR, RATE COMPENSATED
WF	WATERFLOW DETECTOR/SWITCH
PS	PRESSURE DETECTOR/SWITCH
VS	VALVE SUPERVISORY SWITCH
SOV	SOLENOID VALVE
F	MANUAL STATION, FIRE ALARM
	FIRE ALARM HORN STROBE
S	SMOKE DETECTOR

No FLS QC Comments



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE

TINKER AFB, OK

PROJECT INFORMATION

WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION

ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE

FIRE ALARM THIRD FLOOR PLAN - DEMOLITION

SHEET NUMBER

FD106

SHEET - OF

KEY NOTES:

1. DEMOLISH THE EXISTING UNDER-WING AFFF FOAM WATER SYSTEM IN ITS ENTIRETY, INCLUDING, BUT NOT LIMITED TO, OSCILLATING MONITORS, DELUGE VALVES AND ASSOCIATED TRIM, PIPING AND HANGER, ETC.

   AFFF AGENT, CONCENTRATE TANKS AND ASSOCIATED PIPING UP TO THE PROPORTIONING ~~VALVE WILL BE DEMOLISHED UNDER SEPARATE~~

2. DEMOLISH EXISTING OVERHEAD AFFF PRE-ACTION SPRINKLER SYSTEMS IN THEIR ENTIRETY, INCLUDING, BUT NOT LIMITED TO, DELUGE VALVES, ASSOCIATED TRIM, MAIN DRAIN PIPING, SPRINKLERS, PIPING AND HANGERS, ETC.

   AFFF AGENT, CONCENTRATE TANKS AND ASSOCIATED PIPING UP TO THE PROPORTIONING VALVE WILL BE DEMOLISHED UNDER SEPARATE AFCEC CONTRACT.

3. FLUSH EXISTING LEAD-IN PIPING AND PREPARE FOR NEW WORK.

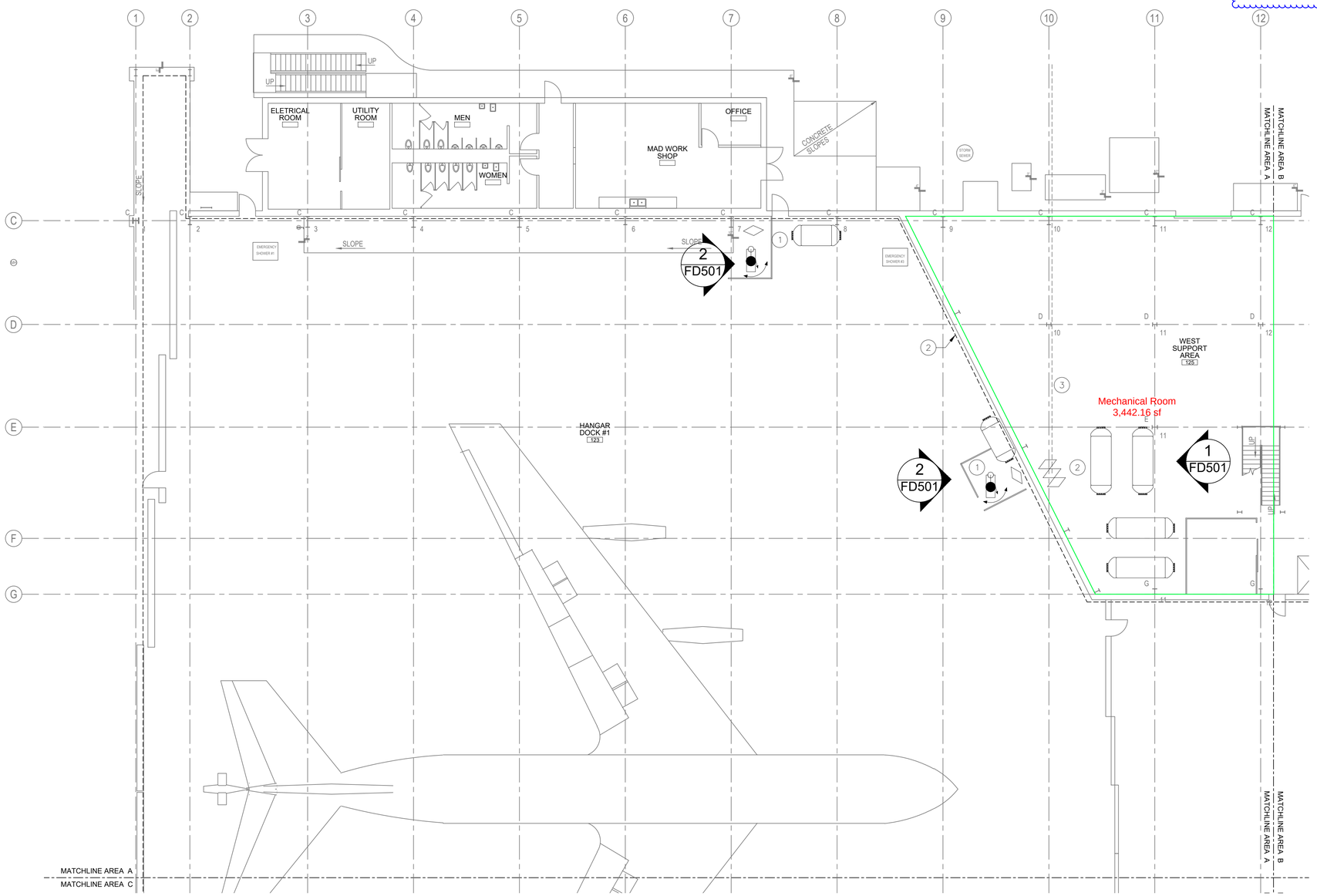
Missing rest of this statement (TYPICAL)

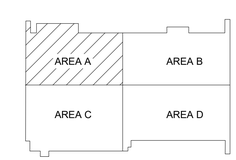
Phasing Sheet G-002 states concentrate tanks need to removed under a specific phase. Is it the plan for the separate AFCEC contract to happen at the same time to align with this project or do we need to remove these items from the phasing plan sheets as well?

Fix spacing in note (TYPICAL)

FIRE SUPPRESSION LEGEND:

- OSCILLATING MONITOR
- HORIZONTAL AFFF TANK
- AFFF SYSTEM DELUGE VALVE
- UNDERGROUND LEAD-IN PIPING





KEY PLAN

1 / FD107 FIRE SUPPRESSION FIRST FLOOR PLAN - AREA A - DEMOLITION

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE

TINKER AFB, OK

PROJECT INFORMATION

WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280

TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION

ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE

FIRE SUPPRESSION FIRST FLOOR PLAN AREA A - DEMOLITION

SHEET NUMBER

FD107

SHEET - OF

KEY NOTES:

1. DEMOLISH THE EXISTING UNDER-WING AFFF FOAM WATER SYSTEM IN ITS ENTIRETY, INCLUDING, BUT NOT LIMITED TO, OSCILLATING MONITORS, DELUGE VALVES AND ASSOCIATED TRIM, PIPING AND HANGER, ETC.

   AFFF AGENT, CONCENTRATE TANKS AND ASSOCIATED PIPING UP TO THE PROPORTIONING VALVE WILL BE DEMOLISHED UNDER SEPARATE

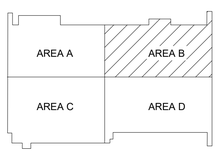
2. DEMOLISH EXISTING OVERHEAD AFFF PRE-ACTION SPRINKLER SYSTEMS IN THEIR ENTIRETY, INCLUDING, BUT NOT LIMITED TO, DELUGE VALVES, ASSOCIATED TRIM, MAIN DRAIN PIPING, SPRINKLERS, PIPING AND HANGERS, ETC.

   AFFF AGENT, CONCENTRATE TANKS AND ASSOCIATED PIPING UP TO THE PROPORTIONING VALVE WILL BE DEMOLISHED UNDER SEPARATE AFCEC CONTRACT.

3. FLUSH EXISTING LEAD-IN PIPING AND PREPARE FOR NEW WORK.

FIRE SUPPRESSION LEGEND:

- OSCILLATING MONITOR
- HORIZONTAL AFFF TANK
- AFFF SYSTEM DELUGE VALVE
- UNDERGROUND LEAD-IN PIPING



KEY PLAN

1 / FD108 FIRE SUPPRESSION FIRST FLOOR PLAN - AREA B - DEMOLITION

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE

TINKER AFB, OK

PROJECT INFORMATION

WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

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DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE

FIRE SUPPERSSION FIRST FLOOR PLAN AREA B - DEMOLITION

SHEET NUMBER

FD108

SHEET - OF

1
FD109

FIRE SUPPRESSION FIRST FLOOR PLAN - AREA C - DEMOLITION

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

KEY NOTES:

1. DEMOLISH THE EXISTING UNDER-WING AFFF FOAM WATER SYSTEM IN ITS ENTIRETY, INCLUDING, BUT NOT LIMITED TO, OSCILLATING MONITORS, DELUGE VALVES AND ASSOCIATED TRIM, PIPING AND HANGER, ETC.

   AFFF AGENT, CONCENTRATE TANKS AND ASSOCIATED PIPING UP TO THE PROPORTIONING VALVE WILL BE DEMOLISHED UNDER SEPARATE

2. DEMOLISH EXISTING OVERHEAD AFFF PRE-ACTION SPRINKLER SYSTEMS IN THEIR ENTIRETY, INCLUDING, BUT NOT LIMITED TO, DELUGE VALVES, ASSOCIATED TRIM, MAIN DRAIN PIPING, SPRINKLERS, PIPING AND HANGERS, ETC.

   AFFF AGENT, CONCENTRATE TANKS AND ASSOCIATED PIPING UP TO THE PROPORTIONING VALVE WILL BE DEMOLISHED UNDER SEPARATE AFCEC CONTRACT.

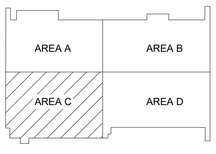
3. FLUSH EXISTING LEAD-IN PIPING AND PREPARE FOR NEW WORK.

FIRE SUPPRESSION LEGEND:

OSCILLATING MONITOR

HORIZONTAL AFFF TANK

AFFF SYSTEM DELUGE VALVE



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE

TINKER AFB, OK

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DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE

FIRE SUPPRESSION FIRST FLOOR PLAN AREA C - DEMOLITION

SHEET NUMBER

FD109

SHEET - OF

KEY NOTES:

1. DEMOLISH THE EXISTING UNDER-WING AFFF FOAM WATER SYSTEM IN ITS ENTIRETY, INCLUDING, BUT NOT LIMITED TO, OSCILLATING MONITORS, DELUGE VALVES AND ASSOCIATED TRIM, PIPING AND HANGER, ETC.

   AFFF AGENT, CONCENTRATE TANKS AND ASSOCIATED PIPING UP TO THE PROPORTIONING VALVE WILL BE DEMOLISHED UNDER SEPARATE

   AFCEC CONTRACT TYPICAL COMMENT FOR ALL SUPPRESS ION DEMO SHEETS.

2. DEMOLISH EXISTING OVERHEAD AFFF PRE-ACTION SPRINKLER SYSTEMS IN THEIR ENTIRETY, INCLUDING, BUT NOT LIMITED TO, DELUGE VALVES, ASSOCIATED TRIM, MAIN DRAIN PIPING, SPRINKLERS, PIPING AND HANGERS, ETC.

   AFFF AGENT, CONCENTRATE TANKS AND ASSOCIATED PIPING UP TO THE PROPORTIONING VALVE WILL BE DEMOLISHED UNDER SEPARATE AFCEC CONTRACT.

3. FLUSH EXISTING LEAD-IN PIPING AND PREPARE FOR NEW WORK.

FIRE SUPPRESSION LEGEND:

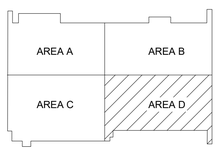
- OSCILLATING MONITOR
- HORIZONTAL AFFF TANK
- AFFF SYSTEM DELUGE VALVE
- UNDERGROUND LEAD-IN PIPING

1 FD110 FIRE SUPPRESSION FIRST FLOOR PLAN - AREA D - DEMOLITION

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"



KEY PLAN

AIR FORCE MATERIEL COMMAND
ABW CIVIL ENGINEER DIRECTORATE

TINKER AFB, OK

PROJECT INFORMATION

WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION

ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

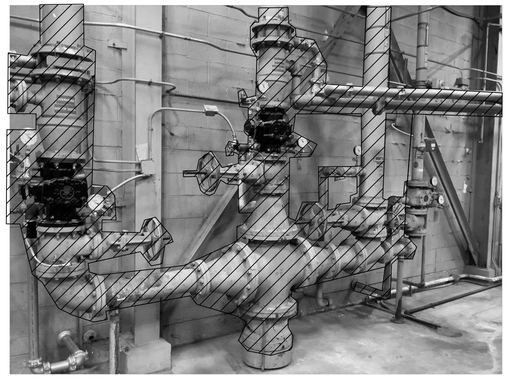
SHEET TITLE

FIRE SUPPRESSION FIRST FLOOR PLAN AREA D - DEMOLITION

SHEET NUMBER

FD110

SHEET - OF



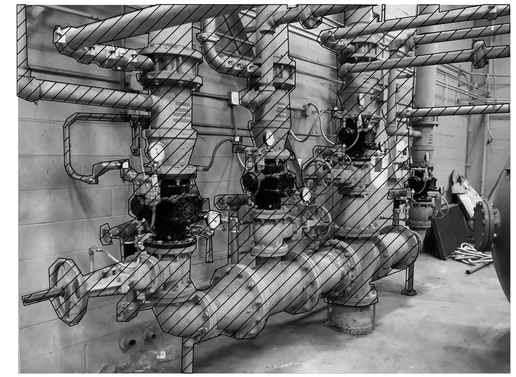
1 FD501 FIRE SUPPRESSION SYSTEM - MECHANICAL ROOM SOUTH DOCK - DEMOLITION

SCALE: NTS

2 FD501 FIRE SUPPRESSION SYSTEM TYPICAL UNDER-WING AFFF SYSTEM - DEMOLITION

SCALE: NTS

Is this still accurate?



3 FD501 FIRE SUPPRESSION SYSTEM - MECHANICAL ROOM NORTH DOCK - DEMOLITION

SCALE: NTS

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION

WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

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ISSUE DATE: 09-15-2022
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DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

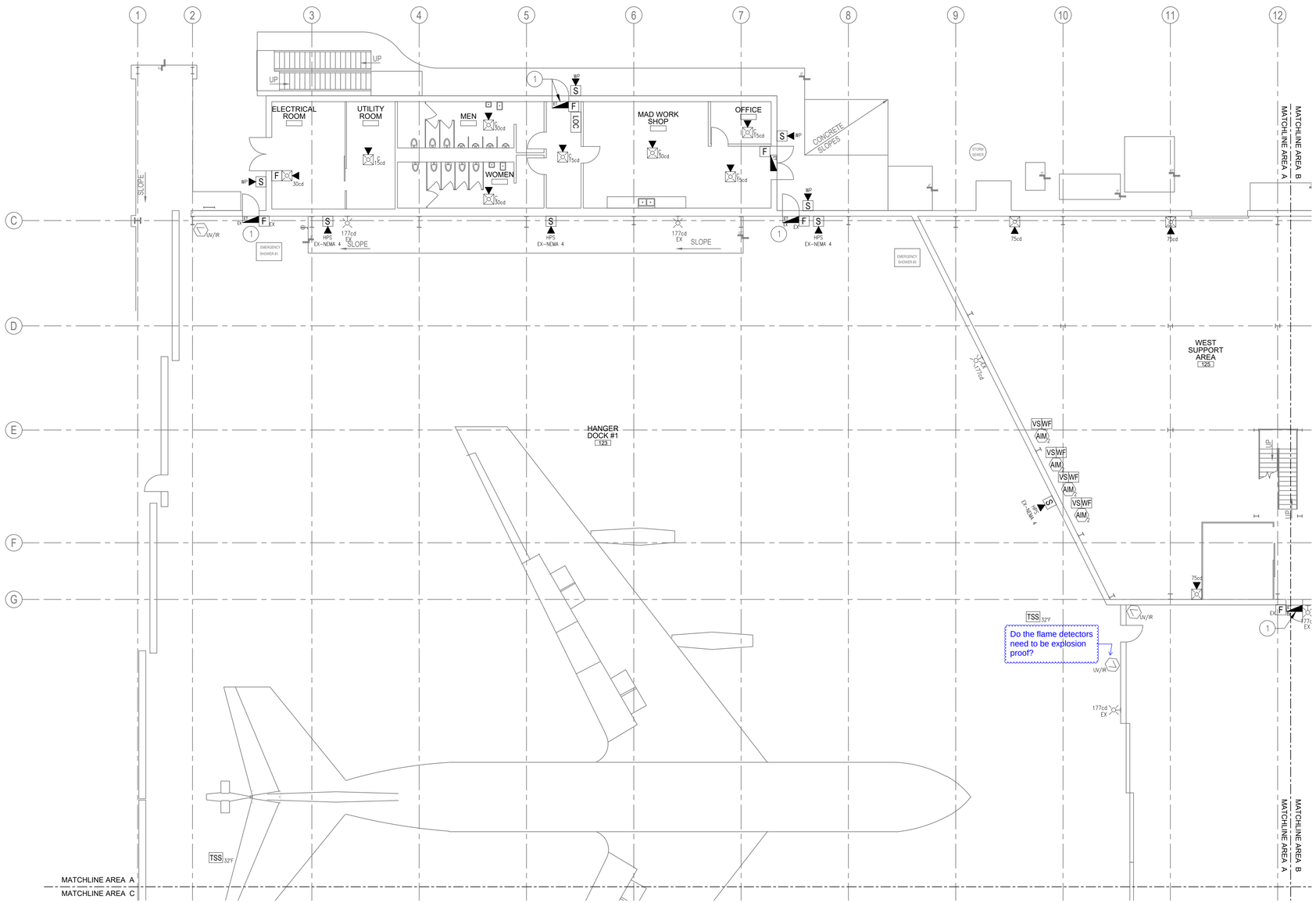
SHEET TITLE

FIRE PROTECTION DEMOLITION PHOTOS

SHEET NUMBER

FD501

SHEET OF



1 FA101 FIRE ALARM / MASS NOTIFICATION PARTIAL FIRST FLOOR PLAN - AREA A - NEW WORK

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

FIRE ALARM AND MASS NOTIFICATION LEGEND:

FMCU	FIRE ALARM AND MASS NOTIFICATION CONTROL UNIT WITH MONACO TRANSCEIVER
NAC	NAC EXTENDER BOOSTER POWER SUPPLY
LOC	LOCAL OPERATORS CONSOLE
FATC	FIRE ALARM TERMINAL CABINET
F	MANUAL STATION, FIRE ALARM, NEMA 4 HANGAR
	FLAME DETECTOR, COMBO MULTI-SPECTRUM INFRARED TYPE DET-TRONICS X3301
S	SMOKE DETECTOR
S	DUCT MOUNTED SMOKE DETECTOR
	STROBE ONLY, CEILING MOUNT
	STROBE ONLY, WALL MOUNT
	SPEAKER/STROBE WALL COMBO
S	SPEAKER, WALL MOUNT
	OMNIDIRECTIONAL ANTENNA
AOM	ADDRESSABLE OUTPUT MODULE, FIRE ALARM
AIM 2	DUAL ADDRESSABLE INPUT MODULE, FIRE ALARM
MD	KEYED MAINTENANCE DISCONNECT SWITCH, WITH STATUS LEG
RTS	REMOTE ALARM INDICATING AND TEST SWITCH
WF	WATERFLOW DETECTOR/SWITCH
VS	VALVE SUPERVISORY SWITCH
PS	PRESSURE SUPERVISORY SWITCH
TSS 12°F	TEMPERATURE SUPERVISORY SWITCH
ET	LED TEXT SIGNS

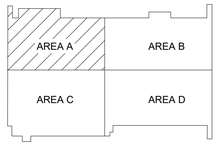
SUBSCRIPTS AND ABBREVIATIONS:

C	CEILING MOUNT
EX	EXPLOSION PROOF
NEMA 4	NEMA 4 RATED
FA	FIRE ALARM
FS	FIRE SUPPRESSION
°F	FAHRENHEIT
FS	FIRE SUPPRESSION
MIR	MULTI-SPECTRUM INFRARED OPTICAL DETECTOR
HPS	HIGH POWERED SPEAKER
IDC	INITIATING DEVICE CIRCUIT
NAC	NOTIFICATION APPLIANCE CIRCUIT
MNS	MASS NOTIFICATION SYSTEM
RI	REMOTE INDICATOR
RTS	REMOTE TEST STATION
SLC	SIGNALING LINE CIRCUIT
SPK	SPEAKER CIRCUIT
WP	WEATHERPROOF
UV/IR	ULTRAVIOLET/INFRARED

NOT ALL SYMBOLS/ABBREVIATIONS MAY BE USED

KEY NOTES:

1. TEXTUAL DISPLAY SIGNS SHALL BE CENTERED ABOVE THE DOOR(S) FOR WHICH THEY SERVE. WHERE EXIT SIGNS ARE ALSO PROVIDED, TEXTUAL DISPLAY SIGNS SHALL BE INSTALLED ABOVE THE EXIT SIGNS. WHERE SPACE DOES NOT ALLOW FOR INSTALLATION ABOVE THE EXIT SIGN, THE TEXTUAL DISPLAY SIGN SHALL BE INSTALLED ON THE RIGHT SIDE OF THE EXIT SIGN.



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION

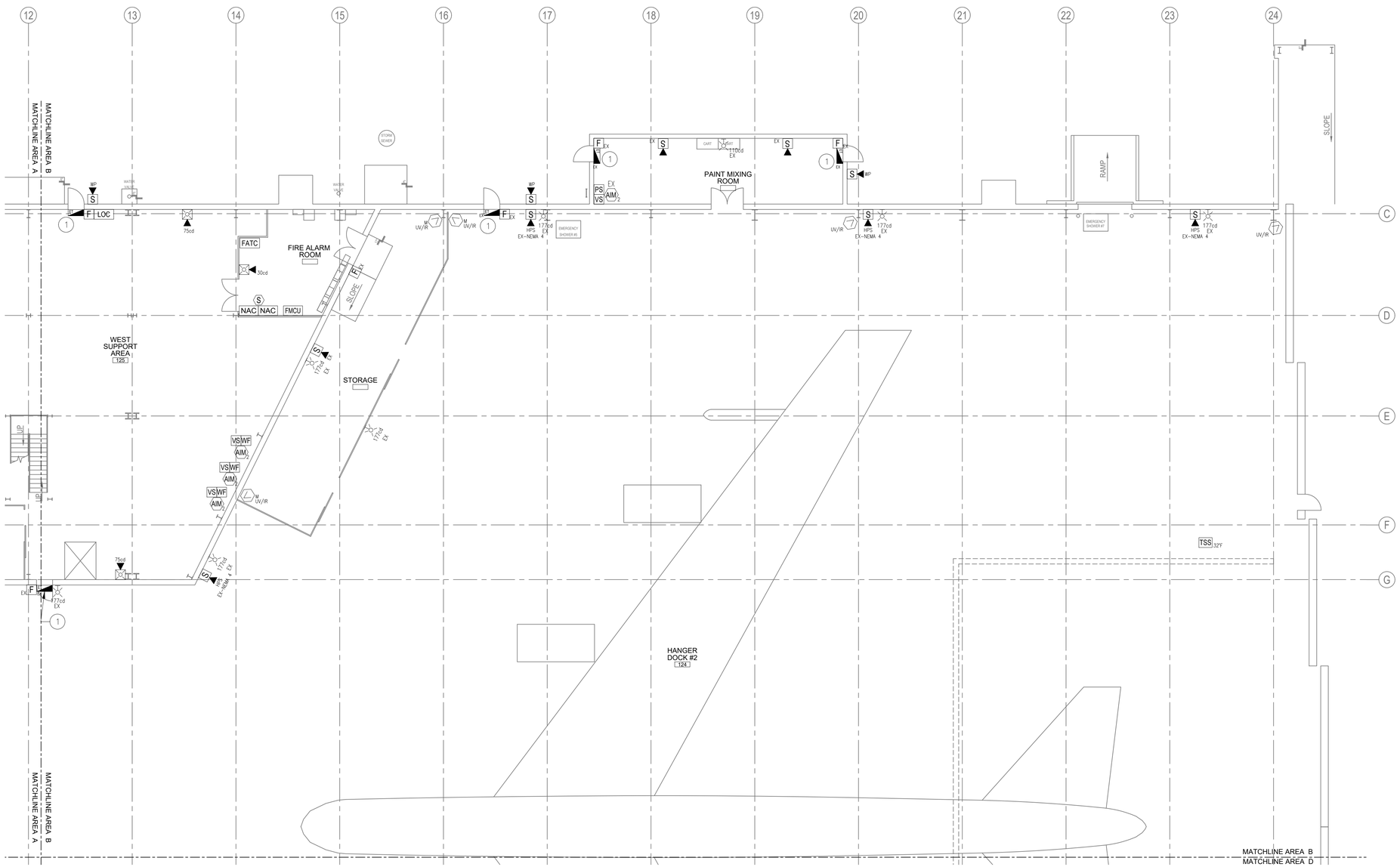
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
FIRE ALARM AND MASS NOTIFICATION PARTIAL FIRST FLOOR PLAN AREA A - NEW WORK

SHEET NUMBER
FA101

SHEET - OF

No FLS QC Comments



FIRE ALARM AND MASS NOTIFICATION LEGEND:

FMCU	FIRE ALARM AND MASS NOTIFICATION CONTROL UNIT WITH MONACO TRANSCEIVER
NAC	NAC EXTENDER BOOSTER POWER SUPPLY
LOC	LOCAL OPERATORS CONSOLE
FATC	FIRE ALARM TERMINAL CABINET
F	MANUAL STATION, FIRE ALARM, NEMA 4 HANGAR
	FLAME DETECTOR, COMBO MULTI-SPECTRUM INFRARED TYPE DET-TRONICS X3301
S	SMOKE DETECTOR
S	DUCT MOUNTED SMOKE DETECTOR
	STROBE ONLY, CEILING MOUNT
	STROBE ONLY, WALL MOUNT
	SPEAKER/STROBE WALL COMBO
S	SPEAKER, WALL MOUNT
	OMNIDIRECTIONAL ANTENNA
AOM	ADDRESSABLE OUTPUT MODULE, FIRE ALARM
AIM 2	DUAL ADDRESSABLE INPUT MODULE, FIRE ALARM
MD	KEYED MAINTENANCE DISCONNECT SWITCH, WITH STATUS LEG
RTS	REMOTE ALARM INDICATING AND TEST SWITCH
WF	WATERFLOW DETECTOR/SWITCH
VS	VALVE SUPERVISORY SWITCH
PS	PRESSURE SUPERVISORY SWITCH
TSS 32°F	TEMPERATURE SUPERVISORY SWITCH
	LED TEXT SIGNS

SUBSCRIPTS AND ABBREVIATIONS:

C	CEILING MOUNT
EX	EXPLOSION PROOF
NEMA 4	NEMA 4 RATED
FA	FIRE ALARM
FS	FIRE SUPPRESSION
°F	FAHRENHEIT
FS	FIRE SUPPRESSION
MIR	MULTI-SPECTRUM INFRARED OPTICAL DETECTOR
HPS	HIGH POWERED SPEAKER
IDC	INITIATING DEVICE CIRCUIT
NAC	NOTIFICATION APPLIANCE CIRCUIT
MNS	MASS NOTIFICATION SYSTEM
RI	REMOTE INDICATOR
RTS	REMOTE TEST STATION
SLC	SIGNALING LINE CIRCUIT
SPK	SPEAKER CIRCUIT
WP	WEATHERPROOF
UV/IR	ULTRAVIOLET/INFRARED

NOT ALL SYMBOLS/ABBREVIATIONS MAY BE USED

KEY NOTES:

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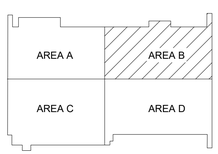


KEY PLAN

1 / FA102 FIRE ALARM / MASS NOTIFICATION PARTIAL FIRST FLOOR PLAN - AREA C - NEW WORK

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

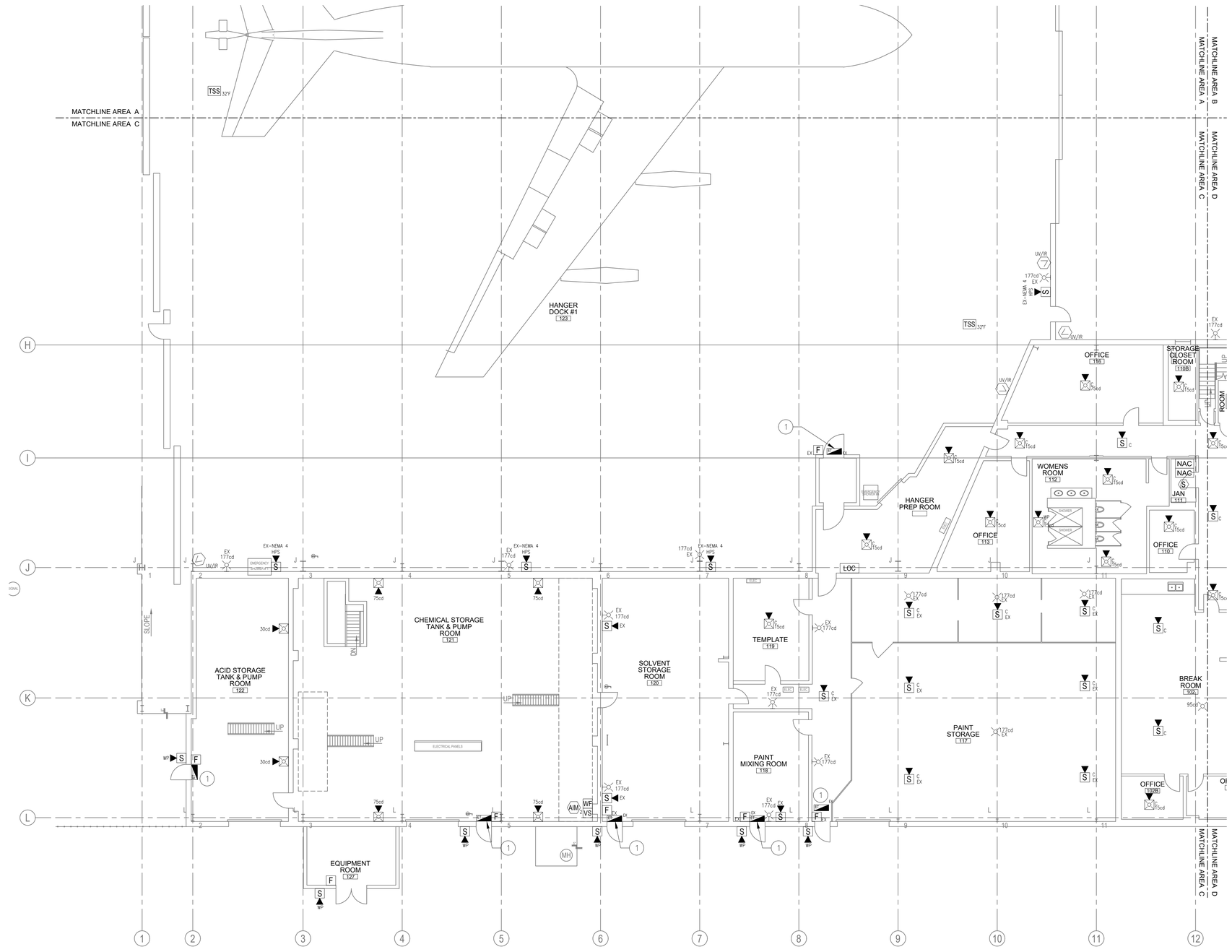
MANAGEMENT INFORMATION

ISSUE DATE:	09-15-2022
DESIGN GROUP:	HDR
DESIGNED BY:	D.E.
DRAWN BY:	J.R.M.
CHECKED BY:	J.M.
DESIGN FILE LOCATION:	

SHEET TITLE
FIRE ALARM / MASS NOTIFICATION PARTIAL FIRST FLOOR PLAN AREA B - NEW WORK

SHEET NUMBER
FA102

SHEET - OF



FIRE ALARM AND MASS NOTIFICATION LEGEND:

FMCU	FIRE ALARM AND MASS NOTIFICATION CONTROL UNIT WITH MONACO TRANSCEIVER
NAC	NAC EXTENDER BOOSTER POWER SUPPLY
LOC	LOCAL OPERATORS CONSOLE
FATC	FIRE ALARM TERMINAL CABINET
F	MANUAL STATION, FIRE ALARM, NEMA 4 HANGAR
	FLAME DETECTOR, COMBO MULTI-SPECTRUM INFRARED TYPE DET-TRONICS X3301
S	SMOKE DETECTOR
S	DUCT MOUNTED SMOKE DETECTOR
	STROBE ONLY, CEILING MOUNT
	STROBE ONLY, WALL MOUNT
	SPEAKER/STROBE WALL COMBO
S	SPEAKER, WALL MOUNT
	OMNIDIRECTIONAL ANTENNA
AOM	ADDRESSABLE OUTPUT MODULE, FIRE ALARM
AIM 2	DUAL ADDRESSABLE INPUT MODULE, FIRE ALARM
MD	KEYED MAINTENANCE DISCONNECT SWITCH, WITH STATUS LEG
RTS	REMOTE ALARM INDICATING AND TEST SWITCH
WF	WATERFLOW DETECTOR/SWITCH
VS	VALVE SUPERVISORY SWITCH
PS	PRESSURE SUPERVISORY SWITCH
TSS 32°F	TEMPERATURE SUPERVISORY SWITCH
EF	LED TEXT SIGNS

SUBSCRIPTS AND ABBREVIATIONS:

C	CEILING MOUNT
EX	EXPLOSION PROOF
NEMA 4	NEMA 4 RATED
FA	FIRE ALARM
FS	FIRE SUPPRESSION
°F	FAHRENHEIT
FS	FIRE SUPPRESSION
MIR	MULTI-SPECTRUM INFRARED OPTICAL DETECTOR
HPS	HIGH POWERED SPEAKER
IDC	INITIATING DEVICE CIRCUIT
NAC	NOTIFICATION APPLIANCE CIRCUIT
MNS	MASS NOTIFICATION SYSTEM
RI	REMOTE INDICATOR
RTS	REMOTE TEST STATION
SLC	SIGNALING LINE CIRCUIT
SPK	SPEAKER CIRCUIT
WP	WEATHERPROOF
UV/IR	ULTRAVIOLET/INFRARED

NOT ALL SYMBOLS/ABBREVIATIONS MAY BE USED

KEY NOTES:

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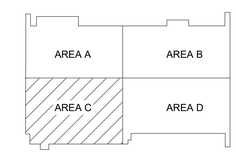

KEY PLAN

No FLS QC Comments

1 / FA103 FIRE ALARM / MASS NOTIFICATION PARTIAL FIRST FLOOR PLAN - AREA C - NEW WORK

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

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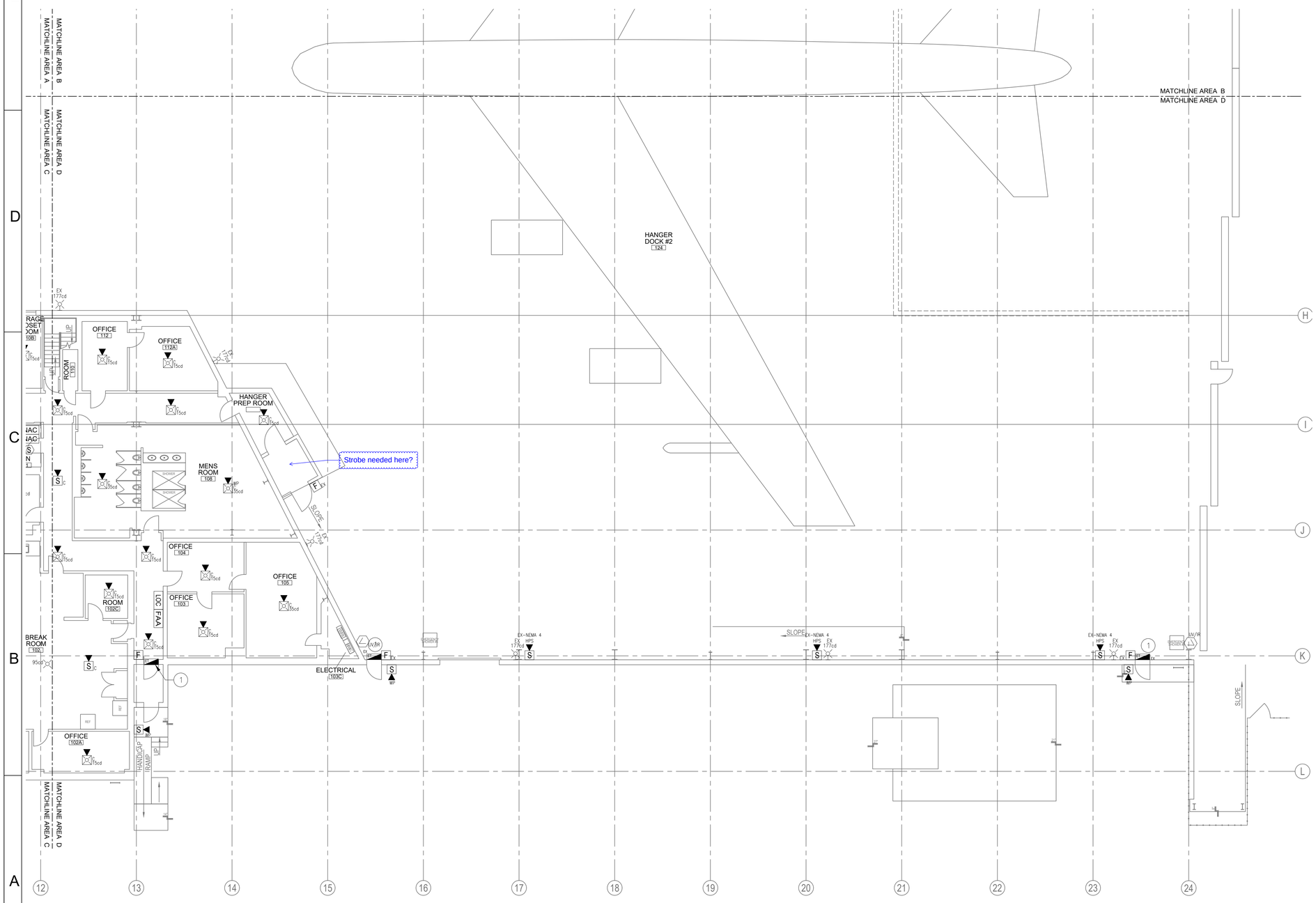
ISSUE DATE:	09-15-2022
DESIGN GROUP:	HDR
DESIGNED BY:	D.E.
DRAWN BY:	J.R.M.
CHECKED BY:	J.M.
DESIGN FILE LOCATION:	

SHEET TITLE
FIRE ALARM / MASS NOTIFICATION PARTIAL FIRST FLOOR PLAN AREA C - NEW WORK

SHEET NUMBER
FA103

SHEET - OF



FIRE ALARM AND MASS NOTIFICATION LEGEND:

FMCU	FIRE ALARM AND MASS NOTIFICATION CONTROL UNIT WITH MONACO TRANSCEIVER
NAC	NAC EXTENDER BOOSTER POWER SUPPLY
LOC	LOCAL OPERATORS CONSOLE
FATC	FIRE ALARM TERMINAL CABINET
F	MANUAL STATION, FIRE ALARM, NEMA 4 HANGAR
	FLAME DETECTOR, COMBO MULTI-SPECTRUM INFRARED TYPE DET-TRONICS X3301
S	SMOKE DETECTOR
S	DUCT MOUNTED SMOKE DETECTOR
	STROBE ONLY, CEILING MOUNT
	STROBE ONLY, WALL MOUNT
	SPEAKER/STROBE WALL COMBO
S	SPEAKER, WALL MOUNT
	OMNIDIRECTIONAL ANTENNA
AOM	ADDRESSABLE OUTPUT MODULE, FIRE ALARM
AIM 2	DUAL ADDRESSABLE INPUT MODULE, FIRE ALARM
MD	KEYED MAINTENANCE DISCONNECT SWITCH, WITH STATUS LEG
RTS	REMOTE ALARM INDICATING AND TEST SWITCH
WF	WATERFLOW DETECTOR/SWITCH
VS	VALVE SUPERVISORY SWITCH
PS	PRESSURE SUPERVISORY SWITCH
TSS 32°F	TEMPERATURE SUPERVISORY SWITCH
	LED TEXT SIGNS

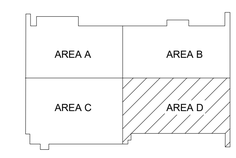
SUBSCRIPTS AND ABBREVIATIONS:

C	CEILING MOUNT
EX	EXPLOSION PROOF
NEMA 4	NEMA 4 RATED
FA	FIRE ALARM
FS	FIRE SUPPRESSION
°F	FAHRENHEIT
FS	FIRE SUPPRESSION
MIR	MULTI-SPECTRUM INFRARED OPTICAL DETECTOR
HPS	HIGH POWERED SPEAKER
IDC	INITIATING DEVICE CIRCUIT
NAC	NOTIFICATION APPLIANCE CIRCUIT
MNS	MASS NOTIFICATION SYSTEM
RI	REMOTE INDICATOR
RTS	REMOTE TEST STATION
SLC	SIGNALING LINE CIRCUIT
SPK	SPEAKER CIRCUIT
WP	WEATHERPROOF
UV/IR	ULTRAVIOLET/INFRARED

NOT ALL SYMBOLS/ABBREVIATIONS MAY BE USED

KEY NOTES:

1. TEXTUAL DISPLAY SIGNS SHALL BE CENTERED ABOVE THE DOOR(S) FOR WHICH THEY SERVE. WHERE EXIT SIGNS ARE ALSO PROVIDED, TEXTUAL DISPLAY SIGNS SHALL BE INSTALLED ABOVE THE EXIT SIGNS. WHERE SPACE DOES NOT ALLOW FOR INSTALLATION ABOVE THE EXIT SIGN, THE TEXTUAL DISPLAY SIGN SHALL BE INSTALLED ON THE RIGHT SIDE OF THE EXIT SIGN.



KEY PLAN

1 / FA104 FIRE ALARM / MASS NOTIFICATION PARTIAL FIRST FLOOR PLAN - AREA D - NEW WORK

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

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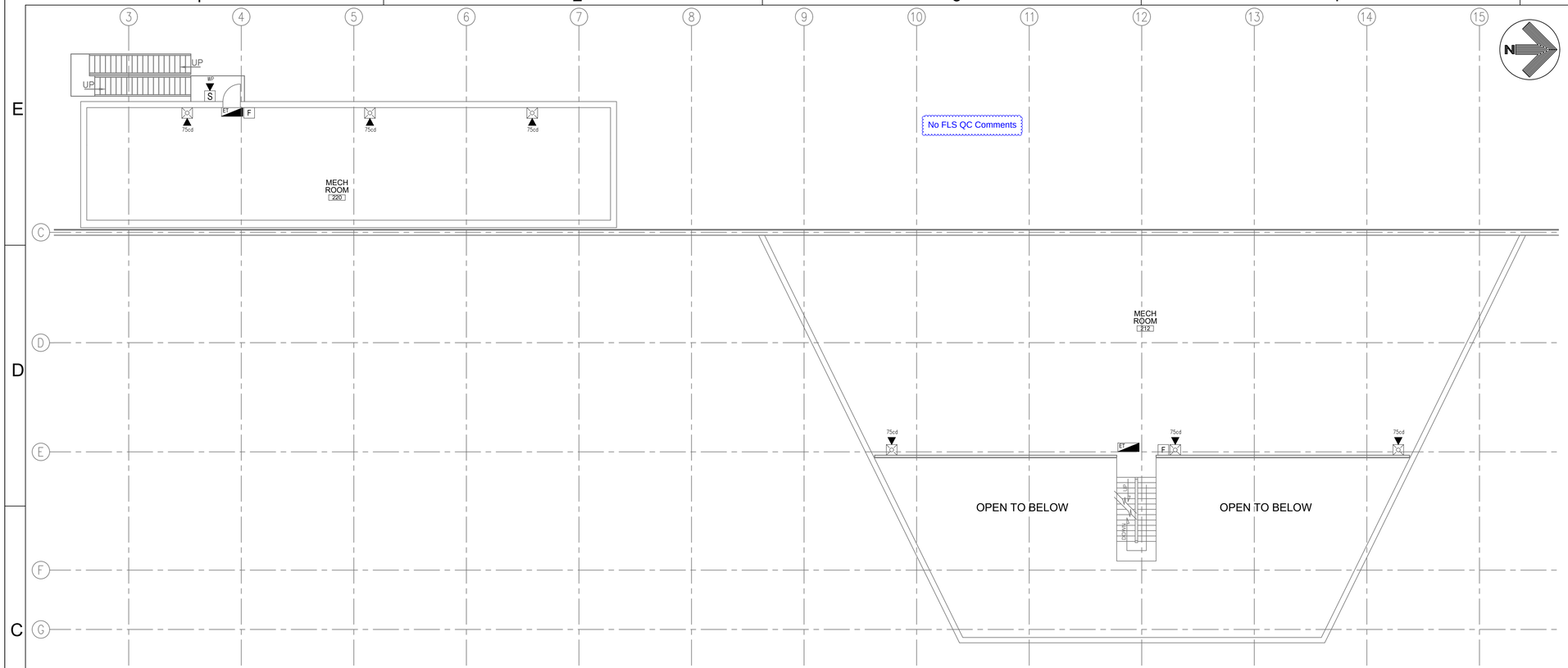
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
FIRE ALARM / MASS NOTIFICATION PARTIAL FIRST FLOOR PLAN AREA D - NEW WORK

SHEET NUMBER
FA104

SHEET - OF

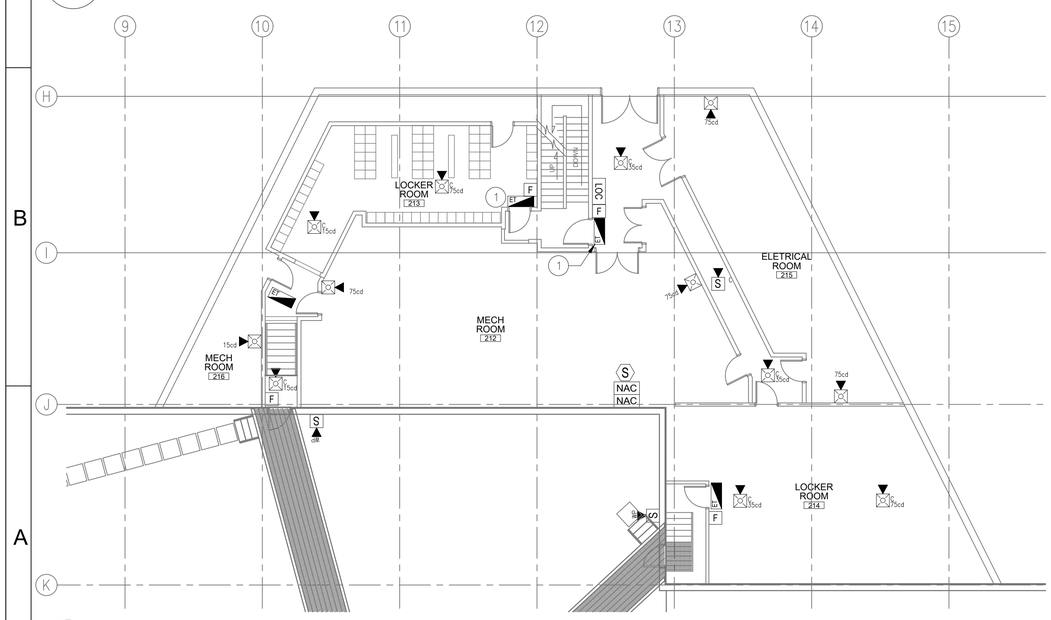


1 FA105 FIRE ALARM / MASS NOTIFICATION SECOND FLOOR PLAN - WEST - NEW WORK

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"



2 FA105 FIRE ALARM / MASS NOTIFICATION SECOND FLOOR PLAN - EAST - NEW WORK

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

KEY NOTES:

1. TEXTUAL DISPLAY SIGNS SHALL BE CENTERED ABOVE THE DOOR(S) FOR WHICH THEY SERVE. WHERE EXIT SIGNS ARE ALSO PROVIDED, TEXTUAL DISPLAY SIGNS SHALL BE INSTALLED ABOVE THE EXIT SIGNS. WHERE SPACE DOES NOT ALLOW FOR INSTALLATION ABOVE THE EXIT SIGN, THE TEXTUAL DISPLAY SIGN SHALL BE INSTALLED ON THE RIGHT SIDE OF THE EXIT SIGN.

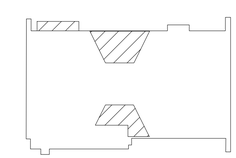
FIRE ALARM AND MASS NOTIFICATION LEGEND:

FMCU	FIRE ALARM AND MASS NOTIFICATION CONTROL UNIT WITH MONACO TRANSCEIVER
NAC	NAC EXTENDER BOOSTER POWER SUPPLY
LOC	LOCAL OPERATORS CONSOLE
FATC	FIRE ALARM TERMINAL CABINET
F	MANUAL STATION, FIRE ALARM, NEMA 4 HANGAR
	FLAME DETECTOR, COMBO MULTI-SPECTRUM INFRARED TYPE DET-TRONICS X3301
S	SMOKE DETECTOR
S	DUCT MOUNTED SMOKE DETECTOR
	STROBE ONLY, CEILING MOUNT
	SPEAKER/STROBE WALL COMBO
S	SPEAKER, WALL MOUNT
	OMNIDIRECTIONAL ANTENNA
AOM	ADDRESSABLE OUTPUT MODULE, FIRE ALARM
AIM 2	DUAL ADDRESSABLE INPUT MODULE, FIRE ALARM
MD	KEYED MAINTENANCE DISCONNECT SWITCH, WITH STATUS LEG
RTS	REMOTE ALARM INDICATING AND TEST SWITCH
WF	WATERFLOW DETECTOR/SWITCH
VS	VALVE SUPERVISORY SWITCH
TSS 32°F	TEMPERATURE SUPERVISORY SWITCH
	LED TEXT SIGNS

SUBSCRIPTS AND ABBREVIATIONS:

C	CEILING MOUNT
EX	EXPLOSION PROOF
NEMA 4	NEMA 4 RATED
FA	FIRE ALARM
FS	FIRE SUPPRESSION
°F	FAHRENHEIT
FS	FIRE SUPPRESSION
MIR	MULTI-SPECTRUM INFRARED OPTICAL DETECTOR
HPS	HIGH POWERED SPEAKER
IDC	INITIATING DEVICE CIRCUIT
NAC	NOTIFICATION APPLIANCE CIRCUIT
MNS	MASS NOTIFICATION SYSTEM
RI	REMOTE INDICATOR
RTS	REMOTE TEST STATION
SLC	SIGNALING LINE CIRCUIT
SPK	SPEAKER CIRCUIT
WP	WEATHERPROOF
UV/IR	ULTRAVIOLET/INFRARED

NOT ALL SYMBOLS/ABBREVIATIONS MAY BE USED



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

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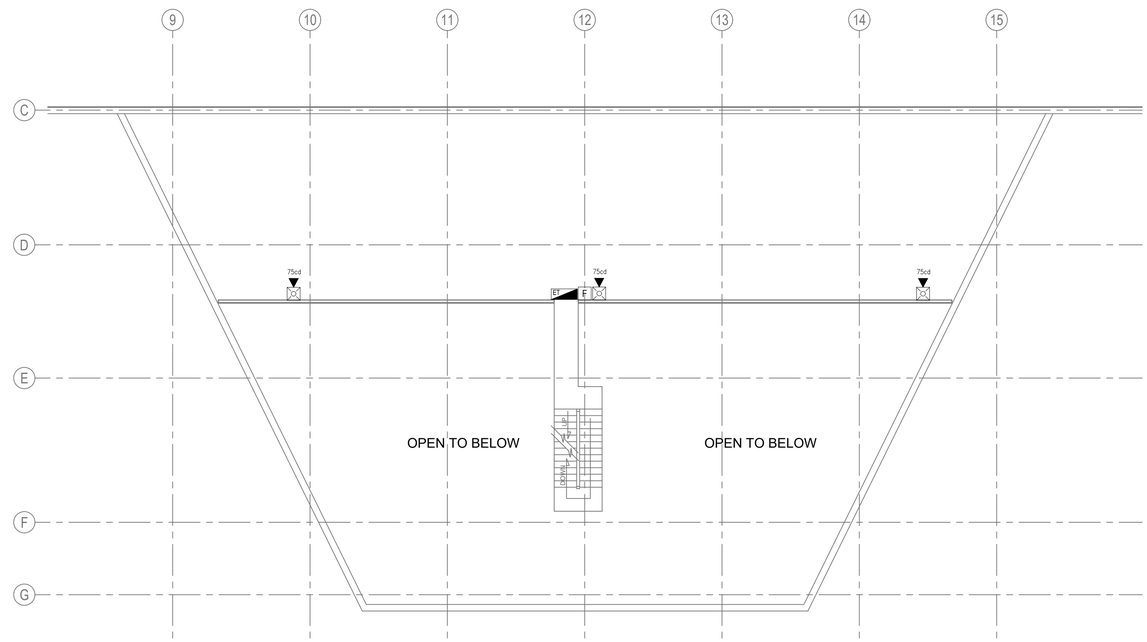
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
FIRE ALARM / MASS NOTIFICATION SECOND FLOOR EAST & WEST NEW WORK

SHEET NUMBER
FA105

SHEET - OF



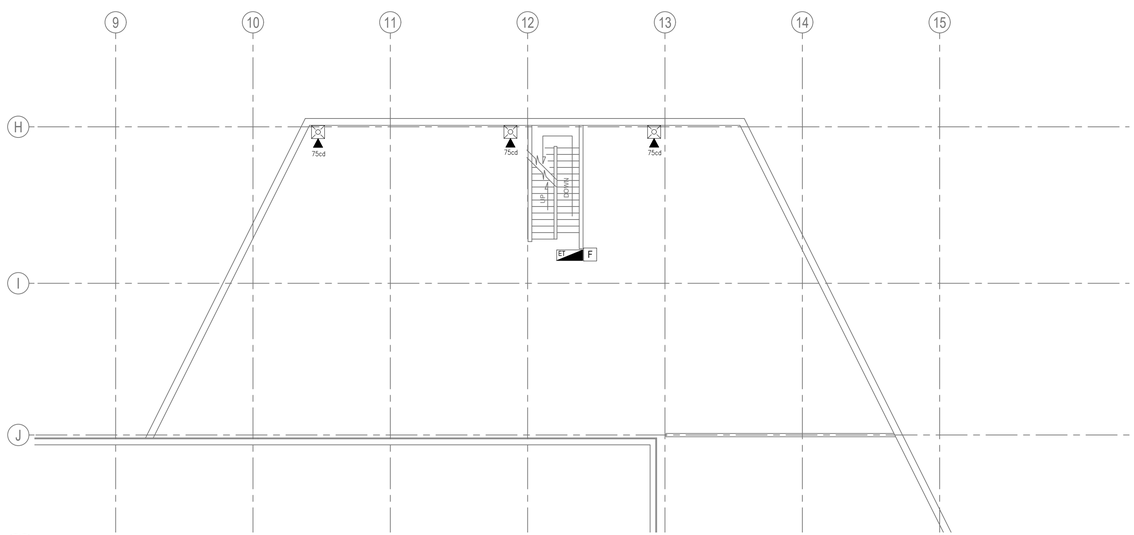
1
FA106

FIRE ALARM / MASS NOTIFICATION MEZZANINE PLAN - WEST - NEW WORK

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"



2
FA106

FIRE ALARM / MASS NOTIFICATION MEZZANINE PLAN - EAST - NEW WORK

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

N

FIRE ALARM AND MASS NOTIFICATION LEGEND:

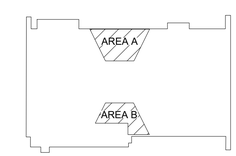
FMCU	FIRE ALARM AND MASS NOTIFICATION CONTROL UNIT WITH MONACO TRANSCEIVER
NAC	NAC EXTENDER BOOSTER POWER SUPPLY
LOC	LOCAL OPERATORS CONSOLE
FATC	FIRE ALARM TERMINAL CABINET
F	MANUAL STATION, FIRE ALARM, NEMA 4 HANGAR
	FLAME DETECTOR, COMBO MULTI-SPECTRUM INFRARED TYPE DET-TRONICS X3301
S	SMOKE DETECTOR
S	DUCT MOUNTED SMOKE DETECTOR
	STROBE ONLY, CEILING MOUNT
	STROBE ONLY, WALL MOUNT
	SPEAKER/STROBE WALL COMBO
S	SPEAKER, WALL MOUNT
	OMNIDIRECTIONAL ANTENNA
AOM	ADDRESSABLE OUTPUT MODULE, FIRE ALARM
AIM 2	DUAL ADDRESSABLE INPUT MODULE, FIRE ALARM
MD	KEYED MAINTENANCE DISCONNECT SWITCH, WITH STATUS LEG
RTS	REMOTE ALARM INDICATING AND TEST SWITCH
WF	WATERFLOW DETECTOR/SWITCH
VS	VALVE SUPERVISORY SWITCH
PS	PRESSURE SUPERVISORY SWITCH
TSS 32°F	TEMPERATURE SUPERVISORY SWITCH
E	LED TEXT SIGNS

SUBSCRIPTS AND ABBREVIATIONS:

C	CEILING MOUNT
EX	EXPLOSION PROOF
NEMA 4	NEMA 4 RATED
FA	FIRE ALARM
FS	FIRE SUPPRESSION
°F	FAHRENHEIT
FS	FIRE SUPPRESSION
MIR	MULTI-SPECTRUM INFRARED OPTICAL DETECTOR
HPS	HIGH POWERED SPEAKER
IDC	INITIATING DEVICE CIRCUIT
NAC	NOTIFICATION APPLIANCE CIRCUIT
MNS	MASS NOTIFICATION SYSTEM
RI	REMOTE INDICATOR
RTS	REMOTE TEST STATION
SLC	SIGNALING LINE CIRCUIT
SPK	SPEAKER CIRCUIT
WP	WEATHERPROOF
UV/IR	ULTRAVIOLET/INFRARED

NOT ALL SYMBOLS/ABBREVIATIONS MAY BE USED

No FLS QC Comments



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

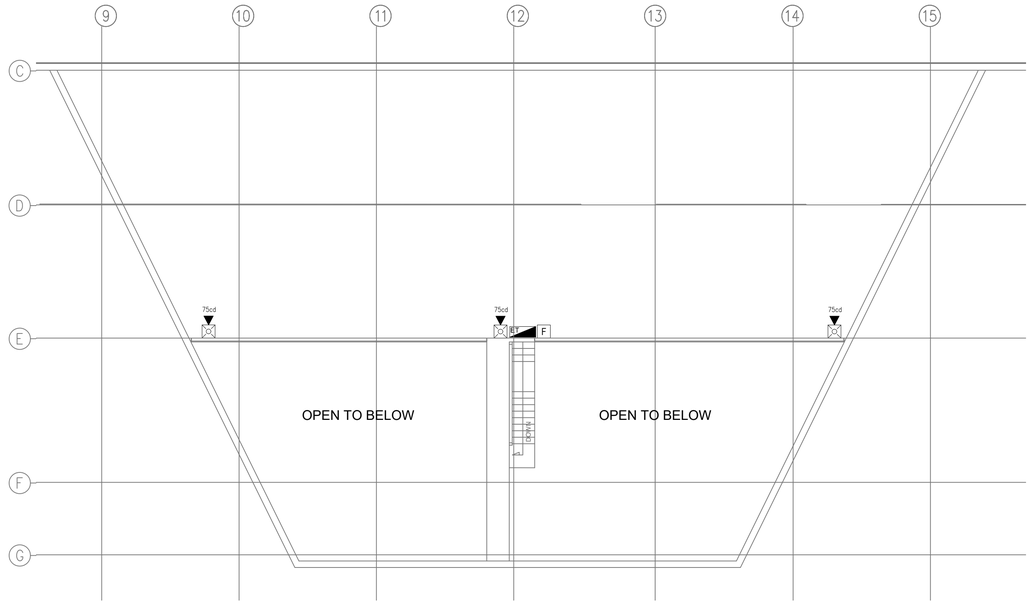
MANAGEMENT INFORMATION

ISSUE DATE:	09-15-2022
DESIGN GROUP:	HDR
DESIGNED BY:	D.E.
DRAWN BY:	J.R.M.
CHECKED BY:	J.M.
DESIGN FILE LOCATION:	

SHEET TITLE
FIRE ALARM / MASS NOTIFICATION MEZZANINE PLAN EAST & WEST NEW WORK

SHEET NUMBER
FA106

SHEET - OF

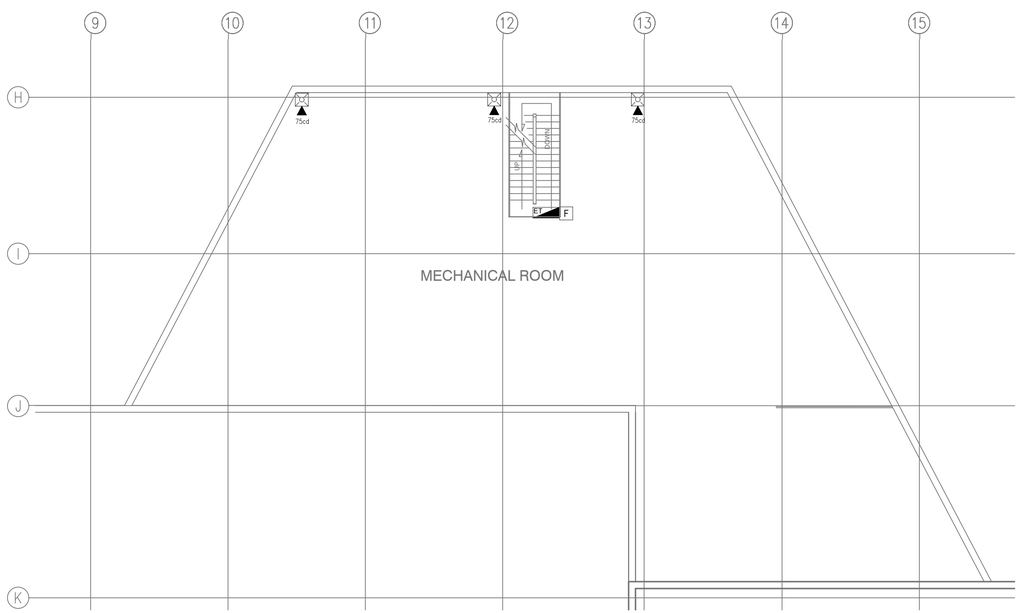


1 / FA107 FIRE ALARM / MASS NOTIFICATION THIRD FLOOR PLAN - WEST - NEW WORK

SCALE: 3/32 = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"



2 / FA107 FIRE ALARM / MASS NOTIFICATION THIRD FLOOR PLAN - EAST - NEW WORK

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0 8' 16' 24'

SCALE: 3/32"=1'-0"

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LOC	LOCAL OPERATORS CONSOLE
FATC	FIRE ALARM TERMINAL CABINET
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	FLAME DETECTOR, COMBO MULTI-SPECTRUM INFRARED TYPE DET-TRONICS X3301
S	SMOKE DETECTOR
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	STROBE ONLY, CEILING MOUNT
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SUBSCRIPTS AND ABBREVIATIONS:

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EX	EXPLOSION PROOF
NEMA 4	NEMA 4 RATED
FA	FIRE ALARM
FS	FIRE SUPPRESSION
°F	FAHRENHEIT
FS	FIRE SUPPRESSION
MIR	MULTI-SPECTRUM INFRARED OPTICAL DETECTOR
HPS	HIGH POWERED SPEAKER
IDC	INITIATING DEVICE CIRCUIT
NAC	NOTIFICATION APPLIANCE CIRCUIT
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RI	REMOTE INDICATOR
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UV/IR	ULTRAVIOLET/INFRARED

NOT ALL SYMBOLS/ABBREVIATIONS MAY BE USED

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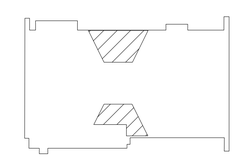

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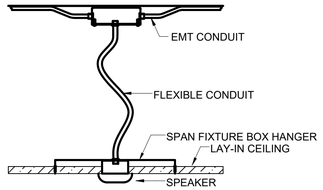
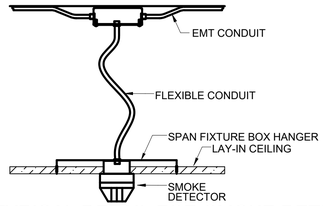


1 FA501 TYPICAL DETAIL FOR SPEAKER MOUNTED ON LAY-IN CEILING
SCALE: NOT TO SCALE



2 FA501 TYPICAL DETAIL FOR SMOKE DETECTOR MOUNTED ON LAY-IN CEILING
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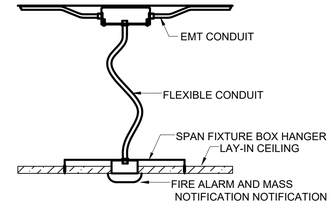
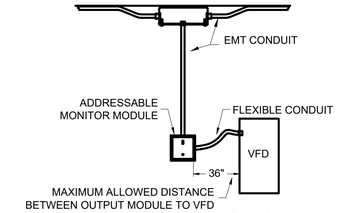
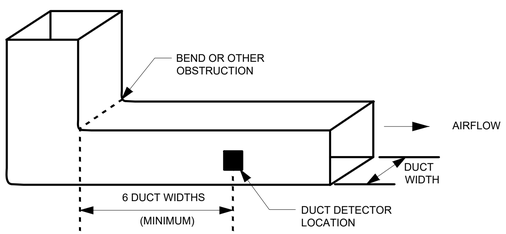


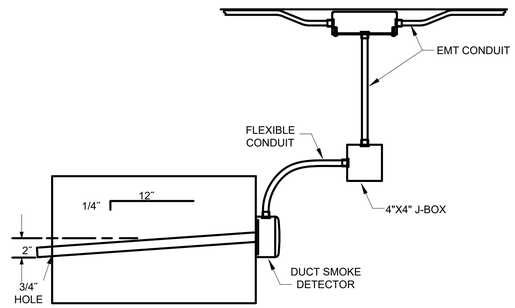
3 FA501 TYPICAL DETAIL FOR MASS NOTIFICATION DEVICE MOUNTED ON LAY-IN CEILING
SCALE: NOT TO SCALE



4 FA501 TYPICAL DETAIL FOR CONTROL MODULES FOR HVAC INTERFACE
SCALE: NOT TO SCALE

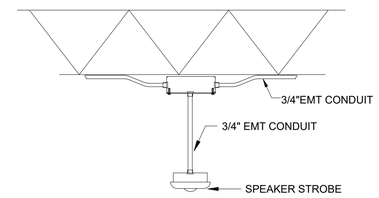


5 FA501 DUCT DETECTOR DETAIL
SCALE: NOT TO SCALE



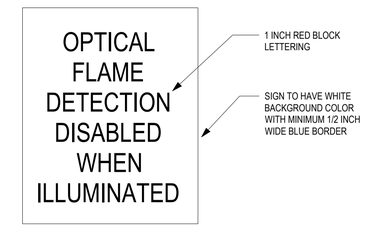
1) THE SAMPLING TUBE SHOULD BE ANGLED AT LEAST 1/4" DOWNWARD FOR EVERY 12" OF DUCT WIDTH.

6 FA501 TYPICAL DETAIL FOR DUCT DETECTOR MOUNTING
SCALE: NOT TO SCALE

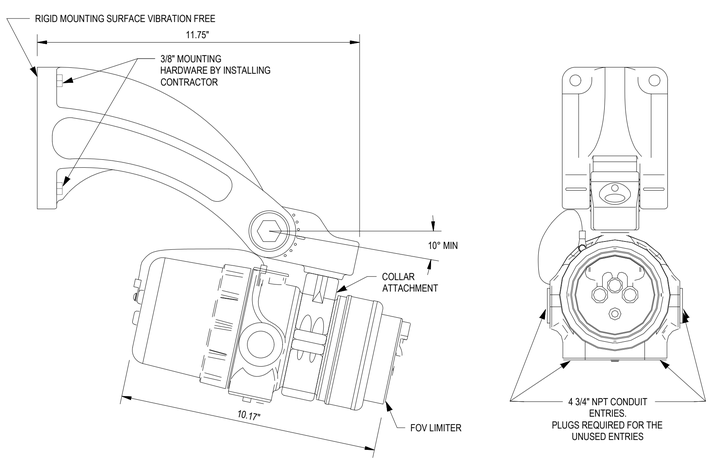


1) STROBES WILL BE MOUNTED NO HIGHER THAN 30 FT. AFF.

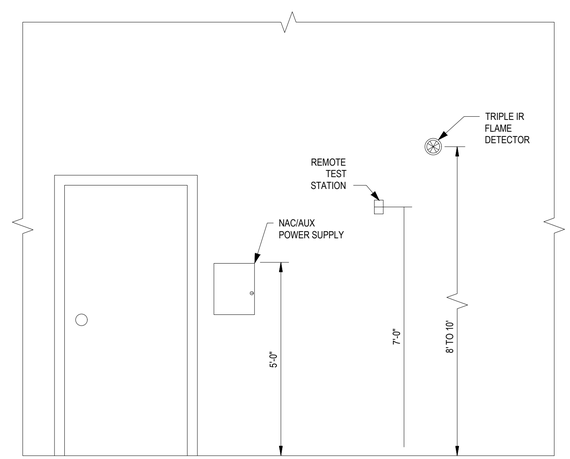
7 FA501 MOUNTING DETAIL FOR SUSPENDED NOTIFICATION DEVICE
SCALE: NOT TO SCALE



8 FA501 OPTICAL FLAME DETECTION DISABLE INDICATOR LIGHT SIGNAGE DETAIL
SCALE: NOT TO SCALE

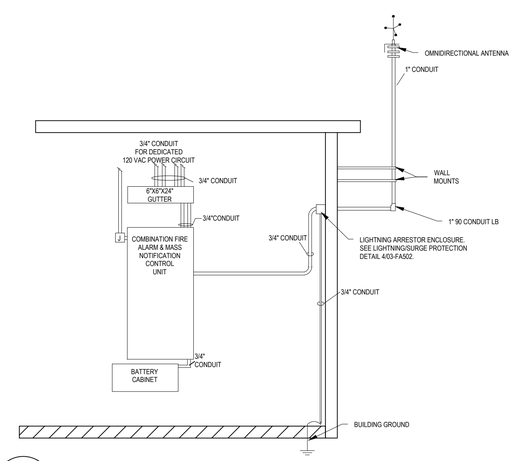


9 FA501 MOUNTING DETAIL DET-TRONICS X3301 FLAME DETECTOR
SCALE: NOT TO SCALE



10 FA501 RELEASING DEVICE MOUNTNG HEIGHTS
SCALE: NOT TO SCALE

Do we want to call this a releasing device still?



11 FA501 FACU ELEVATION DETAIL
SCALE: NOT TO SCALE

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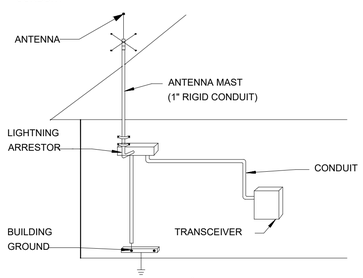
FIRE ALARM AND MASS NOTIFICATION DETAILS

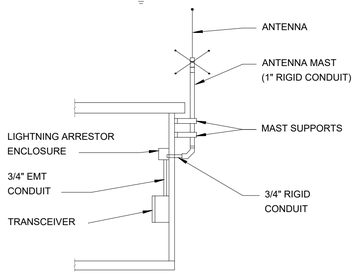
SHEET NUMBER
FA501
SHEET OF

GENERAL NOTES

ANTENNA MOUNTING

1. ANTENNA INSTALLATION SHALL COMPLY WITH NEC ARTICLE 810.
2. DO NOT MOUNT THE ANTENNA WHERE IT MAY CONTACT POWER LINES, POWER DROPS, POWER POLES, OR OTHER TRANSMITTING ANTENNAS.
3. USE BSA-1 OMNIDIRECTIONAL ANTENNA #190-400-00, CUT TO FREQUENCY.
4. PROVIDE AT LEAST 10'-0" HORIZONTAL AND 10'-0" VERTICAL CLEARANCE FROM OTHER ANTENNAS.
5. MAINTAIN A CLEARANCE OF 3 FEET ABOVE THE STRUCTURE OR 2 FEET AWAY FROM THE STRUCTURE.
6. MAINTAIN A MINIMUM OF 3 1/2 FEET FROM ANY METAL SURFACE (HEATING DUCTS, WIRES, ETC.).
7. ENSURE THAT THE ANTENNA WILL NOT TOUCH ANY WIRES OR PROJECTIONS UNDER HIGH WIND CONDITIONS.
8. ENSURE THAT THE ANTENNA MAST IS SECURELY INSTALLED AND WILL NOT COME LOOSE IN HIGH WINDS OR ICING CONDITIONS.
9. IF THE ANTENNA IS BEING MOUNTED ON A BUILDING WITH MORE THAN ONE STORY, MOUNT THE ANTENNA ON THE SIDE OF THE BUILDING TO MINIMIZE COAXIAL CABLE LENGTH AMD LIGHTING EXPOSURE.
10. DO NOT MOUNT THE ANTENNA HIGHER THAN EXISTING LIGHTNING RODS.
11. ANTENNA IS RATED FOR 100MPH WIND LOAD.
12. ANTENNAS MUST BE MOUNTED AT THE ROOF LINE OR HIGHER TO ENSURE RECEPTION OF INCOMING SIGNALS AND TRANSMISSION OF OUTGOING SIGNALS. FAILURE TO MOUNT AT THE ROOF LINE OR AT A HIGHER HEIGHT CAN CAUSE NO REPLYS OR UNRELIABLE COMMUNICATION BECAUSE CENTRAL CANNOT RECEIVE THE SIGNAL FROM THE INCORRECTLY MOUNTED ANTENNA. IF AN ANTENNA IS BEING MOUNTED ON A BUILDING WITH MORE THAN ONE STORY, COAXIAL CABLE LENGTH AND LIGHTING EXPOSURE. INSTALL THE ANTENNA, LIGHTNING ARRESTOR, AND TRANSCEIVER AS CLOSE TOGETHER AS POSSIBLE TO MINIMIZE COAXIAL CABLE LENGTH.
13. ANTENNA MASTS MUST BE WELL SECURED AND ABLE TO WITH STAND LOCAL ENVIRONMENTAL CONDITIONS. ANCHORING MATERIALS SHOULD BE SUITABLE FOR THE MOUNTING SURFACE; BOLTS, SCREWS, STUDS, ETC. USED FOR SUPPORT SHOULD BE NO LESS THAN 1/4 INCH IN DIAMETER.
14. ALL ANTENNA CABLING SHALL BE ENCLOSED IN CONDUIT. USE RIGID CONDUIT FOR EXTERIOR RUNS.
15. ANTENNA MAST SHALL BE 1" RIGID CONDUIT.
16. USE #198-007-01 LIGHTNING ARRESTOR KIT.
17. SEAL COAX CONNECTION TO ANTENNA. SEAL TOP OF MAST TO PREVENT WATER FROM ENTERING. SEAL COAX CONNECTIONS TO LIGHTNING ARRESTOR. SEAL BUILDING PENETRATION HOLE AND CONDUIT.





MOUNTING BRACKETS

199-011-00
HEAVY-DUTY WALL MOUNT PAIR OF 7-INCH HEAVY-DUTY BRACKETS THAT CAN HOLD A MAST UP TO 1 3/4 INCH IN DIAMETER. MOUNTING LAG BOLTS ARE INCLUDED.

CABLE AND CONNECTORS

620-026-00
BULK LOW-LOSS 50 OHM COAX

(1 EACH) 643-557-00
LOW LOSS BNC CONNECTOR (FOR TRANSMITTER)

(3 EACH) 643-530-01
LOW LOSS PL-259 CONNECTOR (FOR SURGE ARRESTOR AND ANTENNA)

USE MONACO COAXIAL CABLE TOOL KIT, P/N 303-000-00. USE DIE SET 4005-02 FOR LOW-LOSS CABLE.

LOW-LOSS CABLE REQUIRES 6" MINIMUM BEND RADIUS

ANTENNA GROUNDING

ENCLOSE THE COAXIAL CABLE ENTIRELY IN CONDUIT. THE CONDUIT PENETRATING THE BUILDING SHALL BE 3/4-INCH MINIMUM RIGID CONDUIT. PENETRATING CONDUIT SHALL DIRECTLY ENTER THE LIGHTNING ARRESTOR ENCLOSURE ON THE INSIDE OF THE BUILDING. TERMINATE THE 3/4-INCH RIGID CONDUIT EXTENDING FROM THE ANTENNA TO THE LIGHTNING ARRESTOR ENCLOSURE WITH A CONDUIT GROUNDING BUSHING. DO NOT USE NON-METALLIC FITTINGS IN THE ANTENNA MAST OR CONDUIT CONNECTIONS. BOND THE CONDUIT GROUNDING BUSHING AND THE LIGHTNING ARRESTOR GROUNDING BOLT WITH A #8 AWG SOLID COPPER BARE WIRE.

CONNECT THE LIGHTNING ARRESTOR GROUNDING BOLT TO THE NEAREST OF THE NEC-QUALIFIED BUILDING OR STRUCTURE GROUNDING ELECTRODE SYSTEM USING A #8 SOLID COPPER BARE WIRE. THE GROUNDING CONDUCTOR DOES NOT NEED TO BE INSTALLED IN CONDUIT UNLESS REQUIRED FOR MECHANICAL PROTECTION, BUT IT MUST BE PROPERLY SUPPORTED AND RUN IN AS STRAIGHT A LINE AS POSSIBLE.

ANTENNA CUTTING

REFER TO MONACO P/N 001-364-00 ANTENNA INSTALLATION MANUAL FOR LENGTH/FREQUENCY ANTENNA CUTTING CHARTS.

MEASURE THE LENGTH ON THE ANTENNA WHIP FROM THE OUTSIDE EDGE OF THE ANTENNA WHIP TIP TO THE ANTENNA WHIP END.

CUT THE EXCESS USING A STAINLESS STEEL BOLT CUTTER OR ANOTHER APPROPRIATE STAINLESS STEEL CUTTING TOOL. AFTER CUTTING, FILE THE CUT END UNTIL FLAT.

LIGHTNING ARRESTOR INSTALLATION

INSTALL THE LIGHTNING ARRESTOR ENCLOSURE:

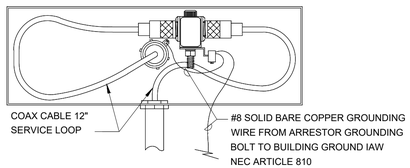
REMOVE THE TWO SCREWS ON THE LIGHTNING ARRESTOR ENCLOSURE, AND REMOVE THE FRONT PANEL.

DRILL A 1 1/8-INCH HOLE IN THE BACK OF THE LIGHTNING ARRESTOR FOR THE CONDUIT.

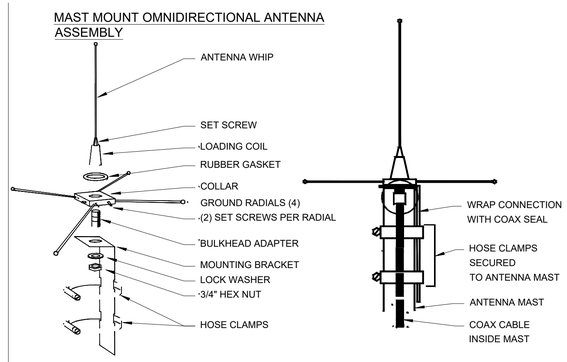
MOUNT THE LIGHTNING ARRESTOR ENCLOSURE TO THE INSIDE OF THE BUILDING OVER THE ENTRANCE HOLE WITH THE CONDUIT EXTENDING THROUGH THE HOLE YOU JUST DRILLED. USE MOUNTING HARDWARE APPROPRIATE TO THE MOUNTING SURFACE, AND STRONG ENOUGH TO SUPPORT THE WEIGHT OF THE LIGHTNING ARRESTOR ENCLOSURE.

SECURE THE CONDUIT TO THE LIGHTNING ARRESTOR ENCLOSURE WITH A CONDUIT GROUNDING BUSHING.

LIGHTNING ARRESTOR DOES NOT MECHANICALLY ATTACH TO ENCLOSURE.



MAST MOUNT OMNIDIRECTIONAL ANTENNA ASSEMBLY



1. REMOVE THE GROUND RADIALS FROM THE MOUNTING BRACKET AND SET THEM ASIDE.
2. REMOVE THE RED PROTECTIVE CAP FROM THE BULKHEAD ADAPTER.
3. LOOSEN THE HEX NUT, AND TWIST THE BULKHEAD ADAPTER UNTIL IT PROJECTS 5/8 OF AN INCH ABOVE THE COLLAR.
4. SLIDE THE RUBBER GASKET ON THE BULKHEAD ADAPTER.
5. SCREW THE LOADING COIL TO THE BULKHEAD ADAPTER UNTIL IT STOPS.
6. HOLDING THE COLLAR, HAND TIGHTEN THE LOADING COIL UNTIL THE RUBBER GASKET SEALS BOTH THE COLLAR AND THE LOADING COIL.
7. TIGHTEN THE HEX NUT TO SECURE THE BULKHEAD ADAPTER TO THE MOUNTING BRACKET.
8. CONNECT THE ANTENNA WHIP TO THE WHIP COLLAR
   LOOSEN THE WHIP COLLAR ONE HALF TURN.

   USE THE SUPPLIED ALLEN WRENCH TO LOOSEN THE WHIP COLLAR SET SCREW UNTIL THE CUT ANTENNA WHIP CAN BE INSERTED INTO THE TOP OF THE LOADING COIL. ENSURE THE ANTENNA SEATS ALL THE WAY INTO THE LOADING COIL.

   TIGHTEN THE WHIP COLLAR SET SCREW.

   RE-TIGHTEN THE WHIP COLLAR.
9. INSTALL THE GROUND RADIALS:

   USING THE SUPPLIED ALLEN WRENCH, LOOSEN ALL THE COLLAR SET SCREWS.

   INSERT A GROUND RADIAL INTO ONE OF THE HOLES LOCATED AT THE CORNERS OF THE COLLAR.

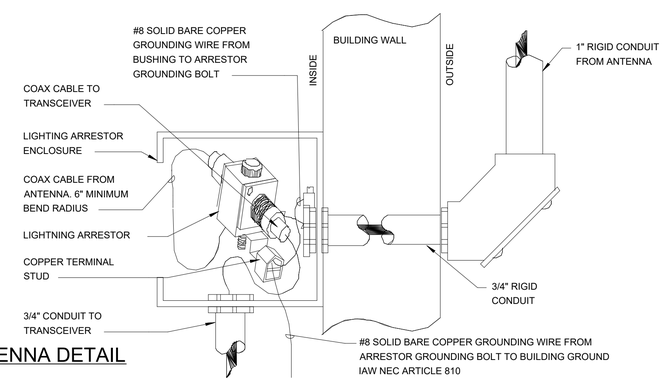
   USING THE ALLEN WRENCH, TIGHTEN THE TWO SET SCREWS TO SECURE THE RADIAL IN PLACE.

   REPEAT FOR THE REMAINING GROUND RADIALS.
10. CONNECT THE ANTENNA TO THE ANTENNA MAST:

RUN THE COAXIAL CABLE INSIDE THE ANTENNA MAST AND CONNECT IT TO THE ANTENNA.

WRAP THE COAX-SEAL AROUND THE ANTENNA/COAXIAL CABLE CONNECTION.

USE THE HOSE CLAMPS TO SECURE THE ANTENNA MOUNTING BRACKET TO THE ANTENNA MAST.



TO INSTALL AN ANTENNA OUTDOORS:

1. FIELD IDENTIFY THE INSTALLATION SITES INDICATED ON THE DRAWINGS FOR THE ANTENNA, LIGHTNING ARRESTOR, AND TRANSCEIVER.
2. SELECT A SITE ON THE BUILDING FOR THE COAXIAL CABLE TO ENTER THE BUILDING. DRILL A COAXIAL CABLE PENETRATION HOLE. THE HOLE NEEDS TO EXTEND COMPLETELY THROUGH THE WALL AND MUST BE LARGE ENOUGH FOR THE CONDUIT TO FIT THROUGH.
3. MOUNT THE ANTENNA AND ANTENNA MAST IN THE PRE-SELECTED LOCATION USING HARDWARE APPROPRIATE TO THE ANTENNA SITE. THE MAST SHALL BE RIGID CONDUIT WITH A 1 INCH INSIDE DIAMETER.
4. INSTALL RIGID CONDUIT ALONG THE COAXIAL CABLE ROUTE FROM THE ANTENNA MAST BASE TO THE COAXIAL CABLE PENETRATION HOLE. THE CONDUIT NEEDS TO EXTEND ALL THE WAY THROUGH THE HOLE.
5. RUN THE COAXIAL CABLE THROUGH THE CONDUIT AND MAST.
6. INSTALL A PL-259 CONNECTOR ON THE COAXIAL CABLE AND CONNECT TO THE ANTENNA. SEAL THE CONNECTION WITH THE PROVIDED WEATHERPROOFING SEALANT.
7. PLACE THE ANTENNA BASE INSIDE THE MAST, AND SECURE THE ANTENNA TO THE MAST.
8. SEAL THE TOP OF THE MAST WITH A WEATHERPROOFING SEALANT.
9. INSTALL THE LIGHTNING ARRESTOR ENCLOSURE.
10. SECURE THE CONDUIT TO THE LIGHTNING ARRESTOR ENCLOSURE WITH A CONDUIT GROUNDING BUSHING.
11. PLACE THE LIGHTNING ARRESTOR INSIDE THE LIGHTNING ARRESTOR ENCLOSURE.
12. INSTALL A PL-259 CONNECTOR ON THE COAXIAL CABLE AND CONNECT TO THE LIGHTNING ARRESTOR:

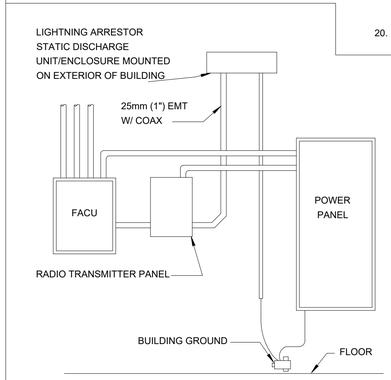
    HAND TIGHTEN THE PL-259 CONNECTOR TO THE LIGHTNING ARRESTOR.

    SEAL THE CONNECTION WITH THE PROVIDED WEATHERPROOFING SEALANT.

    LEAVE A 12-INCH SERVICE LOOP INSIDE THE LIGHTNING ARRESTOR ENCLOSURE.
13. CONNECT A #8 AWG SOLID BARE COPPER GROUND WIRE FROM THE CONDUIT MOUNTING BUSHING TO THE GROUNDING BOLT ON THE LIGHTNING ARRESTOR.
14. CONNECT THE LIGHTNING ARRESTOR GROUNDING BOLT TO THE BUILDING GROUND USING A #8 AWG SOLID BARE COPPER WIRE.
15. INSTALL CONDUIT FROM THE LIGHTNING ARRESTOR ENCLOSURE TO THE TRANSCEIVER ENCLOSURE OR RFM. WHEN CONNECTING CONDUIT TO THE TRANSCEIVER ENCLOSURE, USE THE SUPPLIED CONDUIT KNOCKOUTS. SECURE THE CONDUIT TO THE LIGHTNING ARRESTOR AND TRANSCEIVER ENCLOSURE WITH CONDUIT CONNECTORS AND LOCKNUTS.
16. RUN THE COAXIAL CABLE THROUGH THE CONDUIT.
17. INSTALL A BNC CONNECTOR ON THE COAXIAL CABLE AND CONNECT TO THE TRANSCEIVER. LEAVE A 12-INCH SERVICE LOOP INSIDE THE TRANSCEIVER ENCLOSURE.
18. INSTALL A PL-259 CONNECTOR ON THE COAXIAL CABLE AND CONNECT TO THE LIGHTNING ARRESTOR:

    HAND TIGHTEN THE PL-259 CONNECTOR TO THE LIGHTNING ARRESTOR.

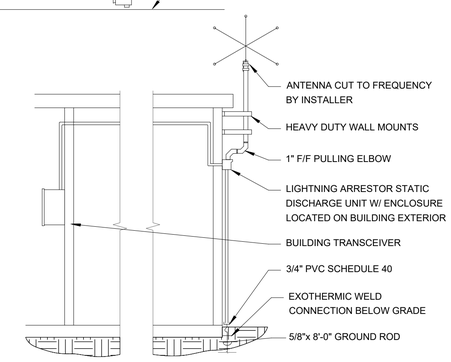
    SEAL THE CONNECTION WITH THE PROVIDED WEATHERPROOFING SEALANT.
19. REPLACE THE LIGHTNING ARRESTOR ENCLOSURE FRONT PANEL, AND SECURE IT WITH THE TWO PREVIOUSLY REMOVED SCREWS.
20. PERFORM A FORWARD AND REFLECTED RF POWER TEST.



A TYPICAL ANTENNA INSTALLATION (USING A VHF OMNI-DIRECTIONAL ANTENNA) IS SHOWN. THE COAXIAL CABLE IS ROUTED FROM THE ANTENNA TO THE LIGHTNING ARRESTOR AND FROM THE LIGHTNING ARRESTOR TO THE TRANSCEIVER. THE CONNECTIONS AT THE ANTENNA MUST BE WEATHERPROOFED WITH A SEALANT.

A MINIMUM 1" CONDUIT WILL ALLOW CLEARANCE FOR THE COAX CABLE CONNECTOR. A DRIP LOOP SHOULD BE PROVIDED WHERE THE CABLE ENTERS A BUILDING OR CONDUIT TO PREVENT RAIN OR MOISTURE FROM ENTERING.

THE COAXIAL CABLE SHOULD ONLY BE LONG ENOUGH TO REACH THE TRANSCEIVER WITH A ONE FOOT SERVICE LOOP. IF NECESSARY, THE COAX CABLE ASSEMBLY SHOULD BE CUT AND RE-TERMINATED TO PROVIDE THE CORRECT LENGTH.



No FLS QC Comments

1 / FA502 FIRE ALARM DETAIL - MONACO ANTENNA DETAIL
SCALE: NOT TO SCALE

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
FIRE ALARM DETAIL - MONACO ANTENNA DETAIL

SHEET NUMBER
FA502
SHEET OF

NOTES:
1. THE CONTRACTOR SHALL PROGRAM THE FA/MNS CONTROL UNITS AND THE MONACO D-21 BASE-WIDE MONITORING SYSTEM TO TRANSMIT AND RECEIVE ALARM SIGNALS/DATA TO INCLUDE ALARM TYPE (ALARM, TROUBLE AND SUPERVISORY SIGNALS), DEVICE TYPE (SMOKE DETECTOR, HEAT DETECTOR, ULTRASENSITIVE SMOKE DETECTION, DUCT SMOKE DETECTION, MANUAL PULL STATION, SUPPRESSION SYSTEM STATUS, SPRINKLER WATER FLOW, SPRINKLER VALVE SUPERVISION, FIRE PUMP STATUS, WATER STORAGE TANK STATUS, ETC.), DEVICE ADDRESS, DEVICE LOCATION (ROOM NUMBER, NEXT TO ROOM NUMBER, BELOW RAISED FLOOR, WITHIN RTU NO., OR OTHER DESCRIPTIVE IDENTIFIER) AND BUILDING LOCATION (BUILDING NUMBER AND NAME).

Do we want to specify FACU location and if so, do we need to add line for smokes above other control equipment?

No CO detector

Sprinkler Waterflow since all systems are wet?

I did not see any of these installed

Need column for activating pre-recorded Mass Notification Message

		NOTIFICATION													MONITORING			SAFETY AND CONTROLS	
	ALARM CONDITION	ACTIVATE INTERIOR SPEAKERS	ACTIVATE EXTERIOR SPEAKERS	ACTIVATE FIRE ALARM/MNS STROBES (CLEAR STROBE)	INITIATE PRE-RECORDED FIRE ALARM MESSAGE (TEMPORAL 3)	ACTIVATE GAS DETECTION NOTIFICATION DEVICES (TEMPORAL 4)	DEACTIVATE FIRE ALARM MESSAGE	INITIATE LIVE MESSAGE ANNOUNCEMENT	INITIATE "ALL CLEAR" MESSAGE PLAYBACK	ACTIVATE MASS NOTIFICATION EMERGENCY TEXT MESSAGE DISPLAY EVACUATE	ACTIVATE MASS NOTIFICATION EMERGENCY TEXT MESSAGE DISPLAY ANNOUNCEMENT	DISPLAY ALARM SIGNAL AT FACU AND REMOTE ANNUNCIATOR	ACTIVATE AUDIO ALARM SIGNAL AT FACU AND REMOTE ANNUNCIATOR	DISPLAY TROUBLE SIGNAL AT FACU AND REMOTE ANNUNCIATOR	ACTIVATE AUDIO TROUBLE SIGNAL AT FACU AND REMOTE ANNUNCIATOR	DISPLAY SUPERVISORY SIGNAL AT FACU AND REMOTE ANNUNCIATOR	ACTIVATE AUDIO SUPERVISORY SIGNAL AT FACU AND REMOTE ANNUNCIATOR	TRANSMIT FIRE ALARM ADDRESSABLE POINT TO BASE MONITORING CENTER D-21 SYSTEM	TRANSMIT FLAME DETECTION INHIBITED SUPERVISORY SIGNAL TO THE BASE MONITORING CENTER D-21 SYSTEM	SHUT DOWN ASSOCIATED AHU
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	MANUAL PULL STATION ACTIVATION	●	●	●	●					●		●	●					●		
2	SMOKE DETECTOR ABOVE FACU ACTIVATION	●	●	●	●					●		●	●					●		
3	SPRINKLER SYSTEM WATERFLOW SWITCH MAIN ACTIVATION	●	●	●	●					●		●	●					●		
4	GAS DETECTION, CO DETECTOR					●				●		●	●					●		
5	OPTICAL DETECTOR ACTIVE SIGNAL	●	●	●	●					●		●	●					●		
6	SPRINKLER SYSTEM - DRY PIPE HIGH PRESSURE ACTIVATION	●	●	●	●					●		●	●					●		

	SUPERVISORY CONDITION	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	SPRINKLER SYSTEM TAMPER SWITCH ACTIVATION															●	●	●	●	
2	DUCT SMOKE DETECTOR ACTIVATION															●	●	●	●	●
3	ROOM LOW TEMPERATURE SIGNAL															●	●	●	●	
4	LOW TEMPERATURE SWITCH															●	●	●	●	
5	FLAME DETECTION INHIBIT SWITCH ACTIVATED.															●	●	●	●	

	TROUBLE CONDITION	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	LOSS OF FACU PRIMARY POWER													●	●			●		
2	FACU BATTERY FAULT													●	●			●		
3	MNS CONTROL UNIT BATTERY FAULT													●	●			●		
4	FIRE ALARM SYSTEM TROUBLE													●	●			●		
5	LOSS OF PRIMARY REMOTE NAC POWER SUPPLY POWER													●	●			●		
6	REMOTE NAC POWER SUPPLY BATTERY FAULT													●	●			●		
7	REMOTE NAC POWER SUPPLY TROUBLE													●	●			●		
8	AMPLIFIER FAULT													●	●			●		
9	SLC CIRCUIT GROUND FAULT													●	●			●		
10	SLC CIRCUIT SHORT													●	●			●		
11	SLC CIRCUIT OPEN													●	●			●		
12	NAC (FA & MNS STROBES) CIRCUIT GROUND FAULT													●	●			●		
13	NAC (FA & MNS STROBES) CIRCUIT SHORT													●	●			●		
14	NAC (FA & MNS STROBES) CIRCUIT OPEN													●	●			●		
15	SPEAKER CIRCUIT GROUND FAULT													●	●			●		
16	SPEAKER CIRCUIT SHORT													●	●			●		
17	SPEAKER CIRCUIT OPEN													●	●			●		

	MASS NOTIFICATION SYSTEM	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	MICROPHONE OFF HOOK	●	●	●			●	●			●					●	●	●		
2	MICROPHONE OFF HOOK WITH FIRE ALARM ACTIVE	●	●	●			●	●			●					●	●	●		
3	PRE-RECORDED MESSAGE MANUAL ACTIVATION (SEE SPECIFICATION FOR MESSAGES)	●	●	●							●					●	●	●		
4	PRE-RECORDED MESSAGE MANUAL ACTIVATION WITH FIRE ALARM ACTIVE	●	●	●							●					●	●	●		
5	PRE-RECORDED "ALL CLEAR" MESSAGE ACTIVATION	●	●	●					●		●					●	●	●		
6	PRE-RECORDED "ALL CLEAR" MESSAGE ACTIVATION WITH FIRE ALARM ACTIVE	●	●	●					●		●					●	●	●		
7	HVAC SHUTDOWN BUTTON AT LOC															●	●	●		●

Remove

Add

1
FA601

FIRE ALARM AND MASS NOTIFICATION SEQUENCE OF OPERATIONS

SCALE: NOT TO SCALE

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

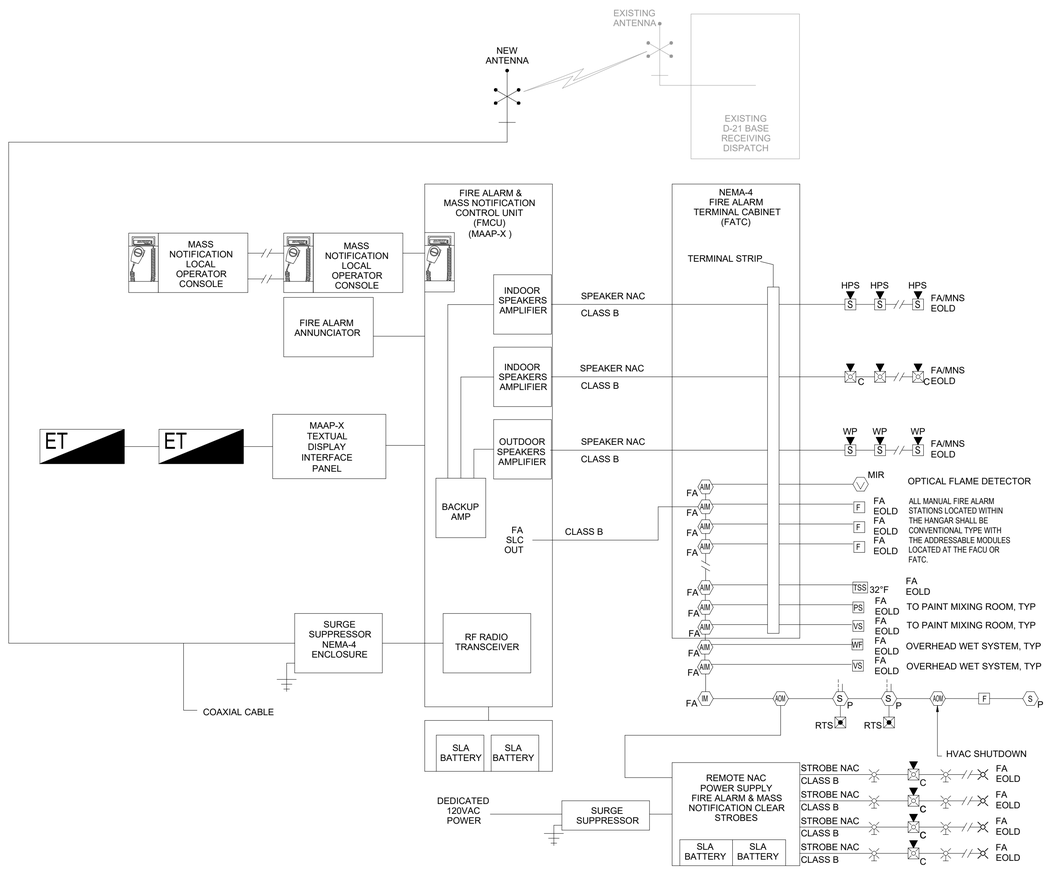
MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION

ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
FIRE ALARM AND MASS NOTIFICATION SEQUENCE OF OPERATIONS

SHEET NUMBER
FA601
SHEET OF



Title?

1. SYSTEM ONE-LINE-DIAGRAM IS NOT A DEPICTION OF ALL DEVICES REQUIRED FOR A FULLY COMPLIANT DESIGN. CONTRACTOR TO SUPPLY ALL NECESSARY DEVICES. DO NOT USE THIS DRAWING FOR TAKE-OFF PURPOSES.
2. ALL ADDRESSABLE DEVICES FOR FACU SHALL BE CENTRALLY LOCATED, AS SHOWN IN DIAGRAM. IDC CIRCUITS SHALL BE RUN FROM TERMINAL STRIPS FROM FATC/FSTC CABINETS OUT TO DEVICES. THE FIRE ALARM SLC SHALL NOT TERMINATE IN ANY HANGAR BAY AREA.
3. ALL SPRINKLER RISER VALVES, PRESSURE SWITCHES, WATERFLOW SWITCHES, MANUAL STATIONS, ETC. SHALL HAVE THEIR OWN UNIQUE ADDRESS AND DESCRIPTION. COMBINING MULTIPLE SUPERVISORY, TROUBLE OR ALARM DEVICES ONTO A SINGLE IDC MODULE (ADDRESS) SHALL NOT BE ALLOWED.
4. NAC POWER SUPPLIES SHALL HAVE SEPARATE MODULES FOR NAC TRIP, GENERAL TROUBLE AND AC TROUBLE ON EACH POWER SUPPLY (NOT SHOWN). EACH CONDITION SHALL BE UNIQUELY DISPLAYED ON THE FACU AND THE POWER SUPPLY SHALL HAVE LED INDICATORS. TRANSCEIVER IS SHOWN AS INTEGRATED TO FIRE ALARM CONTROL. SEE SHEET FA-601 FOR FACU SIGNALS TRANSMITTED TO BASE RECEIVING STATION. BATTERIES SHOWN HERE MAY NOT FIT INSIDE OF CONTROL PANEL ENCLOSURES.
5. CONTRACTOR SHALL DETERMINE QUANTITY AND SIZES OF ALL REQUIRED BATTERY CABINETS. BATTERY CABINETS HAVE NOT BEEN SHOWN IN PLAN. COMBINATION SPEAKER/STROBES SHOWN IN ONE-LINE DO NOT INDICATE BOTH
6. SPEAKER AND STROBE CIRCUITS FOR CLARITY PURPOSES. COMBINATION DEVICES WILL HAVE BOTH SPEAKER CIRCUITS AND STROBE CIRCUIT TERMINATIONS.

Break up this note? Is the note about speaker/strobes complete?

OPTICAL DETECTION NOTES:

1. SYSTEM ONE-LINE-DIAGRAM IS NOT A DEPICTION OF ALL DEVICES REQUIRED FOR A FULLY COMPLIANT DESIGN. CONTRACTOR TO SUPPLY ALL NECESSARY DEVICES. DO NOT USE THIS DRAWING FOR COUNTING PURPOSES.
2. ALL ADDRESSABLE DEVICES FOR RSFACU SHALL BE CENTRALLY LOCATED, AS SHOWN IN DIAGRAM. IDC CIRCUITS SHALL BE RUN FROM TERMINAL STRIPS FROM FATC, FS CABINETS OUT TO DEVICES.
3. EACH OPTICAL FLAME DETECTOR SHALL HAVE ITS OWN UNIQUE ADDRESS AND DESCRIPTION.

Remove?

1 / FA602 FIRE ALARM AND MASS NOTIFICATION RISER DIAGRAM

SCALE: NOT TO SCALE

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE

TINKER AFB, OK

PROJECT INFORMATION

WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION

ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE

FIRE ALARM AND MASS NOTIFICATION RISER DIAGRAM

SHEET NUMBER

FA602

SHEET OF

SPRINKLER SYSTEM SCHEDULE

AREA	HAZARD CLASS	SYSTEM TYPE	MIN. DENSITY (GPM/SQ.-FT.)	HYDRAULIC DESIGN AREA (SQ.-FT.)	HOSE (GPM)	MIN. K-FACTOR	DURATION (MINUTES)
	AIRCRAFT MAINTENANCE HANGAR *	WET	0.20	5,000*	500	14.0	60
	AIRCRAFT MAINTENANCE HANGAR *	WET	0.30	2,500*	500	14.0	60

Are these two correct? No hazard class difference but change in density? (TYPICAL)

* PROVIDE AUTOMATIC SPRINKLER SYSTEMS MEETING THE HYDRAULIC REQUIREMENTS OF UFC 4-211-01 AND SUNDOWN POLICY WITH CHANGE 2.

NOTE:
THE FIRE SPRINKLER CONTRACTOR SHALL BE RESPONSIBLE FOR DESIGNING A SPRINKLER SYSTEM THAT MINIMIZES FRICTION LOSSES AND PRESSURE DEMAND ON THE SYSTEM SUCH THAT THE EXISTING WATER SUPPLY IS CAPABLE OF MEETING SYSTEM DEMAND AND DURATION. THIS SHALL BE DONE AT NO ADDITIONAL COST TO THE GOVERNMENT.

GENERAL NOTES:

Is General Note 1 accurate? I did not read this in the demo sheets or notes.

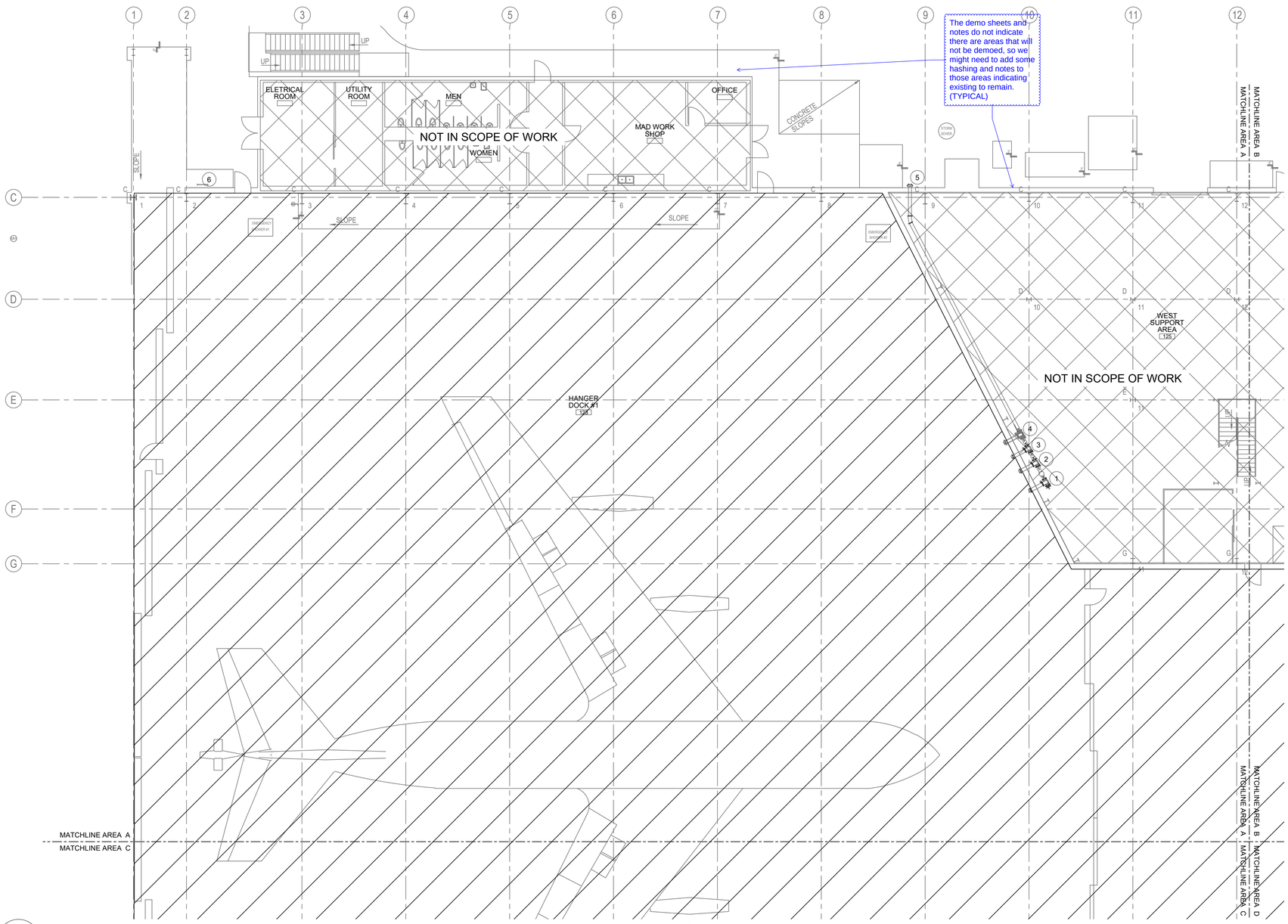
1. FIRE SUPPRESSION SYSTEM OUTSIDE THE HANGAR AREA TO REMAIN OPERATIONAL DURING SPRINKLER SYSTEM MODIFICATIONS.

KEY NOTES:

1. PROVIDE ALARM CHECK VALVE FOR WET SPRINKLER SYSTEM NUMBER ONE WITHIN HANGAR SOUTH DOCK.
2. PROVIDE ALARM CHECK VALVE FOR WET SPRINKLER SYSTEM NUMBER TWO WITHIN HANGAR SOUTH DOCK.
3. PROVIDE ALARM CHECK VALVE FOR WET SPRINKLER SYSTEM NUMBER THREE WITHIN HANGAR SOUTH DOCK.
4. EXISTING ALARM CHECK VALVE FOR MAD WORKSHOP,WEST SUPPORT AREAS AND MECHANICAL ROOM TO REMAIN.
5. PROVIDE NEW FIRE DEPARTMENT CONNECTION (FDC).
6. APPROXIMATE LOCATION OF INSPECTOR'S TEST, REFER TO SHEET FX501 FOR DETAIL.

Is this mentioned in the demo sheets or general notes?

The demo sheets and notes do not indicate there are areas that will not be demoed, so we might need to add some hashing and notes to those areas indicating existing to remain. (TYPICAL)

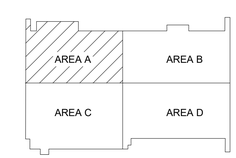


1 FX101 FIRE SUPPRESSION FIRST FLOOR PLAN - AREA A - NEW WORK

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION:
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
FIRE SUPPRESSION FIRST FLOOR PLAN AREA A - NEW WORK

SHEET NUMBER
FX101

SHEET - OF

SPRINKLER SYSTEM SCHEDULE

AREA	HAZARD CLASS	SYSTEM TYPE	MIN. DENSITY (GPM/SQ.-FT.)	HYDRAULIC DESIGN AREA (SQ.-FT.)	HOSE (GPM)	MIN. K-FACTOR	DURATION (MINUTES)
	AIRCRAFT MAINTENANCE HANGAR *	WET	0.20	5,000*	500	14.0	60
	AIRCRAFT MAINTENANCE HANGAR *	WET	0.30	2,500*	500	14.0	60

* PROVIDE AUTOMATIC SPRINKLER SYSTEMS MEETING THE HYDRAULIC REQUIREMENTS OF UFC 4-211-01 AND SUNDOWN POLICY WITH CHANGE 2.

NOTE:
THE FIRE SPRINKLER CONTRACTOR SHALL BE RESPONSIBLE FOR DESIGNING A SPRINKLER SYSTEM THAT MINIMIZES FRICTION LOSSES AND PRESSURE DEMAND ON THE SYSTEM SUCH THAT THE EXISTING WATER SUPPLY IS CAPABLE OF MEETING SYSTEM DEMAND AND DURATION. THIS SHALL BE DONE AT NO ADDITIONAL COST TO THE GOVERNMENT.

GENERAL NOTES:

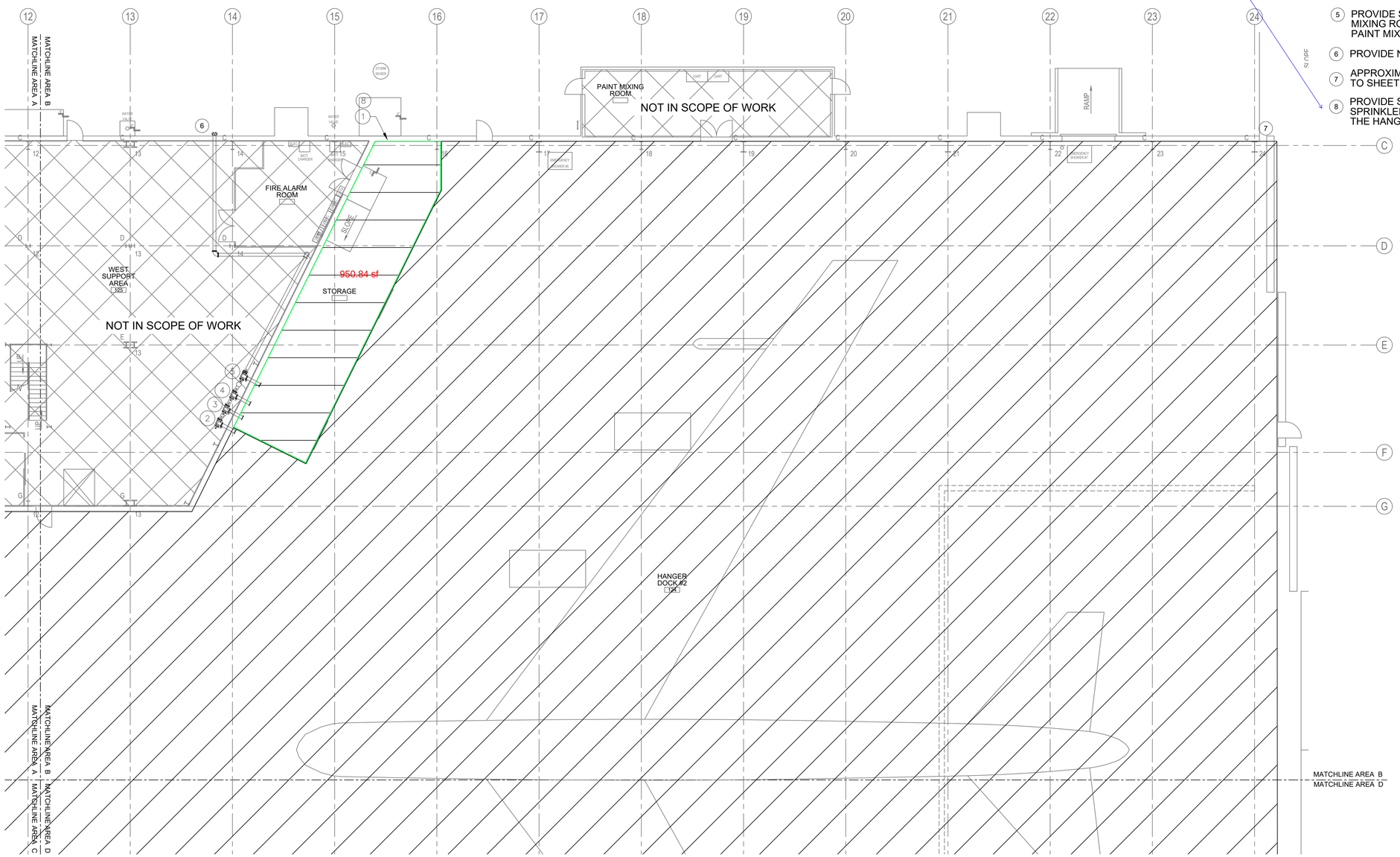
Is General Note 1 accurate? I did not read this in the demo sheets or notes.

1. FIRE SUPPRESSION SYSTEM WITHIN THE HANGAR AREA TO REMAIN AND TO REMAIN OPERATIONAL DURING SPRINKLER SYSTEM MODIFICATIONS ELSEWHERE IN THE FACILITY.

KEY NOTES:

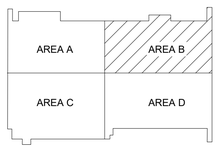
Combine?

1. PROVIDE SPRINKLER COVERAGE WITHIN CAGED AREA. SPRINKLER HEADS WITHIN CAGED AREA SHALL HAVE WATER SHIELDS TO ELIMINATE COLD SOLDERING BY THE OVERHEAD SYSTEM. HANGAR CEILING LEVEL SPRINKLER PROTECTION SHALL CONTINUE OVER CAGED AREA.
2. PROVIDE ALARM CHECK VALVE FOR OVERHEAD SUPPRESSION SYSTEM NUMBER ONE WITHIN HANGAR NORTH DOCK.
3. PROVIDE ALARM CHECK VALVE FOR OVERHEAD SUPPRESSION SYSTEM NUMBER TWO WITHIN HANGAR NORTH DOCK.
4. PROVIDE ALARM CHECK VALVE FOR OVERHEAD SUPPRESSION SYSTEM NUMBER THREE WITHIN HANGAR NORTH DOCK.
5. PROVIDE SPRINKLER PIPE TO DRY-PIPE SYSTEM WITHIN PAINT MIXING ROOM TO REMAIN DRY-PIPE VALVE IS LOCATED WITHIN PAINT MIXING ROOM.
6. PROVIDE NEW FIRE DEPARTMENT CONNECTION (FDC).
7. APPROXIMATE LOCATION OF INSPECTOR'S TEST, REFER TO SHEET FX501 FOR DETAIL.
8. PROVIDE SPRINKLER COVERAGE ABOVE CAGED AREA. SPRINKLER DESIGN CRITERIA FOR AREA SHALL MATCH THE THE HANGAR SPACE AT ROOF LEVEL.



1
FX102
FIRE SUPPRESSION FIRST FLOOR PLAN - AREA B - NEW WORK
SCALE: 3/32" = 1'-0"

0 8' 16' 24'
SCALE: 3/32"=1'-0"



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

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MANAGEMENT INFORMATION
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DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
FIRE SUPPRESSION FIRST FLOOR PLAN AREA B - NEW WORK

SHEET NUMBER
FX102
SHEET - OF

SPRINKLER SYSTEM SCHEDULE

AREA	HAZARD CLASS	SYSTEM TYPE	MIN. DENSITY (GPM/SQ.-FT.)	HYDRAULIC DESIGN AREA (SQ.-FT.)	HOSE (GPM)	MIN. K-FACTOR	DURATION (MINUTES)
	AIRCRAFT MAINTENANCE HANGAR *	WET	0.20	5,000*	500	14.0	60
	AIRCRAFT MAINTENANCE HANGAR *	WET	0.30	2,500*	500	14.0	60

* PROVIDE AUTOMATIC SPRINKLER SYSTEMS MEETING THE HYDRAULIC REQUIREMENTS OF UFC 4-211-01 AND SUNDOWN POLICY WITH CHANGE 2.

NOTE:
THE FIRE SPRINKLER CONTRACTOR SHALL BE RESPONSIBLE FOR DESIGNING A SPRINKLER SYSTEM THAT MINIMIZES FRICTION LOSSES AND PRESSURE DEMAND ON THE SYSTEM SUCH THAT THE EXISTING WATER SUPPLY IS CAPABLE OF MEETING SYSTEM DEMAND AND DURATION. THIS SHALL BE DONE AT NO ADDITIONAL COST TO THE GOVERNMENT.

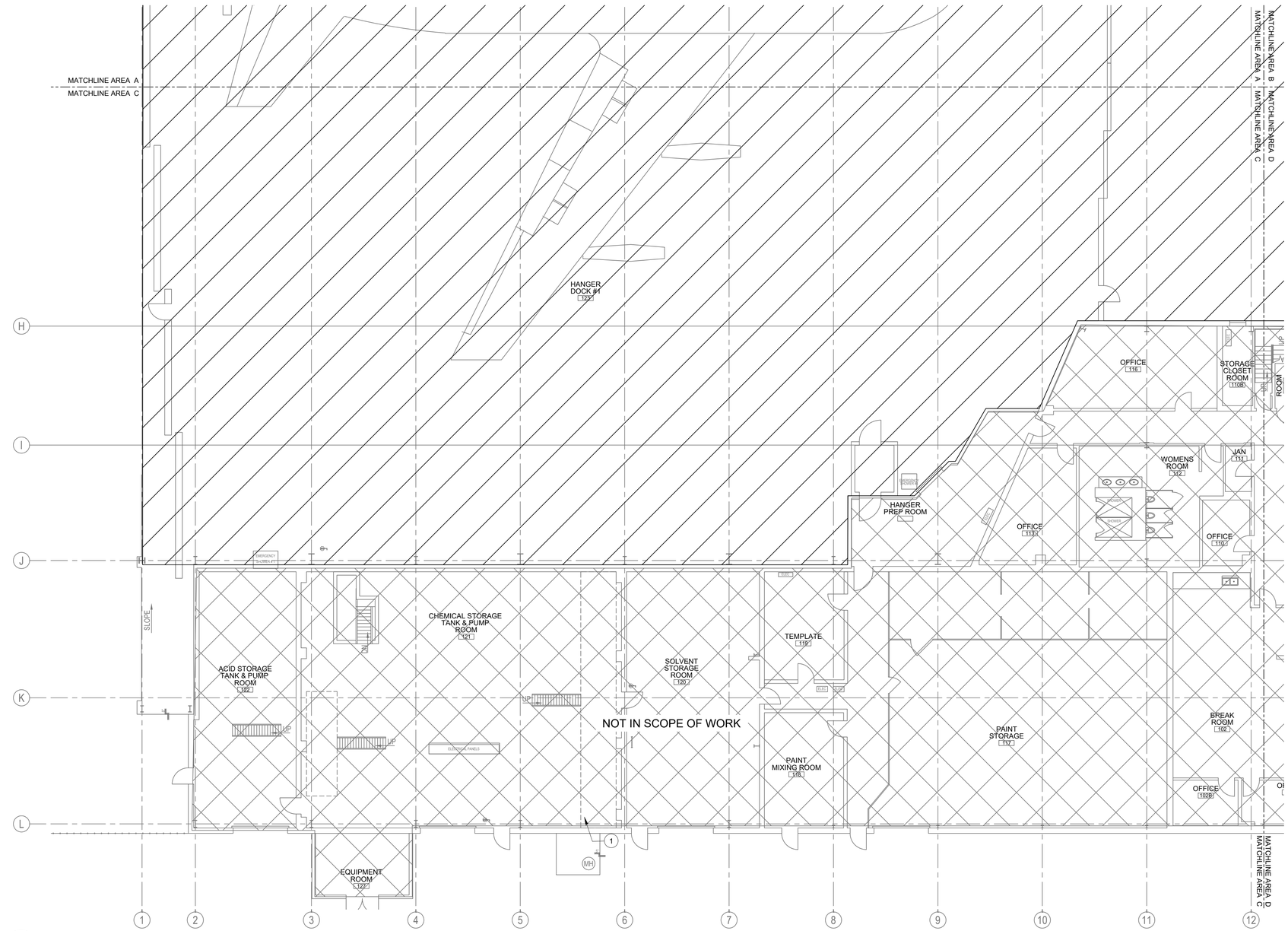
GENERAL NOTES:

Is General Note 1 accurate? I did not read this in the demo sheets or notes.

1. FIRE SUPPRESSION SYSTEM WITHIN THE HANGAR AREA TO REMAIN AND TO REMAIN OPERATIONAL DURING SPRINKLER SYSTEM MODIFICATIONS ELSEWHERE IN THE FACILITY.

KEY NOTES:

1. EXISTING SPRINKLER RISER FOR ADMIN AREA TO REMAIN.

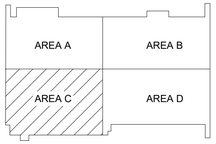


1 FX103 FIRE SUPPRESSION FIRST FLOOR PLAN - AREA C - NEW WORK

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION

ISSUE DATE:	09-15-2022
DESIGN GROUP:	HDR
DESIGNED BY:	D.E.
DRAWN BY:	J.R.M.
CHECKED BY:	J.M.
DESIGN FILE LOCATION:	

SHEET TITLE
FIRE SUPPRESSION FIRST FLOOR PLAN AREA C - NEW WORK

SHEET NUMBER
FX103

SHEET - OF

SPRINKLER SYSTEM SCHEDULE

AREA	HAZARD CLASS	SYSTEM TYPE	MIN. DENSITY (GPM/SQ.-FT.)	HYDRAULIC DESIGN AREA (SQ.-FT.)	HOSE (GPM)	MIN. K-FACTOR	DURATION (MINUTES)
	AIRCRAFT MAINTENANCE HANGAR *	WET	0.20	5,000*	500	14.0	60
	AIRCRAFT MAINTENANCE HANGAR *	WET	0.30	2,500*	500	14.0	60

* PROVIDE AUTOMATIC SPRINKLER SYSTEMS MEETING THE HYDRAULIC REQUIREMENTS OF UFC 4-211-01 AND SUNDOWN POLICY WITH CHANGE 2.

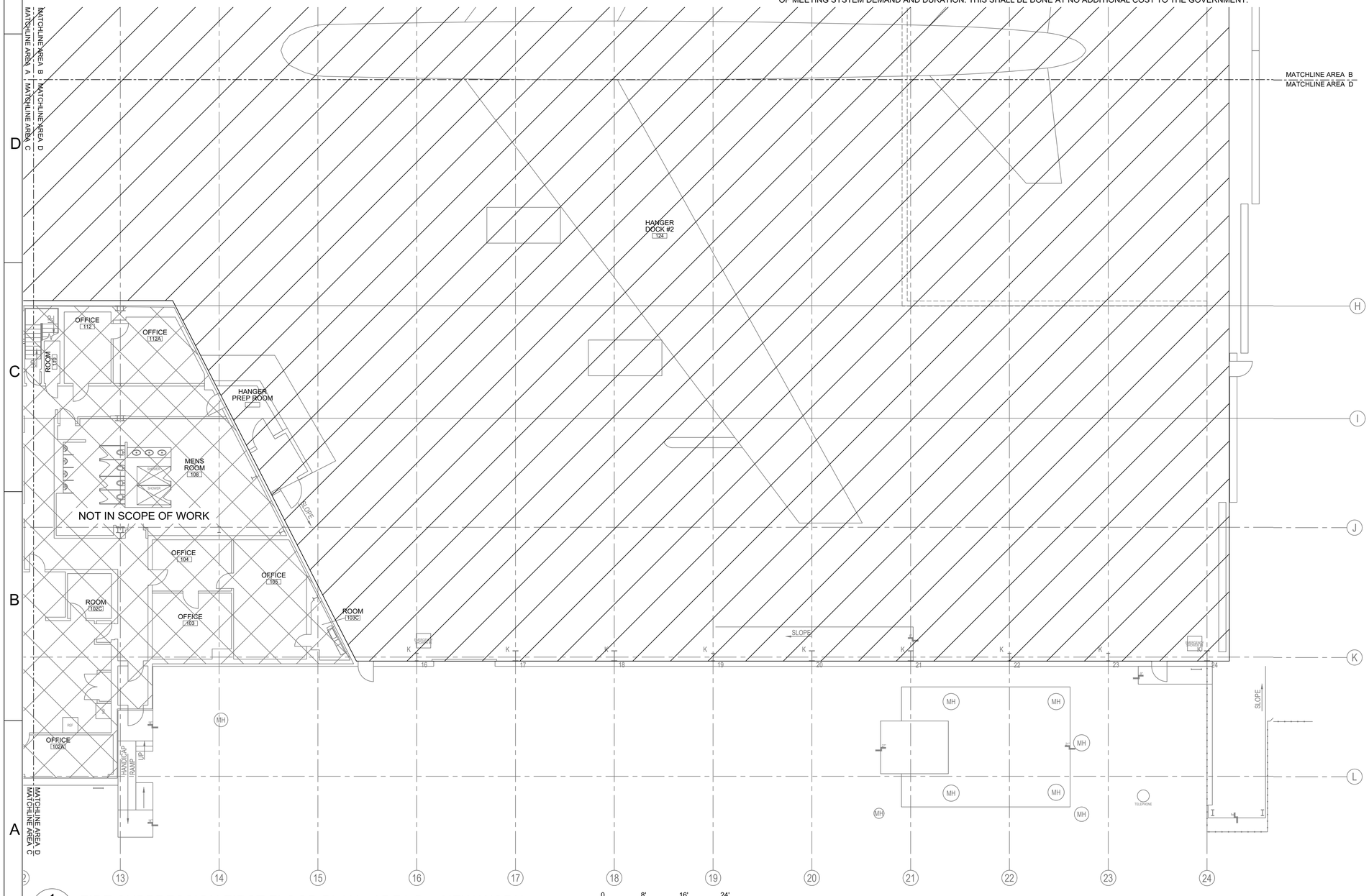
NOTE:
THE FIRE SPRINKLER CONTRACTOR SHALL BE RESPONSIBLE FOR DESIGNING A SPRINKLER SYSTEM THAT MINIMIZES FRICTION LOSSES AND PRESSURE DEMAND ON THE SYSTEM SUCH THAT THE EXISTING WATER SUPPLY IS CAPABLE OF MEETING SYSTEM DEMAND AND DURATION. THIS SHALL BE DONE AT NO ADDITIONAL COST TO THE GOVERNMENT.

GENERAL NOTES:

Is General Note 1 accurate? I did not read this in the demo sheets or notes.

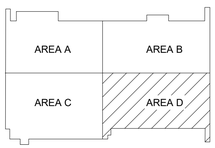
1. FIRE SUPPRESSION SYSTEM WITHIN THE HANGAR AREA TO REMAIN AND TO REMAIN OPERATIONAL DURING SPRINKLER SYSTEM MODIFICATIONS ELSEWHERE IN THE FACILITY.

No sheets for Mezz and Floors 2 & 3, even if to sow it not in scope of work?



1
FX104
FIRE SUPPRESSION FIRST FLOOR PLAN - AREA D - NEW WORK
SCALE: 3/32" = 1'-0"

0 8' 16' 24'
SCALE: 3/32"=1'-0"



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION

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DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
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FIRE SUPPRESSION FIRST FLOOR PLAN AREA D - NEW WORK

SHEET NUMBER
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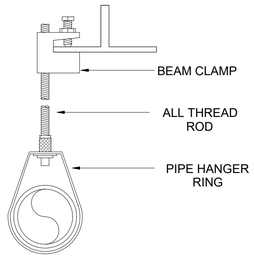
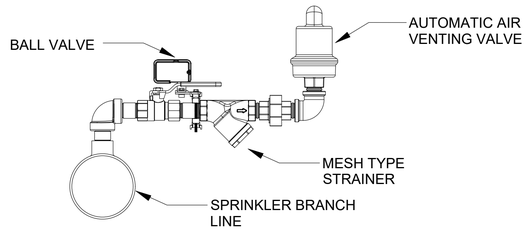
SHEET - OF



1 / FX501 TOP BEAM CLAMP HANGER DETAIL

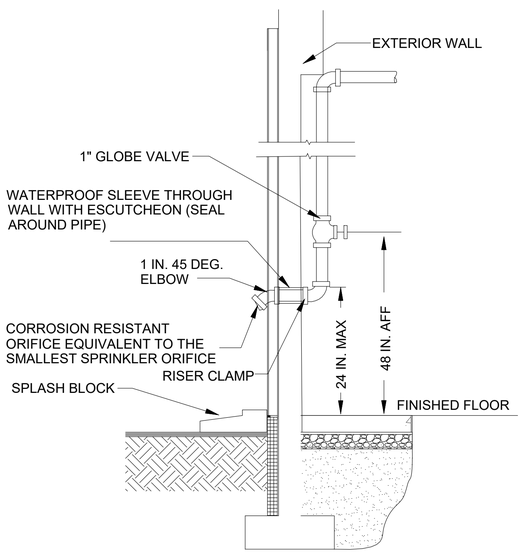
SCALE: NTS



2 / FX501 AUTOMATIC AIR VENTING DETAIL

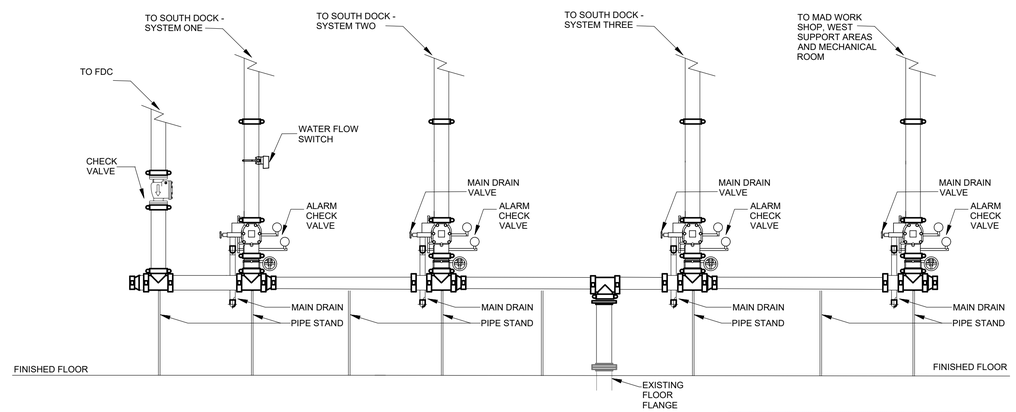
SCALE: NTS

NOTE: CONTRACTOR SHALL COORDINATE PLACEMENT AND QUANTITY WITH FIRE ALARM SUPERVISION



3 / FX501 INSPECTOR'S TEST CONNECTION DETAIL

SCALE: NTS



4 / FX501 FIRE SPRINKLER RISER SECTION FOR SOUTH DOCK DETAILS

SCALE: NTS

Do we need to reference any existing to remain? Do we need to have riser for the North Dock?

NOTES:

1. SPRINKLER SYSTEM LEAD-IN WAS PREVIOUSLY INSTALLED. CONTRACTOR TO CONNECT NEW SPRINKLER SYSTEM TO EXISTING FLOOR FLANGE.
2. NEW SPRINKLER SYSTEM MAIN DRAIN LINES SHALL DRAIN INTO THE HANGAR.
3. EXISTING PIPING IS SHOWN IN HALFTONE.

AFMC
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PROJECT INFORMATION
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FIRE SUPPRESSION DETAILS

SHEET NUMBER
FX501
SHEET OF

sheet not printed correctly

ELECTRICAL SYMBOLS, LEGEND AND ABBREVIATIONS

GENERAL NOTES:

(APPLICABLE TO ALL ELECTRICAL SHEETS)

1. ALL WORKS SHALL BE PROVIDED AND INSTALLED IN ACCORDANCE WITH TINKER AFB ELECTRICAL STANDARDS (JAN 2025)
2. EQUIPMENT INTERRUPTING CAPACITIES SPECIFIED IN THE CONTRACT DOCUMENTS ARE BASED UPON EQUIPMENT CHARACTERISTICS AND IMPEDANCES SHOWN ON THE DRAWINGS. IF ACTUAL INSTALLED EQUIPMENT DEVIATES FROM THESE CHARACTERISTICS OR HAS LOWER IMPEDANCES, THE CONTRACTOR SHALL INCREASE THE INTERRUPTING CAPACITIES OF ALL ITEMS ON THE LOAD SIDE OF THE DEVIANT EQUIPMENT IN DIRECT PROPORTION TO THE CHANGED CHARACTERISTICS. INTERRUPTING CAPACITIES SHALL NOT BE REDUCED TO VALUES LESS THAN THOSE REQUIRED BY THE CONTRACT DOCUMENTS.
3. FIRE STOP SHALL BE PROVIDED AT ALL LOCATIONS WHERE ELECTRICAL EQUIPMENT OR SYSTEMS PENETRATE FIRE RATED WALLS. SEE ARCHITECTURAL PLANS FOR RATED WALL LOCATIONS.
4. CONTROL WIRING P&ID'S FOR MECHANICAL EQUIPMENT ARE NOT SHOWN ON THESE SHEETS.
5. RISER AND ONE-LINE DIAGRAMS ARE MEANT TO SHOW ELECTRICAL RELATIONSHIPS FOR EQUIPMENT, AND THEREFORE MAY NOT INCLUDE ALL REQUIRED EQUIPMENT DEVICES, AND ACCESSORIES.

POWER SYMBOLS LEGEND

SYMBOL	DESCRIPTION
	RECEPTACLE, DUPLEX, 20A, 120V, GROUNDING 2W+G, NEMA 5-20R
C	RECEPTACLE, DUPLEX, SERVING COMPUTER LOAD. 20A, 120V, GROUNDING 2W+G RECEPTACLE, NEMA 5-20R
F	RECEPTACLE, DUPLEX, FLOOR MOUNTED, FLUSH, 20A, 120V, GROUNDING 2W+G NEMA 5-20R.
	RECEPTACLE, DUPLEX, CEILING MOUNTED, 20A, 120V, GROUNDING 2W+G, NEMA 5-20R
IG	ISOLATED GROUND RECEPTACLE, DUPLEX, ORANGE TYPE. 20A, 120V, GROUNDING 2W+2G RECEPTACLE, NEMA 5-20R
	240 VOLT 20 AMP RECEPTACLE
	RECEPTACLE, DUPLEX, SPECIAL PURPOSE
	RECEPTACLE, QUADRAPLEX
	RECEPTACLE/EQUIPMENT CONNECTION, SPECIAL PURPOSE
C	RECEPTACLE, CLOCK
J	JUNCTION BOX, ABOVE CEILING
C J	JUNCTION BOX, WALL MOUNTED, SERVING COMPUTER LOAD.
	HORIZONTAL WIREMOLD
	VERTICAL WIREMOLD
$	SWITCH, TOGGLE, WALL MOUNTED, 20A., 120/277V RATED (AC ONLY), SINGLE-POLE, MOUNT 54" AFF
$2	SWITCH, TOGGLE, WALL MOUNTED, 20A., 120/277V RATED (AC ONLY), DOUBLE-POLE, MOUNT 54" AFF
$3	SWITCH, TOGGLE, WALL MOUNTED, 20A., 120/277V RATED (AC ONLY), THREE-WAY, SPDT. MOUNT 54" AFF
$4	SWITCH, TOGGLE, WALL MOUNTED, 20A., 120/277V RATED (AC ONLY), FOUR-WAY, SPDT. MOUNT 54" AFF
$DM	SWITCH, DIMMER, 120V, 1500 WATT. MOUNT 54" AFF
$M	SWITCH, MOTOR
$OS	SWITCH, OCCUPANCY SENSOR, 120V, 1500 WATT. MOUNT 54" AFF
OS	OCCUPANCY SENSOR, CEILING MOUNTED. MANUAL ON/INTEGRAL MANUAL DIMMING
	BRANCH CIRCUIT HOME RUN WITH NEUTRAL, PHASE AND EQUIPMENT GROUND RESPECTIVELY
T	TRANSFORMER, DRY TYPE
	SWITCH, DISCONNECT
	COMBINATION STARTER/DISCONNECT WITH HOA SWITCH-COORDINATE WITH MECH. CONTRACTOR.

POWER SYMBOLS LEGEND (CONTINUED)

SYMBOL	DESCRIPTION
	PANELBOARD, SURFACE MOUNTED
	PANELBOARD, RECESSED
	RACEWAY, ABOVE FLOOR
	RACEWAY, RISER UP
	RACEWAY, RISER DOWN
M	MOTOR
T	THERMOSTAT BY MECHANICAL CONTRACTOR
	CEILING FAN
	TELEPHONE RECEPTACLE, WALL MOUNTED
	DATA RECEPTACLE, WALL MOUNTED
	TELEPHONE/DATA RECEPTACLE, WALL MOUNTED
	BELL
S	SPEAKER, CEILING MOUNTED
M	MICROPHONE, CEILING MOUNTED
	SPEAKER CONTROL
	SOUND CABINET
	AUDIO/VISUAL PROJECTOR
TV	CABLE TV OUTLET
VFD	VARIABLE FREQUENCY DRIVER
	CCTV SECURITY CAMERA

LIGHTING SYMBOLS LEGEND

SYMBOL	DESCRIPTION
	FLUORESCENT/LED, SURFACE OR PENDANT, RECESSED CEILING MOUNTED
	FLUORESCENT/LED, WALL MOUNTED
	NIGHT LIGHT, FLUORESCENT/LED FIXTURE WITH INTERGAL EMERGENCY BALLAST
	CFL/HID/LED FIXTURE, SURFACE OR PENDANT
	CFL/HID/LED FIXTURE, RECESSED CEILING MOUNTED
	CFL/HID/LED FIXTURE, WALL MOUNTED
	CFL/HID/LED FIXTURE, AREA LIGHT POLE
	EXIT SIGN, LIGHTED, SURFACE OR PENDANT, CEILING MOUNTED W/LIGHTED FACE AND DIRECTIONAL ARROW.
	EXIT SIGN, LIGHTED, WALL MOUNTED.
	EMERGENCY LIGHT, 2 LAMPS, BATTERY POWERED
	BRANCH CIRCUIT HOME RUN
	LIGHTING SWITCHLEG

ONE-LINE & CONTROL SCHEMATIC LEGEND

SYMBOL	DESCRIPTION
	SCHEMATIC, CIRCUIT CONNECTIONS
	SCHEMATIC CIRCUIT
	ELECTRICAL BUSS
	SEPARABLE (PLUG-IN) CONNECTOR OR CONNECTION FOR DRAWOUT ASSEMBLIES
	CABLE OR WIRE
	SWITCH, DISCONNECT, FUSED, LOAD BREAK. FUSE AMPERE RATING [A] AND FUSE TYPE SHOWN NEXT TO SYMBOL
	TRANSFORMER, POWER, KVA RATING, WINDING VOLTAGES AND CONNECTIONS ARE SHOWN NEXT TO SYMBOL
	TRANSFORMER, CURRENT, TURNS RATIO, SHOWN NEXT TO SYMBOL
	GROUNDING CONNECTION. WHEN USED WITH TRANSFORMER WINDING SYMBOL IT INDICATES A NEUTRAL GROUNDING CONNECTION (ON SECONDARY SIDE ONLY)
D	DELTA CONNECTED
Y	WYE CONNECTED
	GROUNDED WYE WINDING CONNECTION
	RELAY OR CONTACTOR CONTACTS
	CIRCUIT BREAKER, MOLDED CASE, TRIP CURRENT [A] AND QUANTITY OF POLES [P] SHOWN NEXT TO SYMBOL
1200A 3P	SWITCH, DISCONNECT, NON-FUSED, LOAD BREAK. CONTINUOUS CURRENT RATING [A] AND QUANTITY OF POLES [P] SHOWN NEXT TO SYMBOL
	FUSE, AMPERE RATING [A] AND FUSE TYPE SHOWN NEXT TO SYMBOL
	MOTOR THERMAL OVERLOAD PROTECTOR
T	INTEGRAL PHOTOELECTRIC CELL AND RELAY (PHOTOCONTROL)
M	WATTHOUR METER
C	CONTACTOR OR RELAY COIL. LETTER(S) INSIDE OF SYMBOL MATCH CONTACTS CONTROLLED
	SURGE ARRESTER, VALVE TYPE ARRESTER KV RATING SHOWN NEXT TO SYMBOL
	EQUIPMENT ENCLOSURE
SPD	SURGE PROTECTION DEVICE
GFP	GROUND FAULT PROTECTION

SITE UTILITIES LEGEND

SYMBOL	DESCRIPTION
—E—E—	DUCT BANK, OVERHEAD PRIMARY
—ES—ES—	DUCT BANK, OVERHEAD SECONDARY
–E-----E–	DUCT BANK, UNDERGROUND PRIMARY
–ES-----ES–	DUCT BANK, UNDERGROUND SECONDARY
E	MANHOLE, ELECTRIC
E	HANDHOLE, ELECTRIC
	POWER POLE, ELECTRIC

GROUNDING LEGEND

SYMBOL	DESCRIPTION
—B—	CONDUCTOR, BARE, UON
	GROUNDING CONNECTION, COUNTERPOISE TO GROUND ROD.

SYMBOL MODIFIERS

SYMBOL	DESCRIPTION
AC	DEVICE MOUNTED ABOVE COUNTER TOP
AV	AUDIBLE AND VISUAL
C	RECEPTACLE SERVING COMPUTER LOAD.
E	EXISTING
F	FIXED TEMPERATURE
GFI	GROUND FAULT CIRCUIT INTERRUPTER
N	NEW
NL	NIGHT LIGHT
R	ITEM OR DEVICE RECESSED INTO MOUNTING SURFACE
RF	RADIO FREQUENCY
WP	WEATHERPROOF

ABBREVIATIONS

A	AMPERES OR TRIP AMPERES	NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
AC	ALTERNATING CURRENT	NEUT	NEUTRAL
AFF	ABOVE FINISHED FLOOR	N.O.	NORMALLY OPEN
AFG	ABOVE FINISHED GRADE	NLT	NOT LESS THAN
AIC	SYMMETRICAL AMPS INTERRUPTING CAPACITY	NMT	NOT MORE THAN
AWG	AMERICAN WIRE GAUGE	OH	OVERHEAD
A/R	AS REQUIRED	PAS	PUBLIC ADDRESS SYSTEM
ARR.	ARRESTOR	PE	PHOTOELECTRIC
BLDG	BUILDING	PH	PHASE
BRKT	BRACKET	PLCS	PLACES
C	CONDUIT	PNL	PANELBOARD
CB	CIRCUIT BREAKER	PVC	POLYVINYL CHLORIDE ELECTRICAL RACEWAY USED ONLY U.G., CARLON OR EQUIVALENT
CKT	CIRCUIT		
CL	CURRENT LIMITING		
CO	CONDUIT ONLY		
CTL	CONTROL	RC	RIGID STEEL CONDUIT
DC	DIRECT CURRENT	REF	REFERENCE
D.T.C.	DATA TERMINAL CABINET	REQ'D	REQUIRED
EMCS	ENERGY MONITORING AND CONTROL SYSTEM	RGC	RIGID GALVANIZED STEEL CONDUIT
ERMS	ENERGY REDUCTION MAINTENANCE SETTING	RM	ROOM
		RMC	RIGID METALIC CONDUIT
FACP	FIRE ALARM CONTROL PANEL	SHT	SHEET
		SOB	STANDOFF BRACKET
FT	FOOT, FEET	SPACE	SPACE(S) ONLY (NO BREAKER DEVICE)
GFCI	GROUND FAULT CIRCUIT INTERRUPTER, 5MA PERSONNEL PROTECTION UNLESS OTHERWISE NOTED.	SPARE	SPARE BREAKER OR DEVICE
		SPDT	SINGLE-POLE, DOUBLE-THROW
GRD	GROUND		
HZ	HERTZ	SPECS	CONTRACT SPECIFICATIONS
IAW	IN ACCORDANCE WITH	SPST	SINGLE-POLE, SINGLE-THROW
IG	ISOLATED GROUND		
IN	INCH, INCHES	ST	SHUNT TRIP
IR	INFRARED	S/N	SOLID NEUTRAL
KV	KILOVOLTS	TB	TELEPHONE BACKBOARD
KVA	KILOVOLT AMPERES	TYP	TYPICAL
KVAR	KILOVOLT AMPS REACTIVE	UG	UNDERGROUND
KWH	KILOWATT HOURS	UL	LISTED BY UNDERWRITER'S LABORATORIES
L-L	LINE TO LINE		
L-N	LINE TO NEUTRAL	UON	UNLESS OTHERWISE NOTED
LSIG	LONG TIME, SHORT TIME, INSTANTANEOUS, GROUND	V	VOLTS
		VA	VOLT AMPERES
MFR	MANUFACTURER	W	WATT
MH	MANHOLE	WAP	WIRELESS ACCESS POINT
MIN	MINIMUM	WH	WEATHERHEAD
MTD	MOUNTED	W/	WITH
MTG	MOUNTING	Ø	PHASE
N.C.	NORMALLY CLOSED	2W+G	CIRCUIT TYPE
NEC	NATIONAL ELECTRICAL CODE	3W+G	CIRCUIT TYPE
		4W+G	CIRCUIT TYPE

SYMBOL NOTES

1. THESE SYMBOLS APPLY TO THE ENTIRE SET OF CONTRACT DRAWINGS.
2. ALL SYMBOLS ARE NOT NECESSARILY USED IN THE DRAWINGS FOR THIS PROJECT. LISTING OF SYMBOLS DOES NOT IMPLY THAT ALL SYMBOLS ARE USED IN THE CONTRACT DRAWINGS.
3. COLORS FOR ALL OUTLETS AND SWITCHES SHALL BE AS SHOWN ON ARCHITECTURAL PLANS.
4. ALL MOUNTING HEIGHTS SHOWN IN SYMBOL LEGEND SHALL BE AS PER TAS/ADA REQUIREMENTS UNLESS OTHERWISE NOTED ON THE ARCHITECTURAL DRAWINGS.
5. BRANCH CIRCUIT NUMBERS MAY BE SHOWN NEXT TO SYMBOLS IN MULTIWIRE CIRCUITS.
6. EQUIPMENT IDENTIFIERS, MATCHING EQUIPMENT SCHEDULES, ARE DISPLAYED ATTACHED TO SYMBOLS BY LEADER ARROWS, UON.
7. SYMBOL ORIENTATION DOES NOT IMPLY DEVICE OR EQUIPMENT ORIENTATION, UNLESS NOTED AS SUCH. SEE REFLECTED CEILING PLANS FOR LIGHT FIXTURE POSITIONS AND ORIENTATIONS.
8. SYMBOL SIZE DOES NOT IMPLY EQUIPMENT SIZE, UON.
9. LOWER CASE LETTER IN POSITION "X" INDICATES FIXTURES CONTROLLED BY SAME LETTER.
10. PLAN SYMBOLS USE THE FOLLOWING LINE TYPE CONVENTION AND ARE REPRESENTED AS FOLLOWS:
    - LINETYPE, DENOTES EXISTING TO REMAIN
    - LINETYPE, DENOTES EXISTING TO BE DEMOLISHED
    - LINETYPE, DENOTES NEW U.G. OR CONCEALED CONSTRUCTION
    - LINETYPE, DENOTES NEW CONSTRUCTION

check sheet printing. does not appear to be center

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION:
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

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DESIGNED BY: KTL
DRAWN BY: LW
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ELECTRICAL SYMBOLS, LEGEND & ABBREVIATIONS

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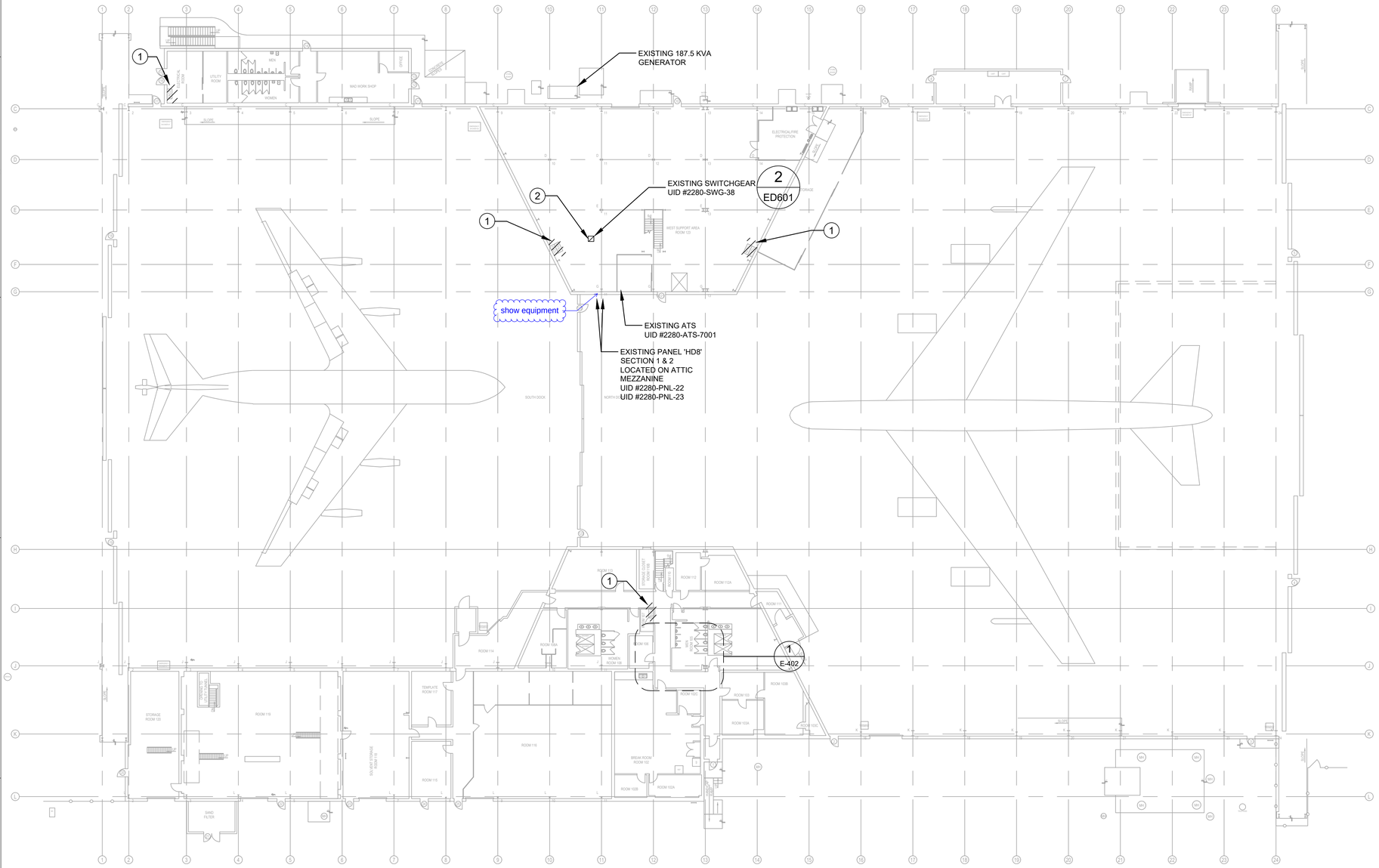

1 ED101 ELECTRICAL OVERALL PLAN - DEMOLITION

SCALE: 3/32" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR TO REPLACE EXISTING CONDUCTORS AND CONDUIT BACK TO THE PROTECTIVE DEVICE WITHIN A PANELBOARD OR TO AN EXISTING SPLICE WITHIN AN EXISTING JUNCTION BOX.
2. ALL AFFECTED CIRCUITS SHALL BE SAFELY ISOLATED AND LOCKED OFF (MADE SAFE) WITH CONDUCTORS AND CONDUITS PROTECTED AND ARRANGED TO PERMIT THE SAFE INSTALLATION OF THE FIRE ALARM DEVICES AND INSTALLATION OF THE SUSPENDED CEILING.
3. COORDINATE AT ALL TIMES WITH THE FIRE PROTECTION CONTRACTOR AND GENERAL CONTRACTOR UNDERTAKING THE CEILING AMENDMENTS.
4. ALL FIRE ALARM CONDUITS, DEVICES, AND ASSOCIATED BOXES SHALL BE FACTORY PAINTED RED IAW TAFB ELECTRICAL STANDARDS.
5. CONTRACTOR SHALL COORDINATE WITH CONTRACTING OFFICER AND USAGE ENTITIES/ORGANIZATION WITHIN THE BUILDING FOR CONDUIT ROUTING AND PENETRATION THROUGH WALL/CEILINGS. SUBMIT PROPOSED CONDUITS ROUTING FOR REVIEW AND APPROVAL FROM CONTRACTING OFFICER AND USAGE ENTITIES/ORGANIZATIONS PRIOR TO COMMENCING WORK.

KEYED NOTES:

1. DISCONNECT ALL ASSOCIATED ELECTRICAL COMPONENTS, CONDUCTORS, AND CONDUITS FROM THE FIRE ALARM EQUIPMENT BEING REMOVED. REMOVE BRANCH CIRCUIT CONDUCTORS AND CONDUITS BACK TO POWER SOURCE. ANY UN-USED BRANCH CIRCUITS SERVING EXISTING EQUIPMENT FROM THE PANEL SOURCES SHALL BE REMOVED AND INDICATED AS 'SPACE'. UPDATE CIRCUIT INDEX DIRECTORY PER SPECIFICATIONS.
2. REMOVE EXISTING 200A FUSES WITHIN FUSIBLE SWITCH OF EXISTING PANEL 'HD8' AND INDICATE AS 'FUSIBLE SWITCH HD8 BUSS'. UPDATE CIRCUIT INDEX DIRECTORY PER SPECIFICATIONS.

SPARE if breaker is to remain and just be turned off

note next to equipment says switchgear but from the photo it looks like a fusible switchboard

photo does not appear to have a circuit directory

wrong TB?

AIR FORCE MATERIEL COMMAND
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TINKER AFB, OK

PROJECT INFORMATION
WWYK130142 - RENOVATE TELECOMMUNICATIONS ITN FACILITY, B416
TINKER AIR FORCE BASE, OKLAHOMA

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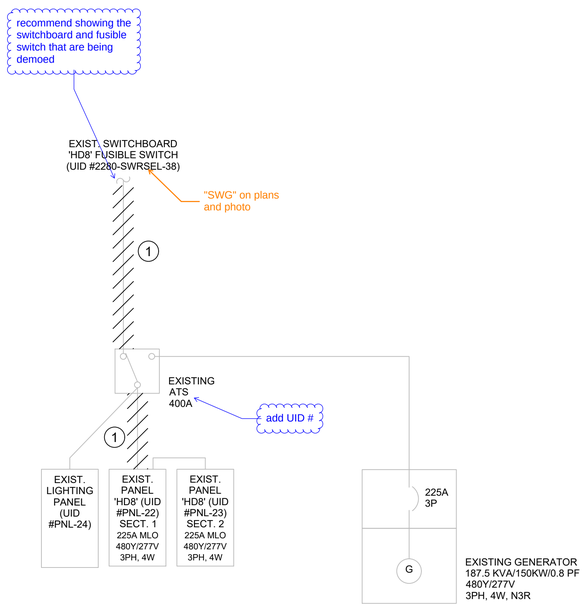

1 ED601 ELECTRICAL ONE-LINE DIAGRAM - DEMOLITION

SCALE: N.T.S.

2 ED601 MECHANICAL ROOM 123
SWITCHBOARD UID #2280-SWR-38 - DEMOLITION

we are calling it three different things across the plans, panel/switchgear/switchboard

GENERAL NOTES:

1. THE DRAWING WAS PREPARED FROM EXISTING AS-BUILTS AND LIMITED ACCESS FOR FIELD OBSERVATIONS AND VERIFICATIONS. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS AND UPDATE AS-BUILTS DRAWINGS FOR RECORD.
2. UNLESS NOTED OTHERWISE, ALL EXISTING EQUIPMENT TO REMAIN.
3. ANY UN-USED BRANCH CIRCUITS SERVING EXISTING EQUIPMENT SHALL BE REMOVED AND INDICATED AS 'SPACE'. UPDATE CIRCUIT INDEX DIRECTORY PER SPECIFICATIONS.

KEYED NOTES:

1. DISCONNECT POWER CONNECTION AND REMOVE CONDUCTORS/CONDUIT AS INDICATED TO HD8 FUSIBLE SWITCH.
2. REMOVE EXISTING 200A FUSES. SEE KEYED NOTE 2/ED100 FOR ADDITIONAL INFORMATION.

ED101

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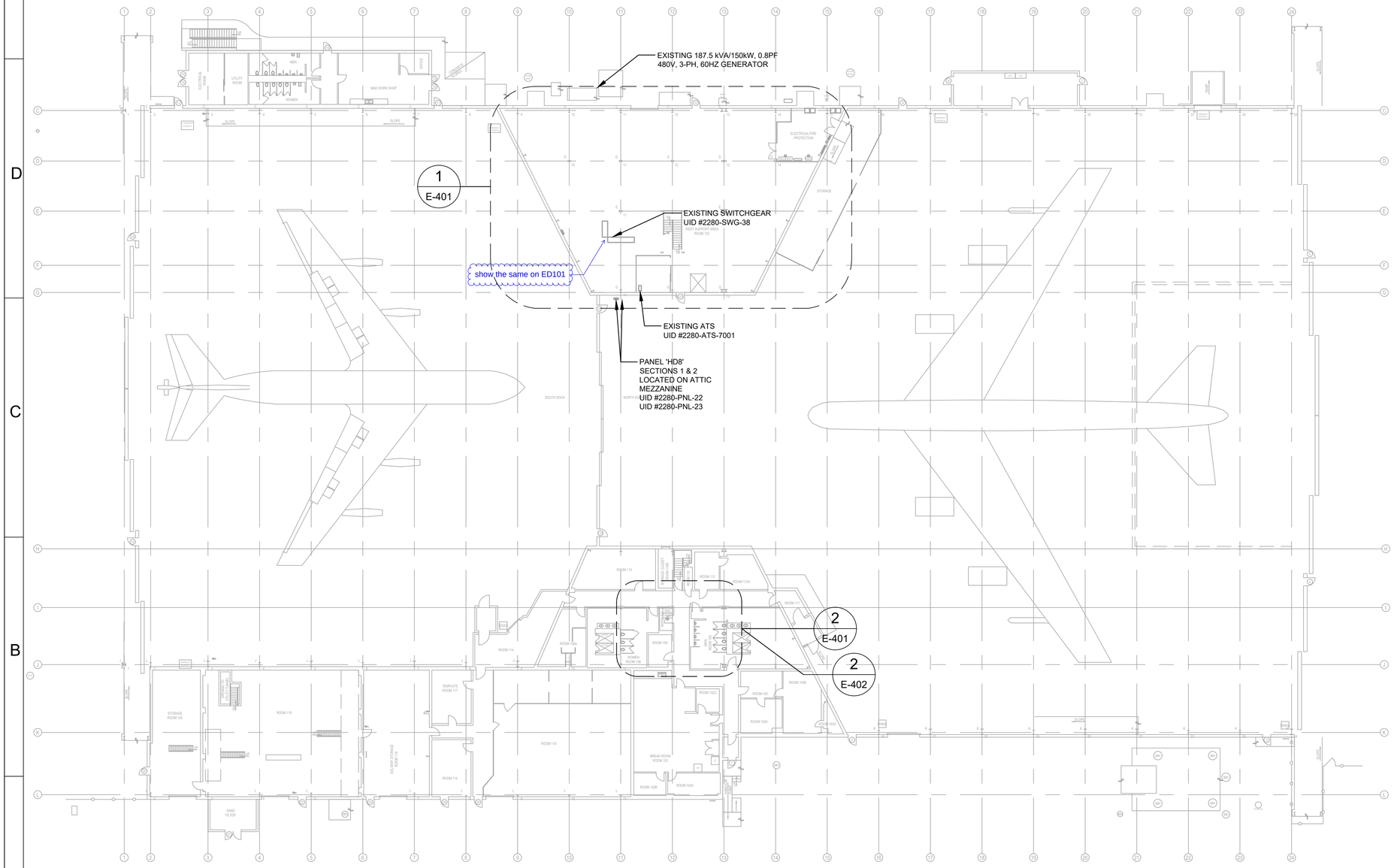
ELECTRICAL ONE-LINE DIAGRAM - DEMOLITION

SHEET NUMBER
ED601

SHEET - OF



1 E-100 ELECTRICAL OVERALL PLAN - NEW WORK

SCALE: 1" = 20'-0"

GENERAL NOTES:

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT.
2. ALL CONSTRUCTION WORK SHALL BE UNDERTAKEN IN ACCORDANCE WITH ALL FEDERAL AND LOCAL LAWS, CURRENT STANDARDS REGULATIONS AND CODES.
3. VERIFY AND CHECK ALL DIMENSIONS AND DETAILS SHOWN ON THE DRAWINGS PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCIES SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE CONTRACTING OFFICER FOR CLARIFICATION.
4. IF ANY DISCREPANCY OCCURS ON THE DRAWINGS OR BETWEEN DRAWINGS AND THE SPECIFICATION, THE CONTRACTOR SHALL DURING THE BID PERIOD ASSUME THE LARGER/GREATER SCOPE. ANY DISCREPANCY SHALL BE REFERRED TO THE CONTRACTING OFFICER BEFORE PROCEEDING WITH THE WORK.
5. THE SCOPE OF WORK INCLUDES BUT IS NOT LIMITED TO THE SUPPLY, DELIVERY, INSTALLATION, TESTING AND COMMISSIONING OF ALL MATERIALS, LABOR AND EQUIPMENT FOR THE COMPLETE ELECTRICAL SERVICES INSTALLATION AND ASSOCIATED CONSTRUCTION/BUILDING WORK AS SHOWN ON THE DRAWINGS AND SPECIFICATION.
6. COORDINATE AT ALL TIMES WITH THE CONTRACTING OFFICER.
7. LOCATIONS ARE BASED ON AVAILABLE EXISTING AS-BUILT DRAWINGS AND LIMITED ACCESS FOR FIELD OBSERVATIONS. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION AND QUANTITIES OF EXISTING ELECTRICAL EQUIPMENT, DEVICES AND COMPONENTS AFFECTED BY THE PROJECT WORKS INCLUDING BUT NOT LIMITED TO ELECTRICAL PANELBOARDS, DISCONNECTS, RECEPTACLES AND LIGHT FIXTURES, SWITCHES, CONDUCTORS, CABLE CONDUITS AND RACEWAYS ETC, THAT ARE AFFECTED BY THIS RENOVATION WORKS.
8. UNLESS SPECIFICALLY NOTED, SPECIFIED, OR APPROVED OTHERWISE, RACEWAYS SHALL BE INSTALLED CONCEALED IN ALL FINISHED AREAS AND EXPOSED IN UNFINISHED AREAS. EXPOSED RACEWAYS SHALL BE PAINTED TO MATCH ADJACENT SURFACES AND SHALL BE ROUTED OVERHEAD AND ALONG STRUCTURAL BEAMS.
9. CONTRACTOR SHALL BE RESPONSIBLE TO RESTORE ELECTRICAL SERVICE TO ALL EQUIPMENT, DEVICES AND CIRCUITS TO ORIGINAL OPERATION, WHICH ARE TO REMAIN IF SUCH ITEMS ARE AFFECTED BY CONSTRUCTION.
10. PROVIDE ALL MATERIALS, LABOR, AND EQUIPMENT FOR COMPLETE AND OPERABLE ELECTRICAL SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED, AND AS REQUIRED BY CODE.
11. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY POWER TO ENSURE ALL EXISTING TO REMAIN EQUIPMENT CONTINUING IN OPERATIONAL.
12. DO NOT COMMENCE ANY POWER OUTAGES UNTIL THE CONTRACTING OFFICER HAS PROVIDED WRITTEN AUTHORIZATION.

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: KTL
DRAWN BY: LW
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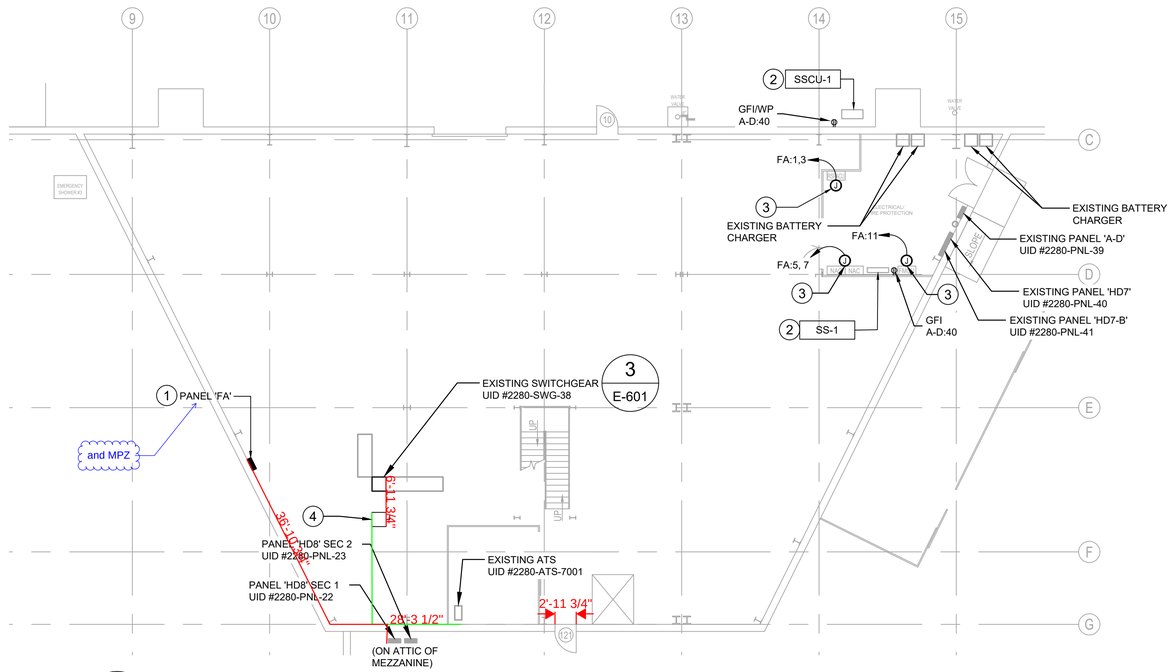
SHEET TITLE
ELECTRICAL OVERALL PLAN - NEW WORK

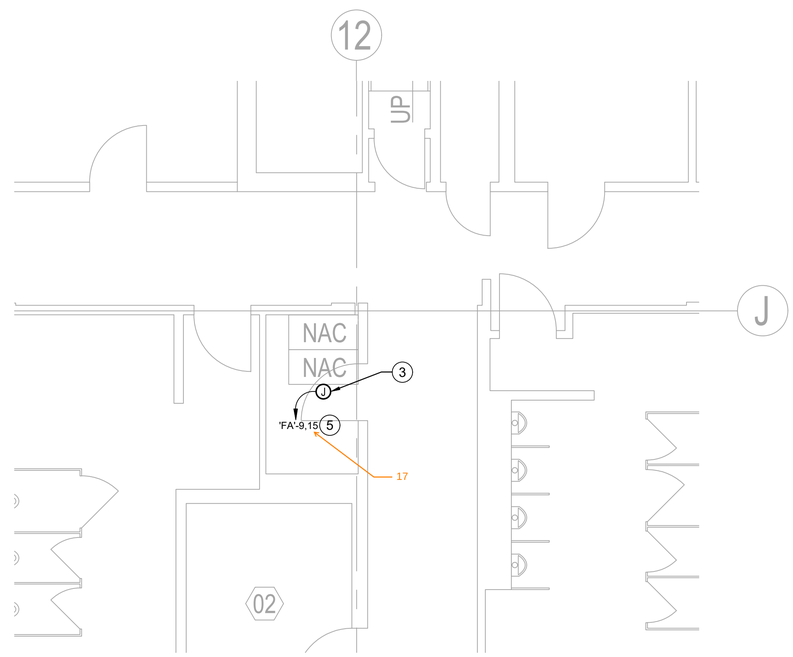
SHEET NUMBER
E-100

SHEET - OF



1
E-401 ELECTRICAL - MECH ROOM - NEW WORK

SCALE: 3/32" = 1'-0"



2
E-401 ELECTRICAL - EAST RM 107 - NEW WORK

SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. CONTRACTOR TO REPLACE EXISTING CONDUCTORS AND CONDUIT BACK TO THE PROTECTIVE DEVICE WITHIN A PANELBOARD OR TO AN EXISTING SPLICE WITHIN AN EXISTING JUNCTION BOX.
2. COORDINATE AT ALL TIMES WITH THE FIRE PROTECTION CONTRACTOR AND GENERAL CONTRACTOR UNDERTAKING THE CEILING AMENDMENTS.
3. ALL FIRE ALARM CONDUITS, DEVICES, AND ASSOCIATED BOXES SHALL BE FACTORY PAINTED RED IAW TAFB ELECTRICAL STANDARDS.
4. CONTRACTOR SHALL COORDINATE WITH CONTRACTING OFFICER AND USAGE ENTITIES/ORGANIZATION WITHIN THE BUILDING FOR CONDUIT ROUTING AND PENETRATION THROUGH WALL/CEILINGS. SUBMIT PROPOSED CONDUITS ROUTING FOR REVIEW AND APPROVAL FROM CONTRACTING OFFICER AND USAGE ENTITIES/ORGANIZATIONS PRIOR TO COMMENCING WORK.

KEYED NOTES:

1. PROVIDE NEW PANEL 'FA' TO SERVE FIRE PROTECTION SYSTEM LOADS. REFER TO ONE-LINE DIAGRAM ON SHEET E-601 FOR ADDITIONAL INFORMATION.
2. CONNECT NEW MECHANICAL EQUIPMENT TO CIRCUIT DESIGNATION INDICATED ON THE MECHANICAL EQUIPMENT SCHEDULE. PROVIDE ELECTRICAL COMPONENT(S), CONDUCTORS, AND CONDUIT AS INDICATED. REFER TO SHEET E-601 FOR MECHANICAL EQUIPMENT SCHEDULE.
3. PROVIDE A DEDICATED 120V CIRCUIT FOR FIRE ALARM EQUIPMENT FROM NEW PANEL 'FA'.
4. PROVIDE UNISTRUT AND MOUNT 400A FUSIBLE DISCONNECT SWITCH AS SHOWN. REFER TO ONE-LINE DIAGRAM ON E-601 FOR ADDITIONAL REQUIREMENTS. LOCATE EQUIPMENT A MINIMUM 3-FEET CLEARANCE FROM REAR OF EXISTING SWITCHGEAR. COORDINATE WITH MANUFACTURER FOR CLEARANCES AND ADDITIONAL REQUIREMENTS PRIOR TO INSTALLATION.
5. PROVIDE 2-#8, 1-#8G, 3/4"C.

for each circuit?

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PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION

ISSUE DATE: 09-15-2022
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DESIGNED BY: KTL
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DESIGN FILE LOCATION:

SHEET TITLE
ELECTRICAL
FIRST FLOOR
ENLARGED PLANS

SHEET NUMBER
E-401

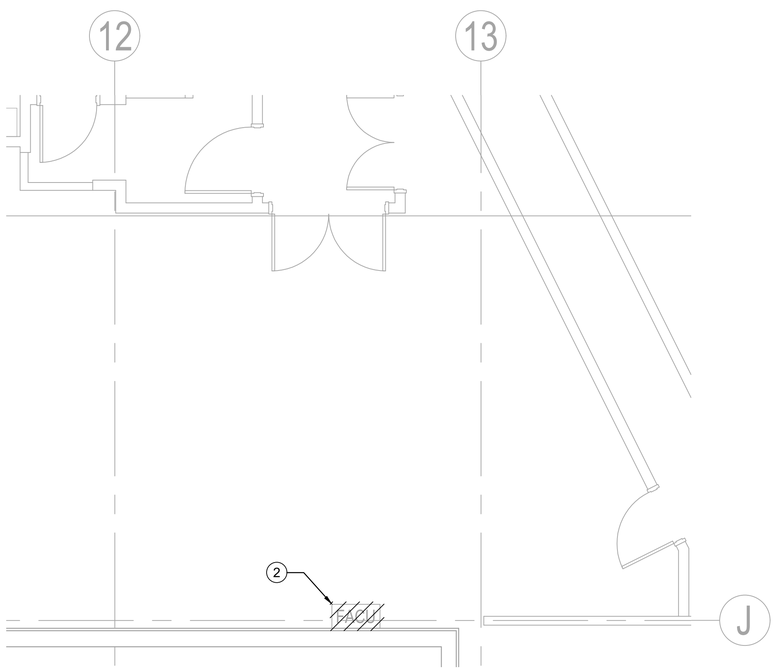
SHEET - OF

GENERAL NOTES:

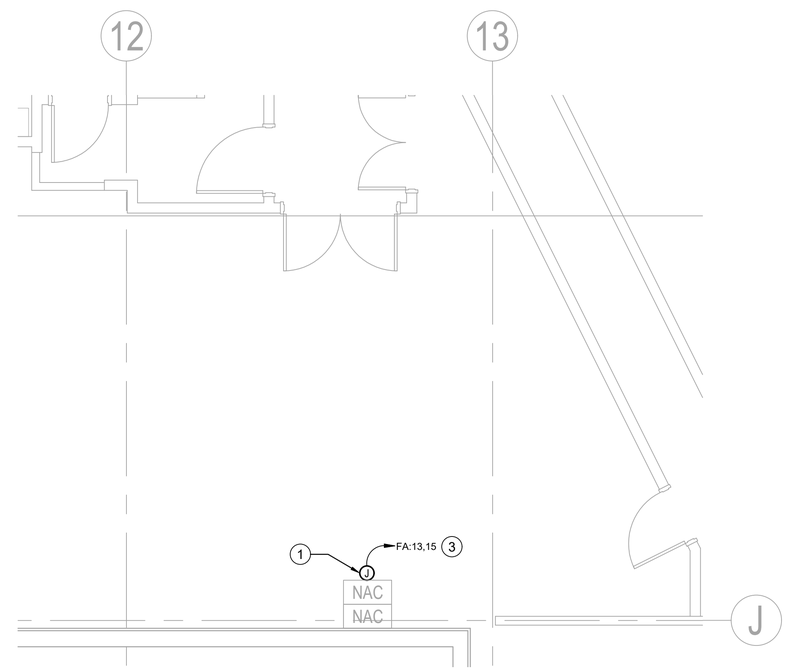
1. CONTRACTOR TO REPLACE EXISTING CONDUCTORS AND CONDUIT BACK TO THE PROTECTIVE DEVICE WITHIN A PANELBOARD OR TO AN EXISTING SPLICE WITHIN AN EXISTING JUNCTION BOX.
2. COORDINATE AT ALL TIMES WITH THE FIRE PROTECTION CONTRACTOR AND GENERAL CONTRACTOR UNDERTAKING THE CEILING AMENDMENTS.
3. ALL FIRE ALARM CONDUITS, DEVICES, AND ASSOCIATED BOXES SHALL BE FACTORY PAINTED RED IAW TAFB ELECTRICAL STANDARDS.
4. CONTRACTOR SHALL COORDINATE WITH CONTRACTING OFFICER AND USAGE ENTITIES/ORGANIZATION WITHIN THE BUILDING FOR CONDUIT ROUTING AND PENETRATION THROUGH WALL/CEILINGS. SUBMIT PROPOSED CONDUITS ROUTING FOR REVIEW AND APPROVAL FROM CONTRACTING OFFICER AND USAGE ENTITIES/ORGANIZATIONS PRIOR TO COMMENCING WORK.

KEYED NOTES:

1. PROVIDE A DEDICATED 120V CIRCUIT FOR FIRE ALARM EQUIPMENT FROM NEW PANEL 'FA'.
2. DISCONNECT ALL ASSOCIATED ELECTRICAL COMPONENTS, CONDUCTORS, AND CONDUITS FROM THE FIRE ALARM EQUIPMENT BEING REMOVED. REMOVE BRANCH CIRCUIT CONDUCTORS AND CONDUITS BACK TO POWER SOURCE. ANY UN-USED BRANCH CIRCUITS SERVING EXISTING EQUIPMENT FROM THE PANEL SOURCES SHALL BE REMOVED AND INDICATED AS 'SPACE'. UPDATE CIRCUIT INDEX DIRECTORY PER SPECIFICATIONS.
3. PROVIDE 2#8, 1#8G, 3/4"C.



1 E-402 ELECTRICAL - EAST SECOND FLOOR - DEMOLITION
SCALE: 1/4" = 1'-0"



2 E-402 ELECTRICAL - EAST SECOND FLOOR - NEW WORK
SCALE: 1/4" = 1'-0"

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PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

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MANAGEMENT INFORMATION

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DRAWN BY: ES
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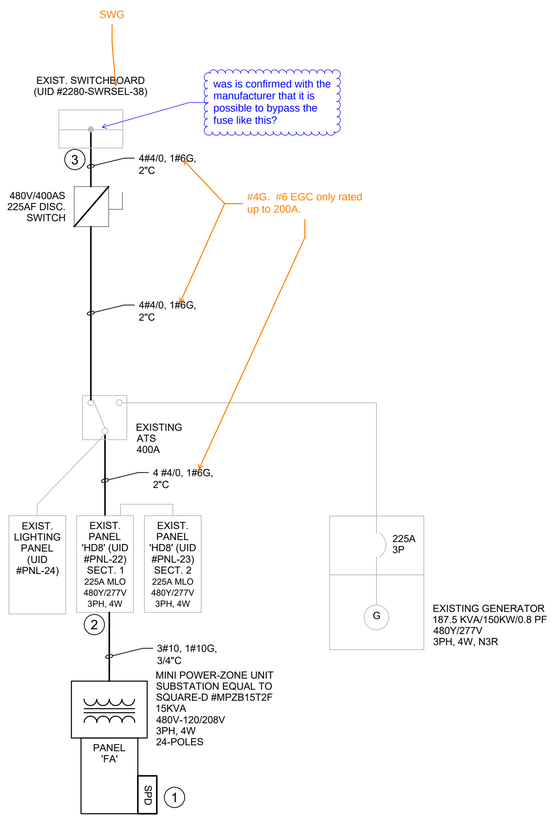
SHEET TITLE
ELECTRICAL SECOND FLOOR ENLARGED PLANS - DEMOLITION & NEW WORK

SHEET NUMBER
E-402

SHEET - OF



1 E-601 ELECTRICAL ONE-LINE DIAGRAM
SCALE: N.T.S.

3 E-601 MECHANICAL ROOM 123
SWITCHBOARD UID #2280-SWR-38 - NEW WORK
SCALE: N.T.S.

NOTES:

1. PROVIDE SELF-ADHESIVE VINYL LABEL TO AFFIX TO ELECTRICAL EQUIPMENT TO WARN OF ARC FLASH HAZARDS.
2. THE LABEL FORMAT AND TEXT CAN BE MODIFIED PROVIDED THAT THE INFORMATION REQUIRED BY UFC 3-501-01 IS INCLUDED.
3. THE LABEL SHALL BE LOCATED ON THE EQUIPMENT TO BE CLEARLY VISIBLE TO QUALIFIED PERSONS BEFORE EXAMINATION, ADJUSTMENT, SERVICING, OR MAINTENANCE OF THE EQUIPMENT.
4. THE SIZE OF THE LABEL SHALL BE MINIMUM:

EQUIPMENT TYPE	HEIGHT	WIDTH
INDOOR	2"	3"
OUTDOOR	3"	4.5"

5. A DOWNLOADABLE WINDOWS METAFILE IS AVAILABLE ON THE WHOLE BUILDING DESIGN GUIDE WEBSITE (WWW.WDBG.ORG) FOR USE IN A LABEL MAKING MACHINE.
   A. THE FILE IS LOCATED ON THE "NAVFAC CADD DETAILS" PAGE. TO NAVIGATE TO THIS LOCATION, FOLLOW: HOME > DOCUMENTS & REFERENCES > CCB > CADD LIBRARY > NAVFAC CADD RESOURCES > NAVFAC CADD DETAILS.
   B. ALTERNATIVELY, TYPE IN THE FOLLOWING ADDRESS IN INTERNET EXPLORER: https://www.wbdg.org/FFC/NAVGRAPH/arc_flash_warning_labels.zip
6. THE CONTRACTOR SHALL UNDERTAKE FAULT CURRENT CALCULATIONS (PREPARED BY A QUALIFIED PROFESSIONAL ENGINEER) AND ARC FLASH ANALYSIS PERFORMED USING "EASY POWER" SOFTWARE AND THE ANALYSIS SHALL BE SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO EQUIPMENT SELECTION. SUBMIT TO 72ABW/CENMP.

2 E-601 ARC FLASH WARNING LABEL
SCALE: N.T.S.

GENERAL NOTES:

1. THE DRAWING WAS PREPARED FROM EXISTING AS-BUILTS AND LIMITED ACCESS FOR FIELD OBSERVATIONS AND VERIFICATIONS. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS AND UPDATE AS-BUILTS DRAWINGS FOR RECORD.
2. UNLESS NOTED OTHERWISE, ALL EXISTING EQUIPMENT TO REMAIN.
3. NEW CIRCUIT BREAKERS SHALL MATCH EXISTING MANUFACTURER AND SHORT CIRCUIT RATING OF EXISTING PANELBOARDS.
4. ANY UN-USED BRANCH CIRCUITS SERVING EXISTING EQUIPMENT SHALL BE REMOVED AND INDICATED AS 'SPACE'. UPDATE CIRCUIT INDEX DIRECTORY PER SPECIFICATIONS.

KEYED NOTES:

1. PROVIDE EXTERNALLY MOUNTED SURGE PROTECTION DEVICE AND INSTALLED PER SPECIFICATIONS OR PER MANUFACTURER RECOMMENDATION, WHICHEVER MORE STRINGENT. PROVIDE 3-#10,1-#10,3/4"C.
2. PROVIDE 25A/3P LOCK-ON CIRCUIT BREAKER WITHIN PANELBOARD.
3. TAP 400A DISCONNECT SWITCH FEEDER TO EXISTING SWITCHGEAR AS SHOWN. FEEDER SHALL NOT EXCEED 10-FT FROM EXISTING SWITCHGEAR BUS. REFER TO FLOOR PLAN FOR LOCATION.

switchboard

PEAK DEMAND CALCULATION WORKSHEET

PER NEC 220.87 [2023]

Project: WWYK190068 Repair Fire Suppression System, Maint Hanger B2280
Distribution Equipment: Existing Panel HD8 SEC 1 (UID #2280-PNL-22)

Maximum Demand	=	103	KW	(Note 1)
Power Factor	=	0.8	P.F.	
Service Voltage	=	480	Volts	
# of Phases	=	3	Phase	
Net Loads	=	0.0	Amps	
New Loads	=	26.0	Amps	
Peak KVA	=	128.8	KVA	(Note 1)
NEC 220.87(2) (Peak x 125%)	=	160.9	KVA	
Peak Amps	=	193.6	Amps	
Calculated New Demand	=	**219.6**	**Amps**	
Current Electrical Service Size	=	**225**	**Amps**	

only 11A at 480V seen at HD8

Additional Notes:
1. The indicated data is based on Peak Demand load from Generator Operating Log (Inspection Checklist), dated on 01/11/2022. The data tested periodically every month for twelve consecutive months (Aug 2021 thru June 2022)

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PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

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DESIGN GROUP: HDR
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DESIGN FILE LOCATION:

SHEET TITLE
ELECTRICAL ONE-LINE DIAGRAM

SHEET NUMBER
E-601

SHEET - OF

MECHANICAL EQUIPMENT CONNECTION SCHEDULE

TAG	DESCRIPTION	VOLTAGE	PHASE	hp/MCA/FLA	LOAD (A)	CIRCUIT	LOCAL DISCONNECT	CONTROLLER TYPE	CIRCUIT BREAKER	CONDUIT	PHASE CONDUCTORS	NEUTRAL CONDUCTORS	GROUND CONDUCTORS
SS-1/SSCU-1 (NOTE 2)	SPLIT SYSTEM	208	1	16.34 MCA	16.34	'A-D'-34,36	30A/250V/NF/N3R (NOTE 1)	NOTE 1	20A/2P	3/4"	2-#10	-	1-#10

GENERAL NOTES:

A. REFER TO MECHANICAL DRAWINGS FOR LOCATIONS AND POWER CONNECTION REQUIREMENTS. COORDINATE ALL POWER CONNECTION REQUIREMENTS WITH MANUFACTURER AS REQUIRED.

B. IF EQUIPMENT IS SUBSTITUTED AND ELECTRICAL MODIFICATIONS ARE REQUIRED, THE ELECTRICAL CONTRACTORS SHALL COORDINATE WITH MANUFACTURER AND DIVISION 22 & 23 CONTRACTORS FOR ALL NEW POWER CONNECTION REQUIREMENTS PRIOR TO PROCUREMENT AND INSTALLATION.

NOTES:

1. INDOOR UNIT LOCAL DISCONNECT AND CONTROLLER ARE PROVIDED WITH MECHANICAL EQUIPMENT. PROVIDE CONNECTION AS REQUIRED. REFER TO MECHANICAL SCHEDULE FOR ADDITIONAL INFORMATION.
2. INDOOR UNIT POWER IS FED FROM OUTDOOR UNIT. PROVIDE 3/4" CONDUIT WITH PULLSTRING.

208V/1PH

RSFACU

add load

PANEL FA

LOCATION: WEST SUPPORT AREA COL E10 | VOLTAGE: 208/120 V | KAIC: 18 | BUSSING SHALL BE FULLY RATED
MOUNTING: SURFACE | PHASE: 3 P / 4W | CODES: 0=EQPT, 1=RCPT, 2=LTG, 3=A/C, 4=HEAT
ENCLOSURE: NEMA 1 | STYLE: MINI POWER-ZONE | BUSSING: 100 A | 5=CONTINUOUS MOTORS, 6=LRGST MOTOR, 7=PANEL
BRKR MTG: BOLT-ON | (REF: SQUARE D) | MCB: 60 A | ACCESSORIES: GROUND BUS, 24 SPACE
BREAKERS: 75 DEGREE TERMINALS | MLO: A

CODE	BRKR	CIRCUIT USE	CKT	LOAD	A	B	C	LOAD	CKT	CIRCUIT USE	BRKR	CODE
0	20/2	SPARE	1		X				2	SPARE	20/1	
0			3			X			4	SPARE	20/1	
0	20/1	FIRE ALARM NAC, WEST ELEC/FP RM COL D14	5	720			X		6	SPARE	20/1	
0	20/1	FIRE ALARM NAC, WEST ELEC/FP RM COL D14	7	720	X				8	SPARE	20/1	
0	20/1	FIRE ALARM NAC, EAST RM COL J12	9	720		X			10	SPARE	20/1	
0	50/1	F/A CONTROL UNIT, WEST ELEC/FP RM COL D15	11	3,840			X		12	SPARE	20/1	
0	20/1	F/A NAC, EAST 2ND FLOOR MECH RM COL J13	13	720	X				14	SPACE	-	
0	20/1	F/A NAC, EAST 2ND FLOOR MECH RM COL J13	15	720		X			16	SPACE	-	
0	20/1	FIRE ALARM NAC, EAST RM COL J12	17	720			X		18	SPACE	-	
	-	SPACE	19		X				20	SPD	30/3	
	-	SPACE	21			X			22			
	-	SPACE	23				X		24			

	EQPT VA	RCPT VA	LTG VA	AC/HEAT VA	MOTORS	LRG MTR	CONN VA	PANEL VA	PHASE AMP
PHASE A	1440	0	0	0	0	0	1440	1440	12
PHASE B	1440	0	0	0	0	0	1440	1440	12
PHASE C	5280	0	0	0	0	0	5280	5280	44
TOTAL	8160	0	0	0	0	0	8160	8160	

PANEL DEMAND KVA: 8.16 | PANEL DEMAND AMPACITY: 23 AMPS
RESERVE KVA: 1.63 | RESERVE AMPACITY: 5 AMPS
DESIGN KVA: 9.79 | DESIGN AMPACITY: 27 AMPS

verify a 50A breaker is compatible in an MPZ

225A MLO on one-line

EXISTING PANEL HD8 SEC 1 (UID #2280-PNL-22)

LOCATION: WEST ATTIC OF MEZZANINE COL G11 | VOLTAGE: 480/277 V | KAIC: 18 | BUSSING SHALL BE FULLY RATED
MOUNTING: SURFACE | PHASE: 3 P / 4W | CODES: 0=EQPT, 1=RCPT, 2=LTG, 3=A/C, 4=HEAT
ENCLOSURE: NEMA 1 | STYLE: WEHB | BUSSING: 400 A | 5=CONTINUOUS MOTORS, 6=LRGST MOTOR, 7=PANEL
BRKR MTG: BOLT-ON | (REF: WESTINGHOUSE) | MCB: 400 A | ACCESSORIES: GROUND BUS, 24 SPACE
BREAKERS: 75 DEGREE TERMINALS | MLO: A

CODE	BRKR	CIRCUIT USE	CKT	LOAD	A	B	C	LOAD	CKT	CIRCUIT USE	BRKR	CODE
	70/3	ML-1	1		X				2	ML-2	70/3	
			3			X			4			
			5				X		6			
	70/3	ML-3	7		X				8	ML-4	70/3	
			9			X			10			
			11				X		12			
7	25/3	PANEL 'FA' VIA MINI POWER-ZONE	13	1,440	X				14	ML-6 & 8	70/3	
7			15	1,440		X			16			
7			17	5,280			X		18			
	70/3	ML-5 & 7	19		X				20	SPACE	-	
			21			X			22	EXISTING LOAD	20/2	
			23				X		24			

	EQPT VA	RCPT VA	LTG VA	AC/HEAT VA	MOTORS	LRG MTR	CONN VA	PANEL VA	PHASE AMP
PHASE A	1440	0	0	0	0	0	1440	1440	**5**
PHASE B	1440	0	0	0	0	0	1440	1440	**5**
PHASE C	5280	0	0	0	0	0	5280	5280	**19**
TOTAL	8160	0	0	0	0	0	8160	8160	

PANEL DEMAND KVA: **8.16** | ADDITIONAL PANEL DEMAND AMPACITY: **10** AMPS
RESERVE KVA: **1.63** | RESERVE AMPACITY: **1** AMPS
DESIGN KVA: **9.79** | DESIGN AMPACITY: **11** AMPS

NOTES:
1. BOLD CIRCUITS INDICATE NEW WORK.
2. PANELBOARD SCHEDULE INDICATES THE ADDITIONAL LOAD TO EXISTING PANELBOARD ONLY.

EXISTING PANEL A-D (UID #2280-PNL-39)

LOCATION: WEST ELEC/FP ROOM | VOLTAGE: 208/120 V | KAIC: 18 | BUSSING SHALL BE FULLY RATED
MOUNTING: SURFACE | PHASE: 3 P / 4W | CODES: 0=EQPT, 1=RCPT, 2=LTG, 3=A/C, 4=HEAT
ENCLOSURE: NEMA 1 | STYLE: NQ | BUSSING: 225 A | 5=CONTINUOUS MOTORS, 6=LRGST MOTOR, 7=PANEL
BRKR MTG: BOLT-ON | (REF: WESTINGHOUSE) | MCB: 200 A | ACCESSORIES: GROUND BUS, 42 SPACE
BREAKERS: 75 DEGREE TERMINALS | MLO: A

CODE	BRKR	CIRCUIT USE	CKT	LOAD	A	B	C	LOAD	CKT	CIRCUIT USE	BRKR	CODE
	30/3	EXISTING LOAD	1		X				2	EXISTING LOAD	20/3	
			3			X			4			
			5				X		6			
	20/1	EXISTING LOAD	7		X				8	EXISTING LOAD	20/1	
	20/1	EXISTING LOAD	9			X			10	MECH ROOM RECEPT EAST WALL	20/1	
	20/1	EXISTING LOAD	11				X		12	EXISTING LOAD	20/1	
	20/1	EXISTING LOAD	13		X				14	EXISTING LOAD	20/1	
	20/1	EXISTING LOAD	15			X			16	EXISTING LOAD	20/1	
	20/1	EXISTING LOAD	17				X		18	EXISTING LOAD	20/2	
	20/1	EXISTING LOAD	19		X				20			
	20/2	EXISTING LOAD	21			X			22	EXISTING LOAD	20/1	
			23				X		24	EXISTING LOAD	20/1	
	20/1	OUTSIDE GFI BATTERY NW	25		X				26	RECEPTS SW HANGAR	20/1	
	20/1	OUTSIDE GFI BATTERY NW	27			X			28	RECEPTS SW HANGAR	20/1	
	20/1	OUTSIDE GFI BATTERY NW	29				X		30	RECEPTS SW HANGAR	20/1	
	20/1	OUTSIDE GFI BATTERY NW	31		X				32	RECEPTS SW HANGAR	20/1	
	20/1	OUTSIDE GFI BATTERY NW	33			X		**1,903**	34	**SS-1/SSCU-1**	**20/2**	**3**
	20/1	OUTSIDE GFI BATTERY NW	35				X	**1,903**	36			**3**
	20/1	EXISTING LOAD	37		X				38	EXISTING LOAD	30/1	
	-	SPACE	39			X		**360**	40	**SS-1/SSCU-1 - GFI RECEPT**	**20/1**	**1**
	-	SPACE	41				X		42	SPACE	-	

	EQPT VA	RCPT VA	LTG VA	AC/HEAT VA	MOTORS	LRG MTR	CONN VA	PANEL VA	PHASE AMP
PHASE A	0	0	0	0	0	0	0	0	**0**
PHASE B	0	0	0	1903	0	0	1903	1903	**16**
PHASE C	0	0	0	1903	0	0	1903	1903	**16**
TOTAL	0	0	0	3806	0	0	3806	3806	

PANEL DEMAND KVA: **3.81** | ADDITIONAL PANEL DEMAND AMPACITY: **11** AMPS
RESERVE KVA: **0.76** | RESERVE AMPACITY: **2** AMPS
DESIGN KVA: **4.57** | DESIGN AMPACITY: **13** AMPS

NOTES:
1. BOLD CIRCUITS INDICATE NEW WORK
2. PANELBOARD SCHEDULE INDICATES THE ADDITIONAL LOAD TO EXISTING PANELBOARD ONLY.

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS
MARK | DATE | DESCRIPTION

MANAGEMENT INFORMATION
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DESIGN GROUP: HDR
DESIGNED BY: KTL
DRAWN BY: LW
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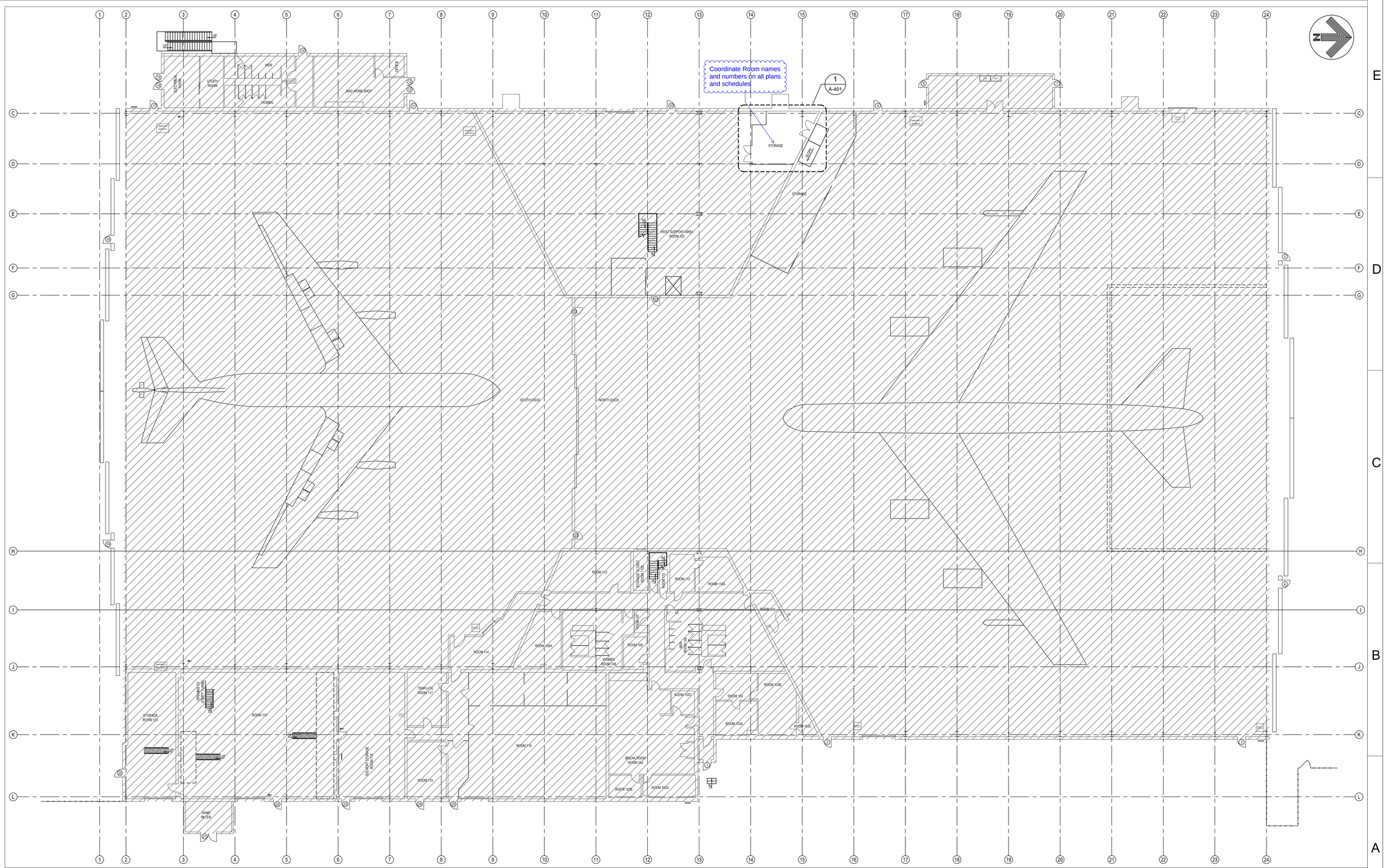
DESIGN FILE LOCATION:

SHEET TITLE
ELECTRICAL SCHEDULES

SHEET NUMBER
E-602
SHEET - OF



1
AD101

ARCHITECTURAL FIRST FLOOR PLAN - DEMOLITION

SCALE: N.T.S.

LEGEND:

NIC: NOT IN ARCHITECTURAL SCOPE OF WORK

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE

TINKER AFB, OK

PROJECT INFORMATION

WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280

TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

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MANAGEMENT INFORMATION

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DRAWN BY: JS
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DESIGN FILE LOCATION:

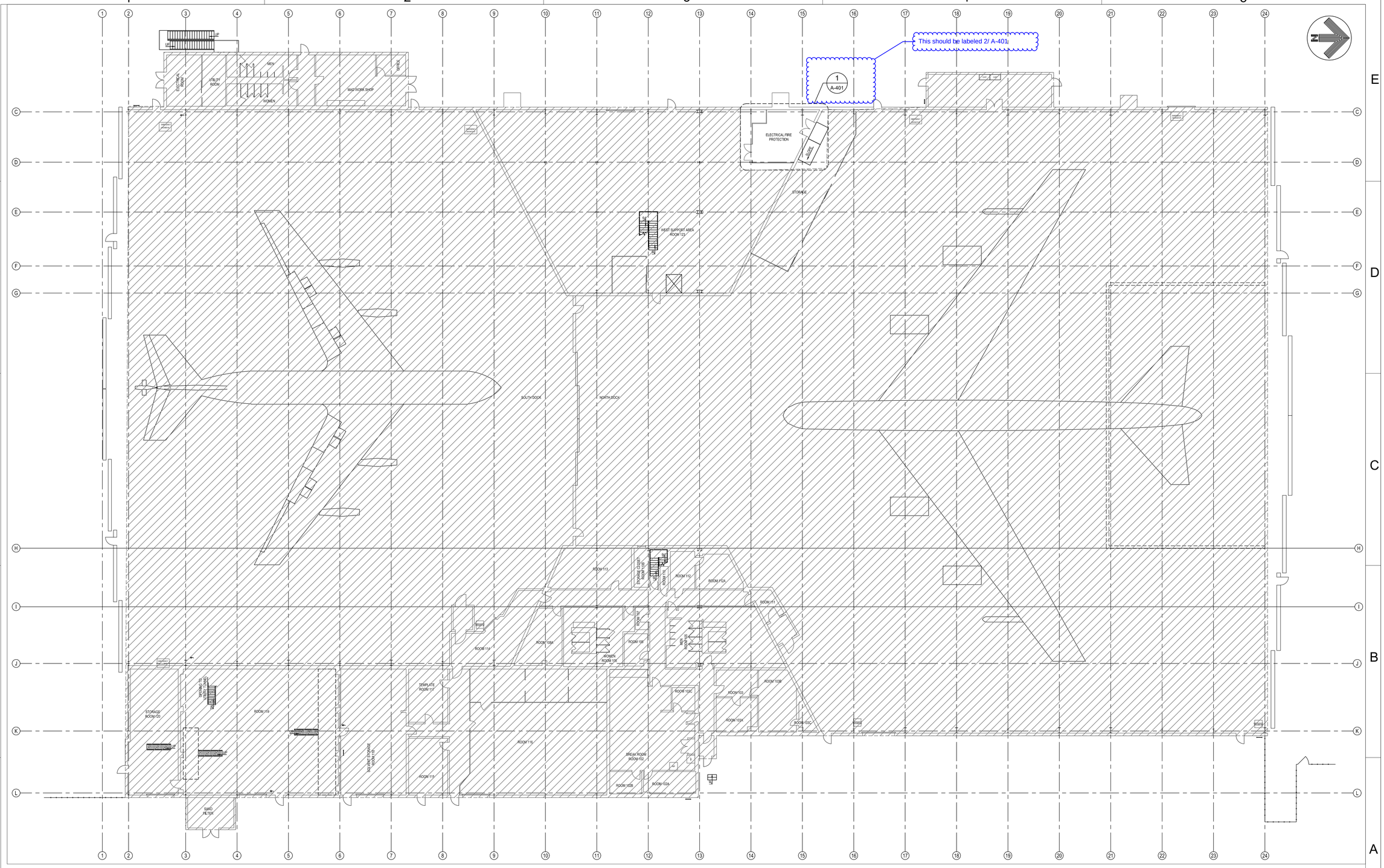
SHEET TITLE

ARCHITECTURAL FIRST FLOOR PLAN - DEMOLITION

SHEET NUMBER

AD101

SHEET - OF



1
A-101

ARCHITECTURAL FIRST FLOOR PLAN - NEW WORK

SCALE: N.T.S.

LEGEND:

NIC: NOT IN ARCHITECTURAL SCOPE OF WORK

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION

WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION

ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: HDR
DRAWN BY: JS
CHECKED BY: AM
DESIGN FILE LOCATION:

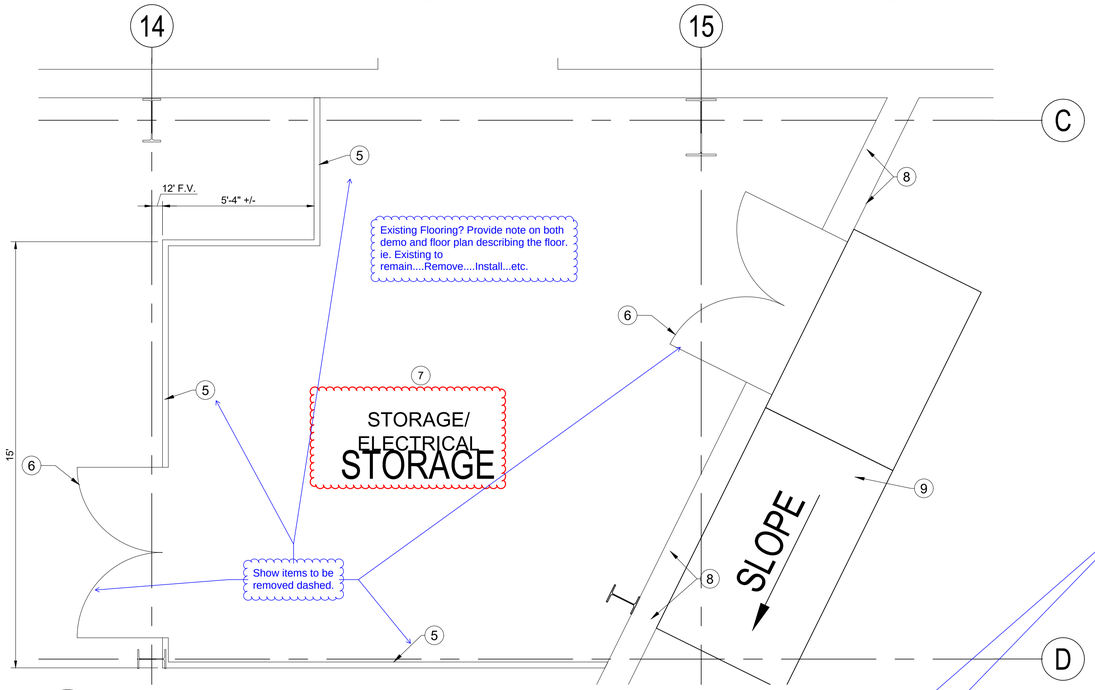
SHEET TITLE

ARCHITECTURAL FIRST FLOOR PLAN - NEW WORK

SHEET NUMBER

A-101

SHEET - OF



1 A-401 ARCHITECTURAL ENLARGED FLOOR PLAN - DEMOLITION

SCALE: 3/8"=1'-0"

DO WE NEED TO HAVE ANY SIGNAGE FOR LOAD RATING OF THE ROOF? OR SOMETHING THAT STATES IT IS NOT DESIGNED FOR STORAGE?

Notes 2 and 4 are not necessary if all of the information is provided in the door schedule.

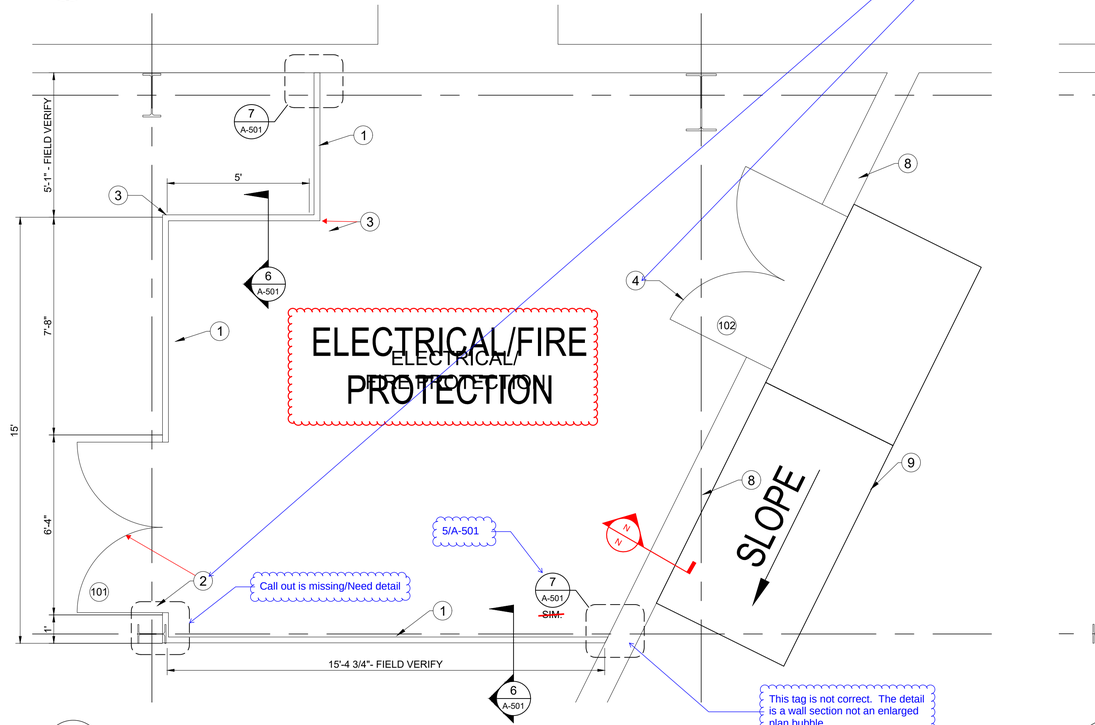
GENERAL NOTES:

1. DRAWINGS & SPECIFICATIONS ARE COMPONENTS OF THE CONTRACT DOCUMENTS. REVIEW ALL DRAWINGS & SPECIFICATIONS FOR THE COMPLETE SCOPE OF WORK. NOTIFY CONSTRUCTION INSPECTOR IMMEDIATELY FOR CLARIFICATION IF INCONSISTENCIES, CONTRADICTIONS, OR OMISSIONS ARE DISCOVERED.
2. DO NOT SCALE DRAWINGS. IF DIMENSIONAL INFORMATION IS REQUIRED & NOT FOUND, NOTIFY CONSTRUCTION INSPECTOR IMMEDIATELY FOR CLARIFICATION.
3. ALL DIMENSIONS ARE TO COLUMN CENTERLINES, FACE OF FINISHED WALLS, OR SURFACES, UNLESS NOTED OTHERWISE.
4. ~~REFER TO OTHER DISCIPLINE DRAWINGS FOR ITEMS NOT SHOWN.~~

KEY NOTES:

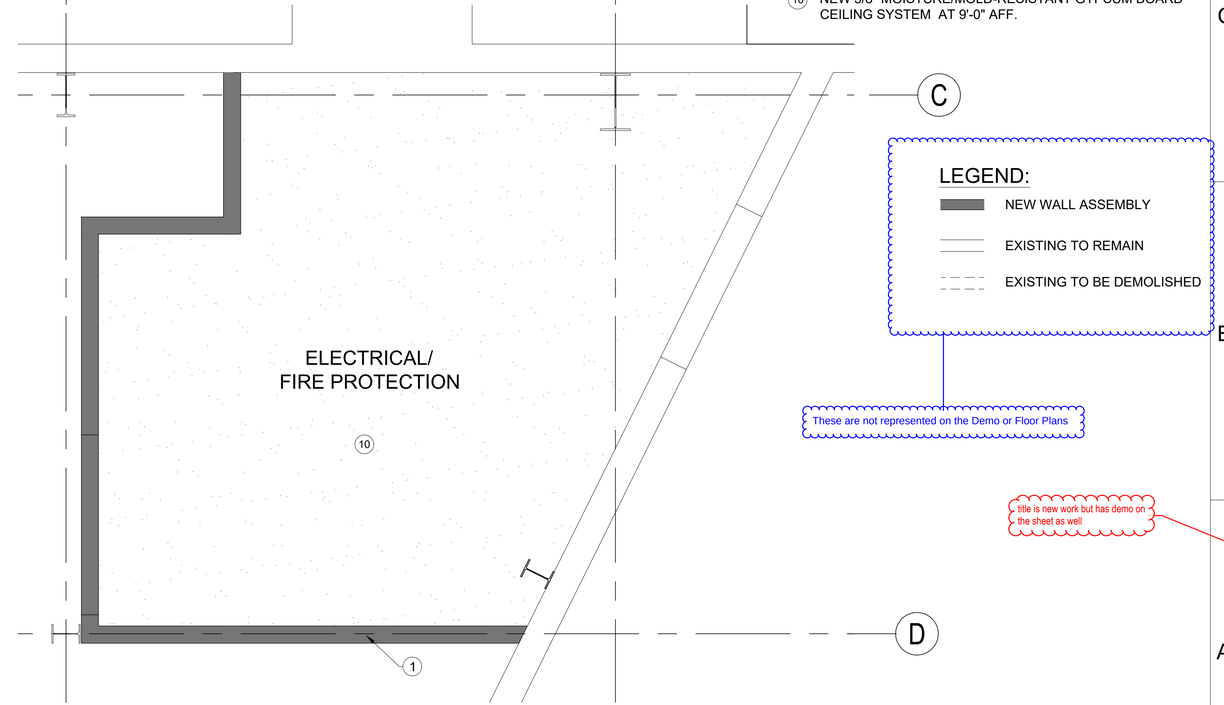
1. NEW FIBER CEMENT PANEL, 6" 20 GA. METAL STUD 24" O.C., & R-13 BATT INSULATION WALL ASSEMBLY - PAINTED.
2. NEW R-10 INSULATED GALVANIZED HOLLOW METAL DOOR & FRAME (PAIR 3'-0" X 7'0") - PAINTED
3. 8'H 304 STAINLESS STEEL CORNER GUARD - 3" WINGS
4. NEW 90 MIN. VAPOR-PROOF FIRE-RATED R-10 INSULATED GALVANIZED HOLLOW METAL DOOR & FRAME - PAINTED
5. EXISTING LIGHT GAGE METAL STUD PARTITION SYSTEM TO BE DEMOLISHED IN ITS ENTIRETY AND AREA PREPPED FOR NEW CONSTRUCTION.
6. EXISTING DOOR AND FRAME TO BE REMOVED IN THEIR ENTIRETY.
7. REMOVE EXISTING CEILING SYSTEM IN ITS ENTIRETY.
8. EXISTING 2-HOUR FIRE-RATED 12" CMU WALL TO REMAIN IN PLACE
9. EXISTING RAMP TO REMAIN IN PLACE
10. NEW 5/8" MOISTURE/MOLD-RESISTANT GYPSUM BOARD CEILING SYSTEM AT 9'-0" AFF.

Verify 12" Coordinate with structural



2 A-401 ARCHITECTURAL ENLARGED FLOOR PLAN - NEW WORK

SCALE: 3/8"=1'-0"



3 A-401 ARCHITECTURAL REFLECTED CEILING PLAN - NEW WORK

SCALE: 3/8"=1'-0"

LEGEND:

- NEW WALL ASSEMBLY
- EXISTING TO REMAIN
- EXISTING TO BE DEMOLISHED

These are not represented on the Demo or Floor Plans

title is new work but has demo on the sheet as well

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TINKER AFB, OK

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ARCHITECTURAL ENLARGED FLOOR PLAN - NEW WORK

SHEET NUMBER
A-401

SHEET - OF

Hardware Sets are not listed for each pair of doors here or in the specs. Recommend Coordinating Schedule with Specs.

Room names do not match

DOOR SCHEDULE

NO	ROOM NAME	DOOR SIZE (WxH)	DOOR TYPE	DOOR Level*	DOOR MATERIAL	DOOR FINISH	FRAME TYPE	FRAME MATERIAL	FRAME FINISH	FIRE RATING	NOTES
101	ELEC/FIRE SUPPRESSION	3'-0"x7'-0" PR	A	2	HM	PAINT	1	HM	PAINT	45 MIN	1,3,7
102	ELEC/FIRE SUPPRESSION	3'-0"x7'-0" PR	A	2	HM	PAINT	2	HM	PAINT	90 MIN	1, 2, 4, 5, 6

NOTES
1. REF. SPECS FOR HARDWARE
2. REPLACE EXISTING DOOR, FRAME, AND HARDWARE IN EXISTING OPENING
3. JAMB DETAIL 1/A-501; HEAD DETAIL 2/A-501
4. JAMB DETAIL 3/A-501; HEAD DETAIL 4/A-501
5. FIELD VERIFY OPENING SIZE FOR PROPER FITMENT OF NEW OPENING ASSEMBLY.
6. 90 MIN. DOOR AND FRAME THIS LOCATION
7. 45 MIN. DOOR AND FRAME THIS LOCATION

*REF. 08 11 13 FOR DOOR LEVEL DESCRIPTIONS

Verify this with the specs. I do not find descriptions in this section. Level 3 is mentioned once. Level 2 has been eliminated

Sealed Concrete? Verify. Provide note describing what is to happen with the floor. If sealant is required coordinate with specs.

Room names and room numbers are not coordinated with the Floor, Ceiling and Demo Plans. Coordinate and make sure they match.

I only see one room in this project. Two listed on the Room Finish Schedule. The number provided for the rooms are letters. Provide numbers and verify number of rooms.

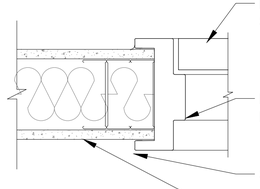
ROOM FINISH SCHEDULE

NO	ROOM NAME	WALL FINISH NORTH	WALL FINISH EAST	WALL FINISH SOUTH	WALL FINISH WEST	BASE FINISH NORTH	BASE FINISH EAST	BASE FINISH SOUTH	BASE FINISH WEST	FLOOR MATERIAL	CEILING MATERIAL	NOTES
EFP	11 - INT	GWB	GWB	GWB	GWB	RB	RB	RB	RB	-	GWP-PT	-
EFP	ELEC/FIRE SUPP. - EXT	GWB	GWB	GWB	GWB	RB	RB	RB	RB	-	GWB-PT	1

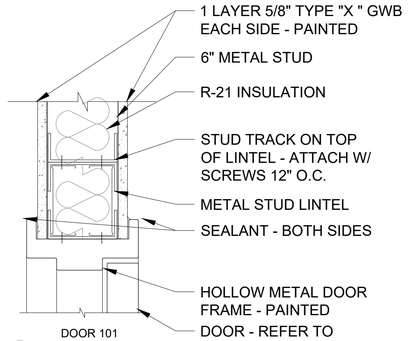
NOTES:
1. VAPOR-BARRIER PRIMER/SEALER BASE COAT AT EXTERIOR WALL AND ROOF PANEL SURFACES.
2. SEAL ALL JOINTS WITH PAINTABLE FIRESTOPPING SEALANT

LEGEND:
GWB-PT - GYPSUM WALL BOARD - PAINTED
RB - RUBBER BASE

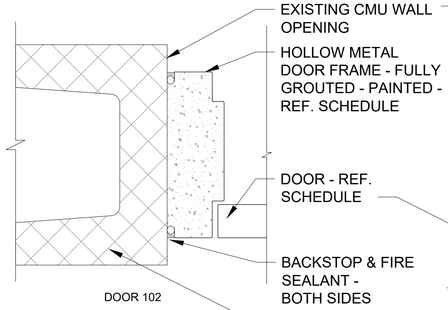
Note 10 on the Floor Plan calls for "Ceiling System." Use "Ceiling System" here to be consistent



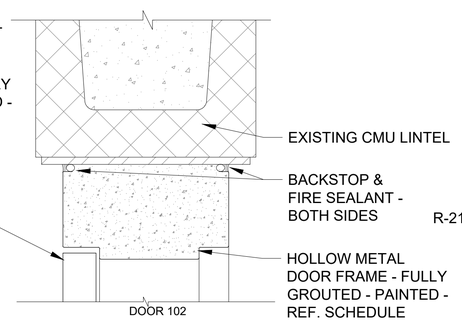
1 A-501 DOOR JAMB
SCALE: 3" = 1'- 0"



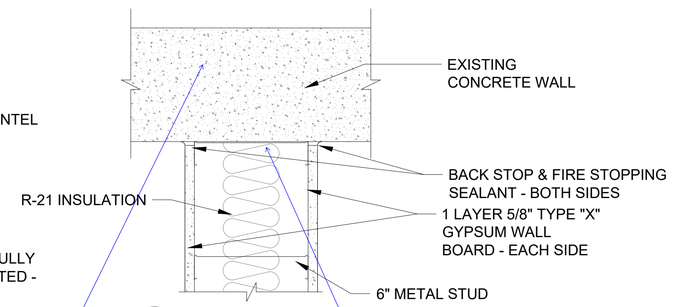
2 A-501 DOOR HEAD
SCALE: 3" = 1'- 0"



3 A-501 DOOR JAMB
SCALE: 3" = 1'- 0"

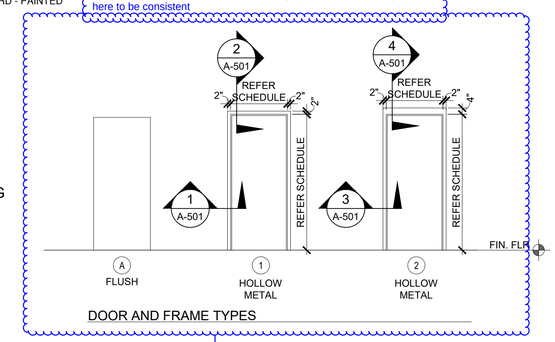


4 A-501 DOOR HEAD
SCALE: 3" = 1'- 0"



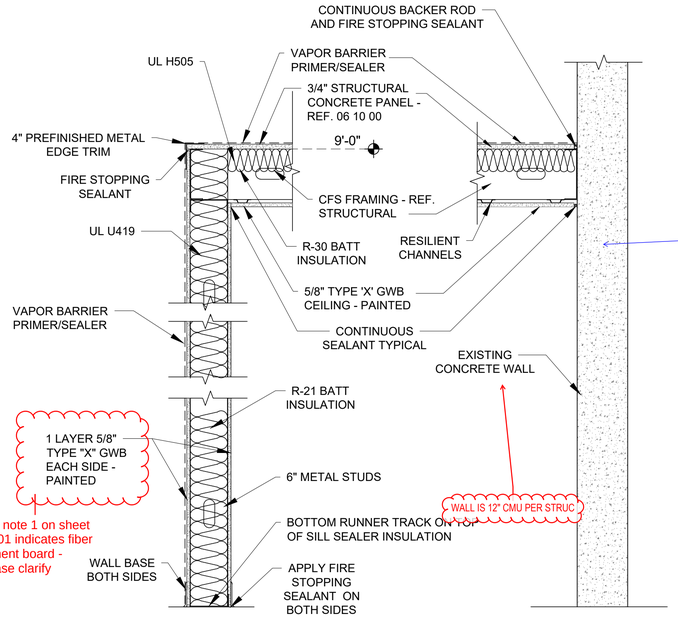
5 A-501 WALL DETAIL
SCALE: 3" = 1'- 0"

This is not drawn correctly. The stud wall hits the CMU wall at an angel



DOOR AND FRAME TYPES

These should be shown as a pair of doors at the proper width



Key note 1 on sheet A-401 indicates fiber cement board - please clarify

Assuming this is keynote 8 CMU Wall to remain. Section mark is not provided on Floor Plan 3/A-401 Clarify and show

6 A-501 WALL SECTION
SCALE: 1" = 1'- 0"

7 A-501 WALL SECTION
SCALE: 1" = 1'- 0"

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MANAGEMENT INFORMATION
ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: DS
DRAWN BY: JG
CHECKED BY: AM
DESIGN FILE LOCATION:

SHEET TITLE
ARCHITECTURAL DETAILS AND SCHEDULES

SHEET NUMBER
A-501
SHEET X OF

GENERAL

1. SCOPE
THE NOTES ON THIS SHEET AND THE STANDARD STRUCTURAL DETAILS ARE GENERAL AND APPLY TO THE ENTIRE PROJECT WHETHER SPECIFICALLY CALLED OUT OR NOT, EXCEPT WHERE THERE ARE SPECIFIC INDICATIONS TO THE CONTRARY ON STRUCTURAL SHEETS. IF THERE ARE QUESTIONS, THEY SHALL BE SUBMITTED TO THE STRUCTURAL ENGINEER AND ANSWERED IN WRITING PRIOR TO CONSTRUCTION.

2. APPLICABLE SPECIFICATIONS AND CODES
A. INTERNATIONAL BUILDING CODE, IBC 2024 WITH APPLICABLE EDITIONS OF THE CODE REFERENCED STANDARDS.
B. ACI 318-19
C. TAFB FACILITY STANDARDS 2020
D. UFC 1-200-01 (WITH CHANGE 4 DATED 17 DECEMBER 2024)
E. UFC 3-301-01 (WITH CHANGE 3 DATED 3 FEBRUARY 2025)

ASCE 7-22

AISI S100-16 (2020)

3. DESIGN CRITERIA
A. DEAD LOAD:
- ACTUAL TRIBUTARY STRUCTURE WEIGHT
- ROOF: 25 PSF

B. LIVE LOAD:
- SLAB ON GRADE: 250 PSF
- ROOF: 20 PSF (NON-REDUCIBLE)

C. WIND:
- STRUCTURE INTERIOR TO EXISTING BUILDING; THEREFORE, STRUCTURE DESIGNED FOR MINIMUM INTERIOR WALL AND PARTITION LOADING OF 5 PSF PER IBC 2024 SECTION 1607.16

D. SEISMIC:
- RISK CATEGORY: II
- IMPORTANCE FACTOR: 1.0
- SPECTRAL RESPONSE ACCELERATION, S_S: 0.299g
- SPECTRAL RESPONSE ACCELERATION, S_1: 0.081g
- SITE CLASS: D
- SEISMIC DESIGN CATEGORY: B
- SPECTRAL RESPONSE COEFFICIENT, SD_S: 0.311g
- SPECTRAL RESPONSE COEFFICIENT, SD_1: 0.130g
- BASIC SEISMIC FORCE RESISTING SYSTEM: STEEL SYSTEM NOT SPECIFICALLY DETAILED FOR SEISMIC RESISTANCE
- ANALYSIS PROCEDURE: EQUIVALENT LATERAL FORCE
- SEISMIC RESPONSE COEFFICIENT (C_S): 0.104
- RESPONSE MODIFICATION FACTOR (R): 3.0
- BASE SHEAR: 7.0 KIPS

E. SNOW LOAD:
- STRUCTURE INTERIOR TO EXISTING BUILDING; THEREFORE, SNOW LOADING HAS NOT BEEN CONSIDERED.

4. SAFETY
SAFETY AND STRUCTURE STABILITY DURING CONSTRUCTION ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. STRUCTURES HAVE BEEN DESIGNED TO RESIST THE DESIGN LIVE LOADS ONLY AS A COMPLETED STRUCTURE.

5. OPENINGS
OPENINGS FOR PIPES, DUCTS, CONDUITS, ETC. ARE NOT ALL SHOWN ON THE STRUCTURAL DRAWINGS. COORDINATE AND PROVIDE OPENINGS AS REQUIRED TO ACCOMMODATE ALL WORK SHOWN OR SPECIFIED IN THE CONTRACT DOCUMENTS AND OTHERWISE REQUIRED FOR THE FURNISHING OF A FUNCTIONALLY COMPLETE PROJECT. REINFORCE AROUND OPENINGS PER STANDARD STRUCTURAL DETAILS UNLESS OTHERWISE SHOWN.

6. STANDARD DETAILS
THE STANDARD DETAILS DEPICT TYPICAL DETAILING TO BE USED ON THIS PROJECT. IF CONDITIONS ARE NOT EXPLICITLY SHOWN ON THE DRAWINGS THEY SHALL BE MADE SIMILAR TO THE STANDARD DETAILS. OBTAIN APPROVAL OF ENGINEER IN WRITING FOR SIMILAR CONDITIONS PRIOR TO CONSTRUCTION.

7. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND ELEVATIONS OF EXISTING CONSTRUCTION AS REQUIRED TO COORDINATE NEW CONSTRUCTION. SUBMIT REQUIRED CHANGES FOR APPROVAL.

8. CONTRACTOR TO SUBMIT FOR REVIEW ALL EQUIPMENT SIZES, OPERATING WEIGHTS, VIBRATION FORCES, SUPPORT LOCATIONS, ALONG WITH ANY FLOOR OPENINGS, NOTCHES, AND RECESSES REQUIRED BY SUCH EQUIPMENT. CONCRETE SUPPORT PADS AND/OR FRAMING REQUIRED TO SUPPORT SAID EQUIPMENT SHALL NOT BE FABRICATED AND PLACED UNTIL THE CONCRETE SUPPORT PADS AND/OR FRAMING IS APPROVED TO SUPPORT THE EQUIPMENT.

COLD FORMED STEEL FRAMING

1. LIGHT GAUGE STUDS SHALL BE CLARK DIETRICH 600S162-33 OR EQUAL.
2. LIGHT GAUGE CEILING JOISTS SHALL BE CLARK DIETRICH 800S162-68 OR EQUAL.
3. LIGHT GAUGE MEMBERS LESS THAN 54 MILS SHALL BE 33 KSI STEEL. LIGHT GAUGE MEMBERS EQUAL TO OR GREATER THAN 54 MILS SHALL BE 50 KSI STEEL.
4. UNLESS NOTED OTHERWISE, MEMBER CONNECTIONS SHALL BE WITH (2) #10 TEK SCREWS, MINIMUM.
5. FABRICATION AND ERECTION OF MEMBERS SHALL BE IN STRICT ACCORDANCE WITH THE MANUFACTURER REQUIREMENTS.
6. ALL MEMBERS ARE SINGLE PIECE MEMBERS EXCEPT TOP AND BOTTOM TRACKS WHICH MAY BE SPLICED.
7. WELDING OF LIGHT GAUGE MATERIAL SHALL BE IN ACCORDANCE WITH ANSI/ AWS D1.3 LATEST EDITION. ALL WELDING ELECTRODES SHALL BE E70XX ELECTRODES.
8. ALL LOAD BEARING WALL STUDS SHALL BE SEATED WITH FULL CONTACT TO TOP AND BOTTOM PLATES.

DEFERRED SUBMITTALS

1. DEFINED:

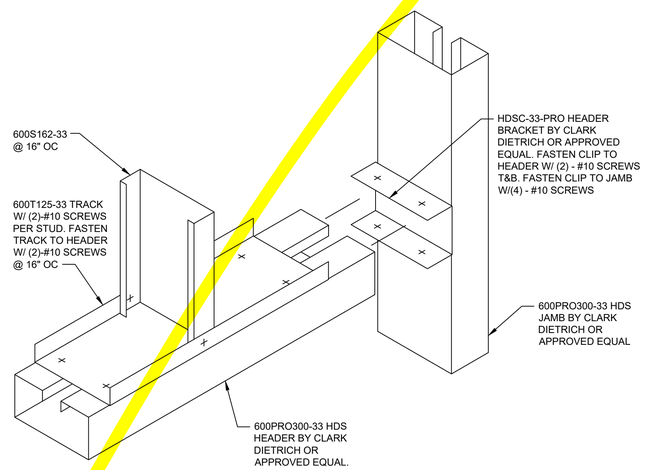
DELEGATED DESIGN SUBMITTALS ARE ITEMS FOR WHICH THE FINAL DESIGN OF A SPECIFIC ELEMENT OF THE PERMANENT CONSTRUCTION WORK EXPRESSLY DELEGATED TO A PROPERLY LICENSED AND REGISTERED DESIGN PROFESSIONAL LICENSED IN THE STATE OF OKLAHOMA RETAINED OR EMPLOYED BY THE CONTRACTOR, SUBCONTRACTOR, SUPPLIER OF ANY TIER. "DELEGATED DESIGN" APPLIES ONLY TO PERMANENT WORK THAT WILL BE PART OF THE COMPLETED PROJECT AS A FUNCTIONING WHOLE.

2. DELEGATED DESIGN LIST:

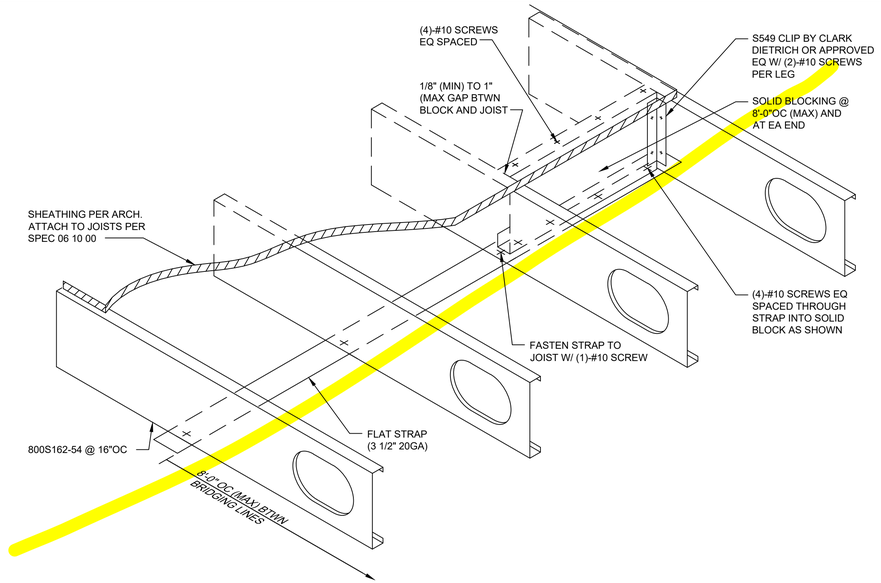
THE FOLLOWING IS A LIST OF DEFERRED SUBMITTALS THAT ARE EXPECTED TO CONTAIN STRUCTURAL CALCULATIONS OF SAFETY-RELATED SYSTEM INFORMATION FOR REVIEW. THESE SUBMITTALS APPLY TO DELEGATED DESIGN SYSTEMS PRIOR TO INSTALLATION OF THE INDICATED STRUCTURAL ELEMENT, EQUIPMENT, DISTRIBUTION SYSTEM, COMPONENT, OR ITS ANCHORAGE. THE CONTRACTOR SHALL SUBMIT THE REQUIRED ENGINEER CERTIFICATION, SUPPORTING DATA, AND DRAWINGS FOR REVIEW AND ACCEPTANCE BY THE CONTRACTING OFFICER.

REPLACE THIS WITH DELEGATED DESIGN NOTES SINCE FEDERAL

DERERRED SUBMITTALS	
SPEC SECTION	ITEM
VARIOUS	ANY EQUIPMENT OR COMPONENT IN WHICH A TECHNICAL SPECIFICATION REQUIRES SUBMITTAL OF EQUIPMENT OR ANCHORAGE SYSTEM CALCULATIONS

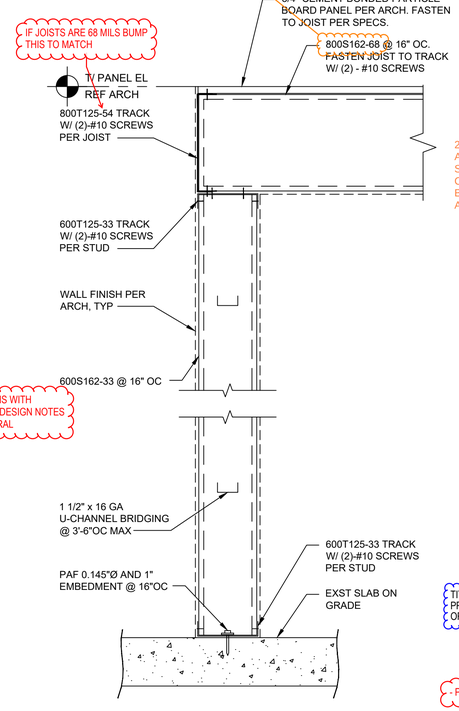


1 S-001 HDS HEADER CONNECTION TO JAMB
NTS



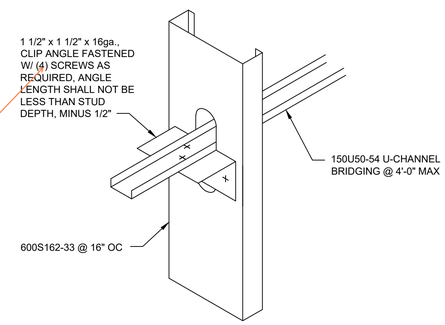
2 S-001 JOIST BRIDGING - TENSION STRAP
NTS

DOES NOT WORK PER DEFL. SEE CALC CHECK.

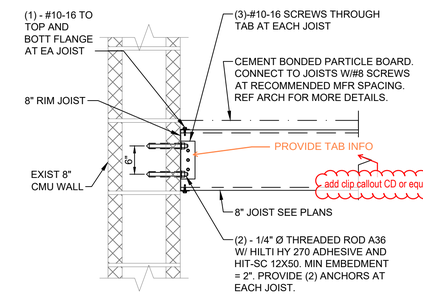


3 S-001 TYPICAL LOAD BEARING WALL SECTION
NTS

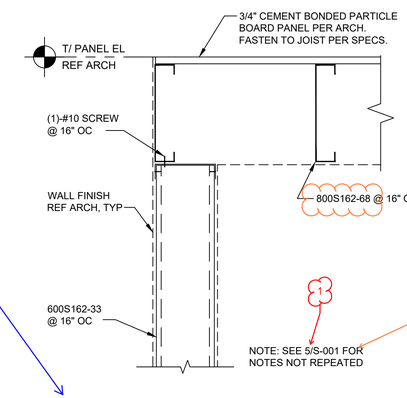
2 SCREWS USED FOR ANGLE TO VERTICAL STUD? AND 2 FOR CONNECTION BETWEEN BRIDGING AND ANGLE? CLARIFY



4 S-001 U-CHANNEL BRIDGING CONNECTION
NTS



6 S-001 CEILING JOIST TO EXIST CMU WALL CONNECTION
SCALE: NTS



TITLES ARE THE SAME PROBABLY SHOULD RENAME OR ADD TO IT

- PERPENDICULAR TO JOISTS

THIS IS 5/S-001. CLARIFY

- PARALLEL TO JOISTS

5 S-001 TYPICAL LOAD BEARING WALL SECTION
NTS

CONFIRM STRUC NAMES IN TITLEBLOCK

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DESIGNED BY:J. FLORES
DRAWN BY:S. FOXX
CHECKED BY:L. MENDOZA
DESIGN FILE LOCATION:

SHEET TITLE
STRUCTURAL GENERAL NOTES AND STANDARD DETAILS

SHEET NUMBER
S-001
SHEET OF

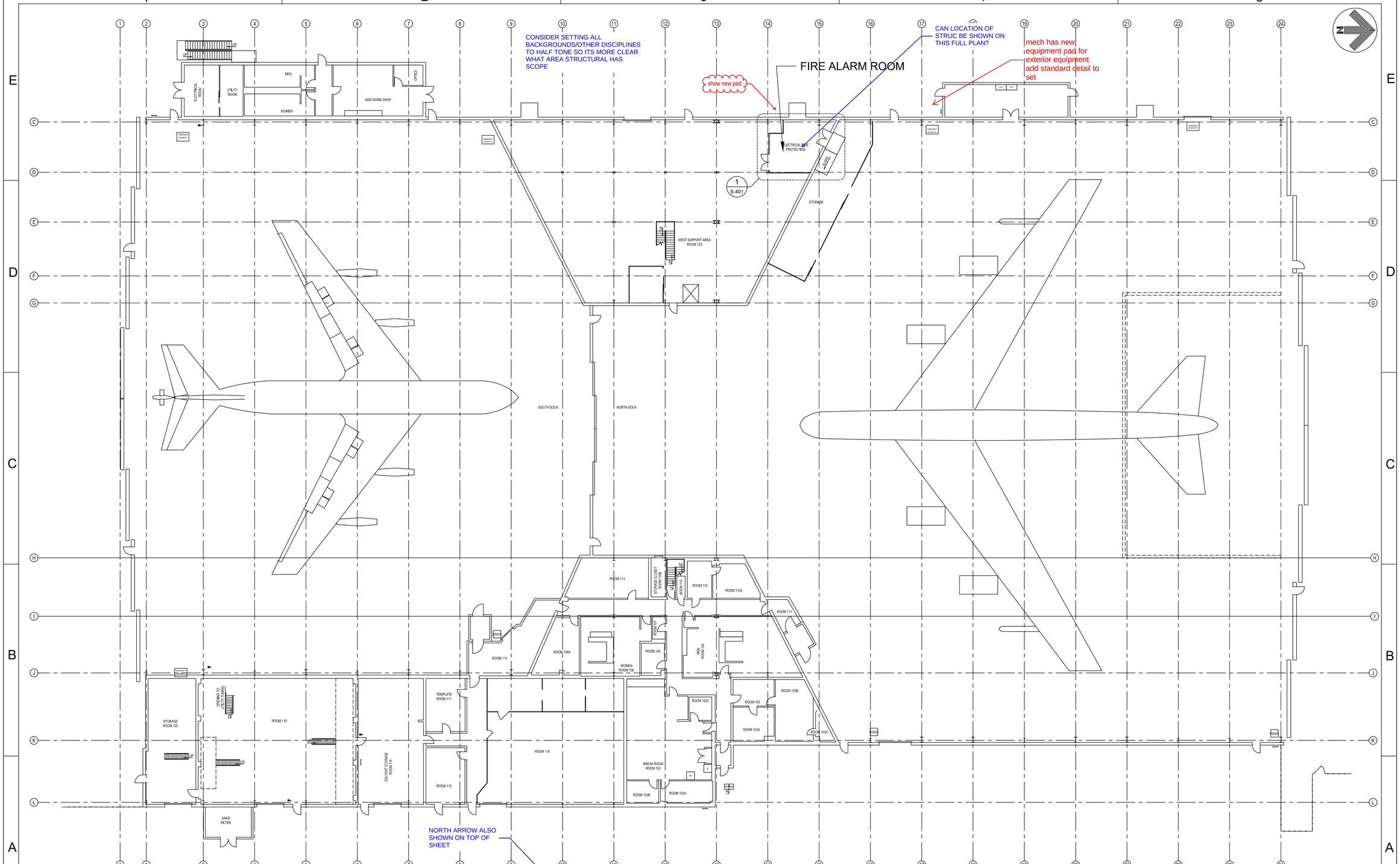
CONSIDER SETTING ALL BACKGROUNDS/OTHER DISCIPLINES TO HALF TONE SO ITS MORE CLEAR WHAT AREA STRUCTURAL HAS SCOPE

CAN LOCATION OF STRUC BE SHOWN ON THIS FULL PLAN?

mech has new equipment pad for exterior equipment. add standard detail to set

show new pad

FIRE ALARM ROOM



NORTH ARROW ALSO SHOWN ON TOP OF SHEET

1 S-101 STRUCTURAL FIRST FLOOR PLAN - NEW WORK

SCALE: N.T.S.

~~1 BUILDING 2280 - FLOOR PLAN~~

0' 8' 16' 32'

SEEMS ODD TO HAVE TWO PLAN TITLES

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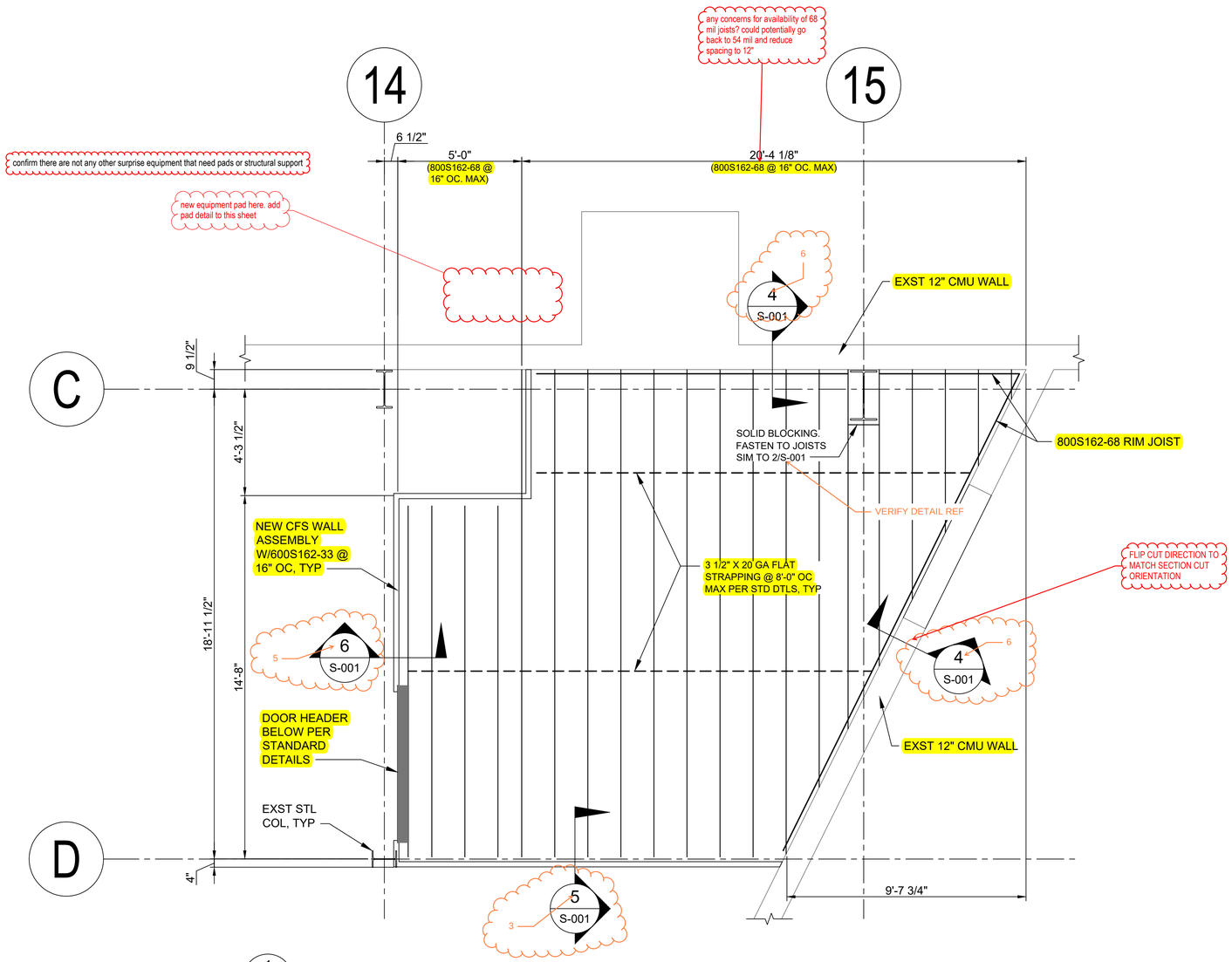
STRUCTURAL FIRST FLOOR PLAN - NEW WORK

SHEET NUMBER

S-100

SHEET OF



1 S-401 STRUCTURAL ENLARGED ROOF PLAN - NEW WORK

SCALE: 3/8"=1'-0"

CONSIDER CALLING THIS AN INTERMEDIATE ROOF?

SLIGHTLY CONFUSING THAT THE FULL PLAN WHICH THE PART PLAN IS CALLED OUT FROM IS FIRST FLOOR PLAN WHILE THIS IS ROOF PLAN

PLAN NOTES:

1. SEE S-001 FOR GENERAL STRUCTURAL NOTES AND STANDARD DETAILS.
2. REFERENCE ARCHITECTURAL FOR ALL NON LOAD BEARING STEEL STUD WALLS.
3. SEE FIRE PROTECTION AND ELECTRICAL DRAWINGS FOR EQUIPMENT DETAILS.
4. EXISTING BUILDING INFORMATION IS AS INDICATED ON THE AS-BUILT DRAWINGS BY KIRK & VOICH DATED DECEMBER 1975. ALL DIMENSIONS SHOWN SHALL BE FIELD VERIFIED BY THE CONTRACTOR. THE CONTRACTOR SHALL NOTIFY THE EOR OR CONTRACTING OFFICER OF ANY DISCREPANCIES.

LEGEND:

NEW WALL ASSEMBLY

EXISTING TO REMAIN

DOES NOT MATCH WHAT IS SHOWN ON PLAN

ADD KEY PLAN

KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION

ISSUE DATE: 09-15-2022
DESIGN GROUP: HDR
DESIGNED BY: J. FLORES
DRAWN BY: S. FOXX
CHECKED BY: L. MENDOZA
DESIGN FILE LOCATION:

SHEET TITLE
STRUCTURAL ENLARGED ROOF PLAN - NEW WORK

SHEET NUMBER
S-401

SHEET OF

PIPING SYSTEMS

	COLD WATER, POTABLE (CW)
	HOT WATER, POTABLE (HW)
	HOT WATER RECIRCULATING, POTABLE (HWC)
NPW	NON POTABLE COLD WATER
140	HOT WATER - TEMPERATURE, POTABLE
TW	TEPID WATER, POTABLE
TWR	TEPID WATER RETURN, POTABLE
SAN	SANITARY SEWER BELOW GRADE
SAN	SANITARY SEWER ABOVE GRADE
V	SANITARY VENT
AW	ACID WASTE
AV	ACID VENT
CWV	COMBINATION WASTE AND VENT
PD	PRESSURE DRAINAGE
SD	STORM DRAIN ABOVE GRADE
SD	STORM DRAIN BELOW GRADE
OD	STORM DRAIN OVERFLOW
NG	NATURAL GAS
LP	LIQUEFIED PROPANE
CA	COMPRESSED AIR
HWS	HEATING HOT WATER SUPPLY
HWR	HEATING HOT WATER RETURN
GHWS	GLYCOL HEATING HOT WATER SUPPLY
GHWR	GLYCOL HEATING HOT WATER RETURN
CWS	CHILLED WATER SUPPLY
CWR	CHILLED WATER RETURN
GCWS	GLYCOL CHILLED WATER SUPPLY
GCWR	GLYCOL CHILLED WATER RETURN
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
CD	CONDENSATE DRAIN
CPD	CONDENSATE PUMP DISCHARGE
STM -15	STEAM SUPPLY - PSI
BBD	BOILER BLOW DOWN
BF	BOILER FEED
SV	STEAM VENT
MU	MAKE-UP WATER

PIPING SYMBOLOGY

	PIPE ANCHOR
	PIPE GUIDE
	EXPANSION JOINT
PT	PRESSURE/ TEMPERATURE PORT
	THERMOMETER
	THERMOWELL
	PRESSURE GAUGE
T	TEMPERATURE GAUGE
	FLEXIBLE PIPING CONNECTION
	WYE STRAINER
	MANUAL AIR VENT
A	AUTOMATIC AIR VENT
M	METER (WATER, GAS, OTHER)
FCO	FLOOR CLEANOUT
CO	CLEANOUT
WCO	WALL CLEANOUT
GCO	DOUBLE GRADE CLEANOUT
	WATER HAMMER ARRESTOR
E	EARTHQUAKE VALVE
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER, FLAT ON BOTTOM
	ECCENTRIC REDUCER, FLAT ON TOP
	ELBOW, 90° TURN DOWN
	ELBOW, 90° TURN UP
	TEE, OUTLET UP
	TEE, OUTLET DOWN
	TEE, OUTLET UP W/ 90° TURN
	TEE, OUTLET DOWN W/ 90° TURN
	PIPE BREAK
	PIPE CAP
	BLIND FLANGE
	UNION
	FLOW ARROW
	SHUTOFF VALVE (NORMALLY OPEN)
	SHUTOFF VALVE (NORMALLY CLOSED)
	DRAIN VALVE
	CHECK VALVE
VB	VACUUM BREAKER
	AUTOMATIC FLOW CONTROL VALVE
	CALIBRATED MANUAL BALANCING VALVE
OR	PRESSURE-RELIEF VALVE
	PRESSURE-REDUCING VALVE (PRV)
	AUTOMATIC CONTROL VALVE, 2-WAY
	AUTOMATIC CONTROL VALVE, 3-WAY
BFP	BACKFLOW PREVENTER
XX-1	PLUMBING FIXTURE

HVAC SYMBOLOGY

24x18	SUPPLY AIR OR OUTSIDE AIR DUCT UP (SECTION CUT, FIRST DIMENSION DUCT WIDTH)
	SUPPLY AIR OR OUTSIDE AIR DUCT DOWN (NO SECTION CUT)
	RETURN AIR DUCT UP (SECTION CUT)
	RETURN AIR DUCT DOWN (NO SECTION CUT)
	EXHAUST AIR DUCT UP (NO SECTION CUT)
	EXHAUST AIR DUCT DOWN (NO SECTION CUT)
	ROUND ELBOW UP
	ROUND ELBOW DOWN
	TRANSITION - RECTANGULAR TO ROUND DUCT
	STANDARD BRANCH
	ELBOW - W/ TURNING VANE (RECTANGULAR)
	ELBOW - (RECTANGULAR), SMOOTH RADIUS
18x24	RECTANGULAR DUCT OR OPENING SIZE FIRST NUMBER INDICATES SIZE OF SIDE SHOWN
18Ø	ROUND DUCT SIZE
R OR D	RECTANGULAR DUCT INCLINE - RISE OR DROP IN RESPECT TO THE AIR FLOW
R OR D	ROUND DUCT INCLINE - RISE OR DROP IN RESPECT TO THE AIR FLOW
18x24	HIDDEN DUCT
T 9'-10" B 9'-0" 18x10	DUCT/PIPE ELEVATION TAG ABOVE FINISH FLOOR
	VOLUME DAMPER
M	MOTOR OPERATED DAMPER
	FIRE DAMPER
S	SMOKE DAMPER
S	SMOKE AND FIRE DAMPER
	FLEXIBLE CONNECTION
	FLEXIBLE DUCT - TWO LINE
	FLEXIBLE DUCT - ONE LINE
	ACOUSTICAL LINING - DUCT DIMENSIONS FOR NET FREE AREA
UC	UNDERCUT DOOR
	NEW TO EXISTING CONNECTION
	REMOVE EXISTING UP TO THIS POINT
	HVAC EMERGENCY SHUTDOWN SWITCH
TAG-SIZE CFM	SUPPLY AIR REGISTER
TAG-SIZE CFM	EXHAUST AIR OR RETURN AIR GRILLE
TAG CFM	EXHAUST AIR OR RETURN AIR GRILLE
TAG CFM	SUPPLY AIR ASSEMBLY SQUARE DIFFUSER
TAG CFM	SUPPLY AIR ASSEMBLY ROUND DIFFUSER

TEMPERATURE CONTROL DIAGRAM SYMBOLOGY

MISCELLANEOUS DEVICE IDENTIFIER

CO	SPACE CARBON MONOXIDE SENSOR
CO2	SPACE CARBON DIOXIDE SENSOR
H	SPACE HUMIDITY SENSOR
NO2	SPACE NITROGEN DIOXIDE SENSOR
S	SPACE TEMPERATURE SENSOR
T	THERMOSTAT

CONTROL DEVICE IDENTIFIER

AFS	AIRFLOW MEASURING STATION
AM	AIRFLOW MEASURING SENSOR
CO	CARBON MONOXIDE SENSOR
CO2	CARBON DIOXIDE SENSOR
F	FLOW SWITCH
FRZ	FREEZE STAT
H	HUMIDITY SENSOR
HS	HIGH STATIC SWITCH
LS	LOW STATIC SWITCH
NO2	NITROGEN DIOXIDE SENSOR
P	PRESSURE SENSOR
S	SPACE TEMPERATURE SENSOR
SD	SMOKE DETECTOR
T	TEMPERATURE SENSOR
TS	TEMPERATURE SWITCH
ΔP	DIFFERENTIAL PRESSURE SENSOR

CONTROL INPUT/OUTPUT IDENTIFIER

AI	ANALOG INPUT
AO	ANALOG OUTPUT
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT

COIL IDENTIFIERS

CC	CHILLED WATER COOLING COIL
DG	DIRECT FIRED GAS BURNER
DX	DIRECT EXPANSION COOLING COIL
EH	ELECTRIC HEATING COIL
ER	DIRECT EVAPORATIVE COIL
FC	FACE AND BYPASS COOLING COIL
FH	FACE AND BYPASS HEATING COIL
HC	HEATING HOT WATER HEATING COIL
IG	INDIRECT FIRED GAS BURNER
ST	STEAM HEATING COIL

CONTROL ABBREVIATIONS

BTU	BTU METER
COMM	COMMUNICATION
CT	CURRENT TRANSMITTER
EC	ELECTRONICALLY COMMUTATED
EF	EXHAUST FAN
FM	FLOW METER
M	MOTOR ACTUATOR
MA	MIXED AIR
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
OA	OUTDOOR AIR
RA	RETURN AIR
RL	RELIEF FAN
RF	RETURN FAN
SA	SUPPLY AIR
SF	SUPPLY FAN
TCC	TEMPERATURE CONTROL CONTRACTOR
VFC	VARIABLE FREQUENCY CONTROLLER

S	DUCT MOUNTED SMOKE DETECTOR
T	TEMPERATURE AVERAGING SENSOR
M	MOTOR OPERATED DAMPER
M	MOTOR OPERATED SINGLE BLADE DAMPER
	BACKDRAFT DAMPER
	HUMIDIFIER
AFS	AIRFLOW MEASURING STATION
	INTAKE/ EXHAUST LOUVER
	FILTER
FRZ	FREEZE STAT
XX M	SEE CONTROL ABBREVIATIONS (TYP) FAN
XX EC	FAN WITH EC MOTOR
	PUMP
EC	PUMP WITH EC MOTOR

ABBREVIATIONS

AD	ACCESS DOOR
AFR	ABOVE FINISHED ROOF
AHU	AIR HANDLING UNIT
APD	AIR PRESSURE DROP
ARF	ABOVE RAISED FLOOR
AV	ABOVE RAISED FLOOR
BAS	BUILDING AUTOMATION SYSTEM
BDD	BACK DRAFT DAMPER
BHP	BRAKE HORSE POWER
BOE	BOTTOM OF EQUIPMENT
BTUH	BRITISH THERMAL UNITS PER HOUR
CAV	CONSTANT AIR VOLUME
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
COP	COEFFICIENT OF PERFORMANCE
COR	CONTRACTING OFFICER'S REPRESENTATIVE
CRAC	COMPUTER ROOM AIR CONDITIONER
CU	CONDENSING UNIT
DB	DRY BULB
DDC	DIRECT DIGITAL CONTROL
DH	DEHUMIDIFIER
DX	DIRECT EXPANSION
EAT	ENTERING AIR TEMPERATURE
EDH	ELECTRIC DUCT HEATER
EER	ENERGY EFFICIENCY RATIO
EMCS	ENERGY MANAGEMENT CONTROL SYSTEM
ERU	ENERGY RECOVERY UNIT
ESP	EXTERNAL STATIC PRESSURE
ESS	EMERGENCY SHUTOFF SWITCH
EWT	ENTERING WATER TEMPERATURE
F	FUTURE
FA	FREE AREA
FCP	FAN CONTROL PANEL
FCU	FAN COIL UNIT
FDBK	FEEDBACK
FLA	FULL LOAD AMPS
FLT	FILTER
FPB	FAN POWERED BOX
FPM	FEET PER MINUTE
GC	GENERAL CONTRACTOR
GE	GRAVITY EXHAUST
GI	GRAVITY INTAKE
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
I/O	INPUT/OUTPUT
I/P	CURRENT TO PNEUMATIC
IAQ	INDOOR AIR QUALITY
IPLV	INTEGRATED PART LOAD VALUE
LAT	LEAVING AIR TEMPERATURE
LVR	LOUVER
LWT	LEAVING WATER TEMPERATURE
MAU	MAKE-UP AIR UNIT
MBH	THOUSAND BTUH
MCC	MOTOR CONTROL CENTER
NC	NOISE CRITERIA
NO	NUMBER
NRC	NOISE REDUCTION COEFFICIENT
OS&Y	OUTSIDE SCREW AND YOKE
PD	PRESSURE DROP
PPH	POUNDS PER HOUR
RH	RELATIVE HUMIDITY
RTU	ROOFTOP UNIT
S	SIGNAL PORT
SCFM	STANDARD CUBIC FEET PER MINUTE
SEER	SEASONAL ENERGY EFFICIENCY RATIO
SP	STATIC PRESSURE
TC	TECHNOLOGY CONTRACTOR
TCP	TEMPERATURE CONTROL PANEL
TD	TEMPERATURE DIFFERENTIAL
TES	THERMAL ENERGY STORAGE
TSP	TOTAL STATIC PRESSURE
UH	UNIT HEATER
V&C	VALVE AND CAP
VAV	VARIABLE AIR VOLUME
VDT	VERTICAL DRAW THRU
VRF	VARIABLE REFRIGERANT FLOW
VTR	VENT THROUGH ROOF
WB	WET BULB
WC	WATER COLUMN
WPD	WATER PRESSURE DROP

GENERAL NOTES

GENERAL MECHANICAL DEMOLITION NOTES

1. THE CONTRACTOR SHALL COMPLETELY REMOVE ALL PIPING, DUCTWORK, COILS, EQUIPMENT, TERMINAL UNITS, ASSOCIATED CONTROLS, WIRING, AND OTHER ITEMS SHOWN BOLD AND/OR BOLD DASHED LINE UNLESS SPECIFICALLY NOTED OTHERWISE. THE ITEMS INDICATED ON THE DRAWINGS TO BE REMOVED ARE ONLY TO INDICATE IN GENERAL THE AMOUNT OF DEMOLITION WORK INVOLVED. A SITE INVESTIGATION BY THE CONTRACTOR MUST BE PERFORMED TO AID IN DETERMINING THE COMPLETE EXTENT OF WORK INVOLVED.
2. LOCATE, IDENTIFY, AND PROTECT MECHANICAL SERVICES PASSING THROUGH DEMOLITION AREA AND SERVING OTHER AREAS OUTSIDE THE DEMOLITION LIMITS. MAINTAIN SERVICES TO AREAS OUTSIDE DEMOLITION LIMITS. WHEN SERVICES MUST BE INTERRUPTED, NOTIFY GOVERNMENT AND INSTALL TEMPORARY SERVICES FOR AFFECTED AREAS.
3. CONTRACTOR SHALL COORDINATE AND SCHEDULE ALL NECESSARY UTILITY SHUT-OFFS WITH THE GOVERNMENT PRIOR TO PROCEEDING WITH SUCH WORK.
4. COORDINATE SAW-CUTTING OF THE FLOOR OR WALL WITH OTHER TRADES.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PATCHING, PAINTING, REPAIRING OR REPLACEMENT OF ALL WALLS, FLOORS, CEILINGS, OR OTHER BUILDING ELEMENTS THAT ARE DISTURBED AS PART OF THE DEMOLITION OR INSTALLATION OF MECHANICAL WORK. SUCH WORK SHALL MATCH THE EXISTING CONSTRUCTION, FINISH, AND RATING. FIRE SEAL WALL OPENINGS AS REQUIRED.
6. PROVIDE PROTECTION AS REQUIRED TO PREVENT DAMAGE TO EXISTING EQUIPMENT. DAMAGED EQUIPMENT SHALL BE REPAIRED OR REPLACED TO THE GOVERNMENT'S SATISFACTION.
7. REMOVALS SHALL BE COMPLETE, INCLUDING BUT NOT LIMITED TO: DUCT HANGERS, ALL THREAD RODS, INCIDENTAL SMALL APPURTENANCES, ETC.
8. ALL DEMOLISHED EQUIPMENT SHALL REMAIN PROPERTY OF THE US GOVERNMENT. CONTRACTOR SHALL CONSULT WITH CONTRACTING OFFICER FOR DIRECTION ON PROPER DISPOSAL OR STORAGE OF ALL DEMOLISHED EQUIPMENT.
9. COORDINATE ALL SHUTDOWNS AND REQUIRED WORK IN EACH SPACE WITH THE GOVERNMENT A MINIMUM OF FOUR WEEKS PRIOR TO STARTING WORK.. CONTRACTOR SHALL CLOSE OFF ALL ASSOCIATED DUCTWORK WHEN DUCTWORK IS DISCONNECTED TO ELIMINATE AIR FROM ENTERING DEMOLISHED AREAS.
10. THIS PROJECT IS A RENOVATION OF AN EXISTING BUILDING. DRAWINGS ARE PRODUCED BASED PRIMARILY ON RECORD DRAWINGS AND MAY NOT REFLECT ACTUAL CONDITIONS AT THE TIME OF BID. CONTRACTOR SHALL SURVEY EXISTING CONDITIONS PRIOR TO BID TO DETERMINE THE FULL EXTENT OF THE PROJECT SCOPE AND ADJUST THEIR PROPOSAL AS REQUIRED.
11. THE MODIFICATION AND RELOCATION OF EXISTING UTILITIES, CONDUITS, PIPING, AND DUCTWORK, AND OTHER ELEMENTS NOT SHOWN ON PLANS BUT THAT CONFLICT WITH THE PROJECT'S SCOPE OF WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE INCLUDED IN THE CONTRACTOR'S PROPOSAL AT THE TIME OF BID.
12. THE REMOVAL AND REPLACEMENT OF ANY EXISTING CEILINGS REQUIRED TO INSTALL MECHANICAL EQUIPMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, REGARDLESS OF IF THESE CEILINGS ARE EXPLICITLY SHOWN TO BE REMOVED/REPLACED ON THE ARCHITECTURAL DRAWINGS, AND SHALL BE INCLUDED IN THE CONTRACTOR'S PROPOSAL AT THE TIME OF BID.
13. CONTRACTOR SHALL ISSUE A REQUEST FOR INFORMATION (RFI) TO THE GOVERNMENT DURING THE PRE-BID PERIOD FOR CLARIFICATION OF ANY QUESTIONS RELATED TO THE MECHANICAL SCOPE OF WORK.

GENERAL MECHANICAL NOTES

1. THESE NOTES ARE NOT ALL INCLUSIVE. REFER TO DRAWINGS AND SPECIFICATION FOR ADDITIONAL REQUIREMENTS.
2. THIS IS A STANDARD MECHANICAL (HVAC AND PLUMBING) SYMBOLOGY AND ABBREVIATIONS SHEET. LISTING OF SYMBOLS AND ABBREVIATIONS DOES NOT IMPLY ALL SYMBOLS AND ABBREVIATIONS HAVE BEEN USED ON THIS PROJECT.
3. VALVE SYMBOLS SHOWN HERE ARE APPLICABLE ONLY TO MECHANICAL SHEETS.
4. PROVIDE ALL MATERIALS, LABOR, AND EQUIPMENT FOR COMPLETE AND OPERABLE SYSTEMS AS INDICATED ON THE DRAWINGS AS SPECIFIED, OR AS REQUIRED BY CODE.
5. MECHANICAL INSTALLATION SHALL COMPLY WITH THE ADA/ABA ACCESSIBILITY GUIDELINES.
6. DETAILS APPLY TO THE ENTIRE PROJECT AND ARE ONLY REFERENCED TO PROVIDE CLARITY IF THERE ARE MULTIPLE DETAILS THAT COULD APPLY TO A PARTICULAR PROJECT CONDITION.
7. COORDINATE LOCATION OF ALL MECHANICAL EQUIPMENT, DUCTWORK, AND PIPING WITH OTHER TRADES BEFORE PROCEEDING WITH WORK. DO NOT INSTALL MECHANICAL EQUIPMENT, DUCTWORK, OR PIPING ABOVE ELECTRICAL EQUIPMENT WHERE PROHIBITED BY ELECTRICAL CODES (SWITCHBOARDS, PANELS, ETC.).
8. LIGHT LINE WEIGHT INDICATES EXISTING PIPING, DUCTWORK, AND/OR EQUIPMENT TO REMAIN. BOLD LINE WEIGHT INDICATES NEW WORK TO BE INSTALLED AS WORK OF THIS CONTRACT.
9. COORDINATE INSTALLATION OF OUTSIDE AIR INTAKE WITH INSTALLATION OF PLUMBING VENTS, FLUES AND EXHAUST/RELIEF OUTLETS TO MAINTAIN MINIMUM 10' SEPARATION.
10. ALL WORK IN FINISHED SPACES SHALL BE LOCATED ABOVE CEILINGS, IN CHASES OR OTHER CONCEALED ACCESSIBLE LOCATIONS UNLESS NOTED OTHERWISE. LOCATE AND ARRANGE VALVES, DRAIN FITTINGS, ETC. TO BE ACCESSIBLE THROUGH LAY-IN CEILINGS, ACCESS PANELS OR ACCESS DOORS. PROVIDE AN ACCESS PANEL OR DOOR FOR ALL NON-ACCESSIBLE INSTALLATIONS. COORDINATE LOCATION OF ACCESS PANELS OR DOORS WITH THE ARCHITECT/ENGINEER AND OTHER TRADES.
11. ALL MATERIALS LOCATED IN PLENUM SHALL BE RATED FOR PLENUM INSTALLATION.
12. ALL DUCTWORK, PIPING, AND EQUIPMENT SUPPORTED FROM STRUCTURAL STEEL SHALL BE COORDINATED WITH ALL TRADES. ALL ATTACHMENTS TO STEEL BAR JOISTS, TRUSSES, OR JOIST GIRDERS SHALL BE AT PANEL POINTS OR AS SHOWN ON THE MECHANICAL OR STRUCTURAL DRAWINGS. WELDING TO STRUCTURAL MEMBERS SHALL NOT BE PERMITTED.
13. ALL MISCELLANEOUS METALS AND MATERIALS REQUIRED TO ENSURE PROPER INSTALLATION AND AS SHOWN IN DETAILS FOR PIPING, DUCTWORK, AND EQUIPMENT (UNLESS OTHERWISE NOTED) SHALL BE PROVIDED BY THE INSTALLING CONTRACTOR.
14. PROVIDE DIELECTRIC UNIONS AT ALL CONNECTIONS OF DISSIMILAR METALS (SUCH AS COPPER TO GALVANIZED STEEL).
15. PROVIDE ISOLATION VALVES AT EACH PIECE OF EQUIPMENT. ALSO PROVIDE ISOLATION VALVES ON EACH BRANCH AND/OR RISER SERVING MULTIPLE PIECES OF EQUIPMENT OR FIXTURES AND ELSEWHERE AS INDICATED. INSTALL VALVES AS CLOSE TO MAIN AS POSSIBLE.
16. ALL MECHANICAL EQUIPMENT INSTALLATIONS SHALL COMPLY WITH THE UNIFIED FACILITIES CRITERIA AND TINKER AFB STANDARDS.

GENERAL HVAC NOTES

1. DUCTWORK DIMENSIONS: FIRST NUMBER INDICATES SIDE OF DUCTWORK SHOWN. ALL DIMENSIONS ARE IN INCHES AND ARE INSIDE CLEAR DIMENSIONS.
2. VOLUME DAMPERS ABOVE PLASTER OR GYPBOARD CEILINGS SHALL HAVE EXTENSION RODS OR OPERATING CABLES AND CHROME-PLATED ESCUTCHEON PLATES.
3. COORDINATE ALL GRILLE, REGISTER AND DIFFUSER LOCATIONS WITH REFLECTED CEILING PLAN, LIGHTING, AND ALL OTHER CEILING MOUNTED DEVICES.
4. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK AND PIPING SYSTEMS CONNECTED TO FANS, PUMPS AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION.
5. PROVIDE ACCESSIBLE VOLUME DAMPERS OR OTHER MEANS OF AIRFLOW ADJUSTMENT AT ALL DUCT RUN-OUTS TO DIFFUSERS AND GRILLES.
6. PROVIDE DUCT ACCESS DOORS AT OUTSIDE AIR INTAKE PLENUMS.
7. ALL DUCT RUN-OUTS TO DIFFUSERS AND GRILLES SHALL BE THE SAME AS THE DIFFUSER OR GRILLE NECK SIZE UNLESS NOTED OTHERWISE.
8. ALL PIPING RUNOUTS SHALL BE 3/4" UNLESS NOTED OTHERWISE.

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

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PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B228
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION

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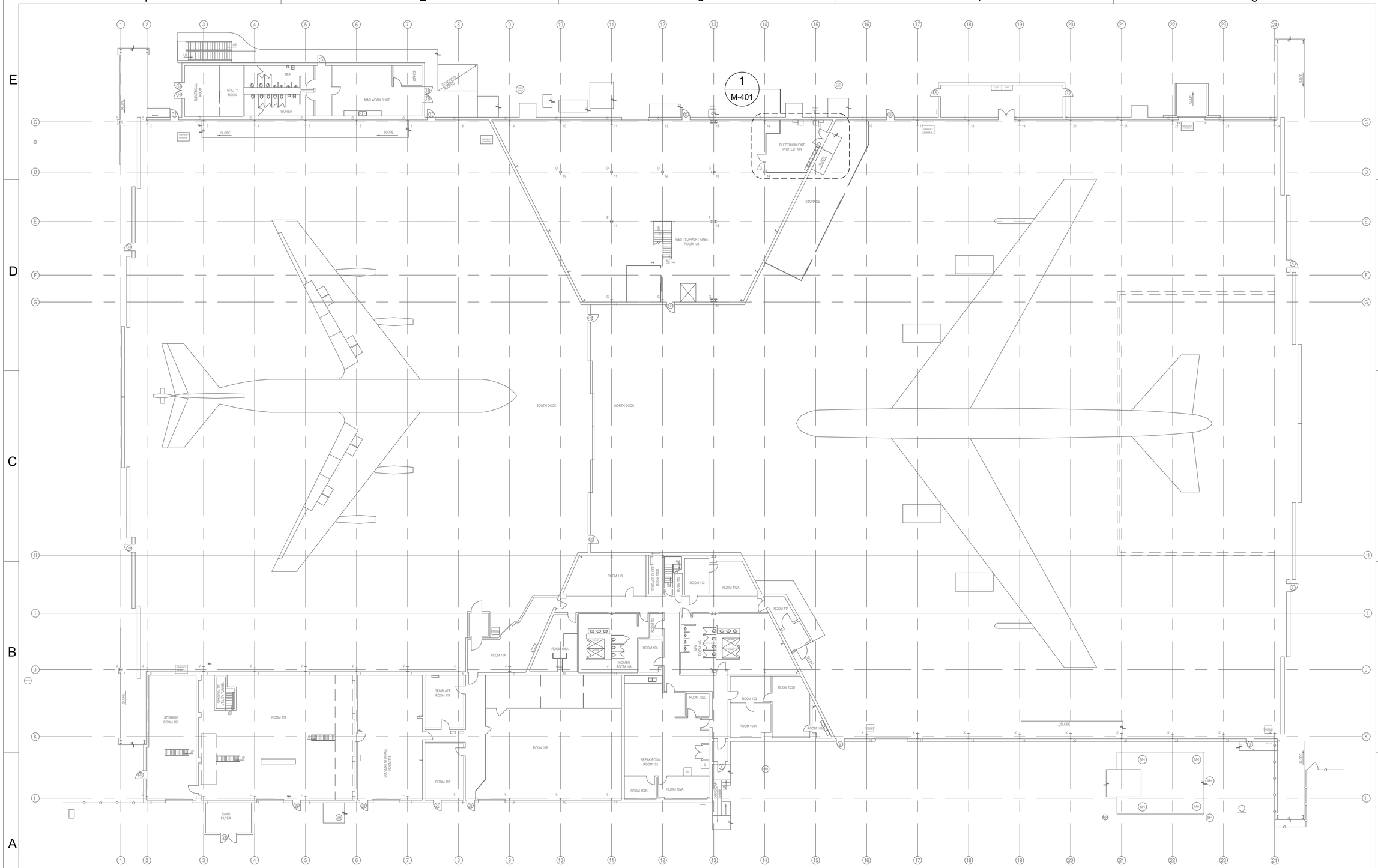
SHEET TITLE
MECHANICAL SYMBOLS, LEGEND & ABBREVIATIONS

SHEET NUMBER
M-001

SHEET OF



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M-101

MECHANICAL OVERALL FIRST FLOOR PLAN

NOT TO SCALE

N

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE

TINKER AFB, OK

PROJECT INFORMATION

WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280

TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

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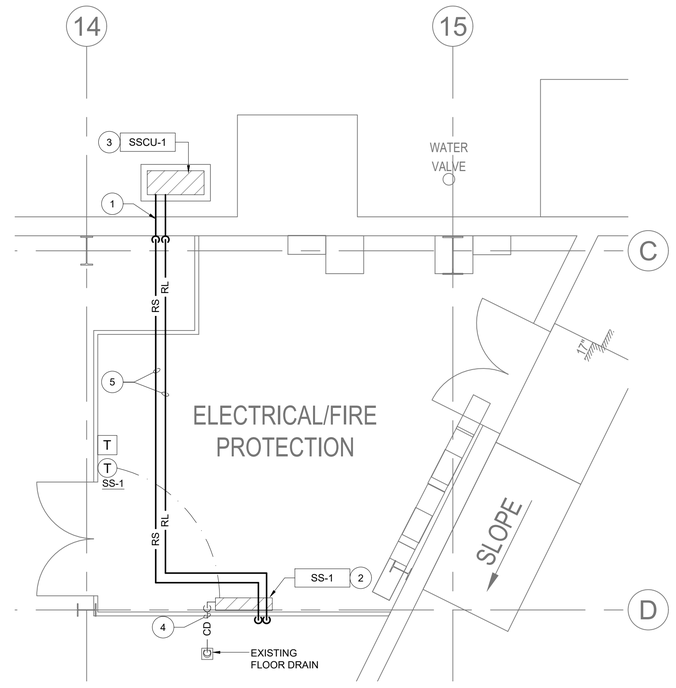
MECHANICAL OVERALL PALN

SHEET NUMBER

M-101

SHEET OF



1 / M-401 MECHANICAL ENLARGED PLAN - NEW WORK

SCALE: 1/4" = 1'-0"

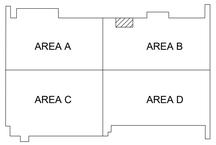
GENERAL NOTES:

1. INSTALL NEW THERMOSTAT AT INDICATED LOCATION AND ABA COMPLIANT HEIGHT. COORDINATE FINAL LOCATION WITH EXISTING CONDITIONS.
2. MAINTAIN MANUFACTURER RECOMMENDED CLEARANCES TO ALL MECHANICAL EQUIPMENT. INSTALL EQUIPMENT SUCH THAT RECOMMENDED CLEARANCE IS PROVIDED.
3. COORDINATE INSTALLATION OF ALL NEW WORK WITH EXISTING CONDITIONS.
4. REFER TO 3/M-501 FOR PIPE HANGER DETAIL AND 2/M501 FOR PIPE SLEEVE THRU INTERIOR WALL DETAIL.

KEY NOTES:

1. RS/RL PIPING THROUGH EXTERIOR WALL. ROUTE AS INDICATED TO SS-1. REF: 1/M-501 FOR REFRIGERANT PIPE SLEEVE THROUGH NON-RATED EXTERIOR WALL DETAIL.
2. MOUNT INDOOR UNIT UP AS HIGH AS POSSIBLE. REF: 5/M-501 FOR SPLIT SYSTEM INSTALLATION DETAIL.
3. MOUNT OUTDOOR UNIT ON NEW EQUIPMENT PAD. REF: 5/M-501 FOR DUCTLESS SPLIT SYSTEM DETAIL AND STRUCTURAL DRAWINGS FOR EQUIPMENT PAD DETAIL.
4. ROUTE CONDENSATE DRAIN PIPE SAME SIZE AS UNIT OUTLET TO EXISTING FLOOR DRAIN. TERMINATE WITH 2" AIR GAP.
5. ROUTE REFRIGERANT PIPING ABOVE CEILING WITHIN THE ELECTRICAL/FIRE PROTECTION ROOM.

coordinate with structural. detail not shown



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SHEET TITLE
MECHANICAL ENLARGED PLAN - NEW WORK

SHEET NUMBER
M-401
SHEET ____ OF ____

AIR COOLED DUCTLESS MINI-SPLIT HEAT PUMP UNIT SCHEDULE

INDOOR UNIT SYMBOL	OUTDOOR UNIT SYMBOL	SERVICE	CONFIGURATION	REFRIGERANT	MIN. SEER RATING	RATED COOLING CAPACITY (BTU/hr) (NOTE 1)	RATED HEATING CAPACITY (BTU/hr) (@ 47F)	INDOOR UNIT			OUTDOOR UNIT			ELECTRICAL				CONTROL TYPE (NOTE 6)	BASIS OF DESIGN MANUFACTURER	NOTES
								AIR FLOW (CFM)	UNIT WT. (LBS)	INDOOR UNIT MODEL	AMBIENT (DEG F)	UNIT WT. (LBS)	OUTDOOR UNIT MODEL	MCA (A)	MOCP (A)	VOLTS/ PHASE	DISCONNECT BY			
SS-1	SSCU-1	MECH RM 106	HEAT PUMP	R-32	21	18,100	21,600	720	40	FTXF18	105	105	RXF18	16.34	20	208/1	MFR	SS-A	DAIKIN	2-6

NOTES:
1. BASED ON AHRI CONDITIONS.
2. EXTEND REFRIGERATION PIPING BETWEEN EVAPORATOR AND CONDENSER AS RECOMMENDED BY MANUFACTURER.
3. SINGLE POINT POWER. INDOOR UNIT SERVED BY OUTDOOR UNIT.
4. PROVIDE WIRED WALL MOUNTED CONTROLLER AND TEMPERATURE SENSOR.
5. PROVIDE INDOOR UNIT WALL MOUNTING BRACKET.
6. REFER TO 4/M-501 FOR DESCRIPTION OF CONTROL TYPE.

SPLIT SYSTEM CONTROL: SS-A POINTS LIST

POINT DESCRIPTION	INPUT		OUTPUT		SETPOINT ADJUSTMENT	CRITICAL ALARM	HIGH LIMIT	LOW LIMIT	FAILURE	TREND	EVENT HISTORY	ARCHIVE	TOTALIZATION	GRAPHIC	UNITS
	ANALOG	DIGITAL	ANALOG	DIGITAL											
ROOM TEMPERATURE	AI					CA	H	L		T		A		G	DEG. F.

NOTES:
1. REFER TO SPLIT SYSTEM CONTROL: SS-A ON M-501 FOR ADDITIONAL INFORMATION.
2. REFER TO PLANS FOR EXACT QUANTITY OF EACH POINT.

SITE CRITERIA

WEATHER DATA LOCATION	TINKER AFB, OK
ASHRAE CLIMATE ZONE	3A (MOIST)
ELEVATION	1,291 FT
LATITUDE	35.42 N
LONGITUDE	97.38 W

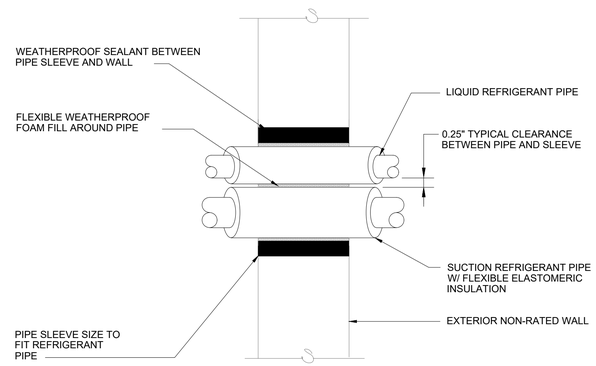
OUTDOOR DESIGN CONDITIONS

COOLING (1.0% DB/MCWB)*	97.0 F / 73.7 F
HEATING (99% DB)*	18.4 F

* PER ASHRAE 2021 FUNDAMENTALS.

INDOOR DESIGN CONDITIONS

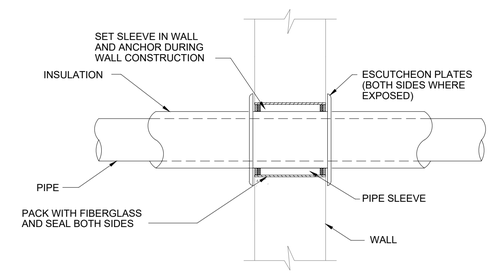
ROOM TYPE	TEMPERATURE		HUMIDITY	
	MAX (DEG. F)	MIN (DEG. F)	MAX (%RH)	MIN (%RH)
FP EQUIPMENT ROOM	76	68	50	N/A



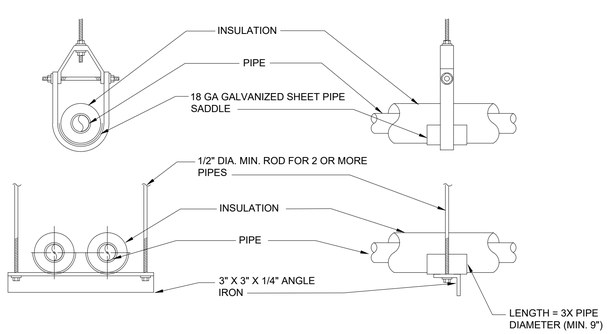
ABOVE GROUND WALL PENETRATION ONLY

PVC PIPE SLEEVE SIZE NOT TO EXCEED 6" SCH 40

1 / M-501 REFRIGERANT PIPE SLEEVE THROUGH NON-RATED EXTERIOR WALL
NTS

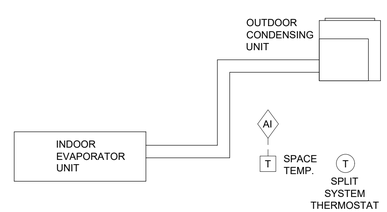


2 / M-501 PIPE SLEEVE THRU INTERIOR WALL DETAIL
NTS



NOTES:
1. INSULATION ABOVE SADDLES SHALL BE FOAM GLASS OF SAME THICKNESS AS PIPE INSULATION AND SHALL HAVE A COMPRESSIVE STRENGTH OF NOT LESS THAN 3,300 PSI.
2. HANGER RODS SHALL BE OF REQUIRED SIZE, BUT NO SMALLER THAN 1/2". DIA.
3. HANGERS WITHOUT PIPE SADDLES SHALL BE TYPICAL FOR UNINSULATED PIPING.

3 / M-501 PIPE HANGER INSTALLATION DETAIL
NTS



SPLIT SYSTEM DESCRIPTION:

THE SPLIT SYSTEM MANUFACTURER SHALL PROVIDE A FACTORY INSTALLED CONTROL SYSTEM AND REMOTELY MOUNTED THERMOSTAT CAPABLE OF SCHEDULING 24/7 SEVEN DAYS A WEEK WITH AUTOMATIC CHANGEOVER.

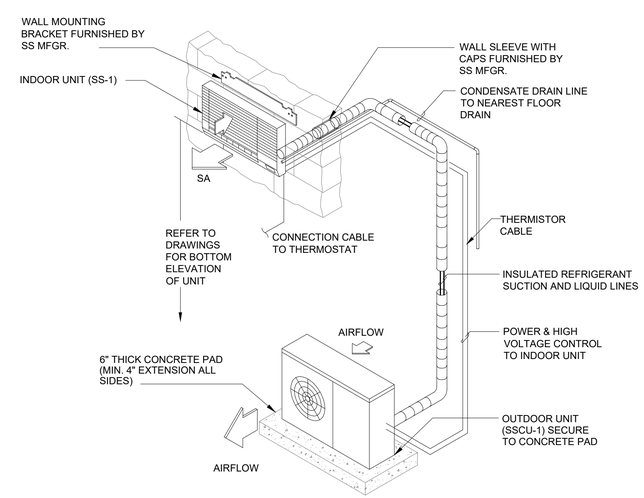
SEQUENCE OF OPERATION:

THE SPLIT SYSTEM SHALL MAINTAIN SPACE SETPOINT AT 76°F CLG., 68°F HTG. (ADJ.). FACTORY INSTALLED CONTROL SYSTEM SHALL RESTART ON A POWER FAILURE.

ALARMS, INTERLOCKS, AND SAFETY:

WHEN THE REMOTE TEMP SENSOR READS SPACE TEMPERATURE ABOVE 90° OR BELOW 40° (ADJ.). AN ALARM SHALL BE SENT TO THE EMCS.

4 / M-501 SPLIT SYSTEM CONTROL: SS-A SEQUENCE
NTS



NOTES:
1. INSTALL WALL UNIT AND CONDENSATE PUMP (IF SPECIFIED) PER MANUFACTURER'S RECOMMENDATIONS.
2. LINE SIZES AND MAXIMUM LENGTHS SHALL BE PER MANUFACTURER'S RECOMMENDATIONS.

5 / M-501 DUCTLESS SPLIT SYSTEM DETAIL
NTS

AFMC
AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 03-26-2025
DESIGN GROUP: HDR
DESIGNED BY: AO
DRAWN BY: SG
CHECKED BY: DS
DESIGN FILE LOCATION:

SHEET TITLE
MECHANICAL DETAILS

SHEET NUMBER
M-501
SHEET OF

REPAIRABLE

Manufactured by **DET TRONICS**

X3301A4M11W2

New Product **$9,386.00**/ea

Radwell SKU 141877612 — Non-Authorized Line

Order Now call for availability

Never Used Original Packaging **Price Hidden**

Radwell SKU 141877613 — Surplus

Request a quote

Monaco Enterprises Inc.
Unique Entity Identifier: EZGFN5WLEEY8
Billing: 14820 E. Sprague Ave.
Spokane Valley, WA 99216-2149
Shipping: 14820 E. Sprague Ave.
Spokane Valley, WA 99216-2149
Phone: 509-926-6277
Web: www.monaco-inc.com

QUOTATION

TO: CONTRACTOR

SHIP TO: CONTRACTOR

Quote No.	Date	Cust No	Your Referenced Inquiry	Contact	Terms	F.O.B.	Expiration
0015122	2/21/2025	001351		ROBIN M. LAWLOR	PREPAY ORD	S/P F/C&A	30 DAYS

Item	Qty	UM	Part #	Rev	Description	Price Code	Price $	Extension $
					SALES MANAGER:			
					STERLING E. MCCONNELL			
001	1	EA	227-955-00	B	ASSY,MAAP-X POINT REPORTING,FIRE MNS:28" SURF,SGLCOM,CUSTOMER OPTION	CNTR	11,946.36	11,946.36
002	1	EA	207-625-00	B	KIT,SUPPORT:MAAP-X PLANNER	CNTR	183.62	183.62
004	1	EA	190-400-00	E	ASSY,ANTENNA:BSA-1,OMNIDIRECTIONAL,VHF,3DBD GAIN,VHF FEMALE,136-174 MHZ	CNTR	98.08	98.08
005	1	EA	199-910-00	A	FEE:ANTENNA CUTTING SERVICE,FACTORY CUT TO BASE FREQUENCY CUSTOMER OPTION	CNTR	69.34	69.34
006	1	EA	199-011-00		MOUNT,ANTENNA:7",WALL,PAIR,WITH LAG BOLTS	CNTR	19.27	19.27
007	1	EA	198-021-01	A	KIT:LIGHTNING ARRESTOR UL LISTED,VHF,PL-259 FEM CONN,8X8X6 NEMA 3R ENCL	CNTR	173.64	173.64
008	1	EA	626-000-02	B	ASSY,CABLE:COAX,TYPE 1,40',MINI RG-8/X,BNC/PL-259	CNTR	104.50	104.50
009	1	EA	625-100-00	B	ASSY,CABLE:COAX,TYPE 2,20',MINI RG-8/X W/(2) PL-259	CNTR	85.25	85.25
012	1	EA	708-026-01	A	ASSY,FIRE ALARM STATION:SPST-NO,DOUBLE ACTION,C415A KEY,TERMINAL BLOCK	CNTR	115.18	115.18
013	1	EA	729-218-00		MODULE:AP/CLIP,MINI-MONITOR,ADDRESSABLE,WHITE	CNTR	51.96	51.96
014	1	EA	723-601-00		DETECTOR,PHOTO:AP/CLIP,PHOTO,15-32VDC,LOW PROFILE,ADDRESSABLE,WHITE	CNTR	75.11	75.11
015	1	EA	729-228-00		BASE:AP/CLIP,6",ADDRESSABLE, WHITE (SINGLE)	CNTR	18.52	18.52
016	1	EA	721-134-00		DETECTOR,HEAT:AP/CLIP,RATE-OF-RISE,ADDRESSABLE,WHIT E	CNTR	54.62	54.62
017	1	EA	729-228-00		BASE:AP/CLIP,6",ADDRESSABLE, WHITE (SINGLE)	CNTR	18.52	18.52
018	1	EA	725-603-00		DETECTOR,CARBON MONOXIDE:DE:APONLY,15-32VDC,LOW PROFILE,ADD RESSABLE,WHITE	CNTR	137.13	137.13
019	1	EA	729-228-00		BASE:AP/CLIP,6",ADDRESSABLE, WHITE (SINGLE)	CNTR	18.52	18.52
020	1	EA	723-370-00		DETECTOR HOUSING,SYSTEM:DUCT,PHOTOELECTRIC,INTELLIGENT,NON RELAY,LOWFLOW	CNTR	118.60	118.60

Monaco Enterprises Inc.
Unique Entity Identifier: EZGFN5WLEEY8
Billing: 14820 E. Sprague Ave.
Spokane Valley, WA 99216-2149
Shipping: 14820 E. Sprague Ave.
Spokane Valley, WA 99216-2149
Phone: 509-926-6277
Web: www.monaco-inc.com

QUOTATION

TO: CONTRACTOR

SHIP TO: CONTRACTOR

Quote No.	Date	Cust No	Your Referenced Inquiry	Contact	Terms	F.O.B.	Expiration
0015122	2/21/2025	001351		ROBIN M. LAWLOR	PREPAY ORD	S/P F/C&A	30 DAYS

Item	Qty	UM	Part #	Rev	Description	Price Code	Price $	Extension $
021	1	EA	723-602-00		DETECTOR,PHOTO:AP/CLIP,15-32VDC,REMOTE TEST DUCT DETECTOR,ADDRESSABLE,WHITE	CNTR	79.90	79.90
022	1	EA	729-205-01		TUBE,SAMPLING:2'-4' DUCT	CNTR	12.59	12.59
023	1	EA	729-221-00		MODULE:AP/CLIP,RELAY,ADDRESSABLE,WHITE	CNTR	73.27	73.27
024	1	EA	729-138-00		STATION:RMT TEST,W/KEY	CNTR	75.54	75.54
025	1	EA	451-700-01		RELAY:SPDT,120-277VAC,10A CONTACTS,LED,RED ENCLOSURE	CNTR	45.61	45.61
026	1	EA	729-206-00		COIL:REMOTE TEST,FOR RTS151/RTS151KEY	CNTR	28.20	28.20
027	1	EA	729-217-00		MODULE:AP/CLIP,MONITOR,ADDRESSABLE,WHITE	CNTR	62.62	62.62
028	1	EA	729-221-00		MODULE:AP/CLIP,RELAY,ADDRESSABLE,WHITE	CNTR	73.27	73.27
029	1	EA	729-225-00		MODULE:AP/CLIP,SUPERVISED CONTROL,ADDRESSABLE,WHITE	CNTR	75.94	75.94
030	1	EA	729-220-00		MODULE:AP/CLIP,DUAL MONITOR,ADDRESSABLE,WHITE	CNTR	102.58	102.58
031	1	EA	580-126-00		SPEAKER STB:LED,WHT,T-1,WM,INDOOR,24V,RED ALERT LTR,CLR,15-185 CANDELA,1/4-2W	CNTR	104.00	104.00
032	1	EA	580-133-00		SPEAKER STB:LED,WHT,T-1,CM,INDOOR,24V,RED ALERT LTR,CLR,15-177 CANDELA,1/4-2W	CNTR	104.00	104.00
033		EA	081-177-00	A	ASSY,BTRY ENCL:24VDC/40AH,20"HIGH SM,RED,NEMA TYPE1	CNTR	1,390.68	
					Total for Quote $			**14,125.74**

Monaco Enterprises Inc.
Unique Entity Identifier: EZGFN5WLEEY8
Billing: 14820 E. Sprague Ave.
Spokane Valley, WA 99216-2149
Shipping: 14820 E. Sprague Ave.
Spokane Valley, WA 99216-2149
Phone: 509-926-6277
Web: www.monaco-inc.com

QUOTATION

TO: CONTRACTOR

SHIP TO: CONTRACTOR

Quote No.	Date	Cust No	Your Referenced Inquiry	Contact	Terms	F.O.B.	Expiration
0015122	2/21/2025	001351		ROBIN M. LAWLOR	PREPAY ORD	S/P F/C&A	30 DAYS

Item	Qty	UM	Part #	Rev	Description	Price Code	Price $	Extension $

Prices given are valid for 30 days; F.O.B. Spokane, Washington 99216. All orders must be accompanied by a Company PO and a valid resale/tax exempt certificate if applicable. If a valid resale/tax exempt certificate is not provided at time of order then sales taxes will apply. Minimum order value is $100.00 excluding taxes and shipping. Freight charges and applicable taxes will be added to your invoice. Lead time to ship this equipment is up to 90 days ARO.

NOTE: The "Price Code" column shows whether it is GSA or Contractor (CNTR) pricing for each line.

NOTE: I am not a PE certified Engineer. The enclosed quotation guesstimates our best attempt to meet your request. It is the responisbility of the requesting Contractor to have your fire alarm specialist or PE certified Engineer look at your specifications to ensure that each part meets your project's needs.

NOTE: Please be aware that all commercial Quotes and Orders are processed solely under Monaco Enterprises terms and conditions. These terms and conditions can be found at www.monaco-inc.com/terms-and-conditions. If you would like these terms and conditions emailed to you, or mailed, please contact your customer service representative. Placing an order constitutes acceptance. Please review quotation, cut sheets and our terms and conditions. Feel free to contact me with any concerns or requests to revise this quotation.

NOTE: GSA quotes and orders are processed solely under Monaco Enterprises GSA contract terms - contract number 47QSWA19D003J

Monaco Enterprises, Inc. is an equal opportunity employer and federal contractor or subcontractor. Consequently, the parties agree that, as applicable, they will abide by the requirements of 41 CFR 60-1.4(a), 41 CFR 60-300.5(a) and 41 CFR 60-741.5(a) and that these laws are incorporated herein by reference. These regulations prohibit discrimination against qualified individuals based on their status as protected veterans or individuals with disabilities, and prohibit discrimination against all individuals based on their race, color, religion, sex, sexual orientation, gender identity or national origin. These regulations require that covered prime contractors and subcontractors take affirmative action to employ and advance in employment individuals without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, protected veteran status or disability. The parties also agree that, as applicable, they will abide by the requirements of Executive Order 13496 (29 CFR Part 471, Appendix A to Subpart A), relating to the notice of employee rights under federal labor laws.

Appendix B

Asbestos and Lead Based Paint

Holliday, Cynthia

From: Goyette, Carmen
Sent: Wednesday, June 15, 2022 6:16 PM
To: Holliday, Cynthia; Matjasko, Andrew; Saucedo, Dennis; Miller, Russell
Cc: Tremblay, Michelle
Subject: FW: Asbestos and LBP testing: Project WWYK190068 - Repair Fire Suppression System and WWYK200131 Chilled Water
Attachments: Project Pics.pptx; 347428_B731_PLM_With_COC.pdf

Hey Cynthia, please pdf below email and combine it with attachments and save it in App B of both WWYK190068 - Repair Fire Suppression System and WWYK200131 Chilled Water.

Andrew, Dennis, and Russell, please be aware of results and make notes as appropriate so we can make sure the cost estimator captures any abatement costs required.

Thanks,
Carmen

Carmen S. Goyette, PMP
Fuels Program Manager/Associate
HDR
613 NW Loop 410, Suite 700
San Antonio, TX 78216
D [210-841-2815] M [210-965-8900]
Carmen.Goyette@hdrinc.com
hdrinc.com/follow-us

-----Original Message-----
From: 72 ABW/CE Asbestos-LBP <72ABW.CE.Asbestos-LBP@us.af.mil>
Sent: Wednesday, June 15, 2022 2:55 PM
To: MCCANN, KENNETH F NH-03 USAF AFMC 76 AMXG/MXDEC <kenneth.mccann.1@us.af.mil>; 72 ABW/CE Asbestos-LBP <72ABW.CE.Asbestos-LBP@us.af.mil>
Cc: 72 ABW/CEED DMAG Workflow <72ABW.CEED.DMAGWorkflow@us.af.mil>; Goyette, Carmen <carmen.goyette@hdrinc.com>; 76 MXSG/Const Workflow <76MXSG.Const.Workflow@us.af.mil>; SCHIER, ERIN A CTR USAF AFMC 72 ABW/CEED <erin.schier.ctr@us.af.mil>; BALDISCHWILER, MATTHEW K CIV USAF AFMC 569 AMXS/MXDXA <matthew.baldischwiler@us.af.mil>; BETTERTON, KEITH D WS-14 USAF AFMC 569 AMXS/MXDPAB <keith.betterton.2@us.af.mil>
Subject: Asbestos and LBP testing: Project WWYK190068 - Repair Fire Suppression System and WWYK200131 Chilled Water

Good afternoon,

Our inspection of bldg. 2280 west mechanical room is complete. All suspect materials that we sampled were negative for asbestos. We do not see any other concerns related to repair of the chilled water line or suppression system and storage room demolition as they relate to asbestos. The storage room did however have LBP on the metal structural beam and part of the south cement wall. Removal of this paint can only be performed by a competent

trained worker and practices that would create dust hazards should be avoided.

If you have any further questions, please let us know.

V/r,

Laura Duck
72 ABW/CEIE
Physical Scientist
Toxic Substances & Air Quality
Comm: (405) 734-3101; DSN: 884-3101
Cell: 405-200-7377

-----Original Message-----
From: MCCANN, KENNETH F NH-03 USAF AFMC 76 AMXG/MXDEC <kenneth.mccann.1@us.af.mil>
Sent: Friday, June 10, 2022 2:00 PM
To: 72 ABW/CE Asbestos-LBP <72ABW.CE.Asbestos-LBP@us.af.mil>
Cc: 72 ABW/CEED DMAG Workflow <72ABW.CEED.DMAGWorkflow@us.af.mil>; GOYETTE, CARMEN (carmen.goyette@hdrinc.com) <carmen.goyette@hdrinc.com>; 76 MXSG/Const Workflow <76MXSG.Const.Workflow@us.af.mil>; SCHIER, ERIN A CTR USAF AFMC 72 ABW/CEED <erin.schier.ctr@us.af.mil>; BALDISCHWILER, MATTHEW K CIV USAF AFMC 569 AMXS/MXDXA <matthew.baldischwiler@us.af.mil>; BETTERTON, KEITH D WS-14 USAF AFMC 569 AMXS/MXDPAB <keith.betterton.2@us.af.mil>
Subject: RE: Asbestos and LBP testing: WWYK190068 - Repair Fire Suppression System, Maint Hangar B2280

Ms. Duck,

Tuesday at 0900 will work best for us. We can meet at the East entrance of B2280.

Respectfully,
Kenneth McCann
76 AMXG/MXDEC
(405) 582-4605
····°°··°°··Ô··°°··°°····

-----Original Message-----
From: 72 ABW/CE Asbestos-LBP <72ABW.CE.Asbestos-LBP@us.af.mil>
Sent: Friday, June 10, 2022 9:02 AM
To: MCCANN, KENNETH F NH-03 USAF AFMC 76 AMXG/MXDEC <kenneth.mccann.1@us.af.mil>; BALDISCHWILER, MATTHEW K CIV USAF AFMC 569 AMXS/MXDXA <matthew.baldischwiler@us.af.mil>
Cc: 72 ABW/CEED DMAG Workflow <72ABW.CEED.DMAGWorkflow@us.af.mil>; GOYETTE, CARMEN (carmen.goyette@hdrinc.com) <carmen.goyette@hdrinc.com>; 76 MXSG/Const Workflow <76MXSG.Const.Workflow@us.af.mil>; 72 ABW/CE Asbestos-LBP <72ABW.CE.Asbestos-LBP@us.af.mil>; SCHIER, ERIN A CTR USAF AFMC 72 ABW/CEED <erin.schier.ctr@us.af.mil>

Subject: RE: Asbestos and LBP testing: WWYK190068 - Repair Fire Suppression System, Maint Hangar B2280

Mr. McCann and Mr. Baldischwiler,

Do you have availability for us to meet you at the project location next week?

We have Monday at 0900 or 1000. Tuesday at 0900 or 1330. Which of these times are good and I will send an invite.

v/r,

Laura Duck
72 ABW/CEIE
Physical Scientist
Toxic Substances & Air Quality
Comm: (405) 734-3101; DSN: 884-3101
Cell: 405-200-7377

-----Original Message-----
From: 76 MXSG/Const Workflow <76MXSG.Const.Workflow@us.af.mil>
Sent: Thursday, June 9, 2022 9:52 AM
To: 72 ABW/CE Asbestos-LBP <72ABW.CE.Asbestos-LBP@us.af.mil>; SCHIER, ERIN A CTR USAF AFMC 72 ABW/CEED <erin.schier.ctr@us.af.mil>
Cc: 72 ABW/CEED DMAG Workflow <72ABW.CEED.DMAGWorkflow@us.af.mil>; GOYETTE, CARMEN (carmen.goyette@hdrinc.com) <carmen.goyette@hdrinc.com>; 76 MXSG/Const Workflow <76MXSG.Const.Workflow@us.af.mil>; MCCANN, KENNETH F NH-03 USAF AFMC 76 AMXG/MXDEC <kenneth.mccann.1@us.af.mil>; BALDISCHWILER, MATTHEW K CIV USAF AFMC 569 AMXS/MXDXA <matthew.baldischwiler@us.af.mil>
Subject: RE: Asbestos and LBP testing: WWYK190068 - Repair Fire Suppression System, Maint Hangar B2280

Laura,

Kenneth McCann 582-4605 or Matt Baldischwiler 582-4836 will be able to assist with the asbestos inspection of B2280. I have also cc'd them in this email.

Thanks,
Bronson

-----Original Message-----
From: 72 ABW/CE Asbestos-LBP <72ABW.CE.Asbestos-LBP@us.af.mil>
Sent: Thursday, June 9, 2022 8:53 AM
To: SCHIER, ERIN A CTR USAF AFMC 72 ABW/CEED <erin.schier.ctr@us.af.mil>; 72 ABW/CE Asbestos-LBP <72ABW.CE.Asbestos-LBP@us.af.mil>
Cc: 72 ABW/CEED DMAG Workflow <72ABW.CEED.DMAGWorkflow@us.af.mil>; GOYETTE, CARMEN (carmen.goyette@hdrinc.com) <carmen.goyette@hdrinc.com>; 76 MXSG/Const Workflow <76MXSG.Const.Workflow@us.af.mil>

Subject: RE: Asbestos and LBP testing: WWYK190068 - Repair Fire Suppression System, Maint Hangar B2280

Good morning, Erin,

Can you provide a POC we can contact to coordinate an inspection bldg. 2280?
Some locations of this project area will require an asbestos inspection.

v/r,

Laura Duck
72 ABW/CEIE
Physical Scientist
Toxic Substances & Air Quality
Comm: (405) 734-3101; DSN: 884-3101
Cell: 405-200-7377

-----Original Message-----
From: SCHIER, ERIN A CTR USAF AFMC 72 ABW/CEED <erin.schier.ctr@us.af.mil>
Sent: Monday, June 6, 2022 2:49 PM
To: 72 ABW/CE Asbestos-LBP <72ABW.CE.Asbestos-LBP@us.af.mil>
Cc: 72 ABW/CEED DMAG Workflow <72ABW.CEED.DMAGWorkflow@us.af.mil>; GOYETTE, CARMEN (carmen.goyette@hdrinc.com) <carmen.goyette@hdrinc.com>; 76 MXSG/Const Workflow <76MXSG.Const.Workflow@us.af.mil>
Subject: Asbestos and LBP testing: WWYK190067 - Repair Fire Suppression System, Maint Hangar B2136 and WWYK190068 - Repair Fire Suppression System, Maint Hangar B2280

Good afternoon,

Request for an EM Survey for the two (2) mentioned projects:
WWYK190067 - Repair Fire Suppression System, Maint Hangar B2136
WWYK190068 - Repair Fire Suppression System, Maint Hangar B2280

I've included the AER Scope Def documents for your review if needed.
Please let me know should you have any questions.

Thank you,

Erin A. Schier
Assoc. AIA, NCARB

CSAG Project Manager
Tehama HDR Joint-Venture
72 ABW/CEED
Tinker Air Force Base, OK

(405) 582-4830
erin.schier.ctr@us.af.mil

-----Original Message-----
From: Goyette, Carmen <Carmen.Goyette@hdrinc.com>
Sent: Monday, June 6, 2022 2:25 PM
To: SCHIER, ERIN A CTR USAF AFMC 72 ABW/CEED <erin.schier.ctr@us.af.mil>
Cc: Tremblay, Michelle <Michelle.Tremblay@hdrinc.com>
Subject: [Non-DoD Source] Asbestos and LBP testing: WWYK190067 - Repair Fire Suppression System, Maint Hangar B2136 and WWYK190068 - Repair Fire Suppression System, Maint Hangar B2280

Hey Erin,

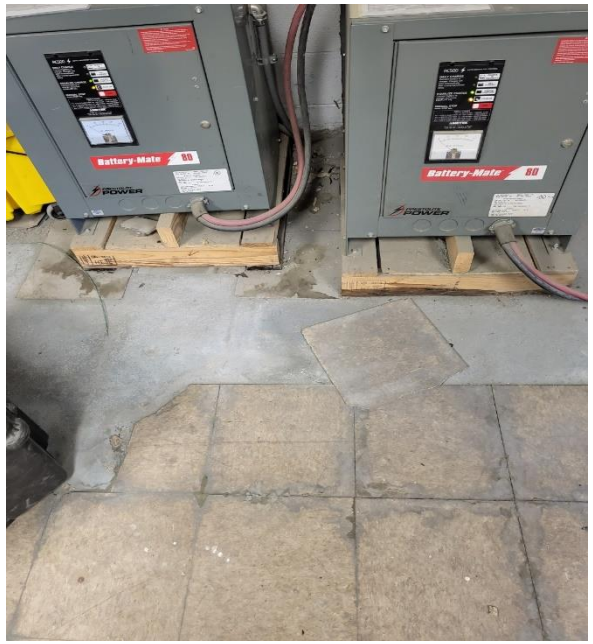
Please request test results for the project scope in both these projects.
Usually Laura Duck takes care of this.

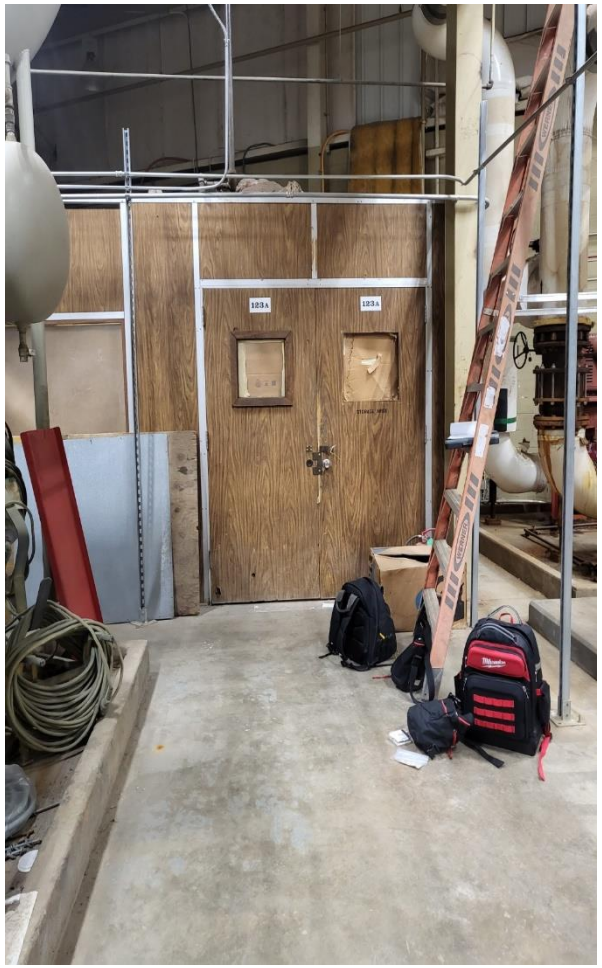
Once received, please send us those results, we include them in App B of the DN so they are always with the project.

Thanks,
Carmen

Carmen S. Goyette, PMP
Fuels Program Manager/Associate
HDR
613 NW Loop 410, Suite 700
San Antonio, TX 78216
D [210-841-2815] M [210-965-8900]
Carmen.Goyette@hdrinc.com <mailto:Carmen.Goyette@hdrinc.com>
hdrinc.com/follow-us
<https://nam12.safelinks.protection.outlook.com/?url=http%3A%2F%2Fhdrinc.com%2F&data=05%7C01%7CCynthia.Holliday%40hdrinc.com%7Cec0d1c6b98e84db92cd308da4f24f5d9%7C3667e201cbdc48b39b425d2d3f16e2a9%7C0%7C0%7C637909317944939385%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=vUbo40ZEkfT6oDHNHvl%2Fbnz0C87XDAmVxvNm4M41uPI%3D&reserved=0
%2Ffollow-us&data=04%7C01%7CCarmen.Goyette%40hdrinc.com%7C8001ea998dfc41bad55a08d91ec15e97%7C3667e201cbdc48b39b425d2d3f16e2a9%7C0%7C0%7C6375746381282608
84%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=ul2XX6IQw7N8JBik7Zccg4ICtuAfkL2C7LDGTXusP3U%3D&reserved=0>

Projects: WWYK190068 and WWYI200131

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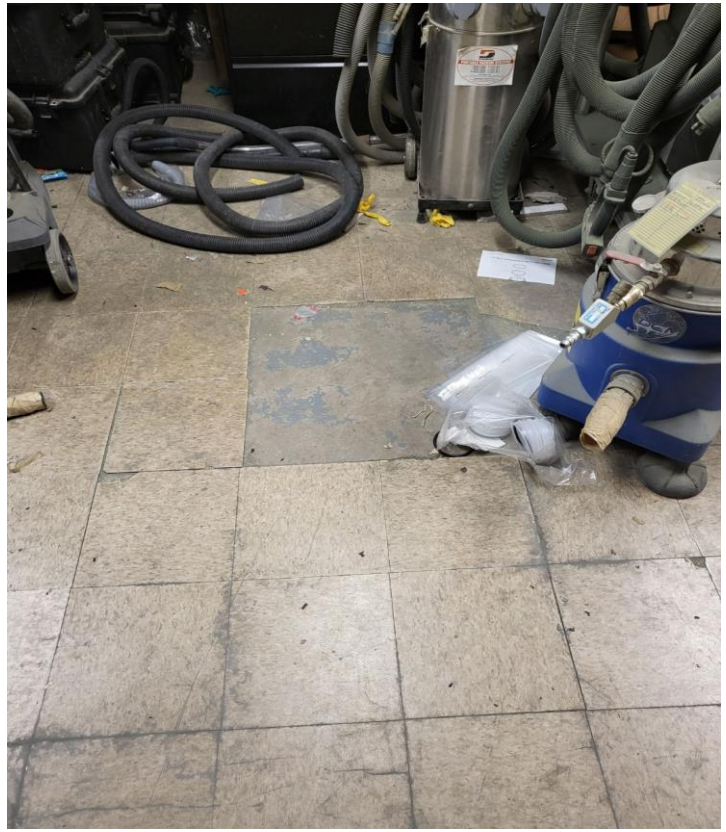

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Polarized Light Microscopy Asbestos Analysis Report

QuanTEM Lab No. 347428
Account Number: B731

Client: Tinker AFB - Civil Engineering
Laura Duck

Date Received: 06/14/2022
Received By: Baylie Longstreth
Date Analyzed: 06/15/2022
Analyzed By: Benjamin Hill
Methodology: EPA/600/R-93/116

Project: Mechanical Room Reno
Project Location: Bldg. 2280 West Mech Rm
Project Number: WWYK190068; WWYK200131

QuanTEM Sample ID	Client Sample ID	Composition	Color / Description	Asbestos (%)	Non-Asbestos Fiber (%)		Non Fibrous
001	GM220112	Homogeneous	White Ceiling Tile	Asbestos Not Present	Cellulose Glass Fiber	50 30	Perlite Paint
002	GM220113	Layered	Tan/Brown Floor Tile	Asbestos Not Present	NA		CaCO3 Vinyl
002a		Layered	Yellow Adhesive	Asbestos Not Present	NA		Glue
002b		Layered	Gray Paint	Asbestos Not Present	NA		Paint
003	GM220114	Layered	Brown Fiberboard	Asbestos Not Present	Cellulose	90	Binder
003a		Layered	Brown/Tan Insulation	Asbestos Not Present	Cellulose Glass Fiber	30 50	Perlite

Benjamin Hill

Benjamin Hill, Assistant Laboratory Manager

6/15/2022
Date of Report

Unless otherwise noted, upon receipt the condition of the sample was acceptable for analysis.

QuanTEM is a NVLAP accredited Testing PLM laboratory (Lab Code: 101959-0). This report relates only to the specific items tested.
NVLAP accreditation applies only to analysis performed utilizing EPA/600/M4-82-020 and EPA/600/R-93/116 methods.
This report may not be used to claim product endorsement by NVLAP or any agency of the US Government.
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For Lab Use Only
Lab No. 347428
(Accept) Reject

Contact Information			
Company:	Tinker AFB, CE Environmental	Phone:	734-3101
Contact:	Michael Green/Laura Duck	Cell Phone:	
Account #:		E-mail:	
SAMPLED BY: Name:	Michael Green/Laura Duck	Date:	14 Jun 2022

Project Information	
Project Name:	Mechanical Room Reno
Project Location:	Bldg. 2280 West Mech Rm
Project ID:	WWYK190068; WWYK200131
P.O. Number:	

Report Results (☑ one box)	
☐	QuanTEM Website
☑	Email ____
☐	Other ____

RELINQUISHED BY	DATE & TIME	VIA	RECEIVED BY	DATE & TIME
MICHAEL GREEN	6/14/22 1:03	HAND	[signature]	6/14/22 1:03

REQUESTED SERVICES (Please ☑ the Appropriate Boxes)

PLM		PLM		TEM		TEM		TURNAROUND TIME	
☑	Bulk Analysis (EPA 600/R-93/116)	☐	Vermiculite Attic Insulation (EPA 600/R-04/004)	☐	Air- AHERA	☐	Bulk- Presence / Absence EPA600/R-93/116	☐	Rush
☐	400 Point Count	☐	Other	☐	Air- NIOSH 7402	☐	Bulk- Quantitative [weight%]- Chatfield	☐	Same Day
☐	1000 Point Count			☐	Air- ISO 10312	☐	Dust- Presence / Absence	☑	24 - Hour
☐	Gravimetric Preparation	PCM		☐	Drinking Water- EPA 100.2	☐	Dust- Quantitative [fibers/sq.cm]- ASTM D5755	☐	3 - Day
☐	Particle ID	☐	NIOSH 7400	☐	Waste Water- EPA 600/4-83-043	☐	Other	☐	5 - Day

No.	Sample ID (10 Characters Max)	☑ To Be Analyzed	Color	Description	Volume / Area (as applicable)	Comments / Notes
1	GM220112	☑	White	Ceiling Tile		Friable remnant ceiling tile debris on floors in SW storage rm
2	GM220113	☑	White/Gray	Floor tile w/adhesive and paint		Old FT remaining in SW storage rm
3	GM220114	☑	Brown	Insulation		Insulation falling out walls in SW storage rm
4		☐				
5		☐				
6		☐				
7		☐				
8		☐				
9		☐				
10		☐				

SATURDAY FEDEX SAMPLE DELIVERY - CALL TO SCHEDULE • Use this address for Saturday Delivery only: 4220 N. Santa Fe Ave., Oklahoma City, OK 73105-8517 • Mark Package "Hold for Saturday Pickup"
Please Note - UPS and USPS are NOT available for Saturday Delivery

Appendix C

Fire Protection Design Analysis and Life Safety Plans

IFC Design

Fire Protection Design Analysis and Life Safety Plans

WWYK190068 Repair Fire Suppression System, Maint Hangar Building 2280

Architect-Engineering Services for 100% Design

Project Number: WWYK190068
Work Order: 20435 - Amend

Tinker Air Force Base, Oklahoma
April 3, 2025

Prepared By:

HDR Engineering, Inc.
613 NW Loop 410, Suite 700
San Antonio, TX 78216

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Attachment 4: Life Safety Plans

Acronyms and Abbreviations

AFB	Air Force Base
AFFF	Aqueous Film Forming Foam
DoD	United States Department of Defense
E	East
ETL	Engineering Technical Letter
FT	Foot / Feet
FT2	Square Feet
FT3	Cubic Feet
GPM	Gallons Per Minute
HRS	Hours
HVAC	Heating, Ventilation and Air Conditioning
IAW	In Accordance With
IBC	International Building Code
IEBC	International Existing Building Code
IN	Inch / Inches
IN	North
N/A	Not Applicable
NFPA	National Fire Protection Association
QFPE	Qualified Fire Protection Engineer
PSF	Pressure per Square Foot
PSI	Pressure per Square Inch
QFPE	Qualified Fire Protection Engineer
S	South
SF	Square Foot
TAFB	Tinker Air Force Base
UFC	Unified Facilities Criteria
USACE	United States Army Corps of Engineers
W	West
WG	Water Gauge
‘	Foot
“	Inch
#	Number
%	Percentage
^{o}F	Fahrenheit
§	Subsection

1 Overview

Building 2280 was originally constructed in 1979. The aircraft servicing bays measure approximately 125,000 SF. The hangar bay's primary function is defueled aircraft maintenance. The existing fire protection systems were installed at the time of construction. Within the hangar area, the existing fire suppression consists of five (5) aqueous film forming foam (AFFF) ceiling level pre-action sprinkler systems and eight (8) AFFF oscillating under-wing monitors. The supporting area is served by two (2) wet sprinkler systems and a dry sprinkler system. The AFFF oscillating under-wing monitors are activated by manual release stations. All systems were installed in accordance with applicable design standards at the time of installation. AFFF suppression equipment should be locked-out of service.

The scope of this project is to remove the AFFF fire suppression systems and associated control equipment and the fire alarm system. The design intent is to follow The Department of Air Force - Sundown Policy for Foam fire Suppression Systems dated 16 November 2021, with Change 2 Dec 29, 2022, for the removal of the AFFF fire suppression systems and installation of the overhead wet sprinkler systems within the hangar bays. AFFF agent, tanks, and associated piping and valves up to the proportioning valve will be demolished under separate contract. The existing fire alarm systems will be removed in its entirety, and a new fire alarm and mass notification system will be installed in accordance with UFC 3-600-01 and UFC 4-021-01.

2 Design Approach

This project consists of renovating existing spaces within Building 2280 at Tinker Air Force Base, Oklahoma City, Oklahoma.

In accordance with UFC 3-600-01 Section 2-1.20 and AFI 32-10141, this Scope of Work is considered a Major Project due to the extent of fire suppression (sprinkler) system modifications and fire alarm system modifications.

The fire protection and life safety systems will be in accordance with applicable UFC requirements. Specifically, the design approach will follow UFC 1-200-01, UFC 3-600-01, Chapters 9 and 34, the International Building Code (IBC), the International Existing Building Code (IEBC), NFPA 101 (Life Safety Code), and The Department of Air Force - Sundown Policy for Foam Fire Suppression Systems dated 16 November 2021, with Change 2, 12 December, 2022. .

Per IEBC, the scope of work (replacement of existing fire alarm system) is defined as an Alteration - Level 2, per IEBC. An Alteration - Level 2 includes the reconfiguration of space, the addition or elimination of any door or window, the reconfiguration of any system, or the installation of any additional equipment.

Per NFPA 101 Chapter 43, the scope of work (replacement of existing fire suppression and fire alarm systems) is defined as a Modification, defined as the reconfiguration of

any space; the addition, relocation or elimination of any door or window; the addition or elimination of load-bearing elements; the reconfiguration or extension of any system; or the installation of any additional equipment.

UFC 3-600-01 Section 34-1.2.7 states that where the building rehabilitation chapter of NFPA 101 requires newly constructed elements, components, and systems to comply with new construction requirements in NFPA 101, then it must also comply with new construction requirements in UFC 3-600-01. Additionally, the work must not make the building areas located outside of the work area less conforming with UFC 3-600-01 and NFPA 101 than before the Modification project was undertaken.

Life/Safety Analysis – HDR has been requested to include a Life Safety Analysis to document the compliance of the relevant existing occupancy requirements of the applicable codes for Building 2280 located at Tinker Air Force Base, Oklahoma City, Oklahoma.

The life safety analysis addresses the compliance of the *major applicable existing occupancy specific life safety features / systems* of Building 2280.

The life safety analysis is based on visual observations during a site survey on April 26, 2022, of the readily accessible locations within Building 2280. The life safety analysis does not include any system testing or destructive testing of any building or life safety feature / system.

3 Applicable Codes and Standards

- IBC — International Building Code (2024) as amended by UFC 1-200-01 (01 September 2022, with Change 4, 17 December 2024).
- IEBC — International Existing Building Code (2024) as amended by UFC 1-200-01, (1 September 2022, with Change 4, 17 December 2024).
- NFPA 1 — Fire Code (2024)
- NFPA 10 — Standard for Portable Fire Extinguishers (2022)
- NFPA 13 — Standard for the Installation of Sprinkler System (2025)
- NFPA 51B — Standard for Fire Prevention During Welding, Cutting, and Other Hot Work (2024)
- NFPA 70 — National Electrical Code (2023)
- NFPA 72 — National Fire Alarm and Signaling Code (2025)
- NFPA 90A — Standard for the Installation of Air-Conditioning and Ventilating Systems (2024)
- NFPA 101 — Life Safety Code (2024)

- NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations (2022)
- NFPA 409 Standard on Aircraft Hangars (2022)
- UFC 1-200-01 DoD Building Code (01 September 2022, with Change 4, 17 December 2024.)
- UFC 3-600-01 Fire Protection Engineering for Facilities (8 Aug 2016 with Change 6, 6 May 2021)
- UFC 3-601-02 Fire Protection Systems Inspection, Testing and Maintenance (7 Oct. 2021)
- UFC 4-010-01 DoD Minimum Antiterrorism Standards For Buildings (12 Dec 2018 with Change 3, 24 May 2024)
- UFC 4-021-01 Design and O&M: Mass Notification Systems (9 Apr 2008, Change 1, Jan 2010)
- UFC 4-211-01 Aircraft Maintenance Hangars (13 Apr 2017 Change 3, Apr 20, 2021)
- UFC 4-211-02 Aircraft Corrosion Control and Paint Facilities (1 Dec 2012)
- AFI 32-10141 Planning and Programming Fire Safety Deficiency Correction Projects Hangars (15 May 2019)
- USACE ECB 2018-17 New Requirements for Visual Notification for Mass Notification Systems (25 Oct 2018, Rev 3, 31 August 2023)
- Department of Air Force –Sundown Policy for Foam Fire Suppression Systems (16 Nov 2021), Change 2 (29 December 2022)
- TAFB ES Tinker Air Force Base Electrical Standards (2023)
- TAFB FPS Tinker Air Force Base Fire Protection Standard (2023)

4 Jurisdictional Authority

The Contracting Officer and Base Designated Fire Protection Engineer.

5 Occupancy Classification

5.1 International Code Council

The overall building occupancy, based on areas inside and outside of the work area, is an existing non-separated mixed-occupancies with group A-3, group B, group H-3, and group S-1 per the IBC.

5.2 NFPA 101

The overall building occupancy, based on areas inside and outside of the work area, is an existing non-separated mixed-occupancies with existing Assembly Use, existing Business Use, High-hazard Industrial Use, Ordinary Hazard Storage Use / Aircraft Hangar, and High Hazard Storage Use. Mixed-Occupancy per NFPA 101.

6 General Building Heights and Areas

The scope of work associated with this project is not affecting the occupancy classifications, building height, building areas, or building construction type for Building 2280.

The allowable building heights and building areas for Sprinklered Type IB – IBC, Type II (222) – NFPA 220)

Allowable Height	180 FT	Actual Height:	99 FT 6 IN
Allowable Stories (IBC T 504.4):	3 Stories	Actual Stories:	3 Stories
Allowable Area:	Unlimited	Actual Area:	131,940 SQFT

Per UFC 4-211-01 § 3-3.1.6 and 3-3.1.7, the allowable building area and height are unlimited for Building 2280.

7 Types of Construction

Construction Type:	Type IB (IBC)	Type II 222 (NFPA 220)
Primary Structural Frame Fire Rating:		2 hr.
Load Bearing Walls Fire Rating (Interior/Exterior):		2 hr.
Non-Load Bearing Wall and Partitions Fire Rating (Interior):		2 hr.
Floor Construction Fire Rating:		2 hr.
Roof Construction Fire Rating:		1 hr.

For exterior wall ratings and opening protectives, the fire separation distance for Building 2280 is greater than 10 feet, therefore in accordance with IBC, section 705.5, exterior walls are not fire rated.

8 Passive Fire Protection

There are existing passive fire protection features within the building. New penetrations related to the fire suppression and fire alarm and mass notification modification will be protected in accordance with the rating of the wall / ceiling system in accordance with IBC Chapter 7.

9 Interior Finishes

Interior finishes are existing. New interior finishes (ceiling, walls, and floors) needed to address any wall, ceiling, or floor modifications associated with this project will be provided in accordance with NFPA 101 Chapter 10 and the applicable occupancy chapters.

Existing interior finishes in Building 2280 shall be in accordance with the following (NFPA 101 Existing Chapters):

Wall and Ceiling Finish Materials:

- Assembly – Class A or B in exit access corridors. Class A in exit enclosures. Class A, B, or C in Assembly Areas (OL <300).
- Business - Class A or B in exit enclosures. Class A or B in exit access corridors. Class A, B, or C in other areas.
- Industrial – Class A, B, or C in operating areas, Class A or B in exit enclosures.
- Storage - Class A, B, or C in storage areas, Class A or B in exit enclosures.

Floor Finish Materials:

- Assembly – No requirements.
- Business – No requirements.
- Industrial – Class I or Class II in exit enclosures and in exit access corridors.
- Storage – Class I or Class II in exit enclosures and in exit access corridors.

There was no indication that the existing interior finishes of Building 2280 are noncompliant with the requirements of NFPA 101.

10 Fire Department (Emergency) Vehicle Access

Fire Department Vehicle Access is existing.

The scope of work associated with this project is not affecting the Fire Department Vehicle Access of Building 2280.

UFC 3-600-01 Section 9-1 requires the all-weather ground access to be paved and extend to within 33 feet of exterior door accessible for the fire department ingress.

11 Fire Protection

11.1 Fire Pumps and Water Supply

The fire sprinkler systems and fire hydrants are supplied by remote fire pumps located in Building 2123. The most recent fire pump tests received from the TAFB Personnel are

found in Attachment 2. The four (4) diesel fire pumps arranged in parallel, one fire pump as the primary and the other three as back-up. Two fire pumps are rated for 1500 GMP at 120 PSI and the other two fire pumps are rated for 1500 GMP at 100 PSI.

The tests are compliant with NFPA 20 requirements but are from 2017. Fire pump number four is currently performing less than 95% of rated capacity, as per fire pump annual test. There is a current ongoing project WWYK180027 – REPAIR AND REPLACE FIRE PUMPS VARIOUS FACILITIES to replace the existing fire pumps within Building 2123.

Preliminary hydraulic calculations have been completed and indicate that the existing fire pumps will provide adequate pressure and flow for the overhead hangar sprinkler systems. See Attachment 3: Preliminary Sprinkler Hydraulic Calculations - Wet System Hangar

11.2 Fire Suppression Systems

11.2.1 Existing Systems

Fire suppression within the hangar bays is currently provided by eight (8) AFFF oscillating under-wing monitors mounted 4 FT above finished floor and five (5) overhead pre-action AFFF sprinkler systems. Sixteen (16) 500-gallon National Foam AFFF concentrate bladder tanks supply the eight (8) oscillating monitors and five (5) overhead pre-action AFFF sprinkler systems.

11.2.2 Demolition:

The existing under-wing AFFF monitors, overhead pre-action AFFF sprinkler systems, and associated pre-action and deluge valves will be demolished in their entirety including, but not limited to piping, fittings, sprinklers, hangers, etc.

AFFF agent, concentrate tanks and associated piping will be demolished up to the proportioning valve under separate AFCEC contract.

In addition, the piping to the dry pipe valve within the Paint Mixing Room on the west side of the building will be removed. The air compressor, alarm check valve, sprinkler heads, and associated piping will remain.

The existing fire suppression lead-ins to remain will be flushed in accordance with NFPA 24 once the demolition is completed and prior to new work beginning,

11.2.3 New Work:

New fire department connections will be added to Building 2280.

Six (6) new wet-pipe sprinkler system risers will be installed to protect the hangar bays of Building 2280. The sprinkler systems serving the overhead hangar bays will be hydraulically designed to not less than 0.2 gpm/ft^2 over 5000 ft^2.

11.3 Fire Detection Within Hangar

11.3.1 Existing Systems

The Hangar Bay is currently equipped with Nine (9) AFFF manual releasing stations located within the Hangar Bays. The manual releasing stations are connected to the existing FCI – 72 Releasing Service Fire Alarm Control Unit (RSFACU) located within the West Mechanical Room. The building fire alarm system has a FCI – 72 fire alarm control unit (FACU).

11.3.2 System Upgrades

The existing systems, to include FCI – 72 control panels (RSFACU, FACU), Aux power supply, existing manual releasing stations, existing interface to pre-action valves and associated cable, conduit and back boxes will be removed in their entirety. All holes and penetrations resulting from the demolition of equipment will be patched and repaired to maintain the integrity of the fire rated barrier separating the Hangar Bay from the offices and support areas.

Optical Flame Detection:

New optical flame detection will be provided at the request of the Tinker AFB DFPE, consistent with the pending release of UFC 4-211-01, Change 4. New optical flame detection will be the X3301 Multi-spectrum IR Flame Detector manufactured by UTC Fire & Security, Detector Electronics Corporation, 6901 W 10th St, Minneapolis, M 55438. The Optical flame detection system will use triple infrared (IR) flame detectors listed/approved for the expected fuel hazards in the hangar bay. The detectors must be immune to radar and radio frequency emissions from handheld equipment or equipment on-board the aircraft. Provide shielding for the detectors and their circuits from radio frequency interference. All circuiting from the FMCU to the detectors will be shielded, and shielding will be grounded at one (1) end. Optical flame detector signals shall be non-latching to the FMCU.

Detectors must be mounted in accordance with their listing at approximately 8 FT above the finished floor of the hangar. Provide a sufficient number of optical flame detector around the perimeter of the hangar bay, such that all portions of the hangar bay are within the range and cone-of-vision of at least three detectors. Exception: The area of the hangar bay within 5 FT of the perimeter wall is not required to be within the cone-of-vision of an optical flame detector. No aircraft silhouette will be solely visible from optical flame detectors located on one (1) side of the fuselage. A minimum of two optical flame detectors covering the aircraft silhouette are required on each side of the fuselage.

Angle the detectors and provide blinds (field of view inhibitors) so the cone-of-vision is contained within its designated suppression zone and does not extend more than 5 FT (1.5 m) outside the hangar bay, into another fire area (e.g., through normally open roll-up fire doors), or is within the view of hot sources such as radiant heaters. Locate optical flame detectors at a sufficient distance per the manufacturer's recommendations from

sources that may cause false alarms (e.g., welding, solar glare, radiant heaters, aircraft engine exhaust, strobes, hot surfaces, and other relevant sources.)

Calibrate optical flame detectors to operate upon viewing the flame signature of the expected fuel(s) to be present in the hangar bay. Use a 2 FT by 2 FT pool fire as the basis to set the sensitivity of the optical flame detectors. Upon the 2 FT by 2 FT pool fire reaching full development, all detectors within the cone-of-vision are required to activate with 30 seconds.

See Attachment 1 for Det-Tronics Optical flame detection layout.

Provide a two (2) position non-key operated switch located at the FMCU that when activated, inhibits optical detection of all optical flame detectors in the hangar bay through programming at the FMCU. Monitor the inhibit switch at the FMCU. Provide a supervisory signal to the receiving station indicating the optical flame detectors are inhibited. Label the switch "INHIBIT OPTICAL FLAME DETECTION." Provide engraved labels on the inhibit switch indicating when the optical flame detectors are in "NORMAL" or "INHIBIT" mode.

11.4 Fire Alarm and Mass Notification System

11.4.1 Existing Systems

The building is equipped with an existing FCI conventional fire alarm system. The existing system has manual pull stations at all building exits. The fire alarm system notification devices include horn/strobes and strobes, and it transmits Alarm, Trouble and Supervisory signals to the Monaco D-21 Base-Wide Monitoring Center.

11.4.2 System Upgrades

Basis of Design Equipment

Monaco Enterprises, Inc., Spokane Washington is the basis of design for the Fire Alarm and Mass Notification per the direction of Tinker Airforce Base Civil Engineering Division. The Monaco equipment will be as follows:

- Monaco MAAP-X is a combined, addressable Fire Alarm/Mass Notification Unit with a built-in RF transceiver.

General Fire Alarm and Mass Notification Criteria

Addressable microprocessor ‑ based FA/MNS control units (Monaco MAAP-X) and built in FA/MNS transceivers (Monaco BT-XM) will be installed.

The new FMCU control unit will be programmed to report device-specific alarm information to the existing Monaco D-21 Based-Wide Monitoring System. Alarm data will include alarm type (Alarm, Trouble and Supervisory), device type (Smoke Detector, Optical Flame Detector, Manual Pull Station, Sprinkler Water Flow, Sprinkler Valve Supervision, Duct Detector, etc.), device address, device location (Room Number, Next to Room Number, or other descriptive identifier) and Building Location (Building Number

and Building Name). FMCU shop drawings will be updated to reflect “As-Built” Conditions. Room Names and Room Numbers will be updated to reflect actual description if different from bid documents.

Signaling Line Circuits and Initiating Device Circuits will be Class B. Notification (speaker and strobes) Circuits will be Class B. All fire detection and alarm system conductors will be run in minimum 3/4 in. electrical metallic tubing (EMT), rigid conduit or raceways as specified in NFPA 70 (NEC) and to meet the survivability requirements of NFPA 72.

Dedicated battery backup power capable of providing 48 hours of standby power under supervisory and trouble conditions including audible trouble signal devices, and audible and visual signal devices under alarm conditions for an additional 15 minutes or 1 hours of the mass notification system

Mass Notification System is required for normally occupied buildings, with 11 or more occupants. Building 2280 has an occupancy of load greater than 11 persons. Mass notification systems will be installed in accordance with UFC 4-021-01, 2018-17 ECB and NFPA 72.

Notification Appliances

Occupant notification will be provided with audible and visual notification devices. Notification devices will be installed in accordance with NFPA 72, UFC 3-600-01, UFC 4-021-01, and Architectural Barriers Act (ABA). Visual notification devices will be visible within the evacuation path. Visual devices will be located no more than 15 feet from the ends and no more than 100 feet on center in corridors. Visual devices will be installed in toilet rooms, break rooms, locker rooms, work rooms, shops, office with more than 2 chairs, and other common use rooms. Audible signaling for fire alarm will be accomplished with pre-recorded voice evacuation messages. Mass notification audio signaling will be accomplished via pre-recorded and “Live” voice messages. Fire Alarm and Mass Notification voice messages will share the same speaker. Fire Alarm and Mass Notification strobes will be clear with “ALERT” text printed on each device in red lettering.

In addition to the audio and visual notification devices, textual signs will be installed to direct hearing-impaired individuals in accordance with UFC 4-021-01.

Local Operating Consoles (LOC) will be provided to allow building occupants to initiate MNS messages. The LOCs will be located at the main entrance and other locations so that occupants do not need to travel more than (200 ft.) horizontally or to travel to other floors to access a LOC.

Initiating Devices

New initiating devices will be installed in accordance with current codes and standards. New conduit, back boxes, and cable will be installed as required. The existing conduit may be re-used, if it is free from corrosion, meets all current standards and codes, and will be warranted by the contractor as new. All existing conduits will be painted as if newly installed.

The new FMCU systems will monitor new and existing fire suppression systems, including automatic sprinkler systems. Sprinkler system valves will be monitored to prevent tampering. Where tamper switches are not currently installed new tamper switches will be installed. The Contractor will calibrate and adjust all sprinkler supervision devices (new and existing) as required to consistently report in accordance with NFPA 72.

Double-action manual pull stations will be provided at all building exists. Manual pull stations will be installed within 5 feet of each exit doorway opening and at each entrance to exit stairways.

Smoke detectors will be provided in accordance with UFC 3-600-01 and NFPA 101. Consequently, smoke and heat detection will be limited to that which is required to protect FA and FMCU Control equipment only.

Carbon monoxide detectors will be installed within all mechanical rooms where fossil fuel burning equipment is installed. Upon detection of carbon monoxide, building occupants will be notified via a Temporal-4, Emergency Tone followed by a voice evacuation message.

Fire and Smoke Dampers and HVAC Systems

Existing duct smoke detectors will be removed, and new addressable duct smoke detectors installed for all HVAC units exceeding 2,000 CFM. HVAC systems will be arranged for fan shut down upon activation of the unit's duct detector in accordance with NFPA 90A. All duct detectors will be addressable type and be compatible with the new FA/MNS system. For holes less than 3/8in in diameter, foil duct tape may be used. For larger holes, sheet metal covers secured to the duct with sheet metal screws will be used. Listed duct sealants will be used to make patches airtight.

Duct smoke detectors will be installed within 5ft. of all fire smoke dampers. Addressable control relays will be provided as required to close fire smoke dampers.

Duct smoke detectors will initiate supervisory signals at the FA/MNS control unit and transmit a supervisory signal to the Monaco D-21 Based-Wide Monitoring System.

11.5 Portable Fire Extinguishers

Portable fire extinguishers are existing. Portable fire extinguishers will not be provided as part of this project.

12 Means of Egress

Refer to Attachment 4 – Life Safety Plans.

12.1 Occupant Load

The project area occupant load is calculated to be 508 persons. The occupant load is based on a load factor of 150 ft2/person for Business Use, 500 ft2/person for Aircraft

Servicing Area Use, 15 ft2/person for Assembly Use, 100 ft2/person for Industrial Use, and 500 ft^2/person for Storage Use per NFPA101 §7.3.1.2 and UFC 3-600-01, Table 10-1. Tabulations per occupancy type are detailed within the Life Safety Plans.

12.2 Arrangement of Means of Egress

The arrangement of Means of Egress are existing and must satisfy UFC 3-600-01 and NFPA 101 for Existing Occupancies. The evaluation of Common Path, Travel Distance to Exit and Dead-End Corridors are detailed within the Life Safety Plans.

12.3 Egress Illumination and Emergency Lighting

Emergency lighting for means of egress is required for exit access and exit discharge areas in accordance with NFPA 101 §7.9.1.1. Egress illumination is required as follows.

- 1 foot-candle on normal power throughout (NFPA 101 §7.8.1.3 (2)).
- 1 foot-candle on emergency power (NFPA 101 §7.9.2.1).

Emergency lighting units were noted to be installed throughout the project area.

12.4 Marking of Means of Egress

Exits are required to be marked by approved exit signs that are readily visible from any point in an exit access corridor and not be more than the rated viewing distance or 100 feet, whichever is less, from the nearest sign (NFPA 101 §7.10.1.2 & §7.10.1.5.2). Exit signs were noted to be installed throughout the building.

New door openings intended for means of egress will comply with NFPA 101 §7.2.1. The Life Safety Plans demonstrate that the capacity is sufficient for the intended occupancy. Existing door opening will not be affected as part of this project.

13 Life Safety Evaluation

13.1 Life Safety Feature / System

UFC 3-600-01 Section 34-1.1 (Existing Facilities) identifies that a Facility as it exists must meet the requirements of NFPA 101, for existing occupancies.

In accordance with NFPA 101, the overall building occupancy is considered an Existing non-separated Mixed-Use Occupancy with Existing Assembly Use, Existing Business Use, Industrial and Storage Use / Aircraft Hangar Mixed-Occupancy.

The applicable NFPA 101 existing occupancy chapters for the Life Safety Feature / System include:

- Chapter 13 – Existing Assembly Occupancies
- Chapter 39 – Existing Business Occupancies
- Chapter 40 – Industrial Occupancies

- Chapter 42 - Storage Occupancies

The major applicable existing occupancy specific life safety features / systems of Building 2280 that are addressed in this Life Safety Analysis for the above noted occupancies are limited to the following:

- Doors
- Stairs
- Egress capacity
- Number of means of egress
- Arrangement of means of egress
- Discharge from exits
- Marking of means of egress
- Fire Protection
- Fire Protection Site

13.2 Life Safety System Deficiencies

The following is a list of major applicable existing occupancy specific life safety features / systems deficiencies for Building 2280 based on visual observations during site surveys of the readily accessible locations within. See Appendix D – Life Safety Plans for correlations with these deficiencies.

13.2.1 Doors

There are numerous doors on Level 1 serving high-hazard areas (examples: Paint Storage 117, Paint Mixing Room 118) that do not swing in the direction of egress travel (NFPA 101 Section 7.2.1.4.2 (3)).

Level 2 double doors in the 2-hour fire barrier to the hangar do not appear to have a 90-minute rating.

- HDR recommends that a separate comprehensive analysis be conducted on the fire-resistance rated constructions and opening protectives (doors, glazing, through penetrations, membrane penetrations, ducts, air transfer openings, etc.) therein to verify compliance with UFC 3-600-01.

13.2.2 Stairs

There are two open stairs (Area A and Area B) serving Level 2, Mezzanine, and Level 3. Vertical opens shall be enclosed (NFPA 101 Section 40.3.1).

There are two stairs (Area A and Area B) which discharge into B2280. Exit stairs shall discharge directly to a public way or exterior exit discharge (NFPA 101 Section 7.7.1).

Level 1 Area D Room 110 is under an exit stair. HDR, Inc. recommends that a separate analysis be conducted to verify that the stair is separated from Room 110 with 1-hour fire-resistive construction (NFPA 101 Section 7.2.2.5.3.2).

13.2.3 Egress capacity

No identified deficiencies at this time.

13.2.4 Number of means of egress

Level 3 (Area A and Area B) is required to have two (2) means of egress (NFPA 101 Section 40.2.4.1.1).

Mezzanine Level (Area A and Area B) is required to have two (2) mean of egress (NFPA 101 Section 7.4.1.1).

Level 2 (Area A) is required to have two (2) means of egress (NFPA 101 Section 40.2.4.1.1).

Level 1 Area D occupancies are not afforded two means of egress since they cannot egress through Area C (high-hazard area).

13.2.5 Arrangement of means of egress

Level 1 Hangar - the exit exceeds the 20 FT distance between the hangar bay door and the personnel exit (UFC 4-211-01 Section 3-3.1.1).

Level 3 (Area A and Area B) common paths of travel exceed 100 feet (NFPA 101 Section 40.2.5).

Mezzanine Level (Area A and Area B) travel distances exceed 75 feet (NFPA 101 Section 40.6.3 and Section 7.2.2.5.1.1).

Level 2 (Area A) common paths of travel exceed 100 feet (NFPA 101 Section 40.2.5).

There are two open stairs (Area A and Area B) serving Level 2, Mezzanine, and Level 3. Vertical openings shall be enclosed (NFPA 101 Section 40.3.1).

There are two stairs (Area A and Area B) which discharge into Building 2280. Exit stairs shall discharge directly to a public way or exterior exit discharge (NFPA 101 Section 7.7.1).

Level 1 Area C and Area D have dead-end corridors greater than 20-feet (NFPA 101 Section 13.2.5.1.3).

Level 1 Area C Paint Storage 117 has a common path of travel that exceeds 0-feet, a travel distance that exceeds 75-feet, and a dead-end corridor that exceed 0-feet (NFPA 101 Table 40.2.5.1, Table 40.2.6.1, and Table 2.5.1, respectively).

Level 1 Area D dead-end corridors and common paths of travel are exceeded for various occupancies because the second means of egress is through Area C high-hazard areas which is not permitted.

Level 2 Area B has a required means of egress path that directs the occupants to the exterior of the building, across the roof over a high-hazard area, and to an exterior stair that descends next to a high hazard area. HDR, Inc. recommends that a separate comprehensive analysis be conducted on the fire-resistance rated constructions of the roof and the exterior wall of the high hazard area and opening protectives (doors, glazing, through penetrations, membrane penetrations, ducts, air transfer openings, etc.) therein to verify a minimum 1-hour fire-resistance rating (NFPA 101 Section 7.2.2.6.3). Additionally, marking of the means of egress, emergency lighting, guards, handrails, stairs, etc. should all be surveyed for compliance with NFPA 101 Section 7.2.2.6 for the exterior means of egress path.

13.2.6 Discharge from exits

No identified deficiencies at this time.

13.2.7 Marking of means of egress

Exit signs are existing. Numerous areas appear to be deficient with exit signage coverage. HDR, Inc. recommends that a separate exit sign analysis be conducted to verify compliance with NFPA 101 Section 39.2.10 and Section 40.2.10.

Emergency lighting is existing. Numerous areas appear to be deficient with emergency lighting. HDR, Inc. recommends that a separate emergency lighting analysis be conducted to verify compliance with NFPA 101 Section 39.2.9 and Section 40.2.9, to include a functional testing and measurement of the levels of illumination.

13.2.8 Fire Protection

Fire Suppression System (existing to be replaced in Hangar only) – see Section 11.1 of this report.

- The west mechanical room has several mechanical duct obstructions greater than four feet wide without sprinkler protection (NFPA 13 Section 9.5.5.3.1).
- Some mechanical rooms and mezzanines have open mesh grating greater than four feet wide without sprinkler protection (NFPA 13 Section 9.5.5.3.1.1).

Fire Alarm System (existing to be replaced throughout) – see Sections 11.2 and 11.4 of this report.

Fire Extinguishers are existing. Numerous areas appear to be deficient with fire extinguisher placement. HDR, Inc. recommends that a separate fire extinguisher analysis related to extinguisher type, extinguisher size, and extinguisher spacing be conducted to verify compliance with UFC 3-600-01 Section 9-17.

13.2.9 Fire Protection Site:

On the west side of the building the fire department access road measures less than the required 20 feet as required by NFPA 1 section 18.2.3.4.1.1.

14 Safeguards During Construction

All work associated with this project will be performed in accordance with NFPA 241—Standard for Safeguarding Construction, Alteration, and Demolition Operations.

14.1 Hot Work

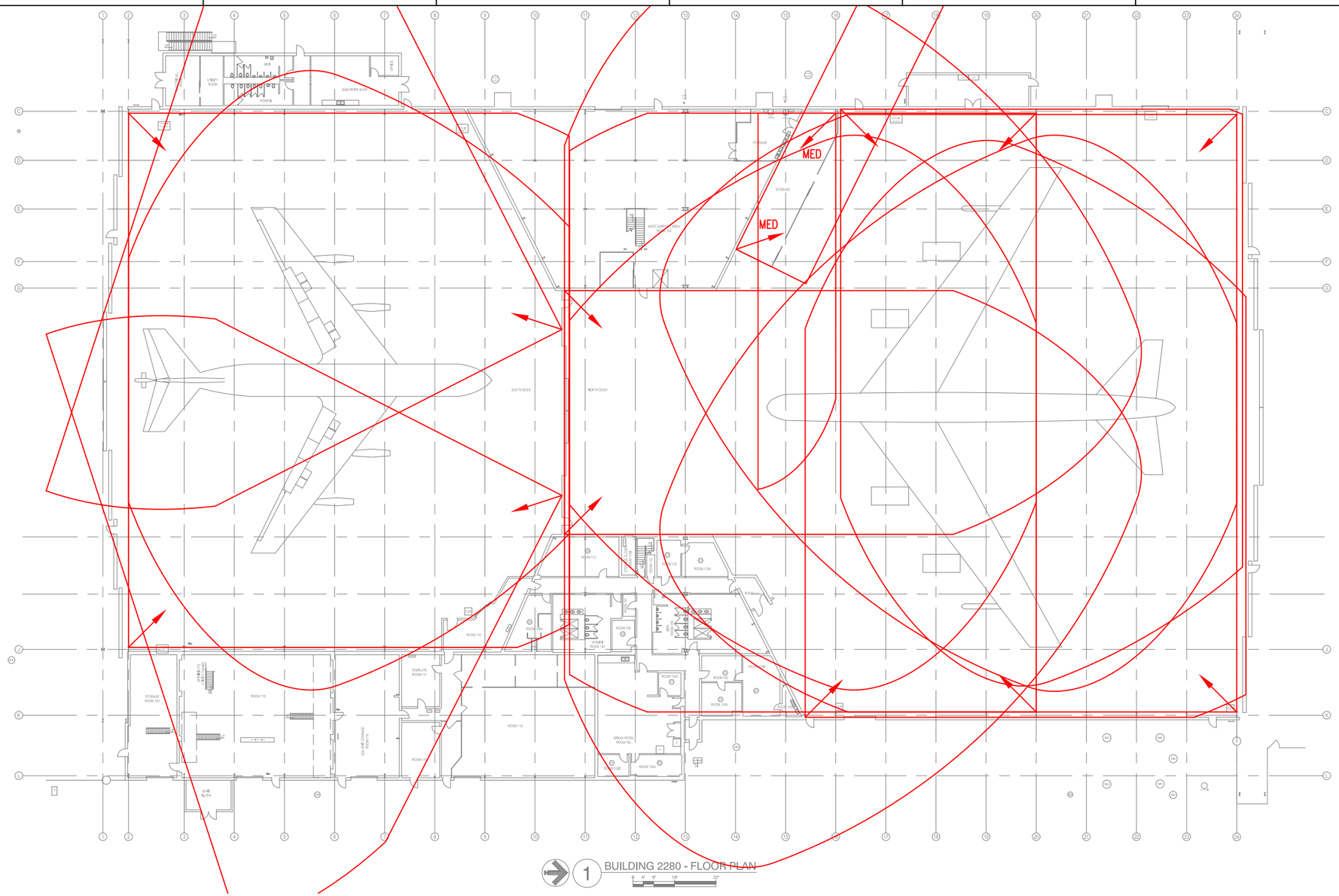
All Hot Work associated with demolition and construction will be performed in accordance with NFPA 51B and Tinker Air Force Base hot work requirements. Safeguard for Hot Work operations include but are not limited to the relocation of combustible storage, the use of fire-resistive barriers to protect combustibles that cannot be relocated, the establishment of Fire Watch, and the termination of hot work operations when fire protection systems are out of service. Additionally, Hot Work will not be performed when alternative methods can be employed to dismantle existing or assemble new systems.

14.2 Fire Protection Impairment Supervision

Fire protection impairments will be supervised and performed in accordance with UFC 3-601-02 and Tinker Air Force Base utility outage requirements (to include the Tinker Air Force Base Outage Request Form).

Attachment 1

Det-Tronics Optical Flame Detection Layout



GENERAL NOTES:

1. MOUNT FLAME DETECTORS AT THE LOCATIONS SHOWN @ 10'±2' A.F.F. USING Q9033 SWIVEL MOUNT AND COLLAR ATTACHMENT. INSTALL 10° FIELD OF VIEW LIMITERS ON ALL DETECTORS.
2. USE DET-TRONICS Q1201C LASER AIMER & HOLDER FOR DETECTOR AIMING. VERIFY THE LASER IS ZEROED WITH THE HOLDER ON THE CENTRAL AXIS PRIOR TO AIMING.
3. THE FIELD OF VIEWS (FOV) SHOWN ARE FOR AN X3301 TO A 2'x2' JP-5 PAN FIRE. DETECTORS DENOTED WITH 'MED' ARE SET TO MEDIUM SENSITIVITY. ALL OTHER DETECTORS ARE SET TO VERY HIGH SENSITIVITY.

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REV	DATE	DESCRIPTION
0.0	05/31/22	PRELIMINARY RELEASE

SCALE: NONE

TOLERANCE UNLESS OTHERWISE SPECIFIED

ONE PLACE	0.0	+/- .020
TWO PLACES	0.00	+/- .010
THREE PLACES	0.000	+/- .005
FRACTIONS	X/XX	+/- 1/32
ANGLES	DEGREES	+/- 1

F.O.
P.O.
DESIGN BY: S. MOORE
DATE: 05/31/22
CHECKED BY:

CUSTOMER:

PROJECT:
TINKER AFB
B2280

CONFIDENTIAL – THIS DRAWING & SPECIFICATION CONTAIN PROPRIETARY INFORMATION AND ANY REPRODUCTION, DISCLOSURE, OR USE THEREOF IS EXPRESSLY PROHIBITED WITHOUT WRITTEN PERMISSION OF DETECTOR ELECTRONICS CORPORATION.

DET-TRONICS®

DETECTOR ELECTRONICS CORPORATION
6901 WEST 110TH STREET
MINNEAPOLIS, MN 55438

DRAWING TITLE	SIZE	DRAWING NUMBER	REV
PROPOSED X3301 LAYOUT	B	–	0.0

Attachment 2

Fire Pump Tests

Attachment 2.1

Pump 1

MASON MECHANICAL
917 AUTUMN WAY
BLANCHARD OK 73010

Inspection report
No. 1

FIRE PUMP PERFORMANCE TEST

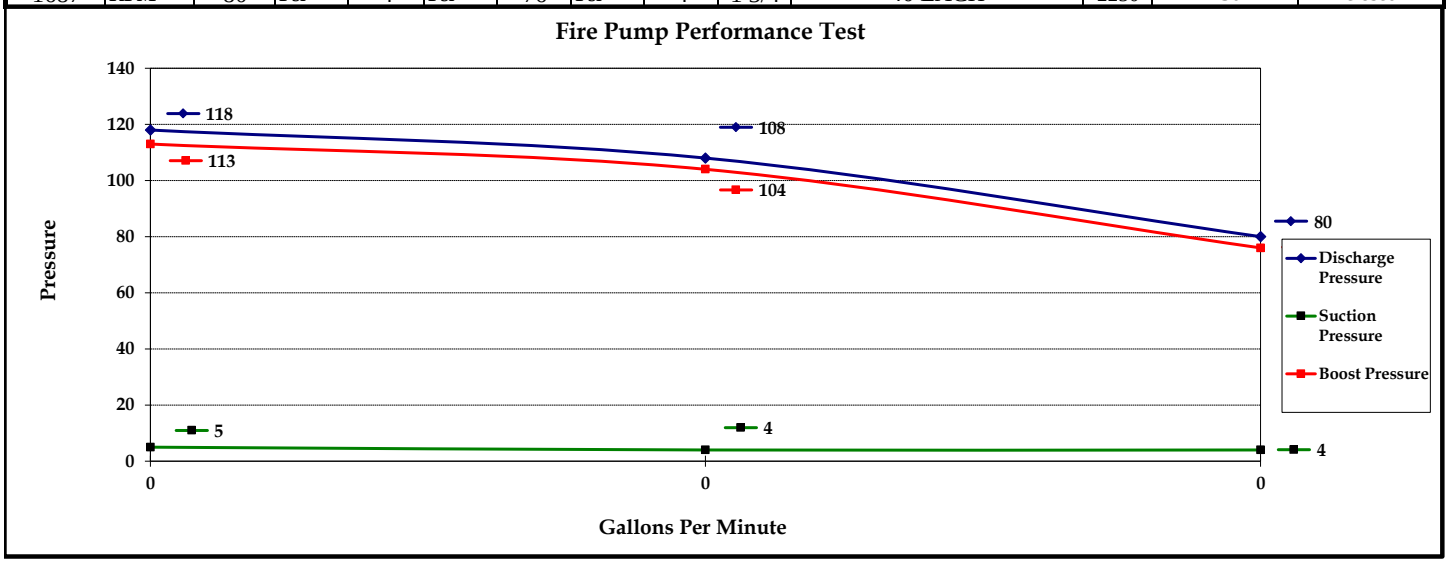
Report to:

Location: TINKER AIR FORCE BASE
Street BUILDING 2123 PUMP 1
City TAFB **State** OK **Zip**
Attn: ADAM RODGERS
Phone **Fax**

Location Inspected PUMP HOUSE
Street Address SAME
Inspector's Name JAMES MASON
Inspection Date DEC-01-17
Inspection Contract **Page** 1 **of** 1

Pump Information	**Shaft**		**Manufacturer**		**Approved**		**Shop or Serial No.**		**Model Number**						
		Vertical	FAIRBANKS		X	**Yes**	K3A1080655F2		684						
	X	**Horizontal**				**No**									
	GPM		**Rated PSI**	**Rated RPM**	**Suction From**		**Size Conn.**		**Tank Supply**		**Tank Height**				
	500		100	2100	Water Tank		6"		50,000		18	**Feet**			
Driver	**Manufacturer**		**Approved**		**Shop or Serial No.**		**Model Number**		**Rated HP**		**Rated RPM**				
	DETROIT		X	**Yes**	360594		PTA-1SD273		NO INFO		NO INFO				
				No											
	Engine type		**Rated Volts**	**Oper. Volt**	**Rated Amps**			**Phase**	**Cycles**		**Service Factor**				
	Diesel		12	**D.C.**	**D.C.**		**Amps**		**Amps**		**Phase**		**Hz.**		
Controller	**Manufacturer**		**Approved**		**Start**	30	**PSI**	**Stop**	40	**Psi**	**Jockey Pump**				
	MASTER		X	**Yes**		X	**Manual**								
				No		X	**Pressure Drop**	X	**Manual**		X	**Yes**			
	Shop or Serial No.		**Model Number**			X	**Auto**		**Auto**			**No**			
	15864-3		DCFR9			30	**Sec Delay**				X	**On**	110		
											X	**Off**	120		

Revolutions Per/minute		**Discharge Pressure**		**Suction Pressure**		**Net Pressure**		**STREAMS No.**	**Size**	**Pitot#**				**GPM**	**%**	**Relief Valve**
1731	**RPM**	118	**Psi**	5	**Psi**	113	**Psi**	0	Churn					0	0	closed
1711	**RPM**	108	**Psi**	4	**Psi**	104	**Psi**	4	1 3/4	18 EACH				1500	100	closed
1687	**RPM**	80	**Psi**	4	**Psi**	76	**Psi**	4	1 3/4	40 EACH				2250	150	closed



Additional Comments: PASS

Signature of owner or owners representative _____ **Date** _____

Duplicate to _____
Street _____
City _____ **State** _____ **Zip** _____
Attn: _____

Attachment 2.2

Pump 2

MASON MECHANICAL

917 AUTUMN WAY
BLANCHARD OK 73010

Inspection report
No. 1

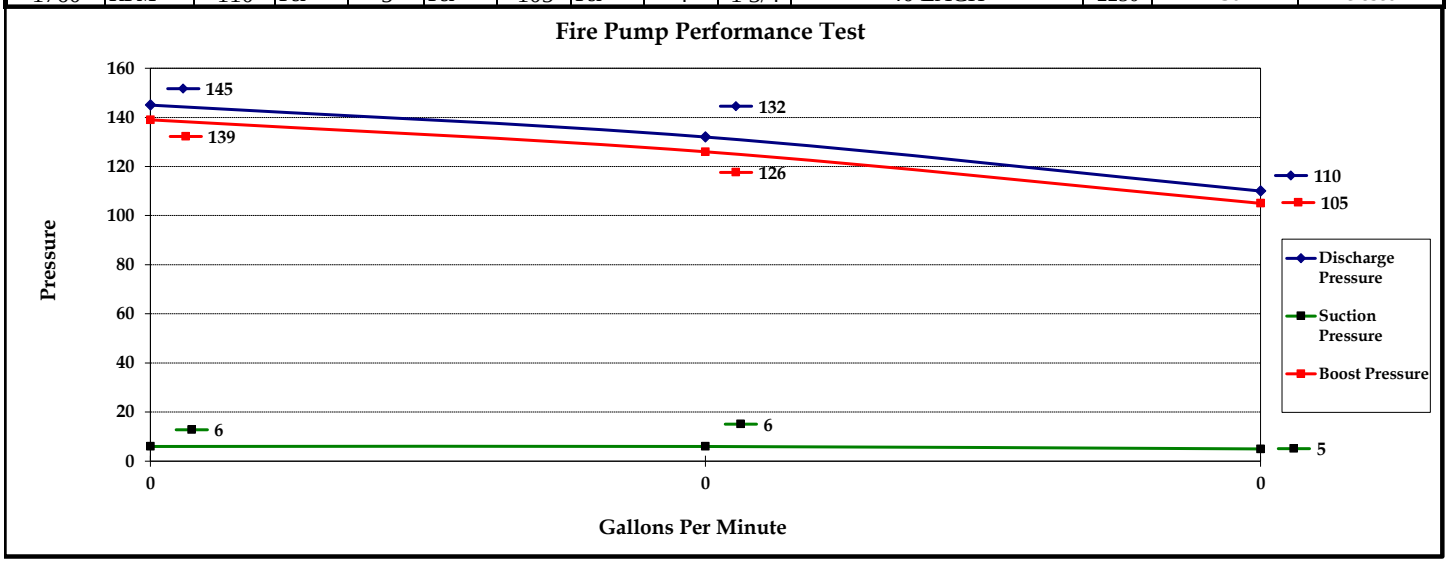
FIRE PUMP PERFORMANCE TEST

Report to:

Location:	TINKER AIR FORCE BASE	**Location Inspected**	PUMP HOUSE
Street	BUILDING 2123 PUMP 2	**Street Address**	SAME
City	TAFB **State** OK **Zip**	**Inspector's Name**	JAMES MASON
Attn:	ADAM RODGERS	**Inspection Date**	DEC-01-17
Phone	**Fax**	**Inspection Contract**	**Page** 1 **of** 1

Pump Information	**Shaft**		**Manufacturer**		**Approved**		**Shop or Serial No.**		**Model Number**						
		Vertical	PENTAIR		X	**Yes**	15-2457930		4"1824BF						
	X	**Horizontal**				**No**									
	GPM		**Rated PSI**	**Rated RPM**	**Suction From**		**Size Conn.**		**Tank Supply**		**Tank Height**				
	1500		125	1770	Water Tank							**Feet**			
Driver	**Manufacturer**		**Approved**		**Shop or Serial No.**		**Model Number**		**Rated HP**		**Rated RPM**				
	Clarke		X	**Yes**	PE60681275743		JU6HUF80D58		183		1760				
				No											
	Engine type		**Rated Volts**	**Oper. Volt**	**Rated Amps**			**Phase**	**Cycles**		**Service Factor**				
	Diesel		12	**D.C.**	**D.C.**	**Amps**		**Amps**		**Phase**		**Hz.**			
Controller	**Manufacturer**		**Approved**		**Start**		40 **PSI**	**Stop**	50 **Psi**		**Jockey Pump**				
	Metron		X	**Yes**		X	**Manual**								
				No		X	**Pressure Drop**	X	**Manual**		X	**Yes**			
	Shop or Serial No.		**Model Number**			X	**Auto**		**Auto**			**No**			
	23602560		FD4J			40	**Sec Delay**				X	**On**	115		
											X	**Off**	142		

Revolutions Per/minute		**Discharge Pressure**		**Suction Pressure**		**Net Pressure**		**STREAMS No.**	**Size**	**Pitot#**	**GPM**	**%**	**Relief Valve**
1767	**RPM**	145	**Psi**	6	**Psi**	139	**Psi**	0	Churn		0	0	closed
1760	**RPM**	132	**Psi**	6	**Psi**	126	**Psi**	4	1 3/4	18 EACH	1500	100	closed
1760	**RPM**	110	**Psi**	5	**Psi**	105	**Psi**	4	1 3/4	40 EACH	2250	150	closed



Additional Comments: PASS

Signature of owner or owners representative _____ **Date** _____

Duplicate to _____
Street _____
City _____ **State** _____ **Zip** _____
Attn: _____

Attachment 2.3

Pump 3

MASON MECHANICAL
917 AUTUMN WAY
BLANCHARD OK 73010

Inspection report
No. 1
Report to:

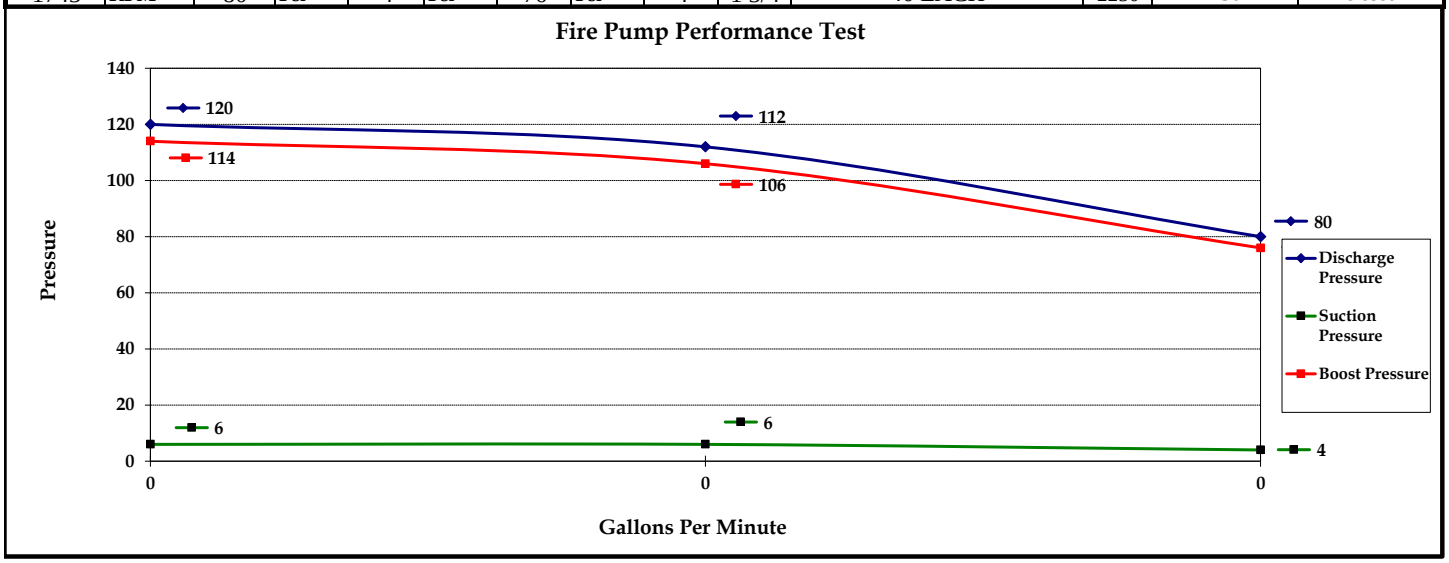
FIRE PUMP PERFORMANCE TEST

Location: TINKER AIR FORCE BASE
Street BUILDING 2123 PUMP 3
City TAFB **State** OK **Zip**
Attn: ADAM RODGERS
Phone **Fax**

Location Inspected PUMP ROOM
Street Address SAME
Inspector's Name JAMES MASON
Inspection Date DEC-01-17
Inspection Contract
Page 1 **of** 1

Pump Information	**Shaft**		**Manufacturer**		**Approved**		**Shop or Serial No.**		**Model Number**						
		Vertical	FAIRBANKS		X	**Yes**	K341080655-3		684						
	X	**Horizontal**				**No**									
	GPM		**Rated PSI**	**Rated RPM**	**Suction From**		**Size Conn.**		**Tank Supply**		**Tank Height**				
	1500		100	1770	Water Tank						18	**Feet**			
Driver	**Manufacturer**		**Approved**		**Shop or Serial No.**		**Model Number**		**Rated HP**		**Rated RPM**				
	DETROIT		X	**Yes**	560595		PTA-15D2735		NO INFO		NO INFO				
				No											
	Engine type		**Rated Volts**	**Oper. Volt**	**Rated Amps**			**Phase**	**Cycles**		**Service Factor**				
	Diesel		12	**D.C.**	**D.C.**		**Amps**		**Amps**		**Phase**		**Hz.**		
Controller	**Manufacturer**		**Approved**		**Start**	50	**PSI**	**Stop**	60	**Psi**	**Jockey Pump**				
	MASTER		X	**Yes**		X	**Manual**								
				No		X	**Pressure Drop**	X	**Manual**		X	**Yes**			
	Shop or Serial No.		**Model Number**			X	**Auto**		**Auto**			**No**			
	15664-4		DCFR9				**Sec Delay**				X	**On**	110		
											X	**Off**	120		

Revolutions Per/minute		**Discharge Pressure**		**Suction Pressure**		**Net Pressure**		**STREAMS No.**	**Size**	**Pitot#**				**GPM**	**%**	**Relief Valve**
1758	**RPM**	120	**Psi**	6	**Psi**	114	**Psi**	0	Churn					0	0	closed
1751	**RPM**	112	**Psi**	6	**Psi**	106	**Psi**	4	1 3/4	18 EACH				1500	100	closed
1743	**RPM**	80	**Psi**	4	**Psi**	76	**Psi**	4	1 3/4	40 EACH				2250	150	closed



Additional Comments: PASS

Signature of owner or owners representative _____ **Date** _____

Duplicate to _____
Street _____
City _____ **State** _____ **Zip** _____
Attn: _____

Attachment 2.4

Pump 4

MASON MECHANICAL
917 AUTUMN WAY
BLANCHARD OK 73010

Inspection report
No. 1
Report to:

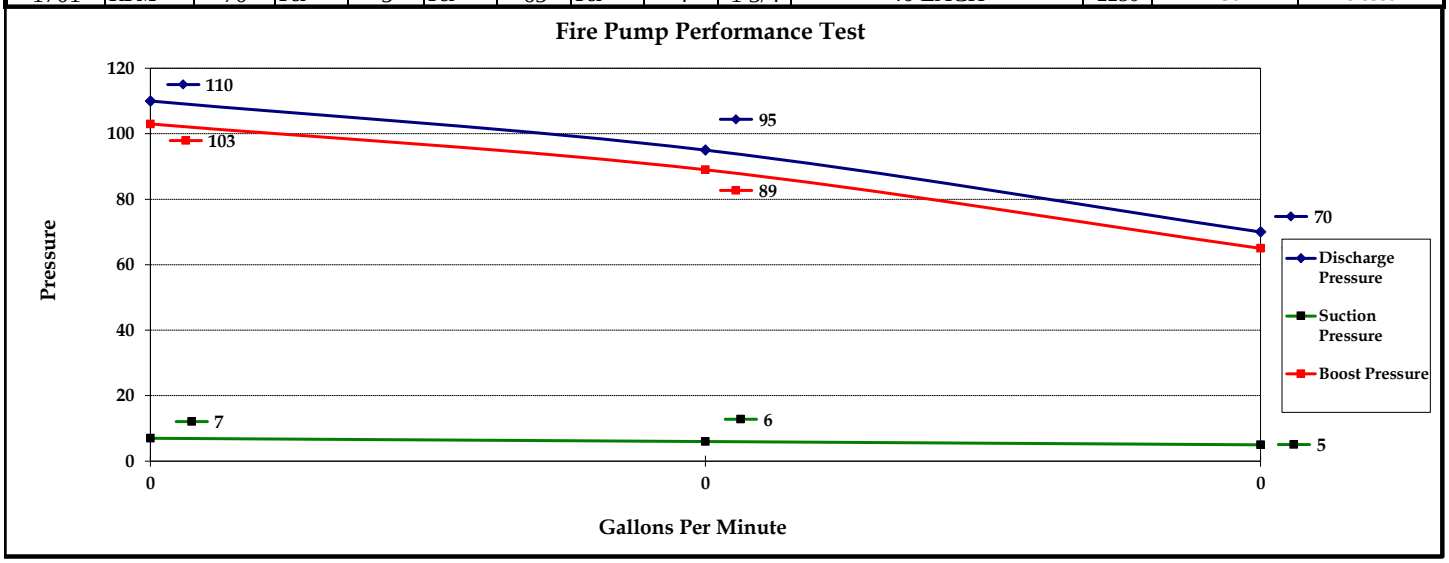
FIRE PUMP PERFORMANCE TEST

Location: TINKER AIR FORCE BASE
Street BUILDING 2123 PUMP 4
City TAFB **State** OK **Zip**
Attn: ADAM ROGERS
Phone **Fax**

Location Inspected PUMP ROOM
Street Address SAME
Inspector's Name JAMES MASON
Inspection Date DEC-01-17
Inspection Contract **Page** 1 **of** 1

Pump Information	**Shaft**		**Manufacturer**		**Approved**		**Shop or Serial No.**		**Model Number**					
		Vertical	FAIRBANKS		X	**Yes**	K3410856		684					
	X	**Horizontal**				**No**								
	GPM		**Rated PSI**	**Rated RPM**	**Suction From**		**Size Conn.**		**Tank Supply**		**Tank Height**			
	1500		100	1770	Water Tank							**Feet**		
Driver	**Manufacturer**		**Approved**		**Shop or Serial No.**		**Model Number**		**Rated HP**		**Rated RPM**			
	DETROIT		X	**Yes**	5605964		PTA-15D273		NO INFO		NO INFO			
				No										
	Engine type		**Rated Volts**	**Oper. Volt**	**Rated Amps**			**Phase**	**Cycles**		**Service Factor**			
	Diesel		12	**D.C.**	**D.C.**	**Amps**		**Amps**		**Phase**		**Hz.**		
Controller	**Manufacturer**		**Approved**		**Start**	60	**PSI**	**Stop**	70	**Psi**	**Jockey Pump**			
	MASTER		X	**Yes**		X	**Manual**							
				No		X	**Pressure Drop**	X	**Manual**		X	**Yes**		
	Shop or Serial No.		**Model Number**			X	**Auto**		**Auto**			**No**		
	15864-9		DCFR9				**Sec Delay**				X	**On**	110	
											X	**Off**	120	

Revolutions Per/minute		**Discharge Pressure**		**Suction Pressure**		**Net Pressure**		**STREAMS No.**	**Size**	**Pitot#**	**GPM**	**%**	**Relief Valve**
1741	**RPM**	110	**Psi**	7	**Psi**	103	**Psi**	0	Churn		0	0	closed
1720	**RPM**	95	**Psi**	6	**Psi**	89	**Psi**	4	1 3/4	18 EACH	1500	100	closed
1701	**RPM**	70	**Psi**	5	**Psi**	65	**Psi**	4	1 3/4	40 EACH	2250	150	closed



Additional Comments: FIRE PUMP IS 11 PSI LOW AT 100% AND 7 PSI LOW AT 150%

Signature of owner or owners representative _____ **Date** _____

Duplicate to _____
Street _____
City _____ **State** _____ **Zip** _____
Attn: _____

Attachment 3

Preliminary Sprinkler Hydraulic Calculations - Wet System Hangar

WATER-BASED FIRE PROTECTION SPRINKLER SYSTEM PRELIMINARY CALCULATIONS
PROJECT: TINKER AFB BUILDING 2280 - WET PIPE SYSTEM HANGAR

SPRINKLER SYSTEM SUMMARY:

LT =	ESTIMATED UNDERGROUND PIPING FRICTION LOSSES	1.03	PSI
HT =	ESTIMATED ELEVATION HEAD LOSS	42.05	PSI
ΔPBLDG =	ESTIMATED BUILDING PIPE FRICTION LOSSES (5 TO 10 PSI)	15.00	PSI
ΔPS =	SPRINKLER PRESSURE LOSS = (QP/K)², (MINIMUM RESIDUAL >= 7 PSIG)	18.37	PSI
ΔPB =	BACKFLOW PREVENTER ASSEMBLY PRESSURE LOSSES		PSI
ΔPT =	SYSTEM PRESSURE LOSS (LT + HT + ΔPBLDG + ΔPS + ΔPB) =	**76.45**	**PSI**

THE ESTIMATED SPRINKLER SYSTEM DEMAND REQUIRED IS: **900 GPM AT 77 PSI.**
THE PRELIMINARY CALCULATED SYSTEM DEMAND WITH HOSE STREAMS IS: **1,400 GPM AT 76 PSI.**

SUPPORTING CALCULATIONS:

I. ESTIMATED SPRINKLER SYSTEM FLOW REQUIREMENTS:

HAZARD CLASSIFICATION:	Extra Hazard	
AREA OF SPRINKLER OPERATION	1,200	SFT
FLOW DENSITY - USE BOTTOM OF 7-2.3.1.2 CURVE IF NOT SPECIFIED IN BY AHJ	0.60	GPM/SFT
AREA ADJUSTMENT IF APPLICABLE (40% REDUCTION FOR QUICK RESPONSE SPRINKLERS, CEILING < 10 FT.)	0.00%	%
MAXIMUM FT² LIMITATION PER SPRINKLER PER OCCUPANCY CLASSIFICATION	100	SFT
REVISED AREA OF SPRINKLER OPERATION	1,200	SFT
MINIMUM NUMBER OF SPRINKLERS	12	
AREA DENSITY CURVE VALUE = GPM/SFT X SFT	720	GPM
25 % IMBALANCE	180	GPM
AREA DENSITY CURVE VALUE + 25% IMBALANCE	**900**	GPM
TOTAL COMBINED INSIDE AND OUTSIDE HOSE STREAM DEMAND (AT HYDRANT)	500	GPM
TOTAL DEMAND	**1,400**	GPM
DURATION OF SUPPLY	60	MINUTES
TOTAL WATER SUPPLY	84,000	GALLONS
QP = MINIMUM FLOW AT THE HYDRAULICALLY MOST DEMANDING SPRINKLER	60	GPM
PENDENT K-FACTOR, ORIFICE SIZE	14.00	

II. HYDRANT FLOW TEST DATA:

A. LOCAL HYDRANT FLOW TEST DATA (REF.):	HYDRANT FLOW (GPM)	PSI	Fire Pump Test 12/01/2017	
B. TEST HYDRANT STATIC PRESSURE (CLOSEST TO BUILDING)	0	118	118	PSIG
C. FLOW HYDRANT RESIDUAL PRESSURE	2,250	80	80	PSIG
FLOW RATE AT RESIDUAL PRESSURE	3,753	20	2,250	GPM

CREATE A SEMI-LOG GRAPH Q VS. DP (N =1.85)
(NOTE: TYPICAL MINIMUM CITY RESIDUAL PRESSURE IS 20 PSI)

III. ESTIMATED UNDERGROUND PIPING FRICTION LOSSES FROM CITY MAIN TO FIRE SERVICE ENTRANCE:

HAZEN WILLIAMS FORMULA: **HF = 10.44 LT Q1.852/C1.852D4.8655**

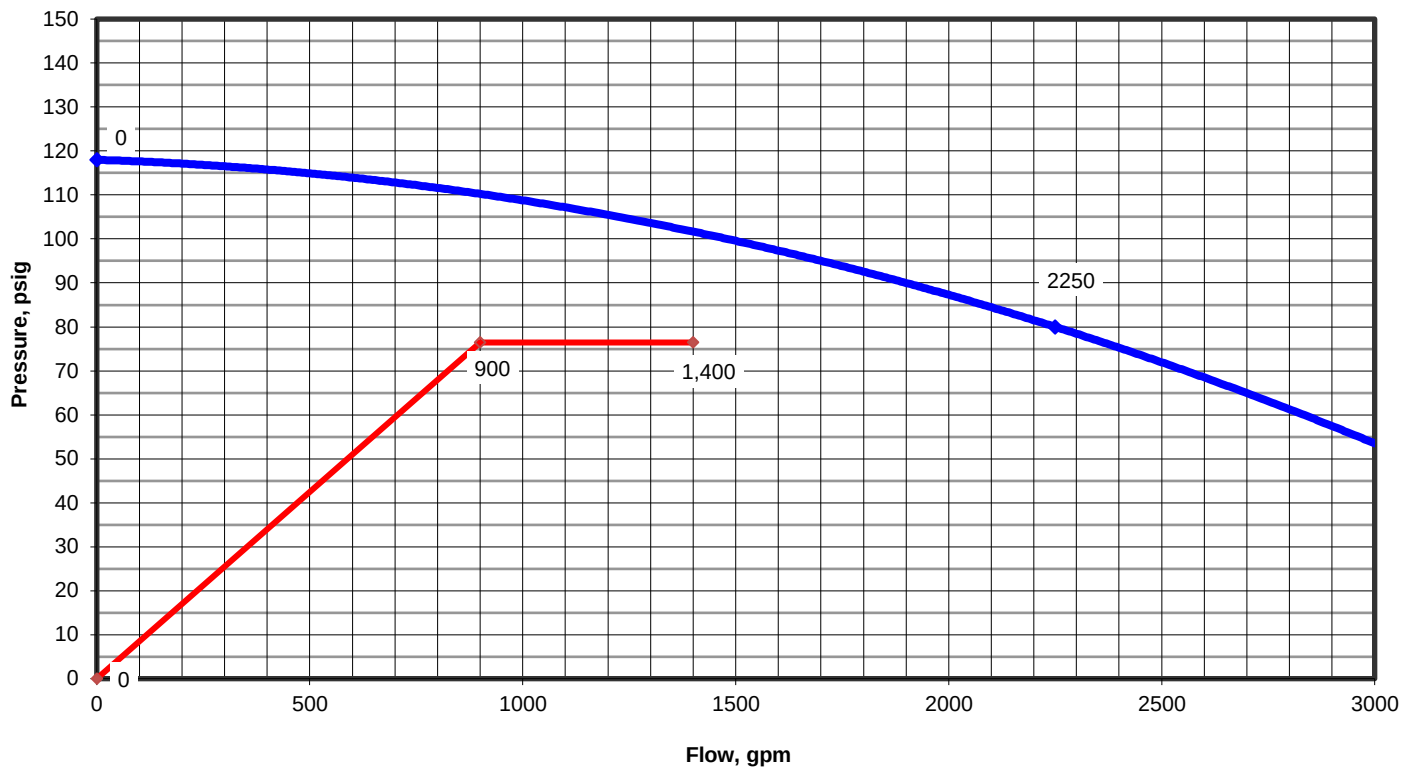
		Base of Riser to 6in Main	
	NOMINAL PIPE SIZE (IN) AND TYPE	14 DIP CL	
D =	PIPE DIAMETER	14.000	IN.
C =	HAZEN-WILLIAMS COEFFICIENT	140	
Q =	FLOW RATE	900	GPM
V =	PIPE VELOCITY	1.88	FT/SEC
μ =	KINEMATIC VISCOSITY, 50°F WATER	0.0000141	FT²/SEC
R =	REYNOLDS NUMBER, NR = DH/12 X V/μ	155,306	
L =	ESTIMATED PIPE LENGTH	2,000	FT.
LF =	ESTIMATED EQUIV. LENGTH FITTING/VALVES	750	
LT =	TOTAL ESTIMATED EQUIVALENT LENGTH	2750	
HF=	HEAD LOSSES	2.38	FT.

IV. ESTIMATED ELEVATION HEAD LOSS:

		Elevation	
HF =	ELEVATION 1 - STARTING REFERENCE	-5.00	FT.
H1 =	ELEVATION 2 - HIGHEST ELEVATION	92.00	FT.
HT =	ELEVATION HEAD LOSS (H1-HF)	97.00	FT.

NOTES:

1. DESIGN VALUE OF HAZEN-WILLIAMS'S ROUGHNESS FACTOR PER NFPA 13-2010, CHAPTER 23 PLANS AND CALCULATIONS
   PVC C-900 C=150, DIP CLASS 50 CEMENT LINED C = 140, BLACK STEEL (WET PIPE SYSTEM) = 120, DIP CL 50 = 100
2. EQUIVALENT LENGTH FOR MINOR LOSSES FROM NFPA 13-2010, CHAPTER 23 PLANS AND CALCULATIONS
   AND DESIGN OF WATER-BASED FIRE PROTECTION SYSTEMS, ROBERT M. GAGNON 1996
3. GRAPH SHOWN IS FOR VISUALIZATION ONLY AND IS NOT A TRUE N1.85 GRAPH.



Attachment 4

Life Safety Plans

GENERAL PHASING NOTES:

1. THE PHASING PLAN PRESENTED IS A SUGGESTED PHASING PLAN ONLY. THE CONTRACTOR SHALL DEVELOP A FINAL PHASING PLAN THAT INCORPORATES THE USER REQUIREMENTS AND SHALL BE COORDINATED WITH AND APPROVED BY THE USER AND GOVERNMENT PRIOR TO IMPLEMENTATION.
2. NOT ALL ASPECTS OF THE SCOPE OF WORK ARE EXPLICITLY DESCRIBED IN THIS PLAN. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INCLUDE ALL WORK THAT IS REQUIRED IN THE FINAL PHASING PLAN.
3. DEMOLITION AND CONSTRUCTION ACTIVITIES WILL GENERALLY TAKE PLACE WHILE THE MAJORITY OF THE FACILITY IS OCCUPIED AND OPERATIONAL. SYSTEM OUTAGES AND CHANGEOVERS SHALL TAKE PLACE OVERNIGHT OR OVER THE WEEKEND WHEN UNOCCUPIED.
4. COORDINATE ALL SYSTEM OUTAGES AND DOWNTIME WITH GOVERNMENT A MINIMUM OF 3 WEEKS IN ADVANCE.
5. CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL EXISTING FURNITURE AND EQUIPMENT THAT IS TO REMAIN WITHIN EACH PHASE. ALL FURNITURE OR EQUIPMENT THAT NEEDS TO BE MOVED TO ACCOMMODATE THE WORK OCCURRING IN EACH PHASE SHALL BE DONE BY THE GOVERNMENT. ANY FURNITURE OR EQUIPMENT DAMAGED DURING CONSTRUCTION SHALL BE REPLACED BY THE CONTRACTOR.
6. THE MAXIMUM ALLOWABLE DOWNTIME FOR PHASE 1 AND PHASE 3 IS ONE WEEK AND PHASE 2 AND PHASE 4 IS SIX WEEKS. CONTRACTOR SHALL UTILIZE AFTER-HOURS AND WEEKEND LABOR AS NEEDED TO MEET THESE MAXIMUM DOWNTIME REQUIREMENTS.
7. PHASES 1, 2, 3, AND 4 MAY BE ACCOMPLISHED CONCURRENTLY TO REDUCE OVERALL CONSTRUCTION TIME IF ALLOWED BY THE THE GOVERNMENT.

PHASE 1 DESCRIPTION:

1. CONSISTS GENERALLY OF THE REMOVAL OF THE UNDER-WING MONITORS AND ASSOCIATED ABOVE GROUND PIPING.
2. REMOVE ALL ABOVE GROUND PIPING BACK TO BUILDING'S RISER WITHIN WEST MECHANICAL ROOM. PENETRATION FROM DEMOLISHED PIPING WILL BE PATCHED AS PER PROJECT SPECIFICATION TO MAINTAIN ELECTRICAL CLASSIFICATION.
3. REMOVE UNDER WING MONITORS AFFF FOAM TANKS ASSOCIATED TRIM.
4. REMOVE EXISTING UNDER WING MONITORS DELUGE VALVES.
5. REMOVE EXISTING UNDER WING MONITORS.
6. AFFF TANKS AND ASSOCIATED PIPING UP TO THE PROPORTIONING VALVE TO BE ACCOMPLISHED UNDER SEPARATE AFCEC CONTRACT.

PHASE 2 DESCRIPTION:

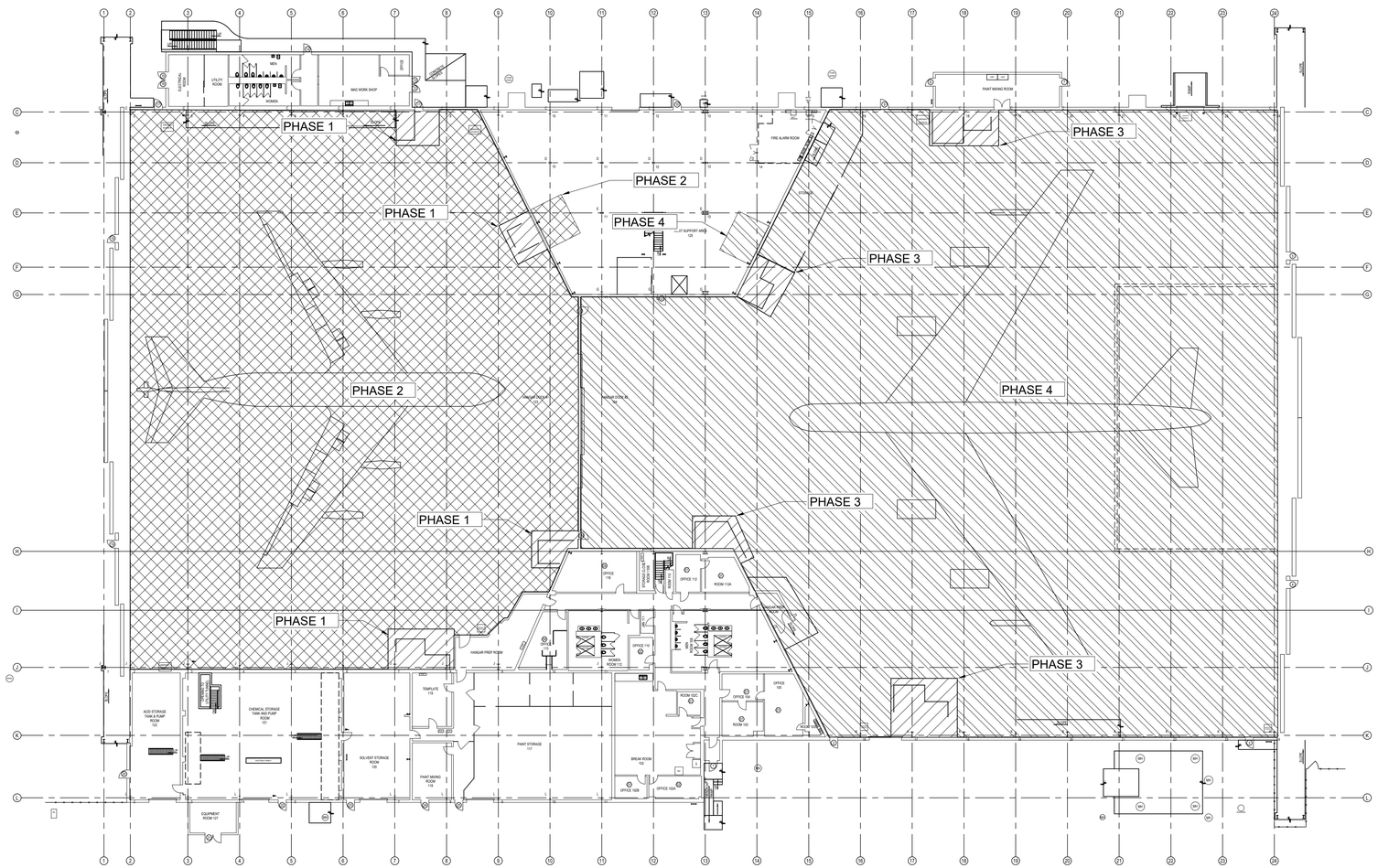
1. CONSISTS GENERALLY OF THE REMOVAL OF THE OVERHEAD FOAM WATER SPRINKLER SYSTEM.
2. DEMOLISH EXISTING DET-TRONICS RELEASING PANEL SERVING THE SOUTH DOCK.
3. DEMOLISH EXISTING FLAME DETECTOR AND ASSOCIATED CONDUIT WITHIN SOUTH DOCK.
4. INSTALL NEW WET SPRINKLER SYSTEM WITHIN THE SOUTH HANGER BAY.
5. INSTALL NEW X3301 MULTISPECTRUM IR FLAME DETECTOR WITHIN SOUTH HANGAR BAY.
6. FOLLOWING THE SUCCESSFUL FINAL INSPECTION OF THE OVERHEAD WET SPRINKLER SYSTEM WITH THE BASE FIRE PROTECTION ENGINEER, BASE FIRE DEPARTMENT, AND PROJECT COR CONTRACTOR MAY PROCEED TO PHASE 3.
7. AFFF TANKS AND ASSOCIATED PIPING UP TO THE PROPORTIONING VALVE TO BE ACCOMPLISHED UNDER SEPARATE AFCEC CONTRACT.

PHASE 3 DESCRIPTION:

1. CONSISTS GENERALLY OF THE REMOVAL OF THE UNDER-WING MONITORS AND ASSOCIATED ABOVE GROUND PIPING.
2. REMOVE ALL ABOVE GROUND PIPING BACK TO BUILDING'S RISER WITHIN WEST MECHANICAL ROOM. PENETRATION FROM DEMOLISHED PIPING WILL BE PATCHED AS PER PROJECT SPECIFICATION TO MAINTAIN ELECTRICAL CLASSIFICATION.
3. REMOVE EXISTING UNDER WING MONITORS DELUGE VALVES.
4. REMOVE EXISTING UNDER WING MONITORS.
5. AFFF TANKS AND ASSOCIATED PIPING UP TO THE PROPORTIONING VALVE TO BE ACCOMPLISHED UNDER SEPARATE AFCEC CONTRACT.

PHASE 4 DESCRIPTION:

1. CONSISTS GENERALLY OF THE REMOVAL OF THE OVERHEAD FOAM WATER SPRINKLER SYSTEM.
2. DEMOLISH EXISTING DET-TRONICS RELEASING PANEL SERVING NORTH HANGAR BAY.
3. DEMOLISH EXISTING FLAME DETECTOR AND ASSOCIATED CONDUIT WITHIN DOCK ONE.
4. INSTALL NEW WET SPRINKLER SYSTEM WITHIN THE NORTH HANGER BAY.
5. INSTALL NEW X3301 MULTISPECTRUM IR FLAME DETECTOR WITHIN THE NORTH HANGAR BAY.
6. AFFF TANKS AND ASSOCIATED PIPING UP TO THE PROPORTIONING VALVE TO BE ACCOMPLISHED AFCEC CONTRACT.



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G-002

GENERAL PHASING PLAN

SCALE: N.T.S.

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE

TINKER AFB, OK

LICENSED PROFESSIONAL ENGINEER
DOUGLAS EMANUS
33105
OKLAHOMA
04/02/2025

PROJECT INFORMATION

WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280

TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION

ISSUE DATE: 02 APRIL 2025
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
GENERAL PHASING PLAN

SHEET NUMBER
G-002

SHEET OF

CODE ANALYSIS

REFERENCED CODES AND STANDARDS:

UNIFIED FACILITIES CRITERIA (UFC)

UFC 1-200-01, DOD BUILDING CODE, CHANGE 4, 17 DECEMBER 2024.
UFC 3-600-01, FIRE PROTECTION ENGINEERING FOR FACILITIES, CHANGE 6, 06 MAY 2021.
UFC 3-601-02, FIRE PROTECTION SYSTEMS INSPECTION, TESTING, AND MAINTENANCE, 07 OCTOBER 2021.
UFC 4-010-01, DOD MINIMUM ANTITERRORISM STANDARDS FOR BUILDINGS, CHANGE 3, 24 MAY 2024.
UFC 4-021-01, DESIGN AND O&M: MASS NOTIFICATION SYSTEMS, CHANGE 1, 01 JANUARY 2010.
UFC 4-211-01, AIRCRAFT MAINTENANCE HANGARS, CHANGE 3, 20 APRIL 2021.
UFC 4-211-02, AIRCRAFT CORROSION CONTROL AND PAINT FACILITIES, 1 DECEMBER 2012

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) - LATEST EDITIONS

NFPA 1, FIRE CODE, 2024 EDITION.
NFPA 10, STANDARD FOR PORTABLE FIRE EXTINGUISHERS, 2022 EDITION
NFPA 13, STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS, 2025 EDITION.
NFPA 24, STANDARD FOR THE INSTALLATION OF PRIVATE FIRE SERVICE MAINS AND THEIR APPURTENANCES, 2025 EDITION.
NFPA 70, NATIONAL ELECTRICAL CODE (NEC), 2023 EDITION.
NFPA 72, NATIONAL FIRE ALARM AND SIGNALING CODE, 2025 EDITION.
NFPA 80, STANDARD FOR FIRE DOORS AND OTHER OPENING PROTECTIVES, 2025 EDITION
NFPA 90A, STANDARD FOR THE INSTALLATION OF AIR-CONDITIONING AND VENTILATING SYSTEMS, 2024 EDITION.
NFPA 101, LIFE SAFETY CODE, 2024 EDITION.
NFPA 170, STANDARD FOR FIRE SAFETY AND EMERGENCY SYMBOLS, 2024 EDITION.
NFPA 220, STANDARD ON TYPES OF BUILDING CONSTRUCTION, 2024 EDITION.
NFPA 241, STANDARD FOR SAFEGUARDING CONSTRUCTION, ALTERATION, AND DEMOLITION OPERATIONS, 2022 EDITION.
NFPA 409, STANDARD ON AIRCRAFT HANGAR, 2022 EDITION.

OTHER REFERENCES

ARCHITECTURAL BARRIERS ACT (ABA), N/A (WAIVER).
ASME/ANSI A13.1- SCHEME FOR THE IDENTIFICATION OF PIPING SYSTEMS.
ETL 98-8, CHANGE 1, JUNE 25, 1998
DOD SUNDOWN POLICY FOR FOAM FIRE SUPPRESSION SYSTEMS, CHANGE 2, 2022 DEC 29.
INTERNATIONAL CODE COUNCIL, INTERNATIONAL BUILDING CODE (IBC), 2024 EDITION. (AS AMENDED BY UFC 1-200-01).
INTERNATIONAL CODE COUNCIL, INTERNATIONAL EXISTING BUILDING CODE (IEBC), 2024 EDITION. (AS AMENDED BY UFC 1-200-01).
US ARMY CORPS OF ENGINEERS 2018-17 ECB (25, OCT 18; WITH REV 3, 31 AUG 23. NEW REQUIREMENTS FOR VISUAL NOTIFICATION FOR MASS NOTIFICATION SYSTEMS

BUILDING DESCRIPTION (EXISTING BUILDING GENERAL INFORMATION)

• BUILDING IS CONSTRUCTED USING TYPE IIB CONSTRUCTION PER IBC § 602 & TABLE 601; TYPE II (222) PER NFPA 220	
• BUILDING IS PROTECTED THROUGHOUT WITH AN AUTOMATIC SPRINKLER SYSTEM	IBC § 903.3.1.1
• IN ACCORDANCE WITH UFC 3-600-01, CHAPTER 34, WHERE WORK IS PERFORMED IN EXISTING BUILDINGS IT SHALL BE EVALUATED IN ACCORDANCE WITH CHAPTER 43 OF NFPA 101.	
• HANGAR BAYS ARE RECEIVING A RENOVATION AND ONLY NEED TO MEET EXISTING REQUIREMENTS PER NFPA 101 § 43.4.1.3.	

BUILDING OCCUPANCY CLASSIFICATION

• IBC OCCUPANCY CLASSIFICATIONS - MIXED USE, NONSEPARATED OCCUPANCIES	IBC § 508.3
GROUP A-3 ASSEMBLY (ACCESSORY USE ONLY , < 10% OF BUILDING AREA)	IBC § 303 (ASSEMBLY)
GROUP B/S-1 (SUPPORT SPACES)	IBC § 304 (BUSINESS)
GROUP S-1 (AIRCRAFT HANGAR)	IBC § 311.2 (STORAGE AND REPAIR)
HANGAR CLASSIFICATION: GROUP 1 AIRCRAFT HANGAR	NFPA 409 § 6.1.1
• NFPA OCCUPANCY CLASSIFICATIONS - MULTIPLE OCCUPANCY, NONSEPARATED OCCUPANCIES	NFPA 101 § 6.1.14
EXISTING ASSEMBLY (INCIDENTAL USE)	NFPA 101 CHAP. 13 PER CHAP. 43
EXISTING BUSINESS	NFPA 101 CHAP. 39 PER CHAP. 43
SPECIAL-PURPOSE INDUSTRIAL, STORAGE (AIRCRAFT SERVICING/STORAGE HANGAR)	NFPA 101 CHAP. 40/42 PER CHAP. 43

NOTES:
- REPAIRS AND STORAGE OCCUR AT THE HANGAR
- FUELING AND DEFUELING PROCESSES ARE COMPLETED OUTSIDE OF THE HANGAR
- JET A FUEL IS USED FOR AIRCRAFT FUELING; CLASS II COMBUSTIBLE LIQUID
- HIGH HAZARD CONTENTS, SINCE FLAMMABLE LIQUID IS PRESENT (NFPA 101 §A.6.2.2.4, A.3.3.205.8.2 FOR DEFINITION OF HIGH HAZARD CONTENTS).

SPECIAL DETAILED REQUIREMENTS BASED ON USE:

USE UFC 3-600-01 CHAPTER 4 IN LIEU OF IBC CHAPTER 4. • COMPLY WITH NFPA 409 WHEN SPECIFICALLY ADDRESSED BY UFC 3-600-01, UFC 4-211-01 AND UFC 4-211-02. • DETAILED MEANS OF EGRESS REQUIREMENTS APPLY (SEE MEANS OF EGRESS FEATURES). • DETAILED PROTECTION REQUIREMENTS APPLY (SEE FIRE PROTECTION SYSTEMS).	UFC 1-200-01 § 2-4

ALLOWABLE IBC BUILDING HEIGHT AND FLOOR AREA:

• ALLOWABLE BUILDING AREA: UNLIMITED AREA • ACTUAL BUILDING AREA: 131,940 SQ. FT • ALLOWABLE BUILDING HEIGHT AND STORIES: 180 FT FOR SPRINKLER IIB; 12 STORIES • ACTUAL BUILDING HEIGHT AND STORIES: 99 FT 6 IN; THREE (3) STORY	UFC 4-211-01 § 3-3.1.6 BUILDING HEIGHT AND NUMBER OF STORIES

FIRE RESISTANCE REQUIREMENTS

IBC STRUCTURAL ELEMENTS:

• STRUCTURAL FRAME (INCLUDING COLUMNS, GIRDERS, AND TRUSSES)	2 HOUR	IBC TABLES 601 & 705.5 ALL ALLOWABLE COMBUSTIBLE MATERIALS AS DEFINED IN SECTION 603
• BEARING WALLS - EXTERIOR SEPARATION DISTANCE 10'<X<30'	2 HOUR	
• BEARING WALLS - INTERIOR	2 HOUR	
• NONBEARING WALLS - EXTERIOR SEPARATION DISTANCE 10'<X<30'	1 HOUR	
• NONBEARING WALLS & PARTITIONS - INTERIOR	0 HOUR	
• FLOOR CONSTRUCTION (INCLUDING SUPPORTING BEAMS AND JOISTS)	2 HOUR	
• ROOF CONSTRUCTION (INCLUDING SUPPORTING BEAMS AND JOISTS)	1 HOUR	

NFPA 101 EXIT ACCESS CORRIDORS:

• CORRIDORS PROVIDING ACCESS TO AN EXIT: NO RATING REQUIRED	NFPA 101 § 39.3.6, § 40.3.6, & § 42.3.6

INTERIOR RATED SEPARATIONS

• 1 HR FIRE BARRIER SEPARATING HANGAR BAY FROM SUPPORT AREAS	UFC 4-211-01 § 3-3.1.3
• 1 HR FIRE BARRIER SEPARATING FIRE PROTECTION EQUIPMENT ROOMS	UFC 4-211-01 § 3-6.7
• 2 HR FIRE BARRIER SEPARATING FIRE AREAS WITHIN THE HANGAR BAY	UFC 4-211-01 § 3-3.1.3
• 2 HR FIRE BARRIER SEPARATING DISSIMILAR HANGAR BAY OPERATIONS	UFC 4-211-01 § 5-3.1

DOORS

• DOORS IN FIRE BARRIERS SHALL BE RATED PER NFPA 101 TABLE 8.3.3.2.2 AND SELF-CLOSING OR AUTOMATIC-CLOSING	NFPA 101 § 8.3.3
• EXISTING DOORS IN FIRE BARRIERS HAVING A MINIMUM 3/4-HOUR FIRE PROTECTION RATING SHALL BE PERMITTED TO CONTINUE TO BE USED IN EXIT ENCLOSURES IN LIEU OF THE MINIMUM 1-HOUR FIRE PROTECTION RATING REQUIRED IN NFPA 101 TABLE 8.3.3.2.2.	NFPA 101 § 8.3.3

HORIZONTAL EXITS

• HORIZONTAL EXITS SHALL HAVE A 2-HOUR FIRE RATED / FIRE BARRIER	NFPA 101 § 7.2.4.3.1
• OUTSIDE WALLS AT AN ANGLE OF LESS THAN 90 DEGREES SHALL BE PROVIDED WITH A 1-HOUR FIRE RATING AND 3/4-HOUR OPENING PROTECTION, FOR A DISTANCE NOT TO EXCEED 10 FEET.	NFPA 101 § 7.2.4.3.4
• ALL FIRE DOOR ASSEMBLIES IN HORIZONTAL EXITS SHALL BE SELF-CLOSING OR AUTOMATIC CLOSING IN ACCORDANCE WITH NFPA 101 § 7.2.1.4	NFPA 101 § 7.2.4.3.7

SHAFTS AND EXIT ENCLOSURES

• PENETRATIONS INTO, AND OPENINGS THROUGH AN EXIT ENCLOSURE, ARE LIMITED PER NFPA 101 SECTION 7.1.3.2.1 (10) TO UTILITIES SERVING THE STAIRWELL.	NFPA 101 § 7.1.3.2 (9)
• SHAFT AND STAIR ENCLOSURES SHALL HAVE NOT LESS THAN 1-HOUR FIRE RESISTANCE RATING WHEN CONNECTING LESS THAN FOUR STORIES.	IBC § 713.4

REQUIRED FIRE DAMPERS IN FIRE RATED BARRIERS

• FIRE DAMPERS ARE REQUIRED FOR ALL HVAC PENETRATIONS OF 2-HOUR FIRE RATED BARRIERS. FIRE DAMPERS NOT REQUIRED FOR FULLY DUCTED HVAC IN 1-HOUR FIRE RATED BARRIERS. FIRE DAMPERS ARE REQUIRED FOR AIR TRANSFER GRILLES.	IBC § 717.5.2

INTERIOR WALL, CEILING, AND FLOOR FINISHES: NFPA 101 CHAPTER 10 TABLE A.10.2.2

GROUP	WITH SPRINKLER SYSTEM			
	EXITS	EXIT ACCESS CORRIDORS	ROOMS AND ENCLOSED SPACES	INTERIOR FINISH FLOOR
ASSEMBLY	A	A OR B	A, B, OR C	CLASS I OR II
BUSINESS	A OR B	A OR B	A, B, OR C	CLASS I OR II
INDUSTRIAL	A OR B	A, B, OR C	A, B, OR C	CLASS I OR II
STORAGE	A OR B	A, B, OR C	A, B, OR C	CLASS I OR II

MEANS OF EGRESS ARE EXISTING

TRAVEL DISTANCE TO AN EXIT

• ASSEMBLY, SPRINKLERED: 250 FEET	NFPA 101 § 13.2.6.2
• BUSINESS, SPRINKLERED: 300 FEET	NFPA 101 § 39.2.6.3
• STORAGE (HANGAR BAY): NOTE 1	UFC 4-211-01 § 3-3.1.9
• INDUSTRIAL HIGH HAZARD, SPRINKLERED: 75 FEET	NFPA 101 TABLE 40.2.6.1

NOTE 1 - TRAVEL DISTANCE DOES NOT APPLY WITHIN HANGAR BAYS. TRAVEL DISTANCE STARTS AT HANGAR BAY EXIT ACCESS; DESIGN TEAM INTERPRETATION ASSUMES TRAVEL DISTANCE LIMIT THROUGH ADJACENT BAYS DOES NOT EXCEED 400FT IN TOTAL FOR STORAGE OCCUPANCIES; THE DESIGN TEAM HAS LIMITED THE TRAVEL DISTANCE STARTING UPON LEAVING THE HANGAR BAY OF ORIGIN TO NOT EXCEED 250FT SUCH THAT THE MAX TRAVEL DISTANCE DOES NOT EXCEED 400FT. AN UNOBSTRUCTED PATH WILL BE PROVIDED TO REACH THE NEAREST EXTERIOR EXIT DISCHARGE DOOR.

COMMON PATH OF TRAVEL

• ASSEMBLY, SPRINKLERED: 20 FEET	NFPA 101 § 13.2.5.2
• BUSINESS, SPRINKLERED: 100 FEET	NFPA 101 § 39.2.5.2.1
• STORAGE, SPRINKLERED: 100 FEET	NFPA 101 TABLE 42.2.5
• INDUSTRIAL HIGH HAZARD, SPRINKLERED: PROHIBITED	NFPA 101 TABLE 40.2.5.1
• EXISTING MECHANICAL EQUIPMENT ROOMS: 150 FEET	NFPA 101 § 7.13.1(2)

DEAD-END LIMITS

• ASSEMBLY, SPRINKLERED: 20 FEET	NFPA 101 § 13.2.5.3
• BUSINESS, SPRINKLERED: 50 FEET	NFPA 101 § 39.2.5.3
• STORAGE, SPRINKLERED: 50 FEET	NFPA 101 § 42.6.3
• INDUSTRIAL HIGH HAZARD, SPRINKLERED: PROHIBITED	NFPA 101 TABLE 40.2.5.1

REMOTENESS OF EXITS:

• IN EXISTING BUILDINGS, EXITS AND EXIT ACCESS DOORS SHALL BE REMOTELY LOCATED FROM EACH OTHER AND BE ARRANGED TO MINIMIZE THE POSSIBILITY OF BLOCKING OF MORE THAN ONE EXIT DURING A FIRE OR OTHER EMERGENCY.	NFPA 101 § 7.5.1.3.1 & § 7.5.1.3.5

MINIMUM WIDTH:

• NOT LESS THAN 28" FOR ANY MEANS OF EGRESS IN EXISTING BUILDINGS	NFPA 101 § 7.3.4.1.2
• NOT LESS THAN 28" FOR DOOR CLEAR WIDTH IN EXISTING BUILDINGS	NFPA 101 § 7.2.1.2.3.2(4)
• NOT LESS THAN 32" FOR DOOR CLEAR WIDTH IN EXISTING BUILDINGS	NFPA 101 § 7.2.1.2.3.2
• DOORS SHALL SWING IN THE DIRECTION OF TRAVEL WHERE SERVING MORE THAN 50 PERSONS.	NFPA 101 § 7.2.1.4.2
• DOORS FROM HANGAR BAYS SHALL SWING IN THE DIRECTION OF EGRESS TRAVEL.	UFC 4-211-01 § 3-3.1.9

MEANS OF EGRESS (CONTINUED):

ACCESSIBLE MEANS OF EGRESS

• PER UFC 1-200-01 § 2-10 AND § 2-11, DELETE CHAPTER 10 & 11 OF THE IBC FOR MEANS OF EGRESS AND ACCESSIBILITY. UTILIZE UFC 3-600-01 AND THE ABA. WHERE THE ABA REFERENCES THE IBC, THE 2024 EDITION WILL BE USED.	UFC 1-200-01 § 2-10 & § 2-11
• ACCESSIBLE SPACES SHALL BE PROVIDED WITH NOT LESS THAN ONE ACCESSIBLE MEANS OF EGRESS. WHERE MORE THAN ONE MEANS OF EGRESS ARE REQUIRED BY § 1006.21 OR § 1006.3 FROM ANY ACCESSIBLE SPACE, EACH ACCESSIBLE PORTION OF THE SPACE SHALL BE SERVED BY NOT LESS THAN TWO ACCESSIBLE MEANS OF EGRESS.	IBC 1009.1
• EACH REQUIRED ACCESSIBLE MEANS OF EGRESS SHALL BE CONTINUOUS TO A PUBLIC WAY AND SHALL CONSIST OF ONE OR MORE OF THE FOLLOWING (ONLY THOSE INCLUDED IN DESIGN ARE LISTED): 1. ACCESSIBLE ROUTES COMPLYING WITH IBC § 1104. 2. INTERIOR EXIT STAIRWAYS COMPLYING WITH IBC § 1009.3 & § 1023. EXCEPTIONS: 1. THE CLEAR WIDTH OF 48 INCHES BETWEEN HANDRAILS IS NOT REQUIRED IN BUILDINGS EQUIPPED THROUGHOUT BY AN AUTOMATIC SPRINKLER SYSTEM IN ACCORDANCE WITH IBC § 903.3.1.1. 2. AREAS OF REFUGE ARE NOT REQUIRED AT STAIRWAYS IN BUILDINGS EQUIPPED THROUGHOUT BY AN AUTOMATIC SPRINKLER SYSTEM INSTALLED IN ACCORDANCE WITH IBC § 903.3.1.1.	IBC § 1009.2 & § 1009.3

OCCUPANCY CAPACITY FACTORS:

• LEVEL COMPONENTS (DOORS) - 0.2 INCHES PER OCCUPANT FOR DOORS.	NFPA 101 TABLE 7.3.3.1
• STAIRS - 0.3 INCHES PER OCCUPANT FOR STAIRS.	NFPA 101 TABLE 7.3.3.1
• HIGH HAZARD - 0.4 INCHES PER OCCUPANT FOR HIGH HAZARD CONTENT.	NFPA 101 TABLE 7.3.3.1

OCCUPANCY LOAD FACTORS

• ASSEMBLY USE; CONFERENCE ROOMS WITH TABLES AND CHAIRS 15 SQ.FT./PERSON NET AREA	UFC 3-600-01 § 10-3.1; NFPA 101 TABLE 7.3.1.2
• STORAGE USE; 500 SQ.FT./PERSON GROSS FLOOR AREA	
• BUSINESS USE; 150 SQ.FT./PERSON GROSS FLOOR AREA	
• MECH/ELEC/UTILITIES; 500 SQ.FT./PERSON GROSS FLOOR AREA	
• AIRCRAFT HANGARS; 500 SQ.FT./PERSON GROSS FLOOR AREA	
• INDUSTRIAL SPECIAL PURPOSE USE; NA	
NOTE: SEE LIFE SAFETY DRAWINGS FOR BUILDING OCCUPANCY LOADS	

FIRE DEPARTMENT VEHICLE ACCESS (UFC 3-600-01 § 9-1 AND UFC 4-211-01)

- ONE MEANS OF PAVED ALL-WEATHER GROUND ACCESS NO FARTHER THAN 33 FEET FROM AN EXTERIOR DOOR ACCESSIBLE FOR FIRE DEPARTMENT INGRESS AND WITHIN 150 FEET OF FIRE DEPARTMENT CONNECTIONS.
- KNOX VAULT 4500 OR SIMILAR AT NOSE ENDS OF EACH HANGAR BAY FOR EMERGENCY ACCESS.
- DIMENSIONS OF FIRE LANES AND TURNAROUNDS COMPLY WITH NFPA 1.

NOTES: THE BUILDING ENEVOLOPE AND FIRE HYDRANTS LOCATIONS ARE EXISTING.
SEE CODE COMPLIANCE SITE PLAN FOR ACTUAL DISTANCES.
PER GOVERNMENT'S DIRECTION, UPGRADES TO NON-CONFORMING CONDITIONS IN REGARDS TO EXISTING FIRE HYDRANT LOCATIONS ARE NOT WITHIN SCOPE OF WORK.

ACTIVE FIRE PROTECTION SYSTEMS (SHALL COMPLY WITH UFC 3-600-01 CH. 9 AND UFC 4-211-01):

FIRE ALARM AND MASS NOTIFICATION SYSTEM (MNS)

GENERAL FIRE ALARM SYSTEM REQUIREMENTS (UFC-3-600-01, UFC 4-211-01, NFPA 70, NFPA 72, ABA, UFC 4-010-01 & UFC 4-021-01)

- MONACO D-21 REPORTING TO RECEIVING DISPATCH WITH RF TRANSCEIVER
- MANUAL PULL STATION AT ALL EXIT DOORS
- A MASS NOTIFICATION SYSTEM SHALL BE PROVIDED IN ACCORDANCE WITH UFC 4-021-01.
- THE FIRE ALARM EVACUATION SIGNAL SHALL BROADCAST OVER THE MNS SYSTEM.

FIRE SUPPRESSION SYSTEMS AND WATER SUPPLY

- WATER SUPPLY FROM FOUR (4) DIESEL FIRE PUMPS ARRANGED IN PARALLEL, ONE FIRE PUMP AS THE PRIMARY AND THE OTHER THREE AS BACK-UP. THE FIRE PUMPS ARE LOCATED WITHIN BUILDING 2119. TWO FIRE PUMPS ARE RATED FOR 1500 GMP AT 120 PSI AND THE OTHER TWO FIRE PUMPS ARE RATED FOR 1500 GMP AT 100 PSI.
- SYSTEM DEMAND INCLUDES SPRINKLER SYSTEM DEMAND
- WET SPRINKLER SYSTEMS SHALL BE PROVIDED FOR THE HANGAR BAY IN ACCORDANCE WITH DOD SUNDOWN POLICY
- STANDPIPE SYSTEMS NOT REQUIRED

FIRE EXTINGUISHERS

- PORTABLE FIRE EXTINGUISHERS ARE EXISTING AND SHALL REMAIN AS CURRENTLY INSTALLED

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

LICENSED PROFESSIONAL ENGINEER
DOUGLAS EMANUS
33105
OKLAHOMA
04/02/2025

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

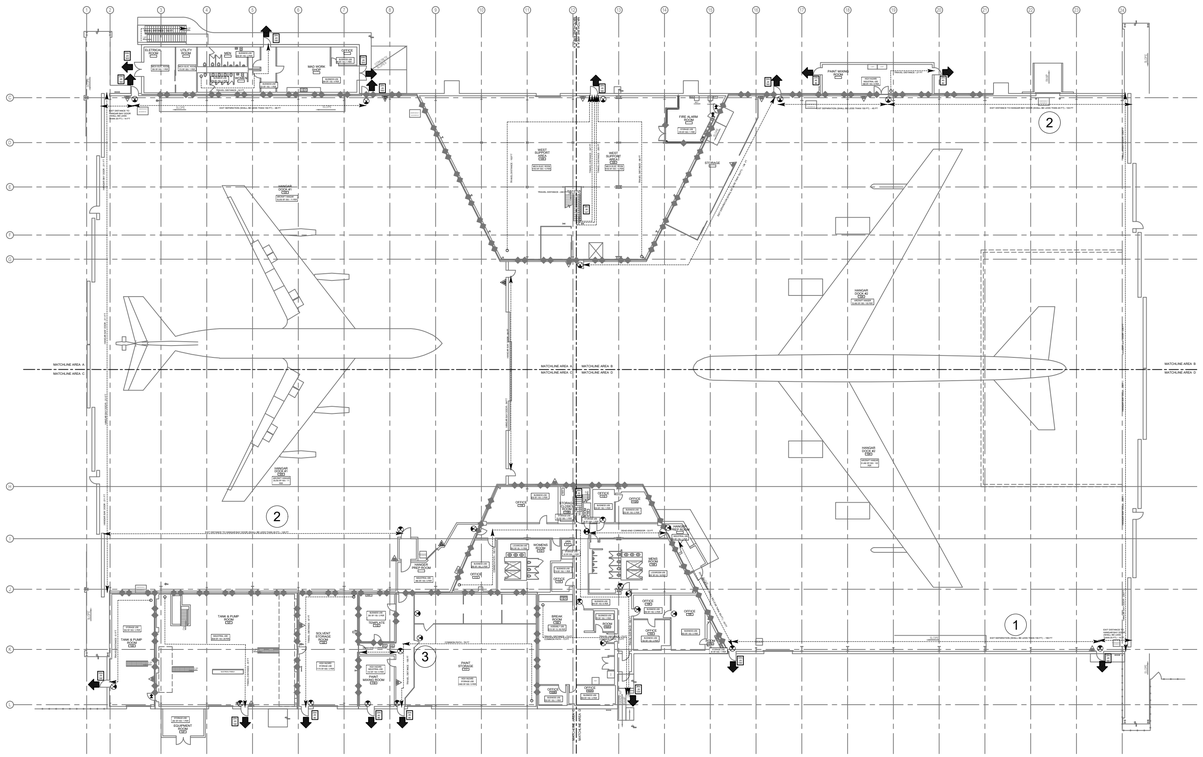
MANAGEMENT INFORMATION

ISSUE DATE: 02 APRIL 2025
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
GENERAL CODE ANALYSIS

SHEET NUMBER
G100A

SHEET – OF



1 G-100B LIFE SAFETY OVERALL HANGAR PLAN
SCALE: 1/32" = 1'-0"

32 16 0 32 64
SCALE: 1/32"=1'-0"

N

GENERAL NOTES:

1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 804.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

BUILDING CODE SUMMARY

UFC 1-200-01 (17 DEC 2024) WITH CHANGE 4
2024 IBC AS AMENDED BY UFC 1-200-01
2024 IEBC AS AMENDED BY UFC 4-211-01
2024 NFPA 101 LIFE SAFETY CODE
UFC 3-600-01 (8 AUG 2016) WITH CHANGE 6
UFC 4-211-02 (1 DEC 2012)

BUILDING AREA

FLOOR	EXISTING AREA (GSF)
1ST FLOOR STORAGE (GROSS)	89,790
1ST FLOOR BUSINESS (GROSS)	6,950
1ST FLOOR INDUSTRIAL (GROSS)	12,780
2ND FLOOR STORAGE (GROSS)	18,730
3RD FLOOR STORAGE (GROSS)	3,690
TOTAL	131,940

OCCUPANCY:

MIXED USE / NON-SEPARATED
GROUP A-3 (IBC 303.4) AND EXISTING ASSEMBLY (NFPA 101)
GROUP B (IBC 304) AND EXISTING BUSINESS (NFPA 101)
GROUP H-3 HIGH-HAZARD GROUP (IBC 307.5) HIGH HAZARD INDUSTRIAL USE (NFPA 101)
GROUP S-1 MODERATE-HAZARD STORAGE (IBC 311.2) ORDINARY AND HIGH HAZARD STORAGE USE (NFPA 101)

OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

LIFE SAFETY SYMBOLS:

XX' — TRAVEL DISTANCE

EXIT DISCHARGE

EXISTING 1 HOUR FIRE BARRIER

EXISTING 2 HOUR FIRE BARRIER

XXin XXX XXX — -EXIT WIDTH, -CAPACITY FACTOR, -EXIT CAPACITY

EXIT SIGNAGE (EXISTING TO REMAIN)

PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)

NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

LIFE SAFETY DEFICIENCY KEY NOTES:

1. PER UFC 4-211-01 § 3-3.1.9: PROVIDE EXITS OR EXIT ACCESS DOORS AROUND THE ENTIRE PERIMETER OF THE HANGAR BAY AT A MAXIMUM SPACING OF 150 FEET (FT.) TRAVEL DISTANCE LIMITATIONS DO NOT APPLY IN THE HANGAR BAY. THE SCOPE OF WORK WILL NOT CORRECT THIS PRE-EXISTING NON-CONFORMING CONDITION.
2. THE EXIT EXCEEDS THE 20 FT DISTANCE BETWEEN THE HANGAR BAY DOOR AND PERSONNEL EXIT AS ALLOWED BY UFC 4-211-01 § 3-3.1.9. THIS REPRESENTS A PRE-EXISTING NON-CONFORMING CONDITION. THE SCOPE OF WORK WILL NOT CORRECT THIS PRE-EXISTING NON-CONFORMING CONDITION.
3. THE EXIT ACCESS DOOR SWING IS NOT IN THE DIRECTION OF EGRESS TRAVEL.THIS REPRESENTS A PRE-EXISTING NON-CONFORMING CONDITION PER UFC 4-211-01 § 3-3.1.9. THE SCOPE OF WORK WILL NOT CORRECT THIS PRE-EXISTING NON-CONFORMING CONDITION.

AFMC
AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

LICENSED PROFESSIONAL ENGINEER
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33105
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04/02/2025

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REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

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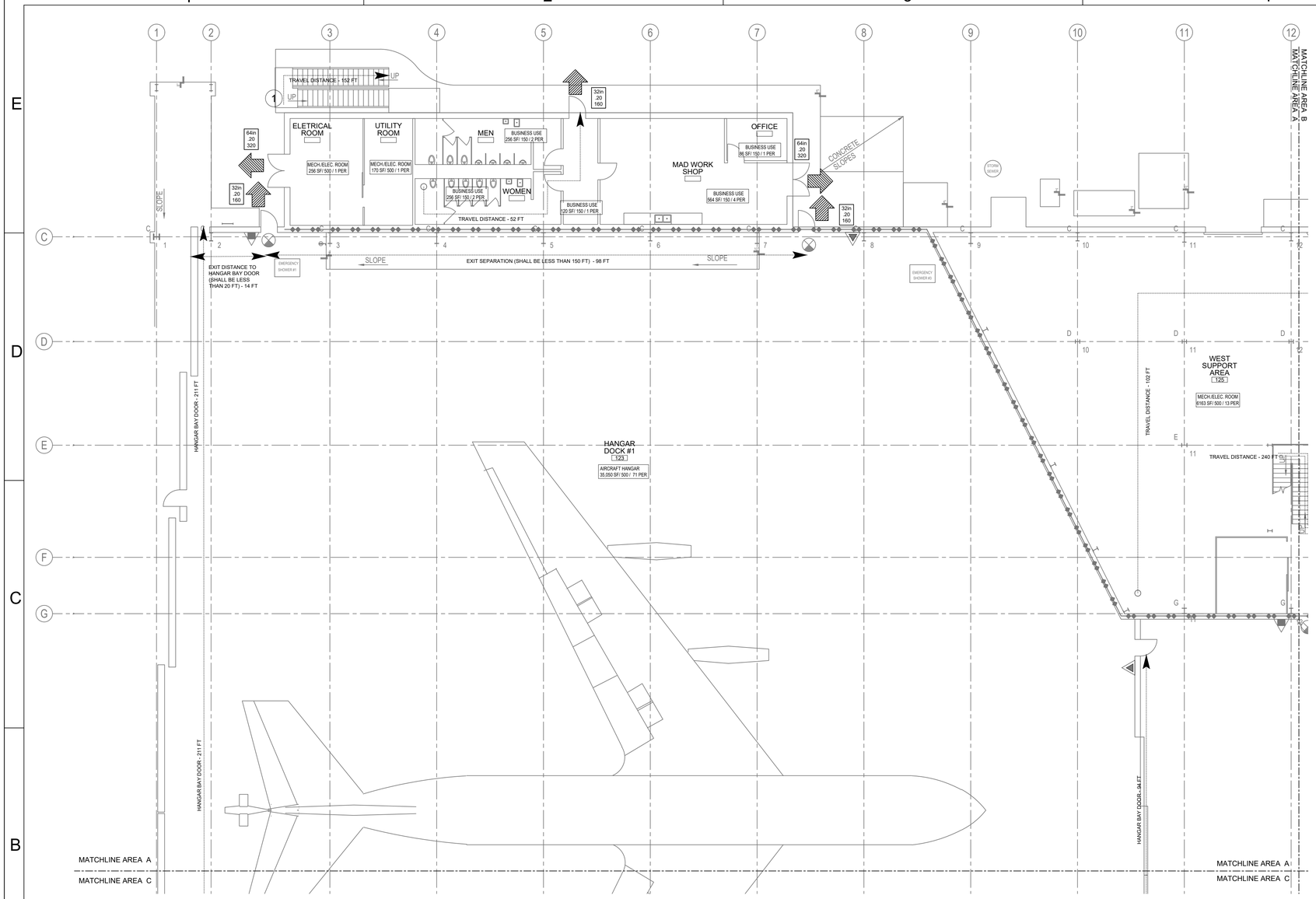
ISSUE DATE: 02 APRIL 2025
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
GENERAL
LIFE SAFETY
OVERALL HANGAR
PLAN

SHEET NUMBER
G100B
SHEET - OF



1 G-101 LIFE SAFETY FIRST FLOOR PLAN - AREA A

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

GENERAL NOTES:

1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 804.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

LIFE SAFETY SYMBOLS:

- XX' — TRAVEL DISTANCE
- EXIT DISCHARGE
- EXISTING 1 HOUR FIRE BARRIER
- EXISTING 2 HOUR FIRE BARRIER
- XXin / XXX / XXX — -EXIT WIDTH / -CAPACITY FACTOR / -EXIT CAPACITY
- EXIT SIGNAGE (EXISTING TO REMAIN)
- PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)
- NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

KEY NOTES:

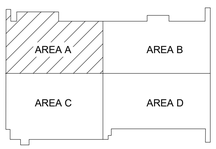
1. TRAVEL DISTANCES AND COMMON PATHS ORIGINATE FROM UPPER FLOORS, REFER TO SHEET G-105 AND G-106.

OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

PROJECT EGRESS TRAVEL DISTANCE

	ALLOWED	ACTUAL	NFPA 101 REF.
INDUSTRIAL USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	N/A	TABLE 40.2.5.1
TRAVEL DISTANCE	400 FEET (WITH SPRINKLERS)	103 FT	TABLE 40.2.6.1
DEAD-END CORRIDOR	50 FEET (WITH SPRINKLERS)	N/A	TABLE 40.2.5.1
EXISTING BUSINESS USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	N/A	39.2.5.2.1
TRAVEL DISTANCE	300 FEET (WITH SPRINKLERS)	52 FT	39.2.6.3
DEAD-END CORRIDOR	50 FEET (WITH SPRINKLERS)	N/A	39.2.5.3



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

LICENSED PROFESSIONAL ENGINEER
DOUGLAS EMANUS
33105
OKLAHOMA
04/02/2025

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

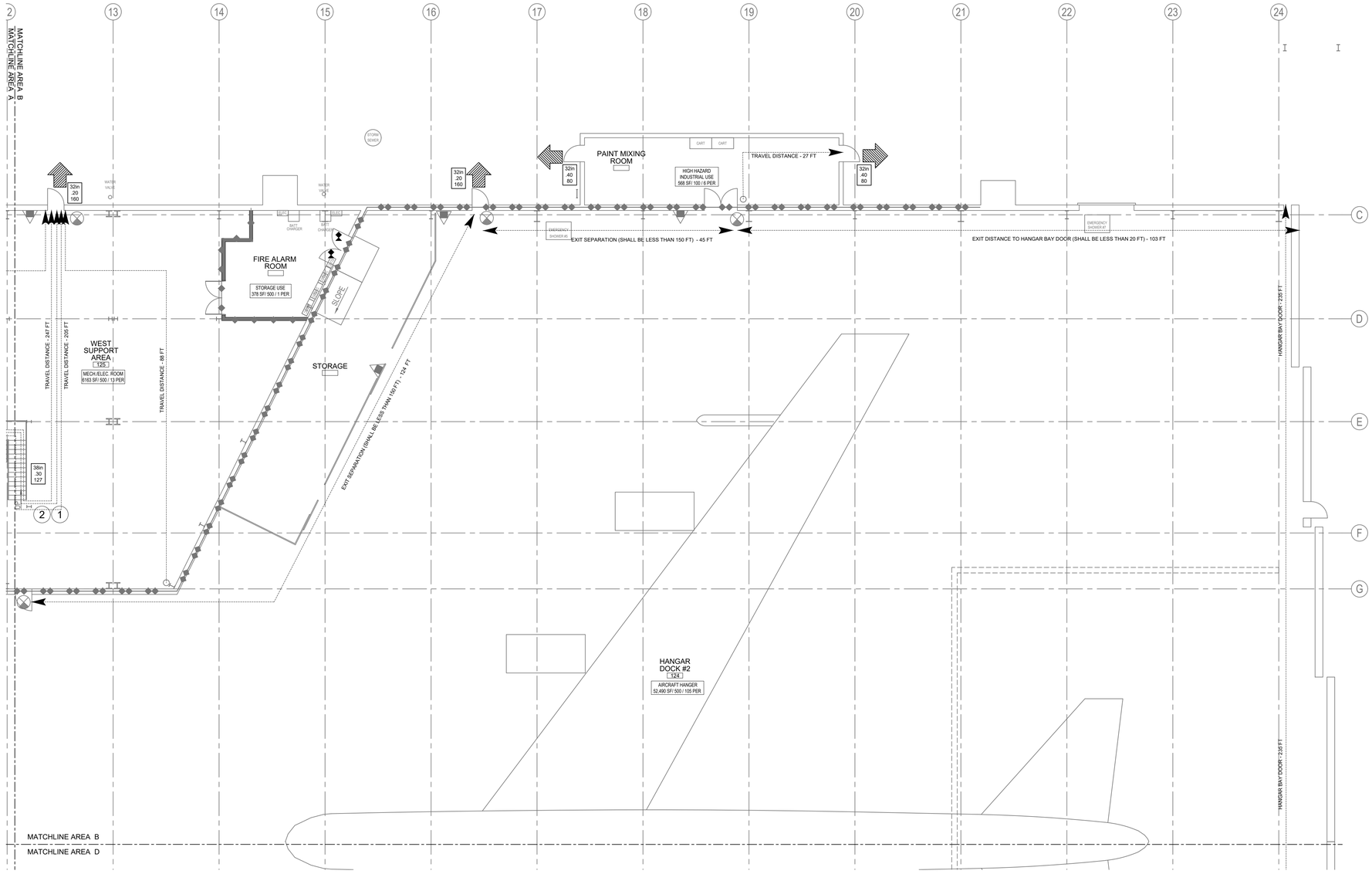
REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 02 APRIL 2025
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
LIFE SAFETY FIRST FLOOR PLAN - AREA A

SHEET NUMBER
G-101
SHEET - OF



1
G-102
LIFE SAFETY FIRST FLOOR PLAN - AREA B
SCALE: 3/32" = 1'-0"

0 8' 16' 24'
SCALE: 3/32"=1'-0"

N

OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

PROJECT EGRESS TRAVEL DISTANCE

	ALLOWED	ACTUAL	NFPA 101 REF.
INDUSTRIAL USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	N/A	TABLE 40.2.5.1
TRAVEL DISTANCE	250 FEET (WITH SPRINKLERS)	88 FT	TABLE 40.2.6.1
DEAD-END CORRIDOR	50 FEET (WITH SPRINKLERS)	N/A	TABLE 40.2.5.1
INDUSTRIAL USE - HIGH HAZARD			
COMMON PATH	NOT ALLOWED	N/A	TABLE 40.2.5.1
TRAVEL DISTANCE	75 FEET (WITH SPRINKLERS)	27 FT	TABLE 40.2.6.1
DEAD-END CORRIDOR	NOT ALLOWED	N/A	TABLE 40.2.5.1

GENERAL NOTES:

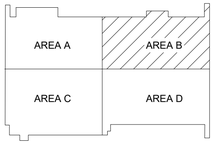
1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 804.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

LIFE SAFETY SYMBOLS:

- XX' — TRAVEL DISTANCE
- EXIT DISCHARGE
- EXISTING 1 HOUR FIRE BARRIER
- EXISTING 2 HOUR FIRE BARRIER
- XXin / XXX / XXX — -EXIT WIDTH, -CAPACITY FACTOR, -EXIT CAPACITY
- EXIT SIGNAGE (EXISTING TO REMAIN)
- PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)
- NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

KEY NOTES:

1. TRAVEL DISTANCES AND COMMON PATHS ORIGINATE FROM UPPER FLOORS, REFER TO SHEET G-105 AND G-106.
2. COMMON PATH ORIGINATES FROM UPPER FLOOR, REFER TO SHEET G-105 AND G-106. THE COMMON PATH EXCEEDS THE NFPA 101 100 FT ALLOWANCE, THIS IS A EXISTING CODE NON-CONFORMING CONDITION.



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

LICENSED PROFESSIONAL ENGINEER
DOUGLAS EMANUS
33105
OKLAHOMA
04/02/2025

PROJECT INFORMATION
WWYK190068
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TINKER AIR FORCE BASE, OKLAHOMA

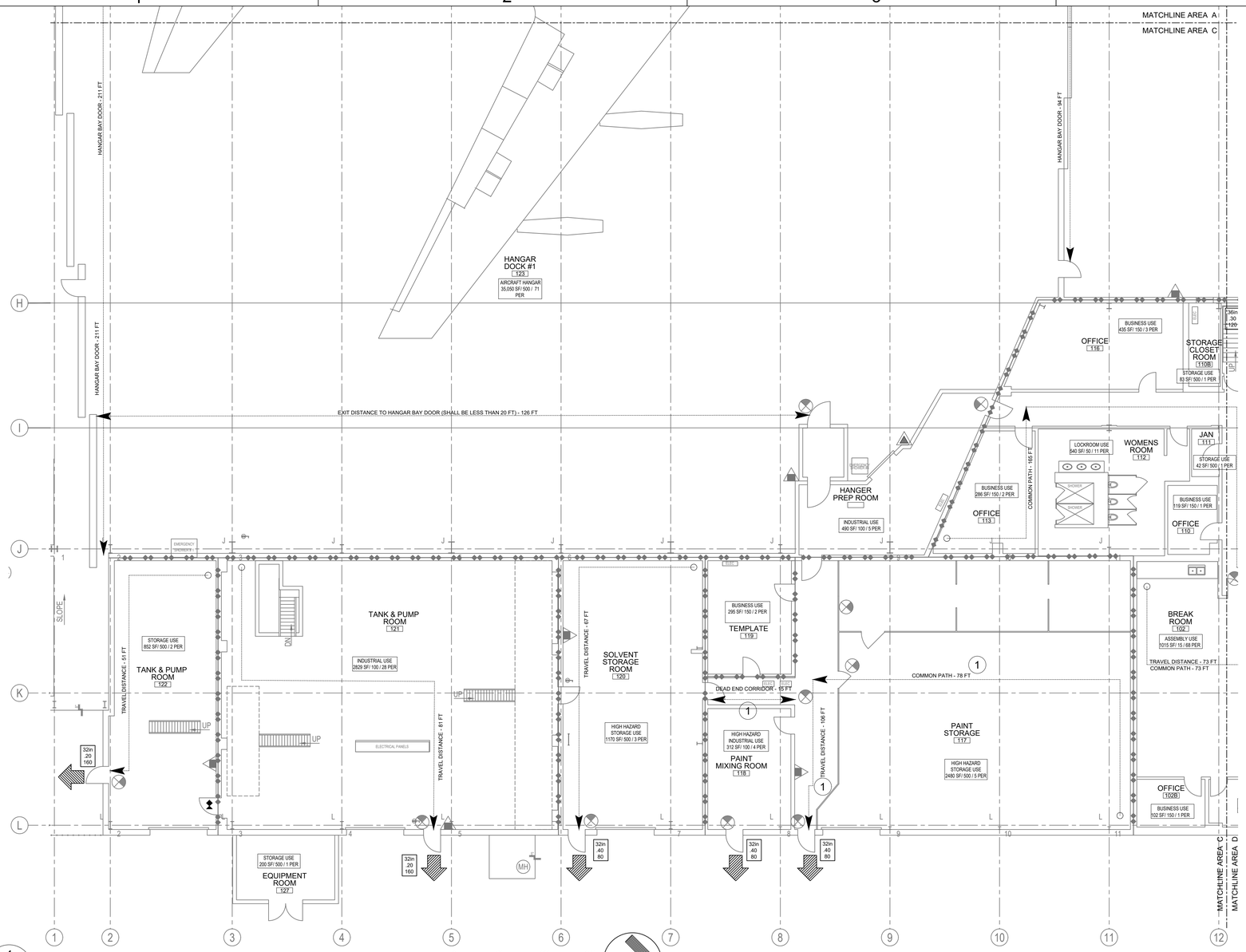
REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 02 APRIL 2025
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
LIFE SAFETY FIRE FLOOR PLAN - AREA B

SHEET NUMBER
G-102
SHEET - OF



1 G-103 LIFE SAFETY FIRST FLOOR PLAN - AREA C

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

GENERAL NOTES:

1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 804.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

LIFE SAFETY SYMBOLS:

- XX' — TRAVEL DISTANCE
- EXIT DISCHARGE
- EXISTING 1 HOUR FIRE BARRIER
- EXISTING 2 HOUR FIRE BARRIER
- XXin / XXX / XXX — -EXIT WIDTH / -CAPACITY FACTOR / -EXIT CAPACITY
- EXIT SIGNAGE (EXISTING TO REMAIN)
- PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)
- NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

KEY NOTES:

1. TRAVEL DISTANCES, COMMON PATH AND DEAD-END CORRIDOR EXCEEDS THE NFPA 101 ALLOWANCE, THIS IS A EXISTING CODE NON-CONFORMING CONDITION.

OCCUPANT LOAD

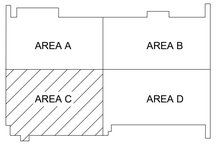
FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

PROJECT EGRESS TRAVEL DISTANCE

	ALLOWED	ACTUAL	NFPA 101 REF.
STORAGE USE - ORDINARY HAZARD			
COMMON PATH	100 FEET (WITH SPRINKLERS)	N/A	TABLE 42.2.5
TRAVEL DISTANCE	400 FEET (WITH SPRINKLERS)	67 FT	TABLE 42.2.6
DEAD-END CORRIDOR	100 FEET (WITH SPRINKLERS)	N/A	TABLE 42.2.5
EXISTING BUSINESS USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	38 FT	39.2.5.2.1
TRAVEL DISTANCE	300 FEET (WITH SPRINKLERS)	155 FT	39.2.6.3
DEAD-END CORRIDOR	50 FEET (WITH SPRINKLERS)	N/A	39.2.5.3

	ALLOWED	ACTUAL	NFPA 101 REF.
EXISTING ASSEMBLY USE			
COMMON PATH	75 FEET (WITH SPRINKLERS)	73 FT	13.2.5.2
TRAVEL DISTANCE	250 FEET (WITH SPRINKLERS)	73 FT	13.2.6.2(1)
DEAD-END CORRIDOR	20 FEET (WITH SPRINKLERS)	N/A	13.2.5.3
INDUSTRIAL USE - HIGH HAZARD			
COMMON PATH	NOT ALLOWED	78 FT	TABLE 40.2.5.1
TRAVEL DISTANCE	75 FEET (WITH SPRINKLERS)	106 FT	TABLE 40.2.6.1
DEAD-END CORRIDOR	NOT ALLOWED	15 FT	TABLE 40.2.5.1

	ALLOWED	ACTUAL	NFPA 101 REF.
INDUSTRIAL USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	N/A	TABLE 40.2.5.1
TRAVEL DISTANCE	250 FEET (WITH SPRINKLERS)	81 FT	TABLE 40.2.6.1
DEAD-END CORRIDOR	50 FEET (WITH SPRINKLERS)	N/A	TABLE 40.2.5.1



KEY PLAN

AFMC
AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

LICENSED PROFESSIONAL ENGINEER
DOUGLAS EMANUS
33105
OKLAHOMA
04/02/2025

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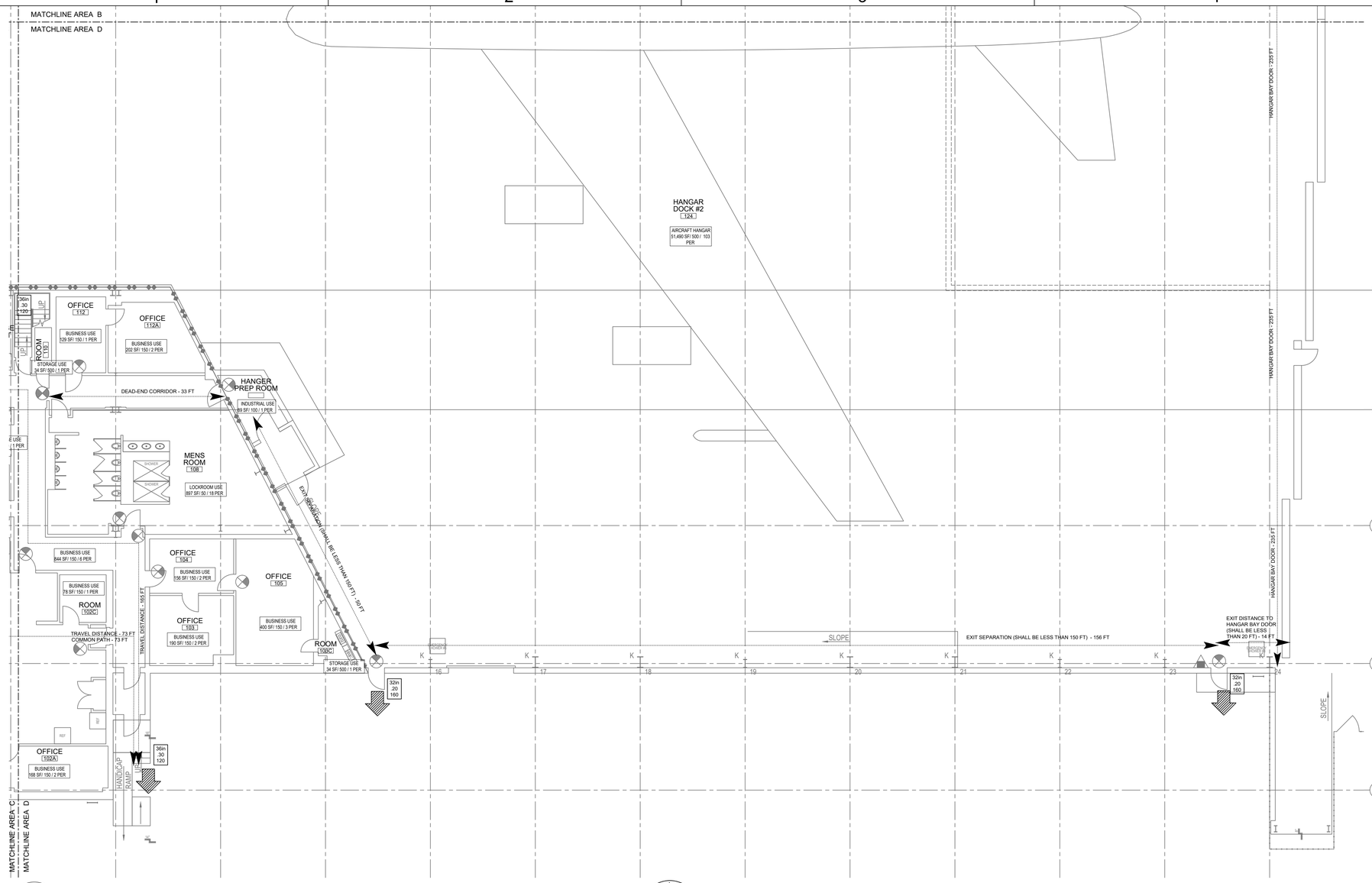
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
LIFE SAFETY FIRST FLOOR PLAN - AREA C

SHEET NUMBER
G-103
SHEET - OF



1
G-104
LIFE SAFETY FIRST FLOOR PLAN - AREA D
SCALE: 3/32" = 1'-0"

0 8' 16' 24'
SCALE: 3/32"=1'-0"

GENERAL NOTES:

1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 804.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

LIFE SAFETY SYMBOLS:

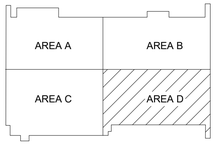
- XX' — TRAVEL DISTANCE
- EXIT DISCHARGE
- EXISTING 1 HOUR FIRE BARRIER
- EXISTING 2 HOUR FIRE BARRIER
- XXin / XXX / XXX — -EXIT WIDTH, -CAPACITY FACTOR, -EXIT CAPACITY
- EXIT SIGNAGE (EXISTING TO REMAIN)
- PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)
- NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

PROJECT EGRESS TRAVEL DISTANCE

	ALLOWED	ACTUAL	NFPA 101 REF.
EXISTING BUSINESS USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	38 FT	39.2.5.2.1
TRAVEL DISTANCE	300 FEET (WITH SPRINKLERS)	165 FT	39.2.6.3
DEAD-END CORRIDOR	50 FEET (WITH SPRINKLERS)	33 FT	39.2.5.3
EXISTING ASSEMBLY USE			
COMMON PATH	75 FEET (WITH SPRINKLERS)	73 FT	13.2.5.2
TRAVEL DISTANCE	250 FEET (WITH SPRINKLERS)	73 FT	13.2.6.2(1)
DEAD-END CORRIDOR	20 FEET (WITH SPRINKLERS)	N/A	13.2.5.3



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

LICENSED PROFESSIONAL ENGINEER
DOUGLAS EMANUS
33105
OKLAHOMA
04/02/2025

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

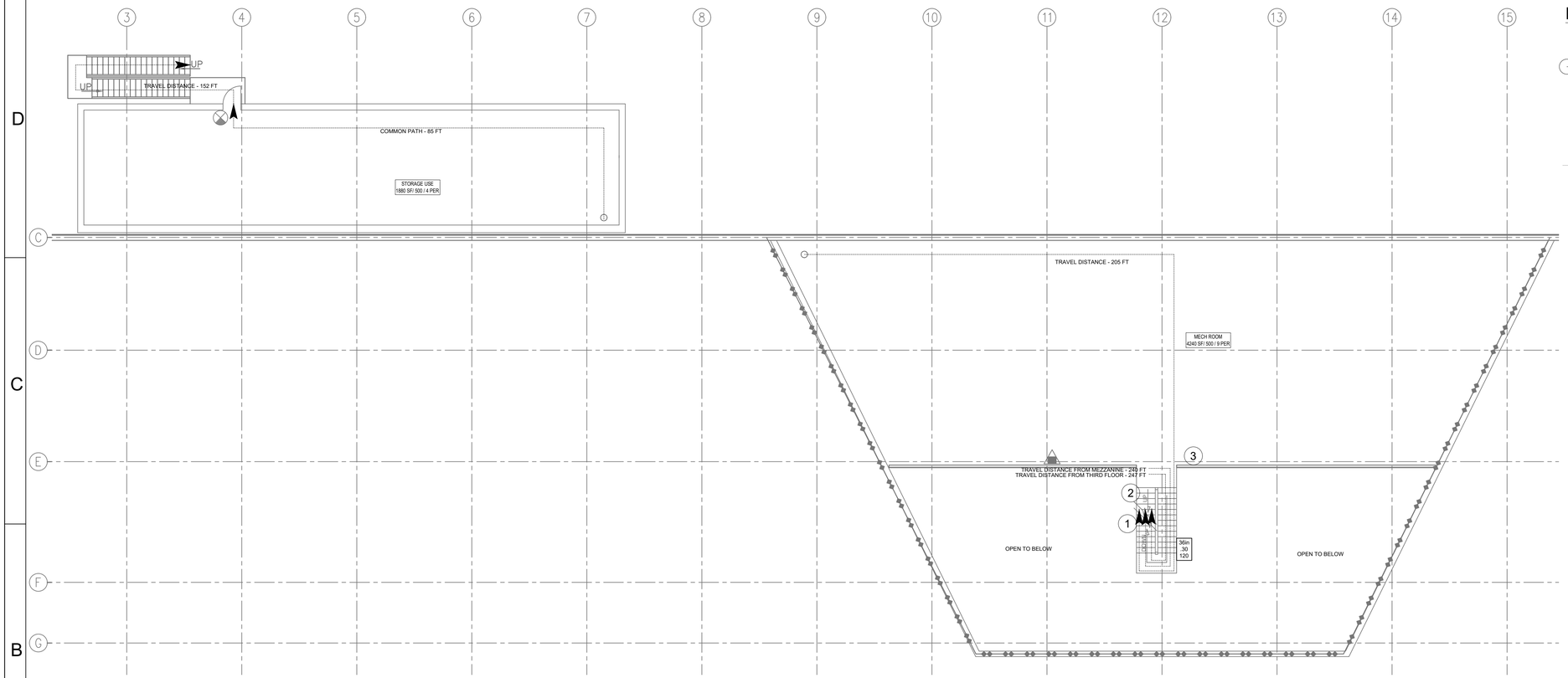
REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 02 APRIL 2025
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
LIFE SAFETY FIRST FLOOR PLAN - AREA D

SHEET NUMBER
G-104
SHEET - OF



1 G-105 LIFE SAFETY SECOND FLOOR PLAN - AREA A

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

GENERAL NOTES:

1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 804.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

LIFE SAFETY SYMBOLS:

- XX' — TRAVEL DISTANCE
- EXIT DISCHARGE
- EXISTING 2 HOUR FIRE BARRIER
- XXin XXX XXX — -EXIT WIDTH, -CAPACITY FACTOR, -EXIT CAPACITY
- EXIT SIGNAGE (EXISTING TO REMAIN)
- PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)
- NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

KEY NOTES:

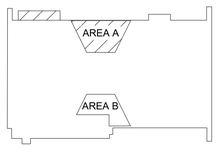
1. TRAVEL DISTANCES AND COMMON PATHS CONTINUE TO FIRST FLOOR, REFER TO SHEET G-102.
2. COMMON PATH ORIGINATES FROM UPPER FLOOR, REFER TO SHEET G-106. THE COMMON PATH EXCEEDS THE NFPA 101 100 FT ALLOWANCE, THIS IS A EXISTING CODE NON-CONFORMING CONDITION.
3. PER NFPA 101, TWO MEANS OF EGRESS SHALL BE PROVIDED ON SECOND AND THIRD FLOOR.

OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

PROJECT EGRESS TRAVEL DISTANCE

	ALLOWED	ACTUAL	NFPA 101 REF.
STORAGE USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	247 FT	TABLE 42.2.5
TRAVEL DISTANCE	400 FEET (WITH SPRINKLERS)	247 FT	TABLE 42.2.6
DEAD-END CORRIDOR	100 FEET (WITH SPRINKLERS)	N/A	TABLE 42.2.5



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

LICENSED PROFESSIONAL ENGINEER
DOUGLAS EMANUS
33105
OKLAHOMA
04/02/2025

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

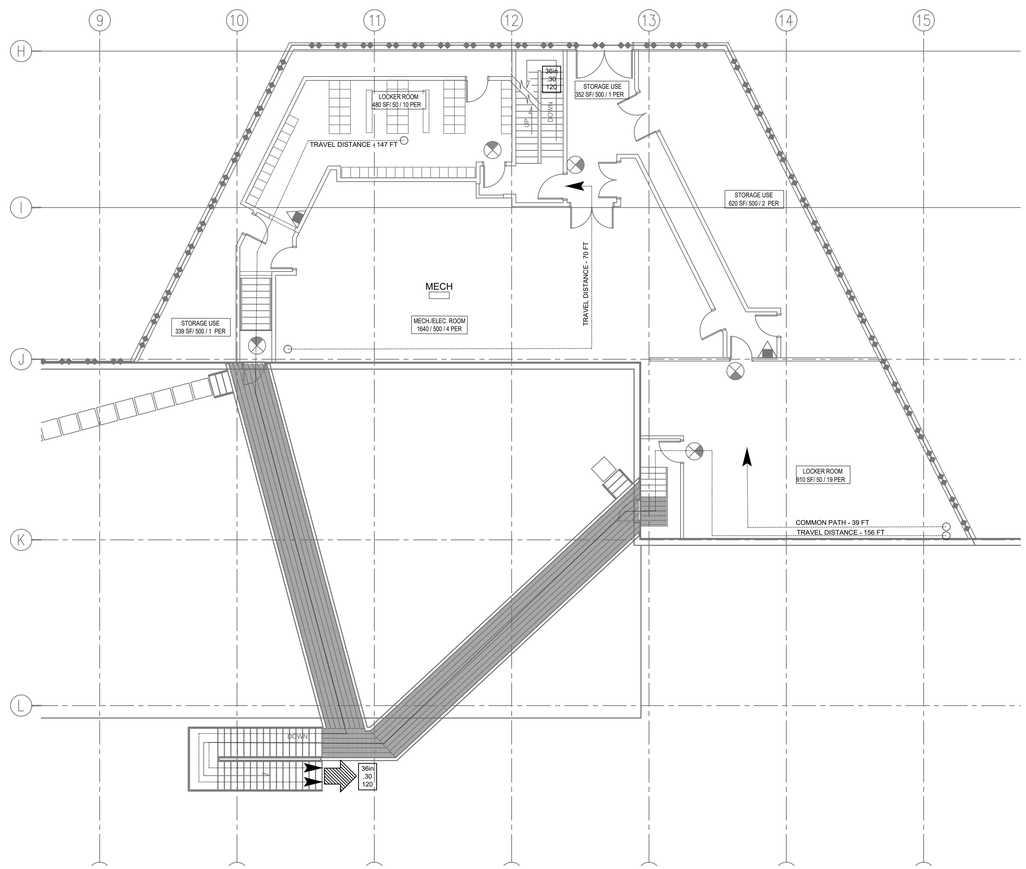
REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 02 APRIL 2025
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
GENERAL LIFE SAFETY SECOND FLOOR PLAN - AREA A

SHEET NUMBER
G-105
SHEET - OF



1
G-106

LIFE SAFETY SECOND FLOOR PLAN - AREA B

SCALE: 3/32" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

N

OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

PROJECT EGRESS TRAVEL DISTANCE

	ALLOWED	ACTUAL	NFPA 101 REF.
EXISTING ASSEMBLY			
COMMON PATH	75 FEET (WITH SPRINKLERS)	39 FT	13.2.5.2
TRAVEL DISTANCE	250 FEET (WITH SPRINKLERS)	156 FT	13.2.6.2(1)
DEAD-END CORRIDOR	20 FEET (WITH SPRINKLERS)	N/A	13.2.5.3
STORAGE USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	N/A	TABLE 42.2.5
TRAVEL DISTANCE	400 FEET (WITH SPRINKLERS)	70 FT	TABLE 42.2.6
DEAD-END CORRIDOR	100 FEET (WITH SPRINKLERS)	N/A	TABLE 42.2.5

GENERAL NOTES:

1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 804.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

LIFE SAFETY SYMBOLS:

XX' — TRAVEL DISTANCE

EXIT DISCHARGE

EXISTING 2 HOUR FIRE BARRIER

XXin — -EXIT WIDTH

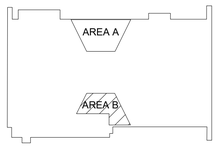
XXX — -CAPACITY FACTOR

XXX — -EXIT CAPACITY

EXIT SIGNAGE (EXISTING TO REMAIN)

PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)

NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT



KEY PLAN

AFMC
AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

LICENSED PROFESSIONAL ENGINEER
DOUGLAS EMANUS
33105
OKLAHOMA
04/02/2025

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

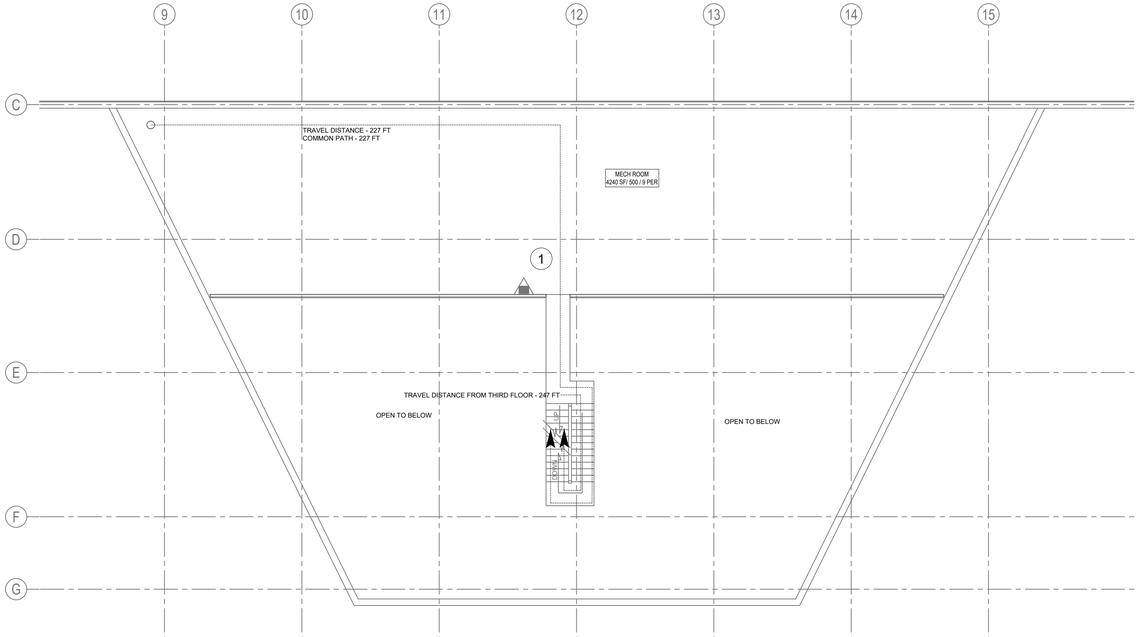
MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 02 APRIL 2025
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
LIFE SAFETY SECOND FLOOR AREA B

SHEET NUMBER
G-106

SHEET - OF

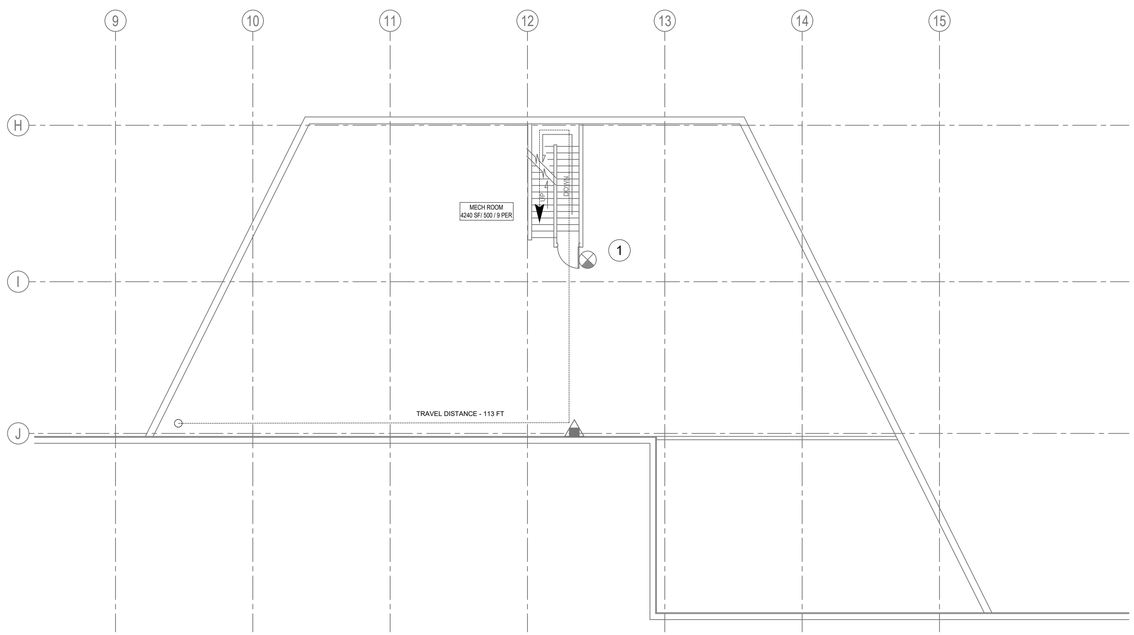


1 G-107 LIFE SAFETY MEZZANINE PLAN - AREA A

SCALE: 1/16" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"



2 G-107 LIFE SAFETY MEZZANINE FLOOR - AREA B

SCALE: 1/16" = 1'-0"

0 8' 16' 24'

SCALE: 3/32"=1'-0"

PROJECT EGRESS TRAVEL DISTANCE

	ALLOWED	ACTUAL	NFPA 101 REF.
STORAGE USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	247 FT	TABLE 42.2.5
TRAVEL DISTANCE	400 FEET (WITH SPRINKLERS)	247 FT	TABLE 42.2.6
DEAD-END CORRIDOR	100 FEET (WITH SPRINKLERS)	N/A	TABLE 42.2.5

OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

GENERAL NOTES:

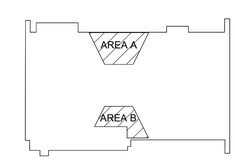
1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 804.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

LIFE SAFETY SYMBOLS:

- XX' — TRAVEL DISTANCE
- EXIT DISCHARGE
- EXISTING 2 HOUR FIRE BARRIER
- XXin — -EXIT WIDTH
- XXX — -CAPACITY FACTOR
- XXX — -EXIT CAPACITY
- EXIT SIGNAGE (EXISTING TO REMAIN)
- PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)
- NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

KEY NOTES:

1. TRAVEL DISTANCES, COMMON PATH AND DEAD-END CORRIDOR EXCEEDS THE NFPA 101 ALLOWANCE, THIS IS A EXISTING CODE NON-CONFORMING CONDITION.



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

LICENSED PROFESSIONAL ENGINEER
DOUGLAS EMANUS
33105
OKLAHOMA
04/02/2025

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

MARK	DATE	DESCRIPTION

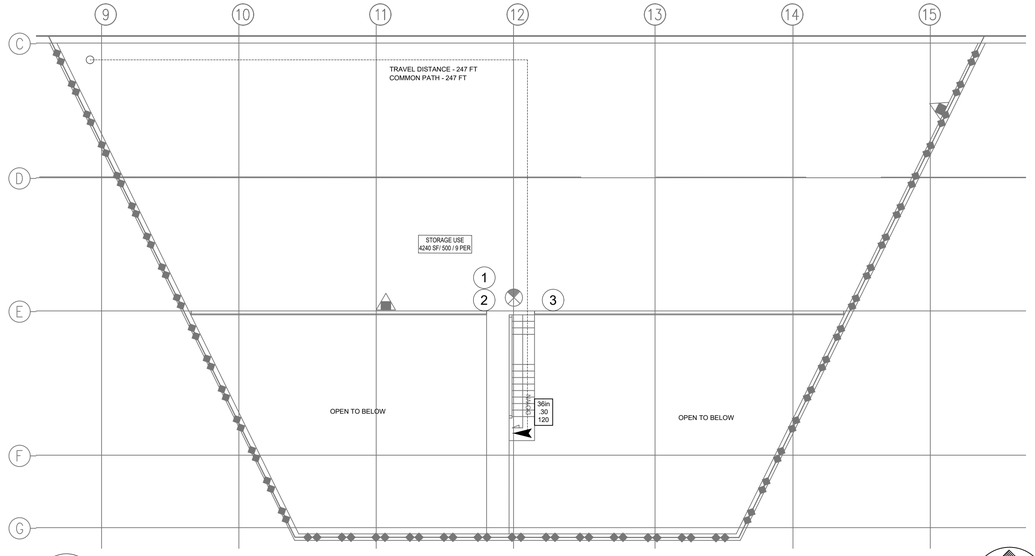
MANAGEMENT INFORMATION

ISSUE DATE: 02 APRIL 2025
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
LIFE SAFETY MEZZANINE PLAN

SHEET NUMBER
G-107

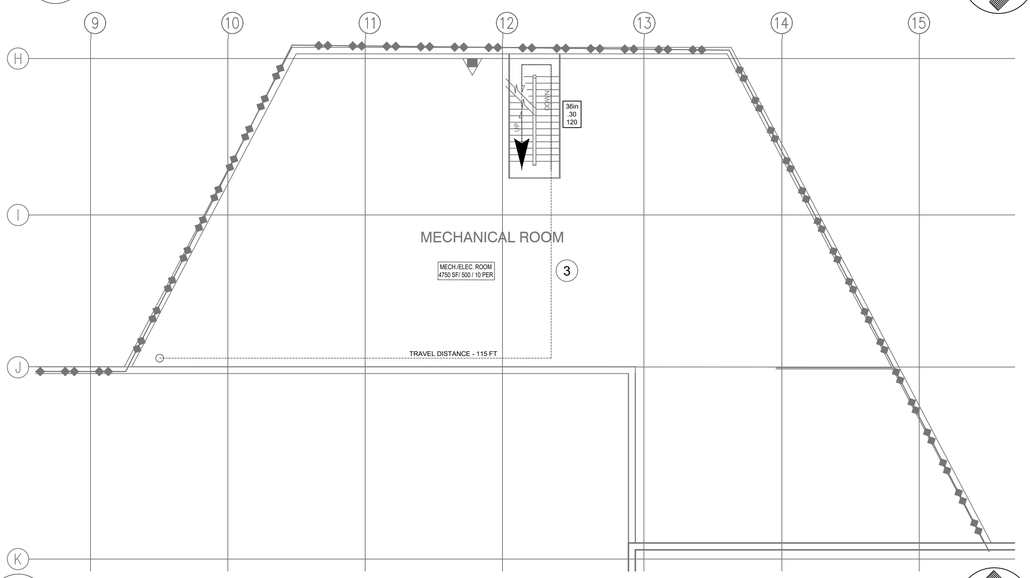
SHEET - OF



1 G-108 LIFE SAFETY THIRD FLOOR PLAN - AREA A

SCALE: 3/32" = 1'-0"

SCALE: 3/32"=1'-0"



2 G-108 LIFE SAFETY THIRD FLOOR PLAN - AREA B

SCALE: 3/32" = 1'-0"

SCALE: 3/32"=1'-0"

OCCUPANT LOAD

FLOOR	AREA TYPE	LOAD FACTOR	LOAD	REFERENCE
1ST FLOOR	STORAGE USE (HANGAR)	500 SF/ OCC.	176	UFC 3-600-01 10-3
1ST FLOOR	STORAGE USE	500 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	BUSINESS USE	150 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	ASSEMBLY USE	15 SF/ OCC.	68	NFPA 101 TABLE 7.3.1.2
1ST FLOOR	INDUSTRIAL USE	100 SF/ OCC.	46	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	STORAGE USE	500 SF/ OCC.	21	NFPA 101 TABLE 7.3.1.2
2ND FLOOR	ASSEMBLY USE	15 SF/ OCC.	29	NFPA 101 TABLE 7.3.1.2
MEZZ.	STORAGE USE	500 SF/ OCC.	18	NFPA 101 TABLE 7.3.1.2
3RD FLOOR	STORAGE USE	500 SF/ OCC.	19	NFPA 101 TABLE 7.3.1.2
TOTAL			435	

PROJECT EGRESS TRAVEL DISTANCE

	ALLOWED	ACTUAL	NFPA 101 REF.
STORAGE USE			
COMMON PATH	100 FEET (WITH SPRINKLERS)	247 FT	TABLE 42.2.5
TRAVEL DISTANCE	400 FEET (WITH SPRINKLERS)	247 FT	TABLE 42.2.6
DEAD-END CORRIDOR	100 FEET (WITH SPRINKLERS)	N/A	TABLE 42.2.5

GENERAL NOTES:

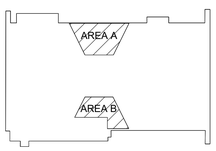
1. THE INTENT OF THE LIFE SAFETY SHEETS IS TO IDENTIFY THE EXISTING CONDITIONS ONLY. THE SCOPE OF WORK DOES NOT INCLUDE UPGRADES TO THE BUILDING RELATED TO COMPLIANCE WITH THE CURRENT LIFE SAFETY CODE REQUIREMENTS. IN ACCORDANCE WITH IEBC 804.2, MEANS OF EGRESS COMPLYING WITH THE REQUIREMENTS OF THE BUILDING CODE UNDER WHICH THE BUILDING WAS CONSTRUCTED SHALL BE CONSIDERED TO BE A COMPLIANT MEANS OF EGRESS SYSTEM IF, IN THE OPINION OF THE CODE OFFICIAL, THEY DO NOT CONSTITUTE A DISTINCT HAZARD TO LIFE SAFETY.
2. ALL REQUESTED ROOM NUMBERS HAVE BEEN GIVEN. ALL AVAILABLE ROOM NUMBERS ARE SHOWN.

LIFE SAFETY SYMBOLS:

- XX' — TRAVEL DISTANCE
- EXIT DISCHARGE
- EXISTING 2 HOUR FIRE BARRIER
- XXin / XXX / XXX — -EXIT WIDTH, -CAPACITY FACTOR, -EXIT CAPACITY
- EXIT SIGNAGE (EXISTING TO REMAIN)
- PORTABLE FIRE EXTINGUISHERS (EXISTING TO REMAIN)
- NEW PORTABLE FIRE EXTINGUISHERS, CLEAN AGENT

KEY NOTES:

1. TRAVEL DISTANCES AND COMMON PATHS CONTINUE TO LOWER FLOORS, REFER TO SHEET G-102 AND G-105.
2. COMMON PATH ORIGINATES CONTINUES TO LOWER FLOOR, REFER TO SHEET G-102 AND G-105. THE COMMON PATH EXCEEDS THE NFPA 101 100 FEET ALLOWANCE, THIS IS A EXISTING NON-COMPLIANCE CONDITION.
3. PER NFPA 101, TWO MEANS OF EGRESS SHALL BE PROVIDED ON SECOND AND THIRD FLOOR.



KEY PLAN

AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

LICENSED PROFESSIONAL ENGINEER
DOUGLAS EMANUS
33105
OKLAHOMA
04/02/2025

PROJECT INFORMATION
WWYK190068
REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

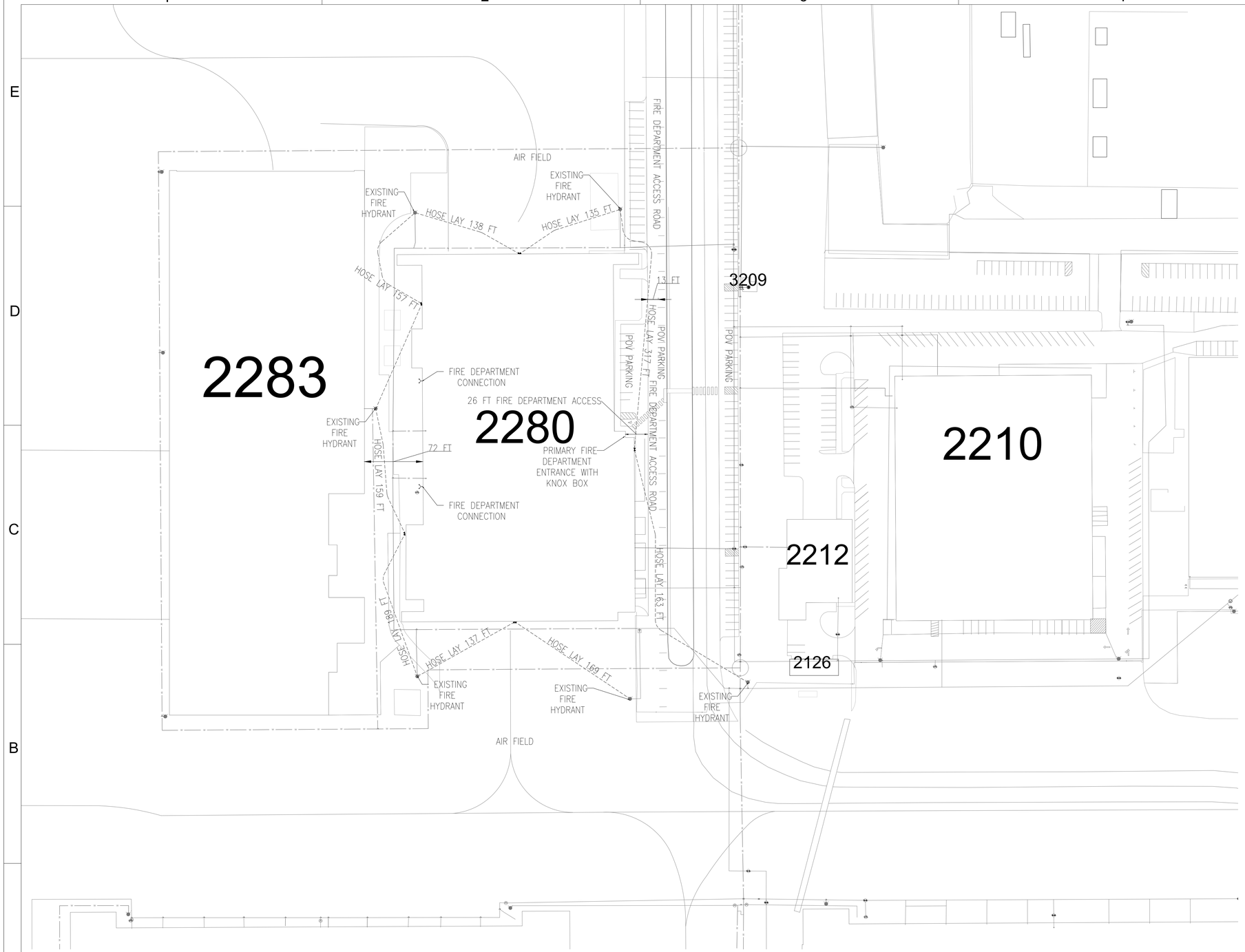
REVISIONS

MARK	DATE	DESCRIPTION

MANAGEMENT INFORMATION
ISSUE DATE: 02 APRIL 2025
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
LIFE SAFETY THIRD FLOOR

SHEET NUMBER
G-108
SHEET - OF



CODE COMPLIANCE LEGEND:

- FIRE HYDRANT
- FIRE DEPARTMENT CONNECTION
- W — UNDERGROUND WATER MAIN
- FIRE HOSE DISTANCE

KEY NOTES:

1. THIS IS THE FIRE CODE COMPLIANCE SITE PLAN, DIMENSIONS ARE NOT APPLICABLE FOR CIVIL CONSTRUCTION.

1 / G-109 CODE COMPLAINCE SITE PLAN

SCALE: 1/64" = 1'-0"

64 32 0 64 128

SCALE: 1/64"=1'-0"

N

AFMC
AIR FORCE MATERIEL COMMAND
72 ABW CIVIL ENGINEER DIRECTORATE
TINKER AFB, OK

LICENSED PROFESSIONAL ENGINEER
DOUGLAS EMANUS
33105
OKLAHOMA
04/02/2025

PROJECT INFORMATION
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REPAIR FIRE SUPPRESSION SYSTEM, MAINT HANGER B2280
TINKER AIR FORCE BASE, OKLAHOMA

REVISIONS

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MANAGEMENT INFORMATION

ISSUE DATE: 02 APRIL 2025
DESIGN GROUP: HDR
DESIGNED BY: D.E.
DRAWN BY: J.R.M.
CHECKED BY: J.M.
DESIGN FILE LOCATION:

SHEET TITLE
CODE COMPLIANCE SITE PLAN

SHEET NUMBER
G-109

SHEET - OF

Appendix D

Mechanical

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TINKER AFB, OK, USA

WMO: **723540**

Lat: **35.417N** Lon: **97.383W** Elev: **1291** StdP: **14.02** Time Zone: **-6.00 (NAC)** Period: **94-19** WBAN: **13919**

Annual Heating, Humidification, and Ventilation Design Conditions

	Coldest Month	Heating DB		Humidification DP/MCDB and HR						Coldest Month WS/MCDB				MCWS/PCWD to 99.6% DB		WSF	
				99.6%			99%			0.4%		1%					
		99.6%	99%	DP	HR	MCDB	DP	HR	MCDB	WS	MCDB	WS	MCDB	MCWS	PCWD		
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(1)	1	13.9	18.4	2.9	6.7	18.5	7.4	8.4	24.2	30.2	42.6	27.8	42.4	11.5	0	0.548	(1)

Annual Cooling, Dehumidification, and Enthalpy Design Conditions

	Hottest Month	Hottest Month DB Range	Cooling DB/MCWB						Evaporation WB/MCDB						MCWS/PCWD to 0.4% DB		
			0.4%		1%		2%		0.4%		1%		2%				
			DB	MCWB	DB	MCWB	DB	MCWB	WB	MCDB	WB	MCDB	WB	MCDB	MCWS	PCWD	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(2)	7	19.9	100.0	73.4	97.0	73.7	93.8	74.0	78.2	90.2	77.1	89.2	76.1	88.1	11.3	180	(2)

	Dehumidification DP/MCDB and HR									Enthalpy/MCDB						Extreme Max WB	
	0.4%			1%			2%			0.4%		1%		2%			
	DP	HR	MCDB	DP	HR	MCDB	DP	HR	MCDB	Enth	MCDB	Enth	MCDB	Enth	MCDB		
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(3)	75.0	137.7	83.5	73.5	130.6	82.3	72.7	127.3	81.6	42.6	90.2	41.4	89.1	40.3	88.3	86.0	(3)

Extreme Annual Design Conditions

	Extreme Annual WS				Extreme Annual Temperature				n-Year Return Period Values of Extreme Temperature								
					Mean		Standard Deviation		n=5 years		n=10 years		n=20 years		n=50 years		
	1%	2.5%	5%		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
	(a)	(b)	(c)		(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(4)	26.7	24.3	21.3	DB	7.1	102.9	3.7	4.0	4.4	105.8	2.3	108.2	0.2	110.4	-2.5	113.3	(4)
(5)				WB	6.1	80.4	3.5	1.9	3.6	81.8	1.6	82.9	-0.4	84.0	-2.9	85.4	(5)

Monthly Climatic Design Conditions

				Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
				(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(6)	Temperatures, Degree-Days and Degree-Hours		DBAvg	61.2	39.1	43.3	52.0	60.4	69.1	77.5	82.1	81.6	74.0	62.5	50.9	41.2	(6)
(7)			DBStd	17.36	10.61	11.57	10.71	8.44	7.07	5.46	5.03	5.25	7.25	8.51	9.31	9.78	(7)
(8)			HDD50	1135	360	242	103	17	1	0	0	0	0	11	100	301	(8)
(9)			HDD65	3382	802	609	416	182	43	1	0	0	14	148	429	738	(9)
(10)			CDD50	5235	24	55	165	328	592	825	996	978	721	397	126	28	(10)
(11)			CDD65	2006	0	2	13	43	169	376	531	513	285	69	5	0	(11)
(12)			CDH74	20907	2	20	117	352	1346	3710	6299	5861	2637	523	39	1	(12)
(13)			CDH80	9720	0	4	21	68	392	1595	3316	3060	1134	127	3	0	(13)
(14)	Wind		WSAvg	10.8	11.6	11.7	12.5	12.8	11.0	10.3	9.3	8.7	9.0	10.5	11.4	11.0	(14)
(15)	Precipitation		PrecAvg	36.1	1.3	1.6	2.6	3.7	5.4	4.7	3.7	3.0	3.5	2.9	2.0	1.7	(15)
(16)			PrecMax	53.3	3.3	4.1	6.5	7.1	16.2	11.3	8.7	7.7	8.9	10.2	6.1	5.7	(16)
(17)			PrecMin	23.9	0.0	0.0	0.4	0.7	1.5	1.0	0.6	0.0	0.8	0.4	0.0	0.0	(17)
(18)			PrecStd	7.6	0.9	1.1	1.7	1.7	3.4	2.6	2.3	1.9	1.8	2.1	1.8	1.3	(18)
(19)	Monthly Design Dry Bulb and Mean Coincident Wet Bulb Temperatures	0.4%	DB		72.3	76.6	82.8	86.1	91.2	99.5	104.1	104.7	100.4	88.0	78.7	70.4	(19)
(20)			MCWB		53.6	57.3	62.1	64.8	71.2	74.9	72.6	73.3	71.7	69.4	63.0	58.2	(20)
(21)		2%	DB		65.5	70.7	77.1	81.8	87.5	94.8	100.2	99.9	93.5	83.6	73.5	65.3	(21)
(22)			MCWB		53.1	55.4	60.6	64.8	71.5	74.6	73.5	73.4	72.2	67.4	60.2	56.0	(22)
(23)		5%	DB		60.7	65.7	72.7	78.3	84.3	91.2	97.0	97.0	90.3	80.0	69.6	60.8	(23)
(24)			MCWB		50.3	54.3	58.7	62.9	70.1	75.0	74.0	73.7	72.0	65.4	58.9	51.4	(24)
(25)		10%	DB		55.6	61.2	68.7	74.6	81.4	88.5	93.7	93.4	86.5	76.3	65.7	56.6	(25)
(26)			MCWB		46.7	52.0	57.1	61.5	69.2	74.2	74.7	73.6	70.8	64.2	57.1	49.1	(26)
(27)	Monthly Design Wet Bulb and Mean Coincident Dry Bulb Temperatures	0.4%	WB		60.8	63.4	67.0	71.4	76.5	79.5	79.9	79.3	76.3	73.2	67.2	63.6	(27)
(28)			MCDB		64.6	68.1	75.1	79.2	86.1	90.5	91.9	91.7	88.0	81.5	72.4	67.7	(28)
(29)		2%	WB		56.1	60.4	64.4	68.7	74.4	77.5	78.2	77.6	74.8	71.2	63.9	58.5	(29)
(30)			MCDB		61.2	65.7	72.3	75.7	82.9	88.6	90.5	90.5	86.3	78.7	69.4	61.9	(30)
(31)		5%	WB		51.5	56.8	62.2	67.0	72.8	76.4	77.2	76.5	73.6	69.2	61.5	54.0	(31)
(32)			MCDB		59.1	63.2	69.2	73.7	80.5	87.3	89.4	89.5	84.8	75.0	66.5	58.1	(32)
(33)		10%	WB		47.4	52.3	59.3	64.7	71.1	75.2	76.1	75.4	72.7	67.1	58.9	49.1	(33)
(34)			MCDB		54.8	61.2	66.8	71.6	78.6	85.7	88.3	88.4	83.2	73.1	64.3	55.8	(34)
(35)	Mean Daily Temperature Range		MDBR		20.2	20.4	21.1	20.7	18.6	18.0	19.9	20.3	19.7	19.9	19.8	18.6	(35)
(36)		5% DB	MCDBR		27.7	27.1	26.3	24.8	21.3	21.1	24.4	25.2	23.4	23.6	24.6	24.8	(36)
(37)			MCWBR		16.7	16.0	13.9	12.9	9.8	8.1	6.7	7.1	7.9	11.4	14.0	15.6	(37)
(38)		5% WB	MCDBR		24.3	22.7	20.8	20.0	18.4	18.6	20.0	20.1	19.3	17.8	20.1	20.6	(38)
(39)			MCWBR		16.8	16.6	12.7	12.8	10.2	8.7	8.1	8.0	7.7	10.8	14.5	16.8	(39)
(40)	Clear-Sky Solar Irradiance	taub			0.294	0.298	0.339	0.375	0.412	0.421	0.423	0.432	0.385	0.344	0.312	0.290	(40)
(41)		taud			2.507	2.512	2.421	2.333	2.299	2.315	2.341	2.257	2.370	2.478	2.506	2.525	(41)
(42)		Ebn at Noon			290	302	296	288	278	274	272	268	276	280	280	285	(42)
(43)		Edh at Noon			26	29	35	40	42	41	40	43	36	30	26	24	(43)
(44)	All-Sky Solar Radiation	RadAvg			878	1066	1395	1727	1864	2131	2158	1962	1622	1233	925	740	(44)
(45)		RadStd			88	162	88	128	200	206	115	121	144	158	121	84	(45)

Historical Trends

		DBAvg	Heating		Cooling			Degree-Days				
			99% DB	99% DP	1% DB	1% WB	1% DP	HDD50	HDD65	CDD50	CDD65	
		(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	
(46)	Station Only	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	(46)
(47)	Regional (40 neighbors)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	(47)

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Nomenclature — Tables of Climate Design Conditions

CDD*n*	Cooling degree-days base *n*°F, °F-day
CDH*n*	Cooling degree-hours base *n*°F, °F-hour
DB	Dry bulb temperature, °F
DBAvg	Average daily dry bulb temperature, °F
DBStd	Standard deviation of daily average dry bulb temperature, °F
DP	Dew point temperature, °F
Ebn at Noon	Clear sky beam normal irradiance at solar noon, Btu/h/ft²
Edh at Noon	Clear sky diffuse horizontal irradiance at solar noon, Btu/h/ft²
Elev	Elevation, ft
Enth	Enthalpy, Btu/lb
HDD*n*	Heating degree-days base *n*°F, °F-day
HR	Humidity ratio, grains of moisture per lb of dry air
Lat	Latitude, °
Long	Longitude, °
MCDB	Mean coincident dry bulb temperature, °F
MCDBR	Mean coincident dry bulb temperature range, °F
MCWB	Mean coincident wet bulb temperature, °F
MCWBR	Mean coincident wet bulb temperature range, °F
MCWS	Mean coincident wind speed, mph
MDBR	Mean dry bulb temperature range, °F
PCWD	Prevailing coincident wind direction, °, 0 = North, 90 = East
Period	Range of years used to calculate design conditions
PrecAvg	Average precipitation, in
PrecMax	Maximum precipitation, in
PrecMin	Minimum precipitation, in
PrecStd	Standard deviation of precipitation, in
RadAvg	Average daily all sky solar radiation, Btu/ft²
RadStd	Standard deviation of average daily all sky solar radiation, Btu/ft²
StdP	Standard pressure at station elevation, psi
taub	Clear sky optical depth for beam irradiance
taud	Clear sky optical depth for diffuse irradiance
Time Zone	Hours ahead or behind UTC, and time zone code
WB	Wet bulb temperature, °F
WBAN	Weather Bureau Army Navy number
WMO	Station identifier derived from the World Meteorological Organziation
WS	Wind speed, mph
WSAvg	Average wind speed, mph
WSF	Weather and shielding factor

Numbers (1) to (47) and letters (a) to (p) are row and column references to quickly point to an element in the table. For example, the 5% design wet bulb temperature for July can be found in row (31), column (k).

Location	**Tinker AFB**
Building owner	**AFCEC**
Program user	**ACO**
Company	**HDR**
Comments	

By	**HDR**	
Dataset name	**C:\USERS\AORTON\ONEDRIVE - HDR, INC\DESKTOP\TINKER_WWYK190068 - REPAIR FIRE SUPPRESSION SYSTEM, B2280\WWYK190068.TRC**	
Calculation time	**08:56 AM on 06/03/2022**	
TRACE® 700 version	**6.3.5**	
Location	**Tinker AFB, Oklahoma**	
Latitude	**35.4**	**deg**
Longitude	**97.4**	**deg**
Time Zone	**6**	
Elevation	**1,131**	**ft**
Barometric pressure	**28.7**	**in. Hg**
Air density	**0.0729**	**lb/cu ft**
Air specific heat	**0.2444**	**Btu/lb·°F**
Density-specific heat product	**1.0693**	**Btu/h·cfm·°F**
Latent heat factor	**4,706.8**	**Btu·min/h·cu ft**
Enthalpy factor	**4.3744**	**lb·min/hr·cu ft**
Summer design dry bulb	**97.4**	**°F**
Summer design wet bulb	**73.6**	**°F**
Winter design dry bulb	**18.5**	**°F**
Summer clearness number	**1.00**	
Winter clearness number	**1.00**	
Summer ground reflectance	**0.20**	
Winter ground reflectance	**0.20**	
Carbon Dioxide Level	**400**	**ppm**
Design simulation period	**January - December**	
Cooling load methodology	**TETD-TA1**	
Heating load methodology	**UATD**	

System Checksums

By HDR

SS-1 / SSCU-1 **Fan Coil**

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 7 / 19
Outside Air: OADB/WB/HR: 90 / 72 / 96

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	0	0	0
Glass Solar	0	0	0	0
Glass/Door Cond	0	0	0	0
Wall Cond	3,188	0	3,188	25
Partition/Door	2,202		2,202	17
Floor	0		0	0
Adjacent Floor	0.00	0.00	0.00	0.00
Infiltration	2,077		2,077	16
Sub Total ==>	7,467	0	7,467	59
Internal Loads				
Lights	1,283	0	1,283	10
People	0	0	0	0
Misc	3,850	0	3,850	31
Sub Total ==>	5,133	0	5,133	41
Ceiling Load	0	0	0	0
Ventilation Load	0	0	0	0
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Underflr Sup Ht Pkup			0	0
Supply Air Leakage		0	0	0
Grand Total ==>	12,600	0	12,600	100.00

CLG SPACE PEAK

Mo/Hr: Sum of
OADB: Peaks

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	0	0
Glass/Door Cond	0	0
Wall Cond	3,188	28
Partition/Door	2,202	19
Floor	0.00	0
Adjacent Floor	0.00	0.00
Infiltration	964	8
Sub Total ==>	6,353	55
Internal Loads		
Lights	1,283	11
People	0	0
Misc	3,850	34
Sub Total ==>	5,133	45
Ceiling Load	0	0
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Ov/Undr Sizing	0	0
Grand Total ==>	11,487	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 19

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	0	0	0.00
Glass Solar	0	0	0.00
Glass/Door Cond	0	0	0.00
Wall Cond	-1,053	-1,053	16.41
Partition/Door	-2,044	-2,044	31.87
Floor	0	0	0.00
Adjacent Floor	0.00	0.00	0.00
Infiltration	-3,317	-3,317	51.71
Sub Total ==>	-6,414	-6,414	100.00
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	0	0	0.00
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	0	0	0.00
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
Underflr Sup Ht Pkup		0	0.00
Supply Air Leakage		0	0.00
Grand Total ==>	-6,414	-6,414	100.00

TEMPERATURES

	Cooling	Heating
SADB	60.7	76.5
Ra Plenum	76.0	68.0
Return	76.0	68.0
Ret/OA	76.0	68.0
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Diffuser	704	704
Terminal	704	704
Main Fan	704	704
Sec Fan	0	0
Nom Vent	0	0
AHU Vent	0	0
Infil	63	63
MinStop/Rh	0	0
Return	766	766
Exhaust	63	63
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	0.0	0.0
cfm/ft²	1.87	1.87
cfm/ton	670.21	
ft²/ton	358.10	
Btu/hr·ft²	33.51	-17.06
No. People	0	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR °F	Enter DB/WB/HR °F	Enter DB/WB/HR gr/lb	Leave DB/WB/HR °F	Leave DB/WB/HR °F	Leave DB/WB/HR gr/lb
Main Clg	1.1	12.6	11.5	704	76.0	63.2	70.0	60.7	57.3	67.7
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	1.1	12.6								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	376		
Part	1,026		
Int Door	1		
ExFlr	0		
Roof	0	0	0
Wall	252	0	0
Ext Door	0	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-6.4	704	68.0	76.5
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-6.4			

Submittal Data Sheet

R-32 --- 1.5-Ton Wall Mounted Daikin OTERRA Heat Pump System

FTXF18AXVJU-RXF18AXVJU

FEATURES

- Daikin Swing Compressor
- Indoor Quite Operation
- Included Handheld Remote
- Titanium Apatite Air-Purifying Filter
- Anti-corrosion Treatment of Outdoor Heat Exchanger

BENEFITS

- Precharged Line set - 33 ft
- Cooling Operation Range - 50-115F
- Heating Operation Range - 5-65F
- 12 Year Parts and Compressor Registered Residential Warranty
- 5 year Parts and Compressor Commercial Warranty
- R-32 Easy, Proven, Efficient, Available
- Facilities Cooling to -4F - See installation manual

INDOOR UNIT

OUTDOOR UNIT

(Daikin's products are subject to continuous improvements. Daikin reserves the right to modify product design, specifications and information in this data sheet without notice and without incurring any obligations)

Submittal Data Sheet

R-32 --- 1.5-Ton Wall Mounted Daikin OTERRA Heat Pump System

FTXF18AXVJU-RXF18AXVJU

SYSTEM PERFORMANCE

Indoor Unit Model No.	FTXF18AXVJU	Indoor Unit Name:	R-32 --- 1.5- Ton, Heat Pump, Wall Mounted IDU Daikin OTERRA
Outdoor Unit Model No.	RXF18AXVJU	Outdoor Unit Name:	R-32 --- 1.5 Ton, Heatpump, Ductless, ODU Daikin OTERRA
Rated Cooling Capacity (Btu/hr):	18,100	Rated Cooling Conditions:	Indoor (°F DB/WB): 80 / 67 Ambient (°F DB/WB): 95 / 75
Sensible Capacity (Btu/hr):	14,120	Rated Piping Length(ft):	25
Max/Min Cooling Capacity (Btu/hr):	22,000 / 6,900	Rated Height Difference (ft):	0.00
Cooling Input Power (kW):	5.300	Heating Input Power (kW):	6.33
SEER2 (Non-Ducted/Ducted):	21.00 /	HSPF2 (Non-Ducted/Ducted):	9.6 /
EER2 (Non-Ducted/Ducted):	12.00 /	Heating COP (Non-Ducted/Ducted):	3.6 /
Rated Heating Capacity (Btu/hr):	21,600	Rated Heating Conditions:	Indoor (°F DB/WB): 70 / 60 Ambient (°F DB/WB): 47 / 43
Max/Min Heating Capacity (Btu/hr):	26,400 / 5,800		

SYSTEM DETAILS

Refrigerant Type:	R-32	Cooling Operation Range (°F DB):	50 - 122
Holding Refrigerant Charge (lbs):	3.31	Heating Operation Range (°F WB):	5 - 65
Additional Charge (oz/ft):	0.18	Max. Pipe Length (Vertical) (ft):	66
Pre-charge Piping (Length) (ft):	33	Cooling Range w/Baffle (°F DB):	-4 - 122
Max. Pipe Length (Total) (ft):	99		
Max Height Separation (Ind to Ind ft):	0		

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Submittal Data Sheet

R-32 --- 1.5-Ton Wall Mounted Daikin OTERRA Heat Pump System

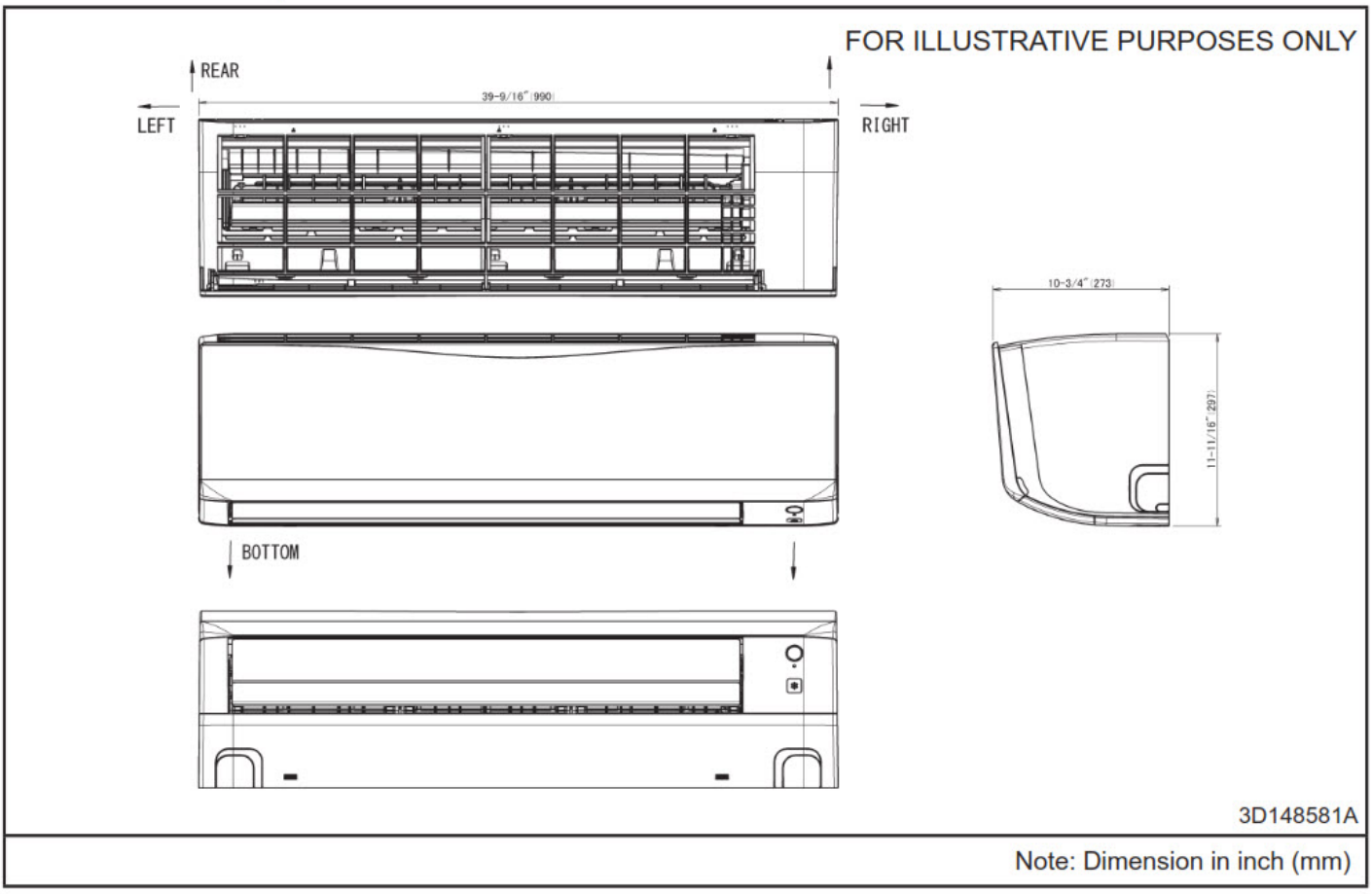
FTXF18AXVJU-RXF18AXVJU

INDOOR UNIT DETAILS

Power Supply (V/Hz/Ph):	208-230 / 60 / 1	Airflow Rate (HH/H/M/L/SL) (CFM):	754/716/605/467/395
Power Supply Connections:	L1, L2, L3, Ground	Moisture Removal (Gal/hr):	0.6
Min. Circuit Amps MCA (A):		Gas Pipe Connection (inch):	1/2
Max Overcurrent Protection (MOP) (A):		Liquid Pipe Connection (inch):	1/4
Dimensions (HxWxD) (in):	11-11/16 x 39-9/16 x 10-3/4	Condensate Connection (inch):	5/8
Net Weight (lb):	30.5	Sound Pressure (H/M/L/SL) (dBA):	49/44/38/33
Ext. Static Pressure (Rated/Max) (inWg):	/	Sound Power Level (dBA):	

DIMENSIONAL DRAWING - INDOOR UNIT

Model : FTKF18/24A, FTXF18/24A



(Daikin's products are subject to continuous improvements. Daikin reserves the right to modify product design, specifications and information in this data sheet without notice and without incurring any obligations)

Submittal Data Sheet

R-32 --- 1.5-Ton Wall Mounted Daikin OTERRA Heat Pump System

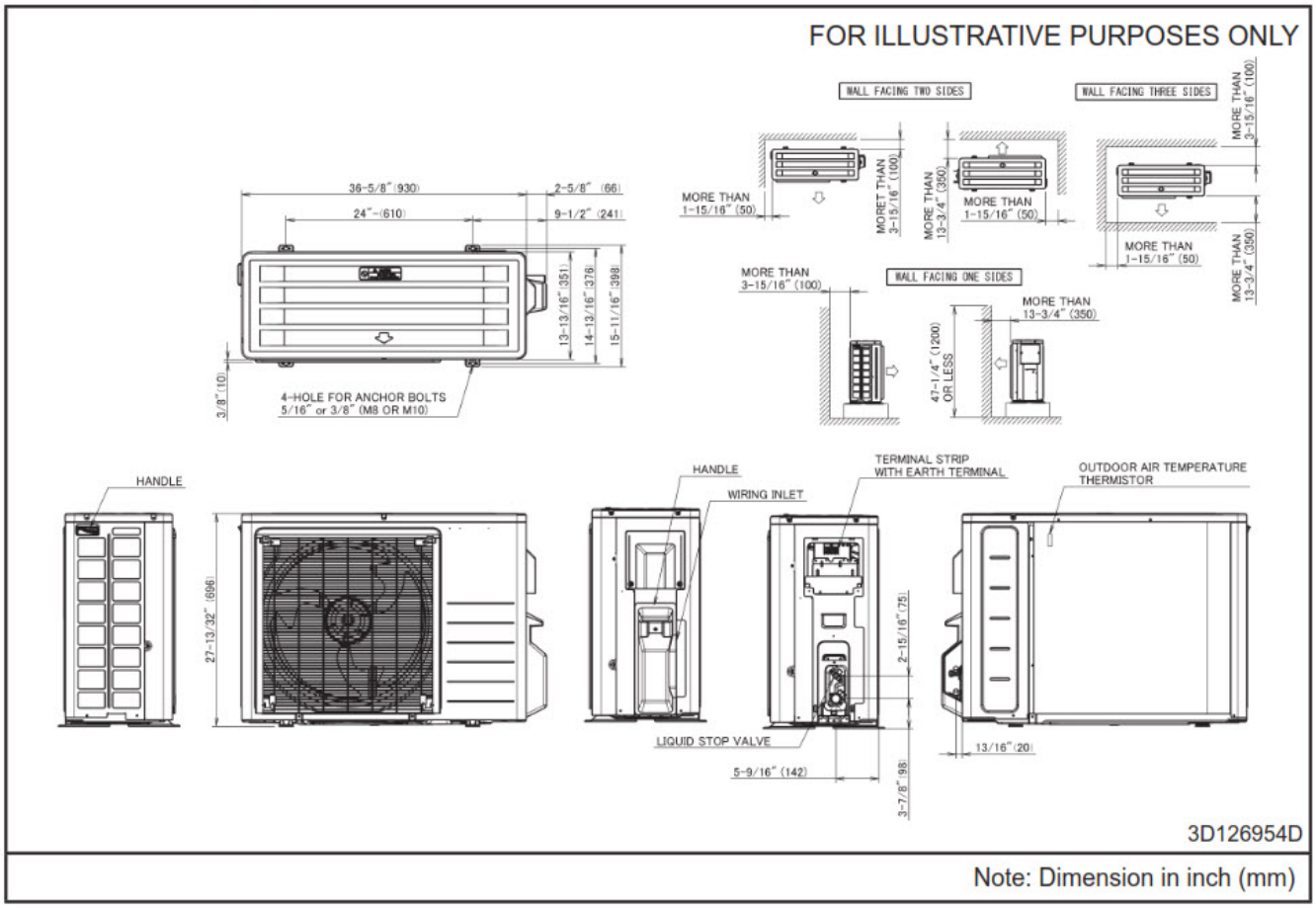
FTXF18AXVJU-RXF18AXVJU

OUTDOOR UNIT DETAILS

Power Supply (V/Hz/Ph):	208-230 / 60 / 1	Compressor Stage:	Inverter
Power Supply Connections:	L1, L2, L3, Ground	Capacity Control Range (%):	-
Min. Circuit Amps MCA (A):	16.34	Airflow Rate (H) (CFM):	1879
Max Overcurrent Protection (MOP) (A):	20	Gas Pipe Connection (inch):	1/2
Max Starting Current MSC(A):		Liquid Pipe Connection (inch):	1/4
Rated Load Amps RLA(A):		Sound Pressure (H) (dBA):	54
Dimensions (HxWxD) (in):	27-13/32 x 36-5/8 x 13-13/16	Sound Power Level (dBA):	
Net Weight (lb):	101		

DIMENSIONAL DRAWING - OUTDOOR UNIT

Model : RKF18/24A, RXF18/24A



INDOOR ACCESSORIES

PART NUMBER	DESCRIPTION	INCLUDED
AZAI6WSCDKB	DKN Residential Cloud Wi-Fi Adaptor for Single- and Multi-Zone System (S21)	No
AZAI6WSPDKC	DKN Plus Interface	No
BRC51D61	Wired Remote Controller Kit	No
DACA-CP1-1	Mini Aqua Condensate Pump	No
DACA-CP4-1	MINI WHITE PUMP KIT 100-250V	No
DTST-LTE-LA-A	Daikin One Lite (with Translation Adaptor for S21 only)	No
DTST-ONE-ADA-A	Daikin One+ Smart Thermostat for VRV, SkyAir, Single- and Multi-Zone System	No
DTST-TOU-ADA-A	Daikin One Touch Smart Thermostat (with Translation Adaptor for S21 and P1P2)	No
KRP928BB2S	RA Interface Adaptor for DIII-Net -	No

OUTDOOR ACCESSORIES

PART NUMBER	DESCRIPTION	INCLUDED
DACA-WB-3	Powder-Coated Wall-Mounted Bracket	No
KEH063A4EA	Bml LRg Drain Pan Heater Rev A	No
KPW063B4E	Air Adjustment Grille	No

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Appendix E

Structural

Calculation Cover Sheet

Client:	Tinker AFB		
Project:	WWYK190068 - Repair Fire Suppression System, Maint Hangar B2280		
Project No:	10296383-006.23.01	Rev:	0
Calculation No:		Page:	1 of 14
Title:	Structural Calculations		

Purpose: Structural calculations for B2280 project. Calculations include CFS joist, wall, and joist to existing CMU wall connection designs.

All calculations IAW UFC 3-301-01, IBC 2024, and their associated reference standards.

Originator:	Colin Mulderick	Date:	03/25/2025
Checked by:	Kerry Teemsma	Date:	
QC Review by:		Date:	
Approved by:	Lucas Mendoza	Date:	

Supersedes Calculation No:

Superseded by Calculation No:

Project: Tinker AFB		Computed: CJM	Date: 3/20
Subject: WWYK 190068		Checked:	Date:
Task: Roof Joist Check		Page: 1	of: 3
Job #: 10426895		No: 6.2.1	

$DL = 25psf$

$LL = 20psf$

$w_u = 45psf$

$S_{jst} = 16''$

$w_{jst} = 60plf$; $w_{LL} = 26.67plf$

$\ell_{jst} \approx 19'-9''$

54 mils : 0.0566" [16 gauge]

Verify 800S162-54 w/ 25psf DL

$\delta_{all} = \ell/240 \ (D+L) \Rightarrow \frac{237}{240} = 0.9875''$

$= \ell/360 \ (LL) \Rightarrow \frac{237}{360} = 0.658''$

$$M_{max-TL} = \frac{60plf\,(19.75ft)^2}{8} = 2925.5^{\#-ft}$$

$$V_{max-TL} = \frac{60plf\,(19.75ft)}{2} = 592.5^{\#}$$

$S_{xe} = 1.23\ in^3$ Effective Section Modulus per Clark Dietrich

$\Omega_b = 1.67$ Safety Factor for elements subjected to flexure per AISI S100 Section C3.1.1.

$F_{y-jst} = 50ksi$ Yield strength of joist

$$M_{all} = \frac{F_{y-jst}(S_{xe})}{\Omega_b} = \frac{50\frac{kip}{in^2}(1.23in^3)}{1.67} = 36.83^{k-in} = 3068.86^{\#-ft}$$

$$IR_F = \frac{M_{max-TL}}{M_{all}} = 0.95 \leq 1.0$$ $\Rightarrow$ Solid blocking w/ bridging will be provided @ 1/3 points

Project: Tinker AFB		Computed: CJM	Date: 3/20
Subject: WWYK 190068		Checked:	Date:
Task: Roof Joist Check		Page: 2	of: 3
Job #: 10426895		No: 6.2.1.	

$\frac{h}{t} = \frac{8}{.0566} = 141.3$ Height-to-web ratio

$k_v = 5.34$ Shear buckling coefficient per AISI S100 Section C3.2.1.

$E_{stl} = 29{,}000\,ksi$ Modulus of Elasticity of Steel

$$\left.\begin{array}{l} \sqrt{\frac{E_{stl}\,k_v}{F_{y\text{-}jst}}} = 55.66 \\ 1.51\sqrt{\frac{E_{stl}\,k_v}{F_{y\text{-}jst}}} = 84.04 \end{array}\right\} \le \frac{h}{t} \Rightarrow F_{v\text{-}jst} = \frac{0.904\,E_{stl}\,k_v}{(h/t)^2}$$

$= 7.01\,ksi$ Nominal shear stress per AISI S100 Eq. C3.2.1-46

$A_w = 8(0.0566) = 0.4528\,in^2$ Area of web

$\Omega_v = 1.6$ Safety factor for elements subjected to shear per AISI S100 Section C3.2.1.

$V_n = \frac{F_{v\text{-}jst}\,A_w}{\Omega_v} = 1.98^k$ Nominal joist capacity per AISI S100 Eq. C3.2.1-1.

$IR_v = \frac{V_{max\text{-}TL}}{V_n} = 0.3 \le 1.0$ Joist adequate in shear

$I_{xe} = 5.60\,in^4$ Effective moment of Inertia

$\delta_{TL} = \frac{5\,w_{jst}\,\ell_{jst}^4}{384\,E_{stl}\,I_{xe}} = \frac{5(5\,lbf/in)(237\,in)^4}{384(29{,}000{,}000\,psi)(5.60\,in^4)} = 1.26\,in \ge \delta_{all}$ N.G.

Project:	Tinker AFB	Computed:	CJM	Date:	3/20
Subject:	WWYK 190068	Checked:		Date:	
Task:	Roof Joist Check	Page:	3	of:	3
Job #:	10426895	No:	6.2.1		

$$I_{req-TL} = \frac{5(5\,lbf/in)(234\,in)^4}{384(29{,}000{,}000\,psi)(0.9875^{\circ})}$$

$= 6.82\ in^4$ Min. moment of inertia req'd.

↳ Increase gauge to 14 (800S162-68)

$t = 0.0713''$

$S_{xe} = 1.66\ in^3 \Rightarrow M_{all} = 4141.72\ ^{\#}\text{-in} \Rightarrow IR_f = \underline{0.706}$

$I_{xe} = 7.07\ in^4$

$$\delta_{act-TL} = \frac{5(5\,lbf/in)(234\,in)^4}{(384)(29{,}000{,}000\,psi)(7.07)} = 0.952'' \Rightarrow \ell/245 \checkmark$$

$$\delta_{act-LL} = \frac{5(2.22\,lbf/in)(234\,in)}{384(29{,}000{,}000\,psi)(7.07\,in^4)} = 0.423'' \Rightarrow \ell/553 \checkmark$$

$h_{stud} = 9'\text{-}0''$ Stud height

$P_{stud} = 592.5^{\#}$ Axial load on Stud

$P_{all} = 1.64^k$ Allowable axial capacity of stud w/ 5psf lateral load (per Clark Dietrich)

$IR_a = \frac{P_{stud}}{P_{all}} = 0.361 \leq 1.0$ Stud is adequate in compression

Company:		Page:	1
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Masonry - Mar 25, 2025	Date:	3/25/2025
Fastening point:			

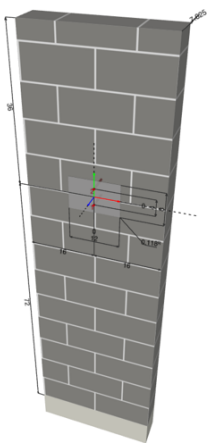
Specifier's comments:

1 Input data

Anchor type and diameter:	**HY 270 + threaded rod 5.8 1/2**
Item number:	385424 HAS 5.8 1/2"x6-1/2" (element) / 2194247 HIT-HY 270 (adhesive)
Specification text:	Hilti ∅ 1/2 HY 270 + threaded rod 5.8 with 4.5 in nominal embedment depth per Technical data , Hammer drilled installation per MPII,
Effective embedment depth:	h_{ef} = 4.500 in.
Material:	5.8
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ASD Masonry
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.118 in.
Anchor plate[R] :	l_x x l_y x t = 12.000 in. x 8.000 in. x 0.118 in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	Grout-filled CMU, L x W x H: 16.000 in. x 8.000 in. x 8.000 in.;
	Joints: vertical: 0.375 in.; horizontal: 0.375 in.; Head (vertical) joints are completely filled with grout or mortar
	Base material temperature: 68 °F
Installation:	Face installation
Seismic loads	no

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.]



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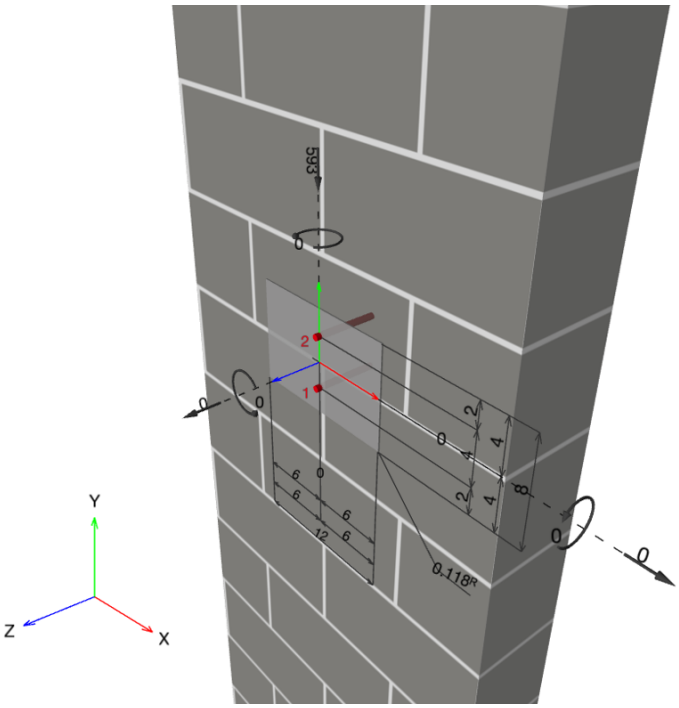
Company:		Page:	2
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Masonry - Mar 25, 2025	Date:	3/25/2025
Fastening point:			

Geometry [in.] & Loading [lb, in.lb]



1.1 Design results

Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 0; V_x = 0; V_y = -593; M_x = 0; M_y = 0; M_z = 0;	no	20

Input data and results must be checked for conformity with the existing conditions and for plausibility!
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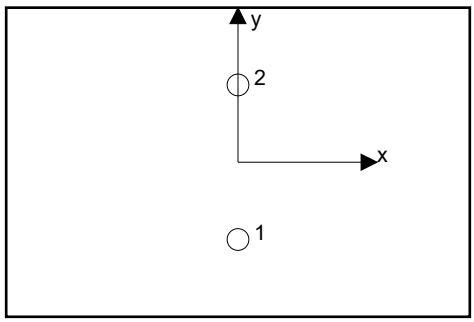
2 Load case/Resulting anchor forces

Load case: Service loads



Anchor reactions [lb]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	0	297	0	-297
2	0	297	0	-297

max. compressive strain: - [‰]
max. compressive stress: - [psi]
Resulting tension force in (x/y)=(-/-): 0 [lb]
Resulting compression force in (x/y)=(-/-): 0 [lb]

Anchor forces are calculated based on the assumption of a rigid anchor plate.

Input data and results must be checked for conformity with the existing conditions and for plausibility!
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3 Tension load (Most utilized anchor 1)

	Load P_s [lb]	Capacity P_t [lb]	Utilization $\beta_P = P_s/P_t$ [%]	Status
Overall strength	N/A	N/A	N/A	N/A

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4 Shear load (Most utilized anchor 1)

	Load V_s [lb]	Capacity V_t [lb]	Utilization $\beta_V = V_s/V_t$ [%]	Status
Steel strength	297	2,420	13	OK
Bond strength para and perp, (Dir. x-)[1]	-	-	20	OK

[1]Shear utilization may result from parallel and perpendicular shear (see details)

4.1 Steel strength

$V_{t,s}$ = Value refer to Hilti Technical Data
$V_{t,s} \geq V_s$

Results

$V_{t,s}$ [lb]	V_s [lb]
2,420	297

4.2 Bond strength parallel

$V_{t,b,Base,||}$ = Value refer to Hilti Technical Data
$V_{t,b,||} = V_{t,b,Base,||} \cdot f_{red,E,||} \cdot f_{red,s,||} \cdot f_{red,Temp}$
$V_{t,b,||} \geq V_{s,||}$

Variables

c_{min} [in.]	c_{cr} [in.]	s_{min} [in.]	s_{cr} [in.]	Temperature [°F]
4.000	12.000	4.000	18.000	68

Results

$V_{t,b,||}$ [lb]	$V_{t,b,Base,||}$ [lb]	$V_{s,||}$ [lb]	$f_{red,E,||}$	$f_{red,S,||}$	$f_{red,Temp}$	Utilization $\beta_{V,||}$ [%]
1,495	1,495	-297	1.000	1.000	1.000	20

4.3 Bond strength perpendicular

$V_{t,b,Base,\perp}$ = Value refer to Hilti Technical Data
$V_{t,b,\perp} = V_{t,b,Base,\perp} \cdot f_{red,E,\perp} \cdot f_{red,s,\perp} \cdot f_{red,Temp}$
$V_{t,b,\perp} \geq V_{s,\perp}$

Variables

c_{min} [in.]	c_{cr} [in.]	s_{min} [in.]	s_{cr} [in.]	Temperature [°F]
4.000	12.000	4.000	18.000	68

Results

$V_{t,b,\perp}$ [lb]	$V_{t,b,Base,\perp}$ [lb]	$V_{s,\perp}$ [lb]	$f_{red,E,\perp}$	$f_{red,S,\perp}$	$f_{red,Temp}$	Utilization $\beta_{V,\perp}$ [%]
0	1,495	0	0.000	0.000	1.000	0

Input data and results must be checked for conformity with the existing conditions and for plausibility!
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4.4 Shear interaction

$\beta_{V,\|\|} = \frac{V_{s,\|\|}}{V_{t,\|\|}}$	$\beta_{V,\perp} = \frac{V_{s,\perp}}{V_{t,\perp}}$	δ	Utilization β_V [%]	Status
0.198	0.000	1.667	20	OK

$\beta_V = \beta_{V,\|\|}^{\delta} + \beta_{V,\perp}^{\delta} <= 1.0$

5 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2021, ETAG 001/Annex C, EOTA TR029 etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- The equations presented in this report are based on imperial units. When inputs are displayed in metric units, the user should be aware that the equations remain in their imperial format.
- Refer to the manufacturer's product literature for cleaning and installation instructions.
- The min. sizes of the bricks, the masonry compressive strength, the type / strength of the mortar and the grout (in case of fully grouted CMU walls) has to fulfill the requirements given in the relevant ESR-approval or in the PTG.
- Only the local load transfer from the anchor(s) to the wall is considered, a further load transfer in the wall is not covered by PROFIS!
- Wall is assumed as being perfectly aligned vertically – checking required(!): Noncompliance can lead to significantly different distribution of forces and higher tension loads than those calculated by PROFIS. Masonry wall must not have any damages (neither visible nor not visible)! While installation, the positioning of the anchors needs to be maintained as in the design phase i.e. either relative to the brick or relative to the mortar joints.
- The effect of the joints on the compressive stress distribution on the plate / bricks was not taken into consideration.
- If no significant resistance is felt over the entire depth of the hole when drilling (e.g. in unfilled butt joints), the anchor should not be set at this position or the area should be assessed and reinforced. Hilti recommends the anchoring in masonry always with sieve sleeve. Anchors can only be installed without sieve sleeves in solid bricks when it is guaranteed that it has not any hole or void.
- The accessories and installation remarks listed on this report are for the information of the user only. In any case, the instructions for use provided with the product have to be followed to ensure a proper installation.
- The compliance with current standards (e.g. 2018, 2015, 2012, 2009 and 2006 IBC) is the responsibility of the user.
- Drilling method (hammer, rotary) to be in accordance with the approval!
- Masonry should be built according to industry standards.

Fastening meets the design criteria!

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6 Installation data

Profile: no profile

Hole diameter in the fixture: d_f = 0.562 in.

Plate thickness (input): 0.118 in.

Drilling method: Drilled in hammer mode

Anchor type and diameter: HY 270 + threaded rod 5.8 1/2

Item number: 385424 HAS 5.8 1/2"x6-1/2" (element) / 2194247 HIT-HY 270 (adhesive)

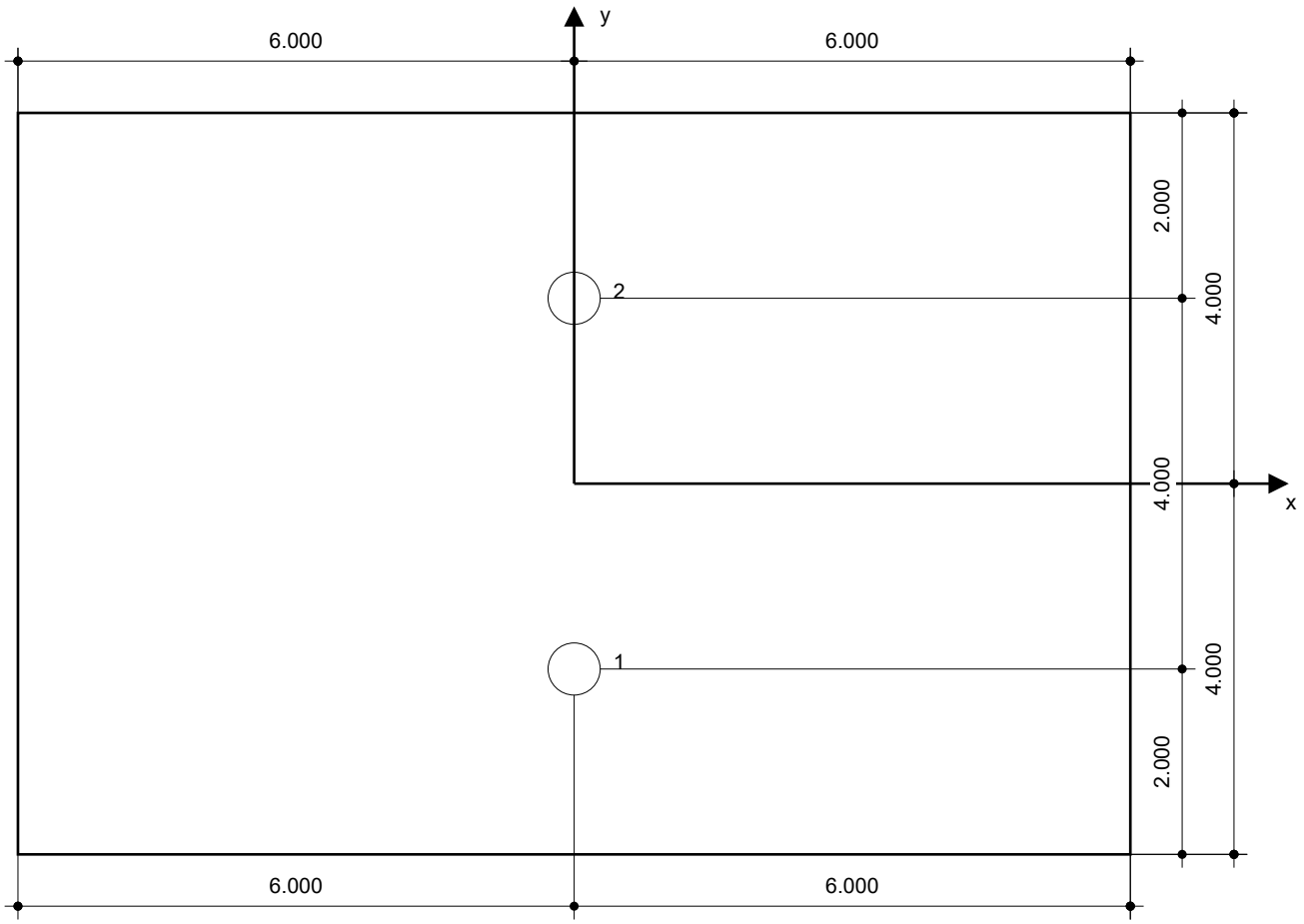
Maximum installation torque: 90 in.lb

Hole diameter in the base material: 0.562 in.

Hole depth in the base material: 4.500 in.

Minimum thickness of the base material: 7.625 in.

Hilti ∅ 1/2 HY 270 + threaded rod 5.8 with 4.5 in nominal embedment depth per Technical data , Hammer drilled installation per MPII



Coordinates Anchor [in.]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	0.000	-2.000	16.000	16.000	70.000	38.000
2	0.000	2.000	16.000	16.000	74.000	34.000

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8" STUD/TRACK PROPERTIES

	Member	Design thickness (in)	Yield strength Fy (ksi)	Gross Properties							Effective Properties				Torsional Properties						Lu (in)
				Area (in^2)	Weight (lb/ft)	Ix (in^4)	Sx (in^3)	Rx (in)	Iy (in^4)	Ry (in)	Ixe (in^4)	Sxe (in^3)	Ma (in-k)	Mad (in-k)	Jx1000 (in^4)	Cw (in^6)	Xo (in)	m (in)	Ro (in)	β	
8" Stud	800S137-33[1]	0.0346	33	0.388	1.32	3.20	0.80	2.87	0.073	0.435	3.00	0.622	12.30	10.29	0.155	0.957	-0.696	0.460	2.99	0.946	32.5
	800S137-43	0.0451	33	0.503	1.71	4.14	1.03	2.87	0.093	0.430	4.00	0.896	17.70	15.10	0.341	1.21	-0.687	0.454	2.98	0.947	32.2
	800S137-54	0.0566	50	0.627	2.13	5.11	1.28	2.86	0.112	0.423	4.97	1.08	32.43	27.02	0.670	1.48	-0.676	0.448	2.96	0.948	25.9
	800S137-68	0.0713	50	0.782	2.66	6.31	1.58	2.84	0.134	0.414	6.29	1.47	43.97	37.40	1.33	1.79	-0.661	0.440	2.94	0.950	25.6
	800S137-97	0.1017	50	1.09	3.72	8.60	2.15	2.81	0.170	0.394	8.60	2.15	64.36	60.29	3.77	2.35	-0.630	0.423	2.90	0.953	25.1
	800S162-33[1]	0.0346	33	0.413	1.41	3.58	0.896	2.94	0.125	0.550	3.38	0.710	14.03	12.22	0.165	1.63	-0.936	0.607	3.14	0.911	40.1
	800S162-43	0.0451	33	0.537	1.83	4.63	1.16	2.94	0.160	0.546	4.50	1.02	20.14	17.72	0.364	2.08	-0.926	0.601	3.13	0.912	39.8
	800S162-54	0.0566	50	0.670	2.28	5.74	1.43	2.93	0.194	0.539	5.60	1.23	36.79	31.52	0.715	2.54	-0.914	0.594	3.11	0.914	32.1
	800S162-68	0.0713	50	0.836	2.84	7.09	1.77	2.91	0.235	0.530	7.07	1.66	49.81	43.23	1.42	3.09	-0.899	0.586	3.09	0.916	31.9
	800S162-97	0.1017	50	1.17	3.98	9.72	2.43	2.88	0.305	0.511	9.71	2.43	72.71	68.90	4.03	4.11	-0.866	0.568	3.05	0.920	31.4
	800S200-33[1]	0.0346	33	0.448	1.52	4.10	1.02	3.02	0.227	0.712	4.10	0.816	16.12	14.15	0.179	2.97	-1.29	0.817	3.36	0.853	50.6
	800S200-43	0.0451	33	0.582	1.98	5.30	1.33	3.02	0.292	0.708	5.30	1.29	25.54	20.41	0.395	3.80	-1.28	0.811	3.35	0.855	50.3
	800S200-54	0.0566	50	0.726	2.47	6.57	1.64	3.01	0.357	0.701	6.57	1.50	44.87	36.18	0.775	4.66	-1.26	0.804	3.34	0.856	40.7
	800S200-68	0.0713	50	0.907	3.09	8.14	2.04	3.00	0.435	0.692	8.14	1.96	65.2*	49.39	1.54	5.71	-1.25	0.796	3.32	0.859	40.4
	800S200-97	0.1017	50	1.27	4.32	11.2	2.80	2.97	0.577	0.674	11.20	2.80	96.6*	78.36	4.38	7.68	-1.21	0.777	3.28	0.863	40.0
	800S250-43	0.0451	33	0.627	2.13	6.02	1.50	3.10	0.500	0.893	6.02	1.31	25.96	21.47	0.425	6.37	-1.67	1.04	3.63	0.787	61.5
	800S250-54	0.0566	50	0.783	2.66	7.47	1.87	3.09	0.614	0.886	7.38	1.53	45.66	37.93	0.836	7.85	-1.66	1.04	3.62	0.789	49.8
	800S250-68	0.0713	50	0.978	3.33	9.26	2.32	3.08	0.752	0.877	9.24	2.06	61.65	52.00	1.66	9.65	-1.64	1.03	3.60	0.791	49.6
	800S250-97	0.1017	50	1.37	4.67	12.8	3.20	3.05	1.01	0.858	12.8	3.05	102.7*	83.33	4.73	13.1	-1.61	1.01	3.56	0.796	49.2
	800S300-54	0.0566	50	0.839	2.86	8.36	2.09	3.16	0.959	1.07	7.86	1.54	45.97	39.05	0.896	12.1	-2.07	1.27	3.92	0.721	58.6
	800S300-68	0.0713	50	1.05	3.57	10.4	2.60	3.15	1.18	1.06	10.1	2.14	64.22	53.72	1.78	14.9	-2.05	1.26	3.90	0.723	58.4
	800S300-97	0.1017	50	1.47	5.02	14.4	3.59	3.12	1.60	1.04	14.2	3.30	98.93	86.82	5.08	20.3	-2.02	1.24	3.86	0.727	58.1
8" Track	800T125-33[1]	0.0346	33	0.363	1.24	2.90	0.711	2.82	0.0356	0.313	2.44	0.407	8.03	—	0.145	0.456	-0.439	0.294	2.88	0.977	—
	800T125-43	0.0451	33	0.473	1.61	3.77	0.925	2.82	0.0458	0.311	3.48	0.640	12.65	—	0.321	0.589	-0.436	0.292	2.87	0.977	—
	800T125-54	0.0566	50	0.594	2.02	4.75	1.16	2.83	0.0568	0.309	4.43	0.824	24.66	—	0.634	0.735	-0.432	0.289	2.88	0.977	—
	800T125-68	0.0713	50	0.748	2.54	6.00	1.45	2.83	0.0703	0.307	5.96	1.22	36.40	—	1.27	0.920	-0.427	0.286	2.88	0.978	—
	800T125-97	0.1017	50	1.07	3.63	8.62	2.06	2.84	0.0967	0.301	8.61	2.06	69.34	—	3.67	1.30	-0.417	0.279	2.89	0.979	—
	800T150-33[1]	0.0346	33	0.380	1.29	3.18	0.781	2.89	0.0600	0.397	2.57	0.414	8.18	—	0.152	0.751	-0.588	0.388	2.98	0.961	—
	800T150-43	0.0451	33	0.496	1.69	4.15	1.02	2.89	0.0774	0.395	3.69	0.655	12.95	—	0.336	0.972	-0.584	0.386	2.98	0.961	—
	800T150-54	0.0566	50	0.622	2.12	5.22	1.27	2.90	0.0961	0.393	4.69	0.844	25.27	—	0.664	1.22	-0.580	0.383	2.98	0.962	—
	800T150-68	0.0713	50	0.783	2.67	6.60	1.60	2.90	0.119	0.390	6.36	1.26	37.58	—	1.33	1.53	-0.575	0.379	2.98	0.963	—
	800T150-97	0.1017	50	1.12	3.80	9.48	2.27	2.91	0.165	0.385	9.48	2.19	65.62	—	3.85	2.16	-0.564	0.372	2.99	0.965	—
	800T200-33[1]	0.0346	33	0.415	1.41	3.75	0.921	3.01	0.135	0.571	2.79	0.424	8.37	—	0.166	1.64	-0.917	0.589	3.19	0.918	—
	800T200-43	0.0451	33	0.541	1.84	4.89	1.20	3.01	0.175	0.569	4.04	0.676	13.35	—	0.367	2.12	-0.913	0.587	3.19	0.918	—
	800T200-54	0.0566	50	0.679	2.31	6.15	1.50	3.01	0.218	0.567	5.15	0.872	26.09	—	0.725	2.66	-0.908	0.584	3.20	0.919	—
	800T200-68	0.0713	50	0.854	2.91	7.79	1.89	3.02	0.272	0.564	7.05	1.31	39.22	—	1.45	3.36	-0.902	0.580	3.20	0.921	—
	800T200-97	0.1017	50	1.22	4.15	11.2	2.68	3.03	0.379	0.558	10.8	2.35	70.28	—	4.20	4.79	-0.889	0.571	3.21	0.923	—
	800T300-33[1]	0.0346	33	0.484	1.65	4.89	1.20	3.18	0.416	0.927	3.46	0.443	8.76	—	0.193	4.87	-1.66	1.03	3.70	0.799	—
	800T300-43	0.0451	33	0.631	2.15	6.37	1.56	3.18	0.540	0.925	4.92	0.737	14.56	—	0.428	6.33	-1.66	1.02	3.70	0.800	—
	800T300-54	0.0566	50	0.792	2.69	8.03	1.96	3.18	0.674	0.923	6.24	0.956	28.62	—	0.845	7.96	-1.65	1.02	3.70	0.801	—
	800T300-68	0.0713	50	0.997	3.39	10.17	2.47	3.19	0.844	0.920	8.16	1.55	46.36	—	1.69	10.1	-1.64	1.02	3.71	0.803	—
	800T300-97	0.1017	50	1.42	4.84	14.7	3.51	3.21	1.19	0.914	12.8	2.59	77.44	—	4.90	14.5	-1.63	1.01	3.72	0.808	—

[1]Web-height-to-thickness ratio exceeds 200. Web stiffeners are required at all support points and concentrated loads.

*Allowable moment includes cold work of forming.

Gross Properties:

Ix = Moment of Inertia of cross-section about the x-axis.
Sx = Section Modulus about the x-axis.
Rx = Radius of Gyration of cross-section about the x-axis.
Iy = Moment of Inertia of cross-section about the y-axis.
Ry = Radius of Gyration of cross-section about the y-axis.

Effective Properties:

Ixe = Effective Moment of Inertia of cross-section about the x-axis.
Sxe = Effective Section Modulus about the x-axis.
Ma = Allowable Moment based on local buckling.
Mad = Allowable Moment based on distortional buckling, assuming Kϕ=0.

Torsional and Other Properties:

J = St. Venant Torsional Constant. The values of J shown in the tables have been factored by 1000.
Cw = Torsional Warping Constant.
Xo = Distance from shear center to the centroid along the principal axis.
m = Distance from shear center to mid-plane of web.
Ro = Polar Radius of Gyration of cross-section about the shear center.
Beta = $1-(Xo/Ro)^2$
Lu = Critical unbraced length for lateral-torsional buckling. Members are considered fully braced when unbraced length is less than Lu.

Complies with AISI S100-16 • IBC 2018

The technical content of this literature is effective 8/13/21 and supersedes all previous information.

ALLOWABLE COMBINED AXIAL & LATERAL LOADS (Kips/Stud)

	Wind = 5psf		S162 (1-5/8" Flange)					S200 (2" Flange)					S250 (2-1/2" Flange)			
	Stud length (ft)	Spacing (in) o.c.	-33 (20ga) 33ksi	-43 (18ga) 33ksi	-54 (16ga) 50ksi	-68 (14ga) 50ksi	-97 (12ga) 50ksi	-33 (20ga) 33ksi	-43 (18ga) 33ksi	-54 (16ga) 50ksi	-68 (14ga) 50ksi	-97 (12ga) 50ksi	-43 (18ga) 33ksi	-54 (16ga) 50ksi	-68 (14ga) 50ksi	-97 (12ga) 50ksi
3-5/8" Stud	8	12	1.87 a	2.64 a	4.15 a	5.38 a	7.86 a	2.25 a	3.28 a	5.18 a	6.68 a	9.53 a	3.71 a	5.82 a	7.76 a	11.03 a
		16	1.79 a	2.57 a	4.07 a	5.31 a	7.78 a	2.17 a	3.20 a	5.10 a	6.60 a	9.45 a	3.62 a	5.73 a	7.67 a	10.95 a
		24	1.64 a	2.42 a	3.93 a	5.16 a	7.62 a	2.01 a	3.03 a	4.94 a	6.44 a	9.29 a	3.45 a	5.56 a	7.50 a	10.80 a
	9	12	1.73 a	2.48 a	3.85 a	4.98 a	7.27 a	2.10 a	3.07 a	4.79 a	6.16 a	8.80 a	3.52 a	5.46 a	7.17 a	10.21 a
		16	1.64 a	2.38 a	3.76 a	4.89 a	7.17 a	2.00 a	2.96 a	4.69 a	6.06 a	8.70 a	3.40 a	5.35 a	7.06 a	10.11 a
		24	1.45 a	2.19 a	3.58 a	4.71 a	6.97 a	1.80 a	2.76 a	4.49 a	5.87 a	8.50 a	3.18 a	5.14 a	6.85 a	9.91 a
	10	12	1.58 a	2.29 a	3.52 a	4.54 a	6.62 a	1.93 a	2.84 a	4.37 a	5.61 a	8.01 a	3.29 a	5.08 a	6.54 a	9.33 a
		16	1.46 a	2.17 a	3.41 a	4.43 a	6.49 a	1.81 a	2.71 a	4.25 a	5.49 a	7.89 a	3.15 a	4.95 a	6.40 a	9.21 a
		24	1.25 a	1.95 a	3.20 a	4.22 a	6.26 a	1.57 a	2.47 a	4.01 a	5.26 a	7.65 a	2.89 a	4.69 a	6.15 a	8.97 a
	12	12	1.25 a	1.86 a	2.78 a	3.59 a	5.22 a	1.56 a	2.32 a	3.45 a	4.44 a	6.36 a	2.74 a	4.06 a	5.21 a	7.49 a
		16	1.11 a	1.71 a	2.65 a	3.46 a	5.07 a	1.40 a	2.16 a	3.30 a	4.29 a	6.20 a	2.55 a	3.90 a	5.05 a	7.34 a
		24	0.85 c	1.44 b	2.40 a	3.21 a	4.79 a	1.11 c	1.86 a	3.03 a	4.02 a	5.91 a	2.22 a	3.59 a	4.74 a	7.04 a
	14	12	0.92 b	1.44 a	2.13 a	2.77 a	4.02 a	1.18 a	1.81 a	2.64 a	3.43 a	4.93 a	2.15 a	3.12 a	4.05 a	5.87 a
		16	0.77 d	1.27 b	1.99 a	2.63 a	3.86 a	1.01 c	1.63 b	2.48 a	3.27 a	4.76 a	1.95 a	2.94 a	3.87 a	5.70 a
		24	0.51 e	0.98 d	1.73 c	2.37 b	3.56 a	0.70 d	1.31 d	2.19 c	2.98 a	4.45 a	1.59 c	2.62 b	3.54 a	5.37 a
	16	12	0.65 d	1.06 c	1.62 b	2.14 a	3.11 a	0.84 c	1.36 b	2.01 a	2.65 a	3.84 a	1.63 a	2.40 a	3.15 a	4.62 a
		16	0.50 e	0.90 d	1.48 c	1.99 b	2.94 a	0.67 d	1.18 c	1.86 c	2.49 a	3.67 a	1.42 c	2.22 b	2.96 a	4.44 a
		24	0.24 f	0.61 e	1.23 e	1.73 d	2.65 c	0.38 e	0.86 e	1.58 d	2.21 c	3.36 b	1.06 d	1.90 d	2.64 c	4.11 a
4" Stud	8	12	2.03 a	2.87 a	4.61 a	6.18 a	9.08 a	2.42 a	3.55 a	5.77 a	7.63 a	11.03 a	3.97 a	6.28 a	8.68 a	12.76 a
		16	1.96 a	2.80 a	4.54 a	6.11 a	9.00 a	2.34 a	3.47 a	5.70 a	7.55 a	10.95 a	3.89 a	6.20 a	8.60 a	12.69 a
		24	1.81 a	2.65 a	4.41 a	5.97 a	8.85 a	2.19 a	3.32 a	5.54 a	7.40 a	10.79 a	3.73 a	6.05 a	8.44 a	12.53 a
	9	12	1.91 a	2.72 a	4.36 a	5.85 a	8.55 a	2.28 a	3.37 a	5.43 a	7.19 a	10.35 a	3.80 a	6.04 a	8.29 a	12.00 a
		16	1.82 a	2.63 a	4.27 a	5.76 a	8.45 a	2.19 a	3.27 a	5.33 a	7.09 a	10.25 a	3.69 a	5.94 a	8.18 a	11.89 a
		24	1.64 a	2.45 a	4.10 a	5.58 a	8.26 a	2.00 a	3.08 a	5.14 a	6.90 a	10.05 a	3.49 a	5.75 a	7.98 a	11.69 a
	10	12	1.77 a	2.56 a	4.07 a	5.47 a	7.95 a	2.13 a	3.16 a	5.04 a	6.69 a	9.60 a	3.60 a	5.71 a	7.79 a	11.15 a
		16	1.66 a	2.44 a	3.96 a	5.36 a	7.82 a	2.01 a	3.04 a	4.92 a	6.57 a	9.48 a	3.48 a	5.59 a	7.66 a	11.02 a
		24	1.45 a	2.23 a	3.75 a	5.14 a	7.58 a	1.79 a	2.81 a	4.69 a	6.34 a	9.23 a	3.23 a	5.35 a	7.40 a	10.78 a
	12	12	1.46 a	2.17 a	3.40 a	4.54 a	6.57 a	1.79 a	2.69 a	4.19 a	5.56 a	7.96 a	3.15 a	4.93 a	6.51 a	9.32 a
		16	1.32 a	2.02 a	3.25 a	4.39 a	6.41 a	1.63 a	2.53 a	4.03 a	5.40 a	7.79 a	2.97 a	4.76 a	6.34 a	9.15 a
		24	1.05 b	1.74 a	2.99 a	4.11 a	6.10 a	1.35 a	2.22 a	3.74 a	5.09 a	7.47 a	2.64 a	4.44 a	6.00 a	8.82 a
	14	12	1.13 a	1.75 a	2.70 a	3.57 a	5.17 a	1.43 a	2.19 a	3.32 a	4.38 a	6.30 a	2.59 a	3.93 a	5.17 a	7.46 a
		16	0.97 c	1.57 a	2.54 a	3.40 a	4.98 a	1.25 b	1.99 a	3.14 a	4.20 a	6.11 a	2.38 a	3.74 a	4.97 a	7.26 a
		24	0.69 d	1.26 c	2.25 b	3.10 a	4.65 a	0.92 d	1.65 b	2.82 a	3.86 a	5.75 a	2.00 b	3.38 a	4.60 a	6.89 a
	16	12	0.84 c	1.35 b	2.11 a	2.78 a	4.03 a	1.07 b	1.71 a	2.60 a	3.42 a	4.94 a	2.05 a	3.09 a	4.05 a	5.91 a
		16	0.67 d	1.17 c	1.94 b	2.61 a	3.84 a	0.89 d	1.51 b	2.41 a	3.23 a	4.75 a	1.82 b	2.88 a	3.85 a	5.70 a
		24	0.38 e	0.85 e	1.65 d	2.30 c	3.51 b	0.56 e	1.15 d	2.09 c	2.89 b	4.39 a	1.43 d	2.52 c	3.47 b	5.32 a

See page 27 for clarification of code developed wind pressures prior to using this table.

Notes:

1. For additional general notes, see page 41.
2. Allowable axial loads listed in kips (1 kip = 1000 pounds).
3. Allowable axial loads determined in accordance with AISI S100-16 and assuming that all axial loads pass through centroid of effective section.
4. Listed tables are based on simple (single)-span.
5. Studs are assumed to be adequately braced at a maximum spacing of Lu to develop full allowable moment, Ma.
6. Cells marked with an "a," "b," "c," "d," "e," or "f" meet L/720, L/600, L/480, L/360, L/240, or L/120 respectively. Blank cells do not meet L/120.
7. For deflection calculations, lateral loads are multiplied by 0.7 per the AISI Standard for Cold-Formed Steel Framing - Wall Stud Design except for 5psf load which is considered interior wall load.
8. Cells marked with an " * " have h/t > 200, and thus require bearing stiffeners. Cells are left blank when h/t > 260.

Complies with AISI S100-16 • IBC 2018

The technical content of this literature is effective 8/13/21 and supersedes all previous information.

Appendix F

Electrical

Sealed, Mini Power-Zone™ Unit Substation

The Square D™ brand Mini Power-Zone™ unit substation from Schneider Electric provides the answer to requirements for a compact unit substation at low amperage ratings.. This complete package yields considerable savings on floor space, installation, and overall cost.

NOTE: Mini Power-Zone unit substations are UL 1062 Listed File E92978 design in a Type 3R enclosure allowing for indoor or outdoor applications. Designed for wall-mounting, the unit substation leverages Schneider Electric components integrated into one device..

- Epoxy resin encapsulated low voltage transformer
- H-frame main circuit breaker
- Secondary main circuit breaker
- Square D panel board or load center allowing for QO™ or QOB™ branch circuit breakers

New!

New MPU solution leverages the latest load center interiors, giving customers more flexibility for branch circuit requirements. Additionally design with a tiered dead front construction. The first dead front allows access to the secondary main circuit breaker, distribution panel board, and the second dead front. The second dead front allows access to the primary main circuit breaker and incoming voltage connection points.

Table 14.11: Distribution System Square D Load Centers (allowing plug-on QO circuit breakers only)

kVA	Catalog No.	Full Capacity Taps[16]	Enclosure	Weight (lbs)	Primary Main Circuit Breaker Rating (A)	Secondary Main Circuit Breaker Rating (A)	Spaces for Branch Circuit Breakers
Single Phase Unit Substation Input: 480 Vac, 18 kAIC; Output: 120 / 240 Vac							
3	MPU3S40F	2–5% FCBN	MPU-A	85	15	15	10
5	MPU5S40F	2–5% FCBN	MPU-A	135	15	30	10
7.5	MPU7S40F	2–5% FCBN	MPU-A	145	20	40	10
10	MPU10S40F	2–5% FCBN	MPU-A	220	30	60	10
15	MPU15S40F	2–5% FCBN	MPU-B	350	60	80	22
25	MPU25S40F	2–5% FCBN	MPU-B	425	100	125	22
Three-Phase Unit Substation Input: 480 Vac 18 kAIC; Output: 208Y / 120 Vac							
15	MPU15T2F	2–5% FCBN	MPU-C	510	40	60	27
22.5	MPU22T2F	2–5% FCBN	MPU-C	670	60	80	27
30	MPU30T2F	2–5% FCBN	MPU-C	695	90	100	27

Table 14.12: Bolt-On Circuit Breakers

kVA	Catalog No.				Full Capacity Taps[16]	Enclosure	Weight (lbs)	Primary Main Circuit Breaker Rating (A)	Secondary Main Circuit Breaker Rating (A)	Spaces for Branch Circuit Breakers
	18 kAIC		25 kAIC	65 kAIC						
Single-Phase Unit Substation Input: 480 Vac, 18 kAIC; Output: 120 / 240 Vac										
3	MPZB3S40F	MPZB3S40FSS	MPZB3S40F25K	MPZB3S40F65K	2–5% FCBN	MPZ-AA	85	15	15	16
5	MPZB5S40F	MPZB5S40FSS	MPZB5S40F25K	MPZB5S40F65K	2–5% FCBN	MPZ-AA	135	15	30	16
7.5	MPZB7S40F	MPZB7S40FSS	MPZB7S40F25K	MPZB7S40F65K	2–5% FCBN	MPZ-AA	145	20	40	16
10	MPZB10S40F	MPZB10S40FSS	MPZB10S40F25K	MPZB10S40F65K	2–5% FCBN	MPZ-AA	220	30	60	16
15	MPZB15S40F	MPZB15S40FSS	MPZB15S40F25K	MPZB15S40F65K	2–5% FCBN	MPZ -BB	350	60	80	28
25	MPZB25S40F	MPZB25S40FSS	MPZB25S40F25K	MPZB25S40F65K	2–5% FCBN	MPZ-BB	425	100	125	28
Three-Phase Unit Substation Input: 480 Vac, 18 kAIC; Output 208Y / 120 Vac										
15	MPZB15T2F	MPZB15T2FSS	MPZB15T2F25K	MPZB15T2F65K	2–5% FCBN	MPZ-CC	510	40	60	27
22.5	MPZB22T2F	MPZB22T2FSS	MPZB22T2F25K	MPZB22T2F65K	2–5% FCBN	MPZ-CC	670	60	80	27
30	MPZB30T2F	MPZB30T2FSS	MPZB30T2F25K	MPZB30T2F65K	2–5% FCBN	MPZ-CC	695	90	100	27

Table 14.13: Enclosure Dimensions and Accessories

Enclosure Number/Style		Height		Width		Depth		Mounting
		in.	mm	in.	mm	in.	mm	
MPU	A	32.9	836	14.0	356	11.8	300	Wall
MPU	B	43.2	1097	21.0	533	13.5	343	Wall
MPU	C	45.2	1148	27.4	696	13.5	343	Wall
MPZ	BB	51.1	1298	21.4	544	13.5	343	Wall
MPZ	C	45.2	1148	27.4	696	13.5	343	Wall
MPZ	CC	48.6	1234	27.4	696	13.5	343	Wall

NOTE: Dimensions should not be used for construction. Contact you local Schneider Electric representative for certified prints.
FCBN = Full Capacity Below Normal

[16] FCBN = Full Capacity Below Normal.

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