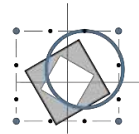




Arkansas City Fire Department Remodel

115 S. D Street
Arkansas City, KS 67005

Prepared by:



AGORA
ARCHITECTURE

Agora Project:
23105

Date:
June 17, 2024

June 17, 2024

Arkansas City Fire Department
115 S. D Street
Arkansas City, Kansas 67005

Existing Building:

The existing Fire Station was previously utilized as an armory. The structure encompasses much of the site with 'flow through' drive access to the north and south. There is a small, paved staging/work area at the south street access. No designed-on site parking, but there is a street cut drop-off area that is currently utilized for parking (approximately 6 cars) on D Street.

The building is an approximately 23,000 square foot, single-story slab on grade steel structure with a center clerestory. The structure has masonry exterior walls; primarily brick over cmu block on three sides and exposed cmu block on the west side. The clerestory east and west walls are also exposed cmu block. The roof decking is a panelized lightweight concrete system. Facility is split into two halves, connected by a steep transition between the two sides, with the north side of the building approximately 18" below the south half of the building.

Project Scope and Priorities:

Facility needs are numerous and range from missing windows and masonry tuckpointing, non-existent decontamination area and equipment, to inadequate air ventilation and filtration systems. A general list of the scope and priorities are listed below.

- Improving control of exposure to contaminants from firefighting.
- Semi-private sleeping quarters and flexibility of gender responders. Inadequate and insufficient living quarters.
- Incorporation and improvement of training opportunities.
- Improve building integrity and image.
- Upgrade public entry and security.
- Upgrade inadequate and outdated Mechanical and Electrical systems.
- Upgrade inadequate and outdated Code, Fire Safety, and Communication systems.
- Incorporation of ICC Shelter as required for Essential Facilities.
- Provide Accessibility improvements.
- Employee parking.

A detailed description of current mechanical and electrical system requirements and recommendations are attached.

Applicable Codes/ADA:

2015 International Building Code series
2010 ADA Standards for Accessible Design
Arkansas City Zoning Regulations

Constraints:

The biggest constraint to improvement is continuous operation of the Department during any construction activities. Any construction work would likely occur in phases and would involve scheduled utility and communication change over coordination.

Upgrading the building structure to meet current Class IV Essential Facility requirements is not deemed feasible and is not included in this project scope & budget.

The building has been neglected for some time. The site has about 10' of elevation change from the southwest corner to the northeast corner. The east exterior wall appears to be situated on the existing building setback line. The west side of the facility is bordered by a retaining wall, about 5' in height, along the alley.

Aspects to Consider:

Providing a new entry addition to provide a clearly identifiable Public and accessible entry with new signage and a display area for the antique fire engine.

Summary:

Attached are Preliminary Floor Plans showing a new entry and interior remodel, as well as preliminary Mechanical Plans showing zoning of air systems.

Mechanical Systems:

The following narrative is the current design intent for the mechanical systems for the Arkansas City Fire Station Remodel. Besides this narrative, we have provided a PDF drawing to better convey the design intent.

HVAC Schematic Design

Design Temperatures:

We will design this project to meet the following outdoor air conditions. Cooling (1%): 97.3°F DB / 74.8°F MCWB
Heating (99.6%): 9.5°F

The table below shows the room design temperature setpoints:

Space Type	Summer		Winter	
	Temp.	RH	Temp.	RH
Apparatus Bays, Shop	--	--	65° F	--
Offices, Kitchen, Sleeping, etc.	75° F	<60%	68°F	--

Recommended System Types

The building will be provided with a combination of gas-fired furnaces with split condensing units, dedicated outdoor air system, and make-up air equipment.

The furnaces will provide air conditioning and heating to the sleeping and residential use spaces, the offices, exercise room, and conference/training rooms. Ventilation air will be ducted directly to each of the furnaces from outdoors.

Due to the high amount of exhaust air from the decontamination, scuba, gear storage, and shop, a dedicated outdoor air system with cooling and dehumidification capabilities will be provided to supply conditioned air. The intent is to provide cool, dehumidified air to these spaces to help maintain the equipment stored in gear and scuba storage.

The apparatus bays will be provided with gas fired radiant tube heaters to maintain the space temperature. No cooling will be provided. Existing ceiling fans will remain to help move air in the space.

By exhausting air from low to the ground, the exhaust fans will extract vehicle exhaust from the bays. These exhaust fans will always maintain a minimum level of exhaust. The system will be provided with a system to detect vehicle exhaust and will increase the amount of exhaust air when necessary. When these exhaust fans are at maximum, makeup air units will provide make-up air to the space. The make-up air units will be provided with heating only. The make-up air units and exhaust fan system can be turned on manually, on a timer, to provide additional heat to the apparatus bay as needed.

Gas Fired (High Efficiency) Furnace:

We would pair an exterior air-cooled condensing unit on grade or on the roof of the facility with an indoor gas-fired furnace. Total amount of units could be just common areas in building or all areas. The interior furnace unit would require a mechanical closet to house the unit and have ductwork serving each space. Using a sealed combustion high efficiency unit will enable combustion air requirements to be satisfied and flue venting to be constructed of plastic piping. Gas flue venting would need to be properly fire stopped through fire rated assemblies for discharge to the exterior of the building.

Advantages:

- Residential system style, in which occupants may be familiar with operation.
- Lower initial cost.
- Independent of other equipment (no central plant)
- No floor space required for central plant equipment.
- Replacing old or malfunctioning equipment is easy.

Disadvantages:

- Equipment life (10-15 years.)
- Condensing unit compressor noise.
- Gas pipe distribution throughout building.
- No building diversity—Equipment sized for a peak load at each space.

Dedicated Outdoor Air System (High Efficiency):

A dedicated outdoor air system (DOAS) is an HVAC system that provides conditioned outdoor air to the indoor space to meet ventilation requirements and may assist with the building's humidity control. DOAS units are typically high-efficiency systems designed with advanced features like modulating compressors for variable cooling capacity, hot gas reheat for dehumidification, and full energy recovery wheels to reclaim energy from exhaust air, improving overall system efficiency.

This type of unit allows for positioning on the roof or at ground level, with ductwork distributing fresh, conditioned air throughout the building. By using energy recovery technologies and modulating operational components, these units optimize energy usage and adjust to varying load conditions. The DOAS units provide a continuous supply of fresh air, separate from the building's main HVAC system, ensuring a higher quality of indoor air and better humidity control.

Advantages:

- Improved indoor air quality by providing constant ventilation.
- Enhanced energy efficiency through heat recovery and modulating components.
- Reduced system load on the primary HVAC units.
- Greater control over humidity levels, enhancing occupant comfort.
- Simplified zoning and independent operation from other HVAC systems.

Disadvantages:

- Higher initial installation cost because of sophisticated technology and additional ductwork.
- Potential for increased maintenance requirements for energy recovery systems and modulating components.
- Requires careful design consideration to prevent over-ventilation and energy waste.
- Space requirements for installation may be significant depending on the building layout.
- This setup not only maintains the desired indoor conditions but also adheres to green building standards by minimizing energy consumption and improving the environmental impact of the building operations.

HVAC Zoning:

1. See attached drawing for suggested zoning with estimated sizes. In general, there are 8 furnaces, 1 DOAS unit, and 2 make-up air units.
2. A mini-split system will serve the IT Office/Server room.

Exhaust Systems

General Exhaust:

- The ceiling mount or roof exhaust fans exhaust the restrooms.
- Decontamination/extractors exhaust fans will be located on the roof and will exhaust at a high velocity.
- The gear storage and scuba rooms will be provided with general exhaust fans to help remove contaminants and humidity from the space.
- Shop:
 - o The design will include a dust collection system for woodworking machinery like table saws, planers, jointers, sanders, etc.
 - o The design will include a dedicated exhaust system to capture over-spray and VOC vapors in any spray booth.

Ventilation System

- The design intent will be for fresh ventilation air to be provided to furnaces directly.
- Ventilation/make-up air to the shop, storage, and decontamination spaces will be provided by a DOAS unit.

Filtration Systems

The carpentry lab will receive four (1) ceiling mounted HEPA filtration units, such as Powermatic PM1200.

Major HVAC Equipment List

The equipment information provided in the schedule on the attached drawing is based on preliminary floor plans and square footage calculations. Equipment sizes are subject to change.

Furnace Options:

1. Provide Unit with MERV 11 filters, Hinged access doors. Condensing units provided with hail guards.
2. Provide high-efficiency units with a minimum of 2-stage gas heat, and 2-stage cooling.

DOAS Unit Options:

1. Provide Unit with a pre-filter, MERV 13 filters, Hinged access doors. Condensing units provided with hail guards.
2. Provide a high-efficiency unit with modulating compressors, modulating hot-gas reheat, and modulating gas heat exchanger. Unit to have a full energy heat recovery wheel, variable speed supply, exhaust, and condenser fan.

Controls

The building will NOT include a BACnet capable DDC System.

- Each system will be provided with packaged controls.
 - o Furnaces: Provided with a programable thermostat with web Access. Units will run fan when space is occupied. The ventilation duct will include a 2-position control damper that will close when the unit is not running.
 - o MAU and Exhaust System for Apparatus Bays: Provided with NOx sensor that will stage the equipment to high speed when NOx is detected. A timed override and thermostat will be provided to help provide additional heat when needed.
 - o Radiant Tube heaters will be provided with thermostats.
 - o DOAS unit will be provided with a programable thermostat with humidistat. -General exhaust will operate continuously, during scheduled building occupancy.

Plumbing Systems:

The following narrative is the current design intent for the plumbing systems for the Arkansas City Fire Station Remodel. Besides this narrative, we have provided a PDF drawing to better convey the design intent.

Plumbing Fixtures:

The plumbing fixtures provided will be manual. Water closets will be tank type, floor mount.

Domestic Water:

The existing domestic water riser on the north side of the building will remain and will be reworked as needed for the new building layout.

The mezzanine will have new tank type domestic water heaters added to serve the west side of the building. Recirculation pumps will recirculate the hot water as required by code.

Because of its remote location, the restroom in the administrative area, on the east side of the building, will have an instantaneous water heater below the lavatory.

New hose bibs will be added as required in the apparatus bay. They can be either cold or hot and cold.

Emergency eyewash stations will be added to select locations within the apparatus bays, decontamination room, and shop.

Sanitary:

The existing sanitary routing is unknown. The new design will make assumptions about the existing routing and will reuse existing mains as much as possible.

A new decontamination storage tank will be added for the drains from the decontamination space.

New area drains will be added to the apparatus bay. These drains will have integral oil and sand traps. Alternatively, a new oil/sand trap separator can be provided outdoors. A single tank would minimize maintenance requirements.

Fire Protection Systems:

The building is not currently sprinkled. This project will provide full coverage of the building. A fire protection service will be brought in from the water main and routed adjacent to the existing domestic water service.

The final sprinkler head layout and design will be by a fire protection contractor.

In addition to the sprinkler riser, tank fill hose connections will be provided in both apparatus bays. These fill lines will not connect directly to the fire protection system. Basis will coordinate with the utility/city to determine if these fill lines can be metered separately or provided without a meter.

Electrical Systems:

We anticipate replacing the entire electrical system as part of this renovation. A new pad-mounted utility transformer will be located in the southwest corner of the property in a location away from heavy traffic. The new electrical service will be 120/208V - 3 phase - 4 wire. The service will likely consist of a single 1000A panel board with 1000A main breaker. This will serve a series of branch panels located throughout the building.

A diesel-powered generator will be located on site with a 24-hour storage tank. This generator will power select loads including IT and emergency radio related loads; loads associated with apparatus and other equipment; all lighting and shelter loads; minimal HVAC loads. The intent would be to keep basic services operating normally, but not to power the entire premises.

Retractable cord drops will be provided at each apparatus to be located in the bays.

Lighting:

All lighting will be replaced with LED fixtures and most areas will feature occupancy sensors and dimmers for efficiency. A general lighting level will be maintained while selected areas designated for specific tasks could be targeted for higher light levels. Emergency lighting will be further studied to determine whether a separate transfer switch or small inverter or individual battery pack lighting is most cost effective.

Lighting in each sleeping room will be tied into the responder radio system to automatically turn on fixtures in the case of a call. This system will be closely coordinated with the radio vendor.

Upgraded track lighting will be provided at the truck display as well as façade lighting near the main entrance.

Fire Alarm Systems:

There will be a digital, addressable, fire alarm system included. This system will provide occupant notification to all areas of the building.

Opinion of Probable Cost:

The following costs are based on the narrative above and our opinion of costs based on previous projects. More precise estimates should be obtained from a contractor.

The cost is based on approximately 25,000 total SF.

Discipline	Cost per Sq. Ft.	Total Cost
Mechanical	44	1,100,000
Plumbing	15	450,000
Fire Protection	7	175,000
Electrical	15	375,000
Lighting	8	200,000
Fire Alarm	1.5	40,000
Total MEP	99.5	2,340,000



CITY OF ARKANSAS CITY
FIRE-EMS DEPARTMENT

ACFD



1 FLOOR PLAN - FIRST LEVEL
 A2.1 NOT TO SCALE



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**AGORA
 ARCHITECTURE**
 800 Main Street #308, Winfield, KS • 620.221.3770

**CITY OF ARKANSAS CITY
 FIRE STATION REMODEL**
 115 S D ST
 ARKANSAS CITY, KS 67005


Revisions


Date 06.13.2024

Project Number
 23105

Sheet Number
 A2.1

GRAPHIC LEGEND

 ICC 500 SHELTER - 2 HR FIRE BARRIER

 PHASES

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CITY OF ARKANSAS CITY
FIRE STATION REMODEL
STREET ADDRESS

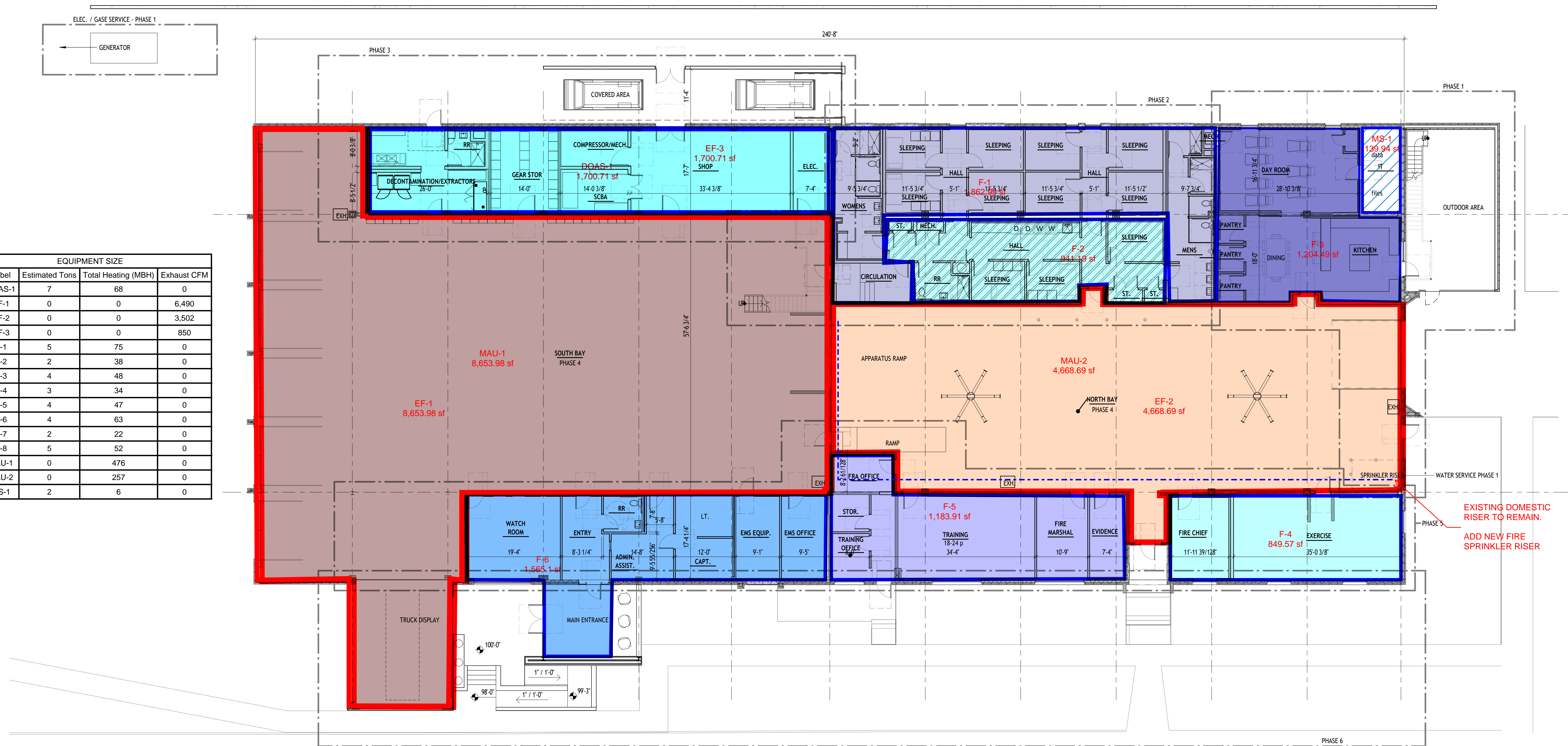
Revisions

Date 05.01.2024

Project Number
23105

Sheet Number
A2.1

EQUIPMENT SIZE			
Label	Estimated Tons	Total Heating (MBH)	Exhaust CFM
DOAS-1	7	68	0
EF-1	0	0	6,490
EF-2	0	0	3,502
EF-3	0	0	850
F-1	5	75	0
F-2	2	38	0
F-3	4	48	0
F-4	3	34	0
F-5	4	47	0
F-6	4	63	0
F-7	2	22	0
F-8	5	52	0
MAU-1	0	476	0
MAU-2	0	257	0
MS-1	2	6	0



EXISTING DOMESTIC RISER TO REMAIN.
ADD NEW FIRE SPRINKLER RISER

1 FLOOR PLAN - FIRST LEVEL
SCALE: 3/32" = 1'-0"