

---

MODIFICATION– 01b to STATEMENT OF WORK  
for EEPZ 10-1001  
**REPAIR MAINTENANCE HANGAR 456**  
16 June 2015

**REFERENCE:**

The fire suppression and foam systems for Hangar 456 shall under this modification comply with new AFCEC directives to prevent inadvertent discharges.

**SUBMITTALS REQUIRED:**

Some redesign is required. Provide drawings and estimates for redesigned elements and systems.

**SCOPE:**

1. Delete Bladder tank and provide a Foam Concentrate Storage Tank which must be a vertical, double-walled, high density cross-linked polyethylene storage tank compatible with the required concentrate. The double wall tank shall not require spill or secondary containment. The tank capacity shall be the volume required to fully submerge the inductor dip tube plus the design volume to operate the foam generators for not less than 15 minutes plus 60 gallons. The inductor dip tube must enter through the top of the tank. No taps are permitted in the bottom or sides of the tank. Provide a closeable fill opening and vent assembly. Provide either a translucent shell or clear vertical window to indicate fill level with permanent capacity markings at least every 50 gallons. The capacity markings will not include the unusable amount of concentrate at the bottom of the tank. Mount concentrate tank on a 4 inch concrete housekeeping pad. For testing purposes, equip the concentrate supply system with fittings to accommodate an auxiliary tank of alternate test liquid to be used during testing. A second foam concentrate tank or reserve concentrate supply is not required.
2. Foam proportioning must be by a single foam inductor for each foam-water riser. The inductor must, through a venturi, reliably and at the designed system flow rate, move and proportion concentrate into the flow stream. The inductor must be specifically tuned for the system required flow rate, inlet pressure, back pressure, concentrate type, proportioning ratio, and lift height (at the near-empty tank level). The inductor must be equipped with the exact orifice at the entry of the foam pipe. Off the shelf pre-tuned generic model inductors shall not be permitted. Shop drawings must be accompanied with an inductor datasheet fully annotated with the flow rate, inlet pressure, back pressure, and concentrate lift height (at the near- empty tank level). The inductor will be fitted with a low loss bronze or brass check valve assembly by the manufacturer that is included in the device's hydraulic design. Known manufacturers of such products include Fomtec (distributed by Viking in US), Matre Maskin, Wilson Foam, and Delta Fire.

3. Provide one or more 4-inch, 6-inch or 8-inch Flow Control Valves (FCV) each with a trim package for electric releasing, remote re-setting, and opening/closing speed control. If an FCV size is greater than or less than the risers, provide smoothly tapered inlet and/or outlet connections. In addition to automatic operation, arrange each valve for manual release at the valve. Provide pressure gages and other appurtenances at each FCV as required by NFPA 13. All trim piping shall be factory configured and installed brass with compatible fittings. The manual release for each FCV shall be installed no higher than 5 ft. nor less than 2.5 ft. above finished floor. Hydraulic calculations must include a minimum pressure drop across flow control valves of 20 psi, or the listed pressure drop, whichever is greater.
4. Prepriming of any foam solution piping is NOT acceptable. All solution piping must be sloped to be self-draining back to the riser.
5. During commissioning, the Fire Protection Engineer (FPE) must seal or install tamper proof guards on the pressure regulator adjusting stem and the two small globe valves on the speed control assembly. It is crucial these settings not be changed after commissioning or the system may be impaired. Safety-wire these devices in those positions and label them "DO NOT ADJUST". Any other trim valves which must be open or closed for an FCV to function must also be safety wired in position.
6. Provide foam stop stations of the "dead-man" type. The stop stations must be used in conjunction with valves and equipment that will prohibit or stop the discharge of foam/water from the foam suppression system. The stations must have distinctive signage at each device. Provide a red mushroom type push button and include the word "PUSH". Colored portions of tamper cover must be blue and lettering on the cover must be "STOP"; the words "FIRE", "ALARM", or "AGENT" must not appear on the cover. A manual foam stop station shall be provided at each manual foam releasing station. Once depressed, and so long as the button is held down, the stop station will prevent/stop discharge from the foam system regardless of whether or not the foam system was activated automatically or manually and whether or not the activation occurs prior to or after the stop station is pressed and held. Unless the Foam System Control Panel (FSCP) has been reset and all activation alarms (manual and automatic) have been cleared, when the foam stop station button is released, the FSCP will restore foam discharge. When the foam stop station button is depressed under full flow, the time to fully close the flow control valve will not exceed 15 seconds. The time for the flow control valve to fully open upon release of the foam stop station button will not exceed 5 seconds. Manual foam stop stations will be protected from mechanical damage and water infiltration (minimum NEMA 4X). Manual foam stop stations will be provided with a clear plastic tamper cover that must be lifted prior to actuating the station. Conduits shall enter the station back box from the bottom. Back

---

box and conduits will not be placed in front of signage. A breather and drain (at the low point in the conduit) will be provided. Where manual stop stations and foam releasing stations are provided at an exit door, they will be located on opposite sides of doorway from fire alarm manual pull station. Where not located at an exit door opening, the manual stop stations and foam releasing stations will be located at least 5 feet apart.

7. Provide two separate but adjacent 24 inch (610 mm) high by 18 inch (457 mm) wide metal signs. There will be no more than 12 inches of separation between the two signs. The words "FIRE", "ALARM", or "AGENT" shall not appear on these signs. The sign for the manual releasing station will have a yellow or lime-yellow background with "START FOAM SYSTEM" in red lettering not less than 3 inches (76 millimeters) high. The manual release station with tamper cover will be located on the lower center portion of the sign. The word "START" will be written in minimum 1 inch (25.4 mm) high green lettering placed directly above the activation station. The sign for the manual stop station will have a white background with a minimum 1/2 inch wide blue boarder with "STOP FOAM SYSTEM" in blue lettering not less than 3 inches (76 millimeters) high. The manual stop station with tamper cover will be located on the lower center portion of the sign. The word "STOP" will be written in minimum 1 inch (25.4 mm) high red lettering placed directly above the manual stop station.
8. The FSCP shall be a Det-Tronics Eagle Quantum Premier Fire Detection/ Releasing System and must be furnished complete with minimum 60-node Safety Systems Software (S3) configuration/logic programming/diagnostic tools software package including USB dongle key and RS232 cable. FSCP alarm, supervisory, and trouble signal reporting to the Fire Alarm Control Panel must be via discrete dry contact output points. This shall be a modular type panel installed in a surface mounted NEMA Type 4 painted steel cabinet with hinged door and cylinder lock. All detectors must be listed for use with that panel. IR detectors must be networked with the panel so that during commissioning IR detectors can be calibrated from the releasing panel. The FSCP must provide a real time display of current IR levels at any detector, have the ability to set the detector sensitivity for each detector from the panel, be able to download detector level log history, have remote test and diagnostics capability (manual self-test, lens dirty, sensor failure, power out of tolerance, device non-responsive), and remote setup and programing of detector options (lens heater power level, detector alarm LED function, alarm latching or non-latching, device address, sensitivity level, timing and gate count for alarm). FSCP must be electro-magnetic interference/radio frequency interference (EMI)/(RFI) tolerant and rated to SIL level 2 capability (IEC 61508), a safety assessment evaluation which evaluates critical fault paths, redundancies, and statistical measurement/prediction to ensure a specific level of long term reliable performance and stability to co-exist with aircraft radar systems. In certain situations a redundant foam suppression control panel may be needed; verify redundancy requirements with agency and mission.

- 
9. Optical flame detection will be the X3301 Multispectrum IR Flame Detector manufactured by Det-Tronics. Optical flame detection system will use triple infrared (IR) flame detectors listed/approved for the expected fuel hazards in the hangar bay. The detectors will be immune to radar and radio frequency emissions. Provide shielding for the detectors and their circuits from radio frequency interference. All circuiting from the FACP or FSCP to the detectors will be shielded and shielding will be grounded at one end. Optical flame detector alarm signals to the FACP or FSCP will be latching. Detectors must be mounted in accordance with their listing at approximately 8 ft. (2.4 m) above the finished floor of the hangar. The specifics for each design must take into account facility construction, type of aircraft, aircraft configuration and positioning, fixed and mobile equipment within the aircraft servicing area, and all other relevant factors. Do not mount optical detectors in inaccessible locations. The detectors will be angled and blinds will be provided such that the cone-of-vision does not extend more than 5 ft. (1.5 m) outside the hangar bay. The horizontal and vertical axis of the detector determined during commissioning will be permanently marked on each detector. The optical flame detectors will be installed with 5 ft. (1.5 m) of flexible conduit to allow for any minor adjustments during testing or changes in mission of the hangar.
  10. Provide blue beacons not less than 400 cd (208/120VAC) powered from a dedicated emergency panel provided in accordance with UFC 3-520-01. The FSCP will control beacon initiation. A backup power supply or supervision of the power supply feeding the beacons is not required when fed from the dedicated emergency panel. Beacons will be mounted 20 – 30 ft. (3 – 9.1 m) above the floor of the hangar bay. For single door hangars, provide one beacon centered on each of the three walls. For drive through hangars, provide one beacon 10-25 ft. (3-7.6 m) from each corner of the hangar bay. Provide additional beacons where at least one beacon is not viewable from normally occupied areas of the hangar bay. The design will take into account facility construction, type of aircraft, aircraft configuration and positioning, fixed and mobile equipment within the aircraft servicing area.
  11. For all fire alarm circuiting in the hangar bay, provide watertight conduit/connections and NEMA 4X junction boxes, back boxes, and enclosures. Initiating devices such as Start Stations, Stop Stations, and Flame Detectors require conduit to enter the bottom of the back box and the low point of the conduit will be provided with a drain. Where the conduit is in a hazardously classified area, additionally provide breathers in isolated portions of the conduit (e.g. sealed off from the remaining conduit system). Drains and breathers shall be rated for the hazardous classification in which they are installed, but shall not be less than NEMA 4X. Install the FSCP, releasing modules and monitor modules integral to the release of the foam system in an occupied, conditioned space within the building. The location selected must be maintained between 60-80°F (15-27°C) and shall not exceed 85% relative humidity at 80°F.

- 
12. Where a Mass Notification System (MNS) is provided, delete amber strobes. Use one clear strobe and also provide text signs. Text signs are required over the door to each egress stairwell and over (or adjacent to) the required means of egress from the level of discharge. Exterior exit doors from a single room (e.g., mechanical or electrical rooms) do not require a text sign.
  13. The designer (a fire protection engineer) must provide hydraulic calculations demonstrating that the design will provide an adequate water supply for the fire extinguishing systems. Hydraulic calculations must be submitted no later than the first design submission. Calculations must be based on recent water flow test data.
  14. Install a new Mass Notification System.
  15. Revise “sequence of operation”. With the exception of a manual foam release station, the cross-zoning of two initiating devices in the hangar bay is required to release the Hi-Ex foam system. This is permitted to be the cross-zoning of the water flow switch and an optical flame detector, or two optical flame detectors.
  - 16. Inventory all HEFFSS items included in the Mod as follows: (1) Identify as “Base-Bid” each item already provided in the Project Base Bid; (2) Identify as “Not-Used” each item provided in the Project Base Bid, but no longer needed in the revised HEFFSS design; and (3) Identify as “New” each item required by the new HEFFSS requirements, but not required in the Project Base Bid. For each “Base-Bid” or “Not-Used” item provide the government with the actual bid-price (contractor, subcontractor, supplier, manufacturer, or otherwise). Submit these costs and their total (including overhead & profit) to the government as an itemized part of the cost of this Modification.**
  - 17. To meet the above HEFFSS design criteria and provide required flow and pressure, design and build an economical solution by either:**
    - (1) Replace existing Fire Pumps, Piping, Electrical Service, and Meters in Building 441, including if necessary, enlarging building 441. If required, add or modify site utilities, e.g. new water lines or electrical conduit and cable e.g. from building 441 to hangar 456. As required, modify existing equipment in other hangars (e.g. 440, 450) affected by new pump discharges; or**
    - (2) Provide new Fire Protection equipment servicing only Hangar 456 including: Fire Pumps, Piping, Electrical Service, and Meters in a new Fire Pump room attached to Hangar 456. If required, add or modify site utilities, e.g. new water lines or electrical conduit and cable e.g. from Hangar 456 to the two water tanks next to building 441.**

---

**DESIGN:**

- All Items: Provide new HEFFSS system schematics.
- Item 1: Provide new plan (and sections/elevations) of Foam Room showing new equipment layout.
- Item 4: Provide manufacturer's specifications and installation instructions for the proposed locks.
- Item 5: Provide plan sketch of location of each duress switch and conduit to accessible ceiling.
- Item 6: Show each element on the drawings for AFCEC review.
- Item 7: Show sign, lettering and colors on drawings for AFCEC review.
- Item 8: Show compliance with these requirements on the drawings. Include any specifications for these items on the FP drawings to allow AFCEC review and contractor installation.
- Item 9: Locate all detectors and flexible conduit on FP drawings.
- Item 10: Show compliance with these requirements on the FP drawings. Locate beacons on the FP drawings. Include any specifications for these items on the FP drawings for ease of AFCEC review and contractor installation.
- Item 11: Include these requirements and any related specifications on the FP drawings to allow AFCEC review and contractor installation.
- Item 12: Locate strobe and exit signs on the FP drawings.
- Item 13: Perform required (by this Modification and by SOW) water flow tests. Provide calculations based on these tests in the 65% Design Submittal.
- Item 14: Show locations of speakers, strobes, etc. on the FP drawings.
- Item 15: Show diagram of this Sequence of Operation on the FP drawings.
- Item 16: Submit all costs for this Modification including those already in the Bid for this project.
- **Item 17: Provide drawing sheets showing demolition and new work in the existing Fire Pump building or new Fire Pump room; and new site utility requirements.**

End of Modification – 01b to Statement of Work for EEPZ 10-1001